City of Everett

2014 Comprehensive Sewer Plan

VOLUME 2

Appendices

November 2014

EVERETT

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Appendix A

Response to Interagency Comments

Sewer Plan Checklist

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2014 Everett Comprehensive Sewer Plan

Responses to Comments Received on Draft Plan

No.	Reviewer	Section/Page # or Topic	Comment	Response
	DOE	Section 2.3.8 Water Supply, Figure 2-11 Water Distribution System, Figure 2.3 Unsewered Areas	The text does not provide a clear discussion about whether private or public drinking water wells exist within the existing and proposed service areas covered by this plan.	No public drinking water wells currently exist within the exisying and proposed service areas. The City, however, has groundwater rights that will not be developed over the next twenty years.
	DOE	Section 1.2.2.4, State Environmental Review Process	The SERP process has evolved over time. Ecology and EPA use the SERP process as a means to extend the SEPA environmental review of projects funded through Ecology to a level that is consistent with federal requirements under NEPA. Ecology has guidance on the SERP process available at the following website: http://www.ecy.wa.gov/programs/wq/funding/GrantLoanMgmtDocs/Eng/GrantLoanMgmtEngRes.html	Agreed. This section has been revised.
	DOE	3-10 Table 3-4, Lift Stations	Please define the "Overflow" column. Ecology assumes that this indicates the water bodies that may be impacted by an overflow from each lift station. However it is not clear whether the impact would be from a direct discharge from a constructed overflow at the station or from another indirect impact. Please indicate which stations have constructed overflow pipes. It would also be helpful to more clearly identify which stations overflow to an authorized CSO outfall.	Agreed. The CSO outfall is named where applicable to the regulator.
	DOE	5-8 Section 5.5.1, O&M Issues for Lift Station 1	Please add brief discussion related to the City working with Snohomish PUD and outside consultants to reassess power reliability for the lift station.	Agreed. Statement has been added as suggested.
	DOE	Section 7.4.1, Future Revenues	Do future revenue estimates include potential revenue from the addition of Snohomish as a wholesale customer? If so, will revenue projections change significantly if Snohomish decides to not go through with a connection to Everett?	Snohomish is no longer planning on contracting with Everett. They are not included in the financial esitmate.

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	DOE	Section 7.4.4, State Revolving Fund description	Ecology administers the SRF program along with the Centennial program. The SRF program does not require a 10% local match for wastewater infrastructure (facility) project loans. Loans can finance up to 100% of the cost of a project, however ceiling limits in statute do not allow a single applicant to take more than 50% of the funds available in each funding cycle. Loan rates are set in statute at 30% of the average tax-exempt bond rate for 5-year loans and 60% of the bond rate for 20-year loans. The program also has funding set aside specifically for "Green Projects" and facility design projects. CIP projects that include Green Stormwater Infrastructure elements may receive special funding consideration under the Green Project Reserve funding set-aside.	Agreed. Description of the funding soure has been updated.
	DOE	Section 7.4.4, Centennial Clean Water Fund	Due to the limited availability of funds in the CCWF program, access to this program is generally limited to municipalities that can demonstrate financial hardship.	Agreed. Description of the funding soure has been updated.
	DOE	Vol. 2 Appendices	Please include sections (specifications and drawings) from the City's Design and Construction Standards manual that relate to sewer system design.	Agreed. Sewer specifications and standard details have been added to Appendix D in Volume 2.
	DOE	Vol. 3, pg 12 CIP item C-5, SR01 CSO Improvements	The description references connection of a new wet weather lift station to a 73-inch force main. Should this be a 72-inch force main (as described in C-4)?	Agreed. Description has been revised.
	DOE	Vol. 3, pp 24-25 CIP descriptions	The draft contains only place holder text for the following proposed CIPs: 12th Street NE Dike, Beverly Lake Collection Reroute, PS03 and Other Outfall Rehab, and Smith Island Dikes. Please provide details on these CIPs.	Agreed. Descriptions have been included. The project Beverly Lake Collection Reroute is now titled "Beverly Lake Sewer Replacement" and the project PSO3 and other outfall rehab has been updated with different projects.
	SLWSD	Section 1.1	In Section 1.1 second paragraph, after “(Silver Lake WSD)” add “With Everett’s approval Silver Lake WSD provides sewer service in the Lowell Larimer area of Cross Valley Water District (between Lowell/Larimer Road and Silver Lake’s corporate boundary). The sewer flow from this area is accounted as part of Silver Lake WSD capacity rights.	Agreed. Text has been added as suggested.
	SLWSD	Figure 2-11	Silver Lake “Tank No. 1” should be identified as “Tank # 4”.	Agreed. The figure has been updated.
	SLWSD	Figure 3-4	Just a question, not a comment, was LS No. 25 recently eliminated by a gravity sewer to LS No. 36 basin or was the force main from this station re-directed to tie to gravity main conveying flows to LS No.36?	LS 25 pumps into a gravity system that feeds into LS 36.
	SLWSD	Table 4-1	Table 4-1 has a typographical error. “Total (FT)” under the column headed Length in System should be corrected to read 1,731,647.	Agreed. Table has been corrected.

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No.	Reviewer	Section/Page # or Topic	Comment	Response
	SLWSD		References are made to I/I memorandum and I/I report by Corollo Engineers. Suggest you show in this chapter a Basin I/I Summary Table and put referenced documents in Appendix.	The Corollo I/I Report has been added to Appendix P. A table has not been added to this section as it is intended to be a brief overview of the the memorandum's. Both reports are attached to see the analysis and results.
	SLWSD	Section 4.6.2	Not a comment, just a question, Section 4.6.2 references screw pumps "…may be reaching end of their useful life" Didn't Everett just rehabilitate these facilities when they investigated for replacement and determined rehabilitation was all that was required?	The screw pumps are mainrained regularly but have not been rehabiltated. The electrical controls were replaced in 2012 under Phase 2-B.
	SLWSD	Table 4-7	Table 4-7 does not reference any "headworks" projects. The District in meeting with Everett Staff learned of conceptual discussions of constructing a third "redundant" river crossing to bring South End Interceptor Flows to the Headworks. This project would allow for flows to be transmitted to WPCF with one river crossing out of service, allowing maintenance activities. This work should be considered in the Everett CIP projects included with this plan.	No Plans currently exist for this redundant crossing. Will be considered in the next comprehensive sewer plan update.
	SLWSD	Figure 5-1	Figure 5-1 Public Works Organization Chart dated October 24, 2011 should be updated to current status.	The most recent org chart will be included without showing staff names.
	SLWSD	Section 5.2.2.1	Section 5.2.2.1 Lift Stations states that "…wet wells are vactored out biannually". Is this correct that they are cleaned every two years or is "semiannually", twice a year, the maintenance period.	This will be changed to say "annualy, or as needed based on visual inspection."
	SLWSD	Table 7-2	Table 7-2 Monthly Sewer Rates identifies under "other" the base unit of "100 CCF of metered water", should that be "100 CF" or just "CCF" meaning "100 cubic feet"? "100 CCF" as written is 10,000 cubic feet.	Agreed. It is per CCF, not 100 CCF. The table has been updated.
	AWWD	page ES-7, paragraph 2	the text talks about the need for, "significant adjustments (in sewer rates)" and "the need to be adjusted approximately 77 percent over the 10-year projected period". The problem is that over 40 percent of the increase occurs in the three year period 2017-19. This is a very large increase in the revenue requirement slated for a very short period of time.	The rate increase projections have been revised done in the updated draft. The current plan is to increase rates by 11% in 2015 and 2016. From 2017 to 2024, an average of 5% per year is necessary.

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	AWWD	Page ES-7, Table ES-2	On page ES-5, Table ES-2 there are several issues including: • From 2013-2016, $3.1 million is being taken out of reserves to maintain adopted rates. • In 2017, $0.5 million is shown replenishing the reserves while the revenue short fall is 20%. • In 2018, $0.2 million is shown replenishing reserves while the cumulative revenue shortfall is 33.8% over two years. • Rate funded capital drops in 2014 and 2015 to maintain adopted rates then climbs to $5.9 million in 2022 and dropping to $1.2 million in 2023. • Net debt service principal plus interest increases from $4.5 million in 2013 to $23.4 million in 2023 (over a 500% increase) which is 88% of the 2013 forecasted revenue ($26.5 million). • The net debt service rises from just over 17% of the forecasted revenue in 2013 to almost 41% of the forecasted revenue in 2023. • Miscellaneous Revenue is shown at 0.9 million per year over the 10 year period. Where does miscellaneous revenue come from and why is it a constant amount over the 10 year period?	The financial analysis has been updated for the updated draft. Transfers are being made to the reserves for 9 of the 10 years. Rate funded capital is generally consistent and trending upward towards 2024. Debt service increases from 5.85 in 2015 to 20.78 in 2024 which is approximately 37% of total revenue requirement. Miscellaneous revenue is from permits, interest income, an dother miscellaneous sources.
	AWWD	Executive Summary	The ten-year financial plan is in support of a fairly aggressive capital improvement program. By contract, the District pays a share of capital projects it benefits from. The District's contributions are not clearly shown, nor is it shown how the City intends to protect the District from large rate increases due to improvements of little or no benefit to our ratepayers.	The City has identified and showed in its CIP, the projects split between sewer and surface water. The District will share in projects that benefit them as required in the existing agreement.
	AWWD	1.1.1 - Everett's 2006 Comprehensive Sewer Plan, page 1-2, bullet 1	Having the report title, "2003 Everett Water Pollution Control Facility (WPCF) Engineering Report' in quotes or italics would help in making it not appear that you are defining the acronym after having used it twice.	Agreed. Quotation marks have been added.
	AWWD	1.2.1.2- Proposed Sanitary Sewer Overflow Rule	Given the recent overflows from the power outage and intense rain event are there going to be additional Federal or State requirements?	DOE issed an agreed order to the City which the City has already met most of the requirements and is in the process of meeting the rest of the requirements.

No.	Reviewer	Section/Page # or Topic	Comment	Response
	AWWD	2.2 - Treatment Service Area, page 2-2, Table 2.1	The table shows the District's portion in Everett's treatment area includes only the Everett Service Area as shown on the attached exhibit. This nearly corresponds with Table 5.1 in the District's 2009 Comprehensive Sewer Plan. Currently flows from the District to Everett also include Area A and Area B as shown on the attached exhibit. Area A contains approximately 310 acres and Area B contains approximately 474 acres. This information is correctly shown on your Figure 3-4. District flows to Everett by contract are 2300 gallons per minute. The District is current planning to redirect flows from Areas A and B south to the King County treatment system. This work should be completed within your current comprehensive plan 6-year window.	Agreed. The total system area in Table 2-1 has been updated 24,497 acres for Alderwood. A statement has also been added "Alderwood WWD is planning to redirect flows from approximately 784 acres that currently flow to Everett and direct them south to the King County treatment system. This is scheduled to be completed by 2020."
	AWWD	2.2 - Collection System Boundaries, page 2-5, Figure 2-2	To be consistent, the "Olympus Terrace Service Area", which is served by Mukilteo Water & Wastewater District (MWWD) should be colored "orange".	Agreed. Figure 2 has been updated.
	AWWD	2.2 - Capacity in Everett System Required for Other Collection Systems, page 2-9, Table 2-2	For consistency a footnote, "Alderwood WWD capacity requirements are those listed in the 1981 Sewage Disposal Agreement" could be added.	Agreed. Footnote has been added.
	AWWD	2.2.2 - Alderwood Water and (should be "&") Wastewater District, page 2-10	The District wonders why the plan refers to portions of section 9 of the contract. The sewage Disposal Contract with the District is in effect until March 31, 2020. This kind of language was used for the Mukilteo WWD agreement. Contract negotiations for a future contract should begin during this 6-year planning period.	Agreed. "and" has been replaced with "&." The text has been updated as suggested.
	AWWD	2.3.1 -Land Use and Zoning, Page 2-11, Table 2-3	"Mixed" is misspelled on row 6.	Agreed. Table has been corrected.
	AWWD	3.2.3, Figure 3-1-Combined System and Figure 3-2-Separated System	Some of the colors are difficult to read, particularly for Trunk A, the Southwest Interceptor, and the Central Interceptor. It would be helpful if all of the figures in the plan were either in bolder colors or in grayscale to improve legibility.	Agreed. Figure has been updated with a different color scheme.
	AWWD	3.3 - Lift Stations, Figure 3-3 and 3-4	From the District's records Area A (attached exhibit) flows to your basin SE-7 not Basin SE-9 unless you have rerouted the gravity crossing of interstate 5 in the vicinity of Freeway Place and Peters Place.	Agreed. The figures has been updated.

No.	Reviewer	Section/Page # or Topic	Comment	Response
	AWWD	3.6.1- WPCF Outfalls, Outfall 25, page 3-25	This paragraph states"... Periodic flushing keeps the outfall functional in case it is needed in an emergency. The outfall is currently unusable due to silt accumulation..." Please clarify.	Flushing is done to prevent silt accumulation. The sentence "the outfall is currently unusable due to silt accumulation."
	AWWD	4.1.2, Table 4-1- Model and System Pipe Length Summary	The column totals appear to be incorrect- the total lineal feet in the model should total to 1,199,370 and the total lineal feet in the system should total to 1,731,647, based on the numbers provided in the table.	Agreed. The table has been corrected.
	AWWD	4.1.3- Flow Input, page 4-3	The abbreviation used for rainfall-derived infiltration/inflow (ROII) should be used instead of switching to the undefined (albeit deducible) abbreviation “I/I”. Paragraph 2 on page 4-3 also mentions the "RTK method" but does not define the term.	Agreed. RDII is used in the description and not I/I. A brief description of RTK as a linear response method of generating a hydrograph has been added. The actual terms RTK are not defined in the EPA guidance documents. They represent a three overlapping triangle approximation of a hydrograph.
	AWWD	4.2.2- Water Use Factors, page 4-4	The water use factors for sanitary sewer flow projections appear to be high compared to actual historical use in the region. An explanation of why Everett's actual water use information was not used should be included.	The system is not fully metered and the water use factor is high to be conservative in the water demand forecast.
	AWWD	4.2.4- Percent of Water Demand Going to Sewer, page 4-5	This section could be clearer by defining "base" and "non-base" use comprehensively, and explaining why data from other jurisdictions was used to determine water consumption rates rather than Everett's own data.	"base" is defined in the paragraph as 4-month (Dec - Mar) winter average water use, multiplied by 12 months. "Non-base" is defined in the paragraph as irrigation water. Water consumption data for the non-residential sector was not available in the comprehensive water plan so estimated developed from two other recent plans were used.
	AWWD	4.2.5- Sanitary Sewer Flow Projections (Everett Sewer Service Area)	As water use factors fall and density increases the amount of "non-base" water in the system lessens so projections should taper off with it. It is unclear whether this projection captures those changing conditions.	The water demand forecast did not take this into account inorder to be conservative in the estimate of future water use projections.
		4.2.6- Large Industrial Water Customers, pages 4-5 to 4-8	Additionally, while it may be appropriate to separately explain the large industrial consumers, it is misleading to not include the impact of those consumers on total projected demand.	The large customer water use is included in the basin projections shown in Table 4-3
	AWWD	4.4.4 - Level of Service Methodology	The Levels of Service need to be explained in more detail.	The text in this section has been reviewed and some edits made to clarify how level of service is calculated for sewer system pipes.
	AWWD	4. 5- Infiltration/Inflow Analysis, page 4-11	Same concern as 4.1.3 -the abbreviation provided for infiltration/inflow was ROII not I/I. Is, the " Appendix N- Stormwater Policy Technical Memorandum", the memorandum being referred to in the first sentence or is there a separate 1/1 memorandum not included in the plan?	In section 4.1.3, RDII is being mentioned which is a modeling term for rainfall derived infiltration and inflow. In section 4.5, infiltration and inflow is being discussed. RDII is only mentioned in section 4.1.3.

No.	Reviewer	Section/Page # or Topic	Comment	Response
	AWWD	4.6 Future Improvements to the WPCF	CSO flow contributions to the WPCF are not clear and should be included in the plan. Given the number of overflows in the last year, what is impact on the WPCF from CSOs? What share of the capacity improvements are being paid by the stormwater system contributing to flows at the WPCF? Recent presentations by Everett to its sewer wholesale customers have indicated that there are different capacity challenges at the WPCF. Are these issues addressed in this Plan? Are recent changes presented by Everett included in this plan?	The City is aggressively separting and will continue to separate, on a project by project basis, surface water from the CSO system and will treat and discharge the stormwater to receiving waters. This will reduce the amount of flow going to the WPCF.
	AWWD	4.6. 1, Table 4-6-Summary of Maximum Month Flows and Loads Projections (from 2010 Engineering Report), page 4-15	It appears that the steep increase between years 2010 and 2030 are due to the addition of flows from the City of Snohomish, however the text does not make that adequately clear.	The City of Snohomish will no longer send its flows to Everett.
	AWWD	4.6.3 - Capacity Analysis, page 4-16	This section states that the Water Pollution Control Facility would reach capacity by 2011, but does not state whether that became reality or summarize what the issues were contributing to the problem. Please clarify.	The statement has been removed. It has not become reality.
	AWWD	4.6.4, Figure 4-3 - Proposed WPCF Plan Improvements (from 2010 Engineering Report)	The legend lists two items that were due for completion prior to the date of the plan, but does not indicate whether they were completed. Please clarify.	Agreed. The figure has been updated to state which projects have been completed.
	AWWD	4.6.4, Table 4-7, WPCF Upgrade Project Phased Construction Schedule (from 2010 Engineering Report)	Items 9, 10 and 11 do not list expected completion dates.	Agreed. Completion dates have been added.

No.	Reviewer	Section/Page # or Topic	Comment	Response
	AWWD	Section 5	M&O and O&M are used interchangeably in this section.	All references are updated to be O&M
	AWWD	Figure 5-1 - Organizational Chart	This chart is difficult to read due to the small font size. Removing the names and/or consolidating groups of workers (e.g. if there are multiple Utility Maintenance Tech II positions) could allow for a larger font size and clearer chart.	Agreed. This figure has been be updated.
	AWWD	5.4 - Performance Indicators, page 5-8	It is unclear whether any performance measures are used, and if so, which ones and what the level of performance was.	The City uses all of the industry performance indicators listed in addition to the ones associated with the regulatory requirements.
	AWWD	5.5.1, Table 5-2- Lift Station Operation and Maintenance Assessment, page 5-10	Lift Station 1: The "Current Issues" column states that two pumps will be replaced in 2013, and the "Other Comments" column states that two pumps were replaced in 2012. Are two additional pumps being replaced in 2013? Lift Station 2: The text on page 5-9 states that cutters were installed on the impellers to reduce clogging, but table 5-2 states that clogging is still a chronic problem. Is this because only two of the pumps have been replaced? Lift Station 7: The "Current Issues" column states that VFDs will be replaced in 2013, and the "Other Comments" column states that the VFDs are new. Which is correct?	Agreed. The text has been updated.

No.	Reviewer	Section/Page # or Topic	Comment	Response
	AWWD	Section 6	The District is concerned about its financial contributions to the City of Everett's Capital Improvement Program (CIP). Since AWWD's customers pay for their share of the capital projects based on the allocated capacity to the District, we would appreciate identification of the CIP Projects that benefit AWWD and our share of the cost of each facility. This provides a better opportunity to specifically look at the improvements and determine if our share is allocated appropriately, and also to plan our capital program and rates. While the Basin Plans begin this process, many of the improvements identified in the basin plans benefit Everett and other Districts and it is difficult to determine which projects specifically benefit AWWD customers. In addition, given the District's concerns with the flow contributions to Everett's facilities in the Plan, we are similarly concerned about the financial contributions of the District. This section should identify which projects and planned contributions from Everett's wholesale customers for their share of the capital projects. The section should also identify the share of the capital projects that would be paid for from those paying for the combined sewer system, in particular, the contributions to the WPCF Projects shown in Table 6-1.	The City has identified sewer portion and stormwater portion of the various conveyace system improvements. AWWD will participate in their fair share of the conveyance projects as described in their existing agreement.
	AWWD	6.2, Table 6-1-Sewer System Recommended CIP, page 6-3 to 6-5	Comments mentioned above for the executive summary would also apply to Table 6-1.	Agreed. Table 6-1 has been updated.
	AWWD	Section 7	Nowhere in this section are the payments from the wholesale customers for their share of the capital projects recognized as revenue or an offset to the capital improvement costs. Unless these contributions are included, the result is a higher revenue requirement and higher than necessary sewer rates for both retail and wholesale customers.	
	AWWD	7.2, page 7-1, second paragraph	A space is needed between "Table 7-1" and "provides" in the first sentence.	Agreed. A space has been added.

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Responses to Comments Received on Draft Plan

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	AWWD	7.2, Table 7-1- Water and Sewer Utility System Financial History ($ Millions), page 7-1	This table appears to be formatted incorrectly- if the revenue is in millions, this table would indicate that revenue is in the billions. Please clarify. The title Non-Operating Revenues appears to be Non-Operating Expenses.	Agreed. Revenue is in the thousands $ the table has been updated.
	AWWD	7. 3, Table 7-2- Monthly Sewer Rates, City of Everett, Ordinance 3299-12	There is no breakdown of retail sewer rates applied to Surface Water Quality vs. Sewerage Treatment, although the wholesale customers are not responsible for the CSO projects or costs. This makes it difficult to determine if the significant rate increases in 2017-2023 are driven by CSO or Sewer projects.	Agreed. The table has been updated to show "Net Operating Revenues / (Expenses)"
	AWWD	7.4.1 - Future Revenues, page 7-5, paragraph 1	The projected medical expenses may be low under the Affordable Care Act- what steps is Everett taking to minimize medical insurance costs over time?	Everett is self-insured and its medical plan exceeds the requirements of the Affordable Care Act.
	AWWD	7.4.2, Future Expenses, page 7-8, second paragraph	At the end of this paragraph there is a discussion about applying 50% of the connection charge revenue to growth related debt to reduce the debt payment by $50,000 per year. That seems like a really low figure. The revenue from connection charges isn't separately stated anywhere. How is that revenue used today, shouldn't it already be used for capital improvement projects?	This assumption is based on data provided from 2012. It was during the recession which is the reason for the low figure.
	AWWD	7.5- Summary of Financial Projections, Table 7-5	Comments mentioned above for the executive summary would also apply to Table 7-5.	Agreed. Table has been updated
	AWWD	Volume 3: Basin Plans; Basin SE-9	In the Basin Description in the row entitled, "Future Development", states, "The major growth in this basin is from the adjacent district contribution (Silver Lake and Mill Creek). Mill Creek is not a district and does not provide sewer service to city customers.	Agreed. Mill Creek has been removed from the table.

Sewer Plan Checklist	
Content of General Sewer Plan per Section G1-3.2 of Washington State Department of Ecology Criteria for Sewerage Works Design and WAC 173-240-	**Location in Everett 2013 Comprehensive Sewer Plan**
(a) The purpose and need for the proposed plan.	● Section 1.0 Introduction ● Section 1.1.2 Sewer Plan Goals
(b) A discussion of who will own, operate, and maintain the systems.	● Section 2.0 Service Area and Vicinity Characteristics ● Section 2.1 Sewer Service Area ● Section 2.2 Treatment Service Area
(c) The existing and proposed service boundaries.	● Section 2.0 Service Area and Vicinity Characteristics ● Section 2.1 Sewer Service Area ● Section 2.2 Treatment Service Area
(d) Layout map including the following:	See below:
(i) Boundaries. The boundary lines of the municipality or special district to be sewered, including a vicinity map;	● Figure 2-1 Location Map ● Figure 2-2 Collection System Boundaries
(ii) Existing sewers. The location, size, slope, capacity, direction of flow of all existing trunk sewers, and the boundaries of the areas served by each;	● Appendix H Summary of Trunk Sewers ● Volume 3 Basin Plans
(iii) Proposed sewers. The location, size, slope, capacity, direction of flow of all proposed trunk sewers, and the boundaries of the areas to be served by each;	● Volume 3 Basin Plans
(iv) Existing and proposed pump stations and force mains. The location of all existing and proposed pumping stations and force mains, designated to distinguish between those existing and proposed;	● Figure 3-4 Lift Station ● Volume 3 Basin Plans
(v) Topography and elevations. Topography showing pertinent ground elevations and surface drainage must be included, as well as proposed and existing streets;	● Section 2.3.2 Topography ● Figure 2-6 Topography
(vi) Streams, lakes, and other bodies of water. The location and direction of flow of major streams, the high and low elevations of water surfaces at sewer outlets, and controlled overflows, if any. All existing and potential discharge locations should be noted; and	● Section 2.3.7 Water Resources ● Figure 2-11 Surface Water Features ● Section 3.5 CSO Outfalls ● Figure 3-6 CSO Outfalls
(vii) Water systems. The location of wells or other sources of water supply, water storage reservoirs and treatment plants, and water transmission facilities.	● Section 2.3.8 Water Supply ● Figure 2-12 Water Distribution System
(e) The population trend as indicated by available records, and the estimated future population for the stated design period. Briefly describe the method used to determine future population trends and the concurrence of any applicable local or regional planning agencies.	● Section 4.2.1 Demographics ● Table 4-2 Demographics ● Appendix J Sanitary Sewer Flow Projections
(f) Any existing domestic or industrial wastewater facilities within twenty miles of the general plan area and within the same topographical drainage basin containing the general plan area.	● Section 3.6 Water Pollution Control Facility
(g) A discussion of any infiltration and inflow problems and a discussion of actions that will alleviate these problems in the future.	Section 4.5 Infiltration/Inflow
(h) A statement regarding provisions for treatment and discussion of the adequacy of the treatment.	● Section 3.6 Water Pollution Control Facility
(i) List of all establishments producing industrial wastewater, the quantity of wastewater and periods of production, and the character of the industrial wastewater insofar as it may affect the sewer system or treatment plant. Consideration must be given to future industrial expansion.	● Section 5.2.3 Industrial Pretreatment Program ● Table 5-1 Permitted Industrial Pretreatment Industries
(j) Discussion of the location of all existing private and public wells, or other sources of water supply, and distribution structures as they are related to both existing and proposed domestic wastewater treatment facilities.	● Section 2.3.8 Water Supply ● Figure 2-11 Water Distribution System ● Figure 2.3 Unsewered Areas

Content of General Sewer Plan per Section G1-3.2 of Washington State Department of Ecology Criteria for Sewerage Works Design and WAC 173-240-	Location in Everett 2013 Comprehensive Sewer Plan
(k) Discussion of the various alternatives evaluated, and a determination of the alternative chosen, if applicable.	● Section 4.4.2 Modeling Scenarios and Alternatives Analysis ● Section 4.7 Improvements and Basin Plans ● Volume 3 Basin Plans
(l) A discussion, including a table, that shows the cost per service in terms of both debt service and operation and maintenance costs, of all facilities (existing and proposed) during the planning period.	● Section 7.0 Financial Program
(m) A statement regarding compliance with any adopted water quality management plan under the Federal Water Pollution Control Act as amended.	● Section 1.2.1.1. Clean Water Act ● Section 1.2.2.1. National Pollutant Discharge Elimination System Program ● Section 3.6.2 NPDES Permit
(n) A statement regarding compliance with the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA), if applicable.	● Section 1.2.2.3 State Environmental Policy Act ● Appendix C SEPA Checklist

Appendix B

Capacity, Management, Operations, and Maintenance (CMOM) Program Components

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CMOM COMPONENTS

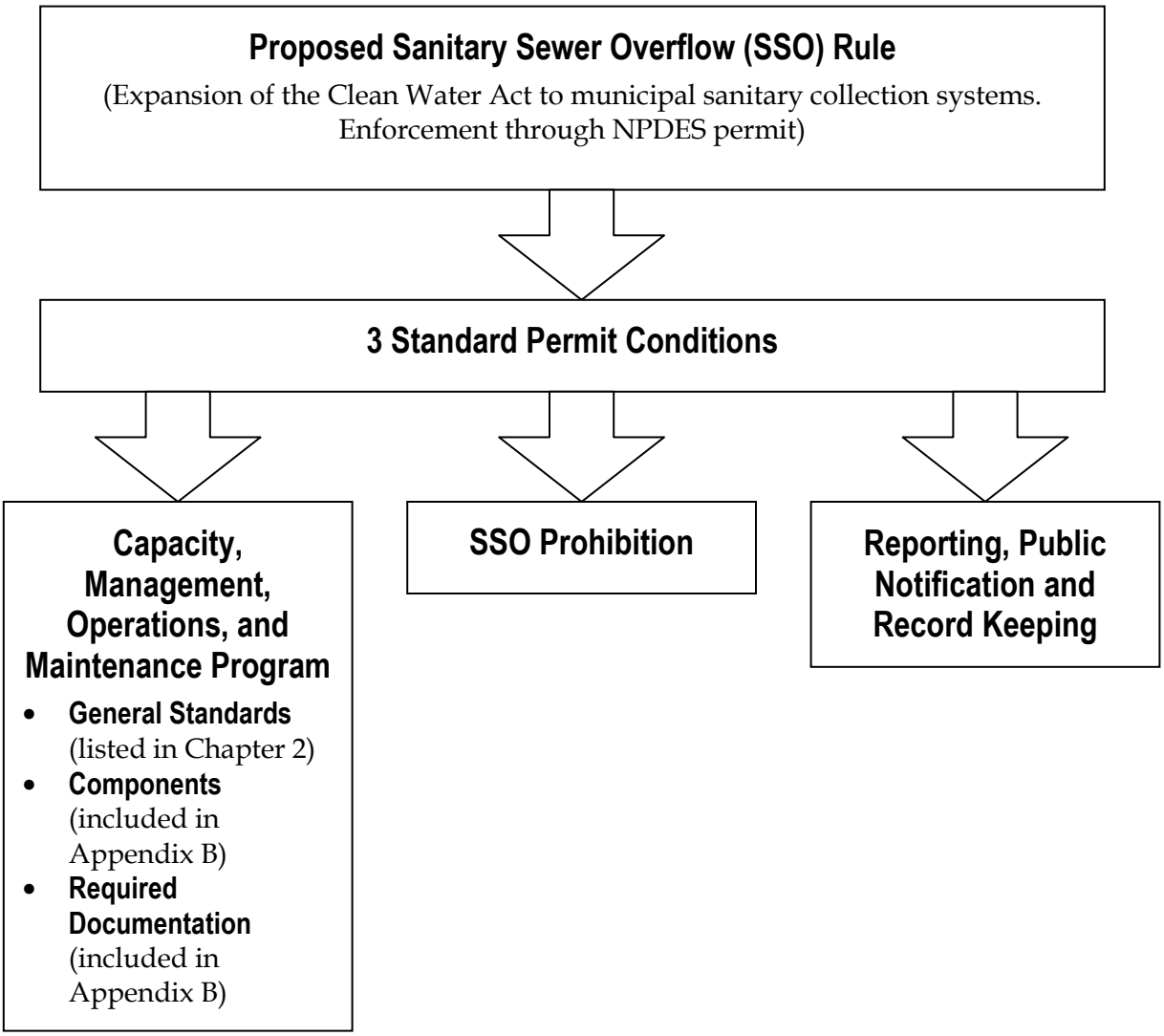
Component	Element	Location in Everett 2013 Comprehensive Sewer Plan*	Summary of the Element	EPA General Public Comment Requests	Specifics noted in the Draft Regulation
1. Goals	Specify Major Goals	● Section 1.1 Background and Goals ● Section 1.2.1.2 Proposed Sanitary Sewer Overflow Rule	Goals of the CMOM program (EPA suggestions: performance, safety, customer service, resource use, compliance)		
2. Organization	Identify Administrative and Maintenance Positions	● Section 5.1 Public Works Department Organization ● Figure 5-1 Public Works Organization Chart ● Section 5.2 Operations and Maintenance Activities	Positions responsible for CMOM implementation		Provide an Organizational Chart
	Identify Lines of Authority				Include in the Organizational Chart
3. Legal Authorities (Legally Binding documents e.g. sewer ordinances, service agreements, etc…)	Control I/I Source connections	● Section 1.2.4.2 Everett Municipal Code			
	Require Proper Design/Construction	● Section 1.2.2.2 Criteria for Sewage Design and Reliability Guidelines ● Section 1.2.4.2 Everett Municipal Code ● Section 3.7 Sewer System Design Criteria			
	Ensure Proper Installation				
	Address Satellite Municipal Flows	● Section 2.2 Treatment Service Area		2010 and 2011 - EPA requested comments on whether to require NPDES permit coverage for municipal satellite collection systems, including standard permit conditions related to reporting, public notification, recordkeeping, and CMOM requirements.	
	Implement Prohibitions of Pretreatment Program	● Section 1.2.4.2 Everett Municipal Code			
4. Measures & Activities	Maintain Facilities	● Section 5.0 Operation and Maintenance	Physical Location: equipment, materials, records, personnel dispatch		
	Accurate Collection System Map	● Section 3.2 Collection System ● Figure 3-1 Combined System ● Figure 3-2 Sanitary System	A GIS map is not required, but it is preferred by most sewerage agencies.		
	Information Management & Analysis	● Section 5.3 Information Management / Record Keeping	Efficient use of gathered information. Open the lines of communication between the field and management staff. Paper copies are sufficient. If the data management is computer based then any unique hardware or software should be noted.	2010 : EPA requested comments on whether to clarify and expand standard permit requirements to establish a comprehensive framework for monitoring, reporting, public notification, and recordkeeping for SSOs. 2011: EPA requested comments on whether to clarify how SSOs are reported to EPA or state permitting authorities, and how and when the public is notified of overflows. 2010 - EPA requested comments on the appropriate role of NPDES permits in addressing unauthorized SSOs that are caused by exceptional circumstances. 2011 - EPA requested comments on whether there are any circumstances under which an SSO may be authorized under an NPDES permit.	<u>Information management should address the following items per EPA</u> • Providing emergency responses; • Investigating problems and complaints that cause or may lead to overflows and determining an appropriate response; • Scheduling and tracking inspections; • Planning maintenance activities, schedules, and work orders; • Managing parts, equipment, and tool inventories; • Developing training plans and schedules; • Tracking and preventing safety incidents; • Planning staffing and budgeting; • Identifying hydraulic and physical deficiencies and prioritizing responses; and • Identifying programmatic deficiencies and developing appropriate responses.
	Preventive O&M	● Section 5.0 Operation and Maintenance		2010: EPA requested comments on whether to develop a standard permit condition with requirements for capacity, management, operations, and maintenance (CMOM) programs based on asset management principles. 2010: EPA requested comments on the costs and benefits of CMOM programs and asset management of sanitary sewers.	<u>Maintenance activities this should address per the EPA</u> • Routinely inspects the collection system, including pump stations, and addresses damage or other problems; • Investigates complaints and promptly corrects faulty conditions; • Provides maintenance records, an adequate workforce and appropriate equipment in working order; and • Maintains and updates a schedule of planned activities. <u>Preventive maintenance activities typically address:</u> • Planned, systematic, and scheduled inspections to determine current conditions and plan for maintenance and repairs; • Planned, systematic, and scheduled cleaning and repairs of the system based on past history; • Proper sealing and/or maintenance of manholes; • Regular repair of deteriorating sewer lines; • Remediation of poor construction; • Inspection and maintenance of pump stations and other appurtenances; and

* This table is intended to indicate where a CMOM Program component or element is addressed by this Sewer Plan. It does not indicate that the requirement for the CMOM program has been entirely fulfilled.

CMOM COMPONENTS

Component	Element	Location in Everett 2013 Comprehensive Sewer Plan*	Summary of the Element	EPA General Public Comment Requests	Specifics noted in the Draft Regulation
					• A program to ensure that new sewers and connections are properly designed and constructed and new connections of inflow sources are prohibited.
	Conveyance Capacity	● Section 4.0 Sewer System Evaluation	Develop and implement a program to assess the current capacity of the collection system.		Program should identify: Hydraulic deficiencies Note: EPA would require studies in portions of the collection system where peak flows have contributed to an SSO.
	Prioritize & Correct Deficiencies	● Section 4.0 Sewer System Evaluation ● Section 5.0 Operation and Maintenance ● Section 6.0 Capital Improvement Program	Condition Assessment. Ongoing program for identifying structural deficiencies and prioritization of corrective actions.		
	Train Staff				Typical industry standard is 3-5% of the gross annual budget
	Keep Equipment Operational, Critical Parts		Spare parts inventory		Create list of parts to keep on hand, and procedures for maintaining inventory levels.
5. Design and Performance	Implement Design Construction Requirements and Standards	● Section 1.2.2.2 Criteria for Sewage Design and Reliability Guidelines ● Section 1.2.4.2 Everett Municipal Code ● Section 3.7 Sewer System Design Criteria	Program to ensure design standards are met for new sewers and rehabilitation projects.		
	Inspect and Test New Facilities				
6. Monitoring, Measurement, and Modifications	Update Program Elements Based on Monitoring, Performance Evaluations	● Section 5.4 Performance Indicators	Perform evaluations on performance indicators to determine the effectiveness of each element of the CMOM program.		
	Keep Program Up-to-date & Accurate		Adjust CMOM program (and written summary) as necessary based on above listed evaluations.		
7. Overflow Emergency Response Plan	Develop and Implement to Protect Public Health & Environment	● Appendix L	Separate Written Document	2010 : EPA requested comments on whether to clarify and expand standard permit requirements for reporting and recordkeeping for SSOs, which may include maintaining and overflow response plan.	
8. System Evaluation and Capacity Assurance (Required if peak flows contribute to an SSO or noncompliance at a treatment plant unless (1) steps have been taken to correct hydraulic deficiency; or (2) proof that SSO was caused by severe natural conditions)	Evaluate system	● Section 4.0 Sewer System Evaluation	Identify, characterize and address hydraulic deficiencies		
	Establish Capacity Enhancement Measures	● Section 4.0 Sewer System Evaluation ● Section 6.0 Capital Improvement Program	Prioritization, Alternatives analysis, Schedule		
	Update Plans		Keep plan up to date with proposed actions and implementation schedules		
9. Program Review	Perform Review		EPA recommends one every 5 years, which can be conducted by a regulatory agency, the system itself, and/or by a third party.		
	Assess Compliance with CMOM		Written report.		

* This table is intended to indicate where a CMOM Program component or element is addressed by this Sewer Plan. It does not indicate that the requirement for the CMOM program has been entirely fulfilled.


Proposed Sanitary Sewer Overflow (SSO) Rule
(Expansion of the Clean Water Act to municipal sanitary collection systems. Enforcement through NPDES permit)
3 Standard Permit Conditions
Capacity, Management, Operations, and Maintenance Program
• General Standards (listed in Chapter 2)
• Components (included in Appendix B)
• Required Documentation (included in Appendix B)
SSO Prohibition
Reporting, Public Notification and Record Keeping

Capacity, Management, Operations, and Maintenance (CMOM) Documentation Requirements

The Capacity, Management, Operation, and Maintenance (CMOM) Program is to reduce and prevent sanitary sewer overflows (SSOs) of untreated wastewater. A CMOM Program is an effective, holistic management tool that owners of collection systems (primarily municipalities) create to operate and manage a collection system to significantly reduce, if not eliminate, sanitary sewer overflows and basement back-ups. It assures sewage collection system owners proactively operate and maintain this infrastructure through planned ongoing maintenance and prioritizing rehabilitation and replacement projects.

Written Summary of the CMOM program

EPA proposed that municipal collection systems be required to develop a written summary of their CMOM programs and to make this document available upon request. The primary purpose of the CMOM program summary is to:

- Define the goals and organizational process of collection system management
- Demonstrate to the permitting agency that the hydraulic capacity of the collection system is defined and SSO locations are identified
- Demonstrate to the permitting agency what steps are necessary to eliminate or reduce the identified SSO locations based on reasonable design criteria
- Demonstrate to the permitting agency that the physical condition of the collection system infrastructure is known and that an approach addressing deficiencies (i.e., CIP) is defined
- Demonstrate appropriate monitoring, reporting, and public notification processes and provide an emergency response plan

The program summary will provide an overview of the management practices for the collection system agency and summarize major implementation activities. The summary may incorporate other documents by reference. Many items listed in the CMOM program summary requirements are included in this 2013 Sewer Plan.

Outline of the CMOM Program written summary:

1) CMOM program goals
2) Lines of Authority
   - A) Personnel responsible for CMOM program implementation
   - B) Communication strategy (including personnel responsible) for reporting SSOs to NPDES authority
3) Legal Authorities
   - A) Summary of, or reference to legally binding documents that implement components of the CMOM program
4) Measures and Activities that are intended to be implemented for CMOM compliance
5) Design and Performance Requirements/Standards which address the following:
   - A) Installation of new facilities
   - B) Rehabilitation and repair of existing facilities

C) Procedures for inspecting/testing new facilities

D) Procedures for inspecting/testing rehabilitation and repair projects for existing facilities

6) Procedure for monitoring implementation of the CMOM program, and measuring its effectiveness/performance

7) Communication plan between permitee and interested stakeholders regarding performance and implementation of CMOM program

Overflow Emergency Response Plan

An overflow emergency response plan provides a standardized course of action for sewer collection system personnel to follow in the event of an SSO. The plan must describe the utility's planned options for response, remediation, and notification measures under different SSO scenarios. EPA guidance states an up-to-date overflow emergency response plan is necessary to ensure that a municipality is adequately prepared to respond to SSO events. EPA anticipates that under the CMOM proposal, overflow emergency response plans would identify procedures for a wide range of potential system failures. It should be noted that under the SSO Rule, reporting of all overflows will be required which is already done annually in the permit reporting. This includes overflows to water bodies, overflows that do not flow into water bodies, and basement backups.

The following is a list of the minimum items expected to be in an overflow emergency response plan:

1) Identify SSOs

A) Describe communication strategies for addressing a wide range of potential SSOs

B) Describe roles of all respondents from the time that they become aware of the SSO, continuing through to a satisfactory resolution of the SSO

2) Provide immediate response and emergency operations

A) Describe labor and equipment mobilization strategies fro addressing a wide range of potential SSOs

B) Documentation of the SSO and satisfactory resolution of the SSO

3) Immediate notification to affected entities

A) Develop a flexible notification strategy in consultation with affected entities for a wide range of potential SSOs

4) Ensure that appropriate personnel are adequately trained to implement the plan

A) Describe distribution of the Emergency Overflow Response Plan to appropriate personnel

B) Personnel training procedures and frequency of training

C) Procedure for reviewing and updating the Emergency Overflow Response Plan

Everett's sewage spill response plan is presented in Chapter 5. While Everett does have portions of an emergency response plan pertaining to sewage spills that would meet EPA requirements, additional materials are required, as identified above. A guidebook is available that assists utilities in developing plans: Preparing Sewer Overflow Response Plans: A Guidebook for Local Governments (APWA, 1999).

CMOM Program Review

EPA's position is that ongoing assessment of the CMOM program and performance of the collection system is critical to the success of the program. Performing periodic comprehensive reviews of the program provides the mechanism for the program assessment. EPA is proposing that utilities with average daily flow of over 2.5 mgd conduct comprehensive reviews of their programs at least once every 5 years. The review would consist of information gathered from the following sources:

- Interviews with Operations and Maintenance Supervisors
- Field inspection of equipment and other resources
- Interviews with and observations of Operations and Maintenance staff
- Review of pertinent records and information management systems

CMOM Program Review Report

Based on an evaluation of information from the CMOM Performance Review, a review report would be developed to address, at a minimum:

- The findings of the review, including deficiencies
- Documentation of steps taken to respond to each finding in the report, including steps taken to correct each deficiency
- A schedule for additional steps to respond to findings of the report

Appendix C

SEPA Checklist

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CITY of EVERETT
PLANNING and COMMUNITY DEVELOPMENT
SEPA APPLICATION (REVIEW PROCESS II)

Use this application for proposals that require an environmental review through the State Environmental Policy Act (SEPA), chapter 43.21C RCW, which aids governmental agencies in the consideration of the environmental impacts of a proposal before making decisions. Examples of proposals that require a SEPA review include the following: 1)construction or location of more than four residential dwelling units; 2)construction of an office, school, commercial, industrial, recreational, service or storage building with at least 4,000 square feet of gross floor area; and, 3) construction of a parking lot designed for more than 20 automobiles. Certain demolition actions will also require a SEPA review. For a complete list of proposed actions that are categorically exempt, see WAC 197-11-800. For SEPA information from WA State Dept of Ecology, go to: http://www.ecy.wa.gov/pubs/0206013.pdf

☐ **Fee**	**$350** application fee + **$250** for each Special Study (i.e. wetland, traffic, etc). Non-refundable and payable by check, credit card or cash upon application.
× **Pre-Application Meeting**	A *Pre-application Meeting* is required prior to this application unless waived by the Planning Department.
☐ **Land Use Application**	The *Land Use Application* must be filled out completely and signed by the owner, applicant, or primary contact.
× **Environmental Checklist**	Provide **one** copy. Must be filled out completely and accurately (see attached).
☐ **Special Studies**	Critical Area, Traffic, etc., as required by the City. Provide **four** copies of each study.
☐ **Site Plan**	Must be drawn in accordance with the *General Site Plan Checklist*. Provide **18** copies and **one reduced copy no larger than 11" x 17"**. Copies must be legible and drawn to scale.
☐ **Mailing List**	Must be completed per the *Mailing List Instructions for Review Process II*.
☐ **Submit Application with this Checklist**	**In Person:** City of Everett Public Works Building, Permit Counter 3200 Cedar St 2nd Floor, Everett, WA 98201 **By Mail:** City of Everett Planning and Community Development 2930 Wetmore Ave Ste. 8-A, Everett, WA 98201

ENVIRONMENTAL CHECKLIST

Purpose of Checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply". In additional, complete the Supplemental Sheet for Nonproject actions (part D).

For nonproject actions, the references in the checklist to the words "project", "applicant", and "property or site" should be read as "proposal", "proposer", and "affected geographic area", respectively.

A. BACKGROUND

1. Name of proposed project, if applicable: City of Everett 2014 Comprehensive Sewer Plan
2. Name of applicant: City of Everett Attn: Paul Crane

3. Address and phone number of applicant and contact person: Paul B. Crane, City of Everett, 3200 Cedar St. Everett, WA 98201

4. Date checklist prepared: 12/8/2014
5. Agency requesting checklist: City of Everett Planning Dept.
6. Proposed timing or schedule (including phasing, if applicable): The plan will be be formally adopted at the end of the SEPA Review period.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
Yes, the Sewer Plan will be amaneded as required.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.
An evaluation of Everett's sewer system was conducted using Everett's hydraulic and hydrologic model. This process included updating the infrastructure in the model, developing sanitary sewer flow projections, developing estimates of inflow and infiltration (stormwater and groundwater that enters the sewer system), calibrating the model, running modeling scenarios to determine current levels of service and identify system deficiencies for the preferred level of service, and developing improvements to address the system deficiencies.
The level of service is defined as how frequently the capacity of a sewer pipe is exceeded. Everett established a level of service goal that sewer pipes should not exceed their capacity more than once every 25 years. This is a 4 percent probability of exceedance in any given year.
The alternatives evaluated with modeling include improvements related to conveyance, lift stations, CSO facilities, and other improvements. Improvements were developed based on the capacity analysis and the condition analysis.

10. List any government approvals or permits that will be needed for your proposal, if known.

City Council adoption is contigent on the completion of the SEPA Review process.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

The Washington State Department of Ecology (DOE) recommends sewer utilities prepare and submit a Sewer System Plan every six years. In 2014, the City of Everett developed a Comprehensive Sewer Plan (CSP) to update the 2006 plan. This 2014 CSP carries forward the policies of that 2006 CSP and provides the documentation and direction for implementing the key functions of the utility. This CSP is designed to fulfill the recommendations by DOE for a Sewer System Plan and is designed to be a summary of the manner in which the City and the Department of Public Works are fulfilling their mission and obligations as a public sewer utility.

The City of Everett's current sewer system consists of a Water Pollution Control Facility (WPCF), 31 sewage lift stations and over 330 miles of sewer mains, interceptors and laterals. The City's service area serves more than 109,000 people. The City also treats a portion of the sewage from three neighboring sewer systems: Alderwood Water and Wastewater District, Mukilteo Water and Sewer District, and Silver Lake Water and

Sewer District. Based on current Land Use Zoning, the population served by Everett is expected to increase to over 141,000 by 2040.

A hydraulic model of the City's sewer collection system was developed to evaluate the requirements of the system under future flow conditions based on Year 2100 population projections and impacts of wet-weather events with an adjustment for climate change. This approach led to the development of Capital Improvement Plan (CIP) including projects for the collection system and an implementation schedule prioritizing projects. Based on this schedule, projected capital funding and revenue requirements were determined. The City maintains a dedicated and professional staff to perform operations and maintenance of the sewer system. The City's preventive maintenance program enables the staff to be effective and proactive in maintaining this system.

The City's sewer utility continues to show a stable financial position, and as part of this Plan, the City created a detailed 10 Year Capital Improvement Plan (CIP) and an extended CIP beyond 10 years. The Sewer Plan identifies over $274 million in sewer improvements through the year 2024, and over $118 million beyond 2024. The City anticipates the adoption of 11 percent annual rate increases in 2015 and 2016. The rate increases are adequate to cover operation and maintenance expenditures and debt service through 2016. Additional rate increases will be necessary but we are anticipating a return to historic levels.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

City Council adoption is contigent on the completion of the SEPA Review process.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known, If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

Please see the attached map.

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): **Flat, rolling, hilly, steep slopes, mountainous**, other _____ .

b. What is the steepest slope on the site (approximate percent slope)?

Varies.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

Varies.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Yes in areas.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Varies as per CIP project.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

N/A

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

N/A

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

N/A

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.'

N/A

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

N/A

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

3. Water

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Yes, several, varies as per project.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Various waters depending on the project.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill materials.

Varies as per project.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

Varies as per project.

5) Does the proposal lie with a 100-year floodplain? If so, note location on the site plan.

Varies as per project.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground

1) Will ground water be withdrawn, or will water be discharge to ground water? Give general description, purpose, and approximate quantities, if known.

Possibly, depends upon the project.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals . . .; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None.

c. Water Runoff (including storm water):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

N/A

2) Could waste materials enter ground or surface waters? If so, generally describe.

N/A

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

4. Plants

a. Check or circle types of vegetation found on the site:

_X__ deciduous tree: alder, maple, aspen, other
_X__ evergreen tree: fir, cedar, pine, other
_X__ shrubs
_X__ grass
_X__ pasture
_X__ crop or grain
_X__ wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
_X__ water plants: water lily, eelgrass, milfoil, other
_X__ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

Depends on the location of the project.

c. List threatened or endangered species known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site: Depends upon the location of the project.

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elks, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site.

Depends upon the location of the project.

c. Is the site part of a migration route? If so, explain.

Depends upon the location of the project.

d. Proposed measure to preserve or enhance wildlife, if any:

Depends upon the location of the project.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

N/A

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

N/A

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

N/A

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal. If so, describe.

N/A

1) Describe special emergency services that might be required.

N/A

2) Proposed measures to reduce or control environmental health hazards, if any:

N/A

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

N/A

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

N/A

3) Proposed measures to reduce or control noise impacts, if any:
N/A

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?
Varies

b. Has the site been used for agriculture? If so, describe.
N/A

c. Describe any structures on the site.
N/A

d. Will any structures be demolished? If so, what?
N/A

e. What is the current zoning classification of the site?
Varies.

f. What is the current comprehensive plan designation of the site?
Varies

g. If applicable, what is the current shoreline master program designation of the site?
Varies.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.
Varies.

i. Approximately how many people would reside or work in the completed project?
N/A

j. Approximately how many people would the completed project displace?
N/A

k. Proposed measures to avoid or reduce displacement impacts, if any:
N/A

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
N/A

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
N/A

c. Proposed measures to reduce or control housing impacts, if any:
N/A

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
N/A

b. What views in the immediate vicinity would be altered or obstructed?
N/A

c. Proposed measure to reduce or control aesthetic impacts, if any:
N/A

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
N/A

b. Could light or glare from the finished project be a safety hazard or interfere with views?
N/A

c. What existing off-site sources of light or glare may affect your proposal?

N/A

d. Proposed measures to reduce or control light and glare impacts, if any:
N/A

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?
N/A

b. Would the proposed project displace any existing recreation uses? If so, describe.
N/A

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
N/A

13. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

N/A

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.
Unknown, varies per site.

c. Proposed measures to reduce or control impacts, if any:
N/A

14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.
Varies as per site.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?
Varies as per site.

c. How many parking spaces would the completed project have? How many would the project eliminate?

N/A

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

N/A

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.
N/A

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.
N/A

g. Proposed measures to reduce or control transportation impacts, if any:
N/A

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.
N/A

b. Proposed measures to reduce or control direct impacts on public services, if any:
N/A

16. Utilities

a. Circle utilities currently available at the site**: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other**.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

A Municipal Sewer system is existing and proposed as per site.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Date Submitted: 12/17/2014

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

No.

Proposed measures to avoid or reduce such increases are:

N/A

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

No.

Proposed measures to protect or conserve plants, animals, fish or marine life are:

N/A

3. How would the proposal be likely to deplete energy or natural resources?

No.

Proposed measures to protect or conserve energy and natural resources are:

N/A

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

No.

Proposed measures to protect such resources or to avoid or reduce impacts are:

N/A

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

No.

Proposed measures to avoid or reduce shoreline and land use impacts are:

N/A

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

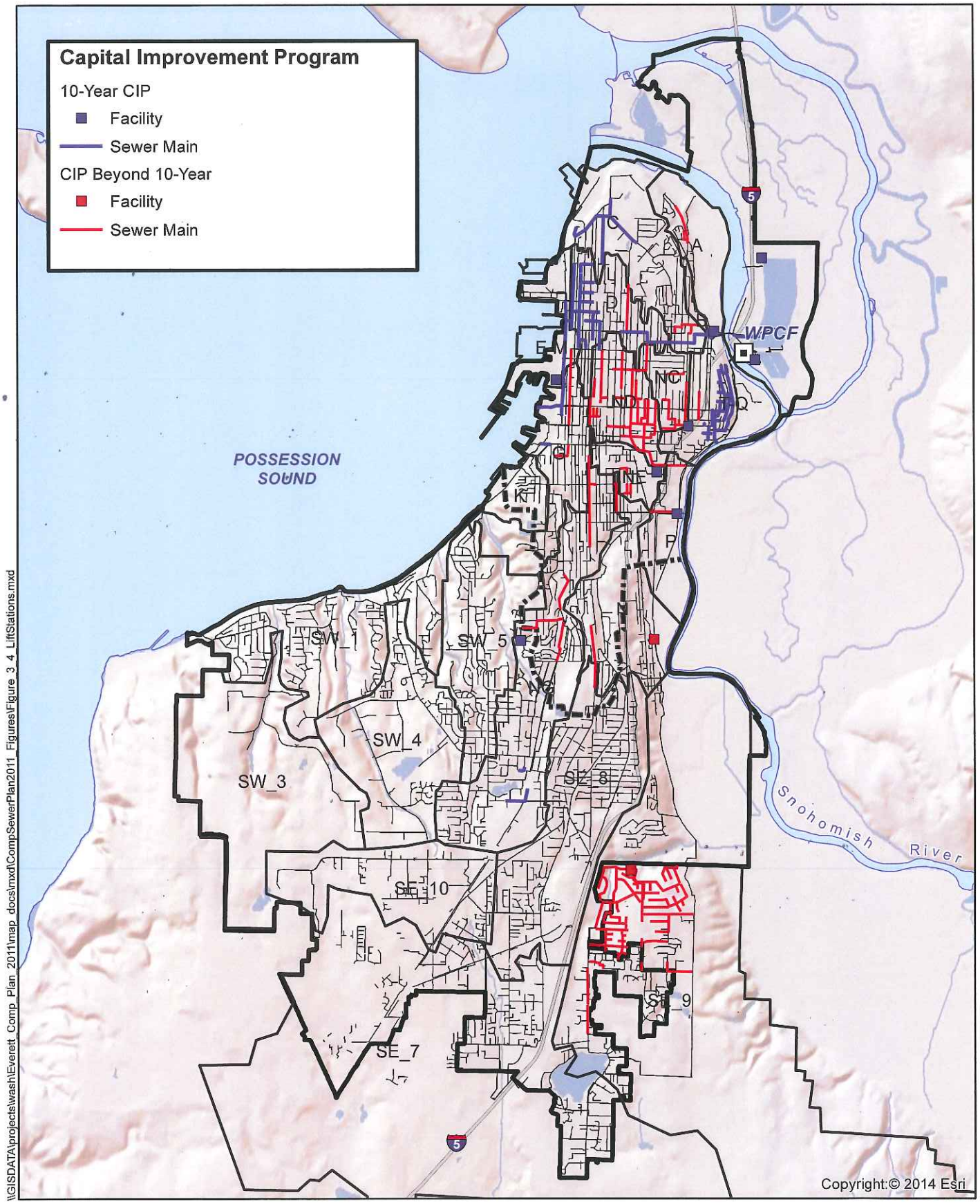
No.

Proposed measures to reduce or respond to such demand(s) are:

N/A

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

No it will not conflict with any laws that provide with protection with the environment.



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2014 Comprehensive Sewer Plan
City of Everett

FIGURE ES-1

2014 - 2023 Capital Improvement Program

City of Everett WPCF
City of Everett Limits
Boundary Between Combined and Sanitary Systems
Sewer Lines
SewerBasins
Highways
Waterbody

0 0.5 1 2
Miles

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Appendix D

Everett Municipal Code (Selected Sections)

- Section 14.04 Sewer Rates and Regulations
- Section 14.08 Sewer Connections
- Section 14.10 Sewage Disposal System
- Section 14.12 Cesspools, Septic Tanks, Etc.
- Section 14.32 Water and Sewer Utility Service Charges
- Section 14.36 Latecomer Agreements
- Section 14.40 Wastewater Pretreatment Regulations
- Section 14.42 Grease Control

Sewer Specifications and Standard Details

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Chapter 14.04
SEWER RATES AND REGULATIONS[1]

Sections:

14.04.010 Definitions.
14.04.020 Sewer service charges.
14.04.022 Repealed.
14.04.023 Rate review and adjustment.
14.04.024 User rate notification.
14.04.025 Reduced rates for low-income senior citizens.
14.04.030 Sewer charge exemption.
14.04.040 Payment date.
14.04.050 Creation of sewer revenue fund.
14.04.060 Sewer construction charges—Generally.
14.04.070 Sewer construction charges—Single-family residence.
14.04.080 Sewer construction charges—Other than single-family residence.
14.04.090 Lateral connection charges—Generally.
14.04.100 Lateral connection charges—Single-family residence.
14.04.110 Lateral connection charges—Other than single-family residence.
14.04.120 Trunk connection charges—Generally.
14.04.130 Trunk connection charges—Single-family residence.
14.04.140 Trunk connection charges—Other than single-family residence.
14.04.150 Sewage disposal for areas outside the city.
14.04.160 Billings.
14.04.170 Unpaid charges—Lien.
14.04.180 Sewer district service.

14.04.010 Definitions.

A. “Bond issue no. 1 system” is described in exhibit “B” on file in the office of the city clerk and incorporated herein by this reference.

B. “Bond issue no. 2 system” is described in exhibit “C” on file in the office of the city clerk and incorporated herein by this reference.

C. “Bond issue no. 3 system” is described in exhibit “D” on file in the office of the city clerk and incorporated in this chapter by this reference.

D. An “interceptor sewer” serves multiple trunk service areas and receives sewage from many trunk sewers and conducts such sewage to a point for treatment and disposal.

E. A “lateral sewer” serves a relatively small area and receives sewage from individual property ownerships (side sewers) and discharges into a trunk or an interceptor sewer. All sewer systems installed pursuant to a local improvement district or a subdivision shall be considered a lateral sewer system.

F. “North end” is described in exhibit “A” on file in the office of the city clerk and incorporated herein by this reference.

G. “Single-family residence” is a building providing complete housekeeping facilities for one family.

H. A “trunk sewer” serves a large territory (multiple lateral service areas) and receives sewage from many lateral sewers and discharges into an interceptor sewer. (Prior code § 14.12.160)

14.04.020 Sewer service charges.[2]

A. Effective January 1, 2009, and thereafter, service charges for the city of Everett sewer system are hereby fixed as follows:

1. Single-family residence: forty dollars and thirty cents per month. (The monthly charge includes surface water quality protection and enhancement and the current state utility tax.)

2. For other than single-family residence (multiple-family residence, commercial, and industrial users, etc.) the rate shall be computed in accordance with the following formula:

Sewer service charge per month equals $4.4788 per one hundred cubic feet of metered water consumption.

(The monthly charge includes surface water quality protection and enhancement and the current state utility tax.) The minimum monthly charge regardless of usage shall be forty dollars and thirty cents per month.

3. Septage volume fees: $0.1609 per gallon of discharge.

B. Effective January 1, 2010, and thereafter, service charges for the city of Everett sewer system are hereby fixed as follows:

1. Single-family residence: forty-two dollars forty cents per month. (The monthly charge includes surface water quality protection and enhancement and the current state utility tax.)

2. For other than single-family residence (multiple-family residence, commercial, and industrial users, etc.) the rate shall be computed in accordance with the following formula:

Sewer service charge per month equals $4.7111 per one hundred cubic feet of metered water consumption.

(The monthly charge includes surface water quality protection and enhancement and the current state utility tax.) The minimum monthly charge regardless of usage shall be forty-two dollars forty cents per month.

3. Septage volume fees: $0.1689 per gallon of discharge.

C. Effective January 1, 2011, and thereafter, service charges for the city of Everett sewer system are hereby fixed as follows:

1. Single-family residence: forty-four dollars and fifty cents per month. (The monthly charge includes surface water quality protection and enhancement and the current state utility tax.)

2. For other than single-family residence (multiple-family residence, commercial, and industrial users, etc.) the rate shall be computed in accordance with the following formula:

Sewer service charge per month equals $4.9444 per one hundred cubic feet of metered water consumption.

(The monthly charge includes surface water quality protection and enhancement and the current state utility tax.) The minimum monthly charge regardless of usage shall be forty-four dollars and fifty cents per month.

3. Septage volume fees: $0.1774 per gallon of discharge.

D. Effective January 1, 2012, and thereafter, service charges for the city of Everett sewer system are hereby fixed as follows:

1. Single-family residence: forty-six dollars seventy cents per month. (The monthly charge includes surface water quality protection and enhancement and the current state utility tax.)

2. For other than single-family residence (multiple-family residence, commercial, and industrial users, etc.) the rate shall be computed in accordance with the following formula:

Sewer service charge per month equals $5.1889 per 100 cubic feet of metered water consumption.

(The monthly charge includes surface water quality protection and enhancement and the current state utility tax.) The minimum monthly charge regardless of usage shall be forty-six dollars seventy cents per month.

3. Septage volume fees: $0.1863 per gallon of discharge. (Ord. 3156-09 §§ 2, 5, 2009; Ord. 3096-08 §§ 1 (part), 4, 7, 10, 2008: Ord. 2366-99 § 2, 1999)

14.04.022 Sewer service charges, 1995.
Repealed by Ord. 2189-96. (Ord. 1976-93 § 2, 1993)

14.04.023 Rate review and adjustment.
The city of Everett will review the user charges at least annually and revise the rates as necessary to ensure that adequate revenues are generated to pay the costs of operation and maintenance including replacement and that the system continues to provide for proportional distribution of costs of operation and maintenance including replacement among users. (Ord. 3096-08 § 20 (part), 2008)

14.04.024 User rate notification.
The city of Everett will notify each user at least annually of the rate being charged for operation and maintenance (including noncapital replacement) of the collection and treatment systems. (Ord. 3096-08 § 21, 2008)

14.04.025 Reduced rates for low-income senior citizens.
A. Person(s) of the age of sixty-two years or older and person(s) qualifying for special parking privileges under RCW 46.16.381 or a blind person as defined in RCW 74.18.020 shall be eligible to pay a reduced rate for water and sewer single-family residence service:

$35,000/year income or less:	80% of current single-family residence rates
$30,000/year income or less:	70% of current single-family residence rates
$25,000/year income or less:	60% of current single-family residence rates

B. To qualify for the above reduced rates, any applicant must also meet the following requirements:

1. At the time of application for the reduced rates under this section, the applicant must be receiving a verifiable property tax discount from Snohomish County;

2. The applicant must be the owner/occupant of a single-family home serviced by the city of Everett water department; and

3. Only the applicant and/or the applicant's spouse may have income within the household. The total annual combined household income may not exceed thirty-five thousand dollars.

C. In no case shall the discounted rate for sewer be less than the equivalent share of operation and maintenance (including replacement) of the city's water pollution control facility. (Ord. 2908-06 § 1, 2006)

14.04.030 Sewer charge exemption.[3]
Where the use of water is such that a portion of all the water delivered to the customer does not discharge into a city sewer due to commercial or industrial use, such as loss by evaporation or any other cause or use in manufactured products, such as ice, canned goods, beverages and the like, no sewer service charge shall be made because of water so used or lost; provided, however, the water user shall provide proof as to the amount of sewage discharge and/or install a meter or other measuring device approved by the city engineer to determine either the amount of sewage discharge or the amount of water used or lost. (Ord. 3096-08 § 18, 2008)

14.04.040 Payment date.
Except as provided in Section 14.08.175 of this title, payment of the sewer service charge shall commence at the time of physical connection to the sewer system. (Ord. 2366-99 § 3, 1999: Ord. 627-79 § 1, 1979; prior code § 14.12.030)

14.04.050 Creation of sewer revenue fund.
There is created a special fund of the city to be known as the “sewer revenue fund.” Any and all connection charges and revenues received for the use of sewers as set forth herein, for sewage disposal service, from the sale of by-products from the sewer treatment plant or from any other source of rental, use or services rendered by such utility shall be credited to and paid into such fund. All engineering expenses incurred by the engineering department in planning, designing, supervising and administering any work on the Everett municipal sewer system, and all expenses of maintenance and operation of the sewer system and sewer department, including but not limited to all improvements, additions, betterments, extensions, repairs, replacements, except when the same are financed by the issuance of bonds, and amounts required to pay and secure the payment of principal and interest on sewer revenue bonds and coupon warrants, shall be paid out of the fund. (Prior code § 14.12.050)

14.04.060 Sewer construction charges—Generally.
The charges and rates allocated for sanitary sewer construction for classes of users connected and to be connected to the sanitary sewer system or the combined sewer system are fixed at the monthly rate designated in Sections 14.04.070 and 14.04.080. (Prior code § 14.12.070)

14.04.070 Sewer construction charges—Single-family residence.
A. Single-family residence sewer construction charges are as follows:

	Trunk	**Lateral**
North Everett	None	None
Bond issue no. 1 system	$0.20	$2.10
Bond issue no. 2 system	1.15	2.25
Bond issue no. 3 system	2.25	2.75

B. The applicable construction charge shall be established by determining the bond issue from which the funds were provided for the construction of that portion of the city’s sewer system to which the sewer connects.

C. Each such applicable construction charge shall terminate upon full payment of the bonded indebtedness to which such construction charge relates.

D. The applicable monthly trunk construction charge shall be paid by all property. The applicable monthly lateral construction charge shall be paid by all property which has not been charged by local improvement district assessment or otherwise with the cost of a lateral sewer.

E. Payments of the construction charge for either the trunk and/or the lateral sewer construction shall commence at the time of physical connection to the sewer system.

F. If a property owner connects directly into an interceptor or trunk sewer, such ownership shall pay both the appropriate lateral and trunk rates and for the purpose of computing the construction charge, the interceptor or trunk sewer shall be considered both the trunk and lateral. (Prior code § 14.12.080)

14.04.080 Sewer construction charges—Other than single-family residence.
A. The charges and rates allocated for sanitary sewer construction for multi-family, commercial and industrial users, etc. (other than single-family residence) shall be fixed at the following monthly rate for each foot of property on the longest side abutting the sewer line, but not less than the appropriate rate for a single-family residence:

	Trunk (per ft.)	**Lateral (per ft.)**
North Everett	None	None
Bond issue no. 1 system	$.003	$0.28
Bond issue no. 2 system	.015	.030
Bond issue no. 3 system	.030	.037

B. The applicable construction charge shall be established by determining the bond issue from which the funds were provided for the construction of that portion of the city's sewer system to which the sewer connects.

C. Each such applicable construction charge shall terminate upon full payment of the bonded indebtedness to which such construction charge relates.

D. The applicable monthly trunk construction charge shall be paid by all property.

E. The applicable monthly lateral construction charge shall be paid by all property which has not been charged by local improvement district assessment or otherwise with the cost of a lateral sewer.

F. Payments of the construction charge for either the trunk and/or the lateral sewer construction shall commence at the time of physical connection to the sewer system.

G. If a property owner connects directly into an interceptor or trunk sewer, such ownership shall pay both the appropriate lateral and trunk rates and for the purpose of computing the construction charge, the interceptor or trunk sewer shall be considered both the trunk and lateral. (Prior code § 14.12.090)

14.04.090 Lateral connection charges—Generally.
Persons connecting a private sewer to a public sewer to serve property which has not been charged by local improvement district assessment or otherwise with the cost of the lateral sewer shall pay, in addition to the payment of the connection permit fee required by the ordinances of the city, the amounts in Sections 14.04.100 and 14.04.110. (Ord. 627-79 § 2 (part), 1979; prior code § 14.12.100)

14.04.100 Lateral connection charges—Single-family residence.

A. Lateral connection charges for single-family residences are as follows:

	1979	1980	1981
North Everett	None	None	None
Bond issue no. 1 system	$440.00	$465.00	$490.00
Bond issue no. 2 system	395.00	422.50	450.00
Bond issue no. 3 system	330.00	362.50	395.00

B. The rates for the year 1981 shall remain in effect for years subsequent to 1981 until the rates are otherwise established or changed by ordinance of the city.

C. Payments of the connection charge for the lateral sewer shall be due and payable at the time of physical connection to the sewer system.

D. If a property owner connects directly into an interceptor or trunk sewer, such ownership shall pay both the appropriate lateral and trunk rates and for the purpose of computing the connection charge, the interceptor or trunk sewer shall be considered both the trunk and lateral. (Ord. 627-79 § 2 (part), 1979; prior code § 14.12.110)

14.04.110 Lateral connection charges—Other than single-family residence.

A. The lateral connection charge for multi-family, commercial and industrial users, etc. (other than single-family residence) shall be fixed at the following amount for each foot of property on the longest side abutting the sewer line, but not less than the appropriate amount for a single-family residence:

	1979 (per ft.)	1980 (per ft.)	1981 (per ft.)
North Everett	None	None	None
Bond issue no. 1 system	$5.87	$6.20	$6.53
Bond issue no. 2 system	5.27	5.63	6.00
Bond issue no. 3 system	4.40	4.83	5.27

B. The rates for the year 1981 shall remain in effect for years subsequent to 1981 until the rates are otherwise established or changed by ordinance of the city.

C. Payments of the connection charge for the lateral sewer shall be due and payable at the time of physical connection to the sewer system.

D. If a property owner connects directly into an interceptor or trunk sewer, such ownership shall pay both the appropriate lateral and trunk rates and for the purpose of

computing the connection charge, the interceptor or trunk sewer shall be considered both the trunk and lateral. (Ord. 627-79 § 2 (part), 1979; prior code § 14.12.120)

14.04.120 Trunk connection charges—Generally.
Persons connecting a private sewer to a public sewer to serve property which has not been charged with the cost of a substantial trunk sewer shall pay, in addition to the payment of the connection permit fee required by the ordinances of the city the amounts designated in Sections 14.04.130 and 14.04.140. (Ord. 627-79 § 2 (part), 1979; prior code § 14.12.130)

14.04.130 Trunk connection charges—Single-family residence.
A. Trunk connection charges for single-family residences are as follows:

	1979	**1980**	**1981**
North Everett	None	None	None
Bond issue no. 1 system	$105.00	$107.50	$110.00
Bond issue no. 2 system	240.00	255.00	270.00
Bond issue no. 3 system	275.00	302.50	330.00

B. The rates for the year 1981 shall remain in effect for years subsequent to 1981 until the rates are otherwise established or changed by ordinance of the city.

C. Payments of the connection charge for the trunk sewer shall be due and payable at the time of physical connection to the sewer system.

D. If a property owner connects directly into an interceptor or trunk sewer, such ownership shall pay both the appropriate lateral and trunk rates and for the purpose of computing the connection charge, the interceptor or trunk sewer shall be considered both the trunk and lateral. (Ord. 627-79 § 2 (part), 1979; prior code § 14.12.140)

14.04.140 Trunk connection charges—Other than single-family residence.
A. The trunk connection charge for multi-family, commercial and industrial users, etc. (other than single-family residence) shall be fixed at the following amount for each foot of property on the longest side abutting the sewer line, but not less than the appropriate amount for a single-family residence:

	1979 (per ft.)	**1980 (per ft.)**	**1981 (per ft.)**
North Everett	None	None	None
Bond issue no. 1 system	$1.40	$1.43	$1.46
Bond issue no. 2 system	3.20	3.40	3.60

Bond issue no. 3 system	3.67	4.03	4.40

B. The rates for the year 1981 shall remain in effect for years subsequent to 1981 until the rates are otherwise established or changed by ordinance of the city.

C. Payments of the connection charge for the trunk sewer shall be due and payable at the time of physical connection to the sewer system.

D. If a property owner connects directly into an interceptor or trunk sewer, such ownership shall pay both the appropriate lateral and trunk rates and for the purpose of computing the connection charge, the interceptor or trunk sewer shall be considered both the trunk and lateral. (Ord. 627-79 § 2 (part), 1979; prior code § 14.12.150)

14.04.150 Sewage disposal for areas outside the city.

A. Sewage disposal service may be provided through the Everett system for such areas outside and adjacent to the city as can, in the judgment of the mayor be feasibly served.

B. Wholesale sewage disposal service shall be provided under contract, the terms of which will include, but are not limited to, the rates, regulations, and conditions as hereinafter provided:

1. Sewage Disposal Contract Limitation Outside the City. Contracts for sewage disposal service to the city's system shall be limited to the county or any municipality or public body under whose jurisdiction local sewerage facilities may be constructed and operated.

2. Sewage Service Outside—Review by Mayor. Prior to entering any contract, the mayor shall review the quality and quantity of the sewage to be accepted and shall determine that the city has the excess capacity to enable it to dispose of the sewage to be accepted.

3. Service Charge for Sewage Outside the City. Monthly service charge for disposal of sewage to the city system shall be as provided by contract.

4. Trunk and Lateral Connections Outside the City. All trunks, laterals or any special facilities required for acceptance and transportation of sewage which shall be connected to the city sewerage system shall be subject to approval of the mayor, and any additions to an approved system so connected shall also be subject to the approval of the mayor. Municipalities desiring a contract for connection to the city sewerage system shall file with the sewer department, or the city engineer, drawings describing and locating all trunks, laterals and any special facilities associated to the system. Satisfactory provisions for maintenance shall be made and where necessary, the city shall have the right to perform maintenance operations on facilities outside the city at the cost of the contracting party. The city shall have the right of inspection of all facilities connected to the city sewage system.

5. Connections Points for Trunks, Laterals or Special Facilities Outside City. All connections to the trunks, laterals, or special facilities of the city sewerage system shall be at points designed by the city. Connection shall be under the supervision of the city and the cost thereof shall be borne by the party connecting to the city system which cost shall be in addition to other charges.

6. Property Owner Outside City Subject to City Sewage Regulations. Owners and/or tenants of all property connected to the sewerage system through or by any district, municipality or governmental unit contracting for such service, shall be subject to all rules and regulations governing sewage and sewage disposal within the city. Failure to abide by such rules and regulations shall be cause for cancellation of continued transmission and treatment service to the entire district, municipality or governmental unit.

C. Retail sewer service shall be subject to the following conditions:

1. Sewage Service Outside City—Review by Mayor. Prior to allowing any retail service outside the city, the mayor shall review the quality and quantity of the sewage to be accepted and shall determine that the city has the excess capacity to enable it to dispose of the sewage to be accepted.

2. Service Charge for Sewage Outside City. Monthly service charge for sewer service shall be as provided under the current sewer rate ordinances of the city, less surface water protection and enhancement, plus a fifty percent surcharge.

3. Utility Service Agreement. Properties located outside the city limits receiving water service from the city are deemed by the city as eligible to receive retail sewer service per the provisions of this chapter. Property owners requesting sewer service shall submit an agreement to be recorded on the property with the property records of Snohomish County in a form approved by the city attorney in which the owners and persons having an interest in the property agree to the following (unless otherwise authorized in writing by the city attorney): annexation of the property to the city; designation of the city's mayor or designee as attorney-in-fact to execute annexation documents; petition for and participation without protest in the formation of any local improvement district or utility local improvement district for sewer service; payment of connection fees and monthly charges established from time to time by the city; and agreement to abide by all city ordinances, rules, and regulations regarding sewer service.

4. Connection Charge for Sewage Outside the City. The connection charges for retail service areas outside the city limits shall be as provided in Section 14.08.135 (Special connection charges).

5. Property Owner Outside City Subject to City Sewage Regulations. Owners and/or tenants of all property connected to the city sewerage system shall be subject to all rules and regulations governing sewage and sewage disposal within the city. Failure to abide by such rules and regulations shall be cause for cancellation of service.

6. Areas outside the city shall not be eligible for benefits per Ordinance No. 1561-89, as amended.

7. Nothing in this section shall be construed to require the provision of sewer service outside of the city limits and the city's decision to extend such service shall remain a discretionary authority of the city. (Ord. 2366-99 § 1, 1999: prior code § 14.12.170)

14.04.160 Billings.
All bills for sewage disposal service shall be rendered monthly and shall become due and payable at the office of the city treasurer on or before the twentieth day after date shown on monthly billing and shall become delinquent thereafter. (Prior code § 14.12.180)

14.04.170 Unpaid charges—Lien.
Any charge for sewage disposal service not paid within forty-five days from date due and payable shall bear interest at the rate of eight percent per year and such charge and interest shall immediately become a lien upon the property to which such sewer service is rendered, superior to all other liens or encumbrances except those for general taxes and special assessments. Such liens shall be foreclosed by the city in the manner provided by law for the enforcement of the same and for delinquent sewage charges. As an additional and concurrent method of enforcing the lien herein provided, the city may cut off the water service from the premises to which such sewage disposal service was furnished, and such water service shall remain cut off until such charges, plus penalties and interest thereon, together with an additional sum of five dollars for turning the water on. (Prior code § 14.12.190)

14.04.180 Sewer district service.
Notwithstanding any language in this title, the city council is authorized to allow the city to contract with sewer districts to provide Everett residents sewer service upon such rates, terms and conditions approved by the city which rates, terms and conditions may be different than otherwise provided in this title. Further, the contract may authorize the districts to assess and charge these residents directly. (Ord. 2647-02 § 1, 2002)

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[1] For statutory provisions authorizing cities to construct, acquire and maintain sewer systems and to fix rates therefor, see RCW 35.21.210; for provisions regarding sewer systems generally, see Chs. 35.67 and 35.92 RCW.

[2] Prior ordinance history: Ord. 627-79 §§ 1A (part)—1C (part), 1979, Ord. 1264-86 §§ 1, 2, 1986, Ord. 1437-88 § 1, 1988 and Ord. 1538-88 § 1, 1988.

[3] Prior ordinance history: Ord. 627-79 §§ 1A (part)—1C (part), 1979 and prior code § 14.12.020.

This page of the Everett Municipal Code is current through Ordinance 3255-12, passed January 18, 2012.
Disclaimer: The City Clerk's Office has the official version of the Everett Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

City Website: http://www.everettwa.org (http://www.everettwa.org/)
Code Publishing Company (http://www.codepublishing.com/)

Chapter 14.08
SEWER CONNECTIONS

Sections:

14.08.010 Definitions.
14.08.020 Unlawful connections.
14.08.030 Required connections.
14.08.040 Storm drainage water connections.
14.08.050 No cesspools, etc., to be connected.
14.08.060 Permit required.
14.08.100 Equipment identification required.
14.08.110 Determination of sufficient grade and open piping.
14.08.135 Special connection charges.
14.08.140 Permit to connect to public sewer—Fees.
14.08.141 Olympus Terrace service area.
14.08.150 Filing and approval of plans.
14.08.160 Inspection and approval of work.
14.08.170 Connection specifications.
14.08.175 Connection to available public sewer—Extension—Forced connection.
14.08.180 Backwater valve.
14.08.190 Rainwater conductors.
14.08.200 Notification of readiness for inspection.
14.08.210 Right of entry.
14.08.220 Interference with sewers—Permit to work near.
14.08.230 Matter excluded from all sewers.
14.08.240 Determination of character of waste matter.
14.08.250 Repealed.
14.08.260 Side sewer ownership and maintenance.
14.08.270 Repair and maintenance of sewer lines.
14.08.280 Violation—Penalty.

14.08.010 Definitions.
Whenever used in this chapter:

A. “Combined sewers” means those sewers which will carry both waste matter permitted by this chapter to enter the system and surface drainage water.

B. “Director of public works” means either the public works director personally or any of his authorized representatives.

C. “Everett municipal sewer system” or “sewer system” means the system of conduits, pumps, treatment plants and structures used for the purpose of conveying from their source, treating in any manner, and conveying to final points of disposal all wastes of any nature permitted by this chapter to enter the system. Specifically included as integral parts of the system are all conduits of any nature forming a part of the general network of conduits or connected directly or indirectly to the network; all

pumps, treatment plants and structures of any kind used in connection with the collection, treatment and disposal of the wastes handled by the system; and all appurtenances to any of the above, either physically or functionally connected therewith. Storm, sanitary and combined sewers, as defined in this section, are all included as parts of the municipal sewer system.

D. “Mayor” means either the mayor personally or any of his duly authorized representatives.

E. “Premises” is defined as a continuous tract of land, building or group of adjacent buildings under a single control with respect to use of water and responsibility for payment therefor. Subdivision of such use or responsibility shall constitute a division into separate premises as defined in this section.

F. “Sanitary sewage” means water-carried human wastes or a combination of water-carried wastes from residences, business buildings, institutions or industrial establishments.

G. “Sanitary sewers” means those sewers which are designated to carry all waste matter permitted by this chapter to enter the system other than surface drainage water.

H. “Storm sewers” means those sewers which are designated to carry nothing but surface drainage waters.

I. “Surface drainage waters” means unconfirmed diffuse waters originating from rain, melting snow or other sources which runs off private property into public streets and storm sewers. (Ord. 1506-88 § 1, 1988)

14.08.020 Unlawful connections.
It is unlawful for any person or persons to make any connection with, or in any manner obstruct, interfere with, alter or repair any part of the Everett municipal sewer system within the corporate limits of the city, except as provided in this chapter. (Ord. 1506-88 § 2, 1988)

14.08.030 Required connections.
Every dwelling house, hotel, apartment, factory, store or other building in which plumbing arrangements have been, or are to be, placed shall be connected to the sanitary sewer, as required in this chapter when such public sewer is abutting the property line of the premises on which such buildings or areas are located. When such sanitary sewer is not provided, such buildings and/or areas shall be connected to a septic disposal system, meeting all requirements of the city. (Ord. 1506-88 § 3, 1988)

14.08.040 Storm drainage water connections.
A. All surface drainage water from roofs, drainage, parking, sales and display lots and other impervious surfaces shall be connected to a storm sewer when such system is available. When such system is not provided, such lots and areas shall provide for surface and storm drainage in accordance with the ordinances of the city.

B. Surface drainage waters may be connected to combined sewers. Combined sewers shall be allowed only in the north end of the city, as shown on Exhibit I

attached to the ordinance codified in this chapter, on file in the office of the city clerk, located within the following described area:

Beginning at the intersection of the west bank of the Snohomish River and the north line of Section 32, Township 29, North Range 5, E.W.M.; thence west along the north line thereof to a point of intersection with the westerly right-of-way margin of Broadway as it now exists; thence southerly along said westerly right-of-way to a point of intersection with the northerly right-of-way margin of Lowell Road. Thence southwesterly along said right-of-way margin to a point of intersection with the northerly projected westerly right-of-way margin of Lombard Avenue; thence southerly along said northerly projection and the westerly right-of-way margin to the northerly right-of way margin of 60th Street; thence westerly along said northerly right-of-way margin to a point of intersection with the easterly right-of-way margin of Oakes Avenue; thence south along said easterly right-of-way margin to the southerly right-of-way margin of 63rd Street; thence westerly along said right-of-way margin to a point of intersection with the east line of Section 6, Township 28 North Range 5 E.W.M.; thence north along said section line to a point of intersection with the easterly projected north line of the plat of Mountain View Addition according to the plat thereof recorded in Volume 10 of Plats, page 64 records of Snohomish County, Washington; thence westerly along said easterly projection and north plat line to the northwest corner thereof, thence northerly along the northerly projected west line of said plat to a point of intersection with the south line of the northeast one-quarter (NE 1/4) of said Section 6; thence westerly along said south line to the easterly right-of-way margin of Evergreen Way; thence northerly along said right-of-way to the easterly drainage basin of Pigeon Creek No. 1; then northerly to Mukilteo Boulevard easterly to Federal Avenue; and thereafter north on Federal Avenue to 35th and West on 35th to Possession Sound and the terminus of this description.

C. Except as provided in subsections A and B of this section, no person(s) or corporation(s) shall connect any source(s) of surface drainage water to a sanitary sewer; provided, that an industrial pretreatment permit may include authorization to discharge surface drainage waters or contaminated effluents from other sources to the Everett municipal sewer system under the terms and conditions therein. (Ord. 1506-88 § 4, 1988)

14.08.050 No cesspools, etc., to be connected.
No person or persons or corporation shall connect any source of sanitary sewage with any sanitary sewer, nor shall any opening whatsoever be made or permitted into a sanitary sewer or into any private sewer or drain connecting with the public sewer except for sinks, water closets or baths. All laundries, livery stables, packing houses, restaurants and butcher shops now connected or which may hereafter be connected with any public sewer shall be provided with a grease trap device as approved by the director of public works. (Ord. 1506-88 § 5, 1988)

14.08.060 Permit required.
No person shall connect with or open or penetrate any part of the Everett municipal sewer system, or any private sewer which connects thereto for any purpose whatsoever, or lay, alter, extend or repair any sewer, public or private, which connects

to the Everett municipal sewer system without first obtaining a permit from the city to do so. In the event that a sewer permit is required in connection with new construction or remodeling for which a building permit is required under the ordinances of the city, any sewer permit required under this chapter shall be obtained and all sewer permit fees and connection charges shall be paid prior to the issuance of a building permit. (Ord. 1506-88 § 6, 1988)

14.08.100 Equipment identification required.
It is unlawful for any person or persons, firm, partnership or corporation engaged in the business of side sewer work within the corporate limits of the city to use or operate a digger, back hoe or power shovel unless such equipment so used has plainly displayed thereon the name of the person, firm, partnership or corporation operating such equipment upon such side sewer work. (Prior code § 2.20.081)

14.08.110 Determination of sufficient grade and open piping.
It shall be the duty and responsibility of the person, firm, partnership or corporation engaged in making a connection of a private side sewer to a main sewer extension, at or near the property line, to determine that the invert at the property line is of sufficient depth to ensure proper grade to house or building drain to permit gravity flow from the house to the main side sewer connection. It shall further be the duty and responsibility of such person, firm, partnership or corporation engaged in making a connection of a private side sewer to a main side sewer extension at or near a property line to determine that the main side sewer extension from the main side sewer pipe to the property line is open, free and in good working order before making the connection. (Ord. 1506-88 § 7, 1988; prior code § 2.02.082)

14.08.135 Special connection charges.
In addition to current sewer and water connection permit and inspection fees, there is hereby imposed, on the owners of properties, a special connection charge in the following amounts:

A. 1. Effective January 1, 2009:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$698	$1,111	$1,809
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$820	$1,309	$2,129
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,021	$1,629	$2,650
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$1,193	$1,902	$3,095
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$1,585	$2,526	$4,111

Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$527	$843	$1,370
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$608	$987	$1,595
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$657	$1,047	$1,704

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use one thousand seven hundred four dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at one thousand seven hundred four dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

B. 1. Effective January 1, 2010:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$986	$1,531	$2,517
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,159	$1,804	$2,963
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,442	$2,245	$3,687
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$1,685	$2,622	$4,307
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$2,238	$3,481	$5,719
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$745	$1,161	$1,906
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$835	$1,324	$2,159
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$928	$1,443	$2,371

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use two thousand three hundred seventy-one dollars per nine hundred cubic feet per month of estimated water demand to calculate

the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at two thousand three hundred seventy-one dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

C. 1. Effective January 1, 2011:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,273	$1,952	$3,225
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,497	$2,299	$3,796
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,863	$2,861	$4,724
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$2,177	$3,341	$5,518
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$2,892	$4,436	$7,328
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$963	$1,480	$2,443
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$1,062	$1,660	$2,722

Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$1,199	$1,838	$3,037

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use three thousand thirty-seven dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at three thousand thirty-seven dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

D. 1. Effective January 1, 2012:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,561	$2,372	$3,933
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,835	$2,794	$4,629
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,284	$3,477	$5,761
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$2,670	$4,060	$6,730
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$3,545	$5,392	$8,937
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$1,180	$1,799	$2,979
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$1,290	$1,996	$3,286
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$1,470	$2,234	$3,704

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use three thousand seven hundred four dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at three thousand seven hundred four dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

E. 1. Effective January 1, 2013:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$1,849	$2,792	$4,641
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,174	$3,289	$5,463
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,706	$4,093	$6,799
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$3,162	$4,779	$7,941
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$4,199	$6,347	$10,546
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$1,398	$2,117	$3,515
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$1,518	$2,332	$3,850
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$1,741	$2,630	$4,371

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use four thousand three hundred seventy-one dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at four thousand three hundred seventy-one dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

F. 1. Effective January 1, 2014:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,136	$3,212	$5,348
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,512	$3,784	$6,296

Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,127	$4,709	$7,836
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$3,654	$5,498	$9,152
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$4,852	$7,302	$12,154
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$1,615	$2,436	$4,051
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$1,746	$2,668	$4,414
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$2,012	$3,026	$5,038

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use five thousand thirty-eight dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at five thousand thirty-eight dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

G. 1. Effective January 1, 2015:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,424	$3,632	$6,056
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,851	$4,278	$7,129
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,548	$5,325	$8,873
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$4,146	$6,218	$10,364
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$5,506	$8,257	$13,763
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$1,833	$2,754	$4,587
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$1,973	$3,005	$4,978
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$2,283	$3,422	$5,705

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use five thousand seven hundred five dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at five thousand seven hundred five dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

H. 1. Effective January 1, 2016:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$2,712	$4,052	$6,764
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,189	$4,773	$7,962
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,970	$5,940	$9,910
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$4,638	$6,937	$11,575
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$6,160	$9,212	$15,372

Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$2,051	$3,073	$5,124
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$2,200	$3,341	$5,541
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$2,554	$3,817	$6,371

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use six thousand three hundred seventy-one dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at six thousand three hundred seventy-one dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

I. 1. Effective January 1, 2017:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,000	$4,472	$7,472
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,528	$5,268	$8,796
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$4,391	$6,556	$10,947
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$5,131	$7,656	$12,787
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$6,813	$10,167	$16,980
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$2,268	$3,392	$5,660
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$2,428	$3,677	$6,105
Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$2,825	$4,213	$7,038

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use seven thousand thirty-eight dollars per nine

hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at seven thousand thirty-eight dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

J. 1. Effective January 1, 2018:

Land Use	Connection Type	Unit and Quantity	Water	Sewer	Total
Single-Family (less than 1,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,288	$4,892	$8,180
Single-Family (1,000—2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$3,866	$5,763	$9,629
Single-Family (over 2,000 sq. ft.)	Inside City Limits1	1 Dwelling Unit	$4,812	$7,172	$11,984
Duplex	Inside City Limits1	2 Dwelling Units (Per Unit)	$5,623	$8,375	$13,998
Triplex	Inside City Limits1	3 Dwelling Units (Per Unit)	$7,467	$11,122	$18,589
Multifamily	Inside City Limits1	4+ Dwelling Units (Per Unit)	$2,486	$3,710	$6,196
Mobile Home	Inside City Limits1	Each Mobile Home Unit	$2,656	$4,013	$6,669

Comm/Industrial	Inside City Limits1	Single-Family Equivalent	$3,096	$4,609	$7,705

1 Areas outside city limits, but connected to the city's water distribution system, shall be charged the rate inside city limits with a twenty-five percent surcharge.

2. The said connection charges shall be assessed based on the number of units to be connected, regardless of whether the units are connected to the public water or sewer system line in common or individually.

3. The utilities director shall establish rules, regulations and procedures for administration of said fees established for system connections.

4. In the event that the proposed improvement on property to be connected to the Everett sewer system constitutes a major project under SEPA guidelines, the mayor or his designee may use the fees established herein as a guideline for mitigation of sewer and water system impacts.

5. Charges for new projects with an estimated water demand in excess of two hundred thousand cubic feet per month shall be determined on a case-by-case basis related to its immediate short-term and long-term impact on the sewer and water systems. Said determinations shall use seven thousand seven hundred five dollars per nine hundred cubic feet per month of estimated water demand to calculate the total charge. The total charge may be reduced or increased based on the following considerations:

a. Proximity to the sewage treatment plant.

b. Pumping requirements to supply water to the proposed development.

c. Pumping requirements to convey the proposed development's sewage effluent to the sewage treatment plant.

d. System improvements to be made by the developer.

e. Peak demand for water. Peak flow for sewer.

f. Fire demand.

g. Estimated sewage effluent quality.

h. Proximity to the water filtration plant.

i. Location outside the city limits.

The minimum utility connection fee shall be the fee charged for a water demand of two hundred thousand cubic feet per month at seven thousand seven hundred five dollars per nine hundred cubic feet per month. Approval of the mayor is required for all connection fees determined under this provision.

K. 1. In calculating reconnections, credit for both water and sewer connection charges shall be given for the historical water consumption of the previous occupancy where a developer is changing the land use or constructing new facilities on a site previously connected to the water and/or the sewer system.

2. In the event an applicant has paid water charges but was not previously connected to the sewer system, said applicant shall pay the sewer connection charge only. (Ord. 3095-08 §§ 1—11, 2008)

14.08.140 Permit to connect to public sewer—Fees.

A. It is unlawful to connect any property or premises with the Everett municipal sewer system, or to make repairs, alterations or additions to a side sewer or drain connecting thereto, without first applying for and securing a permit from the public works department and without paying the fee hereinafter prescribed therefor. This requirement shall apply to all property, including that of the United States of America, the state and any political subdivision thereof.

The permit shall not extend beyond the limits for which the permit has been issued. No permit will be required for the removal of obstructions in a side sewer line when the same can be removed through a cleanout installed for that purpose. Applications for permits must contain the legal description of the property on which the work is to be done; must state the location of the sewer, name of the owner of the premises, the number and location of buildings to be connected; must be made by the owner of the property or premises or by an authorized representative of the owner; and must be accompanied by the current fee established for such permits. Current permit fees are as follows:

Type	Fee
Direct connection public sewer	$60.00 for each direct connection to the public sewer plus $10.00 for each connection of the sanitary building drain to the building's sewer (sometimes referred to as "side sewer")
Alterations or repair to an existing side sewer installed and accepted under a previous permit, other than normal cleanout or root cutting for which no permit is required	$30.00

Installation of catch basins or similar interceptors	–0–
Installation of small yard drains	–0–
Capping of side sewer	$10.00

B. In all cases of dispute regarding fees, permits or other matters relating to this chapter, the decision of the director of public works shall be final and conclusive.

C. The fee shall be paid before the permit is issued and the amount of the fee shall be shown on the permit and on the record of the side sewer connection maintained in the public works department.

D. Permits issued for side sewer and/or drain work shall expire and become null and void one hundred eighty days from date of issue unless a reasonable extension of time is granted by the director of public works. Permits shall be posted at the job on which the work is in progress.

E. Persons desiring to connect a private sewer to a sanitary sewer to serve property which has not been charged with the costs of a lateral sewer and/or trunk sewer and/or special facilities required for acceptance and transportation of sewage by local improvement district assessment, or otherwise, shall pay in addition to the initial connection permit fee above provided, any connection charge required by ordinance of the city. (Ord. 1506-88 § 8, 1988)

14.08.141 Olympus Terrace service area.

A. Special Sewer Service Area. A special sewer service area, to be known hereafter as the “Olympus Terrace service area,” is hereby established within the area as legally described in Exhibit B attached to the ordinance codified in this section and incorporated in this section by reference and as shown on the map attached to said ordinance as Exhibit A.

B. Connection Charges.

1. In addition to current sewer connection permit and inspection fees, as established by the city of Everett, owners of property within the Olympus Terrace service area whose properties connect to public sewer facilities within said area shall pay special sewer connection charges as follows:

a. Area charge in lieu of assessment based on the Olympus Terrace sewer district current rates ($2,871.72 per acre as of October 1997, plus a three dollar and eighty-eight cent per acre per month increase).

b. Connection charges per current connection charge rate schedule of Olympus Terrace sewer district.

2. Permit and inspection fees for connection to public sewer facilities shall be in accordance with the city of Everett’s current fees therefor. All other city of Everett

sewer connection fees, as established by Section 14.08.135 of this code, shall be waived.

C. Monthly Charges.

1. Customers connected to public sewer facilities within the Olympus Terrace service area shall pay to the city of Everett a monthly sewer service rate based on the current sewer service rates established by the Olympus Terrace sewer district (three dollars and fifty-three cents per one thousand gallons per month as of the date of the ordinance codified in this section, subject to increase by the district).

2. In addition to said Olympus Terrace sewer service rates, customers in the Olympus Terrace service area shall be forty-eight percent of the current Everett monthly sewer service rate. Fifty-two percent of the monthly sewer service charges applicable to city of Everett sewer service customers shall be waived for sewer customers in the Olympus Terrace service area.

D. The capacity for total sewage flows from the Olympus Terrace service area is limited to one hundred thousand gallons per day or two hundred pounds of B.O.D., whichever is the lesser, at a maximum peak flow of two hundred gallons per minute with a B.O.D. concentration of not to exceed two hundred forty milligrams per liter. The public works director is authorized to allocate said capacity reasonably among property owners/developers in the areas. Said allocation shall be based on percentage of parcel size to the total Olympus Terrace service total area, capital contributions to local sewer facilities, industrial effluent standards, and any other factors that may assist the director in determining a reasonable allocation.

E. Administration.

1. All persons connected to public sewer facilities within the Olympus Terrace service area shall be sewer customers of the city of Everett and shall be subject to all rules and regulations of the city of Everett applicable to users of city of Everett sewer facilities; provided, that wherever Olympus Terrace sewer district regulations are more stringent, such shall apply.

2. The public works director is hereby authorized to establish rates and charges and rules as necessary to implement this section. (Ord. 2302-98 §§ 1—5, 1998)

14.08.150 Filing and approval of plans.
Before any such permit is granted, a plan of the proposed connections shall be made and presented to the public works department. The plan shall show the course of the drain from the connection with the sewer to its terminus within the house, with the location of all branches, traps and cleanouts to be connected therewith. The director of public works or his designee shall be authorized to issue the permit. (Ord. 1506-88 § 9, 1988)

14.08.160 Inspection and approval of work.
All work done in pursuance of any permit granted as heretofore prescribed, whether on original construction or for repair, shall be under the inspection and subject to the

approval and acceptance of the city. The grade, materials, size of pipe and manner of construction of any sewer or drain built under permit shall be in accordance with standard specifications approved by the public works director, and any licensed sewer contractor who shall refuse to modify, remove, replace or complete any portion of the work when so instructed shall by such refusal forfeit his license, and the persons making such connection, or their successors in interest, shall have no right to claim any damages in consequence of such permission being revoked or annulled. (Ord. 1506-88 § 10, 1988)

14.08.170 Connection specifications.

A. The director of public works is authorized to establish design and construction standards for sewer connection and all connections with public sewers or drains shall be made in a workmanlike manner and in accordance with the city design and construction standards.

B. All excavations made in any street or alley shall be protected and guarded by such permittee, both by day and night, with the proper display of signals and lights, and the permittee shall be responsible for all accidents caused by negligence in this respect. Work in the street must be done in a manner that will occasion the least inconvenience to the public. One-half of the street must be kept clear for the passage of vehicles, and bridgeways must be provided on sidewalks for foot passengers. As soon as any such sewer or drain is completed and inspected, the permittee and/or sewer contractor in charge of such work shall immediately restore and maintain all streets, sidewalks, parking strips and other public areas disturbed or altered in the course of any side sewer or drainage work to the original surface condition and, in the event the applicant fails to immediately restore the area to its original condition, the city shall make such restoration and charge the cost thereof to the applicant who shall, upon receiving written notice of the amount, make immediate payments thereof to the city treasurer. All sewer trenches which have settled due to inadequate backfilling operations shall be immediately restored by permittee and he shall at all times remain liable therefor. All work within the limits of any street or alley must be prosecuted to completion with due diligence, and if, in the judgment of the inspector, any excavation is left open beyond a reasonable time he shall cause the same to be filled and the street or alley restored forthwith, and any cost incurred in such work shall be charged to the permittee and/or the sewer contractor in charge of such work, and must be paid for before he shall receive any further permit. Permittee shall be responsible to follow all safety regulations, particularly but not limited to shoring of excavations over four feet deep. If any work done in pursuance of permit granted as heretofore prescribed be not constructed and completed in accordance with the plan filed, and to the acceptance of the inspector, and the permittee or licensed contractor shall refuse to properly construct and complete the work, notice thereof shall be given to the owner of the property for whom the work is being done and the city shall proceed to complete and connect the sewer in a proper manner, and the full cost of such work and materials necessary therefor shall be charged and become a lien against the property and shall be collected in the manner provided for such liens.

C. Not more than one building shall be connected to a side sewer, except by permission of the director of public works. In all cases where there are houses on

separate lots, they must be connected separately to the main sewer, whether such lots are owned by the same person or by different persons. If two houses are situated on the same lot, one connection to the main sewer may be permitted if approved by the director of public works.

D. Every piece of sewer pipe used in side sewer construction work shall have a bell.

E. All vaults or privies shall be disinfected and filled with fresh earth and all septic tanks, cesspools and similar installations shall be disinfected and filled with fresh earth at the time of the discontinuance of the use thereof.

F. Before any side sewer may be located on any private property, other than that owned by the owner of the side sewer, the owner of the side sewer shall secure from the owner of such property a written easement, duly acknowledged, granting the right to occupy such property for such purpose. Such written easement shall, by the owner of the sewer, be recorded in the office of the county auditor before the director of public works shall issue a permit authorizing the laying of the side sewer in any building site other than the one served by it. The owner shall exhibit to the director of public works the recording number of the easement when required to do so.

G. Where physical conditions render compliance with the foregoing provisions impracticable, the director of public works may issue a special permit for installation of the side sewer requiring compliance with the provisions insofar as is reasonably possible, and such permit shall be issued only upon the condition that the permittee shall record with the county auditor an instrument acceptable to the city agreeing to save harmless and indemnify the city from any damage or injury resulting from such installation. (Ord. 1506-88 § 11, 1988)

14.08.175 Connection to available public sewer—Extension—Forced connection.
A. Within thirty days from the date a public sewer abuts the property line of premises on which any residential, industrial, commercial or public building is placed, the residence, buildings and structures located thereon in which plumbing facilities and/or sanitary sewers are installed shall be connected to the public sewer system by means of a side sewer of a kind and size as required by current City standards.

B. All property owners within one hundred fifty feet of a public sanitary sewer and all property owners adjacent to a street or public right-of-way in which a public sanitary sewer system is installed and available who fail to connect their private sewers to the public sewer system after notice to do so from the public works department shall pay to the city an amount equal to the sewer service charges established for other users of like kind under the city's rates and charges; provided, that all rates and charges so paid shall be credited toward the sewer connection charges applicable to said property at such time as the property is connected. Payments of sewer service and/or construction charges on unconnected properties received prior to said notice shall also be retained by the city and credited to applicable sewer connection charges.

C. The city engineer may, on written request from the property owner, extend the time of the required connection to the public sewer for a maximum period of ten years; provided, that the existing on-site sewage system shall be acceptable to the

Snohomish health district and suitable and reasonable grounds are shown for such extension; provided further, that in no event shall such time extension constitute a waiver of the sewer availability charges established under section B of this section. In the event that the Snohomish health district determines that the on-site sewage system is no longer acceptable within said ten-year extension, the property shall be immediately connected. This time extension shall apply to single-family residential property only; all commercial/industrial and special property use buildings shall be connected.

D. The mayor and city engineer or such other person as the mayor shall appoint are hereby empowered, and it is hereby made their duty, to compel the owners or the occupant of any lot or parcel of real property, the property line of which is abutting a public sewer, to cause to be connected to such public sewer a sufficient sewer or drain pipe from all buildings and structures located thereon used for human occupancy or for use for any other purpose; provided, however, that it shall be unlawful for any person or persons or corporations to make or attempt to make more than one connection to one “Y” or to make more than one such connection to any one standpipe; and no “Y” or standpipe which already has one such connection shall be considered as an accessible point in such sewer as the term is herein used; and provided, further, that no connection shall be made through the top of any standpipe.

E. If any such connection herein required shall not be made within thirty days, or such extension of time as may be granted by the city engineer, after written notice from the mayor or his duly authorized representative to the occupant or owner of such building, structure, lot or parcel or real property, the mayor or his duly authorized representative shall cause such connection to be made by a licensed contractor and file a statement of the cost thereof with the city clerk and thereupon a warrant against the sewer fund in the amount of such cost shall be issued by the city treasurer under the direction of the mayor, payable to the licensed contractor employed to make such connection. The amount of such warrant, together with the amount of any connection charge fixed by ordinance of the city, plus interest at the rate of twelve percent per year upon the total amount of such cost, charge and penalty, shall be assessed against the property with buildings or structures in which the plumbing and sanitary facilities are located, and shall become a lien thereon superior to all other liens or encumbrances except those for general taxes and special assessments. Such total amount when collected shall be paid into the city sewer revenue fund.

F. Such liens may be foreclosed by the city in the manner provided by law for the enforcement of the same and for delinquent sewerage charges. As an additional and concurrent method of enforcing the lien herein provided the city may cut off the water service to the premises to which such sewage disposal service was furnished, and such water service shall remain cut off until all such charges, plus penalties and interest thereon, together with the current applicable charge for turning the water on, shall have been paid.

G. Any person who shall fail to comply with the orders of the mayor or his duly authorized representative as provided in this section, shall be guilty of a misdemeanor punishable by a fine of not to exceed one thousand dollars. (Ord. 2399-99 § 1, 1999)

14.08.180 Backwater valve.
Whenever a situation exists involving an unusual danger of “backup” the city may require a minimum elevation at which the house drain may be discharged to the public sewer. Drains or sewers below such minimum elevation shall be lifted by artificial means. It shall be unlawful for any person to connect any basement with a city sewer without installing a backwater valve at the outlet. All backwater valves shall be installed in a vault to facilitate maintenance. The effective operation of the backwater valve shall be the responsibility of the owner of the sewer or drain. (Ord. 1506-88 § 12, 1988)

14.08.190 Rainwater conductors.
When rainwater roof drains are authorized to be connected to storm sewers or combined sewers, such conductors shall be connected to the main horizontal house drain or to the sewer main line or lateral as required by the director of public works and shall be properly trapped and vented. Drain from roof and/or areas shall be of the capacity in accordance with square footage prescribed in the following areas:

Diameter (in Inches)	Square Feet of Area
2	1,050
3	3,150
4	6,450
5	10,800
6	18,000
8	35,700
10	58,800
12	95,400

Drains serving parking areas or similar impervious ground surface areas may be required to pass through a city-approved catch basin prior to connection to the public system. (Ord. 1506-88 § 13, 1988)

14.08.200 Notification of readiness for inspection.
It shall be the responsibility of any person installing a drain, or making a side sewer connection, alteration, repair and/or extension thereof, for which a permit is required, to notify that the work has been completed and is ready for inspection before backfilling. Upon receiving such notice the inspector shall, within one work day following notice, or such additional time as may be reasonably necessary, inspect the same, and such work must be made in the manner prescribed in this chapter and to the satisfaction of the inspector before trench is backfilled. (Ord. 1506-88 § 14, 1988)

14.08.210 Right of entry.
As a condition of connection to the Everett municipal sewer system, property owners and/or occupants of property connected thereto shall permit the public works director

or his/her authorized representative to enter upon any premises draining sanitary sewage or surface drainage waters into or upon the Everett municipal sewer system at all reasonable hours to ascertain whether the provisions of the ordinance codified in this chapter or any other ordinance pertaining to the Everett municipal sewer system have been complied with, and if he/she shall find any nonconformance with the provisions of the ordinance codified in this chapter or any other ordinance, he/she shall notify the owner of the premises, or his agent, of the fact. It shall thereupon be the duty of the owner or his agent to cause any nonconforming facilities to be so altered, repaired or reconstructed, as to make them conform to the requirements of the law in regard thereto, within fifteen days from the time of receiving notice. Any person who shall refuse to allow inspection as provided in this chapter shall be guilty of a violation of this chapter. (Ord. 1506-88 § 15, 1988)

14.08.220 Interference with sewers—Permit to work near.
It is unlawful for any person or persons to injure, break, remove or otherwise interfere with any portion of any manhole, lamphole, flush-tank or any other part of the Everett municipal sewer system. Repair of any injuries or damage to the system shall require a permit therefor in accordance with the terms of this chapter. (Ord. 1506-88 § 16, 1988)

14.08.230 Matter excluded from all sewers.
A. No person shall discharge substances having the following characteristics into the sewer system:

1. Solid or viscous substances including, but not limited to: ashes, cinders, glass, sand, gravel, mud, coal, straw, rubbish, shavings, grass clippings, metal, rags, feathers, pinfeathers, oils, grease, tar, asphalt, plastics, paraffin, cloth or cloth-cutting wastes, wood, sawdust, brewing or distilling slop, spent grain or hops, paunch manure, entrails, fleshings, hide, hair, offal from livestock, poultry killing and fish processing or waste containing pulped or macerated residue from industries which process fruit, vegetables, fish, meat or similar products;

2. Any matter which is chemically or physically stable for at least five days at twenty degrees centigrade, or which would form a deposit or obstruction or damage or reduce the capacity of the sewer into which it was placed;

3. Flammable, explosive or poisonous liquids, gases or solids or any matter which, after entrance into a sewer, might reasonably be expected to form in any way such flammable, explosive or poisonous liquids, gases or solids;

4. Matter of any nature at a temperature above one hundred fifty degrees Fahrenheit;

5. Liquid matter of any nature containing suspended solids in excess of two hundred fifty parts per million;

6. Matter of any nature containing a five-day biochemical oxygen demand (BOD) in excess of two hundred fifty parts per million;

7. Animal or vegetable greases, oils or matter containing animal or vegetable grease or oil of any nature in excess of fifty parts per million, or any petroleum products;

8. Liquid matter with a hydrogen ion concentration below 6.0 or above 9.0;

9. Substances having a strong odor, unpleasant odor;

10. Substances which can produce a toxic vapor, including, but not limited to, chlorinated hydrocarbons;

11. Food waste which has not been properly shredded so that one hundred percent will pass a three-eighths-inch sieve and seventy-five percent pass a one-fourth-inch sieve. Persons engaged in the retail sale of raw produce shall be limited to one grinder having a prime mover not exceeding five horsepower for the processing of raw produce waste;

12. Waste matter containing daily maximum metal concentrations in excess of state and/or federal laws and regulations;

13. Radioactive waste; and

14. Hazardous wastes concentrations in excess of state and/or federal laws and regulations;

15. Any matter which, in the opinion of the director of public works, might interfere with the satisfactory operation of any treatment plants or any portion of the sewer system.

B. Discharge of substances prohibited under subsection A of this section shall be referred to as “excess pollutant discharge.” In the event that sewage or other matter having or exceeding the above characteristics is discharged into the sewer system, in addition to other remedies, including criminal prosecution, the public works director shall issue a cease and desist order. Further, the public works director shall investigate the circumstances of such excess pollutant discharges or sewer system blockages and estimate the cost of correction and/or treatment of the discharges during the time the discharges have occurred, and the cost of correction or treatment of the discharges shall be added to the sewer charges of the customer discharging the sewage or other matter. The costs shall be collected in the same manner and procedures as all other sewer rates and charges, including lien provisions, and shall be subject to adjustment in accordance with the utility billing supervisor’s procedure.

C. In the event that the public works director finds that excess pollutant discharges of liquids containing suspended solids in excess of two hundred fifty parts per million or matter having a five-day BOD in excess of two hundred fifty parts per million or fats, oils and grease in excess of fifty parts per million may be continued without impairing proper operation of the Everett municipal sewer system, the public works director may issue an excess pollutant discharge permit and establish charges therefor. The permit shall be revocable at any time by the public works director upon finding that continued discharge of sewage exceeding the above standards will impair operation of the Everett sewer system at the time of sewer connection application. All applicants intending to operate any industrial or manufacturing operations shall submit data

concerning type of wastewater discharges and the public works director shall consider issuance of an excess pollutant discharge permit at that time.

D. Correction of sewer system blockages shall be charged on a time and material basis. The city council shall by resolution establish the charges for excess pollutant discharges on the basis of an annual analysis of sewer collection and treatment costs. (Ord. 1506-88 § 17, 1988)

14.08.240 Determination of character of waste matter.
Before any matter of any nature may be discharged into the sewer system, which discharge might reasonably be considered a violation of this chapter, the controlling characteristic of such matter shall be determined to the satisfaction of the public works director. The responsibility of initiating such determinations, of any costs involved, and of submitting the results of the determinations to the public works director for his approval lies solely with the party or parties desiring to discharge the matter into the sewer system. The fact that any matter has been discharged into the sewer system prior to the passage of the ordinance codified in this chapter or subsequent thereto but without any objection from the city does not constitute a valid right to so discharge such matter. (Ord. 1506-88 § 18, 1988)

14.08.250 Pretreatment.
Repealed by Ord. 2034-95. (Ord. 1506-88 § 19, 1988)

14.08.260 Side sewer ownership and maintenance.
A. The city sewer department shall subsequent to approved installation, own, maintain and operate side sewer connections within the boundaries of the public right-of-way. The city sewer department shall not be responsible for maintenance and operation of side sewers outside the public right-of-way.

B. In the event a side sewer becomes blocked or stopped, it shall be the responsibility of the customer whose premises are attached to the side sewer at his expense to investigate, by a roto-rooter type equipment or other approved method, whether the blockage or stoppage is on his premises or within the public right-of-way. In the event that the customer has cause to believe the stoppage is within the public right-of-way, he shall notify the city sewer department which shall investigate and determine the location after the customer has made the initial effort to investigate and remove the side sewer obstruction by the approved methods. The determination of the public works director, or his designee, shall be final and conclusive. If it is determined that the stoppage is within the responsibility of the city, by the city sewer department, and the stoppage is due to a broken side service line within the city right-of-way, the bill for services of the last roto-rooter type contractor shall be paid or reimbursed by the city sewer fund for all work related to investigation and work on the public right of-way, as herein provided, at no cost to the customer. Payment of said bill or said reimbursement in accordance with the aforesaid procedure shall be pursuant to the duty established by this chapter and the city sewer code and a damage claim may be waived.

C. Side sewers shall not be installed nor extended in streets or alleys by customers unless specifically approved by the sewer department prior to such installation and a permit is obtained by the customer from the city engineer's office.

D. Side sewer connections to the sewer main will be made at the owner's expense, under the inspection or supervision of the sewer department. (Ord. 855-82 § 1, 1982; Ord. 296-74 § 1, 1974)

14.08.270 Repair and maintenance of sewer lines.
It shall be the duty of each abutting property owner to repair and maintain the side sewer line serving his property between the premises served and the right-of-way. When any private drain pipe connected with any public sewer or drain becomes obstructed, broken, or out of order, the director of engineering and utilities, or his designee, shall, if the owner, agent or tenant of such premises fails to repair the same after two days notice so to do, cause such drain pipe to be removed, reconstructed, repaired, altered or cleaned out as he may deem expedient, at the expense of the owner, agent or occupant of such premises as aforesaid, and shall be a lien against the property as provided in Section 14.08.250 and shall be collected in the manner provided in Section 14.08.250. (Ord. 296-74 § 2, 1974; prior code § 2.20.230)

14.08.280 Violation—Penalty.
A. Whenever, in the opinion of the mayor, a violation hereof constitutes a hazard to the operation of the Everett municipal sewer system, such violation shall constitute a nuisance for which the city may seek injunctive relief or abatement in a court of competent jurisdiction.

B. Any person violating any of the provisions or failing to comply with any of the mandatory requirements of this chapter shall upon conviction of such violation or failure be punished by a fine of not more than one thousand dollars.

C. Penalty or enforcement provisions in this chapter shall not be exclusive. (Ord. 1506-88 § 20, 1988)

This page of the Everett Municipal Code is current through Ordinance 3255-12, passed January 18, 2012.
Disclaimer: The City Clerk's Office has the official version of the Everett Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

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Chapter 14.10
SEWAGE DISPOSAL SYSTEM

Sections:

14.10.010 Definitions.
14.10.020 General regulations.
14.10.030 Permit—Certificate of competency—Approval requirements.
14.10.040 Discharge requiring purification treatment.
14.10.050 Maintenance of disposal system.
14.10.060 Noncompliance—Nuisance.

14.10.010 Definitions.

A. "Sanitary drainage system" means the piping which conveys sewage from plumbing fixtures to a private sewage disposal system.

B. "Sewage" means any liquid-borne waste from the ordinary living processes, or liquid-borne waste which contains animal or vegetable matter in suspension or solution, or liquid or liquid-borne waste which may contain a chemical in solution, and which may be lawfully discharged into a public sanitary sewer or private sewage disposal system.

C. "Sewage disposal system" means sanitary drainage systems, septic tanks, grease traps, leaching pits, surface and subsurface leaching filter beds, and appurtenances; or other approved facilities for the disposal of sewage by means other than through a public sewer. (Ord. 323-74 § 5, 1974)

14.10.020 General regulations.

Notwithstanding provisions to the contrary, permits authorized by this chapter shall be issued on the following conditions:

A. The city engineer certifying that the premises is not required to be connected to the public sewers as specified in the city code;

B. When a public sewer becomes available, the permit holder is authorized to maintain the sewage disposal system authorized herein for a period not to exceed two years, if the maintenance of the sewage disposal system is not in conflict with the provision herein or the other ordinances of the city;

C. Sewage disposal system is authorized on any building lot of the city as long as no public sewer is available and construction design standards are complied with and satisfactory evidence is furnished that said property percolates. (Ord. 323-74 § 1, 1974)

14.10.030 Permit—Certificate of competency—Approval requirements.

It is unlawful for any person, firm or corporation to:

A. Construct, install or alter a sewage disposal system unless a permit has been issued therefor by the Snohomish health district health authority having jurisdiction over the matter; or

B. To design, construct, install or alter a sewage disposal system unless in possession of such current, valid certificate of competency as is required by the Snohomish health district; or

C. To cause or permit sewage to be carried through such sewage disposal system until final approval for use of such system has been granted by the Snohomish health district. (Ord. 323-74 § 2, 1974)

14.10.040 Discharge requiring purification treatment.
It is unlawful to maintain any sewage disposal system or sanitary drainage system in a manner which shall permit sewage to be directly or indirectly discharged upon the surface of the ground or into any waters of the state unless the contents of said system have been subject to approved purification and bactericidal treatment. (Ord. 323-74 § 3, 1974)

14.10.050 Maintenance of disposal system.
It is the duty of all owners and occupants of premises using disposal systems to at all times maintain the same in such a manner as to protect the public health and welfare; and in event a disposal system fails to function properly although constructed in accordance with this chapter, the same shall be forthwith reconstructed in order to place the same in a sanitary condition. (Ord. 323-74 § 4, 1974)

14.10.060 Noncompliance—Nuisance.
Compliance with the terms and conditions of this chapter constitutes minimum health, sanitation and safety provisions and material; noncompliance with said terms and conditions constitutes a public nuisance and is subject to all criminal, civil and equitable remedies as such. (Ord. 323-74 § 7, 1974)

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Chapter 14.12
CESSPOOLS, SEPTIC TANKS, ETC.

Sections:

14.12.010 License required.
14.12.020 Points of disposal.
14.12.030 License applications.
14.12.040 License fees.
14.12.050 Volume fee.
14.12.060 Bond required—Licensee responsibility.
14.12.070 Insurance.
14.12.080 Points of disposal—License revocation suspension.
14.12.090 Methods of discharge.
14.12.100 Violation of provisions.
14.12.110 Prohibited discharges.
14.12.120 Penalty for violations.

14.12.010 License required.

A. It is unlawful for persons engaged in the business of disposal of materials to discharge sewage or like materials from cesspools, septic tanks, holding tanks, chemical toilets, portable toilets and privies into the city sewage system at any point of disposal without having first obtained from the city a written license to do so. This license shall be in addition to all other permits and/or licenses required by law, and shall be issued only to the holder of a proper registration and inspection certificate issued by the Snohomish County health department to carry on or engage in the business of cleaning septic tanks, cesspools, grease traps and seepage pits.

B. A separate license shall be obtained for each vehicle so used, which license shall be prominently displayed in or on the vehicle at all times. No license may be transferred from one vehicle to another except in the event of loss, destruction or replacement of a vehicle. The city clerk shall issue replacement license only with the approval of the sewer superintendent.

C. The name of the person, persons or business to whom the license is granted and the license number shall be prominently displayed on the vehicle. (Ord. 801-81 § 1, 1981)

14.12.020 Points of disposal.

It is unlawful for persons engaged in the business of disposal of material to discharge sewage or like materials from cesspools, septic tanks, holding tanks, chemical toilets, portable toilets and privies into the city sewage system except at points of disposal authorized by the sewer superintendent. (Ord. 801-81 § 2, 1981)

14.12.030 License applications.

Applications for licenses to discharge sewage or like materials from cesspools, septic tanks, holding tanks, chemical toilets, portable toilets and privies into the city sewage system shall be completed on such forms as are required by the sewer superintendent

and submitted to the city clerk. Upon approval of such application form by the sewer superintendent, together with assurance of compliance of all terms of this chapter, the city clerk is authorized to grant said license. (Ord. 801-81 § 3, 1981)

14.12.040 License fees.

A. The annual fee for a license to discharge sewage or like materials from cesspools, septic tanks, holding tanks, chemical toilets, portable toilets and privies into the city sewage system shall be one hundred dollars for each vehicle having capacity of twenty -five hundred gallons or less, and one hundred sixty dollars for each vehicle having capacity in excess of twenty-five hundred gallons which is employed or used by the license holder for the hauling and discharge of such materials. Said fees shall be considered as sewer revenues. Said license shall be an annual license which shall expire December 31st of each year.

B. In lieu of the annual license herein established and heretofore required by the city, there is established a semiannual license to discharge sewage or like material from cesspools, septic tanks, holding tanks, chemical toilets, portable toilets and privies into the city sewage system, the fee for which shall be fifty dollars for each vehicle having a capacity of twenty-five hundred gallons or less and eighty dollars for each vehicle having a capacity in excess of twenty-five hundred gallons which is employed or used by the license holder for the hauling and discharge of such material. The fees shall be considered sewer revenues. All licenses issued in any month subsequent to July 31st shall be issued upon payment of a semiannual license fee. All licenses issued prior to July 31st shall be issued upon payment of an annual license fee.

C. No refund of any license fee shall be granted for cessation of operations prior to the expiration of the license. Discharge of such materials without renewal of the license shall be considered a violation of Section 14.12.020. (Ord. 801-81 § 4, 1981)

14.12.050 Volume fee.

In addition to the license fee established in Section 14.12.040, there is hereby established a volume fee. For discharging septic waste there is established a fee of 3.35′ per gallon discharged. For discharging chemical toilet waste, there is established a fee of 2.25′ per gallon discharged. For discharge of leachate from the Cathcart Sanitary Landfill, there is established a charge of 2.25′ per gallon discharged. After December 31, 1985, any changes in the volume fee shall be established by resolution of the city council. Septic waste shall include that material taken from cesspools, septic tanks and holding tanks. Chemical toilet waste shall include that material taken from chemical toilets, portable toilets and privies. If a truck load contains both septic waste and chemical toilet waste, the licensee shall be charged per the septic waste rate. The charge levied to the licensee shall be based upon the registered truck volume for each load discharged unless previously arranged otherwise. Furthermore, there shall be a surcharge equal to twenty-five percent of the volume fee for those hauling septic waste from outside the city of Everett and a surcharge of twenty-five percent for those hauling chemical toilet waste from outside the city of Everett beginning October 1, 1981, through December 31, 1983, and a fifty percent surcharge thereafter.

The volume fee shall be paid to the city within fifteen days of mailing the bill therefor by the city. In the event of nonpayment of the volume fee, the license shall be cancelled. If the licensee questions the amount owing, the licensee must contact the city prior to the fifteenth day in which event the procedure set forth in Sections 14.32.060, 14.32.070, 14.32.080 and 14.32.090 (as is or is hereafter amended) will be followed. A licensee who appeals pursuant to the above procedure will not be subject to loss of license during the appeal proceedings; provided that undisputed amounts are paid. (Ord. 1110 -85 § 1, 1985; Ord. 914-82 § 1, 1982; Ord. 801-81 § 5, 1981)

14.12.060 Bond required—Licensee responsibility.

A. Each applicant shall be required to post a continuing cash bond or surety bond in the amount of ten thousand dollars to assure the city of licensee's full performance of all requirements under this chapter including any past due payments as required under Section 14.12.050. At the expiration of the license period, the cash bond shall be returned to the permittee upon written request therefor or the permittee may authorize said bond to be retained to secure a subsequent license.

B. Licensee shall be responsible for negligent or non-negligent damaging by the licensee of property owned or used by the city and all costs incurred by the city as a result of any failure of the licensee to comply with the terms of the license. Failure to pay damages to the city upon demand shall be grounds for revocation of this license. (Ord. 801-81 § 6, 1981)

14.12.070 Insurance.

Each licensee shall hold harmless the city of Everett, its agents, officials and employees against all claims arising out of all operations relating to disposal of material into the city sewage system pursuant to this chapter and each applicant shall submit an insurance certificate with a loss-payee clause demonstrating bodily injury and property damage liability insurance with combined single limits of five hundred thousand dollars each occurrence and said certificate will include the city as a named insured under said policy. Nothing herein shall in any manner preclude the applicant from obtaining such additional insurance coverage as he may deem necessary for his own protection. Cancellation of the required insurance shall be grounds for immediate revocation of the license. The city shall be entitled to thirty days' notice prior to cancellation. (Ord. 801-81 § 7, 1981)

14.12.080 Points of disposal—License revocation suspension.

The sewer superintendent is authorized to designate the points of disposal of materials collected by the licensees. The sewer superintendent or the city clerk is further authorized to revoke or suspend licenses for failure to comply with the provisions of this chapter, subject to the right of persons affected to appeal from such revocation or suspension to city council pursuant to the provisions of Section 5.04.080(B) as it is or is hereafter amended. The licensee shall complete a discharge form and return said form to the septic dump site operator prior to any discharge from permittee's vehicle. Upon approval of the discharge form by the septic dump site operator, the licensee may discharge into the specified dump site manhole. (Ord. 801-81 § 8, 1981)

14.12.090 Methods of discharge.
The licensee shall use a hose to discharge materials into the city sewage system and discharge shall be in a clean and inoffensive manner satisfactory to the sewer superintendent. Equipment and methods used by the licensee to discharge such materials shall be subject to inspection by and/or approval by the sewer superintendent except that the sewer superintendent may waive such inspection upon submittal, by the applicant, of a valid registration and inspection certificate issued by the Snohomish County health district. Failure to comply with the requirements of the sewer superintendent with regard to equipment and methods of discharge shall be grounds for revocation of the license. (Ord. 801-81 § 9, 1981)

14.12.100 Violation of provisions.
A license may be revoked or suspended by the sewer superintendent or the city clerk for failure to discharge at designated points or for any discharge which is in violation of the provisions of this chapter or the rules and regulations as promulgated by the sewer superintendent. (Ord. 801-81 § 10, 1981)

14.12.110 Prohibited discharges.
No person shall discharge, directly or indirectly, into the city sewage system any material or substance which is prohibited by any rules, regulations or ordinances of the city. (Ord. 801-81 § 11, 1981)

14.12.120 Penalty for violations.
Any person who violates any provision of this chapter shall be guilty of a misdemeanor and upon conviction shall be punishable by a fine of not more than five hundred dollars or six months in jail or both. (Ord. 801-81 § 12, 1981)

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Chapter 14.32
WATER AND SEWER UTILITY SERVICE CHARGES

Sections:

14.32.010 Utility bills—Delinquency.
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14.32.030 Collection—Contact with customer—Information.
14.32.040 Collection—Notice in lieu of contact.
14.32.050 Shutoff notice.
14.32.060 Review of disputed bills.
14.32.070 Right of appeal.
14.32.080 Deferred payments.
14.32.090 Additional costs.

14.32.010 Utility bills—Delinquency.
Utility bills shall be delinquent fifteen days from date of mailing. The customer will be notified by past due reminder on or after the sixteenth day of delinquency that the bill must be paid within five business days from the date of this letter or the water service will be shut off. (Ord. 585-79 § 1, 1979)

14.32.020 Delinquent accounts—Collection.
After the expiration of five business days from the date the delinquent letters were mailed, a field serviceman will be given a list of the delinquent accounts to call on in the field to try to make collection. (Ord. 585-79 § 2, 1979)

14.32.030 Collection—Contact with customer—Information.
If contact is made with the customer, the serviceman will explain the following:

A. The amount of the delinquency;

B. That he is there to shut the water off for nonpayment, that if the customer questions the amount payable, he has a right to discuss his bill during city working hours with an employee or officer of the city who is authorized to review disputed bills and correct any errors. If the serviceman is not so authorized, then the serviceman will inform the customer where and how an authorized employee or officer may be contacted and that such contact must be made immediately to avoid cutting off water service;

C. That he can accept a payment in full by check or money order;

D. That if unable to pay in full, arrangements for partial payment will have to be made by contacting the delinquent billing clerk;

E. That if the bill is not disputed and payment or arrangements are not made within twenty-four hours, he will return and shut off the water without further notice. (Ord. 585-79 § 3, 1979)

14.32.040 Collection—Notice in lieu of contact.

A. If at the time the field serviceman calls at a customer's residence and contact is not made with the customer, he will leave a notice stating substantially as follows: "Your unpaid account amounts to $_____. If you question whether the amount shown is due, you must immediately contact (title of authorized representative to review disputed bills and correct errors) at ____ between the hours of ___ and ___, Monday through Friday and discuss the matter or make an appointment with (employee or title of officer or title of person authorized to review disputed bills and correct errors). Otherwise, if the amount is not paid by ____, the service will be cut off without further notice."

B. Service will be restored during regular hours only after the full amount due and a fifteen dollar reconnection charge has been paid. (Ord. 585-79 § 4, 1979)

14.32.050 Shutoff notice.

When the water has been shut off, a notice shall be left notifying customer. (Ord. 585-79 § 5, 1979)

14.32.060 Review of disputed bills.

The budget and finance director, or person he designates, shall be authorized to review disputed bills and correct errors. Customers who question or dispute their bills shall have the right to an informal conference with an employee or officer of the city so authorized by the budget and finance director to review disputed bills and correct errors, during regular business hours, eight a.m. to four p.m., Monday through Friday at _____. (Ord. 585-79 § 6, 1979)

14.32.070 Right of appeal.

A. Customers who disagree with the decisions of city officers or employees after informal conferences shall have the further right to appeal to the budget and finance director, or such supervisory officer as the budget and finance director may designate.

B. Customers who are appealing the decision of the informal conference will not be subject to water shutoff during the appeal proceedings; provided, that undisputed amounts are paid.

C. Appeals resulting from informal conferences must be submitted with the reasons therefor within five business days following the decision from the informal conference. Appeals shall be made in writing and be addressed to the Budget and Finance Director, City Hall, Everett, Washington, 98201.

D. Appeal hearings shall be conducted during the hours of nine a.m. to four p.m., Monday through Friday, within seven business days following appeal of the employee decision.

E. A written decision shall be delivered to the customer by hand or certified mail within three business days following the appeal hearing. If the customer refuses to accept delivery of the written decision or fails to make the payments required by the decision, the city may disconnect the customer's service without further notice. (Ord. 585-79 § 8, 1979)

14.32.080 Deferred payments.

The budget and finance department shall establish uniform procedures for deferred payment arrangements. (Ord. 585-79 § 7, 1979)

14.32.090 Additional costs.

The budget and finance department may assess reasonable charges for costs relating to certain collection actions to partially offset operational expenses involved for the sewer and water utility. (Ord. 585-79 § 9, 1979)

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Chapter 14.36
LATECOMER AGREEMENTS

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14.36.050 Application requirements—Fee.
14.36.060 Eligibility of applicants.
14.36.070 Street system improvement—Procedure.
14.36.080 Utility system improvements—Procedure.

14.36.010 Definitions.
The following definitions control for purposes of this chapter:

A. 1. “Street system improvements” include the acquisition of right-of-way and/or easements, design, grading, paving, installation of curbs, gutters, storm drainage, sidewalks, street lighting, traffic controls and other similar improvements as required by the street standards of the city. A latecomer agreement shall not be approved for the improvement of a developer’s abutting rights-of-way and transitions as required by city ordinance. An exception may apply where vertical grade and alignment changes are required by the city engineer to promote traffic safety and the city engineer recommends a latecomer agreement.

2. No latecomer agreement shall be approved for street improvements that do not include concrete curb, gutter and sidewalks on the benefiting side of the street. The appropriate asphalt width shall be determined by city ordinance in accordance with current design and construction standards and specifications.

3. No latecomer agreement shall be approved for alley improvements.

B. “Utility system improvements” shall include the acquisition of right-of-way and/or easements, design and installation of the system to city design standards including:

1. “Water” includes such things as mains and appurtenances including service lines, valves, fire hydrants, pumping of pressure reducing stations, testing, etc.

2. “Sewer” includes such things as mains and related appurtenances including side sewers, lift stations, telemetering facilities, testing, etc.

3. “Storm drainage” includes such things as mains and related appurtenances including public detention facilities. (Ord. 1115-85 § 2, 1985)

14.36.020 Application authorized—Purpose—Term.
Any developer utilizing private funds to install street, water or sewer (sanitary and/or storm) improvements and appurtenances costing more than four thousand dollars, said

limit to be adjusted annually in accordance with the ENR (Engineering News-Record) Index, on public right-of-way may apply to the city to establish a latecomer agreement for recovery of a pro rata share of the cost of constructing said public improvements from other practices that will later derive a benefit from said improvements. No latecomer agreement shall extend for a period longer than ten years from the date of final acceptance by the city. The city council shall have discretion to authorize or not to authorize latecomer agreements on a case-by-case basis. (Ord. 1115-85 § 1, 1985)

14.36.030 Guidelines establishment authority.
The city engineer shall establish guidelines and rules, regulations, policies and procedures for all applications for latecomer agreements. (Ord. 1115-85 § 3, 1985)

14.36.040 Rights and nonliability of city.
The city reserves the right to refuse to enter into any latecomer agreement or to reject any application therefor. All applications for latecomer agreements shall be made on the basis that the applicant releases and waives any claims for any liability of the city in establishment and enforcement of latecomer agreements. The city shall not be responsible for locating any beneficiary or survivor entitled to benefits by or through latecomer agreements. Any collected funds unclaimed by developers after three years from the expiration of the agreement shall be returned to parties making payment to the city. Any remaining undeliverable funds shall inure to the benefit of the appropriate utility and/or fund approved by city council. (Ord. 1115-85 § 4, 1985)

14.36.050 Application requirements—Fee.
All applications for latecomer agreements shall be on forms approved and established by the city engineer and shall be accompanied by a nonrefundable application fee of two hundred dollars plus twenty-five dollars for every separate parcel to be encumbered by the agreement to cover the city's expenses in processing the application. The city engineer shall establish other requirements for the form of the application. (Ord. 1115-85 § 5, 1985)

14.36.060 Eligibility of applicants.
Applicants for latecomer agreements shall be in compliance with all city ordinances, rules and regulations to be eligible for processing of latecomer agreements. (Ord. 1115 -85 § 6, 1985)

14.36.070 Street system improvement—Procedure.
The procedures to be followed for latecomer agreements for street system improvements shall be as follows:

A. City will formulate an assessment reimbursement area (benefit area) based upon a determination of which parcels adjacent to the improvements would require similar street improvements upon development.

B. The preliminary determination of area boundaries and assessments, along with a description of the property owners' rights and options, shall be forwarded by registered mail to the property owners of record as shown on the records of the Snohomish County assessor within the proposed assessment area. If any property owner requests a hearing in writing within twenty days of the mailing of the preliminary determination, a

hearing shall be held before the city council, notice of which shall be given to all affected property owners at least ten days in advance of the council meeting. The city council's ruling is determinative and final.

C. The latecomer agreements must be recorded in the Snohomish County auditor's office within thirty days of the final execution of the agreement. It shall be the sole responsibility of the latecomer applicant to record said agreement.

D. Once recorded, the latecomer agreement shall be binding on owners of record within the assessment area who are not party to the agreement.

E. All notice requirements set forth herein shall be the sole responsibility of the applicant for latecomer's agreement and shall be satisfied by a notarized affidavit that the applicant has mailed the notices pursuant to the requirements set forth herein. (Ord. 1115-85 § 7, 1985)

14.36.080 Utility system improvements—Procedure.
The procedures to be followed for latecomer agreements for utility system improvements shall be as follows:

A. City will formulate an assessment reimbursement area (benefit area) based upon a determination of which parcels did not contribute to the original cost of such utility system improvement and who may subsequently tap onto, drain to, or use the same including users connected to laterals or branches connecting thereto.

B. The preliminary determination of area boundaries and assessments, along with a description of the property owners' rights and options, shall be forwarded by registered mail to the property owners of record as shown on the records of the Snohomish County assessor within the proposed assessment area. If any property owner requests a hearing in writing within twenty days of the mailing of the preliminary determination, a hearing shall be held before the city council, notice of which shall be given to all affected property owners at least ten days in advance of the council meeting. The city council's ruling is determinative and final.

C. The latecomer agreements must be recorded in the Snohomish County auditor's office within thirty days of the final execution of the agreement. It shall be the sole responsibility of the latecomer applicant to record said agreement.

D. Once recorded, the latecomer agreement shall be binding on owners of record within the assessment area who are not party to the agreement.

E. All notice requirements set forth herein shall be the sole responsibility of the applicant for latecomer agreement and shall be satisfied by a notarized affidavit that the applicant has mailed the notices pursuant to the requirements set forth herein. (Ord. 1115-85 § 8, 1985)

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Chapter 14.40
WASTEWATER PRETREATMENT REGULATIONS

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Article I. General Provisions

14.40.010 Purpose and policy.
This chapter sets forth uniform requirements for users of the publicly owned treatment works (POTW) for the city of Everett, and enables the city to comply with all applicable state and federal laws, including the Clean Water Act (33 USC 1251 et seq.) and the General Pretreatment Regulations (40 CFR Part 403). The objectives of this chapter are:

A. To prevent the introduction of pollutants into the POTW that will interfere with the operation of the POTW;

B. To prevent the introduction of pollutants into the POTW which will pass through the POTW, inadequately treated, into receiving waters or otherwise be incompatible with the POTW;

C. To ensure that the quality of the wastewater treatment plant biosolids is maintained at a level which allows their use and disposal in compliance with applicable statutes and regulations;

D. To protect POTW personnel who may be affected by wastewater, wastewater solids, and biosolids in the course of their employment and to protect the general public;

E. To improve the opportunity to recycle and reclaim wastewater and biosolids from the POTW;

This chapter shall apply to all users of the POTW. This chapter authorizes the issuance of wastewater discharge permits and discharge authorizations; authorizes monitoring, compliance, and enforcement activities; establishes administrative review procedures; requires user reporting; and provides for the setting of fees for the equitable distribution of costs resulting from the program established herein. (Ord. 3070-08 § 1.1, 2008)

14.40.020 Administration.
Except as otherwise provided herein, the director shall administer, implement, and enforce the provisions of this chapter. Any powers granted to or duties imposed upon the director may be delegated by the director to other city of Everett personnel. The director may create administrative guidelines to implement the provisions of this chapter. (Ord. 3070-08 § 1.2, 2008)

14.40.030 Definitions.
Unless a provision explicitly states otherwise, the following terms and phrases, as used in this chapter, shall have the meanings hereinafter designated.

A. “Accessible,” when applied to required pretreatment monitoring or treatment equipment, shall mean direct access without the necessity of removing any panel, door, vehicle, equipment, materials, or other similar obstruction.

B. “Act” or “the Act” means the Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251 et seq.

C. “Administrative penalty (fine)” means a punitive monetary charge unrelated to treatment cost, which is assessed by the director rather than a court.

D. “Applicable pretreatment standards” means, for any specified pollutant, Everett prohibitive standards, Everett specific pretreatment standards (local limits), state of Washington pretreatment standards, or the EPA’s categorical pretreatment standards (when effective), whichever standard is appropriate and most stringent.

E. “Approval authority” means the State of Washington Department of Ecology.

F. “Authorized representative of the user” means:

1. If the user is a corporation:

a. The president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

b. The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiate and direct other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; can ensure that the necessary systems are established or actions taken to gather complete and accurate information for control mechanism requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. If the user is a partnership or sole proprietorship: a general partner or proprietor, respectively;

3. If the user is a federal, state, or local governmental facility: a director or highest official appointed or designated to oversee the operation and performance of the activities of the government facility, or his/her authorized designee.

4. The individuals described in subsections (F)(1) through (3) of this section may designate another authorized representative if the authorization is in writing, the authorization specifies the individual or position responsible for the overall operation of the facility from which the discharge originates or having overall responsibility for environmental matters for the company, and the written authorization is submitted to the city.

G. “Average daily flow” shall be defined as the arithmetical mean of the total process wastewater flow over a one-year period. This mean shall be calculated based on days when a discharge occurs.

H. Best Management Practices (BMPs). The term “best management practices” or “BMPs” means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the prohibitions listed in 40 CFR 403.5(a)(1) and (b). BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.

I. “Biochemical oxygen demand (BOD)” means the quantity of oxygen utilized in the biochemical oxidation of organic matter amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, current approved edition; under standard laboratory procedures for five days at twenty degrees centigrade, usually expressed as a concentration (milligrams per liter (mg/L)).

J. “Categorical pretreatment standard” or “categorical standard” means any regulation containing pollutant discharge limits promulgated by the U.S. EPA in accordance with Sections 307(b) and (c) of the Act (33 USC 1317) which apply to a specific category of users and which appear in 40 CFR Chapter I, Subchapter N, Parts 405 through 471.

K. “Categorical user” means a user covered by one of the EPA’s categorical pretreatment standards.

L. “Chemical oxygen demand (COD)” means a measure of the oxygen-consuming capacity of inorganic and organic matter present in wastewater amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, current approved edition. COD is expressed as the amount of oxygen consumed from a chemical oxidant in mg/L during a specific test.

M. “City” means the city of Everett, Washington.

N. “Cooling water/noncontact cooling water” means water used for cooling which does not come into direct contact with any raw material, intermediate product, waste product, or finished product. Cooling water may be generated from any use, such as air conditioning, heat exchangers, cooling or refrigeration, to which the only pollutant added is heat.

O. “Color” means the optical density at the visual wavelength of maximum absorption, relative to distilled water. One hundred percent transmittance is equivalent to zero (0.0) optical density.

P. “Commercial user” means any discharger of industrial waste that does not meet the definition of a significant industrial user.

Q. “Composite sample” means the sample resulting from the combination of individual wastewater samples taken at selected intervals based on an increment of either flow or time.

R. “Day” shall be defined as a calendar day.

S. “Director” means the director of the city of Everett public works department, or his duly authorized representative.

T. “Discharge authorization” means a wastewater discharge permit authorizing users to discharge wastewater to the Everett POTW. These permits would be for users other than significant industrial dischargers, or categorical industries, but still requiring a control mechanism.

U. “Domestic sewage” means the liquid and water-borne wastes derived from ordinary living processes, free from industrial wastes, and of such character to permit satisfactory disposal, without special treatment, into the POTW.

V. “Domestic user (residential user)” means any person who contributes, causes, or allows the contribution of wastewater into the city POTW that is of a similar volume and/or chemical make-up as that of a residential dwelling unit. Discharges from a residential dwelling unit typically include up to one hundred gallons per capita per day at two hundred mg/L of BOD and TSS.

W. “Environmental Protection Agency (EPA)” means the U.S. Environmental Protection Agency or, where appropriate, the Regional Water Management Division Director, or other duly authorized official of said agency.

X. Existing Source. For a categorical industrial user, an “existing source” is any source of discharge, the construction or operation of which commenced prior to the publication by the EPA of proposed categorical pretreatment standards, which will be applicable to such source if the standard is thereafter promulgated in accordance with Section 307 of the Act.

Y. Existing User. For noncategorical users an “existing user” is defined as any user which is discharging wastewater prior to the effective date of the ordinance codified in this chapter.

Z. Fats, Oils and Grease (FOG). The term “fats, oils, and grease” shall mean those components of wastewater amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, current approved edition. The term “fats, oils and grease” shall include polar and nonpolar fats, oils, and grease and other components extracted from wastewater by these methods.

AA. General Permit. At the discretion of the director, groups of users may be regulated under general control mechanisms if the following conditions are met. All of the facilities to be covered must:

1. Involve the same or substantially similar types of operations;

2. Discharge the same types of wastes;

3. Require the same effluent limitations;

4. Require the same or similar monitoring; and

5. In the opinion of the POTW, are more appropriately controlled under a general control mechanism than under individual control mechanisms.

AB. “Grab sample” means a sample which is taken from a wastestream on a one-time basis without regard to the flow in the wastestream and without consideration of time.

AC. “Grease interceptor” means an interceptor of at least seven hundred fifty gallon capacity to serve one or more fixtures and which shall be remotely located.

AD. “Grease trap” means a device designed to retain grease from one to a maximum of four fixtures.

AE. “High-strength waste” means any waters or wastewater having a concentration of BOD or total suspended solids in excess of two hundred fifty mg/L, or having a concentration of fats, oil and grease in excess of fifty mg/L.

AF. “Indirect discharge” or “discharge” means the introduction of pollutants into the POTW from any nondomestic source regulated under Section 307(b), (c), or (d) of the Act. The discharge into the POTW is normally by means of pipes, conduits, pumping stations, force mains, constructed drainage ditches, surface water intercepting ditches, and all constructed devices and appliances appurtenant thereto.

AG. “Industrial user” means any discharger of industrial waste that meets the definition of a significant industrial user.

AH. “Industrial waste” means any and all liquid or water borne waste from industrial or commercial processes, except domestic sewage.

AI. “Interceptor” means a device designed and installed so as to separate and retain deleterious or undesirable matter from normal wastes and permit normal liquid wastes to discharge by gravity.

AJ. “Interference” means a discharge which, alone or in conjunction with a discharge or discharges from other sources, either: (1) inhibits or disrupts the POTW, its treatment processes or operations; (2) inhibits or disrupts its biosolids (sludge) processes, use or disposal; or (3) is a cause of a violation of the city’s NPDES permit or of the prevention of sewage sludge use or disposal in compliance with any of the following statutory/regulatory provisions or permits issued thereunder: Section 405 of the Clean Water Act; the Solid Waste Disposal Act (SWDA), including Title II, commonly referred to as the Resource Conservation and Recovery Act (RCRA); any state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA; the Clean Air Act; the Toxic Substances Control Act; and the Marine Protection, Research, and Sanctuaries Act.

AK. “Liquid waste” is the discharge from any fixture, appliance or appurtenance in connection with a plumbing system which does not receive fecal matter.

AL. “Maximum allowable discharge limit” means the maximum concentration (or loading) of a pollutant allowed to be discharged at any time.

AM. “Medical wastes” means isolation wastes, infectious agents, human blood and blood products, pathological wastes, sharps, body parts, contaminated bedding, surgical wastes, potentially contaminated laboratory wastes, and dialysis wastes.

AN. Middle Tier Significant Categorical Industrial User. At the director’s discretion, a categorical industrial user may be deemed a “middle tier significant CIU” where the industrial user meets all of the following conditions:

1. The industrial user’s total categorical wastewater flow does not exceed any of the following:

a. 0.01 percent of the design dry weather hydraulic capacity of the POTW, or five thousand gallons per day, whichever is smaller, as measured by a continuous effluent flow monitoring device unless the industrial user discharges in batches;

b. 0.01 percent of the design dry weather organic treatment capacity of the POTW; and

c. 0.01 percent of the maximum allowable headworks loading for any pollutant regulated by the applicable categorical pretreatment standard for which approved local limits were developed by the POTW;

2. The industrial user has not been in significant noncompliance, as defined in 40 CFR 403.8(f)(2)(viii), for any time in the past two years;

3. The industrial user does not have daily flow rates, production levels, or pollutant levels that vary so significantly that decreasing the reporting requirement for this industrial user would result in data that are not representative of conditions.

AO. “New source” means:

1. Any building, structure, facility, or installation from which there is (or may be) a discharge of pollutants, the construction of which commenced after the publication of proposed pretreatment standards under Section 307(c) of the Act which will be applicable to such source if such standards are thereafter promulgated in accordance with that section; provided, that:

a. The building, structure, facility, or installation is constructed at a site at which no other source is located; or

b. The building, structure, facility, or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or

c. The production or wastewater-generating processes of the building, structure, facility, or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant and the extent to which the new facility is engaged in the same general type of activity as the existing source should be considered.

2. Construction on a site at which an existing source is located results in a modification rather than a new source, if the construction does not create a new building, structure, facility, or installation meeting the criteria of subsection (AO)(1)(b) or (c) of this section but otherwise alters, replaces, or adds to existing process or production equipment.

3. Construction of a new source as defined under this subsection has commenced if the owner or operator has:

a. Begun, or caused to begin as part of a continuous on-site construction program:

i. Any placement, assembly, or installation of facilities or equipment; or

ii. Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or

b. Entered into a binding contractual obligation for the purchase of facilities or equipment which are intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this subsection.

AP. New User. A “new user” is not necessarily a “new source” and is defined as a user that applies to the city for a new building permit or any person who occupies an existing building and plans to discharge wastewater to the city’s collection system after the effective date of the ordinance codified in this chapter. Any person who buys an existing facility that is discharging nondomestic wastewater will be considered an “existing user” if no significant changes are made in the operation.

AQ. “Nonsignificant categorical industrial user” means a categorical industrial user that meets the restrictions laid out in subsection (BH)(3) of this section.

AR. “Pass through” means a discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the city’s NPDES permit (including an increase in the magnitude or duration of a violation).

AS. “Permittee” means a person or user issued a wastewater discharge permit or discharge authorization.

AT. “Person” means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity, or their legal representatives, agents, or assigns. This definition includes all federal, state, or local governmental entities.

AU. “pH” is a measure of the acidity or alkalinity of a substance, expressed in standard units.

AV. “Pollutant” means any dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, medical wastes, chemical wastes, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt, agricultural and industrial wastes, and the characteristics of the wastewater (i.e., pH, temperature, TSS, turbidity, color, BOD, chemical oxygen demand (COD), toxicity, or odor).

AW. “Pretreatment” means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to (or in lieu of) introducing such pollutants into the POTW. This reduction or alteration can be obtained by physical, chemical, or biological processes; by process changes; or by other means (except by diluting the concentration of the pollutants unless allowed by an applicable pretreatment standard).

AX. “Pretreatment requirements” means any substantive or procedural requirement related to pretreatment imposed on a user, other than a pretreatment standard.

AY. “Pretreatment standards” or “standards” shall mean prohibited discharge standards, categorical pretreatment standards, and local limits established by the city (POTW).

AZ. “Process wastewater” is industrial waste minus cooling water/noncontact cooling water.

BA. “Prohibited discharge standards” or “prohibited discharges” means absolute prohibitions against the discharge of certain substances; these prohibitions appear in Section 14.40.050(A) and (B).

BB. “Publicly owned treatment works (POTW)” means a “treatment works,” as defined by Section 212 of the Act (33 USC 1292), which is owned by the city. This definition includes all devices, facilities, or systems used in the collection, storage, treatment, recycling, and reclamation of sewage or industrial wastes of a liquid nature and any conveyances which convey wastewater to a treatment plant. The term also means the city of Everett water pollution control facility.

BC. Sanitary Flow. See “Sewage.”

BD. “Septic tank waste” means any domestic and/or residential sewage from holding tanks such as vessels, chemical toilets, campers, trailers, and septic tanks.

BE. “Sewage” means human excrement and gray water (household showers, dishwashing operations, food preparation, etc.).

BF. “Sewer” means any pipe, conduit, ditch, or other device used to collect and transport sewage from the generating source.

BG. Shall, May. “Shall” is mandatory, “may” is permissive.

BH. Significant Industrial User (SIU). Except as provided in subsections (BH)(3) and (4) of this section, the term “significant industrial user” means:

1. All industrial users subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR Chapter I, subchapter N; and

2. Any other industrial user that:

a. Discharges an average of twenty-five thousand gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater);

b. Contributes a process wastestream which makes up five percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or

c. Is designated as such by the control authority on the basis that the industrial user has a reasonable potential for adversely affecting the POTW’s operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

3. The control authority may determine that an industrial user subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR Chapter I, subchapter N is a nonsignificant categorical industrial user rather than a significant industrial user on a finding that the industrial user never discharges more than one hundred gallons per day (gpd) of total categorical wastewater (excluding sanitary, noncontact cooling and boiler blowdown wastewater, unless specifically included in the pretreatment standard) and the following conditions are met:

a. The industrial user, prior to the control authority's finding, has consistently complied with all applicable categorical pretreatment standards and requirements;

b. The industrial user annually submits the certification statement required in 40 CFR 403.12(q) together with any additional information necessary to support the certification statement; and

c. The industrial user never discharges any untreated concentrated wastewater.

4. Upon a finding that an industrial user meeting the criteria in subsection (BH)(2)(b) of this section has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standards or requirement, the control authority may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

BI. "Slug load" means any discharge at a flow rate or concentration which could cause a violation of the discharge standards in Sections 14.40.050 through 14.40.080 or any discharge of a nonroutine, episodic nature, including but not limited to an accidental spill or a noncustomary batch discharge, or any discharge greater than or equal to five times the amount or concentration allowed by permit or this chapter. This five-times level is based on an instantaneous measurement.

BJ. "Standard Industrial Classification (SIC) Code" means a classification pursuant to the Standard Industrial Classification Manual issued by the United States Office of Management and Budget.

BK. "State" means the state of Washington.

BL. "Stormwater" means any flow occurring during or following any form of natural precipitation, and resulting from such precipitation, including snowmelt.

BM. "Total suspended solids" means the total suspended matter that floats on the surface of, or is suspended in, water, wastewater, or other liquid, and which is removable by laboratory filtering and is amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, current approved edition.

BN. "Toxic pollutant" means one of the pollutants, or combination of those pollutants, listed as toxic in regulations promulgated by the EPA under Section 307 (33 USC 1317) of the Act, or other pollutants as may be promulgated.

BO. "Treatment plant effluent" means the discharge from the POTW into waters of the United States.

BP. "User" or "industrial user" means a source of indirect discharge. The source shall not include "domestic user" as defined herein.

BQ. “Wastewater” means liquid and water-carried industrial wastes and sewage from residential dwellings, commercial buildings, industrial and manufacturing facilities, and institutions, whether treated or untreated, which are contributed to the POTW.

BR. “Wastewater discharge permit (industrial wastewater discharge permit, discharge permit, discharge authorization)” means an authorization or equivalent control document issued by the city to users discharging wastewater to the POTW. The permit may contain appropriate pretreatment standards and requirements as set forth in this chapter.

BS. “Wastewater treatment plant,” “treatment plant” or “pollution control facility” means that portion of the POTW which is designed to provide treatment of municipal sewage and industrial waste.

BT. “Zero discharge permit” means a permit for a categorical user that operates its processes so that no industrial waste is discharged to the POTW.

The use of the singular shall be construed to include the plural and the plural shall include the singular as indicated by the context of its use. (Ord. 3070-08 § 1.3, 2008)

14.40.040 Abbreviations.
The following abbreviations shall have the designated meanings:

AKART	all known available and reasonable technology
ASPP	accidental spill prevention plan
BMPs	best management practices
BOD	biochemical oxygen demand
CFR	Code of Federal Regulations
COD	chemical oxygen demand
CSO	combined sewer overflow
EPA	U.S. Environmental Protection Agency
FOG	fats, oils, and grease
GPD	gallons per day
L	liter
LEL	lower explosive limit
mg	milligrams
mg/L	milligrams per liter
NSCIU	nonsignificant categorical industrial user
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
POTW	publicly owned treatment works

RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classifications
SSO	sanitary sewer overflow
SWDA	Solid Waste Disposal Act (42 USC 6901, et seq.)
TSS	total suspended solids
USC	United States Code

(Ord. 3070-08 § 1.4, 2008)

Article II. General Requirements

14.40.050 Prohibited discharge standards.

A. General Prohibitions. No user shall introduce or cause to be introduced into the POTW any pollutant or wastewater which causes pass through or interference. These general prohibitions apply to all users of the POTW whether or not they are subject to categorical pretreatment standards or any other national, state, or local pretreatment standards or requirements.

B. Specific Prohibitions. No user shall introduce or cause to be introduced into the POTW the following pollutants, substances, or wastewater:

1. Pollutants which create a fire or explosive hazard in the POTW, including, but not limited to, wastestreams with a closed-cup flashpoint of less than one hundred forty degrees Fahrenheit (sixty degrees Celsius) using the test methods specified in 40 CFR 261.21;

2. Wastewater having a pH less than 5.0 or more than 11.0 (unless in compliance with Section 14.40.090) or otherwise causing corrosive structural damage to the POTW or equipment;

3. Solid or viscous substances in amounts which will cause obstruction of the flow in the POTW resulting in interference, but in no case solids greater than one-quarter inch;

4. Pollutants, including oxygen-demanding pollutants (BOD, COD, etc.), released in a discharge at a flow rate and/or pollutant concentration which, either singly or by interaction with other pollutants, will cause interference with the POTW;

5. Wastewater having a temperature which will inhibit biological activity in the treatment plant resulting in interference, but in no case wastewater which causes the temperature at the introduction into the treatment plant to exceed one hundred four degrees Fahrenheit (forty degrees Celsius) unless the approval authority, upon the request of the POTW, approves alternate temperature limits;

6. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin, in amounts that will cause interference or pass through;

7. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;

8. Trucked or hauled pollutants (except domestic sewage or septic tank wastes) unless authorized by the director, and at discharge points designated by the city;

9. Noxious or malodorous liquids, gases, solids, or other wastewater which, either singly or by interaction with other wastes, are sufficient to create a public nuisance or a hazard to life, or to prevent entry into the sewers for maintenance or repair;

10. Wastewater which imparts color which cannot be removed by the treatment process, such as, but not limited to, dye wastes and vegetable tanning solutions, which consequently imparts color to the treatment plant's effluent, thereby violating the city's NPDES permit. Color (in combination with turbidity) shall not cause the treatment plant effluent to reduce the depth of the compensation point for photosynthetic activity by more than ten percent from the seasonably established norm for aquatic life;

11. Wastewater containing any radioactive wastes or isotopes except as specifically approved by the director in compliance with applicable state or federal regulations;

12. Stormwater, surface water, ground water, artesian well water, roof runoff, subsurface drainage, swimming pool drainage, condensate, deionized water, noncontact cooling water, and unpolluted wastewater, unless specifically authorized by the director;

13. Any sludges, screenings, or other residues from the pretreatment of industrial or commercial wastes or from industrial or commercial processes, except as authorized by the director;

14. Medical wastes, except as specifically authorized by the director;

15. Wastewater causing, alone or in conjunction with other sources, the treatment plant's effluent to fail a toxicity test;

16. Detergents, surface-active agents, or other substances in amounts which may cause excessive foaming in the POTW;

17. Any liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the POTW or to the operation of the POTW. At no time shall two successive readings on an explosion meter, at the point of discharge into the system (or at any point in the system), be more than five percent nor any single reading over ten percent of the lower explosive limit (LEL) of the meter;

18. Animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dusts, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas, tar asphalt residues, residues from refining or processing of fuel or lubricating oil, mud, or glass grinding or polishing wastes in amounts that cause interference in the POTW;

19. Any substance which will cause the POTW to violate its NPDES and/or other disposal system permits;

20. Any wastewater which in the opinion of the director can cause harm either to the sewers, sewage treatment process, or equipment; have an adverse effect on the receiving stream; or can otherwise endanger life, limb, public property, or constitute a nuisance, unless allowed under special agreement by the director (except that no special waiver shall be given from categorical pretreatment standards);

21. The contents of any tank or other vessel owned or used by any person in the business of collecting or pumping sewage, effluent, septage, or other wastewater unless said person has first obtained testing and approval as may be generally required by the city of Everett and paid all fees assessed for the privilege of said discharge;

22. Any hazardous or dangerous wastes as defined in rules published by the state of Washington (Chapter 173−303 WAC) and/or in EPA rules 40 CFR Part 261;

23. Persistent pesticides and/or pesticides regulated by the Federal Insecticide Fungicide Rodenticide Act (FIFRA);

24. Any slug load;

25. Any substance which may cause the POTW's effluent or treatment residues, sludges, or scums to be unsuitable for reclamation and reuse, or to interfere with the reclamation process;

26. Fats, oils and grease in amounts that may cause obstructions or maintenance problems in the collection/conveyance system, or interference in the POTW;

27. The use of the treatment and controls located at the POTW for wastewater treatment required by the National Emission Standards for Hazardous Air Pollutants for Source Categories (NESHAP) under 40 CFR Part 63 is prohibited. The discharge of any untreated wastewater regulated by the NESHAP also is prohibited. The POTW does not and will not accept an NESHAP regulated wastestream nor provide treatment or controls as an agent for any industrial user within the meaning of 40 CFR Part 63, including but not limited to 40 CFR 63.1595.

Pollutants, substances, or wastewater prohibited by this section shall not be processed or stored in such a manner that they are likely to be discharged to the POTW unless the user has in place an accidental spill prevention plan (ASPP)/slug control plan. (Ord. 3070-08 § 2.1, 2008)

14.40.060 Federal categorical pretreatment standards.
The national categorical pretreatment standards found at 40 CFR Chapter I, Subchapter N, Parts 405 through 471, are incorporated herein by reference as if set forth in full in this chapter. (Ord. 3070-08 § 2.2, 2008)

14.40.070 State requirements.
State requirements and limitations on discharges to the POTW shall be met by all users which are subject to such standards in any instance in which they are more stringent than federal requirements and limitations, or those in this chapter or other applicable ordinances. (Ord. 3070-08 § 2.3, 2008)

14.40.080 Local limits.
The following pollutant limits are established to protect against pass through and interference. No person shall discharge wastewater containing in excess of the following daily maximum allowable discharge limits:

arsenic	0.5 mg/L
cadmium	0.24 mg/L
chromium	5.0 mg/L
copper	3.0 mg/L
cyanide	0.65 mg/L
lead	1.89 mg/L
mercury	0.1 mg/L
nickel	2.83 mg/L
silver	0.49 mg/L
zinc	4.00 mg/L
nonpolar fats, oils, and grease (NPFOG)	200 mg/L

The above limits apply at the point where the wastewater is discharged to the POTW (end of the pipe). Categorical pretreatment standards apply at the end of the process. However, the director may elect to have local limits apply after pretreatment and/or prior to mixing with dilution flows.

All concentrations for metallic substances are for total metal unless indicated otherwise. The director may impose mass limitations in addition to (or in place of) the concentration-based limitations above.

Where a user is subject to a categorical pretreatment standard and a local limit for a given pollutant, the more stringent limit or applicable pretreatment standard shall apply.

The city council authorizes the director to revise local limits. (Ord. 3070-08 § 2.4, 2008)

14.40.090 pH effluent limitations under continuous monitoring.
A. Where a permittee continuously monitors the pH of wastewater discharged to the city's sewer system pursuant to a requirement in their discharge permit, the permittee shall maintain the pH of such wastewater within the range set forth in the permit, except excursions from the range are permitted subject to the following limitations:

1. The total time during which the pH values are outside the required range of pH values shall not exceed two hours in any calendar month; and

2. No individual excursion from the allowable range of pH values shall exceed fifteen minutes.

B. At no time will the pH value be outside the allowable range of pH values by more than one pH unit.

C. At no time shall the pH be less than 5.0 pH units.

D. All batch discharges shall be in compliance with the allowable pH range.

E. For the purposes of this chapter, an “excursion” is an unintentional and temporary incident in which the pH value of the discharged wastewater exceeds the range set forth in the user’s discharge permit.

F. Temporary pH value excursions that comply with the provisions of this section will not be considered violations of the user’s discharge permit but shall be reported in the pretreatment self-monitoring report with copies of the associated pH recorder charts. (Ord. 3070-08 § 2.5, 2008)

14.40.100 City’s right of revision.
The city reserves the right to establish, by ordinance or in wastewater discharge permits, differing standards or requirements on discharges to the POTW. (Ord. 3070-08 § 2.6, 2008)

14.40.110 Special agreement.
The city reserves the right to enter into special agreements with users setting out special terms under which they may discharge to the POTW. In no case will a special agreement waive compliance with a categorical pretreatment standard or federal pretreatment requirement. However, the user may request a net gross adjustment to a categorical standard in accordance with 40 CFR 403.15. They may also request a variance from the categorical pretreatment standard from the approval authority in accordance with 40 CFR 403.13. (Ord. 3070-08 § 2.7, 2008)

14.40.120 Dilution.
A user shall not increase the use of process water, or in any way attempt to dilute a discharge, as a partial or complete substitute for adequate treatment to achieve compliance with an applicable pretreatment standard or requirement unless expressly authorized by an applicable pretreatment standard or requirement. The director may impose mass limitations on users which he believes may be using dilution to meet applicable pretreatment standards or requirements, or in other cases when the imposition of mass limitations is appropriate. (Ord. 3070-08 § 2.8, 2008)

14.40.130 Pretreatment facilities.
A. General. Users shall provide all known, available, and reasonable methods of prevention, control, and treatment (AKART) as required to comply with this chapter and shall achieve compliance with all applicable pretreatment standards and requirements set out in this chapter within the time limitations specified by the EPA, the state, or the director, whichever are more stringent.

Any facilities required to pretreat wastewater to a level acceptable to the city shall be provided, operated, and maintained at the user's expense.

The director may establish best management practices (BMPs) for particular groups of users. These BMPs may include, but are not limited to, types or methods of pretreatment technology to be used, methods of source control, minimum maintenance requirements, dragout prevention practices, spill prevention practices, or other requirements as deemed necessary. The director may establish BMPs in lieu of numerical limits for noncategorical users.

When required by the director, an engineering report as required by, and complying with, Chapter 173-240 WAC, including detailed plans showing the pretreatment facilities and operating procedures, shall be submitted to the city for review, and shall be acceptable to the city before construction of the facility. The review of such plans and operating procedures will in no way relieve the user from the responsibility of modifying the facility as necessary to produce an acceptable discharge to the city under the provisions of this chapter.

Within ninety days after the completion of the wastewater pretreatment facility, the discharger shall furnish as-built drawings and its operations and maintenance procedures. Any subsequent significant changes in the pretreatment facility or method of operation shall be reported to and approved by the director prior to the initiation of the changes.

New sources, and new users determined to be significant industrial users (SIUs), must have pretreatment facilities installed and operating, if required, prior to discharge.

B. Grease Control/Pretreatment. Measures to control, recycle, remove or pretreat for grease that are applicable to food service establishments, other than SIUs, are subject to Chapter 14.42, Grease Control.

C. Other Interceptors. Dischargers who operate automatic and coin-operated laundries, car washes, filling stations, commercial garages or similar businesses having any type of washing facilities (including pressure washing and steam cleaning) or any other dischargers producing grit, sand, oils, lint, or other materials which have the potential of causing partial or complete obstruction of the building side sewer or other areas in the POTW shall, upon order of the director, install approved interceptors, oil/water separators, or tanks in accordance with specifications adopted by the city of Everett such that excessive amounts of oil, sand and inert solids are effectively prevented from entering the POTW.

D. Installation and Maintenance. All grease interceptors, oil/water separators, settling tanks and grit traps shall be properly installed, maintained and operated by the discharger at his own expense. The installation shall be kept in continuous operation at all times, and shall be maintained to provide efficient operation. Cleaning must be performed by a service contractor qualified to perform such cleaning, or in a manner approved by the director. All material removed shall be disposed of in accordance with all state and federal regulations. Records and certification of maintenance shall be

made readily available to the director for review and inspection, and must be maintained for a minimum of three years.

If a failure to maintain settling tanks, grit traps, grease interceptors, or oil/water separators results in partial or complete blockage of the building sewer, private sewer system discharging to the city sewer system, or other parts of the city sewer system, or adversely affects the treatment or transmission capabilities of the POTW, or requires excessive maintenance by the city, or poses a possible health hazard, the discharger responsible for the facilities shall be subject to the remedies herein, including cost recovery, enforcement and penalties. (Ord. 3070-08 § 2.9, 2008)

14.40.140 Deadline for compliance with applicable pretreatment requirements.
Compliance by existing sources (categorical users) covered by categorical pretreatment standards shall be within three years of the date the standard is effective unless a shorter compliance time is specified in the appropriate standard. The city shall establish a final compliance deadline date for any categorical user when the local limits for said user are more restrictive than the EPA's categorical pretreatment standards. The city may establish a final compliance deadline date for any existing user not covered by categorical pretreatment standards.

New source dischargers, and new users that are determined to be significant industrial users (SIUs), are required to comply with applicable pretreatment standards within the shortest feasible time (not to exceed ninety days from the beginning of discharge). New sources, and new users that are determined to be significant industrial users (SIUs), shall install and have in operating condition, and shall startup all pollution control equipment required to meet applicable pretreatment standards before beginning to discharge.

Any wastewater discharge permit issued to a categorical user shall not contain a compliance date beyond any deadline date established in the EPA's categorical pretreatment standards. Any other existing user that is considered to be an SIU, or a categorical user that must comply with a more stringent local limit which is in noncompliance with any local limits shall be provided with a compliance schedule to ensure compliance within the shortest time feasible. (Ord. 3070-08 § 2.10, 2008)

14.40.150 Additional pretreatment measures.
A. Whenever deemed necessary, the director may require users to restrict their discharge during peak flow periods, designate that certain wastewater be discharged only into specific sewers, relocate and/or consolidate points of discharge, separate sewage wastestreams from industrial wastestreams, and such other conditions as may be necessary to protect the POTW and determine the user's compliance with the requirements of this chapter.

B. When determined necessary by the director, each user discharging into the POTW shall install and maintain, on his property and at his expense, a suitable storage and flow-control facility to ensure equalization of flow. The director may require the facility to be equipped with alarms and a rate of discharge controller, the regulation of which shall be determined by the director. A wastewater discharge permit or discharge authorization (DA) may be issued solely for flow equalization.

C. Grease, oil, and sand interceptors shall be provided when, in the opinion of the director, they are necessary for the proper handling of wastewater containing excessive amounts of grease and oil, or sand; except that such interceptors shall not be required for residential users. All interception units shall be of a type and capacity approved by the director and shall be so located as to be easily accessible for cleaning and inspection. Such interceptors shall be inspected, cleaned, and repaired regularly, as needed, by the user at his expense.

D. Users with the potential to discharge flammable substances may be required to install and maintain an approved combustible gas-detection system.

E. When a new building is constructed without a tenant, and has any sewers which are intended to serve wastes other than sanitary or domestic waste, a three-compartment interceptor approved by the director shall be installed. (Ord. 3070-08 § 2.11, 2008)

14.40.160 Accidental discharge—Slug control plans.
The director may require any user to develop and implement an accidental discharge/slug control plan. Where deemed necessary by the city, facilities to prevent accidental discharge or slug discharges of pollutants shall be provided and maintained at the user's cost and expense.

An accidental spill prevention plan (ASPP)/slug control plan showing facilities and operating procedures to provide this protection shall be submitted to the city for review and approval before implementation. The city shall determine which user is required to develop a plan and require said plan to be submitted within ninety days after notification by the city. Each user shall implement its ASPP as submitted or as modified after such plan has been reviewed and approved by the city. Review and approval of such plans and operating procedures by the city shall not relieve the user from the responsibility to modify its facility as necessary to meet the requirements of this section.

A. Any user required to develop and implement an accidental discharge/slug control plan shall submit a plan which addresses, at a minimum, the following:

1. Description of discharge practices, including nonroutine batch discharges;

2. Description of stored chemicals;

3. Procedures for immediately notifying the POTW of any accidental or slug discharge. Such notification must also be given for any discharge which would violate any of the standards in Sections 14.40.050 through 14.40.080; and

4. Procedures to prevent adverse impact from any accidental or slug discharge. Such procedures include, but are not limited to, inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment for emergency response.

B. Users shall notify the Everett water pollution control facility immediately upon the occurrence of a slug or accidental discharge of substances regulated by this chapter. The notification shall include location of discharge, date and time thereof, type of waste, concentration and volume, and corrective actions. Any affected user shall be liable for any expense, loss, or damage to the POTW, in addition to the amount of any fines imposed on the city on account thereof under state or federal law.

C. Within five days following an accidental discharge, the user shall submit to the director a detailed written report describing the cause of the discharge and the measures to be taken by the user to prevent similar future occurrences. Such notification shall not relieve the user of any expense, loss, damage, or other liability which may be incurred as a result of damage to the POTW, fish kills, or any other damage to person or property; nor shall such notification relieve the user of any fines, civil penalties, or other liability which may be imposed by this chapter or other applicable law.

D. When required by the director, signs shall be permanently posted in conspicuous places on the user's premises advising employees whom to call in the event of a slug or accidental discharge. Employers shall instruct all employees who may cause or discover such a discharge with respect to emergency notification procedures. (Ord. 3070-08 § 2.12, 2008)

14.40.170 Septic tank wastes.

A. Residential/domestic septic tank waste may be introduced into the POTW only at a designated receiving structure within the treatment plant area, or at a site authorized by the director and at such times as are established by the director. Such wastes shall not violate this chapter or any other requirements established or adopted by the city, except as authorized by the director.

Permits for individual vehicles to use such facilities shall be issued by the city. Wastewater discharge permits may be issued to each septage-hauling business, and may encompass more than one vehicle.

B. No load may be discharged without prior consent of the director. The director may collect samples of each hauled load to ensure compliance with applicable pretreatment standards. The director may require the hauler to provide a waste analysis of any load prior to discharge.

C. Septage haulers shall utilize a waste tracking form (manifest) provided by the director for every load discharged. Any discharge without a manifest form is an unauthorized discharge and the hauler will receive an administrative fine of not less than five thousand dollars, and may have their discharge permit revoked or suspended.

D. Wastewater discharge permit fees for liquid waste haulers shall be established and charged in addition to license and volume fees charged under Ordinance 801-81 (codified in Chapter 14.12), as amended. License and volume fees shall be established as part of the user fee system utilizing the principles established in Article XIII of this chapter. (Ord. 3070-08 § 2.13, 2008)

Article III. Wastewater Discharge Permit Requirements

14.40.180 Permit required.
No significant industrial user shall discharge wastewater into the POTW without first obtaining a wastewater discharge permit from the director. Any violation of the terms and conditions of a wastewater discharge permit shall be deemed a violation of this chapter and subjects the wastewater discharge permittee to the sanctions set out in this chapter. Obtaining a wastewater discharge permit does not relieve a permittee of its obligation to comply with all federal and state pretreatment standards or requirements or with any other requirements of federal, state, and local law.

The director may require other users, including liquid waste haulers, to obtain wastewater discharge permits (as necessary) to carry out the purposes of this chapter. (Ord. 3070-08 § 3, 2008)

14.40.190 Wastewater discharge permitting—Existing SIU.
Any SIU that was discharging wastewater into the POTW prior to the effective date of the ordinance codified in this chapter and that wishes to continue such discharges in the future shall, within sixty days after notification by the director, submit a permit application to the city in accordance with Section 14.40.230, and shall not cause or allow discharges to the POTW to continue after ninety days of the effective date of the ordinance codified in this chapter except in accordance with a wastewater discharge permit issued by the director.

The city's notification to SIUs covered by categorical pretreatment standards will be in reasonable time to ensure that the SIU complies with the one-hundred-eighty-day submittal deadline date established in 40 CFR 403.12(b). (Ord. 3070-08 § 3.1, 2008)

14.40.200 Wastewater discharge permitting—New source and new user.
At least ninety days prior to the anticipated start-up, new sources, sources that become users subsequent to the promulgation of an applicable categorical pretreatment standard, and new users that are determined to be significant industrial users (SIUs), shall apply for a wastewater discharge permit and will be required to submit to the city at least the information listed in Section 14.40.250(A) through (E). A new source, or new user that is determined to be a significant industrial user (SIU), cannot discharge without first receiving a wastewater discharge permit from the city. New sources, and new users that are determined to be significant industrial users (SIUs), shall also be required to include in their application information on the method of pretreatment the user intends to use to meet applicable pretreatment standards. New sources, and new users that are determined to be significant industrial users (SIUs), shall give estimates of the information requested in Section 14.40.250(D) and (E). (Ord. 3070-08 § 3.2, 2008)

14.40.210 Wastewater discharge permitting—Extrajurisdictional users.
Any existing user located beyond the city limits required to obtain a wastewater discharge permit shall submit a wastewater discharge permit application as outlined in Section 14.40.190.

New sources, and new users that are determined to be significant industrial users (SIUs), located beyond the city limits and required to obtain a wastewater discharge permit shall comply with Section 14.40.200. (Ord. 3070-08 § 3.3, 2008)

14.40.220 Wastewater discharge permitting—Zero discharge permits.
Any categorical user that operates its regulated processes so that no industrial waste is discharged to the POTW may request that a zero discharge permit (ZDP) be issued by the city. To be eligible for a ZDP, the user shall demonstrate to the director's satisfaction that no industrial waste will be discharged and shall either permanently seal all accesses to the POTW other than those required for disposal of domestic sewage or install shutoff devices that will accept city-installed, tamper-evident seals. Breaking this seal without prior authorization by the director shall be a violation of the ZDP and this chapter. (Ord. 3070-08 § 3.4, 2008)

14.40.230 Wastewater discharge permitting—Middle tier categorical industrial user.
Any categorical user that operates its regulated processes so that it complies with the requirements in Section 14.40.030(AM) may request that it be designated a middle tier categorical industrial user. If the director agrees with that request, the user's discharge permit will be modified to incorporate the applicable provisions of 40 CFR 403. If, at any time, the user no longer complies with the requirements in Section 14.40.030(AM), it shall immediately notify the director and comply with the backup reporting requirements contained in the permit. (Ord. 3070-08 § 3.5, 2008)

14.40.240 Wastewater discharge permitting—Nonsignificant categorical industrial user.
Any categorical user that operates its regulated processes so that it complies with the requirements in Section 14.40.030(BH)(3) may request that it be designated a nonsignificant categorical industrial user. If the director agrees with that request, the user will be issued a nonsignificant CIU permit and shall comply with the requirements of that permit. If, at any time, the user no longer complies with the requirements in Section 14.40.030(BH)(3), it shall immediately notify the director and comply with the backup reporting requirements contained in the permit. (Ord. 3070-08 § 3.6, 2008)

14.40.250 Wastewater discharge permit application contents.
All users required to obtain a wastewater discharge permit must submit, at a minimum, the following information. The director shall approve a form to be used as a permit application. Categorical users submitting the following information shall have complied with 40 CFR 403.12(b).

A. Identifying Information. The user shall submit the name and address of the facility including the name of the operator and owners.

B. Permits. The user shall submit a list of any environmental control permits held by or for the facility.

C. Description of Operations. The user shall submit a brief description of the nature, average rate of production, and Standard Industrial Classification of the operation(s)

carried out by such industrial user, including a list of all raw materials and chemicals used or stored at the facility which are, or could accidentally or intentionally be, discharged to the POTW; number and type of employees; hours of operation; each product produced by type, amount, process or processes, and rate of production; type and amount of raw materials processed (average and maximum per day) and the time and duration of discharges. This description should also include a schematic process diagram which indicates points of discharge to the POTW from the regulated or manufacturing processes. Disclosure of site plans, floor plans, mechanical and plumbing plans and details to show all sewers, sewer connections, inspection manholes, sampling chambers and appurtenances by size, location and elevation.

D. Flow Measurement.

1. Categorical User. The user shall submit information showing the measured average daily and maximum daily flow, in gallons per day, to the POTW from each of the following:

a. Regulated or manufacturing process streams; and

b. Other streams as necessary to allow use of the combined wastestream formula of 40 CFR 403.6(e).

2. Noncategorical User. The user shall submit information showing the measured average daily and maximum daily flow, in gallons per day, to the POTW from each of the following:

a. Total process flow, wastewater treatment plant flow, total plant flow or individual manufacturing process flow as required by the director.

The city may allow for verifiable estimates of these flows where justified by cost or feasibility considerations.

E. Measurements of Pollutants.

1. Categorical User.

a. The user shall identify the applicable pretreatment standards for each regulated or manufacturing process.

b. In addition, the user shall submit the results of sampling and analysis identifying the nature and concentration (or mass) where required by the categorical pretreatment standard or as required by the city of regulated pollutants (including standards contained in Sections 14.40.050 through 14.40.080, as appropriate) in the discharge from each regulated or manufacturing process. Both daily maximum and average concentration (or mass, where required) shall be reported. The sample shall be representative of daily operations and shall conform to sampling and analytical procedures outlined in Article V of this chapter.

c. The user shall take a minimum of one representative sample to compile that data necessary to comply with the requirements of this subsection.

d. Where an alternate concentration or mass limit has been calculated in accordance with 40 CFR 403.6(e) for a categorical user covered by a categorical pretreatment standard, this adjusted limit along with supporting data shall be submitted as part of the application.

2. Noncategorical User.

a. The user shall identify the applicable pretreatment standards for its wastewater discharge.

b. In addition, the user shall submit the results of sampling and analysis identifying the nature and concentration (or mass where required by the city) of regulated pollutants contained in Sections 14.40.050 through 14.40.080, as appropriate in the discharge. Both daily maximum and average concentration (or mass, where required) shall be reported. The sample shall be representative of daily operations and shall conform to sampling and analytical procedures outlined in Article V of this chapter.

c. The user shall take a minimum of one representative sample to compile that data necessary to comply with the requirements of this subsection.

d. Where the director developed alternate concentration or mass limits because of dilution, this adjusted limit along with supporting data shall be submitted as part of the application.

F. Certification. A statement, reviewed by an authorized representative of the user and certified by a qualified professional as outlined in Section 14.40.260, indicating whether the applicable pretreatment standards are being met on a consistent basis, and, if not, whether additional operation and maintenance (O&M) and/or additional pretreatment is required for the user to meet the applicable pretreatment standards and requirements.

G. Compliance Schedule. If additional pretreatment and/or O&M will be required to meet the applicable pretreatment standards, the city will establish the shortest schedule by which the user will provide such additional pretreatment and/or O&M. The schedule shall conform with the requirements of Section 14.40.380. The completion date in this schedule shall not be later than the compliance date established pursuant to Section 14.40.130.

1. Where the user's categorical pretreatment standard has been modified by a removal allowance (40 CFR 403.7), the combined wastestream formula (40 CFR 403.6 (e)), and/or a fundamentally different factors variance (40 CFR 403.13) at the time the user submits the report required by this subsection, the information required by subsections D and E of this section shall pertain to the modified limits.

2. If the categorical pretreatment standard is modified by a removal allowance (40 CFR 403.7), the combined wastestream formula (40 CFR 403.6(e)), and/or a fundamentally different factors variance (40 CFR 403.13) after the user submits the report required by subsections D and E of this section, then a new report shall be submitted by the user within sixty days after the modified limit is approved.

H. Any other information as may be deemed necessary by the director to evaluate the wastewater discharge permit application. Incomplete or inaccurate applications will not be processed and will be returned to the user for revision. (Ord. 3070-08 § 3.7, 2008)

14.40.260 Signatory and certification requirement.
All wastewater discharge permit applications and user reports must be signed by an authorized representative of the user and contain the following certification statement:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(Ord. 3070-08 § 3.8, 2008)

14.40.270 Wastewater discharge permit decisions.
The director will evaluate the data furnished by the user and may require additional information. Within thirty days of receipt of a complete wastewater discharge permit application, the director will determine whether or not to issue a wastewater discharge permit. Upon a determination to issue a wastewater discharge permit, the user shall fulfill the public notice requirements, and publish in the largest local daily newspaper its application for, and the city's intent to issue, a wastewater discharge permit. The manner, format, content and length of time for the publication shall be as prescribed by the director, but at no time shall be less stringent than the requirements in WAC 173−216-090. The cost of publication shall be paid for by the applicant. If there have been no adverse comments when the public comment period has elapsed, the application shall be considered complete. The permit shall be issued within thirty days of full evaluation and acceptance of the data furnished. The director may deny any application for a wastewater discharge permit. (Ord. 3070-08 § 3.9, 2008)

14.40.280 Wastewater discharge permit contents.
Wastewater discharge permits shall include such conditions as are reasonably deemed necessary by the director to prevent pass through or interference, protect the quality of the water body receiving the treatment plant's effluent, protect worker health and safety, facilitate sludge management and disposal, and protect against damage to the POTW.

A. Wastewater discharge permits must contain the following conditions:

1. A statement that indicates wastewater discharge permit duration, which in no event shall exceed five years;

2. A statement that the wastewater discharge permit is nontransferable without prior notification to and approval from the city, and provisions for furnishing the new owner or operator with a copy of the existing wastewater discharge permit;

3. Applicable pretreatment standards and requirements, including any special state requirements;

4. Self-monitoring, sampling, reporting, notification, submittal of technical reports, compliance schedules, and record-keeping requirements. These requirements shall include an identification of pollutants to be monitored, sampling location, sampling frequency, and sample type based on federal, state, and local law;

5. Requirement for immediate notification to the city where self-monitoring results indicate noncompliance;

6. Requirement to report a bypass or upset of a pretreatment facility;

7. Requirement for the SIU that reports noncompliance to repeat the sampling and analysis and submit results to the city within thirty days after becoming aware of the violation; and

8. A statement of applicable civil, criminal, and administrative penalties for violation of pretreatment standards and requirements, and any applicable compliance schedule.

B. Wastewater discharge permits may contain, but need not be limited to, the following conditions:

1. Limits on the average and/or maximum rate of discharge, time of discharge, and/or requirements for flow regulation and equalization;

2. Requirements for the installation of pretreatment technology, pollution control, or construction of appropriate containment devices, designed to reduce, eliminate, or prevent the introduction of pollutants into the treatment works;

3. Requirements for the development and implementation of spill control plans or other special conditions including management practices necessary to adequately prevent accidental, unanticipated, or routine discharges;

4. Development and implementation of waste minimization plans to reduce the amount of pollutants discharged to the POTW;

5. The unit charge or schedule of user charges and fees for the management of the wastewater discharged to the POTW;

6. Requirements for installation and maintenance of inspection and sampling facilities and equipment;

7. A statement that compliance with the wastewater discharge permit does not relieve the permittee of responsibility for compliance with all applicable federal and state pretreatment standards, including those which become effective during the term of the wastewater discharge permit;

8. Any special agreements the director chooses to continue or develop between the city and user;

9. Other conditions as deemed appropriate by the director to ensure compliance with this chapter, and state and federal laws, rules, and regulations. (Ord. 3070-08 § 3.10, 2008)

14.40.290 Wastewater discharge permit appeals.
Any person, including the user, may petition the director to reconsider the terms of a wastewater discharge permit within thirty days of its issuance.

A. Failure to submit a timely petition for review shall be deemed to be a waiver of the administrative appeal.

B. In its petition, the appealing party must indicate the wastewater discharge permit provisions objected to, the reasons for this objection, and the alternative conditions, if any, it seeks to place in the wastewater discharge permit.

C. The effectiveness of the wastewater discharge permit shall not be stayed pending the appeal.

D. If the director fails to act within sixty days of the receipt of an appeal, a request for reconsideration shall be deemed to be denied. Decisions not to reconsider a wastewater discharge permit, not to issue a wastewater discharge permit, or not to modify a wastewater discharge permit, shall be considered final administrative actions for purposes of judicial review.

E. Aggrieved parties seeking judicial review of the final administrative wastewater discharge permit decision must do so by filing a petition for review with the Snohomish County superior court within thirty days following the final administrative wastewater discharge permit decision. (Ord. 3070-08 § 3.11, 2008)

14.40.300 Wastewater discharge permit duration.
Wastewater discharge permits shall be issued for a specified time period, not to exceed five years. A wastewater discharge permit may be issued for a period less than five years, at the discretion of the director. Each wastewater discharge permit will indicate a specific date upon which it will expire. The wastewater discharge permit will expire at 11:59 p.m. on the specified date. (Ord. 3070-08 § 3.12, 2008)

14.40.310 Wastewater discharge permit modification.
The director may modify the wastewater discharge permit for good cause including, but not limited to, the following:

A. To incorporate any new or revised federal, state, or local pretreatment standards or requirements;

B. To address significant alterations or additions to the user's operation, processes, or wastewater volume or character since the time of wastewater discharge permit issuance;

C. A change in the POTW that requires either a temporary or permanent reduction or elimination of the authorized discharge;

D. Information indicating that the permitted discharge poses a threat to the city's POTW, city personnel, or the receiving waters;

E. Violation of any terms or conditions of the wastewater discharge permit;

F. Misrepresentations or failure to fully disclose all relevant facts in the wastewater discharge permit application or in any required reporting;

G. Revision of or a grant of variance from categorical pretreatment standards pursuant to 40 CFR 403.13;

H. To correct typographical or other errors in the wastewater discharge permit; or

I. To reflect a transfer of the facility ownership and/or operation to a new owner/operator.

J. Any permit modification may be appealed under Section 14.40.290. (Ord. 3070-08 § 3.13, 2008)

14.40.320 Wastewater discharge permit transfer.
Wastewater discharge permits may be reassigned or transferred to a new owner and/or operator only if the permittee gives at least ninety days' advance notice to the director and the director approves the wastewater discharge permit transfer. The notice to the director must include a written certification by the new owner and/or operator which:

A. States that the new owner and/or operator has no immediate intent to change the facility's operations and processes;

B. Identifies the specific date on which the transfer is to occur; and

C. Acknowledges full responsibility for complying with the existing wastewater discharge permit.

Provided that the above occurs and that there were no significant changes to the manufacturing operation or wastewater discharge, the new owner will be considered an existing user and be covered by the existing limits and requirements in the previous owner's permit. Failure to provide advance notice of a transfer renders the wastewater discharge permit voidable as of the date of facility transfer. (Ord. 3070-08 § 3.14, 2008)

14.40.330 Wastewater discharge permit revocation.
Wastewater discharge permits may be revoked for the following reasons:

A. Failure to notify the city of significant changes to the wastewater prior to the changed discharge;

B. Failure to provide prior notification to the city of changed conditions;

C. Misrepresentation or failure to fully disclose all relevant facts in the wastewater discharge permit application;

D. Falsifying self-monitoring reports;

E. Tampering with monitoring equipment;

F. Refusing to allow the city timely access to the facility premises and records;

G. Failure to meet discharge limitations;

H. Failure to pay fines;

I. Failure to pay sewer charges;

J. Failure to meet compliance schedules;

K. Failure to complete a wastewater survey or the wastewater discharge permit application;

L. Failure to provide advance notice of the transfer of a permitted facility;

M. The city has to invoke its emergency provision as cited in Section 14.40.630;

N. Violation of any pretreatment standard or requirement;

O. Violation of any terms of the wastewater discharge permit;

P. Violation of any provisions of this chapter; or

Q. Violation of any terms of an order of the director issued under this chapter.

Wastewater discharge permits shall be voidable upon cessation of operations or transfer of business ownership. All wastewater discharge permits issued to a particular user are void upon the issuance of a new wastewater discharge permit to that user. (Ord. 3070-08 § 3.15, 2008)

14.40.340 Wastewater discharge permit re-issuance.
A user required to have a wastewater discharge permit shall apply for wastewater discharge permit re-issuance by submitting a complete wastewater discharge permit application, in accordance with Section 14.40.250, a minimum of ninety days prior to the expiration of the user's existing wastewater discharge permit. A user whose existing wastewater discharge permit has expired and has submitted its re-application in the time period specified herein shall be deemed to have an effective wastewater discharge permit until the city issues or denies the new wastewater discharge permit. A user whose existing wastewater discharge permit has expired and who failed to submit its re-application in the time period specified herein will be deemed to be discharging without a wastewater discharge permit. (Ord. 3070-08 § 3.16, 2008)

Article IV. Reporting Requirements

14.40.350 Baseline monitoring reports.
Within either one hundred and eighty days after the effective date of a categorical pretreatment standard, or the final administrative decision on a category determination under 40 CFR 403.6(a)(4) (whichever is later), existing categorical users currently discharging to or scheduled to discharge to the POTW shall be required to submit to the city a report which contains the information listed in Section 14.40.250.

At least ninety days prior to commencement of their discharge, new sources, and sources that become categorical users subsequent to the promulgation of an applicable categorical standard, shall be required to submit to the city a report which contains the information listed in Section 14.40.250.

A new source may be required to submit an engineering report to the director and comply with Chapter 173−240 WAC; the report should explain the method of pretreatment a new source intends to use to meet applicable categorical standards. A new source shall give estimates of its anticipated flow and quantity of pollutants discharged. (Ord. 3070-08 § 4.1, 2008)

14.40.360 Final compliance report (initial compliance report).
A. Within ninety days following the date for final compliance by the significant industrial user with applicable pretreatment standards and requirements set forth in this chapter, in a wastewater discharge permit, or within thirty days following commencement of the introduction of wastewater into the POTW by a new source or new users considered by the city to fit the definition of SIU, the affected user shall submit to the city a report containing the information outlined in Section 14.40.250(D) through (F).

B. For users subject to equivalent mass or concentration limits established by the city in accordance with procedures established in 40 CFR 403.6(c), this report shall contain a reasonable measure of the user's long-term production rate. For all other users subject to categorical pretreatment standards expressed in terms of allowable pollutant discharge per unit of production (or other measure of operation), this report shall include the user's actual production during the appropriate sampling period. (Ord. 3070 -08 § 4.2, 2008)

14.40.370 Periodic compliance report.
A. Any user that is issued a permit under this chapter and performs self-monitoring shall submit to the city during the months of June and December, unless required on other dates or more frequently by the city, a report indicating the nature of the effluent over the previous reporting period. The frequency of monitoring shall be as prescribed within the permit. At a minimum, except for zero discharge users, middle tier CIUs, and NSCIUs, users shall sample their discharge at least twice per year.

B. The report shall include a record of the concentrations (and mass if specified in the wastewater discharge permit) of the pollutants listed in the wastewater discharge permit that were measured and a record of all flow measurements (average and maximum) taken at the designated sampling locations, and shall also include any additional information required by this chapter or the wastewater discharge permit.

Production data shall be reported if required by the wastewater discharge permit. Both daily maximum and average concentration (or mass, where required) shall be reported.

If a user sampled and analyzed more frequently than what was required by the city or by this chapter, using methodologies in 40 CFR Part 136, it must submit all results of sampling and analysis of the discharge during the reporting period.

C. Any user subject to equivalent mass or concentration limits established by the city or by unit production limits specified in the applicable categorical standards shall report production data as outlined in Section 14.40.360(B).

D. Zero discharge users shall submit periodic reports as required by the director stating that no process waste has been discharged to the POTW.

E. Middle tier significant CIUs and NSCIUs shall submit reports as required in their control mechanisms.

F. If the city calculated limits to factor out dilution flows or nonregulated flows, the user will be responsible for providing flows from the regulated process flows, dilution flows and nonregulated flows.

G. Flows shall be reported on the basis of actual measurement; provided, however, that the city may accept reports of average and maximum flows estimated by verifiable techniques if the city determines that an actual measurement is not feasible.

H. Sampling shall be representative of the user's daily operations and shall be taken in accordance with the requirements specified in Article V of this chapter.

I. The city may require reporting by users that are not required to have an industrial wastewater discharge permit if information or data is needed to establish a sewer charge, determine the treatability of the effluent or determine any other factor that is related to the operation and maintenance of the sewer system.

J. The city may require self-monitoring by the user or, if requested by the user, may agree to perform the periodic compliance monitoring needed to prepare the periodic compliance report required under this section. If the city agrees to perform such periodic compliance monitoring, it may charge the user for such monitoring, based upon the costs incurred by the city for the sampling and analyses. Any such charges shall be added to the normal sewer charge and shall be payable as part of the utility bills. The city is under no obligation to perform periodic compliance monitoring for a user. (Ord. 3070-08 § 4.3, 2008)

14.40.380 Compliance schedules for meeting applicable pretreatment standards.

A. The schedule shall contain increments of progress in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the user to meet the applicable pretreatment standards (e.g., hiring an engineer, completing preliminary plans, completing final plans, executing contracts for major components, commencing construction, completing construction, etc.).

B. No increment referred to in subsection A of this section shall exceed nine months.

C. Not later than fourteen days following each date in the schedule and the final date for compliance, the user shall submit a progress report to the city including, at a minimum, whether or not it complied with the increment of progress to be met on such date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps being taken by the user to return the construction to the schedule established. In no event shall more than nine months elapse between such progress reports. (Ord. 3070-08 § 4.4, 2008)

14.40.390 Notification of significant production changes.
Any user operating under a wastewater discharge permit incorporating mass or concentration limits based on production levels shall notify the city within two business days after the user has a reasonable basis to know that the production level will significantly change within the next calendar month. Any user not providing a notice of such anticipated change will be required to comply with the existing limits contained in its wastewater discharge permit. (Ord. 3070-08 § 4.5, 2008)

14.40.400 Hazardous waste notification.
Any user that is discharging fifteen kilograms of hazardous wastes as defined in 40 CFR 261 (listed or characteristic wastes) in a calendar month or any facility discharging any amount of acutely hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e) is required to provide a one-time notification in writing to the city, the EPA Regional Waste Management Division Director, and the hazardous waste division of the NWRO of the Washington State Department of Ecology. Any existing user exempt from this notification shall comply with the requirements contained herein within thirty days of becoming aware of a discharge of fifteen kilograms of hazardous wastes in a calendar month or the discharge of acutely hazardous wastes to the city sewer system.

Such notification shall include:

A. The name of the hazardous waste as set forth in 40 CFR Part 261;

B. The EPA hazardous waste number; and

C. The type of discharge (continuous, batch, or other).

D. If an industrial user discharges more than one hundred kilograms of such waste per calendar month to the sewer system, the notification shall also contain the following information to the extent it is known or readily available to the industrial user:

1. An identification of the hazardous constituents contained in the wastes;

2. An estimation of the mass and concentration of such constituents in the wastestreams discharged during that calendar month; and

3. An estimation of the mass of constituents in the wastestreams expected to be discharged during the following twelve months.

These notification requirements do not apply to pollutants already reported under the self-monitoring requirements.

Whenever the EPA publishes final rules identifying additional hazardous wastes or new characteristics of hazardous waste, a user shall notify the city of the discharge of such a substance within ninety days of the effective date of such regulations.

In the case of any notification made under this section, an industrial user shall certify that it has a program in place to reduce the volume and toxicity of hazardous wastes generated to the degree it has determined to be economically practical. Discharging hazardous waste to the sewer system is prohibited as per Section 14.40.050. (Ord. 3070-08 § 4.6, 2008)

14.40.410 Notice of potential problems, including accidental spills, slug loadings.
Any user shall notify the city immediately of all discharges that could cause problems to the POTW, including any slug loadings, as defined in Section 14.40.030. The notification shall include the concentration and volume and corrective action. Steps being taken to reduce any adverse impact should also be noted during the notification. Any user who discharges a slug (or slugs) of pollutants shall be liable for any expense, loss, or damage to the POTW, in addition to the amount of any fines imposed by the city or on the city under state or federal law. (Ord. 3070-08 § 4.7, 2008)

14.40.420 Noncompliance reporting.
If sampling performed by a user indicates a violation, the user shall notify the city within twenty-four hours of becoming aware of the violation. The user shall also repeat the sampling within five days and submit the results of the repeat analysis to the city within thirty days after becoming aware of the violation, except the user is not required to resample if:

A. The city performs sampling at the user at a frequency of at least once per month; or

B. The city performs sampling at the user between the time when the user performs its initial sampling and the time when the user receives the results of this sampling. (Ord. 3070-08 § 4.8, 2008)

14.40.430 Notification of changed discharge.
All users shall promptly notify the city in advance of any substantial change in the volume or character of pollutants in their discharge, including significant manufacturing process changes, pretreatment modifications, and the listed or characteristic hazardous wastes for which the user has submitted initial notification under 40 CFR 403.12(p). (Ord. 3070-08 § 4.9, 2008)

14.40.440 TTO reporting.
Categorical users which are required by the EPA to eliminate and/or reduce the levels of toxic organics (TTOs) discharged into the sewer system must follow the categorical pretreatment standards for that industry. Those users must also meet the following requirements:

A. Must sample, as part of the initial application requirements, for the organics listed under the TTO limit reasonably expected to be present;

B. May submit a statement that no TTOs are used at the facility and/or develop a solvent management plan in lieu of continuously monitoring for TTO, if authorized by the director:

If allowed to submit a statement or develop a solvent management plan, the user must routinely submit a certification statement as part of its self-monitoring report that there has been no dumping of concentrated toxic organics into the wastewater and that it is implementing a solvent management plan as approved by the city. The director may require the development and implementation of a solvent management plan in addition to monitoring for TTO. (Ord. 3070-08 § 4.10, 2008)

14.40.450 Reports from unpermitted users.
All users not required to obtain a wastewater discharge permit shall provide appropriate reports to the city as the director may require. (Ord. 3070-08 § 4.11, 2008)

14.40.460 Record keeping.
Users subject to the reporting requirements of this chapter shall retain, and make available for inspection and copying, all records of information obtained pursuant to any monitoring activities required by this chapter and any additional records of information obtained pursuant to monitoring activities undertaken by the user independent of such requirements. Records shall include the date, exact place, method, and time of sampling and the name of the person(s) taking the samples; the dates analyses were performed; who performed the analyses; the analytical techniques or methods used; and the results of such analyses. These records shall remain available for a period of at least three years. This period shall be automatically extended for the duration of any litigation concerning the user or POTW, or where the user has been specifically notified of a longer retention period by the director. (Ord. 3070-08 § 4.12, 2008)

14.40.470 Timing.
Written reports will be deemed to have been submitted on the date postmarked. For reports which are not mailed, postage prepaid, into a mail facility serviced by the United States Postal Service, the date of receipt of the report shall govern. (Ord. 3070-08 § 4.13, 2008)

Article V. Sampling and Analytical Requirements

14.40.480 Sampling requirements for users.
A. A minimum of four grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide, and volatile organics. The director will determine on a case-by-case basis whether the user will be able to composite the individual grab samples. For all other pollutants, twenty-four-hour composite samples must be obtained through flow-proportional composite sampling techniques where feasible. The city may waive flow-proportional composite sampling for any user that demonstrates that flow-proportional is not feasible. In such cases, samples may be obtained through time-proportional composite sampling techniques or through a minimum of four grab samples where the

user demonstrates that this will provide a representative sample of the effluent being discharged.

B. Samples should be taken immediately downstream from pretreatment facilities if such exist or immediately downstream from the regulated or manufacturing process if no pretreatment exists or as determined by the city and/or contained in the user's wastewater discharge permit. For categorical users, if other wastewaters are mixed with the regulated wastewater prior to pretreatment the user shall measure the flows and concentrations necessary to allow use of the combined wastestream formula of 40 CFR 403.6(e) in order to evaluate compliance with the applicable categorical pretreatment standards. For other SIUs, for which the city has adjusted its local limits to factor out dilution flows, the user shall measure the flows and concentrations necessary to evaluate compliance with the adjusted pretreatment standard(s).

C. All sample results shall indicate the time, date and place of sampling, and methods of analysis, and shall certify that such sampling and analysis is representative of normal work cycles and expected pollutant discharges from the user. If a user sampled and analyzed more frequently than what was required in its wastewater discharge permit, using methodologies in 40 CFR Part 136, it must submit all results of sampling and analysis of the discharge as part of its self-monitoring report. (Ord. 3070-08 § 5.1, 2008)

14.40.490 Analytical requirements.
All pollutant analyses, including sampling techniques, shall be performed in accordance with the techniques prescribed in 40 CFR Part 136, unless otherwise specified in an applicable categorical pretreatment standard. If 40 CFR Part 136 does not contain sampling or analytical techniques for the pollutant in question, sampling and analyses must be performed in accordance with procedures approved by the EPA.

All analyses performed to establish compliance and used in compliance reporting shall be performed by a laboratory accredited by the Washington State Department of Ecology Quality Assurance Division in accordance with Chapter 173-50 WAC. Laboratories must be accredited for the analyses for which they are performing.

To ensure that the reported data is valid for determining compliance with requirements, all data shall have a detection level (DL) no greater than twenty-five percent of the regulatory limit included in this chapter or applicable state or federal regulation (i.e., for Pb, with a regulatory limit of 1.89 mg/L, the DL shall be no greater than 0.47 mg/L). (Ord. 3070-08 § 5.2, 2008)

14.40.500 City monitoring of user's wastewater.
The city will follow the same procedures as outlined in Sections 14.40.480 and 14.40.490. (Ord. 3070-08 § 5.3, 2008)

Article VI. Compliance Monitoring

14.40.510 Inspection and sampling.
Continued connection and use of the Everett municipal sewer system shall be contingent on the right of the city to inspect and sample all discharges into the system.

The city shall have the right to enter the facilities of any user for the purpose of the enforcement of this chapter and Ordinance 1506-88, as amended, and to determine that any wastewater discharge permit or order issued hereunder is being met and whether the user is complying with all requirements thereof. Users shall allow the director ready access to all parts of the premises for the purposes of inspection, sampling, records examination and copying, and the performance of any additional duties.

A. Where a user has security measures in force which require proper identification and clearance before entry into its premises, the user shall make necessary arrangements with its security guards so that, upon presentation of suitable identification, the director will be permitted to enter without delay for the purposes of performing specific responsibilities.

B. The director shall have the right to set up on the user's property, or require installation of, such devices as are necessary to conduct sampling and/or metering of the user's operations.

C. Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the user at the written or verbal request of the director and shall not be replaced. The costs of clearing such access shall be borne by the user.

D. Unreasonable delays in allowing the director access to the user's premises shall be a violation of this chapter. (Ord. 3070-08 § 6.1, 2008)

14.40.520 Monitoring facilities.
Each user shall provide and operate at its own expense a monitoring facility to allow inspection, sampling, and flow measurements of each sewer discharge to the city. Each monitoring facility shall be situated on the user's premises, except where such a location would be impractical or cause undue hardship on the user, the city may concur with the facility being constructed in the public street or sidewalk area, providing that the facility is located so that it will not be obstructed by landscaping or parked vehicles. The director, whenever applicable, may require the construction and maintenance of sampling facilities at other locations (for example, at the end of a manufacturing line, wastewater treatment system).

There shall be ample room in or near such sampling facility to allow accurate sampling, flow measurement and preparation of samples for analysis. The facility and sampling and measuring equipment shall be maintained at all times in a safe and proper operating condition at the expense of the user. All monitoring facilities shall be constructed and maintained in accordance with all applicable local construction standards and specifications.

The director may require the user to install monitoring equipment as necessary. All devices used to measure wastewater flow and quality shall be maintained and calibrated in accordance with manufacturers' recommendations to ensure their accuracy. (Ord. 3070-08 § 6.2, 2008)

14.40.530 Search warrants.
If the director has been refused access to a building, structure or property, or any part thereof, and is able to demonstrate probable cause to believe that there may be a violation of this chapter, or that there is a need to inspect as part of a routine inspection program of the city designed to verify compliance with this chapter or any wastewater discharge permit or order issued hereunder, or to protect the overall public health, safety and welfare of the community, then the director shall seek issuance of a search and/or seizure warrant from the Everett municipal court, the Everett district court, or the Snohomish County superior court. Such warrant shall be served at reasonable hours by the director and may be accomplished in the company of a uniformed police officer of the city. (Ord. 3070-08 § 6.3, 2008)

14.40.540 Vandalism.
No person shall willfully or negligently break, damage, destroy, uncover, deface, tamper with, or prevent access to any structure, appurtenance or equipment, or other part of the POTW. Any person found in violation of this requirement shall be subject to the sanctions set out in this chapter. (Ord. 3070-08 § 6.4, 2008)

Article VII. Confidential Information

14.40.550 Public disclosure—Exemption.
Information and data on a user obtained from reports, surveys, wastewater discharge permit applications, wastewater discharge permits, and monitoring programs, and from city inspection and sampling activities, shall be available to the public without restriction, unless the user specifically requests, and is able to demonstrate to the satisfaction of the city, that the release of such information would divulge information, processes or methods of production that are exempt from disclosure under the Public Records Act at Chapter 42.56 RCW, or as hereafter amended.

When requested and demonstrated by the user furnishing a report that such information should be held confidential, the city shall make reasonable efforts to protect the portions of a report which might disclose trade secrets or secret processes from inspection by the public. Such information, however, shall be made available immediately upon request to governmental agencies for uses related to the NPDES program or pretreatment program, and in enforcement proceedings involving the person furnishing the report.

Wastewater constituents and characteristics and other “effluent data” as defined by 40 CFR 2.302 will not be recognized as confidential information and will be available to the public without restriction. (Ord. 3070-08 § 7, 2008)

Article VIII. Publication of Users in Significant Noncompliance

14.40.560 Publication of users in significant noncompliance.
The city shall publish annually, in the largest daily newspaper published in the municipality where the POTW is located, a list of the users that, during the previous twelve months, were in significant noncompliance with applicable pretreatment standards and requirements. The term “significant noncompliance” shall mean:

A. Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent or more of wastewater measurements taken during a six-month period exceed the daily maximum limit or average limit for the same pollutant parameter by any amount;

B. Technical review criteria (TRC) violations, defined here as those in which thirty-three percent or more of wastewater measurements taken for each pollutant parameter during a six-month period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable criteria (1.4 for BOD, TSS, fats, oils and grease, and 1.2 for all other pollutants except pH);

C. Any other violation of a pretreatment standard or requirement that the city believes has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of city personnel or the general public);

D. Any discharge of pollutants that has caused imminent endangerment to the public or to the environment, or has resulted in the city's exercise of its emergency authority to halt or prevent such a discharge;

E. Failure to meet, within ninety days of the scheduled date, a compliance schedule milestone contained in a wastewater discharge permit or enforcement order for starting construction, completing construction, or attaining final compliance;

F. Failure to provide, within forty-five days after the due date, any required reports, including baseline monitoring reports, reports on compliance with categorical pretreatment standard deadlines, periodic self-monitoring reports, and reports on compliance with compliance schedules;

G. Failure to accurately report noncompliance; or

H. Any other violation(s) that the city determines will adversely affect the operation or implementation of the local pretreatment program. (Ord. 3070-08 § 8, 2008)

Article IX. Administrative Enforcement Remedies

14.40.570 Notification of violation (notice of violation, NOV).

When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, the director may serve upon that user a written notice of violation. The director may select any means of service which is reasonable under the circumstances.

Within seven calendar days of the receipt of this notice, an explanation of the violation and a plan for the satisfactory correction and prevention thereof, to include specific required actions, shall be submitted by the user to the director. Submission of this plan in no way relieves the user of liability for any violations occurring before or after receipt of the notice of violation. Nothing in this section shall limit the authority of the city to take any action, including emergency actions or any other enforcement action, without first issuing a notice of violation. (Ord. 3070-08 § 9.1, 2008)

14.40.580 Consent orders.
The director may enter into consent orders, assurances of voluntary compliance, or other similar documents establishing an agreement with any user responsible for noncompliance. Such documents will include specific action to be taken by the user to correct the noncompliance within a time period specified by the document. Such documents shall have the same force and effect as the administrative orders issued pursuant to Sections 14.40.600 and 14.40.610 and shall be judicially enforceable. Use of a consent order shall not be a bar against, or prerequisite for, taking any other action against the user. (Ord. 3070-08 § 9.2, 2008)

14.40.590 Show cause hearing.
The director may order a user which has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, to appear before the director and show cause why a proposed enforcement action should not be taken. Notice shall be served on the user specifying the time and place for the hearing, the proposed enforcement action, the reasons for such action, and a request that the user show cause why the proposed enforcement action should not be taken. The notice of the hearing shall be served personally or by registered or certified mail (return receipt requested) at least ten business days prior to the hearing. Such notice may be served on any authorized representative of the user. A show cause hearing shall not be a bar against, or prerequisite for, taking any other action against the user. (Ord. 3070-08 § 9.3, 2008)

14.40.600 Compliance orders.
When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, the director may issue an order to the user responsible for the discharge directing that the user come into compliance within a time specified in the order. Compliance orders may require users to refrain from certain activities, install additional pretreatment equipment, increase self-monitoring, or use best management practices designed to minimize the amount of pollutants discharged to the sewer. If the user does not come into compliance within the time specified in the order, sewer service may be discontinued. Issuance of a compliance order shall not be a bar against, or a prerequisite for, taking any other action against the user. (Ord. 3070 -08 § 9.4, 2008)

14.40.610 Cease and desist orders.
When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, or that the user's past violations are likely to recur, the director may issue an order to the user directing it to cease and desist all such violations and directing the user to:

A. Immediately comply with all requirements; and

B. Take such appropriate remedial or preventive action as may be needed to properly address a continuing or threatened violation, including halting operations and/or terminating the discharge.

Issuance of a cease and desist order shall not be a bar against, or a prerequisite for, taking any other action against the user. (Ord. 3070-08 § 9.5, 2008)

14.40.620 Administrative fines.

A. When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, the director may fine such user in an amount not less than two hundred fifty dollars and not to exceed ten thousand dollars. Such fines shall be assessed on a per-violation, per-day basis. In the case of monthly or other long-term average discharge limits, fines shall be assessed for each day during the period of violation. Said administrative fines shall constitute a sewer service surcharge, and upon assessment, shall be subject to collection in the same manner as all other sewer utility rates, charges and penalties.

B. Unless other arrangements have been made with and authorized by the director, unpaid charges, fines, and penalties shall accrue thereafter at a rate of one percent per month. After ninety days, if charges, fines, and penalties have not been paid, the city may revoke the user's discharge permit.

C. Users desiring to appeal and dispute such fines must file a written request for the director to reconsider the fine along with full payment of the fine amount within ten calendar days of being notified of the fine. Upon receipt of a timely appeal, the director shall set a date and time for an appeal hearing, but in no case shall the hearing be set more than thirty business days from the receipt of the timely notice of appeal. The appellant shall be notified in writing of the date, time, and place for the appeal hearing. The director or his/her designee shall serve as the hearing examiner. In the event the user's appeal is successful, any payments made shall be returned to the user. Affirmation or modification of an administrative fine by the public works director shall relate back to the original date of assessment.

The city shall recover the costs of preparing administrative enforcement actions, such as notices and orders, including the cost of additional inspections, sampling and analysis, and may add them to the fine.

D. Issuance of an administrative fine shall not be a bar against, or a prerequisite for, taking any other action against the user.

E. Users seeking judicial review of administrative fines must do so by filing a petition for review in the Snohomish County superior court within thirty calendar days of the decision of the director. (Ord. 3070-08 § 9.6, 2008)

14.40.630 Emergency suspensions.

The director may immediately suspend a user's discharge (after informal notice to the user) whenever such suspension is necessary to stop an actual or threatened discharge which reasonably appears to present or cause an imminent or substantial endangerment to the health or welfare of persons.

The director may also immediately suspend a user's discharge (after informal notice and opportunity to respond) that threatens to interfere with the operation of the POTW, or which presents or may present an endangerment to the environment.

A. Any user notified of a suspension of its discharge shall immediately stop or eliminate its contribution. In the event of a user's failure to immediately comply voluntarily with the suspension order, the director shall take such steps as deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the POTW, its receiving stream, or endangerment to any individuals.

The director may allow the user to recommence its discharge when the user has demonstrated to the satisfaction of the city that the period of endangerment has passed. If the director does not allow the user to recommence its discharge within fifteen days of the emergency suspension, the director shall initiate termination proceedings pursuant to Section 14.40.640.

B. A user that is responsible, in whole or in part, for any discharge presenting imminent endangerment shall submit a detailed written statement, describing the causes of the harmful contribution and the measures taken to prevent any future occurrence, to the director prior to the date of any show cause or termination hearing under Sections 14.40.590 and 14.40.640.

Nothing in this section shall be interpreted as requiring a hearing prior to any emergency suspension under this section. (Ord. 3070-08 § 9.7, 2008)

14.40.640 Termination of discharge (nonemergency).
In addition to the provisions in Section 14.40.330, any user that violates the following conditions is subject to discharge termination:

A. Violation of wastewater discharge permit conditions;

B. Failure to accurately report the wastewater constituents and characteristics of its discharge;

C. Failure to report significant changes in operations or wastewater volume, constituents and characteristics prior to discharge;

D. Refusal of reasonable access to the user's premises for the purpose of inspection, monitoring or sampling; or

E. Violation of the pretreatment standards in Article II of this chapter.

Such user will be notified of the proposed termination of its discharge and be offered an opportunity for hearing pursuant to Section 14.40.650 to dispute the proposed termination action. Initiation of a termination proceeding by the city shall not be a bar to, or a prerequisite for, taking any other action against the user. (Ord. 3070-08 § 9.8, 2008)

14.40.650 Appeal procedures.

A. Appeals.

1. Any user who has been subject to an enforcement action by the city and who seeks to dispute a notice of violation, order, fine, or other action of the director may file an appeal. No other person may appeal an enforcement action.

2. The notice of appeal must be filed in writing and received by the director, in writing, within ten calendar days of the receipt of the disputed action or proposed action. If the notice of appeal is not received by the director within the ten-day period, the right to an appeal is waived. The notice of appeal shall state with particularity the basis upon which the appellant is disputing the action taken or proposed to be taken.

3. Upon receipt of a timely notice of appeal, the director shall set a date and time for an appeal hearing, but in no case shall the hearing be set more than sixty days from the receipt of the timely notice of appeal. The appellant shall be notified in writing of the date, time, and place for the appeal hearing. The director or his/her designee shall serve as the hearing examiner and be the presiding officer at the hearing.

B. Appeal Hearing.

1. Content of Notice of Hearing. The notice of hearing shall include:

a. Names and mailing addresses of all parties to whom notice is being given, and if known, the names and addresses of their representatives;

b. If the city intends to appear, the mailing address and telephone number of the office designated to represent the city in the proceeding;

c. The official file or other reference number and name of proceeding;

d. The name, official title, mailing address and telephone number of the presiding officer, if known;

e. A statement of the time, place and nature of the proceeding;

f. A statement of the legal authority and jurisdiction under which the hearing is to be held;

g. A reference to the particular section of the chapter or regulations involved;

h. A short and plain statement of the matters asserted by the agency; and

i. A statement that a party who fails to attend or participate in a hearing or other stage of an appeal hearing may be held in default.

2. Procedures at Hearing. The hearing examiner/presiding officer, who may be the director, or his or her designee, shall regulate the course of the hearing. The presiding officer shall afford to all parties the opportunity to respond, present evidence and argument, conduct cross-examination, and submit rebuttal evidence; provided, however, the presiding officer may control the manner and extent of cross-

examinations and rebuttal. In the discretion of the presiding officer, all or part of the hearing may be conducted by telephone or other electronic means as long as each party in the hearing has an opportunity to effectively participate and hear.

3. Rules of Evidence. Evidence, including hearsay evidence, is admissible if in the judgment of the presiding officer it is the kind of evidence on which reasonably prudent persons are accustomed to rely in the conduct of their affairs. The presiding officer shall exclude evidence that is excludable on constitutional or statutory grounds or on the basis of evidentiary privilege recognized in the courts of this state. The presiding officer may exclude evidence that is irrelevant, immaterial, or unduly repetitious. All testimony of parties and witnesses shall be made under oath or affirmation. Documentary evidence may be received in the form of copies or excerpts or by incorporation by reference. Official notice may be taken of (a) any judicially cognizable facts, (b) technical or scientific facts within the city's specialized knowledge, and (c) codes or standards that have been adopted by an agency of the United States, this state or another state, or by a nationally recognized organization or association. A party proposing that official notice be taken may be required to produce a copy of the material to be noticed.

4. Default. If a party fails to attend or participate in any stage of a hearing, the presiding officer may serve upon all parties a default or other dispositive order, which shall include a statement of grounds for the order. Within seven calendar days after service of a default order, the party against whom it was entered may file a written motion requesting that the order be vacated, stating the grounds for the motion. If the party against whom the default order is entered fails to timely file a motion to vacate or the motion to vacate is not granted, the default order will be the final decision of the city.

5. Burden of Proof. The appellant shall have the burden of proof by a preponderance of the evidence.

C. Appeal Conclusion. At the conclusion of the hearing, the hearing examiner shall determine if the disputed action was proper, and shall approve, modify, or rescind the disputed action. The final determination of the hearing examiner shall be in writing, and all parties shall be provided a copy of the final determination. This decision will include findings of fact that are supported by and based on the record. These findings will be entitled to deference on any judicial review.

D. Judicial Review of Appeal.

1. Any party, including the city, the Washington State Department of Ecology, the United States Environmental Protection Agency, or the user/appellant, is entitled to review of the final determination of the hearing examiner in the Snohomish County superior court; provided, that any petition for review shall be filed no later than thirty calendar days after date of the final determination.

2. Copies of the petition for review shall be served as in all civil actions.

3. The filing of the petition shall not stay enforcement of the final determination except by order of the superior court and on posting of a bond to be determined by the court naming the city as beneficiary.

4. The review shall be conducted by the court without a jury. The record shall be satisfied by a narrative report certified by the hearing examiner and no verbatim record of proceedings before the hearing examiner shall be required to be presented to the superior court.

5. The court may affirm the final determination or remand the matter for further proceedings before the hearing examiner; or the court may reverse the final determination if the substantial rights of the petitioners may have been prejudiced because the final determination was:

a. In violation of constitutional provisions; or

b. In excess of the authority or jurisdiction of the hearing examiner; or

c. Arbitrary and capricious. (Ord. 3070-08 § 9.9, 2008)

Article X. Judicial Enforcement Remedies

14.40.660 Injunctive relief.

When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement, the director may petition the Snohomish County superior court through the city's attorney for the issuance of a temporary or permanent injunction, as appropriate, which restrains or compels the specific performance of the wastewater discharge permit, order, or other requirement imposed by this chapter on activities of the user.

The city may also seek such other action as is appropriate for legal and/or equitable relief, including a requirement for the user to conduct environmental remediation. A petition for injunctive relief shall not be a bar against, or a prerequisite for, taking any other action against a user. Injunctive relief shall be nonexclusive to other remedies available to the city. (Ord. 3070-08 § 10.1, 2008)

14.40.670 Civil penalties.

A. A user which has violated or continues to violate any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement shall be liable to the city for a maximum civil penalty of ten thousand dollars per violation, per day. In the case of a monthly or other long-term average discharge limit, penalties shall accrue for each day during the period of the violation.

B. The director may recover reasonable attorneys' fees, court costs, and other expenses associated with enforcement activities, including sampling and monitoring expenses, and the cost of any actual damages incurred by the city.

C. In determining the amount of civil liability, the court shall take into account all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the magnitude and duration, any economic benefit gained through the user's violation, corrective actions by the user, the compliance history of the user, and any other factor as justice requires.

D. Filing a suit for civil penalties shall not be a bar against, or a prerequisite for, taking any other action against a user. (Ord. 3070-08 § 10.2, 2008)

14.40.680 Criminal prosecution.

A. A user who violates any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, shall, upon conviction, be guilty of a gross misdemeanor, punishable by a fine of not more than five thousand dollars and/or one year in jail. Each day a violation occurs shall constitute a separate offense.

B. A user who introduces any substance into the POTW which causes personal injury or property damage shall, upon conviction, be guilty of a gross misdemeanor and be subject to a penalty of not more than five thousand dollars and/or one year in jail. Each day a violation occurs shall constitute a separate offense. This penalty shall be in addition to any other cause of action for personal injury or property damage available under state law.

C. A user who knowingly makes any false statements, representations, or certifications in any application, record, report, plan, or other documentation filed, or required to be maintained, pursuant to this chapter, wastewater discharge permit, or order issued hereunder, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this chapter, shall, upon conviction, be guilty of a gross misdemeanor, and punished by a fine of not more than five thousand dollars and/or one year in jail. Each day a violation occurs shall constitute a separate offense.

In addition, the user shall be subject to:

1. The provisions of 18 USC Section 1001, relating to fraud and false statements;

2. The provisions of Section 309(c)(4) of the Clean Water Act, as amended, governing false statements, representation, or certification; and

3. The provision of Section 309(c)(6) of the Clean Water Act, regarding responsible corporate officers. (Ord. 3070-08 § 10.3, 2008)

14.40.690 Remedies nonexclusive.

The provisions in Articles VIII through XI of this chapter are not exclusive remedies. The city reserves the right to take any, all, or any combination of these actions against a noncompliant user. Enforcement of pretreatment violations will generally be in accordance with the city's enforcement response plan. However, the city reserves the right to take other action against any user when the circumstances warrant. Further, the city is empowered to take more than one enforcement action against any

noncompliant user. These actions may be taken concurrently. (Ord. 3070-08 § 10.4, 2008)

Article XI. Supplemental Enforcement Action

14.40.700 Performance bonds.
The director may decline to issue or reissue a wastewater discharge permit to any user which has failed to comply with any provision of this chapter, a previous wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement unless such user first files a satisfactory bond, payable to the city, in a sum not to exceed a value determined by the director to be necessary to achieve consistent compliance. (Ord. 3070-08 § 11.1, 2008)

14.40.710 Financial assurances.
The director may decline to issue or reissue a wastewater discharge permit to any user which has failed to comply with any provision of this chapter, a previous wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, unless the user first submits proof that it has obtained financial assurances sufficient to meet pretreatment requirements, and/or restore or repair damage to the POTW caused by its discharge. (Ord. 3070-08 § 11.2, 2008)

14.40.720 Service severance.
Whenever a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, water and/or sewer service to the user may be severed. Service will only recommence, at the user's expense, after it has satisfactorily demonstrated its ability to comply. (Ord. 3070-08 § 11.3, 2008)

14.40.730 Public nuisances.
A violation of any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, is hereby declared a public nuisance and shall be corrected or abated as directed by the director. (Ord. 3070-08 § 11.4, 2008)

14.40.740 Contractor listing.
Users which have not achieved compliance with applicable pretreatment standards and requirements are not eligible to receive a contractual award for the sale of goods or services to the city. Existing contracts for the sale of goods or services to the city held by a user found to be in significant noncompliance with pretreatment standards or requirements may be terminated at the discretion of the city. (Ord. 3070-08 § 11.5, 2008)

14.40.750 Publication of violations and/or enforcement actions.
The director may publish violations and/or enforcement actions at any time where monetary fines may be inappropriate in gaining compliance, or in addition to monetary fines. Violations and/or enforcement actions may also be published when the director feels that public notice should be made, or at other appropriate times. The cost of such publications will be recovered from the user. (Ord. 3070-08 § 11.6, 2008)

Article XII. Affirmative Defenses to Discharge Violations

14.40.760 Upset.

A. For the purposes of this section, “upset” means an exceptional incident in which there is unintentional and temporary noncompliance with applicable pretreatment standards because of factors beyond the reasonable control of the user. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. An upset shall constitute an affirmative defense to an action brought for noncompliance with applicable pretreatment standards if the requirements of subsection C of this section are met.

C. A user who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and the user can identify the cause(s) of the upset;

2. The facility was at the time being operated in a prudent and workmanlike manner and in compliance with applicable operation and maintenance procedures; and

3. The user has submitted the following information to the POTW and treatment plant operator within twenty-four hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days):

a. A description of the indirect discharge and cause of noncompliance;

b. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

c. Steps being taken and/or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

D. In any enforcement proceeding, the user seeking to establish the occurrence of an upset shall have the burden of proof.

E. A user may appeal any enforcement action due to an upset as provided under Section 14.40.650.

F. Users shall control production of all discharges to the extent necessary to maintain compliance with applicable pretreatment standards upon reduction, loss, or failure of its treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails. (Ord. 3070-08 § 12.1, 2008)

14.40.770 Prohibited discharge standards.
A user shall have an affirmative defense to an enforcement action brought against it for noncompliance with the prohibitions in Section 14.40.050(A) and (B)(3) through (7) if it can prove that it did not know, or have reason to know, that its discharge, alone or in conjunction with discharges from other sources, would cause pass through or interference and that either: (A) a local limit exists for each pollutant discharged and the user was in compliance with each limit directly prior to, and during, the pass through or interference; or (B) no local limit exists, but the discharge did not change substantially in nature or constituents from the user's prior discharge when the city was regularly in compliance with its NPDES permit, and in the case of interference, was in compliance with applicable sludge use or disposal requirements. (Ord. 3070-08 § 12.2, 2008)

14.40.780 Bypass.
A. For the purposes of this section:

1. "Bypass" means the intentional diversion of wastestreams from any portion of a user's treatment facility.

2. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

B. A user may allow any bypass to occur which does not cause applicable pretreatment standards or requirements to be violated, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of subsections C and D of this section.

C.1. If a user knows in advance of the need for a bypass, it shall submit prior notice to the POTW, at least ten days before the date of the bypass, if possible.

2. A user shall submit oral notice to the city of an unanticipated bypass that exceeds applicable pretreatment standards within twenty-four hours from the time it becomes aware of the bypass. A written submission shall also be provided within five days of the time the user becomes aware of the bypass. The written submission shall contain a description of the bypass and its cause; the duration of the bypass, including exact dates and times, and, if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass. The POTW may waive the written report on a case-by-case basis if the oral report has been received within twenty-four hours.

D.1. Bypass is prohibited, and the POTW may take an enforcement action against a user for a bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The user submitted notices as required under subsection C of this section.

2. The POTW may approve an anticipated bypass, after considering its adverse effects, if the POTW determines that it will meet the three conditions listed in subsection (D)(1) of this section. (Ord. 3070-08 § 12.3, 2008)

Article XIII. Miscellaneous Provisions

14.40.790 Pretreatment charges and fees.
The director may adopt reasonable fees for reimbursement of costs of setting up and operating the city's pretreatment program.

These fees relate solely to the matters covered by this chapter and are separate from all other rates or charges for sewer service; provided, that the city shall collect said charges in the same manner as other sewer utility rates are collected, including but not limited to the sewer lien procedures provided under Chapter 35.67 RCW.

Fees may include:

A. Fees for wastewater discharge permits, including the cost of processing the permit applications, public noticing, issuing and administering the permit, and reviewing monitoring reports submitted by users;

B. Fees for modifying or transferring permits;

C. Fees for monitoring, inspection, surveillance and enforcement procedures including the cost of collection and analyzing a user's discharge;

D. Fees for reviewing and responding to accidental discharge procedures and construction;

E. Fees for preparing and executing enforcement action;

F. Fees for filing appeals;

G. Fees for high-strength waste and industrial process flow; and

H. Other fees as the city may deem necessary to carry out the requirements contained herein.

I. Permit Fees.

1. A five-year permit for a significant categorical user, middle tier significant categorical user, or significant industrial user shall be two thousand two hundred dollars.

2. A five-year permit for a nonsignificant categorical industrial user or zero discharge user shall be one thousand dollars.

3. A five-year discharge authorization shall be one thousand dollars.

4. A one-year discharge authorization shall be five hundred dollars.

5. A discharge authorization shall be two hundred fifty dollars for a one-time batch discharge.

J. Permit transfer fee: five hundred dollars.

K. Permit modification fee: five hundred dollars. Permit modification fees will only be charged in a case where changes in the user's operation require the modification, or when the user requests a modification.

L. Monitoring Fees. Fees for semi-annual inspections and semi-annual sampling events of categorical users and significant industrial users are set at five hundred fifty dollars per visit.

Any user establishing a pattern of noncompliance, or having a history of noncompliance, or suspected of being in noncompliance, may require additional monitoring visits as deemed appropriate by the director. Any additional inspections, sampling, surveillance monitoring activities, and analysis performed which detect noncompliance will be billed directly to the user.

M. Enforcement Actions. All expenses in preparing enforcement actions will be billed directly to the user.

N. High-Strength Waste Fees. Users having effluent concentrations of BOD and/or TSS in excess of two hundred fifty mg/L, and/or FOG concentrations in excess of fifty mg/L, may be billed a high-strength waste surcharge. Surcharge rates will be established by the director, and based on cost of conveyance and treatment in the POTW.

O. Industrial Flow Surcharge. An industrial flow surcharge will be billed to significant industrial users and categorical users (and may be billed to other users where deemed appropriate by the director) and based upon the amount of industrial waste flow. The surcharge rate is nineteen cents per one thousand gallons industrial waste flow. The director may establish new rates based upon the cost of administering the pretreatment program.

P. Cost Recovery. The city may recover any expenses incurred due to noncompliance by a user, including, but not limited to, costs of opening a plugged sewer, costs of repairing a damaged sewer, costs of determining the cause of an SSO or CSO, and costs of cleaning up and mitigating an SSO or CSO.

All fees or charges will be collected by direct billing. Unless the director has been made aware of extenuating circumstances that would prevent prompt payment, all fees are payable within thirty days of the billing. Fees past due will be considered a violation of this chapter. Users not paying fees within sixty days of the billing period will be subject to termination of service. The director may change existing or adopt new fees. (Ord. 3070-08 § 13.1, 2008)

14.40.800 Nonliability.
It is expressly the purpose of this chapter to comply with the September 13, 1985, order of the Washington State Department of Ecology requiring the city of Everett to establish an industrial pretreatment program and to provide for and promote the health, safety and welfare of the general public. It is not the intent of this chapter to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms or requirements of this chapter.

It is the specific intent of this chapter to place the obligation of complying with these regulations upon the applicant or discharger and no provision nor any term used in this chapter is intended to impose any duty whatsoever upon the city or any of its officers, employees or agents, except as provided under the Act or other related statutes of the United States or the state of Washington.

Nothing contained in this chapter is intended to be nor shall be construed to create or form the basis for any tort liability on the part of the city or its officers, employees or agents for any injury or damage resulting from the failure of an applicant or discharger to comply with the provisions of this chapter, or by reason or in consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this chapter, or inaction on the part of the city related in any manner to the implementation or the enforcement of this chapter by its officers, employees or agents. (Ord. 3070-08 § 13.4, 2008)

This page of the Everett Municipal Code is current through Ordinance 3255-12, passed January 18, 2012.
Disclaimer: The City Clerk's Office has the official version of the Everett Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

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Chapter 14.42
GREASE CONTROL

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Article I. General Provisions

14.42.010 Purpose and policy.
This chapter sets forth uniform requirements for food service establishments (FSEs) and non-FSE FOG dischargers (NFDs), collectively fats, oils and grease (FOG) dischargers, that discharge wastewater to the city of Everett publicly owned treatment works (POTW). The objectives of this chapter are:

A. To prevent the introduction of pollutants into the POTW by FOG dischargers that will interfere with the operation of the POTW;

B. To prevent the introduction of pollutants into the POTW by FOG dischargers that will cause combined sewer overflows (CSOs) or sanitary sewer overflows (SSOs);

C. To protect the environment from pollution caused by CSOs and SSOs;

D. To adequately regulate the sale and use of additives added to grease removal systems (GRSs).

This chapter shall apply to all nonresidential users as defined herein as FSEs or NFDs, except those defined as significant industrial users under 40 CFR 403, that discharge or may discharge excess fats, oils and greases (FOG) to the POTW. The chapter authorizes inspection and regulation of these users; authorizes monitoring, compliance, and enforcement activities; establishes administrative review procedures; requires user record keeping; provides for the issuance of control mechanisms if deemed necessary by the director; and provides for the setting of fees for the equitable distribution of costs resulting from the program established herein if deemed necessary by the director. (Ord. 3071-08 § 1.1, 2008)

14.42.020 Administration.
Except as otherwise provided herein, the director shall administer, implement, and enforce the provisions of this chapter. Any powers granted to or duties imposed upon the director may be delegated by the director to other city of Everett personnel. The director may create administrative guidelines to implement the provisions of this chapter. (Ord. 3071-08 § 1.2, 2008)

14.42.030 Definitions.
Unless a provision explicitly states otherwise, the following terms and phrases, as used in this chapter, shall have the meanings hereinafter designated:

A. “Accessible,” when applied to required pretreatment monitoring or treatment equipment, shall mean direct access without the necessity of removing any panel, door, vehicle, equipment, materials, or other similar obstruction.

B. “Additive” means any material, in any physical form, put into a grease removal system (GRS) or any drain lines or appurtenances discharging to a GRS intended in any way to modify the operation of the GRS.

C. “Administrative penalty (fine)” means a punitive monetary charge unrelated to treatment cost, which is assessed by the director rather than a court.

D. “Approval authority” means the State of Washington Department of Ecology.

E. “Authorized representative of the user” means:

1. If the user is a corporation:

a. The president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

b. The manager of one or more facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility; initiate and direct measures to assure long-term compliance with environmental laws and regulations; can ensure that the necessary systems are established or actions taken to gather complete and accurate information for required reports; and where

authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. If the user is a partnership or sole proprietorship: a general partner or proprietor, respectively;

3. If the user is a federal, state, or local governmental facility: a director or highest official appointed or designated to oversee the operation and performance of the activities of the government facility, or his/her authorized designee;

4. The individuals described in subsections (E)(1) through (3) of this section may designate another authorized representative if the authorization is in writing, the authorization specifies the individual or position responsible for the overall operation of the facility from which the discharge originates or having overall responsibility for environmental matters for the company, and the written authorization is submitted to the city.

F. “Automatic grease removal system (AGRS)” means a GRS that has provisions to automatically remove separated FOG and/or settled solids from the tank and collect them for disposal.

G. “Best management practices (BMPs)” means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

H. “Biochemical oxygen demand (BOD)” means the quantity of oxygen utilized in the biochemical oxidation of organic matter amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, latest approved edition, or other methods approved by 40 CFR 136.

I. “Chemical oxygen demand (COD)” means a measure of the oxygen-consuming capacity of inorganic and organic matter present in wastewater amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, latest approved edition, or other methods approved by 40 CFR 136. COD is expressed as the amount of oxygen consumed from a chemical oxidant in mg/L during a specific test.

J. “City” means the city of Everett, Washington.

K. “Combined sewer overflow (CSO)” means any unplanned discharge from the combined sewer system.

L. “Composite sample” means the sample resulting from the combination of individual wastewater samples taken at selected intervals based on an increment of either flow or time.

M. “Day” shall be defined as a calendar day.

N. “Director” means the director of the city of Everett public works department, or his duly authorized representative.

O. “Discharge authorization” means a wastewater discharge permit authorizing users to discharge wastewater to the Everett POTW. These permits are for users requiring a control mechanism.

P. “Domestic sewage” means the liquid and waterborne wastes derived from ordinary living processes, free from industrial wastes, and of such character to permit satisfactory disposal, without special treatment, into the POTW.

Q. “Domestic user (residential user)” means any person who contributes, causes, or allows the contribution of wastewater into the city POTW that is of a similar volume and/or chemical make-up as that of a residential dwelling unit. Discharges from a residential dwelling unit typically include up to one hundred gallons per capita per day at two hundred fifty mg/L of BOD and TSS.

R. “Environmental Protection Agency (EPA)” means the U.S. Environmental Protection Agency or, where appropriate, the Regional Water Management Division Director, or other duly authorized official of said agency.

S. Existing User. An “existing user” is defined as any user which is discharging wastewater prior to the effective date of the ordinance codified in this chapter.

T. Fats, Oils and Grease (FOG). The term “fats, oils, and grease” shall mean those components of wastewater amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, latest approved edition, or other methods approved by 40 CFR 136. For the purposes of this chapter, the term “fats, oils and grease” shall include polar fats, oils, and grease and other components extracted from wastewater by these methods, excluding the nonpolar fraction.

U. “Food service establishment (FSE)” means any establishment, commercial or noncommercial, primarily engaged in preparing, serving, or otherwise making available for consumption foodstuffs in or on a receptacle that requires washing more than two days per week and that discharges to the POTW.

V. “Grab sample” means a sample which is taken from a wastestream on a one-time basis without regard to the flow in the wastestream and without consideration of time.

W. Grease/Greases. See “Fats, Oils and Grease (FOG).”

X. “Grease impact area” means any area of the POTW collection system where grease deposits originating at FSEs and/or NFDs create maintenance requirements exceeding normal sewer maintenance. These areas will be identified by the director and updated as needed.

Y. “Grease interceptor/interceptor/interceptor-style GRS” means any relatively large in-ground or above-ground tank, generally, but not always, of precast concrete, with

internal plumbing and baffling intended to act as a GRS or AGRS to serve one or more fixtures and which shall be remotely located.

Z. “Grease removal system (GRS)” means any device designed for, and intended for, separating, collecting, and removing waterborne FOG and settleable solids prior to discharging to the POTW. This includes any AGRS.

AA. “Grease trap/trap/trap-style GRS” means any relatively small appurtenance, generally, but not always, of cast iron or fabricated steel, with internal configuration and internal or external flow control, intended to function as a GRS or AGRS. All trap-style grease removal systems shall be PDI or IAPMO approved.

AB. “High-strength waste” means any waters or wastewater having a concentration of BOD or total suspended solids in excess of two hundred fifty mg/L, or having a concentration of fats, oil and grease in excess of fifty mg/L.

AC. “Interference” means a discharge which, alone or in conjunction with a discharge or discharges from other sources, either: (1) inhibits or disrupts the POTW, its treatment processes or operations; (2) inhibits or disrupts its biosolids (sludge) processes, use or disposal; or (3) is a cause of a violation of the city’s NPDES permit or of the prevention of sewage sludge use or disposal in compliance with any of the following statutory/regulatory provisions or permits issued thereunder: Section 405 of the Clean Water Act; the Solid Waste Disposal Act (SWDA), including Title II, commonly referred to as the Resource Conservation and Recovery Act (RCRA); any state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA; the Clean Air Act; the Toxic Substances Control Act; and the Marine Protection, Research, and Sanctuaries Act.

AD. “Liquid waste” is the discharge from any fixture, appliance or appurtenance in connection with a plumbing system which does not receive fecal matter.

AE. “Maximum allowable discharge limit” means the maximum concentration (or loading) of a pollutant allowed to be discharged at any time.

AF. “New user” means a user that applies to the city for a new building permit or any person who occupies an existing building and plans to discharge wastewater to the city’s collection system after the effective date of the ordinance codified in this chapter. Any person that buys an existing facility that is discharging nondomestic wastewater will be considered an “existing user” if no substantial remodel is made in the operation.

AG. “Non-FSE FOG discharger (NFD)” means any establishment, such as a church, synagogue, worship hall, banquet facility, or meeting space, with a commercial-style kitchen that is used for preparing, serving, or otherwise making available for consumption foodstuffs in or on a receptacle that requires washing two days a week or less and that discharges to the POTW.

AH. “Pass through” means a discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any

requirement of the city's NPDES permit (including an increase in the magnitude or duration of a violation).

AI. "Permittee" means a person or user issued a wastewater discharge permit, or discharge authorization.

AJ. "Person" means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity, or their legal representatives, agents, or assigns. This definition includes all federal, state, or local governmental entities.

AK. "pH" means a measure of the acidity or alkalinity of a substance, expressed in standard units.

AL. "Pollutant" means any dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, medical wastes, chemical wastes, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt, agricultural and industrial wastes, and the characteristics of the wastewater (i.e., pH, temperature, TSS, turbidity, color, BOD, chemical oxygen demand (COD), toxicity, or odor).

AM. "Pretreatment" means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to (or in lieu of) introducing such pollutants into the POTW. This reduction or alteration can be obtained by physical, chemical, or biological processes; by process changes; or by other means (except by diluting the concentration of the pollutants unless allowed by an applicable pretreatment standard).

AN. "Pretreatment requirements" means any substantive or procedural requirement related to pretreatment imposed on a user, other than a pretreatment standard.

AO. "Pretreatment standards" shall mean prohibited discharge standards, categorical pretreatment standards, and local limits established by the city (POTW).

AP. "Prohibited discharge standards" or "prohibited discharges" means absolute prohibitions against the discharge of certain substances; these prohibitions appear in Section 14.42.050(A) and (B).

AQ. "Publicly owned treatment works (POTW)" means a "treatment works," as defined by Section 212 of the Act (33 USC 1292), which is owned by the city. This definition includes all devices, facilities, or systems used in the collection, storage, treatment, recycling, and reclamation of sewage or industrial wastes of a liquid nature and any conveyances which convey wastewater to a treatment plant. The term also means the city of Everett water pollution control facility.

AR. Sanitary Flow. See "Sewage."

AS. "Sanitary sewer overflow (SSO)" means any unplanned discharge from the separate sanitary sewer system.

AT. “Septic tank waste” means any domestic and/or residential sewage from holding tanks such as vessels, chemical toilets, campers, trailers, and septic tanks.

AU. “Settleable solids” means the solids that sink to the bottom of water, wastewater, or other liquid, and which are amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, latest approved edition, or other methods approved by 40 CFR 136.

AV. “Sewage” means human excrement and gray water (household showers, dishwashing operations, food preparation, etc.)

AW. “Sewer” means any pipe, conduit, ditch, or other device used to collect and transport sewage from the generating source.

AX. Shall, May. “Shall” is mandatory, “may” is permissive.

AY. “Solids interceptor” means any device designed for, and intended for, separating, collecting, and removing waterborne solids prior to being discharged to a GRS. A solids interceptor must remove solids greater than one-eighth inch.

AZ. “Standard Industrial Classification (SIC) Code” means a classification pursuant to the Standard Industrial Classification Manual issued by the United States Office of Management and Budget.

BA. “State” means the state of Washington.

BB. “Stormwater” means any flow occurring during or following any form of natural precipitation, and resulting from such precipitation, including snowmelt.

BC. “Substantial remodel” means any modification to an existing FSE or NFD kitchen that involves changes to fifty percent or more of the floor area of the kitchen.

BD. “Total suspended solids” means the total suspended matter that floats on the surface of, or is suspended in, water, wastewater, or other liquid, and which is removable by laboratory filtering and is amenable to measurement by the methods described in Standard Methods for the Examination of Water and Wastewater, latest approved edition, or other methods approved by 40 CFR 136.

BE. “Toxic pollutant” means one of the pollutants, or combination of those pollutants, listed as toxic in regulations promulgated by the EPA under Section 307 (33 USC 1317) of the Act, or other pollutants as may be promulgated.

BF. “Treatment plant effluent” means the discharge from the POTW into waters of the United States.

BG. “User” means, for the purposes of this chapter, any FSE or NFD. This shall not include “domestic user” as defined herein.

BH. “Wastewater” means liquid and water-carried industrial wastes and sewage from residential dwellings, commercial buildings, industrial and manufacturing facilities, and institutions, whether treated or untreated, which are contributed to the POTW.

BI. “Wastewater discharge permit (industrial wastewater discharge permit, discharge permit, discharge authorization)” means an authorization or equivalent control document issued by the city to users discharging wastewater to the POTW. The permit may contain appropriate pretreatment standards and requirements as set forth in this chapter.

BJ. “Wastewater treatment plant” or “treatment plant” or “pollution control facility” means that portion of the POTW which is designed to provide treatment of municipal sewage and industrial waste.

The use of the singular shall be construed to include the plural and the plural shall include the singular as indicated by the context of its use. The use of either the male or female shall be construed to include both genders. (Ord. 3071-08 § 1.3, 2008)

14.42.040 Abbreviations.
The following abbreviations shall have the designated meanings:

AGRS	automatic grease removal system
AKART	all known available and reasonable technology
BMPs	best management practices
BOD	biochemical oxygen demand
CFR	Code of Federal Regulations
COD	chemical oxygen demand
CSO	combined sewer overflow
EPA	U.S. Environmental Protection Agency
FOG	fats, oils, and grease
FSE	food service establishment
GPD	gallons per day
GRS	grease removal system
L	liter
mg	milligrams
mg/L	milligrams per liter
NFD	non-FSE FOG discharger
O&M	operation and maintenance
POTW	publicly owned treatment works
SSO	sanitary sewer overflow
TSS	total suspended solids

(Ord. 3071-08 § 1.4, 2008)

Article II. General Requirements

14.42.050 Prohibited discharge standards.

A. General Prohibitions. No user shall introduce or cause to be introduced into the POTW any pollutant or wastewater which causes pass through or interference. These general prohibitions apply to all users of the POTW whether or not they are subject to categorical pretreatment standards or any other national, state, or local pretreatment standards or requirements.

B. Specific Prohibitions. No user shall introduce or cause to be introduced into the POTW the following pollutants, substances, or wastewater:

1. Pollutants which create a fire or explosive hazard in the POTW, including, but not limited to, wastestreams with a closed-cup flashpoint of less than one hundred forty degrees Fahrenheit (sixty degrees Celsius) using the test methods specified in 40 CFR 261.21;

2. Wastewater having a pH less than 5.0 or more than 11.0, or otherwise causing corrosive structural damage to the POTW or equipment;

3. Solid or viscous substances in amounts which will cause obstruction of the flow in the POTW resulting in interference, but in no case solids greater than one-quarter inch;

4. Pollutants, including oxygen-demanding pollutants (BOD, COD, etc.), released in a discharge at a flow rate and/or pollutant concentration which, either singly or by interaction with other pollutants, will cause interference with the POTW;

5. Wastewater having a temperature which will inhibit biological activity in the treatment plant resulting in interference, but in no case wastewater which causes the temperature at the introduction into the treatment plant to exceed one hundred four degrees Fahrenheit (forty degrees Celsius) unless the approval authority, upon the request of the POTW, approves alternate temperature limits;

6. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin, in amounts that will cause interference or pass through;

7. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;

8. Trucked or hauled pollutants (except domestic sewage or septic tank wastes) unless authorized by the director, and at discharge points designated by the city;

9. Noxious or malodorous liquids, gases, solids, or other wastewater which, either singly or by interaction with other wastes, are sufficient to create a public nuisance or a hazard to life, or to prevent entry into the sewers for maintenance or repair;

10. Wastewater which imparts color which cannot be removed by the treatment process, such as, but not limited to, dye wastes and vegetable tanning solutions, which consequently imparts color to the treatment plant's effluent, thereby violating the city's NPDES permit. Color (in combination with turbidity) shall not cause the treatment plant effluent to reduce the depth of the compensation point for photosynthetic activity by more than ten percent from the seasonably established norm for aquatic life;

11. Wastewater containing any radioactive wastes or isotopes except as specifically approved by the director in compliance with applicable state or federal regulations;

12. Stormwater, surface water, ground water, artesian well water, roof runoff, subsurface drainage, swimming pool drainage, condensate, deionized water, noncontact cooling water, and unpolluted wastewater, unless specifically authorized by the director;

13. Any sludges, screenings, or other residues from the pretreatment of industrial or commercial wastes or from industrial or commercial processes, except as authorized by the director;

14. Medical wastes, except as specifically authorized by the director;

15. Wastewater causing, alone or in conjunction with other sources, the treatment plant's effluent to fail a toxicity test;

16. Detergents, surface-active agents, or other substances in amounts which may cause excessive foaming in the POTW;

17. Any liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the POTW or to the operation of the POTW. At no time shall two successive readings on an explosion meter, at the point of discharge into the system (or at any point in the system), be more than five percent nor any single reading over ten percent of the lower explosive limit (LEL) of the meter;

18. Animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dusts, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas, tar asphalt residues, residues from refining or processing of fuel or lubricating oil, mud, or glass grinding or polishing wastes;

19. Any substance which will cause the POTW to violate its NPDES and/or other disposal system permits;

20. Any wastewater which in the opinion of the director can cause harm either to the sewers, sewage treatment process, or equipment; have an adverse effect on the receiving stream; or otherwise endanger life, limb, or public property, or constitute a nuisance, unless allowed under special agreement by the director (except that no special waiver shall be given from categorical pretreatment standards);

21. The contents of any tank or other vessel owned or used by any person in the business of collecting or pumping sewage, effluent, septage, or other wastewater unless said person has first obtained testing and approval as may be generally required by the city of Everett and paid all fees assessed for the privilege of said discharge;

22. Any hazardous or dangerous wastes as defined in rules published by the state of Washington (Chapter 173-303 WAC) and/or in the EPA rules (40 CFR Part 261);

23. Persistent pesticides and/or pesticides regulated by the Federal Insecticide Fungicide Rodenticide Act (FIFRA);

24. Any substance which may cause the POTW's effluent or treatment residues, sludges, or scums to be unsuitable for reclamation and reuse, or to interfere with the reclamation process;

25. Fats, oils and grease in amounts that may cause obstructions or maintenance problems in the collection/conveyance system, or interference in the POTW.

Pollutants, substances, or wastewater prohibited by this section shall not be processed or stored in such a manner that they are likely to be discharged to the POTW unless the user has in place an accidental spill prevention plan (ASPP)/slug control plan. (Ord. 3071-08 § 2.1, 2008)

14.42.060 State requirements.
State requirements and limitations on discharges to the POTW shall be met by all users which are subject to such standards in any instance in which they are more stringent than federal requirements and limitations, or those in this chapter or other applicable ordinances. (Ord. 3071-08 § 2.2, 2008)

14.42.070 Local limits.
The following pollutant limits are established to protect against pass through and interference. No person shall discharge wastewater containing in excess of the following daily maximum allowable discharge limit:

Nonpolar fats, oils, and grease (NPFOG)	200 mg/L

The above limit applies at the point where the wastewater is discharged to the POTW (end of the pipe).

The city council authorizes the director to revise local limits. (Ord. 3071-08 § 2.3, 2008)

14.42.080 City's right of revision.
The city reserves the right to establish, by ordinance or in wastewater discharge permits, more stringent standards or requirements on discharges to the POTW. (Ord. 3071-08 § 2.4, 2008)

14.42.090 Special agreement.
The city reserves the right to enter into special agreements with users setting out special terms under which they may discharge to the POTW. In no case will a special agreement waive compliance with a categorical pretreatment standard or federal pretreatment requirement. (Ord. 3071-08 § 2.5, 2008)

14.42.100 Dilution.
A user shall not increase the use of process water, or in any way attempt to dilute a discharge, as a partial or complete substitute for adequate treatment to achieve compliance with an applicable pretreatment standard or requirement unless expressly authorized by an applicable pretreatment standard or requirement. The director may

impose mass limitations on users that he believes may be using dilution to meet applicable pretreatment standards or requirements, or in other cases when the imposition of mass limitations is appropriate. (Ord. 3071-08 § 2.6, 2008)

14.42.110 Pretreatment facilities.

A. General. Users shall provide all known, available, and reasonable methods of prevention, control, and treatment (AKART) as required to comply with this chapter, and shall achieve compliance with all applicable pretreatment standards and requirements set out in this chapter within the time limitations specified by the EPA, the state, or the director, whichever is more stringent.

Any facilities required to pretreat wastewater to a level acceptable to the city shall be provided, operated, and maintained at the user's expense.

In addition, the director may establish best management practices (BMPs) for particular groups of users. These BMPs may include, but are not limited to, types or methods of pretreatment technology to be used, methods of source control, minimum maintenance requirements, spill prevention practices, or other requirements as deemed necessary.

B. If a failure to maintain any GRS results in partial or complete blockage of the building sewer, private sewer system discharging to the city sewer system, or other parts of the city sewer system, or adversely affects the treatment or transmission capabilities of the POTW, or requires excessive maintenance by the city, or poses a possible health hazard, the discharger responsible for the facilities shall be subject to the remedies herein, including cost recovery, enforcement and penalties. (Ord. 3071-08 § 2.7, 2008)

14.42.120 Additional pretreatment measures.

A. Whenever deemed necessary, the director may require users to restrict their discharge during peak flow periods, designate that certain wastewater be discharged only into specific sewers, relocate and/or consolidate points of discharge, separate sewage wastestreams from industrial wastestreams, and such other conditions as may be necessary to protect the POTW and determine the user's compliance with the requirements of this chapter.

B. When determined necessary by the director, each user discharging into the POTW shall install and maintain, on his property and at his expense, a suitable storage and flow-control facility to ensure equalization of flow. The director may require the facility to be equipped with alarms and a rate of discharge controller, the regulation of which shall be determined by the director. A wastewater discharge authorization (DA) may be issued solely for flow equalization. (Ord. 3071-08 § 2.8, 2008)

Article III. Grease Removal System Requirements

14.42.130 Installation required.

All FSEs and NFDs shall have an adequate grease removal system installed and exercise proper kitchen best management practices to ensure that excess concentrations of FOG are not discharged to the POTW. (Ord. 3071-08 § 3, 2008)

14.42.140 New construction.
All new construction FSEs and NFDs shall submit kitchen fixture plan views and kitchen waste plans showing all potential grease-discharging lines, all GRSs, and connecting piping to the director or his designee for approval prior to construction. The plumbing shall be installed in accordance with the approved plans. Failure to submit plans or construct in accordance with approved plans is a violation of this chapter.

A. All new single-occupancy food service establishment buildings shall be constructed with properly sized interceptor-style grease removal systems. Where bona -fide space or gradient limitations make the use of an interceptor-style GRS impractical, and with prior approval of the director, an FSE may install properly sized trap-style GRSs. All kitchen drains and any other drains that may carry grease-laden waste shall be connected to this GRS (except the dishwasher if a trap-style GRS is installed). If a trap-style GRS is installed, the kitchen may not have a garbage disposal/garbage grinder/macerator or similar unit installed.

B. All new construction multi-tenant buildings (strip centers) shall include a separate waste line for all leasable spaces that discharges to a common two thousand gallon or larger interceptor. This waste line shall be permanently marked to identify it as required by the director. When a space is leased, sold, or rented to an FSE or NFD, all kitchen drains and any other drains that may carry grease-laden waste shall be connected to this waste line; no domestic sewage may be connected to this line. The property owner shall be responsible for proper maintenance of this interceptor in accordance with the provisions of this chapter.

C. All new single-occupancy non-FSE FOG discharger buildings shall install a properly sized GRS. Interceptor-style GRSs are recommended, but trap-style GRSs are permissible. All kitchen drains and any other drains that may carry grease-laden waste shall be connected to this GRS (except the dishwasher if a trap-style GRS is installed). If a trap-style GRS is installed, the kitchen may not have a garbage disposal/garbage grinder/macerator or similar unit installed.

D. Any FSE or NFD undertaking a substantial remodel, as defined herein, will be considered to be new construction for the purposes of this chapter. (Ord. 3071-08 § 3.1, 2008)

14.42.150 Existing users.
A. Any existing FSE without a functional GRS shall be required to install one. The type of GRS required will be determined by the director, taking into account cost, available space and gradient, whether the user is in a grease impact area, and any other pertinent information. Where feasible, all kitchen drains and any other drains that may carry grease-laden waste shall be connected to this GRS (except the dishwasher if a trap-style GRS is installed). If a trap-style GRS is installed, the kitchen may not have a garbage disposal/garbage grinder/macerator or similar unit installed.

B. Any existing NFD without a functional GRS may be required to install one. The type of GRS required will be determined by the director, taking into account cost, available space and gradient, whether the user is in a grease impact area, and any other pertinent information. Where feasible, all kitchen drains and any other drains that

may carry grease-laden waste shall be connected to this GRS (except the dishwasher if a trap-style GRS is installed). If a trap-style GRS is installed, the kitchen may not have a garbage disposal/garbage grinder/macerator or similar unit installed. (Ord. 3071 -08 § 3.2, 2008)

14.42.160 Grease removal system maintenance.

A. All grease removal systems shall be maintained to ensure proper operation. At a minimum, interceptor-style GRSs shall be cleaned at least once every ninety days and trap-style GRSs cleaned at least once per week. These required frequencies may be extended with the approval of the director. Grease removal systems must be cleaned whenever the combined thickness of the floating greases and settled solids is equal to, or greater than, twenty-five percent of the total liquid depth in the GRS.

B. When cleaned, an interceptor-style GRS must be completely pumped out, all solids removed, solidified grease scraped from the interior and the structure and all internal plumbing inspected for damage and corrosion. The GRS shall be refilled with water prior to being placed back into operation. If repairs are required, they shall be performed within seven days.

C. Trap-style GRSs may be maintained by the FSE or NFD. When cleaned, the trap must have surface grease and oil removed, settled solids removed, all sides scraped, removable parts removed and cleaned, be inspected for damage and corrosion, and be properly reassembled. If repairs are required, they shall be performed within seven days.

D. The material that is removed in the process of cleaning a GRS shall not be discharged back into the GRS, any part of the POTW, any private sewer, any drainage piping, or storm sewer system. All materials removed shall be handled and disposed of in accordance with federal, state, county and local laws, rules and regulations.

E. In addition to the maintenance required above, automatic grease removal systems shall be maintained in accordance with the manufacturers' guidelines. (Ord. 3071-08 § 3.3, 2008)

14.42.170 Grease removal system additives.

No user may use an additive of any type for the GRS without the approval of the director. The director will adopt procedures for the approval of additives.

No vendor may sell, attempt to sell or otherwise distribute any additive in the city of Everett without prior approval of the additive by the director. Any vendor selling, or attempting to sell, or otherwise distributing any additive intended for use in a GRS that has not been approved for use by the director is in violation of this chapter and is subject to all enforcement actions contained herein. (Ord. 3071-08 § 3.4, 2008)

14.42.180 Solids interceptor.

If a garbage disposal/garbage grinder/macerator or similar unit is installed in a kitchen, it must discharge to the GRS through a solids interceptor plumbed immediately after the garbage disposal/garbage grinder/macerator or similar unit. The solids interceptor

shall be maintained in proper operating condition at all times there is flow through it. (Ord. 3071-08 § 3.5, 2008)

14.42.190 Grease removal system sizing.

A. Trap-style grease removal systems shall be sized in accordance with the standards in the currently adopted plumbing code.

B. The minimum size for an interceptor-style grease removal system shall be determined using the following table:

Drainage Fixture Units1	Nominal Interceptor Volume (gallons)
21	750
35	1,000
90	1,250
172	1,500
216	2,000
307	2,500
342	3,000
428	4,000
576	5,000
724	6,000
880	7,000
1,036	8,000
>1,036	8,000

Note:

1 Drainage fixture units (as defined in the currently adopted plumbing code) for installed equipment plumbed to kitchen drain lines connected to the grease removal system.

C. In no case shall an interceptor smaller than seven hundred fifty gallons be installed without prior approval of the director. If a garbage disposal/garbage grinder/macerator or similar unit is installed, the minimum size is one thousand five hundred gallons to adequately retain the added settleable solids loading.

D. The maximum size for an interceptor shall be four thousand gallons. If the calculated minimum size is larger than this, two interceptors of approximately equal size shall be installed in series. If the calculated minimum size is larger than eight thousand gallons, two four-thousand-gallon interceptors shall be installed in series. (Ord. 3071-08 § 3.6, 2008)

14.42.200 Flow controls.
All trap-style grease removal systems shall have an internal or external flow control installed to ensure that wastewater flow through the trap does not exceed the manufacturer's design flow rating. This flow control shall be maintained in operating condition at all times. (Ord. 3071-08 § 3.7, 2008)

Article IV. Record Keeping—Reporting Requirements

14.42.210 Record keeping.
Users subject to this chapter shall document all cleaning and maintenance activities performed on their GRS. These records shall be maintained for a minimum of three years and be available for inspection and copying by the director or his representative. This period shall be automatically extended for the duration of any litigation concerning the user or the POTW, or where the user has been specifically notified of a longer retention period required by the director. (Ord. 3071-08 § 4.1, 2008)

14.42.220 Reporting.
Where the director has determined that a user must provide written reports, these reports shall be submitted in accordance with the requirement of the director. Written reports will be deemed to have been submitted on the date postmarked. For reports which are not mailed, postage prepaid, into a mail facility serviced by the United States Postal Service, the date of receipt of the report by the city shall govern. (Ord. 3071-08 § 4.2, 2008)

Article V. Confidential Information

14.42.230 Public disclosure—Exemption.
Information and data on a user obtained from reports, surveys, wastewater discharge permit applications, wastewater discharge permits, and monitoring programs, and from city inspection and sampling activities, shall be available to the public without restriction, unless the user specifically requests, and is able to demonstrate to the satisfaction of the city, that the release of such information would divulge information, processes or methods of production that are exempt from disclosure under the public records at Chapter 42.56 RCW, or as hereafter amended.

When requested and demonstrated by the user furnishing a report that such information should be held confidential, the city shall make reasonable efforts to protect the portions of a report which might disclose trade secrets or secret processes from inspection by the public, but shall be made available immediately upon request to governmental agencies for uses related to the NPDES program or pretreatment program, and in enforcement proceedings involving the person furnishing the report.

Wastewater constituents and characteristics and other "effluent data" as defined by 40 CFR 2.302 will not be recognized as confidential information and will be available to the public without restriction. (Ord. 3071-08 § 5, 2008)

Article VI. Administrative Enforcement Remedies

14.42.240 Notification of violation (notice of violation, NOV).
When the director finds that a user has violated (or continues to violate) any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, the director may serve upon that user a written notice of violation. The director may select any means of service which is reasonable under the circumstances.

Within seven calendar days of the receipt of this notice, an explanation of the violation and a plan for the satisfactory correction and prevention thereof, to include specific required actions, shall be submitted by the user to the director. Submission of this plan in no way relieves the user of liability for any violations occurring before or after receipt of the notice of violation. Nothing in this section shall limit the authority of the city to take any action, including emergency actions or any other enforcement action, without first issuing a notice of violation. (Ord. 3071-08 § 6.1, 2008)

14.42.250 Consent orders.
The director may enter into consent orders, assurances of voluntary compliance, or other similar documents establishing an agreement with any user responsible for noncompliance. Such documents will include specific action to be taken by the user to correct the noncompliance within a time period specified by the document. Such documents shall have the same force and effect as the administrative orders issued pursuant to Sections 14.42.270 and 14.42.280 and shall be judicially enforceable. Use of a consent order shall not be a bar against, or prerequisite for, taking any other action against the user. (Ord. 3071-08 § 6.2, 2008)

14.42.260 Show cause hearing.
The director may order a user which has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, to appear before the director and show cause why a proposed enforcement action should not be taken. Notice shall be served on the user specifying the time and place for the hearing, the proposed enforcement action, the reasons for such action, and a request that the user show cause why the proposed enforcement action should not be taken. The notice of the hearing shall be served personally or by registered or certified mail (return receipt requested) at least ten business days prior to the hearing. Such notice may be served on any authorized representative of the user. A show cause hearing shall not be a bar against, or prerequisite for, taking any other action against the user. (Ord. 3071-08 § 6.3, 2008)

14.42.270 Compliance orders.
When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, the director may issue an order to the user responsible for the discharge directing that the user come into compliance within a time specified in the order. Compliance orders may require users to refrain from certain activities, install additional pretreatment equipment, increase self-monitoring, or use best management practices designed to minimize the amount of pollutants discharged to the sewer. If the user does not come into compliance within the time specified in the order, sewer service may be discontinued. Issuance of a compliance order shall not be

a bar against, or a prerequisite for, taking any other action against the user. (Ord. 3071 -08 § 6.4, 2008)

14.42.280 Cease and desist orders.
When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, or that the user's past violations are likely to recur, the director may issue an order to the user directing it to cease and desist all such violations and directing the user to:

A. Immediately comply with all requirements; and

B. Take such appropriate remedial or preventive action as may be needed to properly address a continuing or threatened violation, including halting operations and/or terminating the discharge.

Issuance of a cease and desist order shall not be a bar against, or a prerequisite for, taking any other action against the user. (Ord. 3071-08 § 6.5, 2008)

14.42.290 Administrative fines.
A. When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, the director may fine such user in an amount not less than two hundred fifty dollars and not to exceed ten thousand dollars. Such fines shall be assessed on a per violation, per day basis. In the case of monthly or other long-term average discharge limits, fines shall be assessed for each day during the period of violation. Said administrative fines shall constitute a sewer service surcharge and, upon assessment, shall be subject to collection in the same manner as all other sewer utility rates, charges and penalties.

B. Unless other arrangements have been made with and authorized by the director, unpaid charges, fines, and penalties shall accrue thereafter at a rate of one percent per month. After ninety days, if charges, fines, and penalties have not been paid, the city may revoke the user's discharge permit.

C. Users desiring to appeal and dispute such fines must file a written request for the director to reconsider the fine along with full payment of the fine amount within ten calendar days of being notified of the fine. Upon receipt of a timely appeal, the director shall set a date and time for an appeal hearing, but in no case shall the hearing be set more than thirty business days from the receipt of the timely notice of appeal. The appellant shall be notified in writing of the date, time, and place for the appeal hearing. The director or his/her designee shall serve as the hearing examiner. In the event the user's appeal is successful, any payments made shall be returned to the user. Affirmation or modification of an administrative fine by the public works director shall relate back to the original date of assessment.

The city shall recover the costs of preparing administrative enforcement actions, such as notices and orders, including the cost of additional inspections, sampling and analysis, and may add them to the fine.

D. Issuance of an administrative fine shall not be a bar against, or a prerequisite for, taking any other action against the user.

E. Users seeking judicial review of administrative fines must do so by filing a petition for review in the Snohomish County superior court within thirty calendar days of the decision of the director. (Ord. 3071-08 § 6.6, 2008)

14.42.300 Emergency suspensions.
The director may immediately suspend a user's discharge (after informal notice to the user) whenever such suspension is necessary to stop an actual or threatened discharge which reasonably appears to present or cause an imminent or substantial endangerment to the health or welfare of persons.

The director may also immediately suspend a user's discharge (after informal notice and opportunity to respond) that threatens to interfere with the operation of the POTW, or which presents or may present an endangerment to the environment.

A. Any user notified of a suspension of its discharge shall immediately stop or eliminate its contribution. In the event of a user's failure to immediately comply voluntarily with the suspension order, the director shall take such steps as deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the POTW, its receiving stream, or endangerment to any individuals.

The director may allow the user to recommence its discharge when the user has demonstrated to the satisfaction of the city that the period of endangerment has passed. If the director does not allow the user to recommence its discharge within fifteen days of the emergency suspension, the director shall initiate termination proceedings pursuant to Section 14.42.310.

B. A user that is responsible, in whole or in part, for any discharge presenting imminent endangerment shall submit a detailed written statement, describing the causes of the harmful contribution and the measures taken to prevent any future occurrence, to the director prior to the date of any show cause or termination hearing under Sections 14.42.260 and 14.42.310.

Nothing in this section shall be interpreted as requiring a hearing prior to any emergency suspension under this section. (Ord. 3071-08 § 6.7, 2008)

14.42.310 Termination of discharge (nonemergency).
Any user that violates the following conditions is subject to discharge termination:

A. Violation of wastewater discharge permit conditions;

B. Failure to accurately report the wastewater constituents and characteristics of its discharge;

C. Failure to report significant changes in operations or wastewater volume, constituents and characteristics prior to discharge;

D. Refusal of reasonable access to the user's premises for the purpose of inspection, monitoring or sampling; or

E. Violation of the pretreatment standards in Article II of this chapter.

Such user will be notified of the proposed termination of its discharge and be offered an opportunity for hearing pursuant to Section 14.42.320 to dispute the proposed termination action. Initiation of a termination proceeding by the city shall not be a bar to, or a prerequisite for, taking any other action against the user. (Ord. 3071-08 § 6.8, 2008)

14.42.320 Appeal procedures.

A. Appeals.

1. Any user who has been subject to an enforcement action by the city and who seeks to dispute a notice of violation, order, fine, or other action of the director may file an appeal. No other person may appeal an enforcement action.

2. The notice of appeal must be filed in writing and received by the director within ten calendar days of the receipt of the disputed action or proposed action. If the notice of appeal is not received by the director within the ten-day period, the right to an appeal is waived. The notice of appeal shall state with particularity the basis upon which the appellant is disputing the action taken or proposed to be taken.

3. Upon receipt of a timely notice of appeal, the director shall set a date and time for an appeal hearing, but in no case shall the hearing be set more than sixty days from the receipt of the timely notice of appeal. The appellant shall be notified in writing of the date, time, and place for the appeal hearing. The director or his/her designee shall serve as the hearing examiner and be the presiding officer at the hearing.

B. Appeal Hearing.

1. Content of Notice of Hearing. The notice of hearing shall include:

a. Names and mailing addresses of all parties to whom notice is being given, and, if known, the names and addresses of their representatives;

b. If the city intends to appear, the mailing address and telephone number of the office designated to represent the city in the proceeding;

c. The official file or other reference number and name of proceeding;

d. The name, official title, mailing address and telephone number of the presiding officer, if known;

e. A statement of the time, place and nature of the proceeding;

f. A statement of the legal authority and jurisdiction under which the hearing is to be held;

g. A reference to the particular section of the ordinance or regulations involved;

h. A short and plain statement of the matters asserted by the agency; and

i. A statement that a party who fails to attend or participate in a hearing or other stage of an appeal hearing may be held in default.

2. Procedures at Hearing. The hearing examiner/presiding officer, who may be the director or his or her designee, shall regulate the course of the hearing. The presiding officer shall afford to all parties the opportunity to respond, present evidence and argument, conduct cross-examination, and submit rebuttal evidence; provided, however, the presiding officer may control the manner and extent of cross-examinations and rebuttal. In the discretion of the presiding officer, all or part of the hearing may be conducted by telephone or other electronic means as long as each party in the hearing has an opportunity to effectively participate and hear.

3. Rules of Evidence. Evidence, including hearsay evidence, is admissible if, in the judgment of the presiding officer, it is the kind of evidence on which reasonably prudent persons are accustomed to rely in the conduct of their affairs. The presiding officer shall exclude evidence that is excludable on constitutional or statutory grounds or on the basis of evidentiary privilege recognized in the courts of this state. The presiding officer may exclude evidence that is irrelevant, immaterial, or unduly repetitious. All testimony of parties and witnesses shall be made under oath or affirmation. Documentary evidence may be received in the form of copies or excerpts or by incorporation by reference. Official notice may be taken of (a) any judicially cognizable facts, (b) technical or scientific facts within the city's specialized knowledge, and (c) codes or standards that have been adopted by an agency of the United States, this state or another state, or by a nationally recognized organization or association. A party proposing that official notice be taken may be required to produce a copy of the material to be noticed.

4. Default. If a party fails to attend or participate in any stage of a hearing, the presiding officer may serve upon all parties a default or other dispositive order, which shall include a statement of grounds for the order. Within seven calendar days after service of a default order, the party against whom it was entered may file a written motion requesting that the order be vacated, stating the grounds for the motion. If the party against whom the default order is entered fails to timely file a motion to vacate or the motion to vacate is not granted, the default order will be the final decision of the city.

5. Burden of Proof. The appellant shall have the burden of proof by a preponderance of the evidence.

C. Appeal Conclusion. At the conclusion of the hearing, the hearing examiner shall determine if the disputed action was proper, and shall approve, modify, or rescind the disputed action. The final determination of the hearing examiner shall be in writing, and all parties shall be provided a copy of the final determination. This decision will include findings of fact that are supported by and based on the record. These findings will be entitled to deference on any judicial review.

D. Judicial Review of Appeal.

1. Any party, including the city, the Washington State Department of Ecology, the United States Environmental Protection Agency, or the user/appellant, is entitled to review of the final determination of the hearing examiner in the Snohomish County superior court; provided, that any petition for review shall be filed no later than thirty calendar days after date of the final determination.

2. Copies of the petition for review shall be served as in all civil actions.

3. The filing of the petition shall not stay enforcement of the final determination except by order of the superior court and on posting of a bond, to be determined by the court, naming the city as beneficiary.

4. The review shall be conducted by the court without a jury. The record shall be satisfied by a narrative report certified by the hearing examiner and no verbatim record of proceedings before the hearing examiner shall be required to be presented to the superior court.

5. The court may affirm the final determination or remand the matter for further proceedings before the hearing examiner; or the court may reverse the final determination if the substantial rights of the petitioners may have been prejudiced because the final determination was:

i. In violation of constitutional provisions; or

ii. In excess of the authority or jurisdiction of the hearing examiner; or

iii. Arbitrary and capricious. (Ord. 3071-08 § 6.9, 2008)

Article VII. Judicial Enforcement Remedies

14.42.330 Injunctive relief.

When the director finds that a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement, the director may petition the Snohomish County superior court through the city's attorney for the issuance of a temporary or permanent injunction, as appropriate, which restrains or compels the specific performance of the wastewater discharge permit, order, or other requirement imposed by this chapter on activities of the user.

The city may also seek such other action as is appropriate for legal and/or equitable relief, including a requirement for the user to conduct environmental remediation. A petition for injunctive relief shall not be a bar against, or a prerequisite for, taking any other action against a user. Injunctive relief shall be nonexclusive to other remedies available to the city. (Ord. 3071-08 § 7.1, 2008)

14.42.340 Civil penalties.

A. A user which has violated or continues to violate any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement shall be liable to the city for a maximum civil penalty of ten thousand dollars per violation, per day. In the case of a monthly or other long-term

average discharge limit, penalties shall accrue for each day during the period of the violation.

B. The director may recover reasonable attorneys' fees, court costs, and other expenses associated with enforcement activities, including sampling and monitoring expenses, and the cost of any actual damages incurred by the city.

C. In determining the amount of civil liability, the court shall take into account all relevant circumstances, including, but not limited to, the extent of harm caused by the violation, the magnitude and duration, any economic benefit gained through the user's violation, corrective actions by the user, the compliance history of the user, and any other factor as justice requires.

D. Filing a suit for civil penalties shall not be a bar against or a prerequisite for taking any other action against a user. (Ord. 3071-08 § 7.2, 2008)

14.42.350 Criminal prosecution.

A. A user who violates any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement shall, upon conviction, be guilty of a gross misdemeanor, punishable by a fine of not more than five thousand dollars and/or one year in jail. Each day a violation occurs shall constitute a separate offense.

B. A user who introduces any substance into the POTW which causes personal injury or property damage shall, upon conviction, be guilty of a gross misdemeanor and be subject to a penalty of not more than five thousand dollars and/or one year in jail. Each day a violation occurs shall constitute a separate offense. This penalty shall be in addition to any other cause of action for personal injury or property damage available under state law.

C. A user who knowingly makes any false statements, representations, or certifications in any application, record, report, plan, or other documentation filed, or required to be maintained, pursuant to this chapter, wastewater discharge permit, or order issued hereunder, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this chapter shall, upon conviction, be guilty of a gross misdemeanor, and punished by a fine of not more than five thousand dollars and/or one year in jail. Each day a violation occurs shall constitute a separate offense.

In addition, the user shall be subject to:

1. The provisions of 18 USC Section 1001 relating to fraud and false statements;

2. The provisions of Section 309(c)(4) of the Clean Water Act, as amended, governing false statements, representation, or certification; and

3. The provision of Section 309(c)(6) of the Clean Water Act regarding responsible corporate officers. (Ord. 3071-08 § 7.3, 2008)

14.42.360 Remedies nonexclusive.
The provisions in Articles VI through IX of this chapter are not exclusive remedies. The city reserves the right to take any, all, or any combination of these actions against a noncompliant user. Enforcement of pretreatment violations will generally be in accordance with the city's enforcement response plan. However, the city reserves the right to take other action against any user when the circumstances warrant. Further, the city is empowered to take more than one enforcement action against any noncompliant user. These actions may be taken concurrently. (Ord. 3071-08 § 7.4, 2008)

Article VIII. Supplemental Enforcement Action

14.42.370 Performance bonds.
The director may decline to issue or reissue a wastewater discharge permit to any user which has failed to comply with any provision of this chapter, a previous wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement unless such user first files a satisfactory bond, payable to the city, in a sum not to exceed a value determined by the director to be necessary to achieve consistent compliance. (Ord. 3071-08 § 8.1, 2008)

14.42.380 Financial assurances.
The director may decline to issue or reissue a wastewater discharge permit to any user which has failed to comply with any provision of this chapter, a previous wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, unless the user first submits proof that it has obtained financial assurances sufficient to meet pretreatment requirements, and/or restore or repair damage to the POTW caused by its discharge. (Ord. 3071-08 § 8.2, 2008)

14.42.390 Service severance.
Whenever a user has violated or continues to violate any provision of this chapter, a wastewater discharge permit or order issued hereunder, or any other pretreatment standard or requirement, water and/or sewer service to the user may be severed. Service will only recommence, at the user's expense, after it has satisfactorily demonstrated its ability to comply. (Ord. 3071-08 § 8.3, 2008)

14.42.400 Public nuisances.
A violation of any provision of this chapter, wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement, is hereby declared a public nuisance and shall be corrected or abated as directed by the director. (Ord. 3071-08 § 8.4, 2008)

14.42.410 Contractor listing.
Users which have not achieved compliance with applicable pretreatment standards and requirements are not eligible to receive a contractual award for the sale of goods or services to the city. Existing contracts for the sale of goods or services to the city held by a user found to be in significant noncompliance with pretreatment standards or requirements may be terminated at the discretion of the city. (Ord. 3071-08 § 8.5, 2008)

14.42.420 Publication of violations and/or enforcement actions.
The director may publish violations and/or enforcement actions at any time, where monetary fines may be inappropriate in gaining compliance, or in addition to monetary fines. Violations and/or enforcement actions may also be published when the director feels that public notice should be made, or at other appropriate times. The cost of such publications will be recovered from the user. (Ord. 3071-08 § 8.6, 2008)

Article IX. Affirmative Defenses to Discharge Violations

14.42.430 Upset.
A. For the purposes of this section, “upset” means an exceptional incident in which there is unintentional and temporary noncompliance with applicable pretreatment standards because of factors beyond the reasonable control of the user. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. An upset shall constitute an affirmative defense to an action brought for noncompliance with applicable pretreatment standards if the requirements of subsection C of this section are met.

C. A user who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

1. An upset occurred and the user can identify the cause(s) of the upset;

2. The facility was at the time being operated in a prudent and workmanlike manner and in compliance with applicable operation and maintenance procedures; and

3. The user has submitted the following information to the POTW and treatment plant operator within twenty-four hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days):

a. A description of the indirect discharge and cause of noncompliance;

b. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

c. Steps being taken and/or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

D. In any enforcement proceeding, the user seeking to establish the occurrence of an upset shall have the burden of proof.

E. A user may appeal any enforcement action due to an upset as provided under Section 14.42.320.

F. Users shall control production of all discharges to the extent necessary to maintain compliance with applicable pretreatment standards upon reduction, loss, or failure of

its treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails. (Ord. 3071-08 § 9.1, 2008)

14.42.440 Prohibited discharge standards.
A user shall have an affirmative defense to an enforcement action brought against it for noncompliance with the prohibitions in Section 14.42.050(A) and (B)(3) through (7) if it can prove that it did not know, or have reason to know, that its discharge, alone or in conjunction with discharges from other sources, would cause pass through or interference and that either: (A) a local limit exists for each pollutant discharged and the user was in compliance with each limit directly prior to, and during, the pass through or interference; or (B) no local limit exists, but the discharge did not change substantially in nature or constituents from the user's prior discharge when the city was regularly in compliance with its NPDES permit, and in the case of interference, was in compliance with applicable sludge use or disposal requirements. (Ord. 3071-08 § 9.2, 2008)

14.42.450 Bypass.
A. For the purposes of this section:

1. "Bypass" means the intentional diversion of wastestreams from any portion of a user's treatment facility.

2. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

B. A user may allow any bypass to occur which does not cause applicable pretreatment standards or requirements to be violated, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of subsections C and D of this section.

C.1. If a user knows in advance of the need for a bypass, it shall submit prior notice to the POTW, at least ten days before the date of the bypass, if possible.

2. A user shall submit oral notice to the city of an unanticipated bypass that exceeds applicable pretreatment standards within twenty-four hours from the time it becomes aware of the bypass. A written submission shall also be provided within five days of the time the user becomes aware of the bypass. The written submission shall contain a description of the bypass and its cause; the duration of the bypass, including exact dates and times, and, if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass. The POTW may waive the written report on a case-by-case basis if the oral report has been received within twenty-four hours.

D.1. Bypass is prohibited, and the POTW may take an enforcement action against a user for a bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The user submitted notices as required under subsection C of this section.

2. The POTW may approve an anticipated bypass, after considering its adverse effects, if the POTW determines that it will meet the three conditions listed in subsection (D)(1) of this section. (Ord. 3071-08 § 9.3, 2008)

Article X. Miscellaneous Provisions

14.42.460 Pretreatment charges and fees.
The director may adopt reasonable fees for reimbursement of costs of setting up and operating the city's FOG control program.

These fees relate solely to the matters covered by this chapter and are separate from all other rates or charges for sewer service; provided, that the city shall collect said charges in the same manner as other sewer utility rates are collected, including but not limited to the sewer lien procedures provided under Chapter 35.67 RCW.

Fees may include:

A. Fees for wastewater discharge permits, including the cost of processing the permit applications, public noticing, issuing and administering the permit, and reviewing monitoring reports submitted by users;

B. Fees for modifying or transferring permits;

C. Fees for monitoring, inspection, surveillance and enforcement procedures including the cost of collection and analyzing a user's discharge;

D. Fees for reviewing accidental discharge procedures and construction;

E. Fees for preparing and executing enforcement action;

F. Fees for filing appeals;

G. Fees for high-strength waste and nondomestic flow; and

H. Other fees as the city may deem necessary to carry out the requirements contained herein;

I. Permit Fees. Should the director determine that adequate FOG control activities require issuance of control mechanism to FSEs and NFDs, the fees shall be as follows:

1. A five-year discharge authorization shall be one thousand dollars.

2. A one-year discharge authorization shall be five hundred dollars.

3. Permit transfer fee: five hundred dollars.

4. Permit modification fee: five hundred dollars. Permit modification fees will only be charged in a case where changes in the user's operation require the modification, or when the user requests a modification;

J. Monitoring Fees. Any user establishing a pattern of noncompliance, or having a history of noncompliance, or suspected of being in noncompliance, may require additional monitoring visits as deemed appropriate by the director. Any additional inspections, sampling, surveillance monitoring activities, and analysis performed which detect noncompliance will be billed directly to the user;

K. Enforcement Actions. All expenses in preparing enforcement actions will be billed directly to the user;

L. Cost Recovery. The city may recover any expenses incurred due to noncompliance by a user, including, but not limited to, costs of opening a plugged sewer, costs of repairing a damaged sewer, costs of determining the cause of an SSO or CSO, and costs of cleaning up and mitigating an SSO or CSO.

All fees or charges will be collected via direct billing. Unless the director has been made aware of extenuating circumstances that would prevent prompt payment, all fees are payable within thirty days of the billing. Fees past due will be considered a violation of this chapter. Users not paying fees within sixty days of the billing period will be subject to termination of service. The director may change existing or adopt new fees. (Ord. 3071-08 § 10.1, 2008)

14.42.470 Nonliability.
It is expressly the purpose of this chapter to provide for and promote the health, safety and welfare of the general public. It is not the intent of this chapter to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms or requirements of this chapter.

It is the specific intent of this chapter to place the obligation of complying with these regulations upon the applicant or discharger and no provision nor any term used in this chapter is intended to impose any duty whatsoever upon the city or any of its officers, employees or agents, except as provided under the Act or other related statutes of the United States or the state of Washington.

Nothing contained in this chapter is intended to be nor shall be construed to create or form the basis for any tort liability on the part of the city or its officers, employees or agents, for any injury or damage resulting from the failure of an applicant or discharger

to comply with the provisions of this chapter, or by reason or in consequence of any inspection, notice, order, certificate, permission or approval authorized or issued or done in connection with the implementation or enforcement of this chapter, or inaction on the part of the city related in any manner to the implementation or the enforcement of this chapter by its officers, employees or agents. (Ord. 3071-08 § 10.4, 2008)

This page of the Everett Municipal Code is current through Ordinance 3255-12, passed January 18, 2012.
Disclaimer: The City Clerk's Office has the official version of the Everett Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

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DESIGN & CONSTRUCTION STANDARDS AND SPECIFICATIONS

SECTION 6

SANITARY SEWERS

6-1 GENERAL

Construction of all sanitary sewer mains, side sewers (laterals), and related facilities, including but not limited to sewer lift stations, telemetering facilities and appurtenances will be under the supervision of the city and shall be in compliance with all ordinances and current Standards of Everett.

Sewer main extensions will be required when the property does not front on a sewer main or when the existing sewer main is not adequate for the increased use proposed. The minimum extension shall be to a point at least 5 feet inside the prolongation of the property line.

All pipe installed shall be structurally sound for the design depth.

All requests for inspections and for witnessing tests shall be scheduled with the public works inspector 24 hours in advance. Failure to give adequate advance notice may result in delays to the contractor for required inspections.

6-2 ALIGNMENT TOLERANCE

The maximum tolerance from true line and grade shall be as follows:

A. Maximum deviation from established line and grade shall not be greater than 1/32 inch per inch of pipe diameter and not to exceed 1/2 inch per pipe length.

B. No adverse grade in any pipe length will be permitted.

C. The difference in deviation from established line and grade between two successive joints shall not exceed 1/3 of the amounts specified above.

6-3 CONSTRUCTION PLANS

The installation of all extensions to the sanitary sewer system shall be done per plans which have been approved by the city engineer.

Sanitary sewer plans are to be separate from other utility plans, but all other utilities are to be shown, with the sanitary sewer portions highlighted.

Plans should be prepared on 24 inch by 36 inch plan/profile type sheets and shall show both plan and profile views. Other utilities are to be shown in profile view and in plan view.

The minimum allowable scale shall be 1 inch = 40 feet; on small projects, it shall be expected that the scale will be enlarged to adequately utilize the full plan sheet.

Provide notes on plans that refer to specific City Standards for such things as manholes, drop connections, side sewers, etc.

Plans shall show invert elevations of the main at the outlet and all inlets of each manhole, slope of the main, and surface elevations of the manhole lid. In the profile view, the finish ground elevation over the pipe shall be shown as well as crossings of other existing or proposed utilities. Stationing of side sewers from the downhill manhole is required.

In all cases where a line is to be placed in an easement, the easement is to be shown with measurement information to accurately lay it out prior to constructing the pipe line.

Upon completion of construction, the original of the plan shall be as-built by the developer and certified as as-built by him and turned into the Public Works Department with properly executed easement deeds as applicable for the project.

6-3.1 REQUIRED NOTES ON PLANS

The following standard notes are required on all Sanitary Sewer Plans:

A. All work and materials shall conform to the City of Everett Standards and WSDOT/APWA Standard Specifications.
B. No part of the sanitary sewer system shall be covered, concealed or put into use until it has been tested, inspected, and approved by the city inspector.
C. Approximate locations of existing utilities have been obtained from available records and are shown for convenience. The contractor shall be responsible for verification of locations and to avoid damage to any additional utilities not shown. If conflicts with existing utilities arise during construction, the contractor shall notify the public works inspector and any changes required shall be approved by the city engineer prior to commencement of related construction on the project.
D. All sewer main extensions within the public right-of-way or in easements must be staked by survey for line and grade prior to starting construction.

6-4 EASEMENTS

All public sewer mains not in the public right-of-way shall be in easements granted to the City of Everett.

All public sewer main easements shall be a minimum of 20 feet wide, with the sewer main ideally being in the center of the easement.

No permanent structures are allowed to be constructed in the easement area.

Vehicle access, as approved by the city engineer, will be provided to all manholes.

All easements except for special circumstances shall be located to run within single lots rather than being split by a lot line.

Landscaping within sanitary sewer easements shall be restricted to low growing shrubs, grasses, beauty bark, etc.

6-5 LIFT (PUMP) STATIONS

All side sewers must gravity into the city's sanitary system. The city does not promote the construction of individual side sewer pumps or public service pump stations. The city will only consider this method if no area gravity system can be constructed. Private pressure lines are not permitted on public right-of-way. If no gravity system can be constructed and a nongravity system has been approved by the city, the private pressure lines must enter a manhole on private property and gravity into the public system with a standard side sewer connection. The minimum manhole size permitted for this application is 30 inch diameter installed with a locking lid frame and cover per Standard Plan No. 607.

Plans for lift stations must be approved by Utilities. The following items are to be considered for each application:

A. Lift stations must be a wet well-dry well type.
B. Lift stations must be set up with auxiliary power, including an automatic transfer switch.
C. Provisions for telemetry shall be required.

6-6 MANHOLES

6-6.1 DESCRIPTION

This work shall consist of constructing manholes in accordance with these Specifications, the Standard Plans and Section 7-05 of the WSDOT/APWA Standard Specifications. Where conflicts occur, these Specifications shall have precedence over Section 7-05 of the WSDOT/APWA Standard Specifications.

6-6.2 MATERIALS

Manholes shall be constructed of pre-cast units, in accordance with Standard Plan Nos., 605A, 605B and 605C. Any deviations from Standard Plans will be subject to a shop drawing submitted by the contractor and approved by the city engineer.

Joints between manhole elements shall be rubber gasket.

All pre-cast concrete shall be Class 4000. Manhole channels shall be Class 3000 concrete. Concrete blocks or concrete (masonry) rings may be used for adjustment of the casting to final street grade.

Standard precast cones shall provide reduction from 48 inches to 24 inches with height of not less than 18 inches and 54 to 24 inches with height of not less than 24 inches.

Standard flat slab covers shall be a minimum of 8 inches thick and shall conform to the outer dimension of the standard sections upon which they are to be placed.

6-6.3 CONSTRUCTION REQUIREMENTS

6-6.3(1) BEDDING

Unless otherwise directed by the city engineer, manholes constructed with pre-cast base sections or cast-in-place sections shall be placed to grade upon a 6 inch minimum depth of Crushed Surfacing Base Course meeting the requirements of Section 9-03.9(3) of the WSDOT/APWA Standard Specifications. The Crushed Surfacing Base Course shall be compacted to 95% maximum density.

6-6.3(2) JOINTS

Joints between pre-cast manhole elements shall be rubber gasketed in a manner similar to pipe joints conforming to ASTM C443. Shop drawings of the joint design shall be submitted to the city engineer for approval, prior to manufacture. Completed joints shall show no visible leakage and shall conform to the dimensional requirements of ASTM 478.

6-6.3(3) MANHOLE CHANNELS

All manholes shall be channeled unless otherwise approved by the city engineer. Manhole channels shall be made to conform accurately to the sewer grade and shall be brought together smoothly with well rounded junctions. Channel sides shall be carried up vertically to the crown elevation of the various pipes, and the concrete shelf between channels shall be smoothly finished and warped evenly with slope to drain.

6-6.3(4) MANHOLE PIPE CONNECTIONS

All pipes except PVC pipe entering or leaving the manhole shall be provided with flexible joints within 1/2 of a pipe diameter or 12 inches, whichever is greater, from the outside face of the manhole structure and shall be placed on firmly compacted bedding, particularly within the area of the manhole excavation which normally is deeper than that of the sewer trench. Special care shall be taken to see that the openings through which pipes enter the manhole are completely and firmly rammed full of non-shrink grout to ensure watertightness (see Section 3-20(8) for non-shrink grout).

PVC pipe connected to manholes shall be provided with a manhole adaptor complete with gasket and approved by the city engineer. No pipe joint in PVC shall be placed within 10 feet of the outside face of the manhole.

6-6.3(5) LADDER

All manholes over 3 feet in height shall be provided with a ladder or steps as specified in Standard Plan No. 606.

6-6.3(6) CONNECTIONS TO EXISTING MANHOLES

The contractor shall verify invert elevations prior to construction. The crown elevation of laterals shall be the same as the crown elevation of the incoming pipe unless specified. The existing base shall be reshaped to provide a channel equivalent to that specified for a new manhole.

Inside drops shall be used to connect to existing deep manholes. Outside drops will be allowed only where specifically allowed by the City Engineer.

The contractor shall excavate completely around the manhole to prevent unbalanced loading. The manhole shall be kept in operation at all times and the necessary precautions shall be taken to prevent debris or other material from entering the sewer, including a tight pipeline bypass through the existing channel if required.

The contractor shall core drill, line drill or wall saw an opening to match the size of pipe to be inserted. Where line drilling is the method used, the drilled holes must be interconnected. Line drilling shall be accomplished by the use of a small core drill or a rotary hammer. Jackhammer shall not be used. All openings must provide a minimum of 1 inch and a maximum of 2 inches clearance around the circumference of the pipe. Upstream pipes, except PVC pipe, penetrating the walls of manholes shall be placed with the bell facing out such that the bell is placed snug against the outside wall of the structure as the angle of penetration allows. Pipe, except PVC pipe, leaving or entering manholes shall be provided with a flexible joint within 1/2 of a pipe diameter, or 12 inches, whichever is greater. After pipes have been placed to their final position, they shall be grouted tight with non-shrink grout in a workmanlike manner. PVC pipe connecting to existing manhole shall be per Section 6-6.3(4).

6-6.3(7) SPACING

Maximum spacing of manholes shall be 400 feet, unless approved by the Utilities. All manholes are to be accessible to maintenance vehicles.

Manholes will be required at any change in pipe slope, alignment, or size. Manholes are not allowed in a fill section unless base is on a cut section. A manhole is required at the ends of all sewer mains.

6-7 SEWER MAIN

6-7.1 MATERIALS

Materials for sanitary sewer pipe shall meet the requirements of the following:

1. Plain Concrete Sewer Pipe: Plain concrete sanitary sewer pipe shall meet the requirements of ASTM C14 Class 3, unless otherwise approved.

2. Reinforced Concrete Sewer Pipe: Reinforced concrete sanitary sewer pipe shall conform to ASTM Designation C76 and shall be of the class specified or on the plans.

3. PVC Sewer Pipe: Polyvinyl Chloride (PVC) sanitary sewer pipe shall conform to the requirements of ASTM D3034 SDR35.

4. Ductile Iron Sewer Pipe: Ductile iron sanitary sewer pipe shall conform to ANSI A 21.51 or AWWA C151 and shall be cement mortar lined, push-on joint or mechanical joint. The ductile iron pipe shall be Class 52, unless otherwise approved.

6-7.2 GENERAL

The maximum permissible trench width between the foundation level and to 12 inches above the pipe shall be 40 inches for pipe 15 inches or smaller inside diameter or 1 1/2 times the inside diameter plus 18 inches for pipe 18 inches or larger (see Standard Plan No. 611). If the maximum trench width is exceeded without written authorization of the city engineer, the contractor will be required to provide pipe of higher strength classification or to provide a higher class of bedding, as required by the city engineer.

During excavation and installation of pipelines and placement of trench backfill, excavations shall be kept free of water. The contractor shall control surface run-off so as to prevent entry or collection of water in excavations. The static water level shall be drawn down a minimum of one foot below the bottom of the excavation so as to maintain the undisturbed state of the foundation soils and along the placement of any fill or backfill to the required density. The dewatering system shall be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.

6-7.3 UNDERGROUND UTILITIES

Activities such as trench excavation, tunneling or boring, pipe embankment, backfilling, compaction, safety and pavement patching, whether for public or private utilities, shall conform to the requirements set forth in other sections of these Standards. For all the above except pavement patching, see Section 3-9 Underground Utilities and Standard Plan Nos. 610, 611 and 615.

6-7.4 PIPE BEDDING

Bedding for all pipe shall be Crushed Surfacing Base Course (CSBC) meeting the requirements of Section 9-03.9(3) of the Standard Specifications for Road, Bridge and Municipal Construction. Bedding will be to the pipe zone shown on Standard Drawing 611. The pipe zone is identified as 6 inches below the bottom of the pipe to 12 inches above the pipe. As an option the contractor may use controlled density fill as specified in Section 3-1 of these Specifications.

Bedding shall be placed in more than one lift. The first lift, to provide at least 6 inches thickness under and portion of the pipe, shall be placed before the pipe is installed and shall be spread smoothly so that the pipe is uniformly supported along the barred. Subsequent lifts of not more than 6 inches thickness shall be installed to the crown of the pipe and individually compacted to 90% density as determined by ASTM D698. A further 12 inch lift of moderately compacted material shall be placed over the crown of the pipe prior to the start of backfilling the trench.

6-7.5 LAYING SEWER PIPE

All sewer main installations shall have line and grade set prior to construction by survey, with a minimum of staking for each manhole with cuts to inverts of inlets and outlets. All mains are to be straight between manholes, unless specifically approved otherwise in writing by the city engineer or shown as such on the approved plans.

The contractor may use any method such as "swede line and batter board" and "laser beam" etc., which would allow him to accurately transfer the control points provided by the surveyor in laying the pipe to the designated alignment and grade.

When using the "swede line and batter board" method, the contractor shall transfer line and grade into the ditch where they shall be carried by means of a taut grade line supported on firmly set batter boards at intervals of not more than 30 feet. Not less then three batter boards shall be in use at one time. Grades shall be constantly checked and in event the batter boards do not line up, the work shall be immediately stopped and the cause remedied before proceeding with the work.

When using a "laser beam" to set pipe alignment and grade, the contractor shall constantly check the position of laser beam from surface hubs provided by the surveyor to ensure the laser beam is still on alignment and grade. In the event the laser beam is found out of position, the contractor shall stop work and make necessary corrections to the laser beam equipment and pipe installed.

Clearances between sewer and water main pipe shall be a minimum of 10 feet.

6-7.6 PLUGS AND CONNECTIONS

All fittings shall be capped or plugged with a plug of an approved material gasketed with the same gasket material as the pipe unit; or shall be fitted with an approved mechanical stopper; or shall have an integrally cast knock-out plug. The plug shall be able to withstand all test pressures without leaking, and when later removed, shall permit continuation of piping with jointing similar to joints in the installed line.

6-7.7 JOINTING

Where it is necessary to break out or connect to an existing sewer during construction, only new pipe having the same inside diameter will be used in reconnecting the sewer. Where joints must be made between pipes with a mismatched wall thickness, the Contractor shall using flexible gasketed coupling, adaptor or coupling-adapter to make a watertight joint. Couplings shall be those manufactured by "Romac", "Smith Blair", or approved equal for reinforced pipes and "Fernco" or approved equal for non-reinforced pipes.

6-7.8 JACKING, AUGURING OR TUNNELING

See Section 3-9 Underground Utilities of these Specifications for Jacking, Auguring or Tunneling.

6-7.9 SIZE

The minimum pipe size for sanitary sewer mains shall be 8 inches in diameter. The Utility Superintendent shall determine the pipe size required to serve the surrounding area.

6-7.10 SLOPE

8 inch Mains:

A. 1% slope for the first two runs between manholes and a dead end line.

B. .75% slope when the line is not covered under condition "A" above.

C. Any slope less than condition "A" or "B" above must be approved by the Director of Public Works.

10 Inch Mains or Larger:

The minimum slope shall be such as to provide a minimum flow velocity of 2 feet/sec. (full), providing there are at least 100 lots upstream.

6-7.11 SEPTIC TANKS

Septic systems are generally not allowed within the city. Grinder pump systems should be used before septic tanks systems. In areas of the city where it is determined by the city engineer that conventional gravity or grinder pump sanitary sewer service is not available and/or not practical to be served by a public sewer system in the future, septic tank systems may be installed upon approval by the Utilities and issuance of a permit by the Snohomish County Health District.

6-7.12 PAVEMENT PATCHING

For pavement patching see Section 3-14 and Standard Plan 316 of these Standards.

6-7.13 CLEANING AND TESTING

All sanitary sewer pipe installations shall be tested in accordance with Section 7-17.3(4) of the WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction. A copy of this testing procedure is included at the end of this Section. Sewers and appurtenance shall be cleaned and tested after backfilling by either the exfiltration or low pressure air method at the option of the contractor, except where the ground water table is such that the city engineer may require the infiltration test.

The contractor/developer shall be required to clean and flush, with an approved cleaning ball and clean water, all gravity sanitary sewer lines prior to testing. The cleaning ball shall be an inflatable diagonally ribbed rubber ball of a size that will inflate to fit snugly into the pipe to be tested. A rope or chord will be fastened to the ball to enable total control of the ball at all times.

6-8 SIDE SEWERS

6-8.1 DESCRIPTION

A side sewer is considered to be that portion of a sewer line that will be constructed between a main sewer line and a residence or other buildings in which the disposal of sanitary waste originates. It does not include any of the internal piping or connecting appurtenances, the installation of which is controlled by a municipal code, ordinance or regulation.

The general requirements for construction of sewers in other Sections of these Specifications shall apply for construction of side sewers unless they are inconsistent with any of the provisions of this particular Section and the Specifications shall apply alike to all side sewers on public rights-of-way and private property.

6-8.2 MATERIALS

Materials shall meet the requirements of Section 6-7 of these Specifications.

All pipe shall be clearly marked with type, class, and/or thickness, as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage.

Approved jointing shall be flexible gasketing.

Flexible gasketing shall be construed to include rubber, synthetic rubberlike and plastic materials specially manufactured for the joint, pipe size, and use intended and shall be furnished by the manufacturer of the pipe to be used.

6-8.3 GENERAL

Side sewer construction shall conform to Standard Plan Nos. 601, 602 and 604.

Side sewer locations shown on the drawings shall be subject to relocation in the field after construction starts. Regardless of the drawing location, the contractor shall place the tee or wye branch in the main sewer line at the location designated by the engineer.

A maximum of one residential unit or building will be allowed to connect to each side sewer. If the equivalent sewage flow from the building will be equal to more than 20 residential units, then a manhole will be required to be constructed at the connection to the sewer main.

Side sewers are not permitted to cross a public right-of-way or run parallel to the right-of-way centerline. All lots must front on a public sanitary system in order to be served.

Side sewers shall be replaced to the main at all new developments and remodels that require a sewer application unless otherwise approved by the Utility Superintendent.

6-8.4 EXCAVATION, BEDDING, BACKFILL AND COMPACTION

Excavation, bedding, backfill and compaction for side sewers shall conform to the requirements of Section 3.9 Underground Utilities and to Standard Drawings 611 and 615. The bedding material shall be Crushed Surfacing Base Course conforming to Section 9-03.9(3) of the WSDOT/APWA Standard Specifications and to Section 3-20.5 of these Standards.

6-8.5 SIZE

The minimum size requirement for that portion of any side sewer within any easement or public right-of-way is 6 inches in diameter.

On private property that portion of the side sewer may be reduced to 4 inches in diameter on single family homes, all other uses from duplexes to commercial must install 6 inch minimum in diameter piping to building connection.

6-8.6 SLOPE

The minimum slope for side sewers shall be 2%.

6-8.7 FITTINGS

All fittings shall be factory-produced and shall be designed for installation on the pipe to be used. Fittings shall be of the same quality and material as the pipe used, except when installing a PVC insert on existing pipe.

Side sewers shall be connected to the tee, wye, or riser provided in the public sewer where such is available, utilizing approved fittings or adapters. Where no tee, wye, or riser is provided or available, connection shall be made by core drilling and installing and approved tee. Tees shall be "Romac Industries, Style CG" or approved equal.

6-8.8 CLEANOUTS

All side sewers shall have a 6 inch clean-out at the property line per Standard Plan No. 604. The riser portion of the clean-out shall be PVC unless otherwise approved by the Utility Superintendent. For longer side sewer installations, extra clean-outs will be required at spacings not to exceed 100 feet.

6-8.9 TESTING

All side sewers shall be tested after backfill. Side sewers that are reconstructed or repaired to a length of 10 feet or more shall be tested for watertightness. Testing of newly reconstructed sections of side sewers consisting of a single length of pipe will not be required. Testing shall be performed in the presence of the engineer in accordance with Section 7-17.3(4) of the Standard Specifications for Road, Bridge and Municipal Construction. A copy of this testing procedure is at the end of this section.

When a new side sewer is installed, the entire length of new pipe installed shall be tested. In cases where a new tap is made on the main, the first joint of pipe off the main shall be installed with a test tee, so that an inflatable rubber ball can be inserted for sealing off the side sewer installation for testing. In cases where the side sewer stub is existing to the property line, the test ball may be inserted through the clean-out wye to test the new portion of the side sewer installation.

6-9 TELEVISION INSPECTION

All new mains within the public right-of-way and those in easements to be maintained by the city will be subject to a visual inspection with a TV camera unit by the City Sewer Division. Any deficiencies noted by the TV camera inspection shall be corrected to the satisfaction of the Utilities Division. The initial inspection costs are borne by the city. Follow-up reinspection after correction of any deficiencies are billed on a direct cost basis.

DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS

DRAWING INDEX

600 SERIES	SANITARY SEWER	Last Revision Date
601	Typical Side Sewer Layouts	8-10-11
602	Typical Side Sewer Connections	8-10-11
604	Sewer Clean-out	8-10-11
605A	Type 1 Manhole 48" and 54"	8-10-11
605B	Type 2 Manhole 72" and 96"	8-10-11
605C	Type 3 Manhole 48", 54", 60", 72" and 96"	8-10-11
606	Polypropylene Ladder	8-10-11
606A	Alternate Polypropylene Plastic Step	8-10-11
607	Manhole Ring and Cover	8-10-11
608	Outside Drop Manhole Connection	8-10-11
609	Inside Drop Manhole Connection	8-10-11
610	Typical Trench Section	8-10-11
611	Bedding for Pipe In Trenches	8-10-11
612	Typical Sewer Connection to Existing Sewer Mains	8-10-11
613	Alternate Sewer Connection to Existing/New Concrete Sewer Main	8-10-11
614	Casing Detail	8-10-11
615	Typical Trench Compaction	8-10-11
616	Grinder Pump Connection to Sanitary Sewer	8-12-11
617	Back-Water Valve Connection to Sanitary Sewer	8-12-11

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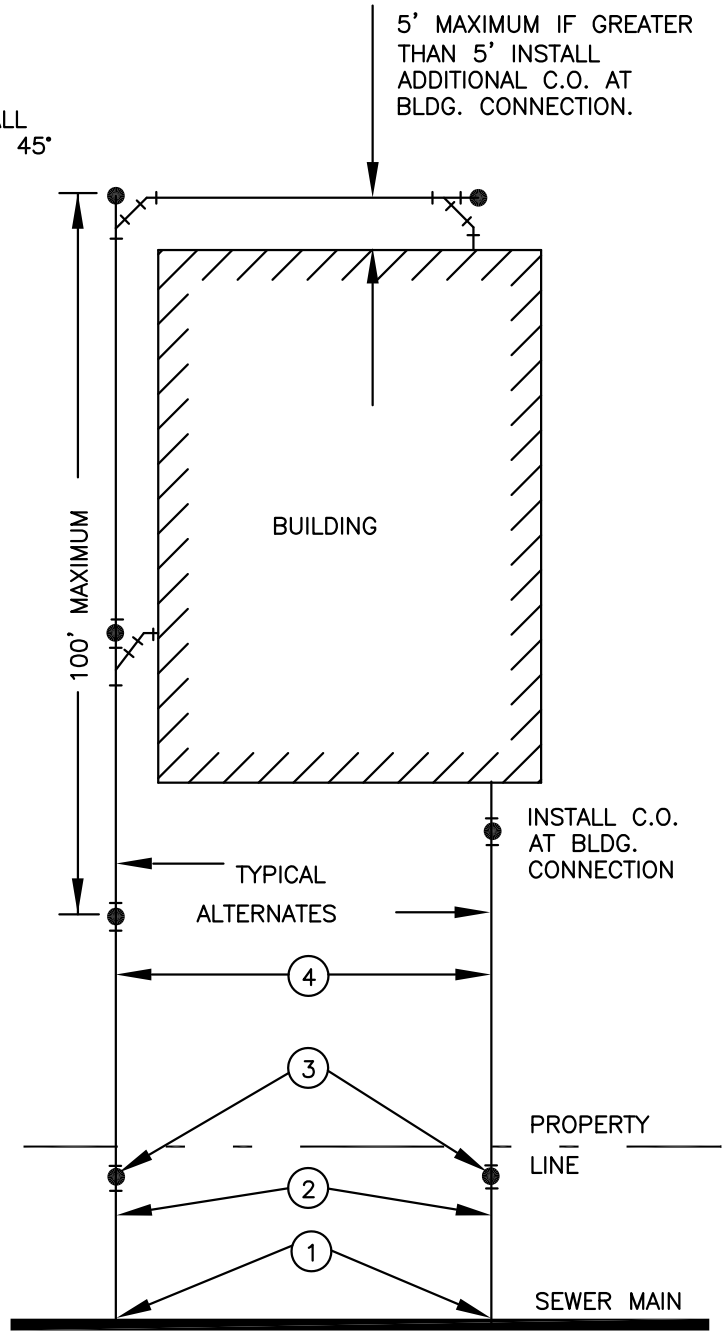


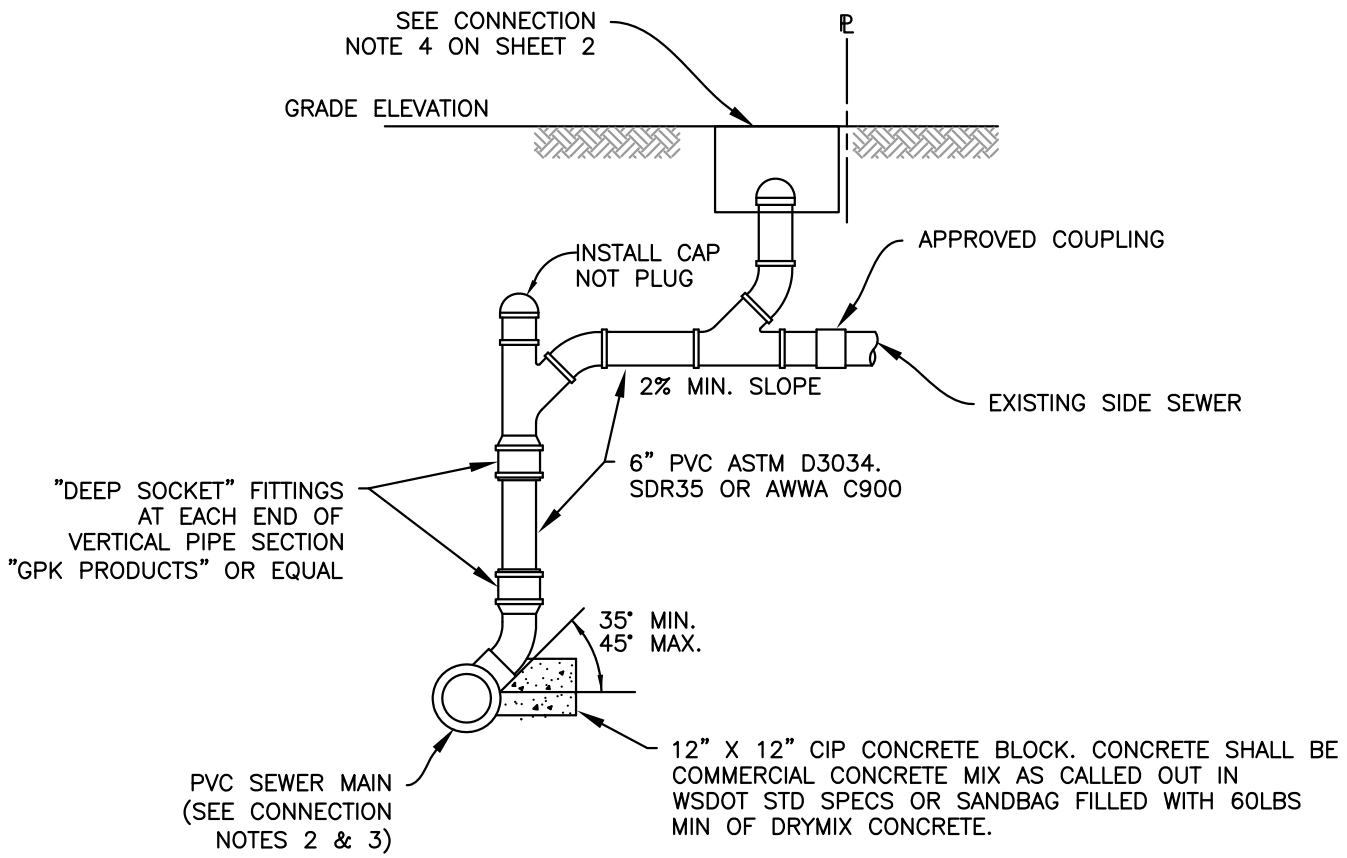
GENERAL NOTES:

1. SEE SECTION 7 OF STANDARD SPECIFICATIONS FOR ROADS; BRIDGE AND MUNICIPAL CONSTRUCTION WSDOT/APWA AND CITY SPECIAL PROVISIONS SECTION 7–18 FOR DETAILS AND REQUIREMENTS ON LATERALS.
2. ALL C.O.'S ON PRIVATE PROPERTY ARE TO BE ADJUSTED TO GRADE IF IN PAVED AREAS PER STD. PLAN #604.
3. C.O.'S ARE TO BE CONSTRUCTED WITH WYES OR SANITARY "T"S (SWEEPS). STRAIGHT "T"S ARE NOT PERMITTED.
4. ALLOWABLE GRADES ARE 2% (1/4"/FT) MINIMUM TO 100% (FT/FT) MAXIMUM.
5. SEWER MUST BE STRAIGHT BETWEEN ANGLE POINTS, CHANGES IN LINE OR GRADE SHALL BE MADE WITH APPROVED FITTINGS.
6. NORMALLY ONLY ONE(1) CONNECTION TO THE SEWER MAIN PER BLDG. IS ALLOWED. TWO (2) DIFFERENT LAYOUTS ARE SHOWN FOR ILLUSTRATIVE PURPOSES <u>ONLY!</u>

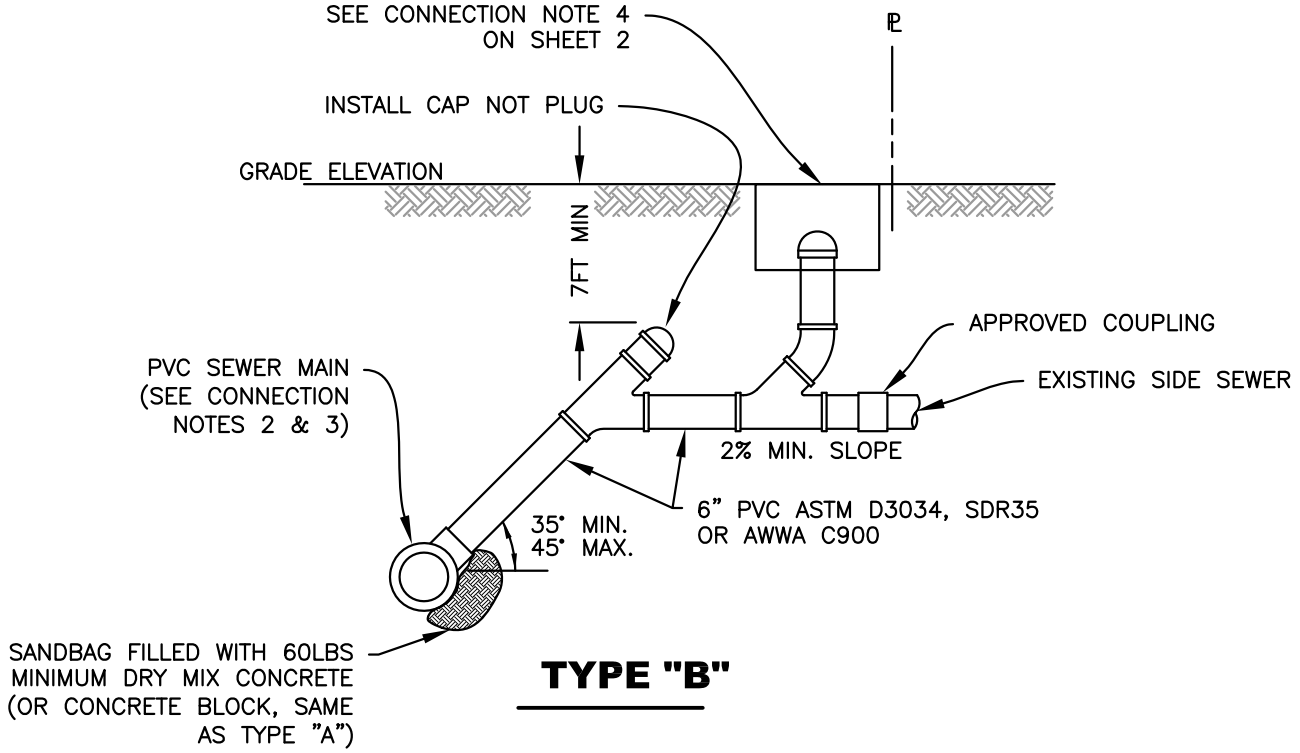
(#) CONSTRUCTION NOTES:

1. CONNECTION TO SEWER MAIN PER SEC. 7 OF STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS AND STD DWG #602
2. INSTALL 6" MINIMUM PIPE SIZE IN R.O.W.
3. INSTALL 6" C.O. PER STD. PLAN #604.
4. PRIVATE SIDE SEWER PIPE DIAMETER:
   4" MINIMUM FOR SINGLE FAMILY
   6" MINIMUM FOR ALL OTHER USES.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	TYPICAL SIDE SEWER LAYOUTS	8/10/2011 Date:
		601 COE Std Dwg:



TYPE "A"



TYPE "B"

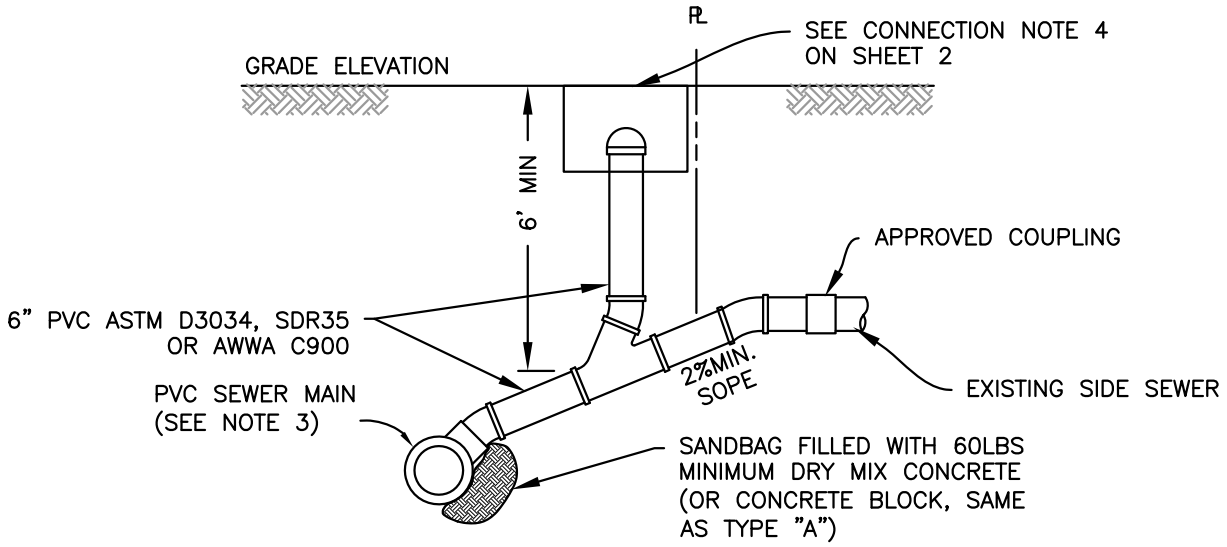
CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

TYPICAL SIDE SEWER CONNECTIONS
TYPE A AND B
SHT 1 OF 3

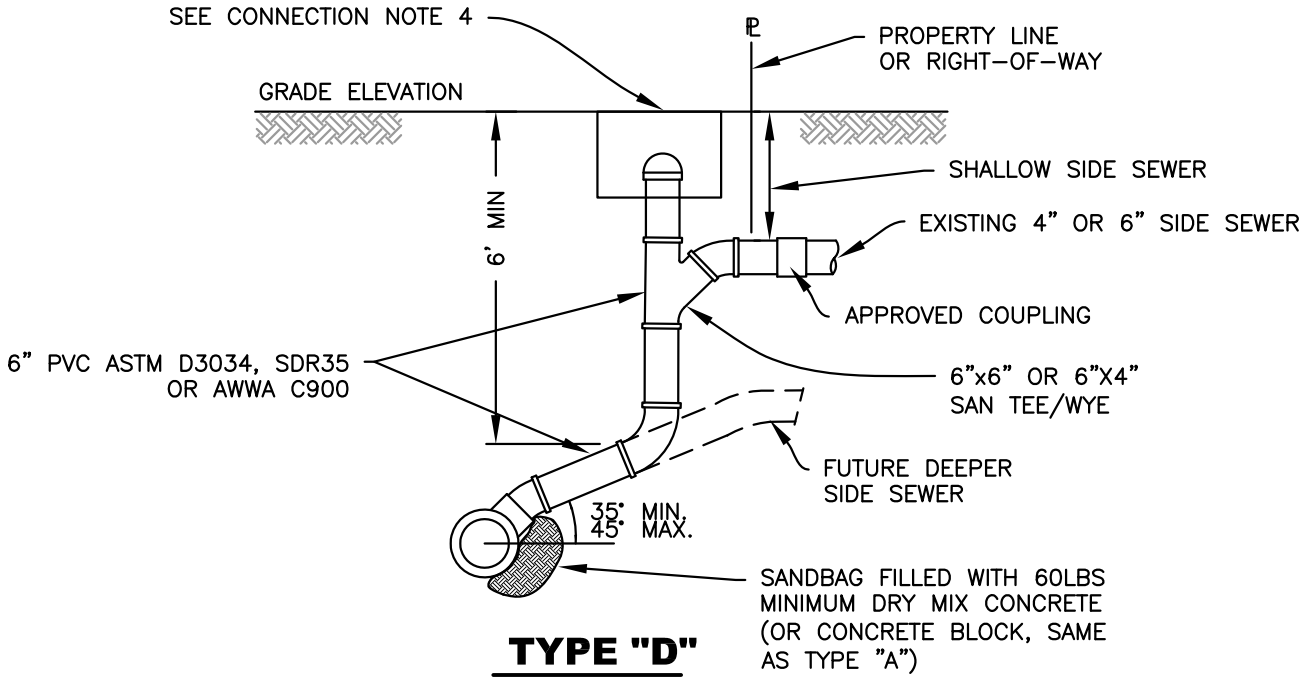
8/10/2011
Date:

602
COE Std Dwg:

T:\ACad\EPS-COE Design & Constr Specs for Development\CURRENT\STD DETAIL DWGS\Dwg Files\STD602.dwg, 602-1 TYPICAL SIDE SEWER CONNECTIONS, 12/9/20



TYPE "C"



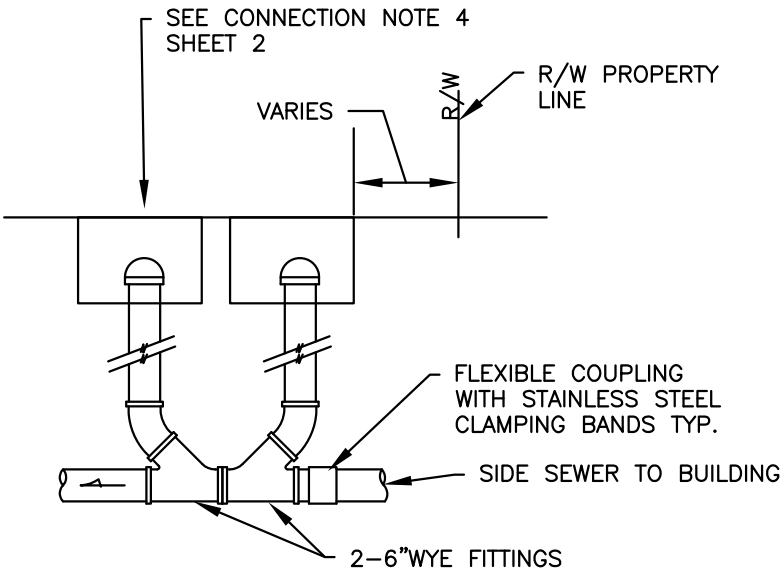
TYPE "D"

CONNECTION NOTES:

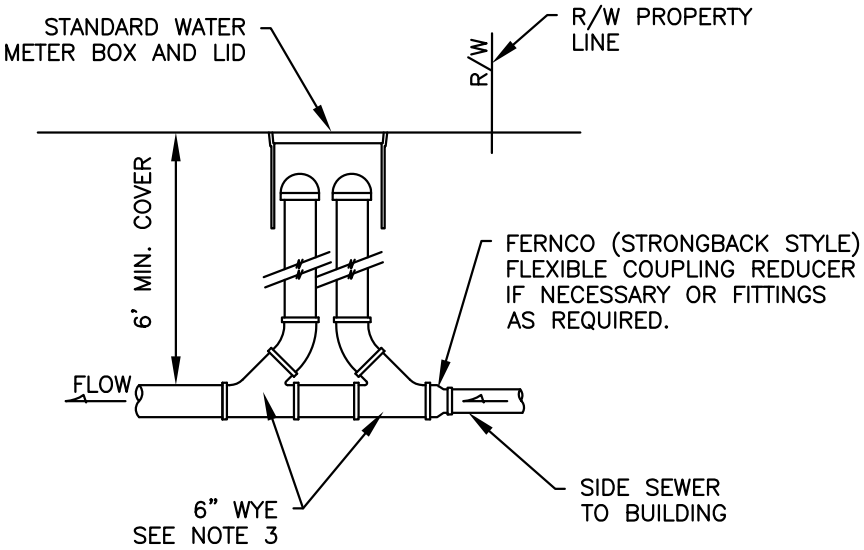
1. PVC SIDE SEWER CONNECTIONS TO PVC NEW MAINS SHALL BE FACTORY TEES.
2. TYPE A & B SHALL BE USED ONLY WHEN SEWER MAIN DEPTH EXCEEDS 15 FEET OR AS APPROVED BY THE ENGINEER. TYPE D SHALL BE USED WHEN EXISTING SIDE SEWER IS SHALLOW (LESS THAN 6' DEPTH AT PROPERTY LINE)
3. CONNECTIONS TO EXISTING CONCRETE SEWER MAINS SHALL BE MADE PER STD DWGS 612 & 613 OR BY APPROVED MANUFACTURED CONCRETE TEE.
4. SEE STANDARD DRAWING 604. WHERE RING AND COVER INSTALLATIONS ARE SHOWN FOR PAVED AND UNPAVED AREAS, FIELD CONDITIONS WILL DICTATE WHICH INSTALLATION IS APPROPRIATE.
5. CONNECTIONS TO EXISTING HDPE SEWER MAINS SHALL BE MADE PER STD DWG 612 OR SIDE-WALL FUSION.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	TYPICAL SIDE SEWER CONNECTIONS TYPE C & D SHT 2 OF 3	8/10/2011 Date: 602 COE Std Dwg:

T:\ACad\EPS-COE Design & Constr Specs for Development\CURRENT\STD DETAIL DWGS\Dwg Files\STD602.dwg, 602-2 TYPICAL SIDE SEWER CONNECTIONS, 12/9/20



TWO-WAY SEWER CLEANOUT FOR STREETS



TWO-WAY SEWER CLEANOUT FOR ALLEYS

TWO-WAY CLEANOUT NOTES:

1. OPPOSING CLEANOUTS SHALL BE INSTALLED.
2. CLEAN-OUT PIPE AND FITTINGS SHALL BE PVC ASTM D3034, SDR 35 OR AWWA C900.
3. SANITARY TEE OR WYE FITTINGS SHALL BE INSTALLED. STRAIGHT TEES ARE NOT ALLOWED.
4. TWO-WAY SEWER CLEAN OUTS ARE ONLY REQUIRED WHERE DIRECTED BY THE CITY.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	TYPICAL SIDE SEWER CONNECTIONS TWO-WAY CLEAN-OUTS SHT 3 OF 3	8/10/2011 Date: 602 COE Std Dwg:

T:\ACad\EPS-COE Design & Constr Specs for Development\CURRENT\STD DETAIL DWGS\Dwg Files\STD602.dwg, 602-3 TYPICAL SIDE SEWER CONNECTIONS, 12/9/20

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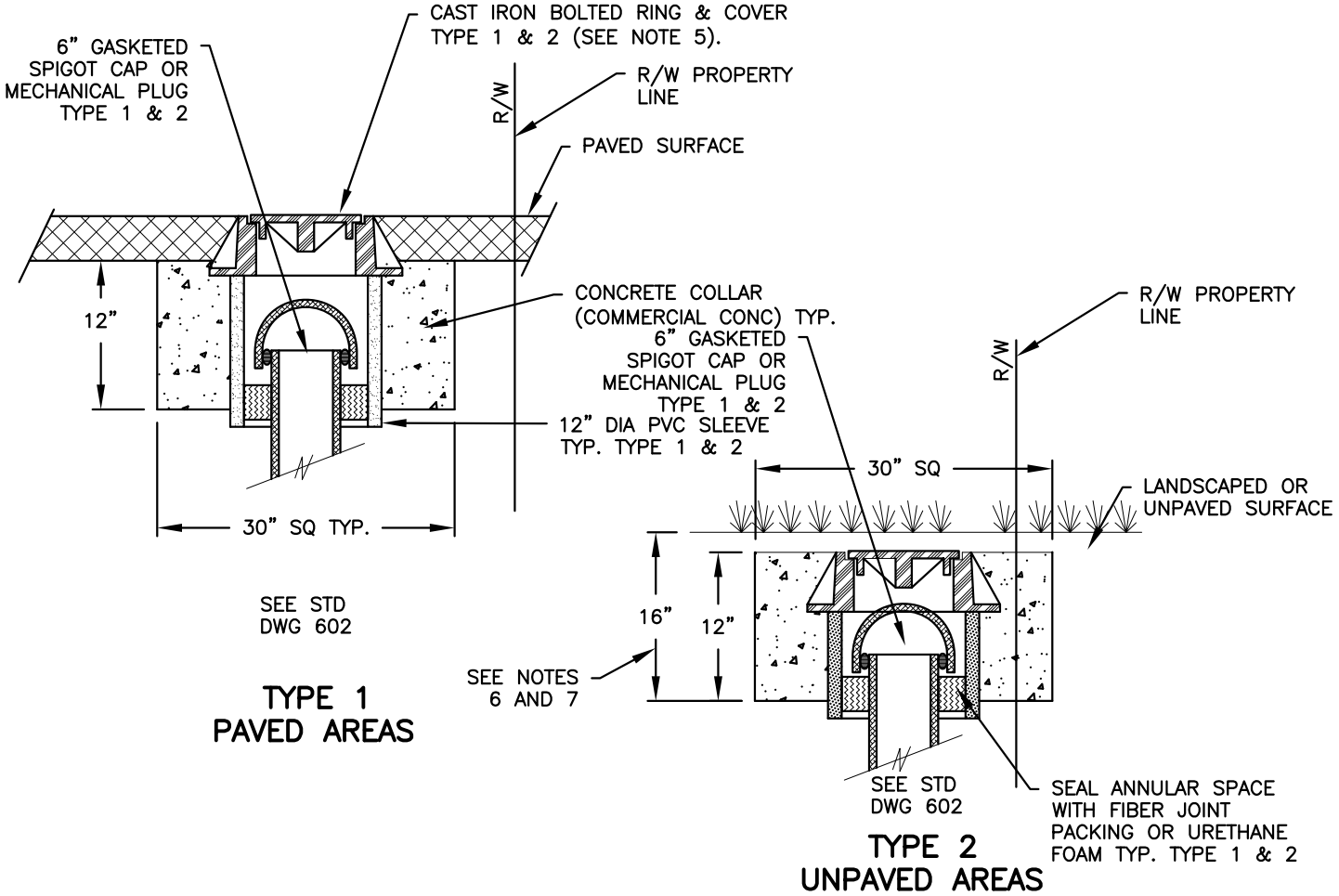

PERMANENT INSTALLATIONS

NOTES

1. CLEAN-OUT PIPE AND FITTINGS SHALL BE PVC, ASTM D3034, SDR 35 OR AWWA C900.
2. A SANITARY TEE MAY BE INSTALLED IN LIEU OF A WYE AS SHOWN. STRAIGHT TEES ARE NOT ACCEPTABLE.
3. SEWER STUB WILL BE EXTENDED 10' BEYOND PROPERTY LINE TO PREVENT DAMAGE TO CLEAN-OUT AND MINIMIZE CONFLICTS WITH OTHER UTILITIES WHEN SERVICE TO BUILDING IS INSTALLED.
4. TYPE 3 TEMPORARY INSTALLATIONS (NEW DEVELOPMENT) SHALL HAVE A PRESSURE TREATED 2"X4" STUB MARKER THAT EXTENDS DOWN TO A MIN OF 24" BELOW GROUND. A MIN OF 36" SHALL EXTEND ABOVE GROUND. STUB MARKER SHALL BE PAINTED WITH WHITE TRAFFIC PAINT. THE WORD "SEWER" AND THE DEPTH IN FEET FROM GROUND SURFACE TO SEWER STUB PIPE INVERT SHALL BE PAINTED ON THE MARKER WITH 3" HIGH BLACK PAINTED LETTERS.
5. CAST IRON BOLTED RING AND COVER SHALL BE EAST JORDAN IRON WORKS NO. 3660CPT OR EQUAL.
6. RING AND COVER INSTALLATION IS SHOWN FOR PAVED AND UNPAVED AREAS, FIELD CONDITIONS WILL DICTATE WHICH INSTALLATION IS APPROPRIATE.
7. RING AND COVER WITH CONCRETE COLLAR MAY BE PLACED AT GROUND SURFACE IN UNPAVED AREAS IF DESIRED.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	SEWER CLEAN-OUT SHT 1 OF 2	8/10/2011 Date: 604 COE Std Dwg:

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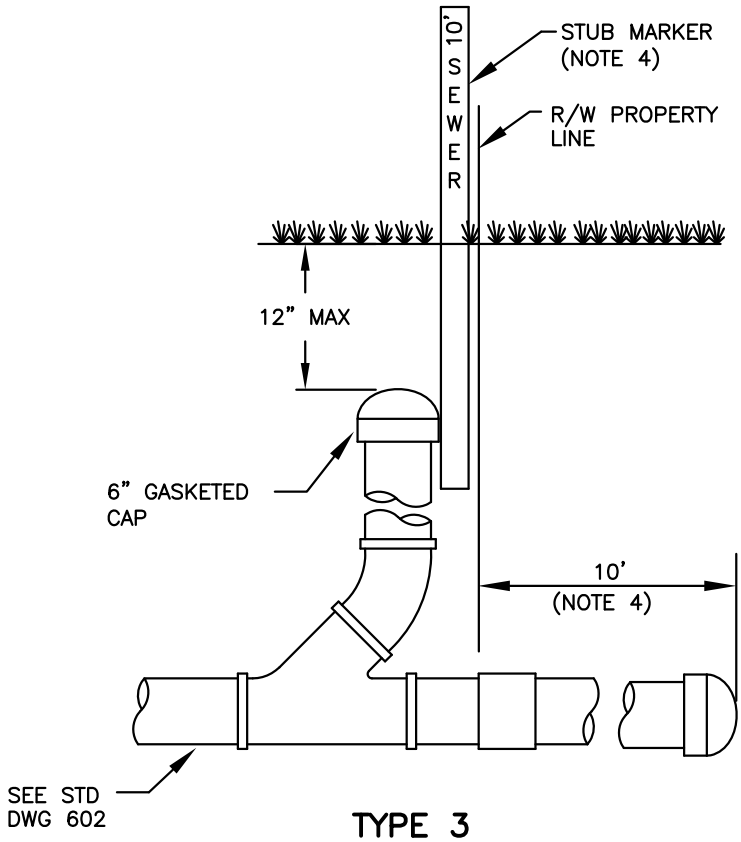
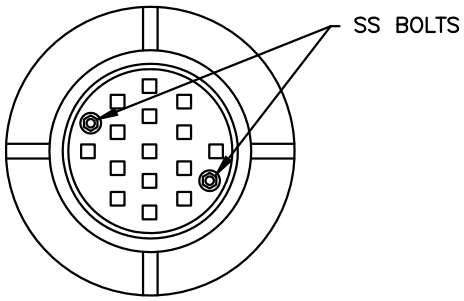
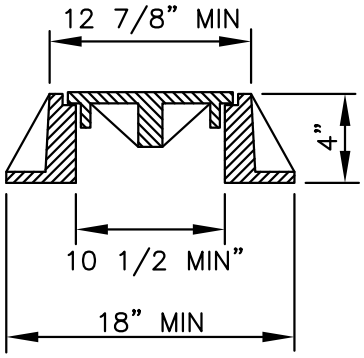


TYPE 3
UNPAVED AREA

TEMPORARY INSTALLATION FOR NEW DEVELOPMENT



PLAN



SECTION

12" CAST IRON BOLTED RING AND COVER

(SEE NOTE 5)

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	SEWER CLEAN-OUT SHT 2 OF 2	8/10/2011 Date: 604 COE Std Dwg:

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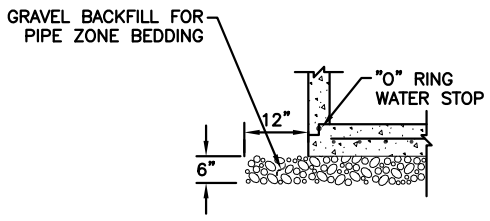
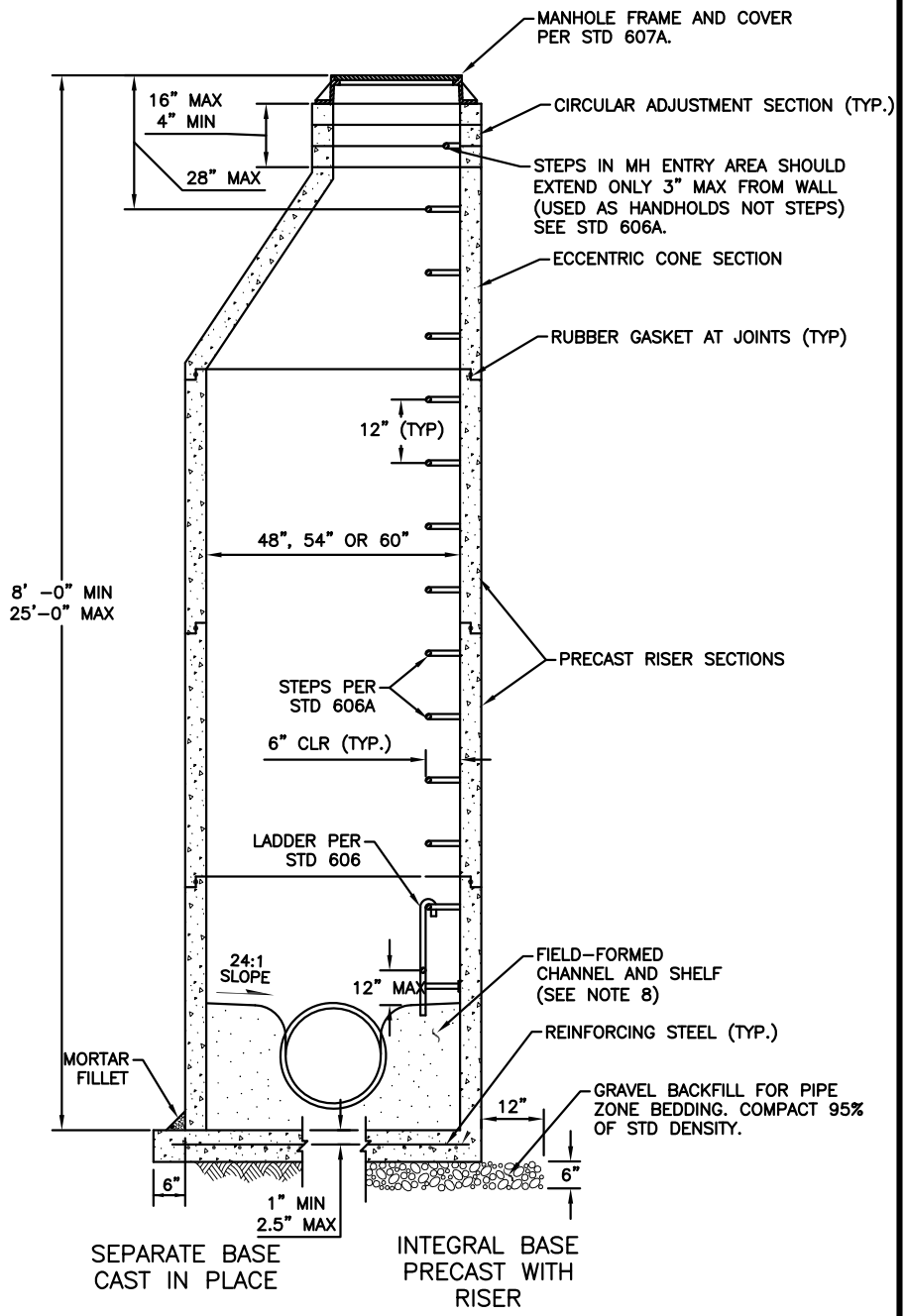
GENERAL NOTES:

1. MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M-199 (ASTM C 478) UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN STANDARD SPECIFICATIONS.
2. ALL REINFORCED CAST IN PLACE CONCRETE SHALL BE CLASS 4000. NON-REINFORCED CONCRETE IN CHANNEL AND SHELF SHALL BE 7 SACK MIX SAND AND CEMENT GROUT. ALL PRECAST CONCRETE SHALL BE CLASS 4000.
3. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS FOR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OR 2" MINIMUM.
4. ALL BASE REINFORCING STEEL SHALL HAVE A MINIMUM YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MINIMUM CLEARANCE.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAMETER PLUS MANHOLE WALL THICKNESS.
6. MANHOLE DIA. DEPENDS ON: SIZE, LOCATION AND NUMBER OF PENETRATIONS FOR PIPES. MANHOLE DESIGN AND SIZE SHALL BE APPROVED AND WARRANTED BY THE MANHOLE SUPPLIER.
7. FOR HEIGHTS OVER 25' MANHOLE BASE SLAB SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.
8. CONCRETE CHANNEL AND SHELF SHALL BE FIELD-FORMED EXCEPT WHERE APPROVED IN ADVANCE BY CITY.



SEPARATE BASE PRECAST



SEPARATE BASE CAST IN PLACE

INTEGRAL BASE PRECAST WITH RISER

NOTE: KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM TO 2.5" MAXIMUM.

MANHOLE DIMENSIONS TABLE

DIAM.	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL IN^2/FT IN EACH DIRECTION	
					SEPARATE BASE	INTEGRAL BASE
48"	4"	6"	36"	8"	0.23	0.15
54"	4.5"	8"	42"	8"	0.19	0.19
60"	5"	8"	48"	8"	0.25	0.25

WSDOT STD PLAN B-15.20, MANHOLE TYPE 1 ACCEPTABLE SUBSTITUTE

CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

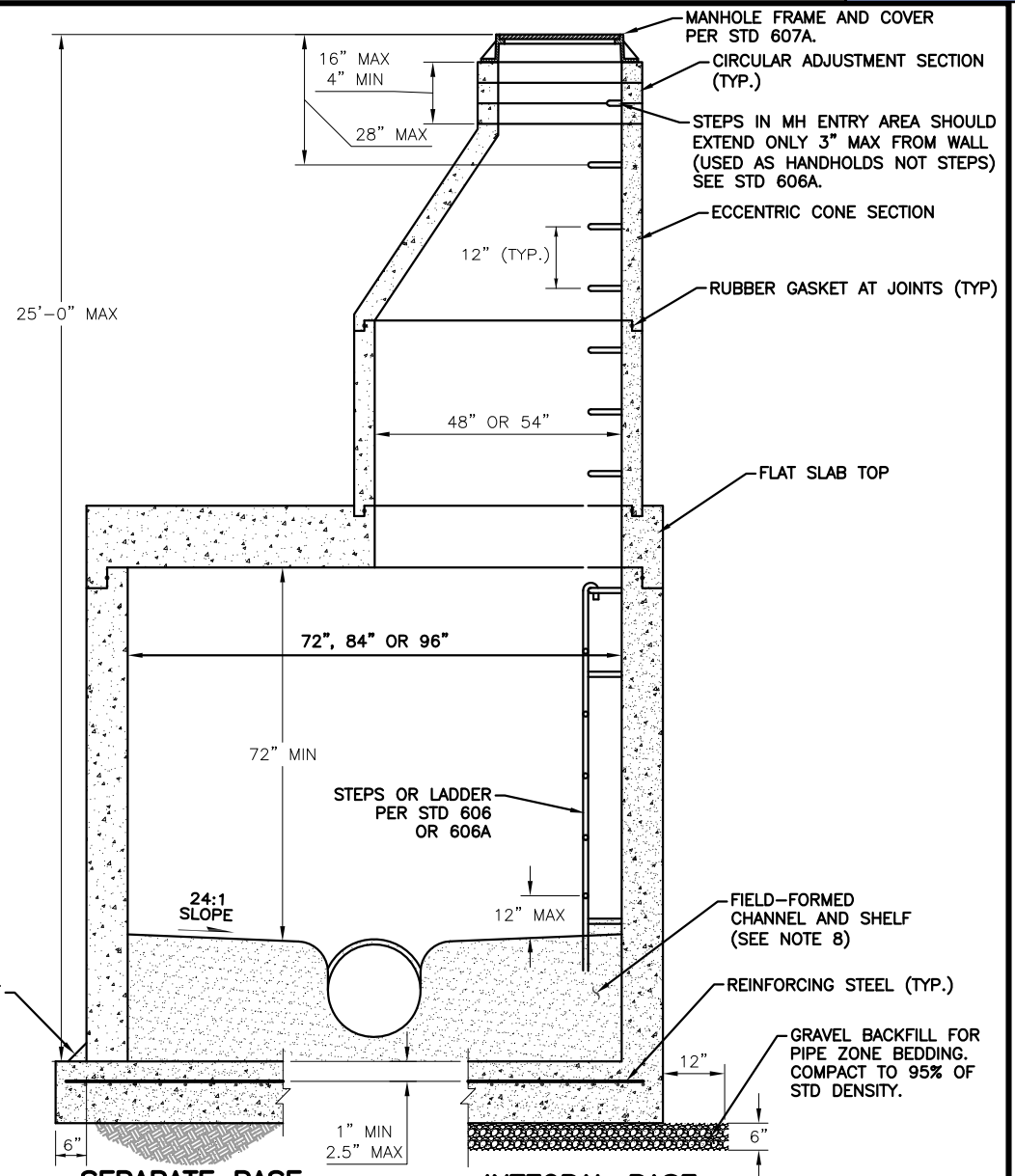
TYPE 1 MANHOLE
48", 54" AND 60"

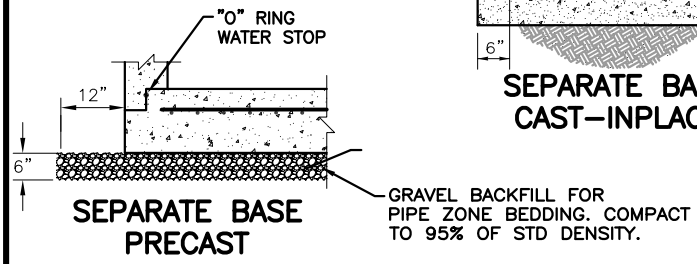
8-10-2011
Date:

605A
COE Std Dwg:

GENERAL NOTES:

1. MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M-199 (ASTM C 478) UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN STANDARD SPECIFICATIONS.
2. ALL REINFORCED CAST IN PLACE CONCRETE SHALL BE CLASS 4000. NON-REINFORCED CONCRETE IN CHANNEL AND SHELF SHALL BE 7 SACK MIX SAND AND CEMENT GROUT. ALL PRECAST CONCRETE SHALL BE CLASS 4000.
3. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS FOR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OR 2" MINIMUM.
4. ALL BASE REINFORCING STEEL SHALL HAVE A MINIMUM YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MINIMUM CLEARANCE.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAMETER PLUS MANHOLE WALL THICKNESS.
6. MANHOLE DIA. DEPENDS ON: SIZE, LOCATION AND NUMBER OF PENETRATIONS FOR PIPES. MANHOLE DESIGN AND SIZE SHALL BE APPROVED AND WARRANTED BY THE MANHOLE SUPPLIER.
7. FOR HEIGHTS OVER 25' MANHOLE BASE SLAB DESIGN SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.
8. CONCRETE CHANNEL AND SHELF SHALL BE FIELD-FORMED EXCEPT WHERE APPROVED IN ADVANCE BY CITY.





MANHOLE DIMENSIONS TABLE

DIAM.	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL IN^2/FT IN EACH DIRECTION	
					SEPARATE BASE	INTEGRAL BASE
72"	6"	8"	60"	12"	0.35	0.24
84"	8"	12"	72"	12"	0.39	0.29
96"	8"	12"	84"	12"	0.39	0.29

NOTE: KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM TO 2.5" MAXIMUM.

WSDOT STD PLAN B-15.40.00,
MANHOLE TYPE 2
ACCEPTABLE SUBSTITUTE

CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

TYPE 2 MANHOLE
72", 84" & 96"

8-10-2011
Date:

605B
COE Std Dwg:

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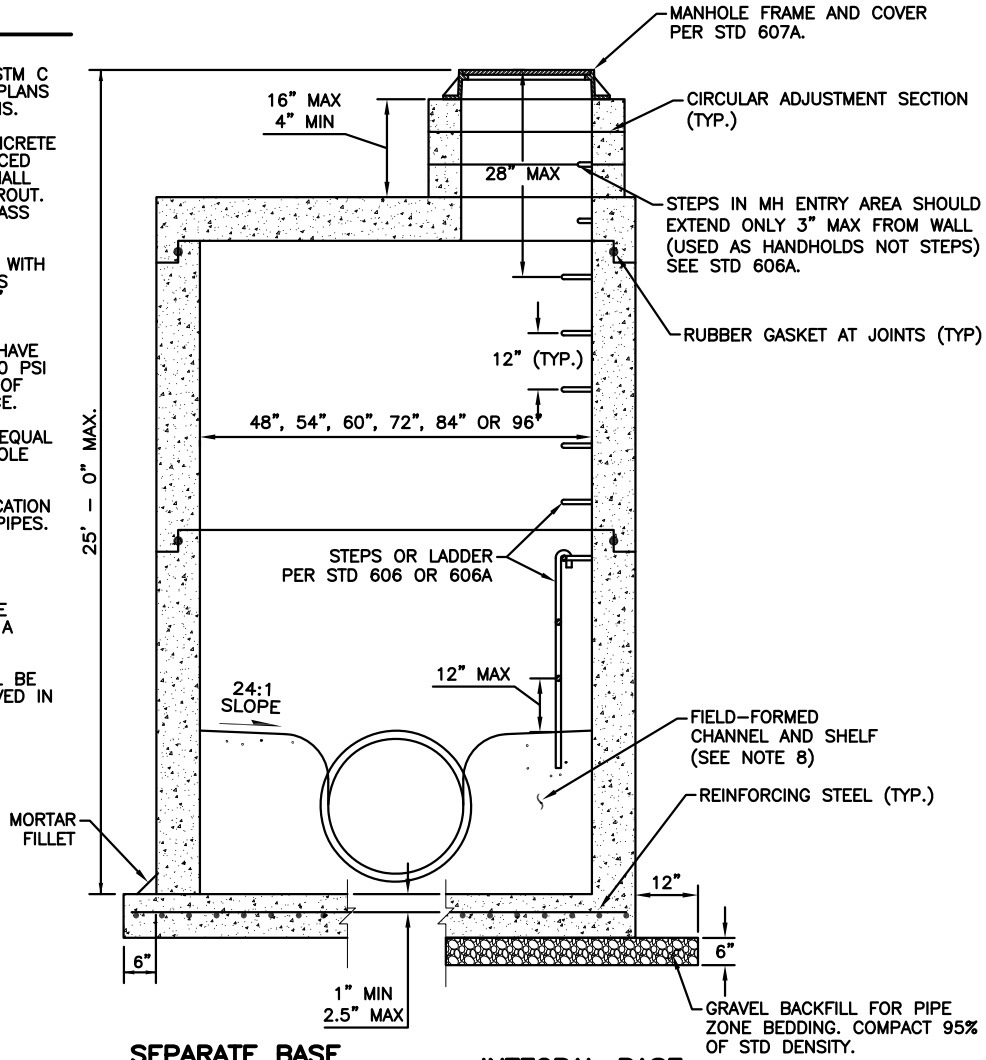
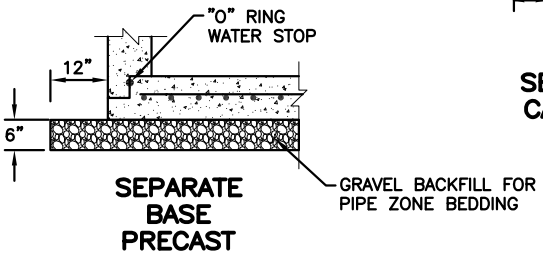
GENERAL NOTES:

1. MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M-199 (ASTM C 478) UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN STANDARD SPECIFICATIONS.
2. ALL RREINFORCED CAST IN PLACE CONCRETE SHALL BE CLASS 4000. NON-REINFORCED CONCRETE IN CHANNEL AND SHELF SHALL BE 7 SACK MIX SAND AND CEMENT GROUT. ALL PRECAST CONCRETE SHALL BE CLASS 4000.
3. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS FOR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OR 2" MINIMUM.
4. ALL BASE REINFORCING STEEL SHALL HAVE A MINIMUM YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MINIMUM CLEARANCE.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAMETER PLUS MANHOLE WALL THICKNESS.
6. MANHOLE DIA. DEPENDS ON: SIZE, LOCATION AND NUMBER OF PENETRATIONS FOR PIPES. MANHOLE DESIGN AND SIZE SHALL BE APPROVED AND WARRANTED BY THE MANHOLE SUPPLIER.
7. FOR HEIGHTS OVER 25' MANHOLE BASE SLAB DESIGN SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.
8. CONCRETE CHANNEL AND SHELF SHALL BE FIELD-FORMED EXCEPT WHERE APPROVED IN ADVANCE BY CITY.





MANHOLE DIMENSION TABLE

DIAM.	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL IN²/FT. IN EACH DIRECTION	
					SEPARATE BASE	INTEGRAL BASE
48"	4"	6"	36"	8"	0.23	0.15
54"	4.5"	8"	42"	8"	0.19	0.19
60"	5"	8"	48"	8"	0.25	0.25
72"	6"	8"	60"	12"	0.35	0.24
84"	8"	12"	72"	12"	0.39	0.29
96"	8"	12"	84"	12"	0.39	0.29

NOTE: KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM TO 2.5" MAXIMUM.

WSDOT STD PLAN B-15.60.00,
MANHOLE TYPE 3
ACCEPTABLE SUBSTITUTE

CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

TYPE 3 MANHOLE
48", 54", 60", 72", 84" & 96"

8/10/2011
Date:

605C
COE Std Dwg:

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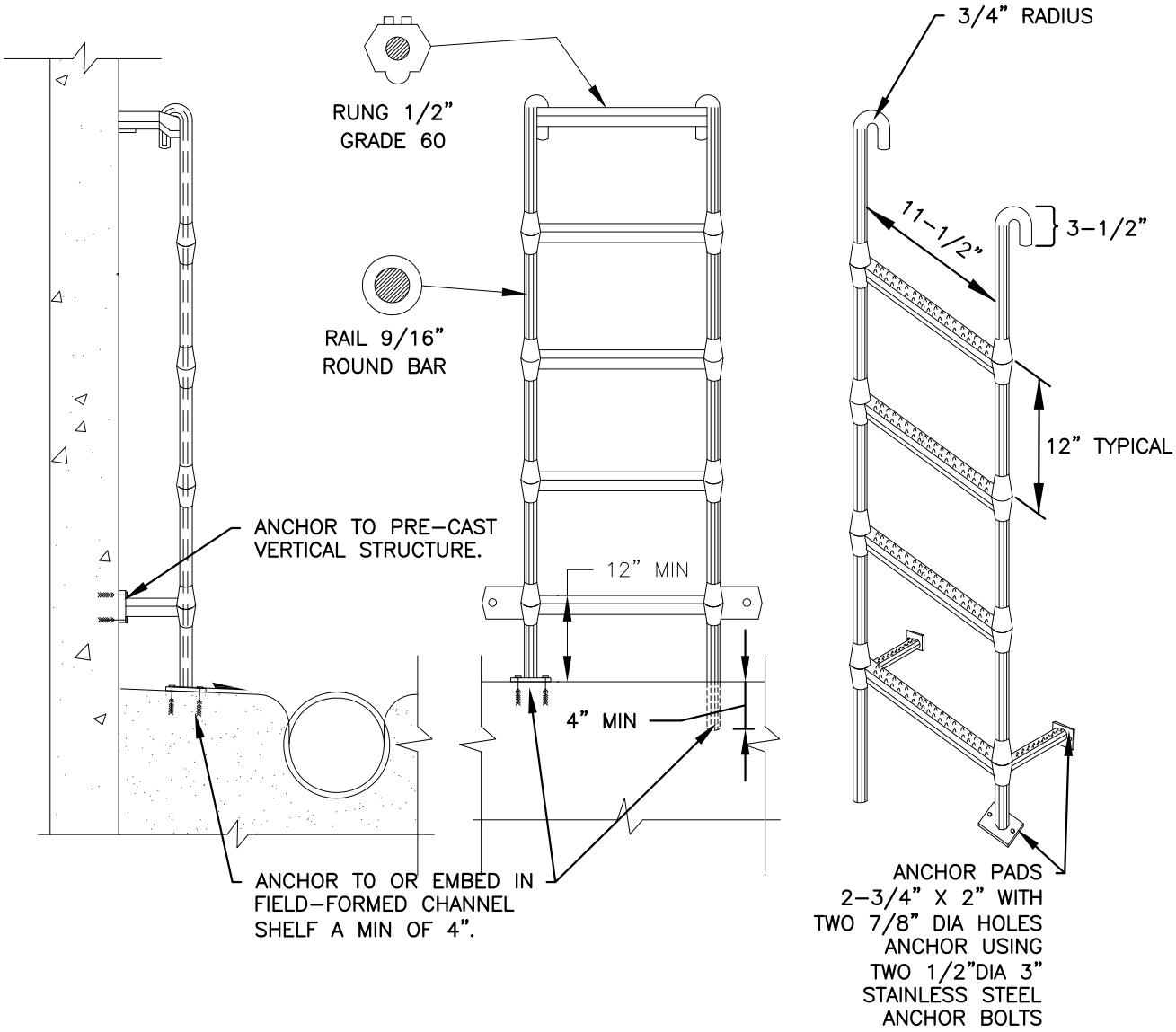

NOTES:

1. STEPS SHALL BE STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTIC CONFORMING TO:

   (A) ASTM C 478 AND AASHTO M-199, ANCHOR-BOLTS SHALL HAVE A MINIMUM HORIZONTAL PULLOUT RATING OF 1500 LBS.

   (B) ASTM A615 GRADE 60 (DEFORMED REINFORCING STEEL BAR).

   (C) POLYPROPYLENE CONFORMS TO D-4101.

2. MANHOLE STEPS SHALL HAVE MOLDED SAFETY HAND GRIP. RED REFLECTORS ARE PREFERRED.
3. ALL FABRICATION DIMENSIONS INDICATED ARE MINIMUM.
4. THE ENTIRE POLYPROPYLENE PLASTIC MATERIAL SURROUNDING THE REINFORCING STEEL BAR SHALL BE CAST MONOLITHICALLY. MINIMUM COVER SHALL BE 3/16-INCH.
5. STEP RUNGS SHALL BE SPACED AT A MAXIMUM OF 14 INCHES.
6. STEPS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED MANUFACTURERS RECOMMENDED PROCEDURE.

EVERETT **CITY OF EVERETT** **PUBLIC WORKS DEPARTMENT**	POLYPROPYLENE LADDER	8/10/2011 Date:
		606 COE Std Dwg:

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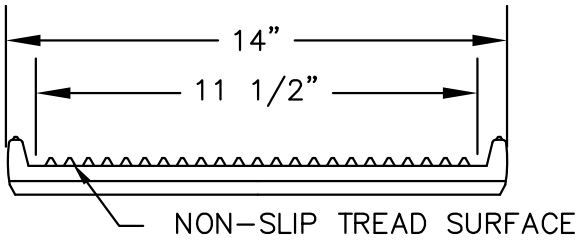
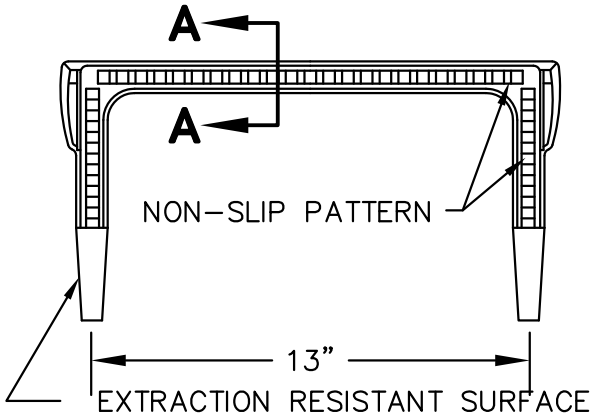
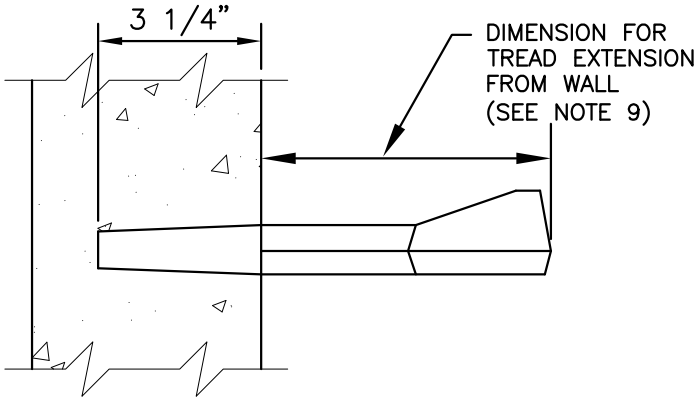


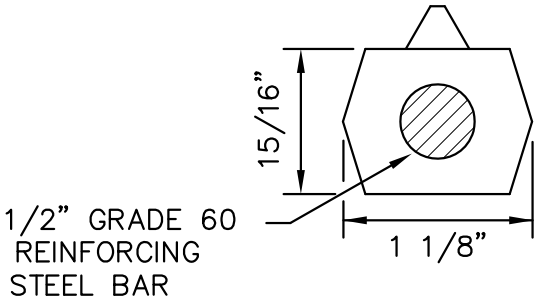
ELEVATION



PLAN



SIDE ELEVATION



SECTION A-A

NOTES:

1. STEPS SHALL BE STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTIC CONFORMING TO:
   A. ASTM D 478 AND AASHTO M-199, MINIMUM HORIZONTAL PULLOUT RATING SHALL BE 1500 LBS.
   B. ASTM A 615 GRADE 60 (DEFORMED REINFORCING STEEL BAR).
2. ONLY STEPS APPROVED BY THE ENGINEER SHALL BE USED.
3. ALL FABRICATION DIMENSIONS INDICATED ARE MINIMUM.
4. THE MINIMUM TOTAL CROSS-SECTIONAL AREA OF THE EXPOSED PORTION OF THE STEP, INCLUDING THE 1/2-INCH DEFORMED REINFORCING STEEL BAR, AND EXCLUDING THE NON-SLIP TREAD SURFACE, SHALL BE ONE SQUARE INCH
5. THE ENTIRE POLYPROPYLENE PLASTIC MATERIAL SURROUNDING THE REINFORCING STEEL BAR SHALL BE CAST MONOLITHICALLY. MINIMUM COVER SHALL BE 3/16-INCH.
6. THE FOLLOWING DIMENSIONS SHALL APPLY UNLESS OTHERWISE NOTED ON THE DRAWINGS OR STANDARD PLANS FOR SPECIFIC STRUCTURES: D=6" ±1/4", E=3 1/4" ±1/4"
7. STEP RUNGS SHALL BE SPACED AT A MAXIMUM OF 14-INCHES.
8. STEPS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED MANUFACTURERS RECOMMENDED PROCEDURE.
9. STEPS IN THE CONE AND RISER SECTIONS WILL HAVE 6" EXTENSION FROM WALL. STEPS INSTALLED ABOVE CONE OR TOP SLAB SHALL BE A MAX OF 3" EXTENSION FROM WALL AND USED AS HANDHOLD. ALSO SEE 605A, 605B OR 605C.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	ALTERNATE POLYPROPYLENE PLASTIC STEP	8/10/2011 Date: 606A COE Std Dwg:

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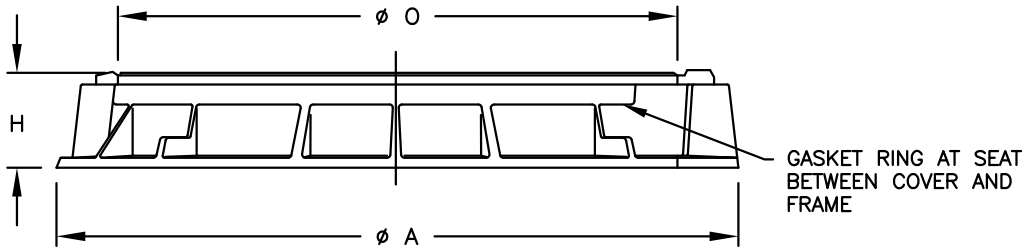

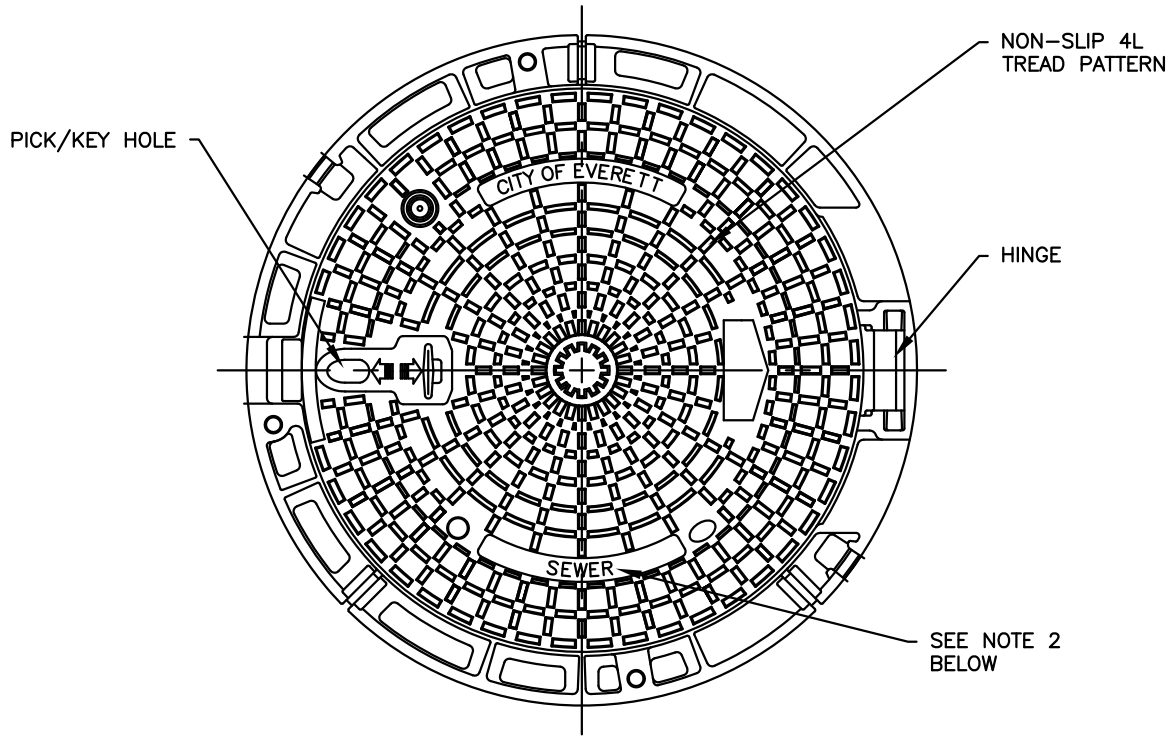

NOTES:

1. MANHOLE COVER AND FRAME SHALL BE AS MANUFACTURED BY PAMREX, EAST JORDAN IRON WORKS (EJIW) OR APPROVED EQUAL. COVER SHALL BE MANUFACTURED FROM DUCTILE IRON, ASTM A536.
2. COVER SHALL BE STAMPED "SEWER", OR "DRAINAGE" DEPENDING ON APPLICATION.
3. COVERS SHALL BE HINGED AND INCORPORATE A 90 DEGREE SAFETY CATCH BLOCKING SYSTEM TO PREVENT ACCIDENTAL CLOSURE AND REMOVABLE AT 120° OPEN. FRAME AND COVER SHALL EXCEED AASHTO H20, M306 OR M105 LOADINGS..
4. FRAMES SHALL BE CIRCULAR, INCORPORATE A SEATING RING AND A FITTED PLUG IN EACH HINGE HOUSING, AND BE AVAILABLE IN A 24 INCH MINIMUM CLEAR OPENING. THE STANDARD FRAME DEPTH SHALL NOT EXCEED 5 INCHES, AND THE FLANGE SHALL INCORPORATE BEDDING SLOTS, BOLT HOLES, AND LIFTING EYES.
5. SHALL BE USED FOR ALL NEW SEWER MANHOLES AND WHERE EXISTING STANDARD MANHOLE FRAME AND COVER ARE TO BE REPLACED.

DIMENSIONS (INCHES)			REFERENCE	MANUFACTURE
A	O	H		
33-1/2	24	4	CDPA60EH	PAMREX
34	24	4	00104042L01	EJIW

CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

MANHOLE FRAME & COVER
"HINGED"

8/10/2011
Date:

607A
COE Std Dwg:

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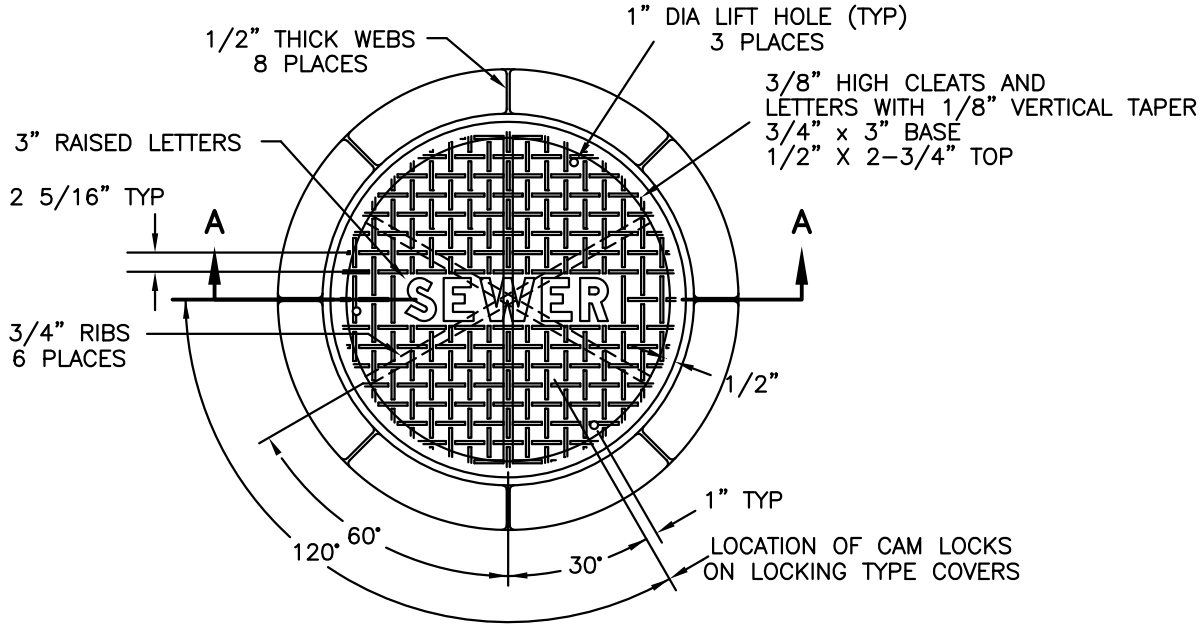
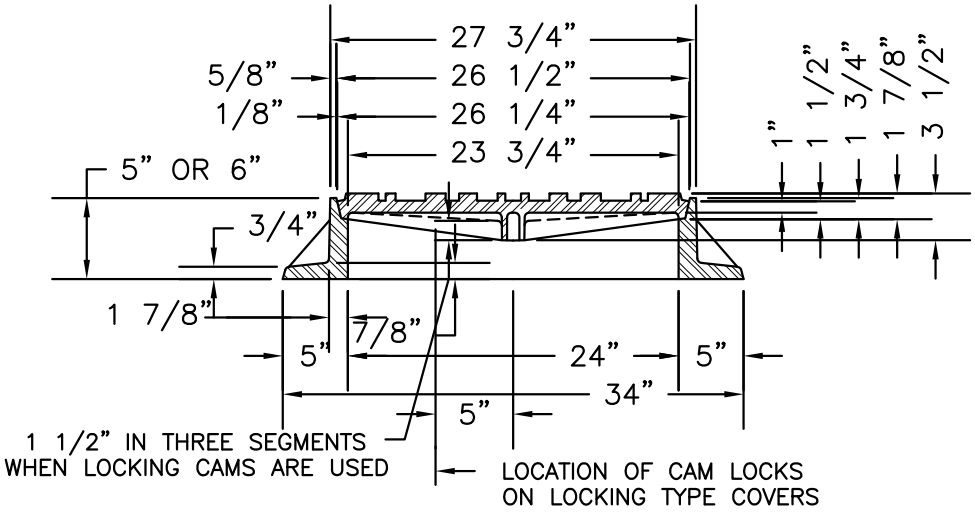


PLAN



SECTION A–A

NOTES:

1. MANHOLE FRAMES SHALL BE GRAY IRON CONFORMING TO THE REQUIREMENTS OF AASHTO M 105, GRADE 30B.
2. MANHOLE COVER TO BE DUCTILE IRON CONFORMING TO ASTM A536, GR 80–55–06
3. LOCKING COVER TO BE USED AT OFF–STREET LOCATIONS AND OTHER LOCATIONS AS DIRECTED. THE COVER SHALL BE LOCKED DOWN WITH 3–5/8" S.S SOCKET HEAD CAP SCREWS.
4. FRAME AND COVER SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS FOR DELIVERY.
5. SHALL BE USED ONLY WHERE DIRECTED BY THE CITY OR APPROVED IN ADVANCE.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	MANHOLE FRAME & COVER "STANDARD"	8/10/2011 Date: 607B COE Std Dwg:

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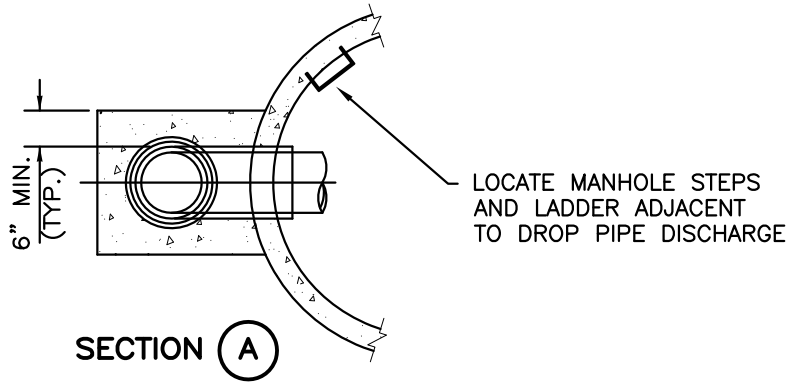
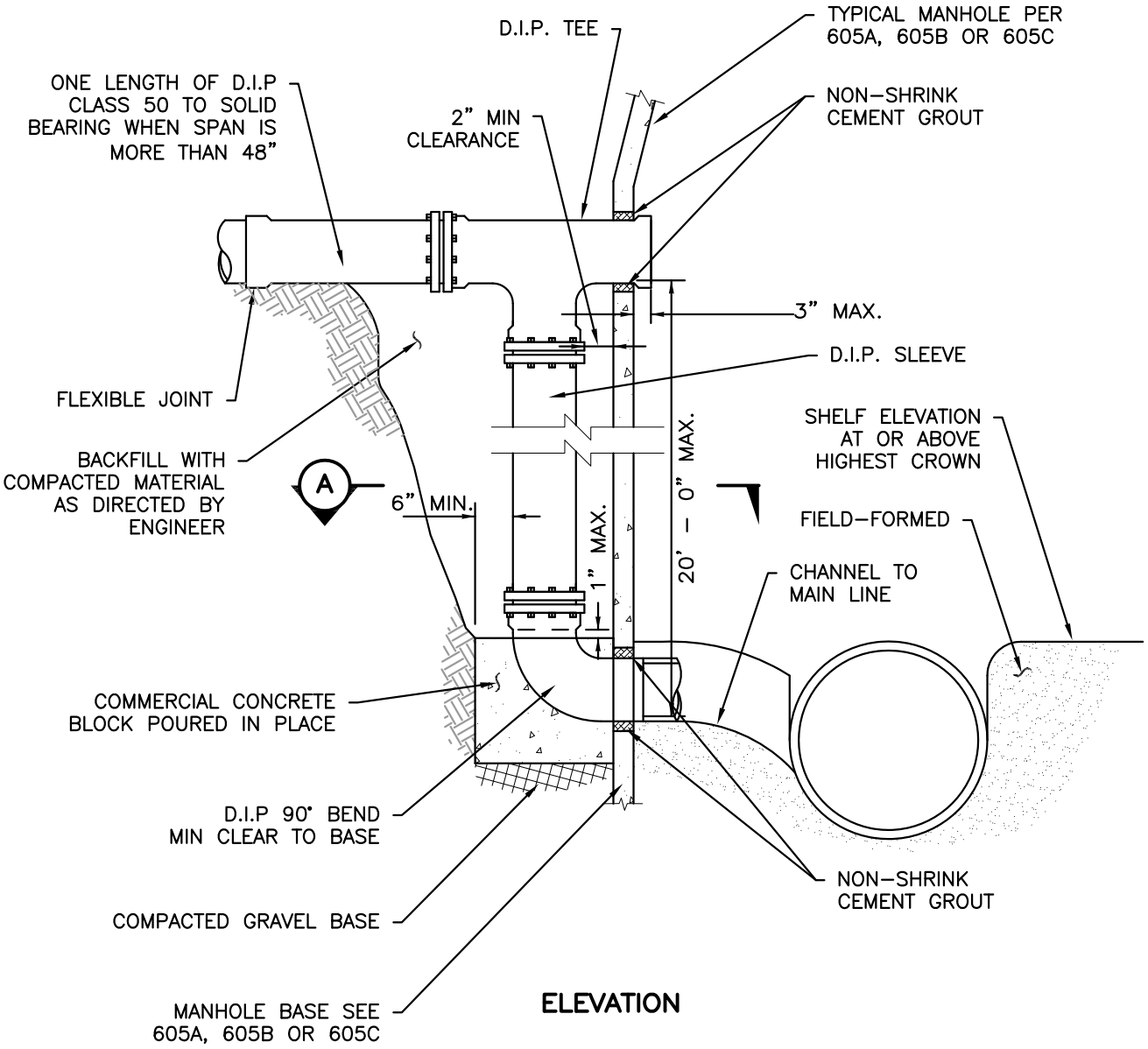


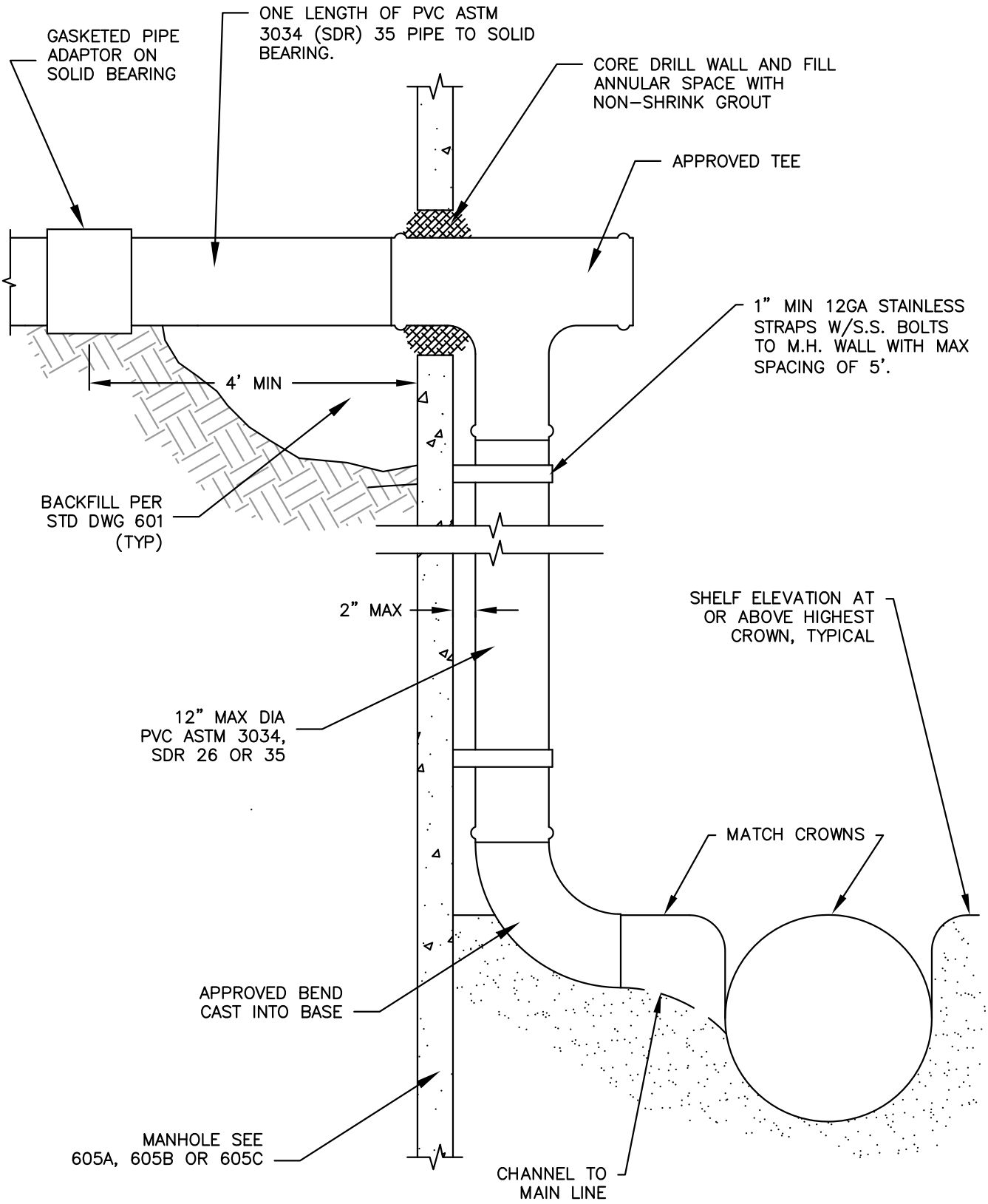
SECTION (A)



ELEVATION

WSDOT STD PLAN B-85.50.00
ACCEPTABLE SUBSTITUTE

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	OUTSIDE DROP MANHOLE CONNECTION DUCTILE IRON	8/10/2011 Date: 608 COE Std Dwg:



NOTE: LOCATE MANHOLE STEPS AND LADDER ADJACENT TO DROP PIPE DISCHARGE. SEE SEC "A" STD 608.

54" MINIMUM DIAMETER MANHOLE REQUIRED

CITY OF EVERETT **PUBLIC WORKS DEPARTMENT**	INSIDE DROP MANHOLE CONNECTION	8/10/2011 Date: 609 COE Std Dwg:

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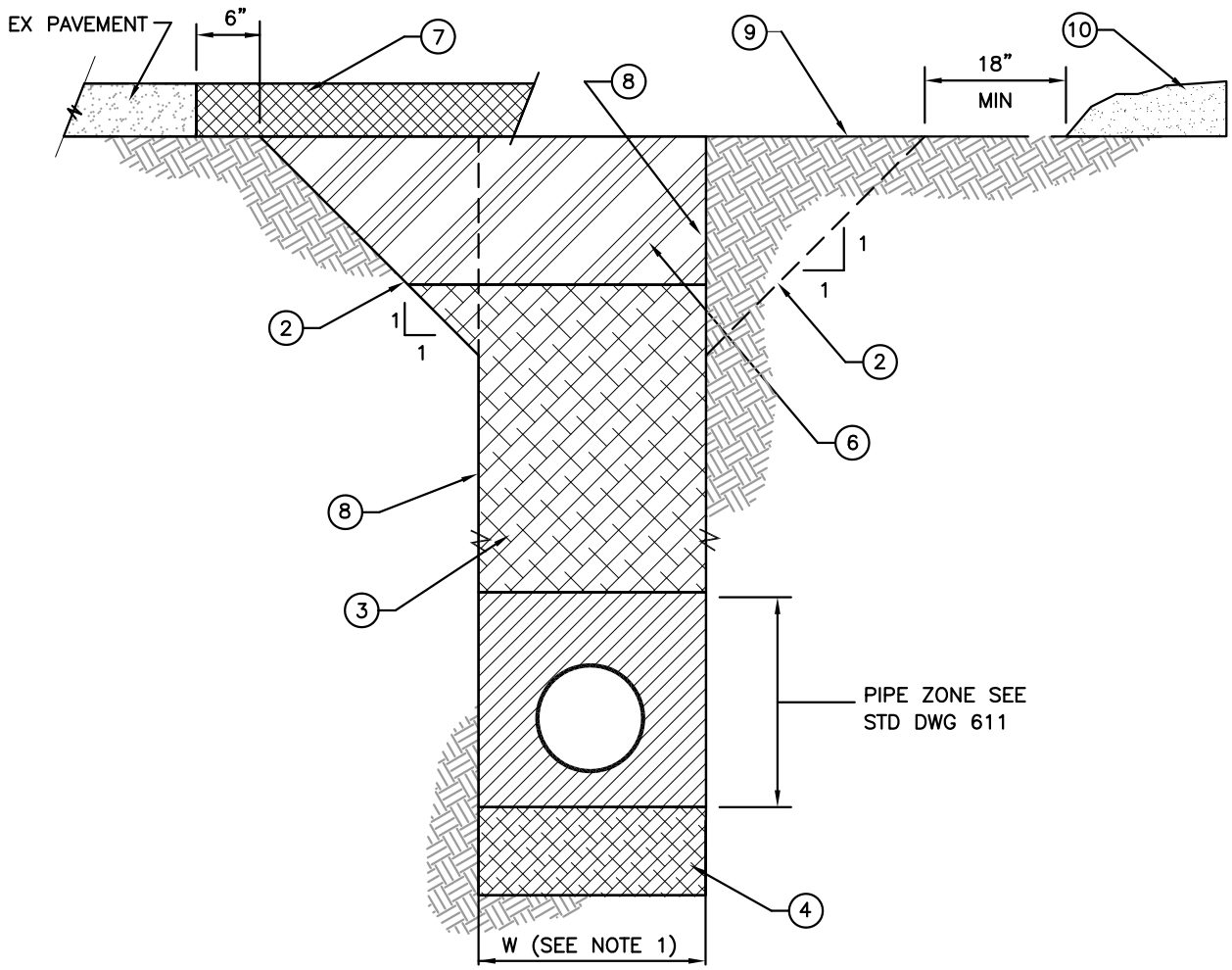

NOTES

1. W = MAXIMUM WIDTH OF TRENCH. FOR PIPES 15" OR LESS IN DIA W=40". FOR PIPES 18" OR GREATER W=1.5 x I.D. + 18". PIPE MUST BE CENTERED IN TRENCH.
2. ALTERNATE SLOPING TRENCH WALL TO MEET O.S.H.A. REQUIREMENTS (NO SLOPES STEEPER THAN 1:1 EXCEPT FOR ROCK).
3. SUITABLE NATIVE MATERIAL OR IMPORTED GRAVEL BORROW AS DIRECTED. COMPACT TO 90% MAXIMUM DENSITY.
4. FOUNDATION GRAVEL IF REQUIRED BY THE ENGINEER TO REPLACE UNSUITABLE MATERIAL. SHALL BE FOUNDATION MATERIAL CLASS A, B OR AS APPROVED BY THE ENGINEER.
5. FOR ADDITIONAL COMPACTION INFORMATION SEE STANDARD DWG 615.
6. IF DIRECTED BY THE ENGINEER THE TOP THREE TO FIVE FEET OF BACKFILL SHALL BE IMPORTED GRAVEL BORROW OR SUITABLE NATIVE MATERIAL COMPACTED TO 95% MAXIMUM DENSITY.
7. SEE CITY OF EVERETT STANDARD DWG 316 FOR PAVEMENT PATCH DETAILS.
8. VERTICAL TRENCH WALLS WITH SHORING TO CONFORM TO O.S.H.A. REGULATIONS.
9. SUBGRADE OR GROUND SURFACE IN NON-PAVED AREAS.
10. EXCAVATED NATIVE MATERIAL OR STOCKPILED BACKFILL MATERIAL.
11. FOR ALL TRENCHING TRANSVERSE TO THE ROADWAY BACKFILL ABOVE THE PIPE ZONE SHALL BE CONTROLLED DENSITY FILL. SEE SECTION 3-9.6 & 3-20.1 OF THESE STANDARDS.
12. FOR UTILITY CUTS SUCH AS GAS, TELEPHONE, POWER, AND CABLE TV LONGITUDINAL TO THE ROADWAY, BACKFILL SHALL BE CONTROLLED DENSITY FILL. SEE SECTION 3-9.5 OF THESE STANDARDS

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	TYPICAL TRENCH SECTION	8/10/2011 Date:
		610 COE Std Dwg:

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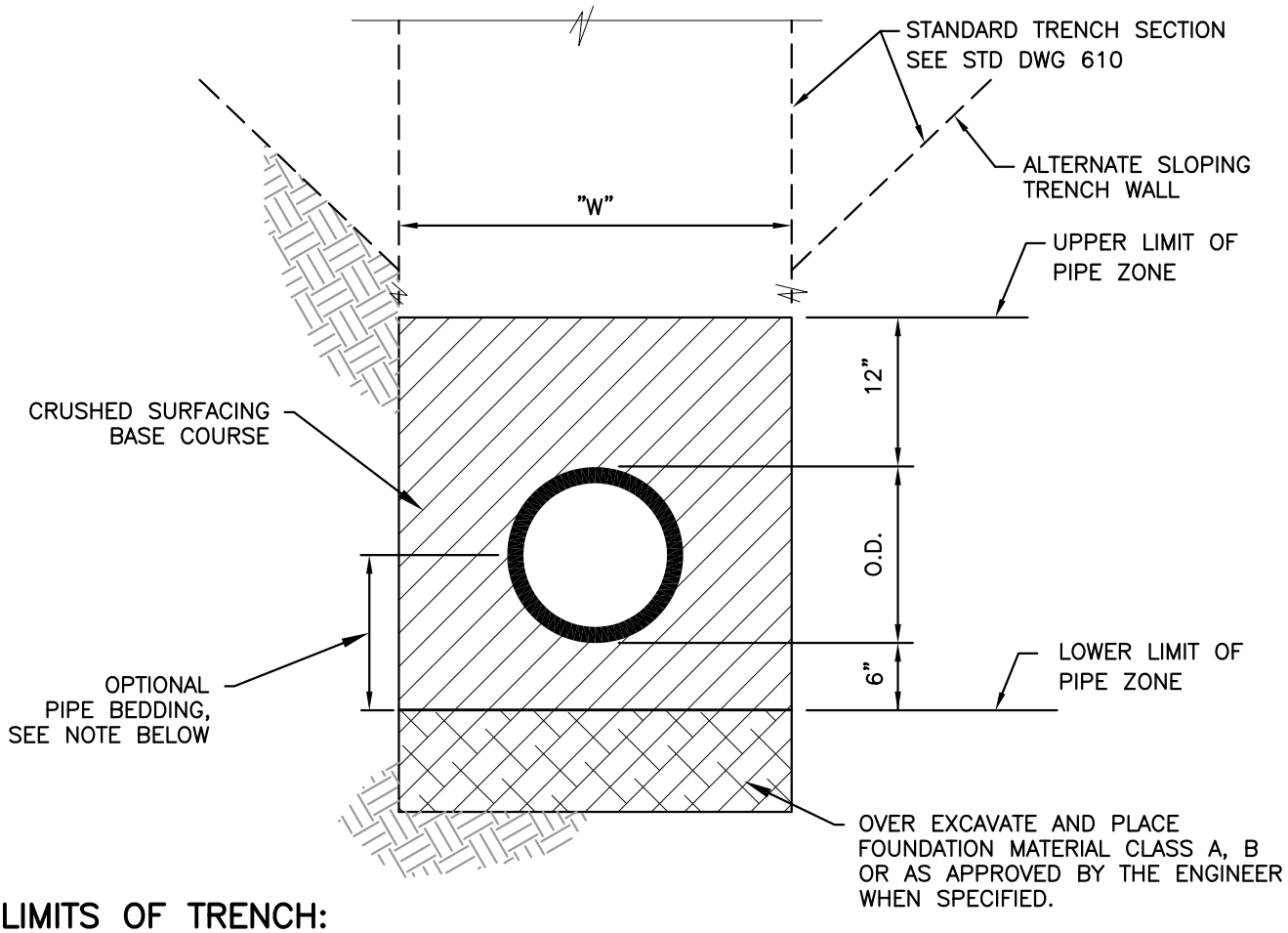


LIMITS OF TRENCH:

W = MAXIMUM WIDTH OF TRENCH. FOR PIPES 15" OR LESS IN DIAMETER W = 40". FOR PIPES 18" OR GREATER W = 1 1/2 x I.D. + 18". PIPE MUST BE CENTERED IN TRENCH.

BEDDING AND FOUNDATION MATERIALS:

PIPE BEDDING MATERIAL SHALL BE CRUSHED SURFACING BASE COURSE CONFORMING TO SECTION 9-03.9(3) OF THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION WSDOT/APWA.

OPTIONAL PIPE BEDDING (TO SPRING-LINE) FOR PIPE 15" DIA AND LARGER: PEA GRAVEL OR 3/4" CLEAN ROCK CHIPS AS APPROVED IN ADVANCE BY ENGINEER.

OVER EXCAVATION AND PLACEMENT OF FOUNDATION MATERIAL, IF REQUIRED SHALL BE FOUNDATION MATERIAL CLASS A OR B CONFORMING TO SECTION 9-03.17 OF THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION WSDOT/APWA.

PROCEDURE FOR COMPACTION:

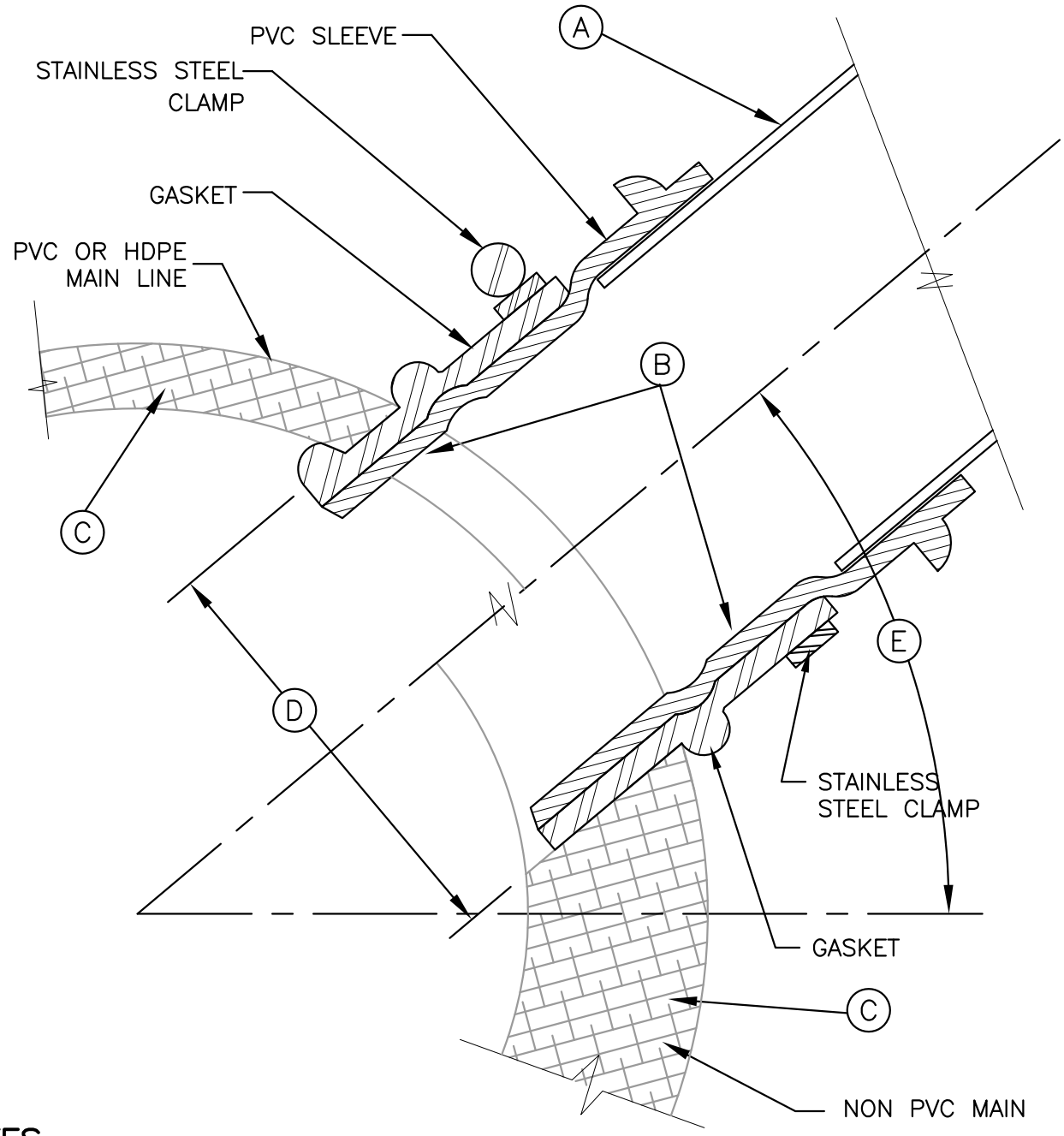
PROVIDE UNIFORM SUPPORT UNDER PIPE BARREL.

COMPACT BEDDING MATERIAL TO 90% MAXIMUM DENSITY EXCEPT DIRECTLY OVER PIPE, HAND TAMP ONLY.

HAND TAMP UNDER PIPE HAUNCHES FOR ALL BEDDING MATERIALS.

FOR ADDITIONAL COMPACTION INFORMATION SEE STANDARD DWG 615.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	BEDDING FOR PIPE IN TRENCHES	8-10-2011 Date: 611 COE Std Dwg:



NOTES

(A) PVC SIDE SEWER. FOR REMAINDER OF PVC SERVICE SEE STD DWG 602.

(B) "INSERTA TEE" OR APPROVED EQUAL.

(C) EXISTING SANITARY SEWER MAIN.

(D) CORE DRILL EXISTING MAINLINE PIPE PER MFG'S SPECIFICATIONS.

(E) 35° MIN, 45° MAX

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	TYPICAL SEWER CONNECTION TO EXISTING SEWER MAINS	8/10/2011 Date: 612 COE Std Dwg:

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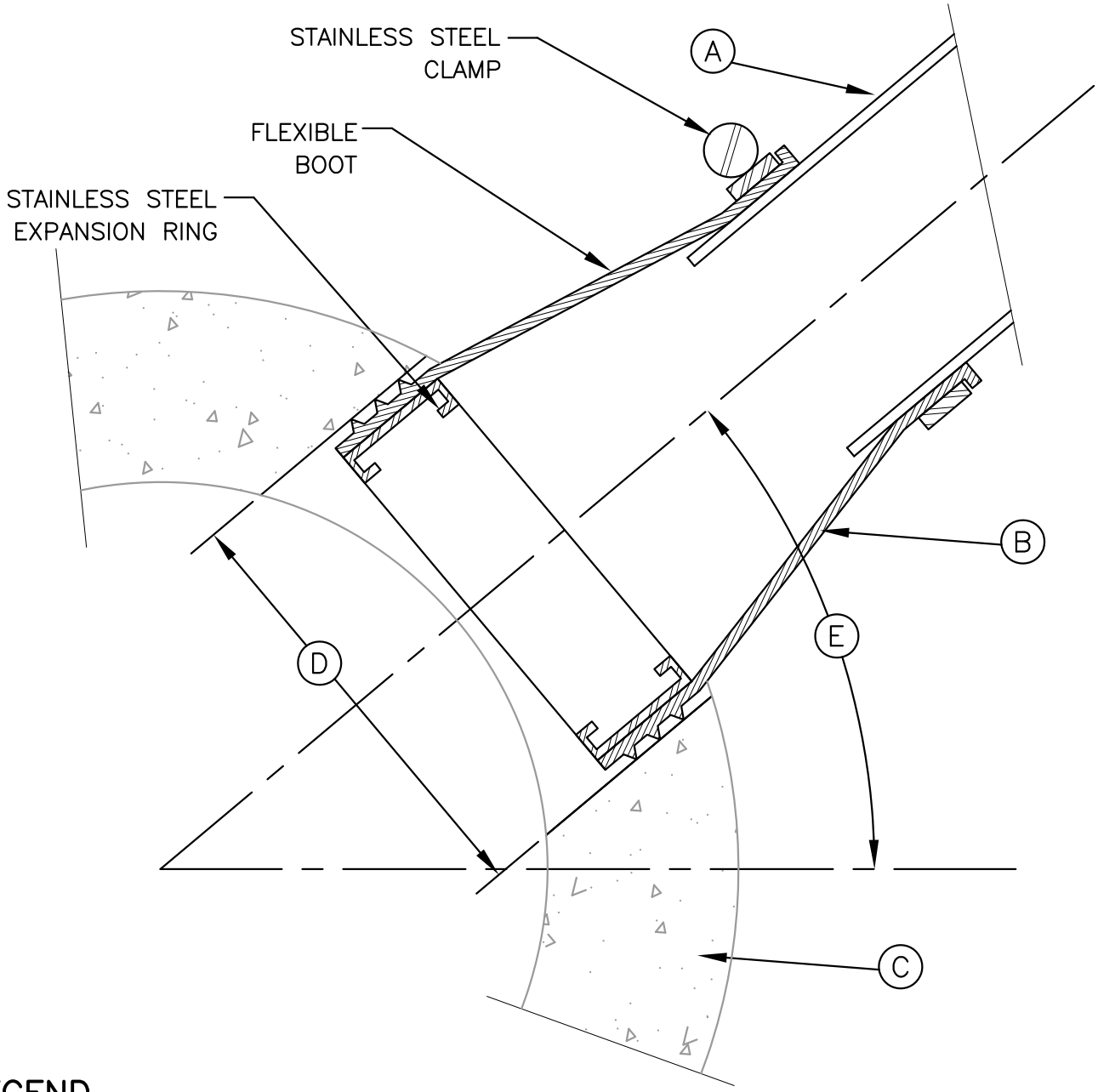

LEGEND

- (A) PVC SIDE SEWER. FOR REMAINDER OF PVC SERVICE SEE STD DWG 602.
- (B) "KOR-N-TEE" OR APPROVED EQUAL.
- (C) EXISTING OR NEW CONCRETE SANITARY SEWER MAIN.
- (D) CORE DRILL EXISTING MAINLINE PIPE PER MFG'S SPECIFICATIONS.
- (E) 35° MIN, 45° MAX

NOTES

1 USE OF THIS SEWER CONNECTION ALTERNATE MUST HAVE APPROVAL OF THE CITY ENGINEER ON A CASE BY CASE BASIS.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	ALTERNATE SEWER CONNECTION TO EXISTING/NEW CONCRETE SEWER MAIN	8-10-2011 Date: 613 COE Std Dwg:

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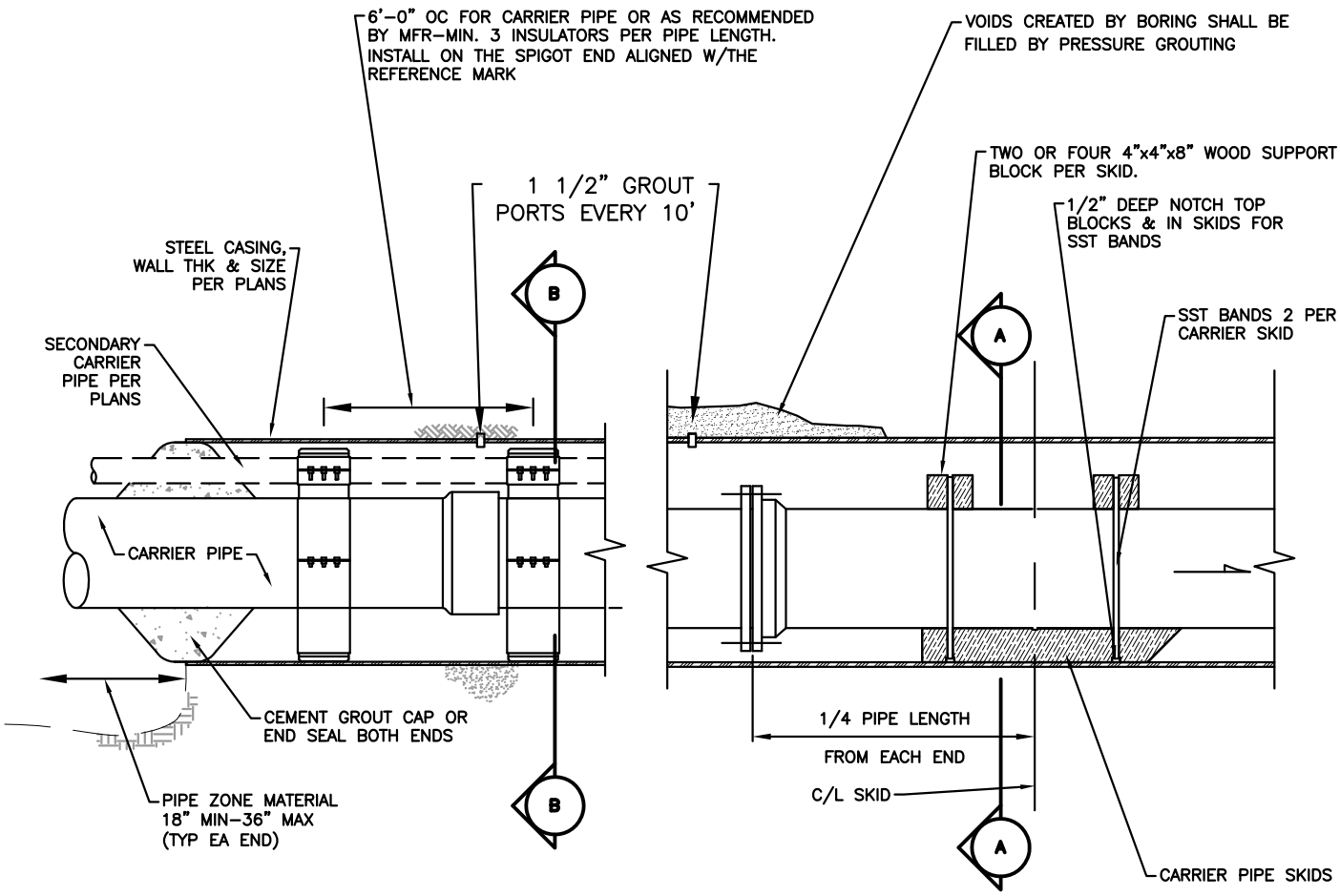


NOTES:

1. NEW ANSI/AWWA C200 STEEL CASING AS REQUIRED (SEE PLANS AND SPECIFICATIONS).
2. PROVIDE 1" MINIMUM CLEARANCE BETWEEN CASING AND CARRIER PIPE BELLS AND APPURTENANCES.
3. CONTRACTOR TO VERIFY CASING SIZES PRIOR TO ORDERING AND SIZING CASING INSULATORS.
4. ALL JOINTS OF CARRIER PIPE TO BE RESTRAINED.
5. CASING SHALL BE FILLED WITH FINE CLEAN DRY SAND CAREFULLY AIR BLOWN IN SUCH A WAY TO ELIMINATE ANY VOIDS.
6. BACKFILL BORE PIT ABOVE PIPE ZONE WITH SPECIFIED CLASS BACKFILL MATERIAL.
7. CASING, APPURTENANCES AND ALL OTHER MISCELLANEOUS ITEMS TO BE FURNISHED BY CONTRACTOR.

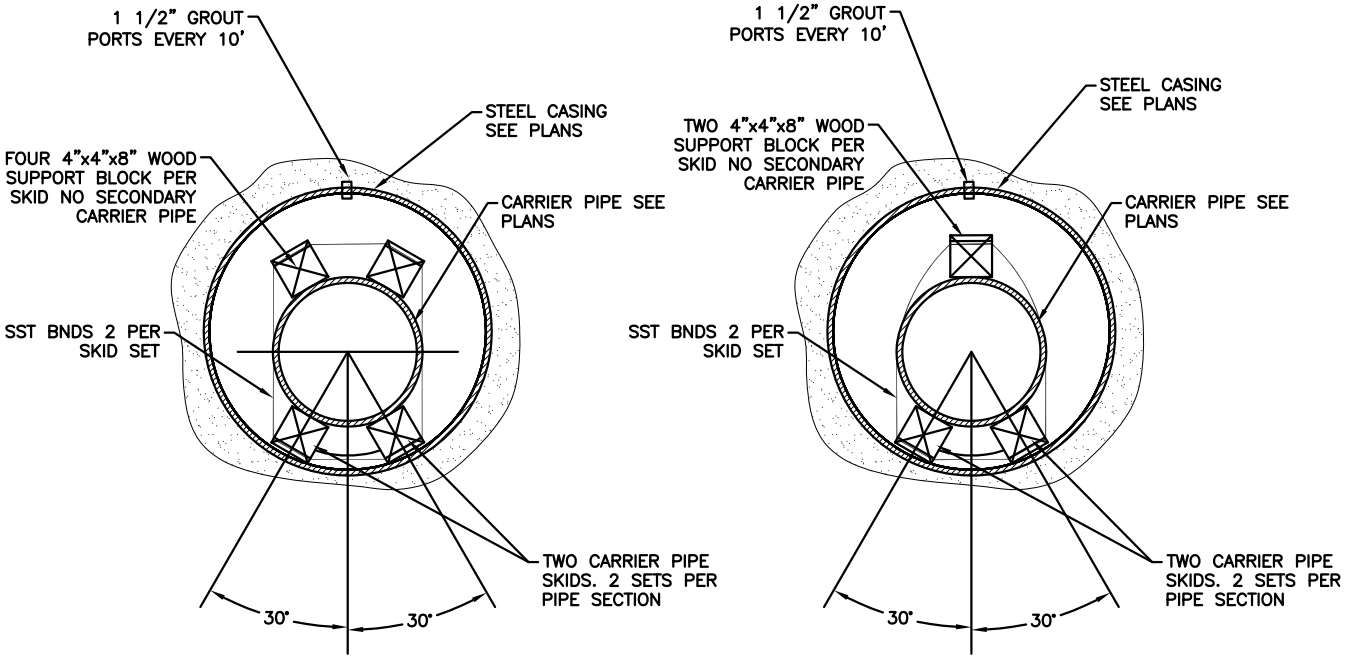
TYPICAL PVC BELL FITTING CARRIER PIPE SPACER INSTALLATION

NOTES:

1. ALL JOINTS OF CARRIER PIPE WITHIN CASING SHALL BE FLANGED (FL) OR MECHANICAL JOINT (MJ) FITTINGS WITH MEG-A-LUG RESTRAINTS.
2. CARRIER PIPE WILL BE PRESSURE TESTED BY CONTRACTOR AND TV INSPECTION BY CITY CREWS.
3. CARRIER SKIDS SHALL BE SECURELY ATTACHED TO CARRIER PIPE W/STAINLESS STEEL (SST) BANDS (MIN 2 BANDS PER SKID SET).
4. CARRIER SKIDS SHALL BE ROUNDED OR BEVELED ON LEADING EDGE, AND SHALL BE NOTCHED TO RECEIVE SST BANDS.
5. CARRIER SKIDS SHALL BE PRESSURE TREATED WOOD 4"x4"x48" (2 SETS OF 2 SKIDS PER LENGTH OF PIPE). CONTRACTOR MAY USE APPROVED PREFABRICATED SKIDS PROVIDED A 1" MIN CLEARANCE IS MAINTAINED BETWEEN JOINT FLANGE AND CASING.
6. SECONDARY CARRIER PIPES SHALL BE SECURED TO THE TOP OF THE MAIN CARRIER PIPE AS SHOWN.
7. SECONDARY CARRIER PIPE WILL BE TESTED BEFORE CASING ANNULAR SPACE IS FILLED.
8. END SEALS SHALL BE PROVIDED FOR THE JACKED CASING PIPES. THE END SEALS SHALL BE APS STANDARD MODEL AM AS MANUFACTURED BY ADVANCED PRODUCTS (WWW.APSONLINE.COM) OR APPROVED EQUIVALENT.
9. CASING, APPURTENANCES AND ALL OTHER MISCELLANEOUS ITEMS TO BE FURNISHED BY CONTRACTOR.

TYPICAL STEEL OR DUCTILE IRON CARRIER PIPE SPACER INSTALLATION

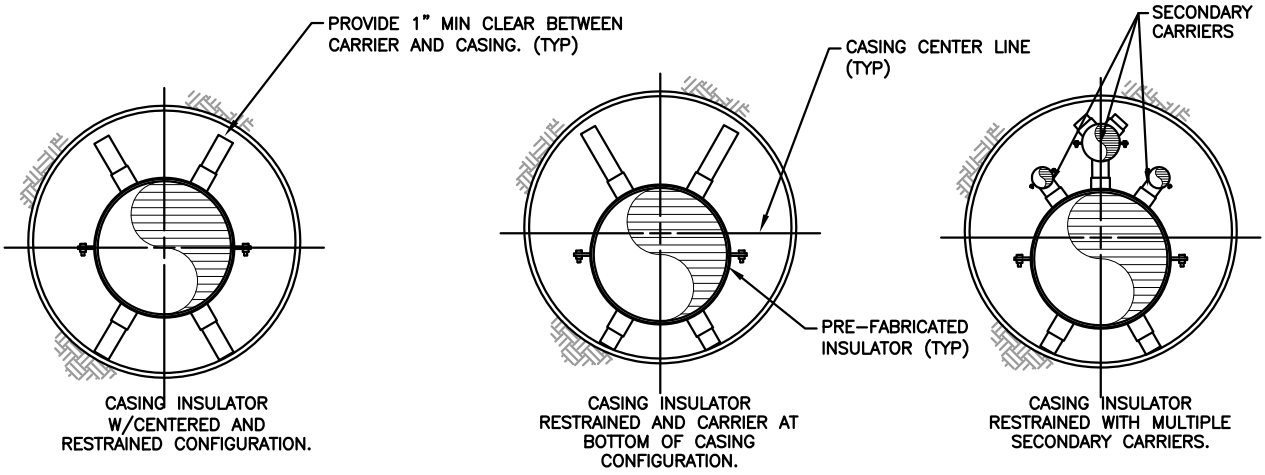
CITY OF EVERETT PUBLIC WORKS DEPARTMENT	CASING DETAIL SHT 1 OF 2	8/10/2011 Date: 614 COE Std Dwg:



EXAMPLES OF FIELD ASSEMBLED CASING SKIDS

A FIELD FABRICATED SKID ASSY.

SCALE: N.T.S.



EXAMPLE OF PRE-FABRICATED SKIDS AND INSULATOR CONFIGURATIONS

B PRE-FABRICATED SKID ASSY.

SCALE: N.T.S.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	CASING DETAIL SHT 2 OF 2	8/10/2011 Date: 614 COE Std Dwg:

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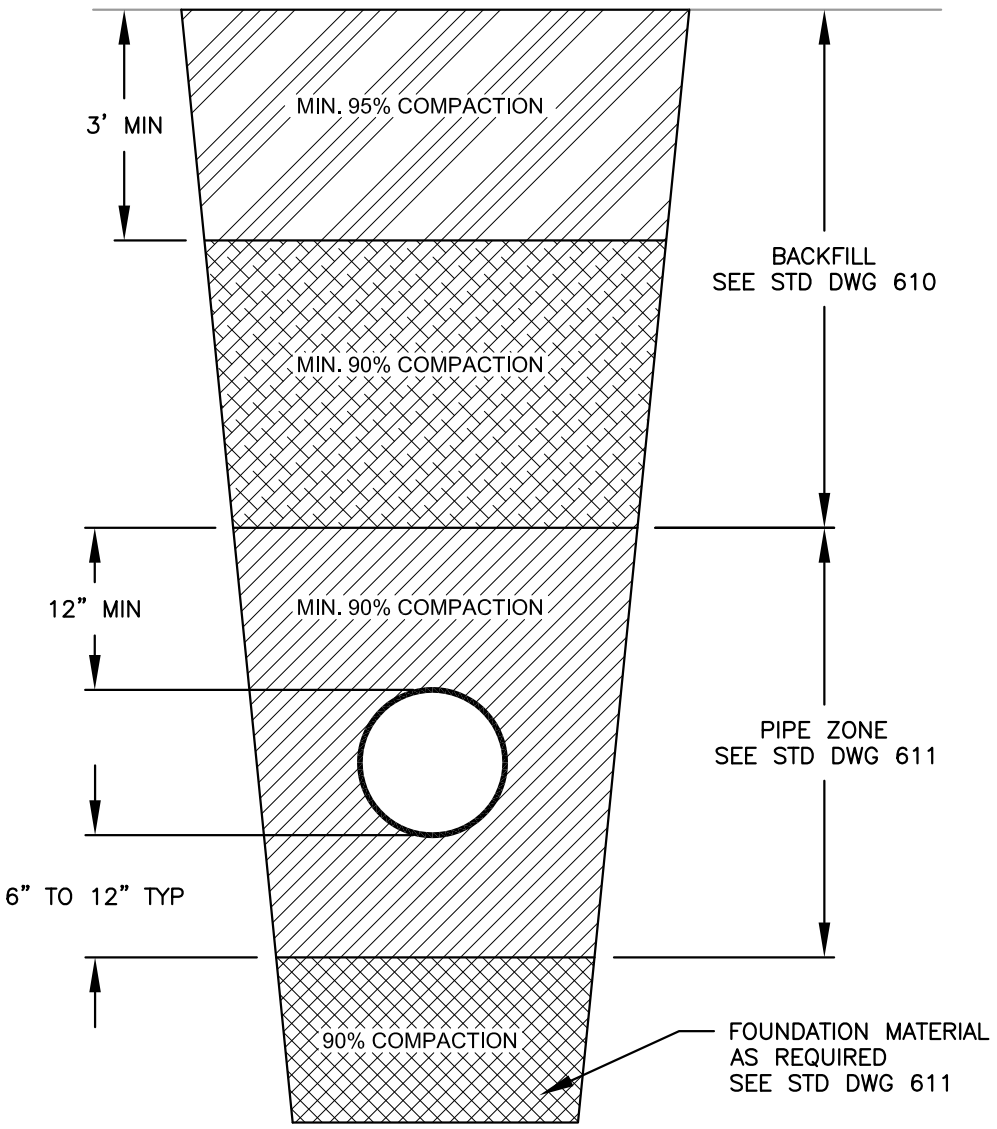
T:\ACad\EPS-COE Design & Constr Specs for Development\CURRENT\STD DETAIL DWGS\Dwg Files\STD615.dwg, 615 TYPICAL TRENCH COMPACTION, 12/9/2011 1:14

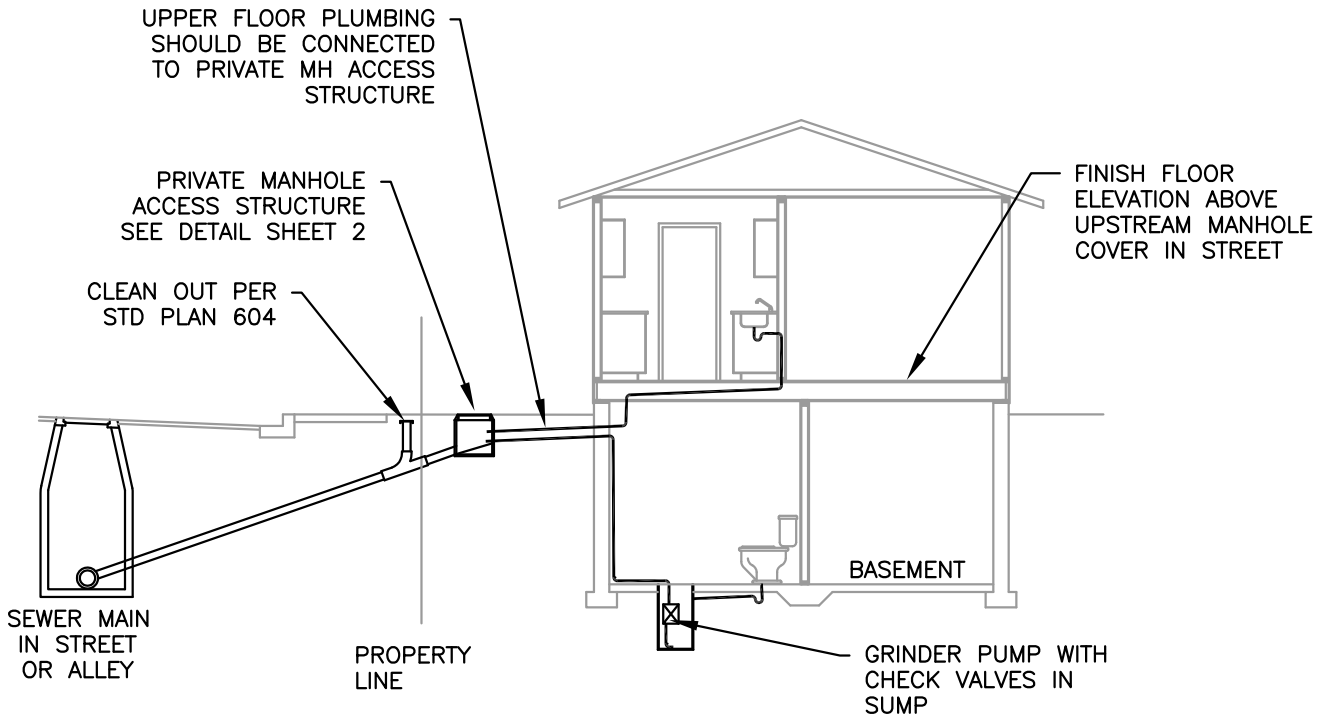


SECTION

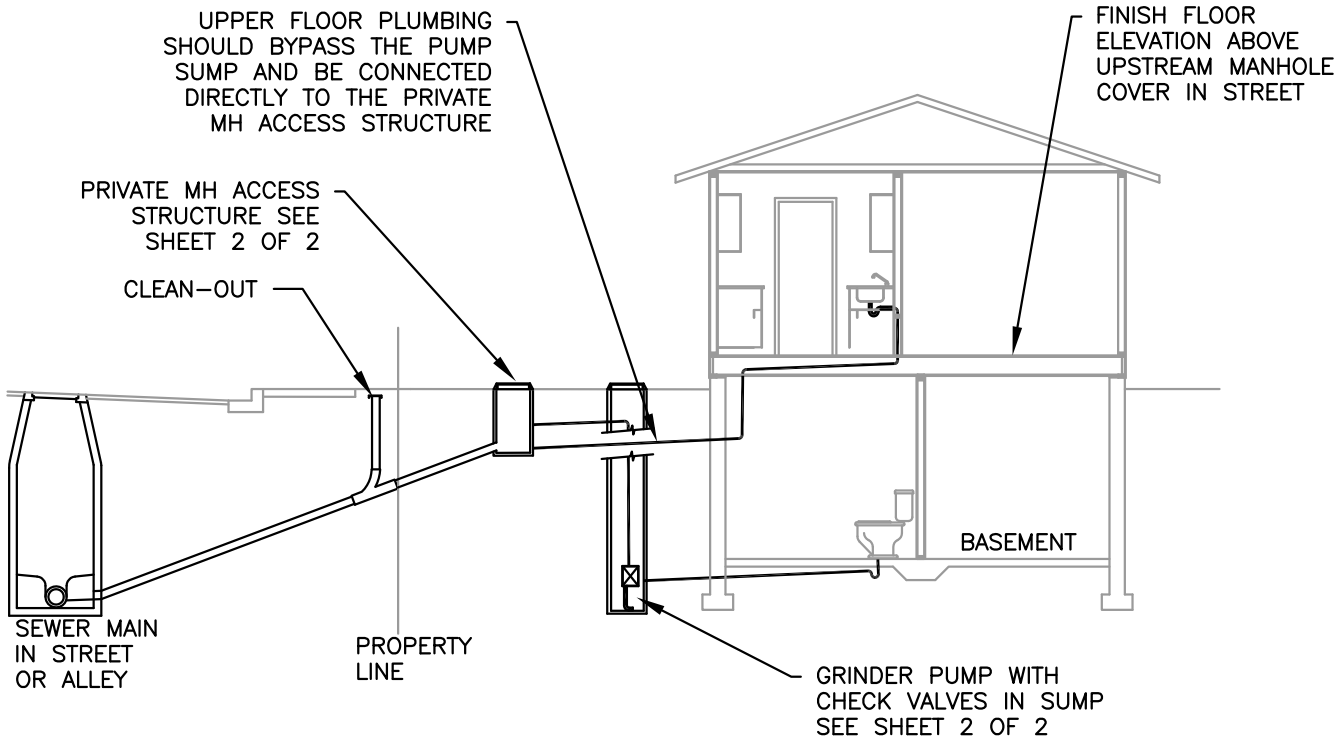
NOTES:

1. ALL BACKFILL MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 12 INCHES BEFORE COMPACTION UNLESS AUTHORIZED BY THE ENGINEER DUE TO THE CHARACTER OF THE MATERIAL AND THE COMPACTING EQUIPMENT.
2. MECHANICAL COMPACTION OF BACK FILL MATERIAL SHALL NOT BEGIN UNTIL THE DEPTH OF COMPACTED BACKFILL MATERIAL IS 2 FEET ABOVE THE TOP OF PIPE.
3. EACH LIFT SHALL BE MECHANICALLY COMPACTED TO THE REQUIRED DENSITY PRIOR TO PLACING SUBSEQUENT LIFTS OF BACKFILL MATERIAL.
4. COMPACTION TESTS SHALL BE AS REQUIRED BY THE CITY ENGINEER, BUT IN NO CASE LESS THAN 2 TESTS EVERY 200 FEET OF TRENCH (ONE AT SUBGRADE AND ONE AT 50% OF TRENCH DEPTH).
5. IN PLACE DENSITY AND MOISTURE CONTENT WILL BE DETERMINED USING NUCLEAR METHOD, ASTM 2922-71.
6. LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT WILL BE DETERMINED USING THE MODIFIED PROCTOR METHOD IN ACCORDANCE WITH ASTM D-1557.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	TYPICAL TRENCH COMPACTION	8-10-2011 Date: 615 COE Std Dwg:



GRINDER PUMP INSIDE HOUSE



GRINDER PUMP OUTSIDE HOUSE

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	GRINDER PUMP CONNECTION TO SANITARY SEWER SHT 1 OF 2	8-12-2011 Date: 616 COE Std Dwg:

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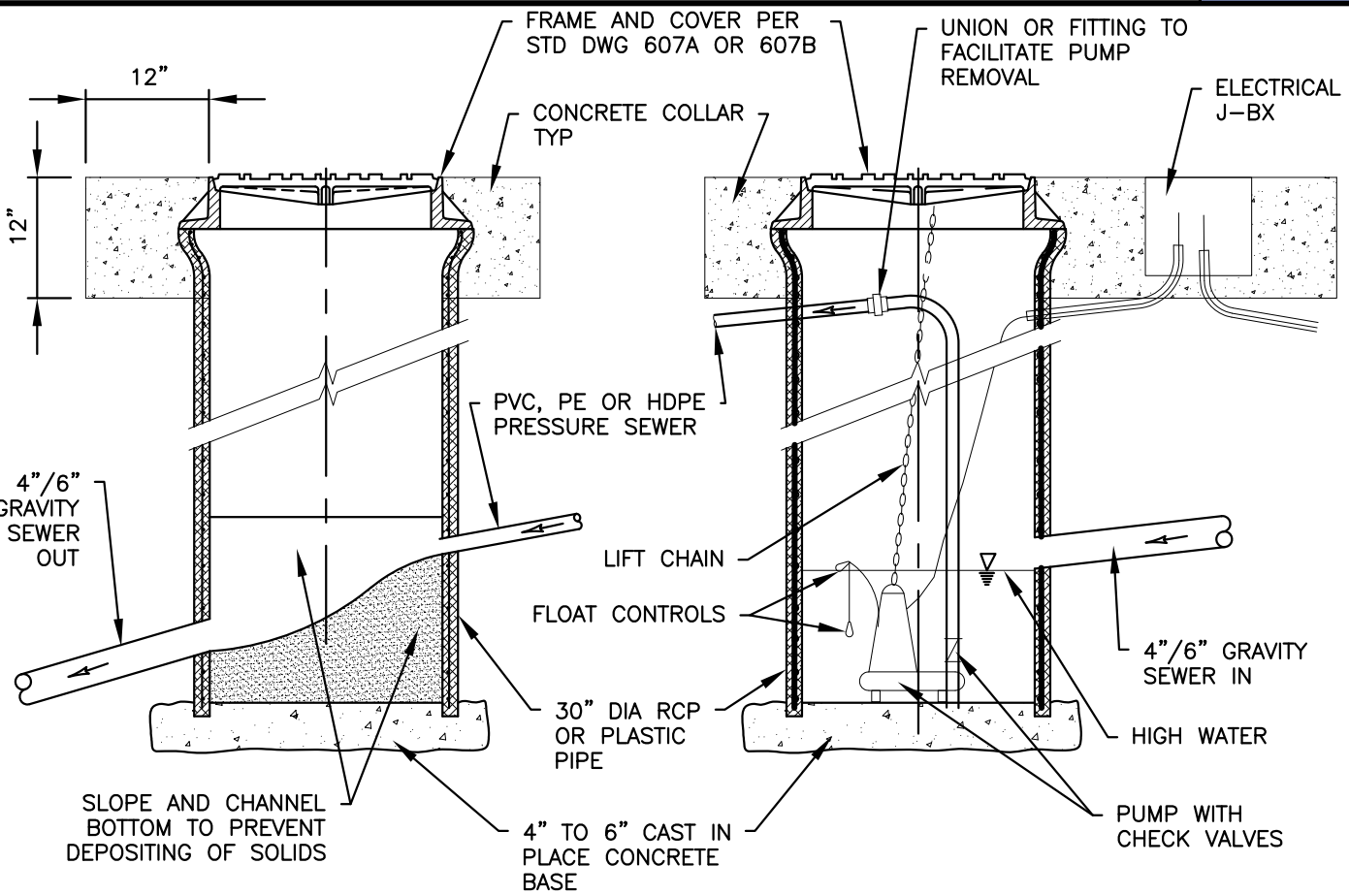


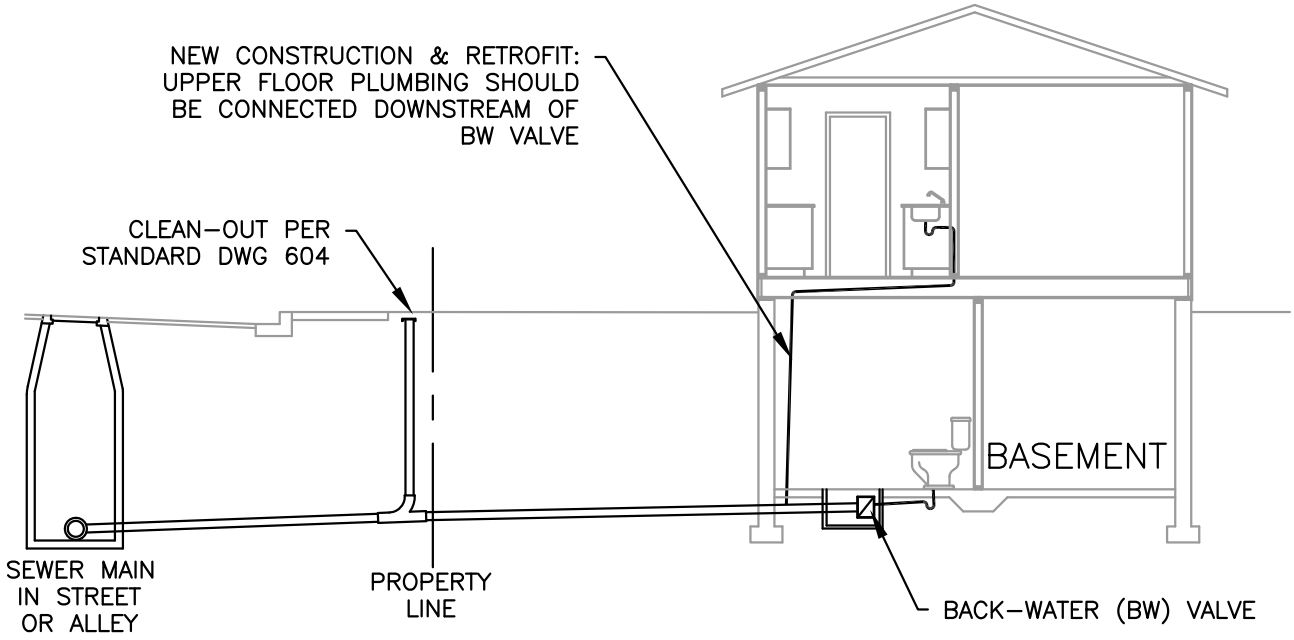
PRIVATE MH ACCESS STRUCTURES **GRINDER PUMP IN SUMP**

PRIVATE MH ACCESS STRUCTURES

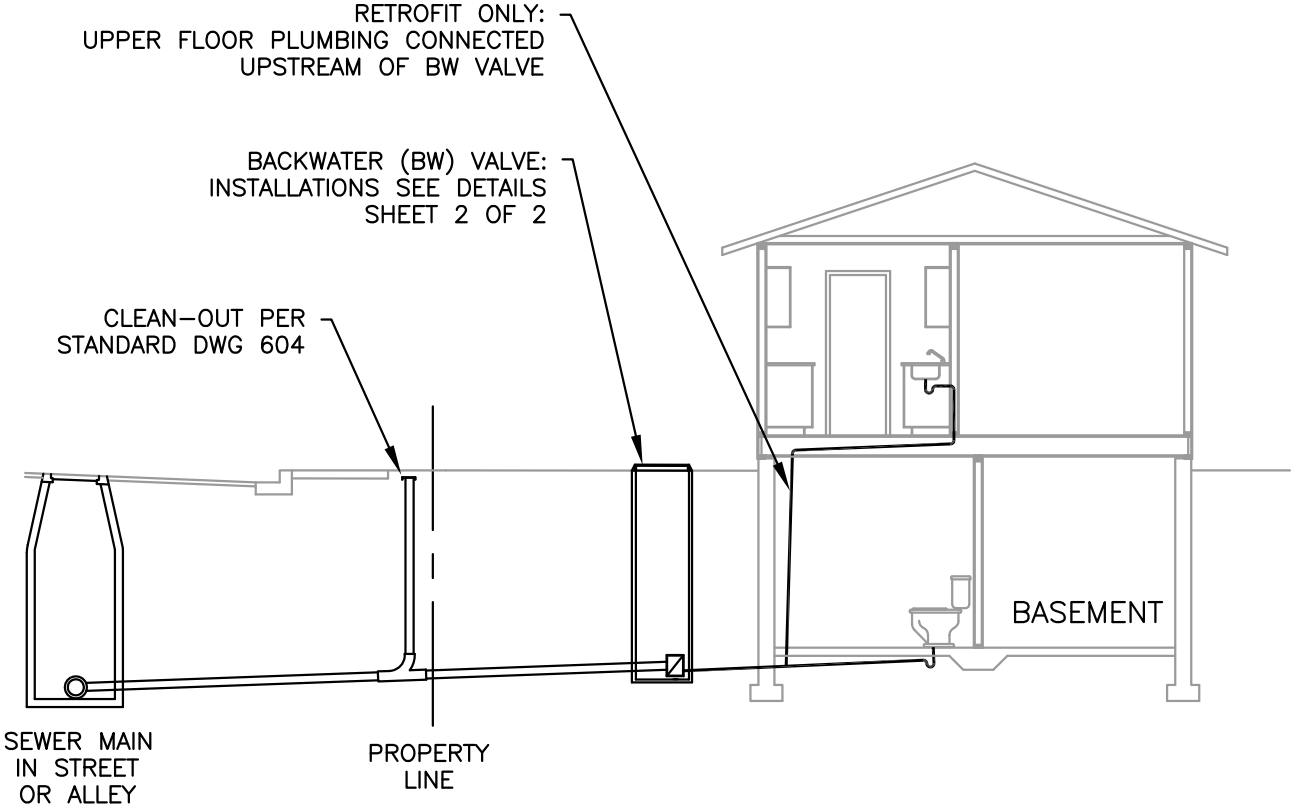
NOTES:

1. PUMP SHALL BE INSTALLED PER MANUFACTURERS SPECIFICATIONS.
2. ANY PLUMBING WITHIN THE BUILDING MUST COMPLY WITH THE CURRENT UNIFORM PLUMBING CODE AS AMENDED BY THE STATE OF WASH..
3. THE SIDE-SEWER OUTSIDE THE BUILDING MUST COMPLY WITH THE CITY'S DESIGN AND CONSTRUCTION STANDARDS.
4. OTHER METHODS FOR BACK-WATER PREVENTION MUST BE APPROVED BY THE CITY.
5. PRIVATE MH ACCESS STRUCTURE MUST BE WATERTIGHT, CORROSION RESISTANT & SUITABLE FOR UNDERGROUND BURIAL. COVER MUST BE GAS-TIGHT, LOAD-SUPPORTING AND REMOVABLE. RECOMMENDED STRUCTURE IS 30" DIA REINFORCED CONCRETE WITH BELL UP. PROVIDE MANHOLE (MH) FRAME AND COVER (STD 607A OR 607B).
6. COMMERCIALLY MFD FRP PUMP WITH SUMP IS ALSO SUITABLE.

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	GRINDER PUMP CONNECTION TO SANITARY SEWER SHT 2 OF 2	8-12-2011 Date: 616 COE Std Dwg:



BACKWATER VALVE INSIDE HOUSE/BASEMENT



BACKWATER VALVE OUTSIDE HOUSE

CITY OF EVERETT
PUBLIC WORKS DEPARTMENT

BACK-WATER VALVE CONNECTION TO SANITARY SEWER

SHT 1 OF 2

8-12-2011
Date:

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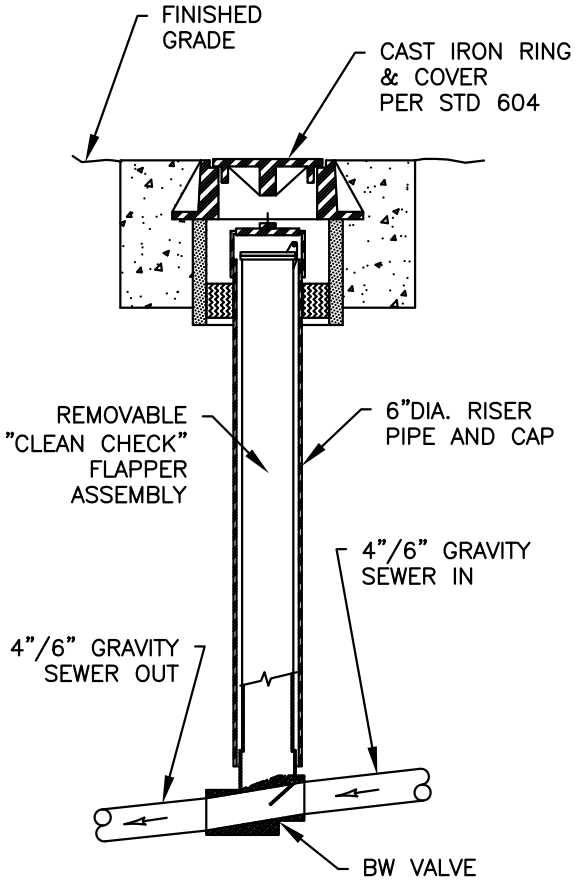
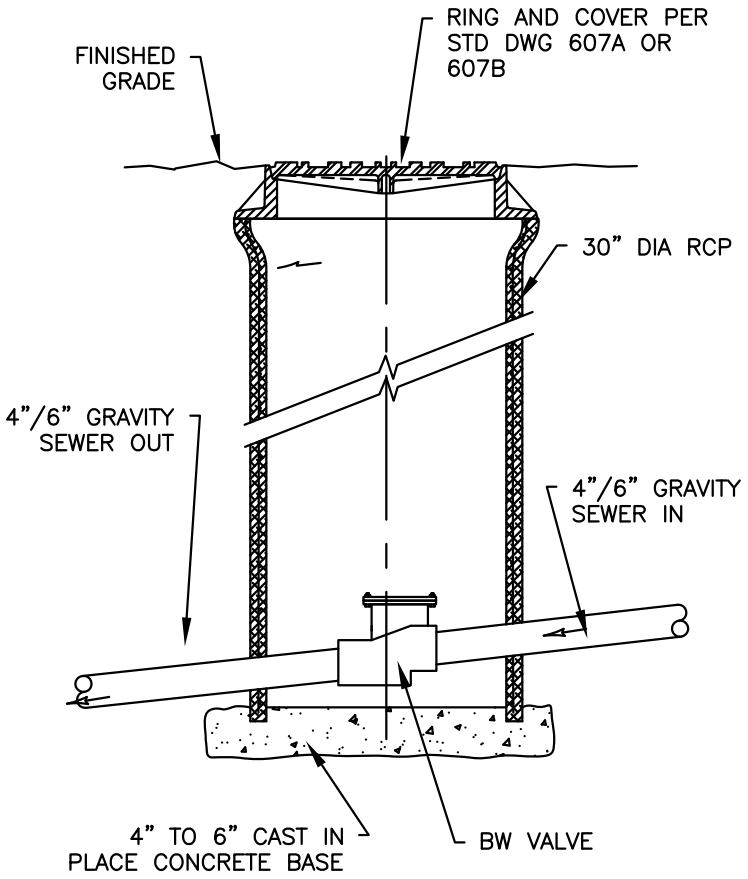


ALTERNATE "CLEAN-CHECK" INSTALLATION

CITY RECOMMENDS "CLEAN CHECK" BY RECTORSEAL WITH REMOVEABLE INSERT/FLAPPER ASSY.



PRIVATE MH ACCESS INSTALLATION

NOTES:

1. ANY PLUMBING WITHIN THE BUILDING MUST COMPLY WITH THE CURRENT UNIFORM PLUMBING CODE AS AMENDED BY THE STATE OF WASH..
2. THE SIDE-SEWER OUTSIDE THE BUILDING MUST COMPLY WITH THE CITY'S DESIGN AND CONSTRUCTION STANDARDS.
3. OTHER METHODS FOR BACK-WATER PREVENTION MUST BE APPROVED BY THE CITY.
4. PRIVATE MH ACCESS STRUCTURE MUST BE WATERTIGHT, CORROSION RESISTANT & SUITABLE FOR UNDERGROUND BURIAL. COVER MUST BE GAS-TIGHT LOAD-SUPPORTING AND REMOVABLE. RECOMMENDED STRUCTURE IS 30" DIA REINFORCED CONCRETE PIPE (RCP) PLACED VERTICAL ON CAST IN PLACE (CIP) CONCRETE BASE WITH BELL UP. PROVIDE MANHOLE (MH) FRAME AND COVER (STD 607A OR 607B).

CITY OF EVERETT PUBLIC WORKS DEPARTMENT	BACK-WATER VALVE CONNECTION TO SANITARY SEWER SHT 2 OF 2	8-12-2011 Date: 617 COE Std Dwg:

Appendix E

Silver Lake Water and Sewer District (WSD) Agreements

- Main Sewage Disposal Agreement
  - 1982 Agreement
  - 1985 Amendment
  - 1986 Amendment
  - 1991 Amendment
  - 2000 Amendment
- Cathcart Landfill Agreement
  - 1989 Main Agreement
  - 1999 Letter from Silver Lake WSD to Snohomish County
  - 2008 Amendment
- Other Agreements
  - 1986 Agreement regarding Silver Lake WSD connection at 19th Avenue and 128th Street
  - 1998 Letter from Everett to Silver Lake WSD regarding new connection along 116th Street SE

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RECEIVED
JUN 24 1982
SILVERLAKE WATER DIST.

AGREEMENT FOR SEWAGE DISPOSAL
between
THE CITY OF EVERETT
and
SILVER LAKE WATER DISTRICT

THIS AGREEMENT made as of this 16 day of June, 1982, between SILVER LAKE WATER DISTRICT of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District," and THE CITY OF EVERETT, a municipal corporation of the State of Washington, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the City and the Fircrest Sewer District, predecessor of the District, previously entered into contracts on September 16, 1970, and December 18, 1974, plus amendments to the December 18, 1974, contract; and

WHEREAS, the City and the District wish to rescind said contracts upon the entering of this contract; and

WHEREAS, the City and the District recognize the need for the District to participate in the costs of certain facilities of the City sewerage system which are necessary to serve the District; and

WHEREAS, the District agrees to contribute toward the costs of said City sewer facilities which benefit the District.

NOW, THEREFORE, the parties agree:

I.

(A) In order that the City may provide sanitary sewerage transmission and treatment services for sewage flowing from the District into the City sewer system, the City and the District agree that the following sewerage system facilities shall be constructed and maintained by the City to service the following capacity requirements of the District determined as the average maximum flow measured over a one-hour period:

Facility	District Capacity Requirements
L.S. #24 and force main	1,500 gpm
L.S. #25 and #26 Interim	1,500 gpm
L.S. #26 ultimate	8,500 gpm
L.S. #26 line	8,500 gpm

S. End Extension	8,500 gpm
S. End Interceptor to Southwest Interceptor	8,500 gpm
S. End Interceptor Northern Segment	8,500 gpm
Headworks	8,500 gpm
Sewer Treatment Plant	4.9 MGD

(B) It is currently anticipated that the following sewerage system facilities shall be improved by the City in order to provide capacity in the following total amounts determined as the average maximum flow measured over a one-hour period:

Facility	Total Facility Capacities
L.S. #24 and force main	3,500 gpm
L.S. #25 and #26 Interim	1,800 gpm
L.S. #26 ultimate	9,500 gpm
L.S. #26 line	9,500 gpm
S. End Extension	9,500 gpm
S. End Interceptor to Southwest Interceptor	29,700 gpm
S. End Interceptor Northern Segment	40,300 gpm
Headworks	80,000 gpm
Sewer Treatment Plant	40.4 MGD

Based on the above-stated capacity requirements, the estimated costs of the District's share of the above facilities is set forth in Exhibit A attached hereto and incorporated herein by reference. The District Capacity Requirements in Section (A) above were established by the District and submitted by the District to the City for inclusion in this Agreement. In reliance on said District Capacity Requirements established by the District, the City will size, design and construct, maintain or improve sewer facilities to serve both the City's and the District's capacity requirements. In the event that it is determined that the City's or the District's sewage flows exceed their respective capacity requirements, the City or the District, whichever is exceeding its alloted capacity, shall pay any and all damages or fines incurred by the City or the District in any manner related to or arising from exceeding the stated District or City's Total Capacity Requirements. City shall notify District at any time that facility capacity problems are anticipated by the City, and the City and District shall meet to discuss and plan for future remedial measures at any time after the District flows exceed 80% of its

above-stated capacity requirements. In the event the District exceeds its allotted capacity and the City and District have not reached agreement as to remedial measures, the City, after notification to the District, may take any one or all of the following remedial steps: (1) Refuse to allow any new sewer connections in the area tributary to the undersized facility; (2) Re-size, re-design and re-construct or improve the above facilities to such capacity as is determined will accommodate the capacity required; (3) Purchase or sell capacity from City or other Districts; and/or (4) Take all reasonable steps to reduce loading. In the event the City elects the second remedial step, the District agrees, as liquidated damages, to pay to the City all costs incurred by the City for the design and improvement of any of said facilities, including but not limited to all costs set forth in Section I (C) hereof, except the cost of design and construction to meet the City's and/or other Districts' additional capacity requirements. Said costs shall be due and payable as provided in Section I (C). In the event that step (1) above is deemed necessary by the City or the District, the party contemplating action shall submit notice thereof at least thirty (30) days prior to taking final action. The District shall have no responsibility for Total Facility Capacities except as provided herein; provided that, in the event the City determines to refuse new connections tributary to facilities which are at or exceed capacity, the District will refuse also to allow new connections tributary to such facilities. The City shall take all reasonable actions to insure preservation to the District of any and all unused District capacity throughout the total Everett sewerage system serving the District until used and/or sold by the District. In the event that the City utilizes the full capacity of the system affecting the District prior to the District's full use of its contracted capacity, either of the following remedies shall apply at the election of the District:

(1) The City shall compensate the District in monies for its loss of the remaining portion of its unused capacity. Compensation shall be by negotiation and in the event the parties cannot agree upon such compensation, the amount of such compensation shall be determined by arbitration under the procedure set forth in Section II hereof;

(2) City shall, at its own expense, expand its facilities in order to accommodate the balance of the District's contracted for capacity.

(C) (1) The District agrees to pay to the City from the gross revenues of its sewer system the following percentage share of total costs of said facilities (said percentage share being calculated by dividing the District's Capacity Requirements

by the Total Facility Capacities above):

Facility	Percentage Share Of Total Cost Payable to City
L.S. #24 and force main	30.0%
L. S. #25 and #26 Interim	83.3%
L.S. #26 ultimate	89.5%
L.S. #26 line	89.5%
S. End Extension	89.5%
S. End Interceptor to Southwest Interceptor	28.6%
S. End Interceptor Northern Segment	21.1%
Headworks	10.6%
Sewer Treatment Plant	12.1%

The total cost of each facility to which said percentage shall be applied shall include but not be limited to engineering costs and fees, all payments to consulting engineers or contractors, or otherwise, for labor, materials, equipment, overhead, etc., right-of-way or land costs, testing, inspection, legal fees, and interim financing costs. Payments to the City shall commence with approval by the City of the Engineer's and/or the Contractor's progress payments for work performed so that payments from the District will coincide with the City's payments to Engineers/Contractors. Final total costs will be established and adjusted upon release of all claims against said projects. Provided that payments to the City as required herein are current, the District's obligation to the City shall be junior to all present and future bonded indebtedness of the District.

(2) Except in the event that the City is directed by the State Department of Ecology or EPA or any other governmental agency having jurisdiction to require such construction, the City shall not proceed to construct L.S. #26 ultimate or the Southend Extension without District agreement.

(3) In the event that the District cannot feasibly finance participation in the Southend Interceptor Northern Segment and the Headworks improvements at the time construction is commenced by the City, the District shall make annual payments to the City, payable on or before June 1 of each year following completion and release of all claims against said improvements, of interest on the amount above determined as the District's share of said improvements. The rate of interest shall be one-half of one percent (0.50%) in excess of the City's annual interest rate schedule on the "1980 Water & Sewer Revenue Bonds," as shown in

Exhibit A-1 attached hereto, for the year in which each interest payment is made. The principal amount shall be payable on or before the date the District agrees or the City is ordered to proceed to construct L.S. #26 ultimate or the Southend Extension.

II.

In addition to the payments set forth in Section I above, the District shall pay the City a sewage disposal maintenance and operation charge (M & O charge) determined on the basis of 58% of the City's monthly sewer service rate for single family residences X 1.20 surcharge X total District customer equivalents. Payment shall be monthly, due within thirty (30) days of billing.

The general formula for determination of the M & O charge is:

$$\frac{\text{District \% Share of Total Costs X City Single Family Service Rate}}{\text{District \% of Total Customer Equivalents}} \times 1.20 \text{ Surcharge}$$

$$= \text{Monthly Sewer Rate Per Customer Equivalent}$$

in accordance with the following understandings:

(A) Customer equivalents shall be single family residence equivalents and shall constitute the total number of single family residences to which the District or the City provides service, plus all other metered water usage divided by 900 cubic feet per month. The City's total single family equivalents shall be determined from the City's December billings. The District's single family equivalents shall be determined monthly for purposes of determining the District's monthly M & O charge. For purposes of determining the District's percentage of total equivalents, the determination shall be based on the District's December billing.

(B) The City's monthly service rate shall be the current City of Everett single family residence sewer service rate; or as such rate may be revised in the future.

(C) The District's % share of total costs for the year 1981 is agreed to be 2.8%.

The District's % of total system customer equivalents for the year 1981 is agreed to be 4.8%.

The District's % of City monthly service rate (before 1.20 surcharge) is agreed to be 58% for the year 1981.

On or about February of 1982, and each year thereafter, the City shall submit to the District a proposed new percentage of City monthly service rate to

be used for the forthcoming year, together with a summary of the final previous year's sewer expenditures. Said new percentage of total costs shall be applied to the monthly M & O charge commencing April 1, 1982, through March 31, 1983, and each year thereafter shall be subject to modification as provided herein. In the event of disagreement between the City and the District as to the District's percentage share of total costs for the forthcoming year, each party shall appoint an arbitrator and the respective appointed arbitrators shall appoint a third arbitrator to create a board of arbitrators whose review and determination of the District's percentage share of total costs shall be final and binding on both parties. Each party shall bear the costs of its appointed arbitrator and the parties shall split the cost of the third arbitrator. The City's proposed rate shall be paid by the District subject to retroactive revision to April 1 by the decision of the arbitration panel.

The District's percentage share of total costs is not expected to include all Everett sewer system costs. The previous year's cost analysis may be used as a guideline wherein, after determination of the District's percentage share of total customer equivalents as of December 31, line items of the Everett sewer system expenditures were reduced or increased in accordance with the exercise of judgment and experience as to the costs to serve the District. In determining the District's percentage share of total costs, it is agreed that the following guidelines will be followed:

(1) The District shall not be charged any cost for in-City drainage.

(2) The District shall not be charged the costs of construction and maintenance of lateral or collector service lines to in-City customers.

(3) Because of the District's current payments for capital facilities as stated in Article 1 hereof, the District shall not be charged for the City's 1980 bond issue, except in the event 1980 bond proceeds are utilized for payment of the costs of the sewer lagoon condemnation (approximately $400,000) and are paid out of capital facilities account. The District will be charged in accordance with its total percentage of total customer equivalents as of December 31 each year on the 1978 bond issue. District's M & O charge shall not include future City bond issues unless said future issues are used to construct facilities of benefit to the District. The parties shall meet to discuss said benefits.

(4) The percentage of total customer equivalents applied to all lift station maintenance and operation costs shall be multiplied by a factor of 3.

(5) Unless actual cost analysis demonstrates a higher amount of benefit, the District shall be charged at 1% of the following costs:

- Maintenance of manholes and lids
- Cleaning sewer mains
- Repair of sewer mains
- Customer records and collection

(6) The following general system costs will be applied in accordance with the District's December 31 percentage of total customer equivalents:

- Treatment and lagoon operations, including sewer lagoon acquisition costs in the event such costs are paid from this account.
- Administration and supervising costs
- Engineering and records
- Outside services and consulting
- Injuries and damages (insurance)
- Future bad debts and uncollectable expenses
- Regulatory expenses
- Miscellaneous general expenses
- General Plant
- Taxes and payments in lieu of tax
- Interest on accounts

(7) Special programs which are not included as a capital cost under Article I herein will be analyzed by City and District according to benefits.

(8) The 20% surcharge shall remain constant.

The City shall notify the District of all contemplated rate changes in order to allow the District to appear and present evidence. Said notice shall be the same as for citizens of the City. If the City fails to so notify, the District shall be allowed a special hearing to present evidence for the Council concerning rate modification.

III.

A. It is agreed that the District may deliver to the City sewage and industrial waste from the existing boundaries of the District or as the District boundaries may be amended provided that District service area shall exclude all areas within the existing City limits of the City and all areas of the District west of I-5 and north of 100th Street S.E. and west of 35th Avenue S.E. except the S.E. 1/4 of the S.E. 1/4 of the S.E. 1/4 of Section 17, T 28 N, R 5 EWM, as shown on the map attached hereto marked Exhibit B. The City shall accept the sewage and waste delivered for treatment and disposal as hereinafter provided up to the maximum capacity set forth in Section I hereof subject to such reasonable rules and regulations as may be adopted from time to time by the City Council provided such rules and regulations shall apply both to the City and the District, subject to capacities set forth in Section I hereof. In the event that an adjacent district obtains capability to serve certain areas of the District at less cost, then and in that event, after consultation with the City, the District may serve such areas by connections to others in a different flow direction. This will not release the District from any portion of any required payments to the City under Section I,

above.

B. The City and the District agree to meet and discuss expansion of the above service area at least once every five years following execution of this agreement.

IV.

Sewerage facilities of the District which may be required for the delivery of sewage and wastes to the City may be connected to facilities of the City sewerage system. Such connection shall be accomplished at the expense of the District and in accordance with the rules and regulations of the City. The initial point of connection of the District's system to the City's system is herewith fixed and shall be in the trunk line of the City system. The City may, as hereinafter provided, designate at its sole discretion additional or alternate points of connection for receiving the District's sewage to the City system which may include connections to other districts which in turn connect to the City system. The District and the City shall install at their respective expense flow meters at locations which will best measure incoming sewage flows to the City system and any City incoming sewage flows to the District local system.

V.

The District shall be responsible for the delivery to the City sewerage system of sewage collected by the District which is required to be delivered to the City hereunder, for the construction, maintenance and operation of local sewerage facilities, and for the payment of all costs incident to the collection of such sewage and its delivery to the City sewerage system. It is expressly understood that the District will be responsible for the delivery of its sewage to the City sewerage system at such points as determined under Article IV. The City may at its sole discretion construct portions of the City sewerage system located within the District and may at its sole discretion permit connection to such portion of the City sewerage system at a point, or points, in the District but shall not be obligated at any time during the life of this Agreement to construct any portion of the City sewerage system within the District. It is contemplated that the District will build local sewers or build or secure the use of other facilities to deliver its sewage to the City at the point hereinbefore described. All District local sewers or other temporary sewerage facilities carrying sewage delivered to the City shall

be constructed and maintained in accordance with the rules and regulations of the City which shall be consistent with APWA, DSHS and DOE standards. All such District local sewers or temporary facilities will be maintained by the District at no expense or risk to the City.

VI.

City may discharge sewage into District sewerage facilities within the District service areas contemplated under this Agreement; provided, that in such event, the City shall be obligated to pay its fair pro-rata share of the District facility based on the method of assessment or financing used to finance said facility and/or M & O related to such discharges, including but not limited to lift station costs. Provided, however, that the City's discharges shall not exceed 10% of the District capacity without prior approval of the District.

VII.

Permanent books and records shall be kept by the City and the District in order to establish rates, volumes of sewage delivered and discharged into the City sewerage system wherever such volumes are measured, total volumes of sewerage transmitted and treated by City facilities, and the number of Residential Customers and Residential Customer Equivalents reported by the City and the District. The records required by this paragraph shall be available for examination by either party during normal business hours for a period of seven years after five (5) days' notice.

VIII.

In the event of third party claims for injuries or damages arising out of or related to this Agreement, the City and the District shall have rights of indemnity against the other at any time after a claim is filed and for a period of three years following release or payment of a claim. Indemnification shall be determined on the basis of proportionate share of fault, if any. In the event that a lawsuit is filed against either party in which the other is not named, rights of indemnification shall be determined by binding arbitration under the procedure described in Article II hereof. This provision shall be in addition to any common law rights of indemnification claims which either party may assert under the procedure herein.

IX.

The District shall not have the right to assign this Agreement or any of its

rights and obligations hereunder either by operation of law or by voluntary agreement without the written consent of the City and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party and this Agreement shall be binding upon and inure to the benefit of the respective sucessors and assigns of the parties hereto. Provided that the District, by agreement of the City, may sell unneeded capacity to others who are a party to agreements with the City.

X.

In the event the City annexes any of the District's area served by facilities under this Agreement, then the City at any time may elect to provide sewer service to customers served by the District in the City's annexed area. If the City so elects, the District's Capacity Requirements shall be reduced proportionately as the sewage flows in the annexed area relate to the total District sewage flows, as stated in Section I hereof, and the City shall be required to pay compensation to the District for said customers and capacity as follows:

A. Local facilities serving customers in the annexed area shall become the responsibility of the City; provided that the District shall continue to maintain and be responsible for any general District facilities, such as lift stations, or interceptors, trunk sewers and laterals serving both the annexed area and the non-annexed area. In cases where sewage from such annexed areas is transmitted through general District facilities to City facilities, the City shall pay the District the maintenance and operation (M and O charge) determined from the following general formula:

$$\frac{\text{City's \% of Share of Total Costs X District Single Family Service Rate}}{\text{City's \% of Total Customer Equivalents}} \times 1.20 \text{ Surcharge}$$

- City's Monthly Sewer Rate to District = Monthly Sewer Rate Per Customer Equivalent

The guidelines for determining the above rates shall be consistent with those shown in Section II herein.

Pursuant to RCW 35.13A, the City shall make annual payments to the District for the annexed area's pro-rata share of the District's total outstanding sewer revenue bond obligations in accordance with annexed area's pro-rata share of the remaining annual payments schedule of said obligations at the time of election. In the event that there are any local facilities in the annexed area assumed by the City which have been constructed with District-wide funds or revenue bond funds (excluding developer or privately installed facilities or facilities constructed from assessments in the annexed area), then the City shall pay the greater of either the

total amount of the said pro-rata share of the District's outstanding bonded indebtedness or the depreciated value of said local facilities based on a 50 year straight line depreciation of actual costs. Payment of the said annexed area's share of the District's outstanding indebtedness shall be made annually thirty days prior to the District's bonded indebtedness payment schedule. Payment for the said depreciated value of District constructed local facilities shall be lump sum upon the City's election to assume said facilities unless otherwise agreed.

B. In the event that the total due under Section X (A) is not sufficient to compensate the District for the annexed area's pro-rata share of sewer system facilities, as paid to the City by the District under Section I hereof, then the City shall increase the amount due under Section X (A) by an amount equal to the annexed area's pro-rata share of sewer system facilities as provided in Section I hereof, said amount to be based on the depreciated value of said facilities on the date of the City's election to serve, as determined on a 50 year straight line depreciation formula. In the event that there is an amount due hereunder and said amount is to be added to the annexed area's share of annual payments on outstanding indebtedness, then the total due shall be amortized in equal payments on the basis of the outstanding bond issue having the least number of years remaining to be paid. In the event that the amount due hereunder relates to District-constructed facilites under Section X (A) above, then the total due hereunder shall be lump sum due on the date of the City's election.

XI.

It is anticipated that the improvements currently planned to expand the City's sewer transmission and treatment facilities or add additional facilities, as set forth in Section I and Exhibit A, will serve the City's and District's requirements for transmission and treatment of sewage until at least December 31, 2010. In the event that unforeseen circumstances at any time shall affect the capability of said City facilities to continue to serve the District, the City and the District shall negotiate terms and conditions for continued sewage transmission and treatment service for the District.

In the event either party gives written notice to the other of its intent to continue said service at any time between January 1, 2010, and December 31, 2010, the District and the City shall be required to continue sewage transmission and treatment service for the District in the capacities described herein beyond the year 2010. Upon receipt of said notice, the other party shall propose terms and

conditions for the continuance of said service. Said proposal may be based on all conditions then existing, including but not limited to capital and operating costs of service, other alternatives for service, growth patterns of service areas, annexations and annexation policies, and state, federal and local laws, rules, regulations and policies. In the event that the parties do not reach agreement on terms and conditions for continued service, the parties hereby grant jurisdiction to an arbitration panel, established under the procedures set forth in Section II(C) hereof to establish terms and conditions for a five year period. Thereafter, the parties shall be required to continue service for additional five year periods in the event the other party gives notice of intent to continue pursuant to the above procedure until the year 2032 at which time, in the event the parties mutually agree that sewer treatment and transmission service by the City should be continued, the parties shall meet and negotiate mutually acceptable terms for continued service.

XII.

The September 16, 1970, agreement and the December 18, 1974, agreement plus amendments thereto are hereby rescinded.

DATED this 16th day of June, 1982.

SILVER LAKE WATER DISTRICT

Howard Lindvall

Rod Keppler

Leo Nelson

CITY OF EVERETT

Wm E Moore

WILLIAM E. MOORE, Mayor

ATTEST:

Elaine Morcheen

CITY CLERK

SECRETARY:

Leo Nelson

APPROVED AS TO FORM:

Bruce Jones

CITY ATTORNEY

EXHIBIT A

SILVER LAKE WATER DISTRICT ESTIMATED COST SHARE OF SEWER FACILITIES

Construction Year	Facility	Design Flow	Cost	SLWD Flow	% Total Flow	Cost
1980	LS #26 Force Main	9500 gpm	$ 220,000	8500 gpm	89.5%	$ 197,000
1981	LS #24 & Force Main	3500 gpm *	1,200,000	1500 gpm	30.0%	360,000
1982	LS #25 & #26 Interim	1800 gpm	200,000	1500 gpm	83.3%	167,000
1982-83	S. End Interceptor (North Segment)	40,300 gpm	5,000,000	8500 gpm	21.1%	1,055,000
1982-83	Treatment Plant Headworks	80,000 gpm	2,300,000	8500 gpm	10.6%	244,000
1988	LS #26 Ultimate	9500 gpm	2,200,000	8500 gpm	89.5%	1,968,000
1988	S. End Extension	9500 gpm	3,700,000	8500 gpm	89.5%	3,312,000
1988	S. End Interceptor (South Segment)	29,700 gpm	5,000,000	8500 gpm	28.6%	1,431,000
1990+	Treatment Plant Expansion	40.4 MGD	6,000,000	4.9 MGD	12.1%	728,000

* Cost shares computed based on 5000 gpm due to future removal of LS #26 flows.

10-8-81

EXHIBIT A-1

SIGNATURE IDENTIFICATION AND NONLITIGATION CERTIFICATE

WE, the duly chosen, qualified and acting Mayor and City Clerk of the City of Everett, Washington, DO HEREBY CERTIFY that we have executed the following-described water and sewer revenue bonds with our manual and facsimile signatures, respectively, and that each of the coupons attached thereto bears the true and correct facsimiles of our signatures.

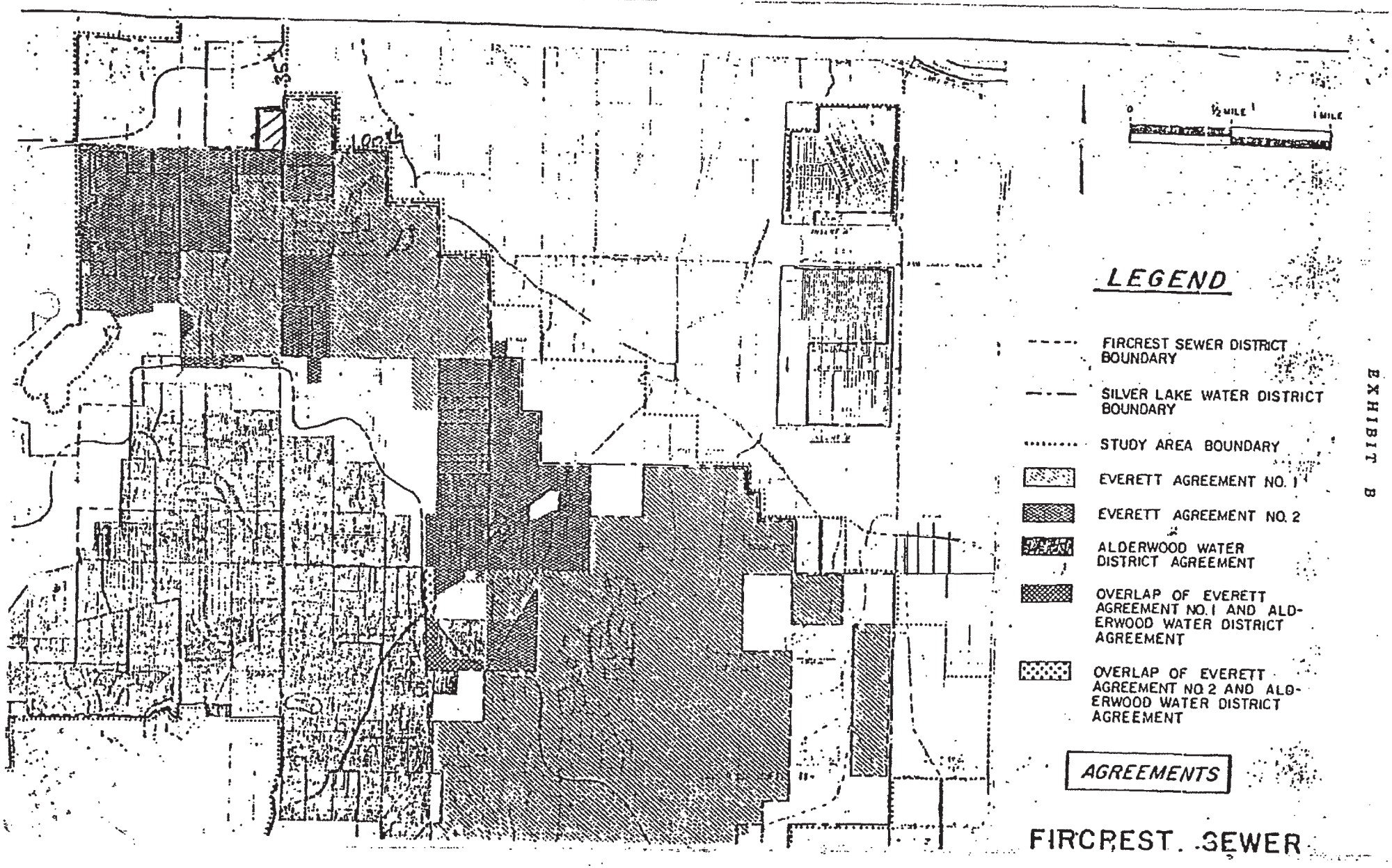
Said bonds are dated August 1, 1980, are in the total principal sum of $20,000,000, are designated "City of Everett, Washington, Water and Sewer Revenue Bonds, 1980," are in the denomination of $5,000 each, are numbered, mature July 1, and bear interest payable on July 1, 1981, and semiannually thereafter on the first days of each January and July as follows:

Bond Nos.	Maturity Years	Amount	Interest Rate
1-153	1981	$ 765,000	5.75
154-290	1982	685,000	5.75
291-436	1983	730,000	5.75
437-560	1984	620,000	6.00
561-591	1985	155,000	6.20
592-623	1986	160,000	6.40
624-657	1987	170,000	6.60
658-692	1988	175,000	6.80
693-729	1989	185,000	7.00
730-792	1990	315,000	7.15
793-891	1991	495,000	7.30
892-1000	1992	545,000	7.45
1001-1113	1993	565,000	7.60
1114-1236	1994	615,000	7.75
1237-1370	1995	670,000	7.90
1371-1513	1996	715,000	8.00
1514-1668	1997	775,000	8.10
1669-1873	1998	1,025,000	8.20
1874-2167	1999	1,470,000	8.30
2168-2478	2000	1,555,000	8.40
2479-2814	2001	1,680,000	8.45
2815-3177	2002	1,815,000	8.50
3178-3570	2003	1,965,000	8.50
3571-4000	2004	2,150,000	8.50

WE FURTHER CERTIFY that there is no litigation pending or to the best of our knowledge threatened, restraining or enjoining the issuance, sale, execution or delivery of said bonds or the fixing or collection of the revenues pledged to pay the principal thereof and interest thereon, the proceedings and authority under which said bonds are issued and said revenues pledged, the validity of said bonds or the title of the present officers of the city to their respective offices. WE FURTHER CERTIFY that the proceedings authorizing the issuance of said bonds have not been repealed, revoked or rescinded.

IN WITHESS WHEREOF, we have hereunto affixed our signatures this 1st day of August, 1980.

Signature	Title
Tom E. Moore	Mayor
[illegible]	City Clerk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LEGEND
FIRCREST SEWER DISTRICT BOUNDARY
SILVER LAKE WATER DISTRICT BOUNDARY
STUDY AREA BOUNDARY
EVERETT AGREEMENT NO. 1
EVERETT AGREEMENT NO. 2
ALDERWOOD WATER DISTRICT AGREEMENT
OVERLAP OF EVERETT AGREEMENT NO. 1 AND ALDERWOOD WATER DISTRICT AGREEMENT
OVERLAP OF EVERETT AGREEMENT NO. 2 AND ALDERWOOD WATER DISTRICT AGREEMENT
AGREEMENTS
FIRCREST SEWER

EXHIBIT B

X

AGREEMENT AMENDMENT

THIS AGREEMENT made as of this 23RD day of JANUARY, 1985, between Silver Lake Water District of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District," and the City of Everett, a municipal corporation of the State of Washington, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the City and the District have previously entered into an agreement for sewage disposal dated June 16, 1982; and

WHEREAS, the City and the District now wish to amend said agreement to allow additional areas to be served by the District provided that property owners in said areas agree to annex to the City upon being requested to do so;

NOW, THEREFORE, the parties agree:

1. Section III(A) of the June 16, 1982, agreement between the City and the District is hereby amended to read hereafter as follows:

> It is agreed that the District may deliver to the City sewage and industrial waste from the existing boundaries of the District or as the District boundaries may be amended provided that the District service area shall exclude all areas within the existing City limits of the City and all areas of the District west of I-5 and ~~west of I-5, the area~~ north of 100th Street S.E. and west of 35th Avenue S.E. except the S.E. 1/4 of the S.E. 1/4 of the S.E. 1/4 of Section 17, T 28 N, R 5 EWM, as shown on the map attached hereto marked Exhibit B and provided further that within the area west of I-5 subject to written approval of the City the District may provide sewer service, or agree with other districts to provide sewer service, on the condition that customers sign the attached agreement shown in Exhibit C and file said agreement with the County Auditor as a covenant running with the land. The City shall accept the sewage and waste delivered for treatment and disposal as hereinafter provided up to the maximum capacity set forth in Section I hereof subject to such reasonable rules and regulations as may be adopted from time to time by the City Council provided such rules shall apply both to the City and the District, subject to capacities set forth in Section I hereof. In the event that an adjacent district obtains capacity to serve certain areas of the District at less cost, then and in that event, after consultation with the City, the District may serve such areas by connections to others in a different flow direction. This will not release the District from any portion of any required payments to the City under Section I, above.

R.K. Rec.

2. All other terms and conditions of the aforesaid June 16, 1982, agreement between the City and the District shall remain the same.

DATED this 14th day of Feb., 1985.

CITY OF EVERETT

WILLIAM E. MOORE, Mayor

ATTEST:

CITY CLERK

APPROVED AS TO FORM:

CITY ATTORNEY

SILVER LAKE WATER DISTRICT

SECRETARY:

X

AMENDMENT NO. _____
to
Agreement for Sewage Disposal
between the
City of Everett and Silver Lake Water District

WHEREAS, the City of Everett hereinafter called the "City," and the Silver Lake Water District hereinafter called the "District," have agreed on June 16, 1982 to terms and conditions for the costs of treatment and transmission of sewage from areas of the Silver Lake Water District; and

WHEREAS, the City and the District wish to amend the boundaries of the areas of the District from which sewage may be transmitted from the District for treatment by the City;

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS: Section III(A) is hereby amended by adding the following land area from which the District may deliver sewage and industrial waste to the City:

> The E 1/4 of the S.E. 1/4 of Section 17, Township 28 N, Range 5 E, W.M. except the North ~~23'~~ 330' thereof,

all as shown on Exhibit C attached hereto and incorporated herein by reference.

All other terms and conditions of the June 16, 1982, agreement between the parties shall remain in full force and effect.

DATED this 19th day of ~~February~~ MARCH, 1986.

CITY OF EVERETT

WILLIAM E. MOORE, Mayor

ATTEST:

CITY CLERK

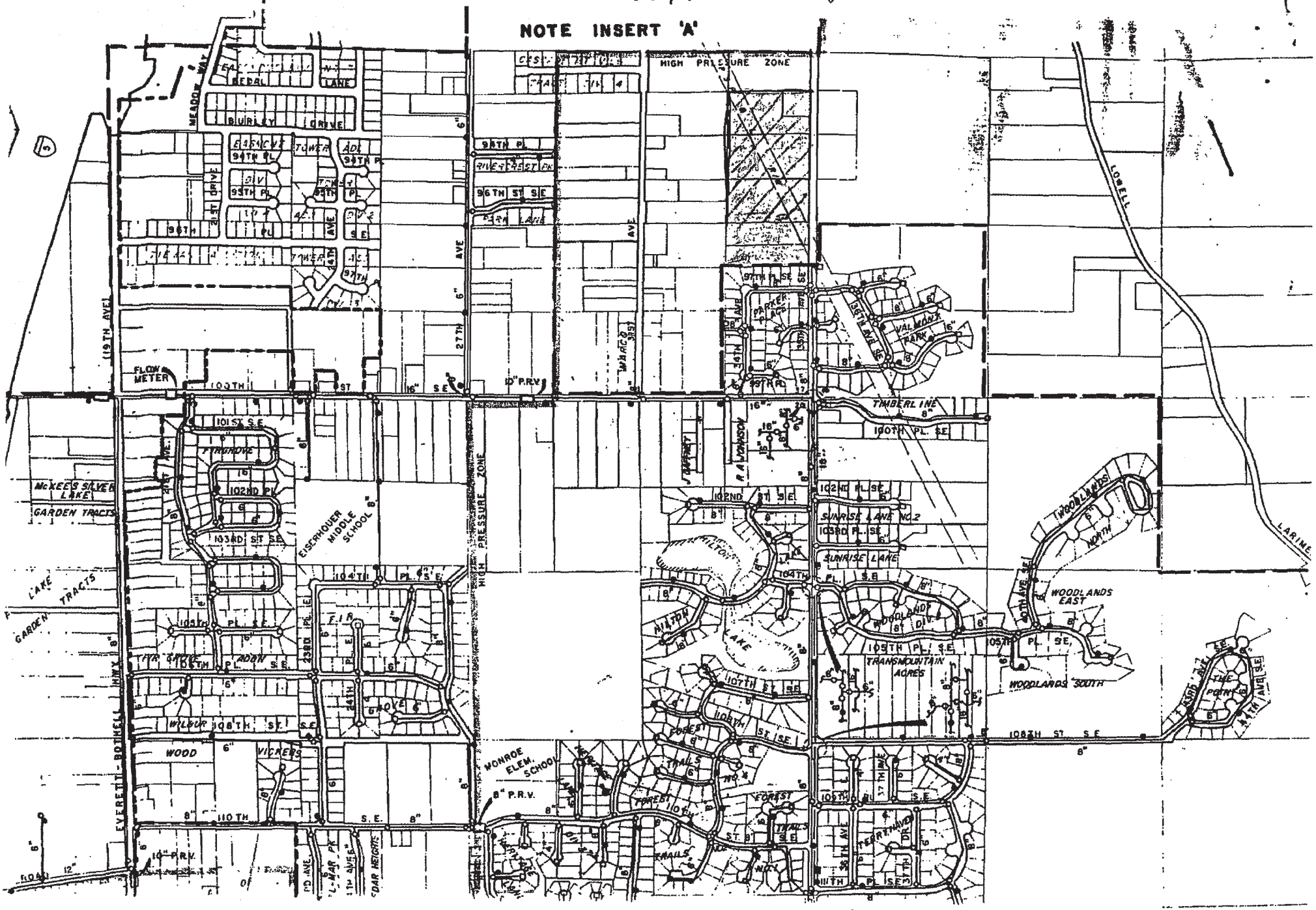
APPROVED AS TO FORM:

CITY ATTORNEY

SILVER LAKE WATER DISTRICT

SECRETARY

EXHIBIT "C"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HIGH PRESSURE ZONE
MEADOW WAY
BURLEY DRIVE
TOWER ADD
119TH AVE
FLOW METER
103RD
101ST S.E.
PINEROVE
102ND PL
103RD ST SE
McKEES SILVER LAKE
GARDEN TRACTS
EISENHOWER MIDDLE SCHOOL
104TH PL S.E.
105TH PL S.E.
108TH ST S.E.
WOOD
VICKERS
110TH S.E.
EVERETT-BOTHELL HWY
MONROE ELEM. SCHOOL
8" P.R.V.
10" P.R.V.
14" P.R.V.
96TH ST S.E.
27TH AVE
PARKER PLACE
VALLEY PARK
TIMBERLINE
100TH PL. S.E.
102ND ST S.E.
SUNRISE LANE NO.2
SUNRISE LANE
MILTON LAKE
WOODLANDS NORTH
WOODLANDS EAST
WOODLANDS SOUTH
TRANSMOUNTAIN ACRES
107TH ST S.E.
110TH ST S.E.
FOREST TRAILS
THE POINT
LOWELL
LARIMER

X

AMENDMENT TO JUNE 16, 1982
AGREEMENT FOR SEWAGE DISPOSAL
between
THE CITY OF EVERETT
and
SILVER LAKE WATER DISTRICT

THIS AGREEMENT made as of this 12th day of December, 1991, between Silver Lake Water District of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District," and the City of Everett, a municipal corporation of the State of Washington, hereinafter referred to as "City."

W I T N E S S E T H :

WHEREAS, the City and the District wish to amend the June 16, 1982, agreement between the parties in order to increase the authorized capacity of the District for Sewage Disposal in City sewage facilities and in order to clarify the City's and the District's rights and obligations in the event of annexation of District territory;

NOW, THEREFORE. the parties agree:

I. A new Subsection is hereby added to Section I of the June 16, 1982, agreement for Sewage Disposal between the District and the City:

(D) (1) Due to the increases in anticipated sanitary sewage transmission and treatment services required by the District, the City and the District agree that the following sewage system facilities be sized by the City to service the following capacity requirements of the District (in addition to the capacity requirements set forth in I(A) herein) determined as the average maximum flow measured over a one-hour period (except Sewer Treatment Plant flow which is maximum winter month flow):

Facility	District Capacity Requirements
S. End Extension	3,000 gpm
S. End Interceptor to Southwest Interceptor	3,000 gpm
S. End Interceptor Northern Segment (1983)	3,000 gpm
Headworks	3,000 gpm
Sewer Treatment Plant	1.7 MGD

(2) It is currently anticipated that the following sewerage system facilities shall be improved by the City in order to provide capacity in the following total amounts determined as the average maximum flow measured over a one-hour period (except Sewer Treatment Plant flow which is maximum winter month flow):

Facility	Total Facility Capacities
S. End Extension	16,000 gpm
S. End Interceptor to Southwest Interceptor	32,000 gpm
S. End Interceptor Northern Segment (1983)	45,000 gpm
Headworks	80,000 gpm
Sewer Treatment Plant	40.4 MGD

(Total facilities capacities have been revised from June 16, 1982, agreement.)

Based on the above-stated capacity requirements, the estimated costs (in addition to costs established for the capacity requirements set forth in I(B) herein) of the District's share of the above facilities is set forth in Exhibit C attached hereto and incorporated herein by reference. The District Capacity Requirements in Section I(D)(1) above were established by the District and submitted by the District to the City for inclusion in this Amendment. In reliance on said District Capacity Requirements established by the District, the City will size, design and construct, maintain or improve sewer facilities to serve both the City's and the District's capacity requirements. Remedies for flows in excess of total Section I capacity shall be as provided in Section I(B) herein.

(3) The District agrees to pay to the City from the gross revenues of its sewer system the following percentage share of total costs of said facilities (said percentage share being calculated by dividing the District's additional Capacity Requirements under the June 16, 1982, agreement and this Amendment by the Total Facility Capacities above):

Facility	Percentage Share of Total Cost Payable To City under 6/16/82 Agreement	Percentage Share Of Total Cost Payable to City Under this Amendment	New Total
S. End Extension	53%	19%	72%
S. End Interceptor to Southwest Interceptor	27%	9%	36%
S. End Interceptor Northern Segment	21%	7%	28%
Headworks	10%	4%	14%
Sewer Treatment Plant	12%	4%	16%

The total costs of each facility to which said percentage shall be applied shall be determined and paid as provided in Section I(C)(1) herein. Annual payments as provided in I(C)(3) shall not apply to the increased capacity provided under this Amendment.

II. Regarding Section II of the June 16, 1982, agreement, it is agreed that after construction of the S. End Extension and Interceptors, lift station operation costs shall not be included in the M & O charge.

III. In addition to the connection points agreed under Section III hereof, the City and District agree to the following new connections points:

- 19th Ave. SE at City limits
- District's Lift Station near 116th St SE and 35th Ave SE
- Side sewer connections to the City's South End Interceptor

Further, it is agreed that sewage and industrial waste may be delivered to the City from the area described in Exhibit D, attached hereto, which shows the Agreed District Service area under the June 16, 1982, agreement and all amendments thereto, including the present Amendment.

IV. Section IX is hereby revised to read hereafter as follows:

The District shall not have the right to assign this agreement or any of its rights and obligations hereunder either by operation of law or by voluntary agreement without the written consent of the City, and

neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party, and this agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto. Provided, that the District, by agreement of the City, may sell unneeded capacity to others who are a party to agreements with the City or who are Special Purpose Districts organized pursuant to Title 56 or Title 57 RCW which are contiguous to the District; provided that any such Special Purpose District shall be lead agency and shall pay all costs for all SEPA review or SEPA procedures related to such assignment.

V. Regarding Section X, the compensation provisions provided herein are not exclusive, and the parties may agree to other provisions where the City annexes District facilities. Proportionate reduction of District capacity in City sewer facilities due to City annexations shall be based on the District's sewer comprehensive planning for the area annexed.

VI. This arrangement shall constitute joint water/sewer facilities planning as required under the Growth Management Act.

DATED this 12th day of December, 1991.

Silver Lake Water District	City of Everett
Approved As To Form:	Approved As To Form:
District Attorney	City Attorney
	Attest:
Secretary of Board	City Clerk
President	Mayor

agreements:lt\Silverlk (10/30/91)

SILVER LAKE SEWER AGREEMENT AMENDMENT

EXHIBIT C (PAGE 1 OF 2)

Increase in district capacity will increase facility cost by approximately the following amounts:

S. End Interceptor Northern Segment	$210,285.32
Headworks	129,364.65
Sewer Treatment Plant	852,356.80
TOTAL:	**$1,192,006.77**

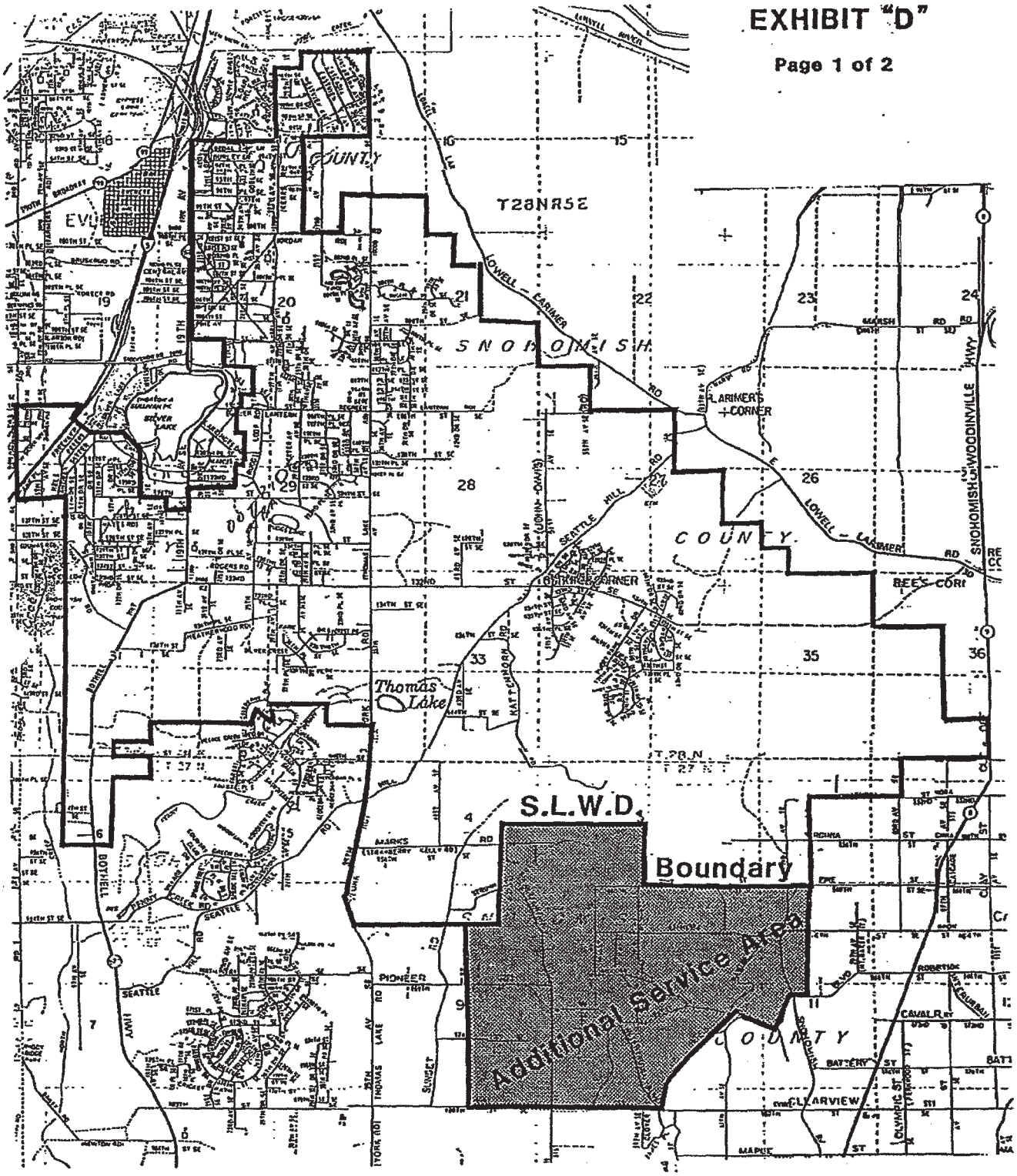
NOTE: All future Sewer Treatment Plant improvement costs will be shared based on percentages to be determined, currently estimated at 16.3%, TOTAL, for Silver Lake. All costs for the 1991 portions of the South End Interceptor will be allocated per the table on page 2 of this schedule.

EXHIBIT C (PAGE 2 OF 2)

SEGMENT	COST MILLIONS	CAPACITY GALS/MIN	CITY CAPACITY	%	SLWD CAPACITY	%	AWD CAPACITY	%	MWD CAPACITY	%
Silver Lake	$1.3	4,550	3,719	82%	831	18%		0%		0%
South	$5.5	16,000	4,500	28%	11,500	72%		0%		0%
Middle	$3.1	16,000	4,500	28%	11,500	72%		0%		0%
North	$4.6	32,000	14,700	46%	11,500	36%	2,300	7%	3,500	11%
West	$0.7	13,900	8,100	58%		0%	2,300	17%	3,500	25%
TOTAL DOLLARS	$15.2			$6.0		$8.1		$0.4		$0.7

MO:EXC:WQ1 11/13/91

EXHIBIT "D"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LOWELL - LARIMER
SNOHOMISH
COUNTY
LARIMER'S CORNER
SEATTLE HILL RD
SNOHOMISH-WOODINVILLE HWY
Thomas Lake
S.L.W.D.
Boundary
Additional Service Area
PIONEER
SEATTLE
CLEARVIEW
MAPLE
BATTERY ST
ROBERTSON
CAVALR
ROHRA ST
MARKS RD
SUNSET
THOMAS LAKE
YORK RD
BOTHELL
SILVER LAKE
EVE

EXHIBIT D - LEGAL DESCRIPTION

THAT PORTION OF SECTIONS 2, 3, 4, 9, 10 AND 11, TOWNSHIP 27 NORTH, RANGE 5 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE INTERSECTION OF THE EAST LINE OF SECTION 9 AND THE CENTERLINE OF 180TH STREET;

THENCE WESTERLY ALONG THE CENTERLINE OF 180TH STREET TO THE WEST LINE OF THE EAST HALF OF SECTION 9, TOWNSHIP 27 NORTH, RANGE 5 EAST, W.M.;

THENCE NORTHERLY ALONG SAID LINE TO THE SOUTHERLY BOUNDARY OF THE SILVER LAKE WATER DISTRICT;

THENCE NORTHERLY AND EASTERLY ALONG SAID SOUTHERLY BOUNDARY TO THE EAST LINE OF THE WEST HALF OF SECTION 2, TOWNSHIP 27 NORTH, RANGE 5 EAST, W.M.;

THENCE SOUTHERLY PARALLEL TO THE WEST LINE OF SECTION 11 TO THE CENTERLINE OF INTERURBAN BOULEVARD; THENCE SOUTHWESTERLY ALONG THE CENTERLINE OF INTERURBAN BOULEVARD TO THE CENTERLINE OF 180TH STREET;

THENCE WESTERLY ALONG THE CENTERLINE OF 180TH STREET TO THE POINT OF BEGINNING.

X

AMENDMENT TO
JUNE 16, 1982
AGREEMENT FOR SEWAGE DISPOSAL
BETWEEN THE
CITY OF EVERETT AND SILVER LAKE WATER DISTRICT

This Agreement made this 28th day of June, 2000, between SILVER LAKE WATER DISTRICT, a municipal corporation of the State of Washington, hereinafter referred to as "DISTRICT", and THE CITY OF EVERETT, a municipal corporation of the State of Washington, hereinafter referred to as "CITY",

W I T N E S S E T H :

I. BACKGROUND

A. The DISTRICT and the CITY have previously entered the June 16, 1982, Agreement For Sewage Disposal, as amended, for the purpose of establishing areas of the DISTRICT for which the CITY has agreed to provide sewage transmission and treatment services. The service areas described in said Agreement exclude DISTRICT areas west of the I-5 freeway and north of 100th Street S.E., as described in Exhibits A through J attached hereto (except for certain areas adjacent to 35th Avenue).

B. Although the CITY has annexed substantial properties in the excluded area, the boundaries of the DISTRICT still include an area north of 100th Street S.E. to which the

DISTRICT provides water service and to which the DISTRICT has received requests for sewer service.

C. This Agreement addresses CITY assumption of water services west of the I-5 Freeway and certain areas east of the I-5 Freeway and north of 100th Street S.E., referred to as Parcel Nos. 1, 2, 4 and 5 on Exhibit 1 and legally described in Exhibits A, C, G and I. This agreement also addresses the conditions for providing sewer services in the area denoted as Parcel No. 3 on Exhibit 1 and described in Exhibit E.

II. WATER SERVICE

A. The CITY shall immediately assume jurisdiction over all water and service facilities and customers within the DISTRICT's boundaries west of the I-5 Freeway (Parcel Numbers 4 and 5 on Exhibit 1).

B. The DISTRICT shall retain water service facilities and shall continue to provide water service for all property within the DISTRICT's boundaries north of 100th and west of 35th (Parcel Number 3 on Exhibit 1), subject to Section III hereafter.

C. The DISTRICT and CITY agree the property in Parcel No. 1 on Exhibit 1 has been annexed to the CITY in five separate CITY Ordinances between 1964 and 1990 and CITY has continuously served water to all residences in Parcel No. 1 since each respective Annexation and DISTRICT and CITY have always operated respective systems with the understanding that CITY assumed customers and water system upon each Annexation. CITY and DISTRICT herein memorialize these transfers of service for the property within Parcel No. 1 and hereby provide notice to the Snohomish County Department of Elections that all

customers within Parcel No. 1 have been transferred to CITY and are served by CITY.

D. The DISTRICT and CITY agree all residents and all the property in Parcel No. 2 have been served by the CITY since approximately 1965. Snohomish County Department of Election records provide that all residents in Parcel No. 2 are within the service area of DISTRICT, even though CITY has continuously served water to all residences in Parcels No. 2 since the mid-1960s and DISTRICT has never served water to this area. DISTRICT and CITY have always operated respective systems with the understanding that CITY is water purveyor to properties in Parcel No. 2. CITY and DISTRICT herein memorialize this historical fact of service for the property within Parcel No. 2 and hereby provide notice to the Snohomish County Department of Elections that all customers within Parcel No. 2 have been transferred to CITY and are served by CITY.

III. SEWER SERVICE

A. The DISTRICT may deliver to the CITY sewerage and industrial waste from properties located entirely or partially within Parcel No. 3 denoted on Exhibit 1 and described in Exhibit E, and any additional properties in Parcel No. 2 developed concurrently with properties in Parcel No. 3, subject to written approval by the CITY Public Works Director for all sewer connections within said area. Said approval by the CITY shall be based on (1) the long-term cost effectiveness to the CITY of transmission and treatment of sewerage flowing to the CITY from said area; (2) execution by the owners of property applying for sewer service of the Utility Extension Agreement for annexation to the CITY as approved by the CITY Public Works Director; and (3) payment to CITY by the

DISTRICT of a plan review fee of $500 for each sewer connection charge collected by the DISTRICT for connections within the area served, regardless of its location in either Parcel No. 3 or in the area adjacent to Parcel No. 3 within Parcel No. 2 being developed concurrently as one plat or division.. In addition, the CITY shall have the right to establish the point of connection to the Everett Sewer System and the terms therefor for any property within the area described in Exhibit 1 as Parcel Nos. 2 and 3.

B. Water and sewer customers within the area described in Exhibit E denoted as Parcel 3 and adjacent areas within Parcel 2 in Exhibit 1 shall be considered as customers of the DISTRICT until annexation by the CITY or for a period of five (5) years from the date of connection to the sewer system. Within thirty (30) days after annexation of any property served by DISTRICT in accordance with this amendment, or on the commencement of the sixth (6th) year after the connection of any property within the area subject to these provisions to the CITY sewer system, the DISTRICT shall relinquish such water and sewer customers to the CITY. Upon annexation or relinquishment of water and sewer services to the CITY as provided herein, the CITY shall not be required to pay any pro-rata share of the DISTRICT's bonded indebtedness with regard to said relinquished services. CITY shall take full responsibility for systems and for customer service at that time.

C. DISTRICT shall collect the Water General Facilities Connection Charges per Resolution 503 and sewer connection charges per Resolution No. 455, or as such may be amended in the future, as applicable to new water and sewer services elsewhere in the DISTRICT.

D. Until annexation by the CITY or relinquishment of water and sewer services as provided herein, DISTRICT shall be responsible to maintain all DISTRICT water facilities located in the area described in Exhibit E hereto, and shall be responsible to maintain all sewer facilities in the area described in Exhibit E and any adjacent areas described in C served by DISTRICT in accordance with the terms set forth herein.

E. All other terms and conditions of the June 16, 1982, Agreement between the parties shall remain in full force and effect.

CITY OF EVERETT

By: Edward D. Hansen
Edward D. Hansen, Mayor

ATTEST:

By: Sharon L. Marker
City Clerk

APPROVED AS TO FORM:

By: _____
City Attorney
MARK T. SOINE

SILVER LAKE WATER DISTRICT

By: Rod Kepple
its President

By: Roger Summers
its Vice President

By: Bill Anderson
its Secretary

AMENDMENT TO JUNE 16, 1982
AGREEMENT FOR SEWAGE DISPOSAL - 5.
SILVERLA2.AAG
6/12/00

EXHIBIT 1
PARCEL INDEX MAP

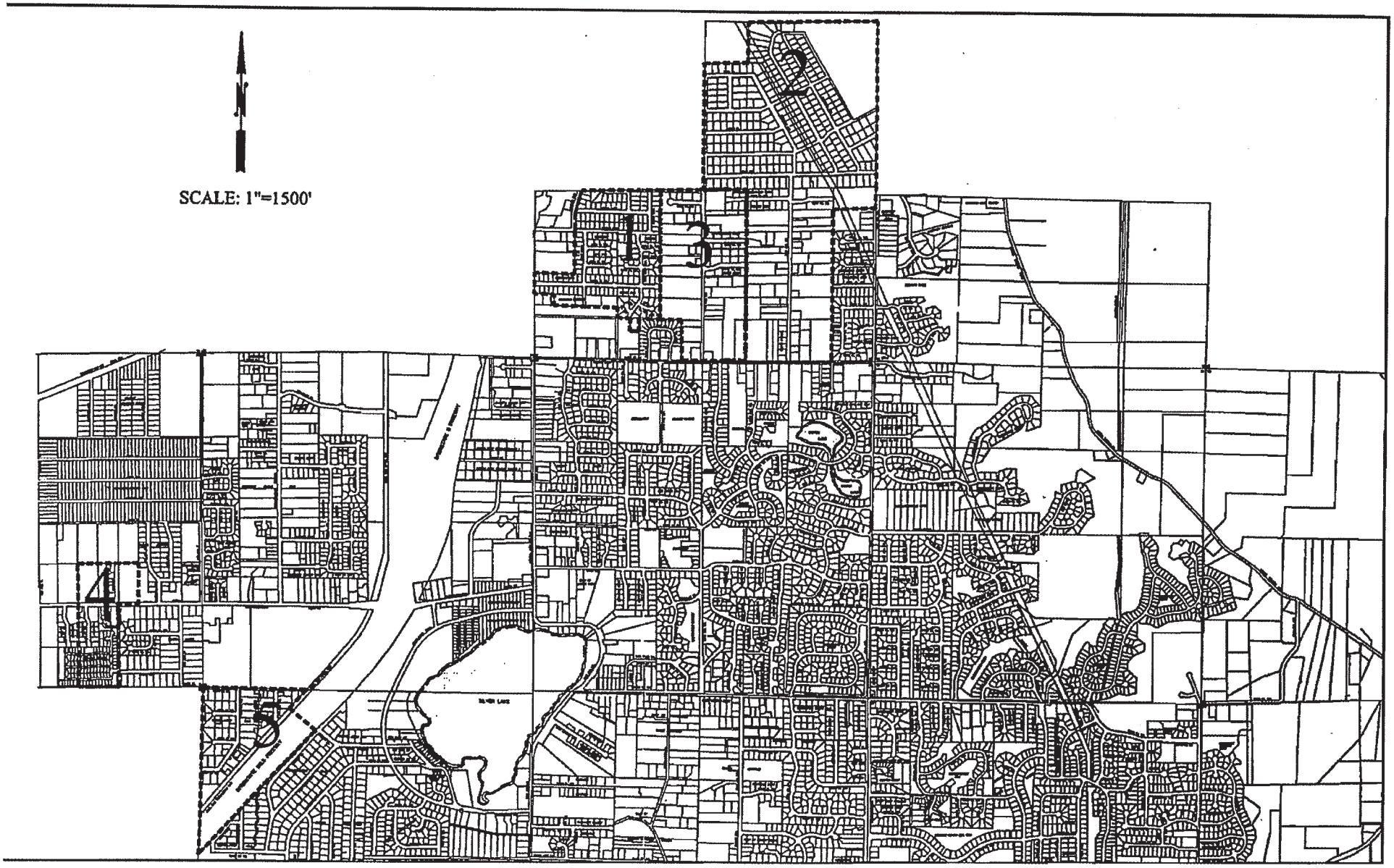


EXHIBIT A
LEGAL DESCRIPTION OF PARCEL 1

That portion of the SW1/4 of Section 17, Township 28 North, Range 5 East, W.M., situated in Snohomish County, State of Washington, more particularly described as follows:

BEGINNING at the intersection of the East-West centerline of Section 17 and the Easterly margin of Meadow Way; thence East along said centerline to the East line of the W1/2 E1/2 SW1/4 Section 17; thence South along said East line to the SE corner of the NW1/4 SE1/4 SW1/4 Section 17; thence West along the South line of the Plat of Tower Addition Div. 3, filed in Volume 26 of Plats at pages 7 and 8, Records of Snohomish County, to the East line of the W1/2 SW1/4 SE1/4 SW1/4 Section 17; thence South along said East line to the North line of the South 481.43 feet of the E1/2 W1/2 SW1/4 SE1/4 SW1/4 Section 17; thence West along said North line to the East line of the West 30.00 feet of the E1/2 W1/2 SW1/4 SE1/4 SW1/4 Section 17; thence North along said East line to the South line of said Plat of Tower Addition Div. 3; thence West along said South line to the West line of said Plat of Tower Addition Div. 3; thence North along said West line to the North line of South 5 acres of the S1/2 N1/2 SW1/4 SW1/4 of Section 17; thence West along said North line to the East line of the West 50 feet of Lot 1 of the Plat of Saundar Estates, recorded in Volume 39 of Plats, Page 181, Records of Snohomish County; thence North along said East line to the North line of the N1/2 S1/2 N1/2 SW1/4 SW1/4 Section 17; thence West along said North line to intersect the West line of Section 17 at the NW corner of the N1/2 S1/2 N1/2 SW1/4 SW1/4 Section 17; thence North along said West line to the North line of the Plat of Tiemann Addition, recorded in Volume 23 of Plats, Page 22, Records of Snohomish County, projected West to intersect with the West line of Section 17; thence East along said North line to the SW corner of Lot 9 of the Plat of Eastmont Division No. 4, recorded in Volume 29 of Plats, Page 16, Records of Snohomish County; thence North along the West line of said Plat of Eastmont Division No. 4 to the NW corner of Lot 1 of said Plat of Eastmont Division No. 4; thence on a bearing of N0°37'21"E to the South line of the NW1/4 NW1/4 SW1/4 Section 17; thence N0°37'21"E for 187 feet; thence on a curve to the right having a radius of 746.33 feet and consuming an angle of 15°53'39" an arc distance of 207.04 feet; thence on a bearing of N16°31'00"E along the Easterly margin of Meadow Way to the East-West centerline of Section 17, POINT OF BEGINNING.

Information referenced for preparing this legal description:

- Snohomish County Boundary Review Board Approved Legal Description for Silver Lake Water District Fircrest Sewer District Merger (1980)
- City of Everett Ordinance #4014
- City of Everett Ordinance #565-78
- City of Everett Ordinance #576-79
- City of Everett Ordinance #913-82
- City of Everett Ordinance #1702-90

EXHIBIT B
PARCEL 1

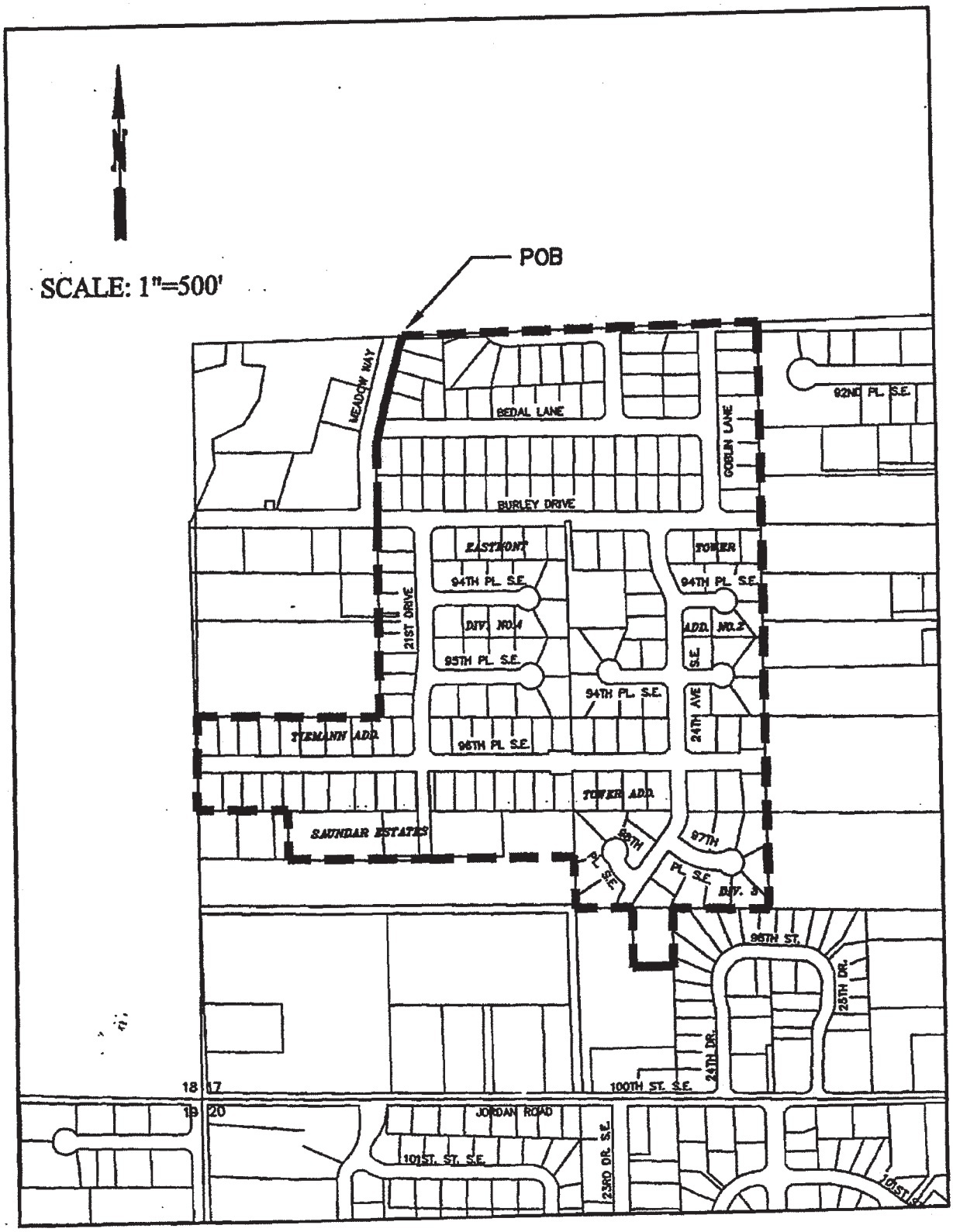


EXHIBIT C
LEGAL DESCRIPTION OF PARCEL 2

That portion of Section 17, Township 28 North, Range 5 East, W.M., situated in Snohomish County, State of Washington, more particularly described as follows:

BEGINNING at the NE corner of said Section 17; thence West along the North line of Section 17, to the NW corner of the NE1/4 NW1/4 NE1/4 Section 17; thence South to the SW corner of said subdivision; thence West to the West line of the NE1/4 Section 17; thence South along said West line to the SW corner of the NE1/4 Section 17; thence East along the East-West centerline of Section 17 to the West line of the E3/4 E1/2 Section 17; thence South along said West line to the North right-of-way line of 100th Street SE; thence East along said North right-of-way line to the East line of the W1/2 E1/2 SE1/4 Section 17; thence North along said East line to the South line of the N1/2 NE1/4 NE1/4 SE1/4 Section 17; thence East along said South line to East line of Section 17; thence North along East line of Section 17 to the NE corner of Section 17, POINT OF BEGINNING.

Information referenced for preparing this legal description:

- Snohomish County Boundary Review Board Approved Legal Description for Silver Lake Water District Fircrest Sewer District Merger (1980)
- Silver Lake Water District Resolution #403A

EXHIBIT D
PARCEL 2

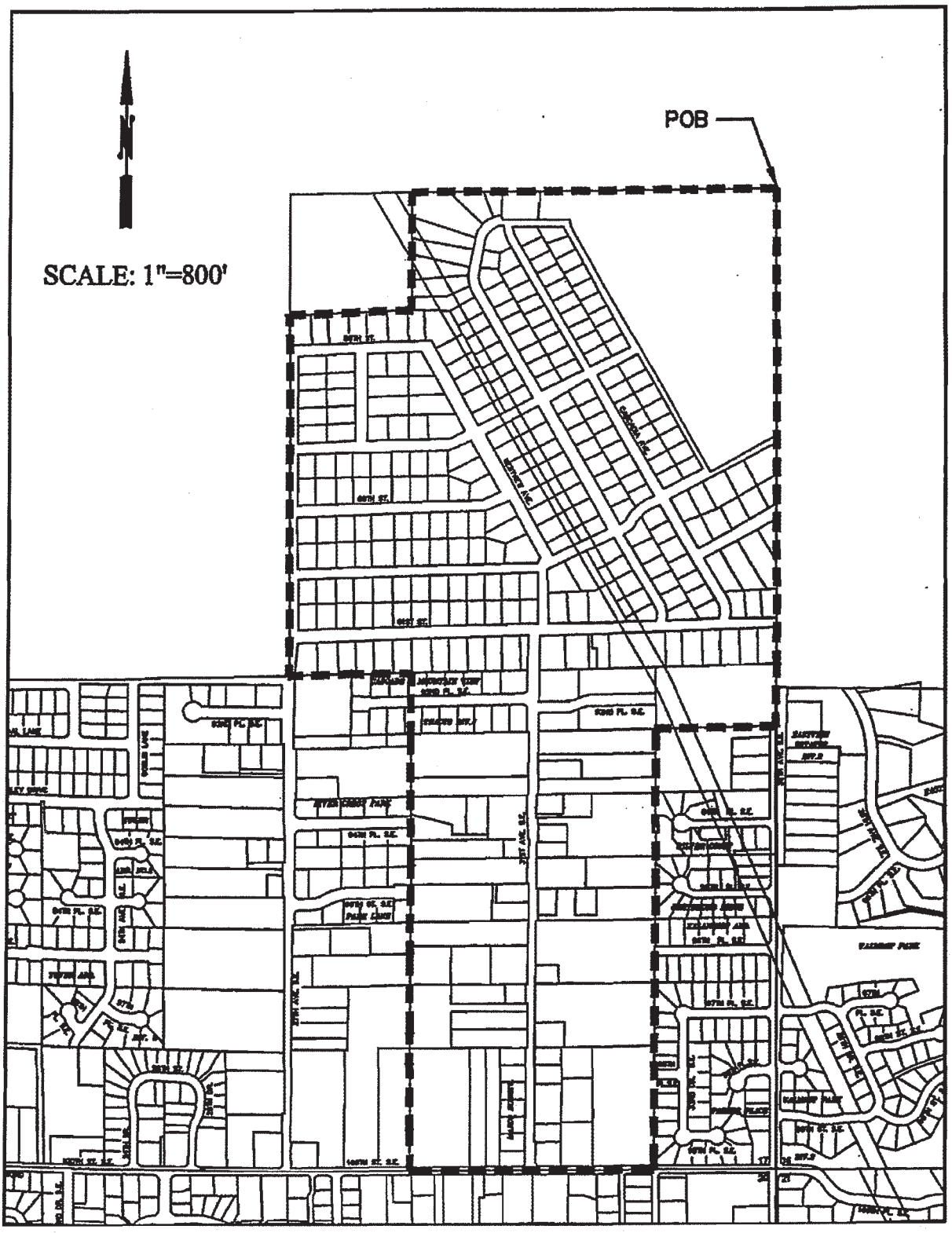


EXHIBIT E
LEGAL DESCRIPTION OF PARCEL 3

That portion of Section 17, Township 28 North, Range 5 East, W.M., situated in Snohomish County, State of Washington, more particularly described as follows:

BEGINNING at the NW corner of the E1/2 E1/2 SW1/4 of Section 17; thence South along the West line of said subdivision to the SW corner of the NE1/4 SE1/4 SW1/4 Section 17; thence East along the South line of said subdivision to the NW corner of the E1/2 SE1/4 SE1/4 SW1/4 Section 17; thence South along the East line of said subdivision to intersect the North right-of-way line of 100th Street SE; thence East along said North right-of-way line to intersect the East line of the W1/2 W1/2 SE1/4 Section 17; thence North along the East line of said subdivision to the North line of the NW1/4 NW1/4 SE1/4 Section 17; thence West along said North line to the NW corner of the SE1/4 Section 17; thence continuing West along said East-West centerline to the POINT OF BEGINNING.

Information referenced for preparing this legal description:

- Snohomish County Boundary Review Board Approved Legal Description for Silver Lake Water District Fircrest Sewer District Merger (1980)
- City of Everett Ordinance #1444-88

EXHIBIT F
PARCEL 3

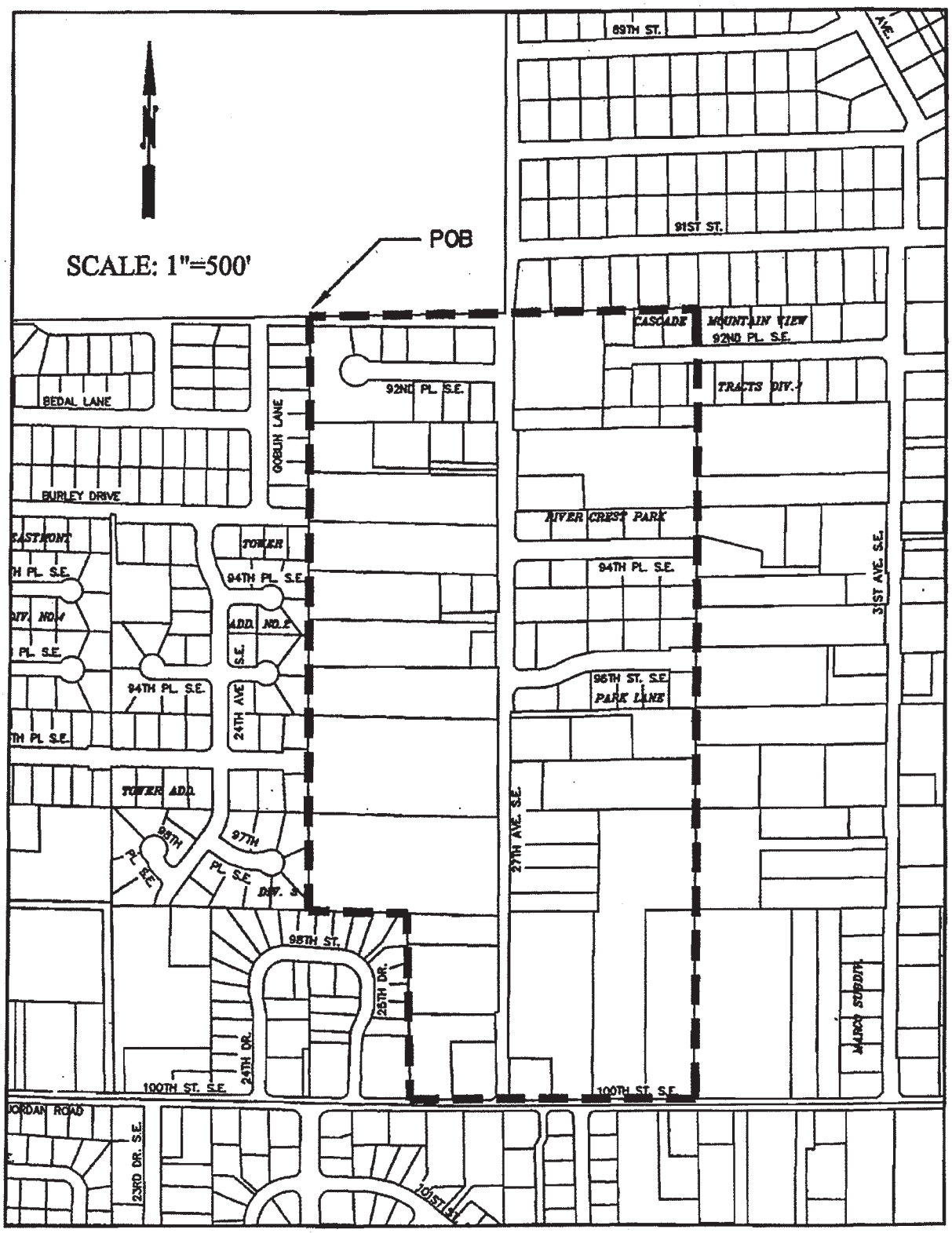


EXHIBIT G
LEGAL DESCRIPTION OF PARCEL 4

That portion of Section 24, Township 28 North, Range 4 East, W.M., situated in Snohomish County, State of Washington, more particularly described as follows:

BEGINNING at the intersection of the South line of said Section 24 and the West margin of Meridian Avenue South, thence North along said West margin to the North margin of 112th Street Southeast; thence East along said North margin to the East line of the W1/2 SW1/4 NE1/4 SE1/4 Section 24; thence North along said East line to the NE corner of the W1/2 SW1/4 NE1/4 SE1/4 Section 24; thence West along the North line of the S1/2 N1/2 SE1/4 Section 24 to the NW corner of the SE1/4 NW1/4 SE1/4 Section 24; thence South along the West line of the E1/2 W1/2 SE1/4 Section 24 to the South line of Section 24; thence East along said South line to the West margin of Meridian Avenue South, POINT OF BEGINNING.

Information referenced for preparing this legal description:

- City of Everett Ordinance #1819-91
- Silver Lake Water District Resolution #58

EXHIBIT H
PARCEL 4

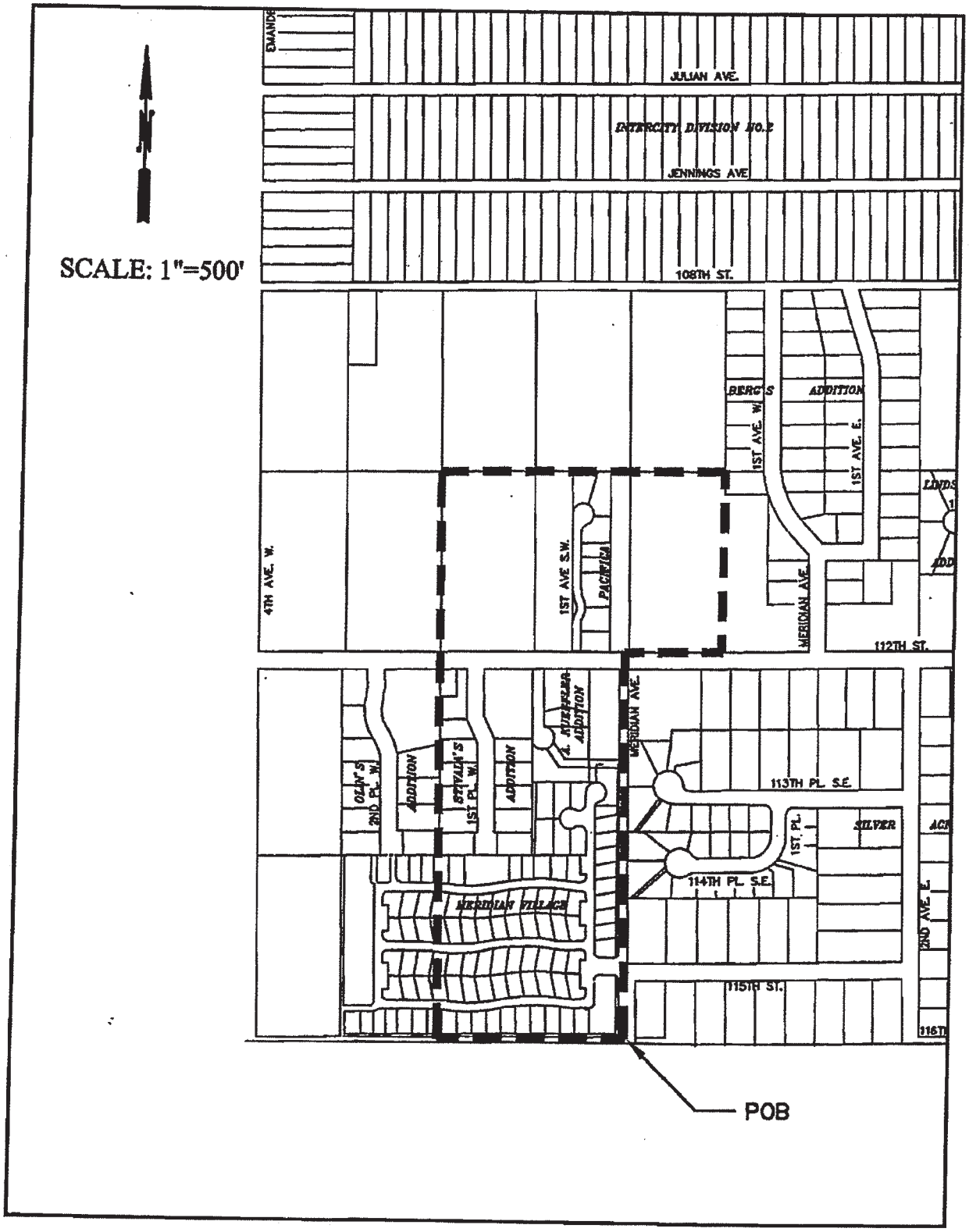


EXHIBIT I
LEGAL DESCRIPTION OF PARCEL 5

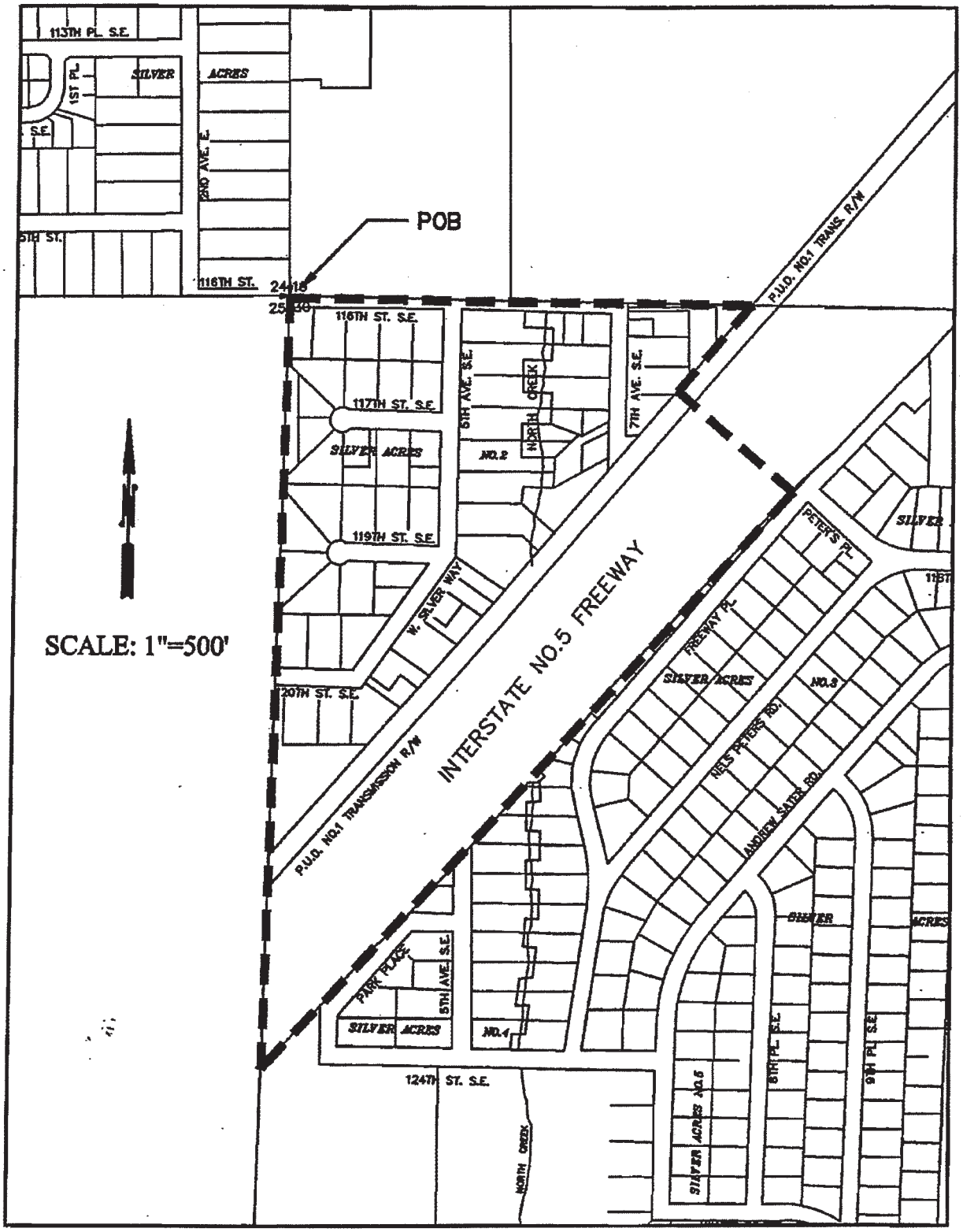
That portion of Section 30, Township 28 North, Range 5 East, W.M., situated in Snohomish County, State of Washington, more particularly described as follows:

BEGINNING at the NW corner of said Section 30; thence South along the West line of Section 30 to the Easterly right-of-way line of Interstate No. 5 Freeway, also being approximately at the W1/4 corner of Section 30; thence Northeasterly along said Easterly right-of-way line to intersect the Southerly right-of-way line of Peters Place; thence Northwesterly along the Southerly right-of-way line of Peters Place extended to the Westerly right-of-way line of P.U.D. No. 1 (Puget Sound Power & Light Company right-of-way); thence Northeasterly along the Westerly right-of-way line of P.U.D. No. 1 right-of-way to the North line of Section 30; thence West along the North line of said Section 30 to the NW corner of Section 30, POINT OF BEGINNING.

Information referenced for preparing this legal description:

- Snohomish County Boundary Review Board Approved Legal Description for Silver Lake Water District Fircrest Sewer District Merger (1980)
- City of Everett Ordinance #4318
- City of Everett Ordinance #4342

EXHIBIT J
PARCEL 5



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AGREEMENT BETWEEN SNOHOMISH COUNTY, THE CITY OF EVERETT AND SILVER LAKE WATER DISTRICT

THIS AGREEMENT is made and entered into as of the 5th day of April, 1989, by and between SNOHOMISH COUNTY, WASHINGTON (hereinafter referred to as "County"), the SILVER LAKE WATER DISTRICT (hereinafter referred to as "District") and the CITY OF EVERETT, WASHINGTON (hereinafter referred to as "Everett"), all of which are organized under the laws of the State of Washington.

WHEREAS, the District presently owns and operates a wastewater conveyance system consisting in part of trunk sewers, lateral sewers, pump stations and force mains operated for the benefit of the citizens of the District; and

WHEREAS, in addition to its own facilities, District has contracted with Everett for treatment of wastewater from the District; and

WHEREAS, County presently owns and operates a municipal solid waste sanitary landfill (Cathcart), which is within the District Service Area, that collects and treats leachate; and

WHEREAS, District is willing to accept leachate that is pre-treated in accordance with Everett's industrial waste pretreatment requirements from County upon certain terms and conditions; and

WHEREAS, it is in the interest of the parties and the public health, safety and welfare of all the people residing in County and Everett that this Agreement be entered into;

NOW, THEREFORE, in consideration of the mutual promises and covenants herein contained and for other good and valuable consideration, it is hereby agreed as follows:

1. **AUTHORITY FOR CONTRACT, COMPLETENESS, TERM**

This Agreement is made and entered into pursuant to the authority vested in County, Everett and District by the provisions of RCW 39.34 (Interlocal Cooperation Act). This contract, except

where otherwise provided, shall be complete within itself and shall remain in full force and effect until altered, cancelled or terminated in accordance with the terms contained herein.

2. **DEFINITION OF TERMS.**

A. "Agreement Area" shall mean that area generally described in Exhibit A attached hereto.

B. "Maximum Daily Flow" shall be defined as the maximum total quantity of flow that County may discharge in any twenty-four (24) hour period commencing at 12:00 A.M. and terminating at 12:00 P.M. any calendar day.

"Maximum Hourly Flow" shall mean the total quantity of flow recorded over a 60 minute period.

C. "Capital Costs" shall mean all expenditures associated with but not limited to planning, designing, inspection, administration, financing, land acquisition, legal counsel, engineering, consulting and other related work for preparation of this Agreement and for upgrading, expanding and/or improving operation and maintenance of District wastewater facilities including those facilities obtained by the District by contract with Everett.

D. "Assessment Fee" shall be $0.03 per square foot for the total gross area of the Cathcart Landfill. Such fee shall be payable before the time of connection.

E. "District Sewer System or Collection System" shall mean the sanitary sewage lines, gravity sewer lines 6-inches and larger, pump stations, force mains, siphons, manholes, interceptors, treatment plant, sludge disposal facilities and appurtenances owned and operated by District or contracted for with Everett.

F. "County Public Works Department" shall mean the Snohomish County Department of Public Works Solid Waste Division as now designated to provide solid waste management and disposal

for County or such subsequent agency as may supersede this designation.

G. "County Leachate Facilities" shall mean the leachate collection, transmission line and pretreatment system owned and operated by County and located in the general facility of the Cathcart Landfill.

H. "Flow Meter" shall mean a flow measuring device such as a Parshal flume, Palmer Bowlus flume, or other measuring device permanently installed in a structure, above or below ground and accessible for operation and maintenance. The device shall be designed to measure the peak, average daily and low flow rates from the County leachate facility. The flow measuring device shall be provided with a continuous operating flow meter to include sensing device for measuring the flow rate, together with a non-resetting totalizer and chart recorder or similar recording device approved by District and Everett. The flow meter and equipment furnished shall be suitable for the environment in which it will be installed.

I. "Leachate" shall mean the liquid waste, pre-treated in accordance with the Industrial Pretreatment Program of Everett and Everett Pretreatment Permit Number 7701 as now or hereafter amended, from the Cathcart Landfill.

J. "May" shall mean permissive, "shall" shall mean mandatory.

K. "Metering" shall mean a permanently installed flow measuring device with telemetry to a flow meter, recorder and totalizer.

L. "GPD" shall mean gallons per day.

M. "Industrial pretreatment regulations with the City of Everett" shall be as defined by Ordinance No. 1308-86 and any subsequent modifications as are officially adopted by City Council action and by Everett Pretreatment Permit No. 7701 as now or hereafter amended.

N. "Wastewater Facilities" shall mean the structures, equipment and processes required to collect and transport domestic and industrial wastes and dispose of the effluent and waste by-products.

3. **PERMISSION FOR THE COUNTY TO DISCHARGE LEACHATE, CAPACITY REQUIREMENTS**

A. Subject to the terms of this agreement, District hereby agrees to allow County permission to discharge pre-treated leachate which complies with Everett Pretreatment Permit Number 7701 as now or hereafter amended via a transmission line into District Sewer System in accordance with all terms set forth in this Agreement. The only point of connection to District's sewer system shall be as described in Exhibit "B" attached and herein incorporated into this Agreement. Such discharge shall never exceed a pumping rate of 12,000 gallons per hour or a maximum daily flow of 144,000 GPD.

B. Discharge of pre-treated leachate shall be coordinated with the District so as to minimize downstream impact on pump stations and trunk sewer integrity and capacity to the greatest extent possible. County shall be liable to mitigate any odor problems that might arise as a result of the discharge of pre-treated leachate into District's facilities.

C. County agrees that any and all discharge of leachate into District facilities shall be subject to the Pretreatment Regulations of Everett as now or hereafter amended and all such local police power necessary for Everett and District to enforce such regulations.

D. County agrees to submit for review and approval its plans and specifications for the County Leachate Facilities to District, Everett and the Department of Ecology (hereinafter DOE). County shall not build its Leachate Facilities prior to approval of District, Everett, the Snohomish County Health District and the DOE.

4. **MONTHLY SEWER SERVICE BILLINGS**

A. District agrees to accept and convey the County's leachate and County agrees to pay for such service at the rates in effect for that billing period for that class of customers defined by District Resolution as industrial users of District with similar strength waste, that are tributary to Everett. Payment to District will be based on County installed permanent flow meter at the Cathcart treatment facility and reported to Everett as required by Everett's Industrial Pretreatment Permit No. 7701 as now or hereafter amended. County will immediately forward copy of such Everett flow meter report to the District. District shall present a statement to County as determined by that period's flow report.

B. County flowmeter and other sampling equipment shall be calibrated and/or certified as to accuracy based upon the manufacturers' recommended schedule. District shall have the right to have any such flowmeter and other sampling equipment re-calibrated and/or re-certified at any time upon ten (10) days notice. District may take its own samples at open flow meter locations to conduct its own tests.

C. County shall pay such charges as are due to District within thirty (30) days of receipt of District's statement. Payment will be based upon actual total flow as reported to Everett under the Industrial Pretreatment Permit times District's then authorized charges. Payments not made within thirty (30) days shall become delinquent. Delinquent charges shall accrue interest on the unpaid balance, from the date of delinquency until paid, at an interest rate of 1% per month.

D. In addition to payment of District rates as provided in paragraph 4 (A) above, County shall pay High Strength Waste Charges directly to Everett based on its rates for customers with similar strength waste.

5. **FEES**

A. County shall pay to District in accordance with the District's regulations a facility hookup fee. The amount of the fee is to be calculated based upon the quantity of capacity requirements used by County in equivalent households. This is calculated to be $651,000 for the County's facilities based upon a maximum flow of 144,000 GPD with an equivalent household being equal to 221 GPD.

In addition a General Facilities fee of $0.03 per square foot of gross area served is required by District regulations. The total gross area of Cathcart landfill consists of 200 acres. A General Facilities fee of $261,360.00 is required by District regulations. A total fee of $912,360.00 is due and payable in full before connection to the sewer system.

B. County shall pay to District all capital costs as defined herein.

C. Upon payment of all sums due under A and B above, District shall service County's capacity requirements as set forth in paragraph 3 above.

D. County capacity requirements, as set forth in paragraph 3 above were established by County and submitted by County to District for this Agreement. If County's sewage flow exceeds its capacity requirements, County shall pay any and all damages, fines or penalties incurred by District that are in any manner related to or arising from County exceeding its stated capacity requirements. County shall also pay all additional fees, capital costs and assessments or other charges of the District in accordance with the District's rules and regulations in effect at that time for such additional capacity, if District determines to provide such capacity to the County. Nothing herein shall obligate District to provide County with additional capacity requirements.

E. County shall have the right to utilize said capacity requirements as it deems appropriate as long as such use remains within the regulations of District and the requirements of

Everett's Industrial Pretreatment Regulations. Nothing herein shall be deemed to allow County to transfer said capacity rights to property outside of the Agreement Area.

6. **METERING**

County shall install a permanent flow meter, with totalizer, at the direction of Everett, at its Cathcart Facility. This meter shall be utilized for billing purposes. County shall install a flow measuring device, such as a Parshal flume, in a separate sampling manhole immediately upstream from its connection to District collection system. Such measuring device must be approved by the District prior to installation. No connections to the sewer line between the metering manhole and sampling station and District collection system are permitted. The metering manhole shall be accessible to District twenty-four (24) hours per day seven (7) days per week. Flow meter and flow measuring devices as described in Section 2 of this Agreement shall be installed and maintained by County at County's expense. County shall install and maintain running time meters (RTM) on its pumps and shall calibrate to the extent possible such RTM's to the flow meter so as to act as a backup in case of failure of the flow meter. Design, construction and maintenance standards and methods for all County leachate facilities shall be equal to or better than the rules and regulations of District and Everett and shall be consistent with APWA, DSHS and DOE standards.

7. **MAINTENANCE AND OPERATION**

County shall operate and maintain all facilities of County subject to this Agreement and located upstream from the point of connection set forth in Exhibit "B". District shall maintain and operate all of its facilities located downstream from the point of connection. Everett shall maintain and operate all of its facilities located downstream from the point of connection. All such maintenance and operation shall be consistent with good

sanitary engineering practice in accordance with all applicable laws, standards and requirements as may be applicable to these specific facilities.

8. **NOTIFICATION TO THE COUNTY**

A. District and Everett agree to provide the County with copies of newly enacted rate increases within thirty (30) days, when possible, of the enactment of a new rate schedule.

B. District and Everett agree to provide the County with copies of newly enacted Ordinances or regulations if they are covered by the Agreement (i.e. pretreatment, connection charge modifications, etc.).

9. **INSURANCE - LIABILITY**

Each party shall secure and maintain with responsible insurers and/or self insure all such insurance as is customarily maintained with respect to sewage systems of like character against loss of or damage to the sewer facilities operated and maintained respectively by the Parties against public and other liability to the extent that such insurance can be issued and maintained at reasonable costs. Liability for damages resulting from the operation of its leachate facilities or by County discharge of leachate and not caused or occasioned by any negligent act of District, shall be the sole responsibility of County. Any liability for damages resulting from the operation of its wastewater facilities and not caused or occasioned by any act of County nor caused in whole or in part by County discharge of leachate shall be the sole responsibility of District. County hereby agrees to indemnify and hold harmless District against and for any and all third party claims, damages, and injuries arising out of County's operation of its leachate facilities or caused in whole or in part by County discharge of leachate to District's sewer system. County shall reimburse District for any and all fines, penalties, fees or assessments placed against District by

any regulatory agency for violations of its rules and regulations that are caused in whole or in part by the operation by County of its leachate facilities or by County discharge of leachate to District's sewer system.

10. **RESOLUTION OF DISPUTES**

In the event any dispute shall arise among the parties to this contract as to the term of the contract or any parties performance, the Parties agree that such dispute shall be resolved by arbitration pursuant to RCW 7.04. Each party to this contract shall select an arbitrator and the panel so selected shall render a decision which shall be final and binding on all parties.

11. **ASSIGNMENT**

County shall not have the right to assign this Agreement or any of its rights or obligations hereunder by operation of law or by voluntary agreement without the written consent of District and this Agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto.

12. **TERM OF AGREEMENT**

It is anticipated that the improvements currently planned will serve County and District requirements for transmission and treatment of sewage until at least December 31, 2010. In the event that unforeseen circumstances at any time affect the capability of said District facilities or Everett facilities to continue to serve County, the Parties shall negotiate terms and conditions for continued leachate transmission and treatment service for County and/or District.

In the event either District or County gives written notice to the other parties of its intent to continue said service at any time between January 1, 2010 and December 31, 2010, the Parties shall be required to continue leachate transmission and treatment service for County and/or District in the capacities described

herein for an additional five (5) year period. Upon receipt of said notice, the remaining parties shall propose terms and conditions for the continuance of said service. Said proposal may be based on all conditions then existing, including but not limited to capital and operating costs of service, other alternatives for service, growth patterns of service areas, annexations and annexation policies, and state, federal and local laws, rules, regulations and policies. In the event that the parties do not reach agreement on terms and conditions for continued service, the parties shall resolve the issues under the procedures set forth in Section 10. Service may be continued for additional five (5) year periods through December 31, 2032 pursuant to the foregoing procedure.

13. **CANCELLATION OR ALTERATION OF AGREEMENT**

This agreement may not be cancelled by any party without good cause and then only upon five (5) years written advance notice.

This agreement may be altered through a process of negotiation which may be invoked by any party through written notice given thirty (30) days in advance of the first negotiation session. If after good faith bargaining no agreement can be reached the issue shall be submitted to arbitration in accordance with Section 10 of this agreement.

14. **COUNTY/EVERETT SOLID WASTE PLANNING**

A. As the ultimate leachate treatment facility for the County's solid waste disposal facility, the County's discharge of leachate from the County's solid waste disposal facility at Cathcart and the acceptance of said leachate into the City of Everett wastewater transmission and treatment facilities constitutes joint City/County solid waste planning, meeting the intent of RCW 70.95.080 and the guidelines therefor. City and County agree to conform their respective solid waste management comprehensive plans to include the County's Cathcart solid waste

disposal site as an alternative disposal site for City of Everett solid waste, regardless of whether the City determines to utilize said County's solid waste disposal facility.

City and County agree and jointly submit to the State Department of Ecology, as the authorized representation of both parties, that the discharge of Cathcart leachate into the City's wastewater transmission and treatment facilities places the County's solid waste disposal site at Cathcart in the jurisdiction of the City for solid waste planning purposes, within the intent of RCW 70.95.130, regardless of whether the City determines to utilize the County's solid waste disposal facilities in the execution of the City's Solid Waste Management Comprehensive Plan.

B. In the event that City determines to utilize the County solid waste disposal facility at Cathcart or other County operated landfill, as part of the execution of the City's Solid Waste Management Comprehensive Plan, disposal fees for City of Everett residents and haulers shall be reasonable and shall be no greater than disposal fees charged by the County to non-City residents and non-City haulers for regular disposal. City accepts that the County may charge a reasonable rate differential for intermittent use in the event that City does not deliver all of its waste stream to the County's facilities or uses the County facilities for by-pass or other irregular disposal.

at the sites or facilities of which non-City waste is finally disposed. The County many, at its option, cause City solid waste to be disposed at the same sites or facilities at which County waste is disposed.

C. City and County recognize mutual interests in future closed landfill regulations and agree to coordinate their positions before state and federal administrative and legislative bodies to advocate that any new regulations for closed landfills consider fiscal impacts and provide appropriate fiscal arrangements for impacted agencies.

D. County and City will review sewage sludge utilization regulations and recommend modifications which will encourage environmentally sound sludge utilization within Snohomish County. Sludge utilization options shall include but not be limited to agricultural and silvicultural utilization and

reclamation of construction sites. In addition to utilization, County and City will develop guidelines for sludge disposal at Cathcart or other appropriate sludge disposal sites.

IN WITNESS WHEREOF, the parties have caused this agreement to be executed this 5th day of April, 1989.

Approved as to form:

Everett City Attorney

CITY OF EVERETT

By: _____
Mayor

CITY CLERK

Approved as to Form:

Deputy Prosecuting Attorney

Reviewed by Risk Management
Approved (✓) Other ( )
4-4-89

SNOHOMISH COUNTY, WASHINGTON

GARY WEIKEL
By: _____ Administrator
Executive APR 05 1989 D-14

Approved as to form:

Attorney for Silver Lake Water District

SILVER LAKE WATER DISTRICT

By: _____
Commissioner

By: _____
Commissioner

By: _____
Commissioner / Secretary

EXHIBIT A

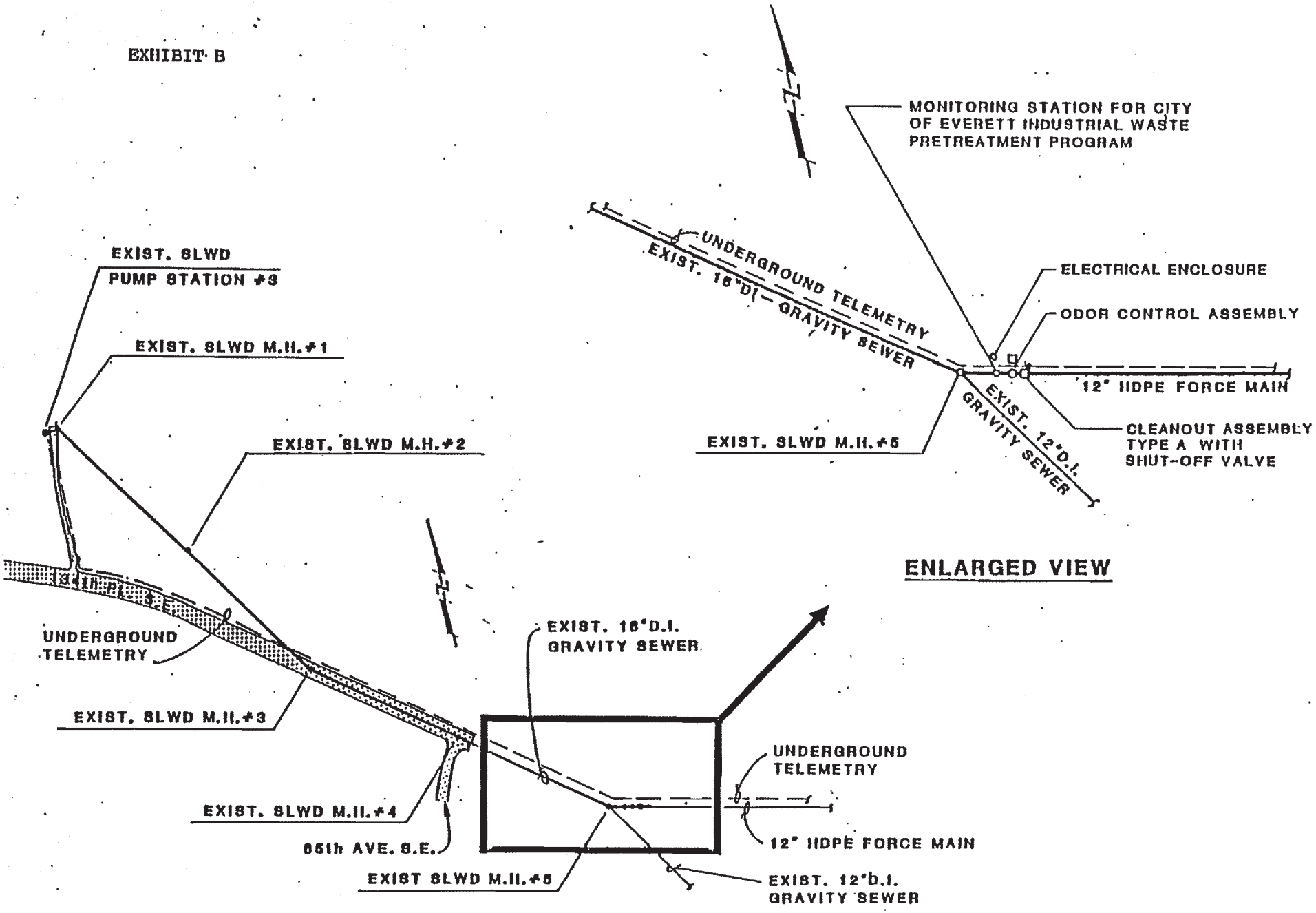
CATHCART SANITARY LANDFILL

Legal Description

The West 1/2 of the NW 1/4 together with the NW 1/4 of the SW 1/4 and the SW 1/4 of the SW 1/4 and the SE 1/4 of the SW 1/4 of Section 36, Township 28, Range 5, East, W.M., except State Highway 9 located therein, Snohomish County, Washington.

The lands herein described contain an area of 197.82 acres, more or less.

EXHIBIT B



12" FORCE MAIN CONNECTION TO SLWD M.H. #5

07/88

SILVER LAKE WATER DISTRICT
WATER & SEWER SERVICE

January 19, 1999

Jeff Kelley-Clarke, Director
Snohomish County Solid Waste Management Division
2930 Wetmore
Everett, WA 98201

Re: Contingency Agreement

Dear Mr. Kelley-Clarke:

Pursuant to the discussions we have held over the last month, the Silver Lake Water District Board of Directors has agreed that an agreement between the District and the County to provide additional off-peak pumping capacity would be a benefit to the County without jeopardizing the District's facilities. We understand that previous experience indicates that you will only rarely need to use this capacity, but that in those circumstances this agreement will provide to the County significant cost savings and reduce the risk involved in over-the-road transport of leachate. Therefore, the Board is ready to make the following agreement with the County. Please review it and sign at the bottom to indicate acceptance of its terms.

1. Whenever the County determines that unusual weather conditions may bring leachate levels close to acceptable maximums in the lagoons at its pretreatment plant in the Cathcart area, the County shall notify the District that in may need to pump higher than normal volumes through the pipeline. Whenever possible, this notification shall be provided at least 24 hours in advance of any excess pumping. The County shall include a proposed pumping plan, including:

- daily volumes
- duration
- daily pumping schedule

2. Upon receipt of notification from the County, the District shall expeditiously determine whether the extra volumes can be received on the proposed schedule without significantly impacting normal operations. As soon as possible, the District will respond to the County with either an approval

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for extra pumping or a denial of the same. In the former case, the District shall also note any requested changes in the proposed pumping plan.

3. Following receipt of approval from the District, the County shall be allowed to utilize the proposed pumping plan if the need arises until the weather problems lessen, or until the District notifies the County that a change is needed. Once a pumping plan is approved, the District shall provide at least 48 hours advance notice before requiring the County to return to normal pumping levels.

4. The District shall bill the County at the then-current regular rate for all leachate pumped to them up to the normal 144,000 gallons each day. For all leachate pumped in excess of 144,000 gallons, but less than 200,000 gallons, in a given day, the District shall bill the County at the rate of $.03 (three cents) per gallon. For all leachate pumped in excess of 200,000 gallons in a given day, the District shall bill the County at the rate of $.04 (four cents) per gallon.

5. At no time shall the County pump in excess of 250,000 gallons per day to District facilities.

6. The District may amend the prices for flows in excess of 144,000 gpd listed in this agreement at such time as it changes other rates charged to customers for receiving waste. At that time, the District and the County shall develop a revised written agreement to cover the new rates for excess flows. Nothing herein affects or limits the authority of the District to set regular rates for industrial users, including the County, for its flows up to 144,000 gpd at such time as the District Commissioners, in their sole discretion, elect to do so.

7. The following pumping plan will be used whenever flows up to 200,000 gallons in a given day is allowed:

Midnight - 5:00 AM	2,875 gallons @ 10 min intervals
5:00 AM - Midnight	1,000 gallons @ 10 min intervals

The following pumping plan will be used whenever flows up to 250,000 gallons in a given day is allowed:

Midnight - 5:00 AM	4,500 gallons @ 10 min intervals
5:00 AM - Midnight	1,000 gallons @ 10 min intervals

8. Either party may terminate this agreement by providing thirty days notice in writing to the other party.

9. Except for terms changed by this agreement, all terms of the contract between the County and the District dated April 5, 1989 ~~1998~~ shall remain in full force and effect.

SKC

Sincerely,

Patrick Curran, General Manager
Silver Lake Water District

Signature on the lines below constitutes acceptance of the terms stated in the letter above:

Jeff Kelley-Clarke	Patrick Curran
for Snohomish County	for Silver Lake Water District

AMENDMENT NO. 1

AGREEMENT BETWEEN SNOHOMISH COUNTY, THE CITY OF EVERETT AND SILVER LAKE WATER DISTRICT

THIS AMENDMENT NO. 1 to that certain Agreement Between Snohomish County, the City of Everett and the Silver Lake Water District (the "Agreement") dated April 5, 1989, is made by and between Snohomish County (the "County"), the Silver Lake Water and Sewer District, formerly the Silver Lake Water District, (hereinafter referred to as the "District"), and the City of Everett ("Everett"), all of which are organized under the laws of the State of Washington.

RECITALS

WHEREAS, the existing agreement between the County, the District and Everett identifies a discharge point of leachate to the District's wastewater conveyance system; and

WHEREAS, development and improvements have occurred in and around the County's property; and

WHEREAS, the District has constructed and continues to construct additional wastewater facilities to serve this development; and

WHEREAS, the County continues to maintain a closed municipal solid waste sanitary landfill (Cathcart), a Vactor Decant Facility, and a Solid Waste Transfer Station, which is within the District Service Area, that collects and treats wastewater; and

WHEREAS, a new point of connection and discharge for the County's industrial treated wastewater has been established by mutual consent of the County, the District and Everett;

NOW THEREFORE, for and in consideration of the mutual benefits and promises set forth below, the parties agree to amend the Agreement as follows:

1. Section 2, DEFINITION OF TERMS, is hereby amended as follows:

A. "Agreement Area" shall mean that area generally described in Exhibit A – 1 attached hereto and incorporated herein by this reference.

I. "Leachate," "pretreated leachate," and "industrial waste water" shall mean the liquid waste, pretreated in accordance with the Industrial Pretreatment Program of Everett and Everett Pretreatment Permit Number 7701 as now or hereafter amended, that originates from the Vactor Decant Facility, Solid Waste Transfer Station, Leachate Pretreatment Facility, closed Cathcart Landfill or other County operated industrial facilities located in the Agreement Area as described in Exhibit A -1 attached hereto and incorporated herein by this reference.

O. "GPM" shall mean gallons per minute.

P. "Off-peak hours" shall mean the hours between 2200 and 0400.

2. Subsection A, of Section 3, PERMISSION FOR THE COUNTY TO DISCHARGE LEACHATE, CAPACITY REQUIREMENTS, is hereby amended as follows:

A. Subject to the terms of this agreement, District hereby agrees to allow County permission to discharge leachate from the County Leachate Facilities via a transmission line into District Sewer System in accordance with all terms set forth in this Agreement. The only point of connection to discharge leachate to District's Sewer System shall be as identified in Exhibit B-1 attached hereto and incorporated herein by this reference. Such discharge shall not exceed a rate of 100 GPM except that once the District's Snohomish Cascade Lift Station has been upgraded and is operational to service the County's Cathcart facilities and surrounding areas, such discharge may be at a rate of up to 400 GPM during off-peak hours. The maximum daily flow shall not exceed 144,000 GPD.

3. Subsection A, of Section 14, COUNTY/EVERETT SOLID WASTE PLANNING, is hereby amended as follows:

A. Pursuant to the Interlocal Agreement Between Snohomish County and Everett Regarding Solid Waste Management, dated November 5, 2003, joint planning and solid waste disposal system responsibilities are defined in compliance with Chapter 70.95 RCW and authorized by chapter 39.34 RCW to allow for interlocal cooperation for joint implementation of solid waste activities. (Refer to Exhibit C for a copy of the interlocal agreement.)

EXCEPT AS EXPRESSLY PROVIDED BY THIS AMENDMENT NO. 1, ALL OTHER TERMS AND CONDITIONS OF THE AGREEMENT AMONG THE PARTIES DATED APRIL 5, 1989 SHALL REMAIN IN FULL FORCE AND EFFECT.

Dated this 9th day of ~~March~~ April, 2008.

"EVERETT"
CITY OF EVERETT

By: Ray Stephanson
Mayor

Attest:
Sharon Marks
City Clerk

Approved as to form only:

By: [signature]
Everett City Attorney, Interim

"COUNTY"
SNOHOMISH COUNTY

By: _____
Executive

Approved as to form only:

By: _____
Deputy Prosecuting Attorney

"DISTRICT"
SILVER LAKE WATER AND SEWER DISTRICT (Successor to the Silver Lake Water District)

By: _____
Commissioner

By: _____
Commissioner/Secretary

Approved as to form:

By: _____
Attorney for Silver Lake Water and Sewer District

"COUNTY"
SNOHOMISH COUNTY

By: _____
Executive

PETER B. CAMP
Executive Director

Approved as to form only:

By: _____ 3/18/08
Deputy Prosecuting Attorney

"DISTRICT"
SILVER LAKE WATER AND
SEWER DISTRICT (Successor
to the Silver Lake Water District)

By: _____
Commissioner

By: _____
Commissioner/Secretary

Approved as to form:

By: _____
Attorney for Silver Lake Water and
Sewer District

COUNCIL USE ONLY
Approved: 4-9-08
Docfile: D-19

EXHIBIT A-1
CATHCART SANITARY LANDFILL
LEGAL DESCRIPTION

(28053600200700) E1/2 SE1/4 NE1/4 SEC 35 & TH PTN W1/2 NW1/4 SEC 36 TWP 28 N, RGE 05 E, WM, SNOHOMISH COUNTY, WASHINGTON DAF: COM NW COR SD SEC 36 FR WH W1/4 SEC COR BEAR S01*13'43"W 2627.50 FT; TH S01*13'43"W ALG W SEC LN THOF 1033.72 FT TO N LN S 280.00 FT NW1/4 NW1/4 SEC 36 & TPB; TH CONT S01*13'43"W ALG SD W SEC LN 280.03 FT TO NE COR SE1/4 NE1/4 SD SEC 35; TH N87*39'43"W ALG N LN SD SE 1/4 NE1/4 661.14 FT TO W LN E1/2 SD SE1/4 NE1/4 TH S01*13'54"W ALG SD W LN 1313.80 FT TO S LN SD SE1/4 NE1/4; TH S87*39'59"E ALG SD S LN 661.20 FT TO E1/4 COR SD SEC 35; TH S88*14'03"E ALG E-W CTR SEC LN SD SEC 36 DIST 1320.47 FT TO E LN W1/2 NW1/4 SD SEC; TH N01*13'34"E ALG SD E LN 1542.37 FT TO N LN S 235.00 FT NW1/4 NW1/4 SD SEC TH N87*57'23"W ALG SD N LN 607.40 FT TO E LN W 713.00 FT SD SEC 36; TH N01*13'43"E ALG SD E LN 400.04 FT TO N LN S 635.00 FT SD NW1/4 NW1/4; TH N87*57'23"W ALG SD N LN 284.45 FT; TH S44*23'31"W 480.34 FT TO N LN S 280.00 FT SD NW1/4 NW1/4; TH N87*57'23"W ALG SD N LN 100.00 FT TO W LN SD SEC 36 & TPB; AKA LOT 2 SNO CO BLA FN 05-118347 REC AFN 200510170215;

Together with:

TH PTN SW1/4 SEC 36 TWP 28 N, RGE 05 E, WM, SNOHOMISH COUNTY, WASHINGTON DAF: BEG W1/4 COR SD SEC 36; TH S01*14'29"W ALG W LN SD SEC DIST 2632.03 FT TO SW SEC COR THOF; TH S88*10'33"E ALG S LN SD SEC DIST 50.81 FT TO SLY MGN CATHCART WAY PER SNO CO R/W PLAN 132ND ST SE EXT DATED AUG 4 1999 SNO CO ENG SURV 3571 & BEG NON TANG 1000.00 FT RAD CRV L CTR OF WH BEAR N24*13'04"W; TH NELY ALG SD MGN & CRV THRU C/A 11*18'01" ARC DIST 197.23 FT TH CONT ALG SD SLY MGN FOL CRSE & DIST: TH S90*00'00"E 273.55 FT; TH N73*00'00"E 68.60 FT; TH N50*00'00"E 85.55 FT; TH N00*00'00"W 235.34 FT; TH N52*26'32"E 68.57 FT TO BEG 950.00 FT RAD CRV TO R; TH NELY ALG SD MGN & CRV THRU C/A 38*46'22" ARC DIST 642.88 FT; TH S88*47'08"E 1304.84 FT TO WLY MGN ST HWY SR9; TH N04*18'52"E ALG SD WLY MGN 102.42 FT; TH N01*13'25"E ALG SD WLY MGN 515.34 FT TO N LN SE1/4 SW1/4 SD SEC 36; TH N88*12'18"W ALG SD N LN 1255.15 FT TO NW COR SD SE1/4 SW1/4; TH N01*13'57"E ALG E LN W1/2 SW1/4 SD SEC DIST 1316.69 FT TO N LN SD SW1/4 THOF; TH N88*14'03"W ALG SD N LN 1320.47 FT TO TPB; AKA LOT 1 SNO CO BLA FN 05-118349 REC AFN 200510170216

Together with:

(28053500400100) TH PTN E1/2 SE1/4 SEC 35 TWP 28 N, RGE 05 E, WM, SNOHOMISH COUNTY, WASHINGTON LY N CATHCART WAY PER SNO CO R/W PLAN 132ND ST SE EXT DATED AUG 4 1999 SNO CO ENG SURV 3571 DAF: COM E1/4 SEC COR SD SEC 35 FR WH SE SEC COR THOF BEAR S01*14'29"W 2632.03 FT; TH N87*39'59"W ALG N LN SD SE1/4 879.53 FT TPB; TH S44*52'05"E 272.05 FT; TH S01*14'29"W PLW E LN SD SEC DIST 691.54 FT TH S45*24'38"E 320.83 FT TO W LN E 450.00 FT SD SEC; TH S01*14'29"W ALG SD W LN 1010.61 FT TO N LN S 535.00 FT SD SEC; TH N88*24'09"W ALG SD N LN 150.00 FT TO W LN E 600.00 FT SD SEC ; TH S01*14'29"W ALG SD W LN 428.01 FT TO NLY MGN SD CATHCART WAY; TH S88*24'09"E ALG SD NLY MGN 436.14 FT TO BEG NON TANG 950.00 FT RAD CRV TO L CTR WH BEAR N05*21'43"W TH NELY ALG SD MGN & CRV THRU C/A 10*06'15" ARC DIST 167.53 FT TO E LN SD SEC 35; TH N01*14'29"E ALG SD E SEC LN 2490.20 FT TO E1/4 SEC COR THOF; TH N87*39'59"W ALG N LN SE1/4 SD SEC 879.53 FT TO TPB; AKA LOT 2 SNO CO BLA FN 05-118351 REC AFN 200510170217

Together with:

(28053500100600) TH PTN E1/2 W1/2 SE1/4 NE1/4 SEC 35 TWN 28 N, RGE 05 E, WM, SNOHOMISH COUNTY, WASHINGTON DAF: COM E1/4 SEC COR SD SEC 35 FR WH NE SEC COR THOF BEAR

N01*13'43"E 2627.50 FT; TH N87*39'59"W ALG S LN SD NE1/4 879.53 FT TO TPB; TH N44*52'05"W143.05 FT; TH N07*36'51"E 667.00 FT TH N09*50'57"E 556.99 FT TO N LN SD SE1/4 NE1/4 TH S87*39'43"E ALG SD N LN 163.78 FT TO E LN W1/2 SD SE1/4 NE1/4; TH S01*13'54"W ALG SD E LN 1313.80 FT TO S LN SD NE1/4; TH N87*39'59"W ALG SD S LN 218.33 FT TO TPB; AKA LOT 2 SNO CO BLA FN 05-118352 REC AFN 200510170218

EXHIBIT A-1

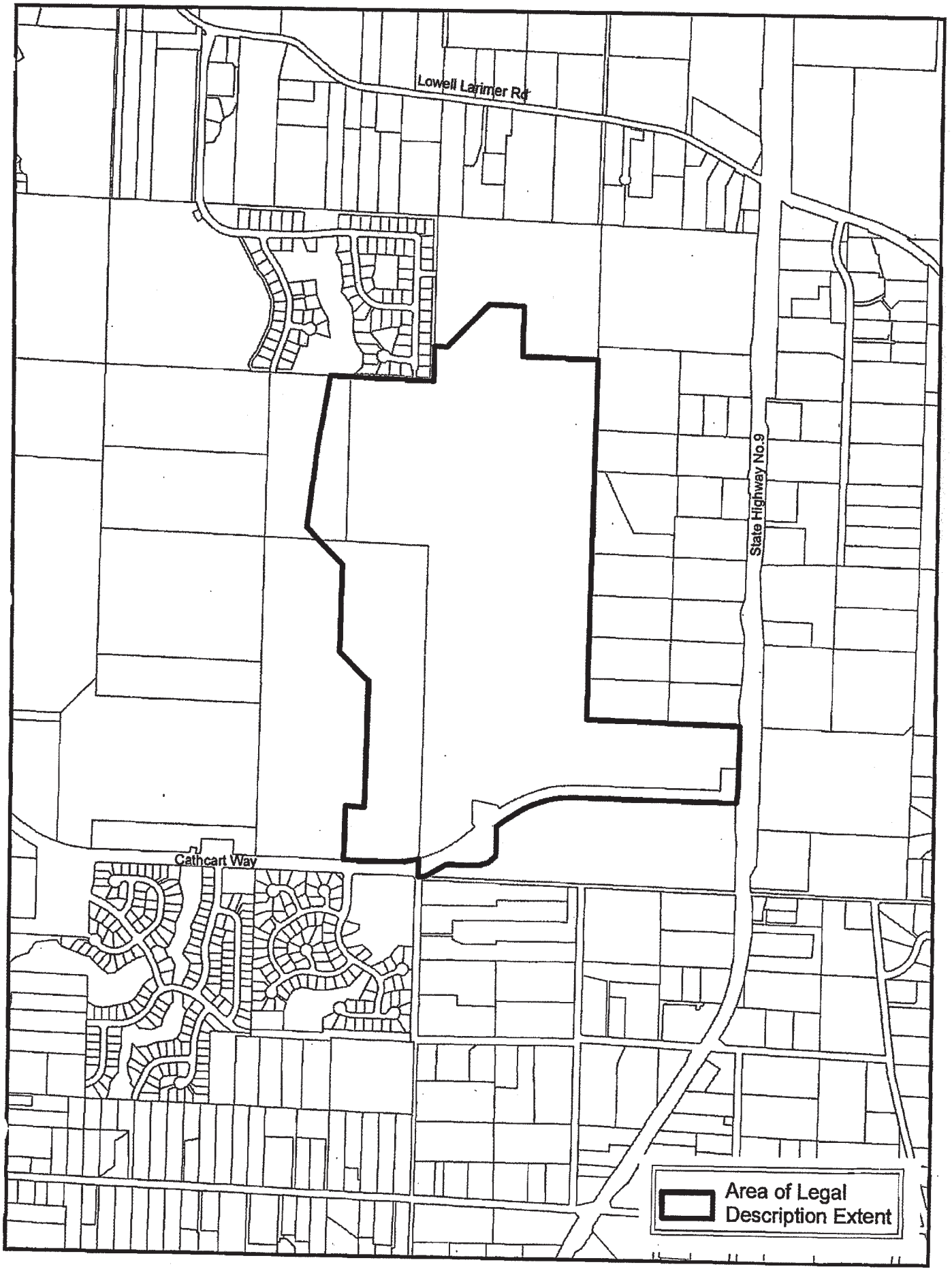
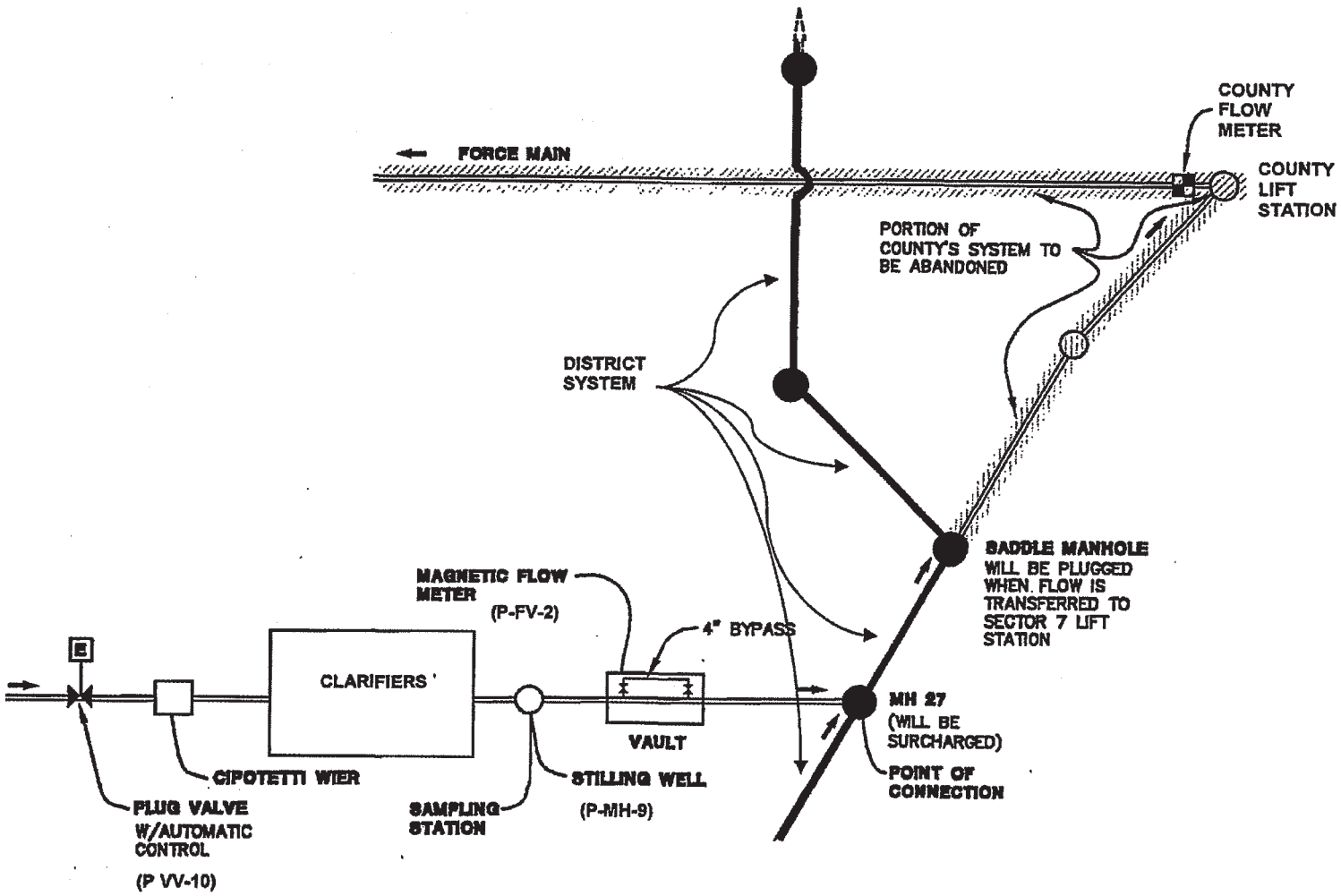

Lowell Larimer Rd
State Highway No.9
Cathcart Way
Area of Legal Description Extent

EXHIBIT B-1


FORCE MAIN
COUNTY FLOW METER
COUNTY LIFT STATION
PORTION OF COUNTY'S SYSTEM TO BE ABANDONED
DISTRICT SYSTEM
SADDLE MANHOLE WILL BE PLUGGED WHEN FLOW IS TRANSFERRED TO SECTOR 7 LIFT STATION
MAGNETIC FLOW METER
(P-FV-2)
4" BYPASS
E
CLARIFIERS
VAULT
MH 27
(WILL BE SURCHARGED)
POINT OF CONNECTION
CIPOTETTI WIER
STILLING WELL
(P-MH-9)
SAMPLING STATION
PLUG VALVE W/AUTOMATIC CONTROL
(P VV-10)

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A G R E E M E N T

THIS AGREEMENT by and between Silver Lake Water District, a municipal corporation of the State of Washington, hereinafter called "District," and the City of Everett, a municipal corporation of the State of Washington, hereinafter called "City," agree as follows:

1. The District shall be allowed to connect its sewer lines from the ULID #85-1 area of the District (essentially in the area of 19th Avenue and 128th) and shall pay to the City therefor $82,700 as compensation for the District's share of the City's lift station and force main located at 1530 - 121st (Silver Lake Road), Everett, Washington, plus construction of the City gravity sewer lines to connect therewith, and the extension of those lines requested by the District.

2. It is understood that the District will connect their sewer line to the end of the City system which is located on 19th Avenue S.E. and opposite the south boundary of the City limits. This location was requested by the Silver Lake Water District to facilitate their construction timetable and required an extension of the City sewer system by approximately sixty feet. The City's sewer line on 19th Avenue is being constructed under LID #719.

3. Payment from the District to the City shall be made within thirty (30) days following completion by the City of the lift station, force main and gravity lines referred to in Section 1 hereof.

DATED this 8 day of MAY, 1986.

CITY OF EVERETT

WILLIAM E. MOORE, Mayor

ATTEST:

CITY CLERK - deputy

APPROVED AS TO FORM:

CITY ATTORNEY

SILVER LAKE WATER DISTRICT

SECRETARY:

(0513)

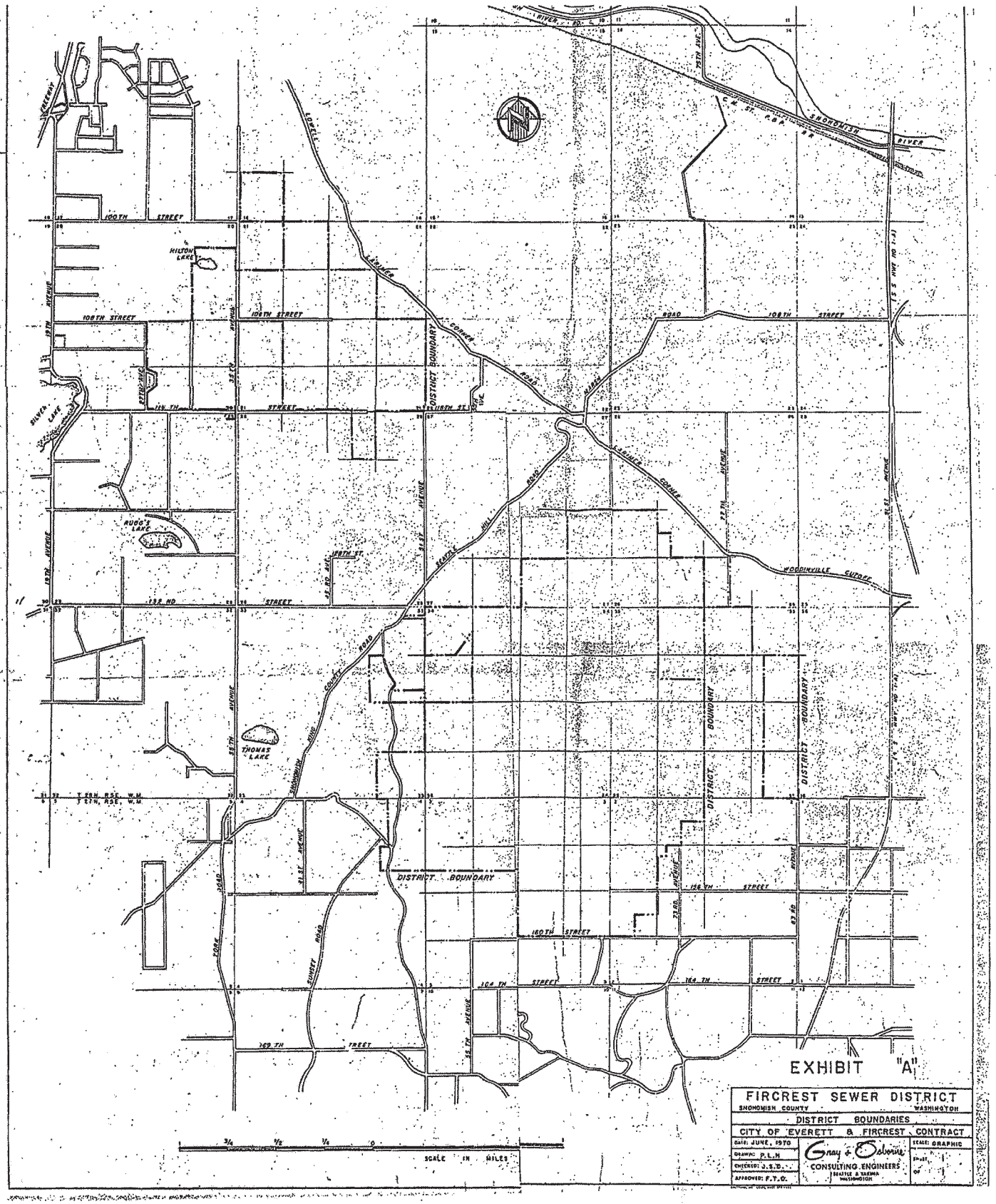


EXHIBIT "A"
FIRCREST SEWER DISTRICT
SNOHOMISH COUNTY WASHINGTON
DISTRICT BOUNDARIES
CITY OF EVERETT & FIRCREST CONTRACT
DATE: JUNE, 1970
DRAWN: P.L.H.
CHECKED: J.S.D.
APPROVED: F.T.O.
Gray & Osborne
CONSULTING ENGINEERS
SEATTLE & YAKIMA
WASHINGTON
SCALE: GRAPHIC
SHEET 1 OF 1
SCALE IN MILES
SNOHOMISH RIVER
C.M. ST. P.&P. R.R.
100TH STREET
108TH STREET
119TH STREET
132ND STREET
148TH STREET
156TH STREET
160TH STREET
164TH STREET
169TH STREET
DISTRICT BOUNDARY
HILTON LAKE
RUGG'S LAKE
THOMAS LAKE
SILVER LAKE
WOODINVILLE CUTOFF
SUNSET ROAD
COUNTY ROAD
LOWELL RIVER ROAD
HILL ROAD
CORNER ROAD
SUNNYSIDE ROAD
FORK ROAD
19TH AVENUE
25TH AVENUE
31ST AVENUE
35TH AVENUE
41ST AVENUE
47TH AVENUE
53RD AVENUE
59TH AVENUE
67TH AVENUE
73RD AVENUE
T 28N, R5E, W.M.
T 27N, R5E, W.M.

PUBLIC WORKS

EVERETT

September 14, 1998

Bruce Nelson
Silver Lake Water District
2210 132nd St. SE
Mill Creek, Wa. 98012

Re: Modification of Silver Lake connection point to City of Everett sewer system

Dear Bruce:

This letter will serve as notice that an additional connection point to the City of Everett sewer system along 116th Street SE has been created due to a developer extension (see the attached map). A developer has extended the public sewer main in 116th east to the east property line of 2420 116th St. SE. This most easterly manhole is now an additional SLWD connection point for future system expansions along 116th Street SE.

This extension results in the possibility of Silver Lake Water District (SLWD) providing sewer service to the lots east of 2319 116th St. SE. Based on the City/SLWD agreement, providing this service through SLWD is authorized.

If you have any questions please contact me at 257-8824.

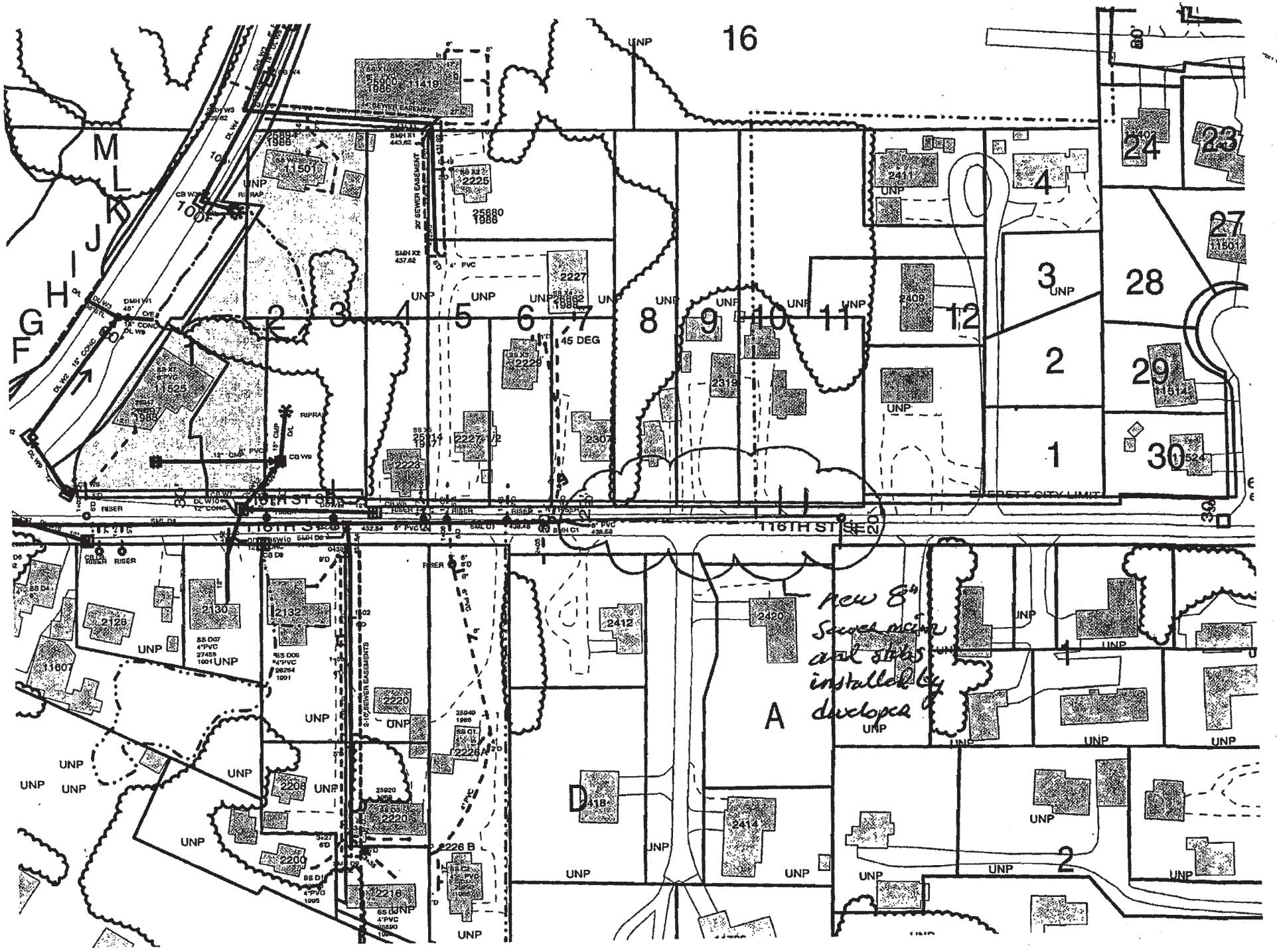
Sincerely,

Tom Thetford, P.E., Maint. Supt.

cc: Clair Olivers
Kirk Brooks

tt:slwd98

CITY OF EVERETT • 3200 Cedar Street • Everett, WA 98201 • (425) 257-8800 • Fax (425) 257-8882


16
116TH ST SE
116TH ST SE
EVERETT CITY LIMIT
20' SEWER EASEMENT
2-10' SEWER EASEMENTS
45 DEG
RIPRAP
UNP
New 8" Sewer main and stubs installed by developer

Appendix F

Alderwood Water and Wastewater District (WWD) Agreements

- Main Sewage Disposal Agreement
  - 1981 Agreement
- Swamp Creek Area
  - November 16, 1994 letter from Alderwood WWD to Everett
  - November 23, 1994 letter from Everett to Alderwood WWD
  - August 21, 1995 letter from Alderwood WWD to Everett

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AGREEMENT FOR SEWAGE DISPOSAL between THE [redacted] and ALDERWOOD WATER DISTRICT

RECEIVED
JAN 4 - 1982
ALDERWOOD WATER & SEWER DISTRICT

THIS AGREEMENT made as of this 30th day of Dec., 1981, between ALDERWOOD WATER DISTRICT of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District," and THE CITY OF EVERETT, a municipal corporation of the State of Washington, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the City and the District previously entered into a contract on October 29, 1969, plus amendments thereto; and

WHEREAS, the City and the District wish to rescind said contracts upon the entering of this contract; and

WHEREAS, the City and the District recognize the need for the District to participate in the costs of certain facilities of the City sewerage system which are necessary to serve the District; and

WHEREAS, the District agrees to contribute toward the costs of said City sewer facilities which benefit the District.

NOW, THEREFORE, the parties agree:

I.

(A) In order that the City may provide sanitary sewerage transmission and treatment services for sewage flowing from the District into the City sewer system, the City and the District agree that the following sewerage system facilities shall be constructed and maintained by the City to service the following capacity requirements of the District:

Facility	District Capacity Requirements
L.S. #24 and force main	2,300 gpm
S. End Interceptor to Southwest Interceptor	2,300 gpm
S. End Interceptor Northern Segment	2,300 gpm
Headworks	2,300 gpm
Sewer Treatment Plant	1.5 MGD

District capacity requirements of 2,300 gpm shall be the average maximum flow measured over a one hour period. Based on the above-stated District capacity requirements, the estimated costs for the District's share of the above-facilities is set forth in Exhibit A attached hereto and incorporated herein by reference.

(B) It is currently anticipated that the following sewerage system facilities shall be improved by the City in order to provide capacity in the following total amounts:

Facility	Total Facility Capacities
L.S. #24 and force main	3,500 gpm
S. End Interceptor to Southwest Interceptor	29,700 gpm
S. End Interceptor Northern Segment	40,300 gpm
Headworks	80,000 gpm
Sewer Treatment Plant	40.4 MGD

The District Capacity Requirements in Section (A) above were established by the District and submitted by the District to the City for inclusion in this Agreement. In reliance on said District Capacity Requirements established by the District, the City will size, design and construct, maintain or improve sewer facilities to serve both the City's and the District's capacity requirements. In the event that it is determined that the City's or the District's sewage flows exceed their respective capacity requirements, the City or the District, whichever is exceeding its allotted capacity, shall pay any and all damages or fines incurred by the City or the District in any manner related to or arising from exceeding the stated District or Total Capacity Requirements. City shall notify District at any time that facility capacity problems are anticipated by the City and the City and the District shall meet to discuss and plan for future remedial measures at any time after the District's flows exceed 80% of its above-stated capacity requirements. In the event the District exceeds its allotted capacity and the City and District have not reached agreement as to remedial measures, the City, after notification to the District, may take any one or all of the following remedial steps: (1) Refuse to allow any new sewer connections in the area tributary to the undersized facility; (2) Re-size, re-design and re-construct or improve the above facilities to such capacity as is determined will accommodate the capacity required; (3) Purchase or sell capacity from City or other Districts; and/or (4) Take

all reasonable steps to reduce loading. In the event the City elects the second remedial step, the District agrees, as liquidated damages, to pay to the City all costs incurred by the City for the design and improvement of any of said facilities, including but not limited to all costs set forth in Section I (C) hereof, except the cost of design and construction to meet the City's and/or other Districts' additional capacity requirements. Said costs shall be due and payable as provided in Section I (C). In the event that step (1) above is deemed necessary by the City, the City shall submit notice thereof at least thirty (30) days prior to taking final action. The District shall have no responsibility for Total Facility Capacities, except as provided herein; provided that, in the event the City determines to refuse new connections tributary to facilities which are at or exceed capacity, District will refuse also to allow new connections to such facilities. In the event that the City utilizes the full capacity of the system affecting the District prior to the District's full use of its contracted capacity, then the following remedies shall apply:

(1) The City shall compensate the District in monies for its loss of the remaining portion of its unused capacity. Compensation shall be by negotiation and in the event the parties cannot agree upon such compensation, the amount of such compensation shall be determined by arbitration under the procedure set forth in Section II hereof;

(2) City shall, at its own expense, expand its facilities in order to accommodate the balance of the District's contracted for capacity.

(C) The District agrees to pay to the City from the gross revenues of its sewer system the following percentage share of total costs of said facilities (said percentage share being calculated by dividing the District's Capacity Requirements by the Total Facility Capacities above):

Facility	Percentage Share Of Total Cost Payable to City
L.S. #24 and force main	46.0%
S. End Interceptor to Southwest Interceptor	7.7%
S. End Interceptor Northern Segment	5.7%
Headworks	2.9%
Sewer Treatment Plant	3.7%

The total cost of each facility to which said percentage shall be applied shall include but not be limited to engineering costs and fees, all payments to consulting

engineers or contractors, or otherwise, for labor, materials, equipment, overhead, etc., right-of-way or land costs, testing, inspection, legal fees, and interim financing costs. Payments to the City shall commence with approval by the City of the Engineer's and/or the Contractor's progress payments for work performed so that payments from the District will coincide with the City's payments to Engineers/Contractors. Final total costs will be established and adjusted upon release of all claims against said projects. Provided that payments to the City as required herein are current, the District's obligation to the City shall be junior to all present and future bonded indebtedness of the District.

II.

In addition to the payments set forth in Section I above, the District shall pay the City from the gross revenues of its sewer system a sewage disposal maintenance and operation charge (M & O charge) determined on the basis of 48% of the City's monthly sewer service rate for single family residences X 1.20 surcharge X total District customer equivalents. Payments shall be monthly, due within thirty (30) days of billing.

The general formula for determination of the M & O charge is:

$$\frac{\text{District \% of Share of Total Costs X City Single Family Service Rate}}{\text{District \% of Total Customer Equivalents}} \quad \text{X} \quad \text{1.20 Surcharge}$$

$$= \quad \text{Monthly Sewer Rate Per Customer Equivalent}$$

in accordance with the following understandings:

(A) Customer equivalents shall be single family residence equivalents and shall constitute the total number of single family residences to which the District or the City provides service, plus all other metered water usage divided by 900 cubic feet per month. The City's total single family equivalents shall be determined from the City's December billings. The District's single family equivalents shall be determined monthly for purposes of determining the District's monthly M & O charge. For purposes of determining the District's percentage of total equivalents, the determination shall be based on the District's December billing.

(B) The City's monthly service rate shall be the current City of Everett single family residence sewer service rate; or as such rate may be revised in the future.

(C) The District's % share of total costs for the year 1981 is agreed to be 1.9%.

The District's % of total system customer equivalents for the year 1981 is agreed to be 4.0%.

The District's % of City monthly service rate (before 1.20 surcharge) is agreed to be 48% for the year 1981.

On or about February of 1982, and each year thereafter, the City shall submit to the District a proposed new percentage of City monthly service rate to be used for the forthcoming year, together with a summary of the final previous year's sewer expenditures. Said new percentage of total costs shall be applied to the monthly M & O charge commencing April 1, 1982, through March 31, 1983, and each year thereafter shall be subject to modification as provided herein. In the event of disagreement between the City and the District as to the District's percentage share of total costs for the forthcoming year, each party shall appoint an arbitrator and the respective appointed arbitrators shall appoint a third arbitrator to create a board of arbitrators whose review and determination of the District's percentage share of total costs shall be final and binding on both parties. Each party shall bear the costs of its appointed arbitrator and the parties shall split the cost of the third arbitrator. The City's proposed rate shall be paid by the District subject to retroactive revision to April 1 by the decision of the arbitration panel.

The District's percentage share of total costs is not expected to include all Everett sewer system costs. The previous year's cost analysis may be used as a guideline wherein, after determination of the District's percentage share of total customer equivalents as of December 31, line items of the Everett sewer system expenditures were reduced or increased in accordance with the exercise of judgment and experience as to the costs to serve the District. In determining the District's percentage share of total costs, it is agreed that the following guidelines will be followed:

(1) The District shall not be charged any cost for in-City drainage.

(2) The District shall not be charged the costs of construction and maintenance of lateral or collector service lines to in-City customers.

(3) Because of the District's current payments for capital facilities as stated in Article 1 hereof, the District shall not be charged for the City's 1980 bond issue except in the event 1980 bond proceeds are utilized for payment of the costs of the sewer lagoon condemnation (approximately $400,000) or are otherwise paid out of capital facilities account. The District will be charged in accordance with its total percentage of total customer equivalents as of December 31 each year on the 1978 bond issue.

(4) The percentage of total customer equivalents applied to all lift station maintenance and operation costs shall be increased by a factor of 1.5.

(5) Unless actual cost analysis demonstrates a higher amount of benefit, the District shall be charged at 1% of the following costs:

- Maintenance of manholes and lids
- Cleaning sewer mains
- Repair of sewer mains
- Customer records and collection

(6) The following general system costs will be applied in accordance with the District's December 31 percentage of total customer equivalents:

- Treatment and lagoon operations, including sewer lagoon acquisition costs in the event such costs are paid from this account.
- Administration and supervising costs
- Engineering and records
- Outside services and consulting
- Injuries and damages (insurance)
- Bad debts and uncollectable expenses
- Regulatory expenses
- Miscellaneous general expenses
- General Plant
- Taxes and payments in lieu of tax
- Interest on accounts

(7) Special programs which are not included as a capital cost under Article I herein will be analyzed according to benefits.

(8) The 20% surcharge shall remain constant.

The City shall notify the District of all contemplated rate changes in order to allow the District to appear and present evidence. Said notice shall be the same as for citizens of the City. If the City fails to so notify, the District shall be allowed a special hearing to present evidence for the Council concerning rate modification.

III.

The District may deliver to the City all of the sewage and industrial waste collected by the District within the boundaries of that certain part of the District which can be served by the City, and the City shall accept the sewage and waste delivered for treatment and disposal as hereinafter provided subject to such reasonable rules and regulations as may be adopted from time to time by the City Council, subject to capacities set forth in Section I hereof. In the event that an adjacent district obtains capability to serve certain areas of the District at less

cost, then and in that event, after notification to the City 60 days prior to flow diversion and consultation with the City, the District may serve such areas by connections to others in a different flow direction. This will not release the District from any portion of any required payments to the City under Section I, above.

IV.

Sewerage facilities of the District which may be required for the delivery of sewage and wastes to the City may be connected to facilities of the City sewerage system. Such connection shall be accomplished at the expense of the District and in accordance with the rules and regulations of the City. The initial point of connection of the District's system to the City's system is herewith fixed and shall be in the trunk line of the City system. The City and the District may, as hereinafter provided, mutually designate additional or alternate points of connection for receiving the District's sewage to the City system which may include connections to other Districts which in turn connect to the City system. The District and the City shall install at their respective expense, flow meters at locations which will best measure incoming sewage flows to the Everett system.

V.

The District shall be responsible for the delivery to the City sewerage system of sewage collected by the District which is required to be delivered to the City hereunder, for the construction, maintenance and operation of local sewerage facilities, and for the payment of all costs incident to the collection of such sewage and its delivery to the City sewerage system. It is expressly understood that the District will be responsible for the delivery of its sewage to the City sewerage system at such points as determined in Article IV. The City may at its sole discretion construct portions of the City sewerage system located within the District and may at its sole discretion permit connection to such portion of the City sewerage system at a point, or points, in the District but shall not be obligated at any time during the life of this Agreement to construct any portion of the City sewerage system within the District. It is contemplated that the District will build local sewers or build or secure the use of other facilities to deliver its sewage to the City at the point hereinbefore described. All local sewers or other temporary sewerage facilities carrying sewage delivered to the City shall be

constructed and maintained in accordance with the rules and regulations of the City which shall be consistent with APWA, DSHS and DOE standards. All such local sewers or temporary facilities will be maintained by the District at no expense or risk to the City.

VI.

City may discharge sewage into District sewerage facilities within the District service areas contemplated under this Agreement; provided, that in such event, the City shall be obligated to pay its fair pro-rata share of the facility based on the method of assessment used to finance said facility and/or M & O costs related to such discharges, including but not limited to lift station costs.

VII.

Permanent books and records shall be kept by the City and the District in order to establish rates, volumes of sewage delivered and discharged into the City sewerage system wherever such volumes are measured, total volumes of sewerage transmitted and treated by City facilities, and the number of Residential Customers and Residential Customer Equivalents of the City and District. The records required by this paragraph shall be available for examination by either party at any reasonable time for a period of seven years.

VIII.

In the event of third party claims for injuries or damages arising out of or related to this Agreement, the City and the District shall have rights of indemnity against the other at any time after a claim is filed and for a period of three years following release or payment of a claim. Indemnification shall be determined on the basis of proportionate share of fault, if any. In the event that a lawsuit is filed against either party in which the other is not named, rights of indemnification shall be determined by binding arbitration under the procedure described in Article II hereof. This provision shall be in addition to any common law rights of indemnification claims which either party may assert under the procedure herein.

IX.

The District shall not have the right to assign this Agreement or any of its rights and obligations hereunder either by operation of law or by voluntary

agreement without the written consent of the City and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party and this Agreement shall be binding upon and inure to the benefit of the respective sucessors and assigns of the parties hereto. Provided that the District, by agreement of the City, may sell unneeded capacity to others who are a party to agreements with the City.

X.

In the event the City annexes any of the District's area served by facilities under this Agreement, then the City at any time may elect to provide sewer service to customers served by the District in the City's annexed area. If the City so elects, the District's Capacity Requirements shall be reduced proportionately as the sewage flows in the annexed area relate to the total District sewage flows, as stated in Section I hereof, and the City shall be required to pay compensation to the District for said customers and capacity as follows:

A. Local facilities serving customers in the annexed area shall become the responsibility of the City; provided that the District shall continue to maintain and be responsible for any general District facilities, such as lift stations, or interceptors, trunk sewers and laterals serving both the annexed area and the non-annexed area. In cases where sewage from such annexed areas is transmitted through general District facilities to City facilities, the City shall pay the District the maintenance and operation (M and O charge) determined from the following general formula:

$$\frac{\text{City's \% of Share of Total Costs x District Single Family Service Rate}}{\text{City's \% of Total Customer Equivalents}} \times \text{1.20 Surcharge}$$

$$- \text{City's Monthly Sewer Rate to District} = \text{Monthly Sewer Rate Per Customer Equivalent}$$

The guidelines for determining the above rates shall be consistent with those shown in Section II herein.

Pursuant to RCW 35.13A, the City shall make annual payments to the District for the annexed area's pro-rata share of the District's total outstanding sewer revenue bond obligations in accordance with annexed area's pro-rata share of the remaining annual payments schedule of said obligations at the time of election. In the event that there are any local facilities in the annexed area assumed by the City which have been constructed with District-wide funds or revenue bond funds (excluding developer or privately installed facilities or facilities constructed from

assessments in the annexed area), then the City shall pay the greater of either the total amount of the said pro-rata share of the District's outstanding bonded indebtedness or the depreciated value of said local facilities based on a 50 year straight line depreciation of actual costs. Payment of the said annexed area's share of the District's outstanding indebtedness shall be made annually thirty days prior to the District's bonded indebtedness payment schedule. Payment for the said depreciated value of District constructed local facilities shall be lump sum upon the City's election to assume said facilities unless otherwise agreed.

B. In the event that the total due under Section X (A) is not sufficient to compensate the District for the annexed area's pro-rata share of sewer system facilities, as paid to the City by the District under Section I hereof, then the City shall increase the amount due under Section X (A) by an amount equal to the annexed area's pro-rata share of sewer system facilities as provided in Section I hereof, said amount to be based on the depreciated value of said facilities on the date of the City's election to serve, as determined on a 50 year straight line depreciation formula. In the event that there is an amount due hereunder and said amount is to be added to the annexed area's share of annual payments on outstanding indebtedness, then the total due shall be amortized in equal payments on the basis of the outstanding bond issue having the least number of years remaining to be paid. In the event that the amount due hereunder relates to District-constructed facilities under Section X (A) above, then the total due hereunder shall be lump sum due on the date of the City's election.

XI.

The October 29, 1969, agreement, between the parties, plus amendments, is hereby rescinded.

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XII.

This Agreement shall be in full force and effect and binding upon the parties until March 31, 2020.

DATED this 30th day of Dec., 1981.

ALDERWOOD WATER DISTRICT

CITY OF EVERETT

WILLIAM E. MOORE, Mayor

ATTEST:

CITY CLERK

SECRETARY:

APPROVED AS TO FORM:

CITY ATTORNEY

EXHIBIT A

ALDERWOOD WATER DISTRICT ESTIMATED COST SHARE OF SEWER FACILITIES

Construction Year	Facility	Design Flow	Cost	AWD Flow	% Total Flow	Cost
1981-82	LS #24 & Force Main	3500 gpm *	$1,200,000	2300 gpm	46.0%	$ 552,000
1982-83	S. End Interceptor (North Segment)	40,300 gpm	5,000,000	2300 gpm	5.7%	285,000
1982-83	Treatment Plant Headworks	80,000 gpm	2,300,000	2300 gpm	2.9%	66,000
1988	S. End Interceptor (South Segment)	29,700 gpm	5,000,000	2300 gpm	7.7%	387,000
1990+	Treatment Plant Expansion	40.4 MGD	6,000,000	1.5 MGD	3.7%	223,000

* Cost shares computed based on 5000 gpm due to future removal of LS #26 flows.

10-8-81

.DERWOOD WATER DISTI CT
3626 - 156th St. S.W.
Lynnwood, Washington 98037-2399
(206) 743-4605 • FAX (206) 742-4562

WATER SERVICE | *Serving South Snohomish County* | SEWER SERVICE

November 16, 1994

Clair Olivers
Director of Public Works
City of Everett
3200 Cedar Street
Everett WA 98201

RE: Modification to Agreement
for Sewage Disposal from
Alderwood Water District to
Everett Facilities

Dear Mr. Olivers:

The Alderwood Water District is requesting your consideration to utilize existing purchased sewer capacity and treatment from Everett's sewer system to serve an area located outside of our current agreement boundary.

The specific area is located in the northern portion of the District in the vicinity of our current Lift Station #12 and lying westerly of our existing service area agreement boundary. The attached map shows the proposed additional service area.

We are requesting your consideration for this contract addendum for the following reasons:

1. The District's Lift Station #12 which serves this area is reaching capacity and service life.

2. Properties lying within this area suffer from failing septic systems or otherwise need sanitary sewer but are unable to obtain service to Lift Station #12.

3. The District is not fully utilizing our purchased treatment and trunk main capacity. Our calculations and monitoring indicate existing flows to the Everett system are approximately .8 MGD and 1113 GPM peak hour. Diverting Lift Station #12 flows and estimating growth at 2 percent per year equates to estimated flows in 2010 of approximately 1.5 MGD and 2200 GPM peak hour.

   Flows would required periodic monitoring to track against our purchased capacity.

4. The planned Swamp Creek Sewer Interceptor which will provide gravity service to this area is not planned to be constructed for approximately fifteen (15) years.

It is our intent this would be for an interim period. Our calculations and estimate of flows indicates our existing purchased treatment and trunk main capacity will serve this and the existing agreement service areas for approximately 15 years.

After 15 years, it is anticipated that the Swamp Creek Trunk Main would be available to provide gravity service and this new station would be de-commissioned. The service area boundary would then revert to the current service area.

We have submitted an Agreement to Stewart Development Corporation who would be constructing the new lift station under a Developer Extension Agreement. The Agreement is contingent upon approval by Everett of this request and an amendment of the current District's contract with the City.

Thank you for your consideration of this request. If you need additional information please give me a call.

Sincerely,

Gregory N. Williamson

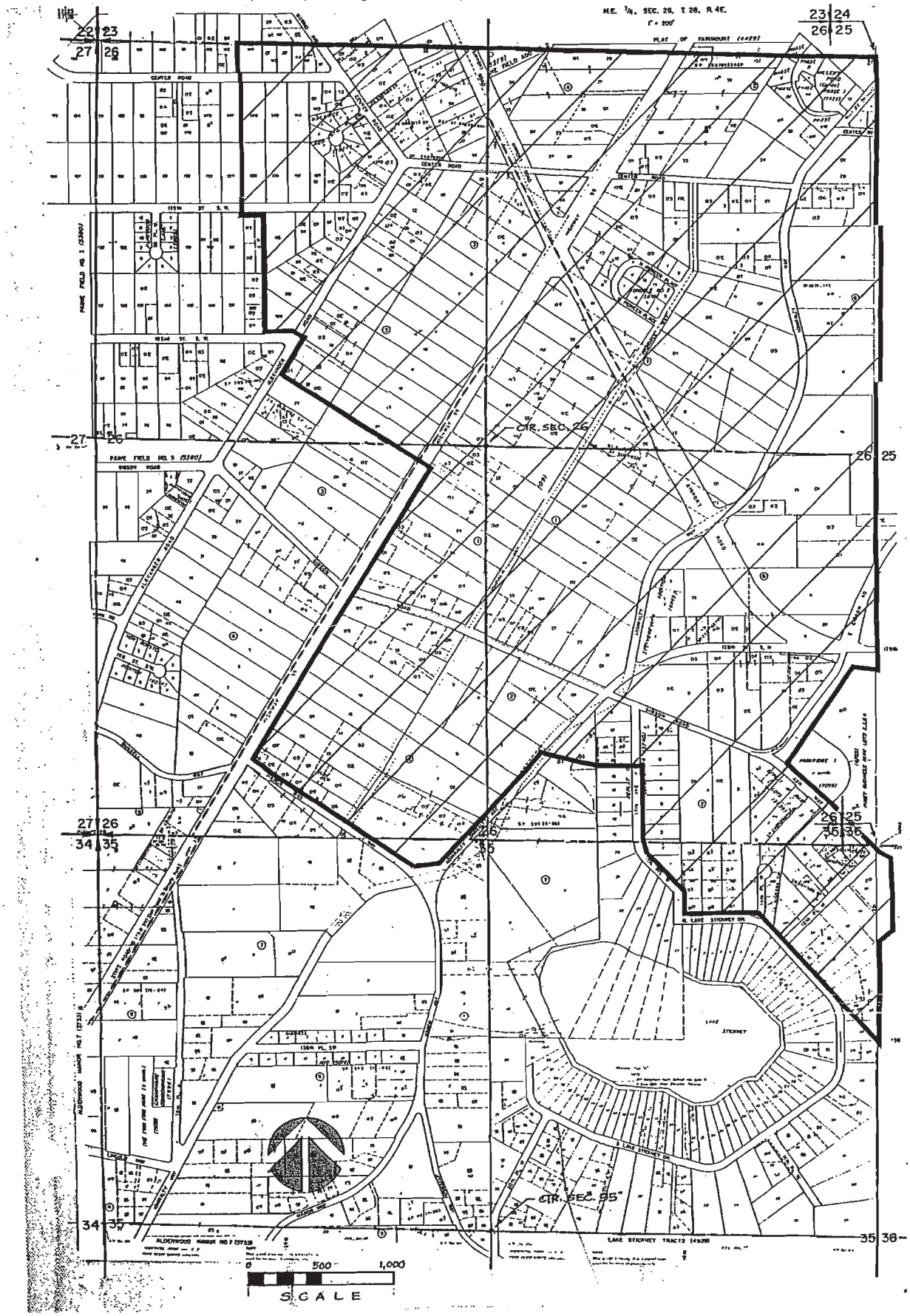
Gregory N. Williamson, P.E.
District Engineer

GNW:kph
Enclosure

EXHIBIT A"

Portions of Alderwood Water District included within this Agreement:

- Portions of Section 26 and North one half of Section 35, Township 28, Range 4 East, W.M.



PUBLIC WORKS
EVERETT

COPY

November 23, 1994

Arden Blackledge
General Manager
Alderwood Water District
3626 156th Street SW
Lynnwood, WA 98037

Subject: Proposed Modification to Alderwood/City Sewer Agreement

Dear Arden:

The proposed modification to our sewer service agreement outlined by Gregory Williamson in his letter of November 16, 1994 seems reasonable. Please direct your District Attorney to draft an amendment to our agreement for our mutual review and presentation to the District Board and City Council.

The amendment should address the time duration of the modification, the resulting impact on District flows to Everett, and a means to deal with uncertainty about the Swamp Creek Trunk extension to service the added area. You probably can add to my list of issues to be addressed in the amendment.

I anticipate a mutually-acceptable solution to the provision of this additional service.

Sincerely,

Clair Olivers
Public Works Director

CO:LM055ltr (11/23/94)

CITY OF EVERETT • 3200 Cedar Street • Everett, WA 98201 • (206) 259-8800 • Fax (206) 259-8856

A DERWOOD WATER DISTR T
3626 - 156th St. S.W.
Lynnwood, Washington 98037-2399
(206) 743-4605 • FAX (206) 742-4562

CLEAN WATER

WATER SERVICE | Serving South Snohomish County | SEWER SERVICE

August 21, 1995

OPERATIONS & MAINTENANCE

Clair Olivers
Director of Public Works
City of Everett
3200 Cedar Street
Everett WA 98201

RE: Sanitary Sewer Service,
Lake Stickney Area

Dear Clair:

We have just recently entered into an agreement with Stewart Development, Inc. to construct a new sanitary sewer lift station in the Lake Stickney area. The approximate service area is shown on the attached drawing "A".

In accordance with Article III of the December 30, 1981 Agreement between the District and the City of Everett, the flows from this lift station will be delivered to the City of Everett at the location shown on the attached drawing "B".

Our current schedule is to complete the design this Fall. The developer will then have one year to complete the construction. Initially when the new station is put into operation, the sanitary sewer flows being delivered to Everett will increase from approximately .8 MGD to .95 MGD which is within the limits established in the December 1981 Agreement.

This new discharge into the Everett system is considered interim. Eventually the Swamp Creek trunk main will be extended to provide gravity service to this area. At that time the flows will be diverted to the Metro system.

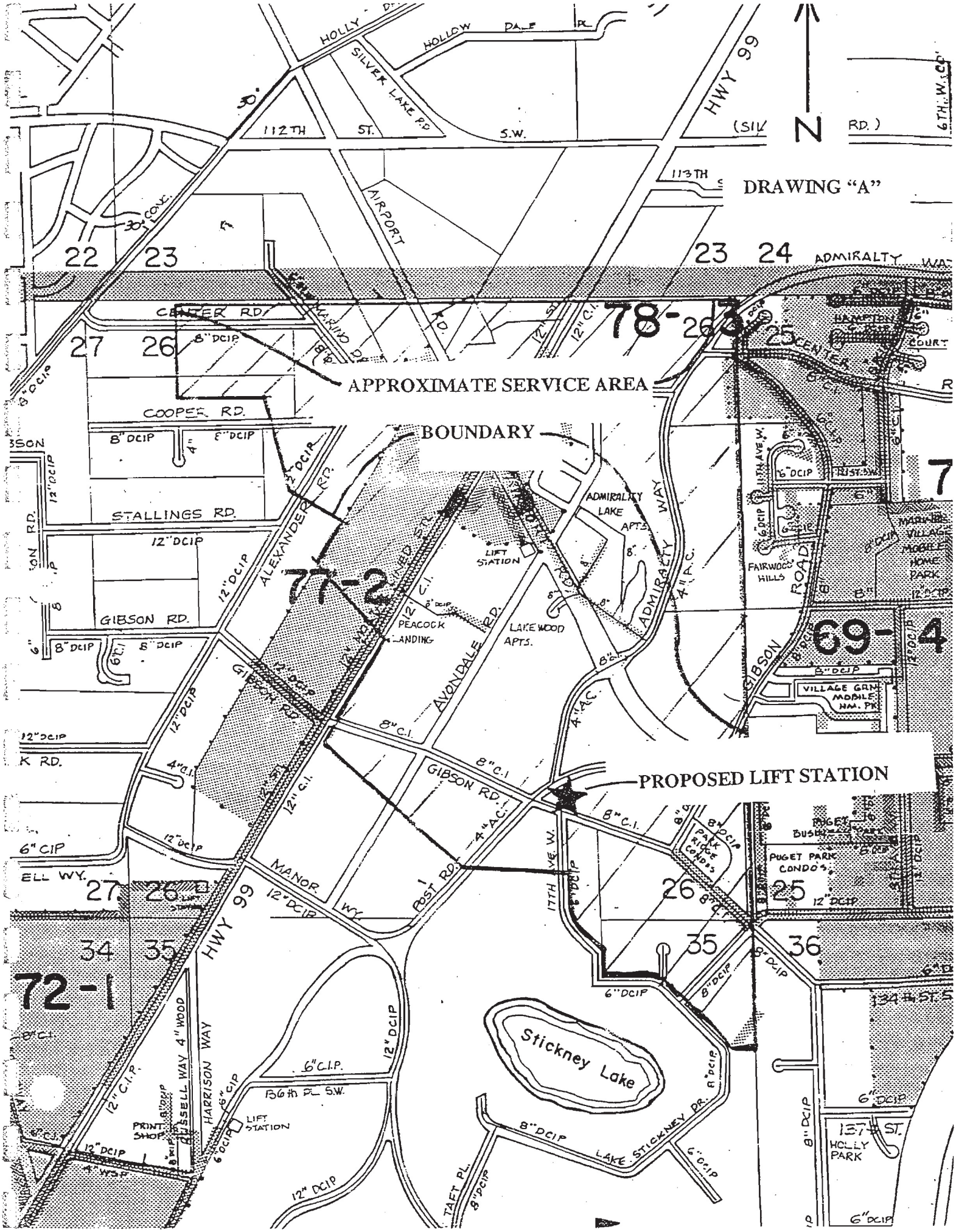
If you have any questions or comments on the District's proposed actions please give me a call.

Sincerely,

Gregory N. Willis

FOR Arden Blackledge, P.E.
General Manager

AB:jll
Enclosure


DRAWING "A"
N
APPROXIMATE SERVICE AREA
BOUNDARY
PROPOSED LIFT STATION
HOLLY DR.
HOLLOW DALE PL.
SILVER LAKE RD.
112TH ST. S.W.
HWY 99
AIRPORT
113TH
ADMIRALTY WAY
CENTER RD.
COOPER RD.
STALLINGS RD.
GIBSON RD.
ALEXANDER RD.
AVONDALE RD.
ADMIRALTY LAKE APTS.
LAKEWOOD APTS.
PEACOCK LANDING
LIFT STATION
FAIRWOOD HILLS
MANOR WY.
POST RD.
17TH AVE. W.
PARK RIDGE CONDOS
PUGET PARK CONDOS
PUGET BUSH PARK
MANOR VILLAGE MOBILE HOME PARK
VILLAGE GRN. MOBILE HM. PK.
HAMPTON COURT
Stickney Lake
LAKE STICKNEY DR.
136th PL. S.W.
137th ST.
HOLLY PARK
TAFT PL.
HARRISON WAY
RUSSELL WAY
PRINT SHOP
78-3
77-2
69-4
72-1
22
23
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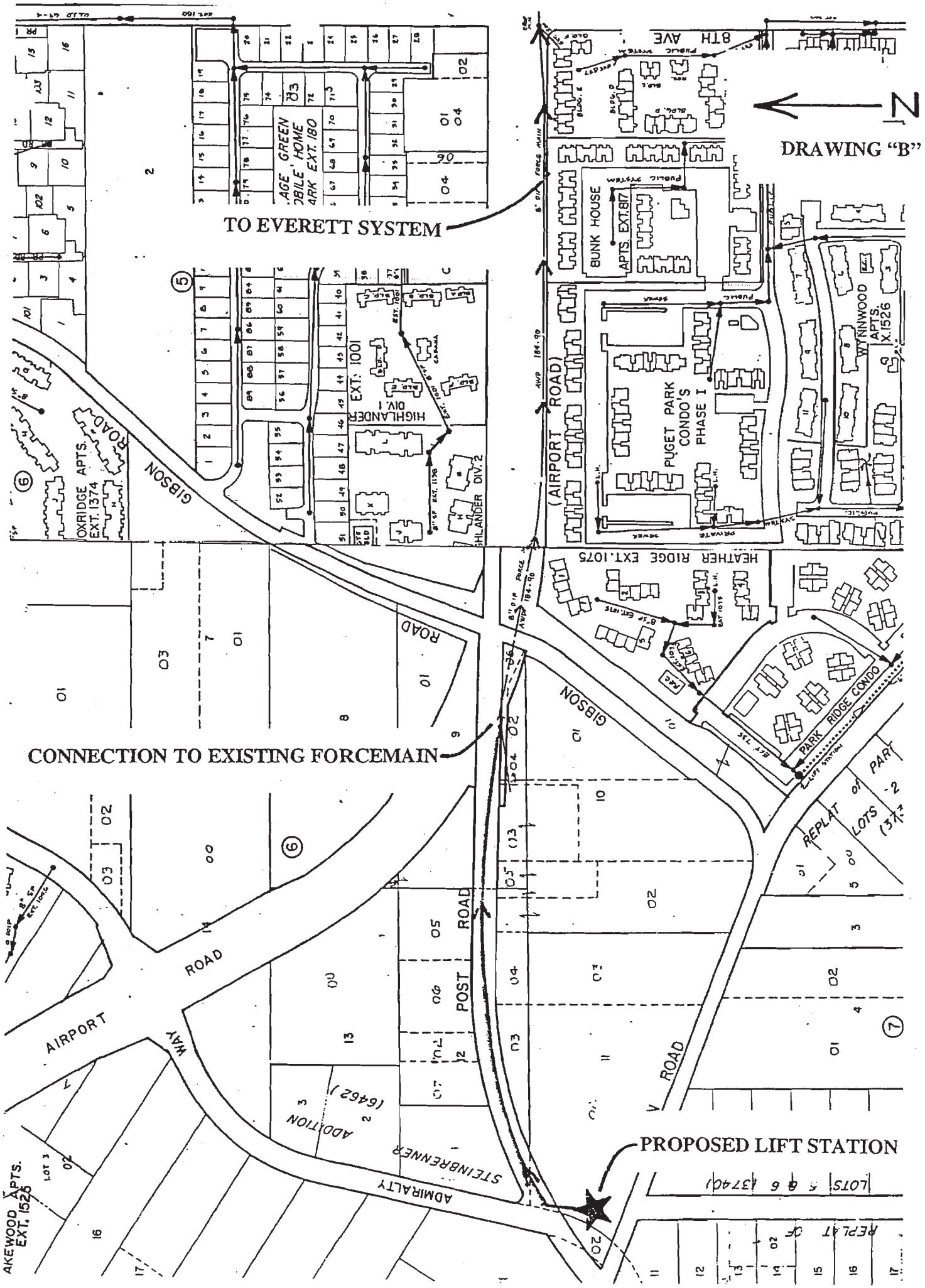
36


DRAWING "B"
N
TO EVERETT SYSTEM
CONNECTION TO EXISTING FORCEMAIN
PROPOSED LIFT STATION
8TH AVE
BUNK HOUSE
APTS. EXT.817
PUGET PARK CONDO'S PHASE I
WYNNWOOD APTS. EXT.1526
HIGHLANDER DIV.1 EXT. 1001
HIGHLANDER DIV.2
OXRIDGE APTS. EXT.1374
GIBSON ROAD
(AIRPORT ROAD)
HEATHER RIDGE EXT.1075
PARK RIDGE CONDO
REPLAT OF LOTS
AIRPORT WAY
POST ROAD
STEINBRENNER ADDITION (6462)
ADMIRALTY
AKEWOOD APTS. EXT. 1526

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Appendix G

Mukilteo Water and Wastewater District (WWD) Agreements

- Main Sewage Disposal Agreement
  - 1983 Agreement
  - 1985 Amendment
  - 1992 Amendment
  - 2003 Amendment
- Olympus Terrace Service Area Agreement
  - 1998 Agreement regarding Mukilteo WWD providing sewer service in this area

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RECORDED

1983 MAY -5 AM 11:52

DEAN V. WILLIAMS, AUDITOR
SNOHOMISH COUNTY, WASH.
DEPUTY

18

NO SALES TAX
REQUIRED

MAY 5 - 1983

KIRKE SIEVERS, Snohomish County Treasurer
By
Deputy

8305050204

AGREEMENT FOR SEWAGE DISPOSAL BETWEEN THE CITY OF EVERETT AND MUKILTEO WATER DISTRICT

THIS AGREEMENT made as of this 4 day of May, 1983, between MUKILTEO WATER DISTRICT of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District" and THE CITY OF EVERETT, a municipal corporation of the State of Washington, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the City and the District previously entered into a Contract on September 7, 1977, regarding sewage disposal; and

WHEREAS, the City and the District wish to rescind said Contract upon the entering of this Contract; and

WHEREAS, the City and the District recognize the need for the District to participate in the costs of certain facilities of the City sewerage system which are necessary to serve the District; and

WHEREAS, the District agrees to contribute toward the costs of said City sewer facilities which benefit the District.

NOW, THEREFORE, the parties agree:

I.

(A) In order that the City may provide sanitary sewerage transmission and treatment services for sewage flowing from the District into the City sewer system, the City and the District agree that the following sewerage system facilities shall be constructed and maintained by the City to service the following capacity requirements of the District:

MUKILTEO WATER DISTRICT
B06 - 5th St. P Box 217
Mukilteo, WA 98275
355-3355

8305050204

Facility	District Capacity Requirements
S. End Interceptor to Southwest Interceptor	2,500 gpm
S. End Interceptor Northern Segment	2,500 gpm
Headworks	2,500 gpm
Sewer Treatment Plant	1.7 MGD

Based on the above-stated District capacity requirements, the estimated costs for the District's share of the above-facilities is set forth in Exhibit A attached hereto and incorporated herein by reference. The capacity requirement immediately above are defined as follows:

GPM shall be defined as the average maximum flow over a one hour period.

MGD shall be defined as the average daily flow over a one year period.

(B) It is currently anticipated that the following sewerage system facilities shall be improved by the City in order to provide capacity in the following total amounts:

Facility	Total Facility Capacities
S End Interceptor to Southwest Interceptor	29,700 gpm
S. End Interceptor Northern Segment	40,300 gpm
Headworks	80,000 gpm
Sewer Treatment Plant	40.4 MGD

The above shall be defined in accordance with definitions set forth above.

MUKILTEO WATER DISTRICT
8006 - 5th St., P. O. Box 279
Mukilteo, WA 98275
355-3355

8805050204

VOL 1787 PAGE 2623

The District Capacity Requirements in Section (A) above were established by the District and submitted by the District to the City for inclusion in this Agreement. In reliance on said District Capacity Requirements established by the District, the City will size, design and construct, maintain or improve sewer facilities to serve both the City's and the District's capacity requirements. In the event that it is determined that the City's or the District's sewage flows exceed their respective capacity requirements, the City or the District, whichever is exceeding its allotted capacity, shall pay any and all damages or fines incurred by the City or the District in any manner related to or arising from exceeding the stated District or City Total Capacity Requirements. City shall notify District at any time that facility capacity problems are anticipated by the City and the City and the District shall meet to discuss and plan for future remedial measures at any time after the City's or District's flows exceed 80% of its above-stated capacity requirements. In the event the District exceeds its allotted capacity and the City and District have not reached agreement as to remedial measures, the City, after notification to the District, may take any one or all of the following remedial steps: (1) Refuse to allow any new sewer connections in the area tributary to the undersized facility; (2) Re-size, re-design and re-construct or improve the above facilities to such capacity as is determined will accommodate the capacity required; (3) Purchase or sell capacity from City or other District; and/or (4) Take all reasonable steps to reduce loading. In the event the City elects the second remedial step, the District agrees, as liquidated damages, to pay to the City <u>all</u> costs incurred by the City for the design and improvement of any of said facilities, including but not limited to all costs set forth in Section I(C) hereof, except the cost of design and construction to meet the City's and or other Districts' additional capacity requirements. Said costs shall be due and payable as provided in Section I(C). In the event that step (1) above is deemed necessary by the City

806 5th St., P. O. Box 217
Mukilteo, W. 98275
355-3355

or District, the party contemplating action shall submit notice thereof at least thirty (30) days prior to taking final action. The District shall have no responsibility for total facility capacities, except as provided herein; provided that, in the event the City determines to refuse new connections tributary to facilities which are at or exceed capacity, District will refuse also to allow new connections to such facilities.

The City shall take all reasonable actions to ensure the preservation to the District of any and all unused District capacity throughout that part of the Everett sewerage system described in §I hereof serving the District, until used and/or sold by the District. In the event the City utilizes the full capacity of said part of the system affecting the District prior to the District's full use of its contracted capacity, either of the following remedies shall apply, at the election of the District:

1) The City shall compensate the District in monies for its loss of the remaining portion of its unused capacity. Compensation shall be by negotiation and, in the event the parties cannot agree upon such compensation, the amount shall be determined by arbitration under the procedure set forth in §II hereof.

2) City shall, at its own expense, expand its facilities, in order to accommodate the balance of the District's contracted for capacity.

(C) The District agrees to pay to the City from the gross revenues of the sewer system the following percentage share of total costs of said facilities (said percentage share being calculated by dividing the District's Capacity Requirements by the Total Facility Capacities above):

MUKILTEO WATER DISTRICT
8006 5th St., P.O. Box 217
Mukilteo, WA 98275
355-3355

Facility	Percentage Share Of Total Cost Payment to City
S. End Interceptor to Southwest Interceptor	8.4%
S. End Interceptor Northern Segment	6.2%
Headworks	3.1%
Sewer Treatment Plant	4.2%

The total cost of each facility to which said percentage shall be applied shall include but not be limited to engineering costs and fees, all payments to consulting engineers or contractors, or otherwise, for labor, materials, equipment, overhead, etc., right-of-way, or land costs, testing, inspection, legal fees, and interim financing costs. Payments to the City shall commence with approval by the City of the Engineer's and/or the Contractor's progress payments for work performed so that payments from the District will coincide with the City's payments to Engineers/Contractors. Final total costs will be established and adjusted upon release of all claims against said projects. The District's obligation to the City shall be junior to all present and future bonded indebtedness of the District.

MUKILTEO WATER DISTRICT
806 - 5th St. P.O. Box 217
Mukilteo, WA 98275
355-3355

II.

In addition to the payments set forth in Section I above, the District shall pay the City from the gross revenues of its sewer system a sewage disposal maintenance and operation charge (M & O charge) determined on the basis of 38% of the City's monthly sewer service rate for single family residences X 1.20 surcharge X total District customer equivalents. Payments shall be monthly, due within thirty (30) days of billing.

The General formula for determination of the M & O Charge is:

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District % Share of Total Costs X City Single Family Service Rate
District % of Total Customer Equivalents X 1.20 Surcharg
= Monthly Sewer Rate Per Customer Equivalent

in accordance with the following understandings:

(A) Customer equivalents shall be single family residence equivalents and shall constitute the total number of single family residences to which the District or the City provides service and effluent to the City's treatment plant, plus all other metered water usage divided by 900 cubic feet per month. The City's total single family equivalents shall be determined from the City's December billings. The District's single family equivalents shall be determined monthly for purposes of determining the District's monthly M & O Charge. For purposes of determining the District's percentage of total equivalents, the determination shall be based on the District's December billing.

(B) The City's monthly service rate shall be the current City of Everett single family residence sewer service rate; or as such rate may be revised in the future.

(C) The District's % share of total costs for the year 1981 is agreed to be 0.65%.

The District's % of total system customer equivalents for the year 1981 is agreed to be 1.7%

The District's % of City monthly service rate (before 1.20 surcharge) is agreed to be 38% for the year 1981.

On or about February of 1983, and each year thereafter, the City shall submit to the District a proposed new percentage of City monthly service rate to be used for the forthcoming year, together with a summary of the final previous year's sewer expenditures. Said new percentage of total costs shall be applied to the monthly M & O charge commencing April 1, 1983, through March 31, 1984, and each year thereafter shall be subject to modification as provided herein. In the event of disagreement between the City and the District as to the District's percentage share of total costs for the forthcoming year,

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355-3355

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the parties shall arbitrate their differences in accordance with the commercial arbitration rules of the American Arbitration Association, using a three-arbitrator panel through the Seattle Regional Office. The determinations made by the panel shall be retroactive to April 1 of such year.

The District's percentage share of total costs is not expected to include all Everett sewer system costs. The previous year's cost analysis may be used as a guideline wherein, after determination of the District's percentage share of total customer equivalents as of December 31, line items of the Everett sewer system expenditures were reduced or increased in accordance with the exercise of judgment and experience as to the costs to serve the District. In determining the District's percentage share of total costs, it is agreed that the following guidelines will be followed:

(1) The District shall not be charged for in-City drainage.

(2) The District shall not be charged the costs of construction and maintenance of lateral or collector service lines to in-City customers.

(3) Because of the District's current payment for capital facilities as stated in Article 1 hereof, the District shall not be charged for the City's 1980 bond issue. The District will be charged in accordance with its total percentage of total customer equivalents as of December 31 each year on the 1978 bond issue. District's M & O shall not include future bond issues of the City except in the event City bond issue funds are used to construct facilities of benefit to the District The parties shall meet to discuss said benefits.

(4) Mukilteo shall not be charged lift station costs as long as it continues not to utilize any City lift stations.

(5) Unless actual cost analysis demonstrates a higher amount of benefit, the District shall be charged at 1% of the following costs:

- Maintenance of manholes and lids
- Cleaning sewer mains
- Repair of sewer mains
- Customer records and collection

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(6) The following general system costs will be applied in accordance with the District's December 31 percentage of total customer equivalents:

- Treatment and lagoon operations, including sewer lagoon acquisition costs in the event such costs are paid from this account
- Administration and supervising costs
- Engineering and records
- Outside services and consulting
- Injuries and damages (insurance)
- Bad debts and uncollectable expenses
- Regulatory expenses
- Miscellaneous general expenses
- General Plant
- Taxes and payments in lieu of tax
- Interest on accounts

(7) Special programs which are not included as a capital cost under Article I herein will be analyzed by City and District according to benefits.

(8) The 20% surcharge shall remain constant.

The City shall notify the District in writing of all contemplated rate changes in order to allow the District to appear and present evidence. Said notice shall be the same as for citizens of the City. If the City fails to so notify, the District shall be allowed a special hearing to present evidence for the Council concerning rate modification.

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III.

The District may deliver to the City all of the sewage and industrial waste collected by the District within the boundaries of Exhibit B, and the City shall accept the sewage and waste delivered for treatment and disposal as hereinafter provided subject to such reasonable rules and regulations as may be adopted from time to time by the City Council, subject to capacities set forth in Section I hereof. In the event that an adjacent city/district obtains capability to serve certain areas of the District as determined by the District to be beneficial to it then and in that event, after notification to the City 60 days prior to the flow diversion and consultation with the City, the District may in its sole discretion serve such areas by connections to others in a different flow direction. This will not release the District from any portion of any required payments to the City under §I above.

IV.

Sewerage facilities of the District which may be required for the delivery of sewage and wastes to the City may be connected to facilities of the City sewerage system. Such connection shall be accomplished at the expense of the District and in accordance with the rules and regulations of the City. The initial points of connection of the District's system to the City's system are herewith fixed and shall be in the trunk lines of the City system. The City and the District may, as hereinafter provided, mutually agree to designate additional or alternate points of connection for receiving the District's sewage to the City system which may include connections to other districts which in turn connect to the City system. The District has already installed flumes to measure inflow into City's system. City will install metering devices to measure its inflow into District's system. The District and the City shall install at their respective expense flow recording devices at locations which will best measure incoming sewage flows when capacity concerns become evident.

V.

The District shall be responsible for the delivery to the City sewerage system of sewage collected by the District which is required to be delivered to the City hereunder, for the construction, maintenance and operation of local sewerage facilities, and for the payment of all costs incident to the collection of such sewage and its delivery to the City sewerage system. It is expressly understood that the District will be responsible for the delivery of its sewage to the City sewerage system at such points as provided in Article IV. The City may but shall not be obligated to construct trunk lines and pump stations located within the District upon reasonable notice to the District. It is contemplated that the District will build local sewers or build or secure the use of other facilities to deliver its sewage

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to the City at the points hereinbefore described. All District sewers or other temporary sewerage facilities carrying sewage delivered to the City shall be constructed and maintained in accordance with the rules and regulations of the City which shall be consistent with APWA, DSHS and DOE standards. All such District sewers or temporary facilities will be maintained by the District at no expense or risk to the City.

VI.

City may upon written approval of the District discharge sewage into District sewerage facilties within the District service areas contemplated under this Agreement; whenever District sewage capacity is available; provided further that in such event, the City shall be obligated to pay its fair pro-rated share of the facility based on the method of assessment used to finance said facility and M & O costs related to such discharges, including but not limited to lift station costs.

VII.

Permanent books and records shall be kept by the City and the District in order to establish rates, volumes of sewage delivered and discharged into and treated by the City sewerage system wherever such volumes are measured and the number of Residential Customers and Residential Customer Equivalents reported. The records required by this paragraph shall be available for examination by either party at any reasonable time after five (5) working days' notice for a period of seven years.

VIII.

In the event of third party claims for injuries or damages arising out of or related to this Agreement, the City and the District shall have rights of indemnity against the other at any time after a claim is filed and for a period of three years following release or payment of a claim. Indemnification shall be determined on the basis of proportionate share of fault, if

MUKILTEO WATER DISTRICT
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any. In the event that a lawsuit is filed against either pary in which the other is not named, rights of indemnification shall be determined by binding arbitration under the procedure described in Article II hereof.

IX.

The District shall not have the right to assign this Agreement or any of its rights and obligations hereunder either by operation of law or by voluntary agreement without the written consent of the City and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party and this Agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto. Provided that the District, by agreement of the City, may sell unneeded capacity to others who are a party to agreements with the City.

X.

In the event the City annexes any of the District's area served by facilities under this Agreement, then the City at any time may elect to provide sewer service to customers served by the District in the City's annexed area. If the City so elects, the District's Capacity Requirements shall be reduced proportionately as the sewage flows in the annexed area relate to the total District sewage flows, as stated in Section I hereof, and the City shall be required to pay compensation to the District for said customers and capacity as follows:

A. Local facilities serving customers in the annexed area shall become the responsibility of the City; provided that the District shall continue to maintain and be responsible for any general District facilities, such as lift stations, or interceptors, trunk sewers and laterals serving both the annexed area and the non-annexed area. In cases where sewage from such annexed areas is transmitted through general District facilities to City facilities, the City shall pay the District the maintenance and operation M & O charge determined from the following general formula:

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City's % of Share of Total Costs X District Single Family Service Rate
City's % of Total Customer Equivalents x 1.20 Surcharge
less the City's Monthly Sewer Rate to District

= Monthly Sewer Rate Per Customer Equivalent

The guidelines for determining the above rates shall be consistent with those shown in §II herein.

Pursuant to RCW 35.13A, the City shall make annual payments to the District for the annexed area's pro-rata share of the District's total outstanding sewer revenue bond obligations in accordance with annexed area's pro-rata share of the remaining annual payments schedule of said obligations at the time of election. In the event that there are any local facilities in the annexed area assumed by the City which have been constructed with District-wide funds or revenue bond funds (excluding developer or privately installed facilities or facilities constructed from assessments in the annexed area), then the City shall pay the greater of either the total amount of the said pro-rata share of the District's outstanding bonded indebtedness or the depreciated value of said local facilities based on a 50 year straight line depreciation of actual costs. Payment of the said annexed area's share of the District's outstanding indebtedness shall be made annually thirty (30) days prior to the District's bonded indebtedness payment schedule. Payment for the said depreciated value of District constructed local facilities shall be lump sum upon the City's election to assume said facilities unless otherwise agreed. Where the City effluent flows into District facilities, then the City shall pay to the District according to the same formula.

B. In the event that the total due under §XA above is not sufficient to compensate the District for the annexed area's pro-rata share of sewer system facilties, as paid to the City

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by the District under Section I hereof, then the City shall increase the amount due under (§)XA by an amount equal to the annexed area's pro-rata share of sewer system facilities as provided in Section I hereof, said amount to be based on the depreciated value of said facilities on the date of the City's election to serve, as determined on a 50 year straight line depreciation formula. In the event that there is an amount due hereunder and said amount is to be added to the annexed area's share of annual payments on outstanding indebtedness, then the total due shall be amortized in equal payments on the basis of the outstanding bond issue having the least number of years remaining to be paid. In the event that the amount due hereunder relates to District-constructed facilities under (§)XA above, then the total due hereunder shall be lump sum due on the date of the City's election.

C. Any annexations made by the City of portions of the sewer function of the District where the City takes action to provide service to District customers shall remove such areas from the sewer function of the District for all purposes except payments for bonded indebtedness as set forth herein.

XI.

This Agreement shall be in full force and effect and binding upon the parties until March 31, 2023.

Thereafter, the parties shall be required to continue service for additional five year periods in the event the other party gives notice of intent to continue pursuant to the above procedure until the year 2033 at which time, in the event the parties mutually agree that sewer treatment and transmission service by the City should be continued, the parties shall meet and negotiate mutually acceptable terms for continued service.)

XII.

The September 7, 1977 Contract between the parties is hereby rescinded.

DATED: May 4 1983

MUKILTEO WATER DISTRICT
806-5th St., P. O. Box 217
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MUKILTEO WATER DISTRICT

Frank J. Brennan
Commissioner

Ronald A. Kane
Commissioner

Michael G. Bahr
Commissioner

ATTEST:

Edward W. Kuhlin

CITY OF EVERETT

William E. Moore
WILLIAM E. MOORE, Mayor

ATTEST:

Elaine Moschelle
City Clerk

APPROVED AS TO FORM:

Richard Jones
City Attorney

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EXHIBIT A

MUKILTEO WATER DISTRICT IMATED COST SHARE OF SEWER FACILITIES

Construction Year	Facility	Design Flow	Cost	MWD Flow	% Total Flow	Cost
1982-83	S. End Interceptor (North Segment)	40,300 gpm	$5,000,000	2500 gpm	6.2%	$ 310,000
1982-83	Treatment Plant Headworks	80,000 gpm	2,300,000	2500 gpm	3.1%	72,000
1988	S. End Interceptor (South Segment)	29,700 gpm	5,000,000	2500 gpm	8.4%	421,000
1990+	Treatment Plant Expansion	40.4 MGD	6,000,000	1.7 MGD	4.2%	252,000

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MUKILTEO WATER DISTRICT
806 5th St., P. O. Box 2...
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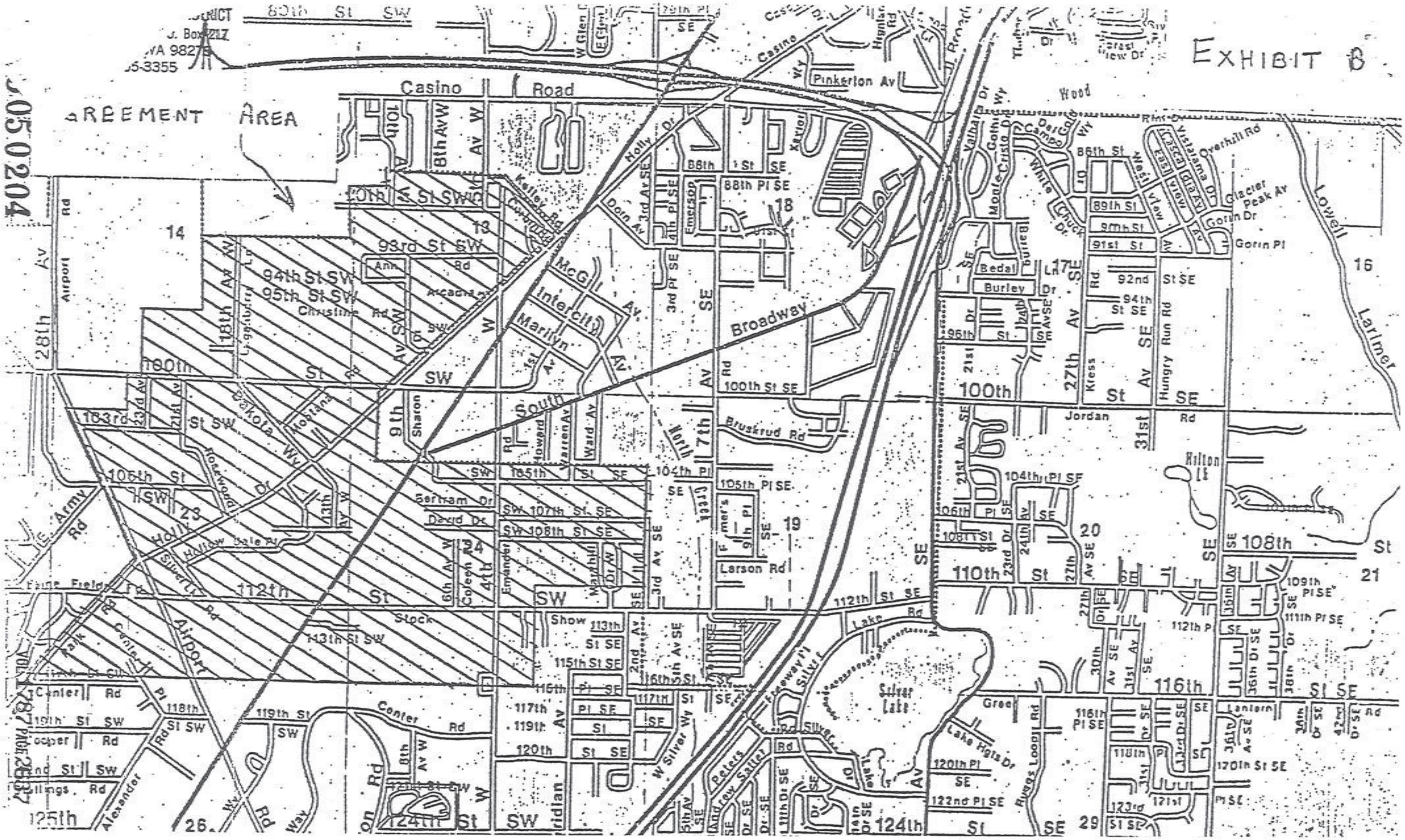
EXHIBIT B



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VOL 1787 PAGE 2687

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DON W. WILLIAMS, AUDITOR
SNOHOMISH COUNTY, WASH
DEPUTY Betty Danielsons

AGREEMENT FOR SEWAGE DISPOSAL
BETWEEN
THE CITY OF EVERETT
AND
MUKILTEO WATER DISTRICT

AMENDMENT NO. 1

8602060198

THIS AGREEMENT made as of this 28th day of Aug., 1985, between Mukilteo Water District of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District" and the City of Everett, a municipal corporation of the Sta referred to as "City."

Original filed in Sewer City of Everett

WITNESSETH:

WHEREAS, the City and the District previou on May 4, 1983, regarding sewage disposal; and

WHEREAS, the City and the District wish to amend said agreement in order to add additional service areas to the District under certain conditions;

NOW, THEREFORE, the parties agree:

Section III of the May 4, 1983, agreement between the parties is hereby amended by adding the following:

> "In addition to delivery to the City of all sewage and industrial waste collected by the District within the boundaries of Exhibit B, the District may deliver all sewage and industrial waste collected within the boundaries of Exhibit C attached hereto and incorporated herein by reference; provided that the District shall continue to be responsible to assure that total effluent from the District to the City, including that from the area shown in Exhibit C, shall not exceed the capacities set forth in Section I(A)."

All other terms and conditions of said May 4, 1983, agreement shall remain in full force and effect.

DATED this 28th day of Aug., 1985.

CITY OF EVERETT

WILLIAM E. MOORE, Mayor

MUKILTEO WATER DISTRICT

ATTEST:

CITY CLERK

MUKILTEO WATER DISTRICT
806 - 5th St., P. O. Box 217
Mukilteo, WA 98275
355-3355

APPROVED AS TO FORM:

CITY ATTORNEY

8602060198

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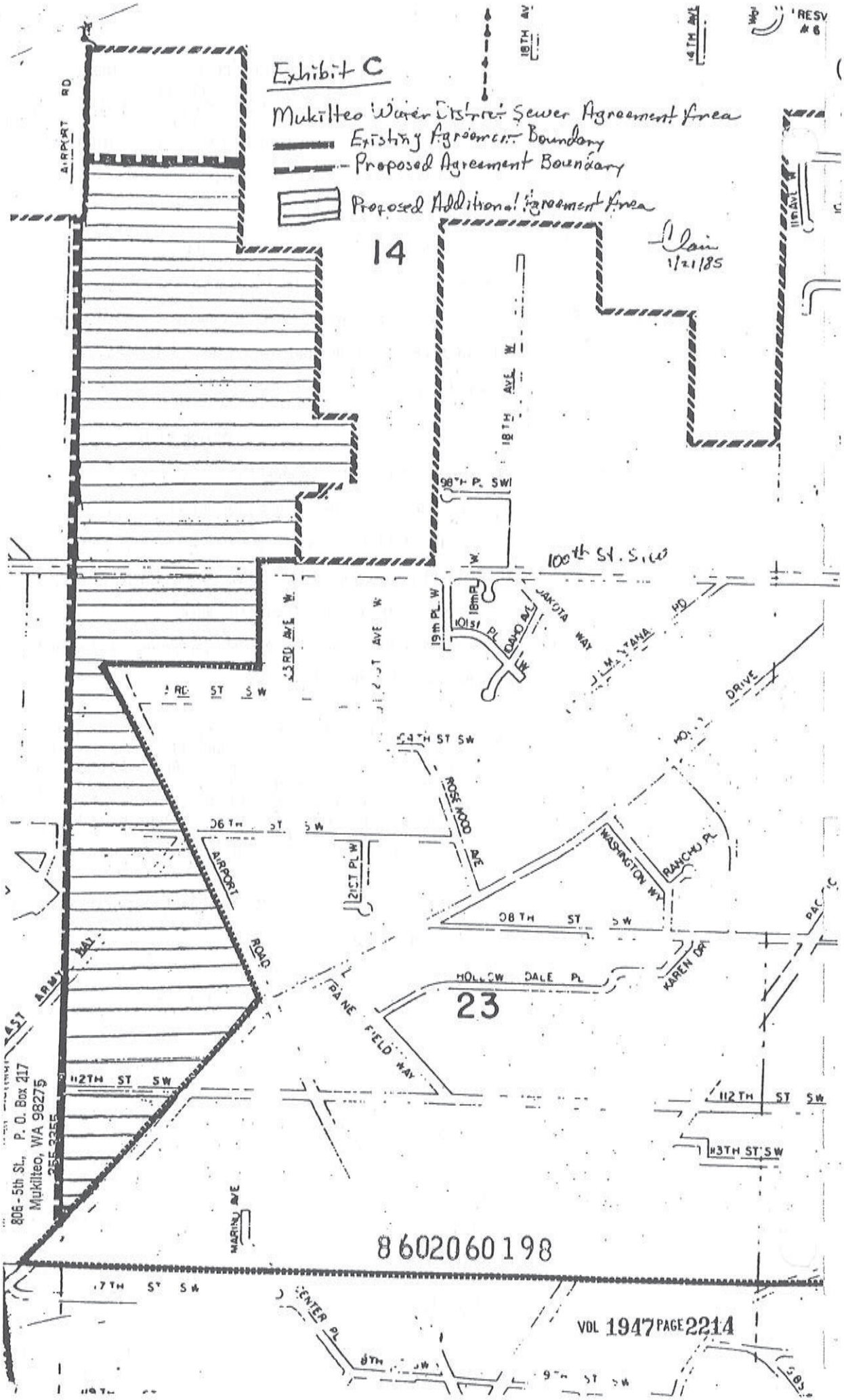
Exhibit C
Mukilteo Water District Sewer Agreement Area
Existing Agreement Boundary
Proposed Agreement Boundary
Proposed Additional Agreement Area
14
23
AIRPORT RD
18TH AVE W
98TH PL SW
100th ST. SW
JAKOTA WAY
MONTANA RD
DRIVE
ROSEWOOD AVE
WASHINGTON WY
RANCHO PL
KAREN DR
HOLLOW DALE PL
AIRPORT ROAD
ARMY WAY
CRANE FIELD WAY
112TH ST SW
113TH ST SW
MARINO AVE
CENTER PL
806-5th St., P. O. Box 417
Mukilteo, WA 98275
255-3255
8602060198
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RECEIVED

JUL 1 1992

MUKILTEO WATER DIST.

11

NO EXCISE TAX REQUIRED

JUL 6 1992

KIRKE SIEVERS, Snohomish County Treasurer
By KIRKE SIEVERS

AMENDMENT TO MAY 4, 1983
AGREEMENT FOR SEWAGE DISPOSAL
between
THE CITY OF EVERETT
and
MUKILTEO WATER DISTRICT

9207060392

THIS AGREEMENT made as of this 24th day of June, 1992, between Mukilteo Water District of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District," and the City of Everett, a municipal corporation of the State of Washington, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the City and the District wish to amend the May 4, 1983 agreement between the parties in order to increase the authorized capacity of the District for Sewage Disposal in City sewage facilities and in order to clarify the City's and the District's rights and obligations in the event of annexation of District territory;

NOW, THEREFORE; the parties agree:

I. A new Subsection is hereby added to Section I of the May 4, 1983, agreement for Sewage Disposal between the District and the City:

(D) (1) Due to the increases in anticipated sanitary sewage transmission and treatment services required by the District, the City and the District agree that the following sewage system facilities be sized by the City to service the following capacity requirements of the District (in addition to the capacity requirements set forth in I(A) herein) determined as the average maximum flow measured over a one-hour period (except Sewer Treatment Plant flow which is average daily flow over a one year period):

Facility	District Capacity Requirements
S. End Interceptor to Southwest Interceptor	1,000 gpm
S. End Interceptor Northern Segment (1983)	1,000 gpm
Headworks	1,000 gpm
Sewer Treatment Plant	.6 MGD

(2) It is currently anticipated that the following sewerage system facilities shall be improved by the City in order to provide capacity in the following total amounts determined as the average maximum flow measured over a one-hour period (except Sewer Treatment Plant flow which is average daily flow over a one year period):

Facility	Total Facility Capacities
S. End Interceptor to Southwest Interceptor	32,000 gpm
S. End Interceptor Northern Segment (1983)	45,000 gpm
Headworks	80,000 gpm
Sewer Treatment Plant	40.4 MGD

(Total facilities capacities have been revised from May 4, 1983, agreement.)

Based on the above-stated capacity requirements, the estimated costs (in addition to costs established for the capacity requirements set forth in I(B) herein) of the District's share of the above facilities is set forth in Exhibit C attached hereto and incorporated herein by reference. The District Capacity Requirements in Section I(D)(1) above were established by the District and submitted by the District to the City for inclusion in this Amendment. In reliance on said District Capacity Requirements established by the District, the City will size, design and construct, maintain or improve sewer facilities to serve both the City's and the District's capacity requirements. Remedies for flows in excess of total Section I capacity shall be as provided in Section I(B) herein.

(3) The District agrees to pay to the City from the gross revenues of its sewer system the following percentage share of total costs of said facilities (said percentage share being calculated by dividing the District's additional Capacity Requirements under the May 4, 1983, agreement and this Amendment by the Total Facility Capacities above):

Facility	Percentage Share of Total Cost Payable To City under 5/4/83 Agreement	Percentage Share Of Total Cost Payable to City Under This Amendment	New Total
S. End Interceptor to Southwest Interceptor	8.4%	2.5%	10.9%
S. End Interceptor Northern Segment	6.2%	1.6%	7.8%
Headworks	3.1%	1.3%	4.4%
Sewer Treatment Plant	4.2%	1.5%	5.7%

The total costs of each facility to which said percentage shall be applied shall be determined and paid as provided in Section I(C) herein.

II. Section IX is hereby revised to read hereafter as follows:

The District shall not have the right to assign this agreement or any of its rights and obligations hereunder either by operation of law or by voluntary agreement without the written consent of the City, and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party, and this agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto. Provided, that the District, by agreement of the City, may sell unneeded capacity to others who are a party to agreements with the City or who are Special Purpose Districts organized pursuant to Title 56 or Title 57 RCW which are contiguous to the District; provided that any such Special Purpose District shall be lead agency and shall pay all costs for all SEPA review or SEPA procedures related to such assignment.

III. Regarding Section X, the compensation provisions provided herein are not exclusive, and the parties may agree to other provisions where the City annexes District facilities. Proportionate reduction of District capacity in City sewer facilities due to City annexations shall be based on the District's sewer comprehensive planning for the area annexed.

IV. This arrangement shall constitute joint water/sewer facilities planning as required under the Growth Management Act.

DATED this 24th day of June, 1992.

Mukilteo Water District

Approved As To Form:

Ronald A. Kane
President

Michael G. Bakht
Secretary of Board

Michael P. Ruan
District Attorney

City of Everett

Approved As To Form:

Robert Fenich
Mayor

Attest:

Lorna L. Rodin
City Clerk

M. Weight
City Attorney

agreements:jg\Mukilteo (5/18/92)

9207060299

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MUKILTEO SEWER AGREEMENT AMENDMENT

EXHIBIT C (PAGE 1 OF 2)

Increase in district capacity will increase facility cost by approximately the following amounts:

S. End Interceptor Northern Segment	$70,095.11
Headworks	43,121.55
Sewer Treatment Plant	284,118.93
TOTAL:	**$397,335.59**

NOTE: All future Sewer Treatment Plant improvement costs will be shared based on percentages to be determined, currently estimated at 6%, TOTAL, for Mukilteo. All costs for the 1991-1992 portions of the South End Interceptor will be allocated per the table on page 2 of this schedule.

EXHIBIT C (PAGE 2 OF 2)

SEGMENT	COST MILLIONS	CAPACITY GALS/MIN	CITY CAPACITY	%	SLWD CAPACITY	%	AWD CAPACITY	%	MWD CAPACITY	%
Silver Lake	$1.3	4,550	3,719	82%	831	18%		0%		0%
South	$5.5	16,000	4,500	28%	11,500	72%		0%		0%
Middle	$3.1	16,000	4,500	28%	11,500	72%		0%		0%
North	$4.6	32,000	14,700	46%	11,500	36%	2,300	7%	3,500	11%
West	$0.7	13,900	8,100	58%		0%	2,300	17%	3,500	25%
TOTAL DOLLARS	$15.2			$6.0		$8.1		$0.4		$0.7

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Filed for record 7/6/92 1:08 AM PM
Request Mukilteo Water Dist.
DEAN V. WILLIAMS, Snohomish Co. Auditor

9207060392

MO:EXC:WQ1 03/26/92

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AMENDMENT TO MAY 4, 1983
AGREEMENT FOR SEWAGE DISPOSAL
between
THE CITY OF EVERETT
and
MUKILTEO WATER DISTRICT

THIS AMENDMENT made as of this 21st day of April, 2003, between Mukilteo Water District of Snohomish County, a municipal corporation of the State of Washington, hereinafter referred to as the "District," and the City of Everett, a municipal corporation of the State of Washington, hereinafter referred to as "City."

WITNESSETH:

WHEREAS, the City and the District entered into an agreement for sewage disposal on May 4, 1983 (the "Agreement"); and

WHEREAS, the City and the District amended the Agreement on October 15, 1985 to add service areas to the District under certain conditions (the "1985 Amendment"); and

WHEREAS, the City and the District further amended the Agreement on June 24, 1992 ("1992 Amendment"), in which the District purchased additional capacity; and

WHEREAS, the City has annexed approximately one thousand acres in the District's service area since 1983; and

WHEREAS, the District no longer needs all of the capacity it purchased pursuant to the 1992 Amendment; and

WHEREAS, the District desires to sell, and the City desires to purchase, most of the capacity it purchased in the 1992 Amendment; and

WHEREAS, such sale and purchase will decrease District's historical Headworks/Interceptor facility cost by Three Hundred Thirty-one Thousand Seven Hundred Thirty-eight dollars ($331,738.00) and its historical Sewer Treatment Plant facility cost by Three Hundred Twenty-one Thousand Three Hundred Thirty-two dollars ($321,332.00), for a total decrease of Six Hundred Fifty-three Thousand Seventy dollars $653,070

WHEREAS, Section X of the Agreement sets forth procedures for City to purchase District Capacity allocations in areas annexed to the City previously served by the District; and

NOW, THEREFORE; the parties agree:

1. The District agrees to sell, and the City agrees to purchase, capacities it no longer needs so the District will have the capacities described herein.

2. Within sixty days of the effective date of this Amendment, the City shall pay the District Six Hundred Fifty-three Thousand Seventy dollars ($653,070.00).

3. Subsection I(D)(1), which was added by the 1992 Amendment, is hereby deleted.

4. Subsection I(A), is modified to read as follows:

The City and the District agree that the following sewerage system facilities shall be constructed and maintained to service the following capacity requirements of the District.

Facility	District Capacity Requirements
S. End Interceptor to Southwest Interceptor	2,500 gpm
S. End Interceptor Northern Segment	2,500 gpm
Headworks	2,500 gpm
Sewer Treatment Plant	1.6 MGD

Based on the above-stated District capacity requirements, the estimated costs for the District's share of the above facilities is set forth in Exhibit A [PBC1]attached hereto and incorporated by reference. The capacity requirement immediately above are defined as follows:

GPM shall be defined as the average maximum flow over a one hour period.
MGD shall be defined as the average daily flow over a one year period.

5. Subsection I(D)(3), which was added by the 1992 Amendment, is hereby deleted.

6. Section I(C) is modified to read as follows:

The District agrees to pay to the City from the gross revenues of the sewer system the following percentage share of total costs of said facilities (said percentage share being calculated by dividing the District's Capacity Requirements by the Total Facility Capacities above):

Facility	Percentage Share Of Total Cost Payment to City
S. End Interceptor to Southwest Interceptor	7.8%

S. End Interceptor Northern Segment	5.6%
Headworks	3.1%
Sewer Treatment Plant	4.0%

The total cost of each facility to which said percentage shall be applied shall include but not be limited to engineering costs and fees, all payments to consulting engineers or contractors, or otherwise, for labor, materials, equipment, overhead, etc., right-of-way, or land costs, testing, inspection, legal fees, and interim financing costs. Payments to the City shall commence with approval by the City of the Engineer's and/or the Contractor's progress payments for work performed so that payments from the District will coincide with the City's payments to Engineers/Contractors. Final total costs will be established and adjusted upon release of all claims against said projects. The District's obligation to the City shall be junior to all present and future bonded indebtedness of the District.

7. This Agreement shall be effective as of the date of attestation by the Everett City Clerk.

8. This Amendment constitutes joint water/sewer facilities planning pursuant to the Growth Management Act.

9. Except as otherwise expressly modified by this Amendment, the terms and conditions of the Agreement, as amended by the 1985 Amendment and 1992 Amendment, remain in full force and effect.

CITY OF EVERETT
WASHINGTON

By: Frank E. Anderson
Frank E. Anderson, Mayor

4/21/03
Date

APPROVED AS TO FORM::

Mark T. Soine, City Attorney
Date: 4/21/03

Mukilteo Water District

[Address] P.O. Box 260 Mukilteo, WA 98275

By: William A. Allison
Typed/Printed Name: William A. Allison
Position/Office: President

March 12, 2003
Date

APPROVED AS TO FORM:

Michael P. Kuark, Attorney
Date: 3/12/2003

S:\MWelborn\MUKILTEO SEWER\20030214 Amend MWD SEWER AGREEMENT.doc

ATTEST:

Sharon Marks

Sharon Marks, City Clerk
Date:

Thomas H Rainville

Secretary of Board Thomas H. Rainville
Date: March 12, 2003

President
Date:

MUKILTEO SEWER AGREEMENT AMENDMENT
EXHIBIT "A "

Decrease in district capacity will decrease Districts historical facility cost by the following present value amounts:

Headworks/Interceptor	$331,738
Sewer Treatment Plant	321,332
TOTAL:	$653,070

The City will reimburse this decrease in historical cost to the District to the District within 60 days of finalization of this agreement.

OK to pay
MKC 5/5/03

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OLYMPUS TERRACE SEWER DISTRICT/CITY OF EVERETT

SEWER SERVICE AGREEMENT

This agreement between Olympus Terrace Sewer District ("the District") and the City of Everett ("City") witnesses the following agreement:

1. **Background**

   a) The political boundaries of the City include an area north of SR526, east of 44th Ave SW, west of the Boeing and Fluke facilities, and south of Mukilteo Blvd., known as "Japanese Gulch", which area slopes toward the Town of Mukilteo in the vicinity where the District provides sanitary sewer service. (See Exhibit A attached).

   b) This Agreement outlines the terms and conditions for providing cost-effective sewer service to said Japanese Gulch area by connection of the City's local sewer lines within said area to the District's trunk and transmission lines and for transmission and treatment of sewage from said area by the District.

2. **Delivery of Sewage**

   a) The City may deliver to the District all of the sewage and industrial waste collected by the City within the Japanese Gulch area (shown on Exhibit A attached hereto). The District shall accept the sewage and waste delivered for treatment and disposal as hereinafter provided subject to such reasonable rules and regulations as may be adopted from time to time by the District. In the event that the City obtains capability to serve said areas, then and in that event, after notification to the District sixty (60) days prior to flow diversion and consultation with the District, the City may serve such areas by connections to other transmission, treatment, and disposal facilities.

3. **Payment**

   a) Area charge in lieu of assessment - The City agrees to pay the District a charge in lieu of assessment as hereinafter stated, based upon the land area within the City that is then benefited by District sewage treatment and from which the City can legally collect such charges. It is agreed that areas with severe slopes determined not possible for development shall be excluded from payment of such charge. The area charge shall be based on the District's October, 1997 charge of $1,871.72 per acre and subject to an increase of $3.88 per acre per month. Any charge in lieu of

assessment due under this Contract shall be paid to the District prior to any treatment of sewage by the District.

b) Connection charges - Customers connecting to the system after the effective date of this contract shall pay the then current connection charge to the District. The District shall collect all connection charges imposed by the District which shall be the same connection charges as assessed throughout the District prior to connecting and the District shall be responsible for inspection and approval of all connections on new construction.

c) Payment for sewage disposal - The City shall pay monthly to the District, for the disposal of sewage delivered to the District, at the rate of $3.53 per one thousand (1000) gallons. The District has the right to set and establish rates to be charged and may adjust the rate as necessary to offset increased operation and maintenance costs provided that City rates shall be adjusted proportionately to other District rates. The City shall install a flow meter, approved by the District, and may establish additional flow meters to segregate costs relative to future commercial or industrial users.

d) Improvements and upgrades to the District Treatment Plant and Collection Systems - It is understood and agreed that the expense of any future additions, modifications or upgrades required to be made to the sewer treatment plant and collection systems as determined by the District commissioners in their discretion, shall be assessed to all District users, both member and non-member customers, and the City agrees to pay its prorated share based upon usage of District facilities as determined by metering done by the City at its point of connection and by the District at its wastewater treatment plant.

e) Rate increases - The District shall notify the City of all contemplated rate changes in order to allow the City to appear and present evidence. Said notice shall be the same as for citizens of the District. If the District fails to so notify, the City shall be allowed a special hearing to present evidence to the Commissioners concerning rate modification.

4. **Local Facilities**

a) Sewerage facilities of the City which may be required for the delivery of sewage and wastes to the District may be connected to facilities of the District sewerage system. Such connection shall be accomplished at the expense of the City and in accordance with the rules and regulations of the District. The initial point of connection of the City's system to the District's system is herewith fixed at 76th St. S.W. The City and the District, may, as hereinafter provided, mutually designate additional or alternate points of connection for receiving the City's sewage to the District system which may include connections to other cities or

districts. The City shall install at its expense, flow meters at locations which will best measure incoming sewage flows to the District system.

b) The City shall be responsible for the delivery to the District sewerage system of sewage collected by the City which is required to be delivered to the District hereunder, for the construction, maintenance and operation of local sewerage facilities, and for the payment of all costs incident to the collection of such sewage and its delivery to the District sewerage system. It is expressly understood that the City will be responsible for the delivery of its sewage to the District sewerage system at agreed connection points. It is contemplated that the City will build local sewers or build or secure the use of the facilities to deliver its sewage to the District at the point hereinbefore described. All local sewers or other temporary sewerage facilities carrying sewage delivered to the District shall be constructed and maintained in accordance with the rules and regulations of the District which shall be consistent with APWA, DOH and DOE standards. All such local sewers or temporary facilities will be maintained by the City at no expense or risk to the District.

c) Permanent books and records shall be kept by the City and the District in order to establish rates, volumes of sewage delivered and discharged into the District sewerage system wherever such volumes are measured, total volumes of sewerage transmitted and treated by District facilities, and the number of Residential Customers and Residential Customer Equivalents of the City and District. The records required by this paragraph shall be available for examination by either party at any reasonable time for a period of seven (7) years.

d) In the event of third party claims for injuries or damages arising out of or related to this Agreement, the City and the District shall have rights of indemnity against the other at any time after a claim is filed and for a period of three (3) years following release or payment of a claim. Indemnification shall be determined on the basis of proportionate share of fault, if any. In the event that a lawsuit is filed against either party in which the other is not named, rights of indemnification shall be determined by binding arbitration as follows: The party seeking arbitration hereunder shall give written notice of demand for arbitration to the other party. The demanding party shall name an arbitrator. The responding party shall within thirty (30) days acknowledge said demand and name a second arbitrator. The two named arbitrators shall name a third arbitrator who shall preside over the arbitration. The decision by a majority of said panel shall be binding.

e) The City shall not have the right to assign this Agreement or any of its rights and obligations hereunder either by operation of law or by voluntary agreement without the written consent of the District and neither party may terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party and this Agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto.

5. **Inspection and Pretreatment**

The District shall have the right to inspect the City collection system and the users connected to it, in order to verify and to investigate any problems associated with the quantity or quality of sewage originating from the City's system which might adversely affect the District's system. District personnel making such inspections shall contact the City Public Works Director in advance to determine whether the City desires to have its personnel accompany District personnel for informational, safety and/or liability reasons. Any industrial customers in the agreement area shall be subject to the requirements of the City's Industrial Pretreatment regulations which shall be enforced by the City on its customers. All records for such industrial customers shall be available for District inspection upon 48 hours notice. In any instance, where the District's local limits are more stringent than the City's, the City will enforce the District's limits.

6. **Insurance**

Both parties shall maintain adequate insurance covering personal injury or property damage that might occur as a result of the operation and maintenance of their respective sewer systems. Such insurance shall be as is customarily maintained with respect to the sewer systems of like character.

7. **Reciprocity**

It is agreed that the District will have the ability in the future to redirect sewage to the City at the same rates and conditions applicable to the City in this agreement, subject to the availability of adequate capacity in the City system at that time and location. If District areas are connected to the City collection system which is covered by this agreement, then the District agrees to waive connection charges in section 3(b) for all City customers. Further, if District facilities are constructed in the vicinity of 40th Ave. SW south of 76th St. then the City will be allowed to connect properties between 40th Ave. SW and Japanese Gulch to these District facilities within the capacity and payment terms of this agreement.

8. **Capacity**

By this agreement, the District is agreeing to accept up to 100,000 gallons of sewerage per day or 200 lbs. B.O.D. per day whichever is the lesser of the two at a maximum peak flow of 200 gallons per minute with a B.O.D. concentration not to exceed 240 milligrams per liter.

9. **Duration**

This Agreement shall be in full force and effect and binding upon the parties until March 31, 2020.

OLYMPUS TERRACE SEWER DISTRICT

CITY OF EVERETT

EDWARD D. HANSEN, MAYOR

ATTEST:

SHARON MARKS, CITY CLERK

SECRETARY:

APPROVED AS TO FORM:

CITY ATTORNEY

AGREEMENT AREAS

All that portion of the Southwest quarter of Section 3 and the Northwest quarter of Section 10, all in Township 28 North, Range 4 East, W.M.; described as follows:

BEGINNING at the West quarter corner of said Section 3; **THENCE**, East along the North line of the Southwest quarter of said section to the Northeast corner of the West half of said Southwest quarter of said section; **THENCE**, South along the East line of said West half of said Southwest quarter of said section, and continue South along the east line of the West half of the Northwest quarter of said Section 10 to the Southeast corner of said West half of said Northwest quarter of said section; **THENCE**, West along the South line of said subdivision of said section to the East line of the West 208.71 feet of said subdivision of said section; THENCE, North along said East line to the North line of the South 208.71 feet of said subdivision of said section; **THENCE**, West along said North line to the West line of said Northwest quarter of said Section 10; **THENCE**, North along said West line, and continuing North along the West line of the Southwest quarter of said Section 3 to the West quarter corner of said Section 3, and the **POINT OF BEGINNING.**

AND

The South 792 feet of the West 330 feet of the Northeast quarter of the Southwest quarter of Section 10, Township 28 North, Range 4 East, W.M., together with the West 330 feet of the Southeast quarter of the Southwest quarter of said section, lying North of SR #526 (a.k.a. Casino Rd.).

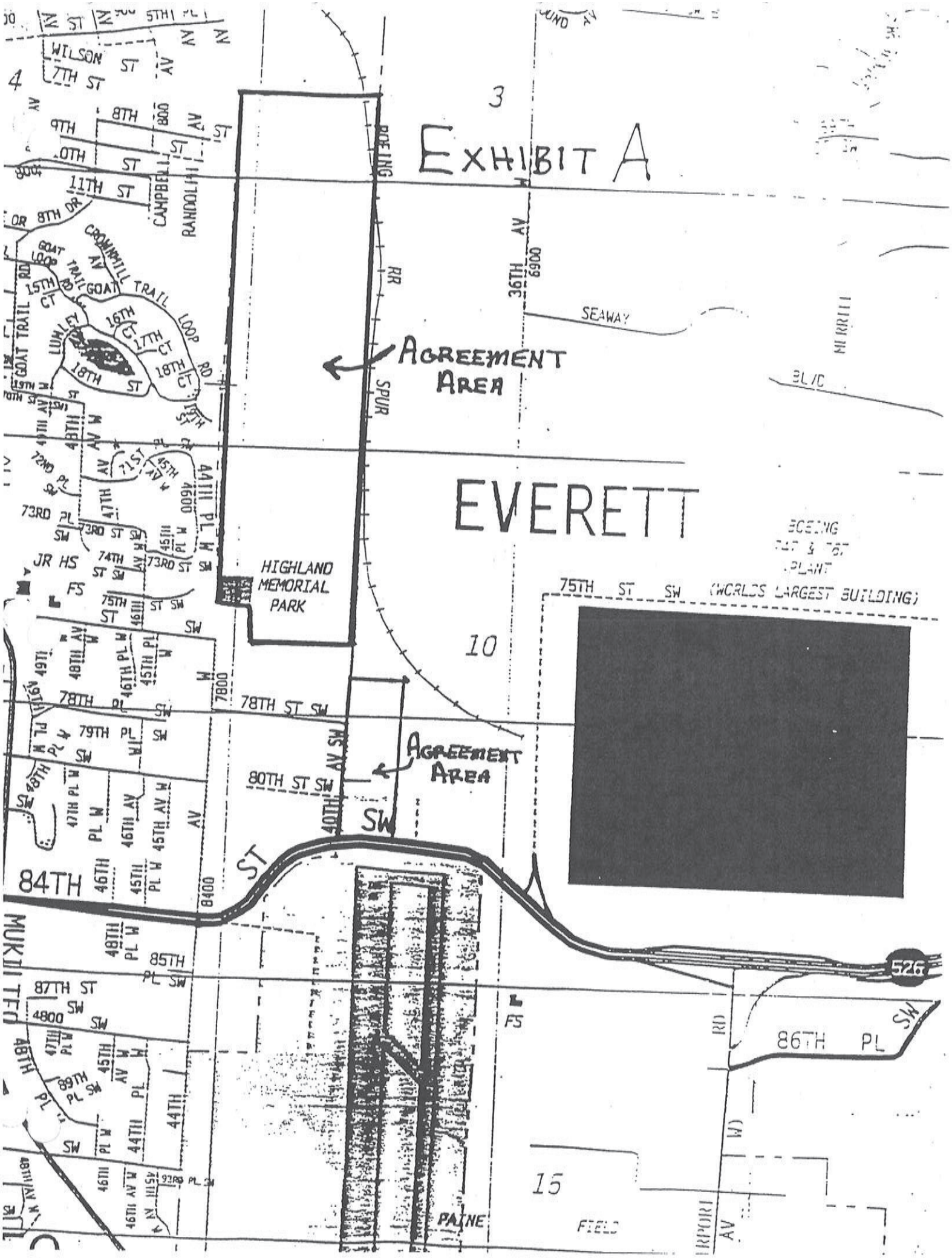
EXHIBIT A
AGREEMENT AREA
AGREEMENT AREA
EVERETT
HIGHLAND MEMORIAL PARK
BOEING SPUR RR
SEAWAY
75TH ST SW
(WORLDS LARGEST BUILDING)
78TH ST SW
80TH ST SW
84TH ST SW
85TH PL SW
86TH PL SW
87TH ST SW
73RD PL SW
74TH ST SW
WILSON ST
7TH ST
8TH ST
9TH ST
10TH ST
11TH ST
CAMPBELL
RANDOLPH
CROWNHILL TRAIL LOOP
GOAT TRAIL RD
LUMLEY
36TH AV
40TH AV SW
46TH AV W
47TH PL W
48TH PL W
45TH AV W
44TH PL W
JR HS
FS
526
PAINE FIELD
AIRPORT RD
10
15
3
4

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Appendix H

Summary of Trunk Sewers

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Summary of Existing Trunk Sewers

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SMH0585X14	SMH0585X14	SMH0585U08	10	184	--	--	Gravity Main
SMH1995Y21	SMH1995Y21	SMH1995T26	12	47	--	--	Gravity Main
SML0184A01	SMH0184A01	SMH3694Z02	8	547	1,034	3.6%	Gravity Main
SML0184A02	SMH0184A02	SMH0184A06	10	231	689	0.5%	Gravity Main
SML0184A03	SMH0184A03	SMH3694Z03	8	357	920	2.9%	Gravity Main
SML0184A04	SMH0184A04	SMH0184A02	10	272	1,692	2.9%	Gravity Main
SML0184A05	SMH0184A05	SMH0184A04	8	38	680	1.6%	Gravity Main
SML0184A06	SMH0184A06	SMH0184A03	10	281	1,934	3.8%	Gravity Main
SML0184A07	SMH0184A07	SMH0184A10	10	215	867	0.8%	Gravity Main
SML0184A08	SMH0184A08	SMH0184A03	8	266	1,006	3.4%	Gravity Main
SML0184A09	SMH0184A09	SMH0184A08	8	158	948	3.0%	Gravity Main
SML0184A10	SMH0184A10	SMH0184A06	10	243	2,194	5.0%	Gravity Main
SML0184A11	SMH0184A11	SMH0184A15	10	305	1,216	1.5%	Gravity Main
SML0184A12	SMH0184A12	SMH0184A08	8	136	1,374	6.4%	Gravity Main
SML0184A13	SMH0184A13	SMH0184A09	8	177	1,415	6.8%	Gravity Main
SML0184A14	SMH0184A14	SMH0184A10	10	130	1,563	2.5%	Gravity Main
SML0184A15	SMH0184A15	SMH0184A14	10	20	--	--	Gravity Main
SML0184A16	SMH0184A16	SMH0184A18	10	105	1,026	1.1%	Gravity Main
SML0184A17	SMH0184A17	SMH0184A12	8	162	954	3.1%	Gravity Main
SML0184A18	SMH0184A18	SMH0184A14	10	105	1,602	2.6%	Gravity Main
SML0184A19	SMH0184A19	SMH0184A17	8	318	958	3.1%	Gravity Main
SML0184A20	SMH0184A20	SMH0184A18	8	36	556	1.0%	Gravity Main
SML0184A21	SMH0184A21	SMH0184A07	8	157	485	0.8%	Gravity Main
SML0184A22	SMH0184A22	SMH0184A16	10	77	--	--	Gravity Main
SML0184A23	SMH0184A23	SMH3694Y05	8	109	375	0.5%	Gravity Main
SML0184A24	SMH0184A24	SMH0184A23	8	242	401	0.5%	Gravity Main
SML0184A25	SMH0184A25	SMH0184A24	8	134	381	0.5%	Gravity Main
SML0184A26	SMH0184A26	SMH0184A25	8	326	381	0.5%	Gravity Main
SML0184A27	SMH0184A27	SMH0184A25	8	165	1,319	5.9%	Gravity Main
SML0184A28	SMH0184A28	SMH0184A27	8	184	967	3.2%	Gravity Main
SML0184A29	SMH0184A29	SMH0184A30	8	110	645	1.4%	Gravity Main
SML0184A30	SMH0184A30	SMH0184H11	8	208	764	2.0%	Gravity Main
SML0184A31	SMH0184A31	SMH0184H13	8	77	526	0.9%	Gravity Main
SML0184B01	SMH0184B01	SMH0184B02	8	140	1,084	4.0%	Gravity Main
SML0184B02	SMH0184B02	SMH0184B03	8	137	1,077	3.9%	Gravity Main
SML0184B03	SMH0184B03	SMH0184B04	8	139	1,078	3.9%	Gravity Main
SML0184B04	SMH0184B04	SMH0184B05	8	170	1,293	5.7%	Gravity Main
SML0184B05	SMH0184B05	SMH0184B06	8	129	1,174	4.7%	Gravity Main
SML0184B07	SMH0184B07	SMH0184G09	4	1381	--	--	Force Main
SML0184B08	SMH0184B08	SMH0184B06	8	90	1,437	7.0%	Gravity Main
SML0184B7A	SMH0184B06	SMH0184B07	8	12	--	0.0%	Gravity Main
SML0184C01	SMH0184C01	SMH0184D07	15	155	6,804	5.5%	Gravity Main
SML0184C02	SMH0184C02	SMH3694X04	8	331	848	2.4%	Gravity Main
SML0184C03	SMH0184C03	SMH0184C02	8	335	545	1.0%	Gravity Main
SML0184C04	SMH0184C04	SMH0184C02	8	122	539	1.0%	Gravity Main
SML0184C05	SMH0184C05	SMH0184C01	8	372	1,454	7.2%	Gravity Main
SML0184C06	SMH0184C06	SMH0184C03	8	240	399	0.5%	Gravity Main
SML0184C07	SMH0184C07	SMH0184C05	8	191	2,113	15.1%	Gravity Main
SML0184C08	SMH0184C08	SMH3694X05	8	164	736	1.8%	Gravity Main
SML0184C09	SMH0184C09	SMH0184C08	8	136	1,034	3.6%	Gravity Main
SML0184C10	SMH0184C10	SMH0184C07	8	265	890	2.7%	Gravity Main
SML0184C11	SMH0184C11	SMH0184C09	8	136	509	0.9%	Gravity Main
SML0184C12	SMH0184C12	SMH0184C11	8	137	823	2.3%	Gravity Main
SML0184C13	SMH0184C13	SMH0184C10	8	54	557	1.1%	Gravity Main
SML0184C14	SMH0184C14	SMH0184C06	8	28	--	--	Gravity Main
SML0184C15	SMH0184C15	SMH0184C05	8	138	2,566	22.3%	Gravity Main
SML0184C16	SMH0184C16	SMH0184C11	8	78	1,355	6.2%	Gravity Main
SML0184C17	SMH0184C17	SMH0184C16	8	91	1,280	5.5%	Gravity Main
SML0184C18	SMH0184C18	SMH0184C15	8	353	638	1.4%	Gravity Main
SML0184C19	SMH0184C19	SMH0184C10	8	60	1,179	4.7%	Gravity Main
SML0184D01	SMH0184D01	SMH3694W03	15	501	7,021	5.8%	Gravity Main
SML0184D03	SMH0184D03	SMH3694W10	8	61	675	1.5%	Gravity Main
SML0184D04	SMH0184D04	SMH3694W13	8	73	1,106	4.1%	Gravity Main
SML0184D05	SMH0184D05	SMH0184D04	8	118	858	2.5%	Gravity Main
SML0184D06	SMH0184D06	SMH0184D01	15	391	6,479	5.0%	Gravity Main
SML0184D07	SMH0184D07	SMH0184D06	15	206	6,575	5.1%	Gravity Main
SML0184D08	SMH0184D08	SMH0184D05	8	51	1,290	5.6%	Gravity Main
SML0184D09	SMH0184D09	SMH0184D08	8	91	664	1.5%	Gravity Main
SML0184D10	SMH0184D10	SMH0184D13	8	106	699	1.6%	Gravity Main
SML0184D11	SMH0184D11	SMH0184D13	8	170	1,431	6.9%	Gravity Main
SML0184D12	SMH0184D12	SMH0184D11	8	134	975	3.2%	Gravity Main
SML0184D13	SMH0184D13	SMH0184D09	8	207	658	1.5%	Gravity Main
SML0184D14	SMH0184D14	SMH0184D11	8	125	1,243	5.2%	Gravity Main
SML0184D15	SMH0184D15	SMH0184D10	8	126	1,728	10.1%	Gravity Main
SML0184D16	SMH0184D16	SMH0184D09	8	208	890	2.7%	Gravity Main
SML0184D17	SMH0184D17	SMH0184D16	8	137	1,618	8.9%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0184E01	SMH0184E01	SMH0184D12	8	487	2,057	14.3%	Gravity Main
SML0184E02	SMH0184E02	SMH0184E01	8	84	1,352	6.2%	Gravity Main
SML0184E03	SMH0184E03	SMH0184E02	8	137	902	2.8%	Gravity Main
SML0184E04	SMH0184E04	SMH0184E03	8	202	1,332	6.0%	Gravity Main
SML0184E05	SMH0184E05	SMH0184E03	8	81	332	0.4%	Gravity Main
SML0184E06	SMH0184E06	SMH0184E05	8	55	1,119	4.2%	Gravity Main
SML0184E07	SMH0184E07	SMH0184E08	8	72	639	1.4%	Gravity Main
SML0184E08	SMH0184E08	SMH0184E06	8	69	3,384	38.7%	Gravity Main
SML0184E09	SMH0184E09	SMH0184E07	8	69	430	0.6%	Gravity Main
SML0184E0A	SMH0184E21	SMH0184E22	8	100	1,289	5.6%	Gravity Main
SML0184E10	SMH0184E10	SMH0184E07	8	21	2,981	30.1%	Gravity Main
SML0184E11	SMH0184E11	SMH0184E10	8	87	594	1.2%	Gravity Main
SML0184E12	SMH0184E12	SMH0184E11	8	68	472	0.8%	Gravity Main
SML0184E13	SMH0184E13	SMH0184E12	8	37	1,334	6.0%	Gravity Main
SML0184E14	SMH0184E14	SMH0184E13	8	33	527	0.9%	Gravity Main
SML0184E15	SMH0184E15	SMH0184E13	8	95	668	1.5%	Gravity Main
SML0184E16	SMH0184E16	SMH0184F17	8	301	1,013	3.5%	Gravity Main
SML0184E17	SMH0184E17	SMH0184E16	8	110	2,149	15.6%	Gravity Main
SML0184E18	SMH0184E18	SMH0184E17	8	109	1,721	10.0%	Gravity Main
SML0184E19	SMH0184E19	SMH0184E18	8	120	1,642	9.1%	Gravity Main
SML0184E20	SMH0184E20	SMH0184E19	8	91	1,004	3.4%	Gravity Main
SML0184E21	SMH0184E21	SMH0184E20	8	104	557	1.0%	Gravity Main
SML0184E22	SMH0184E22	SMH0184E23	8	113	1,685	9.6%	Gravity Main
SML0184E23	SMH0184E23	SMH0184E16	8	248	1,793	10.9%	Gravity Main
SML0184F01	SMH0184F01	SMH0184F17	15	134	6,786	5.4%	Gravity Main
SML0184F02	SMH0184F02	SMH0184F04	15	356	6,613	5.2%	Gravity Main
SML0184F03	SMH0184F03	SMH0184C07	8	107	1,733	10.2%	Gravity Main
SML0184F04	SMH0184F04	SMH0184F01	15	140	8,239	8.0%	Gravity Main
SML0184F05	SMH0184F05	SMH0184F02	15	69	7,168	6.1%	Gravity Main
SML0184F08	SMH0184F08	SMH0184C13	8	142	518	0.9%	Gravity Main
SML0184F09	SMH0184F09	SMH0184F08	8	146	589	1.2%	Gravity Main
SML0184F10	SMH0184F10	SMH0184F09	8	145	450	0.7%	Gravity Main
SML0184F11	SMH0184F11	SMH0184F12	8	224	922	2.9%	Gravity Main
SML0184F12	SMH0184F12	SMH0184F10	8	145	1,131	4.3%	Gravity Main
SML0184F13	SMH0184F13	SMH0184F14	8	94	1,115	4.2%	Gravity Main
SML0184F14	SMH0184F14	SMH0184F15	8	82	616	1.3%	Gravity Main
SML0184F15	SMH0184F15	SMH0184F10	8	133	479	0.8%	Gravity Main
SML0184F16	SMH0184F16	SMH0184F09	8	220	--	0.0%	Gravity Main
SML0184F17	SMH0184F17	SMH0184C01	15	116	6,818	5.5%	Gravity Main
SML0184G01	SMH0184G01	SMH0184A26	8	174	391	0.5%	Gravity Main
SML0184G02	SMH0184G02	SMH0184H17	8	137	1,457	7.2%	Gravity Main
SML0184G03	SMH0184G03	SMH0184G02	8	111	1,535	8.0%	Gravity Main
SML0184G04	SMH0184G04	SMH0184G03	8	188	1,510	7.7%	Gravity Main
SML0184G05	SMH0184G05	SMH0184G04	8	120	828	2.3%	Gravity Main
SML0184G06	SMH0184G06	SMH0184G07	8	48	1,948	12.8%	Gravity Main
SML0184G07	SMH0184G07	SMH0184G08	8	132	384	0.5%	Gravity Main
SML0184G08	SMH0184G08	SMH0184G15	8	215	876	2.6%	Gravity Main
SML0184G09	SMH0184G09	SMH0184G07	8	191	757	1.9%	Gravity Main
SML0184G10	SMH0184G10	SMH0184G13	8	154	516	0.9%	Gravity Main
SML0184G11	SMH0184G11	SMH0184G10	8	105	445	0.7%	Gravity Main
SML0184G12	SMH0184G12	SMH0184G11	8	67	409	0.6%	Gravity Main
SML0184G13	SMH0184G13	SMH0184G14	8	163	1,403	6.7%	Gravity Main
SML0184G14	SMH0184G14	SMH0184B01	8	259	1,291	5.6%	Gravity Main
SML0184G15	SMH0184G15	SMH0184G16	8	67	473	0.8%	Gravity Main
SML0184G16	SMH0184G16	SMH0184G03	8	32	2,429	19.9%	Gravity Main
SML0184H01	SMH0184H01	SMH0184A05	8	493	632	1.4%	Gravity Main
SML0184H02	SMH0184H02	SMH0184A11	10	449	1,232	1.6%	Gravity Main
SML0184H03	SMH0184H03	SMH0184A20	8	391	1,100	4.1%	Gravity Main
SML0184H04	SMH0184H04	SMH0184H03	8	398	663	1.5%	Gravity Main
SML0184H05	SMH0184H05	SMH0184H02	10	365	1,231	1.6%	Gravity Main
SML0184H06	SMH0184H06	SMH0184G01	8	290	386	0.5%	Gravity Main
SML0184H07	SMH0184H07	SMH0184H06	8	211	376	0.5%	Gravity Main
SML0184H08	SMH0184H08	SMH0184H07	8	212	370	0.5%	Gravity Main
SML0184H09	SMH0184H09	SMH0184H08	8	234	381	0.5%	Gravity Main
SML0184H10	SMH0184H10	SMH0184H09	8	152	397	0.5%	Gravity Main
SML0184H11	SMH0184H11	SMH0184H08	8	342	472	0.8%	Gravity Main
SML0184H12	SMH0184H12	SMH0184H11	8	137	467	0.7%	Gravity Main
SML0184H13	SMH0184H13	SMH0184H12	8	109	517	0.9%	Gravity Main
SML0184H14	SMH0184H14	SMH0184H09	8	270	629	1.3%	Gravity Main
SML0184H15	SMH0184H15	SMH0184H10	8	39	303	0.3%	Gravity Main
SML0184H16	SMH0184H16	SMH0184H15	8	38	306	0.3%	Gravity Main
SML0184H17	SMH0184H17	SMH0184H15	8	181	407	0.6%	Gravity Main
SML0184J01	SMH0184J01	SMH0184J02	8	124	353	0.4%	Gravity Main
SML0184J02	SMH0184J02	SMH0184J05	8	181	1,355	6.2%	Gravity Main
SML0184J03	SMH0184J03	SMH0184J02	8	302	1,052	3.7%	Gravity Main
SML0184J04	SMH0184J04	SMH0184J03	8	142	368	0.5%	Gravity Main
SML0184J05	SMH0184J05	SMH0184J07	8	220	365	0.4%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0184J06	SMH0184J06	SMH0184J05	8	70	318	0.3%	Gravity Main
SML0184J07	SMH0184J07	SMH0184J08	8	212	884	2.6%	Gravity Main
SML0184J08	SMH0184J08	SMH0184J15	8	87	539	1.0%	Gravity Main
SML0184J09	SMH0184J09	SMH0184J10	8	65	519	0.9%	Gravity Main
SML0184J10	SMH0184J10	SMH0184J11	8	141	538	1.0%	Gravity Main
SML0184J11	SMH0184J11	SMH0184J13	8	36	2,676	24.2%	Gravity Main
SML0184J12	SMH0184J12	SMH0184H05	8	300	662	1.5%	Gravity Main
SML0184J13	SMH0184J13	SMH0184J12	8	300	638	1.4%	Gravity Main
SML0184J14	SMH0184J14	SMH0184J13	8	312	627	1.3%	Gravity Main
SML0184J15	SMH0184J15	SMH0184J18	8	111	1,612	8.8%	Gravity Main
SML0184J16	SMH0184J16	SMH0184J27	8	88	945	3.0%	Gravity Main
SML0184J17	SMH0184J17	SMH0184J16	8	234	1,014	3.5%	Gravity Main
SML0184J18	SMH0184J18	SMH0184J17	8	221	747	1.9%	Gravity Main
SML0184J19	SMH0184J19	SMH0184J16	8	119	483	0.8%	Gravity Main
SML0184J20	SMH0184J20	SMH0184J18	8	113	510	0.9%	Gravity Main
SML0184J21	SMH0184J21	SMH0184J19	8	162	460	0.7%	Gravity Main
SML0184J22	SMH0184J22	SMH0184J21	8	325	460	0.7%	Gravity Main
SML0184J23	SMH0184J23	SMH0184J22	8	109	1,213	5.0%	Gravity Main
SML0184J24	SMH0184J24	SMH0184J23	8	102	1,431	6.9%	Gravity Main
SML0184J25	SMH0184J25	SMH0184H10	8	219	786	2.1%	Gravity Main
SML0184J26	SMH0184J26	SMH0184J25	8	187	1,142	4.4%	Gravity Main
SML0184J27	SMH0184J27	SMH0184J26	8	126	1,060	3.8%	Gravity Main
SML0184J28	SMH0184J28	SMH0184J26	8	193	1,152	4.5%	Gravity Main
SML0184J29	SMH0184J29	SMH0184J28	8	258	1,647	9.2%	Gravity Main
SML0184J30	SMH0184J30	SMH0184J25	8	40	462	0.7%	Gravity Main
SML0184J31	SMH0184J31	SMH0184J30	8	40	428	0.6%	Gravity Main
SML0184J32	SMH0184J32	SMH0184J31	8	173	1,991	13.4%	Gravity Main
SML0184J33	SMH0184J33	SMH0184J32	8	107	1,546	8.1%	Gravity Main
SML0184J34	SMH0184J34	SMH0184H16	8	167	2,136	15.4%	Gravity Main
SML0184J35	SMH0184J35	SMH0184J34	8	125	1,622	8.9%	Gravity Main
SML0184J36	SMH0184J36	SMH0184J35	8	174	934	3.0%	Gravity Main
SML0184K01	SMH0184K01	SMH0184L07	8	290	1,097	4.1%	Gravity Main
SML0184K02	SMH0184K02	SMH0184K01	8	62	1,407	6.7%	Gravity Main
SML0184K03	SMH0184K03	SMH0184K04	8	76	599	1.2%	Gravity Main
SML0184K04	SMH0184K04	SMH0184K02	8	135	1,550	8.1%	Gravity Main
SML0184K05	SMH0184K05	SMH0184K04	8	191	1,375	6.4%	Gravity Main
SML0184K06	SMH0184K06	SMH0184K05	8	125	787	2.1%	Gravity Main
SML0184K07	SMH0184K07	SMH0184K03	8	181	1,662	9.3%	Gravity Main
SML0184K08	SMH0184K08	SMH0184K09	8	263	528	0.9%	Gravity Main
SML0184K09	SMH0184K09	SMH0184K05	8	415	1,852	11.6%	Gravity Main
SML0184K10	SMH0184K10	SMH0184K09	8	165	675	1.5%	Gravity Main
SML0184K12	SMH0184K12	SMH0184K31	8	150	1,943	12.8%	Gravity Main
SML0184K13	SMH0184K13	SMH0184K12	8	130	1,949	12.8%	Gravity Main
SML0184K14	SMH0184K14	SMH0184K09	8	272	543	1.0%	Gravity Main
SML0184K15	SMH0184K15	SMH0184K16	8	17	945	3.0%	Gravity Main
SML0184K16	SMH0184K16	SMH0184Q13	8	425	544	1.0%	Gravity Main
SML0184K18	SMH0184K18	SMH0184G05	8	225	1,139	4.4%	Gravity Main
SML0184K19	SMH0184K19	SMH0184K20	8	182	906	2.8%	Gravity Main
SML0184K20	SMH0184K20	SMH0184K21	8	141	1,283	5.6%	Gravity Main
SML0184K21	SMH0184K21	SMH0184G02	8	189	2,027	13.9%	Gravity Main
SML0184K22	SMH0184K22	SMH0184K23	8	336	338	0.4%	Gravity Main
SML0184K23	SMH0184K23	SMH0184K24	8	38	281	0.3%	Gravity Main
SML0184K24	SMH0184K24	SMH0184K25	8	67	344	0.4%	Gravity Main
SML0184K25	SMH0184K25	SMH0184K01	8	209	351	0.4%	Gravity Main
SML0184K26	SMH0184K26	SMH0184K22	8	225	1,009	3.4%	Gravity Main
SML0184K27	SMH0184K27	SMH0184K26	8	161	1,481	7.4%	Gravity Main
SML0184K28	SMH0184K28	SMH0184K27	8	155	1,000	3.4%	Gravity Main
SML0184K29	SMH0184K29	SMH0184K28	8	142	1,205	4.9%	Gravity Main
SML0184K30	SMH0184K30	SMH0184K29	8	146	387	0.5%	Gravity Main
SML0184K31	SMH0184K31	SMH0184K30	8	223	384	0.5%	Gravity Main
SML0184L01	SMH0184L01	SMH0184L11	8	174	1,139	4.4%	Gravity Main
SML0184L02	SMH0184L02	SMH0184L08	12	268	726	0.2%	Gravity Main
SML0184L03	SMH0184L03	SMH0184L02	12	220	1,324	0.7%	Gravity Main
SML0184L04	SMH0184L04	SMH0184L07	8	184	441	0.7%	Gravity Main
SML0184L05	SMH0184L05	SMH0184L03	8	219	993	3.3%	Gravity Main
SML0184L06	SMH0184L06	SMH0184L03	10	220	781	0.6%	Gravity Main
SML0184L07	SMH0184L07	SMH0184L06	10	74	606	0.4%	Gravity Main
SML0184L08	SMH0184L08	SMH0184L01	12	91	1,880	1.4%	Gravity Main
SML0184L09	SMH0184L09	SMH0184L08	8	146	542	1.0%	Gravity Main
SML0184L10	SMH0184L10	SMH0184L02	8	175	531	1.0%	Gravity Main
SML0184L11	SMH0184L11	SMH0184F05	15	310	6,481	5.0%	Gravity Main
SML0184L12	SMH0184L12	SMH0184L11	12	60	2,879	3.2%	Gravity Main
SML0184L13	SMH0184L13	SMH0184L12	12	289	2,530	2.5%	Gravity Main
SML0184L14	SMH0184L14	SMH0184L13	6	167	384	2.3%	Gravity Main
SML0184L15	SMH0184L15	SMH0184M09	8	141	568	1.1%	Gravity Main
SML0184M01	SMH0184M01	SMH0184M08	12	127	2,881	3.2%	Gravity Main
SML0184M02	SMH0184M02	SMH0184M01	15	282	5,763	3.9%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0184M03	SMH0184M03	SMH0184M17	15	174	5,668	3.8%	Gravity Main
SML0184M04	SMH0184M04	SMH0184M03	15	302	4,095	2.0%	Gravity Main
SML0184M05	SMH0184M05	SMH0184E04	8	287	1,500	7.6%	Gravity Main
SML0184M06	SMH0184M06	SMH0184M05	8	93	570	1.1%	Gravity Main
SML0184M07	SMH0184M07	SMH0184M05	8	220	749	1.9%	Gravity Main
SML0184M08	SMH0184M08	SMH0184L13	12	188	2,959	3.4%	Gravity Main
SML0184M09	SMH0184M09	SMH0184M08	8	179	447	0.7%	Gravity Main
SML0184M10	SMH0184M10	SMH0184M09	8	140	432	0.6%	Gravity Main
SML0184M11	SMH0184M11	SMH0184M10	8	123	392	0.5%	Gravity Main
SML0184M12	SMH0184M12	SMH0184M11	8	64	513	0.9%	Gravity Main
SML0184M13	SMH0184M13	SMH0184M07	8	363	1,682	9.6%	Gravity Main
SML0184M14	SMH0184M14	SMH0284J09	8	125	477	0.8%	Gravity Main
SML0184M15	SMH0184M15	SMH0184M16	8	100	1,201	4.9%	Gravity Main
SML0184M16	SMH0184M16	SMH0184M05	8	343	1,602	8.7%	Gravity Main
SML0184M17	SMH0184M17	SMH0184M02	15	126	4,815	2.7%	Gravity Main
SML0184N01	SMH0184N01	SMH0184N02	8	276	558	1.1%	Gravity Main
SML0184N02	SMH0184N02	SMH0184N03	8	221	3,697	46.2%	Gravity Main
SML0184N03	SMH0184N03	SMH0184N05	8	54	545	1.0%	Gravity Main
SML0184N05	SMH0184N05	SMH0184N06	8	143	537	1.0%	Gravity Main
SML0184N06	SMH0184N06	SMH0184N07	12	187	1,600	1.0%	Gravity Main
SML0184N07	SMH0184N07	SMH0184N08	12	290	3,472	4.7%	Gravity Main
SML0184N08	SMH0184N08	SMH0184M17	12	222	3,575	5.0%	Gravity Main
SML0184N09	SMH0184N09	SMH0184N06	8	203	--	--	Gravity Main
SML0184P01	SMH0184P01	SMH0184L05	8	327	586	1.2%	Gravity Main
SML0184P02	SMH0184P02	SMH0184P01	8	173	1,513	7.7%	Gravity Main
SML0184Q01	SMH0184Q01	SMH0184P02	8	358	886	2.7%	Gravity Main
SML0184Q02	SMH0184Q02	SMH0184Q01	8	74	719	1.7%	Gravity Main
SML0184Q03	SMH0184Q03	SMH0184Q01	8	70	1,364	6.3%	Gravity Main
SML0184Q04	SMH0184Q04	SMH0184K06	8	162	1,587	8.5%	Gravity Main
SML0184Q05	SMH0184Q05	SMH0184Q06	8	416	1,020	3.5%	Gravity Main
SML0184Q06	SMH0184Q06	SMH0184Q03	8	109	1,044	3.7%	Gravity Main
SML0184Q07	SMH0184Q07	SMH0184Q05	8	201	1,616	8.8%	Gravity Main
SML0184Q08	SMH0184Q08	SMH0184Q07	8	471	546	1.0%	Gravity Main
SML0184Q09	SMH0184Q09	SMH0184Q07	8	311	1,309	5.8%	Gravity Main
SML0184Q10	SMH0184Q10	SMH0184Q09	8	430	550	1.0%	Gravity Main
SML0184Q11	SMH0184Q11	SMH0184Q08	8	320	1,245	5.2%	Gravity Main
SML0184Q12	SMH0184Q12	SMH0184K14	8	194	1,340	6.1%	Gravity Main
SML0184Q13	SMH0184Q13	SMH0184Q09	8	332	591	1.2%	Gravity Main
SML0184Q14	SMH0184Q14	SMH0184Q13	8	496	678	1.6%	Gravity Main
SML0184Q15	SMH0184Q15	SMH0184Q14	8	378	673	1.5%	Gravity Main
SML0184R01	SMH0184R01	SMH0184J03	8	352	891	2.7%	Gravity Main
SML0184R02	SMH0184R02	SMH0184R05	8	200	1,320	5.9%	Gravity Main
SML0184R03	SMH0184R03	SMH0184R02	8	185	364	0.4%	Gravity Main
SML0184R04	SMH0184R04	SMH0184R12	8	402	1,083	4.0%	Gravity Main
SML0184R05	SMH0184R05	SMH0184R07	8	189	377	0.5%	Gravity Main
SML0184R06	SMH0184R06	SMH0184J04	8	151	357	0.4%	Gravity Main
SML0184R07	SMH0184R07	SMH0184R09	8	120	1,812	11.1%	Gravity Main
SML0184R08	SMH0184R08	SMH0184R05	8	189	375	0.5%	Gravity Main
SML0184R09	SMH0184R09	SMH0184R11	8	150	9,588	310.9%	Gravity Main
SML0184R10	SMH0184R10	SMH0184J08	8	119	--	--	Gravity Main
SML0184R11	SMH0184R11	SMH0184R10	8	75	--	0.0%	Gravity Main
SML0184R12	SMH0184R12	SMH0184R13	8	361	1,318	5.9%	Gravity Main
SML0184R13	SMH0184R13	SMH0184S14	8	109	549	1.0%	Gravity Main
SML0184R14	SMH0184R14	SMH0184R13	8	238	1,210	5.0%	Gravity Main
SML0184R15	SMH0184R15	SMH0184J14	8	334	615	1.3%	Gravity Main
SML0184R16	SMH0184R16	SMH0184R15	8	350	581	1.1%	Gravity Main
SML0184R17	SMH0184R17	SMH0184J20	8	189	736	1.8%	Gravity Main
SML0184R18	SMH0184R18	SMH0184R17	8	160	614	1.3%	Gravity Main
SML0184R19	SMH0184R19	SMH0184R18	8	280	615	1.3%	Gravity Main
SML0184R20	SMH0184R20	SMH0184J20	8	250	1,169	4.6%	Gravity Main
SML0184R21	SMH0184R21	SMH0184R20	8	309	464	0.7%	Gravity Main
SML0184R22	SMH0184R22	SMH0184R21	8	252	893	2.7%	Gravity Main
SML0184R23	SMH0184R23	SMH0184R21	8	143	1,322	5.9%	Gravity Main
SML0184R24	SMH0184R24	SMH0184R19	8	174	378	0.5%	Gravity Main
SML0184R4A	SMH0184R04	SMH0184Q15	8	235	801	2.2%	Gravity Main
SML0184S01	SMH0184S01	SMH0184S04	8	340	659	1.5%	Gravity Main
SML0184S02	SMH0184S02	SMH0184R04	8	209	660	1.5%	Gravity Main
SML0184S03	SMH0184S03	SMH0184S05	8	479	962	3.1%	Gravity Main
SML0184S04	SMH0184S04	SMH0184S06	8	315	1,143	4.4%	Gravity Main
SML0184S05	SMH0184S05	SMH0184S09	8	315	826	2.3%	Gravity Main
SML0184S06	SMH0184S06	SMH0184S05	8	299	534	1.0%	Gravity Main
SML0184S07	SMH0184S07	SMH0184S08	8	50	663	1.5%	Gravity Main
SML0184S08	SMH0184S08	SMH0184R13	8	92	284	0.3%	Gravity Main
SML0184S09	SMH0184S09	SMH0184S13	10	173	1,974	4.0%	Gravity Main
SML0184S10	SMH0184S10	SMH0184S09	8	140	1,597	8.6%	Gravity Main
SML0184S11	SMH0184S11	SMH0184S10	10	401	762	0.6%	Gravity Main
SML0184S13	SMH0184S13	SMH0184S08	8	82	507	0.9%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0184S14	SMH0184S14	SMH0184R24	8	120	473	0.8%	Gravity Main
SML0184S3A	SMH0184S03	SMH0184T08	8	346	774	2.0%	Gravity Main
SML0184T01	SMH0184T01	SMH0184Q02	8	370	627	1.3%	Gravity Main
SML0184T02	SMH0184T02	SMH0184T09	8	140	1,175	4.7%	Gravity Main
SML0184T03	SMH0184T03	SMH0184Q11	8	444	563	1.1%	Gravity Main
SML0184T04	SMH0184T04	SMH0184T02	8	399	1,438	7.0%	Gravity Main
SML0184T05	SMH0184T05	SMH0184T04	8	217	1,426	6.9%	Gravity Main
SML0184T06	SMH0184T06	SMH0184T04	8	273	1,693	9.7%	Gravity Main
SML0184T07	SMH0184T07	SMH0184T06	8	117	588	1.2%	Gravity Main
SML0184T08	SMH0184T08	SMH0184T03	8	321	990	3.3%	Gravity Main
SML0184T09	SMH0184T09	SMH0184T01	8	260	1,055	3.8%	Gravity Main
SML0184V01	SMH0184V01	SMH0184V02	8	200	--	--	Gravity Main
SML0184V02	SMH0184V02	SMH0184V03	8	215	--	--	Gravity Main
SML0184V03	SMH0184V03	SMH0184N09	8	206	--	--	Gravity Main
SML0184W01	SMH0184W01	SMH1184A07	12	299	1,116	0.5%	Gravity Main
SML0184W02	SMH0184W02	SMH0184W01	12	301	1,106	0.5%	Gravity Main
SML0184W03	SMH0184W03	SMH0184W02	12	183	1,034	0.4%	Gravity Main
SML0184W04	SMH0184W04	SMH0184W03	12	160	1,069	0.4%	Gravity Main
SML0184W05	SMH0184W05	SMH0184W06	8	371	--	--	Gravity Main
SML0184W06	SMH0184W06	SMH0184W07	8	350	--	--	Gravity Main
SML0184W07	SMH0184W07	SMH0184V01	8	375	--	--	Gravity Main
SML0184X01	SMH0184X01	SMH0184Y03	8	399	704	1.7%	Gravity Main
SML0184Y01	SMH0184Y01	SMH0184T09	8	345	414	0.6%	Gravity Main
SML0184Y02	SMH0184Y02	SMH0184Y01	8	387	400	0.5%	Gravity Main
SML0184Y03	SMH0184Y03	SMH0184Y02	8	170	568	1.1%	Gravity Main
SML0184Y04	SMH0184Y04	SMH0184Y03	8	310	507	0.9%	Gravity Main
SML0184Y05	SMH0184Y05	SMH0184Y04	8	183	492	0.8%	Gravity Main
SML0184Z01	SMH0184Z01	SMH0184Z07	6	77	331	1.7%	Gravity Main
SML0184Z02	SMH0184Z02	SMH1284A09	10	261	2,198	5.0%	Gravity Main
SML0184Z03	SMH0184Z03	SMH0184S06	8	468	733	1.8%	Gravity Main
SML0184Z05	SMH0184Z05	SMH0184S11	10	426	763	0.6%	Gravity Main
SML0184Z06	SMH0184Z06	SMH0685V03	8	497	543	1.0%	Gravity Main
SML0184Z07	SMH0184Z07	SMH0184Z02	6	358	379	2.3%	Gravity Main
SML0184Z08	SMH0184Z08	SMH0184Z02	8	126	1,352	6.2%	Gravity Main
SML0184Z09	SMH0184Z09	SMH0184Z08	8	170	508	0.9%	Gravity Main
SML0184Z10	SMH0184Z10	SMH0184Z09	8	107	541	1.0%	Gravity Main
SML0184Z1A	SMH0184Z01	SMH0184T05	8	370	1,439	7.0%	Gravity Main
SML0284A01	SMH0284A01	SMH0284A07	8	261	1,066	3.8%	Gravity Main
SML0284A02	SMH0284A02	SMH0284A01	8	207	434	0.6%	Gravity Main
SML0284A03	SMH0284A03	SMH0284A02	8	183	353	0.4%	Gravity Main
SML0284A04	SMH0284A04	SMH0284A03	8	109	299	0.3%	Gravity Main
SML0284A05	SMH0284A05	SMH0284A06	8	173	639	1.4%	Gravity Main
SML0284A06	SMH0284A06	SMH0284A04	8	347	541	1.0%	Gravity Main
SML0284A07	SMH0284A07	SMH3594Z02	8	214	938	3.0%	Gravity Main
SML0284B01	SMH0284B01	SMH3594X07	8	250	797	2.1%	Gravity Main
SML0284B02	SMH0284B02	SMH0284B01	8	328	1,506	7.7%	Gravity Main
SML0284B03	SMH0284B03	SMH0284B02	8	233	601	1.2%	Gravity Main
SML0284C01	SMH0284C01	SMH0284C02	8	288	386	0.5%	Gravity Main
SML0284C02	SMH0284C02	SMH3594X03	8	165	1,167	4.6%	Gravity Main
SML0284C03	SMH0284C03	SMH0284C04	8	212	1,383	6.5%	Gravity Main
SML0284C04	SMH0284C04	SMH0284C02	8	178	1,509	7.7%	Gravity Main
SML0284C05	SMH0284C05	SMH0284C06	8	77	1,609	8.8%	Gravity Main
SML0284C06	SMH0284C06	SMH3594W14	8	344	--	--	Gravity Main
SML0284D01	SMH0284D01	SMH0284E13	8	255	911	2.8%	Gravity Main
SML0284D02	SMH0284D02	SMH0284C05	8	263	1,536	8.0%	Gravity Main
SML0284D03	SMH0284D03	SMH0284D02	8	100	452	0.7%	Gravity Main
SML0284D04	SMH0284D04	SMH0284D03	8	88	553	1.0%	Gravity Main
SML0284D05	SMH0284D05	SMH0284D04	8	110	526	0.9%	Gravity Main
SML0284E01	SMH0284E01	SMH0284E02	8	200	1,371	6.4%	Gravity Main
SML0284E02	SMH0284E02	SMH0284E03	8	95	3,126	33.0%	Gravity Main
SML0284E03	SMH0284E03	SMH0284F06	8	201	1,118	4.2%	Gravity Main
SML0284E04	SMH0284E04	SMH0284E05	8	238	1,814	11.1%	Gravity Main
SML0284E05	SMH0284E05	SMH0284E09	8	335	1,150	4.5%	Gravity Main
SML0284E06	SMH0284E06	SMH0284E05	8	135	403	0.5%	Gravity Main
SML0284E07	SMH0284E07	SMH0284E06	8	105	565	1.1%	Gravity Main
SML0284E08	SMH0284E08	SMH0284E03	8	270	381	0.5%	Gravity Main
SML0284E09	SMH0284E09	SMH0284E08	8	238	361	0.4%	Gravity Main
SML0284E10	SMH0284E10	SMH0284E09	8	188	385	0.5%	Gravity Main
SML0284E11	SMH0284E11	SMH0284E10	8	168	346	0.4%	Gravity Main
SML0284E12	SMH0284E12	SMH0284E11	8	161	371	0.5%	Gravity Main
SML0284E13	SMH0284E13	SMH0284F08	8	175	366	0.5%	Gravity Main
SML0284F01	SMH0284F01	SMH0284C03	8	160	1,552	8.1%	Gravity Main
SML0284F02	SMH0284F02	SMH0284F03	8	348	1,095	4.1%	Gravity Main
SML0284F03	SMH0284F03	SMH0284F04	8	341	1,177	4.7%	Gravity Main
SML0284F04	SMH0284F04	SMH0284F05	8	141	1,090	4.0%	Gravity Main
SML0284F05	SMH0284F05	SMH0284F01	8	17	685	1.6%	Gravity Main
SML0284F06	SMH0284F06	SMH0284F07	8	86	365	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0284F07	SMH0284F07	SMH0284E13	8	243	382	0.5%	Gravity Main
SML0284F08	SMH0284F08	SMH0284C05	8	295	1,393	6.6%	Gravity Main
SML0284F09	SMH0284F09	SMH0284F08	8	254	1,013	3.5%	Gravity Main
SML0284H01	SMH0284H01	SMH0284A04	8	111	1,579	8.4%	Gravity Main
SML0284H02	SMH0284H02	SMH0284H01	8	132	1,142	4.4%	Gravity Main
SML0284H03	SMH0284H03	SMH0284H02	8	322	533	1.0%	Gravity Main
SML0284H04	SMH0284H04	SMH0284H03	8	165	434	0.6%	Gravity Main
SML0284H05	SMH0284H05	SMH0284H04	8	90	967	3.2%	Gravity Main
SML0284H06	SMH0284H06	SMH0284H05	8	28	272	0.2%	Gravity Main
SML0284H07	SMH0284H07	SMH0284H06	8	280	461	0.7%	Gravity Main
SML0284H08	SMH0284H08	SMH0284H06	8	86	678	1.6%	Gravity Main
SML0284H09	SMH0284H09	SMH0284H08	8	36	385	0.5%	Gravity Main
SML0284H10	SMH0284H10	SMH0284H09	8	228	595	1.2%	Gravity Main
SML0284H12	SMH0284H12	SMH0284H08	8	108	382	0.5%	Gravity Main
SML0284H13	SMH0284H13	SMH0284H12	8	111	2,467	20.6%	Gravity Main
SML0284H14	SMH0284H14	SMH0284H10	8	143	1,310	5.8%	Gravity Main
SML0284H15	SMH0284H15	SMH0284H16	8	230	372	0.5%	Gravity Main
SML0284H16	SMH0284H16	SMH0184E09	8	117	379	0.5%	Gravity Main
SML0284H17	SMH0284H17	SMH0284H16	8	139	1,747	10.3%	Gravity Main
SML0284H18	SMH0284H18	SMH0184E14	8	104	1,730	10.1%	Gravity Main
SML0284H19	SMH0284H19	SMH0284H18	8	97	1,110	4.2%	Gravity Main
SML0284H20	SMH0284H20	SMH0284H18	8	34	1,865	11.8%	Gravity Main
SML0284H21	SMH0284H21	SMH0284J24	8	353	546	1.0%	Gravity Main
SML0284J01	SMH0284J01	SMH0184M04	15	315	1,555	0.3%	Gravity Main
SML0284J02	SMH0284J02	SMH0284J01	15	279	1,652	0.3%	Gravity Main
SML0284J03	SMH0284J03	SMH0284J02	15	308	1,572	0.3%	Gravity Main
SML0284J04	SMH0284J04	SMH0284J03	15	309	1,570	0.3%	Gravity Main
SML0284J05	SMH0284J05	SMH0284J04	15	272	1,673	0.3%	Gravity Main
SML0284J06	SMH0284J06	SMH0284J07	8	73	608	1.2%	Gravity Main
SML0284J07	SMH0284J07	SMH0284J08	8	69	542	1.0%	Gravity Main
SML0284J08	SMH0284J08	SMH0284J09	8	90	506	0.9%	Gravity Main
SML0284J09	SMH0284J09	SMH0284J11	8	344	1,100	4.1%	Gravity Main
SML0284J10	SMH0284J10	SMH0284J11	8	177	1,175	4.7%	Gravity Main
SML0284J11	SMH0284J11	SMH0184M07	8	202	1,706	9.8%	Gravity Main
SML0284J12	SMH0284J12	SMH0284H13	8	208	504	0.9%	Gravity Main
SML0284J13	SMH0284J13	SMH0284J12	8	170	528	0.9%	Gravity Main
SML0284J14	SMH0284J14	SMH0284J13	8	108	567	1.1%	Gravity Main
SML0284J15	SMH0284J15	SMH0284J14	8	132	407	0.6%	Gravity Main
SML0284J16	SMH0284J16	SMH0284J15	8	323	530	1.0%	Gravity Main
SML0284J17	SMH0284J17	SMH0284J16	8	188	683	1.6%	Gravity Main
SML0284J18	SMH0284J18	SMH0284J13	8	145	551	1.0%	Gravity Main
SML0284J19	SMH0284J19	SMH0284J18	8	118	1,558	8.2%	Gravity Main
SML0284J20	SMH0284J20	SMH0284J19	8	152	482	0.8%	Gravity Main
SML0284J21	SMH0284J21	SMH0284J20	8	144	1,602	8.7%	Gravity Main
SML0284J22	SMH0284J22	SMH0284J21	8	115	599	1.2%	Gravity Main
SML0284J23	SMH0284J23	SMH0284J22	8	203	528	0.9%	Gravity Main
SML0284J24	SMH0284J24	SMH0284J18	8	265	566	1.1%	Gravity Main
SML0284L01	SMH0284L01	SMH0284L02	8	239	891	2.7%	Gravity Main
SML0284L02	SMH0284L02	SMH0284L03	8	330	936	3.0%	Gravity Main
SML0284L03	SMH0284L03	SMH0284F02	8	311	1,049	3.7%	Gravity Main
SML0284L04	SMH0284L04	SMH0284L03	8	44	--	--	Gravity Main
SML0284M01	SMH0284M01	SMH0384J06	8	598	2,942	29.3%	Gravity Main
SML0284M02	SMH0284M02	SMH0284M01	8	105	1,393	6.6%	Gravity Main
SML0284M03	SMH0284M03	SMH0284M02	8	45	1,129	4.3%	Gravity Main
SML0284M04	SMH0284M04	SMH0284M03	8	127	465	0.7%	Gravity Main
SML0284M05	SMH0284M05	SMH0284M04	8	128	1,885	12.0%	Gravity Main
SML0284M06	SMH0284M06	SMH0284M05	8	149	1,569	8.3%	Gravity Main
SML0284M07	SMH0284M07	SMH0284M06	8	260	664	1.5%	Gravity Main
SML0284M08	SMH0284M08	SMH0284M07	8	250	365	0.5%	Gravity Main
SML0284M09	SMH0284M09	SMH0284M08	8	98	555	1.0%	Gravity Main
SML0284M10	SMH0284M10	SMH0284M09	8	102	601	1.2%	Gravity Main
SML0284M11	SMH0284M11	SMH0284M09	8	161	666	1.5%	Gravity Main
SML0284M12	SMH0284M12	SMH0284M13	8	90	2,180	16.1%	Gravity Main
SML0284M13	SMH0284M13	SMH0284E01	8	165	539	1.0%	Gravity Main
SML0284M14	SMH0284M14	SMH0284M13	8	186	556	1.0%	Gravity Main
SML0284N01	SMH0284N01	SMH0284N02	8	176	970	3.2%	Gravity Main
SML0284N02	SMH0284N02	SMH0284P01	8	190	444	0.7%	Gravity Main
SML0284N03	SMH0284N03	SMH0284P01	8	77	356	0.4%	Gravity Main
SML0284N04	SMH0284N04	SMH0284N03	8	294	396	0.5%	Gravity Main
SML0284P01	SMH0284P01	SMH0284P02	8	180	526	0.9%	Gravity Main
SML0284P02	SMH0284P02	SMH0284P03	8	225	496	0.8%	Gravity Main
SML0284P03	SMH0284P03	SMH0284P04	8	211	857	2.5%	Gravity Main
SML0284P04	SMH0284P04	SMH0284P05	8	214	1,076	3.9%	Gravity Main
SML0284P05	SMH0284P05	SMH0284L01	8	241	764	2.0%	Gravity Main
SML0284P06	SMH0284P06	SMH0284P07	8	239	1,362	6.3%	Gravity Main
SML0284P07	SMH0284P07	SMH0284Q01	8	359	1,458	7.2%	Gravity Main
SML0284Q01	SMH0284Q01	SMH0284Q02	8	313	1,388	6.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0284Q02	SMH0284Q02	SMH0284Q03	8	299	1,419	6.8%	Gravity Main
SML0284Q03	SMH0284Q03	SMH0284Q04	8	300	792	2.1%	Gravity Main
SML0284Q04	SMH0284Q04	SMH0284J05	15	312	1,562	0.3%	Gravity Main
SML0284Q05	SMH0284Q05	SMH0284Q04	12	287	1,598	1.0%	Gravity Main
SML0284Q06	SMH0284Q06	SMH0284Q01	8	34	646	1.4%	Gravity Main
SML0284Q07	SMH0284Q07	SMH0284Q06	8	235	1,653	9.2%	Gravity Main
SML0284Q08	SMH0284Q08	SMH0284Q07	8	260	1,211	5.0%	Gravity Main
SML0284R01	SMH0284R01	SMH0284Q05	12	65	2,264	2.0%	Gravity Main
SML0284R02	SMH0284R02	SMH0284Z06	8	390	385	0.5%	Gravity Main
SML0284R03	SMH0284R03	SMH0284Q05	12	255	--	--	Gravity Main
SML0284S01	SMH0284S01	SMH0284R01	12	320	1,627	1.0%	Gravity Main
SML0284S02	SMH0284S02	SMH0284S01	12	271	1,132	0.5%	Gravity Main
SML0284S03	SMH0284S03	SMH0284S02	12	300	1,133	0.5%	Gravity Main
SML0284S04	SMH0284S04	SMH0284S03	12	280	1,173	0.5%	Gravity Main
SML0284S05	SMH0284S05	SMH0284S02	8	111	678	1.6%	Gravity Main
SML0284S06	SMH0284S06	SMH0284S05	8	124	423	0.6%	Gravity Main
SML0284S07	SMH0284S07	SMH0284S04	8	24	982	3.3%	Gravity Main
SML0284S08	SMH0284S08	SMH0284S07	8	70	647	1.4%	Gravity Main
SML0284S09	SMH0284S09	SMH0284R01	8	35	1,682	9.6%	Gravity Main
SML0284S10	SMH0284S10	SMH0284S09	8	146	385	0.5%	Gravity Main
SML0284T01	SMH0284T01	SMH0284S06	8	385	350	0.4%	Gravity Main
SML0284T02	SMH0284T02	SMH0284Q08	8	67	1,158	4.5%	Gravity Main
SML0284T03	SMH0284T03	SMH0284T02	8	110	1,180	4.7%	Gravity Main
SML0284T04	SMH0284T04	SMH0284T03	8	234	1,184	4.7%	Gravity Main
SML0284U01	SMH0284U01	SMH0284P02	8	142	332	0.4%	Gravity Main
SML0284V01	SMH0284V01	SMH0284N01	8	258	817	2.3%	Gravity Main
SML0284V02	SMH0284V02	SMH0284V01	8	54	754	1.9%	Gravity Main
SML0284V09	SMH0284V09	SMH0284V01	8	52	558	1.1%	Gravity Main
SML0284W01	SMH0284W01	SMH0384S03	15	276	10,885	14.0%	Gravity Main
SML0284W02	SMH0284W02	SMH0284W01	15	234	11,539	15.8%	Gravity Main
SML0284W03	SMH0284W03	SMH0284W02	15	220	4,865	2.8%	Gravity Main
SML0284W04	SMH0284W04	SMH0284W03	15	290	5,026	3.0%	Gravity Main
SML0284W05	SMH0284W05	SMH0284W04	15	248	3,510	1.5%	Gravity Main
SML0284W06	SMH0284W06	SMH0284W04	8	58	972	3.2%	Gravity Main
SML0284W07	SMH0284W07	SMH0284W06	8	85	132	0.1%	Gravity Main
SML0284W08	SMH0284W08	SMH0284W06	8	69	893	2.7%	Gravity Main
SML0284W09	SMH0284W09	SMH0284W04	15	28	4,795	2.7%	Gravity Main
SML0284X01	SMH0284X01	SMH0284W05	15	200	3,085	1.1%	Gravity Main
SML0284X02	SMH0284X02	SMH0284X01	15	300	2,812	0.9%	Gravity Main
SML0284X03	SMH0284X03	SMH0284X02	15	210	2,742	0.9%	Gravity Main
SML0284X04	SMH0284X04	SMH0284X03	15	156	2,975	1.0%	Gravity Main
SML0284Y02	SMH0284Y02	SMH0284T04	8	282	1,192	4.8%	Gravity Main
SML0284Y03	SMH0284Y03	SMH0284Y02	8	210	498	0.8%	Gravity Main
SML0284Y04	SMH0284Y04	SMH0284Y03	8	289	535	1.0%	Gravity Main
SML0284Z01	SMH0284Z01	SMH0284S04	12	329	1,082	0.5%	Gravity Main
SML0284Z02	SMH0284Z02	SMH0284Z01	12	255	1,229	0.6%	Gravity Main
SML0284Z05	SMH0284Z05	SMH0284S04	8	104	605	1.2%	Gravity Main
SML0284Z06	SMH0284Z06	SMH0284S10	8	302	385	0.5%	Gravity Main
SML0384A01	SMH0384A01	SMH0384A03	8	399	1,496	7.6%	Gravity Main
SML0384A02	SMH0384A02	SMH0384A04	8	422	909	2.8%	Gravity Main
SML0384A03	SMH0384A03	SMH3494Z03	8	191	1,233	5.1%	Gravity Main
SML0384A04	SMH0384A04	SMH0384A03	8	423	1,170	4.6%	Gravity Main
SML0384A05	SMH0384A05	SMH0384A03	8	171	929	2.9%	Gravity Main
SML0384A06	SMH0384A06	SMH0384A07	24	161	15,636	2.4%	Gravity Main
SML0384A07	SMH0384A07	SMH0384A08	24	285	15,737	2.4%	Gravity Main
SML0384A08	SMH0384A08	SMH0384A09	24	269	14,962	2.2%	Gravity Main
SML0384A09	SMH0384A09	SMH3494Z09	24	313	22,053	4.7%	Gravity Main
SML0384A10	SMH0384A10	SMH0384A05	8	17	2,703	24.7%	Gravity Main
SML0384B01	SMH0384B01	SMH0384B02	8	90	2,125	15.3%	Gravity Main
SML0384B02	SMH0384B02	SMH0384B03	8	77	965	3.1%	Gravity Main
SML0384B03	SMH0384B03	SMH0384B05	8	194	1,011	3.5%	Gravity Main
SML0384B04	SMH0384B04	SMH0384B01	8	254	2,171	15.9%	Gravity Main
SML0384B05	SMH0384B05	SMH3494Y03	8	167	2,172	16.0%	Gravity Main
SML0384B06	SMH0384B06	SMH0384B05	8	79	3,875	50.8%	Gravity Main
SML0384B07	SMH0384B07	SMH0384B04	8	250	1,165	4.6%	Gravity Main
SML0384B08	SMH0384B08	SMH0384B06	8	99	2,957	29.6%	Gravity Main
SML0384B09	SMH0384B09	SMH0384B08	8	114	1,640	9.1%	Gravity Main
SML0384B10	SMH0384B10	SMH0384B09	8	116	547	1.0%	Gravity Main
SML0384B11	SMH0384B11	SMH0384B10	8	147	1,140	4.4%	Gravity Main
SML0384B12	SMH0384B12	SMH0384B11	8	286	1,362	6.3%	Gravity Main
SML0384B13	SMH0384B13	SMH0384A01	8	316	1,526	7.9%	Gravity Main
SML0384B14	SMH0384B14	SMH0384A02	8	308	1,576	8.4%	Gravity Main
SML0384F01	SMH0384F01	SMH0384G01	8	383	524	0.9%	Gravity Main
SML0384G01	SMH0384G01	SMH0384G02	8	165	560	1.1%	Gravity Main
SML0384G02	SMH0384G02	SMH0384G03	8	324	532	1.0%	Gravity Main
SML0384G03	SMH0384G03	SMH0384G04	8	211	564	1.1%	Gravity Main
SML0384G04	SMH0384G04	SMH0384B07	8	305	549	1.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0384G05	SMH0384G05	SMH0384B12	8	261	693	1.6%	Gravity Main
SML0384G07	SMH0384G07	SMH0384H01	8	320	1,025	3.6%	Gravity Main
SML0384G6A	SMH0384G06	SMH0384G07	8	182	2,134	15.4%	Gravity Main
SML0384G6B	SMH0384G06	SMH0384G04	8	596	1,468	7.3%	Gravity Main
SML0384H01	SMH0384H01	SMH0384H02	8	52	722	1.8%	Gravity Main
SML0384H02	SMH0384H02	SMH0384A04	8	414	1,233	5.1%	Gravity Main
SML0384H03	SMH0384H03	SMH0384H04	24	309	18,120	3.2%	Gravity Main
SML0384H04	SMH0384H04	SMH0384H05	24	394	16,057	2.5%	Gravity Main
SML0384H05	SMH0384H05	SMH0384A06	24	268	16,216	2.5%	Gravity Main
SML0384H06	SMH0384H06	SMH0384H01	8	200	1,335	6.0%	Gravity Main
SML0384J01	SMH0384J01	SMH0384J02	24	162	13,383	1.7%	Gravity Main
SML0384J02	SMH0384J02	SMH0384J03	24	262	15,147	2.2%	Gravity Main
SML0384J03	SMH0384J03	SMH0384J06	24	125	15,714	2.4%	Gravity Main
SML0384J04	SMH0384J04	SMH0384J02	12	275	10,750	45.0%	Gravity Main
SML0384J05	SMH0384J05	SMH0384J04	12	99	1,504	0.9%	Gravity Main
SML0384J06	SMH0384J06	SMH0384H03	24	36	15,198	2.2%	Gravity Main
SML0384K01	SMH0384K01	SMH0384K02	12	296	3,024	3.6%	Gravity Main
SML0384K02	SMH0384K02	SMH0384K03	12	288	1,464	0.8%	Gravity Main
SML0384K03	SMH0384K03	SMH0384K04	12	381	1,268	0.6%	Gravity Main
SML0384K04	SMH0384K04	SMH0384J05	12	416	1,316	0.7%	Gravity Main
SML0384K05	SMH0384K05	SMH0384L03	8	46	--	0.0%	Gravity Main
SML0384L01	SMH0384L01	SMH0384K01	12	394	3,852	5.8%	Gravity Main
SML0384L02	SMH0384L02	SMH0384L01	8	53	2,650	23.8%	Gravity Main
SML0384L03	SMH0384L03	SMH0384L02	8	225	1,436	7.0%	Gravity Main
SML0384L04	SMH0384L04	SMH0384L03	8	426	991	3.3%	Gravity Main
SML0384P01	SMH0384P01	SMH0384L04	8	286	838	2.4%	Gravity Main
SML0384P02	SMH0384P02	SMH0384P01	--	31	--	--	Gravity Main
SML0384R01	SMH0384R01	SMH0384R02	24	470	21,418	4.4%	Gravity Main
SML0384R02	SMH0384R02	SMH0384R03	24	428	19,682	3.7%	Gravity Main
SML0384R03	SMH0384R03	SMH0384J01	24	439	16,691	2.7%	Gravity Main
SML0384R04	SMH0384R04	SMH0384R02	15	165	4,549	2.4%	Gravity Main
SML0384R05	SMH0384R05	SMH0384R04	15	200	8,175	7.9%	Gravity Main
SML0384R06	SMH0384R06	SMH0384R05	15	270	12,047	17.2%	Gravity Main
SML0384S01	SMH0384S01	SMH0384R06	15	305	8,183	7.9%	Gravity Main
SML0384S02	SMH0384S02	SMH0384S01	15	298	9,032	9.7%	Gravity Main
SML0384S03	SMH0384S03	SMH0384S02	15	291	9,066	9.7%	Gravity Main
SML0384T01	SMH0384T01	SMH0384T02	8	254	1,667	9.4%	Gravity Main
SML0384T02	SMH0384T02	SMH0384T03	8	278	1,867	11.8%	Gravity Main
SML0384T03	SMH0384T03	SMH0384T04	8	236	1,948	12.8%	Gravity Main
SML0384T04	SMH0384T04	SMH0384T05	8	294	1,644	9.1%	Gravity Main
SML0384T05	SMH0384T05	SMH0384T09	8	270	2,674	24.2%	Gravity Main
SML0384T06	SMH0384T06	SMH0384T07	24	303	27,926	7.5%	Gravity Main
SML0384T07	SMH0384T07	SMH0384T08	24	235	16,348	2.6%	Gravity Main
SML0384T08	SMH0384T08	SMH0384T09	24	225	15,506	2.3%	Gravity Main
SML0384T09	SMH0384T09	SMH0384R01	24	263	15,792	2.4%	Gravity Main
SML0384Y01	SMH0384Y01	SMH0384T06	24	294	22,054	4.7%	Gravity Main
SML0585B01	SMH0585B01	SMH0585B06	8	159	1,954	12.9%	Gravity Main
SML0585B02	SMH0585B02	SMH0585B01	8	428	1,071	3.9%	Gravity Main
SML0585B03	SMH0585B03	SMH0585B02	8	71	--	--	Gravity Main
SML0585B04	SMH0585B04	SMH0585B05	8	102	590	1.2%	Gravity Main
SML0585B05	SMH0585B05	SMH0585G02	8	219	551	1.0%	Gravity Main
SML0585B06	SMH0585B06	SMH3295Y01	10	381	846	0.7%	Gravity Main
SML0585B07	SMH0585B07	SMH0585B06	10	365	1,341	1.9%	Gravity Main
SML0585B08	SMH0585B08	SMH0585B07	10	300	961	1.0%	Gravity Main
SML0585B09	SMH0585B09	SMH0585B06	8	95	596	1.2%	Gravity Main
SML0585B10	SMH0585B10	SMH0585B11	8	269	783	2.1%	Gravity Main
SML0585B11	SMH0585B11	SMH0585B14	8	170	425	0.6%	Gravity Main
SML0585B12	SMH0585B12	SMH3295Y04	8	369	358	0.4%	Gravity Main
SML0585B13	SMH0585B13	SMH0585B12	8	399	344	0.4%	Gravity Main
SML0585B14	SMH0585B14	SMH0585B13	8	110	367	0.5%	Gravity Main
SML0585B15	SMH0585B15	SMH0585B14	10	50	561	0.3%	Gravity Main
SML0585C01	SMH0585C01	SMH0585C06	8	294	1,666	9.4%	Gravity Main
SML0585C02	SMH0585C02	SMH0585C03	8	14	1,698	9.7%	Gravity Main
SML0585C03	SMH0585C03	SMH0585C04	8	80	1,540	8.0%	Gravity Main
SML0585C04	SMH0585C04	SMH3295X01	8	469	1,037	3.6%	Gravity Main
SML0585C05	SMH0585C05	SMH0585C04	8	184	970	3.2%	Gravity Main
SML0585C06	SMH0585C06	SMH0585C05	8	466	1,048	3.7%	Gravity Main
SML0585C07	SMH0585C07	SMH0585C29	8	82	544	1.0%	Gravity Main
SML0585C08	SMH0585C08	SMH0585C09	8	20	6,265	132.7%	Gravity Main
SML0585C09	SMH0585C09	SMH0585C10	8	152	1,621	8.9%	Gravity Main
SML0585C0A	SML0585C26	SMH3295T05	36	2169	--	--	Force Main
SML0585C10	SMH0585C10	SMH0585C11	8	194	1,439	7.0%	Gravity Main
SML0585C11	SMH0585C11	SMH0585C12	8	28	439	0.7%	Gravity Main
SML0585C12	SMH0585C12	SMH0585C17	8	221	1,792	10.9%	Gravity Main
SML0585C13	SMH0585C13	SMH0585C14	8	144	1,872	11.8%	Gravity Main
SML0585C14	SMH0585C14	SMH0585C28	8	61	3,302	36.9%	Gravity Main
SML0585C15	SMH0585C15	SMH0585C28	8	42	2,643	23.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0585C16	SMH0585C16	SML0585C18	8	459	--	--	Gravity Main
SML0585C17	SMH0585C17	SMH0585C21	8	181	1,274	5.5%	Gravity Main
SML0585C18	SMH0585C18	SMH0585C23	8	163	2,075	14.6%	Gravity Main
SML0585C19	SMH0585C19	SMH0585C22	8	67	1,704	9.8%	Gravity Main
SML0585C20	SMH0585C20	SMH0585C19	8	54	719	1.7%	Gravity Main
SML0585C21	SMH0585C21	SMH0585C25	8	110	1,074	3.9%	Gravity Main
SML0585C22	SMH0585C22	SMH0585C24	8	108	548	1.0%	Gravity Main
SML0585C23	SMH0585C23	SMH3295X06	8	365	964	3.1%	Gravity Main
SML0585C24	SMH0585C24	SMH0585C23	8	237	1,008	3.4%	Gravity Main
SML0585C25	SMH0585C25	SMH0585C24	8	363	1,284	5.6%	Gravity Main
SML0585C26	<Null>	SMH0585D16	24	2276	--	--	Force Main
SML0585C27	SMH0585C27	SMH0585F10	8	93	861	2.5%	Gravity Main
SML0585C28	SMH0585C28	SMH0585C18	8	133	1,845	11.5%	Gravity Main
SML0585C29	SMH0585C29	SMH0585C08	--	143	--	--	Gravity Main
SML0585D01	SMH0585D01	SMH3195Z14	8	96	1,040	3.7%	Gravity Main
SML0585D02	SMH0585D02	SMH0585D01	10	536	1,546	2.5%	Gravity Main
SML0585D03	SMH0585D03	SMH3295W04	8	507	1,093	4.0%	Gravity Main
SML0585D04	SMH0585D04	SMH3295W06	8	365	1,150	4.5%	Gravity Main
SML0585D05	SMH0585D05	SMH0585D04	8	379	1,183	4.7%	Gravity Main
SML0585D06	SMH0585D06	SMH0585D08	8	183	903	2.8%	Gravity Main
SML0585D07	SMH0585D07	SMH3295W10	24	261	12,042	1.4%	Gravity Main
SML0585D08	SMH0585D08	SMH0585D07	8	91	1,901	12.2%	Gravity Main
SML0585D09	SMH0585D09	SMH0585D08	8	387	1,249	5.3%	Gravity Main
SML0585D0A	SMH0585D16	SMH0585D13	30	72	--	0.0%	Gravity Main
SML0585D10	SMH0585D10	SMH0585D11	8	373	1,781	10.7%	Gravity Main
SML0585D11	SMH0585D11	SMH0585D07	24	306	13,808	1.8%	Gravity Main
SML0585D12	SMH0585D12	SMH0585E13	8	162	588	1.2%	Gravity Main
SML0585D13	SMH0585D13	SMH0585D11	30	331	24,130	1.7%	Gravity Main
SML0585D14	SMH0585D14	SMH3295W15	8	280	1,657	9.3%	Gravity Main
SML0585D15	SMH0585D15	SMH0585C05	8	464	1,769	10.6%	Gravity Main
SML0585D16	<Null>	SMH0585D26	30	401	--	--	Force Main
SML0585E01	SMH0585E01	SMH0585D02	10	350	1,836	3.5%	Gravity Main
SML0585E02	SMH0585E02	SMH0585E01	10	164	1,683	2.9%	Gravity Main
SML0585E03	SMH0585E03	SMH0585E02	10	151	1,420	2.1%	Gravity Main
SML0585E04	SMH0585E04	SMH0585E03	10	372	1,076	1.2%	Gravity Main
SML0585E05	SMH0585E05	SMH0585D03	8	420	1,255	5.3%	Gravity Main
SML0585E06	SMH0585E06	SMH0585E05	8	422	721	1.8%	Gravity Main
SML0585E07	SMH0585E07	SMH0585D05	8	369	797	2.1%	Gravity Main
SML0585E08	SMH0585E08	SMH0585E07	8	473	1,076	3.9%	Gravity Main
SML0585E09	SMH0585E09	SMH0585E11	8	328	1,079	3.9%	Gravity Main
SML0585E10	SMH0585E10	SMH0585E12	8	231	559	1.1%	Gravity Main
SML0585E11	SMH0585E11	SMH0585D09	8	442	874	2.6%	Gravity Main
SML0585E12	SMH0585E12	SMH0585E14	10	478	1,424	2.1%	Gravity Main
SML0585E13	SMH0585E13	SMH0585E15	10	121	1,796	3.3%	Gravity Main
SML0585E14	SMH0585E14	SMH0585E13	10	306	1,840	3.5%	Gravity Main
SML0585E15	SMH0585E15	SMH0585E18	10	277	1,804	3.3%	Gravity Main
SML0585E16	SMH0585E16	SMH0585E14	8	231	531	1.0%	Gravity Main
SML0585E17	SMH0585E17	SMH0585E16	8	284	616	1.3%	Gravity Main
SML0585E18	SMH0585E18	SMH0585F01	10	50	2,621	7.1%	Gravity Main
SML0585F01	SMH0585F01	SMH0585D16	30	435	26,014	2.0%	Gravity Main
SML0585F02	SMH0585F02	SMH0585F01	30	439	26,252	2.0%	Gravity Main
SML0585F03	SMH0585F03	SMH0585C06	8	314	1,049	3.7%	Gravity Main
SML0585F04	SMH0585F04	SMH0585F03	8	369	950	3.1%	Gravity Main
SML0585F05	SMH0585F05	SMH0585F02	12	289	1,174	0.5%	Gravity Main
SML0585F06	SMH0585F06	SMH0585C07	8	175	549	1.0%	Gravity Main
SML0585F07	SMH0585F07	SMH0585F06	8	27	2,762	25.8%	Gravity Main
SML0585F07	SMH0585F07	SMH0585F06	8	119	1,311	5.8%	Gravity Main
SML0585F07	SMH0585F07	SMH0585F06	8	132	1,247	5.3%	Gravity Main
SML0585F08	SMH0585F08	SMH0585F07	8	270	714	1.7%	Gravity Main
SML0585F09	SMH0585F09	SMH0585F08	8	309	551	1.0%	Gravity Main
SML0585F10	SMH0585F10	SMH0585F13	8	313	1,594	8.6%	Gravity Main
SML0585F11	SMH0585F11	SMH0585F12	8	210	1,180	4.7%	Gravity Main
SML0585F12	SMH0585F12	SMH0585F14	8	157	2,003	13.6%	Gravity Main
SML0585F13	SMH0585F13	SMH0585F14	8	375	544	1.0%	Gravity Main
SML0585F14	SMH0585F14	SMH0585G03	8	164	1,723	10.0%	Gravity Main
SML0585G01	SMH0585G01	SMH0585F14	8	176	534	1.0%	Gravity Main
SML0585G02	SMH0585G02	SMH0585G03	8	204	1,363	6.3%	Gravity Main
SML0585G03	SMH0585G03	SMH0585G06	8	162	1,292	5.6%	Gravity Main
SML0585G04	SMH0585G04	SMH0585G03	8	173	571	1.1%	Gravity Main
SML0585G05	SMH0585G05	SMH0585G06	8	302	425	0.6%	Gravity Main
SML0585G06	SMH0585G06	SMH0585G09	8	167	1,253	5.3%	Gravity Main
SML0585G07	SMH0585G07	SMH0585G06	8	179	545	1.0%	Gravity Main
SML0585G08	SMH0585G08	SMH0585G11	8	244	1,154	4.5%	Gravity Main
SML0585G09	SMH0585G09	SMH0585G13	8	143	1,859	11.7%	Gravity Main
SML0585G10	SMH0585G10	SMH0585G09	8	252	541	1.0%	Gravity Main
SML0585G11	SMH0585G11	SMH0585G12	8	63	630	1.3%	Gravity Main
SML0585G12	SMH0585G12	SMH0585G14	8	188	602	1.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0585G13	SMH0585G13	SMH0585B11	8	386	414	0.6%	Gravity Main
SML0585G14	SMH0585G14	SMH0585G13	8	208	410	0.6%	Gravity Main
SML0585G17	SMH0585G17	SML0585C0A	30	371	--	--	Force Main
SML0585G17	SMH0585G17	SML0585G17	30	54	--	--	Force Main
SML0585G17	SML0585G17	SML0585G17	30	290	--	--	Force Main
SML0585G18	SMH0585G18	SMH0585G17	30	101	--	--	Force Main
SML0585G19	SMH0585G19	SMH0585G18	30	15	--	--	Force Main
SML0585K01	SMH0585K01	SMH0585K02	8	152	1,888	12.1%	Gravity Main
SML0585K02	SMH0585K02	SMH0585G08	8	364	537	1.0%	Gravity Main
SML0585K03	SMH0585K03	SMH0585K02	8	379	558	1.1%	Gravity Main
SML0585K04	SMH0585K04	SMH0585K03	8	58	619	1.3%	Gravity Main
SML0585K05	SMH0585K05	SMH0585K04	8	279	404	0.6%	Gravity Main
SML0585K06	SMH0585K06	SMH0585G11	8	510	533	1.0%	Gravity Main
SML0585K07	SMH0585K07	SMH0585K03	8	33	330	0.4%	Gravity Main
SML0585L01	SMH0585L01	SMH0585F02	30	490	26,499	2.1%	Gravity Main
SML0585L02	SMH0585L02	SMH0585L01	30	456	26,510	2.1%	Gravity Main
SML0585L03	SMH0585L03	SMH0585F05	12	379	1,601	1.0%	Gravity Main
SML0585L04	SMH0585L04	SMH0585L03	12	401	1,758	1.2%	Gravity Main
SML0585L05	SMH0585L05	SMH0585L06	8	176	1,853	11.6%	Gravity Main
SML0585L06	SMH0585L06	SMH0585L09	8	126	2,017	13.8%	Gravity Main
SML0585L07	SMH0585L07	SMH0585L06	8	349	908	2.8%	Gravity Main
SML0585L08	SMH0585L08	SMH0585L15	8	27	697	1.6%	Gravity Main
SML0585L09	SMH0585L09	SMH0585L11	8	54	603	1.2%	Gravity Main
SML0585L10	SMH0585L10	SMH0585L08	8	133	543	1.0%	Gravity Main
SML0585L11	SMH0585L11	SMH0585L10	8	94	538	1.0%	Gravity Main
SML0585L12	SMH0585L12	SMH0585P13	8	100	578	1.1%	Gravity Main
SML0585L14	SMH0585L14	SMH0585L15	8	229	1,815	11.1%	Gravity Main
SML0585L15	SMH0585L15	SMH0585F09	8	290	555	1.0%	Gravity Main
SML0585M01	SMH0585M01	SMH0585E04	10	254	1,051	1.1%	Gravity Main
SML0585M03	SMH0585M03	SMH0585M05	10	223	1,923	3.8%	Gravity Main
SML0585M04	SMH0585M04	SMH0585N03	8	263	503	0.9%	Gravity Main
SML0585M06	SMH0585M06	SMH0585M12	8	362	783	2.1%	Gravity Main
SML0585M07	SMH0585M07	SMH0585N04	8	322	546	1.0%	Gravity Main
SML0585M08	SMH0585M08	SMH0585E12	10	369	1,407	2.0%	Gravity Main
SML0585M09	SMH0585M09	SMH0585N07	8	234	711	1.7%	Gravity Main
SML0585M0C	SMH0585M12	SMH0585M15	8	357	585	1.2%	Gravity Main
SML0585M0D	SMH0585M15	SMH0585M14	8	469	629	1.3%	Gravity Main
SML0585M10	SMH0585M10	SMH0585E16	8	513	541	1.0%	Gravity Main
SML0585M11	SMH0585M11	SMH0585M10	8	370	551	1.0%	Gravity Main
SML0585M12	SMH0585M12	SMH0585M11	8	191	545	1.0%	Gravity Main
SML0585M13	SMH0585M13	SMH0585M14	8	255	761	2.0%	Gravity Main
SML0585M14	SMH0585M14	SMH0585E17	8	261	614	1.3%	Gravity Main
SML0585M15	SMH0585M15	SMH0585L02	8	382	570	1.1%	Gravity Main
SML0585M16	SMH0585M16	SMH0585M17	8	221	581	1.1%	Gravity Main
SML0585M17	SMH0585M17	SMH0585M03	8	16	3,083	32.1%	Gravity Main
SML0585M2A	SMH0585M02	SMH0585M01	10	300	845	0.7%	Gravity Main
SML0585M2B	SMH0585M02	SMH0585M03	10	245	2,267	5.3%	Gravity Main
SML0585M5A	SMH0585M05	SMH0585E08	8	457	389	0.5%	Gravity Main
SML0585M5B	SMH0585M05	SMH0585M08	10	303	2,029	4.2%	Gravity Main
SML0585N01	SMH0585N01	SMH0585N02	8	375	545	1.0%	Gravity Main
SML0585N02	SMH0585N02	SMH0585V06	8	406	778	2.0%	Gravity Main
SML0585N03	SMH0585N03	SMH0585N04	8	171	1,180	4.7%	Gravity Main
SML0585N04	SMH0585N04	SMH0585N08	8	166	1,372	6.4%	Gravity Main
SML0585N05	SMH0585N05	SMH0585N06	8	381	521	0.9%	Gravity Main
SML0585N06	SMH0585N06	SMH0585V09	8	398	841	2.4%	Gravity Main
SML0585N07	SMH0585N07	SMH0585N15	8	447	542	1.0%	Gravity Main
SML0585N08	SMH0585N08	SMH0585N07	8	95	898	2.7%	Gravity Main
SML0585N09	SMH0585N09	SMH0585N08	8	124	546	1.0%	Gravity Main
SML0585N10	SMH0585N10	SMH0585N14	8	419	544	1.0%	Gravity Main
SML0585N11	SMH0585N11	SMH0585N10	8	166	542	1.0%	Gravity Main
SML0585N12	SMH0585N12	SMH0585N13	8	248	547	1.0%	Gravity Main
SML0585N13	SMH0585N13	SMH0585P01	8	398	578	1.1%	Gravity Main
SML0585N14	SMH0585N14	SMH0585P02	8	421	687	1.6%	Gravity Main
SML0585N15	SMH0585N15	SMH0585P03	8	445	665	1.5%	Gravity Main
SML0585P01	SMH0585P01	SMH0585P02	36	345	30,599	1.0%	Gravity Main
SML0585P02	SMH0585P02	SMH0585P03	36	323	9,587	0.1%	Gravity Main
SML0585P03	SMH0585P03	SMH0585L02	30	306	16,145	0.8%	Gravity Main
SML0585P04	SMH0585P04	SMH0585P06	8	157	783	2.1%	Gravity Main
SML0585P05	SMH0585P05	SMH0585L04	12	416	1,114	0.5%	Gravity Main
SML0585P06	SMH0585P06	SMH0585P05	12	448	1,124	0.5%	Gravity Main
SML0585P07	SMH0585P07	SMH0585P14	8	338	1,705	9.8%	Gravity Main
SML0585P08	SMH0585P08	SMH0585P10	8	254	1,836	11.4%	Gravity Main
SML0585P09	SMH0585P09	SMH0585P15	8	300	1,637	9.1%	Gravity Main
SML0585P10	SMH0585P10	SMH0585L09	8	431	686	1.6%	Gravity Main
SML0585P11	SMH0585P11	SMH0585P10	8	112	1,094	4.0%	Gravity Main
SML0585P12	SMH0585P12	SMH0585P15	8	74	892	2.7%	Gravity Main
SML0585P12	SMH0585P12	SMH0585P15	8	122	692	1.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0585P13	SMH0585P13	SMH0585P08	8	90	493	0.8%	Gravity Main
SML0585P14	SMH0585P14	SMH0585P11	8	207	1,087	4.0%	Gravity Main
SML0585P15	SMH0585P15	SMH0585P14	8	43	1,061	3.8%	Gravity Main
SML0585P15	SMH0585P15	SMH0585P14	8	53	947	3.0%	Gravity Main
SML0585P15	SMH0585P15	SMH0585P14	8	77	787	2.1%	Gravity Main
SML0585P17	SMH0585P17	SMH0585P12	8	99	1,844	11.5%	Gravity Main
SML0585U01	SMH0585U01	SMH0585U06	8	406	539	1.0%	Gravity Main
SML0585U02	SMH0585U02	SMH0585U01	8	158	1,034	3.6%	Gravity Main
SML0585U03	SMH0585U03	SMH0585U07	8	416	680	1.6%	Gravity Main
SML0585U04	SMH0585U04	SMH0585U03	8	253	708	1.7%	Gravity Main
SML0585U05	SMH0585U05	SMH0585X01	8	193	1,421	6.8%	Gravity Main
SML0585U06	SMH0585U06	SMH0585P06	10	293	894	0.8%	Gravity Main
SML0585U07	SMH0585U07	SMH0585U06	10	311	842	0.7%	Gravity Main
SML0585U08	SMH0585U08	SMH0585U07	10	303	838	0.7%	Gravity Main
SML0585U09	SMH0585U09	SMH0585U11	8	267	1,151	4.5%	Gravity Main
SML0585U10	SMH0585U10	SMH0585U12	8	218	1,164	4.6%	Gravity Main
SML0585U11	SMH0585U11	SMH0585P17	8	27	1,350	6.2%	Gravity Main
SML0585U11	SMH0585U11	SMH0585P17	8	69	848	2.4%	Gravity Main
SML0585U11	SMH0585U11	SMH0585P17	8	75	816	2.3%	Gravity Main
SML0585U12	SMH0585U12	SMH0585U11	8	328	530	1.0%	Gravity Main
SML0585U13	SMH0585U13	SMH0585U12	8	272	555	1.0%	Gravity Main
SML0585V01	SMH0585V01	SMH0585V06	8	155	1,133	4.3%	Gravity Main
SML0585V02	SMH0585V02	SMH0585V01	8	364	544	1.0%	Gravity Main
SML0585V03	SMH0585V03	SMH0585V02	8	365	544	1.0%	Gravity Main
SML0585V04	SMH0585V04	SMH0585V08	8	365	1,179	4.7%	Gravity Main
SML0585V05	SMH0585V05	SMH0585V07	8	310	1,266	5.4%	Gravity Main
SML0585V06	SMH0585V06	SMH0585V09	8	348	1,129	4.3%	Gravity Main
SML0585V07	SMH0585V07	SMH0585V10	8	294	1,165	4.6%	Gravity Main
SML0585V08	SMH0585V08	SMH0585V12	8	300	1,216	5.0%	Gravity Main
SML0585V09	SMH0585V09	SMH0585V11	8	222	1,043	3.7%	Gravity Main
SML0585V10	SMH0585V10	SMH0585V13	8	257	662	1.5%	Gravity Main
SML0585V11	SMH0585V11	SMH0585V16	8	444	542	1.0%	Gravity Main
SML0585V12	SMH0585V12	SMH0585V13	36	383	9,454	0.1%	Gravity Main
SML0585V13	SMH0585V13	SMH0585V16	36	394	9,448	0.1%	Gravity Main
SML0585V14	SMH0585V14	SMH0585V12	8	226	547	1.0%	Gravity Main
SML0585V15	SMH0585V15	SMH0585V14	8	134	1,218	5.0%	Gravity Main
SML0585V16	SMH0585V16	SMH0585P01	36	374	9,563	0.1%	Gravity Main
SML0585V17	SMH0585V17	SMH0585V13	8	398	545	1.0%	Gravity Main
SML0585V18	SMH0585V18	SMH0585V14	8	379	746	1.9%	Gravity Main
SML0585W01	SMH0585W01	SMH0585W10	8	60	1,288	5.6%	Gravity Main
SML0585W02	SMH0585W02	SMH0585W03	8	442	1,064	3.8%	Gravity Main
SML0585W03	SMH0585W03	SMH0585V12	24	374	22,267	4.8%	Gravity Main
SML0585W04	SMH0585W04	SMH0585W06	8	302	545	1.0%	Gravity Main
SML0585W05	SMH0585W05	SMH0585W07	8	327	571	1.1%	Gravity Main
SML0585W06	SMH0585W06	SMH0585W09	8	233	620	1.3%	Gravity Main
SML0585W07	SMH0585W07	SMH0585X02	8	395	543	1.0%	Gravity Main
SML0585W08	SMH0585W08	SMH0585X04	8	303	553	1.0%	Gravity Main
SML0585W09	SMH0585W09	SMH0585W08	8	83	1,498	7.6%	Gravity Main
SML0585W10	SMH0585W10	SMH0585V03	8	305	132	0.1%	Gravity Main
SML0585W11	SMH0585W11	SMH0585X13	8	131	--	0.0%	Gravity Main
SML0585X01	SMH0585X01	SMH0585X02	8	26	928	2.9%	Gravity Main
SML0585X02	SMH0585X02	SMH0585X06	8	449	539	1.0%	Gravity Main
SML0585X03	SMH0585X03	SMH0585X02	8	94	850	2.4%	Gravity Main
SML0585X04	SMH0585X04	SMH0585X05	8	389	543	1.0%	Gravity Main
SML0585X05	SMH0585X05	SMH0585X06	10	304	1,893	3.7%	Gravity Main
SML0585X06	SMH0585X06	SMH0585U08	10	119	1,419	2.1%	Gravity Main
SML0585X07	SMH0585X07	SMH0585X09	8	103	1,418	6.8%	Gravity Main
SML0585X08	SMH0585X08	SMH0585X10	8	258	1,490	7.5%	Gravity Main
SML0585X09	SMH0585X09	SMH0585X11	8	223	541	1.0%	Gravity Main
SML0585X10	SMH0585X10	SMH0585X12	8	123	502	0.9%	Gravity Main
SML0585X11	SMH0585X11	SMH0585U13	8	339	553	1.0%	Gravity Main
SML0585X12	SMH0585X12	SMH0585X11	8	341	535	1.0%	Gravity Main
SML0585X13	SMH0585X13	SMH0585X03	8	55	--	0.0%	Gravity Main
SML0685B01	SMH0685B01	SMH0685B03	15	415	2,410	0.7%	Gravity Main
SML0685B02	SMH0685B02	SMH0685B04	8	355	483	0.8%	Gravity Main
SML0685B03	SMH0685B03	SMH0685B05	15	410	2,675	0.8%	Gravity Main
SML0685B04	SMH0685B04	SMH0685B06	8	344	488	0.8%	Gravity Main
SML0685B05	SMH0685B05	SMH0685B07	15	157	4,816	2.7%	Gravity Main
SML0685B06	SMH0685B06	SMH0685B09	8	156	--	--	Gravity Main
SML0685B07	SMH0685B07	SMH0685B09	15	20	--	0.0%	Gravity Main
SML0685B08	SMH0685B08	SMH0685B11	12	437	2,290	2.0%	Gravity Main
SML0685B09	SMH0685B09	SMH0685B15	15	214	8,539	8.6%	Gravity Main
SML0685B10	SMH0685B10	SMH0685B12	12	251	2,512	2.5%	Gravity Main
SML0685B11	SMH0685B11	SMH0685B15	12	376	2,116	1.7%	Gravity Main
SML0685B12	SMH0685B12	SMH0685B14	18	282	6,400	1.8%	Gravity Main
SML0685B13	SMH0685B13	SMH0685B12	10	54	1,791	3.3%	Gravity Main
SML0685B14	SMH0685B14	SMH3195Y15	18	291	6,323	1.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0685B15	SMH0685B15	SMH3195Y13	15	92	3,895	1.8%	Gravity Main
SML0685C01	SMH0685C01	SMH0685C06	8	528	1,246	5.3%	Gravity Main
SML0685C02	SMH0685C02	SMH0685C04	8	347	561	1.1%	Gravity Main
SML0685C03	SMH0685C03	SMH0685C05	8	336	1,408	6.7%	Gravity Main
SML0685C04	SMH0685C04	SMH0685C05	8	488	1,091	4.0%	Gravity Main
SML0685C05	SMH0685C05	SMH0685C06	8	290	544	1.0%	Gravity Main
SML0685C06	SMH0685C06	SMH0685B05	8	311	1,216	5.0%	Gravity Main
SML0685C07	SMH0685C07	SMH0685C08	8	118	559	1.1%	Gravity Main
SML0685C08	SMH0685C08	SMH0685F13	8	81	540	1.0%	Gravity Main
SML0685C09	SMH0685C09	SMH0685F03	6	1698	--	--	Force Main
SML0685C10	SMH0685C10	SMH0685C09	8	14	--	0.0%	Gravity Main
SML0685C11	SMH0685C11	SMH0685C10	8	45	2,372	19.0%	Gravity Main
SML0685C12	SMH0685C12	SMH0685C11	8	160	560	1.1%	Gravity Main
SML0685C13	SMH0685C13	SMH0685C14	8	82	1,770	10.6%	Gravity Main
SML0685C14	SMH0685C14	SMH0685C12	8	144	946	3.0%	Gravity Main
SML0685C15	SMH0685C15	SMH0685C14	8	46	568	1.1%	Gravity Main
SML0685D01	SMH0685D01	SMH0184A20	8	199	643	1.4%	Gravity Main
SML0685D02	SMH0685D02	SMH0685D01	8	222	--	--	Gravity Main
SML0685D03	SMH0685D03	SMH0685D04	8	120	544	1.0%	Gravity Main
SML0685D04	SMH0685D04	SMH0685D01	8	176	661	1.5%	Gravity Main
SML0685D05	SMH0685D05	SMH0685D11	8	10	853	2.5%	Gravity Main
SML0685D06	SMH0685D06	SMH0685D05	8	59	591	1.2%	Gravity Main
SML0685D07	SMH0685D07	SMH0685D06	8	40	1,083	4.0%	Gravity Main
SML0685D08	SMH0685D08	SMH0685D09	8	193	554	1.0%	Gravity Main
SML0685D09	SMH0685D09	SMH0685D07	8	320	2,067	14.5%	Gravity Main
SML0685D10	SMH0685D10	SMH0685D09	8	362	808	2.2%	Gravity Main
SML0685D11	SMH0685D11	SMH0685D03	4	375	--	--	Force Main
SML0685E01	SMH0685E01	SMH0685D04	8	400	778	2.0%	Gravity Main
SML0685E02	SMH0685E02	SMH0685E01	8	405	793	2.1%	Gravity Main
SML0685E03	SMH0685E03	SMH0685M14	8	188	695	1.6%	Gravity Main
SML0685E04	SMH0685E04	SMH0685E03	8	145	652	1.4%	Gravity Main
SML0685E05	SMH0685E05	SMH0685E09	8	140	666	1.5%	Gravity Main
SML0685E06	SMH0685E06	SMH0685E10	8	195	1,222	5.1%	Gravity Main
SML0685E07	SMH0685E07	SMH0685E06	8	110	754	1.9%	Gravity Main
SML0685E08	SMH0685E08	SMH0685E07	8	265	676	1.5%	Gravity Main
SML0685E09	SMH0685E09	SMH0685F02	10	536	689	0.5%	Gravity Main
SML0685E10	SMH0685E10	SMH0685D10	8	226	1,136	4.4%	Gravity Main
SML0685E11	SMH0685E11	SMH0685E10	8	244	830	2.3%	Gravity Main
SML0685F02	SMH0685F02	SMH0685L01	10	277	763	0.6%	Gravity Main
SML0685F03	SMH0685F03	SMH0685F04	15	125	2,422	0.7%	Gravity Main
SML0685F04	SMH0685F04	SMH0685F09	15	260	2,558	0.8%	Gravity Main
SML0685F05	SMH0685F05	SMH0685F03	8	31	924	2.9%	Gravity Main
SML0685F06	SMH0685F06	SMH0685F08	8	134	623	1.3%	Gravity Main
SML0685F07	SMH0685F07	SMH0685C04	8	135	685	1.6%	Gravity Main
SML0685F08	SMH0685F08	SMH0685G01	8	160	432	0.6%	Gravity Main
SML0685F09	SMH0685F09	SMH0685B01	15	400	2,596	0.8%	Gravity Main
SML0685F10	SMH0685F10	SMH0685F13	8	201	1,982	13.3%	Gravity Main
SML0685F11	SMH0685F11	SMH0685F10	8	181	1,812	11.1%	Gravity Main
SML0685F12	SMH0685F12	SMH0685F11	8	91	1,613	8.8%	Gravity Main
SML0685F13	SMH0685F13	SMH0685F15	8	125	2,125	15.3%	Gravity Main
SML0685F14	SMH0685F14	SMH0685F12	8	126	893	2.7%	Gravity Main
SML0685F15	SMH0685F15	SMH0685C13	8	100	543	1.0%	Gravity Main
SML0685F16	SMH0685F16	SMH0685F12	8	150	946	3.0%	Gravity Main
SML0685F17	SMH0685F17	SMH0685F15	8	193	388	0.5%	Gravity Main
SML0685F18	SMH0685F18	SMH0685F17	8	199	771	2.0%	Gravity Main
SML0685F19	SMH0685F19	SMH0685F18	8	209	546	1.0%	Gravity Main
SML0685F20	SMH0685F20	SMH0685F19	8	124	568	1.1%	Gravity Main
SML0685F21	SMH0685F21	SMH0685F23	8	166	2,126	15.3%	Gravity Main
SML0685F22	SMH0685F22	SMH0685F20	8	135	543	1.0%	Gravity Main
SML0685F23	SMH0685F23	SMH0685F22	8	63	1,919	12.4%	Gravity Main
SML0685F24	SMH0685F24	SMH0685F22	8	171	500	0.8%	Gravity Main
SML0685F25	SMH0685F25	SMH0685F08	8	162	--	--	Gravity Main
SML0685G01	SMH0685G01	SMH0685G05	8	319	669	1.5%	Gravity Main
SML0685G02	SMH0685G02	SMH0685B02	8	390	579	1.1%	Gravity Main
SML0685G03	SMH0685G03	SMH0685G05	12	388	2,361	2.2%	Gravity Main
SML0685G04	SMH0685G04	SMH0685G06	10	480	1,608	2.7%	Gravity Main
SML0685G05	SMH0685G05	SMH0685B08	12	464	2,374	2.2%	Gravity Main
SML0685G06	SMH0685G06	SMH0685B10	12	480	2,446	2.3%	Gravity Main
SML0685G07	SMH0685G07	SMH0685B13	10	504	1,907	3.7%	Gravity Main
SML0685G08	SMH0685G08	SMH0685G07	10	512	1,875	3.6%	Gravity Main
SML0685J01	SMH0685J01	SMH0685J03	8	56	446	0.7%	Gravity Main
SML0685J02	SMH0685J02	SMH0685J01	8	406	656	1.5%	Gravity Main
SML0685J03	SMH0685J03	SMH0685J04	8	97	1,021	3.5%	Gravity Main
SML0685J04	SMH0685J04	SMH0685J05	8	241	1,587	8.5%	Gravity Main
SML0685J05	SMH0685J05	SMH0585M02	10	27	1,589	2.6%	Gravity Main
SML0685J06	SMH0685J06	SMH0685J05	10	200	991	1.0%	Gravity Main
SML0685K01	SMH0685K01	SMH0685K03	12	430	2,229	1.9%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0685K02	SMH0685K02	SMH0685K04	10	422	1,199	1.5%	Gravity Main
SML0685K03	SMH0685K03	SMH0685K09	12	43	2,517	2.5%	Gravity Main
SML0685K04	SMH0685K04	SMH0685G04	10	517	1,314	1.8%	Gravity Main
SML0685K05	SMH0685K05	SMH0685G08	8	506	1,126	4.3%	Gravity Main
SML0685K09	SMH0685K09	SMH0685G03	12	345	2,582	2.6%	Gravity Main
SML0685L01	SMH0685L01	SMH0685L02	10	236	789	0.6%	Gravity Main
SML0685L02	SMH0685L02	SMH0685L05	10	377	1,665	2.9%	Gravity Main
SML0685L03	SMH0685L03	SMH0685L02	8	306	971	3.2%	Gravity Main
SML0685L04	SMH0685L04	SMH0685P19	8	298	725	1.8%	Gravity Main
SML0685L05	SMH0685L05	SMH0685L08	10	317	2,867	8.5%	Gravity Main
SML0685L06	SMH0685L06	SMH0685L05	8	347	738	1.8%	Gravity Main
SML0685L07	SMH0685L07	SMH0685F03	15	291	9,399	10.5%	Gravity Main
SML0685L08	SMH0685L08	SMH0685L07	15	251	3,660	1.6%	Gravity Main
SML0685L09	SMH0685L09	SMH0685L08	15	15	5,354	3.4%	Gravity Main
SML0685L10	SMH0685L10	SMH0685L09	15	353	2,648	0.8%	Gravity Main
SML0685L11	SMH0685L11	SMH0685F05	8	306	1,580	8.4%	Gravity Main
SML0685L12	SMH0685L12	SMH0685L11	8	299	444	0.7%	Gravity Main
SML0685L13	SMH0685L13	SMH0685F21	8	140	1,413	6.8%	Gravity Main
SML0685L14	SMH0685L14	SMH0685F05	8	33	284	0.3%	Gravity Main
SML0685L15	SMH0685L15	SMH0685L14	8	87	496	0.8%	Gravity Main
SML0685L16	SMH0685L16	SMH0685L11	6	40	257	1.0%	Gravity Main
SML0685M01	SMH0685M01	SMH0184J13	8	378	928	2.9%	Gravity Main
SML0685M02	SMH0685M02	SMH0184J14	8	544	773	2.0%	Gravity Main
SML0685M03	SMH0685M03	SMH0685M05	8	250	835	2.4%	Gravity Main
SML0685M04	SMH0685M04	SMH0685E09	8	309	432	0.6%	Gravity Main
SML0685M05	SMH0685M05	SMH0685M04	8	291	428	0.6%	Gravity Main
SML0685M06	SMH0685M06	SMH0685M05	8	310	470	0.7%	Gravity Main
SML0685M07	SMH0685M07	SMH0685M05	8	252	1,081	4.0%	Gravity Main
SML0685M08	SMH0685M08	SMH0685M06	8	241	1,189	4.8%	Gravity Main
SML0685M09	SMH0685M09	SMH0685M04	8	155	1,214	5.0%	Gravity Main
SML0685M10	SMH0685M10	SMH0685M09	8	66	308	0.3%	Gravity Main
SML0685M11	SMH0685M11	SMH0685N09	8	143	741	1.9%	Gravity Main
SML0685M12	SMH0685M12	SMH0685M13	8	173	978	3.2%	Gravity Main
SML0685M13	SMH0685M13	SMH0685M14	8	28	2,884	28.1%	Gravity Main
SML0685M14	SMH0685M14	SMH0184H05	8	291	904	2.8%	Gravity Main
SML0685M1A	SMH0685M01	SMH0685N09	8	60	1,827	11.3%	Gravity Main
SML0685M2A	SMH0685M02	SMH0685M06	8	478	902	2.7%	Gravity Main
SML0685N01	SMH0685N01	SMH0685N04	8	291	649	1.4%	Gravity Main
SML0685N02	SMH0685N02	SMH0184R16	8	473	790	2.1%	Gravity Main
SML0685N03	SMH0685N03	SMH0685N11	8	237	621	1.3%	Gravity Main
SML0685N04	SMH0685N04	SMH0685N05	8	399	954	3.1%	Gravity Main
SML0685N05	SMH0685N05	SMH0685M06	8	336	516	0.9%	Gravity Main
SML0685N06	SMH0685N06	SMH0685N05	8	348	632	1.4%	Gravity Main
SML0685N07	SMH0685N07	SMH0685P01	12	359	1,094	0.5%	Gravity Main
SML0685N08	SMH0685N08	SMH0685N07	8	414	486	0.8%	Gravity Main
SML0685N09	SMH0685N09	SMH0685M03	8	332	725	1.8%	Gravity Main
SML0685N10	SMH0685N10	SMH0685N11	8	233	557	1.0%	Gravity Main
SML0685N11	SMH0685N11	SMH0685N06	8	238	593	1.2%	Gravity Main
SML0685N1A	SMH0685N01	SMH0184R15	8	342	1,060	3.8%	Gravity Main
SML0685P01	SMH0685P01	SMH0685P04	12	259	2,482	2.4%	Gravity Main
SML0685P02	SMH0685P02	SMH0685P05	8	162	423	0.6%	Gravity Main
SML0685P03	SMH0685P03	SMH0685P02	8	438	425	0.6%	Gravity Main
SML0685P04	SMH0685P04	SMH0685P05	12	109	1,424	0.8%	Gravity Main
SML0685P05	SMH0685P05	SMH0685P06	12	188	3,821	5.7%	Gravity Main
SML0685P06	SMH0685P06	SMH0685P10	12	351	4,824	9.1%	Gravity Main
SML0685P07	SMH0685P07	SMH0685L06	8	391	682	1.6%	Gravity Main
SML0685P08	SMH0685P08	SMH0685P16	15	262	2,858	1.0%	Gravity Main
SML0685P09	SMH0685P09	SMH0685P10	15	92	4,594	2.5%	Gravity Main
SML0685P10	SMH0685P10	SMH0685L10	15	389	4,136	2.0%	Gravity Main
SML0685P11	SMH0685P11	SMH0685P14	8	252	1,177	4.7%	Gravity Main
SML0685P12	SMH0685P12	SMH0685P13	12	362	2,786	3.0%	Gravity Main
SML0685P13	SMH0685P13	SMH0685P14	12	365	2,506	2.4%	Gravity Main
SML0685P14	SMH0685P14	SMH0685K01	12	420	2,070	1.7%	Gravity Main
SML0685P15	SMH0685P15	SMH0685P16	8	210	1,505	7.7%	Gravity Main
SML0685P16	SMH0685P16	SMH0685P09	15	234	2,852	1.0%	Gravity Main
SML0685P17	SMH0685P17	SMH0685P18	8	161	785	2.1%	Gravity Main
SML0685P18	SMH0685P18	SMH0685P19	8	62	2,095	14.8%	Gravity Main
SML0685P19	SMH0685P19	SMH0685L03	8	37	281	0.3%	Gravity Main
SML0685P20	SMH0685P20	SMH0685M08	8	82	631	1.3%	Gravity Main
SML0685Q01	SMH0685Q01	SMH0685K02	10	410	1,462	2.2%	Gravity Main
SML0685Q02	SMH0685Q02	SMH0685Q04	10	316	1,129	1.3%	Gravity Main
SML0685Q03	SMH0685Q03	SMH0685Q02	10	29	1,284	1.7%	Gravity Main
SML0685Q04	SMH0685Q04	SMH0685Q05	10	171	1,190	1.5%	Gravity Main
SML0685Q05	SMH0685Q05	SMH0685Q01	10	249	1,127	1.3%	Gravity Main
SML0685Q06	SMH0685Q06	SMH0685Q03	8	285	1,538	8.0%	Gravity Main
SML0685Q07	SMH0685Q07	SMH0685Q05	8	213	1,880	11.9%	Gravity Main
SML0685Q08	SMH0685Q08	SMH0685Q07	8	205	934	2.9%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0685Q09	SMH0685Q09	SMH0685Q08	8	57	1,423	6.9%	Gravity Main
SML0685Q10	SMH0685Q10	SMH0685Q11	8	325	734	1.8%	Gravity Main
SML0685Q11	SMH0685Q11	SMH0685Q13	8	274	799	2.2%	Gravity Main
SML0685Q12	SMH0685Q12	SMH0685Q13	8	195	607	1.2%	Gravity Main
SML0685Q13	SMH0685Q13	SMH0685R01	8	163	798	2.2%	Gravity Main
SML0685Q14	SMH0685Q14	SMH0685Q12	8	121	508	0.9%	Gravity Main
SML0685R01	SMH0685R01	SMH0685R02	8	132	823	2.3%	Gravity Main
SML0685R02	SMH0685R02	SMH0685R03	8	354	876	2.6%	Gravity Main
SML0685R03	SMH0685R03	SMH0685R13	8	192	806	2.2%	Gravity Main
SML0685R04	SMH0685R04	SMH0685R06	8	225	1,272	5.5%	Gravity Main
SML0685R05	SMH0685R05	SMH0685R08	8	282	1,539	8.0%	Gravity Main
SML0685R06	SMH0685R06	SMH0685R10	8	331	1,464	7.2%	Gravity Main
SML0685R07	SMH0685R07	SMH0685J04	8	470	544	1.0%	Gravity Main
SML0685R08	SMH0685R08	SMH0685R09	10	237	922	0.9%	Gravity Main
SML0685R09	SMH0685R09	SMH0685R10	10	214	930	0.9%	Gravity Main
SML0685R10	SMH0685R10	SMH0685R15	10	183	1,517	2.4%	Gravity Main
SML0685R11	SMH0685R11	SMH0585V01	8	160	1,002	3.4%	Gravity Main
SML0685R12	SMH0685R12	SMH0685R13	8	160	1,112	4.2%	Gravity Main
SML0685R13	SMH0685R13	SMH0685R05	8	99	839	2.4%	Gravity Main
SML0685R14	SMH0685R14	SMH0685R03	8	24	1,216	5.0%	Gravity Main
SML0685R15	SMH0685R15	SMH0685J06	10	307	--	--	Gravity Main
SML0685S01	SMH0685S01	SMH0685S03	8	319	530	0.9%	Gravity Main
SML0685S02	<Null>	SMH0685S05	8	422	934	3.0%	Gravity Main
SML0685S03	SMH0685S03	SMH0685R03	8	360	525	0.9%	Gravity Main
SML0685S04	SMH0685S04	SMH0685Z05	8	182	547	1.0%	Gravity Main
SML0685S05	SMH0685S05	SMH0685S06	8	458	779	2.1%	Gravity Main
SML0685S06	SMH0685S06	SMH0685R08	8	487	832	2.3%	Gravity Main
SML0685S07	SMH0685S07	SMH0685S08	8	256	450	0.7%	Gravity Main
SML0685S08	SMH0685S08	SMH0685S05	8	38	500	0.8%	Gravity Main
SML0685T01	SMH0685T01	SMH0685Q03	10	534	1,604	2.6%	Gravity Main
SML0685T02	SMH0685T02	SMH0685T04	8	417	1,006	3.4%	Gravity Main
SML0685T03	SMH0685T03	SMH0685T06	8	321	970	3.2%	Gravity Main
SML0685T04	SMH0685T04	SMH0685Q09	8	430	1,333	6.0%	Gravity Main
SML0685T05	SMH0685T05	SMH0685T08	8	326	1,273	5.5%	Gravity Main
SML0685T06	SMH0685T06	SMH0685T07	8	385	971	3.2%	Gravity Main
SML0685T07	SMH0685T07	SMH0685Q11	8	393	704	1.7%	Gravity Main
SML0685T08	SMH0685T08	SMH0685T09	8	357	903	2.8%	Gravity Main
SML0685T09	SMH0685T09	SMH0685T11	8	427	671	1.5%	Gravity Main
SML0685T10	SMH0685T10	SMH0685T07	8	215	550	1.0%	Gravity Main
SML0685T11	SMH0685T11	SMH0685R01	8	421	678	1.6%	Gravity Main
SML0685T12	SMH0685T12	SMH0685S01	8	271	1,138	4.4%	Gravity Main
SML0685T13	SMH0685T13	SMH0685S01	8	483	525	0.9%	Gravity Main
SML0685U01	SMH0685U01	SMH0685U03	8	180	988	3.3%	Gravity Main
SML0685U02	SMH0685U02	SMH0685P03	8	433	450	0.7%	Gravity Main
SML0685U03	SMH0685U03	SMH0685U20	8	229	444	0.7%	Gravity Main
SML0685U04	SMH0685U04	SMH0685U03	8	51	382	0.5%	Gravity Main
SML0685U05	SMH0685U05	SMH0685U06	8	132	1,198	4.9%	Gravity Main
SML0685U06	SMH0685U06	SMH0685U08	8	160	1,208	4.9%	Gravity Main
SML0685U07	SMH0685U07	SMH0685P08	15	490	4,158	2.0%	Gravity Main
SML0685U08	SMH0685U08	SMH0685U14	15	404	4,141	2.0%	Gravity Main
SML0685U09	SMH0685U09	SMH0685U08	15	19	1,649	0.3%	Gravity Main
SML0685U10	SMH0685U10	SMH0685U12	8	215	794	2.1%	Gravity Main
SML0685U11	SMH0685U11	SMH0685U12	12	443	2,487	2.4%	Gravity Main
SML0685U12	SMH0685U12	SMH0685P12	12	361	2,787	3.0%	Gravity Main
SML0685U13	SMH0685U13	SMH0685U03	6	130	337	1.8%	Gravity Main
SML0685U14	SMH0685U14	SMH0685U07	15	66	3,849	1.8%	Gravity Main
SML0685U15	SMH0685U15	SMH0685U14	8	225	1,398	6.6%	Gravity Main
SML0685U16	SMH0685U16	SMH0685U15	8	45	568	1.1%	Gravity Main
SML0685U17	SMH0685U17	SMH0685U16	8	28	870	2.6%	Gravity Main
SML0685U18	SMH0685U18	SMH0685U17	8	169	72	0.0%	Gravity Main
SML0685U19	SMH0685U19	SMH0685U18	8	117	188	0.1%	Gravity Main
SML0685U20	SMH0685U20	SMH0685U02	8	142	478	0.8%	Gravity Main
SML0685V01	SMH0685V01	SMH0184R16	8	492	574	1.1%	Gravity Main
SML0685V02	SMH0685V02	SMH0685V01	8	328	456	0.7%	Gravity Main
SML0685V03	SMH0685V03	SMH0685V02	8	330	516	0.9%	Gravity Main
SML0685V04	SMH0685V04	SMH0685V01	8	450	811	2.2%	Gravity Main
SML0685V05	SMH0685V05	SMH0685V02	8	440	733	1.8%	Gravity Main
SML0685V06	SMH0685V06	SMH0685V11	8	277	558	1.1%	Gravity Main
SML0685V07	SMH0685V07	SMH0685N03	8	474	761	2.0%	Gravity Main
SML0685V08	SMH0685V08	SMH0685V07	8	91	906	2.8%	Gravity Main
SML0685V09	SMH0685V09	SMH0685V08	8	213	856	2.5%	Gravity Main
SML0685V10	SMH0685V10	SMH0685V12	8	437	689	1.6%	Gravity Main
SML0685V11	SMH0685V11	SMH0685V13	8	326	927	2.9%	Gravity Main
SML0685V12	SMH0685V12	SMH0685V13	8	262	523	0.9%	Gravity Main
SML0685V13	SMH0685V13	SMH0685W03	8	462	393	0.5%	Gravity Main
SML0685V14	SMH0685V14	SMH0685U20	8	245	1,157	4.5%	Gravity Main
SML0685V6A	SMH0685V06	SMH0685V06	8	430	699	1.7%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0685W01	SMH0685W01	SMH0184Z06	8	503	776	2.0%	Gravity Main
SML0685W02	SMH0685W02	SMH0685W05	8	140	676	1.5%	Gravity Main
SML0685W03	SMH0685W03	SMH0785C01	8	512	402	0.5%	Gravity Main
SML0685W04	SMH0685W04	SMH0685W05	8	192	746	1.9%	Gravity Main
SML0685W05	SMH0685W05	SMH0685W03	8	262	872	2.6%	Gravity Main
SML0685X01	SMH0685X01	SMH0685U04	8	428	682	1.6%	Gravity Main
SML0685X02	SMH0685X02	SMH0685U11	12	456	2,454	2.3%	Gravity Main
SML0685X03	SMH0685X03	SMH0685X07	10	292	1,082	1.2%	Gravity Main
SML0685X06	SMH0685X06	SMH0685X03	10	308	1,075	1.2%	Gravity Main
SML0685X07	SMH0685X07	SMH0685Y08	10	168	848	0.7%	Gravity Main
SML0685Y01	SMH0685Y01	SMH0685X06	8	303	1,661	9.3%	Gravity Main
SML0685Y02	SMH0685Y02	SMH0685T02	8	490	544	1.0%	Gravity Main
SML0685Y03	SMH0685Y03	SMH0685Y05	8	273	1,292	5.6%	Gravity Main
SML0685Y04	SMH0685Y04	SMH0685T08	8	375	854	2.5%	Gravity Main
SML0685Y05	SMH0685Y05	SMH0685Y13	8	296	1,213	5.0%	Gravity Main
SML0685Y06	SMH0685Y06	SMH0785A01	8	283	1,185	4.7%	Gravity Main
SML0685Y07	SMH0685Y07	SMH0685Y11	8	93	178	0.1%	Gravity Main
SML0685Y08	SMH0685Y08	SMH0685Y09	10	242	1,591	2.6%	Gravity Main
SML0685Y09	SMH0685Y09	SMH0685Y10	10	43	1,654	2.8%	Gravity Main
SML0685Y10	SMH0685Y10	SMH0685T01	10	268	1,570	2.5%	Gravity Main
SML0685Y11	SMH0685Y11	SMH0685T13	8	358	1,311	5.8%	Gravity Main
SML0685Y12	SMH0685Y12	SMH0685Y11	8	194	1,108	4.2%	Gravity Main
SML0685Y13	SMH0685Y13	SMH0685Y06	8	82	1,207	4.9%	Gravity Main
SML0685Y2A	SMH0685Y02	SMH0685Y01	8	223	546	1.0%	Gravity Main
SML0685Z01	SMH0685Z01	SMH0585W10	8	167	1,430	6.9%	Gravity Main
SML0685Z02	SMH0685Z02	SMH0585V03	8	36	1,249	5.3%	Gravity Main
SML0685Z03	SMH0685Z03	SMH0685Z02	8	175	1,302	5.7%	Gravity Main
SML0685Z04	SMH0685Z04	SMH0685Z05	8	292	548	1.0%	Gravity Main
SML0685Z05	SMH0685Z05	SMH0685S08	8	161	549	1.0%	Gravity Main
SML0785A01	SMH0785A01	SMH0785A04	8	307	1,098	4.1%	Gravity Main
SML0785A02	SMH0785A02	SMH0785A03	8	240	506	0.9%	Gravity Main
SML0785A03	SMH0785A03	SMH0785A16	8	78	493	0.8%	Gravity Main
SML0785A04	SMH0785A04	SMH0685S04	8	343	571	1.1%	Gravity Main
SML0785A05	SMH0785A05	SMH0785A10	8	368	541	1.0%	Gravity Main
SML0785A06	SMH0785A06	SMH0785A09	6	230	496	3.9%	Gravity Main
SML0785A07	SMH0785A07	SMH0785A08	8	207	528	0.9%	Gravity Main
SML0785A08	SMH0785A08	SMH0785A09	8	299	504	0.9%	Gravity Main
SML0785A09	SMH0785A09	SMH0785H06	8	128	--	0.0%	Gravity Main
SML0785A10	SMH0785A10	SMH0785A11	8	231	489	0.8%	Gravity Main
SML0785A11	SMH0785A11	SMH0885D01	8	336	1,443	7.0%	Gravity Main
SML0785A12	SMH0785A12	SMH0885D04	30	350	22,623	1.5%	Gravity Main
SML0785A13	SMH0785A13	SMH0785H19	8	315	588	1.2%	Gravity Main
SML0785A14	SMH0785A14	SMH0785H18	8	177	817	2.3%	Gravity Main
SML0785A15	SMH0785A15	SMH0785A14	8	81	555	1.0%	Gravity Main
SML0785A16	SMH0785A16	SMH0785A05	8	281	577	1.1%	Gravity Main
SML0785A17	SMH0785A17	SMH0785A16	8	155	1,564	8.3%	Gravity Main
SML0785B01	SMH0785B01	SMH0785B02	8	207	911	2.8%	Gravity Main
SML0785B02	SMH0785B02	SMH0785B03	8	354	545	1.0%	Gravity Main
SML0785B03	SMH0785B03	SMH0685Y01	8	81	573	1.1%	Gravity Main
SML0785B04	SMH0785B04	SMH0785B05	8	282	542	1.0%	Gravity Main
SML0785B05	SMH0785B05	SMH0785B06	8	400	782	2.1%	Gravity Main
SML0785B06	SMH0785B06	SMH0685Y05	8	77	556	1.0%	Gravity Main
SML0785B07	SMH0785B07	SMH0785B08	8	292	340	0.4%	Gravity Main
SML0785B08	SMH0785B08	SMH0685Y06	8	398	345	0.4%	Gravity Main
SML0785B09	SMH0785B09	SMH0685Y13	8	399	685	1.6%	Gravity Main
SML0785C01	SMH0785C01	SMH0785C05	8	341	830	2.3%	Gravity Main
SML0785C02	SMH0785C02	SMH0785C01	8	504	385	0.5%	Gravity Main
SML0785C03	SMH0785C03	SMH0785C02	8	169	545	1.0%	Gravity Main
SML0785C04	SMH0785C04	SMH0785C07	8	289	949	3.0%	Gravity Main
SML0785C05	SMH0785C05	SMH0785C09	8	238	1,160	4.6%	Gravity Main
SML0785C06	SMH0785C06	SMH0785C05	8	342	680	1.6%	Gravity Main
SML0785C07	SMH0785C07	SMH0785C06	8	358	669	1.5%	Gravity Main
SML0785C08	SMH0785C08	SMH0785C11	12	185	1,855	1.3%	Gravity Main
SML0785C09	SMH0785C09	SMH0685U09	15	523	2,667	0.8%	Gravity Main
SML0785C10	SMH0785C10	SMH0785C12	15	187	3,553	1.5%	Gravity Main
SML0785C11	SMH0785C11	SMH0785C14	12	405	2,103	1.7%	Gravity Main
SML0785C12	SMH0785C12	SMH0785C15	15	430	3,660	1.6%	Gravity Main
SML0785C13	SMH0785C13	SMH0785C09	15	143	2,863	1.0%	Gravity Main
SML0785C14	SMH0785C14	SMH0685X02	12	391	2,139	1.8%	Gravity Main
SML0785C15	SMH0785C15	SMH0785C13	15	44	2,288	0.6%	Gravity Main
SML0785C16	SMH0785C16	SMH0785C17	8	299	310	0.3%	Gravity Main
SML0785C17	SMH0785C17	SMH0685X03	8	298	1,220	5.0%	Gravity Main
SML0785C18	SMH0785C18	SMH0785C19	8	362	810	2.2%	Gravity Main
SML0785C19	SMH0785C19	SMH0685X06	8	307	757	1.9%	Gravity Main
SML0785D01	SMH0785D01	SMH0785D02	8	263	541	1.0%	Gravity Main
SML0785D02	SMH0785D02	SMH0785D03	8	348	545	1.0%	Gravity Main
SML0785D03	SMH0785D03	SMH0785E01	8	350	543	1.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0785D04	SMH0785D04	SMH0785D02	8	480	795	2.1%	Gravity Main
SML0785D05	SMH0785D05	SMH0785D03	8	476	698	1.6%	Gravity Main
SML0785D06	SMH0785D06	SMH0785D09	8	437	822	2.3%	Gravity Main
SML0785D07	SMH0785D07	SMH0785E06	8	412	550	1.0%	Gravity Main
SML0785D08	SMH0785D08	SMH0785D09	8	299	545	1.0%	Gravity Main
SML0785D09	SMH0785D09	SMH0785C02	8	452	385	0.5%	Gravity Main
SML0785D10	SMH0785D10	SMH0685W02	--	26	--	--	Gravity Main
SML0785D11	SMH0785D11	SMH0785D10	--	244	--	--	Gravity Main
SML0785E01	SMH0785E01	SMH0785E02	8	349	541	1.0%	Gravity Main
SML0785E02	SMH0785E02	SMH0785E05	15	526	1,775	0.4%	Gravity Main
SML0785E03	SMH0785E03	SMH0785E01	8	405	604	1.2%	Gravity Main
SML0785E04	SMH0785E04	SMH0785E06	8	193	782	2.1%	Gravity Main
SML0785E05	SMH0785E05	SMH0785E08	15	364	1,842	0.4%	Gravity Main
SML0785E06	SMH0785E06	SMH0785E09	8	357	868	2.5%	Gravity Main
SML0785E07	SMH0785E07	SMH0785F02	15	485	1,895	0.4%	Gravity Main
SML0785E08	SMH0785E08	SMH0785E07	15	126	1,865	0.4%	Gravity Main
SML0785E09	SMH0785E09	SMH0785D09	8	494	399	0.5%	Gravity Main
SML0785F01	SMH0785F01	SMH0785F04	8	391	--	--	Gravity Main
SML0785F02	SMH0785F02	SMH0785F05	15	385	1,777	0.4%	Gravity Main
SML0785F03	SMH0785F03	SMH0785F06	8	74	508	0.9%	Gravity Main
SML0785F04	SMH0785F04	SMH0785F03	8	10	--	0.0%	Gravity Main
SML0785F05	SMH0785F05	SMH0785F07	15	110	1,797	0.4%	Gravity Main
SML0785F06	SMH0785F06	SMH0785F05	8	445	557	1.0%	Gravity Main
SML0785F07	SMH0785F07	SMH0785C08	15	479	1,835	0.4%	Gravity Main
SML0785F08	<Null>	SMH0785F11	8	225	530	0.9%	Gravity Main
SML0785F09	SMH0785F09	SMH0785F10	10	147	17,847	327.7%	Gravity Main
SML0785F10	SMH0785F10	SMH0785G03	10	163	--	--	Gravity Main
SML0785F11	SMH0785F11	SMH0785G01	8	505	725	1.8%	Gravity Main
SML0785G01	SMH0785G01	SMH0785C10	10	485	796	0.7%	Gravity Main
SML0785G02	SMH0785G02	SMH0785F11	10	120	1,401	2.0%	Gravity Main
SML0785G03	SMH0785G03	SMH0785G24	10	249	1,810	3.4%	Gravity Main
SML0785G04	SMH0785G04	SMH0785G01	10	252	497	0.3%	Gravity Main
SML0785G05	SMH0785G05	SMH0785B04	8	298	546	1.0%	Gravity Main
SML0785G06	SMH0785G06	SMH0785G05	8	291	538	1.0%	Gravity Main
SML0785G07	SMH0785G07	SMH0785G06	8	196	672	1.5%	Gravity Main
SML0785G08	SMH0785G08	SMH0785G11	8	211	532	1.0%	Gravity Main
SML0785G09	SMH0785G09	SMH0785G04	10	226	580	0.3%	Gravity Main
SML0785G11	SMH0785G11	SMH0785K14	8	232	1,559	8.2%	Gravity Main
SML0785G12	SMH0785G12	SMH0785G14	8	205	530	1.0%	Gravity Main
SML0785G14	SMH0785G14	SMH0785G18	8	287	1,610	8.8%	Gravity Main
SML0785G15	SMH0785G15	SMH0785G17	8	279	933	2.9%	Gravity Main
SML0785G16	SMH0785G16	SMH0785G15	8	312	987	3.3%	Gravity Main
SML0785G17	SMH0785G17	SMH0785G22	8	224	1,365	6.3%	Gravity Main
SML0785G18	SMH0785G18	SMH0785G23	8	265	1,078	3.9%	Gravity Main
SML0785G19	SMH0785G19	SMH0785G20	8	162	640	1.4%	Gravity Main
SML0785G20	SMH0785G20	SMH0785H01	8	317	882	2.6%	Gravity Main
SML0785G21	SMH0785G21	SMH0785G20	8	162	630	1.3%	Gravity Main
SML0785G22	SMH0785G22	SMH0785A02	8	404	541	1.0%	Gravity Main
SML0785G23	SMH0785G23	SMH0785H02	8	260	1,746	10.3%	Gravity Main
SML0785G24	SMH0785G24	SMH0785G02	10	130	754	0.6%	Gravity Main
SML0785H01	SMH0785H01	SMH0785H08	8	346	1,162	4.6%	Gravity Main
SML0785H02	SMH0785H02	SMH0785H05	8	214	755	1.9%	Gravity Main
SML0785H03	SMH0785H03	SMH0785H04	8	137	915	2.8%	Gravity Main
SML0785H04	SMH0785H04	SMH0785H07	8	198	1,213	5.0%	Gravity Main
SML0785H05	SMH0785H05	SMH0785H09	36	237	41,340	1.9%	Gravity Main
SML0785H06	SMH0785H06	SMH0785H07	8	275	147	0.1%	Gravity Main
SML0785H07	SMH0785H07	SMH0785H08	8	136	561	1.1%	Gravity Main
SML0785H08	SMH0785H08	SMH0785H09	8	208	796	2.1%	Gravity Main
SML0785H09	SMH0785H09	SMH0785H11	36	359	29,458	1.0%	Gravity Main
SML0785H10	SMH0785H10	SMH0785H12	8	322	977	3.2%	Gravity Main
SML0785H11	SMH0785H11	SMH0785H18	36	355	29,034	0.9%	Gravity Main
SML0785H12	SMH0785H12	SMH0785H16	8	302	1,212	5.0%	Gravity Main
SML0785H13	SMH0785H13	SMH0785H15	8	237	1,050	3.7%	Gravity Main
SML0785H14	SMH0785H14	SMH0785H15	8	80	--	--	Gravity Main
SML0785H15	SMH0785H15	SMH0785H16	8	288	706	1.7%	Gravity Main
SML0785H16	SMH0785H16	SMH0885M01	8	385	906	2.8%	Gravity Main
SML0785H17	SMH0785H17	SMH0785A14	8	158	1,046	3.7%	Gravity Main
SML0785H18	SMH0785H18	SMH0785A12	30	295	26,761	2.1%	Gravity Main
SML0785H19	SMH0785H19	SMH0785H14	8	53	505	0.9%	Gravity Main
SML0785H20	SMH0785H20	SMH0785H19	8	220	1,167	4.6%	Gravity Main
SML0785J01	SMH0785J01	SMH0785K24	8	395	614	1.3%	Gravity Main
SML0785J02	SMH0785J02	SMH0785J01	8	168	548	1.0%	Gravity Main
SML0785J03	SMH0785J03	SMH0785R01	8	299	468	0.7%	Gravity Main
SML0785J04	SMH0785J04	SMH0785J05	36	390	52,709	3.1%	Gravity Main
SML0785J05	SMH0785J05	SMH0785J06	36	324	57,274	3.6%	Gravity Main
SML0785J06	SMH0785J06	SMH0785H05	36	301	29,051	0.9%	Gravity Main
SML0785J07	SMH0785J07	SMH0785J12	8	383	1,393	6.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0785J08	SMH0785J08	SMH0785J07	8	81	819	2.3%	Gravity Main
SML0785J09	SMH0785J09	SMH0785J10	8	273	549	1.0%	Gravity Main
SML0785J10	SMH0785J10	SMH0785J11	8	286	521	0.9%	Gravity Main
SML0785J11	SMH0785J11	SMH0785J13	8	68	648	1.4%	Gravity Main
SML0785J12	SMH0785J12	SMH0885M02	8	381	1,149	4.5%	Gravity Main
SML0785J13	SMH0785J13	SMH0885M01	8	293	822	2.3%	Gravity Main
SML0785K01	SMH0785K01	SMH0785K26	10	387	1,204	1.5%	Gravity Main
SML0785K02	SMH0785K02	SMH0785K01	10	321	1,203	1.5%	Gravity Main
SML0785K03	SMH0785K03	SMH0785K02	8	124	779	2.1%	Gravity Main
SML0785K04	SMH0785K04	SMH0785K01	8	219	1,491	7.5%	Gravity Main
SML0785K05	SMH0785K05	SMH0785G08	8	433	539	1.0%	Gravity Main
SML0785K06	SMH0785K06	SMH0785K11	8	321	1,497	7.6%	Gravity Main
SML0785K07	SMH0785K07	SMH0785K06	8	166	669	1.5%	Gravity Main
SML0785K08	SMH0785K08	SMH0785K03	8	252	547	1.0%	Gravity Main
SML0785K09	SMH0785K09	SMH0785K16	8	327	1,285	5.6%	Gravity Main
SML0785K10	SMH0785K10	SMH0785K09	8	97	1,597	8.6%	Gravity Main
SML0785K11	SMH0785K11	SMH0785K18	8	321	1,307	5.8%	Gravity Main
SML0785K12	SMH0785K12	SMH0785K11	8	165	545	1.0%	Gravity Main
SML0785K13	SMH0785K13	SMH0785K20	8	320	1,275	5.5%	Gravity Main
SML0785K14	SMH0785K14	SMH0785K15	8	220	1,572	8.4%	Gravity Main
SML0785K15	SMH0785K15	SMH0785K24	8	304	1,077	3.9%	Gravity Main
SML0785K16	SMH0785K16	SMH0785K15	8	210	683	1.6%	Gravity Main
SML0785K17	SMH0785K17	SMH0785K16	8	104	521	0.9%	Gravity Main
SML0785K18	SMH0785K18	SMH0785J01	8	357	1,428	6.9%	Gravity Main
SML0785K19	SMH0785K19	SMH0785K18	8	219	533	1.0%	Gravity Main
SML0785K20	SMH0785K20	SMH0785K21	8	225	1,577	8.4%	Gravity Main
SML0785K21	SMH0785K21	SMH0785J03	8	190	1,294	5.7%	Gravity Main
SML0785K22	SMH0785K22	SMH0785K21	8	98	548	1.0%	Gravity Main
SML0785K23	SMH0785K23	SMH0785K24	8	181	625	1.3%	Gravity Main
SML0785K24	SMH0785K24	SMH0785J06	8	378	1,302	5.7%	Gravity Main
SML0785K26	SMH0785K26	SMH0785G03	10	204	1,076	1.2%	Gravity Main
SML0785L01	SMH0785L01	SMH0785L04	8	402	354	0.4%	Gravity Main
SML0785L02	SMH0785L02	SMH0785F04	8	99	631	1.3%	Gravity Main
SML0785L03	SMH0785L03	SMH0785L02	8	188	2,044	14.1%	Gravity Main
SML0785L04	SMH0785L04	SMH0785L05	8	15	--	--	Gravity Main
SML0785L05	SMH0785L05	SMH0785L06	8	185	797	2.1%	Gravity Main
SML0785L06	SMH0785L06	SMH0785L07	8	279	673	1.5%	Gravity Main
SML0785L07	SMH0785L07	SMH0785K01	8	370	583	1.1%	Gravity Main
SML0785L08	SMH0785L08	SMH0785K02	10	134	1,299	1.7%	Gravity Main
SML0785M01	SMH0785M01	SMH1284J09	8	17	656	1.5%	Gravity Main
SML0785M02	SMH0785M02	SMH0785M06	8	301	1,215	5.0%	Gravity Main
SML0785M03	SMH0785M03	SMH0785M01	8	183	589	1.2%	Gravity Main
SML0785M04	SMH0785M04	SMH1284J11	8	246	548	1.0%	Gravity Main
SML0785M05	SMH0785M05	SMH0785M03	8	296	533	1.0%	Gravity Main
SML0785M06	SMH0785M06	SMH0785M05	8	224	1,703	9.8%	Gravity Main
SML0785M07	SMH0785M07	SMH0785M05	8	172	518	0.9%	Gravity Main
SML0785M08	SMH0785M08	SMH0785M07	8	220	555	1.0%	Gravity Main
SML0785M09	SMH0785M09	SMH0785M06	8	447	1,053	3.7%	Gravity Main
SML0785M10	SMH0785M10	SMH0785M08	10	244	2,080	4.4%	Gravity Main
SML0785M11	SMH0785M11	SMH0785L01	8	411	776	2.0%	Gravity Main
SML0785M12	SMH0785M12	SMH0785M11	8	322	1,383	6.5%	Gravity Main
SML0785M13	SMH0785M13	SMH0785F01	8	159	--	0.0%	Gravity Main
SML0785M14	SMH0785M14	SMH0785M13	8	447	5,732	111.1%	Gravity Main
SML0785N01	SMH0785N01	SMH0785P06	8	400	858	2.5%	Gravity Main
SML0785P01	SMH0785P01	SMH0785P02	8	525	809	2.2%	Gravity Main
SML0785P02	SMH0785P02	SMH0785L05	8	433	603	1.2%	Gravity Main
SML0785P03	SMH0785P03	SMH0785P05	10	17	1,065	1.2%	Gravity Main
SML0785P04	SMH0785P04	SMH0785L08	10	432	751	0.6%	Gravity Main
SML0785P05	SMH0785P05	SMH0785P04	10	395	914	0.9%	Gravity Main
SML0785P06	SMH0785P06	SMH0785P01	8	91	1,004	3.4%	Gravity Main
SML0785P07	SMH0785P07	SMH0785P06	8	102	427	0.6%	Gravity Main
SML0785P08	SMH0785P08	SMH0785P07	8	162	497	0.8%	Gravity Main
SML0785Q01	SMH0785Q01	SMH0785K03	8	294	556	1.0%	Gravity Main
SML0785Q02	SMH0785Q02	SMH0785Q01	8	233	564	1.1%	Gravity Main
SML0785Q03	SMH0785Q03	SMH0785Q02	8	114	525	0.9%	Gravity Main
SML0785Q04	SMH0785Q04	SMH0785U01	8	411	546	1.0%	Gravity Main
SML0785Q05	SMH0785Q05	SMH0785T04	8	395	872	2.6%	Gravity Main
SML0785Q06	SMH0785Q06	SMH0785Q08	8	338	1,135	4.4%	Gravity Main
SML0785Q07	SMH0785Q07	SMH0785K13	8	263	532	1.0%	Gravity Main
SML0785Q08	SMH0785Q08	SMH0785Q07	8	238	796	2.1%	Gravity Main
SML0785Q09	SMH0785Q09	SMH0785Q11	8	254	1,242	5.2%	Gravity Main
SML0785Q10	SMH0785Q10	SMH0785Q13	8	95	621	1.3%	Gravity Main
SML0785Q11	SMH0785Q11	SMH0785Q15	8	120	786	2.1%	Gravity Main
SML0785Q12	SMH0785Q12	SMH0785Q11	8	82	503	0.9%	Gravity Main
SML0785Q13	SMH0785Q13	SMH0785K21	8	247	539	1.0%	Gravity Main
SML0785Q14	SMH0785Q14	SMH0785Q13	8	179	1,642	9.1%	Gravity Main
SML0785Q15	SMH0785Q15	SMH0785Q10	8	131	587	1.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0785Q16	SMH0785Q16	SMH0785Q15	8	208	1,958	13.0%	Gravity Main
SML0785R01	SMH0785R01	SMH0785R02	8	109	493	0.8%	Gravity Main
SML0785R02	SMH0785R02	SMH0785J04	36	397	13,480	0.2%	Gravity Main
SML0785R03	SMH0785R03	SMH0785R04	36	315	53,783	3.2%	Gravity Main
SML0785R04	SMH0785R04	SMH0785R02	36	83	58,291	3.8%	Gravity Main
SML0785R05	SMH0785R05	SMH0785R04	8	431	552	1.0%	Gravity Main
SML0785R06	SMH0785R06	SMH0785R07	8	285	550	1.0%	Gravity Main
SML0785R07	SMH0785R07	SMH0785R09	8	222	798	2.2%	Gravity Main
SML0785R08	SMH0785R08	SMH0785R12	8	121	544	1.0%	Gravity Main
SML0785R09	SMH0785R09	SMH0785R08	8	70	544	1.0%	Gravity Main
SML0785R10	SMH0785R10	SMH0785R09	8	258	1,205	4.9%	Gravity Main
SML0785R11	SMH0785R11	SMH0785R10	8	240	562	1.1%	Gravity Main
SML0785R12	SMH0785R12	SMH0785R13	8	150	2,704	24.7%	Gravity Main
SML0785R13	SMH0785R13	SMH0785R14	8	59	1,495	7.6%	Gravity Main
SML0785R14	SMH0785R14	SMH0885M04	8	285	2,229	16.8%	Gravity Main
SML0785R15	SMH0785R15	SMH0785R14	8	125	2,766	25.9%	Gravity Main
SML0785R16	SMH0785R16	SMH0785R15	8	296	649	1.4%	Gravity Main
SML0785R17	SMH0785R17	SMH0785R18	8	61	--	--	Gravity Main
SML0785R18	SMH0785R18	SMH0785R19	8	85	--	--	Gravity Main
SML0785R19	SMH0785R19	SMH0785R05	8	52	--	--	Gravity Main
SML0785S01	SMH0785S01	SMH0785R03	36	387	41,062	1.9%	Gravity Main
SML0785S02	SMH0785S02	SMH0785S05	8	476	538	1.0%	Gravity Main
SML0785S03	SMH0785S03	SMH0785S02	8	389	543	1.0%	Gravity Main
SML0785S04	SMH0785S04	SMH0785S07	8	204	1,153	4.5%	Gravity Main
SML0785S05	SMH0785S05	SMH0785R05	8	450	541	1.0%	Gravity Main
SML0785S06	SMH0785S06	SMH0785S16	8	107	906	2.8%	Gravity Main
SML0785S07	SMH0785S07	SMH0785S10	8	265	817	2.3%	Gravity Main
SML0785S08	SMH0785S08	SMH0785Z05	8	288	560	1.1%	Gravity Main
SML0785S09	SMH0785S09	SMH0785S07	8	231	530	1.0%	Gravity Main
SML0785S10	SMH0785S10	SMH0785S11	8	264	543	1.0%	Gravity Main
SML0785S11	SMH0785S11	SMH0785S14	8	31	311	0.3%	Gravity Main
SML0785S12	SMH0785S12	SMH0785S11	8	324	549	1.0%	Gravity Main
SML0785S13	SMH0785S13	SMH0885V02	8	63	483	0.8%	Gravity Main
SML0785S14	SMH0785S14	SMH0785S13	8	171	616	1.3%	Gravity Main
SML0785S15	SMH0785S15	SMH0785R11	6	110	332	1.7%	Gravity Main
SML0785S16	SMH0785S16	SMH0785S08	8	210	460	0.7%	Gravity Main
SML0785S17	SMH0785S16	SMH0785S17	8	217	777	2.0%	Gravity Main
SML0785T01	SMH0785T01	SMH0785Y01	8	335	587	1.2%	Gravity Main
SML0785T02	SMH0785T02	SMH0785T04	8	414	541	1.0%	Gravity Main
SML0785T03	SMH0785T03	SMH0785T05	8	96	1,774	10.6%	Gravity Main
SML0785T04	SMH0785T04	SMH0785T06	8	387	947	3.0%	Gravity Main
SML0785T05	SMH0785T05	SMH0785T07	8	387	981	3.3%	Gravity Main
SML0785T06	SMH0785T06	SMH0785Q09	8	262	1,204	4.9%	Gravity Main
SML0785T07	SMH0785T07	SMH0785T08	8	235	1,792	10.9%	Gravity Main
SML0785T08	SMH0785T08	SMH0785T11	8	71	2,304	17.9%	Gravity Main
SML0785T09	SMH0785T09	SMH0785Q12	8	367	810	2.2%	Gravity Main
SML0785T10	SMH0785T10	SMH0785T09	8	240	784	2.1%	Gravity Main
SML0785T11	SMH0785T11	SMH0785S01	36	424	40,586	1.8%	Gravity Main
SML0785T12	SMH0785T12	SMH0785T06	8	208	552	1.0%	Gravity Main
SML0785U01	SMH0785U01	SMH0785P03	8	195	492	0.8%	Gravity Main
SML0785U02	SMH0785U02	SMH0785T02	8	434	544	1.0%	Gravity Main
SML0785V01	SMH0785V01	SMH0785V02	8	410	887	2.7%	Gravity Main
SML0785V02	SMH0785V02	SMH0785N01	8	483	923	2.9%	Gravity Main
SML0785V03	SMH0785V03	SMH0785V04	8	303	894	2.7%	Gravity Main
SML0785V04	SMH0785V04	SMH0785N01	8	97	420	0.6%	Gravity Main
SML0785W01	SMH0785W01	SMH1384A11	10	374	12,092	150.4%	Gravity Main
SML0785W02	SMH0785W02	SMH0785W01	10	220	1,295	1.7%	Gravity Main
SML0785W03	SMH0785W03	SMH0785V01	8	246	1,091	4.0%	Gravity Main
SML0785W04	SMH0785W04	SMH0785W05	8	431	866	2.5%	Gravity Main
SML0785W05	SMH0785W05	SMH1885D13	8	73	1,406	6.7%	Gravity Main
SML0785W06	SMH0785W06	SMH0785X01	8	396	1,002	3.4%	Gravity Main
SML0785W07	SMH0785W07	SMH0785W03	8	100	646	1.4%	Gravity Main
SML0785X01	SMH0785X01	SMH0785X02	8	300	678	1.6%	Gravity Main
SML0785X02	SMH0785X02	SMH0785X03	8	400	516	0.9%	Gravity Main
SML0785X03	SMH0785X03	SMH0785U02	8	376	516	0.9%	Gravity Main
SML0785Y01	SMH0785Y01	SMH0785Y02	8	317	551	1.0%	Gravity Main
SML0785Y02	SMH0785Y02	SMH0785Y03	8	67	--	0.0%	Gravity Main
SML0785Y03	SMH0785Y03	SMH0785Y04	8	217	854	2.5%	Gravity Main
SML0785Y04	SMH0785Y04	SMH0785Y06	8	177	1,437	7.0%	Gravity Main
SML0785Y05	SMH0785Y05	SMH0785Y07	8	280	1,439	7.0%	Gravity Main
SML0785Y06	SMH0785Y06	SMH0785Y08	8	289	1,919	12.4%	Gravity Main
SML0785Y07	SMH0785Y07	SMH0785Y11	8	322	1,407	6.7%	Gravity Main
SML0785Y08	SMH0785Y08	SMH0785Y09	36	234	8,983	0.1%	Gravity Main
SML0785Y09	SMH0785Y09	SMH0785Y10	36	50	10,397	0.1%	Gravity Main
SML0785Y10	SMH0785Y10	SMH0785Y12	36	260	10,205	0.1%	Gravity Main
SML0785Y11	SMH0785Y11	SMH0785Y12	8	56	3,075	32.0%	Gravity Main
SML0785Y12	SMH0785Y12	SMH0785T11	36	462	10,539	0.1%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0785Y13	SMH0785Y13	SMH0785Z01	8	211	542	1.0%	Gravity Main
SML0785Z01	SMH0785Z01	SMH0785S03	8	87	408	0.6%	Gravity Main
SML0785Z02	SMH0785Z02	SMH0785Z03	8	335	536	1.0%	Gravity Main
SML0785Z03	SMH0785Z03	SMH0785Z12	8	43	944	3.0%	Gravity Main
SML0785Z04	SMH0785Z04	SMH0785Z09	8	392	558	1.1%	Gravity Main
SML0785Z05	SMH0785Z05	SMH0785Z06	8	332	521	0.9%	Gravity Main
SML0785Z06	SMH0785Z06	SMH0785Z09	8	215	569	1.1%	Gravity Main
SML0785Z07	SMH0785Z07	SMH0885W02	10	321	1,300	1.7%	Gravity Main
SML0785Z08	SMH0785Z08	SMH0785S12	8	286	584	1.2%	Gravity Main
SML0785Z09	SMH0785Z09	SMH0885W02	8	70	496	0.8%	Gravity Main
SML0785Z10	SMH0785Z10	SMH0785Z11	8	94	550	1.0%	Gravity Main
SML0785Z11	SMH0785Z11	SMH0785Z03	8	186	383	0.5%	Gravity Main
SML0785Z12	SMH0785Z12	SMH0785Z14	8	139	345	0.4%	Gravity Main
SML0785Z13	SMH0785Z13	SMH0785Z12	8	214	1,438	7.0%	Gravity Main
SML0785Z14	SMH0785Z14	SMH0785Z04	8	213	541	1.0%	Gravity Main
SML0785Z15	SMH0785Z15	SMH0785Z16	8	140	729	1.8%	Gravity Main
SML0785Z16	SMH0785Z16	SMH0785Z14	8	93	2,356	18.8%	Gravity Main
SML0795J01	SMH0795J01	SMH0795R04	12	253	774	0.2%	Gravity Main
SML0795J02	SMH0795J02	SMH0795J01	12	91	808	0.3%	Gravity Main
SML0795J03	SMH0795J03	SMH0795J02	12	208	809	0.3%	Gravity Main
SML0795R01	SMH0795R01	SMH0795T05	12	397	820	0.3%	Gravity Main
SML0795R02	SMH0795R02	SMH0795R01	12	394	824	0.3%	Gravity Main
SML0795R03	SMH0795R03	SMH0795R02	12	347	774	0.2%	Gravity Main
SML0795R04	SMH0795R04	SMH0795R03	12	57	847	0.3%	Gravity Main
SML0795R07	SMH0795R07	SMH0795S15	12	246	723	0.2%	Gravity Main
SML0795S03	SMH0795T06	SMH0795S03	10	2645	--	--	Force Main
SML0795S05	SMH0795S05	SMH0795S10	36	349	18,929	0.4%	Gravity Main
SML0795S06	SMH0795S06	SMH0795S05	18	57	6,773	2.1%	Gravity Main
SML0795S08	SMH0795S08	SMH0795S09	8	397	422	0.6%	Gravity Main
SML0795S09	SMH0795S09	SMH0795S10	8	62	602	1.2%	Gravity Main
SML0795S10	SMH0795S10	SMH0895V04	36	311	16,049	0.3%	Gravity Main
SML0795S11	SMH0795S11	SMH0795S10	15	71	3,377	1.3%	Gravity Main
SML0795S12	SMH0795S12	SMH0795S05	18	61	2,011	0.2%	Gravity Main
SML0795S13	SMH0795S13	SMH0795S12	15	209	1,582	0.3%	Gravity Main
SML0795S14	SMH0795S14	SMH0795S13	12	200	871	0.3%	Gravity Main
SML0795S15	SMH0795S15	SMH0795S14	12	183	812	0.3%	Gravity Main
SML0795S16	SMH0795S16	SMH0795S05	24	75	8,218	0.7%	Gravity Main
SML0795S17	SMH0795S17	SMH0795S16	18	256	9,097	3.7%	Gravity Main
SML0795S18	SMH0795S18	SMH0795S17	12	49	--	--	Gravity Main
SML0795S3A	SMH0795S03	SMH0795S16	18	14	7,418	2.5%	Gravity Main
SML0795T01	SMH0795T01	SMH0795T02	12	121	825	0.3%	Gravity Main
SML0795T02	SMH0795T02	SMH0795T03	8	30	283	0.3%	Gravity Main
SML0795T03	SMH0795T03	SMH0795T04	12	277	639	0.2%	Gravity Main
SML0795T04	SMH0795T04	SMH0795T05	12	330	899	0.3%	Gravity Main
SML0795T05	SMH0795T05	SMH0795T06	12	41	--	0.0%	Gravity Main
SML0795T2A	SMH0795T02	SMH0795T03	8	30	282	0.3%	Gravity Main
SML0795Y01	SMH0795Y01	SMH0795T01	12	400	748	0.2%	Gravity Main
SML0795Y02	SMH0795Y02	SMH0795Y01	12	268	865	0.3%	Gravity Main
SML0795Y08	SMH0795Y08	SMH1895B09	12	289	1,318	0.7%	Gravity Main
SML0795Y09	SMH0795Y09	SMH0795Y08	12	150	1,398	0.8%	Gravity Main
SML0795Y10	SMH0795Y10	SMH0795Z13	18	310	4,237	0.8%	Gravity Main
SML0795Y11	SMH0795Y11	SMH0795Y10	18	115	3,799	0.6%	Gravity Main
SML0795Y12	SMH0795Y12	SMH0795Y11	12	129	966	0.4%	Gravity Main
SML0795Y13	SMH0795Y13	SMH0795Y12	12	388	885	0.3%	Gravity Main
SML0795Y14	SMH0795Y14	SMH0795Y13	12	122	884	0.3%	Gravity Main
SML0795Z03	SMH0795Z03	SMH0795Z12	12	387	3,760	5.5%	Gravity Main
SML0795Z05	SMH0795Z05	SMH0795S18	8	340	1,156	4.5%	Gravity Main
SML0795Z06	SMH0795Z06	SMH0795Z05	8	365	759	1.9%	Gravity Main
SML0795Z07	SMH0795Z07	SMH0795S06	18	441	5,380	1.3%	Gravity Main
SML0795Z08	SMH0795Z08	SMH0795Z07	12	478	3,541	4.9%	Gravity Main
SML0795Z09	SMH0795Z09	SMH0795S11	15	438	2,191	0.6%	Gravity Main
SML0795Z10	SMH0795Z10	SMH0795Z09	12	478	3,468	4.7%	Gravity Main
SML0795Z11	SMH0795Z11	SMH0795S17	18	344	7,411	2.5%	Gravity Main
SML0795Z12	SMH0795Z12	SMH0795Z11	18	241	5,061	1.1%	Gravity Main
SML0795Z13	SMH0795Z13	SMH0795Z12	18	225	4,638	1.0%	Gravity Main
SML0885B02	SMH0885B02	SMH0885G11	8	200	574	1.1%	Gravity Main
SML0885B03	SMH0885B03	SMH0885G13	8	154	559	1.1%	Gravity Main
SML0885C01	SMH0885C01	SMH0885C05	8	353	548	1.0%	Gravity Main
SML0885C02	SMH0885C02	SMH0885D14	8	405	533	1.0%	Gravity Main
SML0885C03	SMH0885C03	SMH0885C04	8	135	714	1.7%	Gravity Main
SML0885C04	SMH0885C04	SMH0885C05	10	286	--	--	Gravity Main
SML0885C05	SMH0885C05	SMH0585X05	10	343	830	0.7%	Gravity Main
SML0885C06	SMH0885C06	SMH0885C09	8	322	820	2.3%	Gravity Main
SML0885C07	SMH0885C07	SMH0885C04	8	341	543	1.0%	Gravity Main
SML0885C08	SMH0885C08	SMH0885F15	8	148	547	1.0%	Gravity Main
SML0885C09	SMH0885C09	SMH0885C10	8	33	890	2.7%	Gravity Main
SML0885C10	SMH0885C10	SMH0885C12	8	155	544	1.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0885C11	SMH0885C11	SMH0885C10	8	191	536	1.0%	Gravity Main
SML0885C12	SMH0885C12	SMH0885C14	8	123	548	1.0%	Gravity Main
SML0885C13	SMH0885C13	SMH0585X12	8	147	998	3.4%	Gravity Main
SML0885C14	SMH0885C14	SMH0885C13	8	61	2,550	22.0%	Gravity Main
SML0885D01	SMH0885D01	SMH0885D06	8	329	1,108	4.2%	Gravity Main
SML0885D02	SMH0885D02	SMH0885D01	8	285	549	1.0%	Gravity Main
SML0885D03	SMH0885D03	SMH0885D09	8	436	610	1.3%	Gravity Main
SML0885D04	SMH0885D04	SMH0885D06	24	348	17,585	3.0%	Gravity Main
SML0885D05	SMH0885D05	SMH0885D07	8	205	887	2.7%	Gravity Main
SML0885D06	SMH0885D06	SMH0585W03	24	351	18,535	3.3%	Gravity Main
SML0885D07	SMH0885D07	SMH0885D10	8	376	538	1.0%	Gravity Main
SML0885D08	SMH0885D08	SMH0585W04	8	154	555	1.0%	Gravity Main
SML0885D09	SMH0885D09	SMH0885D14	8	454	544	1.0%	Gravity Main
SML0885D10	SMH0885D10	SMH0885D12	8	297	544	1.0%	Gravity Main
SML0885D11	SMH0885D11	SMH0885D12	8	102	766	2.0%	Gravity Main
SML0885D12	SMH0885D12	SMH0885C01	8	396	547	1.0%	Gravity Main
SML0885D13	SMH0885D13	SMH0885D14	8	88	918	2.8%	Gravity Main
SML0885D14	SMH0885D14	SMH0885E09	8	296	535	1.0%	Gravity Main
SML0885D15	SMH0885D15	SMH0585W08	4	37	538	39.5%	Gravity Main
SML0885E01	SMH0885E01	SMH0885E05	8	442	728	1.8%	Gravity Main
SML0885E02	SMH0885E02	SMH0885E06	8	434	544	1.0%	Gravity Main
SML0885E03	SMH0885E03	SMH0885E07	8	425	550	1.0%	Gravity Main
SML0885E04	SMH0885E04	SMH0885E08	8	455	544	1.0%	Gravity Main
SML0885E05	SMH0885E05	SMH0885E09	8	449	624	1.3%	Gravity Main
SML0885E06	SMH0885E06	SMH0885E10	8	456	652	1.4%	Gravity Main
SML0885E07	SMH0885E07	SMH0885E12	8	456	614	1.3%	Gravity Main
SML0885E08	SMH0885E08	SMH0885E11	8	401	624	1.3%	Gravity Main
SML0885E09	SMH0885E09	SMH0885E10	8	279	551	1.0%	Gravity Main
SML0885E10	SMH0885E10	SMH0885E11	8	282	547	1.0%	Gravity Main
SML0885E11	SMH0885E11	SMH0885E12	8	313	537	1.0%	Gravity Main
SML0885E12	SMH0885E12	SMH0885M15	8	198	555	1.0%	Gravity Main
SML0885E13	SMH0885E13	SMH0885E12	8	221	537	1.0%	Gravity Main
SML0885E14	SMH0885E14	SMH0885E11	8	274	1,075	3.9%	Gravity Main
SML0885F01	SMH0885F01	SMH0885F05	10	297	862	0.8%	Gravity Main
SML0885F02	SMH0885F02	SMH0885E09	8	401	537	1.0%	Gravity Main
SML0885F03	SMH0885F03	SMH0885E10	8	410	794	2.1%	Gravity Main
SML0885F04	SMH0885F04	SMH0885F11	8	402	278	0.3%	Gravity Main
SML0885F05	SMH0885F05	SMH0885F06	10	295	1,449	2.2%	Gravity Main
SML0885F06	SMH0885F06	SMH0885C04	10	311	843	0.7%	Gravity Main
SML0885F07	SMH0885F07	SMH0885F14	8	390	551	1.0%	Gravity Main
SML0885F08	SMH0885F08	SMH0885F01	8	234	545	1.0%	Gravity Main
SML0885F09	SMH0885F09	SMH0885F13	8	254	545	1.0%	Gravity Main
SML0885F10	SMH0885F10	SMH0885F06	8	238	538	1.0%	Gravity Main
SML0885F11	SMH0885F11	SMH0885F17	8	335	1,292	5.6%	Gravity Main
SML0885F12	SMH0885F12	SMH0885F15	8	273	544	1.0%	Gravity Main
SML0885F13	SMH0885F13	SMH0885F18	8	323	541	1.0%	Gravity Main
SML0885F14	SMH0885F14	SMH0885F20	8	416	533	1.0%	Gravity Main
SML0885F15	SMH0885F15	SMH0885F19	8	219	546	1.0%	Gravity Main
SML0885F16	SMH0885F16	SMH0885F17	8	180	1,719	10.0%	Gravity Main
SML0885F17	SMH0885F17	SMH0885F21	8	293	856	2.5%	Gravity Main
SML0885F18	SMH0885F18	SMH0885F23	8	279	530	0.9%	Gravity Main
SML0885F19	SMH0885F19	SMH0885F24	8	180	543	1.0%	Gravity Main
SML0885F20	SMH0885F20	SMH0885F25	8	196	535	1.0%	Gravity Main
SML0885F21	SMH0885F21	SMH0885F26	6	26	--	0.0%	Gravity Main
SML0885F22	SMH0885F22	SMH0885F21	8	127	--	--	Gravity Main
SML0885F23	SMH0885F23	SMH0885F22	8	205	6,932	162.5%	Gravity Main
SML0885F24	SMH0885F24	SMH0885F25	8	278	536	1.0%	Gravity Main
SML0885F25	SMH0885F25	SMH0885F23	8	296	524	0.9%	Gravity Main
SML0885F26	<Null>	SMH0885F01	6	1413	--	--	Force Main
SML0885G01	SMH0885G01	SMH0885G03	8	150	1,944	12.8%	Gravity Main
SML0885G02	SMH0885G02	SMH0885G01	8	371	539	1.0%	Gravity Main
SML0885G03	SMH0885G03	SMH0885G05	8	123	2,023	13.8%	Gravity Main
SML0885G04	SMH0885G04	SMH0885K10	8	228	530	1.0%	Gravity Main
SML0885G05	SMH0885G05	SMH0885G06	8	158	460	0.7%	Gravity Main
SML0885G06	SMH0885G06	SMH0885G07	8	151	459	0.7%	Gravity Main
SML0885G07	SMH0885G07	SMH0885G08	8	166	487	0.8%	Gravity Main
SML0885G08	SMH0885G08	SMH0885G09	8	30	141	0.1%	Gravity Main
SML0885G09	SMH0885G09	SMH0885K13	8	128	370	0.5%	Gravity Main
SML0885G10	SMH0885G10	SMH0885G11	8	130	1,976	13.2%	Gravity Main
SML0885G11	SMH0885G11	SMH0885G13	8	141	1,322	5.9%	Gravity Main
SML0885G12	SMH0885G12	SMH0885G03	8	151	508	0.9%	Gravity Main
SML0885G13	SMH0885G13	SMH0885G05	8	360	379	0.5%	Gravity Main
SML0885G14	SMH0885G14	SMH0885G01	6	72	--	--	Gravity Main
SML0885K01	SMH0885K01	SMH0885K02	8	120	735	1.8%	Gravity Main
SML0885K02	SMH0885K02	SMH0885K05	8	107	1,342	6.1%	Gravity Main
SML0885K03	SMH0885K03	SMH0885K02	8	256	343	0.4%	Gravity Main
SML0885K04	SMH0885K04	SMH0885K03	8	262	322	0.4%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0885K05	SMH0885K05	SMH0885K07	8	99	2,308	18.0%	Gravity Main
SML0885K06	SMH0885K06	SMH0885K09	8	136	1,611	8.8%	Gravity Main
SML0885K07	SMH0885K07	SMH0885K10	8	126	1,979	13.2%	Gravity Main
SML0885K08	SMH0885K08	SMH0885K06	8	267	543	1.0%	Gravity Main
SML0885K09	SMH0885K09	SMH0885K11	8	127	566	1.1%	Gravity Main
SML0885K10	SMH0885K10	SMH0885K14	8	200	--	0.0%	Gravity Main
SML0885K11	SMH0885K11	SMH0885K12	8	298	838	2.4%	Gravity Main
SML0885K12	SMH0885K12	SMH0885K15	8	53	2,265	17.4%	Gravity Main
SML0885K13	SMH0885K13	SMH0885K14	8	177	342	0.4%	Gravity Main
SML0885K14	SMH0885K14	SMH0885K15	8	155	454	0.7%	Gravity Main
SML0885K15	SMH0885K15	SMH0885K16	8	366	295	0.3%	Gravity Main
SML0885K16	SMH0885K16	SMH0885Q17	8	196	505	0.9%	Gravity Main
SML0885K17	SMH0885K17	SMH0885K14	8	19	1,322	5.9%	Gravity Main
SML0885K18	SMH0885K18	SMH0885K05	8	102	373	0.5%	Gravity Main
SML0885L01	SMH0885L01	SMH0885M17	8	269	1,388	6.5%	Gravity Main
SML0885L02	SMH0885L02	SMH0885L03	8	307	589	1.2%	Gravity Main
SML0885L03	SMH0885L03	SMH0885L05	8	344	575	1.1%	Gravity Main
SML0885L04	SMH0885L04	SMH0885F17	8	283	997	3.4%	Gravity Main
SML0885L05	SMH0885L05	SMH0885L04	8	204	671	1.5%	Gravity Main
SML0885L06	SMH0885L06	SMH0885L04	8	150	869	2.6%	Gravity Main
SML0885L07	SMH0885L07	SMH0885F04	8	159	884	2.6%	Gravity Main
SML0885L08	SMH0885L08	SMH0885L09	8	122	562	1.1%	Gravity Main
SML0885L09	SMH0885L09	SMH0885L10	8	50	586	1.2%	Gravity Main
SML0885L10	SMH0885L10	SMH0885L02	8	15	718	1.7%	Gravity Main
SML0885M01	SMH0885M01	SMH0885M02	8	271	1,590	8.6%	Gravity Main
SML0885M02	SMH0885M02	SMH0885M03	8	99	1,455	7.2%	Gravity Main
SML0885M03	SMH0885M03	SMH0885M04	12	338	1,500	0.9%	Gravity Main
SML0885M04	SMH0885M04	SMH0885M10	10	528	743	0.6%	Gravity Main
SML0885M05	SMH0885M05	SMH0885M07	8	271	254	0.2%	Gravity Main
SML0885M06	SMH0885M06	SMH0885M07	8	114	1,694	9.7%	Gravity Main
SML0885M07	SMH0885M07	SMH0885M08	8	108	523	0.9%	Gravity Main
SML0885M08	SMH0885M08	SMH0885M09	8	94	1,692	9.7%	Gravity Main
SML0885M09	SMH0885M09	SMH0885M10	8	232	536	1.0%	Gravity Main
SML0885M10	SMH0885M10	SMH0885M12	10	355	615	0.4%	Gravity Main
SML0885M11	SMH0885M11	SMH0885M07	8	342	--	0.0%	Gravity Main
SML0885M12	SMH0885M12	SMH0885M18	10	27	1,975	4.0%	Gravity Main
SML0885M13	SMH0885M13	SMH0885M12	10	75	1,083	1.2%	Gravity Main
SML0885M14	SMH0885M14	SMH0885M12	10	25	2,668	7.3%	Gravity Main
SML0885M15	SMH0885M15	SMH0885M11	8	145	661	1.5%	Gravity Main
SML0885M16	SMH0885M16	SMH0885M14	8	69	1,776	10.7%	Gravity Main
SML0885M17	SMH0885M17	SMH0885M19	8	114	871	2.6%	Gravity Main
SML0885M18	<Null>	SMH0885F01	6	1172	--	--	Force Main
SML0885M19	SMH0885M19	SMH0885M16	8	114	774	2.0%	Gravity Main
SML0885N01	SMH0885N01	SMH0885N02	10	174	989	1.0%	Gravity Main
SML0885N02	SMH0885N02	SMH0885N03	10	170	3,291	11.1%	Gravity Main
SML0885N03	SMH0885N03	SMH0885N04	10	200	1,408	2.0%	Gravity Main
SML0885N04	SMH0885N04	SMH0885M13	10	264	1,202	1.5%	Gravity Main
SML0885P01	SMH0885P01	SMH0885U01	8	226	658	1.5%	Gravity Main
SML0885P02	SMH0885P02	SMH0885P01	8	131	538	1.0%	Gravity Main
SML0885P03	SMH0885P03	SMH0885P04	8	443	382	0.5%	Gravity Main
SML0885P04	SMH0885P04	SMH0885P06	8	378	776	2.0%	Gravity Main
SML0885P05	SMH0885P05	SMH0885P06	8	225	511	0.9%	Gravity Main
SML0885P06	SMH0885P06	SMH0885Q01	8	349	1,650	9.2%	Gravity Main
SML0885P07	SMH0885P07	SMH0885Q02	8	330	1,622	8.9%	Gravity Main
SML0885P08	SMH0885P08	SMH0885P03	8	167	495	0.8%	Gravity Main
SML0885Q01	SMH0885Q01	SMH0885Q04	8	363	1,439	7.0%	Gravity Main
SML0885Q02	SMH0885Q02	SMH0885Q05	8	294	1,204	4.9%	Gravity Main
SML0885Q03	SMH0885Q03	SMH0885Q06	8	403	1,705	9.8%	Gravity Main
SML0885Q04	SMH0885Q04	SMH0885Q07	8	333	1,703	9.8%	Gravity Main
SML0885Q05	SMH0885Q05	SMH0885Q08	8	352	1,546	8.1%	Gravity Main
SML0885Q06	SMH0885Q06	SMH0885Q09	8	274	1,268	5.4%	Gravity Main
SML0885Q07	SMH0885Q07	SMH0885Q11	8	235	1,281	5.5%	Gravity Main
SML0885Q08	SMH0885Q08	SMH0885Q07	8	228	1,138	4.4%	Gravity Main
SML0885Q09	SMH0885Q09	SMH0885Q12	8	152	1,782	10.7%	Gravity Main
SML0885Q10	SMH0885Q10	SMH0885Q11	8	235	350	0.4%	Gravity Main
SML0885Q11	SMH0885Q11	SMH0885Q13	8	281	791	2.1%	Gravity Main
SML0885Q12	SMH0885Q12	SMH0885Q13	8	168	1,780	10.7%	Gravity Main
SML0885Q13	SMH0885Q13	SMH0885Q16	8	33	652	1.4%	Gravity Main
SML0885Q14	SMH0885Q14	SMH0885Q13	8	90	397	0.5%	Gravity Main
SML0885Q16	SMH0885Q16	SMH0885Q18	12	669	1,372	0.7%	Gravity Main
SML0885Q17	SMH0885Q17	SMH0885Q18	8	101	2,094	14.8%	Gravity Main
SML0885Q18	SMH0885Q18	SMH0585G19	12	875	7,611	22.5%	Gravity Main
SML0885T01	SMH0885T01	SMH0885T03	8	142	1,460	7.2%	Gravity Main
SML0885T02	SMH0885T02	SMH0885T04	8	199	973	3.2%	Gravity Main
SML0885T03	SMH0885T03	SMH0885T05	8	69	1,102	4.1%	Gravity Main
SML0885T04	SMH0885T04	SMH0885T05	8	160	385	0.5%	Gravity Main
SML0885T05	SMH0885T05	SMH0885T06	8	57	1,301	5.7%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0885T06	SMH0885T06	SMH0885T07	8	310	1,639	9.1%	Gravity Main
SML0885T07	SMH0885T07	SMH0885T08	8	400	1,199	4.9%	Gravity Main
SML0885T08	SMH0885T08	SMH0885T09	8	181	1,347	6.1%	Gravity Main
SML0885T09	SMH0885T09	SMH0885Q12	8	222	744	1.9%	Gravity Main
SML0885T10	SMH0885T10	SMH0885T09	8	117	417	0.6%	Gravity Main
SML0885T11	SMH0885T11	SMH0885T10	8	124	408	0.6%	Gravity Main
SML0885U01	SMH0885U01	SMH0885U02	8	310	590	1.2%	Gravity Main
SML0885U02	SMH0885U02	SMH0885U07	8	281	492	0.8%	Gravity Main
SML0885U03	SMH0885U03	SMH0885U08	8	262	537	1.0%	Gravity Main
SML0885U04	SMH0885U04	SMH0885U05	8	191	564	1.1%	Gravity Main
SML0885U05	SMH0885U05	SMH0885U10	8	259	550	1.0%	Gravity Main
SML0885U06	SMH0885U06	SMH0885U07	8	201	378	0.5%	Gravity Main
SML0885U07	SMH0885U07	SMH0885U12	8	228	391	0.5%	Gravity Main
SML0885U08	SMH0885U08	SMH0885U13	8	245	545	1.0%	Gravity Main
SML0885U09	SMH0885U09	SMH0885U10	8	176	544	1.0%	Gravity Main
SML0885U10	SMH0885U10	SMH0885U11	8	174	466	0.7%	Gravity Main
SML0885U11	SMH0885U11	SMH0885U15	8	117	462	0.7%	Gravity Main
SML0885U12	SMH0885U12	SMH0885P07	8	287	434	0.6%	Gravity Main
SML0885U13	SMH0885U13	SMH0885U18	8	194	537	1.0%	Gravity Main
SML0885U15	SMH0885U15	SMH0885U18	8	193	485	0.8%	Gravity Main
SML0885U16	SMH0885U16	SMH0885U15	8	65	584	1.2%	Gravity Main
SML0885U17	SMH0885U17	SMH0885U16	8	104	510	0.9%	Gravity Main
SML0885U18	SMH0885U18	SMH0885U20	8	205	538	1.0%	Gravity Main
SML0885U19	SMH0885U19	SMH0885U05	8	120	--	--	Gravity Main
SML0885U20	SMH0885U20	SMH0885T02	8	126	543	1.0%	Gravity Main
SML0885V01	SMH0885V01	SMH0785R16	8	408	535	1.0%	Gravity Main
SML0885V02	SMH0885V02	SMH0885V01	8	121	1,255	5.3%	Gravity Main
SML0885V03	SMH0885V03	SMH0885V04	10	401	1,815	3.4%	Gravity Main
SML0885V04	SMH0885V04	SMH0885V05	10	401	2,189	4.9%	Gravity Main
SML0885V05	SMH0885V05	SMH0885N01	10	368	2,028	4.2%	Gravity Main
SML0885W01	SMH0885W01	SMH0785Z07	8	104	559	1.1%	Gravity Main
SML0885W02	SMH0885W02	SMH0885W03	10	257	2,320	5.5%	Gravity Main
SML0885W03	SMH0885W03	SMH0885V03	10	247	2,755	7.8%	Gravity Main
SML0895L01	SMH0895L01	SMH0895M04	8	499	854	2.5%	Gravity Main
SML0895M01	SMH0895M01	SMH0895N01	10	532	977	1.0%	Gravity Main
SML0895M02	SMH0895M02	SMH0895M01	10	316	806	0.7%	Gravity Main
SML0895M03	SMH0895M03	SMH0895M02	10	315	805	0.7%	Gravity Main
SML0895M04	SMH0895M04	SMH0895M03	8	340	392	0.5%	Gravity Main
SML0895M05	SMH0895M05	SMH0895M04	8	86	586	1.2%	Gravity Main
SML0895N01	SMH0895N01	SMH0895N02	12	540	1,818	1.3%	Gravity Main
SML0895N02	SMH0895N02	SMH0895V01	15	470	2,165	0.6%	Gravity Main
SML0895N03	SMH0895N03	SMH0895N02	8	199	1,496	7.6%	Gravity Main
SML0895N04	SMH0895N04	SMH0895N03	8	251	844	2.4%	Gravity Main
SML0895N05	SMH0895N05	SMH0895N04	8	304	579	1.1%	Gravity Main
SML0895P01	SMH0895P01	SMH0895L01	8	268	1,195	4.8%	Gravity Main
SML0895P02	SMH0895P02	SMH0895P01	8	295	737	1.8%	Gravity Main
SML0895Q01	SMH0895Q01	SMH0895Q03	8	75	1,339	6.1%	Gravity Main
SML0895Q02	SMH0895Q02	SMH0895Q01	8	152	1,460	7.2%	Gravity Main
SML0895Q03	SMH0895Q03	SMH0895Q05	10	474	649	0.4%	Gravity Main
SML0895Q04	SMH0895Q04	SMH0895Q02	8	453	552	1.0%	Gravity Main
SML0895Q05	SMH0895Q05	SMH0895T14	10	426	770	0.6%	Gravity Main
SML0895Q06	SMH0895Q06	SMH0895Q03	8	78	533	1.0%	Gravity Main
SML0895T01	SMH0895T01	SMH0895T03	8	113	454	0.7%	Gravity Main
SML0895T02	SMH0895T02	SMH0895T04	8	59	664	1.5%	Gravity Main
SML0895T03	SMH0895T03	SMH0895T02	8	202	586	1.2%	Gravity Main
SML0895T04	SMH0895T04	SMH0895Q02	8	482	1,648	9.2%	Gravity Main
SML0895T05	SMH0895T05	SMH0895U04	8	270	539	1.0%	Gravity Main
SML0895T06	SMH0895T06	SMH0895T05	8	254	771	2.0%	Gravity Main
SML0895T07	SMH0895T07	SMH0895T04	8	159	716	1.7%	Gravity Main
SML0895T09	SMH0895T09	SMH0895T12	8	254	1,839	11.4%	Gravity Main
SML0895T10	SMH0895T10	SMH0895Q04	8	176	538	1.0%	Gravity Main
SML0895T11	SMH0895T11	SMH0895T13	8	90	1,791	10.8%	Gravity Main
SML0895T12	SMH0895T12	SMH0895T10	8	209	560	1.1%	Gravity Main
SML0895T13	SMH0895T13	SMH0895T12	8	304	895	2.7%	Gravity Main
SML0895T14	SMH0895T14	SMH0895T16	10	504	763	0.6%	Gravity Main
SML0895T16	SMH0895T16	SMH0895T17	10	410	775	0.6%	Gravity Main
SML0895T17	SMH0895T17	SMH0895Y27	14	296	2,436	1.0%	Gravity Main
SML0895T6A	SMH0895T06	SMH0895Y01	8	332	921	2.9%	Gravity Main
SML0895T8A	SMH0895T08	SMH0895T03	8	180	687	1.6%	Gravity Main
SML0895T8B	SMH0895T08	SMH0895T07	8	194	744	1.9%	Gravity Main
SML0895T8C	SMH0895T08	SMH0895T09	8	176	1,373	6.4%	Gravity Main
SML0895U01	SMH0895U01	SMH0895U02	8	182	556	1.0%	Gravity Main
SML0895U02	SMH0895U02	SMH0895X01	12	301	2,153	1.8%	Gravity Main
SML0895U03	SMH0895U03	SMH0895U02	10	490	1,659	2.8%	Gravity Main
SML0895U04	SMH0895U04	SMH0895U03	10	489	942	0.9%	Gravity Main
SML0895U4A	SMH0895U04	SMH0895X10	8	301	662	1.5%	Gravity Main
SML0895V01	SMH0895V01	SMH0895V02	15	391	2,550	0.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML0895V02	SMH0895V02	SMH0895V04	15	82	2,629	0.8%	Gravity Main
SML0895V03	SMH0895V03	SMH0895W01	36	456	11,415	0.1%	Gravity Main
SML0895V04	SMH0895V04	SMH0895V03	36	50	45,918	2.3%	Gravity Main
SML0895W01	SMH0895W01	SMH0895W02	36	550	14,480	0.2%	Gravity Main
SML0895W02	SMH0895W02	SMH0895W03	42	590	16,987	0.1%	Gravity Main
SML0895W03	SMH0895W03	SMH1795C02	42	269	17,446	0.1%	Gravity Main
SML0895X01	SMH0895X01	SMH0895X02	12	300	2,671	2.8%	Gravity Main
SML0895X02	SMH0895X02	SMH0895X03	15	300	5,893	4.1%	Gravity Main
SML0895X03	SMH0895X03	SMH1795C01	18	318	6,207	1.7%	Gravity Main
SML0895X04	SMH0895X04	SMH0895X01	8	491	927	2.9%	Gravity Main
SML0895X05	SMH0895X05	SMH0895X02	8	488	1,037	3.6%	Gravity Main
SML0895X06	SMH0895X06	SMH0895X03	10	490	1,903	3.7%	Gravity Main
SML0895X07	SMH0895X07	SMH0895X04	8	347	870	2.6%	Gravity Main
SML0895X08	SMH0895X08	SMH0895X06	10	336	1,665	2.9%	Gravity Main
SML0895X09	SMH0895X09	SMH0895X05	8	410	906	2.8%	Gravity Main
SML0895X10	SMH0895X10	SMH0895X11	8	433	747	1.9%	Gravity Main
SML0895X11	SMH0895X11	SMH0895X08	10	221	1,950	3.9%	Gravity Main
SML0895Y01	SMH0895Y01	SMH0895X11	8	329	667	1.5%	Gravity Main
SML0895Y02	SMH0895Y02	SMH1795B02	10	187	2,391	5.9%	Gravity Main
SML0895Y03	SMH0895Y03	SMH0895Y02	6	115	284	1.3%	Gravity Main
SML0895Y04	SMH0895Y04	SMH0895Y05	6	222	354	2.0%	Gravity Main
SML0895Y05	SMH0895Y05	SMH1795B06	10	187	2,152	4.8%	Gravity Main
SML0895Y06	SMH0895Y06	SMH0895Y07	6	57	375	2.2%	Gravity Main
SML0895Y07	SMH0895Y07	SMH1795B14	8	391	496	0.8%	Gravity Main
SML0895Y08	SMH0895Y08	SMH0895Y09	8	130	1,261	5.4%	Gravity Main
SML0895Y09	SMH0895Y09	SMH0895Y10	8	319	1,279	5.5%	Gravity Main
SML0895Y0A	SMH0895Y10	SMH0895Y12	8	199	1,892	12.1%	Gravity Main
SML0895Y10	SMH0895Y10	SMH1795B21	8	351	1,249	5.3%	Gravity Main
SML0895Y11	SMH0895Y11	SMH0895Y12	8	299	519	0.9%	Gravity Main
SML0895Y12	SMH0895Y12	SMH0895Y15	8	145	1,822	11.2%	Gravity Main
SML0895Y14	SMH0895Y14	SMH0895Y15	8	375	628	1.3%	Gravity Main
SML0895Y15	SMH0895Y15	SMH0895Z02	8	164	1,851	11.6%	Gravity Main
SML0895Y17	SMH0895Y17	SMH0895Y05	10	76	1,595	2.6%	Gravity Main
SML0895Y18	SMH0895Y18	SMH0895Y27	12	17	--	--	Gravity Main
SML0895Y19	SMH0895Y19	SMH0895Y18	12	127	4,724	8.7%	Gravity Main
SML0895Y20	SMH0895Y20	SMH0895Y19	12	260	4,029	6.3%	Gravity Main
SML0895Y21	SMH0895Y21	SMH0895Y20	12	207	3,870	5.8%	Gravity Main
SML0895Y22	SMH0895Y22	SMH0895Y21	8	77	1,970	13.1%	Gravity Main
SML0895Y23	SMH0895Y23	SMH0895Y22	8	109	1,793	10.9%	Gravity Main
SML0895Y24	SMH0895Y24	SMH0895Y23	8	139	1,508	7.7%	Gravity Main
SML0895Y25	SMH0895Y25	SMH0895Y23	8	136	1,034	3.6%	Gravity Main
SML0895Y26	SMH0895Y26	SMH0895Y21	12	283	1,139	0.5%	Gravity Main
SML0895Y27	SMH0895Y27	SMH0895Z01	18	181	--	--	Gravity Main
SML0895Z02	SMH0895Z02	SMH0895Z11	18	116	3,425	0.5%	Gravity Main
SML0895Z05	SMH0895Z05	SMH1795A02	24	215	14,698	2.1%	Gravity Main
SML0895Z08	SMH0895Z08	SMH0895Z09	18	101	--	--	Gravity Main
SML0895Z09	SMH0895Z09	SMH0895Z02	--	213	--	--	Gravity Main
SML0895Z11	SMH0895Z11	SMH0895Z12	--	35	--	--	Gravity Main
SML0895Z12	SMH0895Z12	SMH0895Z05	--	35	--	--	Gravity Main
SML1184A01	SMH1184A01	SMH0284Z02	12	321	1,096	0.5%	Gravity Main
SML1184A02	SMH1184A02	SMH1184A05	12	189	1,380	0.7%	Gravity Main
SML1184A03	SMH1184A03	SMH1184A02	12	304	2,252	2.0%	Gravity Main
SML1184A04	SMH1184A04	SMH1184A01	8	110	622	1.3%	Gravity Main
SML1184A05	SMH1184A05	SMH1184A01	12	117	--	0.0%	Gravity Main
SML1184A06	SMH1184A06	SMH1184A05	12	100	2,310	2.1%	Gravity Main
SML1184A07	SMH1184A07	SMH1184A06	12	299	635	0.2%	Gravity Main
SML1184C01	SMH1184C01	SMH0284X04	15	247	2,477	0.7%	Gravity Main
SML1184C02	SMH1184C02	SMH1184C01	15	302	2,607	0.8%	Gravity Main
SML1184C03	SMH1184C03	SMH1184C02	15	358	2,784	0.9%	Gravity Main
SML1184C04	SMH1184C04	SMH1184C03	12	61	--	0.0%	Gravity Main
SML1184G01	SMH1184G01	SMH1184C03	15	267	3,520	1.5%	Gravity Main
SML1184G02	SMH1184G02	SMH1184G01	15	261	5,225	3.2%	Gravity Main
SML1184G03	SMH1184G03	SMH1184G02	15	159	8,093	7.8%	Gravity Main
SML1184G04	SMH1184G04	SMH1184G03	8	298	653	1.4%	Gravity Main
SML1184H01	SMH1184H01	SMH1184H02	8	273	3,226	35.2%	Gravity Main
SML1184H02	SMH1184H02	SMH1184H05	8	347	593	1.2%	Gravity Main
SML1184H03	SMH1184H03	SMH1184A03	12	280	2,348	2.1%	Gravity Main
SML1184H04	SMH1184H04	SMH1284E03	12	64	633	0.2%	Gravity Main
SML1184H05	SMH1184H05	SMH1184H04	12	73	5,360	11.2%	Gravity Main
SML1184J01	SMH1184J01	SMH1184K08	8	236	1,159	4.5%	Gravity Main
SML1184J02	SMH1184J02	SMH1184J03	8	217	1,573	8.4%	Gravity Main
SML1184J03	SMH1184J03	SMH1184R01	8	167	--	0.0%	Gravity Main
SML1184K01	SMH1184K01	SMH1184G04	8	319	536	1.0%	Gravity Main
SML1184K02	SMH1184K02	SMH1184K01	8	300	329	0.4%	Gravity Main
SML1184K03	SMH1184K03	SMH1184K02	8	299	330	0.4%	Gravity Main
SML1184K04	SMH1184K04	SMH1184K03	8	88	--	--	Gravity Main
SML1184K05	SMH1184K05	SMH1184K04	8	90	13,500	616.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1184K06	SMH1184K06	SMH1184K05	8	177	238	0.2%	Gravity Main
SML1184K07	SMH1184K07	SMH1184K06	8	172	344	0.4%	Gravity Main
SML1184K08	SMH1184K08	SMH1184K07	8	292	1,411	6.7%	Gravity Main
SML1184Q01	SMH1184Q01	SMH1184Q02	8	399	544	1.0%	Gravity Main
SML1184Q02	SMH1184Q02	SMH1184K08	8	400	533	1.0%	Gravity Main
SML1184R01	SMH1184R01	SMH1284M10	8	253	1,288	5.6%	Gravity Main
SML1184S01	SMH1184S01	SMH1184S04	8	281	1,053	3.7%	Gravity Main
SML1184S02	SMH1184S02	SMH1284V01	8	503	917	2.8%	Gravity Main
SML1184S03	SMH1184S03	SMH1184T13	8	182	855	2.5%	Gravity Main
SML1184S04	SMH1184S04	SMH1184S02	8	219	--	0.0%	Gravity Main
SML1184S05	SMH1184S05	SMH1184S03	8	225	1,185	4.8%	Gravity Main
SML1184T13	SMH1184T13	SMH1184T14	8	313	385	0.5%	Gravity Main
SML1184T14	SMH1184T14	SMH1184Q01	8	397	386	0.5%	Gravity Main
SML1184Y02	SMH1184Y02	SMH1484B02	8	50	768	2.0%	Gravity Main
SML1284A01	SMH1284A01	SMH0184Z02	8	436	601	1.2%	Gravity Main
SML1284A02	SMH1284A02	SMH0184Z05	10	161	907	0.8%	Gravity Main
SML1284A03	SMH1284A03	SMH1284A02	8	379	383	0.5%	Gravity Main
SML1284A04	SMH1284A04	SMH1284A03	8	111	401	0.5%	Gravity Main
SML1284A05	SMH1284A05	SMH1284A04	8	284	1,199	4.9%	Gravity Main
SML1284A06	SMH1284A06	SMH1284A04	8	200	322	0.3%	Gravity Main
SML1284A07	SMH1284A07	SMH0184Z07	8	216	622	1.3%	Gravity Main
SML1284A08	SMH1284A08	SMH1284A09	8	215	806	2.2%	Gravity Main
SML1284A09	SMH1284A09	SMH1284A11	10	137	3,034	9.5%	Gravity Main
SML1284A10	SMH1284A10	SMH1284A08	8	57	1,288	5.6%	Gravity Main
SML1284A11	SMH1284A11	SMH1284A02	10	90	2,033	4.3%	Gravity Main
SML1284C01	SMH1284C01	SMH0184X01	8	140	762	2.0%	Gravity Main
SML1284C02	SMH1284C02	SMH1284C01	8	267	848	2.4%	Gravity Main
SML1284C03	SMH1284C03	SMH1284C02	8	73	1,345	6.1%	Gravity Main
SML1284C04	SMH1284C04	SMH1284C03	8	194	1,096	4.1%	Gravity Main
SML1284C05	SMH1284C05	SMH1284C04	8	319	883	2.6%	Gravity Main
SML1284E01	SMH1284E01	SMH1184H04	15	32	19,051	43.0%	Gravity Main
SML1284E02	SMH1284E02	SMH1284E01	15	363	2,104	0.5%	Gravity Main
SML1284E03	SMH1284E03	SMH1184H03	12	313	2,702	2.8%	Gravity Main
SML1284E04	SMH1284E04	SMH1284M14	8	191	--	--	Gravity Main
SML1284F01	SMH1284F01	SMH1284L05	8	132	589	1.2%	Gravity Main
SML1284F02	SMH1284F02	SMH1284F01	8	198	411	0.6%	Gravity Main
SML1284F03	SMH1284F03	SMH1284F02	8	209	1,255	5.3%	Gravity Main
SML1284F04	SMH1284F04	SMH1284L05	8	250	1,302	5.7%	Gravity Main
SML1284F05	SMH1284F05	SMH1284F07	8	98	1,118	4.2%	Gravity Main
SML1284F06	SMH1284F06	SMH1284F07	8	263	526	0.9%	Gravity Main
SML1284F07	SMH1284F07	SMH1284F08	8	143	586	1.2%	Gravity Main
SML1284F08	SMH1284F08	SMH1284L10	8	184	642	1.4%	Gravity Main
SML1284F09	SMH1284F09	SMH1284F08	8	185	2,091	14.8%	Gravity Main
SML1284F10	SMH1284F10	SMH1284F09	8	221	652	1.4%	Gravity Main
SML1284F11	SMH1284F11	SMH1284F09	8	269	1,513	7.7%	Gravity Main
SML1284F12	SMH1284F12	SMH1284F11	8	199	1,299	5.7%	Gravity Main
SML1284F13	SMH1284F13	SMH1284F11	8	197	2,116	15.1%	Gravity Main
SML1284G01	SMH1284G01	SMH1284F13	8	225	722	1.8%	Gravity Main
SML1284G02	SMH1284G02	SMH1284G03	8	64	1,700	9.8%	Gravity Main
SML1284G03	SMH1284G03	SMH1284G05	8	58	335	0.4%	Gravity Main
SML1284G04	SMH1284G04	SMH1284G02	8	308	1,594	8.6%	Gravity Main
SML1284G05	SMH1284G05	SMH1284K27	8	253	385	0.5%	Gravity Main
SML1284G07	SMH1284G07	SMH1284G04	8	164	1,111	4.2%	Gravity Main
SML1284G08	SMH1284G08	SMH1284G07	8	144	--	--	Gravity Main
SML1284G09	SMH1284G09	SMH1284G07	8	294	1,610	8.8%	Gravity Main
SML1284G10	SMH1284G10	SMH1284G03	8	79	2,102	14.9%	Gravity Main
SML1284H01	SMH1284H01	SMH1284J03	8	380	421	0.6%	Gravity Main
SML1284H02	SMH1284H02	SMH1284A01	8	445	482	0.8%	Gravity Main
SML1284H03	SMH1284H03	SMH1284H04	8	395	561	1.1%	Gravity Main
SML1284H04	SMH1284H04	SMH1284H02	8	101	422	0.6%	Gravity Main
SML1284H05	SMH1284H05	SMH1284H04	8	54	572	1.1%	Gravity Main
SML1284H26	SMH1284H26	SMH0785E01	8	189	715	1.7%	Gravity Main
SML1284H27	SMH1284H27	SMH1284H28	8	127	1,178	4.7%	Gravity Main
SML1284H28	SMH1284H28	SMH1284J20	8	157	485	0.8%	Gravity Main
SML1284H29	SMH1284H29	SMH1284H28	8	169	533	1.0%	Gravity Main
SML1284J01	SMH1284J01	SMH1284J02	10	290	2,147	4.7%	Gravity Main
SML1284J02	SMH1284J02	SMH1284J03	10	533	1,281	1.7%	Gravity Main
SML1284J03	SMH1284J03	SMH1284J06	10	359	2,190	4.9%	Gravity Main
SML1284J04	SMH1284J04	SMH1284J05	8	366	532	1.0%	Gravity Main
SML1284J05	SMH1284J05	SMH1284J06	8	274	779	2.1%	Gravity Main
SML1284J06	SMH1284J06	SMH1284J20	10	121	898	0.8%	Gravity Main
SML1284J07	SMH1284J07	SMH1284J19	8	27	489	0.8%	Gravity Main
SML1284J08	SMH1284J08	SMH1284J11	8	179	547	1.0%	Gravity Main
SML1284J09	SMH1284J09	SMH0785E02	15	446	1,887	0.4%	Gravity Main
SML1284J10	SMH1284J10	SMH1284J09	8	506	1,803	11.0%	Gravity Main
SML1284J11	SMH1284J11	SMH1284J10	8	317	1,055	3.8%	Gravity Main
SML1284J12	SMH1284J12	SMH1284J02	8	35	449	0.7%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1284J13	SMH1284J13	SMH1284J12	8	225	472	0.8%	Gravity Main
SML1284J14	SMH1284J14	SMH1284J13	8	171	463	0.7%	Gravity Main
SML1284J15	SMH1284J15	SMH1284J04	8	176	--	--	Gravity Main
SML1284J16	SMH1284J16	SMH1284J05	8	164	549	1.0%	Gravity Main
SML1284J17	SMH1284J17	SMH1284J19	8	142	565	1.1%	Gravity Main
SML1284J18	SMH1284J18	SMH1284J17	8	21	1,362	6.3%	Gravity Main
SML1284J19	SMH1284J19	SMH1284J08	8	300	559	1.1%	Gravity Main
SML1284J20	SMH1284J20	SMH1284J09	10	450	1,351	1.9%	Gravity Main
SML1284K01	SMH1284K01	SMH1284K02	8	320	1,138	4.4%	Gravity Main
SML1284K02	SMH1284K02	SMH1284K04	8	172	1,385	6.5%	Gravity Main
SML1284K03	SMH1284K03	SMH1284K28	10	144	2,097	4.5%	Gravity Main
SML1284K04	SMH1284K04	SMH1284K03	8	334	1,447	7.1%	Gravity Main
SML1284K05	SMH1284K05	SMH1284K06	8	139	1,596	8.6%	Gravity Main
SML1284K06	SMH1284K06	SMH1284K08	8	250	1,435	7.0%	Gravity Main
SML1284K07	SMH1284K07	SMH1284K06	8	124	--	--	Gravity Main
SML1284K08	SMH1284K08	SMH1284K10	8	126	1,342	6.1%	Gravity Main
SML1284K09	SMH1284K09	SMH1284K08	8	144	548	1.0%	Gravity Main
SML1284K10	SMH1284K10	SMH1284J13	8	134	1,680	9.5%	Gravity Main
SML1284K11	SMH1284K11	SMH1284J14	8	145	143	0.1%	Gravity Main
SML1284K11	SMH1284K11	SMH1284R15	8	138	147	0.1%	Gravity Main
SML1284K14	SMH1284K14	SMH1284K20	8	265	1,232	5.1%	Gravity Main
SML1284K15	SMH1284K15	SMH1284K18	8	153	500	0.8%	Gravity Main
SML1284K16	SMH1284K16	SMH1284K15	8	126	1,179	4.7%	Gravity Main
SML1284K17	SMH1284K17	SMH1284K16	8	218	684	1.6%	Gravity Main
SML1284K18	SMH1284K18	SMH1284K14	8	244	1,543	8.1%	Gravity Main
SML1284K19	SMH1284K19	SMH1284K18	8	287	832	2.3%	Gravity Main
SML1284K20	SMH1284K20	SMH1284K21	8	399	1,535	8.0%	Gravity Main
SML1284K21	SMH1284K21	SMH1284K11	8	153	1,055	3.8%	Gravity Main
SML1284K27	SMH1284K27	SMH1284K21	8	95	534	1.0%	Gravity Main
SML1284K28	SMH1284K28	SMH1284J01	10	300	2,369	5.8%	Gravity Main
SML1284K29	SMH1284K29	SMH1284K05	8	102	1,464	7.3%	Gravity Main
SML1284K30	SMH1284K30	SMH1284K29	8	25	1,348	6.1%	Gravity Main
SML1284K31	SMH1284K31	SMH1284K30	8	275	1,509	7.7%	Gravity Main
SML1284K32	SMH1284K32	SMH1284K31	8	279	542	1.0%	Gravity Main
SML1284K33	SMH1284K33	SMH1284K01	6	72	265	1.1%	Gravity Main
SML1284K34	SMH1284K34	SMH1284K33	6	35	250	1.0%	Gravity Main
SML1284L01	SMH1284L01	SMH1284L02	8	327	1,440	7.0%	Gravity Main
SML1284L02	SMH1284L02	SMH1284L03	8	219	1,177	4.7%	Gravity Main
SML1284L03	SMH1284L03	SMH1284L04	10	89	1,051	1.1%	Gravity Main
SML1284L04	SMH1284L04	SMH1284M09	10	285	683	0.5%	Gravity Main
SML1284L05	SMH1284L05	SMH1284L01	8	205	700	1.7%	Gravity Main
SML1284L06	SMH1284L06	SMH1284L04	8	214	1,401	6.6%	Gravity Main
SML1284L07	SMH1284L07	SMH1284L09	8	224	832	2.3%	Gravity Main
SML1284L08	SMH1284L08	SMH1284L10	8	287	642	1.4%	Gravity Main
SML1284L09	SMH1284L09	SMH1284L06	8	202	1,343	6.1%	Gravity Main
SML1284L10	SMH1284L10	SMH1284L11	8	346	832	2.3%	Gravity Main
SML1284L11	SMH1284L11	SMH1284L09	8	221	579	1.1%	Gravity Main
SML1284L12	SMH1284L12	SMH1284L10	8	174	1,725	10.1%	Gravity Main
SML1284L13	SMH1284L13	SMH1284L11	8	282	546	1.0%	Gravity Main
SML1284L14	SMH1284L14	SMH1284L12	8	235	1,526	7.9%	Gravity Main
SML1284L15	SMH1284L15	SMH1284L12	8	119	2,213	16.6%	Gravity Main
SML1284L16	SMH1284L16	SMH1284L13	8	194	2,229	16.8%	Gravity Main
SML1284L17	SMH1284L17	SMH1284L14	8	163	1,689	9.6%	Gravity Main
SML1284L18	SMH1284L18	SMH1284F11	8	272	1,319	5.9%	Gravity Main
SML1284L19	SMH1284L19	SMH1284L17	8	109	1,357	6.2%	Gravity Main
SML1284L20	SMH1284L20	SMH1284L16	8	152	1,831	11.3%	Gravity Main
SML1284M02	SMH1284M02	SMH1284E02	15	367	6,704	5.3%	Gravity Main
SML1284M03	SMH1284M03	SMH1284M02	15	239	5,417	3.5%	Gravity Main
SML1284M04	SMH1284M04	SMH1284M06	8	399	832	2.3%	Gravity Main
SML1284M05	SMH1284M05	SMH1284M03	15	342	3,103	1.1%	Gravity Main
SML1284M06	SMH1284M06	SMH1284M13	15	82	3,801	1.7%	Gravity Main
SML1284M07	SMH1284M07	SMH1284M06	15	66	2,049	0.5%	Gravity Main
SML1284M08	SMH1284M08	SMH1284M06	10	78	513	0.3%	Gravity Main
SML1284M09	SMH1284M09	SMH1284M08	10	208	627	0.4%	Gravity Main
SML1284M10	SMH1284M10	SMH1284M12	8	117	1,214	5.0%	Gravity Main
SML1284M12	SMH1284M12	SMH1284M04	8	147	1,397	6.6%	Gravity Main
SML1284M13	SMH1284M13	SMH1284M05	15	187	4,116	2.0%	Gravity Main
SML1284M14	SMH1284M14	SMH1284M15	8	170	502	0.9%	Gravity Main
SML1284M15	SMH1284M15	SMH1284M16	8	29	21,891	1620.6%	Gravity Main
SML1284M16	SMH1284M16	SMH1284M02	8	63	--	--	Gravity Main
SML1284M17	SMH1284M17	SMH1284M16	8	82	13,023	573.5%	Gravity Main
SML1284N01	SMH1284N01	SMH1284M08	10	295	--	--	Gravity Main
SML1284N02	SMH1284N02	SMH1284M10	8	142	1,716	10.0%	Gravity Main
SML1284N03	SMH1284N03	SMH1284M04	8	32	306	0.3%	Gravity Main
SML1284N04	SMH1284N04	SMH1284N03	8	89	514	0.9%	Gravity Main
SML1284N05	SMH1284N05	SMH1284N04	8	247	1,285	5.6%	Gravity Main
SML1284N06	SMH1284N06	SMH1284N05	8	249	1,420	6.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1284N07	SMH1284N07	SMH1284N06	8	253	1,737	10.2%	Gravity Main
SML1284P01	SMH1284P01	SMH1284M07	15	434	3,024	1.1%	Gravity Main
SML1284P02	SMH1284P02	SMH1284P04	12	324	2,307	2.1%	Gravity Main
SML1284P03	SMH1284P03	SMH1284P02	12	210	3,186	3.9%	Gravity Main
SML1284P04	SMH1284P04	SMH1284P01	12	101	2,412	2.3%	Gravity Main
SML1284Q01	SMH1284Q01	SMH1284Q02	8	250	483	0.8%	Gravity Main
SML1284Q02	SMH1284Q02	SMH1284K01	8	201	463	0.7%	Gravity Main
SML1284Q03	SMH1284Q03	SMH1284Q04	8	147	568	1.1%	Gravity Main
SML1284Q04	SMH1284Q04	SMH1284Q05	8	249	1,153	4.5%	Gravity Main
SML1284Q05	SMH1284Q05	SMH1284Q06	8	224	1,458	7.2%	Gravity Main
SML1284Q06	SMH1284Q06	SMH1284Q07	8	115	617	1.3%	Gravity Main
SML1284Q07	SMH1284Q07	SMH1284R02	8	145	1,252	5.3%	Gravity Main
SML1284Q08	SMH1284Q08	SMH1284Q09	8	161	1,042	3.7%	Gravity Main
SML1284Q09	SMH1284Q09	SMH1284K04	8	197	785	2.1%	Gravity Main
SML1284Q10	SMH1284Q10	SMH1284Q11	8	74	1,260	5.4%	Gravity Main
SML1284Q11	SMH1284Q11	SMH1284Q12	8	153	1,229	5.1%	Gravity Main
SML1284Q12	SMH1284Q12	SMH1284Q13	8	180	1,503	7.6%	Gravity Main
SML1284Q13	SMH1284Q13	SMH1284K28	8	199	875	2.6%	Gravity Main
SML1284R01	SMH1284R01	SMH1284R06	8	206	528	0.9%	Gravity Main
SML1284R02	SMH1284R02	SMH1284R04	8	161	588	1.2%	Gravity Main
SML1284R03	SMH1284R03	SMH1284R05	8	151	575	1.1%	Gravity Main
SML1284R04	SMH1284R04	SMH1284R07	8	120	641	1.4%	Gravity Main
SML1284R05	SMH1284R05	SMH1284R08	8	145	1,817	11.2%	Gravity Main
SML1284R06	SMH1284R06	SMH1284J01	8	287	1,064	3.8%	Gravity Main
SML1284R07	SMH1284R07	SMH1284R06	8	206	607	1.2%	Gravity Main
SML1284R08	SMH1284R08	SMH1284R09	8	89	1,911	12.4%	Gravity Main
SML1284R09	SMH1284R09	SMH1284R10	8	340	1,029	3.6%	Gravity Main
SML1284R10	SMH1284R10	SMH1284K11	8	349	1,291	5.6%	Gravity Main
SML1284R12	SMH1284R12	SMH1284J07	8	352	905	2.8%	Gravity Main
SML1284R13	SMH1284R13	SMH1284R12	8	290	911	2.8%	Gravity Main
SML1284R14	SMH1284R14	SMH1284J08	8	532	782	2.1%	Gravity Main
SML1284R15	SMH1284R15	SMH1284J15	12	70	--	0.0%	Gravity Main
SML1284R16	SMH1284R16	SMH1284R14	8	44	2,720	25.0%	Gravity Main
SML1284R17	SMH1284R17	SMH1284R16	8	130	447	0.7%	Gravity Main
SML1284R18	SMH1284R18	SMH1284R17	8	89	13,574	623.1%	Gravity Main
SML1284R19	SMH1284R19	SMH1284R18	8	202	133	0.1%	Gravity Main
SML1284R20	MANHOLE	SMH1284R18	8	83	322	0.4%	Gravity Main
SML1284S01	SMH1284S01	SMH1284R03	8	290	595	1.2%	Gravity Main
SML1284S02	SMH1284S02	SMH1284S01	8	285	414	0.6%	Gravity Main
SML1284S03	SMH1284S03	SMH1284S02	8	316	434	0.6%	Gravity Main
SML1284S04	SMH1284S04	SMH1284S05	8	223	1,380	6.4%	Gravity Main
SML1284S05	SMH1284S05	SMH1284S07	8	265	615	1.3%	Gravity Main
SML1284S06	SMH1284S06	SMH1284R08	8	400	385	0.5%	Gravity Main
SML1284S07	SMH1284S07	SMH1284S06	8	260	638	1.4%	Gravity Main
SML1284S08	SMH1284S08	SMH1284S06	8	84	1,816	11.2%	Gravity Main
SML1284S09	SMH1284S09	SMH1284S15	8	22	2,349	18.7%	Gravity Main
SML1284S10	SMH1284S10	SMH1284S09	8	213	513	0.9%	Gravity Main
SML1284S11	SMH1284S11	SMH1284S10	8	363	807	2.2%	Gravity Main
SML1284S12	SMH1284S12	SMH1284S10	8	189	584	1.2%	Gravity Main
SML1284S13	SMH1284S13	SMH1284S12	8	98	613	1.3%	Gravity Main
SML1284S14	SMH1284S14	SMH1284S20	8	18	1,347	6.1%	Gravity Main
SML1284S15	SMH1284S15	SMH1284S08	8	114	2,004	13.6%	Gravity Main
SML1284S16	SMH1284S16	SMH1284S12	8	40	396	0.5%	Gravity Main
SML1284S17	SMH1284S17	SMH1284S16	8	145	521	0.9%	Gravity Main
SML1284S18	SMH1284S18	SMH1284S20	8	392	396	0.5%	Gravity Main
SML1284S19	SMH1284S19	SMH1284S18	8	150	392	0.5%	Gravity Main
SML1284S20	SMH1284S20	SMH1284S15	8	336	565	1.1%	Gravity Main
SML1284S21	SMH1284S21	SMH1284S22	8	223	507	0.9%	Gravity Main
SML1284S22	SMH1284S22	SMH1284S23	8	67	446	0.7%	Gravity Main
SML1284S23	SMH1284S23	SMH1284S17	8	76	972	3.2%	Gravity Main
SML1284S24	SMH1284S24	SMH1284S13	8	133	477	0.8%	Gravity Main
SML1284S27	SMH1284S27	SMH1284S26	8	105	538	1.0%	Gravity Main
SML1284T01	SMH1284T01	SMH1284T02	8	235	1,243	5.2%	Gravity Main
SML1284T02	SMH1284T02	SMH1284S02	8	185	1,273	5.5%	Gravity Main
SML1284T03	SMH1284T03	SMH1284T04	8	245	910	2.8%	Gravity Main
SML1284T04	SMH1284T04	SMH1284T02	8	166	373	0.5%	Gravity Main
SML1284T05	SMH1284T05	SMH1284T02	8	259	518	0.9%	Gravity Main
SML1284T06	SMH1284T06	SMH1284T05	8	152	453	0.7%	Gravity Main
SML1284T07	SMH1284T07	SMH1284T06	8	120	902	2.7%	Gravity Main
SML1284T08	SMH1284T08	SMH1284T07	8	99	799	2.2%	Gravity Main
SML1284T09	SMH1284T09	SMH1284T08	8	191	1,607	8.7%	Gravity Main
SML1284T10	SMH1284T10	SMH1284T09	8	60	577	1.1%	Gravity Main
SML1284T11	SMH1284T11	SMH1284T10	8	168	306	0.3%	Gravity Main
SML1284T12	SMH1284T12	SMH1284T11	8	119	373	0.5%	Gravity Main
SML1284T13	SMH1284T13	SMH1284T12	8	400	659	1.5%	Gravity Main
SML1284T14	SMH1284T14	SMH1284T11	8	54	443	0.7%	Gravity Main
SML1284T15	SMH1284T15	SMH1284T14	8	129	358	0.4%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1284T16	SMH1284T16	SMH1284T15	8	97	395	0.5%	Gravity Main
SML1284T17	SMH1284T17	SMH1284T16	8	131	374	0.5%	Gravity Main
SML1284T18	SMH1284T18	SMH1284T17	8	201	394	0.5%	Gravity Main
SML1284T19	SMH1284T19	SMH1284T18	8	90	1,632	9.0%	Gravity Main
SML1284T20	SMH1284T20	SMH1284T18	8	297	383	0.5%	Gravity Main
SML1284T23	SMH1284T23	SMH1284T15	8	219	371	0.5%	Gravity Main
SML1284T24	SMH1284T24	SMH1284T23	8	104	424	0.6%	Gravity Main
SML1284T25	SMH1284T25	SMH1284Q07	8	255	903	2.8%	Gravity Main
SML1284T26	SMH1284T26	SMH1284T25	8	300	1,348	6.1%	Gravity Main
SML1284T27	SMH1284T27	SMH1284T26	8	138	1,153	4.5%	Gravity Main
SML1284T28	SMH1284T28	SMH1284T24	8	93	425	0.6%	Gravity Main
SML1284U01	SMH1284U01	SMH1284U02	10	327	2,268	5.3%	Gravity Main
SML1284U02	SMH1284U02	SMH1284U04	10	253	3,189	10.5%	Gravity Main
SML1284U03	SMH1284U03	SMH1284P03	12	498	2,260	2.0%	Gravity Main
SML1284U04	SMH1284U04	SMH1284U05	10	118	1,650	2.8%	Gravity Main
SML1284U05	SMH1284U05	SMH1284U03	10	305	1,919	3.8%	Gravity Main
SML1284U06	SMH1284U06	SMH1284U05	8	371	1,275	5.5%	Gravity Main
SML1284V01	SMH1284V01	SMH1284V02	8	200	834	2.3%	Gravity Main
SML1284V02	SMH1284V02	SMH1284V03	10	300	597	0.4%	Gravity Main
SML1284V03	SMH1284V03	SMH1284V04	12	400	982	0.4%	Gravity Main
SML1284V04	SMH1284V04	SMH1284U01	12	399	999	0.4%	Gravity Main
SML1284V05	SMH1284V05	SMH1284V04	8	40	2,052	14.2%	Gravity Main
SML1284V06	SMH1284V06	SMH1284V05	8	315	657	1.5%	Gravity Main
SML1284W01	SMH1284W01	SMH1284W03	8	133	546	1.0%	Gravity Main
SML1284W02	SMH1284W02	SMH1284W01	8	172	891	2.7%	Gravity Main
SML1284W03	SMH1284W03	SMH1384D02	8	123	914	2.8%	Gravity Main
SML1284W04	SMH1284W04	SMH1384D08	8	169	541	1.0%	Gravity Main
SML1284W05	SMH1284W05	SMH1384D04	8	39	1,307	5.8%	Gravity Main
SML1284W06	SMH1284W06	SMH1284W05	8	125	333	0.4%	Gravity Main
SML1284W07	SMH1284W07	SMH1284W06	8	54	222	0.2%	Gravity Main
SML1284W08	SMH1284W08	SMH1284W07	8	176	325	0.4%	Gravity Main
SML1284W09	SMH1284W09	SMH1284W06	8	126	1,040	3.7%	Gravity Main
SML1284X01	SMH1284X01	SMH1284X02	10	243	910	0.9%	Gravity Main
SML1284X02	SMH1284X02	SMH1384C06	10	219	959	0.9%	Gravity Main
SML1284X03	SMH1284X03	SMH1384C04	8	64	1,014	3.5%	Gravity Main
SML1284X04	SMH1284X04	SMH1284X03	8	104	808	2.2%	Gravity Main
SML1284Y01	SMH1284Y01	SMH1384B02	8	417	552	1.0%	Gravity Main
SML1284Y02	SMH1284Y02	SMH1284Y03	8	305	709	1.7%	Gravity Main
SML1284Y03	SMH1284Y03	SMH1384B03	8	49	2,456	20.4%	Gravity Main
SML1284Y04	SMH1284Y04	SMH1284T05	8	165	680	1.6%	Gravity Main
SML1284Y05	SMH1284Y05	SMH1284Y04	8	301	642	1.4%	Gravity Main
SML1284Y06	SMH1284Y06	SMH1284Y05	8	203	1,487	7.5%	Gravity Main
SML1284Y07	SMH1284Y07	SMH1284Y06	8	209	1,288	5.6%	Gravity Main
SML1284Y08	SMH1284Y08	SMH1284Y09	6	24	349	1.9%	Gravity Main
SML1284Y09	SMH1284Y09	SMH1384B01	8	73	1,733	10.2%	Gravity Main
SML1284Z01	SMH1284Z01	SMH1384A10	8	75	562	1.1%	Gravity Main
SML1284Z02	SMH1284Z02	SMH1284Z03	8	100	688	1.6%	Gravity Main
SML1284Z03	SMH1284Z03	SMH1284Z01	8	170	528	0.9%	Gravity Main
SML1284Z04	SMH1284Z04	SMH1284Z05	8	237	526	0.9%	Gravity Main
SML1284Z05	SMH1284Z05	SMH1284S22	8	145	313	0.3%	Gravity Main
SML1284Z06	SMH1284Z06	SMH1284Z05	8	91	676	1.5%	Gravity Main
SML1284Z07	SMH1284Z07	SMH1284Z06	8	191	451	0.7%	Gravity Main
SML1384A01	SMH1384A01	SMH1384A13	18	52	9,253	3.8%	Gravity Main
SML1384A02	SMH1384A02	SMH1384A03	18	335	2,781	0.3%	Gravity Main
SML1384A03	SMH1384A03	SMH1384A14	18	237	3,518	0.6%	Gravity Main
SML1384A04	SMH1384A04	SMH1384A02	8	243	626	1.3%	Gravity Main
SML1384A05	SMH1384A05	SMH1384A04	8	160	742	1.9%	Gravity Main
SML1384A06	SMH1384A06	SMH1384H10	8	402	940	3.0%	Gravity Main
SML1384A07	SMH1384A07	SMH1384A05	8	150	379	0.5%	Gravity Main
SML1384A08	SMH1384A08	SMH1384H12	10	366	--	--	Gravity Main
SML1384A09	SMH1384A09	SMH1384A06	8	406	725	1.8%	Gravity Main
SML1384A10	SMH1384A10	SMH1384A07	8	202	656	1.5%	Gravity Main
SML1384A11	SMH1384A11	SMH1384A08	10	363	--	0.0%	Gravity Main
SML1384A12	SMH1384A12	SMH1384A09	8	243	931	2.9%	Gravity Main
SML1384A13	SMH1384A13	SMH1384A16	18	164	639	0.0%	Gravity Main
SML1384A14	SMH1384A14	SMH1384A01	18	145	6,161	1.7%	Gravity Main
SML1384A15	SMH1384A15	SMH1384A14	8	78	920	2.9%	Gravity Main
SML1384A16	SMH1384A16	SMH1384H04	18	100	5,728	1.5%	Gravity Main
SML1384B01	SMH1384B01	SMH1384B02	18	384	2,644	0.3%	Gravity Main
SML1384B02	SMH1384B02	SMH1384B03	18	424	2,598	0.3%	Gravity Main
SML1384B03	SMH1384B03	SMH1384B04	18	413	4,346	0.8%	Gravity Main
SML1384B04	SMH1384B04	SMH1384A02	18	422	2,552	0.3%	Gravity Main
SML1384C01	SMH1384C01	SMH1384C04	18	344	4,651	1.0%	Gravity Main
SML1384C02	SMH1384C02	SMH1384C01	8	321	787	2.1%	Gravity Main
SML1384C03	SMH1384C03	SMH1384C02	8	478	344	0.4%	Gravity Main
SML1384C04	SMH1384C04	SMH1384C05	18	139	4,925	1.1%	Gravity Main
SML1384C05	SMH1384C05	SMH1384C06	18	514	9,966	4.4%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1384C06	SMH1384C06	SMH1384B01	18	424	2,526	0.3%	Gravity Main
SML1384C07	SMH1384C07	SMH1384C06	8	160	627	1.3%	Gravity Main
SML1384C08	SMH1384C08	SMH1384C12	8	179	835	2.4%	Gravity Main
SML1384C09	SMH1384C09	SMH1384C08	8	166	636	1.4%	Gravity Main
SML1384C10	<Null>	SMH1384C04	8	50	--	--	Gravity Main
SML1384C11	SMH1384C11	SMH1384F15	8	54	1,038	3.6%	Gravity Main
SML1384C12	SMH1384C12	SMH1384C07	8	145	--	--	Gravity Main
SML1384D01	SMH1384D01	SMH1384D02	18	69	5,733	1.5%	Gravity Main
SML1384D02	SMH1384D02	SMH1384D03	18	164	2,451	0.3%	Gravity Main
SML1384D03	SMH1384D03	SMH1384D04	18	140	--	--	Gravity Main
SML1384D04	SMH1384D04	SMH1384D05	18	339	2,846	0.4%	Gravity Main
SML1384D05	SMH1384D05	SMH1384D06	18	76	7,657	2.6%	Gravity Main
SML1384D06	SMH1384D06	SMH1384D08	18	82	5,775	1.5%	Gravity Main
SML1384D07	SMH1384D07	SMH1384C01	18	278	5,691	1.4%	Gravity Main
SML1384D08	SMH1384D08	SMH1384D07	18	53	4,775	1.0%	Gravity Main
SML1384D09	SMH1384D09	SMH1384D10	12	215	1,147	0.5%	Gravity Main
SML1384D10	SMH1384D10	SMH1384D11	12	165	3,925	6.0%	Gravity Main
SML1384D11	SMH1384D11	SMH1384D12	12	390	1,644	1.1%	Gravity Main
SML1384D12	SMH1384D12	SMH1384D04	12	59	--	0.0%	Gravity Main
SML1384E01	SMH1384E01	SMH1384M04	8	404	541	1.0%	Gravity Main
SML1384E02	SMH1384E02	SMH1384M14	8	200	544	1.0%	Gravity Main
SML1384E03	SMH1384E03	SMH1384E05	8	175	1,060	3.8%	Gravity Main
SML1384E04	SMH1384E04	SMH1384E06	8	101	1,423	6.8%	Gravity Main
SML1384E05	SMH1384E05	SMH1384E06	8	276	546	1.0%	Gravity Main
SML1384E06	SMH1384E06	SMH1384F04	8	249	486	0.8%	Gravity Main
SML1384E07	SMH1384E07	SMH1384E08	12	16	400	0.1%	Gravity Main
SML1384E08	SMH1384E08	SMH1384E09	12	118	739	0.2%	Gravity Main
SML1384E09	SMH1384E09	SMH1384D09	12	164	627	0.2%	Gravity Main
SML1384E10	SMH1384E10	SMH1384E08	6	12	--	--	Gravity Main
SML1384E11	SMH1384E11	SMH1384E10	6	51	--	--	Gravity Main
SML1384F01	SMH1384F01	SMH1384C03	8	520	343	0.4%	Gravity Main
SML1384F02	SMH1384F02	SMH1384C08	8	400	930	2.9%	Gravity Main
SML1384F03	SMH1384F03	SMH1384F02	8	400	541	1.0%	Gravity Main
SML1384F04	SMH1384F04	SMH1384L01	8	185	262	0.2%	Gravity Main
SML1384F05	SMH1384F05	SMH1384L09	8	252	542	1.0%	Gravity Main
SML1384F06	SMH1384F06	SMH1384F04	8	158	591	1.2%	Gravity Main
SML1384F07	SMH1384F07	SMH1384F06	8	121	563	1.1%	Gravity Main
SML1384F08	SMH1384F08	SMH1384F09	8	67	1,167	4.6%	Gravity Main
SML1384F09	SMH1384F09	SMH1384L04	8	310	544	1.0%	Gravity Main
SML1384F10	SMH1384F10	SMH1384F05	8	251	548	1.0%	Gravity Main
SML1384F11	SMH1384F11	SMH1384F12	8	240	1,027	3.6%	Gravity Main
SML1384F12	SMH1384F12	SMH1384F14	8	290	471	0.8%	Gravity Main
SML1384F13	SMH1384F13	SMH1384F14	8	176	866	2.5%	Gravity Main
SML1384F14	SMH1384F14	SMH1384C11	8	107	320	0.3%	Gravity Main
SML1384F15	SMH1384F15	SMH1384F02	8	57	1,010	3.4%	Gravity Main
SML1384F16	SMH1384F16	SMH1384F08	8	101	729	1.8%	Gravity Main
SML1384F17	SMH1384F17	SMH1384F16	8	143	514	0.9%	Gravity Main
SML1384F18	SMH1384F18	SMH1384F09	8	166	1,295	5.7%	Gravity Main
SML1384F20	SMH1384F20	SMH1384F16	8	207	834	2.3%	Gravity Main
SML1384F21	SMH1384F21	SMH1384F20	8	100	772	2.0%	Gravity Main
SML1384G01	SMH1384G01	SMH1384G02	10	318	1,063	1.2%	Gravity Main
SML1384G02	SMH1384G02	SMH1384H01	10	386	1,587	2.6%	Gravity Main
SML1384H01	SMH1384H01	SMH1384H02	10	10	1,367	1.9%	Gravity Main
SML1384H02	SMH1384H02	SMH1384H05	10	251	2,235	5.1%	Gravity Main
SML1384H03	SMH1384H03	SMH1384H06	24	68	15,970	2.5%	Gravity Main
SML1384H04	SMH1384H04	SMH1384H05	18	245	7,855	2.8%	Gravity Main
SML1384H05	SMH1384H05	SMH1384H07	24	91	11,219	1.2%	Gravity Main
SML1384H06	SMH1384H06	SMH1384H08	24	153	15,710	2.4%	Gravity Main
SML1384H07	SMH1384H07	SMH1384H03	24	236	5,425	0.3%	Gravity Main
SML1384H08	SMH1384H08	SMH1384J03	24	202	4,472	0.2%	Gravity Main
SML1384H09	SMH1384H09	SMH1384H06	10	391	1,091	1.2%	Gravity Main
SML1384H10	SMH1384H10	SMH1384H07	8	303	737	1.8%	Gravity Main
SML1384H11	SMH1384H11	SMH1384H08	8	403	900	2.7%	Gravity Main
SML1384H12	SMH1384H12	SMH1384H09	10	364	1,788	3.3%	Gravity Main
SML1384H13	SMH1384H13	SMH1384H11	8	399	847	2.4%	Gravity Main
SML1384H14	SMH1384H14	SMH1384H15	18	118	--	--	Gravity Main
SML1384H15	SMH1384H15	SMH1384H07	--	133	--	--	Gravity Main
SML1384J01	SMH1384J01	SMH1384J03	8	452	--	0.0%	Gravity Main
SML1384J02	SMH1384J02	SMH1384H03	15	469	3,069	1.1%	Gravity Main
SML1384J03	SMH1384J03	SMH1384J04	24	303	8,817	0.8%	Gravity Main
SML1384J04	SMH1384J04	SMH1384J05	24	436	4,496	0.2%	Gravity Main
SML1384J05	SMH1384J05	SMH1384J06	24	431	4,523	0.2%	Gravity Main
SML1384J06	SMH1384J06	SMH1384J07	24	14	45,542	20.0%	Gravity Main
SML1384J06	SMH1384J06	SMH1384J07	24	51	23,951	5.5%	Gravity Main
SML1384J07	SMH1384J07	SMH1384R22	24	318	7,934	0.6%	Gravity Main
SML1384J08	SMH1384J08	SML1384J05	6	33	10,144	1613.8%	Gravity Main
SML1384J10	SMH1384J10	SML1384J05	6	36	1,021	16.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1384J11	PRIV MH	SMH1885M04	--	71	--	--	Gravity Main
SML1384K01	SMH1384K01	SMH1384K03	8	315	761	2.0%	Gravity Main
SML1384K02	SMH1384K02	SMH1384J01	8	361	--	0.0%	Gravity Main
SML1384K03	SMH1384K03	SMH1384K04	15	254	3,771	1.7%	Gravity Main
SML1384K04	SMH1384K04	SMH1384J02	15	233	1,173	0.2%	Gravity Main
SML1384K05	SMH1384K05	SMH_MWD	8	109	530	0.9%	Gravity Main
SML1384L01	SMH1384L01	SMH1384L02	8	110	492	0.8%	Gravity Main
SML1384L02	SMH1384L02	SMH1384L09	8	236	702	1.7%	Gravity Main
SML1384L03	SMH1384L03	SMH1384L04	8	366	980	3.2%	Gravity Main
SML1384L04	SMH1384L04	SMH1384L05	8	309	1,040	3.7%	Gravity Main
SML1384L06	SMH1384L06	SMH1384L04	8	229	672	1.5%	Gravity Main
SML1384L07	SMH1384L07	SMH1384L06	8	184	523	0.9%	Gravity Main
SML1384L09	SMH1384L09	SMH1384L03	8	85	1,144	4.4%	Gravity Main
SML1384L14	SMH1384L14	SMH1384L03	8	34	1,813	11.1%	Gravity Main
SML1384L15	SMH1384L15	SMH1384L14	8	249	--	--	Gravity Main
SML1384M01	SMH1384M01	SMH1384M02	8	398	545	1.0%	Gravity Main
SML1384M02	SMH1384M02	SMH1384M03	8	380	471	0.7%	Gravity Main
SML1384M03	SMH1384M03	SMH1384M06	8	407	471	0.8%	Gravity Main
SML1384M04	SMH1384M04	SMH1384M03	8	123	1,216	5.0%	Gravity Main
SML1384M05	SMH1384M05	SMH1384E06	8	127	1,176	4.7%	Gravity Main
SML1384M06	SMH1384M06	SMH1384L02	8	360	545	1.0%	Gravity Main
SML1384M07	SMH1384M07	SMH1384M09	8	79	470	0.7%	Gravity Main
SML1384M09	SMH1384M09	SMH1384M10	8	215	517	0.9%	Gravity Main
SML1384M10	SMH1384M10	SMH1384M12	8	159	562	1.1%	Gravity Main
SML1384M11	SMH1384M11	SMH1384M10	8	111	460	0.7%	Gravity Main
SML1384M12	SMH1384M12	MWD	8	161	558	1.1%	Gravity Main
SML1384M13	SMH1384M13	SMH1384M09	8	150	763	2.0%	Gravity Main
SML1384M14	SMH1384M14	SMH1384M02	8	58	1,012	3.5%	Gravity Main
SML1384P01	SMH1384P01	PRIV	8	56	450	0.7%	Gravity Main
SML1384Q01	SMH1384Q01	SMH1384Q04	8	396	550	1.0%	Gravity Main
SML1384Q02	SMH1384Q02	SMH1384Q03	8	304	454	0.7%	Gravity Main
SML1384Q03	SMH1384Q03	SMH1384Q05	8	302	472	0.8%	Gravity Main
SML1384Q04	SMH1384Q04	SMH1384Q06	8	481	545	1.0%	Gravity Main
SML1384Q05	SMH1384Q05	SMH1384Q07	8	361	470	0.7%	Gravity Main
SML1384Q06	SMH1384Q06	SMH1384K01	8	231	542	1.0%	Gravity Main
SML1384Q07	SMH1384Q07	SMH1384K02	8	361	521	0.9%	Gravity Main
SML1384Q08	SMH1384Q08	SMH1384Q11	8	257	532	1.0%	Gravity Main
SML1384Q09	SMH1384Q09	SMH1384R01	8	257	1,161	4.6%	Gravity Main
SML1384Q10	SMH1384Q10	SMH1384Q09	8	44	504	0.9%	Gravity Main
SML1384Q11	SMH1384Q11	SMH1384Q10	8	103	339	0.4%	Gravity Main
SML1384Q12	SMH1384Q12	SMH1384Q13	8	141	574	1.1%	Gravity Main
SML1384Q13	SMH1384Q13	SMH1384Q10	8	34	2,438	20.1%	Gravity Main
SML1384Q14	SMH1384Q14	SMH1384Q15	8	185	508	0.9%	Gravity Main
SML1384Q15	SMH1384Q15	SMH1384Q11	8	32	2,515	21.4%	Gravity Main
SML1384R01	SMH1384R01	SMH1384S04	12	241	2,042	1.6%	Gravity Main
SML1384R02	SMH1384R02	SMH1384R23	8	97	308	0.3%	Gravity Main
SML1384R03	SMH1384R03	SMH1384R01	8	346	529	0.9%	Gravity Main
SML1384R05	SMH1384R05	SMH1384R06	8	199	447	0.7%	Gravity Main
SML1384R06	SMH1384R06	SMH1384R08	8	160	476	0.8%	Gravity Main
SML1384R07	SMH1384R07	SMH1384R08	8	276	723	1.8%	Gravity Main
SML1384R08	SMH1384R08	SMH1384R09	8	40	747	1.9%	Gravity Main
SML1384R09	SMH1384R09	SMH1384R11	8	145	364	0.4%	Gravity Main
SML1384R0A	SMH1384R31	SMH1384R29	--	9	--	--	Gravity Main
SML1384R10	SMH1384R10	SMH1384R11	24	276	10,557	1.1%	Gravity Main
SML1384R11	SMH1384R11	SMH1384S19	24	422	17,659	3.0%	Gravity Main
SML1384R12	SMH1384R12	SMH1384R13	8	46	1,194	4.8%	Gravity Main
SML1384R13	SMH1384R13	SMH1384R05	8	218	685	1.6%	Gravity Main
SML1384R14	SMH1384R14	SMH1384R13	8	123	594	1.2%	Gravity Main
SML1384R15	SMH1384R15	SMH1384R07	8	82	555	1.0%	Gravity Main
SML1384R16	SMH1384R16	SMH1384R07	8	74	534	1.0%	Gravity Main
SML1384R17	SMH1384R17	SMH1384R18	8	51	1,382	6.5%	Gravity Main
SML1384R18	SMH1384R18	SMH1384R20	8	209	543	1.0%	Gravity Main
SML1384R19	SMH1384R19	SMH1384R18	8	37	1,442	7.0%	Gravity Main
SML1384R20	SMH1384R20	SMH1384R21	8	236	501	0.9%	Gravity Main
SML1384R21	SMH1384R21	SMH1384R22	8	274	509	0.9%	Gravity Main
SML1384R22	SMH1384R22	SMH1384R10	24	290	10,116	1.0%	Gravity Main
SML1384R23	SMH1384R23	SMH1384R03	8	155	602	1.2%	Gravity Main
SML1384R24	SMH1384R24	SMH1384R23	8	251	1,248	5.3%	Gravity Main
SML1384R25	SMH1384R25	SMH1384R26	8	113	487	0.8%	Gravity Main
SML1384R26	SMH1384R27	SMH1384R27	8	197	941	3.0%	Gravity Main
SML1384R27	SMH1384R27	SMH1384R28	8	93	990	3.3%	Gravity Main
SML1384R28	SMH1384R28	SMH1384R22	8	51	1,388	6.5%	Gravity Main
SML1384R29	SMH1384R29	SMH1885N09	30	132	--	--	Gravity Main
SML1384R30	SMH1384R30	SMH1384R29	30	64	--	--	Gravity Main
SML1384S01	SMH1384S01	SMH1384S26	8	156	1,743	10.3%	Gravity Main
SML1384S02	SMH1384S02	SMH1384S03	8	113	1,268	5.4%	Gravity Main
SML1384S03	SMH1384S03	SMH1384S01	8	154	399	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1384S04	SMH1384S04	SMH1384S06	12	198	5,094	10.1%	Gravity Main
SML1384S05	SMH1384S05	SMH1384Z05	8	224	707	1.7%	Gravity Main
SML1384S06	SMH1384S06	SMH1384S08	12	394	1,128	0.5%	Gravity Main
SML1384S07	SMH1384S07	SMH1384S09	8	74	516	0.9%	Gravity Main
SML1384S08	SMH1384S08	SMH1384S11	12	45	1,097	0.5%	Gravity Main
SML1384S09	SMH1384S09	SMH1384S10	8	171	486	0.8%	Gravity Main
SML1384S10	SMH1384S10	SMH1384S15	8	108	537	1.0%	Gravity Main
SML1384S11	SMH1384S11	SMH1384S19	12	376	1,381	0.7%	Gravity Main
SML1384S12	SMH1384S12	SMH1384S14	8	47	833	2.3%	Gravity Main
SML1384S13	SMH1384S13	SMH1384S14	8	117	540	1.0%	Gravity Main
SML1384S14	SMH1384S14	SMH1384S16	8	144	541	1.0%	Gravity Main
SML1384S15	SMH1384S15	SMH1384S18	8	242	469	0.7%	Gravity Main
SML1384S16	SMH1384S16	SMH1384R09	8	275	397	0.5%	Gravity Main
SML1384S17	SMH1384S17	SMH1384S16	8	61	550	1.0%	Gravity Main
SML1384S18	SMH1384S18	SMH1384S20	8	69	534	1.0%	Gravity Main
SML1384S19	SMH1384S19	SMH1384S23	24	307	3,018	0.1%	Gravity Main
SML1384S20	SMH1384S20	SMH1384Z15	24	186	12,738	1.6%	Gravity Main
SML1384S20	SMH1384S20	SMH1384Z15	24	302	9,990	1.0%	Gravity Main
SML1384S21	SMH1384S21	SMH1384S11	8	118	606	1.2%	Gravity Main
SML1384S22	SMH1384S22	SMH1384S21	8	238	542	1.0%	Gravity Main
SML1384S23	SMH1384S23	SMH1384S20	24	179	5,888	0.3%	Gravity Main
SML1384S24	SMH1384S24	SMH1384S23	8	198	640	1.4%	Gravity Main
SML1384S25	SMH1384S25	SMH1384S24	8	83	972	3.2%	Gravity Main
SML1384S26	SMH1384S26	SMH1384S05	8	104	169	0.1%	Gravity Main
SML1384S27	SMH1384S27	SMH1384S26	8	222	1,373	6.4%	Gravity Main
SML1384S28	SMH1384S28	SMH1384S01	8	188	455	0.7%	Gravity Main
SML1384T01	SMH1384T01	SMH1384T04	8	304	517	0.9%	Gravity Main
SML1384T02	SMH1384T02	SMH1384Q01	8	399	544	1.0%	Gravity Main
SML1384T03	SMH1384T03	SMH1384T05	8	358	904	2.8%	Gravity Main
SML1384T04	SMH1384T04	SMH1384Q02	8	303	473	0.8%	Gravity Main
SML1384T05	SMH1384T05	SMH1384T08	8	366	993	3.3%	Gravity Main
SML1384T06	SMH1384T06	SMH1384T12	8	123	907	2.8%	Gravity Main
SML1384T07	SMH1384T07	SMH1384T10	8	372	546	1.0%	Gravity Main
SML1384T08	SMH1384T08	SMH1384Y05	8	417	518	0.9%	Gravity Main
SML1384T09	SMH1384T09	SMH1384T08	8	255	454	0.7%	Gravity Main
SML1384T10	SMH1384T10	SMH1384S28	8	214	673	1.5%	Gravity Main
SML1384T11	SMH1384T11	SMH1384R01	8	454	966	3.2%	Gravity Main
SML1384T12	SMH1384T12	SMH1384T07	8	174	1,164	4.6%	Gravity Main
SML1384T13	SMH1384T13	SMH1384T12	8	172	1,412	6.7%	Gravity Main
SML1384T15	SMH1384T15	SMH1384S28	8	182	1,083	4.0%	Gravity Main
SML1384U01	SMH1384U01	SMH1384U07	8	207	363	0.4%	Gravity Main
SML1384U02	SMH1384U02	SMH1384X13	8	322	543	1.0%	Gravity Main
SML1384U03	SMH1384U03	SMH1384U04	8	391	730	1.8%	Gravity Main
SML1384U04	SMH1384U04	SMH1384T02	8	392	592	1.2%	Gravity Main
SML1384U05	SMH1384U05	SMH1384T01	8	295	514	0.9%	Gravity Main
SML1384U06	SMH1384U06	SMH1384U03	8	80	251	0.2%	Gravity Main
SML1384U07	SMH1384U07	SMH1384U04	8	100	611	1.3%	Gravity Main
SML1384U08	SMH1384U08	SMH1384U07	8	57	1,116	4.2%	Gravity Main
SML1384U09	SMH1384U09	SMH1384U08	8	297	540	1.0%	Gravity Main
SML1384U10	SMH1384U10	SMH1384P01	8	326	369	0.5%	Gravity Main
SML1384U11	SMH1384U11	SMH1384U10	8	157	380	0.5%	Gravity Main
SML1384U12	<Null>	SMH1384U11	8	41	--	--	Gravity Main
SML1384V01	SMH1384V01	MWD	8	180	609	1.3%	Gravity Main
SML1384V02	SMH1384V02	MWD	--	172	--	--	Gravity Main
SML1384W03	SMH1384W03	SMH1384X01	8	235	384	0.5%	Gravity Main
SML1384X01	SMH1384X01	SMH1384X02	8	43	404	0.6%	Gravity Main
SML1384X02	SMH1384X02	SMH1384X03	8	255	482	0.8%	Gravity Main
SML1384X03	SMH1384X03	SMH1384X04	8	250	487	0.8%	Gravity Main
SML1384X04	SMH1384X04	SMH1384X05	8	96	544	1.0%	Gravity Main
SML1384X05	SMH1384X05	SMH1384X08	8	194	487	0.8%	Gravity Main
SML1384X06	SMH1384X06	SMH1384X07	8	65	546	1.0%	Gravity Main
SML1384X07	SMH1384X07	SMH1384X14	8	289	563	1.1%	Gravity Main
SML1384X08	SMH1384X08	SMH1384X11	8	122	557	1.1%	Gravity Main
SML1384X09	SMH1384X09	SMH1384X06	8	398	545	1.0%	Gravity Main
SML1384X10	SMH1384X10	SMH1384X07	8	309	553	1.0%	Gravity Main
SML1384X11	SMH1384X11	SMH1384X09	8	93	505	0.9%	Gravity Main
SML1384X12	SMH1384X12	SMH1384X11	8	304	543	1.0%	Gravity Main
SML1384X13	SMH1384X13	SMH1384X10	8	318	545	1.0%	Gravity Main
SML1384X14	SMH1384X14	SMH1384X17	8	327	528	0.9%	Gravity Main
SML1384X15	SMH1384X15	SMH1384U05	8	414	672	1.5%	Gravity Main
SML1384X16	SMH1384X16	SMH1384X17	8	470	544	1.0%	Gravity Main
SML1384X17	SMH1384X17	SMH1384Y01	8	255	542	1.0%	Gravity Main
SML1384X18	PRIV CLEANOUT MH	PRIV MH	8	43	--	--	Gravity Main
SML1384Y01	SMH1384Y01	SMH1384Y03	8	393	850	2.4%	Gravity Main
SML1384Y02	SMH1384Y02	SMH1384Y04	8	77	628	1.3%	Gravity Main
SML1384Y03	SMH1384Y03	SMH1384Y07	8	127	452	0.7%	Gravity Main
SML1384Y04	SMH1384Y04	SMH1384T08	8	342	485	0.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1384Y05	SMH1384Y05	SMH1384Z02	8	419	517	0.9%	Gravity Main
SML1384Y06	SMH1384Y06	SMH1384Y07	8	241	1,066	3.8%	Gravity Main
SML1384Y07	SMH1384Y07	SMH1384Y02	8	221	498	0.8%	Gravity Main
SML1384Y08	SMH1384Y08	SMH1384Y04	8	40	2,403	19.5%	Gravity Main
SML1384Y09	SMH1384Y09	SMH1384Y08	8	350	870	2.6%	Gravity Main
SML1384Y10	SMH1384Y10	SMH1384Y04	8	52	--	--	Gravity Main
SML1384Z01	SMH1384Z01	SMH1384Z02	8	250	955	3.1%	Gravity Main
SML1384Z01	SMH1384Z01	SMH1384Z18	8	15	3,896	51.3%	Gravity Main
SML1384Z02	SMH1384Z02	SMH1384Z03	8	33	1,902	12.2%	Gravity Main
SML1384Z03	SMH1384Z03	SMH1384Z04	8	244	772	2.0%	Gravity Main
SML1384Z04	SMH1384Z04	SMH1384Z05	8	212	1,022	3.5%	Gravity Main
SML1384Z05	SMH1384Z05	SMH1384Z06	8	241	1,198	4.8%	Gravity Main
SML1384Z06	SMH1384Z06	SMH1384Z09	8	357	576	1.1%	Gravity Main
SML1384Z07	SMH1384Z07	SMH1384Z08	8	261	538	1.0%	Gravity Main
SML1384Z08	SMH1384Z08	SMH1384Z06	8	111	613	1.3%	Gravity Main
SML1384Z09	SMH1384Z09	SMH1384Z11	8	45	--	--	Gravity Main
SML1384Z10	SMH1384Z10	SMH1384Z08	8	100	527	0.9%	Gravity Main
SML1384Z11	SMH1384Z11	SMH1384Z14	12	285	1,803	1.3%	Gravity Main
SML1384Z12	SMH1384Z12	SMH1384Z11	8	101	1,623	8.9%	Gravity Main
SML1384Z13	SMH1384Z13	SMH1384S15	8	200	493	0.8%	Gravity Main
SML1384Z14	SMH1384Z14	SMH1384Z15	36	329	9,214	0.1%	Gravity Main
SML1384Z15	SMH1384Z15	SMH1885W03	36	440	9,495	0.1%	Gravity Main
SML1384Z16	SMH1384Z16	SMH1384Z09	6	35	1,570	38.7%	Gravity Main
SML1384Z17	SMH1384Z17	SMH1384Z01	8	89	--	--	Gravity Main
SML1484A01	SMH1484A01	SMH1484B08	8	168	1,197	4.8%	Gravity Main
SML1484A02	SMH1484A02	SMH1484A30	8	226	1,236	5.2%	Gravity Main
SML1484A03	SMH1484A03	SMH1484A04	18	219	2,651	0.3%	Gravity Main
SML1484A04	SMH1484A04	SMH1484A05	18	416	2,631	0.3%	Gravity Main
SML1484A05	SMH1484A05	SMH1484A06	18	157	1,195	0.1%	Gravity Main
SML1484A06	SMH1484A06	SMH1384D01	18	221	636	0.0%	Gravity Main
SML1484A07	SMH1484A07	SMH1484A09	8	112	364	0.4%	Gravity Main
SML1484A08	SMH1484A08	SMH1484A07	8	120	424	0.6%	Gravity Main
SML1484A09	SMH1484A09	SMH1484A04	8	28	1,900	12.2%	Gravity Main
SML1484A10	SMH1484A10	SMH1484A01	8	74	385	0.5%	Gravity Main
SML1484A11	SMH1484A11	SMH1484A10	8	170	472	0.8%	Gravity Main
SML1484A12	SMH1484A12	SMH1484A11	8	181	1,528	7.9%	Gravity Main
SML1484A13	SMH1484A13	SMH1484A11	8	172	359	0.4%	Gravity Main
SML1484A14	SMH1484A14	SMH1484A13	8	321	331	0.4%	Gravity Main
SML1484A15	SMH1484A15	SMH1484A14	8	82	307	0.3%	Gravity Main
SML1484A16	SMH1484A16	SMH1484A15	8	93	1,464	7.2%	Gravity Main
SML1484A17	SMH1484A17	SMH1484A16	8	152	348	0.4%	Gravity Main
SML1484A18	SMH1484A18	SMH1484A17	8	147	389	0.5%	Gravity Main
SML1484A19	SMH1484A19	SMH1484A18	8	172	724	1.8%	Gravity Main
SML1484A20	SMH1484A20	SMH1484A19	8	214	935	3.0%	Gravity Main
SML1484A21	SMH1484A21	SMH1484A17	8	38	1,371	6.4%	Gravity Main
SML1484A22	SMH1484A22	SMH1484A21	8	70	614	1.3%	Gravity Main
SML1484A23	SMH1484A23	SMH1484A22	8	156	1,357	6.2%	Gravity Main
SML1484A24	SMH1484A24	SMH1484A22	8	146	446	0.7%	Gravity Main
SML1484A25	SMH1484A25	SMH1484A13	8	148	1,505	7.7%	Gravity Main
SML1484A26	SMH1484A26	SMH1484A25	8	124	391	0.5%	Gravity Main
SML1484A27	SMH1484A27	SMH1484A26	8	46	585	1.2%	Gravity Main
SML1484A28	SMH1484A28	SMH1484A27	8	129	909	2.8%	Gravity Main
SML1484A29	SMH1484A29	SMH1484A28	8	152	409	0.6%	Gravity Main
SML1484A30	SMH1484A30	SMH1484A01	8	79	1,114	4.2%	Gravity Main
SML1484B01	SMH1484B01	SMH1484C07	10	354	466	0.2%	Gravity Main
SML1484B02	SMH1484B02	SMH1484B01	10	388	456	0.2%	Gravity Main
SML1484B03	SMH1484B03	SMH1484B02	8	135	702	1.7%	Gravity Main
SML1484B04	SMH1484B04	SMH1484B03	8	60	707	1.7%	Gravity Main
SML1484B05	SMH1484B05	SMH1484B04	8	215	252	0.2%	Gravity Main
SML1484B06	SMH1484B06	SMH1484B05	8	189	250	0.2%	Gravity Main
SML1484B07	SMH1484B07	SMH1484B02	10	371	826	0.7%	Gravity Main
SML1484B08	SMH1484B08	SMH1484B07	8	254	1,082	4.0%	Gravity Main
SML1484B09	SMH1484B09	SMH1484B10	8	235	401	0.5%	Gravity Main
SML1484B10	SMH1484B10	SMH1484B01	8	54	940	3.0%	Gravity Main
SML1484B11	SMH1484B11	SMH1484B09	8	79	274	0.3%	Gravity Main
SML1484B12	SMH1484B12	SMH1484B08	8	72	729	1.8%	Gravity Main
SML1484B13	SMH1484B13	SMH1484B14	8	131	--	0.0%	Gravity Main
SML1484B14	SMH1484B14	SMH1484B09	8	168	--	--	Gravity Main
SML1484C01	SMH1484C01	SMH1484C02	8	266	906	2.8%	Gravity Main
SML1484C02	SMH1484C02	SMH1484C03	8	185	923	2.9%	Gravity Main
SML1484C03	SMH1484C03	SMH1484C11	8	165	1,113	4.2%	Gravity Main
SML1484C04	SMH1484C04	SMH1484C08	10	31	1,289	1.7%	Gravity Main
SML1484C05	SMH1484C05	SMH1484C04	10	263	904	0.8%	Gravity Main
SML1484C06	SMH1484C06	SMH1484C05	10	283	881	0.8%	Gravity Main
SML1484C07	SMH1484C07	SMH1484C06	10	331	1,774	3.2%	Gravity Main
SML1484C08	SMH1484C08	SMH1484C09	10	23	--	0.0%	Gravity Main
SML1484C09	SMH1484C09	SMH1484A03	6	2764	--	--	Force Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1484C10	SMH1484C10	SMH1484C06	10	203	716	0.5%	Gravity Main
SML1484C11	SMH1484C11	SMH1484C04	8	47	--	--	Gravity Main
SML1484D01	SMH1484D01	SMH1484D02	8	410	259	0.2%	Gravity Main
SML1484D02	SMH1484D02	SMH1484D05	8	197	373	0.5%	Gravity Main
SML1484D03	SMH1484D03	SMH1484C01	8	284	368	0.5%	Gravity Main
SML1484D04	SMH1484D04	SMH1484D01	4	305	--	--	Force Main
SML1484D05	SMH1484D05	SMH1484D03	8	48	284	0.3%	Gravity Main
SML1484E01	SMH1484E01	SMH1584A01	8	76	1,913	12.4%	Gravity Main
SML1484E02	SMH1484E02	SMH1484E01	8	269	504	0.9%	Gravity Main
SML1484E03	SMH1484E03	SMH1484E02	8	217	603	1.2%	Gravity Main
SML1484E04	SMH1484E04	SMH1484E03	8	26	356	0.4%	Gravity Main
SML1484E05	SMH1484E05	SMH1484E04	8	96	346	0.4%	Gravity Main
SML1484E06	SMH1484E06	SMH1484E05	8	264	--	--	Gravity Main
SML1484F01	SMH1484F01	SMH1484F05	8	251	472	0.8%	Gravity Main
SML1484F02	SMH1484F02	SMH1484F01	8	260	458	0.7%	Gravity Main
SML1484F03	SMH1484F03	SMH1484F02	8	109	1,058	3.8%	Gravity Main
SML1484F04	SMH1484F04	SMH1484C03	8	161	772	2.0%	Gravity Main
SML1484F05	SMH1484F05	SMH1484F04	8	28	206	0.1%	Gravity Main
SML1484K01	SMH1484K01	SMH1484Q23	8	246	--	--	Gravity Main
SML1484L01	SMH1484L01	SMH1484F03	4	1377	--	--	Force Main
SML1484P01	SMH1484P01	SMH1484L01	8	271	458	0.7%	Gravity Main
SML1484P02	SMH1484P02	SMH1484P01	8	396	629	1.3%	Gravity Main
SML1484Q01	SMH1484Q01	SMH1484Q02	8	282	504	0.9%	Gravity Main
SML1484Q02	SMH1484Q02	SMH1484T01	8	213	363	0.4%	Gravity Main
SML1484Q03	SMH1484Q03	SMH1484Q05	8	240	1,189	4.8%	Gravity Main
SML1484Q04	SMH1484Q04	SMH1484Q05	8	93	1,226	5.1%	Gravity Main
SML1484Q05	SMH1484Q05	SMH1484Q02	8	123	475	0.8%	Gravity Main
SML1484Q06	SMH1484Q06	SMH1484Q08	8	91	620	1.3%	Gravity Main
SML1484Q07	SMH1484Q07	SMH1484Q08	8	250	775	2.0%	Gravity Main
SML1484Q08	SMH1484Q08	SMH1484Q09	8	96	--	--	Gravity Main
SML1484Q21	SMH1484Q21	SMH1484T04	8	62	1,092	4.0%	Gravity Main
SML1484Q22	SMH1484Q22	SMH1484Q21	8	96	--	--	Gravity Main
SML1484Q23	SMH1484Q23	SMH1484Q22	8	287	--	--	Gravity Main
SML1484Q24	SMH1484Q24	SMH1484T04	8	196	--	--	Gravity Main
SML1484R01	SMH1484R01	SMH1484S01	8	206	560	1.1%	Gravity Main
SML1484R02	SMH1484R02	SMH1484R01	8	396	1,004	3.4%	Gravity Main
SML1484R03	SMH1484R03	SMH1484S11	8	369	741	1.9%	Gravity Main
SML1484S01	SMH1484S01	SMH1484S02	8	200	535	1.0%	Gravity Main
SML1484S02	SMH1484S02	SMH1484S03	8	196	515	0.9%	Gravity Main
SML1484S03	SMH1484S03	SMH1484S04	8	201	1,070	3.9%	Gravity Main
SML1484S04	SMH1484S04	SMH1484S05	8	204	421	0.6%	Gravity Main
SML1484S05	SMH1484S05	SMH1484Z03	8	310	498	0.8%	Gravity Main
SML1484S06	SMH1484S06	SMH1484S05	8	207	567	1.1%	Gravity Main
SML1484S07	SMH1484S07	SMH1484S01	8	312	855	2.5%	Gravity Main
SML1484S08	SMH1484S08	SMH1484S02	8	288	846	2.4%	Gravity Main
SML1484S09	SMH1484S09	SMH1484S03	8	267	769	2.0%	Gravity Main
SML1484S10	SMH1484S10	SMH1484S04	8	254	1,032	3.6%	Gravity Main
SML1484S11	SMH1484S11	SMH1484S12	8	403	554	1.0%	Gravity Main
SML1484S12	SMH1484S12	SMH1484S13	8	175	974	3.2%	Gravity Main
SML1484S13	SMH1484S13	SMH1484S06	8	199	1,033	3.6%	Gravity Main
SML1484T01	SMH1484T01	SMH1484T02	8	120	394	0.5%	Gravity Main
SML1484T02	SMH1484T02	SMH1484T03	8	153	380	0.5%	Gravity Main
SML1484T03	SMH1484T03	MWD	8	104	462	0.7%	Gravity Main
SML1484T04	SMH1484T04	SMH1484Q01	8	98	476	0.8%	Gravity Main
SML1484T08	SMH1484T08	SMH1484T09	8	224	557	1.1%	Gravity Main
SML1484T09	SMH1484T09	SMH1484T03	8	26	1,010	3.5%	Gravity Main
SML1484U01	SMH1484U01	SMH1484P02	8	391	550	1.0%	Gravity Main
SML1484U02	SMH1484U02	SMH1484U03	8	77	501	0.8%	Gravity Main
SML1484U03	SMH1484U03	SMH1484U04	8	74	548	1.0%	Gravity Main
SML1484U04	SMH1484U04	SMH1484U05	8	188	669	1.5%	Gravity Main
SML1484U05	SMH1484U05	SMH1484U06	8	284	408	0.6%	Gravity Main
SML1484U06	SMH1484U06	SMH1484U07	8	111	327	0.4%	Gravity Main
SML1484U07	SMH1484U07	SMH1484U01	8	40	321	0.3%	Gravity Main
SML1484U08	<Null>	SMH1484U02	8	51	994	3.3%	Gravity Main
SML1484Z01	SMH1484Z01	SMH MWD	8	47	618	1.3%	Gravity Main
SML1484Z03	SMH1484Z03	SMH1484Z04	8	374	516	0.9%	Gravity Main
SML1484Z04	SMH1484Z04	SMH1484Z01	8	147	423	0.6%	Gravity Main
SML1484Z05	SMH1484Z05	SMH1484Z03	8	45	654	1.4%	Gravity Main
SML1484Z06	SMH1484Z06	SMH1484Z05	8	292	984	3.3%	Gravity Main
SML1484Z07	SMH1484Z07	SMH1484Z04	8	385	1,169	4.6%	Gravity Main
SML1484Z09	SMH1484Z09	SMH1484Z10	8	256	551	1.0%	Gravity Main
SML1484Z10	SMH1484Z10	SMH1484Z07	8	63	682	1.6%	Gravity Main
SML1484Z11	SMH1484Z11	SMH1484Z12	8	192	192	0.1%	Gravity Main
SML1484Z12	SMH1484Z12	SMH1484Z14	8	314	452	0.7%	Gravity Main
SML1484Z13	SMH1484Z13	SMH1484Z14	8	150	628	1.3%	Gravity Main
SML1484Z14	SMH1484Z14	SMH1484Z15	8	400	374	0.5%	Gravity Main
SML1484Z15	SMH1484Z15	SMH1484Z16	8	350	320	0.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1484Z16	SMH1484Z16	SMHMWD	8	61	671	1.5%	Gravity Main
SML1484Z17	SMH1484Z17	SMH1484Z16	8	277	328	0.4%	Gravity Main
SML1484Z18	SMH1484Z18	SMH1484Z17	8	286	388	0.5%	Gravity Main
SML1484Z19	SMH1484Z19	SMH1484Z18	8	214	379	0.5%	Gravity Main
SML1484Z20	SMH1484Z20	SMH1484Z19	8	195	419	0.6%	Gravity Main
SML1484Z21	SMH1484Z21	SMH1484S13	8	278	550	1.0%	Gravity Main
SML1584A01	SMH1584A01	SMH1484D04	8	22	--	0.0%	Gravity Main
SML1685J01	SMH1685J01	SMH1785J02	36	294	65,078	4.7%	Gravity Main
SML1685N01	SMH1685N01	SMH1685J01	36	296	35,039	1.4%	Gravity Main
SML1685V01	SMH1685V01	SMH1785R01	36	380	27,443	0.8%	Gravity Main
SML1695C02	SML1695C02	SMH1695E01	48	390	--	0.0%	Gravity Main
SML1695C02	SMH1695C02	SML1695C02	48	70	--	0.0%	Gravity Main
SML1695C02	SML1695C02	SML1695C02	48	285	--	0.0%	Gravity Main
SML1695C04	SMH1695C04	SMH1695C02	48	56	--	0.0%	Gravity Main
SML1695E01	SMH1695E01	SMH1695M01	48	19	224,414	12.1%	Gravity Main
SML1695M01	SMH1695M01	D/L	48	233	58,863	0.8%	Gravity Main
SML1695P01	SMH1695V02	SMH1695P03	4	1112	--	--	Force Main
SML1695P02	SMH1695P02	SMH1695P04	8	150	806	2.2%	Gravity Main
SML1695P03	SMH1695P03	SMH1695P02	8	235	390	0.5%	Gravity Main
SML1695P04	SMH1695P04	SMH1695P01	8	29	--	--	Gravity Main
SML1695P05	SMH1695P05	SMH1695P04	8	15	--	--	Gravity Main
SML1695V01	SMH1695V01	SMH1695W02	24	40	17,964	3.1%	Gravity Main
SML1695V02	SMH1695V02	SMH1695W17	8	379	556	1.0%	Gravity Main
SML1695W02	SMH1695W02	SMH1695W08	24	23	72,991	51.4%	Gravity Main
SML1695W04	SMH1695W04	SMH1695W03	6	38	219	0.8%	Gravity Main
SML1695W05	SMH1695W05	SMH1695W06	60	126	124,367	1.1%	Gravity Main
SML1695W11	SMH1695W11	SMH1695W12	30	220	9,869	0.3%	Gravity Main
SML1695W12	SMH1695W12	SMH1695W13	30	69	24,112	1.7%	Gravity Main
SML1695W13	SMH1695W13	SMH1695W06	30	29	6,840	0.1%	Gravity Main
SML1695W14	SMH1695W14	NONE	42	700	--	0.0%	Gravity Main
SML1695W15	SMH1695W15	NONE	24	696	--	0.0%	Gravity Main
SML1695W16	SMH1695W16	SMH1695W18	54	624	--	0.0%	Gravity Main
SML1695W17	SMH1695W17	SMH1695W07	8	49	2,752	25.6%	Gravity Main
SML1695W18	SMH1695W18	SMH1695W07	54	58	--	0.0%	Gravity Main
SML1695W19	SMH1695W19	SMH1695W04	8	178	1,017	3.5%	Gravity Main
SML1695W20	SMH1695W20	SMH1695W16	54	98	326,086	13.6%	Gravity Main
SML1695W20	SMH1695W20	SMH1695W16	54	100	322,839	13.3%	Gravity Main
SML1695W20	SMH1695W20	SMH1695W16	54	164	251,390	8.1%	Gravity Main
SML1695W22	SMH1695W22	SMH1695W05	60	14	--	--	Gravity Main
SML1695W3B	SMH1695W03	SMH1695W02	24	14	38,363	14.2%	Gravity Main
SML1695W6B	SMH1695W06	SMH1695W20	54	61	202,723	5.2%	Gravity Main
SML1695W6C	SMH1695W06	SMH1695W15	24	88	--	--	Gravity Main
SML1695W6C	SMH1695W06	SMH1695W15	24	102	--	--	Gravity Main
SML1695W6C	SMH1695W06	SMH1695W15	24	216	--	--	Gravity Main
SML1695W6D	SMH1695W06	SMH1695W14	42	89	86,015	3.6%	Gravity Main
SML1695W6D	SMH1695W06	SMH1695W14	42	99	81,641	3.3%	Gravity Main
SML1695W6D	SMH1695W06	SMH1695W14	42	215	55,407	1.5%	Gravity Main
SML1695W7A	SMH1695W07	LAGOON	24	2229	--	--	Gravity Main
SML1695W7B	SMH1695W07	LAGOON	24	2232	--	--	Gravity Main
SML1695W7C	SMH1695W07	SMH1695X01	54	813	--	0.0%	Gravity Main
SML1695W8A	<Null>	SMH1695W08	8	76	--	--	Force Main
SML1695W8B	<Null>	SMH1695W08	8	78	--	--	Force Main
SML1695X01	SMH1695X01	HEADWORKS	54	350	50,031	0.3%	Gravity Main
SML1695X02	SMH1695X02	SMH1695X03	8	325	338	0.4%	Gravity Main
SML1695X03	SMH1695X03	D/L	6	171	161	0.4%	Gravity Main
SML1695X04	SMH1695X04	SMH1695X03	8	75	--	0.0%	Gravity Main
SML1785A01	SMH1785A01	SMH1785A02	36	178	16,058	0.3%	Gravity Main
SML1785A02	SMH1785A02	SMH1785A03	36	129	16,261	0.3%	Gravity Main
SML1785A03	SMH1785A03	SMH1785A04	36	271	78,799	6.9%	Gravity Main
SML1785A04	SMH1785A04	SMH1785A05	36	203	71,166	5.6%	Gravity Main
SML1785A05	SMH1785A05	SMH1785A10	36	123	44,559	2.2%	Gravity Main
SML1785A06	SMH1785A06	SMH1785A07	8	219	2,177	16.0%	Gravity Main
SML1785A07	SMH1785A07	SMH1785A08	8	222	472	0.8%	Gravity Main
SML1785A08	SMH1785A08	SMH1785A09	8	60	456	0.7%	Gravity Main
SML1785A09	SMH1785A09	SML1785A10	10	10	1,816	3.4%	Gravity Main
SML1785A10	SML1785A10	SMH0585G19	30	177	--	--	Force Main
SML1785A10	SMH1785A10	SML1785A10	30	12	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	68	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	80	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	97	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	101	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	101	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	158	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	161	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	162	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	203	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	298	--	--	Force Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1785A10	SML1785A10	SML1785A10	30	462	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	875	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	897	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	1499	--	--	Force Main
SML1785A10	SML1785A10	SML1785A10	30	4282	--	--	Force Main
SML1785D01	SMH1785D01	SMH0885W01	8	224	539	1.0%	Gravity Main
SML1785H01	SMH1785H01	SMH1785H02	36	135	15,486	0.3%	Gravity Main
SML1785H02	SMH1785H02	SMH1785H03	36	155	16,000	0.3%	Gravity Main
SML1785H03	SMH1785H03	SMH1785H04	36	493	16,270	0.3%	Gravity Main
SML1785H04	SMH1785H04	SMH1785A01	36	129	16,907	0.3%	Gravity Main
SML1785J02	SMH1785J02	SMH1785J03	36	266	70,131	5.5%	Gravity Main
SML1785J03	SMH1785J03	SMH1785J04	36	135	94,471	9.9%	Gravity Main
SML1785J04	SMH1785J04	SMH1785H01	36	263	34,292	1.3%	Gravity Main
SML1785J05	SMH1785J05	SMH1785R03	8	75	--	--	Gravity Main
SML1785N01	SMH1785N01	SMH1785N03	24	65	14,436	2.0%	Gravity Main
SML1785N02	SMH1785N02	SMH1785N01	24	219	21,600	4.5%	Gravity Main
SML1785N03	SMH1785N03	SMH1785N05	8	129	9,997	338.0%	Gravity Main
SML1785N04	SMH1785N04	SMH1785N06	6	1970	--	--	Force Main
SML1785N05	SMH1785N05	SMH1785N10	8	30	1,161	4.6%	Gravity Main
SML1785N06	SMH1785N06	SMH1785N05	8	50	--	0.0%	Gravity Main
SML1785N07	SMH1785N07	SMH1785N06	8	212	462	0.7%	Gravity Main
SML1785N08	SMH1785N08	SMH1785N05	8	329	1,511	7.7%	Gravity Main
SML1785N09	SMH1785N09	SMH1785N08	8	36	--	--	Gravity Main
SML1785N10	SMH1785N10	SMH1785N04	8	24	--	0.0%	Gravity Main
SML1785P01	SMH1785P01	SMH SLWD	8	179	--	--	Gravity Main
SML1785Q01	SMH1785Q01	SMH1785R08	8	346	--	--	Gravity Main
SML1785Q02	SMH1785Q02	SMH1785S44	8	207	--	--	Gravity Main
SML1785R01	SMH1785R01	SMH1785R02	36	518	45,467	2.3%	Gravity Main
SML1785R02	SMH1785R02	SMH1685N01	36	204	35,564	1.4%	Gravity Main
SML1785R03	SMH1785R03	SMH1785R04	8	170	537	1.0%	Gravity Main
SML1785R04	SMH1785R04	SMH1785R05	8	199	780	2.1%	Gravity Main
SML1785R05	SMH1785R05	SMH1785R06	8	208	1,716	10.0%	Gravity Main
SML1785R06	SMH1785R06	SMH1685N01	8	252	1,513	7.7%	Gravity Main
SML1785R07	SMH1785R07	SMH1785R06	8	149	813	2.2%	Gravity Main
SML1785R08	<Null>	SMH1785S44	8	10	--	--	Gravity Main
SML1785R08	SMH1785R08	SMH1785S44	8	286	--	--	Gravity Main
SML1785S01	SMH1785S01	SMH1785S02	36	507	14,112	0.2%	Gravity Main
SML1785S02	SMH1785S02	SMH1685V01	36	119	27,871	0.9%	Gravity Main
SML1785S26	SMH1785S26	SMH1785S27	8	103	656	1.5%	Gravity Main
SML1785S27	SMH1785S27	SMH1785S28	8	166	532	1.0%	Gravity Main
SML1785S28	SMH1785S28	SMH1785S29	8	112	1,189	4.8%	Gravity Main
SML1785S29	SMH1785S29	SMH1785S30	8	117	773	2.0%	Gravity Main
SML1785S30	SMH1785S30	SMH1785S31	8	146	956	3.1%	Gravity Main
SML1785S31	SMH1785S31	SMH1785S32	8	138	520	0.9%	Gravity Main
SML1785S32	SMH1785S32	SMH1785S33	8	152	552	1.0%	Gravity Main
SML1785S33	SMH1785S33	SMH1785S01	8	24	667	1.5%	Gravity Main
SML1785S34	SMH1785S34	SMH1785S29	8	174	461	0.7%	Gravity Main
SML1785S36	SMH1785S36	SMH1785S31	8	390	1,207	4.9%	Gravity Main
SML1785S37	SMH1785S37	SMH1785S36	8	88	1,628	9.0%	Gravity Main
SML1785S38	SMH1785S38	SMH1785S39	8	177	754	1.9%	Gravity Main
SML1785S39	SMH1785S39	SMH1785S40	8	129	1,544	8.1%	Gravity Main
SML1785S40	SMH1785S40	SMH1785S41	8	119	952	3.1%	Gravity Main
SML1785S41	SMH1785S41	SMH1785S42	8	267	883	2.6%	Gravity Main
SML1785S42	SMH1785S42	SMH1785S32	8	173	677	1.5%	Gravity Main
SML1785S43	SMH1785S43	SMH1785S38	8	188	653	1.4%	Gravity Main
SML1785S44	SMH1785S44	SMH1785S38	8	179	--	--	Gravity Main
SML1785T02	SMH1785T02	SMH1785T03	8	191	683	1.6%	Gravity Main
SML1785T03	SMH1785T03	SMH1785T04	8	148	440	0.7%	Gravity Main
SML1785T04	SMH1785T04	SMH1785S26	8	332	600	1.2%	Gravity Main
SML1785T05	SMH1785T05	SMH1785S43	8	275	826	2.3%	Gravity Main
SML1785T06	SMH1785T06	SMH1785S38	8	306	--	--	Gravity Main
SML1785T07	SMH1785T07	SMH1785T06	8	109	--	--	Gravity Main
SML1785U01	SMH1785U01	SMH1785T01	8	150	1,030	3.6%	Gravity Main
SML1785U02	SMH1785U02	SMH1785U01	8	251	929	2.9%	Gravity Main
SML1785U03	SMH1785U03	SMH1785U02	8	171	530	0.9%	Gravity Main
SML1785U04	SMH1785U04	SMH1785U03	8	105	1,049	3.7%	Gravity Main
SML1785U05	SMH1785U05	SMH1785U04	8	13	--	--	Gravity Main
SML1785V01	SMH1785V01	SMH1785N02	24	209	20,164	3.9%	Gravity Main
SML1785V02	SMH1785V02	SMH1785V01	24	232	17,111	2.8%	Gravity Main
SML1785V03	SMH1785V03	SMH1785V02	24	356	11,945	1.4%	Gravity Main
SML1785V04	SMH1785V04	SMH1785N09	8	326	1,123	4.3%	Gravity Main
SML1785V05	SMH1785V05	SMH1785V06	8	266	676	1.5%	Gravity Main
SML1785V06	SMH1785V06	SMH1785W03	8	400	372	0.5%	Gravity Main
SML1785W01	SMH1785W01	SMH1785V06	8	349	610	1.3%	Gravity Main
SML1785W02	SMH1785W02	SMH1785W01	8	93	1,061	3.8%	Gravity Main
SML1785W03	SMH1785W03	SMH1785W09	8	28	--	--	Gravity Main
SML1785W04	SMH1785W04	SMH1785W03	8	87	379	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1785W05	SMH1785W05	SMH1785W04	8	178	351	0.4%	Gravity Main
SML1785W06	SMH1785W06	SMH1785W05	8	53	569	1.1%	Gravity Main
SML1785W07	SMH1785W07	SMH1785W06	8	123	466	0.7%	Gravity Main
SML1785W08	SMH1785W08	SMH1785W05	8	104	1,202	4.9%	Gravity Main
SML1785W09	SMH1785W09	SMH1885Z06	8	330	187	0.1%	Gravity Main
SML1785W0A	SMH1785W17	SMH1785X01	10	199	1,179	1.4%	Gravity Main
SML1785W10	SMH1785W10	SMH1785W07	8	182	1,131	4.3%	Gravity Main
SML1785W11	SMH1785W11	SMH1785W10	8	227	401	0.5%	Gravity Main
SML1785W12	SMH1785W12	SMH1785W11	8	55	491	0.8%	Gravity Main
SML1785W13	SMH1785W13	SMH1785W10	8	181	693	1.6%	Gravity Main
SML1785W14	SMH1785W14	SMH1785W15	8	72	870	2.6%	Gravity Main
SML1785W15	SMH1785W15	SMH1785W08	8	167	559	1.1%	Gravity Main
SML1785W16	SMH1785W16	SMH1785W14	8	98	536	1.0%	Gravity Main
SML1785W17	SMH1785W17	SMH1785X18	10	50	4,032	16.7%	Gravity Main
SML1785W18	SMH1785W18	SMH1785W09	8	175	526	0.9%	Gravity Main
SML1785W19	SMH1785W19	SMH1785X14	8	43	983	3.3%	Gravity Main
SML1785W1A	SMH1785W01	SMH1785W07	8	311	550	1.0%	Gravity Main
SML1785W20	SMH1785W20	SMH1785W19	8	172	515	0.9%	Gravity Main
SML1785X01	SMH1785X01	SMH1785X02	8	153	891	2.7%	Gravity Main
SML1785X02	SMH1785X02	SMH1785X03	8	287	678	1.6%	Gravity Main
SML1785X03	SMH1785X03	SMH1785X04	8	128	431	0.6%	Gravity Main
SML1785X04	SMH1785X04	SMH1785X05	8	111	723	1.8%	Gravity Main
SML1785X05	SMH1785X05	SMH1785X06	8	225	752	1.9%	Gravity Main
SML1785X06	SMH1785X06	SMH1785X07	8	73	1,013	3.5%	Gravity Main
SML1785X07	SMH1785X07	SMH1785X08	8	83	298	0.3%	Gravity Main
SML1785X08	SMH1785X08	SMH1785X09	8	211	382	0.5%	Gravity Main
SML1785X09	SMH1785X09	SMH1785X10	8	206	373	0.5%	Gravity Main
SML1785X10	SMH1785X10	SMH1785X11	8	258	660	1.5%	Gravity Main
SML1785X11	SMH1785X11	SMH1785Y01	8	259	714	1.7%	Gravity Main
SML1785X12	SMH1785X12	SMH1785W13	8	189	705	1.7%	Gravity Main
SML1785X13	SMH1785X13	SMH1785X12	8	295	859	2.5%	Gravity Main
SML1785X14	SMH1785X14	SMH1785X12	8	127	789	2.1%	Gravity Main
SML1785X15	SMH1785X15	SMH1785X16	10	323	698	0.5%	Gravity Main
SML1785X16	SMH1785X16	SMH1785W14	8	119	675	1.5%	Gravity Main
SML1785X18	SMH1785X18	SMH1785X15	10	337	1,547	2.5%	Gravity Main
SML1785X19	SMH1785X19	SMH1785U03	8	284	736	1.8%	Gravity Main
SML1785X20	SMH1785X20	SMH1785U01	8	260	523	0.9%	Gravity Main
SML1785X21	SMH1785X21	SMH1785X20	8	73	485	0.8%	Gravity Main
SML1785X22	SMH1785X22	SMH1785X21	8	101	515	0.9%	Gravity Main
SML1785X23	SMH1785X23	SMH1785X22	8	220	518	0.9%	Gravity Main
SML1785X24	SMH1785X24	SMH1785X23	8	100	1,239	5.2%	Gravity Main
SML1785X25	SMH1785X25	SMH1785X19	8	113	548	1.0%	Gravity Main
SML1785X26	SMH1785X26	SMH1785X25	8	93	437	0.6%	Gravity Main
SML1785X27	SMH1785X27	SMH1785X11	8	34	594	1.2%	Gravity Main
SML1785X28	SMH1785X28	SMH1785X27	8	230	501	0.8%	Gravity Main
SML1785X29	SMH1785X29	SMH1785X28	8	58	546	1.0%	Gravity Main
SML1785X30	SMH1785X30	SMH1785Y10	8	185	896	2.7%	Gravity Main
SML1785X31	SMH1785X31	SMH1785X32	8	216	657	1.5%	Gravity Main
SML1785X32	SMH1785X32	SMH1785Y10	8	122	577	1.1%	Gravity Main
SML1785Y01	SMH1785Y01	SMH1785Y02	8	252	980	3.2%	Gravity Main
SML1785Y02	SMH1785Y02	SMH2085B07	8	42	733	1.8%	Gravity Main
SML1785Y04	SMH1785Y04	SMH1785Z05	8	351	518	0.9%	Gravity Main
SML1785Y05	SMH1785Y05	SMH1785Y04	8	139	579	1.1%	Gravity Main
SML1785Y06	SMH1785Y06	SMH1785Y04	8	69	--	--	Gravity Main
SML1785Y07	SMH1785Y07	SMH1785Y06	8	230	730	1.8%	Gravity Main
SML1785Y08	SMH1785Y08	SMH1785Y07	8	228	642	1.4%	Gravity Main
SML1785Y09	SMH1785Y09	SMH1785Y08	8	47	494	0.8%	Gravity Main
SML1785Y10	SMH1785Y10	SMH1785Y11	8	138	597	1.2%	Gravity Main
SML1785Y11	SMH1785Y11	SMH SLWD	8	180	1,405	6.7%	Gravity Main
SML1785Y12	SMH1785Y12	SMH1785Y05	8	392	549	1.0%	Gravity Main
SML1785Y13	SMH1785Y13	SMH1785Y14	8	269	--	--	Gravity Main
SML1785Y14	SMH1785Y14	SMH1785Y15	8	280	--	--	Gravity Main
SML1785Y15	SMH1785Y15	SMH1785Y16	8	161	--	--	Gravity Main
SML1785Y16	SMH1785Y16	SMH1785Y05	8	25	--	--	Gravity Main
SML1785Z01	SMH1785Z01	SMH1785Z03	36	264	14,434	0.2%	Gravity Main
SML1785Z02	SMH1785Z02	SMH1785Z01	8	20	4,392	65.2%	Gravity Main
SML1785Z03	SMH1785Z03	SMH1785S01	36	316	13,618	0.2%	Gravity Main
SML1785Z04	SMH1785Z04	SMH1785S34	8	47	372	0.5%	Gravity Main
SML1785Z05	SMH1785Z05	SMH1785Z04	8	92	659	1.5%	Gravity Main
SML1785Z12	SMH1785Z12	SMH1785Z13	8	268	--	--	Gravity Main
SML1785Z13	SMH1785Z13	SMH1785Z14	8	249	--	--	Gravity Main
SML1785Z14	SMH1785Z14	SMH1785Z15	8	234	--	--	Gravity Main
SML1785Z15	SMH1785Z15	SLWD	8	147	--	--	Gravity Main
SML1795A01	SMH1795A01	SMH1795A04	8	232	1,693	9.7%	Gravity Main
SML1795A02	SMH1795A02	SMH1795A03	24	118	6,064	0.4%	Gravity Main
SML1795A03	SMH1795A03	SMH1795A04	24	200	6,229	0.4%	Gravity Main
SML1795A04	SMH1795A04	SMH1795A07	24	95	8,149	0.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1795A05	SMH1795A05	SMH1795H01	24	541	6,081	0.4%	Gravity Main
SML1795A06	SMH1795A06	SMH1795A07	8	130	1,473	7.3%	Gravity Main
SML1795A07	SMH1795A07	SMH1795A05	24	87	8,541	0.7%	Gravity Main
SML1795A08	SMH1795A08	SMH1795A09	14	231	--	--	Gravity Main
SML1795A09	SMH1795A09	SMH0895Z11	14	167	--	--	Gravity Main
SML1795A10	SMH1795A10	SMH1795A08	14	282	--	--	Gravity Main
SML1795A11	SMH1795A11	SMH1795A10	12	51	--	--	Gravity Main
SML1795B01	SMH1795B01	SMH1795C13	21	69	24,046	11.4%	Gravity Main
SML1795B02	SMH1795B02	SMH1795B03	18	245	4,864	1.1%	Gravity Main
SML1795B03	SMH1795B03	SMH1795B04	18	268	8,055	2.9%	Gravity Main
SML1795B04	SMH1795B04	SMH1795B01	21	193	18,518	6.7%	Gravity Main
SML1795B05	SMH1795B05	SMH1795B02	15	120	3,667	1.6%	Gravity Main
SML1795B06	SMH1795B06	SMH1795B05	10	70	2,588	6.9%	Gravity Main
SML1795B07	SMH1795B07	SMH1795B03	12	193	1,155	0.5%	Gravity Main
SML1795B08	SMH1795B08	SMH1795B04	18	190	7,474	2.5%	Gravity Main
SML1795B09	SMH1795B09	SMH1795B06	10	90	1,013	1.1%	Gravity Main
SML1795B10	SMH1795B10	SMH1795B07	8	164	949	3.0%	Gravity Main
SML1795B11	SMH1795B11	SMH1795B09	10	191	1,078	1.2%	Gravity Main
SML1795B12	SMH1795B12	SMH1795B16	6	194	255	1.0%	Gravity Main
SML1795B13	SMH1795B13	SMH1795B08	15	284	5,002	3.0%	Gravity Main
SML1795B14	SMH1795B14	SMH1795B19	8	401	582	1.1%	Gravity Main
SML1795B15	SMH1795B15	SMH1795B13	12	95	2,030	1.6%	Gravity Main
SML1795B16	SMH1795B16	SMH1795B17	10	108	--	--	Gravity Main
SML1795B17	SMH1795B17	SMH1795B13	10	101	1,862	3.6%	Gravity Main
SML1795B18	SMH1795B18	SMH1795B15	12	160	2,143	1.8%	Gravity Main
SML1795B19	SMH1795B19	SMH1795B20	8	227	758	1.9%	Gravity Main
SML1795B20	SMH1795B20	SMH1795B18	8	154	795	2.1%	Gravity Main
SML1795B21	SMH1795B21	SMH1795B24	8	348	737	1.8%	Gravity Main
SML1795B23	SMH1795B23	SMH1795B26	8	286	1,622	8.9%	Gravity Main
SML1795B24	SMH1795B24	SMH1795B25	8	224	1,021	3.5%	Gravity Main
SML1795B26	SMH1795B26	SMH1795B28	8	105	993	3.3%	Gravity Main
SML1795B31	SMH1795B31	SMH1795B25	8	115	2,080	14.6%	Gravity Main
SML1795B32	SMH1795B32	SMH1795B17	8	82	425	0.6%	Gravity Main
SML1795B33	SMH1795B33	SMH1795B16	10	78	790	0.6%	Gravity Main
SML1795B34	SMH1795B34	SMH1795G13	10	432	940	0.9%	Gravity Main
SML1795B35	SMH1795B35	SMH1795G20	10	430	1,703	3.0%	Gravity Main
SML1795C01	SMH1795C01	SMH1795C03	18	24	1,923	0.2%	Gravity Main
SML1795C02	SMH1795C02	SMH1795C03	48	12	140,239	4.7%	Gravity Main
SML1795C02	SMH1795C02	SMH1795C03	48	460	22,945	0.1%	Gravity Main
SML1795C03	SMH1795C03	SMH1795C06	48	261	23,324	0.1%	Gravity Main
SML1795C04	SMH1795C04	SMH1795F03	8	25	3,493	41.3%	Gravity Main
SML1795C05	SMH1795C05	SMH1795C06	4	17	797	86.7%	Gravity Main
SML1795C06	SMH1795C06	SMH1795C08	48	161	33,371	0.3%	Gravity Main
SML1795C07	SMH1795C07	SMH1795C08	10	17	--	0.0%	Gravity Main
SML1795C08	SMH1795C08	SMH1795F10	48	214	12,492	0.0%	Gravity Main
SML1795C09	SMH1795C09	SMH1795C07	10	313	1,970	4.0%	Gravity Main
SML1795C10	SMH1795C10	SMH1795C05	4	411	198	5.3%	Gravity Main
SML1795C11	SMH1795C11	SMH1795C09	10	276	2,047	4.3%	Gravity Main
SML1795C12	SMH1795C12	SMH1795C11	8	148	989	3.3%	Gravity Main
SML1795C13	SMH1795C13	SMH1795F10	30	288	39,069	4.5%	Gravity Main
SML1795C14	SMH1795C14	SMH1795F03	8	28	--	--	Gravity Main
SML1795D01	SMH1795D01	SMH0895W02	10	536	2,523	6.5%	Gravity Main
SML1795D02	SMH1795D02	SMH1795D15	12	49	3,143	3.8%	Gravity Main
SML1795D03	SMH1795D03	SMH1795D14	8	46	3,030	31.0%	Gravity Main
SML1795D05	SMH1795D05	SMH1795D11	8	141	1,692	9.7%	Gravity Main
SML1795D06	SMH1795D06	SMH1795D09	12	220	1,734	1.2%	Gravity Main
SML1795D07	SMH1795D07	SMH1795D13	8	182	1,330	6.0%	Gravity Main
SML1795D08	SMH1795D08	SMH0895W03	15	103	4,701	2.6%	Gravity Main
SML1795D09	SMH1795D09	SMH1795D08	15	283	2,376	0.7%	Gravity Main
SML1795D10	SMH1795D10	SMH1795D03	8	131	1,386	6.5%	Gravity Main
SML1795D11	SMH1795D11	SMH1795D06	8	40	--	0.0%	Gravity Main
SML1795D12	SMH1795D12	SMH1795D07	8	65	717	1.7%	Gravity Main
SML1795D13	SMH1795D13	SMH1795D06	8	26	750	1.9%	Gravity Main
SML1795D14	SMH1795D14	SMH1795D05	--	161	--	--	Gravity Main
SML1795D15	SMH1795D15	SMH1795D10	12	124	--	--	Gravity Main
SML1795E01	SMH1795E01	SMH1895H19	6	182	444	3.1%	Gravity Main
SML1795E02	SMH1795E02	SMH1795E03	8	149	--	--	Gravity Main
SML1795E03	SMH1795E03	SMH1795M01	8	422	--	--	Gravity Main
SML1795E04	SMH1795E04	SMH1795E13	8	229	--	--	Gravity Main
SML1795E05	SMH1795E05	SMH1795E06	8	483	--	--	Gravity Main
SML1795E06	SMH1795E06	SMH1795M02	10	287	--	--	Gravity Main
SML1795E07	SMH1795E07	SMH1795E08	--	482	--	--	Gravity Main
SML1795E08	SMH1795E08	SMH1795M03	--	298	--	--	Gravity Main
SML1795E09	SMH1795E09	SMH1795E10	8	214	816	2.3%	Gravity Main
SML1795E10	SMH1795E10	SMH1795E12	8	117	707	1.7%	Gravity Main
SML1795E11	SMH1795E11	SMH1795E02	8	40	--	--	Gravity Main
SML1795E12	SMH1795E12	SMH1795D12	8	86	946	3.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1795E13	SMH1795E13	SMH1795E05	8	132	--	--	Gravity Main
SML1795F01	SMH1795F01	SMH1795F02	24	155	--	0.0%	Gravity Main
SML1795F02	SMH1795F02	SMH1795F06	24	375	7,052	0.5%	Gravity Main
SML1795F03	SMH1795F03	SMH1795C04	8	382	631	1.3%	Gravity Main
SML1795F04	SMH1795F04	SMH1795F06	12	109	1,613	1.0%	Gravity Main
SML1795F05	SMH1795F05	SMH1795F07	24	88	34,322	11.4%	Gravity Main
SML1795F06	SMH1795F06	SMH1795F05	24	210	7,017	0.5%	Gravity Main
SML1795F07	SMH1795F07	SMH1795F13	24	354	--	0.0%	Gravity Main
SML1795F08	SMH1795F08	SMH1795F06	8	117	--	0.0%	Gravity Main
SML1795F09	SMH1795F09	SMH1795F12	60	285	18,367	0.0%	Gravity Main
SML1795F10	SMH1795F10	SMH1795F09	60	176	70,022	0.4%	Gravity Main
SML1795F11	SMH1795F11	SMH1795F08	8	216	828	2.3%	Gravity Main
SML1795F12	SMH1795F12	SMH1795F15	60	176	52,228	0.2%	Gravity Main
SML1795F13	SMH1795F13	SMH1795F16	24	98	13,383	1.7%	Gravity Main
SML1795F14	SMH1795F14	SMH1795F18	8	179	1,335	6.0%	Gravity Main
SML1795F15	SMH1795F15	SMH1795G01	48	237	5,944	0.0%	Gravity Main
SML1795F16	SMH1795F16	SMH1795F17	24	65	16,975	2.8%	Gravity Main
SML1795F17	SMH1795F17	SMH1795G01	24	138	23,916	5.5%	Gravity Main
SML1795F18	SMH1795F18	SMH1795G02	8	153	1,695	9.7%	Gravity Main
SML1795F19	SMH1795F19	SMH1795C14	8	277	890	2.7%	Gravity Main
SML1795F20	SMH1795F20	SMH1795F01	12	66	2,064	1.7%	Gravity Main
SML1795G01	SMH1795G01	SMH1795G03	48	185	33,249	0.3%	Gravity Main
SML1795G02	SMH1795G02	SMH1795G03	12	114	6,109	14.5%	Gravity Main
SML1795G03	SMH1795G03	SMH1795G05	48	136	24,170	0.1%	Gravity Main
SML1795G05	SMH1795G05	SMH1795K06	48	372	32,826	0.3%	Gravity Main
SML1795G13	SMH1795G13	SMH1795H08	10	150	1,009	1.0%	Gravity Main
SML1795G14	SMH1795G14	SMH1795G01	24	134	37,510	13.6%	Gravity Main
SML1795G15	SMH1795G15	SMH1795G14	8	171	580	1.1%	Gravity Main
SML1795G16	SMH1795G16	SMH1795K14	12	396	2,508	2.4%	Gravity Main
SML1795G18	SMH1795G18	SMH1795G16	10	463	1,018	1.1%	Gravity Main
SML1795G19	SMH1795G19	SMH1795K16	12	447	3,209	4.0%	Gravity Main
SML1795G20	SMH1795G20	SMH1795G19	12	481	3,092	3.7%	Gravity Main
SML1795H01	SMH1795H01	SMH1795J05	24	548	6,043	0.4%	Gravity Main
SML1795H02	SMH1795H02	SMH1795H03	8	93	2,129	15.3%	Gravity Main
SML1795H03	SMH1795H03	SMH1795H04	8	102	1,850	11.6%	Gravity Main
SML1795H04	SMH1795H04	SMH1795H01	8	45	1,879	11.9%	Gravity Main
SML1795H05	SMH1795H11	SMH1795J05	12	96	3,534	4.9%	Gravity Main
SML1795H05	SMH1795H05	SMH1795J10	12	442	1,650	1.1%	Gravity Main
SML1795H06	SMH1795H06	SMH1795H05	12	93	1,793	1.3%	Gravity Main
SML1795H07	SMH1795H07	SMH1795H06	12	109	2,004	1.6%	Gravity Main
SML1795H08	SMH1795H08	SMH1795H07	12	473	1,561	0.9%	Gravity Main
SML1795H09	SMH1795H09	SMH1795H08	8	137	639	1.4%	Gravity Main
SML1795H10	SMH1795H10	SMH1795H01	18	29	11,180	5.6%	Gravity Main
SML1795J05	SMH1795J05	SMH1795J06	24	471	7,691	0.6%	Gravity Main
SML1795J06	SMH1795J06	SMH1795J07	24	385	7,933	0.6%	Gravity Main
SML1795J07	SMH1795J07	SMH1795R09	24	444	7,531	0.5%	Gravity Main
SML1795J08	SMH1795J08	SMH1795R05	8	333	413	0.6%	Gravity Main
SML1795J09	SMH1795J09	SMH1795R15	12	338	1,839	1.3%	Gravity Main
SML1795J10	SMH1795J10	SMH1795J09	12	480	1,646	1.1%	Gravity Main
SML1795J11	SMH1795J11	SMH1795J12	8	96	--	--	Gravity Main
SML1795J12	SMH1795J12	SMH1795H11	8	240	--	--	Gravity Main
SML1795K01	SMH1795K01	SMH1795Q01	8	356	329	0.4%	Gravity Main
SML1795K03	SMH1795K03	SMH1795K04	8	69	2,614	23.1%	Gravity Main
SML1795K04	SMH1795K04	SMH1795K07	10	251	2,210	5.0%	Gravity Main
SML1795K06	SMH1795K06	SMH1795K07	48	400	29,442	0.2%	Gravity Main
SML1795K07	SMH1795K07	SMH1795Q12	48	496	38,849	0.4%	Gravity Main
SML1795K12	SMH1795K12	SMH1795Q20	8	194	539	1.0%	Gravity Main
SML1795K13	SMH1795K13	SMH1795Q21	12	479	2,458	2.4%	Gravity Main
SML1795K14	SMH1795K14	SMH1795K13	12	523	2,761	3.0%	Gravity Main
SML1795K15	SMH1795K15	SMH1795Q23	15	479	2,633	0.8%	Gravity Main
SML1795K16	SMH1795K16	SMH1795K15	12	513	1,967	1.5%	Gravity Main
SML1795K19	SMH1795K19	SMH1795K20	8	11	--	--	Gravity Main
SML1795K20	SMH1795K20	SMH1795K04	8	93	--	--	Gravity Main
SML1795L01	SMH1795L01	SMH1795L02	12	56	3,029	3.6%	Gravity Main
SML1795L02	SMH1795L02	SMH1795L04	8	157	952	3.1%	Gravity Main
SML1795L03	SMH1795L03	SMH1795F01	18	366	1,600	0.1%	Gravity Main
SML1795L04	SMH1795L04	SMH1795L08	15	53	4,747	2.7%	Gravity Main
SML1795L05	SMH1795L05	SMH1795L04	12	157	1,180	0.5%	Gravity Main
SML1795L07	SMH1795L07	SMH1795F20	12	203	1,069	0.4%	Gravity Main
SML1795L08	SMH1795L08	SMH1795L03	15	47	3,246	1.2%	Gravity Main
SML1795L09	SMH1795L09	SMH1795L15	12	106	1,567	1.0%	Gravity Main
SML1795L13	SMH1795L13	SMH1795L14	8	382	--	--	Gravity Main
SML1795L14	SMH1795L14	SMH1795K19	8	391	--	--	Gravity Main
SML1795L15	SMH1795L15	SMH1795L08	--	343	--	--	Gravity Main
SML1795M01	SMH1795M01	SMH1795N03	--	341	--	--	Gravity Main
SML1795M02	SMH1795M02	SMH1795M11	10	196	--	--	Gravity Main
SML1795M03	SMH1795M03	SMH1795M04	--	181	--	--	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1795M04	SMH1795M04	SMH1795N05	8	479	--	--	Gravity Main
SML1795M06	SMH1795M06	SMH1795M07	8	451	370	0.5%	Gravity Main
SML1795M07	SMH1795M07	SMH1795N08	8	478	539	1.0%	Gravity Main
SML1795M08	SMH1795M08	SMH1795N13	--	485	--	--	Gravity Main
SML1795M09	SMH1795M09	TAP	8	183	--	--	Gravity Main
SML1795M10	SMH1795M10	SMH1795M08	10	37	--	--	Gravity Main
SML1795M11	SMH1795M11	SMH1795M10	10	439	--	--	Gravity Main
SML1795M12	SMH1795M12	SMH1795M13	18	7	--	--	Gravity Main
SML1795M13	SMH1795M13	SMH1795M11	18	143	--	--	Gravity Main
SML1795M6A	SMH1795M06	SMH1795E09	8	512	902	2.8%	Gravity Main
SML1795N01	SMH1795N01	SMH1795N11	24	390	8,197	0.6%	Gravity Main
SML1795N02	SMH1795N02	SMH1795V01	24	479	6,413	0.4%	Gravity Main
SML1795N04	SMH1795N13	SMH1795V15	18	481	2,844	0.4%	Gravity Main
SML1795N05	SMH1795N05	SMH1795N06	12	481	2,318	2.1%	Gravity Main
SML1795N06	SMH1795N06	SMH1795N07	15	188	2,162	0.6%	Gravity Main
SML1795N07	SMH1795N07	SMH1795V07	15	291	2,799	0.9%	Gravity Main
SML1795N08	SMH1795N08	SMH1795N09	10	479	966	1.0%	Gravity Main
SML1795N09	SMH1795N09	SMH1795V10	12	477	1,540	0.9%	Gravity Main
SML1795N10	SMH1795N10	SMH1795V12	8	450	785	2.1%	Gravity Main
SML1795N11	SMH1795N11	SMH1795N02	24	90	7,353	0.5%	Gravity Main
SML1795N12	SMH1795N12	SMH1795N04	8	113	--	--	Gravity Main
SML1795N1A	SMH1795N01	SMH1795M08	18	342	--	--	Gravity Main
SML1795N5A	SMH1795N05	SMH1795N08	8	354	374	0.5%	Gravity Main
SML1795P01	SMH1795P01	SMH1795P02	8	238	555	1.0%	Gravity Main
SML1795P02	SMH1795P02	SMH1795P04	8	114	768	2.0%	Gravity Main
SML1795P03	SMH1795P03	SMH1795P05	8	141	1,056	3.8%	Gravity Main
SML1795P04	SMH1795P04	SMH1795P08	8	278	957	3.1%	Gravity Main
SML1795P05	SMH1795P05	SMH1795P06	8	297	792	2.1%	Gravity Main
SML1795P06	SMH1795P06	SMH1795U10	8	294	789	2.1%	Gravity Main
SML1795P07	SMH1795P07	SMH1795P05	8	99	547	1.0%	Gravity Main
SML1795P08	SMH1795P08	SMH1795P11	8	154	518	0.9%	Gravity Main
SML1795P09	SMH1795P09	SMH1795P12	8	151	1,067	3.9%	Gravity Main
SML1795P10	SMH1795P10	SMH1795L05	15	417	2,032	0.5%	Gravity Main
SML1795P11	SMH1795P11	SMH1795P10	15	125	1,893	0.4%	Gravity Main
SML1795P12	SMH1795P12	SMH1795P13	12	293	1,256	0.6%	Gravity Main
SML1795P13	SMH1795P13	SMH1795U12	12	345	1,343	0.7%	Gravity Main
SML1795P14	SMH1795P14	SMH1795U14	8	251	373	0.5%	Gravity Main
SML1795P15	SMH1795P15	SMH1795L13	8	261	--	--	Gravity Main
SML1795P16	SMH1795P16	SMH1795P15	8	205	--	--	Gravity Main
SML1795P17	SMH1795P17	SMH1795P16	8	187	--	--	Gravity Main
SML1795P18	SMH1795P18	SMH1795P11	8	65	--	--	Gravity Main
SML1795P9A	SMH1795P08	SMH1795P09	8	251	543	1.0%	Gravity Main
SML1795Q01	SMH1795Q01	SMH1795Q02	8	462	423	0.6%	Gravity Main
SML1795Q02	SMH1795Q02	SMH1795Q06	8	289	1,230	5.1%	Gravity Main
SML1795Q03	SMH1795Q03	SMH1795K03	8	495	444	0.7%	Gravity Main
SML1795Q04	SMH1795Q04	SMH1795Q03	8	295	575	1.1%	Gravity Main
SML1795Q05	SMH1795Q05	SMH1795T05	8	426	651	1.4%	Gravity Main
SML1795Q06	SMH1795Q06	SMH1795Q09	8	146	1,753	10.4%	Gravity Main
SML1795Q07	SMH1795Q07	SMH1795K04	8	514	537	1.0%	Gravity Main
SML1795Q08	SMH1795Q08	SMH1795Q07	8	427	577	1.1%	Gravity Main
SML1795Q09	SMH1795Q09	SMH1795Q10	8	153	1,556	8.2%	Gravity Main
SML1795Q0A	SMH1795Q23	SMH1795Q22	8	33	507	0.9%	Gravity Main
SML1795Q10	SMH1795Q10	SMH1795Q15	10	165	2,704	7.5%	Gravity Main
SML1795Q11	SMH1795Q11	SMH1795Q15	48	359	30,127	0.2%	Gravity Main
SML1795Q12	SMH1795Q12	SMH1795Q11	48	387	31,693	0.2%	Gravity Main
SML1795Q15	SMH1795Q15	SMH1795Q16	48	45	52,133	0.7%	Gravity Main
SML1795Q16	SMH1795Q16	SMH1795Q17	48	293	41,344	0.4%	Gravity Main
SML1795Q17	SMH1795Q17	SMH1795S06	48	685	23,297	0.1%	Gravity Main
SML1795Q20	SMH1795Q20	SMH1795K15	8	99	538	1.0%	Gravity Main
SML1795Q21	SMH1795Q21	SMH1795T27	15	480	3,230	1.2%	Gravity Main
SML1795Q22	SMH1795Q22	SMH1795T29	15	447	2,072	0.5%	Gravity Main
SML1795Q23	SMH1795Q23	SMH1795Q22	8	33	513	0.9%	Gravity Main
SML1795R05	SMH1795R05	SMH1795R06	10	316	695	0.5%	Gravity Main
SML1795R06	SMH1795R06	SMH1795R07	8	95	948	3.0%	Gravity Main
SML1795R07	SMH1795R07	SMH1795R08	10	472	963	1.0%	Gravity Main
SML1795R08	SMH1795R08	SMH1795R11	8	152	670	1.5%	Gravity Main
SML1795R09	SMH1795R09	SMH1795R10	24	433	7,671	0.6%	Gravity Main
SML1795R10	SMH1795R10	SMH1795S21	24	487	7,719	0.6%	Gravity Main
SML1795R11	SMH1795R11	SMH1795S12	12	160	3,306	4.3%	Gravity Main
SML1795R12	SMH1795R12	SMH1795R06	8	10	4,477	67.8%	Gravity Main
SML1795R13	SMH1795R13	SMH1795S29	15	62	3,456	1.4%	Gravity Main
SML1795R14	SMH1795R14	SMH1795R13	8	48	975	3.2%	Gravity Main
SML1795R15	SMH1795R15	SMH1795R13	12	493	1,645	1.1%	Gravity Main
SML1795S01	SMH1795S01	SMH1795S08	24	328	9,180	0.8%	Gravity Main
SML1795S03	SMH1795S03	SMH1795S04	8	455	579	1.1%	Gravity Main
SML1795S04	SMH1795S04	SMH1795S07	10	182	343	0.1%	Gravity Main
SML1795S06	SMH1795S06	SMH1795S10	48	502	41,788	0.4%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1795S07	SMH1795S07	SMH1795S08	12	21	2,995	3.5%	Gravity Main
SML1795S08	SMH1795S08	SMH1795S14	24	302	10,355	1.0%	Gravity Main
SML1795S0B	SMH1795S07	SMH1795S11	10	287	824	0.7%	Gravity Main
SML1795S0D	SMH1795T23	SMH1795S01	12	28	1,702	1.1%	Gravity Main
SML1795S0E	SMH1795T22	SMH1795T23	12	7	2,696	2.8%	Gravity Main
SML1795S10	SMH1795S10	SMH1795S18	48	176	79,315	1.5%	Gravity Main
SML1795S10	SMH1795S10	SMH1795S18	48	461	49,031	0.6%	Gravity Main
SML1795S11	SMH1795S11	SMH1795S31	18	30	12,892	7.4%	Gravity Main
SML1795S12	SMH1795S12	SMH1795S13	18	382	5,692	1.4%	Gravity Main
SML1795S13	SMH1795S13	SMH1795S15	18	179	1,901	0.2%	Gravity Main
SML1795S14	SMH1795S14	SMH1795S18	24	9	11,365	1.2%	Gravity Main
SML1795S15	SMH1795S15	SMH1795S20	21	425	4,021	0.3%	Gravity Main
SML1795S18	SMH1795S18	SMH1795S19	48	22	47,517	0.5%	Gravity Main
SML1795S19	SMH1795S19	SMH1795S25	48	104	227,762	12.4%	Gravity Main
SML1795S20	SMH1795S20	SMH1695W03	24	281	11,971	1.4%	Gravity Main
SML1795S21	SMH1795S21	SMH1795S23	24	131	7,703	0.6%	Gravity Main
SML1795S22	SMH1795S22	SML1795S24	6	110	76	0.1%	Gravity Main
SML1795S23	SMH1795S23	SMH1795S24	24	343	7,731	0.6%	Gravity Main
SML1795S24	SMH1795S24	SMH1695V01	24	311	7,811	0.6%	Gravity Main
SML1795S25	SMH1795S25	SMH1695W11	30	238	8,538	0.2%	Gravity Main
SML1795S29	SMH1795S29	SMH1795S06	15	96	3,515	1.5%	Gravity Main
SML1795S31	SMH1795S31	SMH1795S14	--	39	--	--	Gravity Main
SML1795T01	SMH1795T01	SMH1795T12	8	320	523	0.9%	Gravity Main
SML1795T02	SMH1795T02	SMH1795Y01	8	462	615	1.3%	Gravity Main
SML1795T03	SMH1795T03	SMH1795T04	6	241	322	1.6%	Gravity Main
SML1795T04	SMH1795T04	SMH1795T01	8	369	1,471	7.3%	Gravity Main
SML1795T05	SMH1795T05	SMH1795T07	8	130	1,332	6.0%	Gravity Main
SML1795T06	SMH1795T06	SMH1795T08	8	113	1,772	10.6%	Gravity Main
SML1795T07	SMH1795T07	SMH1795Q09	8	416	884	2.6%	Gravity Main
SML1795T08	SMH1795T08	SMH1795T12	8	171	1,822	11.2%	Gravity Main
SML1795T0B	SMH1795Y11	SMH1795T12	8	318	739	1.8%	Gravity Main
SML1795T12	SMH1795T12	SMH1795T16	8	171	1,704	9.8%	Gravity Main
SML1795T15	SMH1795T15	SMH1795T16	8	17	--	0.0%	Gravity Main
SML1795T16	SMH1795T16	SMH1795T20	8	346	676	1.5%	Gravity Main
SML1795T18	SMH1795T18	SMH1795T21	18	54	9,346	3.9%	Gravity Main
SML1795T19	SMH1795T19	SMH1795T21	12	38	3,254	4.1%	Gravity Main
SML1795T20	SMH1795T20	SMH1795T19	10	138	291	0.1%	Gravity Main
SML1795T21	SMH1795T21	SMH1795S01	18	164	6,842	2.1%	Gravity Main
SML1795T22	SMH1795T22	SMH1795T19	10	170	1,068	1.2%	Gravity Main
SML1795T23	SMH1795T23	SMH1795S04	10	158	1,572	2.5%	Gravity Main
SML1795T24	SMH1795T24	SMH1795T02	8	38	886	2.7%	Gravity Main
SML1795T25	SMH1795T25	SMH1795T05	8	101	766	2.0%	Gravity Main
SML1795T26	SMH1795T26	SMH1795T18	18	394	4,725	1.0%	Gravity Main
SML1795T27	SMH1795T27	SMH1795T26	18	50	4,942	1.1%	Gravity Main
SML1795T28	SMH1795T28	SMH1795T29	10	422	785	0.6%	Gravity Main
SML1795T29	SMH1795T29	SMH1795T27	18	344	3,549	0.6%	Gravity Main
SML1795T30	SMH1795T30	SMH1795T29	10	173	2,870	8.5%	Gravity Main
SML1795T31	SMH1795T31	SMH1795T30	10	180	1,475	2.2%	Gravity Main
SML1795U08	SMH1795U08	SMH1795U09	12	449	1,587	1.0%	Gravity Main
SML1795U09	SMH1795U09	SMH1795X18	12	461	1,491	0.9%	Gravity Main
SML1795U10	SMH1795U10	SMH1795U11	12	500	1,416	0.8%	Gravity Main
SML1795U11	SMH1795U11	SMH1795X03	21	460	3,891	0.3%	Gravity Main
SML1795U12	SMH1795U12	SMH1795U13	12	475	1,053	0.4%	Gravity Main
SML1795U13	SMH1795U13	SMH1795X06	12	444	1,220	0.6%	Gravity Main
SML1795U14	SMH1795U14	SMH1795U15	8	510	418	0.6%	Gravity Main
SML1795U15	SMH1795U15	SMH1795X20	10	449	673	0.5%	Gravity Main
SML1795V01	SMH1795V01	SMH1795V02	27	173	20,179	2.1%	Gravity Main
SML1795V02	SMH1795V02	SMH1795V14	27	480	9,793	0.5%	Gravity Main
SML1795V07	SMH1795V07	SMH1795V08	15	482	1,873	0.4%	Gravity Main
SML1795V10	SMH1795V10	SMH1795V11	12	483	2,051	1.6%	Gravity Main
SML1795V11	SMH1795V11	SMH1795W13	15	469	2,285	0.6%	Gravity Main
SML1795V12	SMH1795V12	SMH1795V13	8	498	786	2.1%	Gravity Main
SML1795V13	SMH1795V13	SMH1795W18	8	460	254	0.2%	Gravity Main
SML1795V14	SMH1795V14	SMH1795V17	21	344	--	--	Gravity Main
SML1795V15	SMH1795V15	SMH1795V16	21	178	--	--	Gravity Main
SML1795V16	SMH1795V16	SMH1795V17	21	480	--	--	Gravity Main
SML1795V17	SMH1795V17	SMH1795V08	--	170	--	--	Gravity Main
SML1795V18	SMH1795V18	SMH1795V19	24	174	--	--	Gravity Main
SML1795V19	SMH1795V19	SMH1795W10	--	468	--	--	Gravity Main
SML1795W01	SMH1795W01	SMH1795W04	30	342	7,199	0.2%	Gravity Main
SML1795W04	SMH1795W04	SMH1795W09	30	345	7,163	0.2%	Gravity Main
SML1795W09	SMH1795W09	SMH1795W14	30	369	7,059	0.1%	Gravity Main
SML1795W0A	SMH1795W14	SMH1795W15	30	470	11,421	0.4%	Gravity Main
SML1795W10	SMH1795W10	SMH1795W13	24	188	7,422	0.5%	Gravity Main
SML1795W11	SMH1795W11	SMH1795W12	12	478	1,303	0.7%	Gravity Main
SML1795W13	SMH1795W13	SMH1795W14	30	18	--	0.0%	Gravity Main
SML1795W14	SMH1795W14	SMH1795X02	36	510	9,673	0.1%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1795W15	SMH1795W15	SMH2095D09	30	480	10,318	0.3%	Gravity Main
SML1795W16	SMH1795W16	SMH1795W19	12	27	693	0.2%	Gravity Main
SML1795W17	SMH1795W17	SMH1795W16	12	272	673	0.2%	Gravity Main
SML1795W18	SMH1795W18	SMH1795X01	12	173	1,274	0.6%	Gravity Main
SML1795W19	SMH1795W19	SMH1795W18	8	179	261	0.2%	Gravity Main
SML1795W21	SMH1795W21	SMH1795W17	12	42	1,525	0.9%	Gravity Main
SML1795W22	SMH1795W22	SMH2095D14	8	429	847	2.4%	Gravity Main
SML1795W23	SMH1795W23	SMH1795W24	8	430	634	1.4%	Gravity Main
SML1795W24	SMH1795W24	SMH2095D15	10	478	1,322	1.8%	Gravity Main
SML1795W25	SMH1795W25	SMH1795W24	8	173	588	1.2%	Gravity Main
SML1795W26	SMH1795W26	SMH1795V14	8	426	--	--	Gravity Main
SML1795W27	SMH1795W27	SMH1795V17	8	430	--	--	Gravity Main
SML1795W28	SMH1795W28	SMH2095D06	--	481	--	--	Gravity Main
SML1795X01	SMH1795X01	SMH1795X03	12	171	950	0.4%	Gravity Main
SML1795X02	SMH1795X02	SMH1795X09	36	544	8,341	0.1%	Gravity Main
SML1795X03	SMH1795X03	SMH1795X05	18	169	1,994	0.2%	Gravity Main
SML1795X04	SMH1795X04	SMH1795X03	8	480	304	0.3%	Gravity Main
SML1795X05	SMH1795X05	SMH1795X06	18	176	1,885	0.2%	Gravity Main
SML1795X06	SMH1795X06	SMH1795X07	21	481	3,380	0.2%	Gravity Main
SML1795X07	SMH1795X07	SMH1795X10	21	167	3,262	0.2%	Gravity Main
SML1795X09	SMH1795X09	SMH1795X11	36	492	9,373	0.1%	Gravity Main
SML1795X10	SMH1795X10	SMH1795X13	21	176	3,183	0.2%	Gravity Main
SML1795X11	SMH1795X11	SMH1795X16	36	370	9,619	0.1%	Gravity Main
SML1795X13	SMH1795X13	SMH1795X15	24	169	4,952	0.2%	Gravity Main
SML1795X14	<Null>	SMH1795X14	8	440	201	0.1%	Gravity Main
SML1795X15	SMH1795X15	SMH1795X19	24	186	5,284	0.3%	Gravity Main
SML1795X16	SMH1795X16	SMH1795X17	36	137	3,632	0.0%	Gravity Main
SML1795X17	SMH1795X17	SMH1795Y03	36	364	7,871	0.1%	Gravity Main
SML1795X18	SMH1795X18	SMH1795X19	12	483	2,115	1.7%	Gravity Main
SML1795X19	SMH1795X19	SMH1795Y02	24	154	6,910	0.5%	Gravity Main
SML1795X20	SMH1795X20	SMH1795X21	12	80	950	0.4%	Gravity Main
SML1795X21	SMH1795X21	SMH1795X13	12	401	1,837	1.3%	Gravity Main
SML1795Y01	SMH1795Y01	SMH1795Y02	8	483	606	1.2%	Gravity Main
SML1795Y02	SMH1795Y02	SMH1795Y05	30	327	10,751	0.3%	Gravity Main
SML1795Y03	SMH1795Y03	SMH1795Y04	24	157	24,085	5.6%	Gravity Main
SML1795Y04	SMH1795Y04	SMH1795Y17	24	544	10,457	1.1%	Gravity Main
SML1795Y05	SMH1795Y05	SMH1795Y04	30	10	44,834	5.9%	Gravity Main
SML1795Y06	SMH1795Y06	SMH1795T08	8	239	419	0.6%	Gravity Main
SML1795Y07	SMH1795Y07	SMH1795Y08	8	375	689	1.6%	Gravity Main
SML1795Y08	SMH1795Y08	SMH2095B05	30	482	8,817	0.2%	Gravity Main
SML1795Y09	SMH1795Y09	SMH1795Y10	6	96	199	0.6%	Gravity Main
SML1795Y0A	SMH1795Y19	SMH1795Y18	8	98	--	0.0%	Gravity Main
SML1795Y0C	SMH1795Y13	SMH1795T15	8	304	529	0.9%	Gravity Main
SML1795Y10	SMH1795Y10	SMH2095B05	6	7	656	6.7%	Gravity Main
SML1795Y11	SMH1795Y11	SMH1795Y13	8	169	1,598	8.6%	Gravity Main
SML1795Y12	SMH1795Y12	SMH1795Y11	8	377	805	2.2%	Gravity Main
SML1795Y13	SMH1795Y13	SMH1795Y16	10	177	1,590	2.6%	Gravity Main
SML1795Y14	SMH1795Y14	SMH1795Y13	8	283	969	3.2%	Gravity Main
SML1795Y15	SMH1795Y15	SMH1795Y14	8	201	1,389	6.5%	Gravity Main
SML1795Y16	SMH1795Y16	SMH1795Y19	15	171	2,599	0.8%	Gravity Main
SML1795Y17	SMH1795Y17	SMH1795Y23	24	350	17,370	2.9%	Gravity Main
SML1795Y18	SMH1795Y18	SMH1795T20	8	226	--	0.0%	Gravity Main
SML1795Y19	SMH1795Y19	SMH1795Y22	18	178	4,586	0.9%	Gravity Main
SML1795Y20	SMH1795Y20	SMH1795Y19	8	480	891	2.7%	Gravity Main
SML1795Y21	SMH1795Y21	SMH1795T22	8	399	466	0.7%	Gravity Main
SML1795Y22	SMH1795Y22	SMH1795T23	18	417	4,217	0.8%	Gravity Main
SML1795Y23	SMH1795Y23	SMH1795Z07	24	497	13,144	1.7%	Gravity Main
SML1795Y23	SML1795Y23	SMH1795Z07	30	20	118,571	41.3%	Gravity Main
SML1795Y5A	SMH1795Y05	SMH1795Y08	--	17	--	--	Gravity Main
SML1795Z01	SMH1795Z01	SMH1795Z04	8	138	511	0.9%	Gravity Main
SML1795Z02	SMH1795Z02	SMH1795Z01	8	495	577	1.1%	Gravity Main
SML1795Z03	SMH1795Z03	SMH1795Z02	8	245	1,271	5.5%	Gravity Main
SML1795Z04	SMH1795Z04	SMH1795Z05	8	56	463	0.7%	Gravity Main
SML1795Z05	SMH1795Z05	SMH1795S07	8	400	447	0.7%	Gravity Main
SML1795Z08	SMH1795Z08	SMH1795Z09	8	342	386	0.5%	Gravity Main
SML1795Z09	SMH1795Z09	SMH1795Z13	8	348	371	0.5%	Gravity Main
SML1795Z12	SMH1795Z12	SMH1795Z17	36	34	36,401	1.5%	Gravity Main
SML1795Z13	SMH1795Z13	SMH1795Z17	12	25	18,600	134.6%	Gravity Main
SML1795Z13	SMH1795Z13	SMH1795Z17	12	637	3,717	5.4%	Gravity Main
SML1795Z15	SMH1795Z15	SMH1795S20	12	217	1,137	0.5%	Gravity Main
SML1795Z16	SMH1795Z16	SMH1795Z07	8	37	1,819	11.2%	Gravity Main
SML1795Z17	SMH1795Z17	SMH1695W05	36	218	--	--	Gravity Main
SML1795Z18	SMH1795Z18	SMH1795Z19	--	390	--	--	Gravity Main
SML1795Z19	SMH1795Z19	SMH1795Z20	30	247	--	--	Gravity Main
SML1795Z20	SMH1795Z20	SMH1795Z12	30	53	--	--	Gravity Main
SML1795Z21	SMH1795Z21	SMH1795Z18	30	444	--	--	Gravity Main
SML1795Z3A	SMH1795Z03	SMH1795Z08	8	345	384	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1885A01	SMH1885A01	SMH1885A02	8	327	1,029	3.6%	Gravity Main
SML1885A02	SMH1885A02	SMH1885A03	8	92	1,104	4.1%	Gravity Main
SML1885A03	SMH1885A03	SMH1885A04	8	259	905	2.8%	Gravity Main
SML1885A04	SMH1885A04	SMH0785Z07	8	52	1,360	6.3%	Gravity Main
SML1885A05	SMH1885A05	SMH1885A04	8	159	562	1.1%	Gravity Main
SML1885B01	SMH1885B01	SMH1885B02	8	158	1,120	4.2%	Gravity Main
SML1885B02	SMH1885B02	SMH1885B03	8	102	1,237	5.2%	Gravity Main
SML1885B03	SMH1885B03	SMH1885G03	8	115	1,151	4.5%	Gravity Main
SML1885B04	SMH1885B04	SMH1885B01	8	355	1,196	4.8%	Gravity Main
SML1885B05	SMH1885B05	SMH1885B04	8	247	920	2.9%	Gravity Main
SML1885B06	SMH1885B06	SMH1885G05	8	161	491	0.8%	Gravity Main
SML1885B07	SMH1885B07	SMH1885B06	8	132	637	1.4%	Gravity Main
SML1885B08	SMH1885B08	SMH1885B07	8	183	905	2.8%	Gravity Main
SML1885B09	SMH1885B09	SMH1885B08	8	383	1,412	6.7%	Gravity Main
SML1885B10	SMH1885B10	SMH1885B11	36	430	9,491	0.1%	Gravity Main
SML1885B11	SMH1885B11	SMH0785Y08	36	458	10,399	0.1%	Gravity Main
SML1885C01	SMH1885C01	SMH1885C06	8	456	878	2.6%	Gravity Main
SML1885C02	SMH1885C02	SMH1885C01	8	413	552	1.0%	Gravity Main
SML1885C03	SMH1885C03	SMH1885C02	8	320	538	1.0%	Gravity Main
SML1885C04	SMH1885C04	SMH1885C03	8	108	527	0.9%	Gravity Main
SML1885C05	SMH1885C05	SMH1885C07	8	109	391	0.5%	Gravity Main
SML1885C06	SMH1885C06	SMH1885C08	8	196	552	1.0%	Gravity Main
SML1885C07	SMH1885C07	SMH1885C06	8	259	391	0.5%	Gravity Main
SML1885C08	SMH1885C08	SMH1885C14	8	418	541	1.0%	Gravity Main
SML1885C09	SMH1885C09	SMH1885C10	8	399	597	1.2%	Gravity Main
SML1885C10	SMH1885C10	SMH1885F05	8	383	580	1.1%	Gravity Main
SML1885C11	SMH1885C11	SMH1885C12	8	140	518	0.9%	Gravity Main
SML1885C12	SMH1885C12	SMH1885C13	8	320	860	2.5%	Gravity Main
SML1885C13	SMH1885C13	SMH1885C15	8	146	1,124	4.3%	Gravity Main
SML1885C14	SMH1885C14	SMH1885B05	8	417	550	1.0%	Gravity Main
SML1885C15	SMH1885C15	SMH1885C16	8	140	10,124	346.6%	Gravity Main
SML1885C16	SMH1885C16	SMH1885B03	8	215	--	--	Gravity Main
SML1885D01	SMH1885D01	SMH1384H13	8	400	544	1.0%	Gravity Main
SML1885D02	SMH1885D02	SMH1885D01	8	120	944	3.0%	Gravity Main
SML1885D03	SMH1885D03	SMH1885D02	8	114	419	0.6%	Gravity Main
SML1885D04	SMH1885D04	SMH1885D01	8	349	1,071	3.9%	Gravity Main
SML1885D05	SMH1885D05	SMH1885D06	8	41	538	1.0%	Gravity Main
SML1885D06	SMH1885D06	SMH1885D08	8	179	1,100	4.1%	Gravity Main
SML1885D07	SMH1885D07	SMH1885D09	8	299	1,113	4.2%	Gravity Main
SML1885D08	SMH1885D08	SMH1885E08	8	310	546	1.0%	Gravity Main
SML1885D09	SMH1885D09	SMH1885D11	8	302	901	2.7%	Gravity Main
SML1885D10	SMH1885D10	SMH1885D14	8	209	938	3.0%	Gravity Main
SML1885D11	SMH1885D11	SMH1885D13	8	139	519	0.9%	Gravity Main
SML1885D12	SMH1885D12	SMH1885D14	8	254	615	1.3%	Gravity Main
SML1885D13	SMH1885D13	SMH0785W06	8	388	776	2.0%	Gravity Main
SML1885D14	SMH1885D14	SMH1885D15	8	164	568	1.1%	Gravity Main
SML1885D15	SMH1885D15	SMH1885C03	8	302	525	0.9%	Gravity Main
SML1885E01	SMH1885E01	SMH1885E02	8	325	887	2.7%	Gravity Main
SML1885E02	SMH1885E02	SMH1885E03	8	288	543	1.0%	Gravity Main
SML1885E03	SMH1885E03	SMH1885M01	8	259	806	2.2%	Gravity Main
SML1885E04	SMH1885E04	SMH1885D03	8	76	1,602	8.7%	Gravity Main
SML1885E05	SMH1885E05	SMH1885E06	8	145	818	2.3%	Gravity Main
SML1885E06	SMH1885E06	SMH1885E02	8	226	1,404	6.7%	Gravity Main
SML1885E07	SMH1885E07	SMH1885E03	8	225	1,129	4.3%	Gravity Main
SML1885E08	SMH1885E08	SMH1885E09	8	131	520	0.9%	Gravity Main
SML1885E09	SMH1885E09	SMH1885E10	8	332	171	0.1%	Gravity Main
SML1885E10	SMH1885E10	SMH1885M11	8	336	542	1.0%	Gravity Main
SML1885E11	SMH1885E11	SMH1885E12	8	292	553	1.0%	Gravity Main
SML1885E12	SMH1885E12	SMH1885M15	8	542	557	1.0%	Gravity Main
SML1885E13	SMH1885E13	SMH1885E12	8	194	620	1.3%	Gravity Main
SML1885E14	SMH1885E14	SMH1885E11	8	250	761	2.0%	Gravity Main
SML1885E15	SMH1885E15	SMH1885E16	8	289	699	1.7%	Gravity Main
SML1885E16	SMH1885E16	SMH1885M16	8	406	540	1.0%	Gravity Main
SML1885F01	SMH1885F01	SMH1885F04	8	334	677	1.6%	Gravity Main
SML1885F02	SMH1885F02	SMH1885F03	8	278	644	1.4%	Gravity Main
SML1885F03	SMH1885F03	SMH1885F07	8	406	1,280	5.5%	Gravity Main
SML1885F04	SMH1885F04	SMH1885F09	8	401	1,073	3.9%	Gravity Main
SML1885F05	SMH1885F05	SMH1885F11	8	300	544	1.0%	Gravity Main
SML1885F06	SMH1885F06	SMH1885F05	8	285	553	1.0%	Gravity Main
SML1885F07	SMH1885F07	SMH1885F06	8	81	1,178	4.7%	Gravity Main
SML1885F08	SMH1885F08	SMH1885F07	8	161	1,022	3.5%	Gravity Main
SML1885F09	SMH1885F09	SMH1885F10	8	246	1,006	3.4%	Gravity Main
SML1885F10	SMH1885F10	SMH1885F13	8	251	1,770	10.6%	Gravity Main
SML1885F11	SMH1885F11	SMH1885C13	8	260	536	1.0%	Gravity Main
SML1885F12	SMH1885F12	SMH1885F10	8	78	985	3.3%	Gravity Main
SML1885F13	SMH1885F13	SMH1885F14	8	97	2,020	13.8%	Gravity Main
SML1885F14	SMH1885F14	SMH1885G01	8	261	816	2.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1885F15	SMH1885F15	SMH1885C16	8	73	--	0.0%	Gravity Main
SML1885F16	SMH1885F16	SMH1885G06	8	156	532	1.0%	Gravity Main
SML1885G01	SMH1885G01	SMH1885G08	8	47	263	0.2%	Gravity Main
SML1885G02	SMH1885G02	SMH1885G04	36	526	69,168	5.3%	Gravity Main
SML1885G03	SMH1885G03	SMH1885B06	8	151	699	1.7%	Gravity Main
SML1885G04	SMH1885G04	SMH1885G05	36	416	9,421	0.1%	Gravity Main
SML1885G05	SMH1885G05	SMH1885B10	36	292	12,038	0.2%	Gravity Main
SML1885G06	SMH1885G06	SMH1885G08	8	192	540	1.0%	Gravity Main
SML1885G07	SMH1885G07	SMH1885G06	8	40	545	1.0%	Gravity Main
SML1885G08	SMH1885G08	SMH1885G04	8	175	527	0.9%	Gravity Main
SML1885G10	SMH1885G10	SMH1885G12	8	184	1,021	3.5%	Gravity Main
SML1885G12	SMH1885G12	SMH1885G04	8	297	1,149	4.5%	Gravity Main
SML1885H01	SMH1885H01	SMH1885H02	8	179	--	--	Gravity Main
SML1885H02	SMH1885H02	SMH1885A01	8	238	838	2.4%	Gravity Main
SML1885K01	SMH1885K01	SMH1885K26	36	83	13,620	0.2%	Gravity Main
SML1885K02	SMH1885K02	SMH1885K01	36	374	8,068	0.1%	Gravity Main
SML1885K03	SMH1885K03	SMH1885K27	8	30	2,037	14.0%	Gravity Main
SML1885K05	SMH1885K05	SMH1885K06	8	134	694	1.6%	Gravity Main
SML1885K06	SMH1885K06	SMH1885K07	8	51	594	1.2%	Gravity Main
SML1885K07	SMH1885K07	SMH1885K08	8	55	1,228	5.1%	Gravity Main
SML1885K08	SMH1885K08	SMH1885K09	8	49	598	1.2%	Gravity Main
SML1885K09	SMH1885K09	SMH1885K03	8	108	823	2.3%	Gravity Main
SML1885K10	SMH1885K10	SMH1885K09	8	193	824	2.3%	Gravity Main
SML1885K11	SMH1885K11	SMH1885K10	8	139	604	1.2%	Gravity Main
SML1885K12	SMH1885K12	SMH1885K05	8	191	640	1.4%	Gravity Main
SML1885K13	SMH1885K13	SMH1885K14	8	95	591	1.2%	Gravity Main
SML1885K14	SMH1885K14	SMH1885K11	8	247	545	1.0%	Gravity Main
SML1885K15	SMH1885K15	SMH1885K09	8	289	1,086	4.0%	Gravity Main
SML1885K16	SMH1885K16	SMH1885K15	8	79	781	2.1%	Gravity Main
SML1885K17	SMH1885K17	SMH1885K18	8	245	633	1.4%	Gravity Main
SML1885K18	SMH1885K18	SMH1885K14	8	157	761	2.0%	Gravity Main
SML1885K19	SMH1885K19	SMH1885K16	8	76	1,087	4.0%	Gravity Main
SML1885K20	SMH1885K20	SMH1885K19	8	60	510	0.9%	Gravity Main
SML1885K21	SMH1885K21	SMH1885K22	8	86	1,010	3.4%	Gravity Main
SML1885K22	SMH1885K22	SMH1885K18	8	202	746	1.9%	Gravity Main
SML1885K23	SMH1885K23	SMH1885K20	8	207	978	3.2%	Gravity Main
SML1885K24	SMH1885K24	SMH1885K23	8	110	371	0.5%	Gravity Main
SML1885K25	SMH1885K25	SMH1885K21	8	181	661	1.5%	Gravity Main
SML1885K26	SMH1885K26	SMH1885G02	36	432	5,594	0.0%	Gravity Main
SML1885K27	SMH1885K27	SMH1885K26	12	126	2,340	2.1%	Gravity Main
SML1885K28	SMH1885K28	SMH1885K31	8	408	533	1.0%	Gravity Main
SML1885K31	SMH1885K31	SMH1885K32	8	201	1,169	4.6%	Gravity Main
SML1885K32	SMH1885K32	SMH1885G10	8	203	1,459	7.2%	Gravity Main
SML1885K33	SMH1885K33	SMH1885Q06	30	11	--	--	Gravity Main
SML1885L01	SMH1885L01	SMH1885L04	8	163	808	2.2%	Gravity Main
SML1885L02	SMH1885L02	SMH1885L03	8	134	905	2.8%	Gravity Main
SML1885L03	SMH1885L03	SMH1885L07	8	351	776	2.0%	Gravity Main
SML1885L04	SMH1885L04	SMH1885L05	8	129	1,096	4.1%	Gravity Main
SML1885L05	SMH1885L05	SMH1885L07	8	318	879	2.6%	Gravity Main
SML1885L06	SMH1885L06	SMH1885L10	10	271	1,101	1.2%	Gravity Main
SML1885L07	SMH1885L07	SMH1885L09	8	200	740	1.9%	Gravity Main
SML1885L08	SMH1885L08	SMH1885L05	8	181	535	1.0%	Gravity Main
SML1885L09	SMH1885L09	SMH1885L10	8	185	645	1.4%	Gravity Main
SML1885L10	SMH1885L10	SMH1885L14	10	163	1,124	1.3%	Gravity Main
SML1885L11	SMH1885L11	SMH1885L17	8	200	772	2.0%	Gravity Main
SML1885L12	SMH1885L12	SMH1885L15	8	135	589	1.2%	Gravity Main
SML1885L13	SMH1885L13	SMH1885L25	8	137	1,111	4.2%	Gravity Main
SML1885L14	SMH1885L14	SMH1885L22	10	349	1,114	1.3%	Gravity Main
SML1885L15	SMH1885L15	SMH1885F09	8	308	603	1.2%	Gravity Main
SML1885L16	SMH1885L16	SMH1885L17	8	218	546	1.0%	Gravity Main
SML1885L17	SMH1885L17	SMH1885L18	8	139	546	1.0%	Gravity Main
SML1885L18	SMH1885L18	SMH1885L20	8	261	550	1.0%	Gravity Main
SML1885L19	SMH1885L19	SMH1885L18	8	192	543	1.0%	Gravity Main
SML1885L20	SML1885L20	SMH1885L26	8	36	2,377	19.1%	Gravity Main
SML1885L20	SMH1885L20	SMlL885L20	8	63	1,794	10.9%	Gravity Main
SML1885L21	SMH1885L21	SMH1885F12	8	188	420	0.6%	Gravity Main
SML1885L22	SMH1885L22	SMH1885L23	10	74	1,200	1.5%	Gravity Main
SML1885L23	SMH1885L23	SMH1885K02	10	283	880	0.8%	Gravity Main
SML1885L24	SMH1885L24	SMH1885L25	30	390	--	--	Gravity Main
SML1885L25	SMH1885L25	SMH1885L26	30	349	--	--	Gravity Main
SML1885L26	SMH1885L26	SMH1885K33	30	350	--	--	Gravity Main
SML1885M01	SMH1885M01	SMH1885M02	8	252	477	0.8%	Gravity Main
SML1885M02	SMH1885M02	SMH1885M03	8	112	488	0.8%	Gravity Main
SML1885M03	SMH1885M03	SMH1885M04	8	100	260	0.2%	Gravity Main
SML1885M04	SMH1885M04	SMH1885M05	8	325	586	1.2%	Gravity Main
SML1885M05	SMH1885M05	SMH1384J07	8	38	1,005	3.4%	Gravity Main
SML1885M06	SMH1885M06	SMH1885N01	8	317	886	2.7%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1885M08	SMH1885M08	SMH1885M01	8	227	823	2.3%	Gravity Main
SML1885M09	SMH1885M09	SMH1885M02	8	234	1,064	3.8%	Gravity Main
SML1885M10	SMH1885M10	SMH1885M09	8	165	545	1.0%	Gravity Main
SML1885M11	SMH1885M11	SMH1885M12	8	333	545	1.0%	Gravity Main
SML1885M12	SML1885M12	SMH1885M13	8	23	2,086	14.7%	Gravity Main
SML1885M12	SMH1885M12	SML1885M12	8	325	551	1.0%	Gravity Main
SML1885M13	SMH1885M13	SMH1885M14	8	264	751	1.9%	Gravity Main
SML1885M14	SMH1885M14	SMH1885M19	8	384	544	1.0%	Gravity Main
SML1885M15	SMH1885M15	SMH1885M17	8	324	541	1.0%	Gravity Main
SML1885M16	SMH1885M16	SMH1885M17	8	201	812	2.2%	Gravity Main
SML1885M17	SMH1885M17	SMH1885M18	8	99	777	2.0%	Gravity Main
SML1885M18	SMH1885M18	SMH1885M19	8	211	529	0.9%	Gravity Main
SML1885M19	SMH1885M19	SMH1885L06	10	398	856	0.8%	Gravity Main
SML1885M20	SMH1885M20	SMH1885M21	--	374	--	--	Gravity Main
SML1885M21	SMH1885M21	SMH1885M22	30	394	--	--	Gravity Main
SML1885M22	SMH1885M22	SMH1885L24	--	386	--	--	Gravity Main
SML1885N01	SMH1885N01	SMH1885N02	8	225	991	3.3%	Gravity Main
SML1885N02	SMH1885N02	SMH1384R10	8	179	699	1.7%	Gravity Main
SML1885N03	SMH1885N03	SMH1885N04	8	189	565	1.1%	Gravity Main
SML1885N04	SMH1885N04	SMH1885N05	8	313	521	0.9%	Gravity Main
SML1885N05	SMH1885N05	SMH1885N08	8	171	452	0.7%	Gravity Main
SML1885N07	SMH1885N07	SMH1885P15	8	281	533	1.0%	Gravity Main
SML1885N08	SMH1885N08	SMH1885P12	8	36	374	0.5%	Gravity Main
SML1885N09	SMH1885N09	SMH1885M20	--	406	--	--	Gravity Main
SML1885N11	SMH1885N11	SMH1885M13	8	370	--	--	Gravity Main
SML1885P01	SMH1885P01	SMH1885P03	8	577	540	1.0%	Gravity Main
SML1885P02	SMH1885P02	SMH1885P07	8	455	5,730	111.0%	Gravity Main
SML1885P03	SMH1885P03	SMH1885P02	8	88	559	1.1%	Gravity Main
SML1885P04	SMH1885P04	SMH1885L14	8	162	821	2.3%	Gravity Main
SML1885P05	SMH1885P05	SMH1885P04	8	167	359	0.4%	Gravity Main
SML1885P06	SMH1885P06	SMH1885P11	8	330	573	1.1%	Gravity Main
SML1885P07	SMH1885P07	SMH1885P10	8	54	--	--	Gravity Main
SML1885P08	SMH1885P08	SMH1885L22	8	145	1,334	6.0%	Gravity Main
SML1885P09	SMH1885P09	SMH1885P10	8	292	1,290	5.6%	Gravity Main
SML1885P10	SMH1885P10	SMH1885Q01	8	239	662	1.5%	Gravity Main
SML1885P11	SMH1885P11	SMH1885P10	8	206	691	1.6%	Gravity Main
SML1885P12	SMH1885P12	SMH1885V01	8	164	655	1.5%	Gravity Main
SML1885P13	SMH1885P13	SMH1885P12	8	246	382	0.5%	Gravity Main
SML1885P14	SMH1885P14	SMH1885P13	8	216	537	1.0%	Gravity Main
SML1885P15	SMH1885P15	SMH1885P16	8	238	652	1.4%	Gravity Main
SML1885P16	SMH1885P16	SMH1885P02	8	228	853	2.5%	Gravity Main
SML1885Q01	SMH1885Q01	SMH1885K02	36	537	8,491	0.1%	Gravity Main
SML1885Q02	SMH1885Q02	SMH1885Q01	36	84	--	0.0%	Gravity Main
SML1885Q03	SMH1885Q03	SMH1885T06	8	365	522	0.9%	Gravity Main
SML1885Q04	SMH1885Q04	SMH1885Q03	8	368	548	1.0%	Gravity Main
SML1885Q05	SMH1885Q05	SMH1885Q01	8	130	--	--	Gravity Main
SML1885Q06	SMH1885Q06	SMH1885K02	30	21	--	--	Gravity Main
SML1885R03	SMH1885R03	SMH1885T10	8	294	410	0.6%	Gravity Main
SML1885R04	SMH1885R04	SMH1885R04	8	272	--	0.0%	Gravity Main
SML1885R05	SMH1885R05	SMH1885R06	6	87	--	--	Gravity Main
SML1885R06	SMH1885R06	SMH1885R03	8	266	894	2.7%	Gravity Main
SML1885R07	SMH1885R07	SMH1785N05	8	135	2,387	19.3%	Gravity Main
SML1885R07	SMH1885R07	SMH1785N05	8	187	2,027	13.9%	Gravity Main
SML1885S01	SMH1885S01	SMH1885R07	8	418	1,034	3.6%	Gravity Main
SML1885S02	SMH1885S02	SMH1885S01	8	412	543	1.0%	Gravity Main
SML1885S03	SMH1885S03	SMH1885S02	8	318	812	2.2%	Gravity Main
SML1885T01	SMH1885T01	SMH1885Q02	36	496	9,534	0.1%	Gravity Main
SML1885T02	SMH1885T02	SMH1885T01	8	132	1,680	9.5%	Gravity Main
SML1885T03	SMH1885T03	SMH1885T01	10	332	549	0.3%	Gravity Main
SML1885T04	SMH1885T04	SMH1885T03	8	304	452	0.7%	Gravity Main
SML1885T05	SMH1885T05	SMH1885T03	8	160	1,139	4.4%	Gravity Main
SML1885T06	SMH1885T06	SMH1885T02	8	321	536	1.0%	Gravity Main
SML1885T07	SMH1885T07	SMH1885T05	8	254	764	2.0%	Gravity Main
SML1885T08	SMH1885T08	SMH1885T07	8	227	389	0.5%	Gravity Main
SML1885T09	SMH1885T09	SMH1885T08	8	231	433	0.6%	Gravity Main
SML1885T10	SMH1885T10	SMH1885T09	8	327	335	0.4%	Gravity Main
SML1885T11	SMH1885T11	SMH1885Y04	8	238	660	1.5%	Gravity Main
SML1885U01	SMH1885U01	SMH1885U03	36	392	8,305	0.1%	Gravity Main
SML1885U02	SMH1885U02	SMH1885V05	8	397	518	0.9%	Gravity Main
SML1885U03	SMH1885U03	SMH1885U05	36	129	7,930	0.1%	Gravity Main
SML1885U04	SMH1885U04	SMH1885U05	8	350	544	1.0%	Gravity Main
SML1885U05	SMH1885U05	SMH1885U06	36	312	7,597	0.1%	Gravity Main
SML1885U06	SMH1885U06	SMH1885U07	36	167	7,351	0.1%	Gravity Main
SML1885U07	SMH1885U07	SMH1885T01	36	350	10,268	0.1%	Gravity Main
SML1885U08	SMH1885U08	SMH1885V01	8	203	531	1.0%	Gravity Main
SML1885U09	SMH1885U09	SMH1885U08	8	308	537	1.0%	Gravity Main
SML1885U10	SMH1885U10	SMH1885U11	8	233	491	0.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1885U11	SMH1885U11	SMH1885V06	8	201	485	0.8%	Gravity Main
SML1885V01	SMH1885V01	SMH1885V06	8	54	234	0.2%	Gravity Main
SML1885V02	SMH1885V02	SMH1885V03	8	150	402	0.5%	Gravity Main
SML1885V03	SMH1885V03	SMH1885V04	8	394	852	2.5%	Gravity Main
SML1885V04	SMH1885V04	SMH1885U01	36	370	8,105	0.1%	Gravity Main
SML1885V05	SMH1885V05	SMH1885V04	8	62	578	1.1%	Gravity Main
SML1885V06	SMH1885V06	SMH1885V02	8	69	898	2.7%	Gravity Main
SML1885V07	SMH1885V07	SMH1885V06	8	135	522	0.9%	Gravity Main
SML1885W01	SMH1885W01	SMH1384Z15	24	75	5,385	0.3%	Gravity Main
SML1885W02	SMH1885W02	SML1384Z15	8	83	13,297	597.9%	Gravity Main
SML1885W03	SMH1885W03	SMH1885W05	36	419	8,420	0.1%	Gravity Main
SML1885W04	SMH1885W04	SML1885W03	8	79	13,648	629.9%	Gravity Main
SML1885W05	SMH1885W05	SMH1885V04	36	442	8,200	0.1%	Gravity Main
SML1885W06	SMH1885W06	SMH1885V05	8	450	529	0.9%	Gravity Main
SML1885W07	SMH1885W07	SMH1885W06	8	158	312	0.3%	Gravity Main
SML1885X01	SMH1885X01	SMH1885X02	12	351	1,145	0.5%	Gravity Main
SML1885X02	SMH1885X02	SMH1885X03	12	29	1,760	1.2%	Gravity Main
SML1885X03	SMH1885X03	SMH1985B01	12	21	5,369	11.2%	Gravity Main
SML1885X03	SMH1885X03	SMH1985B01	12	104	2,390	2.2%	Gravity Main
SML1885X03	SMH1885X03	SMH1985B01	12	224	1,628	1.0%	Gravity Main
SML1885X04	SMH1885X04	SMH1885X05	8	164	786	2.1%	Gravity Main
SML1885X05	SMH1885X05	SMH1885X06	8	142	528	0.9%	Gravity Main
SML1885X06	SMH1885X06	SMH1885X07	8	36	655	1.5%	Gravity Main
SML1885X07	SMH1885X07	SMH1885X08	8	324	361	0.4%	Gravity Main
SML1885X08	SMH1885X08	SMH1885X09	8	362	356	0.4%	Gravity Main
SML1885X09	SMH1885X09	SMH1885X02	8	38	363	0.4%	Gravity Main
SML1885Y01	SMH1885Y01	SMH1885T04	8	304	395	0.5%	Gravity Main
SML1885Y02	SMH1885Y02	SMH1885Y01	8	268	393	0.5%	Gravity Main
SML1885Y03	SMH1885Y03	SMH1885Y02	8	167	410	0.6%	Gravity Main
SML1885Y04	SMH1885Y04	SMH1885Y05	8	191	1,037	3.6%	Gravity Main
SML1885Y05	SMH1885Y05	SMH1885X01	8	44	883	2.6%	Gravity Main
SML1885Y06	SMH1885Y06	SMH1885Y05	8	113	543	1.0%	Gravity Main
SML1885Z01	SMH1885Z01	SMH1885S03	8	360	673	1.5%	Gravity Main
SML1885Z02	SMH1885Z02	SMH1885Z06	10	81	1,925	3.8%	Gravity Main
SML1885Z03	SMH1885Z03	SMH1785V03	24	338	12,575	1.5%	Gravity Main
SML1885Z04	SMH1885Z04	SMH1985A02	8	58	511	0.9%	Gravity Main
SML1885Z05	SMH1885Z05	SMH1885Z04	8	214	544	1.0%	Gravity Main
SML1885Z06	SMH1885Z06	SMH1985A02	10	314	111	0.0%	Gravity Main
SML1895A01	SMH1895A01	SMH1895A02	12	188	1,199	0.6%	Gravity Main
SML1895A02	SMH1895A02	SMH1895B11	12	173	984	0.4%	Gravity Main
SML1895A03	SMH1895A03	SMH0795Z03	12	369	2,445	2.3%	Gravity Main
SML1895A04	SMH1895A04	SMH1895A03	8	244	805	2.2%	Gravity Main
SML1895A05	SMH1895A05	SMH1895H01	10	478	583	0.3%	Gravity Main
SML1895A06	SMH1895A06	SMH1895A07	10	217	690	0.5%	Gravity Main
SML1895A07	SMH1895A07	SMH1895A05	12	169	1,118	0.5%	Gravity Main
SML1895A08	SMH1895A08	SMH0795Z06	8	478	672	1.5%	Gravity Main
SML1895A09	SMH1895A09	SMH1895A08	8	260	1,134	4.4%	Gravity Main
SML1895A10	SMH1895A10	SMH0795Z08	12	481	1,429	0.8%	Gravity Main
SML1895A11	SMH1895A11	SMH1895A10	12	481	1,574	1.0%	Gravity Main
SML1895A12	SMH1895A12	SMH0795Z10	12	482	1,453	0.8%	Gravity Main
SML1895A13	SMH1895A13	SMH1895A12	10	477	898	0.8%	Gravity Main
SML1895A14	SMH1895A14	SMH1895H18	8	461	--	0.0%	Gravity Main
SML1895A15	SMH1895A15	SMH1895A14	8	50	492	0.8%	Gravity Main
SML1895B01	SMH1895B01	SMH0795Y02	12	398	796	0.2%	Gravity Main
SML1895B02	SMH1895B02	SMH1895B01	12	418	826	0.3%	Gravity Main
SML1895B03	SMH1895B03	SMH1895G02	12	126	757	0.2%	Gravity Main
SML1895B09	SMH1895B09	SMH1895B15	12	178	1,915	1.4%	Gravity Main
SML1895B10	SMH1895B10	SMH1895B09	12	249	1,411	0.8%	Gravity Main
SML1895B11	SMH1895B11	SMH1895G10	12	246	--	--	Gravity Main
SML1895B12	SMH1895B12	SMH1895G15	12	480	1,134	0.5%	Gravity Main
SML1895B13	SMH1895B13	SMH1895B12	12	277	1,135	0.5%	Gravity Main
SML1895B14	SMH1895B14	SMH1895B13	12	178	1,140	0.5%	Gravity Main
SML1895B15	SMH1895B15	SMH0795Y11	12	381	2,941	3.4%	Gravity Main
SML1895G01	SMH1895G01	SMH1895G04	6	71	100	0.2%	Gravity Main
SML1895G02	SMH1895G02	SMH1895G04	12	310	728	0.2%	Gravity Main
SML1895G03	SMH1895G03	SMH1895K01	12	378	751	0.2%	Gravity Main
SML1895G04	SMH1895G04	SMH1895G05	12	420	734	0.2%	Gravity Main
SML1895G05	SMH1895G05	SMH1895G03	12	52	890	0.3%	Gravity Main
SML1895G0A	SMH1895G11	SMH1895G15	12	191	3,224	4.0%	Gravity Main
SML1895G10	SMH1895G10	SMH1895G11	12	237	1,057	0.4%	Gravity Main
SML1895G11	SMH1895G11	SMH1895G12	8	481	457	0.7%	Gravity Main
SML1895G12	SMH1895G12	SMH1895K06	8	478	699	1.7%	Gravity Main
SML1895G13	SMH1895G13	SMH1895K09	12	482	2,069	1.7%	Gravity Main
SML1895G14	SMH1895G14	SMH1895G13	12	156	1,592	1.0%	Gravity Main
SML1895G15	SMH1895G15	SMH1895G14	12	330	1,134	0.5%	Gravity Main
SML1895H01	SMH1895H01	SMH1895H04	18	483	4,877	1.1%	Gravity Main
SML1895H04	SMH1895H04	SMH1895J01	21	479	5,736	0.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1895H05	SMH1895H05	SMH1895A07	10	205	722	0.5%	Gravity Main
SML1895H06	SMH1895H06	SMH1895H07	8	237	348	0.4%	Gravity Main
SML1895H07	SMH1895H07	SMH1895H01	8	349	352	0.4%	Gravity Main
SML1895H08	SMH1895H08	SMH1895H07	8	308	746	1.9%	Gravity Main
SML1895H09	SMH1895H09	SMH1895H10	8	151	561	1.1%	Gravity Main
SML1895H0A	SMH1895H17	SMH1895H18	8	172	516	0.9%	Gravity Main
SML1895H10	SMH1895H10	SMH1895J03	8	479	572	1.1%	Gravity Main
SML1895H11	SMH1895H11	SMH1895A11	12	237	3,593	5.0%	Gravity Main
SML1895H13	SMH1895H13	SMH1895H17	8	172	819	2.3%	Gravity Main
SML1895H14	SMH1895H14	SMH1895H13	8	477	431	0.6%	Gravity Main
SML1895H15	SMH1895H15	SMH1895A13	8	243	810	2.2%	Gravity Main
SML1895H16	SMH1895H16	SMH1895H15	8	190	125	0.1%	Gravity Main
SML1895H17	SMH1895H17	SMH1895H16	8	48	247	0.2%	Gravity Main
SML1895H18	SMH1895H18	SMH1895H19	24	18	34,396	11.4%	Gravity Main
SML1895H18	SMH1895H18	SMH1895H19	24	462	6,699	0.4%	Gravity Main
SML1895H19	SMH1895H19	SMH1895J08	24	474	7,966	0.6%	Gravity Main
SML1895H21	SMH1895H21	SMH1895H13	8	284	347	0.4%	Gravity Main
SML1895J01	SMH1895J01	SMH1895J02	18	479	7,003	2.2%	Gravity Main
SML1895J02	SMH1895J02	SMH1895R01	18	482	9,222	3.8%	Gravity Main
SML1895J03	SMH1895J03	SMH1895J04	8	482	--	0.0%	Gravity Main
SML1895J04	SMH1895J04	SMH1895R02	8	480	929	2.9%	Gravity Main
SML1895J05	SMH1895J05	SMH1895H14	8	462	705	1.7%	Gravity Main
SML1895J06	SMH1895J06	SMH1895J07	8	436	368	0.5%	Gravity Main
SML1895J07	SMH1895J07	SMH1895J04	8	346	915	2.8%	Gravity Main
SML1895J08	SMH1895J08	SMH1895J10	24	41	9,504	0.9%	Gravity Main
SML1895J09	SMH1895J09	SMH1795N01	24	37	11,845	1.4%	Gravity Main
SML1895J11	SMH1895J11	SMH1895J12	24	45	--	--	Gravity Main
SML1895J12	SMH1895J12	SMH1895J13	24	202	--	--	Gravity Main
SML1895J13	SMH1895J13	SMH1895J14	24	25	--	--	Gravity Main
SML1895J14	SMH1895J14	SMH1895J15	24	219	--	--	Gravity Main
SML1895J15	SMH1895J15	SMH1795N01	24	138	--	--	Gravity Main
SML1895J16	SMH1895J16	SMH1895J12	24	9	--	--	Gravity Main
SML1895K01	SMH1895K01	SMH1895K02	12	110	717	0.2%	Gravity Main
SML1895K02	SMH1895K02	SMH1895K03	12	238	697	0.2%	Gravity Main
SML1895K03	SMH1895K03	SMH1895K10	12	276	906	0.3%	Gravity Main
SML1895K06	SMH1895K06	SMH1895K07	8	482	78	0.0%	Gravity Main
SML1895K07	SMH1895K07	SMH1895Q17	8	473	965	3.1%	Gravity Main
SML1895K08	SMH1895K08	SMH1895Q21	12	436	2,475	2.4%	Gravity Main
SML1895K09	SMH1895K09	SMH1895K08	12	473	1,936	1.5%	Gravity Main
SML1895K10	SMH1895K10	SMH1895Q06	12	131	--	--	Gravity Main
SML1895L01	SMH1895L01	SMH1895P09	12	265	--	--	Gravity Main
SML1895L02	SMH1895L02	SMH1895P07	8	161	--	--	Gravity Main
SML1895N01	SMH1895N01	SMH1895P01	18	437	1,985	0.2%	Gravity Main
SML1895N02	SMH1895N02	SMH1895N03	18	105	3,638	0.6%	Gravity Main
SML1895N03	SMH1895N03	SMH1895P02	18	274	--	0.0%	Gravity Main
SML1895P01	SMH1895P01	SMH1895P03	18	325	2,240	0.2%	Gravity Main
SML1895P02	SMH1895P02	SMH1895P01	18	314	1,848	0.2%	Gravity Main
SML1895P03	SMH1895P03	SMH1895P04	18	422	2,058	0.2%	Gravity Main
SML1895P04	SMH1895P04	SMH1895P05	18	337	2,109	0.2%	Gravity Main
SML1895P05	SMH1895P05	SMH1895Q01	18	414	2,141	0.2%	Gravity Main
SML1895P06	SMH1895P06	SMH1895P05	8	246	387	0.5%	Gravity Main
SML1895P07	SMH1895P07	SMH1895Q29	12	187	--	--	Gravity Main
SML1895P08	SMH1895P08	SMH1895P07	12	54	--	--	Gravity Main
SML1895P09	SMH1895P09	SMH1895P08	12	49	--	--	Gravity Main
SML1895Q01	SMH1895Q01	SMH1895Q25	18	268	2,237	0.2%	Gravity Main
SML1895Q02	SMH1895Q02	SMH1895Q05	8	35	92	0.0%	Gravity Main
SML1895Q03	SMH1895Q03	SMH1895Q07	8	163	381	0.5%	Gravity Main
SML1895Q04	SMH1895Q04	SMH1895Q03	8	233	385	0.5%	Gravity Main
SML1895Q05	SMH1895Q05	SMH1895Q04	8	93	366	0.5%	Gravity Main
SML1895Q06	SMH1895Q06	SMH1895Q07	12	438	766	0.2%	Gravity Main
SML1895Q07	SMH1895Q07	SMH1895Q10	12	43	1,409	0.8%	Gravity Main
SML1895Q0C	SMH1895Q10	SMH1895Q11	12	7	3,638	5.1%	Gravity Main
SML1895Q0D	SMH1895Q09	SMH1895Q18	12	28	5,095	10.1%	Gravity Main
SML1895Q0E	SML1895Q0E	SMH1895Q23	18	56	--	--	Force Main
SML1895Q0E	SMH1895Q23	SMH1895Z17	18	2133	--	--	Force Main
SML1895Q0E	SMH1895Q19	SML1895Q0E	16	39	--	--	Force Main
SML1895Q0F	SMH1895Q21	SMH1895Q15	12	44	2,400	2.2%	Gravity Main
SML1895Q0G	SMH1895Q14	SMH1895Q19	24	23	--	--	Gravity Main
SML1895Q11	SMH1895Q11	SMH1895Q18	24	27	18,059	3.1%	Gravity Main
SML1895Q12	SMH1895Q12	SMH1895Q11	18	371	1,452	0.1%	Gravity Main
SML1895Q15	SMH1895Q15	SMH1895Q14	24	65	7,597	0.6%	Gravity Main
SML1895Q17	SMH1895Q17	SMH1895T08	10	487	1,224	1.5%	Gravity Main
SML1895Q18	SMH1895Q22	SMH1895Q14	10	265	--	--	Force Main
SML1895Q19	SMH1895Q19	SMH1895S02	12	1122	--	--	Force Main
SML1895Q19	SML	SML	12	12	--	--	Force Main
SML1895Q21	SMH1895Q21	SMH1895Q14	8	69	990	3.3%	Gravity Main
SML1895Q23	SMH1895Q26	SMH1895Q25	18	29	--	--	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1895Q25	SMH1895Q25	SMH1895Q06	18	32	--	--	Gravity Main
SML1895Q27	SMH1895Q27	SMH1895Q26	18	176	--	--	Gravity Main
SML1895Q28	SMH1895Q28	SMH1895Q27	18	206	--	--	Gravity Main
SML1895Q29	SMH1895Q29	SMH1895Q28	12	44	--	--	Gravity Main
SML1895R01	SMH1895R01	SMH1895S03	24	473	10,126	1.0%	Gravity Main
SML1895R02	SMH1895R02	SMH1895S07	8	479	930	2.9%	Gravity Main
SML1895R06	SMH1895R06	SMH1795N02	8	173	1,332	6.0%	Gravity Main
SML1895R08	SMH1895R08	SMH1895R06	8	15	438	0.6%	Gravity Main
SML1895R09	SMH1895R09	SMH1895S23	8	492	--	--	Gravity Main
SML1895R10	SMH1895R10	SMH1895S24	--	446	--	--	Gravity Main
SML1895R4A	SMH1895R04	SMH1895S11	18	35	9,101	3.7%	Gravity Main
SML1895S01	SMH1895S01	SMH1895S20	24	173	2,447	0.1%	Gravity Main
SML1895S02	SMH1895S02	SMH1895S05	21	181	2,651	0.1%	Gravity Main
SML1895S03	SMH1895S03	SMH1895S01	30	11	30,135	2.7%	Gravity Main
SML1895S04	SMH1895S04	SMH1895S03	21	486	9,492	1.8%	Gravity Main
SML1895S05	SMH1895S05	SMH1895S09	21	347	3,040	0.2%	Gravity Main
SML1895S06	SMH1895S06	SMH1895S03	30	170	7,487	0.2%	Gravity Main
SML1895S07	SMH1895S07	SMH1895S06	21	167	5,232	0.5%	Gravity Main
SML1895S08	SMH1895S08	SMH1895S07	21	479	4,489	0.4%	Gravity Main
SML1895S09	SMH1895S09	SMH1895S10	21	460	3,010	0.2%	Gravity Main
SML1895S10	SMH1895S10	SMH1895S14	21	355	3,027	0.2%	Gravity Main
SML1895S11	SMH1895S11	SMH1895S07	18	318	5,133	1.2%	Gravity Main
SML1895S14	SMH1895S14	SMH1895Z13	21	503	3,032	0.2%	Gravity Main
SML1895S19	SMH1895S19	SMH1895S14	8	170	1,000	3.4%	Gravity Main
SML1895S1A	SMH1895S01	SMH1895S02	21	11	18,310	6.6%	Gravity Main
SML1895S20	SMH1895S20	SMH1895T08	24	181	2,393	0.1%	Gravity Main
SML1895S21	SMH1895S21	SMH1895S08	21	351	--	--	Gravity Main
SML1895S22	SMH1895S22	SMH1895S21	15	348	--	--	Gravity Main
SML1895S23	SMH1895S23	SMH1895S22	8	479	--	--	Gravity Main
SML1895S24	SMH1895S24	SMH1895S25	--	34	--	--	Gravity Main
SML1895S25	SMH1895S25	SMH1895S21	12	481	--	--	Gravity Main
SML1895S26	SMH1895S26	SMH1895Z14	--	216	--	--	Gravity Main
SML1895S27	SMH1895S27	SMH1895S19	8	210	--	--	Gravity Main
SML1895T01	SMH1895T01	SMH1895T02	8	150	361	0.4%	Gravity Main
SML1895T02	SMH1895T02	SMH1895Q02	8	145	375	0.5%	Gravity Main
SML1895T03	SMH1895T03	SMH1895Q12	18	369	1,938	0.2%	Gravity Main
SML1895T04	SMH1895T04	SMH1895T03	18	416	2,185	0.2%	Gravity Main
SML1895T06	SMH1895T06	SMH1895Q15	30	480	20,849	1.3%	Gravity Main
SML1895T07	SMH1895T07	SMH1895T06	15	436	1,805	0.4%	Gravity Main
SML1895T08	SMH1895T08	SMH1895T06	24	178	26,120	6.6%	Gravity Main
SML1895T09	SMH1895T09	SMH1895T08	8	486	462	0.7%	Gravity Main
SML1895T10	SMH1895T10	SMH1895T04	12	71	1,010	0.4%	Gravity Main
SML1895Y01	SMH1895Y01	SMH1895Y02	8	405	446	0.7%	Gravity Main
SML1895Y02	SMH1895Y02	SMH1895Y03	8	55	1,423	6.8%	Gravity Main
SML1895Y03	SMH1895Y03	SMH1895T04	18	301	1,765	0.1%	Gravity Main
SML1895Y04	SMH1895Y04	SMH1895Y03	18	28	1,993	0.2%	Gravity Main
SML1895Y05	SMH1895Y05	SMH1895Y04	18	391	1,820	0.1%	Gravity Main
SML1895Y06	SMH1895Y06	SMH1895T09	8	444	82	0.0%	Gravity Main
SML1895Y07	SMH1895Y07	SMH1895Y08	6	418	117	0.2%	Gravity Main
SML1895Y08	SMH1895Y08	SMH1995B10	6	479	36	0.0%	Gravity Main
SML1895Y09	SMH1895Y09	SMH1895Y01	8	66	407	0.6%	Gravity Main
SML1895Z01	SMH1895Z01	SMH1895S04	21	481	5,057	0.5%	Gravity Main
SML1895Z02	SMH1895Z02	SMH1895Z01	21	486	4,906	0.5%	Gravity Main
SML1895Z03	SMH1895Z03	SMH1895Z08	24	351	4,675	0.2%	Gravity Main
SML1895Z04	SMH1895Z04	SMH1895Z03	24	472	4,980	0.2%	Gravity Main
SML1895Z05	SMH1895Z05	SMH1895S08	8	436	960	3.1%	Gravity Main
SML1895Z06	SMH1895Z06	SMH1895Z07	8	447	296	0.3%	Gravity Main
SML1895Z07	SMH1895Z07	SMH1995A07	8	478	337	0.4%	Gravity Main
SML1895Z08	SMH1895Z08	SMH1895Z12	21	298	9,616	1.8%	Gravity Main
SML1895Z09	SMH1895Z09	SMH1895S13	10	482	852	0.7%	Gravity Main
SML1895Z10	SMH1895Z10	SMH1895Z09	8	479	452	0.7%	Gravity Main
SML1895Z11	SMH1895Z11	SMH1895Z10	8	225	500	0.8%	Gravity Main
SML1895Z12	SMH1895Z12	SMH1895Z13	21	63	29,059	16.6%	Gravity Main
SML1895Z13	SMH1895Z13	SMH1795W01	30	340	7,752	0.2%	Gravity Main
SML1895Z14	SMH1895Z14	SMH1795W01	8	29	4,100	56.8%	Gravity Main
SML1895Z15	SMH1895Z15	SMH1895Z16	8	478	280	0.3%	Gravity Main
SML1895Z16	SMH1895Z16	SMH1995A12	18	480	2,669	0.3%	Gravity Main
SML1895Z17	SMH1895Z17	SMH1895Z03	18	15	3,911	0.7%	Gravity Main
SML1895Z18	SML1895Q0E	SMH1895Z12	18	688	--	--	Force Main
SML1985A01	SMH1985A01	SMH1985A03	8	266	543	1.0%	Gravity Main
SML1985A02	SMH1985A02	SMH1985A03	10	180	435	0.2%	Gravity Main
SML1985A03	SMH1985A03	SMH1985A04	10	166	859	0.8%	Gravity Main
SML1985A04	SMH1985A04	SMH1985A08	10	273	780	0.6%	Gravity Main
SML1985A05	SMH1985A05	SMH1985A06	10	143	703	0.5%	Gravity Main
SML1985A06	SMH1985A06	SMH1985H02	10	181	679	0.5%	Gravity Main
SML1985A07	SMH1985A07	SMH1985A01	8	64	560	1.1%	Gravity Main
SML1985A08	SMH1985A08	SMH1985A05	10	62	699	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1985A09	SMH1985A09	SMH1985A08	8	34	469	0.7%	Gravity Main
SML1985A10	SMH1985A10	SMH1985A09	8	164	345	0.4%	Gravity Main
SML1985A11	SMH1985A11	SMH1985A09	8	312	332	0.4%	Gravity Main
SML1985A12	SMH1985A12	SMH1985A11	8	325	340	0.4%	Gravity Main
SML1985A13	SMH1985A13	SMH1985A12	8	147	356	0.4%	Gravity Main
SML1985B01	SMH1985B01	SMH1985B03	12	150	1,550	0.9%	Gravity Main
SML1985B02	SMH1985B02	SMH1985B03	12	301	1,169	0.5%	Gravity Main
SML1985B03	SMH1985B03	SMH1985B04	12	401	1,104	0.5%	Gravity Main
SML1985B04	SMH1985B04	SMH1985G02	12	177	1,615	1.0%	Gravity Main
SML1985B05	SMH1985B05	SMH1985G08	8	161	593	1.2%	Gravity Main
SML1985C01	SMH1985C01	SMH1985F09	8	239	386	0.5%	Gravity Main
SML1985C02	SMH1985C02	SMH1985C01	8	190	461	0.7%	Gravity Main
SML1985C03	SMH1985C03	SMH1985C02	8	413	469	0.7%	Gravity Main
SML1985C04	SMH1985C04	SMH1985C05	6	219	241	0.9%	Gravity Main
SML1985C05	SMH1985C05	SMH1985C06	8	254	564	1.1%	Gravity Main
SML1985C06	SMH1985C06	SMH1985C01	8	219	1,022	3.5%	Gravity Main
SML1985C07	SMH1985C07	SMH1985C08	8	177	541	1.0%	Gravity Main
SML1985C08	SMH1985C08	SMH1985C09	8	169	545	1.0%	Gravity Main
SML1985C09	SMH1985C09	SMH1985C06	8	260	1,082	4.0%	Gravity Main
SML1985D01	SMH1985D01	SMH1885W01	24	304	3,505	0.1%	Gravity Main
SML1985D02	SMH1985D02	SMH1985D01	24	506	4,293	0.2%	Gravity Main
SML1985D03	SMH1985D03	SMH1985D04	8	230	539	1.0%	Gravity Main
SML1985D04	SMH1985D04	SMH1985D05	8	190	529	0.9%	Gravity Main
SML1985D05	SMH1985D05	SMH1985C05	8	141	1,026	3.6%	Gravity Main
SML1985D06	SMH1985D06	SMH1985C05	8	48	602	1.2%	Gravity Main
SML1985E01	SMH1985E01	SMH1985D02	24	404	4,532	0.2%	Gravity Main
SML1985E02	SMH1985E02	SMH1985E01	24	403	4,242	0.2%	Gravity Main
SML1985E03	SMH1985E03	SMH1985E02	24	330	4,302	0.2%	Gravity Main
SML1985E04	SMH1985E04	SMH1985M11	8	171	575	1.1%	Gravity Main
SML1985E05	SMH1985E05	SMH1985E04	8	115	570	1.1%	Gravity Main
SML1985E06	SMH1985E06	SMH1985F10	8	395	530	0.9%	Gravity Main
SML1985E07	SMH1985E07	SMH1985E08	8	176	559	1.1%	Gravity Main
SML1985E08	SMH1985E08	SMH1985F12	8	384	542	1.0%	Gravity Main
SML1985E09	SMH1985E09	SMH1985E05	8	279	382	0.5%	Gravity Main
SML1985F01	SMH1985F01	SMH1985F02	8	368	380	0.5%	Gravity Main
SML1985F02	SMH1985F02	SMH1985F04	8	399	389	0.5%	Gravity Main
SML1985F03	SMH1985F03	SMH1985F04	8	341	384	0.5%	Gravity Main
SML1985F04	SMH1985F04	SMH1985F06	8	217	402	0.5%	Gravity Main
SML1985F05	SMH1985F05	SMH1985F07	8	272	383	0.5%	Gravity Main
SML1985F06	SMH1985F06	SMH1985F08	8	218	386	0.5%	Gravity Main
SML1985F07	SMH1985F07	SMH1985F08	8	341	384	0.5%	Gravity Main
SML1985F08	SMH1985F08	SMH1985G01	8	331	372	0.5%	Gravity Main
SML1985F09	SMH1985F09	SMH1985F10	8	239	382	0.5%	Gravity Main
SML1985F10	SMH1985F10	SMH1985F11	8	94	375	0.5%	Gravity Main
SML1985F11	SMH1985F11	SMH1985F12	8	249	381	0.5%	Gravity Main
SML1985F12	SMH1985F12	SMH1985F01	8	278	379	0.5%	Gravity Main
SML1985F13	SMH1985F13	SMH1985F14	8	208	579	1.1%	Gravity Main
SML1985F14	SMH1985F14	SMH1985F15	8	349	537	1.0%	Gravity Main
SML1985F15	SMH1985F15	SMH1985F11	8	159	753	1.9%	Gravity Main
SML1985F16	SMH1985F16	SMH1985B05	8	203	418	0.6%	Gravity Main
SML1985F1A	SMH1985L08	SMH1985F01	8	206	381	0.5%	Gravity Main
SML1985G01	SMH1985G01	SMH1985G05	8	156	471	0.8%	Gravity Main
SML1985G02	SMH1985G02	SMH1985G03	12	222	340	0.0%	Gravity Main
SML1985G03	SMH1985G03	SMH1985G04	12	400	1,104	0.5%	Gravity Main
SML1985G04	SMH1985G04	SMH1985G05	12	261	--	--	Gravity Main
SML1985G05	SMH1985G05	SMH1985K01	12	134	1,974	1.5%	Gravity Main
SML1985G06	SMH1985G06	SMH1985G03	8	25	1,388	6.5%	Gravity Main
SML1985G07	SMH1985G07	SMH1985G02	8	36	286	0.3%	Gravity Main
SML1985G08	SMH1985G08	SMH1985G02	8	59	--	--	Gravity Main
SML1985H01	SMH1985H01	SMH1985H03	8	274	517	0.9%	Gravity Main
SML1985H02	SMH1985H02	SMH1985H03	10	328	963	1.0%	Gravity Main
SML1985H03	SMH1985H03	SMH1985H04	10	326	1,039	1.1%	Gravity Main
SML1985H04	SMH1985H04	SMH1985J01	10	331	1,031	1.1%	Gravity Main
SML1985H05	SMH1985H05	SMH1985H06	8	290	386	0.5%	Gravity Main
SML1985H06	SMH1985H06	SMH1985H01	8	314	382	0.5%	Gravity Main
SML1985J01	SMH1985J01	SMH1985J02	10	179	874	0.8%	Gravity Main
SML1985J02	SMH1985J02	SMH1985J03	10	230	879	0.8%	Gravity Main
SML1985J03	SMH1985J03	SMH1985J04	10	245	861	0.8%	Gravity Main
SML1985J04	SMH1985J04	SMH1985R01	10	355	1,322	1.8%	Gravity Main
SML1985J05	SMH1985J05	SMH1985J06	8	144	559	1.1%	Gravity Main
SML1985J06	SMH1985J06	SMH1985J04	8	86	678	1.6%	Gravity Main
SML1985J07	SMH1985J07	SMH1985J02	8	41	895	2.7%	Gravity Main
SML1985J08	SMH1985J08	SMH1985J07	8	109	575	1.1%	Gravity Main
SML1985J09	SMH1985J09	SMH1985J08	8	299	660	1.5%	Gravity Main
SML1985J10	SMH1985J10	SMH1985J09	8	100	877	2.6%	Gravity Main
SML1985J11	SMH1985J11	SMH1985J12	8	141	730	1.8%	Gravity Main
SML1985J12	SMH1985J12	SMH1985R09	8	251	379	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1985K01	SMH1985K01	SMH1985K02	12	416	1,064	0.4%	Gravity Main
SML1985K02	SMH1985K02	SMH1985Q02	12	408	1,080	0.5%	Gravity Main
SML1985L01	SMH1985L01	SMH1985L02	8	103	737	1.8%	Gravity Main
SML1985L02	SMH1985L02	SMH1985F08	8	399	596	1.2%	Gravity Main
SML1985L03	SMH1985L03	SMH1985F04	8	286	487	0.8%	Gravity Main
SML1985L04	SMH1985L04	SMH1985L05	8	201	410	0.6%	Gravity Main
SML1985L05	SMH1985L05	SMH1985P07	8	235	487	0.8%	Gravity Main
SML1985L06	SMH1985L06	SMH1985L04	8	126	643	1.4%	Gravity Main
SML1985L07	SMH1985L07	SMH1985L05	8	128	912	2.8%	Gravity Main
SML1985L08	SMH1985L08	SMH1985L09	8	304	386	0.5%	Gravity Main
SML1985L09	SMH1985L09	SMH1985L10	8	339	385	0.5%	Gravity Main
SML1985L10	SMH1985L10	SMH1985N19	8	43	1,068	3.9%	Gravity Main
SML1985L12	SMH1985L12	SMH1985M24	8	192	529	0.9%	Gravity Main
SML1985L13	SMH1985L13	SMH1985L12	8	152	540	1.0%	Gravity Main
SML1985L16	SMH1985L16	SMH1985L08	8	31	691	1.6%	Gravity Main
SML1985L17	SMH1985L17	SMH1985L16	8	153	--	--	Gravity Main
SML1985L18	SMH1985L18	SMH1985L17	8	255	719	1.7%	Gravity Main
SML1985L19	SMH1985L19	SMH1985L08	8	224	662	1.5%	Gravity Main
SML1985L20	SMH1985L20	SMH1985L03	8	285	971	3.2%	Gravity Main
SML1985L21	SMH1985L21	SMH1985L20	8	224	514	0.9%	Gravity Main
SML1985M01	SMH1985M01	SMH1985E03	24	324	2,713	0.1%	Gravity Main
SML1985M02	SMH1985M02	SMH1985M07	24	10	12,694	1.6%	Gravity Main
SML1985M03	SMH1985M03	SMH1985M02	24	105	2,987	0.1%	Gravity Main
SML1985M04	SMH1985M04	SMH1985M03	24	215	6,809	0.4%	Gravity Main
SML1985M05	SMH1985M05	SMH1985M04	12	14	--	0.0%	Gravity Main
SML1985M06	SMH1985M06	SMH1985M03	8	320	377	0.5%	Gravity Main
SML1985M07	SMH1985M07	SMH1985M01	24	204	4,943	0.2%	Gravity Main
SML1985M08	SMH1985M08	SMH1985M11	8	293	1,546	8.1%	Gravity Main
SML1985M09	SMH1985M09	SMH1985M07	8	288	689	1.6%	Gravity Main
SML1985M10	SMH1985M10	SMH1985M12	8	77	1,818	11.2%	Gravity Main
SML1985M11	SMH1985M11	SMH1985M12	8	191	642	1.4%	Gravity Main
SML1985M12	SMH1985M12	SMH1985M14	8	164	548	1.0%	Gravity Main
SML1985M14	SMH1985M14	SMH1985M19	8	65	549	1.0%	Gravity Main
SML1985M15	SMH1985M15	SMH1985N03	8	293	538	1.0%	Gravity Main
SML1985M16	SMH1985M16	SMH1985M18	8	140	472	0.8%	Gravity Main
SML1985M17	SMH1985M17	SMH1985M16	8	254	480	0.8%	Gravity Main
SML1985M18	SMH1985M18	SMH1985M19	8	19	1,871	11.8%	Gravity Main
SML1985M19	SMH1985M19	SMH1985M20	8	320	381	0.5%	Gravity Main
SML1985M20	SMH1985M20	SMH1985M21	8	84	592	1.2%	Gravity Main
SML1985M21	SMH1985M21	SMH1985L09	8	213	263	0.2%	Gravity Main
SML1985M22	SMH1985M22	SMH1985M21	8	160	136	0.1%	Gravity Main
SML1985M23	SMH1985M23	SMH1985M22	8	64	520	0.9%	Gravity Main
SML1985M24	SMH1985M24	SMH1985L10	8	32	756	1.9%	Gravity Main
SML1985M25	SMH1985M25	SMH1985L10	8	21	647	1.4%	Gravity Main
SML1985M26	SMH1985M26	SMH1985M25	8	36	1,455	7.2%	Gravity Main
SML1985M27	SMH1985M27	SMH1985M26	8	153	278	0.3%	Gravity Main
SML1985M28	SMH1985M28	SMH1985M27	8	167	238	0.2%	Gravity Main
SML1985M29	SMH1985M29	SMH1985M30	18	13	--	--	Gravity Main
SML1985M30	SMH1985M30	SMH1985M07	--	139	--	--	Gravity Main
SML1985N01	SMH1985N01	SMH1985N02	8	81	741	1.9%	Gravity Main
SML1985N02	SMH1985N02	SMH1985N03	8	121	1,343	6.1%	Gravity Main
SML1985N03	SMH1985N03	SMH1985N04	8	242	912	2.8%	Gravity Main
SML1985N04	SMH1985N04	SMH1985M17	8	212	592	1.2%	Gravity Main
SML1985N05	SMH1985N05	SMH1985N08	8	216	1,034	3.6%	Gravity Main
SML1985N06	SMH1985N06	SMH1985N07	8	87	540	1.0%	Gravity Main
SML1985N07	SMH1985N07	SMH1985N10	8	248	963	3.1%	Gravity Main
SML1985N08	SMH1985N08	SMH1985N09	8	132	1,088	4.0%	Gravity Main
SML1985N09	SMH1985N09	SMH1985N10	8	319	522	0.9%	Gravity Main
SML1985N10	SMH1985N10	SMH1985N11	8	178	906	2.8%	Gravity Main
SML1985N11	SMH1985N11	SMH1985V16	8	370	681	1.6%	Gravity Main
SML1985N12	SMH1985N12	SMH1985V24	8	195	533	1.0%	Gravity Main
SML1985N13	SMH1985N13	SMH1985P13	8	38	366	0.5%	Gravity Main
SML1985N14	SMH1985N14	SMH1985N13	8	96	411	0.6%	Gravity Main
SML1985N15	SMH1985N15	SMH1985N14	8	261	385	0.5%	Gravity Main
SML1985N16	SMH1985N16	SMH1985N15	8	122	390	0.5%	Gravity Main
SML1985N17	SMH1985N17	SMH1985N16	8	135	531	1.0%	Gravity Main
SML1985N18	SMH1985N18	SMH1985P13	8	201	364	0.4%	Gravity Main
SML1985N19	SMH1985N19	SMH1985N18	8	88	468	0.7%	Gravity Main
SML1985N20	SMH1985N20	SMH1985M05	12	23	1,067	0.4%	Gravity Main
SML1985N21	SMH1985N21	SMH1985N18	8	155	818	2.3%	Gravity Main
SML1985N22	SML3085E04	SMH1384Z19	--	3230	--	--	Force Main
SML1985P01	SMH1985P01	SMH1985P04	8	190	532	1.0%	Gravity Main
SML1985P02	SMH1985P02	SMH1985P09	8	359	563	1.1%	Gravity Main
SML1985P03	SMH1985P03	SMH1985P02	8	251	558	1.1%	Gravity Main
SML1985P04	SMH1985P04	SMH1985P03	8	203	557	1.0%	Gravity Main
SML1985P05	SMH1985P05	SMH1985P04	8	100	621	1.3%	Gravity Main
SML1985P06	SMH1985P06	SMH1985P03	8	134	1,161	4.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1985P07	SMH1985P07	SMH1985Q04	8	244	1,863	11.7%	Gravity Main
SML1985P08	SMH1985P08	SMH1985P07	8	246	432	0.6%	Gravity Main
SML1985P09	SMH1985P09	SMH1985P08	8	258	406	0.6%	Gravity Main
SML1985P10	SMH1985P10	SMH1985P08	8	133	797	2.1%	Gravity Main
SML1985P11	SMH1985P11	SMH1985P09	8	132	489	0.8%	Gravity Main
SML1985P12	SMH1985P12	SMH1985U12	10	252	666	0.5%	Gravity Main
SML1985P13	SMH1985P13	SMH1985P14	8	431	381	0.5%	Gravity Main
SML1985P14	SMH1985P14	SMH1985P12	8	95	406	0.6%	Gravity Main
SML1985P15	SMH1985P15	SMH1985P13	8	179	659	1.5%	Gravity Main
SML1985P16	SMH1985P16	SMH1985P14	8	234	525	0.9%	Gravity Main
SML1985P17	SMH1985P17	SMH1985P15	8	357	1,176	4.7%	Gravity Main
SML1985P18	SMH1985P18	SMH1985P16	8	343	1,035	3.6%	Gravity Main
SML1985P19	SMH1985P19	SMH1985N21	8	223	852	2.5%	Gravity Main
SML1985P20	SMH1985P20	SMH1985P19	8	138	1,107	4.1%	Gravity Main
SML1985Q01	SMH1985Q01	SMH1985T03	12	280	1,093	0.5%	Gravity Main
SML1985Q02	SMH1985Q02	SMH1985Q03	12	421	1,091	0.5%	Gravity Main
SML1985Q03	SMH1985Q03	SMH1985Q06	12	56	930	0.3%	Gravity Main
SML1985Q04	SMH1985Q04	SMH1985Q05	8	271	450	0.7%	Gravity Main
SML1985Q05	SMH1985Q05	SMH1985Q06	8	333	709	1.7%	Gravity Main
SML1985Q06	SMH1985Q06	SMH1985Q01	12	250	1,152	0.5%	Gravity Main
SML1985R01	SMH1985R01	SMH1985R02	10	346	1,375	1.9%	Gravity Main
SML1985R02	SMH1985R02	SMH1985S13	18	335	3,522	0.6%	Gravity Main
SML1985R03	SMH1985R03	SMH1985R02	18	25	1,346	0.1%	Gravity Main
SML1985R05	SMH1985R05	SMH1985R10	12	178	1,534	0.9%	Gravity Main
SML1985R06	SMH1985R06	SMH1985R05	8	324	393	0.5%	Gravity Main
SML1985R07	SMH1985R07	SMH1985R09	8	169	553	1.0%	Gravity Main
SML1985R08	SMH1985R08	SMH1985R07	8	178	805	2.2%	Gravity Main
SML1985R09	SMH1985R09	SMH1985J05	8	148	387	0.5%	Gravity Main
SML1985R10	SMH1985R10	SMH1985S04	12	303	2,184	1.9%	Gravity Main
SML1985R11	SMH1985R11	SMH1985R06	--	54	--	--	Gravity Main
SML1985S01	SMH1985S01	SMH1985T10	8	48	709	1.7%	Gravity Main
SML1985S02	SMH1985S02	SMH1985S05	8	249	545	1.0%	Gravity Main
SML1985S03	SMH1985S03	SMH1985Z01	8	348	947	3.0%	Gravity Main
SML1985S04	SMH1985S04	SMH1985S10	8	408	871	2.6%	Gravity Main
SML1985S05	SMH1985S05	SMH1985S06	15	230	5,191	3.2%	Gravity Main
SML1985S06	SMH1985S06	SMH1985Z05	15	258	7,565	6.8%	Gravity Main
SML1985S07	SMH1985S07	SMH1985S05	15	174	1,846	0.4%	Gravity Main
SML1985S08	SMH1985S08	SMH1985S11	8	308	1,179	4.7%	Gravity Main
SML1985S09	SMH1985S09	SMH1985Z05	8	411	343	0.4%	Gravity Main
SML1985S10	SMH1985S10	SMH1985S12	10	259	859	0.8%	Gravity Main
SML1985S11	SMH1985S11	SMH1985S14	8	398	545	1.0%	Gravity Main
SML1985S12	SMH1985S12	SMH1985S13	10	333	1,088	1.2%	Gravity Main
SML1985S13	SMH1985S13	SMH1985S14	18	350	4,835	1.0%	Gravity Main
SML1985S14	SMH1985S14	SMH2085V15	18	100	2,755	0.3%	Gravity Main
SML1985S16	SMH1985S16	SMH1985S02	8	119	645	1.4%	Gravity Main
SML1985T01	SMH1985T01	SMH1985U05	12	268	1,143	0.5%	Gravity Main
SML1985T02	SMH1985T02	SMH1985T01	12	312	1,214	0.6%	Gravity Main
SML1985T03	SMH1985T03	SMH1985T02	12	101	1,815	1.3%	Gravity Main
SML1985T04	SMH1985T04	SMH1985T13	8	158	1,624	8.9%	Gravity Main
SML1985T05	SMH1985T05	SMH1985T02	8	141	1,822	11.2%	Gravity Main
SML1985T06	SMH1985T06	SMH1985T05	8	77	215	0.2%	Gravity Main
SML1985T07	SMH1985T07	SMH1985T06	8	61	488	0.8%	Gravity Main
SML1985T08	SMH1985T08	SMH1985T07	8	155	577	1.1%	Gravity Main
SML1985T10	SMH1985T10	SMH1985S04	8	314	521	0.9%	Gravity Main
SML1985T11	SMH1985T11	SMH1985T10	8	50	759	1.9%	Gravity Main
SML1985T12	SMH1985T12	SMH1985T11	8	294	918	2.8%	Gravity Main
SML1985T13	SMH1985T13	SMH1985S01	--	255	--	--	Gravity Main
SML1985U01	SMH1985U01	SMH1985X04	12	233	1,141	0.5%	Gravity Main
SML1985U02	SMH1985U02	SMH1985U01	12	249	1,137	0.5%	Gravity Main
SML1985U03	SMH1985U03	SMH1985U02	12	293	1,140	0.5%	Gravity Main
SML1985U04	SMH1985U04	SMH1985U03	12	355	1,067	0.4%	Gravity Main
SML1985U05	SMH1985U05	SMH1985U04	12	27	918	0.3%	Gravity Main
SML1985U06	SMH1985U06	SMH1985U07	12	334	1,015	0.4%	Gravity Main
SML1985U07	SMH1985U07	SMH1985U08	12	137	1,018	0.4%	Gravity Main
SML1985U08	SMH1985U08	SMH1985U09	12	227	1,008	0.4%	Gravity Main
SML1985U09	SMH1985U09	SMH1985U03	12	53	730	0.2%	Gravity Main
SML1985U10	SMH1985U10	SMH1985U09	8	224	536	1.0%	Gravity Main
SML1985U11	SMH1985U11	SMH1985U10	8	107	612	1.3%	Gravity Main
SML1985U12	SMH1985U12	SMH1985U06	10	235	695	0.5%	Gravity Main
SML1985U13	SMH1985U13	SMH1985U15	8	243	762	2.0%	Gravity Main
SML1985U14	SMH1985U14	SMH1985U13	8	241	766	2.0%	Gravity Main
SML1985U15	SMH1985U15	SMH1985U08	8	14	458	0.7%	Gravity Main
SML1985U16	SMH1985U16	SMH1985U09	6	18	13,035	2665.0%	Gravity Main
SML1985U17	SMH1985U17	SMH1985U16	8	142	749	1.9%	Gravity Main
SML1985U18	SMH1985U18	SMH1985U06	12	112	--	0.0%	Gravity Main
SML1985V13	SMH1985V13	SMH1985W11	8	301	608	1.2%	Gravity Main
SML1985V14	SMH1985V14	SMH1985V15	8	255	827	2.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1985V15	SMH1985V15	SMH1985V17	8	259	1,028	3.6%	Gravity Main
SML1985V16	SMH1985V16	SMH1985V17	8	26	1,641	9.1%	Gravity Main
SML1985V17	SMH1985V17	SMH1985V18	8	217	795	2.1%	Gravity Main
SML1985V18	SMH1985V18	SMH1985V19	8	13	906	2.8%	Gravity Main
SML1985V19	SMH1985V19	SMH1985V20	8	194	599	1.2%	Gravity Main
SML1985V20	SMH1985V20	SMH1985U06	8	301	399	0.5%	Gravity Main
SML1985V21	SMH1985V21	SMH1985V15	8	307	644	1.4%	Gravity Main
SML1985V22	SMH1985V22	SMH1985V19	8	15	806	2.2%	Gravity Main
SML1985V23	SMH1985V23	SMH1985V22	8	104	523	0.9%	Gravity Main
SML1985V24	SMH1985V24	SMH1985V23	8	171	541	1.0%	Gravity Main
SML1985V25	SMH1985V25	SMH1985V20	8	21	119	0.0%	Gravity Main
SML1985V26	SMH1985V26	SMH1985V25	8	65	1,205	4.9%	Gravity Main
SML1985V27	SMH1985V27	SMH1985V26	8	101	516	0.9%	Gravity Main
SML1985V28	SMH1985V28	SMH1985V27	8	168	552	1.0%	Gravity Main
SML1985W01	SMH1985W01	SMH1985W13	8	130	390	0.5%	Gravity Main
SML1985W02	SMH1985W02	SMH3085D02	8	282	491	0.8%	Gravity Main
SML1985W03	SMH1985W03	SMH1985W08	8	206	778	2.0%	Gravity Main
SML1985W08	SMH1985W08	SMH1985W11	8	340	502	0.9%	Gravity Main
SML1985W11	SMH1985W11	SMH1985W12	8	334	648	1.4%	Gravity Main
SML1985W12	SMH1985W12	SMH1985W13	8	337	907	2.8%	Gravity Main
SML1985W13	SMH1985W13	SMH1985W02	8	174	380	0.5%	Gravity Main
SML1985X01	SMH1985X01	SMH3085D02	12	408	1,020	0.4%	Gravity Main
SML1985X02	SMH1985X02	SMH1985X01	12	189	1,144	0.5%	Gravity Main
SML1985X03	SMH1985X03	SMH1985X02	12	140	1,031	0.4%	Gravity Main
SML1985X04	SMH1985X04	SMH1985X03	12	206	1,176	0.5%	Gravity Main
SML1985Y01	SMH1985Y01	SMH1985Y04	18	15	1,239	0.1%	Gravity Main
SML1985Y02	SMH1985Y02	SMH1985Y01	18	315	2,689	0.3%	Gravity Main
SML1985Y03	SMH1985Y03	SMH1985Y02	18	236	2,218	0.2%	Gravity Main
SML1985Y04	<Null>	SMH3085B01	10	808	--	--	Force Main
SML1985Z01	SMH1985Z01	SMH1985Z02	8	142	1,786	10.8%	Gravity Main
SML1985Z02	SMH1985Z02	SMH1985Y03	18	263	2,574	0.3%	Gravity Main
SML1985Z03	SMH1985Z03	SMH1985Z02	15	95	1,332	0.2%	Gravity Main
SML1985Z04	SMH1985Z04	SMH1985Z03	15	97	1,249	0.2%	Gravity Main
SML1985Z05	SMH1985Z05	SMH1985Z04	15	92	1,213	0.2%	Gravity Main
SML1995A02	SMH1995A02	SMH1995A01	12	481	1,067	0.4%	Gravity Main
SML1995A03	SMH1995A03	SMH1995A01	30	169	7,769	0.2%	Gravity Main
SML1995A04	SMH1995A04	SMH1995A03	24	25	7,833	0.6%	Gravity Main
SML1995A07	SMH1995A07	SMH1995A03	30	152	8,195	0.2%	Gravity Main
SML1995A08	SMH1995A08	SMH1995A07	24	480	4,647	0.2%	Gravity Main
SML1995A09	SMH1995A09	SMH1995A10	6	240	195	0.6%	Gravity Main
SML1995A0A	SMH1995A07	SMH1995A03	30	20	--	--	Gravity Main
SML1995A0B	SMH1995A20	SMH1995A21	18	21	--	--	Gravity Main
SML1995A10	SMH1995A10	SMH1995A07	18	343	2,552	0.3%	Gravity Main
SML1995A11	SMH1995A11	SMH1995A10	15	481	1,325	0.2%	Gravity Main
SML1995A12	SMH1995A12	SMH2095D14	18	346	6,143	1.7%	Gravity Main
SML1995A13	SMH1995A13	SMH1995A12	10	488	656	0.4%	Gravity Main
SML1995A14	SMH1995A14	SMH2095D11	36	297	37,211	1.5%	Gravity Main
SML1995A15	SMH1995A15	SMH1995A14	36	373	36,589	1.5%	Gravity Main
SML1995A16	SMH1995A16	SMH1995A15	36	351	32,659	1.2%	Gravity Main
SML1995A17	SMH1995A17	SMH1995A16	36	185	28,773	0.9%	Gravity Main
SML1995A18	SMH1995A03	SMH1895Z04	24	458	--	--	Gravity Main
SML1995A19	SMH1995A19	SMH1995A18	24	29	--	--	Gravity Main
SML1995A1A	SMH1995A01	SMH1895Z02	21	479	5,152	0.5%	Gravity Main
SML1995A1B	SMH1995A01	SMH1995B10	8	366	620	1.3%	Gravity Main
SML1995A20	SMH1995A05	SMH1995A04	--	438	--	--	Gravity Main
SML1995A21	SMH1995A17	SMH1995A16	36	174	--	--	Gravity Main
SML1995A22	SMH1995A22	SMH1995A20	21	18	--	--	Gravity Main
SML1995A3A	SMH1995A03	SMH1895Z04	24	20	27,173	7.1%	Gravity Main
SML1995B02	SMH1995B02	SMH1895Y05	18	372	1,386	0.1%	Gravity Main
SML1995B03	SMH1995B03	SMH1995B02	18	307	1,402	0.1%	Gravity Main
SML1995B04	SMH1995B04	SMH1995B03	18	295	1,867	0.2%	Gravity Main
SML1995B08	SMH1995B08	SMH1995G10	6	281	263	1.1%	Gravity Main
SML1995B09	SMH1995B09	SMH1995G11	8	486	542	1.0%	Gravity Main
SML1995B0A	SMH1995B12	OVERFLOW	30	702	72,492	15.4%	Gravity Main
SML1995B10	SMH1995B10	SMH1995B05	8	170	553	1.0%	Gravity Main
SML1995B11	SMH1995B11	SMH1995B10	8	413	780	2.1%	Gravity Main
SML1995B12	SMH1995B12	SMH1995A17	36	297	18,827	0.4%	Gravity Main
SML1995B13	SMH1995B13	SMH1995B04	18	83	4,288	0.8%	Gravity Main
SML1995B14	<Null>	SMH1995B02	6	77	--	--	Gravity Main
SML1995B5A	SMH1995B05	SMH1995B08	6	457	277	1.2%	Gravity Main
SML1995B5B	SMH1995B05	SMH1995B09	8	477	756	1.9%	Gravity Main
SML1995G02	SMH1995G02	SMH1995G20	12	109	686	0.2%	Gravity Main
SML1995G03	SMH1995G03	SMH1995G02	12	99	835	0.3%	Gravity Main
SML1995G04	SMH1995G04	SMH1995G03	12	292	802	0.2%	Gravity Main
SML1995G05	SMH1995G05	SMH1995G21	18	36	7,680	2.6%	Gravity Main
SML1995G06	SMH1995G06	SMH1995G09	8	179	471	0.7%	Gravity Main
SML1995G07	SMH1995G07	SMH1995G08	8	114	778	2.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1995G08	SMH1995G08	SMH1995G17	8	44	779	2.1%	Gravity Main
SML1995G09	SMH1995G09	SMH1995K06	8	353	262	0.2%	Gravity Main
SML1995G10	SMH1995G10	SMH1995G23	6	452	166	0.4%	Gravity Main
SML1995G11	SMH1995G11	SMH1995G13	15	17	4,510	2.4%	Gravity Main
SML1995G13	SMH1995G13	SMH1995G14	15	511	2,264	0.6%	Gravity Main
SML1995G14	SMH1995G14	SMH1995K11	15	455	2,321	0.6%	Gravity Main
SML1995G15	SMH1995G15	SMH1995G11	6	296	--	0.0%	Gravity Main
SML1995G16	SMH1995G16	SMH1995G22	6	174	805	10.2%	Gravity Main
SML1995G17	SMH1995G17	SMH1995G18	8	122	858	2.5%	Gravity Main
SML1995G18	SMH1995G18	SMH1995G06	8	132	958	3.1%	Gravity Main
SML1995G19	<Null>	SMH1995G05	8	240	--	--	Force Main
SML1995G20	SMH1995G20	SMH1995G19	12	35	1,052	0.4%	Gravity Main
SML1995G21	SMH1995G21	SMH1995B13	18	296	1,531	0.1%	Gravity Main
SML1995G22	SMH1995G22	SMH1995K20	8	456	525	0.9%	Gravity Main
SML1995G23	SMH1995G23	SMH1995G22	8	244	220	0.2%	Gravity Main
SML1995G25	SMH1995G25	SMH1995G26	6	193	--	--	Gravity Main
SML1995G26	SMH1995G26	SMH1995G23	6	174	1,966	60.6%	Gravity Main
SML1995H01	SMH1995H01	SMH1995J01	6	515	149	0.3%	Gravity Main
SML1995H04	SMH1995H04	SMH1995A05	21	479	5,025	0.5%	Gravity Main
SML1995H05	SMH1995H05	SMH1995H04	24	479	12,936	1.6%	Gravity Main
SML1995H06	SMH1995H06	SMH1995A08	24	482	4,841	0.2%	Gravity Main
SML1995H07	SMH1995H07	SMH1995H06	15	479	2,944	1.0%	Gravity Main
SML1995H08	SMH1995H08	SMH1995A11	15	479	1,328	0.2%	Gravity Main
SML1995H09	SMH1995H09	SMH1995H08	15	480	3,979	1.9%	Gravity Main
SML1995H10	SMH1995H10	SMH1995A13	10	468	691	0.5%	Gravity Main
SML1995H11	SMH1995H11	SMH1995H10	10	483	682	0.5%	Gravity Main
SML1995H12	SMH1995H12	SMH1995H13	8	482	--	--	Gravity Main
SML1995H13	SMH1995H13	SMH1995A02	12	480	--	--	Gravity Main
SML1995H8A	SMH1995H08	SMH1995H10	8	346	791	2.1%	Gravity Main
SML1995J01	SMH1995J01	SMH1995J02	6	264	190	0.6%	Gravity Main
SML1995J02	SMH1995J02	SMH1995J03	6	455	257	1.0%	Gravity Main
SML1995J03	SMH1995J03	SMH1995K10	6	354	1,450	33.0%	Gravity Main
SML1995J05	SMH1995J05	SMH1995J06	8	450	735	1.8%	Gravity Main
SML1995J06	SMH1995J06	SMH1995R24	12	178	1,132	0.5%	Gravity Main
SML1995J07	SMH1995J07	SMH1995J05	8	74	908	2.8%	Gravity Main
SML1995J08	SMH1995J08	SMH1995J05	6	62	497	3.9%	Gravity Main
SML1995J09	SMH1995J09	SMH1995H05	24	480	4,764	0.2%	Gravity Main
SML1995J0A	SMH1995R14	SMH1995R16	8	169	789	2.1%	Gravity Main
SML1995J10	SMH1995J10	SMH1995J09	24	474	4,790	0.2%	Gravity Main
SML1995J11	SMH1995J11	SMH1995H07	15	493	2,146	0.5%	Gravity Main
SML1995J12	SMH1995J12	SMH1995J11	12	414	1,198	0.6%	Gravity Main
SML1995J13	SMH1995J13	SMH1995R11	6	466	173	0.5%	Gravity Main
SML1995J14	SMH1995J14	SMH1995H09	8	484	310	0.3%	Gravity Main
SML1995J15	SMH1995J15	SMH1995J14	8	443	298	0.3%	Gravity Main
SML1995J16	SMH1995J16	SMH1995H11	6	439	291	1.3%	Gravity Main
SML1995J17	SMH1995J17	SMH1995J18	6	465	242	0.9%	Gravity Main
SML1995J18	SMH1995J18	SMH2095M03	8	342	--	0.0%	Gravity Main
SML1995J22	SMH1995J22	SMH1995H12	8	314	--	--	Gravity Main
SML1995J5A	SMH1995J05	SMH1995J02	6	184	382	2.3%	Gravity Main
SML1995K01	SMH1995K01	SMH1995G04	12	292	785	0.2%	Gravity Main
SML1995K02	SMH1995K02	SMH1995K03	10	44	392	0.2%	Gravity Main
SML1995K03	SMH1995K03	SMH1995K04	10	475	612	0.4%	Gravity Main
SML1995K04	SMH1995K04	SMH1995Q05	10	487	1,174	1.4%	Gravity Main
SML1995K05	SMH1995K05	SMH1995K03	8	53	1,223	5.1%	Gravity Main
SML1995K06	SMH1995K06	SMH1995K05	8	111	2,745	25.5%	Gravity Main
SML1995K07	SMH1995K07	SMH1995K08	8	402	814	2.2%	Gravity Main
SML1995K08	SMH1995K08	SMH1995Q07	8	481	502	0.9%	Gravity Main
SML1995K10	SMH1995K10	SMH1995Q09	8	438	305	0.3%	Gravity Main
SML1995K11	SMH1995K11	SMH1995K12	18	527	2,913	0.4%	Gravity Main
SML1995K12	SMH1995K12	SMH1995Q18	18	430	2,667	0.3%	Gravity Main
SML1995K13	SMH1995K13	SMH1995K20	6	160	831	10.8%	Gravity Main
SML1995K14	SMH1995K14	SMH1995K12	4	140	727	72.0%	Gravity Main
SML1995K15	SMH1995K15	SMH1995Q13	8	447	679	1.6%	Gravity Main
SML1995K20	SMH1995K20	SMH1995K10	8	551	388	0.5%	Gravity Main
SML1995Q05	SMH1995Q05	SMH1995Q04	10	70	3,296	11.2%	Gravity Main
SML1995Q06	SMH1995Q06	SMH1995Q05	10	495	981	1.0%	Gravity Main
SML1995Q07	SMH1995Q07	SMH1995Q05	10	167	4,422	20.1%	Gravity Main
SML1995Q08	SMH1995Q08	SMH1995Q07	6	428	262	1.1%	Gravity Main
SML1995Q0B	SMH1995Q10	SMH1995T16	8	483	480	0.8%	Gravity Main
SML1995Q0D	SMH1995Q13	SMH1995Q19	8	358	423	0.6%	Gravity Main
SML1995Q0E	SMH1995Q13	SMH1995Q18	--	147	--	--	Gravity Main
SML1995Q11	SMH1995Q11	SMH1995Q12	18	480	3,119	0.4%	Gravity Main
SML1995Q12	SMH1995Q12	SMH1995T20	18	400	5,791	1.5%	Gravity Main
SML1995Q18	SMH1995Q18	SMH1995Q11	18	36	3,868	0.7%	Gravity Main
SML1995Q19	SMH1995Q19	SMH1995T22	8	176	609	1.3%	Gravity Main
SML1995Q22	SMH1995Q22	SMH1995Q23	8	423	--	--	Force Main
SML1995Q23	SMH1995Q23	SMH1995Q18	18	27	--	--	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1995Q4B	SMH1995Q04	SMH1995Q22	12	20	7,830	23.9%	Gravity Main
SML1995R01	SMH1995R01	SMH1995Q13	18	368	10,329	4.8%	Gravity Main
SML1995R02	SMH1995R02	SMH1995R01	8	26	1,767	10.6%	Gravity Main
SML1995R03	SMH1995R03	SMH1995R02	6	209	238	0.9%	Gravity Main
SML1995R04	SMH1995R04	SMH1995S01	6	616	334	1.7%	Gravity Main
SML1995R05	SMH1995R05	SMH1995R20	24	92	--	--	Gravity Main
SML1995R06	SMH1995R06	SMH1995R01	6	171	626	6.1%	Gravity Main
SML1995R07	SMH1995R07	SMH1995Z43	8	135	864	2.5%	Gravity Main
SML1995R08	SMH1995R08	SMH1995S05	10	459	784	0.6%	Gravity Main
SML1995R09	SMH1995R09	SMH1995R10	18	435	1,964	0.2%	Gravity Main
SML1995R10	SMH1995R10	SMH1995R08	8	174	297	0.3%	Gravity Main
SML1995R11	SMH1995R11	SMH1995R12	8	435	312	0.3%	Gravity Main
SML1995R12	SMH1995R12	SMH1995R14	8	176	503	0.9%	Gravity Main
SML1995R13	SMH1995R13	SMH1995R19	10	219	546	0.3%	Gravity Main
SML1995R14	SMH1995R14	SMH1995S24	10	477	523	0.3%	Gravity Main
SML1995R15	SMH1995R15	SMH1995R16	6	410	260	1.1%	Gravity Main
SML1995R16	SMH1995R16	SMH1995S23	8	465	319	0.3%	Gravity Main
SML1995R17	SMH1995R17	SMH1995R18	8	400	399	0.5%	Gravity Main
SML1995R18	SMH1995R18	SMH1995R16	6	171	183	0.5%	Gravity Main
SML1995R19	SMH1995R19	SMH1995R14	10	215	485	0.2%	Gravity Main
SML1995R20	SMH1995R20	SMH1995R21	24	122	9,405	0.9%	Gravity Main
SML1995R21	SMH1995R21	SMH1995J10	24	186	10,434	1.1%	Gravity Main
SML1995R22	CLEANOUT_MH	SMH1995R15	6	30	--	0.0%	Gravity Main
SML1995R23	SMH1995R23	SMH1995J18	6	274	438	3.0%	Gravity Main
SML1995R24	SMH1995R24	SMH1995R01	12	294	1,099	0.5%	Gravity Main
SML1995S01	SMH1995S01	SMH1995S19	6	66	315	1.6%	Gravity Main
SML1995S04	SMH1995S04	SMH1995T26	18	135	12,219	6.7%	Gravity Main
SML1995S05	SMH1995S05	SMH1995S06	10	491	1,604	2.6%	Gravity Main
SML1995S06	SMH1995S06	SMH1995S04	12	171	3,422	4.6%	Gravity Main
SML1995S07	SMH1995S07	SMH1995S08	10	440	1,051	1.1%	Gravity Main
SML1995S08	SMH1995S08	SMH1995S06	10	176	2,089	4.5%	Gravity Main
SML1995S09	SMH1995S09	SMH1995S30	6	330	323	1.6%	Gravity Main
SML1995S10	SMH1995S10	SMH1995Z13	6	465	254	1.0%	Gravity Main
SML1995S11	SMH1995S11	SMH1995S24	10	44	1,098	1.2%	Gravity Main
SML1995S12	SMH1995S12	SMH1995S21	21	301	7,123	1.0%	Gravity Main
SML1995S13	SMH1995S13	SMH1995S18	8	285	809	2.2%	Gravity Main
SML1995S15	SMH1995S15	SMH1995S16	15	389	2,290	0.6%	Gravity Main
SML1995S16	SMH1995S16	SMH1995S17	15	48	1,873	0.4%	Gravity Main
SML1995S17	SMH1995S17	SMH2095V01	21	47	26,547	13.9%	Gravity Main
SML1995S17	SMH1995S17	SMH2095V01	21	125	16,283	5.2%	Gravity Main
SML1995S18	SMH1995S18	SMH1995S15	8	95	1,090	4.0%	Gravity Main
SML1995S19	SMH1995S19	SMH1995S20	8	167	1,597	8.6%	Gravity Main
SML1995S20	SMH1995S20	SMH1995T29	8	59	806	2.2%	Gravity Main
SML1995S21	SMH1995S21	SMH1995S17	21	170	13,669	3.7%	Gravity Main
SML1995S22	SMH1995S22	SMH2095V01	6	45	851	11.4%	Gravity Main
SML1995S23	SMH1995S23	SMH1995S12	21	193	6,881	0.9%	Gravity Main
SML1995S24	SMH1995S24	SMH1995S23	21	179	6,952	1.0%	Gravity Main
SML1995S25	SMH1995S25	SMH1995S21	8	37	909	2.8%	Gravity Main
SML1995S27	SMH1995S27	SMH1995Z42	12	223	2,304	2.1%	Gravity Main
SML1995S28	SMH1995S28	SMH1995S27	12	189	1,233	0.6%	Gravity Main
SML1995S29	SMH1995S29	SMH1995Z17	10	265	822	0.7%	Gravity Main
SML1995S30	SMH1995S30	SMH1995R12	6	74	333	1.7%	Gravity Main
SML1995S6A	SMH1995S06	SML1995Z46	8	492	770	2.0%	Gravity Main
SML1995T01	CAP	SMH1995T03	12	8	1,385	0.7%	Gravity Main
SML1995T03	SMH1995T03	SMH1995T27	14	25	8,564	12.5%	Gravity Main
SML1995T04	SMH1995T04	SMH1995T02	30	127	51,131	7.7%	Gravity Main
SML1995T05	SMH1995T05	SMH1995T01	12	115	1,593	1.0%	Gravity Main
SML1995T06	SMH1995T06	SMH1995T04	30	70	53,519	8.4%	Gravity Main
SML1995T07	SMH1995T07	SMH1995T32	8	428	907	2.8%	Gravity Main
SML1995T08	SMH1995T08	SMH1995Q06	8	382	466	0.7%	Gravity Main
SML1995T09	SMH1995T09	SMH1995T35	30	131	25,575	1.9%	Gravity Main
SML1995T0B	SMH1995T14	SMH1995T13	30	6	28,687	2.4%	Gravity Main
SML1995T0C	SMH1995T04	SMH1995T05	12	7	--	--	Gravity Main
SML1995T11	SMH1995T11	SMH1995T09	24	177	29,509	8.4%	Gravity Main
SML1995T12	SMH1995T12	SMH1995T11	8	442	286	0.3%	Gravity Main
SML1995T13	SMH1995T13	SMH1995T11	24	162	29,935	8.6%	Gravity Main
SML1995T14	SMH1995T14	SMH1995T15	30	63	13,147	0.5%	Gravity Main
SML1995T15	SMH1995T15	SMH1995T28	30	12	101,722	30.4%	Gravity Main
SML1995T16	SMH1995T16	SMH1995T17	8	426	833	2.3%	Gravity Main
SML1995T17	SMH1995T17	SMH1995T14	30	10	18,401	1.0%	Gravity Main
SML1995T18	SMH1995T18	SMH1995T17	12	486	1,792	1.2%	Gravity Main
SML1995T19	SMH1995T19	SMH1995T17	12	34	2,898	3.3%	Gravity Main
SML1995T20	SMH1995T20	SMH1995T17	18	44	6,370	1.8%	Gravity Main
SML1995T21	SMH1995T21	SMH1995T17	8	39	1,479	7.4%	Gravity Main
SML1995T22	SMH1995T22	SMH1995T23	8	416	543	1.0%	Gravity Main
SML1995T23	SMH1995T23	SMH1995T21	8	130	1,644	9.1%	Gravity Main
SML1995T24	SMH1995T24	SMH1995T23	6	447	267	1.1%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1995T25	SMH1995T25	SMH1995T18	12	185	2,885	3.2%	Gravity Main
SML1995T26	SMH1995T26	SMH1995T25	18	181	9,938	4.4%	Gravity Main
SML1995T27	SMH1995T27	SMH1995T15	16	747	--	--	Force Main
SML1995T28	<Null>	SMH1995A22	18	1933	--	--	Force Main
SML1995T28	<Null>	SMH1995A22	16	502	--	--	Force Main
SML1995T28	SMH1995T28	SMH1995A22	22	1549	--	--	Force Main
SML1995T28	SMH1995T28	SMH1995J10	16	147	--	--	Force Main
SML1995T29	SMH1995T29	SMH1995T23	8	138	1,270	5.5%	Gravity Main
SML1995T30	SMH1995T30	SMH1995T08	8	28	1,019	3.5%	Gravity Main
SML1995T32	SMH1995T32	SMH1995T35	8	64	922	2.9%	Gravity Main
SML1995T33	SMH1995T37	SMH1995T27	36	29	57,778	3.7%	Gravity Main
SML1995T33	SMH1995T33	SMH1995T34	24	95	10,898	1.1%	Gravity Main
SML1995T34	SMH1995T34	SMH1995T35	30	18	21,401	1.3%	Gravity Main
SML1995T35	SMH1995T35	SMH1995T06	36	34	237,303	62.5%	Gravity Main
SML1995T36	SMH1995T36	SMH1995T11	8	422	--	--	Gravity Main
SML1995T38	SMH1995T38	SMH1995T27	--	24	--	--	Gravity Main
SML1995U04	SMH1995U04	SMH1995U08	24	51	4,524	0.2%	Gravity Main
SML1995U05	SMH1995U05	SMH1995U06	12	69	1,219	0.6%	Gravity Main
SML1995U06	SMH1995U06	SMH1995U07	12	110	--	--	Gravity Main
SML1995U07	SMH1995U07	SMH1995T03	24	284	4,268	0.2%	Gravity Main
SML1995U08	SMH1995U08	SMH1995U07	24	400	4,552	0.2%	Gravity Main
SML1995U09	SMH1995U09	SMH1995U06	8	283	--	0.0%	Gravity Main
SML1995X03	SMH1995X03	SMH3095C11	12	99	1,069	0.4%	Gravity Main
SML1995X07	SMH1995X07	SMH1995X03	12	209	1,739	1.2%	Gravity Main
SML1995X08	SMH1995X08	SMH1995X07	12	200	1,845	1.3%	Gravity Main
SML1995X09	SMH1995X09	SMH1995X08	10	39	--	--	Gravity Main
SML1995X0A	SMH1995X15	SMH1995X14	8	19	--	0.0%	Gravity Main
SML1995X10	SMH1995X10	SMH1995X16	27	248	10,690	0.6%	Gravity Main
SML1995X11	SMH1995X11	SMH1995X09	8	96	1,184	4.7%	Gravity Main
SML1995X12	SMH1995X12	SMH1995U04	24	233	4,715	0.2%	Gravity Main
SML1995X13	SMH1995X13	SMH1995X11	8	73	--	--	Gravity Main
SML1995X14	SMH1995X14	SMH1995X08	12	181	1,685	1.1%	Gravity Main
SML1995X16	SMH1995X16	SMH1995X14	15	70	9,902	11.6%	Gravity Main
SML1995X20	SMH1995X20	SMH3095C39	36	372	--	--	Gravity Main
SML1995X21	SMH1995X21	SMH1995X20	36	258	--	--	Gravity Main
SML1995Y01	SMH1995Y01	SMH1995X15	24	183	18,880	3.4%	Gravity Main
SML1995Y02	SMH1995Y02	SMH1995Y01	24	97	31,947	9.8%	Gravity Main
SML1995Y03	SMH1995Y03	SMH1995T07	8	190	1,764	10.5%	Gravity Main
SML1995Y04	SMH1995Y04	SMH1995Y02	24	252	26,729	6.9%	Gravity Main
SML1995Y05	SMH1995Y05	SMH1995Y04	12	162	2,224	1.9%	Gravity Main
SML1995Y06	SMH1995Y06	SMH1995Y04	24	173	21,323	4.4%	Gravity Main
SML1995Y07	SMH1995Y07	SMH1995Y06	6	296	603	5.7%	Gravity Main
SML1995Y08	SMH1995Y08	SMH1995T12	8	96	867	2.5%	Gravity Main
SML1995Y09	SMH1995Y09	SMH1995Y06	27	174	31,353	5.1%	Gravity Main
SML1995Y0B	SMH1995Y11	SMH1995Y10	12	464	1,472	0.8%	Gravity Main
SML1995Y10	SMH1995Y10	SMH1995T19	10	475	1,270	1.7%	Gravity Main
SML1995Y11	SMH1995Y11	SMH1995Y09	27	166	33,186	5.7%	Gravity Main
SML1995Y12	SMH1995Y12	SMH1995T25	18	388	7,022	2.2%	Gravity Main
SML1995Y13	SMH1995Y13	SMH1995Y11	36	174	35,233	1.4%	Gravity Main
SML1995Y14	SMH1995Y14	SMH1995Y13	12	197	2,899	3.3%	Gravity Main
SML1995Y15	SMH1995Y15	SMH1995Y18	8	50	815	2.2%	Gravity Main
SML1995Y16	SMH1995Y16	SMH1995Y09	18	183	8,410	3.2%	Gravity Main
SML1995Y18	SMH1995Y18	SMH1995Y08	8	168	748	1.9%	Gravity Main
SML1995Y19	SMH1995Y19	SMH1995Y13	36	185	34,812	1.3%	Gravity Main
SML1995Y20	SMH1995Y20	SMH1995Y01	8	272	1,621	8.9%	Gravity Main
SML1995Y22	SMH1995Y22	SMH1995X21	36	177	--	--	Gravity Main
SML1995Y23	SMH1995Y23	SMH1995Y22	36	15	--	--	Gravity Main
SML1995Y2A	SMH1995Y02	SMH1995X13	8	291	2,001	13.5%	Gravity Main
SML1995Z02	SMH1995Z02	SMH1995Y19	30	291	28,220	2.3%	Gravity Main
SML1995Z03	SMH1995Z03	SMH1995S04	12	333	1,537	0.9%	Gravity Main
SML1995Z06	SMH1995Z06	SMH1995Z46	12	110	3,667	5.2%	Gravity Main
SML1995Z0A	SMH1995Z03	SMH1995Z45	8	105	168	0.1%	Gravity Main
SML1995Z0C	SMH1995Z20	SMH1995Z19	15	22	--	0.0%	Gravity Main
SML1995Z11	SMH1995Z11	SMH1995S08	10	48	715	0.5%	Gravity Main
SML1995Z13	SMH1995Z13	SMH1995Z52	6	454	211	0.7%	Gravity Main
SML1995Z17	SMH1995Z17	SMH1995Z55	24	414	5,595	0.3%	Gravity Main
SML1995Z19	SMH1995Z19	SMH1995Z59	10	167	951	0.9%	Gravity Main
SML1995Z20	SMH1995Z20	SMH1995Z58	16	173	3,453	1.0%	Gravity Main
SML1995Z22	SMH1995Z22	SMH1995Z64	8	192	4,209	59.9%	Gravity Main
SML1995Z27	SMH1995Z27	SMH1995Z58	8	71	1,522	7.8%	Gravity Main
SML1995Z31	SMH1995Z31	SMH1995S17	8	177	525	0.9%	Gravity Main
SML1995Z32	SMH1995Z32	SMH1995Z31	8	121	563	1.1%	Gravity Main
SML1995Z37	SMH1995Z37	SMH1995Z38	12	200	2,325	2.1%	Gravity Main
SML1995Z38	SMH1995Z38	SMH1995Z39	12	71	1,370	0.7%	Gravity Main
SML1995Z39	SMH1995Z39	SMH1995Z52	12	20	2,949	3.4%	Gravity Main
SML1995Z40	SMH1995Z40	SMH1995Z39	12	77	--	--	Gravity Main
SML1995Z41	SMH1995Z41	SMH1995Z40	12	196	2,353	2.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML1995Z42	SMH1995Z42	SMH1995Z41	12	220	--	--	Gravity Main
SML1995Z43	SMH1995Z43	SMH1995R06	8	296	490	0.8%	Gravity Main
SML1995Z44	SMH1995Z44	SMH1995Y19	24	183	20,495	4.1%	Gravity Main
SML1995Z45	SMH1995Z45	SMH1995Z44	12	54	2,321	2.1%	Gravity Main
SML1995Z46	SMH1995Z46	SMH1995Z44	24	170	17,617	3.0%	Gravity Main
SML1995Z47	SMH1995Z47	SMH1995Z46	18	171	11,775	6.2%	Gravity Main
SML1995Z48	SMH1995Z48	SMH1995Z49	12	174	1,173	0.5%	Gravity Main
SML1995Z49	SMH1995Z49	SMH1995Z47	12	256	1,056	0.4%	Gravity Main
SML1995Z50	SMH1995Z50	SMH1995Z51	12	126	2,714	2.9%	Gravity Main
SML1995Z51	SMH1995Z51	SMH1995Z47	12	56	3,242	4.1%	Gravity Main
SML1995Z52	SMH1995Z52	SMH1995Z47	18	172	11,561	6.0%	Gravity Main
SML1995Z53	SMH1995Z53	SMH1995Z54	12	107	5,893	13.5%	Gravity Main
SML1995Z54	SMH1995Z54	SMH1995Z56	30	174	26,227	2.0%	Gravity Main
SML1995Z55	SMH1995Z55	SMH1995Z54	24	25	15,287	2.3%	Gravity Main
SML1995Z56	SMH1995Z56	SMH1995Z61	30	173	10,132	0.3%	Gravity Main
SML1995Z57	SMH1995Z57	SMH1995Z56	12	73	1,601	1.0%	Gravity Main
SML1995Z58	SMH1995Z58	SMH1995Z59	18	11	13,834	8.6%	Gravity Main
SML1995Z59	SMH1995Z59	SMH1995Z56	18	160	8,043	2.9%	Gravity Main
SML1995Z60	SMH1995Z60	SMH1995Z61	12	160	4,203	6.9%	Gravity Main
SML1995Z61	SMH1995Z61	SMH1995Z62	30	164	24,481	1.8%	Gravity Main
SML1995Z62	SMH1995Z62	SMH2095W28	30	181	34,848	3.6%	Gravity Main
SML1995Z63	SMH1995Z63	SMH1995Z44	12	55	2,320	2.1%	Gravity Main
SML1995Z64	SMH1995Z64	SMH1995Z57	8	181	4,330	63.4%	Gravity Main
SML2085A01	SMH2085A01	SMH2085A02	36	377	15,156	0.3%	Gravity Main
SML2085A02	SMH2085A02	SMH1785Z01	36	261	14,497	0.2%	Gravity Main
SML2085A04	SMH2085A04	SMH2085B15	8	162	--	0.0%	Gravity Main
SML2085A05	SMH2085A05	SMH2085A06	8	307	184	0.1%	Gravity Main
SML2085A06	SMH2085A06	SMH2085A07	8	55	--	--	Gravity Main
SML2085A07	SMH2085A07	SMH2085A08	8	57	387	0.5%	Gravity Main
SML2085A08	SMH2085A08	SMH2085B17	8	141	386	0.5%	Gravity Main
SML2085A09	SMH2085A09	SMH2085A11	8	100	551	1.0%	Gravity Main
SML2085A10	SMH2085A10	SMH2085A11	8	80	1,067	3.8%	Gravity Main
SML2085A11	SMH2085A11	SMHSLWD	8	139	994	3.3%	Gravity Main
SML2085B01	SMH2085B01	SMH2085B02	8	283	1,084	4.0%	Gravity Main
SML2085B02	SMH2085B02	SMH2085B03	8	289	936	3.0%	Gravity Main
SML2085B03	SMH2085B03	SMH2085G01	8	360	530	1.0%	Gravity Main
SML2085B04	SMH2085B04	SMH2085G03	8	300	1,017	3.5%	Gravity Main
SML2085B05	SMH2085B05	SMH2085B04	8	100	567	1.1%	Gravity Main
SML2085B06	SMH2085B06	SMH2085B05	8	164	606	1.2%	Gravity Main
SML2085B07	SMH2085B07	SMH2085B06	8	423	532	1.0%	Gravity Main
SML2085B08	SMH2085B08	SMH2085B19	8	26	3,408	39.3%	Gravity Main
SML2085B09	SMH2085B09	SMH2085B10	8	140	--	0.0%	Gravity Main
SML2085B10	SMH2085B10	SMH2085B08	8	153	529	0.9%	Gravity Main
SML2085B11	SMH2085B11	SMH2085B12	8	144	1,204	4.9%	Gravity Main
SML2085B12	SMH2085B12	SMH2085G16	8	138	350	0.4%	Gravity Main
SML2085B13	SMH2085B13	SMH2085B14	8	216	405	0.6%	Gravity Main
SML2085B14	SMH2085B14	SMH2085B12	8	223	369	0.5%	Gravity Main
SML2085B15	SMH2085B15	SMH2085B16	8	253	1,247	5.3%	Gravity Main
SML2085B16	SMH2085B16	SMH2085B17	8	70	1,070	3.9%	Gravity Main
SML2085B17	SMH2085B17	SMH2085A09	8	82	539	1.0%	Gravity Main
SML2085B19	SMH2085B19	SMH2085B06	8	117	--	--	Gravity Main
SML2085C01	SMH2085C01	SMH2085C02	8	81	519	0.9%	Gravity Main
SML2085C02	SMH2085C02	SMH2085C03	8	95	410	0.6%	Gravity Main
SML2085C03	SMH2085C03	SMH2085C04	8	157	1,360	6.3%	Gravity Main
SML2085C04	SMH2085C04	SMH2085C09	8	266	844	2.4%	Gravity Main
SML2085C05	SMH2085C05	SMH2085C06	8	187	778	2.0%	Gravity Main
SML2085C06	SMH2085C06	SMH2085C08	8	68	526	0.9%	Gravity Main
SML2085C07	SMH2085C07	SMH2085C08	8	121	594	1.2%	Gravity Main
SML2085C08	SMH2085C08	SMH2085C10	8	159	395	0.5%	Gravity Main
SML2085C09	SMH2085C09	SMH2085C06	8	175	948	3.0%	Gravity Main
SML2085C10	SMH2085C10	SMH2085B10	8	220	799	2.2%	Gravity Main
SML2085C12	SMH2085C12	SMH2085C04	8	317	537	1.0%	Gravity Main
SML2085C13	SMH2085C13	SMH1785W17	10	388	825	0.7%	Gravity Main
SML2085C14	SMH2085C14	SMH2085C13	10	164	986	1.0%	Gravity Main
SML2085D01	SMH2085D01	SMH1985A05	8	63	804	2.2%	Gravity Main
SML2085D02	SMH2085D02	SMH2085D04	8	20	797	2.1%	Gravity Main
SML2085D03	SMH2085D03	SMH2085D02	8	303	6,798	156.3%	Gravity Main
SML2085D04	SMH2085D04	SMH2085D01	8	11	--	--	Gravity Main
SML2085E05	SMH2085E05	SMH1985H03	8	36	543	1.0%	Gravity Main
SML2085E06	SMH2085E06	SMH2085D01	8	335	476	0.8%	Gravity Main
SML2085E07	SMH2085E07	SMH2085E05	8	33	944	3.0%	Gravity Main
SML2085E08	SMH2085E08	SMH2085E07	8	265	957	3.1%	Gravity Main
SML2085E09	SMH2085E09	SMH2085E08	8	222	527	0.9%	Gravity Main
SML2085E10	SMH2085E10	SMH2085E07	8	38	2,323	18.2%	Gravity Main
SML2085G01	SMH2085G01	SMH2085G27	8	144	1,380	6.4%	Gravity Main
SML2085G02	SMH2085G02	SMH2085G03	8	268	1,223	5.1%	Gravity Main
SML2085G03	SMH2085G03	SMH2085G26	8	196	--	--	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2085G04	SMH2085G04	SMH2085G05	8	146	535	1.0%	Gravity Main
SML2085G05	SMH2085G05	SMH2085G06	8	149	391	0.5%	Gravity Main
SML2085G06	SMH2085G06	SMH2085G07	8	158	360	0.4%	Gravity Main
SML2085G07	SMH2085G07	SMH2085G08	8	171	467	0.7%	Gravity Main
SML2085G08	SMH2085G08	SMH2085G09	8	210	1,207	4.9%	Gravity Main
SML2085G09	SMH2085G09	SMH2085G10	8	121	349	0.4%	Gravity Main
SML2085G10	SMH2085G10	SMH2085G11	8	118	381	0.5%	Gravity Main
SML2085G11	SMH2085G11	SMH2085G12	8	227	1,756	10.4%	Gravity Main
SML2085G12	SMH2085G12	SMH2085G13	8	182	1,865	11.8%	Gravity Main
SML2085G13	SMH2085G13	SMH2085G14	8	141	1,882	12.0%	Gravity Main
SML2085G15	SMH2085G15	SMH2085G11	8	178	1,521	7.8%	Gravity Main
SML2085G16	SMH2085G16	SMH2085G19	8	38	648	1.4%	Gravity Main
SML2085G17	SMH2085G17	SMH2085G16	8	74	2,172	15.9%	Gravity Main
SML2085G18	SMH2085G18	SMH2085G17	8	97	2,125	15.3%	Gravity Main
SML2085G19	SMH2085G19	SMH2085G20	8	144	387	0.5%	Gravity Main
SML2085G20	SMH2085G20	SMH2085G21	8	195	430	0.6%	Gravity Main
SML2085G21	SMH2085G21	SMH2085G22	8	163	359	0.4%	Gravity Main
SML2085G22	SMH2085G22	SMH2085G23	8	64	372	0.5%	Gravity Main
SML2085G23	SMH2085G23	SMH2085G24	8	150	1,245	5.2%	Gravity Main
SML2085G24	SMH2085G24	SMH2085G14	8	184	--	0.0%	Gravity Main
SML2085G26	SMH2085G26	SMH2085G01	8	138	2,004	13.6%	Gravity Main
SML2085G27	SMH2085G27	SMH2085G17	8	110	1,865	11.8%	Gravity Main
SML2085H01	SMH2085H01	SMH2085H02	36	313	13,879	0.2%	Gravity Main
SML2085H02	SMH2085H02	SMH2085H03	36	346	13,981	0.2%	Gravity Main
SML2085H03	SMH2085H03	SMH2085A01	36	452	13,170	0.2%	Gravity Main
SML2085J01	SMH2085J01	SMH2085J02	36	390	37,864	1.6%	Gravity Main
SML2085J02	SMH2085J02	SMH2085H01	36	490	14,218	0.2%	Gravity Main
SML2085J03	SLWD	SMH2085J02	12	53	2,781	3.0%	Gravity Main
SML2085K01	SMH2085K01	SMH2085G07	8	129	1,448	7.1%	Gravity Main
SML2085K02	SMH2085K02	SMH2085K01	8	106	662	1.5%	Gravity Main
SML2085K03	SMH2085K03	SMH2085G13	8	368	795	2.1%	Gravity Main
SML2085K04	SMH2085K04	SMH2085K03	8	126	696	1.6%	Gravity Main
SML2085K05	SMH2085K05	SMH2085G15	8	134	1,013	3.5%	Gravity Main
SML2085K06	SMH2085K06	SMH2085K05	8	114	388	0.5%	Gravity Main
SML2085K07	SMH2085K07	SMH2085K06	8	94	849	2.4%	Gravity Main
SML2085K08	SMH2085K08	SMH2085K06	8	285	567	1.1%	Gravity Main
SML2085K09	SMH2085K09	SLWDSMH	8	162	365	0.4%	Gravity Main
SML2085K10	SMH2085K10	SMH2085K09	8	169	374	0.5%	Gravity Main
SML2085K11	SMH2085K11	SMH2085K10	8	205	859	2.5%	Gravity Main
SML2085K12	SMH2085K12	SMH2085K10	8	49	757	1.9%	Gravity Main
SML2085K13	SMH2085K13	SMH2085K12	8	257	825	2.3%	Gravity Main
SML2085K14	SMH2085K14	SMH2085K10	8	255	379	0.5%	Gravity Main
SML2085K15	SMH2085K15	SMH2085K14	8	359	381	0.5%	Gravity Main
SML2085K16	SMH2085K16	SMH2085K15	8	71	587	1.2%	Gravity Main
SML2085K17	SMH2085K17	SMH2085K15	8	180	545	1.0%	Gravity Main
SML2085K18	SMH2085K18	SMH2085K17	8	82	678	1.6%	Gravity Main
SML2085K19	SMH2085K19	SMH2085K18	8	118	482	0.8%	Gravity Main
SML2085K20	SMH2085K20	SMH2085K19	8	123	354	0.4%	Gravity Main
SML2085K21	SMH2085K21	SMH2085K20	8	119	398	0.5%	Gravity Main
SML2085K22	SMH2085K22	SMH2085K21	8	157	516	0.9%	Gravity Main
SML2085N01	SMH2085N01	SMH2085V12	8	302	518	0.9%	Gravity Main
SML2085N02	SMH2085N02	SMH2085V23	8	343	583	1.1%	Gravity Main
SML2085N04	SMH2085N04	SMH1985R03	18	222	4,818	1.0%	Gravity Main
SML2085N06	SMH2085N06	SMH1985R01	8	67	1,660	9.3%	Gravity Main
SML2085N07	SMH2085N07	SMH2085N06	8	71	801	2.2%	Gravity Main
SML2085N08	SMH2085N08	SMH2085N07	8	102	977	3.2%	Gravity Main
SML2085N09	SMH2085N09	SMH2085N08	8	111	556	1.0%	Gravity Main
SML2085N10	SMH2085N10	SMH2085N09	8	66	625	1.3%	Gravity Main
SML2085N11	SMH2085N11	SMH2085N10	8	149	562	1.1%	Gravity Main
SML2085R01	SMH2085R01	SMH2085R02	36	286	17,123	0.3%	Gravity Main
SML2085R02	SMH2085R02	SMH2085R03	36	553	15,363	0.3%	Gravity Main
SML2085R03	SMH2085R03	SMH2085J01	36	303	76,514	6.5%	Gravity Main
SML2085S01	SMH2085S01	SMH2085S02	36	277	16,439	0.3%	Gravity Main
SML2085S02	SMH2085S02	SMH2085R01	36	331	16,658	0.3%	Gravity Main
SML2085U01	SMH2085U01	SMH2085V06	8	401	1,064	3.8%	Gravity Main
SML2085U02	SMH2085U02	SMH2085W14	8	232	1,141	4.4%	Gravity Main
SML2085U03	SMH2085U03	SMH2085U10	8	60	426	0.6%	Gravity Main
SML2085U04	SMH2085U04	SMH2085U02	8	279	1,234	5.2%	Gravity Main
SML2085U05	SMH2085U05	SMH2085X03	30	298	6,851	0.1%	Gravity Main
SML2085U06	SMH2085U06	SMH2085X03	8	174	1,642	9.1%	Gravity Main
SML2085U07	SMH2085U07	SMH2085U04	8	51	1,004	3.4%	Gravity Main
SML2085U08	SMH2085U08	SMH2085U07	8	223	732	1.8%	Gravity Main
SML2085U09	SMH2085U09	SMH2085U10	8	127	1,520	7.8%	Gravity Main
SML2085U10	SMH2085U10	SMH2085U14	8	100	1,049	3.7%	Gravity Main
SML2085U11	SMH2085U11	SMH2085U01	8	91	1,797	10.9%	Gravity Main
SML2085U12	SMH2085U12	SMH2085U11	8	71	549	1.0%	Gravity Main
SML2085U13	SMH2085U13	SMH2085W15	12	212	3,911	6.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2085U14	SMH2085U14	SMH2085U01	8	125	938	3.0%	Gravity Main
SML2085V09	SMH2085V09	SMH2085U05	30	911	6,502	0.1%	Gravity Main
SML2085V11	SMH2085V11	SMH2085V13	8	192	521	0.9%	Gravity Main
SML2085V12	SMH2085V12	SMH2085V12	8	99	540	1.0%	Gravity Main
SML2085V13	SMH2085V13	SMH2085V14	8	196	542	1.0%	Gravity Main
SML2085V14	SMH2085V14	SMH2085V16	8	148	1,066	3.8%	Gravity Main
SML2085V15	SMH2085V15	SMH2085V17	30	26	22,155	1.4%	Gravity Main
SML2085V16	SMH2085V16	SMH2085V26	8	96	494	0.8%	Gravity Main
SML2085V17	SMH2085V17	SMH2085V18	30	109	9,535	0.3%	Gravity Main
SML2085V18	SMH2085V18	SMH2085V19	30	205	7,742	0.2%	Gravity Main
SML2085V19	SMH2085V19	SMH2085V20	30	306	4,088	0.0%	Gravity Main
SML2085V20	SMH2085V20	SMH2085V21	30	29	--	0.0%	Gravity Main
SML2085V21	SMH2085V21	SMH2085V22	30	257	7,003	0.1%	Gravity Main
SML2085V22	SMH2085V22	SMH2085V26	30	73	6,469	0.1%	Gravity Main
SML2085V23	SMH2085V23	SMH2085V14	8	194	908	2.8%	Gravity Main
SML2085V24	SMH2085V24	SMH1985S13	12	48	--	0.0%	Gravity Main
SML2085V25	SMH2085V25	SMH2085V09	30	158	2,075	0.0%	Gravity Main
SML2085V26	SMH2085V26	SMH2085V25	30	86	6,282	0.1%	Gravity Main
SML2085W02	SMH2085W02	SMH2085W15	15	115	2,475	0.7%	Gravity Main
SML2085W03	SMH2085W03	SMH2085W02	15	165	2,328	0.6%	Gravity Main
SML2085W04	SMH2085W04	SMH2085W05	8	280	479	0.8%	Gravity Main
SML2085W05	SMH2085W05	SMH2085W06	8	94	987	3.3%	Gravity Main
SML2085W06	SMH2085W06	SMH2085W07	8	117	572	1.1%	Gravity Main
SML2085W07	SMH2085W07	SMH2085X10	8	376	546	1.0%	Gravity Main
SML2085W08	SMH2085W08	SMH2085W03	12	59	551	0.1%	Gravity Main
SML2085W12	SMH2085W12	SMH2085W13	15	19	9,681	11.1%	Gravity Main
SML2085W13	SMH2085W13	SMH2085W03	15	334	2,331	0.6%	Gravity Main
SML2085W14	SMH2085W14	SMH2085V09	15	41	2,457	0.7%	Gravity Main
SML2085W15	SMH2085W15	SMH2085W14	15	115	2,252	0.6%	Gravity Main
SML2085X03	SMH2085X03	SMH2085X06	30	152	9,349	0.3%	Gravity Main
SML2085X04	SMH2085X04	SMH2085X03	8	141	768	2.0%	Gravity Main
SML2085X06	SMH2085X06	SMH2085X07	30	49	6,944	0.1%	Gravity Main
SML2085X07	SMH2085X07	SMH2085Y01	30	259	6,587	0.1%	Gravity Main
SML2085X08	SMH2085X08	SMH2085X09	30	401	5,976	0.1%	Gravity Main
SML2085X09	SMH2085X09	SMH2085Y06	30	41	5,784	0.1%	Gravity Main
SML2085X10	SMH2085X10	SMH2985C01	8	73	1,186	4.8%	Gravity Main
SML2085Y01	SMH2085Y01	SMH2085X08	30	248	--	0.0%	Gravity Main
SML2085Y03	SMH2085Y03	SMH2085Z02	30	578	6,559	0.1%	Gravity Main
SML2085Y04	SMH2085Y04	SMH2085Y03	30	352	5,739	0.1%	Gravity Main
SML2085Y05	SMH2085Y05	SMH2085Y04	30	177	5,884	0.1%	Gravity Main
SML2085Y06	SMH2085Y06	SMH2085Y05	30	463	5,882	0.1%	Gravity Main
SML2085Z02	SMH2085Z02	SMH2085Z03	30	533	5,597	0.1%	Gravity Main
SML2085Z03	SMH2085Z03	SMH2085Z04	30	443	37,820	4.2%	Gravity Main
SML2085Z04	SMH2085Z04	SMH2085Z05	30	10	18,827	1.0%	Gravity Main
SML2085Z05	SMH2085Z05	SMH2085Z07	36	580	6,825	0.1%	Gravity Main
SML2085Z07	SMH2085Z07	SMH2085S01	36	591	16,047	0.3%	Gravity Main
SML2085Z07	SMH2085Z07	SMH2085Z10	36	19	89,301	8.9%	Gravity Main
SML2085Z08	SMH2085Z08	SMH2085Z09	30	571	--	--	Gravity Main
SML2085Z09	SMH2085Z09	SMH2085Z07	30	11	--	--	Gravity Main
SML2095A01	SMH2095A01	SMH2095A02	30	161	13,028	0.5%	Gravity Main
SML2095A02	SMH2095A02	SMH2095A18	30	157	13,993	0.6%	Gravity Main
SML2095A04	SMH2095A04	SMH1795Z03	8	180	883	2.6%	Gravity Main
SML2095A05	SMH2095A05	SMH2095A06	12	440	1,204	0.6%	Gravity Main
SML2095A06	SMH2095A06	SMH2095H05	15	482	2,587	0.8%	Gravity Main
SML2095A07	SMH2095A07	SMH1795Z08	8	192	1,604	8.7%	Gravity Main
SML2095A08	SMH2095A08	SMH2095A19	8	480	535	1.0%	Gravity Main
SML2095A10	SMH2095A10	SMH1795Z09	8	195	1,292	5.6%	Gravity Main
SML2095A11	SMH2095A11	SMH2095A12	15	437	2,054	0.5%	Gravity Main
SML2095A12	SMH2095A12	SMH2095H09	15	486	5,004	3.0%	Gravity Main
SML2095A13	SMH2095A13	SMH1795Z13	8	251	1,328	6.0%	Gravity Main
SML2095A14	SMH2095A14	SMH2095A13	8	222	1,316	5.9%	Gravity Main
SML2095A15	SMH2095A15	SMH2095A16	8	266	533	1.0%	Gravity Main
SML2095A16	SMH2095A16	SMH2095H11	8	446	690	1.6%	Gravity Main
SML2095A18	SMH2095A18	SMH2095H01	30	157	13,991	0.6%	Gravity Main
SML2095A19	SMH2095A19	SMH2095H14	10	480	920	0.9%	Gravity Main
SML2095B01	SMH2095B01	SMH1795X19	12	413	2,791	3.0%	Gravity Main
SML2095B02	SMH2095B02	SMH1795Y02	12	415	1,575	1.0%	Gravity Main
SML2095B05	SMH2095B05	SMH2095B07	30	167	7,820	0.2%	Gravity Main
SML2095B06	SMH2095B06	SMH1795Y10	6	93	275	1.2%	Gravity Main
SML2095B07	SMH2095B07	SMH2095B16	30	160	9,564	0.3%	Gravity Main
SML2095B10	SMH2095B10	SMH1795Y15	8	394	534	1.0%	Gravity Main
SML2095B13	SMH2095B13	SMH1795Y20	8	422	939	3.0%	Gravity Main
SML2095B14	SMH2095B14	SMH2095B02	6	110	454	3.2%	Gravity Main
SML2095B16	SMH2095B16	SMH2095B17	21	342	8,617	1.5%	Gravity Main
SML2095B17	SMH2095B17	SMH2095A01	21	344	8,633	1.5%	Gravity Main
SML2095B18	SMH2095B18	SMH2095B19	20	294	4,069	0.4%	Gravity Main
SML2095B19	SMH2095B19	SMH2095B20	18	345	5,903	1.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2095B20	SMH2095B20	SMH2095B21	18	342	6,960	2.2%	Gravity Main
SML2095B21	SMH2095B21	SMH2095A18	18	343	6,952	2.2%	Gravity Main
SML2095B22	SMH2095B22	SMH2095B16	--	345	--	--	Gravity Main
SML2095C01	SMH2095C01	SMH1795W21	8	429	866	2.5%	Gravity Main
SML2095C02	SMH2095C02	SMH2095C03	8	433	360	0.4%	Gravity Main
SML2095C03	SMH2095C03	SMH2095F01	8	482	554	1.0%	Gravity Main
SML2095C04	SMH2095C04	SMH1795X04	8	479	824	2.3%	Gravity Main
SML2095C05	SMH2095C05	SMH2095C04	8	482	350	0.4%	Gravity Main
SML2095C07	SMH2095C07	SMH2095C13	14	173	1,538	0.4%	Gravity Main
SML2095C09	SMH2095C09	SMH2095C14	12	483	796	0.2%	Gravity Main
SML2095C12	SMH2095C12	SMH2095B22	8	457	638	1.4%	Gravity Main
SML2095C13	SMH2095C13	SMH2095C14	18	170	3,096	0.4%	Gravity Main
SML2095C14	SMH2095C14	SMH2095C15	18	172	3,100	0.4%	Gravity Main
SML2095C15	SMH2095C15	SMH2095B18	20	219	4,099	0.4%	Gravity Main
SML2095C16	SMH2095C16	SMH1795X07	12	480	1,535	0.9%	Gravity Main
SML2095C17	SMH2095C17	SMH2095C16	12	441	1,465	0.8%	Gravity Main
SML2095D02	SMH2095D02	SMH2095D03	10	435	638	0.4%	Gravity Main
SML2095D03	SMH2095D03	SMH2095E01	18	480	2,936	0.4%	Gravity Main
SML2095D05	SMH2095D05	SMH2095D12	36	50	34,641	1.3%	Gravity Main
SML2095D06	SMH2095D06	SMH2095D09	18	180	2,966	0.4%	Gravity Main
SML2095D07	SMH2095D07	SMH2095D08	10	442	643	0.4%	Gravity Main
SML2095D08	SMH2095D08	SMH2095E06	10	479	613	0.4%	Gravity Main
SML2095D09	SMH2095D09	SMH2095D10	30	481	10,311	0.3%	Gravity Main
SML2095D10	SMH2095D10	SMH2095E08	30	480	9,606	0.3%	Gravity Main
SML2095D11	SMH2095D11	SMH2095D05	36	361	32,592	1.2%	Gravity Main
SML2095D12	SMH2095D12	SMH2095D13	36	393	21,402	0.5%	Gravity Main
SML2095D13	SMH2095D13	SMH2095D10	30	89	13,980	0.6%	Gravity Main
SML2095D14	SMH2095D14	SMH2095D15	18	341	6,482	1.9%	Gravity Main
SML2095D15	SMH2095D15	SMH2095D06	18	344	2,376	0.3%	Gravity Main
SML2095D4A	SMH2095D15	SMH2095D05	12	468	1,048	0.4%	Gravity Main
SML2095E01	SMH2095E01	SMH2095E03	18	343	4,786	1.0%	Gravity Main
SML2095E02	SMH2095E02	SMH2095E01	15	481	3,506	1.5%	Gravity Main
SML2095E04	SMH2095E04	SMH2095M04	15	478	11,355	15.3%	Gravity Main
SML2095E05	SMH2095E05	SMH2095E06	15	174	3,121	1.2%	Gravity Main
SML2095E06	SMH2095E06	SMH2095E07	10	480	629	0.4%	Gravity Main
SML2095E07	SMH2095E07	SMH2095M08	10	482	550	0.3%	Gravity Main
SML2095E08	SMH2095E08	SMH2095E09	36	480	21,228	0.5%	Gravity Main
SML2095E09	SMH2095E09	SMH2095M10	36	482	21,170	0.5%	Gravity Main
SML2095E10	SMH2095E10	SMH2095D05	12	481	997	0.4%	Gravity Main
SML2095E3A	SMH2095E03	SMH2095E04	12	483	754	0.2%	Gravity Main
SML2095E3B	SMH2095E03	SMH2095E05	15	172	3,019	1.1%	Gravity Main
SML2095E6A	SMH2095E06	SMH2095E08	15	173	4,449	2.3%	Gravity Main
SML2095F01	SMH2095F01	SMH2095F02	10	480	877	0.8%	Gravity Main
SML2095F02	SMH2095F02	SMH2095L01	10	480	1,350	1.9%	Gravity Main
SML2095F03	SMH2095F03	SMH2095C05	8	438	636	1.4%	Gravity Main
SML2095F04	SMH2095F04	SMH2095F05	8	425	834	2.4%	Gravity Main
SML2095F05	SMH2095F05	SMH2095L03	8	479	491	0.8%	Gravity Main
SML2095F06	SMH2095F06	SMH2095C07	8	439	974	3.2%	Gravity Main
SML2095F07	SMH2095F07	SMH2095F08	8	434	783	2.1%	Gravity Main
SML2095F08	SMH2095F08	SMH2095L06	10	479	637	0.4%	Gravity Main
SML2095F09	SMH2095F09	SMH2095C14	8	479	588	1.2%	Gravity Main
SML2095F10	SMH2095F10	SMH2095F09	8	442	585	1.2%	Gravity Main
SML2095F11	SMH2095F11	SMH2095L09	8	429	371	0.5%	Gravity Main
SML2095F13	SMH2095F13	SMH2095G19	15	257	2,924	1.0%	Gravity Main
SML2095G04	SMH2095G04	SMH2095G23	16	174	5,205	2.3%	Gravity Main
SML2095G05	SMH2095G05	SMH2095G04	10	333	753	0.6%	Gravity Main
SML2095G08	SMH2095G08	SMH2095G24	16	339	2,870	0.7%	Gravity Main
SML2095G16	SMH2095G16	SMH2095G17	15	341	4,428	2.3%	Gravity Main
SML2095G17	SMH2095G17	SMH2095G18	15	348	4,316	2.2%	Gravity Main
SML2095G18	SMH2095G18	SMH2095H13	15	343	4,431	2.3%	Gravity Main
SML2095G19	SMH2095G19	SMH2095G16	15	255	2,945	1.0%	Gravity Main
SML2095G20	SMH2095G20	SMH2095G30	15	190	2,496	0.7%	Gravity Main
SML2095G21	SMH2095G21	SMH2095G22	12	88	1,991	1.5%	Gravity Main
SML2095G22	SMH2095G22	SMH2095G04	15	157	5,185	3.2%	Gravity Main
SML2095G23	SMH2095G23	SMH2095G24	16	166	5,185	2.3%	Gravity Main
SML2095G24	SMH2095G24	SMH2095G25	16	176	5,136	2.2%	Gravity Main
SML2095G25	SMH2095G25	SMH2095G26	16	170	5,290	2.3%	Gravity Main
SML2095G26	SMH2095G26	SMH2095G29	16	345	4,113	1.4%	Gravity Main
SML2095G29	SMH2095G29	SMH2095H04	18	173	5,289	1.3%	Gravity Main
SML2095G30	SMH2095G30	SMH2095G22	15	146	2,348	0.7%	Gravity Main
SML2095G31	SMH2095G31	SMH2095G26	15	350	1,363	0.2%	Gravity Main
SML2095G32	SMH2095G32	SMH2095G29	15	347	2,681	0.9%	Gravity Main
SML2095H01	SMH2095H01	SMH2095H13	30	155	11,949	0.4%	Gravity Main
SML2095H03	SMH2095H03	SMH2095H05	36	176	18,359	0.4%	Gravity Main
SML2095H04	SMH2095H04	SMH2095H03	15	128	5,056	3.0%	Gravity Main
SML2095H05	SMH2095H05	SMH2095H06	36	478	15,033	0.3%	Gravity Main
SML2095H06	SMH2095H06	SMH2095J01	30	479	8,843	0.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2095H09	SMH2095H09	SMH2095H10	12	481	2,009	1.6%	Gravity Main
SML2095H10	SMH2095H10	SMH2095J05	12	478	1,936	1.5%	Gravity Main
SML2095H11	SMH2095H11	SMH2095H12	12	479	1,855	1.3%	Gravity Main
SML2095H12	SMH2095H12	SMH2095J07	12	482	2,695	2.8%	Gravity Main
SML2095H13	SMH2095H13	SMH2095H03	30	169	13,305	0.5%	Gravity Main
SML2095H14	SMH2095H14	SMH2095H15	10	480	884	0.8%	Gravity Main
SML2095H15	SMH2095H15	SMH2095J09	12	480	1,387	0.7%	Gravity Main
SML2095J01	SMH2095J01	SMH2095J02	30	481	19,742	1.1%	Gravity Main
SML2095J02	SMH2095J02	SMH2095R02	30	481	19,549	1.1%	Gravity Main
SML2095J05	SMH2095J05	SMH2095J12	12	24	8,556	28.5%	Gravity Main
SML2095J07	SMH2095J07	SMH2095J08	12	481	2,664	2.8%	Gravity Main
SML2095J08	SMH2095J08	SMH2095R10	12	480	2,648	2.7%	Gravity Main
SML2095J09	SMH2095J09	SMH2095J10	12	481	2,015	1.6%	Gravity Main
SML2095J10	SMH2095J10	SMH2095R14	12	480	2,040	1.6%	Gravity Main
SML2095J11	SMH2095J11	SMH2095R15	--	480	--	--	Gravity Main
SML2095J12	SMH2095J12	SMH2095J11	--	456	--	--	Gravity Main
SML2095K03	SMH2095K03	SMH2095P10	8	426	363	0.4%	Gravity Main
SML2095K04	SMH2095K04	SMH2095G05	8	479	242	0.2%	Gravity Main
SML2095K05	SMH2095K05	SMH2095K04	8	391	245	0.2%	Gravity Main
SML2095K06	SMH2095K06	SMH2095K09	12	341	1,924	1.4%	Gravity Main
SML2095K07	SMH2095K07	SMH2095G08	15	483	1,760	0.4%	Gravity Main
SML2095K08	SMH2095K08	SMH2095K07	8	442	373	0.5%	Gravity Main
SML2095K09	SMH2095K09	SMH2095Q03	12	480	1,358	0.7%	Gravity Main
SML2095K10	SMH2095K10	SMH2095K11	8	482	451	0.7%	Gravity Main
SML2095K11	SMH2095K11	SMH2095Q05	8	480	470	0.7%	Gravity Main
SML2095K12	SMH2095K12	SMH2095K13	12	482	1,419	0.8%	Gravity Main
SML2095K13	SMH2095K13	SMH2095Q08	12	480	1,428	0.8%	Gravity Main
SML2095K14	SMH2095K14	SMH2095K15	6	464	167	0.4%	Gravity Main
SML2095K15	SMH2095K15	SMH2095Q10	6	478	308	1.5%	Gravity Main
SML2095K16	SMH2095K16	SMH2095K18	12	170	1,430	0.8%	Gravity Main
SML2095K17	SMH2095K17	SMH2095K19	12	271	1,325	0.7%	Gravity Main
SML2095K18	SMH2095K18	SMH2095K17	12	234	1,387	0.7%	Gravity Main
SML2095K19	SMH2095K19	SMH2095G20	12	208	1,363	0.7%	Gravity Main
SML2095L01	SMH2095L01	SMH2095L02	12	480	1,427	0.8%	Gravity Main
SML2095L02	SMH2095L02	SMH2095P01	15	480	2,259	0.6%	Gravity Main
SML2095L03	SMH2095L03	SMH2095L04	8	482	739	1.8%	Gravity Main
SML2095L04	SMH2095L04	SMH2095L02	8	169	1,248	5.3%	Gravity Main
SML2095L05	SMH2095L05	SMH2095P03	10	478	1,418	2.1%	Gravity Main
SML2095L06	SMH2095L06	SMH2095L07	12	481	1,849	1.3%	Gravity Main
SML2095L07	SMH2095L07	SMH2095L05	12	174	1,386	0.7%	Gravity Main
SML2095L08	SMH2095L08	SMH2095P06	10	490	879	0.8%	Gravity Main
SML2095L09	SMH2095L09	SMH2095L10	8	469	496	0.8%	Gravity Main
SML2095L10	SMH2095L10	SMH2095L08	10	170	677	0.5%	Gravity Main
SML2095L11	<Null>	SMH2095L11	8	478	414	0.6%	Gravity Main
SML2095M01	SMH2095M01	SMH2095E02	10	479	541	0.3%	Gravity Main
SML2095M02	SMH2095M02	SMH2095M01	8	431	294	0.3%	Gravity Main
SML2095M04	SMH2095M04	SMH2095M05	18	480	2,103	0.2%	Gravity Main
SML2095M05	SMH2095M05	SMH2095M07	15	162	3,638	1.6%	Gravity Main
SML2095M06	SMH2095M06	SMH2095N03	10	448	658	0.4%	Gravity Main
SML2095M07	SMH2095M07	SMH2095M09	15	178	3,707	1.6%	Gravity Main
SML2095M08	SMH2095M08	SMH2095M09	15	481	1,540	0.3%	Gravity Main
SML2095M10	SMH2095M10	SMH2095M11	36	479	25,648	0.7%	Gravity Main
SML2095M11	SMH2095M11	SMH2095N07	36	479	23,344	0.6%	Gravity Main
SML2095M12	SMH2095M12	SMH2095M10	12	58	3,974	6.1%	Gravity Main
SML2095M3A	SMH2095M03	SMH2095M02	8	50	319	0.3%	Gravity Main
SML2095M3B	SMH2095M03	SMH2095N01	8	486	323	0.4%	Gravity Main
SML2095M9A	SMH2095M09	SMH2095M11	15	180	5,817	4.0%	Gravity Main
SML2095M9B	SMH2095M09	SMH2095N05	21	481	6,142	0.7%	Gravity Main
SML2095N01	SMH2095N01	SMH2095N03	12	343	3,229	4.1%	Gravity Main
SML2095N02	SMH2095N02	SMH2095V02	8	459	331	0.4%	Gravity Main
SML2095N03	SMH2095N03	SMH2095N04	15	478	1,708	0.3%	Gravity Main
SML2095N04	SMH2095N04	SMH2095V06	15	472	3,305	1.3%	Gravity Main
SML2095N06	SMH2095N06	SMH2095V09	21	469	7,264	1.0%	Gravity Main
SML2095N07	SMH2095N07	SMH2095N08	36	484	23,237	0.6%	Gravity Main
SML2095N08	SMH2095N08	SMH2095V12	36	408	21,691	0.5%	Gravity Main
SML2095N5A	SMH2095N05	SMH2095N06	21	479	3,370	0.2%	Gravity Main
SML2095N5B	SMH2095N05	SMH2095N07	8	180	1,014	3.5%	Gravity Main
SML2095P01	SMH2095P01	SMH2095P02	18	480	3,675	0.6%	Gravity Main
SML2095P02	SMH2095P02	SMH2095U02	18	288	2,975	0.4%	Gravity Main
SML2095P03	SMH2095P03	SMH2095P04	15	481	2,652	0.8%	Gravity Main
SML2095P04	SMH2095P04	SMH2095U10	15	288	3,652	1.6%	Gravity Main
SML2095P05	SMH2095P05	SMH2095U14	12	288	2,091	1.7%	Gravity Main
SML2095P06	SMH2095P06	SMH2095P07	12	480	1,621	1.0%	Gravity Main
SML2095P07	SMH2095P07	SMH2095P05	12	171	1,688	1.1%	Gravity Main
SML2095P08	SMH2095P08	SMH2095P09	8	406	550	1.0%	Gravity Main
SML2095P09	SMH2095P09	SMH2095U20	8	362	575	1.1%	Gravity Main
SML2095P10	SMH2095P10	SMH2095P11	10	481	1,101	1.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2095P11	SMH2095P11	SMH2095U27	10	472	1,184	1.4%	Gravity Main
SML2095Q01	SMH2095Q01	SMH2095K06	10	479	462	0.2%	Gravity Main
SML2095Q02	SMH2095Q02	SMH2095Q01	10	219	546	0.3%	Gravity Main
SML2095Q03	SMH2095Q03	SMH2095Q04	12	482	1,376	0.7%	Gravity Main
SML2095Q04	SMH2095Q04	SMH2095Q06	10	171	2,432	6.1%	Gravity Main
SML2095Q05	SMH2095Q05	SMH2095Q06	15	481	2,743	0.9%	Gravity Main
SML2095Q06	SMH2095Q06	SMH2095Q07	15	172	3,245	1.2%	Gravity Main
SML2095Q07	SMH2095Q07	SMH2095T13	15	287	3,910	1.8%	Gravity Main
SML2095Q08	SMH2095Q08	SMH2095Q09	15	479	2,760	0.9%	Gravity Main
SML2095Q09	SMH2095Q09	SMH2095T15	12	288	1,633	1.0%	Gravity Main
SML2095Q10	SMH2095Q10	SMH2095R01	8	121	1,129	4.3%	Gravity Main
SML2095R01	SMH2095R01	SMH2095R03	8	63	911	2.8%	Gravity Main
SML2095R02	SMH2095R02	SMH2095R03	30	27	19,273	1.1%	Gravity Main
SML2095R03	SMH2095R03	SMH2095R04	30	454	19,775	1.1%	Gravity Main
SML2095R04	SMH2095R04	SMH2095S01	30	270	17,415	0.9%	Gravity Main
SML2095R07	SMH2095R07	SMH2095S14	12	50	1,927	1.4%	Gravity Main
SML2095R08	SMH2095R08	SMH2095R09	10	274	1,338	1.8%	Gravity Main
SML2095R09	SMH2095R09	SMH2095R07	10	247	1,339	1.8%	Gravity Main
SML2095R10	SMH2095R10	SMH2095R08	10	171	1,024	1.1%	Gravity Main
SML2095R14	SMH2095R14	SMH2095S22	18	480	5,762	1.5%	Gravity Main
SML2095R15	SMH2095R15	SMH2095R07	12	454	--	--	Gravity Main
SML2095S01	SMH2095S01	SMH2095S04	30	25	8,295	0.2%	Gravity Main
SML2095S02	SMH2095S02	SMH2095T23	8	141	980	3.2%	Gravity Main
SML2095S03	SMH2095S03	SMH2095S02	8	85	561	1.1%	Gravity Main
SML2095S04	SMH2095S04	SMH2095S05	30	152	22,454	1.5%	Gravity Main
SML2095S05	SMH2095S05	SMH2095S07	30	9	130,260	49.8%	Gravity Main
SML2095S06	SMH2095S06	SMH2095S13	48	181	13,589	0.0%	Gravity Main
SML2095S07	SMH2095S07	SMH2095S06	48	287	20,178	0.1%	Gravity Main
SML2095S08	SMH2095S08	SMH2095S07	42	19	80,092	3.1%	Gravity Main
SML2095S09	SMH2095S09	SMH2095S08	42	178	18,260	0.2%	Gravity Main
SML2095S11	SMH2095S11	SMH2095S13	8	36	3,088	32.2%	Gravity Main
SML2095S12	SMH2095S12	SMH2095S11	8	120	861	2.5%	Gravity Main
SML2095S13	SMH2095S13	SMH2095S14	48	292	18,531	0.1%	Gravity Main
SML2095S14	SMH2095S14	SMH2195V01	48	556	19,392	0.1%	Gravity Main
SML2095S15	SMH2095S15	SMH2095S19	36	107	--	--	Gravity Main
SML2095S16	SMH2095S16	SMH2095S20	8	74	603	1.2%	Gravity Main
SML2095S18	SMH2095S18	SMH2095S19	12	130	2,812	3.1%	Gravity Main
SML2095S19	SMH2095S19	SMH2195V06	42	358	19,876	0.2%	Gravity Main
SML2095S20	SMH2095S20	SMH2195V03	8	172	564	1.1%	Gravity Main
SML2095S22	SMH2095S22	SMH2095S13	18	17	66,607	198.5%	Gravity Main
SML2095S23	SMH2095S23	SMH2095S14	12	11	--	--	Gravity Main
SML2095S7A	SMH2095S07	SMH2095S15	30	738	20,075	1.2%	Gravity Main
SML2095T01	SMH2095T01	SMH2095T02	6	270	311	1.5%	Gravity Main
SML2095T02	SMH2095T02	SMH2095T03	6	41	367	2.1%	Gravity Main
SML2095T03	SMH2095T03	SMH2095Y25	8	20	389	0.5%	Gravity Main
SML2095T06	SMH2095T06	SMH2095T08	8	305	1,081	4.0%	Gravity Main
SML2095T07	SMH2095T07	SMH2095Y23	6	309	557	4.9%	Gravity Main
SML2095T08	SMH2095T08	SMH2095T14	8	345	1,085	4.0%	Gravity Main
SML2095T09	SMH2095T09	SMH2095T11	8	74	1,402	6.7%	Gravity Main
SML2095T10	SMH2095T10	SMH2095T11	8	213	666	1.5%	Gravity Main
SML2095T11	SMH2095T11	SMH2095T13	8	177	1,634	9.0%	Gravity Main
SML2095T12	SMH2095T12	SMH2095Y08	6	316	251	1.0%	Gravity Main
SML2095T13	SMH2095T13	SMH2095T15	12	171	3,052	3.6%	Gravity Main
SML2095T14	SMH2095T14	SMH2095T13	8	181	1,070	3.9%	Gravity Main
SML2095T15	SMH2095T15	SMH2095T20	12	171	3,382	4.4%	Gravity Main
SML2095T16	SMH2095T16	SMH2095T25	6	123	569	5.1%	Gravity Main
SML2095T17	SMH2095T17	SMH2095T19	8	138	1,131	4.3%	Gravity Main
SML2095T18	SMH2095T18	SMH2095T22	8	39	741	1.9%	Gravity Main
SML2095T19	SMH2095T19	SMH2095T18	8	88	670	1.5%	Gravity Main
SML2095T20	SMH2095T20	SMH2095S04	15	191	5,765	3.9%	Gravity Main
SML2095T21	SMH2095T21	SMH2095S09	42	347	18,024	0.2%	Gravity Main
SML2095T22	SMH2095T22	SMH2095T21	42	349	16,256	0.1%	Gravity Main
SML2095T23	SMH2095T23	SMH2095T21	8	26	4,133	57.8%	Gravity Main
SML2095T24	SMH2095T24	SMH2095U28	8	140	1,386	6.5%	Gravity Main
SML2095T25	SMH2095T25	SMH2095T26	8	115	1,509	7.7%	Gravity Main
SML2095T26	SMH2095T26	SMH2095T18	8	69	728	1.8%	Gravity Main
SML2095T27	SMH2095T27	SMH2095T01	8	130	634	1.4%	Gravity Main
SML2095U01	SMH2095U01	SMH2095U03	42	57	25,420	0.3%	Gravity Main
SML2095U02	SMH2095U02	SMH2095U03	24	225	6,217	0.4%	Gravity Main
SML2095U03	SMH2095U03	SMH2095U04	42	137	28,438	0.4%	Gravity Main
SML2095U04	SMH2095U04	SMH2095U05	42	151	26,075	0.3%	Gravity Main
SML2095U05	SMH2095U05	SMH2095U06	42	94	31,264	0.5%	Gravity Main
SML2095U06	SMH2095U06	SMH2095X05	48	459	58,365	0.8%	Gravity Main
SML2095U0A	SMH2095U24	SMH2095U20	8	196	--	0.0%	Gravity Main
SML2095U10	SMH2095U10	SMH2095U02	18	345	3,000	0.4%	Gravity Main
SML2095U11	SMH2095U11	SMH2095U04	8	346	577	1.1%	Gravity Main
SML2095U12	SMH2095U12	SMH2095U13	8	108	777	2.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2095U13	SMH2095U13	SMH2095U05	8	348	291	0.3%	Gravity Main
SML2095U14	SMH2095U14	SMH2095U10	12	176	3,755	5.5%	Gravity Main
SML2095U15	SMH2095U15	SMH2095U11	8	170	909	2.8%	Gravity Main
SML2095U16	SMH2095U16	SMH2095U17	8	195	764	2.0%	Gravity Main
SML2095U17	SMH2095U17	SMH2095U18	8	167	836	2.4%	Gravity Main
SML2095U18	SMH2095U18	SMH2095U19	8	309	294	0.3%	Gravity Main
SML2095U19	SMH2095U19	SMH2095X11	30	311	10,728	0.3%	Gravity Main
SML2095U20	SMH2095U20	SMH2095U16	8	173	1,076	3.9%	Gravity Main
SML2095U21	SMH2095U21	SMH2095U22	8	105	336	0.4%	Gravity Main
SML2095U22	SMH2095U22	SMH2095U23	12	163	1,779	1.2%	Gravity Main
SML2095U23	SMH2095U23	SMH2095U19	10	342	2,010	4.2%	Gravity Main
SML2095U24	SML2095U27	SMH2095U24	8	166	482	0.8%	Gravity Main
SML2095U25	SMH2095U25	SMH2095U27	8	164	585	1.2%	Gravity Main
SML2095U26	SMH2095U26	SMH2095U18	8	511	654	1.4%	Gravity Main
SML2095U27	SMH2095U27	SMH2095U28	10	180	999	1.0%	Gravity Main
SML2095U28	SMH2095U28	SMH2095U29	10	145	952	0.9%	Gravity Main
SML2095U29	SMH2095U29	SMH2095U22	10	185	1,536	2.4%	Gravity Main
SML2095U30	SMH2095U30	SMH2095U19	27	375	12,630	0.8%	Gravity Main
SML2095U31	SMH2095U31	SMH2095U30	27	337	10,736	0.6%	Gravity Main
SML2095U32	SMH2095U32	SMH2095U16	6	129	171	0.5%	Gravity Main
SML2095V01	SMH2095V01	SMH2095V04	21	176	12,758	3.2%	Gravity Main
SML2095V02	SMH2095V02	SMH2095V06	10	337	1,848	3.5%	Gravity Main
SML2095V03	<Null>	SMH2095V04	6	39	629	6.2%	Gravity Main
SML2095V04	SMH2095V04	SMH2095V05	18	164	9,154	3.7%	Gravity Main
SML2095V05	SMH2095V05	SMH2095V07	21	171	11,482	2.6%	Gravity Main
SML2095V06	SMH2095V06	SMH2095V09	15	351	4,074	2.0%	Gravity Main
SML2095V07	SMH2095V07	SMH2095V08	12	177	2,502	2.4%	Gravity Main
SML2095V08	SMH2095V08	SMH2095V10	24	174	16,635	2.7%	Gravity Main
SML2095V09	SMH2095V09	SMH2095V11	18	110	7,189	2.3%	Gravity Main
SML2095V10	SMH2095V10	SMH2095V14	24	178	15,183	2.2%	Gravity Main
SML2095V11	SMH2095V11	SMH2095V12	18	91	5,792	1.5%	Gravity Main
SML2095V12	SMH2095V12	SMH2095V15	36	84	17,294	0.3%	Gravity Main
SML2095V13	SMH2095V13	SMH2095V12	8	496	385	0.5%	Gravity Main
SML2095V14	SMH2095V14	SMH2095U31	27	330	8,572	0.4%	Gravity Main
SML2095V15	SMH2095V15	SMH2095U01	36	257	19,808	0.4%	Gravity Main
SML2095V16	SMH2095V16	SMH2095V01	8	241	571	1.1%	Gravity Main
SML2095V2A	SMH2095V02	SMH2095V03	8	324	578	1.1%	Gravity Main
SML2095V6A	SMH2095V06	SMH2095V07	8	491	312	0.3%	Gravity Main
SML2095V9A	SMH2095V09	SMH2095V10	10	484	517	0.3%	Gravity Main
SML2095W02	SMH2095W02	SMH2095V01	8	355	385	0.5%	Gravity Main
SML2095W08	SMH2095W08	SMH2095V05	8	229	622	1.3%	Gravity Main
SML2095W17	SMH2095W17	SMH2095W24	24	158	14,409	2.0%	Gravity Main
SML2095W19	SMH2095W19	SMH2095W20	30	132	6,636	0.1%	Gravity Main
SML2095W20	SMH2095W20	SMH2095X01	30	139	12,800	0.5%	Gravity Main
SML2095W21	SMH2095W21	SMH2095V04	8	137	850	2.4%	Gravity Main
SML2095W22	SMH2095W22	SMH2095V07	6	228	214	0.7%	Gravity Main
SML2095W23	SMH2095W23	SMH2095V10	8	250	596	1.2%	Gravity Main
SML2095W24	SMH2095W24	SMH2095W19	24	28	44,481	19.1%	Gravity Main
SML2095W25	SMH2095W25	SMH2995D29	12	188	2,269	2.0%	Gravity Main
SML2095W26	SMH2095W26	SMH2995D27	60	240	78,953	0.5%	Gravity Main
SML2095W27	SMH2095W27	SMH2095W26	48	162	37,291	0.3%	Gravity Main
SML2095W28	SMH2095W28	SMH2095W29	30	147	42,232	5.2%	Gravity Main
SML2095W29	SMH2095W29	SMH2095W40	36	43	34,513	1.3%	Gravity Main
SML2095W30	SMH2095W30	SMH2095W28	12	169	2,199	1.9%	Gravity Main
SML2095W31	SMH2095W31	SMH2095W28	12	55	1,580	1.0%	Gravity Main
SML2095W32	SMH2095W32	SMH2095W34	36	206	59,852	4.0%	Gravity Main
SML2095W33	SMH2095W33	SMH2095W32	12	35	--	--	Gravity Main
SML2095W34	SMH2095W34	SMH2095W35	48	142	82,679	1.6%	Gravity Main
SML2095W35	SMH2095W35	SMH2095W37	48	128	46,449	0.5%	Gravity Main
SML2095W36	SMH2095W36	SMH2095W35	12	36	2,489	2.4%	Gravity Main
SML2095W37	SMH2095W37	SMH2095W27	48	41	50,516	0.6%	Gravity Main
SML2095W38	SMH2095W38	SMH2095W34	8	52	--	0.0%	Gravity Main
SML2095W39	SMH2095W39	SMH2095W38	6	51	728	8.3%	Gravity Main
SML2095W40	SMH2095W40	SMH2095W32	36	149	77,584	6.7%	Gravity Main
SML2095X03	SMH2095X03	SMH2995C16	30	189	12,736	0.5%	Gravity Main
SML2095X05	SMH2095X05	SMH2095X25	48	114	55,825	0.7%	Gravity Main
SML2095X08	SMH2095X08	SMH2095X10	16	251	2,180	0.4%	Gravity Main
SML2095X09	SMH2095X09	SMH2095X14	48	287	31,939	0.2%	Gravity Main
SML2095X10	SMH2095X10	SMH2095X14	16	171	6,725	3.8%	Gravity Main
SML2095X11	SMH2095X11	SMH2095X12	30	146	12,237	0.4%	Gravity Main
SML2095X12	SMH2095X12	SMH2095X13	30	78	13,381	0.5%	Gravity Main
SML2095X13	SMH2095X13	SMH2095X14	30	152	33,331	3.3%	Gravity Main
SML2095X14	SMH2095X14	SMH2095X15	54	265	33,540	0.1%	Gravity Main
SML2095X15	SMH2095X15	SMH2095X16	48	53	15,435	0.1%	Gravity Main
SML2095X16	SMH2095X16	SMH2995C10	48	603	44,740	0.5%	Gravity Main
SML2095X17	SMH2095X17	SMH2095X18	8	146	1,349	6.2%	Gravity Main
SML2095X18	SMH2095X18	SMH2095X11	10	355	786	0.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2095X19	SMH2095X19	SMH2095X17	8	106	392	0.5%	Gravity Main
SML2095X1B	SMH2095X01	SMH2095X03	30	48	8,443	0.2%	Gravity Main
SML2095X20	SMH2095X20	SMH2095X19	8	44	--	0.0%	Gravity Main
SML2095X21	SMH2095X21	SMH2095X15	8	197	607	1.2%	Gravity Main
SML2095X22	SMH2095X22	SMH2095X18	8	185	388	0.5%	Gravity Main
SML2095X23	SMH2095X23	SMH2095Y03	6	125	170	0.5%	Gravity Main
SML2095X25	SMH2095X25	SMH2095X09	42	272	36,345	0.6%	Gravity Main
SML2095X26	SMH2095X26	SMH2095U29	8	45	--	0.0%	Gravity Main
SML2095X2A	<Null>	SMH2095X10	14	551	1,881	0.6%	Gravity Main
SML2095Y02	SMH2095Y02	SMH2095Y06	8	342	652	1.4%	Gravity Main
SML2095Y03	SMH2095Y03	SMH2995B01	6	481	--	0.0%	Gravity Main
SML2095Y04	SMH2095Y04	SMH2095X22	8	264	357	0.4%	Gravity Main
SML2095Y05	SMH2095Y05	SMH2095Y07	8	200	495	0.8%	Gravity Main
SML2095Y06	SMH2095Y06	SMH2095Y10	8	349	856	2.5%	Gravity Main
SML2095Y07	SMH2095Y07	SMH2095Y13	6	381	441	3.1%	Gravity Main
SML2095Y08	SMH2095Y08	SMH2095Y09	6	99	515	4.2%	Gravity Main
SML2095Y09	SMH2095Y09	SMH2095Y10	6	200	513	4.1%	Gravity Main
SML2095Y10	SMH2095Y10	SMH2095Y11	8	16	3,879	50.9%	Gravity Main
SML2095Y11	SMH2095Y11	SMH2095Y14	10	153	935	0.9%	Gravity Main
SML2095Y13	SMH2095Y13	SMH2095Y15	6	44	1,408	31.1%	Gravity Main
SML2095Y14	SMH2095Y14	SMH2095Y22	8	140	719	1.7%	Gravity Main
SML2095Y15	SMH2095Y15	SMH2095Y21	42	349	17,963	0.2%	Gravity Main
SML2095Y17	SMH2095Y17	SMH2095Y19	8	107	989	3.3%	Gravity Main
SML2095Y18	SMH2095Y18	SMH2095T17	8	105	487	0.8%	Gravity Main
SML2095Y19	SMH2095Y19	SMH2095T22	8	467	622	1.3%	Gravity Main
SML2095Y20	SMH2095Y20	SMH2095T22	42	120	18,483	0.2%	Gravity Main
SML2095Y21	SMH2095Y21	SMH2095Y20	42	523	18,037	0.2%	Gravity Main
SML2095Y22	SMH2095Y22	SMH2095Y15	8	76	630	1.3%	Gravity Main
SML2095Y23	SMH2095Y23	SMH2095Y06	6	305	500	3.9%	Gravity Main
SML2095Y24	SMH2095Y24	SMH2095Y15	8	98	1,958	13.0%	Gravity Main
SML2095Y25	SMH2095Y25	SMH2095Y26	8	213	118	0.0%	Gravity Main
SML2095Y26	SMH2095Y26	SMH2095Y02	8	69	695	1.6%	Gravity Main
SML2095Z01	SMH2095Z01	SMH2095Z04	10	270	2,046	4.3%	Gravity Main
SML2095Z02	SMH2095Z02	SMH2095Z03	8	63	531	1.0%	Gravity Main
SML2095Z03	SMH2095Z03	SMH2095Z05	8	161	953	3.1%	Gravity Main
SML2095Z04	SMH2095Z04	SMH2095Z09	10	303	1,589	2.6%	Gravity Main
SML2095Z05	SMH2095Z05	SMH2095Z06	8	117	883	2.6%	Gravity Main
SML2095Z06	SMH2095Z06	SMH2095Z07	8	58	1,113	4.2%	Gravity Main
SML2095Z07	SMH2095Z07	SMH2095Z18	8	178	1,054	3.8%	Gravity Main
SML2095Z08	SMH2095Z08	SMH2095Z18	15	8	9,784	11.3%	Gravity Main
SML2095Z08	SMH2095Z08	SMH2095Z18	15	333	1,468	0.3%	Gravity Main
SML2095Z09	SMH2095Z09	SMH2095Z08	15	154	1,306	0.2%	Gravity Main
SML2095Z11	SMH2095Z11	SMH2095Z12	8	183	875	2.6%	Gravity Main
SML2095Z12	SMH2095Z12	SMH2095Z16	8	141	1,089	4.0%	Gravity Main
SML2095Z13	SMH2095Z13	SMH2095Z09	8	175	788	2.1%	Gravity Main
SML2095Z16	SMH2095Z16	SMH2095Z17	15	42	2,915	1.0%	Gravity Main
SML2095Z17	SMH2095Z17	SMH2095Z20	15	165	1,397	0.2%	Gravity Main
SML2095Z18	SMH2095Z18	SMH2095Z17	15	220	1,239	0.2%	Gravity Main
SML2095Z19	SMH2095Z19	SMH2195W04	15	171	1,154	0.2%	Gravity Main
SML2095Z20	SMH2095Z20	SMH2095Z19	15	285	1,560	0.3%	Gravity Main
SML2095Z21	SMH2095Z21	SMH2095W09	72	58	--	--	Force Main
SML2185W01	SMH2185W01	SMH2085Z08	24	41	34,684	11.6%	Gravity Main
SML2185W02	SMHSLWD	SMH2085Z08	24	20	--	--	Gravity Main
SML2195C02	SMH2195C02	HEADWORKS	72	197	--	--	Force Main
SML2195C03	SMH2195C03	SMH2195C04	72	26	--	0.0%	Gravity Main
SML2195C04	SMH2195C04	SMH2195C05	72	193	--	--	Gravity Main
SML2195C05	SMH2195C05	SMH2195C06	72	552	94,264	0.2%	Gravity Main
SML2195C06	SMH2195C06	SMH2195C07	72	82	114,947	0.4%	Gravity Main
SML2195C07	SMH2195C07	NONE	72	17	--	0.0%	Gravity Main
SML2195C08	SMH2195C08	AERATION POND	48	76	--	0.0%	Gravity Main
SML2195C09	SMH2195C09	SMH2195C08	48	41	--	0.0%	Gravity Main
SML2195C10	SMH2195C10	SMH2195C12	30	290	--	--	Force Main
SML2195C11	SMH2195C11	HEADWORKS	30	174	--	--	Force Main
SML2195C11	SMH2195C11	HEADWORKS	30	115	--	--	Force Main
SML2195C12	SMH2195C12	AERATION POND	54	127	--	0.0%	Gravity Main
SML2195C13	<Null>	SMH2195C03	72	51	241,646	1.6%	Gravity Main
SML2195C14	<Null>	POND	42	131	--	--	Gravity Main
SML2195D01	SMH2195D01	SMH2095A13	8	172	587	1.2%	Gravity Main
SML2195D02	SMH2195D02	SMH2195D01	8	143	1,211	5.0%	Gravity Main
SML2195D03	SMH2195D03	SMH1795Z13	8	255	1,536	8.0%	Gravity Main
SML2195D04	SMH2195D04	SMH2195D02	8	114	348	0.4%	Gravity Main
SML2195D05	SMH2195D05	SMH2195D04	8	144	1,887	12.0%	Gravity Main
SML2195D06	SMH2195D06	SMH2195D03	8	329	1,162	4.6%	Gravity Main
SML2195D07	SMH2195D07	SMH2195E07	8	213	--	--	Gravity Main
SML2195D08	SMH2195D08	SMH2195E11	8	207	573	1.1%	Gravity Main
SML2195D09	SMH2195D09	SMH2195C02	60	663	--	--	Force Main
SML2195D10	SMH2195D09	SMH2195D10	72	329	--	--	Force Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2195D11	SMH2195D11	SMH2195D10	72	105	--	--	Force Main
SML2195D12	SMH2195D12	SMH2195E14	8	368	498	0.8%	Gravity Main
SML2195D13	SML2195D13	PRIV	42	871	--	--	Force Main
SML2195D13	SMH2195D13	SML2195D13	42	597	--	--	Force Main
SML2195D13	SMH2195D13	SML2195D13	42	74	--	--	Force Main
SML2195D13	SMH2195D13	SML2195D13	36	643	--	--	Force Main
SML2195D13	SMH2195D13	SML2195D13	24	30	--	--	Force Main
SML2195D13	SML2195D13	SML2195D13	48	971	--	--	Force Main
SML2195D13	SML2195D13	SML2195D13	42	4491	--	--	Force Main
SML2195D13	SML2195D13	SML2195D13	42	90	--	--	Force Main
SML2195D13	SML2195D13	SML2195D13	40	7338	--	--	Force Main
SML2195D13	SML2195D13	SML2195D13	40	392	--	--	Force Main
SML2195D13	SML2195D13	SML2195D13	36	22	--	--	Force Main
SML2195E01	SMH2195E01	SMH2095H11	8	187	--	0.0%	Gravity Main
SML2195E02	SMH2195E02	SMH2195E03	8	167	912	2.8%	Gravity Main
SML2195E03	SMH2195E03	SMH2195E08	8	175	1,156	4.5%	Gravity Main
SML2195E04	SMH2195E04	SMH2195M09	8	307	651	1.4%	Gravity Main
SML2195E05	SMH2195E05	SMH2195E06	8	326	612	1.3%	Gravity Main
SML2195E06	SMH2195E06	SMH2195E10	8	214	1,469	7.3%	Gravity Main
SML2195E07	SMH2195E07	SMH2195E08	8	243	544	1.0%	Gravity Main
SML2195E08	SMH2195E08	SMH2195E09	12	369	1,648	1.1%	Gravity Main
SML2195E09	SMH2195E09	SMH2195E10	12	154	1,569	1.0%	Gravity Main
SML2195E10	SMH2195E10	SMH2195M04	12	318	1,327	0.7%	Gravity Main
SML2195E11	SMH2195E11	SMH2195E12	8	249	550	1.0%	Gravity Main
SML2195E12	SMH2195E12	SMH2195E13	12	514	1,239	0.6%	Gravity Main
SML2195E13	SMH2195E13	SMH2195M07	12	325	1,164	0.5%	Gravity Main
SML2195E14	SMH2195E14	SMH2195E12	8	114	787	2.1%	Gravity Main
SML2195E15	SMH2195E15	SMH2195E17	48	588	--	--	Force Main
SML2195E16	SMH2195E16	SMH2195C10	30	1011	--	--	Force Main
SML2195E17	SMH2195E17	SMH2195C11	30	1003	--	--	Force Main
SML2195E18	SML2195P05	SMH2195F01	12	15	--	--	Force Main
SML2195F01	SMH2195F01	SMH2195D11	72	512	--	--	Force Main
SML2195K01	CAP	VALVE	6	317	--	--	Force Main
SML2195L01	SMH2195L01	SMH2195F01	72	434	--	--	Force Main
SML2195L02	SMH2195L02	SMH2195L01	72	80	--	--	Force Main
SML2195L03	SMH2195L03	SMH2195L02	72	701	--	--	Force Main
SML2195L05	SMH2195L05	SMH2195L06	48	413	--	--	Force Main
SML2195L06	SMH2195L06	SMH2195E15	48	357	--	--	Force Main
SML2195M01	SMH2195M01	SMH2195M02	8	123	619	1.3%	Gravity Main
SML2195M02	SMH2195M02	SMH2195M03	8	364	642	1.4%	Gravity Main
SML2195M03	SMH2195M03	SMH2195N08	8	476	868	2.5%	Gravity Main
SML2195M04	SMH2195M04	SMH2195M05	12	183	1,402	0.8%	Gravity Main
SML2195M05	SMH2195M05	SMH2195M06	12	449	1,310	0.7%	Gravity Main
SML2195M06	SMH2195M06	SMH2195N19	12	87	1,335	0.7%	Gravity Main
SML2195M07	SMH2195M07	SMH2195M08	12	175	1,391	0.8%	Gravity Main
SML2195M08	SMH2195M08	SMH2195N23	12	534	347	0.0%	Gravity Main
SML2195M09	SMH2195M09	SMH2195M01	8	178	645	1.4%	Gravity Main
SML2195N01	SMH2195N01	SMH2195N02	6	110	502	4.0%	Gravity Main
SML2195N02	SMH2195N02	SMH2195N03	6	437	464	3.4%	Gravity Main
SML2195N03	SMH2195N03	SMH2195V05	6	52	559	4.9%	Gravity Main
SML2195N04	SMH2195N04	SMH2195N05	8	332	862	2.5%	Gravity Main
SML2195N05	SMH2195N05	SMH2195N08	8	204	590	1.2%	Gravity Main
SML2195N06	SMH2195N06	SMH2195V09	8	211	1,116	4.2%	Gravity Main
SML2195N07	SMH2195N07	SMH2195N06	8	125	652	1.4%	Gravity Main
SML2195N08	SMH2195N08	SMH2195N07	8	267	860	2.5%	Gravity Main
SML2195N09	SMH2195N09	SMH2195V15	12	223	2,124	1.8%	Gravity Main
SML2195N10	SMH2195N10	SMH2195N11	12	113	2,026	1.6%	Gravity Main
SML2195N11	SMH2195N11	SMH2195N18	12	172	1,396	0.8%	Gravity Main
SML2195N12	SMH2195N12	SMH2195V20	12	67	4,243	7.0%	Gravity Main
SML2195N13	SMH2195N13	SMH2195N14	12	106	2,366	2.2%	Gravity Main
SML2195N14	SMH2195N14	SMH2195N10	12	233	2,461	2.4%	Gravity Main
SML2195N15	SMH2195N15	SMH2195N12	12	204	2,532	2.5%	Gravity Main
SML2195N16	SMH2195N16	SMH2195N15	12	194	2,723	2.9%	Gravity Main
SML2195N17	SMH2195N17	SMH2195N18	12	145	1,332	0.7%	Gravity Main
SML2195N18	SMH2195N18	SMH2195N16	12	69	2,513	2.5%	Gravity Main
SML2195N19	SMH2195N19	SMH2195N20	12	115	1,334	0.7%	Gravity Main
SML2195N20	SMH2195N20	SMH2195N17	12	183	1,299	0.7%	Gravity Main
SML2195N21	SMH2195N21	SMH2195V23	12	425	2,627	2.7%	Gravity Main
SML2195N22	SMH2195N22	SMH2195N21	18	344	2,279	0.2%	Gravity Main
SML2195N23	SMH2195N23	SMH2195N22	18	486	2,249	0.2%	Gravity Main
SML2195N24	SMH2195N24	SMH2195L03	72	706	--	--	Force Main
SML2195P01	SMH2195P01	SMH2195P02	48	324	--	--	Force Main
SML2195P02	SMH2195P02	SMH2195P03	48	325	--	--	Force Main
SML2195P03	SMH2195P03	SMH2195L05	48	428	--	--	Force Main
SML2195P04	SMH2195P04	SML2195P05	4	29	--	--	Force Main
SML2195P05	SML2195P05	SML2195E18	6	471	--	--	Force Main
SML2195P05	SML2195P04	SML2195P05	6	419	--	--	Force Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2195P05	SML2195P05	SML2195P05	6	540	--	--	Force Main
SML2195P05	SML2195P05	SML2195P05	6	500	--	--	Force Main
SML2195U01	SMH2195U01	SMH2195P01	48	423	--	--	Force Main
SML2195V03	SMH2195V03	SMH2195W03	8	314	958	3.1%	Gravity Main
SML2195V04	SMH2195V04	SMH2195V13	30	329	26,406	2.0%	Gravity Main
SML2195V05	SMH2195V05	SMH2195V01	10	170	2,298	5.4%	Gravity Main
SML2195V06	SMH2195V06	SMH2195V07	42	125	39,549	0.8%	Gravity Main
SML2195V07	SMH2195V07	SMH2195V11	42	65	11,199	0.1%	Gravity Main
SML2195V08	SMH2195V08	SMH2195V05	10	145	1,133	1.3%	Gravity Main
SML2195V0A	SMH2195V20	SMH2195V21	12	277	3,682	5.3%	Gravity Main
SML2195V0B	SMH2195V20	SMH2195V19	10	22	2,063	4.4%	Gravity Main
SML2195V10	SMH2195V10	SMH2195V11	8	334	1,085	4.0%	Gravity Main
SML2195V11	SMH2195V11	SMH2195V12	42	132	72,601	2.6%	Gravity Main
SML2195V12	SMH2195V12	SMH2195V13	42	20	71,032	2.5%	Gravity Main
SML2195V13	SMH2195V13	SMH2195W08	42	507	62,328	1.9%	Gravity Main
SML2195V14	SMH2195V14	SMH2195V12	12	139	2,267	2.0%	Gravity Main
SML2195V15	SMH2195V15	SMH2195V16	12	292	3,259	4.1%	Gravity Main
SML2195V16	SMH2195V16	SMH2195V14	12	193	2,499	2.4%	Gravity Main
SML2195V17	SMH2195V17	SMH2195V14	8	160	193	0.1%	Gravity Main
SML2195V18	SMH2195V18	SMH2195V13	12	302	2,262	2.0%	Gravity Main
SML2195V19	SMH2195V19	SMH2195V08	10	420	595	0.4%	Gravity Main
SML2195V1A	SMH2195V01	SMH1695W22	60	4127	23,925	0.0%	Gravity Main
SML2195V1B	SMH2195V01	SMH2195V04	30	491	20,901	1.3%	Gravity Main
SML2195V21	SMH2195V21	SMH2195V18	12	226	3,497	4.8%	Gravity Main
SML2195V22	SMH2195V22	SMH2195V18	15	242	3,824	1.7%	Gravity Main
SML2195V23	SMH2195V23	SMH2195V22	12	211	2,683	2.8%	Gravity Main
SML2195V24	SMH2195V24	SMH2195V06	6	279	627	6.2%	Gravity Main
SML2195V26	SMH2195V26	SMH2195V02	8	164	--	--	Gravity Main
SML2195V27	SMH2195V27	SMH2195V28	72	203	--	--	Force Main
SML2195V28	SMH2195V28	SMH2195V29	72	488	--	--	Force Main
SML2195V29	SMH2195V29	SMH2195N24	72	623	--	--	Force Main
SML2195V2A	SMH2195V02	SMH2195V03	8	185	1,006	3.4%	Gravity Main
SML2195V2B	SMH2195V12	SMH2195V02	8	344	278	0.3%	Gravity Main
SML2195V9A	SMH2195V09	SMH2195V10	8	14	1,973	13.2%	Gravity Main
SML2195V9B	SMH2195V09	SMH2195V08	8	29	1,653	9.2%	Gravity Main
SML2195W03	SMH2195W03	SMH2195W04	8	15	1,546	8.1%	Gravity Main
SML2195W08	SMH2195W08	SMH2195W11	42	17	48,893	1.2%	Gravity Main
SML2195W09	SMH2195W11	SMH2195W11	72	547	--	--	Force Main
SML2195W0A	<Null>	SMH2195V27	72	505	--	--	Force Main
SML2195W0B	SMH2195W11	SMH2195W10	12	113	--	0.0%	Gravity Main
SML2195W0D	SMH2195W75	SMH2195W10	24	48	--	0.0%	Gravity Main
SML2195W10	SMH2195W10	SMH2195W15	16	65	--	--	Force Main
SML2195W11	SMH2195W11	SMH2195W75	42	61	--	--	Gravity Main
SML2195W15	SMH2195W15	SMH2195W18	48	323	--	--	Force Main
SML2195W16	SMH2195W16	SMH2195W15	48	497	--	--	Force Main
SML2195W18	SMH2195W18	SMH2195W19	48	558	--	--	Force Main
SML2195W19	SMH2195W19	SMH2195U01	48	404	--	--	Force Main
SML2195W4A	SMH2195W04	SMH2195W08	15	383	1,757	0.4%	Gravity Main
SML2384H01	SMH2384H01	MANHOLE	8	227	848	2.4%	Gravity Main
SML2384Q01	SMH2384Q01	SMH2384Q02	8	81	1,514	7.8%	Gravity Main
SML2384Q02	SMH2384Q02	SMH2384Q03	8	140	797	2.1%	Gravity Main
SML2384Q03	SMH2384Q03	SMH2384Q04	8	109	1,273	5.5%	Gravity Main
SML2384Q04	SMH2384Q04	SMH2384Q05	8	55	566	1.1%	Gravity Main
SML2384Q05	SMH2384Q05	SMH MWD	8	70	2,106	15.0%	Gravity Main
SML2384R01	SMH2384R01	SMH2384R02	8	193	501	0.8%	Gravity Main
SML2384R02	SMH2384R02	SMH2384S03	8	322	708	1.7%	Gravity Main
SML2384R03	SMH2384R03	MWD	8	143	629	1.3%	Gravity Main
SML2384R04	SMH2384R04	SML2384R01	--	215	--	--	Gravity Main
SML2384S01	SMH2384S01	SMH2384S02	8	355	642	1.4%	Gravity Main
SML2384S02	SMH2384S02	SMH MWD	8	148	480	0.8%	Gravity Main
SML2384S03	SMH2384S03	SMH2384S01	8	75	1,537	8.0%	Gravity Main
SML2384S04	SMH2384S04	SMH2384S05	8	321	474	0.8%	Gravity Main
SML2384S05	SMH2384S05	SMH2384S06	8	107	517	0.9%	Gravity Main
SML2384S06	SMH2384S06	SMH2384T19	8	278	466	0.7%	Gravity Main
SML2384S07	SMH2384S07	SMH MWD	8	171	1,035	3.6%	Gravity Main
SML2384S08	SMH2384S08	SMH2384S06	8	34	1,024	3.5%	Gravity Main
SML2384T01	SMH2384T01	SMH2384T02	8	154	537	1.0%	Gravity Main
SML2384T02	SMH2384T02	SMH2384T03	8	39	1,131	4.3%	Gravity Main
SML2384T03	SMH2384T03	SMH MWD	8	26	340	0.4%	Gravity Main
SML2384T04	SMH2384T04	SMH2384T05	8	58	545	1.0%	Gravity Main
SML2384T05	SMH2384T05	SMH2384T06	8	107	553	1.0%	Gravity Main
SML2384T06	SMH2384T06	SMH MWD	8	113	692	1.6%	Gravity Main
SML2384T09	SMH2384T09	SMH2384Y04	8	159	537	1.0%	Gravity Main
SML2384T10	SMH2384T10	SMH2384T09	8	124	640	1.4%	Gravity Main
SML2384T11	SMH2384T11	SMH2384T09	8	194	537	1.0%	Gravity Main
SML2384T12	SMH2384T12	SMH2384T11	8	74	601	1.2%	Gravity Main
SML2384T13	SMH2384T13	SMHMWD	8	164	315	0.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2384T14	SMH2384T14	SMH2384T13	8	85	655	1.5%	Gravity Main
SML2384T15	SMH2384T15	SMH2384T14	8	98	660	1.5%	Gravity Main
SML2384T16	SMH2384T16	SMH2384T15	8	34	694	1.6%	Gravity Main
SML2384T17	SMH2384T17	SMH2384T15	8	102	737	1.8%	Gravity Main
SML2384T18	SMH2384T18	SMH2384T17	8	138	1,493	7.5%	Gravity Main
SML2384T19	SMH2384T19	SMH MWD	8	10	--	0.0%	Gravity Main
SML2384U02	SMH2384U02	MWD	8	30	--	--	Gravity Main
SML2384U03	SMH2384U03	SMH2384U02	8	30	--	--	Gravity Main
SML2384U04	SMH2384U04	SMH2384U03	8	40	--	--	Gravity Main
SML2384Y01	SMH2384Y01	SMHMWD	8	112	1,339	6.1%	Gravity Main
SML2384Y02	SMH2384Y02	SMH2384Y01	8	51	812	2.2%	Gravity Main
SML2384Y03	SMH2384Y03	SMH2384Y02	8	64	487	0.8%	Gravity Main
SML2384Y04	SMH2384Y04	SMH2384Y03	8	195	538	1.0%	Gravity Main
SML2384Y05	SMH2384Y05	MANHOLE	8	207	549	1.0%	Gravity Main
SML2384Y06	SMH2384Y06	SMH2384Y05	6	60	351	1.9%	Gravity Main
SML2484A01	SMH2484A01	SMH2484A03	8	150	755	1.9%	Gravity Main
SML2484A02	SMH2484A02	SMH2484A04	8	234	1,164	4.6%	Gravity Main
SML2484A03	SMH2484A03	SMH2484A02	8	183	554	1.0%	Gravity Main
SML2484A04	SMH2484A04	SMH1384Z12	8	130	1,321	5.9%	Gravity Main
SML2484A05	SMH2484A05	SMH2484A07	8	221	562	1.1%	Gravity Main
SML2484A06	SMH2484A06	SMH2484A08	8	235	436	0.6%	Gravity Main
SML2484A07	SMH2484A07	SMH1384Z11	8	450	1,167	4.6%	Gravity Main
SML2484A08	SMH2484A08	SMH2484A02	8	39	884	2.6%	Gravity Main
SML2484A09	SMH2484A09	SMH2484H06	8	268	141	0.1%	Gravity Main
SML2484A10	SMH2484A10	SMH2484A09	8	172	698	1.6%	Gravity Main
SML2484A11	SMH2484A11	SMH2484B15	8	241	538	1.0%	Gravity Main
SML2484B01	SMH2484B01	SMH2484B02	8	485	385	0.5%	Gravity Main
SML2484B02	SMH2484B02	SMH2484B03	8	115	344	0.4%	Gravity Main
SML2484B03	SMH2484B03	SMH2484B05	8	335	846	2.4%	Gravity Main
SML2484B04	SMH2484B04	SMH2484B06	8	316	466	0.7%	Gravity Main
SML2484B05	SMH2484B05	SMH2484B07	8	343	1,127	4.3%	Gravity Main
SML2484B06	SMH2484B06	SMH2484B08	8	351	1,131	4.3%	Gravity Main
SML2484B07	SMH2484B07	SMH2484B09	8	255	871	2.6%	Gravity Main
SML2484B08	SMH2484B08	SMH2484B10	8	280	462	0.7%	Gravity Main
SML2484B09	SMH2484B09	SMH2484B11	8	197	513	0.9%	Gravity Main
SML2484B10	SMH2484B10	SMH2484B12	8	230	469	0.7%	Gravity Main
SML2484B11	SMH2484B11	SMH2484B13	8	114	411	0.6%	Gravity Main
SML2484B12	SMH2484B12	SMH2484B14	8	235	421	0.6%	Gravity Main
SML2484B13	SMH2484B13	SMH2484A05	8	315	428	0.6%	Gravity Main
SML2484B14	SMH2484B14	SMH2484A06	8	212	415	0.6%	Gravity Main
SML2484B15	SMH2484B15	SMH2484B14	8	281	538	1.0%	Gravity Main
SML2484B16	SMH2484B16	SMH2484B17	8	182	528	0.9%	Gravity Main
SML2484B17	SMH2484B17	SMH2484B09	8	79	556	1.0%	Gravity Main
SML2484B19	SMH2484B19	SMH2484B08	8	29	501	0.8%	Gravity Main
SML2484B20	SMH2484B20	SMH2484B19	8	20	665	1.5%	Gravity Main
SML2484B21	SMH2484B21	SMH2484B20	8	381	535	1.0%	Gravity Main
SML2484B22	SMH2484B22	SMH2484B16	8	43	--	--	Gravity Main
SML2484C01	SMH2484C01	SMH1384X14	8	193	521	0.9%	Gravity Main
SML2484C02	SMH2484C02	SMH2484B04	8	145	497	0.8%	Gravity Main
SML2484C03	SMH2484C03	SMH1384X06	8	331	772	2.0%	Gravity Main
SML2484D01	SMH2484D01	SMH2484D02	8	245	544	1.0%	Gravity Main
SML2484D02	SMH2484D02	SMH2484D10	8	172	385	0.5%	Gravity Main
SML2484D03	SMH2484D03	SMH2484D02	8	362	393	0.5%	Gravity Main
SML2484D04	SMH2484D04	SMH2484D03	8	301	547	1.0%	Gravity Main
SML2484D05	SMH2484D05	SMH2484D03	8	161	379	0.5%	Gravity Main
SML2484D06	SMH2484D06	SMH2484D05	8	107	551	1.0%	Gravity Main
SML2484D07	SMH2484D07	SMH2484D08	8	213	559	1.1%	Gravity Main
SML2484D08	SMH2484D08	SMH2484D09	8	104	669	1.5%	Gravity Main
SML2484D09	SMH2484D09	SMH2484D10	8	136	751	1.9%	Gravity Main
SML2484D10	SMH2484D10	MWD	8	161	239	0.2%	Gravity Main
SML2484D15	SMH2484D15	SMH2484F18	8	128	672	1.5%	Gravity Main
SML2484D16	SMH2484D16	SMH2484F19	8	107	680	1.6%	Gravity Main
SML2484E01	SMH2484E01	SMH2484M18	8	236	739	1.8%	Gravity Main
SML2484E02	SMH2484E02	SMH2484E01	8	142	485	0.8%	Gravity Main
SML2484F01	SMH2484F01	SMH2484F02	8	87	718	1.7%	Gravity Main
SML2484F02	SMH2484F02	SMH2484F16	8	179	1,019	3.5%	Gravity Main
SML2484F03	SMH2484F03	SMH2484F04	8	143	452	0.7%	Gravity Main
SML2484F04	SMH2484F04	SMH2484F05	8	372	470	0.7%	Gravity Main
SML2484F05	SMH2484F05	SMH2484C02	8	403	467	0.7%	Gravity Main
SML2484F06	SMH2484F06	SMH2484F05	8	181	379	0.5%	Gravity Main
SML2484F07	SMH2484F07	SMH2484F08	8	211	1,019	3.5%	Gravity Main
SML2484F08	SMH2484F08	SMH2484F10	8	199	586	1.2%	Gravity Main
SML2484F09	SMH2484F09	SMH2484F08	8	60	531	1.0%	Gravity Main
SML2484F10	SMH2484F10	SMH2484F11	8	133	587	1.2%	Gravity Main
SML2484F11	SMH2484F11	SMH2484F12	8	168	896	2.7%	Gravity Main
SML2484F12	SMH2484F12	SMH2484F12	8	254	814	2.2%	Gravity Main
SML2484F13	SMH2484F13	SMH2484F12	8	93	436	0.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2484F14	SMH2484F14	SMH2484M13	8	228	669	1.5%	Gravity Main
SML2484F15	SMH2484F15	SMH2484F13	8	138	586	1.2%	Gravity Main
SML2484F16	SMH2484F16	SMH2484E02	8	224	501	0.8%	Gravity Main
SML2484F17	SMH2484F17	SMH2484F16	8	313	455	0.7%	Gravity Main
SML2484F18	SMH2484F18	SMH2484F17	8	200	564	1.1%	Gravity Main
SML2484F19	SMH2484F19	SMH2484D15	8	92	629	1.3%	Gravity Main
SML2484F20	SMH2484F20	SMH2484D16	8	315	--	--	Gravity Main
SML2484F21	SMH2484F21	SMH2484F18	8	126	614	1.3%	Gravity Main
SML2484G01	SMH2484G01	SMH2484B04	8	117	511	0.9%	Gravity Main
SML2484G02	SMH2484G02	SMH2484G01	8	179	572	1.1%	Gravity Main
SML2484G03	SMH2484G03	SMH2484G02	8	201	535	1.0%	Gravity Main
SML2484G04	SMH2484G04	SMH2484G02	8	39	680	1.6%	Gravity Main
SML2484G05	SMH2484G05	SMH2484H09	8	315	708	1.7%	Gravity Main
SML2484H01	SMH2484H01	SMH2484H02	8	223	962	3.1%	Gravity Main
SML2484H02	SMH2484H02	SMH2484H03	8	133	779	2.1%	Gravity Main
SML2484H03	SMH2484H03	SMH2484H04	8	358	729	1.8%	Gravity Main
SML2484H04	SMH2484H04	SMH2484H05	8	121	848	2.4%	Gravity Main
SML2484H05	SMH2484H05	SMH1985E02	8	87	763	2.0%	Gravity Main
SML2484H06	SMH2484H06	SMH2484H11	8	132	810	2.2%	Gravity Main
SML2484H08	SMH2484H08	SMH2484H01	8	325	794	2.1%	Gravity Main
SML2484H09	SMH2484H09	SMH2484H10	8	65	769	2.0%	Gravity Main
SML2484H10	SMH2484H10	SMH2484H11	8	130	775	2.0%	Gravity Main
SML2484H11	SMH2484H11	SMH2484H01	8	261	472	0.8%	Gravity Main
SML2484J2A	SMH2484J02	SMH1985M29	18	315	--	--	Gravity Main
SML2484J2B	SMH2484J02	SMH1985M04	18	32	--	--	Gravity Main
SML2484M01	SMH2484M01	SMH2484M02	8	284	784	2.1%	Gravity Main
SML2484M02	SMH2484M02	SMH2484M03	8	225	573	1.1%	Gravity Main
SML2484M03	SMH2484M03	SMH2484M04	8	390	474	0.8%	Gravity Main
SML2484M04	SMH2484M04	SMH2484M05	8	96	645	1.4%	Gravity Main
SML2484M05	SMH2484M05	SMH2484M10	8	266	543	1.0%	Gravity Main
SML2484M06	SMH2484M06	SMH2484M07	8	248	623	1.3%	Gravity Main
SML2484M07	SMH2484M07	SMH2484M08	8	48	1,700	9.8%	Gravity Main
SML2484M08	SMH2484M08	SMH2484M09	8	194	962	3.1%	Gravity Main
SML2484M09	SMH2484M09	SMH2484N03	8	323	466	0.7%	Gravity Main
SML2484M10	SMH2484M10	SMH2484M09	8	305	470	0.7%	Gravity Main
SML2484M11	SMH2484M11	SMH2484M05	8	70	1,058	3.8%	Gravity Main
SML2484M12	SMH2484M12	SMH2484M11	8	146	465	0.7%	Gravity Main
SML2484M13	SMH2484M23	SMH2484M13	8	35	292	0.3%	Gravity Main
SML2484M15	SMH2484M15	SMH2484M23	8	197	529	0.9%	Gravity Main
SML2484M16	SMH2484M16	SMH2484M15	8	16	2,044	14.1%	Gravity Main
SML2484M17	SMH2484M17	SMH2484M16	8	376	451	0.7%	Gravity Main
SML2484M18	SMH2484M18	SMH2484M17	8	332	576	1.1%	Gravity Main
SML2484M19	SMH2484M19	SMH2484M20	8	91	527	0.9%	Gravity Main
SML2484M21	SMH2484M21	SMH2484M20	8	250	544	1.0%	Gravity Main
SML2484M22	SMH2484M22	SMH2484M12	8	114	527	0.9%	Gravity Main
SML2484M23	SMH2484M23	SMH2484M22	8	217	427	0.6%	Gravity Main
SML2484N01	SMH2484N01	SML2384R01	8	168	578	1.1%	Gravity Main
SML2484N02	SMH2484N02	SMH2484N04	8	126	658	1.5%	Gravity Main
SML2484N03	SMH2484N03	SMH2484N02	8	423	790	2.1%	Gravity Main
SML2484N04	SMH2484N04	SMH2484V01	8	344	348	0.4%	Gravity Main
SML2484Q01	SMH2484Q01	SMH2484T03	8	100	669	1.5%	Gravity Main
SML2484Q02	SMH2484Q02	SMH2484T11	8	275	587	1.2%	Gravity Main
SML2484Q03	SMH2484Q03	SMH2484Q01	8	25	2,260	17.3%	Gravity Main
SML2484R01	SMH2484R01	SMH2484R02	8	115	703	1.7%	Gravity Main
SML2484R02	SMH2484R02	SMH2484S01	8	400	714	1.7%	Gravity Main
SML2484R03	SMH2484R03	SMH2484R02	8	207	707	1.7%	Gravity Main
SML2484R04	SMH2484R04	SMH2484R05	8	124	1,270	5.5%	Gravity Main
SML2484R05	SMH2484R05	SMH2484S04	8	168	764	2.0%	Gravity Main
SML2484R06	SMH2484R06	SMH2484S05	8	293	532	1.0%	Gravity Main
SML2484R07	SMH2484R07	SMH2484R05	8	116	897	2.7%	Gravity Main
SML2484R08	SMH2484R08	SMH2484R07	8	118	602	1.2%	Gravity Main
SML2484R09	SMH2484R09	SMH2484R10	8	227	831	2.3%	Gravity Main
SML2484R10	SMH2484R10	MWD	8	396	546	1.0%	Gravity Main
SML2484R11	SMH2484R11	SMH2484R12	8	346	471	0.7%	Gravity Main
SML2484R12	SMH2484R12	MWDSMH	8	276	380	0.5%	Gravity Main
SML2484R13	SMH2484R13	SMH2484R14	8	71	316	0.3%	Gravity Main
SML2484R14	SMH2484R14	SMH2484R16	8	254	369	0.5%	Gravity Main
SML2484R15	SMH2484R15	SMH2484R16	8	71	872	2.6%	Gravity Main
SML2484R16	SMH2484R16	SMH2484R17	8	128	336	0.4%	Gravity Main
SML2484R17	SMH2484R17	SMH2484R18	8	34	265	0.2%	Gravity Main
SML2484R18	SMH2484R18	MWDSMH	8	148	376	0.5%	Gravity Main
SML2484S01	SMH2484S01	SMH2484S02	8	9	511	0.9%	Gravity Main
SML2484S02	SMH2484S02	SMH1985V14	8	67	597	1.2%	Gravity Main
SML2484S03	SMH2484S03	SMH2484S06	8	322	677	1.5%	Gravity Main
SML2484S04	SMH2484S04	SMH2484S03	8	364	544	1.0%	Gravity Main
SML2484S05	SMH2484S05	SMH2484S04	8	186	537	1.0%	Gravity Main
SML2484S06	SMH2484S06	SMH1985V14	8	354	668	1.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2484S07	SMH2484S07	SMH2484S06	8	92	475	0.8%	Gravity Main
SML2484S08	SMH2484S08	SMH2484S09	6	45	141	0.3%	Gravity Main
SML2484S09	SMH2484S09	SMH2484S07	8	254	373	0.5%	Gravity Main
SML2484S10	SMH2484S10	SMH2484S11	8	146	828	2.3%	Gravity Main
SML2484S11	SMH2484S11	SMH2484S12	8	260	731	1.8%	Gravity Main
SML2484S12	SMH2484S12	SMH2484S13	8	145	349	0.4%	Gravity Main
SML2484S13	SMH2484S13	SMH2484S14	8	307	380	0.5%	Gravity Main
SML2484S14	SMH2484S14	SMH2484S08	8	89	462	0.7%	Gravity Main
SML2484S15	SMH2484S15	SMH2484S09	8	89	412	0.6%	Gravity Main
SML2484S16	SMH2484S16	SMH2484S15	8	70	130	0.1%	Gravity Main
SML2484S19	SMH2484S19	SMH2484S03	8	114	862	2.5%	Gravity Main
SML2484S20	SMH2484S20	SMH2484S19	8	327	918	2.8%	Gravity Main
SML2484S22	SMH2484S22	SMH2484T11	8	251	528	0.9%	Gravity Main
SML2484S23	SMH2484S23	SMH2484Z06	8	36	893	2.7%	Gravity Main
SML2484S23	SMH2484S23	SMH2484Z06	8	66	659	1.5%	Gravity Main
SML2484S24	SMH2484S24	SML2484Z06	8	139	--	0.0%	Gravity Main
SML2484T01	SMH2484T01	SMH2484S10	8	100	551	1.0%	Gravity Main
SML2484T02	SMH2484T02	SMH2484T01	8	62	1,604	8.7%	Gravity Main
SML2484T03	SMH2484T03	SMH2484T04	8	395	265	0.2%	Gravity Main
SML2484T04	SMH2484T04	SMH2484T05	8	85	959	3.1%	Gravity Main
SML2484T05	SMH2484T05	SMH2484T06	8	63	--	--	Gravity Main
SML2484T06	SMH2484T06	SMH2484T07	8	163	519	0.9%	Gravity Main
SML2484T07	SMH2484T07	SMH2484T08	8	186	415	0.6%	Gravity Main
SML2484T08	SMH2484T08	SMH2484T02	8	196	672	1.5%	Gravity Main
SML2484T09	SMH2484T09	SMH2484S20	8	230	432	0.6%	Gravity Main
SML2484T10	SMH2484T10	SMH2484T09	8	40	1,944	12.8%	Gravity Main
SML2484T11	SMH2484T11	SMH2484T10	8	276	487	0.8%	Gravity Main
SML2484T12	<Null>	SMH2484T09	8	85	--	0.0%	Gravity Main
SML2484V01	SMH2484V01	SMH MWD	8	200	529	0.9%	Gravity Main
SML2484V02	SMH2484V02	MWD	8	191	8,894	267.5%	Gravity Main
SML2484Y01	SMH2484Y01	SMH2484Y02	8	138	446	0.7%	Gravity Main
SML2484Y02	SMH2484Y02	SMH2484Y04	8	146	298	0.3%	Gravity Main
SML2484Y03	SMH2484Y03	SMH2484Y01	8	146	1,185	4.7%	Gravity Main
SML2484Y05	SMH2484Y05	SMH2484Y06	8	116	1,430	6.9%	Gravity Main
SML2484Y06	SMH2484Y06	SMH2484Y10	8	240	378	0.5%	Gravity Main
SML2484Y07	SMH2484Y07	SMH2484Y08	8	128	396	0.5%	Gravity Main
SML2484Y08	SMH2484Y08	SMH2484Y09	8	177	522	0.9%	Gravity Main
SML2484Y09	SMH2484Y09	SMH2484Y10	8	197	1,010	3.4%	Gravity Main
SML2484Y10	SMH2484Y10	SMH2484Y11	8	204	361	0.4%	Gravity Main
SML2484Y11	SMH2484Y11	SMH2484Y03	8	91	559	1.1%	Gravity Main
SML2484Y12	SMH2484Y12	SMH2484Y13	8	147	728	1.8%	Gravity Main
SML2484Y13	SMH2484Y13	SMH2484Y11	8	226	1,101	4.1%	Gravity Main
SML2484Y14	SMH2484Y14	SMH2484Y15	8	157	481	0.8%	Gravity Main
SML2484Y15	SMH2484Y15	SMH2484Y16	8	234	443	0.7%	Gravity Main
SML2484Y16	SMH2484Y16	SMH2484Y03	8	114	477	0.8%	Gravity Main
SML2484Z01	SMH2484Z01	SMH2484Z11	8	269	555	1.0%	Gravity Main
SML2484Z02	SMH2484Z02	SMH2484Z03	8	110	401	0.5%	Gravity Main
SML2484Z03	SMH2484Z03	SMH2484S12	8	153	385	0.5%	Gravity Main
SML2484Z04	SMH2484Z04	SMH2484Y02	8	252	397	0.5%	Gravity Main
SML2484Z05	SMH2484Z05	SMH1985W03	8	203	743	1.9%	Gravity Main
SML2484Z06	SMH2484Z06	SMH2484Z05	8	274	778	2.0%	Gravity Main
SML2484Z07	SMH2484Z07	SMH2484S16	8	98	546	1.0%	Gravity Main
SML2484Z08	SMH2484Z08	SMH2484S22	8	274	527	0.9%	Gravity Main
SML2484Z09	SMH2484Z09	SMH2484Z10	8	53	235	0.2%	Gravity Main
SML2484Z10	SMH2484Z10	SMH2484Z11	8	222	563	1.1%	Gravity Main
SML2484Z11	SMH2484Z11	SMH2484Z02	8	8	881	2.6%	Gravity Main
SML2594R01	SMH2594R01	SMH2594R02	14	125	20,075	68.9%	Gravity Main
SML2594R02	SMH2594R02	SMH2594R03	14	202	10,473	18.8%	Gravity Main
SML2594R03	SMH2594R03	SMH2594R04	14	132	8,504	12.4%	Gravity Main
SML2594R04	SMH2594R04	SMH2594R08	24	81	29,882	8.6%	Gravity Main
SML2594R05	SMH2594R05	SMH3095G09	24	5827	--	--	Force Main
SML2594R05	SML2594R05	SML2594R05	30	65	--	--	Force Main
SML2594R05	SML2594R05	SML2594R05	24	33	--	--	Force Main
SML2594R05	SMH2594R05	SML2594RO5	24	54	--	--	Force Main
SML2594R06	SMH2594R06	SMH2594R05	30	163	--	--	Force Main
SML2594R07	SML2594R07	D/L	14	262	5,519	5.2%	Gravity Main
SML2594R07	SMH2594R08	SML2594507	14	56	11,960	24.5%	Gravity Main
SML2594R09	SML3494Q12	SMH2594R06	30	10	--	--	Force Main
SML2594R8A	SMH2594R08	SMH2594R06	24	56	--	--	Gravity Main
SML2594S01	SMH2594S01	SMH2594S02	15	26	3,683	1.6%	Gravity Main
SML2594S02	SMH2594S02	SMH2594S03	15	160	2,740	0.9%	Gravity Main
SML2594S03	SMH2594S03	SMH2594S04	15	39	2,783	0.9%	Gravity Main
SML2594S04	SMH2594S04	SMH2594S05	15	157	3,056	1.1%	Gravity Main
SML2594S05	SMH2594S05	SMH2594S07	15	498	3,350	1.3%	Gravity Main
SML2594S07	SMH2594S07	SMH2594R01	15	282	3,362	1.3%	Gravity Main
SML2594T01	SMH2594T01	SMH2594S01	15	303	2,863	1.0%	Gravity Main
SML2594X02	SMH2594X02	SMH2594X01	10	159	1,071	1.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2594X03	VALVE	SML2594X02	4	7	--	0.0%	Gravity Main
SML2594Y01	<Null>	SMH2594Y02	8	120	397	0.5%	Gravity Main
SML2594Y02	SMH2594Y02	SMH2594Y04	8	141	644	1.4%	Gravity Main
SML2594Y03	SMH2594Y03	SMH2594Y06	8	189	710	1.7%	Gravity Main
SML2594Y04	SMH2594Y04	SMH2594Y03	8	365	716	1.7%	Gravity Main
SML2594Y05	SMH2594Y05	SMH2594Y09	8	319	798	2.2%	Gravity Main
SML2594Y06	SMH2594Y06	SMH2594Y08	15	185	3,974	1.9%	Gravity Main
SML2594Y07	SMH2594Y07	SMH2594Y06	12	55	2,622	2.7%	Gravity Main
SML2594Y08	SMH2594Y08	SMH2594T01	15	372	4,025	1.9%	Gravity Main
SML2594Y09	SMH2594Y09	SMH2594Y10	8	395	962	3.1%	Gravity Main
SML2594Y10	SMH2594Y10	SMH2594Y07	12	218	2,558	2.5%	Gravity Main
SML2594Y11	SMH2594Y11	SMH2594Z01	8	329	807	2.2%	Gravity Main
SML2594Z01	SMH2594Z01	SMH2594S04	8	304	819	2.3%	Gravity Main
SML2594Z02	SMH2594Z02	SMH2594Y09	8	399	764	2.0%	Gravity Main
SML2594Z03	SMH2594Z03	SMH2594Y10	12	422	2,507	2.4%	Gravity Main
SML2594Z04	SMH2594Z04	SMH2594S06	8	287	1,069	3.9%	Gravity Main
SML2594Z05	SMH2594Z05	SMH2594Z04	8	491	1,269	5.4%	Gravity Main
SML2985C01	SMH2985C01	SMH2985D14	8	74	1,565	8.3%	Gravity Main
SML2985C02	SMH2985C02	SMH2985C03	8	161	596	1.2%	Gravity Main
SML2985C03	SMH2985C03	SMH2085X10	8	56	459	0.7%	Gravity Main
SML2985C04	SMH2985C04	SMH2985C03	8	391	538	1.0%	Gravity Main
SML2985C05	SMH2985C05	SMH2985C04	8	58	511	0.9%	Gravity Main
SML2985C06	SMH2985C06	SMH2985C02	8	30	855	2.5%	Gravity Main
SML2985C07	SMH2985C07	SMH2985F07	8	231	576	1.1%	Gravity Main
SML2985C08	SMH2985C08	SMH2985C09	8	318	722	1.8%	Gravity Main
SML2985C09	SMH2985C09	SMH2985C10	8	276	1,239	5.2%	Gravity Main
SML2985C10	SMH2985C10	SMH2985C12	8	229	365	0.5%	Gravity Main
SML2985C11	SMH2985C11	SMH2985C10	8	211	470	0.7%	Gravity Main
SML2985D01	SMH2985D01	SMH3085H01	12	170	869	0.3%	Gravity Main
SML2985D02	SMH2985D02	SMH2985D01	12	389	959	0.4%	Gravity Main
SML2985D03	SMH2985D03	SMH2985D02	8	225	829	2.3%	Gravity Main
SML2985D07	SMH2985D07	SMH2985D03	8	345	894	2.7%	Gravity Main
SML2985D08	SMH2985D08	SMH2985D12	8	265	510	0.9%	Gravity Main
SML2985D09	SMH2985D09	SMH2985D08	8	341	581	1.1%	Gravity Main
SML2985D10	SMH2985D10	SMH2985D03	8	41	3,057	31.6%	Gravity Main
SML2985D11	SMH2985D11	SMH2985D07	8	175	1,078	3.9%	Gravity Main
SML2985D12	SMH2985D12	SMH2085W13	12	167	1,358	0.7%	Gravity Main
SML2985D13	SMH2985D13	SMH2985D14	8	361	--	--	Gravity Main
SML2985D14	SMH2985D14	SMH2985D08	8	150	--	--	Gravity Main
SML2985E04	SMH2985E04	SMH3085H03	12	293	2,100	1.7%	Gravity Main
SML2985E05	SMH2985E05	SMH2985E04	8	370	544	1.0%	Gravity Main
SML2985E06	SMH2985E06	SMH2985D07	8	212	550	1.0%	Gravity Main
SML2985E07	SMH2985E07	SMH2985E05	8	269	730	1.8%	Gravity Main
SML2985E08	SMH2985E08	SMH2985E06	8	239	556	1.0%	Gravity Main
SML2985E09	SMH2985E09	SMH2985E07	8	238	573	1.1%	Gravity Main
SML2985E10	SMH2985E10	SMH2985E11	8	286	531	1.0%	Gravity Main
SML2985E11	SMH2985E11	SMH2985E12	8	81	1,244	5.2%	Gravity Main
SML2985E12	SMH2985E12	SMH2985E13	8	150	442	0.7%	Gravity Main
SML2985E13	SMH2985E13	SMH2985E14	8	210	676	1.5%	Gravity Main
SML2985E14	SMH2985E14	SMH2985E15	8	233	429	0.6%	Gravity Main
SML2985E15	SMH2985E15	SMH2985E16	8	179	512	0.9%	Gravity Main
SML2985E16	SMH2985E16	SMH2985E17	8	109	536	1.0%	Gravity Main
SML2985E17	SMH2985E17	SMH3085H01	8	57	1,062	3.8%	Gravity Main
SML2985E18	SMH2985E18	SMH2985E09	8	143	568	1.1%	Gravity Main
SML2985F01	SMH2985F01	SMH2985E08	8	164	592	1.2%	Gravity Main
SML2985F02	SMH2985F02	SMH2985F03	8	97	586	1.2%	Gravity Main
SML2985F03	SMH2985F03	SMH2985F04	8	48	644	1.4%	Gravity Main
SML2985F04	SMH2985F04	SMH2985F05	8	103	541	1.0%	Gravity Main
SML2985F05	SMH2985F05	SMH2985F06	8	239	850	2.4%	Gravity Main
SML2985F06	SMH2985F06	SMH2985C11	8	207	465	0.7%	Gravity Main
SML2985F07	SMH2985F07	SMH2985F04	8	99	856	2.5%	Gravity Main
SML2985M01	SMH2985M01	SMH3085J06	12	62	1,289	0.6%	Gravity Main
SML2985M02	SMH2985M02	SMH3085J09	8	55	491	0.8%	Gravity Main
SML2985M09	SMH2985M09	SMH2985M01	8	267	386	0.5%	Gravity Main
SML2985M10	SMH2985M10	SMH2985M11	8	322	--	--	Gravity Main
SML2985M11	SMH2985M11	SMH2985M12	8	312	539	1.0%	Gravity Main
SML2985M12	SMH2985M12	SMH2985M13	8	305	393	0.5%	Gravity Main
SML2985M13	SMH2985M13	SMH2985M09	8	317	382	0.5%	Gravity Main
SML2985M14	SMH2985M14	SMH2985M15	8	136	529	0.9%	Gravity Main
SML2985M15	SMH2985M15	SMH2985M16	8	66	347	0.4%	Gravity Main
SML2985M16	SMH2985M16	SMH2985M17	8	180	993	3.3%	Gravity Main
SML2985M17	SMH2985M17	SMH2985M21	8	264	340	0.4%	Gravity Main
SML2985M18	SMH2985M18	SMH2985M25	8	39	397	0.5%	Gravity Main
SML2985M19	SMH2985M19	SMH2985M20	8	306	424	0.6%	Gravity Main
SML2985M20	SMH2985M20	SMH2985M17	8	114	384	0.5%	Gravity Main
SML2985M21	SMH2985M21	SMH2985M02	8	286	366	0.5%	Gravity Main
SML2985M25	SMH2985M25	SMH2985M19	8	145	589	1.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2985M26	SMH2985M26	SMH2985M25	8	126	1,424	6.9%	Gravity Main
SML2985N01	SMH2985N01	SMH2985N02	8	201	510	0.9%	Gravity Main
SML2985N02	SMH2985N02	SMH2985N03	8	202	369	0.5%	Gravity Main
SML2985N03	SMH2985N03	SMH2985M18	8	367	348	0.4%	Gravity Main
SML2985N04	SMH2985N04	SMH2985N05	8	401	390	0.5%	Gravity Main
SML2985N05	SMH2985N05	SMH2985M19	8	402	373	0.5%	Gravity Main
SML2985N06	SMH2985N06	SMH2985N07	8	194	549	1.0%	Gravity Main
SML2985N07	SMH2985N07	SMH2985M17	8	209	378	0.5%	Gravity Main
SML2985N08	SMH2985N08	SMH2985N09	8	87	431	0.6%	Gravity Main
SML2985N09	SMH2985N09	SMH2985N07	8	360	388	0.5%	Gravity Main
SML2985N10	SMH2985N10	SMH2985N11	8	214	510	0.9%	Gravity Main
SML2985N11	SMH2985N11	SMH2985N15	8	25	445	0.7%	Gravity Main
SML2985N12	SMH2985N12	SMH2985N14	10	106	619	0.4%	Gravity Main
SML2985N13	SMH2985N13	SMH2985N14	8	143	521	0.9%	Gravity Main
SML2985N14	SMH2985N14	SMH2985N15	10	106	524	0.3%	Gravity Main
SML2985N15	SMH2985N15	SMH2985N17	10	114	547	0.3%	Gravity Main
SML2985N16	SMH2985N16	SMH2985M21	8	47	356	0.4%	Gravity Main
SML2985N17	SMH2985N17	SMH2985N18	10	379	533	0.3%	Gravity Main
SML2985N18	SMH2985N18	SMH3085R05	10	70	1,348	1.9%	Gravity Main
SML2985N19	SMH2985N19	SMH2985N11	8	184	369	0.5%	Gravity Main
SML2985P01	CAP	SMH2985N03	8	99	--	--	Gravity Main
SML2985V17	SMH2985V17	SMH2985V18	8	140	530	0.9%	Gravity Main
SML2985V18	SMH2985V18	SMH2985V20	8	99	447	0.7%	Gravity Main
SML2985V19	SMH2985V19	SMH2985V20	8	96	430	0.6%	Gravity Main
SML2985V20	SMH2985V20	SMH2985V21	8	178	383	0.5%	Gravity Main
SML2985V21	SMH2985V21	SMH2985N04	8	259	357	0.4%	Gravity Main
SML2985V22	SMH2985V22	SMH2985V23	8	104	526	0.9%	Gravity Main
SML2985V23	SMH2985V23	SMH2985V25	8	167	388	0.5%	Gravity Main
SML2985V24	SMH2985V24	SMH2985V23	8	119	527	0.9%	Gravity Main
SML2985V25	SMH2985V25	SMH2985V26	8	99	417	0.6%	Gravity Main
SML2985V26	SMH2985V26	SMH2985V27	8	92	349	0.4%	Gravity Main
SML2985V27	SMH2985V27	SMH2985N12	8	262	795	2.1%	Gravity Main
SML2985V28	SMH2985V28	SMH2985V29	8	83	897	2.7%	Gravity Main
SML2985V29	SMH2985V29	SMH2985V27	8	86	366	0.5%	Gravity Main
SML2985V30	SMH2985V30	SMH3085Z15	8	79	1,223	5.1%	Gravity Main
SML2985V31	SMH2985V31	SMH2985V30	8	177	390	0.5%	Gravity Main
SML2985V32	SMH2985V32	SMH2985V22	0	63	--	0.0%	Gravity Main
SML2985V33	SMH2985V33	SMH3085S10	8	105	336	0.4%	Gravity Main
SML2985W03	SMH2985W03	SMH3085Z13	8	71	883	2.6%	Gravity Main
SML2985W04	SMH2985W04	SMH2985V30	8	277	390	0.5%	Gravity Main
SML2995A02	SMH2995A02	SMH2995A03	15	335	1,499	0.3%	Gravity Main
SML2995A03	SMH2995A03	SMH2095Z09	15	151	1,476	0.3%	Gravity Main
SML2995A06	SMH2995A06	SMH2995A07	30	81	--	0.0%	Gravity Main
SML2995A07	SMH2995A07	SMH2995A08	72	119	--	0.0%	Gravity Main
SML2995A08	SMH2995A08	SMH2995A09	30	20	--	0.0%	Gravity Main
SML2995A09	SMH2995A12	SMH2995A12	72	686	--	--	Force Main
SML2995A11	SMH2095Z21	SMH2095Z21	72	594	--	--	Force Main
SML2995A12	SMH2995A11	SMH2995A11	72	38	--	--	Force Main
SML2995A1A	SMH2995A01	SMH2995A02	15	413	1,373	0.2%	Gravity Main
SML2995A2A	SMH2995A09	SMH2995A09	72	132	--	--	Force Main
SML2995B01	SMH2995B01	SMH2995B02	6	15	213	0.7%	Gravity Main
SML2995B02	SMH2995B02	SMH2995B18	6	76	205	0.7%	Gravity Main
SML2995B03	SMH2995B03	SMH2995B07	48	310	59,737	0.9%	Gravity Main
SML2995B04	SMH2995B04	SMH2995B06	8	142	539	1.0%	Gravity Main
SML2995B05	SMH2995B05	SMH2995G04	6	293	378	2.2%	Gravity Main
SML2995B06	SMH2995B24	SMH2995B06	8	44	5,457	100.7%	Gravity Main
SML2995B07	SMH2995B07	SMH2995B24	24	10	31,954	9.9%	Gravity Main
SML2995B08	SMH2995B08	SMH2995B11	42	299	15,039	0.1%	Gravity Main
SML2995B09	SMH2995B09	SMH2995B14	48	340	112,709	3.0%	Gravity Main
SML2995B10	SMH2995B10	SMH2995B12	6	133	571	5.1%	Gravity Main
SML2995B11	SMH2995B11	SMH2995B13	42	88	17,373	0.1%	Gravity Main
SML2995B12	SMH2995B12	SMH2995B19	8	40	--	0.0%	Gravity Main
SML2995B13	SMH2995B13	SMH2995B19	42	285	--	0.0%	Gravity Main
SML2995B13	SMH2995B13	SMH2995B19	42	108	--	0.0%	Gravity Main
SML2995B14	SMH2995B14	SMH2995B16	48	344	187,491	8.4%	Gravity Main
SML2995B15	SMH2995B15	SMH2995B16	8	186	--	0.0%	Gravity Main
SML2995B16	SMH2995B16	SMH2995A01	48	208	--	--	Gravity Main
SML2995B18	SMH2995B18	SMH2995C13	12	85	2,320	2.1%	Gravity Main
SML2995B19	SMH2995B19	SMH2095Y15	42	356	25,059	0.3%	Gravity Main
SML2995B20	SMH2995B20	SMH2995B19	12	46	8,285	26.7%	Gravity Main
SML2995B21	SMH2995B21	SMH2995B10	6	192	--	--	Gravity Main
SML2995B22	SMH2995B22	SMH2995B23	30	333	19,306	1.1%	Gravity Main
SML2995B23	SMH2995B23	SMH2995A06	30	508	50,605	7.5%	Gravity Main
SML2995B24	SMH2995B24	SMH2995B08	24	24	13,585	1.8%	Gravity Main
SML2995B7A	SMH2995B07	SMH2995B09	48	40	22,745	0.1%	Gravity Main
SML2995B7C	SMH2995B22	SMH2995B07	30	47	51,502	7.8%	Gravity Main
SML2995C01	SMH2995C01	SMH2995C02	30	283	13,578	0.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2995C02	SMH2995C02	SMH2995C04	30	51	6,856	0.1%	Gravity Main
SML2995C03	SMH2995C03	SMH2995F12	8	291	202	0.1%	Gravity Main
SML2995C04	SMH2995C04	SMH2995C06	30	209	22,862	1.5%	Gravity Main
SML2995C06	SMH2995C06	SMH2995C07	30	195	12,476	0.5%	Gravity Main
SML2995C07	SMH2995C07	SMH2995C17	30	173	15,820	0.7%	Gravity Main
SML2995C09	SMH2995C09	SMH2995F07	16	319	--	0.0%	Gravity Main
SML2995C10	SMH2995C10	SMH2995C12	48	88	61,601	0.9%	Gravity Main
SML2995C12	SMH2995C12	SMH2995B03	48	297	55,927	0.7%	Gravity Main
SML2995C13	SMH2995C13	SMH2995C10	12	143	1,577	1.0%	Gravity Main
SML2995C15	SMH2995C15	SMH2995C06	8	41	--	0.0%	Gravity Main
SML2995C16	SMH2995C16	SMH2995C01	30	31	16,022	0.8%	Gravity Main
SML2995C17	SMH2995C17	SMH2995C18	36	15	13,355	0.2%	Gravity Main
SML2995C18	SMH2995C18	SMH2995F10	36	301	12,601	0.2%	Gravity Main
SML2995C19	SMH2995C19	SMH2995C06	6	262	--	--	Gravity Main
SML2995D01	SMH2995D01	SMH2095W31	8	389	3,239	35.5%	Gravity Main
SML2995D02	SMH2995D02	SMH2995D25	8	108	1,460	7.2%	Gravity Main
SML2995D05	SMH2995D05	SMH2995D26	6	33	--	--	Gravity Main
SML2995D08	SMH2995D08	SMH2995D11	8	168	1,927	12.6%	Gravity Main
SML2995D09	SMH2995D09	SMH2995D13	12	215	5,020	9.8%	Gravity Main
SML2995D0B	SMH2995D21	SMH2995E19	6	289	391	2.4%	Gravity Main
SML2995D0C	SMH2995D13	SMH2995D28	18	56	10,072	4.5%	Gravity Main
SML2995D11	SMH2995D11	SMH2995D16	8	171	1,667	9.4%	Gravity Main
SML2995D12	SMH2995D12	SMH2995D15	6	138	961	14.5%	Gravity Main
SML2995D14	SMH2995D14	SMH2995D13	18	223	7,812	2.7%	Gravity Main
SML2995D15	SMH2995D15	SMH2995D14	18	73	8,016	2.9%	Gravity Main
SML2995D16	SMH2995D16	SMH2995D22	8	134	992	3.3%	Gravity Main
SML2995D17	SMH2995D17	SMH2995E09	6	218	534	4.5%	Gravity Main
SML2995D18	SMH2995D18	SMH2995D21	8	114	--	--	Gravity Main
SML2995D19	SMH2995D19	SMH2995D20	10	283	595	0.4%	Gravity Main
SML2995D20	SMH2995D20	SMH2995C04	8	210	1,531	7.9%	Gravity Main
SML2995D21	SMH2995D21	SMH2995C03	8	160	2,158	15.7%	Gravity Main
SML2995D22	SMH2995D22	SMH2995D18	6	119	1,345	28.4%	Gravity Main
SML2995D25	SMH2995D25	SMH2995D08	8	238	987	3.3%	Gravity Main
SML2995D26	SMH2995D26	SMH2995D09	12	127	5,907	13.6%	Gravity Main
SML2995D27	SMH2995D27	SMH2995D30	60	124	243,284	4.3%	Gravity Main
SML2995D28	SMH2995D28	SMH2995D27	18	97	9,533	4.1%	Gravity Main
SML2995D29	SMH2995D29	SMH2995C01	60	175	36,478	0.1%	Gravity Main
SML2995D30	SMH2995D30	SMH2995D29	60	86	123,477	1.1%	Gravity Main
SML2995D31	SMH2995D31	SMH2995D27	15	89	3,983	1.9%	Gravity Main
SML2995D32	SMH2995D32	SMH2995D34	12	21	6,047	14.2%	Gravity Main
SML2995D33	SMH2995D33	SMH2995D32	8	21	1,096	4.1%	Gravity Main
SML2995D34	SMH2995D34	SMH2995D35	12	138	2,378	2.2%	Gravity Main
SML2995D35	SMH2995D35	SMH2995D36	12	137	2,547	2.5%	Gravity Main
SML2995D36	SMH2995D36	SMH2995D37	15	181	4,494	2.4%	Gravity Main
SML2995D37	SMH2995D37	SMH2995D38	15	164	9,525	10.7%	Gravity Main
SML2995D38	SMH2995D38	SMH2995D43	15	167	6,987	5.8%	Gravity Main
SML2995D39	SMH2995D39	SMH2995D42	12	72	2,541	2.5%	Gravity Main
SML2995D40	SMH2995D40	SMH2995D39	8	35	--	--	Gravity Main
SML2995D41	SMH2995D41	SMH2995D42	12	54	2,288	2.0%	Gravity Main
SML2995D42	SMH2995D42	SMH2995D38	12	321	2,524	2.5%	Gravity Main
SML2995D43	SMH2995D43	SMH2995D13	15	11	5,680	3.8%	Gravity Main
SML2995E01	SMH2995E01	SMH2995D02	6	246	269	1.1%	Gravity Main
SML2995E02	SMH2995E02	SMH2995E03	6	437	281	1.2%	Gravity Main
SML2995E03	SMH2995E03	SMH2995M05	6	230	255	1.0%	Gravity Main
SML2995E04	SMH2995E04	SMH2995D08	8	184	529	0.9%	Gravity Main
SML2995E05	SMH2995E05	SMH2995E21	6	419	509	4.1%	Gravity Main
SML2995E06	SMH2995E06	SMH2995E08	10	170	2,427	6.1%	Gravity Main
SML2995E07	SMH2995E07	SMH2995E20	6	416	175	0.5%	Gravity Main
SML2995E08	SMH2995E08	SMH2995M13	10	480	975	1.0%	Gravity Main
SML2995E09	SMH2995E09	SMH2995E10	6	213	1,572	38.7%	Gravity Main
SML2995E10	SMH2995E10	SMH2995E11	6	310	--	--	Gravity Main
SML2995E11	SMH2995E11	SMH2995M15	12	481	1,553	0.9%	Gravity Main
SML2995E13	SMH2995E13	SMH2995E19	12	489	942	0.3%	Gravity Main
SML2995E15	SMH2995E15	SMH2995E14	84	55	547,362	3.6%	Gravity Main
SML2995E16	SMH2995E16	SMH2995E15	8	33	--	0.0%	Gravity Main
SML2995E17	SMH2995E17	SMH2995E04	8	19	430	0.6%	Gravity Main
SML2995E18	SMH2995E18	SMH2995E19	12	145	4,895	9.3%	Gravity Main
SML2995E19	SMH2995E19	SMH2995F12	18	170	5,229	1.2%	Gravity Main
SML2995E20	SMH2995E20	SMH2995E08	10	28	1,863	3.6%	Gravity Main
SML2995E21	SMH2995E21	SMH2995E06	8	20	--	--	Gravity Main
SML2995F02	SMH2995F02	SMH2995F14	12	12	3,729	5.4%	Gravity Main
SML2995F05	SMH2995F05	SMH2995F17	36	484	16,932	0.3%	Gravity Main
SML2995F06	SMH2995F06	SMH2995L05	36	495	16,740	0.3%	Gravity Main
SML2995F07	SMH2995F07	SMH2995F09	16	195	--	0.0%	Gravity Main
SML2995F09	SMH2995F09	SMH2995G11	16	244	--	--	Gravity Main
SML2995F10	SMH2995F10	SMH2995F11	36	105	9,263	0.1%	Gravity Main
SML2995F11	SMH2995F11	SMH2995F05	30	10	--	--	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2995F12	SMH2995F12	SMH2995F13	18	172	8,071	2.9%	Gravity Main
SML2995F13	SMH2995F13	SMH2995F10	18	149	7,934	2.8%	Gravity Main
SML2995F14	SMH2995F14	SMH2995F15	18	340	4,136	0.8%	Gravity Main
SML2995F15	SMH2995F15	SMH2995F17	18	205	3,304	0.5%	Gravity Main
SML2995F17	SMH2995F17	SMH2995F06	18	10	18,968	16.1%	Gravity Main
SML2995G01	SMH2995G01	SMH2995K07	8	444	--	--	Gravity Main
SML2995G02	SMH2995G02	SMH2995G04	16	177	3,239	0.9%	Gravity Main
SML2995G03	SMH2995G03	SMH2995G08	42	319	14,337	0.1%	Gravity Main
SML2995G04	SMH2995G04	SMH2995G06	16	141	4,917	2.0%	Gravity Main
SML2995G05	SMH2995G05	SMH2995G04	6	267	58	0.1%	Gravity Main
SML2995G06	SMH2995G06	SMH2995B22	18	466	2,592	0.3%	Gravity Main
SML2995G07	SMH2995G07	SMH2995B08	42	502	13,996	0.1%	Gravity Main
SML2995G08	SMH2995G08	SMH2995G07	42	459	14,330	0.1%	Gravity Main
SML2995G09	SMH2995G09	SMH2995K13	8	398	706	1.7%	Gravity Main
SML2995G0A	SMH2995Q13	SMH2995A10	72	2454	--	--	Force Main
SML2995G10	SMH2995G10	SMH2995G07	12	55	12,666	62.4%	Gravity Main
SML2995G11	SMH2995G11	SMH2995G02	16	203	2,398	0.5%	Gravity Main
SML2995G12	SMH2995G12	SMH2995G01	8	65	1,536	8.0%	Gravity Main
SML2995G14	SMH2995G14	SMH2995G03	12	127	--	--	Gravity Main
SML2995G7A	SMH2995G06	SMH2995G07	16	24	--	0.0%	Gravity Main
SML2995K01	SMH2995K01	SMH2995K02	42	139	14,365	0.1%	Gravity Main
SML2995K02	SMH2995K02	SMH2995K05	42	189	14,355	0.1%	Gravity Main
SML2995K03	SMH2995K03	SMH2995G03	42	288	11,636	0.1%	Gravity Main
SML2995K04	SMH2995K04	SMH2995K06	42	39	12,528	0.1%	Gravity Main
SML2995K05	SMH2995K05	SMH2995K04	42	494	14,264	0.1%	Gravity Main
SML2995K06	SMH2995K06	SMH2995K03	42	158	14,424	0.1%	Gravity Main
SML2995K07	SMH2995K07	SMH2995K12	8	234	977	3.2%	Gravity Main
SML2995K08	SMH2995K08	SMH2995K09	10	136	1,068	1.2%	Gravity Main
SML2995K09	SMH2995K09	SMH2995K10	10	107	1,230	1.6%	Gravity Main
SML2995K10	SMH2995K10	SMH2995K14	12	72	4,710	8.6%	Gravity Main
SML2995K11	SMH2995K11	SMH2995K08	10	145	1,105	1.3%	Gravity Main
SML2995K12	SMH2995K12	SMH2995K11	10	314	921	0.9%	Gravity Main
SML2995K13	SMH2995K13	SMH2995K12	8	53	440	0.7%	Gravity Main
SML2995K14	SMH2995K14	SMH2995Q18	12	178	4,279	7.1%	Gravity Main
SML2995L01	SMH2995L01	SMH2995P01	8	124	--	0.0%	Gravity Main
SML2995L02	SMH2995L02	SMH2995F02	12	483	531	0.1%	Gravity Main
SML2995L03	SMH2995L03	SMH2995F15	8	450	489	0.8%	Gravity Main
SML2995L04	SMH2995L04	SMH2995P12	8	68	209	0.1%	Gravity Main
SML2995L05	SMH2995L05	SMH2995P22	36	1001	22,921	0.6%	Gravity Main
SML2995L06	SMH2995L06	SMH2995L02	8	213	354	0.4%	Gravity Main
SML2995M01	SMH2995M01	SMH2995M02	8	486	889	2.7%	Gravity Main
SML2995M02	SMH2995M02	SMH2995M09	21	346	5,284	0.5%	Gravity Main
SML2995M03	SMH2995M03	SMH2995M02	6	33	1,798	50.7%	Gravity Main
SML2995M04	SMH2995M04	SMH2995M03	6	84	196	0.6%	Gravity Main
SML2995M05	SMH2995M05	SMH2995M06	6	258	747	8.8%	Gravity Main
SML2995M06	SMH2995M06	SMH2995M08	8	176	1,438	7.0%	Gravity Main
SML2995M07	SMH2995M07	SMH2995M12	8	354	679	1.6%	Gravity Main
SML2995M08	SMH2995M08	SMH2995M09	8	489	544	1.0%	Gravity Main
SML2995M09	SMH2995M09	SMH2995N06	21	480	4,439	0.4%	Gravity Main
SML2995M0A	SMH2995M10	SMH2995M08	8	175	1,320	5.9%	Gravity Main
SML2995M0B	SMH2995M21	SMH2995L02	6	172	--	--	Gravity Main
SML2995M10	SMH2995M10	SMH2995E06	8	482	464	0.7%	Gravity Main
SML2995M11	SMH2995M11	SMH2995M12	6	196	--	--	Gravity Main
SML2995M12	SMH2995M12	SMH2995N09	8	164	1,137	4.4%	Gravity Main
SML2995M13	SMH2995M13	SMH2995M14	10	479	1,217	1.5%	Gravity Main
SML2995M14	SMH2995M14	SMH2995N13	10	480	1,016	1.1%	Gravity Main
SML2995M15	SMH2995M15	SMH2995M18	8	186	1,093	4.0%	Gravity Main
SML2995M16	SMH2995M16	SMH2995M17	6	442	413	2.7%	Gravity Main
SML2995M17	SMH2995M17	SMH2995N16	6	486	305	1.5%	Gravity Main
SML2995M18	SMH2995M18	SMH2995M21	12	187	9,625	36.0%	Gravity Main
SML2995M19	SMH2995M19	SMH2995M18	10	474	356	0.1%	Gravity Main
SML2995M20	SMH2995M20	SMH2995M21	6	20	--	--	Gravity Main
SML2995M21	SMH2995M21	SMH2995E13	12	484	--	--	Gravity Main
SML2995M22	SMH2995M22	SMH2995M07	6	294	369	2.1%	Gravity Main
SML2995M23	SMH2995M23	SMH2995M24	12	137	2,212	1.9%	Gravity Main
SML2995M24	SMH2995M24	SMH2995L02	12	175	3,219	4.0%	Gravity Main
SML2995N01	SMH2995N01	SMH2995N05	30	178	52,213	8.0%	Gravity Main
SML2995N02	SMH2995N02	SMH2995M07	6	252	231	0.8%	Gravity Main
SML2995N03	SMH2995N03	SMH2995N02	6	197	623	6.1%	Gravity Main
SML2995N04	SMH2995N04	SMH2995N05	8	432	414	0.6%	Gravity Main
SML2995N05	SMH2995N05	SMH2995N08	30	164	54,426	8.7%	Gravity Main
SML2995N06	SMH2995N06	SMH2995N14	18	340	8,110	2.9%	Gravity Main
SML2995N07	SMH2995N07	SMH2995N08	8	240	1,059	3.8%	Gravity Main
SML2995N08	SMH2995N08	SMH2995N12	30	174	53,390	8.4%	Gravity Main
SML2995N09	SMH2995N09	SMH2995N10	8	323	807	2.2%	Gravity Main
SML2995N0A	SMH2995N18	SMH2995M19	10	481	371	0.1%	Gravity Main
SML2995N10	SMH2995N10	SMH2995N13	10	172	1,961	4.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2995N11	SMH2995N11	SMH2995N12	8	420	544	1.0%	Gravity Main
SML2995N12	SMH2995N12	SMH2995N15	30	170	54,016	8.6%	Gravity Main
SML2995N13	SMH2995N13	SMH2995N16	10	166	2,335	5.6%	Gravity Main
SML2995N14	SMH2995N14	SMH2995N15	21	474	9,423	1.7%	Gravity Main
SML2995N15	SMH2995N15	SMH2995N21	36	389	47,337	2.5%	Gravity Main
SML2995N16	SMH2995N16	SMH2995N18	10	185	2,023	4.2%	Gravity Main
SML2995N17	SMH2995N17	SMH2995N16	8	314	557	1.0%	Gravity Main
SML2995N18	SMH2995N18	SMH2995N19	12	50	6,220	15.1%	Gravity Main
SML2995N19	SMH2995N19	SMH2995P02	12	133	2,696	2.8%	Gravity Main
SML2995N20	SMH2995N20	SMH2995N21	8	416	267	0.2%	Gravity Main
SML2995N21	SMH2995N21	SMH2995P04	36	186	50,083	2.8%	Gravity Main
SML2995N7A	SMH2995N07	SMH2995N06	8	234	1,376	6.4%	Gravity Main
SML2995P01	SMH2995P01	SMH2995P02	8	299	--	--	Gravity Main
SML2995P02	SMH2995P02	SMH2995P08	15	185	2,198	0.6%	Gravity Main
SML2995P03	SMH2995P03	SMH2995P04	36	55	37,420	1.6%	Gravity Main
SML2995P04	SMH2995P04	SMH2995P05	48	93	81,423	1.6%	Gravity Main
SML2995P05	SMH2995P05	SMH2995P07	48	56	120,561	3.5%	Gravity Main
SML2995P06	SMH2995P06	SMH2995P08	60	45	30,104	0.1%	Gravity Main
SML2995P07	SMH2995P07	SMH2995P06	60	397	72,961	0.4%	Gravity Main
SML2995P08	SMH2995P08	SMH2995P10	48	344	58,360	0.8%	Gravity Main
SML2995P09	SMH2995P09	SMH2995P11	8	208	--	--	Gravity Main
SML2995P0A	<Null>	SMH2995P30	30	13	--	0.0%	Gravity Main
SML2995P0B	SMH2995P34	SMH2995P25	42	73	21,265	0.2%	Gravity Main
SML2995P10	SMH2995P10	SMH2995P13	48	176	340,157	27.7%	Gravity Main
SML2995P11	SMH2995P11	SMH2995P15	8	81	831	2.3%	Gravity Main
SML2995P12	SMH2995P12	SMH2995P13	8	252	2,658	23.9%	Gravity Main
SML2995P13	SMH2995P13	SMH2995P30	48	105	440,008	46.3%	Gravity Main
SML2995P14	SMH2995P14	SMH2995P13	8	308	849	2.4%	Gravity Main
SML2995P15	SMH2995P15	SMH2995P14	8	94	879	2.6%	Gravity Main
SML2995P16	SMH2995P16	SMH2995P18	48	153	135,441	4.4%	Gravity Main
SML2995P18	SMH2995P18	SMH2995P22	48	98	35,114	0.3%	Gravity Main
SML2995P19	SMH2995P19	SMH2995P24	10	86	698	0.5%	Gravity Main
SML2995P22	SMH2995P22	SMH2995P34	54	17	103,438	1.4%	Gravity Main
SML2995P24	SMH2995P24	SMH2995P27	10	279	1,675	2.9%	Gravity Main
SML2995P25	SMH2995P25	SMH2995P26	42	74	26,399	0.3%	Gravity Main
SML2995P26	SMH2995P26	SMH2995Q29	42	178	9,588	0.0%	Gravity Main
SML2995P27	SMH2995P27	SMH2995P26	10	334	1,051	1.1%	Gravity Main
SML2995P28	SMH2995P28	SMH2995P10	8	153	531	1.0%	Gravity Main
SML2995P30	SMH2995P30	SMH2995P16	48	71	42,042	0.4%	Gravity Main
SML2995P31	SMH2995Q14	SMH2995Q14	30	167	--	--	Force Main
SML2995P31	SMH2995Q14	SMH2995Q14	30	376	--	--	Force Main
SML2995P31	SML2995P31	SML2995P31	30	92	--	--	Force Main
SML2995P34	SMH2995P34	SMH2995Q13	54	1466	136,813	2.4%	Gravity Main
SML2995P35	SMH2995P35	SMH2995P05	8	51	543	1.0%	Gravity Main
SML2995P36	SMH2995P36	SMH2995P35	8	86	587	1.2%	Gravity Main
SML2995P3A	SMH2995P25	SMH2995P31	30	26	85,991	21.7%	Gravity Main
SML2995Q01	SMH2995Q01	SMH2995K01	42	185	16,629	0.1%	Gravity Main
SML2995Q03	SMH2195W16	SML2995Z03	48	31	--	--	Force Main
SML2995Q03	SMH2195W16	VALVE	48	47	--	--	Force Main
SML2995Q03	SMH2195W16	VALVE	48	1110	--	--	Force Main
SML2995Q03	SMH2195W16	VALVE	48	1368	--	--	Force Main
SML2995Q03	SMH2195W16	VALVE	48	1544	--	--	Force Main
SML2995Q08	SMH2995Q08	SMH2995Q09	12	390	3,351	4.4%	Gravity Main
SML2995Q09	SMH2995Q09	SMH2995Q10	12	331	1,094	0.5%	Gravity Main
SML2995Q10	SMH2995Q10	SMH2995Q12	12	211	3,020	3.5%	Gravity Main
SML2995Q12	SMH2995Q12	SMH2995Q03	12	39	5,262	10.8%	Gravity Main
SML2995Q14	SMH2995Q14	SMH2195W16	30	747	--	--	Force Main
SML2995Q18	SMH2995Q18	SMH2995Q09	12	199	--	--	Gravity Main
SML2995Q19	SMH2995Q19	SMH2995Q09	12	49	7,553	22.2%	Gravity Main
SML2995Q20	SMH2995Q20	SMH2995S02	6	347	177	0.5%	Gravity Main
SML2995Q21	SMH2995Q21	SMH2995Q22	3	289	--	--	Force Main
SML2995Q21	SML3295T03	SML2995Q03	36	1129	--	--	Force Main
SML2995Q22	CONTROL VALVE	SMH2995Q12	4	100	267	9.7%	Gravity Main
SML2995Q22	SMH2995Q22	SMH2995Q23	3	283	--	--	Force Main
SML2995Q23	SMH2995Q23	SMH2995Q24	3	377	--	--	Force Main
SML2995Q24	SMH2995Q24	SMH2995Q25	3	187	--	--	Force Main
SML2995Q25	SMH2995Q25	SMH2995Q12	3	48	--	--	Force Main
SML2995Q27	SMH2995Q27	SMH2995Q28	12	129	--	--	Gravity Main
SML2995Q29	SMH2995Q29	SMH2995Q01	42	29	--	--	Gravity Main
SML2995S01	SMH2995S01	SMH2995S03	10	498	726	0.5%	Gravity Main
SML2995S02	SMH2995S02	SMH2995S01	8	349	390	0.5%	Gravity Main
SML2995S03	SMH2995S03	SMH2995Z01	8	245	356	0.4%	Gravity Main
SML2995T01	SMH2995T01	SMH2995T02	3	275	--	--	Force Main
SML2995T02	SMH2995T02	SMH2995T03	3	300	--	--	Force Main
SML2995T03	SMH2995T03	SMH2995Q21	3	537	--	--	Force Main
SML2995U01	SMH2995U01	SMH2995U02	36	53	30,894	1.1%	Gravity Main
SML2995U02	SMH2995U02	SMH2995P03	36	403	36,447	1.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML2995U03	SMH2995U03	SMH2995U02	8	151	1,158	4.5%	Gravity Main
SML2995U04	SMH2995U04	SMH2995U03	8	362	1,241	5.2%	Gravity Main
SML2995U05	SMH2995U05	SMH2995U02	8	183	976	3.2%	Gravity Main
SML2995U06	SMH2995U06	SMH2995U05	8	360	555	1.0%	Gravity Main
SML2995U07	SMH2995U07	SMH2995U08	8	176	622	1.3%	Gravity Main
SML2995U08	SMH2995U08	SMH2995U09	8	169	1,334	6.0%	Gravity Main
SML2995U09	SMH2995U09	SMH2995P19	10	468	556	0.3%	Gravity Main
SML2995U10	SMH2995U10	SMH2995U09	18	483	3,568	0.6%	Gravity Main
SML2995U11	SMH2995U11	SMH2995U12	8	33	212	0.2%	Gravity Main
SML2995U12	SMH2995U12	SMH2995U08	8	81	822	2.3%	Gravity Main
SML2995U13	SMH2995U13	SMH2995U11	8	297	388	0.5%	Gravity Main
SML2995V01	SMH2995V01	SMH2995V03	8	138	2,391	19.3%	Gravity Main
SML2995V02	SMH2995V02	SMH2995N01	8	421	996	3.4%	Gravity Main
SML2995V03	SMH2995V03	SMH2995W04	18	352	3,359	0.5%	Gravity Main
SML2995V04	SMH2995V04	SMH2995N05	8	397	866	2.5%	Gravity Main
SML2995V05	SMH2995V05	SMH2995V04	8	16	--	0.0%	Gravity Main
SML2995V06	SMH2995V06	SMH2995V07	8	104	--	--	Gravity Main
SML2995V07	SMH2995V07	SMH2995N08	8	354	592	1.2%	Gravity Main
SML2995V08	SMH2995V08	SMH2995V10	8	149	1,067	3.8%	Gravity Main
SML2995V09	SMH2995V09	SMH2995V11	36	351	27,437	0.8%	Gravity Main
SML2995V10	SMH2995V10	SMH2995V14	8	327	759	1.9%	Gravity Main
SML2995V11	SMH2995V11	SMH2995V13	36	244	28,632	0.9%	Gravity Main
SML2995V12	SMH2995V12	SMH2995V11	10	141	1,365	1.9%	Gravity Main
SML2995V13	SMH2995V13	SMH2995V14	24	51	39,355	14.9%	Gravity Main
SML2995V14	SMH2995V14	SMH2995U01	36	191	24,452	0.7%	Gravity Main
SML2995V15	SMH2995V15	SMH2995N21	8	418	532	1.0%	Gravity Main
SML2995V16	SMH2995V16	SMH2995U04	8	147	527	0.9%	Gravity Main
SML2995W01	SMH2995W01	SMH2995W02	30	212	--	--	Gravity Main
SML2995W02	SMH2995W02	SMH2995W03	30	409	36,868	4.0%	Gravity Main
SML2995W03	SMH2995W03	SMH2995W04	30	57	37,943	4.2%	Gravity Main
SML2995W04	SMH2995W04	SMH2995V09	36	272	25,018	0.7%	Gravity Main
SML2995W05	SMH2995W05	SMH2995V12	8	350	1,140	4.4%	Gravity Main
SML2995W06	SMH2995W06	SMH2995V16	8	473	841	2.4%	Gravity Main
SML2995X01	SMH2995X01	SMH2995W06	8	282	394	0.5%	Gravity Main
SML2995X02	SMH2995X02	SMH2995X01	8	352	1,081	4.0%	Gravity Main
SML2995X03	SMH2995X03	SMH2995X05	8	168	948	3.0%	Gravity Main
SML2995X04	SMH2995X04	SMH2995X03	8	135	1,683	9.6%	Gravity Main
SML2995X05	SMH2995X05	SMH2995X06	8	131	857	2.5%	Gravity Main
SML2995X06	SMH2995X06	SMH2995X07	8	154	931	2.9%	Gravity Main
SML2995X07	SMH2995X07	SMH2995X09	10	210	624	0.4%	Gravity Main
SML2995X08	SMH2995X08	SMH2995X07	8	368	345	0.4%	Gravity Main
SML2995X09	SMH2995X09	SMH2995U10	10	270	632	0.4%	Gravity Main
SML2995Y01	SMH2995Y01	SMH2995Y02	3	298	--	--	Force Main
SML2995Y02	SMH2995Y02	SMH2995Y03	3	297	--	--	Force Main
SML2995Y03	SMH2995Y03	SMH2995T01	3	279	--	--	Force Main
SML2995Z01	SMH2995Z01	SMH2995Z03	8	23	358	0.4%	Gravity Main
SML2995Z02	SMH2995Z02	SMH2995Z01	8	561	430	0.6%	Gravity Main
SML2995Z03	<Null>	SML2995Q03	6	35	--	--	Force Main
SML2995Z03	SML3295A04	SML2995Q03	8	1439	--	--	Force Main
SML3085B01	SMH3085B01	SMH3085G01	15	452	2,902	1.0%	Gravity Main
SML3085B02	SMH3085B02	SMH1985Y04	12	212	875	0.3%	Gravity Main
SML3085B03	SMH3085B03	SMH3085B02	12	254	955	0.4%	Gravity Main
SML3085B04	SMH3085B04	SMH3085B06	8	104	466	0.7%	Gravity Main
SML3085B05	SMH3085B05	SMH3085B03	12	222	745	0.2%	Gravity Main
SML3085B06	SMH3085B06	SMH3085B05	12	128	863	0.3%	Gravity Main
SML3085B07	SMH3085B07	SMH3085G14	10	74	2,289	5.4%	Gravity Main
SML3085C01	SMH3085C01	SMH3085D04	15	314	4,581	2.5%	Gravity Main
SML3085C02	SMH3085C02	SMH3085C01	15	539	3,646	1.6%	Gravity Main
SML3085C03	SMH3085C03	SMH3085C02	15	217	5,477	3.5%	Gravity Main
SML3085C04	SMH3085C04	SMH3085C06	8	115	1,015	3.5%	Gravity Main
SML3085C05	SMH3085C05	SMH3085C04	8	143	539	1.0%	Gravity Main
SML3085C06	SMH3085C06	SMH3085C03	8	237	930	2.9%	Gravity Main
SML3085D01	SMH3085D01	SMH3085E03	12	396	1,139	0.5%	Gravity Main
SML3085D02	SMH3085D02	SMH3085D03	12	311	1,052	0.4%	Gravity Main
SML3085D03	SMH3085D03	SMH3085D04	12	306	1,501	0.9%	Gravity Main
SML3085D04	SMH3085D04	SMH3085D01	12	270	2,659	2.8%	Gravity Main
SML3085D05	SMH3085D05	SMH1985W01	8	147	755	1.9%	Gravity Main
SML3085D4A	SMH3085D04	SMH3085E04	12	1093	1,135	0.5%	Gravity Main
SML3085E01	SMH3085E01	SMH3085E04	18	24	3,601	0.6%	Gravity Main
SML3085E02	SMH3085E02	SMH3085E01	18	62	5,554	1.4%	Gravity Main
SML3085E03	SMH3085E03	SMH3085E02	12	393	1,144	0.5%	Gravity Main
SML3085E04	SMH3085E04	SMH1985M05	20	5205	--	--	Force Main
SML3085E05	SMH3085E05	SMH3085E06	--	143	--	--	Gravity Main
SML3085E06	SMH3085E06	SMH3085E07	8	125	--	--	Gravity Main
SML3085E07	SMH3085E07	SMH3085E01	12	169	--	--	Gravity Main
SML3085F01	SMH3085F01	SMH3085C03	15	365	3,342	1.3%	Gravity Main
SML3085F02	SMH3085F02	SMH3085F01	15	295	2,949	1.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3085G02	SMH3085G02	SMH3085G04	8	273	1,467	7.3%	Gravity Main
SML3085G04	SMH3085G04	SMH3085B04	8	114	378	0.5%	Gravity Main
SML3085G05	SMH3085G05	SMH3085G04	8	198	354	0.4%	Gravity Main
SML3085G06	SMH3085G06	SMH3085G05	8	299	374	0.5%	Gravity Main
SML3085G07	SMH3085G07	SMH3085G08	8	118	613	1.3%	Gravity Main
SML3085G08	SMH3085G08	SMH3085G10	8	168	570	1.1%	Gravity Main
SML3085G09	SMH3085G09	SMH3085G06	8	129	317	0.3%	Gravity Main
SML3085G10	SMH3085G10	SMH3085G12	8	145	1,497	7.6%	Gravity Main
SML3085G11	SMH3085G11	SMH3085G09	8	123	439	0.7%	Gravity Main
SML3085G12	SMH3085G12	SMH3085G11	8	318	886	2.7%	Gravity Main
SML3085G13	SMH3085G13	SMH3085K07	12	296	1,719	1.1%	Gravity Main
SML3085G14	SMH3085G14	SMH3085G15	10	350	813	0.7%	Gravity Main
SML3085G15	SMH3085G15	SMH3085G16	10	61	2,957	9.0%	Gravity Main
SML3085G16	SMH3085G16	SMH3085G17	10	144	2,015	4.2%	Gravity Main
SML3085G17	SMH3085G17	SMH3085G18	10	163	972	1.0%	Gravity Main
SML3085G18	SMH3085G18	SMH3085J35	10	506	537	0.3%	Gravity Main
SML3085G19	SMH3085G19	SMH3085G06	8	39	--	--	Gravity Main
SML3085G1A	SMH3085G01	SMH3085F02	15	453	2,699	0.9%	Gravity Main
SML3085G1B	SMH3085G01	SMH3085B07	10	144	3,884	15.5%	Gravity Main
SML3085G1B	SMH3085G01	SMH3085B07	10	231	3,072	9.7%	Gravity Main
SML3085H01	SMH3085H01	SMH3085H02	12	255	998	0.4%	Gravity Main
SML3085H02	SMH3085H02	SMH3085H03	12	275	952	0.4%	Gravity Main
SML3085H03	SMH3085H03	SMH3085J06	12	389	934	0.3%	Gravity Main
SML3085H04	SMH3085H04	SMH3085H05	8	136	541	1.0%	Gravity Main
SML3085H05	SMH3085H05	SMH3085J10	8	154	534	1.0%	Gravity Main
SML3085H06	SMH3085H06	SMH3085H08	8	81	533	1.0%	Gravity Main
SML3085H07	SMH3085H07	SMH3085H08	8	126	543	1.0%	Gravity Main
SML3085H08	SMH3085H08	SMH3085H09	8	328	544	1.0%	Gravity Main
SML3085H09	SMH3085H09	SMH3085J16	8	58	--	--	Gravity Main
SML3085H10	SMH3085H10	SMH3085H03	6	31	1,121	19.7%	Gravity Main
SML3085J01	SMH3085J01	SMH3085J36	16	57	4,345	1.6%	Gravity Main
SML3085J02	SMH3085J02	SMH3085J01	15	397	1,185	0.2%	Gravity Main
SML3085J03	SMH3085J03	SMH3085J02	15	390	1,705	0.3%	Gravity Main
SML3085J04	SMH3085J04	SMH3085J03	8	222	945	3.0%	Gravity Main
SML3085J05	SMH3085J05	SMH3085J09	8	353	627	1.3%	Gravity Main
SML3085J06	SMH3085J06	SMH3085J03	15	318	1,770	0.4%	Gravity Main
SML3085J07	SMH3085J07	SMH3085J06	12	261	968	0.4%	Gravity Main
SML3085J08	SMH3085J08	SMH3085J07	12	219	1,150	0.5%	Gravity Main
SML3085J09	SMH3085J09	SMH3085J08	12	281	951	0.4%	Gravity Main
SML3085J10	SMH3085J10	SMH3085J11	8	22	540	1.0%	Gravity Main
SML3085J11	SMH3085J11	SMH3085J03	8	145	440	0.7%	Gravity Main
SML3085J12	SMH3085J12	SMH3085J11	8	127	541	1.0%	Gravity Main
SML3085J15	SMH3085J15	SMH3085J01	8	53	912	2.8%	Gravity Main
SML3085J16	SMH3085J16	SMH3085J15	8	67	1,508	7.7%	Gravity Main
SML3085J17	SMH3085J17	SMH3085J18	8	233	1,003	3.4%	Gravity Main
SML3085J18	SMH3085J18	SMH3085J19	8	56	383	0.5%	Gravity Main
SML3085J19	SMH3085J19	SMH3085J20	8	222	391	0.5%	Gravity Main
SML3085J20	SMH3085J20	SMH3085J21	8	89	373	0.5%	Gravity Main
SML3085J21	SMH3085J21	SMH3085J22	8	16	3,027	31.0%	Gravity Main
SML3085J22	SMH3085J22	SMH3085J02	8	32	1,363	6.3%	Gravity Main
SML3085J23	SMH3085J23	SMH3085J19	8	111	418	0.6%	Gravity Main
SML3085J24	SMH3085J24	SMH3085J23	8	118	--	--	Gravity Main
SML3085J25	SMH3085J25	SMH3085J24	8	67	721	1.8%	Gravity Main
SML3085J26	SMH3085J26	SMH3085J25	8	170	356	0.4%	Gravity Main
SML3085J27	SMH3085J27	SMH3085J26	8	57	846	2.4%	Gravity Main
SML3085J28	SMH3085J28	SMH3085J27	8	160	506	0.9%	Gravity Main
SML3085J29	SMH3085J29	SMH3085J28	8	81	594	1.2%	Gravity Main
SML3085J30	SMH3085J30	SMH3085J26	8	131	365	0.5%	Gravity Main
SML3085J31	SMH3085J31	SMH3085J31	8	76	531	1.0%	Gravity Main
SML3085J32	SMH3085J32	SMH3085J31	8	95	605	1.2%	Gravity Main
SML3085J35	SMH3085J35	SMH3085J37	10	56	777	0.6%	Gravity Main
SML3085J36	SMH3085J36	SMH2085W12	12	43	--	--	Force Main
SML3085J36	SMH3085J36	SMH2085W12	12	3385	--	--	Force Main
SML3085J36	SMH3085J36	SMH2085W12	10	14	--	--	Force Main
SML3085J37	SMH3085J37	SMH3085J01	12	66	7,567	22.3%	Gravity Main
SML3085K01	SMH3085K01	SMH3085G13	12	260	954	0.4%	Gravity Main
SML3085K02	SMH3085K02	SMH3085K01	12	126	969	0.4%	Gravity Main
SML3085K03	SMH3085K03	SMH3085K02	12	194	934	0.3%	Gravity Main
SML3085K04	SMH3085K04	SMH3085K03	12	117	949	0.4%	Gravity Main
SML3085K05	SMH3085K05	SMH3085K04	12	338	948	0.3%	Gravity Main
SML3085K06	SMH3085K06	SMH3085K05	8	77	1,321	5.9%	Gravity Main
SML3085K07	SMH3085K07	SMH3085J37	12	243	4,623	8.3%	Gravity Main
SML3085K14	SMH3085K14	SMH3085K06	8	76	329	0.4%	Gravity Main
SML3085R01	SMH3085R01	SMH3085R04	12	166	483	0.1%	Gravity Main
SML3085R02	SMH3085R02	SMH3085R03	8	253	508	0.9%	Gravity Main
SML3085R03	SMH3085R03	SMH3085R04	8	70	652	1.4%	Gravity Main
SML3085R04	SMH3085R04	SMH3085J09	12	201	706	0.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3085R05	SMH3085R05	SMH3085R06	12	307	888	0.3%	Gravity Main
SML3085R06	SMH3085R06	SMH3085R01	12	28	1,295	0.7%	Gravity Main
SML3085R07	SMH3085R07	SMH3085R05	8	403	428	0.6%	Gravity Main
SML3085R08	SMH3085R08	SMH3085R07	8	373	406	0.6%	Gravity Main
SML3085R09	SMH3085R09	SMH3085R08	8	147	428	0.6%	Gravity Main
SML3085R10	SMH3085R10	SMH3085R09	8	128	407	0.6%	Gravity Main
SML3085R11	SMH3085R11	SMH3085R10	8	186	708	1.7%	Gravity Main
SML3085R12	SMH3085R12	SMH3085R11	8	164	617	1.3%	Gravity Main
SML3085R13	SMH3085R13	SMH3085R14	8	328	--	--	Gravity Main
SML3085R14	SMH3085R14	SMH3085R08	8	169	--	--	Gravity Main
SML3085S02	SMH3085S02	SMH3085S03	10	186	15,148	236.1%	Gravity Main
SML3085S03	SMH3085S03	SMH3085S10	10	216	--	--	Gravity Main
SML3085S04	SMH3085S04	SMH3085S05	8	38	1,575	8.4%	Gravity Main
SML3085S05	SMH3085S05	SMH3085S06	8	162	553	1.0%	Gravity Main
SML3085S06	SMH3085S06	SMH3085S07	8	250	531	1.0%	Gravity Main
SML3085S07	SMH3085S07	SMH3085S08	8	230	554	1.0%	Gravity Main
SML3085S08	SMH3085S08	SMH3085S09	8	196	374	0.5%	Gravity Main
SML3085S09	SMH3085S09	SMH3085S03	8	235	552	1.0%	Gravity Main
SML3085S10	SMH3085S10	SMH3085S11	10	34	2,854	8.4%	Gravity Main
SML3085S11	SMH3085S11	SMH3085S14	10	36	3,869	15.4%	Gravity Main
SML3085S11	SMH3085S11	SMH3085S14	10	107	2,258	5.2%	Gravity Main
SML3085S12	SMH3085S12	SMH3085S13	8	353	456	0.7%	Gravity Main
SML3085S13	SMH3085S13	SMH3085S11	8	218	523	0.9%	Gravity Main
SML3085S14	SMH3085S14	SMH3085R05	10	331	894	0.8%	Gravity Main
SML3085S15	SMH3085S15	SMH3085S16	8	35	--	--	Gravity Main
SML3085S17	SMH3085S17	SMH3085S18	8	97	--	--	Gravity Main
SML3085S18	SMH3085S18	SMH3085S19	8	102	--	--	Gravity Main
SML3085S19	SMH3085S19	SMH3085S15	8	88	--	--	Gravity Main
SML3085Y01	SMH3085Y01	SMH3085Z04	8	318	388	0.5%	Gravity Main
SML3085Z01	SMH3085Z01	SMH3085Z02	8	53	567	1.1%	Gravity Main
SML3085Z02	SMH3085Z02	SMH3085Z03	8	133	340	0.4%	Gravity Main
SML3085Z03	SMH3085Z03	SMH3085Z04	8	232	541	1.0%	Gravity Main
SML3085Z04	SMH3085Z04	SMH3085Z05	8	102	497	0.8%	Gravity Main
SML3085Z05	SMH3085Z05	SMH3085Z06	8	273	337	0.4%	Gravity Main
SML3085Z06	SMH3085Z06	SMH3085Z07	8	290	376	0.5%	Gravity Main
SML3085Z07	SMH3085Z07	SMH3085Z08	8	214	370	0.5%	Gravity Main
SML3085Z08	SMH3085Z08	SMH3085Z09	8	129	421	0.6%	Gravity Main
SML3085Z09	SMH3085Z09	SMH3085Z15	8	222	365	0.5%	Gravity Main
SML3085Z10	SMH3085Z10	SMH3085Z09	8	298	632	1.3%	Gravity Main
SML3085Z11	SMH3085Z11	SMH3085Z12	10	74	627	0.4%	Gravity Main
SML3085Z12	SMH3085Z12	SMH3085Z13	10	210	667	0.5%	Gravity Main
SML3085Z13	SMH3085Z13	SMH3085Z14	10	241	622	0.4%	Gravity Main
SML3085Z14	SMH3085Z14	SMH3085Z15	10	266	625	0.4%	Gravity Main
SML3085Z15	SMH3085Z15	SMH3085S02	10	262	853	0.7%	Gravity Main
SML3095A01	SMH3095A01	SMH1995Z63	6	446	1,320	27.3%	Gravity Main
SML3095A02	SMH3095A02	SMH3095A01	6	231	320	1.6%	Gravity Main
SML3095A03	SMH3095A03	SMH3095A02	6	252	151	0.4%	Gravity Main
SML3095A05	SMH3095A05	SMH1995Z06	8	426	998	3.4%	Gravity Main
SML3095A07	SMH3095A07	SMH3095A23	12	27	817	0.3%	Gravity Main
SML3095A08	SMH3095A08	SMH3095A07	8	443	759	1.9%	Gravity Main
SML3095A09	SMH3095A09	SMH1995Z20	15	263	4,139	2.0%	Gravity Main
SML3095A10	SMH3095A10	SMH3095A09	10	135	1,663	2.8%	Gravity Main
SML3095A11	SMH3095A11	SMH3095A10	10	363	759	0.6%	Gravity Main
SML3095A12	SMH3095A12	SMH1995Z27	8	261	498	0.8%	Gravity Main
SML3095A13	SMH3095A13	SMH3095A12	6	189	721	8.2%	Gravity Main
SML3095A14	SMH3095A14	SMH3095A12	6	160	643	6.5%	Gravity Main
SML3095A15	SMH3095A15	SMH3095A14	6	55	762	9.1%	Gravity Main
SML3095A16	SMH3095A16	SMH3095H23	12	259	1,556	0.9%	Gravity Main
SML3095A21	SMH3095A21	SMH3095A22	8	277	462	0.7%	Gravity Main
SML3095A22	SMH3095A22	SMH3095A26	10	248	1,716	3.0%	Gravity Main
SML3095A23	SMH3095A23	SMH1995Z37	12	250	2,236	1.9%	Gravity Main
SML3095A24	SMH3095A24	SMH3095A25	6	284	293	1.3%	Gravity Main
SML3095A25	SMH3095A25	SMH1995Z50	12	348	2,840	3.1%	Gravity Main
SML3095A26	SMH3095A26	SMH1995Z60	12	353	3,710	5.4%	Gravity Main
SML3095A4A	SMH3095A04	SMH3095B18	12	184	2,420	2.3%	Gravity Main
SML3095A4B	SMH3095A04	SMH3095A03	6	46	515	4.2%	Gravity Main
SML3095B04	SMH3095B04	SMH3095B10	10	372	574	0.3%	Gravity Main
SML3095B05	SMH3095B05	SMH3095B04	8	419	1,413	6.7%	Gravity Main
SML3095B06	SMH3095B06	SMH1995Y05	12	383	4,518	7.9%	Gravity Main
SML3095B07	SMH3095B07	SMH3095B06	8	38	790	2.1%	Gravity Main
SML3095B08	SMH3095B08	SMH3095B07	8	140	1,855	11.6%	Gravity Main
SML3095B09	SMH3095B09	SMH3095B08	6	298	556	4.8%	Gravity Main
SML3095B0A	SMH3095B17	SMH3095B15	10	177	1,571	2.5%	Gravity Main
SML3095B10	SMH3095B10	SMH3095B14	10	356	796	0.7%	Gravity Main
SML3095B11	SMH3095B11	SMH1995Y16	18	394	8,801	3.5%	Gravity Main
SML3095B13	SMH3095B13	SMH3095B11	12	485	3,427	4.6%	Gravity Main
SML3095B14	SMH3095B14	SMH1995Y11	8	577	700	1.7%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3095B15	SMH3095B15	SMH1995Y14	12	365	1,780	1.2%	Gravity Main
SML3095B16	SMH3095B16	SMH3095B15	12	33	6,823	18.1%	Gravity Main
SML3095B17	SMH3095B17	SMH1995Z02	30	262	29,646	2.6%	Gravity Main
SML3095B18	SMH3095B18	SMH3095B17	30	483	19,381	1.1%	Gravity Main
SML3095B20	SMH3095B20	SMH3095B21	8	418	1,128	4.3%	Gravity Main
SML3095B21	SMH3095B21	SMH3095B22	8	61	900	2.7%	Gravity Main
SML3095B22	SMH3095B22	SMH3095B23	8	206	1,667	9.4%	Gravity Main
SML3095B23	SMH3095B23	SMH1995Y20	8	48	1,680	9.5%	Gravity Main
SML3095B24	SMH3095B24	SMH3095B15	18	20	--	--	Gravity Main
SML3095B25	SMH3095B25	SMH3095B26	18	129	--	--	Gravity Main
SML3095B26	SMH3095B26	SMH3095B15	18	18	--	--	Gravity Main
SML3095B27	SMH3095B27	SMH3095B15	12	303	--	--	Gravity Main
SML3095B28	SMH3095B28	SMH3095B27	8	15	--	--	Gravity Main
SML3095C01	SMH3095C01	SMH3095C05	24	134	7,135	0.5%	Gravity Main
SML3095C01	SMH3095C01	SMH3095C05	24	263	5,097	0.3%	Gravity Main
SML3095C05	SMH3095C05	SMH3095C03	24	84	2,945	0.1%	Gravity Main
SML3095C06	SMH3095C06	SMH3095C04	24	82	6,341	0.4%	Gravity Main
SML3095C07	SMH3095C07	SMH3095C06	12	150	1,212	0.6%	Gravity Main
SML3095C0A	<Null>	SMH3095C25	8	11	507	0.9%	Gravity Main
SML3095C10	SMH3095C10	SMH3095C07	12	156	1,051	0.4%	Gravity Main
SML3095C11	SMH3095C11	SMH3095C10	12	163	1,324	0.7%	Gravity Main
SML3095C12	SMH3095C12	SMH3095C14	12	92	5,868	13.4%	Gravity Main
SML3095C13	SMH3095C13	SMH3095C12	12	138	4,846	9.1%	Gravity Main
SML3095C14	SMH3095C14	SMH3095C15	15	123	7,798	7.2%	Gravity Main
SML3095C15	SMH3095C15	SMH1995X10	27	359	12,525	0.8%	Gravity Main
SML3095C16	SMH3095C16	SMH3095C15	8	43	2,664	24.0%	Gravity Main
SML3095C17	SMH3095C17	SMH3095C16	6	260	891	12.4%	Gravity Main
SML3095C19	SMH3095C19	SMH3095C16	8	238	1,176	4.7%	Gravity Main
SML3095C20	SMH3095C20	SMH3095C19	6	423	686	7.4%	Gravity Main
SML3095C21	SML3095C21	SMH1995X12	14	203	--	--	Force Main
SML3095C21	SMH3095C21	SML3095C21	14	263	--	--	Force Main
SML3095C21	SMH3095C21	SML3095C21	14	373	--	--	Force Main
SML3095C21	SML3095C21	SML3095C21	14	170	--	--	Force Main
SML3095C21	SML3095C21	SML3095C21	14	427	--	--	Force Main
SML3095C25	SMH3095C25	SMH3095C26	8	58	539	1.0%	Gravity Main
SML3095C26	SMH3095C26	SMH3095C04	8	104	1,066	3.8%	Gravity Main
SML3095C27	SMH3095C27	SMH3095C13	12	245	4,867	9.2%	Gravity Main
SML3095C28	SMH3095C28	SMH3095C27	8	52	1,041	3.7%	Gravity Main
SML3095C32	SMH3095C32	SMH3095C28	15	40	7,493	6.6%	Gravity Main
SML3095C38	SMH3095C38	SMH3095C39	30	23	--	--	Gravity Main
SML3095C39	SMH3095C39	CAP	30	338	--	--	Gravity Main
SML3095C3A	SMH3095C03	SMH3095C21	24	30	27,209	7.1%	Gravity Main
SML3095C40	SMH3095C40	SMH3095C43	24	219	--	--	Gravity Main
SML3095C42	SMH3095C42	SMH3095C44	12	183	--	--	Gravity Main
SML3095C43	SMH3095C43	SMH3095C44	36	25	--	--	Gravity Main
SML3095C44	SMH3095C44	SMH3095C45	36	74	--	--	Gravity Main
SML3095C45	SMH3095C45	SMH3095C46	--	41	--	--	Gravity Main
SML3095C46	SMH3095C46	SMH3095C47	--	78	--	--	Gravity Main
SML3095C47	SMH3095C47	SMH3095C04	--	420	--	--	Gravity Main
SML3095C4A	SMH3095C04	SMH3095C21	24	28	28,126	7.6%	Gravity Main
SML3095D01	SMH3095D01	SMH3095C26	8	230	401	0.5%	Gravity Main
SML3095E01	SMH3095E01	SMH3095E05	8	203	--	--	Gravity Main
SML3095E02	SMH3095E02	SMH3095F02	8	338	468	0.7%	Gravity Main
SML3095E03	SMH3095E03	SMH3095E06	24	55	9,665	0.9%	Gravity Main
SML3095E04	SMH3095E04	SMH3095F01	8	284	289	0.3%	Gravity Main
SML3095E05	SMH3095E05	SMH3095F03	8	270	988	3.3%	Gravity Main
SML3095E06	SMH3095E06	SMH3095C01	24	99	11,086	1.2%	Gravity Main
SML3095E06	SMH3095E06	SMH3095C01	24	181	8,193	0.6%	Gravity Main
SML3095F01	SMH3095F01	SMH3095F04	12	158	403	0.1%	Gravity Main
SML3095F02	SMH3095F02	SMH3095F01	8	156	1,589	8.5%	Gravity Main
SML3095F03	SMH3095F03	SMH3095F02	8	157	1,591	8.6%	Gravity Main
SML3095F04	SMH3095F04	SMH3095F12	15	337	867	0.1%	Gravity Main
SML3095F06	SMH3095F06	SMH3095F14	10	295	2,172	4.9%	Gravity Main
SML3095F07	SMH3095F07	SMH3095F13	8	194	572	1.1%	Gravity Main
SML3095F08	SMH3095F08	SMH3095F07	8	129	926	2.9%	Gravity Main
SML3095F12	SMH3095F12	SMH3095F52	24	92	3,363	0.1%	Gravity Main
SML3095F13	SMH3095F13	SMH3095F12	24	193	16,860	2.7%	Gravity Main
SML3095F14	SMH3095F14	SMH3095F13	24	172	18,140	3.2%	Gravity Main
SML3095F15	SMH3095F15	SMH3095C28	8	159	1,188	4.8%	Gravity Main
SML3095F16	SMH3095F16	SMH3095F17	8	291	--	--	Gravity Main
SML3095F17	SMH3095F17	SMH3095F14	30	248	13,972	0.6%	Gravity Main
SML3095F49	SML3095F49	SMH3095F51	18	13	4,153	0.8%	Gravity Main
SML3095F49	SMH3095F49	SML3095F49	18	43	2,287	0.2%	Gravity Main
SML3095F51	SMH3095F51	SMH3095F17	--	352	--	--	Gravity Main
SML3095F52	SMH3095F52	SMH3095F53	24	95	--	--	Gravity Main
SML3095F53	SMH3095F53	SMH3095C40	24	443	--	--	Gravity Main
SML3095G01	SMH3095G01	SMH3095G04	10	180	459	0.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3095G03	SMH3095G03	SMH3095B05	8	535	666	1.5%	Gravity Main
SML3095G04	SMH3095G04	SMH3095G03	10	483	496	0.3%	Gravity Main
SML3095G05	SMH3095G05	SMH3095B09	6	531	489	3.7%	Gravity Main
SML3095G06	SMH3095G06	SMH3095G05	6	455	486	3.7%	Gravity Main
SML3095G07	SMH3095G07	SMH3095B13	8	483	1,400	6.6%	Gravity Main
SML3095G08	SMH3095G08	SMH3095G07	8	481	1,134	4.3%	Gravity Main
SML3095G09	SMH3095G09	SMH3095G11	30	62	--	--	Force Main
SML3095G10	SMH3095G10	SMH3095G09	8	44	451	0.7%	Gravity Main
SML3095G11	SMH3095G11	SMH2995P31	30	5580	--	--	Force Main
SML3095G12	SMH3095G12	SMH3095B16	8	483	955	3.1%	Gravity Main
SML3095G13	SMH3095G13	SMH3095G12	8	474	1,221	5.0%	Gravity Main
SML3095G14	SMH3095G14	SMH3095B18	30	495	19,143	1.1%	Gravity Main
SML3095G15	SMH3095G15	SMH3095G14	30	470	16,251	0.8%	Gravity Main
SML3095G2A	SMH3095G02	SMH3095G01	10	56	3,349	11.5%	Gravity Main
SML3095G2B	SMH3095G02	SMH3095F49	18	129	9,014	3.6%	Gravity Main
SML3095H01	SMH3095H01	SMH3095A04	6	428	149	0.4%	Gravity Main
SML3095H02	SMH3095H02	SMH3095G14	10	160	1,847	3.5%	Gravity Main
SML3095H03	SMH3095H03	SMH3095G15	27	172	15,749	1.3%	Gravity Main
SML3095H04	SMH3095H04	SMH3095H05	8	203	468	0.7%	Gravity Main
SML3095H05	SMH3095H05	SMH3095H06	8	478	954	3.1%	Gravity Main
SML3095H06	SMH3095H06	SMH3095H03	27	172	15,406	1.2%	Gravity Main
SML3095H07	SMH3095H07	SMH3095A08	8	409	770	2.0%	Gravity Main
SML3095H08	SMH3095H08	SMH3095H07	8	553	439	0.7%	Gravity Main
SML3095H09	SMH3095H09	SMH3095H08	8	45	344	0.4%	Gravity Main
SML3095H0A	SMH3095H09	SMH3095H10	8	36	2,835	27.2%	Gravity Main
SML3095H10	SMH3095H10	SMH3095H11	8	135	1,325	5.9%	Gravity Main
SML3095H11	SMH3095H11	SMH3095H13	8	172	1,322	5.9%	Gravity Main
SML3095H12	SMH3095H12	SMH3095H13	18	480	3,643	0.6%	Gravity Main
SML3095H13	SMH3095H13	SMH3095J14	18	481	7,872	2.8%	Gravity Main
SML3095H14	SMH3095H14	SMH3095A21	6	374	289	1.3%	Gravity Main
SML3095H15	SMH3095H15	SMH3095H16	6	203	431	2.9%	Gravity Main
SML3095H16	SMH3095H16	SMH3095H17	8	216	631	1.3%	Gravity Main
SML3095H17	SMH3095H17	SMH3095J16	8	480	1,311	5.8%	Gravity Main
SML3095H20	SMH3095H20	SMH3095H21	8	184	552	1.0%	Gravity Main
SML3095H21	SMH3095H21	SMH3095H22	8	161	678	1.6%	Gravity Main
SML3095H22	SMH3095H22	SMH3095H05	8	12	1,523	7.8%	Gravity Main
SML3095H23	SMH3095H23	SMH3095H12	12	83	1,009	0.4%	Gravity Main
SML3095H3A	SMH3095H03	SMH3095H02	10	472	673	0.5%	Gravity Main
SML3095J01	SMH3095J01	SMH3095G15	10	431	1,637	2.8%	Gravity Main
SML3095J02	SMH3095J02	SMH3095J01	6	37	420	2.8%	Gravity Main
SML3095J03	SMH3095J03	SMH3095J02	6	292	515	4.2%	Gravity Main
SML3095J04	SMH3095J04	SMH3095H03	10	486	794	0.6%	Gravity Main
SML3095J05	SMH3095J05	SMH3095J04	10	481	1,584	2.6%	Gravity Main
SML3095J06	SMH3095J06	SMH3095H06	24	362	8,375	0.7%	Gravity Main
SML3095J07	SMH3095J07	SMH3095J06	24	116	8,231	0.7%	Gravity Main
SML3095J08	SMH3095J08	SMH3095J07	8	192	768	2.0%	Gravity Main
SML3095J09	SMH3095J09	SMH3095J08	8	240	1,212	5.0%	Gravity Main
SML3095J10	SMH3095J10	SMH3095J09	8	81	765	2.0%	Gravity Main
SML3095J11	SMH3095J11	SMH3095J10	8	112	1,291	5.6%	Gravity Main
SML3095J12	SMH3095J12	SMH3095H09	8	434	90	0.0%	Gravity Main
SML3095J13	SMH3095J13	SMH3095J12	8	526	375	0.5%	Gravity Main
SML3095J14	SMH3095J14	SMH3095J15	21	485	11,948	2.8%	Gravity Main
SML3095J15	SMH3095J15	SMH3095J17	21	171	5,180	0.5%	Gravity Main
SML3095J16	SMH3095J16	SMH3095J17	8	486	957	3.1%	Gravity Main
SML3095J17	SMH3095J17	SMH2995M02	21	174	5,673	0.6%	Gravity Main
SML3095J18	SMH3095J18	SMH3095J15	12	171	6,016	14.1%	Gravity Main
SML3095K01	SMH3095K01	SMH3095G02	18	431	8,214	3.0%	Gravity Main
SML3095K02	SMH3095K02	SMH3095K01	21	173	5,424	0.6%	Gravity Main
SML3095K03	SMH3095K03	SMH3095K02	18	495	9,641	4.2%	Gravity Main
SML3095K04	SMH3095K04	SMH3095K03	18	135	4,264	0.8%	Gravity Main
SML3095K05	SMH3095K05	SMH3095K12	12	417	2,207	1.9%	Gravity Main
SML3095K06	SMH3095K06	SMH3095K05	8	438	1,294	5.7%	Gravity Main
SML3095K07	SMH3095K07	SMH3095G08	8	308	685	1.6%	Gravity Main
SML3095K08	SMH3095K08	SMH3095Q11	8	125	635	1.4%	Gravity Main
SML3095K09	SMH3095K09	SMH3095G13	8	486	609	1.3%	Gravity Main
SML3095K10	SMH3095K10	SMH3095K09	8	240	566	1.1%	Gravity Main
SML3095K11	SMH3095K11	SMH3095K10	8	176	1,844	11.5%	Gravity Main
SML3095K12	SMH3095K12	SMH3095K02	12	35	2,596	2.6%	Gravity Main
SML3095K13	SMH3095K13	SMH3095K12	8	188	284	0.3%	Gravity Main
SML3095L01	SMH3095L01	SMH3095L02	8	156	1,793	10.9%	Gravity Main
SML3095L02	SMH3095L02	SMH3095L05	8	154	1,292	5.6%	Gravity Main
SML3095L03	SMH3095L03	SMH3095L02	8	475	2,132	15.4%	Gravity Main
SML3095L04	SMH3095L04	SMH3095L08	8	349	508	0.9%	Gravity Main
SML3095L05	SMH3095L05	SMH3095L06	8	157	1,351	6.2%	Gravity Main
SML3095L06	SMH3095L06	SMH3095L09	10	93	2,585	6.9%	Gravity Main
SML3095L07	SMH3095L07	SMH3095L09	6	35	134	0.3%	Gravity Main
SML3095L08	SMH3095L08	SMH3095F14	10	241	2,722	7.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3095L09	SMH3095L09	SMH3095L08	10	241	3,584	13.2%	Gravity Main
SML3095L14	SMH3095L14	SMH3095L07	6	374	844	11.2%	Gravity Main
SML3095L15	SMH3095L15	SMH3095L16	--	480	--	--	Gravity Main
SML3095L16	SMH3095L16	SMH3095F17	8	480	--	--	Gravity Main
SML3095L17	SMH3095L17	SMH3095F51	12	486	--	--	Gravity Main
SML3095L18	SMH3095L18	SMH3095L17	12	513	--	--	Gravity Main
SML3095M01	SMH3095M01	SMH3095F06	8	151	1,250	5.3%	Gravity Main
SML3095M02	SMH3095M02	SMH3095L04	8	526	1,356	6.2%	Gravity Main
SML3095M03	SMH3095M03	SMH3095F06	8	448	1,467	7.3%	Gravity Main
SML3095M04	SMH3095M04	SMH3095L01	8	144	1,864	11.7%	Gravity Main
SML3095M05	SMH3095M05	SMH3095M04	8	70	1,578	8.4%	Gravity Main
SML3095M06	SMH3095M06	SMH3095M05	8	254	2,157	15.7%	Gravity Main
SML3095M07	SMH3095M07	SMH3095M06	8	145	143	0.1%	Gravity Main
SML3095P05	SMH3095P05	SMH3095L18	12	104	--	--	Gravity Main
SML3095P06	SMH3095P06	SMH3095P05	12	240	--	--	Gravity Main
SML3095P07	SMH3095P07	SMH3095P06	--	342	--	--	Gravity Main
SML3095Q01	SMH3095Q01	SMH3095K03	8	191	1,913	12.4%	Gravity Main
SML3095Q02	SMH3095Q02	SMH3095Q01	8	359	1,177	4.7%	Gravity Main
SML3095Q03	SMH3095Q03	SMH3095Q04	8	139	1,530	7.9%	Gravity Main
SML3095Q04	SMH3095Q04	SMH3095Q09	8	360	1,422	6.8%	Gravity Main
SML3095Q05	SMH3095Q05	SMH3095Q09	15	250	3,076	1.1%	Gravity Main
SML3095Q06	SMH3095Q06	SMH3095K04	15	206	4,438	2.3%	Gravity Main
SML3095Q07	SMH3095Q07	SMH3095Q05	12	174	3,286	4.2%	Gravity Main
SML3095Q08	SMH3095Q08	SMH3095Q06	15	95	2,872	1.0%	Gravity Main
SML3095Q09	SMH3095Q09	SMH3095Q08	15	100	2,606	0.8%	Gravity Main
SML3095Q10	SMH3095Q10	SMH3095K06	8	506	787	2.1%	Gravity Main
SML3095Q11	SMH3095Q11	SMH3095Q12	8	324	504	0.9%	Gravity Main
SML3095Q12	SMH3095Q12	SMH3095Q14	8	113	554	1.0%	Gravity Main
SML3095Q13	SMH3095Q13	SMH3095Q15	36	88	41,194	1.9%	Gravity Main
SML3095Q14	SMH3095Q14	SMH3095Q16	36	41	85,485	8.1%	Gravity Main
SML3095Q15	SMH3095Q15	SMH3095Q14	36	281	42,370	2.0%	Gravity Main
SML3095Q16	SMH3095Q16	SMH3095R01	36	186	34,821	1.3%	Gravity Main
SML3095R01	SMH3095R01	SMH3095R04	48	182	25,785	0.2%	Gravity Main
SML3095R02	SMH3095R02	SMH3095R01	15	482	1,263	0.2%	Gravity Main
SML3095R03	SMH3095R03	SMH3095J05	10	349	1,800	3.3%	Gravity Main
SML3095R04	SMH3095R04	SMH3095R07	48	170	24,257	0.1%	Gravity Main
SML3095R05	SMH3095R05	SMH3095R22	8	189	891	2.7%	Gravity Main
SML3095R06	SMH3095R06	SMH3095R02	15	179	2,569	0.8%	Gravity Main
SML3095R07	SMH3095R07	SMH3095R08	48	132	25,153	0.2%	Gravity Main
SML3095R08	SMH3095R08	SMH3095R10	48	54	29,151	0.2%	Gravity Main
SML3095R09	SMH3095R09	SMH3095J11	8	409	544	1.0%	Gravity Main
SML3095R0A	SMH3095R14	SMH3095J13	6	493	194	0.6%	Gravity Main
SML3095R0B	SMH3095R18	SMH3095R17	8	45	742	1.9%	Gravity Main
SML3095R10	SMH3095R10	SMH3095R11	48	418	118,562	3.4%	Gravity Main
SML3095R11	SMH3095R11	SMH3095R12	48	33	431,000	44.5%	Gravity Main
SML3095R12	SMH3095R12	SMH3095R13	48	153	29,521	0.2%	Gravity Main
SML3095R13	SMH3095R13	SMH3095R18	36	343	52,824	3.1%	Gravity Main
SML3095R14	SMH3095R14	SMH3095R08	6	202	438	3.0%	Gravity Main
SML3095R15	SMH3095R15	SMH3095R14	6	431	224	0.8%	Gravity Main
SML3095R16	SMH3095R16	SMH3095J15	8	474	865	2.5%	Gravity Main
SML3095R17	SMH3095R17	SMH3095R16	8	433	1,475	7.4%	Gravity Main
SML3095R18	SMH3095R18	SMH2995N01	36	346	14,780	0.2%	Gravity Main
SML3095R19	SMH3095R19	SMH3095J17	8	287	537	1.0%	Gravity Main
SML3095R20	SMH3095R20	SMH3095R19	8	187	1,459	7.2%	Gravity Main
SML3095R21	SMH3095R21	SMH3095R20	8	430	1,427	6.9%	Gravity Main
SML3095R22	SMH3095R22	SMH3095R04	10	231	--	--	Gravity Main
SML3095R4A	SMH3095R04	SMH3095R03	10	129	1,808	3.4%	Gravity Main
SML3095S01	SMH3095S01	SMH3095R02	10	478	1,353	1.9%	Gravity Main
SML3095S03	SMH3095S03	SMH3095R11	12	509	1,637	1.0%	Gravity Main
SML3095S04	SMH3095S04	SMH3095R13	12	481	2,127	1.8%	Gravity Main
SML3095S05	SMH3095S09	SMH3095R18	8	482	741	1.9%	Gravity Main
SML3095S06	SMH3095S06	SMH2995V01	8	240	1,575	8.4%	Gravity Main
SML3095S07	SMH3095S07	SMH3095R06	18	430	7,440	2.5%	Gravity Main
SML3095S09	SMH3095S09	SMH3095S06	8	479	--	--	Gravity Main
SML3095S10	SMH3095S10	SMH3095S07	18	50	--	--	Gravity Main
SML3095T01	SMH3095T01	SMH3095T02	12	26	5,730	12.8%	Gravity Main
SML3095T02	SMH3095T02	SMH3095Q07	12	229	3,320	4.3%	Gravity Main
SML3095T03	SMH3095T03	SMH3095T01	12	358	2,413	2.3%	Gravity Main
SML3095T04	SMH3095T04	SMH3095Q10	8	541	413	0.6%	Gravity Main
SML3095T05	SMH3095T05	SMH3095T07	36	204	38,934	1.7%	Gravity Main
SML3095T06	SMH3095T06	SMH3095T05	36	221	44,051	2.2%	Gravity Main
SML3095T07	SMH3095T07	SMH3095Q13	36	339	39,507	1.7%	Gravity Main
SML3095T08	SMH3095T08	SMH3095T05	8	274	1,274	5.5%	Gravity Main
SML3095T09	SMH3095T09	SMH3095T08	8	269	1,329	6.0%	Gravity Main
SML3095T10	SMH3095T10	SMH3095T09	8	208	544	1.0%	Gravity Main
SML3095T11	SMH3095T11	SMH3095T03	18	331	3,182	0.5%	Gravity Main
SML3095T12	SMH3095T12	SMH3095T03	8	175	1,819	11.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3095T13	SMH3095T13	SMH3095T12	8	154	554	1.0%	Gravity Main
SML3095T14	SMH3095T14	SMH3095T13	8	56	2,293	17.8%	Gravity Main
SML3095T15	SMH3095T15	SMH3095T14	8	187	1,995	13.5%	Gravity Main
SML3095T16	SMH3095T16	SMH3095T11	8	94	--	0.0%	Gravity Main
SML3095T17	SMH3095T17	SMH3095T16	8	176	1,518	7.8%	Gravity Main
SML3095T18	SMH3095T18	SMH3095T08	8	177	893	2.7%	Gravity Main
SML3095T19	SMH3095T19	SMH3095T18	8	94	660	1.5%	Gravity Main
SML3095T20	SMH3095T20	SMH3095T19	8	230	196	0.1%	Gravity Main
SML3095U04	SMH3095U04	SMH3095U05	10	89	1,517	2.4%	Gravity Main
SML3095U05	SMH3095U05	SMH3095T12	8	287	2,428	19.9%	Gravity Main
SML3095U06	SMH3095U06	SMH3095X13	8	176	525	0.9%	Gravity Main
SML3095U07	SMH3095U07	SMH3095U06	8	121	617	1.3%	Gravity Main
SML3095U08	SMH3095U08	SMH3095U07	8	145	555	1.0%	Gravity Main
SML3095U10	SMH3095U10	SMH3095U09	8	120	1,050	3.7%	Gravity Main
SML3095U11	SMH3095U11	SMH3095U10	8	38	441	0.7%	Gravity Main
SML3095U12	SMH3095U12	SMH3095U02	--	279	--	--	Gravity Main
SML3095U13	SMH3095U13	SMH3095P07	--	343	--	--	Gravity Main
SML3095U14	SMH3095U14	SMH3095U15	8	9	--	--	Gravity Main
SML3095U15	SMH3095U15	SMH3095U13	14	174	--	--	Gravity Main
SML3095U16	SMH3095U16	SMH3095U14	--	231	--	--	Gravity Main
SML3095W01	SMH3095W01	SMH3095X19	8	169	441	0.7%	Gravity Main
SML3095W02	SMH3095W02	SMH3095W01	8	94	626	1.3%	Gravity Main
SML3095X02	SMH3095X02	SMH3095U04	8	544	878	2.6%	Gravity Main
SML3095X03	SMH3095X03	SMH3095X23	8	64	816	2.3%	Gravity Main
SML3095X04	SMH3095X04	SMH3095X03	10	303	1,025	1.1%	Gravity Main
SML3095X05	SMH3095X05	SMH3095X03	10	18	704	0.5%	Gravity Main
SML3095X06	SMH3095X06	SMH3095X05	8	295	565	1.1%	Gravity Main
SML3095X07	SMH3095X07	SMH3095X20	8	206	820	2.3%	Gravity Main
SML3095X08	SMH3095X08	SMH3095X07	8	417	895	2.7%	Gravity Main
SML3095X09	SMH3095X09	SMH3095X08	8	56	695	1.6%	Gravity Main
SML3095X10	SMH3095X10	SMH3095X09	8	105	427	0.6%	Gravity Main
SML3095X11	SMH3095X11	SMH3095X22	8	90	1,068	3.9%	Gravity Main
SML3095X12	SMH3095X12	SMH3095X11	8	182	1,027	3.6%	Gravity Main
SML3095X13	SMH3095X13	SMH3095X12	8	173	918	2.9%	Gravity Main
SML3095X14	SMH3095X14	SMH3095X11	8	87	471	0.8%	Gravity Main
SML3095X15	SMH3095X15	SMH3095X14	8	251	1,012	3.5%	Gravity Main
SML3095X16	SMH3095X16	SMH3095X15	8	176	457	0.7%	Gravity Main
SML3095X17	SMH3095X17	SMH3095X16	8	165	472	0.8%	Gravity Main
SML3095X18	SMH3095X18	SMH3095X17	8	76	697	1.6%	Gravity Main
SML3095X19	SMH3095X19	SMH3095X18	8	128	403	0.5%	Gravity Main
SML3095X20	SMH3095X20	SMH3095X21	8	13	2,088	14.7%	Gravity Main
SML3095X21	SMH3095X21	SMH3095X22	4	718	--	--	Force Main
SML3095X22	SMH3095X22	SMH3095X23	8	344	564	1.1%	Gravity Main
SML3095X23	SMH3095X23	SMH3095X02	8	367	788	2.1%	Gravity Main
SML3095Y01	SMH3095Y01	SMH3095Y02	8	200	954	3.1%	Gravity Main
SML3095Y02	SMH3095Y02	SMH3095Y03	8	166	2,137	15.4%	Gravity Main
SML3095Y03	SMH3095Y03	SMH3095Z14	8	47	2,566	22.3%	Gravity Main
SML3095Y04	SMH3095Y04	SMH3095Y03	8	201	768	2.0%	Gravity Main
SML3095Y06	SMH3095Y06	SMH3095T11	18	208	2,494	0.3%	Gravity Main
SML3095Y07	SMH3095Y07	SMH3095Y06	8	109	255	0.2%	Gravity Main
SML3095Y08	SMH3095Y08	SMH3095Y07	8	327	594	1.2%	Gravity Main
SML3095Y09	SMH3095Y09	SMH3195B18	8	400	329	0.4%	Gravity Main
SML3095Y0A	SMH3095Y12	SMH3095T10	8	367	532	1.0%	Gravity Main
SML3095Y10	SMH3095Y10	SMH3095T06	36	494	41,583	1.9%	Gravity Main
SML3095Y11	SMH3095Y11	SMH3095Y10	36	354	26,605	0.8%	Gravity Main
SML3095Y12	SMH3095Y12	SMH3095Y13	8	240	625	1.3%	Gravity Main
SML3095Y13	SMH3095Y13	SMH3095Y14	8	145	577	1.1%	Gravity Main
SML3095Y14	SMH3095Y14	SMH3095Y15	12	72	1,536	0.9%	Gravity Main
SML3095Y15	SMH3095Y15	SMH3195B26	12	259	1,514	0.9%	Gravity Main
SML3095Y16	SMH3095Y16	SMH3095Y14	8	57	1,437	7.0%	Gravity Main
SML3095Y17	SMH3095Y17	SMH3095Y16	8	98	521	0.9%	Gravity Main
SML3095Y19	SMH3095Y19	SMH3095Y20	18	232	4,229	0.8%	Gravity Main
SML3095Y20	SMH3095Y20	SMH3095Y23	18	248	4,207	0.8%	Gravity Main
SML3095Y21	SMH3095Y21	SMH3095Y20	8	172	518	0.9%	Gravity Main
SML3095Y22	SMH3095Y22	SMH3095Y21	8	164	542	1.0%	Gravity Main
SML3095Y23	SMH3095Y23	SMH3095Z03	18	172	4,144	0.8%	Gravity Main
SML3095Y24	SMH3095Y24	SMH3095Y17	8	212	829	2.3%	Gravity Main
SML3095Z01	SMH3095Z01	SMH3095S01	10	482	1,340	1.8%	Gravity Main
SML3095Z02	SMH3095Z02	SMH3095Z01	10	481	880	0.8%	Gravity Main
SML3095Z05	SMH3095Z05	SMH3095S03	10	479	1,006	1.0%	Gravity Main
SML3095Z06	SMH3095Z06	SMH3095Z11	10	207	1,013	1.1%	Gravity Main
SML3095Z07	SMH3095Z07	SMH3095S04	12	480	1,866	1.4%	Gravity Main
SML3095Z08	SMH3095Z08	SMH3095Z12	10	208	1,530	2.4%	Gravity Main
SML3095Z09	SMH3095Z09	SMH3095Z18	8	118	1,365	6.3%	Gravity Main
SML3095Z11	SMH3095Z11	SMH3095Z12	10	159	1,881	3.6%	Gravity Main
SML3095Z12	SMH3095Z12	SMH3095Z07	10	272	1,648	2.8%	Gravity Main
SML3095Z14	SMH3095Z14	SMH3095Y08	8	122	1,893	12.1%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3095Z15	SMH3095Z15	SMH3095Z14	8	50	761	2.0%	Gravity Main
SML3095Z16	SMH3095Z16	SMH3095Z15	8	84	583	1.2%	Gravity Main
SML3095Z17	SMH3095Z17	SMH3095S06	8	226	--	--	Gravity Main
SML3095Z18	SMH3095Z18	SMH3095Z17	8	254	--	--	Gravity Main
SML3095Z19	SMH3095Z19	SMH3095S08	18	474	--	--	Gravity Main
SML3095Z20	SMH3095Z20	SMH3095Y19	18	169	--	--	Gravity Main
SML3195A01	SMH3195A01	SMH3195A03	8	16	3,487	41.1%	Gravity Main
SML3195A02	SMH3195A02	SMH3095Z02	8	495	472	0.8%	Gravity Main
SML3195A03	SMH3195A03	SMH3195A02	8	433	483	0.8%	Gravity Main
SML3195A05	SMH3195A05	SMH3195A07	10	189	600	0.4%	Gravity Main
SML3195A06	SMH3195A06	SMH3095Z06	12	396	2,698	2.8%	Gravity Main
SML3195A07	SMH3195A07	SMH3195A10	10	184	797	0.7%	Gravity Main
SML3195A08	SMH3195A08	SMH3095Z08	10	300	1,962	4.0%	Gravity Main
SML3195A09	SMH3195A09	SMH3195A08	10	95	2,563	6.8%	Gravity Main
SML3195A10	SMH3195A10	SMH3195A09	10	95	640	0.4%	Gravity Main
SML3195A11	SMH3195A11	SMH3195A08	8	290	366	0.5%	Gravity Main
SML3195A12	SMH3195A12	SMH3195A07	8	468	449	0.7%	Gravity Main
SML3195A14	SMH3195A14	SMH3095Z20	15	557	--	--	Gravity Main
SML3195A15	SMH3195A15	SMH3195A14	15	382	--	--	Gravity Main
SML3195B01	SMH3195B01	SMH3195B07	8	165	2,197	16.3%	Gravity Main
SML3195B02	SMH3195B02	SMH3195B01	8	233	801	2.2%	Gravity Main
SML3195B03	SMH3195B03	SMH3195B04	8	165	469	0.7%	Gravity Main
SML3195B04	SMH3195B04	SMH3195B05	8	26	4,979	83.8%	Gravity Main
SML3195B05	SMH3195B05	SMH3195B06	8	42	1,934	12.7%	Gravity Main
SML3195B06	SMH3195B06	SMH3195B12	12	133	4,292	7.2%	Gravity Main
SML3195B07	SMH3195B07	SMH3195B13	8	153	2,673	24.2%	Gravity Main
SML3195B08	SMH3195B08	SMH3195B07	8	212	968	3.2%	Gravity Main
SML3195B09	SMH3195B09	SMH3195B10	8	221	567	1.1%	Gravity Main
SML3195B10	SMH3195B10	SMH3195B11	8	29	3,340	37.7%	Gravity Main
SML3195B11	SMH3195B11	SMH3195B12	8	29	782	2.1%	Gravity Main
SML3195B12	SMH3195B12	SMH3195B14	12	183	4,706	8.6%	Gravity Main
SML3195B13	SMH3195B13	SMH3195B18	8	209	2,099	14.9%	Gravity Main
SML3195B14	SMH3195B14	SMH3195B16	12	372	4,487	7.8%	Gravity Main
SML3195B15	SMH3195B15	SMH3195B21	15	304	8,056	7.7%	Gravity Main
SML3195B16	SMH3195B16	SMH3195B15	15	198	8,588	8.7%	Gravity Main
SML3195B17	SMH3195B17	SMH3195B20	8	137	1,717	10.0%	Gravity Main
SML3195B18	SMH3195B18	SMH3195B19	8	34	2,627	23.3%	Gravity Main
SML3195B19	SMH3195B19	SMH3095Y11	10	307	1,865	3.6%	Gravity Main
SML3195B20	SMH3195B20	SMH3195B23	8	260	1,391	6.5%	Gravity Main
SML3195B21	SMH3195B21	SMH3195B22	15	18	6,322	4.7%	Gravity Main
SML3195B22	SMH3195B22	SMH3095Y11	36	619	27,019	0.8%	Gravity Main
SML3195B23	SMH3195B23	SMH3195B22	30	471	25,663	1.9%	Gravity Main
SML3195B24	SMH3195B24	SMH3195B22	21	319	6,208	0.8%	Gravity Main
SML3195B25	SMH3195B25	SMH3195B28	12	67	1,526	0.9%	Gravity Main
SML3195B26	SMH3195B26	SMH3195B24	12	133	1,396	0.8%	Gravity Main
SML3195B27	SMH3195B27	SMH3195B24	12	116	1,602	1.0%	Gravity Main
SML3195B28	SMH3195B28	SMH3195B29	12	63	1,381	0.7%	Gravity Main
SML3195B29	SMH3195B29	SMH3195B30	12	67	1,344	0.7%	Gravity Main
SML3195B30	SMH3195B30	SMH3195B31	12	224	1,350	0.7%	Gravity Main
SML3195B31	SMH3195B31	SMH3195B27	12	68	1,739	1.2%	Gravity Main
SML3195C01	SMH3195C01	SMH3195C02	15	128	3,587	1.5%	Gravity Main
SML3195C02	SMH3195C02	SMH3195C03	15	138	3,180	1.2%	Gravity Main
SML3195C03	SMH3195C03	SMH3195B06	15	323	3,764	1.7%	Gravity Main
SML3195C04	SMH3195C04	SMH3095X04	8	25	423	0.6%	Gravity Main
SML3195C05	SMH3195C05	SMH3195C04	8	239	415	0.6%	Gravity Main
SML3195C06	SMH3195C06	SMH3195C05	8	195	531	1.0%	Gravity Main
SML3195F01	SMH3195F01	SMH3195F03	12	253	2,996	3.5%	Gravity Main
SML3195F02	SMH3195F02	SMH3195C01	15	333	4,698	2.6%	Gravity Main
SML3195F03	SMH3195F03	SMH3195F02	15	267	4,794	2.7%	Gravity Main
SML3195F04	SMH3195F04	SMH3195G02	8	87	1,008	3.4%	Gravity Main
SML3195G01	SMH3195G01	SMH3195G05	8	79	2,657	23.9%	Gravity Main
SML3195G02	SMH3195G02	SMH3195G03	8	60	3,636	44.7%	Gravity Main
SML3195G03	SMH3195G03	SMH3195G06	8	75	2,028	13.9%	Gravity Main
SML3195G04	SMH3195G04	SMH3195G07	8	282	938	3.0%	Gravity Main
SML3195G05	SMH3195G05	SMH3195G04	8	170	1,191	4.8%	Gravity Main
SML3195G06	SMH3195G06	SMH3195G05	8	200	1,166	4.6%	Gravity Main
SML3195G07	SMH3195G07	SMH3195G08	8	185	869	2.6%	Gravity Main
SML3195G08	SMH3195G08	SMH3195B17	8	180	1,229	5.1%	Gravity Main
SML3195G09	SMH3195G09	SMH3195G11	8	194	1,103	4.1%	Gravity Main
SML3195G10	SMH3195G10	SMH3195G07	8	439	519	0.9%	Gravity Main
SML3195G11	SMH3195G11	SMH3195G10	8	177	896	2.7%	Gravity Main
SML3195G12	SMH3195G12	SMH3195G15	8	194	2,104	15.0%	Gravity Main
SML3195G13	SMH3195G13	SMH3195B23	24	187	7,138	0.5%	Gravity Main
SML3195G14	SMH3195G14	SMH3195G17	24	498	18,648	3.4%	Gravity Main
SML3195G15	SMH3195G15	SMH3195G13	24	164	11,869	1.4%	Gravity Main
SML3195G16	SMH3195G16	SMH3195G15	24	126	13,529	1.8%	Gravity Main
SML3195G17	SMH3195G17	SMH3195G16	24	105	27,584	7.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3195G18	SMH3195G18	SMH3195B25	12	227	1,353	0.7%	Gravity Main
SML3195G19	SMH3195G19	SMH3195G18	12	258	1,372	0.7%	Gravity Main
SML3195G20	SMH3195G20	SMH3195G19	12	477	3,157	3.9%	Gravity Main
SML3195G21	SMH3195G21	SMH3195G20	8	70	520	0.9%	Gravity Main
SML3195G22	SMH3195G22	SMH3195G19	8	156	596	1.2%	Gravity Main
SML3195G23	SMH3195G23	SMH3195G22	8	259	491	0.8%	Gravity Main
SML3195G24	SMH3195G24	SMH3195G23	8	180	458	0.7%	Gravity Main
SML3195G25	SMH3195G25	SMH3195G24	8	65	2,159	15.8%	Gravity Main
SML3195H01	SMH3195H01	SMH3195A01	6	368	337	1.8%	Gravity Main
SML3195H02	SMH3195H02	SMH3195H06	8	199	545	1.0%	Gravity Main
SML3195H05	SMH3195H05	SMH3195H24	8	167	657	1.5%	Gravity Main
SML3195H06	SMH3195H06	SMH3195H05	8	282	1,089	4.0%	Gravity Main
SML3195H07	SMH3195H07	SMH3195H09	18	54	9,045	3.7%	Gravity Main
SML3195H08	SMH3195H08	SMH3195H07	15	425	6,616	5.2%	Gravity Main
SML3195H09	SMH3195H09	SMH3195H12	24	162	10,634	1.1%	Gravity Main
SML3195H0A	SMH3195H23	SMH3195H04	8	267	--	--	Gravity Main
SML3195H10	SMH3195H10	SMH3195A12	8	231	452	0.7%	Gravity Main
SML3195H11	SMH3195H11	SMH3195H15	8	200	1,089	4.0%	Gravity Main
SML3195H12	SMH3195H12	SMH3195H16	24	187	11,686	1.3%	Gravity Main
SML3195H13	SMH3195H13	SMH3195H14	6	58	--	0.0%	Gravity Main
SML3195H14	SMH3195H14	SMH3195H17	15	59	12,092	17.3%	Gravity Main
SML3195H15	SMH3195H15	SMH3195H14	15	425	6,063	4.3%	Gravity Main
SML3195H16	SMH3195H16	SMH3195H17	24	44	40,342	15.7%	Gravity Main
SML3195H17	SMH3195H17	SMH3195H18	24	172	20,753	4.2%	Gravity Main
SML3195H18	SMH3195H18	SMH3195H20	24	118	22,906	5.1%	Gravity Main
SML3195H19	SMH3195H19	SMH3195H20	24	453	14,953	2.2%	Gravity Main
SML3195H20	SMH3195H20	SMH3295E01	30	164	42,948	5.4%	Gravity Main
SML3195H21	SMH3195H21	SMH3195H07	15	28	6,331	4.7%	Gravity Main
SML3195H23	SMH3195H23	SMH3195A15	12	259	--	--	Gravity Main
SML3195H24	SMH3195H24	SMH3195H21	--	143	--	--	Gravity Main
SML3195J01	SMH3195J01	SMH3195J02	8	62	2,264	17.3%	Gravity Main
SML3195J02	SMH3195J02	SMH3195J18	8	93	559	1.1%	Gravity Main
SML3195J03	SMH3195J03	SMH3195H02	8	441	1,226	5.1%	Gravity Main
SML3195J04	SMH3195J04	SMH3195J07	8	289	952	3.1%	Gravity Main
SML3195J05	SMH3195J05	SMH3195J04	8	371	1,004	3.4%	Gravity Main
SML3195J06	SMH3195J06	SMH3195H06	8	408	1,359	6.2%	Gravity Main
SML3195J07	SMH3195J07	SMH3195J08	8	45	1,058	3.8%	Gravity Main
SML3195J08	SMH3195J08	SMH3195H08	15	456	6,160	4.5%	Gravity Main
SML3195J09	SMH3195J09	SMH3195J08	15	138	6,708	5.3%	Gravity Main
SML3195J10	SMH3195J10	SMH3195J09	15	208	5,979	4.2%	Gravity Main
SML3195J11	SMH3195J11	SMH3195H11	8	303	822	2.3%	Gravity Main
SML3195J12	SMH3195J12	SMH3195J09	8	143	616	1.3%	Gravity Main
SML3195J13	SMH3195J13	SMH3195J12	8	303	1,218	5.0%	Gravity Main
SML3195J14	SMH3195J14	SMH3195J08	8	163	533	1.0%	Gravity Main
SML3195J15	SMH3195J15	SMH3195H15	15	277	7,138	6.0%	Gravity Main
SML3195J16	SMH3195J16	SMH3195J15	15	536	6,217	4.6%	Gravity Main
SML3195J17	SMH3195J17	SMH3195H19	24	465	14,098	1.9%	Gravity Main
SML3195J18	SMH3195J18	SMH3195J05	8	44	717	1.7%	Gravity Main
SML3195K01	SMH3195K01	SMH3195K02	8	199	1,219	5.0%	Gravity Main
SML3195K02	SMH3195K02	SMH3195K04	8	273	765	2.0%	Gravity Main
SML3195K03	SMH3195K03	SMH3195G06	8	231	1,202	4.9%	Gravity Main
SML3195K04	SMH3195K04	SMH3195K03	8	242	1,175	4.7%	Gravity Main
SML3195K05	SMH3195K05	SMH3195G09	8	367	1,173	4.7%	Gravity Main
SML3195K06	SMH3195K06	SMH3195K05	8	189	795	2.1%	Gravity Main
SML3195K07	SMH3195K07	SMH3195K09	8	135	2,445	20.2%	Gravity Main
SML3195K08	SMH3195K08	SMH3195K10	24	200	12,461	1.5%	Gravity Main
SML3195K09	SMH3195K09	SMH3195K08	24	507	15,672	2.4%	Gravity Main
SML3195K10	SMH3195K10	SMH3195G14	24	300	13,021	1.6%	Gravity Main
SML3195K11	SMH3195K11	SMH3195G21	8	158	548	1.0%	Gravity Main
SML3195K12	SMH3195K12	SMH3195K13	8	83	2,418	19.8%	Gravity Main
SML3195K13	SMH3195K13	SMH3195J01	8	153	1,376	6.4%	Gravity Main
SML3195K14	SMH3195K14	SMH3195K15	24	12	78,471	59.4%	Gravity Main
SML3195K15	SMH3195K15	SMH3195K09	24	12	5,969	0.3%	Gravity Main
SML3195K16	SMH3195K16	SMH3195K17	6	233	--	0.0%	Gravity Main
SML3195K17	SMH3195K17	SMH3195K11	8	325	--	0.0%	Gravity Main
SML3195L01	SMH3195L01	SMH3195L04	6	138	1,119	19.6%	Gravity Main
SML3195L04	SMH3195L04	SMH3195L05	10	133	2,377	5.8%	Gravity Main
SML3195L05	SMH3195L05	SMH3195F01	10	109	1,933	3.8%	Gravity Main
SML3195L06	SMH3195L06	SMH3195P03	8	558	635	1.4%	Gravity Main
SML3195L07	SMH3195L07	SMH3195P04	8	254	758	1.9%	Gravity Main
SML3195M01	SMH3195M01	SMH3694J13	8	95	538	1.0%	Gravity Main
SML3195N01	SMH3195N01	SMH3195P01	2.5	370	--	--	Force Main
SML3195N02	SMH3195N01	SMH3195P06	4	966	--	--	Force Main
SML3195N03	SMH3195N03	SMH3195N04	8	164	1,547	8.1%	Gravity Main
SML3195N04	SMH3195N04	SMH3195N11	8	137	1,414	6.8%	Gravity Main
SML3195N05	SMH3195N05	SMH3195N04	8	149	1,016	3.5%	Gravity Main
SML3195N06	SMH3195N06	SMH3195N05	8	133	1,662	9.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3195N07	SMH3195N07	SMH3195N05	8	132	803	2.2%	Gravity Main
SML3195N08	SMH3195N08	SMH3195N09	8	104	961	3.1%	Gravity Main
SML3195N09	SMH3195N09	SMH3195N10	8	62	718	1.7%	Gravity Main
SML3195N10	SMH3195N10	SMH3195N02	8	33	1,041	3.7%	Gravity Main
SML3195N11	SMH3195N11	SMH3195N12	8	77	1,505	7.7%	Gravity Main
SML3195N12	SMH3195N12	SMH3195N10	8	100	699	1.7%	Gravity Main
SML3195N13	SMH3195N13	SMH3195N07	8	42	444	0.7%	Gravity Main
SML3195P01	SMH3195P01	SMH3195P02	8	482	411	0.6%	Gravity Main
SML3195P02	SMH3195P02	SMH3195P03	12	318	2,246	2.0%	Gravity Main
SML3195P03	SMH3195P03	SMH3195P05	15	345	3,860	1.8%	Gravity Main
SML3195P04	SMH3195P04	SMH3195P05	8	312	811	2.2%	Gravity Main
SML3195P05	SMH3195P05	SMH3195Q03	15	282	4,972	2.9%	Gravity Main
SML3195P06	SMH3195P06	SMH3195P01	8	21	916	2.8%	Gravity Main
SML3195Q01	SMH3195Q01	SMH3195Q04	8	120	608	1.2%	Gravity Main
SML3195Q02	SMH3195Q02	SMH3195Q03	8	362	607	1.2%	Gravity Main
SML3195Q03	SMH3195Q03	SMH3195Q05	15	138	5,091	3.1%	Gravity Main
SML3195Q04	SMH3195Q04	SMH3195K01	8	314	966	3.2%	Gravity Main
SML3195Q05	SMH3195Q05	SMH3195Q09	12	219	5,576	12.1%	Gravity Main
SML3195Q06	SMH3195Q06	SMH3195Q14	10	161	2,252	5.2%	Gravity Main
SML3195Q07	SMH3195Q07	SMH3195Q08	8	175	942	3.0%	Gravity Main
SML3195Q08	SMH3195Q08	SMH3195Q10	8	129	1,245	5.2%	Gravity Main
SML3195Q09	SMH3195Q09	SMH3195Q11	15	64	6,598	5.2%	Gravity Main
SML3195Q0A	SMH3195Q31	SMH3195Q20	18	98	7,749	2.7%	Gravity Main
SML3195Q10	SMH3195Q10	SMH3195K07	8	67	2,747	25.5%	Gravity Main
SML3195Q11	SMH3195Q11	SMH3195Q17	15	129	6,368	4.8%	Gravity Main
SML3195Q12	SMH3195Q12	SMH3195Q11	15	104	8,684	8.9%	Gravity Main
SML3195Q13	SMH3195Q13	SMH3195Q35	8	202	468	0.7%	Gravity Main
SML3195Q14	SMH3195Q14	SMH3195Q12	15	108	3,136	1.2%	Gravity Main
SML3195Q15	SMH3195Q15	SMH3195Q14	12	216	1,877	1.4%	Gravity Main
SML3195Q17	SMH3195Q17	SMH3195Q18	15	140	6,545	5.1%	Gravity Main
SML3195Q18	SMH3195Q18	SMH3195Q19	15	48	5,534	3.6%	Gravity Main
SML3195Q19	SMH3195Q19	SMH3195K14	36	499	28,506	0.9%	Gravity Main
SML3195Q20	SMH3195Q20	SMH3195Q21	24	122	15,449	2.3%	Gravity Main
SML3195Q21	SMH3195Q21	SMH3195Q19	24	41	11,678	1.3%	Gravity Main
SML3195Q22	SMH3195Q22	SMH3195Q31	18	21	4,568	0.9%	Gravity Main
SML3195Q23	SMH3195Q23	SMH3195Q22	8	204	1,101	4.1%	Gravity Main
SML3195Q24	SMH3195Q24	SMH3195Q25	8	116	540	1.0%	Gravity Main
SML3195Q25	SMH3195Q25	SMH3195Q23	8	62	1,938	12.7%	Gravity Main
SML3195Q26	SMH3195Q26	SMH3195Q32	42	38	32,838	0.5%	Gravity Main
SML3195Q28	SMH3195Q28	SMH3195R02	8	384	442	0.7%	Gravity Main
SML3195Q29	SMH3195Q29	SMH3195K12	6	201	56	0.0%	Gravity Main
SML3195Q30	SMH3195Q30	SMH3195Q31	36	201	33,500	1.2%	Gravity Main
SML3195Q31	SMH3195Q31	SMH3195Q21	36	156	42,531	2.0%	Gravity Main
SML3195Q32	SMH3195Q32	SMH3195Q30	42	143	34,462	0.6%	Gravity Main
SML3195Q34	SMH3195Q34	SMH3195K09	8	100	2,188	16.2%	Gravity Main
SML3195Q35	SMH3195Q35	SMH3195Q34	8	111	1,669	9.4%	Gravity Main
SML3195Q36	SMH3195Q36	SMH3195Q32	0	28	--	22.4%	Gravity Main
SML3195R02	SMH3195R02	SMH3195R03	8	120	660	1.5%	Gravity Main
SML3195R03	SMH3195R03	SMH3195T20	15	272	5,881	4.1%	Gravity Main
SML3195R04	SMH3195R04	SMH3195R06	8	217	1,065	3.8%	Gravity Main
SML3195R05	SMH3195R05	SMH3195R03	15	63	2,884	1.0%	Gravity Main
SML3195R06	SMH3195R06	SMH3195R03	8	144	1,225	5.1%	Gravity Main
SML3195R07	SMH3195R07	SMH3195J05	8	348	997	3.4%	Gravity Main
SML3195R08	SMH3195R08	SMH3195R10	15	270	3,408	1.4%	Gravity Main
SML3195R10	SMH3195R10	SMH3195J10	15	379	5,470	3.5%	Gravity Main
SML3195R11	SMH3195R11	SMH3195J13	8	334	1,240	5.2%	Gravity Main
SML3195R12	SMH3195R12	SMH3195R15	12	203	4,514	7.9%	Gravity Main
SML3195R13	SMH3195R13	SMH3195J16	15	510	4,150	2.0%	Gravity Main
SML3195R14	SMH3195R14	SMH3195R13	15	96	7,485	6.6%	Gravity Main
SML3195R15	SMH3195R15	SMH3195R14	15	379	2,578	0.8%	Gravity Main
SML3195R16	SMH3195R16	SMH3195J18	8	360	2,307	18.0%	Gravity Main
SML3195R17	SMH3195R17	SMH3195Q29	6	148	207	0.7%	Gravity Main
SML3195R18	SMH3195R18	SMH3195R08	12	208	4,012	6.3%	Gravity Main
SML3195S01	SMH3195S01	SMH3195T21	8	149	1,560	8.2%	Gravity Main
SML3195S02	SMH3195S02	SMH3195S01	8	49	952	3.1%	Gravity Main
SML3195S03	SMH3195S03	SMH3195S01	8	40	1,361	6.3%	Gravity Main
SML3195S04	SMH3195S04	SMH3195S03	8	273	653	1.4%	Gravity Main
SML3195S05	SMH3195S05	SMH3195R05	15	115	2,205	0.6%	Gravity Main
SML3195S06	SMH3195S06	SMH3195S01	8	177	1,309	5.8%	Gravity Main
SML3195S07	SMH3195S07	SMH3195S05	15	415	2,125	0.5%	Gravity Main
SML3195S08	SMH3195S08	SMH3195S10	8	38	1,658	9.3%	Gravity Main
SML3195S09	SMH3195S09	SMH3195S05	8	111	931	2.9%	Gravity Main
SML3195S10	SMH3195S10	SMH3195S07	12	425	1,402	0.8%	Gravity Main
SML3195S11	SMH3195S11	SMH3195S09	8	144	562	1.1%	Gravity Main
SML3195S12	SMH3195S12	SMH3195S10	8	156	764	2.0%	Gravity Main
SML3195S13	SMH3195S13	SMH3195S17	8	159	1,221	5.0%	Gravity Main
SML3195S14	SMH3195S14	SMH3195S15	12	91	2,516	2.5%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3195S15	SMH3195S15	SMH3195R18	12	500	2,589	2.6%	Gravity Main
SML3195S16	SMH3195S16	SMH3195S14	12	343	1,884	1.4%	Gravity Main
SML3195S17	SMH3195S17	SMH3195S16	12	272	1,938	1.5%	Gravity Main
SML3195S18	SMH3195S18	SMH3195S17	8	192	539	1.0%	Gravity Main
SML3195S19	SMH3195S19	SMH3195R12	10	486	971	1.0%	Gravity Main
SML3195S20	SMH3195S20	SMH3195S19	12	488	1,565	1.0%	Gravity Main
SML3195S21	SMH3195S21	SMH3195R15	10	511	875	0.8%	Gravity Main
SML3195S4A	SMH3195S04	SMH3195T22	8	283	1,567	8.3%	Gravity Main
SML3195S6A	SMH3195S06	SMH3195S08	8	164	1,302	5.7%	Gravity Main
SML3195T01	SMH3195T01	SMH3195T03	8	204	1,499	7.6%	Gravity Main
SML3195T02	SMH3195T02	SMH3195T05	8	217	1,221	5.0%	Gravity Main
SML3195T03	SMH3195T03	SMH3195T04	8	284	857	2.5%	Gravity Main
SML3195T04	SMH3195T04	SMH3195Q06	10	351	2,442	6.1%	Gravity Main
SML3195T05	SMH3195T05	SMH3195T08	10	261	2,452	6.2%	Gravity Main
SML3195T06	SMH3195T06	SMH3195T08	8	112	523	0.9%	Gravity Main
SML3195T07	SMH3195T07	SMH3195T06	8	321	533	1.0%	Gravity Main
SML3195T08	SMH3195T08	SMH3195T11	10	190	2,666	7.3%	Gravity Main
SML3195T09	SMH3195T09	SMH3195T10	8	249	496	0.8%	Gravity Main
SML3195T10	SMH3195T10	SMH3195T11	8	301	473	0.8%	Gravity Main
SML3195T11	SMH3195T11	SMH3195Q15	12	357	2,455	2.3%	Gravity Main
SML3195T12	SMH3195T12	SMH3195Q20	18	680	5,775	1.5%	Gravity Main
SML3195T13	SMH3195T13	SMH3195T14	15	443	2,100	0.5%	Gravity Main
SML3195T14	SMH3195T14	SMH3195Q26	15	434	2,188	0.6%	Gravity Main
SML3195T15	SMH3195T15	SMH3195T24	24	128	10,836	1.1%	Gravity Main
SML3195T16	SMH3195T16	SMH3195T15	24	121	13,746	1.8%	Gravity Main
SML3195T17	SMH3195T17	SMH3195T18	15	386	3,465	1.4%	Gravity Main
SML3195T18	SMH3195T18	SMH3195Q26	24	80	11,194	1.2%	Gravity Main
SML3195T19	SMH3195T19	SMH3195T18	24	106	32,444	10.2%	Gravity Main
SML3195T20	SMH3195T20	SMH3195T19	15	53	9,018	9.6%	Gravity Main
SML3195T21	SMH3195T21	SMH3195T22	15	514	2,384	0.7%	Gravity Main
SML3195T22	SMH3195T22	SMH3195T20	15	230	4,703	2.6%	Gravity Main
SML3195T23	SMH3195T23	SMH3195Q02	6	87	270	1.1%	Gravity Main
SML3195T24	SMH3195T24	SMH3195T17	24	239	12,237	1.4%	Gravity Main
SML3195U01	SMH3195U01	SMH3195U19	8	18	--	0.0%	Gravity Main
SML3195U02	SMH3195U02	SMH3195U06	8	314	495	0.8%	Gravity Main
SML3195U03	SMH3195U03	SMH3195U04	8	252	1,958	13.0%	Gravity Main
SML3195U04	SMH3195U04	SMH3195U01	8	204	1,057	3.8%	Gravity Main
SML3195U05	SMH3195U05	SMH3195U04	8	199	740	1.9%	Gravity Main
SML3195U06	SMH3195U06	SMH3195U11	8	442	709	1.7%	Gravity Main
SML3195U07	SMH3195U07	SMH3195U04	8	264	1,497	7.6%	Gravity Main
SML3195U08	SMH3195U08	SMH3195U05	8	272	750	1.9%	Gravity Main
SML3195U09	SMH3195U09	SMH3195U10	8	269	412	0.6%	Gravity Main
SML3195U0A	SMH3195U15	SMH3195U16	8	261	521	0.9%	Gravity Main
SML3195U10	SMH3195U10	SMH3195U13	8	67	297	0.3%	Gravity Main
SML3195U11	SMH3195U11	SMH3195P03	8	368	577	1.1%	Gravity Main
SML3195U12	SMH3195U12	SMH3195U11	8	341	494	0.8%	Gravity Main
SML3195U13	SMH3195U13	SMH3195U12	8	268	423	0.6%	Gravity Main
SML3195U14	SMH3195U14	SMH3195U15	8	223	472	0.8%	Gravity Main
SML3195U15	SMH3195U15	SMH3195T01	8	295	546	1.0%	Gravity Main
SML3195U16	SMH3195U16	SMH3195T02	8	295	765	2.0%	Gravity Main
SML3195U17	SMH3195U17	SMH3195P05	8	371	536	1.0%	Gravity Main
SML3195U18	SMH3195U18	SMH3195U17	8	344	548	1.0%	Gravity Main
SML3195U19	SML3195U19	SMH3195U02	4	628	--	--	Force Main
SML3195U20	SMH3195U20	SMH3195U21	8	211	1,353	6.2%	Gravity Main
SML3195U21	SMH3195U21	SMH3195V01	8	207	2,212	16.5%	Gravity Main
SML3195U22	SMH3195U22	SMH3195T01	8	126	537	1.0%	Gravity Main
SML3195V01	SMH3195V01	SMH3195V02	8	183	1,326	5.9%	Gravity Main
SML3195V02	SMH3195V02	SMH3195U01	8	222	320	0.3%	Gravity Main
SML3195V03	SMH3195V03	SMH3195V04	8	136	509	0.9%	Gravity Main
SML3195V04	SMH3195V04	SMH3195V05	8	154	1,122	4.3%	Gravity Main
SML3195V05	SMH3195V05	SMH3195V01	8	164	1,000	3.4%	Gravity Main
SML3195V06	SMH3195V06	SMH3195V04	8	145	517	0.9%	Gravity Main
SML3195V08	SMH3195V08	SMH3195V06	8	23	751	1.9%	Gravity Main
SML3195V09	SMH3195V09	SMH3195V10	8	170	402	0.5%	Gravity Main
SML3195V10	SMH3195V10	SMH3195V03	8	49	517	0.9%	Gravity Main
SML3195X01	SMH3195X01	SMH3195X03	8	127	404	0.6%	Gravity Main
SML3195X02	SMH3195X02	SMH3195X05	8	182	399	0.5%	Gravity Main
SML3195X03	SMH3195X03	SMH3195X02	8	86	424	0.6%	Gravity Main
SML3195X04	SMH3195X04	SMH3195X01	8	127	313	0.3%	Gravity Main
SML3195X05	SMH3195X05	SMH3195U03	8	201	1,387	6.5%	Gravity Main
SML3195X06	<Null>	SMH3195X05	8	181	1,372	6.4%	Gravity Main
SML3195X07	SMH3195X07	SMH3195X04	8	236	1,713	9.9%	Gravity Main
SML3195X08	SMH3195X08	SMH3195X10	6	149	--	--	Gravity Main
SML3195X09	SMH3195X09	SMH3195X10	6	102	--	--	Gravity Main
SML3195X10	SMH3195X10	SMH3195X12	8	250	1,063	3.8%	Gravity Main
SML3195X11	SMH3195X11	SMH3195X14	8	273	415	0.6%	Gravity Main
SML3195X12	SMH3195X12	SMH3195X13	8	93	567	1.1%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3195X13	SMH3195X13	SMH3195X17	8	95	1,124	4.3%	Gravity Main
SML3195X14	SMH3195X14	SMH3195X16	8	104	750	1.9%	Gravity Main
SML3195X15	SMH3195X15	SMH3195X14	6	193	--	--	Gravity Main
SML3195X16	SMH3195X16	SMH3195X18	8	113	323	0.4%	Gravity Main
SML3195X17	SMH3195X17	SMH3195Y01	8	202	968	3.2%	Gravity Main
SML3195X18	SMH3195X18	SMH3195Y03	8	235	1,218	5.0%	Gravity Main
SML3195X19	SMH3195X19	SMH3195Y02	8	178	1,079	3.9%	Gravity Main
SML3195Y01	SMH3195Y01	SMH3195Y07	8	271	985	3.3%	Gravity Main
SML3195Y02	SMH3195Y02	SMH3195Y05	8	202	1,262	5.4%	Gravity Main
SML3195Y03	SMH3195Y03	SMH3195Y06	8	137	1,220	5.0%	Gravity Main
SML3195Y04	SMH3195Y04	SMH3195T05	8	260	550	1.0%	Gravity Main
SML3195Y05	SMH3195Y05	SMH3195Y07	8	204	637	1.4%	Gravity Main
SML3195Y06	SMH3195Y06	SMH3195Y09	8	167	1,329	6.0%	Gravity Main
SML3195Y07	SMH3195Y07	SMH3195Y08	8	77	1,524	7.9%	Gravity Main
SML3195Y08	SMH3195Y08	SMH3195Y12	8	184	1,485	7.5%	Gravity Main
SML3195Y09	SMH3195Y09	SMH3195Y10	8	135	1,840	11.4%	Gravity Main
SML3195Y10	SMH3195Y10	SMH3195Y11	8	36	256	0.2%	Gravity Main
SML3195Y11	SMH3195Y11	SMH3195Y14	8	148	779	2.1%	Gravity Main
SML3195Y12	SMH3195Y12	SMH3195Y13	8	26	2,134	15.4%	Gravity Main
SML3195Y13	SMH3195Y13	SMH3195Y14	15	304	5,316	3.3%	Gravity Main
SML3195Y14	SMH3195Y14	SMH3195Y16	15	311	5,126	3.1%	Gravity Main
SML3195Y15	SMH3195Y15	SMH3195Y20	18	319	6,558	1.9%	Gravity Main
SML3195Y16	SMH3195Y16	SMH3195T12	15	653	3,641	1.6%	Gravity Main
SML3195Y17	SMH3195Y17	SMH3195Y18	12	127	3,184	3.9%	Gravity Main
SML3195Y18	SMH3195Y18	SMH3195Y22	12	123	1,737	1.2%	Gravity Main
SML3195Y19	SMH3195Y19	SMH3195T13	12	170	1,763	1.2%	Gravity Main
SML3195Y20	SMH3195Y20	SMH3195Y23	18	453	6,344	1.8%	Gravity Main
SML3195Y21	SMH3195Y21	SMH3195Y19	12	109	1,801	1.3%	Gravity Main
SML3195Y22	SMH3195Y22	SMH3195Y21	12	73	1,977	1.5%	Gravity Main
SML3195Y23	SMH3195Y23	SMH3195T16	24	371	9,323	0.8%	Gravity Main
SML3195Y24	SMH3195Y24	SMH3195Y25	8	371	490	0.8%	Gravity Main
SML3195Y25	SMH3195Y25	SMH3195T21	8	447	475	0.8%	Gravity Main
SML3195Y26	SMH3195Y26	SMH3195Y24	8	23	924	2.9%	Gravity Main
SML3195Y28	SMH3195Y28	SMH3195Y29	8	138	604	1.2%	Gravity Main
SML3195Y29	SMH3195Y29	SMH3195Y17	8	99	1,035	3.6%	Gravity Main
SML3195Y30	SMH3195Y30	SMH3195Y28	8	108	569	1.1%	Gravity Main
SML3195Z01	SMH3195Z01	SMH3195Z02	8	409	634	1.4%	Gravity Main
SML3195Z02	SMH3195Z02	SMH3195S02	8	316	671	1.5%	Gravity Main
SML3195Z03	SMH3195Z03	SMH3195Y26	8	257	1,699	9.8%	Gravity Main
SML3195Z04	SMH3195Z04	SMH3195Z03	8	195	716	1.7%	Gravity Main
SML3195Z05	SMH3195Z05	SMH3195Z07	8	64	1,279	5.5%	Gravity Main
SML3195Z06	SMH3195Z06	SMH3195S10	10	402	940	0.9%	Gravity Main
SML3195Z07	SMH3195Z07	SMH3195Z06	8	368	978	3.2%	Gravity Main
SML3195Z08	SMH3195Z08	SMH3195S13	8	376	623	1.3%	Gravity Main
SML3195Z09	SMH3195Z09	SMH3195Z08	8	363	1,043	3.7%	Gravity Main
SML3195Z0A	SMH3195Z14	SMH3295W02	8	120	--	--	Gravity Main
SML3195Z10	SMH3195Z10	SMH3195S18	8	390	766	2.0%	Gravity Main
SML3195Z11	SMH3195Z11	SMH3195Z10	8	410	999	3.4%	Gravity Main
SML3195Z12	SMH3195Z12	SMH3195S20	10	399	1,188	1.5%	Gravity Main
SML3195Z13	SMH3195Z13	SMH3195Z12	8	422	1,070	3.9%	Gravity Main
SML3195Z14	SMH3195Z14	SMH3195Z13	8	45	--	--	Gravity Main
SML3195Z4A	SMH3195Z04	SMH3195Z05	8	171	1,133	4.3%	Gravity Main
SML3295A01	SMH3295A01	SMH2995Z02	6	449	179	0.5%	Gravity Main
SML3295A02	SMH3295A02	SMH3295A03	8	356	381	0.5%	Gravity Main
SML3295A03	SMH3295A03	SMH3295A04	12	23	1,051	0.4%	Gravity Main
SML3295A04	SMH3295A04	SML2995Z03	6	1895	--	--	Force Main
SML3295A0A	SMH3295A01	SMH3295A02	6	501	178	0.5%	Gravity Main
SML3295B02	SMH3295B02	SMH3295B04	3	583	--	--	Force Main
SML3295B03	SMH3295B03	FORCED MAIN	3	156	--	--	Force Main
SML3295B04	SMH3295B04	SMH2995Y01	3	230	--	--	Force Main
SML3295C01	SMH3295C01	SMH3295C02	8	208	--	0.0%	Gravity Main
SML3295C02	SMH3295C02	SMH3295F03	8	362	1,195	4.8%	Gravity Main
SML3295C03	SMH3295C03	SMH3295C04	8	270	773	2.0%	Gravity Main
SML3295C04	SMH3295C04	SMH3295C05	8	106	1,914	12.4%	Gravity Main
SML3295C05	SMH3295C05	SMH3295F05	8	380	666	1.5%	Gravity Main
SML3295D01	SMH3295D01	SMH3295D02	30	262	34,145	3.4%	Gravity Main
SML3295D02	SMH3295D02	SMH2995W01	30	103	77,206	17.5%	Gravity Main
SML3295D03	SMH3295D03	SMH3295D07	30	86	37,193	4.1%	Gravity Main
SML3295D04	SMH3295D04	SMH3295D05	30	110	48,761	7.0%	Gravity Main
SML3295D05	SMH3295D05	SMH3295D06	30	178	26,202	2.0%	Gravity Main
SML3295D06	SMH3295D06	SMH3295D01	30	310	26,345	2.0%	Gravity Main
SML3295D07	SMH3295D07	SMH3295D04	30	114	37,869	4.2%	Gravity Main
SML3295E01	SMH3295E01	SMH3295D03	30	130	40,997	4.9%	Gravity Main
SML3295F01	SMH3295F01	SMH3295L05	8	396	486	0.8%	Gravity Main
SML3295F02	SMH3295F02	SMH3295F03	8	68	1,718	10.0%	Gravity Main
SML3295F03	SMH3295F03	SMH3295F04	8	311	680	1.6%	Gravity Main
SML3295F04	SMH3295F04	SMH3295L07	8	403	685	1.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3295F05	SMH3295F05	SMH3295F06	8	394	548	1.0%	Gravity Main
SML3295F06	SMH3295F06	SMH3295F07	8	227	541	1.0%	Gravity Main
SML3295F07	SMH3295F07	SMH3295L10	8	388	552	1.0%	Gravity Main
SML3295F08	SMH3295F08	SMH3295F06	8	37	627	1.3%	Gravity Main
SML3295G01	SMH3295G01	SMH3295A03	8	400	384	0.5%	Gravity Main
SML3295G02	SMH3295G02	SMH3295G01	6	300	179	0.5%	Gravity Main
SML3295L01	SMH3295L01	SMH3295L03	10	35	1,616	2.7%	Gravity Main
SML3295L02	SMH3295L02	SMH3295L04	12	397	6,311	15.5%	Gravity Main
SML3295L03	SMH3295L03	SMH3295L02	8	157	846	2.4%	Gravity Main
SML3295L04	SMH3295L04	SMH3295L05	12	133	3,659	5.2%	Gravity Main
SML3295L05	SMH3295L05	SMH3295L06	10	471	1,029	1.1%	Gravity Main
SML3295L06	SMH3295L06	SMH3295L09	10	153	3,546	12.9%	Gravity Main
SML3295L07	SMH3295L07	SMH3295L08	8	226	908	2.8%	Gravity Main
SML3295L08	SMH3295L08	SMH3295L09	8	477	686	1.6%	Gravity Main
SML3295L09	SMH3295L09	SMH3295L11	10	161	2,845	8.3%	Gravity Main
SML3295L10	SMH3295L10	SMH3295L11	8	411	849	2.4%	Gravity Main
SML3295L11	SMH3295L11	SMH3295P08	10	364	855	0.8%	Gravity Main
SML3295L12	SMH3295L12	SMH3295P11	8	263	375	0.5%	Gravity Main
SML3295L13	SMH3295L13	SMH3295L10	6	70	--	0.0%	Gravity Main
SML3295M01	SMH3295M01	SMH3195J17	24	392	13,460	1.7%	Gravity Main
SML3295M02	SMH3295M02	SMH3295M01	24	11	11,605	1.3%	Gravity Main
SML3295M03	SMH3295M03	SMH3295M01	18	405	6,664	2.0%	Gravity Main
SML3295M04	SMH3295M04	SMH3295M02	24	398	14,291	2.0%	Gravity Main
SML3295N01	SMH3295N01	SMH3295M03	18	53	6,469	1.9%	Gravity Main
SML3295N02	SMH3295N02	SMH3295N01	18	200	3,254	0.5%	Gravity Main
SML3295N03	SMH3295N03	SMH3295N02	18	201	8,891	3.5%	Gravity Main
SML3295N04	SMH3295N04	SMH3295N03	15	484	4,592	2.5%	Gravity Main
SML3295N05	SMH3295N05	SMH3295M04	24	56	14,271	2.0%	Gravity Main
SML3295N06	SMH3295N06	SMH3295N05	24	201	13,236	1.7%	Gravity Main
SML3295N07	SMH3295N07	SMH3295N06	24	200	15,890	2.4%	Gravity Main
SML3295N08	SMH3295N08	SMH3295N07	24	485	16,131	2.5%	Gravity Main
SML3295N09	SMH3295N09	SMH3295N05	10	145	3,413	12.0%	Gravity Main
SML3295N0A	SMH3295N15	SMH3295V05	8	268	576	1.1%	Gravity Main
SML3295N10	SMH3295N10	SMH3295N06	8	145	2,179	16.1%	Gravity Main
SML3295N11	SMH3295N11	SMH3295N10	8	179	932	2.9%	Gravity Main
SML3295N12	SMH3295N12	SMH3295N11	8	118	594	1.2%	Gravity Main
SML3295N13	SMH3295N13	SMH3295N12	8	226	540	1.0%	Gravity Main
SML3295N14	SMH3295N14	SMH3295N13	8	175	534	1.0%	Gravity Main
SML3295N15	SMH3295N15	SMH3295N14	8	199	1,721	10.0%	Gravity Main
SML3295N16	SMH3295N16	SMH3295N09	10	385	2,056	4.3%	Gravity Main
SML3295N17	SMH3295N17	SMH3295N13	8	266	641	1.4%	Gravity Main
SML3295N18	SMH3295N18	SMH3295N23	8	255	1,432	6.9%	Gravity Main
SML3295N19	SMH3295N19	SMH3295N18	8	262	917	2.8%	Gravity Main
SML3295N20	SMH3295N20	SMH3295N19	8	276	963	3.1%	Gravity Main
SML3295N21	SMH3295N21	SMH3295N20	8	283	1,324	5.9%	Gravity Main
SML3295N22	SMH3295N22	SMH3295P02	8	133	1,896	12.2%	Gravity Main
SML3295N23	SMH3295N23	SMH3295N24	8	55	3,906	51.6%	Gravity Main
SML3295N24	SMH3295N24	SMH3295P01	8	39	903	2.8%	Gravity Main
SML3295P01	SMH3295P01	SMH3295L01	8	424	982	3.3%	Gravity Main
SML3295P02	SMH3295P02	SMH3295P01	8	313	1,216	5.0%	Gravity Main
SML3295P03	SMH3295P03	SMH3295P02	8	419	788	2.1%	Gravity Main
SML3295P04	SMH3295P04	SMH3295L06	8	422	529	0.9%	Gravity Main
SML3295P05	SMH3295P05	SMH3295P04	8	272	691	1.6%	Gravity Main
SML3295P06	SMH3295P06	SMH3295L09	8	398	545	1.0%	Gravity Main
SML3295P07	SMH3295P07	SMH3295P06	8	398	690	1.6%	Gravity Main
SML3295P08	SMH3295P08	SMH3295P10	12	197	2,576	2.6%	Gravity Main
SML3295P09	SMH3295P09	SMH3295P08	8	458	545	1.0%	Gravity Main
SML3295P10	SMH3295P10	SMH3295P12	12	271	2,452	2.3%	Gravity Main
SML3295P11	SMH3295P11	SMH3295P10	8	224	545	1.0%	Gravity Main
SML3295P12	SMH3295P12	SMH3295U15	12	481	1,676	1.1%	Gravity Main
SML3295T01	SMH3295T01	SMH3295T02	15	14	11,936	16.9%	Gravity Main
SML3295T02	SMH3295T02	SMH3295T03	8	59	--	--	Force Main
SML3295T03	SMH3295T03	SMH3295T06	4	23	--	--	Gravity Main
SML3295T03	SML3295T03	SML2995P31	36	25	--	--	Force Main
SML3295T03	SMH3295T03	SML3295T03	36	904	--	--	Force Main
SML3295T03	SML3295T03	SML3295T03	36	104	--	--	Force Main
SML3295T03	SML3295T03	SML3295T03	36	5354	--	--	Force Main
SML3295T04	SMH3295T04	SML3295T07	4	14	--	--	Gravity Main
SML3295T04	SMH3295T04	SMH3295T03	36	34	--	--	Force Main
SML3295T05	SMH3295T05	SML3295T07	4	14	317	13.7%	Gravity Main
SML3295T05	SMH3295T05	SMH3295T04	36	54	--	--	Force Main
SML3295T06	SMH3295T06	SMH3295T02	8	54	222	0.2%	Gravity Main
SML3295T07	SMH3295T07	SMH3295T06	8	386	429	0.6%	Gravity Main
SML3295T08	SMH3295T08	SMH3295T01	15	10	--	--	Gravity Main
SML3295T0A	SMH3295T01	O/E	15	8	8,221	8.0%	Gravity Main
SML3295T8A	SMH3295T08	SMH3295T02	15	17	--	--	Gravity Main
SML3295U01	SMH3295U01	SMH3295P03	8	438	551	1.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3295U02	SMH3295U02	SMH3295U01	8	458	539	1.0%	Gravity Main
SML3295U03	SMH3295U03	SMH3295U06	8	90	1,087	4.0%	Gravity Main
SML3295U04	SMH3295U04	SMH3295P07	8	283	959	3.1%	Gravity Main
SML3295U05	SMH3295U05	SMH3295U08	8	168	1,790	10.8%	Gravity Main
SML3295U06	SMH3295U06	SMH3295U09	8	166	1,952	12.9%	Gravity Main
SML3295U07	SMH3295U07	SMH3295U06	8	171	603	1.2%	Gravity Main
SML3295U08	SMH3295U08	SMH3295P09	8	401	608	1.2%	Gravity Main
SML3295U09	SMH3295U09	SMH3295U08	8	375	577	1.1%	Gravity Main
SML3295U10	SMH3295U10	SMH3295U09	8	374	899	2.7%	Gravity Main
SML3295U11	SMH3295U11	SMH3295U12	8	97	591	1.2%	Gravity Main
SML3295U12	SMH3295U12	SMH3295U17	8	161	975	3.2%	Gravity Main
SML3295U13	SMH3295U13	SMH3295U14	8	170	595	1.2%	Gravity Main
SML3295U14	SMH3295U14	SMH3295U19	8	160	1,564	8.3%	Gravity Main
SML3295U15	SMH3295U15	SMH3295U16	12	33	2,778	3.0%	Gravity Main
SML3295U16	SMH3295U16	SMH3295U18	12	287	1,658	1.1%	Gravity Main
SML3295U17	SMH3295U17	SMH3295U18	10	91	1,652	2.8%	Gravity Main
SML3295U18	SMH3295U18	SMH3295T08	15	116	5,741	3.9%	Gravity Main
SML3295U19	SMH3295U19	SMH3295U17	10	378	1,793	3.3%	Gravity Main
SML3295U20	SMH3295U20	SMH3295U05	8	145	--	--	Gravity Main
SML3295V01	SMH3295V01	SMH3295N04	15	482	3,784	1.7%	Gravity Main
SML3295V02	SMH3295V02	SMH3295V01	24	230	10,143	1.0%	Gravity Main
SML3295V03	SMH3295V03	SMH3295N08	24	473	13,215	1.7%	Gravity Main
SML3295V04	SMH3295V04	SMH3295V01	8	200	1,733	10.2%	Gravity Main
SML3295V05	SMH3295V05	SMH3295V04	8	349	680	1.6%	Gravity Main
SML3295V06	SMH3295V06	SMH3295V04	8	157	1,816	11.1%	Gravity Main
SML3295V08	SMH3295V08	SMH3295N21	8	298	540	1.0%	Gravity Main
SML3295V09	SMH3295V09	SMH3295V08	8	250	586	1.2%	Gravity Main
SML3295V1A	SMH3295V01	SMH3295V03	24	11	16,503	2.6%	Gravity Main
SML3295W01	SMH3295W01	SMH3295W05	8	136	1,013	3.5%	Gravity Main
SML3295W02	SMH3295W02	SMH3295W04	8	88	2,384	19.2%	Gravity Main
SML3295W03	SMH3295W03	SMH3295W01	8	502	1,164	4.6%	Gravity Main
SML3295W04	SMH3295W04	SMH3295W06	8	185	1,692	9.7%	Gravity Main
SML3295W05	SMH3295W05	SMH3295W07	8	297	572	1.1%	Gravity Main
SML3295W06	SMH3295W06	SMH3295W09	8	177	1,523	7.8%	Gravity Main
SML3295W07	SMH3295W07	SMH3295W08	24	114	20,751	4.2%	Gravity Main
SML3295W08	SMH3295W08	SMH3295V02	24	447	20,153	3.9%	Gravity Main
SML3295W09	SMH3295W09	SMH3295W10	8	59	1,585	8.5%	Gravity Main
SML3295W10	SMH3295W10	SMH3295W07	24	305	16,098	2.5%	Gravity Main
SML3295W11	SMH3295W11	SMH3295V04	8	460	570	1.1%	Gravity Main
SML3295W12	SMH3295W12	SMH3295W11	8	316	896	2.7%	Gravity Main
SML3295W13	SMH3295W13	SMH3295W14	8	125	343	0.4%	Gravity Main
SML3295W14	SMH3295W14	SMH3295W15	8	257	1,268	5.4%	Gravity Main
SML3295W15	SMH3295W15	SMH0585C02	8	144	1,747	10.3%	Gravity Main
SML3295X01	SMH3295X01	SMH3295U02	8	470	812	2.2%	Gravity Main
SML3295X03	SMH3295X03	SMH3295U07	8	200	1,916	12.4%	Gravity Main
SML3295X04	SMH3295X04	SMH3295X03	8	355	1,216	5.0%	Gravity Main
SML3295X05	SMH3295X05	SMH0585C18	8	154	530	1.0%	Gravity Main
SML3295X06	SMH3295X06	SMH3295U10	8	373	918	2.9%	Gravity Main
SML3295X07	SMH3295X07	SMH0585C15	8	320	584	1.2%	Gravity Main
SML3295X2A	SMH3295X02	SMH3295X04	8	146	2,664	24.0%	Gravity Main
SML3295X2B	SMH3295X07	SMH3295X02	8	65	--	0.0%	Gravity Main
SML3295Y01	SMH3295Y01	SMH3295U19	10	375	1,533	2.4%	Gravity Main
SML3295Y02	SMH3295Y02	SMH3295T07	8	271	343	0.4%	Gravity Main
SML3295Y03	SMH3295Y03	SMH3295Y02	8	270	344	0.4%	Gravity Main
SML3295Y04	SMH3295Y04	SMH3295Y03	8	270	341	0.4%	Gravity Main
SML3494Q01	SMH3494Q01	SMH3494T01	10	66	730	0.5%	Gravity Main
SML3494Q02	SMH3494Q02	SMH3494Q01	10	250	1,128	1.3%	Gravity Main
SML3494Q03	SMH3494Q03	SMH3494Q02	10	414	1,017	1.1%	Gravity Main
SML3494Q04	SMH3494Q04	SMH3494Q03	10	446	848	0.7%	Gravity Main
SML3494Q05	SMH3494Q05	SMH3494Q04	8	369	867	2.5%	Gravity Main
SML3494Q06	SMH3494Q06	SMH3494Q04	8	224	1,425	6.9%	Gravity Main
SML3494Q07	SMH3494Q07	SMH3494Q08	8	172	816	2.3%	Gravity Main
SML3494Q08	SMH3494Q08	SMH3494Q05	8	230	2,933	29.1%	Gravity Main
SML3494Q09	SMH3494Q09	SMH3494Q10	16	303	20,099	33.9%	Gravity Main
SML3494Q10	SMH3494Q10	SML3494X19	20	159	25,672	16.8%	Gravity Main
SML3494Q12	SMH3494Q12	SMH3594L16	20	3411	--	--	Force Main
SML3494Q12	SML3494Q12	SML3494Q12	30	3338	--	--	Force Main
SML3494Q12	SML3494Q12	SML3494Q12	24	424	--	--	Force Main
SML3494Q12	SML3494Q12	SML3494Q12	24	800	--	--	Force Main
SML3494Q12	SML3494Q12	SML3494Q12	24	2656	--	--	Force Main
SML3494Q12	SML3494Q12	SML3494Q12	20	824	--	--	Force Main
SML3494Q12	SML3494Q12	SML3494Q12	20	1434	--	--	Force Main
SML3494Q9A	SMH3494Q09	SMH3494Q10	16	303	20,092	33.9%	Gravity Main
SML3494R01	SMH3494R01	SMH3494Q06	8	82	2,017	13.8%	Gravity Main
SML3494R02	SMH3494R02	SMH3494R01	8	76	1,957	13.0%	Gravity Main
SML3494R03	SMH3494R03	SMH3494Q09	20	526	17,236	7.6%	Gravity Main
SML3494R04	SMH3494R04	SMH3494R03	24	276	9,950	1.0%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3494R05	SMH3494R05	SMH3494R02	8	365	615	1.3%	Gravity Main
SML3494R06	SMH3494R06	SMH3494R08	8	282	355	0.4%	Gravity Main
SML3494R07	SMH3494R07	SMH3494R09	8	134	489	0.8%	Gravity Main
SML3494R08	SMH3494R08	SMH3494R11	8	184	363	0.4%	Gravity Main
SML3494R09	SMH3494R09	SMH3494R12	10	78	1,117	1.3%	Gravity Main
SML3494R10	SMH3494R10	SMH3494R09	8	233	1,154	4.5%	Gravity Main
SML3494R11	SMH3494R11	SMH3494R13	10	185	636	0.4%	Gravity Main
SML3494R12	SMH3494R12	SMH3494R11	10	246	1,478	2.2%	Gravity Main
SML3494R13	SMH3494R13	SMH3594M01	10	370	943	0.9%	Gravity Main
SML3494S01	SMH3494S01	SMH3494T26	8	163	732	1.8%	Gravity Main
SML3494S02	SMH3494S02	SMH3494T25	24	218	15,017	2.2%	Gravity Main
SML3494S03	SMH3494S03	SMH3494T27	8	138	1,259	5.4%	Gravity Main
SML3494S04	SMH3494S04	SMH3494S03	8	136	944	3.0%	Gravity Main
SML3494S05	SMH3494S05	SMH3494S07	24	141	7,754	0.6%	Gravity Main
SML3494S06	SMH3494S06	SMH3494S08	8	90	1,304	5.8%	Gravity Main
SML3494S07	SMH3494S07	SMH3494R04	24	134	7,569	0.6%	Gravity Main
SML3494S08	SMH3494S08	SMH3494R05	8	123	1,283	5.6%	Gravity Main
SML3494S09	SMH3494S09	SMH3494S04	8	127	741	1.9%	Gravity Main
SML3494S10	SMH3494S10	SMH3494S13	24	285	6,293	0.4%	Gravity Main
SML3494S11	SMH3494S11	SMH3494S05	24	436	5,365	0.3%	Gravity Main
SML3494S12	SMH3494S12	SMH3494S11	24	133	5,993	0.3%	Gravity Main
SML3494S13	SMH3494S13	SMH3494S12	24	106	6,102	0.4%	Gravity Main
SML3494S14	SMH3494S14	SMH3494R10	8	174	594	1.2%	Gravity Main
SML3494S15	SMH3494S15	SMH3494S14	8	192	439	0.7%	Gravity Main
SML3494S16	<Null>	SMH3494S02	24	149	5,534	0.3%	Gravity Main
SML3494S18	SMH3494S18	SMH3494S19	8	171	--	--	Gravity Main
SML3494S19	SMH3494S19	SMH3494S20	8	48	--	--	Gravity Main
SML3494S20	SMH3494S20	SMH3494S13	8	78	--	--	Gravity Main
SML3494T01	SMH3494T01	SMH3494U13	12	252	1,045	0.4%	Gravity Main
SML3494T02	SMH3494T02	SMH3494T01	8	283	957	3.1%	Gravity Main
SML3494T03	SMH3494T03	SMH3494T02	8	270	1,959	13.0%	Gravity Main
SML3494T04	SMH3494T04	SMH3494U14	10	242	1,814	3.4%	Gravity Main
SML3494T05	SMH3494T05	SMH3494U15	24	231	11,609	1.3%	Gravity Main
SML3494T06	SMH3494T06	SMH3494T04	8	190	1,456	7.2%	Gravity Main
SML3494T07	SMH3494T07	SMH3494T10	8	103	721	1.8%	Gravity Main
SML3494T08	SMH3494T08	SMH3494T04	8	238	980	3.2%	Gravity Main
SML3494T09	SMH3494T09	SMH3494T02	8	336	551	1.0%	Gravity Main
SML3494T0A	SMH3494T16	SMH3494T15	8	369	1,273	5.5%	Gravity Main
SML3494T10	SMH3494T10	SMH3494T09	8	213	2,010	13.7%	Gravity Main
SML3494T11	SMH3494T11	SMH3494T05	24	348	6,056	0.4%	Gravity Main
SML3494T12	SMH3494T12	SMH3494T17	8	343	543	1.0%	Gravity Main
SML3494T14	SMH3494T14	SMH3494Q03	8	343	803	2.2%	Gravity Main
SML3494T15	SMH3494T15	SMH3494T09	8	333	1,075	3.9%	Gravity Main
SML3494T16	SMH3494T16	SMH3494T11	24	331	5,950	0.3%	Gravity Main
SML3494T17	SMH3494T17	SMH3494T16	8	207	2,310	18.1%	Gravity Main
SML3494T18	SMH3494T18	SMH3494T20	8	185	677	1.5%	Gravity Main
SML3494T19	SMH3494T19	SMH3494T15	8	253	1,278	5.5%	Gravity Main
SML3494T20	SMH3494T20	SMH3494T24	8	227	697	1.6%	Gravity Main
SML3494T21	SMH3494T21	SMH3494T20	8	204	1,336	6.0%	Gravity Main
SML3494T22	SMH3494T22	SMH3494T16	24	390	5,810	0.3%	Gravity Main
SML3494T23	SMH3494T23	SMH3494T21	8	116	2,250	17.1%	Gravity Main
SML3494T24	SMH3494T24	SMH3494T27	8	151	362	0.4%	Gravity Main
SML3494T25	SMH3494T25	SMH3494T22	24	207	6,484	0.4%	Gravity Main
SML3494T26	SMH3494T26	SMH3494Q08	8	154	550	1.0%	Gravity Main
SML3494T27	SMH3494T27	SMH3494T26	8	225	1,377	6.4%	Gravity Main
SML3494T28	SMH3494T28	SMH3494T27	8	278	981	3.3%	Gravity Main
SML3494T29	SMH3494T29	SMH3494T28	8	130	1,570	8.3%	Gravity Main
SML3494U01	SMH3494U01	SMH3494X02	12	64	943	0.3%	Gravity Main
SML3494U02	SMH3494U02	SMH3494U01	12	377	1,014	0.4%	Gravity Main
SML3494U03	SMH3494U03	SMH3494U02	8	187	784	2.1%	Gravity Main
SML3494U04	SMH3494U04	SMH3494X08	24	398	16,850	2.7%	Gravity Main
SML3494U05	SMH3494U05	SMH3494X07	10	386	1,796	3.3%	Gravity Main
SML3494U06	SMH3494U06	SMH3494U03	8	190	936	3.0%	Gravity Main
SML3494U07	SMH3494U07	SMH3494U02	12	397	1,021	0.4%	Gravity Main
SML3494U08	SMH3494U08	SMH3494U06	8	91	954	3.1%	Gravity Main
SML3494U09	SMH3494U09	SMH3494U05	10	250	1,775	3.2%	Gravity Main
SML3494U10	SMH3494U10	SMH3494U09	8	32	1,129	4.3%	Gravity Main
SML3494U11	SMH3494U11	SMH3494U04	24	338	18,692	3.4%	Gravity Main
SML3494U12	SMH3494U12	SMH3494U08	8	164	620	1.3%	Gravity Main
SML3494U13	SMH3494U13	SMH3494U07	12	415	995	0.4%	Gravity Main
SML3494U14	SMH3494U14	SMH3494U09	8	151	1,272	5.5%	Gravity Main
SML3494U15	SMH3494U15	SMH3494U11	24	43	37,261	13.4%	Gravity Main
SML3494X02	SMH3494X02	SMH3494X18	12	76	5,615	12.3%	Gravity Main
SML3494X03	SMH3494X03	SMH3494X02	24	20	21,020	4.3%	Gravity Main
SML3494X04	SMH3494X04	SMH3494X18	24	93	38,172	14.1%	Gravity Main
SML3494X05	SMH3494X05	SMH3494X04	24	17	16,173	2.5%	Gravity Main
SML3494X06	SMH3494X06	SMH3494X05	12	48	901	0.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3494X07	SMH3494X07	SMH3494X06	10	103	1,570	2.5%	Gravity Main
SML3494X08	SMH3494X08	SMH3494X05	24	145	15,895	2.4%	Gravity Main
SML3494X09	SMH3494X09	SMH3494X07	8	242	1,662	9.3%	Gravity Main
SML3494X10	SMH3494X10	SMH3494X09	8	326	1,765	10.5%	Gravity Main
SML3494X11	SMH3494X11	SMH3494X12	8	67	1,489	7.5%	Gravity Main
SML3494X12	SMH3494X12	SMH3494X13	8	93	1,435	7.0%	Gravity Main
SML3494X13	SMH3494X13	SMH3494X14	8	267	991	3.3%	Gravity Main
SML3494X14	SMH3494X14	SMH3494U10	8	153	1,042	3.7%	Gravity Main
SML3494X15	SMH3494X15	SMH3494X10	8	339	556	1.0%	Gravity Main
SML3494X16	SMH3494X16	SMH3494U15	8	373	1,320	5.9%	Gravity Main
SML3494X17	SMH3494X17	SMH3494X15	8	244	541	1.0%	Gravity Main
SML3494X18	SML3494X18	SMH3494X19	12	3346	--	--	Force Main
SML3494X18	SMH3494X18	SML3494X18	12	657	--	--	Force Main
SML3494X19	SMH3494X19	SMH3494Q12	12	103	--	--	Force Main
SML3494X2A	SMH3494X02	SMH3494X18	12	84	17,160	114.6%	Gravity Main
SML3494Y01	SMH3494Y01	SMH3494T06	8	233	1,379	6.4%	Gravity Main
SML3494Y02	SMH3494Y02	SMH3494Y01	8	394	733	1.8%	Gravity Main
SML3494Y03	SMH3494Y03	SMH3494Y02	8	192	1,758	10.5%	Gravity Main
SML3494Y04	SMH3494Y04	SMH3494T12	8	291	1,090	4.0%	Gravity Main
SML3494Y05	SMH3494Y05	SMH3494Y04	6	138	1,285	25.9%	Gravity Main
SML3494Y06	SMH3494Y06	SMH3494Y10	8	266	343	0.4%	Gravity Main
SML3494Y07	SMH3494Y07	SMH3494T17	8	350	1,967	13.1%	Gravity Main
SML3494Y08	SMH3494Y08	SMH3494Y07	8	320	1,939	12.7%	Gravity Main
SML3494Y09	SMH3494Y09	SMH3494Y08	8	128	1,996	13.5%	Gravity Main
SML3494Y10	SMH3494Y10	SMH3494Y19	8	149	1,278	5.5%	Gravity Main
SML3494Y11	SMH3494Y11	SMH3494T23	8	320	2,121	15.2%	Gravity Main
SML3494Y12	SMH3494Y12	SMH3494T29	8	305	1,634	9.0%	Gravity Main
SML3494Y13	SMH3494Y13	SMH3494Y11	8	52	1,582	8.5%	Gravity Main
SML3494Y14	SMH3494Y14	SMH3494Y13	8	236	1,494	7.6%	Gravity Main
SML3494Y15	SMH3494Y15	SMH3494Z02	8	67	1,088	4.0%	Gravity Main
SML3494Y16	SMH3494Y16	SMH3494Y17	8	121	519	0.9%	Gravity Main
SML3494Y17	SMH3494Y18	SMH3494Y17	8	110	695	1.6%	Gravity Main
SML3494Y18	SMH3494Y18	SMH3494Y14	8	133	1,147	4.5%	Gravity Main
SML3494Y19	SMH3494Y19	SMH3494Y09	8	104	1,026	3.6%	Gravity Main
SML3494Y20	SMH3494Y20	SMH3494Y19	8	163	637	1.4%	Gravity Main
SML3494Z01	SMH3494Z01	SMH3494Y12	8	390	1,605	8.7%	Gravity Main
SML3494Z02	SMH3494Z02	SMH3494Z01	8	197	1,559	8.2%	Gravity Main
SML3494Z03	SMH3494Z03	SMH3494Z02	8	151	1,537	8.0%	Gravity Main
SML3494Z04	SMH3494Z04	SMH3494Z02	8	370	1,020	3.5%	Gravity Main
SML3494Z05	SMH3494Z05	SMH3494S10	24	266	5,917	0.3%	Gravity Main
SML3494Z06	SMH3494Z06	SMH3494Z05	24	23	6,770	0.4%	Gravity Main
SML3494Z07	SMH3494Z07	SMH3494Z06	24	78	7,125	0.5%	Gravity Main
SML3494Z08	SMH3494Z08	SMH3494Z07	24	201	6,088	0.4%	Gravity Main
SML3494Z09	SMH3494Z09	SMH3494Z08	24	260	5,956	0.3%	Gravity Main
SML3494Z10	SMH3494Z10	SMH3494Z12	8	99	386	0.5%	Gravity Main
SML3494Z11	SMH3494Z11	SMH3594W01	8	147	384	0.5%	Gravity Main
SML3494Z12	SMH3494Z12	SMH3494Z11	8	103	390	0.5%	Gravity Main
SML3494Z13	SMH3494Z13	SMH3594W02	8	100	516	0.9%	Gravity Main
SML3494Z14	SMH3494Z14	SMH3594W03	8	117	352	0.4%	Gravity Main
SML3594J01	SMH3594J01	SMH3594J04	8	337	860	2.5%	Gravity Main
SML3594J02	SMH3594J02	SMH3594K10	10	253	844	0.7%	Gravity Main
SML3594J03	SMH3594K10	SMH3594J05	10	425	651	0.4%	Gravity Main
SML3594J04	SMH3594J04	SMH3594K10	8	175	801	2.2%	Gravity Main
SML3594J05	SMH3594J05	SMH3594J07	12	172	984	0.4%	Gravity Main
SML3594J06	SMH3594J06	SML3694M01	12	193	7,645	22.7%	Gravity Main
SML3594J07	SMH3594J07	SMH3594J06	12	23	1,100	0.5%	Gravity Main
SML3594J08	SMH3594J08	SML3494Q12	18	914	6,817	2.1%	Gravity Main
SML3594K01	SML3594K01	SML3494Q12	8	57	--	0.0%	Gravity Main
SML3594K01	SMH3594K01	SML3594K01	8	342	--	0.0%	Gravity Main
SML3594K02	SMH3594K02	SMH3594K01	8	32	10,169	349.7%	Gravity Main
SML3594K03	SMH3594K03	SMH3594K01	8	252	3,857	50.3%	Gravity Main
SML3594K04	SMH3594K04	SMH3594K02	8	383	717	1.7%	Gravity Main
SML3594K05	SMH3594K05	SMH3594K07	10	344	2,074	4.4%	Gravity Main
SML3594K06	SMH3594K06	SMH3594K05	8	184	2,316	18.1%	Gravity Main
SML3594K07	SMH3594K07	SMH3594K09	10	215	1,823	3.4%	Gravity Main
SML3594K08	SMH3594K08	SMH3594K09	6	30	4,927	380.7%	Gravity Main
SML3594K09	SMH3594K09	SMH3594J02	10	115	610	0.4%	Gravity Main
SML3594L01	SMH3594L01	SMH3594L02	10	73	633	0.4%	Gravity Main
SML3594L02	SMH3594L02	SMH3594L03	10	60	2,001	4.1%	Gravity Main
SML3594L03	SMH3594L03	SMH3594L04	10	116	1,586	2.6%	Gravity Main
SML3594L04	SMH3594L04	SMH3594L05	10	76	1,197	1.5%	Gravity Main
SML3594L05	SMH3594L05	SMH3594L06	10	82	3,154	10.2%	Gravity Main
SML3594L06	SMH3594L06	SMH3594L07	10	122	4,970	25.4%	Gravity Main
SML3594L07	SMH3594L07	SML3594L08	10	266	4,842	24.1%	Gravity Main
SML3594L08	SML3594L08	SML3494Q12	12	24	3,044	3.6%	Gravity Main
SML3594L08	SML3594L08	SML3594L08	12	133	1,305	0.7%	Gravity Main
SML3594L08	SMH3594L08	SML3594L17	10	408	458	0.2%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3594L09	SMH3594L09	SMH3594L08	10	65	2,916	8.7%	Gravity Main
SML3594L10	SMH3594L10	SML3594L08	8	104	3,983	53.6%	Gravity Main
SML3594L11	SMH3594L11	SMH3594L09	10	286	2,930	8.8%	Gravity Main
SML3594L12	SMH3594L12	SMH3594L10	8	210	544	1.0%	Gravity Main
SML3594L13	SMH3594L13	SMH3594L11	10	93	1,089	1.2%	Gravity Main
SML3594L14	SMH3594L14	SMH3594L13	8	138	498	0.8%	Gravity Main
SML3594L15	SMH3594L15	SMH3594L12	8	207	545	1.0%	Gravity Main
SML3594M01	SMH3594M01	SMH3594M02	10	318	2,116	4.6%	Gravity Main
SML3594M02	SMH3594M02	SMH3594M03	10	65	3,079	9.8%	Gravity Main
SML3594M03	SMH3594M03	SMH3594M04	10	125	2,063	4.4%	Gravity Main
SML3594M04	SMH3594M04	SMH3594M05	10	60	3,533	12.8%	Gravity Main
SML3594M05	SMH3594M05	SMH3594L01	10	302	1,194	1.5%	Gravity Main
SML3594N01	SMH3594N01	SMH3494R12	8	197	628	1.3%	Gravity Main
SML3594N02	SMH3594N02	SMH3494S14	8	371	692	1.6%	Gravity Main
SML3594N03	SMH3594N03	SMH3594N07	8	398	1,278	5.5%	Gravity Main
SML3594N04	SMH3594N04	SMH3594N05	8	125	1,311	5.8%	Gravity Main
SML3594N05	SMH3594N05	SMH3594N06	8	200	1,711	9.9%	Gravity Main
SML3594N06	SMH3594N06	SMH3594N08	8	171	1,222	5.0%	Gravity Main
SML3594N07	SMH3594N07	SMH3594N09	8	273	1,129	4.3%	Gravity Main
SML3594N08	SMH3594N08	SMH3594P02	8	395	612	1.3%	Gravity Main
SML3594N09	SMH3594N09	SMH3594P01	8	260	592	1.2%	Gravity Main
SML3594N10	SMH3594N10	SMH3594N09	8	246	595	1.2%	Gravity Main
SML3594P01	SMH3594P01	SMH3594L02	8	263	1,538	8.0%	Gravity Main
SML3594P02	SMH3594P02	SMH3594N10	8	247	888	2.7%	Gravity Main
SML3594P03	SMH3594P03	SMH3594P09	8	60	1,056	3.8%	Gravity Main
SML3594P04	SMH3594P04	SMH3594P10	8	98	1,866	11.8%	Gravity Main
SML3594P05	SMH3594P05	SMH3594P04	8	177	1,173	4.7%	Gravity Main
SML3594P06	SMH3594P06	SMH3594P07	10	229	1,010	1.0%	Gravity Main
SML3594P07	SMH3594P07	SMH3594P08	10	400	1,552	2.5%	Gravity Main
SML3594P08	SMH3594P08	SMH3594L13	10	308	2,074	4.4%	Gravity Main
SML3594P09	SMH3594P09	SMH3594L08	8	124	1,113	4.2%	Gravity Main
SML3594P10	SMH3594P10	SMH3594P03	8	200	1,495	7.6%	Gravity Main
SML3594P11	SMH3594P11	SMH3594P10	8	56	3,124	33.0%	Gravity Main
SML3594P11	SMH3594P11	SMH3594P10	8	92	2,432	20.0%	Gravity Main
SML3594P12	SMH3594P12	SMH3594P10	8	174	569	1.1%	Gravity Main
SML3594P13	SMH3594P13	SMH3594P10	8	30	--	0.0%	Gravity Main
SML3594P14	SMH3594P14	SMH3594P15	8	183	--	--	Gravity Main
SML3594P15	SMH3594P15	SMH3594P16	8	103	--	--	Gravity Main
SML3594P16	SMH3594P16	SMH3594P07	8	30	--	--	Gravity Main
SML3594Q01	SMH3594Q01	SMH3594Q02	8	112	1,755	10.4%	Gravity Main
SML3594Q02	SMH3594Q02	SMH3594Q11	8	105	1,688	9.6%	Gravity Main
SML3594Q03	SMH3594Q03	SMH3594Q01	8	149	1,452	7.1%	Gravity Main
SML3594Q05	SMH3594Q05	SMH3594Q06	8	308	1,977	13.2%	Gravity Main
SML3594Q06	SMH3594Q06	SMH3594K06	8	168	1,996	13.5%	Gravity Main
SML3594Q07	SMH3594Q07	SMH3594Q08	8	185	1,726	10.1%	Gravity Main
SML3594Q08	SMH3594Q08	SMH3594R02	8	200	1,757	10.4%	Gravity Main
SML3594Q09	SMH3594Q09	SMH3594J01	6	122	1,177	21.7%	Gravity Main
SML3594Q10	SMH3594Q10	SMH3594Q05	8	55	774	2.0%	Gravity Main
SML3594Q11	SMH3594Q11	SMH3594Q10	8	63	785	2.1%	Gravity Main
SML3594Q12	SMH3594Q12	SMH3594Q11	8	193	622	1.3%	Gravity Main
SML3594Q13	SMH3594Q13	SMH3594Q12	8	257	2,254	17.2%	Gravity Main
SML3594R01	SMH3594R01	SMH3594R06	8	307	1,583	8.5%	Gravity Main
SML3594R02	SMH3594R02	SMH3594R01	8	24	2,043	14.1%	Gravity Main
SML3594R03	SMH3594R03	SMH3594R02	8	227	1,980	13.3%	Gravity Main
SML3594R04	SMH3594R04	SMH3594R07	8	289	1,919	12.5%	Gravity Main
SML3594R05	SMH3594R05	SMH3594R08	8	250	784	2.1%	Gravity Main
SML3594R06	SMH3594R06	SMH3594R11	8	389	893	2.7%	Gravity Main
SML3594R07	SMH3594R07	SMH3594R09	8	125	1,966	13.1%	Gravity Main
SML3594R08	SMH3594R08	SMH3594J04	8	143	1,198	4.9%	Gravity Main
SML3594R09	SMH3594R09	SMH3594R13	8	253	1,173	4.6%	Gravity Main
SML3594R10	SMH3594R10	SMH3594R18	8	41	1,658	9.3%	Gravity Main
SML3594R11	SMH3594R11	SMH3594R10	8	120	1,283	5.6%	Gravity Main
SML3594R12	SMH3594R12	SMH3594R11	8	177	878	2.6%	Gravity Main
SML3594R13	SMH3594R13	SMH3594R12	8	174	1,059	3.8%	Gravity Main
SML3594R14	SMH3594R14	SMH3594R12	8	154	535	1.0%	Gravity Main
SML3594R15	SMH3594R15	SMH3594R11	8	201	543	1.0%	Gravity Main
SML3594R16	SMH3594R16	SMH3594S15	8	160	2,074	14.6%	Gravity Main
SML3594R17	SMH3594R17	SMH3594R18	8	180	1,344	6.1%	Gravity Main
SML3594R18	SMH3594R18	SMH3594J05	8	172	293	0.3%	Gravity Main
SML3594R19	SMH3594R19	SMH3594R13	8	43	498	0.8%	Gravity Main
SML3594R20	SMH3594R20	SMH3594R19	8	110	495	0.8%	Gravity Main
SML3594R21	SMH3594R21	SMH3594R20	8	132	559	1.1%	Gravity Main
SML3594R22	SMH3594R22	SMH3594R21	8	75	687	1.6%	Gravity Main
SML3594S01	SMH3594S01	SMH3594S02	8	210	2,177	16.0%	Gravity Main
SML3594S02	SMH3594S02	SMH3594S05	8	198	2,153	15.7%	Gravity Main
SML3594S03	SMH3594S03	SMH3594R07	8	342	1,179	4.7%	Gravity Main
SML3594S04	SMH3594S04	SMH3594S03	8	186	1,605	8.7%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3594S05	SMH3594S05	SMH3594S06	8	123	1,367	6.3%	Gravity Main
SML3594S06	SMH3594S06	SMH3594S04	8	244	1,698	9.8%	Gravity Main
SML3594S07	SMH3594S07	SMH3594S01	8	214	863	2.5%	Gravity Main
SML3594S08	SMH3594S08	SMH3594S07	8	93	632	1.3%	Gravity Main
SML3594S09	SMH3594S09	SMH3594S06	8	127	1,965	13.1%	Gravity Main
SML3594S10	SMH3594S10	SMH3594S03	8	295	1,336	6.0%	Gravity Main
SML3594S11	SMH3594S11	SMH3594S13	8	240	1,505	7.7%	Gravity Main
SML3594S12	SMH3594S12	SMH3594S09	8	135	1,772	10.6%	Gravity Main
SML3594S13	SMH3594S13	SMH3594S14	8	103	2,759	25.7%	Gravity Main
SML3594S14	SMH3594S14	SMH3594S12	8	127	1,257	5.3%	Gravity Main
SML3594S15	SMH3594S15	SMH3594S03	8	64	1,818	11.2%	Gravity Main
SML3594S16	SMH3594S16	SMH3594S10	8	158	1,154	4.5%	Gravity Main
SML3594S17	SMH3594S17	SMH3594S16	8	123	1,758	10.5%	Gravity Main
SML3594T01	SMH3594T01	SMH3594Q03	8	217	1,656	9.3%	Gravity Main
SML3594T02	SMH3594T02	SMH3594T01	8	175	1,076	3.9%	Gravity Main
SML3594T03	SMH3594T03	SMH3594T02	8	108	1,562	8.3%	Gravity Main
SML3594T04	SMH3594T04	SMH3594T03	8	268	1,883	12.0%	Gravity Main
SML3594T05	SMH3594T05	SMH3594T04	8	305	1,407	6.7%	Gravity Main
SML3594T06	SMH3594T06	SMH3594T02	8	240	1,988	13.4%	Gravity Main
SML3594T07	SMH3594T07	SMH3594Q13	8	214	1,643	9.1%	Gravity Main
SML3594U01	SMH3594U01	SMH3594U07	8	126	1,125	4.3%	Gravity Main
SML3594U03	SMH3594U03	SMH3594U09	8	186	353	0.4%	Gravity Main
SML3594U04	SMH3594U04	SMH3594V22	8	80	1,764	10.5%	Gravity Main
SML3594U05	SMH3594U05	SMH3594U13	10	265	2,008	4.1%	Gravity Main
SML3594U06	SMH3594U06	SMH3594U05	8	133	1,395	6.6%	Gravity Main
SML3594U07	SMH3594U07	SMH3594U06	8	85	2,043	14.1%	Gravity Main
SML3594U08	SMH3594U08	SMH3594P02	8	324	1,197	4.8%	Gravity Main
SML3594U09	SMH3594U09	SMH3594U11	8	92	1,036	3.6%	Gravity Main
SML3594U10	SMH3594U10	SMH3594U06	8	175	1,962	13.0%	Gravity Main
SML3594U11	SMH3594U11	SMH3594U12	8	196	2,027	13.9%	Gravity Main
SML3594U12	SMH3594U12	SMH3594U10	8	145	2,293	17.8%	Gravity Main
SML3594U13	SMH3594U13	SMH3594U16	10	258	868	0.8%	Gravity Main
SML3594U14	SMH3594U14	SMH3594U11	8	137	351	0.4%	Gravity Main
SML3594U15	SMH3594U15	SMH3594U14	8	120	2,164	15.8%	Gravity Main
SML3594U16	SMH3594U16	SMH3594U19	10	98	1,565	2.5%	Gravity Main
SML3594U17	SMH3594U17	SMH3594P06	8	171	2,084	14.7%	Gravity Main
SML3594U18	SMH3594U18	SMH3594U17	8	150	596	1.2%	Gravity Main
SML3594U19	SMH3594U19	SMH3594P06	10	92	941	0.9%	Gravity Main
SML3594U20	SMH3594U20	SMH3594U19	8	212	1,080	3.9%	Gravity Main
SML3594U21	SMH3594U21	SMH3594U20	8	161	1,557	8.2%	Gravity Main
SML3594U22	SMH3594U22	SMH3594U21	8	154	1,280	5.5%	Gravity Main
SML3594U23	SMH3594U23	SMH3594U22	8	208	1,186	4.8%	Gravity Main
SML3594U24	SMH3594U24	SMH3594U22	8	190	2,617	23.2%	Gravity Main
SML3594U25	SMH3594U25	SMH3594U24	8	331	1,200	4.9%	Gravity Main
SML3594V01	SMH3594V01	SMH3494S15	8	179	1,105	4.1%	Gravity Main
SML3594V02	SMH3594V02	SMH3594V01	8	118	1,864	11.8%	Gravity Main
SML3594V03	SMH3594V03	SMH3594V02	8	208	2,444	20.2%	Gravity Main
SML3594V04	SMH3594V04	SMH3594V03	8	150	1,753	10.4%	Gravity Main
SML3594V05	SMH3594V05	SMH3594V04	8	252	1,546	8.1%	Gravity Main
SML3594V06	SMH3594V06	SMH3594V12	8	393	926	2.9%	Gravity Main
SML3594V07	SMH3594V07	SMH3594V10	8	229	543	1.0%	Gravity Main
SML3594V08	SMH3594V08	SMH3594V07	8	155	1,354	6.2%	Gravity Main
SML3594V09	SMH3594V09	SMH3594V08	8	194	2,332	18.4%	Gravity Main
SML3594V10	SMH3594V10	SMH3594V15	10	198	2,440	6.1%	Gravity Main
SML3594V11	SMH3594V11	SMH3594V10	8	232	1,013	3.5%	Gravity Main
SML3594V12	SMH3594V12	SMH3594V14	8	101	1,469	7.3%	Gravity Main
SML3594V13	SMH3594V13	SMH3594V11	8	152	1,580	8.4%	Gravity Main
SML3594V14	SMH3594V14	SMH3594V13	8	154	2,359	18.8%	Gravity Main
SML3594V15	SMH3594V15	SMH3594V18	10	88	2,429	6.1%	Gravity Main
SML3594V16	SMH3594V16	SMH3594V15	8	161	834	2.4%	Gravity Main
SML3594V17	SMH3594V17	SMH3594V21	8	227	692	1.6%	Gravity Main
SML3594V18	SMH3594V18	SMH3594V19	10	179	871	0.8%	Gravity Main
SML3594V19	SMH3594V19	SMH3594U05	10	394	888	0.8%	Gravity Main
SML3594V20	SMH3594V20	SMH3594V19	8	183	652	1.4%	Gravity Main
SML3594V21	SMH3594V21	SMH3594V20	8	341	1,964	13.0%	Gravity Main
SML3594V22	SMH3594V22	SMH3594U01	6	117	1,144	20.5%	Gravity Main
SML3594W01	SMH3594W01	SMH3594V05	8	227	1,724	10.1%	Gravity Main
SML3594W02	SMH3594W02	SMH3594W01	8	213	1,358	6.2%	Gravity Main
SML3594W03	SMH3594W03	SMH3594W02	8	132	1,000	3.4%	Gravity Main
SML3594W04	SMH3594W04	SMH3594W03	8	107	1,819	11.2%	Gravity Main
SML3594W05	SMH3594W05	SMH3594W07	8	93	1,507	7.7%	Gravity Main
SML3594W06	SMH3594W06	SMH3594W10	8	435	916	2.8%	Gravity Main
SML3594W07	SMH3594W07	SMH3594W09	8	250	754	1.9%	Gravity Main
SML3594W08	SMH3594W08	SMH3594W11	8	352	1,374	6.4%	Gravity Main
SML3594W09	SMH3594W09	SMH3594W14	8	336	1,669	9.4%	Gravity Main
SML3594W10	SMH3594W10	SMH3594V14	8	312	1,664	9.4%	Gravity Main
SML3594W11	SMH3594W11	SMH3594W10	8	285	1,188	4.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3594W12	SMH3594W12	SMH3594W11	8	145	726	1.8%	Gravity Main
SML3594W13	SMH3594W13	SMH3594W16	8	127	1,118	4.2%	Gravity Main
SML3594W14	SMH3594W14	SMH3594W13	8	78	1,613	8.8%	Gravity Main
SML3594W15	SMH3594W15	SMH3594V21	8	329	1,822	11.2%	Gravity Main
SML3594W16	SMH3594W16	SMH3594W12	8	30	1,592	8.6%	Gravity Main
SML3594W17	SMH3594W17	SMH3594W12	8	399	550	1.0%	Gravity Main
SML3594W18	SMH3594W18	SMH3594W17	8	132	1,778	10.7%	Gravity Main
SML3594X01	SMH3594X01	SMH3594X05	8	112	687	1.6%	Gravity Main
SML3594X02	SMH3594X02	SMH3594U09	8	194	2,255	17.2%	Gravity Main
SML3594X03	SMH3594X03	SMH3594X04	8	148	1,359	6.2%	Gravity Main
SML3594X04	SMH3594X04	SMH3594X05	8	270	1,620	8.9%	Gravity Main
SML3594X05	SMH3594X05	SMH3594X02	8	254	1,342	6.1%	Gravity Main
SML3594X06	SMH3594X06	SMH3594X02	8	170	417	0.6%	Gravity Main
SML3594X07	SMH3594X07	SMH3594X08	8	217	1,679	9.5%	Gravity Main
SML3594X08	SMH3594X08	SMH3594X10	8	171	2,038	14.0%	Gravity Main
SML3594X09	SMH3594X09	SMH3594U23	8	293	2,169	15.9%	Gravity Main
SML3594X10	SMH3594X10	SMH3594X09	8	180	2,100	14.9%	Gravity Main
SML3594Y01	SMH3594Y01	SMH3594T05	8	370	840	2.4%	Gravity Main
SML3594Y02	SMH3594Y02	SMH3594Y01	8	72	--	0.0%	Gravity Main
SML3594Z01	SMH3594Z01	SMH3594S01	8	170	1,733	10.2%	Gravity Main
SML3594Z02	SMH3594Z02	SMH3594Z03	8	288	764	2.0%	Gravity Main
SML3594Z03	SMH3594Z03	SMH3594Z01	8	230	1,123	4.3%	Gravity Main
SML3594Z04	SMH3594Z04	SMH3594Z03	8	94	178	0.1%	Gravity Main
SML3594Z05	SMH3594Z05	SMH3594Z04	8	109	548	1.0%	Gravity Main
SML3694A01	SMH3694A01	SMH3694A03	12	209	2,002	1.6%	Gravity Main
SML3694A02	SMH3694A02	SMH2594Z03	12	408	2,077	1.7%	Gravity Main
SML3694A03	SMH3694A03	SMH3694A06	12	59	1,478	0.8%	Gravity Main
SML3694A04	SMH3694A04	SMH3694A02	12	151	3,161	3.9%	Gravity Main
SML3694A05	SMH3694A05	SMH3694A04	12	274	2,999	3.5%	Gravity Main
SML3694A06	SMH3694A06	SMH3694A05	12	236	2,801	3.1%	Gravity Main
SML3694A07	SMH3694A07	SMH2594Z05	8	312	683	1.6%	Gravity Main
SML3694A08	SMH3694A08	SMH3694A04	8	126	793	2.1%	Gravity Main
SML3694A09	SMH3694A09	SMH3694A08	8	116	994	3.3%	Gravity Main
SML3694A10	SMH3694A10	SMH3694A09	8	141	842	2.4%	Gravity Main
SML3694A11	SMH3694A11	SMH3694A08	8	229	665	1.5%	Gravity Main
SML3694A12	SMH3694A12	SMH3694H14	8	256	628	1.3%	Gravity Main
SML3694A13	SMH3694A13	SMH3694A12	8	261	624	1.3%	Gravity Main
SML3694B01	SMH3694B01	SMH2594Y02	8	94	833	2.3%	Gravity Main
SML3694B02	SMH3694B02	SMH3694B01	8	269	1,397	6.6%	Gravity Main
SML3694B03	SMH3694B03	SMH3694B02	8	398	1,419	6.8%	Gravity Main
SML3694B04	SMH3694B04	SMH3694B02	8	346	913	2.8%	Gravity Main
SML3694B05	SMH3694B05	SMH3694B04	8	165	742	1.9%	Gravity Main
SML3694B06	SMH3694B06	SMH3694B05	8	278	791	2.1%	Gravity Main
SML3694B07	SMH3694B07	SMH3694A04	8	429	552	1.0%	Gravity Main
SML3694B08	SMH3694B08	SMH3694A05	8	466	829	2.3%	Gravity Main
SML3694B09	SMH3694B09	SMH3694A01	8	115	714	1.7%	Gravity Main
SML3694B4A	SMH3694B04	SMH3694B07	8	270	1,159	4.5%	Gravity Main
SML3694B6A	SMH3694B06	SMH3694B09	8	248	638	1.4%	Gravity Main
SML3694C01	SMH3694C01	SMH3694C02	10	376	2,316	5.5%	Gravity Main
SML3694C02	SMH3694C02	SMH3694C03	10	225	2,490	6.4%	Gravity Main
SML3694C03	SMH3694C03	SMH3694C04	10	153	3,947	16.0%	Gravity Main
SML3694C04	SMH3694C04	SML2594X02	10	271	4,766	23.4%	Gravity Main
SML3694E03	SMH3694E03	SMH3694E24	16	92	--	0.0%	Gravity Main
SML3694E03	SML3694E03	SML3494Q12	10	23	--	0.0%	Gravity Main
SML3694E03	SML3694E03	SML3694E25	16	116	--	0.0%	Gravity Main
SML3694E04	SML3694E04	SMH3694E03	8	8	13,425	609.5%	Gravity Main
SML3694E04	SMH3694E04	SML3694E04	8	120	3,354	38.0%	Gravity Main
SML3694E05	SMH3694E05	SML3694E03	8	115	1,090	4.0%	Gravity Main
SML3694E06	SMH3694E06	SMH3694E05	8	63	2,998	30.4%	Gravity Main
SML3694E07	SMH3694E07	SMH3694E06	8	234	1,561	8.2%	Gravity Main
SML3694E08	SMH3694E08	SMH3694M12	8	202	453	0.7%	Gravity Main
SML3694E09	SMH3694E09	SMH3694E07	8	32	1,836	11.4%	Gravity Main
SML3694E10	SMH3694E10	SMH3694E08	8	379	1,031	3.6%	Gravity Main
SML3694E11	SMH3694E11	SMH3694M14	8	401	1,075	3.9%	Gravity Main
SML3694E12	SMH3694E12	SMH3694E11	8	88	1,187	4.8%	Gravity Main
SML3694E13	SMH3694E13	SMH3694E09	8	348	1,405	6.7%	Gravity Main
SML3694E14	SMH3694E14	SMH3694E10	8	198	1,855	11.6%	Gravity Main
SML3694E15	SMH3694E15	SMH3694E13	8	177	1,149	4.5%	Gravity Main
SML3694E16	SMH3694E16	SMH3694E12	8	331	733	1.8%	Gravity Main
SML3694E17	SMH3694E17	SMH3694E15	8	84	3,045	31.4%	Gravity Main
SML3694E18	SMH3694E18	SMH3694E16	8	69	1,392	6.6%	Gravity Main
SML3694E19	SMH3694E19	SMH3694E17	8	85	646	1.4%	Gravity Main
SML3694E20	SMH3694E20	SMH3694E19	8	29	1,832	11.4%	Gravity Main
SML3694E21	SMH3694E21	SMH3694E14	8	279	1,634	9.0%	Gravity Main
SML3694E22	SMH3694E22	SMH3694E18	8	94	1,122	4.3%	Gravity Main
SML3694E23	SMH3694E23	SMH3694E20	8	70	630	1.3%	Gravity Main
SML3694F01	SMH3694F01	SMH3694E23	8	61	629	1.3%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3694F02	SMH3694F02	SMH3694F06	8	345	1,806	11.0%	Gravity Main
SML3694F03	SMH3694F03	SMH3694F02	8	104	1,188	4.8%	Gravity Main
SML3694F04	SMH3694F04	SMH3694F03	8	56	1,038	3.6%	Gravity Main
SML3694F05	SMH3694F05	SMH3694F04	8	332	1,008	3.4%	Gravity Main
SML3694F06	SMH3694F06	SMH3694F12	8	187	1,274	5.5%	Gravity Main
SML3694F07	SMH3694F07	SMH3694F06	8	176	546	1.0%	Gravity Main
SML3694F08	SMH3694F08	SMH3694F07	8	54	2,087	14.7%	Gravity Main
SML3694F09	SMH3694F09	SMH3694F08	8	45	4,028	54.9%	Gravity Main
SML3694F10	SMH3694F10	SMH3694F09	8	109	1,160	4.6%	Gravity Main
SML3694F11	SMH3694F11	SMH3694F10	8	83	1,467	7.3%	Gravity Main
SML3694F12	SMH3694F12	SMH3694C01	10	296	892	0.8%	Gravity Main
SML3694F13	SMH3694F13	SMH3694F11	8	56	540	1.0%	Gravity Main
SML3694F14	SMH3694F14	SMH3694F12	8	130	1,834	11.4%	Gravity Main
SML3694F15	SMH3694F15	SMH3694F14	8	141	1,702	9.8%	Gravity Main
SML3694F16	SMH3694F16	SMH3694F15	8	237	1,614	8.8%	Gravity Main
SML3694F17	SMH3694F17	SMH3694F16	8	355	1,567	8.3%	Gravity Main
SML3694G01	SMH3694G01	SMH3694G04	8	298	1,084	4.0%	Gravity Main
SML3694G02	SMH3694G02	SMH3694B03	8	354	1,131	4.3%	Gravity Main
SML3694G03	SMH3694G03	SMH3694G02	8	361	812	2.2%	Gravity Main
SML3694G04	SMH3694G04	SMH3694G03	8	170	818	2.3%	Gravity Main
SML3694G05	SMH3694G05	SMH3694G07	8	176	1,038	3.6%	Gravity Main
SML3694G06	SMH3694G06	SMH3694G08	8	234	791	2.1%	Gravity Main
SML3694G07	SMH3694G07	SMH3694H01	8	182	1,023	3.5%	Gravity Main
SML3694G08	SMH3694G08	SMH3694H03	8	65	1,537	8.0%	Gravity Main
SML3694H01	SMH3694H01	SMH3694H05	12	62	2,326	2.1%	Gravity Main
SML3694H02	SMH3694H02	SMH3694H01	12	143	2,404	2.2%	Gravity Main
SML3694H03	SMH3694H03	SMH3694H02	12	423	2,643	2.7%	Gravity Main
SML3694H04	SMH3694H04	SMH3694A01	12	32	5,549	12.0%	Gravity Main
SML3694H05	SMH3694H05	SMH3694H04	12	263	2,790	3.0%	Gravity Main
SML3694H06	SMH3694H06	SMH3694H05	8	37	775	2.0%	Gravity Main
SML3694H07	SMH3694H07	SMH3694H02	8	139	787	2.1%	Gravity Main
SML3694H08	SMH3694H08	SMH3694H06	8	149	543	1.0%	Gravity Main
SML3694H09	SMH3694H09	SMH3694A06	8	319	1,325	5.9%	Gravity Main
SML3694H10	SMH3694H10	SMH3694H09	8	54	916	2.8%	Gravity Main
SML3694H11	SMH3694H11	SMH3694H10	8	254	758	1.9%	Gravity Main
SML3694H12	SMH3694H12	SMH3694H11	8	252	537	1.0%	Gravity Main
SML3694H13	SMH3694H13	SMH3694H11	8	332	982	3.3%	Gravity Main
SML3694H14	SMH3694H14	SMH3694H13	8	246	683	1.6%	Gravity Main
SML3694H15	SMH3694H15	SMH3694H16	8	383	1,042	3.7%	Gravity Main
SML3694H16	SMH3694H16	SMH3694H09	8	75	1,482	7.4%	Gravity Main
SML3694J01	SMH3694J01	SMH3694K05	12	49	1,717	1.1%	Gravity Main
SML3694J02	SMH3694J02	SMH3694H07	8	509	1,250	5.3%	Gravity Main
SML3694J03	SMH3694J03	SMH3694J02	8	34	2,053	14.2%	Gravity Main
SML3694J04	SMH3694J04	SMH3694J03	8	201	857	2.5%	Gravity Main
SML3694J05	SMH3694J05	SMH3694J01	12	285	3,910	5.9%	Gravity Main
SML3694J06	SMH3694J06	SMH3694J05	12	94	3,129	3.8%	Gravity Main
SML3694J07	SMH3694J07	SMH3694J05	8	463	799	2.2%	Gravity Main
SML3694J08	SMH3694J08	SMH3694J07	8	503	485	0.8%	Gravity Main
SML3694J09	SMH3694J09	SMH3694J07	8	41	2,270	17.4%	Gravity Main
SML3694J10	SMH3694J10	SMH3694J09	8	133	567	1.1%	Gravity Main
SML3694J11	SMH3694J11	SMH3694J10	8	259	519	0.9%	Gravity Main
SML3694J12	SMH3694J12	SMH3694J11	8	246	549	1.0%	Gravity Main
SML3694J13	SMH3694J13	SMH3694J12	8	65	512	0.9%	Gravity Main
SML3694K01	SMH3694K01	SMH3694K02	8	225	625	1.3%	Gravity Main
SML3694K02	SMH3694K02	SMH3694G01	8	275	860	2.5%	Gravity Main
SML3694K03	SMH3694K03	SMH3694K04	8	364	1,372	6.4%	Gravity Main
SML3694K04	SMH3694K04	SMH3694H03	12	510	2,641	2.7%	Gravity Main
SML3694K05	SMH3694K05	SMH3694K04	12	268	1,733	1.2%	Gravity Main
SML3694K06	SMH3694K06	SMH3694K05	8	174	1,562	8.2%	Gravity Main
SML3694L01	SMH3694L01	SMH3694F04	8	311	1,789	10.8%	Gravity Main
SML3694L02	SMH3694L02	SMH3694L01	8	336	961	3.1%	Gravity Main
SML3694L03	SMH3694L03	SMH3694L02	8	200	1,603	8.7%	Gravity Main
SML3694L04	SMH3694L04	SMH3694L03	8	250	1,446	7.1%	Gravity Main
SML3694L05	SMH3694L05	SMH3694F05	8	323	1,032	3.6%	Gravity Main
SML3694L06	SMH3694L06	SMH3694L05	8	365	541	1.0%	Gravity Main
SML3694L07	SMH3694L07	SMH3694L06	8	45	506	0.9%	Gravity Main
SML3694L08	SMH3694L08	SMH3694L07	8	248	49	0.0%	Gravity Main
SML3694L09	SMH3694L09	SMH3694L10	8	281	1,558	8.2%	Gravity Main
SML3694L10	SMH3694L10	SMH3694F17	8	404	1,297	5.7%	Gravity Main
SML3694M01	SMH3694M01	SMH3594J08	18	44	--	0.0%	Gravity Main
SML3694M01	SMH3694M01	SML3694M01	18	204	--	0.0%	Gravity Main
SML3694M02	SMH3694M02	SMH3694M01	18	15	6,706	2.0%	Gravity Main
SML3694M03	SMH3694M03	SMH3694M06	8	95	498	0.8%	Gravity Main
SML3694M04	SMH3694M04	SMH3694M03	8	86	435	0.6%	Gravity Main
SML3694M05	SMH3694M05	SMH3694M02	10	114	2,025	4.2%	Gravity Main
SML3694M06	SMH3694M06	SMH3694E04	8	189	1,426	6.9%	Gravity Main
SML3694M07	SMH3694M07	SMH3694M06	8	19	873	2.6%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3694M08	SMH3694M08	SMH3694M04	8	132	2,205	16.4%	Gravity Main
SML3694M09	SMH3694M09	SMH3694M07	8	105	472	0.8%	Gravity Main
SML3694M10	SMH3694M10	SMH3694M05	10	206	2,024	4.2%	Gravity Main
SML3694M11	SMH3694M11	SMH3694M08	8	191	1,448	7.1%	Gravity Main
SML3694M12	SMH3694M12	SMH3694M09	8	86	574	1.1%	Gravity Main
SML3694M13	SMH3694M13	SMH3694M09	8	102	3,128	33.1%	Gravity Main
SML3694M14	SMH3694M14	SMH3694M10	8	390	1,159	4.5%	Gravity Main
SML3694M15	SMH3694M15	SMH3694E12	8	305	2,399	19.5%	Gravity Main
SML3694M16	SMH3694M16	SMH3694M02	18	28	8,154	3.0%	Gravity Main
SML3694M17	SMH3694M17	SMH3694M16	15	244	5,486	3.6%	Gravity Main
SML3694N01	SMH3694N01	SMH3694M10	10	266	855	0.8%	Gravity Main
SML3694N02	SMH3694N02	SMH3694N01	10	76	4,534	21.1%	Gravity Main
SML3694N02	SMH3694N02	SMH3694N01	10	141	3,329	11.4%	Gravity Main
SML3694N02	SMH3694N02	SMH3694N01	10	184	2,915	8.7%	Gravity Main
SML3694N03	SMH3694N03	SMH3694N02	10	270	1,135	1.3%	Gravity Main
SML3694N04	SMH3694N04	SMH3694N01	6	26	1,937	58.8%	Gravity Main
SML3694N05	SMH3694N05	SMH3694N02	6	58	1,551	37.7%	Gravity Main
SML3694N06	SMH3694N06	SMH3694N03	8	251	2,355	18.8%	Gravity Main
SML3694N07	SMH3694N07	SMH3694M17	15	460	7,236	6.2%	Gravity Main
SML3694N08	SMH3694N08	SMH3694N07	18	425	5,528	1.4%	Gravity Main
SML3694N10	SMH3694N10	SMH3694M16	8	47	371	0.5%	Gravity Main
SML3694N11	SMH3694N10	SMH3694N11	8	38	1,127	4.3%	Gravity Main
SML3694N12	SMH3694N12	SMH3694N11	8	370	1,041	3.7%	Gravity Main
SML3694N13	SMH3694N12	SMH3694N13	8	159	571	1.1%	Gravity Main
SML3694P01	SMH3694P01	SMH3694L04	8	352	658	1.5%	Gravity Main
SML3694P02	SMH3694P02	SMH3694P01	8	398	1,143	4.4%	Gravity Main
SML3694P03	SMH3694P03	SMH3694P04	8	415	783	2.1%	Gravity Main
SML3694P04	SMH3694P04	SMH3694P08	8	183	1,610	8.8%	Gravity Main
SML3694P05	SMH3694P05	SMH3694P04	8	117	551	1.0%	Gravity Main
SML3694P06	SMH3694P06	SMH3694P10	8	334	595	1.2%	Gravity Main
SML3694P07	SMH3694P07	SMH3694P08	8	104	2,151	15.7%	Gravity Main
SML3694P08	SMH3694P08	SMH3694P09	8	137	1,576	8.4%	Gravity Main
SML3694P09	SMH3694P09	SMH3694L08	8	417	1,504	7.6%	Gravity Main
SML3694P10	SMH3694P10	SMH3694Q02	8	215	1,326	5.9%	Gravity Main
SML3694P11	SMH3694P11	SMH3694P12	8	45	3,442	40.1%	Gravity Main
SML3694P12	SMH3694P12	SMH3694P09	8	61	1,686	9.6%	Gravity Main
SML3694Q01	SMH3694Q01	SMH3694P12	8	270	1,351	6.2%	Gravity Main
SML3694Q02	SMH3694Q02	SMH3694Q01	8	215	1,421	6.8%	Gravity Main
SML3694Q03	SMH3694Q03	SMH3694K06	8	354	903	2.8%	Gravity Main
SML3694Q04	SMH3694Q04	SMH3694Q07	8	88	906	2.8%	Gravity Main
SML3694Q05	SMH3694Q05	SMH3694Q08	8	125	488	0.8%	Gravity Main
SML3694Q06	SMH3694Q06	SMH3694Q03	8	181	1,364	6.3%	Gravity Main
SML3694Q07	SMH3694Q07	SMH3694Q06	8	120	642	1.4%	Gravity Main
SML3694Q08	SMH3694Q08	SMH3694Q07	8	57	471	0.7%	Gravity Main
SML3694Q09	SMH3694Q09	SMH3694Q05	8	176	476	0.8%	Gravity Main
SML3694R01	SMH3694R01	SMH3694K06	8	451	886	2.7%	Gravity Main
SML3694R02	SMH3694R02	SMH3694R01	8	458	1,100	4.1%	Gravity Main
SML3694R03	SMH3694R03	SMH3694J06	12	295	3,425	4.6%	Gravity Main
SML3694R04	SMH3694R04	SMH3694R03	10	321	1,424	2.1%	Gravity Main
SML3694R05	SMH3694R05	SMH3694R04	10	326	2,022	4.2%	Gravity Main
SML3694R06	SMH3694R06	SMH3694R03	8	357	1,143	4.4%	Gravity Main
SML3694R07	SMH3694R07	SMH3694J07	8	177	1,346	6.1%	Gravity Main
SML3694R08	SMH3694R08	SMH3694R07	8	436	855	2.5%	Gravity Main
SML3694R09	SMH3694R09	SMH3694R08	8	318	905	2.8%	Gravity Main
SML3694R10	SMH3694R10	SMH3694R07	8	351	1,273	5.5%	Gravity Main
SML3694R11	SMH3694R11	SMH3694R10	8	162	1,559	8.2%	Gravity Main
SML3694R12	SMH3694R12	SMH3694R10	8	119	522	0.9%	Gravity Main
SML3694R13	SMH3694R13	SMH3694R11	8	62	366	0.5%	Gravity Main
SML3694R14	SMH3694R13	SMH3694R14	8	79	498	0.8%	Gravity Main
SML3694R8A	SMH3694R04	SMH3694R08	8	438	853	2.5%	Gravity Main
SML3694R9A	SMH3694R05	SMH3694R09	8	320	952	3.1%	Gravity Main
SML3694S01	SMH3694S01	SMH3694T05	8	253	543	1.0%	Gravity Main
SML3694S02	SMH3694S02	SMH3694T06	8	331	454	0.7%	Gravity Main
SML3694S03	SMH3694S03	SMH3694R05	10	516	1,362	1.9%	Gravity Main
SML3694S04	SMH3694S04	SMH3694S03	10	310	1,755	3.2%	Gravity Main
SML3694S05	SMH3694S05	SMH3694S03	8	146	1,337	6.0%	Gravity Main
SML3694S06	SMH3694S06	SMH3694S04	8	123	1,348	6.1%	Gravity Main
SML3694S07	SMH3694S07	SMH3694S06	8	92	1,230	5.1%	Gravity Main
SML3694S08	SMH3694S08	SMH3694R09	8	370	622	1.3%	Gravity Main
SML3694S09	SMH3694S09	SMH3694S08	8	297	543	1.0%	Gravity Main
SML3694S10	SMH3694S10	SMH3694S09	8	205	522	0.9%	Gravity Main
SML3694S11	SMH3694S11	SMH3694S10	8	72	510	0.9%	Gravity Main
SML3694S12	SMH3694S12	SMH3694S11	8	152	647	1.4%	Gravity Main
SML3694S13	SMH3694S13	SMH3694S12	8	116	202	0.1%	Gravity Main
SML3694T01	SMH3694T01	SMH3694T03	8	120	460	0.7%	Gravity Main
SML3694T02	SMH3694T02	SMH3694T06	8	411	593	1.2%	Gravity Main
SML3694T03	SMH3694T03	SMH3694T05	8	338	485	0.8%	Gravity Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3694T04	SMH3694T04	SMH3694T01	8	235	1,040	3.7%	Gravity Main
SML3694T05	SMH3694T05	SMH3694R02	8	464	748	1.9%	Gravity Main
SML3694T06	SMH3694T06	SMH3694T05	8	363	1,019	3.5%	Gravity Main
SML3694T09	SMH3694T09	SMH3694T01	8	79	--	--	Gravity Main
SML3694T10	SMH3694T10	SML3694Y07	3	247	--	--	Force Main
SML3694U01	SMH3694U01	SMH3694P02	8	405	917	2.8%	Gravity Main
SML3694U02	SMH3694U02	SMH3694U01	8	396	728	1.8%	Gravity Main
SML3694U03	SMH3694U03	SMH3694U02	8	398	559	1.1%	Gravity Main
SML3694U04	SMH3694U04	SMH3694P03	8	397	547	1.0%	Gravity Main
SML3694U05	SMH3694U05	SMH3694U04	8	159	962	3.1%	Gravity Main
SML3694U06	SMH3694U06	SMH3694U05	8	112	861	2.5%	Gravity Main
SML3694U07	SMH3694U07	SMH3694U06	8	110	733	1.8%	Gravity Main
SML3694U08	SMH3694U08	SMH3694U05	8	290	420	0.6%	Gravity Main
SML3694U09	SMH3694U09	SMH3694U08	8	345	344	0.4%	Gravity Main
SML3694U10	SMH3694U10	SMH3694U09	8	251	391	0.5%	Gravity Main
SML3694U11	SMH3694U11	SMH3694U10	8	103	450	0.7%	Gravity Main
SML3694U12	SMH3694U12	SMH3694U11	8	169	1,293	5.6%	Gravity Main
SML3694U13	SMH3694U13	SMH3694U15	8	100	565	1.1%	Gravity Main
SML3694U14	SMH3694U14	SMH3694U10	8	271	398	0.5%	Gravity Main
SML3694U15	SMH3694U15	SMH3694U08	8	247	1,611	8.8%	Gravity Main
SML3694U16	SMH3694U16	SMH3694U09	8	164	1,601	8.7%	Gravity Main
SML3694V01	SMH3694V01	SMH3694N03	10	397	886	0.8%	Gravity Main
SML3694V02	SMH3694V02	SMH3694V01	10	254	1,916	3.8%	Gravity Main
SML3694V03	SMH3694V03	SMH3694V02	10	162	1,964	4.0%	Gravity Main
SML3694V04	SMH3694V04	SMH3694V03	15	219	7,264	6.2%	Gravity Main
SML3694V05	SMH3694V05	SMH3694V04	8	20	1,167	4.6%	Gravity Main
SML3694V06	SMH3694V06	SMH3694N08	18	340	5,731	1.5%	Gravity Main
SML3694V07	SMH3694V07	SMH3694V06	18	233	5,456	1.3%	Gravity Main
SML3694V08	SMH3694V08	SMH3694V01	8	41	1,200	4.9%	Gravity Main
SML3694V11	SMH3694V11	SMH3694V03	8	106	644	1.4%	Gravity Main
SML3694V12	SMH3694V12	SMH3694V11	8	95	554	1.0%	Gravity Main
SML3694V13	SMH3694V13	SMH3694V07	8	32	945	3.0%	Gravity Main
SML3694V14	SMH3694V14	SMH3694V13	8	138	1,583	8.5%	Gravity Main
SML3694V15	SMH3694V15	SMH3694V11	8	101	516	0.9%	Gravity Main
SML3694V16	SMH3694V16	SMH3694V15	8	127	524	0.9%	Gravity Main
SML3694V3A	SMH3694V03	SMH3694V07	18	225	8,298	3.1%	Gravity Main
SML3694W01	SMH3694W01	SMH3694V04	15	166	6,757	5.4%	Gravity Main
SML3694W02	SMH3694W02	SMH3694W01	8	23	3,605	44.0%	Gravity Main
SML3694W03	SMH3694W03	SMH3694W01	15	100	11,464	15.6%	Gravity Main
SML3694W03	SMH3694W03	SMH3694W01	15	194	8,232	8.0%	Gravity Main
SML3694W04	SMH3694W04	SMH3694W02	8	365	2,427	19.9%	Gravity Main
SML3694W05	SMH3694W05	SMH3694W04	8	174	1,377	6.4%	Gravity Main
SML3694W06	SMH3694W06	SMH3694W11	8	207	766	2.0%	Gravity Main
SML3694W07	SMH3694W07	SMH3694W06	8	159	554	1.0%	Gravity Main
SML3694W08	SMH3694W08	SMH3694W07	8	129	1,240	5.2%	Gravity Main
SML3694W09	SMH3694W09	SMH3694W08	8	131	991	3.3%	Gravity Main
SML3694W10	SMH3694W10	SMH3694W09	8	180	1,041	3.7%	Gravity Main
SML3694W11	SMH3694W11	SMH3694W14	8	181	398	0.5%	Gravity Main
SML3694W12	SMH3694W12	SMH3694W09	8	137	929	2.9%	Gravity Main
SML3694W13	SMH3694W13	SMH3694W12	8	221	1,190	4.8%	Gravity Main
SML3694W14	SMH3694W14	SMH3694V05	8	149	345	0.4%	Gravity Main
SML3694W15	SMH3694W15	SMH3694W12	8	259	515	0.9%	Gravity Main
SML3694W16	SMH3694W16	SMH3694W15	8	220	1,085	4.0%	Gravity Main
SML3694W17	SMH3694W17	SMH3694W03	8	25	2,062	14.4%	Gravity Main
SML3694W18	SMH3694W18	SMH3694W01	6	24	7,170	806.3%	Gravity Main
SML3694W19	SMH3694W19	SMH3694W18	6	91	690	7.5%	Gravity Main
SML3694X01	SMH3694X01	SMH3694W05	8	235	3,255	35.8%	Gravity Main
SML3694X02	SMH3694X02	SMH3694X03	8	110	116	0.0%	Gravity Main
SML3694X03	SMH3694X03	SMH3694X04	8	171	697	1.6%	Gravity Main
SML3694X04	SMH3694X04	SMH3694X01	8	91	1,524	7.9%	Gravity Main
SML3694X05	SMH3694X05	SMH3694X06	8	151	1,191	4.8%	Gravity Main
SML3694X06	SMH3694X06	SMH3694X09	8	29	1,246	5.3%	Gravity Main
SML3694X07	SMH3694X07	SMH3694X08	8	120	544	1.0%	Gravity Main
SML3694X08	SMH3694X08	SMH3694U14	8	160	569	1.1%	Gravity Main
SML3694X09	SMH3694X09	SMH3694X08	8	317	1,117	4.2%	Gravity Main
SML3694X10	SMH3694X10	SMH3694X09	8	120	520	0.9%	Gravity Main
SML3694X11	<Null>	SMH3694X08	8	445	462	0.7%	Gravity Main
SML3694X12	SMH3694X12	SMH3694X10	8	246	1,519	7.8%	Gravity Main
SML3694X13	SMH3694X13	SMH3694X08	8	107	1,968	13.1%	Gravity Main
SML3694X14	SMH3694X14	SMH3694V12	8	158	530	1.0%	Gravity Main
SML3694X15	SMH3694X15	SMH3694X14	8	94	1,307	5.8%	Gravity Main
SML3694Y01	SMH3694Y01	SMH3694Y02	8	275	518	0.9%	Gravity Main
SML3694Y02	SMH3694Y02	SMH3694Y03	8	257	547	1.0%	Gravity Main
SML3694Y03	SMH3694Y03	SMH3694T06	8	327	521	0.9%	Gravity Main
SML3694Y05	SMH3694Y05	SMH3694Y06	8	204	395	0.5%	Gravity Main
SML3694Y06	SMH3694Y06	SMH3694Y03	8	197	1,076	3.9%	Gravity Main
SML3694Y07	SMH3694Y07	SML3694Y08	3	381	--	--	Force Main

Pipe ID	From Manhole	To Manhole	Diameter (in)	Length (feet)	Capacity (gpm)	Slope	FM/GM
SML3694Y08	SMH3694Y08	SMH3694Y01	3	563	--	--	Force Main
SML3694Z01	SMH3694Z01	SMH3694Y03	8	193	525	0.9%	Gravity Main
SML3694Z02	SMH3694Z02	SMH3694Z01	8	416	963	3.1%	Gravity Main
SML3694Z03	SMH3694Z03	SMH3694S04	10	503	1,056	1.1%	Gravity Main
SML3694Z04	SMH3694Z04	SMH3694S04	8	172	794	2.1%	Gravity Main
SML3694Z05	SMH3694Z05	SMH3694S07	8	507	978	3.2%	Gravity Main
SML3694Z06	SMH3694Z06	SMH3694Z05	8	239	740	1.9%	Gravity Main
SML3694Z07	SMH3694Z07	SMH3694Z05	8	282	863	2.5%	Gravity Main
SML3694Z08	SMH3694Z08	SMH3694Z07	8	260	763	2.0%	Gravity Main

Appendix I

NPDES Permit and Fact Sheet

- NPDES Permit
- Fact Sheet

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM WASTE DISCHARGE PERMIT No. WA-002449-0

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

State of Washington
DEPARTMENT OF HEALTH

In compliance with the provision of
Chapter 90.46 and 43.70 Revised Code of Washington

City of Everett Water Pollution Control Facility
3200 Cedar Street
Everett, Washington 98201

is authorized to discharge in accordance with the Special and General Conditions that follow.

Plant Location: 4027 4th Street SE Everett, WA 98205	Receiving Water: Snohomish River Port Gardner Bay
Plant Type: Combined Aerated/Facultative and Trickling Filter/Solids Contact	Discharge Location: Lagoon System (Outfall 015) Latitude: 48˚ 00' 15" N Longitude: 122˚ 10' 38" W Trickling Filter/Solids Contact System (Outfall 025) Latitude: 47˚ 59' 29" N Longitude: 122˚ 10' 44" W Port Gardner Bay (Outfall 100) Latitude: 47˚ 58' 10" N Longitude: 122˚ 14' 48" W

Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

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SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3	Discharge Monitoring Report	Monthly	
S3.E	Reporting Permit Violations	As necessary	
S3.F	Other Reporting	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S6.A.5	Pretreatment Report	1/year	
S8	Application for Permit Renewal	1/permit cycle	October 1, 2013
S9.A	Engineering Report	1/permit cycle	November 1, 2009
S9.C	Plans and Specifications	1/permit cycle	November 1, 2010
S9.D	Construction Quality Assurance Plan	1/permit cycle	Prior to construction
S10	Spill Control Plan	As necessary	
S11.B	Combined Sewer Overflow Report	Annually	April 1, 2010
S11.C	Combined Sewer Overflow Reduction Plan Amendment	At permit renewal	October 1, 2013
S11.D. 1 and 2	Combined Sewer Overflow Reduction monitoring improvements and proposed corrections		October 1, 2013
S12.C	Acute Toxicity Compliance Monitoring Reports	4/year	January 1, 2010
S12.D	Acute Toxicity: “Causes and Preventative Measures for Transient Events”	As necessary	
S12.D	Acute Toxicity TI/TRE Plan	As necessary	
S13.A	Chronic Toxicity Effluent Test Results with Permit Renewal Application	2/permit cycle	October 1, 2013 (with renewal application)
G1.C	Notice of Change in Authorization	As necessary	
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G7	Notice of Permit Transfer	As necessary	
G10	Duty to Provide Information	As necessary	
G21	Contract Submittal	As necessary	

SPECIAL CONDITIONS

In this permit, the word "must" denotes an action that is mandatory and is equivalent to the word "shall" used in previous permits.

S1. DISCHARGE LIMITS

A. Effluent Limits, Low River Flow Period (July through October)

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee may discharge municipal wastewater at the permitted locations during July, August, September, and October subject to compliance with the following limits:

EFFLUENT LIMITS: OUTFALL # 015 (Lagoon, Snohomish R.)		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Carbonaceous Biochemical Oxygen Demand (5-day)	25 mg/L 65% removal of influent CBOD	40 mg/L
Total Suspended Solids	66 mg/L 8,420 lbs/day	99 mg/L 12,630 lbs/day
Fecal Coliform Bacteria [c]	200/100 mL	400/100 mL
pH [d]	Daily minimum is equal to or greater than 6.0, and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily [e]**
Equivalent Carbonaceous Biochemical Oxygen Demand (5-day) [f]	3,043 lbs/day	5,402 lbs/day
Total Residual Chlorine	0.016 mg/L	0.083 mg/L
EFFLUENT LIMITS: OUTFALL # 100 (TF/SC, Port Gardner)		
Parameter	**Average Monthly**	**Average Weekly**
Carbonaceous Biochemical Oxygen Demand (5-day)	25 mg/L 4,380 lbs/day 85% removal of influent CBOD	40 mg/L 7,010 lbs/day
Total Suspended Solids	30 mg/L 5,250 lbs/day 85% removal of influent TSS	45 mg/L 7,880 lbs/day
Fecal Coliform Bacteria [c]	200/100 mL	400/100 mL
Total Residual Chlorine	0.5 mg/L	0.75mg/L
pH [d]	Daily minimum is equal to or greater than 6.0, and the daily maximum is less than or equal to 9.0.	

[a] Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote [c] for fecal coliform calculations.

b	Average weekly discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week. See footnote [c] for fecal coliform calculations.
c	To calculate the average monthly and average weekly values for fecal coliforms, you must use the geometric mean. Ecology gives directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators*, available at: http://www.ecy.wa.gov/pubs/0410020.pdf
d	Indicates the range of permitted values, where such values are attributable to inorganic industrial contributions. The Permittee must report the instantaneous maximum and minimum pH monthly. Do not average pH values.
e	Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limits expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day. This does not apply to pH.
f	Equivalent CBOD (5-day) loading is defined by the following equation: Equivalent $CBOD_5$ (lbs/day) = $CBOD_5$ (lbs/day) + (2.1 * Ammonia (lbs/day)) where $CBOD_5$ and total ammonia are measurements from the same daily composite sample.

EFFLUENT LIMITS: OUTFALL #025 (diffuser maintenance)

The Permittee may discharge treated effluent from Outfall #025 for the purpose of outfall and diffuser flushing and maintenance.

The Permittee must:

- Not use Outfall #025 more than once per week and for greater than three hours at a time at a flow rate of 18 MGD.
- Not discharge from the lagoon system outfall (Outfall #015) when it is discharging from Outfall #025.
- Conduct sampling for all parameters required for Outfall #015 on the effluent discharged from Outfall #025.
- Not allow the combined discharges from Outfalls #015 and #025 to exceed the permit limits for Outfall #015 above.
- Report sampling results and flow volumes on the monthly discharge monitoring report.

B. Effluent Limits, High River Flow Period (November through June)

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee may discharge municipal wastewater at the permitted locations during November through June subject to compliance with the following limits:

EFFLUENT LIMITS: OUTFALL # 015 (Lagoon, Snohomish R.)		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Carbonaceous Biochemical Oxygen Demand (5-day)	25 mg/L 3,190 lbs/day	40 mg/L 5,100 lbs/day
Total Suspended Solids	66 mg/L 8,420 lbs/day	99 mg/L 12,630 lbs/day
Fecal Coliform Bacteria [c]	200/100 mL	400/100 mL
pH [d]	Daily minimum is equal to or greater than 6.0, and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily [e]**
Total Residual Chlorine	0.016 mg/L	0.083 mg/L
EFFLUENT LIMITS: OUTFALL # 100 (TF/SC, Port Gardner)		
Parameter	**Average Monthly**	**Average Weekly**
Carbonaceous Biochemical Oxygen Demand (5-day)	25 mg/L 4,380 lbs/day 85% removal of influent CBOD	40 mg/L 7,010 lbs/day
Total Suspended Solids	30 mg/L 5,250 lbs/day 85% removal of influent TSS	45 mg/L 7,880 lbs/day
Fecal Coliform Bacteria [c]	200/100 mL	400/100 mL
Total Residual Chlorine	0.5 mg/L	0.75mg/L
pH [d]	Daily minimum is equal to or greater than 6.0, and the daily maximum is less than or equal to 9.0.	

a	Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote [c] for fecal coliform calculations.
b	Average weekly discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week. See footnote [c] for fecal coliform calculations.
c	To calculate the average monthly and average weekly values for fecal coliforms, you must use the geometric mean. Ecology gives directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators* available at: http://www.ecy.wa.gov/pubs/0410020.pdf
d	Indicates the range of permitted values, where such values are attributable to inorganic industrial contributions. The Permittee must report the instantaneous maximum and minimum pH monthly. Do not average pH values.

e	Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limits expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day. This does not apply to pH.

EFFLUENT LIMITS: OUTFALL #025 (diffuser maintenance)

The Permittee may discharge treated effluent from Outfall #025 for the purpose of outfall and diffuser flushing and maintenance.

The Permittee must:

- Not use Outfall #025 more than once per week and for greater than three hours at a time at a flow rate of 18 MGD.
- Not discharge from the lagoon system outfall (Outfall #015) when it is discharging from Outfall #025.
- Conduct sampling for all parameters required for Outfall #015 on the effluent discharged from Outfall #025.
- Not allow the combined discharges from Outfalls #015 and #025 to exceed the permit limits for Outfall #015 above.
- Report sampling results and flow volumes on the monthly discharge monitoring report.

C. Mixing Zone Authorization

The following paragraphs define the maximum boundaries of the mixing zones:

Lagoon System (Outfall 015):

1. The width of the mixing zone is limited to 90 feet and is centered on the middle of the multi-port diffuser 180 feet from the east bank of the river at Mean Lower Low Water.
2. The length of the mixing zone downstream perpendicular to the outfall is 208 feet; the length of the mixing zone upstream perpendicular to the outfall is 208 feet. The mixing zone extends from the river bottom to the water surface. The Chronic Dilution Factor $DF_c = 14.2$.
3. The zone where acute criteria may be exceeded extends a distance of 20.8 feet in any horizontal direction from the diffuser and extends vertically to the water surface. The Acute Dilution Factor $DF_a = 6.4$.

Trickling Filter/Solids Contact System (Outfall 025):

1. The width of the mixing zone is limited to 105 feet and is centered on the middle of the multi-port diffuser 222.5 feet from the east bank of the river at Mean Lower Low Water.

2. The length of the mixing zone downstream perpendicular to the outfall is 216 feet; the length of the mixing zone upstream perpendicular to the outfall is 216 feet. The mixing zone extends from the river bottom to the water surface. The Chronic Dilution Factor DF_c = 15.6.

3. The zone where acute criteria may be exceeded extends a distance of 21.6 feet in any horizontal direction from the diffuser and extends vertically to the water surface. The Acute Dilution Factor DF_a = 7.3.

Port Gardner Bay Outfall (Outfall 100):

1. The mixing zone extends in any horizontal direction from the discharge ports for 550 feet. The mixing zone extends from the seabed to the water surface.

2. A zone where acute criteria may be exceeded extends 55 feet measured horizontally from any discharge port and extends vertically to the water surface.

3. The Chronic Dilution Factor DF_c = 696.
   The Acute Dilution Factor DF_a = 156.

S2. MONITORING REQUIREMENTS

A. Monitoring Schedule

The Permittee must monitor in accordance with the following schedule and must use the laboratory method, detection level (DL), and quantitation level (QL) specified in Appendix A.

Parameter	Units	Minimum Sampling Frequency	Sample Type
(1) Wastewater Influent			
Wastewater Influent means the raw sewage flow. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.			
Flow	MGD	Continuous [1]	Measurement
BOD_5	mg/L	1/week	24-hour composite [2]
$CBOD_5$	mg/L	4/week	24-hour composite
TSS	mg/L	4/week	24-hour composite
(2) Final Wastewater Effluent			
Final Wastewater Effluent means wastewater which is exiting, or has exited, the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD5 analysis before or after the disinfection process. If taken after, dechlorinate and reseed the sample.			

Parameter	Units	Minimum Sampling Frequency	Sample Type
Lagoon system (Outfall 015)			
Flow	MGD	Continuous	Measurement
$CBOD_5$	mg/L	4/week	24-hour composite
TSS	mg/L	4/week	24-hour composite
Total Residual Chlorine	mg/L	7/week	Grab [3]
Fecal Coliform	Organisms /100 ml	5/week	Grab
pH	Standard Units	7/week	Grab
Temperature	°C	7/week	Grab
Ammonia-N	mg/l	4/week (July-Oct)	24-hour composite
TF/SC system (Outfall 100)			
Flow	MGD	Continuous	Measurement
$CBOD_5$	mg/L	4/week	24-hour composite (above SEPS)
TSS	mg/L	4/week	24-hour composite (above SEPS)
Total Residual Chlorine	mg/L	7/week	Grab (at SEPS or at K-C site)
Fecal Coliform	Organisms /100 ml	5/week	Grab (at SEPS or at K-C site)
pH	Standard Units	7/week	Grab (above SEPS)
Temperature	°C	7/week	Grab (at SEPS or at K-C site)
TF/SC system (Outfall 025)			
Flow	MGD	Each discharge event	Measurement
$CBOD_5$	mg/L	Each discharge event	Grab
TSS	mg/L	Each discharge event	Grab
Total Residual Chlorine	mg/L	Each discharge event	Grab
Fecal Coliform	Organisms /100 ml	Each discharge event	Grab
pH	Standard Units	Each discharge event	Grab
Ammonia-N	mg/l	Each discharge event (July-October only)	Grab
Temperature grab sampling must occur when the effluent is at or near its daily maximum temperature, which is usually in the late afternoon. If temperature is measured continuously, the Permittee must determine and report a daily maximum from half-hour measurements in a 24-hour period. To determine the daily average, use the temperature on the half-hour from the chart for the twenty-four (24)-hour period and calculate the average of the values. Continuous monitoring instruments must achieve an accuracy of 0.2 degrees C, and the Permittee must verify accuracy annually.			
(3) Whole Effluent Toxicity Testing – Final Wastewater Effluent			
Lagoon system (Outfall 015) and TF/SC system (Outfall 100)			
Acute Toxicity Testing	See Section S.12	4/year: January, April, July, October	24-hour composite
Chronic Toxicity Testing	See Section S.13	2/permit cycle: July 2012 & January 2013	24-hour composite

Parameter	Units	Minimum Sampling Frequency	Sample Type
(4) Pretreatment			
As specified in Permit Condition S6.			
(5) Effluent Characterization – Final Wastewater Effluent			
Lagoon system (Outfall 015) and TF/SC system (Outfall 100)			
Total ammonia	mg/L N	1/month	24-hour composite
Total Phosphorus	mg/L P	1/month	24-hour composite
Ortho-Phosphorus (PO4)	mg/L P	1/month	24-hour composite
Nitrate-Nitrite Nitrogen	mg/L N	1/month	24-hour composite
Total Nitrogen	mg/L N	1/month	24-hour composite
(6) Permit Application Requirements – Final Wastewater Effluent			
Lagoon system (Outfall 015) and TF/SC system (Outfall 100)			
Dissolved Oxygen	mg/L	1/year	Grab
Total Kjeldahl Nitrogen	mg/L N	1/year	24-hour composite
Oil and Grease	mg/L	1/year	Grab
Total Dissolved Solids	mg/L	1/year	24-hour composite
Total Hardness	mg/L	1/year	24-hour composite
Cyanide	µg/L	1/year	24-hour composite
Total Phenolic Compounds	µg/L	1/year	24-hour composite
Priority Pollutants (PP) – metals [4]	µg/L	1/year	24-hour composite
PP – Volatile Organic Compounds [4]	µg/L	1/year	24-hour composite
PP – Acid-extractable compounds [4]	µg/L	1/year	24-hour composite
PP – Base-neutral compounds [4]	µg/L	1/year	24-hour composite
The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for priority pollutant testing with the discharge monitoring report.			

[1]	Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance.
[2]	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.
[3]	Grab means an individual sample collected over a fifteen (15)-minute, or less, period.
[4]	See Appendix A for the required detection (DL) or quantitation (QL) levels. Report single analytical values below detection as “less than (detection level)” where (detection level) is the numeric value specified in attachment A. Report single analytical values between the agency-required detection and quantitation levels with qualifier code of j following the value. To calculate the average value (monthly average): • Use the reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value. • For values reported below detection, use one-half the detection value if the lab detected the parameter in another sample for the reporting period.

Parameter	Units	Minimum Sampling Frequency	Sample Type
• For values reported below detection, use zero if the lab did not detect the parameter in another sample for the reporting period. If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix specific MDL and a QL to Ecology with appropriate laboratory documentation.			

B. Sampling and Analytical Procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136.

C. Flow Measurement and Continuous Monitoring Devices

The Permittee must:

1. Select and use appropriate flow measurement and continuous monitoring devices and methods consistent with accepted scientific practices.

2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard and the manufacturer's recommendation for that type of device.

3. If the Permittee uses micro-recording temperature devices known as thermistors, it must calibrate the devices using protocols from Ecology's Quality Assurance Project Plan Development Tool (*Continuous Temperature Sampling Protocols for the Environmental Monitoring and Trends*). This document is available online at http://www.ecy.wa.gov/programs/eap/qa/docs/QAPPtool/Mod6%20Ecology%20SOPs/Protocols/ContinuousTemperatureSampling.pdf . Calibration as specified in this document is not required if the Permittee uses recording devices which are certified by the manufacturer.

4. Calibrate these devices at the frequency recommended by the manufacturer.

5. Calibrate flow monitoring devices at a minimum frequency of at least one calibration per year.

6. Maintain calibration records for at least three years.

D. Laboratory Accreditation

The Permittee must ensure that all monitoring data required by Ecology is prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories.* Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S3. REPORTING AND RECORDING REQUIREMENTS

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Submit monitoring results each month.

2. Summarize, report, and submit monitoring data obtained during each monitoring period on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by Ecology.

3. Submit DMR forms monthly whether or not the facility was discharging. If the facility did not discharge during a given monitoring period, submit the form as required with the words "NO DISCHARGE" entered in place of the monitoring results.

4. Ensure that DMR forms are postmarked or received by Ecology no later than the 15th day of the month following the completed monitoring period, unless otherwise specified in this permit.

5. Submit priority pollutant analysis data no later than forty-five (45) days following the monitoring.

6. Send report(s) to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

All laboratory reports providing data for organic and metal parameters must include the following information: sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), laboratory practical quantitation limit (PQL), reporting units, and concentration detected. Analytical results from samples sent to a contract laboratory must include information on the chain of custody, the analytical method, QA/QC results, and documentation of accreditation for the parameter.

B. Records Retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

C. Recording of Results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR.

E. Reporting Permit Violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

a. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.

b. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

1. Immediate Reporting

The Permittee must report any failure of the disinfection system, any collection system overflows which may reach surface waters, or any plant bypass discharging to a shellfish area **immediately** to the Department of Ecology and the Department of Health, Shellfish Program at the numbers listed below:

Northwest Regional Office	425-649-7000
Department of Health, Shellfish Program	360-236-3330 (business hours) 360-786-4183 (24 hours)

2. Twenty-four-hour Reporting

The Permittee must report the following occurrences of noncompliance, by telephone, to Ecology at 425-649-7000 within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

a. Any noncompliance that may endanger health or the environment, unless previously reported under subpart 1, above.

b. Any unanticipated **bypass** that exceeds any effluent limitation in the permit (See Part S4.B, "Bypass Procedures").

c. Any **upset** that exceeds any effluent limitation in the permit (See G.15, "Upset").

d. Any violation of a maximum daily or instantaneous maximum discharge limitation for any of the pollutants in Section S1.A of this permit.

e. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limitation in the permit.

3. Report Within Five Days

The Permittee must also provide a written submission within five days of the time that the Permittee becomes aware of any event required to be reported under subparts 1 or 2, above. The written submission must contain:

a. A description of the noncompliance and its cause.

b. The period of noncompliance, including exact dates and times.

c. The estimated time noncompliance is expected to continue if it has not been corrected.

d. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

e. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

4. Waiver of Written Reports

Ecology may waive the written report required in subpart 3, above, on a case-by-case basis upon request if a timely oral report has been received.

5. All Other Permit Violation Reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in paragraph E.3, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

6. Report Submittal

The Permittee must submit reports to the address listed in S3.

F. Other Reporting

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and Chapter 173-303-145. You can obtain further instructions at the following website:
http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm .

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

G. Maintaining a Copy of This Permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. FACILITY LOADING

A. Design Criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Maximum Month Influent Design Flow	36.3 MGD
BOD_5 influent loading for maximum month	48,900 lbs/day
TSS influent loading for maximum month	67,700 lbs/day

B. Plans for Maintaining Adequate Capacity

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.

2. The projected increase would reach design capacity within five years.

   The plan and schedule for continuing to maintain capacity must be sufficient to achieve the effluent limits and other conditions of this permit. This plan must identify any of the following actions or any other actions necessary to meet the objective of maintaining capacity.

   a. Analysis of the present design, including the introduction of any process modifications that would establish the ability of the existing facility to achieve the effluent limits and other requirements of this permit at specific levels in excess of the existing design criteria specified in paragraph A, above.

   b. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.

   c. Limitation on future sewer extensions or connections or additional waste loads.

   d. Modification or expansion of facilities necessary to accommodate increased flow or waste load.

   e. Reduction of industrial or commercial flows or waste loads to allow for increasing sanitary flow or waste load.

   Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

C. Duty to Mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

D. Notification of New or Altered Sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the POTW is proposed which:

   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the POTW;

   b. Is not part of an approved general sewer plan or approved plans and specifications; or

   c. Would be subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.

2. This notice must include an evaluation of the POTW's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the POTW, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S5. OPERATION AND MAINTENANCE

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

A. Certified Operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class IV plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class III plant must be in charge during all regularly scheduled shifts.

B. O & M Program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.

2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.

3. Make maintenance records available for inspection at all times.

C. Short-term Reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during noncritical water quality periods and carry this maintenance out in a manner approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.

2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

D. Electrical Power Failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430/9-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

E. Prevent Connection of Inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the separate sanitary sewer system.

F. Bypass Procedures

This permit prohibits a bypass which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.

   This bypass is permitted only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. No feasible alternatives to the bypass exist, such as:

      - The use of auxiliary treatment facilities.
      - Retention of untreated wastes.
      - Stopping production.
      - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
      - Transport of untreated wastes to another treatment facility or preventative maintenance), or transport of untreated wastes to another treatment facility.

   c. Ecology is properly notified of the bypass as required in Condition S3E of this permit.

3. If bypass is anticipated and has the potential to result in noncompliance of this permit.

   a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

- A description of the bypass and its cause.
- An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
- A cost-effectiveness analysis of alternatives including comparative resource damage assessment.
- The minimum and maximum duration of bypass under each alternative.
- A recommendation as to the preferred alternative for conducting the bypass.
- The projected date of bypass initiation.
- A statement of compliance with SEPA.
- A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
- Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during preparation of the engineering report or facilities plan and plans and specifications and must include these to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:

- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

G. Operations and Maintenance Manual

The Permittee must:

1. Review the O&M Manual at least annually.

2. Submit to Ecology substantial changes or updates to the O&M Manual whenever it incorporates them into the manual.

3. Keep the approved O&M Manual at the permitted facility.

4. Follow the instructions and procedures of this manual.

In addition to the requirements of WAC 173-240-080 (1) through (5), the O&M Manual must include:

1. Emergency procedures for cleanup in the event of wastewater system upset or failure.

2. Wastewater system maintenance procedures that contribute to the generation of process wastewater.

3. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).

4. The treatment plant process control monitoring schedule.

5. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.

S6. PRETREATMENT

A. General Requirements

1. The Permittee must implement the Industrial Pretreatment Program in accordance with the legal authorities, policies, procedures, and financial provisions described in the Permittee's approved pretreatment program submittal entitled “Industrial Pretreatment Program” and dated November 25, 1986; any approved revisions thereto; and the General Pretreatment Regulations (40 CFR Part 403). At a minimum, the Permittee must undertake the following pretreatment implementation activities:

   a. Enforce categorical pretreatment standards under Section 307(b) and (c) of the Federal Clean Water Act (hereinafter, the Act), prohibited discharge standards as set forth in 40 CFR 403.5, local limits specified in Ordinance #3070-08 and

Ordinance #3071-08, or state standards, which ever are most stringent or apply at the time of issuance or modification of a local industrial waste discharge permit. Locally derived limits are defined as pretreatment standards under Section 307(d) of the Act and are not limited to categorical industrial facilities.

b. Issue industrial waste discharge permits to all significant industrial users [SIUs, as defined in 40 CFR 403.3(t)(i)(ii)] contributing to the treatment system, including those from other jurisdictions. Industrial waste discharge permits must contain, as a minimum, all the requirements of 40 CFR 403.8 (f)(l)(iii). The Permittee must coordinate the permitting process with Ecology regarding any industrial facility which may possess a state waste discharge permit issued by Ecology. Once issued, an industrial waste discharge permit takes precedence over a state-issued waste discharge permit.

c. Maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by industrial users to the POTW. The Permittee must maintain records for at least a three-year period.

d. Perform inspections, surveillance, and monitoring activities on industrial users to determine or confirm compliance with pretreatment standards and requirements. The Permittee must conduct a thorough inspection of SIUs annually. The Permittee must conduct regular local monitoring of SIU wastewaters commensurate with the character and volume of the wastewater but not less than once per year. The Permittee must collect and analyze samples in accordance with 40 CFR Part 403.12(b)(5)(ii)-(v) and 40 CFR Part 136.

e. Enforce and obtain remedies for noncompliance by any industrial users with applicable pretreatment standards and requirements. Once violations have been identified, the Permittee must take timely and appropriate enforcement action to address the noncompliance. The Permittee's action must follow its enforcement response procedures and any amendments, thereof.

f. Publish, at least annually in the largest daily newspaper in the Permittee's service area, a list of all nondomestic users which, at any time in the previous 12 months, were in significant noncompliance as defined in 40 CFR 403.8(f)(2)(vii).

g. If the Permittee elects to conduct sampling of an SIU's discharge in lieu of requiring user self-monitoring, it must satisfy all requirements of 40 CFR Part 403.12. This includes monitoring and record keeping requirements of Sections 403.12(g) and (o). For SIU's subject to categorical standards (CIUs), the Permittee may either complete baseline and initial compliance reports for the CIU (when required by 403.12(b) and (d)) or require these of the CIU. The Permittee must ensure SIUs are provided the results of sampling in a timely manner, inform SIUs of their right to sample, their obligations to report any sampling they do, to respond to noncompliance, and to submit other

notifications. These include a slug load report (403.12(f)), notice of changed discharge (403.12(j)), and hazardous waste notifications (403.12(p)). If sampling for the SIU, the Permittee must not sample less than once in every six month period unless the Permittee's approved program includes procedures for reduction of monitoring for Middle-Tier or Non-Significant Categorical Users per 403.12(e)(2) and (3) and those procedures have been followed.

h. Develop and maintain a data management system designed to track the status of the Permittee's industrial user inventory, industrial user discharge characteristics, and compliance status.

i. Maintain adequate staff, funds, and equipment to implement its pretreatment program.

j. Establish, where necessary, contracts or legally-binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements by commercial or industrial users within these jurisdictions. These contracts or agreements must identify the agency responsible for the various implementation and enforcement activities to be performed in the contributing jurisdiction. In addition, the Permittee must develop a Memorandum of Understanding (or Inter-local Agreement) that outlines the specific roles, responsibilities, and pretreatment activities of each jurisdiction.

2. The Permittee must implement the Accidental Spill Prevention Program described in the approved Industrial Pretreatment Program dated November 25, 1986.

3. The Permittee must evaluate, at least once every two years, whether each Significant Industrial User needs a plan to control slug discharges. For purposes of this subsection, a slug discharge is any discharge of a nonroutine, episodic nature, including but not limited to an accidental spill or non-customary batch discharge. The Permittee must make the results of this evaluation available to Ecology upon request. If the Permittee decides that a Slug Control Plan is needed, the plan must contain, at a minimum, the following elements:

a. Description of discharge practices, including nonroutine batch discharges.

b. Description of stored chemicals.

c. Procedures for immediately notifying the Permittee of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5(b), with procedures for follow-up written notification within five days.

d. If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment necessary for emergency response.

4. Whenever Ecology determines that any waste source contributes pollutants to the Permittee's treatment works in violation of Subsection (b), (c), or (d) of Section 307 of the Act, and the Permittee has not taken adequate corrective action, Ecology will notify the Permittee of this determination. If the Permittee fails to take appropriate enforcement action within thirty (30) days of this notification, Ecology may take appropriate enforcement action against the source or the Permittee.

5. Pretreatment Report

   The Permittee must provide to Ecology an annual report that briefly describes its program activities during the previous calendar year.

   By April 1 of each year the Permittee must send the annual report to Ecology at:

   Water Quality Permit Coordinator
   Department of Ecology
   Northwest Regional Office
   3190 160th Avenue SE
   Bellevue, WA 98008-5452

   The report must include the following information:

   a. An updated nondomestic inventory.

   b. Results of wastewater sampling at the treatment plant as specified in S6.B. The Permittee must calculate removal rates for each pollutant and evaluate the adequacy of the existing local limits in Ordinance #3070-08 in prevention of treatment plant interference, pass through of pollutants that could affect receiving water quality, and sludge contamination.

   c. Status of program implementation, including:

      i. Any substantial modifications to the pretreatment program as originally approved by Ecology, including staffing and funding levels.

      ii. Any interference, upset, or permit violations experienced at the POTW that are directly attributable to wastes from industrial users.

      iii. Listing of industrial users inspected and/or monitored, and a summary of the results.

      iv. Listing of industrial users scheduled for inspection and/or monitoring for the next year, and expected frequencies.

      v. Listing of industrial users notified of promulgated pretreatment standards and/or local standards as required in 40 CFR 403.8(f)(2)(iii). The list must indicate which industrial users are on compliance schedules and the final date of compliance for each.

vi. Listing of industrial users issued industrial waste discharge permits.

vii. Planned changes in the pretreatment program implementation plan. (See subsection A.6. below.)

d. Status of compliance activities, including:

i. Listing of industrial users that failed to submit baseline monitoring reports or any other reports required under 40 CFR 403.12 and in Section 1 of the Permittee's pretreatment program, dated November 25, 1986.

ii. Listing of industrial users that were at any time during the reporting period not complying with federal, state, or local pretreatment standards or with applicable compliance schedules for achieving those standards, and the duration of such noncompliance.

iii. Summary of enforcement activities and other corrective actions taken or planned against noncomplying industrial users. The Permittee must supply to Ecology a copy of the public notice of facilities that were in significant noncompliance.

6. The Permittee must request and obtain approval from Ecology before making any significant changes to the approved local pretreatment program. The Permittee must follow the procedure in 40 CFR 403.18 (b) and (c).

B. Monitoring Requirements

The Permittee must monitor its influent, effluent, and sludge for the priority pollutants identified in Tables II and III of Appendix D of 40 CFR Part 122 as amended, any compounds identified as a result of Condition S6.B.4, and any other pollutants expected from nondomestic sources using U.S. EPA-approved procedures for collection, preservation, storage, and analysis. The Permittee must test influent, effluent, and sludge samples for the priority pollutant metals (Table III, 40 CFR 122, Appendix D) on a quarterly basis throughout the term of this permit. The Permittee must test influent, effluent, and sludge samples for the organic priority pollutants (Table II, 40 CFR 122, Appendix D) on an annual basis.

1. The Permittee must sample POTW influent and effluent on a day when industrial discharges are occurring at normal to maximum levels. The Permittee must obtain 24-hour composite samples for the analysis of acid and base/neutral extractable compounds and metals. The Permittee must collect samples for the analysis of volatile organic compounds and samples must be collected using grab sampling techniques at equal intervals for a total of four grab samples per day.

The laboratory may run a single analysis for volatile pollutants (Method 624) for each monitoring day by compositing equal volumes of each grab sample directly in the GC purge and trap apparatus in the laboratory, with no less than 1 ml of each grab included in the composite.

Unless otherwise indicated, all reported test data for metals must represent the total amount of the constituent present in all phases, whether solid, suspended, or dissolved, elemental or combined including all oxidation states.

The Permittee must handle, prepare, and analyze all wastewater samples taken for GC/MS analysis in accordance with the U.S. EPA Methods 624 and 625 (October 26, 1984).

2. The Permittee must collect a sludge sample concurrently with a wastewater sample as a single grab of residual sludge. Sampling and analysis must conform to U.S. EPA Methods 624 and 625 unless the Permittee requests an alternate method and Ecology has approved.

3. The Permittee must take Cyanide, phenols, and oils as grab samples. Oils must be hexane soluble or equivalent, and should be measured in the influent and effluent only.

4. In addition to quantifying pH, oil and grease, and all priority pollutants, the Permittee must make a reasonable attempt to identify all other substances and quantify all pollutants shown to be present by gas chromatograph/mass spectrometer (GC/MS) analysis per 40 CFR 136, Appendix A, Methods 624 and 625. The Permittee should attempt to make determinations of pollutants for each fraction, which produces identifiable spectra on total ion plots (reconstructed gas chromatograms). The Permittee should attempt to make determinations from all peaks with responses 5% or greater than the nearest internal standard. The 5% value is based on internal standard concentrations of 30 μg/l, and must be adjusted downward if higher internal standard concentrations are used or adjusted upward if lower internal standard concentrations are used. The Permittee may express results for non-substituted aliphatic compounds as total hydrocarbon content. The Permittee must use a laboratory whose computer data processing programs are capable of comparing sample mass spectra to a computerized library of mass spectra, with visual confirmation by an experienced analyst. For all detected substances which are determined to be pollutants, the Permittee must conduct additional sampling and appropriate testing to determine concentration and variability, and to evaluate trends.

C. Reporting of Monitoring Results

The Permittee must include a summary of monitoring results in the Annual Pretreatment Report.

D. Local Limit Development

As sufficient data become available, the Permittee must, in consultation with Ecology, reevaluate their local limits in order to prevent pass-through or interference. If Ecology determines that any pollutant present causes pass-through or interference, or exceeds established sludge standards, the Permittee must establish new local limits or revise existing local limits as required by 40 CFR 403.5. Ecology may also require the Permittee to revise or establish local limits for any pollutant discharged from the POTW

that has a reasonable potential to exceed the water quality standards, sediment standards, or established effluent limits, or causes whole effluent toxicity. Ecology makes this determination in the form of an administrative order.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures under state and federal law and regulation.

S7. SOLID WASTES

A. Solid Waste Handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. APPLICATION FOR PERMIT RENEWAL

The Permittee must submit an application for renewal of this permit by October 1, 2013.

S9. ENGINEERING DOCUMENTS

A. The Permittee must prepare and submit two copies of an approvable engineering report or facility plan in accordance with Chapter 173-240 WAC to Ecology for review and approval by November 1, 2009. The engineering report or facility plan must describe how the Permittee plans to provide additional treatment plant capacity.

B. The report must contain any appropriate requirements as described in *Water Reclamation and Reuse Standards* (Washington State Department of Ecology and Department of Health Publication No. 97-23, 1997). As required by RCW 90.48.112, the report must address the feasibility of using reclaimed water as defined in RCW 90.46.010.

C. The Permittee must prepare and submit two copies of approvable **Plans and Specifications** to Ecology for review and approval in accordance with Chapter 173-240 WAC by November 1, 2010.

D. Prior to the start of construction, the Permittee must submit to Ecology a **Quality Assurance Plan** as required by Chapter 173-240 WAC.

S10. SPILL CONTROL PLAN

The Permittee must:

1. Review the Spill Control Plan at least annually and update as needed.
2. Send changes to the plan to Ecology.
3. Follow the plan and any supplements throughout the term of the permit.

The Spill Control Plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on-site, which when spilled, or otherwise released into the environment, designate as Dangerous Waste (DW) or Extremely Hazardous Waste (EHW) by the procedures set forth in WAC 173-303-070. Include other materials used and/or stored on-site which may become pollutants or cause pollution upon reaching state's waters.
2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
3. A description of the reporting system the Permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

S11. COMBINED SEWER OVERFLOWS

A. Discharge Locations

The following list of combined sewer overflows (CSOs) represents occasional point sources of pollutants as a result of precipitation events. The law prohibits discharges from these sites except as a result of and during precipitation events. This permit does not authorize a discharge from a CSO that causes adverse impacts that threaten characteristic uses of the receiving water as identified in the water quality standards, Chapter 173-201A WAC.

Discharge Number	Everett CSO ID	Discharge Name	Receiving Water	Latitude	Longitude
005	PSO1	Lift Station #8	Port Gardner Bay	-122.223469	48.000415
007	PSO7	Lift Station #2	Port Gardner Bay	-122.222371	47.978237
008	PSO6	West Hewitt & Bond Street Outfall	Port Gardner Bay	-122.221072	47.979464
009	PSO5	Lift Station #3	Port Gardner Bay	-122.218904	47.982584
011	PSO4	Lift Station #5	Port Gardner Bay	-122.219653	47.984358
012	PSO3	15th & Grand Street Outfall	Port Gardner Bay	-122.214166	47.997053
013	PSO2	Lift Station #7	Port Gardner Bay	-122.216061	47.998904
016	SRO1	Lift Station #9	Snohomish River	-122.181430	47.995277

Discharge Number	Everett CSO ID	Discharge Name	Receiving Water	Latitude	Longitude
017	SRO2	Hayes Street Outfall	Snohomish River	-122.181432	47.995254
018	SRO3	Siphon Headworks Outfall	Snohomish River	-122.181279	47.994794
019	SRO4	Lift Station #32	Snohomish River	-122.181949	47.979755
026	SRO7	East Pacific Avenue Outfall	Snohomish River	-122.187303	47.976652
028	SRO8	East 36th Street & Lift Station #33 Outfall	Snohomish River	-122.188762	47.970098

B. Combined Sewer Overflow Report

The Permittee must submit a CSO Report to Ecology for review and approval by April 1st of each year. The report must include the following components:

- All requirements of WAC 173-245-090(1).
- Documentation of compliance with the Nine Minimum Controls for CSOs described in Section S11.E.
- A summary of the number of untreated discharge events per outfall on a 5-year moving average, calculated once annually.
- An electronic template file that includes event-based reporting for all CSO discharges for the reporting period. Ecology will supply the electronic template file.

C. Combined Sewer Overflow Reduction Plan Amendment

The Permittee must submit an amendment of its CSO Reduction Plan to Ecology for review and approval by October 1, 2013. The amendment must comply with the requirements of WAC 173-245-090(2).

D. Compliance Schedule

In order to achieve the greatest reasonable reduction of combined sewer overflows at the earliest possible date, the Permittee must complete the following elements of the approved Combined Sewer Overflow Reduction Plan.

1. By October 1, 2013, complete monitoring, estimation, and overflow weir improvements described in *City of Everett 2008 CSO Control Plan Update*, Section 6.0 – Updated Five-year Implementation Plan.

2. By October 1, 2013, propose correction projects for all CSO sites which do not meet the performance standard of one discharge per year. Include these projects along with a construction schedule in the CSO Reduction Plan Amendment required in Section S11.C.

3. The Permittee must proceed with construction of the Bond Street CSO facilities as city financing allows, with a final compliance date of 2017.

E. Nine Minimum Controls

In accordance with Chapter 173-245 WAC and US EPA CSO control policy (59 FR 18688), the Permittee must implement and document the following nine minimum controls (NMC) for CSOs. Compliance with the NMC must be documented in the annual CSO report as required in S11.B.

The Permittee must comply with the following technology-based requirements. The Permittee must:

1. Implement proper operation and maintenance programs for the sewer system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSOs. The program must consider regular sewer inspections; sewer, catch basin, and regulator cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections.

2. Implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSOs.

3. Review and modify, as appropriate, its existing pretreatment program to minimize CSO impacts from the discharges from nondomestic users.

4. Operate the POTW treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSOs. The Permittee must deliver all flows to the treatment plant within the constraints of the treatment capacity of the POTW.

5. Not discharge overflows from CSO outfalls during dry weather. The Permittee must report each dry weather overflow to the permitting authority as soon as it becomes aware of the overflow. When it detects a dry weather overflow, the Permittee must begin corrective action immediately and inspect the dry weather overflow each subsequent day until it has eliminated the overflow.

6. Implement measures to control solid and floatable materials in CSOs.

7. Implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters.

8. Implement a public notification process to inform the citizens of when and where CSOs occur. The process must include: (a) mechanism to alert persons of the occurrence of CSOs and (b) a system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSOs.

9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This must include collection of data that it will use to document the existing baseline conditions, evaluate the efficacy of the technology-based controls, and determine the baseline conditions upon which it will base the long-term control plan. This data must include:

    a. Characteristics of the combined sewer system, including the population served by the combined portion of the system and locations of all CSO outfalls in the CSS.

    b. Total number of CSO events and the frequency and duration of CSOs for a representative number of events.

    c. Locations and designated uses of receiving water bodies.

    d. Water quality data for receiving water bodies.

    e. Water quality impacts directly related to CSO (for example, beach closing, floatables, wash-up episodes, fish kills).

S12. ACUTE TOXICITY

A. Effluent Limit for Acute Toxicity

The effluent limit for acute toxicity is:

No acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC).

The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the acute mixing zone, defined in Section S1.C of this permit.

- The ACEC for Outfall 015 equals 15.6 % effluent.
- The ACEC for Outfall 100 equals 0.64% effluent.

B. Compliance With the Effluent Limit for Acute Toxicity

Compliance with the effluent limit for acute toxicity means the results of the testing specified in Subsection C show no statistically-significant difference in survival between the control and the ACEC.

If the test results show a statistically-significant difference in survival between the control and the ACEC, the test does not comply with the effluent limit for acute toxicity. The Permittee must then immediately conduct the additional testing described in Subsection D. The Permittee will comply with the requirements of this section by meeting the requirements of Subsection D.

The Permittee must determine the statistical significance by conducting a hypothesis test at the 0.05 level of significance (Appendix H, EPA/600/4-89/001). If the difference in survival between the control and the ACEC is less than 10%, the Permittee must conduct the hypothesis test at the 0.01 level of significance.

C. Compliance Testing for Acute Toxicity

The Permittee must:

1. Begin compliance testing by October 31, 2009.

2. Test the effluent from both the lagoon system and from the TF/SC system.

3. Perform the acute toxicity tests with 100% effluent, the ACEC, and a control, or with a full dilution series.

4. Submit a written report of all test results to Ecology within sixty (60) days after each sample date.

The Permittee must perform compliance tests quarterly – January, April, July, and October – using each of the species and protocols listed below on a rotating basis:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia*, *Daphnia pulex*, or *Daphnia magna*	EPA-821-R-02-012

D. Response to Noncompliance With the Effluent Limit for Acute Toxicity

If a toxicity test conducted under Subsection C determines a statistically-significant difference in response between the ACEC and the control, using the statistical test described in Subsection B, the Permittee must begin additional testing within one week from the time of receiving the test results. The Permittee must:

1. Conduct one additional test each week for four consecutive weeks, using the same test and species as the failed compliance test.

2. Test at least five effluent concentrations and a control to determine appropriate point estimates. One of these effluent concentrations must equal the ACEC. The results of the test at the ACEC will determine compliance with the effluent limit for acute toxicity as described in Subsection B.

3. Return to the original monitoring frequency in Subsection C after completion of the additional compliance monitoring.

Anomalous test results: If a toxicity test conducted under Subsection C indicates noncompliance with the acute toxicity limit and the Permittee believes that the test result is anomalous, the Permittee may notify Ecology that the compliance test result may be anomalous. The Permittee may take one additional sample for toxicity testing and wait for notification from Ecology before completing the additional testing. The Permittee must submit the notification with the report of the compliance test result and identify the reason for considering the compliance test result to be anomalous.

If Ecology determines that the test result was not anomalous, the Permittee must complete all of the additional monitoring required in this subsection. Or,

If the one additional sample fails to comply with the effluent limit for acute toxicity, then the Permittee must complete all of the additional monitoring required in this subsection. Or,

If Ecology determines that the test result was anomalous, the one additional test result will replace the anomalous test result.

If all of the additional testing complies with the permit limit, the Permittee must submit a report to Ecology on possible causes and preventive measures for the transient toxicity event, which triggered the additional compliance monitoring. This report must include a search of all pertinent and recent facility records, including:

1. Operating records
2. Monitoring results
3. Inspection records
4. Spill reports
5. Weather records
6. Production records
7. Raw material purchases
8. Pretreatment records, etc.

If the additional testing shows violation of the acute toxicity limit, the Permittee must submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to Ecology within sixty (60) days after the sample date [WAC 173-205-100(2)].

E. Sampling and Reporting Requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.

3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.

4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection C and the Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.

5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.

6. For **lagoon system** effluent, the Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.

   For **TF/SC system** effluent, the Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.

7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC).

   - The ACEC for **Outfall 015 (lagoon system)** equals 15.6 % effluent.

   - The ACEC for **Outfall 100 (TF/SC system)** equals 0.64% effluent.

8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

9. Reports of individual compliance test results must be submitted to Ecology within sixty (60) days after each sample date.

S13. CHRONIC TOXICITY

A. Testing When There Is No Permit Limit for Chronic Toxicity

The Permittee must:

1. Conduct chronic toxicity testing on final effluent during July 2012 and January 2013.

2. Submit the results to Ecology with the permit renewal application.

3. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC).

   - The ACEC for Outfall 015 equals 15.6 % effluent.

   - The ACEC for Outfall 100 equals 0.64% effluent.

4. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.

5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136
Mysid shrimp survival and growth	*Mysidopsis bahia/ Americamysis bahia*	EPA-821-R-02-014

B. Sampling and Reporting Requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.

3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.

4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection A and the Department of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.

5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection A or pristine natural water of sufficient quality for good control performance.

6. For **lagoon system** effluent, the Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.

   For **TF/SC system** effluent, the Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.

7. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S14. REUSE FOR SINGLE PASS NONCONTACT COOLING WATER

A. Special Class – Reclaimed Water

This permit authorizes the distribution of special class reclaimed water from the Permittee's discharge pipeline for the use described below subject to the following water quality and operational requirements.

The Permittee may distribute this special class reclaimed water to Kimberly-Clark:

1. Only for use as cooling water within the bounds of the Kimberly-Clark Corporation mill bleach plant.

2. Provided that the recipient uses it only for single-pass, noncontact cooling water. The cooling water system must be a closed loop, nonaerosol system with no route of human exposure during routine bleach plant cooling operations.

3. Provided that it conforms to all of the treatment and disinfection requirements of Condition S1 of this permit.

4. From a diversion of the effluent discharge pipeline at a location within the Kimberly-Clark Corporation mill bleach plant site.

The Permittee must follow the operations and maintenance procedures identified in the *Operating Guidelines and Procedures for Treated Effluent Reuse as Non-Contact Cooling Water* of the City of Everett and Kimberly-Clark Corporation as approved by the regulatory agencies.

B. Other Uses – Reclaimed Water

This permit does not authorize any other uses of this Special Class Reclaimed Water.

GENERAL CONDITIONS

G1. SIGNATORY REQUIREMENTS

A. All applications, reports, or information submitted to Ecology must be signed and certified.

1. In the case of corporations, by a responsible corporate officer.

   For the purpose of this section, a responsible corporate officer means:

   (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or

   (ii) The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

2. In the case of a partnership, by a general partner.

3. In the case of sole proprietorship, by the proprietor.

4. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.

B. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to Ecology.

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

C. Changes to authorization. If an authorization under paragraph B.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section must make the following certification:

> "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. RIGHT OF INSPECTION AND ENTRY

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.

B. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.

C. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

A. The following are causes for terminating this permit during its term, or for denying a permit renewal application:

1. Violation of any permit term or condition.

2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.

3. A material change in quantity or type of waste disposal.

4. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

5. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.

6. Nonpayment of fees assessed pursuant to RCW 90.48.465.

7. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

B. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

1. A material change in the condition of the waters of the state.

2. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

3. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

4. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

5. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

6. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

7. Incorporation of an approved local pretreatment program into a municipality's permit.

C. The following are causes for modification or alternatively revocation and reissuance:

1. When cause exists for termination for reasons listed in A1 through A7 of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

2. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G8) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. REPORTING PLANNED CHANGES

The Permittee must, as soon as possible, but no later than sixty (60) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:
1) the permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b);
2) a significant change in the nature or an increase in quantity of pollutants discharged; or
3) a significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. PLAN REVIEW REQUIRED

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit must be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. TRANSFER OF THIS PERMIT

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

A. Transfers by Modification

Except as provided in paragraph (B) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

B. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

1. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

2. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

3. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. REDUCED PRODUCTION FOR COMPLIANCE

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. DUTY TO PROVIDE INFORMATION

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. ADDITIONAL MONITORING

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. PAYMENT OF FEES

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof must be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit will incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. UPSET

Definition – “Upset” means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
1) an upset occurred and that the Permittee can identify the cause(s) of the upset;
2) the permitted facility was being properly operated at the time of the upset;
3) the Permittee submitted notice of the upset as required in Condition S3.E; and
4) the Permittee complied with any remedial measures required under S4.C of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. DUTY TO COMPLY

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. TOXIC POLLUTANTS

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit must, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment must be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. COMPLIANCE SCHEDULES

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. CONTRACT REVIEW

The Permittee must submit to Ecology any proposed contract for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW. In the event that Ecology does not comment within a thirty (30)-day period, the Permittee may assume consistency and proceed with the contract.

APPENDIX A
EFFLUENT CHARACTERIZATION FOR POLLUTANTS
THIS LIST INCLUDES EPA REQUIRED POLLUTANTS (PRIORITY POLLUTANTS)
AND SOME ECOLOGY PRIORITY TOXIC CHEMICALS (PBTs)

The following table with analytical methods and levels is to be used as guidance for effluent characterization in NPDES permit applications, applications for permit renewal, and monitoring required by permit. This attachment is used in conjunction with Section V, Parts A, B, and C of EPA Application Form 2C, Parts A.12, B.6, and D of EPA application form 2A and with State applications. This attachment specifies effluent characterization requirements of the Department of Ecology. For application, analyze your wastewater for all parameters required by the application and any additional pollutants with an X in the left column. The data should be compiled from last year's data if it is a parameter routinely measured. If you are a primary industry category with effluent guidelines you may have some mandatory testing requirements (see Table 2C-2 of Form 2C). If you are a municipal POTW you also have some mandatory testing requirements which are dependent upon the design flow (see EPA Form 2A).

The permit applications will specify the groups of compounds to be analyzed. Ecology may require additional pollutants to be analyzed within a group. The objectives are to reduce the number of analytical "non-detects" in applications and to measure effluent concentrations near or below criteria values where possible at a reasonable cost. If an applicant or Permittee knows that an alternate, less sensitive method (higher DL and QL) from 40 CFR Part 136 is sufficient to produce measurable results in their effluent, that method may be used for analysis.

	Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)**[2] *µg/L unless specified*	**Quantitation Level (QL)**[3] *µg/L unless specified*
1	**CONVENTIONALS**			
	Biochemical Oxygen Demand	SM5210-B		2 mg/L
	Chemical Oxygen Demand	SM5220-D		10 mg/L
	Total Organic Carbon	SM5310-B/C/D		1 mg/L
	Total Suspended Solids	SM2540-D		5 mg/L
	Total Ammonia (as N)	SM4500-NH3- GH		0.3 mg/L
	Flow	Calibrated device		
	Dissolved oxygen	4500-OC/OG		0.2 mg/L
	Temperature (max. 7-day avg.)	Analog recorder or use micro-recording devices known as thermistors		0.2º C
	pH	SM4500-H^+ B	N/A	N/A
1	**NONCONVENTIONALS**			
	Total Alkalinity	SM2320-B		5 mg/L as CaCo3
	Bromide (24959-67-9)	4110 B	100	400
	Chlorine, Total Residual	4500 Cl G		50.0
	Color	SM2120 B/C/E		10 color unit
	Fecal Coliform	SM 9221E	N/A	N/A
	Fluoride (16984-48-8)	SM4500-F E	25	100
	Nitrate-Nitrite (as N)	4500-NO3-E/F/H		100
	Nitrogen, Total Kjeldahl (as N)	4500-NH3-C/E/FG		300
	Ortho-Phosphate (PO_4 as P)	4500-PE/PF	30	100
	Phosphorus, Total (as P)	4500-PE/PF	30	100

	Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[2] *µg/L unless specified*	Quantitation Level (QL)[3] *µg/L unless specified*
	Oil and Grease (HEM)	1664A		5,000
	Radioactivity	Table 1E		
	Salinity	SM2520-B		3 PSS
	Settleable Solids	SM2540 -F		100
	Sulfate (as mg/L SO_4)	SM4110-B		200
	Sulfide (as mg/L S)	4500-S^2F/D/E/G		200
	Sulfite (as mg/L SO_3)	SM4500-SO3B		2000
	Surfactants	SM5540 C		50
	Total dissolved solids	SM2540 C		20 mg/L
	Total Hardness	2340B		200 as CaCO3
	Aluminum, Total (7429-90-5)	200.8	2.0	10
	Barium Total (7440-39-3)	200.8	0.5	2.0
	Boron Total (7440-42-8)	200.8	2.0	10.0
	Cobalt, Total (7440-48-4)	200.8	0.05	0.25
	Iron, Total (7439-89-6)	200.8	12.5	50
	Magnesium, Total (7439-95-4)	200.8	10	50
	Molybdenum, Total (7439-98-7)	200.8	0.1	0.5
	Manganese, Total (7439-96-5)	200.8	0.1	0.5
	Tin, Total (7440-31-5)	200.8	0.3	1.5
	Titanium, Total (7440-32-6)	200.8	0.5	2.5
1	**METALS, CYANIDE & TOTAL PHENOLS**			
	Antimony, Total (7440-36-0)	200.8	0.3	1.0
	Arsenic, Total (7440-38-2)	200.8	0.1	0.5
	Beryllium, Total (7440-41-7)	200.8	0.1	0.5
	Cadmium, Total (7440-43-9)	200.8	0.05	0.25
	Chromium (hex) dissolved (185-402-99)	SM3500-Cr EC	0.3	1.2
	Chromium, Total (7440-47-3)	200.8	0.2	1.0
	Copper, Total (7440-50-8)	200.8	0.4	2.0
	Lead, Total (7439-92-1)	200.8	0.1	0.5
	Mercury, Total (7439-97-6)	1631E	0.0002	0.0005
	Nickel, Total (7440-02-0)	200.8	0.1	0.5
	Selenium, Total (7782-49-2)	200.8	1.0	1.0
	Silver, Total (7440-22-4)	200.8	0.04	0.2
	Thallium, Total (7440-28-0)	200.8	0.09	0.36
	Zinc, Total (7440-66-6)	200.8	0.5	2.5
	Cyanide, Total (7440-66-6)	335.4	5	10
	Cyanide, Weak Acid Dissociable	SM4500-CN I	5	10
	Phenols, Total	EPA 420.1		50
	DIOXIN			
	2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (176-40-16)	1613B	1.3 pg/L	5 pg/L
1	**VOLATILE COMPOUNDS**			
	Acrolein (107-02-8)	624	5	10
	Acrylonitrile (107-13-1)	624	1.0	2.0

	Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[2] *µg/L unless specified*	Quantitation Level (QL)[3] *µg/L unless specified*
	Benzene (71-43-2)	624	1.0	2.0
	Bis(2-Chloroethyl)ether (111-44-4)	611/625	1.0	2.0
	Bis(2-Chloroisopropyl) ether (108-60-1)	611/625	1.0	2.0
	Bromoform (75-25-2)	624	1.0	2.0
	Carbon tetrachloride (108-90-7)	624/601 or SM6230B	1.0	2.0
	Chlorobenzene (108-90-7)	624	1.0	2.0
	Chloroethane (75-00-3)	624/601	1.0	2.0
	2-Chloroethylvinyl Ether (110-75-8)	624	1.0	2.0
	Chloroform (67-66-3)	624 or SM6210B	1.0	2.0
	Dibromochloromethane (124-48-1)	624	1.0	2.0
	1,2-Dichlorobenzene (95-50-1)	624	1.9	7.6
	1,3-Dichlorobenzene (541-73-1)	624	1.9	7.6
	1,4-Dichlorobenzene (106-46-7)	624	4.4	17.6
	3,3'-Dichlorobenzidine (91-94-1)	605/625	0.5	1.0
	Dichlorobromomethane (75-27-4)	624	1.0	2.0
	1,1-Dichloroethane (75-34-3)	624	1.0	2.0
	1,2-Dichloroethane (107-06-2)	624	1.0	2.0
	1,1-Dichloroethylene (75-35-4)	624	1.0	2.0
	1,2-Dichloropropane (78-87-5)	624	1.0	2.0
	1,3-dichloropropylene (mixed isomers) (542-75-6)	624	1.0	2.0
	Ethylbenzene (100-41-4)	624	1.0	2.0
	Methyl bromide (74-83-9) (Bromomethane)	624/601	5.0	10.0
	Methyl chloride (74-87-3) (Chloromethane)	624	1.0	2.0
	Methylene chloride (75-09-2)	624	5.0	10.0
	1,1,2,2-Tetrachloroethane (79-34-5)	624	1.9	2.0
	Tetrachloroethylene (127-18-4)	624	1.0	2.0
	Toulene (108-88-3)	624	1.0	2.0
	1,2-Trans-Dichloroethylene (156-60-5) (Ethylene dichloride)	624	1.0	2.0
	1,1,1-Trichloroethane (71-55-6)	624	1.0	2.0
	1,1,2-Trichloroethane (79-00-5)	624	1.0	2.0
	Trichloroethylene (79-01-6)	624	1.0	2.0
	Vinyl chloride (75-01-4)	624/SM6200B	1.0	2.0
1	**ACID COMPOUNDS**			
	2-Chlorophenol (95-57-8)	625	1.0	2.0
	2,4-Dichlorophenol (120-83-2)	625	0.5	1.0
	2,4-Dimethylphenol (105-67-9)	625	0.5	1.0
	4,6-dinitro-o-cresol (534-52-1) (2-methyl-4,6,-dinitrophenol)	625/1625B	1.0	2.0
	2,4 dinitrophenol (51-28-5)	625	1.0	2.0
	2-Nitrophenol (88-75-5)	625	0.5	1.0
	4-nitrophenol (100-02-7)	625	0.5	1.0

	Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[2] *µg/L unless specified*	Quantitation Level (QL)[3] *µg/L unless specified*
	Parachlorometa cresol (59-50-7) (4-chloro-3-methylphenol)	625	1.0	2.0
	Pentachlorophenol (87-86-5)	625	0.5	1.0[10]
	Phenol (108-95-2)	625	2.0	4.0
	2,4,6-Trichlorophenol (88-06-2)	625	2.0	4.0
1	**BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)**			
	Acenaphthene (83-32-9)	625	0.2	0.4
	Acenaphtylene (208-96-8)	625	0.3	0.6
	Anthracene (120-12-7)	625	0.3	0.6
	Benzidine (92-87-5)	625	12	24
	Benzyl butyl phthalate (85-68-7)	625	0.3	0.6
	Benzo(*a*)anthracene (56-55-3)	625	0.3	0.6
	Benzo(j)fluoranthene (205-82-3)	625	0.5	1.0
	Benzo(r,s,t)pentaphene (189-55-9)	625	0.5	1.0
	Benzo(*a*)pyrene (50-32-8)	610/625	0.5	1.0
	3,4-benzofluoranthene (Benzo(b)fluoranthene) (205-99-2)	610/625	0.8	1.6
	11,12-benzofluoranthene (Benzo(k)fluoranthene) (207-08-9)	610/625	0.8	1.6
	Benzo(*ghi*)Perylene (191-24-2)	610/625	0.5	1.0
	Bis(*2-chloroethoxy)*methane (111-91-1)	625	5.3	21.2
	Bis(*2-chloroethyl*)ether (111-44-4)	611/625	0.3	1.0
	Bis(*2-chloroisopropyl*)ether (108-60-1)	625	0.3	0.6
	Bis(*2-ethylhexyl*)phthalate (117-81-7)	625	0.1	0.5
	4-Bromophenyl phenyl ether (101-55-3)	625	0.2	0.4
	2-Chloronaphthalene (91-58-7)	625	0.3	0.6
	4-Chlorophenyl phenyl ether (7005-72-3)	625	0.3	0.5
	Chrysene (218-01-9)	610/625	0.3	0.6
	Dibenzo (a,j)acridine (224-42-0)	610M/625M	2.5	10.0
	Dibenzo (a,h)acridine (226-36-8)	610M/625M	2.5	10.0
	Dibenzo(a-*h*)anthracene (53-70-3) (1,2,5,6-dibenzanthracene)	625	0.8	1.6
	Dibenzo(a,e)pyrene (192-65-4)	610M/625M	2.5	10.0
	Dibenzo(a,h)pyrene (189-64-0)	625M	2.5	10.0
	3,3'-Dichlorobenzidine (91-94-1)	605/625	0.5	1.0
	Diethyl phthalate (84-66-2)	625	1.9	7.6
	Dimethyl phthalate (131-11-3)	625	1.6	6.4
	Di-n-butyl phthalate (84-74-2)	625	0.5	1.0
	2,4-dinitrotoluene (121-14-2)	609/625	0.2	0.4
	2,6-dinitrotoluene (606-20-2)	609/625	0.2	0.4
	Di-n-octyl phthalate (117-84-0)	625	0.3	0.6
	1,2-Diphenylhydrazine (*as Azobenzene*) (122-66-7)	1625B	5.0	20
	Fluoranthene (206-44-0)	625	0.3	0.6
	Fluorene (86-73-7)	625	0.3	0.6

	Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[2] *µg/L unless specified*	Quantitation Level (QL)[3] *µg/L unless specified*
	Hexachlorobenzene (118-74-1)	612/625	0.3	0.6
	Hexachlorobutadiene (87-68-3)	625	0.5	1.0
	Hexachlorocyclopentadiene (77-47-4)	1625B/625	0.5	1.0
	Hexachloroethane (67-72-1)	625	0.5	1.0
	Indeno(*1,2,3-cd*)Pyrene (193-39-5)	610/625	0.5	1.0
	Isophorone (78-59-1)	625	0.5	1.0
	3-Methyl cholanthrene (56-49-5)	625	2.0	8.0
	Naphthalene (91-20-3)	625	0.3	0.6
	Nitrobenzene (98-95-3)	625	0.5	1.0
	N-Nitrosodimethylamine (62-75-9)	607/625	2.0	4.0
	N-Nitrosodi-n-propylamine (621-64-7)	607/625	0.5	1.0
	N-Nitrosodiphenylamine (86-30-6)	625	0.5	1.0
	Perylene (198-55-0)	625	1.9	7.6
	Phenanthrene (85-01-8)	625	0.3	0.6
	Pyrene (129-00-0)	625	0.3	0.6
	1,2,4-Trichlorobenzene (120-82-1)	625	0.3	0.6
1	**PESTICIDES/PCBs**			
	Aldrin (309-00-2)	608	0.025	0.05
	alpha-BHC (319-84-6)	608	0.025	0.05
	beta-BHC (319-85-7)	608	0.025	0.05
	gamma-BHC (58-89-9)	608	0.025	0.05
	delta-BHC (319-86-8)	608	0.025	0.05
	Chlordane (57-74-9)	608	0.025	0.05
	4,4'-DDT (50-29-3)	608	0.025	0.05
	4,4'-DDE (72-55-9)	608	0.025	0.05[10]
	4,4' DDD (72-54-8)	608	0.025	0.05
	Dieldrin (60-57-1)	608	0.025	0.05
	alpha-Endosulfan (959-98-8)	608	0.025	0.05
	beta-Endosulfan (33213-65-9)	608	0.025	0.05
	Endosulfan Sulfate (1031-07-8)	608	0.025	0.05
	Endrin (72-20-8)	608	0.025	0.05
	Endrin Aldehyde (7421-93-4)	608	0.025	0.05
	Heptachlor (76-44-8)	608	0.025	0.05
	Heptachlor Epoxide (1024-57-3)	608	0.025	0.05
	PCB-1242 (53469-21-9)	608	0.25	0.5
	PCB-1254 (11097-69-1)	608	0.25	0.5
	PCB-1221 (11104-28-2)	608	0.25	0.5
	PCB-1232 (11141-16-5)	608	0.25	0.5
	PCB-1248 (12672-29-6)	608	0.25	0.5
	PCB-1260 (11096-82-5)	608	0.13	0.5
	PCB-1016 (12674-11-2)	608	0.13	0.5
	Toxaphene (8001-35-2)	608	0.24	0.5

1. An X placed in this box means you must analyze for all pollutants in the group.
2. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR Part 136, Appendix B.
3. Quantitation Level (QL) is equivalent to EPA's Minimum Level (ML) which is defined in 40 CFR Part 136 as the minimum level at which the entire GC/MS system must give recognizable mass spectra (background corrected) and acceptable calibration points. These levels were published as proposed in the Federal Register on March 28, 1997.

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FACT SHEET FOR NPDES PERMIT WA-002449-0
City of Everett Water Pollution Control Facility
September 1, 2009

PURPOSE of this Fact Sheet

This fact sheet explains and documents the decisions Ecology made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for the City of Everett Water Pollution Control Facility (Everett WPCF).

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit *and accompanying fact sheet* for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Everett WPCF, NPDES permit WA-002449-0, were available for public review and comment from July 26, 2009, until August 25, 2009. For more details on preparing and filing comments about these documents, please see *Appendix A—Public Involvement Information*.

City of Everett staff reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, discharges, or receiving water.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as *Appendix F—Response to Comments*, and publish it when issuing the final NPDES permit. Ecology will not revise the rest of the fact sheet, but the full document will become part of the legal history contained in the facility's permit file.

Laura Fricke, P.E., prepared the permit and this fact sheet.

SUMMARY

The Everett Water Pollution Control Facility has two parallel treatment systems: a trickling filter/solids contact (TF/SC) system and an aeration/oxidation pond system. The trickling filter system discharges treated wastewater to Port Gardner Bay; the pond (lagoon) system discharges to the Snohomish River. Ecology issued the previous permit for this facility on July 1, 2004. Ecology issued modifications to the permit on May 9, 2005 and October 19, 2007. The proposed permit includes only minor changes to the effluent limits for Total Suspended Solids and Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) from the permit modification issued in October 2007. Ecology based the limits for Total Ammonia and $CBOD_5$ during the months of July through October on the Total Maximum Daily Load for the Snohomish Estuary (Ecology, 1999). The proposed permit includes new limits for Acute Whole Effluent Toxicity, and requires the City of Everett to submit engineering documents to address the need for increased capacity of the treatment plant.

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I. INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the State of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to municipal NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC)
- Technical criteria for discharges from municipal wastewater treatment facilities (chapter 173-221 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC) and for ground waters (chapter 173-200 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Whole effluent toxicity testing and limits (chapter 173-205 WAC)
- Submission of Plans and Reports for Construction of Wastewater Facilities (Chapter 173-240 WAC)

These rules require any treatment facility operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See *Appendix A—Public Involvement Information* for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit. Ecology will summarize the responses to comments and any changes to the permit in *Appendix F*.

II. BACKGROUND INFORMATION

Table 1 – General Facility Information

Applicant:	City of Everett
Facility Name and Address:	Everett Water Pollution Control Facility 4027 4th Street South East Everett, Washington 98205
Type of Treatment:	Combined Aerated/Facultative Lagoon System Trickling Filter/Solids Contact System
Discharge Location:	Snohomish River Lagoon System (Outfall 015) Latitude: 48° 00' 15" N Longitude: 122° 10' 38" W Trickling Filter/Solids Contact System (Outfall 025) Latitude: 47° 59' 29" N Longitude: 122° 10' 44" W Port Gardner Bay (Outfall 100) Latitude: 47° 58' 10" N Longitude: 122° 14' 48" W

Location maps are included in Appendix C.

A. Facility Description

History

The City of Everett (City) constructed its first sewers in 1890, three years before the City was incorporated. In 1897, after a sewer bond election passed, construction of the citywide system began in the north end of the City. This system is a combined sewer system, carrying stormwater and sanitary sewage to the WPCF. With population growth, the City expanded to the south and installed separate storm and sewer systems in the new areas. The current system serves more than 136,000 people, conveying sewage through approximately 345 miles of sewer mains, interceptors and laterals, and 29 lift stations.

The City's sewer system originally discharged into the Snohomish River and Port Gardner Bay. In 1960, the WPCF was constructed and operated by the Snohomish County Health District to provide wastewater treatment. The City took over operation of the facility in 1975. The facility originally consisted of oxidation ponds and an outfall to the Snohomish River. Over time, Everett added significant improvements to the plant, including aeration ponds and a chlorine contact channel in 1971, a new headworks in 1985, the trickling filter/solids contact system (TF/SC) in 1991, the South Effluent Pump Station (SEPS) for discharge to Outfall 100 in Port Gardner Bay in 2005, and primary clarifiers in 2007. Currently, the WPCF has two parallel treatment systems: a trickling filter/solids contact (TF/SC) system (Outfalls 100 and 025) and an aeration/oxidation pond system (Outfall 015).

The WPCF, designed for a maximum month design flow of 36.3 million gallons per day (MGD), provides wastewater treatment for the following entities: City of Everett, Mukilteo Water District (0.6 MGD average maximum flow), Silver Lake Water District (12.2 MGD average maximum flow), and Alderwood Water and Wastewater District (3.3 MGD average maximum flow). Septic systems still serve a few hundred residential lots within the City and an unknown number in the larger service area.

The WPCF is located on a 350-acre land parcel owned by the City on Smith Island, east of Snohomish River. The WPCF is bordered by Interstate 5 to the west, the Snohomish River to the south, and Union Slough to the east. A dike system protects the plant, which is located within the Snohomish River flood plain.

Collection System Status

The City relies on gravity flow for the majority of the collection system. Interceptors collect the sewage draining to the west and pump it to the east, toward the WPCF. The north end of the City has a combined sewer system, and the south end has a separate sanitary system.

The combined system in the north end of the City serves an area of approximately 6,500 acres. Constructed between 1890 and 1963, the combined system requires a high maintenance effort due to its age. The City originally constructed its sewers with vitrified clay pipe, but since 1920 has used other pipe materials, such as concrete, ductile iron, polyvinyl chloride (PVC) and high-density polyethylene (HDPE). The combined system consists of approximately 2,785 manholes and 145 miles of 2- to 84-inch diameter pipelines not including side sewers. During wet weather, stormwater and wastewater in excess of the capacity of the combined sewers can discharge through combined sewer overflows (CSOs). The City has 13 active CSOs; six discharge to the Snohomish River and seven discharge to Port Gardner Bay. The City has abandoned two other CSOs that used to discharge to the Snohomish River.

The sanitary system in the south end of the City serves an area of 11,500 acres within the city and a total of 25,000 acres, including the contribution received from the Alderwood, Silver Lake, and Mukilteo districts. This system was constructed after 1963. The sewers were originally concrete. Since 1982, Everett has used new materials including PVC and ductile iron. Pipes constructed after 1950 typically used rubber gaskets to seal the pipe joints. The separate system in the south end is where the main growth within Everett is expected to occur. The sanitary collection system consists of approximately 4,379 manholes and 200 miles (not including laterals) of 6- to 48-inch diameter pipelines.

Treatment Processes

A process flow schematic is included in Appendix C.

Table 2 – WPCF Process Flows, annual average 10/1/07-9/30/08

Process Description	WPCF label	Flow, MGD
Primary Influent	PI	18.1
Primary Clarifier to TFI	PCE	6.2
Aerated Lagoon Effluent to TFI	ALE-1, ALE-2	8.6
Trickling Filter Influent	TFI	14.8
TF/SC recirculation to AC-1	BP	4.7
Aeration Cell 1 to AC-2	AC-1	Unknown *
Aeration Cell 2 to Oxidation pond	AC-2	9.3
Outfall 100 effluent	SCE	10.5
Outfall 015 effluent	FEN	9.3
Outfall 025 effluent	FES	No discharge**

* Aerated lagoon flow to TFI may be from ALE-1, ALE-2, or varying proportions of both ports. There is no flow measurement on the ALE ports, so it is not possible to calculate flow entering AC-1 that is not pulled into ALE-1 and therefore passes on to AC-2.

** Outfall O25 has been out of service since 2005 due to diffuser damage which the City is currently repairing. The proposed permit allows a discharge of a maximum of 0.32 MG per week (flushing is allowed once per week for three hours at a maximum flow of 18 MGD)

Primary Influent (PI) from the collection system enters the plant through Archimedes screw pumps (4) at the headworks, passes through Parshall flumes (4) for flow measurement, bar screens (4), and grit tanks (2). Influent flows are highly variable from the combined collection system. The screw pumps and bar screens are set up to automatically increase the number of units in operation as PI flow increases.

DS-1 is a distribution structure containing gates that regulate flow to the primary clarifier tanks (2) and Aeration Cell 1 (AC-1).

The Primary Clarifier (PC) tanks have a nominal capacity of 44 MGD. All flow in excess of 44 MGD is routed to AC-1. Currently flow is regulated by DS-1 ahead of the PC to limit organic loading to the trickling filters.

The balance of the TF/SC flow is made up by drawing aerated lagoon effluent from Aeration cells 1 and 2. Construction began in November 2008 to add a second line between the PC and AC-1 to allow up to 44 MGD of PI to flow through the PC tanks for scum and solids removal followed by discharge to AC-1 or blending of some fraction with AC-1 and/or AC-2 effluent to feed the Trickling Filter/Solids Contact (TF/SC) system. AC-1 and AC-2 feeds to the trickling filters are known as Aerated Lagoon Effluent #1 (ALE-1) and Aerated Lagoon Effluent #2 (ALE-2), respectively.

The Trickling Filter/Solids Contact (TF/SC) system is rated at 21.0 MGD, 11.5 MGD per trickling filter (TF). When the hydraulic capacity increased in the Phase A expansion from 16 MGD to 21 MGD, organic loading became the limiting factor in TF/SC capacity. PCE, ALE-1, and ALE-2 are blended in varying proportions depending on the season and pond conditions to limit the organic strength. The operators adjust the number of pumps running to manage a “recirculation” system that sends 3-4 MGD from each TFI pump back to its wet well to regulate TFI flow.

The trickling filter effluent (TFE) flows to four sets of aeration basins (AB’s) fitted with fine-bubble diffusers. The operators can change the AB configuration from series to parallel, and use various modes such as step feed, re-aeration, or plug flow depending on operating conditions and influent strength. The ABs solids contact detention time is much shorter than in an activated sludge system and the main objective is enhancing flocculation to promote settling in the clarifiers.

Secondary clarifier effluent (SCE) is the NPDES permit compliance point for all Everett WPCF permit parameters except fecal coliform and chlorine residual because during the low-flow period, the South Effluent Pump Station (SEPS) directs a combination of WPCF and City of Marysville effluent to Outfall 100. The City of Marysville operates its own wastewater treatment system and shares Outfall 100 along with Everett and Kimberly Clark Corporation as described later in the fact sheet.

SCE that is not discharged is "bypassed" (BP) back to AC-1. This is not a bypass in the sense of bypassing treatment units, as this is fully-treated secondary effluent, but a recirculation within the WPCF and a way to provide additional flow to the lagoon system when needed.

Sodium Hypochlorite is added for disinfection in the secondary clarifiers, at the entrance to the SEPS, or both. Dechlorination with sodium bisulfite is not required for Outfall 100 discharge, but is provided whenever the plant discharges to Snohomish River Outfall 025, the TF/SC emergency outfall. Everett has not routinely flushed Outfall 025 since 2005 due to damaged diffuser risers, but it is being repaired and flushing will resume soon.

All PI flow not treated by TF/SC and discharged to Outfall #100 passes through AC-2 into the oxidation pond (130 acres). The oxidation pond was originally 135 acres, but the City filled in 5 acres at the SE corner to create a biosolids processing and storage pad during the 2006 "Phase A" expansion. Lagoon system flow then travels from the oxidation pond to the polishing pond (25 acres) and through the chlorine contact channel (0.60 acre). Sodium hypochlorite is added at the point water enters the FEN chlorine contact channel. Sodium bisulfite is added at the other end of the channel prior to Outfall 015 discharge.

Power at FEN is from the Marysville power transmission grid to the north. There is an emergency generator at Outfall 015 that provides power to close the gravity valve in a power outage to prevent discharge of unchlorinated effluent.

The TF/SC plant is fed power by transmission grids from Everett to the south and Marysville to the north. In the event one grid goes down, Snohomish PUD #1 is called to manually switch power over to the other grid. Portable generators are also available at the plant and the Public Works Service Center in downtown Everett (3200 Cedar Street) for emergency operations.

The Everett Water Pollution Control Facility is a Class IV rated plant. Seven operators (Group OIT – IV) staff it from 7:30 a.m. to 4:00 p.m., Monday through Friday, with an operator holding at least Group III certification supervising process changes each shift. Operators also work 4-hour shifts (7:30-11:30) on weekends and holidays for purposes of sample collection, meter readings, and performing permit required water quality testing.

Industrial Discharges

In addition to domestic sewage from residential and light commercial activities located within the service area, the treatment plant also receives pretreated industrial wastewater from permitted pretreatment facilities [13 Significant Industrial Users (SIUs) and 7 Categorical Industrial Users (CIUs)]. The City of Everett received approval of its pretreatment program on June 26, 1987.

The following table lists permitted pretreatment industries discharging to the WPCF.

Table 3 – Pretreatment Industries

Name	Flow (gallons per day)	INDUSTRIAL PROCESS	Categorical Pretreatment Standards
Achilles USA	19,134	Vinyl and PVC film extrusion and lamination	N/A
Airport Road Transfer Station	4,679	Solid waste transfer station, liquid squeezed from garbage	N/A
Ametech	276	Metal finishing, shaping, cutting, polishing, etc.	40 CFR 433.17
Aramark/Overall Laundry Service	152,756	Commercial uniform and laundry service	N/A
Blue Streak Finishers, LTD	4,290	Metal finishing, painting, NDT	40 CFR 433.17
Boeing Commercial Airplane Company	49,730	Aircraft assembly, metal finishing, painting, NDT	40 CFR 433.17
Cathcart Sanitary Landfill	114,682	Closed sanitary landfill (leachate pretreatment; aerated lagoon and secondary clarification)	N/A
Cintas Corporation	81,272	Industrial laundry (pretreatment via Dissolved Air Floatation (DAF) system)	N/A
Community Transit, Kasch Park Operations Base	4,673	Transit bus service and maintenance	N/A
Community Transit, Merrill Creek Operations Base	5,051	Transit bus service and maintenance	N/A
Dura Coatings, Inc.	Zero discharge	Metal finishing, powder coating, painting	40 CFR 433.17
Everett Landfill and Transfer Station	210,000	Closed municipal landfill, leachate	N/A
Fluke Evergreen	3,943	Board wash discharge from flow soldered circuit board assembly	N/A
Fluke Seaway	7,551	Electroplating and electroless plating processes	40 CFR 433.17
Naval Station Everett	57,864	Pretreatment of fuel and/or oil contaminated bilge and ballast water	N/A
Port Chatham Smoked Seafoods	51,302	Frozen fish thawing, fish curing, fish smoking, fish packaging, fish canning	N/A
Railmakers NW	28	Welding, electropolishing	40 CFR 433.17
Shin-Nippon Bioengineering Laboratories	31,588	Testing dietary products on rodents and primates	N/A
Stockpot	236,718	Food manufacturer, cooking and packaging soups	N/A
TC Systems	4,371	Metal finishing, painting, powder coating, NDT	40 CFR 433.17
Total	**1,039,908**		

Discharge Outfalls

Lagoon Outfall (Outfall 015)

Effluent from the aeration/oxidation pond system (lagoon) enters the Snohomish River about 900 feet west of the polishing pond and about one mile downstream of the trickling filter/solids contact facility. The river is approximately 350 feet wide at the location of the outfall. The outfall pipe is 48 inches in diameter. The diffuser is located at approximately -8 feet below mean lower low water datum. The diffuser is approximately 36 feet long and has sixteen 10-inch risers spaced 2.5 feet apart. Effluent discharges horizontally through pinch check valves.

Trickling Filter/Solids Contact Port Gardner Bay Outfall (Outfall 100)

Outfall 100 was constructed by, and is owned and operated by, Kimberly-Clark Worldwide, Inc. (Kimberly-Clark or K-C). Under an agreement with Kimberly-Clark, the City of Everett has purchased capacity to discharge through Outfall 100. The outfall discharges to Port Gardner Bay at a depth of about 350 feet and over 1,300 feet from the nearest shoreline. The outfall pipe is 63-inch diameter HDPE, which is buried in the intertidal and shallow subtidal area and then rests on the seabed with concrete anchors. The diffuser section is 1,556 feet in length and it is laid along a gradual curve that starts at -340 feet and ends at -348 feet below mean lower low water (MLLW). The diffuser has 80 vertical risers with 90° elbows, and these terminate with 5-inch round ports on each diffuser orifice plate. The riser elbows are oriented so that the diffuser port openings alternate along the length of the diffuser.

Trickling Filter/Solids Contact Snohomish River Outfall (Outfall 025)

The 48-inch diameter trickling filter/solids contact outfall is located about one mile upstream of the lagoon outfall. The river at the outfall location is approximately 450 feet wide; the outfall diffuser extends approximately 200 feet into the river at a depth of -16 feet below mean lower low water datum. The diffuser is approximately 35 feet long and has twelve 10-inch risers spaced 2.5 feet apart. Effluent discharges horizontally through pinch check valves. At times, scouring has caused the outfall diffuser ports to be exposed in the river channel; other times, as a result of sedimentation the ports have been buried under several feet of silt. This outfall is used only for periodic flushing and in case of emergency. Flushing is currently permitted once a week for a maximum of 3 hours at a flow of 18 MGD. Periodic flushing keeps the outfall functional in case it is needed in an emergency.

Solid Wastes

The treatment of wastewater at the Everett Water Pollution Control Facility produces a variety of solids. Grit and screenings are collected from the headworks, scum is removed from the inlet area of the aerated lagoons, waste secondary sludge is collected from the trickling filter/solids contact facility, and digested sludge is collected from the bottom of the aerated lagoons. Dewatered grit material, screenings, and scum are collected and transported to the Roosevelt Landfill in Klickitat County for disposal. Digested biosolids collected in the aerated lagoons are removed every 1-2 years and applied to forest land, or composted in a pilot composting project on site.

B. Permit Status

Ecology issued the previous permit for this facility on July 1, 2004. Ecology issued modifications to the permit on May 9, 2005 (added Outfall 025 flushing conditions, dilution factors for Outfall 100, and water reuse at Kimberly-Clark) and October 19, 2007 (increased design capacity). The previous permit placed effluent limits on

- Carbonaceous biochemical oxygen demand (5-day) ($CBOD_5$)
- Total suspended solids (TSS)
- Fecal Coliform bacteria
- pH
- Total residual chlorine, and
- Total ammonia.

The City of Everett submitted an application for permit renewal on December 31, 2008. Ecology accepted it as complete on January 28, 2009.

C. Summary of Compliance With Previous Permit

Ecology staff last conducted a sampling compliance inspection on May 5, 2009, and a non-sampling compliance inspection on April 10, 2007. Inspection results showed no compliance issues. Ecology staff conduct pretreatment compliance inspections annually.

In 2006 and 2007, the WPCF had eight violations of $CBOD_5$ effluent limits and nine violations of TSS effluent limits.

The Everett WPCF influent BOD wasteload exceeded 85% design capacity for three consecutive months and 100% design for one month in 2007. The City has contracted for an engineering report per WAC 173-240-060 to address plans for maintaining adequate capacity as stipulated in the NPDES permit section S4.B. The City expects that the engineering report will lead immediately into design for "Phase B" construction to increase WPCF organic loading treatment capacity.

Interim measures to deal with the abrupt increase in influent BOD concentration and loadings between 2006 and 2007 included adding additional aeration to both aerated lagoon cells (AC-1 and AC-2) and adding a second pipe from the primary clarifier effluent (PCE) box to AC-1 to make it possible to send all PCE to AC-1 while simultaneously feeding the trickling filters from AC-1 and/or AC-2.

The City has generally succeeded in controlling TF/SC flow and trickling filter loading in 2008. The only NPDES violation in 2008 was not directly associated with increased influent loading. The lagoon system exceeded the limit for daily equivalent $CBOD_5$ loading because of a combination of unusual storm flow during the low-flow period and inadequate nitrification to remove ammonia.

D. Wastewater Characterization

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The tabulated data represent the quality of the effluent discharged from July 1, 2004 to December 31, 2008. The data presented in the tables include only detectable compounds and elements.

Table 4 - Wastewater Characterization, Outfall 015 (Lagoon)

Parameter	Average	Maximum	Number of Samples
pH (minimum)		6.0 standard units(su)	
pH (maximum)		8.8 su	
Flow rate	9.7 MGD	41.8 MGD	1002
Temperature (winter)	6.3 °C	11.6 °C	266
Temperature (summer)	20.6 °C	26.2 °C	251
Conventional and Non-Conventional Pollutants			
$CBOD_5$	20 mg/l	63 mg/l	585
Fecal Coliform	71 colony forming units (cfu)/100 ml	3600 cfu/100 ml	733
Total suspended solids	41 mg/l	112 mg/l	797
Chlorine (total residual)	0.005 mg/l	0.080 mg/l	1001
Dissolved oxygen	5.0 mg/l	18.0 mg/l	1004
Oil and grease	<4.9 mg/l	<5.6 mg/l	12
Total dissolved solids	298 mg/l	360 mg/l	4
Nutrients			
Ammonia nitrogen	15.4 mg/l	36.6 mg/l	391
Nitrate + nitrite	3.7 mg/l	17.5 mg/l	92
Total Kjeldal nitrogen (TKN)	30.8 mg/l	38.8 mg/l	4
Total phosphorus	5.8 mg/l	8.1 mg/l	4
Priority Pollutants - Organics			
Acetone	6.8 µg/l	16 µg/l	5
Toluene	2.0 µg/l	6.6 µg/l	5
bis(2-Ethylhexyl)phthalate	4.3 µg/l	7.0 µg/l	5
Isophorone	0.8 µg/l	1.3 µg/l	5
Priority Pollutants - Metals			
Antimony	0.8 µg/l	1.2 µg/l	15
Arsenic	1.8 µg/l	4.1 µg/l	56
Chromium	1.1 µg/l	3.0 µg/l	57
Cobalt	1.4 µg/l	4.5 µg/l	46
Copper	5.2 µg/l	11.8 µg/l	56
Lead	2.0 µg/l	7.3 µg/l	56
Manganese	97.2 µg/l	137 µg/l	15
Mercury	10.8 ng/l	16.5 ng/l	6

Parameter	Average	Maximum	Number of Samples
Molybdenum	4.9 µg/l	10 µg/l	55
Nickel	3.7 µg/l	7.5 µg/l	57
Selenium	0.32 µg/l	1.0 µg/l	16
Silver	0.29 µg/l	0.8 µg/l	56
Thallium	0.10 µg/l	0.25 µg/l	16
Tin	1.53 µg/l	5 µg/l	14
Zinc	17.7 µg/l	34 µg/l	57

Table 5 - Wastewater Characterization, Outfall 100 (TF/SC)

Parameter	Average	Maximum	Number of Samples
pH (minimum)		6.0 su	
pH (maximum)		8.2 su	
Flow rate	10.8 MGD	21.0 MGD	978
Temperature (winter)	10.0°C	14.9°C	255
Temperature (summer)	19.5°C	22.8°C	253
Conventional and Non-Conventional Pollutants			
$CBOD_5$	15 mg/l	41 mg/l	560
Fecal Coliform	66 cfu/100 ml	2200 cfu/100 ml	751
Total suspended solids	15 mg/l	45 mg/l	711
Chlorine (total residual)	0.45 mg/l	0.99 mg/l	978
Dissolved oxygen	6.1 mg/l	9.7 mg/l	994
Oil and grease	<5.1 mg/l	<5.7 mg/l	20
Total dissolved solids	288 mg/l	310 mg/l	4
Nutrients			
Ammonia nitrogen	19.1 mg/l	36.4 mg/l	211
Nitrate + nitrite	2.84 mg/l	21 mg/l	95
Total Kjeldal nitrogen (TKN)	31.5 mg/l	32.7 mg/l	4
Total phosphorus	4.4 mg/l	4.7 mg/l	4
Priority Pollutants - Organics			
Acetone	7.0 µg/l	11 µg/l	3
gamma Chlordane	0.07 µg/l	0.16 µg/l	3
Chloroform	0.77 µg/l	1.3 µg/l	3
bis(2-Ethylhexyl)phthalate	3.7 µg/l	4.9 µg/l	3
Priority Pollutants - Metals			
Antimony	0.77 µg/l	1.1 µg/l	9
Arsenic	1.3 µg/l	3.1 µg/l	54
Cadmium	0.10 µg/l	0.21 µg/l	54
Chromium	0.81 µg/l	1.6 µg/l	46
Cobalt	0.84 µg/l	1.2 µg/l	37

Copper	6.3 µg/l	10.8 µg/l	52
Lead	1.2 µg/l	2.2 µg/l	53
Manganese	74.7 µg/l	109 µg/l	10
Mercury	15.4 ng/l	23 ng/l	7
Molybdenum	6.4 µg/l	14 µg/l	46
Nickel	2.9 µg/l	6.6 µg/l	46
Silver	0.24 µg/l	0.5 µg/l	54
Tin	0.94 µg/l	2.7 µg/l	8
Zinc	26.9 µg/l	56 µg/l	54
Priority Pollutants - Other			
Cyanide	0.004 mg/l	0.011 mg/l	10
Phenolics	0.031 mg/l	0.11 mg/l	10

E. Description of the Receiving Water

Everett WPCF discharges to the Snohomish River Estuary and Port Gardner Bay. Other nearby point source outfalls include the Marysville, Lake Stevens Sewer District, and Snohomish wastewater treatment plants, and the Kimberly-Clark industrial discharge. Significant nearby non-point sources of pollutants include several diking districts and associated agricultural areas, highway runoff, and stormwater from urban and suburban areas.

The ambient background data used for this permit include the following from Snohomish River Estuary Dry Season TMDL Study – Phase I (1995) and Snohomish River Estuary Dry Season TMDL Study – Phase II (1997) for sampling station SNO20. Metals ambient data are from Ecology monitoring station 07A090 at Snohomish for 1996 and 1997.

Table 6 - Ambient Background Data, Outfall 015 (Snohomish River)

Parameter	Value Used
Temperature	17.8° C (highest annual 1-DMax) 16.6° C (critical season average)
pH (Maximum / Minimum)	7.3-7.9 su
Dissolved Oxygen	8.3 mg/L (average, 12 samples)
Total Ammonia-N	0.05 mg/L (average, 12 samples)
Fecal Coliform	81/100 mL dry weather (geometric mean of 3 samples)
Turbidity	3.7 NTU (average, 6 samples)
Salinity	0.2 psu (average low tide) 16.7 (average high tide)
Copper	0.639 µg/L
Lead	0.238 µg/L
Mercury	0.0015 µg/L
Zinc	1.30 µg/L

The ambient background data used for this permit includes the following from Ecology's marine water sampling station PSS010, and *Effluent Mixing Study Outfall 100* (CH2MHill, 2004):

Table 7 - Ambient Background Data, Outfall 100 (Port Gardner Bay)

Parameter	Value Used
Temperature	19.65 °C (highest surface temp.) 10°C (at horizontal mixing zone boundary)
Dissolved Oxygen	6.2 mg/L (lowest average)
Fecal Coliform	1/100 mL
Salinity	28.8 psu (average)

F. SEPA Compliance

Regulation exempts reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions are no less stringent than state rules and regulations. The exemption applies only to existing discharges, not to new discharges.

III. PROPOSED PERMIT LIMITS

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC) or the National Toxics Rule (40 CFR 131.36).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants that were not reported in the permit application but that may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. If significant changes occur in any constituent of the effluent discharge, Everett is required to notify Ecology (40 CFR 122.42(a)). Everett may be in violation of the permit until Ecology modifies the permit to reflect additional discharge of pollutants.

A. Design Criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. The July 1, 2004, permit specified design criteria from the *Everett Water Pollution Control Facility Re-rating and Effluent Mixing Zone Study*, April 1996 (amended January 2001) prepared by Brown and Caldwell. A 1996 study re-rated the plant flow and BOD_5 loading values based on an empirical method using treatment plant operating data. The re-rating studies showed the actual flow capacity of the plant was 31.3 MGD: 15.3 MGD for the aerated lagoon system and 16 MGD for the trickling filter/solids contact system.

Ecology approved the *Everett Water Pollution Control Facility – Facilities Plan and Basis of Design Report* (April 2003, revised November 2004) on December 17, 2004. Ecology approved the *Everett Water Pollution Control Facility Expansion, Phase A, Plans and Specifications* (February 2005) on February 17, 2005. Everett completed construction of the Phase A facility improvements in 2007 and Ecology modified the permit to reflect the new design criteria. Ecology based the design criteria for the proposed permit on the 2004 *Facilities Plan* and the 2005 *Plans and Specifications*.

Table 8 - Design Standards for Everett Water Pollution Control Facility

Parameter	Design Capacity
Facility Design Flow Maximum month	36.3 mgd 15.3 mgd (Lagoon) 21 mgd (TF/SC)
Influent BOD_5 Loading Maximum month	48,900 lb/day
Influent TSS Loading Maximum month	67,700 lb/day

B. Technology-Based Effluent Limits

Federal and state regulations define technology-based effluent limits for municipal wastewater treatment plants. These effluent limits are given in 40 CFR Part 133 (federal) and in chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for municipal wastewater.

Chapter 173-221 WAC describes technology-based limits for pH, fecal coliform, BOD_5, and TSS. Alternative limits for waste stabilization ponds (lagoons), combined sewer facilities, $CBOD_5$ effluent limits apply, according to the sections of WAC 173-221 described below.

> Section 050(2): Waste stabilization ponds which either have design capacity below 2 million gallons per day or received Ecology's approval for a greater design capacity prior to 11/12/1987 can qualify for alternative limits. Everett's treatment lagoon qualifies as a previously approved system. This section allows Ecology to set BOD_5 and TSS limits at "effluent concentrations consistently achievable through proper operation and maintenance" of the wastewater facility based on an analysis of past performance. Based

on effluent results from 2004 through 2008, Everett's lagoon system can achieve monthly average $CBOD_5$ concentrations of 25 mg/l (standard technology-based limit) and TSS concentrations of 66 mg/l (95th percentile performance-based limit). Percent removal limits for $CBOD_5$ are set according to section 050(6)(b). No percent removal limit applies for TSS.

Section 050(3): Facilities which receive flow from combined sewers during wet weather can qualify for alternative monthly percent removal limits. During such wet weather conditions, Ecology may excuse the facility from achieving any predetermined percent removal requirement. Everett's TF/SC system can achieve 85% removal of $CBOD_5$ and TSS year-round. The lagoon system is not required to meet percent removal limits during the wet weather months.

Section 050(6): Ecology may substitute the parameter $CBOD_5$ for BOD_5 as an effluent limit. Alternative limits for $CBOD_5$ apply to lagoon systems covered under Section 050(2).

The technology-based mass limits are based on WAC 173-220-130(3)(b).

Monthly effluent mass loadings (lbs/day) = maximum monthly design flow (MGD) x concentration limit (mg/L) x 8.34 (conversion factor) = mass limit (lbs/day).

Table 9 - Technology-based Limits for Outfall 015 (Lagoon System)

Parameter	Limit
pH	The pH must measure within the range of 6.0 to 9.0 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
$CBOD_5$ (concentration)	Average Monthly Limit is the most stringent of the following: - 25 mg/L - may not exceed thirty-five percent (35%) of the average influent concentration (dry weather only) Average Weekly Limit = 40 mg/L
$CBOD_5$ (mass)	Average Monthly Limit = 15.3 MGD x 25 mg/l x 8.34 = 3,190 lbs/day Average Weekly Limit = 15.3 MGD x 40 mg/l x 8.34 = 5,100 lbs/day
TSS (concentration)	Average Monthly Limit = 66 mg/L Average Weekly Limit = 99 mg/L
TSS (mass)	Average Monthly Limit = 15.3 MGD x 66 mg/l x 8.34 = 8,420 lbs/day Average Weekly Limit = 15.3 MGD x 99 mg/l x 8.34 = 12,630 lbs/day

Table 10 - Technology-based Limits for Outfall 100 (TF/SC system)

Parameter	Limit
pH	The pH must measure within the range of 6.0 to 9.0 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
$CBOD_5$ (concentration)	Average Monthly Limit is the most stringent of the following: - 25 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 40 mg/L
$CBOD_5$ (mass)	Average Monthly Limit = 21 MGD x 25 mg/l x 8.34 = 4,380 lbs/day Average Weekly Limit = 21 MGD x 40 mg/l x 8.34 = 7,010 lbs/day
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (mass)	Average Monthly Limit = 21 MGD x 30 mg/l x 8.34 = 5,250 lbs/day Average Weekly Limit = 21 MGD x 45 mg/l x 8.34 = 7,880 lbs/day
Chlorine	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

Ecology derived the technology-based monthly average limit for chlorine from standard operating practices. The Water Pollution Control Federation's Chlorination of Wastewater (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after fifteen minutes of contact time. See also Metcalf and Eddy, *Wastewater Engineering, Treatment, Disposal and Reuse*, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/L chlorine limit on a monthly average basis.

C. Surface Water Quality-Based Effluent Limits

The Washington State Surface Water Quality Standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

Numerical Criteria for the Protection of Aquatic Life and Recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State (EPA 1992). These criteria are designed to protect humans from exposure to pollutants linked to cancer and other disease, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative Criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210,; 2006) in the State of Washington.

Antidegradation

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.

Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions. Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities. Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.

Ecology's analysis described in this section of the fact sheet demonstrates that the existing and designated uses of the receiving water will be protected under the conditions of the proposed permit.

If Everett proposes a facility expansion it must meet Tier II requirements. A Tier II analysis focuses on evaluating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs associated with the lowering of water quality. New discharges and facility expansions are prohibited from lowering water quality without providing overriding public benefits**.**

Mixing Zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and use no more than 25% of the available width of the water body for dilution. Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derive any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the

most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 10 means the effluent is 10% and the receiving water is 90% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life **acute** criterion is based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Each aquatic life **chronic** criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two liters/day for drinking water
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes acute mixing zones, surrounded by chronic mixing zones around the points of discharge (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. **Ecology must specify both the allowed size and location in a permit.**
   The proposed permit specifies the sizes and locations of the allowed mixing zones.

2. **The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.**
   Ecology has determined that the treatment provided at Everett WPCF meets the requirements of AKART (see "Technology-based Limits").

3. **Ecology must consider critical discharge conditions.**
   Surface water quality-based limits are derived for the waterbody's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: http://www.ecy.wa.gov/biblio/92109.html.

Outfalls 015 and 025 – discharges to Snohomish River: The *Everett Water Pollution Control Facility Re-rating and Effluent Mixing Zone Study* (Brown and Caldwell, 1996) used the following critical conditions to model the discharge into the Snohomish River:

- July-October 7-day-average low river flow with a recurrence interval of twenty years (7Q20) of 1051 cfs.
- River depth of 8 feet (015) and 16 feet (025) at the 7Q10 period.
- The model was run for each concurrent combination of tide elevation, current speed and salinity/temperature/depth profile observed at Langus Park on August 14-15, 1995.
- Maximum average monthly effluent flow of 16 MGD (lagoon) and 8 MGD (TF/SC).
- Mixing ratios were also assessed with a dye tracer study conducted by Cosmopolitan Engineering Group on August 14-18, 1995.

Outfall 100 – discharge to Port Gardner Bay: The *Effluent Mixing Study Outfall 100* (CH2M Hill, 2004) used the following critical conditions to model the combined discharge from Kimberly-Clark, Everett, and Marysville:

- Water depth at MLLW of 344 feet.
- Density profiles representing minimum and maximum stratification.
- Ambient current speeds: 10th percentile current speed of 1.2 cm/sec, 50th percentile current speed of 5.3 cm/sec, 90th percentile current speed of 11.1 cm/sec.
- Maximum average monthly effluent flow of 58.5 MGD for chronic and human health non-carcinogen.
- Maximum daily flow of 69.9 million gallons per day (MGD) for acute mixing zone.
- 1-DMax Effluent temperature of 32.5 degrees C.

4. Supporting information must clearly indicate the mixing zone would not:

- **Have a reasonable potential to cause the loss of sensitive or important habitat.**
- **Substantially interfere with the existing or characteristic uses.**
- **Result in damage to the ecosystem.**
- **Adversely affect public health.**

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that concentrations below both acute and chronic criteria are reached within minutes of being discharged.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

Ecology reviewed the above information, the specific information on the characteristics of the effluent, the receiving water characteristics and the discharge locations. Based on this review, Ecology concluded that the discharges do not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

5. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.
Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and each outfall and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundaries of the mixing zones if permit limits are met.

6. The size of the mixing zone and the concentrations of the pollutants must be minimized.
At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. Because tidal currents change direction, the plume orientation within the mixing zone changes. The plume rises

through the water column as it mixes, therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years (or in some cases once in every twenty years) to perform the reasonable potential analysis.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zones authorized in the proposed permit.

7. Maximum size of mixing zone.
The authorized mixing zones do not exceed the maximum size restriction.

8. Acute Mixing Zone.

- **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.**
  Ecology determined the acute criteria will be met at 10% of the distance of the chronic mixing zone.
- **The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**
  As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).
- **Comply with size restrictions.**
  The mixing zones authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

9. Overlap of Mixing Zones.
These mixing zones do not overlap each other or any other mixing zone.

D. Designated Uses and Surface Water Quality Criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). Criteria applicable to this facility's discharge are summarized below in Table 5.

Marine water aquatic life uses are designated using the following general categories. All indigenous fish and non-fish aquatic species must be protected in waters of the state.

(a) **Extraordinary quality** salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

(b) **Excellent quality** salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

(c) **Good quality** salmonid migration and rearing; other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

(d) **Fair quality** salmonid and other fish migration.

According to WAC 173-201A-260(3)(e), in brackish waters of estuaries, where different criteria for the same use occurs for fresh and marine waters, the decision to use the fresh water or the marine water criteria must be selected and applied on the basis of vertically averaged daily maximum salinity. The marine water criteria apply where the salinity values are greater than one part per thousand, except that the fresh water criteria for bacteria apply when the salinity is less than 10 parts per thousand.

The two Snohomish River outfalls are located within an estuary boundary defined by a salinity of one part per thousand (‰) at Mean Higher High Water and at an average annual low flow of 6,577 cubic feet per second. The "excellent quality" marine water criteria apply for this receiving water. For the Environmental Protection Agency's National Toxics Rule, freshwater criteria apply to waters with salinity less than 1‰; saltwater criteria apply in waters with salinity greater than 10 ‰; and the more stringent criteria apply in waters between 1 and 10 ‰.

Port Gardner Bay is also "excellent quality" marine water.

Table 11 - Aquatic Life Uses and Associated Criteria

Excellent Quality	
Temperature Criteria – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen Criteria – Lowest 1-Day Minimum	6.0 mg/L
Turbidity Criteria	• 5 NTU over background when the background is 50 NTU or less; or • A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH Criteria	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

To protect **shellfish harvesting**, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.

The **recreational uses** are primary contact recreation and secondary contact recreation.

Table 12 - Water Contact Recreation Bacteria Criteria in Marine Water

Recreational Use	Criteria
Primary Contact Recreation	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
Secondary Contact Recreation	Enterococci organism levels must not exceed a geometric mean value of 70 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 208 colonies/100 mL.

For the **Snohomish River** from mouth and east of longitude 122°13’40”W upstream to latitude 47°56’30”N (southern tip of Ebey Island at river mile 8.1) fecal coliform organism levels must not exceed a geometric mean value of 200 colonies/100 mL and not have more than 10 percent of the samples obtained for calculating the mean value exceeding 400 colonies/100 mL (WAC 173-201A Table 602 specific classification).

The **miscellaneous marine water uses** are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Evaluation of Surface Water Quality-Based Effluent Limits for Numeric Criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants—their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biological oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by chapter 173-201A WAC.

Chronic Mixing Zone

WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports as measured during MLLW and not occupy greater than 25% of the width of the water body. The mixing zone extends from the seabed to the top of the water surface.

Acute Mixing Zone

WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone.

Lagoon System (Outfall 015):

1. The width of the mixing zone is 90 feet and is centered on the middle of the multi-port diffuser 180 feet from the east bank of the river at Mean Lower Low Water.

2. The length of the mixing zone downstream perpendicular to the outfall is 208 feet; the length of the mixing zone upstream perpendicular to the outfall is 208 feet.

3. The zone where acute criteria may be exceeded is 20.8 feet in any horizontal direction from the diffuser and extends vertically to the water surface.

Port Gardner Bay Outfall (Outfall 100):

1. The mixing zone extends in any horizontal direction from the discharge ports for 550 feet and extends vertically to the water surface.

2. The zone where acute criteria may be exceeded extends 55 feet measured independently in any horizontal direction from any discharge port and extends vertically to the water surface.

Trickling Filter/Solids Contact System (Outfall 025):

1. The width of the mixing zone is 105 feet and is centered on the middle of the multi-port diffuser 222.5 feet from the east bank of the river at Mean Lower Low Water.

2. The length of the mixing zone downstream perpendicular to the outfall is 216 feet; the length of the mixing zone upstream perpendicular to the outfall is 216 feet.

3. The zone where acute criteria may be exceeded is 21.6 feet in any horizontal direction from the diffuser and extends vertically to the water surface.

See diagrams in Appendix C.

For the Snohomish River outfalls, Ecology determined the dilution factors that occur within these zones at the critical condition using dye studies and the EPA WASP5 and PLUMES models. See *Everett Water Pollution Facility, Re-rating and Effluent Mixing Zone Study* (Brown and Caldwell, April 1996). For the Port Gardner Bay outfall, Ecology determined the dilution factors using the model UDKHDEN and a modified Brooks farfield method. See *Effluent Mixing Study for Outfall 100* (CH2M Hill, September 2004). The dilution factors are listed in Tables 13-15:

Table 13 - Dilution Factors (DF) – Lagoon System, Snohomish River Outfall 015

Criteria	Acute	Chronic
Aquatic Life	6.4	14.2
Human Health, Carcinogen		14.2
Human Health, Non-carcinogen		14.2

Table 14 - Dilution Factors (DF) – TF/SC System, Port Gardner Bay Outfall 100

Criteria	Acute	Chronic
Aquatic Life	156	696
Human Health, Carcinogen		696
Human Health, Non-carcinogen		696

Table 15 - Dilution Factors (DF) – TF/SC System, Snohomish River Outfall 025

Criteria	Acute	Chronic
Aquatic Life	7.3	15.6
Human Health, Carcinogen		15.6
Human Health, Non-carcinogen		15.6

Ecology determined the impacts of dissolved oxygen deficiency, temperature, pH, fecal coliform, chlorine, ammonia, metals, and other toxics as described below, using the dilution factors in the above table. The derivation of surface water quality-based limits also takes into account the variability of pollutant concentrations in both the effluent and the receiving water.

BOD_5 – Snohomish River: Under critical conditions Ecology predicted a violation of the dissolved oxygen criterion for the Snohomish River Estuary (see the discussion on $CBOD_5$). The *Snohomish River Estuary Dry Season TMDL Study* recommended the implementation of waste load allocations for ammonia (nitrogenous biochemical oxygen demand) and carbonaceous biochemical demand to be protective of the dissolved oxygen criterion. In this permit, the BOD_5 effluent limit is replaced by $CBOD_5$ and ammonia effluent limits.

$CBOD_5$ – Snohomish River: The impact of carbonaceous biochemical oxygen demand to the Snohomish River Estuary was modeled by Ecology using an EPA-supported model, WASP5. The results of the assessments are presented in:

- *Snohomish River Estuary Dry Season TMDL Study – Phase I, Water Quality Model Calibration*, July 1995, Washington State Department of Ecology.
- *Snohomish River Estuary Dry Season TMDL Study – Phase II, Water Quality Model Confirmation and Pollutant Loading Capacity Recommendations*, June 1997, Washington State Department of Ecology.

- *Snohomish River Estuary Dry Season TMDL Study – Phase II, Technical Addendum Number 1*, January 1998, Washington State Department of Ecology.
- *Snohomish River Estuary Total Maximum Daily Load, Submittal Report*, August 1999, Washington State Department of Ecology.
- *Snohomish River Estuary Total Maximum Daily Load, Supplement*, August 1999, Washington State Department of Ecology.
- *Snohomish River Estuary Dry Season TMDL Study – Phase II, Technical Addendum Number 2*, July 1999, Washington State Department of Ecology.

Ecology used the WASP5 model to simulate the hydrodynamics and water quality of the estuary system at the critical 7Q20 river flow condition under changing tides with steady state pollutant loading conditions. The model predicted for existing discharges under critical conditions, the dissolved oxygen concentrations at low ebbing and high slack tide in a large portion of the lower river and estuary would be below the Marine Class A criteria. To meet the allowable human-caused dissolved oxygen deficit of 0.2 milligrams per liter, the TMDL study recommended waste load allocations for ammonia and carbonaceous BOD for the wastewater treatment plants at Everett, Lake Stevens Sewer District, Marysville, and Snohomish.

In July 1999, using new data collected by the Snohomish Regional Water Quality Association, Ecology revised the recommended waste load allocations for the 5-day carbonaceous biochemical oxygen demand and ammonia for the Snohomish River Estuary. The following table shows the waste load allocations for the Everett WPCF.

Table 16 – TMDL Waste Load Allocations

Everett WPCF	Daily Maximum	
	Ammonia (lb/day)	**$CBOD_5$ (lb/day)**
Lagoon	876	1,668
Trickling Filter/Solids Contact	667	494
Total	1,543	2,162

The TF/SC effluent now discharges through the Port Gardner Bay outfall, and does not discharge into the Snohomish River from the TF/SC system except for occasional flushing. Therefore, Ecology applied the total load allocations for ammonia and $CBOD_5$ to the maximum daily limits for the lagoon system.

Effluent mass loading limits for $CBOD_5$ and ammonia are related because both these substances exert an oxygen demand that affects dissolved oxygen levels in the river. Ecology allows an exchange of waste load allocations between $CBOD_5$ and ammonia if the overall daily load remains constant. River modeling studies indicated an exchange rate of 2.1 lbs. of $CBOD_5$ for each 1 lb. of ammonia. The proposed permit sets the daily maximum limit for "equivalent $CBOD_5$" using this ratio.

*Equivalent $CBOD_5$ (lbs/day) = $CBOD_5$ (lbs/day) + (2.1 * Ammonia (lbs/day))*

where $CBOD_5$ and total ammonia are measurements from the same daily composite sample.

The daily maximum limit for equivalent $CBOD_5$ is:

2,162 lbs/day $CBOD_5$ + (2.1 * 1,543 lbs/day ammonia) = 5,402 lbs/day

Equivalent monthly average limits were calculated according to the methods in EPA's *Technical Support Document for Water Quality-Based Toxics Control*. The calculations are presented in Appendix E.

The average monthly limit for ammonia is 904 lbs/day.

The average monthly limit for $CBOD_5$ is 1,145 lbs/day.

The monthly average limit for equivalent $CBOD_5$ is:

1,145 lbs/day $CBOD_5$ + (2.1 * 904 lbs/day ammonia) = 3,043 lbs/day

The TMDL-based limits apply during the low flow months of July through October. The technology-based limits for $CBOD_5$ apply from November through June.

BOD_5/$CBOD_5$ – Port Gardner Bay: With technology-based limits, this discharge results in a small amount of BOD loading relative to the large amount of dilution in the receiving water at critical conditions. Technology-based limits will ensure that dissolved oxygen criteria are met in the receiving water.

Temperature: The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual summer maximum and supplementary spawning/rearing criteria

  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

  Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A-602, Table 602]. These criteria apply during specific date-windows.

The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- Incremental warming criteria

  The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

  At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

  At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

  When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Temperature Acute Effects

  Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C 2-seconds after discharge.

  General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

  Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

  Annual summer maximum and incremental warming criteria – Snohomish River, Outfalls 015 and 025: Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical conditions. The temperature at the edge of the chronic mixing zone during critical condition(s) is:

$T_{chronic} = (T_{effluent95} + (DF - 1)*T_{ambient90})/DF$

$T_{chronic} = (22.6 + (14.2 -1) * 17.8)/14.2 = 18.1$

Where:
$T_{ambient90}$ = 90th percentile background water temperature (estimated as the highest measured average ambient temperature)
$T_{effluent95}$ = 95th percentile 1-Dmax effluent temperature
DF = the chronic dilution factor at the critical condition.

The incremental increase at the edge of the chronic mixing zone is:

$T_{chronic} - T_{ambient90} = 18.1 - 17.8 = 0.3$

The ambient background temperature ($T_{ambient90}$) at critical conditions is warmer than the threshold criterion. Therefore the allowed temperature increase at the edge of the chronic mixing zone is 0.3°C.

The incremental increase for this discharge ($T_{chronic} - T_{ambient90}$) is less than or equal to 0.3°C. Therefore, the proposed permit does not include a temperature limit.

General lethality and migration blockage: The Snohomish River Estuary does not exceed a 1DMax of 23°C or a 7DADMax of 22°C.

Temperature – Port Gardner Bay, Outfall 100: The estimated maximum temperature for the combined Kimberly-Clark, Everett and Marysville effluents from Outfall 100 is 32.5°C (*Effluent Mixing Study Outfall 100*, CH2MHill 2004). Ecology calculated the reasonable potential for the discharge to exceed the annual summer maximum and the incremental warming criteria at the edge of the chronic mixing zone during critical conditions. No reasonable potential exists to exceed the temperature criterion where:

$(Criterion + 0.3) > (Criterion + (T_{effluent95} - Criterion)/DF)$.

$(16 + 0.3) > (16 + (32.5 - 16)/696)$.

$16.3 > 16.02$.

Therefore, the proposed permit does not include a temperature limit for Outfall 100.

General lethality and migration blockage: Port Gardner Bay does not exceed a 1DMax of 23°C.

pH—Compliance with the technology-based limits of 6.0 to 9.0 will assure compliance with the water quality standards of surface waters because of the high buffering capacity of marine water.

Fecal Coliform—Ecology modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 14.2 for the Lagoon System Outfall 015, 696 for the TF/SC Outfall 100, and 15.3 for the Trickling Filter/Solids Contact System Outfall 025.

Under critical conditions, modeling predicts no violation of the water quality criteria for fecal coliform. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria.

Toxic Pollutants—Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants are present in the discharge: chlorine, ammonia, metals, cyanide, and organic pollutants (see Tables 4 and 5). Ecology conducted a reasonable potential analysis (See Appendix E) on these parameters to determine whether it would require effluent limits in this permit.

Ammonia's toxicity depends on that portion which is available in the unionized form. The amount of unionized ammonia depends on the temperature, pH, and salinity of the receiving marine water. To evaluate ammonia toxicity, Ecology used the available receiving water information from Snohomish River Estuary Dry Season TMDL Study – Phase II (1997) and from ambient station PSS010 and Ecology spreadsheet tools.

No valid ambient background data were available for dissolved arsenic, nickel, selenium, and silver in the Snohomish River. No valid ambient background data were available for any toxic pollutants in Port Gardner Bay. Ecology used zero for background.

Valid ambient background data were available for ammonia, copper, lead, mercury, and zinc in the Snohomish River. Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Ecology determined that the toxic pollutants in the discharge pose no reasonable potential to exceed the water quality criteria at the critical condition using procedures given in EPA, 1991 (Appendix E) and as described above. Ecology's determination assumes that this facility meets the other effluent limits of this permit.

F. Whole Effluent Toxicity

The water quality standards for surface waters forbid discharge of effluent that causes toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

- *Acute toxicity tests measure mortality as the significant response* to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.

- *Chronic toxicity tests measure various sublethal toxic responses,* such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test on an organism with an extremely short life cycle, or a partial life cycle test during a critical stage of a test organism's life. Some chronic toxicity tests also measure organism survival.

Ecology-accredited WET testing laboratories use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format. Ecology gives all accredited labs the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (http://www.ecy.wa.gov/biblio/9580.html), which is referenced in the permit. Ecology recommends that Everett WPCF send a copy of the acute or chronic toxicity sections(s) of its NPDES permit to the laboratory.

WET testing conducted during the previous permit term showed the facility's effluent has a reasonable potential to cause acute toxicity in the receiving water. The proposed permit will impose an acute toxicity limit. **The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC).** The acute critical effluent concentration (ACEC) is the concentration of effluent at the boundary of the acute mixing zone during critical conditions.

- The ACEC for lagoon system effluent (Outfall 015) equals 15.6% effluent.

- The ACEC for TF/SC system effluent (Outfall 100) equals 0.64% effluent.

Compliance with an acute toxicity limit is measured by an acute toxicity test comparing test organism survival in the ACEC (using a sample of effluent diluted to equal the ACEC) to survival in nontoxic control water. Everett WPCF is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC sample and the control sample.

WET testing conducted during effluent characterization showed no reasonable potential for effluent discharges to cause receiving water chronic toxicity. The proposed permit will not impose a chronic WET limit. Everett WPCF must retest the effluent before submitting an application for permit renewal.

- If this facility makes process or material changes which, in Ecology's opinion, increase the potential for effluent toxicity, then Ecology may (in a regulatory order, by permit modification, or in the permit renewal) require the facility to conduct additional effluent characterization.

- If WET testing conducted for submittal with a permit application fails to meet the performance standards in WAC 173-205-020, Ecology will assume that effluent toxicity has increased. Everett WPCF may demonstrate to Ecology that effluent toxicity has not increased by performing additional WET testing after the process or material changes have been made.

G. Human Health

Washington's water quality standards include 91 numeric human health-based criteria that Ecology must consider when writing NPDES permits. These criteria were established in 1992 by the U.S. EPA in its National Toxics Rule (40 CFR 131.36). The National Toxics Rule allows states to use mixing zones to evaluate whether discharges comply with human health criteria.

Ecology determined the effluent may contain chemicals of concern for human health, based on the facility's status as an EPA major discharger, and data or information indicating regulated chemicals occur in the discharge.

Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) and Ecology's *Permit Writer's Manual* to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

H. Sediment Quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. http://www.ecy.wa.gov/programs/tcp/smu/sediment.html

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

- Both Snohomish River outfalls discharge into a navigation channel, which is routinely dredged to maintain navigation depths. The river velocity together with bedload transport and the routine dredging prevent the accumulation of contaminated sediments in the vicinity of the outfalls.

- Outfall 100 in Port Gardner Bay is owned by Kimberly-Clark. Kimberly-Clark submitted a sediment analysis study in June 2004 which evaluated the sediments around the new outfall. The samples did not exceed the sediment management standards. Ecology decided that Kimberly-Clark did not need to perform bioassay testing.

I. Ground Water Quality Limits

The ground water quality standards (chapter 173-200 WAC) protect beneficial uses of ground water. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

Everett WPCF does not discharge wastewater to the ground. No permit limits are required to protect ground water.

J. Comparison of Effluent Limits With the Previous Permit as Modified on October 19, 2007

Table 17 - Comparison of Effluent Limits – Lagoon (River) Outfall 015

	Basis of Limit	Previous Effluent Limits: Outfall # 015		Proposed Effluent Limits: Outfall # 015	
		Average Monthly	Average Weekly	Average Monthly	Average Weekly
Carbonaceous Biochemical Oxygen Demand (5-day)	Technology	25 mg/l 3,190 lbs/day (Nov-Jun) 65% removal (Jul-Oct)	40 mg/l 5,100 lbs/day (Nov-Jun)	25 mg/l 3,190 lbs/day (Nov-Jun) 65% removal (Jul-Oct)	40 mg/l 5,100 lbs/day (Nov-Jun)
Total Suspended Solids	Technology	60 mg/l 7,660 lbs/day	90 mg/l 11,480 lbs/day	66 mg/l[(1)] 8,420 lbs/day	99 mg/l 12,630 lbs/day
Fecal Coliform Bacteria	Technology	200/100 ml	400/100 ml	200/100 ml	400/100 ml
pH	Technology	Daily min/max = 6.0/9.0		Daily min/max = 6.0/9.0	
Parameter		**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Equivalent $CBOD_5$	TMDL	3,043 lbs/day (Jul-Oct)	5,402 lbs/day (Jul-Oct)	3,043 lbs/day (Jul-Oct)	5,402 lbs/day (Jul-Oct)
Total Residual Chlorine[(2)]	WQ	0.016 mg/l	0.083 mg/l	0.016 mg/l	0.083 mg/l

(1) TSS limits are performance based according to WAC 173-221-050(2). Ecology's *Permit Writers Manual* allows for lagoon TSS limits of up to 75 mg/l monthly average. TSS levels from Everett WPCF's lagoon have not consistently achieved the limits set in the existing permit. There is no evidence of inadequate operation or maintenance practices, so Ecology calculated new limits based on 2004-2008 performance data.

(2) The existing permit set water quality-based chlorine limits using a very high coefficient of variation. More recent data may result in the calculation of a less stringent average monthly limit. However, the facility is able to comply with the existing limits and they are included in the proposed permit.

Table 18 - Comparison of Effluent Limits – TF/SC (Port Gardner) Outfall 100

	Basis of Limit	Previous Effluent Limits: Outfall # 100		Proposed Effluent Limits: Outfall # 100	
		Average Monthly	Average Weekly	Average Monthly	Average Weekly
Carbonaceous Biochemical Oxygen Demand (5-day)	Technology	25 mg/l 4,380 lbs/day 85% removal	40 mg/l 7,010 lbs/day	25 mg/l 4,380 lbs/day 85% removal	40 mg/l 7,010 lbs/day
Total Suspended Solids	Technology	30 mg/l 5,250 lbs/day 85% removal	45 mg/l 7,880 lbs/day	30 mg/l 5,250 lbs/day 85% removal	45 mg/l 7,880 lbs/day
Fecal Coliform Bacteria	Technology	200/100 ml	400/100 m.	200/100 ml	400/100 m.
pH	Technology	Daily min/max = 6.0/9.0		Daily min/max = 6.0/9.0	
Total Residual Chlorine	Technology	0.5 mg/l	0.75 mg/l	0.5 mg/l	0.75 mg/l

IV. MONITORING REQUIREMENTS

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (Publication Number 92-09).

Monitoring of biosolids quantity and quality is necessary to determine its appropriate uses. Biosolids monitoring is required by the current state and local solid waste management program and by EPA under 40 CFR 503.

As a pretreatment publicly owned treatment works (POTW), the City of Everett is required to sample influent, primary clarifier effluent, final effluent, and sludge for toxic pollutants in order to characterize the industrial input. Sampling is also done to determine if pollutants interfere with the treatment process or pass-through the plant to the sludge or the receiving water. The City of Everett will use the monitoring data to develop local limits which commercial and industrial users must meet.

A. Lab Accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories* to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for general chemistry, metals, microbiology, and ignitability.

V. OTHER PERMIT CONDITIONS

A. Reporting and Record Keeping

Ecology based permit condition S3 on our authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

B. Prevention of Facility Overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require Everett WPCF to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

Condition S.9 sets a compliance schedule for Everett to submit engineering documents required by Condition S.4.

C. Operation and Maintenance (O&M)

The proposed permit contains Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, chapter 173-230 WAC, and WAC 173-240-080. Ecology included it to ensure proper operation and regular maintenance of equipment, and to ensure that Everett WPCF takes adequate safeguards so that it uses constructed facilities to their optimum potential in terms of pollutant capture and treatment.

D. Pretreatment

Duty to Enforce Discharge Prohibitions

This provision prohibits the publicly owned treatment works (POTW) from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

- The first section of the pretreatment requirements prohibits the POTW from accepting pollutants which causes "Pass-through" or "Interference." This general prohibition is from 40 CFR §403.5(a). Appendix B of this fact sheet defines these terms.
- The second section reinforces a number of specific State and Federal pretreatment prohibitions found in WAC 173-216-060 and 40 CFR §403.5(b). These reinforce that the POTW may not accept certain wastes, which:
  - Are prohibited due to dangerous waste rules.
  - Are explosive or flammable.
  - Have too high or low of a pH (too corrosive, acidic or basic).
  - May cause a blockage such as grease, sand, rocks, or viscous materials.
  - Are hot enough to cause a problem.
  - Are of sufficient strength or volume to interfere with treatment.
  - Contain too much petroleum-based oils, mineral oil, or cutting fluid.
  - Create noxious or toxic gases at any point.

  40 CFR Part 403 contains the regulatory basis for these prohibitions, with the exception of the pH provisions which are based on WAC 173-216-060.
- The third section of pretreatment conditions reflects state prohibitions on the POTW accepting certain types of discharges unless the discharge has received prior written authorization from Ecology. These discharges include:
  - Cooling water in significant volumes.
  - Stormwater and other direct inflow sources.
  - Wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Ecology delegated authority to the City of Everett for permitting, monitoring, and enforcement over industrial users discharging to their treatment system to provide more direct and effective control of pollutants. Ecology oversees the delegated Industrial Pretreatment Program to assure compliance with federal pretreatment regulations (40 CFR Part 403) and categorical standards and state regulations (chapter 90.48 RCW and chapter 173-216 WAC).

E. Solid Waste Control

To prevent water quality problems, the facility is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under chapter 70.95J RCW, chapter 173-308 WAC "Biosolids Management," and chapter 173-350 WAC "Solid Waste Handling Standards." The disposal of other solid waste is under the jurisdiction of the Snohomish County Health Department.

F. Spill Plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology can require a facility to develop best management plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

Everett WPCF developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan as necessary.

G. Combined Sewer Overflows

In accordance with RCW 90.48.480 and chapter 173-245 WAC, proposed permit Condition S.11 requires Everett to submit an annual Combined Sewer Overflow (CSO) report and to update its CSO reduction plan at the time of permit renewal. The annual CSO report must include documentation of the Nine Minimum Controls and information on all CSO discharges for the year.

Everett has completed correction projects at most of its CSO sites. During this permit term Everett intends to improve the monitoring and operation of these CSO to determine which are in compliance with the one discharge per year performance standard. For those which are not in compliance, Everett is required to propose additional correction projects.

Everett has completed design and received Ecology's approval for the Bond Street CSO facilities project. This project must be completed by the final compliance date in the CSO Reduction Plan, 2017.

H. Reuse for Single-Pass Non-Contact Cooling Water

The City of Everett and Kimberly-Clark developed an operating agreement for the use of treated effluent in a non-contact cooling water system at the mill bleach plant. Section S.14 of the proposed permit authorizes the use of this effluent.

The State of Washington Water Reclamation and Reuse Standards specifies Class C Reclaimed Water for industrial cooling purposes where aerosols or other mist are not created. RCW 90.46.030 authorizes the Department of Health (DOH) to issue permits for commercial and industrial uses of reclaimed water through the Department of Ecology (ECY or Ecology) administrative permit system. Article 6 of the Standards authorizes DOH and ECY to accept methods of treatment other than those specified within the Standards provided the applicant demonstrates to the agencies' mutual satisfaction that the methods of treatment and reliability features will assure an equal degree of treatment, public health protection and treatment reliability. DOH and ECY determined that the use of the permitted secondary treated and disinfected effluent meets this requirement for use as cooling water in the Kimberly-Clark closed loop system under the provisions of this permit.

I. General Conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual municipal NPDES permits issued by Ecology.

VI. PERMIT ISSUANCE PROCEDURES

A. Permit Modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for ground waters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed Permit Issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of five years.

VII. REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. *National Toxics Rule.* Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001.

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April 1996 (amended January 2001). *Everett Water Pollution Control Facility Re-rating and Effluent Mixing Zone Study,* prepared by Brown and Caldwell.

April 2003 (revised November 2004). *Facilities Plan and Basis of Design Report*.

2004. *Effluent Mixing Study Outfall 100* (for combined effluent discharge from Kimberly-Clark, Everett, and Marysville). CH2M Hill

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2006. *Permit Writer's Manual.* Publication Number 92-109 (http://www.ecy.wa.gov/biblio/92109.html)

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Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html)

July 1995. *Snohomish River Estuary Dry Season TMDL Study – Phase I, Water Quality Model Calibration.*

June 1997. *Snohomish River Estuary Dry Season TMDL Study – Phase II, Water Quality Model Confirmation and Pollutant Loading Capacity Recommendations*.

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APPENDIX A—PUBLIC INVOLVEMENT INFORMATION

Ecology proposes to reissue a permit to Everett WPCF. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on January 29, 2009, and February 5, 2009, in *The Herald*, a daily newspaper printed and published in the City of Everett, to inform the public about the submitted application and to invite comment on the reissuance of this permit.

Ecology placed a Public Notice of Draft on July 26, 2009, in *The Herald* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice –

- Tells where copies of the draft permit and fact sheet are available for public evaluation (a local public library, the closest regional or field office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Asks people to tell us how well the proposed permit would protect the receiving water.
- Invites people to suggest fairer conditions, limits, and requirements for the permit.
- Invites comments on Ecology's determination of compliance with antidegradation rules.
- Urges people to submit their comments, in writing, before the end of the comment period.
- Tells how to request a public hearing about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting* which is available on our website at http://www.ecy.wa.gov/biblio/0307023.html.

You may obtain further information from Ecology by telephone, 425-649-7201, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The primary author of this permit and fact sheet is Laura Fricke, P.E.

APPENDIX B—GLOSSARY

1-DMax or **1-day maximum temperature**—The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or **7-day average of the daily maximum temperatures**—The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute Toxicity—The lethal effect of a compound on an organism that occurs in a short period of time, usually 48 to 96 hours.

AKART—The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Ambient Water Quality—The existing environmental condition of the water in a receiving water body.

Ammonia—Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual Average Design Flow (AADF)—The average of the daily flow volumes anticipated to occur over a calendar year.

Average Monthly Discharge Limit—The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)—Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5—Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass—The intentional diversion of waste streams from any portion of a treatment facility.

Chlorine—Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity—The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)—The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance Inspection - Without Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling—A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite Sample—A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity—Clearing, grading, excavation, and any other activity which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous Monitoring—Uninterrupted, unless otherwise noted in the permit.

Critical Condition—The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor (DF)—A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report—A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria—Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample—A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial Wastewater—Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Major Facility—A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limit—The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum Day Design Flow (MDDF)—The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum Month Design Flow (MMDF)—The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum Week Design Flow (MWDF)—The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method Detection Level (MDL)—The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Minor Facility—A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone—An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)—The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH—The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Peak Hour Design Flow (PHDF)—The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak Instantaneous Design Flow (PIDF)—The maximum anticipated instantaneous flow.

Quantitation Level (QL)—The smallest detectable concentration of analyte greater than the Method Detection Limit (MDL) where the accuracy (precision &bias) achieves the objectives of the intended purpose.

Reasonable Potential—A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible Corporate Officer—A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Technology-based Effluent Limit—A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)—Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to receiving waters may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Solid Waste—All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

State Waters—Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater—That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Upset—An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

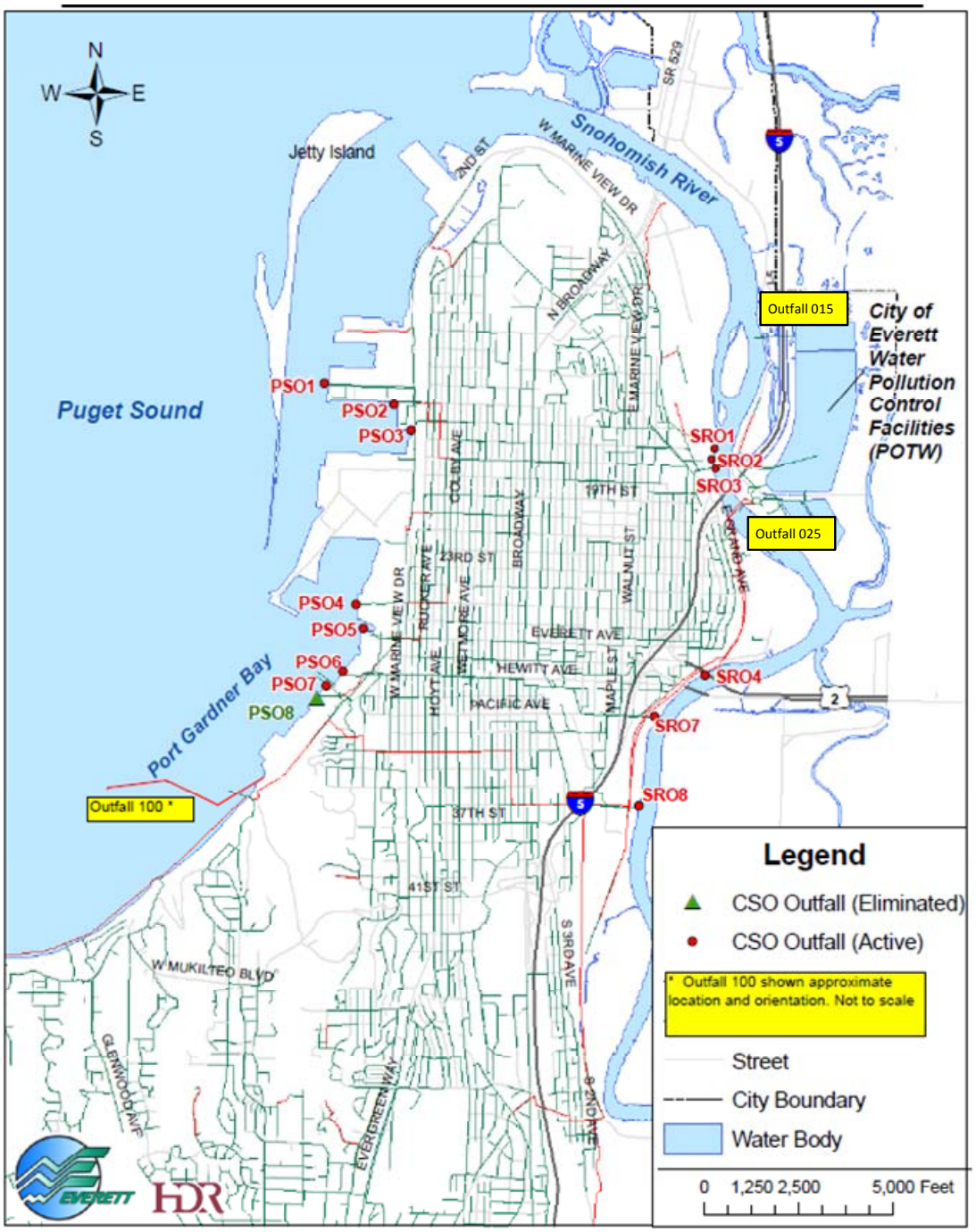
Water Quality-based Effluent Limit—A limit on the concentration of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into receiving waters.

APPENDIX C—MAPS AND DIAGRAMS

This appendix contains the following maps and diagrams:

- Outfall location map (CSOs and Outfall 100)
- WPCF vicinity map and river outfalls
- WPCF process flow diagram
- Diagram of Outfall 100 and associated mixing zones
- Diagram of Outfall 015 and associated mixing zones

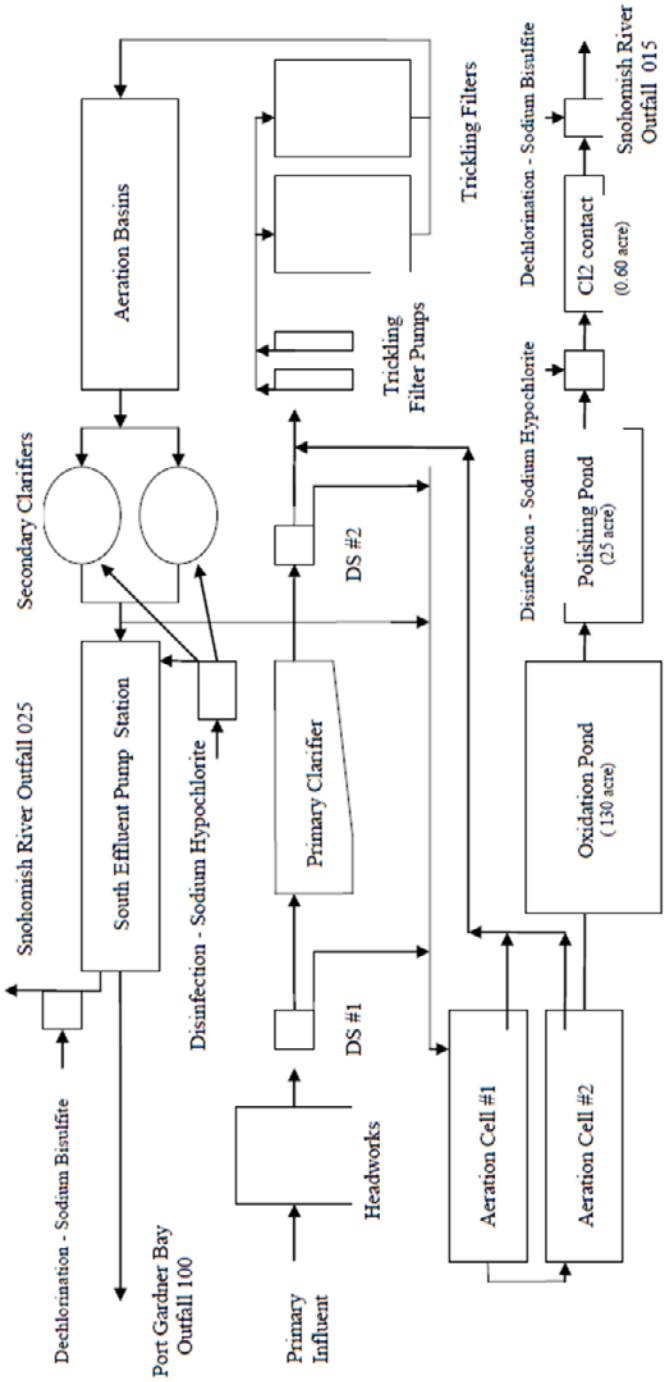
City of Everett Outfall Locations



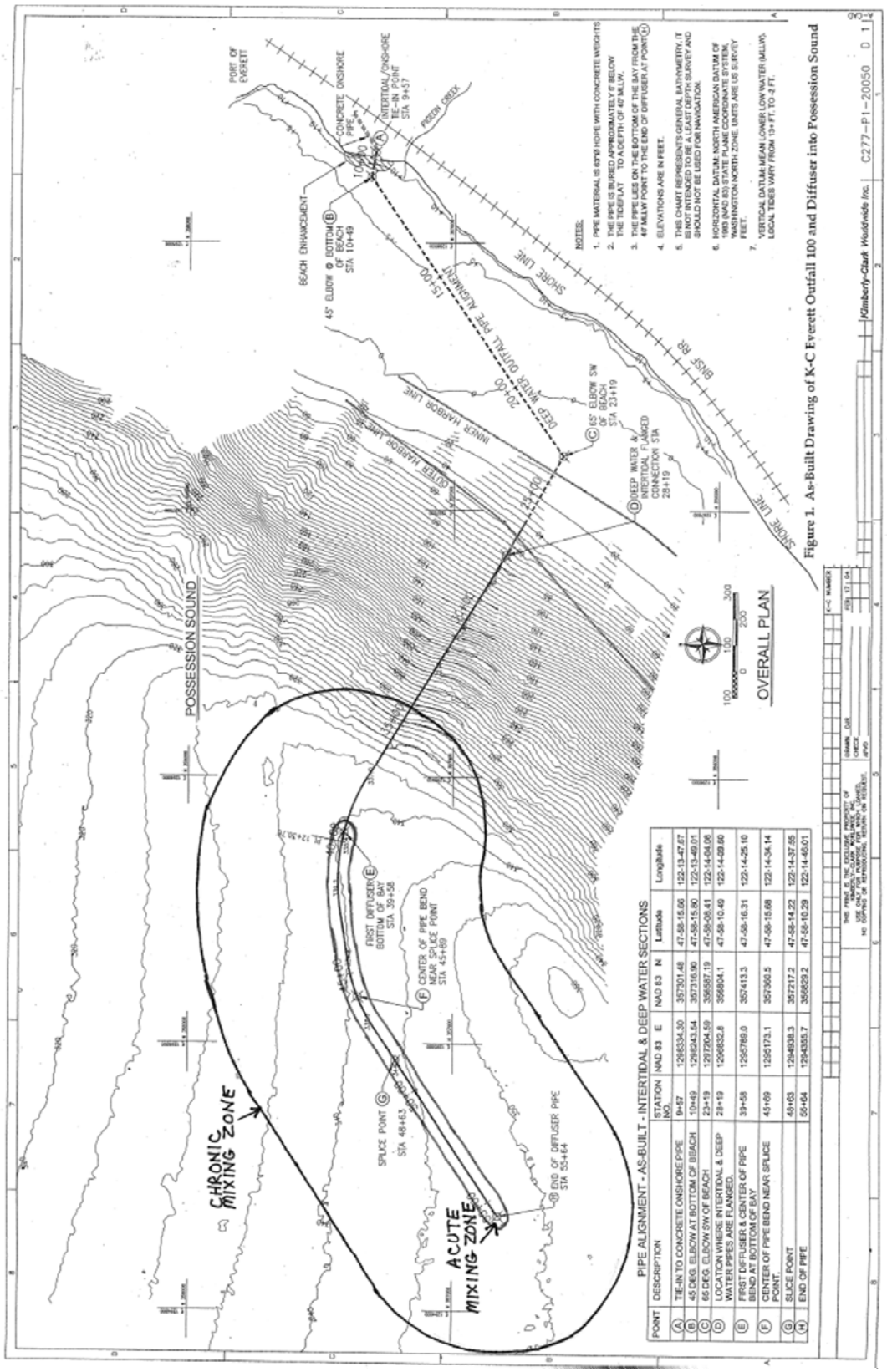
WPCF Vicinity Map
1 inch equals 250 feet
Legend
WPCF Structure
Sewer, Force Main
Sewer, Gravity Main
Storm Drain Line
Drainage Manhole
Drainage Catch Basin / Inlet
N
Administration Building
Maintenance Building
Headworks
Primary Bioffer
Primary Sedimentation Tanks
Division Structure No. 1
Division Structure No. 2
South Cleaning Building
Clarifier #2
Clarifier #1
Aerated Solids Contact Tanks
Operations Building
Tricking Filter #2
Tricking Filter #1
Tricking Filter Pump Station
Tricking Filter Bioffer
Clarifier Flow Control
Disinfectation Building
Cl2 Channel
Filter Filter
Everett
WPCF
SNOHOMISH RIVER
UNION SLOUGH
STEAMBOAT SLOUGH
EBEY SLOUGH
DEADWATER SLOUGH
CITY OF EVERETT
Oxidation Pond
Biosolids Pad
Aeration Pond
South Spencer Island
Smith Island
Ebey Island
E GRAND AVE
BROADWAY
SUMMIT AVE
RAILWAY AVE
EVERETT AVE
MAPLE ST
SCI ESSALL RD
1 inch equals 1,500 feet

City of Everett Water Pollution Control Facility
NPDES Permit No. WA-002449-0

Part B.3 – EWPCF Process Flow Diagram



Outfall 100 and mixing zones

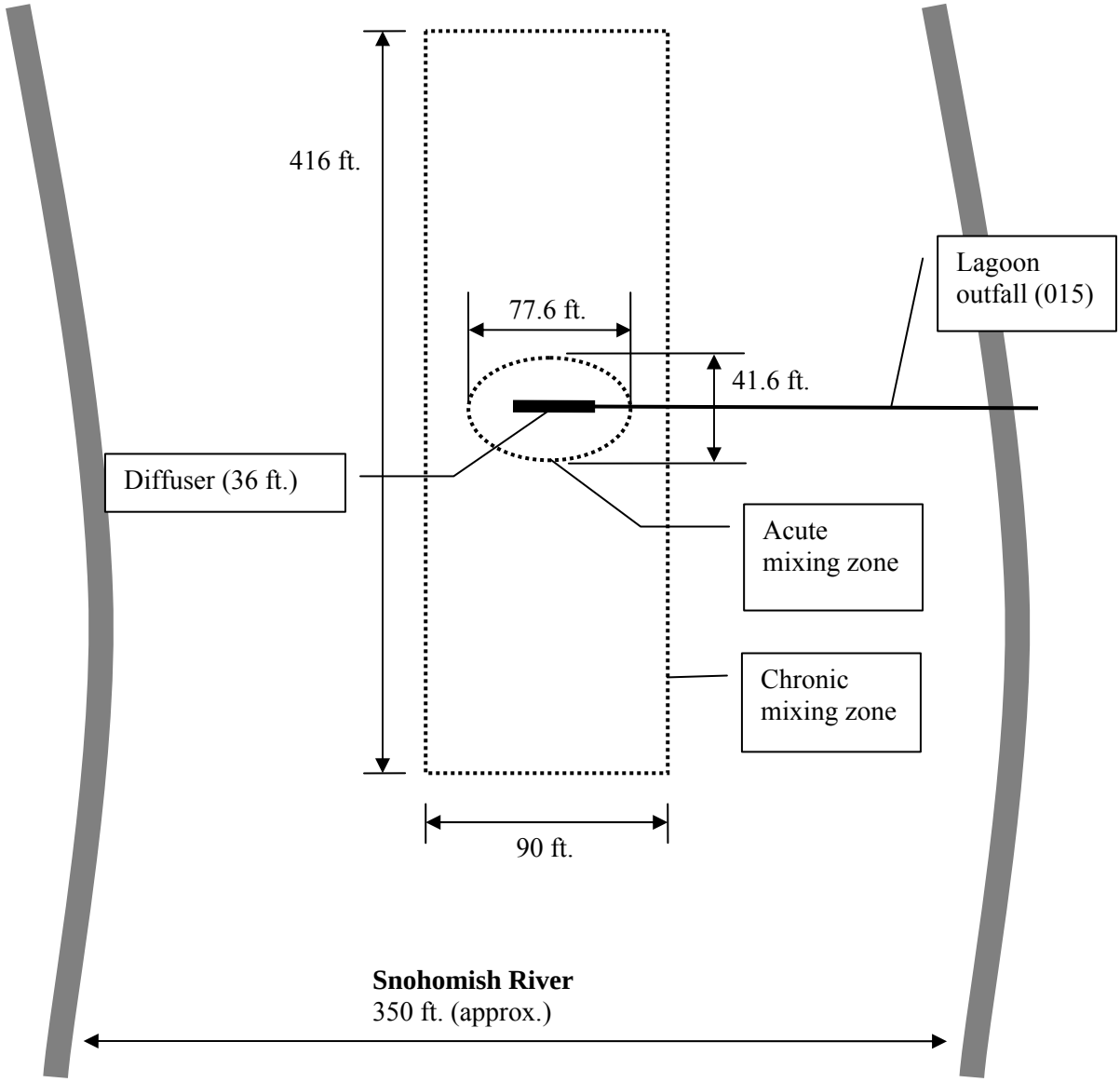


PIPE ALIGNMENT - AS-BUILT - INTERTIDAL & DEEP WATER SECTIONS

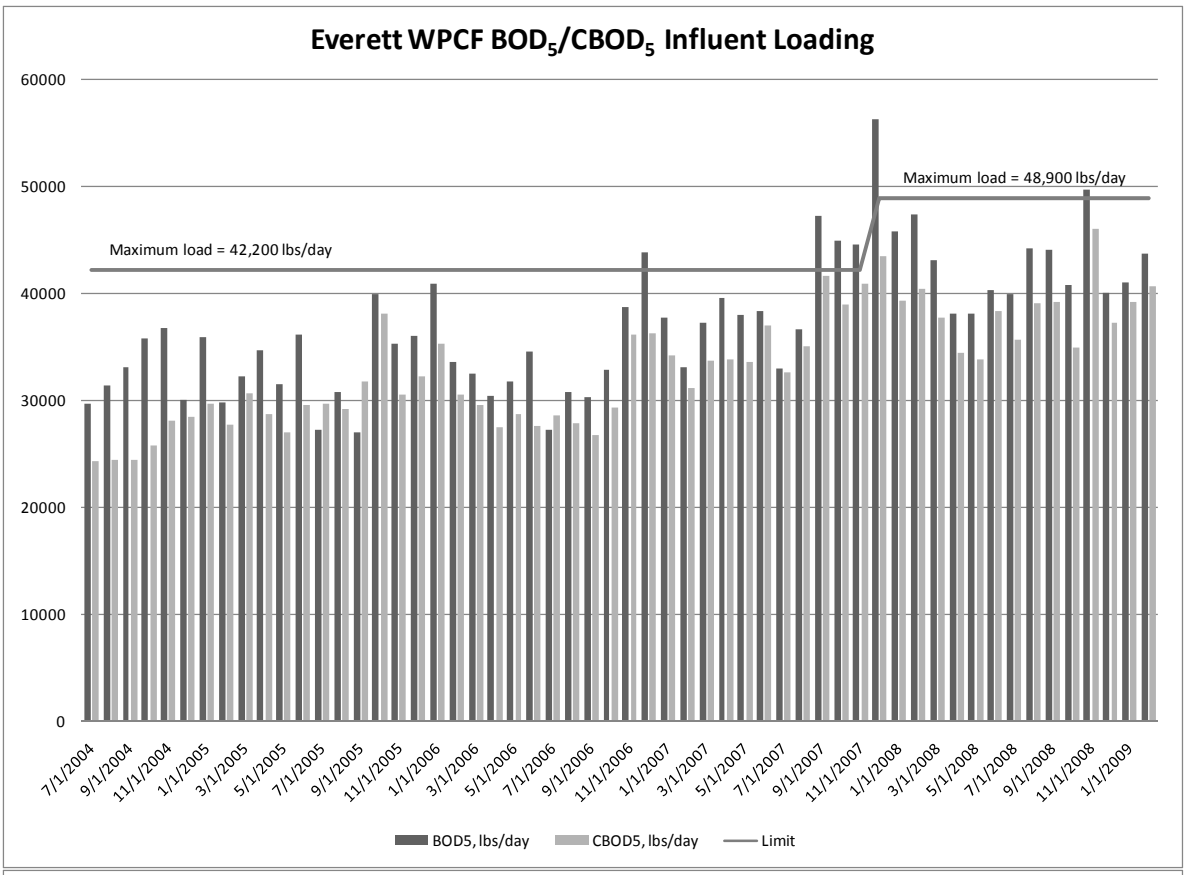
POINT	DESCRIPTION	STATION NO.	NAD 83 E	NAD 83 N	Latitude	Longitude
(A)	TIE-IN TO CONCRETE ONSHORE PIPE	9+57	1298334.30	357301.48	47-58-15.06	122-13-47.67
(B)	45 DEG. ELBOW AT BOTTOM OF BEACH	10+49	1298243.54	357316.90	47-58-15.90	122-13-49.01
(C)	65 DEG. ELBOW SW OF BEACH	23+19	1297204.59	356987.19	47-58-08.41	122-14-04.06
(D)	LOCATION WHERE INTERTIDAL & DEEP WATER PIPES ARE FLANGED.	28+19	1296832.8	356804.1	47-58-10.49	122-14-09.60
(E)	FIRST DIFFUSER & CENTER OF PIPE BEND AT BOTTOM OF BAY	39+58	1295789.0	357413.3	47-58-16.31	122-14-25.10
(F)	CENTER OF PIPE BEND NEAR SPLICE POINT.	45+69	1295173.1	357360.5	47-58-15.68	122-14-34.14
(G)	SLICE POINT	49+63	1294938.3	357217.2	47-58-14.22	122-14-37.55
(H)	END OF PIPE	55+64	1294355.7	356829.2	47-58-10.29	122-14-46.01

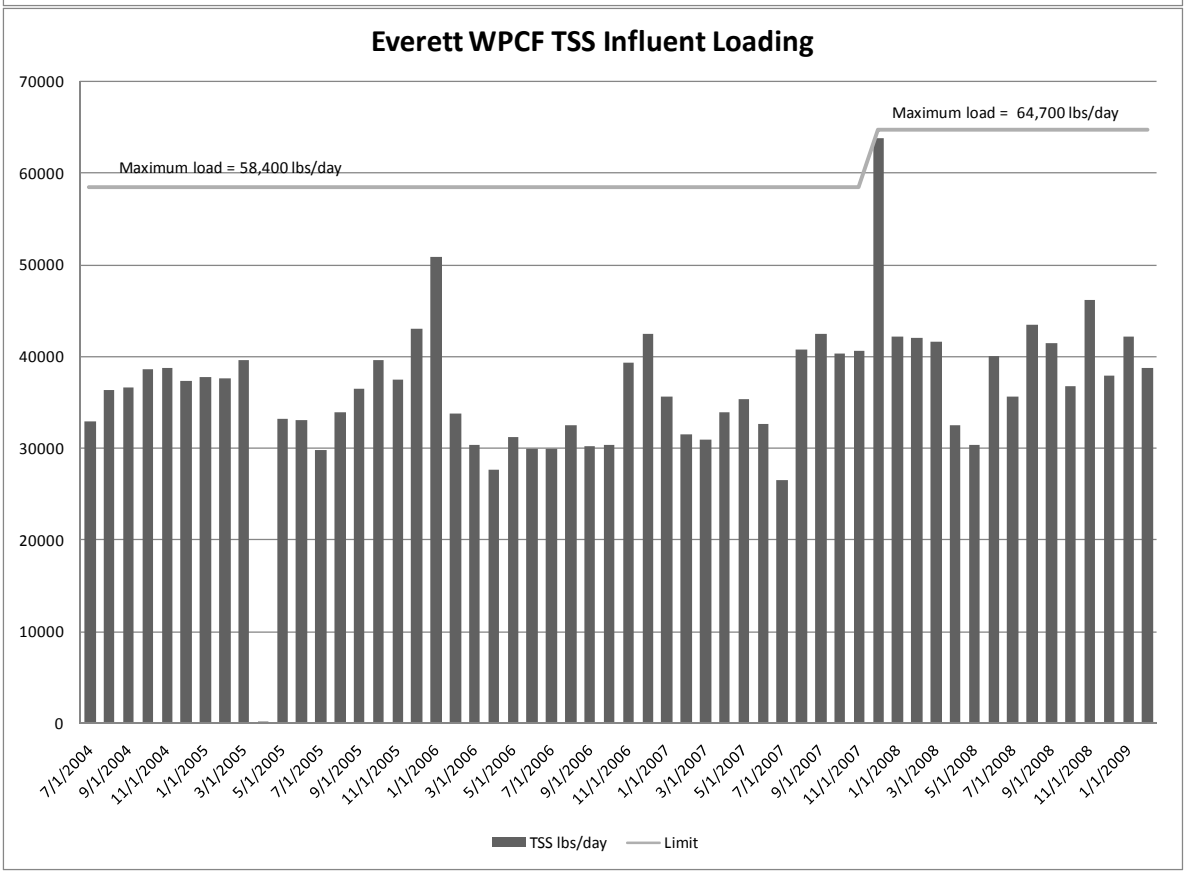
Outfall 015 and mixing zones

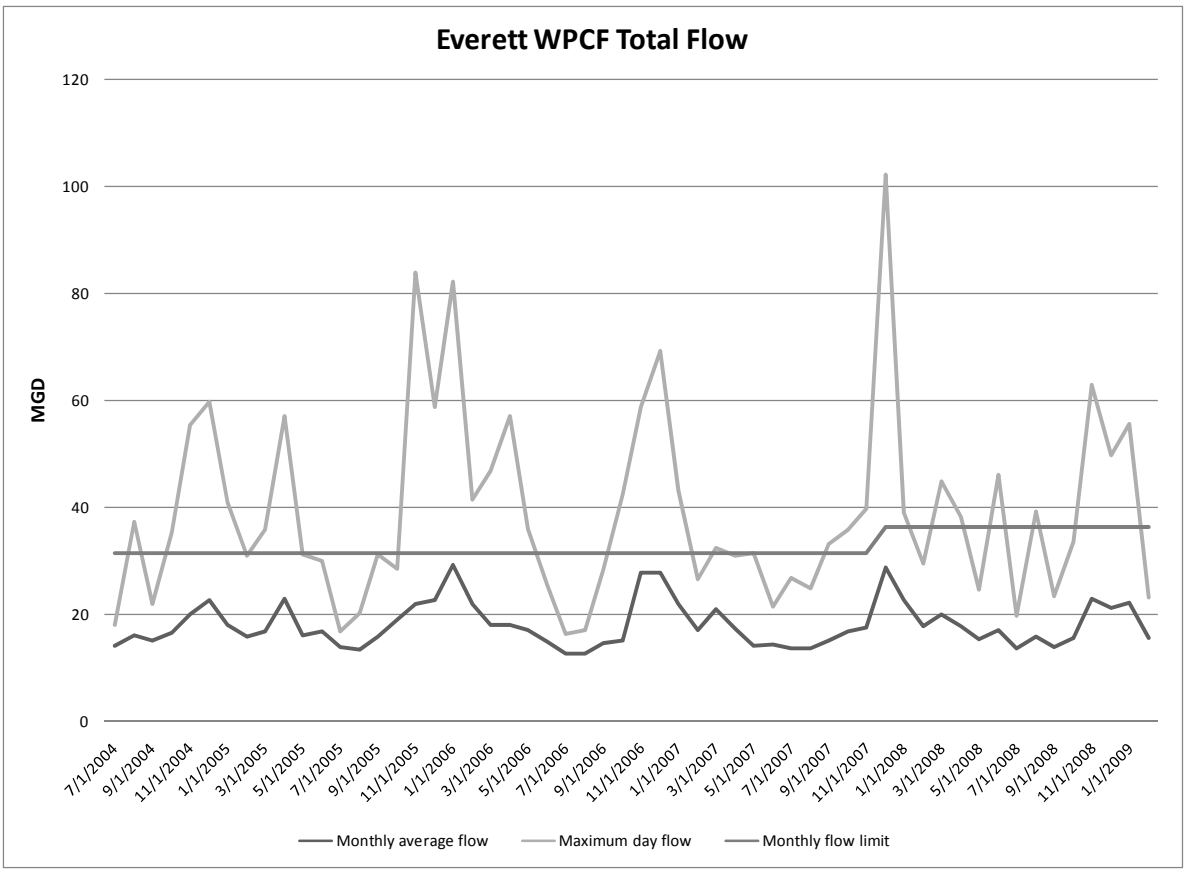
(plan view, not to scale – Outfall 025 mixing zone is similar)



APPENDIX D—WASTEWATER INFLUENT AND EFFLUENT DATA


Everett WPCF BOD5/CBOD5 Influent Loading
60000
50000
40000
30000
20000
10000
0
Maximum load = 48,900 lbs/day
Maximum load = 42,200 lbs/day
7/1/2004
9/1/2004
11/1/2004
1/1/2005
3/1/2005
5/1/2005
7/1/2005
9/1/2005
11/1/2005
1/1/2006
3/1/2006
5/1/2006
7/1/2006
9/1/2006
11/1/2006
1/1/2007
3/1/2007
5/1/2007
7/1/2007
9/1/2007
11/1/2007
1/1/2008
3/1/2008
5/1/2008
7/1/2008
9/1/2008
11/1/2008
1/1/2009
BOD5, lbs/day
CBOD5, lbs/day
Limit


Everett WPCF TSS Influent Loading
70000
60000
50000
40000
30000
20000
10000
0
Maximum load = 64,700 lbs/day
Maximum load = 58,400 lbs/day
7/1/2004
9/1/2004
11/1/2004
1/1/2005
3/1/2005
5/1/2005
7/1/2005
9/1/2005
11/1/2005
1/1/2006
3/1/2006
5/1/2006
7/1/2006
9/1/2006
11/1/2006
1/1/2007
3/1/2007
5/1/2007
7/1/2007
9/1/2007
11/1/2007
1/1/2008
3/1/2008
5/1/2008
7/1/2008
9/1/2008
11/1/2008
1/1/2009
TSS lbs/day
Limit


Everett WPCF Total Flow
MGD
120
100
80
60
40
20
0
7/1/2004
9/1/2004
11/1/2004
1/1/2005
3/1/2005
5/1/2005
7/1/2005
9/1/2005
11/1/2005
1/1/2006
3/1/2006
5/1/2006
7/1/2006
9/1/2006
11/1/2006
1/1/2007
3/1/2007
5/1/2007
7/1/2007
9/1/2007
11/1/2007
1/1/2008
3/1/2008
5/1/2008
7/1/2008
9/1/2008
11/1/2008
1/1/2009
Monthly average flow
Maximum day flow
Monthly flow limit

Discharge Monitoring Report Summary, Influent

Parameter	BOD5	BOD5	BOD5	BOD5	CBOD5	CBOD5	CBOD5	CBOD5	Flow	Flow	TSS	TSS	TSS	TSS
	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
Units	LBS/DAY	LBS/DAY	MG/L	MG/L	LBS/DAY	LBS/DAY	MG/L	MG/L	MGD	MGD	LBS/DAY	LBS/DAY	MG/L	MG/L
Limit	Max: 42200 (before 12/07)								Max: 31.3 (before 12/07)		Max: 58400 (before 12/07)			
	Max: 48900 (after 12/07)								Max: 36.3 (after 12/07)		Max: 64700 (after 12/07)			
7/1/2004	29625	34903	247	270	24289	31058	204	280	14.2	18.2	32913	47830	278	409
8/1/2004	31283	37530	258	360	24406	43668	194	260	16	37.4	36255	107299	272	365
9/1/2004	33106	35804	272	300	24418	32201	194	270	15.1	22.1	36610	64510	292	452
10/1/2004	35739	45245	264	350	25785	31442	195	250	16.6	35.4	38615	68688	289	474
11/1/2004	36738	41433	258	280	28019	57096	186	230	20	55.5	38762	95814		
12/1/2004	29947	31375	200	230	28435	40397	164	240	22.8	59.8	37263	69822		
1/1/2005	35910	41333	240	280	29632	46787	200	270	18.1	41	37717	68388		
2/1/2005	29809	32576	213	280	27640	31759	224	280	15.8	31	37552	69806		
3/1/2005	32207	34903	228	310	30661	52250	229	350	16.9	36	39607	71457		
4/1/2005	34675	45240	146	220	28686	48989	162	220	23	57.1	204	296		
5/1/2005	31412	38164	240	260	26897	36696	210	270	16.1	31.3	33137	55084	300	307
6/1/2005	36106	41158	275	350	29555	37030	215	300	16.9	30.1	33041	45797		
7/1/2005	27198	28022	248	280	29655	30314	255	266	13.9	17	29669	32076	256	286
8/1/2005	30677	37972	278	290	29194	30061	255	266	13.5	20.4	33857	34956	300	307
9/1/2005	27003	32292	228	240	31717	41802	236	266	15.9	31.3	36489	44492	273	288
10/1/2005	39895	46162	232	270	38102	45066	247	262	19.1	28.6	39584	46240	253	269
11/1/2005	35220	37872	235	270	30540	34095	196	222	21.9	83.9	37370	54983	216	240
12/1/2005	35927	40983	228	310	32242	37922	202	264	22.7	58.9	42996	56352	262	350
1/1/2006	40826	55503	165	200	35231	35268	157	175	29.3	82.1	50846	46568	200	249
2/1/2006	33489	38064	173	220	30475	30866	166	180	21.9	41.6	33749	37665	182	209
3/1/2006	32456	39231	220	240	29505	31930	201	213	18.1	46.9	30319	34341	208	238
4/1/2006	30408	37230	230	240	27488	31702	206	215	18.1	57.2	27611	32644	205	231
5/1/2006	31744	38281	258	300	28657	33143	207	218	17	35.8	31184	36112	226	273
6/1/2006	34533	37972	270	290	27546	28510	224	238	15	25.3	29929	32631	238	273
7/1/2006	27244	31067	260	300	28497	30987	270	308	12.7	16.4	29814	40106	279	398
8/1/2006	30690	34428	294	320	27798	29734	257	270	12.7	17.1	32497	34969	300	324
9/1/2006	30272	34027	260	300	26764	29434	216	235	14.6	28.3	30147	38112	242	251
10/1/2006	32795	35937	275	310	29294	39143	223	245	15.1	42.4	30340	42277	237	256
11/1/2006	38598	44310	204	230	36123	38333	168	250	27.9	58.8	39252	43103	169	244
12/1/2006	43772	74159	168	250	36183	40203	165	208	27.8	69.2	42364	56188	173	200
1/1/2007	37649	43235	220	260	34094	39974	189	226	21.9	43.1	35566	41190	198	256
2/1/2007	32989	46612	245	280	31068	37138	218	250	17.1	26.6	31427	33473	219	232
3/1/2007	37152	39265	210	230	33632	34548	202	223	21	32.4	30928	33803	185	207
4/1/2007	39524	42915	283	323	33774	36648	239	273	17.4	31	33840	41812	231	267
5/1/2007	37980	45611	315	340	33491	35093	283	315	14.1	31.4	35350	40486	292	321
6/1/2007	38313	41811	315	337	36907	39990	305	338	14.4	21.6	32528	34158	270	278
7/1/2007	32879	44569	302	380	32545	40674	296	363	13.7	26.8	26412	37089	241	333
8/1/2007	36538	53993	321	430	35059	36367	313	330	13.7	24.9	40626	61964	343	425
9/1/2007	47195	75135	333	390	41574	46623	311	325	15.2	33.2	42412	54743	313	370
10/1/2007	44872	82266	309	360	38903	50920	270	298	16.8	35.9	40221	47475	275	315
11/1/2007	44573	50390	338	373	40866	47732	300	333	17.5	39.8	40578	61666	263	291
12/1/2007	56255	77573	218	253	43461	47340	183	255	28.7	102.2	63808	96157	242	274
1/1/2008	45766	57599	257	333	39218	45458	217	250	22.6	39.1	42101	49676	228	252
2/1/2008	47316	49904	335	373	40392	44338	286	330	17.8	29.6	41908	43657	291	327
3/1/2008	43021	47788	277	337	37646	42326	252	278	20	44.8	41564	45359	259	299
4/1/2008	37998	39490	274	287	34379	37161	249	273	17.9	38.3	32449	35394	226	253
5/1/2008	38060	40566	292	333	33765	36327	257	285	15.3	24.8	30332	34490	235	256
6/1/2008	40212	51752	274	323	38302	43996	269	330	17	46.1	40015	48406	283	326
7/1/2008	39910	56570	331	510	35590	39832	301	333	13.7	19.8	35504	43032	300	330
8/1/2008	44171	62433	334	530	39038	41635	289	305	15.8	39.4	43409	53408	318	339
9/1/2008	44047	52359	382	500	39135	44075	340	378	13.9	23.4	41457	47902	369	421
10/1/2008	40763	52792	345	380	34921	38977	296	345	15.6	33.7	36733	41547	295	376
11/1/2008	49581	62639	282	333	46025	59586	256	315	23	63	46111	59133	245	286
12/1/2008	40032	41744	268	313	37228	39407	243	285	21.3	49.9	37861	48967	238	271
1/1/2009	41026	4437	263	347	39172	45689	233	315	22.3	55.7	42093	65281	228	284
2/1/2009	43608	47866	326	337	40648	44027	308	318	15.7	23.2	38727	43078	284	290
Min	27003	4437	146	200	24289	28510	157	175	12.7	16.4	204	296	169	200
Max	56255	82266	382	530	46025	59586	340	378	29.3	102.2	63808	107299	369	474
Avg	37156	44544	263	313	33112	39353	235	275	18.1	39.2	36315	49142	256	301

Discharge Monitoring Report Summary, Outfall 015 (Lagoon)

Parameter	CBOD5	CBOD5	CBOD5	CBOD5	CBOD5	Chlorine	Chlorine	Fecal Coliform	Fecal Coliform	Flow	Ph	Ph	TSS	TSS	TSS	TSS
	AVG	AVW	AVG	AVG	AVW	AVG	MAX	GEM	GM7	AVG	MAX	MIN	AVG	AVW	AVG	AVW
Units	MG/L	MG/L	%	LBS/DAY	LBS/DAY	MG/L	MG/L	#/100 ML	#/100 ML	MGD	S.U.	S.U.	LBS/DAY	LBS/DAY	MG/L	MG/L
Limit	Max: 25	Max: 40	Min: 65	Max: 7660 (Nov-Jun)	Max: 11480 (Nov-Jun)	Max: .016	Max: .083	Max: 200	Max: 400	Max: 15.3	Max: 9	Min: 6	Max: 7660	Max: 11480	Max: 60	Max: 90
				Max: 3043 (Jul-Oct)	Max: 5402 (Jul-Oct)											
7/1/2004	18	24				0.008	0.012	32	159	4.9	8.9	6.6	2380	2760	60	79
8/1/2004	16	19	91			0.01	0.066	33	64	9.1	8.5	7.4	3169	3770	46	62
9/1/2004	20	26	89			0.011	0.073	38	93	8.5	7.7	7	2856	3770	40	56
10/1/2004	11	12				0.011	0.057	22	61	9.8	7.8	7.4	2010	2376	25	27
11/1/2004	13	15		839	1666	0.008	0.053	31	151	7.4	8	7.3	1586	2962	24	26
12/1/2004	17	20		1743	2444	0.008	0.041	48	107	11.9	7.4	7.1	2212	2852	23	27
1/1/2005	16	19		1366	1954	0.008	0.065	9	47	9.8	7.5	7.1	2737	4210	34	38
2/1/2005	13	15		726	1011	0.009	0.06	2	3	6.7	8.3	7.4	3187	3958	57	62
3/1/2005	17	24		1173	2229	0.01	0.067	2	5	7.8	8.3	6.9	2174	4098	32	63
4/1/2005	21	23		1713	1979	0.008	0.061	16	66	10.7	8.3	6.9	2065	2811	23	28
5/1/2005	24	27		1587	1715	0.008	0.015	8	13	8.2	8.6	7.2	2680	3380	41	55
6/1/2005	17	23		884	1332	0.008	0.062	19	336	6.1	8.1	6.5	2087	3128	41	56
7/1/2005	22	32	80	1008	1850	0.008	0.051	18	93	5.1	7.8	6.1	3098	3369	73	82
8/1/2005	10	14	94	1007	1687	0.008	0.05	4	5	6.5	7.8	6.6	1605	4621	26	69
9/1/2005	9	14	93	1713	3245	0.008	0.069	4	7	4.4	8.1	6.9	320	449	9	15
10/1/2005	16	19	91	5117	14685	0.008	0.066	24	67	10.1	7.9	6.6	1970	2435	25	29
11/1/2005	11	14		996	1590	0.009	0.078	17	35	10.1	7.9	6.6	2026	2930	23	27
12/1/2005	13	15		1540	2602	0.01	0.066	30	53	13.6	7.6	6.2	1998	3203	18	20
1/1/2006	12	13		2198	2418	0.008	0.07	78	136	20.9	7.8	6.1	4023	3996	22	22
2/1/2006	13	19		1214	1193	0.008	0.048	9	19	10.2	8.7	6.1	2360	3244	29	42
3/1/2006	18	20		1151	1737	0.008	0.061	4	19	7.5	8.8	6	2350	2916	39	52
4/1/2006	29	37		2267	4420	0.008	0.056	4	14	10.7	7.9	6.2	2963	4418	36	49
5/1/2006	28	33		1818	2282	0.008	0.029	4	8	7.8	8.5	6.8	4193	4669	64	76
6/1/2006	26	29		1450	2117	0.008	0.066	9	69	6.2	8.1	6.7	2928	4290	53	66
7/1/2006	23	28	91	2061	4166	0.008	0.047	34	251	6.2	7.5	6.2	3098	4889	61	66
8/1/2006	19	23	92	2578	4707	0.008	0.023	20	156	5.1	7.9	6.5	2646	3959	64	78
9/1/2006																
10/1/2006	16	19	93	1321	2141	0.008	0.08	9	47	6.7	7.8	6.5	2558	3014	45	48
11/1/2006	16	18		2020	2538	0.01	0.07	55	129	15.9	8	6.6	3878	4630	31	42
12/1/2006	23	28		2836	3788	0.008	0.066	124	170	14.9	7.3	6.1	4277	6195	33	38
1/1/2007	22	27		2389	2839	0.01	0.062	26	103	13	7.7	6	2960	4440	26	31
2/1/2007	28	32		2315	3511	0.01	0.069	3	5	9.5	7.4	6.8	2484	3451	30	37
3/1/2007	19	21		2159	3037	0.008	0.072	10	78	14.1	8.2	6.8	4796	6593	41	46
4/1/2007	27	35		2498	3632	0.008	0.04	5	9	10.6	8.3	6.9	3777	6153	40	58
5/1/2007	27	37		1986	3572	0.008	0.059	6	13	8.8	7.8	6.9	2805	5031	40	52
6/1/2007	22	24		1203	1726	0.008	0.052	17	29	6.4	8.3	7	2807	4425	49	67
7/1/2007	22	39	92	1180	2607	0.012	0.062	9	57	5.3	7.3	6.1	1253	2269	40	98
8/1/2007	18	29	94	2052	3958	0.008	0.066	31	460	5.2	7.9	6.4	2604	3649	59	82
9/1/2007	18	20	94	1062	2248	0.008	0.027	17	44	4.8	7.7	6.3	2425	2962	66	79
10/1/2007	16	21	94	1516	2558	0.008	0.071	12	58	6.6	7.7	6.1	3144	4838	54	67
11/1/2007	15	19		1043	1520	0.008	0.064	5	85	8.5	7.4	6.2	4606	5963	69	78
12/1/2007	14	16		2181	3264	0.008	0.065	39	201	16.7	7.7	6.6	4829	9764	31	46
1/1/2008	16	19		1737	2682	0.008	0.028	26	239	13.3	7.5	6.4	3500	5404	32	37
2/1/2008	18	20		1191	1849	0.008	0.036	3	3	7.8	7.8	6.7	1954	2801	30	35
3/1/2008	20	22		1865	1738	0.008	0.009	3	4	11.2	7.6	6.7	2494	2349	26	35
4/1/2008	23	26		2436	3874	0.008	0	4	17	13.2	7.7	7.1	2605	4427	25	36
5/1/2008	24	33		2119	3255	0.008	0.031	6	17	10.4	7.9	7.3	2780	4078	31	41
6/1/2008	21	24		1771	2703	0.008	0.037	5	16	9.7	7.6	7.3	3879	6632	46	55
7/1/2008	17	19	94	2639	3907	0.008	0.052	4	6	3.8	8.2	7.2	995	1264	32	36
8/1/2008	23	25	91	2781	10328	0.008	0.012	7	21	4.1	7.8	6.9	2021	4561	51	58
9/1/2008	20	24	94	773	1410	0.008	0	20	66	2.8	7.7	6.5	1283	1486	52	59
10/1/2008	18	20	94	1076	2415	0.008	0	4	17		7.3	6.5	1595	2171	41	45
11/1/2008	18	22		0.008	0.051			10	42	11.2	7.5	6.2	3886	6784	38	50
12/1/2008	17	24		0.008	0.012			18	36	8.5	7.5	6.6	2029	4691	25	28
1/1/2009	16	16		1624	2674			10	71	11.6	7.4	6.9	2192	3319	21	23
2/1/2009	23	28		0.008	0.023			6	16	9.2	7.5	6.9	2246	3472	30	38
Min	9	12	80	0.008	0.012	0.008	0	2	3	2.8	7.3	6	320	449	9	15
Max	29	39	94	5117	14685	0.012	0.08	124	460	20.9	8.9	7.4	4829	9764	73	98
Avg	19	23	92	1646	2800	0.008	0.050	18	74	9.1	7.9	6.7	2680	3932	39	49

Discharge Monitoring Report Summary, Outfall 100 (TF/SC)

Parameter	CBOD5	CBOD5	CBOD5	CBOD5	CBOD5	Chlorine	Chlorine	Fecal Coliform	Fecal Coliform	Flow	Ph	Ph	TSS	TSS	TSS	TSS	TSS
	AVG	AVW	AVG	AVW	AVG	AVG	MAX	GEM	GM7	AVG	MAX	MIN	AVG	AVW	AVG	AVW	AVG
Units	LBS/DAY	LBS/DAY	MG/L	MG/L	%	MG/L	MG/L	#/100 ML	#/100 ML	MGD	S.U.	S.U.	LBS/DAY	LBS/DAY	MG/L	MG/L	%
Limit	Max: 3340 (before 12/07)	Max: 5340 (before 12/07)	Max: 25	Max: 40	Min: 85	Max: 0.5	Max: 0.75	Max: 200	Max: 400		Max: 9	Min: 6	Max: 4000 (before 12/07)	Max: 6000 (before 12/07)	Max: 30	Max: 45	Min: 85
	Max: 4380 (after 12/07)	Max: 7010 (after 12/07)											Max: 5250 (after 12/07)	Max: 7880 (after 12/07)			
11/1/2004	329	329	4	4	97	0.32	0.4	17	17	11.6	7.3	7	596	596	7	7	97
12/1/2004	407	447	6	6	96	0.22	0.27	9	12	11.6	7.6	7.3	461	557	6	8	97
1/1/2005	667	812	9	11	92	0.2	0.29	13	14	8.6	7.6	7.2	562	752	8	10	86
2/1/2005	800	1032	12	13	94	0.27	0.47	5	11	7.7	7.6	7.4	748	844	11	12	96
3/1/2005	781	1195	11	13	95	0.28	0.54	5	7	8.8	7.6	6.7	886	1561	12	13	96
4/1/2005	756	1041	8	9	95	0.35	0.62	12	20	11.3	7.7	6.8	1039	1437	11	13	95
5/1/2005	265	346	5	6	98	0.33	0.66	21	45	7.7	7.5	6.9	452	719	7	8	97
6/1/2005	560	728	6	8	97	0.38	0.67	29	75	0.8	7.4	6.9	780	903	9	9	96
7/1/2005	480	674	7	9	94	0.38	0.41	20	27	9.5	7.2	6.8	776	895	10	12	93
8/1/2005	563	776	5	6	94	0.39	0.42	30	92	11.9	7.5	6.7	1052	1310	11	11	94
9/1/2005	420	703	5	7	95	0.42	0.56	6	14	10.2	7.7	7.1	617	682	8	10	95
10/1/2005	1291	1195	14	14	87	0.49	0.61	12	9	10	7.5	6.9	1483	1341	16	15	89
11/1/2005	1157	1649	12	13	88	0.48	0.62	20	37	12.2	7.6	6.7	1180	2125	11	17	89
12/1/2005	1241	2045	14	16	89	0.45	0.58	9	16	11.3	7.9	6.1	1649	2597	18	23	86
1/1/2006	832	1011	8	11	91	0.47	0.54	5	7	13.1	7.5	6.4	1154	1526	11	15	88
2/1/2006	1526	2179	12	17	86	0.46	0.49	10	17	14.4	8.2	6.3	1981	2979	17	23	75
3/1/2006	1442	1852	16	17	88	0.43	0.49	7	14	11	7.6	6.3	1841	2359	22	25	85
4/1/2006	1289	2069	18	21	91	0.43	0.43	7	15	8.9	7.3	6.5	1731	3328	22	32	89
5/1/2006	912	1512	11	14	94	0.48	0.52	21	46	7.8	7.8	6.8	909	1420	11	14	95
6/1/2006	1280	1829	13	18	94	0.46	0.52	25	55	12	7.5	6.9	1036	1191	10	12	95
7/1/2006	989	1171	20	22	92	0.48	0.53	56	72	3.9	7.6	6.9	597	1464	12	15	95
8/1/2006	1519	2127	19	22	93	0.47	0.51	22	68	7.2	7.6	6.8	1140	1282	15	17	95
9/1/2006	1622	2346	15	20	93	0.47	0.48	24	40	14	7.6	6.2	1955	2680	17	22	93
10/1/2006	1351	2043	16	19	93	0.47	0.5	21	45	11.2	7.8	6.5	1587	2298	17	19	93
11/1/2006	1188	1332	12	16	92	0.4	0.45	19	46	12.2	7.8	6	1314	1556	13	16	92
12/1/2006	1028	1098	12	15	93	0.43	0.45	11	18	11.5	7.3	6.2	999	1012	12	15	93
1/1/2007	1471	2229	17	28	91	0.41	0.47	11	27	11.1	7.5	6.2	1387	2147	16	26	91
2/1/2007	2465	3073	29	33	86	0.47	0.62	43	151	9.1	7.5	6.7	2551	2940	33	38	84
3/1/2007	1705	2297	24	35	87	0.42	0.51	62	231	9.1	7.5	6.3	1622	2589	22	32	88
4/1/2007	2219	3069	29	40	87	0.47	0.49	69	78	8.6	7.6	6.9	1324	1584	19	35	91
5/1/2007	975	1321	19	27	93	0.47	0.5	92	133	6.5	7.7	7	904	1264	17	23	94
6/1/2007	1363	2504	16	22	95	0.45	0.5	83	242	9.8	7.5	6.9	1022	2338	12	21	95
7/1/2007	1153	1546	11	14	96	0.47	0.48	108	172	12.4	7.5	6.9	1070	1288	10	13	95
8/1/2007	1370	2030	14	17	96	0.45	0.48	116	201	11.3	7.7	6.9	1357	2092	13	17	96
9/1/2007	1051	1773	12	15	96	0.47	0.49	99	156	11.9	7.9	6.9	1132	1531	12	17	96
10/1/2007	1785	2328	17	19	94	0.46	0.53	66	122	13.1	7.5	6.7	1659	2260	15	19	94
11/1/2007	2262	2426	24	27	92	0.49	0.52	65	66	12.3	7.6	6.2	2116	2236	21	24	92
12/1/2007	1873	2115	18	30	90	0.47	0.5	35	54	14.9	7.6	6.2	2015	2448	18	23	92
1/1/2008	1530	1988	20	28	91	0.46	0.51	10	29	9	7.6	6.7	1635	1897	22	25	90
2/1/2008	1890	1964	25	26	91	0.43	0.44	8	13	9.2	7.6	6.85	1781	2214	23	29	92
3/1/2008	1175	1614	17	23	93	0.47	0.53	7	13	8.9	7.7	6.9	1092	1093	15	17	94
4/1/2008	823	992	12	15	95	0.45	0.47	6	14	8.2	7.4	7.1	880	1068	13	15	94
5/1/2008	556	701	10	11	96	0.45	0.48	10	20	6.8	7.4	7.1	499	536	9	10	96
6/1/2008	504	656	8	9	97	0.44	0.45	23	28	7.1	7.4	7.1	390	460	7	9	97
7/1/2008	576	774	8	10	97	0.46	0.49	31	50	9.4	7.6	7.1	593	702	8	9	97
8/1/2008	1258	1611	12	14	96	0.44	0.47	43	57	12.5	7.6	7	1377	1573	13	17	96
9/1/2008	1751	2121	15	16	95	0.45	0.47	23	33	14.4	7.5	6.7	1578	2764	13	19	96
10/1/2008	1696	1953	18	26	94	0.44	0.48	13	36	14.7	7.5	6.6	1126	1408	12	16	96
11/1/2008	1435	1710	13	16	94	0.45	0.48	18	36	13.3	7.6	6.8	1731	1947	16	19	93
12/1/2008	2440	3519	20	27	92	0.46	0.5	35	95	14.2	7.5	6.8	2889	4526	23	34	89
1/1/2009	2268	3175	21	32	91	0.4	0.44	60	120	14.1	7.4	6.9	3090	3888	27	36	88
2/1/2009	1708	2626	24	35	92	0.42	0.45	9	28	8.6	7.4	7.1	2024	3279	27	39	90
Min	265	329	4	4	86	0.2	0.27	5	7	0.8	7.2	6	390	460	6	7	75
Max	2465	3519	29	40	98	0.49	0.67	116	242	14.9	8.2	7.4	3090	4526	33	39	97
Avg	1236	1657	14	18	93	0.42	0.49	32	61	10.3	7.6	6.7	1312	1787	15	19	92

APPENDIX E—TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's homepage at http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html.

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant	Priority pollutant	Carcin-ogen	Water Quality Criteria Marine acute	Water Quality Criteria Marine chronic	Human Health Criteria Marine	Organoleptic Effects
AMMONIA unionized	N	N	233	35		
ANTIMONY (INORGANIC)	Y	N			4300	
ARSENIC (dissolved)	Y	Y	69	36		
BIS(2-ETHYLHEXYL) PHTHALATE	Y	Y			5.9	
CADMIUM	Y	N	42.00	9.3		
CHLORDANE	Y	Y	0.09	0.004	0.00059	
CHLORINE (Total Residual)	N	N	13	7.50		
CHLOROFORM	Y	Y			470	
CHROMIUM(TRI)	N	N				
COPPER	Y	N	4.80	3.10		1000
CYANIDE	Y	N	9.1	2.8	220000	
ISOPHORONE	Y	Y			600	
LEAD	Y	N	210.00	8.10		
MANGANESE	N	N			100.00	
MERCURY	Y	N	1.80	0.0250	0.15	
NICKEL	Y	N	74.00	8.20	4600	
NITRATE/NITRITE (N)	N	N				
PHENOL	Y	N			4600000	300
SELENIUM	Y	N	290	71	4200	
SILVER	Y	N	1.90	NA		
THALLIUM	Y	N			6.30	
TOLUENE	Y	N			200000	
ZINC	Y	N	90.00	81.00		5000

REASONABLE POTENTIAL CALCULATIONS

Parameter	Ambient Concentration (metals as dissolved) *ug/L*	State Water Quality Standard Acute *ug/L*	State Water Quality Standard Chronic *ug/L*	Max concentration at edge of... Acute Mixing Zone *ug/L*	Max concentration at edge of... Chronic Mixing Zone *ug/L*	**LIMIT REQ'D?**	Effluent percentile value	Max effluent conc. measured (metals as total recoverable) *ug/L*	Coeff Variation *CV*	# of samples *n*	Mult-iplier	Acute DF	Chronic DF
Lagoon (015)													
AMMONIA	50	7378	2491	4909	2240	**NO**	0.95	31150	0.64	391	1.00	6.4	14.2
ARSENIC (dissolved)		69	36	0.65	0.29	**NO**	0.95	4.10	0.60	56	1.01	6.4	14.2
CHLORINE		13	7.50	117.19	52.82	**YES**	0.95	750	0.60	300	1.00	6.4	14.2
COPPER	0.6390	4.80	3.10	2.09	1.29	**NO**	0.95	11.80	0.60	56	1.01	6.4	14.2
LEAD	0.2380	210.00	8.10	1.30	0.72	**NO**	0.95	7.30	0.60	56	1.01	6.4	14.2
MERCURY	0.0015	1.80	0.0250	0.01	0.00	**NO**	0.95	0.02	0.60	6	2.14	6.4	14.2
NICKEL		74.00	8.20	1.17	0.53	**NO**	0.95	7.50	0.60	57	1.01	6.4	14.2
SELENIUM		290	71	0.23	0.10	**NO**	0.95	1.00	0.60	16	1.47	6.4	14.2
SILVER		1.90	1000.00	0.11	0.06	**NO**	0.95	0.80	0.60	56	1.01	6.4	14.2
ZINC	1.3000	90.00	81.00	6.16	3.49	**NO**	0.95	34.00	0.60	57	1.01	6.4	14.2
TF/SC (100)													
AMMONIA		30205	4537	191	43	**NO**	0.95	29800	0.64	391	1.00	156	696
ARSENIC (dissolved)		69	36	0.02	0.00	**NO**	0.95	3.10	0.60	54	1.02	156	696
CADMIUM		42.00	9.3	0.00	0.00	**NO**	0.95	0.21	0.60	54	1.02	156	696
CHLORDANE		0.09	0.004	0.0031	0.0007	**NO**	0.95	0.16	0.60	3	3.00	156	696
CHLORINE		13	7.50	4.8077	1.0776	**NO**	0.95	750	0.60	300	1.00	156	696
COPPER		4.80	3.10	0.06	0.01	**NO**	0.95	10.80	0.60	52	1.03	156	696
CYANIDE		1.00	1.00	0.00	0.00	**NO**	0.95	0.01	0.60	10	1.74	156	696
LEAD		210.00	8.10	0.01	0.00	**NO**	0.95	2.20	0.60	53	1.03	156	696
MERCURY		1.80	0.0250	0.00	0.00	**NO**	0.95	0.02	0.60	7	2.01	156	696
NICKEL		74.00	8.20	0.04	0.01	**NO**	0.95	6.60	0.60	46	1.07	156	696
SILVER		1.90	1000.00	0.00	0.00	**NO**	0.95	0.50	0.60	54	1.02	156	696
ZINC		90.00	81.00	0.35	0.08	**NO**	0.95	56.00	0.60	54	1.02	156	696

PERMIT LIMIT CALCULATIONS

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Water Quality Standard Acute *ug/L*	Water Quality Standard Chronic *ug/L*	**Average Monthly Limit (AML) ug/L**	**Maximum Daily Limit (MDL) ug/L**	Statistical variables for permit limit calculation: Coeff. Var. (CV)	AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month
Lagoon (015)										
CHLORINE	6	14	13	7.50	**16**	**83**	3.05	0.95	0.99	30.00
TF/SC (100)										
CHLORINE	156	696	13	7.50	**775**	**2028**	0.60	0.95	0.99	30.00

HUMAN HEALTH REASONABLE POTENTIAL CALCULATIONS

Parameter	Water Quality Criteria for Protection of Human Health *ug/L*	Max concentration at edge of chronic mixing zone. *ug/L*	**LIMIT REQ'D?**	Max effluent conc. measured *ug/L*	Coeff Variation *CV*	# of samples from which # in col. K was taken *n*	Multiplier	Calculated 50th percentile Effluent Conc. (When n>10)	Dilution Factor
Lagoon (015)									
ANTIMONY (INORGANIC)	4300	0.06	**NO**	1.20	0.60	15	0.60	0.80	14.2
BIS(2-ETHYLHEXYL) PHTHALATE	5.9	0.46	**NO**	7.00	0.60	5	0.93		14.2
ISOPHORONE	600	0.09	**NO**	1.30	0.60	5	0.93		14.2
MANGANESE	100.00	6.89	**NO**	137.00	0.60	15	0.60	97.90	14.2
MERCURY	0.15	0.00	**NO**	0.02	0.60	6	0.86		14.2
NICKEL	4600	0.21	**NO**	7.50	0.60	57	0.40	3.00	14.2
SELENIUM	4200.00	0.02	**NO**	1.00	0.60	16	0.59	0.25	14.2
THALLIUM	6.30	0.00	**NO**	0.25	0.60	16	0.59	0.07	14.2
TOLUENE	200000	0.43	**NO**	6.60	0.60	5	0.93		14.2
TF/SC (100)									
ANTIMONY (INORGANIC)	4300	0.00	**NO**	1.10	0.60	9	0.73		696.0
BIS(2-ETHYLHEXYL) PHTHALATE	5.9	0.01	**NO**	4.90	0.60	3	1.20		696.0
CHLORDANE	0.00059	0.00	**NO**	0.16	0.60	3	1.20		696.0
CHLOROFORM	470	0.00	**NO**	1.30	0.60	3	1.20		696.0
CYANIDE	220000	0.00	**NO**	0.01	0.60	10	0.70		696.0
MANGANESE	100.00	0.11	**NO**	109.00	0.60	10	0.70		696.0
MERCURY	0.15	0.03	**NO**	23.00	0.60	7	0.81		696.0
NICKEL	4600	0.00	**NO**	6.60	0.60	46	0.43	2.80	696.0
PHENOL	4600000	0.00	**NO**	0.11	0.60	10	0.70		696.0

Ammonia Criteria Calculations – Snohomish River Acute Conditions

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from WAC 173-201A and EPA 440/5-88-004.

INPUT	
1. Temperature (deg C):	17.8
2. pH:	7.9
3. Salinity (g/Kg):	0.2
OUTPUT	
1. Unionized ammonia NH3 criteria (mgNH3/L)	
Acute:	0.233
Chronic:	0.035
2. Total ammonia nitrogen criteria (mgN/L)	
Acute:	**7.378**
Chronic:	**1.108**

Ammonia Criteria Calculations – Snohomish River Chronic Conditions

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from WAC 173-201A and EPA 440/5-88-004.

INPUT	
1. Temperature (deg C):	16.6
2. pH:	7.6
3. Salinity (g/Kg):	8.5
OUTPUT	
1. Unionized ammonia NH3 criteria (mgNH3/L)	
Acute:	0.233
Chronic:	0.035
2. Total ammonia nitrogen criteria (mgN/L)	
Acute:	**16.583**
Chronic:	**2.491**

Ammonia Criteria Calculations – Port Gardner Bay

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from WAC 173-201A and EPA 440/5-88-004.

INPUT	
1. Temperature (deg C):	10.0
2. pH:	7.6
3. Salinity (g/Kg):	28.8
OUTPUT	
1. Unionized ammonia NH3 criteria (mgNH3/L)	
Acute:	0.233
Chronic:	0.035
2. Total ammonia nitrogen criteria (mgN/L)	
Acute:	**30.205**
Chronic:	**4.537**

Calculation of TMDL-based Average Monthly Effluent Limits – Ammonia

Ammonia
1. The daily Waste Load Allocation (WLA) = Maximum Daily Limit = MDL = 1,543 lbs/day ammonia.
2. Calculate the long-term average (LTA) which will comply with this waste load allocation. $MDL = LTA * e^{(Z\sigma - 0.5\sigma^2)}$ where: $\sigma^2 = \ln[CV^2 + 1] = .0918$ z = 2.326 (99th percentile occurrence) CV = coefficient of variation = std. dev. /mean = 0.31 LTA = long-term average = 798.5 lbs/day ammonia
3. Calculate the monthly average effluent limit. $AML = LTA * e^{(Z\sigma_n - 0.5\sigma_n^2)}$ where: $\sigma^2 = \ln[(CV^2/n) + 1] = .0060$ n = number of samples/month =16 z = 1.645 (95th percentile occurrence probability) CV = coefficient of variation = std. dev./mean = 0.31 Average Monthly Limit = AML = 904 lbs/day ammonia

Calculation of TMDL-based Average Monthly Effluent Limits – $CBOD_5$

$CBOD_5$
1. The Daily Waste Load Allocation (WLA) = Maximum Daily Limit = MDL = 2,162 lbs/day $CBOD_5$
2. Calculate the long-term average (LTA) which will comply with this waste load allocation. $MDL = LTA * e^{(Z\sigma - 0.5\sigma^2)}$ where: $\sigma^2 = \ln[CV^2 + 1] = .1349$ z = 2.326 (99th percentile occurrence) CV = coefficient of variation = std. dev./mean = 0.38 LTA = long-term average = 984.3 lbs/day $CBOD_5$
3. Calculate the monthly average effluent limit. $AML = LTA * e^{(Z\sigma_n - 0.5\sigma_n^2)}$ where: $\sigma^2 = \ln[(CV^2/n) + 1] = 0.0090$ n = number of samples/month = 16 z = 1.645 (95th percentile occurrence probability) CV = coefficient of variation = std. dev./mean = 0.38 Average Monthly Limit = AML = 1,145 lbs/day $CBOD_5$

APPENDIX F—RESPONSE TO COMMENTS

Ecology received comments on the draft permit and fact sheet from the City of Everett and from Mark Toy, Department of Health. The comments and Ecology's responses are as follows:

City of Everett Comments on Draft Permit:

Page 4. Summary of Permit Report Submittals.

Change reference to S6.A.6 to S6.A.5.

Change reference to S13.E to S13.A.

Response: References changed.

Page 6. S1.A – effluent limits table for low river flow – footnote "d".

The footnote pertains to the pH limits. We request it be changed to read:

> [d.] Indicates the range of permitted values where such values are attributable to inorganic industrial contributions. The Permittee must report the instantaneous maximum and minimum pH monthly. Do not average pH values.

Restoring this wording to the pH limits is consistent with Everett's existing NPDES permit language and acknowledges there are times lagoon system biology can cause pH to be less than 6.0 or greater than 9.0 standard units due to nitrification consuming the alkalinity and causing low pH, or algae blooms consuming the CO_2 resulting in high pH. While historically pH measurements have very rarely been outside the 6.0 to 9.0 range, there is potential for this to occur for short periods of time under the conditions created by lagoon system biology during the wastewater treatment process.

The identical condition is provided in other permits with lagoon treatment systems of sanitary wastes. (See, condition S1.F in the NPDES permit for Intalco, and condition S1.A in the NPDES permit for the City of Marysville.)

There was no mention made in the fact sheet as to why the above wording from the existing permit was not included in the proposed permit.

Page 7. S1.B – effluent limits table for high river flow – footnote "d".

Same comment as for S1.A above.

Response: The requested change is consistent with WAC 173-221-040, and has been added to the footnote.

Page 11. S2.A.6 – monitoring for permit application requirements.

Change Dissolved Oxygen from 24 hour composite to a Grab sample.

Reason: Analytical protocols for Dissolved Oxygen analysis (Appendix A, pg.46) require immediate analysis. This is consistent with grab, not composite, sampling.

Response: Test method corrected.

Page 11. S2.A.6 – monitoring for permit application requirements.

We request addition of a footnote "5" to Cyanide as follows:

[5.] Cyanide analysis will use the weak acid dissociable method 4500-CN I.

Reason: Because the EPA approved state water quality standards for cyanide specify the weak acid dissociable method, any permit monitoring requirements for cyanide must specify the method. See footnote "mm" in Table 240(3) in Chapter 173-201A WAC.

Response: Footnote 4 of the table refers to Appendix A for test methods. The test method for cyanide has been corrected in Appendix A, so there is no need for a new footnote.

Page 15. S3.E.2.e – Twenty-four-hour Reporting.

Does this condition apply to both the sanitary and combined collection systems in addition to section S3.E.1 where we must immediately report overflows potentially impacting surface waters or basements? (per letter from Ecology 1-31-08) Specifically, please clarify whether combined system CSO events fall under this 24 hr reporting requirement with letter report within 5 days or not. We see nothing in the CSO section (Pg. 29 S.11) that suggests that is the case. If CSO events do not fall under this section please make that explicit.

Response: Section S3.E addresses the reporting of permit <u>violations</u>. This section does not apply to combined sewer overflows, which are permitted under Section S11.

Page 16. S3.F – Other Reporting.

Please clarify whether the oil or hazardous materials reporting requirement includes the collection system within our service area or just to spills that could potentially reach waters of the state as is our understanding of RCW 90.56.280.
(We are concerned about responsibility for spills caused by other than the City. i.e. do we have to investigate and report every auto accident in the city where oil or gas leaks ?)

Response: The permit condition requires reporting according to the conditions of RCW 90.56.280 and Chapter 173-303-145. This is standardized permit language. Your comment is noted and will be considered for future permit shell document updates.

Page 19. S5.E – Prevent Connection of Inflow.

Please make clear this condition does not apply to the combined sewer system, but only to the separate sewer portion of the collection system. Everett requires connection of roof drains to the collection system in the combined sewer system.

Response: The condition now refers to the "separate sanitary sewer system."

Page 22. S5.G. – Operations and Maintenance Manual.

Does this section apply to just the Water Pollution Control Facility or also to the collection system?

Response: The intent of the permit language is to address the treatment plant facility.

Page 28. S7.A – Solid Waste Handling.

Please add language to make explicit this condition refers only to solid waste generated or handled by the Permittee and not by the public within the City's collection area.

Response: This is standardized permit language. Your comment is noted and will be considered for future permit shell document updates.

Page 29. S10 – Spill Control Plan.

Does this requirement also apply to the collection area or just to the wastewater plant?

Response: The intent of the permit language is to address the treatment plant facility.

Page 47 – Appendix A.

Please delete "Cyanide, Available" and the analytical protocol of SM4500-CN G and replace with "Cyanide, Weak Acid Dissociable" and the analytical protocol of SM 4500-CN I.

Reason: The analysis for weak acid dissociable cyanide will provide effluent data relevant to our water quality standards and will better inform future permitting decisions. There is no requirement in 40 CFR 122 Appendix D to measure for "Cyanide, Available".

Response: Appendix A has been corrected.

City of Everett Comments on Fact Sheet:

Page 18 – Table 10

Change the Average Weekly Limit CBOD5 calculation from:

Average Weekly Limit = 21 MGD x 25 mg/l x 8.34 = 7,010 lbs/day
to:
Average Weekly Limit = 21 MGD x 40 mg/l x 8.34 = 7,010 lbs/day

Response: Error noted and corrected.

Pages 36 and 61 – Chlorine Limits and Reasonable Potential

The limits are AML 0.016 mg/L and MDL 0.083 mg/L. The reasonable potential calculations on page 64 of the fact sheet identify a maximum effluent concentration measured as 750 ug/L (0.75 mg/L). This one value assures that the AML of 0.016 mg/L was not met and if accurate it would be incorrect to continue the existing more stringent limits on the basis that the facility is able to comply when the fact sheet actually demonstrates that it was not able to comply.

The reasonable potential calculations for total residual chlorine in Appendix E, page 64, show a maximum effluent concentration measured value of 750 ug/L for chlorine for both the lagoon (015) discharge and the TF/SC (100) discharge. We believe this is an error and the correct value for Outfall 015 maximum TRC discharge should be 0.080 mg/L.

Response: In the reasonable potential spreadsheet, I used the value of 750 ug/L to demonstrate that the technology-based chlorine limit would not meet the water quality criteria. The comment is correct that the actual maximum effluent levels of chlorine are not that high. The Everett WPCF has complied with the chlorine limits in its existing permit and the same limits are included in the new permit.

Page 57 – Discharge Monitoring Report Summary for Outfall 015.

Different loading limits are shown for CBOD5 from July-October but it is not clear the parameter reported is Equivalent CBOD, not CBOD. The Min, Max and Avg calculations are a mix of ECBOD and CBOD so not accurate for either parameter. Perhaps a footnote of explanation with the definition of ECBOD could be added to this table or break ECBOD results out into separate columns so the correct Min, Max and Avg may be calculated for each parameter.

> Please note Outfall 015 CBOD5 and chlorine results are not correct for November 2008 through February 2009. Chlorine results are reported as CBOD in three of the four months with no results reported for chlorine in that time period.

Page 58 – Discharge Monitoring Report Summary for Outfall 100.

> The 2-1-2006 Outfall 100 TSS % is flagged as a violation with 75% removal. This was the minimum daily value for that month, but we do not have daily permit limits. The number reported in this column should be monthly average % removal and the correct value for Outfall 100 TSS removal that month was 89%.

Response: These comments are correct. The text of the fact sheet describing past compliance reflects the actual number of permit violations. Rather than revising this complex table, this response to comments document will serve as the correction.

<u>Mark Toy, Department of Health, Comment on Permit:</u>

With regards to the draft NPDES permit for Everett, our BEACH program reports that the second most used wind surf area in the state (at Jetty Island) is located adjacent to several of their outfalls. Therefore, we would like the following wording (or equivalent) added to the Immediate Reporting part of Section S3 of the Permit:

> "Unauthorized discharges, such as collection system overflows or treatment bypasses, near beach recreations areas shall be reported immediately to the Department of Health and Department of Ecology BEACH Program. The BEACH Program emergency number is (360) 480-4868."

Response: The permit requires reporting of all unauthorized overflows and bypasses to the Department of Ecology Northwest Regional Office emergency number, 425-649-7000. Ecology's emergency report tracking system (ERTS) can refer all applicable reports to BEACH staff. The permit writer will see that this is arranged.

Appendix J

Sanitary Sewer Flow Projections

This appendix includes the following worksheets from the spreadsheet used to develop the sanitary sewer flow projections:

- **Demographics by Basin:** Documents the demographics by sewer basin, for each year from 2010 to 2040. There are separate tables for population, single family households, multifamily households, and employees.

- **Water by Basin (& Sector):** Calculates a water demand forecast for the Everett sewer collection area. Does this by multiplying the demographics by the water use factors. There are separate tables for single family, multifamily, and non-residential.

- **Sewer as % of Water**: Estimates the percent of the potable water that goes into the sewer system. Does this by calculating an annual base use, which is a 4-month winter average water use multiplied by 12 months. It is assumed 100% of the base use goes to the sewer system and 0% of the non-base use goes to the sewer system.

- **Sewer by Basin (& Sector):** Calculates the sanitary sewer flow forecast by basin. Does this by multiplying the water demand by the estimated percent going to the sewer system. There are separate tables for single family, multifamily, and non-residential.

- **Sewer by Basin (No Sector**): Aggregates the sanitary sewer flow forecast by basin to exclude sectors. Also extends the forecast out to 2100 (previous worksheets only go to 2040, which is the last year of the Puget Sound Regional Council demographic data). Does this by using the annual growth rates between 2030-2040 as the annual growth rates between 2040-2050 and then using a 0.5% annual growth rate between 2050-2100, which is similar to the method used in the 2011 Everett Water System Plan.

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Demographics by Basin

Calendar Year	Plan Year	Demographics																						
		Population																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	3,194	320	5,623	3,716	1,676	4,434	1,121	2,738	1,537	3,691	1,426	10,115	617	2,651	17,262	11,001	10,207	9,392	3,949	2,944	3,245	5,183	106,040
2011	n/a	3,211	321	5,653	3,736	1,685	4,483	1,136	2,763	1,551	3,720	1,449	10,198	626	2,691	17,528	11,114	10,335	9,553	3,994	2,984	3,280	5,220	107,231
2012	n/a	3,228	323	5,683	3,756	1,694	4,532	1,151	2,788	1,565	3,749	1,471	10,282	635	2,731	17,795	11,227	10,462	9,715	4,039	3,023	3,314	5,257	108,421
2013	1	3,245	325	5,714	3,776	1,703	4,582	1,167	2,813	1,580	3,778	1,494	10,365	643	2,771	18,062	11,340	10,589	9,876	4,084	3,062	3,349	5,294	109,611
2014	2	3,263	326	5,744	3,797	1,712	4,631	1,182	2,838	1,594	3,808	1,517	10,448	652	2,811	18,328	11,453	10,716	10,038	4,129	3,102	3,383	5,331	110,802
2015	3	3,280	328	5,775	3,817	1,721	4,681	1,198	2,863	1,608	3,837	1,539	10,531	661	2,851	18,595	11,566	10,843	10,199	4,174	3,141	3,418	5,368	111,992
2016	4	3,297	330	5,805	3,837	1,730	4,730	1,213	2,889	1,623	3,866	1,562	10,614	670	2,891	18,861	11,680	10,970	10,360	4,219	3,180	3,452	5,405	113,182
2017	5	3,314	332	5,835	3,857	1,739	4,779	1,228	2,914	1,637	3,895	1,584	10,697	678	2,931	19,128	11,793	11,097	10,522	4,264	3,219	3,486	5,442	114,373
2018	6	3,332	333	5,866	3,877	1,748	4,829	1,244	2,939	1,651	3,925	1,607	10,780	687	2,970	19,395	11,906	11,224	10,683	4,309	3,259	3,521	5,479	115,563
2019	7	3,349	335	5,896	3,897	1,757	4,878	1,259	2,964	1,665	3,954	1,630	10,863	696	3,010	19,661	12,019	11,352	10,845	4,354	3,298	3,555	5,516	116,753
2020	8	3,366	337	5,927	3,917	1,766	4,928	1,274	2,989	1,680	3,983	1,652	10,946	704	3,050	19,928	12,132	11,479	11,006	4,399	3,337	3,590	5,553	117,943
2021	9	3,379	338	5,950	3,933	1,773	4,977	1,290	3,020	1,693	4,009	1,675	11,040	714	3,090	20,111	12,235	11,562	11,111	4,436	3,367	3,619	5,594	118,915
2022	10	3,392	339	5,972	3,948	1,780	5,027	1,306	3,050	1,706	4,034	1,698	11,134	723	3,130	20,294	12,339	11,645	11,215	4,473	3,398	3,649	5,636	119,886
2023	11	3,405	341	5,995	3,963	1,787	5,076	1,321	3,081	1,719	4,060	1,720	11,228	732	3,169	20,477	12,443	11,728	11,320	4,510	3,428	3,678	5,677	120,857
2024	12	3,418	342	6,018	3,978	1,794	5,126	1,337	3,112	1,732	4,085	1,743	11,321	741	3,209	20,660	12,546	11,811	11,424	4,547	3,458	3,708	5,719	121,829
2025	13	3,431	343	6,041	3,993	1,801	5,175	1,353	3,142	1,745	4,111	1,766	11,415	750	3,249	20,843	12,650	11,894	11,529	4,585	3,488	3,737	5,760	122,800
2026	14	3,444	346	6,110	4,054	1,835	5,497	1,476	3,433	1,891	4,444	2,073	12,928	899	3,960	23,808	2,769	3,045	1,035	1,336	938	1,016	1,582	87,917
2027	15	3,457	347	6,132	4,069	1,847	5,571	1,499	3,479	1,911	4,485	2,105	13,077	912	4,017	2,873	2,802	3,092	1,055	1,352	949	1,026	1,595	67,654
2028	16	3,470	347	6,110	4,038	1,821	5,324	1,399	3,234	1,784	4,187	1,833	11,697	777	3,368	21,392	12,961	12,143	11,843	4,696	3,578	3,826	5,885	125,714
2029	17	3,483	348	6,132	4,054	1,828	5,373	1,415	3,265	1,797	4,213	1,856	11,791	786	3,407	21,575	13,064	12,226	11,947	4,733	3,608	3,855	5,926	126,685
2030	18	3,496	350	6,155	4,069	1,835	5,423	1,431	3,296	1,810	4,239	1,879	11,885	795	3,447	21,758	13,168	12,310	12,052	4,770	3,639	3,885	5,968	127,657
2031	19	3,520	352	6,197	4,096	1,847	5,497	1,453	3,342	1,830	4,280	1,911	12,034	808	3,504	21,963	13,314	12,450	12,150	4,825	3,680	3,929	6,037	129,019
2032	20	3,544	355	6,239	4,124	1,860	5,571	1,476	3,388	1,850	4,321	1,943	12,183	821	3,561	22,168	13,460	12,590	12,248	4,879	3,721	3,973	6,106	130,382
2033	21	3,568	357	6,281	4,152	1,872	5,646	1,499	3,433	1,870	4,362	1,976	12,332	834	3,618	22,373	13,606	12,731	12,346	4,933	3,763	4,017	6,175	131,744
2034	22	3,592	359	6,323	4,180	1,885	5,720	1,522	3,479	1,891	4,403	2,008	12,481	847	3,675	22,578	13,753	12,871	12,445	4,987	3,804	4,061	6,244	133,107
2035	23	3,615	362	6,365	4,207	1,897	5,794	1,545	3,525	1,911	4,444	2,040	12,630	860	3,732	22,783	13,899	13,011	12,543	5,041	3,846	4,105	6,313	134,469
2036	24	3,639	364	6,407	4,235	1,910	5,868	1,568	3,571	1,931	4,485	2,073	12,779	873	3,789	22,988	14,045	13,152	12,641	5,096	3,887	4,149	6,382	135,832
2037	25	3,663	367	6,449	4,263	1,922	5,943	1,590	3,617	1,951	4,526	2,105	12,928	886	3,846	23,193	14,191	13,292	12,739	5,150	3,928	4,193	6,451	137,194
2038	26	3,687	369	6,491	4,291	1,935	6,017	1,613	3,663	1,971	4,567	2,137	13,077	899	3,903	23,398	14,337	13,433	12,837	5,204	3,970	4,237	6,520	138,557
2039	27	3,711	371	6,533	4,318	1,947	6,091	1,636	3,709	1,991	4,608	2,170	13,226	912	3,960	23,603	14,484	13,573	12,935	5,258	4,011	4,281	6,589	139,919
2040	28	3,735	374	6,575	4,346	1,960	6,165	1,659	3,754	2,012	4,649	2,202	13,375	925	4,017	23,808	14,630	13,713	13,034	5,312	4,053	4,325	6,658	141,282

Demographics by Basin

Calendar Year	Plan Year	Single Family Households																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	448	38	1,033	1,043	380	889	256	727	444	803	149	2,357	120	766	2,873	2,769	2,997	994	1,289	893	962	1,502	23,734
2011	n/a	451	38	1,043	1,053	384	895	258	734	449	809	149	2,375	121	777	2,926	2,802	3,045	1,014	1,305	904	973	1,516	24,020
2012	n/a	454	38	1,052	1,063	388	901	259	741	454	815	150	2,393	122	788	2,978	2,835	3,092	1,035	1,320	916	983	1,529	24,305
2013	1	457	39	1,061	1,073	392	907	261	747	459	821	150	2,410	123	799	3,030	2,869	3,139	1,055	1,336	927	994	1,542	24,590
2014	2	460	39	1,071	1,083	395	912	263	754	464	827	150	2,428	124	810	3,083	2,902	3,186	1,075	1,352	938	1,005	1,555	24,875
2015	3	463	39	1,080	1,093	399	918	265	761	468	833	151	2,445	126	821	3,135	2,935	3,233	1,095	1,367	949	1,016	1,568	25,161
2016	4	466	39	1,089	1,103	403	924	267	768	473	839	151	2,463	127	832	3,187	2,968	3,280	1,115	1,383	961	1,026	1,582	25,446
2017	5	469	39	1,099	1,113	407	930	268	775	478	845	152	2,480	128	842	3,240	3,001	3,327	1,135	1,399	972	1,037	1,595	25,731
2018	6	472	39	1,108	1,123	411	936	270	781	483	851	152	2,498	129	853	3,292	3,034	3,374	1,155	1,414	983	1,048	1,608	26,016
2019	7	475	40	1,117	1,133	414	942	272	788	488	857	153	2,515	130	864	3,345	3,067	3,421	1,175	1,430	995	1,059	1,621	26,302
2020	8	477	40	1,127	1,143	418	948	274	795	492	863	153	2,533	131	875	3,397	3,100	3,468	1,195	1,446	1,006	1,069	1,634	26,587
2021	9	480	40	1,134	1,151	421	954	275	804	497	868	154	2,552	132	886	3,438	3,132	3,502	1,211	1,460	1,015	1,079	1,649	26,831
2022	10	482	40	1,141	1,159	424	959	277	812	501	872	154	2,572	133	897	3,478	3,164	3,535	1,227	1,473	1,023	1,088	1,664	27,076
2023	11	484	40	1,148	1,168	427	964	278	821	505	877	154	2,592	134	907	3,519	3,195	3,569	1,243	1,487	1,032	1,098	1,679	27,320
2024	12	486	40	1,155	1,176	430	970	280	829	509	881	154	2,611	135	918	3,560	3,227	3,603	1,259	1,501	1,041	1,107	1,693	27,565
2025	13	488	40	1,162	1,184	432	975	282	838	514	886	154	2,631	136	928	3,600	3,259	3,636	1,275	1,515	1,050	1,117	1,708	27,809
2026	14	490	41	1,169	1,192	435	980	283	846	518	890	155	2,651	137	939	3,641	3,290	3,670	1,292	1,528	1,058	1,126	1,723	28,054
2027	15	492	41	1,176	1,200	438	985	285	855	522	894	155	2,670	138	950	3,682	3,322	3,704	1,308	1,542	1,067	1,136	1,737	28,298
2028	16	494	41	1,183	1,208	441	991	286	863	526	899	155	2,690	139	960	3,722	3,354	3,737	1,324	1,556	1,076	1,145	1,752	28,543
2029	17	496	41	1,190	1,216	444	996	288	872	531	903	155	2,710	140	971	3,763	3,385	3,771	1,340	1,570	1,084	1,154	1,767	28,787
2030	18	499	41	1,198	1,224	447	1,001	289	880	535	908	155	2,729	141	982	3,803	3,417	3,805	1,356	1,583	1,093	1,164	1,782	29,032
2031	19	502	41	1,209	1,236	451	1,011	292	893	541	915	156	2,761	143	997	3,851	3,462	3,858	1,373	1,605	1,107	1,179	1,805	29,389
2032	20	506	42	1,220	1,248	456	1,020	295	905	548	922	157	2,793	145	1,013	3,899	3,507	3,910	1,391	1,626	1,122	1,194	1,828	29,746
2033	21	510	42	1,231	1,260	460	1,029	298	918	554	930	158	2,825	146	1,028	3,947	3,552	3,963	1,409	1,647	1,136	1,210	1,851	30,103
2034	22	514	42	1,242	1,272	464	1,038	300	930	560	937	159	2,857	148	1,044	3,994	3,597	4,016	1,427	1,669	1,150	1,225	1,874	30,460
2035	23	518	42	1,254	1,284	469	1,048	303	943	567	945	160	2,889	150	1,059	4,042	3,641	4,069	1,445	1,690	1,165	1,240	1,897	30,817
2036	24	522	43	1,265	1,296	473	1,057	306	955	573	952	160	2,921	151	1,075	4,090	3,686	4,122	1,462	1,711	1,179	1,255	1,920	31,174
2037	25	526	43	1,276	1,308	477	1,066	309	968	579	959	161	2,952	153	1,091	4,138	3,731	4,175	1,480	1,733	1,193	1,270	1,943	31,532
2038	26	530	43	1,287	1,320	482	1,075	311	980	586	967	162	2,984	154	1,106	4,185	3,776	4,228	1,498	1,754	1,208	1,286	1,966	31,889
2039	27	534	43	1,299	1,333	486	1,085	314	993	592	974	163	3,016	156	1,122	4,233	3,821	4,280	1,516	1,775	1,222	1,301	1,989	32,246
2040	28	538	44	1,310	1,345	490	1,094	317	1,005	598	982	164	3,048	158	1,137	4,281	3,866	4,333	1,534	1,796	1,236	1,316	2,012	32,603

Demographics by Basin

Calendar Year	Plan Year	Multifamily Households																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	682	80	809	351	189	1,194	293	392	208	876	471	1,893	85	254	4,338	1,684	792	2,834	227	175	215	568	18,609
2011	n/a	688	80	818	356	191	1,219	301	399	212	889	482	1,925	88	262	4,431	1,714	811	2,894	234	181	221	577	18,972
2012	n/a	694	81	826	360	194	1,244	309	407	216	903	493	1,956	90	271	4,523	1,744	831	2,954	240	188	226	587	19,336
2013	1	701	82	835	365	196	1,268	317	414	220	917	504	1,987	93	279	4,615	1,774	850	3,014	247	195	232	596	19,699
2014	2	707	82	843	369	199	1,293	325	421	224	930	514	2,018	95	287	4,708	1,804	870	3,074	253	201	238	605	20,063
2015	3	713	83	851	374	201	1,318	333	429	227	944	525	2,050	98	296	4,800	1,833	889	3,134	260	208	244	615	20,426
2016	4	720	84	860	379	203	1,343	341	436	231	958	536	2,081	100	304	4,892	1,863	909	3,194	266	214	250	624	20,789
2017	5	726	85	868	383	206	1,368	349	443	235	971	547	2,112	103	313	4,985	1,893	929	3,254	273	221	256	633	21,153
2018	6	732	85	877	388	208	1,393	358	451	239	985	558	2,144	105	321	5,077	1,923	948	3,314	279	227	262	643	21,516
2019	7	739	86	885	393	211	1,418	366	458	243	999	569	2,175	108	329	5,169	1,953	968	3,374	286	234	268	652	21,879
2020	8	745	87	893	397	213	1,442	374	466	247	1,012	580	2,206	110	338	5,262	1,983	987	3,434	292	240	274	662	22,243
2021	9	752	87	902	402	215	1,470	383	475	251	1,026	591	2,243	113	348	5,338	2,013	1,007	3,477	299	247	280	673	22,593
2022	10	758	88	910	407	218	1,497	392	484	255	1,040	603	2,280	116	359	5,414	2,043	1,027	3,520	306	254	287	684	22,943
2023	11	764	89	919	411	220	1,524	401	493	259	1,054	615	2,317	119	369	5,490	2,073	1,047	3,564	314	261	293	696	23,293
2024	12	771	90	928	416	223	1,552	410	503	263	1,068	627	2,354	122	379	5,566	2,103	1,067	3,607	321	267	299	707	23,643
2025	13	777	90	936	421	225	1,579	419	512	268	1,082	638	2,391	125	390	5,642	2,134	1,087	3,650	328	274	306	718	23,993
2026	14	784	91	945	425	227	1,606	428	521	272	1,096	650	2,428	128	400	5,719	2,164	1,107	3,694	335	281	312	730	24,343
2027	15	790	92	953	430	230	1,633	437	530	276	1,110	662	2,465	131	411	5,795	2,194	1,128	3,737	342	288	319	741	24,693
2028	16	796	92	962	434	232	1,661	446	539	280	1,123	674	2,502	134	421	5,871	2,224	1,148	3,780	349	294	325	752	25,043
2029	17	803	93	970	439	235	1,688	455	549	285	1,137	686	2,539	137	432	5,947	2,254	1,168	3,824	356	301	331	764	25,393
2030	18	809	94	979	444	237	1,715	464	558	289	1,151	697	2,576	140	442	6,023	2,285	1,188	3,867	363	308	338	775	25,743
2031	19	820	95	992	451	240	1,754	477	571	295	1,171	714	2,630	144	457	6,109	2,324	1,216	3,908	372	315	345	791	26,189
2032	20	830	96	1,005	457	244	1,792	490	584	301	1,191	730	2,683	148	472	6,194	2,364	1,243	3,949	380	322	353	808	26,636
2033	21	840	97	1,018	464	247	1,831	503	597	307	1,212	746	2,736	152	488	6,280	2,403	1,271	3,990	388	329	360	824	27,083
2034	22	850	99	1,031	471	251	1,869	515	610	314	1,232	762	2,790	156	503	6,365	2,443	1,299	4,031	396	336	368	841	27,530
2035	23	861	100	1,044	478	254	1,908	528	623	320	1,252	779	2,843	161	518	6,451	2,482	1,327	4,072	404	342	375	857	27,977
2036	24	871	101	1,058	485	258	1,946	541	636	326	1,272	795	2,896	165	533	6,536	2,522	1,355	4,113	412	349	383	873	28,424
2037	25	881	102	1,071	491	261	1,985	553	649	332	1,292	811	2,950	169	548	6,621	2,561	1,383	4,154	420	356	390	890	28,871
2038	26	891	103	1,084	498	264	2,023	566	662	339	1,312	828	3,003	173	563	6,707	2,601	1,411	4,195	428	363	397	906	29,318
2039	27	901	104	1,097	505	268	2,062	579	675	345	1,332	844	3,056	177	579	6,792	2,640	1,439	4,236	436	370	405	923	29,765
2040	28	912	106	1,110	512	271	2,100	592	688	351	1,352	860	3,110	181	594	6,878	2,680	1,467	4,277	444	377	412	939	30,212

Demographics by Basin

Calendar Year	Plan Year	Employees																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	1,682	45	7,082	3,765	2,947	6,862	2,835	2,330	544	3,055	2,766	7,847	1,625	713	5,576	5,648	1,384	4,009	5,595	13,395	8,846	1,607	90,158
2011	n/a	1,718	47	7,217	3,838	3,002	7,016	2,900	2,363	557	3,123	2,824	7,985	1,659	728	5,691	5,746	1,410	4,085	5,640	13,492	8,910	1,632	91,582
2012	n/a	1,755	48	7,352	3,912	3,057	7,171	2,966	2,396	569	3,191	2,882	8,123	1,693	743	5,806	5,845	1,435	4,160	5,685	13,589	8,974	1,657	93,006
2013	1	1,791	50	7,487	3,985	3,111	7,325	3,031	2,429	582	3,259	2,940	8,261	1,727	759	5,920	5,944	1,461	4,235	5,729	13,686	9,037	1,682	94,430
2014	2	1,828	51	7,622	4,058	3,166	7,480	3,096	2,462	594	3,327	2,998	8,400	1,760	774	6,035	6,042	1,487	4,310	5,774	13,783	9,101	1,707	95,854
2015	3	1,864	53	7,757	4,131	3,221	7,634	3,161	2,495	607	3,394	3,056	8,538	1,794	789	6,150	6,141	1,513	4,385	5,818	13,880	9,165	1,732	97,278
2016	4	1,901	54	7,892	4,204	3,276	7,789	3,226	2,528	620	3,462	3,114	8,676	1,828	804	6,264	6,240	1,539	4,460	5,863	13,977	9,229	1,757	98,702
2017	5	1,937	56	8,027	4,278	3,331	7,943	3,292	2,561	632	3,530	3,172	8,814	1,862	819	6,379	6,339	1,565	4,535	5,907	14,074	9,292	1,782	100,126
2018	6	1,974	57	8,162	4,351	3,386	8,098	3,357	2,594	645	3,598	3,229	8,953	1,896	834	6,494	6,437	1,591	4,610	5,952	14,171	9,356	1,807	101,550
2019	7	2,010	59	8,297	4,424	3,441	8,252	3,422	2,627	658	3,666	3,287	9,091	1,930	849	6,609	6,536	1,617	4,685	5,996	14,268	9,420	1,832	102,974
2020	8	2,047	60	8,432	4,497	3,496	8,407	3,487	2,660	670	3,733	3,345	9,229	1,963	864	6,723	6,635	1,643	4,760	6,041	14,365	9,483	1,857	104,398
2021	9	2,074	62	8,526	4,552	3,535	8,558	3,551	2,690	683	3,802	3,400	9,352	1,994	878	6,857	6,732	1,668	4,858	6,084	14,458	9,544	1,878	105,736
2022	10	2,101	63	8,621	4,606	3,575	8,709	3,614	2,721	696	3,870	3,455	9,476	2,025	892	6,991	6,829	1,693	4,957	6,127	14,551	9,604	1,899	107,073
2023	11	2,128	64	8,715	4,661	3,614	8,860	3,678	2,751	709	3,938	3,510	9,599	2,056	906	7,125	6,926	1,718	5,055	6,170	14,644	9,665	1,920	108,411
2024	12	2,155	66	8,810	4,716	3,654	9,010	3,741	2,782	721	4,006	3,565	9,722	2,087	919	7,260	7,023	1,743	5,153	6,213	14,736	9,726	1,941	109,749
2025	13	2,182	67	8,904	4,770	3,693	9,161	3,804	2,812	734	4,074	3,620	9,845	2,118	933	7,394	7,120	1,768	5,252	6,257	14,829	9,786	1,961	111,086
2026	14	2,209	68	8,999	4,825	3,733	9,312	3,868	2,843	747	4,143	3,675	9,969	2,148	947	7,528	7,217	1,793	5,350	6,300	14,922	9,847	1,982	112,424
2027	15	2,237	70	9,093	4,879	3,772	9,463	3,931	2,873	760	4,211	3,730	10,092	2,179	961	7,662	7,314	1,818	5,448	6,343	15,015	9,907	2,003	113,762
2028	16	2,264	71	9,188	4,934	3,812	9,614	3,995	2,904	773	4,279	3,785	10,215	2,210	974	7,796	7,411	1,843	5,547	6,386	15,108	9,968	2,024	115,099
2029	17	2,291	72	9,282	4,988	3,852	9,765	4,058	2,934	785	4,347	3,840	10,339	2,241	988	7,930	7,508	1,868	5,645	6,429	15,201	10,029	2,045	116,437
2030	18	2,318	74	9,377	5,043	3,891	9,916	4,121	2,965	798	4,415	3,894	10,462	2,272	1,002	8,064	7,605	1,893	5,743	6,473	15,294	10,089	2,065	117,775
2031	19	2,344	75	9,466	5,097	3,930	10,081	4,190	2,998	813	4,494	3,953	10,588	2,303	1,016	8,220	7,705	1,920	5,869	6,519	15,393	10,154	2,087	119,214
2032	20	2,371	76	9,556	5,151	3,969	10,245	4,258	3,031	828	4,572	4,011	10,715	2,335	1,030	8,377	7,805	1,947	5,994	6,566	15,492	10,218	2,108	120,654
2033	21	2,398	78	9,645	5,205	4,008	10,410	4,326	3,064	843	4,650	4,070	10,842	2,366	1,044	8,534	7,904	1,974	6,119	6,612	15,591	10,282	2,129	122,093
2034	22	2,424	79	9,735	5,259	4,046	10,575	4,395	3,097	857	4,728	4,128	10,968	2,398	1,058	8,690	8,004	2,001	6,244	6,658	15,690	10,347	2,150	123,533
2035	23	2,451	80	9,824	5,314	4,085	10,740	4,463	3,130	872	4,806	4,187	11,095	2,429	1,073	8,847	8,104	2,028	6,369	6,705	15,789	10,411	2,171	124,972
2036	24	2,477	82	9,914	5,368	4,124	10,905	4,532	3,163	887	4,884	4,245	11,222	2,460	1,087	9,004	8,203	2,055	6,494	6,751	15,888	10,476	2,192	126,412
2037	25	2,504	83	10,003	5,422	4,163	11,069	4,600	3,196	902	4,963	4,304	11,348	2,492	1,101	9,160	8,303	2,083	6,620	6,798	15,986	10,540	2,213	127,851
2038	26	2,530	85	10,093	5,476	4,202	11,234	4,668	3,228	917	5,041	4,362	11,475	2,523	1,115	9,317	8,403	2,110	6,745	6,844	16,085	10,605	2,234	129,291
2039	27	2,557	86	10,182	5,530	4,240	11,399	4,737	3,261	931	5,119	4,421	11,602	2,555	1,129	9,473	8,502	2,137	6,870	6,891	16,184	10,669	2,255	130,731
2040	28	2,583	87	10,272	5,584	4,279	11,564	4,805	3,294	946	5,197	4,479	11,729	2,586	1,143	9,630	8,602	2,164	6,995	6,937	16,283	10,733	2,276	132,170

Water by Basin (& Sector)

Calendar Year	Plan Year	Water Average Day Demand (gpd)																						
		Single Family																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	93,682	7,965	215,990	217,948	79,465	185,719	53,467	151,920	92,890	167,885	31,038	492,714	25,122	160,076	600,528	578,768	626,470	207,813	269,380	186,638	201,007	314,003	4,960,488
2011	n/a	94,292	8,001	217,938	220,050	80,257	186,966	53,840	153,344	93,894	169,144	31,142	496,379	25,345	162,362	611,471	585,685	636,307	212,016	272,658	188,998	203,256	316,761	5,020,106
2012	n/a	94,902	8,037	219,886	222,151	81,049	188,213	54,212	154,769	94,897	170,403	31,246	500,044	25,569	164,648	622,414	592,601	646,144	216,218	275,936	191,358	205,506	319,520	5,079,724
2013	1	95,512	8,073	221,834	224,253	81,841	189,460	54,584	156,194	95,901	171,661	31,350	503,709	25,793	166,934	633,357	599,518	655,981	220,421	279,215	193,718	207,756	322,278	5,139,342
2014	2	96,123	8,110	223,782	226,354	82,633	190,706	54,956	157,619	96,904	172,920	31,454	507,374	26,016	169,220	644,300	606,435	665,819	224,624	282,493	196,078	210,006	325,037	5,198,960
2015	3	96,733	8,146	225,730	228,456	83,425	191,953	55,329	159,043	97,908	174,178	31,558	511,039	26,240	171,506	655,242	613,352	675,656	228,826	285,771	198,438	212,255	327,795	5,258,578
2016	4	97,343	8,182	227,677	230,558	84,216	193,200	55,701	160,468	98,911	175,437	31,662	514,704	26,463	173,792	666,185	620,269	685,493	233,029	289,049	200,797	214,505	330,554	5,318,196
2017	5	97,953	8,219	229,625	232,659	85,008	194,447	56,073	161,893	99,915	176,695	31,766	518,369	26,687	176,078	677,128	627,186	695,330	237,231	292,328	203,157	216,755	333,313	5,377,814
2018	6	98,563	8,255	231,573	234,761	85,800	195,694	56,445	163,317	100,919	177,954	31,870	522,034	26,911	178,364	688,071	634,102	705,167	241,434	295,606	205,517	219,005	336,071	5,437,432
2019	7	99,173	8,291	233,521	236,862	86,592	196,941	56,818	164,742	101,922	179,213	31,974	525,699	27,134	180,651	699,014	641,019	715,004	245,636	298,884	207,877	221,254	338,830	5,497,050
2020	8	99,783	8,328	235,469	238,964	87,384	198,188	57,190	166,167	102,926	180,471	32,078	529,364	27,358	182,937	709,957	647,936	724,841	249,839	302,162	210,237	223,504	341,588	5,556,668
2021	9	100,224	8,352	236,951	240,647	87,984	199,299	57,520	167,944	103,811	181,392	32,116	533,472	27,577	185,158	718,455	654,560	731,875	253,187	305,037	212,059	225,479	344,666	5,607,763
2022	10	100,665	8,376	238,432	242,330	88,585	200,410	57,849	169,722	104,696	182,312	32,155	537,580	27,796	187,380	726,952	661,184	738,909	256,534	307,911	213,882	227,453	347,744	5,658,858
2023	11	101,105	8,400	239,914	244,014	89,186	201,521	58,179	171,500	105,581	183,233	32,193	541,689	28,014	189,601	735,449	667,808	745,943	259,882	310,785	215,704	229,427	350,822	5,709,952
2024	12	101,546	8,424	241,396	245,697	89,787	202,632	58,509	173,277	106,466	184,153	32,232	545,797	28,233	191,823	743,947	674,432	752,978	263,229	313,659	217,527	231,402	353,901	5,761,047
2025	13	101,987	8,448	242,878	247,380	90,387	203,744	58,838	175,055	107,351	185,074	32,270	549,905	28,452	194,044	752,444	681,056	760,012	266,577	316,534	219,349	233,376	356,979	5,812,141
2026	14	102,427	8,473	244,360	249,063	90,988	204,855	59,168	176,833	108,236	185,995	32,309	554,014	28,670	196,266	760,942	687,680	767,046	269,925	319,408	221,171	235,351	360,057	5,863,236
2027	15	102,868	8,497	245,842	250,746	91,589	205,966	59,498	178,610	109,121	186,915	32,348	558,122	28,889	198,488	769,439	694,304	774,080	273,272	322,282	222,994	237,325	363,135	5,914,330
2028	16	103,309	8,521	247,324	252,429	92,190	207,077	59,827	180,388	110,006	187,836	32,386	562,231	29,108	200,709	777,936	700,928	781,114	276,620	325,157	224,816	239,300	366,213	5,965,425
2029	17	103,749	8,545	248,805	254,113	92,790	208,189	60,157	182,166	110,891	188,756	32,425	566,339	29,327	202,931	786,434	707,552	788,149	279,967	328,031	226,639	241,274	369,291	6,016,519
2030	18	104,190	8,569	250,287	255,796	93,391	209,300	60,487	183,943	111,776	189,677	32,463	570,447	29,545	205,152	794,931	714,176	795,183	283,315	330,905	228,461	243,249	372,369	6,067,614
2031	19	105,014	8,626	252,635	258,319	94,298	211,235	61,060	186,556	113,104	191,225	32,638	577,108	29,888	208,405	804,906	723,551	806,230	287,036	335,361	231,454	246,430	377,174	6,142,256
2032	20	105,838	8,684	254,983	260,842	95,206	213,170	61,634	189,169	114,433	192,774	32,813	583,769	30,230	211,659	814,880	732,925	817,277	290,757	339,817	234,447	249,611	381,979	6,216,897
2033	21	106,662	8,741	257,331	263,365	96,113	215,104	62,208	191,781	115,761	194,323	32,987	590,429	30,573	214,912	824,855	742,300	828,325	294,478	344,274	237,440	252,793	386,784	6,291,539
2034	22	107,486	8,798	259,679	265,888	97,020	217,039	62,782	194,394	117,089	195,871	33,162	597,090	30,915	218,165	834,829	751,675	839,372	298,200	348,730	240,433	255,974	391,589	6,366,181
2035	23	108,310	8,855	262,027	268,411	97,928	218,974	63,356	197,007	118,417	197,420	33,337	603,751	31,258	221,418	844,804	761,049	850,419	301,921	353,186	243,426	259,155	396,394	6,440,823
2036	24	109,134	8,913	264,376	270,934	98,835	220,909	63,929	199,619	119,745	198,968	33,511	610,412	31,600	224,672	854,779	770,424	861,467	305,642	357,642	246,419	262,336	401,199	6,515,465
2037	25	109,958	8,970	266,724	273,457	99,743	222,844	64,503	202,232	121,073	200,517	33,686	617,072	31,943	227,925	864,753	779,799	872,514	309,363	362,098	249,412	265,518	406,004	6,590,107
2038	26	110,782	9,027	269,072	275,980	100,650	224,779	65,077	204,844	122,402	202,065	33,861	623,733	32,285	231,178	874,728	789,173	883,561	313,084	366,554	252,406	268,699	410,809	6,664,749
2039	27	111,606	9,084	271,420	278,503	101,557	226,714	65,651	207,457	123,730	203,614	34,035	630,394	32,628	234,431	884,702	798,548	894,609	316,805	371,010	255,399	271,880	415,614	6,739,390
2040	28	112,430	9,141	273,768	281,026	102,465	228,648	66,225	210,070	125,058	205,162	34,210	637,055	32,970	237,685	894,677	807,923	905,656	320,526	375,466	258,392	275,061	420,419	6,814,032

Water by Basin (& Sector)

Calendar Year	Plan Year	Multifamily																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	113,855	13,278	135,165	58,601	31,536	199,388	48,974	65,434	34,772	146,244	78,670	316,162	14,212	42,391	724,516	281,258	132,191	473,224	37,950	29,220	35,848	94,817	3,107,706
2011	n/a	114,913	13,397	136,567	59,377	31,941	203,537	50,316	66,664	35,412	148,523	80,482	321,392	14,635	43,792	739,934	286,240	135,458	483,242	39,035	30,310	36,836	96,386	3,168,390
2012	n/a	115,970	13,516	137,969	60,152	32,346	207,687	51,657	67,895	36,052	150,803	82,295	326,623	15,058	45,194	755,352	291,222	138,726	493,259	40,120	31,401	37,824	97,954	3,229,074
2013	1	117,028	13,636	139,371	60,927	32,750	211,836	52,999	69,126	36,692	153,082	84,107	331,853	15,482	46,595	770,769	296,205	141,993	503,277	41,206	32,491	38,812	99,522	3,289,758
2014	2	118,086	13,755	140,772	61,702	33,155	215,986	54,340	70,356	37,331	155,361	85,920	337,083	15,905	47,997	786,187	301,187	145,260	513,295	42,291	33,582	39,800	101,090	3,350,442
2015	3	119,144	13,874	142,174	62,478	33,559	220,135	55,682	71,587	37,971	157,641	87,733	342,314	16,328	49,399	801,605	306,169	148,528	523,313	43,377	34,672	40,788	102,658	3,411,126
2016	4	120,201	13,993	143,576	63,253	33,964	224,285	57,023	72,817	38,611	159,920	89,545	347,544	16,751	50,800	817,023	311,151	151,795	533,331	44,462	35,763	41,776	104,226	3,471,810
2017	5	121,259	14,112	144,977	64,028	34,368	228,434	58,365	74,048	39,251	162,199	91,358	352,775	17,174	52,202	832,441	316,133	155,062	543,349	45,548	36,853	42,764	105,794	3,532,494
2018	6	122,317	14,232	146,379	64,803	34,773	232,584	59,706	75,278	39,891	164,478	93,170	358,005	17,597	53,604	847,858	321,116	158,330	553,367	46,633	37,944	43,752	107,363	3,593,178
2019	7	123,375	14,351	147,781	65,579	35,177	236,733	61,048	76,509	40,530	166,758	94,983	363,235	18,020	55,005	863,276	326,098	161,597	563,385	47,719	39,034	44,740	108,931	3,653,862
2020	8	124,432	14,470	149,183	66,354	35,582	240,883	62,389	77,739	41,170	169,037	96,795	368,466	18,443	56,407	878,694	331,080	164,865	573,402	48,804	40,125	45,728	110,499	3,714,546
2021	9	125,505	14,591	150,612	67,129	35,980	245,439	63,906	79,284	41,876	171,360	98,762	374,643	18,934	58,149	891,412	336,123	168,212	580,639	49,993	41,254	46,797	112,393	3,772,992
2022	10	126,578	14,711	152,041	67,903	36,379	249,996	65,424	80,828	42,582	173,684	100,729	380,820	19,424	59,890	904,130	341,167	171,559	587,875	51,182	42,384	47,866	114,286	3,831,438
2023	11	127,651	14,832	153,470	68,678	36,778	254,552	66,941	82,373	43,287	176,007	102,696	386,997	19,915	61,632	916,848	346,210	174,906	595,111	52,371	43,514	48,936	116,180	3,889,884
2024	12	128,724	14,953	154,899	69,452	37,177	259,109	68,458	83,918	43,993	178,330	104,663	393,173	20,405	63,374	929,566	351,253	178,253	602,348	53,560	44,643	50,005	118,074	3,948,330
2025	13	129,796	15,073	156,328	70,227	37,575	263,666	69,976	85,462	44,699	180,653	106,629	399,350	20,896	65,115	942,284	356,297	181,601	609,584	54,749	45,773	51,074	119,967	4,006,775
2026	14	130,869	15,194	157,758	71,002	37,974	268,222	71,493	87,007	45,405	182,976	108,596	405,527	21,386	66,857	955,002	361,340	184,948	616,820	55,938	46,903	52,144	121,861	4,065,221
2027	15	131,942	15,315	159,187	71,776	38,373	272,779	73,010	88,551	46,111	185,300	110,563	411,704	21,876	68,598	967,720	366,383	188,295	624,057	57,126	48,032	53,213	123,755	4,123,667
2028	16	133,015	15,435	160,616	72,551	38,772	277,336	74,528	90,096	46,817	187,623	112,530	417,881	22,367	70,340	980,438	371,426	191,642	631,293	58,315	49,162	54,283	125,649	4,182,113
2029	17	134,087	15,556	162,045	73,325	39,170	281,892	76,045	91,640	47,522	189,946	114,496	424,058	22,857	72,082	993,156	376,470	194,989	638,529	59,504	50,292	55,352	127,542	4,240,559
2030	18	135,160	15,676	163,474	74,100	39,569	286,449	77,562	93,185	48,228	192,269	116,463	430,235	23,348	73,823	1,005,874	381,513	198,337	645,766	60,693	51,421	56,421	129,436	4,299,004
2031	19	136,870	15,871	165,664	75,240	40,143	292,880	79,685	95,358	49,267	195,622	119,180	439,143	24,040	76,357	1,020,147	388,113	202,996	652,607	62,043	52,576	57,665	132,175	4,373,644
2032	20	138,580	16,066	167,854	76,380	40,718	299,312	81,808	97,531	50,307	198,974	121,897	448,050	24,733	78,890	1,034,420	394,714	207,655	659,449	63,393	53,730	58,909	134,914	4,448,284
2033	21	140,290	16,261	170,044	77,520	41,292	305,743	83,931	99,703	51,346	202,327	124,614	456,958	25,425	81,424	1,048,693	401,314	212,315	666,291	64,743	54,885	60,153	137,653	4,522,924
2034	22	142,000	16,456	172,234	78,660	41,867	312,175	86,054	101,876	52,385	205,680	127,330	465,865	26,118	83,957	1,062,966	407,915	216,974	673,133	66,093	56,039	61,396	140,392	4,597,563
2035	23	143,710	16,651	174,423	79,800	42,441	318,606	88,177	104,049	53,424	209,032	130,047	474,773	26,810	86,490	1,077,239	414,515	221,633	679,975	67,442	57,193	62,640	143,131	4,672,203
2036	24	145,420	16,846	176,613	80,940	43,015	325,038	90,300	106,222	54,463	212,385	132,764	483,680	27,503	89,024	1,091,512	421,116	226,293	686,817	68,792	58,348	63,884	145,870	4,746,843
2037	25	147,130	17,041	178,803	82,080	43,590	331,469	92,423	108,395	55,502	215,738	135,481	492,588	28,195	91,557	1,105,785	427,716	230,952	693,659	70,142	59,502	65,128	148,609	4,821,483
2038	26	148,840	17,236	180,993	83,220	44,164	337,900	94,545	110,568	56,542	219,090	138,198	501,495	28,888	94,090	1,120,058	434,316	235,611	700,500	71,492	60,657	66,372	151,348	4,896,123
2039	27	150,550	17,430	183,183	84,360	44,738	344,332	96,668	112,740	57,581	222,443	140,915	510,403	29,580	96,624	1,134,331	440,917	240,271	707,342	72,842	61,811	67,616	154,087	4,970,762
2040	28	152,259	17,625	185,373	85,500	45,313	350,763	98,791	114,913	58,620	225,795	143,631	519,310	30,273	99,157	1,148,604	447,517	244,930	714,184	74,192	62,965	68,859	156,826	5,045,402

Water by Basin (& Sector)

Calendar Year	Plan Year	Non-Residential																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	75,690	2,026	318,684	169,432	132,609	308,781	127,583	104,834	24,476	137,485	124,473	353,093	73,129	32,097	250,924	254,145	62,267	180,427	251,797	602,765	398,089	72,296	4,057,102
2011	n/a	77,330	2,095	324,760	172,727	135,078	315,734	130,518	106,321	25,044	140,537	127,079	359,315	74,652	32,777	256,087	258,586	63,431	183,803	253,800	607,130	400,955	73,424	4,121,183
2012	n/a	78,971	2,164	330,835	176,021	137,547	322,686	133,452	107,807	25,613	143,589	129,686	365,537	76,174	33,457	261,249	263,028	64,596	187,180	255,803	611,495	403,821	74,552	4,185,265
2013	1	80,611	2,233	336,911	179,316	140,016	329,639	136,386	109,294	26,181	146,641	132,292	371,759	77,696	34,137	266,412	267,470	65,761	190,557	257,806	615,861	406,687	75,680	4,249,346
2014	2	82,252	2,301	342,986	182,611	142,485	336,592	139,321	110,780	26,749	149,693	134,899	377,981	79,218	34,817	271,574	271,911	66,926	193,933	259,810	620,226	409,553	76,808	4,313,427
2015	3	83,892	2,370	349,061	185,905	144,954	343,544	142,255	112,267	27,318	152,745	137,506	384,203	80,740	35,497	276,737	276,353	68,091	197,310	261,813	624,591	412,419	77,936	4,377,508
2016	4	85,533	2,439	355,137	189,200	147,423	350,497	145,189	113,754	27,886	155,797	140,112	390,425	82,262	36,177	281,900	280,795	69,256	200,686	263,816	628,956	415,285	79,064	4,441,590
2017	5	87,173	2,508	361,212	192,494	149,892	357,450	148,123	115,240	28,455	158,849	142,719	396,647	83,784	36,857	287,062	285,237	70,421	204,063	265,819	633,322	418,151	80,192	4,505,671
2018	6	88,814	2,577	367,288	195,789	152,361	364,402	151,058	116,727	29,023	161,901	145,325	402,869	85,306	37,537	292,225	289,678	71,586	207,440	267,822	637,687	421,017	81,320	4,569,752
2019	7	90,454	2,645	373,363	199,084	154,830	371,355	153,992	118,213	29,591	164,953	147,932	409,092	86,828	38,217	297,387	294,120	72,751	210,816	269,825	642,052	423,883	82,449	4,633,833
2020	8	92,095	2,714	379,438	202,378	157,299	378,308	156,926	119,700	30,160	168,005	150,539	415,314	88,351	38,897	302,550	298,562	73,915	214,193	271,828	646,417	426,749	83,577	4,697,915
2021	9	93,316	2,774	383,691	204,834	159,079	385,098	159,780	121,072	30,736	171,073	153,010	420,860	89,739	39,516	308,582	302,930	75,041	218,619	273,772	650,597	429,476	84,513	4,758,109
2022	10	94,537	2,833	387,943	207,290	160,859	391,889	162,634	122,444	31,312	174,142	155,481	426,407	91,127	40,136	314,614	307,299	76,166	223,045	275,717	654,778	432,202	85,450	4,818,304
2023	11	95,758	2,892	392,195	209,745	162,639	398,679	165,488	123,816	31,889	177,211	157,952	431,953	92,515	40,755	320,647	311,667	77,291	227,472	277,661	658,958	434,929	86,387	4,878,499
2024	12	96,980	2,952	396,447	212,201	164,419	405,470	168,341	125,188	32,465	180,280	160,423	437,500	93,903	41,375	326,679	316,036	78,416	231,898	279,605	663,138	437,655	87,324	4,938,694
2025	13	98,201	3,011	400,699	214,657	166,199	412,260	171,195	126,560	33,042	183,349	162,894	443,046	95,292	41,994	332,711	320,404	79,541	236,324	281,549	667,318	440,382	88,261	4,998,889
2026	14	99,422	3,071	404,951	217,112	167,978	419,051	174,049	127,932	33,618	186,418	165,366	448,593	96,680	42,613	338,744	324,773	80,666	240,750	283,493	671,498	443,109	89,198	5,059,084
2027	15	100,643	3,130	409,203	219,568	169,758	425,841	176,903	129,304	34,194	189,486	167,837	454,139	98,068	43,233	344,776	329,141	81,792	245,176	285,437	675,678	445,835	90,135	5,119,278
2028	16	101,864	3,189	413,455	222,024	171,538	432,632	179,757	130,676	34,771	192,555	170,308	459,686	99,456	43,852	350,808	333,510	82,917	249,603	287,381	679,858	448,562	91,071	5,179,473
2029	17	103,086	3,249	417,707	224,480	173,318	439,423	182,610	132,048	35,347	195,624	172,779	465,233	100,845	44,471	356,840	337,878	84,042	254,029	289,325	684,038	451,288	92,008	5,239,668
2030	18	104,307	3,308	421,959	226,935	175,098	446,213	185,464	133,420	35,924	198,693	175,250	470,779	102,233	45,091	362,873	342,247	85,167	258,455	291,270	688,218	454,015	92,945	5,299,863
2031	19	105,501	3,370	425,986	229,371	176,845	453,628	188,540	134,903	36,589	202,211	177,881	476,480	103,647	45,725	369,921	346,731	86,389	264,087	293,359	692,671	456,914	93,894	5,364,642
2032	20	106,696	3,433	430,013	231,806	178,592	461,044	191,616	136,385	37,254	205,728	180,512	482,180	105,061	46,360	376,968	351,216	87,610	269,719	295,449	697,125	459,813	94,842	5,429,421
2033	21	107,890	3,495	434,040	234,242	180,339	468,459	194,692	137,868	37,919	209,246	183,143	487,880	106,475	46,994	384,016	355,701	88,832	275,351	297,539	701,578	462,711	95,791	5,494,200
2034	22	109,084	3,557	438,067	236,677	182,085	475,875	197,768	139,351	38,584	212,763	185,774	493,581	107,889	47,628	391,064	360,185	90,053	280,984	299,629	706,031	465,610	96,740	5,558,979
2035	23	110,279	3,619	442,094	239,112	183,832	483,290	200,844	140,833	39,249	216,281	188,404	499,281	109,303	48,263	398,112	364,670	91,275	286,616	301,719	710,484	468,509	97,688	5,623,758
2036	24	111,473	3,681	446,121	241,548	185,579	490,705	203,920	142,316	39,914	219,799	191,035	504,981	110,717	48,897	405,160	369,155	92,497	292,248	303,809	714,938	471,408	98,637	5,688,538
2037	25	112,667	3,743	450,148	243,983	187,326	498,121	206,996	143,798	40,579	223,316	193,666	510,682	112,132	49,532	412,208	373,639	93,718	297,880	305,898	719,391	474,307	99,586	5,753,317
2038	26	113,862	3,805	454,175	246,419	189,073	505,536	210,072	145,281	41,244	226,834	196,297	516,382	113,546	50,166	419,256	378,124	94,940	303,512	307,988	723,844	477,206	100,534	5,818,096
2039	27	115,056	3,867	458,202	248,854	190,820	512,952	213,148	146,763	41,910	230,351	198,928	522,083	114,960	50,800	426,304	382,609	96,161	309,145	310,078	728,297	480,105	101,483	5,882,875
2040	28	116,250	3,929	462,229	251,290	192,567	520,367	216,223	148,246	42,575	233,869	201,559	527,783	116,374	51,435	433,351	387,093	97,383	314,777	312,168	732,751	483,004	102,432	5,947,654

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Sewer as % of Water

Water Consumption (ccf) [1]																
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Dec-Mar Avg	Annual Base Use	Base Use as % of Total
Single Family [2]																
2004	29,871	45,089	28,804	45,039	32,320	57,837	55,844	92,837	58,003	47,470	35,352	42,526	570,992	36,573	438,870.60	77%
2005	38,402	35,283	41,256	34,994	41,382	42,770	50,247	56,735	77,308	37,227	45,805	14,414	515,823	32,339	388,063.50	75%
Avg	34,136	40,186	35,030	40,017	36,851	50,304	53,046	74,786	67,656	42,349	40,579	28,470	543,407	34,456	413,467.05	76%
Multifamily																
2004	142,651	65,742	143,352	69,921	136,650	79,216	143,952	100,516	155,208	76,109	132,604	90,387	1,336,307	110,533	1,326,393.90	99%
2005	131,845	63,068	145,123	68,742	137,069	79,845	139,049	91,304	137,167	104,353	110,956	23,363	1,231,884	90,850	1,090,197.00	88%
Avg	137,248	64,405	144,237	69,332	136,860	79,531	141,500	95,910	146,187	90,231	121,780	56,875	1,284,095	100,691	1,208,295.45	94%
Non-Residential [3]																70%

1. From the 2011 Everett Water Suppy Plan. Specifically, from this spreadsheet pw:\\PWAPPSEA01:NorthWest_Seattle\Documents\City_of_Everett-Public_Works_Dept\Everett_Water_Plan\15.00_Ch_3 - Supply_Req\Analysis-Data Compalation\Everett WSP Chapter 3 Analyses 2.4 - Potable Water_By Month.

2. This is only the metered SF consumption.

3. There was no similar summary for non-residential. Therefore used the avg of the percent calculated for similar analyses for the City of Tukwila (77%) and the City of Pullman (63%).

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Sewer by Basin (& Sector)

Calendar Year	Plan Year	Sewer Average Day Demand (gpd)																						
		Single Family (76% of Water)																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	71,281	6,060	164,342	165,832	60,464	141,310	40,682	115,593	70,678	127,740	23,616	374,895	19,114	121,798	456,929	440,372	476,668	158,121	204,965	142,009	152,942	238,918	3,774,329
2011	n/a	71,745	6,088	165,824	167,431	61,066	142,258	40,965	116,677	71,442	128,698	23,695	377,684	19,285	123,538	465,255	445,635	484,153	161,318	207,460	143,805	154,654	241,017	3,819,691
2012	n/a	72,209	6,115	167,307	169,030	61,669	143,207	41,249	117,761	72,205	129,656	23,774	380,473	19,455	125,277	473,581	450,898	491,638	164,516	209,954	145,600	156,365	243,116	3,865,053
2013	1	72,673	6,143	168,789	170,629	62,271	144,156	41,532	118,845	72,969	130,613	23,854	383,261	19,625	127,017	481,907	456,161	499,122	167,714	212,448	147,396	158,077	245,215	3,910,416
2014	2	73,138	6,171	170,271	172,228	62,873	145,104	41,815	119,929	73,732	131,571	23,933	386,050	19,795	128,756	490,234	461,423	506,607	170,911	214,943	149,191	159,789	247,314	3,955,778
2015	3	73,602	6,198	171,753	173,827	63,476	146,053	42,098	121,013	74,496	132,529	24,012	388,839	19,965	130,495	498,560	466,686	514,092	174,109	217,437	150,987	161,501	249,413	4,001,140
2016	4	74,066	6,226	173,235	175,426	64,078	147,002	42,382	122,097	75,260	133,486	24,091	391,627	20,136	132,235	506,886	471,949	521,577	177,307	219,931	152,782	163,212	251,511	4,046,502
2017	5	74,530	6,253	174,717	177,025	64,681	147,951	42,665	123,181	76,023	134,444	24,170	394,416	20,306	133,974	515,213	477,212	529,061	180,504	222,426	154,578	164,924	253,610	4,091,864
2018	6	74,995	6,281	176,199	178,624	65,283	148,899	42,948	124,265	76,787	135,401	24,249	397,204	20,476	135,714	523,539	482,475	536,546	183,702	224,920	156,374	166,636	255,709	4,137,226
2019	7	75,459	6,309	177,681	180,224	65,886	149,848	43,231	125,349	77,550	136,359	24,328	399,993	20,646	137,453	531,865	487,738	544,031	186,899	227,414	158,169	168,348	257,808	4,182,588
2020	8	75,923	6,336	179,163	181,823	66,488	150,797	43,515	126,433	78,314	137,317	24,407	402,782	20,816	139,193	540,191	493,001	551,516	190,097	229,909	159,965	170,059	259,907	4,227,950
2021	9	76,258	6,355	180,291	183,103	66,946	151,642	43,765	127,785	78,987	138,017	24,437	405,907	20,983	140,883	546,657	498,041	556,868	192,644	232,096	161,351	171,562	262,249	4,266,827
2022	10	76,594	6,373	181,418	184,384	67,403	152,488	44,016	129,138	79,661	138,718	24,466	409,033	21,149	142,573	553,122	503,081	562,220	195,191	234,283	162,738	173,064	264,591	4,305,704
2023	11	76,929	6,391	182,546	185,665	67,860	153,333	44,267	130,490	80,334	139,418	24,495	412,159	21,315	144,264	559,588	508,121	567,572	197,738	236,470	164,125	174,566	266,933	4,344,581
2024	12	77,264	6,410	183,673	186,945	68,317	154,179	44,518	131,843	81,008	140,118	24,525	415,285	21,482	145,954	566,053	513,161	572,925	200,286	238,657	165,511	176,069	269,275	4,383,457
2025	13	77,599	6,428	184,801	188,226	68,774	155,024	44,769	133,196	81,681	140,819	24,554	418,411	21,648	147,644	572,519	518,201	578,277	202,833	240,844	166,898	177,571	271,617	4,422,334
2026	14	77,935	6,447	185,928	189,507	69,231	155,870	45,020	134,548	82,355	141,519	24,583	421,537	21,815	149,335	578,984	523,241	583,629	205,380	243,031	168,285	179,074	273,959	4,461,211
2027	15	78,270	6,465	187,056	190,787	69,688	156,715	45,270	135,901	83,028	142,220	24,613	424,663	21,981	151,025	585,450	528,281	588,981	207,927	245,218	169,671	180,576	276,302	4,500,088
2028	16	78,605	6,483	188,183	192,068	70,145	157,561	45,521	137,253	83,701	142,920	24,642	427,789	22,148	152,715	591,915	533,321	594,333	210,474	247,405	171,058	182,078	278,644	4,538,964
2029	17	78,941	6,502	189,311	193,349	70,602	158,406	45,772	138,606	84,375	143,621	24,671	430,915	22,314	154,406	598,381	538,361	599,685	213,021	249,592	172,445	183,581	280,986	4,577,841
2030	18	79,276	6,520	190,438	194,630	71,059	159,252	46,023	139,959	85,048	144,321	24,701	434,041	22,480	156,096	604,846	543,401	605,038	215,568	251,779	173,831	185,083	283,328	4,616,718
2031	19	79,903	6,564	192,225	196,549	71,750	160,724	46,460	141,946	86,059	145,499	24,833	439,109	22,741	158,571	612,435	550,534	613,443	218,400	255,169	176,109	187,503	286,984	4,673,511
2032	20	80,530	6,607	194,011	198,469	72,440	162,196	46,896	143,934	87,069	146,678	24,966	444,177	23,002	161,047	620,025	557,667	621,849	221,231	258,560	178,386	189,924	290,640	4,730,305
2033	21	81,157	6,651	195,798	200,389	73,130	163,668	47,333	145,922	88,080	147,856	25,099	449,245	23,262	163,522	627,614	564,800	630,255	224,062	261,950	180,663	192,345	294,296	4,787,098
2034	22	81,784	6,694	197,585	202,308	73,821	165,141	47,769	147,910	89,090	149,034	25,232	454,313	23,523	165,997	635,204	571,933	638,660	226,894	265,341	182,941	194,765	297,952	4,843,891
2035	23	82,411	6,738	199,371	204,228	74,511	166,613	48,206	149,898	90,101	150,212	25,365	459,381	23,783	168,473	642,793	579,066	647,066	229,725	268,732	185,218	197,186	301,608	4,900,685
2036	24	83,038	6,781	201,158	206,148	75,202	168,085	48,643	151,886	91,112	151,391	25,498	464,449	24,044	170,948	650,383	586,199	655,472	232,556	272,122	187,495	199,606	305,264	4,957,478
2037	25	83,664	6,825	202,944	208,067	75,892	169,557	49,079	153,874	92,122	152,569	25,631	469,517	24,304	173,423	657,972	593,332	663,877	235,388	275,513	189,773	202,027	308,920	5,014,271
2038	26	84,291	6,868	204,731	209,987	76,582	171,029	49,516	155,862	93,133	153,747	25,764	474,585	24,565	175,899	665,562	600,465	672,283	238,219	278,903	192,050	204,447	312,576	5,071,065
2039	27	84,918	6,912	206,517	211,907	77,273	172,502	49,952	157,850	94,143	154,925	25,897	479,653	24,826	178,374	673,151	607,598	680,689	241,050	282,294	194,327	206,868	316,232	5,127,858
2040	28	85,545	6,956	208,304	213,826	77,963	173,974	50,389	159,838	95,154	156,104	26,030	484,721	25,086	180,849	680,741	614,731	689,094	243,882	285,684	196,605	209,288	319,888	5,184,652

Sewer by Basin (& Sector)

Calendar Year	Plan Year	Multifamily (94% of Water)																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	107,134	12,494	127,187	55,142	29,675	187,618	46,083	61,571	32,720	137,611	74,026	297,499	13,373	39,888	681,748	264,655	124,388	445,290	35,709	27,495	33,732	89,220	2,924,260
2011	n/a	108,129	12,606	128,506	55,872	30,056	191,523	47,346	62,729	33,322	139,756	75,732	302,421	13,771	41,207	696,256	269,344	127,462	454,716	36,731	28,521	34,662	90,696	2,981,361
2012	n/a	109,125	12,718	129,825	56,601	30,436	195,427	48,608	63,887	33,924	141,901	77,437	307,342	14,170	42,526	710,763	274,032	130,537	464,143	37,752	29,547	35,591	92,172	3,038,463
2013	1	110,120	12,831	131,144	57,331	30,817	199,332	49,870	65,045	34,526	144,045	79,143	312,264	14,568	43,845	725,271	278,720	133,611	473,569	38,774	30,573	36,521	93,647	3,095,565
2014	2	111,115	12,943	132,463	58,060	31,197	203,236	51,133	66,203	35,128	146,190	80,848	317,186	14,966	45,164	739,779	283,408	136,686	482,996	39,795	31,599	37,451	95,123	3,152,667
2015	3	112,111	13,055	133,781	58,790	31,578	207,141	52,395	67,361	35,730	148,335	82,554	322,107	15,364	46,483	754,287	288,096	139,760	492,422	40,816	32,626	38,380	96,598	3,209,769
2016	4	113,106	13,167	135,100	59,519	31,959	211,045	53,657	68,519	36,332	150,480	84,259	327,029	15,762	47,802	768,794	292,784	142,835	501,849	41,838	33,652	39,310	98,074	3,266,871
2017	5	114,101	13,279	136,419	60,249	32,339	214,950	54,919	69,677	36,934	152,625	85,965	331,950	16,160	49,121	783,302	297,472	145,909	511,275	42,859	34,678	40,240	99,549	3,323,972
2018	6	115,097	13,391	137,738	60,978	32,720	218,854	56,182	70,835	37,536	154,769	87,670	336,872	16,558	50,440	797,810	302,160	148,984	520,702	43,880	35,704	41,169	101,025	3,381,074
2019	7	116,092	13,504	139,057	61,708	33,101	222,759	57,444	71,992	38,138	156,914	89,376	341,794	16,957	51,758	812,317	306,848	152,058	530,128	44,902	36,730	42,099	102,501	3,438,176
2020	8	117,087	13,616	140,376	62,437	33,481	226,663	58,706	73,150	38,740	159,059	91,082	346,715	17,355	53,077	826,825	311,537	155,133	539,555	45,923	37,756	43,028	103,976	3,495,278
2021	9	118,097	13,729	141,721	63,166	33,857	230,951	60,134	74,604	39,404	161,245	92,932	352,528	17,816	54,716	838,792	316,282	158,282	546,364	47,042	38,819	44,035	105,758	3,550,274
2022	10	119,106	13,843	143,066	63,895	34,232	235,239	61,562	76,057	40,068	163,431	94,783	358,340	18,278	56,355	850,760	321,028	161,432	553,173	48,161	39,882	45,041	107,540	3,605,269
2023	11	120,116	13,956	144,411	64,624	34,607	239,526	62,990	77,511	40,732	165,617	96,634	364,152	18,739	57,994	862,727	325,773	164,582	559,982	49,279	40,945	46,047	109,322	3,660,265
2024	12	121,125	14,070	145,756	65,353	34,982	243,814	64,417	78,964	41,396	167,803	98,484	369,965	19,201	59,633	874,694	330,519	167,731	566,791	50,398	42,008	47,053	111,104	3,715,261
2025	13	122,135	14,183	147,100	66,081	35,357	248,102	65,845	80,417	42,061	169,989	100,335	375,777	19,662	61,271	886,661	335,264	170,881	573,600	51,517	43,071	48,060	112,886	3,770,257
2026	14	123,144	14,297	148,445	66,810	35,733	252,389	67,273	81,871	42,725	172,175	102,186	381,589	20,124	62,910	898,629	340,010	174,030	580,410	52,636	44,134	49,066	114,668	3,825,253
2027	15	124,153	14,411	149,790	67,539	36,108	256,677	68,701	83,324	43,389	174,361	104,036	387,402	20,585	64,549	910,596	344,756	177,180	587,219	53,754	45,197	50,072	116,450	3,880,248
2028	16	125,163	14,524	151,135	68,268	36,483	260,965	70,128	84,777	44,053	176,547	105,887	393,214	21,047	66,188	922,563	349,501	180,330	594,028	54,873	46,260	51,078	118,232	3,935,244
2029	17	126,172	14,638	152,480	68,997	36,858	265,252	71,556	86,231	44,717	178,733	107,738	399,026	21,508	67,827	934,530	354,247	183,479	600,837	55,992	47,323	52,085	120,013	3,990,240
2030	18	127,182	14,751	153,825	69,726	37,233	269,540	72,984	87,684	45,381	180,920	109,588	404,839	21,970	69,466	946,498	358,992	186,629	607,646	57,111	48,386	53,091	121,795	4,045,236
2031	19	128,791	14,935	155,885	70,799	37,774	275,592	74,982	89,729	46,359	184,074	112,145	413,220	22,621	71,849	959,928	365,203	191,013	614,084	58,381	49,472	54,261	124,373	4,115,469
2032	20	130,400	15,118	157,946	71,871	38,314	281,644	76,979	91,773	47,337	187,229	114,701	421,602	23,273	74,233	973,358	371,414	195,397	620,522	59,651	50,558	55,432	126,950	4,185,703
2033	21	132,009	15,301	160,006	72,944	38,855	287,695	78,977	93,818	48,315	190,384	117,258	429,984	23,924	76,617	986,789	377,625	199,782	626,960	60,921	51,645	56,602	129,527	4,255,937
2034	22	133,618	15,485	162,067	74,017	39,395	293,747	80,974	95,863	49,293	193,538	119,814	438,365	24,576	79,001	1,000,219	383,836	204,166	633,398	62,191	52,731	57,772	132,105	4,326,171
2035	23	135,227	15,668	164,127	75,089	39,936	299,799	82,972	97,907	50,270	196,693	122,371	446,747	25,228	81,385	1,013,650	390,046	208,550	639,836	63,461	53,817	58,943	134,682	4,396,405
2036	24	136,836	15,851	166,188	76,162	40,476	305,851	84,969	99,952	51,248	199,848	124,927	455,129	25,879	83,769	1,027,080	396,257	212,935	646,274	64,731	54,904	60,113	137,259	4,466,639
2037	25	138,445	16,035	168,248	77,235	41,017	311,902	86,967	101,996	52,226	203,003	127,484	463,511	26,531	86,152	1,040,511	402,468	217,319	652,712	66,002	55,990	61,283	139,836	4,536,872
2038	26	140,054	16,218	170,309	78,307	41,557	317,954	88,964	104,041	53,204	206,157	130,040	471,892	27,183	88,536	1,053,941	408,679	221,703	659,150	67,272	57,076	62,454	142,414	4,607,106
2039	27	141,663	16,402	172,370	79,380	42,098	324,006	90,962	106,085	54,182	209,312	132,596	480,274	27,834	90,920	1,067,371	414,890	226,088	665,588	68,542	58,162	63,624	144,991	4,677,340
2040	28	143,272	16,585	174,430	80,453	42,638	330,058	92,959	108,130	55,160	212,467	135,153	488,656	28,486	93,304	1,080,802	421,100	230,472	672,026	69,812	59,249	64,795	147,568	4,747,574

Sewer by Basin (& Sector)

Calendar Year	Plan Year	Non-Residential (70% of Water)																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	52,983	1,418	223,079	118,603	92,826	216,147	89,308	73,384	17,133	96,240	87,131	247,165	51,191	22,468	175,647	177,901	43,587	126,299	176,258	421,935	278,662	50,607	2,839,972
2011	n/a	54,131	1,467	227,332	120,909	94,555	221,014	91,362	74,424	17,531	98,376	88,955	251,520	52,256	22,944	179,261	181,010	44,402	128,662	177,660	424,991	280,668	51,397	2,884,828
2012	n/a	55,279	1,515	231,585	123,215	96,283	225,880	93,416	75,465	17,929	100,513	90,780	255,876	53,322	23,420	182,874	184,120	45,217	131,026	179,062	428,047	282,675	52,187	2,929,685
2013	1	56,428	1,563	235,837	125,521	98,011	230,747	95,470	76,506	18,327	102,649	92,605	260,231	54,387	23,896	186,488	187,229	46,033	133,390	180,464	431,102	284,681	52,976	2,974,542
2014	2	57,576	1,611	240,090	127,827	99,740	235,614	97,524	77,546	18,725	104,785	94,429	264,587	55,453	24,372	190,102	190,338	46,848	135,753	181,867	434,158	286,687	53,766	3,019,399
2015	3	58,725	1,659	244,343	130,134	101,468	240,481	99,578	78,587	19,122	106,922	96,254	268,942	56,518	24,848	193,716	193,447	47,664	138,117	183,269	437,214	288,693	54,555	3,064,256
2016	4	59,873	1,707	248,596	132,440	103,196	245,348	101,632	79,628	19,520	109,058	98,079	273,298	57,583	25,324	197,330	196,556	48,479	140,481	184,671	440,269	290,700	55,345	3,109,113
2017	5	61,021	1,755	252,849	134,746	104,925	250,215	103,686	80,668	19,918	111,194	99,903	277,653	58,649	25,800	200,943	199,666	49,295	142,844	186,073	443,325	292,706	56,135	3,153,970
2018	6	62,170	1,804	257,101	137,052	106,653	255,082	105,740	81,709	20,316	113,331	101,728	282,009	59,714	26,276	204,557	202,775	50,110	145,208	187,475	446,381	294,712	56,924	3,198,826
2019	7	63,318	1,852	261,354	139,359	108,381	259,949	107,794	82,749	20,714	115,467	103,552	286,364	60,780	26,752	208,171	205,884	50,925	147,571	188,878	449,437	296,718	57,714	3,243,683
2020	8	64,466	1,900	265,607	141,665	110,110	264,815	109,848	83,790	21,112	117,603	105,377	290,720	61,845	27,228	211,785	208,993	51,741	149,935	190,280	452,492	298,724	58,504	3,288,540
2021	9	65,321	1,941	268,583	143,384	111,355	269,569	111,846	84,750	21,515	119,751	107,107	294,602	62,817	27,661	216,007	212,051	52,528	153,033	191,641	455,418	300,633	59,159	3,330,677
2022	10	66,176	1,983	271,560	145,103	112,601	274,322	113,844	85,711	21,919	121,900	108,837	298,485	63,789	28,095	220,230	215,109	53,316	156,132	193,002	458,344	302,542	59,815	3,372,813
2023	11	67,031	2,025	274,536	146,822	113,847	279,076	115,841	86,671	22,322	124,048	110,566	302,367	64,761	28,529	224,453	218,167	54,104	159,230	194,362	461,270	304,450	60,471	3,414,949
2024	12	67,886	2,066	277,513	148,541	115,093	283,829	117,839	87,632	22,726	126,196	112,296	306,250	65,732	28,962	228,675	221,225	54,891	162,328	195,723	464,196	306,359	61,127	3,457,086
2025	13	68,741	2,108	280,489	150,260	116,339	288,582	119,837	88,592	23,129	128,344	114,026	310,132	66,704	29,396	232,898	224,283	55,679	165,427	197,084	467,122	308,267	61,783	3,499,222
2026	14	69,595	2,149	283,466	151,979	117,585	293,336	121,834	89,552	23,533	130,492	115,756	314,015	67,676	29,829	237,121	227,341	56,466	168,525	198,445	470,048	310,176	62,438	3,541,358
2027	15	70,450	2,191	286,442	153,698	118,831	298,089	123,832	90,513	23,936	132,641	117,486	317,898	68,648	30,263	241,343	230,399	57,254	171,623	199,806	472,974	312,085	63,094	3,583,495
2028	16	71,305	2,233	289,418	155,417	120,077	302,842	125,830	91,473	24,340	134,789	119,216	321,780	69,619	30,696	245,566	233,457	58,042	174,722	201,167	475,901	313,993	63,750	3,625,631
2029	17	72,160	2,274	292,395	157,136	121,323	307,596	127,827	92,434	24,743	136,937	120,945	325,663	70,591	31,130	249,788	236,515	58,829	177,820	202,528	478,827	315,902	64,406	3,667,768
2030	18	73,015	2,316	295,371	158,855	122,569	312,349	129,825	93,394	25,146	139,085	122,675	329,545	71,563	31,564	254,011	239,573	59,617	180,918	203,889	481,753	317,810	65,062	3,709,904
2031	19	73,851	2,359	298,190	160,559	123,791	317,540	131,978	94,432	25,612	141,547	124,517	333,536	72,553	32,008	258,944	242,712	60,472	184,861	205,352	484,870	319,840	65,726	3,755,249
2032	20	74,687	2,403	301,009	162,264	125,014	322,731	134,131	95,470	26,078	144,010	126,358	337,526	73,543	32,452	263,878	245,851	61,327	188,803	206,814	487,987	321,869	66,390	3,800,595
2033	21	75,523	2,446	303,828	163,969	126,237	327,921	136,284	96,508	26,543	146,472	128,200	341,516	74,533	32,896	268,811	248,990	62,182	192,746	208,277	491,104	323,898	67,054	3,845,940
2034	22	76,359	2,490	306,647	165,674	127,460	333,112	138,438	97,545	27,009	148,934	130,042	345,506	75,522	33,340	273,745	252,130	63,037	196,689	209,740	494,222	325,927	67,718	3,891,286
2035	23	77,195	2,533	309,466	167,379	128,683	338,303	140,591	98,583	27,474	151,397	131,883	349,497	76,512	33,784	278,678	255,269	63,893	200,631	211,203	497,339	327,956	68,382	3,936,631
2036	24	78,031	2,577	312,285	169,084	129,905	343,494	142,744	99,621	27,940	153,859	133,725	353,487	77,502	34,228	283,612	258,408	64,748	204,574	212,666	500,456	329,986	69,046	3,981,976
2037	25	78,867	2,620	315,104	170,788	131,128	348,685	144,897	100,659	28,406	156,321	135,566	357,477	78,492	34,672	288,545	261,548	65,603	208,516	214,129	503,574	332,015	69,710	4,027,322
2038	26	79,703	2,664	317,923	172,493	132,351	353,875	147,050	101,697	28,871	158,784	137,408	361,468	79,482	35,116	293,479	264,687	66,458	212,459	215,592	506,691	334,044	70,374	4,072,667
2039	27	80,539	2,707	320,741	174,198	133,574	359,066	149,203	102,734	29,337	161,246	139,249	365,458	80,472	35,560	298,412	267,826	67,313	216,401	217,055	509,808	336,073	71,038	4,118,012
2040	28	81,375	2,751	323,560	175,903	134,797	364,257	151,356	103,772	29,802	163,708	141,091	369,448	81,462	36,004	303,346	270,965	68,168	220,344	218,517	512,925	338,102	71,702	4,163,358

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Sewer by Basin (No Sector)

Calendar Year	Plan Year	Sewer Average Day Demand (gpd)																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2010	n/a	231,398	19,973	514,608	339,577	182,965	545,074	176,074	250,548	120,531	361,591	184,773	919,559	83,678	184,154	1,314,323	882,929	644,642	729,709	416,933	591,439	465,336	378,746	9,538,560
2011	n/a	234,006	20,161	521,662	344,211	185,676	554,794	179,673	253,830	122,294	366,830	188,382	931,625	85,312	187,689	1,340,771	895,989	656,017	744,697	421,851	597,317	469,984	383,110	9,685,881
2012	n/a	236,613	20,348	528,716	348,846	188,388	564,514	183,273	257,113	124,058	372,069	191,992	943,691	86,946	191,223	1,367,219	909,049	667,392	759,685	426,769	603,194	474,631	387,474	9,833,202
2013	1	239,221	20,536	535,770	353,481	191,099	574,235	186,872	260,395	125,821	377,308	195,601	955,756	88,580	194,757	1,393,667	922,109	678,766	774,672	431,686	609,071	479,279	391,838	9,980,523
2014	2	241,829	20,724	542,823	358,116	193,811	583,955	190,472	263,678	127,585	382,546	199,210	967,822	90,214	198,292	1,420,115	935,169	690,141	789,660	436,604	614,949	483,927	396,202	10,127,844
2015	3	244,437	20,912	549,877	362,751	196,522	593,675	194,072	266,960	129,348	387,785	202,819	979,888	91,847	201,826	1,446,562	948,230	701,516	804,648	441,522	620,826	488,574	400,566	10,275,164
2016	4	247,045	21,100	556,931	367,385	199,233	603,395	197,671	270,243	131,112	393,024	206,429	991,954	93,481	205,360	1,473,010	961,290	712,890	819,636	446,440	626,704	493,222	404,930	10,422,485
2017	5	249,653	21,288	563,985	372,020	201,945	613,115	201,271	273,525	132,875	398,263	210,038	1,004,019	95,115	208,895	1,499,458	974,350	724,265	834,624	451,358	632,581	497,869	409,295	10,569,806
2018	6	252,261	21,476	571,039	376,655	204,656	622,835	204,870	276,808	134,639	403,501	213,647	1,016,085	96,749	212,429	1,525,906	987,410	735,640	849,611	456,276	638,458	502,517	413,659	10,717,127
2019	7	254,869	21,664	578,093	381,290	207,368	632,555	208,470	280,090	136,402	408,740	217,257	1,028,151	98,382	215,963	1,552,353	1,000,470	747,015	864,599	461,194	644,336	507,165	418,023	10,864,448
2020	8	257,477	21,852	585,146	385,924	210,079	642,275	212,069	283,373	138,166	413,979	220,866	1,040,216	100,016	219,498	1,578,801	1,013,530	758,389	879,587	466,112	650,213	511,812	422,387	11,011,769
2021	9	259,676	22,025	590,595	389,653	212,158	652,162	215,745	287,139	139,907	419,014	224,476	1,053,037	101,616	223,261	1,601,457	1,026,374	767,679	892,041	470,778	655,589	516,229	427,167	11,147,777
2022	10	261,876	22,199	596,044	393,382	214,236	662,048	219,422	290,906	141,648	424,048	228,086	1,065,858	103,216	227,023	1,624,112	1,039,218	776,968	904,496	475,445	660,964	520,647	431,946	11,283,786
2023	11	264,075	22,372	601,493	397,110	216,314	671,935	223,098	294,672	143,389	429,083	231,695	1,078,679	104,815	230,786	1,646,767	1,052,061	786,257	916,951	480,112	666,340	525,064	436,726	11,419,795
2024	12	266,275	22,546	606,941	400,839	218,392	681,822	226,774	298,439	145,130	434,118	235,305	1,091,500	106,415	234,549	1,669,423	1,064,905	795,547	929,405	484,778	671,716	529,481	441,506	11,555,804
2025	13	268,475	22,719	612,390	404,567	220,470	691,708	230,451	302,205	146,871	439,152	238,915	1,104,321	108,015	238,311	1,692,078	1,077,748	804,836	941,860	489,445	677,091	533,898	446,286	11,691,813
2026	14	270,674	22,893	617,839	408,296	222,548	701,595	234,127	305,971	148,612	444,187	242,525	1,117,142	109,614	242,074	1,714,733	1,090,592	814,126	954,315	494,111	682,467	538,315	451,066	11,827,822
2027	15	272,874	23,067	623,288	412,024	224,627	711,481	237,803	309,738	150,353	449,222	246,135	1,129,963	111,214	245,837	1,737,389	1,103,436	823,415	966,769	498,778	687,843	542,732	455,845	11,963,831
2028	16	275,073	23,240	628,737	415,753	226,705	721,368	241,479	313,504	152,094	454,256	249,744	1,142,783	112,814	249,600	1,760,044	1,116,279	832,705	979,224	503,445	693,218	547,150	460,625	12,099,840
2029	17	277,273	23,414	634,185	419,481	228,783	731,254	245,156	317,271	153,835	459,291	253,354	1,155,604	114,413	253,362	1,782,699	1,129,123	841,994	991,678	508,111	698,594	551,567	465,405	12,235,848
2030	18	279,473	23,587	639,634	423,210	230,861	741,141	248,832	321,037	155,576	464,326	256,964	1,168,425	116,013	257,125	1,805,355	1,141,966	851,283	1,004,133	512,778	703,970	555,984	470,185	12,371,857
2031	19	282,545	23,857	646,300	427,907	233,315	753,856	253,419	326,107	158,030	471,121	261,495	1,185,865	117,915	262,428	1,831,308	1,158,449	864,928	1,017,345	518,902	710,451	561,604	477,082	12,544,230
2032	20	285,617	24,128	652,966	432,604	235,768	766,570	258,007	331,178	160,484	477,916	266,026	1,203,305	119,817	267,732	1,857,261	1,174,932	878,574	1,030,557	525,025	716,932	567,224	483,979	12,716,603
2033	21	288,688	24,398	659,632	437,302	238,222	779,285	262,594	336,248	162,938	484,712	270,557	1,220,745	121,719	273,035	1,883,215	1,191,416	892,219	1,043,769	531,149	723,412	572,844	490,877	12,888,975
2034	22	291,760	24,669	666,298	441,999	240,676	792,000	267,181	341,318	165,392	491,507	275,088	1,238,185	123,621	278,338	1,909,168	1,207,899	905,864	1,056,980	537,272	729,893	578,465	497,774	13,061,348
2035	23	294,832	24,939	672,964	446,696	243,130	804,715	271,768	346,388	167,846	498,302	279,619	1,255,625	125,523	283,641	1,935,121	1,224,382	919,509	1,070,192	543,396	736,374	584,085	504,672	13,233,720
2036	24	297,904	25,209	679,630	451,393	245,583	817,429	276,356	351,459	170,300	505,098	284,150	1,273,065	127,426	288,945	1,961,075	1,240,865	933,154	1,083,404	549,520	742,855	589,705	511,569	13,406,093
2037	25	300,976	25,480	686,296	456,090	248,037	830,144	280,943	356,529	172,754	511,893	288,681	1,290,505	129,328	294,248	1,987,028	1,257,348	946,799	1,096,616	555,643	749,336	595,325	518,466	13,578,466
2038	26	304,048	25,750	692,962	460,788	250,491	842,859	285,530	361,599	175,208	518,688	293,212	1,307,945	131,230	299,551	2,012,982	1,273,831	960,444	1,109,828	561,767	755,817	600,945	525,364	13,750,838
2039	27	307,120	26,021	699,628	465,485	252,944	855,574	290,118	366,669	177,662	525,484	297,743	1,325,385	133,132	304,854	2,038,935	1,290,314	974,089	1,123,040	567,890	762,298	606,565	532,261	13,923,211
2040	28	310,192	26,291	706,294	470,182	255,398	868,288	294,705	371,740	180,116	532,279	302,274	1,342,825	135,034	310,157	2,064,888	1,306,797	987,734	1,136,252	574,014	768,779	612,185	539,159	14,095,583
2041	29	313,602	26,593	713,655	475,401	258,112	883,185	300,138	377,611	182,957	540,069	307,604	1,362,868	137,248	316,554	2,094,573	1,325,659	1,003,566	1,151,202	580,869	775,856	618,374	547,068	14,291,972
2042	30	317,049	26,897	721,093	480,677	260,856	898,336	305,671	383,575	185,843	547,972	313,027	1,383,210	139,498	323,083	2,124,684	1,344,794	1,019,652	1,166,349	587,806	782,999	624,624	555,093	14,491,097
2043	31	320,534	27,206	728,608	486,012	263,628	913,748	311,306	389,633	188,774	555,992	318,547	1,403,856	141,785	329,747	2,155,228	1,364,204	1,035,996	1,181,695	594,825	790,207	630,938	563,236	14,692,996
2044	32	324,057	27,518	736,201	491,406	266,430	929,424	317,045	395,786	191,752	564,129	324,164	1,424,810	144,110	336,548	2,186,211	1,383,895	1,052,602	1,197,243	601,929	797,482	637,316	571,498	14,897,708
2045	33	327,619	27,833	743,873	496,860	269,262	945,369	322,890	402,037	194,776	572,385	329,880	1,446,077	146,473	343,490	2,217,640	1,403,870	1,069,474	1,212,996	609,117	804,824	643,759	579,882	15,105,273
2046	34	331,220	28,152	751,626	502,375	272,124	961,587	328,842	408,387	197,849	580,761	335,696	1,467,661	148,874	350,574	2,249,520	1,424,134	1,086,617	1,228,956	616,391	812,233	650,266	588,388	15,315,729
2047	35	334,861	28,475	759,459	507,951	275,016	978,084	334,905	414,836	200,970	589,261	341,616	1,489,568	151,315	357,805	2,281,858	1,444,690	1,104,034	1,245,126	623,752	819,711	656,839	597,020	15,529,118
2048	36	338,542	28,801	767,374	513,589	277,939	994,863	341,079	421,388	204,140	597,884	347,639	1,511,801	153,796	365,184	2,314,662	1,465,542	1,121,730	1,261,508	631,201	827,257	663,479	605,778	15,745,479
2049	37	342,263	29,132	775,371	519,289	280,893	1,011,931	347,367	428,043	207,360	606,634	353,769	1,534,366	156,318	372,716	2,347,937	1,486,696	1,139,710	1,278,107	638,739	834,873	670,186	614,664	15,964,855
2050	38	346,025	29,465	783,452	525,052	283,878	1,029,291	353,771	434,803	210,630	615,512	360,007	1,557,268	158,880	380,404	2,381,691	1,508,155	1,157,978	1,294,923	646,367	842,559	676,960	623,681	16,187,288
2051	39	347,755	29,613	787,369	527,678	285,298	1,034,438	355,539	436,977	211,684	618,590	361,807	1,565,055	159,675	382,306	2,393,599	1,515,695	1,163,768	1,301,398	649,598	846,772	680,345	626,800	16,268,224
2052	40	349,494	29,761	791,306	530,316	286,724	1,039,610	357,317	439,162	212,742	621,683	363,616	1,572,880	160,473	384,217	2,405,567	1,523,274	1,169,587	1,307,905	652,846	851,006	683,747	629,934	16,349,565
2053	41	351,241	29,910	795,262	532,968	288,158	1,044,808	359,104	441,358	213,806	624,791	365,434	1,580,744	161,276	386,138	2,417,595	1,530,890	1,175,435	1,314,445	656,111	855,261	687,165	633,083	16,431,313
2054	42	352,998	30,059	799,239	535,632	289,599	1,050,032	360,899	443,565	214,875	627,915	367,261	1,588,648	162,082	388,069	2,429,683	1,538,545	1,181,312	1,321,017	659,391	859,537	690,601	636,249	16,513,470
2055	43	354,762	30,210	803,235	538,311	291,047	1,055,282	362,704	445,783	215,949	631,055	369,097	1,596,591	162,892	390,009	2,441,831	1,546,237	1,187,219	1,327,622	662,688	863,835	694,054	639,430	16,596,037
2056	44	356,536	30,361	807,251	541,002	292,502	1,060,559	364,517	448,012	217,029	634,210	370,943	1,604,574	163,707	391,959	2,454,040	1,553,969	1,193,155	1,334,260	666,002	868,154	697,524	642,627	16,679,017
2057	45	358,319	30,512	811,287	543,707	293,964	1,065,861	366,340	450,252	218,114	637,381	372,798	1,612,597	164,525	393,919	2,466,311	1,561,738	1,199,121	1,340,931	669,332	872,495	701,012	645,840	16,762,412
2058	46	360,111	30,665	815,344	546,426	295,434	1,071,191	368,171	452,503	219,205	640,568	374,662	1,620,660	165,348	395,889	2,478,642	1,569,547	1,205,116	1,347,636	672,678	876,858	704,517	649,069	16,846,224
2059	47	361,911	30,818	819,420	549,158	296,911	1,076,547	370,012	454,766	220,301	643,771	376,535	1,628,763	166,175	397,868	2,491,035	1,577,395	1,211,142	1,354,374	676,042	881,242	708,040	652,315	16,930,455
2060	48	363,721	30,972	823,518	551,904	298,396	1,081,929	371,862	457,039	221,402	646,990	378,418	1,636,907	167,006	399,858	2,503,491	1,585,282	1,217,198	1,361,146	679,422	885,648	711,580	655,576	17,015,108
2061	49	365,539	31,127	827,635	554,663	299,888	1,087,339	373,722	459,325	222,509	650,225	380,310	1,645,092	167,841	401,857	2,516,008	1,593,208	1,223,284	1,367,952	682,819	890,076	715,138	658,854	17,100,183
2062	50	367,367	31,283	831,773	557,436	301,387	1,092,776	375,590	461,621	223,622	653,476	382,211	1,653,317	168,680	403,866	2,528,588	1,601,174	1,229,400	1,374,791	686,233	894,527	718,714	662,148	17,185,684
2063	51	369,204	31,439	835,932	560,224	302,894	1,098,240	377,468	463,929	224,740	656,743	384,122	1,661,584	169,523	405,886	2,541,231	1,609,180	1,235,547	1,381,665	689,664	898,999	722,307	665,459	17,271,613
2064	52	371,050	31,596	840,112	563,025	304,409	1,103,731	379,356	466,249	225,863	660,027	386,043	1,669,892	170,371	407,915	2,553,937	1,617,226	1,241,725	1,388,574	693,113	903,494	725,919	668,786	17,357,971
2065	53	372,905	31,754	844,312	565,840	305,931	1,109,249	381,252	468,580	226,993	663,327	387,973	1,678,241	171,223	409,955	2,566,707	1,625,312	1,247,933	1,395,517	696,578	908,012	729,548	672,130	17,444,761
2066	54	374,770	31,913	848,534	568,669	307,460	1,114,796	383,159	470,923	228,128	666,644	389,913	1,686,632	172,079	412,004	2,579,540	1,633,439	1,254,173	1,402,494	700,061	912,552	733,196	675,491	17,531,984
2067	55	376,643	32,073	852,777	571,512	308,998	1,120,370	385,074	473,278	229,268	669,977	391,863	1,695,065	172,939	414,064	2,592,438	1,641,606	1,260,444	1,409,507	703,561	917,115	736,862	678,868	17,619,644
2068	56	378,527	32,233	857,041	574,370	310,543	1,125,972	387,000	475,644	230,415	673,327	393,822	1,703,541	173,804	416,135	2,605,400	1,649,814	1,266,746	1,416,554	707,079	921,700	740,546	682,263	17,707,742
2069	57	380,419	32,394	861,326	577,242	312,095	1,131,601	388,935	478,022	231,567	676,693	395,791	1,712,058	174,673	418,215	2,618,427	1,658,063	1,273,080	1,423,637	710,614	926,309	744,249	685,674	17,796,281
2070	58	382,321	32,556	865,632	580,128	313,656	1,137,259	390,879	480,412	232,725	680,077	397,770	1,720,619	175,546	420,306	2,631,519	1,666,353	1,279,445	1,430,755	714,168	930,940	747,970	689,103	17,885,263
2071	59	384,233	32,719	869,961	583,029	315,224	1,142,946	392,834	482,814	233,888	683,477	399,759	1,729,222	176,424	422,408	2,644,677	1,674,685	1,285,842	1,437,909	717,738	935,595	751,710	692,548	17,974,689
2072	60	386,154	32,883	874,310	585,944	316,800	1,148,660	394,798	485,229	235,058	686,895	401,758	1,737,868	177,306	424,520	2,657,900	1,683,059	1,292,272	1,445,098	721,327	940,273	755,469	696,011	18,064,562

Sewer by Basin (No Sector)

Calendar Year	Plan Year	Sewer Average Day Demand (gpd)																						
		Sewer Basin																						Total
		A	B	C	D	E-M	G	K	N	NC	ND	NE	NG	P	T-Q	SE_7	SE_8	SE_9	SE_10	SW_1	SW_3	SW_4	SW_5	
2073	61	388,085	33,047	878,682	588,874	318,384	1,154,404	396,772	487,655	236,233	690,329	403,766	1,746,557	178,193	426,643	2,671,190	1,691,474	1,298,733	1,452,324	724,934	944,974	759,246	699,491	18,154,885
2074	62	390,025	33,212	883,075	591,818	319,976	1,160,176	398,756	490,093	237,414	693,781	405,785	1,755,290	179,084	428,776	2,684,546	1,699,931	1,305,227	1,459,586	728,558	949,699	763,042	702,988	18,245,660
2075	63	391,976	33,378	887,491	594,777	321,576	1,165,977	400,750	492,543	238,601	697,250	407,814	1,764,067	179,979	430,920	2,697,968	1,708,431	1,311,753	1,466,884	732,201	954,448	766,857	706,503	18,336,888
2076	64	393,935	33,545	891,928	597,751	323,184	1,171,806	402,753	495,006	239,794	700,736	409,853	1,772,887	180,879	433,074	2,711,458	1,716,973	1,318,312	1,474,218	735,862	959,220	770,692	710,036	18,428,572
2077	65	395,905	33,713	896,388	600,740	324,800	1,177,666	404,767	497,481	240,993	704,240	411,902	1,781,751	181,783	435,240	2,725,016	1,725,558	1,324,903	1,481,589	739,541	964,016	774,545	713,586	18,520,715
2078	66	397,885	33,882	900,870	603,743	326,424	1,183,554	406,791	499,969	242,198	707,761	413,962	1,790,660	182,692	437,416	2,738,641	1,734,186	1,331,528	1,488,997	743,239	968,836	778,418	717,154	18,613,319
2079	67	399,874	34,051	905,374	606,762	328,056	1,189,472	408,825	502,468	243,409	711,300	416,032	1,799,613	183,606	439,603	2,752,334	1,742,857	1,338,185	1,496,442	746,955	973,680	782,310	720,740	18,706,385
2080	68	401,873	34,221	909,901	609,796	329,696	1,195,419	410,869	504,981	244,626	714,856	418,112	1,808,611	184,524	441,801	2,766,096	1,751,571	1,344,876	1,503,924	750,690	978,549	786,222	724,343	18,799,917
2081	69	403,883	34,392	914,450	612,845	331,345	1,201,396	412,923	507,506	245,849	718,430	420,202	1,817,654	185,446	444,010	2,779,926	1,760,329	1,351,601	1,511,444	754,444	983,441	790,153	727,965	18,893,917
2082	70	405,902	34,564	919,023	615,909	333,002	1,207,403	414,988	510,043	247,079	722,023	422,303	1,826,743	186,374	446,230	2,793,826	1,769,130	1,358,359	1,519,001	758,216	988,359	794,103	731,605	18,988,386
2083	71	407,932	34,737	923,618	618,989	334,667	1,213,440	417,063	512,593	248,314	725,633	424,415	1,835,876	187,305	448,461	2,807,795	1,777,976	1,365,150	1,526,596	762,007	993,300	798,074	735,263	19,083,328
2084	72	409,971	34,911	928,236	622,084	336,340	1,219,507	419,148	515,156	249,555	729,261	426,537	1,845,056	188,242	450,703	2,821,834	1,786,866	1,371,976	1,534,229	765,817	998,267	802,064	738,939	19,178,745
2085	73	412,021	35,085	932,877	625,194	338,022	1,225,605	421,244	517,732	250,803	732,907	428,670	1,854,281	189,183	452,957	2,835,943	1,795,800	1,378,836	1,541,900	769,646	1,003,258	806,075	742,634	19,274,639
2086	74	414,081	35,261	937,541	628,320	339,712	1,231,733	423,350	520,321	252,057	736,572	430,813	1,863,553	190,129	455,222	2,850,123	1,804,779	1,385,730	1,549,610	773,494	1,008,274	810,105	746,347	19,371,012
2087	75	416,152	35,437	942,229	631,462	341,410	1,237,891	425,467	522,922	253,318	740,255	432,967	1,872,870	191,080	457,498	2,864,373	1,813,803	1,392,659	1,557,358	777,362	1,013,316	814,156	750,079	19,467,867
2088	76	418,232	35,614	946,940	634,619	343,117	1,244,081	427,594	525,537	254,584	743,956	435,132	1,882,235	192,035	459,785	2,878,695	1,822,872	1,399,622	1,565,144	781,249	1,018,382	818,226	753,829	19,565,206
2089	77	420,324	35,792	951,675	637,792	344,833	1,250,301	429,732	528,165	255,857	747,676	437,308	1,891,646	192,995	462,084	2,893,089	1,831,987	1,406,620	1,572,970	785,155	1,023,474	822,317	757,598	19,663,032
2090	78	422,425	35,971	956,433	640,981	346,557	1,256,553	431,881	530,806	257,136	751,414	439,494	1,901,104	193,960	464,395	2,907,554	1,841,146	1,413,653	1,580,835	789,081	1,028,592	826,429	761,386	19,761,348
2091	79	424,537	36,151	961,216	644,186	348,290	1,262,836	434,040	533,460	258,422	755,171	441,692	1,910,610	194,930	466,717	2,922,092	1,850,352	1,420,722	1,588,739	793,026	1,033,735	830,561	765,193	19,860,154
2092	80	426,660	36,332	966,022	647,407	350,031	1,269,150	436,211	536,127	259,714	758,947	443,900	1,920,163	195,905	469,050	2,936,702	1,859,604	1,427,825	1,596,683	796,991	1,038,903	834,714	769,019	19,959,455
2093	81	428,793	36,514	970,852	650,644	351,781	1,275,496	438,392	538,807	261,013	762,742	446,120	1,929,763	196,884	471,395	2,951,386	1,868,902	1,434,964	1,604,666	800,976	1,044,098	838,888	772,864	20,059,252
2094	82	430,937	36,696	975,706	653,897	353,540	1,281,873	440,584	541,502	262,318	766,555	448,350	1,939,412	197,869	473,752	2,966,143	1,878,246	1,442,139	1,612,690	804,981	1,049,318	843,082	776,729	20,159,549
2095	83	433,092	36,880	980,585	657,166	355,308	1,288,282	442,787	544,209	263,629	770,388	450,592	1,949,109	198,858	476,121	2,980,973	1,887,638	1,449,350	1,620,753	809,006	1,054,565	847,297	780,612	20,260,346
2096	84	435,257	37,064	985,487	660,452	357,085	1,294,724	445,000	546,930	264,948	774,240	452,845	1,958,855	199,852	478,502	2,995,878	1,897,076	1,456,597	1,628,857	813,051	1,059,838	851,534	784,515	20,361,648
2097	85	437,434	37,249	990,415	663,755	358,870	1,301,197	447,225	549,665	266,272	778,111	455,109	1,968,649	200,852	480,894	3,010,858	1,906,561	1,463,880	1,637,001	817,116	1,065,137	855,792	788,438	20,463,456
2098	86	439,621	37,436	995,367	667,073	360,664	1,307,703	449,462	552,413	267,604	782,002	457,385	1,978,492	201,856	483,299	3,025,912	1,916,094	1,471,199	1,645,186	821,202	1,070,463	860,070	792,380	20,565,774
2099	87	441,819	37,623	1,000,344	670,409	362,468	1,314,242	451,709	555,175	268,942	785,912	459,672	1,988,385	202,865	485,715	3,041,042	1,925,675	1,478,555	1,653,412	825,308	1,075,815	864,371	796,342	20,668,602
2100	88	444,028	37,811	1,005,346	673,761	364,280	1,320,813	453,967	557,951	270,286	789,841	461,970	1,998,327	203,879	488,144	3,056,247	1,935,303	1,485,948	1,661,679	829,434	1,081,194	868,693	800,324	20,771,945

Blue - Milestone years to summarize in chapter.

Appendix K

Hydraulic Modeling Technical Memorandum

Disclaimer: Modeling analysis described in this report was conducted between 2012 and 2013. Results and recommendations contained within the report reflect the best available information and at the time and are subject to change as more information from the system is collected and projects are further developed. Modeling analysis contained herein will be updated as the system develops. Refer to more recent modeling Technical Memorandum to supplement the information within this report.

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Everett Sewer Comprehensive Plan

Hydraulic Modeling Technical Memorandum

November 29, 2014

Project No.: 157248
Contract No.: CON0061212

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Appendices

Appendix A – Calibration Plots
Appendix B – As Builts
Appendix C – Hydraulic Profiles

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1.0 Introduction

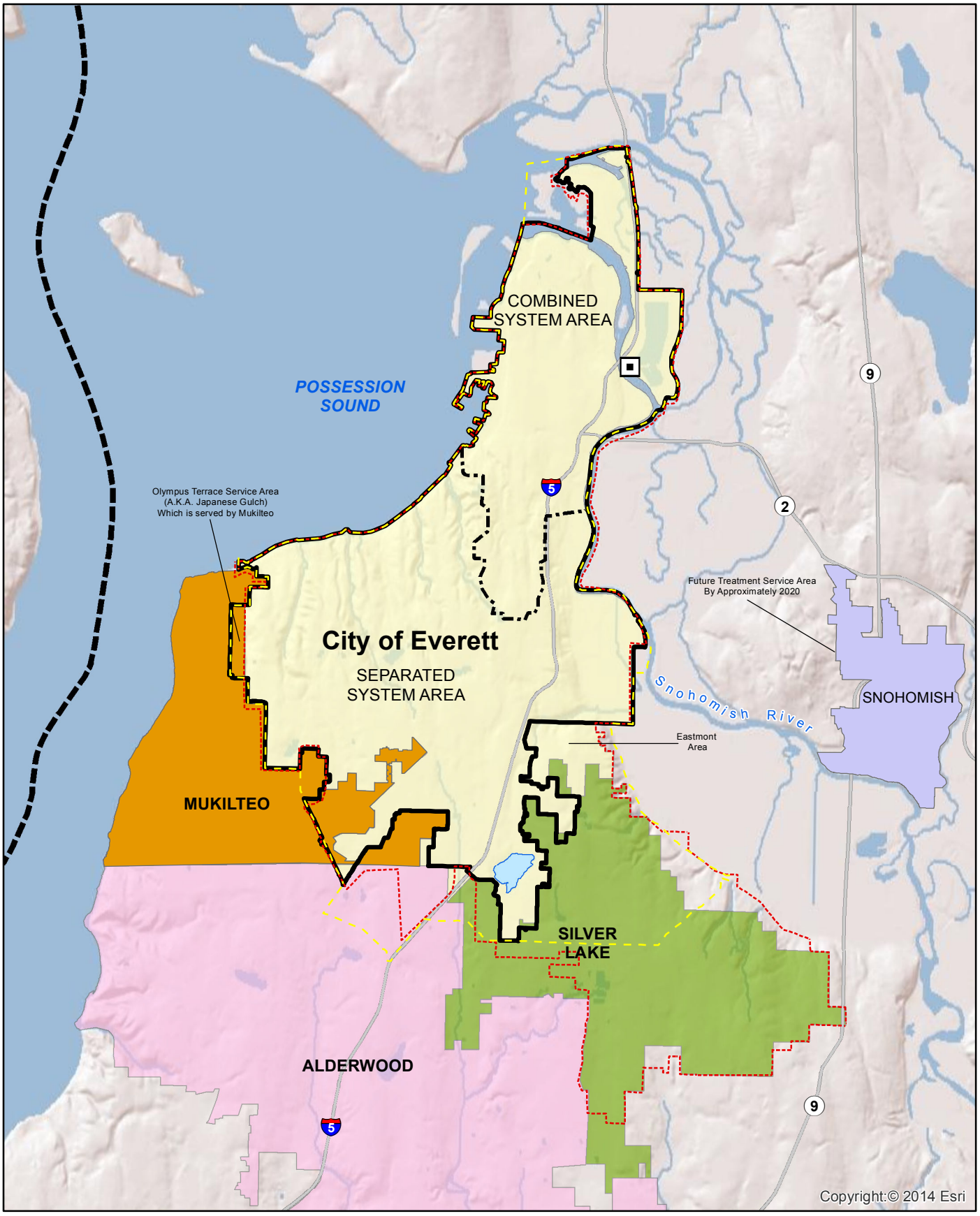
As part of the City of Everett's (City) 2014 Comprehensive Sewer Plan (CSP), an evaluation of the City's sewer systems was conducted using the City's hydraulic model of its collection system. The model was organized into two sub-models to evaluate the combined sewer system in the northern area of the City and the sanitary sewer system in the southern area of the City. Figure 1 depicts the boundaries of the two systems. Figure 2 depicts each sewer basin. Figure depicts a schematic of the sewer collection system.

HDR updated the models with record drawings from recent improvements and additional data provided by City staff. Sewer flow monitoring data collected by SFE Global was used to calibrate dry weather flow (DWF) and wet weather flow (WWF) model parameters. With the updated and calibrated model, various scenarios were simulated to evaluate the City's sewer collection system performance under different system conditions. The calibrated model was then used to identify facilities with inadequate capacities and to evaluate improvements to provide the desired level of service.

1.1 Hydraulic Model

A hydraulic model is a representation of the sewer system used to predict the system's response and adequacy under operating conditions. A hydraulic model includes information about the network of physical structures and appurtenances that convey sewage in the sewer service area to the treatment facilities. A hydraulic model also contains information about sewage flows.

The first version of Everett's model was developed using DHI's Modeling Urban Sewers (MOUSE) software in 2001. A portion of the model was transferred into Innovyze's InfoSWMM software and updated for the North Everett Combined Sewer Evaluation (Basin D) prepared by OTAK. For the 2014 CSP, HDR combined the portion of Everett's model updated by OTAK with the remainder of the existing model to create a complete model of Everett's system in the InfoSWMM software platform. After integrating these components together, the model was divided into a South Model (the sanitary system) and North Model (the combined system). HDR updated the models with record drawings and data provided by City staff.



Sewer Service Areas
- City of Everett
- Alderwood Water & Wastewater District
- Mukilteo Water & Wastewater District
- Silver Lake Water & Sewer District
- City of Snohomish

- Boundary Between Combined and Separated Systems
- Everett Municipal Boundary
- Everett Urban Growth Area (UGA) Boundary
- Everett Treatment Service Area
- Snohomish County Boundary

- Highway
- City of Everett WPCF
- Water

0 0.5 1 2
Miles

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 1
Collection System Boundaries

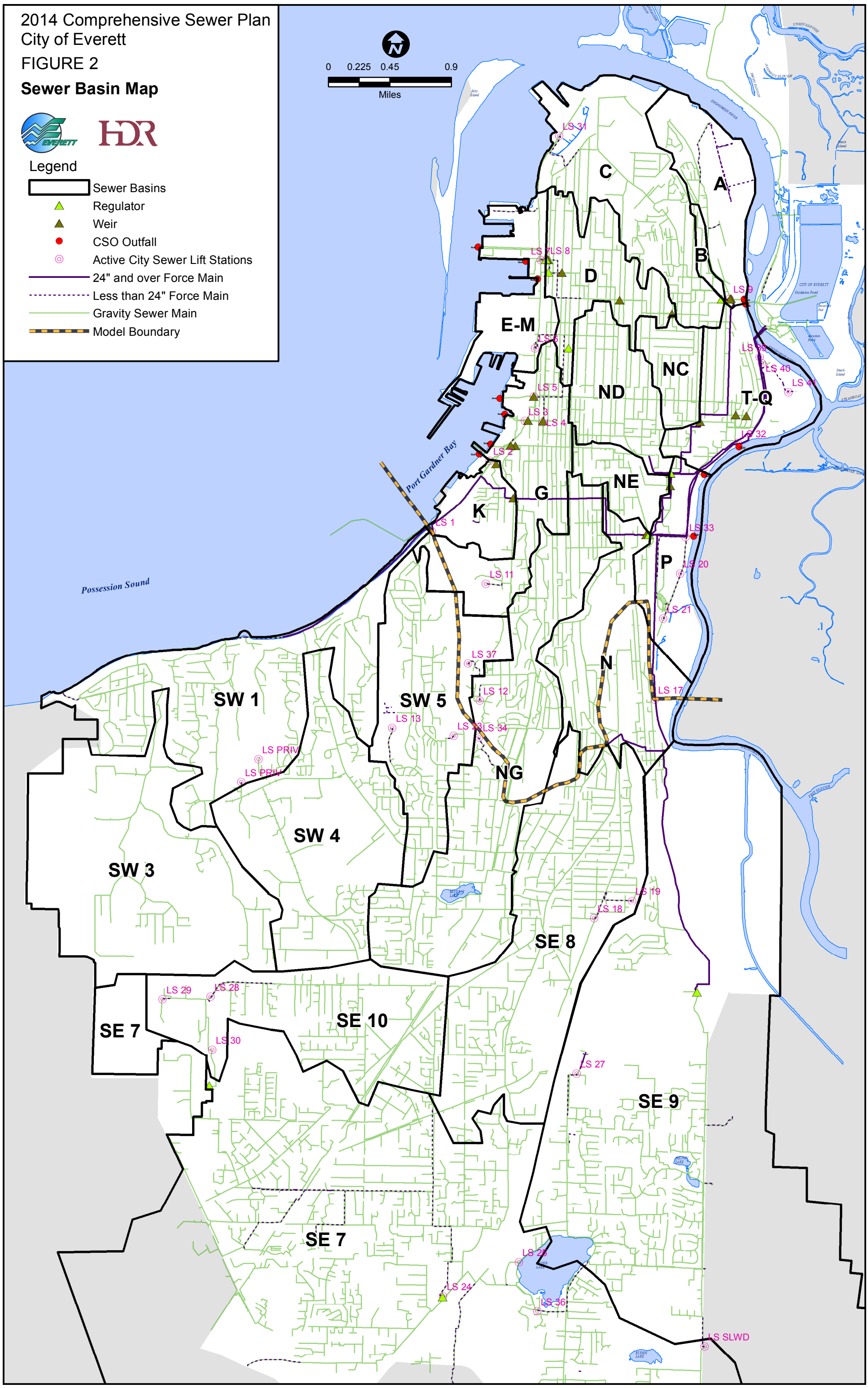
2014 Comprehensive Sewer Plan
City of Everett

FIGURE 2

Sewer Basin Map

Legend

- Sewer Basins
- Regulator
- Weir
- CSO Outfall
- Active City Sewer Lift Stations
- 24" and over Force Main
- Less than 24" Force Main
- Gravity Sewer Main
- Model Boundary



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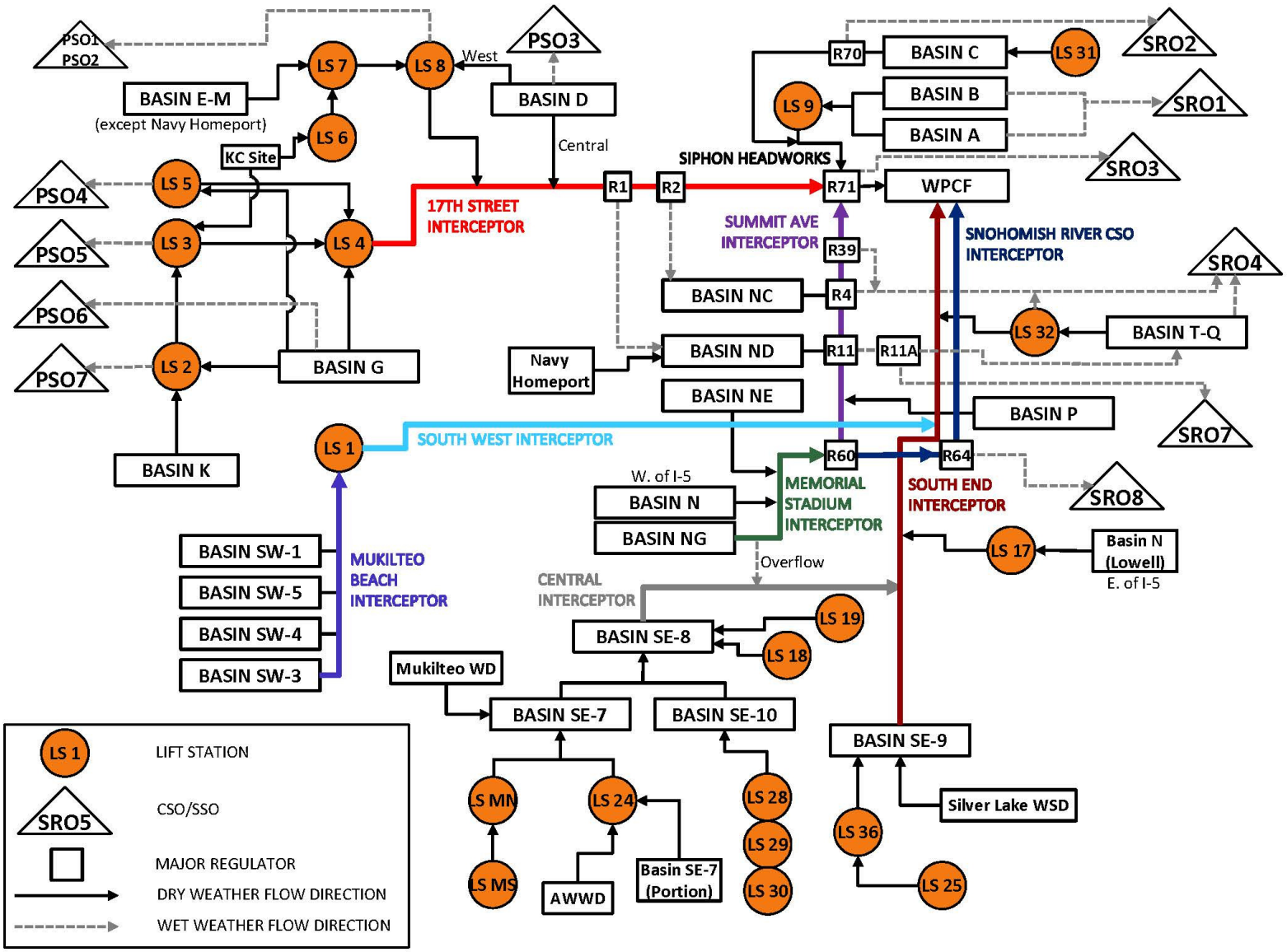


Figure 3. Sewer System Diagram

1.2 Representation of City's System Pipe Network

The model represents a subset of the entire collection system of manholes, pipes, diversions, overflows, and lift stations. Everett maintains an inventory of its system in a geographic information system (GIS) database. While the model was originally developed from GIS, updates are now added directly into the model.

There are 35 major regulators in the system (leaping weir, weirs, and elevated pipes). The model contains 32 of these regulators. Table 1 lists the regulators and their location. The subset of the system modeled also includes 23 of the 31 active lift stations, listed in Table 2, and all 13 combined sewer outfalls, listed in Table 3.

The model is a skeletonized representation of the existing system. It contains a majority of the existing pipes, regulator, and lift stations in the system. A portion of smaller diameter piping, some regulators, and small lift stations are not included in the model because they do not have significant impact to the operation of the system.

Table 1. Regulators

Regulator ID	Manhole ID	Location	Regulator Type	Overflow to CSO (or other)
R1	SMH1795W14	17th Street and Broadway Avenue (Removal recommended by 17th St. Interceptor CIP)	Leaping Weir	No
R2	SMH1795Y05	19th Street between Cedar Avenue and Pine Avenue(Removal recommended by 17th St. Interceptor CIP)	Leaping Weir	No
R4	SMH2095S07	Chestnut Street between 26th Street and Everett Avenue (to be modified following East Grand and Cleveland Ave sewer projects)	Leaping Weir	LS 32 to SRO4
R6	SMH2195V20	26th Street between Cleveland Avenue and East Grand Avenue (removal pending by Cleveland Ave Sewer project, 2016)	Leaping Weir	No
R7	SMH1995T04	Everett Avenue and Nassau Street	Leaping Weir	PSO5
R8	SMH1995X15	Hewitt Avenue and Federal Avenue (relocation of R8 pending by BNSF bridge removal and embankment placement)	Leaping Weir	PSO6
R11	SMH2995B07	Pacific Avenue and Pine Street	Weir	R11A to SRO7
R11A	SMH2995A01	Pacific Avenue and Chestnut Street	Weir	SRO7
R14	SMH1895S01	15th Street between Rucker Avenue and Hoyt Avenue (Sewer M to change function of this regulator to be low flow storm drainage diversion to 17th St. Interceptor)	Leaping Weir	LS8 to, PSO1,2 or 3
R17	SMH1895Q14	14th Street and Grand Avenue, upstream of LS 8 (CSO overflow to PSO1 and PSO2 to be changed by Sewer M project in 2015. New regulator at Grand Ave and 15th St.)	Weir	PSO1 & PSO2

Regulator ID	Manhole ID	Location	Regulator Type	Overflow to CSO (or other)
R17A	SMH1895Q13	14th Street and Grand Avenue, west of Regulator R17(CSO overflow to PSO1 and PSO2 to be changed by Sewer M project in 2015. New regulator at Grand Ave and 15th St. PSO2 to be abandoned in 2017, overflow to PSO1 to remain as an emergency LS8 overflow)	Weir/Overflow Pipe	PSO1 & PSO2
R18	SMH1695W03	East Grand Avenue and Hayes Street, at LS 9 (to be modified by Hayes St CSO Control project, 2017)	Weir	SRO1
R20	SMH1995Q04	25th Street and Norton Avenue, upstream of LS 5	Weir	PSO4
R21	SMH1995T14	Everett Avenue and Grand Avenue	Weir	R7 to PSO5
R36	SMH1895Q10	WMVD at 14th Street near LS 7	Overflow Pipe	R82 to PSO2
R37	SMH1895T06	15th Street and Grand Avenue (to be removed by Sewer M projects)	Overflow Pipe	PSO3
R39	SMH2195V01	26th Street and Summit Avenue(to be modified following East Grand and Cleveland Ave sewer projects)	Weir	LS32 to SRO4
R40	SMH3095C04	Upstream of LS 2, to northeast	Weir/Overflow Pipe	PSO7
R40A	SMH3095C03	Upstream of LS 2 to southwest	Overflow Pipe	PSO7
R43	SMH1995T03	Upstream of LS 3 on Everett Avenue, east of Federal Avenue	Weir	PSO5
R50	SMH3095G02	33rd Street between Federal Avenue and Nassau Avenue (to be removed by City crews, 2014)	Dam	LS2 to PSO7
R60	SMH2995P30	36th Street between Paine Avenue and Smith Avenue	Slide Gate	No (Maint. Bypass)
R61	SMH2995P34	36th Street between Smith Avenue and I-5	Weir	No (to Summit Int, SRO7, SRO4))
R62	SMH2995P31	36th Street under I-5 SB	Gate	No (Maint. Bypass)
R63	SMH2995Q12	36th Street/Eclipse Mill Rd near LS33	Overflow Pipe	SRO8
R64	SMH2995Q13	36th Street/Eclipse Mill Rd at SRO8 structure	Motor Operated Slide Gate	SRO8
R70	SMH1795S25	Hayes Street at Marine View Drive (to be relocated, 2017)	Weir	SRO2
R71	SMH1695W06	East of Marine View Drive, south of Hayes Street (at Siphon Headworks Structure)	Weir	SRO3
R72	SMH2195W75	Upstream of LS 32, east of Railway Avenue and US-2 (to be reconstructed by East Grand sewer project, 2015)	Weir	SRO4

Regulator ID	Manhole ID	Location	Regulator Type	Overflow to CSO (or other)
R80	SMH1995Q04	Upstream of LS 5	Weir	PSO4
R81	SMH1995T37	Upstream of LS 3	Cipolletti Weir	PSO5
R82	SMH1895Q10	WMVD at 14th Street near LS7 (Tide gate welded closed)	Overflow Pipe	PSO2 (not active)
R90	SMH1995A20	20th Street and Hoyt Avenue	Weir Gate	No (20th St trunk)
R100	NID4626	Upstream of LS 1, on Pigeon Creek Road	Weir	SSO to Bay
R101	SMH1384R29	3rd Avenue SE and 92nd Street	Overflow Pipe	No (diversion)

Sources: City of Everett staff; City of Everett As-Built Drawings; City of Everett GIS Database; CH2M HILL, 1978, NESS Study, Lower Snohomish Basin 201 Facilities Plan.

Table 2. Lift Stations

Lift Station ID	Basin	Address	Firm Capacity (GPM)	Number of Pumps	Receiving Waters	Overflow
1	SW-1	3520 Pigeon Creek Road	12,000	4	Port Gardner Bay	Direct Discharge
2(2)	G	522 Wall Street	2,400	3	Port Gardner Bay	Direct Discharge (PSO7)
3(2)	G	1111 Everett Avenue	3,900	3	Port Gardner Bay	Direct Discharge (PSO5)
4	G	2700 Grand Avenue	4,800	2	Port Gardner Bay	Indirect Discharge
5(2)	G	1200 25th Street	800	2	Port Gardner Bay	Direct Discharge (PSO4)
6	E-M	2104 W. Marine View Drive	700	2	Port Gardner Bay	Indirect Discharge
7	E-M	1331 W. Marine View Drive	1,960	2	Port Gardner Bay	Indirect Discharge
8(2)	E-M	1222 14th Street	3,500	2	Port Gardner Bay	Direct Discharge (PSO1, 2 , & 3)
9(2)	A	3427 Hayes Street	1,350	2	Snohomish River	Direct Discharge (SRO1)
11	G	704 41st Place	100	2	Wetland	Indirect Discharge
12	NG	4845 Black Forest Lane	215	2	Pigeon Creek No. 1	Indirect Discharge
13	SW-5	5400 1st Drive West	200	2	Pigeon Creek No. 2	Indirect Discharge
17	N	4919 South 2nd Avenue	1,200	2	Bigelow Creek	Indirect Discharge
18	SE-8	7600 Broadway Avenue	400	2	Wetland	Indirect Discharge
19	SE-8	2515 74th Street	400	2	Stormwater Conveyance System	Indirect Discharge
21	SW-5	2922 36th Street	350	2	Bigelow Creek	Indirect Discharge
23	SW-5	5200 1/2 East Drive	225	2	Pigeon Creek No. 1	Indirect Discharge
24	SE-7	332 120th Street SE	4,500	3	North Creek	Indirect Discharge
25	SE-9	11500 W Silver Lake Road	800	2	Silver Lake	Indirect Discharge
27	SE-9	1931 Burley Drive	240	2	Wetland	Indirect Discharge
28	SE-10	2114 W Casino Road	350	2	Wetland	Indirect Discharge
29	SE-10	2722 W Casino Road	200	2	Ditch	Indirect Discharge

Lift Station ID	Basin	Address	Firm Capacity (GPM)	Number of Pumps	Receiving Waters	Overflow
30	SE-10	Kasch Park	500	2	Swamp Creek	Indirect Discharge
31	C	402 W Marine View Drive	850	3	Port Gardner Bay	Indirect Discharge
32(2)	T-Q	3520 Railway Avenue	2,700	2	Snohomish River	Direct Discharge (SRO4)
33(2)	P	3020 36th Street	800	2	Snohomish River	Direct Discharge (SRO8)
34	NG	5800 Fleming Street	300	2	Pigeon Creek No. 1	Indirect Discharge
36	SE-9	1530 121st Street S.F.	850	2	Silver Lake	Indirect Discharge
37	SW-5	4500 5th Drive SE	80	2	Pigeon Creek No. 1	Indirect Discharge
39[1]	T-Q	3702 Railway Avenue	1,100	3	Snohomish River	Indirect Discharge
41[1]	T-Q	4000 Railway Avenue	0	1	Snohomish River	Indirect Discharge

1. Pump capacity is 300 gpm with no back-up pump.
2. Lift Station with authorized CSO outfall

Table 3. CSO Outfalls

Everett CSO ID	Discharge Number	Discharge Name	Receiving Water
PS 01	005	Lift Station #8	Port Gardner Bay
PS 02	013	Lift Station #8	Port Gardner Bay
PS 03	012	15th & Grand Street Outfall	Port Gardner Bay
PS 04	011	Lift Station #5	Port Gardner Bay
PS 05	009	Lift Station #3	Port Gardner Bay
PS 06	008	West Hewitt & Bond Street Outfall	Port Gardner Bay
PS 07	007	Lift Station #2	Port Gardner Bay
SR 01	016	Lift Station #9	Snohomish River
SR 02	017	Hayes Street Outfall	Snohomish River
SR 03	018	Siphon Headworks Outfall	Snohomish River
SR 04	019	Lift Station #32	Snohomish River
SR 07	026	East Pacific Avenue Outfall	Snohomish River
SR 08	028	East 36th Street & Lift Station #33 Outfall	Snohomish River

Source: NPDES permit; Section S11 Combined Sewer Overflows.

2.0 Model Flow Inputs

The two components of flow contribution in the model are dry weather flow and wet weather flow.

2.1 Dry Weather Flow

Dry weather flow includes sanitary flows from residential, commercial, industrial, and institutional customers. This flow component for the base year in the model is based on flow monitoring data during dry periods which were defined as periods in excess of a week without precipitation. Groundwater infiltration (GWI) embedded in the monitored dry weather flow data is also included in this component.

Dry weather flow typically varies throughout the day in a diurnal pattern with peak flow rates occurring in the morning and evening. Diurnal patterns were developed from the flow monitoring data with different patterns for weekdays and weekends.

2.2 Wet Weather Flow

The North Model utilizes the Natural Resource Conservation Service (NRCS) runoff method to simulate the rapid runoff response in the model. The parameters that define the NRCS method within a basin are: tributary area, percentage of impervious area, slope and width, pervious infiltration, manning's N, and depression storage. These parameters are contained within the subcatchment modeling component described in the following section. In addition to the NRCS method, the triangular unit hydrograph, known as the RTK, method was utilized to simulate the long-term response of rainfall that occurs during multiple storm events.

The South Model utilizes the RTK method to simulate infiltration. The majority of wet weather flow is through infiltration through the ground surface into the sewer network. The basins are separated in this area of the system with storm drainage facilities that convey a majority of surface runoff.

2.2.1 Subcatchment Definition

A subcatchment is an area used by the model to define the contributing WWF area for loading manholes. Subcatchment parameters define rainfall-runoff WWF generation. An area is defined in the model for each loading manhole with rainfall-runoff parameters to describe how rainfall is factored into runoff and how the runoff enters the sewer network. The following parameters and data sources are used in the model to describe the characteristics of each subcatchment:

- ***Tributary Area –*** Subcatchments were delineated using the drainage components (catch basins, manholes, and piping) from the City's GIS database as well as LIDAR data for determining direction of flow. The tributary area is assumed to be 100% of the subcatchment area unless monitoring data suggests that a portion of the subcatchment does not enter the sewer.
- ***Percentage of Impervious Area –*** The impervious area is defined as the percentage of paved and roof areas over the tributary area. The source of this information is the City's GIS database.
- ***Slope and Width –*** Width was obtained by using the square root of the tributary area and reducing that number by 10 percent. Slopes were obtained by calculating the average slope for the basin from LIDAR data.

- ***Pervious Infiltration*** – Pervious infiltration is defined by soil classifications from the United States Geological Survey (USGS).
- ***Manning's N*** – Manning's N values 0.011 for impervious areas and 0.150 for pervious areas were assigned for all tributary areas. Typical Manning's N values are listed in Table 4.

Table 4. Typical Manning's N Values

Surface Type	Manning's N
Smooth asphalt	0.011
Smooth concrete	0.012
Ordinary concrete lining	0.013
Good wood	0.014
Brick with cement mortar	0.014
Vitrified clay	0.015
Cast iron	0.015
Corrugated metal pipes	0.024
Cement rubble surface	0.024
Fallow soils (no residue)	0.05
Cultivated soils	
Residue cover < 20%	0.06
Residue cover > 20%	0.17
Range (natural)	0.13
Grass	
Short, prairie	0.15
Dense	0.24
Bermuda grass	0.41
Woods	
Light underbrush	0.40
Dense underbrush	0.80

Source: McCuen, R. et al. (1996), Hydrology, FHWA-SA-96-067, Federal Highway Administration, Washington, DC

- ***Depression Storage*** – Depression storage values 0.04 inches for impervious areas and 0.10 inches for pervious areas were assigned for all tributary areas. Typical depression storage values are listed in Table 5.

Table 5. Typical Depression Storage Values

Surface	Typical Depression Storage
Impervious Surfaces	0.05 - 0.10 inches
Lawns	0.10 - 0.20 inches
Pasture	0.20 inches
Forest Litter	0.30 inches

Source: ASCE, (1992), Design & Construction of Urban Stormwater Management Systems, New York, NY

As rainfall is processed in the model, the parameters described above determine the volume of runoff which enters the sewer. Figure 4 depicts a flow chart of runoff generation.

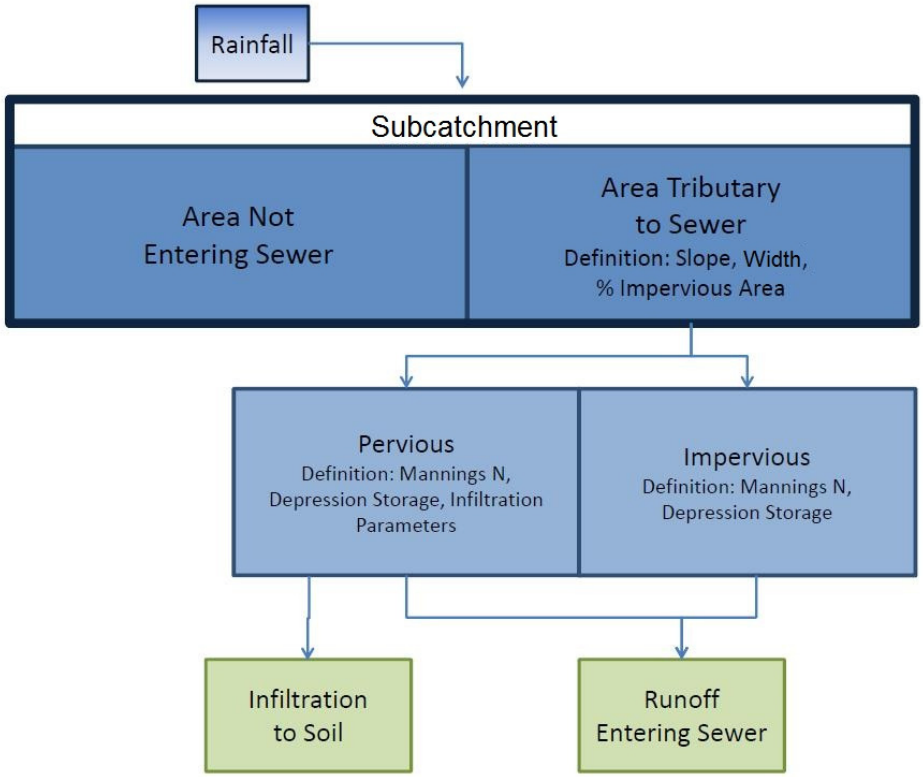


Figure 4. Runoff Generation Flow Chart

2.2.2 Rainfall Long-Term Response

The portion of rainfall that is not immediately conveyed into the combined sewer system soaks into the ground. As the ground becomes saturated, its capacity to absorb more rainfall decreases. This causes runoff to increase over time from long duration storms, which are common during the winter. Once the ground is saturated, a combined or sanitary sewer will experience more infiltration and inflow (I/I) after subsequent rainfall events. This is referred to as the long-term response.

The model uses the RTK method to simulate the long-term response of rainfall. The RTK method uses a series of three overlapping triangles to create the runoff hydrograph and simulates the I/I or the long-term rainfall response. Figure 5 depicts the triangles and setting that define the method.

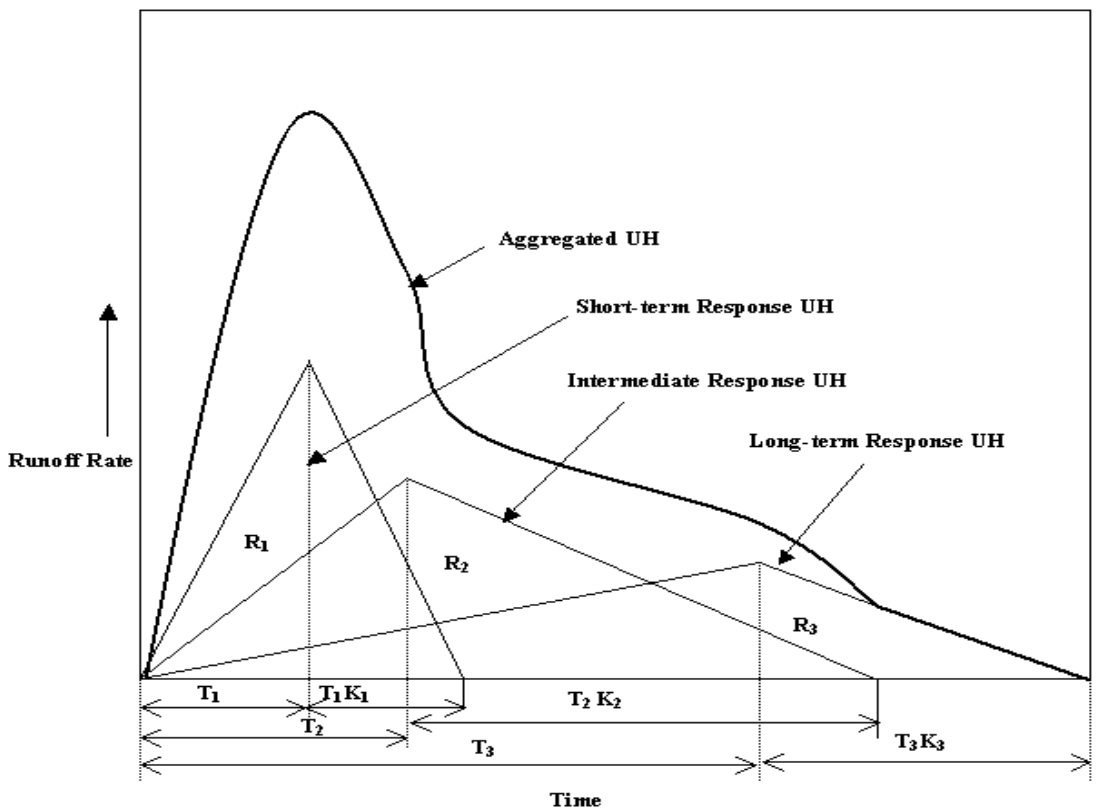


Figure 5. RTK Method Hydrograph

The following three parameters define each unit hydrograph (UH):

R: Fraction of rainfall volume that enters the sewer system

T: Time from the onset of rainfall to the peak of the UH (in hours)

K: Ratio of time to recession of the UH to the time to peak

2.3 Calibration Events

City flow monitoring data was used to calibrate dry weather and wet weather parameters for the model. The City provided records for 26 flow monitoring sites collecting data between 2009 and 2012. Five of the sites were operational for the entire period. The remainder collected data for only a portion of that period. Appendix A contains charts of the calibration events with the flow monitoring data and model output plotted.

The North and South Models were calibrated by simulating events between 2009 and 2012. Five periods were used for dry weather flow calibration. The periods were selected because there was no rainfall that would influence the monitored flow. Table 6 lists the dates.

Table 6. Dry Weather Flow Calibration Events

Event	Start Date	End Date
1	May 21, 2009	May 27, 2009
2	August 1, 2009	August 8, 2009
3	October 5, 2009	October 12, 2009
4	December 5, 2009	December 12, 2009
5	July 15, 2010	July 22, 2010

For wet weather calibration, a total of 8 storm events were selected to be simulated in the model. The Silverlake Rain Gauge and Rain Gauge B, located at the Golf Course, were used as the rainfall data record during the simulation. Table 7 lists the dates of the events selected for wet weather calibration.

Table 7. Wet Weather Flow Calibration Events

Event	Start Date	End Date
1	31-Mar-09	8-Apr-09
2	10-Aug-09	18-Aug-09
3	19-Sep-09	27-Sep-09
4	13-Nov-09	27-Nov-09
5	31-Aug-10	8-Sep-10
6	7-Dec-10	15-Dec-10
7	6-Jun-10	11-Jun 10
8	20-Nov-11	27-Nov-11

2.3.1 Dry Weather Calibration

Dry weather flow from a basin's monitoring data was distributed upstream of the monitor in proportion to the catchment areas in the basin. In areas where no monitoring data was available, area-based flow values were extrapolated from metersheds with similar demographic characteristics and applied based upon the area.

Table 8 provides a comparison between the flow monitoring values input to the model and the sanitary sewer flow projection (for plan year 1) developed for the CSP. Comments are added where there are large differences between the projections and monitored flows. Metersheds discussed in the table are the partial areas of sewer basins that contribute flow to a particular flow as measured by a flow meter at a sewer flow monitoring site.

Table 8. Sanitary Base Loading Projection and Flow Monitoring Comparison

			Flow Monitor	Sanitary Sewer Flow Projections (Plan Year 1, 2013)	Sanitary Sewer Flows used in Model*	Flow Monitoring as % of Sanitary Flow Projections	Comments
				gpd	gpd	(%)	
Sewer Average Day Demand (gpd)	Combined Sewer Basins	A	None	239,221	1,300	1	No flow monitoring in basin. Area-based flow values from similar metershed applied. Basin is small and flow value underestimates flow. A more detailed model was developed as part of the East Grand Project.
		B	None	20,536	13,000	63	No flow monitoring in basin. Area-based flow values from similar metershed applied. Basin is small and area-based flow value underestimates flow. A more detailed model was developed as part of the East Grand Project.
		C	SFE 9, 13, & 14	535,770	434,100	81	
		D	SFE 25 & 6	353,481	448,500	127	
		E-M	None	191,099	147,400	77	No flow monitoring in basin. Area-based flow values from similar metershed applied.
		G	SHE 12A, 12B, 27	574,235	618,500	108	
		K	None	186,872	71,500	38	No flow monitoring in basin. Area-based flow values from similar metershed applied. Basin is small and area-based flow value underestimates flow.
		N	None	260,395	417,000	160	No flow monitoring in basin. Area-based flow values from similar metershed applied.
		NC	None	125,821	166,000	132	No flow monitoring in basin. Area-based flow values from similar metershed applied.
		ND	SFE 9, 24A, & 24B	377,308	513,000	136	
		NE	None	195,601	169,800	87	No flow monitoring in basin. Area-based flow values from similar metershed applied.
		NG	None	955,756	1,488,600	156	No flow monitoring in basin. Area-based flow values from similar metershed applied.
		P	None	88,580	112,000	126	Sewer model not fully developed for basin. No flow monitoring in basin. Area-based flow values from similar metershed applied.
		T-Q	SFE 26A & 26B	194,757	283,800	146	A portion of the basin is monitored. Area-based flow values from similar metershed applied.
	Separated Sewer Basins	SE_7	SFE 1	1,393,667	850,188	61	Mukilteo and Alderwood discharge to this basin. The flow contribution in the monitoring data is removed to estimate only the contribution from the City's system.
		SE_8	SFE 4 & 23	922,109	2,087,300	226	Basin SE_7 flows into SE_8, when combined, the difference is 127%.
		SE_9	SFE 2 & 3	678,766	744,563	110	Silver Lake discharges to this basin. The flow contribution is removed from monitored data to estimate only the contribution from the City's system.
		SE_10	SFE 4	774,672	1,321,570	118	This basin receives a portion of the flow from Mukilteo. The flow contribution is removed from monitored data to estimate only the contribution from the City's system.
		SW_1	SFE 8	431,686	875,000	176	A portion of the basin is monitored. Area-based flow values from similar metershed applied.
		SW_3	SFE 20	609,071	787,900	129	
		SW_4	SFE 7, 16, 21, & 22	479,279	890,000	98	
		SW_5	SFE 10	391,838	691,220	176	Flow monitoring data exceeds sanitary flow projection.
	Total			**9,980,523**	**13,132,242**	**132**	

* This is either the actual flow monitored data from the basin or the area-based flow values from similar metersheds

Flow contributions from the City's wholesale contract customers, Silver Lake Water and Sewer District, Alderwood Water and Wastewater District, and Mukliteo Water and Wastewater District, are not included the flow values listed in Table 8. The flow from Silver Lake and Alderwood is monitored by flow monitoring sites SFE 1, 2, and 3. The average dry weather flow recorded by these flow monitoring sites was subtracted from downstream monitoring sites to calculate the flow that is being contributed only within the City's collection system.

2.3.2 Wet Weather Calibration

Peak flow events due to I/I are estimated by the model's wet weather flow RDII components. Tributary area, percentage of impervious area, slope and width, and pervious infiltration were all adjusted based on SFE flow data collected between 2009 and 2012 and flow data collected during the design of the Bond Street RTB facility. Impervious area, slope, width, and pervious infiltration affect the peaking intensity of runoff. By adjusting these parameters, the model hydrograph of each rain event changes.

Adjustments to the tributary area are particularly necessary for the North Model because it represents a combined sewer system which, by definition, is heavily influenced by stormwater. The size of the tributary area is a key piece of information that typically is not definitively known. Standard modeling practice entails estimating the tributary area by reducing its size (starting from the size of the subcatchment) to match the volume observed in the flow monitoring data. This approach was applied to calibrate the North Model. Table 9 documents the adjustments to the tributary area in each basin.

Table 9. Summary of Tributary Areas in North Model

	Tributary Area as % of Total Subcatchment Area		
Basin	Average	Min	Max
A	60	60	60
B	60	60	60
C	100		
D	84	60	100
E-M	61	60	61
G	63	19	100
K	45	45	46
N	63	60	100
NC	64	60	100
ND	100		
NE	67	60	100
NG	65	60	100
P	70	60	100
T-Q	89	60	100

The assumption that 100 percent of the total area is tributary to runoff to a basin's combined sewer is conservative and is used uniformly in Basins ND and C only. It was observed that during calibration events, model simulated flow was consistent with the monitored data. However, during high intensity events, the model tended to report a higher peak flow than observed in the monitoring data. In areas where no flow data was collected, the parameters from similar metersheds were extrapolated to define the model characteristics for those areas.

The range of settings used in the North Model to simulate the lag response of rainfall are depicted in Table 10. The RTK contributions are in addition to the subcatchment runoff generation. Receiving nodes in the model are assigned a tributary area and settings shown in Table 10. The values were determined during calibration of the model with flow monitoring data.

Table 10. RTK Setting from North Model

Response Type	R	T (hr)	K
Short-Term	0.05 – 0.2	1 – 1.5	3.5
Medium-Term	0.05 – 0.2	3	3.5
Long-Term	0.05 – 0.1	6 – 12	5.0

The South Model only utilizes the RTK component to simulate infiltration which represents the source of wet weather flow loading (aside from sanitary flows) in the South Model. Flow monitoring data indicates that I&I rates vary between basins. The I/I TM (July, 2012) characterized I/I in the southern system where a few monitoring basins show relatively high rates of I&I, especially in the basins tributary to Lift Station 1. The calibration events described in Section 2.4 were simulated in the model and RTK settings were adjusted based on the flow monitoring data in each basin. The RTK values vary by basin to account for relatively high I/I rates in some basins. Table 11 depicts the range of RTK settings used in the South model.

Table 11. RTK Setting from South Model

Response Type	R	T (hr)	K
Short-Term	0.001 - 0.037	1 – 1.5	1 – 2
Medium-Term	0.01 - 0.001	2 – 5	2 – 3
Long-Term	0.05 - 0.001	12 – 72	2.5 – 6.3

Because it is a separated system, the range of R values in the South Model is less than the range used in the combined system North Model. The flow loading into the combined system North Model is much greater than I/I contributions in the South Model. Additionally, based on the observed flow monitoring data, a wider range of T and K values are input in the South Model to calibrate the model to differing I/I response characteristics.

2.4 Rainfall Series

The Everett rainfall record is the rainfall series used for modeling analysis. It was defined from the Silver Lake Rain Gage located to the south of Everett and contains 24 years of data. Everett's system was evaluated by running simulations with this long term rainfall record. The *Everett Rainfall Time Series Memorandum* documents the selection and development of the rainfall record.

Due to the extensive processing time to simulate the entire 24 year series, reduced time series were developed. The first time series was developed to evaluate level of service (LOS). It is based on the largest five storm events for the 1, 2, 3, 6, 12, and 24 hour duration categories. After removing overlap events, a rainfall series containing the 14 largest storms was developed and named the 14 Storm Series.

The second time series was developed to evaluate CSO compliance. It contained the largest 25 events in the 1, 2, 3, 6, 12, and 24 hour duration categories. After removing overlap events, a rainfall series containing the 69 largest storm events was developed and named the 69 Storm Series.

The rainfall series were adjusted to account for climate change increasing the intensity of storm events. The climate change rainfall record was used to evaluate level of service improvements.

3.0 Level of Service and CSO Analysis

The City's calibrated models were used to simulate flow events from the City's rainfall record to evaluate the sewer collection system's capacity to achieve level of service goals and regulatory compliance. Analysis conducted from these simulations was used to develop capital improvement projects to meet the goals establish by the City to provide an acceptable level of service and to achieve CSO compliance. The following sections document the evaluation methodology, simulations conducted in the model, and the modeling results.

Three continuous simulation scenarios were used to evaluate the collection system's current LOS capacity and to develop and evaluate sewer system improvement alternatives.

1. **Current Level of Service.** The 14 Storm Series was used to define the City's current LOS. Data generated from this simulation was used to create the LOS figures showing the LOS of the existing pipes.
2. **Year 2100 Level of Service.** Multiple alternatives were evaluated in this scenario to improve the LOS in deficient areas. The 14 Storm Series volumes were increased to account for climate change to the year 2100. These flows were combined with year 2100 base load projections to simulate future flows in the system to evaluate LOS improvements.
3. **CSO Compliance Scenario.** The 69 Storm Series was simulated in the model to determine CSO compliance in the existing system, determine the downstream CSO impacts from proposed LOS improvements, and to evaluate proposed CSO improvements.

3.1 Level of Service

3.1.1 Methodology

The level of service (LOS) is defined as how frequently the capacity of a sewer pipe is exceeded. Everett established a level of service goal that sewer pipes should not exceed their capacity more than once every 25 years.

The modeling analysis was used to determine the current level of service for each pipe in the system and to identify improvements necessary to meet Everett's level of service goal.

To determine the current level of service for Everett's collection system pipes, the model was used to simulate the 14 Storm Series described in Section **Error! Reference source not found.**. The simulated rainfall events determine if a pipe exceeds its capacity. In areas without reported basement backups, surcharging is allowed to five feet below the rim of the manhole. In areas where backups occurred, no surcharging above the crown of the pipe is allowed.

A pipe capacity exceedence event is defined as a flow that causes the water level in the pipe to rise above either of the two thresholds described above (depending on the area). The LOS recurrence interval for any particular pipe is determined based upon the number of times that flow exceeds the threshold during the 24 year rainfall record.

Table 12 shows the recurrence interval for various event counts down to a one year recurrence interval for the 24 year City of Everett Rainfall Series. A pipe color coding similar to that shown in the table was used in the modeling graphics to describe the LOS for each modeled pipe.

Table 12. Recurrence Interval for 24 Years of Silver Lake Rain Gauge Data

Event Count	Recurrence Interval (T_r) LOS (years)		LOS Category Years
	Gringorten's Equation	Weibull's Equation	
1	43.1	25.0	> 25
2	15.5	12.5	10 to 25
3	9.4	8.3	5 to 10
4	6.8	6.3	
5	5.3	5.0	
6	4.3	4.2	< 5
10	2.5	2.5	
15	1.7	1.7	
20	1.2	1.3	
25	1.0	1.0	

After running the model, a statistical tool is used to determine the number of times that the flow depth in each pipe exceeded a threshold (i.e. crown of pipe, 3 feet above crown, 5 feet below rim) with a minimum inter-event period during of 8 hours. An inter-event period is defined as the time between events in which the flow depth exceeds the threshold. A single event would be counted when the flow depth continuously exceeds the threshold for any duration of time, or multiple occurrences of the flow depth exceeding the threshold as long as there are less than eight hours between each occurrence. A new event will not be counted unless a period of 8 hours occurs without the flow depth exceeding the threshold.

This period of record and methodology is sufficient to statistically classify the LOS provided by each of the pipes into one of the four LOS categories (greater than 25 years, 10 to 25 years, 5 to 10 years, and less than 5 years).

3.1.2 Results

A LOS evaluation was conducted assuming the LOS threshold of no surcharging. An LOS exceedence event is counted when the flow depth exceeds the crown of the pipe. The modeling results are depicted in Figure 6. Force mains and pressure gravity mains are excluded from this analysis and are not depicted in LOS analysis. Their capacities were evaluated separately.

The modeled subcatchment basin flows were typically set up to enter the model's flow network at a single model node - typically at a manhole which may be connected to a small diameter pipe. In many cases, this causes the model to indicate that the smaller diameter 8-to-10-inch pipes connected to that manhole node are over capacity – when in reality they are flowing under their capacity for all conditions. Therefore, each of these locations were reviewed on a case-by-case basis to determine if these were actual small diameter piping system deficiencies or just being shown as deficient due to the modeling flow input methodology. After this review, non-deficient pipes were removed from the LOS figures showing deficient pipes.

A second LOS evaluation was conducted with a LOS threshold of 5 feet below the manhole rim in areas where no basement backups has been reported. In areas with basement backups, the LOS threshold remains the crown of pipe. This evaluation allowed for "conditional surcharging" which is defined by factors that determine the allowable surcharge threshold, in this case, the factor is a record of basement backups. Figure 7 shows the resulting current LOS that allows conditional surcharging. Force mains and pressure gravity mains are excluded from this analysis and are not depicted in LOS analysis.

In addition to the above analysis, areas identified by the model with less than a 25-year LOS were evaluated according to the following criteria to determine if a system improvement is necessary.

- Geometry and slope are not influenced by a downstream main surcharging
- A record of basement backups in the area
- The pipe is aging or in poor condition
- Conditional surcharging is not allowed
- Flow data confirms model results

Pipe segments or general areas with a LOS of 25 years or less on the LOS map are identified in Figure 7. Table 13 describes each deficiency using the above criteria. Where the identified pipe is aging or in poor condition, it is designated as a condition improvement. Figure 8 shows the system piping age and highlights pipes that are older than 80 years old.

2014 Comprehensive Sewer Plan
City of Everett
FIGURE 6

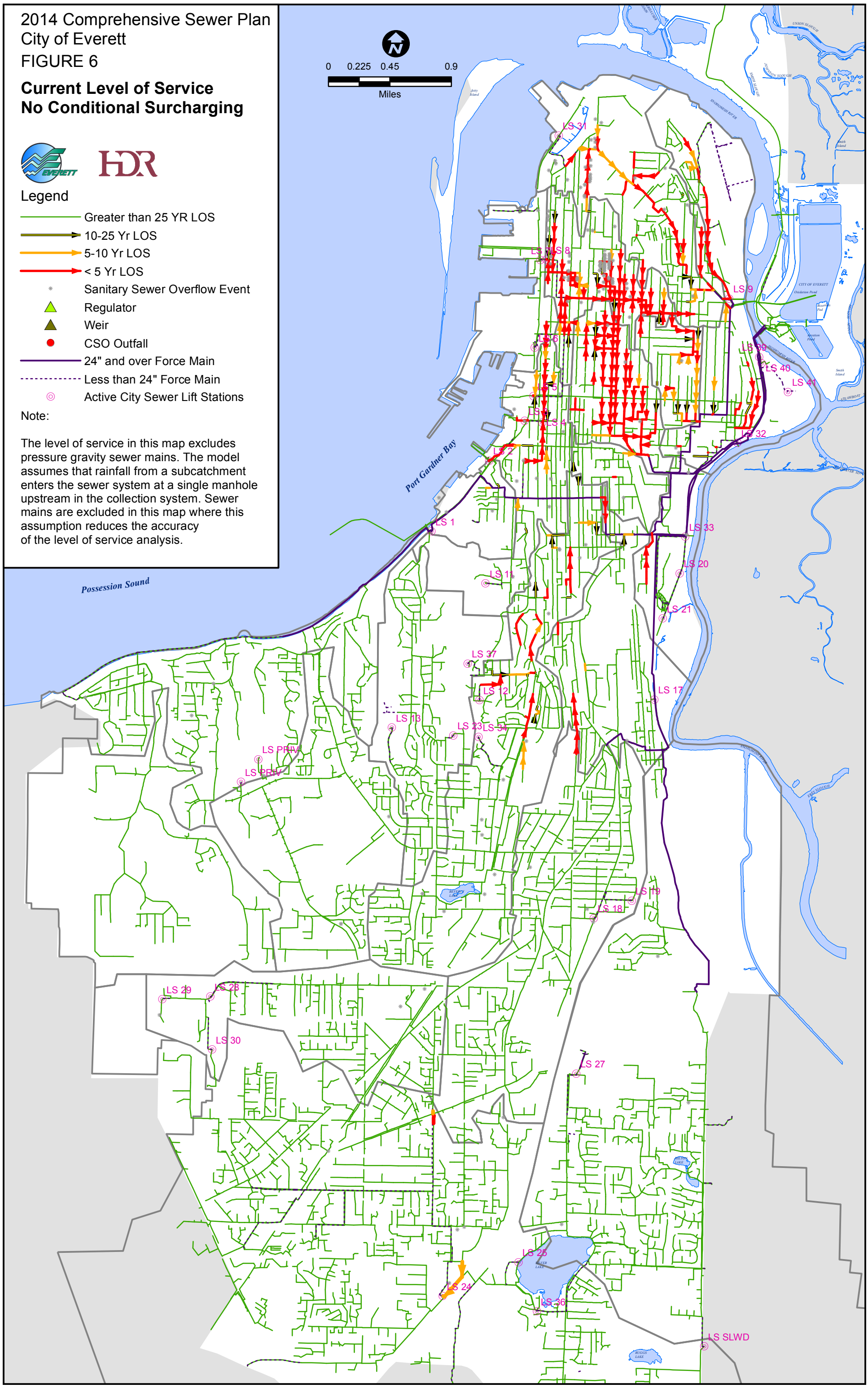
Current Level of Service
No Conditional Surcharging

Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations

Note:

The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.



2014 Comprehensive Sewer Plan
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FIGURE 7

Current Level of Service With Conditional Surcharging

Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- Area with No Conditional Surcharging

Notes:

1. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.

2. The level of service considers conditional surcharing up to a level of 5 feet below the rim elevation.

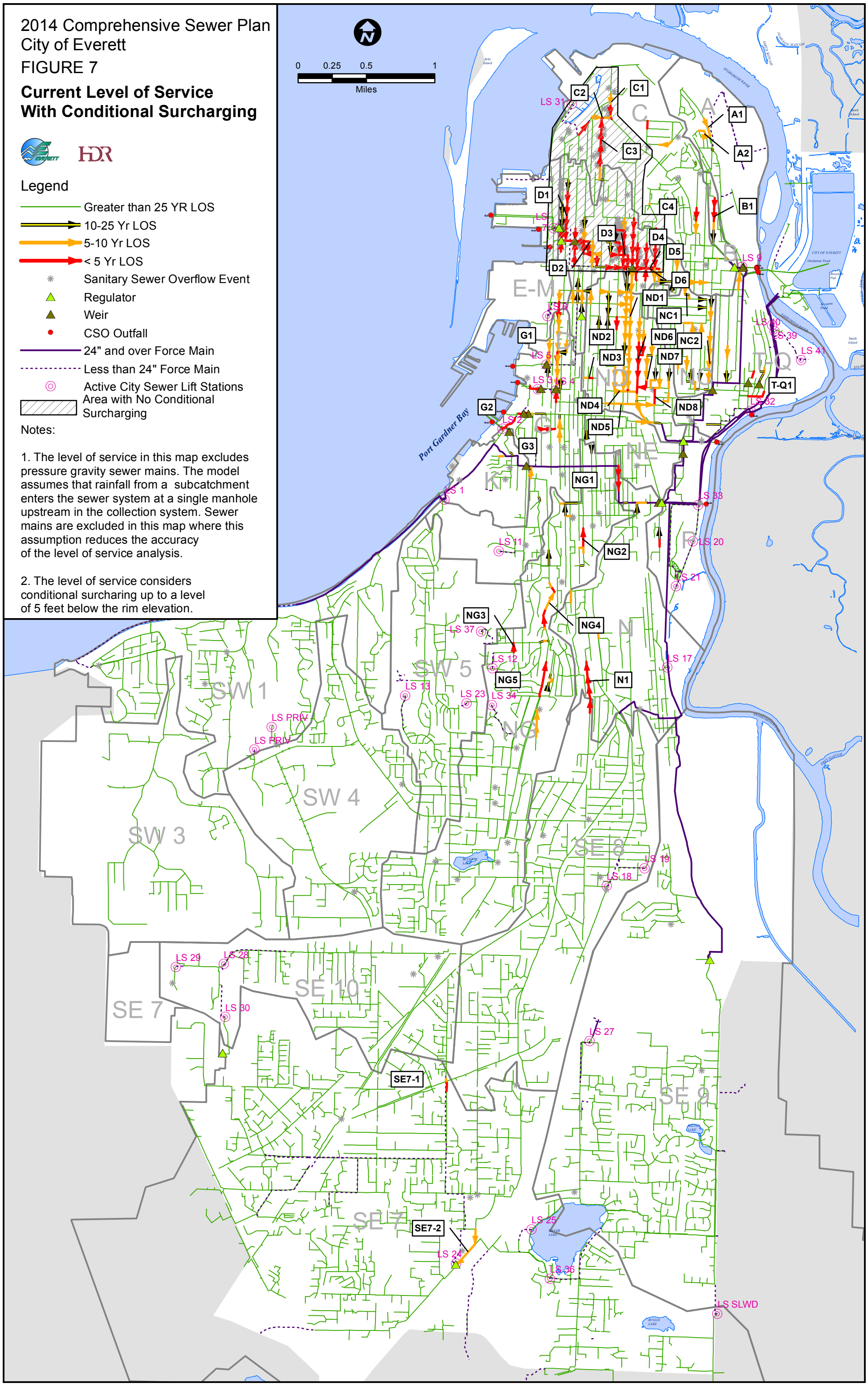

Table 13. Areas with Current LOS of 25 Years or Less

ID	LOS	Length (feet)	Diameter	Description of Alignment	Surcharge Threshold	Comments
A1	5-10 yr	700	10"	E Marine View Dr from Broadway to Belmonte Ln	5 FT Below Rim	Small diameter piping may be overloaded by model assumptions.
A2	5-10 yr	650	12"	Belmonte Ln from Pilchuck Path to E Marine View Dr	5 FT Below Rim	Small diameter piping may be overloaded by model assumptions.
B1	<5-10 Yr	1,700	10" - 12"	Chestnut St from 11th St to 15th St	5 FT Below Rim	Small diameter piping may be overloaded by model assumptions. Subcatchment basin flow is directed to upstream manhole.
C1	5-10 Yr	1,000	15"	Rockefeller Ave from 3rd St to 5th St	Crown of Pipe	Multiple basement flooding events reported.
C2	<5-10 Yr	800, 750	18", 24"	Alverson Blvd from Rucker Ave to Colby Ave; 5th St from Alverson Blvd to Rockefeller Ave	Crown of Pipe	Basement backups reported on Maulsby and Wetmore upstream of piping.
C3	<5-10 Yr	2,400	8" - 12"	Wetmore Ave from 10th St to 5th St	Crown of Pipe	Multiple basement flooding events reported.
C4	<5-10 Yr	1,000	15"	Between Fir St and Linden St from 12th St to 14th St	5 FT Below Rim	Modeling assumption overloads piping. Subcatchment basin flow is directed to upstream manhole.
D1	<5 Yr	2,400	8" - 10"	Between Grand Ave and Rucker Ave from 10th St to 15" St.	Crown of Pipe	Multiple basement flooding events reported.
D2	<5 Yr	Varies	Varies	Multiple pipe alignments along 15th and 14th, between Hoyt and Colby, and Colby and Wetmore	Crown of Pipe	Multiple basement flooding events reported.
D3	<5 Yr	Varies	Varies	Multiple pipe alignments along Lombard and Oakes.	Crown of Pipe	Multiple basement flooding events reported. Sewer L project installed new conveyance piping that is affected by surcharging from the 17th St Interceptor.
D4	<5 Yr	1,900	10" - 15"	Broadway from 13th St to 17th St	Crown of Pipe	Surcharging from 17th St Interceptor affects LOS.
D5	<5 Yr	6,400	24" - 36"	17th St Interceptor from Lombard to Siphon Headworks	Crown of Pipe	Model indicates 17th St Interceptor is over capacity and floods at manholes between Rainier and McDougall and between Larch and Walnut St.
D6	<5 Yr	1,800	12" - 24"	Parallel Piping network to 17th St Interceptor from Broadway to Cedar St.	Crown of Pipe	Bypass conveyance connects to 17th St Interceptor on 18th between Cedar St and Pine St. Existing parallel bypass conveyance is over capacity.
G1	<5 - 10 Yr	3,800	6" - 18"	Grand Ave from 19th St to Everett Ave	5 FT Below Rim	Pipe capacity is exceeded in parallel pipe alignments along Grand Ave into Lift Station 4.
G2	<5 Yr LOS	1,500	12"	From Hewitt Ave and Federal Ave to Lift Station 2	5 FT Below Rim	Pipe segment is a bottle neck that causes overflows at PSO6.
G3	<5 Yr	700	10"	Wall St from Nassau St to Grand Ave	5 FT Below Rim	Pipe segment is a bottle neck.
N1	<5 Yr	1,700	8" - 12"	Colby Ave from Fairfax to 48th St.	5 FT Below Rim	Pipe is under capacity. The upstream drainage area includes flow from the South system.
NC1	5-10 Yr	1,100	24" - 30"	Basin NC Trunk between Cedar St and Pine St from 18th St to 19th St	5 FT Below Rim	Wet weather flow from Basin D can flow into Basin NC downstream of the Regulator at 18th St and Pine St. Wet weather diversion impacts the LOS in this pipe segment.
NC2	5-10 Yr	2,200	30"	Basin NC Trunk between Walnut St and Chestnut St from 22nd St to 26th St.	5 FT Below Rim	Wet weather flow from Basin D impacts LOS in this pipe segment. Piping is greater than 80 years old.
ND1	5 - 10 Yr	6,700	30" - 48"	Broadway Trunk from 17th St to Hewitt Ave and Virginia Ave	5 FT Below Rim	No basement backups are reported in the area indicating flooding has not occurred. Piping is greater than 100 years old.
ND2	5 - 10 Yr	2,400	10"	Alley between Broadway and Lombard from 19th St to 24th St	5 FT Below Rim	Pipe segment is under capacity. No backups or flooding reported. Piping is greater than 100 years old.
ND3	<5 - 10 Yr	800	8" - 10"	26th St from Colby Ave to Wetmore Ave and along Alley to Everett Ave.	5 FT Below Rim	Pipe segment is a bottleneck.
ND4	5-10 Yr	550	15" - 18"	Everett Ave from Alley between Oakes and Lombard to Broadway.	5 FT Below Rim	Pipe segment is a bottleneck. No backups and flooding reported. Piping is greater than 80 years old
ND5	5 - 10 Yr	1,900	18" - 27"	California St from Alley between Rockefeller Ave and Oakes Ave to Virginia Ave.	5 FT Below Rim	No backups or flooding reported.
ND6	<5 Yr	1,500	15" - 24"	Mcdougall Ave from 24th St to Everett Ave	5 FT Below Rim	No backups or flooding reported. Piping is greater than 80 years old
ND7	<5 - 10 Yr	1,600	10" - 18"	Rainier Ave from 24th St to Mcdougall Ave	5 FT Below Rim	No backups or flooding is reported. Piping is greater than 100 years old.
ND8	<5 - 10 Yr	700	8"	Virginia Ave from 26th St to California St	5 FT Below Rim	No backups or flooding is reported. Piping is greater than 100 years old.
NG1	<5 Yr	1,400	10"	Lombard Ave from 33rd St to 36th St	5 FT Below Rim	Pipe is greater than 80 years old.
NG2	<5 Yr	800	10" - 12"	Colby Ave from 40th St to 38th St	5 FT Below Rim	Piping is greater than 100 years old.
NG3	<5 - 10 Yr	1,100	8"	48th St to College Ave	5 FT Below Rim	LS12 discharges into piping.
NG4	<5 - 10 Yr	2,400	24"	Evergreen Way from 47th St to 42nd St	5 FT Below Rim	Pipe is under capacity. This pipe is a main trunk through Basin NG and conveys flow from the South portion of the system.
NG5	<5 Yr	1,400	15"	Evergreen Way from 52nd St to Vesper Dr	5 FT Below Rim	Pipe is under capacity. This pipe is a main trunk through Basin NG and conveys flow from the South portion of the system.
T-Q1	< 5 Yr	800	12"	Everett Ave from Grand Ave to Harrison Ave	5 FT Below Rim	Pipe is under capacity.
SE7-1	<5 - 10 Yr	450	24" - 36"	3rd Ave and Everett Mall Way	5 FT Below Rim	LS 24 discharges at this location and the Central interceptor surcharges. Maximum surcharge depth is under 2 feet.
SE7-2	5 - 10 Yr	1,700	12" - 24"	7th Ave SE to Lift Station 24	5 FT Below Rim	LS 24 surcharges into the pipe segment. Model indicates that no flooding will occur.

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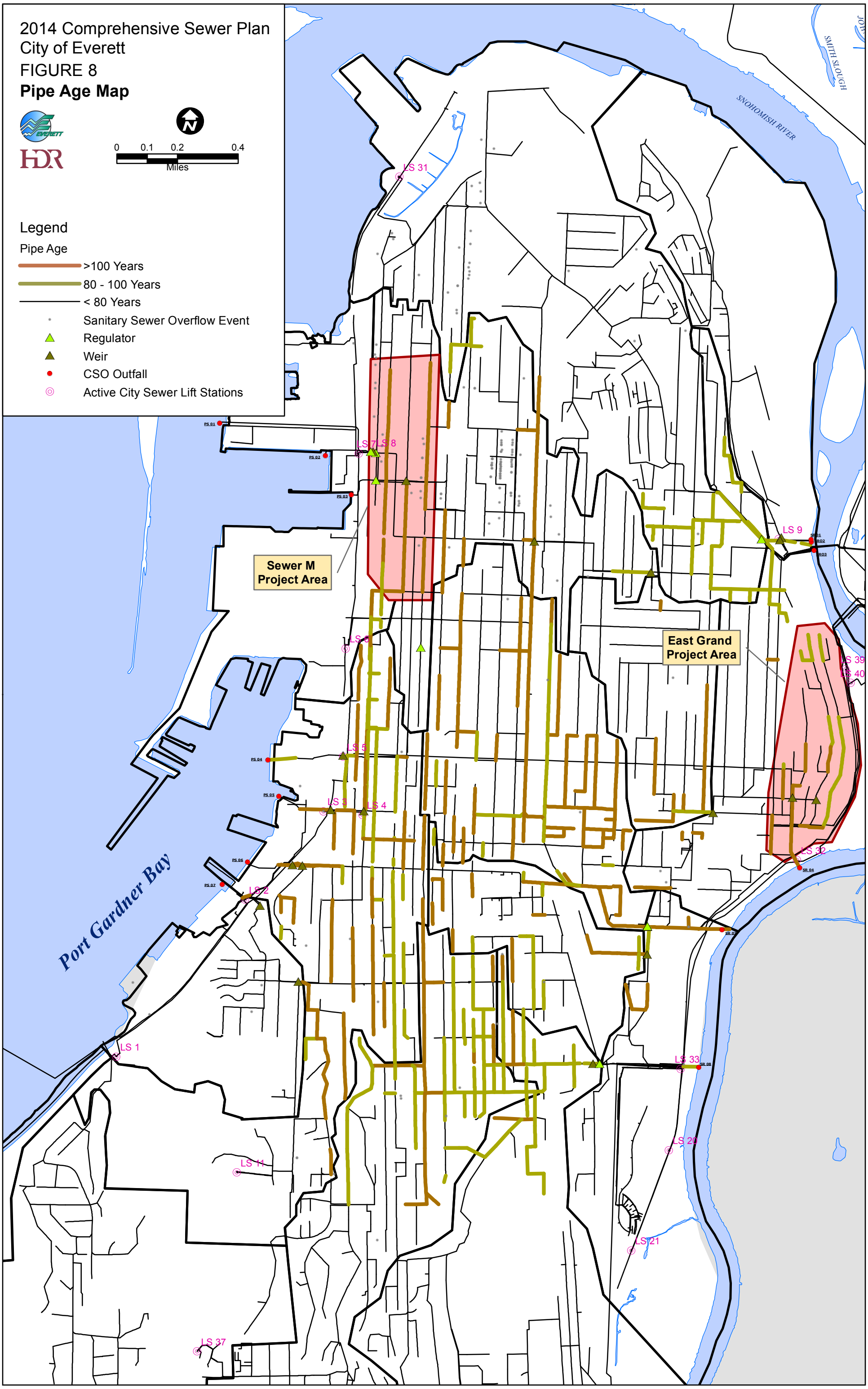
FIGURE 8
Pipe Age Map



3.2 Year 2100 Level of Service

A modeling scenario with the forecasted year 2100 rainfall record (adjusted for climate change) and loading projections was utilized to evaluate proposed system improvements for both the North and South sewer collection systems. The combined system was of primary concern due to basement backup events that have occurred.

The design criteria for any proposed conveyance improvement is that it has the capacity to convey the year 2100 flow without surcharging except under special circumstances such as deep interceptors or pipes without lateral connections. Figure 9 illustrates the year 2100 level of service without any system improvements and with no surcharging.

All improvements identified in the analysis are for planning purposes and the extents and sizing should be re-evaluated during the preliminary design phase.

3.2.1 Year 2100 Level of Service Goal

For the purposes of this alternatives analysis, all pipes with less than a 25-year LOS were evaluated for improvement. All new proposed improvements were designed to provide a minimum 25-year LOS with no surcharging and year 2100 rainfall and flows.

3.2.2 Proposed Improvement Project Groups

The proposed improvements were evaluated in four groups of alternatives. These groups are defined by alternatives associated with the 17th Street Interceptor improvements in the *North Everett Combined Sewer Evaluation* (Basin D) (OTAK 2011). The recommended improvements from that evaluation were to install an interceptor paralleling the existing 17th Street Interceptor and to install a new trunk sewer from 21st Street and Broadway Avenue to convey a portion of Basin ND's flow into the new 17th Street Interceptor. The following four groups of alternatives focus on improvements to Basins D, ND, and NC. Additional improvements throughout the system are included in Group D. Figure 10 depicts the improvements contained within the project groups.

- Group A – Alternative includes the 17th Street Interceptor, Sewer M, East Grand, and Hayes Street Regulator Improvements. This alternative evaluated the LOS improvements resulting from these previously identified projects. Figure 11 depicts the LOS with implementation of the Group A improvements.

  After simulating the alternative, the model indicates the 17th Street Interceptor improvement would improve LOS in Basin D, but the improvement to LOS in Basin ND is minimal according to modeling results.
- Group B – Alternative includes the Group A improvements along with a new trunk sewer intercepting flow from Broadway and 21st into the 17th Street Interceptor. This project is identified as the 21st St Interceptor Spur. During this evaluation, it was determined that a new trunk sewer could extend a block south to 21st Street. This evaluated the improvement of LOS in the Basin ND trunk sewer by intercepting a portion of Basin ND flow into the 17th Street Interceptor. Figure 12 depicts the LOS with implementation of the Group B improvements.

  After simulating the alternative, the model indicates the interceptor from 21st and Broadway to the proposed 17th Street Interceptor would improve LOS in the Basin ND trunk sewer for the portion that is on Broadway Ave. This improvement would also reduce flow to the Summit Ave Interceptor by conveying a portion of Basin ND's flow into the 17th Street Interceptor. In the this alternative, the model results

indicated that the LOS is between 5-10 years in the portion of the Basin ND trunk main east of Broadway to the Pacific Regulator. The model indicates that additional improvements in sewer mains tributary to the Basin ND trunk would be needed to improve LOS in the Basin.

- Group C – Alternative includes all Group A improvements along with a complete replacement of the Broadway Trunk sewer rather than implementing the 21st St Interceptor Spur. By eliminating the surcharge in the Broadway Trunk, the improvement to LOS was evaluated in the sewer mains tributary to the Broadway Trunk. Figure 13 depicts the LOS with implementation of the Group C improvements.

  After simulating this alternative, the model indicates the complete replacement of the Basin ND trunk main would improve LOS to greater than 25 years. This alternative would increase the flow contribution to the Pacific Regulator without the benefits of diverting a portion of Basin ND's flow to the proposed 17th Street Interceptor. The model indicates that additional improvements in sewer mains tributary to the Basin ND trunk would be needed to improve LOS in the Basin.
- Group D – Alternative includes additional LOS improvements in the sewer system irrespective of the Group A, B, and C improvements. For many areas the modeling indicates with a LOS less than 25 years, increasing the sewer main capacity is the only identified alternative. This alternative also includes improvements to the sewer mains tributary to the Basin ND trunk main. The 17th Street Interceptor as well as Basin ND Trunk improvements are included in this alternative.

  Either Group B or C improvements could be implemented to improve LOS in the Basin ND Trunk. However, the modeling analysis indicates that the 21st St Interceptor Spur (Group B) would improve the LOS in the portion of the Basin ND Trunk along Broadway Ave. Additional improvements to the Trunk would be needed between Broadway and the Pacific Regulator to provide the same improvement to the LOS as the complete replacement of the Basin ND Trunk (Group C). In the Group D alternative, either the complete Basin ND trunk main, the the 21st St Interceptor Spur and a Basin ND Trunk improvement between Broadway and the Pacific Regulator may be implemented to improve LOS in the Trunk.

Based on several iterations of each alternative, a final list of proposed improvements was developed to be included and prioritized in the capital improvement plan for the CSP. The diameters recommended for each improvement should be re-evaluated during the preliminary design phase.

There are some areas with a LOS less than 25-years that remain after all of the proposed improvement groups are completed. In many cases, these did not necessitate improvements based upon the initial screening outlined in Section 3.1, particularly where surcharging is allowed. In other cases, the limited LOS was confined to only a few isolated pipe segments that are more likely related to modeling issues rather than actual LOS deficiencies. These pipes should be scheduled for installation of flow and level monitoring equipment during storm events to determine if they represent real capacity deficiencies.

3.3 Downstream Facilities Impact Analysis

The proposed improvements determined from the LOS analysis were also evaluated for their impact to downstream conveyance facilities. In the eastern draining basins, the Summit Ave Interceptor, Snohomish River CSO Interceptor (SRI), and Siphon Headworks would receive increased flow contribution as a result of these upstream system improvements and climate change impacts to rainfall. Growth in the southern system will impact the South End Interceptor. All will result in increased flow volume and peak flow rates to the WPCF.

The following is an evaluation of each conveyance facility to determine if there is sufficient capacity to convey increased flows. Figures 15 and 16 summarize the 1-Year and 25-Year flow events into the Summit Ave Interceptor, Siphon Headworks, and SRI. The 1-Year and 25-Year flow events are the basis for the following downstream impacts evaluation and are defined by individual storm events extracted from the 69 Storm Series.

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City of Everett

FIGURE 9

Year 2100 Level of Service
No Improvements
No Conditional Surcharging

Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations

Notes:

1. Pipe capacity is exceeded when water reaches the crown of the pipe. Conditional surcharging is not considered.

2. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.

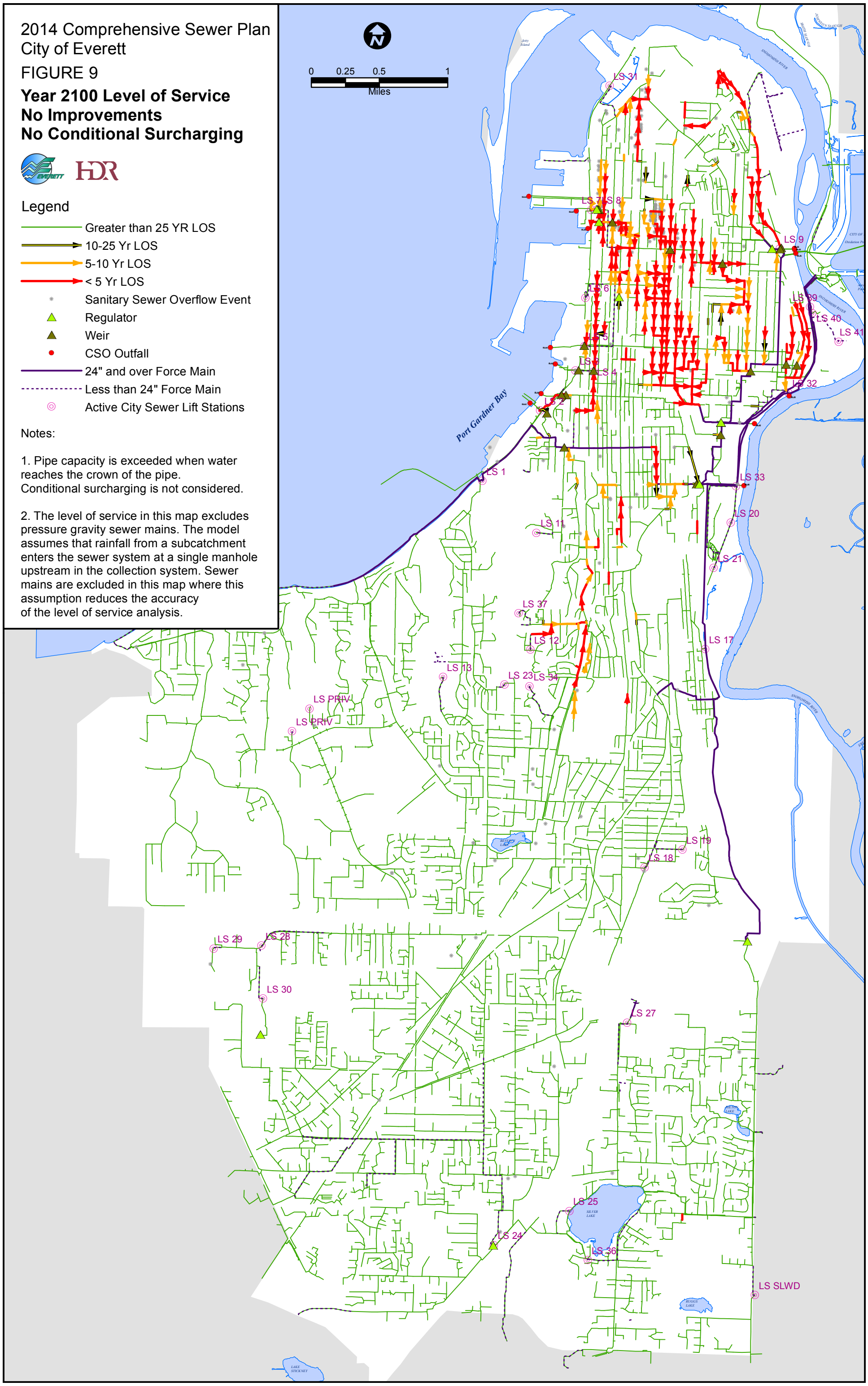

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FIGURE 10
Project Group Map

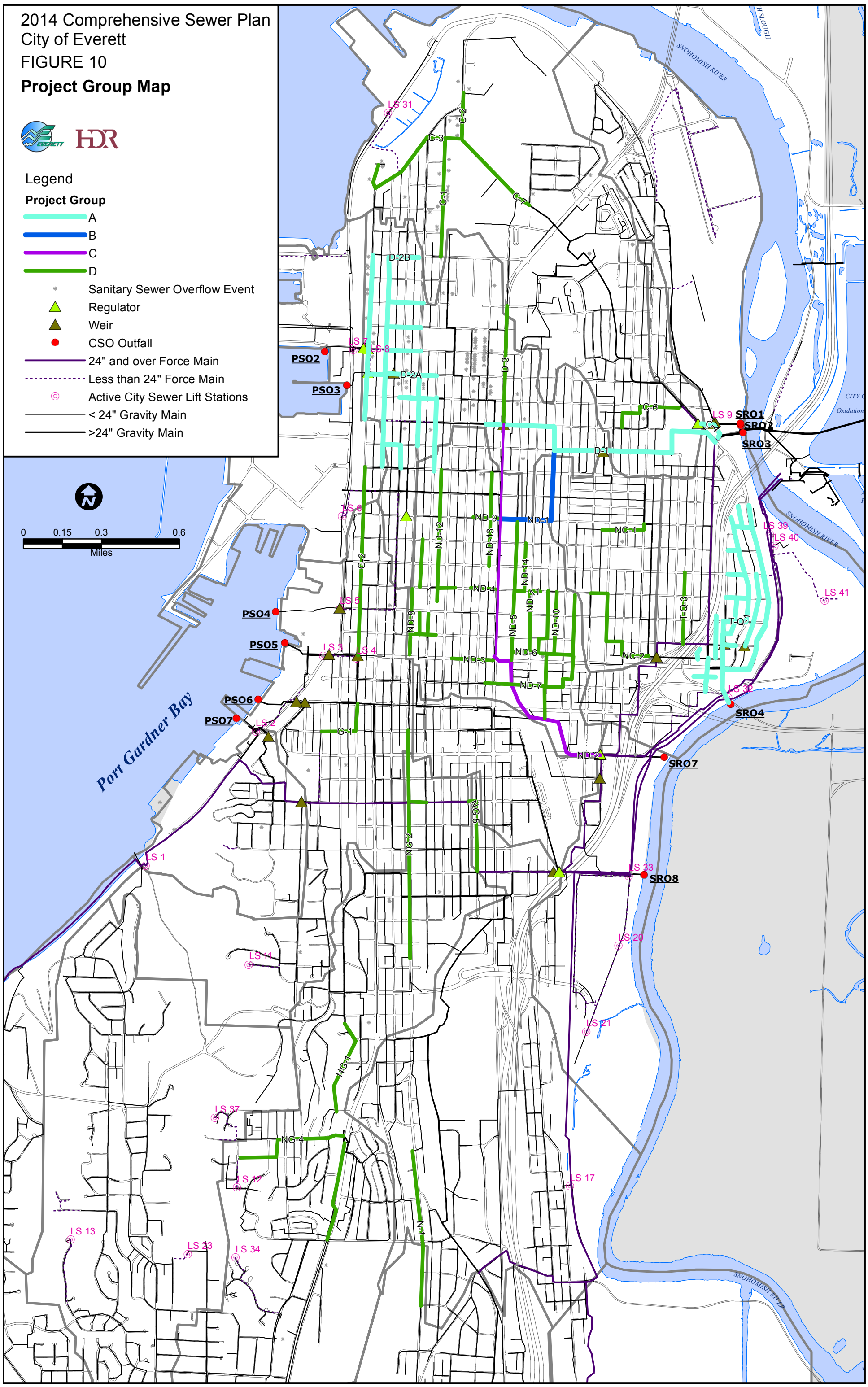

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FIGURE 11

Year 2100 Level of Service With Group A Improvements No Conditional Surcharging

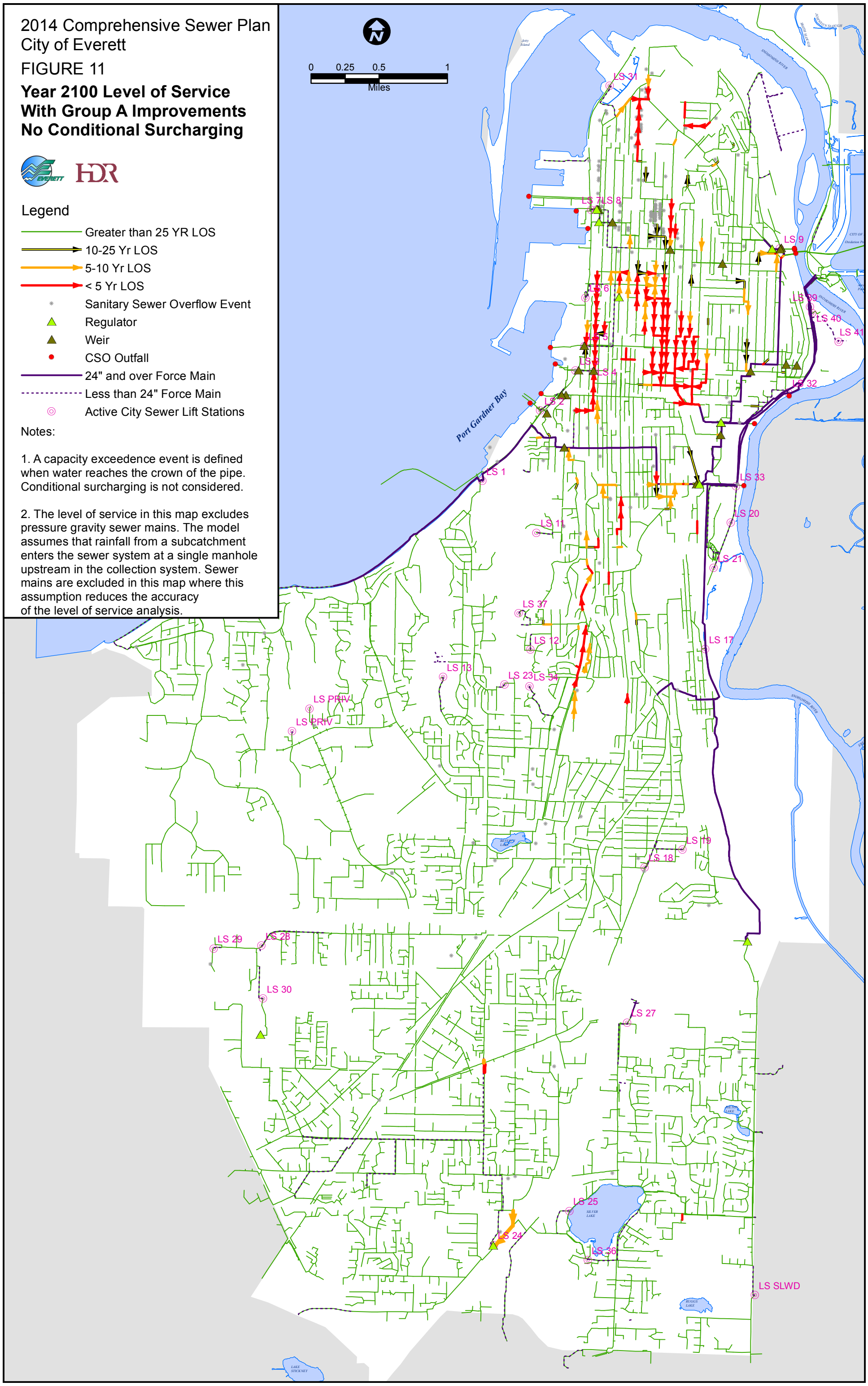
Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations

Notes:

1. A capacity exceedence event is defined when water reaches the crown of the pipe. Conditional surcharging is not considered.

2. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.



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City of Everett

FIGURE 12

Year 2100 Level of Service With Group B Improvments No Conditional Surcharging

Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations

Notes:

1. A capacity exceedence event is defined when water reaches the crown of the pipe. Conditional surcharging is not considered.

2. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.

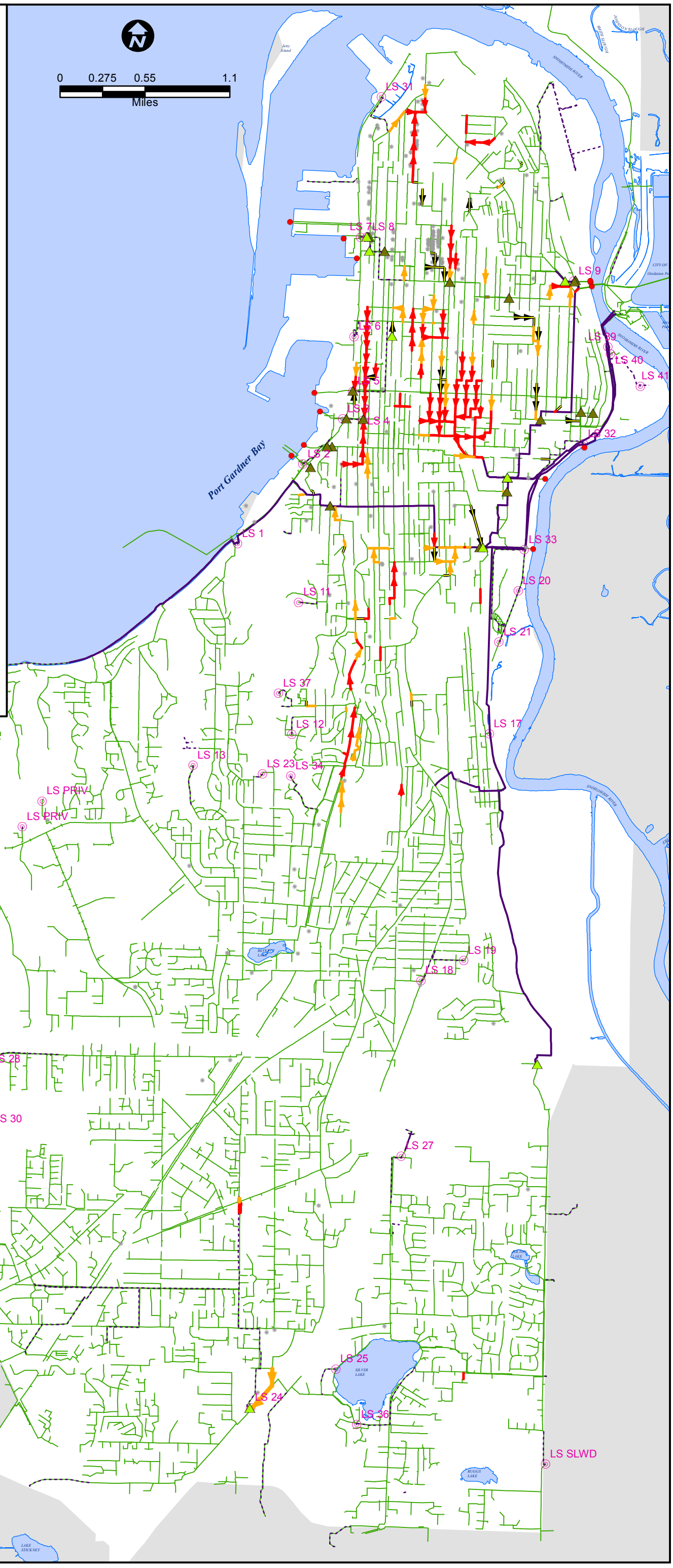

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FIGURE 13

Year 2100 Level of Service With Group C Improvements No Conditional Surcharging

Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations

Notes:

1. A capacity exceedence event is defined when water reaches the crown of the pipe. Conditional surcharging is not considered.

2. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.

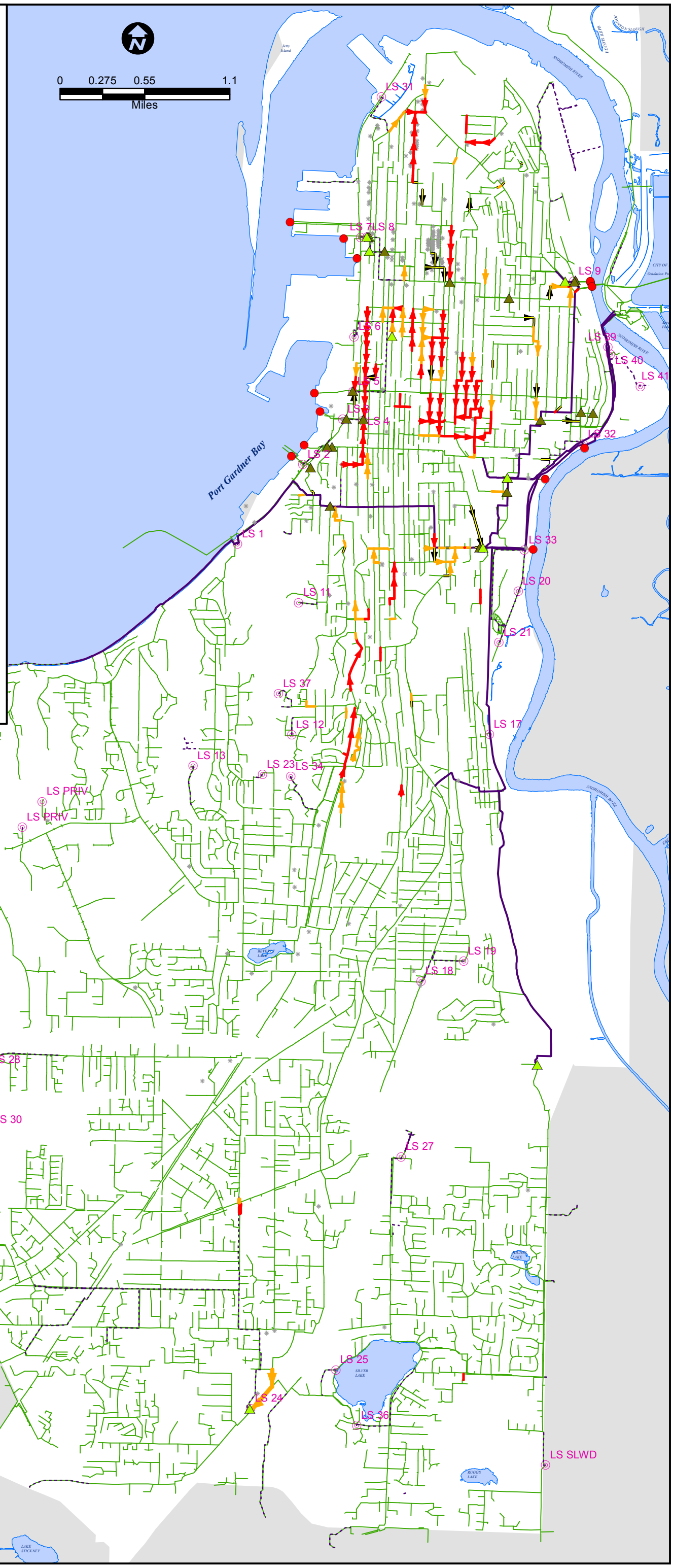

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FIGURE 14

Year 2100 Level of Service
With Group D Improvements
No Conditional Surcharging

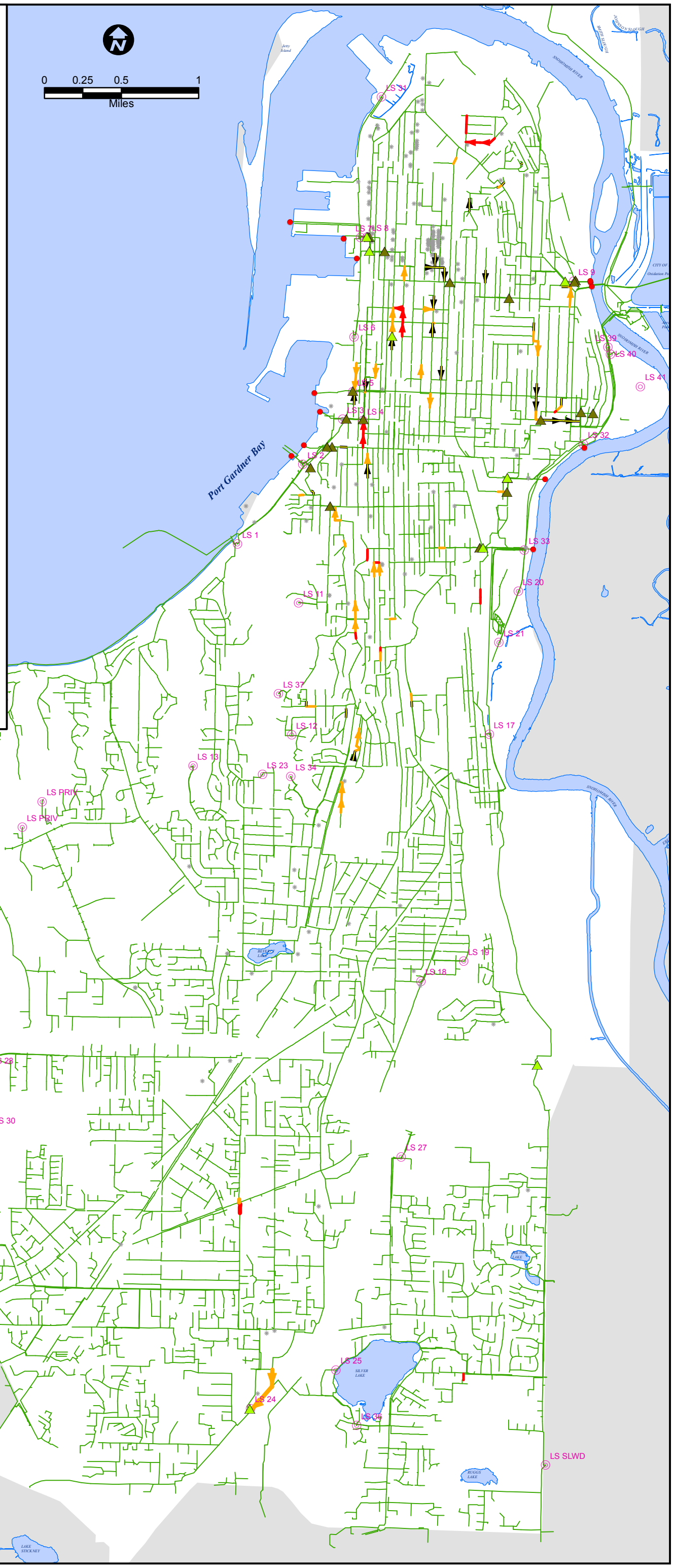
Legend

- Greater than 25 YR LOS
- 10-25 Yr LOS
- 5-10 Yr LOS
- < 5 Yr LOS
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations

Notes:

1. A capacity exceedence event is defined when water reaches the crown of the pipe. Conditional surcharging is not considered.

2. The level of service in this map excludes pressure gravity sewer mains. The model assumes that rainfall from a subcatchment enters the sewer system at a single manhole upstream in the collection system. Sewer mains are excluded in this map where this assumption reduces the accuracy of the level of service analysis.



2014 Comprehensive Sewer Plan
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FIGURE 15

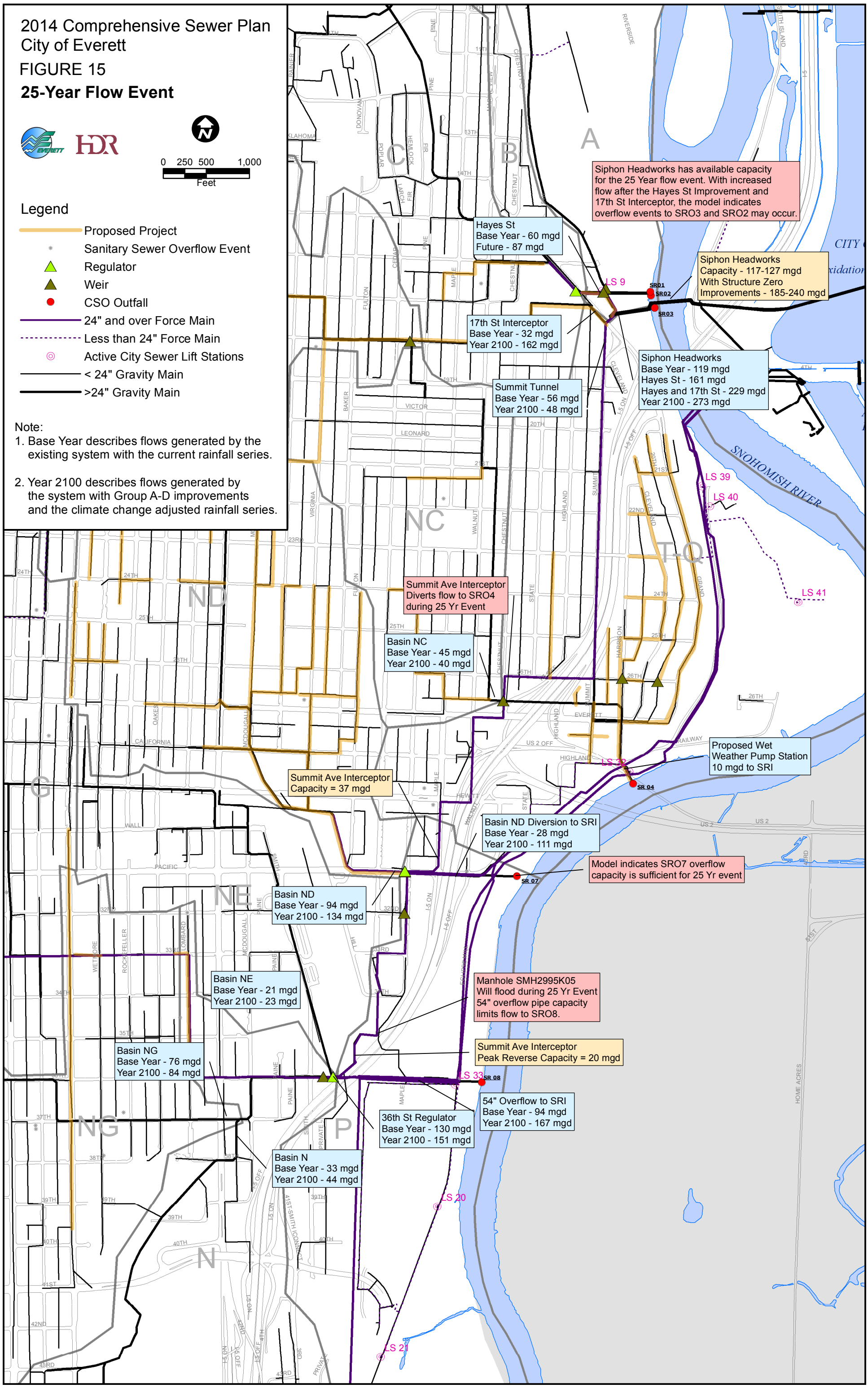
25-Year Flow Event

0 250 500 1,000
Feet

Legend

- Proposed Project
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main

Note:
1. Base Year describes flows generated by the existing system with the current rainfall series.
2. Year 2100 describes flows generated by the system with Group A-D improvements and the climate change adjusted rainfall series.



2014 Comprehensive Sewer Plan
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FIGURE 16

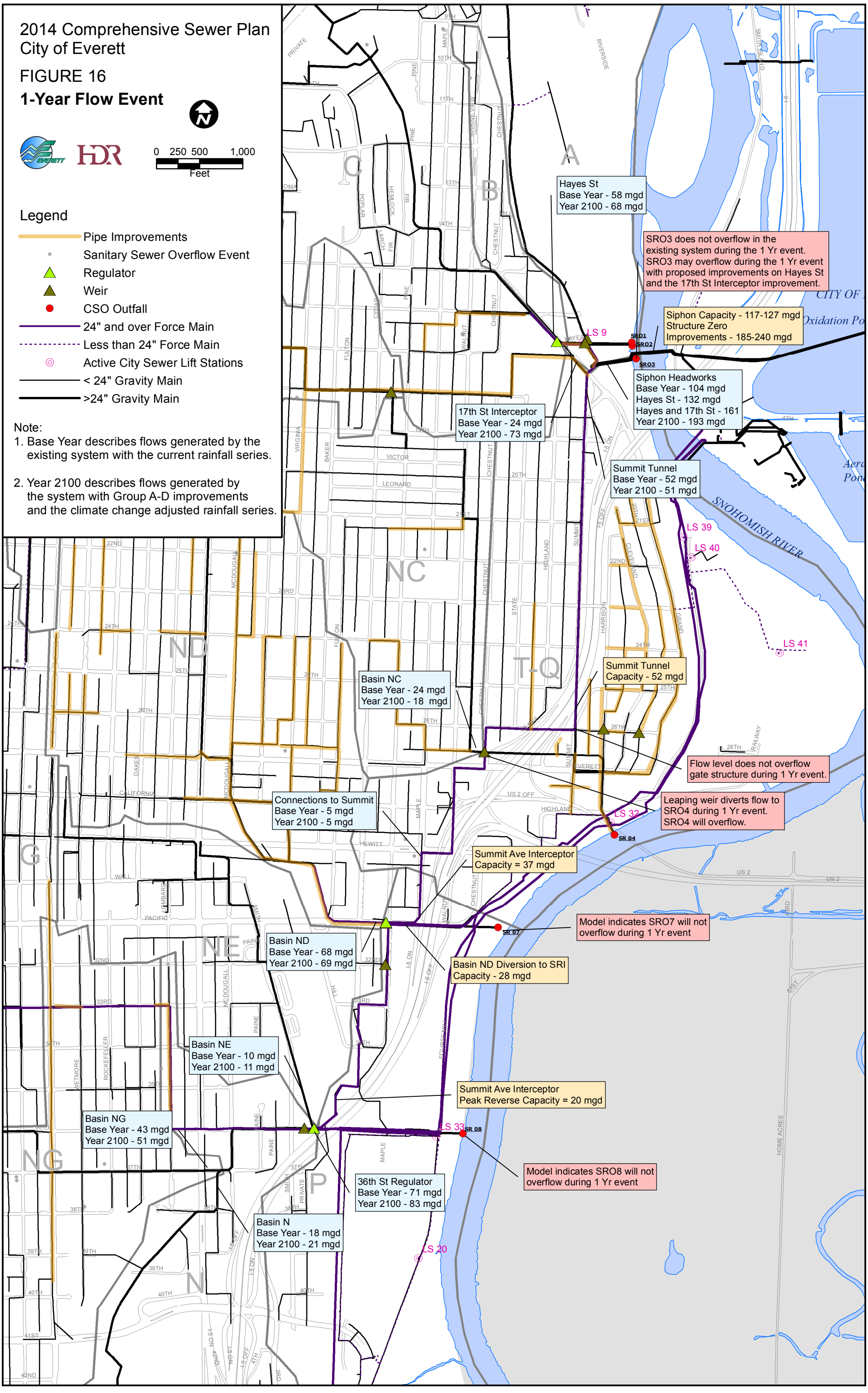
1-Year Flow Event

0 250 500 1,000
Feet

Legend

- Pipe Improvements
- Sanitary Sewer Overflow Event
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main

Note:
1. Base Year describes flows generated by the existing system with the current rainfall series.
2. Year 2100 describes flows generated by the system with Group A-D improvements and the climate change adjusted rainfall series.



3.3.1 Siphon Headworks

3.3.1.1 Existing Capacity

A preliminary evaluation in the *Hayes St Combined Sewer Overflow Reduction Technical Memorandum (OTAK, April 2011)* determined the capacity of the siphons between the Siphon Headworks and Diversion Structure Zero (DS-0) to be 157 mgd which is the maximum flow rate without an overflow occurring at SRO3. This flow rate assumes the water level in the Headworks Forebay is approximately 6 feet.

The siphon capacity was re-evaluated for the CSP with a more developed model of the WPCF that includes the CSO Splitter Box and flows from the Snohomish River CSO Interceptor. A copy of the as built drawings referenced during this evaluation are included in Appendix B. The following boundary conditions were included in the model based on typical operational settings of the oxidation and aeration pond levels.

- The high water level in the aeration and oxidation ponds is assumed to be 11.4 feet (NAVD88).
- A low water level is assumed to be 9.2 feet based on a minimum operating level of the ponds.
- The screw pumps in the Headworks Forebay are operating at 73.2 mgd.
- Weir elevation in the CSO Splitter Box is 11.7 feet.
- Flows from SRI are 120 mgd, the peak capacity of the interceptor.

The model simulated the above boundary conditions with steadily increasing flow upstream of the siphons to determine the flow rate at which SRO3 begins to overflow. Depending on the pond water level, the capacity of siphons is 112 to 122 mgd.

The modeled capacity of the siphons is less than the preliminary evaluation conducted by OTAK because the water surface elevation in the Headworks Forebay rises to approximately 16 feet based on the configuration of the CSO Splitter Box and the hydraulics in the system during peak wet weather flows.

3.3.1.2 Projected Flow Events

The Siphon Headworks collects flow from the Hayes St Regulator, the 17th Street Interceptor, and the Summit Tunnel. There are proposed improvements for the Hayes St Regulator and the 17th Street Interceptor that will increase the flow contribution to the Siphon Headworks. The model simulated these improvements for the 1-Year and 25-Year flow events and the results are presented in Table 14.

Table 14. Siphon Headworks Peak Flow Events

Scenario	1 Yr Flow Event (mgd)	25 Yr Flow Event (mgd)
Existing	104	119
Hayes St Improvement	132	161
Hayes St and 17th St Improvements	161	229
Year 2100 with Above Improvements	193	273

With the increased flow contribution from the Hayes Street Regulator improvements, the model suggests an overflow during the 1-Year flow event may occur at SRO3 based on the siphons capacity between 112 – 122 mgd. When the project is completed, monitoring of the flow within the Siphon Headworks structure (aft-bay) should be conducted to observe the actual increase in flow contribution.

With the addition of the 17th Street Interceptor, the 1-Year and 25-Year flow event in the Siphon Headworks will increase to 161 mgd. The model suggests that overflows to SRO3 will likely exceed one event per year based on the siphons capacity. An improvement to increase the capacity of the siphons may be necessary if monitoring confirms the modeling analysis.

By the Year 2100, the 1-Year and 25-Year flow events increase due to additional conveyance improvements upstream of the Siphon Headworks, the assumed rainfall increase associated with climate change, and future dry weather flow projections.

The following sections describe analyses of alternatives that would increase the capacity of the siphons. Another option would be to include in-line storage to reduce the peak flow rate in the 17th Street Interceptor. This should be evaluated during the design of the proposed interceptor. Figure 18 shows a site map of the location of the alternative features.

3.3.1.3 Siphon Headworks Alternatives

The capacity of the siphons depends on the water level in the Headworks Forebay which causes a tailwater effect in DS-0. The tailwater limits the flow between DS-0 and the Headworks Forebay, and the 24” and 39” overflow pipes from DS-0 to the Oxidation Pond have limited capacity. These conditions limit the flow through the siphons before a CSO event at SRO3 occurs.

Three alternatives were evaluated to increase the siphon capacity by reducing the tailwater in DS-0. This may be accomplished by installing either a gravity pipe or a pump station to create an additional bypass to the aeration pond. The alternatives are described below.

- Alternative 1 – A 96-inch gravity pipe would be installed between the existing DS-0 and the aeration pond. Modifications to the DS-0 would include enlarging the structure to accommodate the new connection, weir, and bar screen. It is assumed for modeling that the new weir is 50 feet in length and set at an elevation of 13 feet (NAVD88).
- Alternative 2 – A 100 mgd pump station would be installed adjacent to DS-0 to draw down the water level in the vault. A high-flow, low-head pump station would convey flow from the overflow in DS-0 to the aeration pond.
- Alternative 3 – A 250 mgd pump station would be installed adjacent to DS-0 to draw down the water level below the HGL of the aeration pond. The pump station would be designed to convey all flow from the siphons to both the Headworks Forebay and the aeration pond.

Table 15 shows the siphons capacity for the alternatives.

Table 15. Siphon Capacity Alternatives

Alternative	Flow Rate -Pond Elevation @ 11.4 feet (mgd)	Flow Rate - Pond Elevation @ 9.2 feet (mgd)
1	215	232
2	168	177
3*	240	240

The model suggests that a new gravity connection between DS-0 and the oxidation pond would increase the siphons capacity enough to convey the 1-year flow event without causing an overflow to SRO3. The model also suggests that this increased siphon capacity may be necessary after the Hayes Street Improvements are implemented, but more likely needed with the addition of the 17th Street Interceptor Improvement. At that point, SRO3 should be monitored to determine if more than one CSO event per year is observed. If SRO3 is observed to no longer be in CSO compliance, then the DS-0 improvements could be implemented.

Figure 17 depicts the flow events to the Siphon Headworks for several scenarios and the proposed alternatives for increasing the capacity of the siphons.

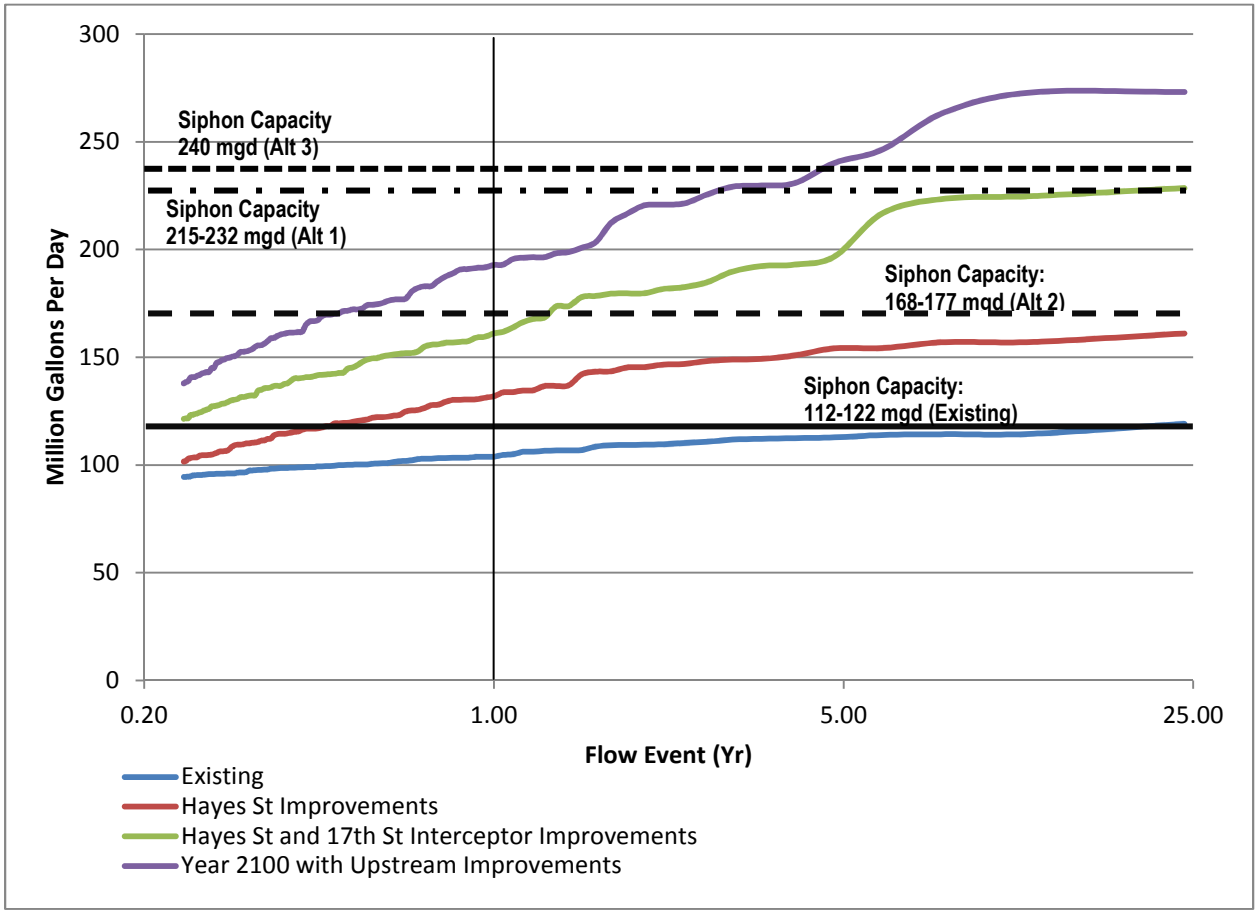
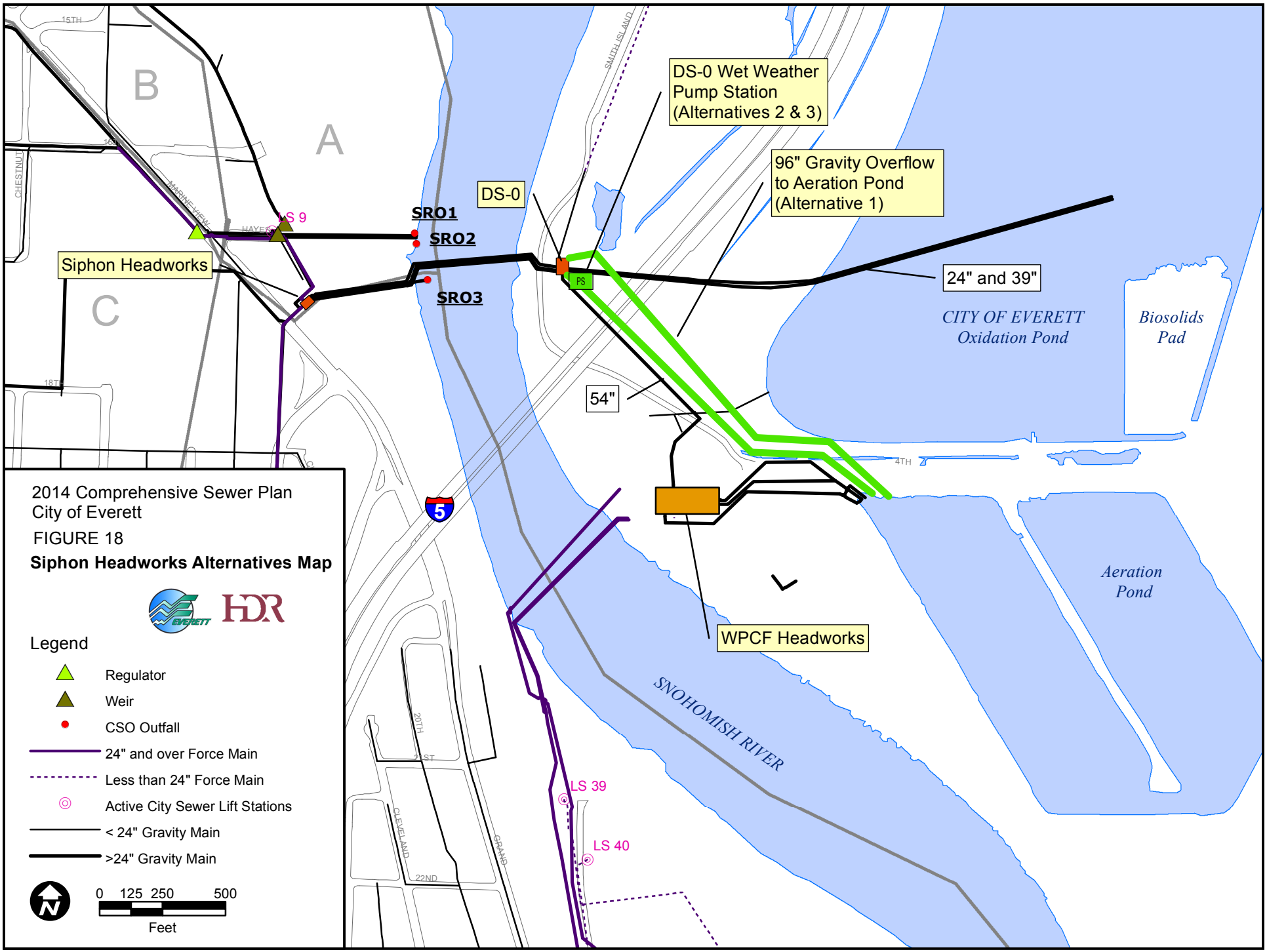


Figure 17. Siphon Headworks Flow Events and Siphon Capacity


2014 Comprehensive Sewer Plan
City of Everett
FIGURE 18
Siphon Headworks Alternatives Map
Legend
Regulator
Weir
CSO Outfall
24" and over Force Main
Less than 24" Force Main
Active City Sewer Lift Stations
< 24" Gravity Main
>24" Gravity Main
0 125 250 500
Feet
B
A
C
15TH
CHESTNUT
HARBOR VIEW
HAYES
LS 9
SRO1
SRO2
SRO3
Siphon Headworks
DS-0
DS-0 Wet Weather Pump Station (Alternatives 2 & 3)
96" Gravity Overflow to Aeration Pond (Alternative 1)
24" and 39"
54"
PS
SMITH ISLAND
CITY OF EVERETT Oxidation Pond
Biosolids Pad
Aeration Pond
4TH
WPCF Headworks
SNOHOMISH RIVER
5
20TH
21ST
CLEVELAND
GRAND
22ND
LS 39
LS 40

3.3.2 17th Street Interceptor

The 17th Street Interceptor collects flow from Basin D and conveys it to the Siphon Headworks. It has been determined that the capacity of existing interceptor is insufficient and requires a conveyance improvement.

3.3.2.1 Analysis

The North Everett Combined Sewer Evaluation (Basin D) (OTAK 2011) evaluated alternatives for the 17th Street Interceptor improvements. As part of the CSP, the proposed alternatives were reevaluated and further analysis supported the need to install a parallel interceptor to increase the conveyance capacity.

The Sewer L project installed new piping upstream of the interceptor to eliminate basement flooding in the project area. This improvement increased flow contributions to the 17th Street Interceptor which has limited capacity downstream of the project area. There is a risk of flooding from manholes along the interceptor. These potential spills will be resolved by increasing the interceptor capacity with a parallel interceptor. Table 16 lists the 1-Year and 25-Year flow events for the existing and Year 2100 scenario with improvements. Hydraulic grade lines of the existing and proposed interceptor improvements for these events are included in Appendix C.

Table 16. 1-Year and 25-Year Flow Events in the 17th Street Interceptor

Segment and Scenario (1)	1-Year Flow Event (mgd)	25-Year Flow Event (mgd)
Hoyt St and 17th St		
Base Year	13 (1a)	11 (1d) (2)
Year 2100	13 (1b & 1c)	17 (1e & 1f)
Pine St and 18th St		
Base Year	22 (1a)	24 (1d) (2)
Year 2100	65 (1b & 1c)	152 (1e & 1f)
Siphon Headworks		
Base Year	24 (1a)	32 (1d) (2)
Year 2100	73 (1d)	162 (1e & 1f)

1. Hydraulic profiles for each scenario are included in Appendix C. The plot number is indicated for each flow value.
2. The capacity during the 25-Year is limited and causes a bottleneck reducing the conveyance capacity.

3.3.2.2 Recommendations

A parallel interceptor should be installed to increase the capacity for the existing 17th Street Interceptor corridor. The recommendation for this improvement in the *North Everett Combined Sewer Evaluation (OTAK 2010)* is confirmed by additional analysis completed for this plan. The 17th Street Interceptor is a necessary project to convey flow from Basin D to the Siphon Headworks. An additional benefit of the 17th Street Interceptor improvement will be to remove (disconnect) the leaping weirs that divert flow to Basin ND and Basin NC. This will relieve flow contributions to these basins during wet weather events.

Oversizing the new 17th Street Interceptor parallel pipe to provide in-line CSO storage to reduce peak flow events at the Siphon Headworks should also be evaluated during interceptor design. Preliminary calculations estimate that storage of 1 MG could reduce the peak flow during the 1-Year flow event by 20 mgd.

3.3.3 Summit Ave Interceptor

The Summit Ave Interceptor conveys flow from Basins N, NG, NE, ND, and NC to the Siphon Headworks. The interceptor alignment begins at the 36th St Regulator and ends at the Summit Tunnel. The three scenarios depicted are the existing system, a revised weir structure to upgrade Regulator R4 leaping weir downstream of Basin NC, and the Year 2100 system with all level of service improvements. Figure 20 (see page 45) depicts the alignment of the Summit Ave Interceptor and major regulators and control structures. Figure 21 (see page 46) schematically illustrates the flow routing. The hydraulic grade lines of the interceptor for existing and future conditions are included in Appendix C.

The following is a description of each regulator (from south to north) connected to the Summit Ave Interceptor.

- ***36th St Regulator –*** This regulator allows peak flows to divert to the SRI.
- ***Pacific Regulator –*** This regulator allows peak flows to divert to the SRI and SRO7. During wet weather events, the flow direction in the Summit Ave Interceptor will reverse between the 36th St and Pacific Regulators. During such events, all flow from Basins N, NG, and NE are diverted into the SRI in addition to the reverse flow from the Pacific Regulator.
- ***Regulator R4 –*** This leaping weir, located on Chestnut St a half a block south of 26th St, diverts wet weather high flow from Basin NC to Lift Station 32 and SRO4.
- ***Summit Tunnel Gate Structure –*** This structure contains two slide gate valves that could isolate the Summit Tunnel for maintenance. Flow from the structure would be diverted to Lift Station 32. During large wet weather flow events, the Summit Tunnel surcharges and the water level increases in the structure above the crest of the valves and flows to Lift Station 32 and SRO4.

3.3.3.1 36th St Regulator

The 36th St Regulator contains a weir that diverts wet weather flow into the SRI when the Summit Avenue Interceptor surcharges. A 54-inch pipe extending east on 36th St connects the regulator to the SRI. Trunk Mains from Basins N, NE, and NG convey flow into the regulator. Dry weather flow is conveyed into the Summit Ave Interceptor.

During peak wet weather flow events, the model indicates Summit Ave Interceptor reverses flow direction such that flow goes south from the Pacific Regulator to the 36th St Regulator which then conveys flow to the SRI. This may be an unintended occurrence by the design engineers. Proposed alternatives evaluated to eliminate the reverse flow condition are described in Section 3.3.3.3. Hydraulic profiles in Appendix C illustrate the reverse flow in the Summit Ave Interceptor system by negative values.

Table 17 lists the 1-Year and 25-Year flow events into the 36th Street Regulator and contributing flows from Basins N, NE, and NG.

Table 17. 1-Year and 25-Year Flow Events Upstream of the 36th St Regulator

Scenario	1-Year Flow Event (mgd)				25-Year Flow Event (mgd)			
	Basin N	Basin NE	Basin NG	36th Street Regulator	Basin N	Basin NE	Basin NG	36th Street Regulator
Base Year	18	10	43	71	33	21	76	130
Year 2100	21	11	51	83	44	23	84	151

3.3.3.2 Pacific Regulator

The Pacific Regulator receives flow from Basin ND with dry weather flow conveyed north towards R4. When the Summit Ave Interceptor surcharges, flow reverses direction and flows south to the 36th St Regulator. As the flow level in the Summit Ave Interceptor rises, the Pacific Regulator can divert flow into the SRI. If flow rises further, a weir in the Pacific regulator will divert flow to the Riverside Regulator and to SRO7. Figure 21 (see page 46) shows schematically the flow routing.

The City maintains a level sensor in the Pacific Regulator. Monitoring level data was provided for a storm event between November 21 and 23, 2011 where a CSO event occurred. The height of the weir that overflows to the Riverside Regulator is 6'-10" from the flow line to the top of the weir plate (as measured in March 2013). Figure 19 depicts the comparison of the monitoring data and the model output during the CSO event. The model output indicated by the red line reports an overflow event occurring.

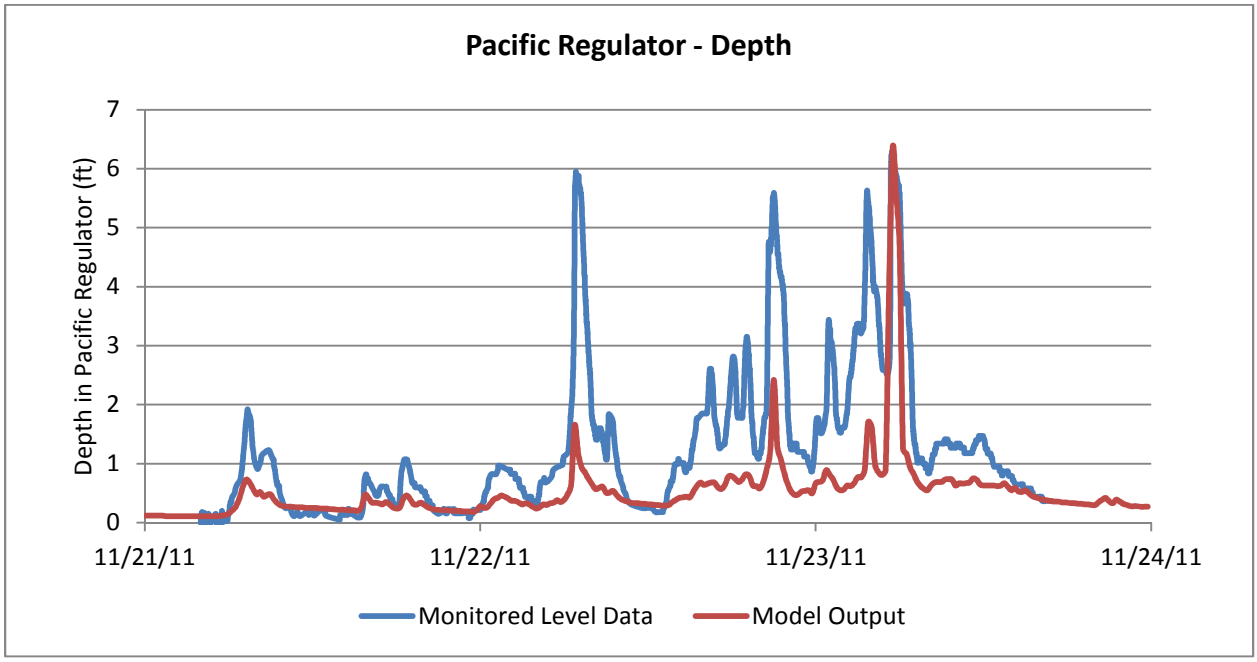


Figure 19. Pacific Regulator Level during November 2011 Storm Event

During the existing LOS analysis, it was determined that the Broadway Trunk may need a capacity upgrade. The existing LOS is identified as 5-10 years with modeling indicating that flooding may occur during a 25 year flow event. Appendix C Section 6 contains HGL profiles of the Broadway Trunk Main (Basin ND) trunk sewer. The proposed alternatives

for the Broadway Trunk were evaluated in the Group B and Group C alternatives. Modeling suggested that the 21st St Interceptor Spur would remove a portion of the flow conveyed in the trunk sewer. This improved the LOS in the section of the trunk along Broadway, but downstream of Broadway and Everett, the model indicated that the LOS was not improved significantly.

In the Group D improvements, the Partial Broadway Trunk improvement was simulated which consists of increasing the pipe diameter of the existing trunk sewer from Broadway and Everett to the Pacific Regulator. This improvement increases the ability to convey the 25 year flow event without surcharging, but results in a significantly greater flow during the event. The capacity and flow routing of the Broadway Trunk needs additional study that could be conducted as part of the pre-design for the 17th Street Interceptor Improvements. Additional alternatives not evaluated in this plan include the addition of storm water separation with a storm water trunk main parallel to the Broadway Trunk that discharges to SRO7.

Table 18 below lists the 1-Year and 25-Year flow events upstream of the Pacific Regulator. Year 2100 simulates all upstream LOS improvements including the Partial Broadway Trunk and 21st St Interceptor Spur improvements.

Table 18. 1-Year and 25-Year Flow Events Upstream of the Pacific Regulator

Scenario (1)	1-Year Flow Event (mgd)	25-Year Flow Event (mgd)
Base Year	68 (6a)	94 (6c)
Year 2100	69 (6b)	134 (6d)

1. Hydraulic profiles for each scenario are included in Appendix C. The plot number is indicated for each flow value.

For the base year scenario, the model suggests there is enough capacity in the Summit Ave Interceptor and the diversion to the SRI to convey the 1-Year flow event without discharging to SRO7. During the 25-Year flow event, the Pacific Regulator will overflow to the Riverside Regulator and discharge to SRO7.

During both the 1-Year and 25-Year flow events, the model suggests the flow contribution from the Pacific Regulator into the Summit Ave Interceptor will raise the hydraulic grade in the interceptor so that flow reverses direction. The model indicates that in the 1-Year event, there is capacity in the interceptor without causing flooding at manhole SMH K05. In the simulated 25-Year event, the hydraulic grade is raised at the 36th St Regulator and also at the Pacific Regulator indicating that flooding may occur at the manhole.

With the proposed improvements to increase the level of service in Basin ND, the 25-Year flow event will increase significantly. Additional alternatives to improve the capacity of the Summit Ave Interceptor during peak wet weather events are discussed in Section 3.3.5.

3.3.3.3 Basin NC Leaping Weir (R4) and Summit Tunnel Gate Structure

The 69 Storm Series was simulated to determine the cause of CSO events at SRO4. In an evaluation of the existing Summit Ave Interceptor system, it was discovered that the Basin NC leaping weir (R4) and the Summit Tunnel Gate Structure were contributing to overflows at SRO4. Table 19 presents the annual frequency for CSO flow events contributed by each structure.

Table 19. SR04 Diversion CSO Event Frequency – Existing System

Structure	CSO Event Frequency (Events per yr)
Leaping Weir	>5
Summit Tunnel Gate Structure	0.4

Under current conditions, it is estimated that Regulator R4 contributes to overflows at SRO4 in excess of five times per year. A second simulation was performed to evaluate removing the leaping weir and installing a flat weir at that location. With a flat weir at this location, more flow is forced towards the Summit Tunnel thereby reducing the number of discharges to SRO4.

The East Grand Stormwater Separation and Sanitary Sewer Improvements would reduce wet weather flow to LS32 and further reduce CSO discharge to SRO4. This project and revising the weir structure at Regulator R4 may reduce CSO events to less than one event per year. The City should proceed with these projects and conduct monitoring to determine if SRO4 is in compliance.

In case SRO4 is determined to not to be in CSO compliance, additional alternatives are presented below for further consideration. Figure 21 provides a site map of these alternatives.

1. The overflow pipe from Regulator R4 may be utilized to convey flow into the SRI. In the Spring of 2013, the pipe as inspected via CCTV to determine the condition and diameter. GIS mapping indicates the pipe is 30-inch, but it may be 36-inch based on inspection. This pipe would be slip-lined with a pressure pipe under I-5 and a routed into the SRI. The connection to LS32 would be disconnected and all flow would be conveyed into the SRI.

   Modeling analysis indicated that a 1-Year flow event in SRI may raise the hydraulic grade near LS32 to an elevation of 28 feet. At that hydraulic grade, flow from the R4 weir structure could no be conveyed by gravity without surcharging the Summit Interceptor during wet weather flows.

2. A wet weather pump station may be installed to pump flow into the SRI. Preliminary analysis determined that the capacity of the pump station would be approximately 10 mgd. This would be reevaluated during the design stage if the project were selected for installation. A potential location for this pump station could be adjacent to the R4 regulator structure to the West of I-5 or adjacent to LS32.

3. The flow contribution from Basin NC may be reduced by installing stormwater separation (and treatment) and using the existing 30/36-inch pipe under I-5 and eventually discharged at SRO4. This was evaluated in the *Stormwater Separation for East Grand Memorandum* (OTAK 2012). Based on the capacity of the pipe under I-5, a separate stormwater network may be necessary for the entire Basin NC. The 30/36-inch pipe under I-5 currently serves as an essential overflow point for the Summit Ave Interceptor during extreme storm events.

4. If this pipe were converted to stormwater only, it is recommended to modify the Summit Tunnel Gate Structure as the overflow point to prevent excessive surcharging in the interceptor. The structure may overflow over the gates, but there

is risk the existing safety grating above the channels may get clogged. This could be modified by installing a weir at the same elevation as the top of the gates. It would also be helpful to install telemetry equipment in this structure to monitor depth of flow.

5. Another alternative to reduce flow contribution to the Summit Ave Interceptor may be to divert the northerly portion of Basin NC flows to the proposed 17th Street Interceptor pipe. Flow from 21st and Walnut could be conveyed into the proposed 17th Street Interceptor pipe which would remove approximately 50% of the flows from Basin NC to the Summit Ave Interceptor. There may be further opportunity to install a new main to divert a portion of flows from Basin T-Q west of I-5 into the proposed 17th Street Interceptor.

3.3.4 Snohomish River CSO Interceptor

The Snohomish River CSO Interceptor (SRI) conveys flow from Basins N, NG, NE, and ND to the WPCF headworks.

3.3.4.1 Analysis

Modeling analysis was conducted on the SRI to determine if its current capacity is sufficient for the future flow projections and increased contributions from LOS improvements. The capacity is controlled by the water level in the CSO Splitter Box and the elevation at which the gate to SRO8 opens. The minimum capacity of the SRI, as determined by the model, is 120 mgd. This is based on a flow condition when the water level in the CSO Splitter Box is 17.78 feet and the upstream HGL at SRO8 is 37.12 which is the maximum water level before the gate to SRO8 opens.

Table 20 lists the flow contributions from the collection system into the interceptor during the 1-Year and 25-Year flow events. The hydraulic grade line for the 1-Year and 25-Year flow events are included in Appendix C Section 3.

Table 20. 1-Year and 25-Year Flow Event to the Snohomish River CSO Interceptor

Segment and Scenario (1)	1-Year Flow Event (mgd)	25-Year Flow Event (mgd)
From 36th St Regulator		
Base Year	85 (3a)	94 (3g)
Year 2100	100 (3f)	167 (3l)
From Pacific Regulator		
Base Year	23 (3a)	28 (3g)
Year 2100	9 (3f)	111 (3l)

1. Hydraulic profiles for each scenario are included in Appendix C. The plot number is indicated for each flow value.

According to the model, there is sufficient capacity in the SRI during the 1-Year event to convey flow to the WPCF and the motor operated valve at SRO8 would not open. However, CSO monitoring at SRO8 reports that discharges have been occurring on an average of one event per year from 2009 to 2011.

3.3.4.2 Recommendations

The modeling analysis suggest that the SRI has sufficient capacity for current and projected flow contributions while CSO monitoring reports suggest that its capacity is being exceeded at approximately one event per year. The interceptor's condition should be evaluated to determine if any physical aspects or blockages exist that are reducing the capacity of the interceptor.

3.3.5 Summit Ave Interceptor and Snohomish River CSO Interceptor Alternatives

Based upon the above evaluation, the model indicated that the Summit Ave Interceptor is limited in its ability to convey the 25-Year flow event without causing flooding at SMH K05. The following presents an analysis of three alternatives that would improve the interceptor system by reducing surcharging in the Summit Ave Interceptor.

3.3.5.1 Analysis

Figure 21 depicts a site map of the existing interceptors and regulators. Figure 22 depicts a schematic layout of the existing trunk sewers and interceptor network and regulators that flows into the SRI system and siphon headworks. Figure 23 illustrates the following proposed improvements in the schematic. The alternatives are labeled SRO4, SRO7, and SRO8 based on their proximately to each outfall.

- Alternative SRO4 (Wet Weather Pump Station adjacent to LS32) – A 10 mgd pump station and modified weir in regulator R4 were modeled for impacts to the Summit Ave Interceptor and the SRI.
- Alternative SRO7 (Pacific Regulator) – Increase the pipe size from the Pacific Regulator to the SRI. Replace the existing 30-inch pipe with a 48-inch (or larger) pipe to increase the capacity to the SRI during peak flow events.
- Alternative SRO8 (36th Street Regulator) – Modeling shows the 54-inch pipe from the 36th Street Regulator to the SRI and SRO8 is a "bottleneck". This alternative consists of a parallel 60-inch pipe that would increase the capacity of the regulator to divert flow to SRO8 during peak flow events. This parallel pipe could be installed to bypass the SRO8 control structure and connect directly to the SRO8 outfall. Overflow events could then be monitored within the 36th Street Regulator.

These alternatives were simulated in the model assuming that the SRO4 improvements would be the first project installed to address CSO control. The alternatives at SRO7 and SRO8 were evaluated in conjunction with the SRO4 alternative, as well as in conjunction with each other to determine the effect. Table 21 and 22 presents a summary of the model results for the 1-Year and 25-Year flow events reported in the model. Hydraulic profiles of the Summit Ave Interceptor, Snohomish River CSO Interceptor, and the Basin ND Trunk are included in Appendix C Sections 2, 3 and 6.

The flow events are reported from the model at a time in the simulation where the maximum surcharge in each interceptor was observed. The flow rates in each section of the interceptors do not peak simultaneously. Typically, the peak flow rates occur first in the upstream sections and are conveyed downstream. Tables 21 and 22 depict the combination of peak flows when the surcharge levels were at their maximum.

Table 21. 1-Year Flow Event in Summit Ave and Snohomish River CSO Interceptors

Alternative (2)	SRI Peak Flow Rate (mgd)(1)				HGL at SRO8 (3)	Summit Ave Interceptor - Peak Flow Rate (mgd) 1)				SMH K05 Flooding
	36th Ave to SRO8	SRO8 to Pacific Ave	Pacific Ave to Harrison Ave	Harrison Ave to Splitter Box		36th St Reg to Pacific Reg	Pacific Reg to R4	R4 to Summit Tunnel Gate Structure	Summit Tunnel	
Existing (2a, 3a)	85	85	108	108	34.5	-20	34	50	52	None
SRO4 (2b, 3b)	80	80	105	115	35.0	-20	35	46	52	None
SRO4 and SRO7 (2c, 3c)	72	72	112	122	36.5	-8	34	50	51	None
SRO4 and SRO8 (2d, 3d)	81	81	102	112	35.0	-20	35	49	51	None
SRO4, SRO7, and SRO8 (2e, 3e)	73	73	108	118	35.5	-14	33	46	51	None

1. Peak flow events are reported at the time with the maximum surcharge in the interceptors. Peaks do not all occur simultaneously.
2. Each Alternative corresponds to a hydraulic profile in Appendix C. Existing (Plot 3A), SRO4 (Plot 3B), SRO4 and SRO7 (Plot 3C), SRO4 and SRO8 (Plot 3D), and SRO4, SRO7, and SRO8 (Plot 3E).
3. The valve controlling discharge to SRO8 is programmed to open at a depth of 36 feet. The invert of the structure is 1.12 feet, so the HGL at which SRO8 begins to discharge is 37.12 feet (NAVD88).
4. Hydraulic profiles for each scenario are included in Appendix C. The plot number is indicated for both the SRI and Summit Ave Interceptor next to each scenario.

Table 22. 25-Year Flow Event in Summit Ave and Snohomish River CSO Interceptors

Alternative (2)	SRI Peak Flow Rate (mgd) (1)					Summit Ave Interceptor Peak Flow Rate (mgd) (1)				SMH K05 Flooding
	36th Ave to SRO8	SRO8 to Pacific Ave	Pacific Ave to Harrison Ave	Harrison Ave to Splitter Box		36th St Reg to Pacific Reg (3)	Pacific Reg to R4	R4 to Summit Tunnel Gate Structure	Summit Tunnel	
Existing (2g, 3g)	94	87	115	115		29,-28	30	59	56	Yes
SRO4 (2h, 3h)	91	85	115	125		29,-28	31	52	60	Yes
SRO4 and SRO7 (2i, 3i)	95	55	112	122		30,-16	27	51	58	Yes
SRO4 and SRO8 (2j, 3j)	165	79	108	118		-25	33	56	60	Reduced
SRO4, SRO7, SRO8 (2k, 3k)	160	56	116	126		-14	29	50	56	None

1. Peak flow events are reported at the time with the maximum surcharge in the interceptors. Peaks do not all occur simultaneously.
2. Each Alternative corresponds to a hydraulic profile in Appendix C. Existing (Plot 3F), SRO4 (Plot 3G), SRO4 and SRO7 (Plot 3H), SRO4 and SRO8 (Plot 3I), and SRO4, SRO7, and SRO8 (Plot 3J).
3. Two flow values indicate the combined flow from both the 36th St and Pacific Regulator that is flooding from SMH K05.
4. Hydraulic profiles for each scenario are included in Appendix C. The plot number is indicated for both the SRI and Summit Ave Interceptor next to each scenario.

The modeling simulation demonstrated the following impacts of each alternative on the interceptor system:

- Alternative SRO4 – A wet weather pump station into the SRI increases the flow contribution to the SRI which results in a slight increase in the hydraulic profile of the interceptor. The model suggests that this flow contribution will not cause an overflow to occur at SRO8 during a 1-Year flow event. This improvement has no effect on flooding that may occur at SMH K05.

- Alternative SRO7 – Increasing the diameter of the pipe between the Pacific Regulator and the SRI, assumed to be 48-inch in the model simulation would increase the capacity for the regulator to discharge to the SRI. A larger diameter may be evaluated during the pre-design. This project would reduce the flow contribution into the Summit Ave Interceptor which consequently lowers the surcharge level in the Summit Ave Interceptor. During the 1-Year flow event, the contribution to the SRI increases, which causes the hydraulic grade of the SRI to increase. The model suggests this would not cause an overflow. During the 25-Year flow event, the flow contribution to the SRI through the 48-inch pipe increases significantly which reduces flow to the Summit Ave Interceptor and SRO7.

  While increasing the capacity of the pipe between the Pacific Regulator and the SRI may reduce flow contributions, it may not be sufficient to eliminate the reserve flow condition. Preliminary modeling analysis of the Pacific regulator suggests that to eliminate the reverse flow condition, a new regulator is needed that would connect the Summit Ave Interceptor, the Broadway trunk, and overflow weirs to the SRI and SRO7 in one structure.
- Alternative SRO8 – Installing a parallel pipe between the 36th St Regulator and SRO8 would remove a hydraulic limitation that the model indicates would contribute to flooding at SMH K05. The model indicates the reverse flow condition would continue to occur after this alternative is implemented. The model indicates that there is minimal impact to the existing system during the 1-Year flow event and is not likely to cause an overflow to occur at SRO8.

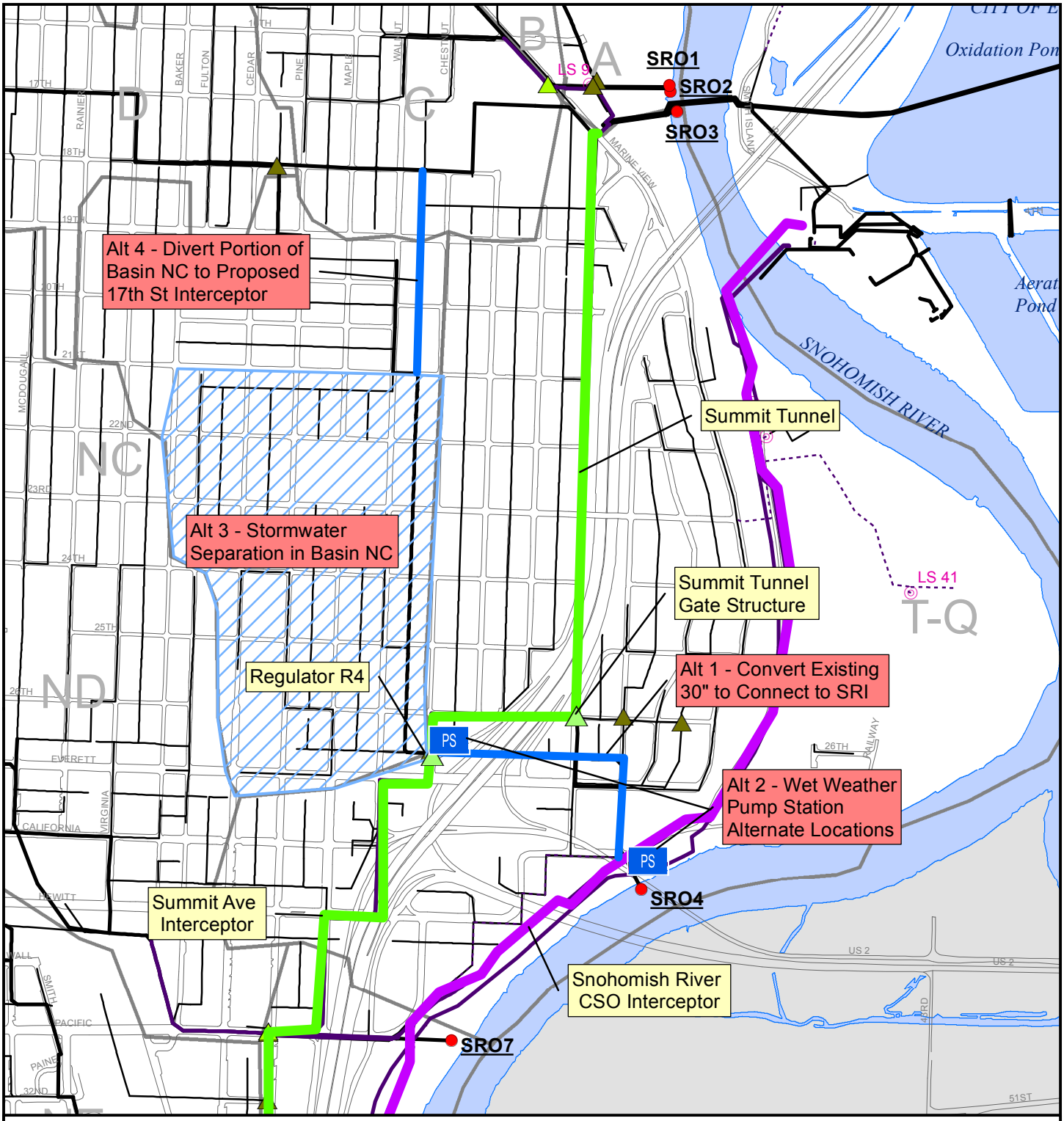
Both Alternatives SRO7 and SRO8 should be considered for implementation. Modeling analysis suggests that a restructuring of the Pacific Regulator would eliminate the reverse flow condition. However, the hydraulic bottle neck between the 36th Street Regulator and SRO8 may still cause flooding at SMH K05 if Alternative SRO8 is not implemented. Further evaluation of these alternatives should be conducted in a Summit Ave Interceptor alternatives analysis.

3.3.5.2 Recommendations

After conducting the analysis of the Summit Ave Interceptor, it was determined that existing and Year 2100 1-Year flow events can be conveyed in the existing interceptor. However, in the 25-Year flow event, the model suggests flooding will occur at manhole SMH K05. It was observed during a field visit that the manhole has surcharged to within 2-feet of the ground surface and possibly flooded. Before any of the following improvements are installed, additional flow monitoring should be conducted to confirm the model results.

- 36th St Regulator – The model indicates the 54-inch pipe from the regulator to SRO8 does not have capacity to convey the 25-Year flow event. In the model, the hydraulic grade upstream of the weir will rise and cause flooding at the manhole on the Summit Ave Interceptor. Increasing the pipe diameter or installing a new parallel pipe will reduce surcharging in the Summit Ave Interceptor to avoid flooding at Manhole SMH K05. The length of the weir in the structure should be increased to limit surcharging upstream of the weir during peak flow events. Flow monitoring of the structure should be conducted to confirm the model results.

- Pacific Regulator – The model indicates that installing a larger diameter pipe to replace the existing 30-inch pipe that conveys flow from the regulator to the SRI would limit flow contribution to the Summit Ave Interceptor. This project alone does not eliminate flooding at SMH K05, however, a locking manhole may be installed to allow the interceptor segment to surcharge to a higher level if the existing interceptor can withstand the additional pressure. A locking manhole and increase in the pipe diameter to the SRI may also eliminate the potential for flooding in the Summit Ave Interceptor.
- Basin NC Leaping Weir – It is recommended to revise the leaping weir R4 to a flat weir structure to limit discharges to LS32. After the East Grand separation and weir revision, monitoring should be performed to determine if these projects will achieve compliance. If SRO4 is found to be out of compliance, stormwater separation in Basin NC and diverting a portion of the basin to the proposed 17th Street Interceptor would reduce wet weather flow contributions to the Summit Ave Interceptor and may reduce CSO events to less than 1 event per year.



Legend

- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main
- Piping Alternative
- PS Pump Station Alternative

2014 Comprehensive Sewer Plan
City of Everett

FIGURE 20
SRO4 Alternatives Map

0 250 500 1,000
Feet

2014 Comprehensive Sewer Plan
City of Everett

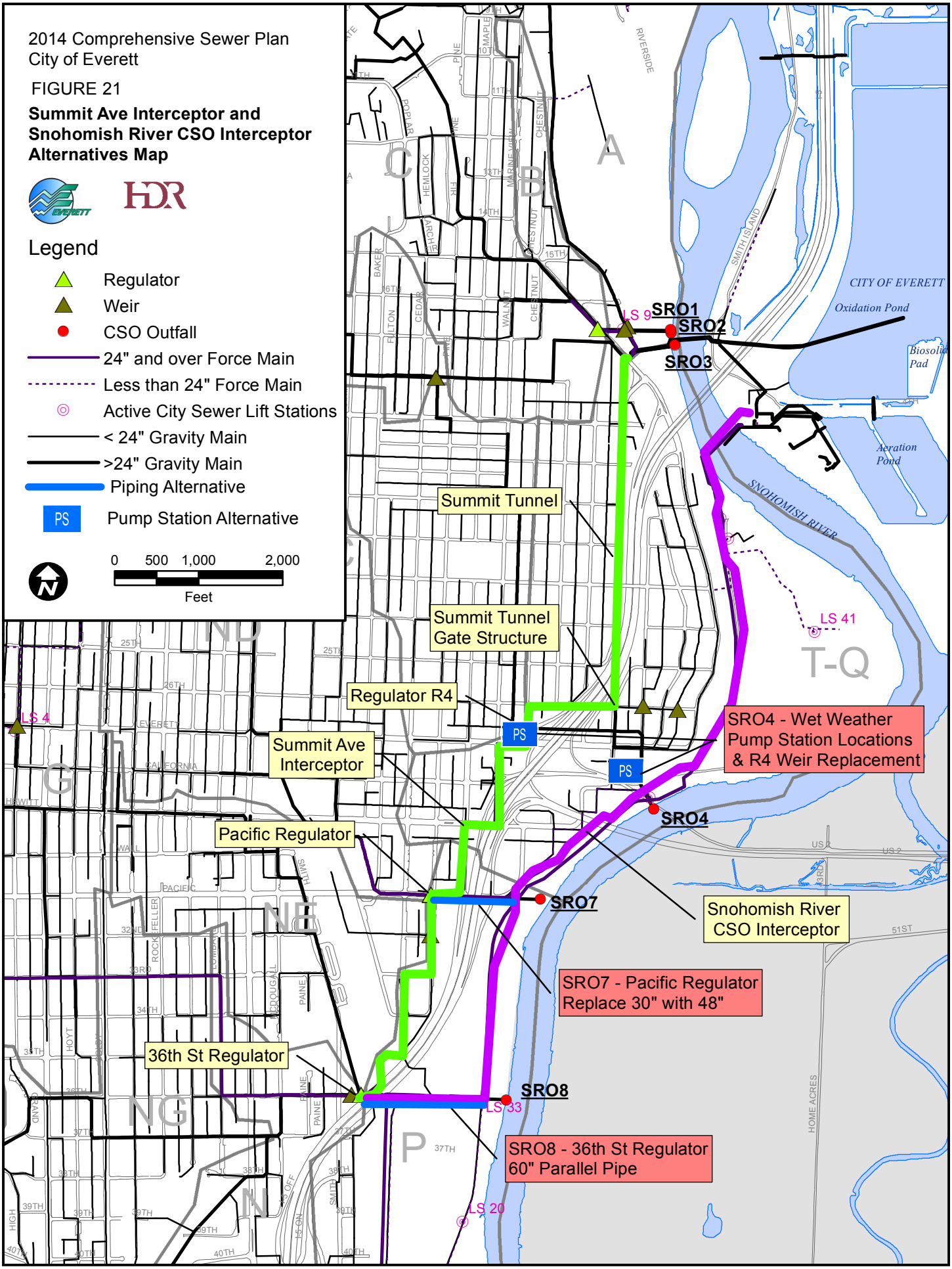
FIGURE 21

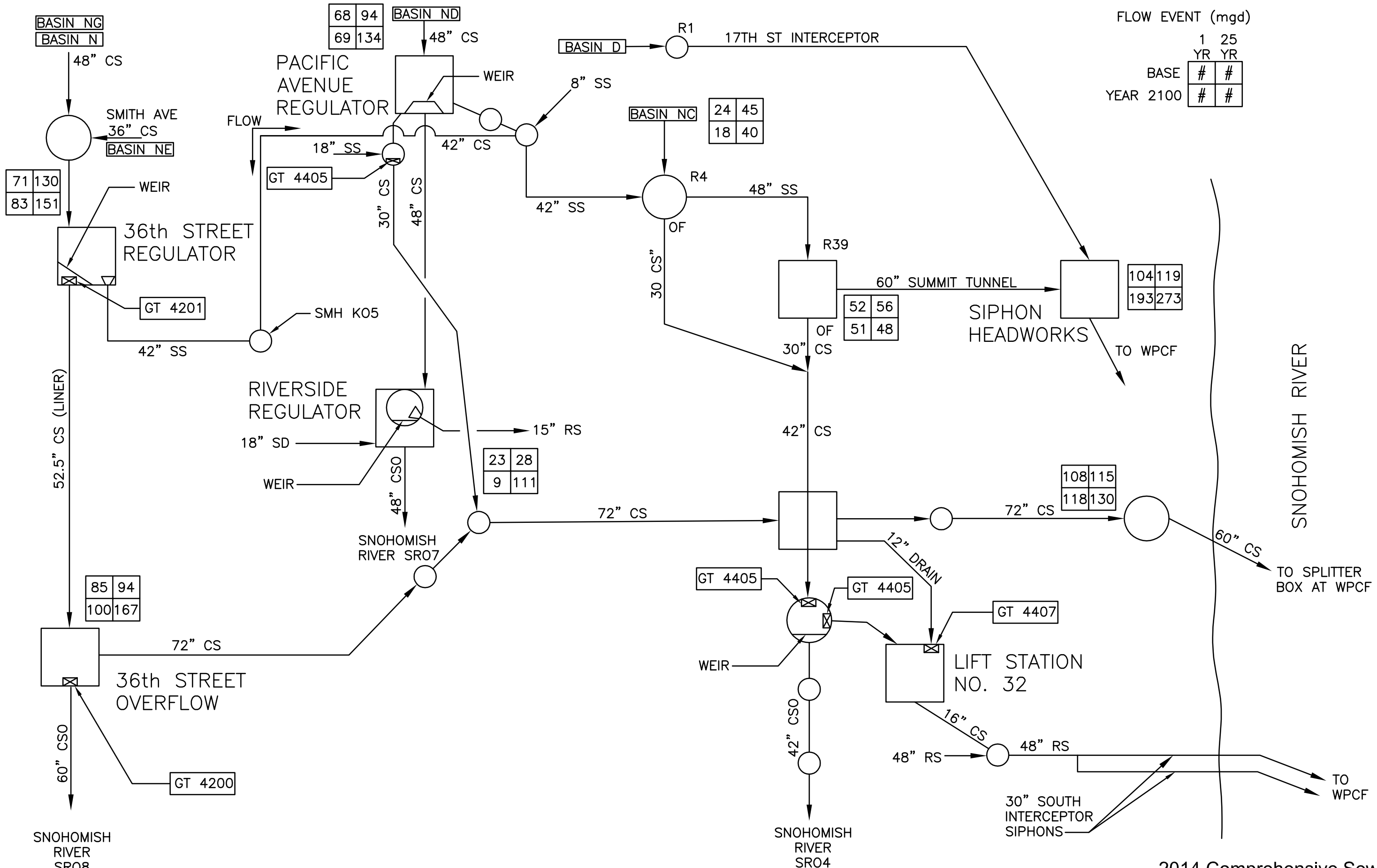
Summit Ave Interceptor and Snohomish River CSO Interceptor Alternatives Map

Legend

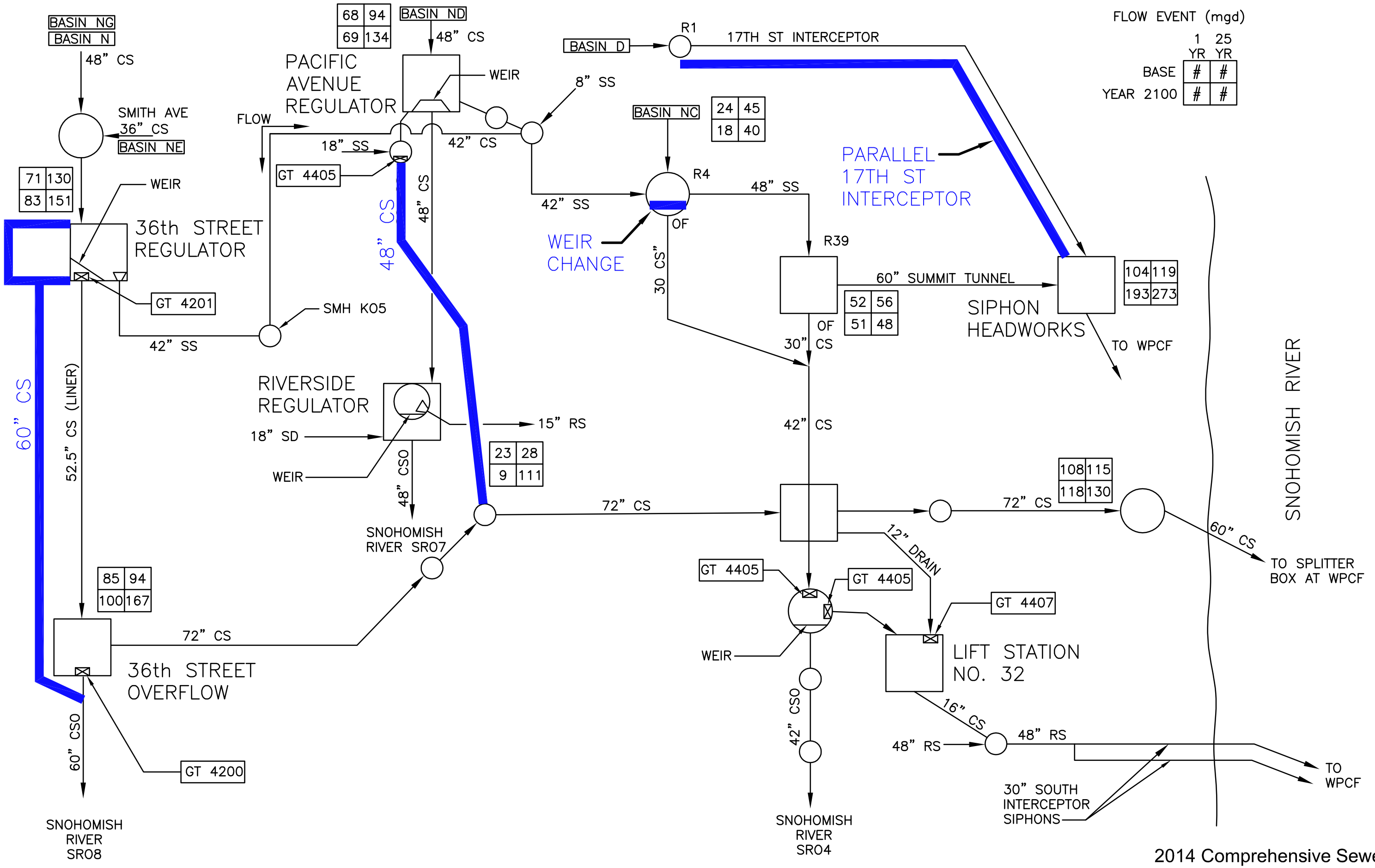
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main
- Piping Alternative
- PS Pump Station Alternative

0 500 1,000 2,000
Feet





2014 Comprehensive Sewer Plan
City of Everett
FIGURE 22
Summit Ave Interceptor and Snohomish River CSO Interceptor Schematic



2014 Comprehensive Sewer Plan
City of Everett
FIGURE 23
Summit Ave Interceptor and Snohomish River CSO Interceptor Alternatives

3.3.6 South End Interceptor

The South End Interceptor conveys separated sanitary sewer flow from the Southern system to the WPCF. Future flow contributions will increase due to growth within the City of Everett's service area. The interceptor is divided into the three segments described below. Figure 24 depicts these locations on a map of the system.

- ***Extension Segment*** – This segment begins at 27th Ave SE and 116th St SE and extends for approximately 13,000 feet to Shadow Wood Drive. It conveys flow from Basin SE-9 and Silverlake Water and Sewer District. This segment functions as a conventional gravity sewer.
- ***South Segment*** – This segment begins at Shadow Wood Drive and extends for approximately 11,000 feet to Lowell-Snohomish River Road. It conveys flow from the Extension Segment and Basin SE-9. This segment functions as a pressure sewer.
- ***North Segment*** – This segment begins at Lowell-Snohomish River Road and extends approximately 19,000 feet to the headworks of the WPCF. It conveys flow from the South Segment, Basins SE-7, SE-8, and SE-10, and Lift Station 1. Lift Station 32 also discharges into the interceptor in the combined system at manhole SMH2195W15. This segment functions as a pressure sewer.

Table 23 shows the current and future flow contributions to the South End Interceptor.

Table 23. 25-Year Flow Event in the South End Interceptor

Segment and Scenario	25-Year Flow Event (mgd)
Extension	
Base Year	18.5 (5b)
Year 2100	28 (5e)
South Segment	
Base Year	36 (5b)
Year 2100	52 (5e)
North Segment	
Base Year	64 (5b)
Year 2100	80 (5e)

By Year 2100, the model indicates that the projected growth in the southern system will exceed the capacity of the interceptor. The capacity is defined by the level at which flooding would occur due to surcharging of the interceptor. There are two locations where overflows (flooding) could occur if the hydraulic grade reaches certain elevations.

Figure 24 identifies those locations. They are further described as follows:

1. Shadowwood screen structure, SMH1785A10 & SMH1785Z02, rim elevation 256.25.
2. Within the power transmission line corridor approximately 875 feet west of Larimer Rd, SMH0885Q18, rim elevation 253.45. Maximum HG elevation in SEI will be somewhat lower than SMHQ18 rim elevation in order to account for flow into the SEI from this branch connection.

3. The connection at Lenora St. which has a pressure sewer extension westerly to Lowell Rd. at the PUD corridor (230 feet northeast of Commercial Ave.), SMH0585D16, rim elevation 304.72. The critical hydraulic grade elevation in the SEI would be approximately elevation 195 in order to account for flow in the Lowell Rd./Lenora St. pressure sewer.

Internal pipe operating pressure in the SEI is measured at LS17 and furnishes some data with respect to the current and historical flow conditions in the SEI. A sewer flow meter was in place for nearly 3 years (2009-2011) and has documented the current flow characteristics in the Extension segment. A previous effort to install flow meters at the WPCF that would measure the SEI flow is currently on hold, but should be resumed at some time in the future. Similarly, additional flow metering equipment should be considered at other locations along the SEI or at branch connections.

The City has identified a proposed improvement to install a parallel interceptor to provide redundancy. It is recommended to increase the size of the redundant interceptor to be used when the flows exceed the capacity of the existing interceptor. Hydraulic profiles generated for this interceptor are included in Appendix C Section 5.

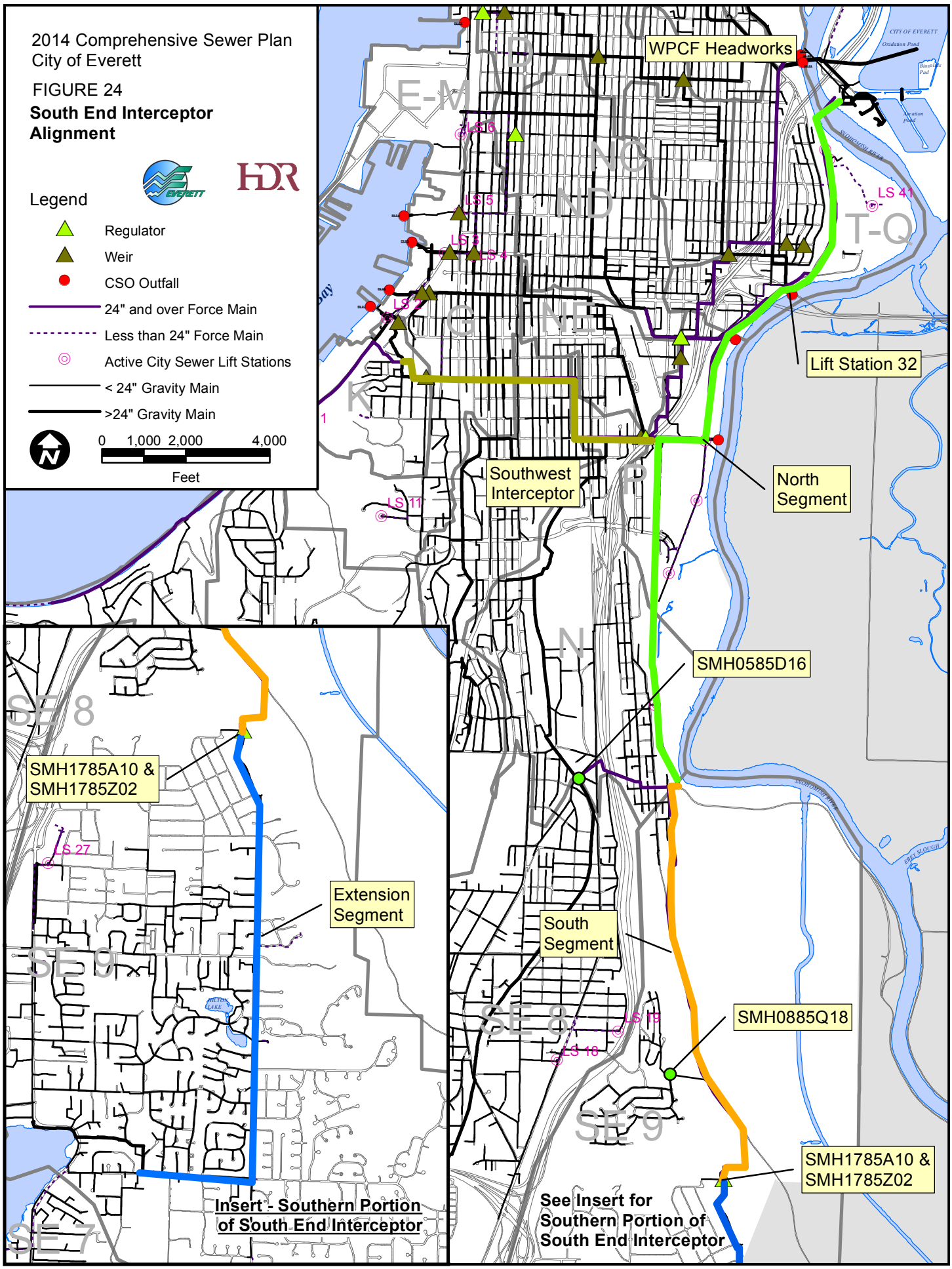
2014 Comprehensive Sewer Plan
City of Everett

FIGURE 24
South End Interceptor Alignment

Legend

- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main

0 1,000 2,000 4,000
Feet



3.3.7 Water Pollution Control Facility

This section describes the increase in average and peak flow rates to the WPCF. The proposed improvements recommended in this CSP, along with growth in the system, will increase average and peak flows to the plant. The model was used to simulate rainfall data to determine the average day in the max month and the peak flow at the WPCF. The Everett Rainfall Series contains 24 years of data of which two sample years were selected for simulation. The rainfall data from 2007 and 2009 was selected because their total annual rainfall was representative of the average annual rainfall through the entire series. Table 24 lists the average annual rainfall and the two sample years.

Table 24. Annual Rainfall Summary

Years	Annual Rainfall (in)
Everett Rainfall Series (24 Year average)	39.0
2007	39.7
2009	39.8

The 2007 and 2009 years represent average rainfall years, so the model was used to simulate these years and determine the average day sewer flow in the max month, which is shown in Table 25.

Table 25. Average Day Sewer Flow in Max Month at WPCF

Year	Average Day in Max Month (mgd)
Existing	37.5 (1)
Year 2100	52.8 (2)

1 – Simulated with the Everett Rainfall Series for years 2007 and 2009.
2 – Simulated with the Everett Climate Change Rainfall Series for year 2007 and 2009 with all proposed level of service improvements and Year 2100 growth projections.

The peak flow volume conveyed to the WPCF was simulated with the 69 Storm Series with the major storm events in the 24 year rainfall record. Five alternatives were considered for the impact to projected flow volume.

1. ***Existing*** – No improvements simulated with Existing 69 Storm Series
2. ***Hayes St*** – Includes the Hayes St Improvements simulated with Existing 69 Storm Series
3. ***17th St Interceptor*** – Includes both the Hayes St and 17th St Interceptor Improvements simulated with Existing 69 Storm Series
4. ***DS-0*** – Includes the Hayes St, 17th St Interceptor, and DS-0 Improvements simulated with Existing 69 Storm Series
5. ***Year 2100*** – Includes all projects identified for improving level of service and potential increase in rainfall intensity due to climate change. Projects identified in Section 3.3.5 as also included. This increase in rainfall is reflected in the Year 2100 69 Storm Series simulated in the hydraulic model

Table 26 presents the modeled 24-hour flow event volume conveyed to the WPCF for the five alternatives described above. Flow events are based on recurrence interval of 1, 5, 10, and 25 years. The rainfall volume is also included in the table.

Table 26. 24-Hour Flow Event Volume to WPCF

Flow Event	Existing 69 Storm Series					Year 2100 69 Storm Series	
	Simulated Rainfall Event (in)	Existing System	With Hayes St Improvements	With 17th St Interceptor Improvements	With DS-0 Improvements	Simulated Rainfall Event (in)	With All Year 2100 Improvements
		Volume (MG)					Volume (MG)
1-Year	1.6	114	114	118	118	1.8	149
5-Year	2.0	148	152	159	163	2.3	184
10-Year	2.6	173	185	195	198	2.8	221
25-Year	3.7	213	232	237	253	4.1	279

4.0 Recommendations

Recommended improvements have been incorporated into the capital improvement program outlined in the 2014 CSP. Final CIP maps are included in the Basin Plans in the CSP.

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Appendix A
Calibration Plots

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Section 1
Dry Weather Flow Calibration
Event Period
May 21 to 27, 2009

Table 1. Calibration Event Summary - May 21 to 27, 2009

Flow Monitor	Observed		Predicted		Absolute Difference Volume (MG)	Absolute Difference Average (mgd)	% Difference Volume	% Difference Average
	Volume (MG)	Average (mgd)	Volume (MG)	Average (mgd)				
6	9.99	1.43	8.37	1.20	1.62	0.23	16%	16%
9	2.69	0.37	1.82	0.26	0.87	0.11	32%	30%
13	2.41	0.39	3.07	0.44	-0.66	-0.05	-27%	-13%
7	2.29	0.33	2.91	0.42	-0.62	0.18	-27%	20%
10	4.27	0.61	4.86	0.69	-0.59	-0.04	-14%	-4%

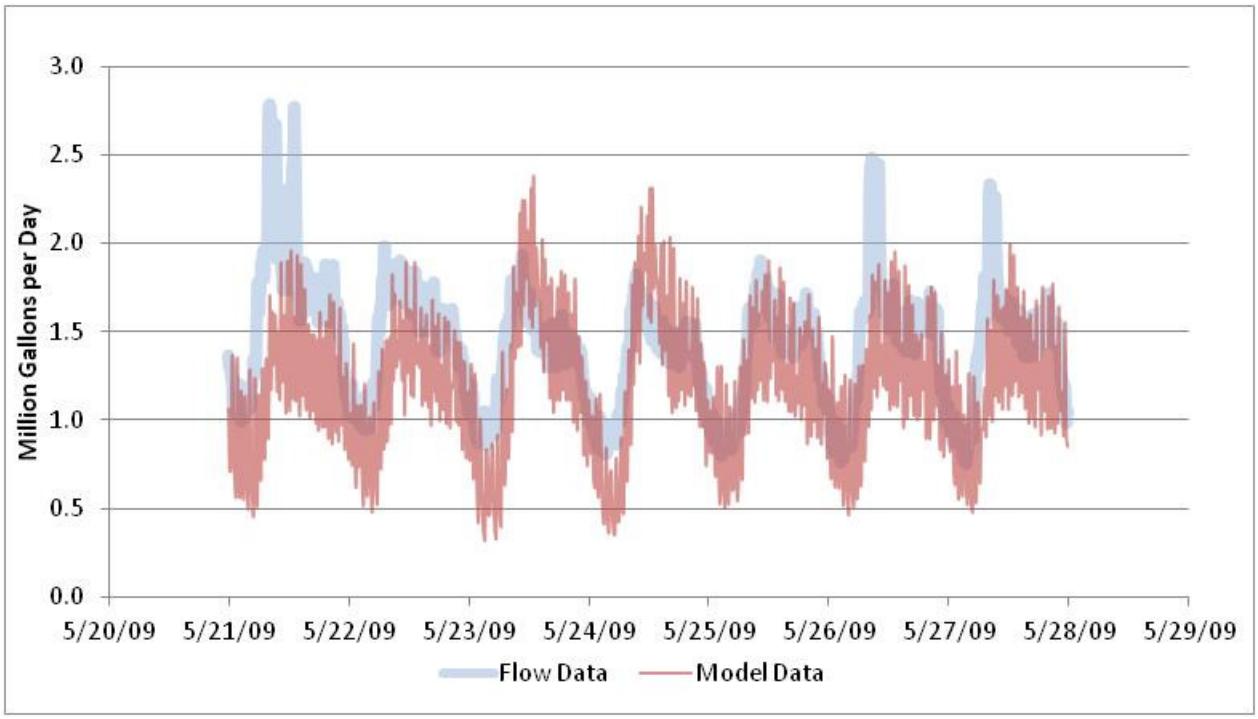

Figure 2. SFE No 6
Monitor DWF = 1.4 mgd
Model DWF= 1.2 mgd

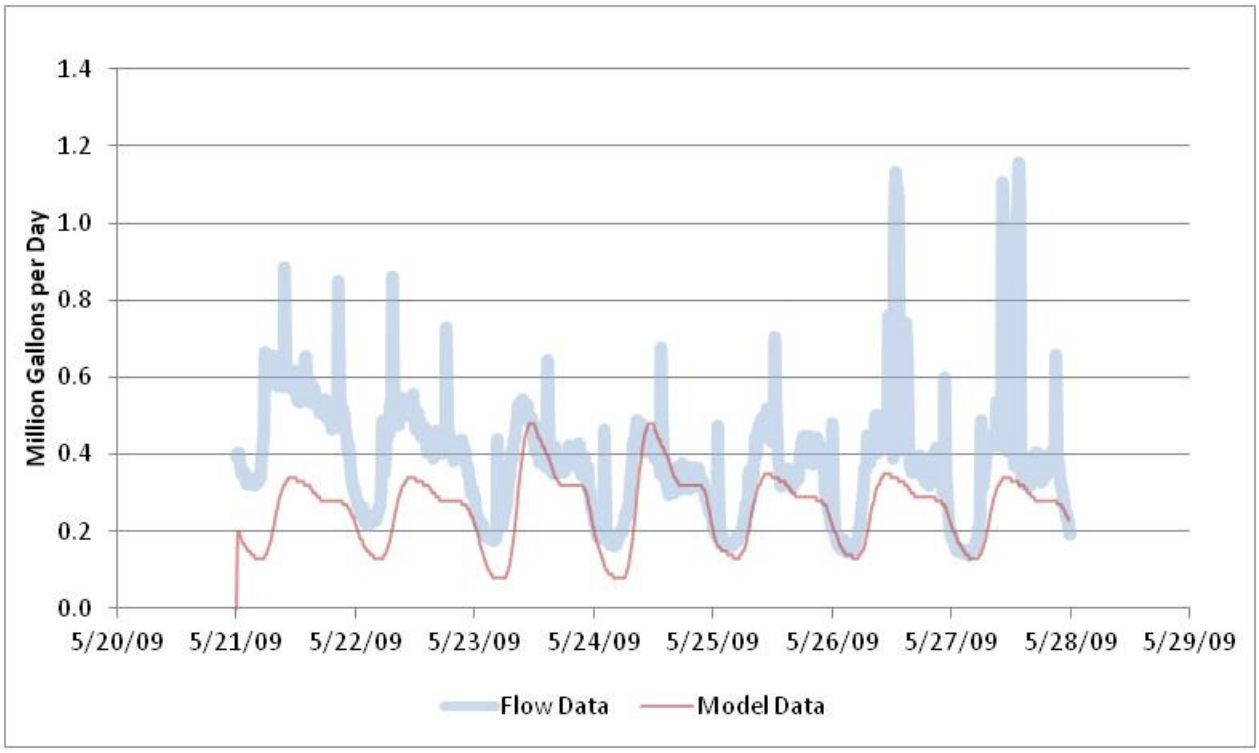

Figure 3. SFE No 9
Monitor DWF = 0.37 mgd
Model DWF= 0.26 mgd

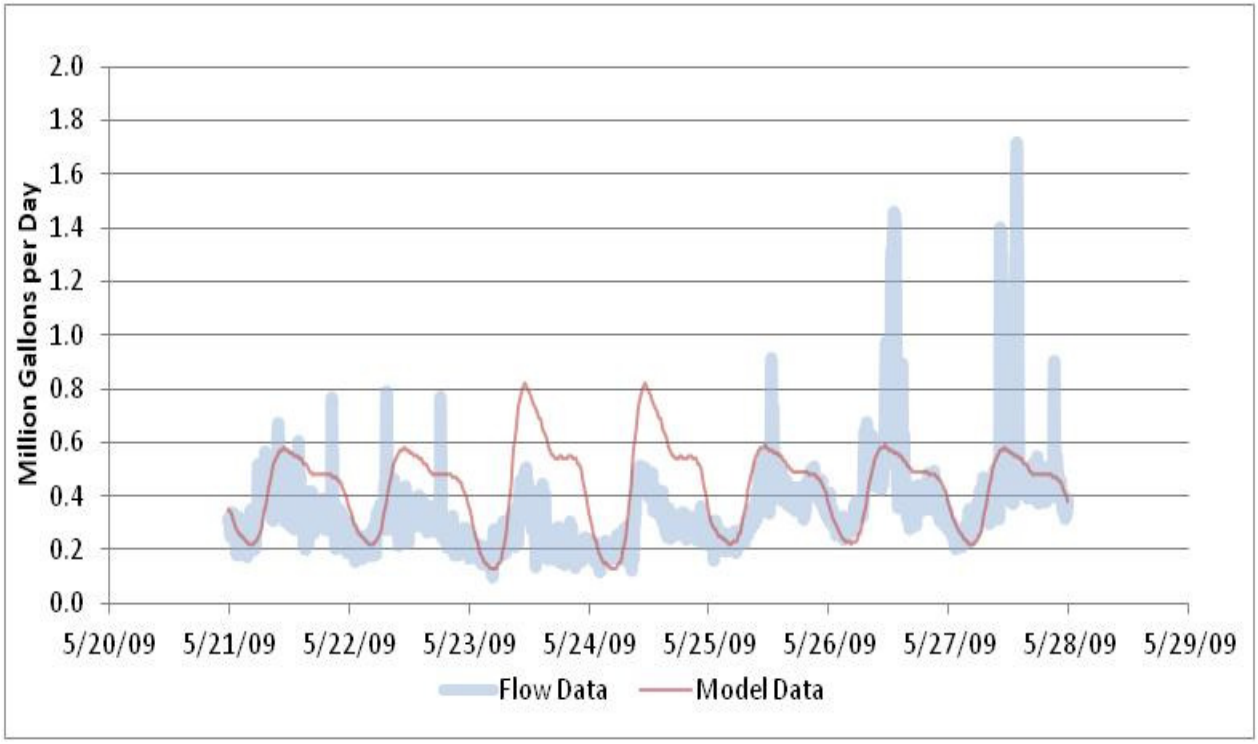

Figure 4. SFE No 13
Monitor DWF = 0.39 mgd
Model DWF= 0.44 mgd

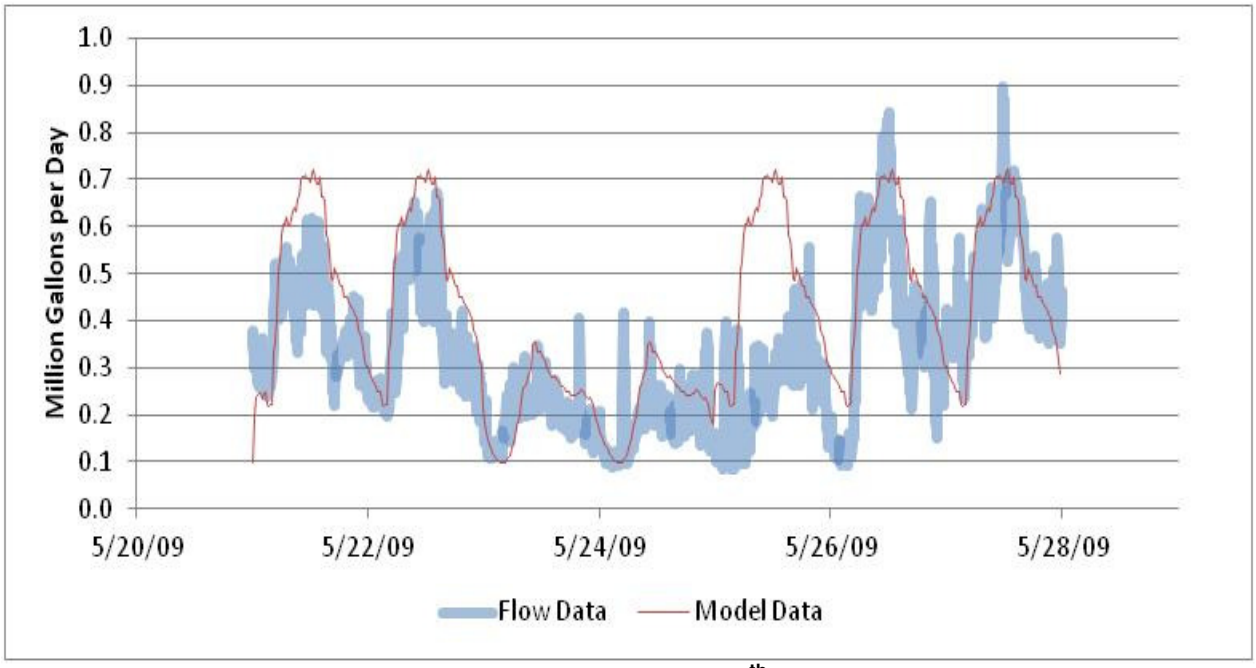

Figure 5. SFE No 07 (May 25th is a holiday)
Monitor DWF = 0.33 mgd
Model DWF= 0.42 mgd

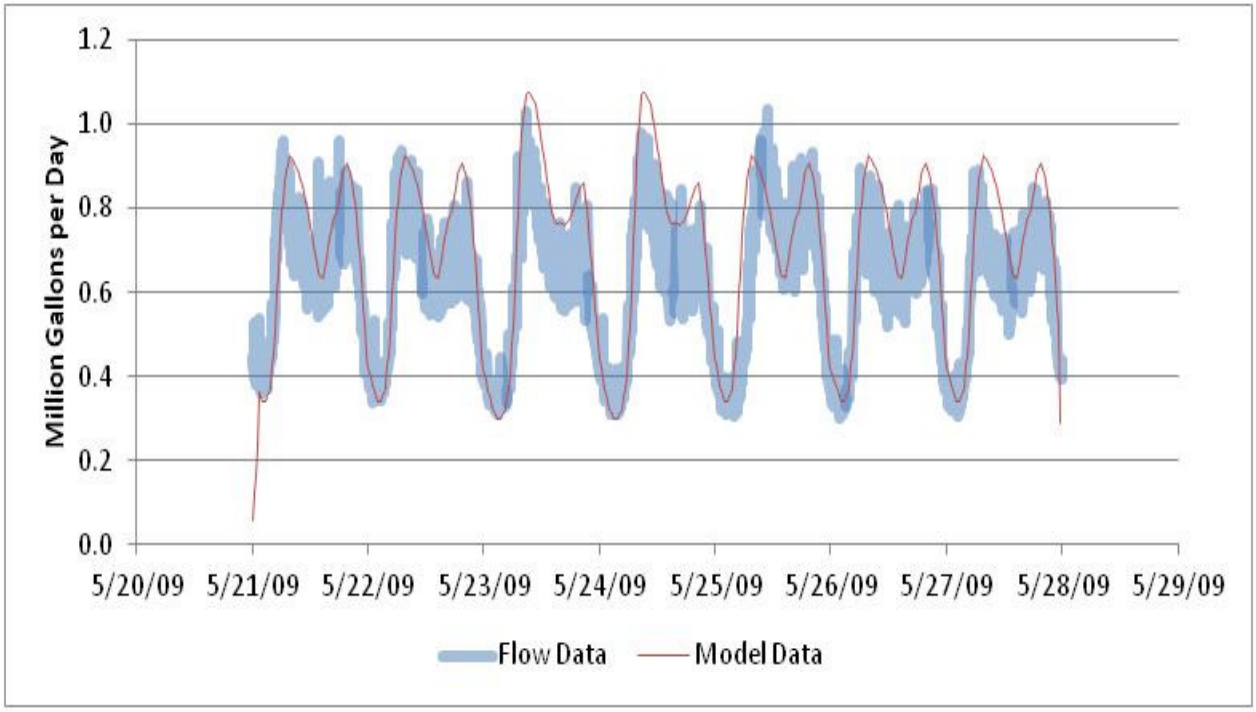

Figure 6. SFE No 10
Monitor DWF = 0.61 mgd
Model DWF= 0.69 mgd

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Section 2
Dry Weather Flow Calibration
Event Period
August 1 to 8, 2009

Table 7. Calibration Event Summary - August 1 to 8, 2009

Flow Monitor	Observed		Predicted		Absolute Difference Volume (MG)	Absolute Difference Average (mgd)	% Difference Volume	% Difference Average
	Volume (MG)	Average (mgd)	Volume (MG)	Average (mgd)				
6	8.50	1.22	8.24	1.18	0.27	0.04	3%	3%
9	2.64	0.37	1.81	0.26	0.83	0.11	31%	29%
13	4.07	0.57	3.06	0.44	1.01	0.13	25%	23%
19	1.23	0.16	0.64	0.09	0.59	0.07	48%	44%
1	4.26	0.53	4.52	0.57	-0.26	0.17	-6%	16%
2	4.94	0.62	4.87	0.61	0.07	0.06	1%	6%
3	21.81	2.73	26.03	3.26	-4.22	0.10	-19%	2%
4	27.05	3.28	27.85	3.49	-0.80	0.38	-3%	7%
16	1.56	0.19	1.87	0.23	-0.31	0.04	-20%	8%
17	2.14	0.27	2.29	0.29	-0.15	0.02	-7%	4%

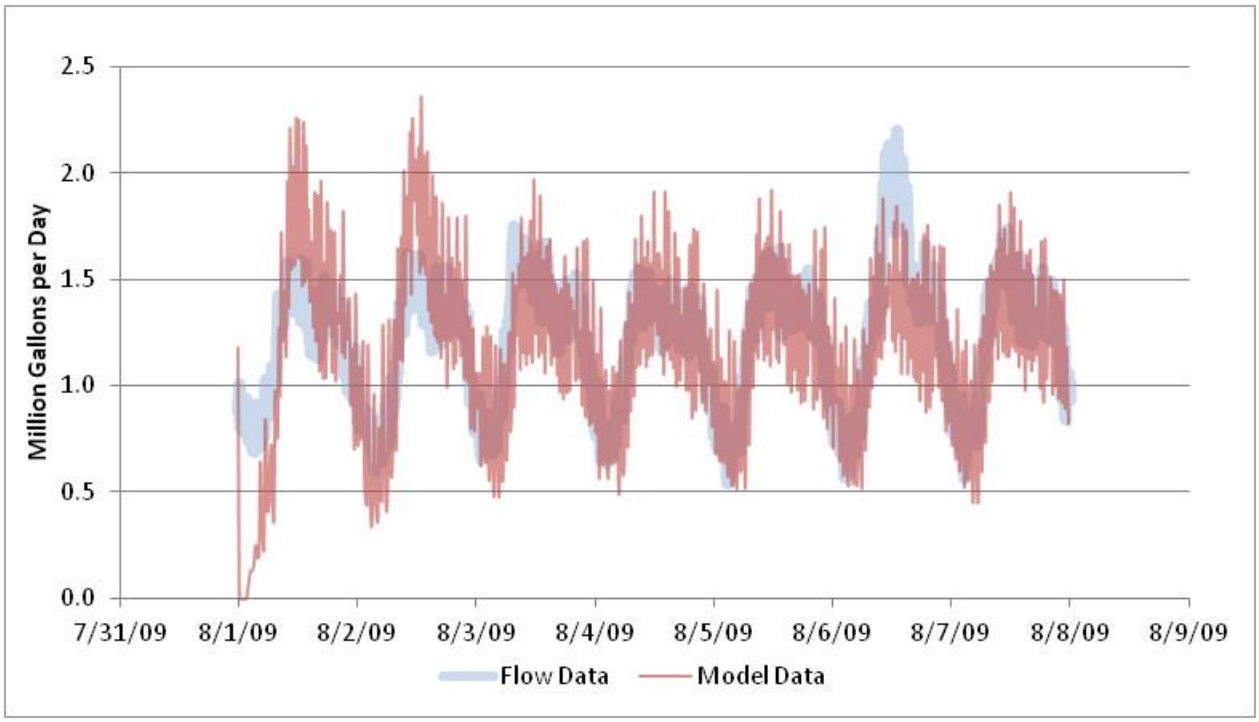

Figure 8. SFE No 6
Monitor DWF = 1.2 mgd
Model DWF= 1.2 mgd

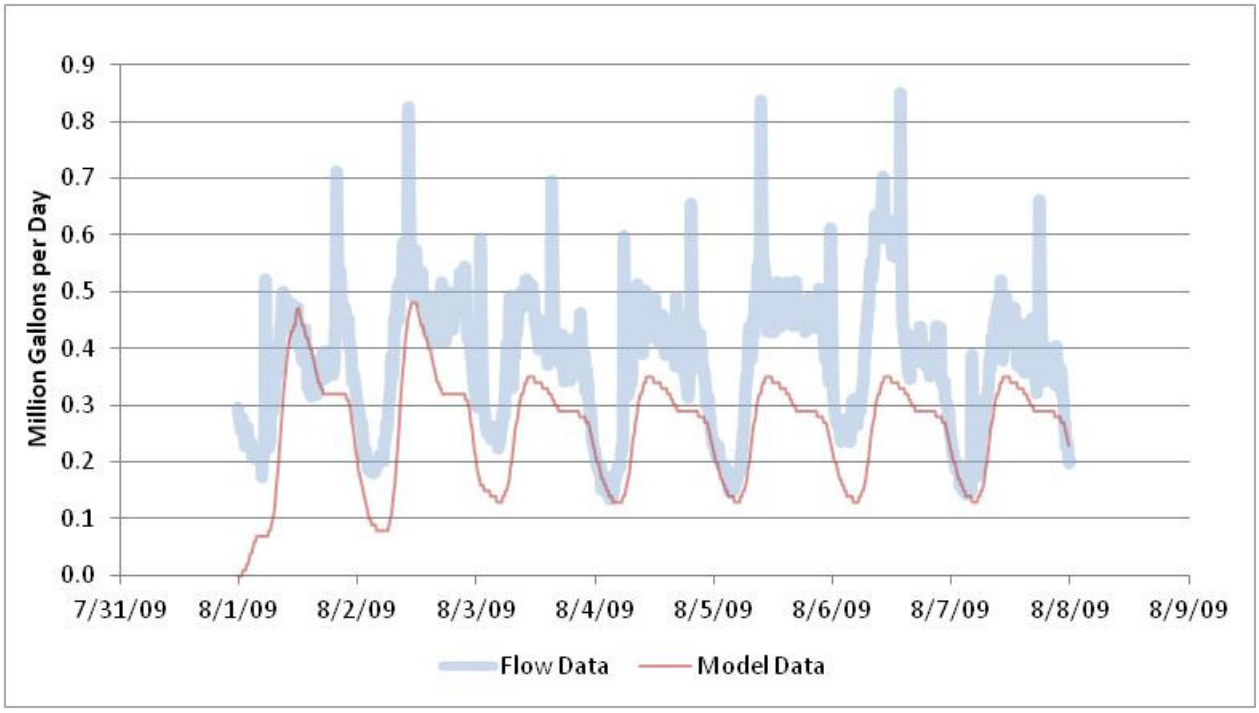

Figure 9. SFE No 9
Monitor DWF = 0.37 mgd
Model DWF = 0.26 mgd

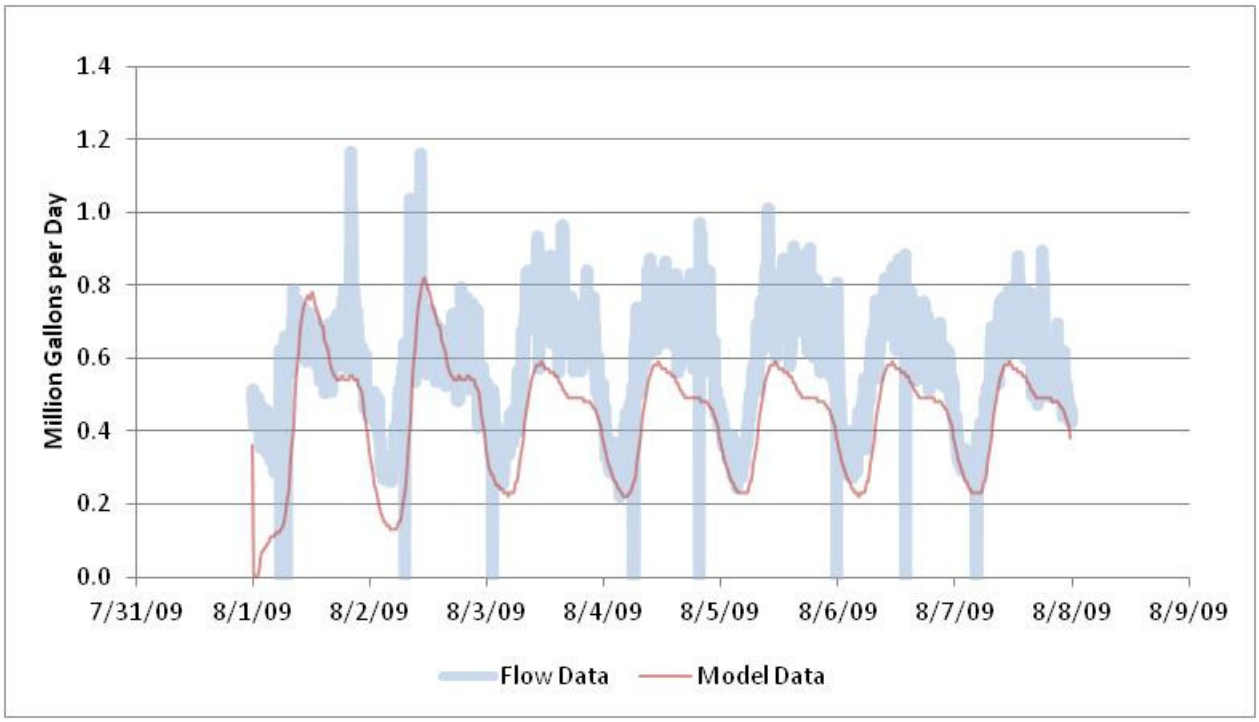

Figure 10. SFE No 13
Monitor DWF = 0.57 mgd
Model DWF= 0.44 mgd

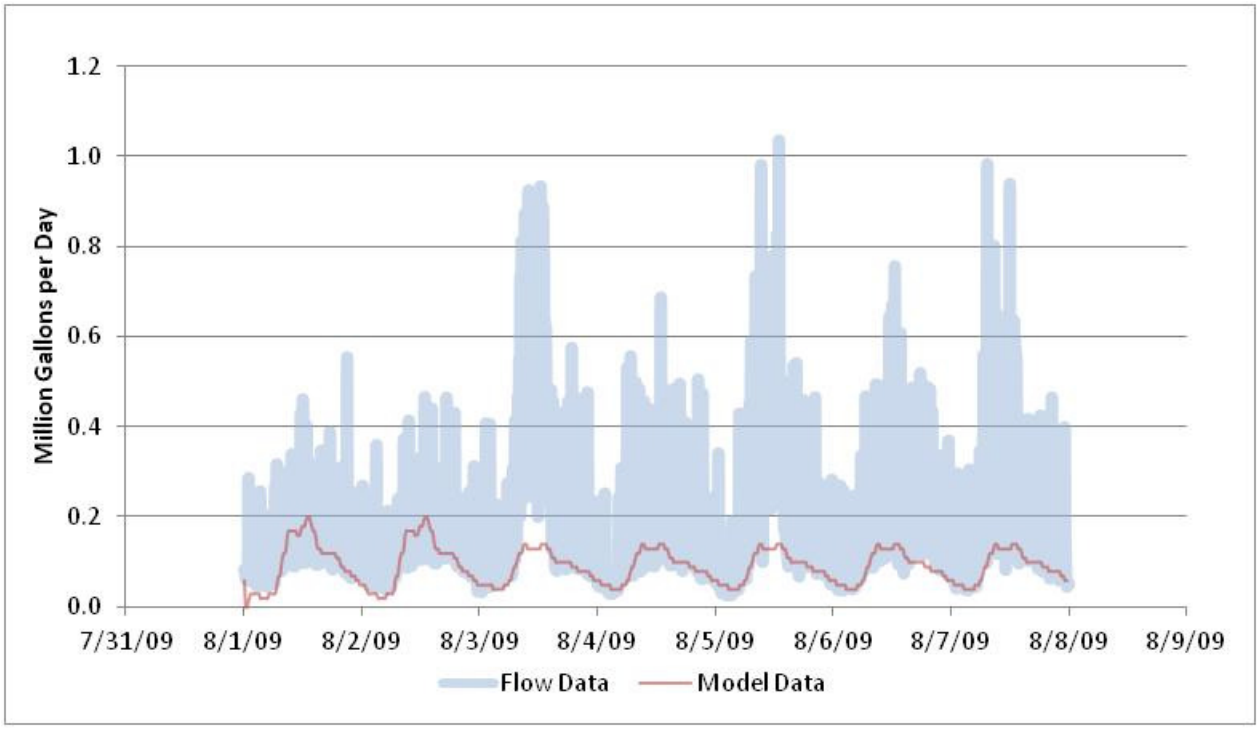

Figure 11. SFE No 19
Monitor DWF = 0.16 mgd
Model DWF= 0.09 mgd

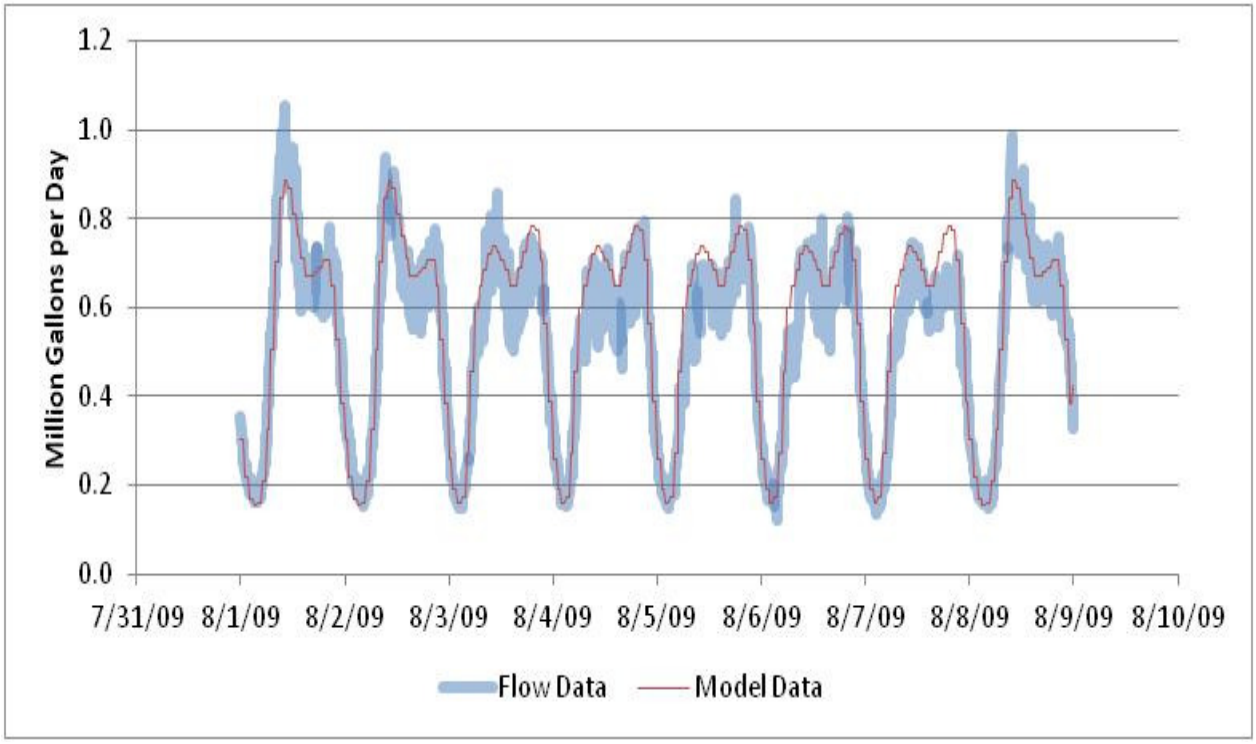

Figure 12. SFE No 01
Monitor DWF = 0.53 mgd
Model DWF= 0.57 mgd

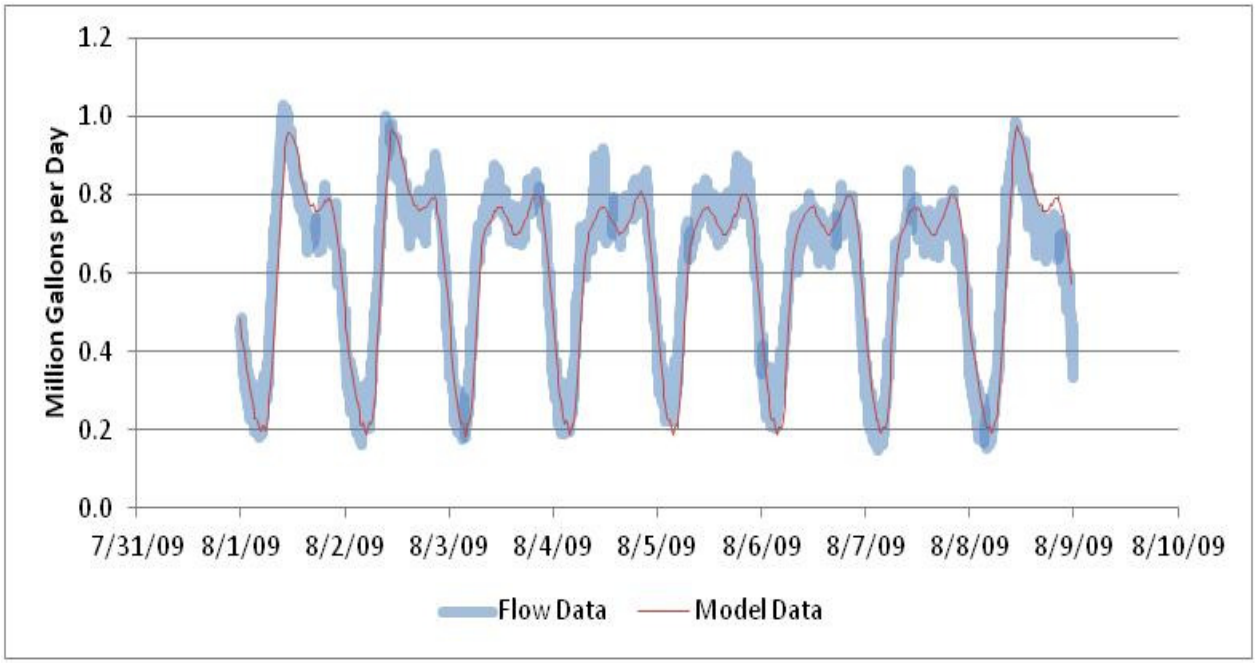

Figure 13. SFE No 02
Monitor DWF = 0.62 mgd
Model DWF= 0.61 mgd

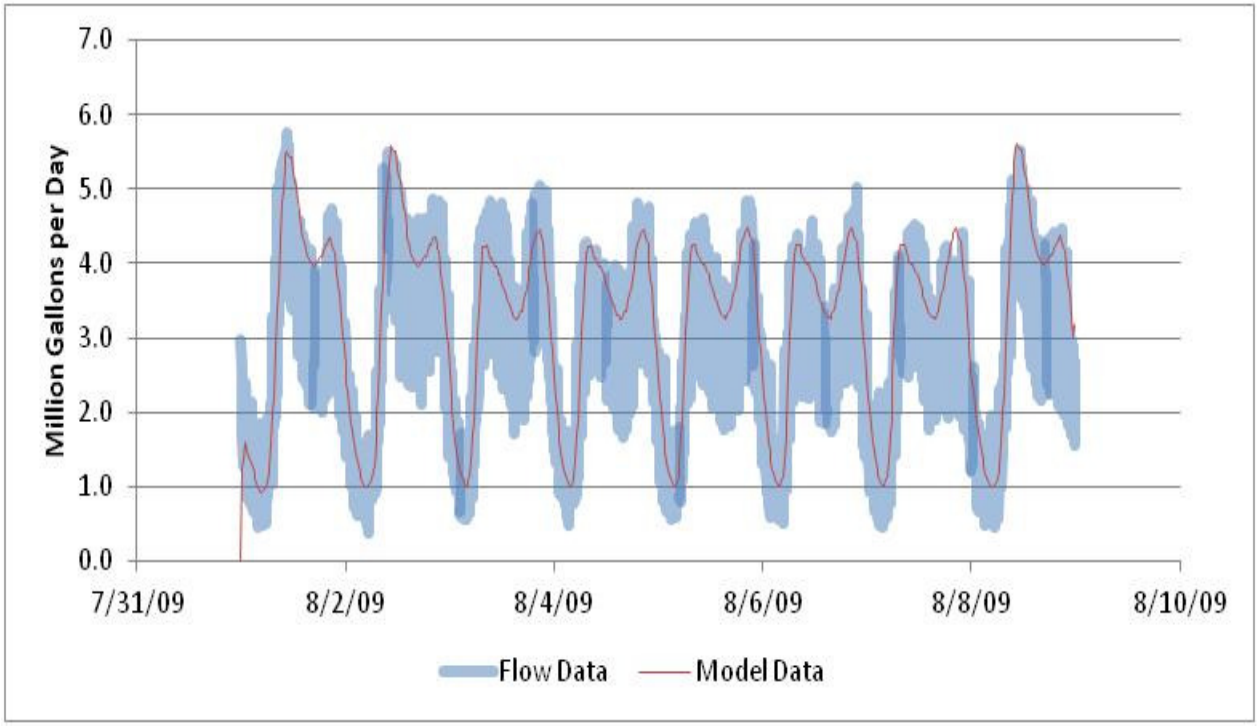

Figure 14. SFE No 03
Monitor DWF = 2.73 mgd
Model DWF= 3.26 mgd

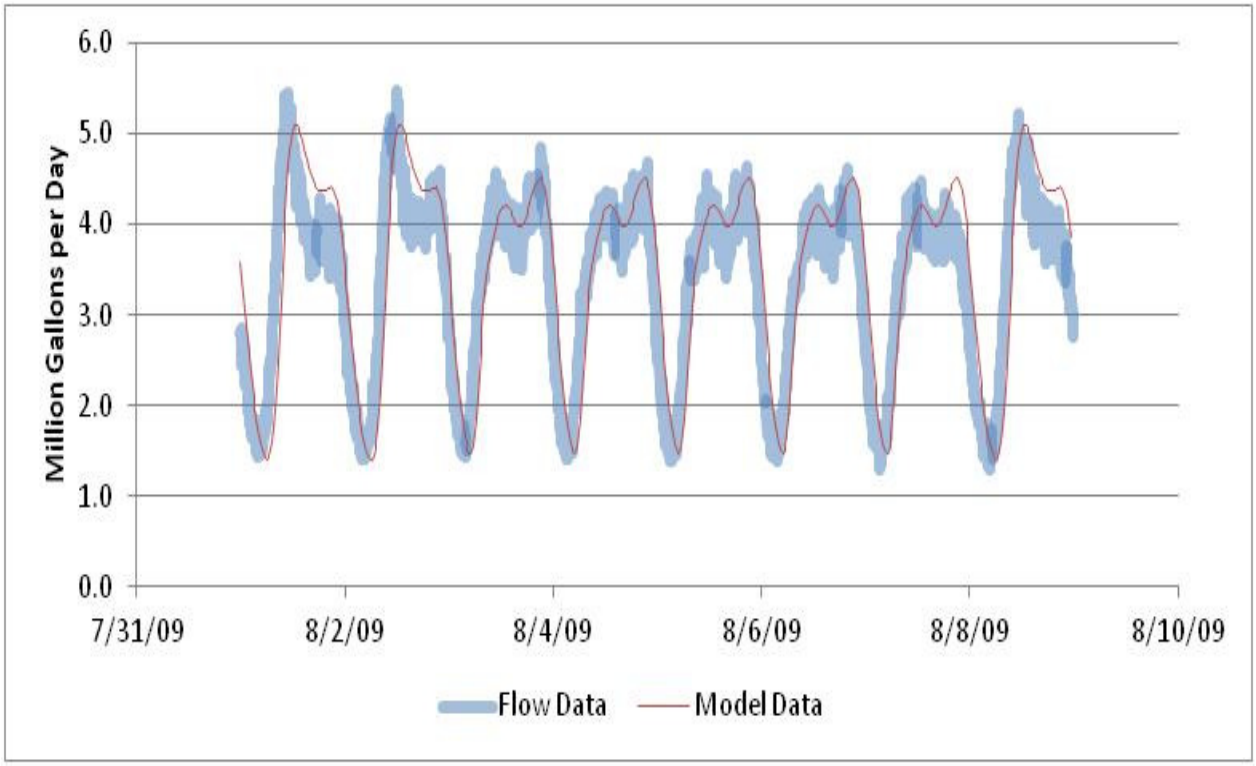

Figure 15. SFE No 04
Monitor DWF = 3.38 mgd
Model DWF= 3.49 mgd

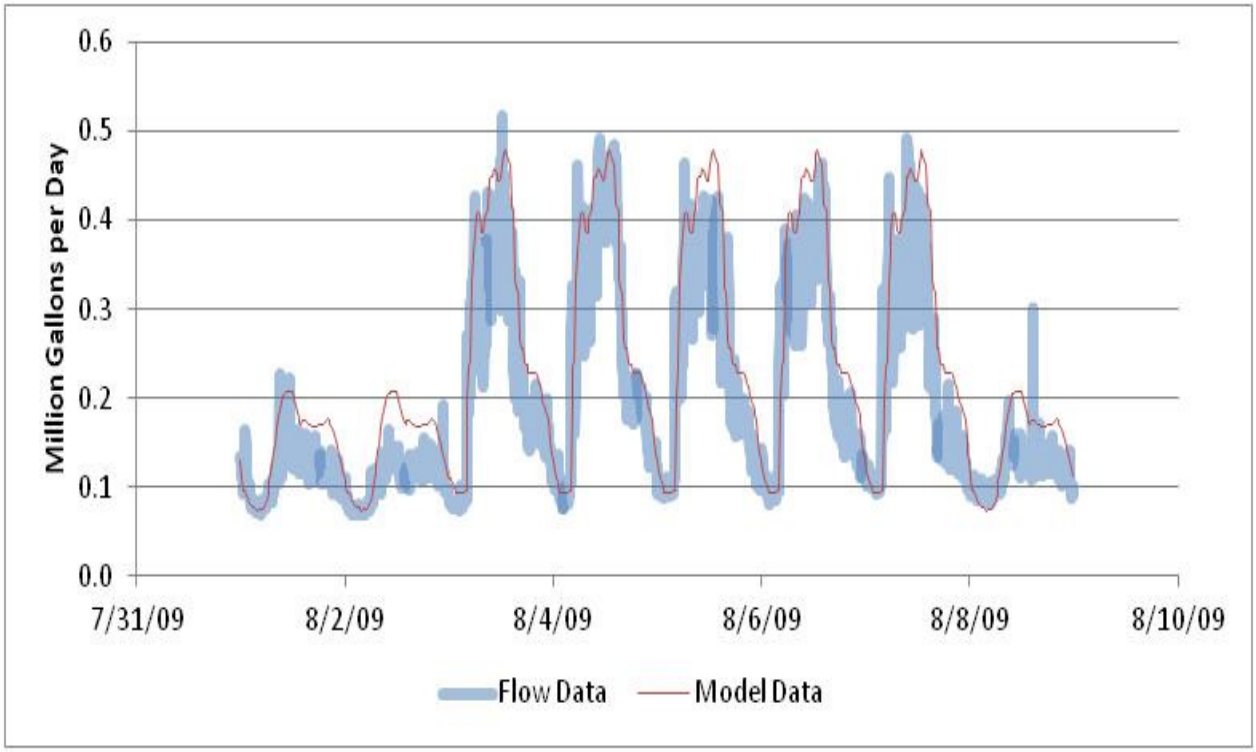

Figure 16. SFE No 16
Monitor DWF = 0.19 mgd
Model DWF= 0.23 mgd

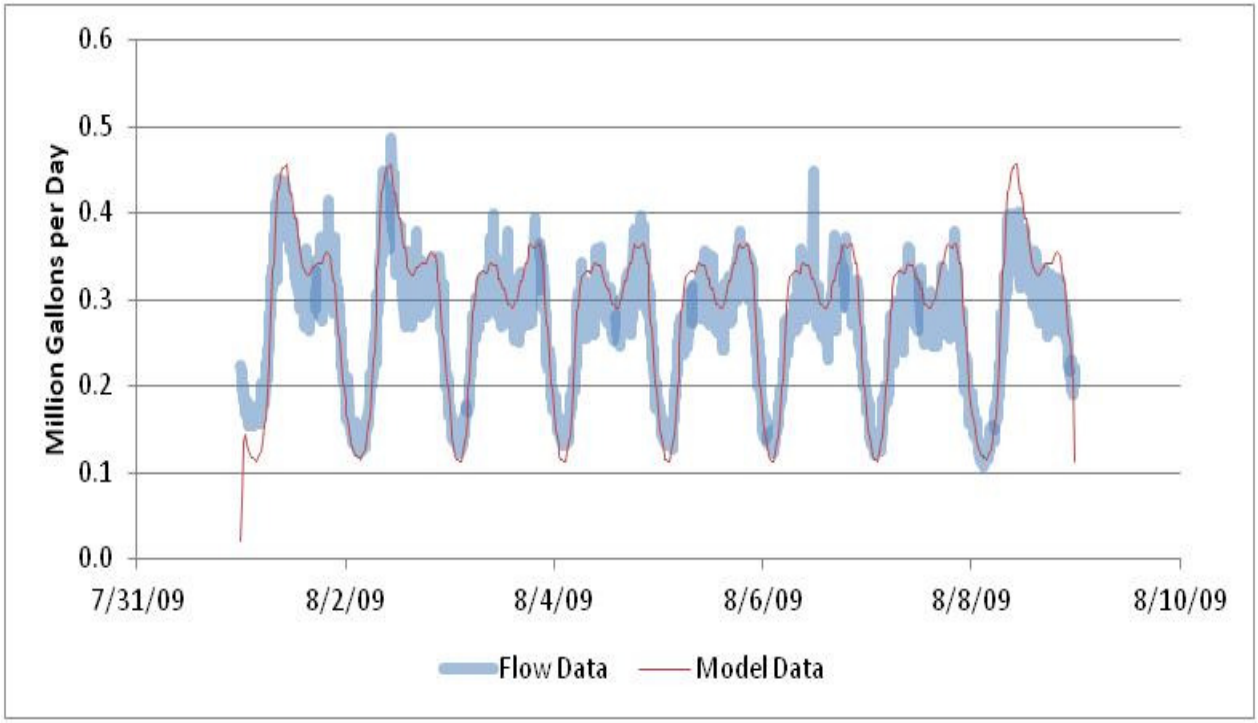

Figure 17. SFE No 17
Monitor DWF = 0.27 mgd
Model DWF= 0.29 mgd

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Section 3
Dry Weather Flow Calibration
Event Period
October 5 to 12, 2009

Table 18. Calibration Event Summary - October 5 to 12, 2009

Flow Monitor	Observed		Predicted		Absolute Difference Volume (MG)	Absolute Difference Average (mgd)	% Difference Volume	% Difference Average
	Volume (MG)	Average (mgd)	Volume (MG)	Average (mgd)				
6	6.89	0.99	8.75	1.25	-1.86	-0.27	-27%	-27%
9	1.98	0.38	1.80	0.26	0.19	0.12	9%	32%
13	3.98	0.73	3.05	0.44	0.93	0.30	23%	41%
19	0.87	0.13	0.64	0.09	0.23	0.04	26%	31%
20	5.69	0.71	5.46	0.68	0.23	1.38	4%	47%
21	0.42	0.05	0.59	0.07	-0.17	0.10	-40%	45%

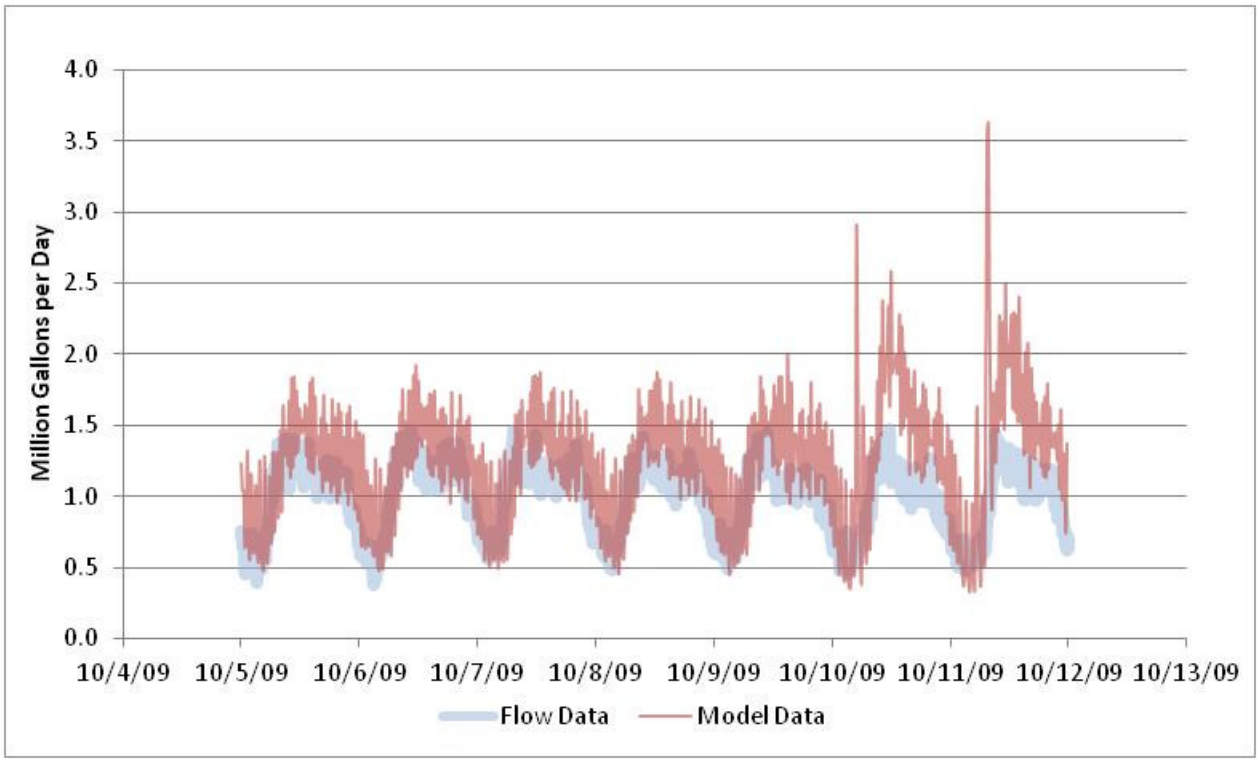

Figure 19. SFE No 6
Monitor DWF = 0.99 mgd
Model DWF= 1.25 mgd

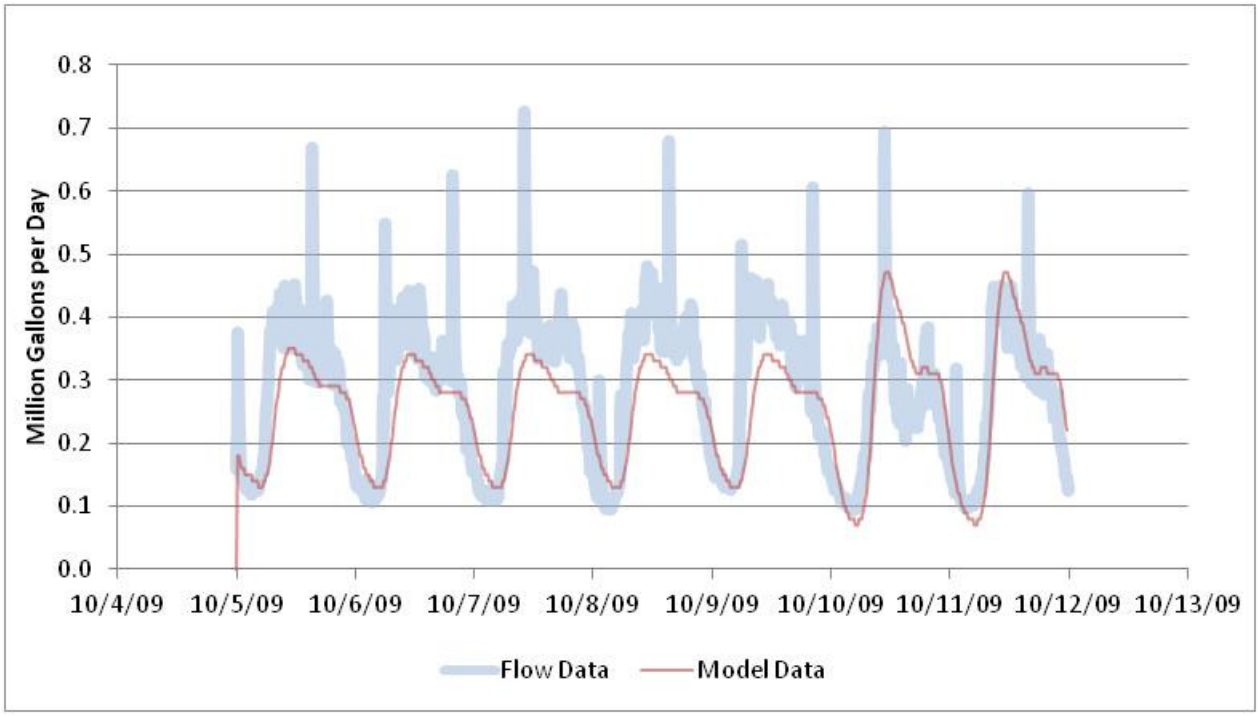

Figure 20. SFE No 9
Monitor DWF = 0.38 mgd
Model DWF= 0.26 mgd

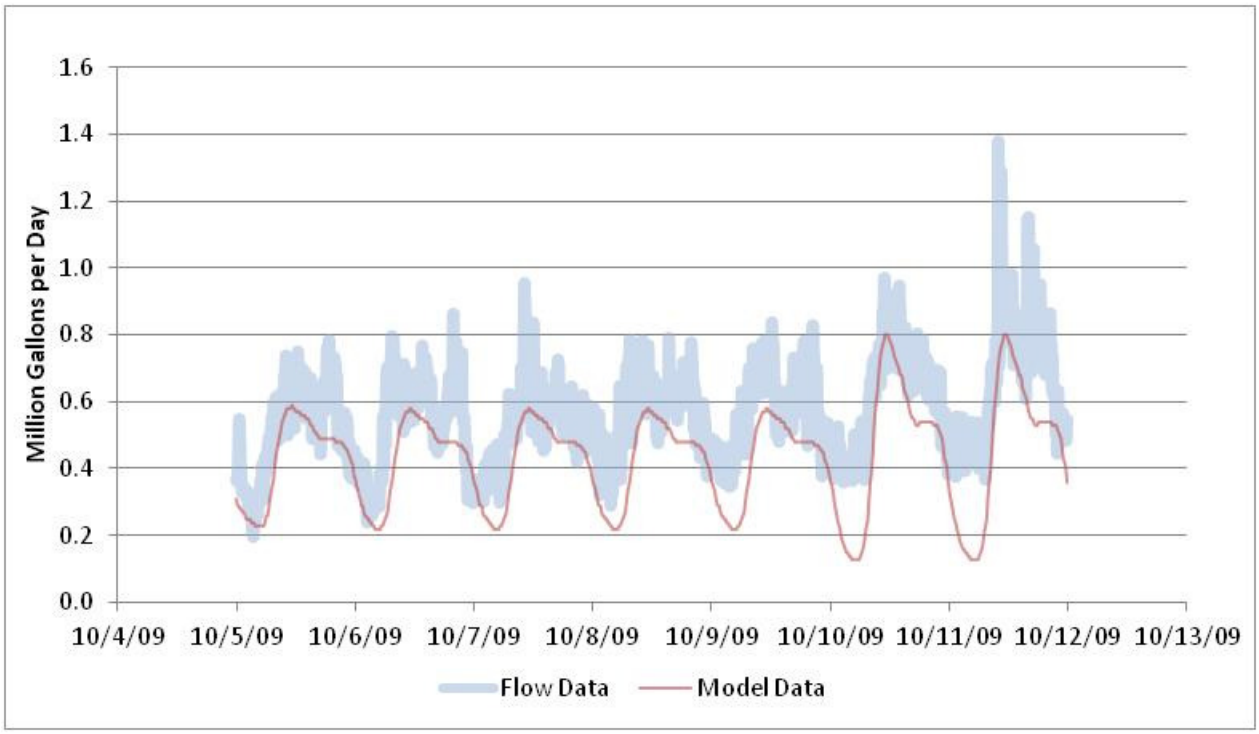

Figure 21. SFE No 13
Monitor DWF = 0.73 mgd
Model DWF= 0.44 mgd

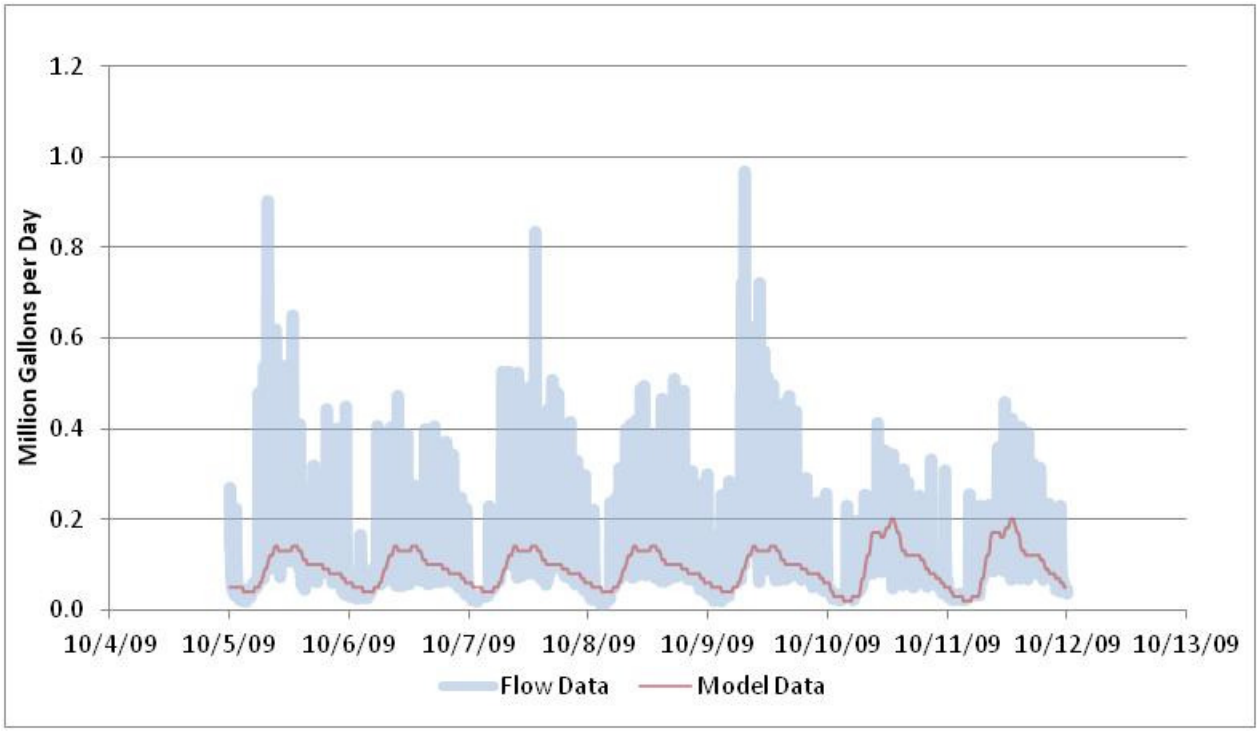

Figure 22. SFE No 19
Monitor DWF = 0.13 mgd
Model DWF= 0.09 mgd

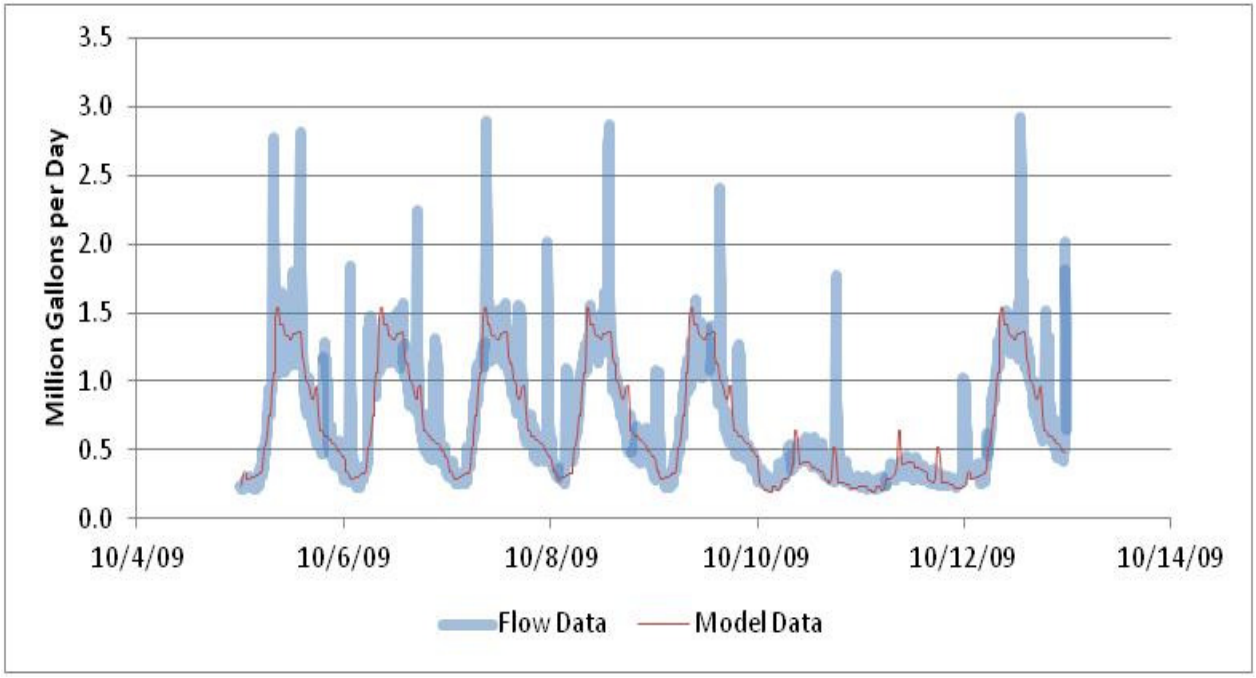

Figure 23. SFE No 20
Monitor DWF = 0.71 mgd
Model DWF= 0.68 mgd

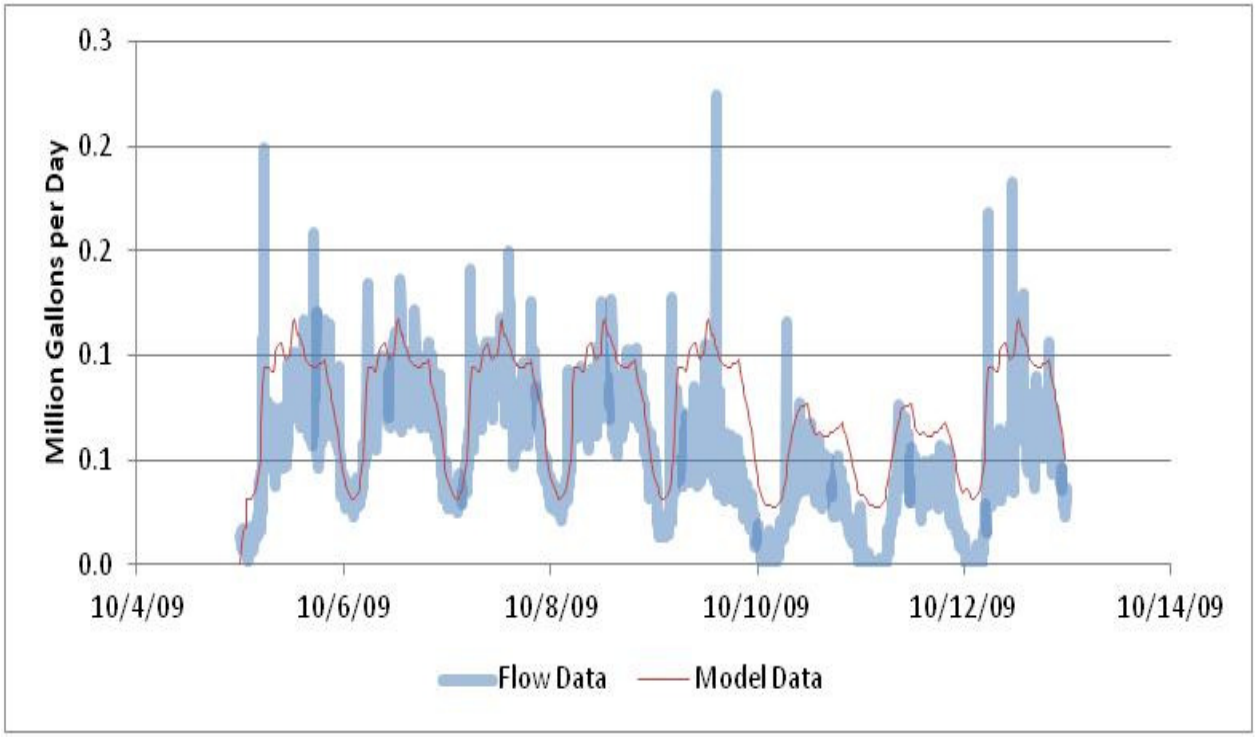

Figure 24. SFE No 21
Monitor DWF = 0.05 mgd
Model DWF= 0.07 mgd

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Section 4
Dry Weather Flow Calibration
Event Period
December 5 to 12, 2009

Table 25. Calibration Event Summary - December 5 to 12, 2009

Flow Monitor	Observed		Predicted		Absolute Difference Volume (MG)	Absolute Difference Average (mgd)	% Difference Volume	% Difference Average
	Volume (MG)	Average (mgd)	Volume (MG)	Average (mgd)				
6	4.64	0.66	8.22	1.18	-3.58	-0.51	-77%	-77%
9	4.74	0.59	1.78	0.25	2.96	0.34	62%	57%
13	5.54	0.95	3.02	0.43	2.52	0.52	45%	55%
19	1.89	0.28	0.64	0.09	1.24	0.19	66%	68%
22	0.75	0.09	0.91	0.11	-0.16	0.05	-21%	22%

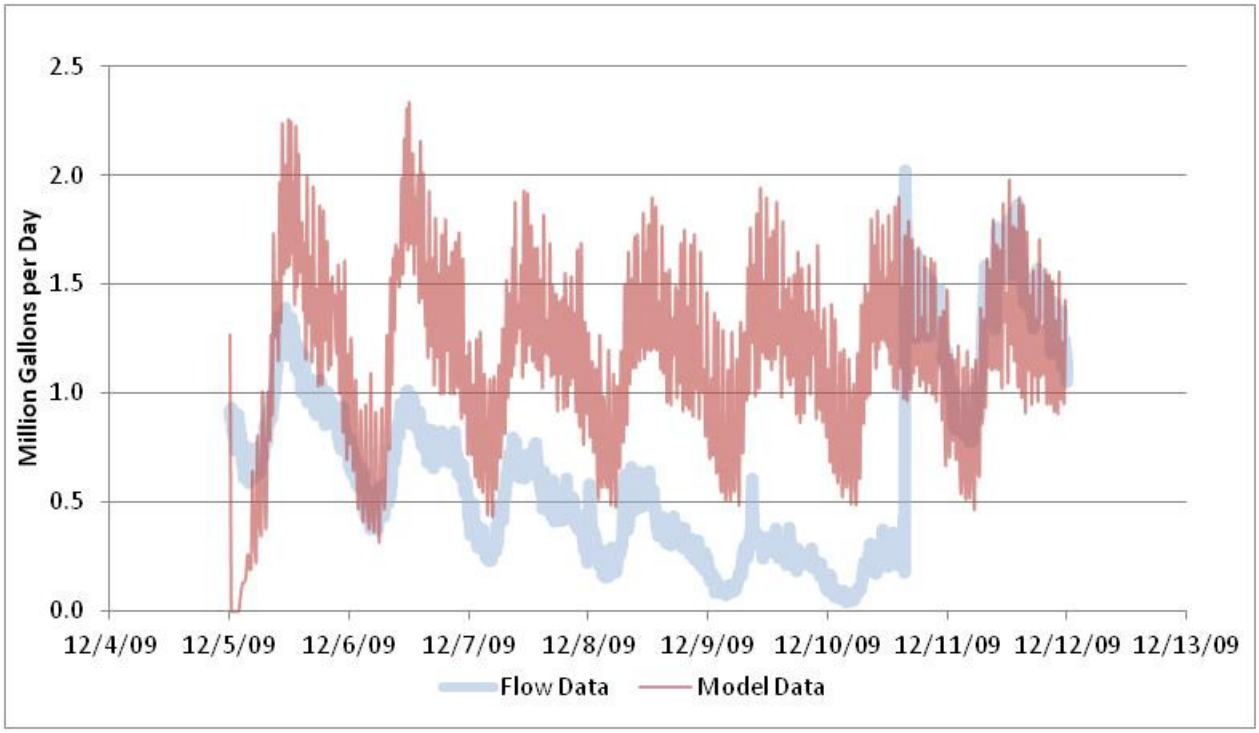

Figure 26. SFE No 6
Monitor DWF = 0.66 mgd
Model DWF= 1.18 mgd

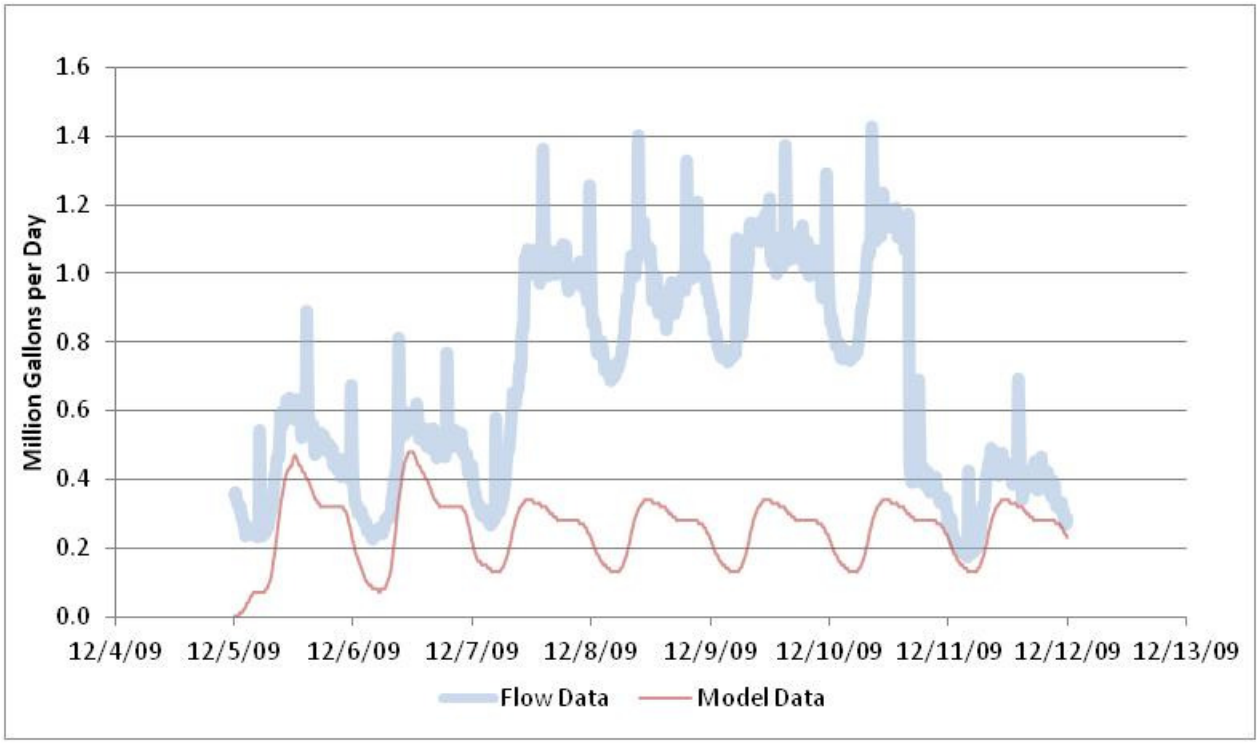

Figure 27. SFE No 9
Monitor DWF = 0.59 mgd
Model DWF= 0.25 mgd

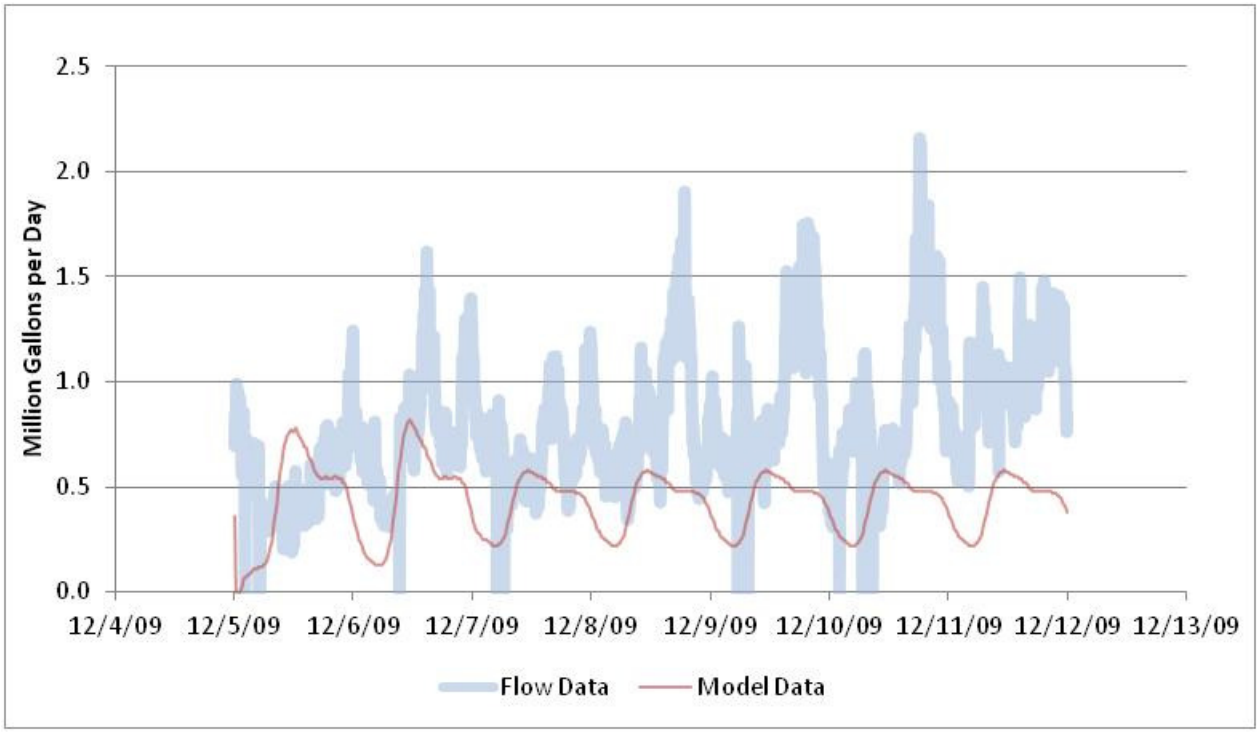

Figure 28. SFE No 13
Monitor DWF = 0.95 mgd
Model DWF= 0.43 mgd

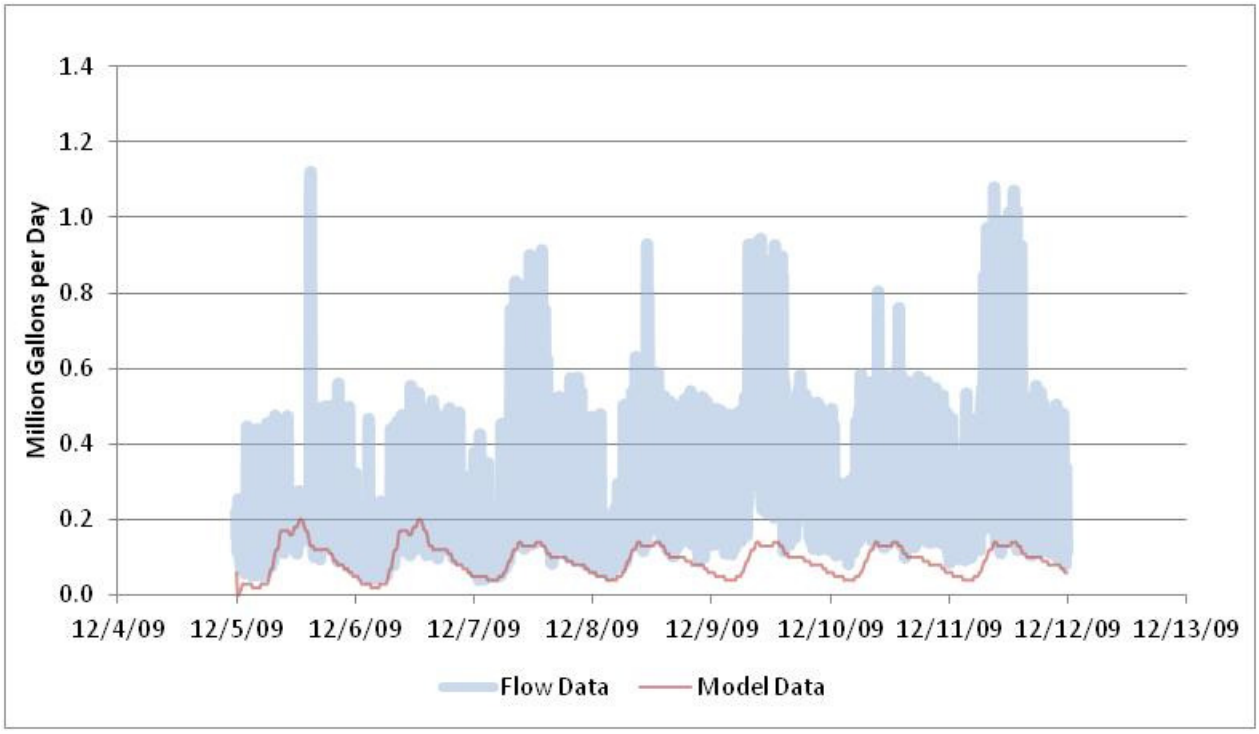

Figure 29. SFE No 19
Monitor DWF = 0.28 mgd
Model DWF= 0.09 mgd

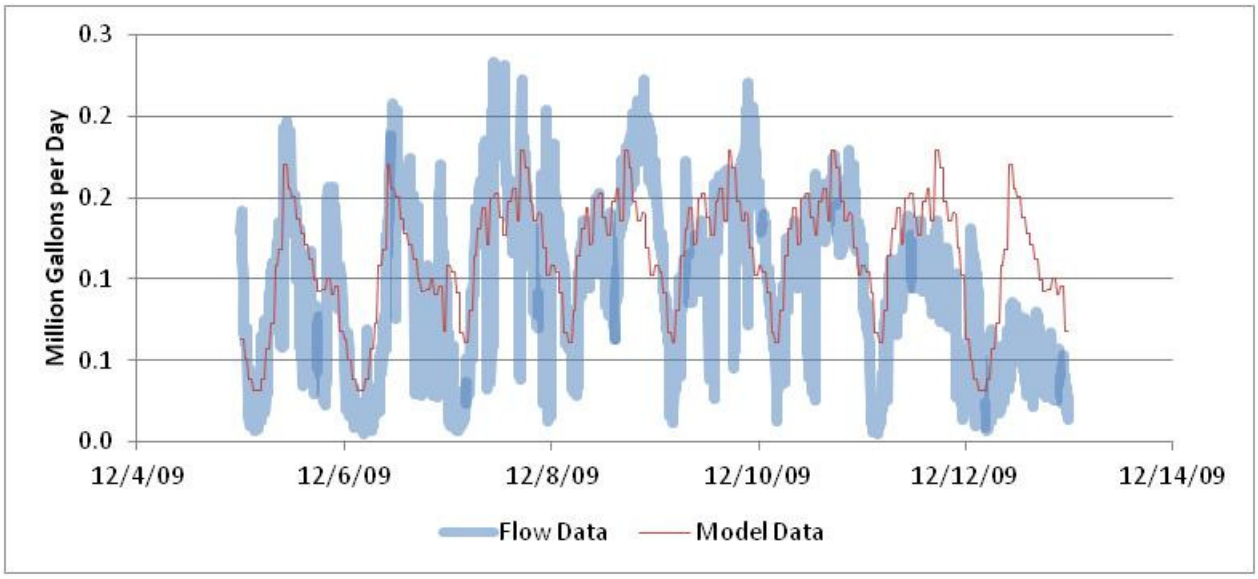

Figure 30. SFE No 22
Monitor DWF = 0.09 mgd
Model DWF= 0.11 mgd

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Section 5
Dry Weather Flow Calibration
Event Period
July 15 to 22, 2010

Table 31. Calibration Event Summary – July 15 to 22, 2010

Flow Monitor	Observed		Predicted		Absolute Difference Volume (MG)	Absolute Difference Average (mgd)	% Difference Volume	% Difference Average
	Volume (MG)	Average (mgd)	Volume (MG)	Average (mgd)				
13	7.21	1.25	3.03	0.43	4.18	0.82	58%	65%
24A	1.35	0.18	2.59	0.37	-1.24	-0.19	-92%	-105%
25	7.67	1.07	7.38	1.06	0.30	0.02	4%	2%
26A	0.74	0.14	1.20	0.17	-0.46	-0.04	-62%	-26%
23	37.89	4.74	37.51	4.69	0.38	0.10	1%	1%

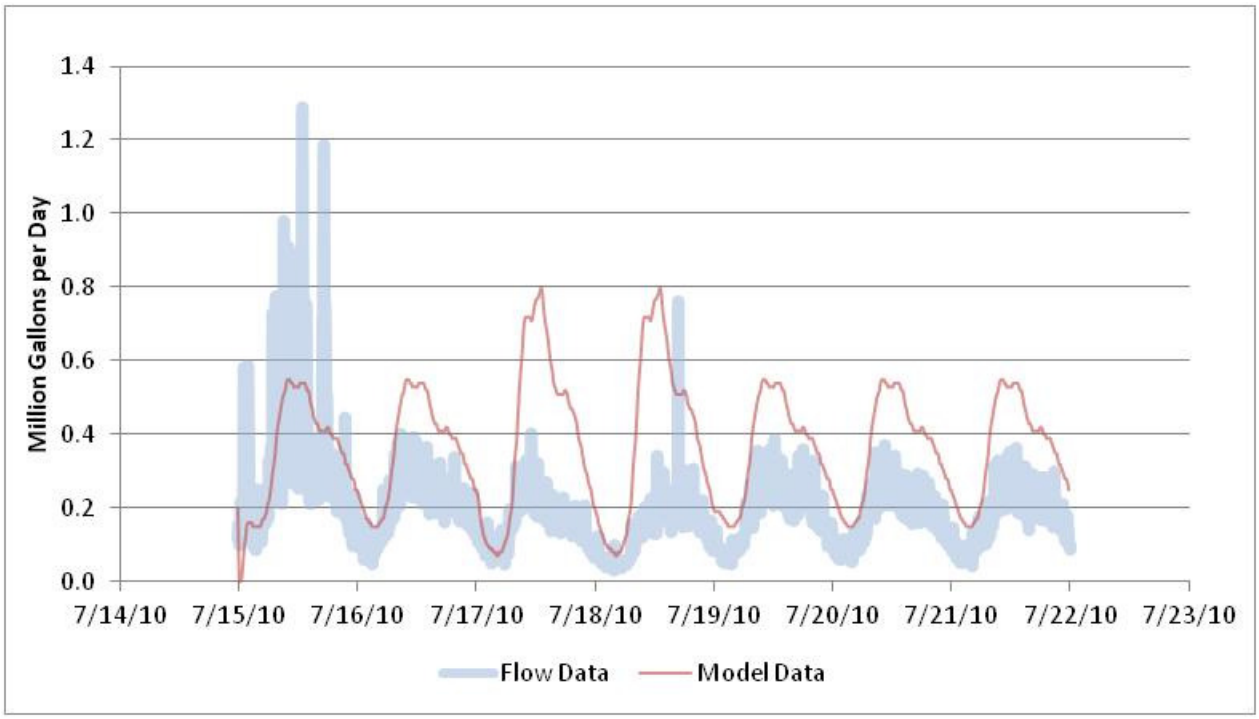

Figure 32. SFE No 24A
Monitor DWF = 0.18 mgd
Model DWF= 0.37 mgd

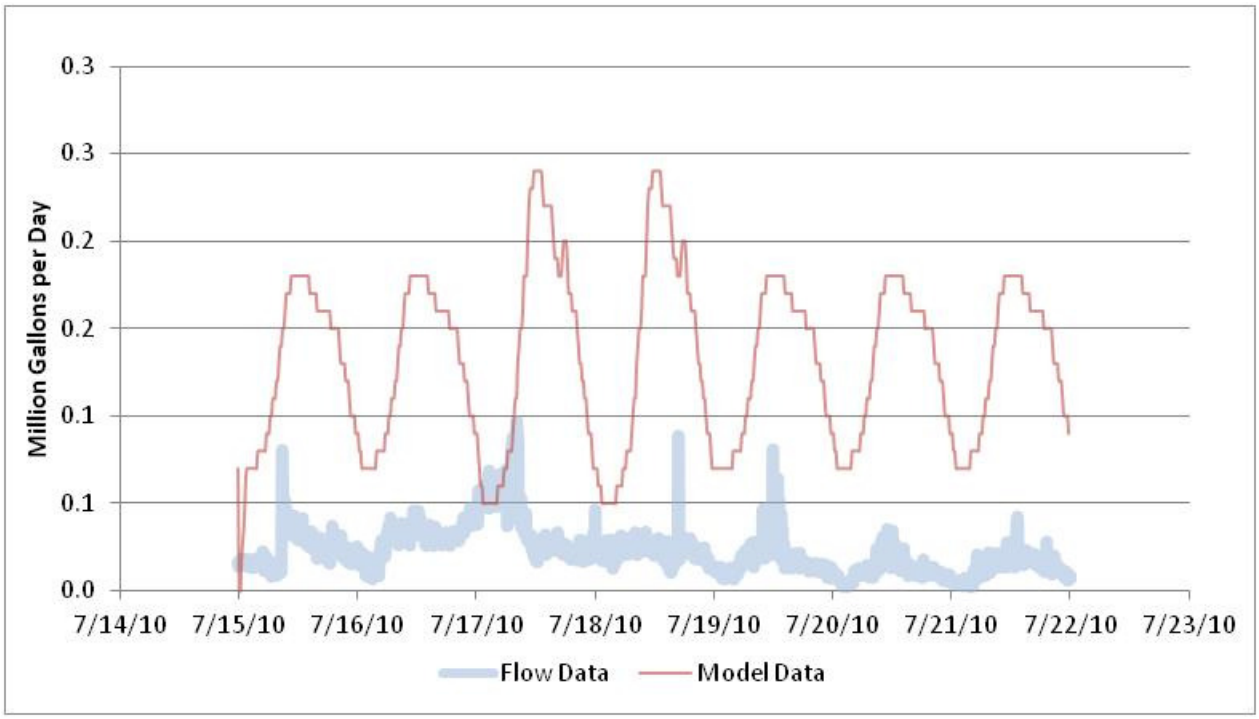

Figure 33. SFE No 24B
Monitor DWF = 0.02 mgd
Model DWF= 0.13 mgd

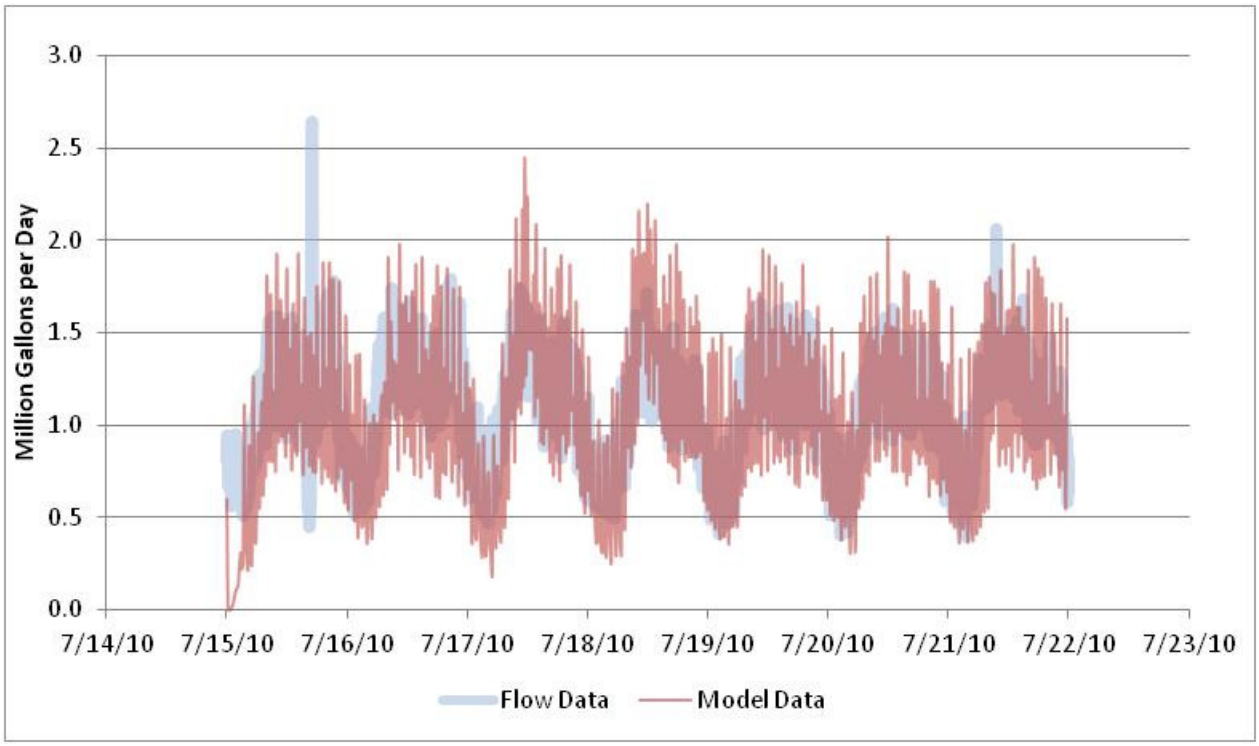

Figure 34. SFE No 25
Monitor DWF = 1.07 mgd
Model DWF= 1.06 mgd

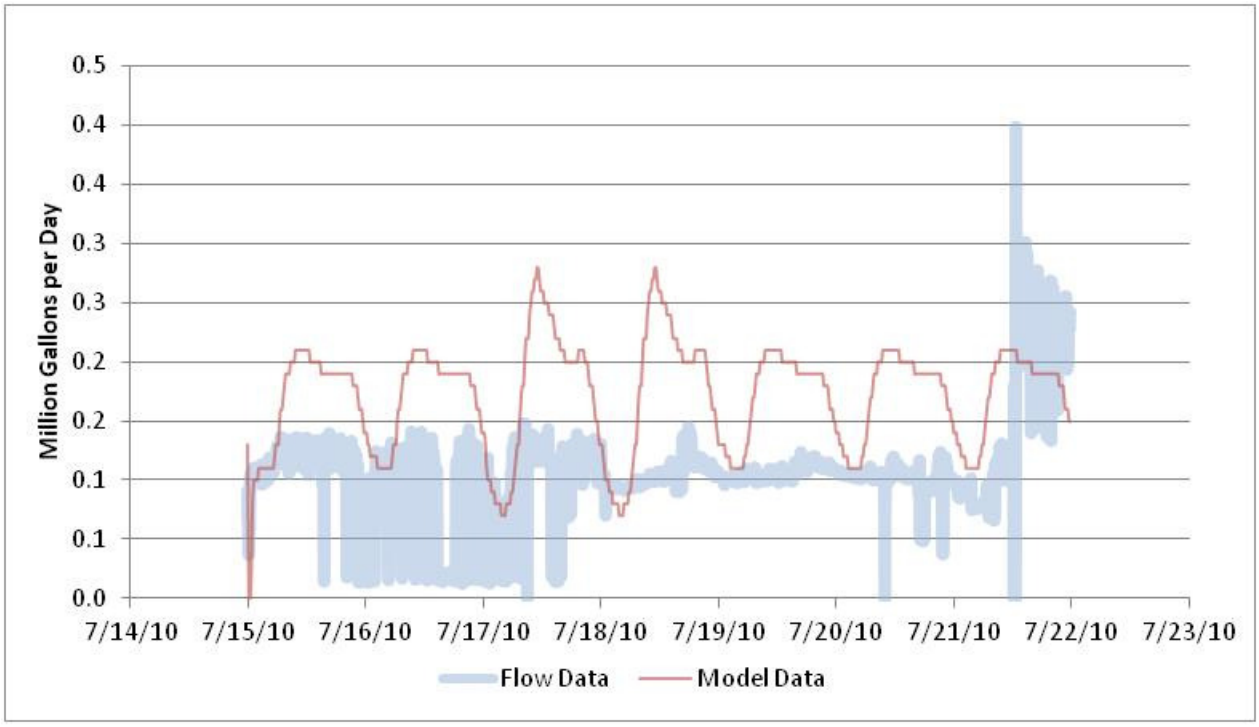

Figure 35. SFE No 26A
Monitor DWF = 0.14 mgd
Model DWF= 0.17 mgd

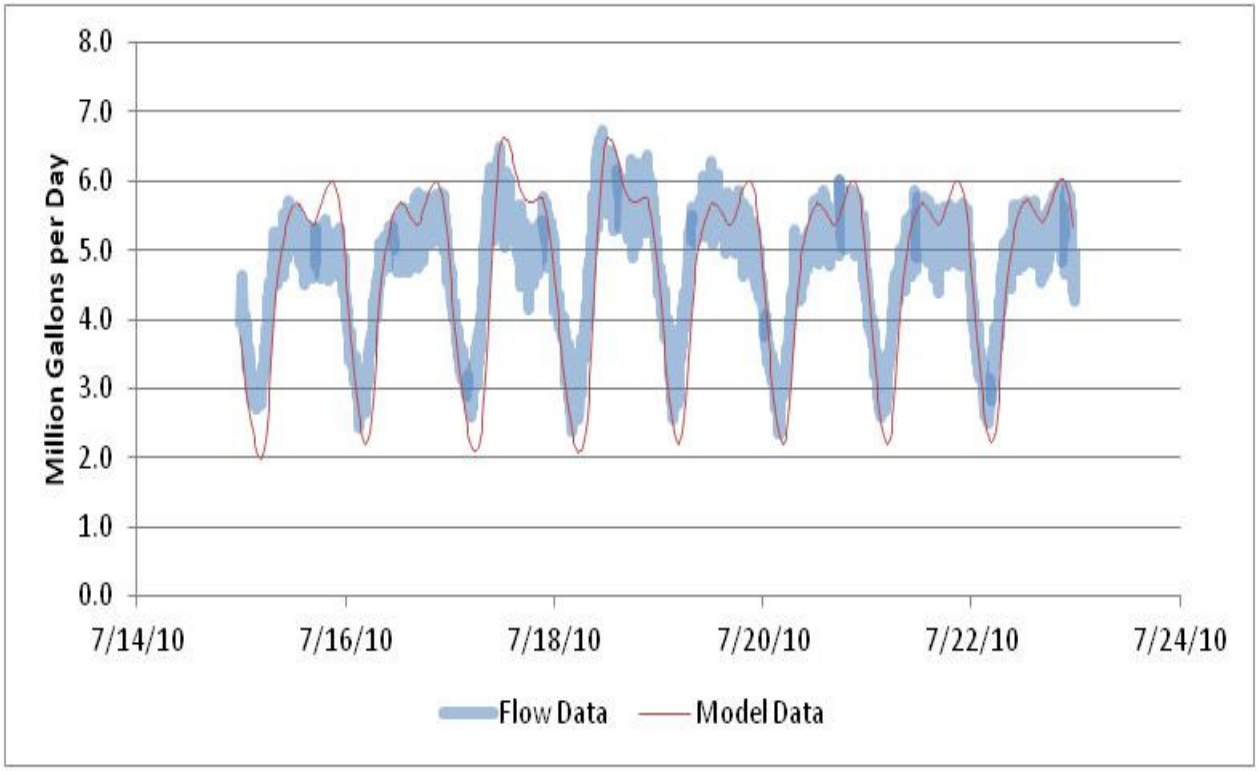

Figure 36. SFE No 23
Monitor DWF = 4.74 mgd
Model DWF= 4.69 mgd

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Section 6
Wet Weather Flow Calibration
Event Period
March 31 to April 8, 2009

Table 37. Calibration Event Summary – March 31 to April 8, 2009

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
6	18.77697	20.66	4/2/09 23:35	14.02	15.71	4/3/09 2:15	4.8	5.0	25%	24%
9	10.23	16.10	4/1/09 19:50	5.90	9.41	4/3/09 3:30	4.3	6.7	42%	42%
12B	0.55	5.79	4/2/09 23:25	0.05	3.24	4/3/09 2:00	0.5	2.6	92%	44%
13	11.11	16.38	4/2/09 2:15	10.10	14.26	4/3/09 3:30	1.0	2.1	9%	13%
1	5.82	1.3	4/4/09 9:45	5.05	1.03	4/4/09 10:00	0.8	0.3	13%	21%
2	7.69	1.47	4/4/09 10:45	6.22	1.24	4/5/09 11:00	1.5	0.2	19%	16%
3	35.41	7.34	4/5/09 20:40	27.18	5.88	4/5/09 11:00	8.2	1.5	23%	20%
4	39.83	7.54	4/3/09 12:10	32.06	6.46	4/2/09 11:40	7.8	1.1	20%	14%
7	4.11	1.01	4/3/09 8:55	4.2	0.98	4/3/09 10:40	-0.1	0.0	-2%	3%
10	4.91	1.62	4/1/09 19:15	5.96	1.67	4/2/09 9:00	-1.1	0.0	-21%	-3%

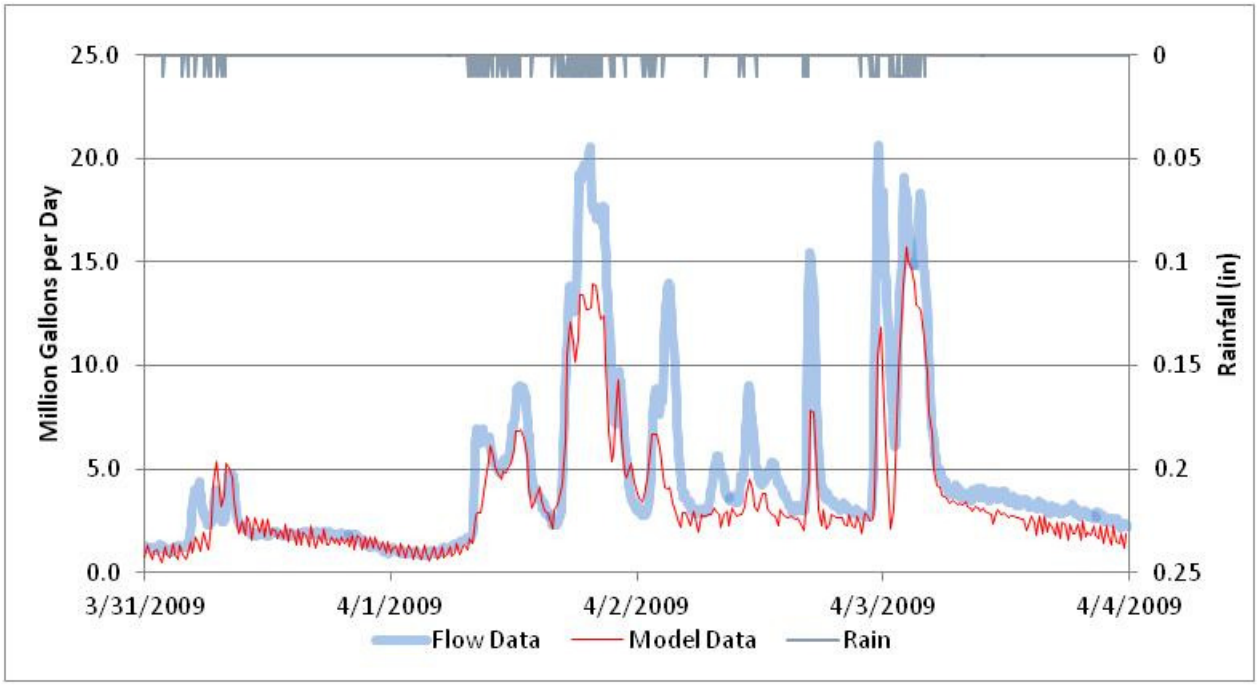

Figure 38. SFE No 6 – March 31 – April 3, 2009
Rainfall = 1.07 in,
Flow Volume = 18.8 MG
Model Volume = 14.0 MG

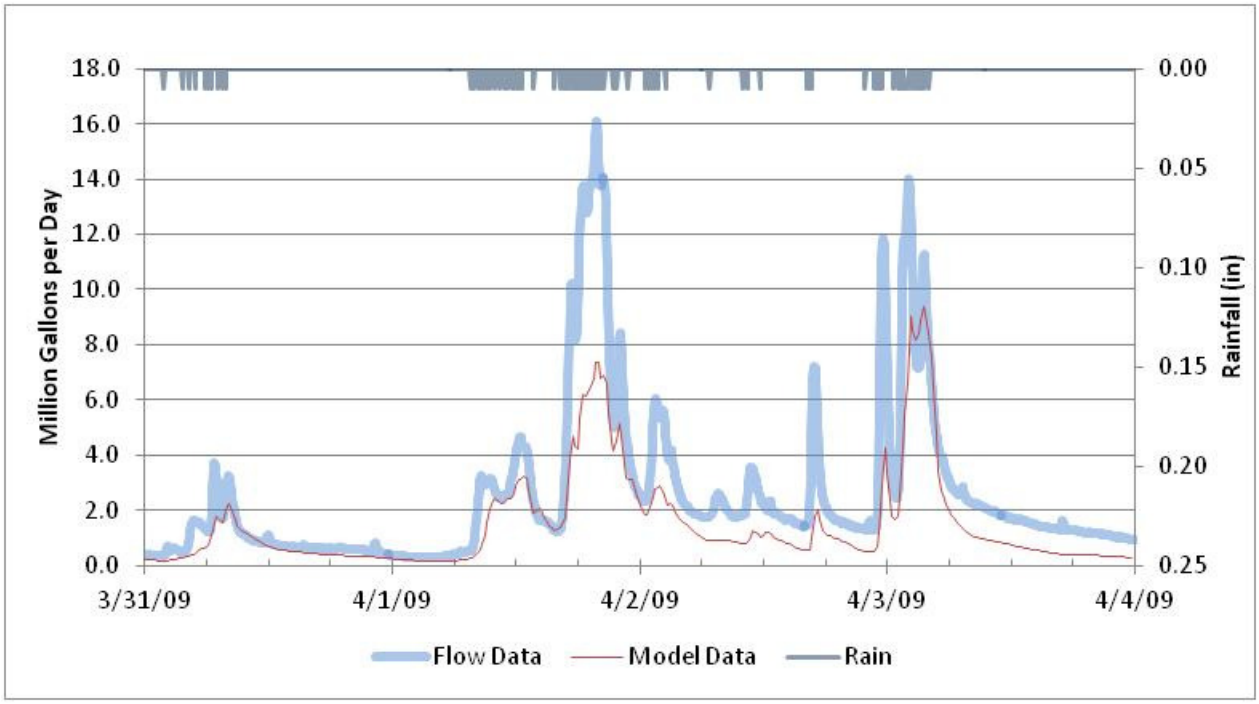

Figure 39. SFE No 9 – March 31 – April 3, 2009
Rainfall = 1.07 in,
Flow Volume = 10.2 MG
Model Volume = 5.9 MG

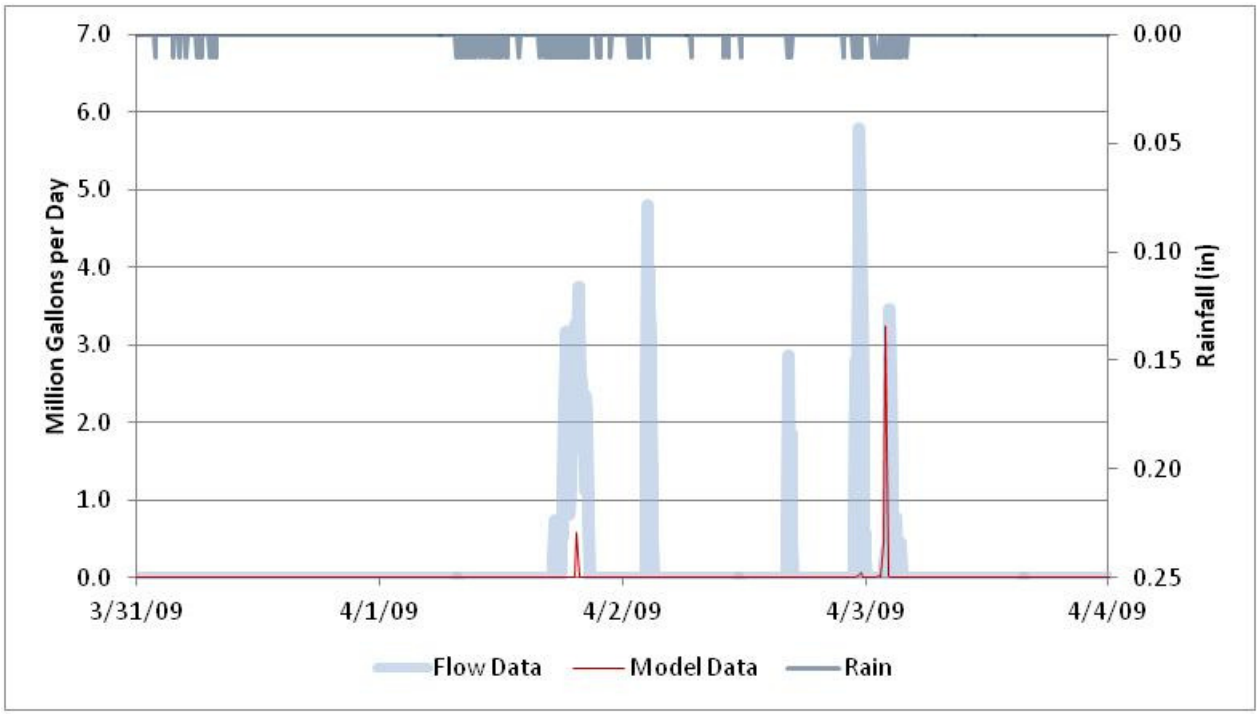

Figure 40. SFE No 12B – March 31 – April 3, 2009
Rainfall = 1.07 in,
Flow Volume = 0.5 MG
Model Volume = 0.1 MG

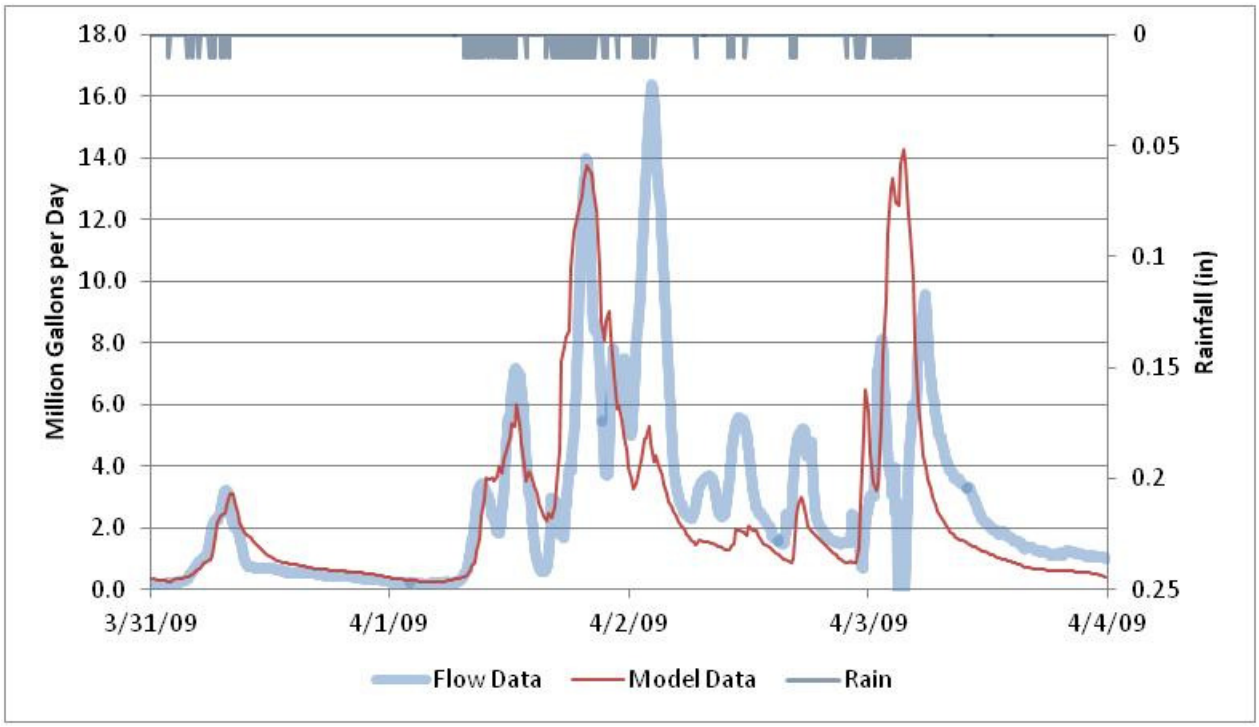

Figure 41. SFE No 13 – March 31 – April 3, 2009
Rainfall = 1.07 in,
Flow Volume = 11.1 MG
Model Volume = 10.1 MG

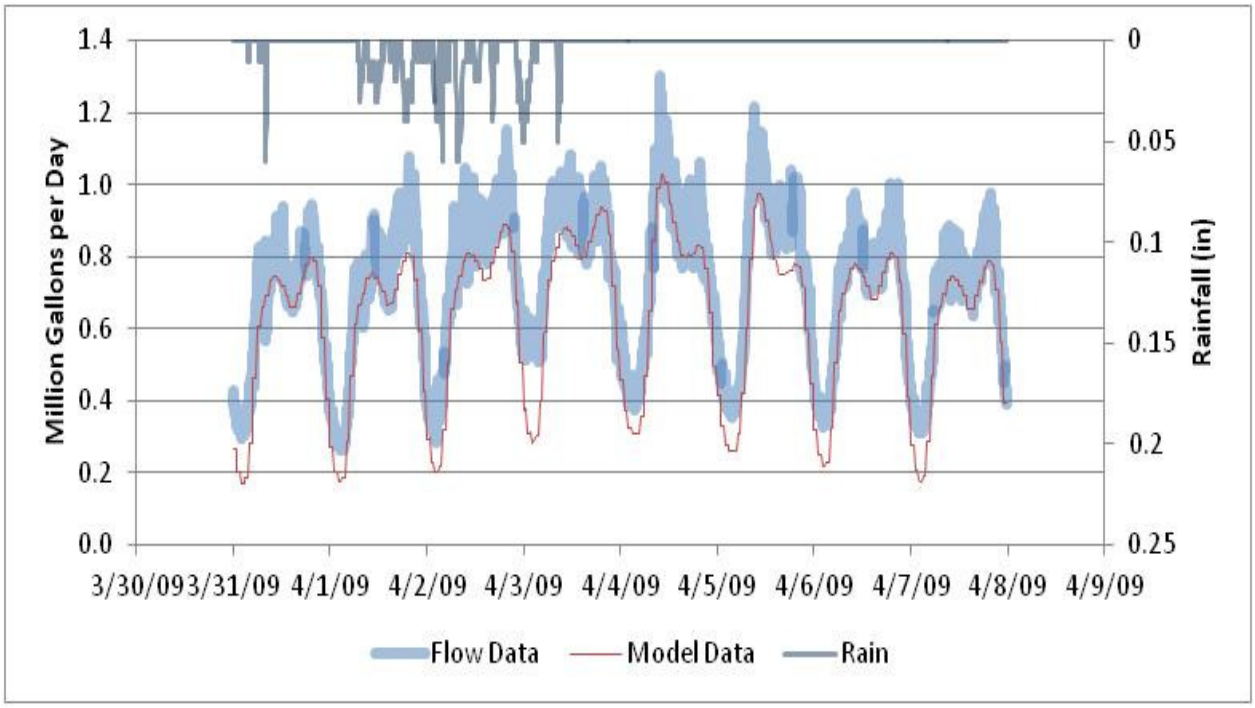

Figure 42. SFE No 01 – March 31 – April 8, 2009
Rainfall = 6.96 in,
Flow Volume = 5.82 MG
Model Volume = 5.05 MG

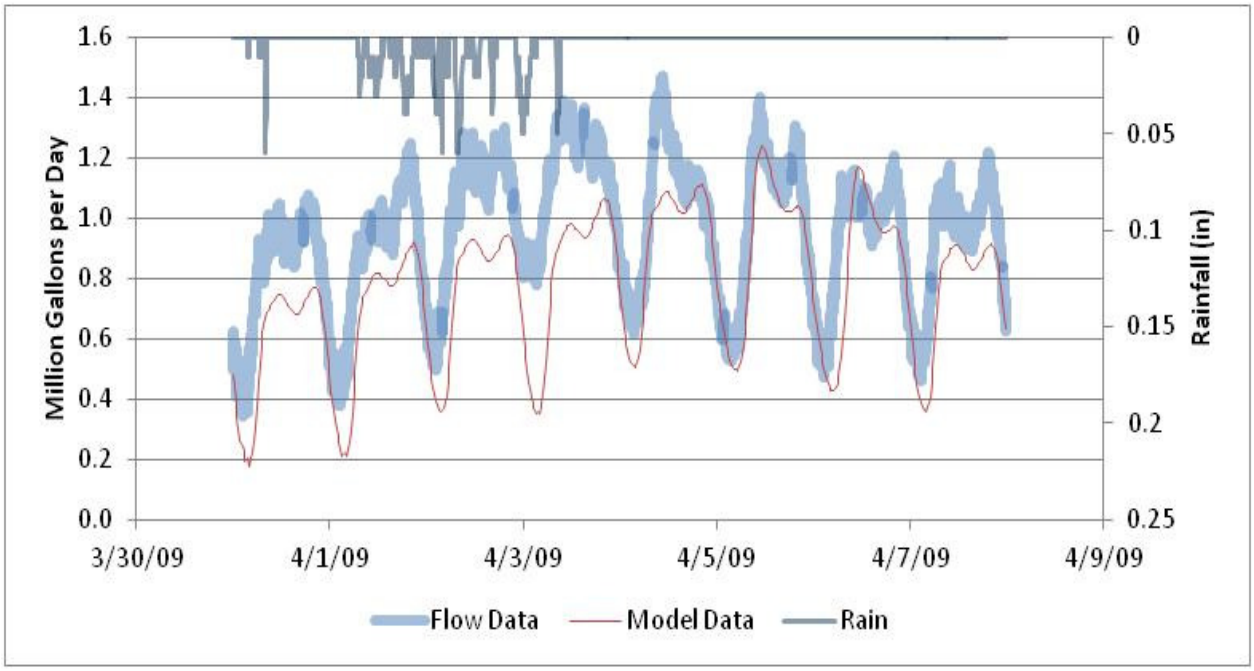

Figure 43. SFE No 02 – March 31 – April 8, 2009
Rainfall = 6.96 in,
Flow Volume = 7.69 MG
Model Volume = 6.22 MG

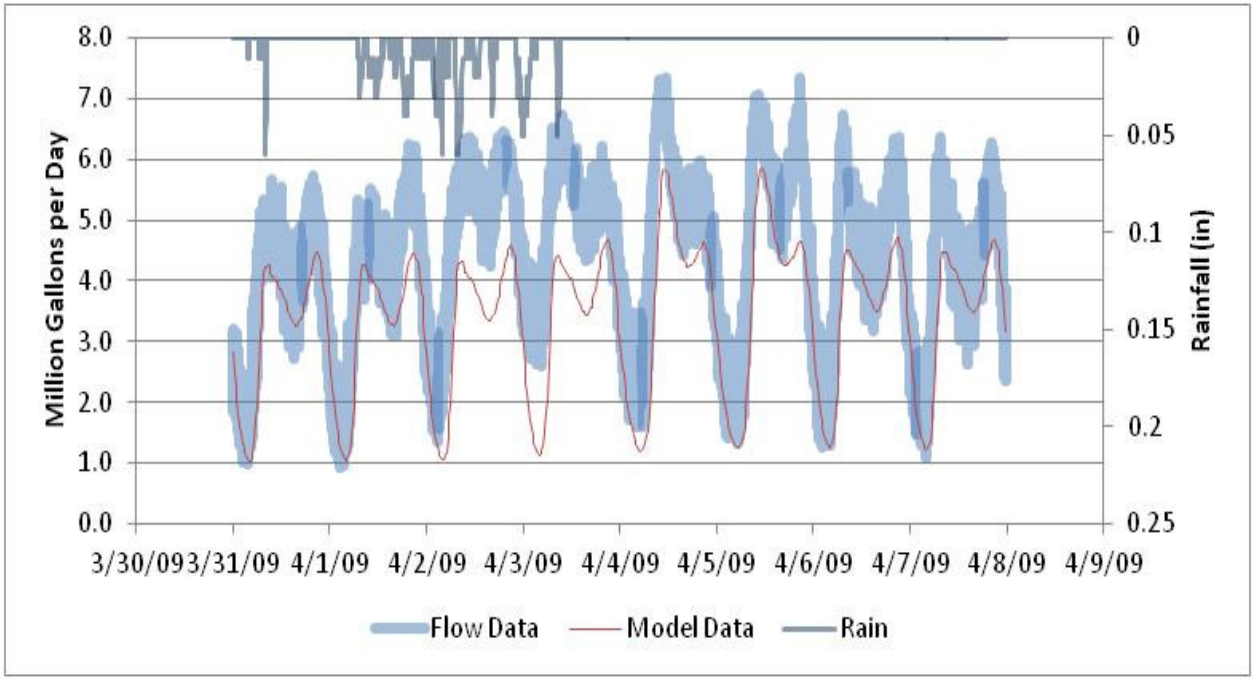

Figure 44. SFE No 03 – March 31 – April 8, 2009
Rainfall = 6.96 in,
Flow Volume = 35.41 MG
Model Volume = 27.18 MG

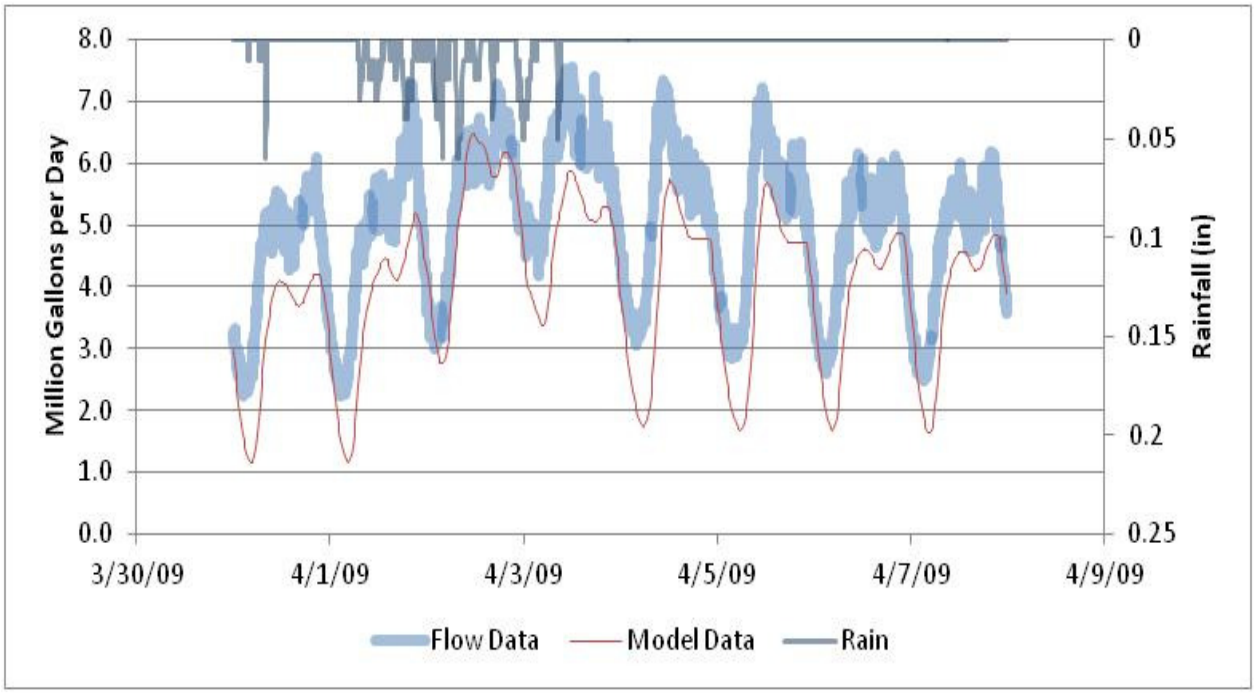

Figure 45. SFE No 04 – March 31 – April 8, 2009
Rainfall = 6.96 in,
Flow Volume = 39.83 MG
Model Volume = 32.06 MG

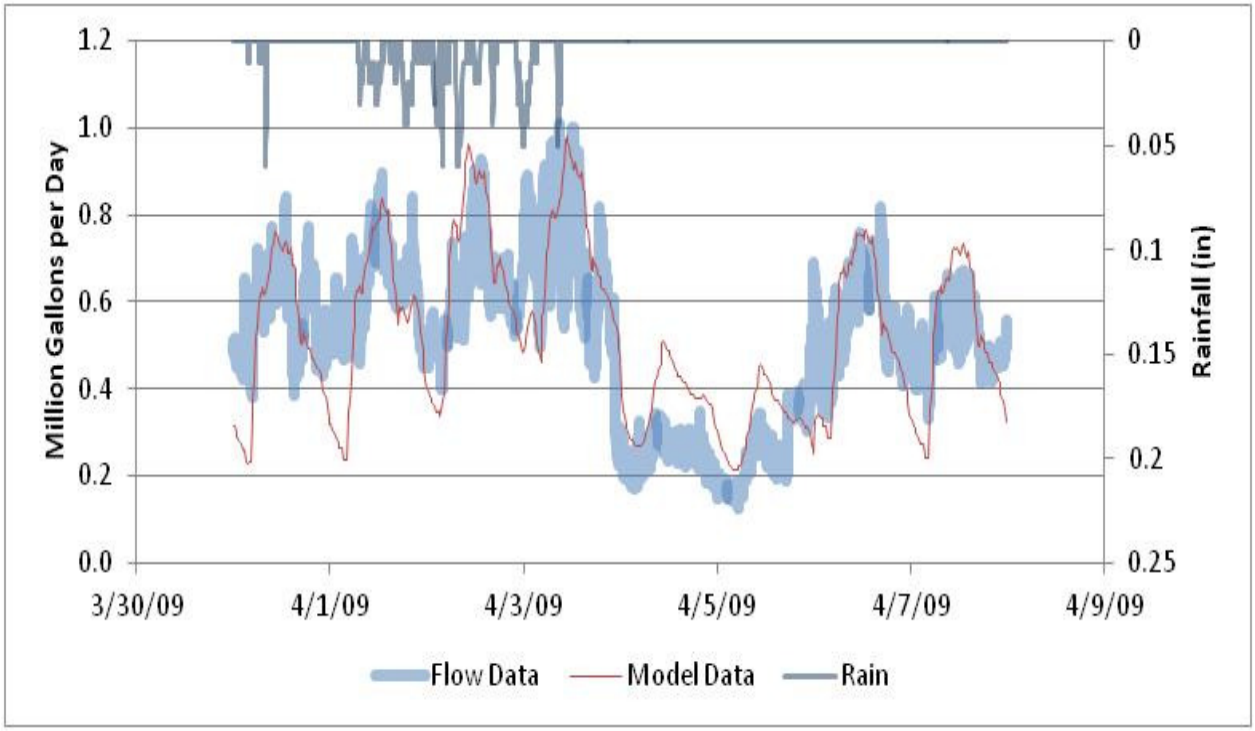

Figure 46. SFE No 07 – March 31 – April 8, 2009
Rainfall = 6.96 in,
Flow Volume = 2.29 MG
Model Volume = 2.90 MG

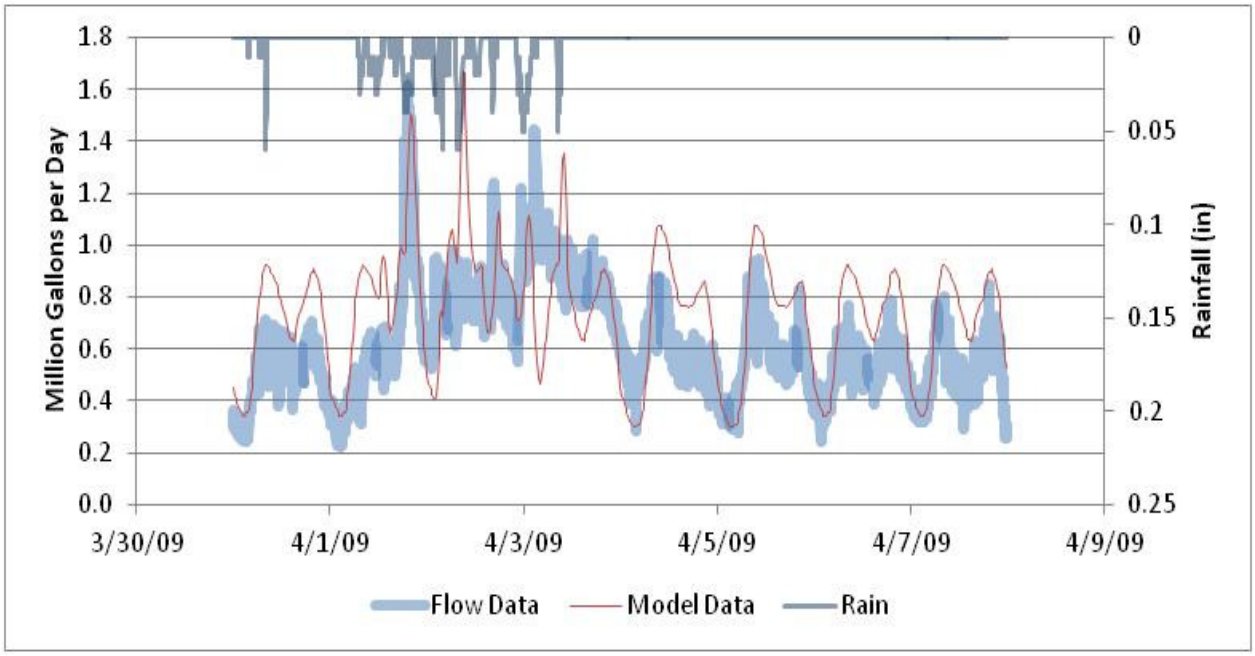

Figure 47. SFE No 10 – March 31 – April 8, 2009
Rainfall = 6.96 in,
Flow Volume = 4.91 MG
Model Volume = 5.96 MG

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Section 7
Wet Weather Flow Calibration
Event Period
August 10 to 18, 2009

Table 48. Calibration Event Summary – August 10 to 18, 2009

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
6	4.86	13.89	8/10/09 23:05	5.81	14.22	8/10/09 22:30	-0.9	-0.3	-20%	-2%
9	2.14	9.21	8/10/09 21:25	2.45	7.09	8/10/09 22:30	-0.3	2.1	-14%	23%
13	2.82	7.32	8/10/09 22:15	4.22	12.54	8/10/09 23:15	-1.4	-5.2	-50%	-71%
18	0.30	0.88	8/10/09 21:15	0.39	1.66	8/10/09 21:15	-0.1	-0.8	-28%	-89%
19	0.52	1.30	8/10/09 21:30	0.58	2.40	8/10/09 21:15	-0.1	-1.1	-11%	-85%
1	4.49	1.01	8/15/09 9:15	4.86	0.95	8/15/09 10:00	-0.4	0.1	-8%	6%
2	6.07	1.34	8/16/09 10:50	5.42	1.1	8/16/09 11:00	0.7	0.2	11%	18%
3	21.57	5.84	8/15/09 10:25	26.7	5.77	8/16/09 11:00	-5.1	0.1	-24%	1%
4	27.48	5.63	8/16/09 10:20	29.93	5.56	8/15/09 12:20	-2.5	0.1	-9%	1%
16	1.40	0.54	8/10/09 11:45	1.97	0.47	8/14/09 13:00	-0.6	0.1	-41%	13%
17	2.19	0.49	8/16/09 8:45	2.33	0.46	8/15/09 10:40	-0.1	0.0	-6%	6%

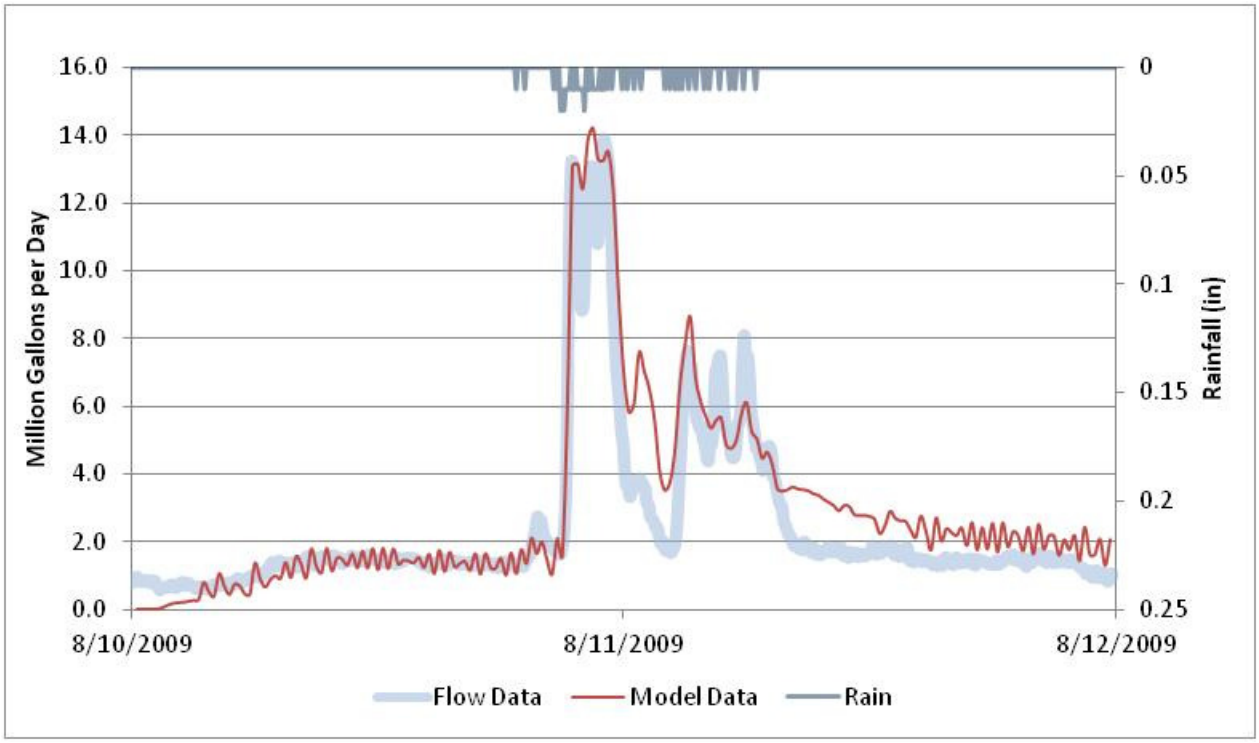

Figure 49. SFE No 6 – August 10 - 11, 2009
Rainfall = 0.48 in,
Flow Volume = 4.8 MG
Model Volume = 5.8 MG

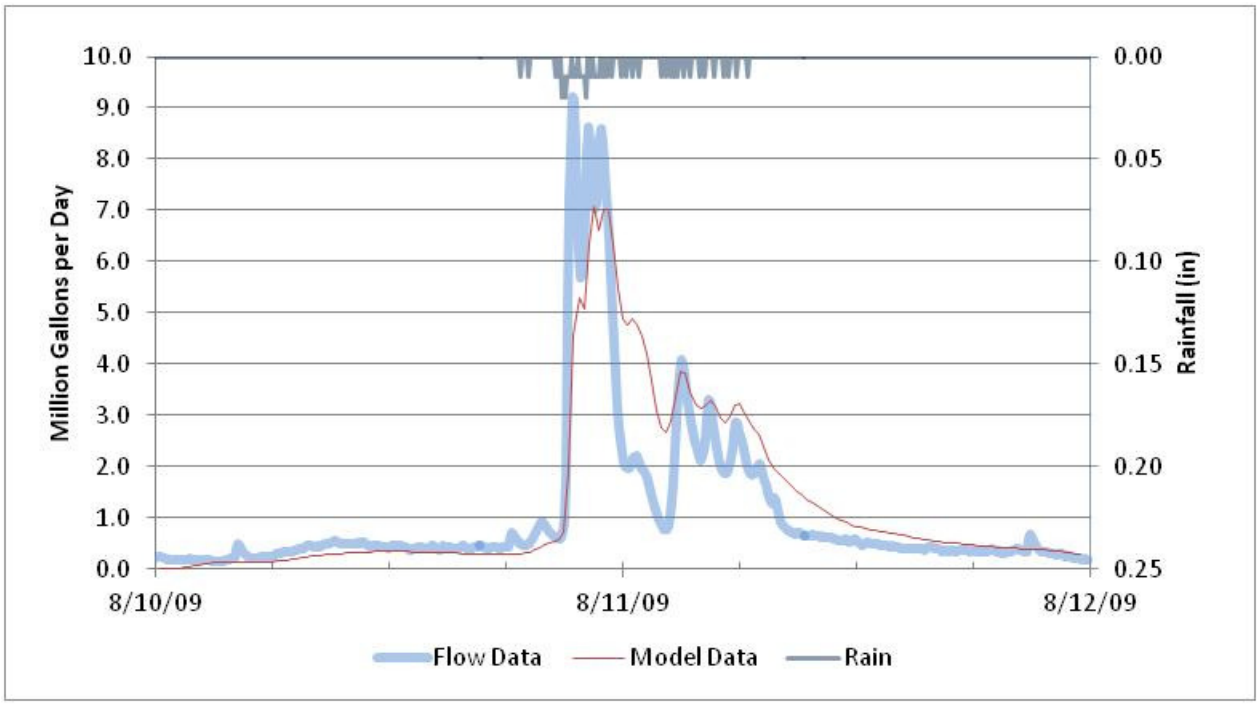

Figure 50. SFE No 9 – August 10 – 11, 2009
Rainfall = 0.48 in,
Flow Volume = 2.1 MG
Model Volume = 2.4 MG

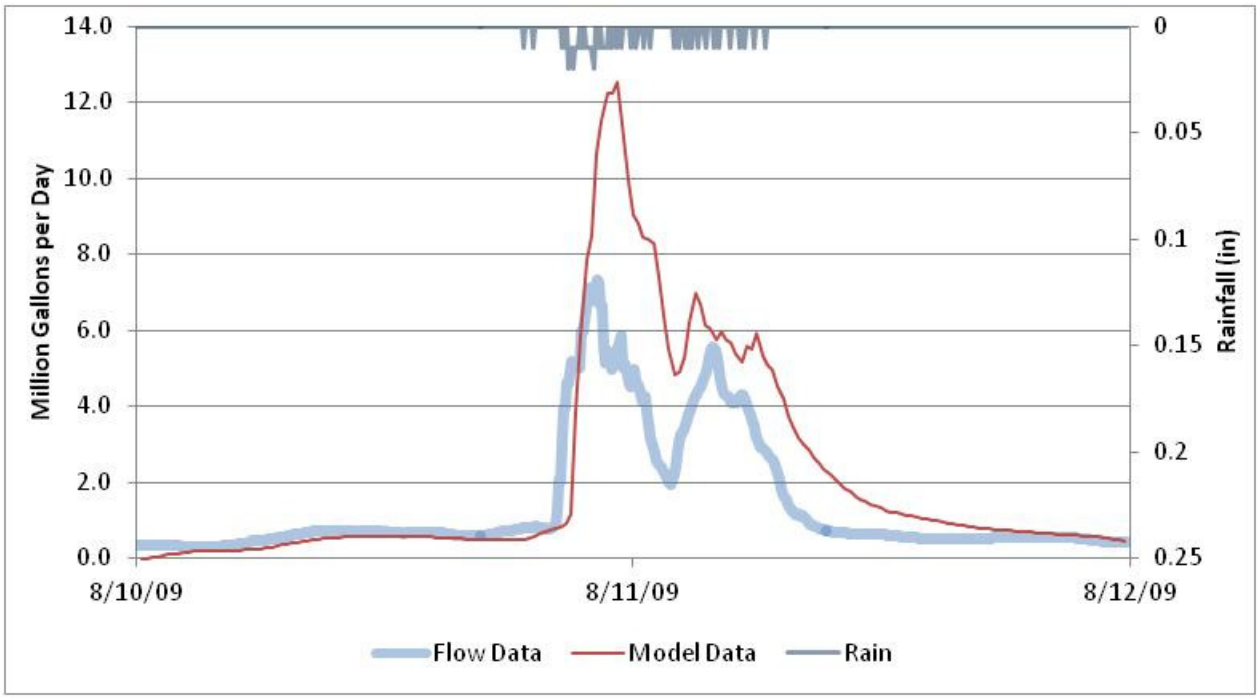

Figure 51. SFE No 13 – August 10 – 11, 2009
Rainfall = 0.48 in,
Flow Volume = 2.8 MG
Model Volume = 4.2 MG

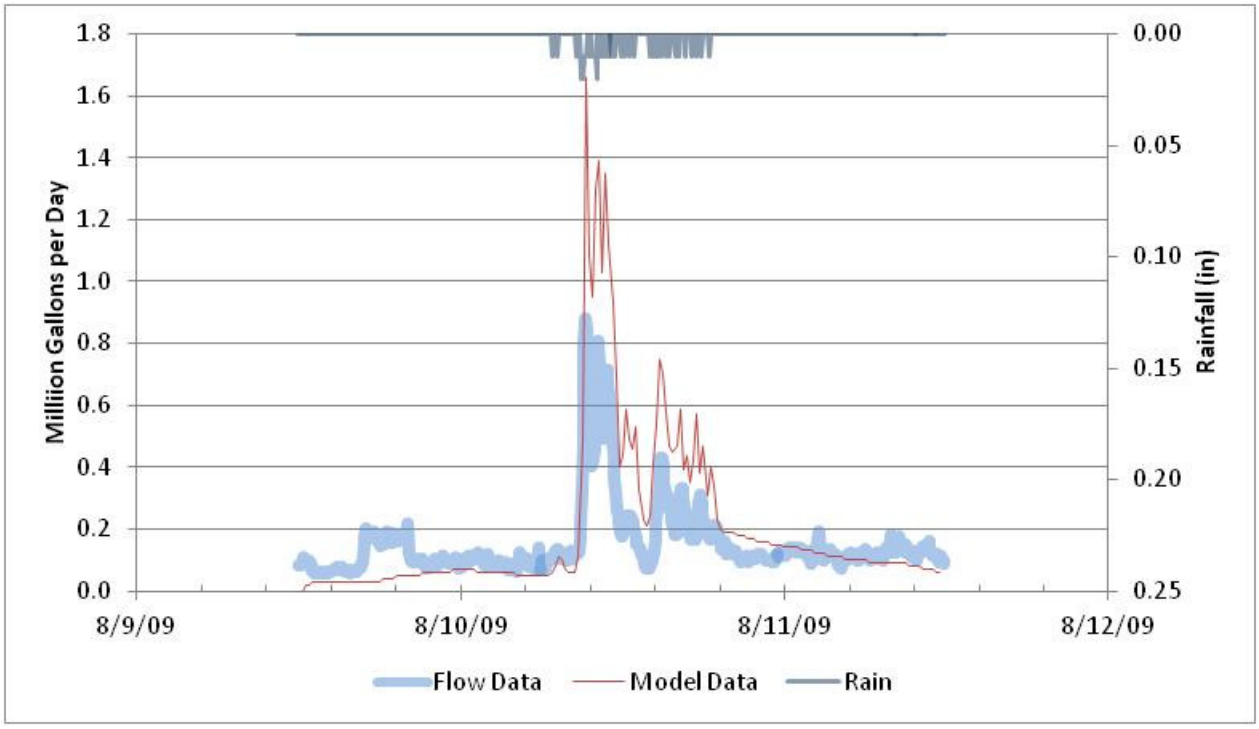

Figure 52. SFE No 18 – August 10 – 11, 2009
Rainfall = 0.48 in,
Flow Volume = 0.3 MG
Model Volume = 0.4 MG

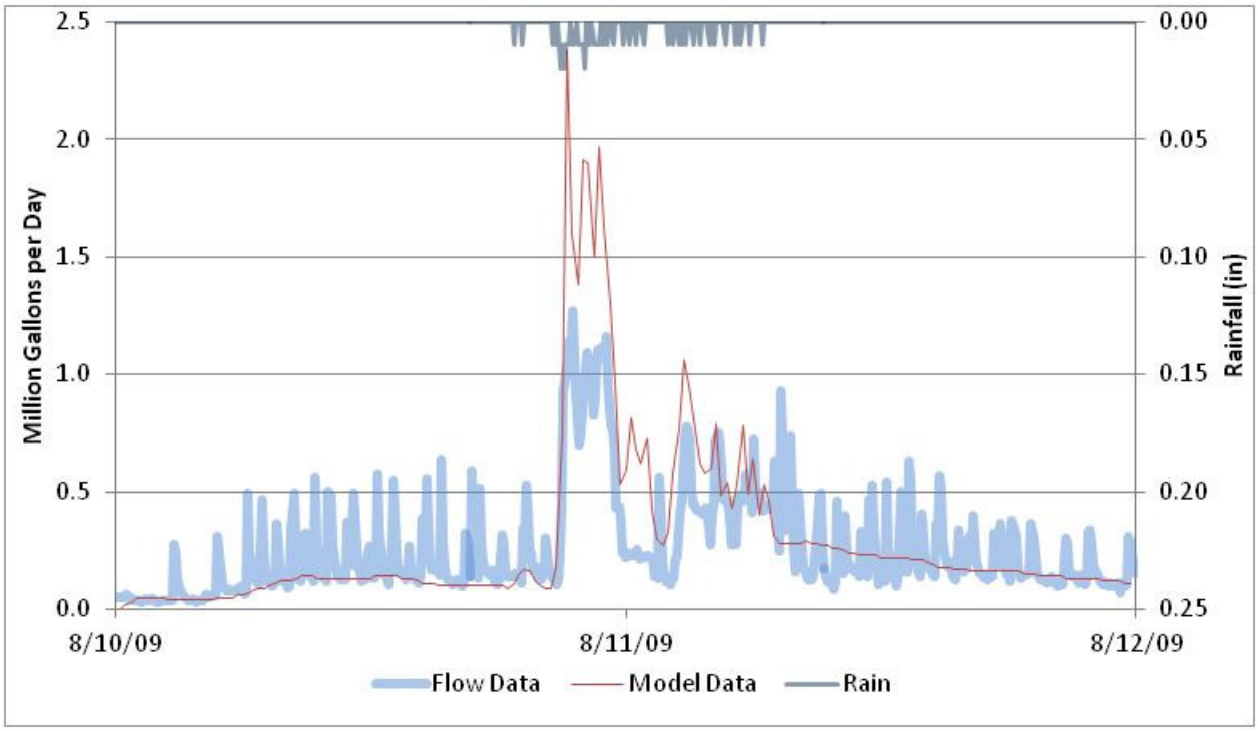

Figure 53. SFE No 19 – August 10 – 11, 2009
Rainfall = 0.48 in,
Flow Volume = 0.5 MG
Model Volume = 0.6 MG

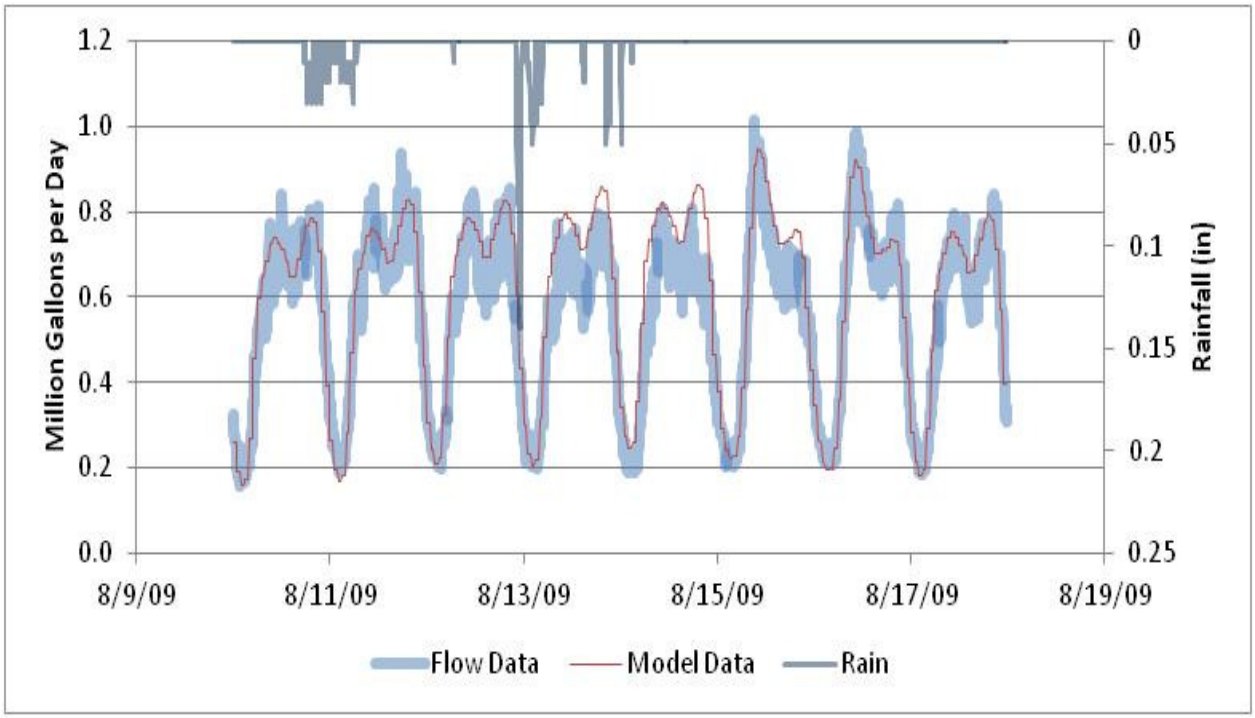

Figure 54. SFE No 01 – August 10 – 18, 2009
Rainfall = 4.47 in,
Flow Volume = 4.49 MG
Model Volume = 4.86 MG

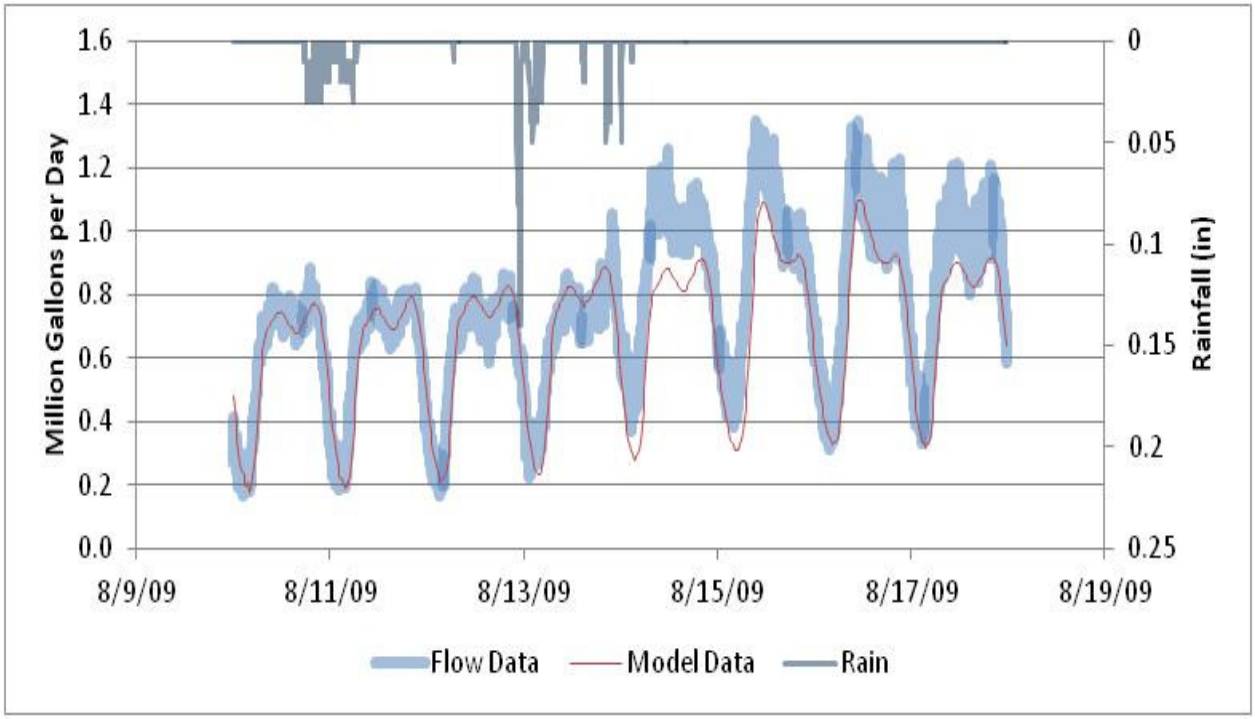

Figure 55. SFE No 02 – August 10 – 18, 2009
Rainfall = 4.47 in,
Flow Volume = 6.07 MG
Model Volume = 5.42 MG

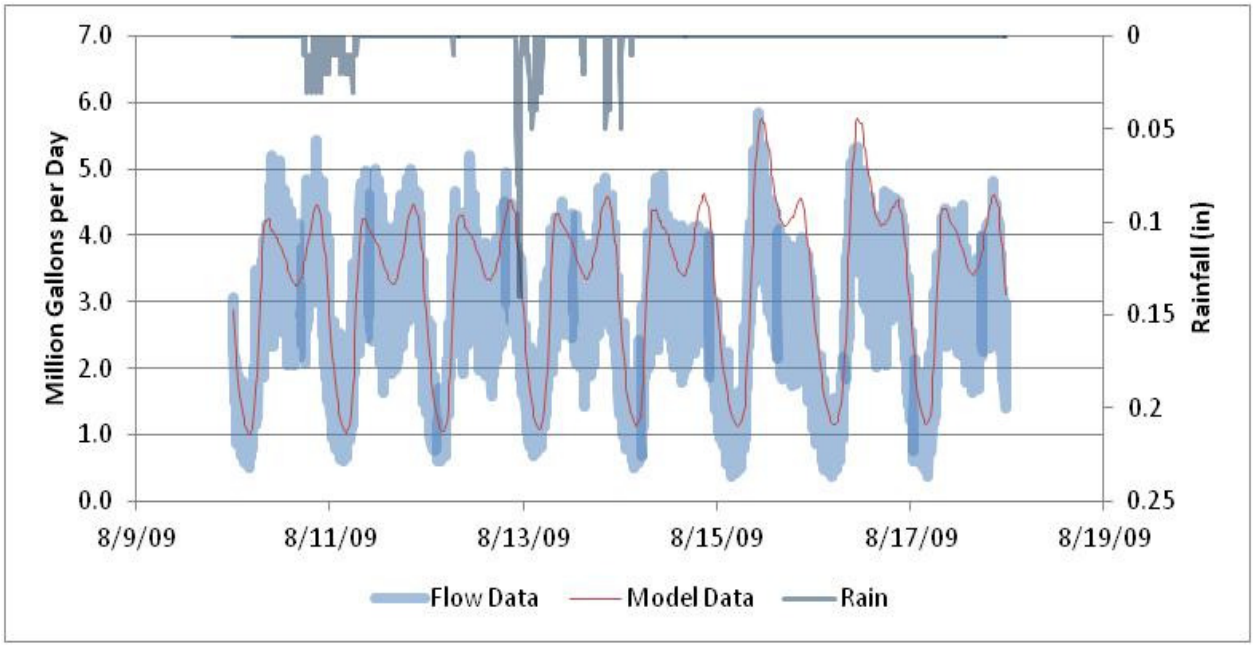

Figure 56. SFE No 03 – August 10 – 18, 2009
Rainfall = 4.47 in,
Flow Volume = 21.57 MG
Model Volume = 26.70 MG

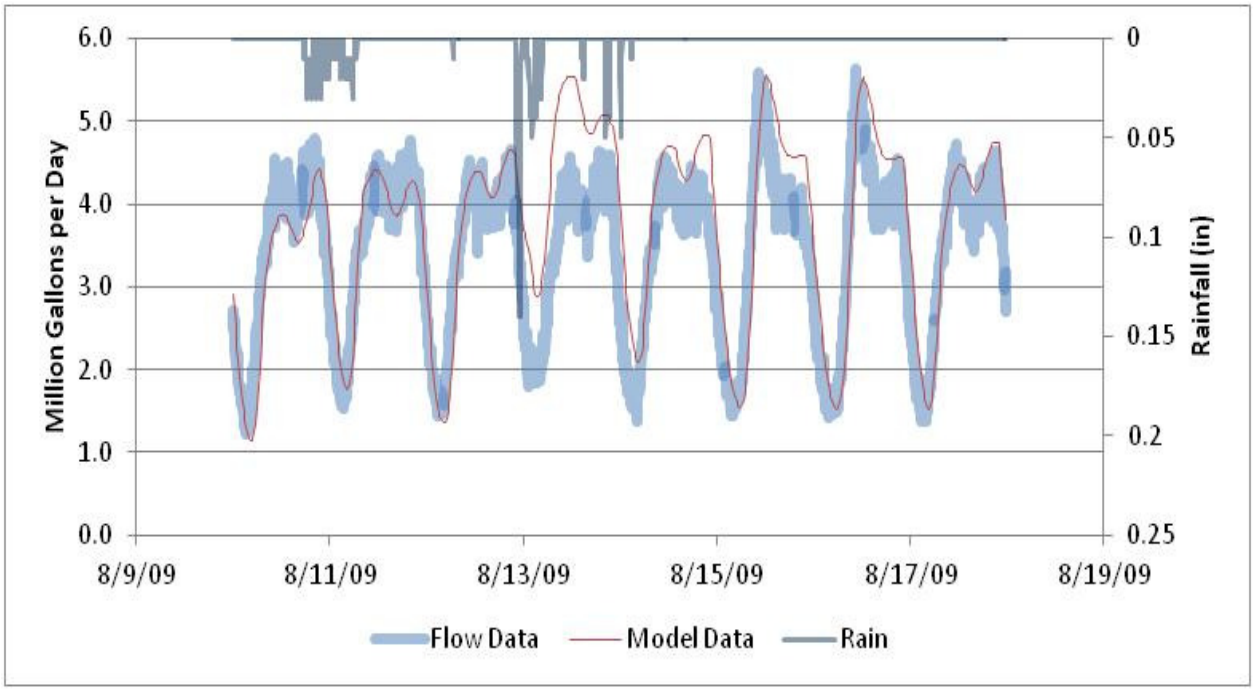

Figure 57. SFE No 04 – August 10 – 18, 2009
Rainfall = 4.47 in,
Flow Volume = 27.48 MG
Model Volume = 29.93 MG

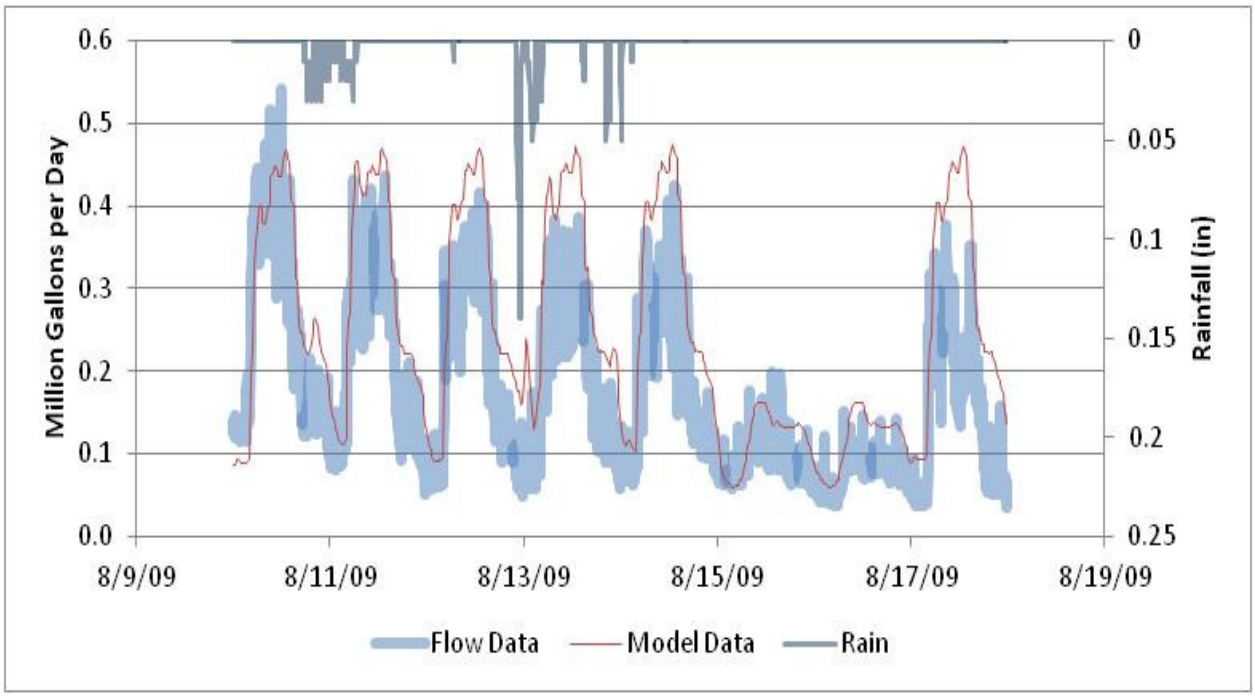

Figure 58. SFE No 16 – August 10 – 18, 2009
Rainfall = 4.47 in,
Flow Volume = 1.40 MG
Model Volume = 1.97 MG

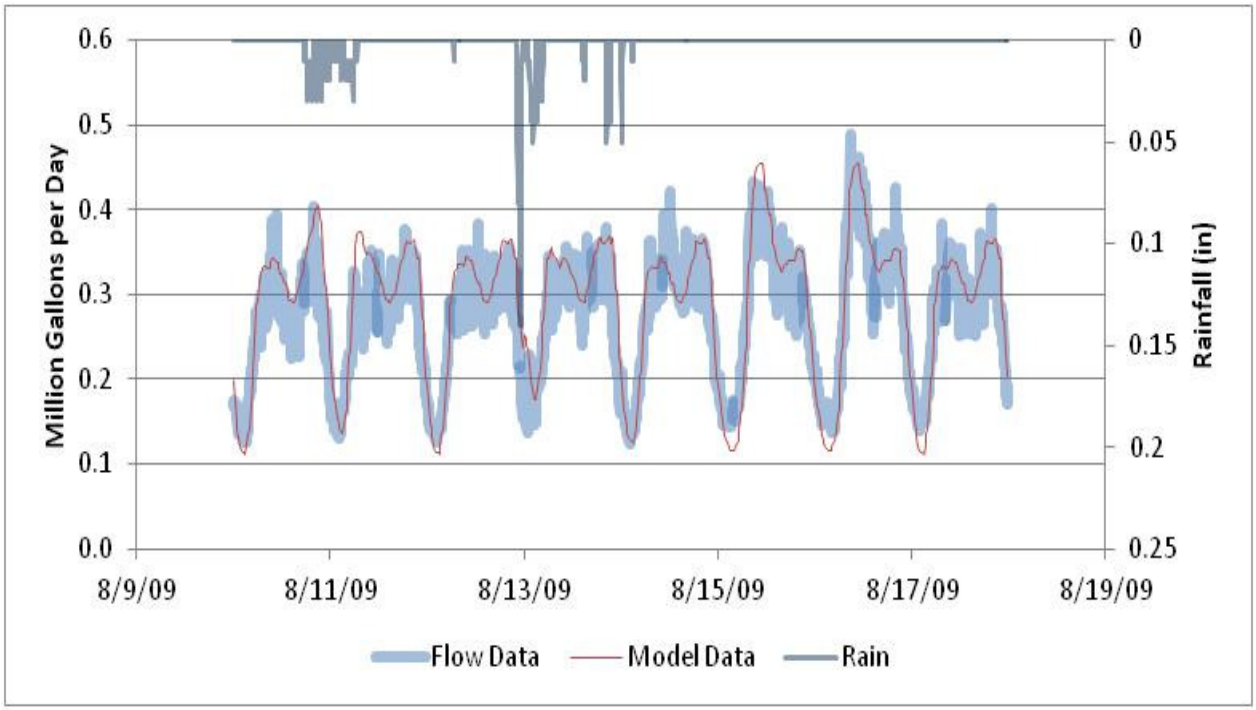

Figure 59. SFE No 17 – August 10 – 18, 2009

Rainfall = 4.47 in,
Flow Volume = 2.19 MG
Model Volume = 2.33 MG

Section 8
Wet Weather Flow Calibration
Event Period
September 19 to 27, 2009

Table 60. Calibration Event Summary – September 19 to 27, 2009

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
6	5.6	22.29	9/19/09 5:40	6.25	17.00	9/19/09 5:45	-0.7	5.3	-12%	24%
9	3.14	18.52	9/19/09 17:05	3.34	10.24	9/19/09 17:15	-0.2	8.3	-6%	45%
13	12.24	66.19	9/19/09 17:25	6.42	18.28	9/19/09 17:15	5.8	47.9	48%	72%
18	0.25	1.82	9/19/09 16:40	0.45	2.50	9/19/09 17:00	-0.2	-0.7	-85%	-38%
19	0.59	5.00	9/19/09 17:10	0.74	4.20	9/19/09 17:00	-0.2	0.8	-25%	16%
20	5.86	2.84	9/21/09 13:10	5.74	2.86	9/19/09 7:20	0.1	0.0	2%	-1%
21	0.54	0.22	9/24/09 5:55	0.57	0.14	9/19/09 19:20	0.0	0.1	-6%	36%

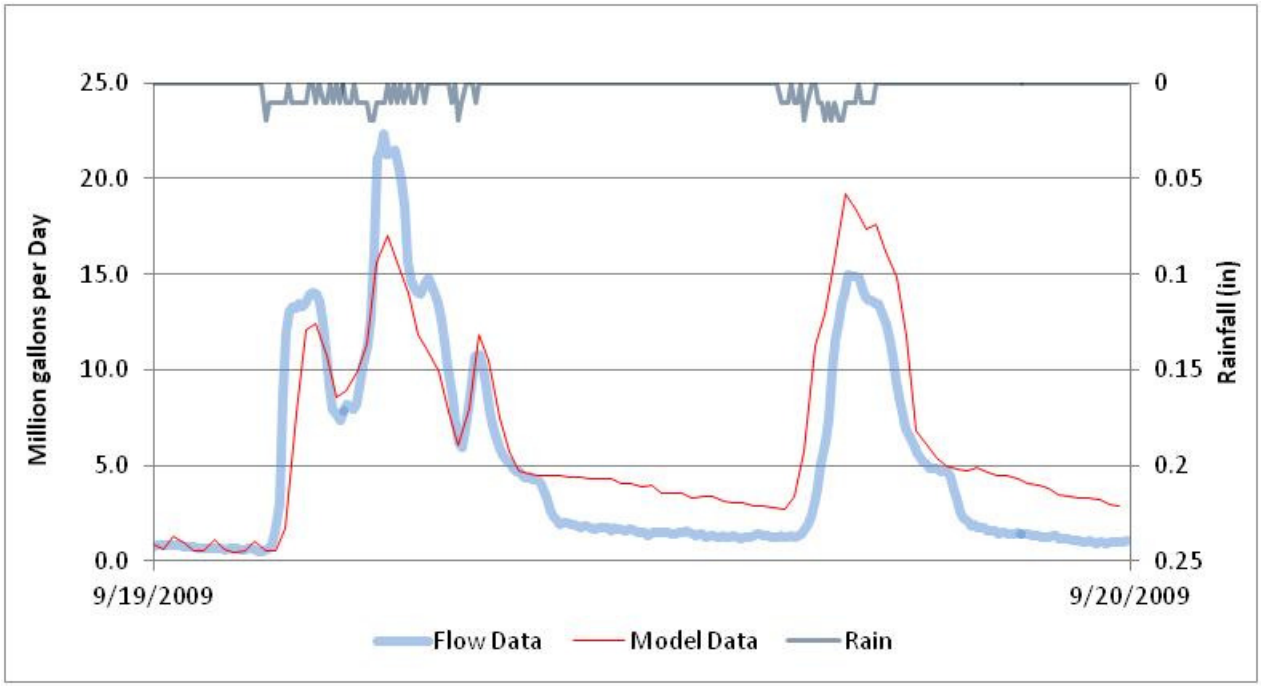

Figure 61. SFE No 6 – September 19 - 20, 2009
Rainfall = 0.70 in
Flow Volume = 5.6 MG
Model Volume = 6.2 MG

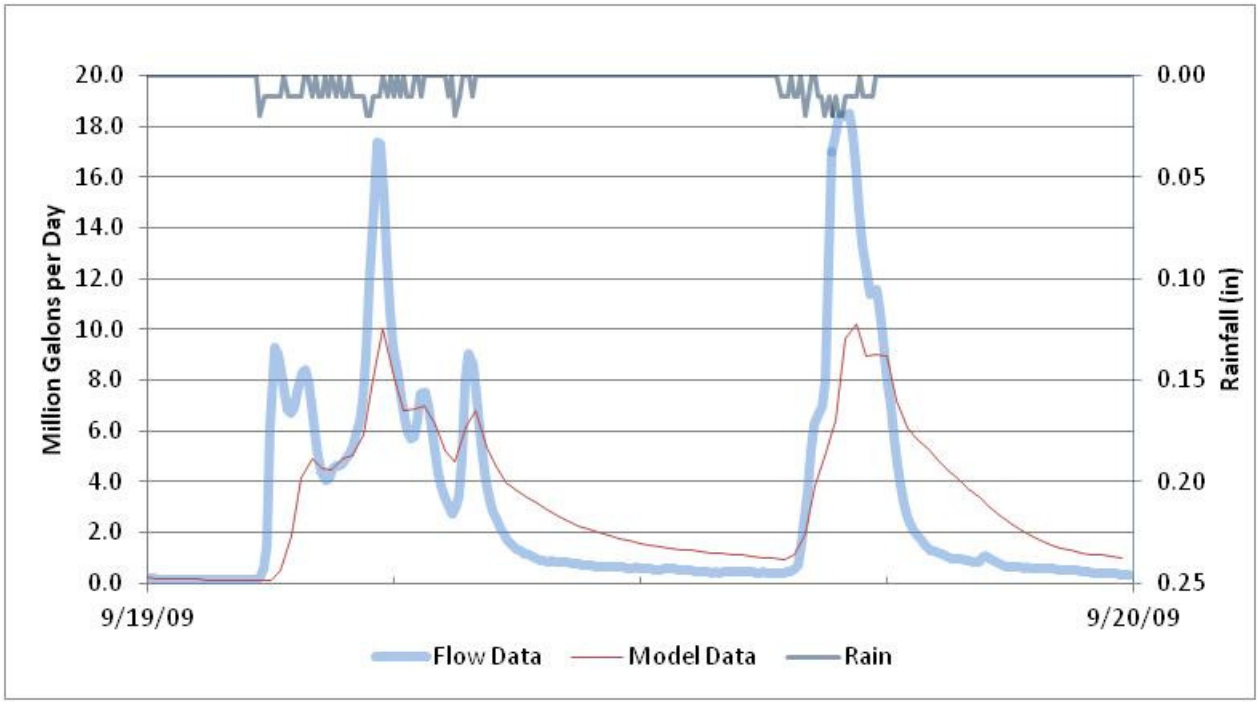

Figure 62. SFE No 9 – September 19 – 20, 2009
Rainfall = 0.70 in
Flow Volume = 3.1 MG
Model Volume = 3.3 MG

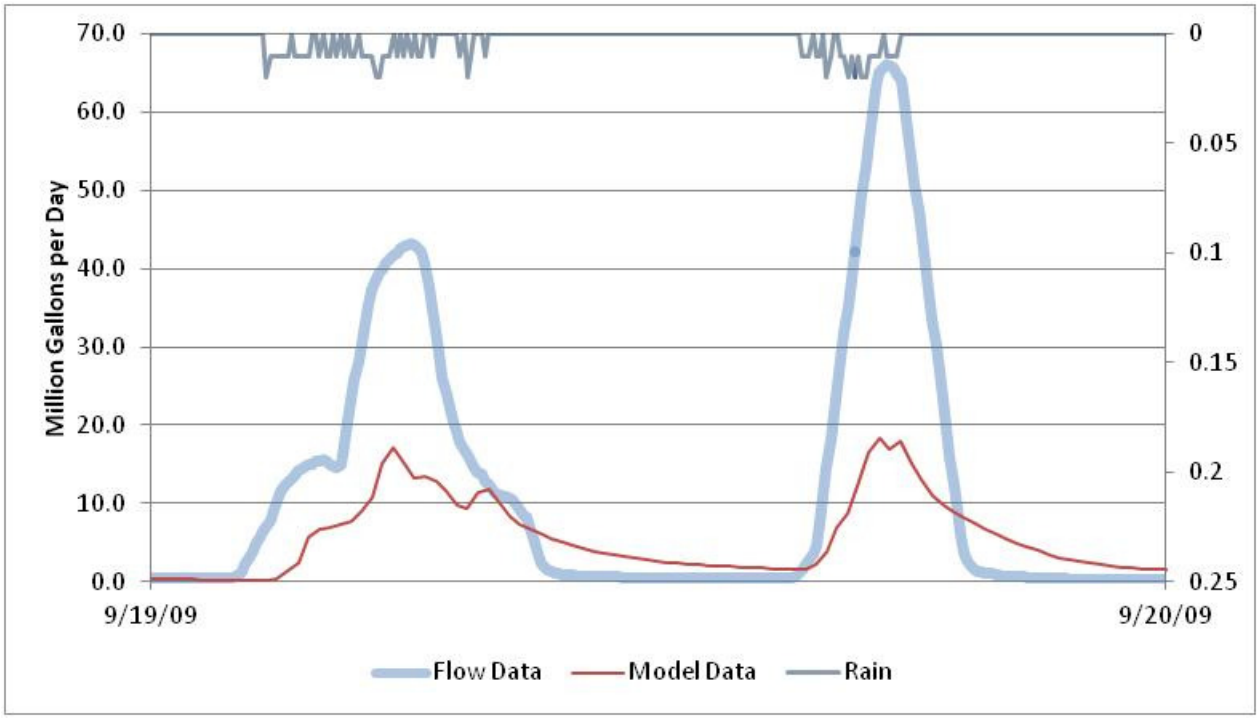

Figure 63. SFE No 13 – September 19 – 20, 2009
Rainfall = 0.70 in
Flow Volume = 12.2 MG
Model Volume = 6.4 MG

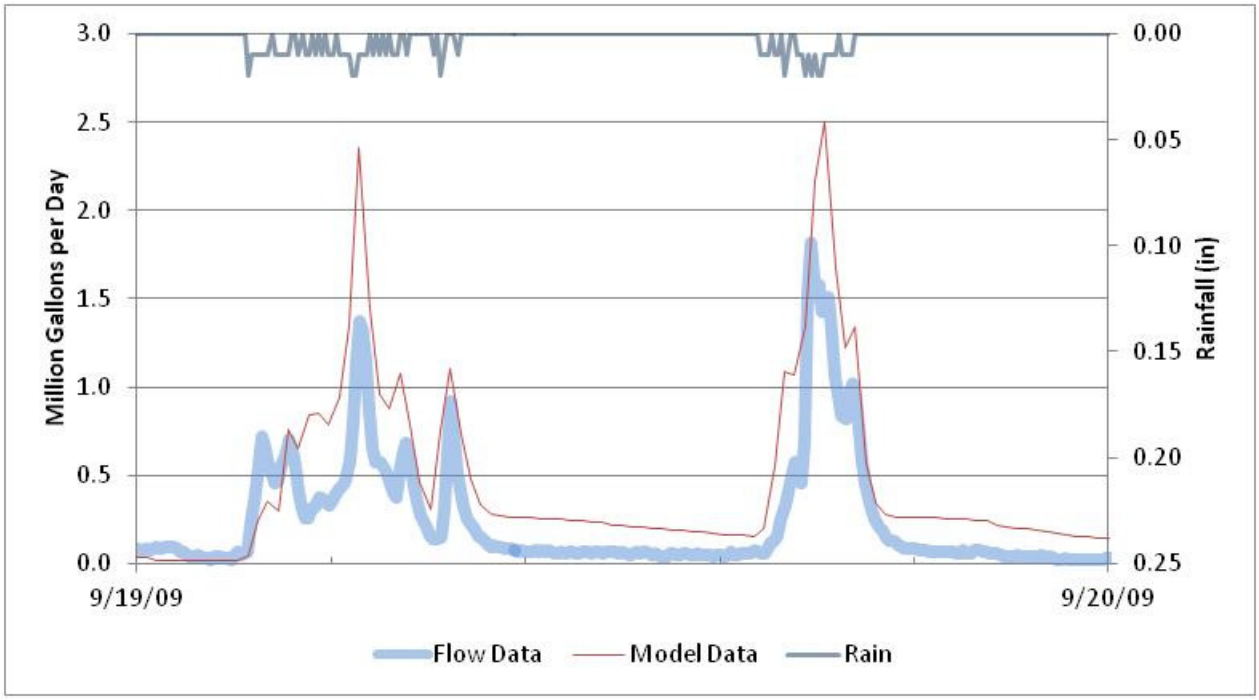

Figure 64. SFE No 18 – September 19 – 20, 2009
Rainfall = 0.70 in
Flow Volume = 0.2 MG
Model Volume = 0.5 MG

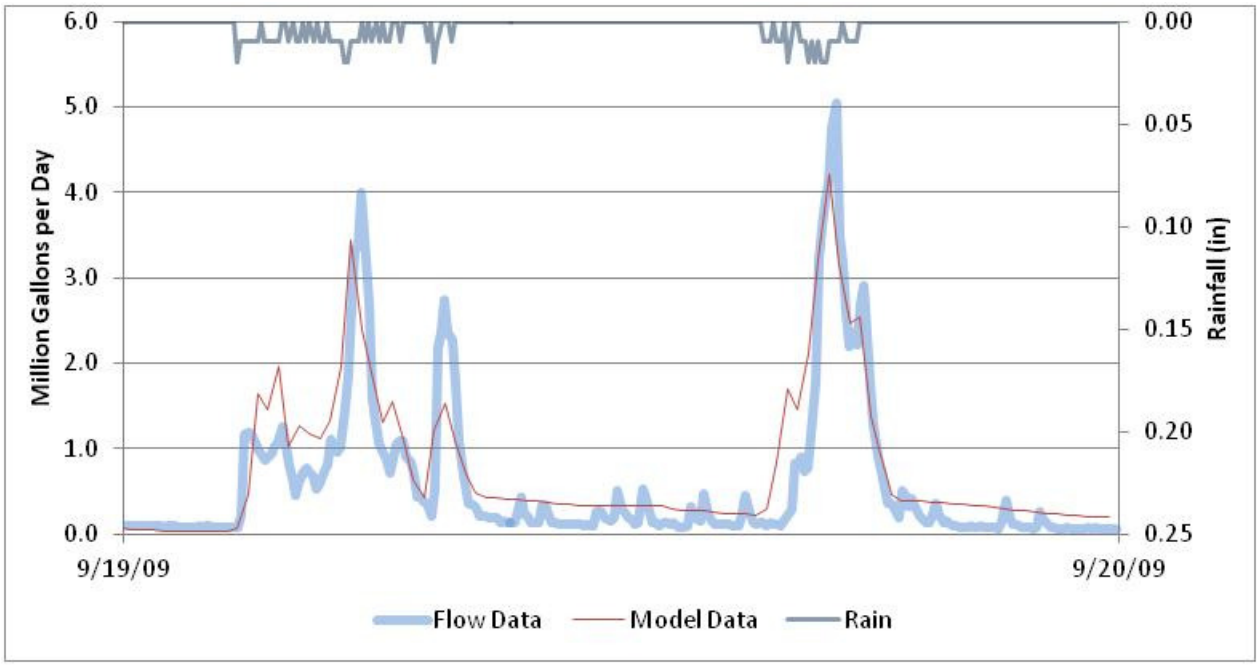

Figure 65. SFE No 19 – September 19 – 20, 2009
Rainfall = 0.70 in,
Flow Volume = 0.6 MG
Model Volume = 0.7 MG

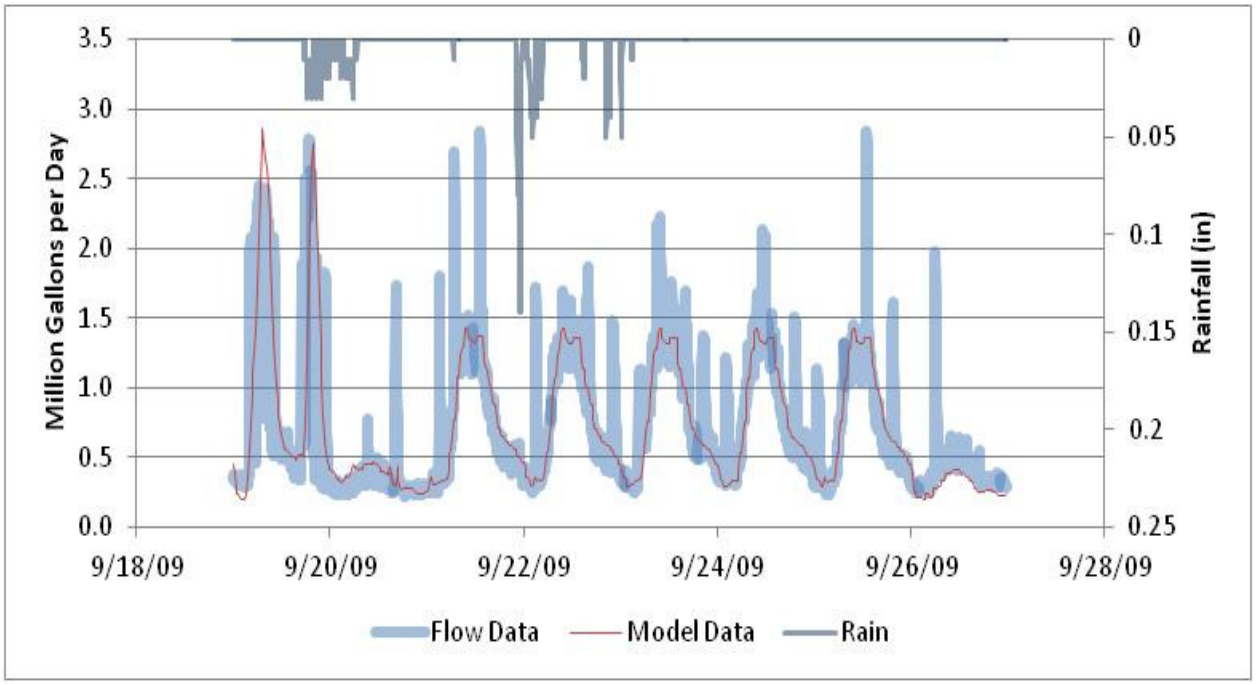

Figure 66. SFE No 20 – September 19 – 27, 2009
Rainfall = 0.70 in,
Flow Volume = 5.86 MG
Model Volume = 5.74 MG

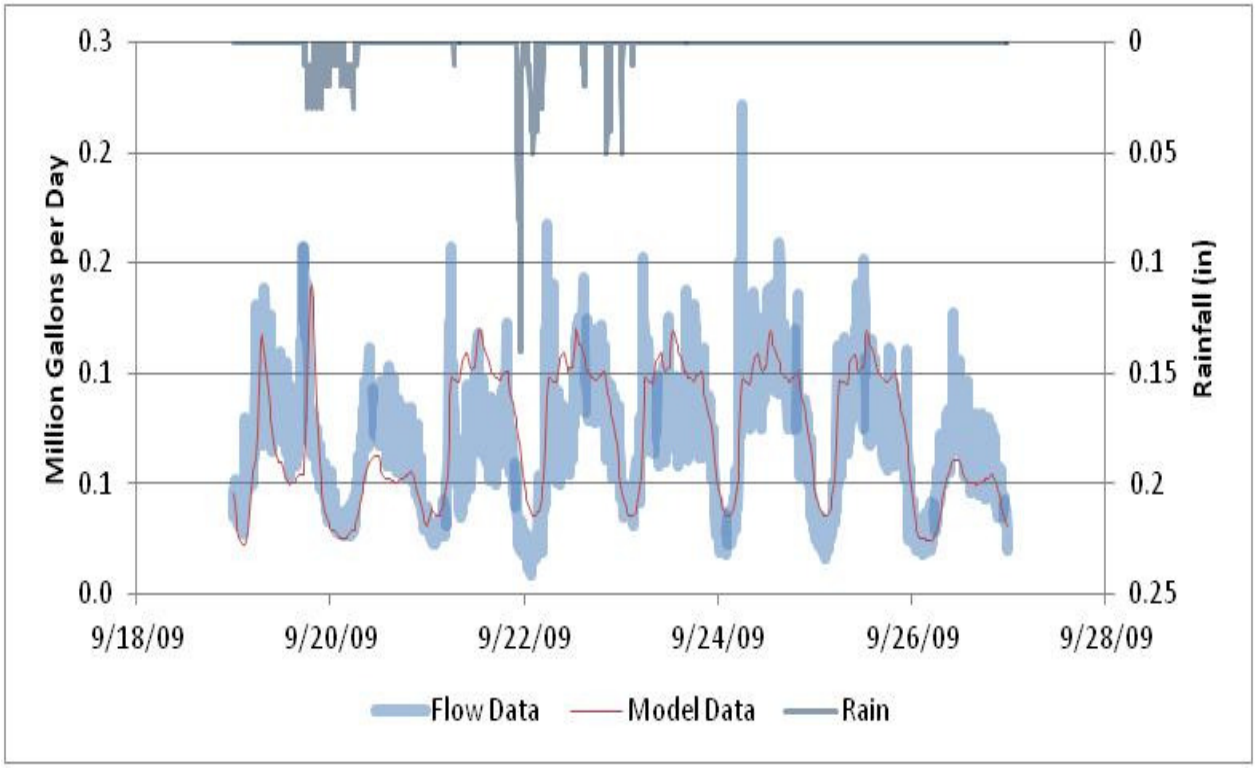

Figure 67. SFE No 21 – September 19 – 27, 2009
Rainfall = 0.70 in,
Flow Volume = 0.54 MG
Model Volume = 0.57 MG

Section 9
Wet Weather Flow Calibration
Event Period
November 13 to 26, 2009

Table 68. Calibration Event Summary – November 13 to 27, 2009

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
6	60.89	24.41	11/22/09 1:50	42.04	20.45	11/22/09 2:00	18.9	4.0	31%	16%
9	35.40	28.74	11/26/09 4:15	30.22	29.24	11/26/09 4:15	5.2	-0.5	15%	-2%
12B	1.64	21.14	11/16/09 17:45	0.68	10.15	11/22/09 1:45	1.0	11.0	59%	52%
13	45.79	26.37	11/22/09 2:05	24.60	32.37	11/22/09 2:15	21.2	-6.0	46%	-23%
14	0.60	8.12	11/26/09 4:05	0.35	7.48	11/22/09 2:15	0.3	0.6	42%	8%
18	1.24	2.55	11/16/09 17:50	1.63	2.62	11/16/09 17:45	-0.4	-0.1	-32%	-3%
19	4.25	9.60	11/16/09 17:55	2.49	4.80	11/16/09 17:45	1.8	4.8	41%	50%
1	9.44	2.25	11/22/09 12:50	8.47	1	11/21/09 10:00	1.0	1.3	10%	56%
2	10.81	1.4	11/22/09 12:40	10.49	1.31	11/22/09 11:20	0.3	0.1	3%	6%
3	41.93	6.54	11/22/09 12:40	45.4	6	11/22/09 11:00	-3.5	0.5	-8%	8%
4	63.2	9.1	11/22/09 13:35	70.37	8.9	11/22/09 12:00	-7.2	0.2	-11%	2%
20	13.26	3.90	11/16/09 10:40	13.06	2.91	11/16/09 19:40	0.2	1.0	2%	25%

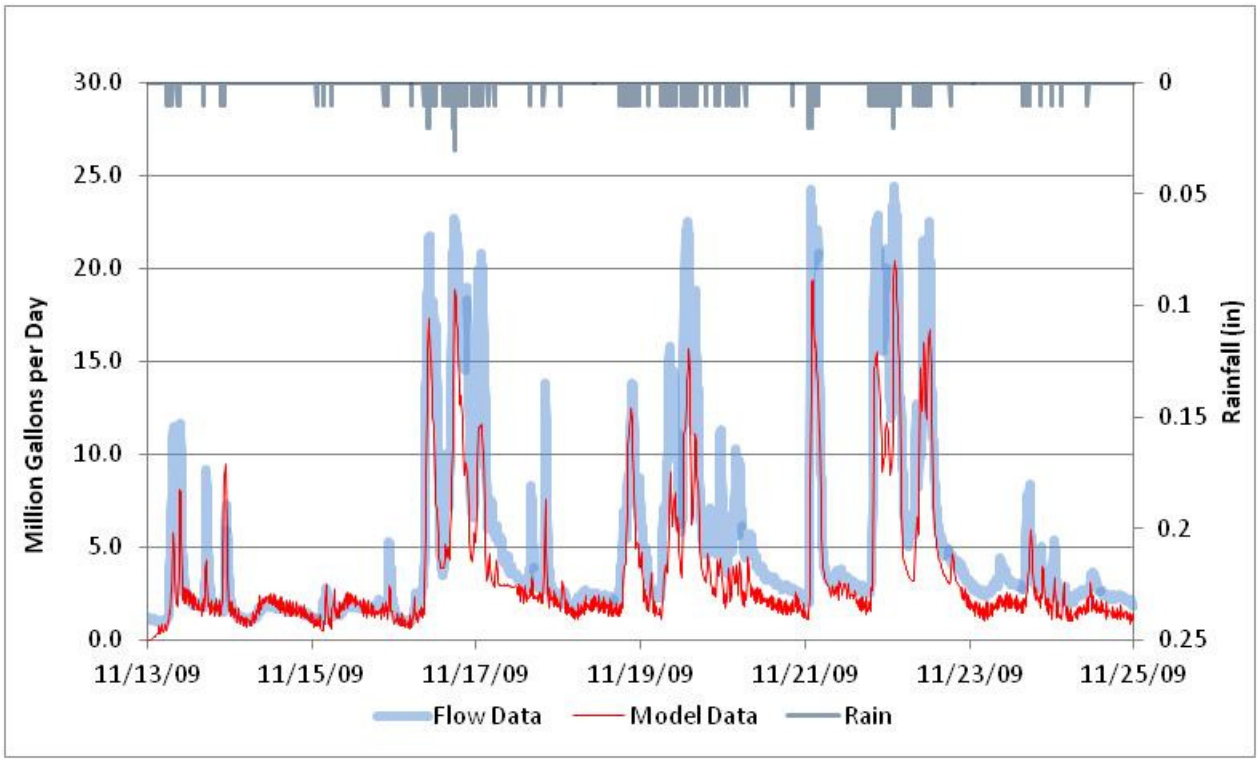

Figure 69. SFE No 6 – November 13 – 25, 2009

Rainfall = 2.51 in,
Flow Volume = 60.9 MG
Model Volume = 42.0 MG

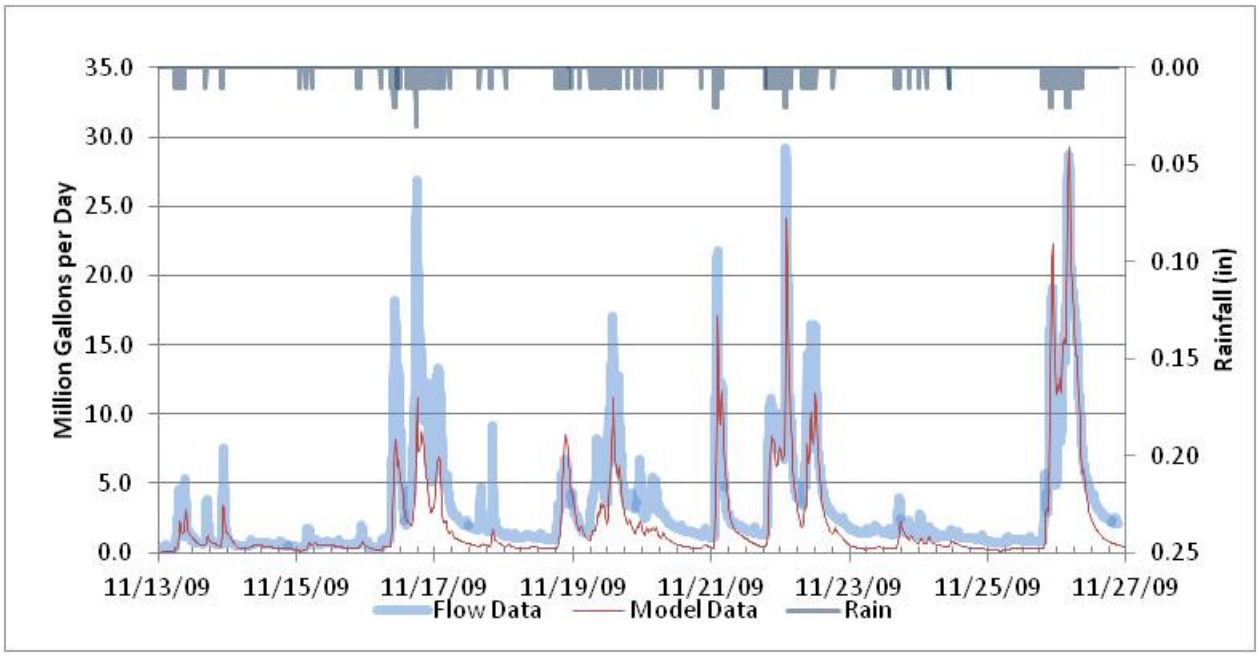

Figure 70. SFE No 9 – November 13 – 27, 2009

Rainfall = 3.35 in,
Flow Volume = 35.4 MG
Model Volume = 30.2 MG

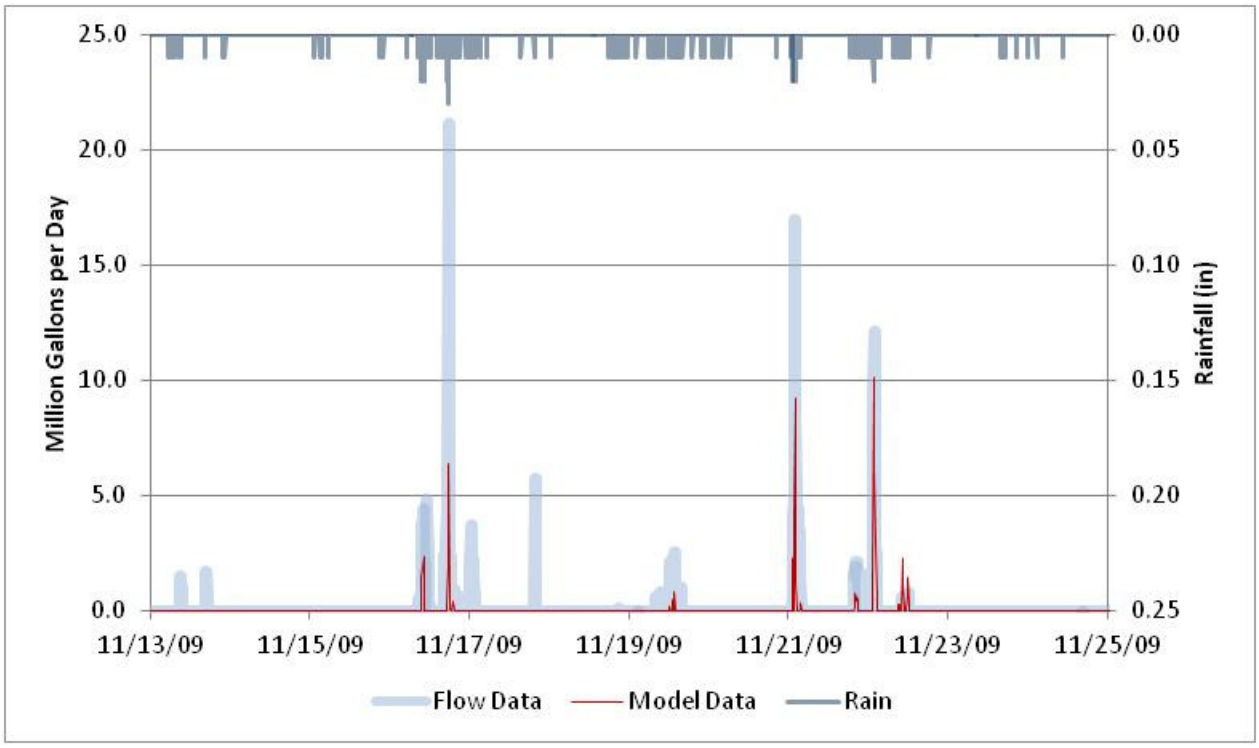

Figure 71. SFE No 12B – November 13 – 25, 2009
Rainfall = 2.51 in,
Flow Volume = 1.6 MG
Model Volume = 0.7 MG

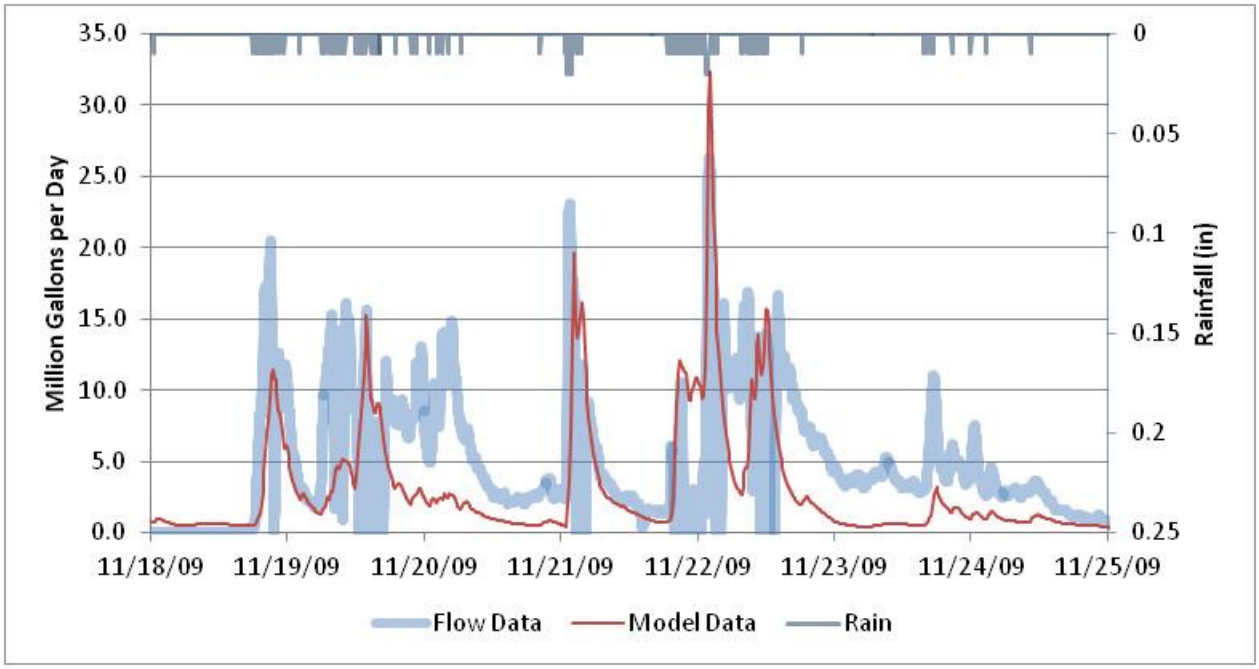

Figure 72. SFE No 13 – November 18 – 25, 2009
Rainfall = 2.28 in,
Flow Volume = 45.8 MG
Model Volume = 24.6 MG

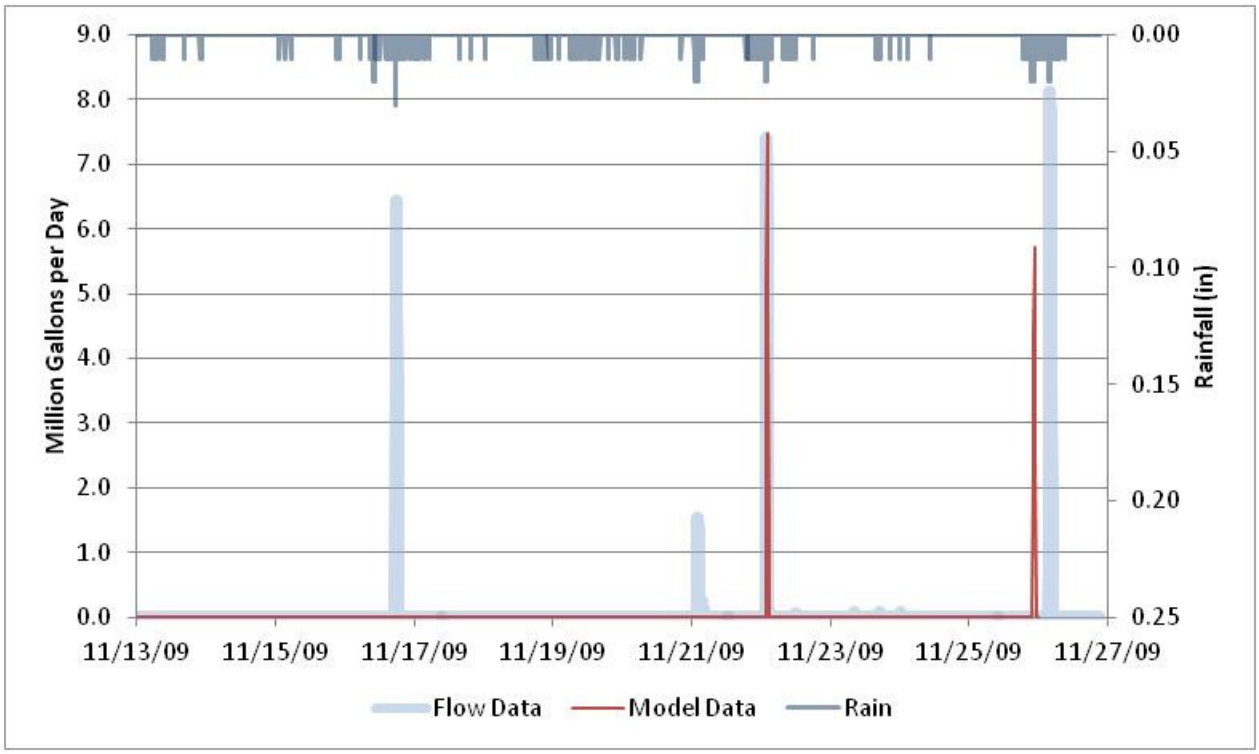

Figure 73. SFE No 14 – November 13 – 27, 2009
Rainfall = 3.35 in,
Flow Volume = 0.6 MG
Model Volume = 0.4 MG

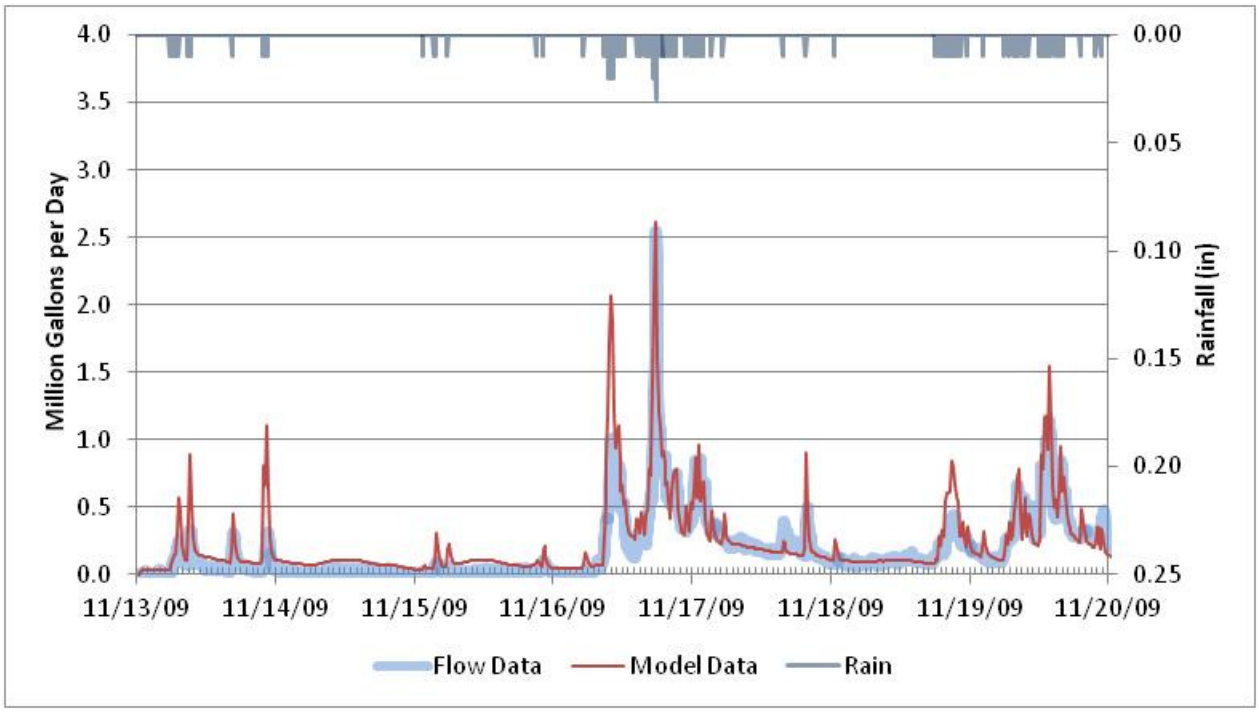

Figure 74. SFE No 18 – November 13 – 20, 2009
Rainfall = 1.53 in,
Flow Volume = 1.2 MG

Model Volume = 1.6 MG

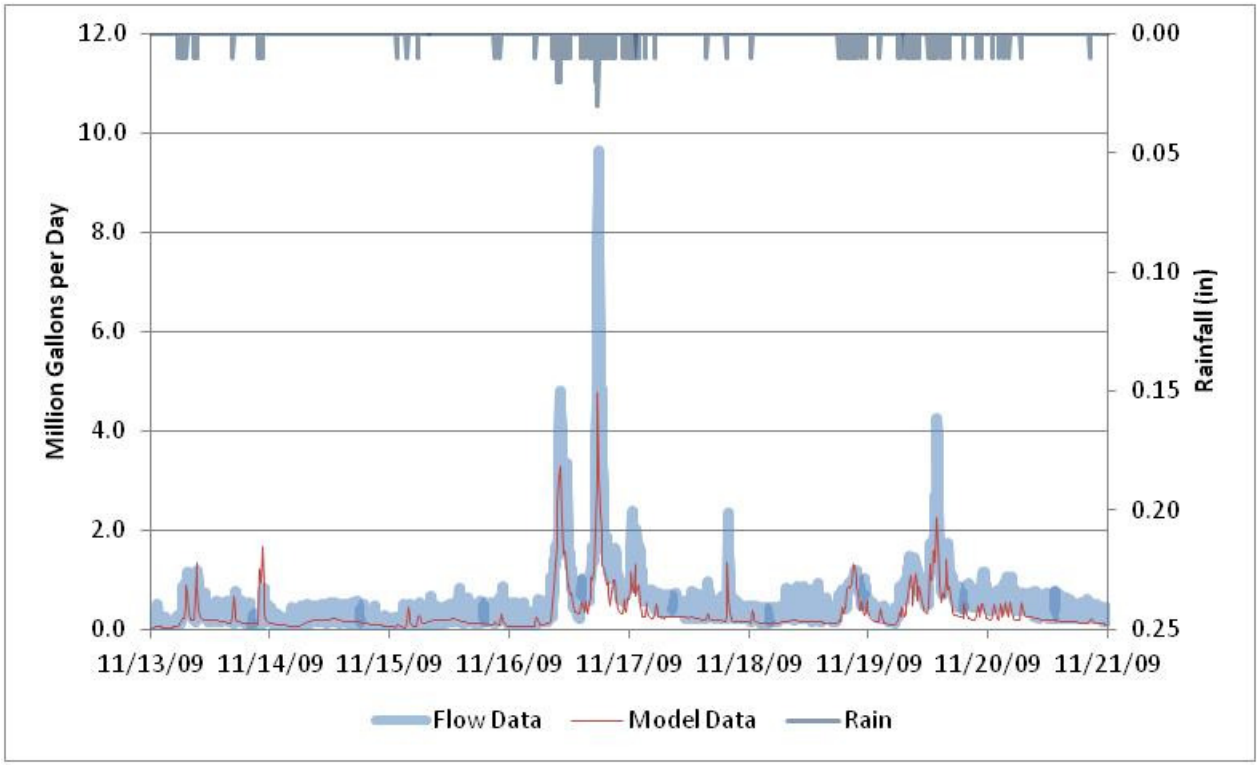

Figure 75. SFE No 19 – November 13 – 21, 2009

Rainfall = 1.59 in,
Flow Volume = 4.2 MG
Model Volume = 2.5 MG

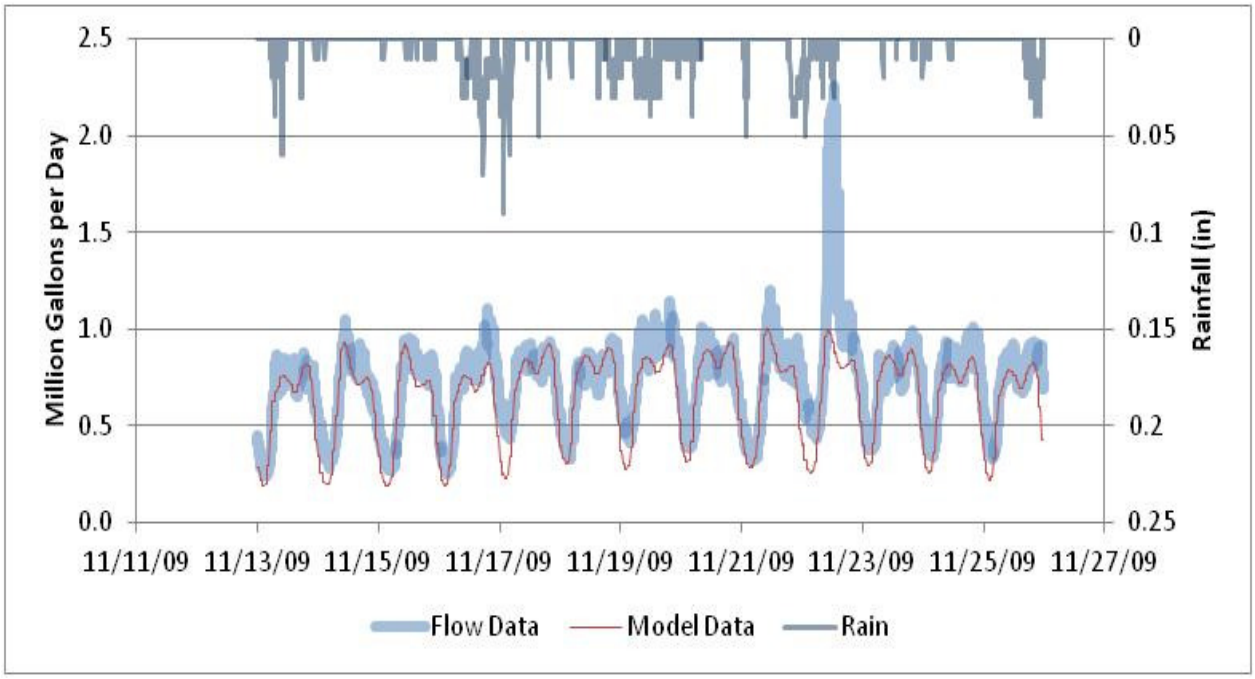

Figure 76. SFE No 01 – November 13 – 26, 2009

Rainfall = 16.72 in,
Flow Volume = 9.44 MG
Model Volume = 8.47 MG

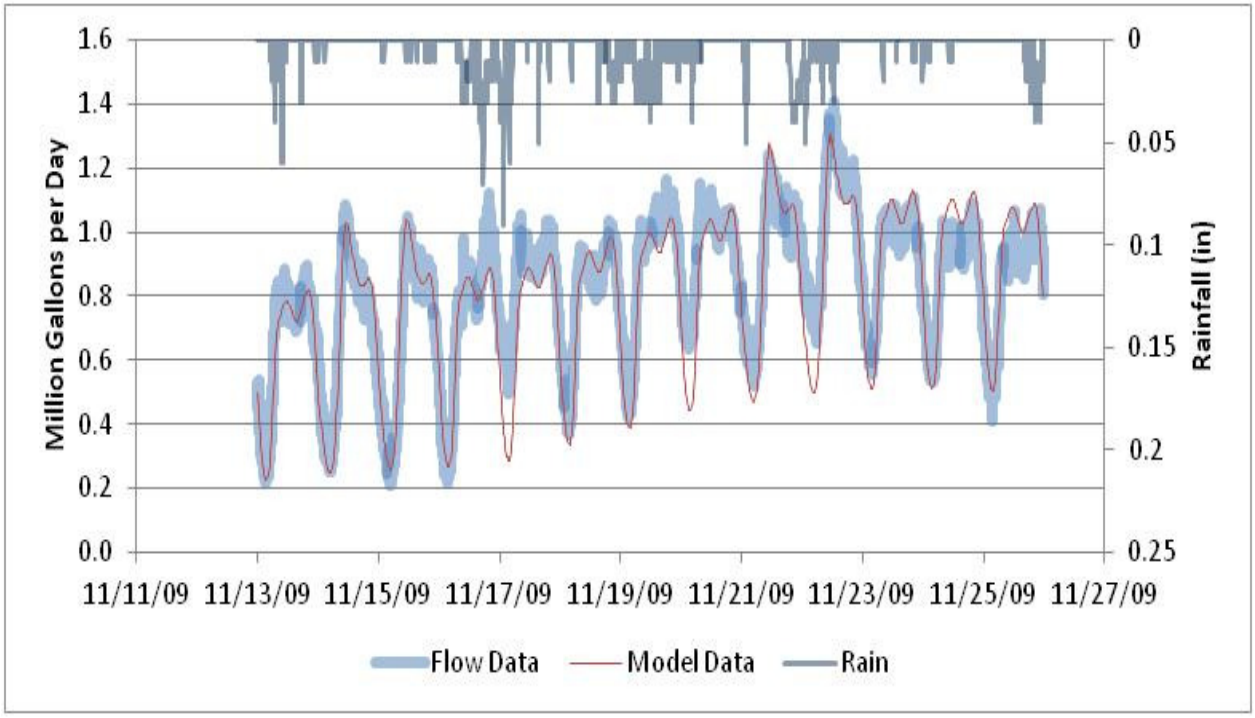

Figure 77. SFE No 02 – November 13 – 26, 2009
Rainfall = 16.72 in,
Flow Volume = 10.81 MG
Model Volume = 10.49 MG

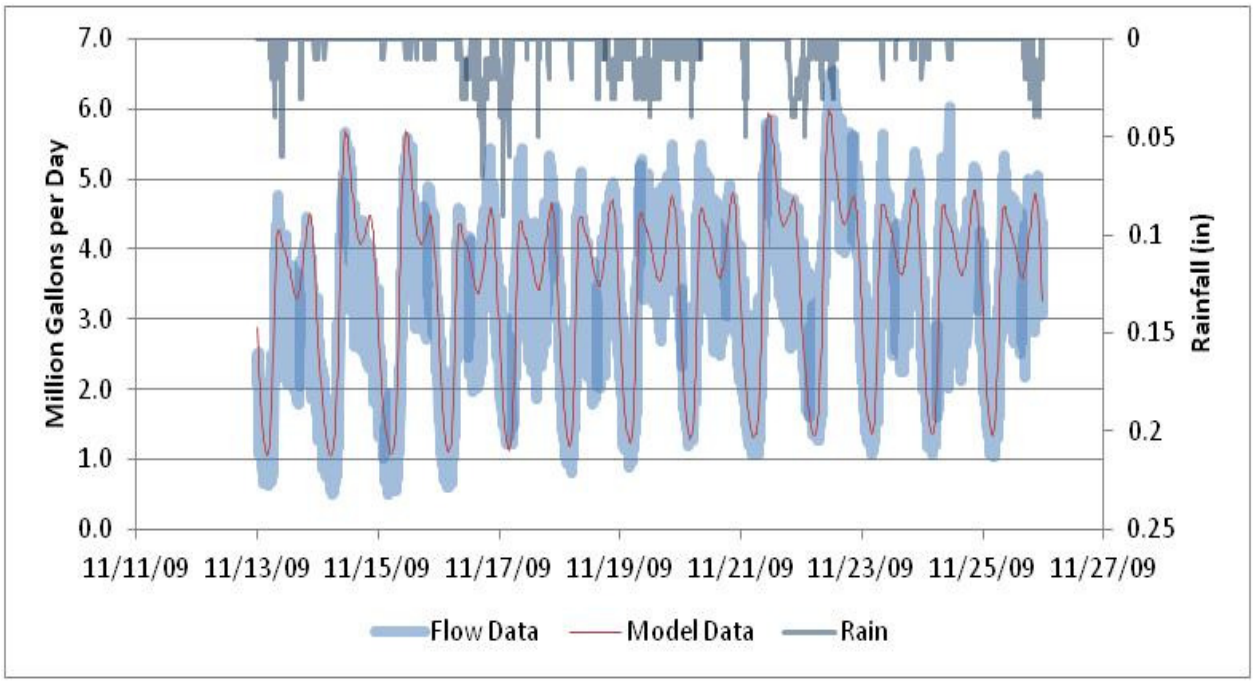

Figure 78. SFE No 03 – November 13 – 26, 2009
Rainfall = 16.72 in,
Flow Volume = 41.93 MG
Model Volume = 45.40 MG

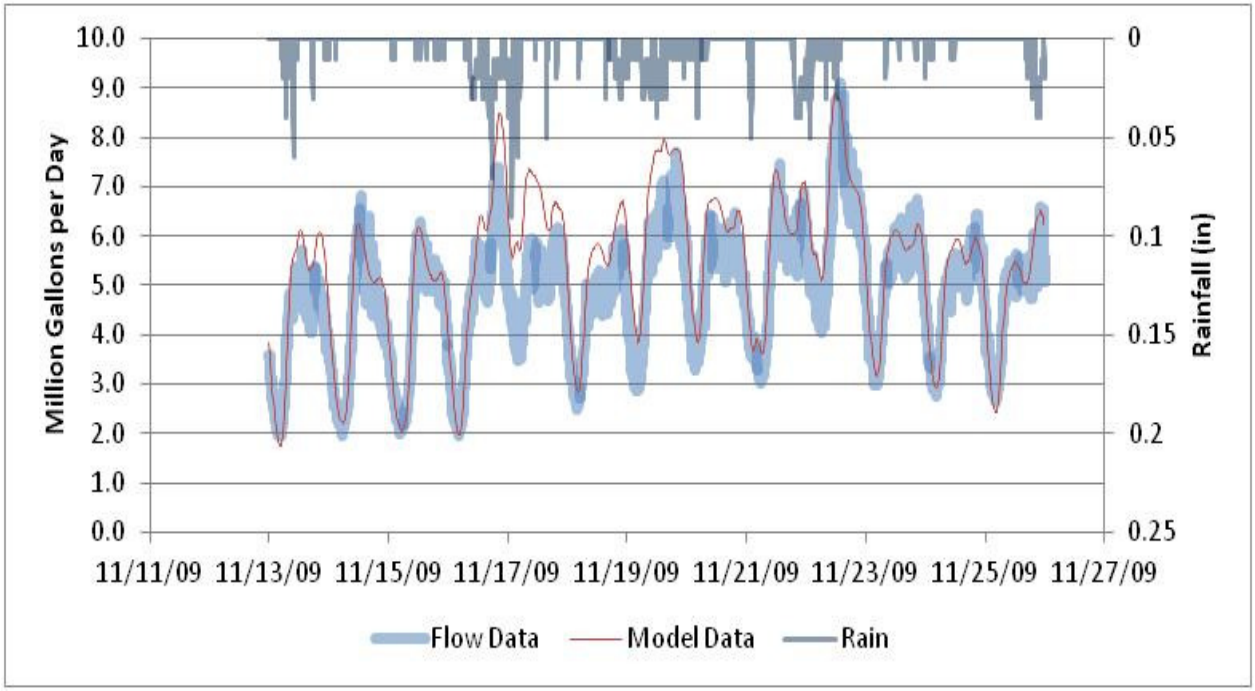

Figure 79. SFE No 04 – November 13 – 26, 2009
Rainfall = 16.72 in,
Flow Volume = 63.20 MG
Model Volume = 70.37 MG

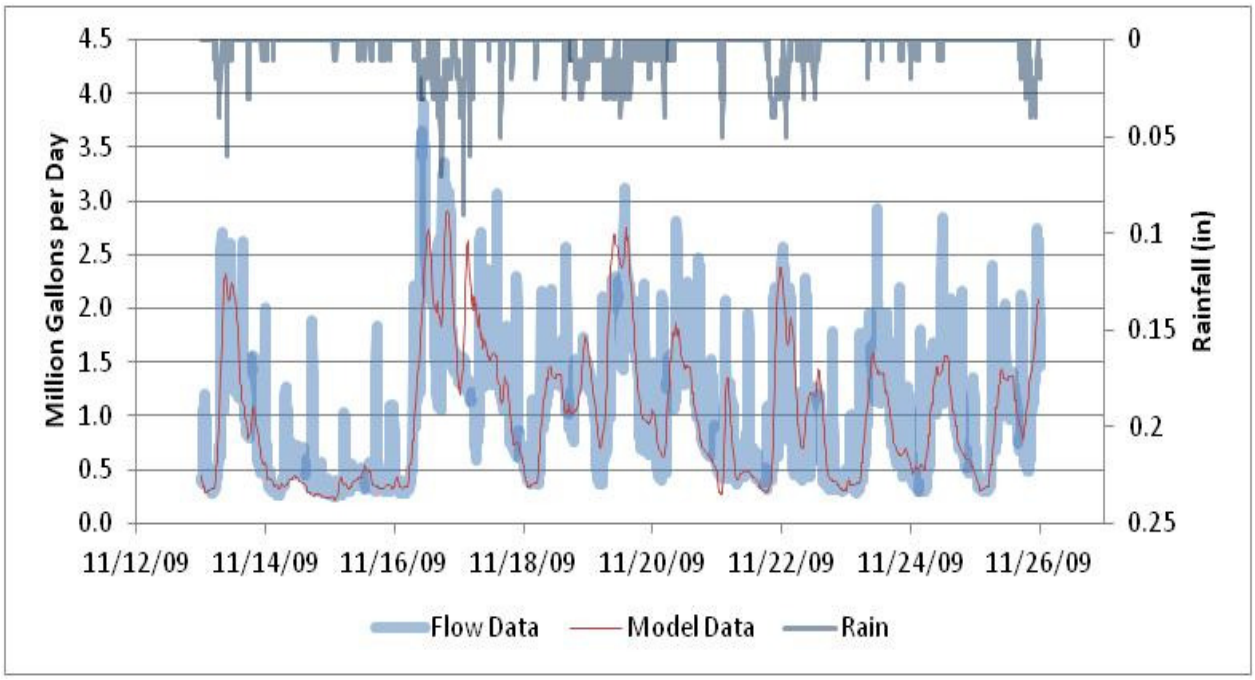

Figure 80. SFE No 20 – November 13 – 26, 2009
Rainfall = 16.72 in,
Flow Volume = 13.26 MG
Model Volume = 13.06 MG

Section 10
Wet Weather Flow Calibration
Event Period
August 31 to September 8, 2010

Table 81. Calibration Event Summary - August 31 to September 6, 2010

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
12B	0.90	25.00	9/1/10 0:20	0.56	20.10	9/1/10 0:00	0.3	4.9	38%	20%
13	9.93	20.00	8/31/10 23:50	10.46	22.80	9/1/10 0:30	-0.5	-2.8	-5%	-14%
14	0.09	0.89	9/1/10 0:35	0.02	1.29	9/1/10 0:30	0.1	-0.4	78%	-45%
18	0.56	3.59	9/1/10 0:15	0.98	3.01	8/31/10 23:15	-0.4	0.6	-75%	16%
24A	5.15	22.20	9/1/10 0:15	5.31	19.90	9/1/10 0:15	-0.2	2.3	-3%	10%
24B	0.98	13.80	9/1/10 0:20	1.98	9.10	9/1/10 0:00	-1.0	4.7	-102%	34%
25	11.87	69.30	9/1/10 0:15	10.60	15.60	9/1/10 3:00	1.3	53.7	11%	77%
26A	2.91	10.30	8/31/10 21:15	2.92	8.70	9/1/10 0:15	0.0	1.6	0%	16%
1	4.64	1.1	9/6/10 11:45	5	0.94	9/4/10 10:00	-0.4	0.2	-8%	15%
2	3.94	0.98	9/2/10 19:00	5.84	1.16	9/4/10 11:00	-1.9	-0.2	-48%	-18%
20	5.52	2.81	9/2/10 13:15	7.54	3.66	9/1/10 0:00	-2.0	-0.9	-37%	-30%
23	42.59	14.55	8/31/10 21:35	42.17	11.40	8/31/10 22:40	0.4	3.2	1%	22%

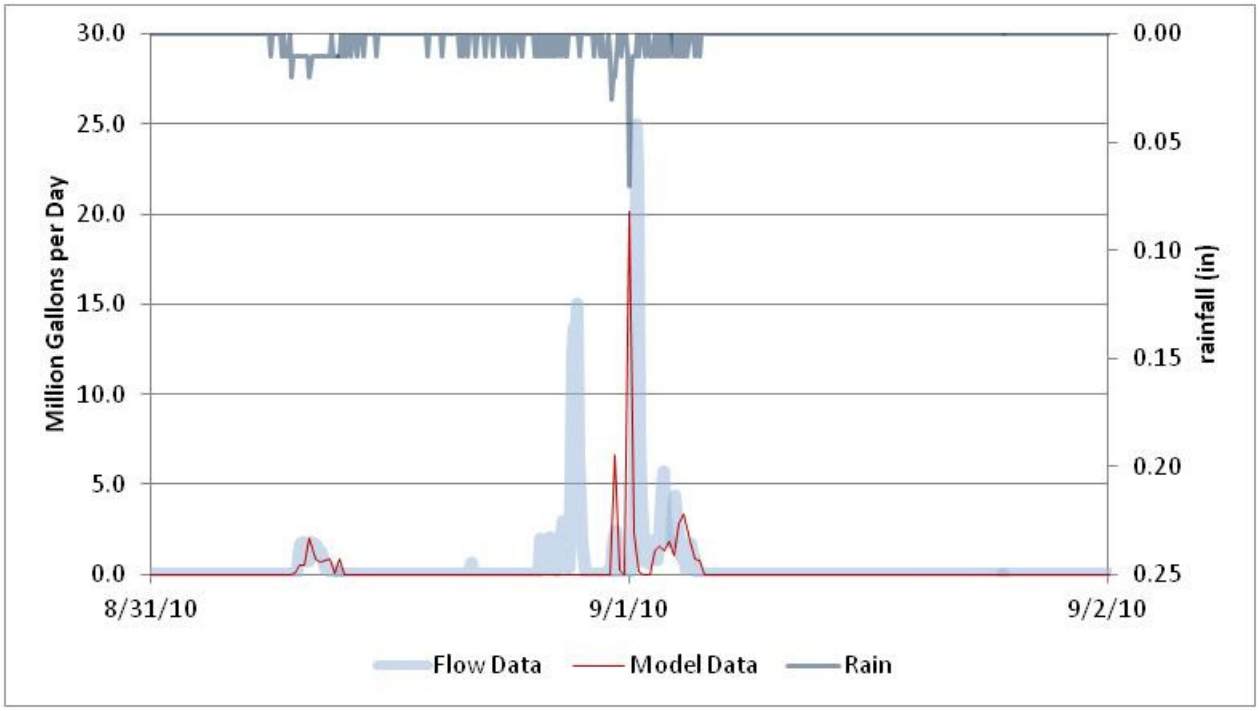

Figure 82. SFE No 12B – August 31 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 0.9 MG
Model Volume = 0.6 MG

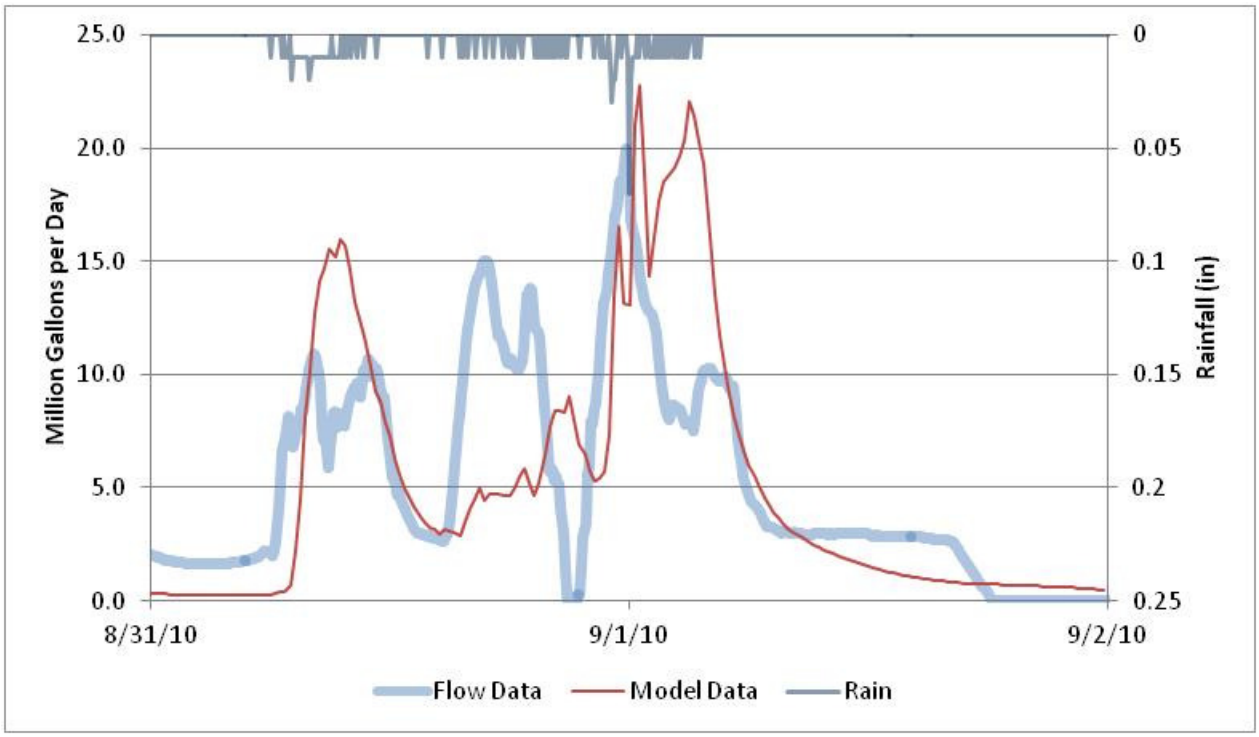

Figure 83. SFE No 13 – August 31 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 9.9 MG
Model Volume = 10.4 MG

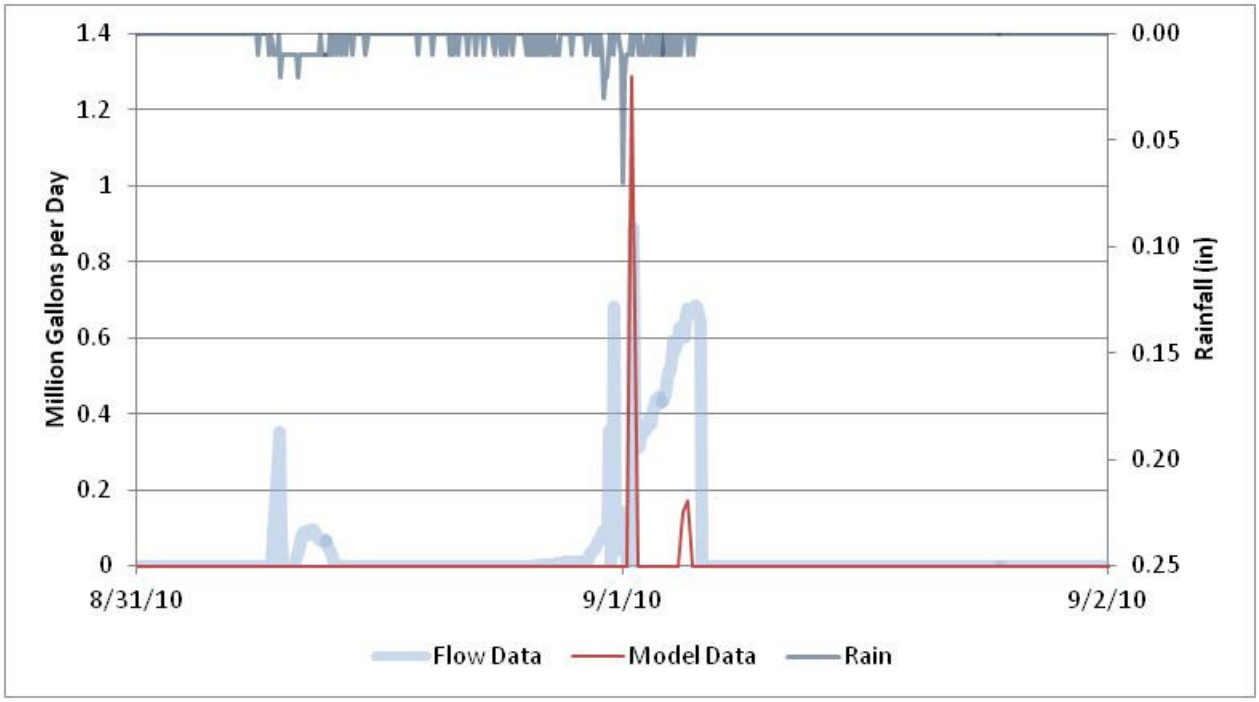

Figure 84. SFE No 14 – August 31 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 0.1 MG
Model Volume = 0.02 MG

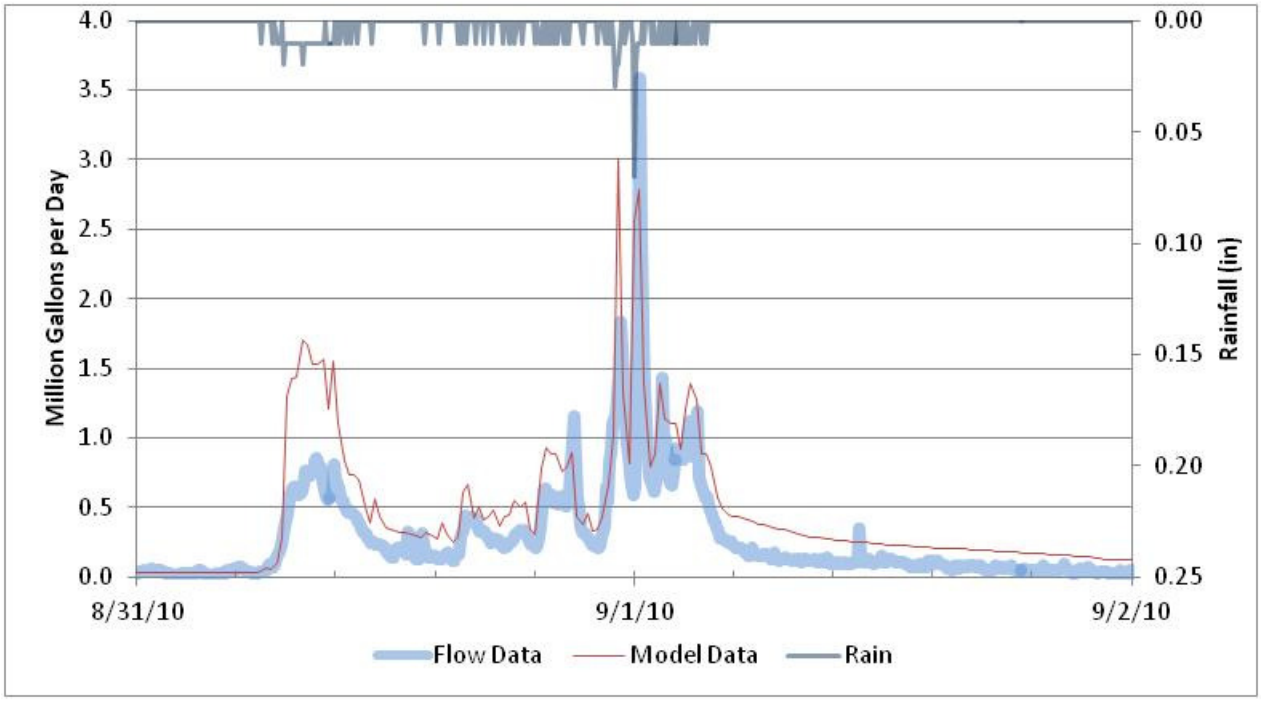

Figure 85. SFE No 18 – August 31 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 0.6 MG
Model Volume = 1.0 MG

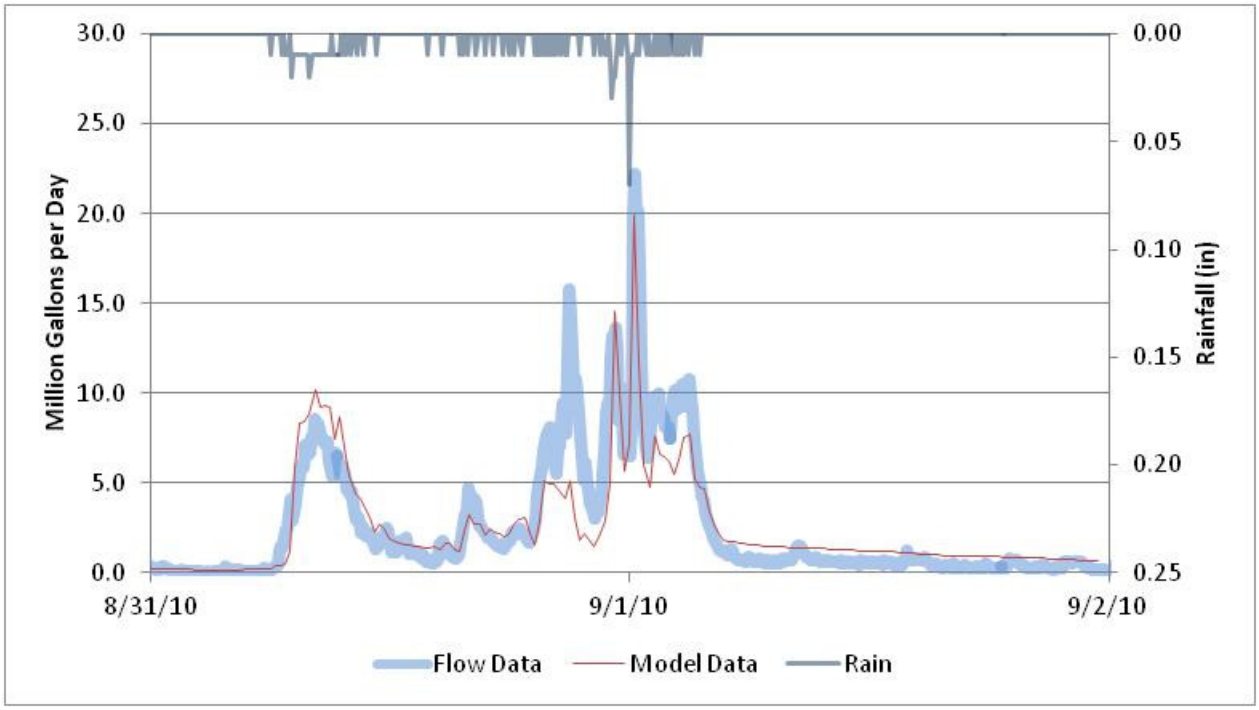

Figure 86. SFE No 24A – August 30 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 5.1 MG
Model Volume = 5.3 MG

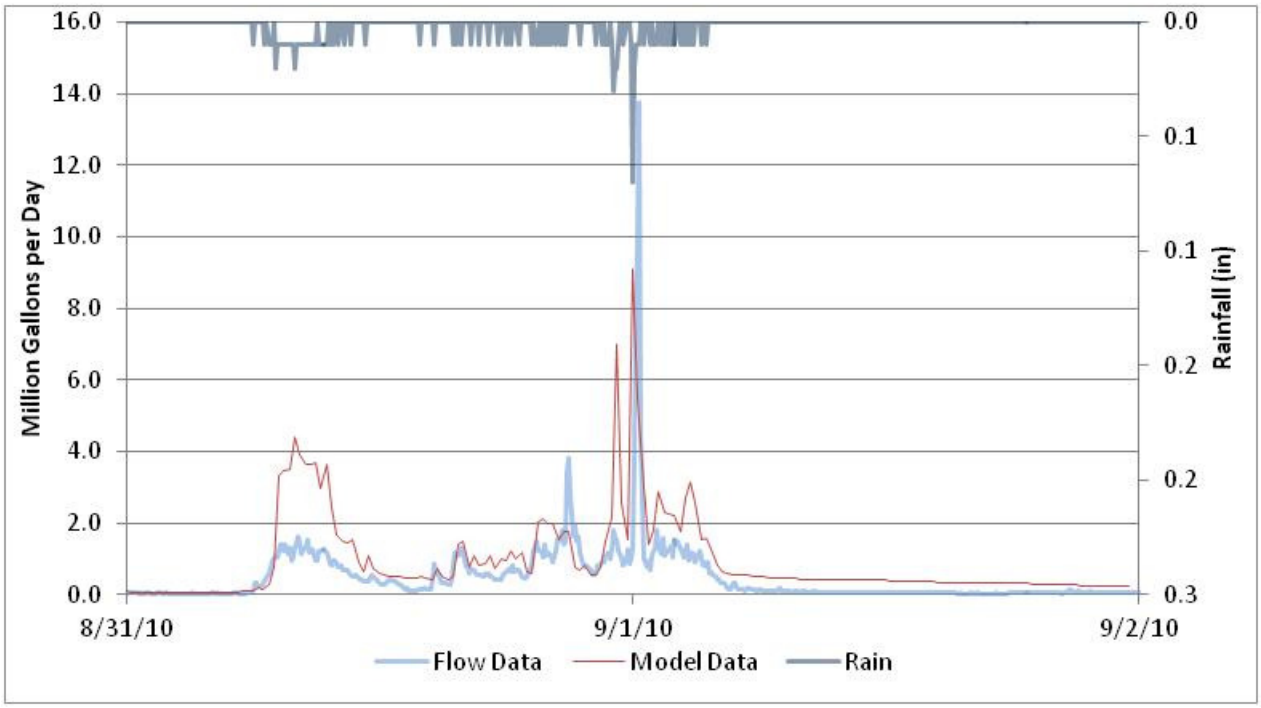

Figure 87. SFE No 24B – August 31 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 1.0 MG
Model Volume = 1.9 MG

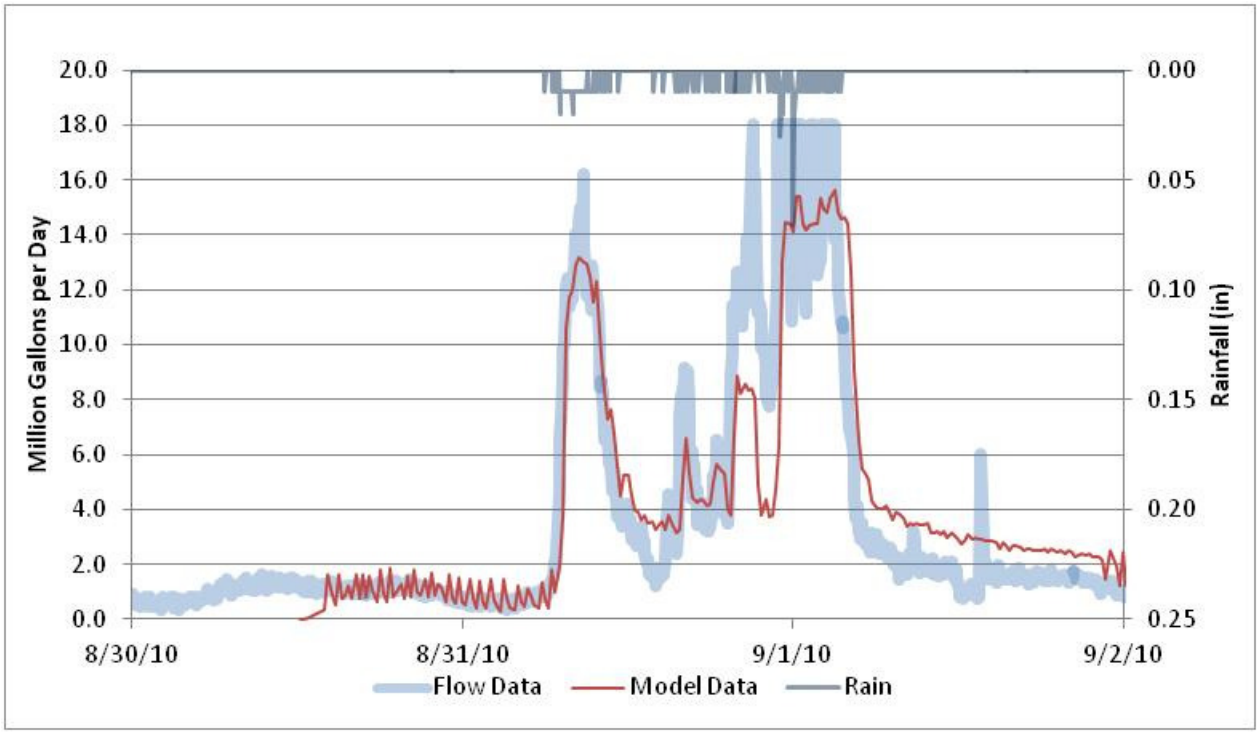

Figure 88. SFE No 25 – August 30 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 11.9 MG
Model Volume = 10.6 MG

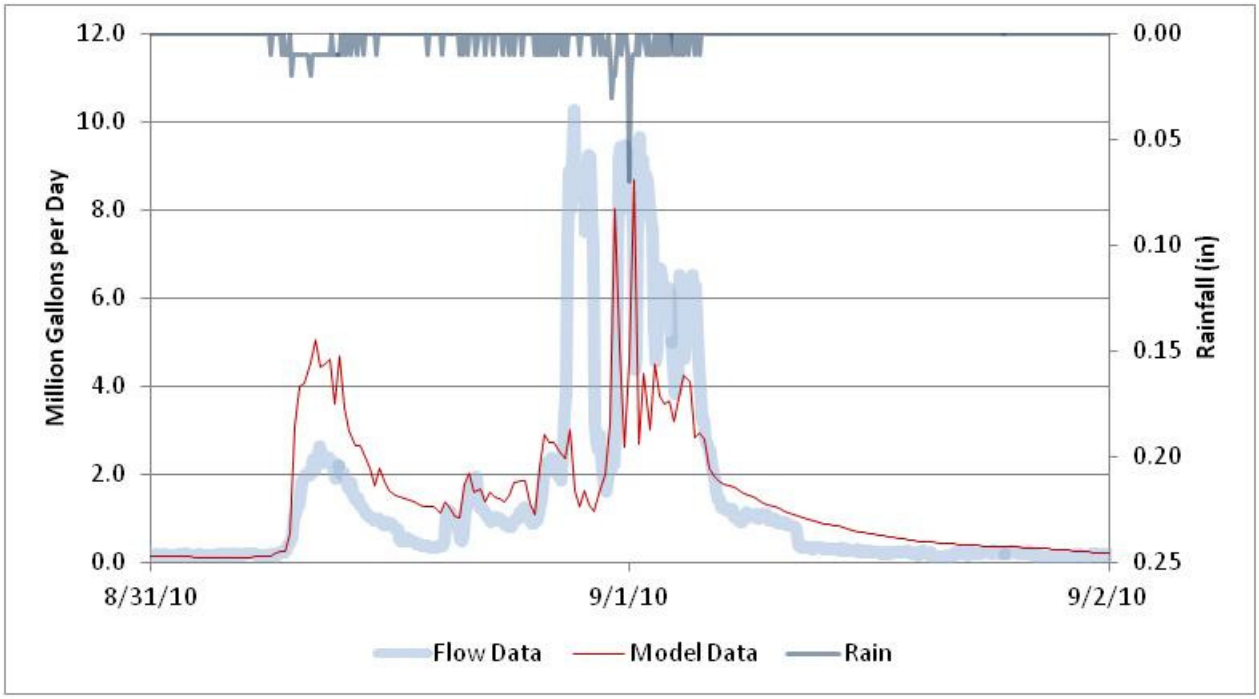

Figure 89. SFE No 26A – August 31 – September 1, 2010
Rainfall = 1.11 in,
Flow Volume = 2.9 MG
Model Volume = 2.9 MG

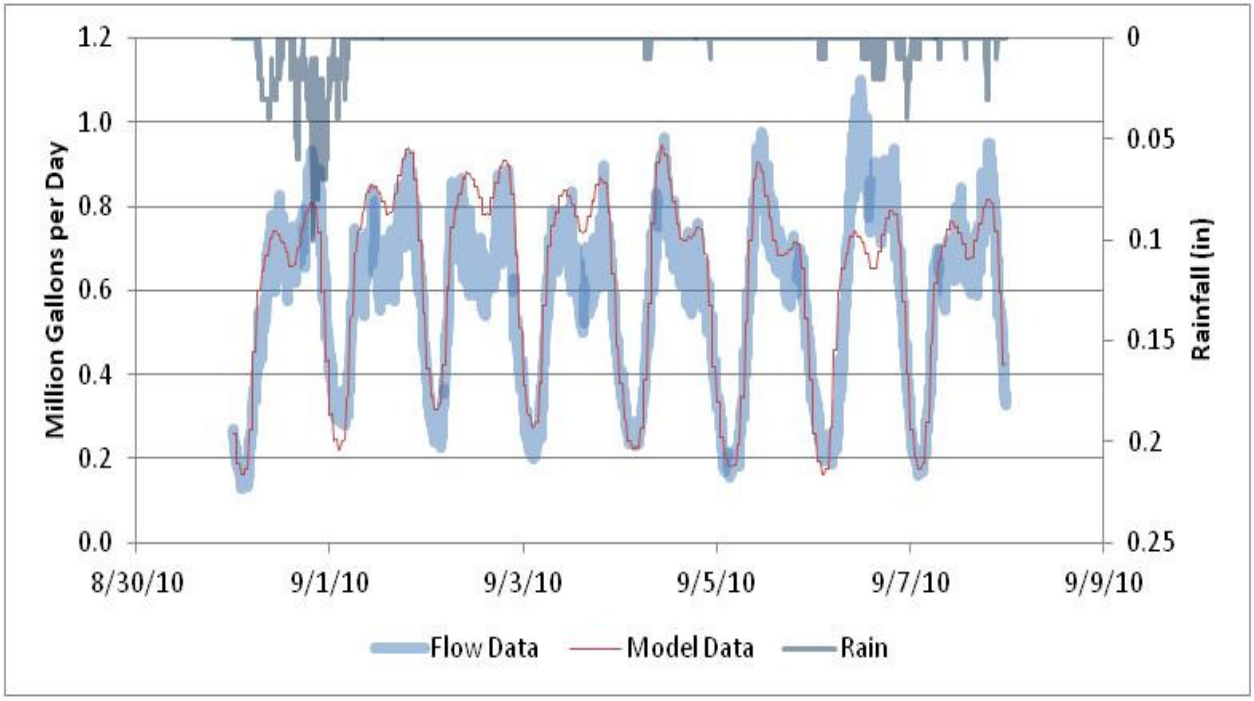

Figure 90. SFE No 01 – August 31 – September 8, 2010
Rainfall = 7.53 in,
Flow Volume = 4.64 MG
Model Volume = 4.99 MG

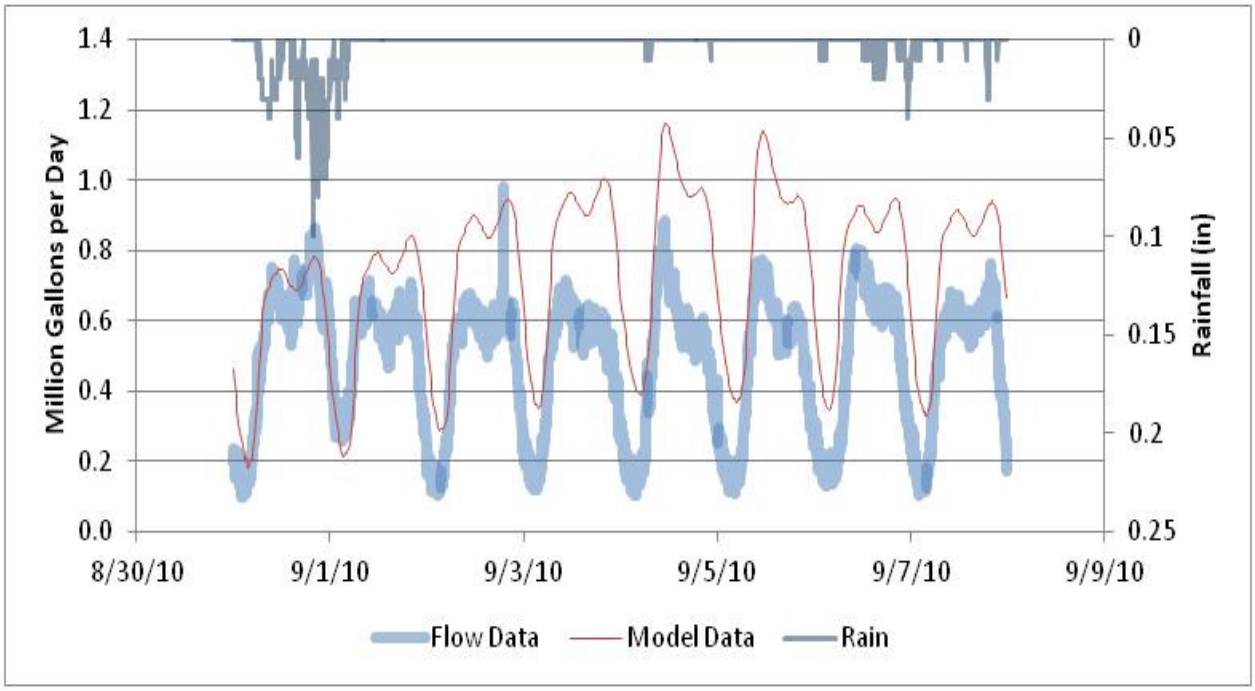

Figure 91. SFE No 02 – August 31 – September 8, 2010
Rainfall = 7.53 in,
Flow Volume = 3.94 MG
Model Volume = 5.85 MG

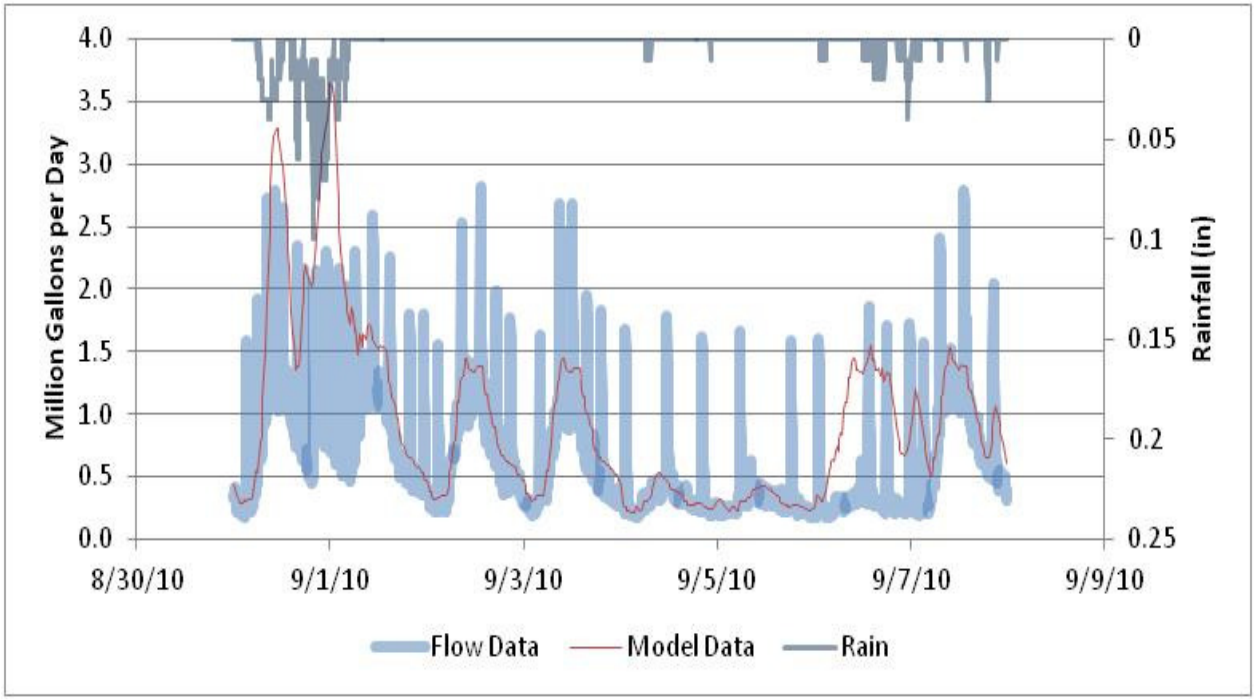

Figure 92. SFE No 20 – August 31 – September 8, 2010
Rainfall = 7.53 in,
Flow Volume = 5.52 MG
Model Volume = 7.54 MG

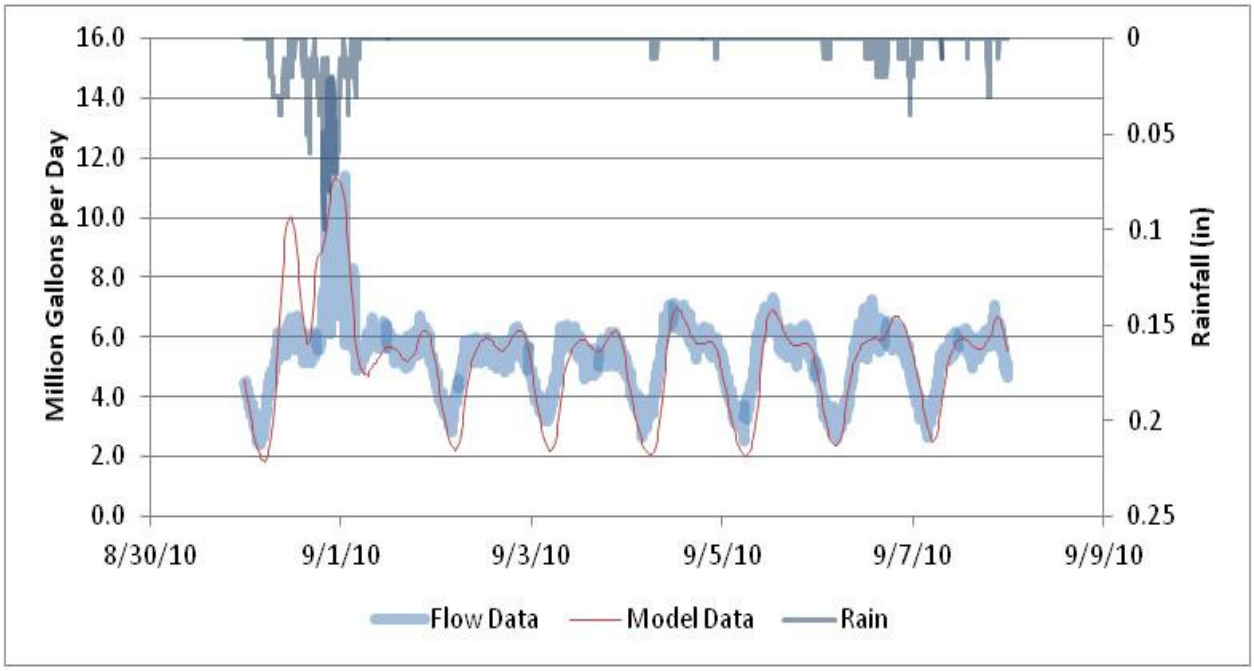

Figure 93. SFE No 23 – August 31 – September 8, 2010
Rainfall = 7.53 in,
Flow Volume = 42.59 MG
Model Volume = 42.17 MG

Section 11
Wet Weather Flow Calibration
Event Period
December 7 to 15, 2010

Table 94. Calibration Event Summary – December 7 to 15 2010

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
13	14.81	10.26	12/12/10 22:20	26.31	22.97	12/9/10 21:30	-11.5	-12.7	-78%	-124%
18	2.49	4.82	12/14/10 1:20	2.23	3.23	12/14/10 1:15	0.3	1.6	10%	33%
24A	15.38	26.30	12/14/10 1:15	13.08	20.10	12/14/10 1:15	2.3	6.2	15%	24%
24B	5.17	19.40	12/14/10 1:15	4.73	8.60	12/14/10 1:15	0.4	10.8	9%	56%
25	33.02	77.50	12/14/10 1:10	27.20	16.30	12/9/10 21:15	5.8	61.2	18%	79%
26A	9.85	12.50	12/14/10 1:25	7.62	9.20	12/14/10 1:15	2.2	3.3	23%	26%

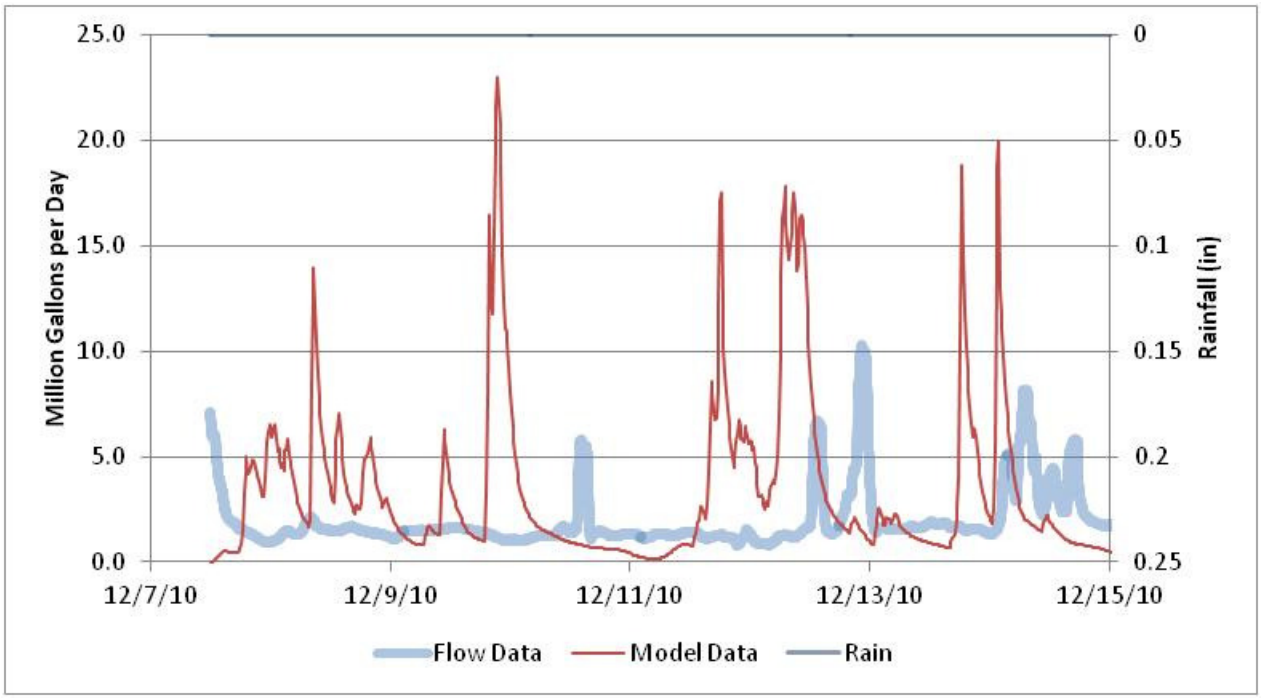

Figure 95. SFE No 13 – December 7 – 15, 2010
Rainfall = 1.99 in,
Flow Volume = 14.8 MG
Model Volume = 26.3 MG

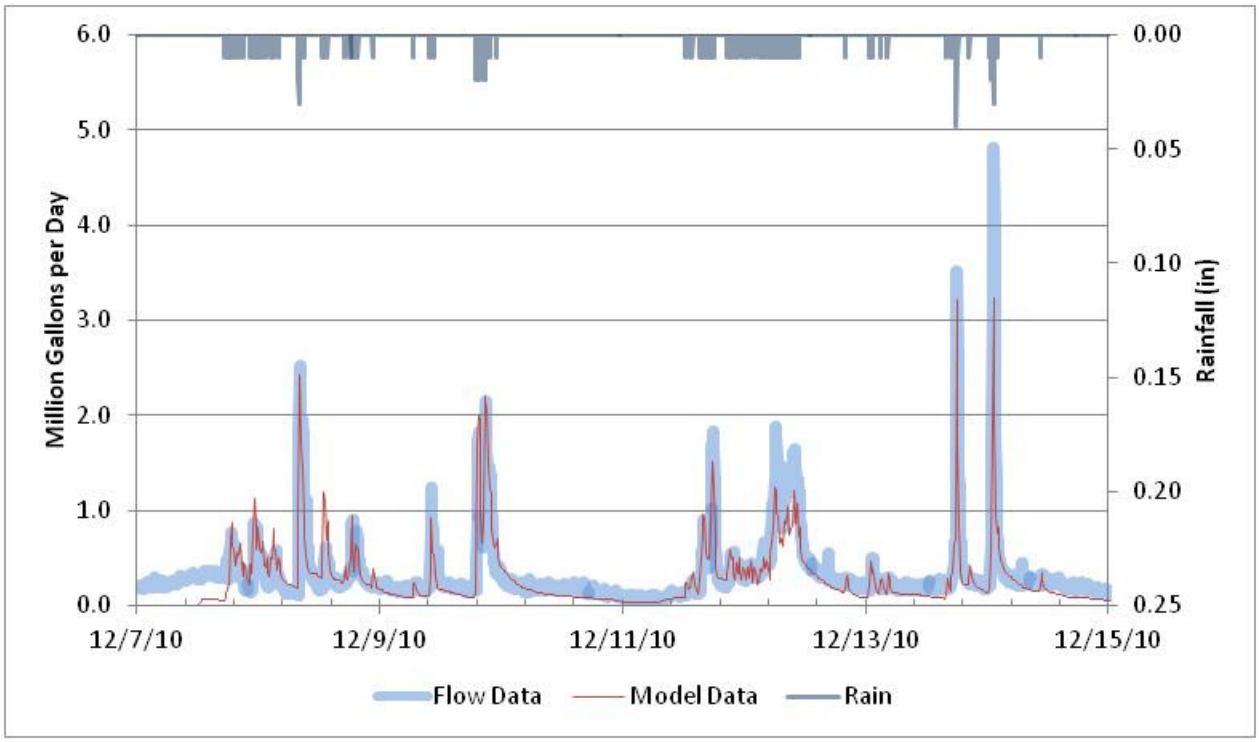

Figure 96. SFE No 18 – December 7 – 15, 2010
Rainfall = 1.99 in,
Flow Volume = 2.5 MG
Model Volume = 2.3 MG

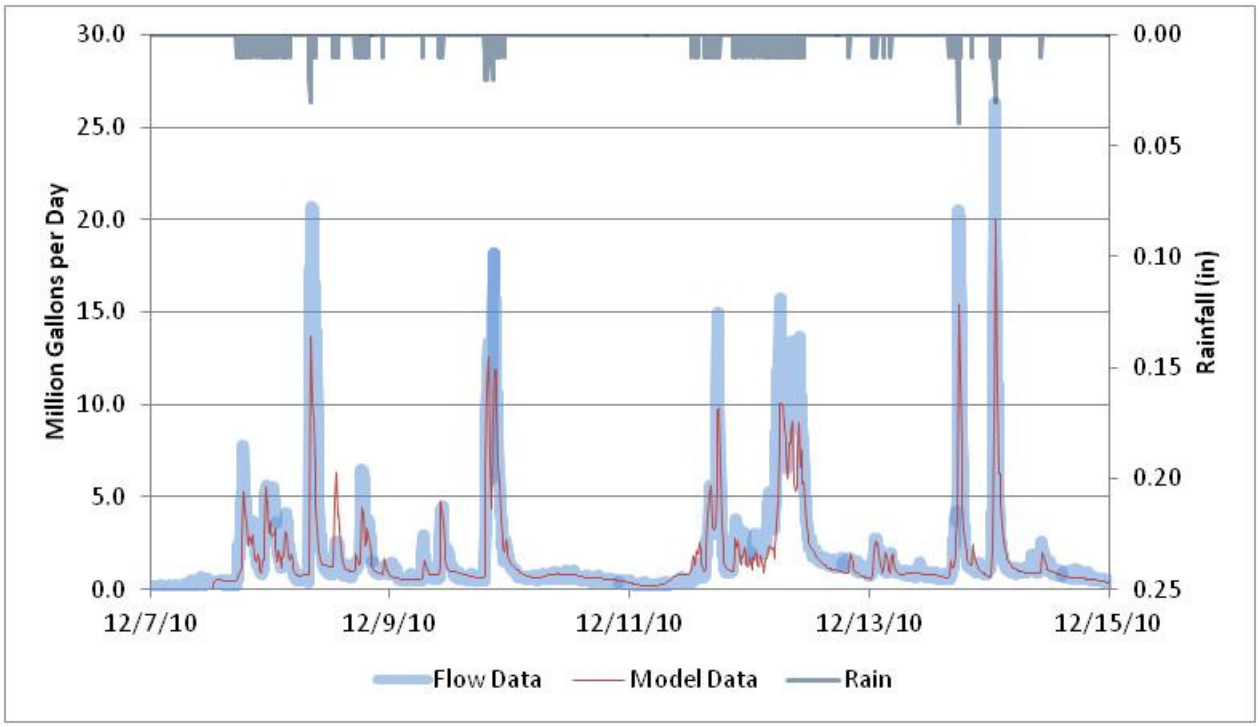

Figure 97. SFE No 24A – December 7 – 15, 2010
Rainfall = 1.99 in,
Flow Volume = 15.4 MG
Model Volume = 13.1 MG

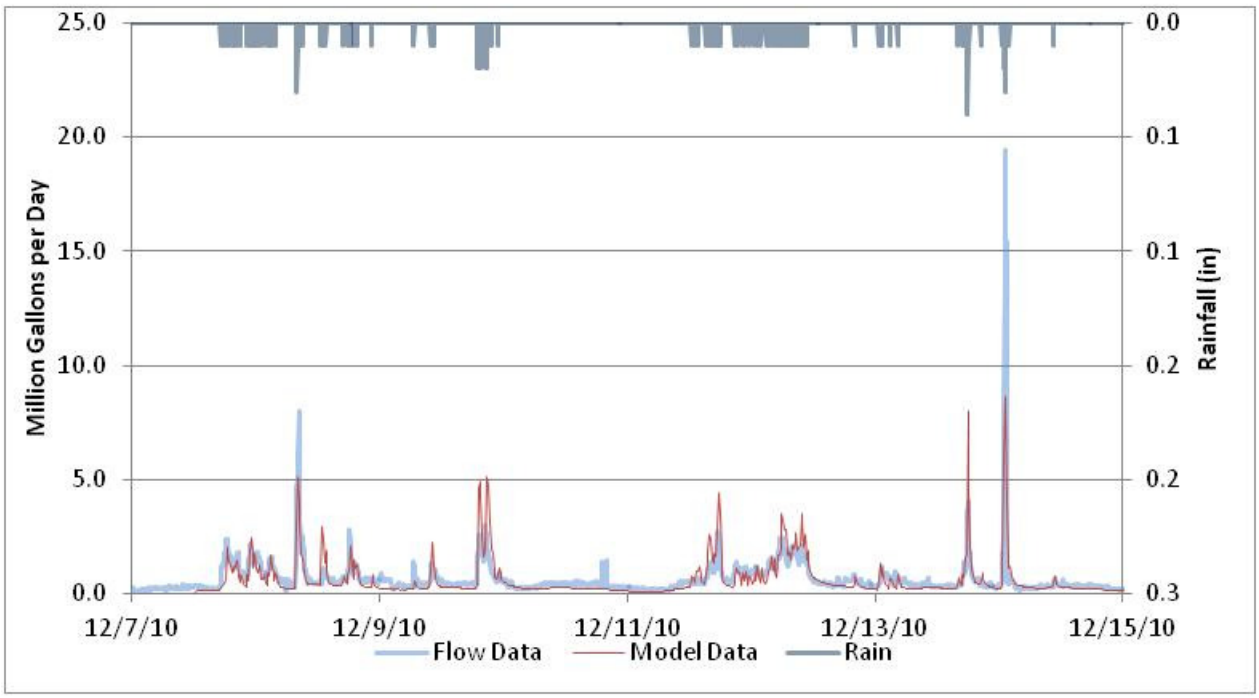

Figure 98. SFE No 24B – December 7 – 15, 2010
Rainfall = 1.99 in,
Flow Volume = 5.2 MG
Model Volume = 4.7 MG

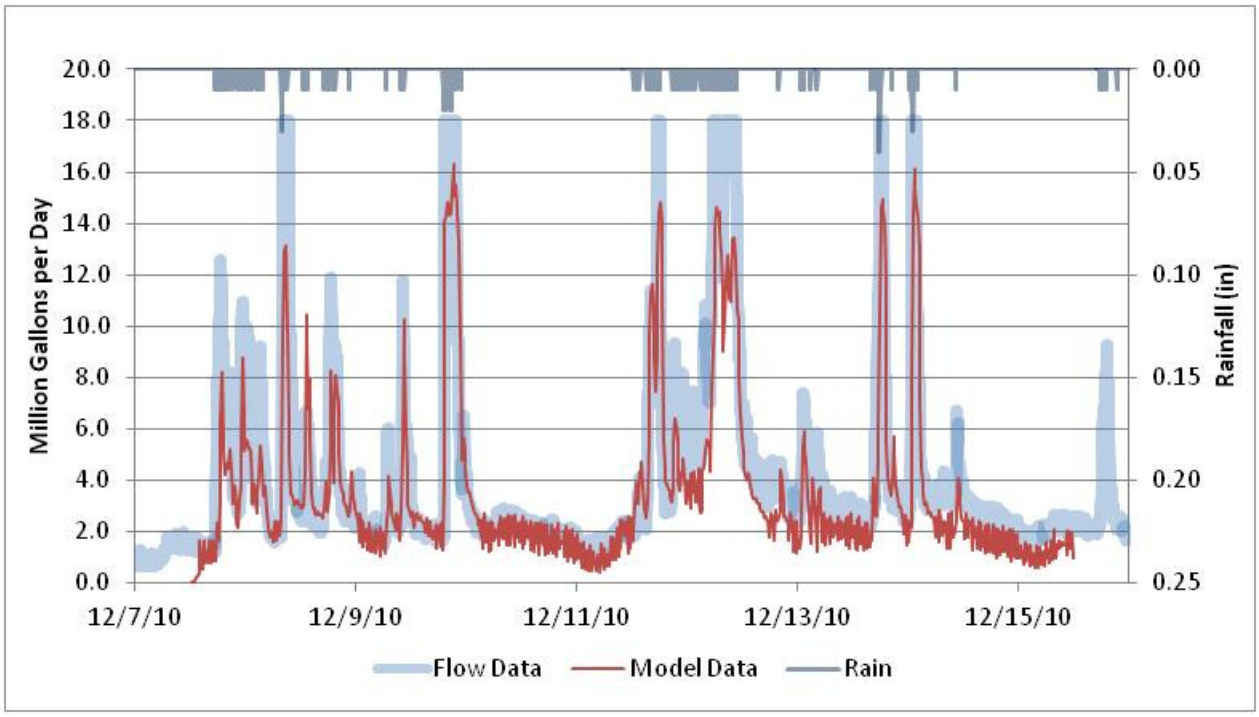

Figure 99. SFE No 25 – December 7 – 15, 2010
Rainfall = 1.99 in,
Flow Volume = 33.6 MG
Model Volume = 27.2 MG

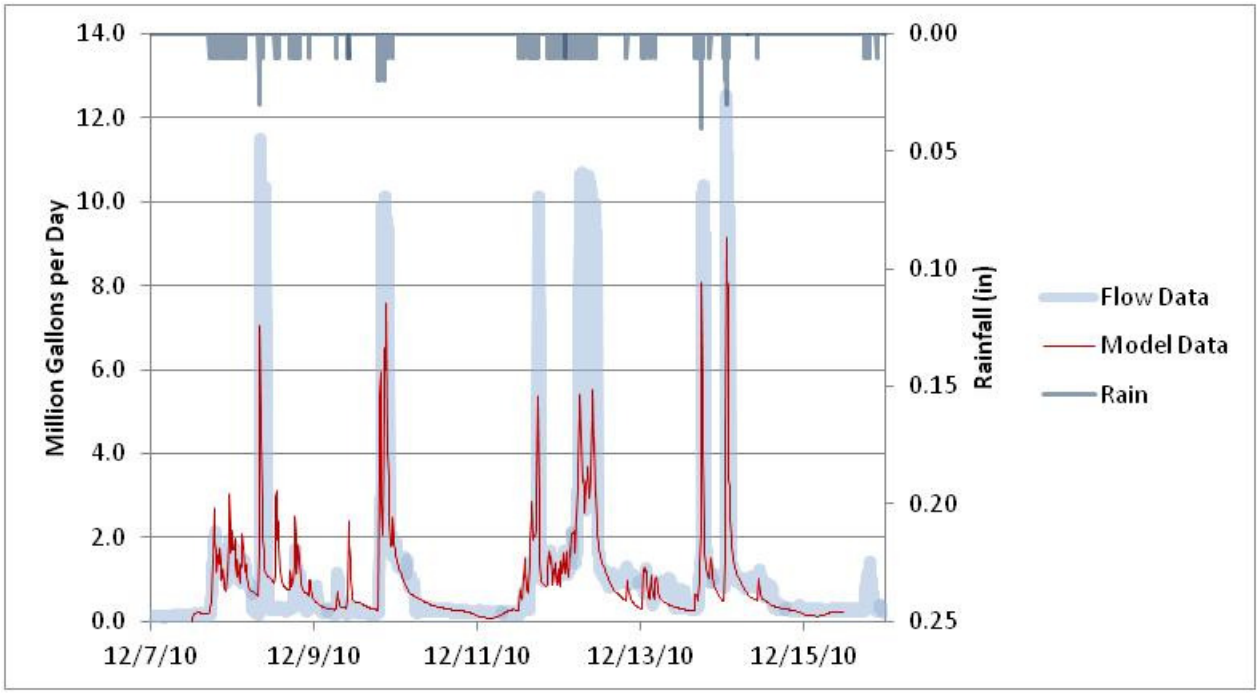

Figure 100. SFE No 26A – December 7 – 15, 2010
Rainfall = 1.99 in
Flow Volume = 9.6 MG
Model Volume = 7.6 MG

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Section 12
Wet Weather Flow Calibration
Event Period
June 6 to 11, 2010

Table 101. Calibration Event Summary – June 6 to 11, 2010

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
24A	10.37	33.90	6/9/10 15:30	9.77	47.90	6/9/10 16:00	0.6	-14.0	6%	-41%
24B	2.07	41.50	6/9/10 15:20	3.42	25.70	6/9/10 15:45	-1.4	15.8	-66%	38%
25	18.67	66.60	6/7/10 4:30	18.32	17.30	6/9/10 16:00	0.4	49.3	2%	74%

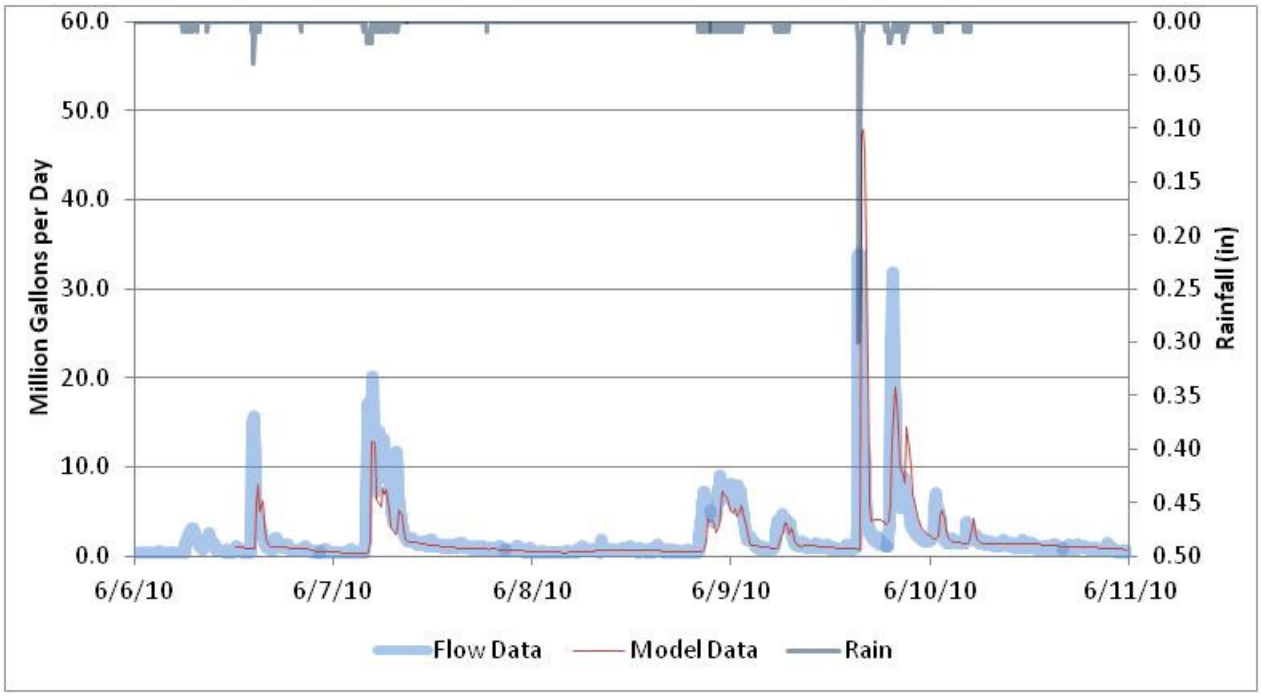

Figure 102. SFE No 24A – June 6 – 11, 2010
Rainfall = 2.18 in,
Flow Volume = 10.4 MG
Model Volume = 9.8 MG

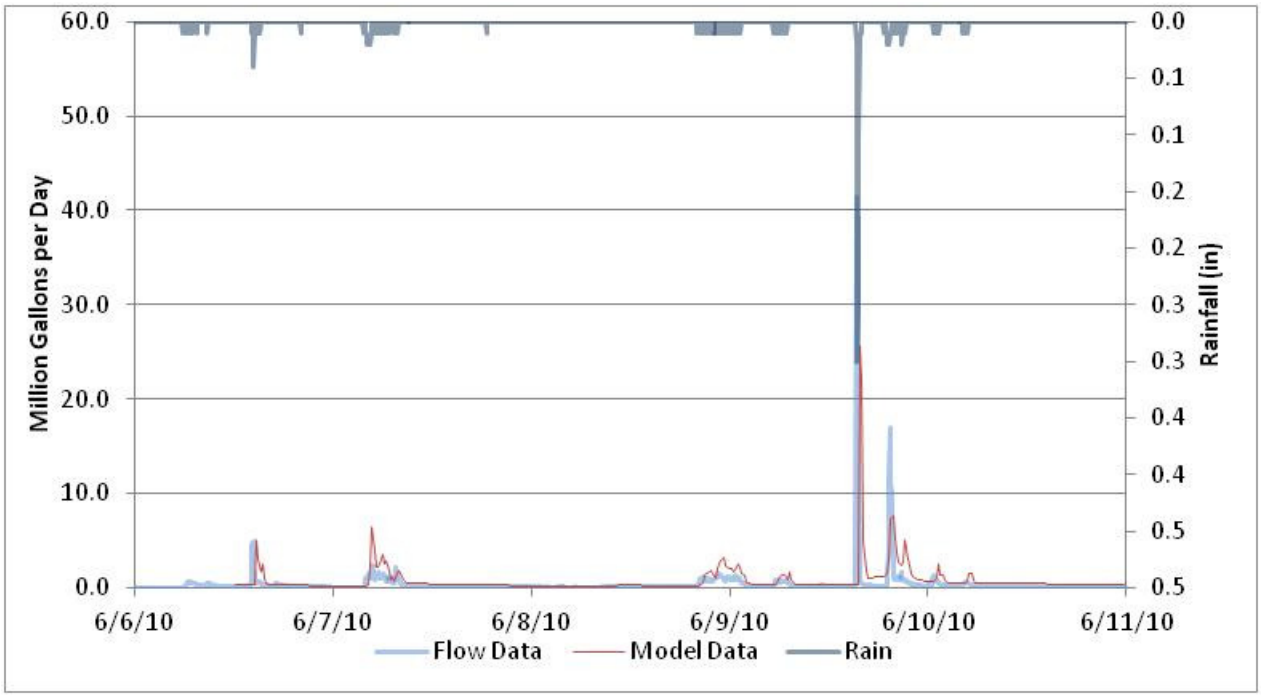

Figure 103. SFE No 24B – June 6 – 11, 2010
Rainfall = 2.18 in,
Flow Volume = 2.1 MG
Model Volume = 3.4 MG

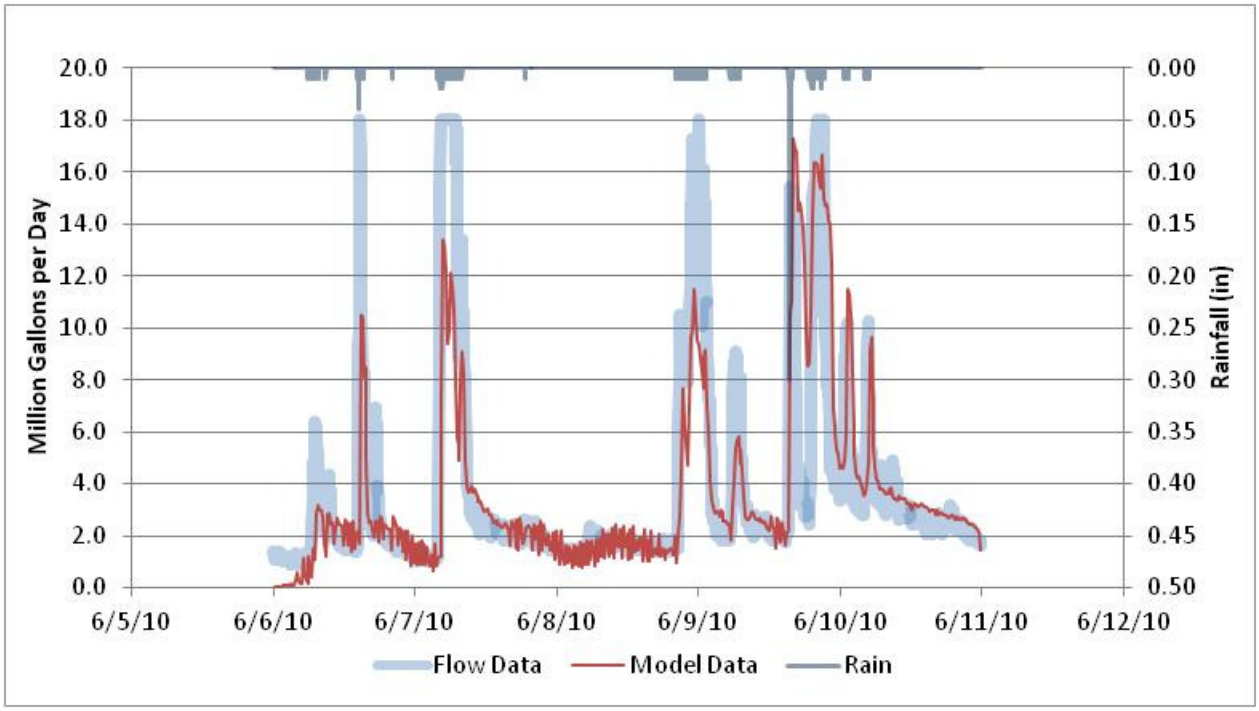

Figure 104. SFE No 25 – June 6 – 11, 2010

Rainfall = 2.18 in,
Flow Volume = 19.0 MG
Model Volume = 18.3 MG

Section 13
Wet Weather Flow Calibration
Event Period
November 20 to 27, 2011

Table 105. Calibration Event Summary –November 20- to 27, 2011

Flow Monitor	Observed			Predicted			Absolute Difference Volume (MG)	Absolute Difference in Peak (mgd)	% Difference Volume	% Difference Peak
	Volume (MG)	Peak (mgd)	Time @ Peak	Volume (MG)	Peak (mgd)	Time @ Peak				
24A	16.74	42.20	11/23/11 5:55	17.09	49.20	11/23/11 5:45	-0.4	-7.0	-2%	-17%
24B	3.04	22.40	11/23/11 5:55	5.70	24.80	11/23/11 5:30	-2.7	-2.4	-88%	-11%
25	28.76	21.54	11/23/11 7:10	30.01	16.68	11/23/11 5:30	-1.3	4.9	-4%	23%
27	3.11	12.17	11/23/11 5:15	3.44	17.29	11/23/11 5:30	-0.3	-5.1	-11%	-42%

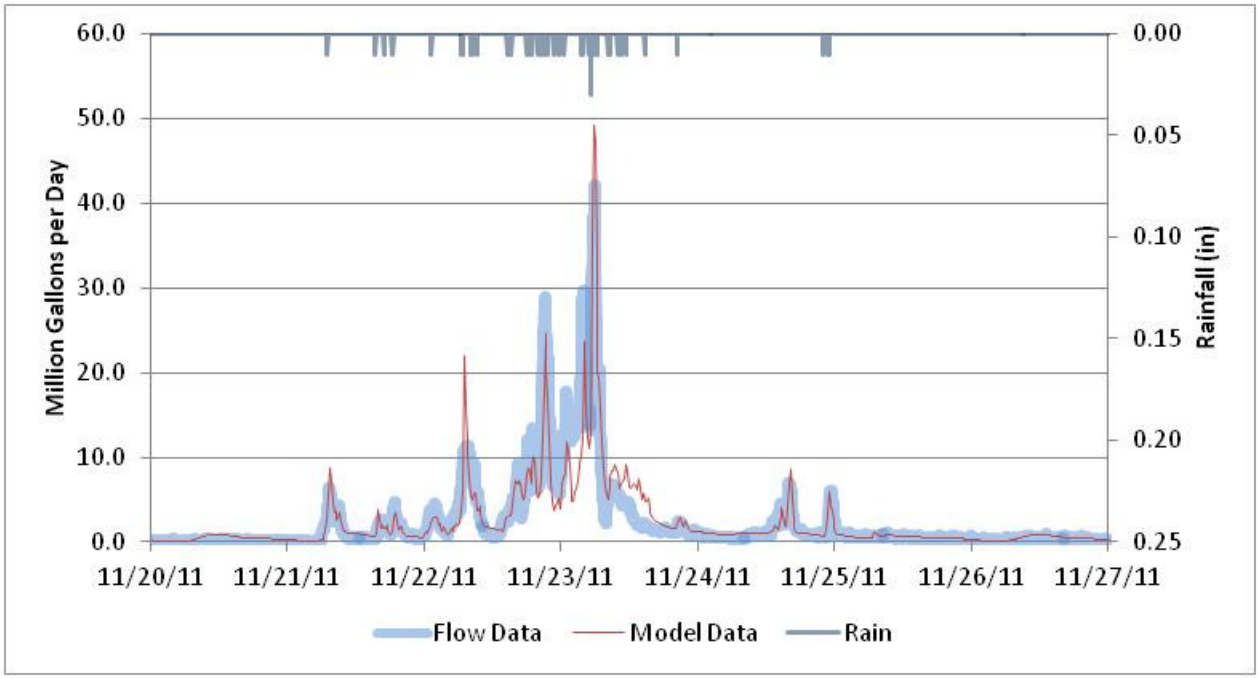

Figure 106. SFE No 24A – November 20 – 27, 2011
Rainfall = 2.54 in,
Flow Volume = 16.7 MG
Model Volume = 17.1 MG

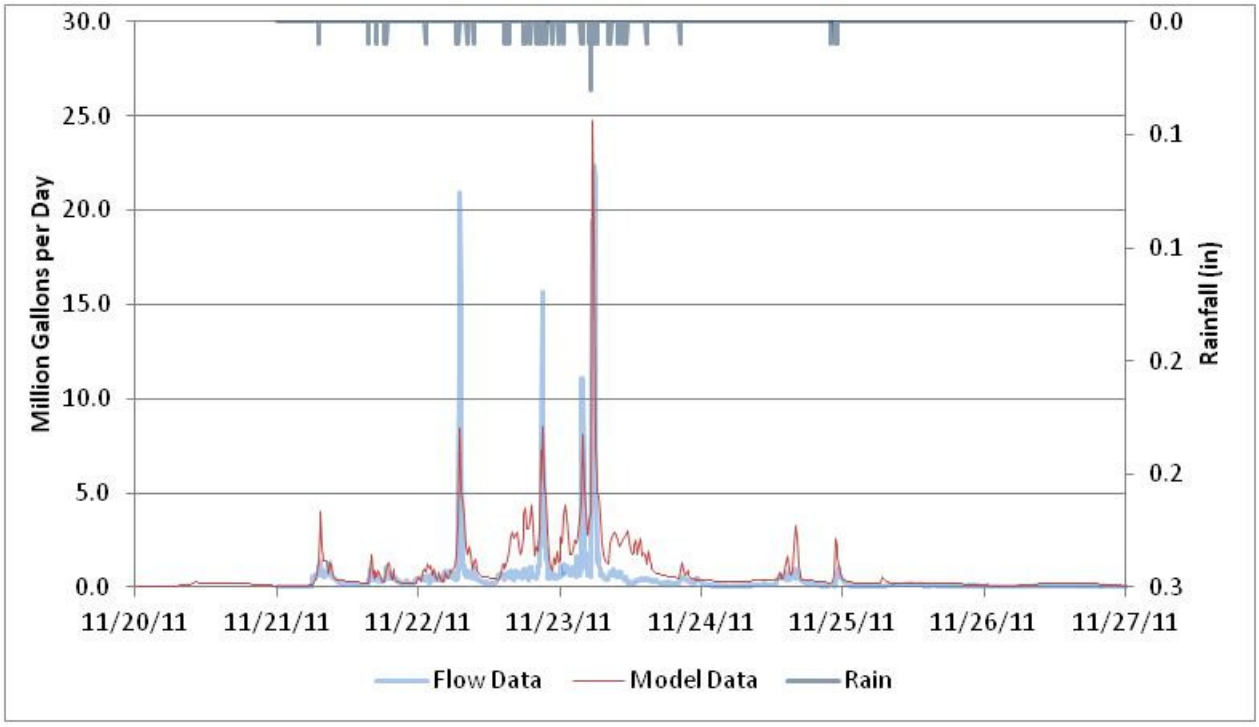

Figure 107. SFE No 24B – November 20 – 27, 2011
Rainfall = 2.54 in,
Flow Volume = 3.0 MG
Model Volume = 5.7 MG

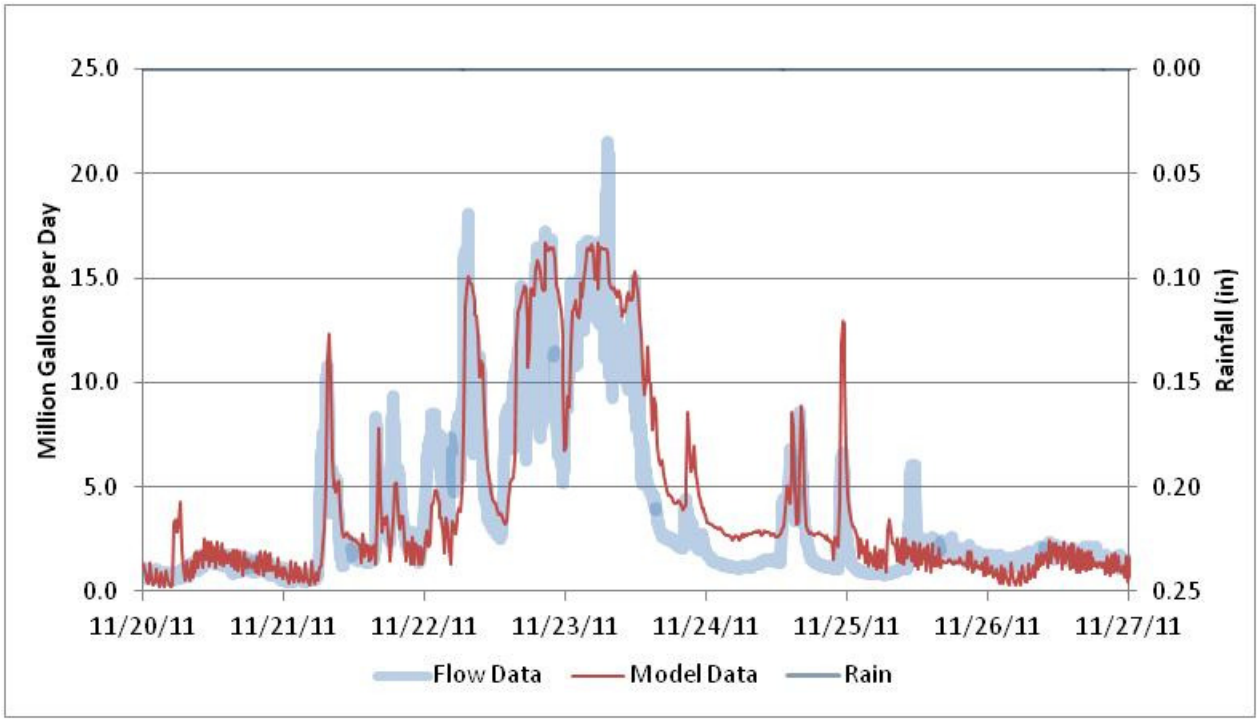

Figure 108. SFE No 25 – November 20 – 27, 2011
Rainfall = 2.54 in,
Flow Volume = 26.5 MG
Model Volume = 30.0 MG

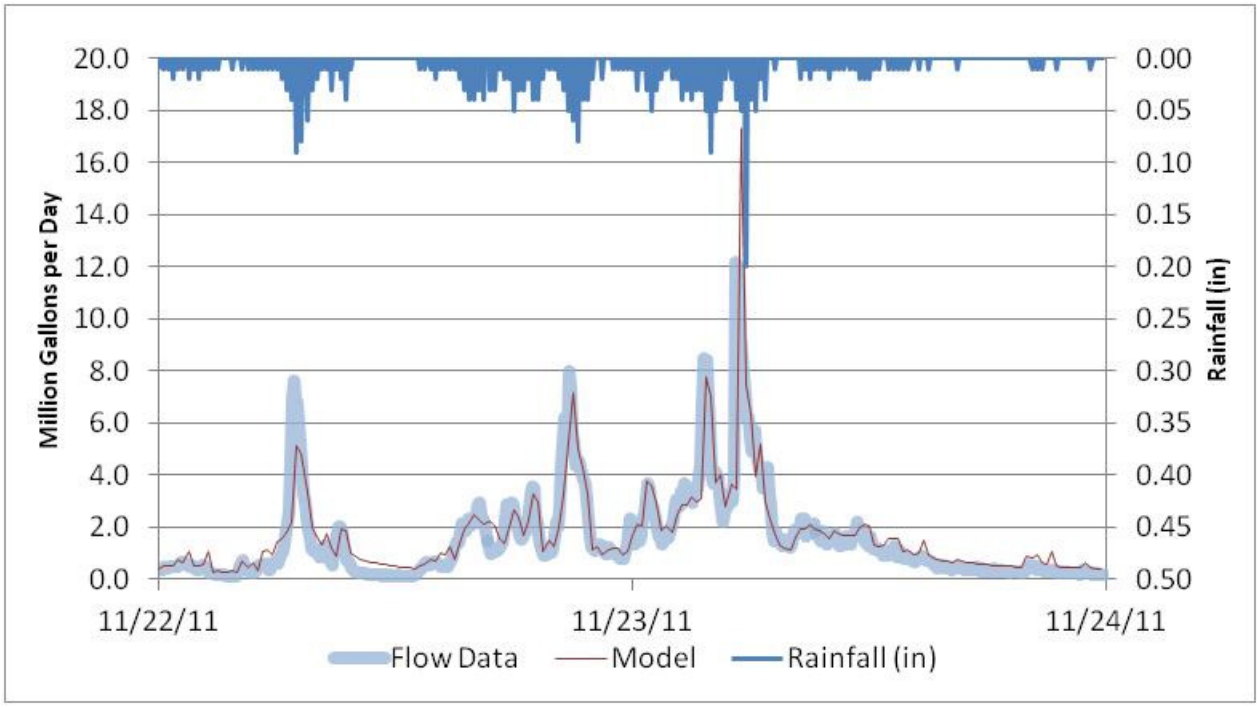

Figure 109. SFE No 27 – November 22 – 24, 2011
Rainfall = 2.54 in,
Flow Volume = 3.1 MG
Model Volume = 3.4 MG

Appendix B
As Builts

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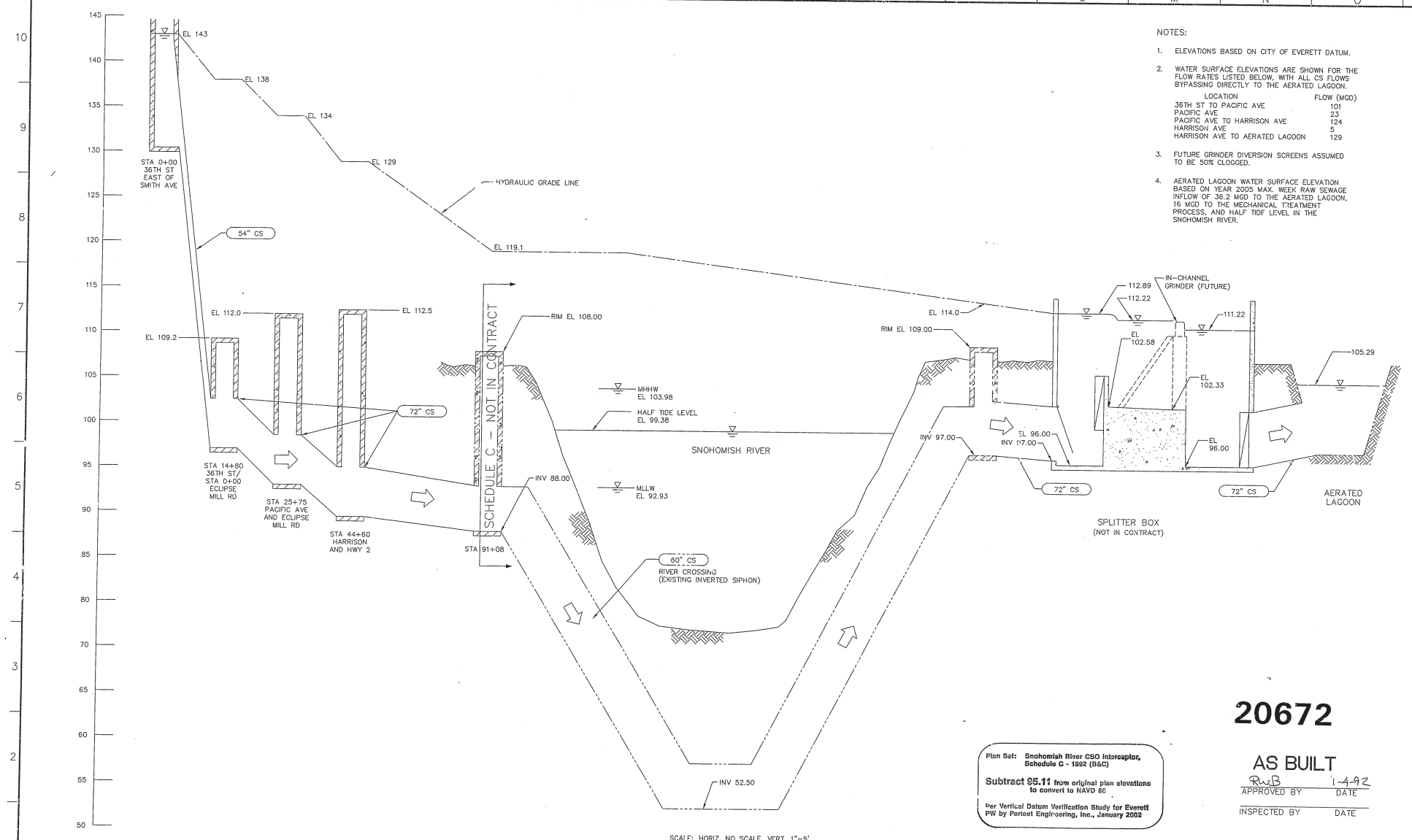


NOTES:

1. ELEVATIONS BASED ON CITY OF EVERETT DATUM.
2. WATER SURFACE ELEVATIONS ARE SHOWN FOR THE FLOW RATES LISTED BELOW, WITH ALL CS FLOWS BYPASSING DIRECTLY TO THE AERATED LAGOON.

LOCATION	FLOW (MGD)
36TH ST TO PACIFIC AVE	101
PACIFIC AVE	23
PACIFIC AVE TO HARRISON AVE	124
HARRISON AVE	5
HARRISON AVE TO AERATED LAGOON	129

3. FUTURE GRINDER DIVERSION SCREENS ASSUMED TO BE 50% CLOGGED.
4. AERATED LAGOON WATER SURFACE ELEVATION BASED ON YEAR 2005 MAX. WEEK RAW SEWAGE INFLOW OF 36.2 MGD TO THE AERATED LAGOON, 16 MGD TO THE MECHANICAL TREATMENT PROCESS, AND HALF TIDE LEVEL IN THE SNOHOMISH RIVER.

SCALE: HORIZ. NO SCALE, VERT. 1"=5'

Plan Set: Snohomish River CSO Interceptor, Schedule C - 1992 (B&C)

Subtract 95.11 from original plan elevations to convert to NAVD 88

Per Vertical Datum Verification Study for Everett PW by Perteet Engineering, Inc., January 2002

20672

AS BUILT

RWB 1-4-92
APPROVED BY DATE

INSPECTED BY DATE

Brown and Caldwell
Consultants
Seattle, Washington

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL
APPROVED: _____ DATE: _____

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE 24742AG02.DWG
DRAWN CADD TEAM
DESIGNED B. PERSICH
CHECKED R. SCHAEFER
CHECKED A. SHEN

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

CITY OF EVERETT

SNOHOMISH RIVER CSO INTERCEPTOR

HYDRAULIC PROFILE

SCHEDULE C
DRAWING NUMBER
G2
SHEET NUMBER
2

NOTES:

1. ELEVATIONS BASED ON CITY OF EVERETT DATUM.
2. WATER SURFACE ELEVATIONS ARE SHOWN FOR THE FLOW RATES LISTED BELOW:

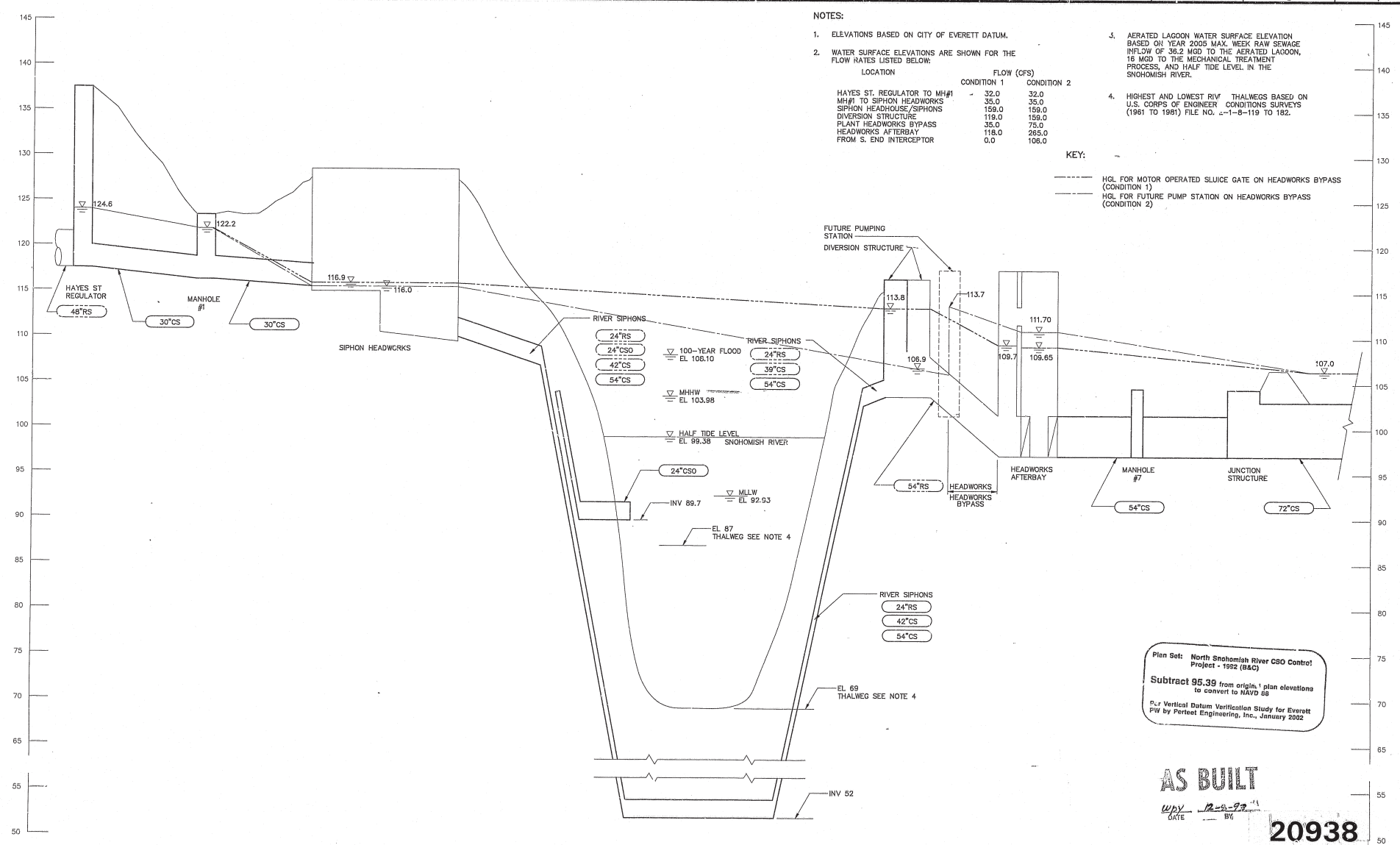
LOCATION	FLOW (CFS) CONDITION 1	CONDITION 2
HAYES ST. REGULATOR TO MH#1	32.0	32.0
MH#1 TO SIPHON HEADWORKS	35.0	35.0
SIPHON HEADHOUSE/SIPHONS	159.0	159.0
DIVERSION STRUCTURE	119.0	159.0
PLANT HEADWORKS BYPASS	35.0	75.0
HEADWORKS AFTERBAY	118.0	265.0
FROM S. END INTERCEPTOR	0.0	106.0

3. AERATED LAGOON WATER SURFACE ELEVATION BASED ON YEAR 2005 MAX. WEEK RAW SEWAGE INFLOW OF 38.2 MGD TO THE AERATED LAGOON, 16 MGD TO THE MECHANICAL TREATMENT PROCESS, AND HALF TIDE LEVEL IN THE SNOHOMISH RIVER.
4. HIGHEST AND LOWEST RIVER THALWEGS BASED ON U.S. CORPS OF ENGINEER CONDITIONS SURVEYS (1961 TO 1981) FILE NO. 2-1-8-119 TO 182.

KEY:

HGL FOR MOTOR OPERATED SLUICE GATE ON HEADWORKS BYPASS (CONDITION 1)

HGL FOR FUTURE PUMP STATION ON HEADWORKS BYPASS (CONDITION 2)



Plan Set: North Snohomish River CSO Control Project - 1992 (B&C)

Subtract 95.39 from origin.' plan elevations to convert to NAVD 88

Per Vertical Datum Verification Study for Everett PW by Perteet Engineering, Inc., January 2002

AS BUILT

WPY 12-6-99 DATE BYG

20938

Brown and Caldwell Consultants
Seattle, Washington

SUBMITTED: DATE: 1/10/92
PROJECT MANAGER
APPROVED: DATE: 3/18/92
BROWN AND CALDWELL
APPROVED: DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 5415G003.DWG
DRAWN CADD TEAM
DESIGNED RLS
CHECKED DE
CHECKED

RICHARD L. SCHAFER STATE OF WASHINGTON 18861 REGISTERED PROFESSIONAL ENGINEER

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

CITY OF EVERETT

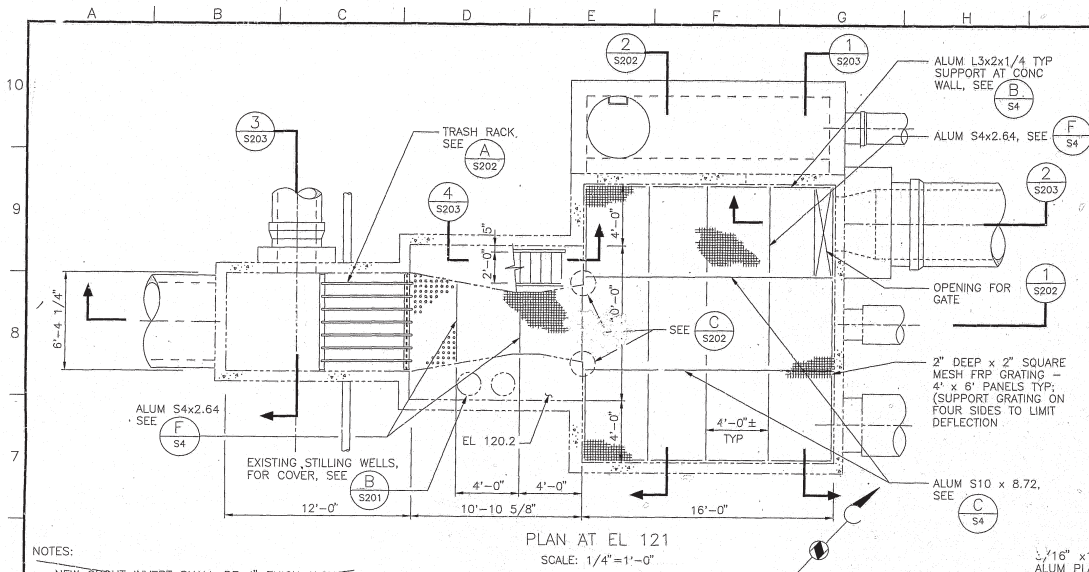
NORTH SNOHOMISH RIVER CSO CONTROL PROJECT

HYDRAULIC PROFILE

1/24/92 ZZ

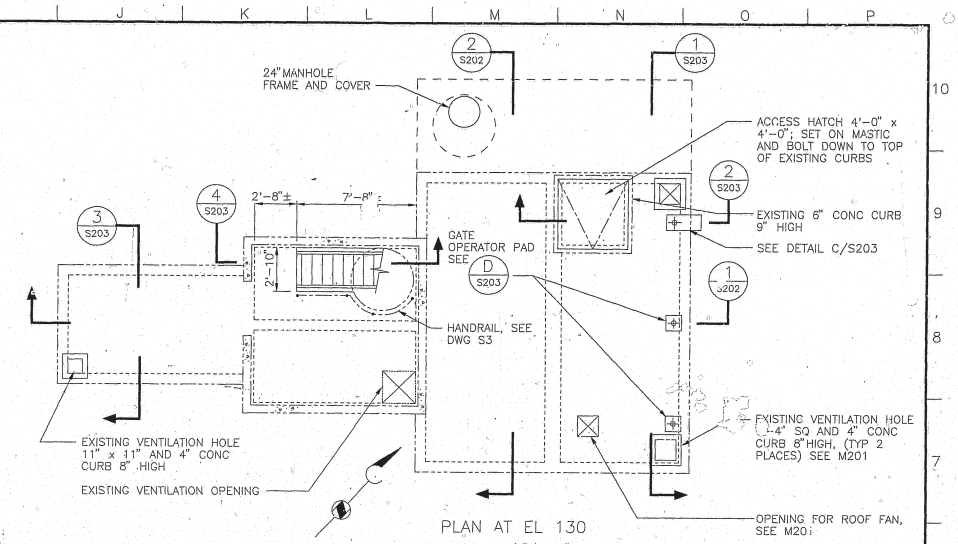
DRAWING NUMBER G2

SHEET NUMBER 2



PLAN AT EL 121

SCALE: 1/4"=1'-0"



PLAN AT EL 130

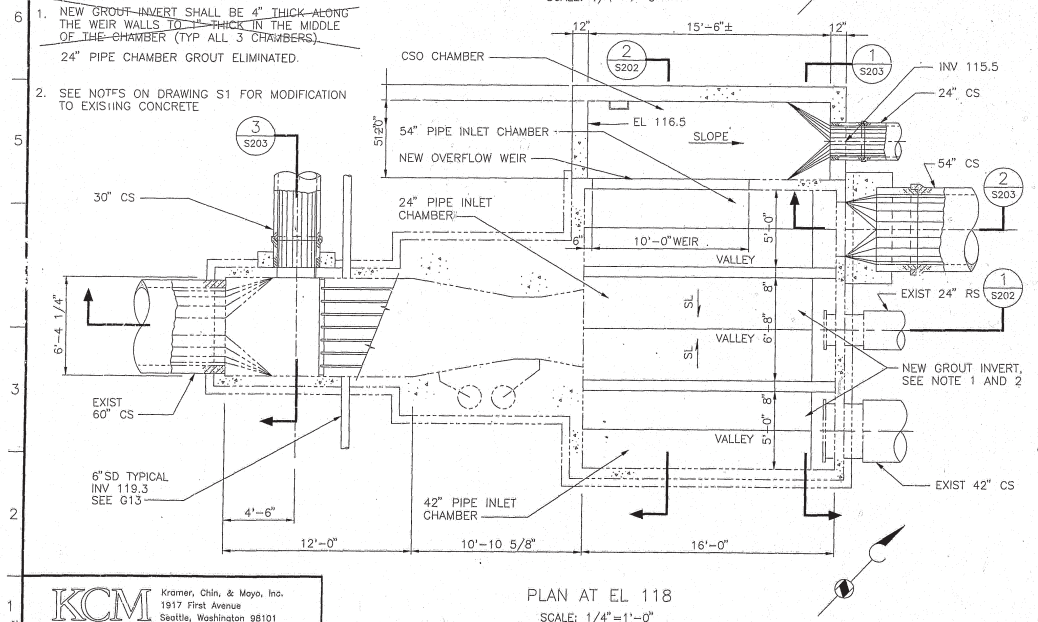
SCALE: 1/4"=1'-0"

NOTES:

1. ~~NEW GROUT INVERT SHALL BE 4" THICK ALONG THE WEIR WALLS TO 1" THICK IN THE MIDDLE OF THE CHAMBER (TYP ALL 3 CHAMBERS).~~

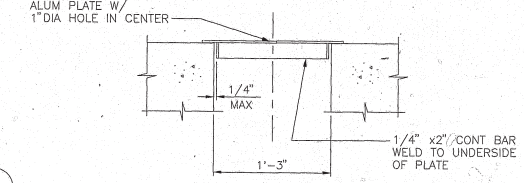
   24" PIPE CHAMBER GROUT ELIMINATED.

2. SEE NOTES ON DRAWING S1 FOR MODIFICATION TO EXISTING CONCRETE



PLAN AT EL 118

SCALE: 1/4"=1'-0"



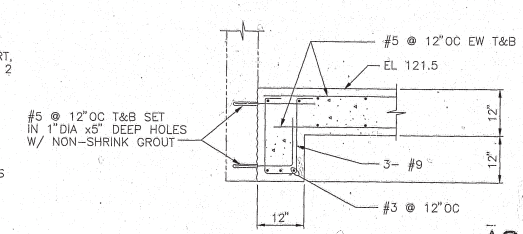
DETAIL B S201

SCALE: 1 1/2"=1'-0"

Plan Set: North Snohomish River CSO Control Project - 1992 (B&C)

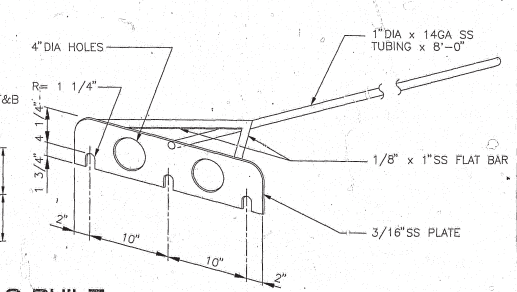
Subtract 95.39 from original plan elevations to convert to NAVD 88

Per Vertical Datum Verification Study for Everett PW by Pertest Engineering, Inc., January 2002



DETAIL A S202 A S203

SCALE: 3/4"=1'-0"



TRASH RACK RAKE

DETAIL C S201

SCALE: 1 1/2"=1'-0"

AS BUILT

WDY 12.8.93

APPROVED BY DATE

INSPECTED BY DATE

KCM Kramer, Chin, & Mayo, Inc. 1917 First Avenue Seattle, Washington 98101

BC Brown and Caldwell Consultants Seattle, Washington

SUBMITTED: PROJECT MANAGER DATE:
APPROVED: BROWN AND CALDWELL DATE:
APPROVED: DATE:

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"–SCALE ACCORDINGLY)

FILE 2568AS41.DWG
DRAWN GCB
DESIGNED WGG
CHECKED JCM
CHECKED

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

CITY OF EVERETT

NORTH SNOHOMISH RIVER CSO CONTROL PROJECT

20977

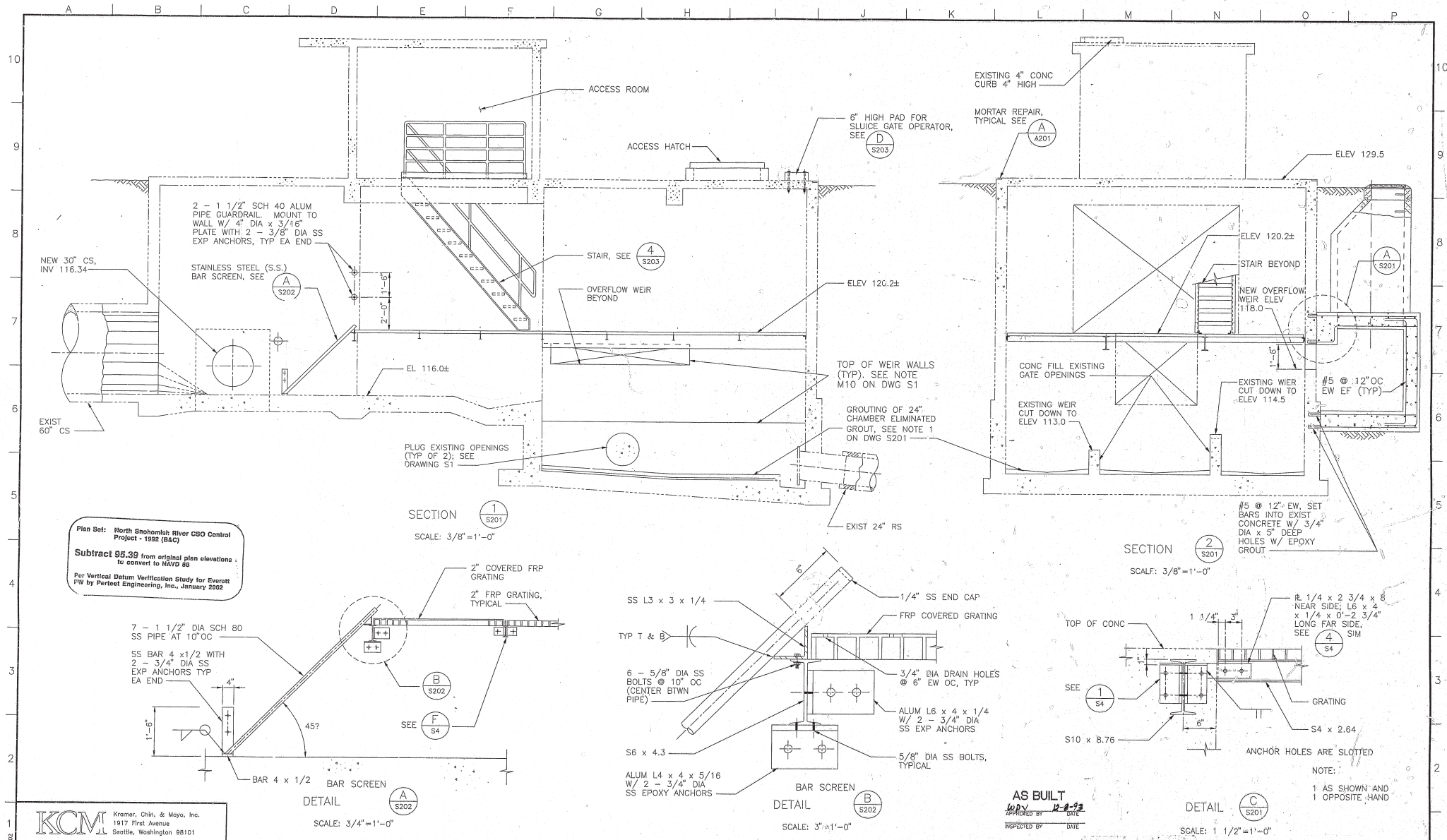
SIPHON HEADWORKS

PLANS

DRAWING NUMBER S201

SHEET NUMBER 41

1-31-92 30232031 1-48 DSK-48 1022-02



Plan Set: North Snohomish River CSO Control Project - 1992 (G&C)

Subtract 95.39 from original plan elevations to convert to NAVD 88

Per Vertical Datum Verification Study for Everett PW by Perteet Engineering, Inc., January 2002

AS BUILT
WBV 12-8-93
APPROVED BY DATE
INSPECTED BY DATE

KCM Kramer, Chin, & Mayo, Inc.
1917 First Avenue
Seattle, Washington 98101

BC Brown and Caldwell Consultants
Seattle, Washington

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"–SCALE ACCORDINGLY)

FILE 2434AS42.DWG
DRAWN GCB
DESIGNED WGG
CHECKED JCM
CHECKED –

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

CITY OF EVERETT

NORTH SNOHOMISH RIVER CSO CONTROL PROJECT

20978

SIPHON HEADWORKS

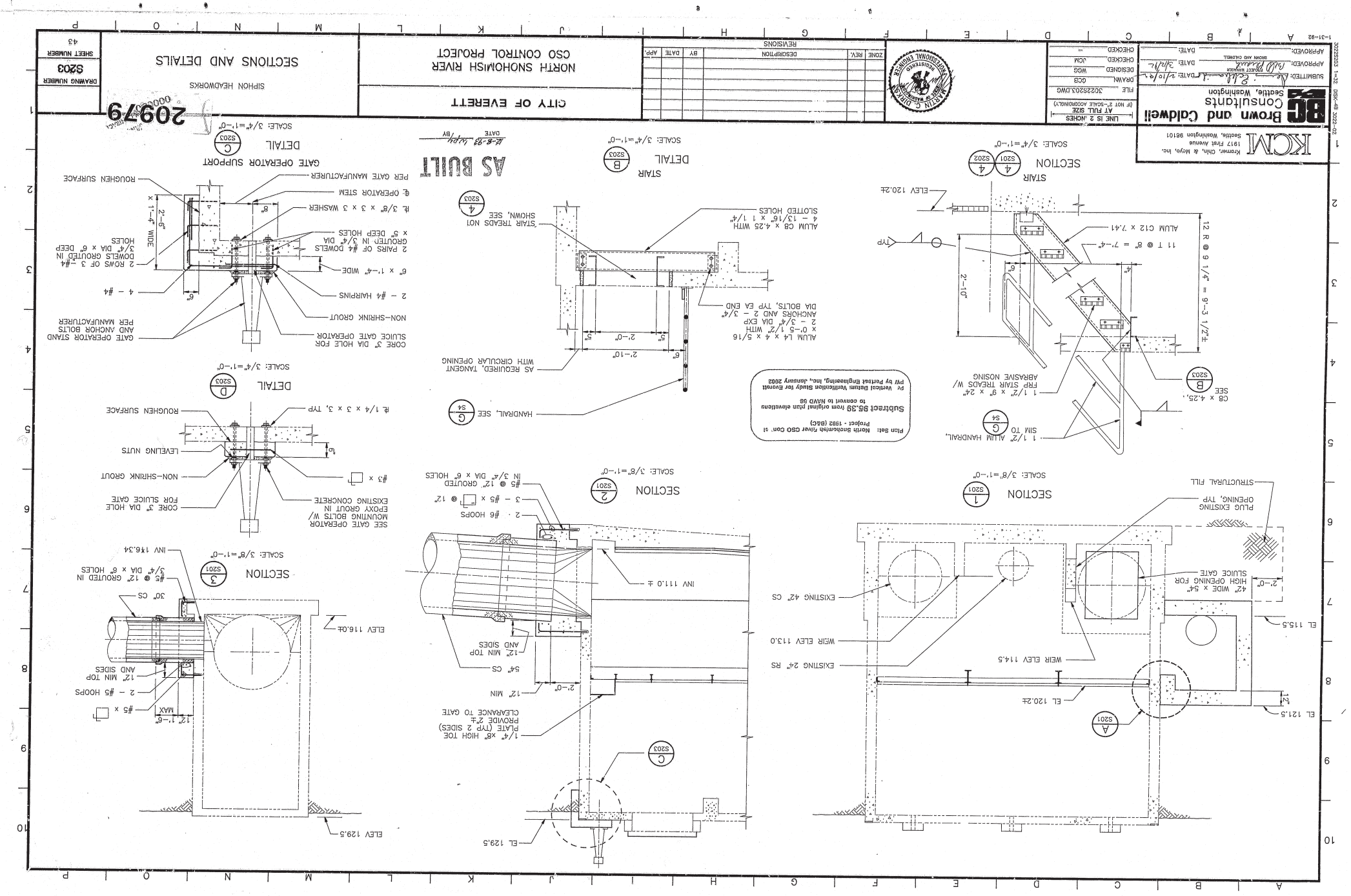
SECTIONS AND DETAILS

DRAWING NUMBER S202

SHEET NUMBER 42

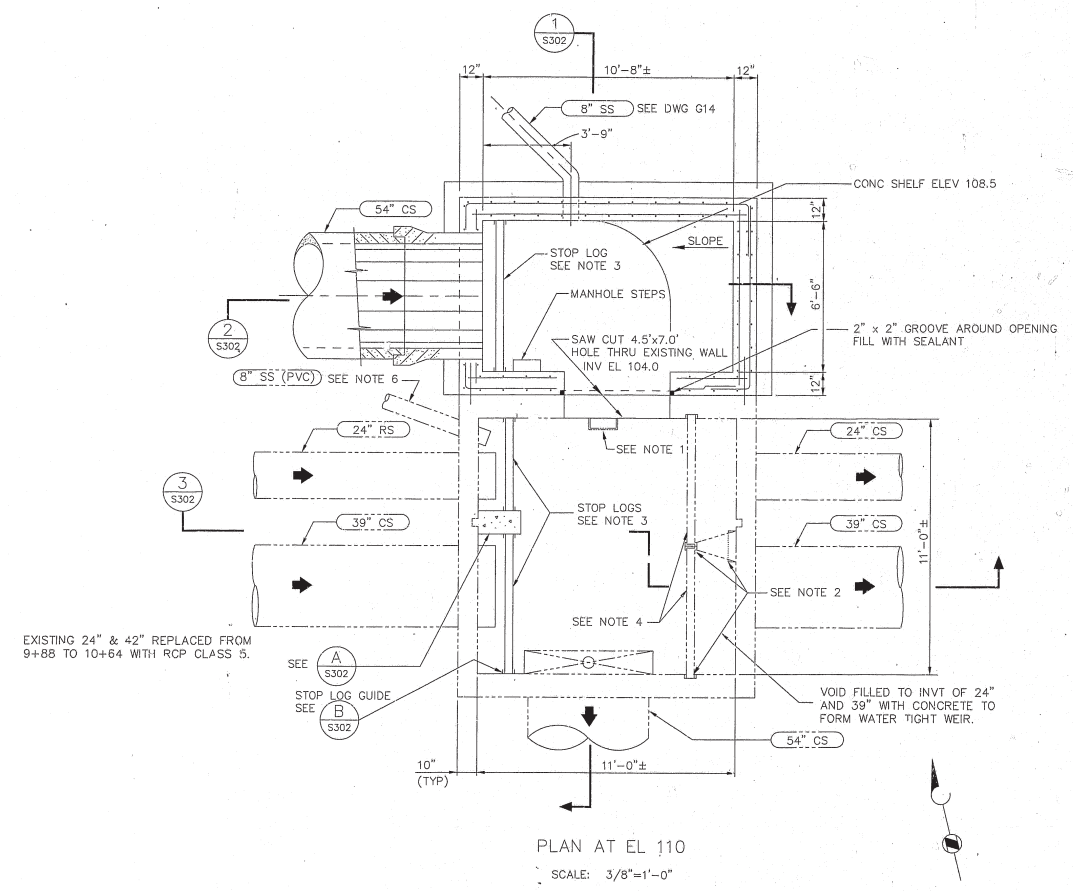
30235202 1-32 DSK-48 3022-02

1-31-92


SECTIONS AND DETAILS
SIPHON HEADWORKS
DRAWING NUMBER
S203
SHEET NUMBER
43
CITY OF EVERETT
NORTH SNOHOMISH RIVER
CSO CONTROL PROJECT
REVISIONS
ZONE
REV.
DESCRIPTION
BY
DATE
APP.
KCM
Kramer, Chin. & Mayo, Inc.
1917 First Avenue
Seattle, Washington 98101
BG
Brown and Caldwell
Consultants
Seattle, Washington
LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)
FILE
3C2252S203.DWG
DRAWN
CGB
DESIGNED
WGG
CHECKED
JCM
CHECKED
SUBMITTED:
DATE:
APPROVED:
PROJECT MANAGER
DATE:
APPROVED:
SIGNAL AND CLEARED
DATE:
Plan Set: North Snohomish River CSO Con. S1
Project - 1932 (BAC)
Subtract BS.39 from original plan elevations
to convert to NAVD 88
PF Vertical Datum Verification Study for Everett
PF by Parfett Engineering, Inc., January 2002
SECTION
1
S201
SCALE: 3/8"=1'-0"
SECTION
2
S201
SCALE: 3/8"=1'-0"
SECTION
3
S201
SCALE: 3/8"=1'-0"
SECTION
4
S201
SCALE: 3/4"=1'-0"
STAIR
4
S202
SCALE: 3/4"=1'-0"
STAIR
B
S203
DETAIL
SCALE: 3/4"=1'-0"
DETAIL
C
S203
SCALE: 3/4"=1'-0"
DETAIL
D
S203
SCALE: 3/4"=1'-0"
A
S201
EL 120.2±
WEIR ELEV 114.5
EXISTING 24" RS
WEIR ELEV 113.0
EXISTING 42" CS
42" WIDE × 54" HIGH OPENING FOR SLUICE GATE
2'-0"
PLUG EXISTING OPENING, TYP
STRUCTURAL FILL
EL 115.5
EL 121.5
EL 129.5
INV 111.0 ±
2 - #6 HOOPS
3 - #5 × ⊓ @ 12"
#5 @ 12" GROUTED IN 3/4" DIA × 6" HOLES
54" CS
12" MIN TOP AND SIDES
2'-0"
12" MIN
1/4" x8" HIGH TOE PLATE (TYP 2 SIDES) PROVIDE 2"± CLEARANCE TO GATE
ELEV 116.0±
30" CS
#5 @ 12" GROUTED IN 3/4" DIA × 6" HOLES
INV 146.34
12" 1'-6" MAX
#5 × ⊓
2 - #5 HOOPS
12" MIN TOP AND SIDES
ELEV 129.5
SEE GATE OPERATOR MOUNTING BOLTS W/ EPOXY GROUT IN EXISTING CONCRETE
CORE 3" DIA HOLE FOR SLUICE GATE
#3 × ⊓
NON-SHRINK GROUT
LEVELING NUTS
R. 1/4 × 3 × 3, TYP
ROUGHEN SURFACE
CORE 3" DIA HOLE FOR SLUICE GATE
GATE OPERATOR STAND AND ANCHOR BOLTS PER MANUFACTURER
NON-SHRINK GROUT
2 - #4 HAIRPINS
6" × 1'-4" WIDE
4 - #4
2 ROWS OF 3 - #4 DOWELS GROUTED IN 3/4" DIA × 6" DEEP HOLES
2 PAIRS OF #4 DOWELS GROUTED IN 3/4" DIA × 5" DEEP HOLES
R. 3/8" × 3 × 3 WASHER
℄ OPERATOR STEM
PER GATE MANUFACTURER
ROUGHEN SURFACE
GATE OPERATOR SUPPORT
2'-6" WIDE
1'-4"
HANDRAIL, SEE G S4
AS REQUIRED, TANGENT WITH CIRCULAR OPENING
ALUM L4 × 4 × 5/16 × 0'-5 1/2" WITH 2 - 3/4" DIA EXP ANCHORS AND 2 - 3/4" DIA BOLTS, TYP EA END
ALUM C8 × 4.25 SLOTTED HOLES
STAIR TREADS NO SHOWN, SEE S203 4
2'-10"
2'-0"
2'-10"
12 R @ 9 1/4" = 9'-3 1/2"±
11 T @ 8" = 7'-4"
ALUM C12 × 7.41
ELEV 120.2±
C8 × 4.25, SEE B S203
1 1/2" × 9" × 24" FRP STAIR TREADS W/ ABRASIVE NOSING
1 1/2" ALUM HANDRAIL SIM TO G S4
AS BUILT
4-8-98 Hydro
DATE
BY
209679
0000000
1-31-92

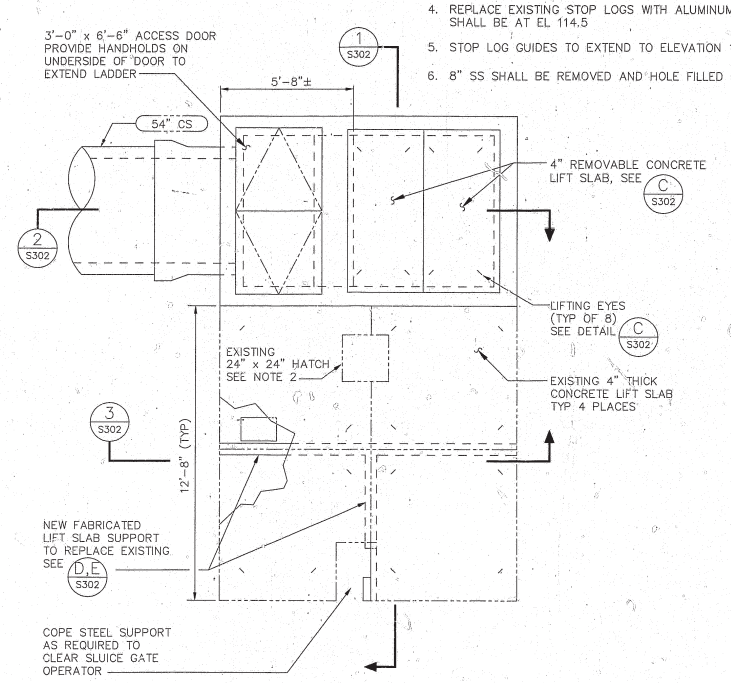
NOTES:

1. EXISTING MANHOLE STEPS SHALL BE REMOVED AND STEEL LEFT IN THE CONCRETE SHALL BE CUT BACK 1 INCH FROM THE SURFACE AND A NON-SHRINK GROUT USED TO FILL THE HOLES.
2. EXISTING ACCESS HATCH AND STEEL SUPPORTS AND GUIDES FOR STOP LOGS SHALL BE SANDBLASTED AND PAINTED.
3. ALUMINUM STOP LOGS SHALL BE PROVIDED TO ISOLATE SIPHONS. TOP OF STOP LOGS SHALL BE AT EL 109.0
4. REPLACE EXISTING STOP LOGS WITH ALUMINUM LOGS. TOP OF STOP SHALL BE AT EL 114.5
5. STOP LOG GUIDES TO EXTEND TO ELEVATION 116.0±.
6. 8" SS SHALL BE REMOVED AND HOLE FILLED WITH NON-SHRINK GROUT



PLAN AT EL 110

SCALE: 3/8"=1'-0"



TOP PLAN

SCALE: 3/8"=1'-0"

Plan Set: North Snohomish River CSO Control Project - 1992 (B&C)

Subtract 95.39 from original plan elevations to convert to NAVD 88

Per Vertical Datum Verification Study for Everett PW by Perteet Engineering, Inc., January 2002

AS BUILT

WDV 12-8-93
APPROVED BY DATE

INSPECTED BY DATE

20980

KCM Kramer, Chin, & Mayo, Inc.
1917 First Avenue
Seattle, Washington 98101

BC Brown and Caldwell Consultants
Seattle, Washington

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 2566AS44.DWG
DRAWN DV
DESIGNED WGG
CHECKED JCM
CHECKED --

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

CITY OF EVERETT

NORTH SNOHOMISH RIVER CSO CONTROL PROJECT

DIVERSION VAULT

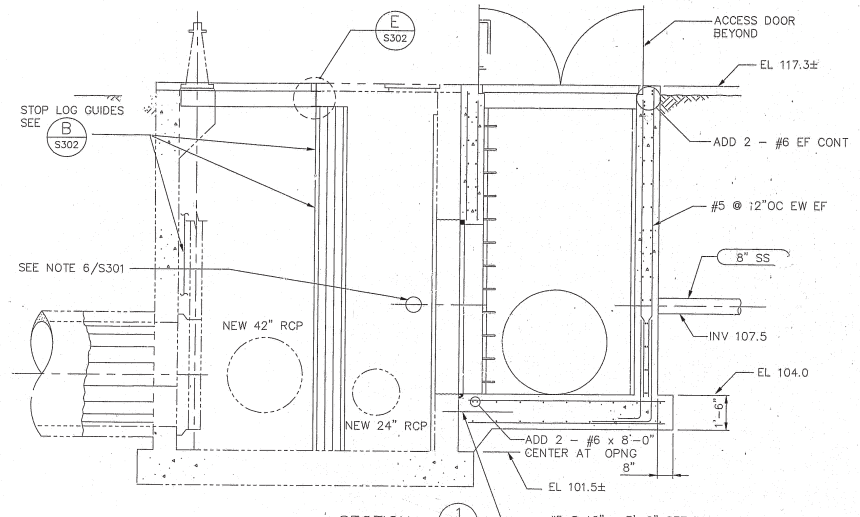
PLANS

DRAWING NUMBER S301

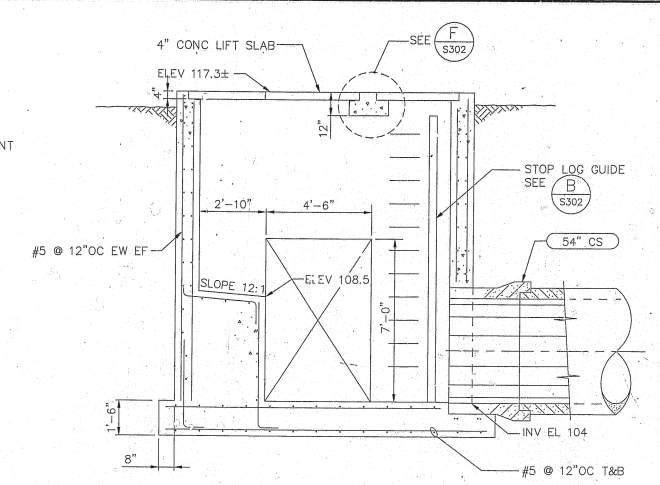
SHEET NUMBER 44

1-31-92

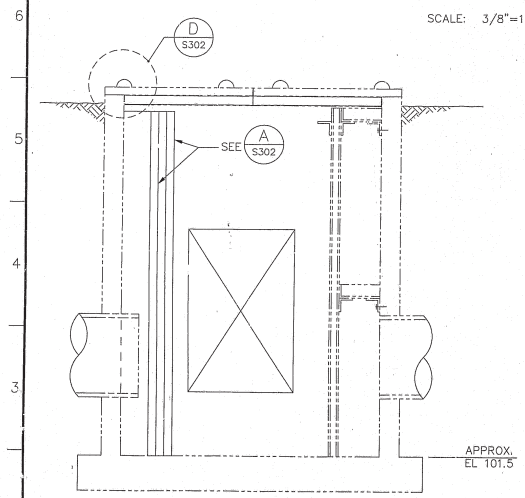
30222930 1=32 DWG-33 3022-02



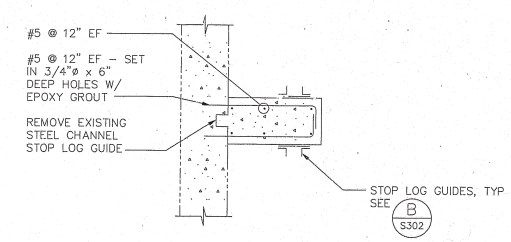
SECTION 1 S301
SCALE: 3/8"=1'–0"



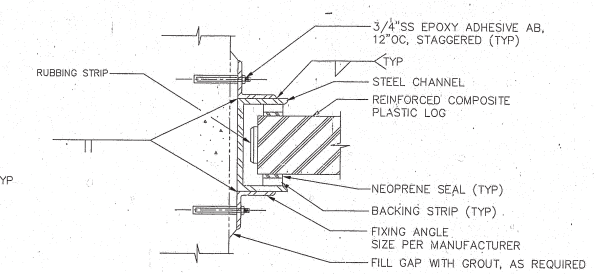
SECTION 2 S301
SCALE: 3/8"=1'–0"



SECTION 3 S301
SCALE: 3/8"=1'–0"

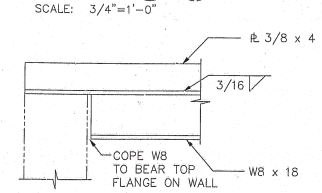


STOP LOG GUIDE WALL SUPPORT DETAIL A S302 A S301
SCALE: 3/4"=1'–0"

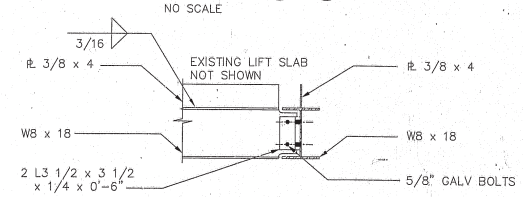


STOP LOG GUIDE WALL SUPPORT DETAIL B S302 B S301
NO SCALE

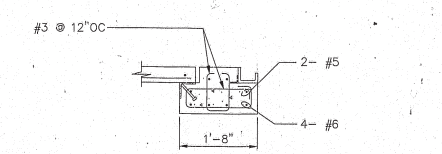
CONCRETE LIFT SLABS DETAIL C S301
NO SCALE



DETAIL D S301 D S302
NO SCALE



DETAIL E S301 E S302
NO SCALE



DETAIL F S302
SCALE: 3/4"=1'–0"

Plan Set: North Snohomish River CSO Control Project - 1992 (B&C)

Subtract 95.39 from original plan elevations to convert to NAVD 88

For Vertical Datum Verification Study for Everett FW by Perteet Engineering, Inc., January 2002

KCM Kramer, Chin, & Mayo, Inc.
1917 First Avenue
Seattle, Washington 98101

BC Brown and Caldwell Consultants
Seattle, Washington

SUBMITTED: _____ PROJECT MANAGER DATE: _____
APPROVED: _____ BROWN AND CALDWELL DATE: _____
APPROVED: _____ DATE: _____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE 2566AS45.DWG
DRAWN DV
DESIGNED WDG
CHECKED JCM
CHECKED --

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

AS BUILT
W.P.V. APPROVED BY 13-8-98 DATE
INSPECTED BY DATE
20981

CITY OF EVERETT
NORTH SNOHOMISH RIVER CSO CONTROL PROJECT

DIVERSION VAULT
SECTIONS AND DETAILS

DRAWING NUMBER S302
SHEET NUMBER 45

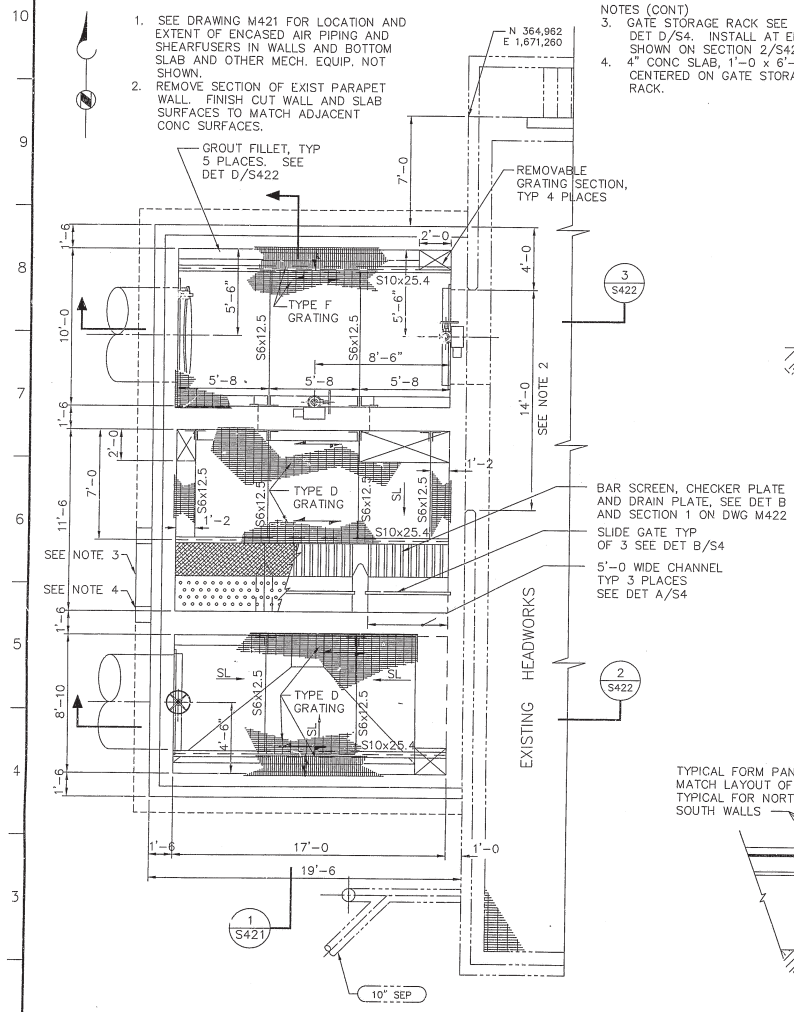
30222020 1=32 DISK-31 3023-02

NOTES:

1. SEE DRAWING M421 FOR LOCATION AND EXTENT OF ENCASED AIR PIPING AND SHEARFUSERS IN WALLS AND BOTTOM SLAB AND OTHER MECH. EQUIP. NOT SHOWN.
2. REMOVE SECTION OF EXIST PARAPET WALL. FINISH CUT WALL AND SLAB SURFACES TO MATCH ADJACENT CONC SURFACES.

NOTES (CONT)

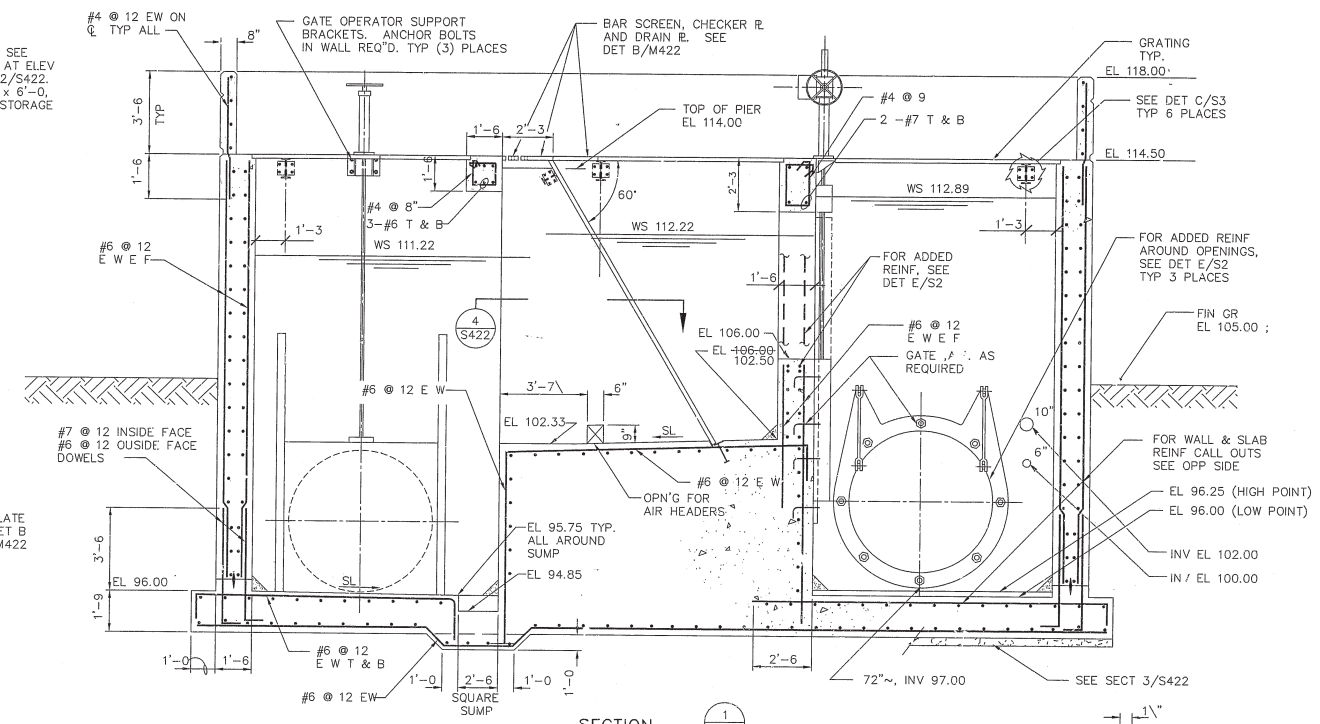
3. GATE STORAGE RACK SEE DET D/S4. INSTALL AT ELEV SHOWN ON SECTION 2/S422.
4. 4" CONC SLAB, 1'-0 x 6'-0, CENTERED ON GATE STORAGE RACK.



SPLITTER BOX

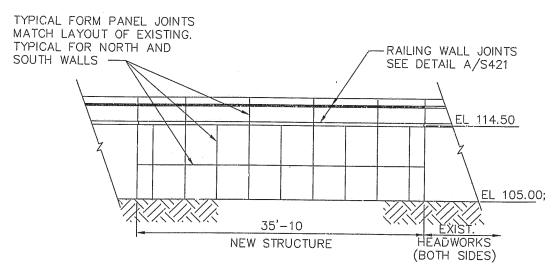
PLAN

SCALE: 1/4"=1'-0



SECTION

SCALE: 3/8" = 1'-0



WEST ELEVATION

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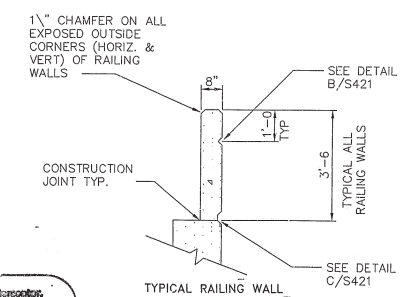
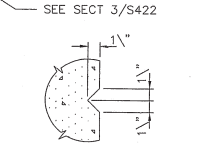


TYPICAL RAILING WALL

DETAIL

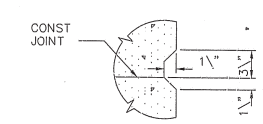
SCALE: 1/2" = 1'-0



GROOVE TYPE 1

DETAIL

SCALE: 1 1/2" = 1'-0



GROOVE TYPE 2

DETAIL

SCALE: 1 1/2" - 1'-0

Plan Set: Snohomish River CSO Interceptor, Schedule D - 1992 (BAC)

Subtract 05.11 from original plan elevations to convert to NAVD 88

Per Vertical Datum Verification Study for Everett PW by Perteet Engineering, Inc., January 2002

20697

Brown and Caldwell Consultants Seattle, Washington

SUBMITTED: _____ PROJECT MANAGER DATE: ____
APPROVED: _____ BROWN AND CALDWELL DATE: ____
APPROVED: _____ DATE: ____

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

FILE 2474 -2474AS27.DWG
DRAWN CADD TEAM
DESIGNED W. JAMES
CHECKED R. KELLNER
CHECKED A. SHEN

AS BUILT
Rev-0 11-30-92
APPROVED BY DATE
INSPECTED BY DATE

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

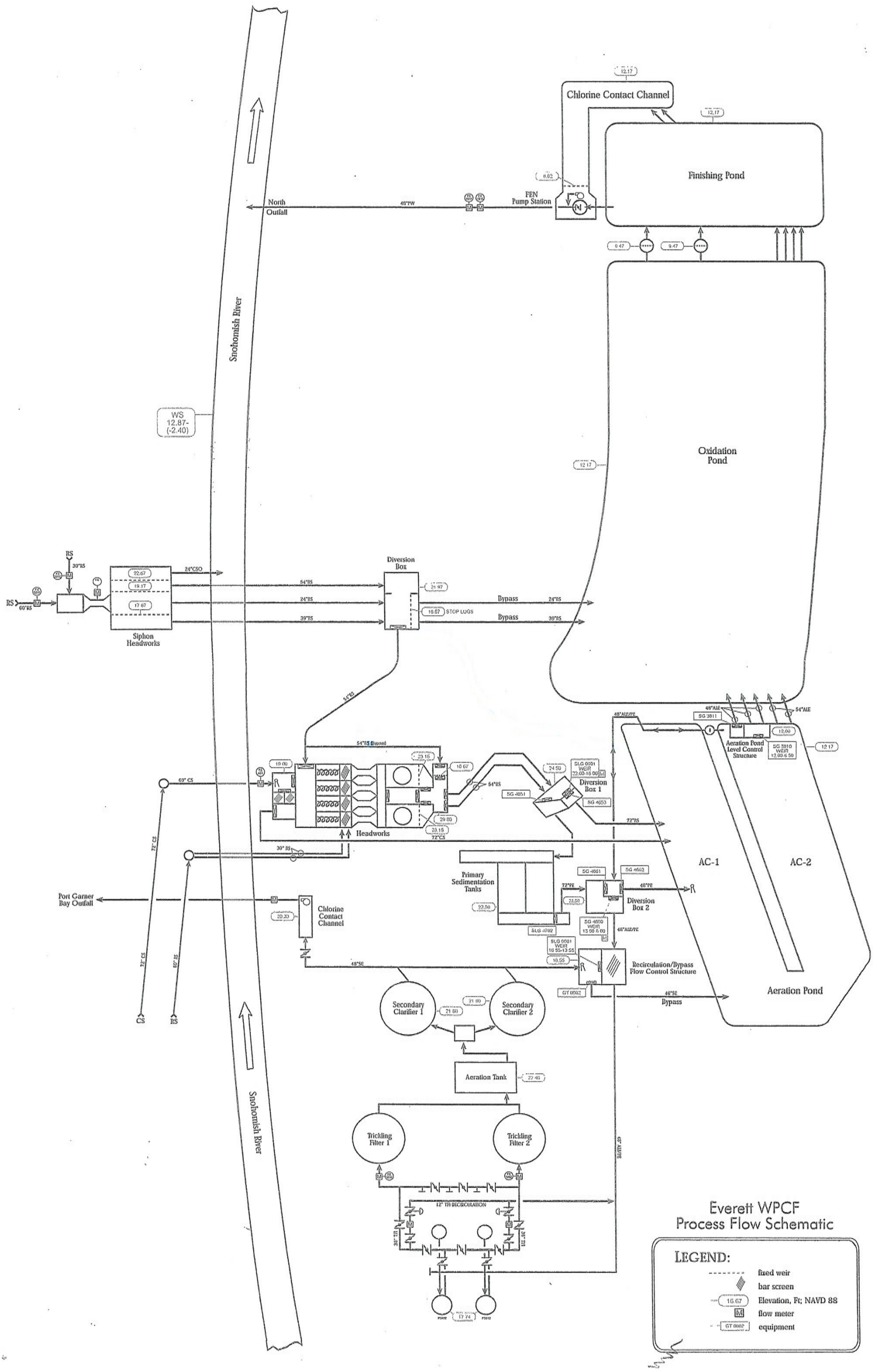
REVISIONS

CITY OF EVERETT

SNOHOMISH RIVER CSO INTERCEPTOR

SPLITTER BOX
PLAN AND SECTIONS

SCHEDULE C
DRAWING NUMBER S421
SHEET NUMBER 27

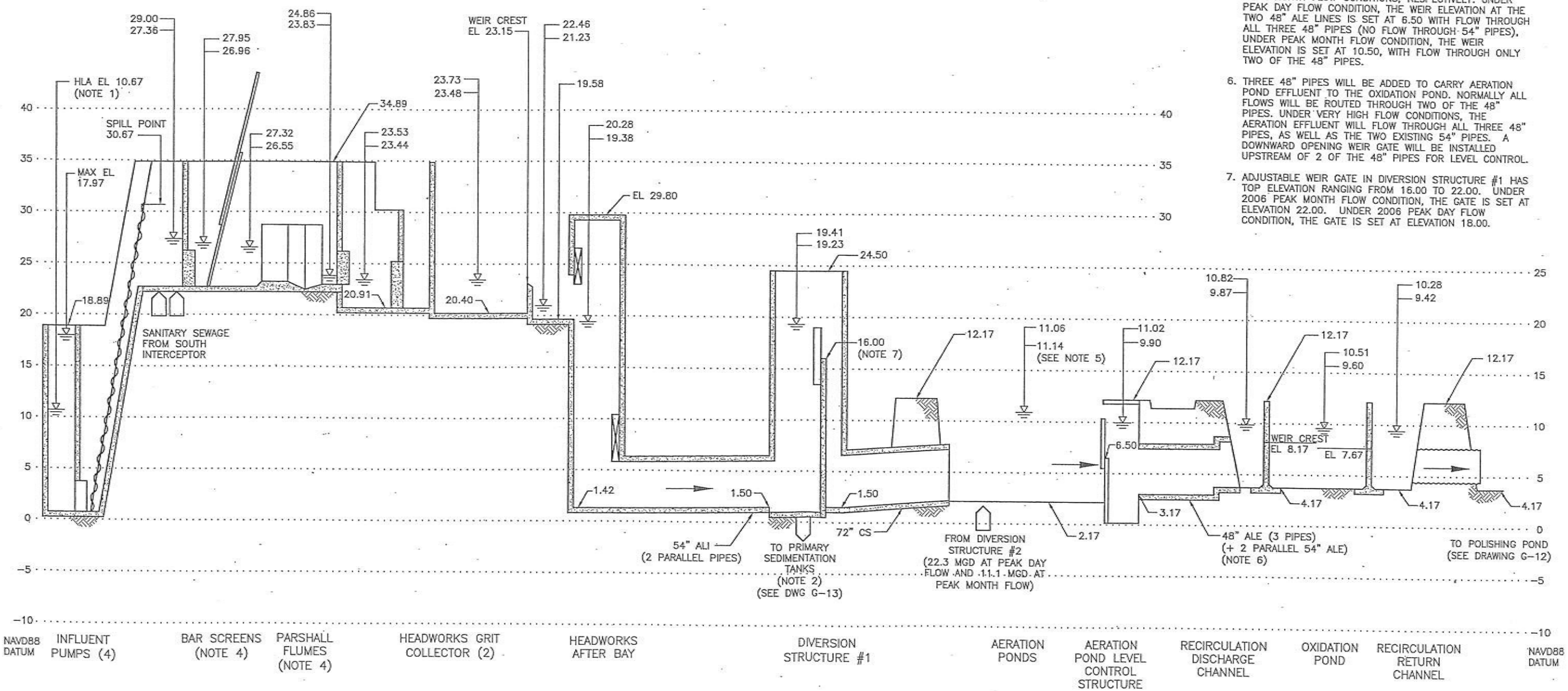

Chlorine Contact Channel
Finishing Pond
North Outfall
FEN Pump Station
Snohomish River
WS 12.87- (-2.40)
Oxidation Pond
Siphon Headworks
Diversion Box
Bypass
STOP LOGS
Headworks
Diversion Box 1
Aeration Pond Level Control Structure
AC-1
AC-2
Primary Sedimentation Tanks
Diversion Box 2
Port Garner Bay Outfall
Chlorine Contact Channel
Recirculation/Bypass Flow Control Structure
Aeration Pond
Secondary Clarifier 1
Secondary Clarifier 2
Aeration Tank
Trickling Filter 1
Trickling Filter 2
Everett WPCF
Process Flow Schematic
LEGEND:
fixed weir
bar screen
Elevation, Ft; NAVD 88
flow meter
equipment

LEGEND:

11.09 WATER LEVEL AT 2006 PEAK DAY FLOW OF 75.6 MGD (NOTE 5)
10.45 WATER LEVEL AT 2006 PEAK MONTH FLOW OF 32.1 MGD (NOTE 5)

NOTES:

1. HLA = HIGH LEVEL ALARM.
2. UP TO 43.3 MGD OF ALL RAW INFLUENT FLOW IS ROUTED TO THE PRIMARY SEDIMENTATION TANKS. ANY FLOW BEYOND 43.3 MGD IS SENT TO THE AERATION PONDS.
3. ELEVATIONS BASED ON NAVD88 DATUM. NAVD88 DATUM = CITY OF EVERETT DATUM – 95.33.
4. ASSUME UP TO 52 MGD OF FLOW PASSES THROUGH CHANNEL 1. WITH 4–FOOT PARSHALL FLUME AND 1/4–INCH MAHR SCREEN, AND THE REMAINING FLOW PASSES THROUGH CHANNELS 2, 3, AND 4.
5. WATER SURFACE LEVELS SHOWN IN AERATION PONDS CORRESPONDS TO THOSE FOR 54.6 AND 11.1 MGD ROUTED TO THE FEN OUTFALL UNDER PEAK DAY AND PEAK MONTH FLOW CONDITIONS, RESPECTIVELY. UNDER PEAK DAY FLOW CONDITION, THE WEIR ELEVATION AT THE TWO 48" ALE LINES IS SET AT 6.50 WITH FLOW THROUGH ALL THREE 48" PIPES (NO FLOW THROUGH 54" PIPES). UNDER PEAK MONTH FLOW CONDITION, THE WEIR ELEVATION IS SET AT 10.50, WITH FLOW THROUGH ONLY TWO OF THE 48" PIPES.
6. THREE 48" PIPES WILL BE ADDED TO CARRY AERATION POND EFFLUENT TO THE OXIDATION POND. NORMALLY ALL FLOWS WILL BE ROUTED THROUGH TWO OF THE 48" PIPES. UNDER VERY HIGH FLOW CONDITIONS, THE AERATION EFFLUENT WILL FLOW THROUGH ALL THREE 48" PIPES, AS WELL AS THE TWO EXISTING 54" PIPES. A DOWNWARD OPENING WEIR GATE WILL BE INSTALLED UPSTREAM OF 2 OF THE 48" PIPES FOR LEVEL CONTROL.
7. ADJUSTABLE WEIR GATE IN DIVERSION STRUCTURE #1 HAS TOP ELEVATION RANGING FROM 16.00 TO 22.00. UNDER 2006 PEAK MONTH FLOW CONDITION, THE GATE IS SET AT ELEVATION 22.00. UNDER 2006 PEAK DAY FLOW CONDITION, THE GATE IS SET AT ELEVATION 18.00.



HEADWORKS TO AERATION POND

RECORD DRAWING JULY 2007 THIS RECORD DRAWING WAS PREPARED USING INFORMATION REPORTED TO BROWN AND CALDWELL AND CONTAINS ONLY THE STANDARD AND CUSTOMARY LEVEL OF DETAIL. THIS DRAWING CANNOT BE RELIED UPON AS AN EXACT REPRESENTATION OF ACTUAL CONDITIONS	Drawn By: M. Chastain Designed By: P. Tam Checked By: P. Tam W.O. No.: UP–2993–40 Date: 02–10–05	CITY OF EVERETT PUBLIC WORKS DEPARTMENT	WATER POLLUTION CONTROL FACILITY EXPANSION, PHASE A BROWN AND CALDWELL

GENERAL
HYDRAULIC PROFILE–1

Drawing No. G–11
Sheet No. 11

Appendix C
Hydraulic Profiles

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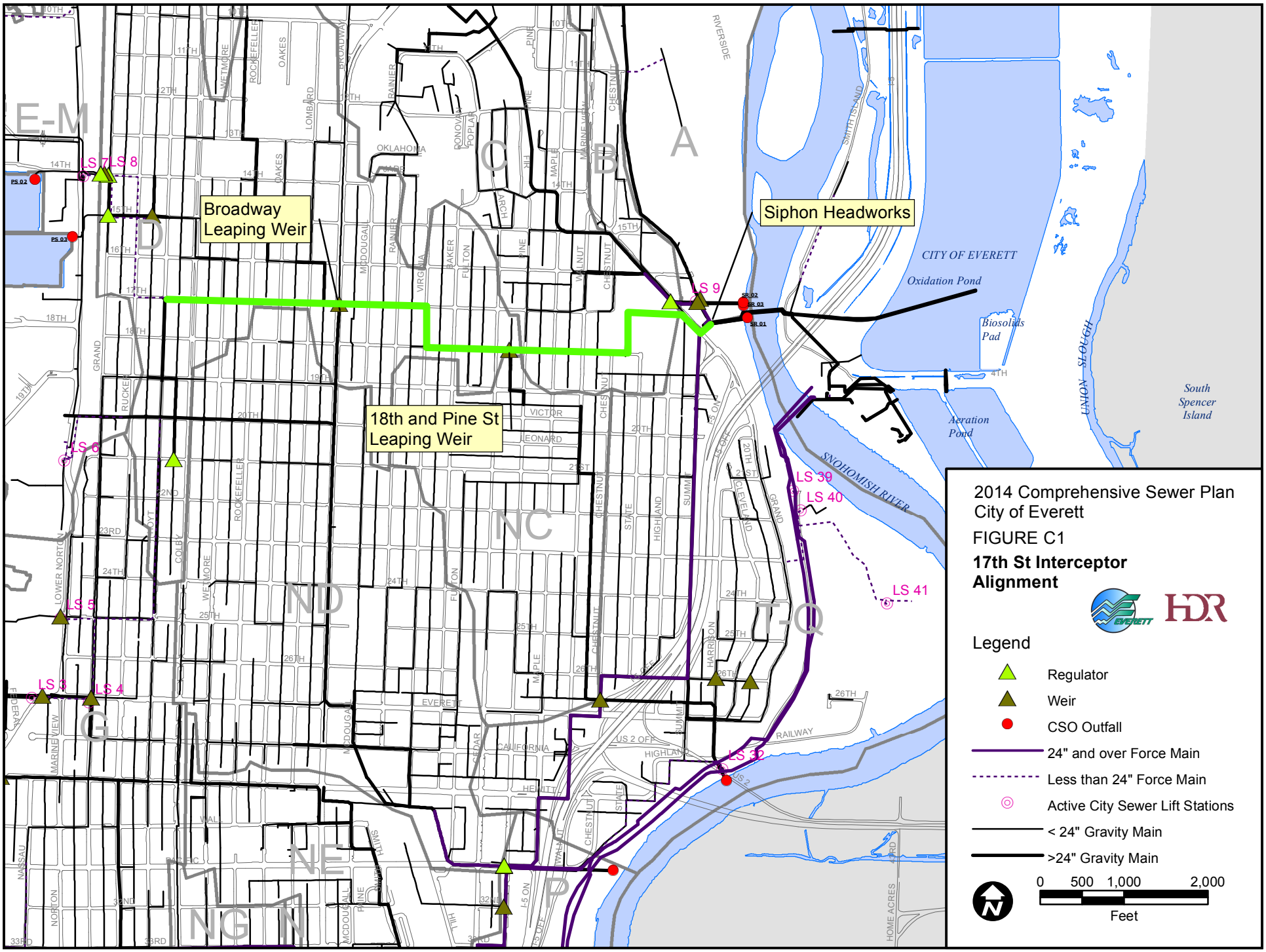
Section 1
Hydraulic Grade Line
17th Street Interceptor

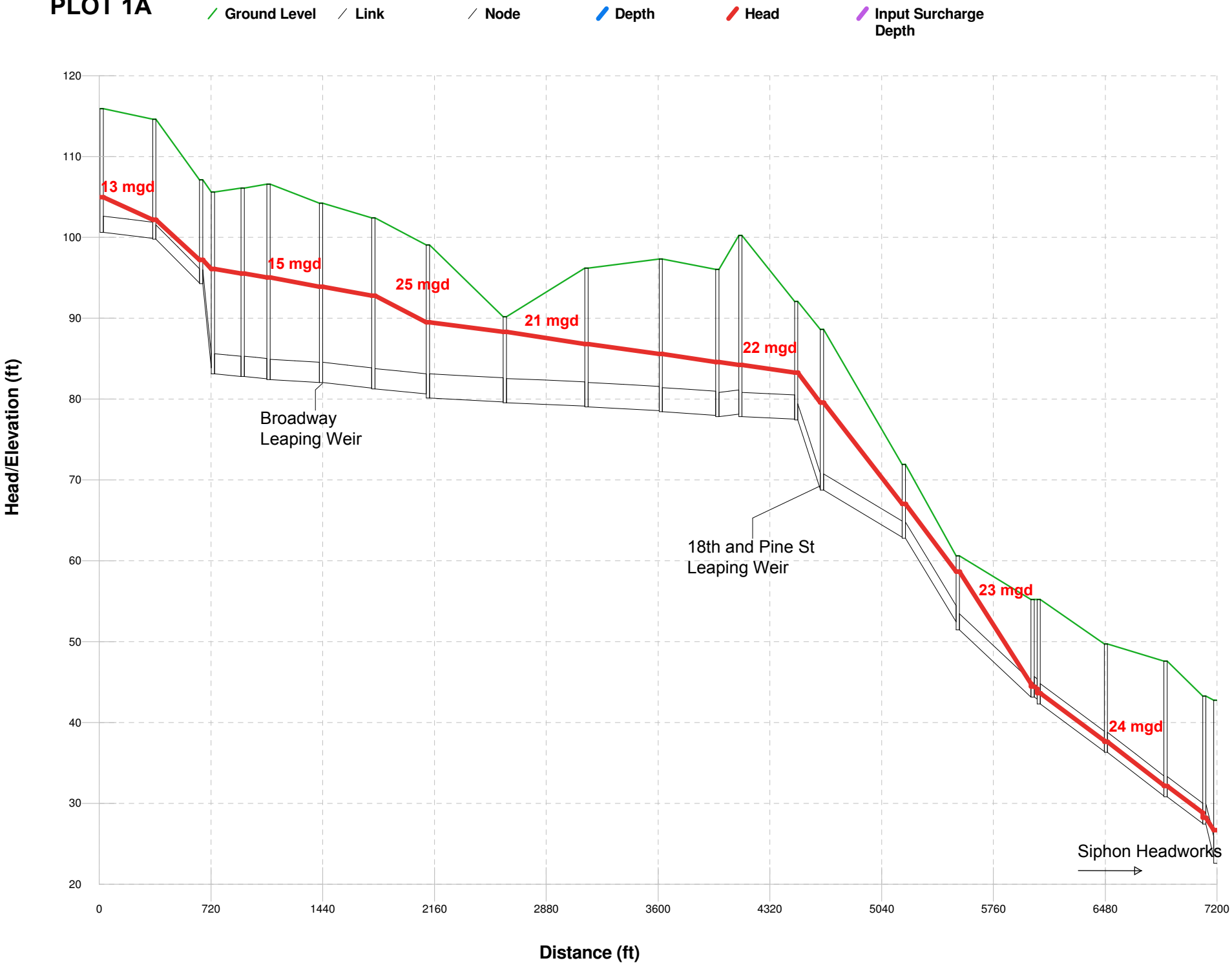
Table C1 – 17th Street Interceptor HGL Plot Description

Plot	Scenario	Flow Event	Improvement Simulated
1a	Existing	1-Year	None
1b	Year 2100	1-Year	Upstream Improvements
1c	Year 2100	1-Year	Parallel Interceptor
1d	Existing	25-Year	None
1e	Year 2100	25-Year	Upstream Improvements
1f	Year 2100	25-Year	Parallel Interceptor


Broadway Leaping Weir
18th and Pine St Leaping Weir
Siphon Headworks
CITY OF EVERETT
Oxidation Pond
Biosolids Pad
Aeration Pond
South Spencer Island
SNOHOMISH RIVER
UNION SLOUGH
LS 3
LS 4
LS 5
LS 6
LS 7
LS 8
LS 9
LS 32
LS 39
LS 40
LS 41
PS 02
PS 03
SR 01
SR 02
SR 03
2014 Comprehensive Sewer Plan
City of Everett
FIGURE C1
17th St Interceptor Alignment
Legend
Regulator
Weir
CSO Outfall
24" and over Force Main
Less than 24" Force Main
Active City Sewer Lift Stations
< 24" Gravity Main
>24" Gravity Main
0 500 1,000 2,000
Feet

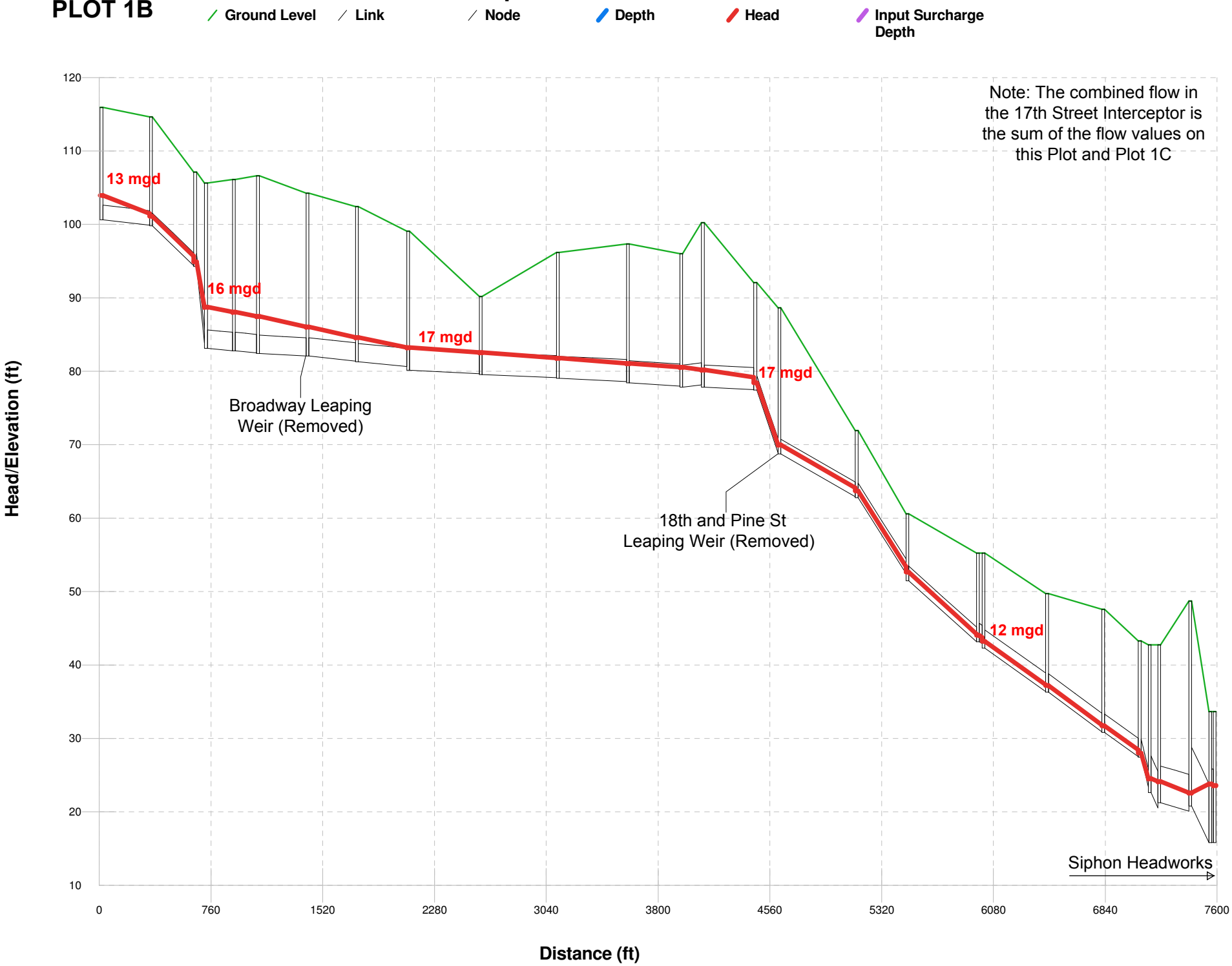
PLOT 1A

17th St Interceptor - Existing - 1-Yr Flow Event



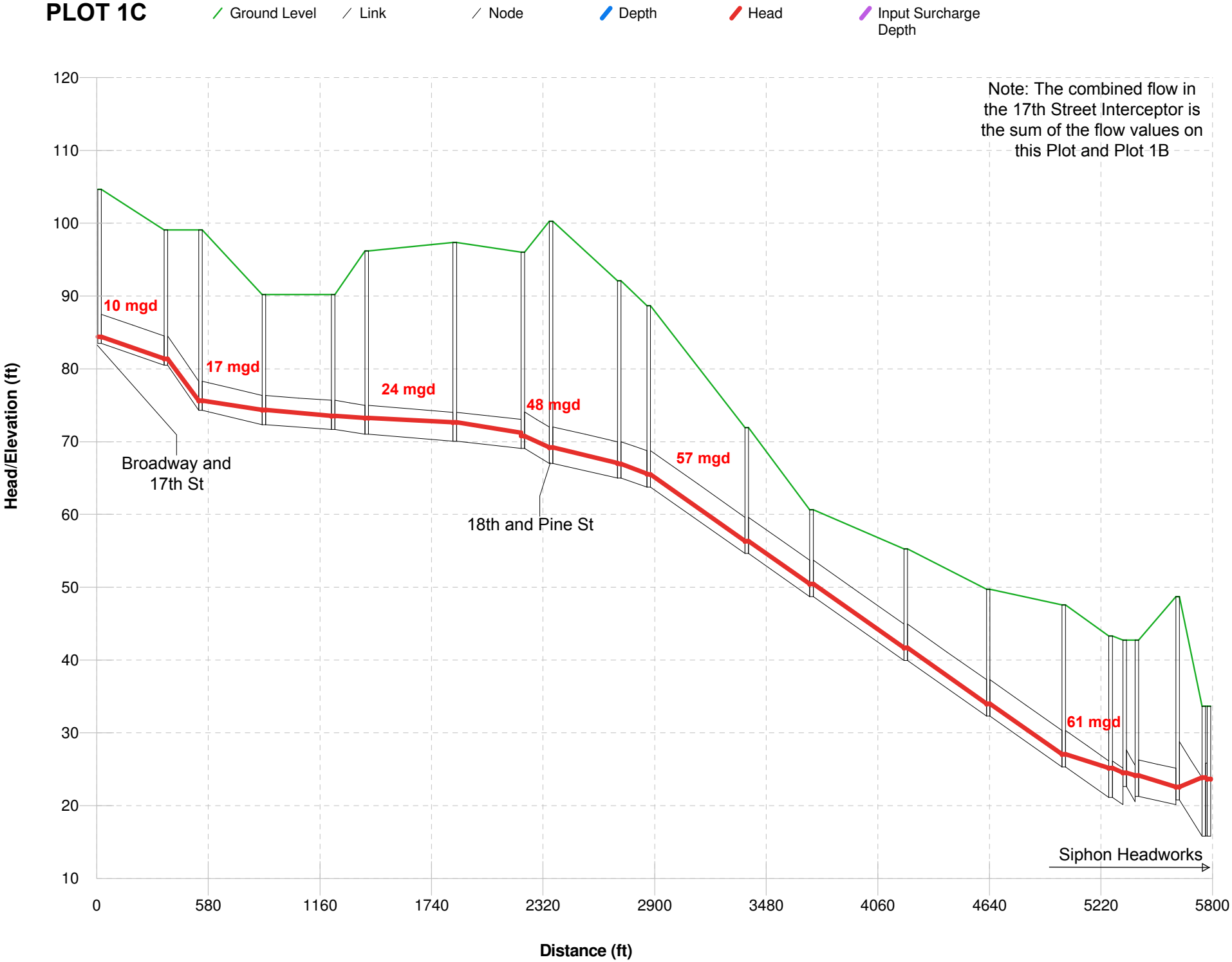
PLOT 1B

17th St Interceptor - Year 2100 - 1-Yr Flow Event

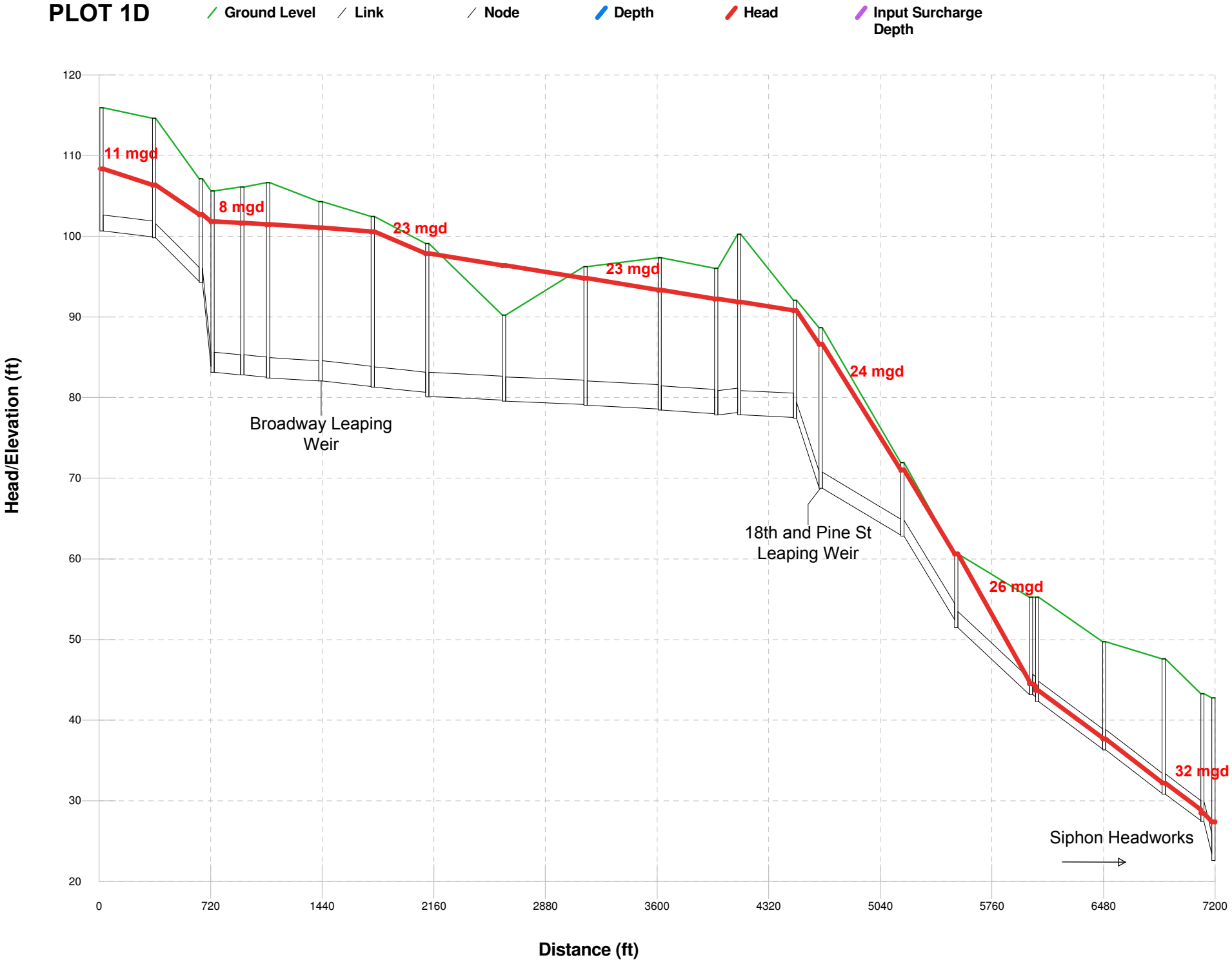


Parallel 17th St Interceptor - Year 2100 - 1-Yr Flow Event

PLOT 1C

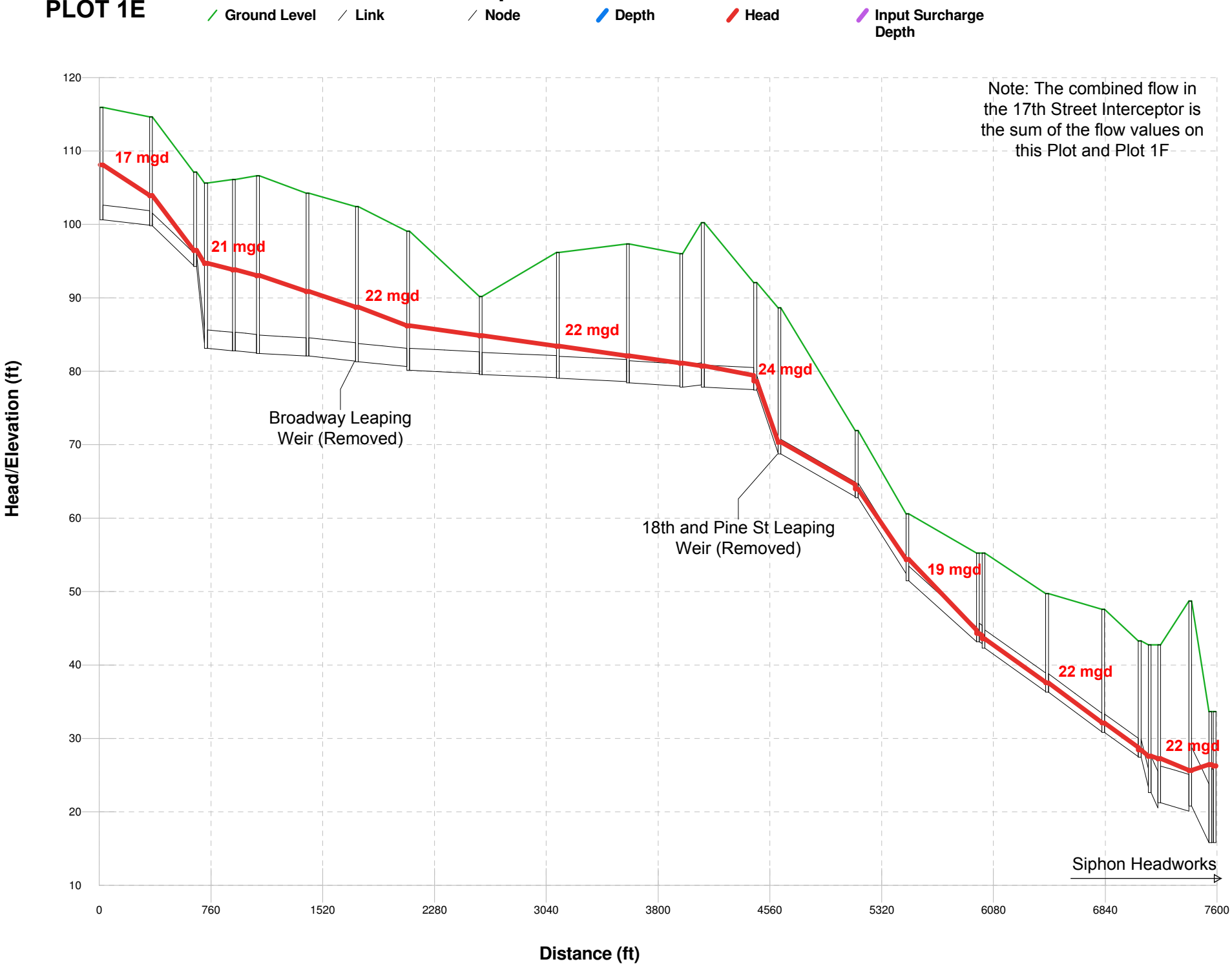


17th St Interceptor - Existing - 25-Yr Flow Event



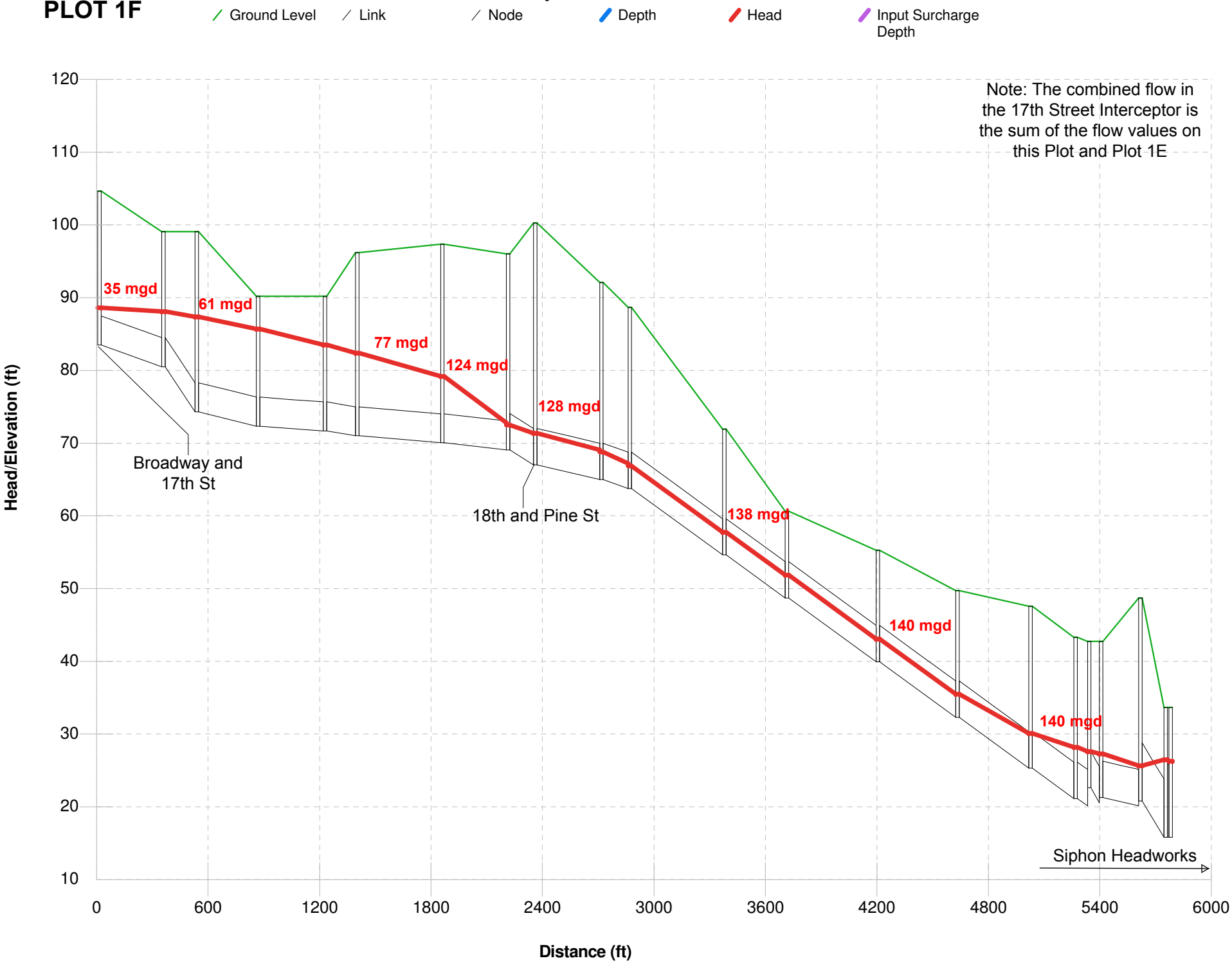
PLOT 1E

17th St Interceptor - Year 2100 - 25-Yr Flow Event



PLOT 1F

Parallel 17th St Interceptor - Year 2100 - 25-Yr Flow Event



Section 2
Hydraulic Grade Line
Summit Ave Interceptor

Table C2 – Summit Ave Interceptor HGL Plot Description

Plot	Scenario	Flow Event	Improvement Simulated
2a	Existing	1-Year	None
2b	Existing	1-Year	LS32 CSO Lift Station (SRO4)
2c	Existing	1-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI (SRO7)
2d	Existing	1-Year	LS32 CSO Lift Station (SRO4), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
2e	Existing	1-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
2f	Year 2100	1-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
2g	Existing	25-Year	None
2h	Existing	25-Year	LS32 CSO Lift Station (SRO4)
2i	Existing	25-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI (SRO7)
2j	Existing	25-Year	LS32 CSO Lift Station (SRO4), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
2k	Existing	25-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
2l	Year 2100	25-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)

2014 Comprehensive Sewer Plan
City of Everett

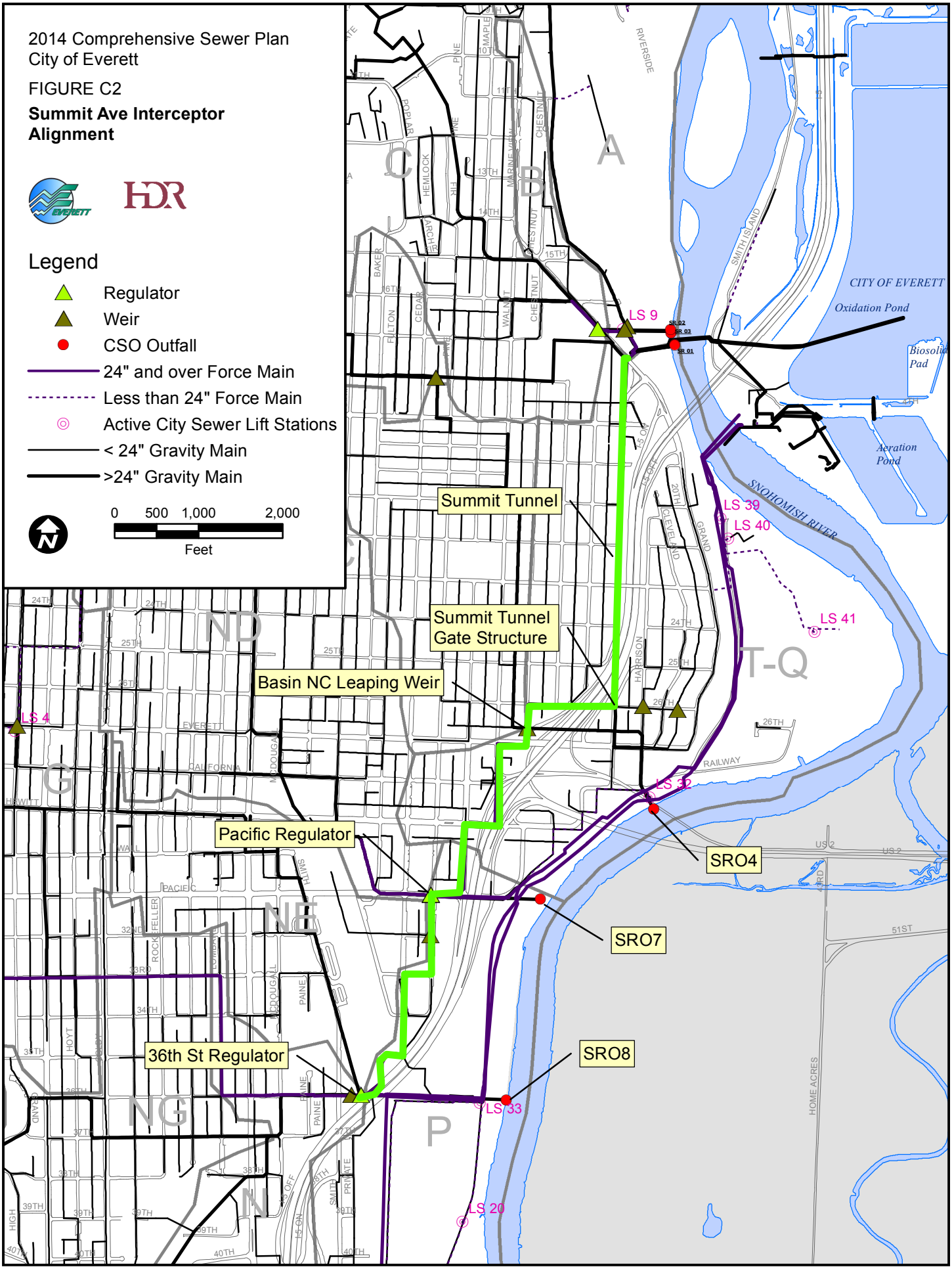
FIGURE C2

Summit Ave Interceptor Alignment

Legend

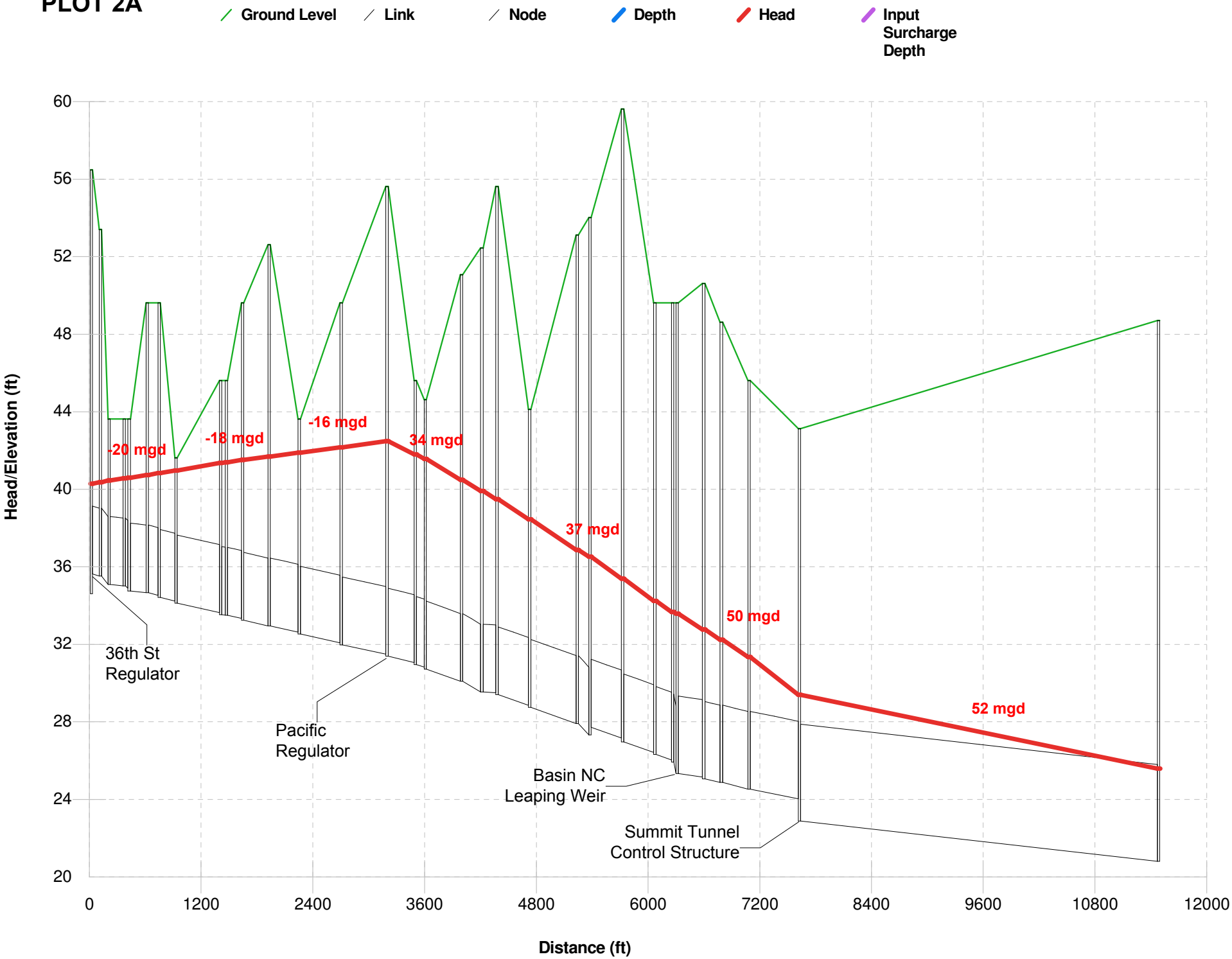
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main

0 500 1,000 2,000
Feet



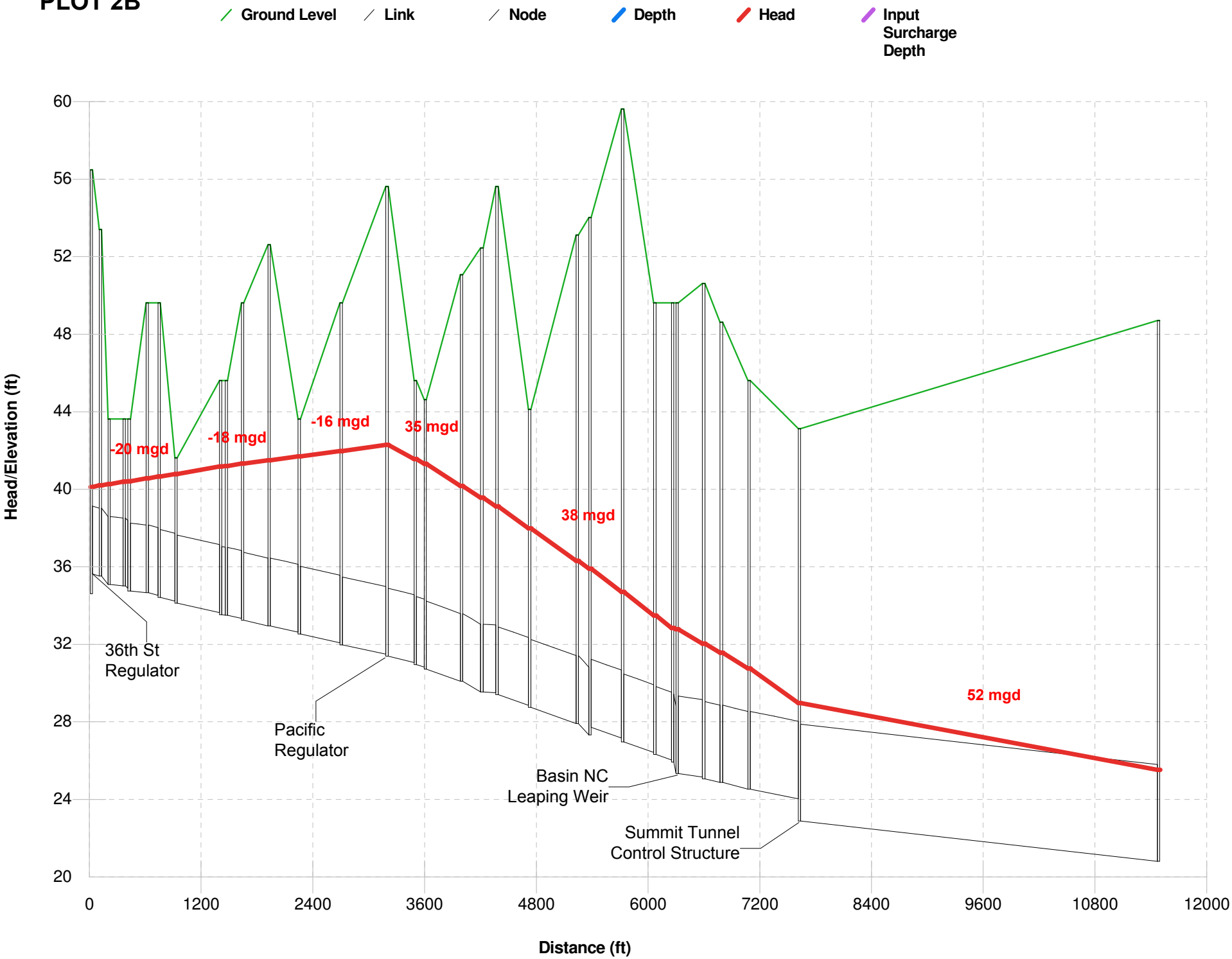
PLOT 2A

Summit Ave Interceptor - Existing - 1-Yr Flow Event



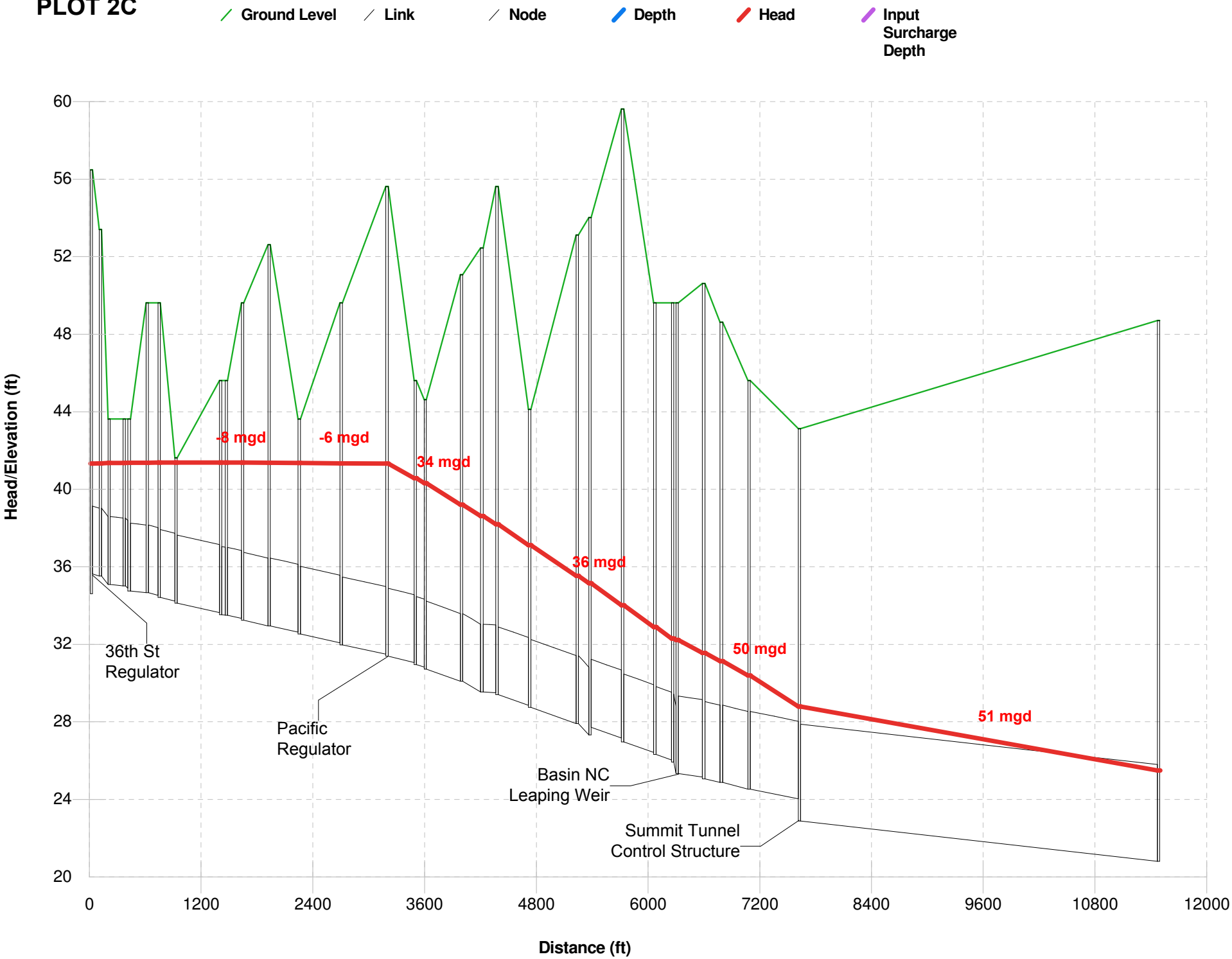
PLOT 2B

Summit Ave Interceptor - SRO4 - 1-Yr Flow Event



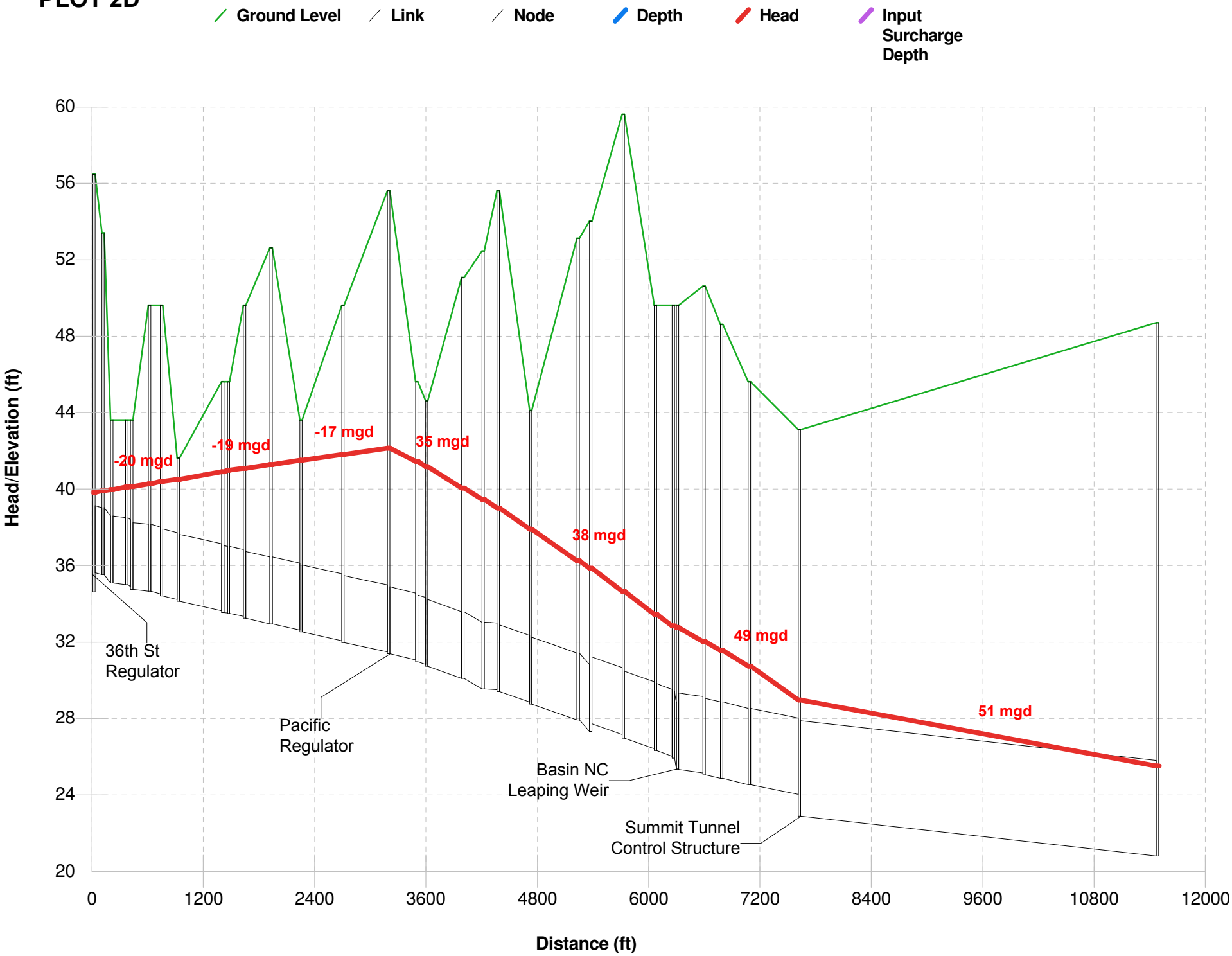
PLOT 2C

Summit Ave Interceptor - SRO7 and SRO4 - 1-Yr Flow Event



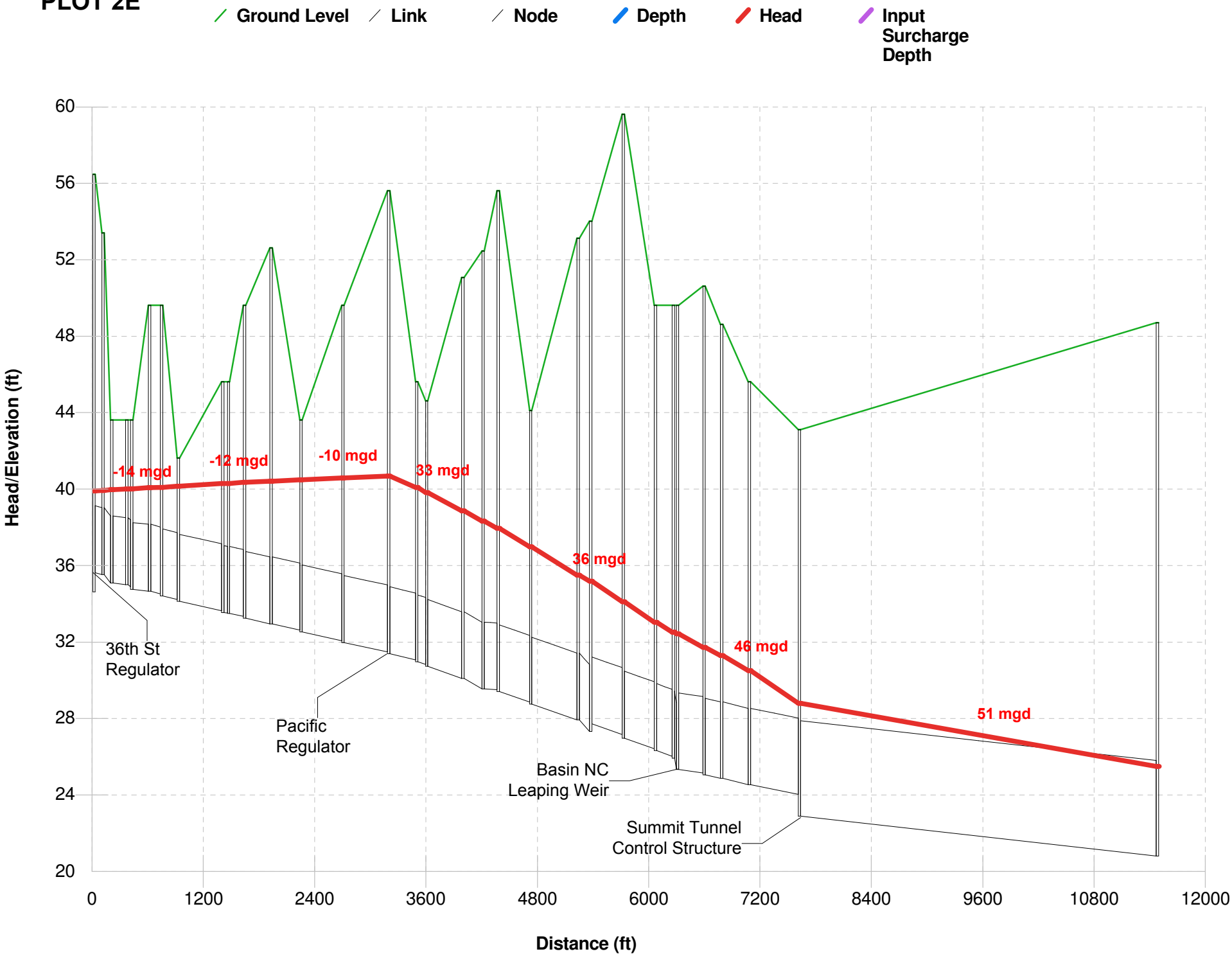
PLOT 2D

Summit Ave Interceptor - SRO8 and SRO4 - 1-Year Flow Event



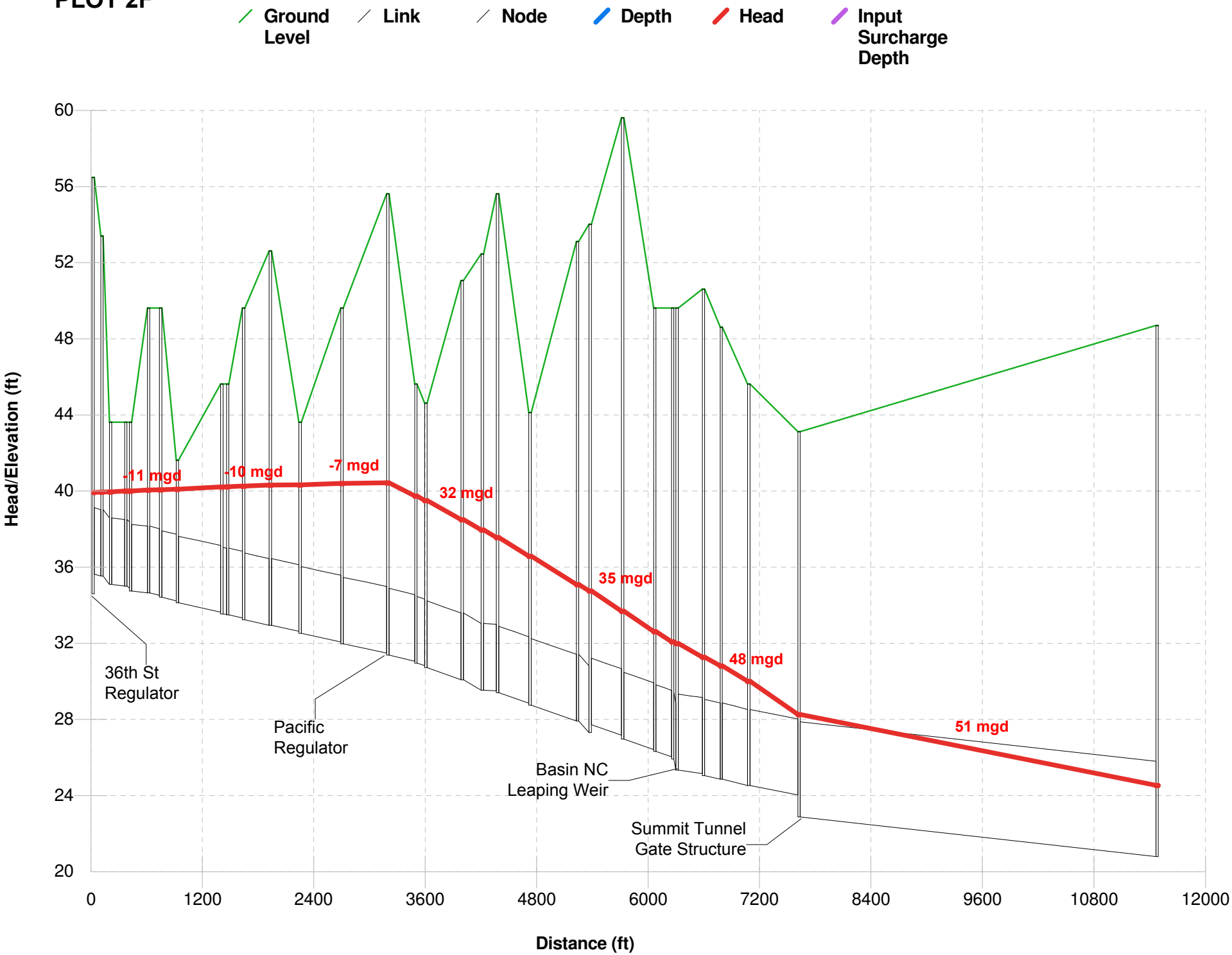
PLOT 2E

Summit Ave Interceptor - SRO8, SRO7, and SRO4 - 1-Yr Flow Event



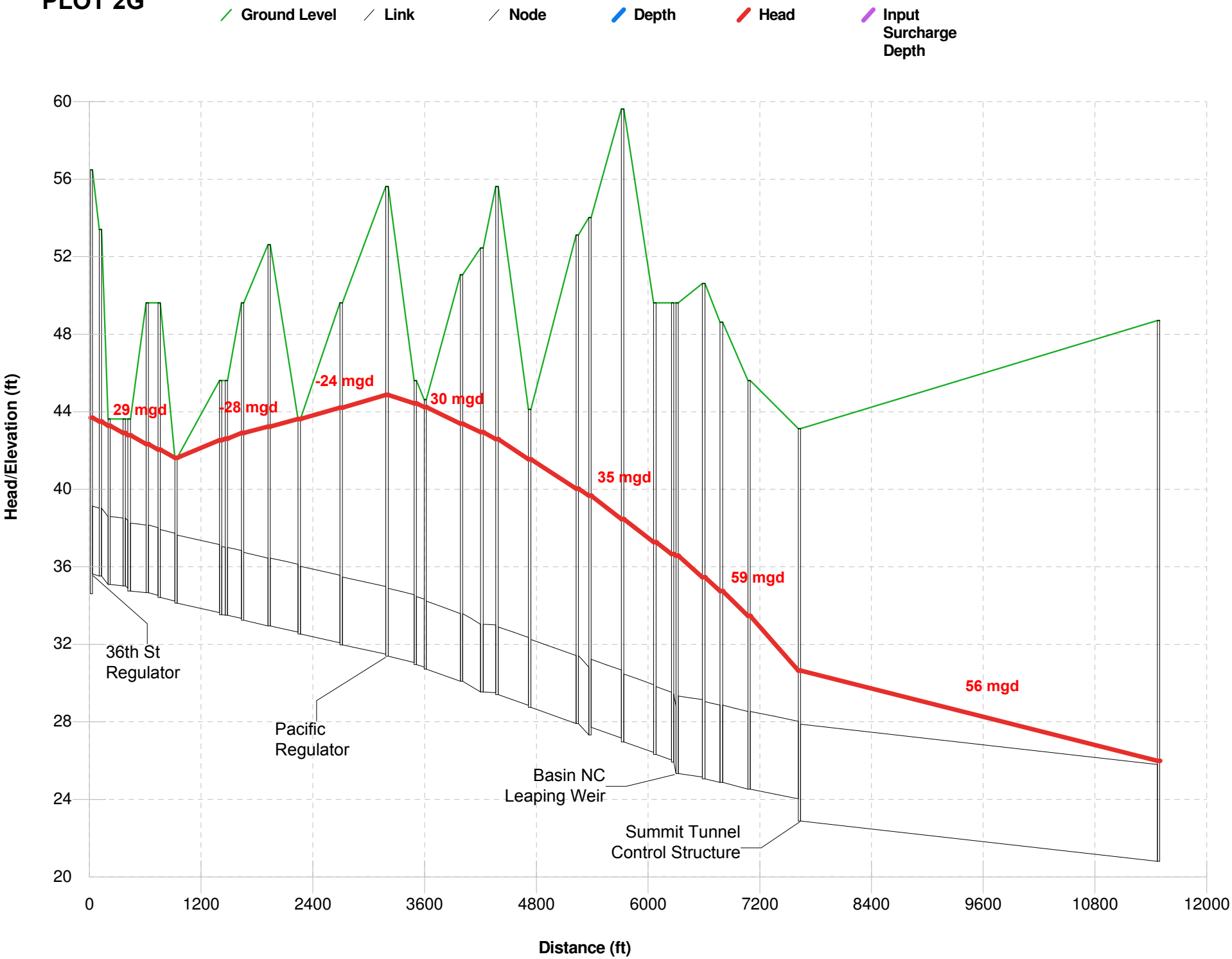
PLOT 2F

Summit Ave Interceptor - Year 2100 - 1-Yr Flow Event



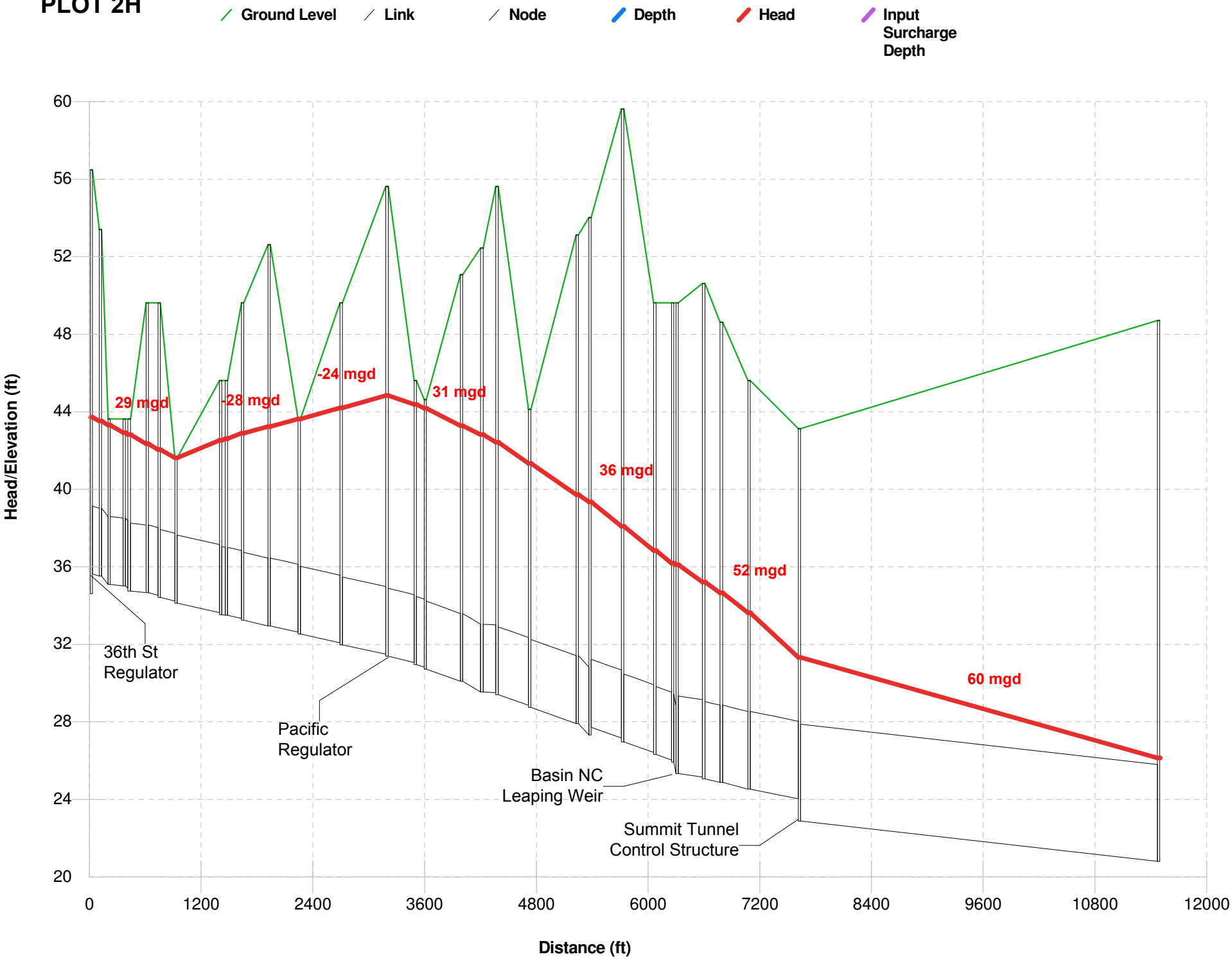
PLOT 2G

Summit Ave Interceptor - Existing - 25-Yr Flow Event



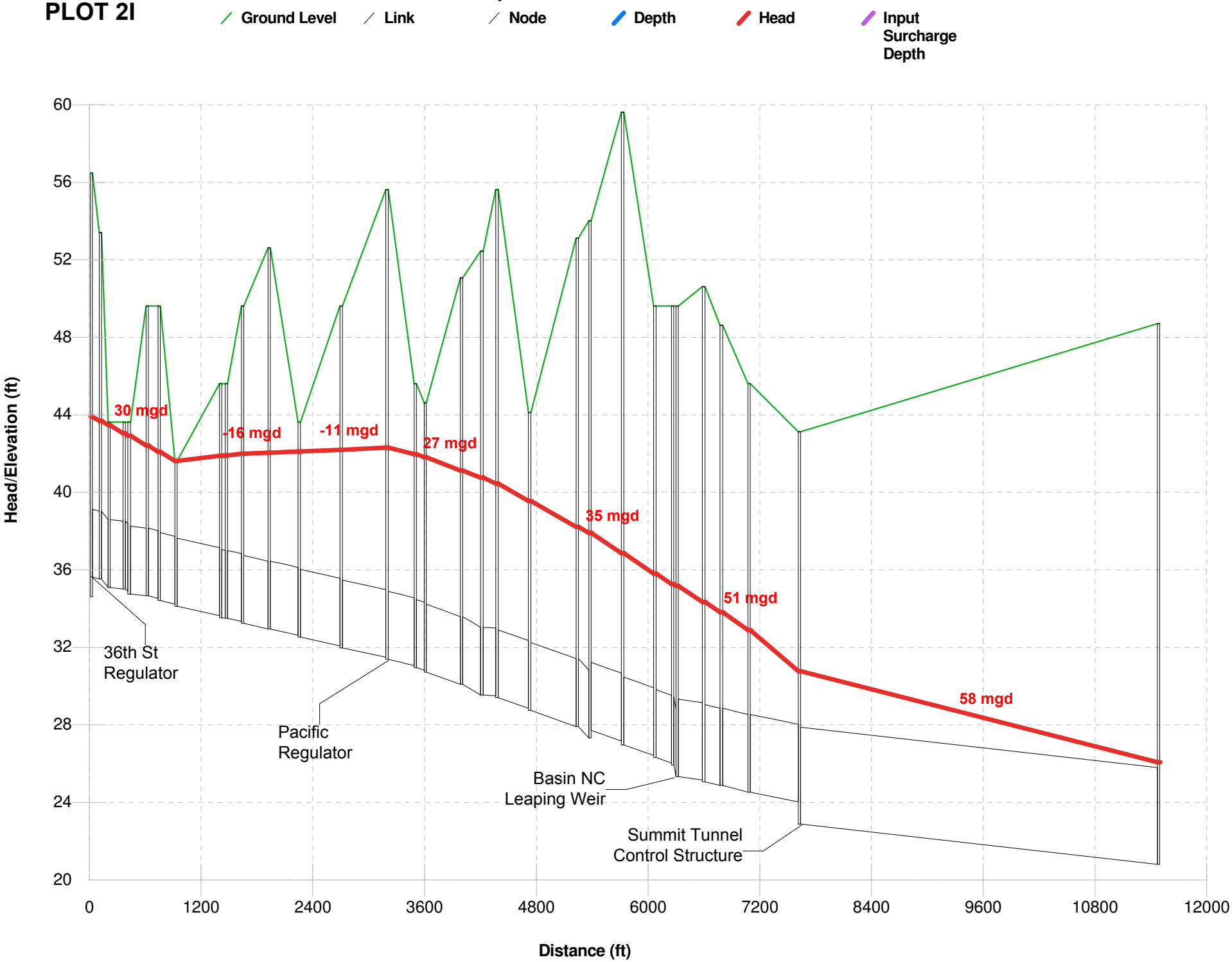
PLOT 2H

Summit Ave Interceptor - SRO4 - 25-Yr Flow Event



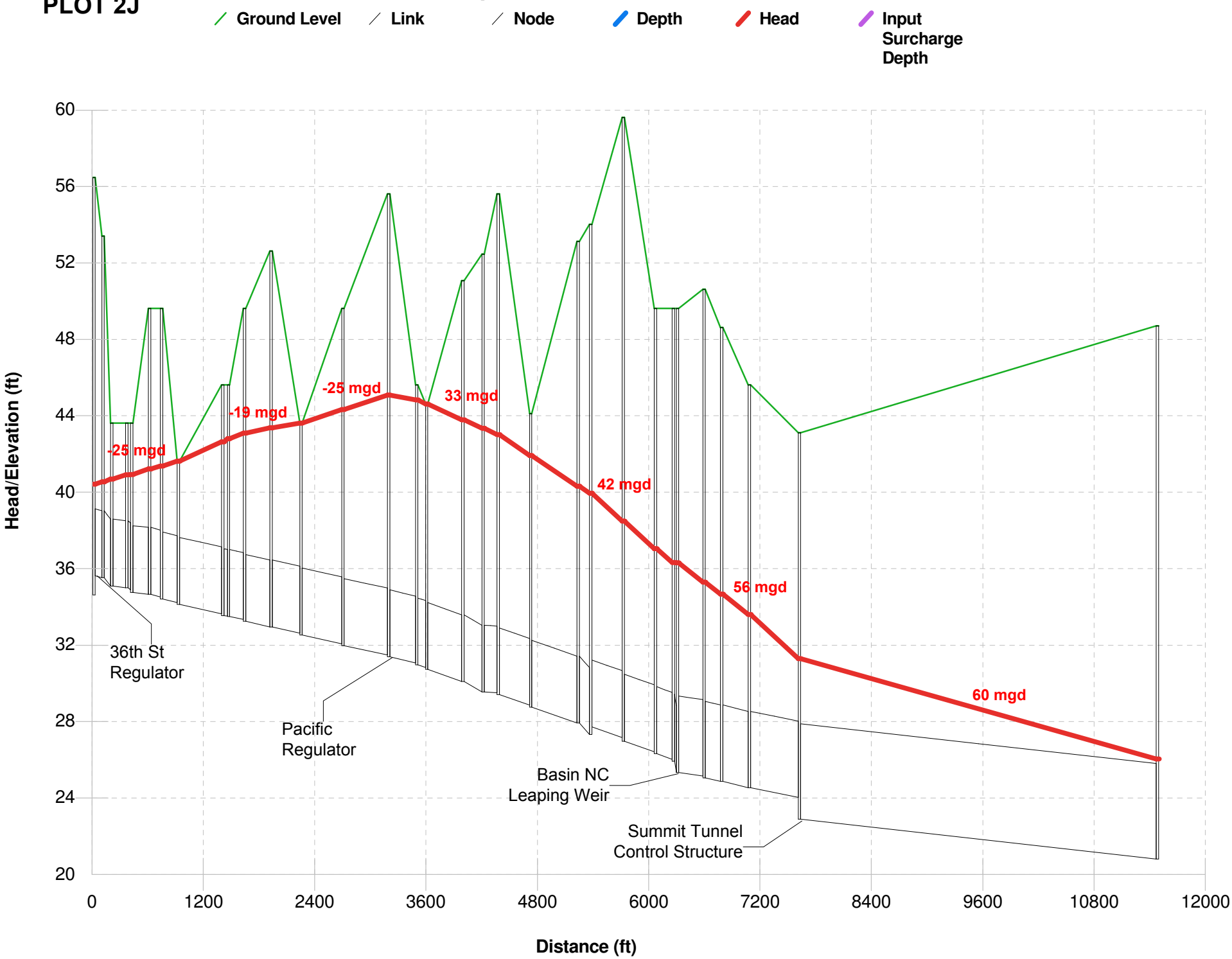
PLOT 2I

Summit Ave Interceptor - SRO7 and SRO4 - 25-Yr Flow Event



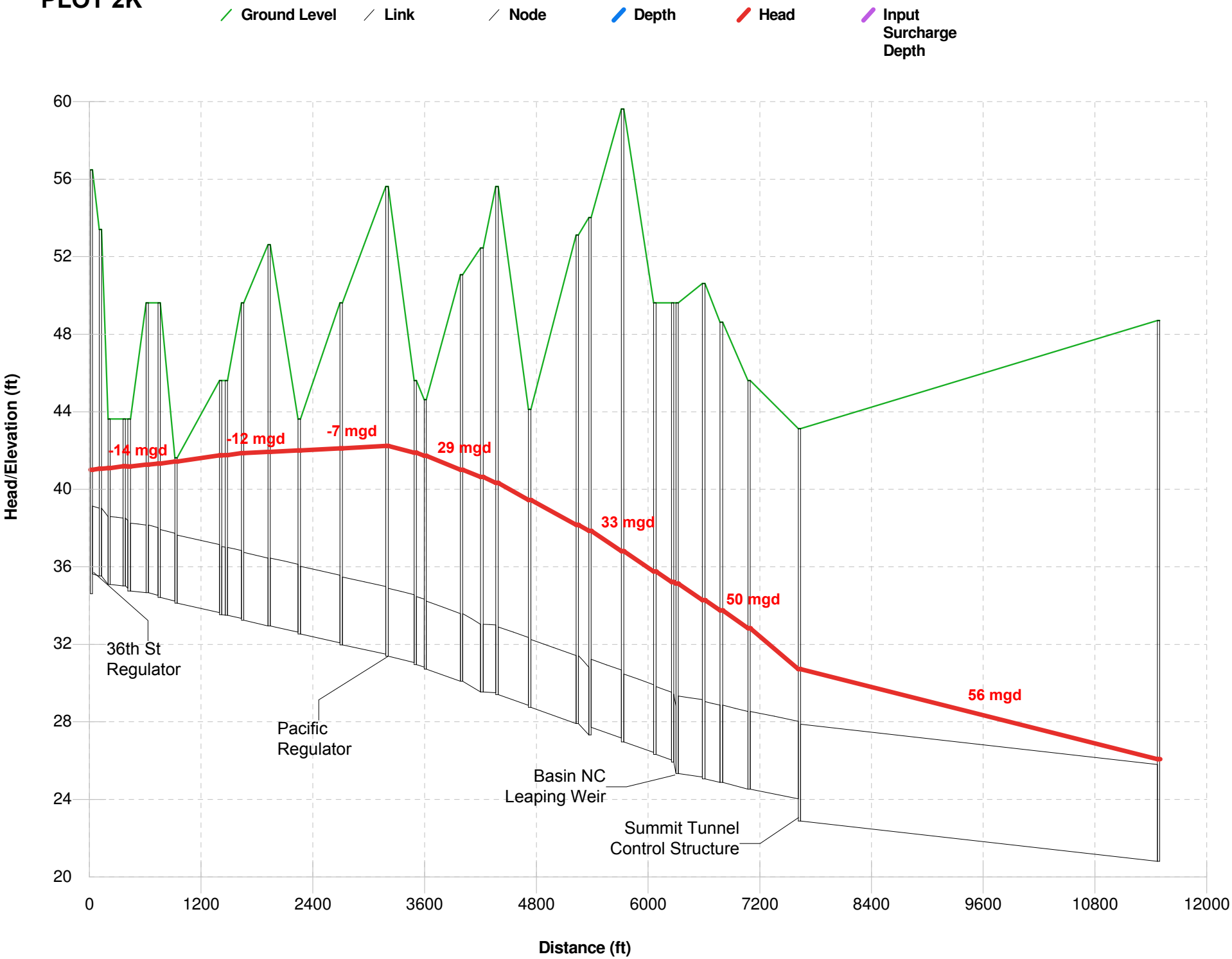
PLOT 2J

Summit Ave Interceptor - SRO8 and SRO4 - 25-Year Flow Event



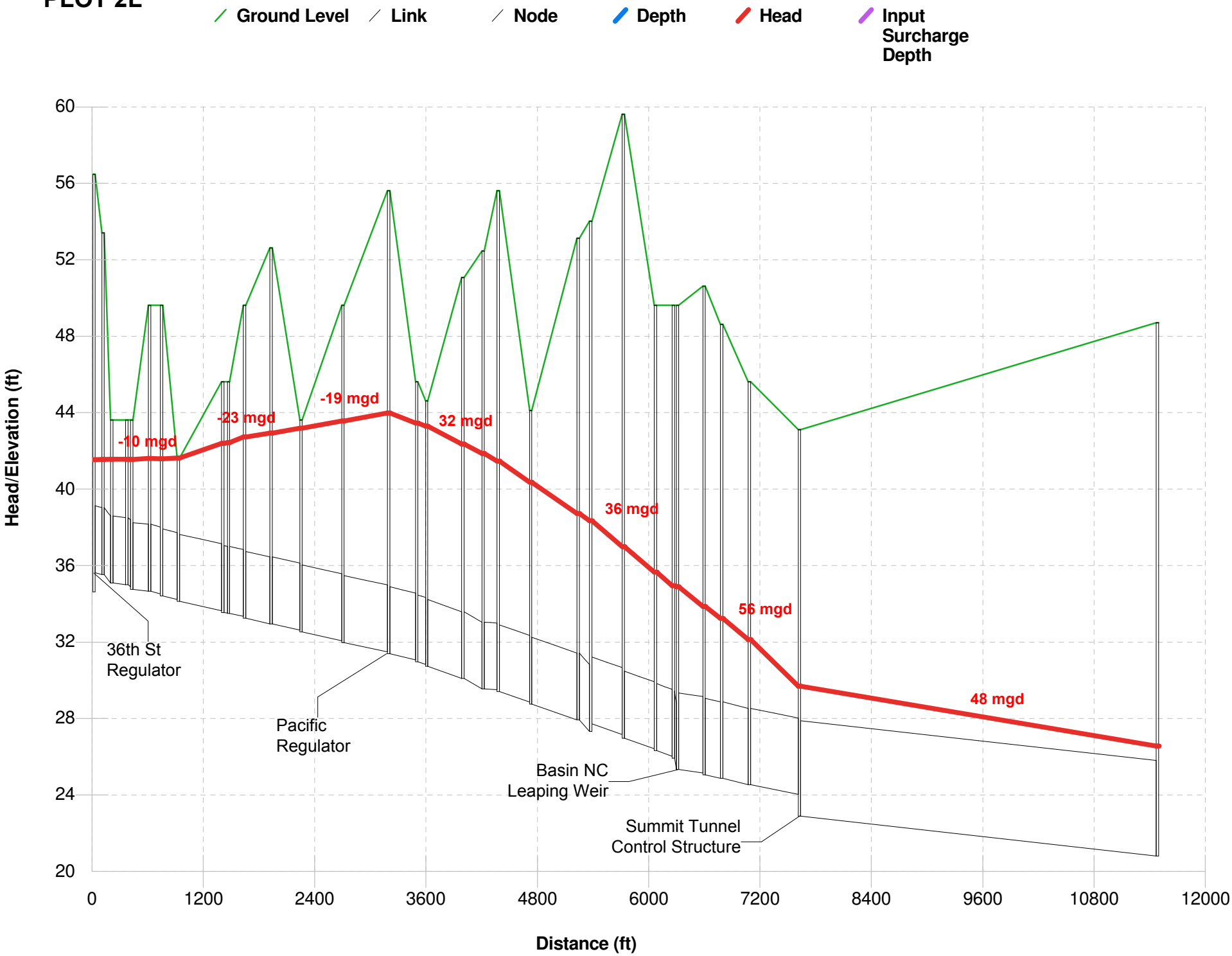
PLOT 2K

Summit Ave Interceptor - SRO8, SRO7, and SRO4 - 25-Yr Flow Event



PLOT 2L

Summit Ave Interceptor - Year 2100 - 25-Yr Flow Event



Section 3
Hydraulic Grade Line
Snohomish River Interceptor

Table C3 – Snohomish River Interceptor HGL Plot Description

Plot	Scenario	Flow Event	Improvement Simulated
3a	Existing	1-Year	None
3b	Existing	1-Year	LS32 CSO Lift Station (SRO4)
3c	Existing	1-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI (SRO7)
3d	Existing	1-Year	LS32 CSO Lift Station (SRO4), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
3e	Existing	1-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
3f	Year 2100	1-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
3g	Existing	25-Year	None
3h	Existing	25-Year	LS32 CSO Lift Station (SRO4)
3i	Existing	25-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI (SRO7)
3j	Existing	25-Year	LS32 CSO Lift Station (SRO4), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
3k	Existing	25-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)
3l	Year 2100	25-Year	LS32 CSO Lift Station (SRO4), 48" pipe from Pacific Regulator to SRI(SRO7), 60" parallel pipe from 36th St Regulator to SRI (SRO8)

2014 Comprehensive Sewer Plan
City of Everett

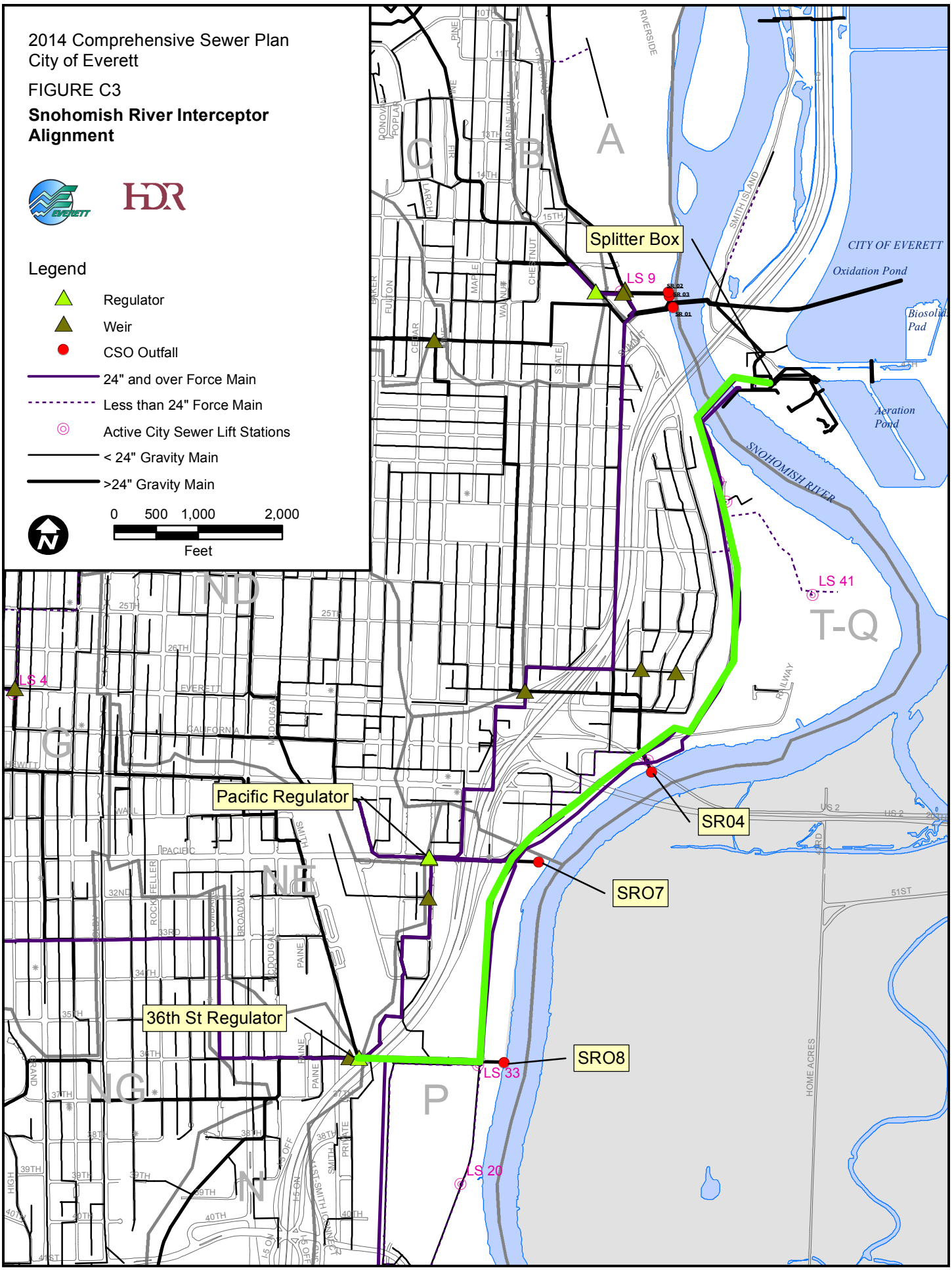
FIGURE C3

Snohomish River Interceptor Alignment

Legend

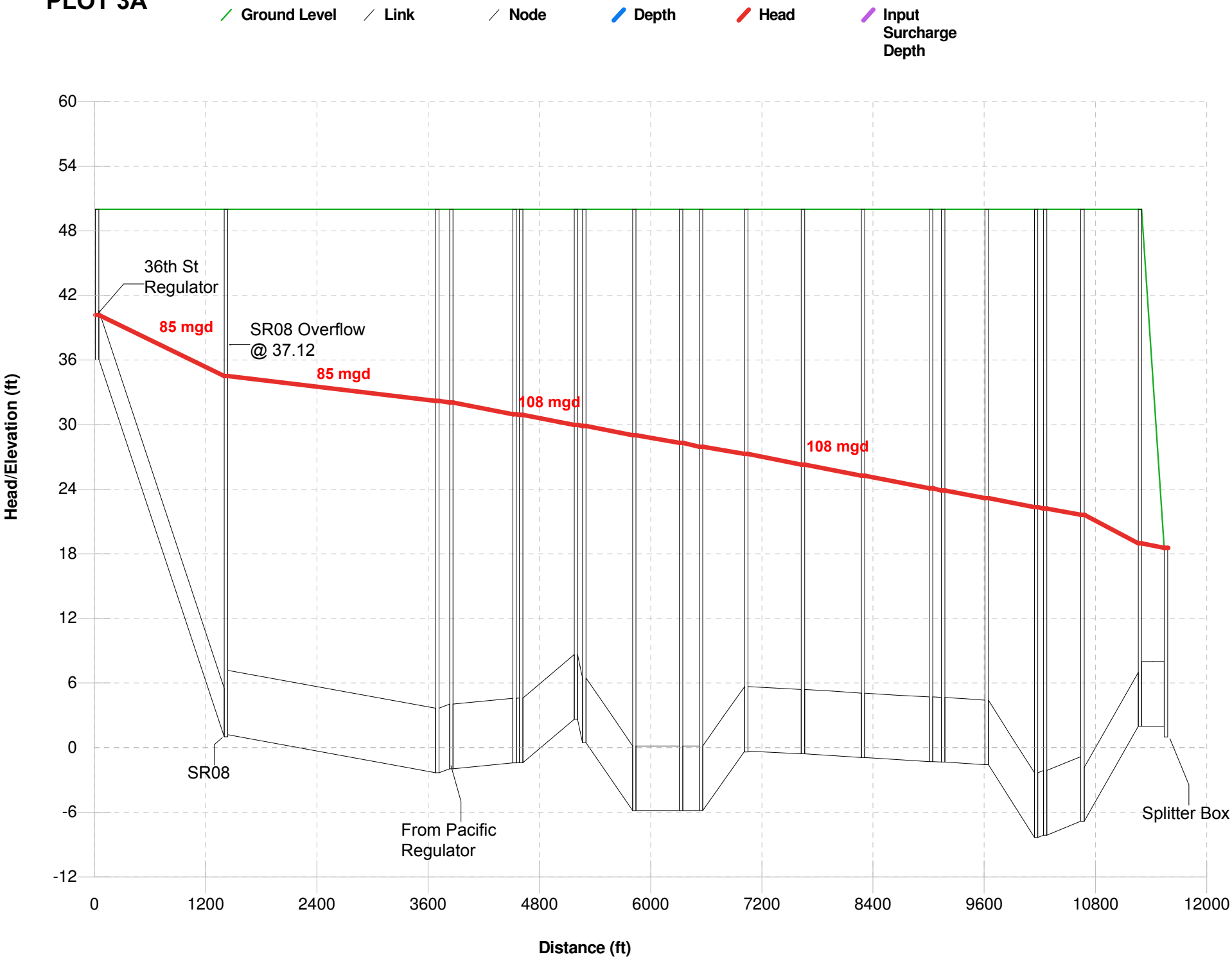
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main

0 500 1,000 2,000
Feet



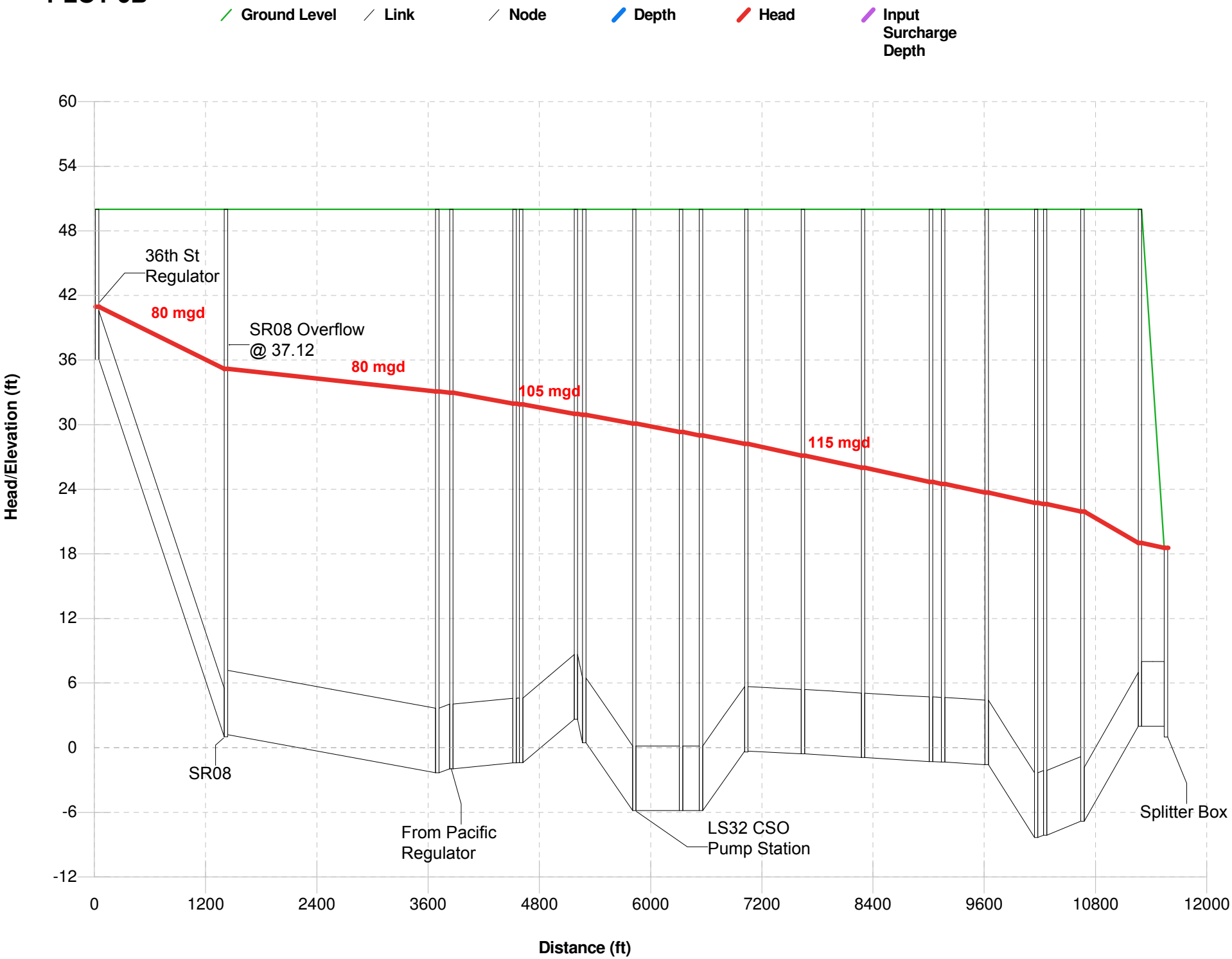
PLOT 3A

Snohomish River Interceptor - Existing - 1-Yr Flow Event



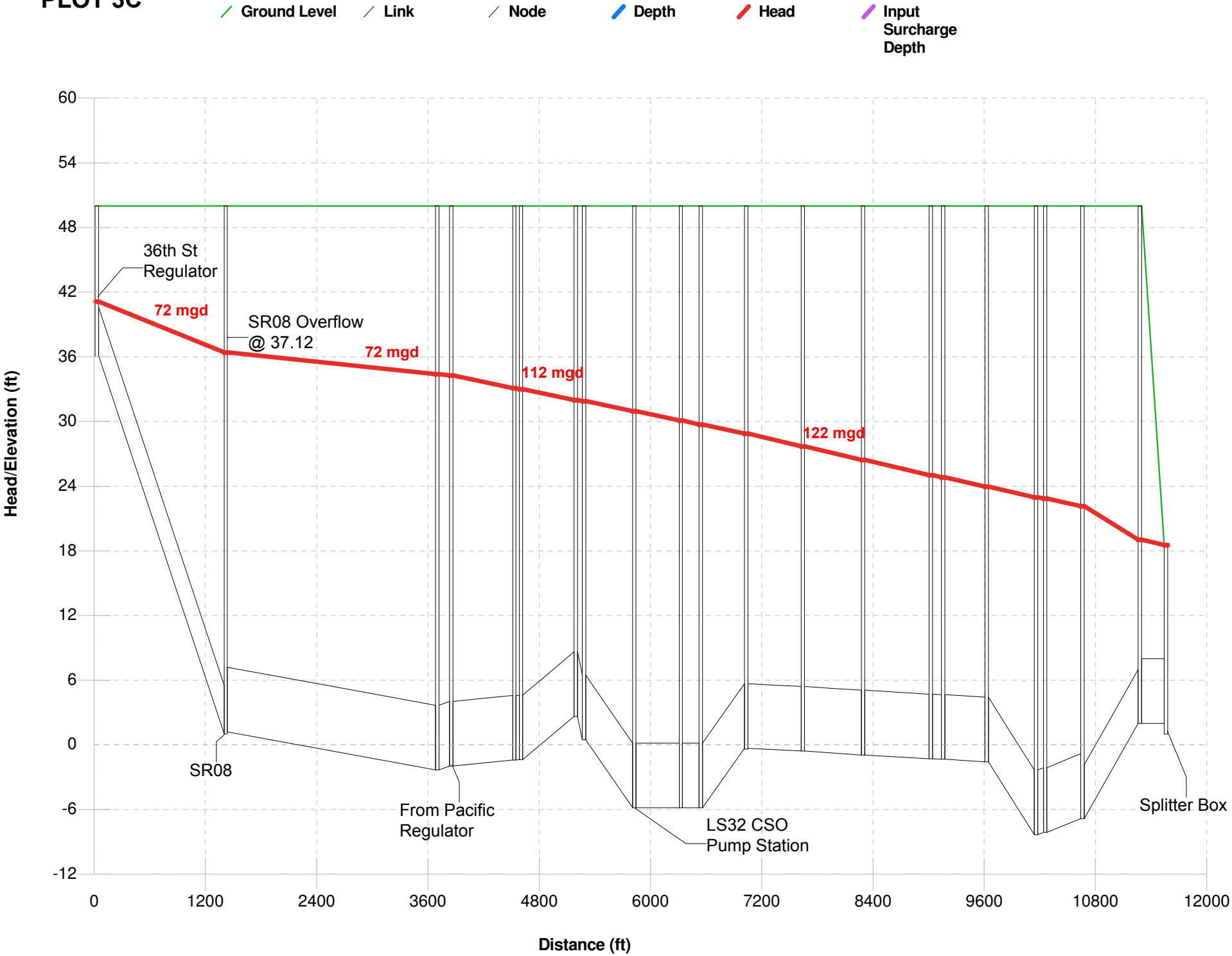
PLOT 3B

Snohomish River Interceptor - SRO4 - 1-Yr Flow Event



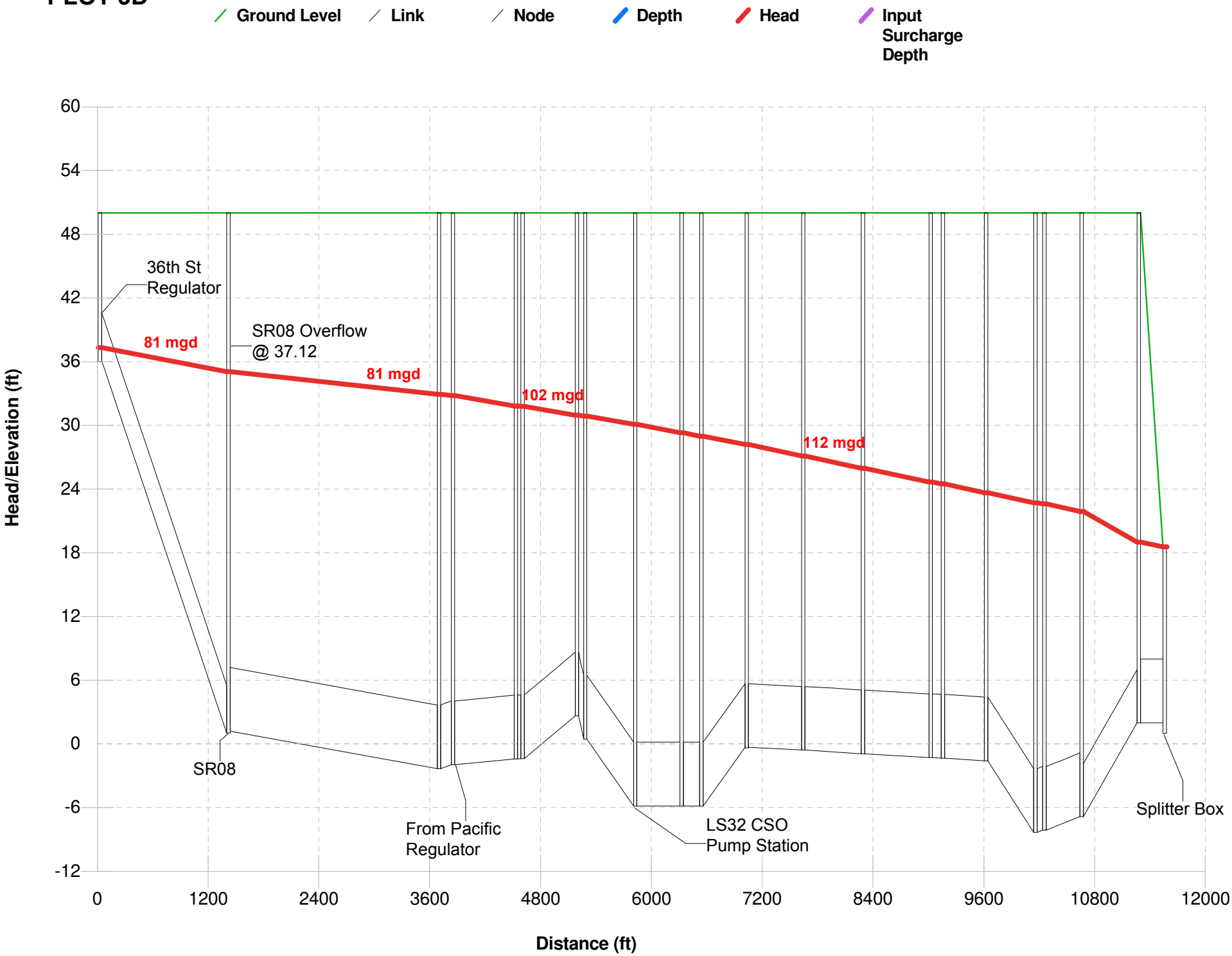
PLOT 3C

Snohomish River Interceptor - SRO7 and SRO4 - 1-Yr Flow Event



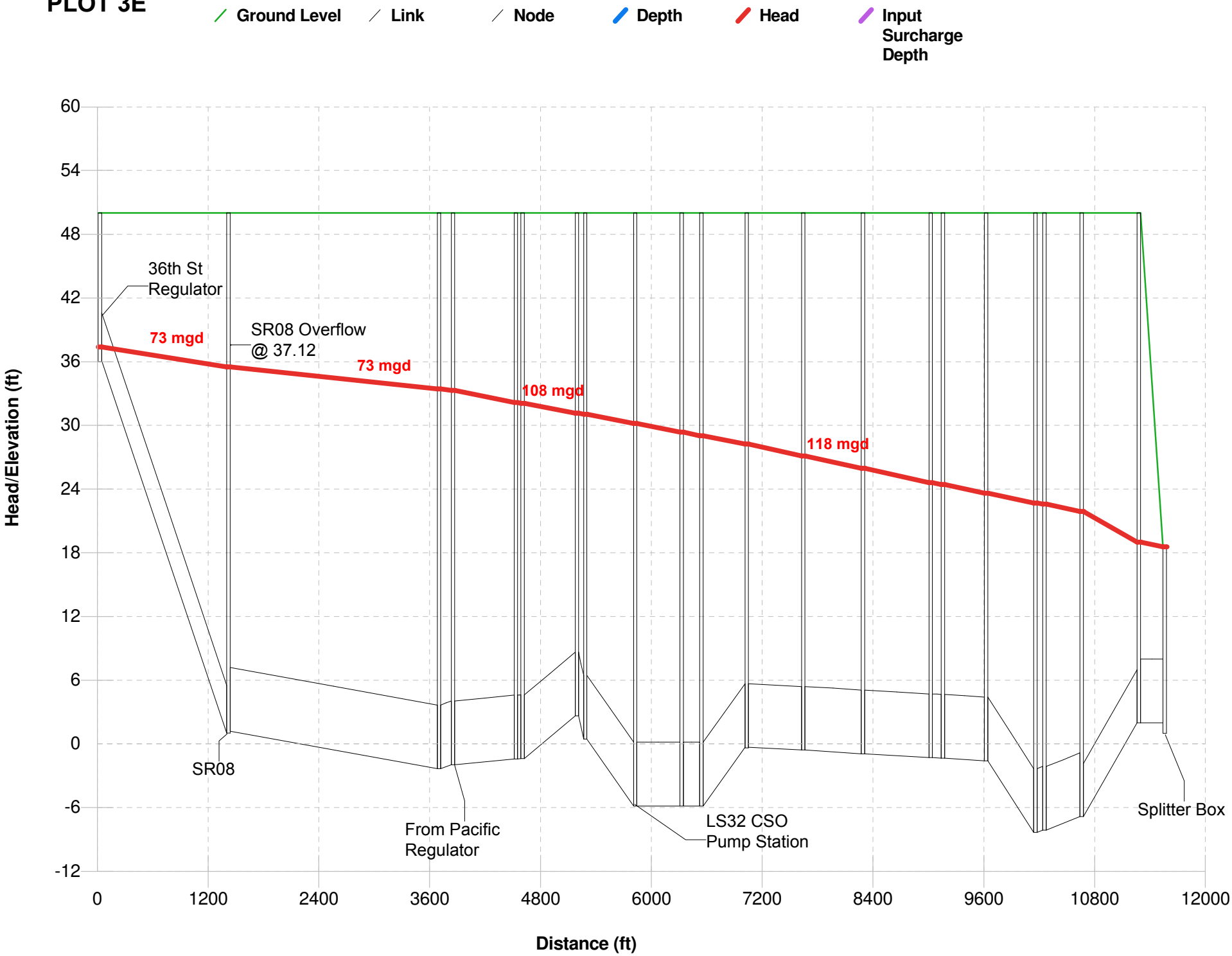
PLOT 3D

Snohomish River Interceptor - SRO8 and SRO4 - 1-Year Flow Event



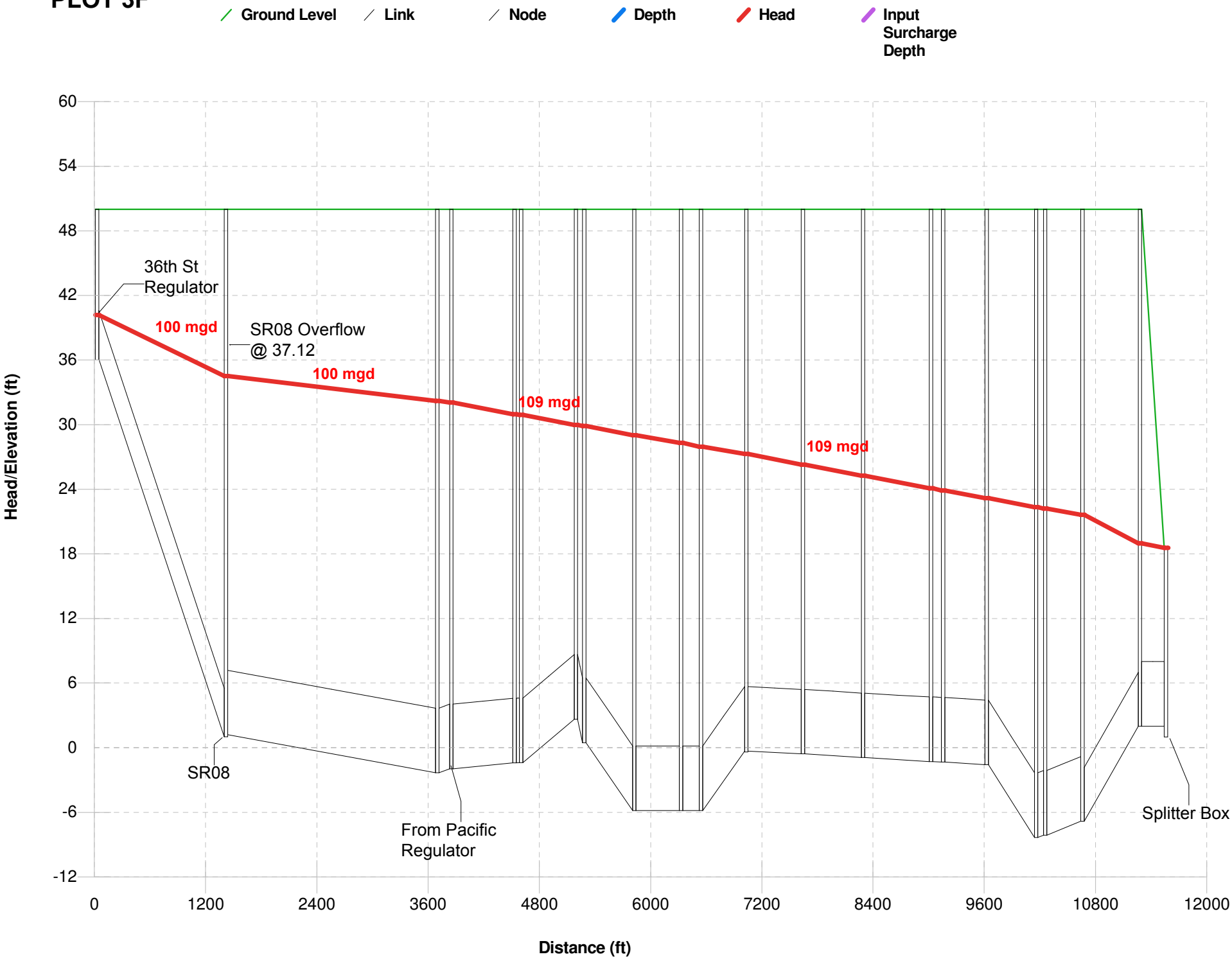
PLOT 3E

Snohomish River Interceptor - SRO8, SRO7, and SRO4 - 1-Yr Flow Event



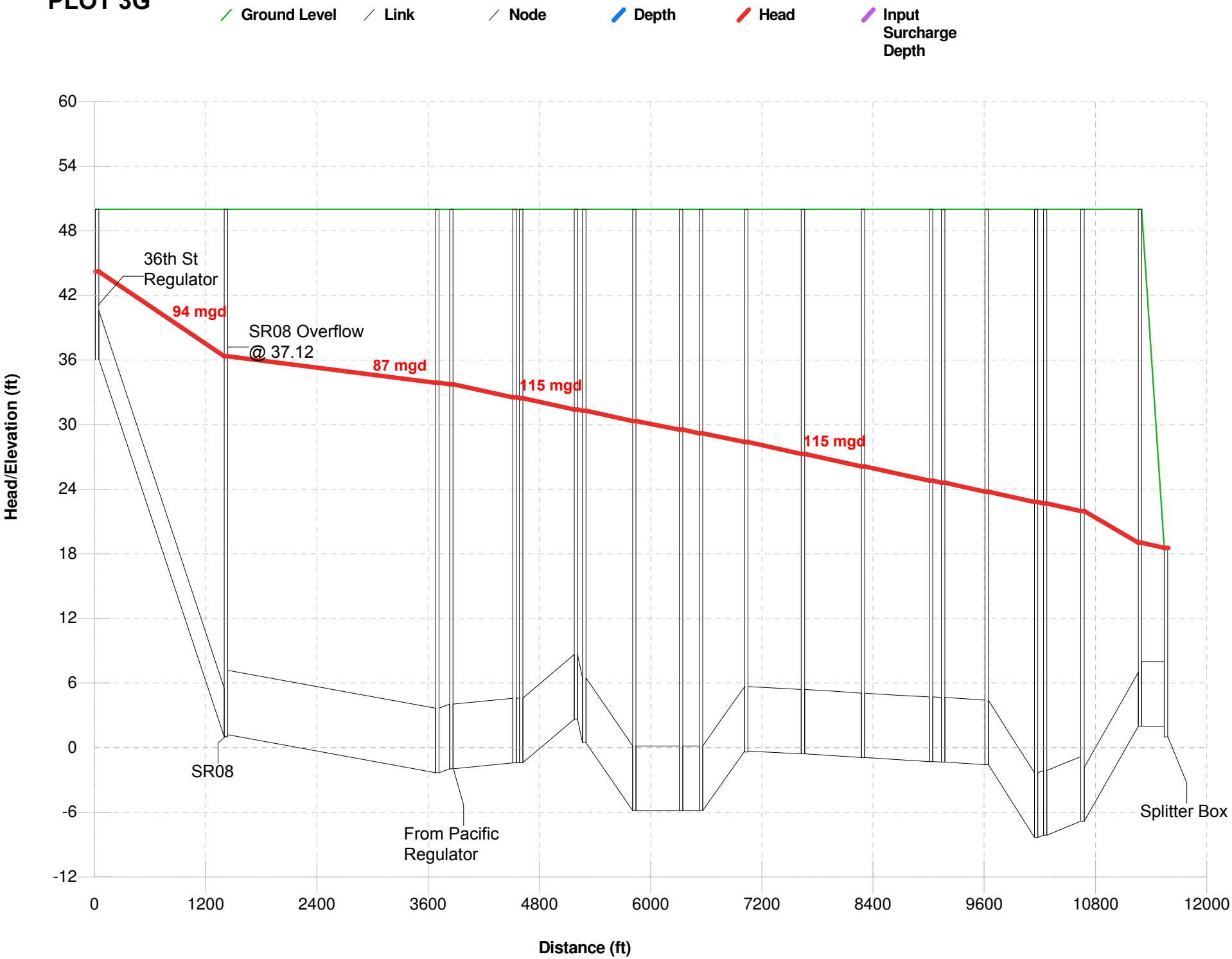
PLOT 3F

Snohomish River Interceptor - Year 2100 - 1-Yr Flow Event



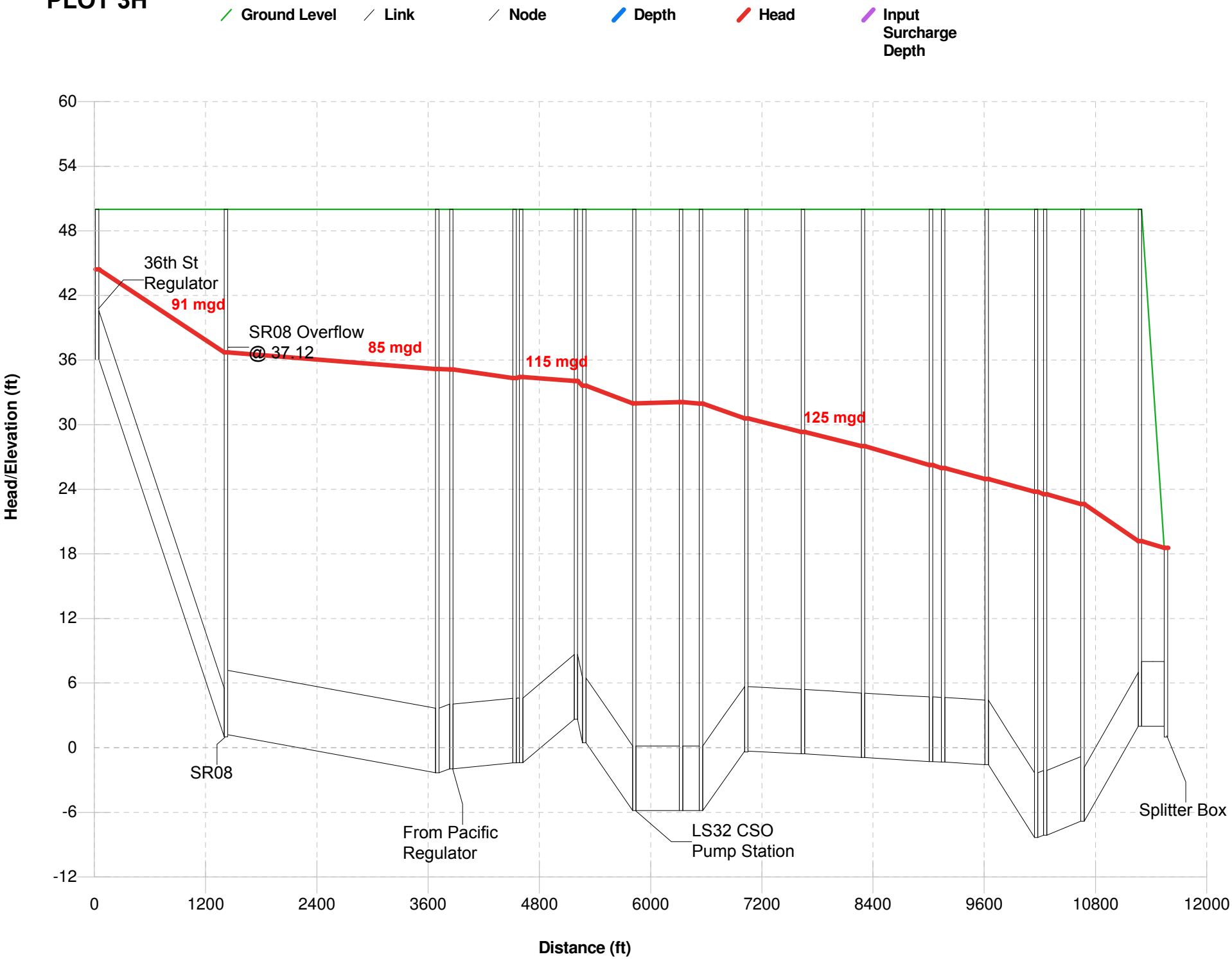
PLOT 3G

Snohomish River Intereptor - Existing - 25-Yr Flow Event



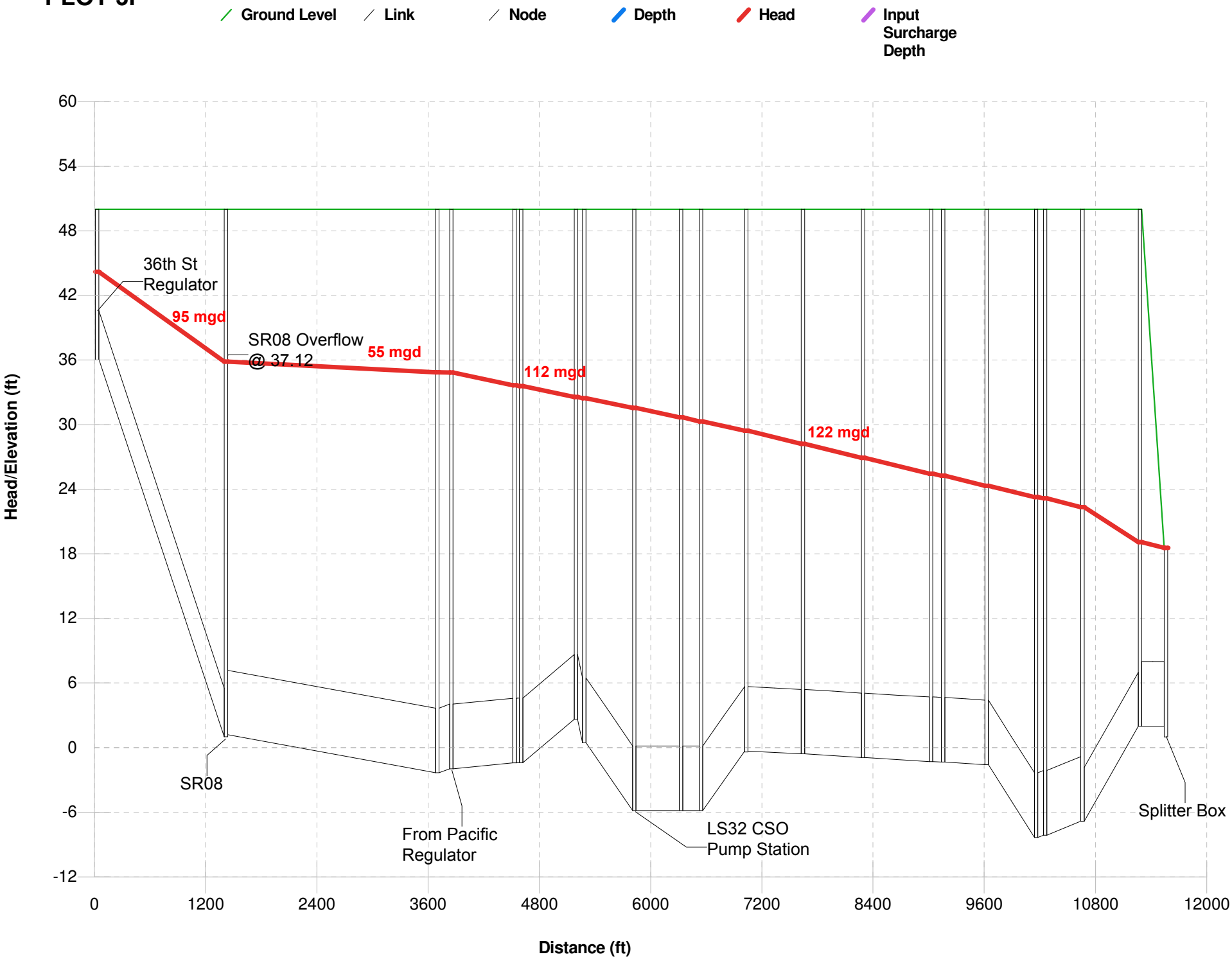
PLOT 3H

Snohomish River Interceptor - SRO4 - 25-Yr Flow Event



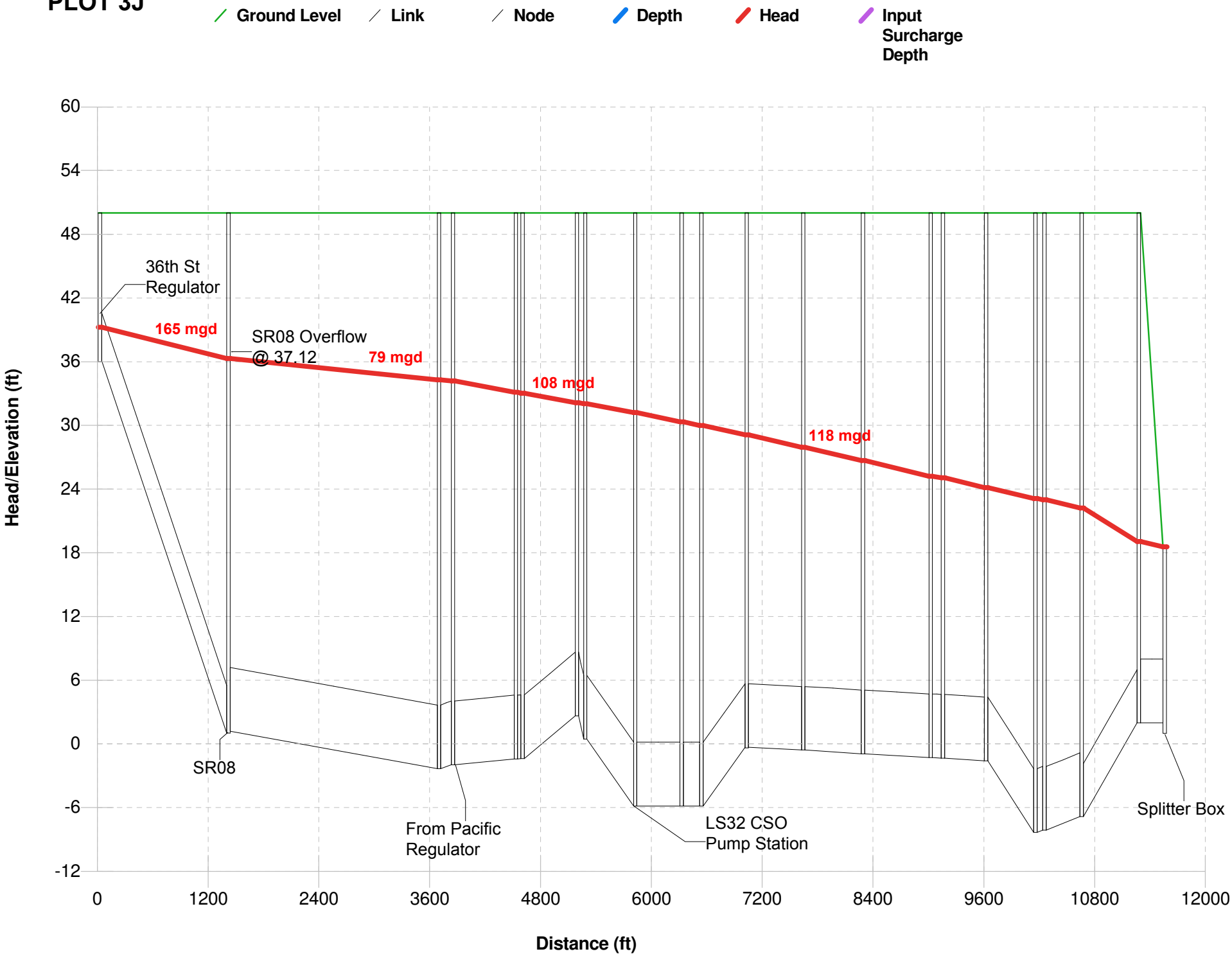
PLOT 3I

Snohomish River Inteceptor - SRO7 and SRO4 - 25-Yr Flow Event



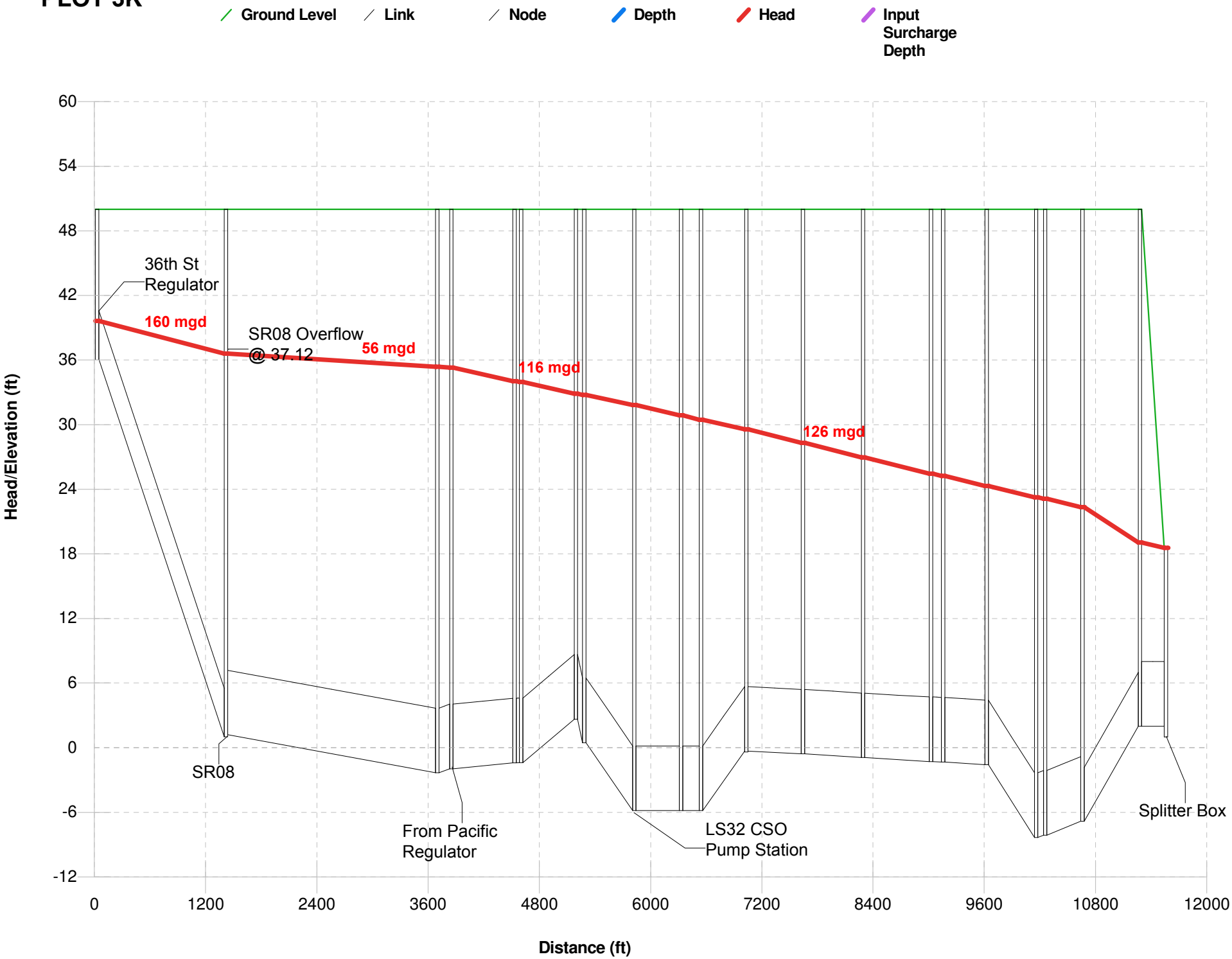
PLOT 3J

Snohomish River Interceptor - SRO8 and SRO4 - 25-Year Flow Event



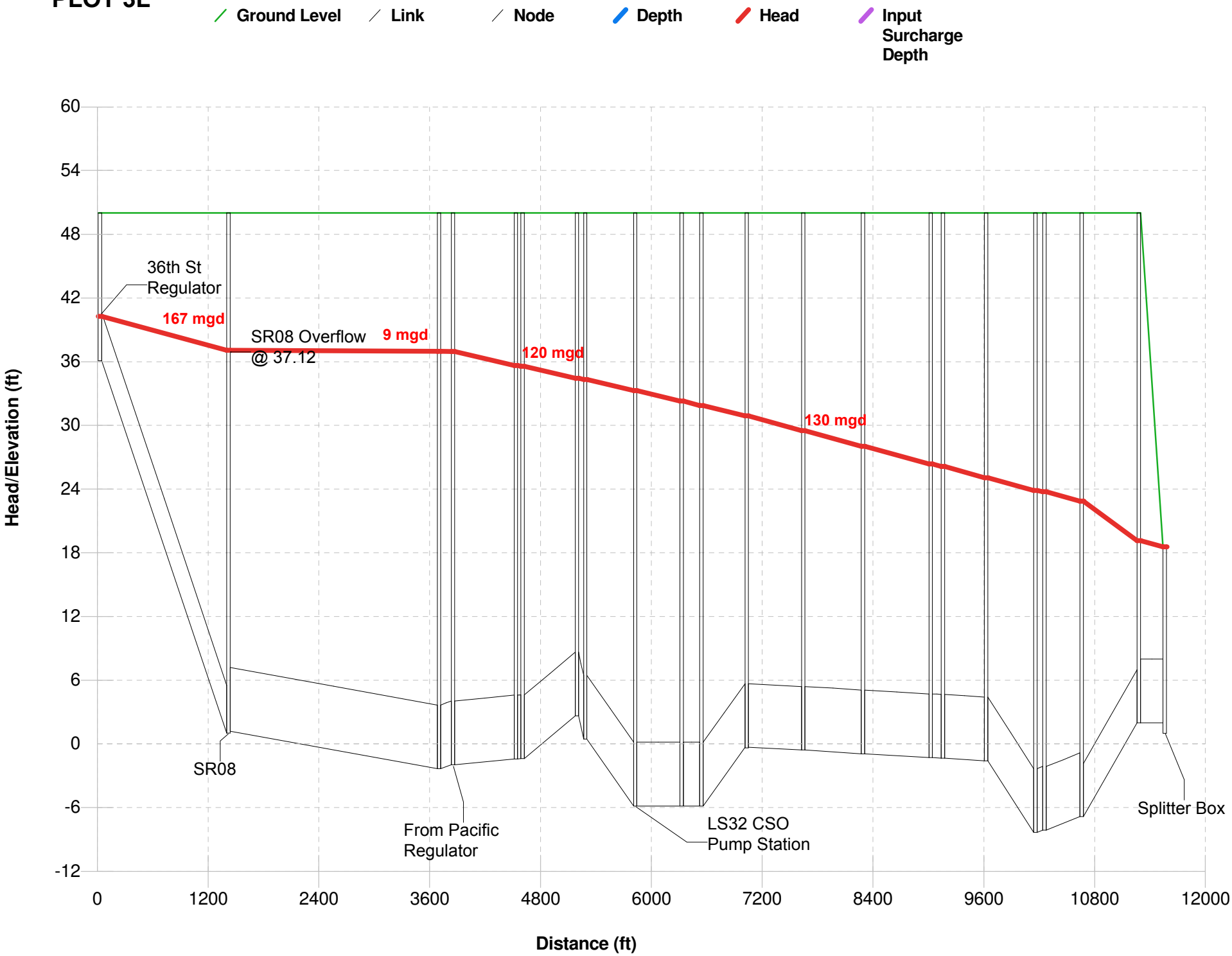
PLOT 3K

Snohomish River Interceptor - SRO8, SRO7, and SRO4 - 25-Yr Flow Event



PLOT 3L

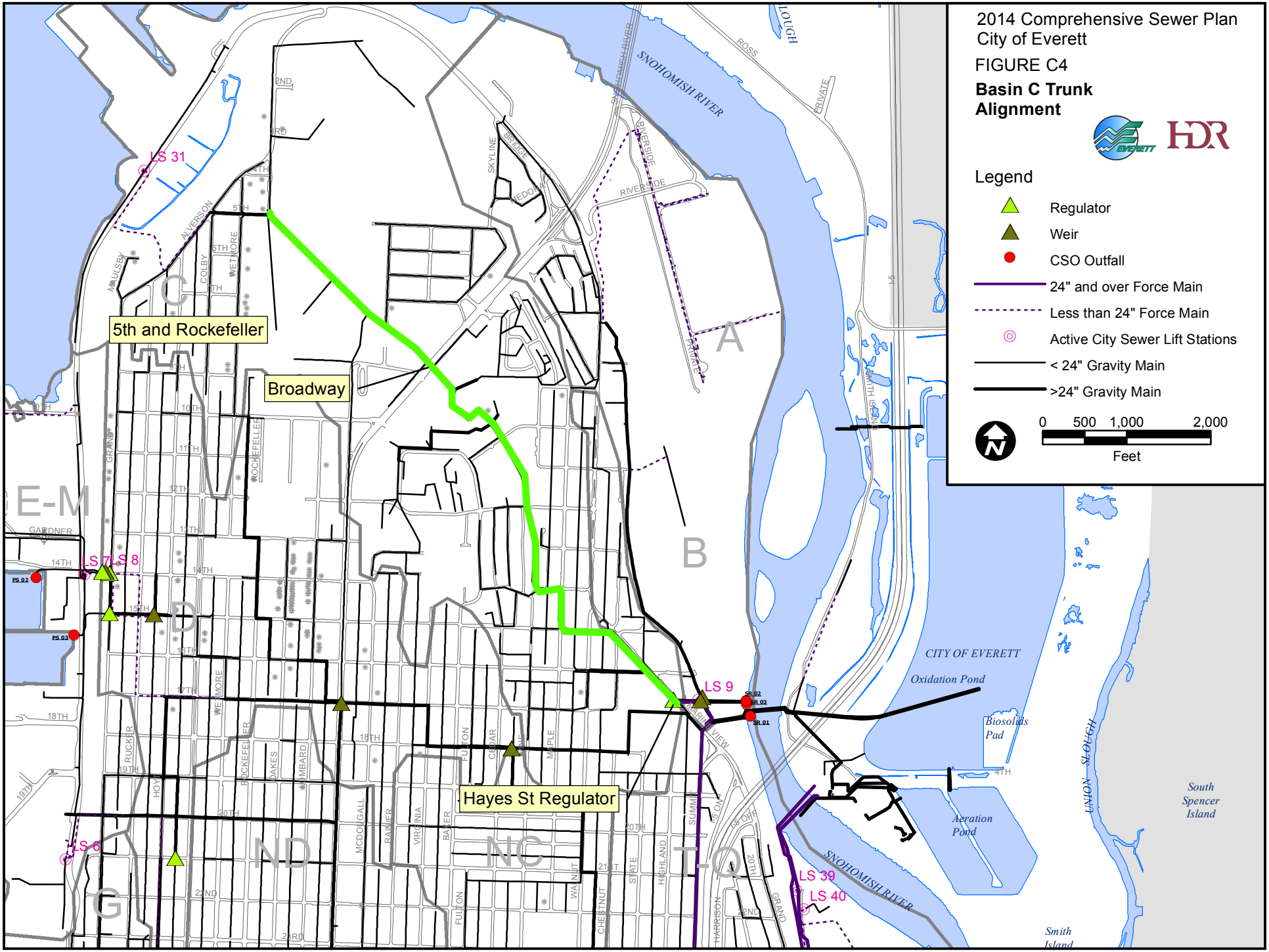
Snohomish River Interceptor - Year 2100 - 25-Yr Flow Event



Section 4
Hydraulic Grade Line
Basin C Trunk Main

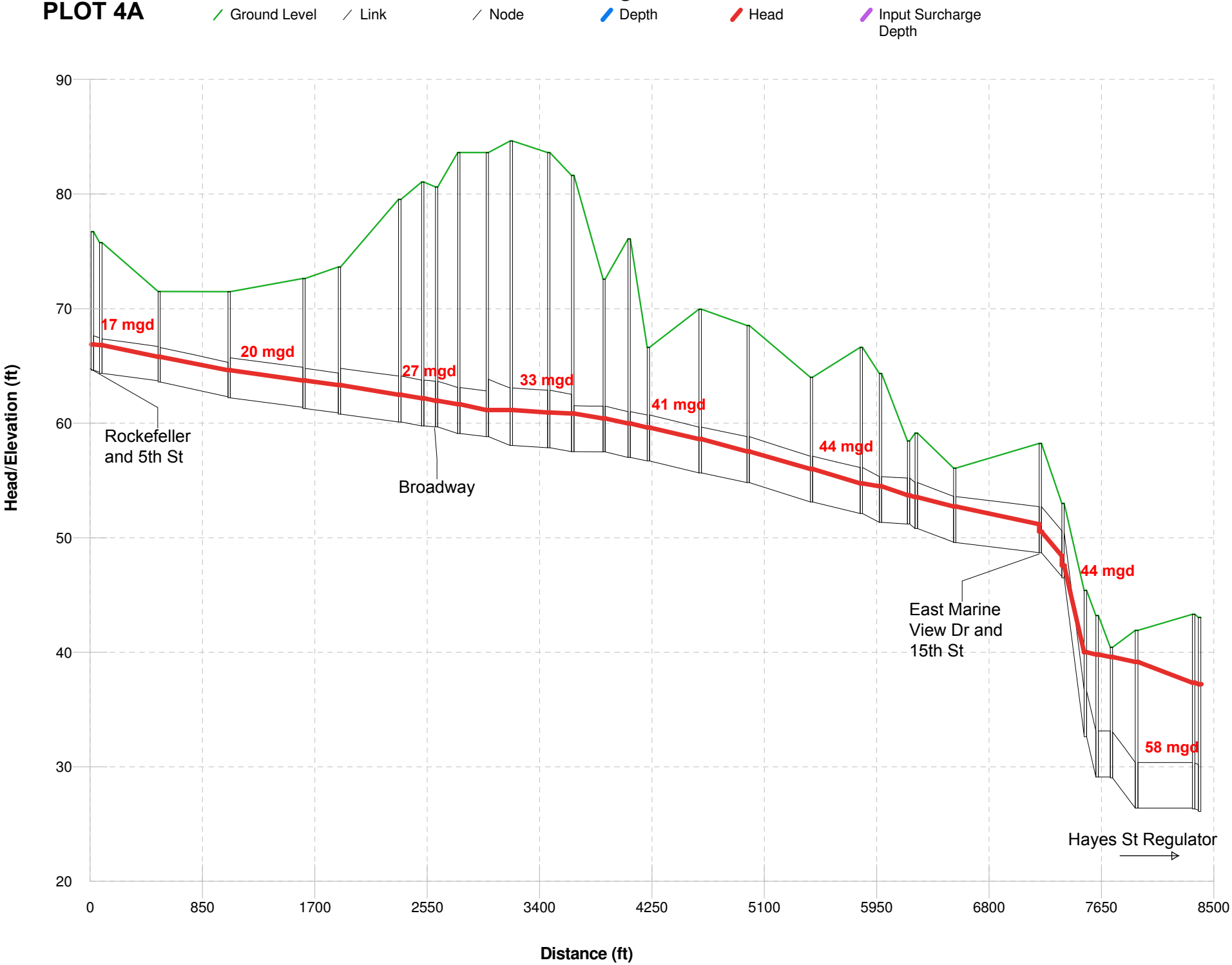
Table C4 – Basin C Trunk HGL Plot Description

Plot	Scenario	Flow Event	Improvement Simulated
4a	Existing	1-Year	None
4b	Year 2100	1-Year	Upstream Improvements, Basin C Trunk Improvements
4c	Existing	25-Year	None
4d	Year 2100	25-Year	Upstream Improvements, Basin C Trunk Improvements


2014 Comprehensive Sewer Plan
City of Everett
FIGURE C4
Basin C Trunk Alignment
Legend
Regulator
Weir
CSO Outfall
24" and over Force Main
Less than 24" Force Main
Active City Sewer Lift Stations
< 24" Gravity Main
>24" Gravity Main
0 500 1,000 2,000
Feet
5th and Rockefeller
Broadway
Hayes St Regulator
LS 31
LS 7
LS 8
LS 9
LS 6
LS 39
LS 40
SNOHOMISH RIVER
CITY OF EVERETT
Oxidation Pond
Biosolids Pad
Aeration Pond
South Spencer Island
Smith Island
UNION SLOUGH
A
B
C
D
E-M
G
ND
NC
T-Q

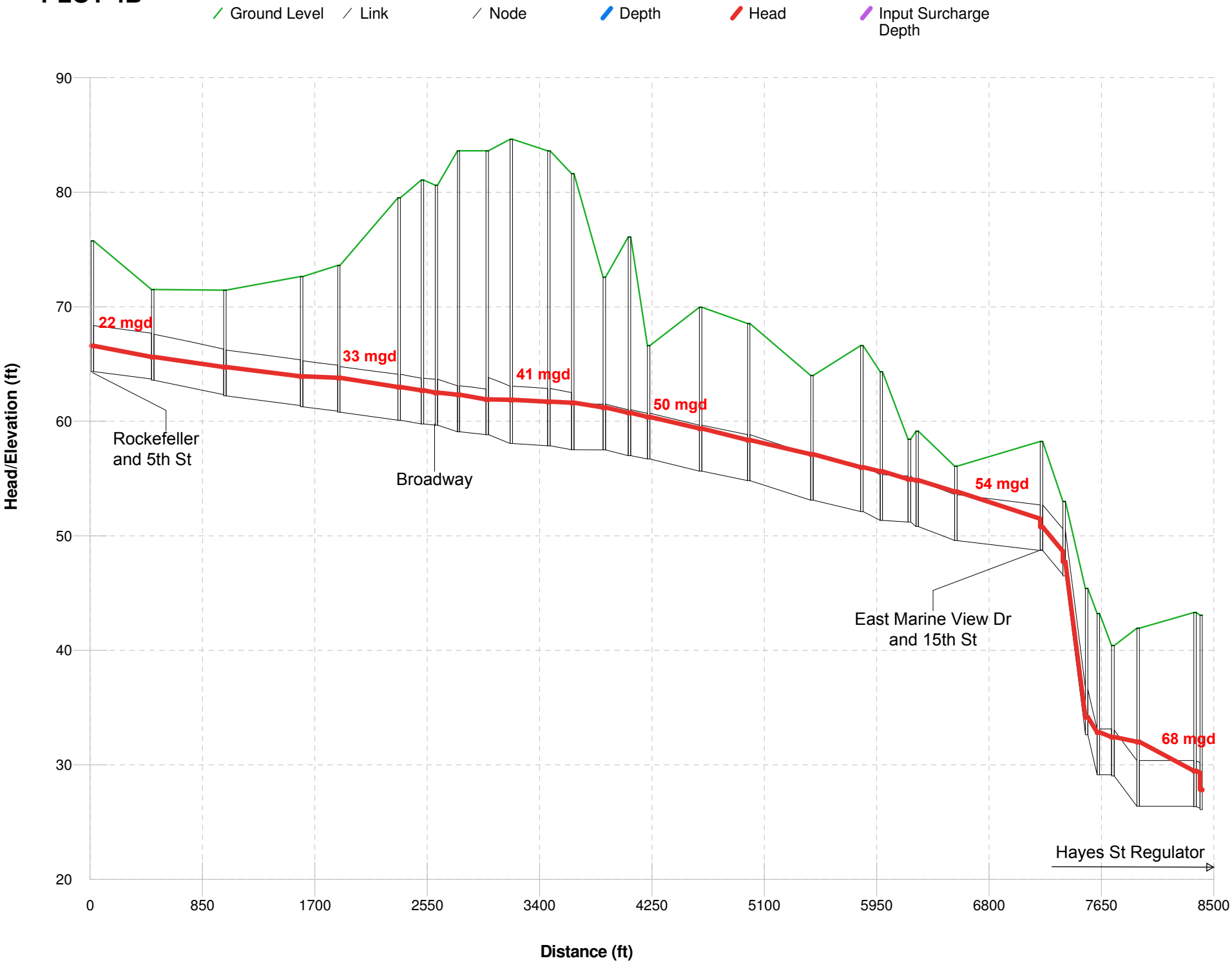
Basin C Trunk - Existing - 1-Yr Flow Event

PLOT 4A



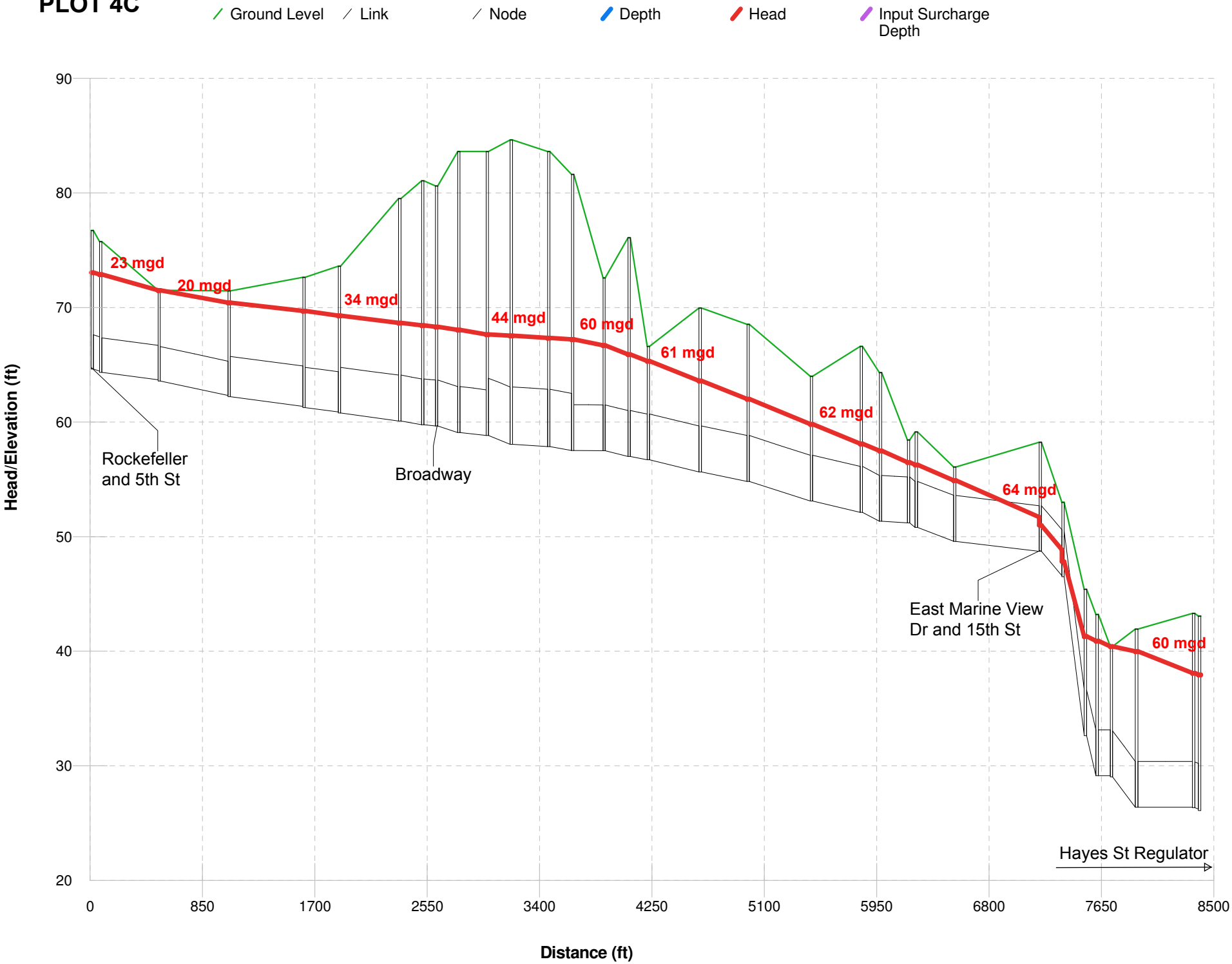
PLOT 4B

Basin C Trunk - Year 2100 - 1-Yr Flow Event



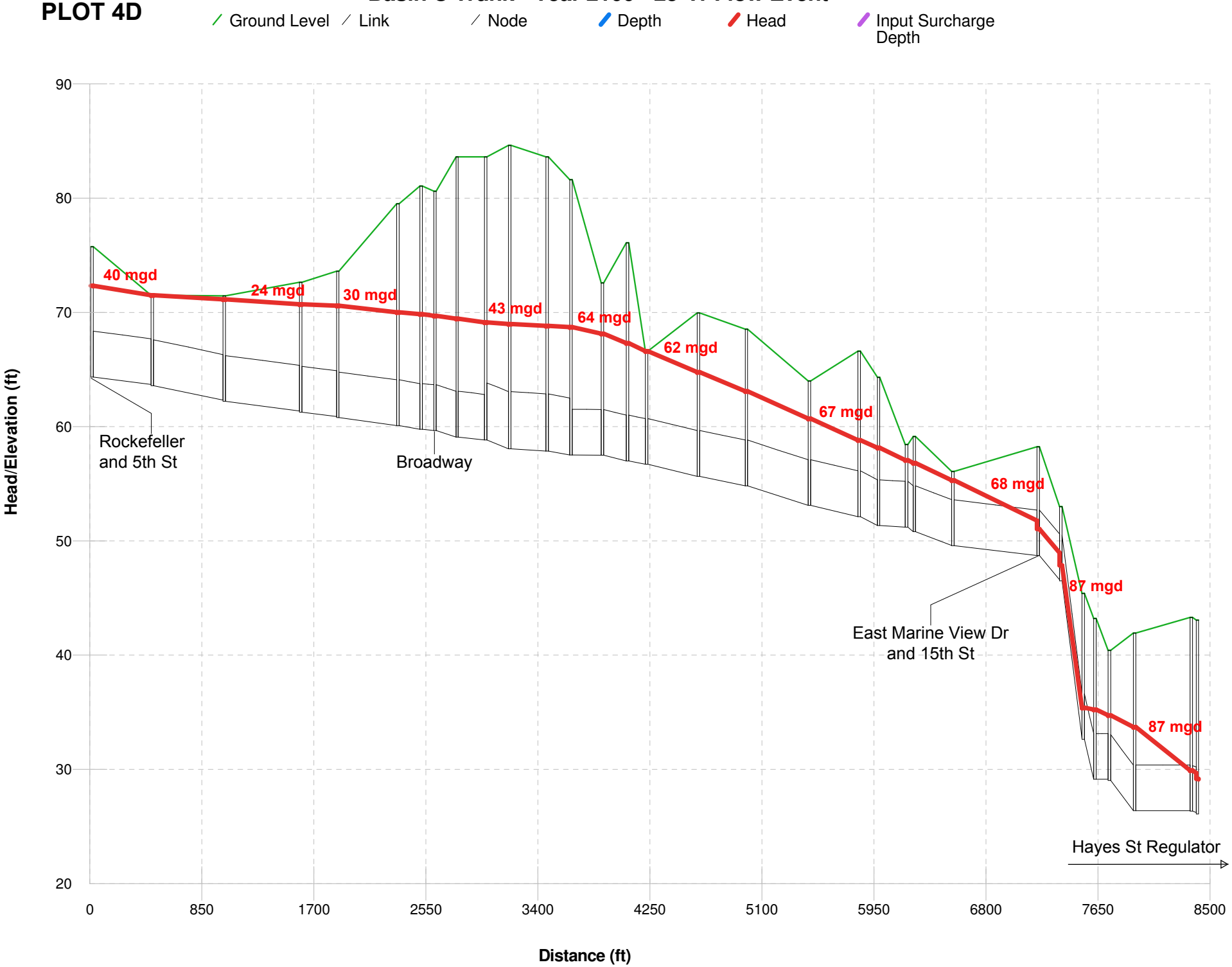
PLOT 4C

Basin C Trunk - Existing - 25-Yr Flow Event



PLOT 4D

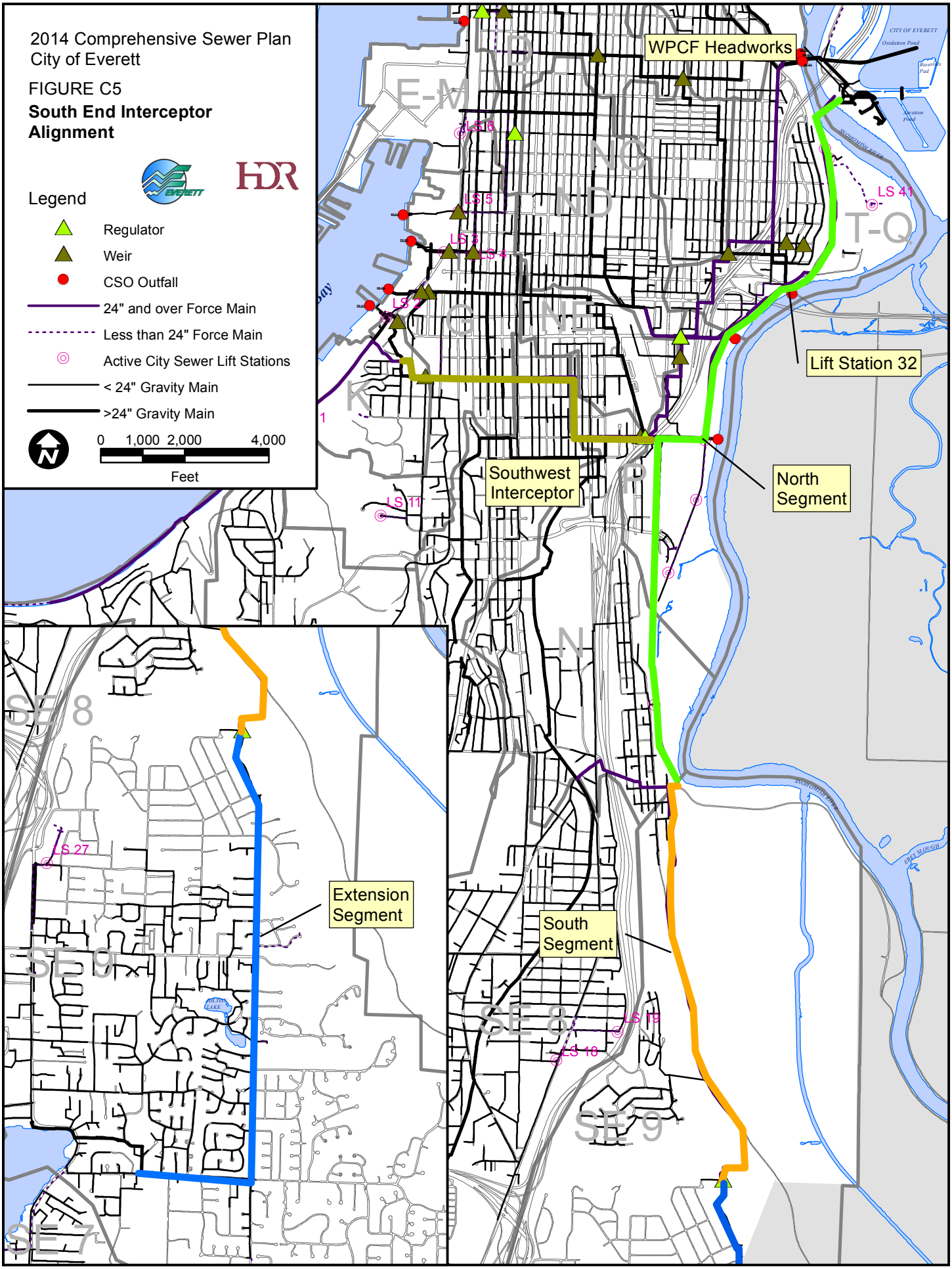
Basin C Trunk - Year 2100 - 25-Yr Flow Event



Section 5
Hydraulic Grade Line
South End Interceptor

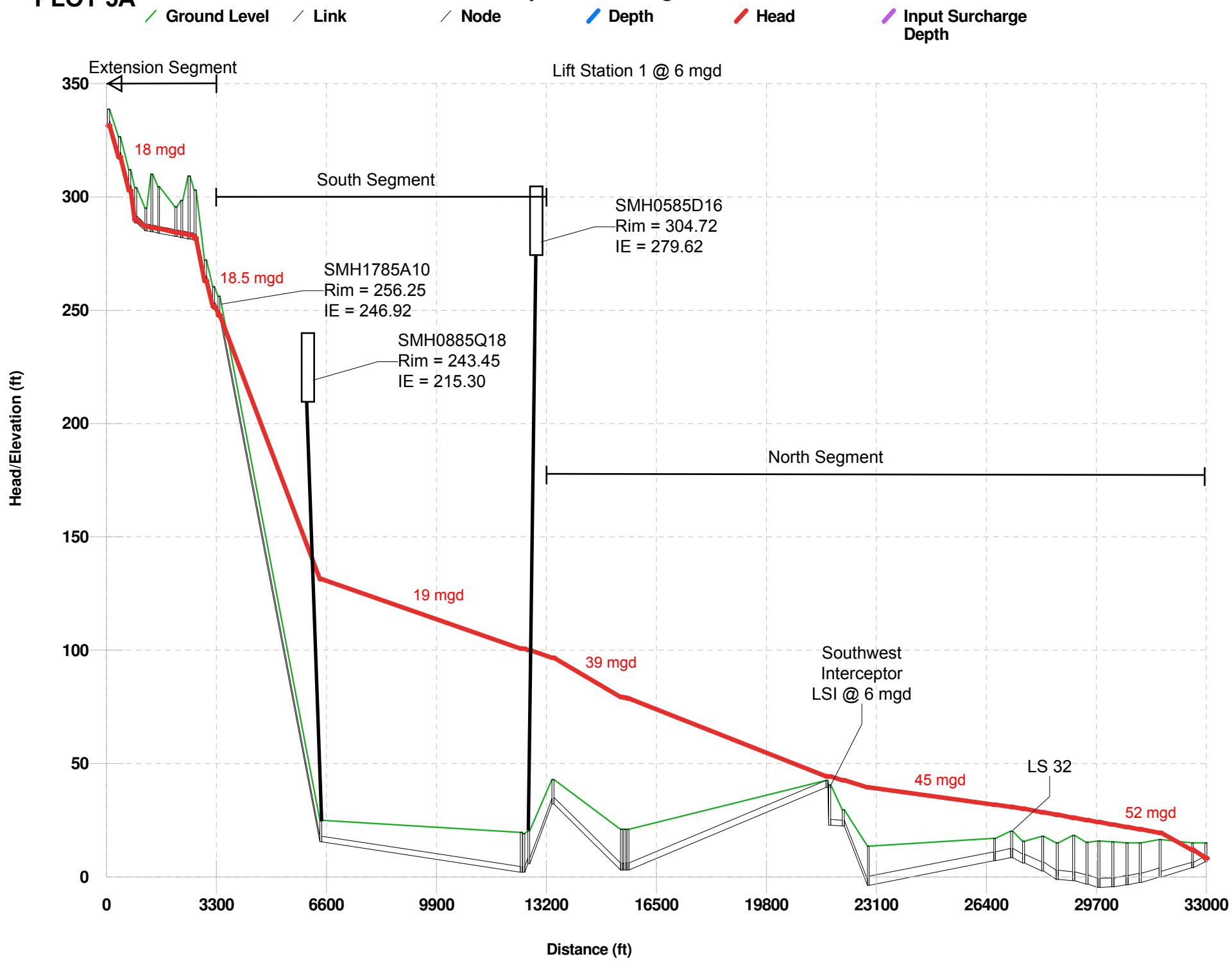
Table C5 – South End Interceptor HGL Plot Description

Plot	Scenario	Flow Event	Improvement Simulated
5a	Existing	25-Year	None
5b	Existing	25-Year	Lift Station at 20 mgd
5c	Year 2100	25-Year	None
5d	Year 2100	25-Year	Lift Station at 20 mgd


2014 Comprehensive Sewer Plan
City of Everett
FIGURE C5
South End Interceptor Alignment
Legend
Regulator
Weir
CSO Outfall
24" and over Force Main
Less than 24" Force Main
Active City Sewer Lift Stations
< 24" Gravity Main
>24" Gravity Main
0 1,000 2,000 4,000
Feet
WPCF Headworks
Lift Station 32
North Segment
Southwest Interceptor
South Segment
Extension Segment
LS 41
LS 11
LS 27
LS 18
LS 19
SE 8
SE 9
SE 7

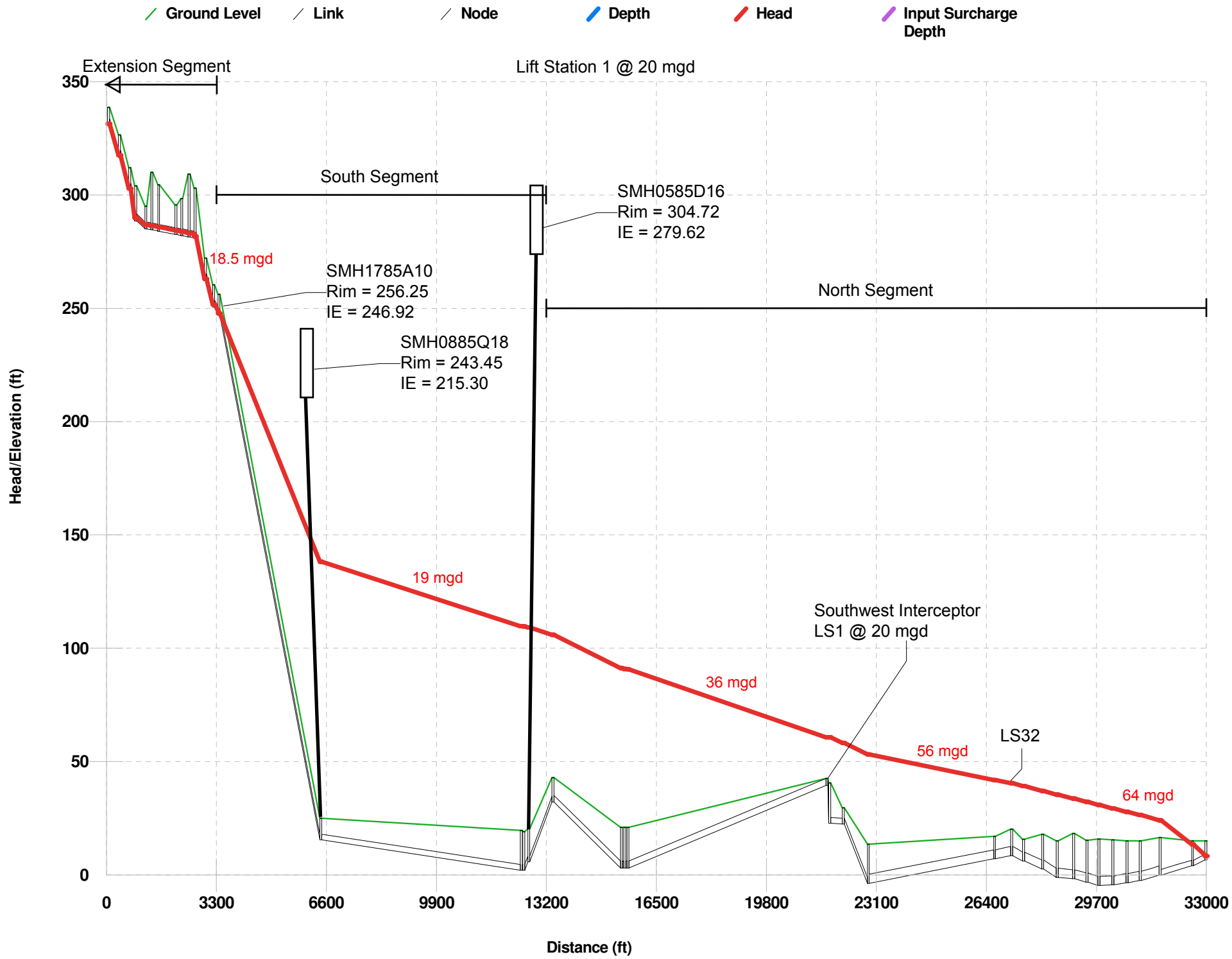
PLOT 5A

South End Interceptor - Existing - 25-Yr Flow Event



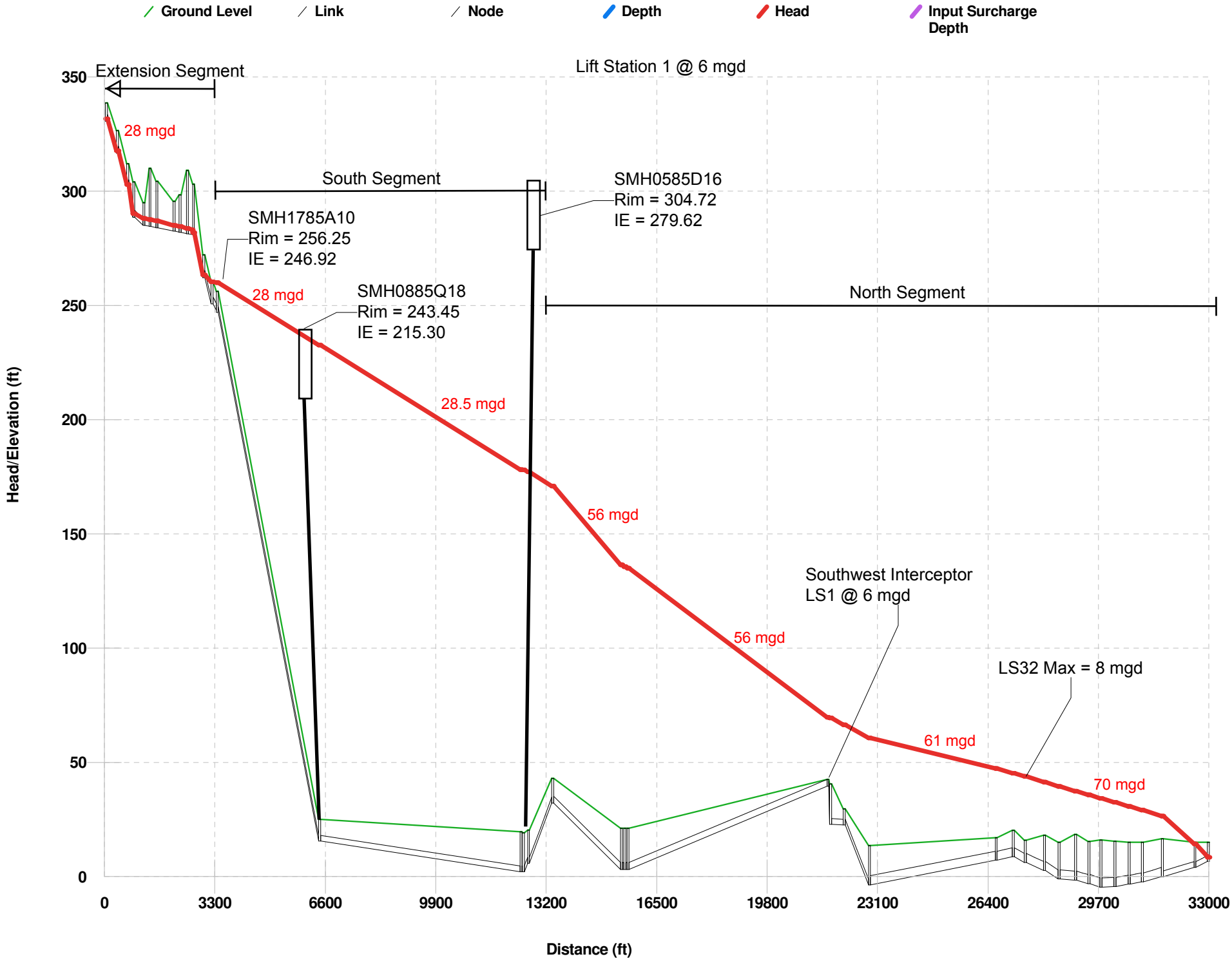
PLOT 5B

South End Interceptor - Existing - 25-Yr Flow Event



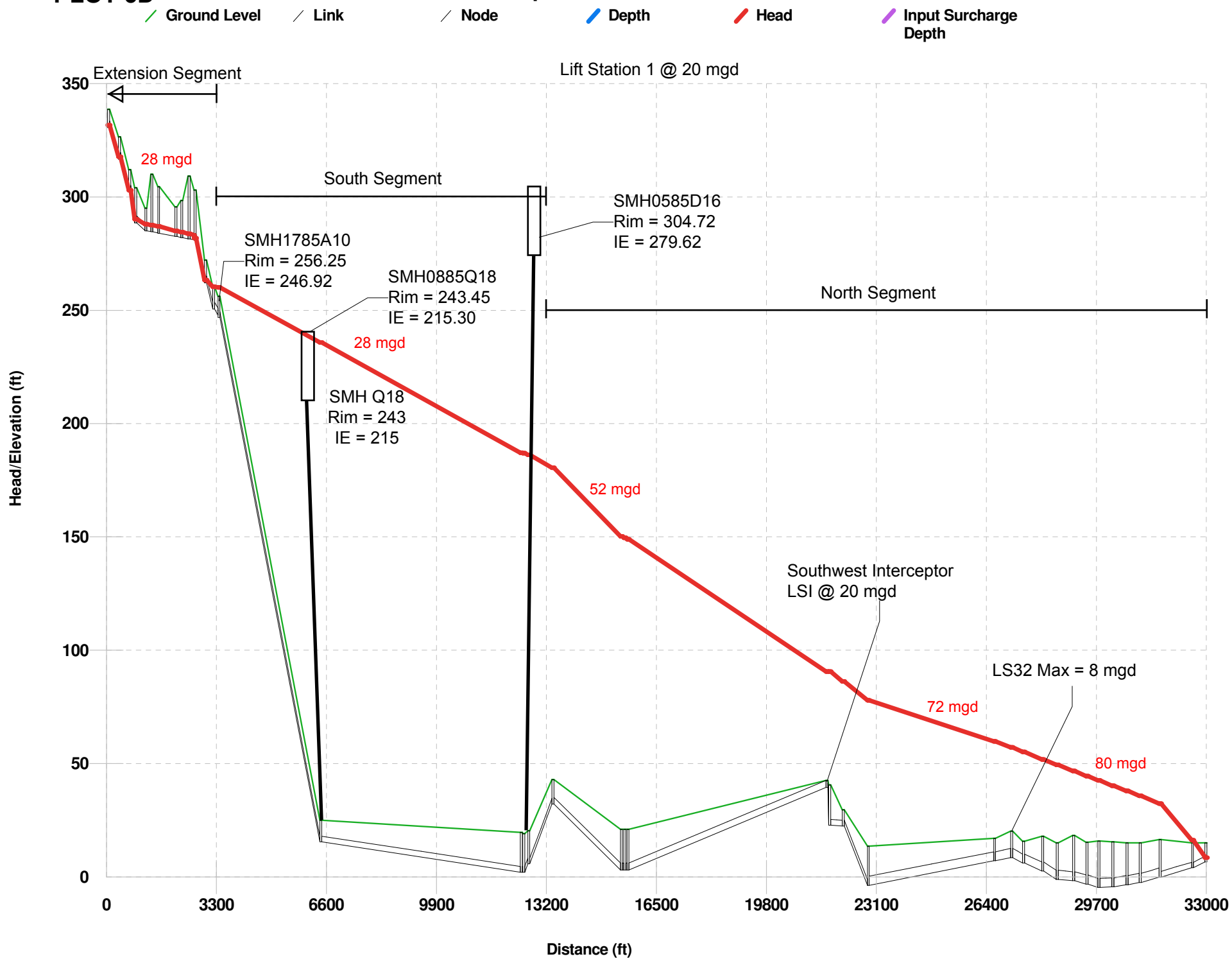
PLOT 5C

South End Interceptor - Year 2100 - 25-Yr Flow Event



PLOT 5D

South End Interceptor - Yr 2100 - 25-Yr Flow Event



Section 6
Hydraulic Grade Line
Basin ND Trunk Main

Table C6 – Basin ND Trunk Main HGL Plot Description

Plot	Scenario	Flow Event	Improvement Simulated
6a	Existing	1-Year	None
6b	Year 2100	1-Year	New Trunk Main, Upstream Improvements
6c	Existing	25-Year	None
6d	Year 2100	25-Year	New Trunk Main, Upstream Improvements

2014 Comprehensive Sewer Plan
City of Everett

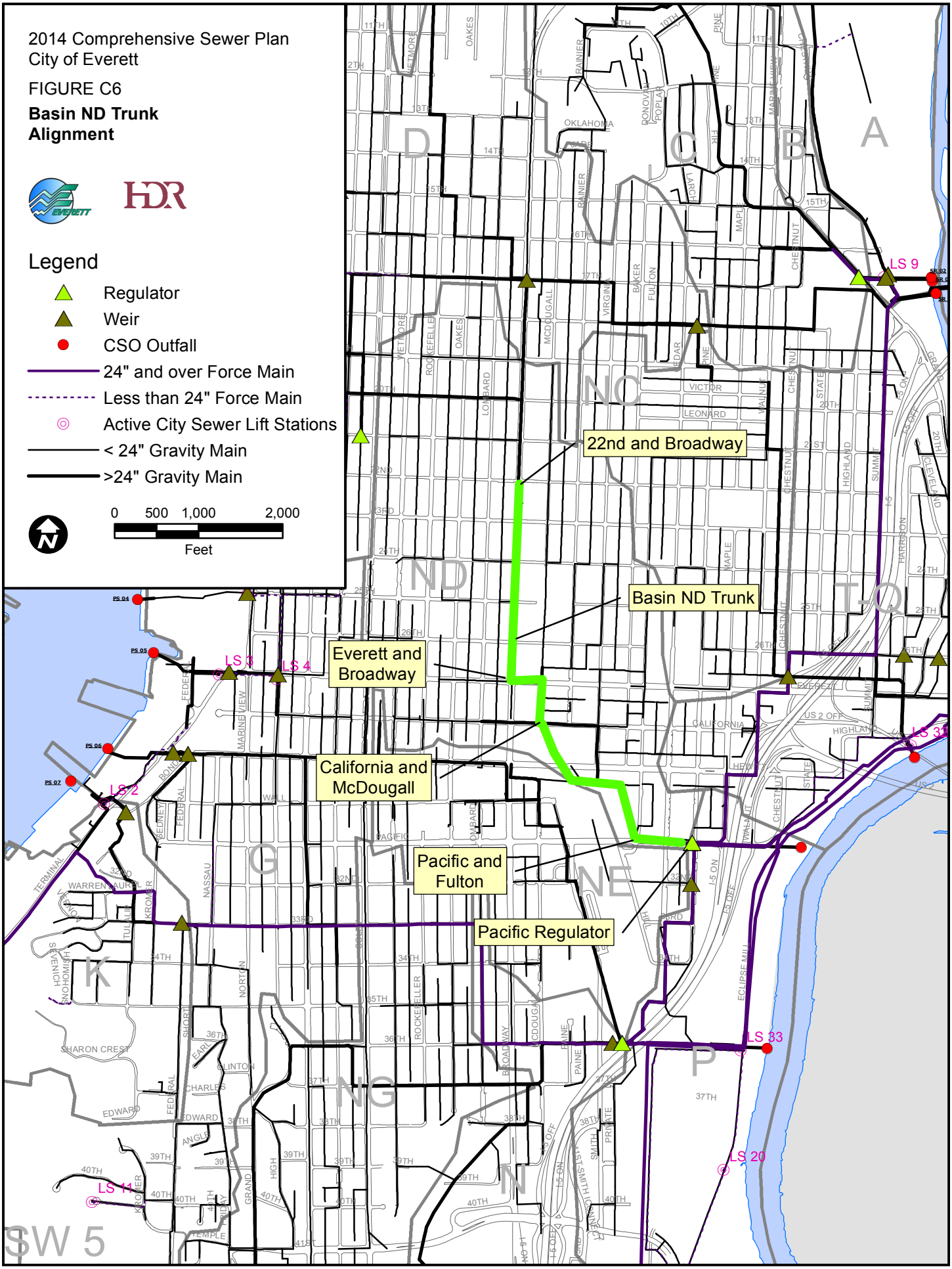
FIGURE C6

Basin ND Trunk Alignment

Legend

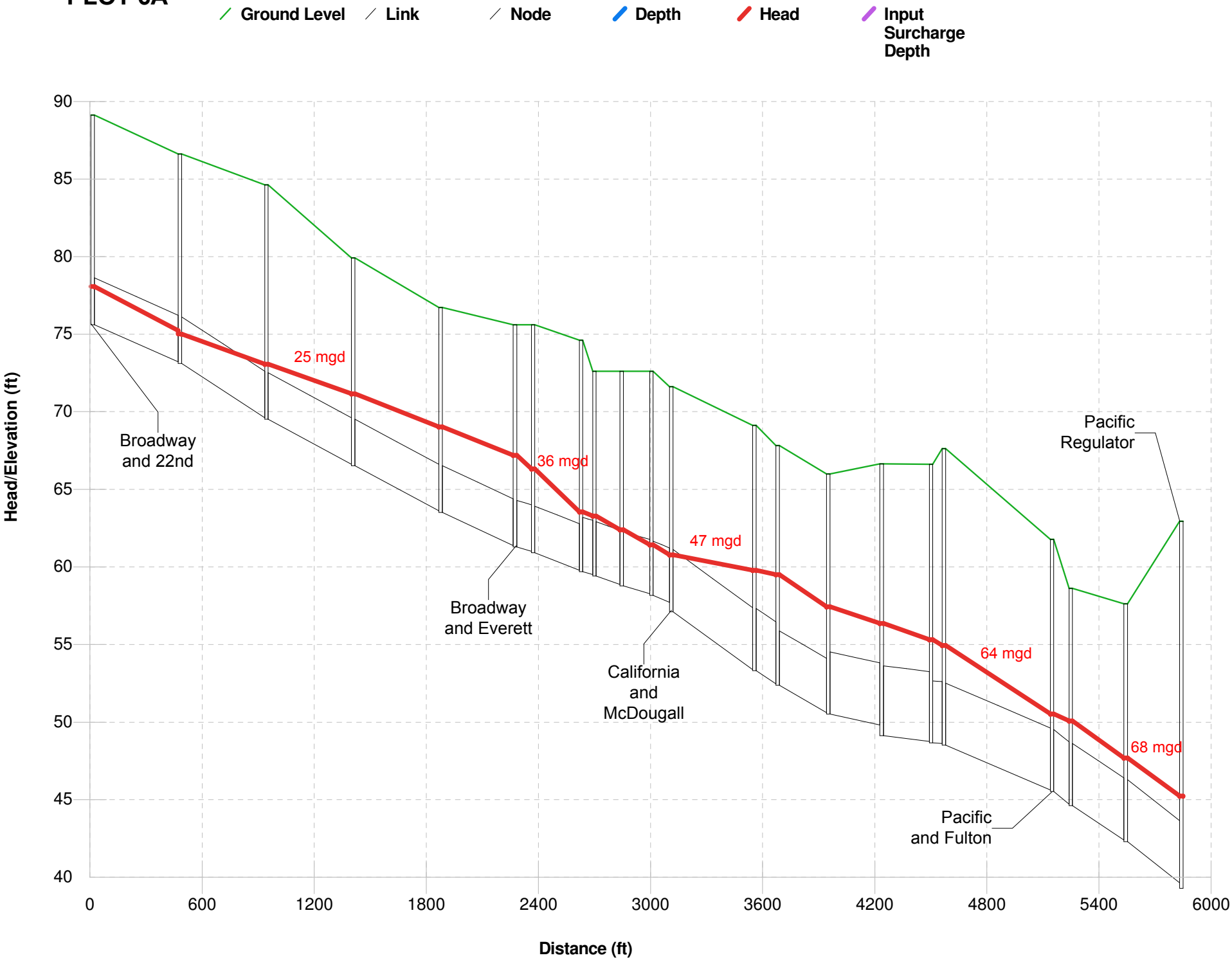
- Regulator
- Weir
- CSO Outfall
- 24" and over Force Main
- Less than 24" Force Main
- Active City Sewer Lift Stations
- < 24" Gravity Main
- >24" Gravity Main

0 500 1,000 2,000
Feet



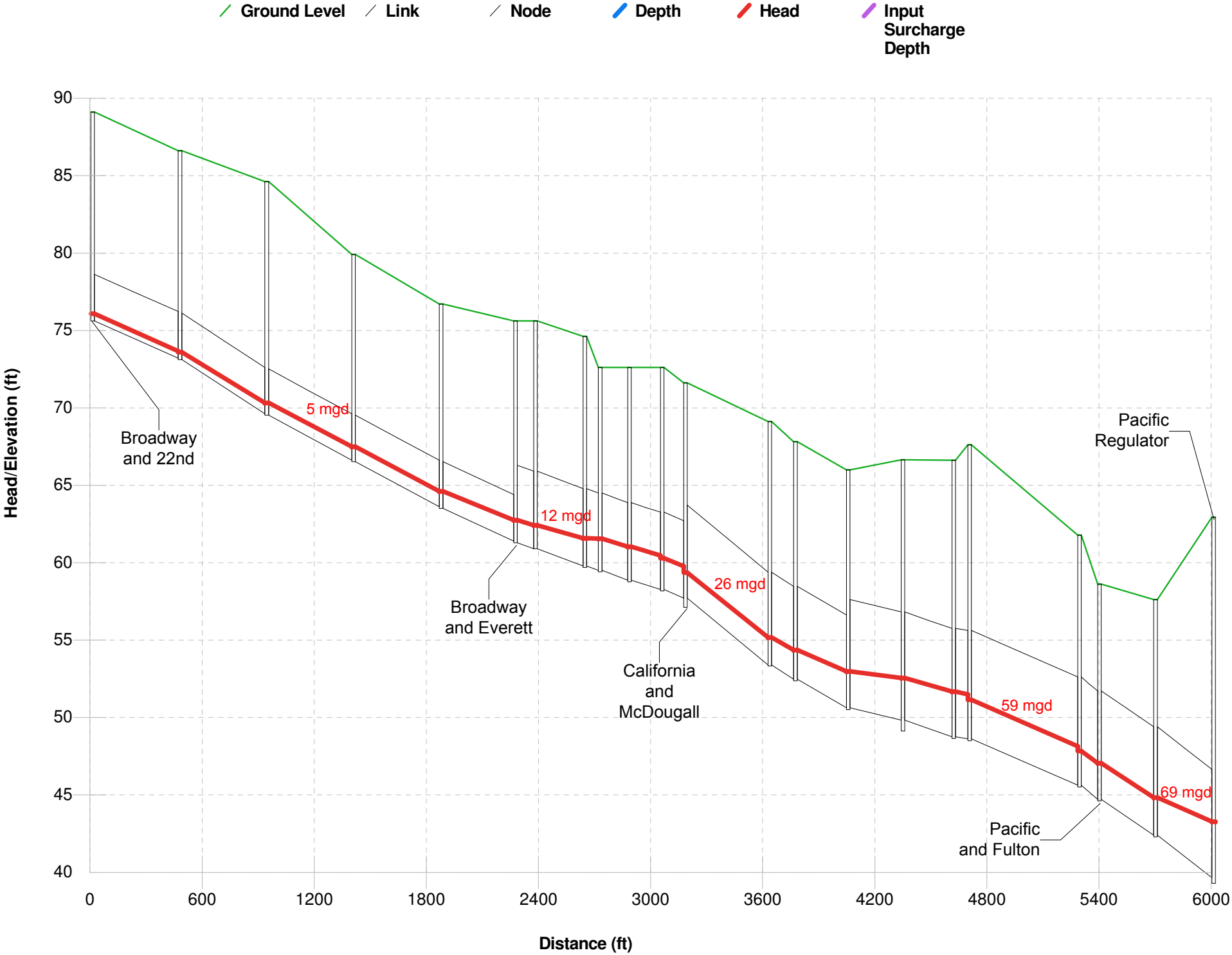
PLOT 6A

Basin ND Trunk - Existing - 1-Yr Flow Event



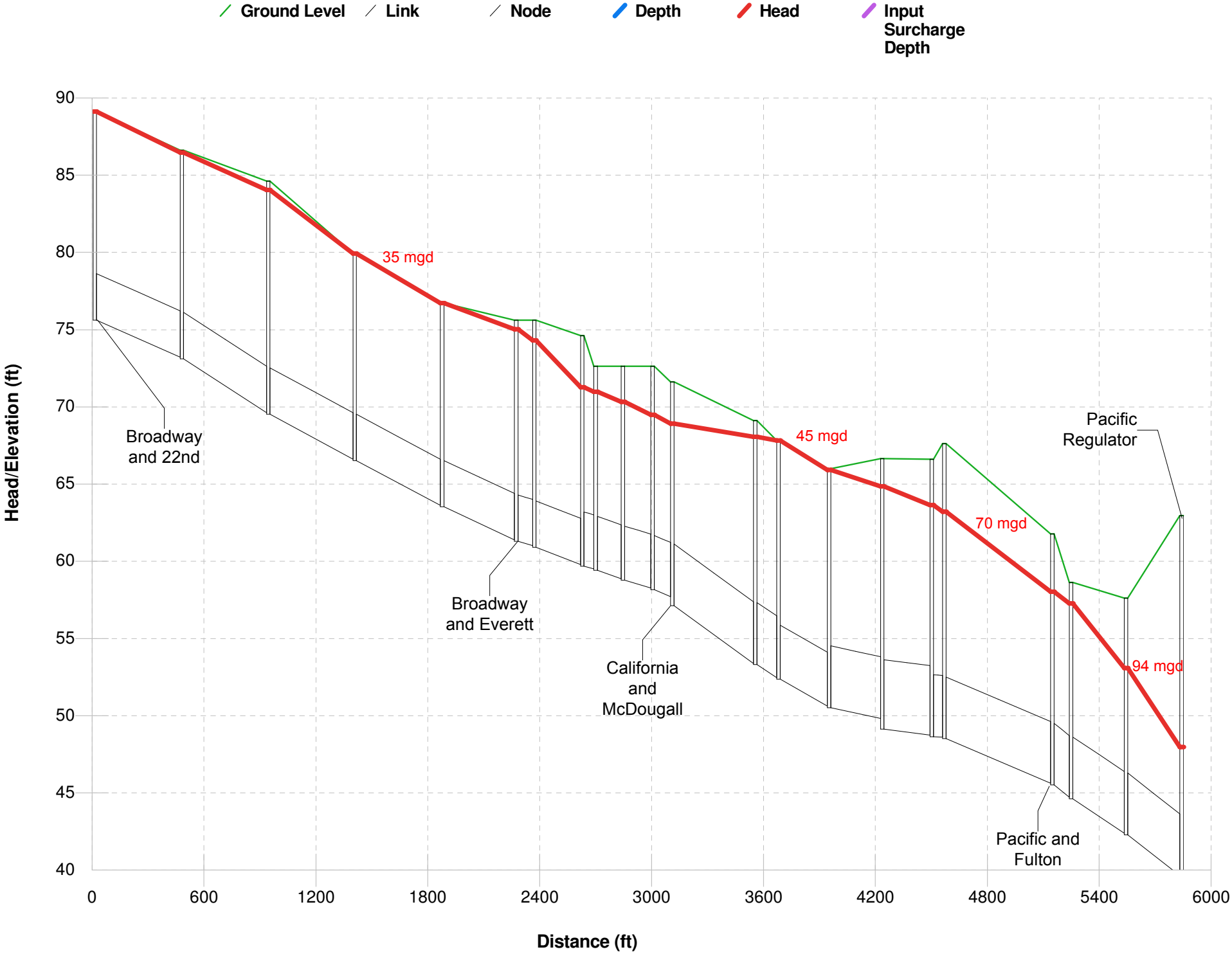
PLOT 6B

Basin ND Trunk - Year 2100 - 1-Yr Flow Event



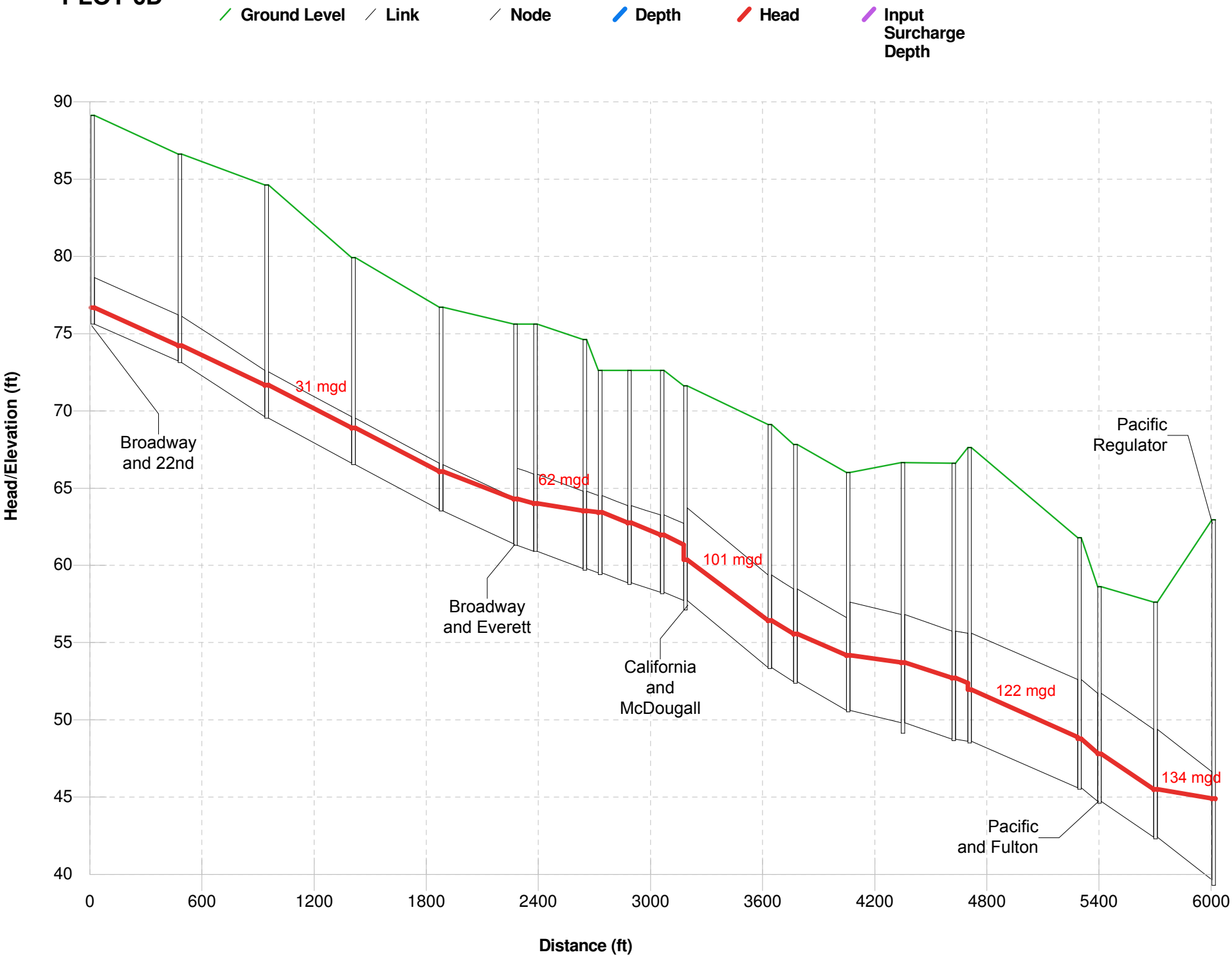
PLOT 6C

Basin ND Trunk - Existing - 25-Yr Flow Event



PLOT 6D

Basin ND Trunk - Year 2100 - 25-Yr Flow Event



Appendix L

2012 Annual CSO Report

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COMBINED SEWER OVERFLOW ANNUAL REPORT FOR 2012

Submitted March 29, 2013

CITY OF EVERETT

Utilities Department

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2012 Annual Combined Sewer Overflow Report

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Chapter 2 – 2012 CSO Monitoring Results & CSO Reduction Accomplishments

Chapter 3 – CSO Nine Minimum Controls

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Attachment 2 – Table of 2012 CSO Events

Attachment 3 – Revised Snohomish River Outfall Number 1 Fact Sheet

City of Everett CSO Control Plan Implementation

November 2, 1987 to December 31, 2012

INTRODUCTION

In 1985, the Washington State Legislature passed legislation requiring municipalities with combined sewer overflows (CSOs) to provide the greatest reasonable reduction of combined sewer overflows at the earliest possible date. In 1987, the Department of Ecology (DOE) established WAC 173-245 that provided guidance for controlling CSOs.

The City of Everett submitted the CSO Control Plan to DOE on November 2, 1987. The City's CSO Control Plan was approved on March 15, 1988, the first municipality in the state to obtain state approval of its CSO Control Plan.

Everett's 1987 CSO Control Plan recommended construction of a system of new lift stations and interceptors to convey an increased volume of combined sewage to the City's Water Pollution Control Facility (WPCF) on Smith Island. The cost of implementation was originally estimated in 1987 to be $38,000,000. In addition, the WPCF has been upgraded since 1987 in order to handle the increased flows routed to it as a result of the CSO Control Plan. The 1987 CSO Control Plan presented a 30-year period for fully implementing the recommended capital improvements.

CSO CONTROL PLAN IMPLEMENTATION

The City of Everett combined sewer outfalls discharge to two different water bodies, the Snohomish River and Port Gardner Bay. Snohomish River Outfalls (SRO) are numbered sequentially from north to south. There are six active Snohomish River Outfalls. The Port Gardner Bay outfalls are called Puget Sound Outfalls (PSO) and are also numbered from north to south. There are seven active Puget Sound Outfalls. See Attachment 1 for the location of the outfalls.

A CSO control project has been completed at all of the City outfalls except for PSO5, PSO6, and PSO7. However, a control project has been designed for these three remaining facilities. The City remains on schedule to complete control projects for all City outfalls over the original 30-year period proposed in the CSO Control Plan. The following is a summary of completed control projects:

- In 1992 the North Snohomish River CSO Control project was completed for SRO1, SRO2, and SRO3. The capacity of Lift Station No. 9 was upgraded and a 30-inch relief sewer was installed between the Hayes Street Regulator and the Siphon Headworks. The project included three new siphon pipes (24", 42", and 54" diameter) under the Snohomish River from the Siphon Headworks to the WPCF on Smith Island.

- In early 1994, Schedules A and B of the Snohomish River CSO Interceptor were completed for SRO4, SRO7, and SRO8. Both Lift Station No. 32 (SRO4) and Lift Station No. 33 (SRO8) were also upgraded.

- In 1998, the City began construction of the Lift Station No. 7 and No. 8 upgrade projects to control overflows occurring at PSO1, PSO2 and PSO3. In addition to increasing the pumping capacity at both stations the project included a new force main for Lift Station No. 8.

- In 2010 the City constructed the Lift Station No. 5 Force Main project to control overflows occurring at PSO4. This project included placing 450 lineal feet of 8-inch combined sewer force main to replace the existing 6-inch force main for Lift Station No. 5. The existing 6-inch main was not removed, and additional valves were installed to allow the use of the old 6-inch force main during emergencies or maintenance situations. The new 8-inch force main was connected to Lift Station No. 5 on June 8, 2010. In addition the City replaced the 25 horsepower motor in Lift Station No. 5 with a 30 horsepower motor on October 19, 2010.

For the remaining three City outfalls not addressed by the above projects (PSO5, PSO6, and PSO7) a CSO treatment facility with piping improvements has been determined to be the most cost effective method of achieving compliance (the Bond Street CSO Control Facilities).

The planning, predesign, permitting, design, and approval of the construction plans have been completed for the Bond Street CSO Control Facilities (which include the Bond Street Retention and Treatment Basin, the Bond Street Interceptor, and the new Lift Station 2 Force Main). The Bond Street Retention Treatment Basin will provide for 50% removal of solids on an annual basis and for disinfection of all flows entering the facility. Design of the construction plans and specifications was completed in December 2008 per the NPDES permit requirements and formal written approval by DOE was given in March 2009. The total estimated cost is $24 million in 2008 dollars for all Bond Street CSO Control Facility projects.

An SRF Loan for $6.2 million was obtained for the Bond Street CSO Control Facilities to begin phased construction starting with the construction of some of the transmission projects. A portion of these funds were used to construct the Lift Station No. 5 Force Main and the Bond Street Interceptor. The remaining funds were used on the Lift Station No. 2 Force Main project which was constructed in 2012.

From 2009 through 2012 several components of the Bond Street CSO Control Facilities have been constructed. These facilities include the Bond Street Interceptor, a 30" pipe crossing the Burlington Northern Santa Fe railroad track, conduits leading to Lift Station No. 2, and the Lift Station No. 2 Force Main.

Construction of the remaining components of the Bond Street CSO Control Facilities is currently scheduled to be completed when there is additional funding for the project. Section S11.D.3 of the City's current NPDES permit requires the construction of the Bond Street CSO Control facilities, as City financing allows, with a final completion date of 2017.

In 2012 the City selected a consultant to update the City Sewer Comprehensive Plan and CSO Control Plan. The updated CSO Control Plan is due October 2013. Future CSO control projects and strategies will be evaluated and presented in 2013 through these plan updates.

2012 CSO Monitoring Results & CSO Reduction Accomplishments

January 1, 2012 to December 31, 2012

INTRODUCTION

The 2008 CSO Control Plan Update, submitted December 2008, provided recommendations for improving the CSO monitoring capabilities and accuracy in overflow duration and quantity estimations. Some sites may experience a difference in reported CSO events based on these changes. The City will utilize these improved monitoring results to analyze the effectiveness of previous control projects, and determine where future improvements are needed as part of the 2013 CSO Plan update.

CSO MONITORING RESULTS

The CSO monitoring results for January 1, 2012 to December 31, 2012 are summarized in Table 1. Attachment 1 is a map showing the location of the City of Everett CSO outfalls. The annual baseline statistics in columns 3 and 4 of Table 1 are taken from the 1987 CSO Control Plan (Table 3-1). These estimates were made by computer modeling of flows in the combined sewer system for the 1949 through 1986 rainfall record before any capital improvements to reduce CSOs were constructed.

The number of untreated discharge events per outfall on a moving 5-year average is included in Table 1. This table presents the best available data at the time it was collected. Improvements to monitoring techniques have been made by the City over time as data was collected and potential improvements became apparent. Puget Sound Outfalls 2 and 3 did not have a full year of data collected prior to 2010, and 2010, 2011, and 2012 data is shown as a 3 year average. Also, prior to 2010 only representational data was available for PSO7. During that time PSO7 was assumed to overflow at the same time as PSO5.

Projects that were designed to reduce overflows, make improvements and modifications to the CSO monitoring system, or provide other CSO benefits at specific outfalls, are described following Table 1 for each specific CSO outfall.

Individual CSO events are listed by outfall in Attachment 2. For the 2012 calendar year the reduction of combined sewer overflow volumes was more than 85% from the baseline statistics presented in the 1987 CSO Control Plan.

TABLE 1. Comparison of Baseline with 2012 CSO Data and 5-year Average

City Outfall Name	Description	Average Annual Baseline for 1987 Conditions		2012 CSO Monitoring Results			Rolling 5-yr Average
		CSO Volume (MG)	No. of Events, 3-hour Inter-event Time (IET)	CSO Volume (MG)	CSO Duration (Hours)	No. of Events, 24-hour IET	No. of Events, 24-hour IET
Col. 1	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
PSO1	Lift Station No. 8	4.4	25	0.25	3.3	6	3.8
PSO2	Lift Station No. 8			0	0	0	0.6
PSO3	15th St & Grand Ave			0	0	0	0.6
PSO4	Lift Station No. 5	48.9	69	0.014	0.3	4	3.6
PSO5	Lift Station No. 3			3.1	94.7	23	20.2
PSO6	Hewitt & Bond St			25	1061.3	64	48.2
PSO7	Lift Station No. 2			2.0	103.9	24	20
SRO1	Lift Station No. 9	5.4	79	0	0	0	<1**
SRO2	Hayes Street	84.8	111	5.4	137.7	27	18
SRO3	Siphon Headworks	Negligible	Negligible	0	0	0	0.2
SRO4	Lift Station No. 32	35.3	58	17	208.8	30	19.4
SRO7	Riverside Regulator (Pacific Ave)	36.3	58	1.1	2.5	3	1.2
SRO8	36th St Valve & Lift Station No. 33	269.9	101	NA	3.1	2	3.6

* = PSO7 representational monitoring uses PSO5 data from 2008 and 2009 in order to compute the 5 year average for PSO7.

** = See discussion in the below section titled CSO RELATED INFORMATION AND FINDINGS

NA = Not able to estimate volume.

CSO SUMMARY

For a listing of individual CSO events by outfall refer to Attachment 2. The City has made significant progress since 1987 in reducing combined sewer discharge volumes into the Snohomish River and Port Gardner Bay. However, improvements are still needed for achieving the State-required limit of one CSO event per year per outfall.

CSO RELATED INFORMATION AND FINDINGS

In 2012 all City of Everett combined sewer outfalls were inspected by City crews using our CCTV system, or other measures. The purpose of these inspections was to determine the condition of the outfall pipelines, set the frequency of inspections, conduct detailed inspections of manholes and structures that have been infrequently inspected (due to location,

railroad coordination, or other access issues), and verify that no illegal connections are present.

All 13 outfalls were inspected, and no illegal connections were found. All pipes were successfully inspected but for portions of pipes and siphons that were under water or otherwise inaccessible. However during these 2012 CCTV inspections new information was found regarding Snohomish River Outfall Number 1 (SRO1), the overflow pipe from LS 9 and Snohomish River Outfall Number 2 (SRO2), the overflow pipe from the Hayes Street regulator.

These two overflows are in close proximity as are downstream manholes on each pipeline. The manhole for SRO 1 was buried within the Burlington Northern Santa Fe (BNSF) Right of Way and had not been recently found or inspected. After coordinating with the railroad for access, City crews were able to devegetate the area and excavate down to the buried manhole lid to access the structure. Additional inspection determined a pipeline leaving the manhole to the south that connects to SRO2. The pipeline invert that connects to SRO2 is lower than the outlet pipe's invert leading to the SRO1 outfall such that all flows that enter this manhole are routed to SRO2 except in an extreme surcharge event where water could rise to the invert elevation of the pipeline leading to the outfall of SRO1. See Attachment 3 for a revised fact sheet detailing SRO1 and the connection to SRO2.

All historic City CSO monitoring efforts for SRO1 and SRO2 through 2011 were reported as if these were entirely separate pipelines from the overflow regulators at Lift Station No. 9 and in Hayes Street. This monitoring assumed that when flows surcharged in the City sewer system so that a regulator sent water down the SRO1 outfall pipe near Lift Station No. 9 the flow would discharge to the Snohomish River out of the end of the SRO 1 outfall pipe. However, this is not the case due to the connection between SRO1 and SRO2 within BNSF Right of Way.

This connection does not change the total volume, or durations of overflow events reported for these two overflows and the City CSO network, but the CSO events previously reported to have discharged out of SRO1 actually discharged 15 feet further south out of SRO2.

This 2012 report correctly reports these events for SRO1 and SRO2 as per actual field conditions described above.

OUTFALLS WITH MORE THAN ONE OVERFLOW EVENT RECORDED IN 2012

PSO1 - Lift Station No. 8

Puget Sound Outfall 1(PSO1) is associated with Lift Station No. 8. This outfall experienced six overflow events in 2012. In 2012 the previous weir located in manhole SMH1895Q14 immediately north of Lift Station No. 8 was removed so that the weir located in manhole SMH1895Q13 west of the lift station now functions as the CSO control structure for PSO1 and PSO2. This was done per the recommendation of CSO consultant, HDR to more accurately determine overflows via direct measurement of the wet well level. The crest of the weir located in SMH1895Q13 is at the same elevation as the crest of the weir that was removed from SMH1895Q14.

PSO4 – Lift Station No. 5

PSO4 is associated with Lift Station No. 5, and recorded four overflow events in 2012.

The 2005 CSO Facility Plan Update originally specified that PSO4 would be controlled along with PSO5, PSO6, and PSO7 with the Bond Street CSO Control Facilities project. However, during the design of this project it was determined that the most cost effective way to control PSO4 was by increasing the size of the Lift Station No. 5 force main, instead of routing flows to the Bond Street CSO Control Facilities. Since this was a change from the 2005 CSO Facility

Plan Update the City included this modification in the CSO Control Plan Update in December 2008. This control project was completed in 2010.

For the entirety of 2012 the City operated the newly upgraded Lift Station No. 5 system and monitored CSO overflows at PSO4. PSO4 experienced more than one overflow event in 2012 (four), however no overflow event lasted for more than fifteen minutes, and the annual overflow volume was estimated at 18,000 gallons. This was the lowest CSO volume recorded at PS04 in the last 5 years of monitoring.

SRO2 – Hayes Street Regulator

SRO2 is associated with the Hayes Street regulator located near Lift Station No. 9 and the Siphon Headworks. In 2012 the City used a pressure transducer in the regulator structure to measure flow depths as they crest the overflow weir. We believe this monitoring method is more accurate than the previous monitoring method used by the city's flow monitoring consultant (SFE Global) at this location. Additionally, due to a connection between SRO1 and SRO2 flows that go over the weir in the manhole adjacent to Lift Station No. 9 can be routed out of SRO2 as well. Monitoring results indicate that 27 overflow events occurred in 2012.

SRO4 – Lift Station No. 32

SRO4 is located at Lift Station No. 32. The City's monitoring systems indicate that SRO4 experienced 32 events in 2012. The City's SCADA system monitors the wet well level at this lift station. However, due to the elevation of the lift station and outfall relative to the fluctuating tide levels in the receiving water, overflow events and volumes have historically been difficult to monitor at this location.

In June of 2010 the City had its flow monitoring consultant, SFE Global install new monitoring equipment at this CSO location in an attempt to collect more accurate overflow volume data. A new sensor on the overflow weir was installed on August 19, 2011. This continues to be a difficult site to monitor, however it appears that the new flow monitoring configuration is providing more reliable data. This monitoring configuration was utilized to determine CSO event data in 2012.

SRO7– Pacific Avenue Regulator

SRO7 is downstream of a regulator in a manhole located at the intersection of Pacific Avenue and Chestnut Street. This outfall pipe is also used as a storm water outfall for storm water from an adjacent Washington State Department of Transportation (WSDOT) storm water pond for Interstate 5. Monitoring results indicate that three overflow events occurred via SRO7 in 2012.

In 2011 storm water flooding associated with the WSDOT pond and SRO7 outfall occurred through manhole lids downstream of the SR07 regulator. Maintenance efforts to clean and inspect this outfall pipe determined that the end of the outfall pipe was crushed by large rock placed to armor the bank of the Snohomish River in this area. A temporary repair was completed by City crews in 2011. This temporary repair does not provide the full conveyance capacity of the original outfall.

The reduced capacity of the repair pipe may cause surcharging in the pipe system and cause storm water from the WSDOT pond to backflow into the sewer system at the SRO7 regulator. This backflow effect may lead to false CSO event readings and therefore limit the accuracy of the 2012 monitoring data at this location.

SRO8– Lift Station No. 33

There are two ways that overflows can be directed to Snohomish River Outfall 8. One is the opening of a motor-operated valve when the Snohomish River CSO Interceptor exceeds capacity. The other is when Lift Station No. 33 exceeds its capacity and overflows into the outfall through a duck-bill valve. In 2012, SRO8 experienced two overflow events.

The operator for the motor-operated valve was damaged during a construction project in 2011. Therefore, during the February 19, 2012 CSO event (the first event of the year for SRO 8) City crews manually opened and closed the valve. In August of 2012 the motor-controlled operator for the control valve in the Snohomish River CSO Interceptor was replaced. During the November 19, 2012 CSO event (the second event for this site) the new operator started to open the valve at the proper setting, however it closed as soon as the pressure dropped appreciably. When the pressure rose again the valve started to open, then continued to fluctuate between partially opened and closed for the duration of the event. Under this operation it was not possible to estimate the overflow volumes. However, this operating procedure should have minimized CSO volumes during this event. After this event the programming for the valve operator was modified so that it will now operate as it did during 2011. This operating procedure will allow for CSO volumes to be better estimated at this site in 2013.

The annual number of overflows at SR08 has decreased significantly since 2008 from 13 events to 2 events. This decrease is believed to be due to eliminating overflows from Lift Station 33 due to land use changes in the contributing area to Lift Station 33 that occurred in 2008.

PSO5, PSO6, and PSO7 – No CSO Control Project Completed For These Outfalls

PSO5 is associated with Lift Station No. 3. PSO6 is associated with a regulator in a manhole located at the intersection of Bond Street and Hewitt Avenue. PSO7 is associated with Lift Station No. 2. In 2012 PSO5, PSO6, and PSO7 experienced more than one event per year, with 23 events, 64 events, and 24 events respectively.

OUTFALLS WITH ONE OR FEWER OVERFLOW EVENTS RECORDED IN 2012

PSO2– Lift Station No. 8

PSO2 is associated with Lift Station No. 8. Overflows occur at PSO2 when the water level in SMH Q13 surcharges above the top of the 18" PSO1 outfall pipe by more than 0.95 feet during an overflow event.

In 2012 there were no recorded overflows at this outfall.

PSO3– 500 feet upstream of Lift Station No. 8

PSO3 is associated with a regulator in a manhole at the intersection of 15th Street and Grand Avenue approximately 500 feet upstream of Lift Station No. 8. Flows discharge from this outfall when the sewer system in this area surcharges above the invert elevation of the outfall pipe. The 1987 CSO Control Plan noted that "PSO3 rarely overflows". This site was further controlled with the upgrade of Lift Stations No. 8 in 1998.

This location is remote to any available telemetry, and it is currently monitored through SCADA system readings of the flow level in the Lift Station No. 8 wet well. Elevations in the Lift Station No. 8 wet well are used to represent the surcharge level at the PSO3 regulator. Also site inspections are conducted periodically to verify monitoring results.

In 2012 there were no recorded overflows at this outfall.

SRO1 – Lift Station No. 9

Snohomish River Outfall No. 1(SRO1) is associated with Lift Station No. 9. Previous control efforts at this site were completed to alleviate capacity restrictions for conveyance pipelines leading into the lift station and to install a new weir. Monitoring improvements were also made so that the wet well level data at the lift station was added to the City's SCADA system. Due to a connection between SRO1 and SRO2 downstream of the regulators SRO2 has to surcharge

above the crown of the pipe prior to any overflows being routed out of SRO1. Therefore it appears that SRO1 did not experience any overflow events in 2012.

SRO3– Siphon Headworks

SRO3 is associated with a regulator in a structure known as Siphon Headworks which is located west of the Snohomish River. A 54" diameter concrete pipe, 42" diameter concrete pipe, and a 24" diameter concrete pipe route flows from Siphon Headworks east under the Snohomish River and BNSF Delta Yard tracks towards the WPCF.

In 2012 there were no recorded overflows at this outfall.

2013 PLANNED CSO COMPLIANCE AND IMPROVEMENT PROJECTS

Combined Sewer Overflow Control Plan and Sewer Comprehensive Plan

In 2013 the newest edition of the City's Combined Sewer Overflow Control Plan will be completed and submitted to the Department of Ecology. This plan will detail the City's hydraulic modeling efforts relating to CSOs, and outline the City's CSO control capital projects plan over the following five years.

The City also plans to complete the newest edition of the Comprehensive Sewer Plan in 2013. This will further detail the City's sewer system, modeling efforts, and capital projects plan.

Improvements and Projects for Sites with More than 1 Overflow in 2012

PSO 1

The City has initiated improvements to reduce overflows at PSO1, with the design of a sewer replacement and basement flooding elimination project (Sewer "M"). This project started in the latter half of 2011 and the design continued through 2012. Proposed changes to the collection system involve either separation of storm water from the combined sewer system which would significantly reduce wet weather flows going to Lift Station No.8, an extension of a sewer interceptor into the project area, or a wet weather storage facility. Hydraulic and hydrologic modeling is being done to demonstrate the effectiveness of this project at reducing CSOs at PSO1, PSO2 and PSO3 in the future.

This project will be evaluated as a control option for this CSO outfall and will be addressed in the 2013 CSO Control Plan update. Construction is planned in 2014.

PSO 4

In 2013 the City will analyze the possibility of raising the CSO control weir crest elevations and removing sources of storm water inflow in order to further reduce the frequency of CSO events. If either option is feasible, City crews are planned to perform these improvements.

SRO 1

During the reporting year the City has continued to monitor this site to determine the current capacity and flow quantities conveyed at this location. In addition, hydraulic and hydrologic modeling by a City consultant utilizing the recent monitoring data was used to identify some improvements that would effectively control CSO flows that could crest the weir adjacent to Lift Station Number 9. The SRO1 and SRO2 CSO control projects are being analyzed concurrently to determine the preferred projects in this area. Possible improvement options include storm water separation, re-routing some combined sewer flow and drainage away from lift station 9, a combined sewer detention facility, or additional wet weather pump capacity improvements.

This information is being analyzed in conjunction with the Sewer Comprehensive Plan Update and CSO Control Plan efforts in order to determine the appropriate project and project timeline for further CSO control projects at SRO1. A project will be evaluated as a control option for this CSO outfall and is planned to be addressed in the 2013 CSO Control Plan update.

SRO 2

Previous analysis has indicated that there is a need for greater pipe capacity between the SRO2 regulator and the Siphon Headworks. SRO2 experienced 27 overflow events in 2012. Data from the monitoring at this site will be used in the modeling and design of an improvement in this area.

The City's engineering consultant is evaluating a CSO control project that would increase the pipe capacity between the SRO2 Regulator and the Siphon Headworks. Analysis and design for this project began in 2011.The SRO1 and SRO2 CSO control projects are being analyzed concurrently to determine the preferred projects in this area. Design of the SRO2 control project will continue in 2013. The project will be designed to reduce CSOs at SRO2 to a maximum of one time per year on a five year average.

SRO2 CSO control efforts will be analyzed as part of the concurrent Sewer Comprehensive Plan and CSO Control Plan Update efforts the City is undertaking during 2013. The selected CSO control project will be addressed in the City's 2013 Control Plan update.

SRO 4

In 2012 a City engineering consultant worked on the design of the East Grand Sewer Replacement and Stormwater Separation Project in the drainage basin tributary to Lift Station No. 32 and SRO4. Proposed changes to the collection system involve separation of storm water from the combined sewer system which would significantly reduce wet weather flows going to Lift Station No.32. Separated storm water from this project area is being designed to discharge to the Snohomish River via SRO4. The project is also looking at methods to provide treatment of the stormwater prior to discharge.

In 2013 the City will further examine the CSO control project alternatives in conjunction with the Sewer Comprehensive Plan Update and CSO Control Plan efforts in order to determine the appropriate project and implementation timeline in this area. The final control strategy in this area may include a combination of projects. The preferred control strategy will be addressed in the 2013 CSO Control Plan update and as a separate submittal to Ecology if needed.

SRO 7

A repair project that will restore the original capacity of SRO7 was designed in 2012. This project is scheduled for construction in 2013 pending permit approvals.

SR 08

Further inspections of the Snohomish Interceptor are planned to ensure the pipeline is operating as designed. We believe overflows at this outfall are trending downward since the change of land use and lesser impacts from LS 33.

PSO 3, PSO 4, PSO 5

No CSO control projects have been completed at these outfalls, however a project to address these uncontrolled outfalls has been completely designed and await funding per our current NPDES permit.

Prior to 2012 the City's CSO consultant designed the Bond Street CSO Control Facilities project, which once constructed is planned to reduce overflows at these locations to bring these outfalls into compliance. Several components of this facility have been completed including the Lift Station No. 2 Force Main, the Bond Street Interceptor, a 30" diameter pipeline crossing of BNSF railroad to connect to the Deepwater Outfall, and conduits crossing BNSF railroad for

future power and SCADA. Each of these improvements were completed as phased components of the Bond Street CSO Control Facilities.

Improvements and Projects at Sites in Compliance

PSO 2 and PSO 3

A sewer replacement and basement flooding elimination project (Sewer "M") was under design throughout 2012 and continuing into 2013. Proposed changes to the collection system being considered are separation of storm water from the combined sewer system which would significantly reduce wet weather flows going to Lift Station No.8, extension of a sewer interceptor, and wet weather storage. In 2012 the City evaluated this project as part of the Sewer Comprehensive Plan and CSO Control Plan efforts. This control project will be addressed in the 2013 CSO Control Plan update.

SRO 3

The City currently has an engineering consultant designing a pipe replacement project that would increase flow capacity between the Hayes St. Regulator (SRO2) and the Siphon Headworks and bring SRO2 into regulatory compliance. The consultant is also analyzing the hydraulics of the Siphon Headworks and SRO3. The modeling indicates that in the near-term, SRO3 should continue to experience less than one CSO per year on a five year average following the proposed project. However, when additional future flows are directed to the Siphon Headworks by interceptor improvements, it may be necessary to undertake some improvements in this area in order to increase the capacity of the siphon system.

Siphon Headworks, the conveyance pipes tributary to this area, and associated lift stations and regulators were evaluated via sewer modeling in 2012 as part of the Sewer Comprehensive Plan and CSO Control Plan efforts.

Combined Sewer Overflows Nine Minimum Controls

City of Everett 2012 Annual Report Compliance Summary

WAC 173-245 and US EPA CSO Policy (59 FR 18688)

INTRODUCTION

The City's current NPDES permit (issued October 1, 2009) requires that the City of Everett document and implement EPA's Nine Minimum Controls (NMC) for combined sewer overflows. Compliance with the NMCs must be documented in the annual CSO report.

2012 NMC COMPLIANCE

The City's previous efforts for compliance and documentation of the NMCs included preparing compliance strategy technical memos for each of the nine controls. The City hired HDR Engineering in July of 2008 to assist the City with its NPDES compliance efforts. HDR prepared the compliance strategy memos and standard operating procedure (SOP) documents for the City's operation and maintenance programs. The technical memos, which document the City's compliance efforts, were completed in August 2009. These memos were revised in March of 2010. These March 2010 reports were included as appendices to the City's 2009 Annual Report. These technical memos and SOPs are revised as necessary by the City on an ongoing basis.

A summary of our 2012 efforts for each of the NMC follows:

CONTROL #1 PROPER OPERATION & REGULAR MAINTENANCE PROGRAMS

The Permittee shall implement proper operation and maintenance programs for the sewer system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSOs. The program shall consider regular sewer inspections; sewer, catch basin, and regulator

cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections.

The City's maintenance program includes the following: regular scheduled updates of geographical information system (GIS) and mapping of the City's sewer system; routine inspection and cleaning of combined sewer system; routine sewer pipe cleaning; routine inspection and cleaning of catch basins; annual replacement projects; standardized operations and maintenance procedures; inspection checklists; electronic recordkeeping using the City's Utility Maintenance Management Data System (CassWorks); training programs and procedures for safe work practices (e.g. confined space entry); and emergency response.

During the reporting year the City completed the following progress for this control:

1. Utilized, updated, and revised operating procedure memos and SOPs for the maintenance and operation of the collection system. This includes documented procedures for: Curb Inlet and Catch Basin Inspection and Maintenance, Sewer and Drainage Manhole Inspection and Maintenance, Routine Sewer Line Cleaning, High Frequency Sewer Line Cleaning, TV Inspection of Sewer Lines, Underground Combined Sewer Detention Vault Inspections, CSO Regulator Inspections, CSO Regulator Calibration, Side Sewer Response Inspection and Maintenance, and Side Sewer Repair Inspection and Maintenance. In addition inspection and maintenance procedures for each of the 31 City lift stations were utilized, and revised where appropriate.

2. Utilized the City's GIS mapping system to perform inspections and tracked these and other maintenance activities for critical CSO facilities using the City's computer maintenance management system.

3. Completed a third party review of the collection system operations and maintenance through a sewer comprehensive plan process.

4. Completed a third party review of the Computer Maintenance Management Systems used by the City for record keeping and scheduling.

5. Inspected over 3,400 combined area catch basins and inlets, and cleaned over 1,000 of those structures that were found to be in need of cleaning.

6. Identified and worked with the property owner to remove 1 illicit connection from the plumbing of a residential building that was piped into the City Municipal Separate Storm Sewer System.

CONTROL #2 MAXIMIZATION OF STORAGE IN THE COLLECTION SYSTEM

The Permittee shall implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSOs.

Control measures defined by EPA (*Combined Sewer Overflow Technology Fact Sheet, Maximization of In-line Storage*, EPA 832-F-99-036) include the six items listed below, followed by a summary of the City's compliance efforts:

1. Inspection of the collection system and removal of obstructions.

The City continues to inspect and assess its collection pipes via a CCTV service truck, pipe assessment method (per NASSCO). The data is managed within the City's computer maintenance management system and using software by Granite to manage the electronic video and inspection reports.

The City uses the sewer pipeline assessments to prioritize sewers for additional maintenance and replacement. In general, sewer replacement priority ranking is given to sewers that are known problem areas for poor condition or performance.

Also, the City has implemented a sewer pipe inspection process that is completed and entered into the City GIS system during all sewer pipe cleaning activities. These inspections are used to determine future cleaning frequencies for sewer pipes throughout the City.

Pipes that are known to have poor performance historically are routinely cleaned at a higher frequency than the remainder of the sewer system. The frequency is adjusted based on past performance and sewer cleaning inspection records.

Obstructions that are observed during inspections are removed in a timely manner. Sewer lines that are identified as needing repairs are scheduled to be repaired by City crews, or included in our sewer replacement capital program.

We continue to make improvements in our 24-hour call-outs and response to sewer related spills and obstructions, and respond in a timely manner to remedy these when they occur. Known or historical sewer spill problems areas are scheduled for frequent preventative maintenance through our maintenance management system.

2. Maintenance, repair, and replacement of tide control structures, if present.
Per NMC No. 1 SOPs and checklists for tide control structures were developed and implemented, along with a regular inspection schedule. In 2012, we inspected CSO outfalls and tide gates during low tide periods by both visual inspection and CCTV inspection. Routine maintenance was performed as necessary.

The City completed an extensive CSO outfall pipe inspection process in 2012 and has documented the findings with the typical inspection reports as well as a City CSO condition summary report memo.

3. Installation and adjustment of regulators.
Combined Sewer Overflow regulators and their monitoring systems were inspected by either City crews or the City's flow monitoring consultant, SFE Global, during 2012. Calibration and adjustment of the monitoring equipment was performed as necessary during the inspection process.

4. Reduction or retardation of inflows.
In 2011 the City issued an interim policy requiring developers to provide detention of storm water for new projects in the combined sewer area.

This interim storm water policy has been analyzed in conjunction with several other potential storm water programs as part of the Comprehensive Sewer Plan and CSO Control Plan efforts in 2012.

5. Upgrades and adjustments of pump stations.
City lift stations are checked several times weekly by our utility technicians. SOPs for NMC No. 1 detail proper lift station maintenance and the City's O & M program. The utility technicians perform preventive and corrective maintenance and take care of other problems associated with lift stations, including making adjustments to the station controls, troubleshooting, or upgrading equipment.

In the combined sewer system the following pump improvements were completed:

- LS02 - Installed new wear rings on two pumps. Installed a rag cutting impeller to reduce clogging on one pump. Setup adaptors for bypass pumping through the access port on the force main incase of power outage.
- LS05 - Constructed a second access to the wet well for improved cleaning capability.
- LS07 - Rebuilt both pump check valves and made control wiring improvements.
- LS09 - Installed a new Rugid PLC. Installed a new Miltronics control panel with wiring improvements. Installed new variable frequency drives. Replaced the Miltronics water level transducer for overflow monitoring with a submersible transmitter for better calibration and more accurate readings.
- LS33 - Installed a submersible transmitter to monitor any LS33 overflows to SR08.

In addition in the separated system the following pump improvements were completed:

- LS01- Installed a new PLC and rewired the control panel for improved operation and monitoring. Two small motors were rebuilt and the drivelines for the two small pumps were rebuilt. Replaced the volute and wear rings on one of the small pumps.
- LS12 – Installed a Miltronics level transmitter to replace older level monitoring and pump control system.
- LS19 - Installed a new control panel. Installed new soft starts for smoother control and monitoring of pumping conditions. Installed a new air intake filter system for improved conditions for electrical equipment. Installed a new electrical service panel. Rewired pump motors. Rewired the lighting and outlets.
- LS21 - Installed a new leachate pump station, submersible pumps and control system.
- LS24 - Replaced the force main and began construction of a new lift station.
- LS25 - Sealed below ground station penetrations from ground water seepage.
- LS28 - Sealed below ground station penetrations from ground water seepage.
- LS29 - Replaced entrance to provide safer access. Installed improved ventilation. Replaced both discharge valves. Rewired controls. Installed new electrical service conduit and conductors. Telemetry system was moved to radio for better monitoring. Sealed below ground penetrations from ground water seepage.
- LS34 - Installed Miltronics ultrasonic level transmitter for better control and monitoring wet well conditions, relocated high wet well float, new control panel, rerouted motor wiring for easier maintenance, relocated and replaced both pump check valves.
- LS36 – Installed upgrades to the generator controls.

6. Real time monitoring.

As previously reported, the City has a real time monitoring (SCADA) network of all lift stations, the Everett Water Pollution Control Facility (EWPCF), and key elements of the sewer system that is operated and maintained by City staff. City staff continually updates the SCADA network as changes and improvements are made.

In addition the City monitoring efforts, the City also has hired a flow monitoring consultant to measure and monitor sewer flows at key locations throughout the City service area in 2012. This includes monitors installed by the City flow monitoring consultant at CSO outfalls PSO6 and SRO4. Prior to 2012 the consultant also monitored flows at SRO2, however they were replaced by City monitoring equipment in 2012.

The sewage flow monitoring data gathered by the City's consultant is automatically uploaded daily by the consultant for calibration and data verification, and then accessible within a few days for City use (the data is not considered "real-time").

The City will continue to evaluate this monitoring strategy in 2013 and make adjustments as necessary where improvements are identified. The ongoing sewer comprehension planning will also evaluate sewer monitoring needs.

CONTROL #3 REVIEW PRETREATMENT REQUIREMENTS

The Permittee shall review and modify, as appropriate, its existing pretreatment program to minimize CSO impacts from the discharges from nondomestic users.

No significant changes to report for 2012; however we continue to implement this control.

As previously reported, Ecology has approved and delegated (to the City) a pretreatment program that reduces the impact of Everett's CSOs by regulating the quality and quantity of industrial discharges into the combined sewer system. Industries are required to have a pretreatment permit if they discharge significant amounts of wastewater. Significant Industrial Users, as defined by the federal Clean Water Act, are issued a discharge permit by the City that contains specific effluent limits and quantities. The City submits under separate cover an Annual Pretreatment Report to the Department of Ecology that details the program, monitoring, any necessary enforcement actions and planned policy changes.

CONTROL #4 MAXIMIZATION OF FLOWS TO THE POTW FOR TREATMENT

The Permittee shall operate the POTW treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSOs. The Permittee shall deliver all flows to the treatment plant within the constraints of the treatment capacity of the POTW.

The fourth minimum control entails simple modifications to the Combined Sewer System (CSS) and treatment plant to enable as much wet weather flow as possible to reach the treatment plant. Chapter 5 of Combined Sewer Overflows, Guidance for Nine Minimum Controls, (EPA 832-B-95-003, May 1995) suggests six control measures be considered for maximizing flow to the POTW.

1. Determine the capacity of the major interceptors and pumping stations that deliver flows to the treatment plant.
Although the City's sewer conveyance system includes a complex network of gravity systems and pump systems, all City flows routed to the WPCF are conveyed through gravity systems. The maximum conveyance capacity of the three major interceptors that convey flow to the WPCF is 70 mgd, 122 mgd, and 120 mgd. Therefore the maximum instantaneous conveyance capacity to the WPCF is 312MGD.

2. Analyze existing records to compare wet and dry period flows processed by the plant.
Normal Trickling Filter/Solids Contact Plant (TF/SC) wet weather operation is to treat wastewater at a constant flow of 16-18 MGD increasing flow to its 21 MGD maximum as necessary during storm events. Flow not treated by TF/SC is treated by the lagoon system, which also provides storage for storm flows. The lagoon system currently can store 90 million gallons under emergency operations. Under extreme high flow storm events, the 90 million gallons of storage may be used up while discharging at the maximum possible effluent flows. If pond levels continue to rise after the lagoon ponds are full, the EWPCF will call for an emergency shutdown of portions of the combined sewer collection system flow to the plant to save the lagoon dikes (as per the current NPDES permit, Section S5.F.2a, under the bypass conditions).

3. Compare current flows with design capacity of the facility, overall and by unit process, to identify excess capacity.
The City did not have any events that exceeded the WPCF's treatment and storage capacity and necessitated bypass or temporary reduction of combined sewage flow to the plant in 2012. However, the need for WPCF capacity improvements was determined previously by the City and documented in the April 2010 Engineering Report that has been approved by Ecology. Projects designed to provide additional capacity are currently scheduled to be constructed in phases with completion of the first phase to add 50% more TF/SC plant liquid stream treatment capacity expected by January 2016.

4. Determine ability of facility to operate acceptably at incremental increases in wet weather flows.
A review of existing records shows little correlation between flow rates and effluent quality for either the TF/SC or lagoons. When influent flows are high due to storm flows from the combined collection system, the concentrations generally decrease and greater volumes of flow can be handled by each process without overloading treatment processes or exceeding discharge permit loading limits. Sometimes effluent quality is better during storm events due to this dilution. Other times during a storm, wind and/or a rapid increase in effluent flow may stir up the lagoon system and decrease effluent quality. The combination of cold temperatures and high flow rates during the wet weather season may also affect microbial activity and secondary clarifier settling which limits the flow that can be treated to NPDES permit standards by the TF/SC plant.

5. Determine whether any inoperative or unused treatment facilities on the POTW site can be used to store or treat wet weather flows.
There are no inoperative or unused treatment facilities at the plant.

6. Develop cost estimates for any planned physical modifications and any increased O&M costs due to increased wet weather flow.
In 2010 the City's Treatment Plant consultant, Carollo Engineering, developed an engineering report for the expansion of the Everett WPCF that provides a detailed analysis of plant capacity, projections for growth, and plans for maintaining adequate treatment and storage capacity into the future.

The Comprehensive Sewer Plan update will assess potential additional modifications that could be completed to increase wet weather flow capacity in the combined sewer system.

CONTROL #5 ELIMINATION OF CSO DURING DRY WEATHER

Dry weather overflows from CSO outfalls are prohibited. Each dry weather overflow must be reported to the permitting authority as soon as the Permittee becomes aware of the overflow. When the Permittee detects a dry weather overflow, the Permittee shall begin corrective action immediately. The Permittee shall inspect the dry weather overflow each subsequent day until the overflow has been eliminated.

The City continues to implement this control and to make continuous improvements where they are identified.

Everett's combined sewer system does not typically experience overflow events during dry weather. The collection system has been built to accommodate sanitary flows without surcharging.

There is a standard operating procedure in place for responding to sanitary spills and reporting the incident to the Department of Ecology per Section S2.F of our existing NPDES permit. This procedure is implemented for both the combined and separated sewer systems.

The City utilizes remote monitoring systems, and routine inspections to monitor critical regulators, lift station, and outfalls as described in NMC 1 and 2 above. These processes are utilized to identify possible overflows. Outfalls are inspected with these protocols; however inspection of some outfalls depend on favorable tides and accessibility conditions.

In 2012 there were no dry weather overflows out of CSO outfalls recorded in the City of Everett.

CONTROL #6 CONTROL OF SOLID AND FLOATABLE MATERIALS IN CSO

The Permittee shall implement measures to control solid floatable materials in CSOs.

Physical controls currently in place include bar racks, screens, baffles, and trash racks. Most of the drainage structures within the combined sewer collection system have floatable material separators and gas traps mounted on the discharge pipes to restrict floatable material from entering the combined collection system.

Preventative measures include an active street sweeping program that is on a typical six week return cycle and regular catch basin cleaning.

CONTROL #7 POLLUTION PREVENTION PROGRAMS

The Permittee shall implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters.

As previously documented and reported the City has on-going pollution prevention programs that have been implemented for a number of years, and were continued throughout 2012.

The City has the following programs:

1. **Street Cleaning**
   The City of Everett has three street sweepers that operate year-round. Additionally, the City performs localized street cleaning at the request of citizens, following accidents or functions (such as parades), and during City maintenance or construction activities.
2. **Public Education Programs**
   The City of Everett implements the following pollution prevention programs: Adopt-A-Street, Classroom Presentations, Videos, Educational Materials, Natural Yard Care Workshops, storm drain marking, the Public Works Website and participation in regional Puget Sound Starts Here campaigns.
3. **Solid Waste Collection and Recycling**
   Garbage is collected weekly, and recycling is collected bi-weekly in Everett. County facilities also recycle motor oil.
4. **Control of Product Use**
   De-icing salts are not applied directly to streets, rather the City uses about an 8:1 mix of sand to salt mix for snow and ice control events. Post-storm sweeping and sand clean-up begins immediately after a snow and ice event and continues on multiple shifts until all of the sand has been removed from the street.
5. **Illegal Dumping**
   DOE provides a grant to offset the disposal costs for the clean-up of illegal dumping. Signs are posted on properties that have experienced previous illegal dumping. The Code Compliance division handles the enforcement program for problem areas.
6. **Bulk Refuse Disposal**
   The Snohomish County transfer station located just south of the City is the current collection point for bulk refuse not accepted by curbside garbage collection.
7. **Hazardous Waste Collection**
   There is a permanent location within the City for the collection of hazardous waste from residents and small businesses. This program is run by Snohomish County.
8. **Water Conservation**
   The City of Everett has a water conservation program. The program provides free classroom presentations and teacher workshops, a video lending library, workbooks, brochures, posters and both indoor and outdoor water conservation kits for customers. Lawn watering calendars are provided each year in utility bills. Ad space is purchased on local buses to display water conservation messages.
9. **Commercial and Industrial Pollution Prevention**
   Commercial and industrial pollution prevention at the City is covered by the City's industrial pretreatment group as well as a voluntary business audit program. Additionally the City also receives funding through the Local Source Control Program administered by the Department of Ecology. This

funding allows the City to hire one half time employee to do inspections of local businesses that handle small quantities of hazardous waste. Inspectors ensure that storage of hazardous waste is being done safely, and that it is not being discharged to either sanitary or stormwater systems.

CONTROL #8 PUBLIC NOTIFICATION

The Permittee shall implement a public notification process to inform the citizens of when and where CSOs occur. The process must include (a) mechanism to alert persons of the occurrence of CSOs and (b) a system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSOs.

The City routinely modifies the response and reporting procedures for sanitary spills which includes spills within the combined area. This procedure includes emergency spill response and notification of agencies.

In 2009 the City posted public notification signage at every CSO, for both land and water viewing. The signs include the outfall name, appropriate health warning, and contact numbers. The City website also has been updated to include information regarding combined sewers and outfalls and a location map of the outfalls. In 2010 the City implemented a webpage that posts real-time information regarding the overflow status of each City outfall with available monitoring data. This webpage can be viewed at http://www.everettwa.org/CSOMap/CSOMap.aspx

The City posts temporary signs at locations where sewer spills occur that the public could come in contact with. Press releases are also issued to notify the public of larger volume CSO or sewer spill events as necessary.

CONTROL #9 MONITORING TO CHARACTERIZE CSO IMPACTS AND EFFICACY OF CSO CONTROLS

The permittee shall monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This shall include collection of data that will be used to document the existing baseline conditions, evaluate the efficacy of the technology-based controls, and determine the baseline conditions upon which the long-term control plan will be based. Including:

1. *Characteristics of combined sewer system (CSS) including the population served by the combined portion of the system and locations of all CSO outfalls in the CSS.*
2. *Total number of CSO events and the frequency and duration of CSOs for a representative number of events.*
3. *Locations and designated uses of receiving water bodies.*
4. *Water quality data for receiving water bodies.*
5. *Water quality impacts directly related to CSO.*

The City has taken the presumptive approach for the elimination or capture and treatment of no less than 85% by volume of the combined sewage collected in the CSS during rain events on a system-wide annual average basis (item ii of the presumptive approach). The City's presumptive approach meets the EPA's 1994 CSO Control Policy to protect water quality and meet the standards of the Clean Water Act.
Per the EPA's presumptive approach taken by the City, the City has improved water quality through the control of CSOs. The City conveys combined wastewater to the EWPCF. Since approval of the LTCP, the capacity of the conveyance system has been increased, thus accommodating additional combined sewer flows to the EWPCF.

The City has reduced overflow volume by more than 85% since the implementation of the LTCP which meets the requirement under item ii of the presumptive approach.

As per each of the listed compliance points for this Control, the following is a summary of the City's efforts to-date (and as previously reported):

1. **Characteristics of combined sewer system (CSS) including the population served by the combined portion of the system and locations of all CSO outfalls in the combined sewer system.**
   The City of Everett North End Sewer System (NESS) is a combined sewer system. The 1987 CSO Control Plan quantified the CSO volume and pollutants discharged to the receiving waters by the NESS. The 1987 plan reported for an average year, approximately 485 million gallons (MG) of untreated combined sewage used to spill from 14 CSO locations (note – the city currently has 13 combined sewer outfalls). This volume represented at that time 8 percent of the sanitary, inflow, and infiltration flows in the NESS on an annual basis. The volume of CSO events Everett's outfalls has been reduced significantly since 1987. The population served by the NESS is estimated to be 60,000.
2. **Total number of CSO events and the frequency and duration of CSOs for a representative number of events.**
   See table and narrative in Chapter 2 of this Annual CSO Report and Attachment 2.
3. **Locations and designated uses of receiving water bodies.**
   The receiving water body to the west of the NESS is Port Gardner Bay. The receiving water to the east is the Snohomish River.
4. **Water quality data for receiving water bodies.**
   The City characterized the water quality of receiving water bodies in the 2004 EWPCF Facilities Plan and Basis of Design Report that was previously submitted to Ecology.
5. **Water quality impacts directly related to CSO (e.g., floatables, fish kills).**
   To date no water quality impacts related to CSOs have been observed or reported.

Status of Five Year Control Plan

January 1, 2012 to December 31, 2012

INTRODUCTION

Table 6.1 of the 2008 CSO Control Plan Update, submitted December 2008, listed priority ranked recommendations for improving the CSO monitoring capabilities and accuracy in overflow rate estimations. The plan states that these improvements should be implemented over a five year period beginning in 2009. The following table summarizes the improvements that have been made to address each item in table 6.1 of the 2008 CSO Control Plan Update.

TABLE 2. Summary of Five Year Control Plan Improvement Status

Ranking	Outfall	Proposed Improvement	Status
1	PSO7	Complete Sewer Main F Replacement project – Schedule A	This project was completed in 2009.
2	PSO1	The sensor located in the LS8 wet well should be used to document future CSO events for this site.	The sensor measuring the LS8 wet well level was linked to the SCADA system in February of 2009, and was used to document PSO1 CSO events in this 2012 report.
3	PSO2	Overflow set points at the two overflow pipes for LS7 should be established, so the overflow frequency can be monitored using the sensor located in the LS7 wet well.	PSO2 can no longer overflow from LS7. The pipe from LS7 to PSO2 is permanently blocked with a fused metal gate. PSO2 now can only overflow from the regulator at the top of the bluff downstream of LS8. The overflow set point in the manhole downstream of PSO2 has been established and the water level in the manhole is monitored and linked to the City's SCADA system.
4	PSO7	The sensor located in the LS2 wet well should be used to document future CSO events.	The sensor measuring the LS2 wet well level is linked to the SCADA system and these readings were used to document PSO7 CSO events in this 2012 report.
5	SRO1	The range of the ultrasonic sensor located in the LS9 wet well should be adjusted.	The range was adjusted from 10 feet to 18 feet in 2008.

6	SRO1	The ultrasonic sensor located in SMH W3 should be adjusted to record depth in the channel.	A sensor that measures the depth of water above the weir in SMH W3was used in weir equations to calculate overflow volumes in 2012. A second sensor measures the depth of the flow in the channel below the weir crest. This data is available on the City's SCADA system.
7	SRO4	The range of the LS32 wet well sensor should be adjusted.	The range of this sensor was increased in 2010, and this is used in part to determine the frequency and duration of overflow events. The City's flow monitoring consultant installed monitoring equipment in the overflow pipe in June of 2010 to determine overflow volumes at this location.
8	SRO4	The sensor located in the LS32 wet well should be used to document future CSO events for this site.	The range of this sensor was increased in 2010, and this is used in part to determine the frequency and duration of overflow events at this location. See above.
9	SRO7	Ultrasonic sensors should be reconfigured to measure full range of depths in both the Riverside and Pacific Avenue Regulator structures.	In 2010 the sensor measured the height of water above the weir during an overflow, but it did not measure depth of flow prior to an overflow event. In 2011 a separate sensor was installed to measure the range of flows at these locations prior to cresting the overflow weir.
10	SRO8	The sensor located in the LS33 wet well should be used to document future CSO events for the overflow pipe located in SMH Q12.	The sensor measuring the LS33 wet well level is linked to the SCADA system and was used to document SRO8 CSO events in this 2012 report (in addition to flows from the sluice gate described below).
11	SRO8	Overflow rates from the sluice gate should be estimated using an orifice equation based on the head in the Snohomish River CSO Interceptor and the gate opening.	Overflow events from the sluice gate were estimated using an orifice equation and added to any overflow events identified via the overflow pipe in SMH Q12 (described above) for this 2012 report.
12	SRO8	A temporary flow meter should be installed to measure total flows from the drainage basin to LS33. Overflow rates should be estimated by measuring total basin flow and subtracting the LS33 pumping rate.	This was done through the City's flow monitoring consultant from January 2009 to June 2010. At that time it was determined that due to redevelopment of this area there was no longer an issue with overflows, therefore data was not needed for design of a solution.

13	SRO3	The equation and parameters currently used to estimate overflow rates and volumes should be verified.	Overflow volumes are estimated using a broad crested weir equation. Additional measurements were taken in 2011 to verify the dimensions of this weir. However, under some circumstances this weir can be surcharged due to restricted conveyance capacity in the downstream outfall pipe, and fluctuating river levels. No CSO events occurred at this outfall in 2012, and historically the outfall rarely experiences overflows.
14	PSO6	Methods should be evaluated to modify the overflow regulator to prevent dry-weather overflows and improve overflow monitoring capabilities (to measure overflow volume).	The City's flow monitoring consultant installed an overflow prevention backboard prior to 2010 that reduces overflow events at this regulator. Also, the consultant placed flow monitoring equipment in the outfall pipe to measure event frequencies and volumes. No dry weather overflow events were recorded during 2012.
15	SRO4	A temporary flow meter should be installed to measure total flows from the drainage basin to LS32. Overflow rates should be estimated by measuring total basin flow and subtracting the LS32 pumping rate.	In May of 2010 a flow meter was installed to measure flows from the drainage basin to LS 32. A second flow monitor was placed in the overflow pipe in May of 2010 to measure overflow volumes. In August of 2011 this flow monitor was equipped with an area velocity meter to provide more accurate results. The area velocity meter located in the overflow pipe was used to calculate overflow volumes in 2012. However, this outfall remains difficult to monitor accurately.
16	PSO3	A temporary sensor should be installed to determine if overflows occur at this site.	Due to the infrequency of overflows at this site, and challenges of placing sensors at this remote location the City plans to continue monitoring the frequency of overflows at this site through the recorded relative wet well levels at LSO8. Overflow volumes are not calculated for this outfall in this current configuration. No overflows were recorded at this outfall in 2012.

17	SRO2	The bricks should be removed from the overflow weir in the Hayes Street Overflow Structure to eliminate the “blanking distance” issue with the sensor, and a sharp-crested weir plate should be installed to improve accuracy of overflow rate estimations. The sharp-crested weir equation should be used to estimate overflow volumes for this site.	The current configuration of this outfall pipe and monitoring equipment will be evaluated as part of the SRO2 CSO control project design in 2013. The City installed a pressure transducer to measure flows at this location which does not have blanking distance limitations. Overflow events and volumes were calculated with a weir equation and the water levels measured in the Hayes Street Overflow Structure in 2012.
18	PSO1	The existing structures for the PSO1 overflow site should be modified to improve overflow monitoring capabilities (to measure overflow volume).	In 2010 City crews installed a concrete weir. The sensor measuring the LS8 wet well level is linked to the SCADA system and was used to document PSO1 CSO events in this 2012 report. The sharp crested weir equation was used to calculated volumes for overflow events when the flow levels rose above the overflow weir.
19	PSO2	Methods should also be evaluated to measure overflow volumes of each CSO event.	A sensor was placed in the manhole that discharges to PSO1 and PSO2 in 2011. This sensor was used to record the water level in the manhole during a CSO event, and therefore the water level adjacent to the pipe invert leading to PSO2. This sensor allows the frequency of overflows at PSO2 to be determined. The volume of overflows at PSO2 would be included in the volume reported for PSO1 under this configuration since the weir used to calculate the PSO1 volume is located upstream of both PSO1 and PSO2. However, in 2012 there were no overflows recorded at this location.

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CITY OF EVERETT COMBINED SEWER OUTFALLS

Vicinity Map

Sewer Outfall
Site Location Map
City of Everett
Public Works
Utility Mapping
June 2009
Legend
CSO Outfall (Eliminated)
CSO Outfall (Active)
City of Everett WPCF
Sewer Interceptor
Gravity Main
Force Main
Drainage Mains
Combined / Sanitary Boundary
N
W
E
S
PSO1
PSO2
PSO3
PSO4
PSO5
PSO6
PSO7
PSO8
SRO1
SRO2
SRO3
SRO4
SRO7
SRO8
WPCF
Jetty Island
Port Gardner Bay
SNOHOMISH RIVER
UNION SLOUGH
JOHNSON LOUGH
529
5
10TH ST
N BROADWAY
E MARINE VIEW DR
COLBY AVE
BROADWAY AVE
19TH ST
W MARINE VIEW DR
WALNUT ST
23RD ST
EVERETT AVE
HEWITT AVE
PACIFIC AVE
CITY OF EVERETT SEWAGE LAGOON
Spencer Island
Smith Island
Ebey Island
STEAMBOAT SL
RESERVOIR #1
RESERVOIR #4
RESERVOIR #2
RESERVOIR #5
RESERVOIR #3
RUCKER AVE
41ST
S 3RD AVE
S 2ND AVE
52ND ST SE
BEVERLY LANE
GLENWOOD AVE
EVERGREEN WAY
LOWELL SNOHOMISH
EBEY SLOUGH
G:\Basemaps\Letter\Sewer\Combined_CSO_Location..mxd

2012 Combined Sewer Overflow Events

Dates, Durations and Volumes of Each Event

Each event from each outfall must be entered on separate lines.

As shown in "Permitted Outfall Locations"

NPDES	Outfall #	Facility Name	Receiving Water	Fill in data for each discharge event: Event Starting Date	Duration (hours)	Volume (gallons)	Optional: Precipitation (inches)	Storm Duration (hours)
WA0024490	005	City of Everett - Puget Sound Outfall 1	Port Gardner Bay	2/19/2012	0.6	65,000		
				3/17/2012	0.2	4,500		
				4/30/2012	0.3	33,000		
				10/16/2012	0.2	3,800		
				10/21/2012	0.1	480		
				11/19/2012	2.0	140,000		
			Totals	6	3.3	250,000		
WA0024490	007	City of Everett - Puget Sound Outfall 7	Port Gardner Bay	1/29/2012	0.3	11,000		
				2/19/2012	1.2	77,000		
				2/21/2012	5.6	170,000		
				2/29/2012	0.2	680		
				3/12/2012	1.0	35,000		
				3/15/2012	0.3	16,000		
				3/30/2012	0.2	1,100		
				4/20/2012	0.8	43,000		
				4/30/2012	0.6	22,000		
				5/4/2012	1.3	91,000		
				6/12/2012	0.2	5,800		
				6/23/2012	0.6	23,000		
				7/3/2012	0.8	48,000		
				7/20/2012	0.1	6,700		
				10/16/2012	0.5	24,000		
				10/18/2012	30.8	120,000		
				10/21/2012	0.4	17,000		
				10/31/2012	5.9	59,000		
				11/19/2012	10.6	220,000		
				11/21/2012	1.0	17,000		
				11/30/2012	11.1	170,000		
				12/4/2012	0.8	40,000		
				12/16/2012	6.3	75,000		
				12/19/2012	23.3	670,000		
			Totals	24	103.9	2,000,000		
WA0024490	008	City of Everett - Puget Sound Outfall 6	Port Gardner Bay	1/2/2012	1.5	93,000		
				1/4/2012	1.7	110,000		
				1/14/2012	0.3	3,500		
				1/20/2012	48.6	1,000,000		

1/29/2012	21.3	220,000
2/1/2012	11.3	280,000
2/9/2012	2.3	52,000
2/17/2012	34.8	1,100,000
2/20/2012	23.9	1,300,000
2/24/2012	21.5	58,000
2/28/2012	42.0	540,000
3/2/2012	0.5	8,700
3/5/2012	3.5	150,000
3/9/2012	1.1	60,000
3/10/2012	0.7	49,000
3/12/2012	5.4	520,000
3/14/2012	27.1	510,000
3/17/2012	22.3	35,000
3/22/2012	0.4	3,700
3/27/2012	114.5	830,000
4/3/2012	2.4	180,000
4/5/2012	0.5	61,000
4/16/2012	3.8	16,000
4/19/2012	14.7	530,000
4/25/2012	14.2	23,000
4/30/2012	39.4	530,000
5/3/2012	34.3	880,000
5/21/2012	0.3	4,400
5/22/2012	21.8	310,000
6/5/2012	0.9	72,000
6/7/2012	1.8	36,000
6/12/2012	1.6	270,000
6/17/2012	13.4	380,000
6/22/2012	24.9	300,000
9/10/2012	0.6	33,000
10/13/2012	69.4	710,000
10/18/2012	33.1	2,000,000
10/21/2012	0.9	220,000
10/22/2012	23.5	530
10/26/2012	24.5	1,200
10/28/2012	1.7	37,000
10/30/2012	23.7	1,200,000
11/2/2012	0.3	4,900
11/4/2012	1.1	17,000
11/6/2012	4.8	110,000
11/11/2012	0.9	46,000
11/13/2012	18.8	14,000

				11/16/2012	3.9	36,000
				11/18/2012	70.8	3,800,000
				11/23/2012	12.7	77,000
				11/28/2012	0.3	3,800
				11/30/2012	114.2	2,500,000
				12/6/2012	0.3	4,100
				12/8/2012	1.4	140,000
				12/9/2012	0.4	6,500
				12/11/2012	10.8	280,000
				12/14/2012	1.8	19,000
				12/15/2012	37.2	880,000
				12/19/2012	27.7	1,700,000
				12/22/2012	2.1	11,000
				12/23/2012	6.6	120,000
				12/25/2012	3.6	140,000
				12/26/2012	4.9	210,000
				12/29/2012	1.0	5,800
			Totals	64	1061.3	25,000,000
WA0024490	009	City of Everett - Puget Sound Outfall 5	Port Gardner Bay	1/29/2012	0.3	36,000
				2/1/2012	0.4	16,000
				2/17/2012	1.0	5,200
				2/19/2012	1.6	180,000
				2/29/2012	16.5	70,000
				3/12/2012	0.4	11,000
				3/15/2012	0.3	36,000
				4/20/2012	0.9	32,000
				4/30/2012	1.1	180,000
				5/4/2012	0.8	59,000
				5/23/2012	0.3	7,400
				6/12/2012	0.5	77,000
				6/23/2012	0.6	98,000
				7/3/2012	0.9	92,000
				7/20/2012	3.8	42,000
				10/16/2012	0.4	20,000
				10/18/2012	29.9	230,000
				10/21/2012	0.4	44,000
				10/31/2012	5.8	150,000
				11/18/2012	18.6	980,000
				11/21/2012	0.9	170,000
				11/30/2012	7.2	400,000
				12/19/2012	2.0	140,000
			Totals	23	94.7	3,100,000

WA0024490	011	City of Everett - Puget Sound Outfall 4	Port Gardner Bay	6/23/2012	0.1	5,600
				7/13/2012	0.03	1,100
				10/16/2012	0.2	6,300
				10/21/2012	0.1	4,500
			Totals	4	0.4	18,000
WA0024490	012	City of Everett - Puget Sound Outfall 3	Port Gardner Bay			
			Totals	0	0	0
WA0024490	013	City of Everett - Puget Sound Outfall 2	Port Gardner Bay			
			Totals	0	0	0
WA0024490	016	City of Everett - Snohomish River Outfall 1	Snohomish River			
			Totals	0	0.0	0
WA0024490	017	City of Everett - Snohomish River Outfall 2	Snohomish River	1/21/2012	0.5	20,000
				1/29/2012	0.2	7,900
				2/1/2012	1.7	250,000
				2/19/2012	1.7	180,000
				2/21/2012	7.9	340,000
				2/29/2012	0.7	80,000
				3/12/2012	0.2	4,400
				3/15/2012	0.4	46,000
				3/17/2012	0.3	52,000
				4/1/2012	0.3	20,000
				4/30/2012	2.4	690,000
				5/4/2012	1.3	220,000
				5/23/2012	0.2	7,800
				6/12/2012	0.2	12,000
				6/23/2012	0.5	75,000
				7/3/2012	0.7	4,400
				8/29/2012	29.2	56,000
				10/16/2012	0.5	150,000
				10/17/2012	24.8	310,000
				10/21/2012	0.3	46,000
				10/31/2012	6.1	440,000
				11/18/2012	19.7	1,300,000
				11/21/2012	1.0	200,000
				11/30/2012	10.8	470,000

				12/4/2012	0.5	35,000
				12/16/2012	5.1	28,000
				12/19/2012	20.6	330,000
			Totals	27	137.7	5,400,000
WA0024490	018	City of Everett - Snohomish River Outfall 3	Snohomish River			
			Totals	0	0	0
WA0024490	019	City of Everett - Snohomish River Outfall 4	Snohomish River	1/21/2012	15.7	210,000
				1/29/2012	0.4	90,000
				2/1/2012	1.0	200,000
				2/17/2012	1.2	82,000
				2/19/2012	1.9	830,000
				2/21/2012	8.6	1,400,000
				2/29/2012	16.7	250,000
				3/12/2012	1.0	110,000
				3/15/2012	5.9	170,000
				3/30/2012	2.0	79,000
				4/1/2012	0.3	13,000
				4/20/2012	1.7	290,000
				4/30/2012	1.6	430,000
				5/4/2012	1.8	430,000
				5/23/2012	9.9	100,000
				6/12/2012	1.1	170,000
				6/18/2012	0.9	130,000
				7/3/2012	1.1	210,000
				10/16/2012	0.9	330,000
				10/18/2012	29.3	1,100,000
				10/21/2012	0.7	100,000
				10/31/2012	6.6	890,000
				11/18/2012	23.3	4,500,000
				11/21/2012	1.4	200,000
				11/30/2012	33.8	1,200,000
				12/4/2012	0.2	37,000
				12/8/2012	0.2	11,000
				12/16/2012	17.0	590,000
				12/19/2012	21.8	2,300,000
				12/27/2012	1.0	170,000
			Totals	30	208.8	17,000,000
WA0024490	026	City of Everett - Snohomish River Outfall 7	Snohomish River	2/19/2012	0.2	23,000
				10/16/2012	0.3	150,000

				11/19/2012	2.1	900,000
			Totals	3	2.5	1,100,000
WA0024490	028	City of Everett - Snohomish River Outfall 8	Snohomish River	2/19/2012	0.7	2,300,000
				11/19/2012	2.4	*
			Totals	2	3.1	2,300,000
			Grand Total	183		56,000,000

*Volume could not be estimated for this event.
**Volume for this event was difficult to estimate and the accuracy is unknown.
Volume of event is estimated and may be less than reported.

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Snohomish River Outfall Number 1 Fact Sheet

Revised per 2012 inspection findings

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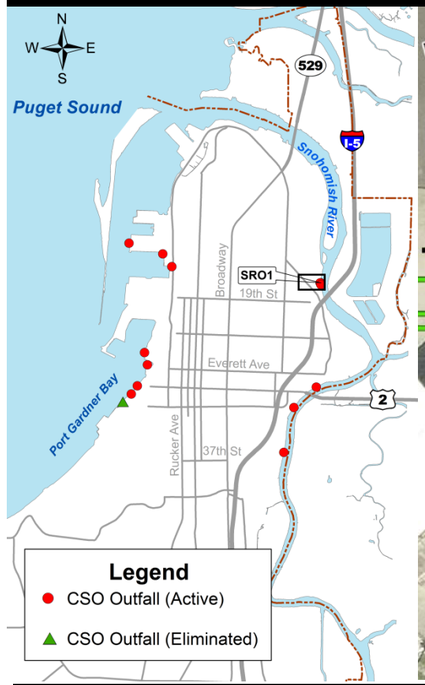
City of Everett

SRO1 Overflow Site – Fact Sheet

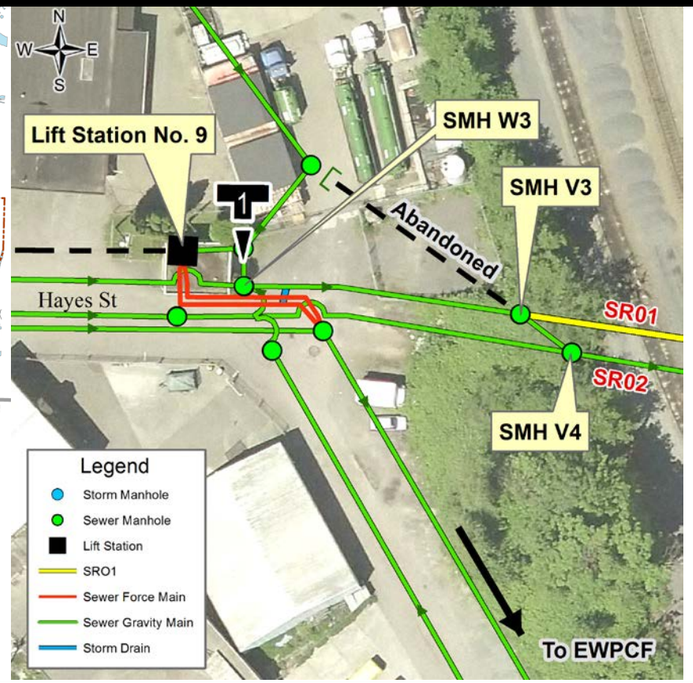
Overflow Site **SRO1**

January 2013

VICINITY MAP



EXISTING SEWER SYSTEM



OVERFLOW SITE INFORMATION

Overflow Configuration (see Flow Schematic Diagram)

- During normal conditions, flows from a 24-inch-diameter gravity sewer enter SMH W3 where a weir plate diverts the flows to Lift Station No. 9 (LS9).
- During wet-weather conditions when the flow exceeds the pumping capacity at LS9, combined sewage surcharges in SMH W3. Once the combined sewage crests the overflow weir in the manhole, overflows are routed to the 24-inch-diameter pipe. This pipe is then diverted into SRO2 inside SMH V3. If SRO2 exceeds its capacity, the overflow will rise inside SMH V3 until it can flow down the SRO1 outfall pipe to the Snohomish River

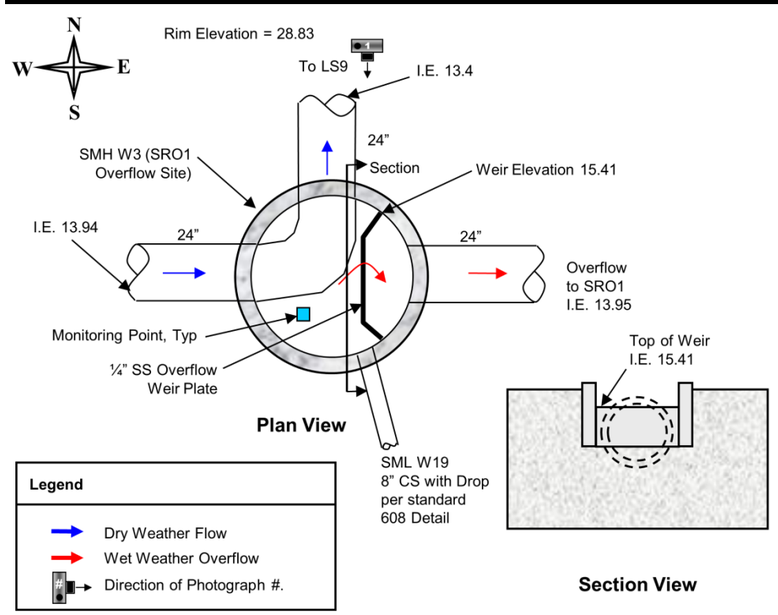
Historical Overflow Monitoring Method

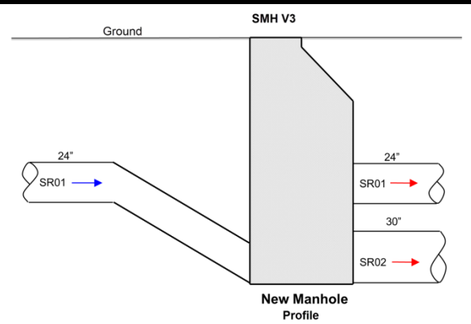
- A level sensor is located in SMH W3. The water surface elevation measured from this sensor is used to determine the overflow rate in SMH W3. Only depth measured above the crest of the weir is recorded.
- The ultrasonic sensor located in the LS9 wet well is used to verify that an overflow event has occurred.

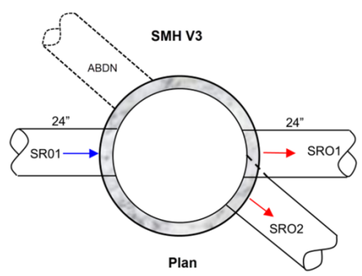
PHOTOS

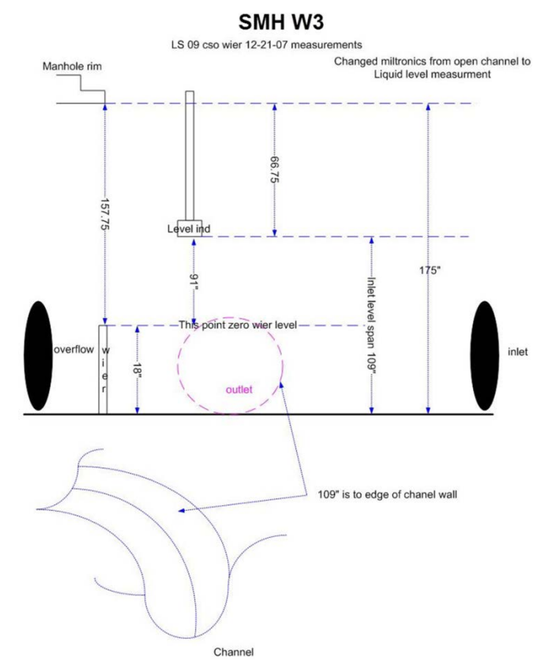
Photo 1. SMH W3, looking down into manhole facing southward

FLOW SCHEMATIC DIAGRAM









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Appendix M

CIP Support Documentation

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Introduction

This Appendix provides the cost estimate sources for the City's CIP. The following describes each estimate source and including supporting documentation for all estimates generated with the Tabula v3.1 cost estimating tool.

Cost Estimate Sources

Cost estimates for improvements shown in Table 6-1 of the CSP were prepared by the City of Everett. Improvements shown in Table 1 below are scheduled beyond 2024. The project cost estimates were developed based on the following methods:

- **Tabula:** Construction Cost estimate was provided by Tabula cost estimating tool. Multipliers for Undefined scope of work (50%), sales tax (9.2%), and allied costs (35%) were applied to develop a project cost estimate. Supporting documentation is included in this Appendix.
- **2006 CSP:** Project cost estimate was developed in the 2006 CSP and adjusted with ENR Cost Indices to 2013 Dollars. No multipliers are applied for undefined scope of work, sales tax, or allied costs.

Table 1. Project Cost Estimate Source for Improvements Scheduled beyond 2024

Project No.	Project Type	Project Name	Estimate Source
Collection and Conveyance Improvements			
A-1A	Conveyance	East Marine View Dr North of Broadway	2006 CSP
A-1B	Conveyance	East Marine View Dr South of Broadway	2006 CSP
A-2A	Conveyance	Belmonte Ln to Butler St	2006 CSP
A-2B	Conveyance	Butler St West of Marine View Dr	2006 CSP
C-1	Conveyance	18" vic 17th and Pine St to 16th and E Grand Ave	Tabula
C-2	Conveyance	Larch St from 12th to 14th	Tabula
D-1	Conveyance	Broadway Ave from 17th St to 11th St	Tabula
G-1	Conveyance	Nassau Ave & Wall St to Grand Ave & Hewitt St	Tabula
G-2	Conveyance	Grand Ave from Everett Ave to 19th St	Tabula
N-1	Conveyance	Colby Ave from Fairfax Ave to 48th St SE	Tabula
N-2	Lift Station	LS 17 Improvements	2006 CSP
NC-1	Conveyance	21st St from Pine St to Walnut St	Tabula
NC-2	Condition	vic 24th St to Pine St to 26th St to Maple St to Everett Ave	Tabula
ND-1	Conveyance	21St St to 17th St. Interceptor	Tabula
ND-2	Conveyance	Broadway Trunk Main Improvement	Tabula
ND-3	Conveyance	Everett Ave from Rockefeller Ave to Broadway Ave	Tabula
ND-4	Conveyance	24th St from Oakes Ave to Broadway Ave	Tabula
ND-5	Conveyance	McDougall Ave from Everett Ave to 24th St	Tabula
ND-6	Conveyance	Virginia Ave & 24th St to McDougall vic Everett Ave	Tabula

Project No.	Project Type	Project Name	Estimate Source
ND-7	Conveyance	California St & Broadway to Hewitt Ave & Virginia	Tabula
ND-8	Conveyance	Colby Ave, 26th St, Rockefeller, and Wetmore Ave	Tabula
ND-9	Conveyance	21st St from Rockefeller to Broadway	Tabula
ND-10	Condition	Fulton St and Virginia Ave	Tabula
ND-11	Condition	Rainier Ave from Everett Ave to 24th St	Tabula
ND-12	Condition	vic Wetmore Ave from 24th St to 19th St	Tabula
ND-13	Condition	vic Broadway from 23rd St to 19th St	Tabula
ND-14	Condition	McDougall Ave from 21st St to 24th St	Tabula
ND-15	Conveyance	Pacific Regulator to SRI Improvement	Tabula
NE-1	Condition	Pacific and Broadway to McDougall and 32nd	2006 CSP
NE-2	Condition	McDougall from 33rd to 34th	2006 CSP
NE-3	Condition	34th from McDougall to Broadway	2006 CSP
NE-4	Condition	33rd to 34th between Broadway and McDougall	2006 CSP
NG-1	Conveyance	Grand Ave from 52nd St to 42nd St	Tabula
NG-2	Condition	Colby Ave from 40th St to Wall St	Tabula
NG-3	Conveyance	48th and 49th St from Black Forest Lane to Evergreen Way	Tabula
NG-4	Condition	Lombard Ave from 33rd to 36th St	Tabula
NG-5	Conveyance	36th St Regulator to SRO8 Improvement	Tabula
TQ-1	Conveyance	State St from 23rd to 26th St	Tabula
SE9-1	Conveyance	19th Ave SE	2006 CSP
SE9-2	Conveyance	19th Ave SE	2006 CSP
SE9-3	Conveyance	100th St SE	2006 CSP
Eastm-1	Conveyance	Eastmont Gravity Sewer	2006 CSP
Eastm-2	Conveyance	Eastmont Forcemain	2006 CSP
Eastm-3	Lift Station	Eastmont Lift Station	2006 CSP

2006 CSP Projects included in Current Plan as scheduled beyond 2024.

The following table lists the project costs developed in the 2006 CSP and included in the current plan. The 2006 CSP used a base year of 2005 for its cost estimates. The ENR CCI Seattle cost index for January, 2005 (8165.36) and cost index for January, 2014 (10140.15) were used to adjust each project cost estimate to 2014 dollars.

Table 2. Summary of 2006 CSP Projects Scheduled Beyond 2024 in the 2014 CSP.

2014 CSP ID	2006 Project Description	2005 Cost (ENR 8165.36)	2014 Cost (ENR 10140.15)
A-1A	1,182 feet of 10-inch-diameter pipe should be increased to 15-inch, from SMH0895T14 to SMH0895Z02, along East Marine View Drive.	$897,000	$1,110,000
A-1B	507 feet of 10-inch-diameter pipe should be increased to 15-inch, from SMH0895T14 to SMH0895Z02, along East Marine View Drive.	$385,000	$480,000
A-2A	905 feet of 8-inch-diameter pipe should be increased to 10-inch, from SMH0895Y13 to SMH0895Z02, along 160 feet of Butler Street and 745 feet in the alley between Pilchuck and East Marine View Drive.	$545,000	$680,000
A-2B	115 feet of 10-inch-diameter pipe should be increased to 18-inch, from SMH0895Z02 to SMH0895Z03, along East Marine View Drive.	$116,000	$140,000
N-2	LS 17 Lift station upgrade and repair.	$327,000	$410,000
NE-1	Replace existing 6- and 8-inch pipeline with a 12-inch parallel to 32nd Street up to SMH2995D21, then parallel to McDougall Avenue, from manhole SMH2995D16, downstream to SMH2995E12 (Approx. 655 ft).	$295,000	$370,000
NE-2	Replace existing 12-inch pipeline with a 15-inch along McDougall Avenue from manhole SMH2995F02 downstream to SMH2995L02 (Approx. 479 ft).	$215,000	$270,000
NE-3	Replace existing 6-inch pipeline with 12-inch along 34th St from SMH2995M18 to SMH2995L02 (Approx 170 ft).	$83,000	$100,000
NE-4	Replace existing 12-inch pipeline along 34th Street and along Broadway Avenue from manhole SMH2995M18 downstream to SMH2995E13 (Approx. 659 ft).	$278,000	$350,000
SE9-1	Replace existing 10-inch pipeline with a 15-inch along 19th Avenue SE from manhole SMH1985R02 downstream to SMH1985J04 (Approx. 693 ft).	$306,000	$380,000
SE9-2	Replace existing 10-inch pipeline with a 12-inch along 19th Avenue SE, from manhole SMH1985A02 downstream to SMH1985R02 (Approx. 2,149 ft).	$894,000	$1,110,000
SE9-3	Replace existing 8-inch pipeline with a 10-inch parallel to 100th Steet SE, from manhole SMH1785X16 downstream to NID8099 (Approx.1,089 ft).	$469,000	$580,000
Eastm-1	8-inch gravity pipelines serving 452 acres (approximately 44,836 ft)	$15,270,000	$18,960,000

2014 CSP ID	2006 Project Description	2005 Cost (ENR 8165.36)	2014 Cost (ENR 10140.15)
Eastm-2	6-inch force main (Approx. 2,480 ft)	$863,000	$1,070,000
Eastm-3	New Lift Station located north of Gold Way, connecting the east area of eastmont to the South End Interceptor, firm capacity of 350gpm.	$874,000	$1,090,000

Cost Calculations for Pipe: **C-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1600 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,230.0	CY	13.00	42,000
Backfill	2,070.0	CY	34.00	70,400
Complete Pavement Restoration	1,240.0	SY	86.00	107,000
Overlay Pavement Restoration	2,670.0	SY	28.00	74,700
Trench Safety	34,900.0	SF	0.53	18,500
Spoil Load and Haul	3,230.0	CY	16.00	51,700
Pipe Unit Material Cost	1,600.0	lf	24.00	38,400
Pipe Installation	1,600.0	lf	29.00	46,400
Place Pipe Zone Fill	988.0	CY	34.00	33,600
Manholes	4.0	MH	8,330.00	33,300
Existing Utilities	1,600.0	lf	3.00	4,800

Dewatering	1,600.0	lf	24.00	38,400
Traffic Control	1,600.0	lf	8.00	12,800
			Year 2008 Subtotal	$572,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$697,000

Year 2014 Total: $697,000

Cost Calculations for Pipe: **C-2**

Printed date : 11/04/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 900 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	1,820.0	CY	13.00	23,600
Backfill	1,160.0	CY	34.00	39,600
Complete Pavement Restoration	699.0	SY	86.00	60,100
Overlay Pavement Restoration	1,500.0	SY	28.00	42,000
Trench Safety	19,700.0	SF	0.53	10,400
Spoil Load and Haul	1,820.0	CY	16.00	29,100
Pipe Unit Material Cost	900.0	lf	24.00	21,600
Pipe Installation	900.0	lf	29.00	26,100
Place Pipe Zone Fill	556.0	CY	34.00	18,900
Manholes	2.0	MH	8,330.00	16,700
Existing Utilities	900.0	lf	3.00	2,700

Dewatering	900.0	lf	24.00	21,600
Traffic Control	900.0	lf	8.00	7,200
			Year 2008 Subtotal	$320,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$390,000

Year 2014 Total: $390,000

Cost Calculations for Pipe: **D-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2900 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	14.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	8,000.0	CY	13.00	104,000
Backfill	5,900.0	CY	34.00	201,000
Complete Pavement Restoration	2,250.0	SY	86.00	194,000
Overlay Pavement Restoration	4,840.0	SY	28.00	135,000
Trench Safety	86,500.0	SF	0.53	45,900
Spoil Load and Haul	8,000.0	CY	16.00	128,000
Pipe Unit Material Cost	2,900.0	lf	24.00	69,600
Pipe Installation	2,900.0	lf	29.00	84,100
Place Pipe Zone Fill	1,790.0	CY	34.00	60,900
Manholes	6.0	MH	8,330.00	50,000
Existing Utilities	2,900.0	lf	3.00	8,700

Dewatering	2,900.0	lf	24.00	69,600
Traffic Control	2,900.0	lf	8.00	23,200
			Year 2008 Subtotal	$1,170,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,430,000

Year 2014 Total: $1,430,000

Cost Calculations for Pipe: **G-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1350 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	2,720.0	CY	13.00	35,400
Backfill	1,750.0	CY	34.00	59,400
Complete Pavement Restoration	1,050.0	SY	86.00	90,200
Overlay Pavement Restoration	2,250.0	SY	28.00	63,000
Trench Safety	29,500.0	SF	0.53	15,600
Spoil Load and Haul	2,720.0	CY	16.00	43,600
Pipe Unit Material Cost	1,350.0	lf	24.00	32,400
Pipe Installation	1,350.0	lf	29.00	39,200
Place Pipe Zone Fill	833.0	CY	34.00	28,300
Manholes	3.0	MH	8,330.00	25,000
Existing Utilities	1,350.0	lf	3.00	4,050

Dewatering	1,350.0	lf	24.00	32,400
Traffic Control	1,350.0	lf	8.00	10,800
			Year 2008 Subtotal	$479,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$585,000

Year 2014 Total: $585,000

Cost Calculations for Pipe: **G-2**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 3950 ft
Conduit Type: Gravity
Depth of Cover: 18 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	21.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	18,100.0	CY	13.00	235,000
Backfill	14,300.0	CY	34.00	486,000
Complete Pavement Restoration	3,400.0	SY	86.00	293,000
Overlay Pavement Restoration	6,250.0	SY	28.00	175,000
Trench Safety	170,000.0	SF	0.53	90,000
Spoil Load and Haul	18,100.0	CY	16.00	289,000
Pipe Unit Material Cost	3,950.0	lf	36.00	142,000
Pipe Installation	3,950.0	lf	33.00	130,000
Place Pipe Zone Fill	3,070.0	CY	34.00	104,000
Manholes	8.0	MH	9,700.00	77,600
Existing Utilities	3,950.0	lf	5.00	19,800

Dewatering	3,950.0	lf	24.00	94,800
Traffic Control	3,950.0	lf	12.00	47,400
			Year 2008 Subtotal	$2,180,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$2,660,000

Year 2014 Total: $2,660,000

Cost Calculations for Pipe: **N-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 3300 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	14.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	7,650.0	CY	13.00	99,500
Backfill	5,840.0	CY	34.00	198,000
Complete Pavement Restoration	2,330.0	SY	86.00	200,000
Overlay Pavement Restoration	5,740.0	SY	28.00	161,000
Trench Safety	95,200.0	SF	0.53	50,400
Spoil Load and Haul	7,650.0	CY	16.00	122,000
Pipe Unit Material Cost	3,300.0	lf	17.00	56,100
Pipe Installation	3,300.0	lf	25.00	82,500
Place Pipe Zone Fill	1,620.0	CY	34.00	55,100
Manholes	7.0	MH	8,330.00	58,300
Existing Utilities	3,300.0	lf	3.00	9,900

Dewatering	3,300.0	lf	24.00	79,200
Traffic Control	3,300.0	lf	8.00	26,400
			Year 2008 Subtotal	$1,200,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,460,000

Year 2014 Total: $1,460,000

Cost Calculations for Pipe: **NC-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1000 ft
Conduit Type: Gravity
Depth of Cover: 18 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	21.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	4,580.0	CY	13.00	59,500
Backfill	3,620.0	CY	34.00	123,000
Complete Pavement Restoration	861.0	SY	86.00	74,100
Overlay Pavement Restoration	1,580.0	SY	28.00	44,300
Trench Safety	43,000.0	SF	0.53	22,800
Spoil Load and Haul	4,580.0	CY	16.00	73,300
Pipe Unit Material Cost	1,000.0	lf	36.00	36,000
Pipe Installation	1,000.0	lf	33.00	33,000
Place Pipe Zone Fill	777.0	CY	34.00	26,400
Manholes	2.0	MH	9,700.00	19,400
Existing Utilities	1,000.0	lf	5.00	5,000

Dewatering	1,000.0	lf	24.00	24,000
Traffic Control	1,000.0	lf	12.00	12,000
			Year 2008 Subtotal	$553,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$674,000

Year 2014 Total: $674,000

Cost Calculations for Project: **NC-2**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Project Year: 2014
Responsible Party:
Comments:

Sub Items

Name	Type	Year	Cost	Multiplier	2014 Cost
NC-2A	Pipe	2014	1,180,000	1.00	1,180,000
NC-2B	Pipe	2014	324,000	1.00	324,000
NC-2C	Pipe	2014	327,000	1.00	327,000
NC-2D	Pipe	2014	97,400	1.00	97,400
NC-2E	Pipe	2014	1,200,000	1.00	1,200,000
			Year 2008 Subtotal		$3,130,000

Year 2014 Total: $3,130,000

Cost Calculations for Pipe: **NC-2A**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2000 ft
Conduit Type: Gravity
Depth of Cover: 18 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	20.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	7,730.0	CY	13.00	101,000
Backfill	6,290.0	CY	34.00	214,000
Complete Pavement Restoration	1,550.0	SY	86.00	134,000
Overlay Pavement Restoration	3,340.0	SY	28.00	93,400
Trench Safety	83,700.0	SF	0.53	44,300
Spoil Load and Haul	7,730.0	CY	16.00	124,000
Pipe Unit Material Cost	2,000.0	lf	24.00	48,000
Pipe Installation	2,000.0	lf	29.00	58,000
Place Pipe Zone Fill	1,230.0	CY	34.00	42,000
Manholes	4.0	MH	10,100.00	40,500
Existing Utilities	2,000.0	lf	3.00	6,000

Dewatering	2,000.0	lf	24.00	48,000
Traffic Control	2,000.0	lf	8.00	16,000
			Year 2008 Subtotal	$968,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,180,000

Year 2014 Total: $1,180,000

Cost Calculations for Pipe: **NC-2B**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 480 ft
Conduit Type: Gravity
Depth of Cover: 18 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	21.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	2,200.0	CY	13.00	28,600
Backfill	1,740.0	CY	34.00	59,100
Complete Pavement Restoration	413.0	SY	86.00	35,500
Overlay Pavement Restoration	760.0	SY	28.00	21,300
Trench Safety	20,600.0	SF	0.53	10,900
Spoil Load and Haul	2,200.0	CY	16.00	35,200
Pipe Unit Material Cost	480.0	lf	36.00	17,300
Pipe Installation	480.0	lf	33.00	15,800
Place Pipe Zone Fill	373.0	CY	34.00	12,700
Manholes	1.0	MH	9,700.00	9,700
Existing Utilities	480.0	lf	5.00	2,400

Dewatering	480.0	lf	24.00	11,500
Traffic Control	480.0	lf	12.00	5,760
			Year 2008 Subtotal	$266,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$324,000

Year 2014 Total: $324,000

Cost Calculations for Pipe: **NC-2C**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 840 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: None
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Residential Street (28 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	1,410.0	CY	13.00	18,300
Backfill	946.0	CY	34.00	32,100
Complete Pavement Restoration	592.0	SY	86.00	50,900
Overlay Pavement Restoration	2,020.0	SY	28.00	56,600
Trench Safety	17,500.0	SF	0.53	9,280
Spoil Load and Haul	1,410.0	CY	16.00	22,500
Pipe Unit Material Cost	840.0	lf	17.00	14,300
Pipe Installation	840.0	lf	25.00	21,000
Place Pipe Zone Fill	412.0	CY	34.00	14,000
Existing Utilities	840.0	lf	3.00	2,520
Dewatering	840.0	lf	24.00	20,200

Traffic Control	840.0	lf	8.00	6,720
			Year 2008 Subtotal	$268,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$327,000

Year 2014 Total: $327,000

Cost Calculations for Pipe: **NC-2D**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 250 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: None
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Residential Street (28 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	419.0	CY	13.00	5,440
Backfill	281.0	CY	34.00	9,570
Complete Pavement Restoration	176.0	SY	86.00	15,200
Overlay Pavement Restoration	602.0	SY	28.00	16,800
Trench Safety	5,210.0	SF	0.53	2,760
Spoil Load and Haul	419.0	CY	16.00	6,700
Pipe Unit Material Cost	250.0	lf	17.00	4,250
Pipe Installation	250.0	lf	25.00	6,250
Place Pipe Zone Fill	123.0	CY	34.00	4,170
Existing Utilities	250.0	lf	3.00	750
Dewatering	250.0	lf	24.00	6,000

Traffic Control	250.0	lf	8.00	2,000
			Year 2008 Subtotal	$79,900

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$97,400

Year 2014 Total: $97,400

Cost Calculations for Pipe: **NC-2E**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2150 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: None
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Residential Street (28 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 30 in.

Geometry

Outer Diameter	3.08 ft
Trench Width	6.51 ft
Excavation Depth	12.1 ft
Complete Surface Rest. Width	8.51 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	6,260.0	CY	13.00	81,400
Backfill	3,630.0	CY	34.00	123,000
Complete Pavement Restoration	2,030.0	SY	86.00	175,000
Overlay Pavement Restoration	4,660.0	SY	28.00	130,000
Trench Safety	52,000.0	SF	0.53	27,500
Spoil Load and Haul	6,260.0	CY	16.00	100,000
Pipe Unit Material Cost	2,150.0	lf	51.00	110,000
Pipe Installation	2,150.0	lf	38.00	81,700
Place Pipe Zone Fill	2,040.0	CY	34.00	69,400
Existing Utilities	2,150.0	lf	5.00	10,800
Dewatering	2,150.0	lf	24.00	51,600

Traffic Control	2,150.0	lf	12.00	25,800
			Year 2008 Subtotal	$987,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,200,000

Year 2014 Total: $1,200,000

Cost Calculations for Pipe: **NC-3**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1450 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: None
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Residential Street (28 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 30 in.

Geometry

Outer Diameter	3.08 ft
Trench Width	6.51 ft
Excavation Depth	16.1 ft
Complete Surface Rest. Width	8.51 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,620.0	CY	13.00	73,100
Backfill	3,840.0	CY	34.00	131,000
Complete Pavement Restoration	1,370.0	SY	86.00	118,000
Overlay Pavement Restoration	3,140.0	SY	28.00	87,900
Trench Safety	46,600.0	SF	0.53	24,700
Spoil Load and Haul	5,620.0	CY	16.00	89,900
Pipe Unit Material Cost	1,450.0	lf	51.00	74,000
Pipe Installation	1,450.0	lf	38.00	55,100
Place Pipe Zone Fill	1,380.0	CY	34.00	46,800
Existing Utilities	1,450.0	lf	5.00	7,250
Dewatering	1,450.0	lf	24.00	34,800

Traffic Control	1,450.0	lf	12.00	17,400
			Year 2008 Subtotal	$760,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$926,000

Year 2014 Total: $926,000

Cost Calculations for Pipe: **ND-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2500 ft
Conduit Type: Gravity
Depth of Cover: 18 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Arterial (44 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 54 in.

Geometry

Outer Diameter	5.54 ft
Trench Width	9.7 ft
Excavation Depth	24.5 ft
Complete Surface Rest. Width	11.7 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	22,100.0	CY	13.00	287,000
Backfill	15,300.0	CY	34.00	519,000
Complete Pavement Restoration	3,250.0	SY	86.00	280,000
Overlay Pavement Restoration	8,970.0	SY	28.00	251,000
Trench Safety	123,000.0	SF	0.53	65,000
Spoil Load and Haul	22,100.0	CY	16.00	353,000
Pipe Unit Material Cost	2,500.0	lf	168.00	420,000
Pipe Installation	2,500.0	lf	70.00	175,000
Place Pipe Zone Fill	4,540.0	CY	34.00	154,000
Manholes	5.0	MH	20,200.00	101,000
Existing Utilities	2,500.0	lf	16.00	40,000

Dewatering	2,500.0	lf	35.00	87,500
Traffic Control	2,500.0	lf	18.00	45,000
			Year 2008 Subtotal	$2,780,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$3,390,000

Year 2014 Total: $3,390,000

Cost Calculations for Project: **ND-2**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Project Year: 2014
Responsible Party:
Comments:

Sub Items

Name	Type	Year	Cost	Multiplier	2014 Cost
ND-2A	Pipe	2014	1,020,000	1.00	1,020,000
ND-2B	Pipe	2014	1,350,000	1.00	1,350,000
ND-2C	Pipe	2014	3,840,000	1.00	3,840,000
			Year 2008 Subtotal		$6,200,000

Year 2014 Total: $6,200,000

Cost Calculations for Pipe: **ND-2A**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 855 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Arterial (44 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 60 in.

Geometry

Outer Diameter	6.13 ft
Trench Width	10.5 ft
Excavation Depth	15.1 ft
Complete Surface Rest. Width	12.5 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,010.0	CY	13.00	65,100
Backfill	2,320.0	CY	34.00	78,900
Complete Pavement Restoration	1,180.0	SY	86.00	102,000
Overlay Pavement Restoration	3,000.0	SY	28.00	83,900
Trench Safety	25,900.0	SF	0.53	13,700
Spoil Load and Haul	5,010.0	CY	16.00	80,200
Pipe Unit Material Cost	855.0	lf	220.00	188,000
Pipe Installation	855.0	lf	81.00	69,300
Place Pipe Zone Fill	1,760.0	CY	34.00	59,800
Manholes	2.0	MH	15,400.00	30,800
Existing Utilities	855.0	lf	25.00	21,400

Dewatering	855.0	lf	35.00	29,900
Traffic Control	855.0	lf	18.00	15,400
			Year 2008 Subtotal	$838,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,020,000

Year 2014 Total: $1,020,000

Cost Calculations for Pipe: **ND-2B**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 880 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Arterial (44 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 72 in.

Geometry

Outer Diameter	7.29 ft
Trench Width	12 ft
Excavation Depth	16.3 ft
Complete Surface Rest. Width	14 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	6,360.0	CY	13.00	82,700
Backfill	2,730.0	CY	34.00	92,900
Complete Pavement Restoration	1,370.0	SY	86.00	118,000
Overlay Pavement Restoration	2,940.0	SY	28.00	82,200
Trench Safety	28,700.0	SF	0.53	15,200
Spoil Load and Haul	6,360.0	CY	16.00	102,000
Pipe Unit Material Cost	880.0	lf	346.00	304,000
Pipe Installation	880.0	lf	109.00	95,900
Place Pipe Zone Fill	2,270.0	CY	34.00	77,100
Manholes	2.0	MH	17,700.00	35,400
Existing Utilities	880.0	lf	34.00	29,900

Dewatering	880.0	lf	53.00	46,600
Traffic Control	880.0	lf	25.00	22,000
			Year 2008 Subtotal	$1,100,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,350,000

Year 2014 Total: $1,350,000

Cost Calculations for Pipe: **ND-2C**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1965 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Full Width - Arterial (44 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 84 in.

Geometry

Outer Diameter	8.33 ft
Trench Width	13.3 ft
Excavation Depth	17.3 ft
Complete Surface Rest. Width	15.3 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	16,800.0	CY	13.00	219,000
Backfill	6,790.0	CY	34.00	231,000
Complete Pavement Restoration	3,350.0	SY	86.00	288,000
Overlay Pavement Restoration	6,260.0	SY	28.00	175,000
Trench Safety	68,100.0	SF	0.53	36,100
Spoil Load and Haul	16,800.0	CY	16.00	269,000
Pipe Unit Material Cost	1,970.0	lf	490.00	963,000
Pipe Installation	1,970.0	lf	146.00	287,000
Place Pipe Zone Fill	6,060.0	CY	34.00	206,000
Manholes	4.0	MH	41,700.00	167,000
Existing Utilities	1,970.0	lf	77.00	151,000

Dewatering	1,970.0	lf	53.00	104,000
Traffic Control	1,970.0	lf	25.00	49,100
			Year 2008 Subtotal	$3,150,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$3,840,000

Year 2014 Total: $3,840,000

Cost Calculations for Pipe: **ND-3**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 950 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	15.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,140.0	CY	13.00	40,800
Backfill	2,230.0	CY	34.00	75,700
Complete Pavement Restoration	818.0	SY	86.00	70,400
Overlay Pavement Restoration	1,500.0	SY	28.00	42,100
Trench Safety	29,500.0	SF	0.53	15,600
Spoil Load and Haul	3,140.0	CY	16.00	50,200
Pipe Unit Material Cost	950.0	lf	36.00	34,200
Pipe Installation	950.0	lf	33.00	31,400
Place Pipe Zone Fill	738.0	CY	34.00	25,100
Manholes	2.0	MH	7,390.00	14,800
Existing Utilities	950.0	lf	5.00	4,750

Dewatering	950.0	lf	24.00	22,800
Traffic Control	950.0	lf	12.00	11,400
			Year 2008 Subtotal	$439,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$535,000

Year 2014 Total: $535,000

Cost Calculations for Pipe: **ND-4**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 550 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	1,110.0	CY	13.00	14,400
Backfill	712.0	CY	34.00	24,200
Complete Pavement Restoration	427.0	SY	86.00	36,700
Overlay Pavement Restoration	917.0	SY	28.00	25,700
Trench Safety	12,000.0	SF	0.53	6,360
Spoil Load and Haul	1,110.0	CY	16.00	17,800
Pipe Unit Material Cost	550.0	lf	24.00	13,200
Pipe Installation	550.0	lf	29.00	16,000
Place Pipe Zone Fill	339.0	CY	34.00	11,500
Manholes	2.0	MH	8,330.00	16,700
Existing Utilities	550.0	lf	3.00	1,650

Dewatering	550.0	lf	24.00	13,200
Traffic Control	550.0	lf	8.00	4,400
			Year 2008 Subtotal	$202,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$246,000

Year 2014 Total: $246,000

Cost Calculations for Pipe: **ND-5**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1550 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	11.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,800.0	CY	13.00	49,300
Backfill	2,310.0	CY	34.00	78,600
Complete Pavement Restoration	1,330.0	SY	86.00	115,000
Overlay Pavement Restoration	2,450.0	SY	28.00	68,700
Trench Safety	35,700.0	SF	0.53	18,900
Spoil Load and Haul	3,800.0	CY	16.00	60,700
Pipe Unit Material Cost	1,550.0	lf	36.00	55,800
Pipe Installation	1,550.0	lf	33.00	51,200
Place Pipe Zone Fill	1,200.0	CY	34.00	40,900
Manholes	4.0	MH	7,390.00	29,500
Existing Utilities	1,550.0	lf	5.00	7,750

Dewatering	1,550.0	lf	24.00	37,200
Traffic Control	1,550.0	lf	12.00	18,600
			Year 2008 Subtotal	$632,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$771,000

Year 2014 Total: $771,000

Cost Calculations for Pipe: **ND-6**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2050 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	11.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,020.0	CY	13.00	65,300
Backfill	3,060.0	CY	34.00	104,000
Complete Pavement Restoration	1,770.0	SY	86.00	152,000
Overlay Pavement Restoration	3,250.0	SY	28.00	90,900
Trench Safety	47,200.0	SF	0.53	25,000
Spoil Load and Haul	5,020.0	CY	16.00	80,300
Pipe Unit Material Cost	2,050.0	lf	36.00	73,800
Pipe Installation	2,050.0	lf	33.00	67,700
Place Pipe Zone Fill	1,590.0	CY	34.00	54,100
Manholes	5.0	MH	7,390.00	36,900
Existing Utilities	2,050.0	lf	5.00	10,300

Dewatering	2,050.0	lf	24.00	49,200
Traffic Control	2,050.0	lf	12.00	24,600
			Year 2008 Subtotal	$834,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,020,000

Year 2014 Total: $1,020,000

Cost Calculations for Pipe: **ND-7**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2000 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	14.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,520.0	CY	13.00	71,700
Backfill	4,070.0	CY	34.00	138,000
Complete Pavement Restoration	1,550.0	SY	86.00	134,000
Overlay Pavement Restoration	3,340.0	SY	28.00	93,400
Trench Safety	59,700.0	SF	0.53	31,600
Spoil Load and Haul	5,520.0	CY	16.00	88,200
Pipe Unit Material Cost	2,000.0	lf	24.00	48,000
Pipe Installation	2,000.0	lf	29.00	58,000
Place Pipe Zone Fill	1,230.0	CY	34.00	42,000
Manholes	4.0	MH	8,330.00	33,300
Existing Utilities	2,000.0	lf	3.00	6,000

Dewatering	2,000.0	lf	24.00	48,000
Traffic Control	2,000.0	lf	8.00	16,000
			Year 2008 Subtotal	$808,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$985,000

Year 2014 Total: $985,000

Cost Calculations for Project: **ND-8**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Project Year: 2014
Responsible Party:
Comments:

Sub Items

Name	Type	Year	Cost	Multiplier	2014 Cost
ND-8A	Pipe	2014	246,000	1.00	246,000
ND-8B	Pipe	2014	858,000	1.00	858,000
				Year 2008 Subtotal	$1,100,000

Year 2014 Total: $1,100,000

Cost Calculations for Pipe: **ND-8A**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 550 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	1,110.0	CY	13.00	14,400
Backfill	712.0	CY	34.00	24,200
Complete Pavement Restoration	427.0	SY	86.00	36,700
Overlay Pavement Restoration	917.0	SY	28.00	25,700
Trench Safety	12,000.0	SF	0.53	6,360
Spoil Load and Haul	1,110.0	CY	16.00	17,800
Pipe Unit Material Cost	550.0	lf	24.00	13,200
Pipe Installation	550.0	lf	29.00	16,000
Place Pipe Zone Fill	339.0	CY	34.00	11,500
Manholes	2.0	MH	8,330.00	16,700
Existing Utilities	550.0	lf	3.00	1,650

Dewatering	550.0	lf	24.00	13,200
Traffic Control	550.0	lf	8.00	4,400
			Year 2008 Subtotal	$202,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$246,000

Year 2014 Total: $246,000

Cost Calculations for Pipe: **ND-8B**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2200 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,690.0	CY	13.00	47,900
Backfill	2,480.0	CY	34.00	84,200
Complete Pavement Restoration	1,550.0	SY	86.00	133,000
Overlay Pavement Restoration	3,830.0	SY	28.00	107,000
Trench Safety	45,800.0	SF	0.53	24,300
Spoil Load and Haul	3,690.0	CY	16.00	59,000
Pipe Unit Material Cost	2,200.0	lf	17.00	37,400
Pipe Installation	2,200.0	lf	25.00	55,000
Place Pipe Zone Fill	1,080.0	CY	34.00	36,700
Manholes	5.0	MH	8,330.00	41,600
Existing Utilities	2,200.0	lf	3.00	6,600

Dewatering	2,200.0	lf	24.00	52,800
Traffic Control	2,200.0	lf	8.00	17,600
			Year 2008 Subtotal	$704,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$858,000

Year 2014 Total: $858,000

Cost Calculations for Pipe: **ND-9**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 550 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	1,110.0	CY	13.00	14,400
Backfill	712.0	CY	34.00	24,200
Complete Pavement Restoration	427.0	SY	86.00	36,700
Overlay Pavement Restoration	917.0	SY	28.00	25,700
Trench Safety	12,000.0	SF	0.53	6,360
Spoil Load and Haul	1,110.0	CY	16.00	17,800
Pipe Unit Material Cost	550.0	lf	24.00	13,200
Pipe Installation	550.0	lf	29.00	16,000
Place Pipe Zone Fill	339.0	CY	34.00	11,500
Manholes	2.0	MH	8,330.00	16,700
Existing Utilities	550.0	lf	3.00	1,650

Dewatering	550.0	lf	24.00	13,200
Traffic Control	550.0	lf	8.00	4,400
			Year 2008 Subtotal	$202,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$246,000

Year 2014 Total: $246,000

Cost Calculations for Project: **ND-10**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Project Year: 2014
Responsible Party:
Comments:

Sub Items

Name	Type	Year	Cost	Multiplier	2014 Cost
ND-10A	Pipe	2014	915,000	1.00	915,000
ND-10B	Pipe	2014	562,000	1.00	562,000
ND-10C	Pipe	2014	597,000	1.00	597,000
ND-10D	Pipe	2014	489,000	1.00	489,000
				Year 2008 Subtotal	$2,560,000

Year 2014 Total: $2,560,000

Cost Calculations for Pipe: **ND-10A**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2050 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	14.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	4,750.0	CY	13.00	61,800
Backfill	3,630.0	CY	34.00	123,000
Complete Pavement Restoration	1,440.0	SY	86.00	124,000
Overlay Pavement Restoration	3,570.0	SY	28.00	99,900
Trench Safety	59,100.0	SF	0.53	31,300
Spoil Load and Haul	4,750.0	CY	16.00	76,000
Pipe Unit Material Cost	2,050.0	lf	17.00	34,900
Pipe Installation	2,050.0	lf	25.00	51,300
Place Pipe Zone Fill	1,010.0	CY	34.00	34,200
Manholes	5.0	MH	8,330.00	41,600
Existing Utilities	2,050.0	lf	3.00	6,150

Dewatering	2,050.0	lf	24.00	49,200
Traffic Control	2,050.0	lf	8.00	16,400
			Year 2008 Subtotal	$750,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$915,000

Year 2014 Total: $915,000

Cost Calculations for Pipe: **ND-10B**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1450 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	2,430.0	CY	13.00	31,600
Backfill	1,630.0	CY	34.00	55,500
Complete Pavement Restoration	1,020.0	SY	86.00	87,900
Overlay Pavement Restoration	2,520.0	SY	28.00	70,600
Trench Safety	30,200.0	SF	0.53	16,000
Spoil Load and Haul	2,430.0	CY	16.00	38,900
Pipe Unit Material Cost	1,450.0	lf	17.00	24,700
Pipe Installation	1,450.0	lf	25.00	36,300
Place Pipe Zone Fill	712.0	CY	34.00	24,200
Manholes	3.0	MH	8,330.00	25,000
Existing Utilities	1,450.0	lf	3.00	4,350

Dewatering	1,450.0	lf	24.00	34,800
Traffic Control	1,450.0	lf	8.00	11,600
			Year 2008 Subtotal	$461,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$562,000

Year 2014 Total: $562,000

Cost Calculations for Pipe: **ND-10C**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1200 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	14.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,310.0	CY	13.00	43,000
Backfill	2,440.0	CY	34.00	83,000
Complete Pavement Restoration	932.0	SY	86.00	80,200
Overlay Pavement Restoration	2,000.0	SY	28.00	56,000
Trench Safety	35,800.0	SF	0.53	19,000
Spoil Load and Haul	3,310.0	CY	16.00	52,900
Pipe Unit Material Cost	1,200.0	lf	24.00	28,800
Pipe Installation	1,200.0	lf	29.00	34,800
Place Pipe Zone Fill	741.0	CY	34.00	25,200
Manholes	3.0	MH	8,330.00	25,000
Existing Utilities	1,200.0	lf	3.00	3,600

Dewatering	1,200.0	lf	24.00	28,800
Traffic Control	1,200.0	lf	8.00	9,600
			Year 2008 Subtotal	$490,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$597,000

Year 2014 Total: $597,000

Cost Calculations for Pipe: **ND-10D**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1250 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	2,090.0	CY	13.00	27,200
Backfill	1,410.0	CY	34.00	47,800
Complete Pavement Restoration	881.0	SY	86.00	75,700
Overlay Pavement Restoration	2,170.0	SY	28.00	60,900
Trench Safety	26,000.0	SF	0.53	13,800
Spoil Load and Haul	2,090.0	CY	16.00	33,500
Pipe Unit Material Cost	1,250.0	lf	17.00	21,300
Pipe Installation	1,250.0	lf	25.00	31,300
Place Pipe Zone Fill	614.0	CY	34.00	20,900
Manholes	3.0	MH	8,330.00	25,000
Existing Utilities	1,250.0	lf	3.00	3,750

Dewatering	1,250.0	lf	24.00	30,000
Traffic Control	1,250.0	lf	8.00	10,000
			Year 2008 Subtotal	$401,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$489,000

Year 2014 Total: $489,000

Cost Calculations for Pipe: **ND-11**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1500 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	11.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,670.0	CY	13.00	47,800
Backfill	2,240.0	CY	34.00	76,000
Complete Pavement Restoration	1,290.0	SY	86.00	111,000
Overlay Pavement Restoration	2,380.0	SY	28.00	66,500
Trench Safety	34,500.0	SF	0.53	18,300
Spoil Load and Haul	3,670.0	CY	16.00	58,800
Pipe Unit Material Cost	1,500.0	lf	36.00	54,000
Pipe Installation	1,500.0	lf	33.00	49,500
Place Pipe Zone Fill	1,160.0	CY	34.00	39,600
Manholes	3.0	MH	7,390.00	22,200
Existing Utilities	1,500.0	lf	5.00	7,500

Dewatering	1,500.0	lf	24.00	36,000
Traffic Control	1,500.0	lf	12.00	18,000
			Year 2008 Subtotal	$605,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$738,000

Year 2014 Total: $738,000

Cost Calculations for Pipe: **ND-12**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 4000 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	8,070.0	CY	13.00	105,000
Backfill	5,180.0	CY	34.00	176,000
Complete Pavement Restoration	3,110.0	SY	86.00	267,000
Overlay Pavement Restoration	6,670.0	SY	28.00	187,000
Trench Safety	87,300.0	SF	0.53	46,300
Spoil Load and Haul	8,070.0	CY	16.00	129,000
Pipe Unit Material Cost	4,000.0	lf	24.00	96,000
Pipe Installation	4,000.0	lf	29.00	116,000
Place Pipe Zone Fill	2,470.0	CY	34.00	83,900
Manholes	8.0	MH	8,330.00	66,600
Existing Utilities	4,000.0	lf	3.00	12,000

Dewatering	4,000.0	lf	24.00	96,000
Traffic Control	4,000.0	lf	8.00	32,000
			Year 2008 Subtotal	$1,410,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,720,000

Year 2014 Total: $1,720,000

Cost Calculations for Pipe: **ND-13**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1900 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 15 in.

Geometry

Outer Diameter	1.67 ft
Trench Width	4.67 ft
Excavation Depth	10.7 ft
Complete Surface Rest. Width	6.67 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	3,500.0	CY	13.00	45,500
Backfill	2,300.0	CY	34.00	78,200
Complete Pavement Restoration	1,410.0	SY	86.00	121,000
Overlay Pavement Restoration	3,240.0	SY	28.00	90,600
Trench Safety	40,500.0	SF	0.53	21,500
Spoil Load and Haul	3,500.0	CY	16.00	56,000
Pipe Unit Material Cost	1,900.0	lf	20.00	38,000
Pipe Installation	1,900.0	lf	27.00	51,300
Place Pipe Zone Fill	1,050.0	CY	34.00	35,700
Manholes	4.0	MH	8,330.00	33,300
Existing Utilities	1,900.0	lf	3.00	5,700

Dewatering	1,900.0	lf	24.00	45,600
Traffic Control	1,900.0	lf	8.00	15,200
			Year 2008 Subtotal	$638,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$778,000

Year 2014 Total: $778,000

Cost Calculations for Pipe: **ND-14**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2550 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	4,270.0	CY	13.00	55,500
Backfill	2,870.0	CY	34.00	97,600
Complete Pavement Restoration	1,800.0	SY	86.00	155,000
Overlay Pavement Restoration	4,440.0	SY	28.00	124,000
Trench Safety	53,100.0	SF	0.53	28,200
Spoil Load and Haul	4,270.0	CY	16.00	68,300
Pipe Unit Material Cost	2,550.0	lf	17.00	43,400
Pipe Installation	2,550.0	lf	25.00	63,800
Place Pipe Zone Fill	1,250.0	CY	34.00	42,600
Manholes	6.0	MH	8,330.00	50,000
Existing Utilities	2,550.0	lf	3.00	7,650

Dewatering	2,550.0	lf	24.00	61,200
Traffic Control	2,550.0	lf	8.00	20,400
			Year 2008 Subtotal	$817,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$997,000

Year 2014 Total: $997,000

Cost Calculations for Pipe: **ND-15**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 500 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Complex
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 48 in.

Geometry

Outer Diameter	4.83 ft
Trench Width	8.78 ft
Excavation Depth	13.8 ft
Complete Surface Rest. Width	10.8 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	2,250.0	CY	13.00	29,300
Backfill	1,140.0	CY	34.00	38,700
Complete Pavement Restoration	599.0	SY	86.00	51,500
Overlay Pavement Restoration	623.0	SY	28.00	17,400
Trench Safety	13,800.0	SF	0.53	7,330
Spoil Load and Haul	2,250.0	CY	16.00	36,000
Pipe Unit Material Cost	500.0	lf	123.00	61,500
Pipe Installation	500.0	lf	60.00	30,000
Place Pipe Zone Fill	772.0	CY	34.00	26,200
Manholes	1.0	MH	12,600.00	12,600
Existing Utilities	500.0	lf	166.00	83,000

Dewatering	500.0	lf	35.00	17,500
Traffic Control	500.0	lf	18.00	9,000
			Year 2008 Subtotal	$420,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$512,000

Year 2014 Total: $512,000

Cost Calculations for Project: **NG-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Project Year: 2014
Responsible Party:
Comments:

Sub Items

Name	Type	Year	Cost	Multiplier	2014 Cost
NG-1A	Pipe	2014	984,000	1.00	984,000
NG-1B	Pipe	2014	1,410,000	1.00	1,410,000
			Year 2008 Subtotal		$2,390,000

Year 2014 Total: $2,390,000

Cost Calculations for Pipe: **NG-1A**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2000 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	11.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	4,900.0	CY	13.00	63,700
Backfill	2,980.0	CY	34.00	101,000
Complete Pavement Restoration	1,720.0	SY	86.00	148,000
Overlay Pavement Restoration	3,170.0	SY	28.00	88,700
Trench Safety	46,000.0	SF	0.53	24,400
Spoil Load and Haul	4,900.0	CY	16.00	78,400
Pipe Unit Material Cost	2,000.0	lf	36.00	72,000
Pipe Installation	2,000.0	lf	33.00	66,000
Place Pipe Zone Fill	1,550.0	CY	34.00	52,800
Manholes	4.0	MH	7,390.00	29,500
Existing Utilities	2,000.0	lf	5.00	10,000

Dewatering	2,000.0	lf	24.00	48,000
Traffic Control	2,000.0	lf	12.00	24,000
			Year 2008 Subtotal	$807,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$984,000

Year 2014 Total: $984,000

Cost Calculations for Pipe: **NG-1B**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1950 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 42 in.

Geometry

Outer Diameter	4.25 ft
Trench Width	8.03 ft
Excavation Depth	13.3 ft
Complete Surface Rest. Width	10 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	7,680.0	CY	13.00	99,800
Backfill	4,060.0	CY	34.00	138,000
Complete Pavement Restoration	2,170.0	SY	86.00	187,000
Overlay Pavement Restoration	2,590.0	SY	28.00	72,600
Trench Safety	51,700.0	SF	0.53	27,400
Spoil Load and Haul	7,680.0	CY	16.00	123,000
Pipe Unit Material Cost	1,950.0	lf	86.00	168,000
Pipe Installation	1,950.0	lf	52.00	101,000
Place Pipe Zone Fill	2,600.0	CY	34.00	88,300
Manholes	4.0	MH	9,720.00	38,900
Existing Utilities	1,950.0	lf	11.00	21,500

Dewatering	1,950.0	lf	35.00	68,300
Traffic Control	1,950.0	lf	12.00	23,400
			Year 2008 Subtotal	$1,160,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,410,000

Year 2014 Total: $1,410,000

Cost Calculations for Project: **NG-2**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Project Year: 2014
Responsible Party:
Comments:

Sub Items

Name	Type	Year	Cost	Multiplier	2014 Cost
NG-2A	Pipe	2014	1,960,000	1.00	1,960,000
NG-2B	Pipe	2014	133,000	1.00	133,000
			Year 2008 Subtotal		$2,100,000

Year 2014 Total: $2,100,000

Cost Calculations for Pipe: **NG-2A**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 5050 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	10.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	8,460.0	CY	13.00	110,000
Backfill	5,680.0	CY	34.00	193,000
Complete Pavement Restoration	3,560.0	SY	86.00	306,000
Overlay Pavement Restoration	8,790.0	SY	28.00	246,000
Trench Safety	105,000.0	SF	0.53	55,800
Spoil Load and Haul	8,460.0	CY	16.00	135,000
Pipe Unit Material Cost	5,050.0	lf	17.00	85,900
Pipe Installation	5,050.0	lf	25.00	126,000
Place Pipe Zone Fill	2,480.0	CY	34.00	84,300
Manholes	11.0	MH	8,330.00	91,600
Existing Utilities	5,050.0	lf	3.00	15,200

Dewatering	5,050.0	lf	24.00	121,000
Traffic Control	5,050.0	lf	8.00	40,400
			Year 2008 Subtotal	$1,610,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,960,000

Year 2014 Total: $1,960,000

Cost Calculations for Pipe: **NG-2B**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 300 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	10.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	605.0	CY	13.00	7,870
Backfill	388.0	CY	34.00	13,200
Complete Pavement Restoration	233.0	SY	86.00	20,000
Overlay Pavement Restoration	500.0	SY	28.00	14,000
Trench Safety	6,550.0	SF	0.53	3,470
Spoil Load and Haul	605.0	CY	16.00	9,690
Pipe Unit Material Cost	300.0	lf	24.00	7,200
Pipe Installation	300.0	lf	29.00	8,700
Place Pipe Zone Fill	185.0	CY	34.00	6,300
Manholes	1.0	MH	8,330.00	8,330
Existing Utilities	300.0	lf	3.00	900

Dewatering	300.0	lf	24.00	7,200
Traffic Control	300.0	lf	8.00	2,400
			Year 2008 Subtotal	$109,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$133,000

Year 2014 Total: $133,000

Cost Calculations for Pipe: **NG-3**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 2500 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 12 in.

Geometry

Outer Diameter	1.42 ft
Trench Width	4.34 ft
Excavation Depth	14.4 ft
Complete Surface Rest. Width	6.34 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,800.0	CY	13.00	75,300
Backfill	4,420.0	CY	34.00	150,000
Complete Pavement Restoration	1,760.0	SY	86.00	151,000
Overlay Pavement Restoration	4,350.0	SY	28.00	122,000
Trench Safety	72,100.0	SF	0.53	38,200
Spoil Load and Haul	5,800.0	CY	16.00	92,700
Pipe Unit Material Cost	2,500.0	lf	17.00	42,500
Pipe Installation	2,500.0	lf	25.00	62,500
Place Pipe Zone Fill	1,230.0	CY	34.00	41,700
Manholes	5.0	MH	8,330.00	41,600
Existing Utilities	2,500.0	lf	3.00	7,500

Dewatering	2,500.0	lf	24.00	60,000
Traffic Control	2,500.0	lf	8.00	20,000
			Year 2008 Subtotal	$906,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$1,100,000

Year 2014 Total: $1,100,000

Cost Calculations for Pipe: **NG-4**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1600 ft
Conduit Type: Gravity
Depth of Cover: 12 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 24 in.

Geometry

Outer Diameter	2.5 ft
Trench Width	5.75 ft
Excavation Depth	15.5 ft
Complete Surface Rest. Width	7.75 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,280.0	CY	13.00	68,700
Backfill	3,750.0	CY	34.00	127,000
Complete Pavement Restoration	1,380.0	SY	86.00	118,000
Overlay Pavement Restoration	2,530.0	SY	28.00	70,900
Trench Safety	49,600.0	SF	0.53	26,300
Spoil Load and Haul	5,280.0	CY	16.00	84,500
Pipe Unit Material Cost	1,600.0	lf	36.00	57,600
Pipe Installation	1,600.0	lf	33.00	52,800
Place Pipe Zone Fill	1,240.0	CY	34.00	42,200
Manholes	4.0	MH	7,390.00	29,500
Existing Utilities	1,600.0	lf	5.00	8,000

Dewatering	1,600.0	lf	24.00	38,400
Traffic Control	1,600.0	lf	12.00	19,200
			Year 2008 Subtotal	$744,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$907,000

Year 2014 Total: $907,000

Cost Calculations for Pipe: **NG-5**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 500 ft
Conduit Type: Gravity
Depth of Cover: 8 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Complex
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 60 in.

Geometry

Outer Diameter	6.13 ft
Trench Width	10.5 ft
Excavation Depth	15.1 ft
Complete Surface Rest. Width	12.5 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	2,930.0	CY	13.00	38,100
Backfill	1,360.0	CY	34.00	46,100
Complete Pavement Restoration	692.0	SY	86.00	59,500
Overlay Pavement Restoration	530.0	SY	28.00	14,800
Trench Safety	15,100.0	SF	0.53	8,020
Spoil Load and Haul	2,930.0	CY	16.00	46,900
Pipe Unit Material Cost	500.0	lf	220.00	110,000
Pipe Installation	500.0	lf	81.00	40,500
Place Pipe Zone Fill	1,030.0	CY	34.00	35,000
Manholes	1.0	MH	15,400.00	15,400
Existing Utilities	500.0	lf	265.00	133,000

Dewatering	500.0	lf	35.00	17,500
Traffic Control	500.0	lf	18.00	9,000
			Year 2008 Subtotal	$573,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$699,000

Year 2014 Total: $699,000

Cost Calculations for Pipe: **TQ-1**

Printed date : 10/29/2014

Project year: 2014

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2014
Length: 1350 ft
Conduit Type: Gravity
Depth of Cover: 18 ft
Trench Backfill Type: Imported
Disposal Type: No Disposal Cost
Manhole Spacing: Average (500 ft)
Existing Utilities: Average
Dewatering: Minimal
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Land Adjustment Factor: King County Average
Trench Safety: Standard
Pipe Diameter: 18 in.

Geometry

Outer Diameter	1.92 ft
Trench Width	4.99 ft
Excavation Depth	20.9 ft
Complete Surface Rest. Width	6.99 ft

Unit Costs (Basis 2008)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	5,220.0	CY	13.00	67,900
Backfill	4,240.0	CY	34.00	144,000
Complete Pavement Restoration	1,050.0	SY	86.00	90,200
Overlay Pavement Restoration	2,250.0	SY	28.00	63,000
Trench Safety	56,500.0	SF	0.53	29,900
Spoil Load and Haul	5,220.0	CY	16.00	83,500
Pipe Unit Material Cost	1,350.0	lf	24.00	32,400
Pipe Installation	1,350.0	lf	29.00	39,200
Place Pipe Zone Fill	833.0	CY	34.00	28,300
Manholes	3.0	MH	10,100.00	30,400
Existing Utilities	1,350.0	lf	3.00	4,050

Dewatering	1,350.0	lf	24.00	32,400
Traffic Control	1,350.0	lf	8.00	10,800
			Year 2008 Subtotal	$656,000

Mobilization/Demobilization at 6%	1.06
Multiplier from ENRCCI 8815 (2008) to 10140 (2014)	1.15
Effective Multiplier	1.22
Construction Year 2014 Subtotal	$800,000

Year 2014 Total: $800,000

Appendix N

Stormwater Policy Technical Memorandum

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Everett Sewer Comprehensive Plan Memorandum

To:	Souheil, Nasr, Heather Griffin, City of Everett Public Works	**Date:**	June 12, 2013
From:	Robin Kirschbaum, HDR	**Project:**	Everett Comprehensive Sewer Plan
cc:	Jim Peterson, HDR	**Proj. No:**	HDR: 157248 City: CON0061212
Subject:	City of Everett's Combined Sewer System Associated Stormwater Policy Issues		

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1.0 Introduction

This memorandum provides recommendations on stormwater policies and programs to help comprehensively manage stormwater runoff in specific portions of the City of Everett's combined sewer area to reduce sewer backups and help meet Combined Sewer Overflow regulatory requirements.

The remainder of this section provides additional background information, including a summary of the history of backups in the north end of the City and discussion of the proposed level of service goals. The objectives for managing stormwater runoff in the combined areas are also discussed.

1.1 Background

The City of Everett (City) is preparing its 2013 Comprehensive Sewer Plan (CSP) Update of the 2006 Sewer Plan. The previous CSP was prepared in 2006 and provided guidance on needed infrastructure improvements to the City's existing sewer facilities.

Construction of the sewer system in the current north end of the City began in 1897. This portion of the system is a combined system, conveying both sanitary sewage and stormwater runoff to the Everett Water Pollution Control Facility (WPCF; treatment plant). During higher intensity storms that exceed the combined sewer system conveyance capacity, combined sewage is discharged to the treatment plant, and as needed a portion to receiving waters via permitted combined sewer overflow (CSO) outfalls (Figure 1). All CSO outfalls are not currently in regulatory compliance (one overflow per year per outfall) and are required to be in compliance by the end of 2017.

These higher intensity storms have caused localized flooding and surcharging in the combined sewer system that have resulted in some basement or street flooding. Managing stormwater flows to the combined sewer system can reduce localized flooding and surcharging and thereby reduce potential damage to private properties, health hazards, interruption of business, and the need for costly City utility capital and maintenance projects. Managing stormwater flows to the combined sewer system will also help meet the City's CSO regulatory requirements.

1.1.1 History of Backups

The north end of Everett has a combined sewer collection system that has experienced a history of sewer backups in various areas during heavy rain storms. Some locations have been impacted repeatedly - in particular the neighborhoods within a few blocks southeast and southwest of Providence Regional Medical Center, Everett (PRMCE). In most cases the sewer backups caused flooding in basements of homes not equipped with sewer backflow preventers. However, in some instances, basement flooding was attributable to or otherwise made worse by incorrect connection of roof drains to the side sewer. Some storms also generated excessive surface runoff that contributed to basement flooding problems and property damage.

The following is a brief summary of notable storm events that caused flooding and sewer backups:

- June 1989 - 48 complaints, 0.7 inches per hour
- September 1996 - 44 complaints
- June 1997 - 11 complaints
- October 2008 - 26 claims, 0.60 inches per hour
- June 2010 - 71 claims, 0.84 inches in 19 minutes (2.65 inches per hour, 400 yr. event)

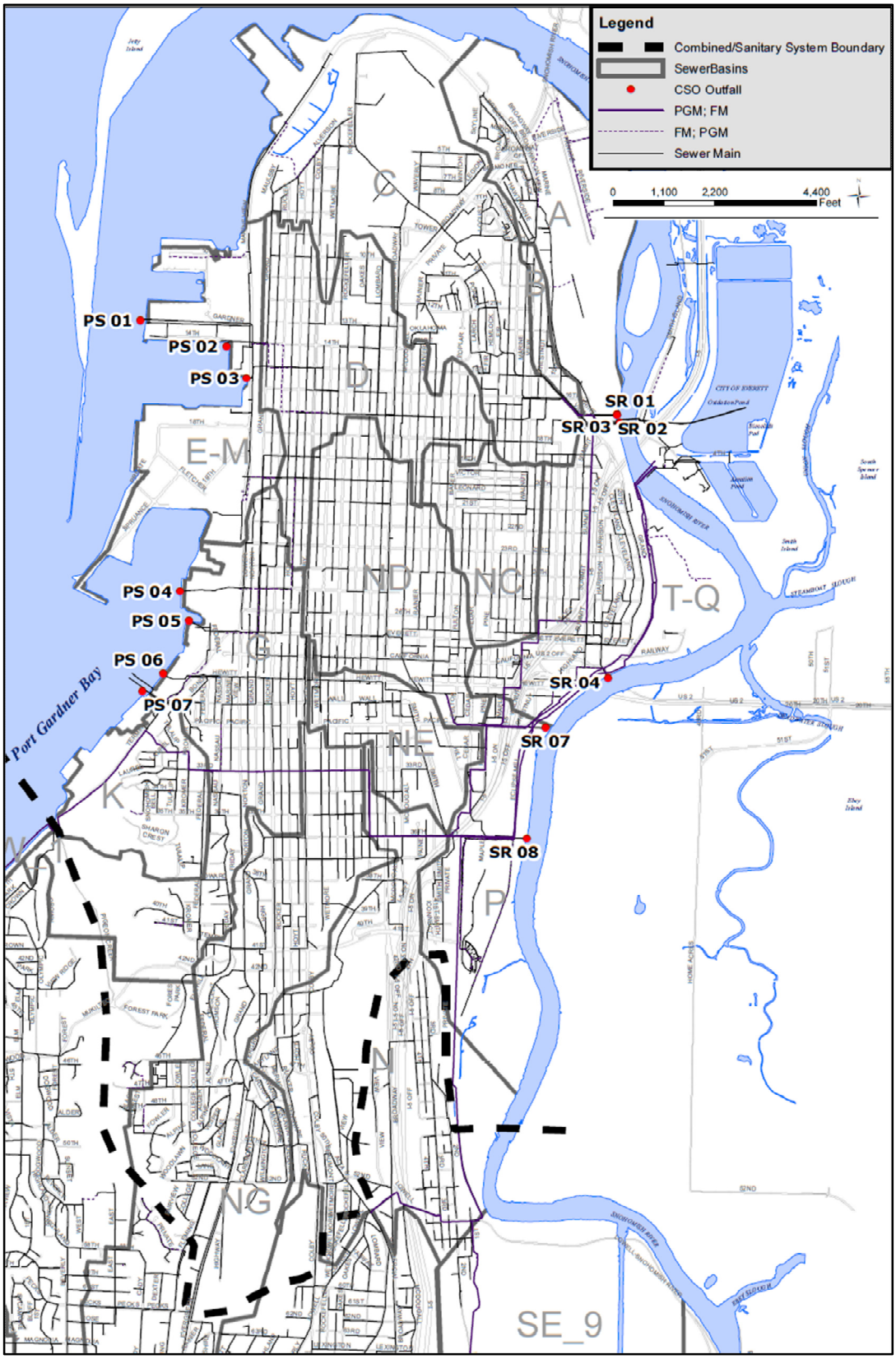

Figure 1. Combined Sewer Basins and Outfalls

Due to this history of chronic sewer backups and surface flooding problems, policies to comprehensively manage storm water runoff in specific areas of north Everett will be essential in helping to curtail or eliminate basement flooding problems.

1.1.2 Proposed Level of Service Goals

The Department has a level of service (LOS) goal for new separated and combined sewer facilities is to convey sewer pipe flows that occur with recurrence intervals of up to 25 years with no surcharging in the sewer pipes. The Department realizes that achieving this goal in some of the combined sewer areas will take time and may require a combination of alternative measures. In some areas it is expected that surcharging of some pipes will be allowed as long as they do not result in LOS failures (HDR 2011).

1.2 Goals and Guiding Principles for Managing Stormwater Runoff in Combined Areas

The primary goals for managing stormwater runoff in the combined sewer area are to:

- Reduce the amount of stormwater runoff entering the combined sewer system
- Reduce property damage
- Meet combined sewer system regulatory requirements
- Meet combined sewer system LOS goals
- Provide environmental and social benefits through system management and stormwater treatment

In addition to these primary goals, the City has established a guiding principle of “not backsliding” in regards to pollutant loadings to receiving waters as a result of separating or partially separating stormwater runoff from the combined system.

2.0 Existing Combined Sewer Regulatory Requirements

The primary regulatory requirement for combined sewer areas is the Washington State Department of Ecology (Ecology) requirement to limit combined sewer overflows (CSOs) to no more than an average of one overflow per year per National Pollutant Discharge Elimination System (NPDES) permitted outfall – based on a five-year rolling average. Dry weather overflows are not permitted. Ecology also requires that basement backups caused from blockages in sewer mains or surcharge from sewer mains be reported as sanitary sewer overflows.

3.0 Existing Stormwater Codes and Policies

3.1 Municipal Code

Section 14.28 of the Everett Municipal Code (EMC) establishes surface and storm drainage requirements for the purpose of guiding development to protect water resources, maintain surface and groundwater quality, protect private property, and provide for public safety and transportation. By Code, these requirements apply to separated storm sewer areas only, not to combined sewer areas.

3.2 Interim Public Works Policy #2-11

On August 17, 2011, the Public Works Director (Director) signed an Interim Policy for Stormwater Control in the Combined Sewer Area. The policy applies to all new development and redevelopment that creates and/or redevelops a total of 2,000 square feet or more of impervious area, as follows:

1. Stormwater in the combined sewer area shall be controlled according to the requirements in the City's 2010 Stormwater Management Manual, with the exception of Minimum Requirement #6 – Runoff Treatment and in Minimum Requirement #7 – Flow Control, the term "a forested land cover" shall be replaced by "the existing site conditions," provided that the resulting stormwater flow shall not increase Combined Sewer Overflows (CSOs) and/or basement flooding in the combined sewer area.
2. The cost of stormwater controls that are required in addition to requirements of the Stormwater Management Manual will be credited against the project's sewer connection charge (EMC 14.08.135).
3. No connections of roof drains to side sewers or laterals shall be allowed without prior approval of the Director.

This policy applies to all applications submitted after the effective date and remains in effect until terminated by the Director, or superseded by code adoption.

4.0 Stormwater Requirements in Future Separated Areas

In areas where stormwater runoff is separated from the combined sewer system, the City will need to comply with both the Municipal Stormwater NPDES MS4 Phase II permit (Phase II permit) and the Water Pollution Control Facility Permit (Ecology 2012). Separation projects are considered by Ecology to be underground utility projects and are therefore not required to include flow control or water quality treatment. Underground utility projects that replace the ground surface with in-kind materials with similar runoff characteristics are only subject to Minimum Requirement #2 – Construction Stormwater Pollution Prevention (EMC 14.28.050(E)).

While separation projects are not required by City Code or by the Phase II permit to provide flow control or treatment, treatment may be required to be eligible for Ecology grant funding for some projects. Further, the Phase II permit requirements for new/redevelopment, Illicit Discharge Detection and Elimination, and stormwater monitoring will apply to the newly separated areas. If the separated stormwater is discharged via an existing combined sewer outfall, future water quality treatment may be necessary for these discharges to meet future permit requirements (e.g., 2018 permit update, or later).

With respect to the new/redevelopment requirements, the new Phase II permit requires in 2016 that Low Impact Development (LID), flow control, and treatment be implemented for projects that exceed certain thresholds for new and replaced hard surfaces. Hard surfaces are defined in the Phase II permit to include impervious surfaces, permeable pavements, and vegetated roofs. In partially separated basins, LID and flow control may help improve levels of service and meet CSO regulatory requirements, as more and more projects install facilities on private properties to infiltrate, disperse, retain, and detain stormwater runoff on-site.

5.0 Recommendations for Managing Stormwater in Combined Areas

This section presents recommendations for stormwater policies, programs, and Green Stormwater Infrastructure (GSI) projects to manage stormwater runoff in combined areas.

5.1 Policies

Existing Interim Policy #2-11 is expected to reduce stormwater discharges to the combined sewer system and aid in lessening future combined flows throughout the entire combined area. Thus, this interim policy is beneficial to keep in place. The combined area consists of Basins A, B, C, D, E-M, G, K, N, NC, ND, NE, NG, P and T-Q as shown in Figure 1.

Basins C, D, ND, NC, G, and T-Q have been identified as being affected by either sewer system backups or are basins that detrimentally impact CSO compliance. HDR recommends that the City continue to enforce Interim Policy #2-11 in these basins. The City should consider identifying the remaining basins (A, B, E-M, K, N, NE, NG and P), as being subject to basin-specific capital facilities fees.

Funds collected from these fees should be used to finance design, land acquisition, and construction of capital facilities recommended in the combined area in the CSP update. By paying these fees, developers in these basins will avoid the cost and land impacts of stormwater management facilities that would be required to be constructed by the developer to comply with the interim policy.

After the capital facilities are constructed and CSO regulatory requirements and levels of service are achieved, the City should re-evaluate, adjust, or terminate this fee, as appropriate.

5.2 Stormwater Programs

This section presents a review of other existing stormwater programs locally and nationally, and presents recommendations for a stormwater incentives program for the City's combined areas.

5.2.1 Review of Other Programs

Several types of customer incentive programs are currently offered by municipalities, such as (PSP 2011):

- Reduced utility rates and/or application fees
- Expedited project review and approval
- Density bonuses
- Setback reductions
- Property tax reductions
- Reduced flow control and/or water quality treatment facility sizes

The United States Environmental Protection Agency published a description of municipal incentive mechanisms in their Managing Wet Weather with Green Infrastructure Municipal Handbook (2009). The handbook provides guidance on how to implement various types of incentive programs, such as fee discount, development incentives, grants, rebates and installation financing, and awards and recognition programs to incentivize LID for managing wet weather flows. The handbook also provides several case examples from around the country.

Seattle Public Utilities (SPU) and Portland Bureau of Environmental Services (Portland BES) have implemented several incentive programs that provide local examples for the City to consider. SPU's RainWise Residential program and Stormwater Facilities Credit program and Portland BES' Ecoroof Incentive and downspout disconnection programs are discussed briefly below.

SPU RainWise Residential Program

SPU's RainWise Residential program is an incentive program for single family residential customers. The program currently offers rebates for residents in the Ballard neighborhood in northwest Seattle to install and maintain rain gardens or cisterns on their private properties. Qualifying properties may be eligible to receive a rebate of up to $3.50 per square foot of stormwater runoff managed on-site using a rain garden or cistern (SPU 2012a). SPU is currently exploring opportunities to expand RainWise to other neighborhoods as part of its Long-Term CSO Control Plan. King County is also exploring opportunities to collaborate with SPU to extend RainWise to other priority basins in the County and include additional types of incentives, such as incentives for commercial property owners to construct green roofs, cisterns, and permeable pavement (King County 2011).

While SPU's current program offers rebates for both rain gardens and cisterns, approximately 80 percent of participants choose rain gardens. The average rain garden is designed to control stormwater runoff from approximately 1,100 square feet of impervious area. With a rebate of $3.50 per square foot multiplied by an average of approximately 1,100 square feet, the average rain garden incentive cost equates to approximately $3,850.

SPU uses two methods to monitor program success. The first method involves tracking how much area is being controlled and calculating a control volume based on the estimated amount of controlled area. From conversations with Bob Spencer, SPU's RainWise Program Manager, SPU currently estimates that they are controlling approximately one million gallons of stormwater runoff per year. The second method involves monitoring flows in combined sewer pipes. Currently, the monitoring data do not show any effects as a result of the program (SPU 2012b).

SPU's Stormwater Facilities Credit Program

SPU's Stormwater Facilities Credit Program offers customers a reduction of up to 50 percent on their annual drainage bills for construction and maintenance of approved on-site stormwater BMPs. LID BMPs, such as rain gardens, permeable pavement, and green roofs, are encouraged, but conventional detention and water quality treatment facilities may also qualify for credit. The amount of credit provided depends on the type of basin in which the customer is located (e.g., separated, combined, or creek basin), their billing rate tier, the amount of impervious area managed on-site, the types of facilities constructed, and degree of long-term maintenance.

Portland BES Ecoroof Incentives Program

Portland BES offers the Ecoroof Incentive program to property owners and developers as part of the City's Grey to Green Initiative. The incentive funds up to $5 per square foot of an Ecoroof project, which could cover all or a significant portion of the total construction cost of an Ecoroof in Portland. Program requirements include (Portland BES 2011):

- Project is within city limits
- Project manages stormwater runoff
- Construction will start within two years of being approved
- Project is feasible and buildable
- Projects that receive the Floor Area Ratio (FAR; total square feet of a building divided by the total square feet of the lot the building is located on)
- Project cannot be complete before the incentive application deadline

Portland BES Downspout Disconnection Program

Portland BES' Downspout Disconnection Program has disconnected over 56,000 downspouts between 1993 and 2011. They estimate that the disconnections remove over 1.2 billion gallons of stormwater from the combined sewer system each year. BES used to offer residents who disconnect downspouts themselves $53 for each downspout disconnected, or free help disconnecting downspouts in targeted neighborhoods. However, direct incentives to disconnect downspouts are no longer offered because the program goals have been successfully met (Portland BES 2012).

5.2.2 Incentive Program Recommendations

HDR recommends that the City consider a residential incentives program to encourage private property owners to install stormwater management facilities that treat, detain, and/or retain stormwater runoff on-site. These on-site stormwater management facilities, or Best Management Practices (BMPs), can reduce the peak flow rates, volume, and pollutant loading of stormwater runoff from private properties tributary to the City's combined sewer system, thereby helping to meet combined sewer LOS goals and regulatory requirements. The incentives program can further help increase environmental stewardship among residents and help alleviate drainage issues on private properties, which are primary goals for managing stormwater runoff in the combined areas (Section 1.2). If implemented in portions of the combined sewer area where future separation is planned, the incentives program can also help reduce peak flow rates, volume, and pollutant loading to the new separated storm sewers and downstream receiving waters.

Recommended BMPs include downspout disconnection, rain barrels, and rain gardens. Downspout disconnection entails diverting roof downspouts from the combined sewer system and rerouting them to an approved discharge location. An approved discharge location may consist of a splash pad or on-site vegetated area if technically feasible. Disconnected downspouts may also discharge to a rain barrel or rain garden. Rain barrels are small (e.g., typically 55 gallons) storage systems that collect stormwater runoff from roof surfaces and provide water for reuse (e.g., irrigation, washing cars, etc.). Rain barrels can also help convey stormwater runoff away from building foundations by connecting low flow and overflow drains to a garden hose and conveying the stored water to a suitable discharge location. Rain gardens are depressed landscaped facilities that treat stormwater runoff and reduce peak flow rates and volumes of stormwater runoff through storage, filtration, and infiltration.

In line with the City's primary goals of helping to meet combined sewer LOS goals and regulatory requirements (Section 1.2), we recommend that the program initially prioritize sub-basins for which future separation is not planned. We understand that future separation is not planned for basins A, B, C, E-M, G, K, N, ND, NE, NG, and P (Figure 1). Further prioritization in these basins should focus on neighborhoods for which public acceptance and participation is expected to be highest, based on public outreach, surveys, and other information to be gathered by the City. Qualifying properties should be required to confirm side sewer connections to the public sewer system.

Incentives program budgets typically consider costs for paying rebates, as well as administrative and soft costs, such as salary for construction inspectors, rebate processing, program management, public outreach, and creating materials and demonstrations. Table 1 provides a summary of possible program costs in the first year of implementation based on assumed participation and rebate amounts to be offered by the City.

Table 1. Example first year program costs based on assumed participation and rebate amounts to be offered by the City

BMP	Installations in Year 1 (#)	City-Offered Rebate Per BMP ($)	Impervious Area Managed Per BMP (Square Feet)	Cost of Rebates in Year 1 ($)
Rain Gardens	36 (3 per month)	$2.50 per square foot of impervious surface controlled	800	$72,000
Downspout Disconnection	400	$50 per downspout disconnect	N/A	$20,000
Rain Barrels	200	$50 per rain barrel	N/A	$10,000
			Rebates Subtotal (Year 1)	$102,000
			Soft Costs (Year 1)	$100,000
			Total Costs (Year 1)	**$202,000**

Notes: BMP – Best Management Practice; NA – Not Applicable

To estimate the volume of stormwater runoff diverted from the combined sewer system as a result of implementing the above hypothetical program example for Year 1, the following assumptions were made:

- Average annual rainfall is 38 inches per year
- Average annual roof runoff is 37.24 inches per year (approximated as 98% of average annual rainfall)
- The rain garden sizing objective is to infiltrate 91% of the average annual tributary roof runoff
- An assumed 25% of the infiltrated stormwater runoff may reenter the combined sewer system through cracked side sewers or other points of entry
- Total roof area tributary to the rain gardens is 28,800 square feet (800 square feet/rain garden x 36 rain gardens)
- Downspout disconnections and rain barrels discharge to the rain gardens

Based on these assumptions, approximately 460,000 gallons of stormwater runoff may be expected to be removed from the combined sewer system in Year 1. This was estimated as follows:

> 28,800 square feet of roof area x 37.24 inches of runoff per year x 91% infiltrated x (100%-25%) removed from system x 7.48 cubic feet per gallon / 12 inches per foot = 456,273 gallons (rounded to 460,000 gallons)

The actual annual program cost would depend on the rebate amount offered for each BMP, the scale of the program (i.e., the number of participating properties), and the City's actual administrative and soft costs for this type of program. The scale of the program should be determined based on public willingness to participate, technical feasibility, and available program budget.

The expected benefits of the program similarly depend significantly on how the program is implemented (e.g., sizing of facilities, which basins are prioritized, number of participating properties, whether downspout disconnections are credited for flow control with no downstream rain garden or rain barrel in combined basins, etc.).

5.3 Green Stormwater Infrastructure Projects

This Stormwater Policies Memorandum provides recommendations on the types of GSI projects that should be considered – along with the sewer basins in which these projects could be implemented. Specific locations and proposed types of GSI projects within the selected basins will be discussed with City engineering and operations staff and then further defined in the CSP Capital Improvement Plan.

The City is currently planning to use "grey infrastructure" improvements, including control structure modifications and conveyance improvements, as the primary method for meeting the LOS goals and regulatory requirements. GSI projects are recommended in combination with these grey infrastructure projects to provide additional factor of safety on system performance, help comply with the City's guiding principal to not backslide with respect to pollutant loadings to receiving waters (Section 1.2), and provide opportunities to demonstrate GSI to the community and monitor its effectiveness. As post-construction monitoring data become available for GSI projects, results of the monitoring may be used to reduce or eliminate grey improvements that are scheduled for later construction.

The City is currently planning stormwater separation in Basin NC (Figure 1). The streets and sewer pipes in this basin are generally in poor condition. HWA (2012) mapped the majority of this basin as being potentially suitable for shallow infiltration (e.g., within 15 feet of the surface). The northern tip of this basin is mapped as having a high potential suitability for shallow subsurface infiltration.

As discussed above in this section, specific locations and types of GSI projects to be recommended for this basin will be discussed with City staff. Planning-level concepts, cost estimates, and benefits evaluation will be provided in the CSP document update and the CSP Capital Improvement Plan.

6.0 References

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Appendix O

Inflow and Infiltration Technical Memorandums

- Inflow and Infiltration Memorandum (HDR, 2012)
- Infiltration-Inflow Report (Corollo, 2008)

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Everett Sewer Comprehensive Plan
Inflow and Infiltration Memorandum

To:	Souheil Nasr, P.E.	**Date:**	July 12, 2012
From:	Eric Bergstrom, P.E.	**Project:**	Everett Comprehensive Sewer Plan
cc:	Jim Peterson, P.E.	**Proj. No:**	HDR: 157248 City: CON0061212
Subject:	Task 400 – Inflow and Infiltration (I/I) Data Evaluation		

Introduction

As part of the 2012 Comprehensive Sewer Plan Update, the City of Everett requested an analysis of the inflow and infiltration (I/I) in the separated sanitary sewer collection system.

Excess water that enters sanitary sewer pipes from groundwater and stormwater is called infiltration and inflow, or I/I. Infiltration is groundwater that seeps into sewer pipes through holes, cracks, joint failures, foundation drains, and faulty connections. Infiltration patterns can sometimes be identified by flow monitoring because the in-pipe flow response typically tends to lag behind the storm event. Infiltration is often distributed throughout the basin from a number of small sources that are difficult to locate and identify. Identification of specific infiltration sources can be made by observation using a CCTV camera, but it is often impractical to mobilize and perform these observations during with wet weather events when the infiltration rate is the highest. If a large discrete source of infiltration is identified, the area should be repaired because, if left uncorrected, it could lead to the loss of sewer pipe trench material – leading to a potential sewer collapse or washout. Repair of a large discrete infiltration source also serves to reduce the peak wet weather flow in the conveyance system and to the treatment plant.

Inflow is stormwater that enters sewers through direct connections such as roof drains, patio drains, street catch basins, and manhole covers. In a separated sewer system these are typically illicit connections. Basins with suspected inflow may be identified through rainfall and flow monitoring because the peak flow response tends to correspond directly to the intensity of the rainfall during a storm event. However, some sources of infiltration may also respond very quickly to rainfall so flow monitoring data cannot always be used to determine whether the source is inflow or infiltration. Smoke testing has been used to identify inflow sources; however, this method is often ineffective because traps or other obstructions on the inflow sources prevent the migration of smoke through the piping system to a location where it can be observed by the testers. Dye testing of suspected sources may also be used to identify inflow locations. Inflow may also originate from sump pumps in basements and crawl spaces that can often only be located by site specific dye testing and inspection.

This memorandum provides information regarding the inflow and infiltration (I/I) rates for several representative monitored basins within the separated sanitary sewer area of the City's collection system.

Background

I/I sources can be difficult to locate because they typically allow water into the sewer during wet-weather when CCTV cameras may be ineffective or difficult to schedule to be in the field. To better understand I/I within their system, King County conducted one of the nations largest and

most comprehensive I/I studies. As part of that study, they installed approximately 800 flow meters to measure in-pipe flows over a two year period in sewer basins for 34 local agencies that connect to the King County regional system. This comprehensive study provided information that serves to establish typical I/I rates that might be expected for separated sewer basins in the Puget Sound Lowlands area – including the City of Everett.

Figure 1 shows the summary I/I results of the program and monitoring during the 2001/2002 wet season. The I/I rates were calculated based upon the highest basin flows from the ten largest measured storms. The results show that nearly 50 percent of sanitary sewer basins exceeded a peak wet weather I/I rate of 3,000 gallons-per-acre-per-day (gpad).

The King County study also found that typically approximately 75 percent of the I/I was coming from side sewers located on private properties. Another general finding of the analysis was that basins with an I/I allocation of less than 3 gallons-per-minute (gpm) per property were not good candidates for cost-effective removal of I/I because achieving the total targeted I/I reduction in those basins would require rehabilitation of too many properties.

After pilot testing various I/I rehabilitation methods and approaches the King County program found that in basins with higher I/I it was difficult to reduce the peak I/I rates to the median value of 3,000 gpad. More typical post rehabilitation I/I rates were on the order of 4,000 to 8,000 gpad. This pilot testing included a pilot project that replaced 100 percent of side sewers and sewer mains and still ended up with 8,400 gpad I/I. This information indicates that it is typically not economically feasible to attempt to remove I/I in basins where the peak I/I rate is already on the order of 8,000 gpad or less.

These King County criteria were used to evaluate measured and modeled I/I rates within the City of Everett collection system to determine any Everett separated sewer basins could be candidates for additional I/I investigations and/or I/I reduction projects.

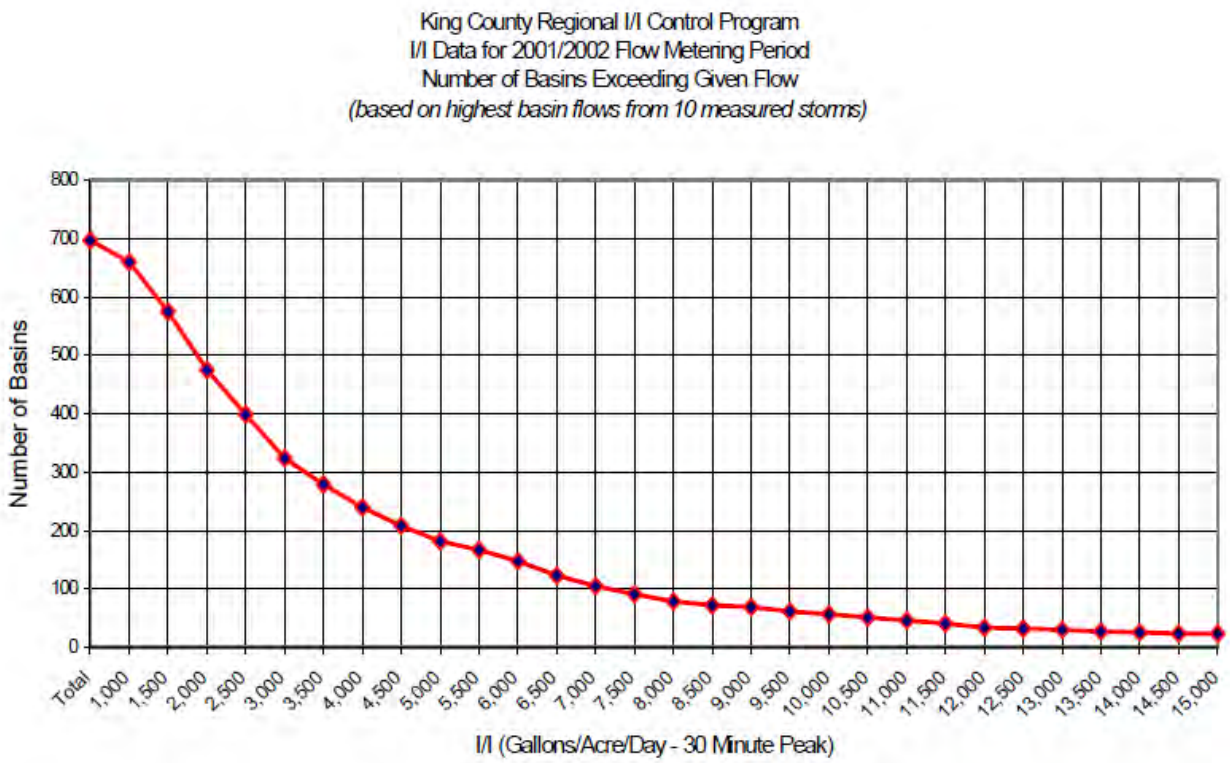

Figure 1: Result of the King County I/I Study conducted during the 2001/2002 wet season.

I / I Analysis Method

The following five steps were completed in performing the I/I analysis for representative City of Everett separated sewer areas:

1. Established the I/I review monitoring basins based on the sewer drainage area upstream of existing flow monitors. The monitoring basins are shown in Figure 2. As shown in the figure, the monitoring basins comprise parts of Everett sewersheds SW 3, 4, and 5; NG; and SE 7, 8, 9, and 10. The shaded areas in the figure represent the sewered area(s) with connections that contribute flow to the flow monitor. For SFE flow monitor Nos. 17 and 20, the contributing areas are not contiguous. Data from the following flow monitors were used in the analysis.

SFE Flow Monitor No.	Address	Manhole ID
2	11501 27th Ave	SMH2085X08
3	3502 35th Ave	SMH1785S02
4	1319 Pinkerton Ave	SMH0785Y08
7	1200 Merril Creek Parkway	SMH0284J02
10	1007 Northpark Dr	SMH2594S03
17	426 72nd St SE	SMH0785E05
20	4811 Gardener Ave	SMH3494R04
21	7200 Hardeson Rd	SMH1284E02
23	5529 Commercial Ave	SMH0585F01

2. Determined I/I rates for the monitoring basins for storms during the 2009 – 2010 flow monitoring period. Five of the most significant storms that occurred during that flow monitoring period were selected to be compared to dry-weather diurnal flow patterns in the same basins. The I/I rate is equal to the maximum difference between the measured wet weather flow and diurnal dry weather flow as shown in Figure 3. This rate is converted to gallons per acre per day (gpad) using the area of the monitoring basin.

    - Flow monitoring data were not available for all storms during this period; therefore, some measured flow rates could not be determined.

    - As shown in Table 1, the following measured storms (as measured at the Silver Lake gauge) that overlapped with available flow monitoring data were used to determine I/I rates from monitoring data:

Storm 1: March 31 - April 3, 2009	2.32 inches
Storm 2: August 12-14, 2009	0.87 inches
Storm 3: September 19-20, 2009	1.32 inches
Storm 4: November 13-16, 2009	5.11 inches
Storm 5: Aug 31 – Sep 1, 2010	1.98 inches

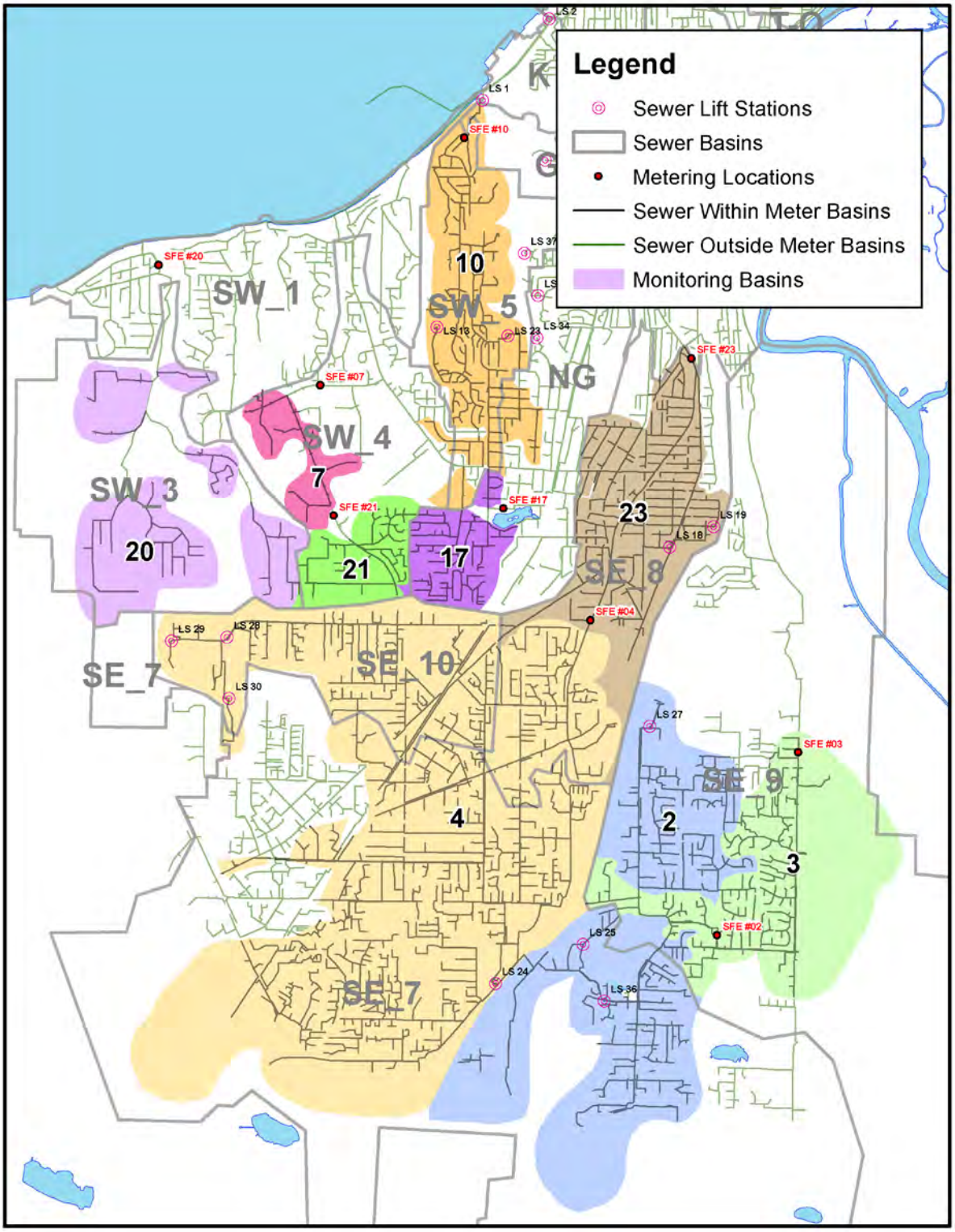

Figure 2. Monitoring Basin Locations

3. Used the sewer model to predict I/I rates for larger storms. Based on an analysis of historical rainfall, the above flow monitored storms that occurred during 2009 and 2010 were relatively small. Peak I/I rates correlate to the magnitude of the storm event, so the calibrated sewer model was used to predict I/I rates for larger modeled storms.

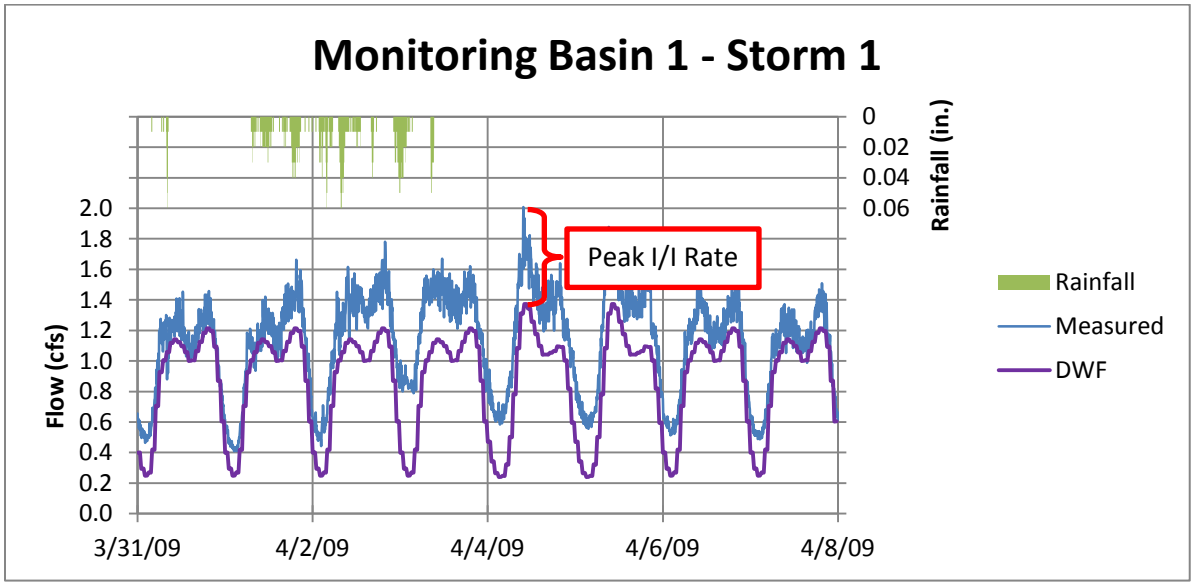

Figure 3. Example showing peak I/I rate based on measured data and modeled diurnal flow.

4. The sewer model was validated by comparing model predicted I/I rates with the monitored I/I rates for the five 2009/2010 storms listed in Step 2. Table 2 summarizes the model predicted I/I rates for Storms 1 through 5. These modeled I/I rates were compared with the measured rates for the same metering basins shown in Table 1. While there are differences (in some cases significant) between the model results and monitoring data for all events in each basin, the ranges of I/I rates typically have the same orders of magnitude and show similar trends between the flow monitored data and model results. The most significant difference — for the flow monitor SFE 3 basin is likely because the measured peak flows are influenced from the two upstream lift stations; where the model predicts a lower average flow from the basin. Other basins, like SFE 7 had very limited measured data to be used for model calibration – which can be improved as more data becomes available.

5. Used the sewer model to predict I/I rates for the following five larger measured storms to determine predicted I/I rates for larger storms that were evaluated in the sewer model:

Storm 6:	April 22-27, 1996	3.19 inches
Storm 7:	Dec 28, 1996 - Jan 3, 1997	6.28 inches
Storm 8:	June 24-26, 1998	1.66 inches
Storm 9:	November 15-20, 2003	4.18 inches
Storm 10:	December 2-4, 2007	5.29 inches

These were some of the largest storms recorded within the 24 years of historical rainfall record as discussed in *Rainfall Time Series Memorandum*. Model predicted flows during Storm 6 thru Storm 10 were compared with dry-weather diurnal flows within model. The peak I/I rate is then determined to be the maximum difference between the modeled wet weather flow and dry weather diurnal flow and converted into units of gpad. The following historical large storms were used in the model to predict peak I/I rates that would occur during large rainfall events. The predicted I/I rates for these five larger storms are shown in Table 3.

Conclusions and Recommendations

Tables 1, 2, and 3 show the results of the I/I analysis for the nine sanitary sewer flow monitored basins studied. Table 1 shows I/I rates based upon five storms that occurred during flow monitoring. Table 2 shows I/I rates based upon the model data for the same five storms. This is similar to the approach used for the King County I/I analysis – where they used the ten largest storms, with rainfalls from 0.6 to 5.2 inches that occurred during the flow monitoring period. Finally, Table 3 shows I/I rates based upon five of the larger storms from the 24 year period of record that were evaluated to forecast peak I/I rates.

The I/I rates range in these separated sewer basins varied from as little a few hundred gpad to as much as 8,700 gpad. In general, they have relatively low levels of I/I (typically less than 3,000 gpad). The weighted (based upon the relative areas of the monitored basins) I/I averages for the measured storms vary from approximately 600 to 900 gpad. The weighted I/I averages for the large modeled storms vary from approximately 800 to 1,400 gpad. These I/I rates are significantly lower than the worst basins King County studied, which, in some cases, exceeded 20,000 gpad.

Monitoring Basin 20 has the highest I/I rate with a range of 3,040 – 4,690 gpad for smaller storms and 5,400 – 8,680 gpad for larger modeled storms. While these I/I rates are greater than the other Everett monitored basins, they are still likely too low for the basin to be considered for any kind of I/I reduction projects. Also, in spite of the higher measured and projected I/I rates in this basin, there were no identified existing capacity issues or deficiencies in the collection system serving this basin.

Therefore based upon this analysis, no additional I/I reduction measures have been identified for the City's flow monitored separated sewer system basins. Flow monitoring could be continued to provide additional flow data from larger storms that could be used to improve the calibration of the sewer system model to simulate the responses of the separated sewer system to larger storms. Alternatively, flow monitoring could be continued only through the remainder of the wet season and then reinstalled at the same locations in the future (prior to the next sewer plan update) to compare the future system responses and I/I rates during similar conditions and storms. This would serve to determine if there is any measureable system degradation causing increases in I/I rates. City operations staff should also continue to observe the performance of the collection system during storm events and monitor any trends or changes in customer reported capacity restrictions or sewer backups in the sanitary sewer basins.

Table 1. I/I rates based on monitoring data for storms during 2009 and 2010

Flow Meter	Monitoring Basin Area (acres)	% of Total Area	Peak I/I Flow (gpm)					Peak I/I rate (gpad)					Peak I/I rate (gpad)		
	Storm Number		1	2	3	4	5	1	2	3	4	5	Low	Average	High
2	1,660	7.1	540	360		420	150	470	310		360	130	130	300	470
3	2,670	11.4	2,280	1,140		1,440		1,230	610		780		610	920	1,230
4	7,960	33.9	2,980	1,010		2,670		540	180		480		180	360	540
7	420	1.8	390					1,340					1,340	1,340	1,340
10	730	3.1	780					1,540					1,540	1,540	1,540
17	240	1.0		70					420				420	420	420
20	700	3.0			1,690	1,790	1,260			3,480	3,680	2,590	2,590	3,135	3,680
21	250	1.1			60					350			350	350	350
23	8,820	37.6					5,200					850	850	850	850
Totals	**23,450**	**100.0**						**Weighted (by basin area) average gpad**					**617**	**741**	**866**

Table 2. I/I rates based on modeling data for storms during 2009 and 2010

Flow Meter	Monitoring Basin Area (acres)	% of Total Area	Peak I/I Flow (gpm)					Peak I/I rate (gpad)					Peak I/I rate (gpad)		
	Storm Number		1	2	3	4	5	1	2	3	4	5	Low	Average	High
2	1,660	7.1	180	110	90	250	150	160	100	80	220	130	80	150	220
3	2,670	11.4	220	130	100	330	190	120	70	50	180	100	50	115	180
4	7,960	33.9	1,840	1,550	950	2,280	2,290	330	280	170	410	410	170	290	410
7	420	1.8	190	130	140	180	200	650	450	480	620	690	450	570	690
10	730	3.1	530	710	730	560	670	1,050	1,400	1,440	1,100	1,320	1,050	1,245	1,440
17	240	1.0	70	70	80	70	90	420	420	480	420	540	420	480	540
20	700	3.0	1,560	1,480	1,780	1,630	2,280	3,210	3,040	3,660	3,350	4,690	3,040	3,865	4,690
21	250	1.1	50	60	60	50	70	290	350	350	290	400	290	345	400
23	8,820	37.6	4,530	3,740	4,150	4,950	5,480	740	610	680	810	890	610	750	890
Totals	**23,450**	**100.0**						**Weighted (by basin area) average gpad**					**437**	**577**	**717**

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Table 3. I/I rates based on modeling data for larger storms during the 24-year period of rainfall record.

Flow Meter	Monitoring Basin Area (acres)	% of Total Area	Peak I/I Flow (gpm)					Peak I/I rate (gpad)					Peak I/I rate (gpad)		
	Storm Number		6	7	8	9	10	6	7	8	9	10	Low	Average	High
2	1,660	7.1	300	510	160	400	510	260	440	140	350	440	140	290	440
3	2,670	11.4	1,050	550	180	420	560	570	300	100	230	300	100	335	570
4	7,960	33.9	3,580	3,800	2,770	3,020	5,140	650	690	500	550	930	500	715	930
7	420	1.8	320	360	290	290	400	1,100	1,230	990	990	1,370	990	1,180	1,370
10	730	3.1	860	800	1620	900	1060	1,700	1580	3200	1780	2090	1,580	2,390	3,200
17	240	1.0	130	110	190	120	160	780	660	1140	720	960	660	900	1,140
20	700	3.0	2,780	2,630	4,220	2,670	3,660	5,720	5,410	8,680	5,490	7,530	5,410	7,045	8,680
21	250	1.1	100	90	150	80	110	580	520	860	460	630	460	660	860
23	8,820	37.6	7,950	7,670	7,900	6,250	9,670	1,300	1,250	1,290	1,020	1,580	1,020	1,300	1,580
Totals	**23,450**	**100.0**						**Weighted (by basin area) average gpad**					**815**	**1,112**	**1,410**

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References

King County. King County Regional Infiltration/Inflow Control Program Wet Weather Technical Memorandum 2001/2002 Monitoring Period. June 2002.

King County. King County Regional Infiltration/Inflow Control Program Pilot Project Report. October 2004.

King County. Initial Infiltration and Inflow Reduction Project Alternatives Analysis Report. April 2009.

HDR. *Rainfall Time Series Memorandum. February 2012.*

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Infiltration-Inflow Report
for the
City of Everett
Water Pollution Control Facility

December 2008

Prepared for City of Everett by
Carollo Engineers
Seattle, Washington

City of Everett

WATER POLLUTION CONTROL FACILITY

Infiltration-Inflow Report

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1.0 PURPOSE

The City of Everett (City) is re-applying for their National Pollution Discharge Elimination System (NPDES) permits for their Water Pollution Control Facility (WPCF). One of the items that is required to be submitted with this re-application is an Infiltration-Inflow (I/I) Report. Excessive I/I affects the collection and treatment system in several ways. It can cause hydraulic overloading of the treatment plant and impact process performance. Hydraulic overloading in the collection system from high I/I can result in overflows to surface water, streets, or basements. Excessive I/I can also dilute sewage, making compliance with secondary effluent standards difficult or impossible. Each collection system is different - the purpose of the I/I report is to help both facility owners and the Washington State Department of Ecology (DOE) track and understand the specific I/I issues faced by a particular community.

2.0 ANALYSIS

According to the DOE, the I/I report must contain the following:

1. The average monthly flow and total precipitation for each month for the past year together with a graph plotting comparison of precipitation versus influent flow.
2. The maximum monthly and peak hourly hydraulic design capacity for the plant.
3. The design population equivalent for the treatment plant and the population served by the facility, per month, for the past year.
4. The amount of I/I for each year since the base year and the percent of maximum monthly design capacity each year's I/I represents.
5. The percent increase or reduction in I/I for each year subsequent to the base year I/I.
6. The additional lengths of sewer lines added to the collection system, per month, for the past year. Also include a brief summary of any major sewer rehabilitation or I/I reduction projects.

There are two components of I/I that are typically addressed in this report. The first, infiltration, is defined as water entering a collection system from the ground through such means as defective pipes, joints, or manholes. Infiltration was estimated based on the methodology provided in *"I/I Analysis and Project Certification*, EPA, 1985".

The second component is inflow, defined as "flow that has a direct connection to stormwater runoff".

A significant portion of the City's collection system is a combined system. Any rainfall that enters the combined portion of the system is conveyed to the treatment facility or in some infrequent cases possibly to a combined sewer overflow (CSO).

For this reason, the conventional methodology for determining excessive inflow in a separate sewer system does not apply. Based on discussions with DOE, the inflow component is not required for a combined system, as long as the City submits a CSO control Plan Update. The purpose of the CSO Control Plan Update is to demonstrate that the City is establishing a plan to achieve a reasonable reduction in combined sewer overflows.

The City is currently completing a CSO Control Plan Update which is scheduled to be submitted to the DOE by December 31, 2008.

2.1 Average Monthly Flow

Table 1 summarizes the average monthly flow and total precipitation for each month for the past year.

Figure 1 is a graphical depiction of the information in Table 1.

Table 1 Average Inflow vs. Rainfall for 2007
Infiltration-Inflow Report
City of Everett

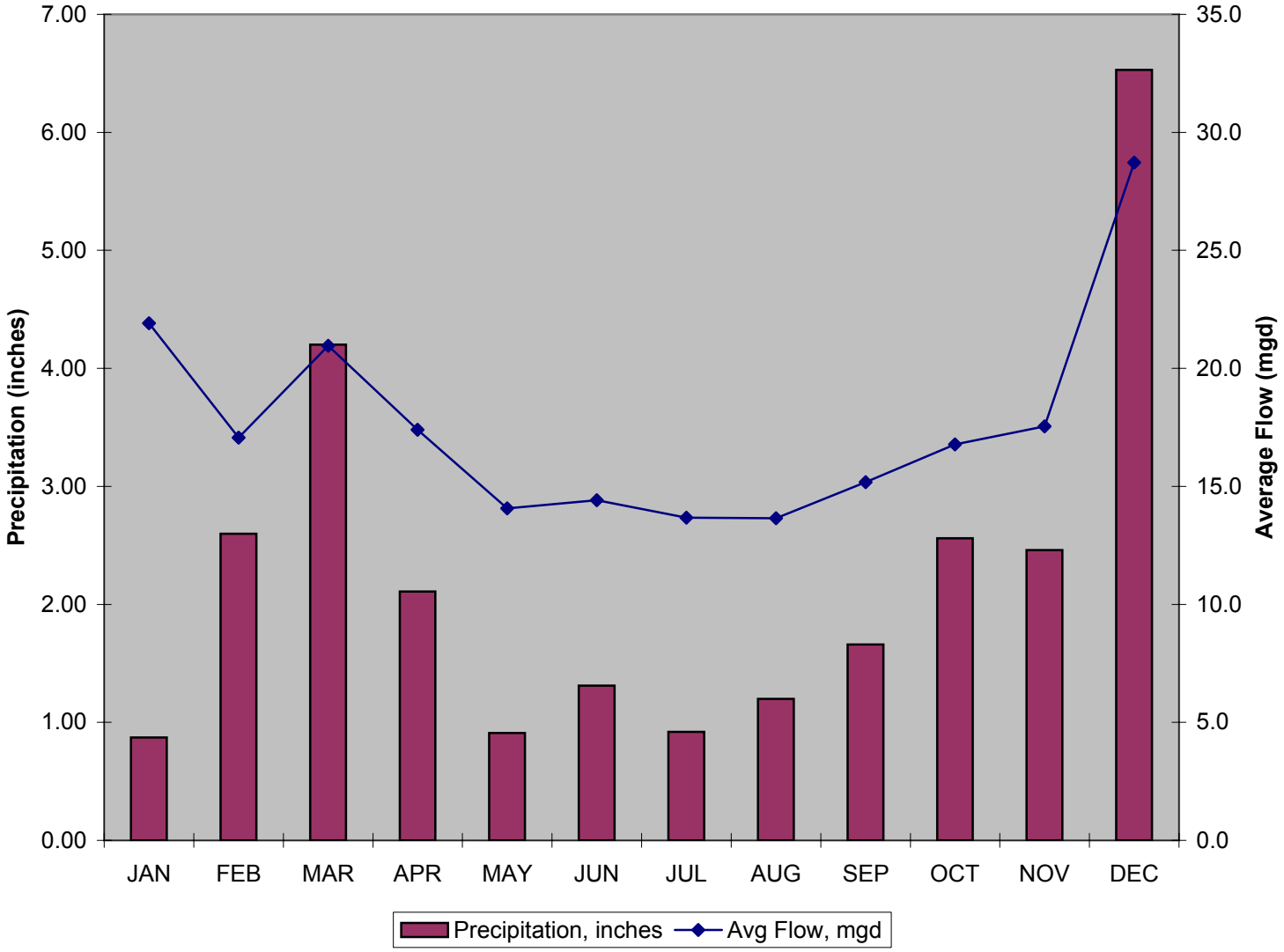
Month	Average Primary Inflow (mgd)	Rainfall (inches)
January	21.9	0.87
February	17.1	2.60
March	21.0	4.20
April	17.4	2.11
May	14.1	0.91
June	14.4	1.31
July	13.7	0.92
August	13.7	1.20
September	15.2	1.66
October	16.8	2.56
November	17.5	2.46
December	28.7	6.53

Note: Recorded rainfall for January is less than the historical average due to inaccurate rain gauge readings for part of the month.

2.2 Hydraulic Design Capacity

From the October 2007 NPDES permit, the maximum month hydraulic design capacity is 36.3 million gallons per day (mgd). The peak day flow for the plant is 74.6 mgd.

Figure 1
Average Monthly Flow vs. Total Precipitation (2007)



2.3 Design Population

The service area for the City of Everett WPCF included portions of the Silver Lake Water District, Alderwood Water and Wastewater District, and the Mukilteo Water District. The WPCF also provides service for the Port of Everett.

The October 2007 Fact Sheet for NPDES Permit WA-002449-0 provides population estimates, which are summarized in Table 2.

Table 2 NPDES Fact Sheet Population Data
Infiltration-Inflow Report
City of Everett

Year	Population
2000	143,909
2005	152,749
2010	161,592

In order to estimate population for any other year, a linear interpolation can be performed between two given populations. These population interpolations were used in the following two sections.

2.4 Infiltration

Excessive infiltration, as defined by *"I/I Analysis and Project Certification*, EPA, 1985", is dry weather flow (DWF) during a period of seasonal high ground water in excess of 120 gallons per capita per day (gpcd). Dry weather flow is defined as the highest average daily flow recorded over a seven to 14 day period during a period of high groundwater but no rainfall.

A period of five-years of operating data was reviewed. For each calendar year, a period of no rainfall during the winter was selected. The winter period was used since this is typically when high groundwater levels occur in Western Washington. These two conditions combine to produce a situation where infiltration would be more prevalent than inflow. The average daily flows for these periods are divided by the estimated population to determine the gpcd flow. Table 3 below summarizes those periods.

As shown in Table 3, the DWF in each of the past five years is less than 120 gpcd, indicating

Table 3 Infiltration
Infiltration-Inflow Report
City of Everett

Year	DWF (gpcd)	Period
2003	109	Jan 5 - Jan 12
2004	105	Nov 5 - Nov 12
2005	90	Nov 14 - Nov 21
2006	115	Dec 1 - Dec 8
2007	98	Feb 16 - Feb 23

that the collection system is not considered to have excessive infiltration.

The information provided in *"Information Manual for Treatment Plant Operators*, DOE, 2004" recommends the identification of a "base year" and comparing data to the base year information. The base year is defined as a year of typical rainfall. After analyzing the five-years of data, 2003 was identified as the base year. Comparing the DWF value in Table 3 for the year 2003 to the remaining years in the same table, yields the results in Table 4.

Table 4 DWF Value % Changes
Infiltration-Inflow Report
City of Everett

Year	DWF (gpcd)	% Change from Base Year
2003	109	--
2004	105	-3.7
2005	90	-17.4
2006	115	+5.5
2007	98	-10.1

As can be seen, 2006 is the only year where infiltration has increased compared to the base year. According to DOE, if I/I increases by less than 15 percent, then no further explanation or study is required. Table 4 demonstrates that Everett meets this criteria.

2.5 Sewer Improvements

The City's sewer system has provided service to all areas within the City for many years. There has been minimal new sewer line construction in the last five years. Most construction within the system has been limited to repair and replacement of existing infrastructure. The quantity of repair and replacement for the previous five year period is summarized in Table 5.

Table 5	Sewer System - Repair and Replacement Infiltration-Inflow Report City of Everett
Diameter	**Repair and Replacement (Inch-diameter-mile)**
8'' and Less	14.0
10'' through 15''	34.6
18'' through 24''	17.5
30''	6.7
36''	7.7
Total	80.8

3.0 CONCLUSION

The estimated DWF for the last five years has consistently been below 120 gpcd, an indicator that the collection system is not considered to have excessive infiltration. The per capita flows for these periods have not increased from the base year more than six percent, which is well below the suggested maximum of 15 percent. Both of these guidelines confirm that the collection system is not considered to have excessive infiltration.

The City is currently in the process of preparing a CSO Control Plan Update that will demonstrate the City's plan to minimize combined sewer overflows. The City has recently implemented a flow-monitoring program to gather data to help better understand flow conditions in the system as they correlate to rainfall. This will assist in the City's continuing plan to provide a reasonable reduction in CSO events.

4.0 REFERENCES

National Pollution Discharge Elimination System (NPDES) 2007, *Fact Sheet for NPDES Permit WA-002449-0.*

Washington State Department of Ecology (DOE) 2004, *Information Manual for Treatment Plant Operators.* Olympia, Washington.

United States Environmental Protection Agency (EPA) 1985, *I/I Analysis and Project Certification.* Washington DC.

Appendix P

Level of Service Technical Memorandums

- Level of Service Alternatives Analysis
- Rainfall Time Series Memorandum

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Level of Service Alternatives Analysis

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Everett Sewer Comprehensive Plan
Level of Service Alternatives Analysis

To:	Souheil Nasr	**Date:**	February 13th, 2014
From:	Eric Habermeyer and Jim Peterson	**Project:**	Everett Comprehensive Sewer Plan
cc:		**Proj. No.:**	HDR: 157248 City: CON0061212

Subject: Amend No. 2 Task 2400 & 2500 North Everett Level of Service Alternatives Analysis

1.0 Introduction

Over the past few years the City of Everett has experienced three high intensity storm events that occurred on: June 9, 2010, August 29, 2013, and September 5-6, 2013. The June and August storm events had the highest rainfall intensity observed in Everett since the 1940s when rainfall data began to be recorded. These storms caused the sewer collection system to surcharge and overflow at multiple locations including surface flooding and basement back-ups. The location of observed flooding and reported sewer back-ups is depicted on Figure 1.

This technical memorandum (TM) evaluates the cost to achieve different Levels of Service (LOS) in the sewer system. LOS is defined as the frequency with which sewer back-ups are anticipated to occur in the entire combined sewer area (i.e. once every 5 years, 10 years, 25 years, etc.). In this TM a LOS of 25-years and 100-years were evaluated by simulating storm events in a model of the City's sewer system. The following evaluation methods were employed.

- 25-Year LOS – This LOS is evaluated in the model of the sewer system by simulating the City of Everett Rainfall Series which includes the largest storm events from 24 years of rainfall data collected at the Silver Lake Rain Gauge. This rainfall data series was used to determine sewer collection facilities required to provide a 25-year LOS.
- 100-Year LOS – This LOS is evaluated in the model of the sewer system by simulating the August 29th storm event. This storm event has an estimated recurrence interval of 1-in-550 years. The recurrence interval is the probability that a similar magnitude storm will occur in the same location within the City. Based upon the approximate ratio of the typical footprint area of these short-duration high-intensity storms compared to the area of the City (City area is four times larger than the storm area), it is likely that a storm of this magnitude will occur somewhere within the City once every 100 years or so. This concept is discussed further in section 2. Therefore, the August 29th storm event represents the magnitude of storm that could occur somewhere within the City approximately every 100 years and was used to evaluate a 100-Year LOS.

Three combined sewer system-wide alternatives were developed for this TM. They include a comprehensive set of improvements to achieve different LOS goals. The system-wide alternatives described below have been evaluated for their LOS, total costs, and sewer rates impacts.

- Alternative 1 – 2013 Comprehensive Sewer Plan (CSP) with Programs: This alternative includes all the projects in the CSP plus installation of backwater valves (BWV) and public-private partnership (P3) program for stormwater management. This alternative would achieve a LOS of 25 years.
- Alternative 2 – 100-Year Level of Service: This alternative includes all projects in Alternative 1 plus additional sewer pipeline replacements to achieve a LOS of 100-years. Implementation options of 10, 20, and 30 years are evaluated for this alternative.

- Alternative 3 – Complete Storm Sewer Separation: This alternative would install a separate stormwater collection network in the combined sewer collection area to reduce sources of run off inflow to the sewer system. This alternative would achieve a LOS of greater than 100-years. Implementation options of 10, 20, and 30 years are evaluated for this alternative.

Table 1 provides a summary of each alternative's LOS goal, LOS project cost, 30-year reduction in potential property damage claim payments, and 30-year sewer rate increases. A range of rate increases is provided for Alternatives 2 and 3 indicating LOS improvement implementation options of 10, 20, and 30 years. The following sections and appendix attachments of this TM provide details about the development of the information in this table.

Table 1 – Summary of Alternative LOS Costs and Reduction in Property Claim Payments

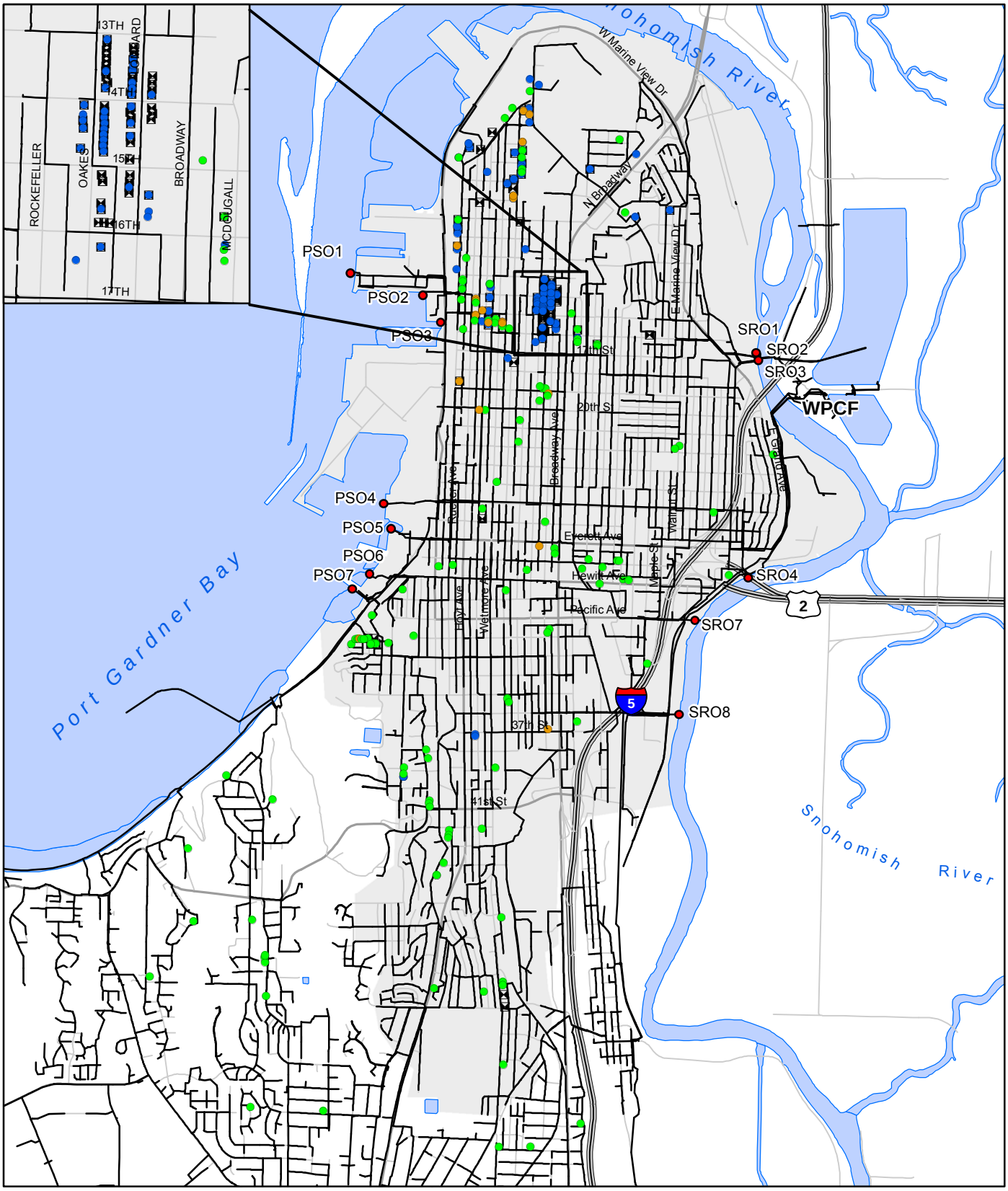
Alternative	LOS (years)	Design Storm Recurring Interval (years)	LOS Project Costs (1)	30 Year Benefit (Reduction in Sewer Claims)	Cumulative Sewer Rate Increase by 2043 (2)
			(million 2013 $)		
Alternative 1	25	100	$52	$20	114%
Alternative 2	100	400	$249	$23	159 - 201%
Alternative 3	>100	>400	$774	$25	307 - 377%

1. The 10-year Capital Improvement Plan identifies $231 million for projects not related to LOS improvements. This cost would be in addition to the LOS project costs shown in this column.
2. Rates have been adopted through 2016. The sewer rate increases in this table are in addition to preapproved rates. A range of sewer rate increase indicates different implementation schedules from 10 – 30 years for LOS projects.

The table illustrates that there are diminishing benefits for the reduction in potential property damage claim payments with Alternatives 2 and 3. The corresponding project costs for those alternatives increase dramatically compared to the relative marginal benefit of reducing potential property damage claims.

The reduction in property damage claim payments is a relatively small part of the benefits associated with the conveyance system LOS improvements. Other quantitative and qualitative benefits associated with making sewer system improvements include system reliability and performance, reduced operation and maintenance costs, improved regulatory compliance, and customer goodwill and satisfaction.

A more detailed evaluation of individual project alternatives, costs, and LOS benefits would have to be completed to further define projects that would be added to the 2013 CSP. Along with conveyance improvements, other localized alternatives in some of the deficient areas may include individual customer service line improvements (backwater valves, grinder pumps, or surface/roof drain disconnects, etc.).



Legend

Reported Backup and Flooding Event

- Aug 29 2013
- Aug 29 and Sep 5-6 2013
- June 9, 2010
- Customer Backflow Prevention Valve

- Sewer Lines
- CSO Outfall
- Combined Sewer Area
- Road
- Interstate/Highway
- Major Road

FIGURE 1: Reported Sewer Backup and Flooding Location Map

Level of Service Alternatives Analysis
City of Everett

0 0.25 0.5 1
Miles

2.0 MGS Storm Analysis TM Summary

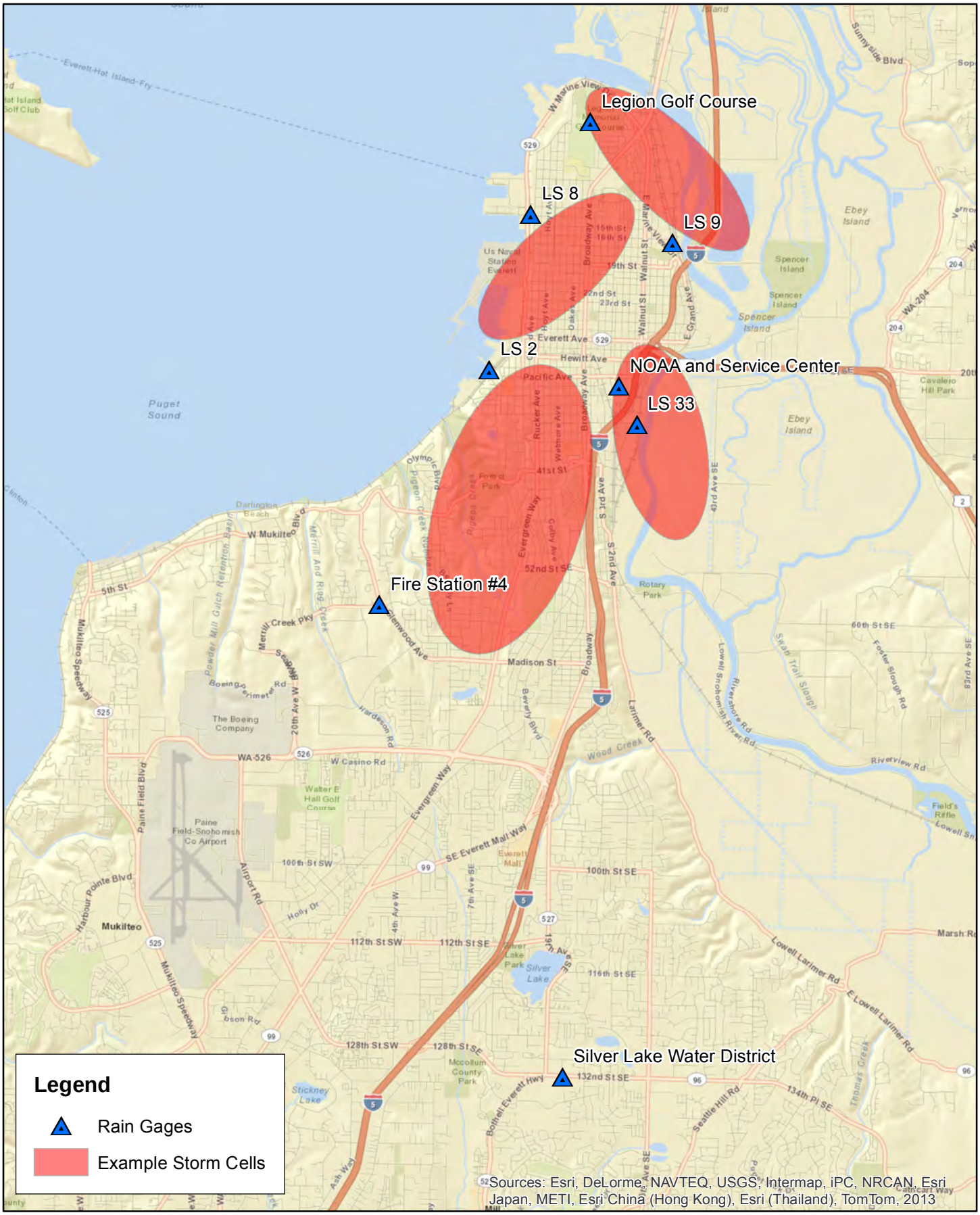
As part of the recent Comprehensive Sewer Plan Update, the City wanted to define characteristics of recent historical short-duration high-intensity storm events that have occurred within the City's sewer service area; specifically the June 9, 2010 and August 29, 2013 storm events. To accomplish this Mel Schaefer of MGS Engineering Consultants (MGS) prepared an October 30, 2013 memorandum *"Assessment of Short-Duration High-Intensity Storm Characteristics for Historical Storms for Everett WA"* that reviewed and evaluated the available storm data. That memorandum is attached to this Task 2400 memorandum.

MGS concluded that the two Everett storms were characteristic of short-duration, high-intensity storms that can occur during the spring and summer in western Washington. Large winter storms typically are lower intensity and cause rain to fall over the entire City sewer service area. By comparison, warm weather, short-duration thunderstorm cells have smaller "footprints" that typically impact only at-random areas throughout the City, and thus subareas of the sewer system service area. These randomly impacted subareas depend upon where the thunderstorm cells form and how they "track" or move over the City.

The June 9th storm cells initially formed to the south of the City then tracked from south to north where the largest storm cell grew in size and intensity over a 20 minute period directly over north Everett. The June 9th storm included a peak measured intensity of 0.86 inches of rain per 30 minutes over a relatively small area. The August 29th storm cells began forming over Puget Sound to the southwest of the City and then tracked to the northeast over a larger part of the City. The August 29th 2013 storm measured peak intensity was 0.91 inches of rain per 30 minutes, but was spread over a larger area than the June 9th storm.

Although these two storms were characteristic of warm weather thunderstorms in western Washington, the high intensity of the peak rainfall rates over selected areas of the City was relatively rare. The June 9th storm measured at Rain Gauge 5B (Legion Golf Course) had a 30 minute storm duration (the most intense period) recurrence interval of 1-in-400 years. The August 29th storm as measured at Fire Station 4 had a 30 minute duration recurrence interval of 1-in-550 years.

The recurrence interval of a storm event is the estimated probability that the storm event will occur at a specific location. A 1-in-100 year storm has a one percent annual probability of occurring. Typically, high-intensity rainfall storm cells have footprints that are approximately one quarter of the area of the entire City. Therefore, the probability that a high intensity short duration 1-in-100 year storm event will occur somewhere within the City is once every 25 years or a four percent probability of occurring in any year. This concept is illustrated in Figure 2 which shows the typical high-intensity storm cells of four typical thunderstorm events that may randomly occur over different areas within the City.



0 0.5 1 2
Miles

Figure 2: Rain Gage Locations

Level of Service Alternatives Analysis
City of Everett

2.1 High Intensity Short Duration Storm Curves

An Intensity-Duration-Frequency (IDF) Curve is a graphical representation of the probability that a average rainfall intensity will occur for a given duration of time. It defines how rare a storm event is. IDF curves were developed for the high intensity, short duration storms based upon information provided in MGS's rainfall TM. These curves characterize the City's rainfall patterns based on an analysis of historical short duration storm events around the Puget Sound and scaled to match the City of Everett's historical rainfall data. Table 2 and Figure 3 depict the IDF Curves data..

Table 2 – City of Everett Intensity-Duration-Frequency Curve Data

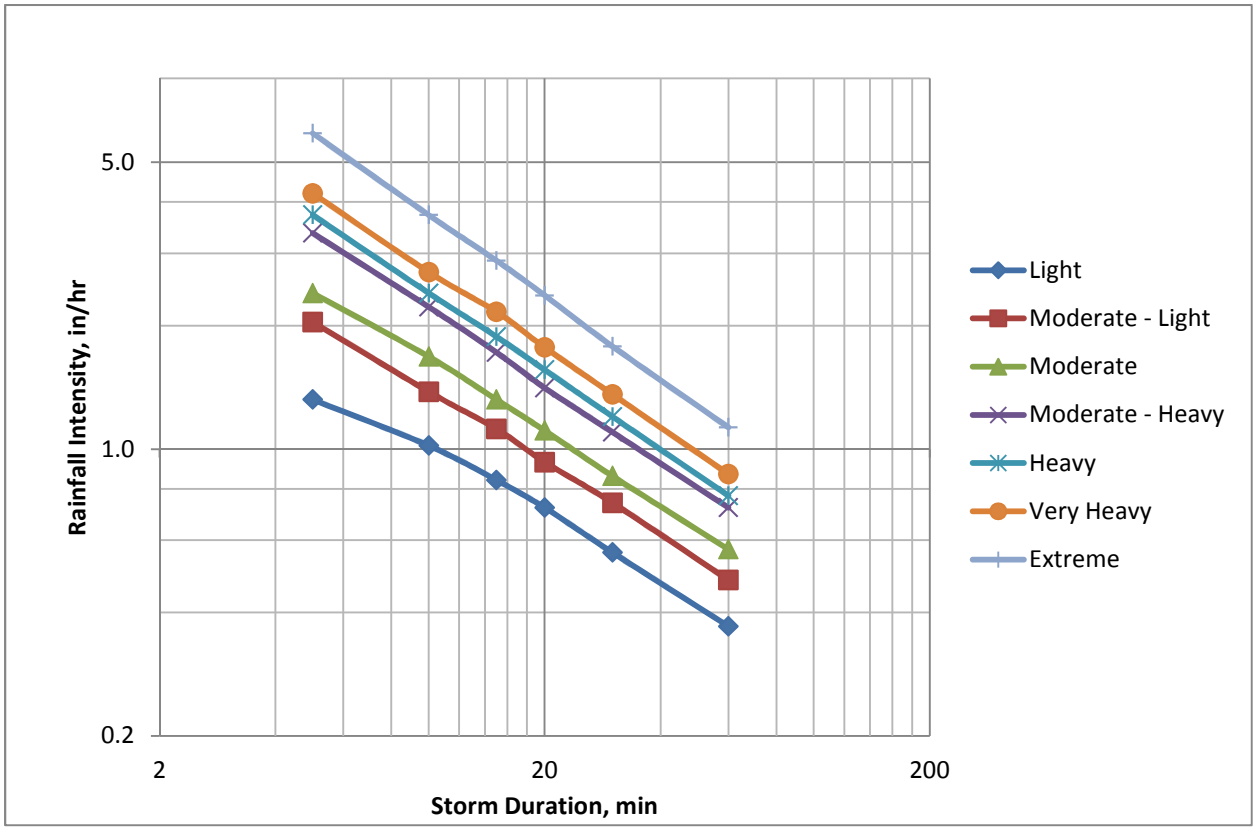
Duration (mins)	Intensity (in/hr) and Frequency						
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
5	1.3	2.0	2.4	3.4	3.7	4.2	5.9
10	1.0	1.4	1.7	2.2	2.4	2.7	3.7
15	0.8	1.1	1.3	1.7	1.9	2.2	2.9
20	0.7	0.9	1.1	1.4	1.6	1.8	2.4
30	0.6	0.7	0.9	1.1	1.2	1.4	1.8
60	0.4	0.5	0.6	0.7	0.8	0.9	1.1

Table 3 provides an anecdotal reference for evaluating the magnitude of precipitation intensities depicted in the IDF curves. It is important to note that the intensities vary for each IDF curve based on a duration between 5 – 60 minutes. The anecdotal descriptions are intended to be a instantanoues oberservation of rainfall.

Table 3 – Guidance for Interpreting Rainfall Intensity

Rainfall Intensity (inches/hour)	National Weather Service Category	Anecdotal Description of Rainfall Intensity
0.00 – 0.10	Light	Typical intensity for wintertime rain in Seattle
0.10 – 0.20	Moderate	Must use umbrella to avoid getting completely soaked
0.20 – 0.30	Moderate	Driving - traffic slows because of problems with visibility
0.30 – 0.50	Moderate	Driving - tedious, difficult even with windshield wipers on high
0.50 – 1.00	Heavy	Driving - can't see more than 50 feet with wipers on high
1.00 – 2.00	Very Heavy	Driving - Traffic stopped
2.00 – 4.50	Intense	Torrential downpour
4.50 and higher	Extreme	Awestruck

Figure 3 – City of Everett Intensity-Duration-Frequency Curves



3.0 Alternatives Evaluation

3.1 Effectiveness of Past Projects

In response to the June 9, 2010 storm event, the City began putting more emphasis on working with sewer customers to help them install backwater valves (BWVs) at affected sewer connections. The City also installed the "Sewer L" piping improvements, and began implementing other system improvements in the affected areas.

The following are some findings of the basement sewer back-ups reports during the June 9th and August 29th storm events:

- During the August 29th storm event, no basement sewer back-ups were reported at 95 out of 107 properties with BWVs (i.e., 89 percent of the properties were protected by the BWVs).
- During the Sept 5-6th storm event, no basement sewer back-ups were reported at 104 out of 107 properties with BWVs (i.e., 97 percent of the properties where protected by the BWVs).
- During the August 29th storm event, no basement sewer back-ups were reported at properties within the Sewer L project area which was constructed in response to flooding during the June 9th storm event.

3.2 Alternatives Background

The following three alternatives were identified for evaluation of their LOS, total approximate costs, and resulting sewer rates impacts. Table 4 lists the total project cost for each alternative. The subsequent sections provide detail on the development of those project costs.

Table 4 – Alternative Project Costs

Alternative	Description	LOS (Years)	Design Storm Recurring Interval (Years)	Component Project Cost (2013 $ Millions)
1	2013 Comprehensive Sewer Plan with programs	25	100	$283
2	100-year Level of Service	100	400	$480
3	Complete Storm Sewer Separation	>100	>400	$1,005

Alternative 1 – 2013 Comprehensive Sewer Plan with Programs

Alternative 1 is the 2013 Comprehensive Sewer Plan (CSP) plus additional programs for BWV installation and public-private partnership for stormwater management. Implementation of these improvements is expected to achieve a 25-year LOS throughout the entire sewer collection system. LOS improvements were identified by hydraulic modeling analysis of the City of Everett's Rainfall Series based on 24 years of rainfall data collected from the Silver Lake Rain Gage.

Alternative 2 – 100-Year Level of Service

Alternative 2 includes all improvements in Alternative 1 plus additional LOS improvements to achieve a 100-year LOS throughout the combined sewer area. The 100-year LOS was evaluated by model simulation of the August 29th 2013 storm event adjusted for climate change.

Alternative 3 – Complete Storm Sewer Separation

Alternative 3 provides complete separation of the combined sewer collection system into two piping systems, one for stormwater and one for sewage. Stormwater would discharge to existing combined sewer outfalls to the Snohomish River and a new deep water outfall to Port Gardner Bay. To account for stormwater regulatory requirements, stormwater treatment is included in the costs for this alternative. This alternative would achieve a LOS of greater than 100 years.

3.3 Alternative Components

Each alternative consists of two or three packages of projects or "components" that would be required to achieve a particular sewer system goal as defined below. These components are presented first with their individual estimated costs and then as part of their combined cost for each alternative.

Component A – CSP – Non-LOS Related Improvements

Component A is a subset of the CSP that includes improvements that are unrelated to LOS such as Water Pollution Control Facility upgrades, and system maintenance, condition, and combined sewer overflow regulatory-required improvements. These projects would be implemented regardless of which alternative is selected. The project cost estimate of $231 million was developed in the CSP for projects scheduled between 2014 and 2023. Table 5 provides a breakdown of projects included in this component. An annual project cost of $6.35 million is included for annual maintenance upgrades and repairs beyond year 2023. This component is included in all three alternatives.

Table 5 – Component A Projects

ID	Project Description	Project Cost (Million $)
A1	East Grand Stormwater Separation	$9
A2	Bond Street RTB	$22
A3	South End Interceptor	$12
A4	Mukilteo Beach Interceptor	$15
A5	Other CSO Improvements	$9
A6	Lift Stations and Conveyance	$15
A7	WPCF Improvements	$96
A8	Annual Maintenance Programs (Monitoring, GSI, CSO Outfall, Force main/Pressure Main, Condition)	$53
	Total	**$231**

Component B – CSP – LOS Improvements Scheduled over the next 10 Years

Component B is a subset of the CSP that represents the LOS improvements in the CSP scheduled over the next 10 years. These projects were identified based on modeling analysis conducted during the development of the CSP. No additional modeling was conducted for this TM. This component is included in Alternatives 1 and 2. The project cost estimate of $45 million was developed as part of the CSP Capital Improvement Program. This component includes the 17th Street Interceptor and Sewer M projects. This component would achieve a 25-year LOS.

Component C – Additional LOS Improvements

Component C represents additional LOS improvements that are identified based on modeling analysis of the system during the August 29th, 2013 storm event as recorded at Fire Station 4. The simulation was conducted by assuming the storm event recorded at Fire Station 4 occurred uniformly across the combined sewer collection system. The reported flows from the storm event were used to identify and estimate the size of needed improvements in areas where the model predicted that either basement sewer back-ups or surface flooding may occur. This component is included in Alternative 2 only. The project cost estimate of $197 million was generated using the Tabula cost estimating program which was also used for cost estimates in the CSP. This component would achieve a 100-year LOS.

Component D – Stormwater Separation for the Combined Sewer Area

Component D represents construction of a separated stormwater collection and conveyance system within the entire remaining combined sewer collection area. For the purpose of cost estimation, it was assumed that the lengths, depths, and diameters of the separated conveyance pipes would be the same as the existing combined sewer collection pipes.

Stormwater that drains to Port Gardner Bay would be conveyed into the existing deep water outfall and a new 10,000 LF 54-inch deep water outfall. Approximately 1/3 of the combined sewer area drains to Port Gardner Bay. The estimated peak stormwater flow is 120 million gallons per day (mgd). Stormwater could be discharged through the existing deep water outfall up to its current available capacity which is approximately 54 mgd. The remaining flow would be discharged to a new deep water outfall that would be installed parallel to the existing outfall. A 120 mgd pump station would also be constructed to pump into the deep water outfalls.

The project cost estimate of $644 million was generated using the Tabula cost estimating program. This component is included in Alternative 3 only.

Component E – Stormwater Treatment for Newly Separated System

Component E represents stormwater treatment for the separated stormwater system described in Component D. Stormwater treatment is defined in this component as detention storage and filter vaults. According to the Stormwater Management Manual for Western Washington (August 2012), stormwater treatment should be designed to collect and treat 91 percent of the runoff volume. To determine the 91 percent target volumes and flow rates for treatment, the City's sewer system model simulated rainfall data from 2009 through 2011 collected at the City of Everett Rain Gauge B (Legion Golf Course). The wet weather flow response was estimated by the model for the three year simulation. For the purpose of sizing the treatment facilities, it was assumed that 100 percent of the wet weather flow reported in the model would be conveyed via a separated stormwater network.

The average annual stormwater volume was estimated to be approximately two billion gallons. This component would include property acquisition for stormwater treatment detention storage and filters. Cost for additional staff is not included. The project cost estimate is based on detention storage of approximately 6 million gallons (MG) and a filter capacity of 120 mgd to achieve a treatment volume of 91 percent of the total stormwater volume. It was estimated that approximately 17 acres of land would be needed for these facilities. The cost estimate is based on similar stormwater treatment costs in the Puget Sound region and estimated site area and property costs for the City of Everett. The total project cost estimate is $130 million. This component is included in Alternative 3 only.

Future requirements for stormwater treatment are dependent on future revisions to stormwater treatment regulations. It is uncertain how these regulations will be revised and what the future stormwater treatment requirements would be. This component assumes a treatment requirement of 91 percent volume of all existing stormwater. If more stringent stormwater

treatment regulations are developed and it is required to treat 100 percent of the stormwater volume, the project cost estimate would increase to $300 million for approximately 16 MG of detention storage and 250 mgd of filter capacity.

Component F – Backwater Valves and Public-Private Partnership Programs

Component F represents program costs to install BWVs at all properties with a LOS of 100 years or less and introduction of a public-private partnership for management of stormwater.

There are 3,658 properties with basements mapped by the City of Everett in the combined sewer area. It is estimated that 50 percent (1,829) of the basements have a LOS of 100-years or less. These basements would have a BWV installed at a cost of $3,000 each. The total program cost is $5.5 million which will be scheduled over 10 years.

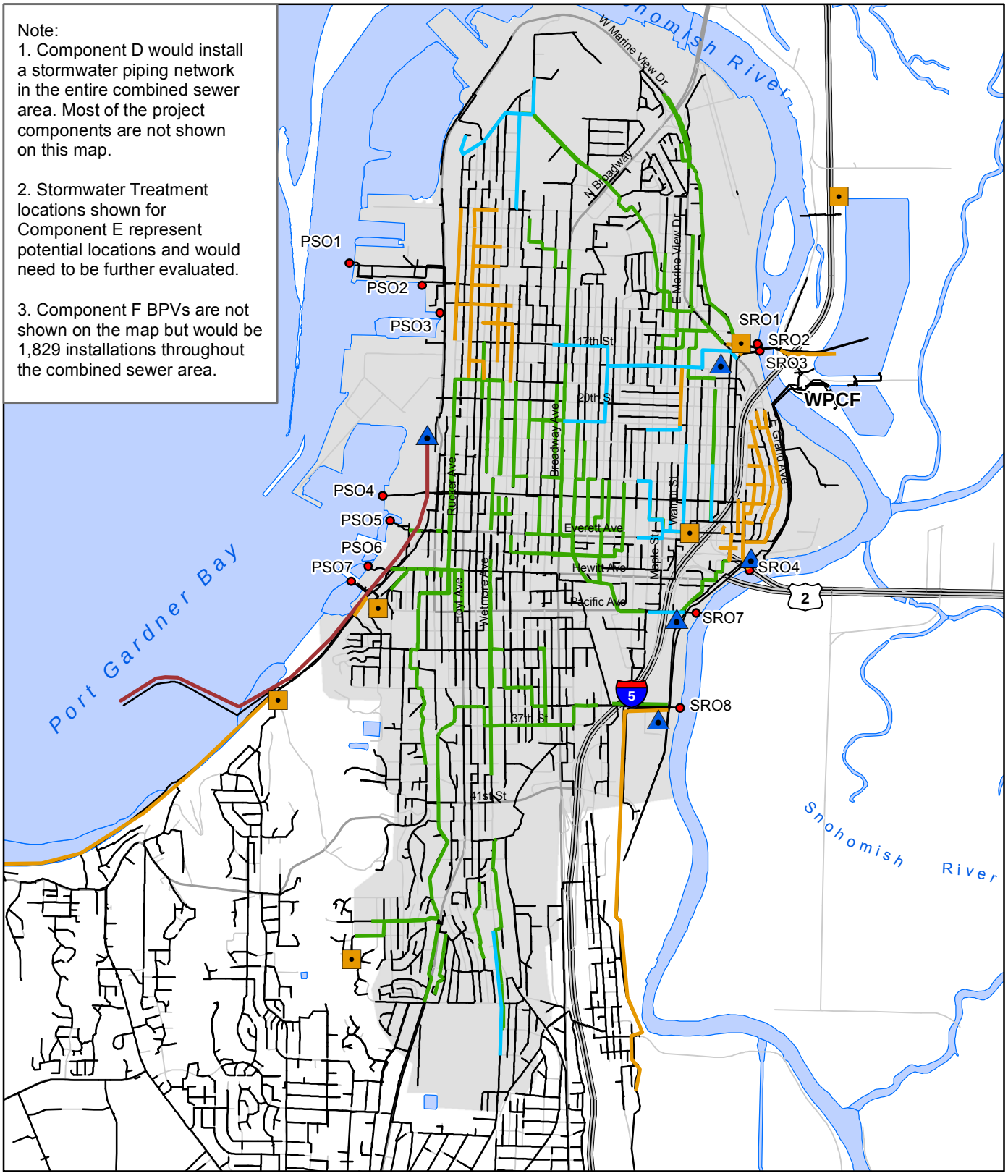
A public-private partnership (P3) program would focus on stormwater management on private property to reduce the impact to the combined sewer. The City would allocate $100,000 annually for this program. This component is included in Alternatives 1 and 2.

3.4 Alternative Component Estimated Costs

Table 6 lists each alternative component, the alternative(s) that contain that component, and the estimated total costs for the projects contained within that component. Figure 4 shows the locations of projects within each component. The construction cost for each component is based on either costs estimated by Tabula version 3.1 or engineer's estimates from the CSP. The following multipliers are applied to the construction cost to estimate the project cost: 50 percent for undefined scope of work, 35 percent for allied costs including engineering, permitting, and construction management, and 9.2 percent for sales tax. All project costs are in 2013 dollars.

Table 6 – Alternative Components

Component	Description	Alternatives Containing this Component	Component Project Cost (2013 $ Millions)	Comments
A	CSP – Non-LOS-Related Improvements	1, 2, & 3	$231 ($6.3 Annual after 2023)	CSP Projects Future O&M projects.
B	CSP – 25-year LOS Improvements Scheduled over the next 10 Years	1, & 2	$45	~25,000 feet of sewer pipe
C	Additional 100-year LOS Improvements	2	$197	~69,000 feet of sewer pipe
D	Stormwater Separation for the Entire Combined Sewer Collection Area	3	$644	~324,000 feet of stormwater pipe 120 mgd Pump Station Deep Water Outfall
E	Stormwater Treatment for the Entire Combined Sewer Collection Area	3	$130	120 mgd filter vault capacity 6 MG Detention Storage
F	BWV and Public-Private Partnership programs	1, & 2	$7	Install 1,830 BWVs and program costs



Legend

- Component A -
- Component A - Sewer
- Component B
- Component C
- Component D
- Component E - Stormwater Treatment
- Combined Sewer
- Sewer Lines
- CSO Outfall
- Road
- Interstate/Highway
- Major Road

Figure 4: Component Site Map

Level of Service Alternatives Analysis
City of Everett

0 0.25 0.5 1
Miles

3.5 Alternative Cost Estimates

The following sections provide summary descriptions of the system alternatives their project components and estimated budgetary planning level costs.

Alternative 1 – 2013 Comprehensive Sewer Plan With Programs

Alternative 1 consists of Components A and B, which make up the 2013-2023 Capital Improvement Program, plus Component F. Project costs associated with Components A and B are scheduled according to the CSP. Project costs for Component F would be scheduled over 10 years for the BWV program and the Public-Private Partnership would be an ongoing annual program. Therefore no other implementation options were considered for these Components. Table 7 lists the Alternative 1 components and total project costs.

Table 7 – Alternative 1 Projects Costs

Component ID	Alternative Components	Project Costs (2013 $ Millions)	Implementation Option (years)
A	CSP – Non-LOS-Related Improvements	$231	n/a
B	CSP – LOS Improvements Scheduled over the next 10 Years	$45	n/a
F	BWV and Public Private Partnership Programs	$7	n/a
	Alternative 1 Projects Total Cost	**$283**	

Alternative 2 – 100-Year Level of Service

Alternative 2 consists of Components A, B, C, and F. It includes all the projects identified in Alternative 1 as well as the additional projects identified from modeling analysis that would be required to increase the LOS to 100 years throughout the combined sewer area.

Project costs associated with Components A and B are scheduled according to the 10-year Capital Improvement Program as defined in the CSP, therefore no other implementation options were considered with these components. Project costs for Component F would be scheduled over 10 years for the BWV program and the Public-Private Partnership would be an ongoing annual program. Project costs associated with Component C would be distributed evenly into an annual program with implementation options of 10, 20, or 30 years. Table 8 lists the Alternative 2 components and total project costs.

Table 8 – Alternative 2 Projects Costs

Component ID	Alternative Components	Project Costs (2013 $ Millions)	Implementation Option (years)
A	CSP – Non-LOS-Related Improvements	$231	n/a
B	CSP – LOS Improvements Scheduled over the next 10 Years	$45	n/a
C	Additional LOS Improvements for the August 29th Storm Event	$197	10, 20, or 30
F	BWV and Public Private Partnership Programs	$7	n/a
	Alternative 2 Projects Total Cost	**$480**	

Alternative 3 – Complete Sewer Separation

Alternative 3 consists of Components A, D, and E and includes all the projects identified in the 10-year Capital Improvement Program in the CSP that are unrelated to LOS improvements, as

well as the costs of a new separated stormwater collection system. It was assumed that by separating the entire combined system, no additional LOS improvements would be needed within the combined sewer system area. Stormwater treatment was also included to account for potential changes in stormwater regulations that would require stormwater treatment for the separated system.

Project costs associated with Component A are scheduled according to the 10-year Capital Improvement Program in the CSP. Components D and E are combined as a lump sum and would be distributed evenly into an annual program with implementation options of 10, 20, or 30 years. Table 9 lists the total project costs of each component.

Table 9 – Alternative 3 Total Project Costs

Component ID	Alternative Components	Project Costs (2013 $ Millions)	Implementation Option (years)
A	CSP – Non-LOS-Related Improvements	$231	n/a
D	Stormwater Separation for the Entire Combined Sewer Collection Area	$644	10, 20, or 30
E	Stormwater Treatment for the Entire Combined Sewer Collection Area	$130	10, 20, or 30
	Total Project Cost	**$1,005**	

3.6 Alternative Benefit Evaluation

The following section provides an evaluation of potential system benefits for each alternative. Potential benefits are defined in terms of a reduction in potential future property damage claims from basement sewer back-ups.

A GIS dataset of basement locations was spatially linked to modeling results for LOS in the combined sewer area. Table 10 provides a summary of the total number of basements that the City has identified within the combined sewer area and the approximate number of basements with different LOS as determined by modeling analysis. The LOS is defined for the following frequencies: 1-in-5-years, 10-years, 25-years, or 100-years. The values in the table are cumulative (i.e. the number of basements with a 5-year LOS are included in the number of basements with a 10-year LOS and so forth).

Table 10 – Summary of Basements in Combined Sewer Area and LOS

	Number of Basements	Percentage of Total Basements
Basements with 25 - 100 Year LOS	732	20%
Basements with 10 - 25 Year LOS	548	15%
Basements with 5 - 10 Year LOS	183	5%
Basements with 5 Year LOS or less	366	10%
Basements with 100-Year LOS or less	1,829	50%
Total Number of Basements in Combined Area	3,658	

To estimate the potential cost of basement back-up claims, the following assumptions were used:

- Average property damage claim would be approximately $30,000 based upon past claims information from the City.
- A BWV would be installed at the connection when a property is flooded. Based upon past performance, a failure rate of 10 percent was assumed for the BWV during subsequent flooding events.
- Alternative 1 would increase LOS to 25 years for basements with a LOS less than 25 years (1,097 basements).
- Alternative 2 would increase LOS to 100 years for all basements with a LOS less than 100 years (1,829).

Table 11 lists the results of the calculated total annual property damage claim payouts. The costs are annualized based on the LOS listed in Table 7 above.

Table 11 – Summary of Property Claim Payments and Alternative Cost

Alternative	LOS (years)	Design Storm Recurring Interval (years)	Estimated Average Annual Claim Payments (2013 $) (1)	Alternative Cost (2013 $ million)	Reduction in Property Damage Claim Payments
No Improvement	<25	<25	$830,000	0	n/a
Alternative 1	25	100	$160,000	$283	80%
Alternative 2	100	400	$60,000	$480	93%
Alternative 3	>100	>400	$0	$1,005	100%

1. Estimated average annual claim payouts is calculated by annualizing costs from a 100 year period where every basement with a 100 year LOS floods once, a 25 year LOS floods 4 times, a 10 year LOS floods 10 times, and a 5 year LOS floods 20 times. After the first flooding event occurs, a BWV is installed which has a failure rate of 10% for subsequent flooding events. Where a LOS improvement is implemented, the estimate assumes the surrounding properties would not flood. The average property damage claim is $20,000.

Alternative 1 improvements would achieve a LOS of 25-years for 1,097 property basements. Basements would also be protected with a BWV. There remains a 10 percent risk that the BWV will fail and the basements would experience a sewer back-up. This alternative reduces the estimate annual claim payout by approximately 80 percent relative to the No Improvement Alternative.

Alternative 2 improvements would achieve a LOS of 100-years for 1,829 property basements. Basements would also be protected with a BWV. There remains a 10 percent risk that the BWV will fail and the basements would experience a sewer back-up. This alternative reduces the estimate annual claim payout by approximately 93 percent relative to the No Improvement Alternative.

Alternative 3 improvements would achieve a LOS greater than 100-years. Complete stormwater separation would eliminate the 10% BWV failure risk so there are no estimated annual claim payouts.

3.7 Alternatives Sewer Rate Financial Review

A financial review was developed to calculate the sewer rate adjustments that would be necessary to fund operating and capital needs for each alternative based on the provided Capital Improvement Program. The 10-year implementation as outlined in the CSP was used for Alternative 1. Implementation options of 10, 20 and 30 years were evaluated for Alternatives 2 and 3. All of the alternatives were evaluated over a 30 year period. Those options with only a 10 or 20 year implementation plan include renewal and replacement (R&R) costs for the

remainder of the 30 year period. This assumes annual R&R needs of approximately $6.35 million starting in 2024 escalating annually at 3 percent.

A key assumption of the analysis is that the majority of the improvements would be funded through long-term debt. In this case, the assumption is to use municipal revenue bonds with a 20 year term and a 5.0 percent annual interest rate. Given the range of capital needs, the amount of annual debt service payments varies by alternative.

As noted, the CSP financial analysis model was run for a thirty year period assuming a uniform scheduling of construction projects over either 10, 20, or 30 years. The rate impacts at the end of 10 years vary with the annual debt service. Table 12 provides a summary of the cumulative and average annual sewer rate increases that would be necessary over the first 30 years and starting in the year 2017, to adequately fund each alternative.

Table 12 – Cumulative and Average Annual Rate Increases by Year 10, 20 and 30 of Alternative Implementations

Alternative (Implementation)	Cumulative Rate Increase (1)			Average Annual Rate Increase(1)		
	Year			Year		
	2023	2033	2043	2017-2023	2024 - 2033	2034 - 2043
Alternative 1	93%	114%	114%	9.9%	1.9%	0.0%
Alt 2 (10 years)	177%	201%	201%	15.7%	2.2%	0.0%
Alt 2 (20 years)	140%	178%	178%	13.3%	3.3%	0.0%
Alt 2 (30 years)	122%	159%	159%	12.1%	3.2%	0.0%
Alt 3 (10 years)	280%	307%	307%	21.0%	2.4%	0.0%
Alt 3 (20 years)	182%	329%	342%	16.0%	9.5%	1.2%
Alt 3 (30 years)	145%	257%	377%	13.7%	7.8%	8.2%

1. See Appendix for annual rate projections.

2. Rates have been adopted through 2016. The cumulative/average annual rate increases in this table are in addition to preapproved rates and occur after year 2016.

Table 13 provides the estimated monthly rate for customers at the end of each 10 year interval for each alternative rounded to the nearest dollar. The average monthly residential bill in 2014 is $49.50 and would increase to $52.70 in 2016 with already adopted rate increases. The Appendix includes a more detailed table of the annual rate increases and residential bill amounts.

Table 13 – Residential Sewer Rate by Alternative

Alternative (Implementation)	Average Residential Monthly Sewer Rate (2013 $) (1)		
	Year 2023	Year 2033	Year 2043
Alternative 1	$102	$113	$113
Alt 2 (10 years)	$146	$159	$159
Alt 2 (20 years)	$126	$147	$147
Alt 2 (30 years)	$117	$137	$137
Alt 3 (10 years)	$200	$214	$214
Alt 3 (20 years)	$148	$226	$233
Alt 3 (30 years)	$129	$188	$251

CPI (existing rate)	$65	$87	$117

1. See Appendix for annual average residential monthly sewer rate projections.

For each alternative, annual rate adjustments and subsequent average residential monthly bills are provided as an attachment.

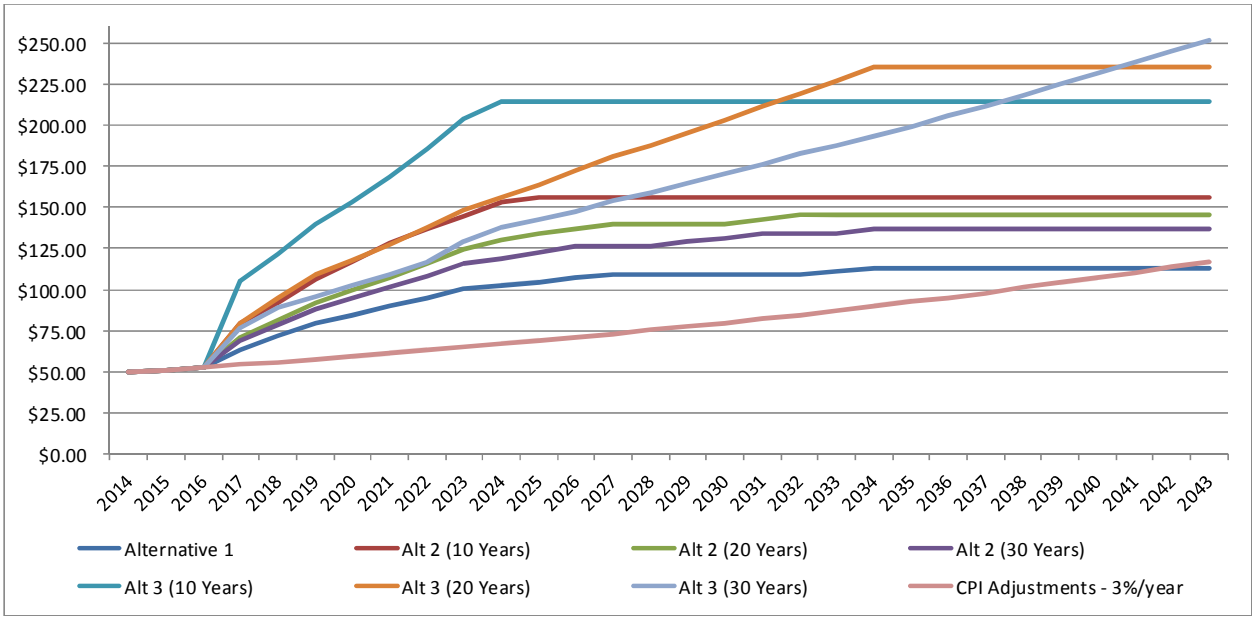
As shown above, the rate impacts vary significantly by alternative. For Alternative 1, the 10-year overall revenue adjustment would be met through annual rate increases necessary to fund the capital needs during the first 10-year period. Rate adjustments in the following 20 years are generally related to annual cost escalation for anticipated inflation. For Alternatives 2 and 3, the 20 and 30 year implementation options would require additional rate increases over the next 10 or 20 years following the initial 10-year rate increase as the remaining capital projects are developed and constructed. Similar to Alternative 1, the increases for Alternatives 2 and 3, 10-year implementation options after the initial capital improvements are related to escalation for inflation.

The Alternative 3, 10-year option does not appear to be feasible given the current, adopted, rates as the operating reserve fund goes negative in the years 2016 and 2017 with negative balances of $6.5 million and $1.4 million, respectively (see detailed table in the appendix).

With the 10 and 20 year plans, the rates have to increase rapidly to a high level in the first 10-year period to accommodate the capital improvements and then large surpluses are created in the following 20 years as the annual R&R is much less then the initial CIP. There are several options for the City to consider. First, the rates could be reduced in the final 10-years of the 30-year period to levels that reflect the City's capital needs during these time periods. Second, these funds could be used to fund future, currently unidentified, capital projects that may occur during future planning periods. Finally, the funds could be used to create additional reserves funds (e.g., rate stabilization, replacement/capital) that could be used to offset future rate increases, or major system replacement needs.

Figure 5 provides a summary of the average residential monthly bill calculated for each of the alternatives over the 30-year time period and the existing rate with an annual escalation based upon an average annual Consumer Price Index (CPI) adjustment of 3 percent.

Figure 5 – Average Monthly Residential Sewer Rate



As can be seen, and as noted previously, the rate adjustments for the shorter implementation periods (e.g., 10-year, 20-year) result in rates being set at a level that can be sustained over the following 10 or 20 years. At that time the City will need to determine if the rate levels are necessary to support operations and capital needs during the subsequent years.

In summary, implementation of any alternative would only be feasible with the adoption of the associated rate increase. Given the higher level of capital improvement needs, these rate increases would be more substantial with Alternatives 2 and 3. The potential benefits of implementing the more costly alternatives must be compared to the marginal benefits and rate impacts resulting from funding the improvements.

3.8 Evaluation Summary

This evaluation of system-wide sewer system alternatives summarizes the approximate range of costs, rate impacts, and potential sewer system back-up claims reduction benefits associated with combined sewer system improvements that could convey flows equivalent to those from the August 29, 2013 storm event throughout the entire combined sewer system.

Table 14 compares the alternatives costs and potential sewer system claims reduction benefits over a 30 year period.

Table 14 – Comparison of Alternative Costs and Benefits for 30 Years

Alternative	LOS (years)	Design Storm Recurring Interval (years)	Total Project Costs	LOS Project Costs	Incremental Project Cost	30 Year Benefit (Reduction in Claims Payments)	Incremental Benefits
			(million 2013 $)				
No Improvement	< 25	<25	$0	$0	$0	$0	$0
Alternative 1	25	100	$283	$52	$52	$20	$20
Alternative 2	100	400	$480	$249	$197	$23	$3
Alternative 3	>100	>400	$1,005	$774	$525	$25	$2

The table illustrates that sewer back-up claims reduction cost potential is a relatively small part of the benefits associated with the conveyance system LOS improvements. Other quantitative and qualitative benefits associated with making sewer system improvements include system reliability and performance, reduced operation and maintenance costs, improved regulatory compliance, and customer goodwill and satisfaction.

A more detailed evaluation of individual project alternatives, costs, and LOS benefits would have to be completed to further define projects that would be added to the 2013 CSP. Along with conveyance improvements, other localized alternatives in some of the deficient areas may include individual customer service line improvements (backwater valves, grinder pumps, or surface/roof drain disconnects, etc.).

Appendix

Annual Rate Adjustments and Monthly Bill Projections

MGS Technical Memorandum: "Assessment of Short-Duration High-Intensity Storm Characteristics of Historical Storms for Everett, WA"

Alternative (Implementation)	Annual Rate Adjustments									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alternative 1	3.1%	3.1%	3.2%	20.0%	13.0%	13.0%	6.0%	6.0%	6.0%	6.0%
Alt 2 (10 Years)	3.1%	3.1%	3.2%	50.0%	16.0%	16.0%	10.0%	10.0%	6.5%	6.5%
Alt 2 (20 Years)	3.1%	3.1%	3.2%	35.0%	15.0%	12.5%	9.0%	8.0%	8.0%	8.0%
Alt 2 (30 Years)	3.1%	3.1%	3.2%	30.0%	15.0%	12.0%	8.0%	7.5%	7.0%	6.5%
Alt 3 (10 Years)	3.1%	3.1%	3.2%	100.0%	15.0%	15.0%	10.0%	9.5%	9.5%	9.0%
Alt 3 (20 Years)	3.1%	3.1%	3.2%	50.0%	20.0%	15.0%	8.0%	8.0%	8.0%	8.0%
Alt 3 (30 Years)	3.1%	3.1%	3.2%	45.0%	17.0%	7.0%	7.0%	7.0%	7.0%	10.0%

Alternative (Implementation)	Average Customer Bill									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alternative 1	$49.50	$51.10	$52.70	$63.24	$71.46	$80.75	$85.60	$90.73	$96.18	$101.95
Alt 2 (10 Years)	$49.50	$51.10	$52.70	$79.05	$91.70	$106.37	$117.01	$128.71	$137.07	$145.98
Alt 2 (20 Years)	$49.50	$51.10	$52.70	$71.15	$81.82	$92.04	$100.33	$108.35	$117.02	$126.38
Alt 2 (30 Years)	$49.50	$51.10	$52.70	$68.51	$78.79	$88.24	$95.30	$102.45	$109.62	$116.74
Alt 3 (10 Years)	$49.50	$51.10	$52.70	$105.40	$121.21	$139.39	$153.33	$167.90	$183.85	$200.39
Alt 3 (20 Years)	$49.50	$51.10	$52.70	$79.05	$94.86	$109.09	$117.82	$127.24	$137.42	$148.41
Alt 3 (30 Years)	$49.50	$51.10	$52.70	$76.42	$89.41	$95.66	$102.36	$109.53	$117.19	$128.91

Note: The City has adopted rate adjustments through 2016, no adjustments were made to the adopted rates.

Alternative (Implementation)	Annual Rate Adjustments									
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Alternative 1	2.0%	2.0%	0.0%	2.0%	0.0%	2.0%	0.0%	2.0%	0.0%	0.0%
Alt 2 (10 Years)	6.5%	0.0%	1.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%
Alt 2 (20 Years)	3.0%	2.0%	2.0%	2.0%	2.0%	0.0%	0.0%	2.0%	0.0%	2.0%
Alt 2 (30 Years)	4.0%	2.0%	2.0%	2.0%	0.0%	0.0%	3.0%	0.0%	3.0%	0.0%
Alt 3 (10 Years)	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 3 (20 Years)	5.0%	5.0%	5.0%	5.0%	4.0%	4.0%	4.0%	4.0%	3.5%	3.5%
Alt 3 (30 Years)	7.0%	3.5%	3.5%	4.0%	3.5%	3.5%	3.5%	3.5%	3.5%	3.0%

Alternative (Implementation)	Average Customer Bill									
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Alternative 1	$103.99	$106.07	$106.07	$108.19	$108.19	$110.35	$110.35	$112.56	$112.56	$112.56
Alt 2 (10 Years)	$155.47	$155.47	$157.03	$157.03	$157.03	$157.03	$158.60	$158.60	$158.60	$158.60
Alt 2 (20 Years)	$130.18	$132.78	$135.43	$138.14	$140.91	$140.91	$140.91	$143.72	$143.72	$146.60
Alt 2 (30 Years)	$121.41	$123.84	$126.32	$128.85	$128.85	$128.85	$132.71	$132.71	$136.69	$136.69
Alt 3 (10 Years)	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42
Alt 3 (20 Years)	$155.84	$163.63	$171.81	$180.40	$187.61	$195.12	$202.92	$211.04	$218.43	$226.07
Alt 3 (30 Years)	$137.94	$142.76	$147.76	$153.67	$159.05	$164.62	$170.38	$176.34	$182.51	$187.99

Alternative (Implementation)	Annual Rate Adjustments									
	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Alternative 1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 2 (10 Years)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 2 (20 Years)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 2 (30 Years)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 3 (10 Years)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 3 (20 Years)	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Alt 3 (30 Years)	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	2.5%

Alternative (Implementation)	Average Customer Bill									
	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Alternative 1	$112.56	$112.56	$112.56	$112.56	$112.56	$112.56	$112.56	$112.56	$112.56	$112.56
Alt 2 (10 Years)	$158.60	$158.60	$158.60	$158.60	$158.60	$158.60	$158.60	$158.60	$158.60	$158.60
Alt 2 (20 Years)	$146.60	$146.60	$146.60	$146.60	$146.60	$146.60	$146.60	$146.60	$146.60	$146.60
Alt 2 (30 Years)	$136.69	$136.69	$136.69	$136.69	$136.69	$136.69	$136.69	$136.69	$136.69	$136.69
Alt 3 (10 Years)	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42	$214.42
Alt 3 (20 Years)	$232.85	$232.85	$232.85	$232.85	$232.85	$232.85	$232.85	$232.85	$232.85	$232.85
Alt 3 (30 Years)	$193.63	$199.44	$205.42	$211.58	$217.93	$224.47	$231.20	$238.14	$245.28	$251.41

MGS Engineering Consultants, Inc.

TECHNICAL MEMORANDUM

December 26, 2013

TO: Jim Peterson P.E., HDR Engineering Inc.

FROM: Mel Schaefer Ph.D. P.E., MGS Engineering Consultants, Inc.

SUBJECT: Assessment of Short-Duration High-Intensity Storm Characteristics of Historical Storms for Everett, WA

BACKGROUND

Several short-duration, high-intensity thunderstorm events have occurred within the City of Everett in recent years that exceeded the capacity of the combined sewer systems and resulted in some localized sewer system backups. In particular, the storms of June 9, 2010 and August 29, 2013 resulted in a large number of sewer system backup claims from City residents. Both of these storms were localized in areal coverage and only produced backups in certain areas of the City's combined sewer and separated sewer systems.

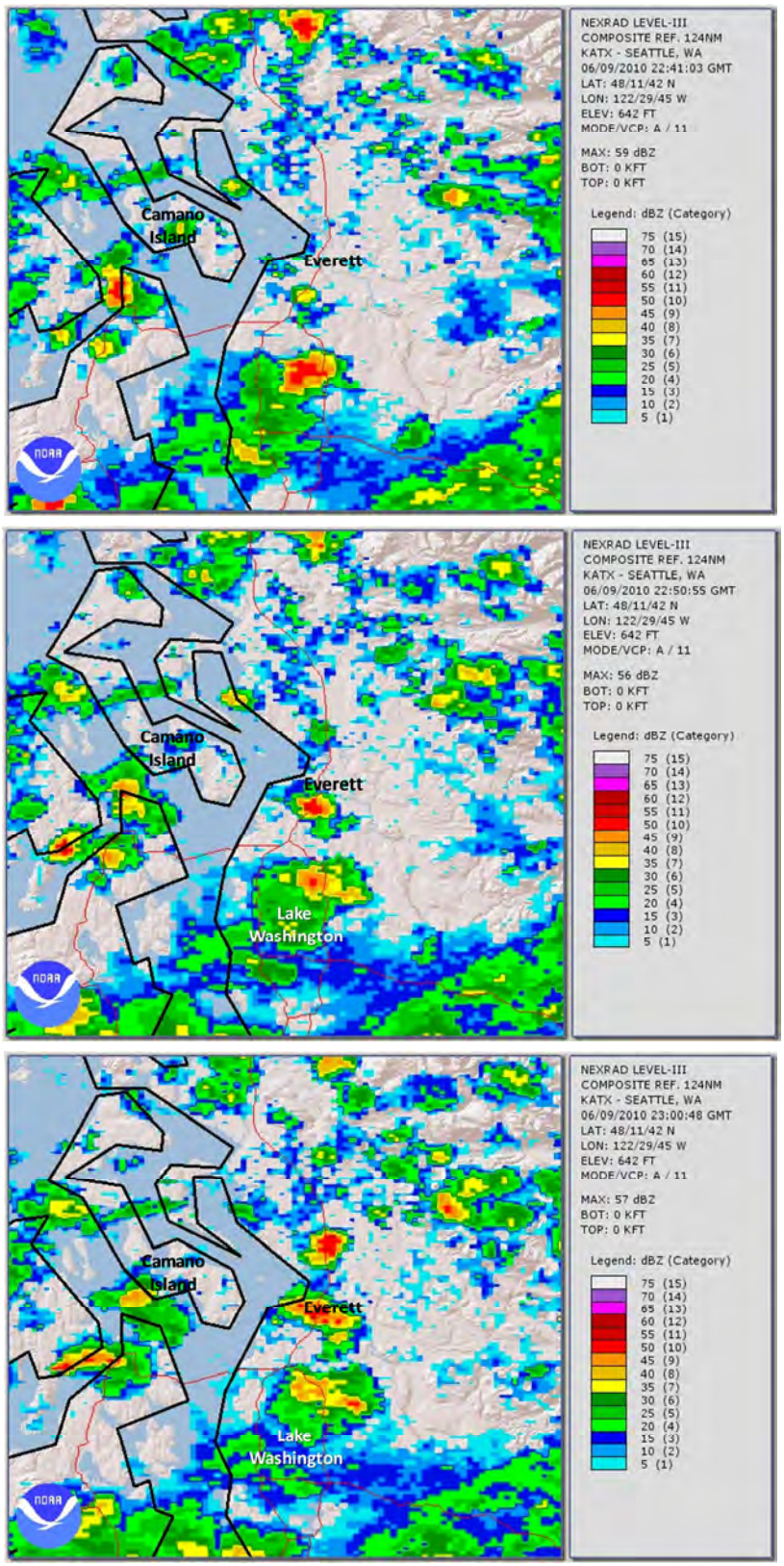
Questions have been raised by City officials about the rareness of these storms and the frequency with which urban flooding might occur in the future. Studies have been underway for the past two years by HDR[1] to evaluate the adequacy of the existing combined and sanitary sewer systems and to identify deficiencies. The findings of that study will include recommendations for upgrades to portions of the sewer system that are deficient. City officials have recently raised questions about the need for setting more stringent design criteria for upgrading the existing sewer system.

This memorandum presents an analysis of localized, high-intensity storms to help City officials address concerns regarding the potential frequency of sewer system backups and the selection of a sewer system design Level-of-Service (LOS).

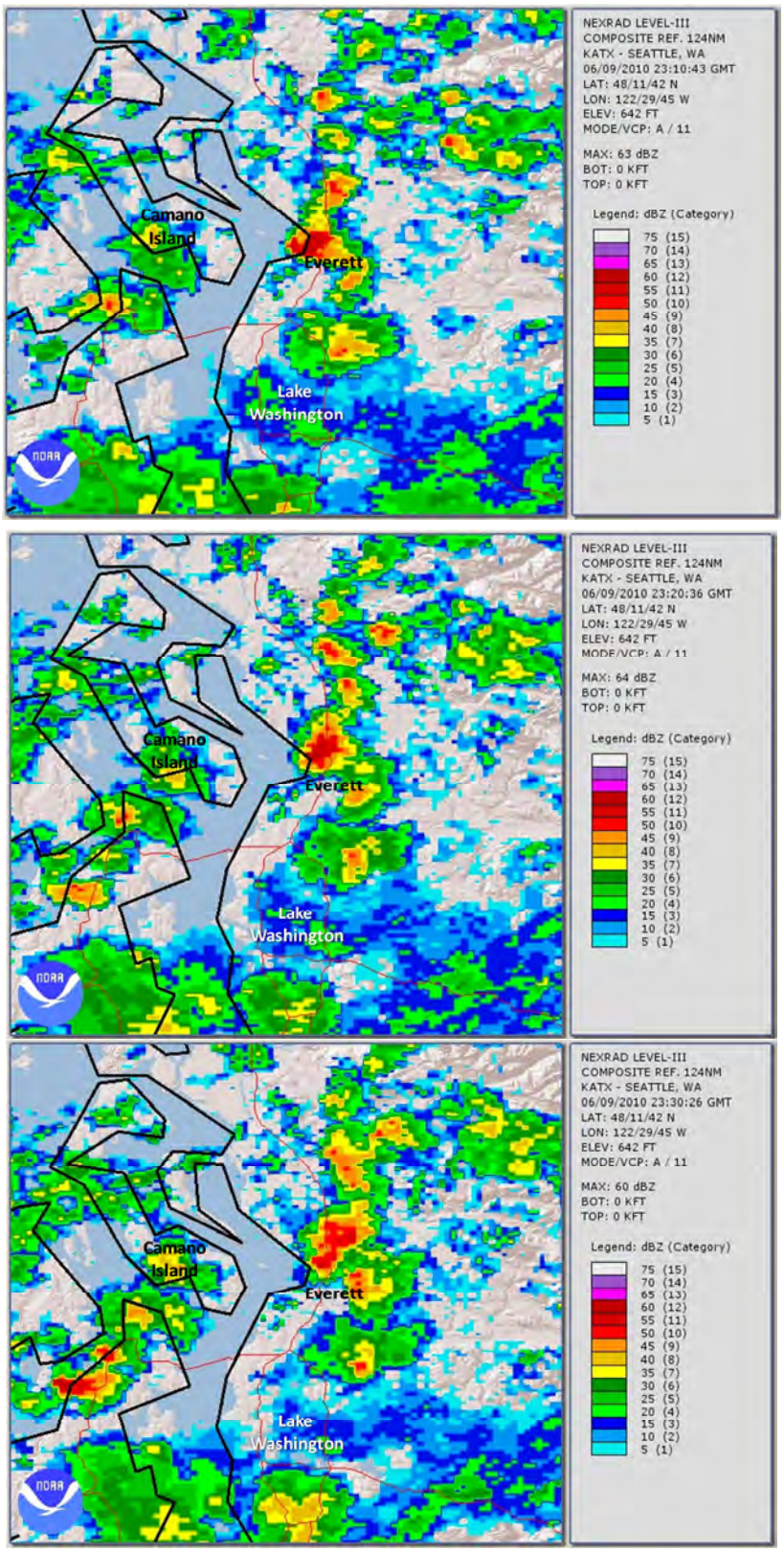
SPATIAL AND TEMPORAL CHARACTERISTICS OF WESTERN WASHINGTON THUNDERSTORMS

Both the June 9, 2010 and August 29, 2013 storms were characteristic of the short-duration high-intensity precipitation events (thunderstorms) which can occur in the warm season in western Washington. Specifically, heavy localized precipitation occurs as convective storm cells grow to the mature stage and generate high intensity precipitation before dissipating. The duration of precipitation at any specific location is dependent, in part, upon the number and size of the convective cells and rate of storm movement over the ground. Given the size of the City and the relatively smaller size of groupings of convective cells, the typical situation is for only a portion of the City to receive intense precipitation during a thunderstorm event.

Figures 1a to 1f show NEXRAD RADAR images depicting southwest to northeast storm movement in 10-minute increments over a 50-minute period (HDR[1]) for the June 9, 2010 storm. RADAR reflectivity is color-shaded where orange and red shading are indicative of areas with the highest precipitation intensities.



Figures 1a, 1b and 1c – NEXRAD RADAR Reflectivity Images
at 13:41 PDT, 13:51 PDT and 14:01 PDT for Storm of June 9, 2010



Figures 1d, 1e and 1f – NEXRAD RADAR Reflectivity Images
at 14:11 PDT, 14:21 PDT and 14:31 PDT for Storm of June 9, 2010

A review of Figures 1a to 1f shows a number of high-intensity convective cells scattered throughout and moving across the Lake Washington, Camano Island, Everett and Marysville areas. These figures provide a typical depiction of the spatial pattern of intense precipitation from convective cells.

The severity of urban flooding is also dependent upon the magnitude and duration of precipitation intensities. Figures 2a to 2d depict hyetographs (temporal patterns) of precipitation intensity observed at various locations within or near the City for the storm of June 9, 2010. Table 1 provides an anecdotal reference for evaluating the magnitude of precipitation intensities observed in Figures 2a-2d. The hyetographs indicate that very heavy to intense precipitation was produced over a very short time-span (few minutes) for a limited portion of the City.

A similar picture is seen for the storm of August 29, 2013. Figures 3a-3f depict the spatial patterns of intense precipitation in 15-minute increments for the August 29, 2013 storm (NCDC website[2]). The temporal patterns of precipitation were measured at several rain gages in the Everett area (Figure 4). Figures 5a-5d depict the hyetographs at four locations within the City which show the diversity in both temporal patterns and precipitation intensities. The August 29, 2013 storm generally has more widespread areal coverage than the June 9, 2010 storm as well as higher precipitation intensities over a broader area.

It is clear from review of the time-dependent spatial patterns in Figures 1a-1f, 3a-3f and the diversity of temporal patterns in Figures 2a-2d, 5a-5d that the ground locations subjected to very high precipitation intensities during the June 9, 2010 and August 29, 2013 storms are limited in areal extent. These figures reinforce the prior descriptions about warm season short-duration high-intensity convective events being relatively limited in areal extent. This behavior has important implications when considering design criteria for achieving a specified level-of-service in upgrading the sewer systems citywide. This will be discussed in detail in a following section.

Table 1 – Guidance for Interpreting Rainfall Intensity

RAINFALL INTENSITY (inches/hour)	NATIONAL WEATHER SERVICE CATEGORY	ANECDOTAL DESCRIPTION OF RAINFALL INTENSITY
0.00 – 0.10	Light	Typical intensity for wintertime rain in Seattle
0.10 – 0.20	Moderate	Must use umbrella to avoid getting completely soaked
0.20 – 0.30	Moderate	Driving - traffic slows because of problems with visibility
0.30 – 0.50	Moderate	Driving - tedious, difficult even with windshield wipers on high speed
0.50 – 1.00	Heavy	Driving - can't see more than 50 feet with wipers on high speed
1.00 – 2.00	Very Heavy	Driving - Traffic stopped, can't make out objects through the windshield
2.00 – 4.50	Intense	Awestruck
4.50 and higher	Extreme	Start loading the Ark

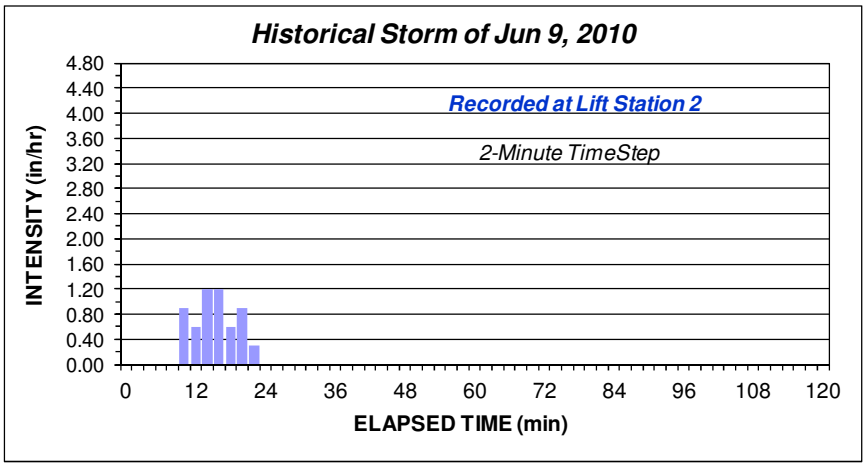


Figure 2a – Hyetograph Recorded at Lift Station 2 Everett WA for Storm of June 9, 2010

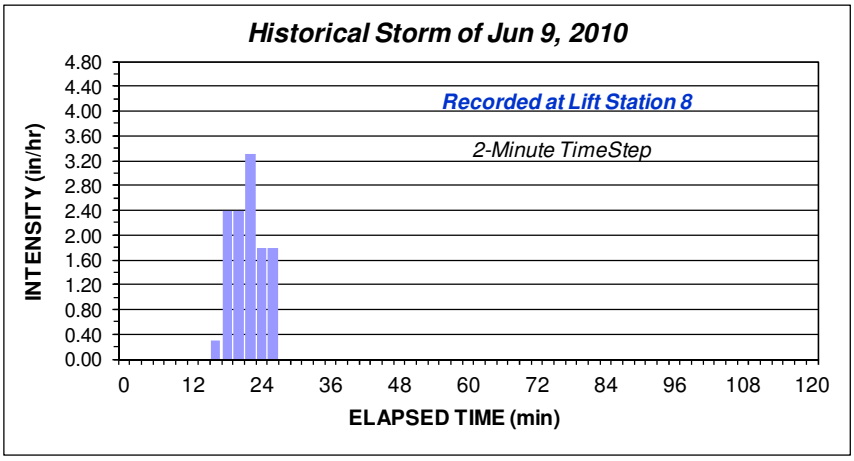


Figure 2b – Hyetograph Recorded at Lift Station 8 Everett WA for Storm of June 9, 2010

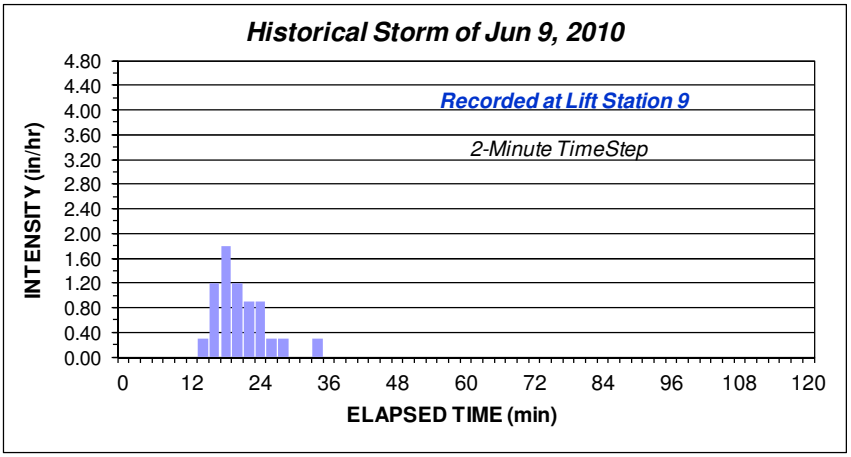


Figure 2c – Hyetograph Recorded at Lift Station 9 Everett WA for Storm of June 9, 2010

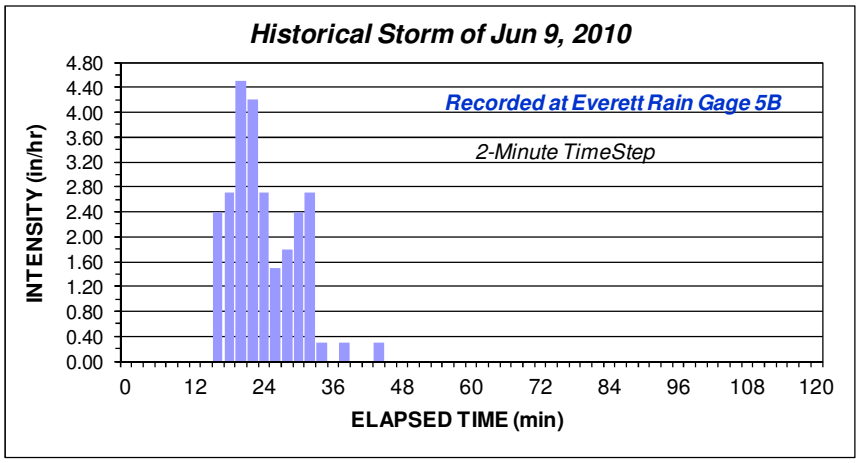
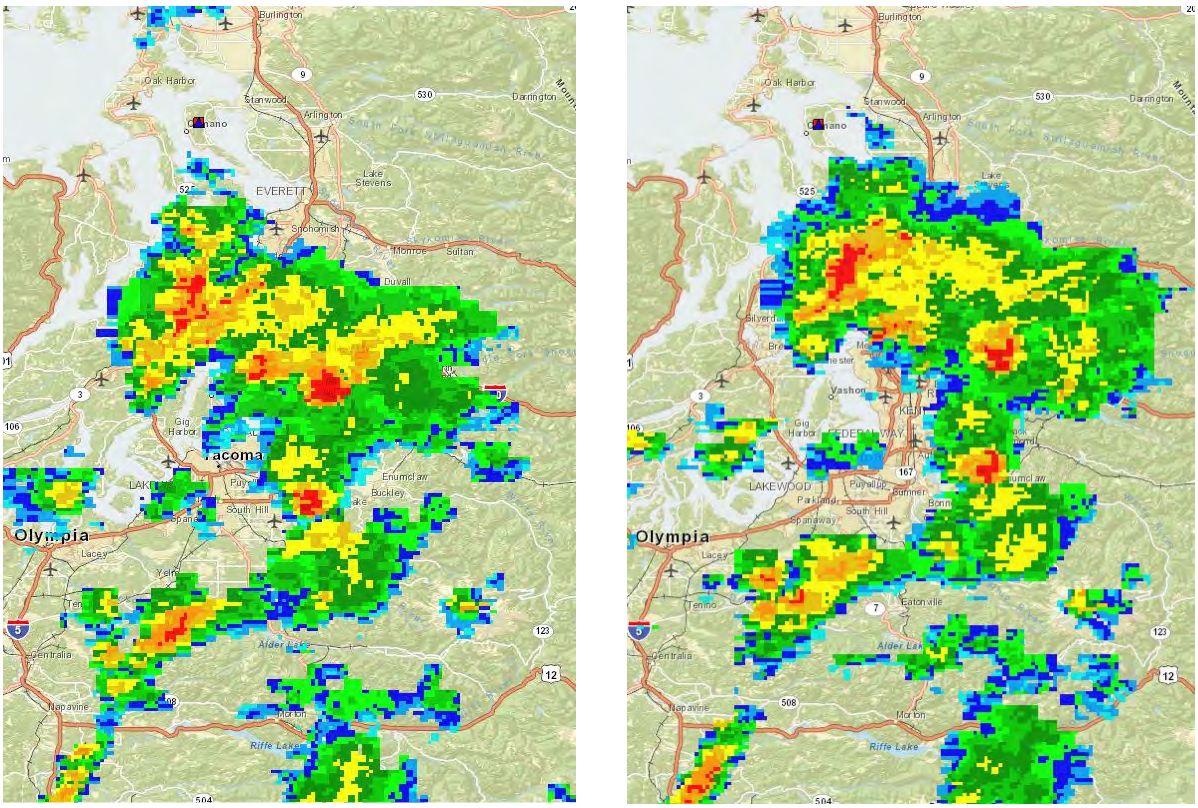
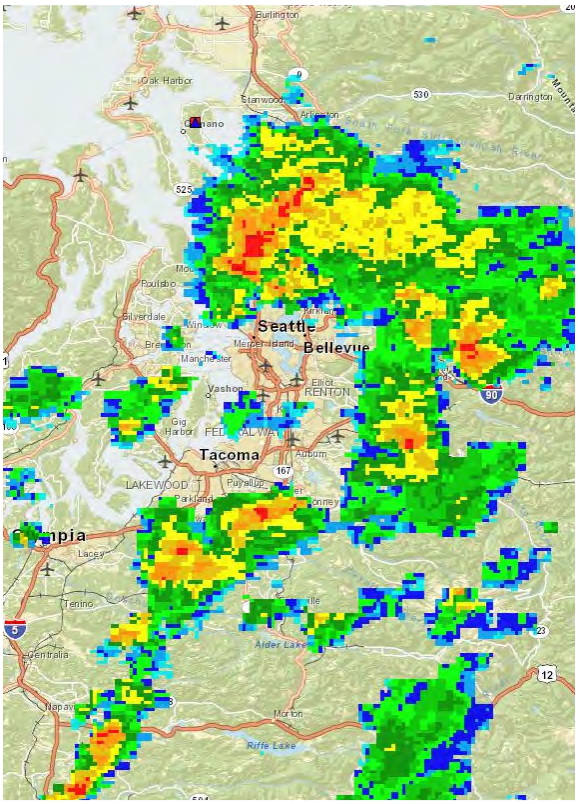
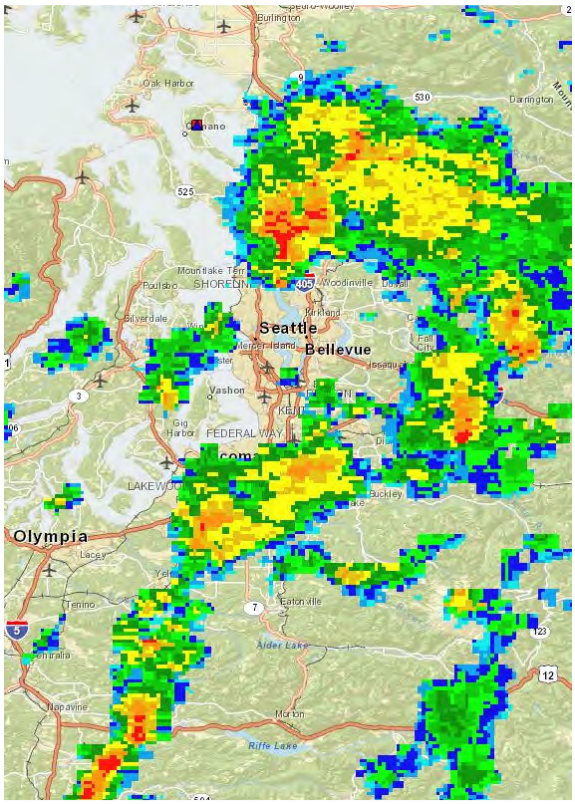


Figure 2d – Hyetograph Recorded at Rain Gage 5B (Legion Golf Course) Everett WA for Storm of June 9, 2010

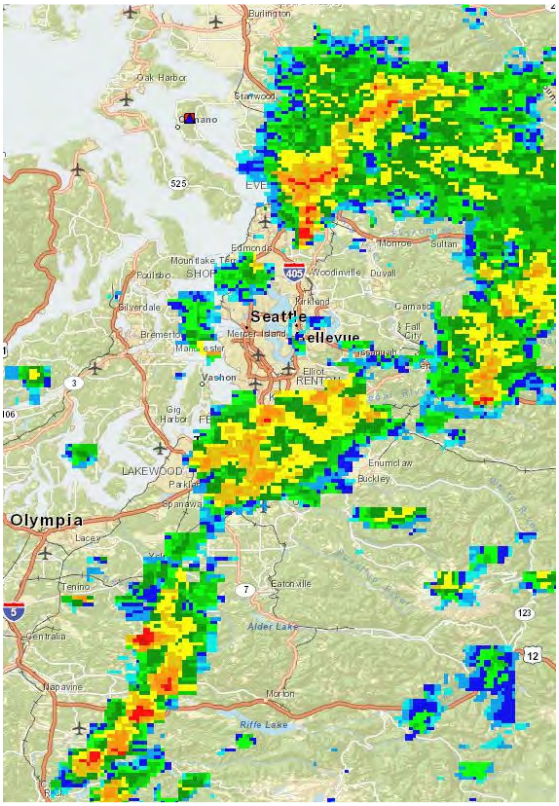


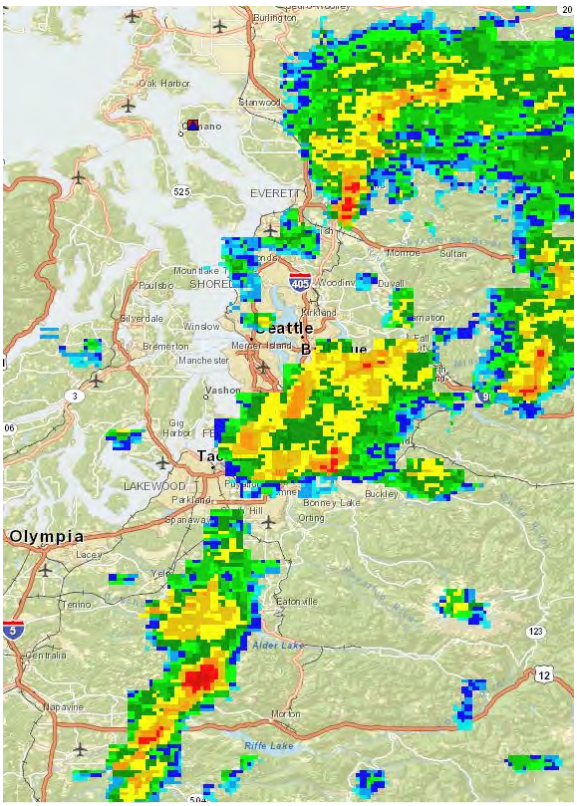
Figures 3a and 3b – NEXRAD RADAR Reflectivity Images
at 17:15 PDT and 17:30 PDT for Storm of August 29, 2013





Figures 3c and 3d – NEXRAD RADAR Reflectivity Images
at 17:45 PDT and 18:00 PDT for Storm of August 29, 2013





Figures 3e and 3f – NEXRAD RADAR Reflectivity Images
at 18:15 PDT and 18:30 PDT for Storm of August 29, 2013

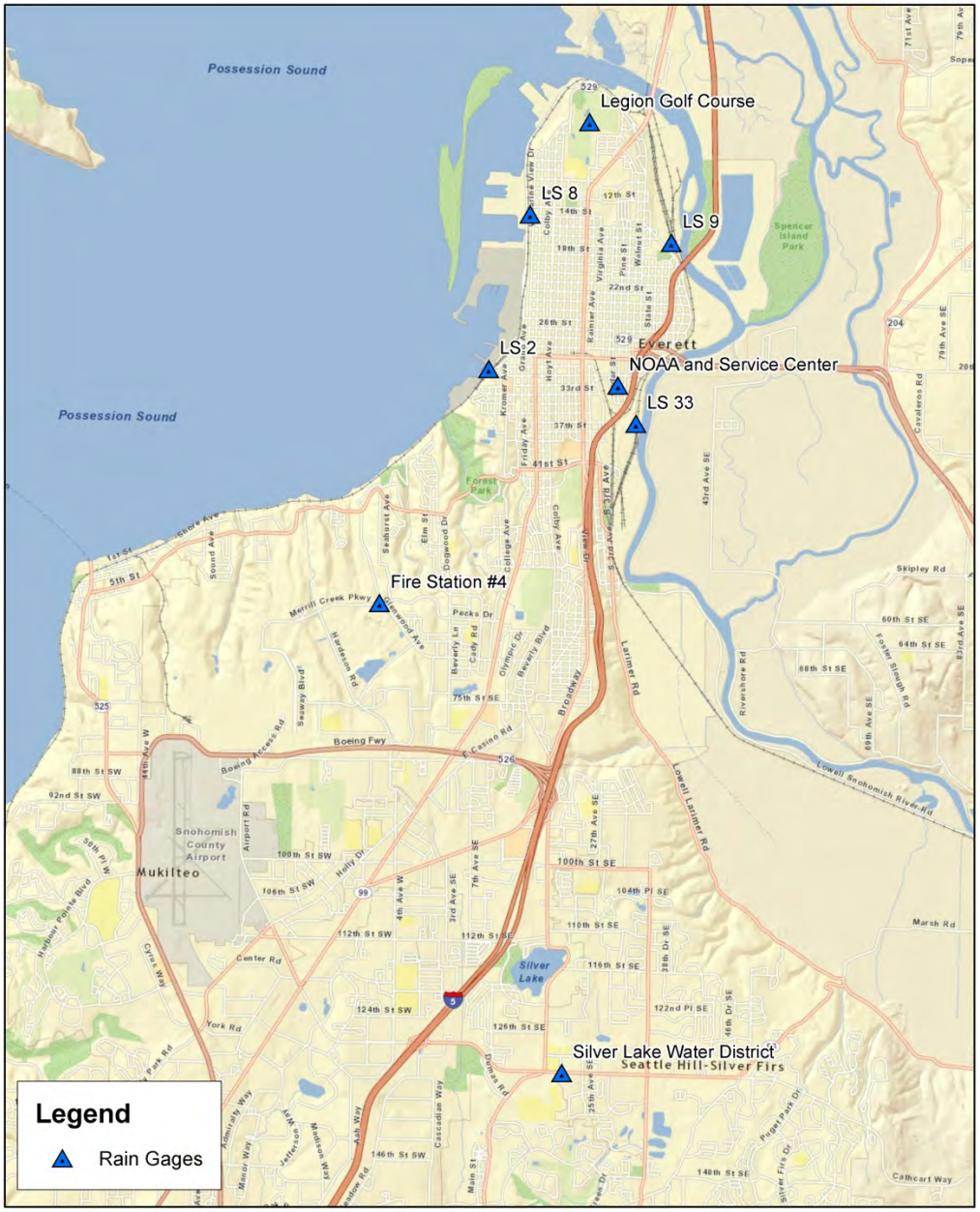


Figure 4 –Location of Rain Gages for the City of Everett

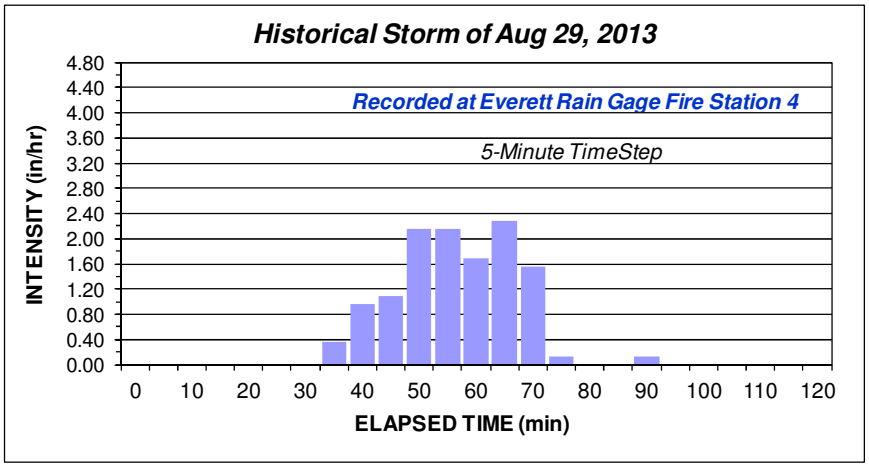


Figure 5a – Hyetograph Recorded at Fire Station 4 Everett WA for Storm of August 29, 2013

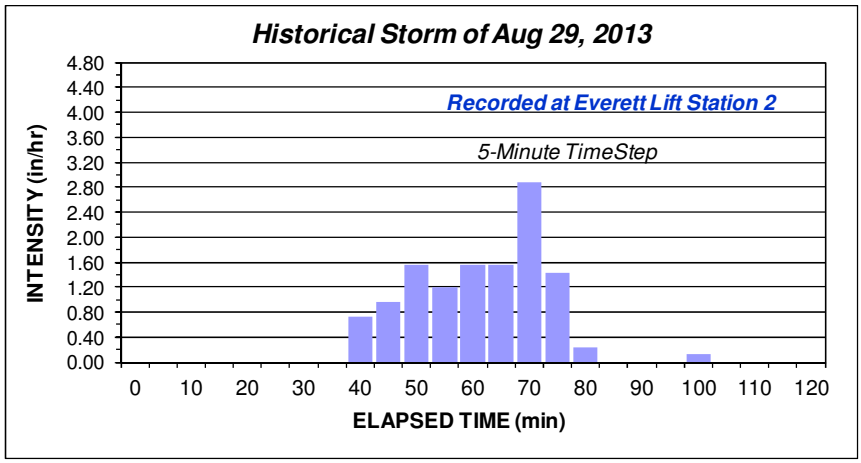


Figure 5b – Hyetograph Recorded at Lift Station 2 Everett WA for Storm of August 29, 2013

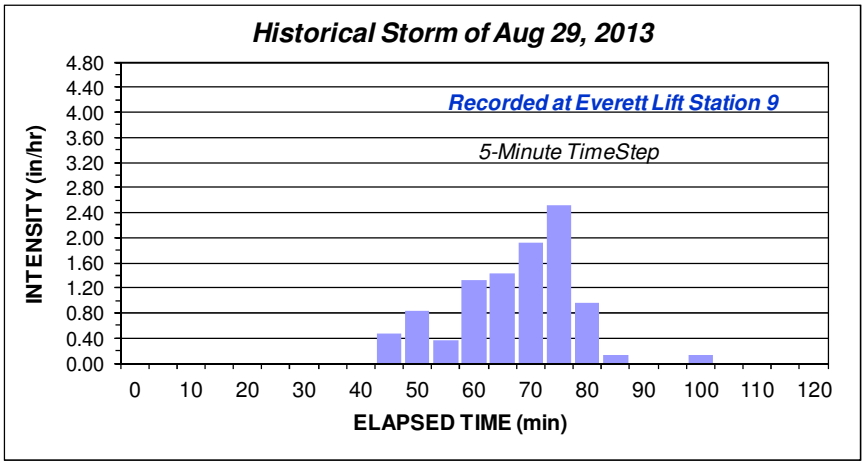


Figure 5c – Hyetograph Recorded at Lift Station 9 Everett WA for Storm of August 29, 2013

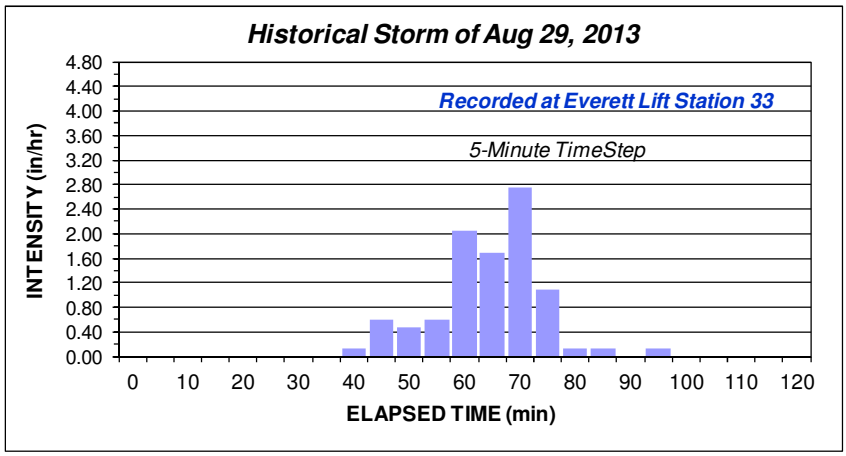


Figure 5d – Hyetograph Recorded at Lift Station 33 Everett WA for Storm of August 29, 2013

RARENESS OF THE JUNE 9, 2010 AND AUGUST 29, 2013 STORMS

It is common practice in the engineering community to compute exceedance probabilities for rare precipitation amounts observed at a measurement site and to "tag" the storm as a 10-year, or 25-year or "storm of the century". While these labels are useful for casual conversation, they are only partially helpful in characterizing the rarity of a storm. In most cases, the rarity of the runoff and resultant damages are of interest and the rarity of the storm is used as a convenient surrogate for the rarity of runoff-related problems and damages.

The reality is that storms are quite complex having both spatial and temporal components and the rarity of the storm varies with both location and duration. A review of Figures 1a-5d clearly shows the diversity of storm amounts varying by location and duration. With regard to flooding, the storm duration of interest should be something in the range of 60% to 100% of the time-of-concentration for the basin of interest. For small urban watersheds in western Washington that are sensitive to high-intensity precipitation, this criterion typically leads to a duration of interest in the range of 10-minutes to 30-minutes.

Annual Exceedance Probabilities (AEPs) and recurrence intervals were computed for a range of durations for a number of precipitation stations for the June 9, 2010 and August 29, 2013 storms (Tables 2a,b). AEPs were computed based on the findings of the 2012 Precipitation Study (Schaefer[8], HDR[1]) and the precipitation-frequency relationships applicable to the Everett Metropolitan Area are depicted in Figure 6. Recurrence interval is computed as the inverse of annual exceedance probability (1/AEP).

A review of Tables 2a and 2b demonstrates that the recurrence intervals of observed precipitation maxima vary widely for various durations and locations for each storm. Precipitation maxima are the greatest precipitation amounts for a selected duration, which may be for a specific storm or for a seasonal or annual period. Both storms produced precipitation maxima at short durations that were quite rare along the storm track of the convective cells. The highest precipitation intensities have recurrence intervals that are well beyond the conventional design targets used by municipalities for design/sizing of sewer system components.

Table 2a – Estimates Recurrence Intervals for Precipitation Maxima at Various Durations Measured at Selected Rain Gages for the Storm of June 9, 2010

RAIN GAGE	PRECIPITATION MAXIMA (in)				RECURRENCE INTERVAL (Years)			
	10-Min	15-Min	20-Min	30-Min	10-Min	15-Min	20-Min	30-Min
Lift Station 2	0.15	0.19	0.19	0.19	1.02	1.7	1.4	1.1
Lift Station 8	0.39	0.40	0.40	0.40	45	25	15	7.0
Lift Station 9	0.20	0.23	0.23	0.23	3.5	3.0	2.0	1.3
Station 5B (Legion GC)	0.55	0.70	0.84	0.86	250	425	550	400

Table 2b – Estimates Recurrence Intervals for Precipitation Maxima at Various Durations Measured at Selected Rain Gages for the Storm of August 29, 2013

RAIN GAGE	PRECIPITATION MAXIMA (in)				RECURRENCE INTERVAL (Years)			
	10-Min	15-Min	20-Min	30-Min	10-Min	15-Min	20-Min	30-Min
Fire Station 4	0.36	0.50	0.69	0.91	32	70	240	550
Fire Station 6	0.30	0.38	0.45	0.52	14	20	25	25
Lift Station 2	0.37	0.50	0.62	0.85	35	70	135	360
Lift Station 8	0.30	0.39	0.48	0.72	14	21	35	140
Lift Station 33	0.37	0.54	0.63	0.72	35	105	145	140

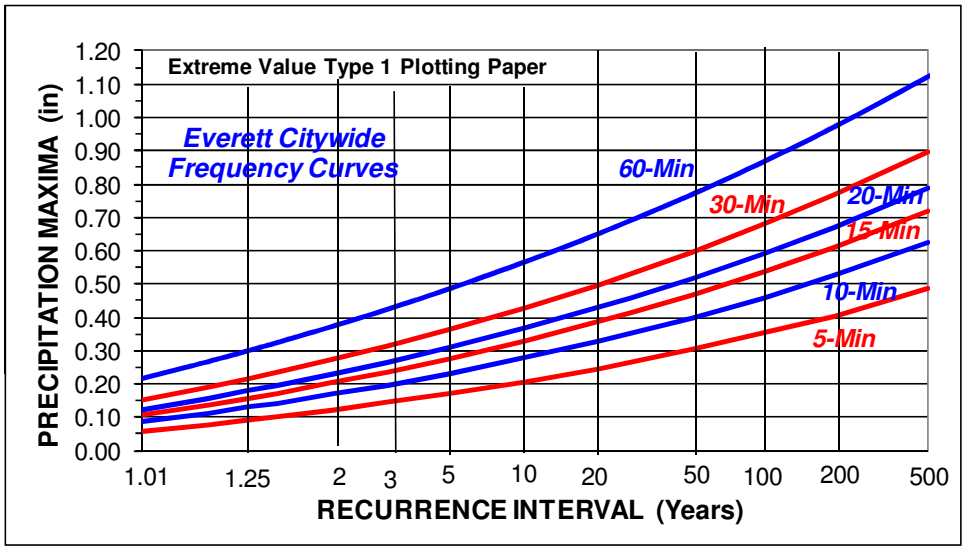


Figure 6 – Precipitation-Frequency Relationships for Precipitation Annual Maxima for Durations from 5-Minutes through 60-Minutes for Everett Metropolitan Area

CITY-WIDE LEVEL-OF-SERVICE PRODUCED BY NOMINAL 1:25 DESIGN STORM

It is common practice for municipalities in the United States to use 25-year design storm criteria for design/sizing of sewer systems. This approach generally achieves a 25-year LOS for individual neighborhoods and sections of a large city that are comparable in size to the typical areal coverage of actual storms. While a given neighborhood will typically only see one storm event exceeding the 25-year design standard in a 25-year period, a large city will experience a greater number of storm

events exceeding the precipitation magnitude for a 25-year recurrence interval. This is a direct consequence of the service area for the municipality being significantly larger than the typical areal coverage of actual thunderstorms.

As discussed in the prior sections, the typical areal coverage of high intensity precipitation from thunderstorms in the Puget Sound Lowlands is much smaller than the geographical size of the City. Short-duration high-intensity thunderstorms occur randomly in space (various locations throughout the City) and in time (chronologically). When considering the geographical size of the City, it is likely that several of these short-duration high-intensity storms will exceed the precipitation magnitude for a 25-year recurrence interval somewhere within the City in a given 25-year chronological period. Again, storm events exceeding a 25-year recurrence interval will occur over isolated areas of the City on separate dates. Thus storm-related damage claims can be expected on a higher frequency than implied by a 25-year LOS.

Overview Method of Analysis

An analysis was conducted to assess the LOS that would be achieved citywide by a nominal 25-year design standard. As discussed above, the LOS for a particular neighborhood (section of the sewer system) will be different from the LOS achieved citywide. This analysis was accomplished using the observed 1978-2012 precipitation record from the City of Seattle gaging network. The Seattle rain gage network was used because it has a long record length and includes a sufficient number/density of gages to analyze the spatial storm characteristics. Specifically, the 10 rain gages in the northern portion of Seattle (north of downtown, Figure 7) were used in the analysis where there is a rain gage network with sufficient density to capture the random occurrence of thunderstorm precipitation which is representative of the Puget Sound lowlands.

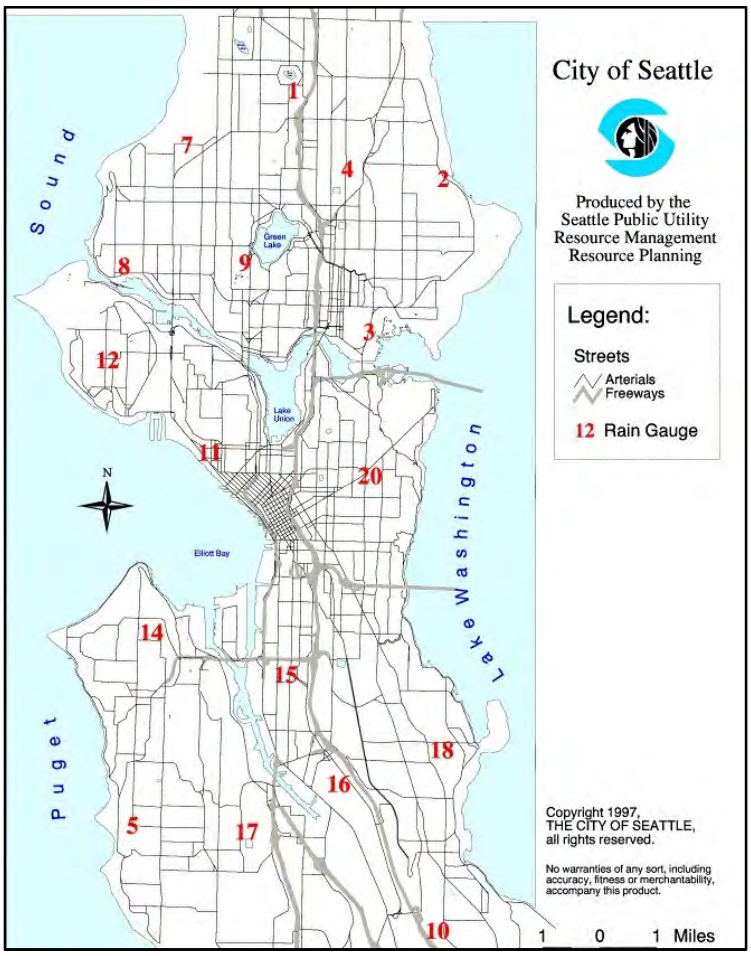


Figure 7 – Map of City of Seattle Showing Location of Rain Gages

The basic concept for the analysis can be explained by considering two extremes. If thunderstorm cells producing high precipitation intensities had extremely wide areal coverage, then the dates of occurrence of rare precipitation magnitudes would be the same for all rain gages. Conversely, if the areal coverage of thunderstorm cells with high precipitation intensities had very limited areal coverage, then none of the dates of occurrence for rare precipitation intensities would match for any of the rain gages. Therefore, the number of separate storm events exceeding a given precipitation threshold (recurrence interval) provides a means for assessing the frequency with which separate storm events can be expected to occur on a citywide basis.

Details of Method of Analysis

The 30-minute duration was taken as representative of the high intensity portion of thunderstorm precipitation which is consistent with the life-cycle of thunderstorm cells. Precipitation maxima were assembled for each of the 10 rain gages for the 35-year period (1978-2012) and the dates of occurrence were recorded. The seven largest precipitation maxima at each rain gage were selected, which corresponds to all events exceeding a nominal 5-year recurrence interval (0.37-inches). This resulted in 70 storm dates for the seven largest events at the 10 rain gages. A 5-year threshold was used rather than the 25-year threshold because there are an insufficient number of storm events exceeding the 25-year threshold to obtain a reliable estimate.

Counts were then made of the number of date matches for the 70 storm dates. Figure 8a depicts a histogram showing 44 date matches for the 70 storm events. Relatively small areal coverage of thunderstorms is indicated by the numerous instances where a thunderstorm event only affected one or two rain gages. A second case was examined by relaxing the threshold for counting of nearby rain gages where a precipitation amount of 0.30-inches or more (2.5-year recurrence interval) was sufficient for counting of a nearby rain gage (Figure 8b). Figure 8b reveals a similar picture to that of Figure 8a, thunderstorms typically only affect a small number of rain gages and thus have relatively small areal coverage. The notable exception is the storm of November 3, 1978 which exceeded a 5-year recurrence interval at 9 of the 10 rain gages.

This numerical information supports the qualitative perspective seen in the spatial storm patterns shown in the red and orange shading in Figures 1a-1f and Figures 3a-3f. Specifically, thunderstorms have relatively small areal coverage. Consequently, there will be several thunderstorms in a 25-year period that exceed the precipitation amount corresponding to a 25-year recurrence interval when considering an area size that dramatically exceeds the areal coverage of a typical thunderstorm, such as the City of Everett service area.

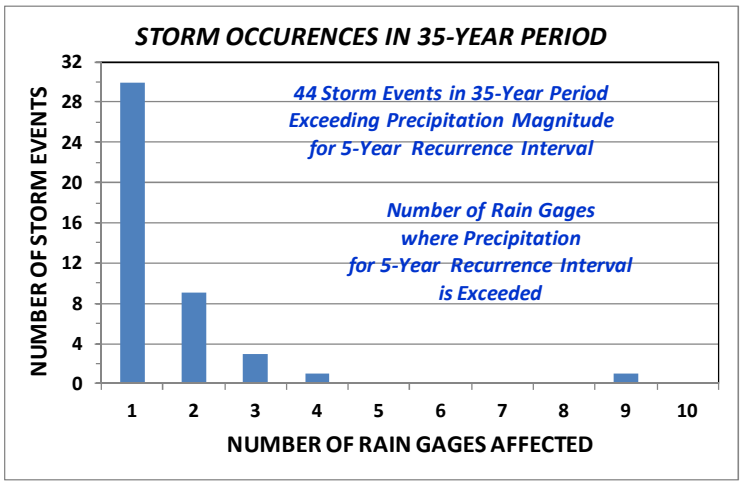


Figure 8a – Histogram of the Number of Storm Events at the 30-Minute Duration Exceeding a 5-Year Recurrence Interval and Being Recorded at Multiple Rain Gages

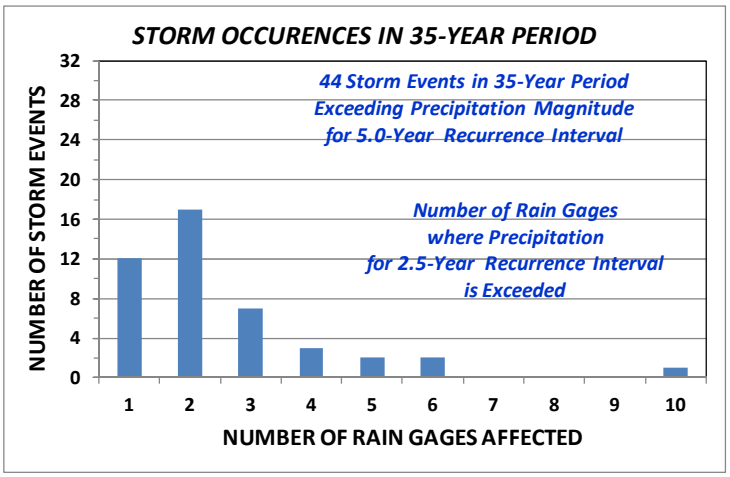


Figure 8b – Histogram of the Number of Storm Events at the 30-Minute Duration Exceeding a 5-Year Recurrence Interval and the Number of Nearby Rain Gages Recording Precipitation of a 2.5-Year Recurrence Interval or Greater

Level-of-Service Achieved by 25-Year Design Criteria

A design storm with a 25-year recurrence interval is commonly used by municipalities for sizing pipe networks in sewer systems. The level-of-service achieved by this standard is dependent upon the geographic size of the municipality and the typical areal coverage of storms. For the City of Everett, prior analyses have demonstrated that the high intensity portion of thunderstorms affecting the City have small areal coverage relative to the geographical size of the City.

The increased rate of thunderstorm exceedances of the design criteria can be inferred from the exceedance information developed for the 5-year recurrence interval storms in the preceding section. This rate is estimated as the actual number of separate storms exceeding the 5-year threshold (44) divided by the expected number of exceedances for a single site (35-years record/5-yr recurrence interval =7 separate storms), proportioned by the size of the City of Everett relative to the size of northern Seattle (0.67). This yields an estimated rate of exceedances of about four times the target rate of a 25-year recurrence interval.

Therefore, it is estimated that if all of combined sewers in the City were designed/sized to accommodate flows associated with a short-duration high-intensity thunderstorm with a 25-year recurrence interval, then the capacity of some portion of the sewer system would be expected to be exceeded about once every 6-years on-average. This corresponds to the multiplying factor of four computed above relative to the 25-year recurrence interval target (25-years divided by 4 equates to approximately 6-years).

If City officials wanted to achieve a citywide LOS where the frequency of storm/runoff-related damage claims for the entire City was once in 25-years, then a 100-year recurrence interval design criteria for short-duration high-intensity storms would be required.

SCALABLE DESIGN THUDERSTORMS

In design/sizing of pipe networks for the combined sewer systems it is common practice to use design storms. The runoff from these design storms may be analyzed individually using event hydrologic models. Alternatively, many design storms may be embedded within precipitation time-series for use with continuous hydrologic models. This latter approach was taken by HDR[1] where historical storms of various magnitudes, intensities and durations were embedded in the precipitation time-series obtained from the rain gage at Silver Lake (Figure 4). Scalable design storms may be either historical design storms or synthetic design storms. Historical storms are actual storm events recorded at a rain gage in a climatic location representative of the location where the historical storm is to be applied. Synthetic design storms are developed using statistics and storm characteristics obtained from a sample of historical storms.

Figures 9a-9g depict historical thunderstorms recorded in the Puget Sound lowlands whose temporal patterns may be used as design storms. These storms can be scaled (ordinates multiplied) by precipitation amounts for the 30-minute duration corresponding to a user-specified recurrence interval (Figure 6, Table 3). MGS has provided Excel workbooks for automatic scaling of the eight historical storms shown in Figure 9a-9g.

Similarly, the synthetic design storm shown in Figure 10 was developed for the City of Seattle in 2003 (Schaefer[5]) using historical data on thunderstorms recorded from the Seattle network of 17

rain gages. A separate Excel workbook has been provided for automatic scaling of the synthetic storm and Figure 10 shows an example of scaling using a 30-minute precipitation maxima of 0.68-inches which corresponds to a 100-year recurrence interval (Table 3).

Table 3 – Precipitation-Frequency Estimates for 30-Minute Duration Applicable to City of Everett

30-MINUTE PRECIPITATION MAXIMA (in)							
RECURRENCE INTERVAL (Years)							
2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	200-Yr	500-Yr
0.30	0.37	0.43	0.52	0.60	0.68	0.77	0.90

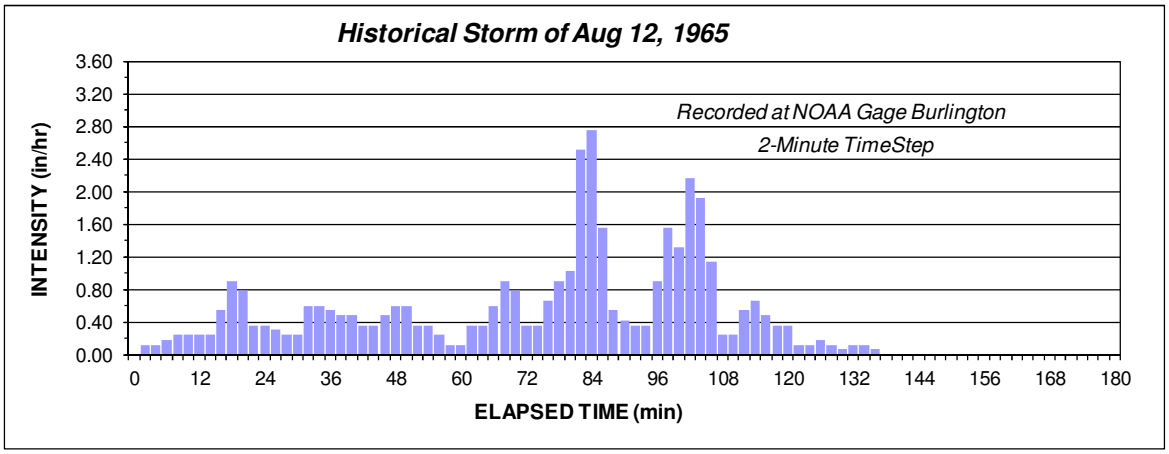


Figure 9a – Historical Storm of August 12, 1965 Recorded at NOAA Station at Burlington WA

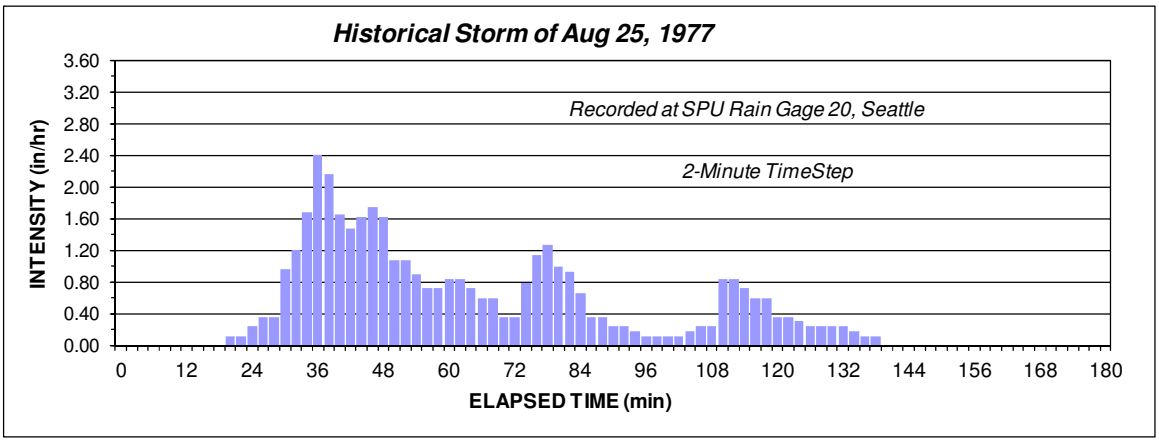


Figure 9b – Historical Storm of August 25, 1977 Recorded at Seattle Rain Gage RG20

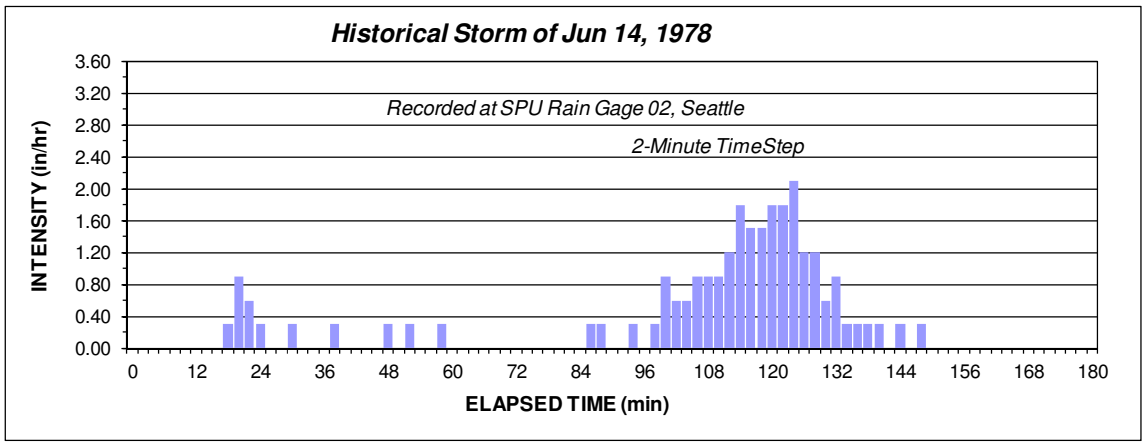


Figure 9c – Historical Storm of June 14, 1978 Recorded at Seattle Rain Gage RG02

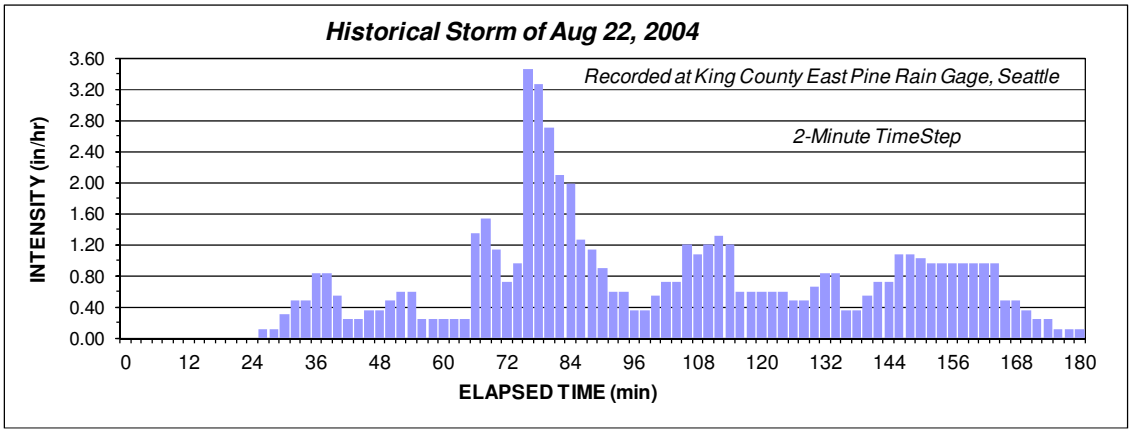


Figure 9d – Historical Storm of August 22, 2004 Recorded at King County East Pine Station

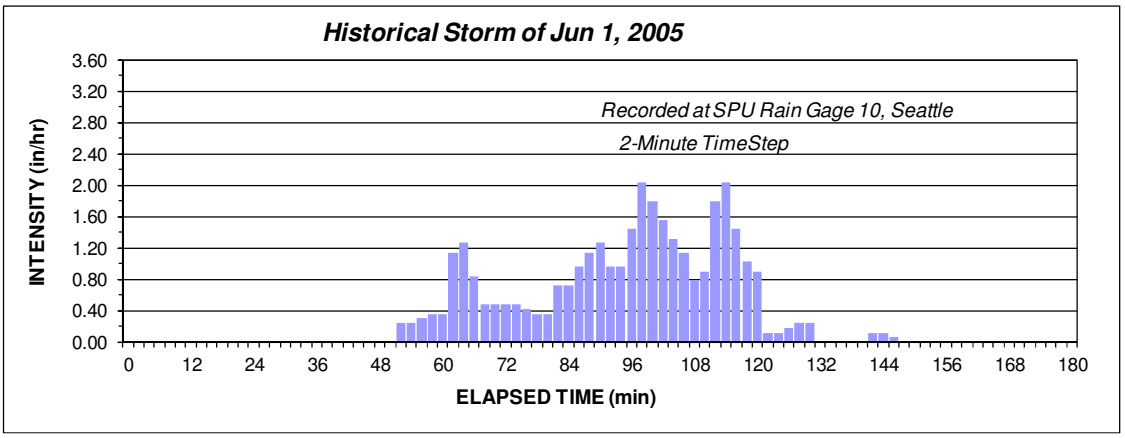


Figure 9e – Historical Storm of June 1, 2005 Recorded at Seattle Rain Gage 10

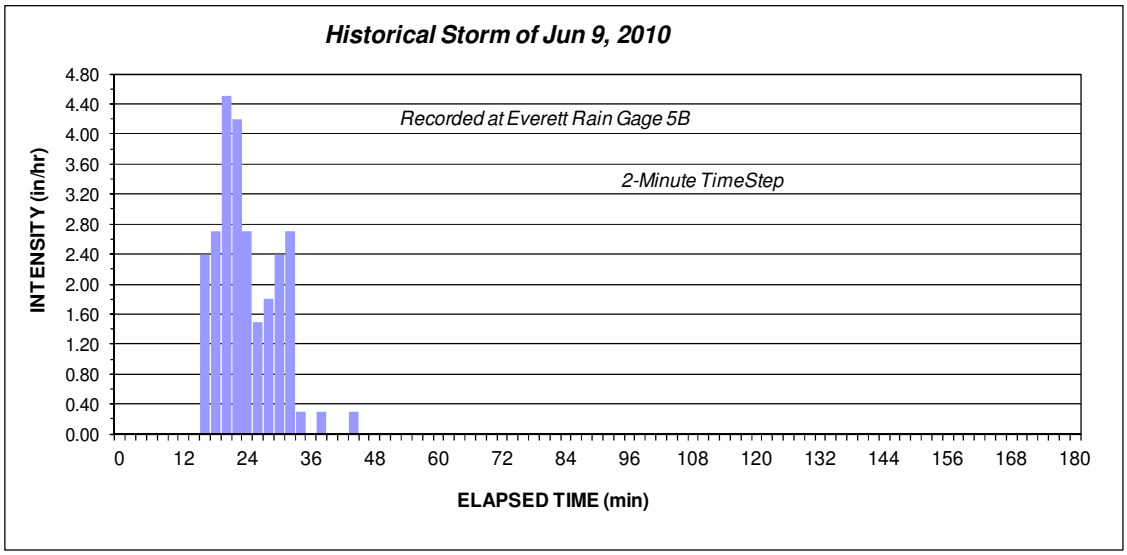


Figure 9f – Historical Storm of June 9, 2010 Recorded at Everett Rain Gage 5B (Legion GC)

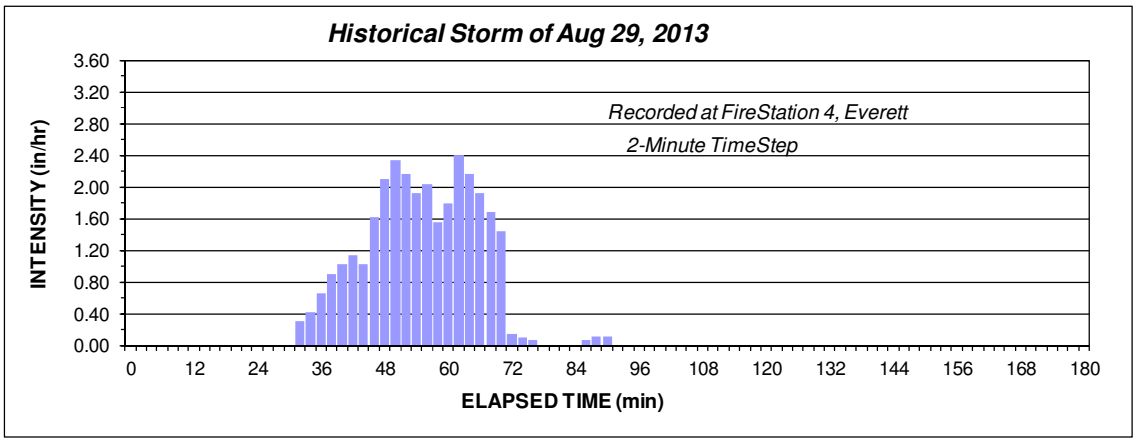


Figure 9g – Historical Storm of August 29, 2013 Recorded at Everett Fire Station 4

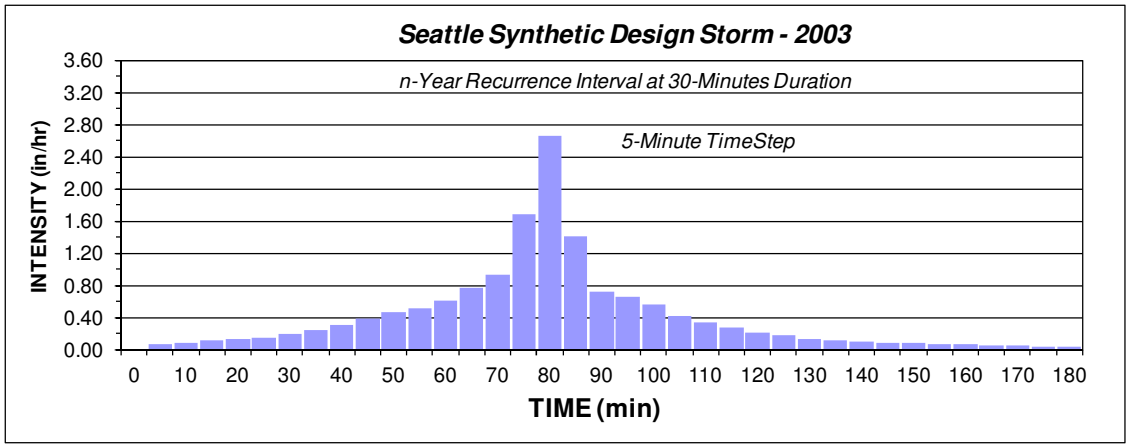


Figure 10 – Seattle Synthetic Design Storm Scaled to 100-Yr Recurrence Interval at 30-Minutes Duration

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1. HDR, Technical Memorandum, Everett Sewer Comprehensive Plan Rainfall Time-Series Memorandum, Peterson J, Bergstrom E, and Drangsholt S, January 2012.
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4. Schaefer MG, Barker BL, Taylor GH and Wallis JR, Regional Precipitation-Frequency Analysis and Spatial Mapping for 24-Hour and 2-Hour Durations for Western Washington, MGS Engineering Consultants and Oregon Climate Service for Washington State Dept. of Transportation, March 2002.
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7. Schaefer MG, Update of Characteristics of Extreme Precipitation Events in Washington State, Washington State Department of Ecology, Water Resources Program, September 2007.
8. Schaefer MG, Technical Memorandum, Assessment of the Precipitation Time-Series from Silver Lake WA for Rainfall-Runoff Modeling of Stormwater and Combined Sewer Systems in Everett WA, Prepared for HDR and City of Everett, January 29, 2012

Rainfall Time Series Memorandum

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Everett Sewer Comprehensive Plan
Rainfall Time Series Memorandum

To:	Souheil Nasr	**Date:**	February 24, 2012
From:	Jim Peterson, Eric Bergstrom, and Steven Drangsholt	**Project:**	Everett Comprehensive Sewer Plan
cc:		**Proj. No.:**	HDR: 157248 City: CON0061212

Subject: Task 600 Comprehensive Sewer Plan long-term rainfall time series recommendation

1.0 Introduction

As part of the 2012 Comprehensive Sewer Plan Update, the City wants to define a long-term rainfall record that will be used to model and analyze the collection system. After reviewing and evaluating available data, project team member, Mel Schaefer of MGS Engineering Consultants (MGS) prepared a January 29, 2012 memorandum *"Assessment of the Precipitation Time-Series from Silver Lake WA for Rainfall Runoff Modeling of Stormwater and Combined Sewer Systems in Everett WA"*. That memorandum is referenced and attached to this Task 600 memorandum.

This memorandum provides information regarding the criteria used for the selection of the rainfall record; summarizes the characteristics of the rain gages that were indentified and considered; compares some of the overlapping data from the available gages; describes the rationale for selecting and adjusting the long-term rain gage data; and makes recommendations for adjusting the selected long-term rainfall data to account for climate change through the year 2100 planning horizon. This memorandum also describes how the adjusted long-term rainfall data was used to determine levels of service (LOS) within the Everett sewer system.

2.0 Summary of Memorandum Conclusions

- The 24-year Silver Lake rain gage rainfall record – with scaling of the data to account for gage measurement characteristics, is suitable and has been selected for use in modeling the Everett sewer system.
- To better correspond to other long-term rainfall records for Everett and other Puget Sound Lowlands gages, the Silver Lake data (any measured rainfall greater than 0.01 inch) was uniformly reduced by 10 percent. This adjusted data will be used for the current LOS analysis.
- A comparison with short-term data from other local gages does not show any clear pattern of rainfall variation based upon gage location, but is suitable for helping to verify and calibrate the model.
- Rainfall volumes based upon adjusted Silver Lake and other long-term rain gage information for a 25-year recurrence interval storm vary from 0.26 inches for a five-minute storm event to 2.66 inches for a 24-hour event. Table 6-1 summarizes other recurrence intervals and durations.
- To account for climate change to a year 2100 planning horizon for the future LOS, the Silver Lake rainfall volumes were readjusted upward by between 9 percent (nearly equivalent to the raw Silver Lake data) in the winter months and 18 percent (8 percent increase over the raw Silver Lake data) during the summer months.

- Using the City's no surcharge criterion, the following number of surcharges in each pipe during the 24 year rainfall record will be used to define the LOS for each pipe (see Section 8.0):
    - Zero or one surcharge – greater than 25 year LOS.
    - Two surcharges – 10 to 25 year LOS
    - Three to five surcharges – 5 to 10 year LOS
    - Six or more surcharges – less than 5 year LOS

- To decrease model run times, approximately 14 of the largest combined storm events (containing 36 storms) within the 24 years of record are used in continuous simulation InfoSWMM model.
- To account for antecedent conditions, any rainfall that occurred within seven days prior to the beginning of the rainfall event is added to the record for that event and used in the model simulation.

3.0 Long-term Rainfall Time Series Data Criteria

The rainfall data that will be used for the long-term combined/sanitary sewer analysis must meet the following five criteria:

1. Provide a nearly continuous minimum 25 year record.
2. Record rainfall in 15-minute or shorter time steps.
3. Be located within or as close as possible to the City of Everett.
4. Record rainfall in 0.01 inch increments.
5. Be a well-maintained gage with consistent data integrity.

These criteria were used in the review and selection of the rainfall data to be used in the modeling analysis.

4.0 Characteristics of Considered Rain Gages

The following Figure 4-1 shows the locations of the local Everett rain gages that were considered for use in the modeling analysis of the combined and separated sewer systems. The long term Haller Lake gage was also considered, but is too far south to show on the figure. Table 4-1 summarizes the characteristics of these rain gages.

Figure 4-1. Local Rain Gage Locations

Table 4-1. Local Available Rain Gage Characteristics					
Gage Name Location	**Owner/ Maintainer**	**Relative Location***	**Period of Record**	**Increment (in) / Time Step (min)**	**Data Integrity/ Notes**
Multiple-Year Data					
Haller Lake	City of Seattle	19 mi SSW	11/3/70 to 12/29/07	0.01 / 5	Good long-term data but far from Everett
Silver Lake former office Silver Lake WD	Snohomish Co.	6.7 mi S	11/21/87 to current	0.01 / on tip	Consistent and well maintained data set
FS No. 4	SFE	3 mi SW	2/2009 to current	0.01 / 10	No data from 9/2009 to 1/2010
NOAA Gage 45-2675	NOAA	0 (City Service Center)	1941-2009	0.1 / 15	Long term record but not to .01 or 5 min
Service Center	City	0	8/1997 to current	0.01 / 10	Contains some negative values
Legion GC	SFE	2.6 mi N	2/2009 to current	0.01 / 1	Consistent record
2011 Only Data					
LS No. 8	SFE	1.9 mi NW	4/2011 to current	0.01 / 5	Limited data
LS No. 2	SFE	1.3 mi WNW	4/2011 to current	0.01 / 5	Limited data
LS No. 9	SFE	1.5 mi NNE	4/2011 to current	0.01 / 5	Limited data
LS No. 33	SFE	0.5 mi S	4/2011 to current	0.01 / 5	Limited data

* Approximate distance and compass direction from the City of Everett Service Center

As described in Section 6.0, MGS used the 1941-2009 precipitation record from NOAA cooperative Station 45-2675 located next to the City gage at the Everett Public Works Service Center and data from 300 other regional Puget Sound Lowlands gages to define the long-term precipitation-frequency characteristics (the Everett Regional Solution) for the Everett sewer system area. This methodology is further described in the attached MGS memorandum.

5.0 Rainfall Data Comparisons

5.1 Rainfall Gage / Data Selection

Only two of the gages, Haller Lake and Silver Lake met the long-term, nearly continuous 25-year record, with short time steps, and consistent data integrity criteria. Haller Lake has a longer period of record (approximately 40 years), but is located in north Seattle approximately 19 miles south of the center of the City of Everett's Service Center. The Silver Lake gage is only about seven miles south of the Service Center and provides a continuous nearly 24-year record.

The Silver Lake gage also meets the remaining three criteria: short time steps (5 minute), recording rainfall to the 0.01 inch, and consistent data integrity. Because of the better geographic proximity to the City's sewer system – and proximity to other City maintained shorter-term gages – using the Silver Lake rainfall data is recommended for this analysis.

Therefore, the following local rain gage raw data comparisons are with the Silver Lake gage raw data.

In the following sections, the data from these seven short term gages and the NOAA gage at the Service Center is compared to concurrent period Silver Lake gage data to determine the typical variations in recorded rainfall in the local City of Everett sewered area. Data from these gages – along with flow monitoring data, should be suitable for helping to verify and/or calibrate hydraulic modeling results.

5.2 Local Rain Gage Data Comparisons

This section presents a comparison of local rain gage data that may be used to help validate and calibrate the sewer system model.

Periods of overlapping data for the above local short and long-term (Silver Lake) gages were compared to determine if there were any clear patterns or tendencies in the rainfall intensities or volumes that depended upon the rain gage location.

Data from Jan 2009 through June 2011 were compared for overlapping records between Silver Lake, FS No. 4, Service Center, NOAA (at the Service Center) and Legion GC gages. The following graphs show the monthly rainfall accumulations at the five gages. For each month, the gages are shown in order left to right from the most southern gage (Silver Lake) to the most northern gage (Legion GC).

Figure 5-1 shows that during 2009, the Silver Lake rain gage frequently recorded more rainfall each month than other gages in the vicinity. Silver Lake recorded an average of up to 20 percent more recorded rainfall than FS No. 4, up to 30 percent more than the Service Center and up to 40 percent more recorded rainfall than Legion GC on a monthly basis. These differences were most significant during the wet weather months of October and November. Rainfall measurements at Silver Lake were often similar to those measured at the NOAA gage.

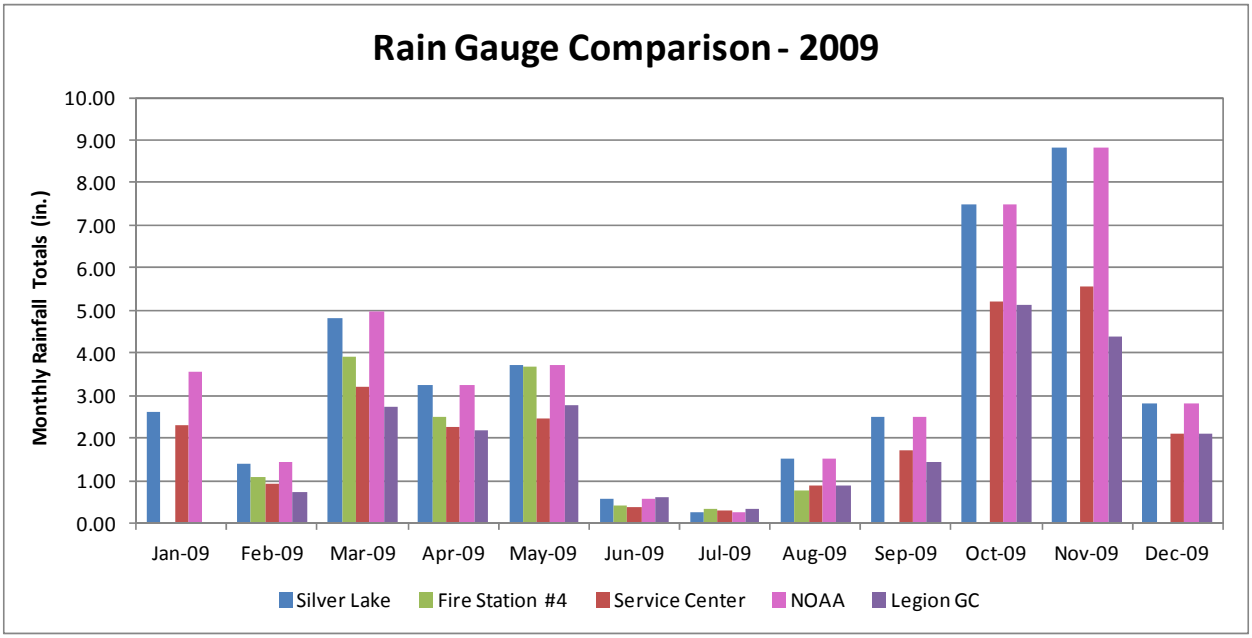


Figure 5-1. Rain Gage Comparison for 2009

Figure 5-2 shows that during 2010, the Silver Lake rain gage also typically recorded more monthly rainfall than other local gages. Silver Lake received an average of approximately 20 percent more rainfall than FS No. 4 and the Service Center, and approximately 40 percent more

rainfall than Legion GC. The largest differences were in January and December. Typically, the Silver Lake gage recorded monthly rainfall volumes that were similar to the NOAA gage.

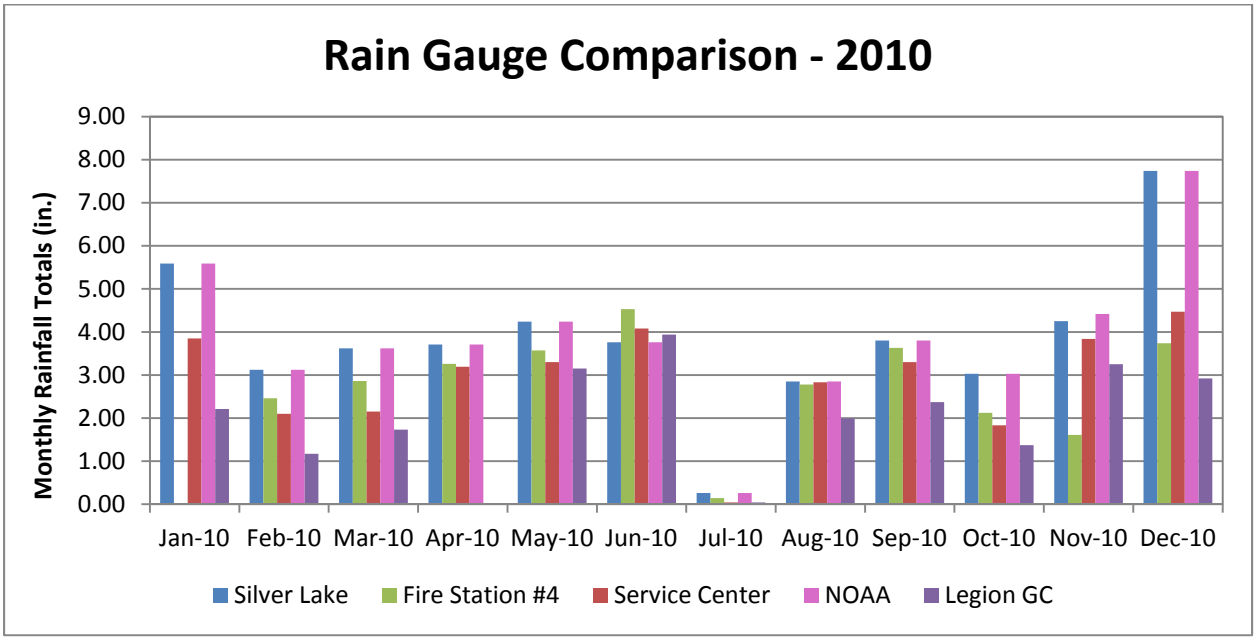


Figure 5-2. Rain Gage Comparison for 2010

Figure 5-3 shows that during the first six months of 2011, the Silver Lake rain gage does not indicate as significant a difference in monthly recorded rainfall from other local gages. During February and March, the Fire Station No. 4 gage, unlike the previous two years, recorded substantially more rainfall than the Silver Lake gage. The NOAA data is only through June 17th.

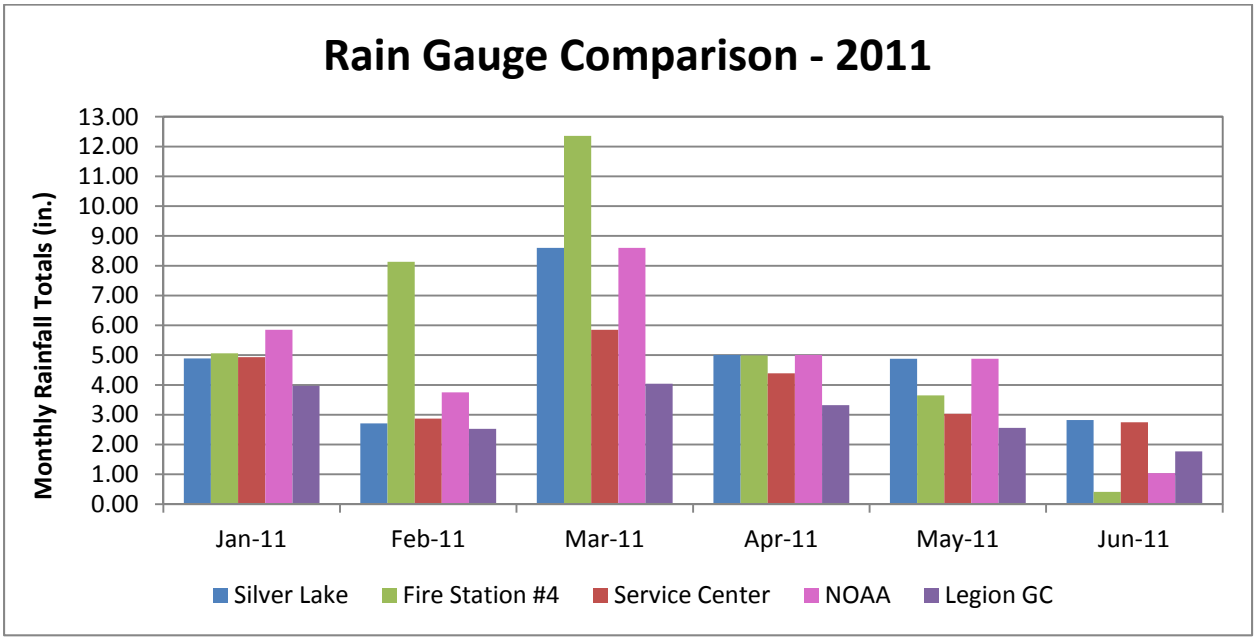


Figure 5-3. Rain Gage Comparison for 2011

Figure 5-4 shows a comparison of the Silver Lake gage to Fire Station No. 4, the Service Center, NOAA (through June 17th), and the Legion gages, as well as overlapping rain gage data from Lift Stations No. 2, No. 8, No. 9 and No. 33. Except during the month of May, there does not appear to be a discernible pattern from the limited amount of data or spatial representation of the recorded rainfall across the gages. The FS No. 4 gage did not record any rainfall between June 3rd and July 3rd; however, based upon the other local gages, there does not appear to have been any significant rainfall during that time period.

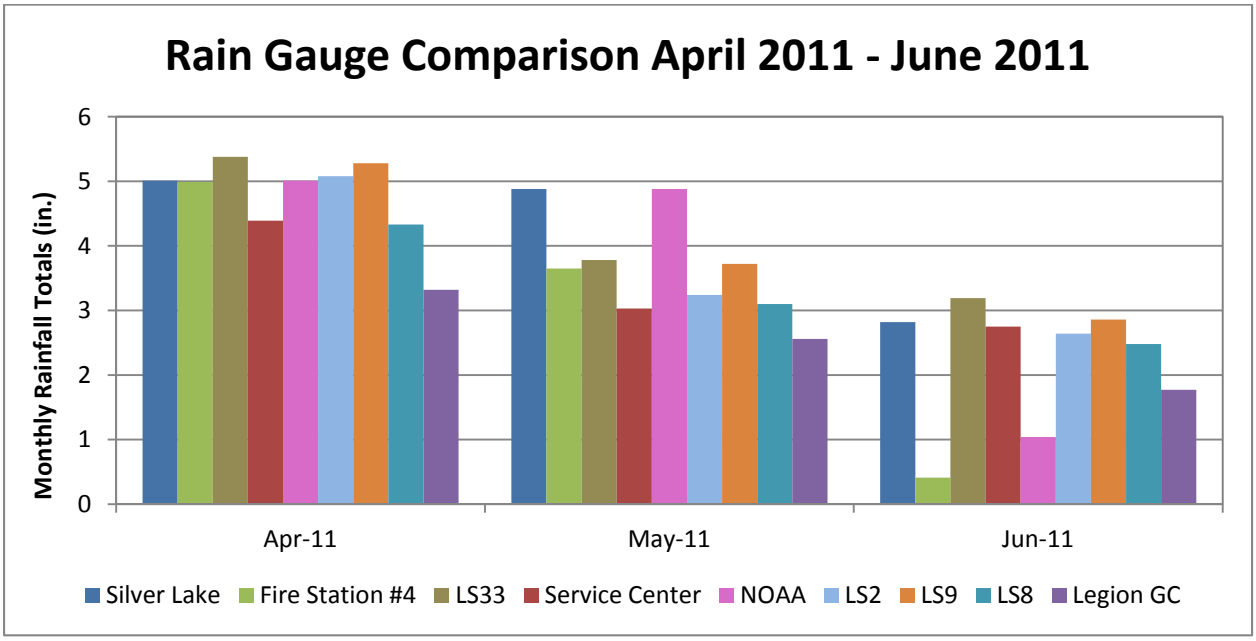


Figure 5-4. Rain Gage Comparison for 2011 – Additional LS Gages

The difference between these last two data comparisons from the first two comparisons illustrate that it is difficult to reach any conclusions regarding any trends in local sewered area rainfall intensities based upon comparing these short periods of record for local gages.

5.3 Potential Reasons for Data Differences

There are a number of factors that can influence rain gage data, including the following:

- Sampling and rainfall variability during these short term records
- Rain gage location and screening – wind currents may cause under reporting
- Freezing or plugging – may result in skewed or under reported rainfall
- Gage mechanical, calibration, or data logging failure

Since it cannot be reliably determined which of these factors would cause variations between local rain gage data, MGS compared and adjusted the Silver Lake record by doing a statistical comparison with other long-term records for the NOAA Service Center gage as well as multiple gages in the western Washington Puget Sound Lowlands. Section 6.0 summarizes the Silver Lake data adjustments methodology. The details of MGS rainfall analysis and adjustment of the Silver Lake data is described in the attached MGS memorandum.

6.0 Silver Lake Rainfall Data Adjustments

Based upon a comparison of overlapping local rainfall data, it is apparent that rainfall intensities and volumes for any particular storm event can vary between the Silver Lake gage and other rainfall gages in Everett area. As discussed above, for this short period of overlapping record, it is difficult to determine any clear trends or the reasons for these variations. The reasons are likely a combination of varying rainfall intensities of the measured storms at each gage as well as the characteristics of the gages.

Rather than rely on these short term comparisons, MGS has compared the Silver Lake data to 69 years of record from NOAA cooperative station 45-2675 (located at the City Service Center) and more than 300 other Puget Sound Lowlands gages with long-term records. MGS used this information to develop the Everett Regional Solution graphs shown in the attached memorandum.

The Silver Lake data was compared to the Everett Regional Solution. The Silver Lake gage data matched the shape of the longer-term records, but the Silver Lake rainfall magnitudes were consistently somewhat greater than expected. The reasons for the differences may be due to sampling variability, wind effects, the physical location of the gage, and/or calibration.

Based upon this information, MGS uniformly adjusted the Silver Lake gage measured rainfall amounts exceeding 0.01-inch downward by ten percent so that the Silver Lake data better-matched rainfall magnitudes and patterns from the statistically developed Everett Regional Solution. The details of this analysis and figures recurrence intervals graphs of various storm durations are presented in the attached MGS memorandum. Table 6-1 summarizes the rainfall volumes and recurrence intervals for the Everett Regional Solution from the MGS memorandum.

Table 6-1.
Year 2012 Climate Everett Regional Solution Rainfall Volumes for Various Recurrence Intervals and Durations

Storm Duration	Rainfall Volumes (inches)						
	2-year	5-year	10-year	25-year	50-year	100-year	500-year
5-minutes	0.14	0.18	0.20	0.26	0.31	0.35	0.49
15-minutes	0.23	0.29	0.33	0.40	0.47	0.53	0.72
1-hour	0.41	0.50	0.57	0.68	0.77	0.87	1.12
2-hours	0.58	0.70	0.79	0.93	1.04	1.15	1.45
6-hours	0.92	1.08	1.20	1.38	1.51	1.64	1.96
24-hours	1.67	2.02	2.28	2.66	2.97	3.28	4.05

7.0 Climate Change Rainfall Impacts

In June of 2011, Clear Creek Solutions, Inc. (CCS) prepared a “Climate Change Impacts on Stormwater” memorandum for Otak under a stormwater planning contract with the City of Everett. This memorandum, which is attached for reference, cited climate model research by the University of Washington – Center for Science in the Earth System Climate Impacts Group which had selected three climate models to represent the range of warming impacts in the Pacific Northwest.

CCS recommended the middle range climate change model and then referenced the United States Environmental Protection Agency (EPA) Climate Assessment Tool (CAT) to modify precipitation and air temperature data.

Based upon their interpretations and uses of these models, CCS recommended the following increases in precipitation that would gradually occur over the next 88 years (until year 2100):

- Winter months (November through March): increase 2100 precipitation by 9 percent.
- Summer months (April through October): increase 2100 precipitation by 18 percent.

After a review of these findings and of historical short-duration precipitation characteristics for the Puget Sound Lowlands, MGS concluded that seasonal characteristics transition more smoothly between winter and summer months. Therefore, for the year 2100 planning horizon, MGS recommended increasing the Silver Lake adjusted data (after raw data was reduced by 10 percent to represent year 2012 rainfall) by the following percentages to account for climate change:

- Winter (Dec-Mar) increase by 9 percent
- Transition months (Oct-Nov, Apr-May) increase by 13.5 percent
- Summer (Jun-Sep) increase 18 percent

More details of the reasoning for this recommendation are presented in the attached MGS memorandum. Based upon that recommendation, MGS then used these percentages to seasonally adjust the rainfall precipitation-frequency relationships for planning year 2100. The MGS memorandum discusses the methodology and presents figures comparing the current and future relationships.

Table 6-2 summarizes the MGS climate change seasonally adjusted rainfall volumes and recurrence intervals for the Everett Regional Solution for planning year 2100.

Table 6-2.
Year 2100 Climate Everett Regional Solution Rainfall Volumes for Various Recurrence Intervals and Durations

Storm Duration	Rainfall Volumes (inches)						
	2-year	5-year	10-year	25-year	50-year	100-year	500-year
5-minutes	0.16	0.20	0.24	0.30	0.35	0.41	0.56
15-minutes	0.26	0.33	0.38	0.47	0.55	0.62	0.83
1-hour	0.47	0.57	0.65	0.78	0.89	1.00	1.29
2-hours	0.66	0.80	0.90	1.07	1.19	1.33	1.66
6-hours	1.04	1.23	1.30	1.56	1.71	1.86	2.22
24-hours	1.86	2.25	2.53	2.97	3.30	3.65	4.51

8.0 Use of Rainfall Data for Sewer System Analysis

This section describes how the adjusted Silver Lake rainfall record was used to determine the level of service (LOS) of the City of Everett's collection system pipes.

Based upon directions from the City during a LOS workshop, the LOS provided by pipes within the sewer collection and interceptor systems was divided into the following four categories:

- Pipes with a greater than 25-year LOS
- Pipes with between a 10 and 25-year LOS
- Pipes with between a 5 and 10-year LOS
- Pipes with less than a 5-year LOS

8.1 Background

A recurrence interval, also known as a return period, is an estimate of the interval of time between events such as earthquakes, floods, and rainfall. In this case, the recurrence interval or return period is for a particular flow in the pipes of the City's sewer collection and interceptor systems.

The recurrence interval is the inverse of the probability of an event. For example, if a flow event has a 10-year recurrence interval, typically referred to as the 10-year flow, that event has a one in ten chance (10 percent chance) of occurring in any given year. A 10-year recurrence interval for a flood does not mean that flood will happen once every ten years; rather 10-year recurrence internal means that the flood has a ten percent chance of occurring in any year.

There are a two primary equations used for calculating recurrence interval (T_r):

Gringorten's Equation

$$T_r = \frac{n+0.12}{m-0.44}$$

Weibull's Equation

$$T_r = \frac{n+1}{m}$$

Where, *n* is the number of years of data and *m* is the rank of an event from largest to smallest. (Linsley 1982).

These equations produce similar results; however, the Gringorten's equation gives longer return periods for higher events in a series and recognizes that the "true" return period of the event is likely longer than the recurrence interval indentified by the Weibull's equation. Because it provides a better representation of actual return intervals, most notably for the larger events, the Gringorten equation was used for this analysis.

8.2 LOS Analysis Methodology

To establish the LOS for the City's collection system pipes, an InfoSWMM hydrologic and hydraulic computer model was used to simulate sewer flows under wet-weather conditions. The adjusted 24-year rainfall data series from the Silver Lake rain gage was used to simulate the wet-weather conditions. The Silver Lake gage rainfall time series contains a range of storms (high-intensity, short-duration, and large-volume long-duration) that are representative of the rainfall pattern and volume that would be experienced by the City of Everett.

The collection system pipe network within the InfoSWMM model contains pipe diameters, invert elevations at manholes, and pipe slopes. To meet the City's criterion of no surcharging above the crown of the pipe, an "event" has been defined as a flow that causes the water level in the pipe to rise to the pipe crown (water depth "d" over pipe diameter "D": d/D = 1.0). The LOS recurrence interval for any particular pipe will be determined based upon the number of times that flow exceeds the elevation of the pipe crown.

Table 8-1 shows the recurrence interval for various event ranks down to a one year recurrence interval for the 24 year Silver Lake rainfall data. A pipe color coding similar to that shown in the table will be used in the modeling graphics to describe the LOS for each modeled pipe.

Table 8-1. Recurrence Interval for 24 years of Silver Lake Data			
	Gringorten's Equation	Weibull's Equation	
Event Rank (m)	Recurrence Interval (T_r) LOS	Recurrence Interval (T_r) LOS	LOS Category
	Years	Years	Years
1	43.1	25.0	> 25
2	15.5	12.5	10 to 25
3	9.4	8.3	5 to 10
4	6.8	6.3	
5	5.3	5.0	
6	4.3	4.2	< 5
10	2.5	2.5	
15	1.7	1.7	
20	1.2	1.3	
25	1.0	1.0	

For a pipe to meet a 25-year LOS definition, the pipe can experience no more than one surcharge event during the 24-year record. Two surcharge events would indicate approximately a 15 year LOS. To have a greater than a 5-year LOS, the pipe can experience no more than five surcharge events during the 24-year record flow simulation.

8.3 Reducing the Dataset Size

The adjusted 24 years of Silver Lake rainfall data contains approximately 1,700 discrete storm events of varying durations and intensities. Running the entire 24-year rainfall record through the InfoSWMM continuous simulation model would take several days for each model simulation. Since only the higher intensity and volume storms cause system capacity/LOS problems, the rainfall record was edited using the following steps:

1. The record was divided into discrete events with at least a 24 hour interval between measureable rainfall. This resulted in 1,700 discrete events during the 24-years of record.
2. The data for non-significant "drizzle" and smaller storms that would clearly not cause pipe surcharging was eliminated.
3. The storm events were classified by 1, 2, 3, 6, 12, and 24 hour durations. The largest six events within each duration classification were selected for the data set (total of 36 events).
4. Because many of the largest shorter duration storms overlapped or were contained within the longer duration events, 14 combined storms contain and represent the top six storms for each of the six storm durations.
5. To account for antecedent conditions, any rainfall that occurred within seven days prior to the start of each of the selected events was added to the data. To separate the events, seven days with no rainfall was then inserted between each event to complete a continuous 199 day record used as the rainfall data input to the model.

As a result, the adjusted and edited rainfall record used for the modeling contains approximately 36 of the largest storm events contained within 14 combined storms occurring over a period of 144 days.

Even with this reduction in the rainfall record, the continuous period simulation model run takes several hours to run. For future analysis, the model simulation run time may be further reduced during analysis by running the model on a basin-by-basin mode to evaluate alternative improvements within each basin.

Hyetographs of the Silver Lake gage raw data for the 14 selected storm events are attached to this memo for reference. The dates/times shown on the x-axis of the storm hyetographs are artificial dates used to create the continuous condensed rainfall record used in the model. The actual end dates for each storm event used to create the record is shown at the top of each graph.

8.4 Counting Capacity Exceedence Events

After running the model using the combined storms data, a statistical tool is used to determine the number of times that the flow depth in each pipe exceeded a d/D of 1.0 during an 8 hour period. To avoid over-counting continuing events, the next exceedence event is not counted until a minimum of 8 hours has passed since the end of the previous exceedence event.

As described above (Table 8-1), this period of record and methodology is sufficient to statistically classify the LOS provided by each of the pipes into one of the four LOS categories (greater than 25 year, 10 to 25 year, 5 to 10 year, and less than 5 year).

8.5 Rainfall Data Summary

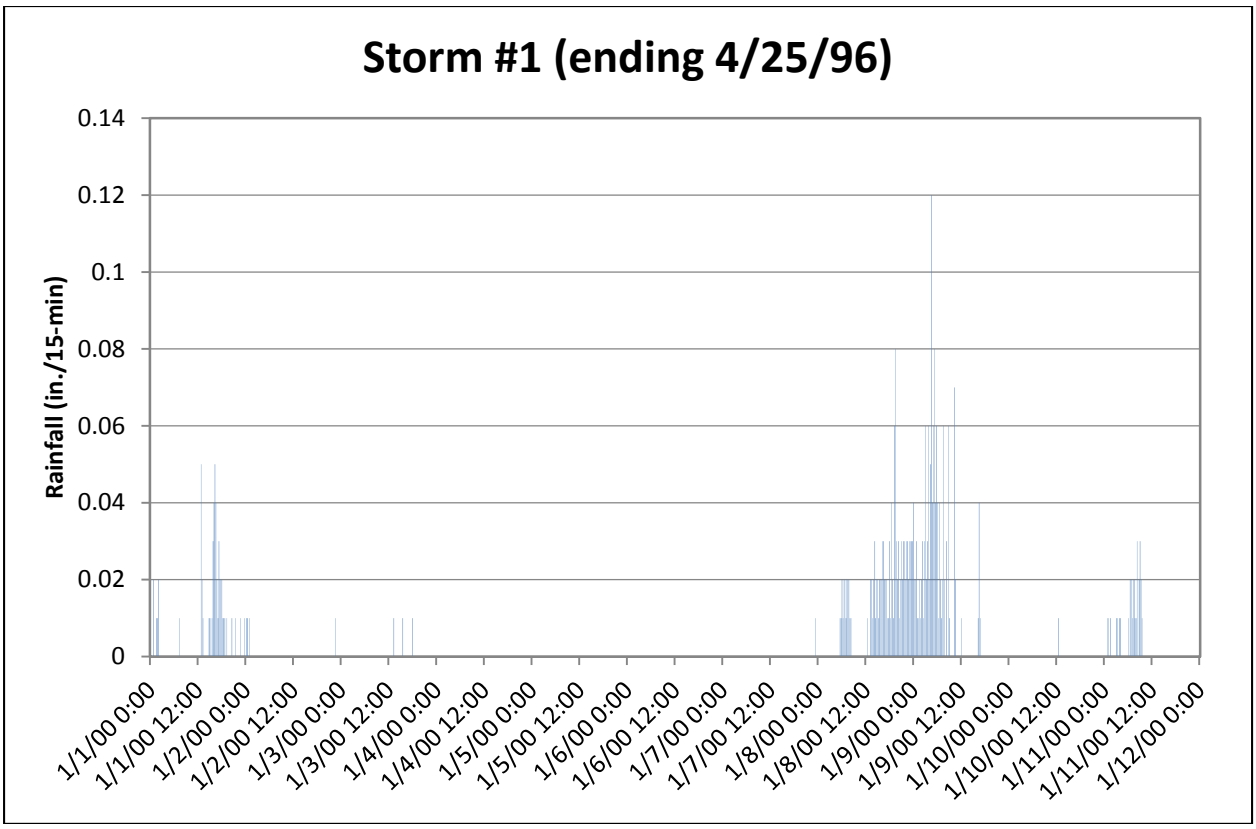
The Silver Lake rainfall time series has been reduced to approximately 36 of the largest rainfall events contained within 14 combined storms. This condensed record is sufficient to establish the LOS for the collection system. These events include high intensity-short duration, low intensity-long duration, and historically relevant rainfall. Based on the recurrence interval methodology and LOS analysis, the pipe LOS can be determined in the most efficient method as possible to limit model run/analysis time and focus results on relevant data.

References

1. Schaefer, Mel, Ph.D., P.E., MGS Engineering Consultants, Inc., Memorandum: Assessment of Precipitation Time-Series from Silver Lake WA for Rainfall-Runoff Modeling of Stormwater and Combined Sewer Systems in Everett WA, January 2012.
2. Linsley, Ray K., Kohler, Max A., and Paulhus, Joseph L.H. Hydrology for Engineers. New York: Mcgraw-Hill, Inc., 1982.
3. Doug Beyerlein, P.E., Clear Creek Solutions, Inc., Climate Change Impacts on Stormwater, June 2011.

Silver Lake Rainfall Data
Storm Events Used in the Modeling

(Note that the dates/times shown on the x-axis of the hyetographs are artificial dates used to create the continuous condensed rainfall record used in the model. The actual end dates for each storm is shown at the top of each graph.)


Storm #1 (ending 4/25/96)
Rainfall (in./15-min)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1/1/00 0:00
1/1/00 12:00
1/2/00 0:00
1/2/00 12:00
1/3/00 0:00
1/3/00 12:00
1/4/00 0:00
1/4/00 12:00
1/5/00 0:00
1/5/00 12:00
1/6/00 0:00
1/6/00 12:00
1/7/00 0:00
1/7/00 12:00
1/8/00 0:00
1/8/00 12:00
1/9/00 0:00
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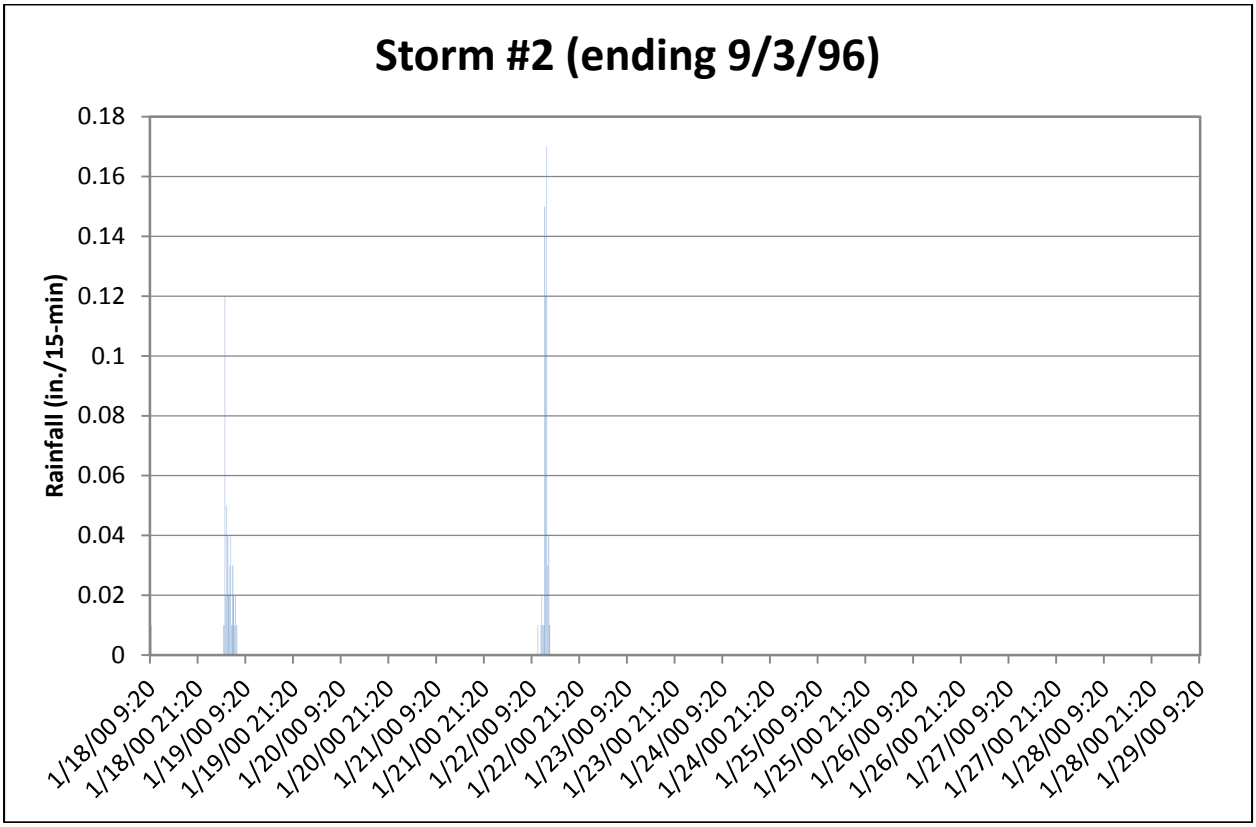
1/11/00 12:00
1/12/00 0:00


Storm #2 (ending 9/3/96)
Rainfall (in./15-min)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1/18/00 9:20
1/18/00 21:20
1/19/00 9:20
1/19/00 21:20
1/20/00 9:20
1/20/00 21:20
1/21/00 9:20
1/21/00 21:20
1/22/00 9:20
1/22/00 21:20
1/23/00 9:20
1/23/00 21:20
1/24/00 9:20
1/24/00 21:20
1/25/00 9:20
1/25/00 21:20
1/26/00 9:20
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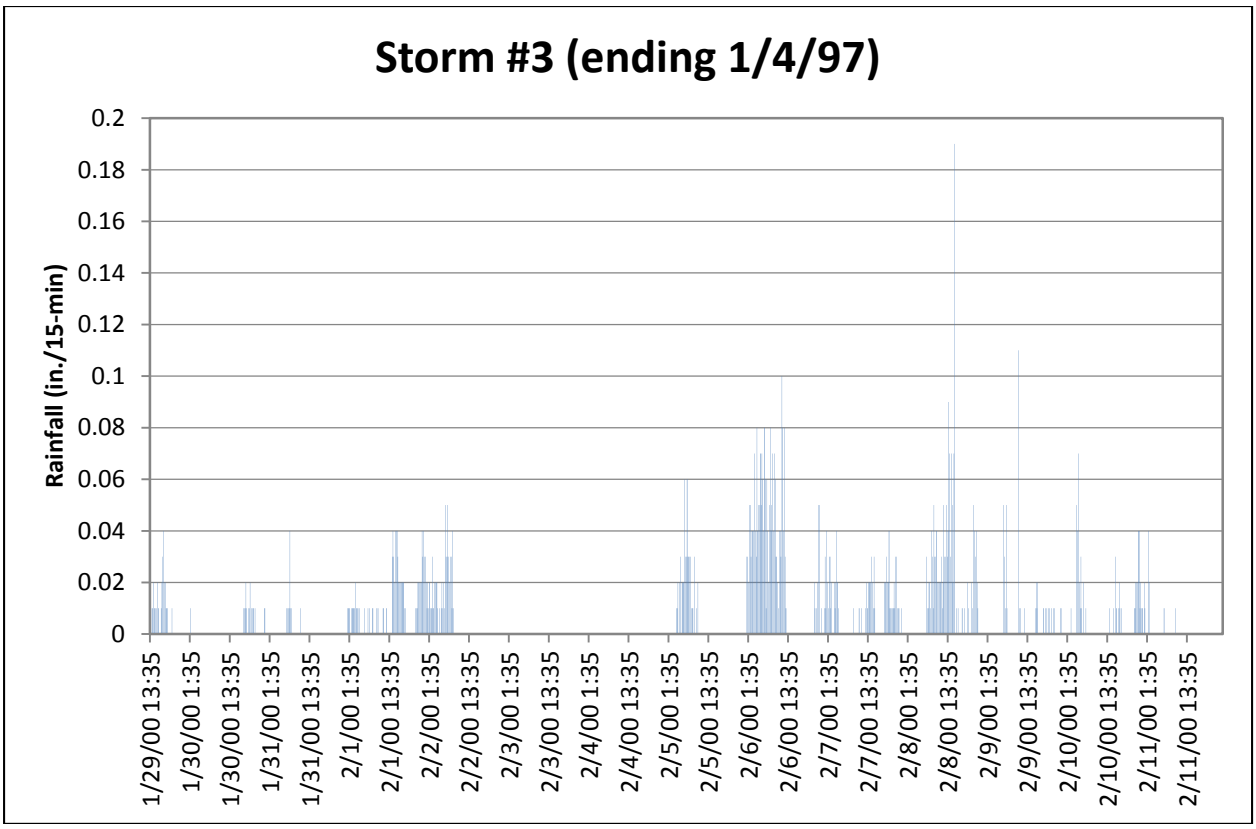
1/28/00 21:20
1/29/00 9:20


Storm #3 (ending 1/4/97)
Rainfall (in./15-min)
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1/29/00 13:35
1/30/00 1:35
1/30/00 13:35
1/31/00 1:35
1/31/00 13:35
2/1/00 1:35
2/1/00 13:35
2/2/00 1:35
2/2/00 13:35
2/3/00 1:35
2/3/00 13:35
2/4/00 1:35
2/4/00 13:35
2/5/00 1:35
2/5/00 13:35
2/6/00 1:35
2/6/00 13:35
2/7/00 1:35
2/7/00 13:35
2/8/00 1:35
2/8/00 13:35
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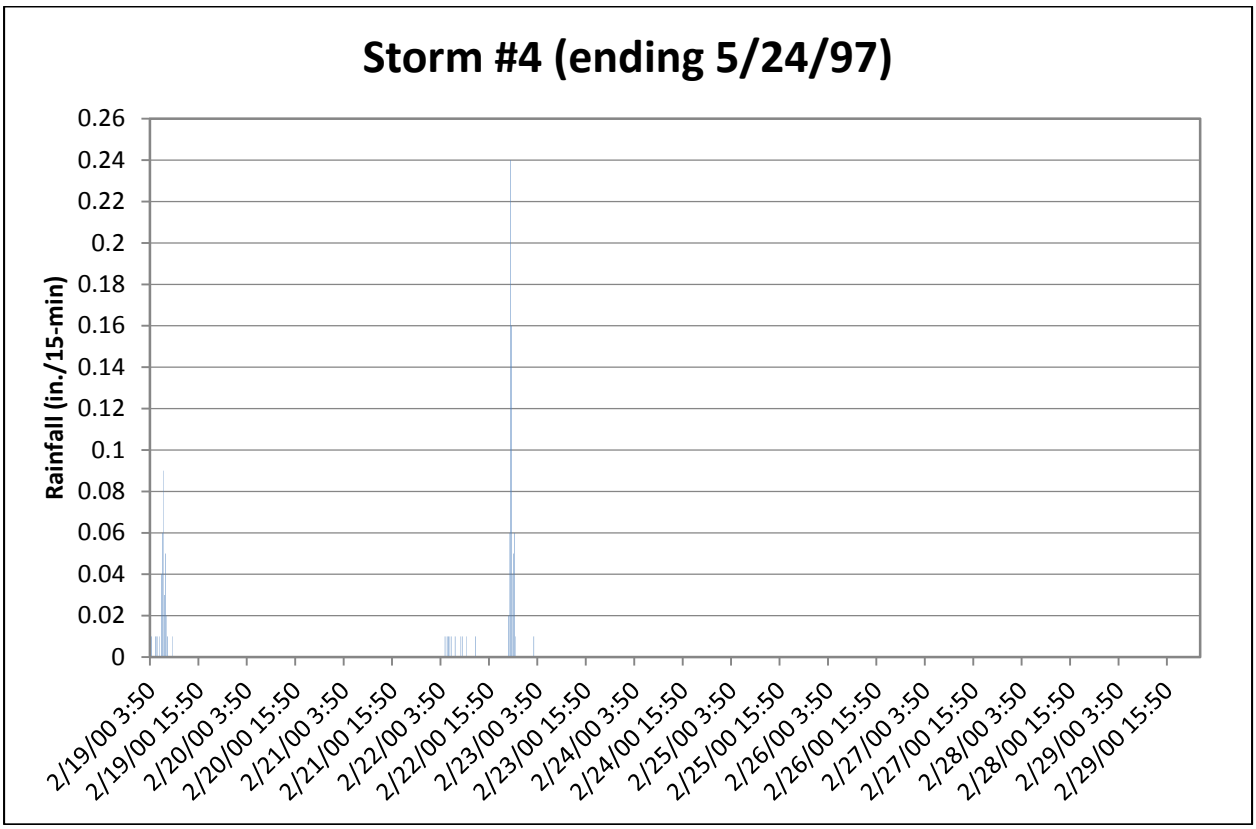
2/11/00 1:35
2/11/00 13:35


Storm #4 (ending 5/24/97)
Rainfall (in./15-min)
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
2/19/00 3:50
2/19/00 15:50
2/20/00 3:50
2/20/00 15:50
2/21/00 3:50
2/21/00 15:50
2/22/00 3:50
2/22/00 15:50
2/23/00 3:50
2/23/00 15:50
2/24/00 3:50
2/24/00 15:50
2/25/00 3:50
2/25/00 15:50
2/26/00 3:50
2/26/00 15:50
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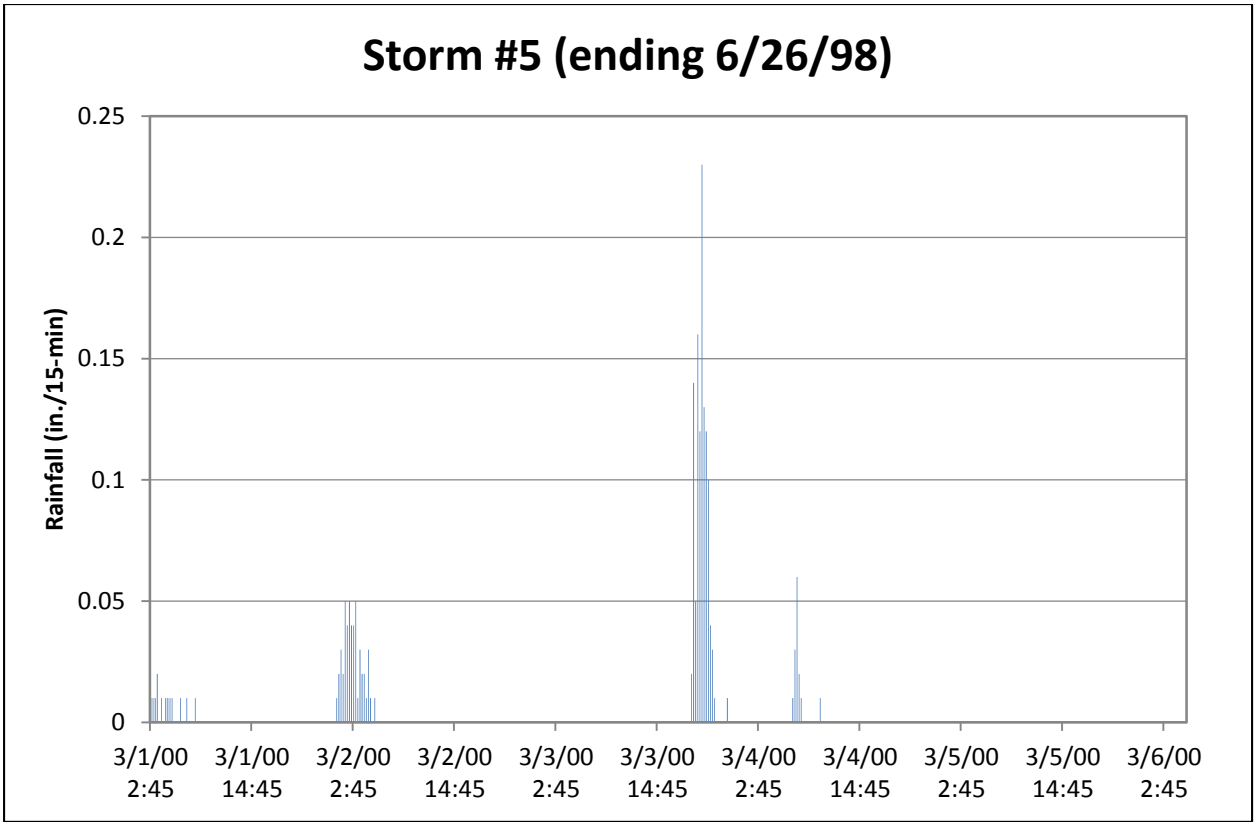
2/29/00 3:50
2/29/00 15:50


Storm #5 (ending 6/26/98)
Rainfall (in./15-min)
0.25
0.2
0.15
0.1
0.05
0
3/1/00 2:45
3/1/00 14:45
3/2/00 2:45
3/2/00 14:45
3/3/00 2:45
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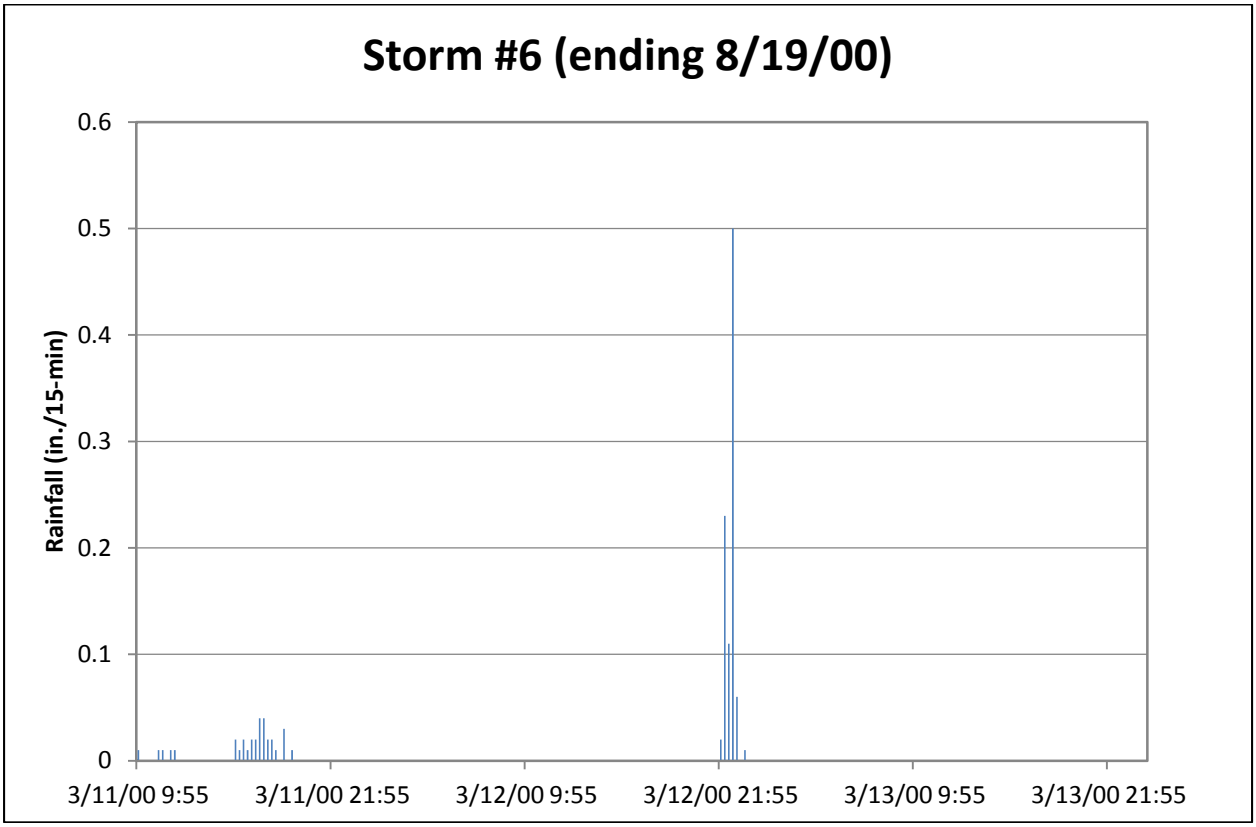
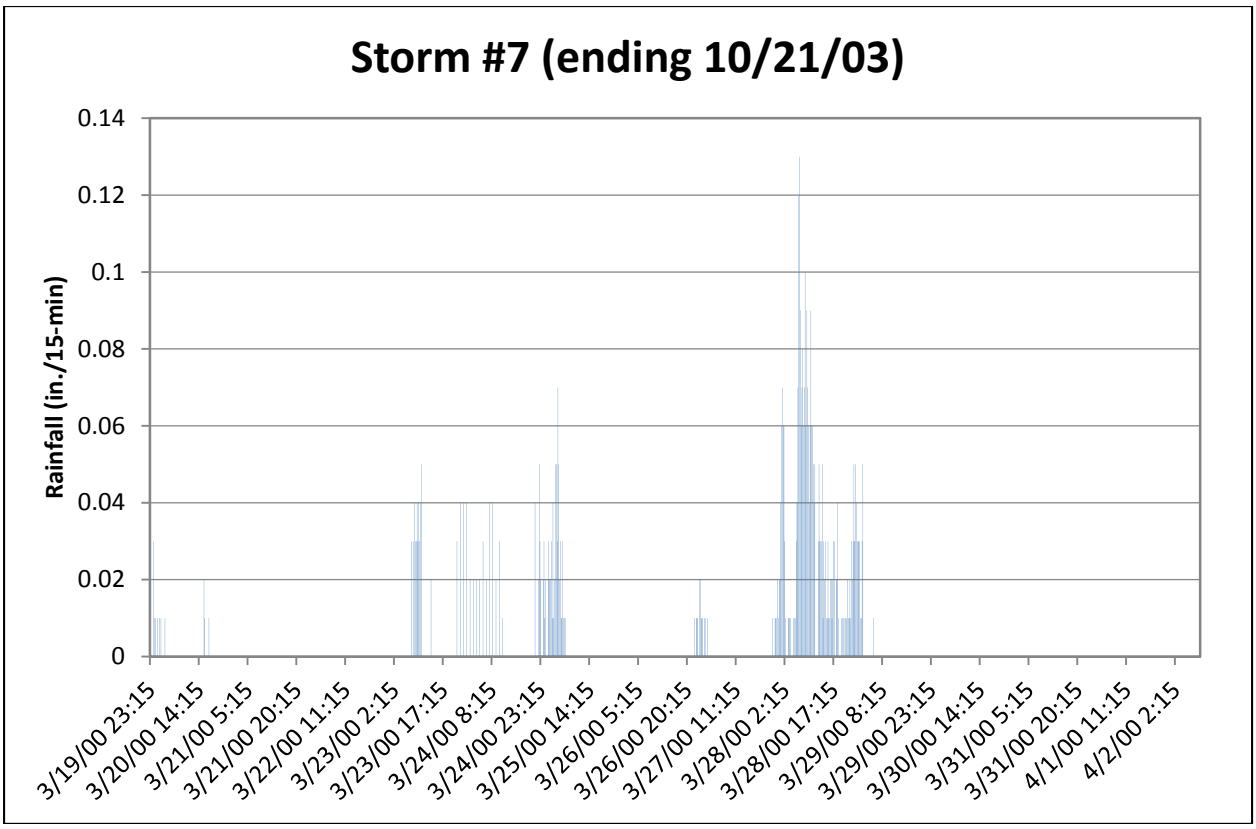
3/5/00 14:45
3/6/00 2:45


Storm #6 (ending 8/19/00)
Rainfall (in./15-min)
0.6
0.5
0.4
0.3
0.2
0.1
0
3/11/00 9:55
3/11/00 21:55
3/12/00 9:55
3/12/00 21:55
3/13/00 9:55
3/13/00 21:55


Storm #7 (ending 10/21/03)
Rainfall (in./15-min)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
3/19/00 23:15
3/20/00 14:15
3/21/00 5:15
3/21/00 20:15
3/22/00 11:15
3/23/00 2:15
3/23/00 17:15
3/24/00 8:15
3/24/00 23:15
3/25/00 14:15
3/26/00 5:15
3/26/00 20:15
3/27/00 11:15
3/28/00 2:15
3/28/00 17:15
3/29/00 8:15
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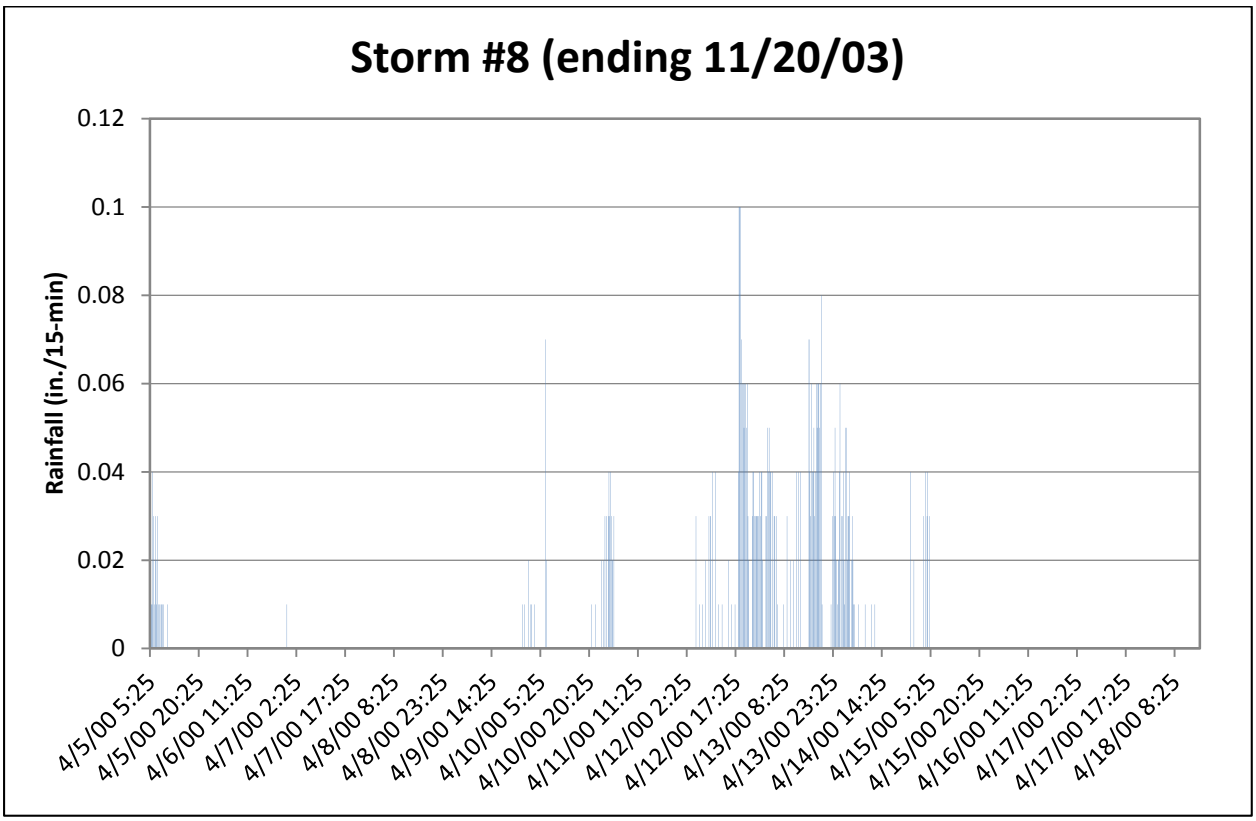
4/1/00 11:15
4/2/00 2:15


Storm #8 (ending 11/20/03)
Rainfall (in./15-min)
0.12
0.1
0.08
0.06
0.04
0.02
0
4/5/00 5:25
4/5/00 20:25
4/6/00 11:25
4/7/00 2:25
4/7/00 17:25
4/8/00 8:25
4/8/00 23:25
4/9/00 14:25
4/10/00 5:25
4/10/00 20:25
4/11/00 11:25
4/12/00 2:25
4/12/00 17:25
4/13/00 8:25
4/13/00 23:25
4/14/00 14:25
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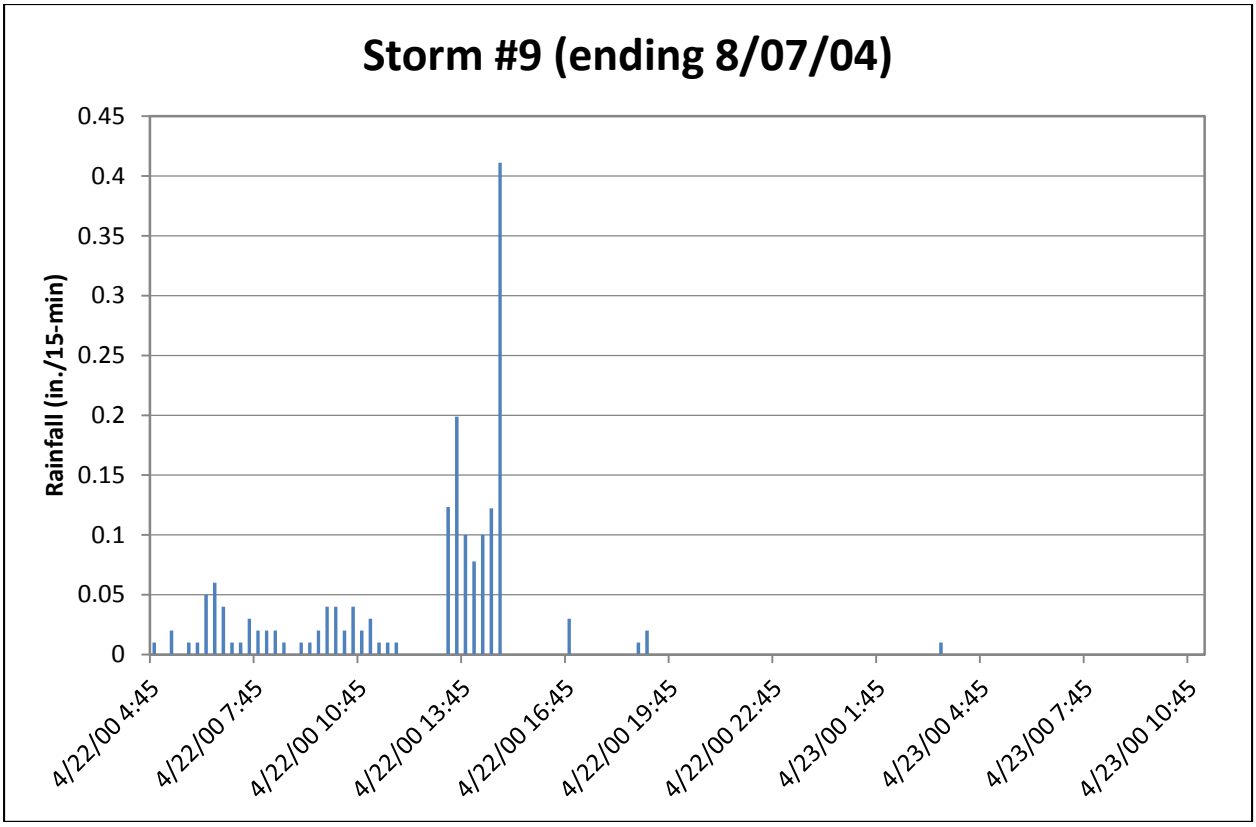
4/17/00 17:25
4/18/00 8:25


Storm #9 (ending 8/07/04)
Rainfall (in./15-min)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4/22/00 4:45
4/22/00 7:45
4/22/00 10:45
4/22/00 13:45
4/22/00 16:45
4/22/00 19:45
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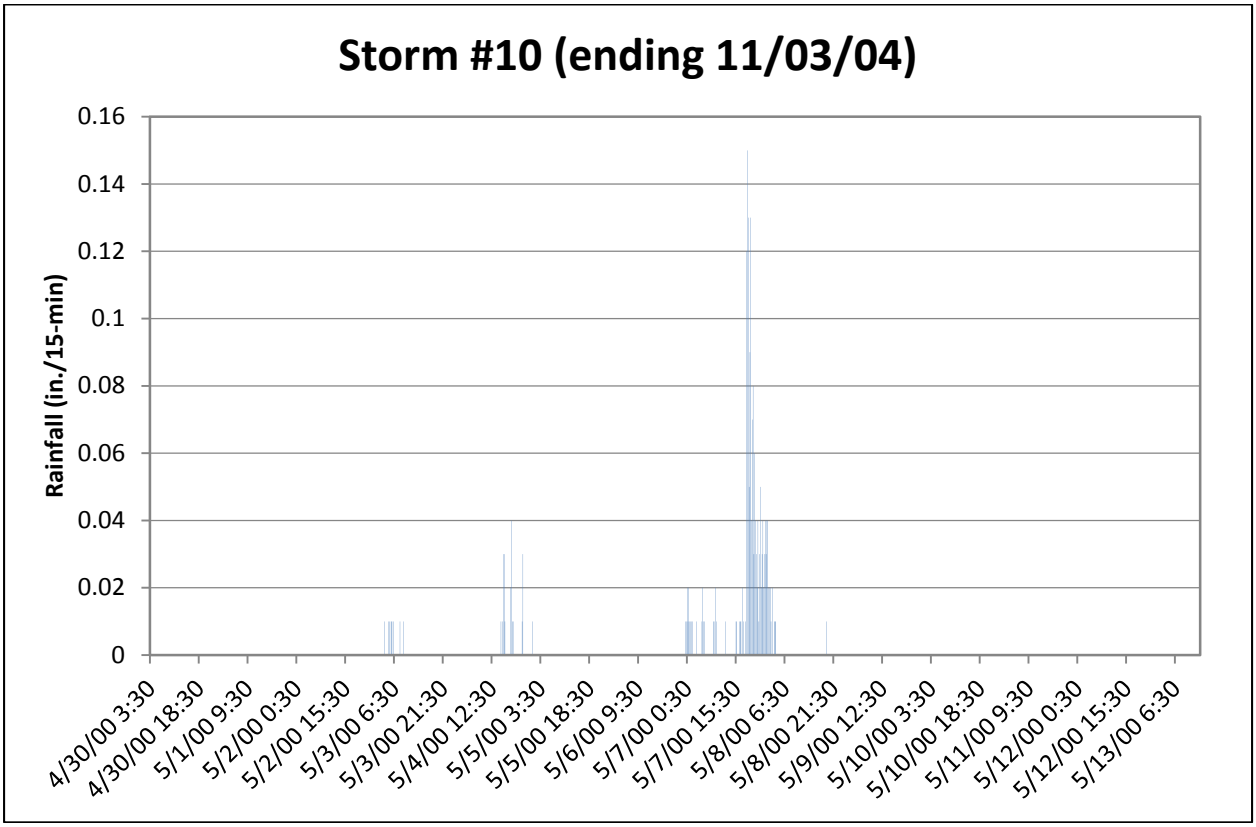
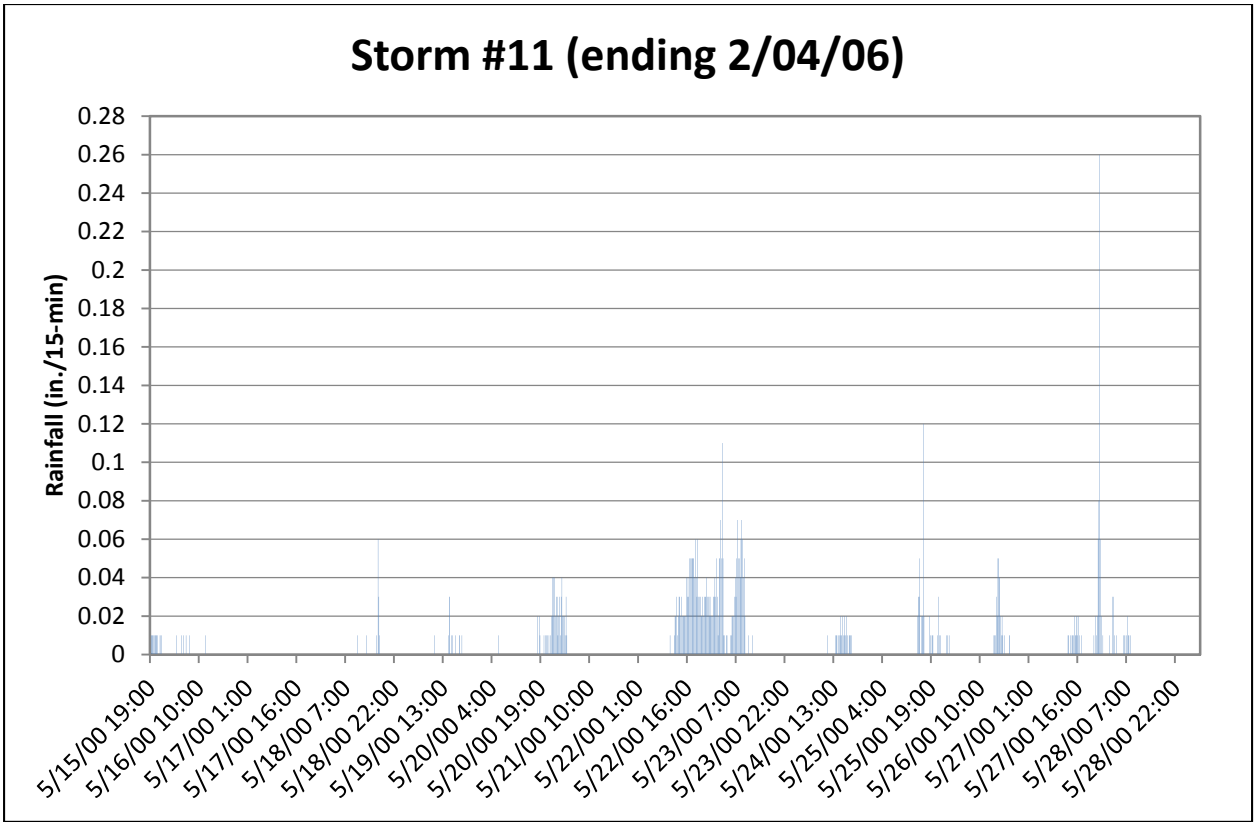
4/23/00 4:45
4/23/00 7:45
4/23/00 10:45


Storm #10 (ending 11/03/04)
Rainfall (in./15-min)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
4/30/00 3:30
4/30/00 18:30
5/1/00 9:30
5/2/00 0:30
5/2/00 15:30
5/3/00 6:30
5/3/00 21:30
5/4/00 12:30
5/5/00 3:30
5/5/00 18:30
5/6/00 9:30
5/7/00 0:30
5/7/00 15:30
5/8/00 6:30
5/8/00 21:30
5/9/00 12:30
5/10/00 3:30
5/10/00 18:30
5/11/00 9:30
5/12/00 0:30
5/12/00 15:30
5/13/00 6:30


Storm #11 (ending 2/04/06)
Rainfall (in./15-min)
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
5/15/00 19:00
5/16/00 10:00
5/17/00 1:00
5/17/00 16:00
5/18/00 7:00
5/18/00 22:00
5/19/00 13:00
5/20/00 4:00
5/20/00 19:00
5/21/00 10:00
5/22/00 1:00
5/22/00 16:00
5/23/00 7:00
5/23/00 22:00
5/24/00 13:00
5/25/00 4:00
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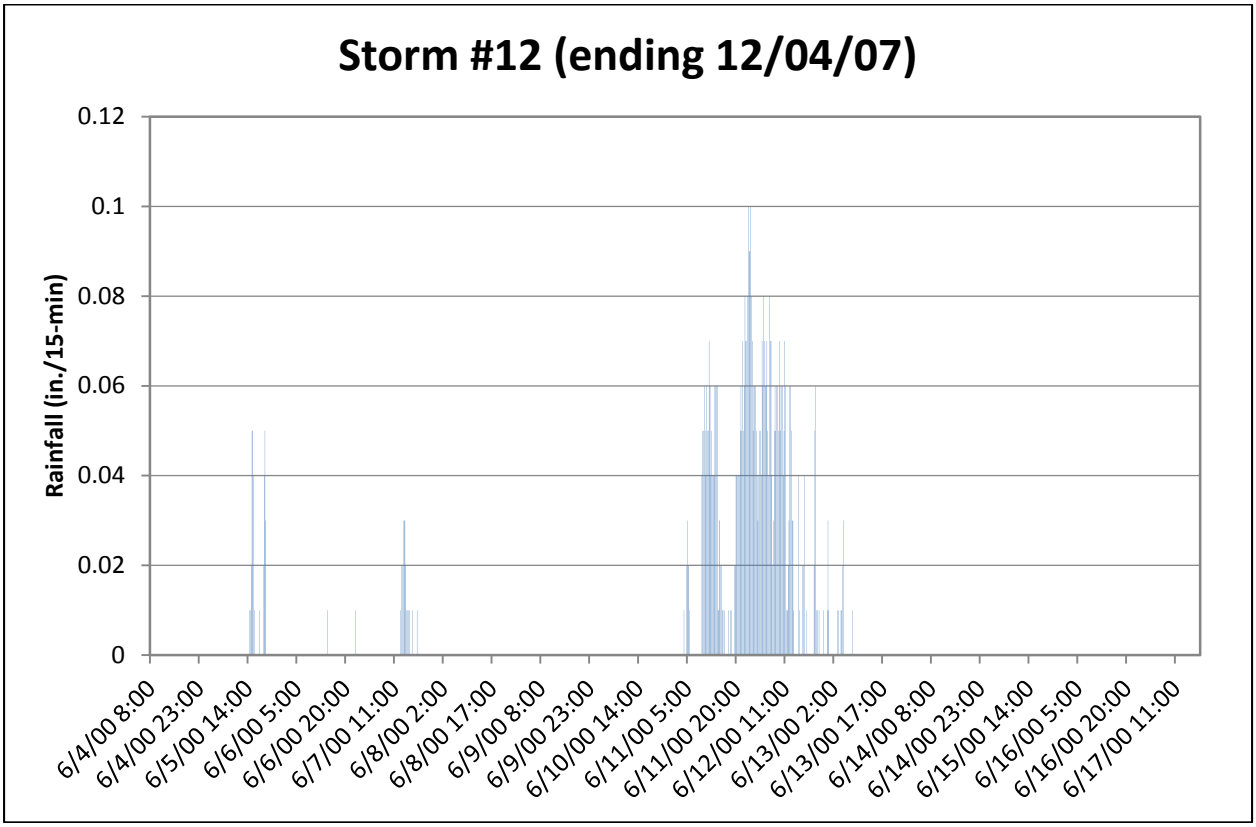
5/28/00 7:00
5/28/00 22:00


Storm #12 (ending 12/04/07)
Rainfall (in./15-min)
0.12
0.1
0.08
0.06
0.04
0.02
0
6/4/00 8:00
6/4/00 23:00
6/5/00 14:00
6/6/00 5:00
6/6/00 20:00
6/7/00 11:00
6/8/00 2:00
6/8/00 17:00
6/9/00 8:00
6/9/00 23:00
6/10/00 14:00
6/11/00 5:00
6/11/00 20:00
6/12/00 11:00
6/13/00 2:00
6/13/00 17:00
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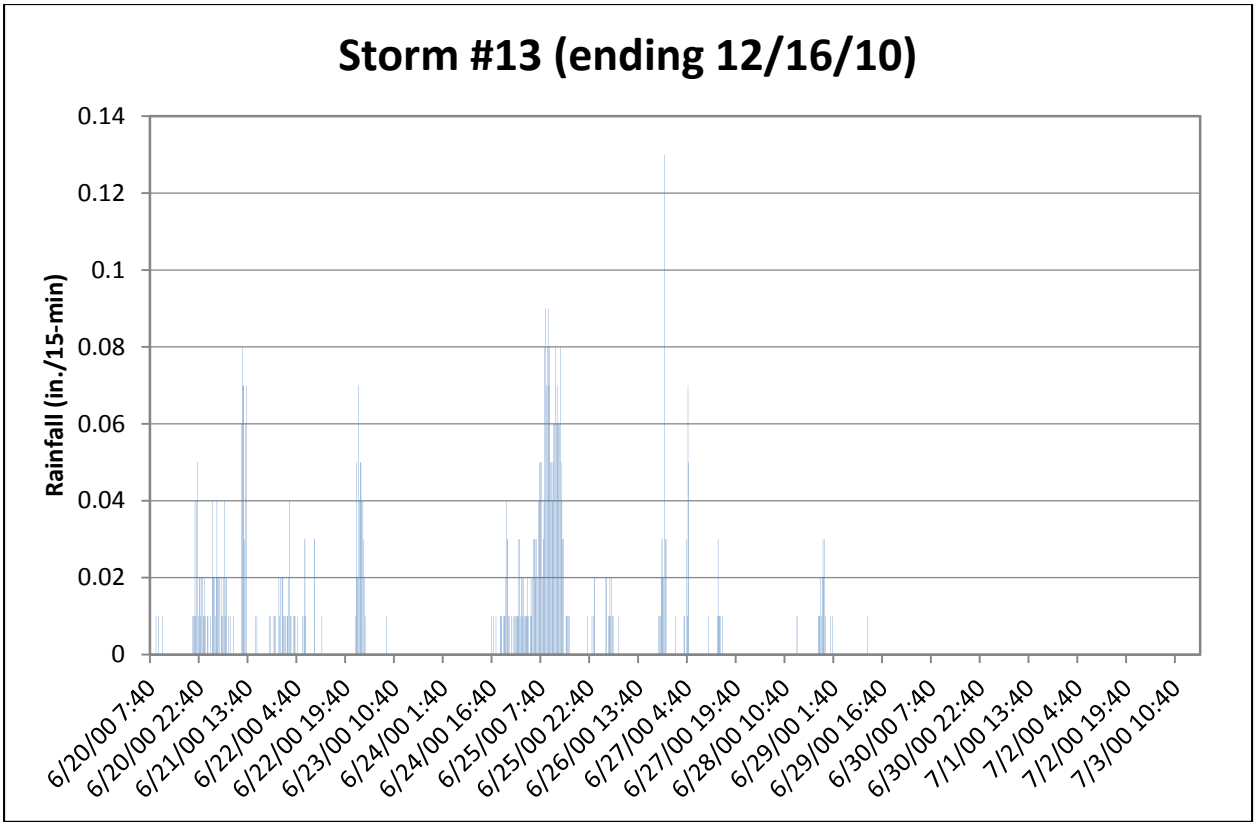
6/16/00 20:00
6/17/00 11:00


Storm #13 (ending 12/16/10)
Rainfall (in./15-min)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
6/20/00 7:40
6/20/00 22:40
6/21/00 13:40
6/22/00 4:40
6/22/00 19:40
6/23/00 10:40
6/24/00 1:40
6/24/00 16:40
6/25/00 7:40
6/25/00 22:40
6/26/00 13:40
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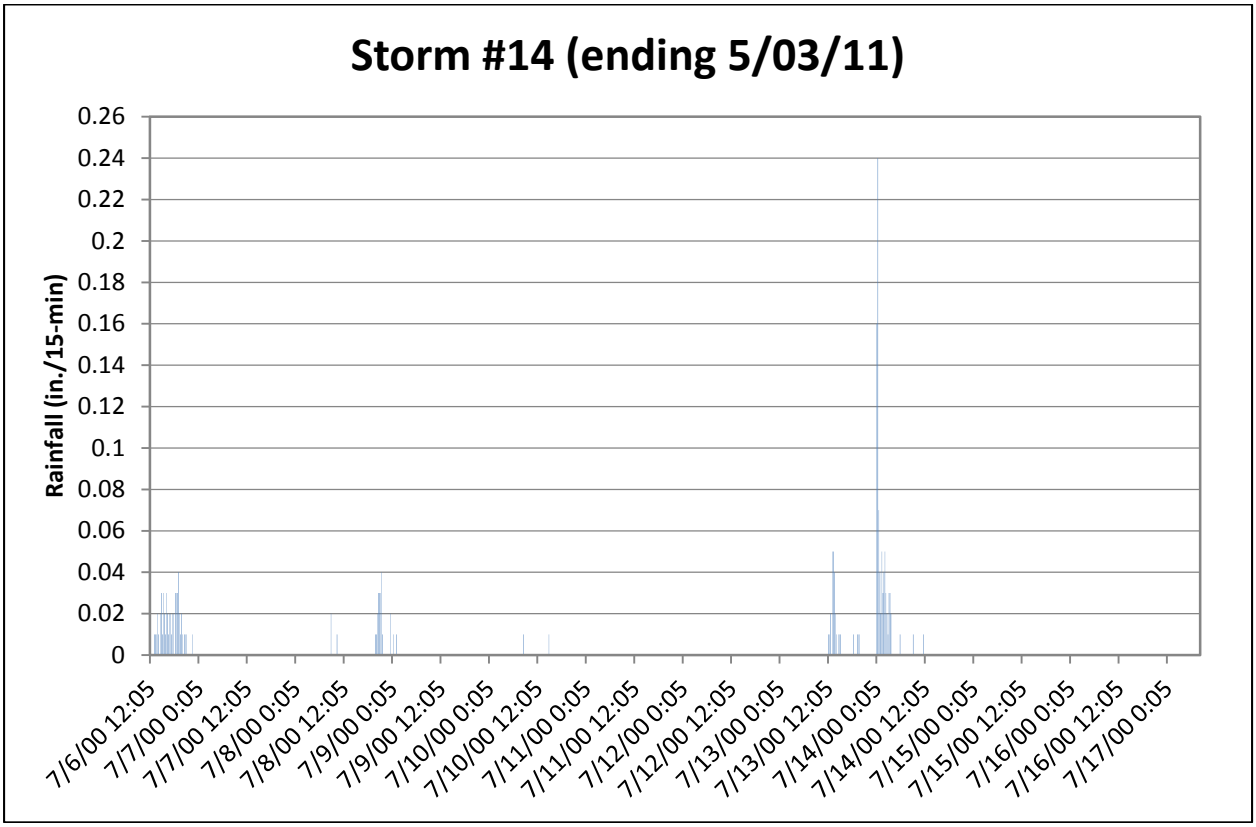

Storm #14 (ending 5/03/11)
Rainfall (in./15-min)
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
7/6/00 12:05
7/7/00 0:05
7/7/00 12:05
7/8/00 0:05
7/8/00 12:05
7/9/00 0:05
7/9/00 12:05
7/10/00 0:05
7/10/00 12:05
7/11/00 0:05
7/11/00 12:05
7/12/00 0:05
7/12/00 12:05
7/13/00 0:05
7/13/00 12:05
7/14/00 0:05
7/14/00 12:05
7/15/00 0:05
7/15/00 12:05
7/16/00 0:05
7/16/00 12:05
7/17/00 0:05

MGS Engineering Consultants, Inc.

MEMORANDUM

January 29, 2012

TO: Jim Peterson P.E., HDR Engineering Inc.

FROM: Mel Schaefer Ph.D. P.E., MGS Engineering Consultants, Inc.

SUBJECT: Assessment of the Precipitation Time-Series from Silver Lake WA for Rainfall-Runoff Modeling of Stormwater and Combined Sewer Systems in Everett WA

BACKGROUND

High resolution precipitation time-series data with a long record length is needed for continuous rainfall-runoff modeling of stormwater and combined sewer systems in western Washington. Precipitation measurement systems are needed which can measure in volume increments of 0.01-inch or smaller and time-steps of 15-minutes or shorter. Record lengths of 20-years or more are preferred. The NOAA cooperative precipitation station located at the City of Everett recorded with a resolution of 0.01-inch and a 1-hour time-step from 1941-1976 and a resolution of 0.10-inch and a 15-minute time-step from 1976-present. Neither of these data formats is adequate for describing the short-duration temporal characteristics of storms needed for modeling of sewer systems.

A search for high-resolution, high-quality precipitation data in the Everett area resulted in identification of a precipitation recorder at the Silver Lake Water District office operated by Snohomish County. The precipitation time-series data from the Silver Lake recorder has a resolution of 0.01-inch, a 5-minute time-step and a continuous record extending from November 1987 to present.

This memorandum provides a brief summary of the analyses that were conducted to assess the suitability of the precipitation time-series record at Silver Lake WA for rainfall-runoff modeling of stormwater and combined sewer systems in Everett WA. This assessment was made by comparing the precipitation-frequency characteristics of the time-series record at the Silver Lake station with the precipitation-frequency characteristics for the Everett area.

PRECIPITATION-FREQUENCY CHARACTERISTICS AT EVERETT WASHINGTON

The precipitation-frequency characteristics at Everett Washington were determined based on the 1941-2009 precipitation record from NOAA cooperative station 45-2675 and findings of regional precipitation-frequency analyses for the Puget Sound Lowlands. Specifically, the regional analyses of precipitation for western Washington (Schaefer et al[5]) used data from 300 stations with 15,000 station-years of record for spatial mapping of precipitation in western Washington (Figure 1). These findings provided the foundation for describing the precipitation-frequency characteristics for the Everett area for durations of 2-hours, 6-hours and 24-hours.

Information on the precipitation-frequency characteristics for short-duration precipitation maxima (durations of 5-minutes through 60-minutes) was provided by the findings of analyses for the 17 rain gage network operated by the City of Seattle (Schaefer[6]). These findings can be expressed in a dimensionless manner as a function of the longer 2-hour duration precipitation and transposed to other locations by scaling to match the observed precipitation characteristics for sites throughout the Puget Sound Lowlands. This scaling technique is the basis for development of the suite of 37 extended precipitation time-series (Schaefer et al[7]) used by WSDOT, cities and engineering consultants for analysis and design of stormwater systems throughout western Washington.

Figures 2a,b,c depict observed precipitation annual maxima for the 69-year period from 1941-2009 for the NOAA Everett station for durations of 2-hours, 6-hours and 24-hours. The red curve in each figure describes the precipitation-frequency relationship at Everett obtained from the regional analyses of the stations in the Puget Sound Lowlands in western Washington. The precipitation-frequency relationships depicted in Figures 2a,b,c are considered robust estimates of the precipitation-frequency characteristics at Everett given the long record length at Everett and very large regional precipitation database for the Puget Sound Lowlands.

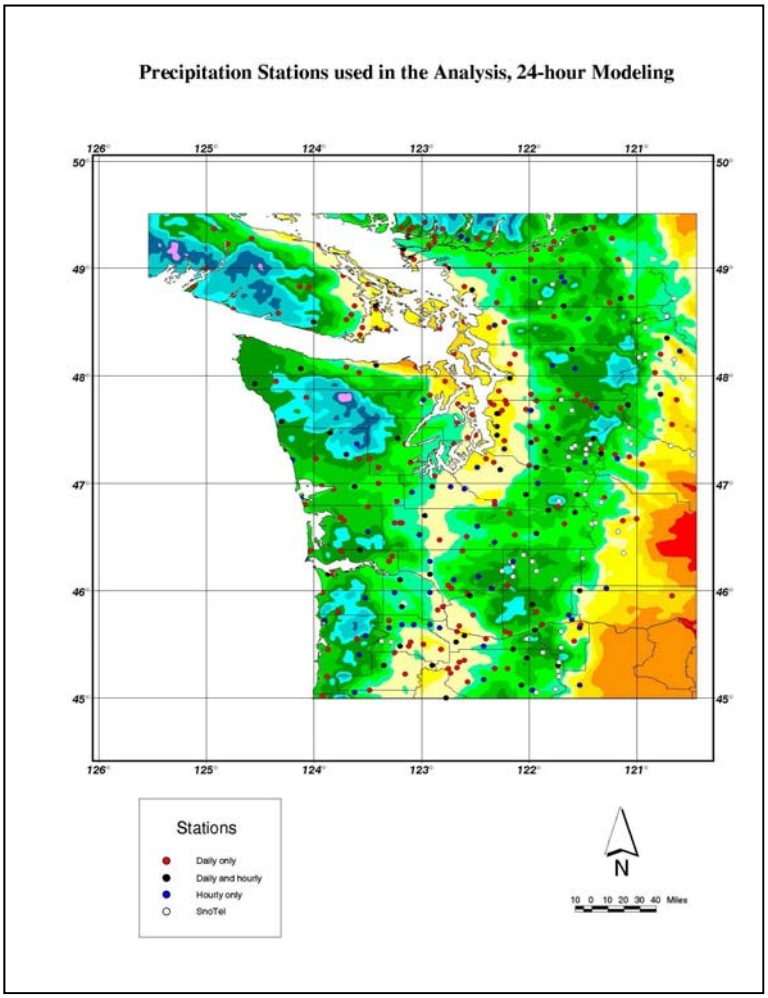
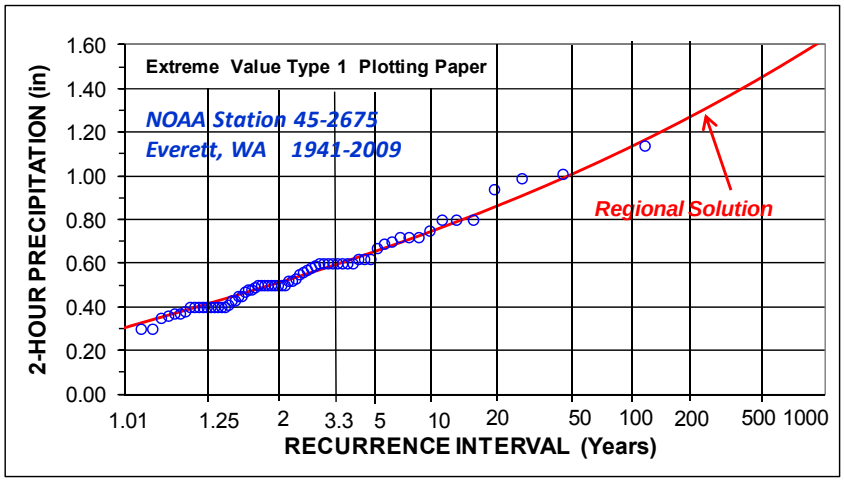
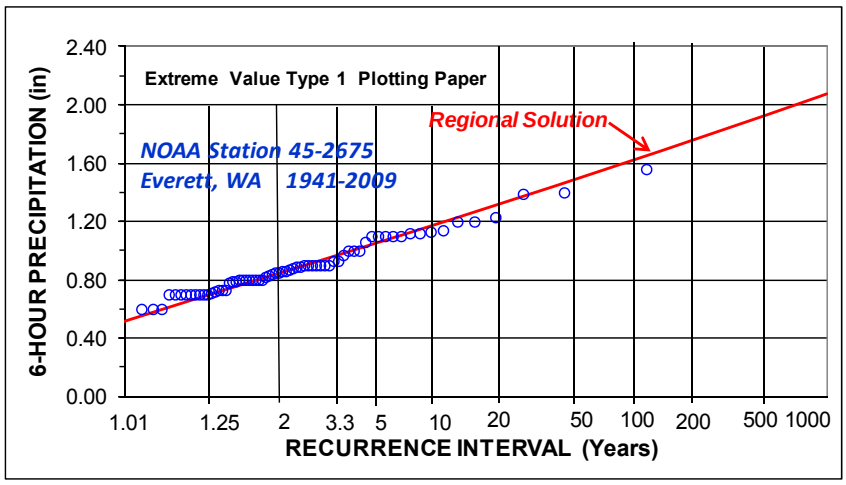
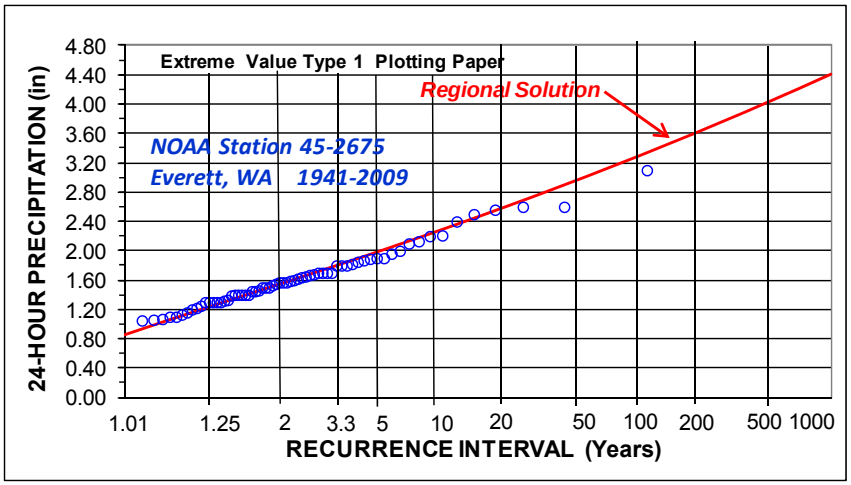


Figure 1 – Example of Precipitation Mapping for Western Washington and Location of Precipitation Measurement Stations used in Regional Precipitation-Frequency Analyses







Figures 2a,b,c – Precipitation Annual Maxima Observed at NOAA Station 45-2675 for the Period from 1941-2009 and the Regional Precipitation-Frequency Relationship for Durations of 2-Hours, 6-Hours and 24-Hours, respectively

PRECIPITATION-FREQUENCY CHARACTERISTICS AT SILVER LAKE GAGE

The precipitation-frequency characteristics for the Silver Lake rain gage were examined by assembly of probability-plots of precipitation annual maxima (Figures 3a,b,c) and comparison with the precipitation-frequency characteristics at the Everett NOAA station for the 2, 6 and 24-hour durations (Figures 2a,b,c). Review of Figures 3a,b,c shows that the precipitation for the 1988-2011 period at Silver Lake generally matches the shape of the precipitation-frequency relationship for Everett for the period from 1941-2009 but that the precipitation magnitudes are somewhat greater.

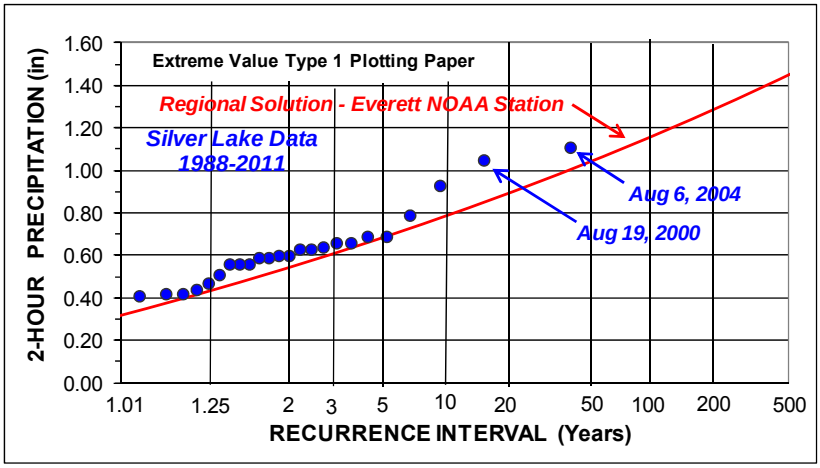


Figure 3a – Comparison of 2-Hour Precipitation Annual Maxima Observed at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

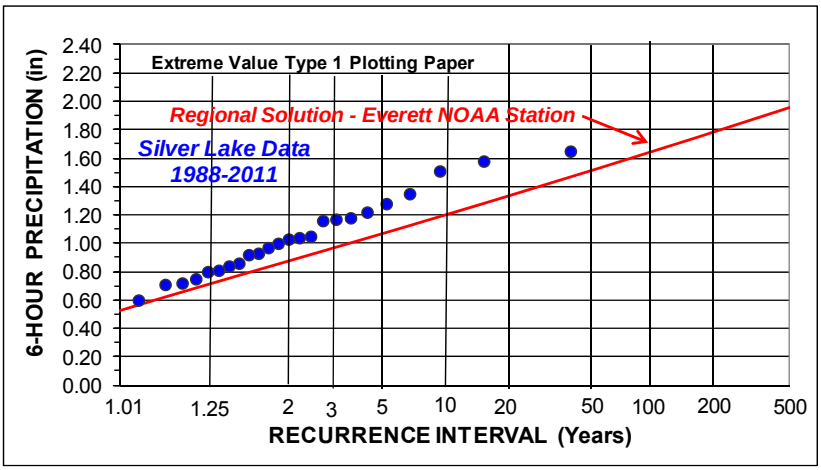


Figure 3b – Comparison of 6-Hour Precipitation Annual Maxima Observed at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

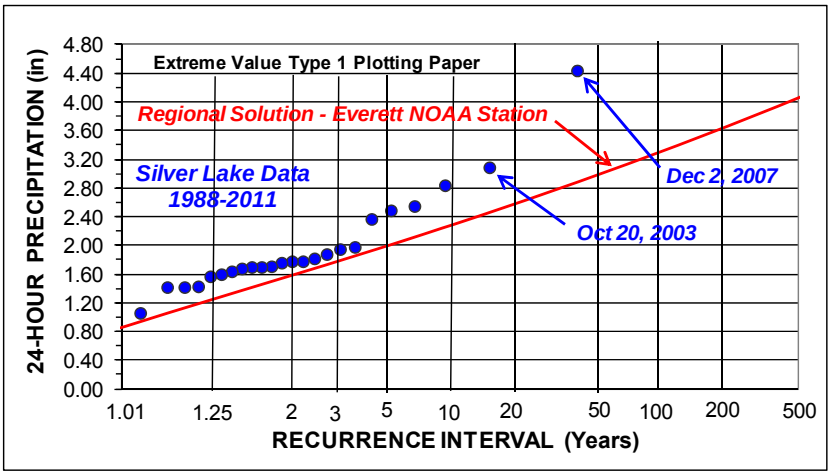


Figure 3c – Comparison of 24-Hour Precipitation Annual Maxima Observed at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

Review of the findings of the regional precipitation analyses (Schaefer et al[5]) indicates that it is very unlikely that there actually are significant differences in precipitation characteristics between the locations of the Silver Lake and NOAA Everett stations. The generally larger precipitation magnitudes observed at the Silver Lake station could be due to a variety of causes most notably due to sampling variability and the short 24-year record length.

Precipitation annual maxima are inherently variable and what appears to the eye to be significant differences in the behavior of probability-plots is oftentimes simply the result of the chance collection of storms that occurred during the observation period. Sampling variability is the generic term given to the variability in the sample statistics obtained for datasets that arise from the chance occurrence of events that comprise the dataset. The 1988-2011 period is a relatively active period of storms recorded at the Silver Lake gage as evidenced by the two large August short-duration thunderstorms (Figure 3a) and the two large winter general storms, Oct 2003 and Dec 2007 (Figure 3c). Both the Oct 2003 and Dec 2007 storms were very rare events in the Puget Sound Lowlands, and both storms exceeded the prior 24-hour record in the Seattle and Everett areas for the period from 1930 to present. The occurrence or non-occurrence of these storms in the 24-year record dramatically alters the sample statistics, character of the probability-plots and the inferences drawn from the behavior of the data. Such is the nature of the variability inherent in precipitation annual maxima from short records.

The recent large storm events at the 24-hour duration are often attributed to the effects of climate change. However, the three largest storms at the 2-hour duration in the Everett area occurred many decades ago in May 1958, Sep 1944 and Sep 1972, respectively. The prior two largest general storms at the 24-hour duration in the Seattle and Everett areas occurred in Oct 1981 and Jan 1986. Again, sampling variability is likely the primary contributor to the differences in the comparison of precipitation magnitudes at the two locations at both the 24-hour and 2-hour durations.

There are other possible factors that could contribute to differences seen in Figures 3a,b,c. These differences could be attributable to differences in wind effects on the rain catch due to the physical location and setting for the precipitation gages and accuracy of calibration of the measurement equipment. In summary, there is no reason to believe, and no strong evidence to support the premise, there are significant differences in the actual precipitation-frequency characteristics at the locations of the Silver Lake and NOAA Everett stations.

Additional comparisons were made between the short-duration precipitation annual maxima for the Silver Lake station and the short-duration precipitation-frequency characteristics expected for the Everett area (Figures 4a,b,c). The descriptor *"Regional Solution for Everett Area"* in Figures 4a,b,c indicates that the shape of the precipitation-frequency relationship was obtained from the findings of the regional analyses conducted for the 17 rain gage network in Seattle. The mean values for the precipitation-frequency relationships are based on the proportions of 5-min/120-min, 15-min/120-min and 60-min/120-min precipitation in the Seattle area scaled by the 120-minute mean value from the Everett NOAA station. These dimensionless *n*-min/120-min proportions are termed depth-duration values and are representative of areas throughout the Puget Sound Lowlands. This is a standard meteorological/statistical approach that tailors the precipitation depth-duration characteristics to the magnitudes observed in the Everett area and provides the best-estimates possible of short-duration precipitation-frequency for Everett.

The probability-plots for short-duration precipitation maxima from Silver Lake generally exhibit similar shapes as the statistically transposed data representative of the Everett area, but have somewhat higher magnitudes. As before, the thunderstorms of Aug 2000 and Aug 2004 tend to distort the inferences drawn from the probability-plots. Had either of the August storms not been captured by the Silver Lake gage, the ranking of the remaining data would have been reordered and the probability-plot of the data would compare more favorably with the regional precipitation-frequency relationship. As described previously, the differences are likely attributable primarily to sampling variability inherent in the short 24-year record.

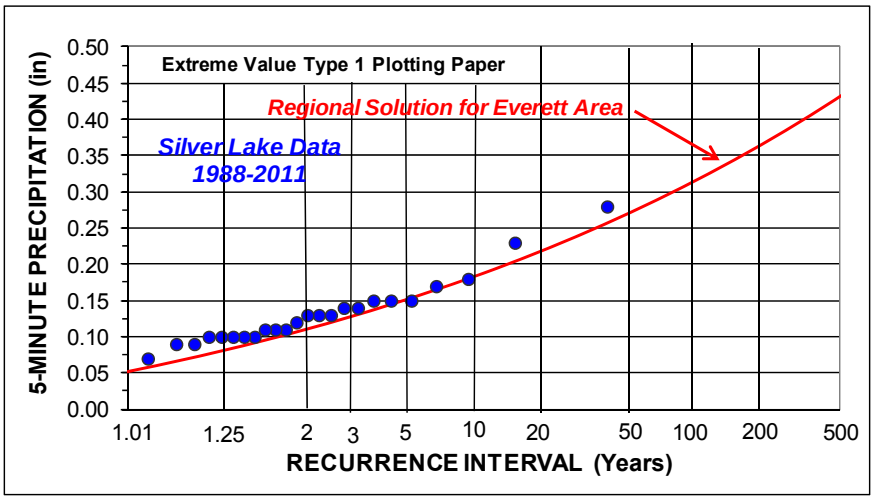


Figure 4a – Comparison of 5-Minute Precipitation Annual Maxima Observed at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

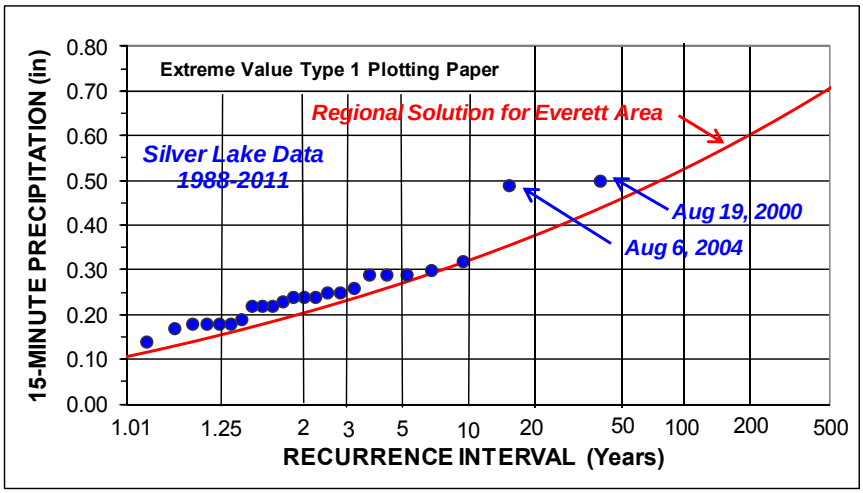


Figure 4b – Comparison of 15-Minute Precipitation Annual Maxima Observed at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

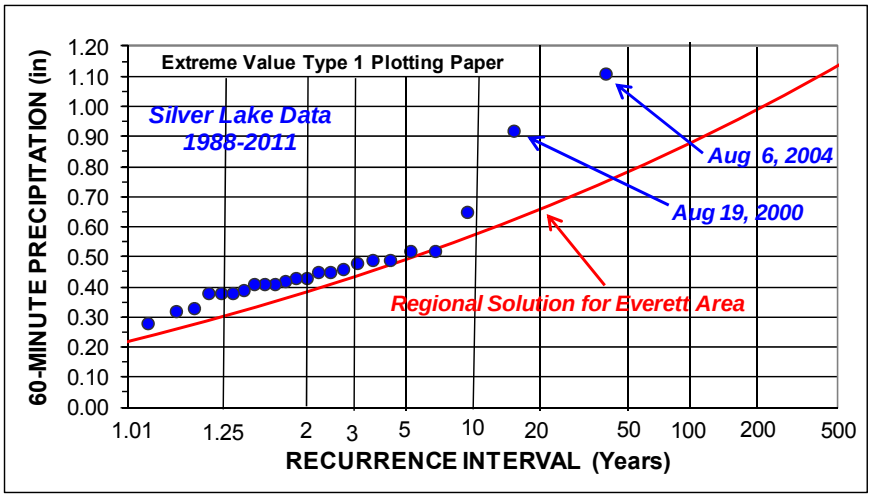


Figure 4c – Comparison of 60-Minute Precipitation Annual Maxima Observed at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

PRECIPITATION TIME-SERIES FOR ASSESSING THE ADEQUACY OF EXISTING STORMWATER AND COMBINED SEWER SYSTEMS USING RAINFALL-RUNOFF MODELING

The precipitation-frequency characteristics of the precipitation time-series recorded at the Silver Lake gage generally mimic the characteristics observed in large regional datasets applicable to the Everett area (Figures 3a,b,c and Figures 4a,b,c). Given this similarity, minor adjustments can be made to the 5-minute precipitation increments for Silver Lake to reasonably replicate the precipitation-frequency characteristics that are representative of the Everett area. These adjustments are based on the statistics observed in the long-term regional records representative of Everett and the Puget Sound Lowlands. Rescaling of the precipitation time-series for Silver Lake will make it suitable for use by rainfall-runoff models for assessing the adequacy of existing stormwater and combined sewer systems.

A review of Figures 3a,b,c shows the precipitation for the 2-hour, 6-hour and 24-hour durations at Silver Lake for the 1988-2011 period to be slightly greater than for the Everett NOAA station for the longer 1941-2009 period. Similarly, Figures 4a,b,c shows the precipitation for short 5-minute to 60-minute durations for the 1988-2011 period at Silver Lake to be slightly greater than what has

been determined to be representative of the Everett area. Given this situation, the precipitation time-series for the Silver Lake gage was rescaled using a 10% reduction in those 5-minute precipitation increments of 0.02-inches and greater. This corresponds to reducing those precipitation increments associated with the higher intensity segments of storms which are primarily responsible for generating the high runoff rates and peak flows in stormwater systems in the Everett area. Reductions were also made to several 5-minute increments in the August 2004 storm to provide consistency with the precipitation-frequency characteristics for the short-durations.

Figures 5a,b,c,d,e,f depict probability-plots for the rescaled Silver Lake precipitation time-series and comparison with the precipitation-frequency relationships representative of Everett based on regional analyses. Comparison of Figures 4a,b,c with Figures 5a,b,c respectively, shows significant improvement in the agreement between the shape of the precipitation-frequency relationship for the Everett area and the precipitation annual maxima for the rescaled Silver Lake data for durations from 5-minutes through 24-hours. The rescaled precipitation time-series for Silver Lake should be suitable for use by rainfall-runoff models for assessing the adequacy of existing stormwater and combined sewer systems.

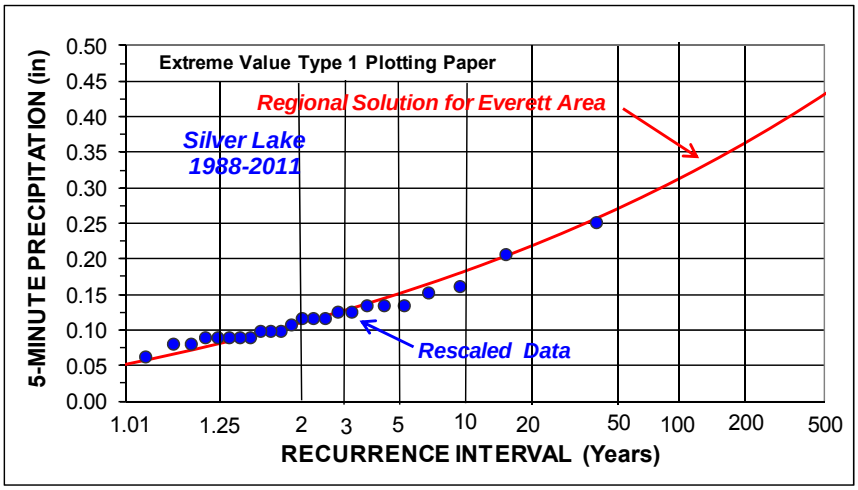


Figure 5a – Comparison of Rescaled 5-Minute Precipitation Annual Maxima at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

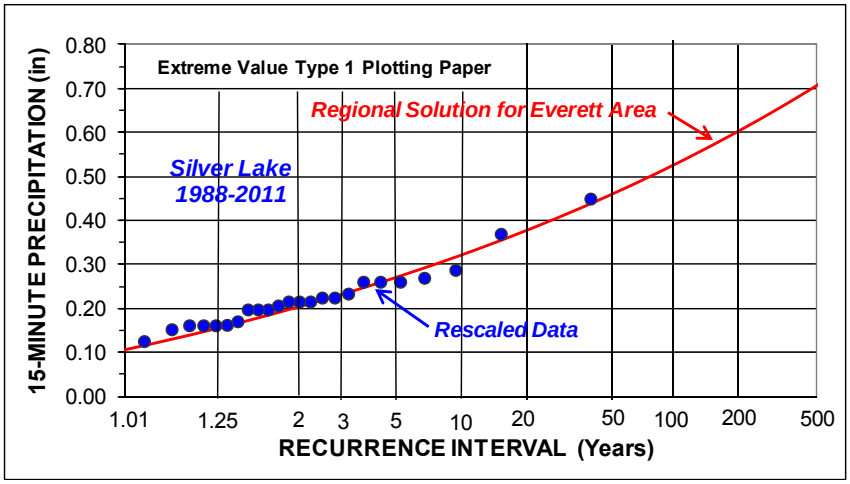


Figure 5b – Comparison of Rescaled 15-Minute Precipitation Annual Maxima at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

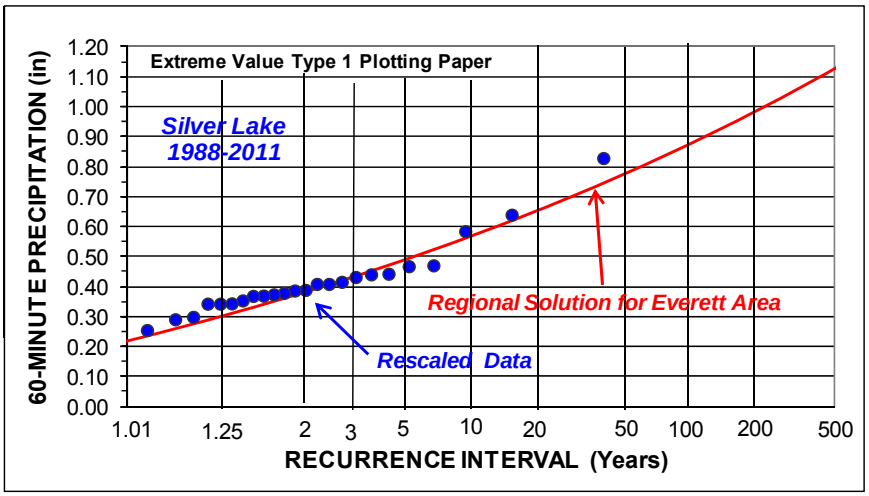


Figure 5c – Comparison of Rescaled 60-Minute Precipitation Annual Maxima at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

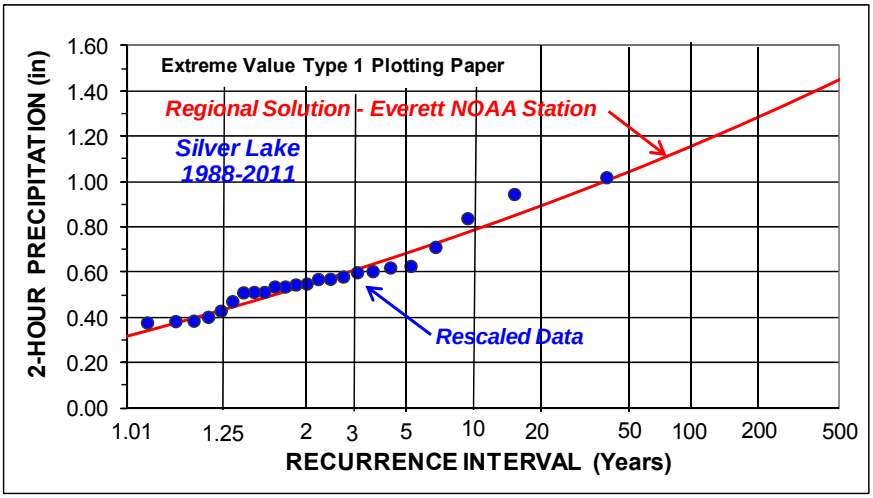


Figure 5d – Comparison of Rescaled 2-Hour Precipitation Annual Maxima at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

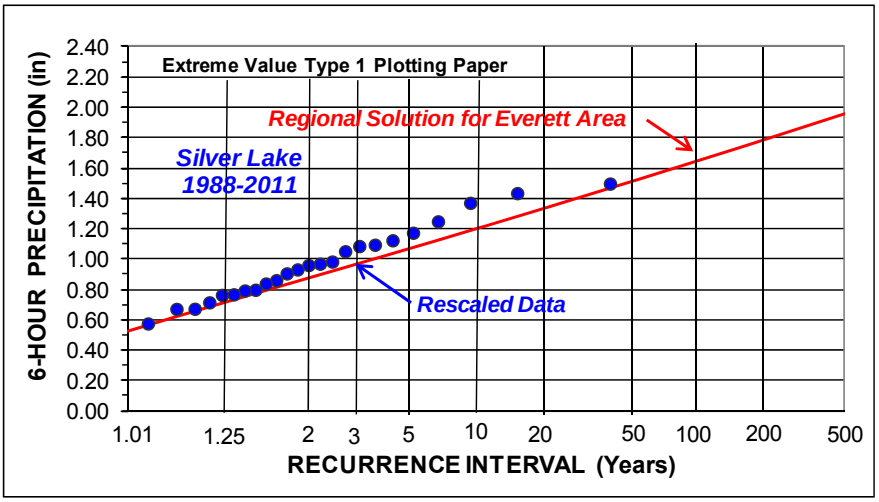


Figure 5e – Comparison of Rescaled 6-Hour Precipitation Annual Maxima at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

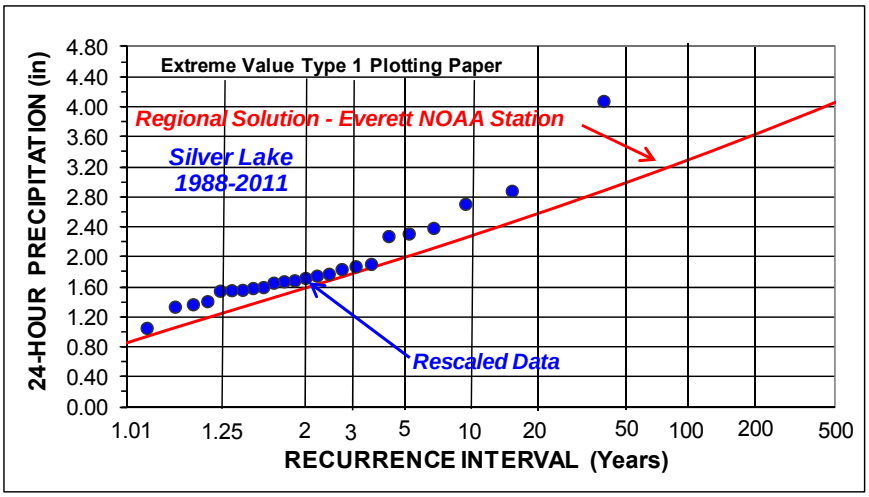


Figure 5f – Comparison of Rescaled 24-Hour Precipitation Annual Maxima at Silver Lake Gage with Regional Precipitation-Frequency Relationship for Everett WA

Option for Use of Comprehensive Statistical Scaling Techniques for Silver Lake Data

Comprehensive statistical scaling techniques are available (Schaefer and Barker[7]) which could be used to rescale the Silver Lake precipitation time-series for the full range of durations from short-durations (5-min through 120-min) to intermediate durations (3-hr through 12-hr), to long durations (24-hr to 72-hr) and very long durations (10-day, monthly and annual precipitation). This approach would result in matching of the precipitation characteristics and statistics for the Silver Lake precipitation time-series to those for the Everett area using all available sources of information and prior analyses applicable to the Everett area. This approach would be appropriate for developing a general purpose precipitation time-series applicable to the design of new infrastructure or modification of existing systems for a wide range of project types.

CONSIDERATIONS OF CLIMATE CHANGE

Clear Creek Solutions (CCS) has identified several options for mimicking the effects of climate change on precipitation magnitudes for use in assessing the adequacy of stormwater and combined sewer systems (CCS memorandum to City of Everett, June 8, 2011). After review of simulations from various climate models conducted by the University of Washington Climate Impacts Group, CSS has recommended applying a constant multiplier to precipitation for selected monthly groupings. Specifically, their recommendation is for a uniform increase of 9% for winter months (November through March) and an increase of 18% for summer months (April through October) for the year 2100. This equates to a 1% increase in precipitation magnitudes for each decade for the colder months and a 2% increase in precipitation magnitudes for each decade for the warmer months.

These proposed adjustments produce an abrupt jump in the increase in precipitation at the seasonal boundaries of March-April and October-November. Review of historical short-duration precipitation characteristics for the Puget Sound Lowlands (Schaefer[6,7]) indicates seasonal characteristics that transition more smoothly between the cold winter months and the warm summer months (Figures 6a,b). In Figures 6a and 6b, the terms short, intermediate and long-duration storms refer to precipitation during a storm event that is most rare at the 2-hour, 6-hour or 24-hour duration, respectively. In particular, the short-duration storm characteristics (precipitation maxima for 5-minutes through 120-minutes) within storms are often the controlling factor for stormwater and combined sewer systems where peak flow capacity is the primary consideration. These

seasonal characteristics suggest a minor revision to the CCS recommendation which provides a transition between the winter and summer months. Table 1 lists precipitation adjustment factors that include a transition period in the fall and spring of the year. In addition, it is common to consider a service life for infrastructure and Table 1 provides precipitation adjustment factors for a range of planning horizons. These adjustment factors are consistent with both the University of Washington simulations and the historical characteristics of short-duration precipitation in the Puget Sound Lowlands.

Table 1 – Seasonal Precipitation Adjustment Factors to Mimic the Effects of Climate Change for Application in the Everett Metropolitan Area

PRECIPITATION ADJUSTMENT FACTORS FOR MIMICKING EFFECTS OF CLIMATE CHANGE			
PLANNING HORIZON	WINTER MONTHS DEC-JAN-FEB-MAR	TRANSITION MONTHS OCT-NOV APR-MAY	SUMMER MONTHS JUN-JUL-AUG-SEP
30-Year	3.0%	4.5%	6.0%
50-Year	5.0%	7.5%	10.0%
Year 2100	9.0%	13.5%	18.0%

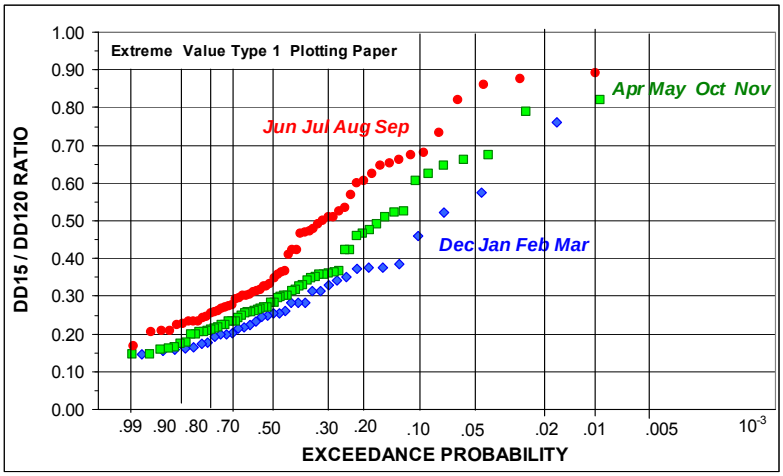


Figure 6a – Depth-Duration Ratios for Maximum 15-Minute Precipitation as Ratio to Maximum 2-Hour Precipitation for Short-Duration Storms

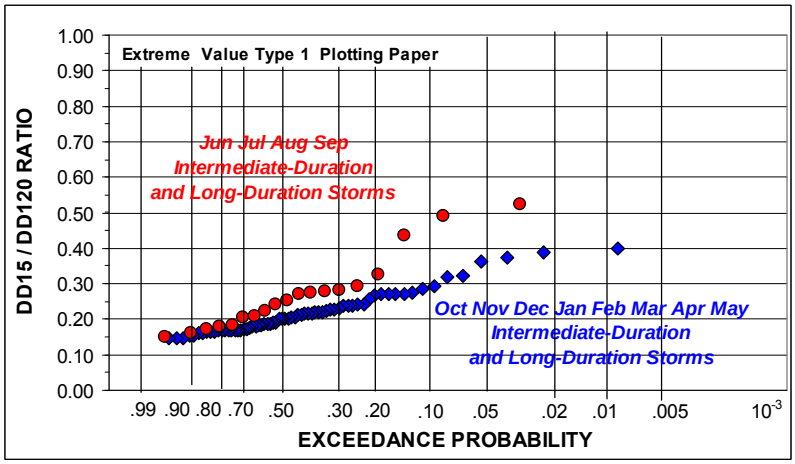


Figure 6b – Depth-Duration Ratios for Maximum 15-Minute Precipitation as Ratio to Maximum 2-Hour Precipitation for Intermediate-Duration and Long-Duration Storms

Projection of Climate Change Effects for Year 2100

An assessment of the effects of climate change for year 2100 can be made by application of the precipitation adjustment factors shown in Table 1. The rescaled 5-minute precipitation time-series for Silver Lake described previously was modified by applying the seasonal precipitation adjustment factors (Table 1) to all 5-minute precipitation increments in the 24-year time-series. Precipitation annual maxima datasets were then assembled and probability-plots were created (Figures 7a,b,c,d,e,f). The precipitation-frequency relationships representative of the Everett area for current climatic conditions and projected year 2100 conditions are also displayed in the figures.

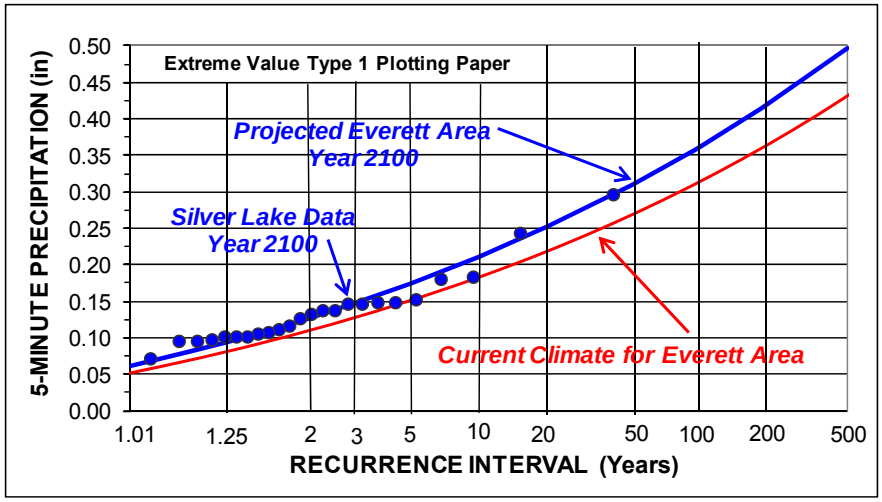


Figure 7a – Comparison of Projected 5-Minute Precipitation Annual Maxima at Silver Lake with Regional Precipitation-Frequency Relationship for Year 2100 for Everett WA

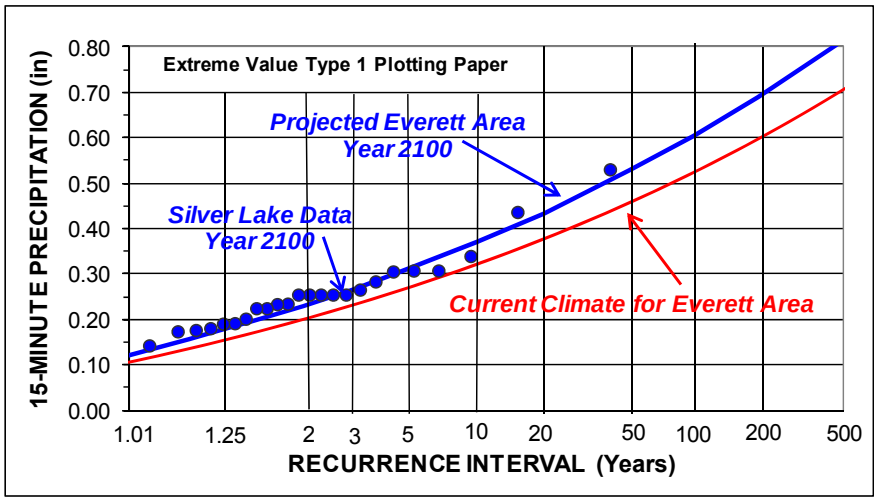


Figure 7b – Comparison of Projected 15-Minute Precipitation Annual Maxima at Silver Lake with Regional Precipitation-Frequency Relationship for Year 2100 for Everett WA

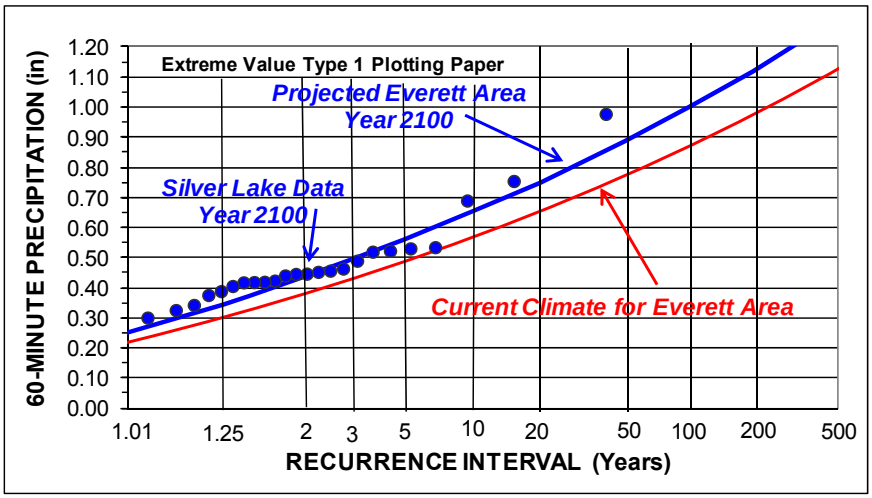


Figure 7c – Comparison of Projected 60-Minute Precipitation Annual Maxima at Silver Lake with Regional Precipitation-Frequency Relationship for Year 2100 for Everett WA

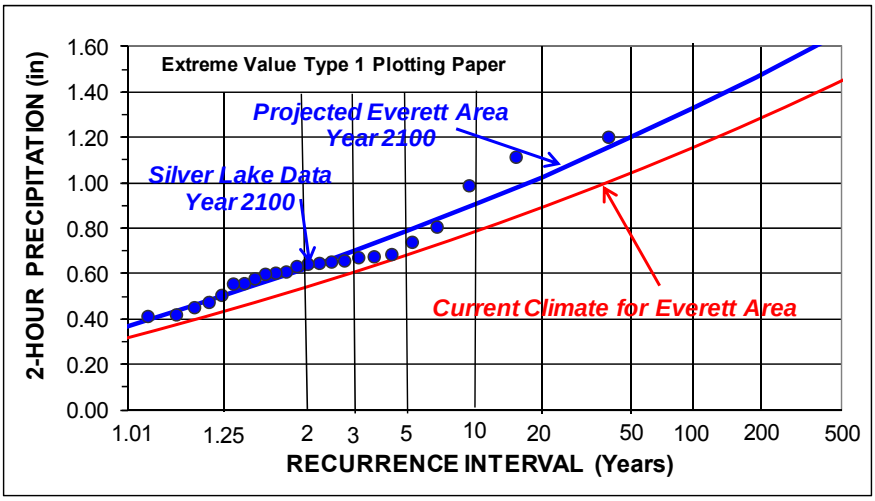


Figure 7d – Comparison of Projected 2-Hour Precipitation Annual Maxima at Silver Lake with Regional Precipitation-Frequency Relationship for Year 2100 for Everett WA

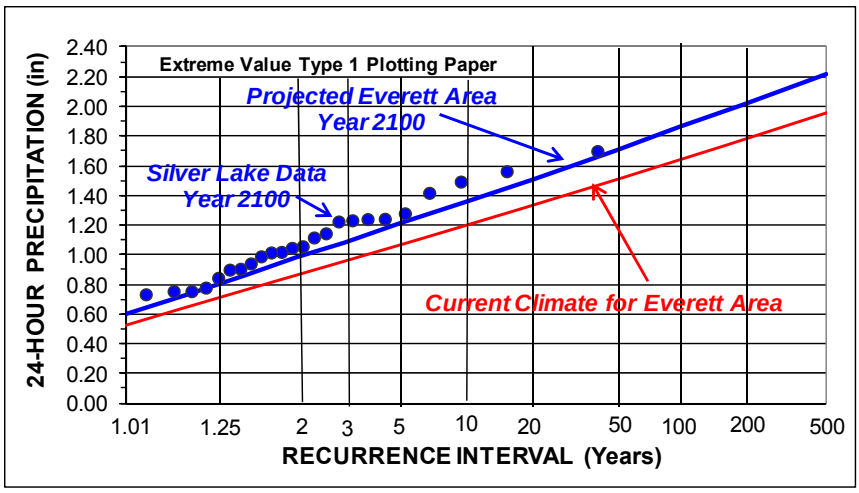


Figure 7e – Comparison of Projected 6-Hour Precipitation Annual Maxima at Silver Lake with Regional Precipitation-Frequency Relationship for Year 2100 for Everett WA

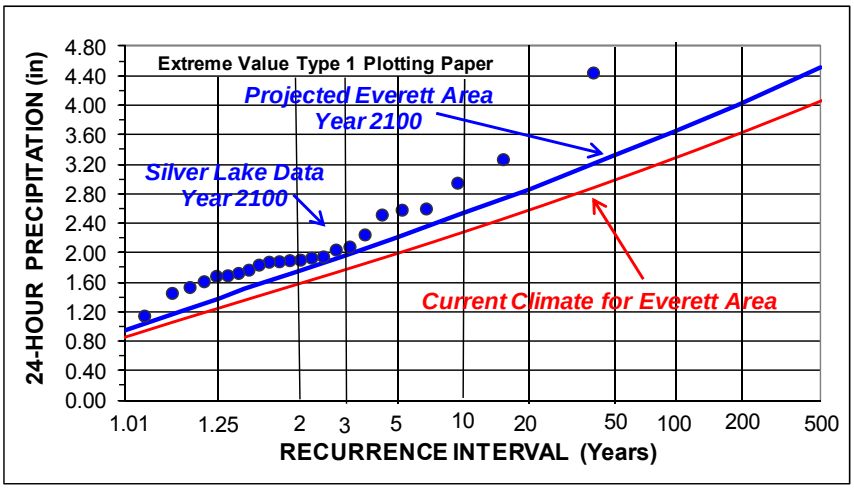


Figure 7f – Comparison of Projected 24-Hour Precipitation Annual Maxima at Silver Lake with Regional Precipitation-Frequency Relationship for Year 2100 for Everett WA

Assessing Sensitivity to Climate Change

Any policy on assessing uncertainties due to climate change should be considered as temporary and subject to change. Climate change predictions can be expected to change over the next years/decades as additional data are collected and analyses are conducted. It is recommended that the hydrologic software be capable of incorporating seasonal adjustment factors for the precipitation time-series to assess sensitivities and a range of possibilities. The precipitation adjustment factors would be applied to whichever precipitation time-series is adopted as representative of the Everett area for current climatic conditions.

SUMMARY

High resolution precipitation time-series data with a long record length is needed for continuous rainfall-runoff modeling of stormwater and combined sewer systems. The 5-minute precipitation time-series for the 1988-2011 period from the gage at Silver Lake has the necessary high resolution (0.01-inch measurement increment and short 5-minute time-step), high quality (completeness of record and care in record-keeping for missing periods, snow, etc.) and adequate record length for use in stormwater modeling in the Everett area.

A comparison was made between the precipitation-frequency characteristics for the Silver Lake precipitation time-series (1988-2011) and precipitation-frequency characteristics representative of the Everett area based on the Everett NOAA station and findings of regional analyses for the Puget Sound Lowlands and the Seattle 17 gage network. It was found that the Silver Lake data for the 1988-2011 period exhibited slightly greater precipitation than that judged representative of the Everett area based on the longer 1941-2009 record and regional analyses. The Silver Lake precipitation time-series was rescaled by a 10% reduction for all 5-minute increments of 0.02-inch or more. This produced a precipitation time-series with precipitation-frequency characteristics representative of the Everett area suitable for use in assessing the performance of existing stormwater and combined sewer systems.

Seasonal precipitation adjustment factors have been provided as a method for mimicking the effects of climate change on precipitation magnitudes. These seasonal adjustment factors would be multipliers to precipitation increments in the 5-minute precipitation time-series that is adopted as representative of current climatic conditions. The adjusted precipitation time-series would then be suitable for assessing the sensitivity of stormwater and combined sewer system capacity to possible changes in precipitation-frequency characteristics due the effects of climate change.

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DATE: 8 June 2011

TO: Russ Gaston and David Ojala, Otak

CC: Joe Brascher, CCS

FROM: Doug Beyerlein, P.E., CCS

SUBJECT: Climate Change Impacts on Stormwater

At the 27 May meeting with the City of Everett engineering staff the question of climate change effects on the future predicted stormwater runoff was raised. The purpose of this memo is to outline options for appropriate methods to modify historical precipitation and pan evaporation data to incorporate climate change effects in the stormwater modeling.

This memo provides information on extending the historical National Weather Service Everett precipitation and pan evaporation modifications to the year 2100 and the cost associated with this additional work. The National Weather Service Everett hourly precipitation currently in WWHM4 is for the period of October 1948 through March 1997. The City of Everett requests that the NWS Everett precipitation be extended to 2010 in WWHM4.

The University of Washington Center for Science in the Earth System Climate Impacts Group has analyzed the response to climate change for the Pacific Northwest, as simulated by several climate models. These climate simulations were prepared by climate modeling centers worldwide for the Fourth IPCC Assessment. From the different models used in climate modeling the UW Climate Impacts Group has selected the following models and scenarios to represent the lowest, middle, and highest expected climate warming for the Pacific Northwest:

- Lowest: GISS-ER B1
- Middle: ECHAM5 SRES A2
- Highest: IPSL_CM4 A2

For the purposes of the Everett stormwater modeling work I have selected the middle scenario: ECHAM5 SRES A2 and used this climate change scenario to provide input on how to modify existing historical precipitation and pan evaporation data.

U.S. EPA has developed the BASINS CAT (Climate Assessment Tool) to modify HSPF meteorological time series data to incorporate climate change effects. CAT does this in two ways: (1) modifying precipitation data, and (2) modifying air temperature data to adjust potential evapotranspiration (PET).

Precipitation data can be modified using one or more of the five methods described below:

1. Apply a constant multiplier to the entire precipitation record, uniformly increasing or decreasing precipitation by a constant percent change.
2. Apply a constant multiplier to a user-specified month or season each year, the remainder of the year stays unchanged.
3. Apply a constant multiplier to a user-specified range of years within the entire period of record, the remainder of the years stays unchanged.
4. Add or removal specific precipitation events to the historical period of record, the remainder of the period of record stays unchanged.
5. Apply a constant multiplier to a user-specified event size class within the entire period of record, the remainder of the record stays unchanged.

The ECHAM5 SRES A2 simulation scenario shows an approximate increase in winter precipitation of 9% between the years 2000 and 2100. Summer precipitation is estimated to increase by 18%. These changes can best be represented by applying method #2 (apply a constant multiplier to a user-specified month or season each year) separately for both the winter months (November through March) and the summer months (April through October).

Air temperature data can be modified using one or more of the three methods described below:

1. Add or subtract a constant value to the entire temperature record, uniformly increasing or decreasing air temperature by a constant amount.
2. Add or subtract a constant value to a user-specified month or season each year, the remainder of the year stays unchanged.
3. Add or subtract a constant value to a user-specified range of years within the entire period of record, the remainder of the years stays unchanged.

Once the air temperature data have been changed then the potential evapotranspiration (PET) time series can be calculated using the Hamon Method.

For Western Washington we use Puyallup pan evaporation data to calculate PET instead of the Hamon Method, which uses air temperature and length of daylight period. However, for the purposes of adjusting the PET data we can use the percent change in Hamon-calculated PET (produced by air temperature changes) to adjust pan evaporation-based PET.

The Hamon Method equation is:

PET (mm/day) = 0.1651*Ld*RHOSAT*KPEC

where

Ld = daytime length (multiples of 12 hours)
RHOSAT = 216.7*ESAT/(T+273.3)
ESAT = 6.108*EXP(17.26939*T/(T+273.3))
KPEC = 1.2
T = daily mean air temperature (degrees C)

Using the Hamon Method equation there is approximately a 5% increase in PET for every one degree C increase in air temperature for daily mean air temperature values in the range of 15 degrees C to 35 degrees C.

The ECHAM5 SRES A2 simulation scenario shows an approximate increase in mean annual air temperature values of 4 degrees C between the years 2000 and 2100. This indicates a 20% increase in mean annual PET values by the year 2100.

Based on the UW Climate Impacts Group's climate simulation results using the simulation that describes the middle expected climate warming for the Pacific Northwest (ECHAM5 SRES A2), I recommend the following modifications to the Everett historical precipitation and PET time series:

1. Increase precipitation values for winter months (November through March) by 9% and precipitation values for the summer months (April through October) by 18% using CAT.

2. Increase PET for the entire period of record by 20% by changing the HSPF pan evaporation coefficient from 0.76 to 0.91 (20% increase) in WWHM4.

Prior to making the above-described modifications, the City of Everett will obtain digital files of the National Weather Service Everett hourly precipitation records for the period of April 1997 through September 2010 and provide that those records to Otak and Clear Creek Solutions. Clear Creek Solutions will then add this extended period to WWHM4.

The cost associated with the above-described meteorological data modifications and addition of an existing conditions simulation scenario that includes climate change impacts (in addition to an existing scenario without climate change impacts) are outlined below.

Extension of WWHM4 Everett hourly precipitation data to 2010: $3000
Modification of meteorological data to include climate change impacts: $300
Set up of an existing conditions simulation scenario that includes climate change impacts: $300
Analysis of an existing conditions simulation scenario that includes climate change impacts: $900

Total additional cost: $4500.

Appendix Q

City of Everett Design Rainfall Series

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City of Everett's Design Rainfall Time Series

The City's policy for the design of sewer and stormwater conveyance improvements is to use the climate change adjusted rainfall series. The rainfall time series is provided in the subsequent table. The values reported in the table are described as follows:

- **Model Date and Time:** Generic time stamp with time between measured rainfall the same as the actual date and time but with only seven days of no rainfall between individual events rather than the weeks, months, or years between the actual events.
- **Rainfall Accumulation:** Rainfall values from the raw data adjusted for the Everett area. Estimated Year 2100 climate change adjusted rainfall series adopted by the City of Everett

Model Rainfall Time Series Development

The modeling rainfall time series was developed from the City's adopted long term rainfall series based on the Silver Lake Rain Gage and adjusted for the Everett Area. A climate change adjustment is also made to the rainfall time series as discussed in the Everett Sewer Comprehensive Plan Rainfall Time Series Memorandum dated February 24, 2012. The purpose of developing these time series was to reduce the total amount of data processed in a modeling analysis. These times series include the largest storm events in the overall record and consequently the storm events that define the capacity requirement of the sewer and combined sewer systems.

A total of 1704 discrete storm events were identified in the entire 24 year rainfall time series based on a 24 hour dry inter-event period between measured rainfall. For each of the events the largest accumulations for the 1 hour, 2 hour, 3, hour, 6 hour, 12 hour, and 24 hour durations were determined. The events were sorted based on the events with largest accumulations in each duration. For the Level of Service (LOS) sewer system analysis with a minimum threshold of a 5 years, the top 6 storms events in each time duration were identified for a total of 36 events. Many of the events overlapped into multiple time duration increments so the duplicate rainfall events were deleted. This reduced the total to 14 independent storm events. To account for antecedent conditions that may be present at the beginning of a storm any rainfall that occurred in the 7 days prior to a storm event was added back into the time series. Finally, to compress the overall time series and the model processing time, the Actual Date and Time of the rainfall was translated into an equivalent generic time series starting on 1/1//00 at 0:00. In the generic time series seven days of no rainfall was inserted in between individual storm events to allow the antecedent conditions to recover between each storm. Compressing the 24 year time series as described above reduced the modeling time series for the LOS analysis form 24 years to 7 months and 14 days. This reduced time series includes the top 14 storms events and the flow generated by these events defines the conveyance system capacity of the collection system. Since the majority of the storm events have been deleted, modeling analysis using the time series will not determine total flow or annual flow generated by the system.

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Model Date and Time	Rainfall Accumulation (in)
1/1/00 0:00	0.01135
1/1/00 0:30	0.01135
1/1/00 0:40	0.01135
1/1/00 1:20	0.01135
1/1/00 1:40	0.01135
1/1/00 1:50	0.01135
1/1/00 1:55	0.01135
1/1/00 7:00	0.01135
1/1/00 12:45	0.051075
1/1/00 12:50	0.01135
1/1/00 12:55	0.01135
1/1/00 13:05	0.01135
1/1/00 14:40	0.01135
1/1/00 15:00	0.01135
1/1/00 15:15	0.01135
1/1/00 15:35	0.01135
1/1/00 15:40	0.01135
1/1/00 15:45	0.01135
1/1/00 15:50	0.02043
1/1/00 15:55	0.02043
1/1/00 16:00	0.01135
1/1/00 16:05	0.02043
1/1/00 16:10	0.02043
1/1/00 16:15	0.01135
1/1/00 16:20	0.01135
1/1/00 16:25	0.01135
1/1/00 16:30	0.01135
1/1/00 16:35	0.01135
1/1/00 16:40	0.01135
1/1/00 16:55	0.01135
1/1/00 17:00	0.01135
1/1/00 17:10	0.01135
1/1/00 17:15	0.01135
1/1/00 17:25	0.02043
1/1/00 17:30	0.01135
1/1/00 17:40	0.01135
1/1/00 17:50	0.01135
1/1/00 17:55	0.01135
1/1/00 18:05	0.01135
1/1/00 18:15	0.01135
1/1/00 18:35	0.01135
1/1/00 19:05	0.01135
1/1/00 20:20	0.01135
1/1/00 21:20	0.01135
1/1/00 22:40	0.01135
1/1/00 23:35	0.01135
1/2/00 0:05	0.01135
1/2/00 0:20	0.01135
1/2/00 0:55	0.01135
1/2/00 22:15	0.01135
1/3/00 13:05	0.01135
1/3/00 15:20	0.01135
1/3/00 17:50	0.01135
1/7/00 23:05	0.01135
1/8/00 5:20	0.01135
1/8/00 5:35	0.01135
1/8/00 5:45	0.01135
1/8/00 5:55	0.01135
1/8/00 6:05	0.01135
1/8/00 6:15	0.01135
1/8/00 6:25	0.01135
1/8/00 6:35	0.01135
1/8/00 6:45	0.01135
1/8/00 6:50	0.01135
1/8/00 7:00	0.01135
1/8/00 7:10	0.01135
1/8/00 7:20	0.01135
1/8/00 7:25	0.01135
1/8/00 7:35	0.01135
1/8/00 7:40	0.01135
1/8/00 7:55	0.01135
1/8/00 8:15	0.01135
1/8/00 12:25	0.01135
1/8/00 13:00	0.01135
1/8/00 13:10	0.01135
1/8/00 13:15	0.01135
1/8/00 13:25	0.01135
1/8/00 13:35	0.01135
1/8/00 13:45	0.01135
1/8/00 13:55	0.01135
1/8/00 14:00	0.01135

Model Date and Time	Rainfall Accumulation (in)
1/8/00 14:10	0.01135
1/8/00 14:15	0.01135
1/8/00 14:25	0.01135
1/8/00 14:30	0.01135
1/8/00 14:40	0.01135
1/8/00 14:50	0.01135
1/8/00 15:00	0.01135
1/8/00 15:10	0.01135
1/8/00 15:15	0.01135
1/8/00 15:25	0.01135
1/8/00 15:35	0.01135
1/8/00 15:45	0.01135
1/8/00 15:50	0.01135
1/8/00 15:55	0.01135
1/8/00 16:00	0.01135
1/8/00 16:05	0.01135
1/8/00 16:10	0.01135
1/8/00 16:15	0.01135
1/8/00 16:20	0.01135
1/8/00 16:25	0.01135
1/8/00 16:35	0.01135
1/8/00 16:40	0.01135
1/8/00 16:50	0.01135
1/8/00 16:55	0.01135
1/8/00 17:05	0.01135
1/8/00 17:15	0.01135
1/8/00 17:25	0.01135
1/8/00 17:35	0.01135
1/8/00 17:45	0.01135
1/8/00 17:55	0.01135
1/8/00 18:00	0.01135
1/8/00 18:10	0.01135
1/8/00 18:15	0.02043
1/8/00 18:20	0.01135
1/8/00 18:25	0.01135
1/8/00 18:35	0.01135
1/8/00 18:45	0.01135
1/8/00 18:55	0.01135
1/8/00 19:00	0.02043
1/8/00 19:05	0.02043
1/8/00 19:10	0.02043
1/8/00 19:15	0.02043
1/8/00 19:20	0.030645
1/8/00 19:25	0.02043
1/8/00 19:30	0.01135
1/8/00 19:35	0.02043
1/8/00 19:40	0.01135
1/8/00 19:50	0.01135
1/8/00 19:55	0.01135
1/8/00 20:00	0.01135
1/8/00 20:05	0.01135
1/8/00 20:10	0.01135
1/8/00 20:20	0.01135
1/8/00 20:30	0.01135
1/8/00 20:35	0.01135
1/8/00 20:45	0.01135
1/8/00 20:50	0.01135
1/8/00 21:00	0.01135
1/8/00 21:05	0.01135
1/8/00 21:10	0.01135
1/8/00 21:15	0.01135
1/8/00 21:20	0.01135
1/8/00 21:25	0.01135
1/8/00 21:30	0.01135
1/8/00 21:40	0.01135
1/8/00 21:45	0.01135
1/8/00 21:50	0.01135
1/8/00 21:55	0.01135
1/8/00 22:00	0.01135
1/8/00 22:05	0.01135
1/8/00 22:10	0.01135
1/8/00 22:20	0.01135
1/8/00 22:25	0.01135
1/8/00 22:30	0.01135
1/8/00 22:35	0.01135
1/8/00 22:40	0.01135
1/8/00 22:45	0.01135
1/8/00 22:50	0.01135
1/8/00 22:55	0.01135
1/8/00 23:00	0.01135
1/8/00 23:05	0.01135

Model Date and Time	Rainfall Accumulation (in)
1/8/00 23:10	0.01135
1/8/00 23:20	0.01135
1/8/00 23:25	0.02043
1/8/00 23:30	0.01135
1/8/00 23:35	0.01135
1/8/00 23:40	0.01135
1/8/00 23:45	0.01135
1/8/00 23:50	0.01135
1/8/00 23:55	0.01135
1/9/00 0:00	0.01135
1/9/00 0:05	0.01135
1/9/00 0:10	0.01135
1/9/00 0:20	0.01135
1/9/00 0:25	0.01135
1/9/00 0:30	0.01135
1/9/00 0:40	0.01135
1/9/00 0:45	0.01135
1/9/00 0:55	0.01135
1/9/00 1:05	0.01135
1/9/00 1:15	0.01135
1/9/00 1:25	0.01135
1/9/00 1:40	0.01135
1/9/00 1:50	0.01135
1/9/00 1:55	0.01135
1/9/00 2:00	0.01135
1/9/00 2:10	0.01135
1/9/00 2:15	0.01135
1/9/00 2:25	0.01135
1/9/00 2:30	0.01135
1/9/00 2:35	0.01135
1/9/00 2:40	0.01135
1/9/00 2:45	0.02043
1/9/00 2:50	0.02043
1/9/00 2:55	0.01135
1/9/00 3:00	0.01135
1/9/00 3:05	0.01135
1/9/00 3:10	0.01135
1/9/00 3:15	0.01135
1/9/00 3:20	0.01135
1/9/00 3:25	0.01135
1/9/00 3:30	0.02043
1/9/00 3:35	0.02043
1/9/00 3:40	0.01135
1/9/00 3:45	0.01135
1/9/00 3:50	0.01135
1/9/00 3:55	0.01135
1/9/00 4:00	0.01135
1/9/00 4:05	0.030645
1/9/00 4:10	0.01135
1/9/00 4:15	0.02043
1/9/00 4:20	0.030645
1/9/00 4:25	0.04086
1/9/00 4:30	0.030645
1/9/00 4:35	0.02043
1/9/00 4:40	0.02043
1/9/00 4:45	0.02043
1/9/00 4:50	0.02043
1/9/00 4:55	0.02043
1/9/00 5:00	0.030645
1/9/00 5:05	0.02043
1/9/00 5:10	0.01135
1/9/00 5:15	0.02043
1/9/00 5:20	0.02043
1/9/00 5:25	0.02043
1/9/00 5:30	0.02043
1/9/00 5:35	0.01135
1/9/00 5:40	0.030645
1/9/00 5:45	0.02043
1/9/00 5:50	0.01135
1/9/00 6:00	0.01135
1/9/00 6:05	0.01135
1/9/00 6:15	0.02043
1/9/00 6:20	0.01135
1/9/00 6:25	0.01135
1/9/00 6:30	0.01135
1/9/00 6:35	0.01135
1/9/00 6:50	0.01135
1/9/00 7:00	0.01135
1/9/00 7:10	0.01135
1/9/00 7:20	0.02043
1/9/00 7:25	0.02043

Model Date and Time	Rainfall Accumulation (in)
1/9/00 7:30	0.02043
1/9/00 7:35	0.02043
1/9/00 8:00	0.01135
1/9/00 8:05	0.01135
1/9/00 8:10	0.01135
1/9/00 8:30	0.01135
1/9/00 8:35	0.02043
1/9/00 8:40	0.030645
1/9/00 8:55	0.01135
1/9/00 10:00	0.01135
1/9/00 10:05	0.01135
1/9/00 10:10	0.051075
1/9/00 10:15	0.02043
1/9/00 12:00	0.01135
1/9/00 16:10	0.01135
1/9/00 16:15	0.02043
1/9/00 16:20	0.01135
1/9/00 16:25	0.01135
1/9/00 16:35	0.01135
1/10/00 12:15	0.01135
1/11/00 0:30	0.01135
1/11/00 0:55	0.01135
1/11/00 1:20	0.01135
1/11/00 2:45	0.01135
1/11/00 3:05	0.01135
1/11/00 3:30	0.01135
1/11/00 3:55	0.01135
1/11/00 5:55	0.01135
1/11/00 6:15	0.01135
1/11/00 6:25	0.01135
1/11/00 6:35	0.01135
1/11/00 6:40	0.01135
1/11/00 6:50	0.01135
1/11/00 7:00	0.01135
1/11/00 7:05	0.01135
1/11/00 7:15	0.01135
1/11/00 7:25	0.01135
1/11/00 7:35	0.01135
1/11/00 7:45	0.01135
1/11/00 8:00	0.01135
1/11/00 8:05	0.01135
1/11/00 8:10	0.01135
1/11/00 8:30	0.01135
1/11/00 8:35	0.01135
1/11/00 8:45	0.01135
1/11/00 8:50	0.01135
1/11/00 8:55	0.01135
1/11/00 9:00	0.01135
1/11/00 9:10	0.01135
1/11/00 9:20	0.01135
1/18/00 9:20	0.0118
1/18/00 9:30	0.0118
1/19/00 3:40	0.0118
1/19/00 3:50	0.0118
1/19/00 3:55	0.03186
1/19/00 4:00	0.0531
1/19/00 4:05	0.03186
1/19/00 4:10	0.02124
1/19/00 4:20	0.0118
1/19/00 4:25	0.02124
1/19/00 4:30	0.02124
1/19/00 4:35	0.0118
1/19/00 4:40	0.0118
1/19/00 4:45	0.0118
1/19/00 4:50	0.0118
1/19/00 4:55	0.0118
1/19/00 5:00	0.0118
1/19/00 5:05	0.02124
1/19/00 5:15	0.0118
1/19/00 5:30	0.0118
1/19/00 5:35	0.03186
1/19/00 5:40	0.0118
1/19/00 5:50	0.0118
1/19/00 6:00	0.02124
1/19/00 6:05	0.0118
1/19/00 6:10	0.0118
1/19/00 6:25	0.0118
1/19/00 6:35	0.02124
1/19/00 6:50	0.0118
1/22/00 10:35	0.0118
1/22/00 11:35	0.0118

Model Date and Time	Rainfall Accumulation (in)
1/22/00 11:40	0.0118
1/22/00 11:45	0.0118
1/22/00 11:55	0.0118
1/22/00 12:20	0.0118
1/22/00 12:25	0.06372
1/22/00 12:30	0.09558
1/22/00 12:35	0.07434
1/22/00 12:40	0.04248
1/22/00 12:45	0.0118
1/22/00 12:50	0.0531
1/22/00 12:55	0.07434
1/22/00 13:00	0.03186
1/22/00 13:05	0.02124
1/22/00 13:10	0.02124
1/22/00 13:15	0.0118
1/22/00 13:20	0.02124
1/22/00 13:25	0.0118
1/22/00 13:30	0.0118
1/22/00 13:35	0.0118
1/29/00 13:35	0.0109
1/29/00 13:55	0.0109
1/29/00 14:20	0.0109
1/29/00 14:25	0.0109
1/29/00 14:35	0.0109
1/29/00 14:50	0.0109
1/29/00 15:05	0.0109
1/29/00 15:20	0.0109
1/29/00 15:40	0.0109
1/29/00 15:50	0.0109
1/29/00 16:00	0.0109
1/29/00 16:50	0.0109
1/29/00 17:00	0.0109
1/29/00 17:05	0.0109
1/29/00 17:15	0.0109
1/29/00 17:20	0.01962
1/29/00 17:25	0.0109
1/29/00 17:30	0.01962
1/29/00 17:35	0.0109
1/29/00 17:40	0.0109
1/29/00 17:45	0.0109
1/29/00 17:55	0.0109
1/29/00 18:05	0.0109
1/29/00 18:10	0.0109
1/29/00 18:25	0.0109
1/29/00 18:40	0.0109
1/29/00 20:05	0.0109
1/30/00 1:25	0.0109
1/30/00 17:35	0.0109
1/30/00 17:45	0.0109
1/30/00 18:00	0.0109
1/30/00 18:10	0.0109
1/30/00 18:20	0.0109
1/30/00 18:25	0.0109
1/30/00 18:55	0.0109
1/30/00 19:15	0.0109
1/30/00 19:25	0.0109
1/30/00 19:35	0.0109
1/30/00 19:55	0.0109
1/30/00 20:10	0.0109
1/30/00 20:25	0.0109
1/30/00 21:00	0.0109
1/30/00 23:45	0.0109
1/31/00 0:05	0.0109
1/31/00 6:35	0.0109
1/31/00 6:45	0.0109
1/31/00 7:00	0.0109
1/31/00 7:20	0.0109
1/31/00 7:25	0.0109
1/31/00 7:30	0.01962
1/31/00 7:35	0.0109
1/31/00 7:40	0.0109
1/31/00 7:55	0.0109
1/31/00 10:50	0.0109
2/1/00 0:45	0.0109
2/1/00 1:00	0.0109
2/1/00 1:20	0.0109
2/1/00 1:35	0.0109
2/1/00 1:55	0.0109
2/1/00 2:10	0.0109
2/1/00 2:35	0.0109
2/1/00 2:45	0.0109

Model Date and Time	Rainfall Accumulation (in)
2/1/00 2:55	0.0109
2/1/00 3:10	0.0109
2/1/00 3:20	0.0109
2/1/00 3:35	0.0109
2/1/00 3:50	0.0109
2/1/00 4:05	0.0109
2/1/00 4:30	0.0109
2/1/00 6:05	0.0109
2/1/00 7:05	0.0109
2/1/00 7:30	0.0109
2/1/00 8:10	0.0109
2/1/00 8:35	0.0109
2/1/00 9:30	0.0109
2/1/00 10:00	0.0109
2/1/00 11:25	0.0109
2/1/00 11:45	0.0109
2/1/00 12:35	0.0109
2/1/00 14:10	0.0109
2/1/00 14:15	0.0109
2/1/00 14:20	0.0109
2/1/00 14:25	0.0109
2/1/00 14:30	0.0109
2/1/00 14:35	0.01962
2/1/00 14:40	0.0109
2/1/00 14:45	0.0109
2/1/00 14:50	0.0109
2/1/00 15:00	0.0109
2/1/00 15:05	0.0109
2/1/00 15:10	0.0109
2/1/00 15:15	0.01962
2/1/00 15:20	0.0109
2/1/00 15:25	0.01962
2/1/00 15:30	0.0109
2/1/00 15:35	0.0109
2/1/00 15:40	0.0109
2/1/00 15:45	0.0109
2/1/00 15:50	0.01962
2/1/00 15:55	0.0109
2/1/00 16:00	0.0109
2/1/00 16:05	0.0109
2/1/00 16:10	0.0109
2/1/00 16:20	0.0109
2/1/00 16:25	0.0109
2/1/00 16:35	0.0109
2/1/00 16:45	0.0109
2/1/00 16:50	0.0109
2/1/00 17:00	0.0109
2/1/00 17:05	0.0109
2/1/00 17:15	0.0109
2/1/00 17:20	0.0109
2/1/00 17:30	0.0109
2/1/00 17:35	0.0109
2/1/00 17:40	0.0109
2/1/00 17:45	0.0109
2/1/00 17:55	0.0109
2/1/00 18:15	0.0109
2/1/00 21:10	0.0109
2/1/00 21:30	0.0109
2/1/00 21:45	0.0109
2/1/00 21:55	0.0109
2/1/00 22:00	0.0109
2/1/00 22:10	0.0109
2/1/00 22:15	0.0109
2/1/00 22:25	0.0109
2/1/00 22:35	0.0109
2/1/00 22:45	0.0109
2/1/00 22:50	0.0109
2/1/00 22:55	0.0109
2/1/00 23:00	0.0109
2/1/00 23:10	0.0109
2/1/00 23:15	0.0109
2/1/00 23:20	0.01962
2/1/00 23:25	0.0109
2/1/00 23:30	0.0109
2/1/00 23:35	0.0109
2/1/00 23:40	0.01962
2/1/00 23:45	0.0109
2/1/00 23:50	0.0109
2/1/00 23:55	0.01962
2/2/00 0:05	0.0109
2/2/00 0:10	0.0109

Model Date and Time	Rainfall Accumulation (in)
2/2/00 0:15	0.0109
2/2/00 0:20	0.0109
2/2/00 0:30	0.0109
2/2/00 0:35	0.0109
2/2/00 0:45	0.0109
2/2/00 0:55	0.0109
2/2/00 1:05	0.0109
2/2/00 1:20	0.0109
2/2/00 1:30	0.0109
2/2/00 1:35	0.0109
2/2/00 1:45	0.0109
2/2/00 1:55	0.0109
2/2/00 2:10	0.0109
2/2/00 2:25	0.0109
2/2/00 2:30	0.0109
2/2/00 2:35	0.0109
2/2/00 2:45	0.0109
2/2/00 3:00	0.0109
2/2/00 3:05	0.0109
2/2/00 3:15	0.0109
2/2/00 3:20	0.0109
2/2/00 3:25	0.0109
2/2/00 3:30	0.0109
2/2/00 3:40	0.0109
2/2/00 3:45	0.0109
2/2/00 3:55	0.0109
2/2/00 4:35	0.0109
2/2/00 4:55	0.0109
2/2/00 5:10	0.0109
2/2/00 5:15	0.0109
2/2/00 5:30	0.0109
2/2/00 5:40	0.0109
2/2/00 5:50	0.0109
2/2/00 5:55	0.0109
2/2/00 6:05	0.01962
2/2/00 6:10	0.0109
2/2/00 6:15	0.0109
2/2/00 6:20	0.0109
2/2/00 6:25	0.0109
2/2/00 6:30	0.0109
2/2/00 6:35	0.0109
2/2/00 6:40	0.01962
2/2/00 6:45	0.0109
2/2/00 6:50	0.0109
2/2/00 6:55	0.0109
2/2/00 7:00	0.0109
2/2/00 7:05	0.01962
2/2/00 7:10	0.0109
2/2/00 7:15	0.0109
2/2/00 7:20	0.0109
2/2/00 7:25	0.0109
2/2/00 7:30	0.0109
2/2/00 7:35	0.0109
2/2/00 7:40	0.0109
2/2/00 7:45	0.0109
2/2/00 7:55	0.0109
2/2/00 8:00	0.0109
2/2/00 8:05	0.0109
2/2/00 8:10	0.0109
2/2/00 8:20	0.0109
2/2/00 8:25	0.0109
2/2/00 8:30	0.0109
2/2/00 8:35	0.0109
2/2/00 8:40	0.0109
2/5/00 3:40	0.0109
2/5/00 4:00	0.0109
2/5/00 4:15	0.01962
2/5/00 4:35	0.0109
2/5/00 4:50	0.0109
2/5/00 5:00	0.02943
2/5/00 5:25	0.0109
2/5/00 5:35	0.0109
2/5/00 5:45	0.0109
2/5/00 5:50	0.0109
2/5/00 6:00	0.01962
2/5/00 6:05	0.0109
2/5/00 6:10	0.0109
2/5/00 6:15	0.0109
2/5/00 6:20	0.02943
2/5/00 6:25	0.0109
2/5/00 6:35	0.01962

Model Date and Time	Rainfall Accumulation (in)
2/5/00 6:40	0.0109
2/5/00 6:45	0.01962
2/5/00 6:50	0.0109
2/5/00 6:55	0.0109
2/5/00 7:00	0.0109
2/5/00 7:05	0.02943
2/5/00 7:10	0.0109
2/5/00 7:15	0.0109
2/5/00 7:20	0.0109
2/5/00 7:25	0.0109
2/5/00 7:30	0.01962
2/5/00 7:35	0.0109
2/5/00 7:45	0.0109
2/5/00 7:50	0.0109
2/5/00 8:05	0.02943
2/5/00 8:15	0.0109
2/5/00 8:30	0.0109
2/5/00 8:50	0.0109
2/5/00 9:10	0.02943
2/5/00 9:40	0.0109
2/5/00 10:15	0.01962
2/6/00 0:55	0.0109
2/6/00 1:00	0.0109
2/6/00 1:05	0.0109
2/6/00 1:10	0.0109
2/6/00 1:15	0.0109
2/6/00 1:20	0.0109
2/6/00 1:25	0.0109
2/6/00 1:30	0.0109
2/6/00 1:35	0.0109
2/6/00 1:40	0.01962
2/6/00 1:45	0.0109
2/6/00 1:50	0.0109
2/6/00 1:55	0.01962
2/6/00 2:00	0.01962
2/6/00 2:05	0.0109
2/6/00 2:10	0.0109
2/6/00 2:15	0.01962
2/6/00 2:20	0.0109
2/6/00 2:25	0.0109
2/6/00 2:30	0.0109
2/6/00 2:35	0.0109
2/6/00 2:40	0.0109
2/6/00 2:45	0.01962
2/6/00 2:50	0.0109
2/6/00 2:55	0.01962
2/6/00 3:00	0.01962
2/6/00 3:05	0.02943
2/6/00 3:10	0.01962
2/6/00 3:15	0.0109
2/6/00 3:20	0.0109
2/6/00 3:25	0.01962
2/6/00 3:30	0.0109
2/6/00 3:35	0.0109
2/6/00 3:40	0.0109
2/6/00 3:45	0.01962
2/6/00 3:50	0.01962
2/6/00 3:55	0.02943
2/6/00 4:00	0.01962
2/6/00 4:05	0.0109
2/6/00 4:10	0.0109
2/6/00 4:15	0.01962
2/6/00 4:20	0.0109
2/6/00 4:25	0.02943
2/6/00 4:30	0.01962
2/6/00 4:35	0.0109
2/6/00 4:40	0.01962
2/6/00 4:45	0.0109
2/6/00 4:50	0.0109
2/6/00 4:55	0.01962
2/6/00 5:00	0.01962
2/6/00 5:05	0.02943
2/6/00 5:10	0.02943
2/6/00 5:15	0.01962
2/6/00 5:20	0.01962
2/6/00 5:25	0.0109
2/6/00 5:30	0.01962
2/6/00 5:35	0.01962
2/6/00 5:40	0.01962
2/6/00 5:45	0.01962
2/6/00 5:50	0.01962

Model Date and Time	Rainfall Accumulation (in)
2/6/00 5:55	0.01962
2/6/00 6:00	0.01962
2/6/00 6:05	0.01962
2/6/00 6:10	0.01962
2/6/00 6:15	0.01962
2/6/00 6:20	0.01962
2/6/00 6:25	0.02943
2/6/00 6:30	0.01962
2/6/00 6:35	0.0109
2/6/00 6:40	0.0109
2/6/00 6:50	0.0109
2/6/00 6:55	0.01962
2/6/00 7:00	0.0109
2/6/00 7:05	0.01962
2/6/00 7:10	0.01962
2/6/00 7:15	0.0109
2/6/00 7:20	0.0109
2/6/00 7:25	0.0109
2/6/00 7:30	0.0109
2/6/00 7:35	0.0109
2/6/00 7:40	0.0109
2/6/00 7:45	0.0109
2/6/00 7:50	0.01962
2/6/00 7:55	0.01962
2/6/00 8:00	0.03924
2/6/00 8:05	0.01962
2/6/00 8:10	0.01962
2/6/00 8:15	0.01962
2/6/00 8:20	0.01962
2/6/00 8:25	0.0109
2/6/00 8:30	0.0109
2/6/00 8:35	0.0109
2/6/00 8:40	0.01962
2/6/00 8:45	0.01962
2/6/00 8:50	0.02943
2/6/00 8:55	0.01962
2/6/00 9:00	0.01962
2/6/00 9:05	0.01962
2/6/00 9:10	0.01962
2/6/00 9:15	0.0109
2/6/00 9:20	0.01962
2/6/00 9:25	0.01962
2/6/00 9:30	0.01962
2/6/00 9:35	0.01962
2/6/00 9:40	0.01962
2/6/00 9:45	0.0109
2/6/00 9:50	0.01962
2/6/00 10:00	0.0109
2/6/00 10:10	0.0109
2/6/00 10:15	0.0109
2/6/00 10:25	0.0109
2/6/00 10:35	0.0109
2/6/00 10:40	0.0109
2/6/00 10:50	0.01962
2/6/00 11:00	0.01962
2/6/00 11:05	0.01962
2/6/00 11:10	0.0109
2/6/00 11:15	0.01962
2/6/00 11:20	0.01962
2/6/00 11:25	0.02943
2/6/00 11:30	0.01962
2/6/00 11:35	0.02943
2/6/00 11:40	0.02943
2/6/00 11:45	0.01962
2/6/00 11:50	0.02943
2/6/00 11:55	0.01962
2/6/00 12:00	0.01962
2/6/00 12:05	0.01962
2/6/00 12:10	0.02943
2/6/00 12:15	0.0109
2/6/00 12:20	0.01962
2/6/00 12:30	0.01962
2/6/00 12:35	0.0109
2/6/00 12:40	0.0109
2/6/00 21:15	0.0109
2/6/00 21:20	0.0109
2/6/00 21:30	0.0109
2/6/00 22:00	0.0109
2/6/00 22:15	0.0109
2/6/00 22:20	0.0109
2/6/00 22:25	0.03924

Model Date and Time	Rainfall Accumulation (in)
2/6/00 22:30	0.0109
2/6/00 22:35	0.01962
2/6/00 22:40	0.01962
2/6/00 22:45	0.0109
2/6/00 23:25	0.0109
2/7/00 0:05	0.0109
2/7/00 0:25	0.0109
2/7/00 0:30	0.0109
2/7/00 0:35	0.0109
2/7/00 0:45	0.0109
2/7/00 0:50	0.01962
2/7/00 0:55	0.0109
2/7/00 1:05	0.0109
2/7/00 1:10	0.0109
2/7/00 1:20	0.0109
2/7/00 1:25	0.0109
2/7/00 1:35	0.0109
2/7/00 1:40	0.0109
2/7/00 1:45	0.0109
2/7/00 1:55	0.0109
2/7/00 2:00	0.0109
2/7/00 2:05	0.0109
2/7/00 2:15	0.0109
2/7/00 2:25	0.0109
2/7/00 2:30	0.0109
2/7/00 3:10	0.0109
2/7/00 3:20	0.0109
2/7/00 3:30	0.0109
2/7/00 3:40	0.0109
2/7/00 3:45	0.0109
2/7/00 3:50	0.0109
2/7/00 3:55	0.0109
2/7/00 4:00	0.0109
2/7/00 4:05	0.0109
2/7/00 4:10	0.0109
2/7/00 4:15	0.0109
2/7/00 4:30	0.0109
2/7/00 9:00	0.0109
2/7/00 10:40	0.0109
2/7/00 11:20	0.0109
2/7/00 12:45	0.0109
2/7/00 12:55	0.0109
2/7/00 13:05	0.0109
2/7/00 13:15	0.0109
2/7/00 13:25	0.0109
2/7/00 13:30	0.0109
2/7/00 13:40	0.0109
2/7/00 13:45	0.0109
2/7/00 13:55	0.0109
2/7/00 14:05	0.0109
2/7/00 14:10	0.0109
2/7/00 14:15	0.0109
2/7/00 14:20	0.0109
2/7/00 14:25	0.0109
2/7/00 14:30	0.0109
2/7/00 14:40	0.0109
2/7/00 14:45	0.0109
2/7/00 14:55	0.0109
2/7/00 15:05	0.0109
2/7/00 15:10	0.0109
2/7/00 15:15	0.0109
2/7/00 15:25	0.0109
2/7/00 18:25	0.0109
2/7/00 18:35	0.0109
2/7/00 18:40	0.0109
2/7/00 18:45	0.0109
2/7/00 18:50	0.0109
2/7/00 18:55	0.0109
2/7/00 19:05	0.0109
2/7/00 19:10	0.0109
2/7/00 19:20	0.0109
2/7/00 19:25	0.01962
2/7/00 19:35	0.0109
2/7/00 19:40	0.0109
2/7/00 19:50	0.01962
2/7/00 19:55	0.0109
2/7/00 20:10	0.0109
2/7/00 20:30	0.0109
2/7/00 20:50	0.0109
2/7/00 21:00	0.0109
2/7/00 21:05	0.0109

Model Date and Time	Rainfall Accumulation (in)
2/7/00 21:15	0.0109
2/7/00 21:25	0.0109
2/7/00 21:40	0.0109
2/7/00 21:45	0.01962
2/7/00 21:50	0.0109
2/7/00 21:55	0.01962
2/7/00 22:15	0.0109
2/7/00 22:25	0.0109
2/7/00 22:50	0.0109
2/7/00 23:20	0.0109
2/8/00 6:50	0.0109
2/8/00 7:00	0.0109
2/8/00 7:05	0.0109
2/8/00 7:20	0.0109
2/8/00 7:25	0.0109
2/8/00 7:35	0.0109
2/8/00 7:40	0.0109
2/8/00 7:55	0.0109
2/8/00 8:05	0.0109
2/8/00 8:15	0.0109
2/8/00 8:20	0.0109
2/8/00 8:25	0.0109
2/8/00 8:30	0.0109
2/8/00 8:35	0.0109
2/8/00 8:40	0.0109
2/8/00 8:45	0.0109
2/8/00 8:50	0.0109
2/8/00 9:00	0.0109
2/8/00 9:05	0.0109
2/8/00 9:10	0.0109
2/8/00 9:15	0.0109
2/8/00 9:20	0.01962
2/8/00 9:25	0.0109
2/8/00 9:30	0.0109
2/8/00 9:35	0.0109
2/8/00 9:40	0.01962
2/8/00 9:45	0.0109
2/8/00 9:50	0.0109
2/8/00 9:55	0.0109
2/8/00 10:00	0.0109
2/8/00 10:05	0.0109
2/8/00 10:15	0.0109
2/8/00 10:20	0.0109
2/8/00 10:35	0.0109
2/8/00 10:45	0.0109
2/8/00 11:00	0.0109
2/8/00 11:05	0.0109
2/8/00 11:15	0.01962
2/8/00 11:25	0.0109
2/8/00 11:30	0.0109
2/8/00 11:35	0.0109
2/8/00 11:45	0.0109
2/8/00 11:55	0.0109
2/8/00 12:00	0.0109
2/8/00 12:05	0.01962
2/8/00 12:10	0.0109
2/8/00 12:15	0.0109
2/8/00 12:20	0.0109
2/8/00 12:30	0.0109
2/8/00 12:35	0.01962
2/8/00 12:40	0.0109
2/8/00 12:45	0.01962
2/8/00 12:50	0.01962
2/8/00 12:55	0.0109
2/8/00 13:00	0.0109
2/8/00 13:05	0.0109
2/8/00 13:15	0.0109
2/8/00 13:20	0.01962
2/8/00 13:25	0.01962
2/8/00 13:30	0.01962
2/8/00 13:35	0.01962
2/8/00 13:40	0.01962
2/8/00 13:45	0.01962
2/8/00 13:50	0.02943
2/8/00 13:55	0.01962
2/8/00 14:00	0.01962
2/8/00 14:05	0.02943
2/8/00 14:10	0.01962
2/8/00 14:15	0.0109
2/8/00 14:20	0.01962
2/8/00 14:25	0.01962

Model Date and Time	Rainfall Accumulation (in)
2/8/00 14:30	0.0109
2/8/00 14:35	0.01962
2/8/00 14:40	0.01962
2/8/00 14:45	0.0109
2/8/00 14:50	0.01962
2/8/00 14:55	0.0109
2/8/00 15:00	0.0109
2/8/00 15:05	0.01962
2/8/00 15:10	0.01962
2/8/00 15:15	0.0109
2/8/00 15:20	0.01962
2/8/00 15:25	0.13734
2/8/00 15:30	0.03924
2/8/00 15:35	0.0109
2/8/00 15:55	0.0109
2/8/00 16:25	0.0109
2/8/00 17:45	0.0109
2/8/00 18:25	0.0109
2/8/00 19:10	0.0109
2/8/00 19:15	0.0109
2/8/00 19:35	0.0109
2/8/00 20:20	0.0109
2/8/00 20:30	0.0109
2/8/00 20:40	0.0109
2/8/00 21:05	0.0109
2/8/00 21:10	0.0109
2/8/00 21:15	0.01962
2/8/00 21:20	0.0109
2/8/00 21:25	0.01962
2/8/00 21:35	0.01962
2/8/00 21:40	0.01962
2/8/00 21:45	0.0109
2/8/00 21:50	0.0109
2/8/00 21:55	0.0109
2/8/00 22:05	0.01962
2/8/00 22:10	0.0109
2/8/00 22:15	0.0109
2/8/00 22:25	0.0109
2/9/00 6:15	0.02943
2/9/00 6:20	0.01962
2/9/00 6:25	0.01962
2/9/00 6:30	0.0109
2/9/00 6:45	0.0109
2/9/00 6:50	0.01962
2/9/00 6:55	0.01962
2/9/00 7:00	0.0109
2/9/00 7:20	0.0109
2/9/00 10:40	0.04905
2/9/00 10:45	0.03924
2/9/00 10:50	0.01962
2/9/00 10:55	0.0109
2/9/00 11:10	0.0109
2/9/00 12:25	0.0109
2/9/00 15:45	0.0109
2/9/00 15:50	0.01962
2/9/00 16:10	0.0109
2/9/00 16:25	0.0109
2/9/00 16:30	0.0109
2/9/00 18:20	0.0109
2/9/00 18:40	0.0109
2/9/00 19:10	0.0109
2/9/00 19:35	0.0109
2/9/00 20:05	0.0109
2/9/00 20:45	0.0109
2/9/00 21:05	0.0109
2/9/00 21:30	0.0109
2/9/00 23:15	0.0109
2/9/00 23:35	0.0109
2/10/00 2:35	0.0109
2/10/00 4:10	0.0109
2/10/00 4:15	0.0109
2/10/00 4:20	0.02943
2/10/00 4:25	0.01962
2/10/00 4:30	0.01962
2/10/00 4:35	0.0109
2/10/00 4:40	0.01962
2/10/00 4:45	0.01962
2/10/00 4:50	0.01962
2/10/00 4:55	0.0109
2/10/00 5:05	0.0109
2/10/00 5:15	0.0109

Model Date and Time	Rainfall Accumulation (in)
2/10/00 5:20	0.0109
2/10/00 5:25	0.0109
2/10/00 5:35	0.0109
2/10/00 5:50	0.0109
2/10/00 6:05	0.0109
2/10/00 6:10	0.0109
2/10/00 6:55	0.0109
2/10/00 14:05	0.0109
2/10/00 15:20	0.0109
2/10/00 15:50	0.0109
2/10/00 16:00	0.0109
2/10/00 16:05	0.0109
2/10/00 16:15	0.0109
2/10/00 16:35	0.0109
2/10/00 17:00	0.0109
2/10/00 17:05	0.0109
2/10/00 17:15	0.0109
2/10/00 17:40	0.0109
2/10/00 21:30	0.0109
2/10/00 21:40	0.0109
2/10/00 21:55	0.0109
2/10/00 22:05	0.0109
2/10/00 22:10	0.0109
2/10/00 22:15	0.0109
2/10/00 22:25	0.0109
2/10/00 22:30	0.0109
2/10/00 22:35	0.0109
2/10/00 22:40	0.0109
2/10/00 22:45	0.0109
2/10/00 22:50	0.0109
2/10/00 22:55	0.0109
2/10/00 23:00	0.0109
2/10/00 23:05	0.01962
2/10/00 23:10	0.0109
2/10/00 23:20	0.0109
2/10/00 23:30	0.0109
2/10/00 23:50	0.0109
2/11/00 0:00	0.0109
2/11/00 0:30	0.01962
2/11/00 0:45	0.0109
2/11/00 1:40	0.02943
2/11/00 1:50	0.0109
2/11/00 1:55	0.0109
2/11/00 2:00	0.0109
2/11/00 6:25	0.0109
2/11/00 9:55	0.0109
2/12/00 3:50	0.0109
2/19/00 3:50	0.01135
2/19/00 4:00	0.01135
2/19/00 5:00	0.01135
2/19/00 5:05	0.01135
2/19/00 5:35	0.01135
2/19/00 5:55	0.01135
2/19/00 6:25	0.02043
2/19/00 6:30	0.02043
2/19/00 6:35	0.02043
2/19/00 6:40	0.02043
2/19/00 6:45	0.02043
2/19/00 6:50	0.02043
2/19/00 6:55	0.04086
2/19/00 7:00	0.01135
2/19/00 7:05	0.02043
2/19/00 7:10	0.01135
2/19/00 7:15	0.02043
2/19/00 7:20	0.01135
2/19/00 7:25	0.030645
2/19/00 7:30	0.01135
2/19/00 7:35	0.01135
2/19/00 7:45	0.01135
2/19/00 7:55	0.01135
2/19/00 9:15	0.01135
2/22/00 4:35	0.01135
2/22/00 5:10	0.01135
2/22/00 5:25	0.01135
2/22/00 5:40	0.01135
2/22/00 6:10	0.01135
2/22/00 7:10	0.01135
2/22/00 8:30	0.01135
2/22/00 9:00	0.01135
2/22/00 9:55	0.01135
2/22/00 12:05	0.01135

Model Date and Time	Rainfall Accumulation (in)
2/22/00 20:35	0.02043
2/22/00 20:40	0.030645
2/22/00 20:45	0.030645
2/22/00 20:50	0.04086
2/22/00 20:55	0.071505
2/22/00 21:00	0.132795
2/22/00 21:05	0.051075
2/22/00 21:10	0.030645
2/22/00 21:15	0.051075
2/22/00 21:20	0.030645
2/22/00 21:25	0.02043
2/22/00 21:30	0.02043
2/22/00 21:35	0.01135
2/22/00 21:40	0.030645
2/22/00 21:45	0.01135
2/22/00 21:50	0.02043
2/22/00 21:55	0.02043
2/22/00 22:00	0.01135
2/22/00 22:05	0.01135
2/22/00 22:10	0.01135
2/23/00 2:45	0.01135
3/1/00 2:45	0.0118
3/1/00 2:55	0.0118
3/1/00 3:05	0.0118
3/1/00 3:15	0.0118
3/1/00 3:25	0.0118
3/1/00 3:55	0.0118
3/1/00 4:25	0.0118
3/1/00 4:40	0.0118
3/1/00 4:55	0.0118
3/1/00 5:10	0.0118
3/1/00 6:00	0.0118
3/1/00 6:55	0.0118
3/1/00 7:50	0.0118
3/2/00 0:35	0.0118
3/2/00 0:50	0.0118
3/2/00 0:55	0.0118
3/2/00 1:00	0.0118
3/2/00 1:05	0.0118
3/2/00 1:10	0.0118
3/2/00 1:20	0.0118
3/2/00 1:25	0.0118
3/2/00 1:30	0.02124
3/2/00 1:35	0.0118
3/2/00 1:40	0.02124
3/2/00 1:45	0.0118
3/2/00 1:50	0.02124
3/2/00 1:55	0.0118
3/2/00 2:00	0.0118
3/2/00 2:05	0.02124
3/2/00 2:10	0.02124
3/2/00 2:15	0.02124
3/2/00 2:20	0.0118
3/2/00 2:25	0.0118
3/2/00 2:30	0.0118
3/2/00 2:35	0.02124
3/2/00 2:40	0.0118
3/2/00 2:45	0.02124
3/2/00 2:50	0.02124
3/2/00 2:55	0.0118
3/2/00 3:05	0.0118
3/2/00 3:20	0.0118
3/2/00 3:25	0.02124
3/2/00 3:30	0.0118
3/2/00 3:35	0.0118
3/2/00 3:45	0.0118
3/2/00 3:55	0.0118
3/2/00 4:05	0.0118
3/2/00 4:15	0.0118
3/2/00 4:20	0.0118
3/2/00 4:25	0.0118
3/2/00 4:35	0.0118
3/2/00 5:10	0.0118
3/3/00 18:40	0.02124
3/3/00 18:45	0.02124
3/3/00 18:50	0.07434
3/3/00 18:55	0.0531
3/3/00 19:00	0.02124
3/3/00 19:05	0.02124
3/3/00 19:10	0.0118
3/3/00 19:15	0.02124

Model Date and Time	Rainfall Accumulation (in)
3/3/00 19:20	0.07434
3/3/00 19:25	0.07434
3/3/00 19:30	0.0531
3/3/00 19:35	0.04248
3/3/00 19:40	0.03186
3/3/00 19:45	0.04248
3/3/00 19:50	0.08496
3/3/00 19:55	0.11682
3/3/00 20:00	0.0531
3/3/00 20:05	0.0531
3/3/00 20:10	0.03186
3/3/00 20:15	0.03186
3/3/00 20:20	0.04248
3/3/00 20:25	0.0531
3/3/00 20:30	0.04248
3/3/00 20:35	0.03186
3/3/00 20:40	0.03186
3/3/00 20:45	0.02124
3/3/00 20:50	0.0118
3/3/00 20:55	0.0118
3/3/00 21:00	0.0118
3/3/00 21:05	0.0118
3/3/00 21:10	0.0118
3/3/00 21:15	0.0118
3/3/00 22:45	0.0118
3/4/00 6:35	0.0118
3/4/00 6:50	0.0118
3/4/00 6:55	0.02124
3/4/00 7:00	0.03186
3/4/00 7:05	0.0118
3/4/00 7:10	0.02124
3/4/00 7:15	0.0118
3/4/00 7:25	0.0118
3/4/00 7:35	0.0118
3/4/00 9:55	0.0118
3/11/00 9:55	0.0118
3/11/00 11:10	0.0118
3/11/00 11:20	0.0118
3/11/00 11:45	0.0118
3/11/00 12:00	0.0118
3/11/00 15:45	0.0118
3/11/00 15:50	0.0118
3/11/00 16:00	0.0118
3/11/00 16:20	0.0118
3/11/00 16:25	0.0118
3/11/00 16:35	0.0118
3/11/00 16:45	0.0118
3/11/00 16:55	0.0118
3/11/00 17:00	0.0118
3/11/00 17:10	0.0118
3/11/00 17:15	0.0118
3/11/00 17:20	0.0118
3/11/00 17:25	0.02124
3/11/00 17:30	0.0118
3/11/00 17:35	0.02124
3/11/00 17:40	0.0118
3/11/00 17:50	0.02124
3/11/00 18:00	0.0118
3/11/00 18:05	0.0118
3/11/00 18:20	0.0118
3/11/00 18:45	0.0118
3/11/00 18:50	0.0118
3/11/00 18:55	0.0118
3/11/00 19:15	0.0118
3/12/00 21:55	0.02124
3/12/00 22:00	0.0531
3/12/00 22:05	0.09558
3/12/00 22:10	0.09558
3/12/00 22:15	0.0118
3/12/00 22:20	0.03186
3/12/00 22:25	0.07434
3/12/00 22:30	0.29736
3/12/00 22:35	0.19116
3/12/00 22:40	0.04248
3/12/00 22:45	0.03186
3/12/00 22:50	0.03186
3/12/00 23:15	0.0118
3/19/00 23:15	0.01135
3/20/00 0:05	0.01135
3/20/00 0:10	0.01135
3/20/00 0:15	0.01135

Model Date and Time	Rainfall Accumulation (in)
3/20/00 0:25	0.01135
3/20/00 0:30	0.01135
3/20/00 1:15	0.01135
3/20/00 1:50	0.01135
3/20/00 2:30	0.01135
3/20/00 3:40	0.01135
3/20/00 15:35	0.01135
3/20/00 15:40	0.01135
3/20/00 15:50	0.01135
3/20/00 17:05	0.01135
3/23/00 7:25	0.030645
3/23/00 7:55	0.030645
3/23/00 8:25	0.04086
3/23/00 8:40	0.030645
3/23/00 8:55	0.030645
3/23/00 9:10	0.04086
3/23/00 9:25	0.030645
3/23/00 9:40	0.04086
3/23/00 9:55	0.030645
3/23/00 10:10	0.04086
3/23/00 10:25	0.051075
3/23/00 13:25	0.02043
3/23/00 21:25	0.030645
3/23/00 22:25	0.04086
3/23/00 23:25	0.04086
3/24/00 0:25	0.04086
3/24/00 1:25	0.02043
3/24/00 2:25	0.02043
3/24/00 3:25	0.02043
3/24/00 4:25	0.02043
3/24/00 5:25	0.030645
3/24/00 6:25	0.02043
3/24/00 7:25	0.04086
3/24/00 8:25	0.04086
3/24/00 9:25	0.02043
3/24/00 10:25	0.030645
3/24/00 11:25	0.01135
3/24/00 21:25	0.04086
3/24/00 22:25	0.01135
3/24/00 22:30	0.01135
3/24/00 22:35	0.01135
3/24/00 22:40	0.02043
3/24/00 22:45	0.02043
3/24/00 22:50	0.02043
3/24/00 22:55	0.01135
3/24/00 23:05	0.01135
3/24/00 23:15	0.01135
3/24/00 23:55	0.01135
3/25/00 0:00	0.01135
3/25/00 0:05	0.01135
3/25/00 0:10	0.01135
3/25/00 0:15	0.01135
3/25/00 0:25	0.01135
3/25/00 0:35	0.01135
3/25/00 0:45	0.01135
3/25/00 1:15	0.01135
3/25/00 1:25	0.01135
3/25/00 1:30	0.01135
3/25/00 1:40	0.01135
3/25/00 1:45	0.01135
3/25/00 1:50	0.01135
3/25/00 1:55	0.01135
3/25/00 2:00	0.01135
3/25/00 2:10	0.01135
3/25/00 2:20	0.01135
3/25/00 2:25	0.01135
3/25/00 2:30	0.01135
3/25/00 2:35	0.01135
3/25/00 2:45	0.01135
3/25/00 2:50	0.01135
3/25/00 2:55	0.01135
3/25/00 3:00	0.01135
3/25/00 3:10	0.01135
3/25/00 3:20	0.01135
3/25/00 3:25	0.01135
3/25/00 3:30	0.02043
3/25/00 3:35	0.01135
3/25/00 3:40	0.01135
3/25/00 3:45	0.01135
3/25/00 3:50	0.01135
3/25/00 3:55	0.02043

Model Date and Time	Rainfall Accumulation (in)
3/25/00 4:00	0.02043
3/25/00 4:05	0.02043
3/25/00 4:10	0.01135
3/25/00 4:15	0.01135
3/25/00 4:20	0.02043
3/25/00 4:25	0.02043
3/25/00 4:30	0.02043
3/25/00 4:35	0.02043
3/25/00 4:40	0.02043
3/25/00 4:45	0.01135
3/25/00 4:50	0.01135
3/25/00 4:55	0.01135
3/25/00 5:00	0.02043
3/25/00 5:10	0.01135
3/25/00 5:25	0.01135
3/25/00 5:35	0.01135
3/25/00 5:45	0.01135
3/25/00 5:55	0.01135
3/25/00 6:00	0.01135
3/25/00 6:10	0.01135
3/25/00 6:20	0.01135
3/25/00 6:30	0.01135
3/26/00 22:25	0.01135
3/26/00 23:00	0.01135
3/26/00 23:05	0.01135
3/26/00 23:20	0.01135
3/26/00 23:50	0.01135
3/27/00 0:00	0.01135
3/27/00 0:05	0.01135
3/27/00 0:15	0.01135
3/27/00 0:25	0.01135
3/27/00 0:40	0.01135
3/27/00 0:55	0.01135
3/27/00 1:20	0.01135
3/27/00 1:35	0.01135
3/27/00 2:20	0.01135
3/27/00 22:25	0.01135
3/27/00 23:10	0.01135
3/27/00 23:25	0.01135
3/27/00 23:40	0.01135
3/27/00 23:50	0.01135
3/28/00 0:00	0.01135
3/28/00 0:10	0.01135
3/28/00 0:25	0.01135
3/28/00 0:30	0.01135
3/28/00 0:40	0.01135
3/28/00 0:45	0.01135
3/28/00 0:50	0.01135
3/28/00 0:55	0.01135
3/28/00 1:00	0.02043
3/28/00 1:05	0.02043
3/28/00 1:10	0.02043
3/28/00 1:15	0.02043
3/28/00 1:20	0.02043
3/28/00 1:25	0.030645
3/28/00 1:30	0.02043
3/28/00 1:35	0.02043
3/28/00 1:40	0.02043
3/28/00 1:45	0.02043
3/28/00 1:50	0.030645
3/28/00 1:55	0.02043
3/28/00 2:00	0.01135
3/28/00 2:05	0.01135
3/28/00 2:10	0.01135
3/28/00 2:15	0.01135
3/28/00 2:25	0.01135
3/28/00 3:05	0.01135
3/28/00 3:30	0.01135
3/28/00 3:35	0.01135
3/28/00 3:50	0.01135
3/28/00 4:55	0.01135
3/28/00 5:15	0.01135
3/28/00 5:25	0.01135
3/28/00 5:35	0.01135
3/28/00 5:40	0.01135
3/28/00 5:45	0.01135
3/28/00 5:50	0.01135
3/28/00 5:55	0.02043
3/28/00 6:00	0.01135
3/28/00 6:05	0.02043
3/28/00 6:10	0.02043

Model Date and Time	Rainfall Accumulation (in)
3/28/00 6:15	0.030645
3/28/00 6:20	0.04086
3/28/00 6:25	0.04086
3/28/00 6:30	0.04086
3/28/00 6:35	0.04086
3/28/00 6:40	0.051075
3/28/00 6:45	0.04086
3/28/00 6:50	0.04086
3/28/00 6:55	0.030645
3/28/00 7:00	0.02043
3/28/00 7:05	0.02043
3/28/00 7:10	0.01135
3/28/00 7:15	0.030645
3/28/00 7:20	0.01135
3/28/00 7:25	0.02043
3/28/00 7:30	0.04086
3/28/00 7:35	0.030645
3/28/00 7:40	0.030645
3/28/00 7:45	0.02043
3/28/00 7:50	0.030645
3/28/00 7:55	0.030645
3/28/00 8:05	0.02043
3/28/00 8:10	0.02043
3/28/00 8:15	0.030645
3/28/00 8:20	0.030645
3/28/00 8:25	0.030645
3/28/00 8:30	0.04086
3/28/00 8:35	0.02043
3/28/00 8:40	0.02043
3/28/00 8:45	0.02043
3/28/00 8:50	0.030645
3/28/00 8:55	0.030645
3/28/00 9:00	0.030645
3/28/00 9:05	0.02043
3/28/00 9:10	0.030645
3/28/00 9:15	0.02043
3/28/00 9:20	0.02043
3/28/00 9:25	0.02043
3/28/00 9:30	0.02043
3/28/00 9:35	0.02043
3/28/00 9:40	0.01135
3/28/00 9:45	0.01135
3/28/00 9:50	0.02043
3/28/00 9:55	0.02043
3/28/00 10:00	0.02043
3/28/00 10:05	0.04086
3/28/00 10:10	0.030645
3/28/00 10:15	0.02043
3/28/00 10:20	0.030645
3/28/00 10:25	0.02043
3/28/00 10:30	0.01135
3/28/00 10:35	0.02043
3/28/00 10:40	0.02043
3/28/00 10:45	0.02043
3/28/00 10:50	0.02043
3/28/00 10:55	0.02043
3/28/00 11:00	0.01135
3/28/00 11:05	0.01135
3/28/00 11:10	0.02043
3/28/00 11:15	0.01135
3/28/00 11:20	0.02043
3/28/00 11:25	0.030645
3/28/00 12:25	0.01135
3/28/00 12:30	0.02043
3/28/00 12:35	0.02043
3/28/00 12:40	0.02043
3/28/00 12:45	0.01135
3/28/00 12:50	0.01135
3/28/00 12:55	0.01135
3/28/00 13:00	0.01135
3/28/00 13:05	0.01135
3/28/00 13:10	0.01135
3/28/00 13:15	0.01135
3/28/00 13:20	0.01135
3/28/00 13:25	0.01135
3/28/00 13:30	0.01135
3/28/00 13:35	0.02043
3/28/00 13:40	0.02043
3/28/00 13:45	0.01135
3/28/00 13:55	0.01135
3/28/00 14:05	0.01135

Model Date and Time	Rainfall Accumulation (in)
3/28/00 14:10	0.01135
3/28/00 14:15	0.01135
3/28/00 14:20	0.01135
3/28/00 14:30	0.01135
3/28/00 14:40	0.02043
3/28/00 14:45	0.01135
3/28/00 14:55	0.01135
3/28/00 15:05	0.01135
3/28/00 15:20	0.01135
3/28/00 15:25	0.01135
3/28/00 15:30	0.01135
3/28/00 15:40	0.01135
3/28/00 15:55	0.01135
3/28/00 16:05	0.01135
3/28/00 16:15	0.01135
3/28/00 16:20	0.01135
3/28/00 16:25	0.01135
3/28/00 16:40	0.01135
3/28/00 16:50	0.01135
3/28/00 16:55	0.01135
3/28/00 17:05	0.01135
3/28/00 17:10	0.01135
3/28/00 17:15	0.01135
3/28/00 17:20	0.02043
3/28/00 17:30	0.01135
3/28/00 17:50	0.01135
3/28/00 18:00	0.01135
3/28/00 18:10	0.01135
3/28/00 18:15	0.01135
3/28/00 18:20	0.02043
3/28/00 18:25	0.01135
3/28/00 18:30	0.01135
3/28/00 18:35	0.01135
3/28/00 19:45	0.01135
3/28/00 19:55	0.01135
3/28/00 20:10	0.01135
3/28/00 20:35	0.01135
3/28/00 20:50	0.01135
3/28/00 21:10	0.01135
3/28/00 21:20	0.01135
3/28/00 21:25	0.01135
3/28/00 21:35	0.01135
3/28/00 22:00	0.01135
3/28/00 22:05	0.01135
3/28/00 22:10	0.01135
3/28/00 22:25	0.01135
3/28/00 22:35	0.01135
3/28/00 22:40	0.01135
3/28/00 22:45	0.01135
3/28/00 22:50	0.01135
3/28/00 23:00	0.01135
3/28/00 23:10	0.01135
3/28/00 23:15	0.02043
3/28/00 23:20	0.02043
3/28/00 23:25	0.02043
3/28/00 23:30	0.01135
3/28/00 23:35	0.02043
3/28/00 23:40	0.01135
3/28/00 23:50	0.02043
3/28/00 23:55	0.01135
3/29/00 0:00	0.02043
3/29/00 0:05	0.02043
3/29/00 0:10	0.01135
3/29/00 0:15	0.01135
3/29/00 0:20	0.01135
3/29/00 0:25	0.01135
3/29/00 0:30	0.01135
3/29/00 0:35	0.01135
3/29/00 0:40	0.01135
3/29/00 0:45	0.01135
3/29/00 0:50	0.01135
3/29/00 0:55	0.01135
3/29/00 1:00	0.01135
3/29/00 1:05	0.01135
3/29/00 1:10	0.01135
3/29/00 1:15	0.01135
3/29/00 1:25	0.01135
3/29/00 1:45	0.01135
3/29/00 1:50	0.01135
3/29/00 1:55	0.01135
3/29/00 2:00	0.01135

Model Date and Time	Rainfall Accumulation (in)
3/29/00 2:05	0.01135
3/29/00 2:10	0.02043
3/29/00 2:15	0.02043
3/29/00 5:25	0.01135
4/5/00 5:25	0.01135
4/5/00 5:35	0.01135
4/5/00 5:45	0.01135
4/5/00 5:55	0.01135
4/5/00 6:00	0.01135
4/5/00 6:05	0.01135
4/5/00 6:10	0.01135
4/5/00 6:15	0.01135
4/5/00 6:20	0.01135
4/5/00 6:25	0.01135
4/5/00 6:35	0.01135
4/5/00 6:45	0.01135
4/5/00 6:50	0.01135
4/5/00 6:55	0.01135
4/5/00 7:00	0.01135
4/5/00 7:10	0.01135
4/5/00 7:20	0.01135
4/5/00 7:25	0.01135
4/5/00 7:30	0.01135
4/5/00 7:40	0.01135
4/5/00 7:45	0.01135
4/5/00 8:05	0.01135
4/5/00 8:35	0.01135
4/5/00 8:50	0.01135
4/5/00 9:00	0.01135
4/5/00 9:20	0.01135
4/5/00 10:35	0.01135
4/6/00 23:25	0.01135
4/9/00 23:45	0.01135
4/10/00 0:20	0.01135
4/10/00 1:30	0.01135
4/10/00 1:40	0.01135
4/10/00 2:20	0.01135
4/10/00 2:40	0.01135
4/10/00 3:15	0.01135
4/10/00 6:40	0.01135
4/10/00 6:45	0.04086
4/10/00 6:50	0.01135
4/10/00 6:55	0.01135
4/10/00 7:00	0.02043
4/10/00 21:05	0.01135
4/10/00 22:05	0.01135
4/11/00 0:05	0.02043
4/11/00 0:35	0.02043
4/11/00 1:05	0.030645
4/11/00 1:35	0.030645
4/11/00 2:05	0.030645
4/11/00 2:15	0.04086
4/11/00 2:30	0.030645
4/11/00 2:45	0.04086
4/11/00 3:05	0.030645
4/11/00 3:25	0.02043
4/11/00 3:45	0.030645
4/12/00 5:05	0.030645
4/12/00 6:05	0.01135
4/12/00 7:05	0.01135
4/12/00 8:05	0.02043
4/12/00 9:05	0.030645
4/12/00 9:35	0.030645
4/12/00 10:05	0.04086
4/12/00 11:05	0.04086
4/12/00 12:05	0.01135
4/12/00 13:05	0.01135
4/12/00 15:05	0.02043
4/12/00 16:05	0.01135
4/12/00 17:05	0.01135
4/12/00 18:05	0.01135
4/12/00 18:10	0.030645
4/12/00 18:15	0.030645
4/12/00 18:20	0.04086
4/12/00 18:25	0.030645
4/12/00 18:30	0.04086
4/12/00 18:35	0.030645
4/12/00 18:40	0.030645
4/12/00 18:45	0.02043
4/12/00 18:50	0.051075
4/12/00 18:55	0.030645

Model Date and Time	Rainfall Accumulation (in)
4/12/00 19:00	0.030645
4/12/00 19:05	0.02043
4/12/00 19:10	0.02043
4/12/00 19:15	0.01135
4/12/00 19:20	0.02043
4/12/00 19:25	0.030645
4/12/00 19:30	0.02043
4/12/00 19:35	0.02043
4/12/00 19:40	0.02043
4/12/00 19:45	0.01135
4/12/00 19:50	0.02043
4/12/00 19:55	0.02043
4/12/00 20:00	0.030645
4/12/00 20:05	0.02043
4/12/00 20:10	0.01135
4/12/00 20:15	0.02043
4/12/00 20:20	0.02043
4/12/00 20:25	0.02043
4/12/00 20:30	0.01135
4/12/00 20:35	0.02043
4/12/00 20:40	0.02043
4/12/00 20:45	0.030645
4/12/00 20:50	0.01135
4/12/00 20:55	0.02043
4/12/00 21:00	0.01135
4/12/00 21:05	0.01135
4/12/00 21:10	0.01135
4/12/00 21:15	0.02043
4/12/00 22:20	0.01135
4/12/00 22:25	0.02043
4/12/00 22:30	0.01135
4/12/00 22:35	0.02043
4/12/00 22:40	0.01135
4/12/00 22:45	0.02043
4/12/00 22:50	0.01135
4/12/00 22:55	0.01135
4/12/00 23:00	0.01135
4/12/00 23:05	0.01135
4/12/00 23:10	0.01135
4/12/00 23:15	0.01135
4/12/00 23:20	0.01135
4/12/00 23:25	0.01135
4/12/00 23:30	0.01135
4/12/00 23:35	0.01135
4/12/00 23:40	0.01135
4/12/00 23:45	0.01135
4/12/00 23:50	0.01135
4/12/00 23:55	0.01135
4/13/00 0:00	0.01135
4/13/00 0:05	0.01135
4/13/00 0:10	0.01135
4/13/00 0:15	0.01135
4/13/00 0:20	0.01135
4/13/00 0:25	0.01135
4/13/00 0:30	0.02043
4/13/00 0:35	0.01135
4/13/00 0:40	0.01135
4/13/00 0:45	0.01135
4/13/00 0:50	0.01135
4/13/00 0:55	0.01135
4/13/00 1:00	0.01135
4/13/00 1:05	0.01135
4/13/00 1:10	0.02043
4/13/00 1:15	0.01135
4/13/00 1:20	0.02043
4/13/00 1:25	0.01135
4/13/00 1:30	0.02043
4/13/00 2:35	0.01135
4/13/00 2:40	0.02043
4/13/00 2:45	0.01135
4/13/00 2:50	0.01135
4/13/00 2:55	0.01135
4/13/00 3:00	0.01135
4/13/00 3:05	0.02043
4/13/00 3:10	0.02043
4/13/00 3:15	0.01135
4/13/00 3:20	0.02043
4/13/00 3:25	0.01135
4/13/00 3:30	0.02043
4/13/00 3:35	0.01135
4/13/00 3:40	0.02043

Model Date and Time	Rainfall Accumulation (in)
4/13/00 3:45	0.01135
4/13/00 3:50	0.02043
4/13/00 3:55	0.01135
4/13/00 4:00	0.01135
4/13/00 4:05	0.030645
4/13/00 4:35	0.04086
4/13/00 5:05	0.030645
4/13/00 5:25	0.030645
4/13/00 5:45	0.030645
4/13/00 6:05	0.01135
4/13/00 8:05	0.01135
4/13/00 9:05	0.030645
4/13/00 10:05	0.02043
4/13/00 11:05	0.02043
4/13/00 12:05	0.04086
4/13/00 12:35	0.04086
4/13/00 13:05	0.04086
4/13/00 15:45	0.02043
4/13/00 15:50	0.030645
4/13/00 15:55	0.02043
4/13/00 16:00	0.01135
4/13/00 16:05	0.01135
4/13/00 16:10	0.02043
4/13/00 16:15	0.01135
4/13/00 16:20	0.02043
4/13/00 16:30	0.01135
4/13/00 16:35	0.02043
4/13/00 16:40	0.030645
4/13/00 16:45	0.02043
4/13/00 16:55	0.02043
4/13/00 17:00	0.01135
4/13/00 17:05	0.01135
4/13/00 17:10	0.02043
4/13/00 17:15	0.030645
4/13/00 17:25	0.02043
4/13/00 17:30	0.01135
4/13/00 17:35	0.01135
4/13/00 17:40	0.01135
4/13/00 17:45	0.02043
4/13/00 17:50	0.01135
4/13/00 17:55	0.01135
4/13/00 18:00	0.030645
4/13/00 18:05	0.01135
4/13/00 18:10	0.02043
4/13/00 18:15	0.01135
4/13/00 18:20	0.01135
4/13/00 18:25	0.030645
4/13/00 18:30	0.02043
4/13/00 18:35	0.02043
4/13/00 18:40	0.02043
4/13/00 18:45	0.02043
4/13/00 18:50	0.02043
4/13/00 18:55	0.02043
4/13/00 19:00	0.02043
4/13/00 19:05	0.01135
4/13/00 19:10	0.02043
4/13/00 19:15	0.01135
4/13/00 19:20	0.01135
4/13/00 19:25	0.04086
4/13/00 19:30	0.02043
4/13/00 19:35	0.04086
4/13/00 19:40	0.02043
4/13/00 19:45	0.01135
4/13/00 22:40	0.01135
4/13/00 23:00	0.01135
4/13/00 23:10	0.02043
4/13/00 23:15	0.02043
4/13/00 23:20	0.01135
4/13/00 23:25	0.01135
4/13/00 23:30	0.01135
4/13/00 23:35	0.01135
4/13/00 23:40	0.01135
4/13/00 23:45	0.01135
4/13/00 23:50	0.01135
4/13/00 23:55	0.030645
4/14/00 0:00	0.02043
4/14/00 0:05	0.01135
4/14/00 0:20	0.01135
4/14/00 0:25	0.01135
4/14/00 0:35	0.01135
4/14/00 0:55	0.02043

Model Date and Time	Rainfall Accumulation (in)
4/14/00 1:00	0.01135
4/14/00 1:05	0.01135
4/14/00 1:10	0.02043
4/14/00 1:15	0.01135
4/14/00 1:20	0.02043
4/14/00 1:25	0.030645
4/14/00 1:45	0.02043
4/14/00 1:55	0.01135
4/14/00 2:00	0.01135
4/14/00 2:10	0.02043
4/14/00 2:20	0.01135
4/14/00 2:25	0.030645
4/14/00 2:40	0.02043
4/14/00 2:55	0.01135
4/14/00 3:00	0.02043
4/14/00 3:05	0.01135
4/14/00 3:10	0.02043
4/14/00 3:20	0.04086
4/14/00 3:25	0.01135
4/14/00 3:35	0.02043
4/14/00 3:50	0.030645
4/14/00 4:00	0.01135
4/14/00 4:05	0.01135
4/14/00 4:10	0.01135
4/14/00 4:15	0.01135
4/14/00 4:20	0.02043
4/14/00 4:25	0.01135
4/14/00 4:45	0.01135
4/14/00 4:55	0.01135
4/14/00 5:00	0.01135
4/14/00 5:10	0.02043
4/14/00 5:20	0.01135
4/14/00 5:25	0.01135
4/14/00 5:40	0.01135
4/14/00 5:55	0.01135
4/14/00 7:05	0.01135
4/14/00 9:05	0.01135
4/14/00 11:05	0.01135
4/14/00 12:05	0.01135
4/14/00 23:05	0.04086
4/15/00 0:05	0.02043
4/15/00 3:05	0.030645
4/15/00 3:35	0.04086
4/15/00 4:05	0.030645
4/15/00 4:25	0.04086
4/15/00 4:45	0.030645
4/22/00 4:45	0.0118
4/22/00 5:05	0.0118
4/22/00 5:10	0.0118
4/22/00 5:45	0.0118
4/22/00 6:00	0.0118
4/22/00 6:05	0.0118
4/22/00 6:10	0.02124
4/22/00 6:15	0.02124
4/22/00 6:20	0.02124
4/22/00 6:25	0.02124
4/22/00 6:30	0.02124
4/22/00 6:35	0.02124
4/22/00 6:40	0.0118
4/22/00 6:45	0.0118
4/22/00 6:55	0.0118
4/22/00 7:05	0.0118
4/22/00 7:20	0.02124
4/22/00 7:25	0.0118
4/22/00 7:35	0.0118
4/22/00 7:40	0.0118
4/22/00 7:50	0.0118
4/22/00 7:55	0.0118
4/22/00 8:05	0.0118
4/22/00 8:10	0.0118
4/22/00 8:30	0.0118
4/22/00 8:55	0.0118
4/22/00 9:15	0.0118
4/22/00 9:25	0.0118
4/22/00 9:30	0.0118
4/22/00 9:35	0.0118
4/22/00 9:40	0.0118
4/22/00 9:45	0.02124
4/22/00 9:50	0.02124
4/22/00 9:55	0.0118
4/22/00 10:00	0.0118

Model Date and Time	Rainfall Accumulation (in)
4/22/00 10:05	0.0118
4/22/00 10:10	0.0118
4/22/00 10:20	0.0118
4/22/00 10:25	0.02124
4/22/00 10:30	0.0118
4/22/00 10:40	0.0118
4/22/00 10:45	0.0118
4/22/00 10:50	0.0118
4/22/00 10:55	0.0118
4/22/00 11:00	0.0118
4/22/00 11:10	0.0118
4/22/00 11:20	0.0118
4/22/00 11:45	0.0118
4/22/00 13:05	0.0354
4/22/00 13:10	0.059
4/22/00 13:15	0.03658
4/22/00 13:20	0.0944
4/22/00 13:25	0.07434
4/22/00 13:30	0.04248
4/22/00 13:35	0.1062
4/22/00 13:55	0.0236
4/22/00 14:00	0.059
4/22/00 14:05	0.0354
4/22/00 14:10	0.0472
4/22/00 14:15	0.0236
4/22/00 14:20	0.0472
4/22/00 14:25	0.0354
4/22/00 14:30	0.0472
4/22/00 14:35	0.059
4/22/00 14:40	0.13334
4/22/00 14:45	0.24426
4/22/00 16:35	0.02124
4/22/00 16:45	0.0118
4/22/00 18:45	0.0118
4/22/00 18:50	0.0118
4/22/00 18:55	0.0118
4/23/00 3:30	0.0118
4/30/00 3:30	0.01135
5/3/00 3:20	0.01135
5/3/00 4:35	0.01135
5/3/00 5:00	0.01135
5/3/00 5:15	0.01135
5/3/00 5:35	0.01135
5/3/00 6:00	0.01135
5/3/00 8:10	0.01135
5/3/00 9:10	0.01135
5/4/00 15:10	0.01135
5/4/00 15:35	0.01135
5/4/00 15:45	0.01135
5/4/00 15:50	0.01135
5/4/00 15:55	0.01135
5/4/00 16:00	0.01135
5/4/00 16:05	0.01135
5/4/00 16:10	0.01135
5/4/00 16:25	0.01135
5/4/00 18:05	0.01135
5/4/00 18:10	0.01135
5/4/00 18:20	0.01135
5/4/00 18:25	0.02043
5/4/00 18:30	0.01135
5/4/00 18:35	0.01135
5/4/00 18:45	0.01135
5/4/00 21:40	0.01135
5/4/00 21:45	0.01135
5/4/00 21:50	0.01135
5/4/00 21:55	0.01135
5/5/00 0:50	0.01135
5/6/00 23:55	0.01135
5/7/00 0:15	0.01135
5/7/00 0:25	0.01135
5/7/00 0:30	0.01135
5/7/00 0:40	0.01135
5/7/00 0:50	0.01135
5/7/00 1:00	0.01135
5/7/00 1:05	0.01135
5/7/00 1:25	0.01135
5/7/00 1:30	0.01135
5/7/00 1:50	0.01135
5/7/00 3:05	0.01135
5/7/00 4:55	0.01135
5/7/00 5:05	0.01135

Model Date and Time	Rainfall Accumulation (in)
5/7/00 5:10	0.01135
5/7/00 5:15	0.01135
5/7/00 5:35	0.01135
5/7/00 8:25	0.01135
5/7/00 8:45	0.01135
5/7/00 9:00	0.01135
5/7/00 9:10	0.01135
5/7/00 9:25	0.01135
5/7/00 12:05	0.01135
5/7/00 15:25	0.01135
5/7/00 15:40	0.01135
5/7/00 16:20	0.01135
5/7/00 16:35	0.01135
5/7/00 16:55	0.01135
5/7/00 17:25	0.01135
5/7/00 17:30	0.01135
5/7/00 17:35	0.01135
5/7/00 18:30	0.01135
5/7/00 18:35	0.030645
5/7/00 18:40	0.091935
5/7/00 18:45	0.051075
5/7/00 18:50	0.06129
5/7/00 18:55	0.04086
5/7/00 19:00	0.030645
5/7/00 19:05	0.04086
5/7/00 19:10	0.02043
5/7/00 19:15	0.04086
5/7/00 19:20	0.030645
5/7/00 19:25	0.02043
5/7/00 19:30	0.030645
5/7/00 19:35	0.030645
5/7/00 19:40	0.030645
5/7/00 19:45	0.04086
5/7/00 19:50	0.030645
5/7/00 19:55	0.030645
5/7/00 20:00	0.030645
5/7/00 20:05	0.02043
5/7/00 20:10	0.02043
5/7/00 20:15	0.030645
5/7/00 20:20	0.02043
5/7/00 20:25	0.02043
5/7/00 20:30	0.01135
5/7/00 20:35	0.030645
5/7/00 20:40	0.02043
5/7/00 20:45	0.02043
5/7/00 20:50	0.01135
5/7/00 20:55	0.02043
5/7/00 21:00	0.02043
5/7/00 21:05	0.02043
5/7/00 21:10	0.02043
5/7/00 21:15	0.01135
5/7/00 21:20	0.01135
5/7/00 21:25	0.01135
5/7/00 21:30	0.01135
5/7/00 21:35	0.02043
5/7/00 21:40	0.01135
5/7/00 21:45	0.01135
5/7/00 21:50	0.01135
5/7/00 22:00	0.01135
5/7/00 22:05	0.01135
5/7/00 22:10	0.01135
5/7/00 22:15	0.01135
5/7/00 22:25	0.01135
5/7/00 22:30	0.01135
5/7/00 22:35	0.01135
5/7/00 22:40	0.01135
5/7/00 22:45	0.01135
5/7/00 22:50	0.02043
5/7/00 23:00	0.02043
5/7/00 23:05	0.01135
5/7/00 23:10	0.01135
5/7/00 23:15	0.01135
5/7/00 23:20	0.01135
5/7/00 23:25	0.01135
5/7/00 23:30	0.01135
5/7/00 23:35	0.01135
5/7/00 23:40	0.01135
5/7/00 23:45	0.01135
5/7/00 23:50	0.01135
5/7/00 23:55	0.01135
5/8/00 0:00	0.01135

Model Date and Time	Rainfall Accumulation (in)
5/8/00 0:05	0.01135
5/8/00 0:10	0.01135
5/8/00 0:15	0.01135
5/8/00 0:25	0.01135
5/8/00 0:30	0.02043
5/8/00 0:35	0.01135
5/8/00 0:40	0.02043
5/8/00 0:45	0.02043
5/8/00 0:50	0.01135
5/8/00 0:55	0.01135
5/8/00 1:00	0.01135
5/8/00 1:05	0.01135
5/8/00 1:10	0.01135
5/8/00 1:15	0.01135
5/8/00 1:20	0.01135
5/8/00 1:25	0.01135
5/8/00 1:35	0.01135
5/8/00 1:40	0.01135
5/8/00 1:50	0.01135
5/8/00 1:55	0.01135
5/8/00 2:10	0.01135
5/8/00 2:30	0.01135
5/8/00 2:45	0.01135
5/8/00 3:00	0.01135
5/8/00 3:15	0.01135
5/8/00 3:40	0.01135
5/8/00 19:00	0.01135
5/15/00 19:00	0.0109
5/15/00 19:15	0.0109
5/15/00 19:25	0.0109
5/15/00 19:40	0.0109
5/15/00 19:55	0.0109
5/15/00 20:05	0.0109
5/15/00 20:20	0.0109
5/15/00 20:35	0.0109
5/15/00 20:50	0.0109
5/15/00 21:10	0.0109
5/15/00 21:55	0.0109
5/15/00 22:30	0.0109
5/16/00 2:50	0.0109
5/16/00 4:25	0.0109
5/16/00 5:15	0.0109
5/16/00 5:50	0.0109
5/16/00 6:50	0.0109
5/16/00 11:50	0.0109
5/18/00 10:35	0.0109
5/18/00 13:15	0.0109
5/18/00 16:30	0.0109
5/18/00 16:50	0.03924
5/18/00 16:55	0.01962
5/18/00 17:00	0.0109
5/18/00 17:05	0.0109
5/18/00 17:10	0.0109
5/18/00 17:20	0.0109
5/19/00 10:00	0.0109
5/19/00 14:30	0.0109
5/19/00 14:45	0.0109
5/19/00 14:50	0.0109
5/19/00 15:00	0.0109
5/19/00 15:20	0.0109
5/19/00 15:45	0.0109
5/19/00 16:35	0.0109
5/19/00 17:55	0.0109
5/19/00 18:40	0.0109
5/20/00 5:50	0.0109
5/20/00 17:50	0.0109
5/20/00 18:00	0.0109
5/20/00 18:15	0.0109
5/20/00 18:20	0.0109
5/20/00 18:30	0.0109
5/20/00 19:55	0.0109
5/20/00 20:20	0.0109
5/20/00 20:40	0.0109
5/20/00 21:00	0.0109
5/20/00 21:15	0.0109
5/20/00 21:50	0.0109
5/20/00 22:05	0.0109
5/20/00 22:10	0.0109
5/20/00 22:15	0.0109
5/20/00 22:20	0.0109
5/20/00 22:25	0.0109

Model Date and Time	Rainfall Accumulation (in)
5/20/00 22:30	0.0109
5/20/00 22:35	0.0109
5/20/00 22:40	0.0109
5/20/00 22:45	0.0109
5/20/00 22:50	0.01962
5/20/00 22:55	0.0109
5/20/00 23:00	0.0109
5/20/00 23:05	0.0109
5/20/00 23:10	0.0109
5/20/00 23:15	0.0109
5/20/00 23:20	0.0109
5/20/00 23:25	0.0109
5/20/00 23:30	0.0109
5/20/00 23:35	0.0109
5/20/00 23:40	0.0109
5/20/00 23:50	0.0109
5/20/00 23:55	0.0109
5/21/00 0:00	0.0109
5/21/00 0:05	0.0109
5/21/00 0:15	0.0109
5/21/00 0:20	0.0109
5/21/00 0:30	0.0109
5/21/00 0:40	0.0109
5/21/00 0:45	0.0109
5/21/00 0:55	0.0109
5/21/00 1:00	0.0109
5/21/00 1:05	0.0109
5/21/00 1:10	0.0109
5/21/00 1:15	0.0109
5/21/00 1:20	0.0109
5/21/00 1:25	0.0109
5/21/00 1:30	0.0109
5/21/00 1:35	0.0109
5/21/00 1:40	0.0109
5/21/00 1:45	0.0109
5/21/00 1:50	0.0109
5/21/00 2:00	0.0109
5/21/00 2:10	0.0109
5/21/00 2:25	0.0109
5/21/00 2:30	0.0109
5/21/00 2:35	0.0109
5/21/00 2:40	0.0109
5/21/00 3:00	0.0109
5/22/00 10:35	0.0109
5/22/00 11:45	0.0109
5/22/00 12:00	0.0109
5/22/00 12:10	0.0109
5/22/00 12:20	0.0109
5/22/00 12:25	0.0109
5/22/00 12:30	0.0109
5/22/00 12:35	0.0109
5/22/00 12:40	0.0109
5/22/00 12:50	0.0109
5/22/00 13:00	0.0109
5/22/00 13:05	0.0109
5/22/00 13:15	0.0109
5/22/00 13:20	0.0109
5/22/00 13:25	0.0109
5/22/00 13:30	0.0109
5/22/00 13:35	0.0109
5/22/00 13:40	0.0109
5/22/00 13:45	0.0109
5/22/00 13:50	0.0109
5/22/00 14:00	0.0109
5/22/00 14:05	0.0109
5/22/00 14:10	0.0109
5/22/00 14:20	0.0109
5/22/00 14:25	0.0109
5/22/00 14:30	0.0109
5/22/00 14:40	0.0109
5/22/00 14:45	0.0109
5/22/00 14:50	0.0109
5/22/00 15:00	0.0109
5/22/00 15:05	0.0109
5/22/00 15:15	0.0109
5/22/00 15:25	0.0109
5/22/00 15:30	0.0109
5/22/00 15:35	0.01962
5/22/00 15:40	0.0109
5/22/00 15:45	0.0109
5/22/00 15:50	0.0109

Model Date and Time	Rainfall Accumulation (in)
5/22/00 15:55	0.0109
5/22/00 16:00	0.01962
5/22/00 16:05	0.0109
5/22/00 16:10	0.0109
5/22/00 16:15	0.0109
5/22/00 16:20	0.0109
5/22/00 16:25	0.0109
5/22/00 16:30	0.01962
5/22/00 16:35	0.01962
5/22/00 16:40	0.0109
5/22/00 16:45	0.01962
5/22/00 16:50	0.01962
5/22/00 16:55	0.0109
5/22/00 17:00	0.0109
5/22/00 17:05	0.01962
5/22/00 17:10	0.01962
5/22/00 17:15	0.01962
5/22/00 17:20	0.01962
5/22/00 17:25	0.0109
5/22/00 17:30	0.0109
5/22/00 17:35	0.01962
5/22/00 17:40	0.01962
5/22/00 17:45	0.01962
5/22/00 17:50	0.0109
5/22/00 17:55	0.01962
5/22/00 18:00	0.0109
5/22/00 18:05	0.0109
5/22/00 18:10	0.01962
5/22/00 18:15	0.01962
5/22/00 18:20	0.01962
5/22/00 18:25	0.01962
5/22/00 18:30	0.0109
5/22/00 18:35	0.01962
5/22/00 18:40	0.0109
5/22/00 18:45	0.0109
5/22/00 18:50	0.0109
5/22/00 18:55	0.0109
5/22/00 19:00	0.01962
5/22/00 19:05	0.01962
5/22/00 19:10	0.01962
5/22/00 19:15	0.0109
5/22/00 19:20	0.0109
5/22/00 19:25	0.0109
5/22/00 19:30	0.0109
5/22/00 19:35	0.0109
5/22/00 19:40	0.0109
5/22/00 19:45	0.0109
5/22/00 19:50	0.0109
5/22/00 19:55	0.0109
5/22/00 20:00	0.0109
5/22/00 20:10	0.0109
5/22/00 20:15	0.0109
5/22/00 20:25	0.0109
5/22/00 20:30	0.0109
5/22/00 20:35	0.0109
5/22/00 20:40	0.0109
5/22/00 20:50	0.0109
5/22/00 20:55	0.0109
5/22/00 21:00	0.0109
5/22/00 21:05	0.0109
5/22/00 21:10	0.0109
5/22/00 21:15	0.0109
5/22/00 21:20	0.0109
5/22/00 21:25	0.0109
5/22/00 21:30	0.0109
5/22/00 21:35	0.0109
5/22/00 21:40	0.0109
5/22/00 21:45	0.0109
5/22/00 21:50	0.01962
5/22/00 21:55	0.0109
5/22/00 22:00	0.0109
5/22/00 22:05	0.0109
5/22/00 22:10	0.0109
5/22/00 22:15	0.01962
5/22/00 22:20	0.0109
5/22/00 22:30	0.0109
5/22/00 22:40	0.0109
5/22/00 22:45	0.0109
5/22/00 22:50	0.0109
5/22/00 22:55	0.0109
5/22/00 23:00	0.0109

Model Date and Time	Rainfall Accumulation (in)
5/22/00 23:05	0.0109
5/22/00 23:15	0.0109
5/22/00 23:25	0.0109
5/22/00 23:30	0.0109
5/22/00 23:35	0.0109
5/22/00 23:45	0.0109
5/22/00 23:55	0.01962
5/23/00 0:00	0.0109
5/23/00 0:05	0.0109
5/23/00 0:10	0.0109
5/23/00 0:15	0.0109
5/23/00 0:20	0.0109
5/23/00 0:25	0.01962
5/23/00 0:30	0.0109
5/23/00 0:35	0.0109
5/23/00 0:40	0.0109
5/23/00 0:45	0.01962
5/23/00 0:50	0.0109
5/23/00 0:55	0.01962
5/23/00 1:00	0.0109
5/23/00 1:05	0.0109
5/23/00 1:10	0.0109
5/23/00 1:15	0.0109
5/23/00 1:30	0.0109
5/23/00 1:40	0.0109
5/23/00 1:45	0.0109
5/23/00 1:50	0.0109
5/23/00 1:55	0.02943
5/23/00 2:00	0.02943
5/23/00 2:05	0.02943
5/23/00 2:10	0.0109
5/23/00 2:15	0.0109
5/23/00 2:20	0.0109
5/23/00 2:25	0.02943
5/23/00 2:30	0.07848
5/23/00 2:35	0.01962
5/23/00 2:40	0.0109
5/23/00 2:45	0.01962
5/23/00 2:50	0.01962
5/23/00 2:55	0.0109
5/23/00 3:05	0.0109
5/23/00 3:20	0.0109
5/23/00 3:55	0.0109
5/23/00 4:10	0.0109
5/23/00 5:10	0.0109
5/23/00 5:25	0.0109
5/23/00 5:30	0.0109
5/23/00 5:40	0.0109
5/23/00 5:50	0.0109
5/23/00 5:55	0.0109
5/23/00 6:00	0.0109
5/23/00 6:05	0.0109
5/23/00 6:15	0.0109
5/23/00 6:20	0.0109
5/23/00 6:25	0.0109
5/23/00 6:30	0.01962
5/23/00 6:35	0.0109
5/23/00 6:40	0.0109
5/23/00 6:50	0.0109
5/23/00 6:55	0.01962
5/23/00 7:00	0.01962
5/23/00 7:05	0.01962
5/23/00 7:10	0.0109
5/23/00 7:15	0.01962
5/23/00 7:20	0.01962
5/23/00 7:25	0.02943
5/23/00 7:30	0.01962
5/23/00 7:35	0.01962
5/23/00 7:40	0.0109
5/23/00 7:45	0.01962
5/23/00 7:50	0.0109
5/23/00 7:55	0.01962
5/23/00 8:00	0.0109
5/23/00 8:05	0.01962
5/23/00 8:10	0.0109
5/23/00 8:15	0.01962
5/23/00 8:20	0.01962
5/23/00 8:25	0.01962
5/23/00 8:30	0.01962
5/23/00 8:35	0.01962
5/23/00 8:40	0.02943

Model Date and Time	Rainfall Accumulation (in)
5/23/00 8:45	0.01962
5/23/00 8:50	0.01962
5/23/00 8:55	0.01962
5/23/00 9:00	0.0109
5/23/00 9:05	0.01962
5/23/00 9:10	0.0109
5/23/00 9:15	0.0109
5/23/00 9:20	0.01962
5/23/00 9:25	0.01962
5/23/00 9:30	0.0109
5/23/00 9:35	0.0109
5/23/00 10:30	0.0109
5/23/00 11:50	0.0109
5/24/00 10:50	0.0109
5/24/00 13:25	0.0109
5/24/00 13:40	0.0109
5/24/00 13:55	0.0109
5/24/00 14:15	0.0109
5/24/00 14:35	0.0109
5/24/00 14:45	0.0109
5/24/00 14:55	0.0109
5/24/00 15:05	0.0109
5/24/00 15:20	0.0109
5/24/00 15:30	0.0109
5/24/00 15:40	0.0109
5/24/00 15:45	0.0109
5/24/00 16:00	0.0109
5/24/00 16:10	0.0109
5/24/00 16:15	0.0109
5/24/00 16:30	0.0109
5/24/00 16:45	0.0109
5/24/00 16:55	0.0109
5/24/00 17:10	0.0109
5/24/00 17:30	0.0109
5/24/00 17:45	0.0109
5/24/00 18:00	0.0109
5/24/00 18:20	0.0109
5/25/00 14:35	0.0109
5/25/00 14:40	0.0109
5/25/00 14:45	0.0109
5/25/00 14:50	0.0109
5/25/00 14:55	0.0109
5/25/00 15:05	0.01962
5/25/00 15:10	0.0109
5/25/00 15:15	0.0109
5/25/00 15:20	0.02943
5/25/00 15:25	0.0109
5/25/00 15:50	0.0109
5/25/00 15:55	0.0109
5/25/00 16:00	0.0109
5/25/00 16:10	0.0109
5/25/00 16:15	0.02943
5/25/00 16:20	0.04905
5/25/00 16:25	0.03924
5/25/00 16:30	0.0109
5/25/00 16:40	0.0109
5/25/00 18:25	0.01962
5/25/00 18:35	0.0109
5/25/00 19:05	0.0109
5/25/00 19:20	0.0109
5/25/00 20:50	0.0109
5/25/00 21:00	0.0109
5/25/00 21:05	0.0109
5/25/00 21:10	0.0109
5/25/00 21:20	0.0109
5/25/00 21:35	0.0109
5/25/00 23:30	0.0109
5/25/00 23:45	0.0109
5/26/00 0:20	0.0109
5/26/00 14:10	0.0109
5/26/00 14:20	0.0109
5/26/00 14:35	0.0109
5/26/00 14:45	0.0109
5/26/00 14:50	0.0109
5/26/00 14:55	0.0109
5/26/00 15:05	0.0109
5/26/00 15:10	0.0109
5/26/00 15:15	0.0109
5/26/00 15:20	0.01962
5/26/00 15:25	0.01962
5/26/00 15:30	0.01962

Model Date and Time	Rainfall Accumulation (in)
5/26/00 15:35	0.0109
5/26/00 15:40	0.01962
5/26/00 15:45	0.0109
5/26/00 15:50	0.0109
5/26/00 15:55	0.01962
5/26/00 16:00	0.0109
5/26/00 16:10	0.0109
5/26/00 16:20	0.0109
5/26/00 16:35	0.0109
5/26/00 16:40	0.0109
5/26/00 16:45	0.0109
5/26/00 17:20	0.0109
5/26/00 18:50	0.0109
5/27/00 12:45	0.0109
5/27/00 13:10	0.0109
5/27/00 13:30	0.0109
5/27/00 14:00	0.0109
5/27/00 14:25	0.0109
5/27/00 14:40	0.0109
5/27/00 14:50	0.0109
5/27/00 14:55	0.0109
5/27/00 15:10	0.0109
5/27/00 15:20	0.0109
5/27/00 15:35	0.0109
5/27/00 15:40	0.0109
5/27/00 15:50	0.0109
5/27/00 16:00	0.0109
5/27/00 16:10	0.0109
5/27/00 16:25	0.0109
5/27/00 17:05	0.0109
5/27/00 20:45	0.0109
5/27/00 21:15	0.0109
5/27/00 21:25	0.0109
5/27/00 21:40	0.0109
5/27/00 21:45	0.0109
5/27/00 21:55	0.0109
5/27/00 22:00	0.0109
5/27/00 22:05	0.01962
5/27/00 22:10	0.02943
5/27/00 22:15	0.01962
5/27/00 22:20	0.02943
5/27/00 22:25	0.02943
5/27/00 22:30	0.05886
5/27/00 22:35	0.14715
5/27/00 22:40	0.04905
5/27/00 22:45	0.02943
5/27/00 22:50	0.0109
5/27/00 22:55	0.01962
5/27/00 23:00	0.0109
5/27/00 23:05	0.0109
5/27/00 23:40	0.0109
5/28/00 1:30	0.0109
5/28/00 2:35	0.0109
5/28/00 2:40	0.01962
5/28/00 2:45	0.0109
5/28/00 2:50	0.0109
5/28/00 2:55	0.0109
5/28/00 3:10	0.0109
5/28/00 3:50	0.0109
5/28/00 5:50	0.0109
5/28/00 6:15	0.0109
5/28/00 6:45	0.0109
5/28/00 7:00	0.0109
5/28/00 7:10	0.0109
5/28/00 7:25	0.0109
5/28/00 7:40	0.0109
5/28/00 8:00	0.0109
6/4/00 8:00	0.01135
6/5/00 14:25	0.01135
6/5/00 14:35	0.01135
6/5/00 14:50	0.01135
6/5/00 14:55	0.01135
6/5/00 15:00	0.02043
6/5/00 15:05	0.01135
6/5/00 15:10	0.02043
6/5/00 15:15	0.01135
6/5/00 15:20	0.02043
6/5/00 15:25	0.02043
6/5/00 15:30	0.01135
6/5/00 15:35	0.02043
6/5/00 15:40	0.01135

Model Date and Time	Rainfall Accumulation (in)
6/5/00 15:45	0.01135
6/5/00 17:15	0.01135
6/5/00 18:35	0.01135
6/5/00 18:40	0.01135
6/5/00 18:45	0.01135
6/5/00 18:50	0.01135
6/5/00 18:55	0.02043
6/5/00 19:00	0.02043
6/5/00 19:05	0.01135
6/5/00 19:10	0.02043
6/5/00 19:15	0.01135
6/5/00 19:20	0.01135
6/5/00 19:25	0.01135
6/6/00 14:20	0.01135
6/6/00 22:50	0.01135
6/7/00 12:45	0.01135
6/7/00 13:00	0.01135
6/7/00 13:10	0.01135
6/7/00 13:15	0.01135
6/7/00 13:25	0.01135
6/7/00 13:30	0.01135
6/7/00 13:35	0.01135
6/7/00 13:40	0.01135
6/7/00 13:45	0.01135
6/7/00 13:50	0.01135
6/7/00 13:55	0.01135
6/7/00 14:00	0.01135
6/7/00 14:05	0.01135
6/7/00 14:10	0.01135
6/7/00 14:15	0.01135
6/7/00 14:25	0.01135
6/7/00 14:35	0.01135
6/7/00 14:50	0.01135
6/7/00 15:05	0.01135
6/7/00 15:35	0.01135
6/7/00 16:25	0.01135
6/7/00 17:55	0.01135
6/11/00 3:45	0.0109
6/11/00 4:30	0.0109
6/11/00 4:35	0.0109
6/11/00 4:45	0.0109
6/11/00 4:50	0.0109
6/11/00 4:55	0.0109
6/11/00 5:05	0.0109
6/11/00 5:10	0.0109
6/11/00 5:15	0.0109
6/11/00 5:25	0.0109
6/11/00 5:35	0.0109
6/11/00 9:15	0.0109
6/11/00 9:20	0.0109
6/11/00 9:25	0.01962
6/11/00 9:30	0.0109
6/11/00 9:35	0.01962
6/11/00 9:40	0.01962
6/11/00 9:45	0.0109
6/11/00 9:50	0.01962
6/11/00 9:55	0.01962
6/11/00 10:00	0.0109
6/11/00 10:05	0.02943
6/11/00 10:10	0.01962
6/11/00 10:15	0.01962
6/11/00 10:20	0.0109
6/11/00 10:25	0.01962
6/11/00 10:30	0.01962
6/11/00 10:35	0.0109
6/11/00 10:40	0.0109
6/11/00 10:45	0.01962
6/11/00 10:50	0.01962
6/11/00 10:55	0.01962
6/11/00 11:00	0.01962
6/11/00 11:05	0.01962
6/11/00 11:10	0.0109
6/11/00 11:15	0.01962
6/11/00 11:20	0.01962
6/11/00 11:25	0.0109
6/11/00 11:30	0.01962
6/11/00 11:35	0.01962
6/11/00 11:40	0.02943
6/11/00 11:45	0.01962
6/11/00 11:50	0.01962
6/11/00 11:55	0.01962

Model Date and Time	Rainfall Accumulation (in)
6/11/00 12:00	0.0109
6/11/00 12:05	0.01962
6/11/00 12:10	0.0109
6/11/00 12:15	0.01962
6/11/00 12:20	0.0109
6/11/00 12:25	0.01962
6/11/00 12:30	0.01962
6/11/00 12:35	0.0109
6/11/00 12:40	0.0109
6/11/00 12:45	0.0109
6/11/00 12:50	0.01962
6/11/00 12:55	0.0109
6/11/00 13:00	0.0109
6/11/00 13:05	0.0109
6/11/00 13:10	0.01962
6/11/00 13:15	0.0109
6/11/00 13:20	0.02943
6/11/00 13:25	0.01962
6/11/00 13:30	0.01962
6/11/00 13:35	0.02943
6/11/00 13:40	0.0109
6/11/00 13:45	0.01962
6/11/00 13:50	0.01962
6/11/00 13:55	0.01962
6/11/00 14:00	0.01962
6/11/00 14:05	0.02943
6/11/00 14:10	0.0109
6/11/00 14:15	0.0109
6/11/00 14:35	0.0109
6/11/00 14:45	0.0109
6/11/00 14:50	0.0109
6/11/00 14:55	0.0109
6/11/00 15:05	0.0109
6/11/00 15:10	0.0109
6/11/00 15:15	0.0109
6/11/00 15:20	0.0109
6/11/00 15:35	0.0109
6/11/00 15:50	0.0109
6/11/00 16:20	0.0109
6/11/00 17:40	0.0109
6/11/00 18:05	0.0109
6/11/00 18:25	0.0109
6/11/00 19:15	0.0109
6/11/00 19:25	0.0109
6/11/00 19:35	0.0109
6/11/00 19:40	0.0109
6/11/00 19:45	0.01962
6/11/00 19:50	0.0109
6/11/00 19:55	0.0109
6/11/00 20:00	0.0109
6/11/00 20:05	0.01962
6/11/00 20:10	0.0109
6/11/00 20:15	0.0109
6/11/00 20:20	0.0109
6/11/00 20:25	0.01962
6/11/00 20:30	0.0109
6/11/00 20:35	0.0109
6/11/00 20:40	0.01962
6/11/00 20:45	0.0109
6/11/00 20:50	0.01962
6/11/00 20:55	0.0109
6/11/00 21:00	0.01962
6/11/00 21:05	0.0109
6/11/00 21:10	0.01962
6/11/00 21:15	0.01962
6/11/00 21:20	0.01962
6/11/00 21:25	0.01962
6/11/00 21:30	0.01962
6/11/00 21:35	0.01962
6/11/00 21:40	0.0109
6/11/00 21:45	0.01962
6/11/00 21:50	0.01962
6/11/00 21:55	0.02943
6/11/00 22:00	0.0109
6/11/00 22:05	0.01962
6/11/00 22:10	0.01962
6/11/00 22:15	0.0109
6/11/00 22:20	0.02943
6/11/00 22:25	0.01962
6/11/00 22:30	0.02943
6/11/00 22:35	0.01962

Model Date and Time	Rainfall Accumulation (in)
6/11/00 22:40	0.02943
6/11/00 22:45	0.01962
6/11/00 22:50	0.02943
6/11/00 22:55	0.01962
6/11/00 23:00	0.01962
6/11/00 23:05	0.02943
6/11/00 23:10	0.01962
6/11/00 23:15	0.02943
6/11/00 23:20	0.01962
6/11/00 23:25	0.02943
6/11/00 23:30	0.02943
6/11/00 23:35	0.03924
6/11/00 23:40	0.02943
6/11/00 23:45	0.02943
6/11/00 23:50	0.02943
6/11/00 23:55	0.02943
6/12/00 0:00	0.02943
6/12/00 0:05	0.02943
6/12/00 0:10	0.02943
6/12/00 0:15	0.02943
6/12/00 0:20	0.03924
6/12/00 0:25	0.02943
6/12/00 0:30	0.02943
6/12/00 0:35	0.01962
6/12/00 0:40	0.02943
6/12/00 0:45	0.02943
6/12/00 0:50	0.01962
6/12/00 0:55	0.01962
6/12/00 1:00	0.0109
6/12/00 1:05	0.01962
6/12/00 1:10	0.01962
6/12/00 1:15	0.0109
6/12/00 1:20	0.01962
6/12/00 1:25	0.02943
6/12/00 1:30	0.01962
6/12/00 1:35	0.01962
6/12/00 1:40	0.01962
6/12/00 1:45	0.02943
6/12/00 1:50	0.01962
6/12/00 1:55	0.0109
6/12/00 2:00	0.01962
6/12/00 2:05	0.01962
6/12/00 2:10	0.0109
6/12/00 2:15	0.01962
6/12/00 2:20	0.0109
6/12/00 2:25	0.0109
6/12/00 2:30	0.0109
6/12/00 2:35	0.0109
6/12/00 2:40	0.0109
6/12/00 2:45	0.0109
6/12/00 2:50	0.01962
6/12/00 2:55	0.0109
6/12/00 3:00	0.0109
6/12/00 3:05	0.02943
6/12/00 3:10	0.0109
6/12/00 3:15	0.01962
6/12/00 3:20	0.01962
6/12/00 3:25	0.0109
6/12/00 3:30	0.0109
6/12/00 3:35	0.01962
6/12/00 3:40	0.0109
6/12/00 3:45	0.01962
6/12/00 3:50	0.01962
6/12/00 3:55	0.02943
6/12/00 4:00	0.01962
6/12/00 4:05	0.01962
6/12/00 4:10	0.01962
6/12/00 4:15	0.02943
6/12/00 4:20	0.01962
6/12/00 4:25	0.02943
6/12/00 4:30	0.01962
6/12/00 4:35	0.01962
6/12/00 4:40	0.02943
6/12/00 4:45	0.0109
6/12/00 4:50	0.02943
6/12/00 4:55	0.01962
6/12/00 5:00	0.01962
6/12/00 5:05	0.01962
6/12/00 5:10	0.01962
6/12/00 5:15	0.01962
6/12/00 5:20	0.01962

Model Date and Time	Rainfall Accumulation (in)
6/12/00 5:25	0.02943
6/12/00 5:30	0.01962
6/12/00 5:35	0.0109
6/12/00 5:40	0.01962
6/12/00 5:45	0.0109
6/12/00 5:50	0.01962
6/12/00 5:55	0.0109
6/12/00 6:00	0.02943
6/12/00 6:05	0.01962
6/12/00 6:10	0.02943
6/12/00 6:15	0.01962
6/12/00 6:20	0.01962
6/12/00 6:25	0.02943
6/12/00 6:30	0.01962
6/12/00 6:35	0.02943
6/12/00 6:40	0.01962
6/12/00 6:45	0.0109
6/12/00 6:50	0.01962
6/12/00 6:55	0.0109
6/12/00 7:00	0.0109
6/12/00 7:05	0.0109
6/12/00 7:15	0.0109
6/12/00 7:20	0.0109
6/12/00 7:25	0.0109
6/12/00 7:30	0.01962
6/12/00 7:35	0.0109
6/12/00 7:40	0.01962
6/12/00 7:45	0.02943
6/12/00 7:50	0.0109
6/12/00 7:55	0.01962
6/12/00 8:00	0.01962
6/12/00 8:05	0.0109
6/12/00 8:10	0.01962
6/12/00 8:15	0.02943
6/12/00 8:20	0.01962
6/12/00 8:25	0.0109
6/12/00 8:30	0.01962
6/12/00 8:35	0.01962
6/12/00 8:40	0.01962
6/12/00 8:45	0.01962
6/12/00 8:50	0.0109
6/12/00 8:55	0.01962
6/12/00 9:00	0.01962
6/12/00 9:05	0.01962
6/12/00 9:10	0.02943
6/12/00 9:15	0.01962
6/12/00 9:20	0.01962
6/12/00 9:25	0.01962
6/12/00 9:30	0.01962
6/12/00 9:35	0.01962
6/12/00 9:40	0.0109
6/12/00 9:45	0.01962
6/12/00 9:50	0.01962
6/12/00 9:55	0.01962
6/12/00 10:00	0.01962
6/12/00 10:05	0.01962
6/12/00 10:10	0.01962
6/12/00 10:15	0.0109
6/12/00 10:20	0.01962
6/12/00 10:25	0.0109
6/12/00 10:30	0.0109
6/12/00 10:35	0.01962
6/12/00 10:40	0.01962
6/12/00 10:45	0.0109
6/12/00 10:50	0.02943
6/12/00 10:55	0.02943
6/12/00 11:00	0.01962
6/12/00 11:05	0.02943
6/12/00 11:10	0.0109
6/12/00 11:20	0.0109
6/12/00 11:35	0.0109
6/12/00 11:45	0.0109
6/12/00 11:50	0.0109
6/12/00 12:05	0.0109
6/12/00 12:10	0.01962
6/12/00 12:15	0.02943
6/12/00 12:20	0.01962
6/12/00 12:25	0.0109
6/12/00 12:30	0.01962
6/12/00 12:35	0.01962
6/12/00 12:40	0.01962

Model Date and Time	Rainfall Accumulation (in)
6/12/00 12:45	0.01962
6/12/00 12:50	0.01962
6/12/00 12:55	0.0109
6/12/00 13:00	0.0109
6/12/00 13:05	0.01962
6/12/00 13:15	0.0109
6/12/00 13:20	0.0109
6/12/00 13:25	0.0109
6/12/00 13:40	0.0109
6/12/00 15:00	0.01962
6/12/00 15:05	0.0109
6/12/00 15:10	0.0109
6/12/00 15:20	0.0109
6/12/00 16:20	0.0109
6/12/00 16:25	0.0109
6/12/00 16:30	0.0109
6/12/00 16:40	0.0109
6/12/00 16:45	0.01962
6/12/00 16:50	0.0109
6/12/00 16:55	0.0109
6/12/00 17:30	0.0109
6/12/00 19:55	0.01962
6/12/00 20:00	0.0109
6/12/00 20:05	0.01962
6/12/00 20:10	0.01962
6/12/00 20:15	0.04905
6/12/00 20:20	0.0109
6/12/00 20:30	0.0109
6/12/00 20:55	0.0109
6/12/00 21:15	0.0109
6/12/00 22:45	0.0109
6/12/00 23:55	0.0109
6/13/00 0:00	0.0109
6/13/00 0:05	0.0109
6/13/00 0:10	0.0109
6/13/00 0:25	0.0109
6/13/00 3:05	0.0109
6/13/00 3:15	0.0109
6/13/00 4:10	0.0109
6/13/00 4:20	0.0109
6/13/00 4:30	0.0109
6/13/00 4:40	0.0109
6/13/00 4:45	0.01962
6/13/00 4:50	0.0109
6/13/00 7:40	0.0109
6/20/00 7:40	0.0109
6/20/00 9:10	0.0109
6/20/00 10:10	0.0109
6/20/00 11:15	0.0109
6/20/00 20:30	0.0109
6/20/00 20:50	0.0109
6/20/00 21:00	0.0109
6/20/00 21:10	0.0109
6/20/00 21:15	0.0109
6/20/00 21:20	0.0109
6/20/00 21:25	0.0109
6/20/00 21:35	0.0109
6/20/00 21:40	0.0109
6/20/00 21:45	0.0109
6/20/00 21:50	0.01962
6/20/00 21:55	0.0109
6/20/00 22:00	0.0109
6/20/00 22:05	0.01962
6/20/00 22:10	0.0109
6/20/00 22:15	0.0109
6/20/00 22:25	0.0109
6/20/00 22:30	0.0109
6/20/00 22:40	0.0109
6/20/00 22:50	0.0109
6/20/00 23:00	0.0109
6/20/00 23:10	0.0109
6/20/00 23:20	0.0109
6/20/00 23:30	0.0109
6/20/00 23:40	0.0109
6/20/00 23:50	0.0109
6/21/00 0:00	0.0109
6/21/00 0:10	0.0109
6/21/00 0:15	0.0109
6/21/00 0:30	0.0109
6/21/00 0:55	0.0109
6/21/00 1:20	0.0109

Model Date and Time	Rainfall Accumulation (in)
6/21/00 2:05	0.0109
6/21/00 2:25	0.0109
6/21/00 2:30	0.0109
6/21/00 2:35	0.0109
6/21/00 2:40	0.0109
6/21/00 2:45	0.0109
6/21/00 2:50	0.0109
6/21/00 2:55	0.0109
6/21/00 3:05	0.0109
6/21/00 3:20	0.0109
6/21/00 3:25	0.0109
6/21/00 3:35	0.0109
6/21/00 3:40	0.0109
6/21/00 3:45	0.0109
6/21/00 3:55	0.0109
6/21/00 4:00	0.01962
6/21/00 4:05	0.0109
6/21/00 4:15	0.01962
6/21/00 4:25	0.0109
6/21/00 4:35	0.0109
6/21/00 4:40	0.0109
6/21/00 4:55	0.0109
6/21/00 5:10	0.0109
6/21/00 5:20	0.0109
6/21/00 5:35	0.0109
6/21/00 5:45	0.0109
6/21/00 6:00	0.0109
6/21/00 6:05	0.0109
6/21/00 6:10	0.0109
6/21/00 6:15	0.0109
6/21/00 6:20	0.0109
6/21/00 6:25	0.0109
6/21/00 6:30	0.0109
6/21/00 6:40	0.0109
6/21/00 6:45	0.0109
6/21/00 7:00	0.0109
6/21/00 7:10	0.0109
6/21/00 7:25	0.0109
6/21/00 8:00	0.0109
6/21/00 9:00	0.0109
6/21/00 11:30	0.0109
6/21/00 11:35	0.01962
6/21/00 11:40	0.02943
6/21/00 11:45	0.04905
6/21/00 11:50	0.02943
6/21/00 11:55	0.01962
6/21/00 12:00	0.01962
6/21/00 12:05	0.02943
6/21/00 12:10	0.02943
6/21/00 12:15	0.01962
6/21/00 12:20	0.0109
6/21/00 12:25	0.0109
6/21/00 12:30	0.0109
6/21/00 12:35	0.01962
6/21/00 12:40	0.01962
6/21/00 12:45	0.01962
6/21/00 12:50	0.01962
6/21/00 12:55	0.02943
6/21/00 13:00	0.03924
6/21/00 15:40	0.0109
6/21/00 16:15	0.0109
6/21/00 20:00	0.0109
6/21/00 20:40	0.0109
6/21/00 21:35	0.0109
6/21/00 21:50	0.0109
6/21/00 22:05	0.0109
6/21/00 23:00	0.0109
6/21/00 23:05	0.0109
6/21/00 23:20	0.0109
6/21/00 23:25	0.0109
6/21/00 23:35	0.0109
6/22/00 0:00	0.0109
6/22/00 0:05	0.0109
6/22/00 0:10	0.0109
6/22/00 0:25	0.0109
6/22/00 0:35	0.0109
6/22/00 0:40	0.0109
6/22/00 1:00	0.0109
6/22/00 1:35	0.0109
6/22/00 1:55	0.0109
6/22/00 2:05	0.01962

Model Date and Time	Rainfall Accumulation (in)
6/22/00 2:10	0.01962
6/22/00 2:15	0.0109
6/22/00 2:20	0.0109
6/22/00 2:25	0.0109
6/22/00 2:45	0.0109
6/22/00 3:35	0.0109
6/22/00 3:40	0.0109
6/22/00 4:00	0.0109
6/22/00 4:45	0.0109
6/22/00 6:10	0.0109
6/22/00 6:50	0.0109
6/22/00 7:00	0.0109
6/22/00 7:05	0.01962
6/22/00 7:15	0.0109
6/22/00 9:55	0.01962
6/22/00 10:05	0.0109
6/22/00 12:10	0.0109
6/22/00 22:35	0.0109
6/22/00 22:45	0.0109
6/22/00 22:50	0.01962
6/22/00 22:55	0.01962
6/22/00 23:00	0.0109
6/22/00 23:05	0.0109
6/22/00 23:10	0.0109
6/22/00 23:15	0.0109
6/22/00 23:25	0.0109
6/22/00 23:30	0.0109
6/22/00 23:35	0.02943
6/22/00 23:40	0.01962
6/22/00 23:45	0.01962
6/22/00 23:50	0.01962
6/22/00 23:55	0.0109
6/23/00 0:00	0.01962
6/23/00 0:05	0.01962
6/23/00 0:10	0.0109
6/23/00 0:15	0.01962
6/23/00 0:20	0.01962
6/23/00 0:25	0.01962
6/23/00 0:30	0.0109
6/23/00 0:35	0.0109
6/23/00 0:40	0.0109
6/23/00 0:45	0.0109
6/23/00 0:50	0.01962
6/23/00 0:55	0.01962
6/23/00 1:00	0.0109
6/23/00 1:10	0.0109
6/23/00 1:15	0.0109
6/23/00 1:25	0.0109
6/23/00 7:55	0.0109
6/24/00 16:10	0.0109
6/24/00 17:05	0.0109
6/24/00 17:45	0.0109
6/24/00 19:00	0.0109
6/24/00 19:15	0.0109
6/24/00 19:35	0.0109
6/24/00 19:55	0.0109
6/24/00 20:15	0.0109
6/24/00 20:35	0.0109
6/24/00 20:40	0.0109
6/24/00 20:50	0.0109
6/24/00 20:55	0.0109
6/24/00 21:00	0.0109
6/24/00 21:05	0.01962
6/24/00 21:10	0.0109
6/24/00 21:15	0.01962
6/24/00 21:25	0.0109
6/24/00 21:50	0.0109
6/24/00 22:25	0.0109
6/24/00 23:05	0.0109
6/24/00 23:25	0.0109
6/24/00 23:50	0.0109
6/25/00 0:00	0.0109
6/25/00 0:15	0.0109
6/25/00 0:30	0.0109
6/25/00 0:40	0.0109
6/25/00 0:50	0.01962
6/25/00 0:55	0.0109
6/25/00 1:00	0.0109
6/25/00 1:05	0.0109
6/25/00 1:15	0.0109
6/25/00 1:30	0.0109

Model Date and Time	Rainfall Accumulation (in)
6/25/00 1:35	0.0109
6/25/00 1:45	0.0109
6/25/00 1:50	0.0109
6/25/00 2:00	0.0109
6/25/00 2:10	0.0109
6/25/00 2:20	0.0109
6/25/00 2:25	0.0109
6/25/00 2:40	0.0109
6/25/00 2:55	0.0109
6/25/00 3:10	0.0109
6/25/00 3:25	0.0109
6/25/00 3:35	0.0109
6/25/00 3:50	0.0109
6/25/00 4:10	0.0109
6/25/00 4:25	0.0109
6/25/00 4:35	0.0109
6/25/00 4:45	0.0109
6/25/00 4:55	0.0109
6/25/00 5:05	0.0109
6/25/00 5:10	0.01962
6/25/00 5:20	0.0109
6/25/00 5:25	0.0109
6/25/00 5:30	0.0109
6/25/00 5:35	0.0109
6/25/00 5:40	0.0109
6/25/00 5:45	0.0109
6/25/00 5:50	0.0109
6/25/00 6:00	0.0109
6/25/00 6:05	0.0109
6/25/00 6:10	0.0109
6/25/00 6:15	0.0109
6/25/00 6:20	0.0109
6/25/00 6:25	0.0109
6/25/00 6:30	0.0109
6/25/00 6:40	0.01962
6/25/00 6:45	0.0109
6/25/00 6:50	0.0109
6/25/00 6:55	0.01962
6/25/00 7:00	0.0109
6/25/00 7:05	0.01962
6/25/00 7:10	0.0109
6/25/00 7:15	0.0109
6/25/00 7:20	0.01962
6/25/00 7:25	0.01962
6/25/00 7:30	0.0109
6/25/00 7:35	0.01962
6/25/00 7:40	0.01962
6/25/00 7:45	0.0109
6/25/00 7:50	0.01962
6/25/00 8:00	0.0109
6/25/00 8:05	0.0109
6/25/00 8:15	0.01962
6/25/00 8:20	0.0109
6/25/00 8:25	0.01962
6/25/00 8:30	0.0109
6/25/00 8:35	0.0109
6/25/00 8:40	0.02943
6/25/00 8:45	0.01962
6/25/00 8:50	0.02943
6/25/00 8:55	0.03924
6/25/00 9:00	0.02943
6/25/00 9:05	0.01962
6/25/00 9:10	0.02943
6/25/00 9:15	0.01962
6/25/00 9:20	0.01962
6/25/00 9:25	0.01962
6/25/00 9:30	0.01962
6/25/00 9:35	0.03924
6/25/00 9:40	0.02943
6/25/00 9:45	0.02943
6/25/00 9:50	0.02943
6/25/00 9:55	0.01962
6/25/00 10:00	0.02943
6/25/00 10:05	0.01962
6/25/00 10:10	0.02943
6/25/00 10:15	0.02943
6/25/00 10:20	0.01962
6/25/00 10:25	0.01962
6/25/00 10:30	0.0109
6/25/00 10:35	0.01962
6/25/00 10:40	0.0109

Model Date and Time	Rainfall Accumulation (in)
6/25/00 10:45	0.01962
6/25/00 10:50	0.01962
6/25/00 10:55	0.0109
6/25/00 11:00	0.0109
6/25/00 11:05	0.01962
6/25/00 11:10	0.01962
6/25/00 11:15	0.0109
6/25/00 11:20	0.01962
6/25/00 11:25	0.01962
6/25/00 11:30	0.01962
6/25/00 11:35	0.01962
6/25/00 11:40	0.01962
6/25/00 11:45	0.01962
6/25/00 11:50	0.01962
6/25/00 11:55	0.02943
6/25/00 12:00	0.01962
6/25/00 12:05	0.02943
6/25/00 12:10	0.01962
6/25/00 12:15	0.01962
6/25/00 12:20	0.01962
6/25/00 12:25	0.02943
6/25/00 12:30	0.01962
6/25/00 12:35	0.01962
6/25/00 12:40	0.01962
6/25/00 12:45	0.01962
6/25/00 12:50	0.01962
6/25/00 12:55	0.01962
6/25/00 13:00	0.01962
6/25/00 13:05	0.01962
6/25/00 13:10	0.01962
6/25/00 13:15	0.01962
6/25/00 13:20	0.01962
6/25/00 13:25	0.02943
6/25/00 13:30	0.01962
6/25/00 13:35	0.02943
6/25/00 13:40	0.01962
6/25/00 13:45	0.01962
6/25/00 13:50	0.0109
6/25/00 13:55	0.0109
6/25/00 14:00	0.01962
6/25/00 14:05	0.0109
6/25/00 14:10	0.0109
6/25/00 14:15	0.0109
6/25/00 14:20	0.0109
6/25/00 14:25	0.0109
6/25/00 14:30	0.0109
6/25/00 14:35	0.0109
6/25/00 15:10	0.0109
6/25/00 15:30	0.0109
6/25/00 15:40	0.0109
6/25/00 15:55	0.0109
6/25/00 16:20	0.0109
6/25/00 21:50	0.0109
6/25/00 23:15	0.0109
6/25/00 23:50	0.0109
6/25/00 23:55	0.0109
6/26/00 0:05	0.0109
6/26/00 3:30	0.0109
6/26/00 3:35	0.0109
6/26/00 3:40	0.0109
6/26/00 3:50	0.0109
6/26/00 4:20	0.0109
6/26/00 4:30	0.0109
6/26/00 4:40	0.0109
6/26/00 4:50	0.0109
6/26/00 5:00	0.0109
6/26/00 5:10	0.0109
6/26/00 5:15	0.0109
6/26/00 5:30	0.0109
6/26/00 5:40	0.0109
6/26/00 7:25	0.0109
6/26/00 19:45	0.0109
6/26/00 20:05	0.0109
6/26/00 20:10	0.0109
6/26/00 20:30	0.0109
6/26/00 20:35	0.0109
6/26/00 20:40	0.0109
6/26/00 20:45	0.0109
6/26/00 20:50	0.0109
6/26/00 20:55	0.0109
6/26/00 21:05	0.0109

Model Date and Time	Rainfall Accumulation (in)
6/26/00 21:15	0.0109
6/26/00 21:20	0.0109
6/26/00 21:25	0.04905
6/26/00 21:30	0.05886
6/26/00 21:35	0.01962
6/26/00 21:40	0.01962
6/26/00 21:45	0.0109
6/26/00 21:55	0.0109
6/26/00 22:00	0.0109
6/26/00 22:05	0.0109
6/27/00 1:05	0.0109
6/27/00 3:25	0.0109
6/27/00 3:50	0.0109
6/27/00 4:10	0.0109
6/27/00 4:15	0.0109
6/27/00 4:20	0.0109
6/27/00 4:35	0.0109
6/27/00 4:40	0.01962
6/27/00 4:45	0.03924
6/27/00 4:50	0.0109
6/27/00 4:55	0.01962
6/27/00 5:00	0.01962
6/27/00 5:05	0.0109
6/27/00 11:05	0.0109
6/27/00 13:50	0.0109
6/27/00 13:55	0.0109
6/27/00 14:05	0.01962
6/27/00 14:15	0.0109
6/27/00 14:35	0.0109
6/27/00 14:45	0.0109
6/27/00 15:15	0.0109
6/28/00 14:10	0.0109
6/28/00 20:40	0.0109
6/28/00 21:00	0.0109
6/28/00 21:15	0.0109
6/28/00 21:25	0.0109
6/28/00 21:35	0.0109
6/28/00 21:50	0.0109
6/28/00 21:55	0.0109
6/28/00 22:05	0.0109
6/28/00 22:15	0.01962
6/28/00 22:20	0.0109
6/28/00 22:25	0.0109
6/28/00 22:30	0.0109
6/28/00 22:40	0.0109
6/28/00 22:45	0.0109
6/28/00 22:50	0.0109
6/28/00 23:00	0.0109
6/29/00 0:35	0.0109
6/29/00 1:15	0.0109
6/29/00 12:05	0.0109
7/6/00 12:05	0.01135
7/6/00 12:50	0.01135
7/6/00 13:10	0.01135
7/6/00 13:25	0.01135
7/6/00 13:40	0.01135
7/6/00 13:50	0.01135
7/6/00 14:05	0.01135
7/6/00 14:20	0.01135
7/6/00 14:30	0.01135
7/6/00 14:40	0.01135
7/6/00 14:45	0.01135
7/6/00 14:50	0.01135
7/6/00 15:00	0.01135
7/6/00 15:05	0.01135
7/6/00 15:10	0.01135
7/6/00 15:20	0.01135
7/6/00 15:25	0.01135
7/6/00 15:35	0.01135
7/6/00 15:40	0.01135
7/6/00 15:50	0.01135
7/6/00 15:55	0.01135
7/6/00 16:05	0.01135
7/6/00 16:15	0.01135
7/6/00 16:20	0.01135
7/6/00 16:30	0.01135
7/6/00 16:35	0.01135
7/6/00 16:45	0.01135
7/6/00 16:55	0.01135
7/6/00 17:05	0.01135
7/6/00 17:15	0.01135

Model Date and Time	Rainfall Accumulation (in)
7/6/00 17:25	0.01135
7/6/00 17:30	0.01135
7/6/00 17:40	0.01135
7/6/00 17:50	0.01135
7/6/00 18:05	0.01135
7/6/00 18:15	0.01135
7/6/00 18:20	0.01135
7/6/00 18:25	0.01135
7/6/00 18:30	0.01135
7/6/00 18:35	0.01135
7/6/00 18:40	0.02043
7/6/00 18:45	0.01135
7/6/00 18:50	0.01135
7/6/00 18:55	0.01135
7/6/00 19:00	0.01135
7/6/00 19:05	0.01135
7/6/00 19:10	0.01135
7/6/00 19:15	0.01135
7/6/00 19:25	0.01135
7/6/00 19:35	0.01135
7/6/00 19:45	0.01135
7/6/00 20:05	0.01135
7/6/00 20:25	0.01135
7/6/00 20:40	0.01135
7/6/00 21:00	0.01135
7/6/00 22:25	0.01135
7/8/00 8:40	0.01135
7/8/00 8:45	0.01135
7/8/00 10:10	0.01135
7/8/00 19:45	0.01135
7/8/00 20:00	0.01135
7/8/00 20:10	0.01135
7/8/00 20:15	0.01135
7/8/00 20:20	0.02043
7/8/00 20:30	0.01135
7/8/00 20:40	0.01135
7/8/00 20:45	0.01135
7/8/00 20:50	0.01135
7/8/00 20:55	0.02043
7/8/00 21:00	0.01135
7/8/00 21:05	0.01135
7/8/00 21:10	0.01135
7/8/00 21:20	0.02043
7/8/00 21:35	0.01135
7/8/00 23:20	0.01135
7/8/00 23:30	0.01135
7/9/00 0:05	0.01135
7/9/00 1:05	0.01135
7/10/00 8:20	0.01135
7/10/00 14:40	0.01135
7/13/00 11:55	0.01135
7/13/00 12:15	0.01135
7/13/00 12:20	0.01135
7/13/00 12:30	0.01135
7/13/00 12:50	0.01135
7/13/00 12:55	0.02043
7/13/00 13:00	0.02043
7/13/00 13:05	0.02043
7/13/00 13:10	0.01135
7/13/00 13:15	0.02043
7/13/00 13:20	0.01135
7/13/00 13:25	0.02043
7/13/00 13:30	0.01135
7/13/00 13:35	0.01135
7/13/00 13:45	0.01135
7/13/00 13:55	0.01135
7/13/00 14:20	0.01135
7/13/00 14:35	0.01135
7/13/00 14:55	0.01135
7/13/00 18:10	0.01135
7/13/00 19:10	0.01135
7/13/00 19:20	0.01135
7/13/00 19:35	0.01135
7/13/00 23:55	0.051075
7/14/00 0:00	0.112365
7/14/00 0:05	0.091935
7/14/00 0:10	0.10215
7/14/00 0:15	0.051075
7/14/00 0:20	0.02043
7/14/00 0:25	0.030645
7/14/00 0:30	0.02043

Model Date and Time	Rainfall Accumulation (in)
7/14/00 0:35	0.01135
7/14/00 0:40	0.02043
7/14/00 0:45	0.01135
7/14/00 0:50	0.01135
7/14/00 0:55	0.01135
7/14/00 1:05	0.02043
7/14/00 1:10	0.02043
7/14/00 1:15	0.01135
7/14/00 1:20	0.01135
7/14/00 1:25	0.01135
7/14/00 1:30	0.01135
7/14/00 1:35	0.01135
7/14/00 1:40	0.01135
7/14/00 1:45	0.02043
7/14/00 1:50	0.01135
7/14/00 1:55	0.02043
7/14/00 2:00	0.02043
7/14/00 2:05	0.01135
7/14/00 2:15	0.02043
7/14/00 2:20	0.01135
7/14/00 2:25	0.01135
7/14/00 2:45	0.01135
7/14/00 2:55	0.02043
7/14/00 3:00	0.01135
7/14/00 3:05	0.01135
7/14/00 3:10	0.01135
7/14/00 3:15	0.01135
7/14/00 3:20	0.01135
7/14/00 3:30	0.01135
7/14/00 5:40	0.01135
7/14/00 8:50	0.01135
7/14/00 11:20	0.01135

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