Osborn Consulting

City of Sammamish Washington

Sammamish Louis Thompson Road Tightline Project

Final Technical Information Report

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FINAL TECHNICAL INFORMATION REPORT

SAMMAMISH LOUIS THOMPSON ROAD TIGHTLINE PROJECT

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Certificate of Engineer

The report and data contained in this report for the **Sammamish Louis Thompson Road Tightline Project: FINAL Technical Information Report** were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

1/26/2024

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ADT	average daily traffic
BMP	best management practice
cfs	cubic feet per second
CR	core requirement
CMP	corrugated metal pipe
CSWPP	Construction Stormwater Pollution Prevention
Ecology	Washington State Department of Ecology
ESC	erosion and sediment control
KCSWDM	King County Surface Water Design Manual
mph	miles per hour
Osborn	Osborn Consulting, Inc.
PGIS	pollution-generating impervious surface
PGPS	pollution-generating pervious surface
Project	Louis Thompson Road tightline project
SMC	Sammamish Municipal Code
SSA	AutoDesk Storm and Sanitary Analysis program
SWPPS	Stormwater Pollution Prevention and Spill Control
TDA	threshold discharge area
TIR	Technical Information Report

1 PROJECT OVERVIEW

The purpose of this Technical Information Report (TIR) is to document the basis of design for proposed stormwater improvements as part of the Sammamish Louis Thompson Road tightline project (Project). The TIR worksheet from the 2021 King County Surface Water Design Manual (KCSWDM) is included on **Figure 1** and summarizes the Project's design constraints and design to meet the core requirements of the KCSWDM. All figures are located in the Figures section at the end of this report, with the exception of **Figure 2**, which is located in Section 1.1.

1.1 PROJECT SUMMARY

The proposed Project design will upgrade the existing ditch and culvert system on Louis Thompson Road to a tightline system that includes a storm sewer pipe and structures for the collection and conveyance of the runoff. The proposed work extends 0.67 mile from 210th Place SE to East Lake Sammamish Parkway NE as shown on **Figure 2.** This Project will address high velocities and erosion within the existing ditch systems, reduce flooding risk, and mitigate stormwater impacts from in-fill development. This Project is part of the City of Sammamish's commitment to protecting Zackuse Creek and Lake Sammamish and is listed as a high-priority capital improvement project in the Final Zackuse Creek Basin Plan (AltaTerra 2019). The Project extents and basin areas are shown on **Figure 3** and a summary of existing soil conditions is included on **Figure 4**.

Figure 2. Site Location Map

Louis Thompson Road is a collector arterial roadway that runs north–south through Sammamish and connects 212th Avenue SE with East Lake Sammamish Parkway NE. Existing conditions include a two-lane cross section with ditches and culverts on the north side and an unimproved slope leading to Zackuse Creek on the south side. The private developments around Louis Thompson Road were primarily constructed in the 1970s and 1980s, and little has been done in those neighborhoods to improve runoff. Historically, this has caused the corridor to be impacted by uncontrolled stormwater runoff. This Project intends to mitigate flooding, erosion, and landslide hazards.

The proposed design involves the installation of a stormwater tightline and non-motorized improvements in the form of a new sidewalk and bike lane on the north side of the roadway. There are also spot locations of shoulder widening on the south side of the Project to provide a consistent shoulder width for use as a bike lane. To accommodate the sidewalk widening and spot location widening on the south side, several short rockery walls are proposed along the corridor.

Sammamish Plateau Water will install a new 8-inch ductile iron watermain as a separate project ahead of this project's construction along the south side of Louis Thompson Road NE. This Project will include a final pavement overlay of both travel lanes. Segments of the existing asbestos cement watermain that conflict with the proposed stormwater improvements will be removed.

2 CONDITIONS AND REQUIREMENTS

The applicability of the Core Requirements and Special Requirements are evaluated in this section. The Project improvements result in more than 2,000 square feet of new plus replaced impervious surface; therefore, all nine core requirements (CRs) per Section 1.2 of the KCSWDM must be evaluated, along with all five special requirements in Section 1.3.

2.1 CORE REQUIREMENTS

The following sections describe the minimum CRs applicable to the Project.

2.1.1 Discharge at the Natural Location (CR #1)

The intent of the discharge at the natural location requirement is to prevent adverse impacts to downstream properties caused by diversion of flow path drainage. To prevent adverse impacts, this Project mitigates for the changes in surface runoff in developed conditions at the main discharge points through the addition of flow-control facilities. These facilities were added to mitigate for new impervious surface areas generating a higher surface runoff prior to existing culverts with areas of steep downslope flow paths. The main discharge points on the Project are primarily existing cross-culverts discharging south to steep-slope areas along with a discharge to an existing storm drainage mainline system to the west, which contribute flows to Zackuse Creek. The existing discharge points are shown on **Figure 5** and are maintained in the developed condition, with the exception of a slightly shifted discharge pipe into the existing detention facility as shown on **Figure 6**. The discharge point to the existing detention facility noted on **Figure 6** shows where stormwater leaves the roadway public right-of-way; however, stormwater is discharged to an existing pond on a city-owned parcel.

2.1.2 Offsite Analysis (CR #2)

The intent of the offsite analysis requirement is to necessitate identification and evaluation of offsite flooding, erosion, and water quality problems so that appropriate mitigation can be provided. The existing outfalls and flow paths downstream of the Project area are noted in Section 3. A Level 1 analysis of the downstream flow paths is detailed in this section. The Offsite Analysis Drainage System Table from the KCSWDM has been included in **Appendix A** along with key photos from a site visit of the Project conducted on February 15, 2023. As the downstream area of the Project is mostly within an erosion hazard area, Osborn Consulting (Osborn) conducted a Level 2 analysis at culvert discharge points to measure the difference in flow rates from existing to developed conditions to ensure the Project does not cause any erosion issues downstream. Flow rates from the post-developed conveyance system are included in the model results within **Appendix B**. The areas contributing to existing culverts are shown on **Figure 7** and post-developed areas to culverts and flow control facilities are shown on **Figure 8**.

2.1.3 Flow Control (CR #3)

The purpose of this CR is to ensure projects provide onsite flow control facilities to mitigate the impacts of stormwater runoff from new impervious surface, new pervious surface, and replaced impervious target surfaces for flow control mitigation per the KCSWDM.

The Project lies within a Conservation Flow Control Level 2 area which requires flow control to historic site conditions matching historic durations for 50 percent of the 2-year through 50-year peaks and matching historic 2- and 10-year peak flows. Flow control facilities in the Conservation Flow Control Area must mitigate runoff from target surfaces within each threshold discharge area (TDA) to which the CR applies.

For this Project, the target surfaces for flow control are the new impervious surfaces. The Project does not generate new pervious surfaces. The proposed non-motorized improvements along this corridor qualify

this as a transportation redevelopment project. As a transportation redevelopment project, the replaced impervious surfaces are not considered target surfaces because the new impervious area totals less than 50 percent of the existing impervious surface within project limits, per KCSWDM Section 1.2.3.1.

The flow control facility requirement in Conservation Flow Control Areas is waived for any TDA in which there is no more than a 0.15 cubic foot per second (cfs) difference in the sum of historic condition 100-year flows to developed 100-year flows (when modeled using 15-minute time steps). TDAs 1 and 4 are exempt from flow control as they meet the 0.15-cfs difference exception criteria of the KCSWDM. A summary of TDAs triggering flow control is listed in **Table 1**. **Figure 6** shows the new and replaced impervious and PGIS areas by TDA.

Table 1. Summary of Flow Control Applicability

TDA	CR #3 Applies?	Flow Control Provided?
TDA 1	No(1)	Yes(2)
TDA 2	Yes	Yes
TDA 3	Yes	Yes
TDA 4	No(3)	No

Notes:
(1) The TDA is exempt from CR #3 as there is less than a 0.15 cubic foot per second increase in flows from historic to developed conditions when modeled with 15-minute timesteps. See **Appendix C** for TDA 1_POC model results.
(2) Flow control is provided to mitigate concerns of added flows from new impervious area at the existing outfalls in an erosion hazard area with steep slopes.
(3) There is no new impervious area added to this TDA, no changes in flow. Therefore, flow control is not required.
CR – core requirement
TDA – threshold discharge area

2.1.4 Conveyance System (CR #4)

This CR requires all engineered conveyance system elements to be analyzed, designed, and constructed per applicable codes, manuals, and addendums. Pipe systems are designed to convey the 25-year flow assuming developed conditions for onsite tributary areas and existing conditions for offsite tributary areas. The 100-year hydraulic grade line has been analyzed and all structures are confirmed to not overtop at the 100-year event due to downstream steep-slope, critical area concerns. Energy dissipation is required at outfalls from all drainage systems.

Section 5 discusses in further detail how the conveyance system analysis and design for this Project meets this CR.

2.1.5 Construction Stormwater Pollution Prevention (CR #5)

The Project is required to provide erosion and sediment controls (ESCs) to prevent the transport of sediment from the Project site. ESC measures are shown on the Erosion Control and Site Preparation Plans. A Construction Stormwater Pollution Prevention (CSWPP) Plan is included in **Appendix D**.

2.1.6 Maintenance and Operations (CR #6)

Operation and maintenance procedures are required for best management practice (BMP) facilities. The City of Sammamish will maintain and operate the drainage facilities installed as part of this Project. Operation and maintenance procedures for detention tank facilities follow the standard maintenance

recommendations in the KCSWDM, as noted in the Operation and Maintenance Manual included in **Appendix E**. Operation and maintenance procedures for the Contech StormFilter water quality units are discussed further in Section 10.

2.1.7 Financial Guarantees and Liability (CR #7)

This Project is not subject to the financial guarantees and liability requirements of the KCSWDM because the City of Sammamish will own and maintain the drainage facilities.

2.1.8 Water Quality (CR #8)

Water quality treatment facilities are required to treat the stormwater runoff from new and replaced pollution-generating impervious surfaces (PGIS) and new pollution-generating pervious surface (PGPS). Replaced PGIS areas are required to be treated on transportation redevelopment projects where new PGIS are 5,000 square feet or more. The four TDAs within the Project limits fall under the "Surface Exemption from Transportation Redevelopment Projects" from CR #8 as the total new impervious surface within the Project limits is less than 50 percent of the existing impervious surface. There is less than 5,000 square feet of new PGIS that is not fully dispersed within each TDA and less than 0.75 acre of new PGPS that is not fully dispersed.

The City of Sammamish Water Quality Map shows this Project is within a Sensitive Lake Water Quality Treatment Area. The treatment goal for water quality facilities within a sensitive lake area is 50 percent of the annual average total phosphorus removal. The Sensitive Lake Protection Menu per KCSWDM must also be used for water quality facility selection where CR #8 is required. Louis Thompson Road has average daily traffic (ADT) counts above 2,000 which would require Enhanced Basic treatment if CR #8 applies to any of the Project TDAs.

As this Project will add a raised sidewalk, which is considered non-pollution generating and all TDAs are under the 5,000 square feet new PGIS threshold, CR #8 does not apply. Although CR #8 is not applicable, water quality facilities are proposed upstream of all detention facilities to improve the water quality of the Zackuse Basin following the goals of the Final Zackuse Creek Basin Plan (AltaTerra 2019).

2.1.9 Flow Control BMPs (CR #9)

Flow control BMPs are methods and designs for dispersing, infiltrating, or otherwise reducing or preventing development-related increases in runoff at or near the sources of those increases. CR #9 is applicable to this Project as there is more than 2,000 square feet of new plus replaced impervious surfaces.

As this Project is considered a road improvement project within an urban growth area, it must meet the requirements of KCSWDM Section 1.2.9.3.2. The first requirement of this section is to consider the applicability of full dispersion for target impervious surfaces. Due to adjacent steep slopes and limited viable areas for full dispersion, the dispersion of the new impervious areas from the sidewalk and curb installation are infeasible.

Full infiltration, limited infiltration, bioretention, and dispersion are also considered infeasible due to the corridor's steep roadway longitudinal slope, and adjacent downstream steep slope embankments to the south. The Project area is also located in a critical aquifer recharge area classified as susceptible to groundwater contamination, limiting infiltration of stormwater. There is also limited space within the roadway right-of-way to provide flow control BMPs.

The soil moisture holding capacity of replaced pervious areas shall meet soil amendment requirements of KCSWDM Section 1.2.9.3.2 and is the only applicable CR#9 BMP proposed as part of this Project.

2.2 SPECIAL REQUIREMENTS

All five special requirements of the KCSWDM have been evaluated for this Project and only Special Requirement #1 is applicable. Special Requirement #1 lists other adopted regulations for controlling drainage on an area-specific basis. The Final Zackuse Creek Basin Plan applies to this Project, which is referred to as Zack-CIP-3 in the plan. As noted in the Final Zackuse Creek Basin Plan, this Project will address 25- and 100-year flooding on Louis Thompson Road as well as reduce high velocity and erosion for outfalls towards Zackuse Creek. Water quality treatment is noted as being part of the Project design.

Special Requirement #2 pertains to flood hazard areas and Special Requirement #3 pertains to flood protection facilities, such as levees or revetments. There are no flood hazard areas or flood protection facilities planned for this Project. Special Requirement #4, source controls, also does not apply to this Project, because it does not require a commercial building or site development permit.

Special Requirement #5, oil control, is required for high-use sites including roadway intersections with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles on the intersecting roadway. For this Project, the main roadway with higher ADT counts is East Lake Sammamish Parkway NE and the intersecting roadway, Louis Thompson Road. According to data from the City of Sammamish, both roadways have ADT counts below 15,000. Special Requirement #5 does not apply to this Project.

3 OFFSITE ANALYSIS

Offsite analysis includes a downstream analysis, evaluation of impacts to fish habitat, groundwater levels, groundwater quality, wetlands, or other environmental features which may be impacted by the proposed Project. Potential or existing problems per Section 2.3 of the KCSWDM are noted in the Drainage System Table, included in **Appendix A**, and described in Section 3.1. A Level 1 analysis is included in this section, which consists of a qualitative survey of the downstream system from the Project. A Level 2, quantitative analysis, was performed to analyze the change in flows to key outfall locations as there are steep slopes and creek incision identified downstream. This analysis has been conducted to quantify impacts to sensitive downstream elements.

3.1 LEVEL 1 DOWNSTREAM ANALYSIS

Potential or existing problems within the Project study area, extending up to 1 mile downstream and to the extent of the upstream contributing basins, are noted in the Drainage System Table located in **Appendix A**.

3.1.1 Resource Review

The resources in **Table 2** have been consulted to analyze the downstream conditions of the Project.

Table 2. Downstream Analysis Resource Review

Resource	Finding
Final Zackuse Basin Plan, AltaTerra, April 2019	Site walk of the mainstem of Zackuse Creek found evidence of downcutting (channel erosion) and incision in several locations downstream of the Project area.
King County iMap	Environmentally sensitive area GIS layers indicate the downstream flow paths from the Project are in a mapped erosion hazard and landslide hazard area from NE 2nd Street, east.
City of Sammamish Storm Bandit GIS Map	Downstream flow paths and discharge points along the Project corridor.
Louis Thompson Road from East Lake Sammamish Parkway NE to 210th Place SE Tightline Project: Existing Conditions, David Evans and Associates, June 2022	Descriptions of wetlands W4 and W5, downstream of the Project; streams, Project located in critical aquifer recharge area.

3.1.2 Site Inspection Findings

Osborn and City of Sammamish staff conducted a site visit on February 15, 2023, which included walking the Project corridor and inspecting downstream flow paths. In steep slope areas, downstream flow paths were observed from the edge of the shoulder along Louis Thompson Road. In general, the downstream flow paths were observed to be heavily forested, with heavy vegetation including ferns and blackberry outside of developed areas.

Where traversable, Osborn staff inspected culvert outfalls and downstream flow paths for signs of erosion or downcutting. Of all the outfall locations and discharge points observed, there were only two main locations exhibiting existing downcutting in the channels downslope of the culvert flow paths and one location with severe erosion around the culvert pipe outlet. Culvert 2, as noted on **Figure 6**, has a

corrugated metal half pipe directing the flow path downslope of the culvert pipe. At the end of the metal half pipe, the flow path becomes recessed with evidence of downcutting and minor erosion downstream (photographs 9 and 10 in **Appendix A**). While the downstream end of Culvert 4 did not have any signs of erosion, the second 18-inch corrugated metal pipe (CMP) culvert under a driveway entrance had severe erosion around the downstream end (photograph 5 in **Appendix A**). The issue of erosion at this culvert will be evaluated separately by City of Sammamish maintenance staff and not addressed as part of this Project, other than the flow control mitigation measures which are proposed at Culvert 4, which is an upstream crossing of Louis Thompson Road. Key photos from the site visit are included in **Appendix A**.

Of note from the site visit, there was one downstream flow path which was seen to be obstructed. There is an existing 12-inch CMP which drains a portion of Louis Thompson Road into an existing pond facility maintained by the City of Sammamish. Although it had recently rained prior to the site visit, the pond bottom was dry. The Project had originally planned on tying into this existing outfall; however, from the observations during the site visit, this pipe was moderately misshapen at the downstream end, likely under the weight of the rockery wall and large tree on top (photograph 4 in **Appendix A**). To ensure the proposed stormwater system has a long-term viable flow path towards the existing detention facility, this pipe will be abandoned and a new pipe connection under the east edge of the maintenance access road is proposed.

3.2 LEVEL 2 QUANTITATIVE ANALYSIS

A Level 2 quantitative analysis was conducted to model the difference in flows to each outfall within Project limits. These areas were modeled using MGSFlood and 100-year flow rates and difference in flows are summarized in **Table 3**. MGSFlood results are included in **Appendix C**.

Table 3. Summary of Outfall Changes in Flows

Outfall	Change in 100-year Flow Rate (cfs) Developed-Existing	Model Reference
Culvert 1	+0.017	Culvert 1_Flow Analysis
Culvert 2	-0.459	Culvert 02_Flow Control_Iteration3
Culvert 3	-0.159	Culvert 03_Flow Control_Iteration3
Culvert 4	-0.018	Culvert 04_Flow Control_Iteration3
Existing Pond	+0.018	To Pond_Flow Control_Iteration3

Notes:
cfs – cubic feet per second

4 FLOW CONTROL, LOW IMPACT DEVELOPMENT, AND WATER QUALITY FACILITY ANALAYSIS AND DESIGN

The existing and developed site hydrology along with the flow control and water quality facility analysis and design is summarized in this section.

4.1 EXISTING SITE HYDROLOGY

The existing site hydrology is divided into onsite areas within Project right-of-way and offsite areas, which contribute runoff to Louis Thompson Road. The onsite area is a mix of impervious roadway surface and grassed pervious surface. Within the roadway right-of-way, stormwater runoff is collected in a series of ditches on the north side of the roadway, which convey flow westward down to Lake Sammamish. At 205th Avenue NE, the stormwater flows are conveyed to the west of Lake Sammamish Parkway NE in a pipe system draining into Zackuse Creek.

There is an existing pond facility north of Louis Thompson Road and east of 205th Avenue NE, which collects both roadway and offsite neighborhood runoff. There is a pipe connecting the north ditch to the pond which drains back into the Louis Thompson Road ditch and pipe system to the west.

The offsite basin areas consist primarily of residential single-family homes and neighborhood streets which have been split into impervious areas and pervious grassed surfaces. The offsite areas are designated as “OA” Offsite Area if the contributing area is outside project limits, # (TDA number the offsite area drains to), ### (catch basin number the offsite area drains to), alphabetical letter of the drainage area, and I (impervious area) or P (pervious area). Areas designated as pervious are assigned a weighted curve number per an approximation of offsite area impervious vs. pervious surface split per hydrologic soil group type. Both the offsite (OA) areas, project (PA) areas, and hydrologic soil type pervious areas are shown on **Figure 9**. Although there are trees within the offsite areas, the pervious condition has all been modeled as grassed surfaces considering potential developed conditions, which may generate a greater stormwater surface runoff volume and peak flows than forested surfaces. The residential roadway areas collect flows via roadside ditches which then drain southward towards Louis Thompson Road. There are also several offsite piped connections from yard drains and other private connections which tie into the existing Louis Thompson Road ditch system.

The Final Geotechnical Report (AESI) notes the project soils are primarily outwash with a section of fine sediment till soils at the east end of the project corridor. The NRCS hydrologic soil classifications are noted on **Figure 3**. Due to the presence of groundwater seepage, however, the on-site soils are modeled as Type C soils per Section 13.1 of the Final Geotechnical Report. The pre-developed and post-developed soils in MGSFlood within the Project limits are modeled as Till in lieu of Outwash soils due to the groundwater seepage and high groundwater consideration, which generates more stormwater surface runoff and less infiltration.

4.2 DEVELOPED SITE HYDROLOGY

In the developed condition, the Project will add new non-pollution generating impervious area with the addition of a sidewalk along the north side of the roadway. Driveway grading adjustments and shoulder widening in selected areas on the south side of Louis Thompson Road also add a small amount of new pollution-generating impervious area.

With the addition of sidewalk and curb and gutter on the north side of the road, a new tightline conveyance system has been proposed, which is primarily 18-inches in diameter and connects to the existing stormwater pipe system near 205th Avenue NE.

There are four flow control facilities proposed on this Project which are underground detention tanks. Three facilities are proposed upstream of existing roadway cross culverts (Culverts 2, 3, and 4) which

discharge into erosion and steep slope hazard areas. Each flow control facility is proposed to have a Contech StormFilter water quality treatment facility upstream.

The fourth flow control facility is sited upstream of the existing pond east of 205th Ave NE to detain new impervious area in TDA 3. Built in 1978, this pond is owned and maintained by the City of Sammamish and was not designed to the level of flow control currently required by the KCSWDM. As this pond provides flow control for the roadway in existing conditions, the roadway flows continue to be routed through the pond to ensure downstream flows are not increased more than 0.15 cfs in TDA 3. The inlet into the pond is proposed to be replaced as part of this Project due to the crushed, dilapidated condition of the existing CMP inlet. The existing pond itself will not be altered as part of this Project.

4.3 PERFORMANCE STANDARDS

For this Project, the target surfaces for flow control are the new impervious surfaces. The Project does not generate new pervious surfaces. The proposed non-motorized improvements along this corridor qualify this as a transportation redevelopment project. As a transportation redevelopment project, the replaced impervious surfaces are not considered target surfaces as the new plus replaced area totals less than 50 percent of the existing impervious surface within Project limits, per KCSWDM Section 1.2.3.1.

The Project lies within a Conservation Flow Control Level 2 area which requires flow control to historic site conditions matching historical durations for 50 percent of the 2-year through 50-year peaks and matches historical 2- and 10-year peak flows. Flow control facilities in the Conservation Flow Control Area mitigate runoff from target surfaces within each TDA the CR applies.

The flow control facility requirement in Conservation Flow Control Areas is waived for any TDA in which there is no more than a 0.15-cfs difference in the sum of historic condition 100-year flows to developed 100-year flows (when modeled using 15-minute time steps). TDAs 1 and 4 are exempt from flow control as they meet the 0.15-cfs difference exception criteria of the KCSWDM. TDAs 2 and 3 require flow control and detention tank facilities, which are provided in the proposed design to meet the flow control requirement. This design is further documented in Section 4.4.

Water quality treatment facilities are required to treat the stormwater runoff from new and replaced PGIS and new PGPS. Replaced PGIS are required to be treated on transportation redevelopment projects where new PGIS is 5,000 square feet or more. The four TDAs within the Project limits fall under the “Surface Exemption from Transportation Redevelopment Projects” from CR #8 because the total new impervious surface within the Project limits is less than 50 percent of the existing impervious surface, there is less than 5,000 square feet of new PGIS that is not fully dispersed within each TDA, and less than 0.75 acre of new PGPS that is not fully dispersed, will be added.

There are no required performance standards for water quality on this Project; however, water quality facilities have been proposed on this Project to improve the overall quality of stormwater runoff draining both to Zackuse Creek and Lake Sammamish. The City of Sammamish Water Quality Map shows this Project is within a Sensitive Lake Water Quality Treatment Area. The specific type of water quality facility proposed is Contech’s StormFilter units, following feedback from City of Sammamish maintenance personnel. These facilities are proposed to include ZPG filter media to provide basic treatment as approved per the KCSWDM.

4.4 FLOW CONTROL SYSTEM

Detention tank (pipe) flow control systems were selected and modeled for this Project to meet flow control standards. Modeling was accomplished using MGSFlood Version 4.55.

TDAs 2 and 3 require flow control to the performance standards noted in Section 4.3. In addition to meeting flow control performance standards for each TDA, the flow control facilities were sited to mitigate for increases in developed flows at the existing culvert crossings within steep-slope and erosion-hazard

areas. There are two detention pipe facilities within both TDA 2 and TDA 3. Between the two flow control facilities within each TDA, the new impervious target surface within that TDA is detained to historic conditions (till forest). The split in target mitigated surface between flow control facilities is based on the weighted percentage of contributing area to the facility according to available space for siting detention upstream.

Three iterations were run to size the flow control systems within TDAs 2 and 3. The first model iteration was run using the auto-size detention facility option to obtain an approximate volume-at-riser storage required to detain post-developed flows compared to pre-developed flows with mitigated area reverted to forested condition. The volume-at-riser was input into a spreadsheet which then calculates the stage-storage table for detention pipes, subtracting the bottom 6 inches of storage for future sediment buildup per the KCSWDM. The stage-storage detention information was then modeled in Iteration 2 to size the orifices and riser heights to meet the flow control performance standards. Finally, Iteration 3 was run adding in the offsite areas which contribute to the flow control system to verify that detention structure 100-year developed water surface elevation does not overtop the adjacent stormwater structure rims and calculate flows at the downstream culvert discharge points.

TDA 1 does not require flow control per CR #3. However, flow control is provided to mitigate for additional runoff draining towards an existing culvert whose downstream discharge lies within a steep slope and erosion hazard area. In this TDA, the detention pipe system was sized to detain post-developed flows to less than pre-developed condition rates. In this model, the pre-developed condition is not reverted to historic forested conditions, but rather to existing till grass conditions. Iteration 1 uses a pond auto-size module in MGSFlood, similar to the approach used for TDAs 2 and 3. For iteration 3, post-developed flows are split into the area receiving flow control and the area bypassing the flow control system, which enters the culvert downstream so that the point of compliance is evaluated at the downstream culvert endpoint. The iteration 3 model contains the stage-storage pipe detention data and orifices are sized to detain flows below existing conditions for the 2 and 10-year return periods in this iteration. Finally, model iteration 3 was run to ensure the offsite bypass flows can pass through the detention facility while providing at least 1 foot of freeboard from the rim elevations of adjacent structures.

4.5 WATER QUALITY SYSTEM

Four water quality facilities are provided to improve the water quality in the Zackuse Creek Basin. These facilities are Contech StormFilter units with 27-inch-tall ZPG filter cartridges. As CR #8 is not applicable to this Project, these units will provide basic treatment. On-line water quality flow rates were calculated for units WQ-1 and WQ-2, and the remaining two facilities consider the off-line flow rates with flow splitters upstream. The units are proposed to include the maximum number of cartridges for additional treatment and contingency at this stage in design. MGSFlood water quality results are included in **Appendix C** and the water quality unit design is summarized in **Table 4**.

Table 4. Water Quality Facility Design Summary

Water Quality Facility	Water Quality Flow Rate (cfs)	Off-line or On-line Flow Rate	StormFilter Facility Size, Number of Filter Cartridges	StormFilter Treatment Provided (cfs)
WQ – 1	0.04	On-line	SFMH48, 3 ZPG	0.075
WQ – 2	0.08	On-line	SFMH48, 3 ZPG	0.075
WQ – 3	0.32	Off-line	SFMH96, 14 ZPG	0.350
WQ – 4	0.29	Off-line	SFMH96, 14 ZPG	0.350

Notes:

cfs – cubic feet per second

5 CONVEYANCE SYSTEM ANALYSIS AND DESIGN

This section summarizes the design of the proposed stormwater collection and conveyance system. The stormwater conveyance pipe system on this Project has been modeled using AutoDesk's Storm and Sanitary Analysis (SSA) program with SCS TR-55 hydrology and time of concentration methodology. The TR-55 computation method was selected in lieu of the rational method per Table 3.2 of the KCSWDM as the rational method is more applicable for tributary areas less than 10 acres and the offsite area contributing to the system is greater than 20 acres. The SCS Type 1A 24-hour rainfall distribution was applied to rainfall depths input into the model. The rainfall depths used for the modeling are interpolated from KCSWDM isopluvial maps for the 25-year and 100-year, 24-hour storm events. To model the flows more accurately through the pipe system, the hydrodynamic link routing methodology was used. The pipe systems were modeled to ensure the proposed stormwater pipes convey the 25-year storm event without surcharging.

While the KCSWDM allows overtopping of structures in the 100-year storm event provided discharge can be routed safely downstream, the critical areas and roadway slopes adjacent to the Project do not provide a safe overflow route. Therefore, the 100-year hydraulic grade line was evaluated, and model results indicate no overtopping along the conveyance system occurs for this storm event. While a 1-foot freeboard was set in the model from the 100-year hydraulic grade line to structure rim, no pipes or facilities were oversized to provide this freeboard.

The SSA model includes both onsite and offsite contributing basins and offsite drainage tie-ins. Offsite basin hydrology has been modeled approximating the percentage of impervious and grass surface area within each basin and calculating a time of concentration based on flow path lengths, slopes, and surface types for larger offsite areas. The offsite areas are illustrated on **Figure 3** and piped connections to the proposed conveyance system are shown on the drainage plan and profile sheets.

The pipe material proposed follows Chapter 4 of the Sammamish Addendum to the 2021 KCSWDM. There are a few low cover pipes which are specifically called out as ductile iron pipes on the drainage profiles. The proposed storm sewer pipe slopes range from 0.26 percent to 11 percent slopes with most pipes in the 8 percent slope range. The 25-year velocities in the pipes are around 10 feet per second.

In addition to the pipe conveyance and catch basin structures modeled in SSA, there are also two flow splitters proposed on the Project upstream of water quality facilities WQ-3 and WQ-4, as noted on the drainage plan and profile sheets. These flow splitters are necessary to restrict the flows entering the StormFilter facilities due to the larger offsite area contributing to these locations. The flows entering StormFilter units WQ-1 and WQ-2 are below the maximum flow threshold and do not require a bypass system. The flow splitter design follows KCSWDM Figure 6.2.5.B Flow Splitter, Option B, due to the need for an orifice restrictor based on higher bypass flow compared to restricted water quality flow rate. The two flow splitters will have a riser "tee" section with orifice bottom plate and a separate riser with solid bottom and baffle to collect the bypass flows.

There are several short walls proposed throughout the Project to minimize grading impacts in steep-slope areas and limited right-of-way locations. The two soldier pile walls will require wall drains, as shown in the drainage plans. The proposed short rockery walls, averaging 2 feet in height, which are part of the Project improvements do not require underdrains.

Louis Thompson Road will be overlaid as part of this Project and existing structure rims within the paving sections will be adjusted to grade. An existing open-grate lid in the intersection drive lanes of East Lake Sammamish Parkway NE at the intersection of Louis Thompson Road will be replaced with a solid cover. Due to the curb ramp and adjacent sidewalk ramp slopes at this intersection, two through-curb inlet structures will be replaced with vaned grates. The East Lake Sammamish Parkway NE roadway is superelevated to the west near this intersection and these structures do not collect much of East Lake Sammamish Parkway NE surface runoff.

The City of Sammamish has also requested combination inlets in steep slope areas with tree cover, which have a higher stormwater collection efficiency. The through-curb portion of these inlets allows stormwater to be captured in the catch basins even if the grates are clogged with debris from adjacent trees. The locations of the combination inlets along the corridor have been coordinated with the City of Sammamish and are specified on the plans to address future maintenance considerations.

Another maintenance consideration that has been incorporated into the final design is the addition of shallow ditches at the back side of the sidewalk to help keep the sidewalks drier and free off offsite water and ice in the winter. These ditches are shown on the Drainage Plans and enter the new conveyance system via catch basins at the downstream end. These catch basins have debris cages to help trap offsite sediment and debris prior to entering the storm conveyance system.

Results from the 25-year and 100-year SSA model and flow splitter calculations are included in **Appendix B**.

6 SPECIAL REPORTS AND STUDIES

Special reports and studies conducted for the Project are submitted under a separate cover and include:

- Geotechnical Report, AESI
- Critical Areas Report, DEA
- Cultural Resources Report, ERSI

7 OTHER PERMITS

This section will describe the permits, agencies requiring the permits, and permit requirements that affect the drainage plan. No federal or state permits are anticipated for this Project. Project permits with the City of Sammamish include a clearing and grading permit, building permit, and Ecology General Stormwater Construction permit as indicated in the TIR Worksheet shown on **Figure 1**.

8 CSWPP ANALYSIS AND DESIGN

This section will describe the CSWPP Plan which consists of ESC measures as noted on the Erosion Control and Site Preparation Plans and Stormwater Pollution Prevention and Spill Control (SWPPS) measures. The CSWPP plan is included in **Appendix D**.

8.1 EROSION CONTROL PLAN

The Erosion Control and Site Preparation Plan proposes installing storm drain inlet protection on all storm drains, which may receive construction stormwater runoff to control onsite sediment. In addition, silt fence is also proposed as a perimeter BMP downslope of disturbed areas.

To control erosion, natural vegetation will be preserved outside of work zone limits and disturbed earth may be permanently stabilized and seeded if the schedule aligns with requirements per the Project specifications. Clearing within Project limits will be minimized to the extent necessary to perform the work, as noted on the plans. Disturbed earth must be stabilized with temporary measures per the CSWPP Plan.

Steep slope areas, as shown on **Figure 3**, are susceptible to a higher degree of erosion. There are existing steep slopes present on both the north and south sides of the Project throughout the corridor. Developed condition slopes are proposed to be restored to 2 horizontal:1 vertical (2H:1V) in most areas that are also subject to erosion if not properly stabilized. Topsoil and hydroseeding is proposed as a restoration measure for disturbed areas.

According to the Geotechnical Report, groundwater was observed as seepage on the southern slopes of the Project and was noted higher up on the slope at the east end of the Project. In addition to the ESC measures shown on the Erosion Control and Site Preparation Plans, the Contractor will also be required to control construction dewatering water and ensure discharges from the site meet National Pollutant Discharge Elimination System permit requirements.

With adjacent erosion hazard areas and location of the Project within a critical aquifer recharge area, construction stormwater infiltration BMPs should not be used.

The ESC measures and BMPs which apply to the Project per Section 1.2.5 of KCSWDM are detailed in the CSWPP Plan.

8.2 STORMWATER POLLUTION PREVENTION AND SPILL CONTROL PLAN

The CSWPP Plan identifies all activities that may contribute pollutants to surface and storm water during construction and describes the selection of specific SWPPS BMPs proposed. These BMPs are described the CSWPP, included in **Appendix D**.

The primary receiving water body for Project stormwater runoff is Zackuse Creek. According to Washington State Department of Ecology's Water Quality Atlas Map, Zackuse Creek is not on Ecology's 303d list of polluted water bodies. Zackuse Creek discharges into Lake Sammamish which is listed on Ecology's 303d Category 5 for both polychlorinated biphenyls and methyl mercury. There are no total maximum daily load requirements for Lake Sammamish. This Project's construction should not generate polychlorinated biphenyls or methyl mercury emissions. Burning of waste is not allowed and any equipment leaks or spills must be immediately contained, mitigated, and reported to Ecology.

9 BOND QUALITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT

This section is not applicable to this Project as it is a publicly constructed and owned project.

10 OPERATIONS AND MAINTENANCE MANUAL

Maintenance and operations for stormwater facilities shall be performed in accordance with the 2021 KCSWDM Appendix A – Maintenance Requirements for Flow Control, Conveyance, and Water Quality Facilities. An operations and maintenance manual is provided in **Appendix E** for the stormwater facilities on this project, including water quality and flow control facilities, as well as standard maintenance procedures as recommended by the KCSWDM.

11 REFERENCES

Associated Earth Sciences Incorporated (AESI). 2023. Subsurface Exploration, Geologic Hazard, and Geotechnical Engineering Report. August. AltaTerra. 2019. Final Zackuse Basin Plan. June.

City of Sammamish. 2022. Sammamish Addendum to the 2021 King County Surface Water Design Manual. June.

David Evans and Associates. 2022. Louis Thompson Road from East Lake Sammamish Parkway NE to 210th Place SE Tightline Project: Existing Conditions. June.

David Evans and Associates. 2023. Critical Areas Report. October.

Ecology (Washington State Department of Ecology). Water Quality Atlas Map. Accessed April 2023.

King County Department of Natural Resources and Parks. 2021. King County, Washington Surface Water Design Manual. July.

FIGURES

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 1 PROJECT OWNER AND PROJECT ENGINEER

Project Owner: City of Sammamish - Jed Ireland, P.E.

Phone: (425) 295-0563

Address: 801 228th Avenue SE

Sammamish, WA 98075

Project Engineer: Janina Glovatchi, P.E.

Company: Osborn Consulting, Inc.

Phone: (425) 502-6230

Part 2 PROJECT LOCATION AND DESCRIPTION

Project Name: Louis Thompson Road Tightline Project

DLS-Permitting

Permit #: N/A

Location Township: 22 N, 23 N

Range: 20E

Section: 5, 32

Site Address: Louis Thompson Road and East Lake Sammamish Parkway

Part 3 TYPE OF PERMIT APPLICATION

- ☐ Land use (e.g.,Subdivision / Short Subd. / UPD)
- ■ Building (e.g.,M/F / Commercial / SFR)
- ■ Clearing and Grading
- ☐ Right-of-Way Use
- ☐ Other Ecology General Stormwater Construction Permit

Part 4 OTHER REVIEWS AND PERMITS[1]

- ☐ DFW HPA
- ☐ COE CWA 404
- ☐ ECY Dam Safety
- ☐ FEMA Floodplain
- ☐ COE Wetlands
- ☐ Other _____
- ☐ Shoreline Management
- ■ Structural Rockery/Vault/ Walls
- ☐ ESA Section 7

Part 5 PLAN AND REPORT INFORMATION

Technical Information Report

Type of Drainage Review (check one):

- ■ Full
- ☐ Targeted
- ☐ Simplified
- ☐ Large Project
- ☐ Directed

Date (include revision dates): 60% - 4/28/2023

Date of Final: 100% - 1/26/2024

Site Improvement Plan (Engr. Plans)

Plan Type (check one):

- ■ Full
- ☐ Modified
- ☐ Simplified

Date (include revision dates): 60% - 4/28/2023

Date of Final: 100% - 1/26/2024

Part 6 SWDM ADJUSTMENT APPROVALS

Type (circle one): Standard / Experimental / Blanket

Description: (include conditions in TIR Section 2)

N/A

Approved Adjustment No. _____ Date of Approval: _____

[1] DFW: WA State Dept. of Fish and Wildlife. HPA: hydraulic project approval. COE: (Army) Corps of Engineers. CWA: Clean Water Act. ECY: WA State Dept. of Ecology. FEMA: Federal Emergency Management Agency. ESA: Endangered Species Act.

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 7 MONITORING REQUIREMENTS

Monitoring Required: (Yes) / No

Start Date: TBD

Completion Date: TBD

Describe: SWPPS control BMP monitoring during construction for NPDES permit compliance.

Re: KCSWDM Adjustment No. _____

Part 8 SITE COMMUNITY AND DRAINAGE BASIN

Community Plan : _____

Special District Overlays: _____

Drainage Basin: Zackuse Creek Basin Plan

Stormwater Requirements: _____

Part 9 ONSITE AND ADJACENT SENSITIVE AREAS

- [x] River/Stream Zackuse Creek
- [x] Lake Lake Sammamish
- [x] Wetlands W4 and W5
- [ ] Closed Depression
- [ ] Floodplain
- [ ] Other

- [x] Steep Slope
- [x] Erosion Hazard
- [x] Landslide Hazard
- [ ] Coal Mine Hazard
- [ ] Seismic Hazard
- [ ] Habitat Protection
- [ ]

Part 10 SOILS

Soil Type	Slopes	Erosion Potential
AgC - Alderwood	8-15%	Low
RdC - Ragnar-Indianola	8-10%	Low
InC - Indianola	5-15%	Moderate
AkF - Alderwood and Kitsap	50%	High

- [x] High Groundwater Table (within 5 feet)
- [ ] Other
- [x] Sole Source Aquifer (Critical Aquifer Recharge Area)
- [x] Seeps/Springs (Wetland Source)

- [ ] Additional Sheets Attached

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 11 DRAINAGE DESIGN LIMITATIONS

REFERENCE	LIMITATION / SITE CONSTRAINT
■ Core 2 – Offsite Analysis: TIR - Appendix B	Evidence of downcutting and erosion in some locations downstream of existing culverts
■ Sensitive/Critical Areas: Existing Conditions Memo (June, 2022)	Critical aquifer recharge area, landslide hazard and erosion hazard area
■ SEPA:	
■ LID Infeasibility: Existing Conditions Memo (June, 2022)	Critical aquifer recharge area limiting infiltration of stormwater, steep slopes.
☐ Other:	
☐	

☐ Additional Sheets Attached

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)

Threshold Discharge Area: TDA 1
(name or description)

Core Requirements (all 8 apply):

Discharge at Natural Location	Number of Natural Discharge Locations: 2
Offsite Analysis	Level: 1 / (2) / 3 dated: 1/4/2024, TDA 1 POC MGSFlood
Flow Control (include facility summary sheet)	Level: 1 / 2 / 3 or Exemption Number 2 (SWDM pg. 1-46) Flow Control BMPs Detention Tank
Conveyance System	Spill containment located at: TBD (by Contractor)
Erosion and Sediment Control / Construction Stormwater Pollution Prevention	CSWPP/CESCL/ESC Site Supervisor: TBD Contact Phone: TBD After Hours Phone: TBD
Maintenance and Operation	Responsibility (circle one): Private / (Public) If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: Yes / (No)
Water Quality (include facility summary sheet)	Type (circle one): (Basic) / Sens. Lake / Enhanced Basic / Bog or Exemption No. Landscape Management Plan: Yes / (No)
For Entire Project: % of Target Impervious that had a feasible FCBMP implemented 100%	Total Replaced Impervious surfaces on the site 0.055 acres Total New Pervious Surfaces on the site 0 acres New+ Repl. Imp. on site mitigated w/flow control facility 0.219 acres New+ Repl. Imp. on site mitigated w/water quality facility 0.215 acres New+ Repl. Imp. on site mitigated with FCBMP 0.219 acres

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Special Requirements (as applicable):	
Area Specific Drainage Requirements	Type: (CDA) / SDO / MDP / BP / LMP / Shared Fac. / None Name: Erosion hazard and landslide hazard areas present
Floodplain/Floodway Delineation	Type (circle one): Major / Minor / Exemption / (None) 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe: None
Source Control (commercial / industrial land use)	Describe land use: N/A Describe any structural controls: N/A
Oil Control	High-use Site: Yes / (No) Treatment BMP: _____ Maintenance Agreement: Yes / No with whom? _____
Other Drainage Structures	
Describe: Water quality facility = Contech StormFilter with ZPG Flow control facility = detention tank	

Part 13 EROSION AND SEDIMENT CONTROL REQUIREMENTS	
MINIMUM ESC REQUIREMENTS DURING CONSTRUCTION	MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION
■ Clearing Limits ■ Cover Measures ■ Perimeter Protection ■ Traffic Area Stabilization ■ Sediment Retention ■ Surface Water Collection ■ Dewatering Control ■ Dust Control ■ Flow Control ■ Protection of Flow Control BMP Facilities (existing and proposed) ■ Maintain BMPs / Manage Project	■ Stabilize exposed surfaces ■ Remove and restore Temporary ESC Facilities ■ Clean and remove all silt and debris, ensure operation of Permanent Facilities, restore operation of Flow Control BMP Facilities as necessary ❑ Flag limits of SAO and open space preservation areas ❑ Other _____

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Threshold Discharge Area: TDA 2 (name or description)	
Core Requirements (all 8 apply):	
Discharge at Natural Location	Number of Natural Discharge Locations: 6
Offsite Analysis	Level: 1 / (2) / 3 dated: 12/5/2023, see Flow Control Calcs
Flow Control (include facility summary sheet)	Level: 1 / (2) / 3 or Exemption Number _____ Flow Control BMPs Detention Tanks
Conveyance System	Spill containment located at: TBD (by Contractor)
Erosion and Sediment Control / Construction Stormwater Pollution Prevention	CSWPP/CESCL/ESC Site Supervisor: TBD Contact Phone: TBD After Hours Phone: TBD
Maintenance and Operation	Responsibility (circle one): Private / (Public) If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: Yes / (No)
Water Quality (include facility summary sheet)	Type (circle one): (Basic) / Sens. Lake / Enhanced Basic / Bog or Exemption No. _____ Landscape Management Plan: Yes / (No)
For Entire Project: % of Target Impervious that had a feasible FCBMP implemented 100%	Total Replaced Impervious surfaces on the site 0.229 acres Total New Pervious Surfaces on the site 0 acres New+ Repl. Imp. on site mitigated w/flow control facility 0.200 acres New+ Repl. Imp. on site mitigated w/water quality facility 0.314 acres New+ Repl. Imp. on site mitigated with FCBMP 0.200 acres

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Special Requirements (as applicable):	
Area Specific Drainage Requirements	Type: (CDA) / SDO / MDP / BP / LMP / Shared Fac. / None Name: Erosion hazard and landslide hazard areas present
Floodplain/Floodway Delineation	Type (circle one): Major / Minor / Exemption / (None) 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe: None
Source Control (commercial / industrial land use)	Describe land use: N/A Describe any structural controls: N/A
Oil Control	High-use Site: Yes / (No) Treatment BMP: _____ Maintenance Agreement: Yes / No with whom? _____
Other Drainage Structures	
Describe: Water quality facility type = Contech StormFilter with ZPG Flow control facility type = detention tank	

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Threshold Discharge Area: TDA 3 (name or description)	
Core Requirements (all 8 apply):	
Discharge at Natural Location	Number of Natural Discharge Locations: 4
Offsite Analysis	Level: 1 / (2) / 3 dated: 12/8/2023, see Flow Control Calcs
Flow Control (include facility summary sheet)	Level: 1 / (2) / 3 or Exemption Number _____ Flow Control BMPs Detention Tanks
Conveyance System	Spill containment located at: TBD (by Contractor)
Erosion and Sediment Control / Construction Stormwater Pollution Prevention	CSWPP/CESCL/ESC Site Supervisor: TBD Contact Phone: TBD After Hours Phone: TBD
Maintenance and Operation	Responsibility (circle one): Private / (Public) If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: Yes / (No)
Water Quality (include facility summary sheet)	Type (circle one): (Basic) / Sens. Lake / Enhanced Basic / Bog or Exemption No. _____ Landscape Management Plan: Yes / (No)
For Entire Project: % of Target Impervious that had a feasible FCBMP implemented 100%	Total Replaced Impervious surfaces on the site 0.381 acres Total New Pervious Surfaces on the site 0 acres New+ Repl. Imp. on site mitigated w/flow control facility 0.309 acres New+ Repl. Imp. on site mitigated w/water quality facility 0.690 acres New+ Repl. Imp. on site mitigated with FCBMP 0.309 acres

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Special Requirements (as applicable):	
Area Specific Drainage Requirements	Type: (CDA) / SDO / MDP / BP / LMP / Shared Fac. / None Name: Erosion hazard and landslide hazard areas present
Floodplain/Floodway Delineation	Type (circle one): Major / Minor / Exemption / (None) 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe: None
Source Control (commercial / industrial land use)	Describe land use: N/A Describe any structural controls: N/A
Oil Control	High-use Site: Yes / (No) Treatment BMP: _____ Maintenance Agreement: Yes / No with whom? _____
Other Drainage Structures	
Describe: Water quality facility type = Contech StormFilter with ZPG Flow control facility type = detention tank	

Part 13 EROSION AND SEDIMENT CONTROL REQUIREMENTS	
MINIMUM ESC REQUIREMENTS DURING CONSTRUCTION	MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION
■ Clearing Limits ■ Cover Measures ■ Perimeter Protection ■ Traffic Area Stabilization ■ Sediment Retention ■ Surface Water Collection ■ Dewatering Control ■ Dust Control ■ Flow Control ■ Protection of Flow Control BMP Facilities (existing and proposed) ■ Maintain BMPs / Manage Project	■ Stabilize exposed surfaces ■ Remove and restore Temporary ESC Facilities ■ Clean and remove all silt and debris, ensure operation of Permanent Facilities, restore operation of Flow Control BMP Facilities as necessary ❑ Flag limits of SAO and open space preservation areas ❑ Other _____

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Threshold Discharge Area: TDA 4 (name or description)	
Core Requirements (all 8 apply):	
Discharge at Natural Location	Number of Natural Discharge Locations: 2
Offsite Analysis	Level: (1) 2 / 3 dated: 2/15/2023 Site Visit
Flow Control (include facility summary sheet)	Level: 1 / 2 / 3 or Exemption Number 2 (SWDM pg. 1-46) No New or Replaced Area Flow Control BMPs None
Conveyance System	Spill containment located at: TBD (by Contractor)
Erosion and Sediment Control / Construction Stormwater Pollution Prevention	CSWPP/CESCL/ESC Site Supervisor: TBD Contact Phone: TBD After Hours Phone: TBD
Maintenance and Operation	Responsibility (circle one): Private / (Public) If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: Yes / (No)
Water Quality (include facility summary sheet)	Type (circle one): Basic / Sens. Lake / Enhanced Basic / Bog or Exemption No. 2 (SWDM pg. 1-69) Landscape Management Plan: Yes / (No)
For Entire Project: % of Target Impervious that had a feasible FCBMP implemented 0 acres	Total Replaced Impervious surfaces on the site 0 acres Total New Pervious Surfaces on the site 0 acres Repl. Imp. on site mitigated w/flow control facility 0 acres Repl. Imp. on site mitigated w/water quality facility 0 acres Repl. Imp. on site mitigated with FCBMP 0 acres

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
Special Requirements (as applicable):	
Area Specific Drainage Requirements	Type: (CDA) / SDO / MDP / BP / LMP / Shared Fac. / None Name: Erosion hazard and landslide hazard areas present
Floodplain/Floodway Delineation	Type (circle one): Major / Minor / Exemption / (None) 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe: None
Source Control (commercial / industrial land use)	Describe land use: N/A Describe any structural controls: N/A
Oil Control	High-use Site: Yes / (No) Treatment BMP: _____ Maintenance Agreement: Yes / No with whom? _____
Other Drainage Structures	
Describe: None	

FIGURE 1. TIR WORKSHEET

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 14 STORMWATER FACILITY DESCRIPTIONS (Note: Include Facility Summary and Sketch)

Flow Control	Type/Description		Water Quality	Type/Description
■ Detention	Tanks (Pipes), see Plans		☐ Vegetated Flowpath	
☐ Infiltration			☐ Wetpool	
☐ Regional Facility			☐ Filtration	
☐ Shared Facility			☐ Oil Control	
☐ Flow Control BMPs			☐ Spill Control	
☐ Other			☐ Flow Control BMPs	
			■ Other	Contech StormFilter Units with ZPG Cartridges

Part 15 EASEMENTS/TRACTS		Part 16 STRUCTURAL ANALYSIS
☐ Drainage Easement		☐ Cast in Place Vault
☐ Covenant		■ Retaining Wall Calculations included under separate cover
☐ Native Growth Protection Covenant		☐ Rockery > 4' High
☐ Tract		☐ Structural on Steep Slope
☐ Other N/A		☐ Other

Part 17 SIGNATURE OF PROFESSIONAL ENGINEER

I, or a civil engineer under my supervision, have visited the site. Actual site conditions as observed were incorporated into this worksheet and the attached Technical Information Report. To the best of my knowledge the information provided here is accurate.

Janina Gloratchi 1/8/2023

Signed/Date

FIGURE 1. TIR WORKSHEET

NOTES

1. SEE CONVEYANCE FIGURES FOR FURTHER DELINEATION OF OFF-SITE AND ON-SITE CONTRIBUTING AREAS AND SURFACE/SOIL TYPE.
2. SEE EXISTING CONDITIONS FIGURES FOR TDA SURFACE AREA TOTALS.
3. DISCHARGE POINT DESCRIPTIONS ARE NOTED IN THE DRAINAGE REPORT.

OFFSITE AREA 3
46.611 AC (2,030,382 SF)

OFFSITE AREA 2
15.155 AC (660,139 SF)

OFFSITE AREA 1
1.726 AC (75,164 SF)

TDA 1
0.981 AC (42,719 SF)

TDA 2
2.085 AC (90,831 SF)

TDA 3
3.040 AC (132,414 SF)

TDA 4
0.255 AC (11,112 SF)

E1-1, E1-2, E2-1, E2-2, E2-3, E2-4, E2-5, E2-6, E3-1, E3-2, E3-3, E3-4, E4-1, E4-2

WETLAND W4

WETLAND W5

210TH PL NE

210TH AVE NE

211TH PL NE

208TH AVE NE

205TH AVE NE

E MAIN ST

E LAKE SAMMAMISH PKWY NE

NE 2ND ST

NE 3RD ST

206TH AVE NE

ZACKUSE CREEK

LOUIS THOMPSON RD

SE 3RD WAY

LAKE SAMMAMISH

DOWNSTREAM FLOW PATH ENTERS LAKE SAMMAMISH < ¼ MILE DOWNSTREAM OF DISCHARGE POINT

¼ MILE DOWNSTREAM FROM DISCHARGE POINT E4-2

¼ MILE DOWNSTREAM FROM DISCHARGE POINT E2-6

¼ MILE DOWNSTREAM FROM DISCHARGE POINT E1-2

LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- DOWNSTREAM FLOW PATH
- TDA 1
- TDA 2
- TDA 3
- TDA 4
- OFFSITE CONTRIBUTING BASIN
- DISCHARGE POINT
- WETLAND AREA
- STEEP SLOPE AREA

SCALE: 1" = 300'
0 150 300 450

Osborn Consulting

City of Sammamish Washington

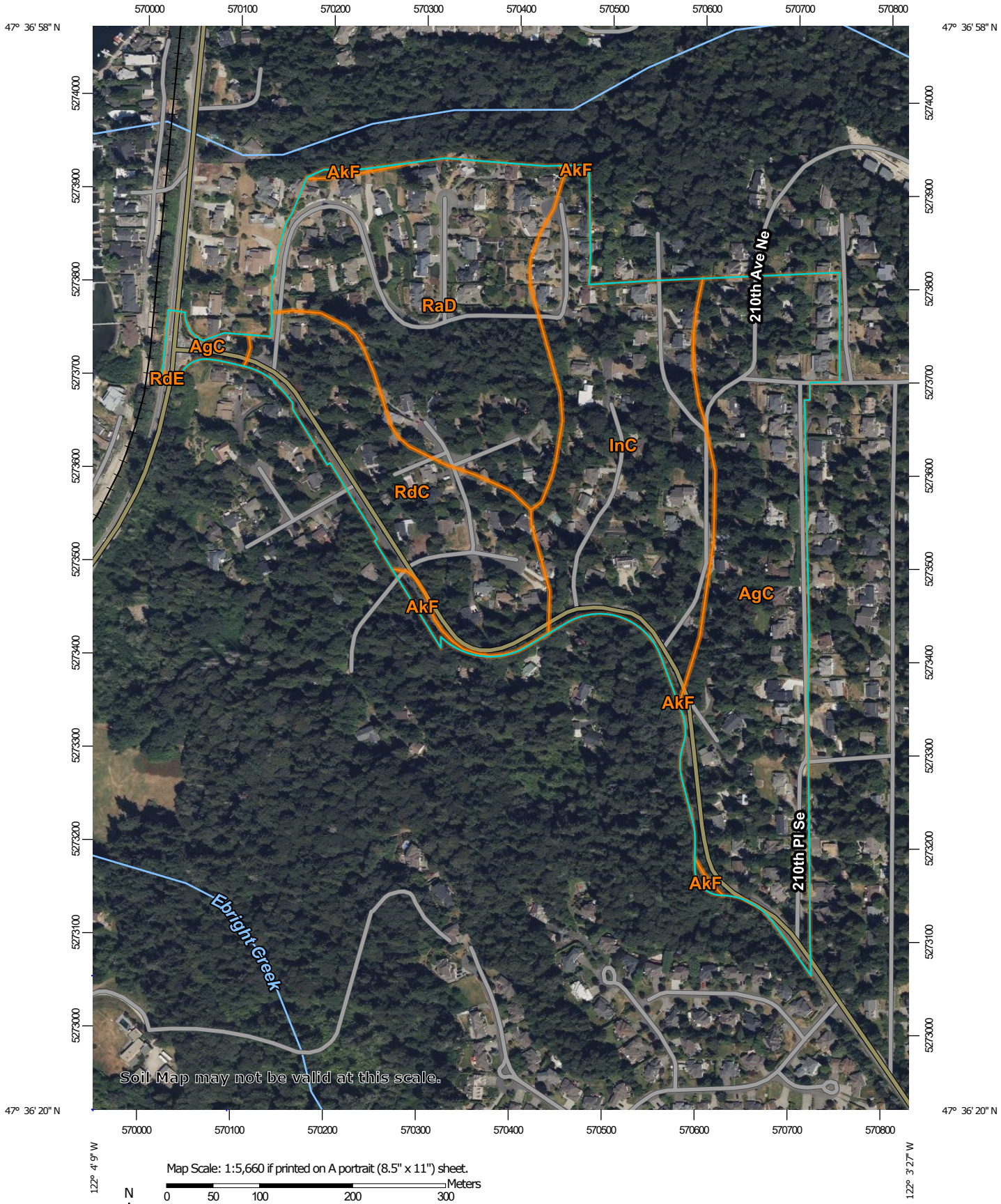
LOUIS THOMPSON ROAD TIGHTLINE PROJECT

BASIN MAP

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=300' V: N/A	FIGURE NUMBER 3

FILE NAME: C:\PW_OCL\WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS31497\F_10-210058_BASINS.DWG
PLOT TIME: 1/22/2024 11:01 AM
USER NAME: ALEKSANDRA SLATALA

Soil Map—King County Area, Washington
(Boundary)



Map Scale: 1:5,660 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Figure 4

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 18, Sep 8, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 31, 2022—Aug 8, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgC	Alderwood gravelly sandy loam, 8 to 15 percent slopes	21.9	31.0%
AkF	Alderwood and Kitsap soils, very steep	0.6	0.9%
InC	Indianola loamy sand, 5 to 15 percent slopes	17.4	24.7%
RaD	Ragnar fine sandy loam, 15 to 25 percent slopes	19.0	26.9%
RdC	Ragnar-Indianola association, sloping	11.6	16.4%
RdE	Ragnar-Indianola association, moderately steep	0.0	0.0%
Totals for Area of Interest		**70.6**	**100.0%**

Figure 4

SUMMARY OF EXISTING AREAS PER TDA								
	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
TDA #	SF	AC	SF	AC	SF	AC	SF	AC
1	21,127	0.485	55	0.001	21,072	0.484	21,590	0.496
2	45,704	1.049	374	0.009	45,330	1.041	45,134	1.036
3	70,480	1.618	3,929	0.090	66,551	1.528	61,927	1.422
4	6,635	0.152	26	0.001	6,609	0.152	4,476	0.103
TOTAL	143,946	3.304	4,384	0.101	139,562	3.205	133,127	3.057

NOTES

1. AREAS OUTSIDE OF EXISTING IMPERVIOUS AREA HATCH WITHIN THE PROJECT BOUNDARY ARE CONSIDERED PERVIOUS.

EXISTING DETENTION POND FACILITY

DISCHARGE POINT #E3-2
12" ADS PIPE TO EXISTING DETENTION POND
SHIFTED IN PROPOSED CONDITIONS, NEW PIPE SIZE

205TH AVE NE

208TH

NE 2ND ST

TDA 3

LOUIS THOMPSON RD

TDA 4

TDA 2

DISCHARGE POINT #E3-3
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E3-4
SHEET FLOW
REMAINS UNCHANGED

NE 3RD ST

DISCHARGE POINT #E4-1
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E4-2
SHEET FLOW
REMAINS UNCHANGED

206TH AVE NE

WETLAND W4

ZACKUSE CREEK

E LAKE SAMMAMISH PKWY NE

DISCHARGE POINT #E3-1
24" ADS PIPE TO ZACKUSE CREEK
REMAINS UNCHANGED

MATCHLINE - SEE EXISTING CONDITIONS 2

LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- EXISTING IMPERVIOUS AREA
- EXISTING NPGIS AREA
- EXISTING DISCHARGE POINT
- SURFACE FLOW DIRECTION

SCALE: 1" = 100'
0 50 100 150

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISTING CONDITIONS (1 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 5

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS31497IF_10-210058_EXISTTALLY.DWG
PLOT TIME: 1/5/2024 3:23 PM
USER NAME: ALEKSANDRA SLATALA

NOTES

1. AREAS OUTSIDE OF EXISTING IMPERVIOUS AREA HATCH WITHIN THE PROJECT BOUNDARY ARE CONSIDERED PERVIOUS.
2. SEE EXISTING CONDITIONS SHEET 1 OF 2 FOR THE SUMMARY OF EXISTING AREAS PER TDA.

208TH AVE NE

210TH AVE NE

E MAIN ST

THOMPSON HILL RD SE

210TH PL SE

TDA 2

TDA 1

CULVERT 4

DISCHARGE POINT #E2-5
18" CONCRETE PIPE TO ZACKUSE CREEK
REMAINS UNCHANGED

DISCHARGE POINT #E2-4
SHEET FLOW
REMAINS UNCHANGED

CULVERT 3

DISCHARGE POINT #E2-6
18" CMP PIPE TO ZACKUSE CREEK
REMAINS UNCHANGED

DISCHARGE POINT #E2-3
SHEET FLOW
REMAINS UNCHANGED

WETLAND W5

DISCHARGE POINT #E2-2
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E2-1
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E1-1
18" CONCRETE PIPE TO ZACKUSE CREEK
REMAINS UNCHANGED

CULVERT 2

CULVERT 1

DISCHARGE POINT #E1-2
12" ADS PIPE TO ZACKUSE CREEK
REMAINS UNCHANGED

ZACKUSE CREEK

ZACKUSE CREEK

ZACKUSE CREEK

MATCHLINE - SEE EXISTING CONDITIONS 1

LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- EXISTING IMPERVIOUS AREA
- EXISTING NPGIS AREA
- EXISTING DISCHARGE POINT
- SURFACE FLOW DIRECTION

SCALE: 1" = 100'
0 50 100 150

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISTING CONDITIONS (2 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 5

FILE NAME: C:\PW_OC\ WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS314976F_10-210058_EXISTTALLY.DWG
PLOT TIME: 1/5/2024 4:23 PM
USER NAME: ALEKSANDRA SLATALA

SUMMARY OF TDA 2 AREAS

TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	8,707	0.200	6,247	0.143	2,460	0.056	0	0.000
REPLACED	9,968	0.229	231	0.005	9,737	0.224	0	0.000
EX. TO REMAIN	35,948	0.825	0	0.000	35,593	0.817	36,206	0.831
TOTAL	54,623	1.254	6,478	0.148	47,790	1.097	36,206	0.831

SUMMARY OF TDA 3 AREAS

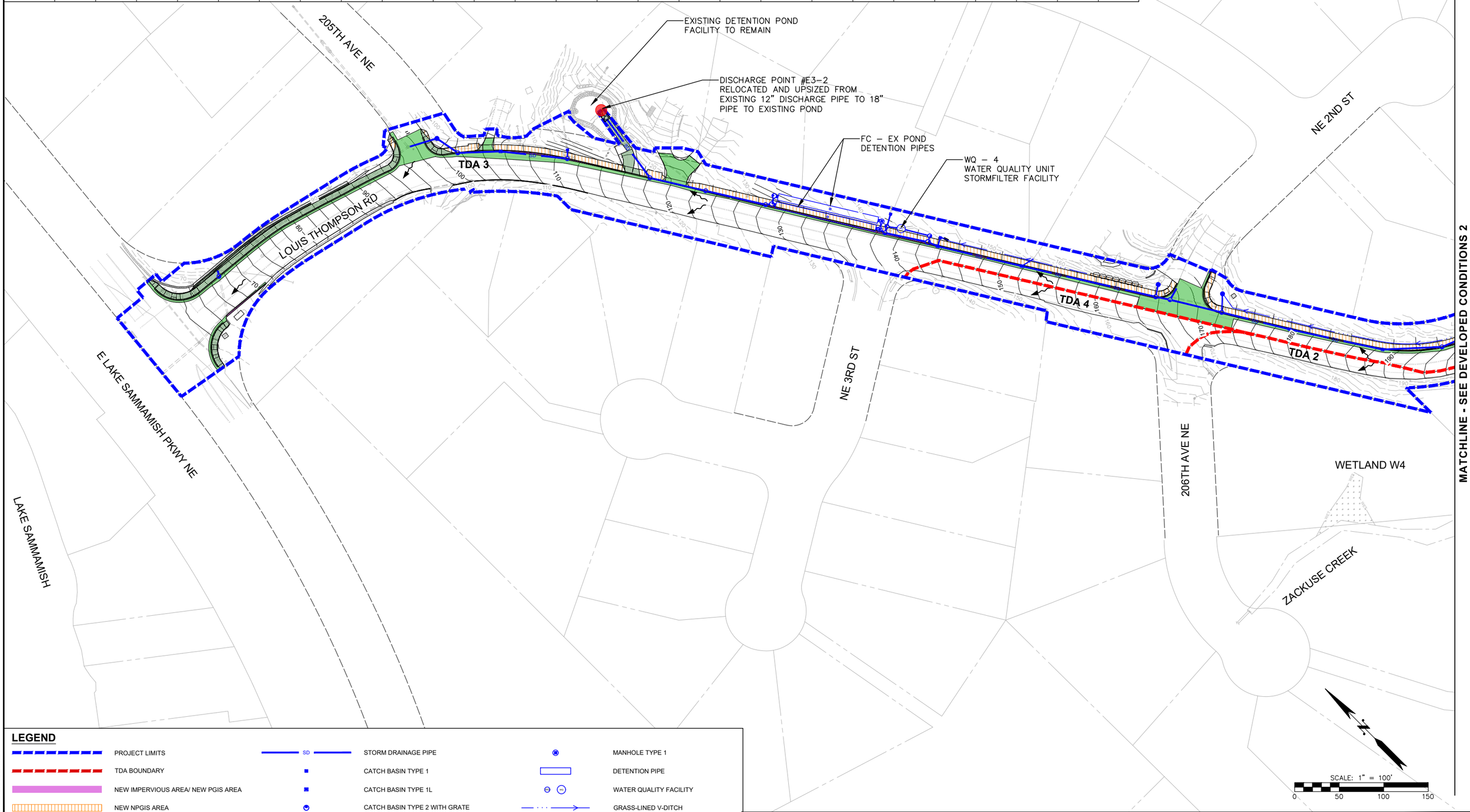
TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	13,475	0.309	11,072	0.254	2,403	0.055	0	0.000
REPLACED	16,582	0.381	4,335	0.100	12,247	0.281	0	0.000
EX. TO REMAIN	53,932	1.238	0	0.000	54,304	1.247	48,424	1.112
TOTAL	83,989	1.928	15,407	0.354	68,954	1.583	48,424	1.112

SUMMARY OF TDA 4 AREAS

TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	0	0.000	0	0.000	0	0.000	0	0.000
REPLACED	0	0.000	0	0.000	0	0.000	0	0.000
EX. TO REMAIN	6,635	0.152	26	0.001	6,609	0.431	4,476	0.103
TOTAL	6,635	0.152	26	0.001	6,609	0.431	4,476	0.103

NOTES

1. AREAS OUTSIDE OF EXISTING IMPERVIOUS AREA HATCH WITHIN THE PROJECT BOUNDARY ARE CONSIDERED PERVIOUS.
2. THERE IS NO NEW OR REPLACED IMPERVIOUS AREA IN TDA 4.
3. SEE DEVELOPED CONDITIONS SHEET 1 OF 2 FOR SUMMARY OF AREAS WITHIN TDA 2 - 4.



LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- NEW IMPERVIOUS AREA/ NEW PGIS AREA
- NEW NPGIS AREA
- REPLACED IMPERVIOUS AREA
- REPLACED NPGIS AREA
- SD — STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY
- GRASS-LINED V-DITCH
- PROPOSED DISCHARGE POINT (NEW OR ALTERED LOCATION FROM EXISTING POINTS ONLY)

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

DEVELOPED CONDITIONS (1 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1" = 100' V: N/A	FIGURE NUMBER 6

FILE NAME: C:\PW_OC_WORKINGDIR\OSBORNCONSULTING+PW\BENTLEY.COM_OSBORNCONSULTING+PW-01\ALEKSANDRA SLATALA\DMS314971F_10-210058_PROPTALLY_UPDATED.DWG
PLOT TIME: 12/4/2024 11:37 AM
USER NAME: ALEKSANDRA SLATALA

SUMMARY OF TDA 1 AREAS								
	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
TYPE	SF	AC	SF	AC	SF	AC	SF	AC
NEW	4,277	0.098	3,595	0.083	682	0.016	0	0.000
REPLACED	2,384	0.055	55	0.001	2,329	0.053	0	0.000
EX. TO REMAIN	18,747	0.430	0.000	0.000	18,743	0.431	17,310	0.397
TOTAL	25,408	0.583	3,650	0.084	21,754	0.500	17,310	0.397

NOTES

1. AREAS OUTSIDE OF EXISTING IMPERVIOUS AREA HATCH WITHIN THE PROJECT BOUNDARY ARE CONSIDERED PERVIOUS.
2. SEE DEVELOPED CONDITIONS SHEET 1 OF 2 FOR SUMMARY OF AREAS WITHIN TDA 2 - 4.

MATCHLINE - SEE DEVELOPED CONDITIONS 1

208TH AVE NE

210TH AVE NE

E MAIN ST

210TH PL SE

THOMPSON HILL RD SE

FC – CULVERT 4
DETENTION PIPE

WQ – 3
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 4

CULVERT 3

FC – CULVERT 3
DETENTION PIPE

WQ – 2
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 2

FC – CULVERT 2
DETENTION PIPE

WQ – 1
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 1

TDA 1

TDA 2

TDA 3

WETLAND W5

ZACKUSE CREEK

ZACKUSE CREEK

ZACKUSE CREEK

SCALE: 1" = 100'

0 50 100 150

LEGEND

PROJECT LIMITS	SD	STORM DRAINAGE PIPE	MANHOLE TYPE 1
TDA BOUNDARY		CATCH BASIN TYPE 1	DETENTION PIPE
NEW IMPERVIOUS AREA/ NEW PGIS AREA		CATCH BASIN TYPE 1L	WATER QUALITY FACILITY
NEW NPGIS AREA		CATCH BASIN TYPE 2 WITH GRATE	GRASS-LINED V-DITCH
REPLACED IMPERVIOUS AREA		CATCH BASIN TYPE 2 WITH SOLID LID	PROPOSED DISCHARGE POINT (NEW OR ALTERED LOCATION FROM EXISTING POINTS ONLY)
REPLACED NPGIS AREA		CATCH BASIN TYPE 2 WITH DEBRIS CAGE	

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

DEVELOPED CONDITIONS (2 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1" = 100' V: N/A	FIGURE NUMBER 6

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING+PW.BENTLEY.COM_OSBORNCONSULTING+PW-0\11\ALEKSANDRA SLATALA\DMS314971F_10-210058_PROPTALLY_UPDATED.DWG
PLOT TIME: 1/24/2024 11:38 AM
USER NAME: ALEKSANDRA SLATALA

OUTFLOW LOCATION	EXISITNG AREA TO CULVERTS AND POND						
	UNMITIGATED AREA		MIGITGATED AREA	BYPASS AREA	OFF-SITE AREA		TOTAL (AC)
	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	
CULVERT 1	0.015	0.140	0.000	0.000	0.000	0.000	0.155
CULVERT 2	0.221	0.145	0.000	0.000	0.359	1.345	0.366
CULVERT 3	0.024	0.227	0.111	0.000	0.425	1.530	0.362
CULVERT 4	0.000	0.315	0.089	0.058	2.965	10.922	0.462
TO POND	0.341	0.954	0.309	0.000	2.660	12.289	1.604

NOTES

1. MITIGATED AREAS ARE EXISTING AREAS WHICH ARE MODELED AS HISTORIC FORESTED SURFACES IN FLOW CONTROL MODELS TO MEET FLOW CONTROL REQUIREMENTS.
2. UNMITIGATED AREAS ARE EXISTING AREAS MODELS AS EXISTING SURFACE AREA CONDITIONS (NOT HISTORIC).
3. BYPASS AREAS ARE THOSE WHICH DO NOT ENTER THE UPSTREAM END OF THE CULVERT OR PIPE, BUT DRAIN TOWARD THE DOWNSTREAM DISCHARGE POINT.
4. SEE FIGURE 9 FOR OFFSITE AREA SURFACE INFORMATION.

205TH AVE NE

EXISTING POND

TDA 3

LOUIS THOMPSON RD

AREA TO EXISTING POND

NE 2ND ST

TDA 4

TDA 2

E LAKE SAMMAMISH PKWY NE

NE 3RD ST

LAKE SAMMAMISH

WETLAND W4

ZACKUSE CREEK

MATCHLINE - SEE EXISTING AREA TO CULVERTS AND POND 2

N

SCALE: 1" = 100'

0 50 100 150

LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- IMPERVIOUS AREA
- PERVIOUS AREA
- IMPERVIOUS BYPASS AREA
- OFFSITE AREA AREA

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING+PW.BENTLEY.COM_OSBORNCONSULTING+PW-01\ALEKSANDRA SLATALA\DMS31758\EXISTING AREA CULVERTS FIGURE.DWG
PLOT TIME: 12/20/2022 2:58 PM
USER NAME: ALEKSANDRA SLATALA

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISITNG AREA TO CULVERTS AND POND (1 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 7

NOTES

1. MITIGATED AREAS ARE EXISTING AREAS WHICH ARE MODELED AS HISTORIC FORESTED SURFACES IN FLOW CONTROL MODELS TO MEET FLOW CONTROL REQUIREMENTS.
2. UNMITIGATED AREAS ARE EXISTING AREAS MODELS AS EXISTING SURFACE AREA CONDITIONS (NOT HISTORIC).
3. BYPASS AREAS ARE THOSE WHICH DO NOT ENTER THE UPSTREAM END OF THE CULVERT OR PIPE, BUT DRAIN TOWARD THE DOWNSTREAM DISCHARGE POINT.
4. SEE FIGURE 9 FOR OFFSITE AREA SURFACE INFORMATION.
5. SEE EXISTING AREA TO CULVERTS AND POND EXHIBIT 1 OF 2 FOR SUMMARY OF EXISTING AREAS.

MATCHLINE - SEE EXISTING AREA TO CULVERTS POND 1

208TH AVE NE

210TH AVE NE

E MAIN ST

210TH PL SE

CULVERT 4 – BYPASS AREA

CULVERT 4 – AREA

TDA 2

EXISTING CULVERT 4

THOMPSON HILL RD SE

CULVERT 3 – AREA

EXISTING CULVERT 3

CULVERT 1 – AREA

CULVERT 2 – AREA

TDA 1

EXISTING CULVERT 1

EXISTING CULVERT 2

AREA TO EXISTING POND

TDA 3

WETLAND W5

ZACKUSE CREEK

ZACKUSE CREEK

ZACKUSE CREEK

N

SCALE: 1" = 100'

0 50 100 150

LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- IMPERVIOUS AREA
- PERVIOUS AREA
- IMPERVIOUS BYPASS AREA
- OFFSITE AREA AREA

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS317581\EXISTING AREA CULVERTS FIGURE.DWG
PLOT TIME: 12/20/2023 2:58 PM
USER NAME: ALEKSANDRA SLATALA

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT	JOB# / DWG 10-210058	DATE JAN 2024
EXISITNG AREA TO CULVERTS AND POND (2 OF 2)	SCALE H: 1"=20' V: N/A	FIGURE NUMBER 7

OUTFLOW LOCATION	PROPOSED AREAS TO CULVERTS AND POND							
	UNMITIGATED AREA		MIGITGATED AREA	BYPASS AREA		OFF-SITE AREA		TOTAL (AC)
	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	
CULVERT 1	0.060	0.097	0.000	0.000	0.000	0.000	0.000	0.157
CULVERT 2	0.219	0.064	0.000	0.058	0.026	0.359	1.345	0.367
CULVERT 3	0.071	0.100	0.111	0.033	0.043	0.425	1.532	0.358
CULVERT 4	0.081	0.201	0.089	0.041	0.050	2.965	10.922	0.462
TO POND	0.494	0.578	0.309	0.157	0.126	2.660	12.289	1.664

NOTES

1. MITIGATE AREAS ARE AREAS WHICH ARE MODELED AS HISTORIC FORESTED SURFACES IN FLOW CONTROL MODELS TO MEET FLOW CONTROL REQUIREMENTS.
2. UNMITIGATED AREAS ARE EXISTING AREAS MODELS AS EXISTING SURFACE AREA CONDITIONS (NOT HISTORIC).
3. BYPASS AREAS ARE THOSE WHICH DO NOT ENTER THE UPSTREAM END OF THE CULVERT OR PIPE, BUT DRAIN TOWARD THE DOWNSTREAM DISCHARGE POINT.
4. SEE FIGURE 9 FOR OFFSITE AREA SURFACE INFORMATION.

205TH AVE NE

LOUIS THOMPSON RD

TDA 3

FC – EX POND DETENTION PIPES

WQ – 4 WATER QUALITY UNIT STORMFILTER FACILITY

NE 2ND ST

EX POND – FC BYPASS AREA

TDA 4

TDA 2

EX POND – FC AREA

E LAKE SAMMAMISH PKWY NE

NE 3RD ST

206TH AVE NE

LAKE SAMMAMISH

WETLAND W4

ZACKUSE CREEK

MATCHLINE - SEE PROPOSED AREA TO CULVERTS AND FC 2

SCALE: 1" = 100'

0 50 100 150

LEGEND

- PROJECT LIMITS
- TDA BOUNDARY
- IMPERVIOUS AREA
- PERVIOUS AREA
- OFFSITE AREA
- IMPERVIOUS BYPASS AREA
- PERVIOUS BYPASS AREA
- STORM DRAINAGE PIPE (SD)
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

PROPOSED AREA TO CULVERTS AND FC (1 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 8

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING+PW.BENTLEY.COM_OSBORNCONSULTING+PW-01\ALEKSANDRA SLATALA\DMS31758\PROPOSED AREA TO FC AND CULVERTS FIGURE.DWG
PLOT TIME: 12/20/2023 3:23 PM
USER NAME: ALEKSANDRA SLATALA

NOTES

1. MITIGATE AREAS ARE AREAS WHICH ARE MODELED AS HISTORIC FORESTED SURFACES IN FLOW CONTROL MODELS TO MEET FLOW CONTROL REQUIREMENTS.
2. UNMITIGATED AREAS ARE EXISTING AREAS MODELS AS EXISTING SURFACE AREA CONDITIONS (NOT HISTORIC).
3. BYPASS AREAS ARE THOSE WHICH DO NOT ENTER THE UPSTREAM END OF THE CULVERT OR PIPE, BUT DRAIN TOWARD THE DOWNSTREAM DISCHARGE POINT.
4. SEE FIGURE 9 FOR OFFSITE AREA SURFACE INFORMATION.
5. SEE PROPOSED AREA TO CULVERTS AND POND EXHIBIT 1 OF 2 FOR SUMMARY OF PROPOSED AREAS.

MATCHLINE - SEE PROPOSED AREA TO CULVERTS AND FC 1

208TH AVE NE

210TH AVE NE

E MAIN ST

210TH PL SE

THOMPSON HILL RD SE

CULVERT 4 – FC BYPASS AREA

CULVERT 4 – FC AREA

STA. 30+96.59 (73.40' L)

TDA 2

WQ – 3
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 4

FC – CULVERT 4
DETENTION PIPE

CULVERT 3 – FC BYPASS AREA

CULVERT 3

CULVERT 3 – FC AREA

FC – CULVERT 3
DETENTION PIPE

CULVERT 2 – FC BYPASS AREA

WQ – 2
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 2 – FC AREA

FC AREA – EX POND

WETLAND W5

CULVERT 2

FC – CULVERT 2
DETENTION PIPE

TDA 3

TDA 1

WQ – 1
WATER QUALITY UNIT
STORMFILTER FACILITY

ZACKUSE CREEK

ZACKUSE CREEK

ZACKUSE CREEK

SCALE: 1" = 100'

0 50 100 150

LEGEND

PROJECT LIMITS	IMPERVIOUS BYPASS AREA		CATCH BASIN TYPE 2 WITH SOLID LID
TDA BOUNDARY	PERVIOUS BYPASS AREA		CATCH BASIN TYPE 2 WITH DEBRIS CAGE
IMPERVIOUS AREA	STORM DRAINAGE PIPE (SD)		MANHOLE TYPE 1
PERVIOUS AREA	CATCH BASIN TYPE 1		DETENTION PIPE
OFFSITE AREA	CATCH BASIN TYPE 1L		WATER QUALITY FACILITY
	CATCH BASIN TYPE 2 WITH GRATE		

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

PROPOSED AREA TO CULVERTS AND FC (2 OF 2)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 8

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS31758\PROPOSED AREA TO FC AND CULVERTS FIGURE.DWG
PLOT TIME: 12/20/2023 3:24 PM
USER NAME: ALEKSANDRA SLATALA

MATCHLINE - SEE CONVEYANCE AREA 3

NOTES

1. AREAS ARE DESIGNATED AS "XX# - ***YZ WHERE XX IS PROJECT AREA (PA) OR OFF-SITE AREA (OA), # IS THE TDA #, *** IS THE CATCH BASIN THE AREA IS DRAINING TO, Y IS THE ALPHABETICAL LETTER OF THE DRAINAGE AREA, AND Z IS I (IMPERVIOUS AREA) OR P (PERVIOUS AREA).
2. NOTE, AREAS DESIGNATED AS PERVIOUS ON THIS FIGURE AREA ARE A MIX OF OPEN SPACE AND IMPERVIOUS AREAS. WEIGHTED CURVE NUMBERS ARE ASSIGNED PER SOIL TYPE AND LAND USE APPROXIMATION AS DOCUMENTED ON CONVEYANCE AREA 3.
3. SEE CONVEYANCE AREA EXHIBIT 3 OF 3 FOR SUMMARY OF EXISTING AREAS.

0A3–470CP
0A3–470AI
0A3–460DP
0A3–PONDCI
0A3–PONDBP
0A3–470BP
0A3–350FP
0A3–430GP
0A3–PONDAP
0A3–430FI
PA3–430CP
0A3–430EI
0A3–380DP
0A3–350EI
NE 2ND ST
205TH AVE NE
0A3–490CP
PA3–490BP
PA3–460BP
PA3–470DP
0A3–460EI
PA3–460CP
PA3–460AI
PA3–430DP
PA3–430BP
PA3–430AI
FC – EX POND DETENTION PIPES
WQ – 4 WATER QUALITY UNIT STORMFILTER FACILITY
PA3–350HI
PA3–380CI
PA3–380BP
0A3–350GP
0A3–350DP
LOUIS THOMPSON RD
PA3–490AI
NE 3RD ST
PA3–380AI
PA3–350CP
PA3–350BP
PA3–350AI

MATCHLINE - SEE CONVEYANCE AREA 2

LEGEND

- IMPERVIOUS AREA
- TYPE A SOIL PERVIOUS AREA
- TYPE B SOIL PERVIOUS AREA
- TYPE C SOIL PERVIOUS AREA
- WATER QUALITY AREA BOUNDARY
- STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY

SCALE: 1" = 100'
0 50 100 150

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

CONVEYANCE AREA (1 OF 3)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 9

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING+PW.BENTLEY.COM_OSBORNCONSULTING+PW-01\ALEKSANDRA SLATALA\DMS31758\CONVEYANCE AREA FIGURES.DWG
PLOT TIME: 1/8/2024 9:50 AM
USER NAME: ALEKSANDRA SLATALA

MATCHLINE - SEE CONVEYANCE AREA 3

MATCHLINE - SEE CONVEYANCE AREA 1

NOTES

1. AREAS ARE DESIGNATED AS "XX# - ***YZ WHERE XX IS PROJECT AREA (PA) OR OFF-SITE AREA (OA), # IS THE TDA #, *** IS THE CATCH BASIN THE AREA IS DRAINING TO, Y IS THE ALPHABETICAL LETTER OF THE DRAINAGE AREA, AND Z IS I (IMPERVIOUS AREA) OR P (PERVIOUS AREA).
2. NOTE, AREAS DESIGNATED AS PERVIOUS ON THIS FIGURE AREA ARE A MIX OF OPEN SPACE AND IMPERVIOUS AREAS. WEIGHTED CURVE NUMBERS ARE ASSIGNED PER SOIL TYPE AND LAND USE APPROXIMATION AS DOCUMENTED ON CONVEYANCE AREA 3.
3. SEE CONVEYANCE AREA EXHIBIT 3 OF 3 FOR SUMMARY OF EXISTING AREAS.

208TH AVE NE
210TH AVE NE
210TH PL NE
211TH PL NE
E MAIN ST
THOMPSON HILL RD SE
210TH PL SE
ZACKUSE CREEK
WETLAND W5

0A3-460FI
0A2-160EI
0A2-160FP
0A3-260GP
0A2-160GI
0A2-160DI
0A2-17CI
0A2-210EP
0A2-160CP
0A2-140GI
0A3-220DI
0A2-210DI
0A3-220CI
0A2-170EP
0A2-170DI
0A3-220EP
PA3-220AI
PA3-210CP
PA3-220BP
0A3-260EP
0A3-260HP
0A3-260JI
PA3-260BP
PA2-140BP
0A2-140FP
PA2-170DI
PA2-170BP
PA2-210BP
PA2-160BP
PA2-160AI
PA2-140CP
PA3-260AI
PA3-260DP
0A3-260II
PA3-260CP
CULVERT 4
FC – CULVERT 4
DETENTION PIPE
PA2-210AI
WQ – 3
WATER QUALITY UNIT
STORMFILTER FACILITY
PA2-140AI
0A2-140DI
0A2-140EP
0A2-100DI
0A2-80EI
0A2-130CP
0A2-100CP
CULVERT 3
FC – CULVERT 3
DETENTION PIPE
PA2-130BP
0A2-80DP
PA2-130AI
0A1-70EI
PA2-80CI
PA3-280BP
PA3-280AI
0A3-280CP
WQ – 2
WATER QUALITY UNIT
STORMFILTER FACILITY
PA2-80BP
0A1-70DP
0A1-10DP
PA2-100AI
PA2-70CP
PA2-70AI
PA2-70BP
PA2-80AI
PA1-45BP
0A1-10CP
0A1-20CP
PA1-10BP
0A3-320CP
PA3-320BP
PA3-320AI
CULVERT 2
0A1-40CP
PA1-10AI
FC – CULVERT 2
DETENTION PIPE
PA1-20AI
WQ – 1
WATER QUALITY UNIT
STORMFILTER FACILITY
PA1-40AI
PA1-20BP
PA1-40BP
PA1-45AI

SCALE: 1" = 100'
0 50 100 150

LEGEND

- IMPERVIOUS AREA
- TYPE A SOIL PERVIOUS AREA
- TYPE B SOIL PERVIOUS AREA
- TYPE C SOIL PERVIOUS AREA
- WATER QUALITY AREA BOUNDARY
- STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

CONVEYANCE AREA (2 OF 3)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 9

FILE NAME: C:\PW_OCL\WORKINGDIR\OSBORNCONSULTING+PW\BENTLEY.COM_OSBORNCONSULTING+PW-01\ALEKSANDRA SLATALA\DMS31758\CONVEYANCE AREA FIGURES.DWG
PLOT TIME: 1/8/2024 9:51 AM
USER NAME: ALEKSANDRA SLATALA

AREA NAME	SF	AC	CN	AREA NAME	SF	AC	CN	AREA NAME	SF	AC	CN	AREA NAME	SF	AC	CN	AREA NAME	SF	AC	CN
PA1-10AI	1,973	0.045	98	OA2-80EI	7,140	0.164	98	PA2-170BP	169	0.004	90	OA3-260II	187	0.004	98	PA3-430AI	7,126	0.164	98
PA1-10BP	4,007	0.092	90	PA2-100AI	4,724	0.108	98	OA2-170CI	3,507	0.081	98	OA3-260IJ	31,709	0.728	98	PA3-430BP	4,961	0.114	90
OA1-10CP	4,471	0.103	90	PA2-100BP	3,167	0.073	90	OA2-170DI	877	0.020	98	OA3-260KP	3,667	0.084	85	PA3-430CP	245	0.006	90
OA1-10DP	4,873	0.112	87	OA2-100CP	28,868	0.663	87	OA2-170EP	10,678	0.245	77	PA3-280AI	6,284	0.144	98	PA3-430DP	622	0.014	90
PA1-20AI	1,116	0.026	98	OA2-100DI	3,744	0.086	98	PA2-210AI	1,597	0.037	98	PA3-280BP	4,364	0.100	90	OA3-460EI	306	0.007	98
PA1-20BP	855	0.020	90	PA2-130AI	1,382	0.032	98	PA2-210BP	544	0.012	90	OA3-280CP	7,870	0.181	83	OA3-460FI	129,718	2.978	98
OA1-20CP	5,596	0.128	90	PA2-130BP	2,030	0.047	90	PA2-210CP	1,572	0.036	90	PA3-320AI	10,275	0.236	98	OA3-460GP	43,799	1.005	81
PA1-40AI	5,779	0.133	98	OA2-130CP	2,068	0.047	92	OA2-210DI	867	0.020	98	PA3-320BP	6,552	0.150	90	OA3-460HP	2,275	0.052	77
PA1-40BP	856	0.020	90	PA2-140AI	3,284	0.075	98	OA2-210EP	61,933	1.422	82	OA3-320CP	18,102	0.416	80	OA3-460IP	68,481	1.572	83
OA1-40CP	4,453	0.102	87	PA2-140BP	1,760	0.040	90	PA3-220AI	1,450	0.033	98	PA3-350AI	7,773	0.178	98	OA3-460JP	90,965	2.088	83
PA1-45AI	2,453	0.056	98	OA2-140DI	13,782	0.316	98	PA3-220BP	498	0.011	90	PA3-350BP	4,767	0.109	90	OA3-460KP	95,872	2.201	90
PA1-45BP	1,184	0.027	90	PA2-140CP	1,374	0.032	90	OA3-220CI	439	0.010	98	PA3-350CP	604	0.014	90	OA3-470AI	143,111	3.285	98
PA1-70AI	2,241	0.051	98	OA2-140EP	3,504	0.080	87	OA3-220DI	1,238	0.028	98	OA3-350DP	29,461	0.676	85	OA3-470BP	157,356	3.612	83
PA1-70BP	62	0.001	90	OA2-140FP	59,980	1.377	87	OA3-220EP	4,881	0.112	81	OA3-350EI	35,381	0.812	98	OA3-470CP	363,433	8.343	83
PA1-70CP	1,051	0.024	90	OA2-140GI	8,761	0.201	98	PA3-260AI	2,211	0.051	98	OA3-350FP	177,572	4.076	84	PA3-470DP	1,196	0.027	90
OA1-70DP	44,595	1.024	89	PA2-160AI	2,786	0.064	98	PA3-260BP	1,598	0.037	90	OA3-350GP	4,422	0.102	77	PA3-490AI	3,170	0.073	98
OA1-70EI	4,037	0.093	98	PA2-160BP	5,442	0.125	90	PA3-260CP	274	0.006	90	OA3-350HI	1,167	0.027	98	PA3-490BP	2,101	0.048	90
PA2-80AI	824	0.019	98	OA2-160CP	74,332	1.706	88	PA3-260DP	48	0.001	90	PA3-380AI	7,330	0.168	98	OA3-490CP	10,061	0.231	87
PA2-80BP	1,019	0.023	90	OA2-160DI	9,535	0.219	98	OA3-260EP	10,880	0.250	80	PA3-380BP	6,216	0.143	90				
PA2-80CI	683	0.016	98	OA2-160EI	44,049	1.011	98	OA3-260GP	100,534	2.308	83	PA3-380CI	174	0.004	98				
OA2-80DP	29,583	0.679	88	PA2-170AI	1,375	0.032	98	OA3-260HI	1,025	0.024	98	OA3-380DP	59,833	1.374	84				

NOTES

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LEGEND

- IMPERVIOUS AREA
- TYPE A SOIL PERVIOUS AREA
- TYPE B SOIL PERVIOUS AREA
- TYPE C SOIL PERVIOUS AREA
- WATER QUALITY AREA BOUNDARY
- SD — STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY

SCALE: 1" = 200'
0 100 200 300

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

CONVEYANCE AREA (3 OF 3)

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 9

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING+PW.BENTLEY.COM_OSBORNCONSULTING+PW-011\ALEKSANDRA SLATALA\DMS31756\CONVEYANCE AREA FIGURES.DWG
PLOT TIME: 10/2/2024 9:51 AM
USER NAME: ALEKSANDRA SLATALA

APPENDIX A
OFFSITE ANALYSIS

Offsite Analysis Drainage System Table

Site Visit Photos

OFF-SITE ANALYSIS DRAINAGE SYSTEM TABLE
KING COUNTY SURFACE WATER DESIGN MANUAL, CORE REQUIREMENT #2

Basin:	Zackuse Creek Basin	Subbasin Name:	Louis Thompson Rd NE Subbasin	Subbasin Number:		Date	04/12/2023

Symbol	Drainage Component Type, Name, and Size	Drainage Component Description	Slope	Distance from site discharge	Existing Problems	Potential Problems	Observations of field inspector, resource reviewer, or resident
see map	Type: sheet flow, swale, stream, channel, pipe, pond, flow control/wq BMP; Size: diameter, surface area	drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	¼ ml = 1,320 ft.	constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		tributary area, likelihood of problem, overflow pathways, potential impacts
E1-1	18" Concrete Pipe	steep slopes, roadway and neighborhood drainage	31.4%	1/16 mi = 324 ft	Minor down cutting.	None	None
E1-2	12" ADS Pipe	steep slopes, roadway and neighborhood drainage	14.6%	1/4 mi = 1,320 ft	None	None	None
E2-1	Sheet Flow	steep slopes, roadway and neighborhood drainage	31.1%	1/24 mi = 217 ft	None	None	None
E2-2	Sheet Flow	steep slopes, roadway and neighborhood drainage	28.1%	1/20 mi = 243 ft	None	None	None
E2-3	Sheet Flow	steep slopes, roadway and neighborhood drainage	11.2%	1/18 mi = 287 ft	None	None	None
E2-4	Sheet Flow	steep slopes, roadway and neighborhood drainage	14.9%	1/20 mi = 263 ft	None	None	None
E2-5	18" Concrete Pipe	steep slopes, roadway and neighborhood drainage	11.9%	1/12 mi = 438 ft	Down cutting at second culvert outfall.	None	None
E2-6	18" CM Pipe	steep slopes, roadway and neighborhood drainage	13.4%	1/4 mi = 1,320 ft	None	None	None
E3-1	24" ADS Pipe	roadway and neighborhood drainage	5.4%	1/50 mi = 88 ft	None	None	None
E3-2	Detention Pond	roadway and neighborhood drainage	8.5%	1/50 mi = 121 ft	None	None	None
E3-3	Sheet Flow	roadway and neighborhood drainage	9.8%	1/9 mi = 600 ft	None	None	None
E3-4	Sheet Flow	roadway and neighborhood drainage	7.8%	1/4 mi = 1,320 ft	None	None	None
E4-1	Sheet Flow	roadway and neighborhood drainage	6.4%	1/6 mi = 872 ft	None	None	None
E4-2	Sheet Flow	roadway and neighborhood drainage	8.2%	1/4 mi = 1,320 ft	None	None	None

OSBORN CONSULTING INCORPORATED

PHOTOGRAPHS
Louis Thompson Tightline
Louis Thompson Rd NE
Sammamish, WA

Project No.:	210058
Date:	02, 2023
Taken By:	JSG, LEO, FJ
Chk By:	JSG

Photograph 1. Existing detention pond at station 15+25 looking north from the access ramp.

Photograph 2. Existing detention pond at station 15+25 looking south from the riser structure.

Photograph 3. Riser structure downstream of the existing detention pond at station 15+00.

Photograph 4. Existing southern inlet to the existing detention pond at station 15+25.

Photograph 5. Outfall of the downstream culvert to culvert 4 with downcutting at station 30+75.

Photograph 6. Forest area downstream of culvert 4 at station 30+75.

Photograph 7. Vegetated area at the outfall of culvert 4 at station 31+50.

Photograph 8. Forest area at the outfall of culvert 3 at station 36+00.

Photograph 9. Culvert 2 outfall with splash pad at station 40+50.

Photograph 10. Forest area downstream of culvert 2 show with minor downcutting at station 40+50.

Photograph 11. Culvert 1 outfall at station 43+00.

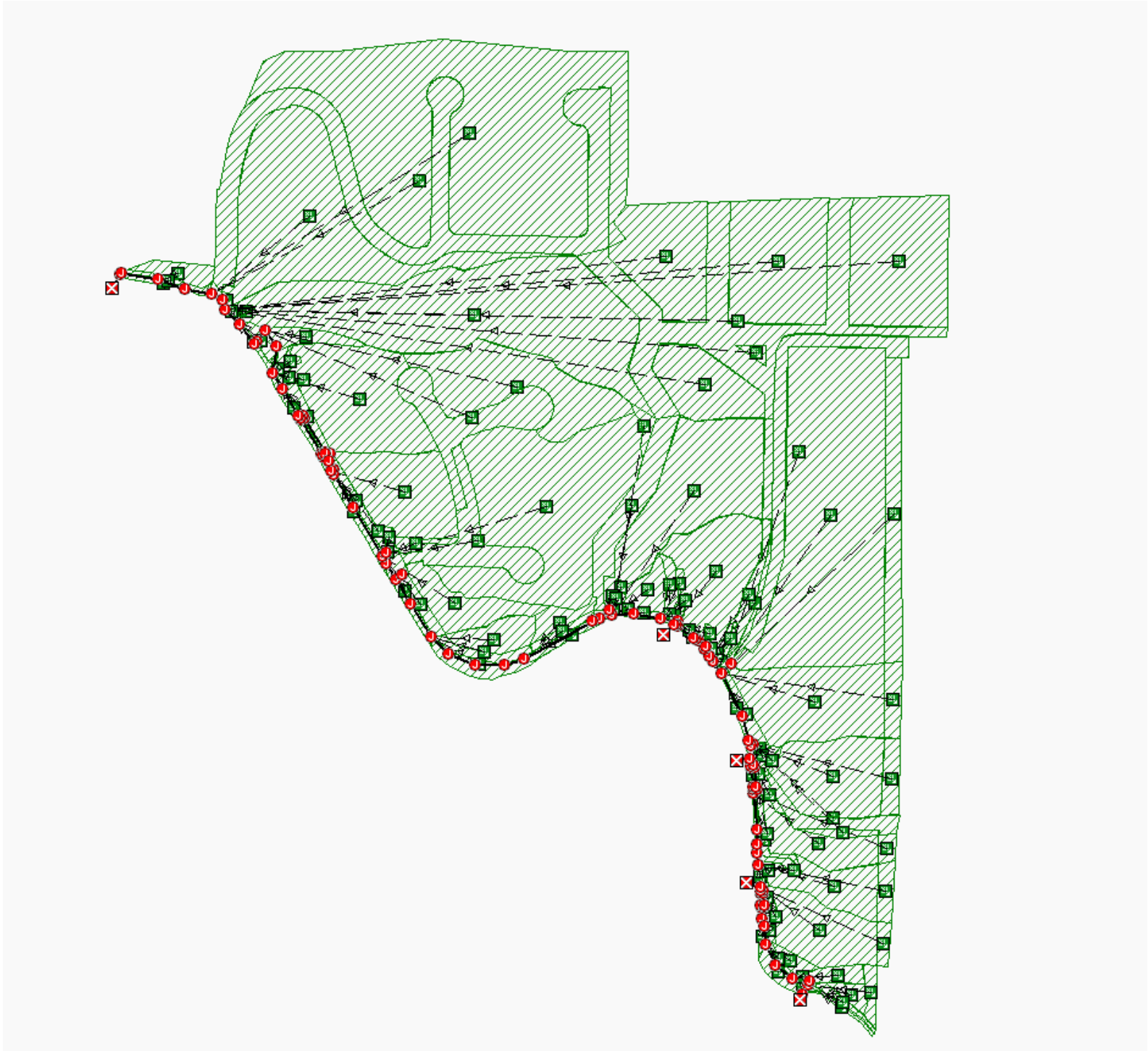
Photograph 12. Forest area downstream of culvert 1 at station 43+00.

APPENDIX B
CONVEYANCE CALCULATIONS

SSA Model Results

Flow Splitter Calculations

AutoDesk Storm and Sanitary Sewer Analysis (SSA) – Conveyance Calculations



25-Year Storm Event

Project Description

File Name	SSA_Model.SPF
Description	pw.bentley.com_osbornconsulting-pw-01\francisco jimenez\dms27928\P_10-210058_STRM_Basin Areas.dwg

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	114
Nodes	101
Junctions	96
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	102
Channels	0
Pipes	102
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	StormData	Time Series	25 Year from KC Manual	Cumulative	inches	Washington	King	25.00	3.45	SCS Type IA 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	{Catch Basin Boundaries}.OA2-100CP	0.66	484.00	86.95	3.45	2.13	1.41	0.36	0 00:05:00
2	{Catch Basin Boundaries}.OA2-100DI	0.09	484.00	98.00	3.45	3.22	0.28	0.07	0 00:05:00
3	{Catch Basin Boundaries}.OA2-130CP	0.05	484.00	91.50	3.45	2.53	0.12	0.03	0 00:05:00
4	{Catch Basin Boundaries}.OA2-140DI	0.32	484.00	98.00	3.45	3.22	1.02	0.26	0 00:05:00
5	{Catch Basin Boundaries}.OA2-140EP	0.08	484.00	86.95	3.45	2.13	0.17	0.04	0 00:05:00
6	{Catch Basin Boundaries}.OA2-140FP	1.38	484.00	86.95	3.45	2.13	2.94	0.74	0 00:05:00
7	{Catch Basin Boundaries}.OA2-140GI	0.20	484.00	98.00	3.45	3.22	0.65	0.16	0 00:05:00
8	{Catch Basin Boundaries}.OA2-160CP	1.71	484.00	87.60	3.45	2.19	3.74	0.95	0 00:05:00
9	{Catch Basin Boundaries}.OA2-160DI	0.22	484.00	98.00	3.45	3.22	0.70	0.18	0 00:05:00
10	{Catch Basin Boundaries}.OA2-160EI	1.01	484.00	98.00	3.45	3.22	3.25	0.83	0 00:05:00
11	{Catch Basin Boundaries}.OA2-160FP	5.84	484.00	88.90	3.45	2.30	13.45	3.47	0 00:05:00
12	{Catch Basin Boundaries}.OA2-160GI	0.89	484.00	98.00	3.45	3.22	2.86	0.73	0 00:05:00
13	{Catch Basin Boundaries}.OA2-170CI	0.08	484.00	98.00	3.45	3.22	0.26	0.07	0 00:05:00
14	{Catch Basin Boundaries}.OA2-170EP	0.25	484.00	77.00	3.45	1.39	0.34	0.07	0 00:05:00
15	{Catch Basin Boundaries}.OA2-20CP	0.13	484.00	90.20	3.45	2.42	0.31	0.08	0 00:05:00
16	{Catch Basin Boundaries}.OA2-210DI	0.02	484.00	98.00	3.45	3.19	0.06	0.02	0 00:05:00
17	{Catch Basin Boundaries}.OA2-210EP	1.42	484.00	82.25	3.45	1.76	2.50	0.60	0 00:05:00
18	{Catch Basin Boundaries}.OA2-40CP	0.10	484.00	86.95	3.45	2.13	0.22	0.06	0 00:05:00
19	{Catch Basin Boundaries}.OA2-70DP	1.02	484.00	88.90	3.45	2.30	2.36	0.61	0 00:05:00
20	{Catch Basin Boundaries}.OA2-70EI	0.09	484.00	98.00	3.45	3.22	0.30	0.07	0 00:05:00
21	{Catch Basin Boundaries}.OA2-80DP	0.68	484.00	88.25	3.45	2.25	1.52	0.39	0 00:05:00
22	{Catch Basin Boundaries}.OA2-80EI	0.16	484.00	98.00	3.45	3.22	0.53	0.14	0 00:05:00
23	{Catch Basin Boundaries}.OA3-220DI	0.03	484.00	98.00	3.45	3.20	0.09	0.02	0 00:05:00
24	{Catch Basin Boundaries}.OA3-220EP	0.11	484.00	81.20	3.45	1.68	0.19	0.05	0 00:05:00
25	{Catch Basin Boundaries}.OA3-260EP	0.25	484.00	80.15	3.45	1.61	0.40	0.09	0 00:05:00
26	{Catch Basin Boundaries}.OA3-260GP	2.31	484.00	83.30	3.45	1.84	4.24	1.03	0 00:05:00
27	{Catch Basin Boundaries}.OA3-260HI	0.02	484.00	98.00	3.45	3.20	0.08	0.02	0 00:05:00
28	{Catch Basin Boundaries}.OA3-260IJ	0.73	484.00	98.00	3.45	3.22	2.34	0.60	0 00:05:00
29	{Catch Basin Boundaries}.OA3-260KP	0.08	484.00	85.40	3.45	2.00	0.17	0.04	0 00:05:00
30	{Catch Basin Boundaries}.OA3-280CP	0.18	484.00	83.30	3.45	1.84	0.33	0.08	0 00:05:00
31	{Catch Basin Boundaries}.OA3-320CP	0.42	484.00	80.15	3.45	1.61	0.67	0.15	0 00:05:00
32	{Catch Basin Boundaries}.OA3-350DP	0.68	484.00	85.40	3.45	2.01	1.36	0.34	0 00:05:00
33	{Catch Basin Boundaries}.OA3-350EI	0.81	484.00	98.00	3.45	3.22	2.61	0.66	0 00:05:00
34	{Catch Basin Boundaries}.OA3-350FP	4.08	484.00	84.35	3.45	1.92	7.83	1.93	0 00:05:00
35	{Catch Basin Boundaries}.OA3-350GP	0.10	484.00	77.00	3.45	1.39	0.14	0.03	0 00:05:00
36	{Catch Basin Boundaries}.OA3-380DP	1.37	484.00	84.35	3.45	1.92	2.64	0.65	0 00:05:00
37	{Catch Basin Boundaries}.OA3-430GP	2.00	484.00	83.30	3.45	1.84	3.69	0.89	0 00:05:00
38	{Catch Basin Boundaries}.OA3-460DP	5.17	484.00	80.15	3.45	1.61	8.31	1.92	0 00:05:00
39	{Catch Basin Boundaries}.OA3-460EI	0.01	484.00	98.00	3.45	1.51	0.01	0.01	0 00:05:00
40	{Catch Basin Boundaries}.OA3-460GP	1.01	484.00	81.20	3.45	1.68	1.69	0.40	0 00:05:00
41	{Catch Basin Boundaries}.OA3-460HP	0.05	484.00	77.00	3.45	1.39	0.07	0.02	0 00:05:00
42	{Catch Basin Boundaries}.OA3-460IP	1.57	484.00	83.30	3.45	1.84	2.89	0.70	0 00:05:00
43	{Catch Basin Boundaries}.OA3-460JP	2.09	484.00	83.30	3.45	1.84	3.84	0.93	0 00:05:00
44	{Catch Basin Boundaries}.OA3-460KP	2.20	484.00	90.20	3.45	2.42	5.32	1.38	0 00:05:00
45	{Catch Basin Boundaries}.OA3-470AI	3.29	484.00	98.00	3.45	3.22	10.57	2.69	0 00:05:00
46	{Catch Basin Boundaries}.OA3-470BP	3.61	484.00	83.30	3.45	1.84	6.65	1.61	0 00:05:00
47	{Catch Basin Boundaries}.OA3-470CP	8.34	484.00	83.30	3.45	1.84	15.35	3.72	0 00:05:00
48	{Catch Basin Boundaries}.OA3-490CP	0.23	484.00	86.95	3.45	2.13	0.49	0.12	0 00:05:00
49	{Catch Basin Boundaries}.OA3-PondAP	0.23	484.00	77.00	3.45	1.39	0.32	0.07	0 00:05:00
50	{Catch Basin Boundaries}.OA3-PondBP	1.82	484.00	85.40	3.45	2.01	3.65	0.91	0 00:05:00
51	{Catch Basin Boundaries}.OA3-PondCI	1.00	484.00	98.00	3.45	3.22	3.21	0.82	0 00:05:00
52	{Catch Basin Boundaries}.PA2-130AI	0.03	484.00	98.00	3.45	3.21	0.10	0.03	0 00:05:00
53	{Catch Basin Boundaries}.PA2-140BP	0.04	484.00	90.00	3.45	2.39	0.10	0.02	0 00:05:00
54	{Catch Basin Boundaries}.PA2-160BP	0.12	484.00	90.00	3.45	2.40	0.30	0.08	0 00:05:00
55	{Catch Basin Boundaries}.PA2-20AI	0.03	484.00	98.00	3.45	3.20	0.08	0.02	0 00:05:00
56	{Catch Basin Boundaries}.PA2-40AI	0.13	484.00	98.00	3.45	3.22	0.43	0.11	0 00:05:00
57	{Catch Basin Boundaries}.PA2-80AI	0.02	484.00	98.00	3.45	3.19	0.06	0.02	0 00:05:00
58	{Catch Basin Boundaries}.PA3-220AI	0.03	484.00	98.00	3.45	3.21	0.11	0.03	0 00:05:00
59	{Catch Basin Boundaries}.PA3-260AI	0.05	484.00	98.00	3.45	3.21	0.16	0.04	0 00:05:00
60	{Catch Basin Boundaries}.PA3-280AI	0.14	484.00	98.00	3.45	3.22	0.46	0.12	0 00:05:00
61	{Catch Basin Boundaries}.PA3-320AI	0.24	484.00	98.00	3.45	3.22	0.76	0.19	0 00:05:00
62	{Catch Basin Boundaries}.PA3-380AI	0.17	484.00	98.00	3.45	3.22	0.54	0.14	0 00:05:00
63	{Catch Basin Boundaries}.PA3-430AI	0.16	484.00	98.00	3.45	3.22	0.53	0.14	0 00:05:00
64	{Catch Basin Boundaries}.PA3-490AI	0.07	484.00	98.00	3.45	3.21	0.23	0.06	0 00:05:00
65	OA1-10CP	0.10	484.00	90.20	3.45	2.42	0.25	0.06	0 00:05:00
66	OA1-10DP	0.11	484.00	86.95	3.45	2.13	0.24	0.06	0 00:05:00
67	OA2-170DI	0.02	484.00	98.00	3.45	3.19	0.06	0.02	0 00:05:00
68	OA3-220CI	0.01	484.00	98.00	3.45	2.97	0.03	0.01	0 00:05:00
69	OA3-260II	0.01	484.00	98.00	3.45	1.51	0.01	0.01	0 00:05:00
70	OA3-350HI	0.03	484.00	86.00	3.45	2.02	0.05	0.01	0 00:05:00
71	OA3-430EI	0.02	484.00	98.00	3.45	2.97	0.05	0.01	0 00:05:00
72	OA3-430FI	0.03	484.00	98.00	3.45	3.21	0.11	0.03	0 00:05:00
73	OA3-460FI	2.98	484.00	98.00	3.45	3.22	9.58	2.43	0 00:05:00
74	OA3-470DP	0.03	484.00	90.00	3.45	2.37	0.07	0.02	0 00:05:00
75	PA1-10AI	0.05	484.00	98.00	3.45	3.21	0.15	0.04	0 00:05:00

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
76	PA1-10BP	0.09	484.00	90.00	3.45	2.40	0.22	0.06	0 00:05:00
77	PA2-100AI	0.11	484.00	98.00	3.45	3.22	0.35	0.09	0 00:05:00
78	PA2-100BP	0.07	484.00	90.00	3.45	2.40	0.17	0.04	0 00:05:00
79	PA2-130BP	0.05	484.00	90.00	3.45	2.39	0.11	0.03	0 00:05:00
80	PA2-140AI	0.08	484.00	98.00	3.45	3.21	0.24	0.06	0 00:05:00
81	PA2-140CP	0.03	484.00	90.00	3.45	2.38	0.07	0.02	0 00:05:00
82	PA2-160AI	0.06	484.00	98.00	3.45	3.21	0.21	0.05	0 00:05:00
83	PA2-170AI	0.03	484.00	98.00	3.45	3.21	0.10	0.03	0 00:05:00
84	PA2-170BP	0.01	484.00	90.00	3.45	0.78	0.01	0.00	0 00:05:00
85	PA2-20BP	0.02	484.00	90.00	3.45	2.34	0.05	0.01	0 00:05:00
86	PA2-210AI	0.04	484.00	98.00	3.45	3.21	0.12	0.03	0 00:05:00
87	PA2-210BP	0.01	484.00	90.00	3.45	2.05	0.03	0.01	0 00:05:00
88	PA2-210CP	0.04	484.00	90.00	3.45	2.39	0.09	0.02	0 00:05:00
89	PA2-40BP	0.02	484.00	90.00	3.45	2.34	0.05	0.01	0 00:05:00
90	PA2-45AI	0.06	484.00	98.00	3.45	3.21	0.18	0.05	0 00:05:00
91	PA2-45BP	0.03	484.00	90.00	3.45	2.37	0.06	0.02	0 00:05:00
92	PA2-70AI	0.05	484.00	98.00	3.45	3.21	0.17	0.04	0 00:05:00
93	PA2-70BP	0.01	484.00	90.00	3.45	0.78	0.01	0.00	0 00:05:00
94	PA2-70CP	0.02	484.00	90.00	3.45	2.37	0.06	0.02	0 00:05:00
95	PA2-80BP	0.02	484.00	90.00	3.45	2.37	0.06	0.02	0 00:05:00
96	PA2-80CI	0.02	484.00	98.00	3.45	2.97	0.05	0.01	0 00:05:00
97	PA3-220BP	0.01	484.00	90.00	3.45	2.05	0.02	0.01	0 00:05:00
98	PA3-260BP	0.04	484.00	90.00	3.45	2.39	0.09	0.02	0 00:05:00
99	PA3-260CP	0.01	484.00	90.00	3.45	0.78	0.01	0.00	0 00:05:00
100	PA3-260DP	0.01	484.00	90.00	3.45	0.78	0.01	0.00	0 00:05:00
101	PA3-280BP	0.10	484.00	90.00	3.45	2.40	0.24	0.06	0 00:05:00
102	PA3-320BP	0.15	484.00	90.00	3.45	2.40	0.36	0.10	0 00:05:00
103	PA3-350AI	0.18	484.00	98.00	3.45	3.22	0.57	0.15	0 00:05:00
104	PA3-350BP	0.11	484.00	90.00	3.45	2.40	0.26	0.07	0 00:05:00
105	PA3-350CP	0.01	484.00	90.00	3.45	2.05	0.03	0.01	0 00:05:00
106	PA3-380BP	0.14	484.00	90.00	3.45	2.40	0.34	0.09	0 00:05:00
107	PA3-380CI	0.01	484.00	98.00	3.45	1.51	0.01	0.01	0 00:05:00
108	PA3-430BP	0.11	484.00	90.00	3.45	2.40	0.27	0.07	0 00:05:00
109	PA3-430CP	0.01	484.00	90.00	3.45	0.78	0.01	0.00	0 00:05:00
110	PA3-430DP	0.01	484.00	90.00	3.45	2.05	0.03	0.01	0 00:05:00
111	PA3-460AI	0.06	484.00	98.00	3.45	3.21	0.19	0.05	0 00:05:00
112	PA3-460BP	0.09	484.00	90.00	3.45	2.40	0.23	0.06	0 00:05:00
113	PA3-460CP	0.01	484.00	90.00	3.45	0.78	0.01	0.00	0 00:05:00
114	PA3-490BP	0.05	484.00	90.00	3.45	2.39	0.12	0.03	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-10	Junction	343.39	347.29	343.39	346.29	0.00	0.21	343.48	0.00	3.81	0 00:00	0.00	0.00
2	CB-100	Junction	289.90	293.31	289.90	292.31	0.00	1.07	290.20	0.00	3.11	0 00:00	0.00	0.00
3	CB-10EX	Junction	344.23	348.02	344.23	347.02	0.00	0.00	344.23	0.00	3.79	0 00:00	0.00	0.00
4	CB-110	Junction	281.63	293.45	281.63	292.45	0.00	1.07	282.06	0.00	11.39	0 00:00	0.00	0.00
5	CB-110A	Junction	281.10	285.84	281.10	284.84	0.00	0.92	282.04	0.00	3.80	0 00:00	0.00	0.00
6	CB-110B	Junction	281.10	285.56	281.10	285.56	0.00	0.86	282.04	0.00	3.52	0 00:00	0.00	0.00
7	CB-115	Junction	281.86	293.61	281.86	292.61	0.00	0.15	282.00	0.00	11.61	0 00:00	0.00	0.00
8	CB-115A	Junction	281.34	285.80	281.34	285.80	0.00	0.14	281.79	0.00	4.01	0 00:00	0.00	0.00
9	CB-115B	Junction	281.34	285.80	281.34	285.80	0.00	0.12	281.79	0.00	4.01	0 00:00	0.00	0.00
10	CB-120	Junction	281.53	287.37	281.53	286.37	0.00	0.79	281.93	0.00	5.44	0 00:00	0.00	0.00
11	CB-125	Junction	281.82	288.17	281.82	287.17	0.00	0.07	281.93	0.00	6.24	0 00:00	0.00	0.00
12	CB-130	Junction	281.49	285.66	281.49	284.66	0.00	0.75	281.71	0.00	3.95	0 00:00	0.00	0.00
13	CB-132	Junction	281.03	283.33	281.03	282.33	0.00	0.90	281.38	0.00	1.95	0 00:00	0.00	0.00
14	CB-135	Junction	280.23	283.80	280.23	282.80	0.00	0.90	280.44	0.00	3.36	0 00:00	0.00	0.00
15	CB-140	Junction	279.09	282.54	279.09	281.54	0.00	1.33	279.32	0.00	3.22	0 00:00	0.00	0.00
16	CB-145EX	Junction	113.37	119.91	113.37	118.91	0.00	5.98	113.83	0.00	6.08	0 00:00	0.00	0.00
17	CB-150	Junction	272.90	276.31	272.90	275.31	0.00	1.33	273.11	0.00	3.20	0 00:00	0.00	0.00
18	CB-160	Junction	264.28	267.62	264.28	266.62	0.00	7.59	264.84	0.00	2.78	0 00:00	0.00	0.00
19	CB-161	Junction	267.00	268.00	267.00	268.00	0.00	0.00	267.00	0.00	1.00	0 00:00	0.00	0.00
20	CB-165	Junction	260.10	264.54	260.10	263.54	0.00	7.59	260.81	0.00	3.73	0 00:00	0.00	0.00
21	CB-170	Junction	258.30	262.66	258.30	261.66	0.00	7.78	258.92	0.00	3.74	0 00:00	0.00	0.00
22	CB-180	Junction	255.29	261.76	255.29	260.76	0.00	7.80	255.76	0.00	6.00	0 00:00	0.00	0.00
23	CB-185	Junction	251.20	259.05	251.20	258.05	0.00	7.78	252.75	0.00	6.30	0 00:00	0.00	0.00
24	CB-190	Junction	245.48	258.53	245.48	257.53	0.00	7.75	246.87	0.00	11.66	0 00:00	0.00	0.00
25	CB-190A	Junction	244.95	250.35	244.95	250.35	0.00	7.65	246.78	0.00	3.58	0 00:00	0.00	0.00
26	CB-190B	Junction	244.95	250.35	244.95	250.35	0.00	7.40	246.76	0.00	3.60	0 00:00	0.00	0.00
27	CB-20	Junction	337.37	342.99	337.37	341.99	0.00	0.11	337.43	0.00	5.56	0 00:00	0.00	0.00
28	CB-200	Junction	245.43	252.54	245.43	251.54	0.00	7.23	246.63	0.00	5.91	0 00:00	0.00	0.00
29	CB-20EX	Junction	341.53	346.77	341.53	345.77	0.00	0.21	341.64	0.00	5.13	0 00:00	0.00	0.00
30	CB-210	Junction	245.40	251.58	245.40	250.58	0.00	7.62	246.02	0.00	5.56	0 00:00	0.00	0.00
31	CB-211	Junction	246.84	249.52	246.84	248.52	0.00	0.00	246.84	0.00	2.69	0 00:00	0.00	0.00
32	CB-220	Junction	245.58	249.16	245.58	248.16	0.00	0.11	245.65	0.00	3.51	0 00:00	0.00	0.00
33	CB-250	Junction	239.67	243.25	239.67	242.25	0.00	0.11	239.73	0.00	3.52	0 00:00	0.00	0.00
34	CB-260	Junction	234.51	237.78	234.51	236.78	0.00	1.97	234.77	0.00	3.01	0 00:00	0.00	0.00
35	CB-261	Junction	234.49	237.58	234.49	236.58	0.00	0.06	234.78	0.00	2.80	0 00:00	0.00	0.00
36	CB-265	Junction	231.01	234.85	231.01	233.85	0.00	1.98	231.32	0.00	3.53	0 00:00	0.00	0.00
37	CB-270	Junction	229.14	232.76	229.14	231.76	0.00	1.99	229.40	0.00	3.36	0 00:00	0.00	0.00
38	CB-280	Junction	211.41	215.22	211.41	214.22	0.00	2.24	211.70	0.00	3.52	0 00:00	0.00	0.00
39	CB-290	Junction	206.34	209.91	206.34	208.91	0.00	2.24	206.60	0.00	3.31	0 00:00	0.00	0.00
40	CB-30	Junction	332.08	335.68	332.08	334.68	0.00	0.11	332.14	0.00	3.54	0 00:00	0.00	0.00
41	CB-300	Junction	197.45	201.07	197.45	200.07	0.00	2.24	197.72	0.00	3.35	0 00:00	0.00	0.00
42	CB-310	Junction	190.10	193.71	190.10	192.71	0.00	2.24	190.39	0.00	3.32	0 00:00	0.00	0.00
43	CB-320	Junction	184.85	188.45	184.85	187.45	0.00	2.65	185.15	0.00	3.30	0 00:00	0.00	0.00
44	CB-330	Junction	175.77	179.34	175.77	178.34	0.00	2.65	176.06	0.00	3.28	0 00:00	0.00	0.00
45	CB-340	Junction	168.39	172.14	168.39	171.14	0.00	2.65	168.73	0.00	3.41	0 00:00	0.00	0.00
46	CB-341	Junction	170.66	173.82	170.66	172.82	0.00	0.00	170.66	0.00	3.16	0 00:00	0.00	0.00
47	CB-345	Junction	163.77	167.16	163.77	166.16	0.00	2.65	164.02	0.00	3.14	0 00:00	0.00	0.00
48	CB-350	Junction	160.02	165.52	160.02	164.52	0.00	5.71	160.48	0.00	5.04	0 00:00	0.00	0.00
49	CB-351	Junction	160.06	166.95	160.06	165.95	0.00	0.05	160.49	0.00	6.46	0 00:00	0.00	0.00
50	CB-360	Junction	148.00	151.58	148.00	150.58	0.00	5.71	148.42	0.00	3.16	0 00:00	0.00	0.00
51	CB-361	Junction	138.38	143.48	138.38	142.48	0.00	5.70	138.93	0.00	4.55	0 00:00	0.00	0.00
52	CB-365	Junction	136.54	143.15	136.54	142.15	0.00	5.74	137.10	0.00	6.05	0 00:00	0.00	0.00
53	CB-370	Junction	136.50	143.23	136.50	142.23	0.00	1.31	136.99	0.00	6.24	0 00:00	0.00	0.00
54	CB-375	Junction	133.23	139.43	133.23	138.43	0.00	1.31	134.58	0.00	4.85	0 00:00	0.00	0.00
55	CB-376	Junction	138.50	143.22	138.50	142.22	0.00	0.00	138.50	0.00	4.72	0 00:00	0.00	0.00
56	CB-380	Junction	133.20	138.53	133.20	137.53	0.00	6.50	134.57	0.00	3.96	0 00:00	0.00	0.00
57	CB-390A	Junction	121.89	128.92	121.89	128.92	0.00	3.68	123.23	0.00	5.69	0 00:00	0.00	0.00
58	CB-390B	Junction	121.89	128.92	121.89	128.92	0.00	3.63	123.23	0.00	5.70	0 00:00	0.00	0.00
59	CB-395A	Junction	121.84	128.87	121.84	128.87	0.00	2.60	123.24	0.00	5.64	0 00:00	0.00	0.00
60	CB-395B	Junction	121.84	128.87	121.84	128.87	0.00	2.00	123.23	0.00	5.64	0 00:00	0.00	0.00
61	CB-40	Junction	325.96	329.53	325.96	328.53	0.00	0.29	326.05	0.00	3.48	0 00:00	0.00	0.00
62	CB-400	Junction	122.31	130.98	122.31	129.98	0.00	1.75	123.22	0.00	7.76	0 00:00	0.00	0.00
63	CB-405	Junction	122.26	129.24	122.26	128.24	0.00	4.66	123.17	0.00	6.07	0 00:00	0.00	0.00
64	CB-410	Junction	122.22	128.09	122.22	127.09	0.00	4.65	122.65	0.00	5.44	0 00:00	0.00	0.00
65	CB-420	Junction	117.16	122.83	117.16	121.83	0.00	4.65	117.68	0.00	5.15	0 00:00	0.00	0.00
66	CB-430	Junction	114.91	117.98	114.91	116.98	0.00	5.19	115.95	0.00	2.03	0 00:00	0.00	0.00
67	CB-440	Junction	109.33	112.83	109.33	111.83	0.00	5.98	110.07	0.00	2.76	0 00:00	0.00	0.00
68	CB-45	Junction	319.25	323.11	319.25	322.11	0.00	0.35	319.34	0.00	3.77	0 00:00	0.00	0.00
69	CB-450	Junction	107.35	110.80	107.35	109.80	0.00	5.97	107.84	0.00	2.96	0 00:00	0.00	0.00
70	CB-455	Junction	101.37	105.52	101.37	104.52	0.00	5.98	101.86	0.00	3.66	0 00:00	0.00	0.00
71	CB-460	Junction	97.60	101.55	97.60	100.55	0.00	12.43	98.55	0.00	3.00	0 00:00	0.00	0.00
72	CB-465	Junction	94.85	98.89	94.85	97.89	0.00	12.40	95.49	0.00	3.40	0 00:00	0.00	0.00
73	CB-470EX	Junction	89.17	97.22	89.17	96.22	0.00	20.23	90.36	0.00	6.86	0 00:00	0.00	0.00
74	CB-480EX	Junction	82.12	90.03	82.12	89.03	0.00	20.22	82.78	0.00	7.25	0 00:00	0.00	0.00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
75	CB-490	Junction	60.90	67.08	60.90	66.08	0.00	20.44	62.12	0.00	4.96	0 00:00	0.00	0.00
76	CB-490EX	Junction	75.53	80.48	75.63	79.48	0.00	20.44	76.46	0.00	4.02	0 00:00	0.00	0.00
77	CB-495EX	Junction	61.80	68.14	61.80	67.14	0.00	20.43	64.68	0.00	3.45	0 00:00	0.00	0.00
78	CB-50	Junction	311.89	321.06	311.89	320.06	0.00	0.35	312.02	0.00	9.04	0 00:00	0.00	0.00
79	CB-50A	Junction	311.37	315.27	311.37	315.27	0.00	0.28	312.02	0.00	3.25	0 00:00	0.00	0.00
80	CB-50B	Junction	311.87	315.27	311.87	315.27	0.00	0.13	312.02	0.00	3.34	0 00:00	0.00	0.00
81	CB-53	Junction	311.85	321.82	311.85	320.82	0.00	0.10	311.92	0.00	9.90	0 00:00	0.00	0.00
82	CB-53A	Junction	311.33	315.23	311.33	315.23	0.00	0.13	311.92	0.00	3.31	0 00:00	0.00	0.00
83	CB-53B	Junction	311.83	315.23	311.83	315.23	0.00	0.04	311.92	0.00	3.41	0 00:00	0.00	0.00
84	CB-56	Junction	311.82	317.02	311.82	316.02	0.00	0.03	311.92	0.00	5.10	0 00:00	0.00	0.00
85	CB-60	Junction	311.80	316.99	311.80	315.99	0.00	0.11	311.93	0.00	5.06	0 00:00	0.00	0.00
86	CB-70	Junction	311.75	315.46	311.75	314.46	0.00	0.75	311.91	0.00	3.55	0 00:00	0.00	0.00
87	CB-80	Junction	306.46	309.88	306.46	308.88	0.00	0.57	306.60	0.00	3.28	0 00:00	0.00	0.00
88	CB-90	Junction	303.21	306.62	303.21	305.62	0.00	0.57	303.36	0.00	3.26	0 00:00	0.00	0.00
89	CB-95	Junction	301.27	304.68	301.27	303.68	0.00	0.57	301.41	0.00	3.27	0 00:00	0.00	0.00
90	MH-1	Junction	122.42	138.57	122.42	137.57	0.00	6.50	123.30	0.00	15.27	0 00:00	0.00	0.00
91	MH-2	Junction	122.37	141.94	122.37	140.94	0.00	2.74	123.24	0.00	18.70	0 00:00	0.00	0.00
92	Pond	Junction	114.70	120.00	114.70	120.00	0.00	5.19	115.18	0.00	4.82	0 00:00	0.00	0.00
93	WQ-1	Junction	319.46	326.02	319.46	325.02	0.00	0.29	319.66	0.00	6.36	0 00:00	0.00	0.00
94	WQ-2	Junction	295.25	301.82	295.25	300.82	0.00	0.57	295.40	0.00	6.42	0 00:00	0.00	0.00
95	WQ-3	Junction	252.19	261.73	252.19	260.73	0.00	1.01	252.77	0.00	8.96	0 00:00	0.00	0.00
96	WQ-4	Junction	133.29	140.43	133.29	139.43	0.00	1.30	134.60	0.00	5.83	0 00:00	0.00	0.00
97	CB-500EX	Outfall	56.00					20.44	56.78					
98	Culver-2	Outfall	308.34					0.75	308.50					
99	Culvert-1	Outfall	340.76					0.21	340.86					
100	Culvert-3	Outfall	280.30					0.75	280.50					
101	Culvert-4	Outfall	241.65					7.62	242.12					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	11 (1)	Pipe	CB-380	MH-1	7.37	133.20	133.16	0.4900	18.000	0.0120	6.50	7.95	0.82	4.36	1.17	0.79	0.00	Calculated
2	117 (1)	Pipe	CB-250	CB-260	64.97	239.67	234.51	7.9400	18.000	0.0120	0.11	32.07	0.00	1.16	0.16	0.11	0.00	Calculated
3	118 (1)	Pipe	CB-270	CB-280	212.62	229.14	211.66	8.2200	18.000	0.0120	1.98	32.63	0.06	9.97	0.25	0.17	0.00	Calculated
4	118 (2) (1)	Pipe	CB-265	CB-270	19.68	231.01	229.14	9.5100	18.000	0.0120	1.99	35.10	0.06	8.74	0.28	0.19	0.00	Calculated
5	120 (1)	Pipe	CB-300	CB-310	77.51	197.45	190.10	9.4800	18.000	0.0120	2.24	35.04	0.06	9.91	0.28	0.19	0.00	Calculated
6	123 (1)	Pipe	CB-340	CB-345	59.93	168.39	163.77	7.7100	18.000	0.0120	2.65	31.60	0.08	10.78	0.29	0.20	0.00	Calculated
7	123 (1) (1)	Pipe	CB-345	CB-350	16.88	163.77	160.02	22.2400	18.000	0.0120	2.64	53.66	0.05	8.82	0.35	0.24	0.00	Calculated
8	3	Pipe	CB-470EX	CB-480EX	75.55	89.17	82.12	9.3300	18.000	0.0120	20.22	34.76	0.58	17.86	0.92	0.62	0.00	Calculated
9	4	Pipe	CB-10EX	CB-10	11.39	344.23	343.39	7.3800	18.000	0.0120	0.00	30.92	0.00	0.00	0.05	0.03	0.00	Calculated
10	5	Pipe	CB-10	CB-20EX	30.38	343.39	341.53	6.1200	18.000	0.0120	0.21	28.14	0.01	4.09	0.10	0.07	0.00	Calculated
11	6	Pipe	CB-80	CB-90	35.43	306.46	303.21	9.1700	18.000	0.0120	0.57	34.47	0.02	6.55	0.14	0.10	0.00	Calculated
12	7	Pipe	CB-185	CB-190	10.45	251.20	251.15	0.5000	18.000	0.0120	7.75	8.03	0.97	4.80	1.29	0.86	0.00	Calculated
13	9	Pipe	CB-341	CB-340	20.90	170.66	168.80	8.8800	12.000	0.0120	0.00	11.50	0.00	0.00	0.00	0.00	0.00	Calculated
14	11	Pipe	CB-360	CB-361	97.29	148.00	138.38	9.8900	18.000	0.0120	5.70	35.79	0.16	11.59	0.48	0.32	0.00	Calculated
15	25	Pipe	CB-420	CB-430	64.25	117.16	114.91	3.5100	18.000	0.0120	4.64	21.31	0.22	4.99	0.78	0.52	0.00	Calculated
16	32	Pipe	CB-50A	CB-50B	35.07	311.37	311.37	0.0000	42.000	0.0120	0.13	130.15	0.00	0.23	0.41	0.12	0.00	Calculated
17	33	Pipe	CB-110A	CB-110B	70.00	281.10	281.10	0.0000	48.000	0.0120	0.86	69.59	0.01	0.41	0.93	0.23	0.00	Calculated
18	36	Pipe	CB-390A	CB-390B	110.00	121.89	121.89	0.0000	72.000	0.0120	3.63	205.18	0.02	0.80	1.34	0.22	0.00	Calculated
19	37	Pipe	CB-395A	CB-395B	110.00	121.84	121.84	0.0000	72.000	0.0120	2.00	205.18	0.01	0.47	1.39	0.23	0.00	Calculated
20	40	Pipe	CB-60	CB-70	10.65	311.80	311.75	0.5400	18.000	0.0120	0.08	8.33	0.01	1.63	0.15	0.10	0.00	Calculated
21	41	Pipe	CB-50B	CB-60	4.63	311.87	311.84	0.5400	36.000	0.0120	0.11	53.11	0.00	1.39	0.12	0.04	0.00	Calculated
22	42	Pipe	CB-50	CB-50A	4.61	311.89	311.37	11.3800	36.000	0.0120	0.28	243.79	0.00	0.93	0.39	0.13	0.00	Calculated
23	43	Pipe	CB-40	WQ-1	50.04	325.96	319.46	12.9900	18.000	0.0120	0.29	41.01	0.01	3.48	0.14	0.10	0.00	Calculated
24	44	Pipe	CB-490	CB-500EX	42.92	60.90	56.00	11.4100	18.000	0.0120	20.44	38.44	0.53	16.51	1.00	0.67	0.00	Calculated
25	45	Pipe	CB-110B	CB-120	4.58	281.60	281.58	0.5000	36.000	0.0120	0.79	51.19	0.02	1.69	0.39	0.13	0.00	Calculated
26	46	Pipe	CB-110	CB-110A	4.64	281.63	281.60	0.5000	36.000	0.0120	0.92	50.86	0.02	1.78	0.43	0.14	0.00	Calculated
27	48	Pipe	CB-90	CB-95	21.47	303.21	301.27	9.0600	18.000	0.0120	0.57	34.25	0.02	6.28	0.15	0.10	0.00	Calculated
28	49	Pipe	CB-190B	CB-200	4.62	245.45	245.43	0.5000	36.000	0.0120	7.23	50.97	0.14	2.60	1.25	0.42	0.00	Calculated
29	50	Pipe	CB-100	CB-110	6.22	289.90	289.50	6.4600	18.000	0.0120	1.07	28.92	0.04	5.71	0.25	0.17	0.00	Calculated
30	51	Pipe	CB-70	Culver-2	42.05	311.75	308.34	8.1000	18.000	0.0120	0.75	32.39	0.02	7.02	0.17	0.11	0.00	Calculated
31	52	Pipe	CB-190	CB-190A	4.67	245.48	245.45	0.4900	36.000	0.0120	7.65	50.69	0.15	2.90	1.35	0.45	0.00	Calculated
32	53	Pipe	CB-400	CB-405	8.92	122.31	122.26	0.5600	18.000	0.0120	1.76	8.52	0.21	1.58	0.91	0.61	0.00	Calculated
33	55	Pipe	CB-130	Culvert-3	37.87	281.49	280.30	3.1400	18.000	0.0120	0.75	20.17	0.04	5.05	0.21	0.14	0.00	Calculated
34	57	Pipe	CB-120	CB-130	17.99	281.53	281.49	0.2000	18.000	0.0120	0.70	5.09	0.14	2.17	0.36	0.24	0.00	Calculated
35	58	Pipe	CB-190A	CB-190B	55.00	244.95	244.95	0.0000	60.000	0.0120	7.40	126.18	0.06	1.17	1.81	0.36	0.00	Calculated
36	59	Pipe	MH-1	CB-390A	4.64	122.42	122.39	0.6500	36.000	0.0120	3.68	58.10	0.06	2.33	0.85	0.28	0.00	Calculated
37	60	Pipe	MH-2	CB-395A	4.61	122.37	122.34	0.6500	36.000	0.0120	2.60	58.27	0.04	1.92	0.88	0.29	0.00	Calculated
38	61	Pipe	CB-390B	CB-405	4.65	122.39	122.35	0.8600	36.000	0.0120	3.30	67.00	0.05	2.28	0.83	0.28	0.00	Calculated
39	62	Pipe	CB-395B	CB-400	4.65	122.34	122.31	0.6500	36.000	0.0120	1.75	58.04	0.03	1.04	0.90	0.30	0.00	Calculated
40	64	Pipe	CB-140	CB-150	83.44	279.09	272.90	7.4200	18.000	0.0120	1.33	31.00	0.04	8.39	0.22	0.15	0.00	Calculated
41	66	Pipe	CB-150	CB-160	117.45	272.90	264.28	7.3400	18.000	0.0120	1.33	30.83	0.04	4.12	0.39	0.26	0.00	Calculated
42	68	Pipe	CB-351	CB-350	14.00	160.06	160.02	0.2900	12.000	0.0120	0.05	2.09	0.03	0.29	0.45	0.45	0.00	Calculated
43	69	Pipe	CB-170	CB-180	17.02	258.30	255.29	17.6900	18.000	0.0120	7.80	47.86	0.16	13.75	0.54	0.36	0.00	Calculated
44	72	Pipe	CB-160	CB-165	44.73	264.28	260.10	9.3400	18.000	0.0120	7.59	34.79	0.22	10.65	0.64	0.42	0.00	Calculated
45	72 (1)	Pipe	CB-165	CB-170	19.07	260.10	258.30	9.4400	18.000	0.0120	7.60	34.96	0.22	10.21	0.67	0.44	0.00	Calculated
46	74	Pipe	CB-200	CB-210	7.28	245.43	245.40	0.4800	18.000	0.0120	7.22	7.89	0.91	6.46	0.91	0.61	0.00	Calculated
47	75	Pipe	CB-210	Culvert-4	39.23	245.40	241.65	9.5500	18.000	0.0120	7.62	35.16	0.22	13.05	0.55	0.37	0.00	Calculated

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
48	76	Pipe	CB-132	CB-135	12.08	281.03	280.73	2.4500	12.000	0.0120	0.90	6.04	0.15	4.49	0.30	0.30	0.00	Calculated
49	80	Pipe	CB-350	CB-360	154.90	160.02	148.00	7.7600	18.000	0.0120	5.71	31.70	0.18	13.12	0.44	0.29	0.00	Calculated
50	84	Pipe	CB-110	CB-115	7.40	281.90	281.86	0.5000	18.000	0.0120	0.15	8.05	0.02	1.74	0.14	0.10	0.00	Calculated
51	85	Pipe	CB-125	CB-120	7.24	281.82	281.58	3.2300	18.000	0.0120	0.07	20.46	0.00	0.46	0.23	0.15	0.00	Calculated
52	86	Pipe	CB-115	CB-115A	4.63	281.86	281.84	0.5000	36.000	0.0120	0.14	50.94	0.00	1.74	0.12	0.04	0.00	Calculated
53	87	Pipe	MH-1	MH-2	9.30	122.42	122.37	0.5400	18.000	0.0120	2.74	8.34	0.33	2.83	0.87	0.58	0.00	Calculated
54	88	Pipe	CB-115A	CB-115B	70.02	281.34	281.34	0.0000	48.000	0.0120	0.11	69.59	0.00	0.65	0.44	0.11	0.00	Calculated
55	89	Pipe	CB-115B	CB-125	4.63	281.84	281.82	0.5400	36.000	0.0120	0.04	53.08	0.00	0.87	0.07	0.02	0.00	Calculated
56	90	Pipe	CB-480EX	CB-490EX	79.14	82.12	75.63	8.2000	18.000	0.0150	9.23	26.07	0.35	10.78	0.74	0.50	0.00	Calculated
57	91	Pipe	CB-405	CB-410	7.08	122.26	122.22	0.5700	18.000	0.0120	4.65	8.55	0.54	6.05	0.67	0.45	0.00	Calculated
58	92	Pipe	CB-410	CB-420	74.14	122.22	117.16	6.8200	18.000	0.0120	4.65	29.73	0.16	9.63	0.48	0.32	0.00	Calculated
59	93	Pipe	CB-490EX	CB-495EX	101.21	75.53	61.80	13.5700	18.000	0.0150	20.43	33.53	0.61	13.35	1.21	0.81	0.00	Calculated
60	94	Pipe	CB-495EX	CB-490	7.47	61.80	60.90	12.1000	18.000	0.0120	20.44	39.59	0.52	12.12	1.36	0.91	0.00	Calculated
61	98	Pipe	CB-261	CB-260	14.02	234.49	234.60	-0.8200	12.000	0.0120	0.06	3.50	0.02	0.57	0.23	0.23	0.00	Calculated
62	104	Pipe	CB-50	CB-53	6.96	311.89	311.85	0.5700	18.000	0.0120	0.10	8.62	0.01	2.40	0.09	0.06	0.00	Calculated
63	105	Pipe	CB-53	CB-53A	4.60	311.85	311.33	11.3700	36.000	0.0120	0.10	243.61	0.00	0.78	0.33	0.11	0.00	Calculated
64	106	Pipe	CB-53A	CB-53B	35.00	311.33	311.33	0.0000	42.000	0.0120	0.03	130.27	0.00	0.28	0.34	0.10	0.00	Calculated
65	107	Pipe	CB-53B	CB-56	4.66	311.83	311.82	0.1900	36.000	0.0120	0.04	32.31	0.00	0.86	0.09	0.03	0.00	Calculated
66	108	Pipe	CB-56	CB-60	6.97	311.82	311.80	0.2200	18.000	0.0120	0.03	5.28	0.01	0.68	0.11	0.07	0.00	Calculated
67	109	Pipe	WQ-1	CB-45	25.08	319.46	319.25	0.8400	18.000	0.0120	0.29	10.41	0.03	3.27	0.14	0.10	0.00	Calculated
68	111	Pipe	CB-20	CB-30	57.34	337.37	332.08	9.2300	18.000	0.0120	0.11	34.57	0.00	4.42	0.06	0.04	0.00	Calculated
69	112	Pipe	CB-30	CB-40	65.84	332.08	325.96	9.2900	18.000	0.0120	0.11	34.69	0.00	3.31	0.08	0.05	0.00	Calculated
70	117	Pipe	CB-220	CB-250	77.62	245.58	239.67	7.6100	18.000	0.0120	0.11	31.40	0.00	4.13	0.06	0.04	0.00	Calculated
71	118	Pipe	CB-260	CB-265	32.34	234.51	231.01	10.8100	18.000	0.0120	1.98	37.42	0.05	8.69	0.28	0.19	0.00	Calculated
72	119	Pipe	CB-280	CB-290	58.54	211.41	206.34	8.6600	18.000	0.0120	2.24	33.49	0.07	10.05	0.27	0.18	0.00	Calculated
73	120	Pipe	CB-290	CB-300	81.37	206.34	197.45	10.9300	18.000	0.0120	2.24	37.61	0.06	10.60	0.27	0.18	0.00	Calculated
74	121	Pipe	CB-310	CB-320	66.91	190.10	184.85	7.8500	18.000	0.0120	2.24	31.88	0.07	9.13	0.30	0.20	0.00	Calculated
75	122	Pipe	CB-320	CB-330	107.29	184.85	175.77	8.4600	18.000	0.0120	2.65	33.10	0.08	10.65	0.30	0.20	0.00	Calculated
76	123	Pipe	CB-330	CB-340	78.84	175.77	168.39	9.3600	18.000	0.0120	2.65	34.82	0.08	9.82	0.31	0.21	0.00	Calculated
77	127	Pipe	CB-450	CB-455	75.57	107.35	101.37	7.9200	18.000	0.0120	5.98	32.02	0.19	11.86	0.49	0.33	0.00	Calculated
78	128	Pipe	CB-460	CB-465	28.61	97.60	94.85	9.6100	18.000	0.0120	12.40	35.28	0.35	13.16	0.80	0.53	0.00	Calculated
79	130	Pipe	CB-45	CB-50	26.54	319.25	313.56	21.4400	18.000	0.0120	0.35	52.69	0.01	8.11	0.09	0.06	0.00	Calculated
80	132	Pipe	CB-95	WQ-2	39.21	301.27	298.30	7.5600	18.000	0.0120	0.57	31.29	0.02	6.41	0.15	0.10	0.00	Calculated
81	133	Pipe	WQ-2	CB-100	94.80	295.25	289.90	5.6400	18.000	0.0120	0.57	27.03	0.02	3.51	0.22	0.15	0.00	Calculated
82	142	Pipe	CB-375	CB-380	7.52	133.23	133.20	0.4700	18.000	0.0120	1.38	7.76	0.18	0.86	1.35	0.91	0.00	Calculated
83	143	Pipe	CB-430	Pond	74.00	114.91	114.70	0.2700	18.000	0.0120	5.19	5.96	0.87	5.78	0.76	0.51	0.00	Calculated
84	146	Pipe	CB-145EX	CB-440	37.30	113.37	109.33	10.8300	18.000	0.0120	5.98	37.45	0.16	9.17	0.60	0.40	0.00	Calculated
85	148	Pipe	CB-465	CB-470EX	34.10	94.85	89.17	16.6600	18.000	0.0120	12.40	46.45	0.27	12.03	0.92	0.61	0.00	Calculated
86	150	Pipe	CB-365	CB-370	7.26	136.54	136.50	0.5000	18.000	0.0120	1.31	8.01	0.16	2.42	0.52	0.35	0.00	Calculated
87	151	Pipe	WQ-4	CB-375	16.25	133.29	133.21	0.5200	18.000	0.0120	1.31	6.92	0.19	0.80	1.32	0.89	0.00	Calculated
88	155	Pipe	CB-440	CB-450	9.96	109.33	107.35	19.8900	12.000	0.0120	5.97	17.21	0.35	11.79	0.62	0.62	0.00	Calculated
89	170	Pipe	CB-370	WQ-4	33.10	136.50	136.34	0.4900	18.000	0.0120	1.30	7.94	0.16	2.95	0.45	0.30	0.00	Calculated
90	171	Pipe	CB-365	CB-380	49.40	136.54	133.70	5.7500	12.000	0.0120	4.44	9.26	0.48	8.83	0.71	0.72	0.00	Calculated
91	173	Pipe	CB-376	CB-375	14.78	138.50	136.00	16.9200	12.000	0.0120	0.00	15.88	0.00	0.00	0.00	0.00	0.00	Calculated
92	174	Pipe	CB-180	CB-185	32.95	255.29	251.20	12.4100	18.000	0.0120	6.78	40.09	0.17	6.12	0.99	0.66	0.00	Calculated
93	176	Pipe	CB-211	CB-210	13.22	246.84	246.80	0.2900	12.000	0.0120	0.00	2.10	0.00	0.00	0.00	0.00	0.00	Calculated
94	Link-01	Pipe	CB-480EX	CB-490EX	79.01	82.12	75.53	8.3400	18.000	0.0120	11.00	32.86	0.33	11.79	0.79	0.53	0.00	Calculated

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
95	Link-02	Pipe	CB-161	CB-160	18.43	267.00	264.70	12.4800	12.000	0.0120	0.00	13.63	0.00	0.00	0.07	0.07	0.00	Calculated
96	Link-04	Pipe	Pond	CB-145EX	54.47	114.20	113.37	1.5200	60.000	0.0150	5.20	353.10	0.01	5.66	0.46	0.09	0.00	Calculated
97	Link-05	Pipe	CB-20EX	Culvert-1	17.15	341.53	340.76	4.4900	18.000	0.0120	0.21	24.12	0.01	3.93	0.10	0.07	0.00	Calculated
98	Link-07	Pipe	CB-135	CB-140	11.44	280.23	279.09	9.9800	18.000	0.0150	0.90	28.76	0.03	5.79	0.22	0.14	0.00	Calculated
99	Link-08	Pipe	CB-180	WQ-3	9.63	255.29	255.24	0.5200	18.000	0.0150	1.01	6.56	0.15	2.48	0.42	0.28	0.00	Calculated
100	Link-09	Pipe	WQ-3	CB-185	31.88	252.19	251.70	1.5400	18.000	0.0150	1.06	11.29	0.09	2.39	0.80	0.54	0.00	Calculated
101	Link-10	Pipe	CB-361	CB-365	11.92	138.38	136.54	15.4200	18.000	0.0120	5.74	44.68	0.13	9.68	0.56	0.37	0.00	Calculated
102	Link-11	Pipe	CB-455	CB-460	48.20	101.37	97.60	7.8200	18.000	0.0120	5.98	31.81	0.19	8.62	0.68	0.45	0.00	Calculated

Subbasin Hydrology

Subbasin : {Catch Basin Boundaries}.OA2-100CP

Input Data

Area (ac) 0.66
Peak Rate Factor 484
Weighted Curve Number 86.95
Rain Gage ID ..... StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.66	B	86.95
Composite Area & Weighted CN	0.66		86.95

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.13
Peak Runoff (cfs) 0.36
Weighted Curve Number 86.95
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-100DI

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98
Composite Area & Weighted CN	0.09		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.07
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-130CP

Input Data

Area (ac)	0.05
Peak Rate Factor	484
Weighted Curve Number	91.5
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	B	91.5
Composite Area & Weighted CN	0.05		91.5

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.53
Peak Runoff (cfs)	0.03
Weighted Curve Number	91.5
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140DI

Input Data

Area (ac)	0.32
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.32	A	98
Composite Area & Weighted CN	0.32		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.26
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140EP

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	B	86.95
Composite Area & Weighted CN	0.08		86.95

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.13
Peak Runoff (cfs)	0.04
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140FP

Input Data

Area (ac)	1.38
Peak Rate Factor	484
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.38	A	86.95
Composite Area & Weighted CN	1.38		86.95

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.13
Peak Runoff (cfs)	0.74
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140GI

Input Data

Area (ac)	0.2
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.2	A	98
Composite Area & Weighted CN	0.2		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.16
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160CP

Input Data

Area (ac)	1.71
Peak Rate Factor	484
Weighted Curve Number	87.6
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.69	B	87.6
Composite Area & Weighted CN	1.69		87.6

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.19
Peak Runoff (cfs)	0.95
Weighted Curve Number	87.6
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160DI

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.22	B	98
Composite Area & Weighted CN	0.22		98

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.18
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160EI

Input Data

Area (ac)	1.01
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.01	A/B	98
Composite Area & Weighted CN	1.01		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.83
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160FP

Input Data

Area (ac)	5.84
Peak Rate Factor	484
Weighted Curve Number	88.9
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.84	B	88.9
Composite Area & Weighted CN	5.84		88.9

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.3
Peak Runoff (cfs)	3.47
Weighted Curve Number	88.9
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160GI

Input Data

Area (ac)	0.89
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.89	B	98
Composite Area & Weighted CN	0.89		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.73
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-170CI

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	A	98
Composite Area & Weighted CN	0.08		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.07
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-170EP

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.25	A	77
Composite Area & Weighted CN	0.25		77

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.39
Peak Runoff (cfs)	0.07
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-20CP

Input Data

Area (ac)	0.13
Peak Rate Factor	484
Weighted Curve Number	90.2
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.13	B	90.2
Composite Area & Weighted CN	0.13		90.2

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.42
Peak Runoff (cfs)	0.08
Weighted Curve Number	90.2
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-210DI

Input Data

Area (ac)	0.02
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.02	A	98
Composite Area & Weighted CN	0.02		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.19
Peak Runoff (cfs)	0.02
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-210EP

Input Data

Area (ac)	1.42
Peak Rate Factor	484
Weighted Curve Number	82.25
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	1.42	A	82.25
Composite Area & Weighted CN	1.42		82.25

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.76
Peak Runoff (cfs)	0.6
Weighted Curve Number	82.25
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-40CP

Input Data

Area (ac)	0.1
Peak Rate Factor	484
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.09	B	86.95
Composite Area & Weighted CN	0.09		86.95

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.13
Peak Runoff (cfs)	0.06
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-70DP

Input Data

Area (ac)	1.02
Peak Rate Factor	484
Weighted Curve Number	88.9
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.02	B	88.9
Composite Area & Weighted CN	1.02		88.9

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.3
Peak Runoff (cfs)	0.61
Weighted Curve Number	88.9
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-70EI

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98
Composite Area & Weighted CN	0.09		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.07
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-80DP

Input Data

Area (ac)	0.68
Peak Rate Factor	484
Weighted Curve Number	88.25
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.68	B	88.25
Composite Area & Weighted CN	0.68		88.25

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.25
Peak Runoff (cfs)	0.39
Weighted Curve Number	88.25
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-80EI

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	B	98
Composite Area & Weighted CN	0.16		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.14
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-220DI

Input Data

Area (ac)	0.03
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.03	A	98
Composite Area & Weighted CN	0.03		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.2
Peak Runoff (cfs)	0.02
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-220EP

Input Data

Area (ac)	0.11
Peak Rate Factor	484
Weighted Curve Number	81.2
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.11	A	81.2
Composite Area & Weighted CN	0.11		81.2

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.68
Peak Runoff (cfs)	0.05
Weighted Curve Number	81.2
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260EP

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	80.15
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.25	A	80.15
Composite Area & Weighted CN	0.25		80.15

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.61
Peak Runoff (cfs)	0.09
Weighted Curve Number	80.15
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260GP

Input Data

Area (ac)	2.31
Peak Rate Factor	484
Weighted Curve Number	83.3
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	2.31	A	83.3
Composite Area & Weighted CN	2.31		83.3

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.84
Peak Runoff (cfs)	1.03
Weighted Curve Number	83.3
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260HI

Input Data

Area (ac)	0.02
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.02	B	98
Composite Area & Weighted CN	0.02		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.2
Peak Runoff (cfs)	0.02
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260IJ

Input Data

Area (ac)	0.73
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.73	A	98
Composite Area & Weighted CN	0.73		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.22
Peak Runoff (cfs)	0.6
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260KP

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	85.4
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	A	85.4
Composite Area & Weighted CN	0.08		85.4

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2
Peak Runoff (cfs)	0.04
Weighted Curve Number	85.4
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-280CP

Input Data

Area (ac)	0.18
Peak Rate Factor	484
Weighted Curve Number	83.3
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.18	A	83.3
Composite Area & Weighted CN	0.18		83.3

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.84
Peak Runoff (cfs)	0.08
Weighted Curve Number	83.3
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-320CP

Input Data

Area (ac)	0.42
Peak Rate Factor	484
Weighted Curve Number	80.15
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.42	A	80.15
Composite Area & Weighted CN	0.42		80.15

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	1.61
Peak Runoff (cfs)	0.15
Weighted Curve Number	80.15
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-350DP

Input Data

Area (ac)	0.68
Peak Rate Factor	484
Weighted Curve Number	85.4
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.68	A	85.4
Composite Area & Weighted CN	0.68		85.4

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.01
Peak Runoff (cfs)	0.34
Weighted Curve Number	85.4
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-350EI

Input Data

Area (ac)	0.81
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.81	A	98
Composite Area & Weighted CN	0.81		98

Time of Concentration

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	CB-10	343.39	347.29	3.90	343.39	0.00	346.29	-1.00	0.00	0.00
2	CB-100	289.90	293.31	3.41	289.90	0.00	292.31	-1.00	0.00	0.00
3	CB-10EX	344.23	348.02	3.79	344.23	0.00	347.02	-1.00	0.00	0.00
4	CB-110	281.63	293.45	11.82	281.63	0.00	292.45	-1.00	0.00	0.00
5	CB-110A	281.10	285.84	4.73	281.10	0.00	284.84	-1.00	0.00	0.00
6	CB-110B	281.10	285.56	4.46	281.10	0.00	285.56	0.00	0.00	0.00
7	CB-115	281.86	293.61	11.75	281.86	0.00	292.61	-1.00	0.00	0.00
8	CB-115A	281.34	285.80	4.46	281.34	0.00	285.80	0.00	0.00	0.00
9	CB-115B	281.34	285.80	4.46	281.34	0.00	285.80	0.00	0.00	0.00
10	CB-120	281.53	287.37	5.84	281.53	0.00	286.37	-1.00	0.00	0.00
11	CB-125	281.82	288.17	6.36	281.82	0.00	287.17	-1.00	0.00	0.00
12	CB-130	281.49	285.66	4.17	281.49	0.00	284.66	-1.00	0.00	0.00
13	CB-132	281.03	283.33	2.30	281.03	0.00	282.33	-1.00	0.00	0.00
14	CB-135	280.23	283.80	3.57	280.23	0.00	282.80	-1.00	0.00	0.00
15	CB-140	279.09	282.54	3.45	279.09	0.00	281.54	-1.00	0.00	0.00
16	CB-145EX	113.37	119.91	6.54	113.37	0.00	118.91	-1.00	0.00	0.00
17	CB-150	272.90	276.31	3.41	272.90	0.00	275.31	-1.00	0.00	0.00
18	CB-160	264.28	267.62	3.34	264.28	0.00	266.62	-1.00	0.00	0.00
19	CB-161	267.00	268.00	1.00	267.00	0.00	268.00	0.00	0.00	0.00
20	CB-165	260.10	264.54	4.44	260.10	0.00	263.54	-1.00	0.00	0.00
21	CB-170	258.30	262.66	4.36	258.30	0.00	261.66	-1.00	0.00	0.00
22	CB-180	255.29	261.76	6.47	255.29	0.00	260.76	-1.00	0.00	0.00
23	CB-185	251.20	259.05	7.85	251.20	0.00	258.05	-1.00	0.00	0.00
24	CB-190	245.48	258.53	13.05	245.48	0.00	257.53	-1.00	0.00	0.00
25	CB-190A	244.95	250.35	5.40	244.95	0.00	250.35	0.00	0.00	0.00
26	CB-190B	244.95	250.35	5.40	244.95	0.00	250.35	0.00	0.00	0.00
27	CB-20	337.37	342.99	5.62	337.37	0.00	341.99	-1.00	0.00	0.00
28	CB-200	245.43	252.54	7.11	245.43	0.00	251.54	-1.00	0.00	0.00
29	CB-20EX	341.53	346.77	5.24	341.53	0.00	345.77	-1.00	0.00	0.00
30	CB-210	245.40	251.58	6.18	245.40	0.00	250.58	-1.00	0.00	0.00
31	CB-211	246.84	249.52	2.69	246.84	0.00	248.52	-1.00	0.00	0.00
32	CB-220	245.58	249.16	3.58	245.58	0.00	248.16	-1.00	0.00	0.00
33	CB-250	239.67	243.25	3.58	239.67	0.00	242.25	-1.00	0.00	0.00
34	CB-260	234.51	237.78	3.27	234.51	0.00	236.78	-1.00	0.00	0.00
35	CB-261	234.49	237.58	3.10	234.49	0.00	236.58	-1.00	0.00	0.00
36	CB-265	231.01	234.85	3.84	231.01	0.00	233.85	-1.00	0.00	0.00
37	CB-270	229.14	232.76	3.62	229.14	0.00	231.76	-1.00	0.00	0.00
38	CB-280	211.41	215.22	3.81	211.41	0.00	214.22	-1.00	0.00	0.00
39	CB-290	206.34	209.91	3.57	206.34	0.00	208.91	-1.00	0.00	0.00
40	CB-30	332.08	335.68	3.60	332.08	0.00	334.68	-1.00	0.00	0.00
41	CB-300	197.45	201.07	3.62	197.45	0.00	200.07	-1.00	0.00	0.00
42	CB-310	190.10	193.71	3.61	190.10	0.00	192.71	-1.00	0.00	0.00
43	CB-320	184.85	188.45	3.60	184.85	0.00	187.45	-1.00	0.00	0.00
44	CB-330	175.77	179.34	3.57	175.77	0.00	178.34	-1.00	0.00	0.00
45	CB-340	168.39	172.14	3.75	168.39	0.00	171.14	-1.00	0.00	0.00
46	CB-341	170.66	173.82	3.16	170.66	0.00	172.82	-1.00	0.00	0.00
47	CB-345	163.77	167.16	3.39	163.77	0.00	166.16	-1.00	0.00	0.00
48	CB-350	160.02	165.52	5.50	160.02	0.00	164.52	-1.00	0.00	0.00
49	CB-351	160.06	166.95	6.89	160.06	0.00	165.95	-1.00	0.00	0.00
50	CB-360	148.00	151.58	3.58	148.00	0.00	150.58	-1.00	0.00	0.00
51	CB-361	138.38	143.48	5.11	138.38	0.00	142.48	-1.00	0.00	0.00
52	CB-365	136.54	143.15	6.61	136.54	0.00	142.15	-1.00	0.00	0.00
53	CB-370	136.50	143.23	6.73	136.50	0.00	142.23	-1.00	0.00	0.00
54	CB-375	133.23	139.43	6.20	133.23	0.00	138.43	-1.00	0.00	0.00
55	CB-376	138.50	143.22	4.72	138.50	0.00	142.22	-1.00	0.00	0.00
56	CB-380	133.20	138.53	5.34	133.20	0.00	137.53	-1.00	0.00	0.00
57	CB-390A	121.89	128.92	7.03	121.89	0.00	128.92	0.00	0.00	0.00
58	CB-390B	121.89	128.92	7.03	121.89	0.00	128.92	0.00	0.00	0.00
59	CB-395A	121.84	128.87	7.03	121.84	0.00	128.87	0.00	0.00	0.00
60	CB-395B	121.84	128.87	7.03	121.84	0.00	128.87	0.00	0.00	0.00
61	CB-40	325.96	329.53	3.57	325.96	0.00	328.53	-1.00	0.00	0.00
62	CB-400	122.31	130.98	8.67	122.31	0.00	129.98	-1.00	0.00	0.00
63	CB-405	122.26	129.24	6.98	122.26	0.00	128.24	-1.00	0.00	0.00
64	CB-410	122.22	128.09	5.87	122.22	0.00	127.09	-1.00	0.00	0.00
65	CB-420	117.16	122.83	5.67	117.16	0.00	121.83	-1.00	0.00	0.00
66	CB-430	114.91	117.98	3.07	114.91	0.00	116.98	-1.00	0.00	0.00
67	CB-440	109.33	112.83	3.50	109.33	0.00	111.83	-1.00	0.00	0.00
68	CB-45	319.25	323.11	3.86	319.25	0.00	322.11	-1.00	0.00	0.00
69	CB-450	107.35	110.80	3.45	107.35	0.00	109.80	-1.00	0.00	0.00
70	CB-455	101.37	105.52	4.15	101.37	0.00	104.52	-1.00	0.00	0.00
71	CB-460	97.60	101.55	3.95	97.60	0.00	100.55	-1.00	0.00	0.00
72	CB-465	94.85	98.89	4.04	94.85	0.00	97.89	-1.00	0.00	0.00
73	CB-470EX	89.17	97.22	8.05	89.17	0.00	96.22	-1.00	0.00	0.00
74	CB-480EX	82.12	90.03	7.91	82.12	0.00	89.03	-1.00	0.00	0.00
75	CB-490	60.90	67.08	6.18	60.90	0.00	66.08	-1.00	0.00	0.00

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
76	CB-490EX	75.53	80.48	4.95	75.63	0.10	79.48	-1.00	0.00	0.00
77	CB-495EX	61.80	68.14	6.34	61.80	0.00	67.14	-1.00	0.00	0.00
78	CB-50	311.89	321.06	9.17	311.89	0.00	320.06	-1.00	0.00	0.00
79	CB-50A	311.37	315.27	3.90	311.37	0.00	315.27	0.00	0.00	0.00
80	CB-50B	311.87	315.27	3.40	311.87	0.00	315.27	0.00	0.00	0.00
81	CB-53	311.85	321.82	9.97	311.85	0.00	320.82	-1.00	0.00	0.00
82	CB-53A	311.33	315.23	3.90	311.33	0.00	315.23	0.00	0.00	0.00
83	CB-53B	311.83	315.23	3.40	311.83	0.00	315.23	0.00	0.00	0.00
84	CB-56	311.82	317.02	5.20	311.82	0.00	316.02	-1.00	0.00	0.00
85	CB-60	311.80	316.99	5.19	311.80	0.00	315.99	-1.00	0.00	0.00
86	CB-70	311.75	315.46	3.71	311.75	0.00	314.46	-1.00	0.00	0.00
87	CB-80	306.46	309.88	3.42	306.46	0.00	308.88	-1.00	0.00	0.00
88	CB-90	303.21	306.62	3.41	303.21	0.00	305.62	-1.00	0.00	0.00
89	CB-95	301.27	304.68	3.42	301.27	0.00	303.68	-1.00	0.00	0.00
90	MH-1	122.42	138.57	16.15	122.42	0.00	137.57	-1.00	0.00	0.00
91	MH-2	122.37	141.94	19.57	122.37	0.00	140.94	-1.00	0.00	0.00
92	Pond	114.70	120.00	5.30	114.70	0.00	120.00	0.00	0.00	0.00
93	WQ-1	319.46	326.02	6.56	319.46	0.00	325.02	-1.00	0.00	0.00
94	WQ-2	295.25	301.82	6.57	295.25	0.00	300.82	-1.00	0.00	0.00
95	WQ-3	252.19	261.73	9.54	252.19	0.00	260.73	-1.00	0.00	0.00
96	WQ-4	133.29	140.43	7.14	133.29	0.00	139.43	-1.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-10	0.21	0.21	343.48	0.09	0.00	3.81	343.41	0.02	0 07:59	0 00:00	0.00	0.00
2	CB-100	1.07	0.52	290.20	0.30	0.00	3.11	289.95	0.05	0 08:02	0 00:00	0.00	0.00
3	CB-10EX	0.00	0.00	344.23	0.00	0.00	3.79	344.23	0.00	0 00:00	0 00:00	0.00	0.00
4	CB-110	1.07	0.00	282.06	0.43	0.00	11.39	281.72	0.09	0 08:09	0 00:00	0.00	0.00
5	CB-110A	0.92	0.00	282.04	0.94	0.00	3.80	281.66	0.56	0 08:12	0 00:00	0.00	0.00
6	CB-110B	0.86	0.00	282.04	0.94	0.00	3.52	281.66	0.56	0 08:15	0 00:00	0.00	0.00
7	CB-115	0.15	0.00	282.00	0.14	0.00	11.61	281.87	0.01	0 08:14	0 00:00	0.00	0.00
8	CB-115A	0.14	0.00	281.79	0.45	0.00	4.01	281.70	0.36	0 09:52	0 00:00	0.00	0.00
9	CB-115B	0.12	0.00	281.79	0.45	0.00	4.01	281.70	0.36	0 09:48	0 00:00	0.00	0.00
10	CB-120	0.79	0.00	281.93	0.40	0.00	5.44	281.62	0.09	0 08:19	0 00:00	0.00	0.00
11	CB-125	0.07	0.00	281.93	0.12	0.00	6.24	281.82	0.01	0 08:24	0 00:00	0.00	0.00
12	CB-130	0.75	0.10	281.71	0.22	0.00	3.95	281.54	0.05	0 08:19	0 00:00	0.00	0.00
13	CB-132	0.90	0.90	281.38	0.35	0.00	1.95	281.09	0.06	0 08:00	0 00:00	0.00	0.00
14	CB-135	0.90	0.00	280.44	0.21	0.00	3.36	280.27	0.04	0 08:01	0 00:00	0.00	0.00
15	CB-140	1.33	0.43	279.32	0.23	0.00	3.22	279.14	0.05	0 08:00	0 00:00	0.00	0.00
16	CB-145EX	5.98	1.79	113.83	0.46	0.00	6.08	113.48	0.11	0 08:29	0 00:00	0.00	0.00
17	CB-150	1.33	0.00	273.11	0.21	0.00	3.20	272.94	0.04	0 08:02	0 00:00	0.00	0.00
18	CB-160	7.59	6.27	264.84	0.56	0.00	2.78	264.38	0.10	0 08:00	0 00:00	0.00	0.00
19	CB-161	0.00	0.00	267.00	0.00	0.00	1.00	267.00	0.00	0 00:00	0 00:00	0.00	0.00
20	CB-165	7.59	0.00	260.81	0.71	0.00	3.73	260.21	0.11	0 08:00	0 00:00	0.00	0.00
21	CB-170	7.78	0.19	258.92	0.62	0.00	3.74	258.40	0.10	0 08:02	0 00:00	0.00	0.00
22	CB-180	7.80	0.00	255.76	0.47	0.00	6.00	255.37	0.08	0 08:04	0 00:00	0.00	0.00
23	CB-185	7.78	0.00	252.75	1.55	0.00	6.30	251.45	0.25	0 08:08	0 00:00	0.00	0.00
24	CB-190	7.75	0.00	246.87	1.39	0.00	11.66	245.75	0.27	0 08:11	0 00:00	0.00	0.00
25	CB-190A	7.65	0.00	246.78	1.83	0.00	3.58	245.70	0.75	0 08:14	0 00:00	0.00	0.00
26	CB-190B	7.40	0.00	246.76	1.81	0.00	3.60	245.70	0.75	0 08:14	0 00:00	0.00	0.00
27	CB-20	0.11	0.11	337.43	0.06	0.00	5.56	337.38	0.01	0 07:57	0 00:00	0.00	0.00
28	CB-200	7.23	0.00	246.63	1.20	0.00	5.91	245.65	0.22	0 08:15	0 00:00	0.00	0.00
29	CB-20EX	0.21	0.00	341.64	0.11	0.00	5.13	341.55	0.02	0 08:01	0 00:00	0.00	0.00
30	CB-210	7.62	0.67	246.02	0.62	0.00	5.56	245.51	0.11	0 08:16	0 00:00	0.00	0.00
31	CB-211	0.00	0.00	246.84	0.00	0.00	2.69	246.84	0.00	0 00:00	0 00:00	0.00	0.00
32	CB-220	0.11	0.11	245.65	0.07	0.00	3.51	245.59	0.01	0 08:00	0 00:00	0.00	0.00
33	CB-250	0.11	0.00	239.73	0.06	0.00	3.52	239.68	0.01	0 08:02	0 00:00	0.00	0.00
34	CB-260	1.97	1.85	234.77	0.26	0.00	3.01	234.56	0.05	0 07:58	0 00:00	0.00	0.00
35	CB-261	0.06	0.00	234.78	0.29	0.00	2.80	234.59	0.10	0 07:55	0 00:00	0.00	0.00
36	CB-265	1.98	0.00	231.32	0.31	0.00	3.53	231.07	0.06	0 08:00	0 00:00	0.00	0.00
37	CB-270	1.99	0.00	229.40	0.26	0.00	3.36	229.19	0.05	0 08:02	0 00:00	0.00	0.00
38	CB-280	2.24	0.26	211.70	0.29	0.00	3.52	211.47	0.06	0 08:02	0 00:00	0.00	0.00
39	CB-290	2.24	0.00	206.60	0.26	0.00	3.31	206.39	0.05	0 08:03	0 00:00	0.00	0.00
40	CB-30	0.11	0.00	332.14	0.06	0.00	3.54	332.09	0.01	0 08:01	0 00:00	0.00	0.00
41	CB-300	2.24	0.00	197.72	0.27	0.00	3.35	197.50	0.05	0 08:04	0 00:00	0.00	0.00
42	CB-310	2.24	0.00	190.39	0.29	0.00	3.32	190.16	0.06	0 08:06	0 00:00	0.00	0.00
43	CB-320	2.65	0.44	185.15	0.30	0.00	3.30	184.91	0.06	0 08:05	0 00:00	0.00	0.00
44	CB-330	2.65	0.00	176.06	0.29	0.00	3.28	175.83	0.06	0 08:06	0 00:00	0.00	0.00
45	CB-340	2.65	0.00	168.73	0.34	0.00	3.41	168.46	0.07	0 08:08	0 00:00	0.00	0.00
46	CB-341	0.00	0.00	170.66	0.00	0.00	3.16	170.66	0.00	0 00:00	0 00:00	0.00	0.00
47	CB-345	2.65	0.00	164.02	0.25	0.00	3.14	163.82	0.05	0 08:09	0 00:00	0.00	0.00
48	CB-350	5.71	3.19	160.48	0.46	0.00	5.04	160.11	0.09	0 08:02	0 00:00	0.00	0.00
49	CB-351	0.05	0.00	160.49	0.43	0.00	6.46	160.13	0.07	0 08:00	0 00:00	0.00	0.00
50	CB-360	5.71	0.00	148.42	0.42	0.00	3.16	148.08	0.08	0 08:04	0 00:00	0.00	0.00
51	CB-361	5.70	0.00	138.93	0.55	0.00	4.55	138.46	0.08	0 08:00	0 00:00	0.00	0.00
52	CB-365	5.74	0.00	137.10	0.56	0.00	6.05	136.64	0.10	0 08:03	0 00:00	0.00	0.00
53	CB-370	1.31	0.00	136.99	0.49	0.00	6.24	136.59	0.09	0 08:05	0 00:00	0.00	0.00
54	CB-375	1.31	0.00	134.58	1.35	0.00	4.85	133.45	0.22	0 08:06	0 00:00	0.00	0.00
55	CB-376	0.00	0.00	138.50	0.00	0.00	4.72	138.50	0.00	0 00:00	0 00:00	0.00	0.00
56	CB-380	6.50	0.88	134.57	1.38	0.00	3.96	133.43	0.24	0 08:07	0 00:00	0.00	0.00
57	CB-390A	3.68	0.00	123.23	1.34	0.00	5.69	122.54	0.65	0 08:28	0 00:00	0.00	0.00
58	CB-390B	3.63	0.00	123.23	1.34	0.00	5.70	122.54	0.65	0 08:25	0 00:00	0.00	0.00
59	CB-395A	2.60	0.00	123.24	1.40	0.00	5.64	122.49	0.65	0 08:23	0 00:00	0.00	0.00
60	CB-395B	2.00	0.00	123.23	1.39	0.00	5.64	122.49	0.65	0 08:25	0 00:00	0.00	0.00
61	CB-40	0.29	0.18	326.05	0.09	0.00	3.48	325.98	0.02	0 08:00	0 00:00	0.00	0.00
62	CB-400	1.75	0.00	123.22	0.91	0.00	7.76	122.50	0.19	0 08:24	0 00:00	0.00	0.00
63	CB-405	4.66	0.00	123.17	0.91	0.00	6.07	122.47	0.21	0 08:26	0 00:00	0.00	0.00
64	CB-410	4.65	0.00	122.65	0.43	0.00	5.44	122.32	0.10	0 08:27	0 00:00	0.00	0.00
65	CB-420	4.65	0.00	117.68	0.52	0.00	5.15	117.28	0.12	0 08:29	0 00:00	0.00	0.00
66	CB-430	5.19	1.15	115.95	1.04	0.00	2.03	115.16	0.25	0 08:26	0 00:00	0.00	0.00
67	CB-440	5.98	0.00	110.07	0.74	0.00	2.76	109.48	0.15	0 08:31	0 00:00	0.00	0.00
68	CB-45	0.35	0.06	319.34	0.09	0.00	3.77	319.27	0.02	0 08:04	0 00:00	0.00	0.00
69	CB-450	5.97	0.00	107.84	0.49	0.00	2.96	107.47	0.12	0 08:32	0 00:00	0.00	0.00
70	CB-455	5.98	0.00	101.86	0.49	0.00	3.66	101.49	0.12	0 08:34	0 00:00	0.00	0.00
71	CB-460	12.43	7.86	98.55	0.95	0.00	3.00	97.79	0.19	0 08:05	0 00:00	0.00	0.00
72	CB-465	12.40	0.00	95.49	0.64	0.00	3.40	94.99	0.14	0 08:05	0 00:00	0.00	0.00
73	CB-470EX	20.23	8.01	90.36	1.19	0.00	6.86	89.38	0.21	0 08:04	0 00:00	0.00	0.00
74	CB-480EX	20.22	0.00	82.78	0.66	0.00	7.25	82.26	0.14	0 08:03	0 00:00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
75	CB-490	20.44	0.00	62.12	1.22	0.00	4.96	61.11	0.21	0 08:06	0 00:00	0.00	0.00
76	CB-490EX	20.44	0.21	76.46	0.93	0.00	4.02	75.72	0.19	0 08:05	0 00:00	0.00	0.00
77	CB-495EX	20.43	0.00	64.68	2.88	0.00	3.45	62.11	0.31	0 07:44	0 00:00	0.00	0.00
78	CB-50	0.35	0.00	312.02	0.13	0.00	9.04	311.92	0.03	0 08:34	0 00:00	0.00	0.00
79	CB-50A	0.28	0.00	312.02	0.65	0.00	3.25	311.85	0.48	0 08:22	0 00:00	0.00	0.00
80	CB-50B	0.13	0.00	312.02	0.15	0.00	3.34	311.90	0.03	0 08:25	0 00:00	0.00	0.00
81	CB-53	0.10	0.00	311.92	0.07	0.00	9.90	311.87	0.02	0 12:36	0 00:00	0.00	0.00
82	CB-53A	0.13	0.00	311.92	0.59	0.00	3.31	311.78	0.45	0 12:48	0 00:00	0.00	0.00
83	CB-53B	0.04	0.00	311.92	0.09	0.00	3.41	311.86	0.03	0 12:24	0 00:00	0.00	0.00
84	CB-56	0.03	0.00	311.92	0.10	0.00	5.10	311.86	0.04	0 15:07	0 00:00	0.00	0.00
85	CB-60	0.11	0.00	311.93	0.13	0.00	5.06	311.85	0.05	0 08:06	0 00:00	0.00	0.00
86	CB-70	0.75	0.74	311.91	0.16	0.00	3.55	311.79	0.04	0 08:01	0 00:00	0.00	0.00
87	CB-80	0.57	0.57	306.60	0.14	0.00	3.28	306.49	0.03	0 08:00	0 00:00	0.00	0.00
88	CB-90	0.57	0.00	303.36	0.15	0.00	3.26	303.24	0.03	0 08:00	0 00:00	0.00	0.00
89	CB-95	0.57	0.00	301.41	0.15	0.00	3.27	301.29	0.03	0 08:03	0 00:00	0.00	0.00
90	MH-1	6.50	0.00	123.30	0.88	0.00	15.27	122.60	0.18	0 08:10	0 00:00	0.00	0.00
91	MH-2	2.74	0.00	123.24	0.87	0.00	18.70	122.55	0.18	0 08:26	0 00:00	0.00	0.00
92	Pond	5.19	0.00	115.18	0.48	0.00	4.82	114.82	0.12	0 08:27	0 00:00	0.00	0.00
93	WQ-1	0.29	0.00	319.66	0.20	0.00	6.36	319.50	0.04	0 08:03	0 00:00	0.00	0.00
94	WQ-2	0.57	0.00	295.40	0.15	0.00	6.42	295.28	0.03	0 08:04	0 00:00	0.00	0.00
95	WQ-3	1.01	0.00	252.77	0.58	0.00	8.96	252.25	0.06	0 08:06	0 00:00	0.00	0.00
96	WQ-4	1.30	0.00	134.60	1.31	0.00	5.83	133.49	0.20	0 08:06	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	No. of Barrels
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)					(cfs)		
1	11 (1)	7.37	133.20	0.00	133.16	10.74	0.04	0.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
2	117 (1)	64.97	239.67	0.00	234.51	0.00	5.16	7.9400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
3	118 (1)	212.62	229.14	0.00	211.66	0.25	17.48	8.2200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	118 (2) (1)	19.68	231.01	0.00	229.14	0.00	1.87	9.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
5	120 (1)	77.51	197.45	0.00	190.10	0.00	7.35	9.4800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
6	123 (1)	59.93	168.39	0.00	163.77	0.00	4.62	7.7100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
7	123 (1) (1)	16.88	163.77	0.00	160.02	0.00	3.75	22.2400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
8	3	75.55	89.17	0.00	82.12	0.00	7.05	9.3300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
9	4	11.39	344.23	0.00	343.39	0.00	0.84	7.3800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
10	5	30.38	343.39	0.00	341.53	0.00	1.86	6.1200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
11	6	35.43	306.46	0.00	303.21	0.00	3.25	9.1700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
12	7	10.45	251.20	0.00	251.15	5.67	0.05	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
13	9	20.90	170.66	0.00	168.80	0.41	1.86	8.8800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
14	11	97.29	148.00	0.00	138.38	0.00	9.63	9.8900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
15	25	64.25	117.16	0.00	114.91	0.00	2.25	3.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
16	32	35.07	311.37	0.00	311.37	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
17	33	70.00	281.10	0.00	281.10	0.00	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
18	36	110.00	121.89	0.00	121.89	0.00	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
19	37	110.00	121.84	0.00	121.84	0.00	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
20	40	10.65	311.80	0.00	311.75	0.00	0.06	0.5400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
21	41	4.63	311.87	0.00	311.84	0.04	0.03	0.5400	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
22	42	4.61	311.89	0.00	311.37	0.00	0.52	11.3800	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
23	43	50.04	325.96	0.00	319.46	0.00	6.50	12.9900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
24	44	42.92	60.90	0.00	56.00	0.00	4.90	11.4100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
25	45	4.58	281.60	0.50	281.58	0.05	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
26	46	4.64	281.63	0.00	281.60	0.50	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
27	48	21.47	303.21	0.00	301.27	0.00	1.94	9.0600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
28	49	4.62	245.45	0.50	245.43	0.00	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
29	50	6.22	289.90	0.00	289.50	7.87	0.40	6.4600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
30	51	42.05	311.75	0.00	308.34	0.00	3.41	8.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
31	52	4.67	245.48	0.00	245.45	0.50	0.02	0.4900	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
32	53	8.92	122.31	0.00	122.26	0.00	0.05	0.5600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
33	55	37.87	281.49	0.00	280.30	0.00	1.19	3.1400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
34	57	17.99	281.53	0.00	281.49	0.00	0.04	0.2000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
35	58	55.00	244.95	0.00	244.95	0.00	0.00	0.0000	CIRCULAR	60.000	60.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
36	59	4.64	122.42	0.00	122.39	0.50	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
37	60	4.61	122.37	0.00	122.34	0.50	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
38	61	4.65	122.39	0.50	122.35	0.09	0.04	0.8600	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
39	62	4.65	122.34	0.50	122.31	0.00	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
40	64	83.44	279.09	0.00	272.90	0.00	6.19	7.4200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
41	66	117.45	272.90	0.00	264.28	0.00	8.62	7.3400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
42	68	14.00	160.06	0.00	160.02	0.00	0.04	0.2900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
43	69	17.02	258.30	0.00	255.29	0.00	3.01	17.6900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
44	72	44.73	264.28	0.00	260.10	0.00	4.18	9.3400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
45	72 (1)	19.07	260.10	0.00	258.30	0.00	1.80	9.4400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
46	74	7.28	245.43	0.00	245.40	0.00	0.04	0.4800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
47	75	39.23	245.40	0.00	241.65	0.00	3.75	9.5500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
48	76	12.08	281.03	0.00	280.73	0.50	0.30	2.4500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
49	80	154.90	160.02	0.00	148.00	0.00	12.02	7.7600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
50	84	7.40	281.90	0.27	281.86	0.00	0.04	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
51	85	7.24	281.82	0.00	281.58	0.05	0.23	3.2300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
52	86	4.63	281.86	0.00	281.84	0.50	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
53	87	9.30	122.42	0.00	122.37	0.00	0.05	0.5400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
54	88	70.02	281.34	0.00	281.34	0.00	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
55	89	4.63	281.84	0.50	281.82	0.00	0.02	0.5400	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
56	90	79.14	82.12	0.00	75.63	0.10	6.49	8.2000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
57	91	7.08	122.26	0.00	122.22	0.00	0.04	0.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
58	92	74.14	122.22	0.00	117.16	0.00	5.06	6.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
59	93	101.21	75.53	0.00	61.80	0.00	13.73	13.5700	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
60	94	7.47	61.80	0.00	60.90	0.00	0.90	12.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
61	98	14.02	234.49	0.00	234.60	0.09	-0.11	-0.8200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
62	104	6.96	311.89	0.00	311.85	0.00	0.04	0.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
63	105	4.60	311.85	0.00	311.33	0.00	0.52	11.3700	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
64	106	35.00	311.33	0.00	311.33	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
65	107	4.66	311.83	0.00	311.82	0.00	0.01	0.1900	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
66	108	6.97	311.82	0.00	311.80	0.00	0.01	0.2200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
67	109	25.08	319.46	0.00	319.25	0.00	0.21	0.8400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
68	111	57.34	337.37	0.00	332.08	0.00	5.29	9.2300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
69	112	65.84	332.08	0.00	325.96	0.00	6.12	9.2900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
70	117	77.62	245.58	0.00	239.67	0.00	5.91	7.6100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
71	118	32.34	234.51	0.00	231.01	0.00	3.50	10.8100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
72	119	58.54	211.41	0.00	206.34	0.00	5.07	8.6600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
73	120	81.37	206.34	0.00	197.45	0.00	8.89	10.9300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
74	121	66.91	190.10	0.00	184.85	0.00	5.25	7.8500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
75	122	107.29	184.85	0.00	175.77	0.00	9.08	8.4600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
76	123	78.84	175.77	0.00	168.39	0.00	7.38	9.3600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
77	127	75.57	107.35	0.00	101.37	0.00	5.98	7.9200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
78	128	28.61	97.60	0.00	94.85	0.00	2.75	9.6100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
79	130	26.54	319.25	0.00	313.56	1.67	5.69	21.4400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
80	132	39.21	301.27	0.00	298.30	3.05	2.96	7.5600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
81	133	94.80	295.25	0.00	289.90	0.00	5.35	5.6400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
82	142	7.52	133.23	0.00	133.20	0.00	0.03	0.4700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
83	143	74.00	114.91	0.00	114.70	0.00	0.20	0.2700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
84	146	37.30	113.37	0.00	109.33	0.00	4.04	10.8300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
85	148	34.10	94.85	0.00	89.17	0.00	5.68	16.6600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
86	150	7.26	136.54	0.00	136.50	0.00	0.04	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
87	151	16.25	133.29	0.00	133.21	-0.03	0.08	0.5200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
88	155	9.96	109.33	0.00	107.35	0.00	1.98	19.8900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
89	170	33.10	136.50	0.00	136.34	3.05	0.16	0.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
90	171	49.40	136.54	0.00	133.70	0.50	2.84	5.7500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
91	173	14.78	138.50	0.00	136.00	2.77	2.50	16.9200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
92	174	32.95	255.29	0.00	251.20	0.00	4.09	12.4100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
93	176	13.22	246.84	0.00	246.80	1.40	0.04	0.2900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
94	Link-01	79.01	82.12	0.00	75.53	0.00	6.59	8.3400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
95	Link-02	18.43	267.00	0.00	264.70	0.42	2.30	12.4800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
96	Link-04	54.47	114.20	-0.50	113.37	0.00	0.83	1.5200	CIRCULAR	60.000	60.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
97	Link-05	17.15	341.53	0.00	340.76	0.00	0.77	4.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
98	Link-07	11.44	280.23	0.00	279.09	0.00	1.14	9.9800	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
99	Link-08	9.63	255.29	0.00	255.24	3.05	0.05	0.5200	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
100	Link-09	31.88	252.19	0.00	251.70	0.50	0.49	1.5400	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
101	Link-10	11.92	138.38	0.00	136.54	0.00	1.84	15.4200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
102	Link-11	48.20	101.37	0.00	97.60	0.00	3.77	7.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	11 (1)	6.50	0 08:08	7.95	0.82	4.36	0.03	1.17	0.79	0.00		Calculated
2	117 (1)	0.11	0 08:02	32.07	0.00	1.16	0.93	0.16	0.11	0.00		Calculated
3	118 (1)	1.98	0 08:03	32.63	0.06	9.97	0.36	0.25	0.17	0.00		Calculated
4	118 (2) (1)	1.99	0 08:01	35.10	0.06	8.74	0.04	0.28	0.19	0.00		Calculated
5	120 (1)	2.24	0 08:05	35.04	0.06	9.91	0.13	0.28	0.19	0.00		Calculated
6	123 (1)	2.65	0 08:08	31.60	0.08	10.78	0.09	0.29	0.20	0.00		Calculated
7	123 (1) (1)	2.64	0 08:10	53.66	0.05	8.82	0.03	0.35	0.24	0.00		Calculated
8	3	20.22	0 08:04	34.76	0.58	17.86	0.07	0.92	0.62	0.00		Calculated
9	4	0.00	0 00:00	30.92	0.00	0.00		0.05	0.03	0.00		Calculated
10	5	0.21	0 08:00	28.14	0.01	4.09	0.12	0.10	0.07	0.00		Calculated
11	6	0.57	0 08:00	34.47	0.02	6.55	0.09	0.14	0.10	0.00		Calculated
12	7	7.75	0 08:08	8.03	0.97	4.80	0.04	1.29	0.86	0.00		Calculated
13	9	0.00	0 00:00	11.50	0.00	0.00		0.00	0.00	0.00		Calculated
14	11	5.70	0 08:04	35.79	0.16	11.59	0.14	0.48	0.32	0.00		Calculated
15	25	4.64	0 08:30	21.31	0.22	4.99	0.21	0.78	0.52	0.00		Calculated
16	32	0.13	0 08:08	130.15	0.00	0.23	2.54	0.41	0.12	0.00		Calculated
17	33	0.86	0 08:06	69.59	0.01	0.41	2.85	0.93	0.23	0.00		Calculated
18	36	3.63	0 08:10	205.18	0.02	0.80	2.29	1.34	0.22	0.00		Calculated
19	37	2.00	0 08:10	205.18	0.01	0.47	3.90	1.39	0.23	0.00		Calculated
20	40	0.08	0 08:27	8.33	0.01	1.63	0.11	0.15	0.10	0.00		Calculated
21	41	0.11	0 08:25	53.11	0.00	1.39	0.06	0.12	0.04	0.00		Calculated
22	42	0.28	0 07:59	243.79	0.00	0.93	0.08	0.39	0.13	0.00		Calculated
23	43	0.29	0 08:00	41.01	0.01	3.48	0.24	0.14	0.10	0.00		Calculated
24	44	20.44	0 08:06	38.44	0.53	16.51	0.04	1.00	0.67	0.00		Calculated
25	45	0.79	0 08:15	51.19	0.02	1.69	0.05	0.39	0.13	0.00		Calculated
26	46	0.92	0 08:03	50.86	0.02	1.78	0.04	0.43	0.14	0.00		Calculated
27	48	0.57	0 08:01	34.25	0.02	6.28	0.06	0.15	0.10	0.00		Calculated
28	49	7.23	0 08:14	50.97	0.14	2.60	0.03	1.25	0.42	0.00		Calculated
29	50	1.07	0 08:04	28.92	0.04	5.71	0.02	0.25	0.17	0.00		Calculated
30	51	0.75	0 08:02	32.39	0.02	7.02	0.10	0.17	0.11	0.00		Calculated
31	52	7.65	0 08:09	50.69	0.15	2.90	0.03	1.35	0.45	0.00		Calculated
32	53	1.76	0 08:29	8.52	0.21	1.58	0.09	0.91	0.61	0.00		Calculated
33	55	0.75	0 08:20	20.17	0.04	5.05	0.12	0.21	0.14	0.00		Calculated
34	57	0.70	0 08:20	5.09	0.14	2.17	0.14	0.36	0.24	0.00		Calculated
35	58	7.40	0 08:11	126.18	0.06	1.17	0.78	1.81	0.36	0.00		Calculated
36	59	3.68	0 08:09	58.10	0.06	2.33	0.03	0.85	0.28	0.00		Calculated
37	60	2.60	0 08:10	58.27	0.04	1.92	0.04	0.88	0.29	0.00		Calculated
38	61	3.30	0 08:12	67.00	0.05	2.28	0.03	0.83	0.28	0.00		Calculated
39	62	1.75	0 08:27	58.04	0.03	1.04	0.07	0.90	0.30	0.00		Calculated
40	64	1.33	0 08:01	31.00	0.04	8.39	0.17	0.22	0.15	0.00		Calculated
41	66	1.33	0 08:02	30.83	0.04	4.12	0.48	0.39	0.26	0.00		Calculated
42	68	0.05	0 07:39	2.09	0.03	0.29	0.80	0.45	0.45	0.00		Calculated
43	69	7.80	0 08:03	47.86	0.16	13.75	0.02	0.54	0.36	0.00		Calculated
44	72	7.59	0 08:00	34.79	0.22	10.65	0.07	0.64	0.42	0.00		Calculated
45	72 (1)	7.60	0 08:02	34.96	0.22	10.21	0.03	0.67	0.44	0.00		Calculated
46	74	7.22	0 08:16	7.89	0.91	6.46	0.02	0.91	0.61	0.00		Calculated
47	75	7.62	0 08:16	35.16	0.22	13.05	0.05	0.55	0.37	0.00		Calculated
48	76	0.90	0 08:01	6.04	0.15	4.49	0.04	0.30	0.30	0.00		Calculated
49	80	5.71	0 08:03	31.70	0.18	13.12	0.20	0.44	0.29	0.00		Calculated
50	84	0.15	0 08:10	8.05	0.02	1.74	0.07	0.14	0.10	0.00		Calculated
51	85	0.07	0 08:13	20.46	0.00	0.46	0.26	0.23	0.15	0.00		Calculated
52	86	0.14	0 08:16	50.94	0.00	1.74	0.04	0.12	0.04	0.00		Calculated
53	87	2.74	0 08:09	8.34	0.33	2.83	0.05	0.87	0.58	0.00		Calculated
54	88	0.11	0 08:12	69.59	0.00	0.65	1.80	0.44	0.11	0.00		Calculated
55	89	0.04	0 08:26	53.08	0.00	0.87	0.09	0.07	0.02	0.00		Calculated
56	90	9.23	0 08:05	26.07	0.35	10.78	0.12	0.74	0.50	0.00		Calculated
57	91	4.65	0 08:27	8.55	0.54	6.05	0.02	0.67	0.45	0.00		Calculated
58	92	4.65	0 08:28	29.73	0.16	9.63	0.13	0.48	0.32	0.00		Calculated
59	93	20.43	0 08:05	33.53	0.61	13.35	0.13	1.21	0.81	0.00		Calculated
60	94	20.44	0 08:05	39.59	0.52	12.12	0.01	1.36	0.91	0.00		Calculated
61	98	0.06	0 07:41	3.50	0.02	0.57	0.41	0.23	0.23	0.00		Calculated
62	104	0.10	0 08:35	8.62	0.01	2.40	0.05	0.09	0.06	0.00		Calculated
63	105	0.10	0 08:38	243.61	0.00	0.78	0.10	0.33	0.11	0.00		Calculated
64	106	0.03	0 08:22	130.27	0.00	0.28	2.08	0.34	0.10	0.00		Calculated
65	107	0.04	0 08:11	32.31	0.00	0.86	0.09	0.09	0.03	0.00		Calculated
66	108	0.03	0 07:57	5.28	0.01	0.68	0.17	0.11	0.07	0.00		Calculated
67	109	0.29	0 08:04	10.41	0.03	3.27	0.13	0.14	0.10	0.00		Calculated
68	111	0.11	0 08:00	34.57	0.00	4.42	0.22	0.06	0.04	0.00		Calculated
69	112	0.11	0 08:01	34.69	0.00	3.31	0.33	0.08	0.05	0.00		Calculated
70	117	0.11	0 08:00	31.40	0.00	4.13	0.31	0.06	0.04	0.00		Calculated
71	118	1.98	0 07:59	37.42	0.05	8.69	0.06	0.28	0.19	0.00		Calculated
72	119	2.24	0 08:03	33.49	0.07	10.05	0.10	0.27	0.18	0.00		Calculated
73	120	2.24	0 08:04	37.61	0.06	10.60	0.13	0.27	0.18	0.00		Calculated
74	121	2.24	0 08:06	31.88	0.07	9.13	0.12	0.30	0.20	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
75	122	2.65	0 08:06	33.10	0.08	10.65	0.17	0.30	0.20	0.00		Calculated
76	123	2.65	0 08:07	34.82	0.08	9.82	0.13	0.31	0.21	0.00		Calculated
77	127	5.98	0 08:33	32.02	0.19	11.86	0.11	0.49	0.33	0.00		Calculated
78	128	12.40	0 08:05	35.28	0.35	13.16	0.04	0.80	0.53	0.00		Calculated
79	130	0.35	0 08:05	52.69	0.01	8.11	0.05	0.09	0.06	0.00		Calculated
80	132	0.57	0 08:03	31.29	0.02	6.41	0.10	0.15	0.10	0.00		Calculated
81	133	0.57	0 08:04	27.03	0.02	3.51	0.45	0.22	0.15	0.00		Calculated
82	142	1.38	0 08:14	7.76	0.18	0.86	0.15	1.35	0.91	0.00		Calculated
83	143	5.19	0 08:26	5.96	0.87	5.78	0.21	0.76	0.51	0.00		Calculated
84	146	5.98	0 08:30	37.45	0.16	9.17	0.07	0.60	0.40	0.00		Calculated
85	148	12.40	0 08:05	46.45	0.27	12.03	0.05	0.92	0.61	0.00		Calculated
86	150	1.31	0 08:03	8.01	0.16	2.42	0.05	0.52	0.35	0.00		Calculated
87	151	1.31	0 08:08	6.92	0.19	0.80	0.34	1.32	0.89	0.00		Calculated
88	155	5.97	0 08:32	17.21	0.35	11.79	0.01	0.62	0.62	0.00		Calculated
89	170	1.30	0 08:06	7.94	0.16	2.95	0.19	0.45	0.30	0.00		Calculated
90	171	4.44	0 08:05	9.26	0.48	8.83	0.09	0.71	0.72	0.00		Calculated
91	173	0.00	0 00:00	15.88	0.00	0.00		0.00	0.00	0.00		Calculated
92	174	6.78	0 08:05	40.09	0.17	6.12	0.09	0.99	0.66	0.00		Calculated
93	176	0.00	0 00:00	2.10	0.00	0.00		0.00	0.00	0.00		Calculated
94	Link-01	11.00	0 08:05	32.86	0.33	11.79	0.11	0.79	0.53	0.00		Calculated
95	Link-02	0.00	0 00:00	13.63	0.00	0.00		0.07	0.07	0.00		Calculated
96	Link-04	5.20	0 08:28	353.10	0.01	5.66	0.16	0.46	0.09	0.00		Calculated
97	Link-05	0.21	0 08:02	24.12	0.01	3.93	0.07	0.10	0.07	0.00		Calculated
98	Link-07	0.90	0 08:02	28.76	0.03	5.79	0.03	0.22	0.14	0.00		Calculated
99	Link-08	1.01	0 08:05	6.56	0.15	2.48	0.06	0.42	0.28	0.00		Calculated
100	Link-09	1.06	0 08:02	11.29	0.09	2.39	0.22	0.80	0.54	0.00		Calculated
101	Link-10	5.74	0 08:03	44.68	0.13	9.68	0.02	0.56	0.37	0.00		Calculated
102	Link-11	5.98	0 08:34	31.81	0.19	8.62	0.09	0.68	0.45	0.00		Calculated

100-Year Storm Event

Project Description

File Name	SSA_Model.SPF
Description	pw.bentley.com_osbornconsulting-pw-01\francisco jimenez\dms27928\P_10-210058_STRM_Basin Areas.dwg

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	114
Nodes	101
Junctions	96
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	102
Channels	0
Pipes	102
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	StormData	Time Series	100 Year from KC Manual	Cumulative	inches	Washington	King	100.00	3.95	SCS Type IA 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	{Catch Basin Boundaries}.OA2-100CP	0.66	484.00	86.95	3.95	2.59	1.71	0.44	0 00:05:00
2	{Catch Basin Boundaries}.OA2-100DI	0.09	484.00	98.00	3.95	3.71	0.32	0.08	0 00:05:00
3	{Catch Basin Boundaries}.OA2-130CP	0.05	484.00	91.50	3.95	3.01	0.14	0.04	0 00:05:00
4	{Catch Basin Boundaries}.OA2-140DI	0.32	484.00	98.00	3.95	3.72	1.18	0.29	0 00:05:00
5	{Catch Basin Boundaries}.OA2-140EP	0.08	484.00	86.95	3.95	2.58	0.21	0.06	0 00:05:00
6	{Catch Basin Boundaries}.OA2-140FP	1.38	484.00	86.95	3.95	2.59	3.56	0.91	0 00:05:00
7	{Catch Basin Boundaries}.OA2-140GI	0.20	484.00	98.00	3.95	3.72	0.75	0.19	0 00:05:00
8	{Catch Basin Boundaries}.OA2-160CP	1.71	484.00	87.60	3.95	2.65	4.52	1.17	0 00:05:00
9	{Catch Basin Boundaries}.OA2-160DI	0.22	484.00	98.00	3.95	3.72	0.81	0.20	0 00:05:00
10	{Catch Basin Boundaries}.OA2-160EI	1.01	484.00	98.00	3.95	3.72	3.76	0.95	0 00:05:00
11	{Catch Basin Boundaries}.OA2-160FP	5.84	484.00	88.90	3.95	2.77	16.16	4.20	0 00:05:00
12	{Catch Basin Boundaries}.OA2-160GI	0.89	484.00	98.00	3.95	3.72	3.30	0.84	0 00:05:00
13	{Catch Basin Boundaries}.OA2-170CI	0.08	484.00	98.00	3.95	3.71	0.30	0.08	0 00:05:00
14	{Catch Basin Boundaries}.OA2-170EP	0.25	484.00	77.00	3.95	1.77	0.43	0.10	0 00:05:00
15	{Catch Basin Boundaries}.OA2-20CP	0.13	484.00	90.20	3.95	2.89	0.37	0.10	0 00:05:00
16	{Catch Basin Boundaries}.OA2-210DI	0.02	484.00	98.00	3.95	3.70	0.07	0.02	0 00:05:00
17	{Catch Basin Boundaries}.OA2-210EP	1.42	484.00	82.25	3.95	2.18	3.10	0.76	0 00:05:00
18	{Catch Basin Boundaries}.OA2-40CP	0.10	484.00	86.95	3.95	2.58	0.26	0.07	0 00:05:00
19	{Catch Basin Boundaries}.OA2-70DP	1.02	484.00	88.90	3.95	2.77	2.83	0.74	0 00:05:00
20	{Catch Basin Boundaries}.OA2-70EI	0.09	484.00	98.00	3.95	3.71	0.34	0.08	0 00:05:00
21	{Catch Basin Boundaries}.OA2-80DP	0.68	484.00	88.25	3.95	2.71	1.84	0.48	0 00:05:00
22	{Catch Basin Boundaries}.OA2-80EI	0.16	484.00	98.00	3.95	3.72	0.61	0.16	0 00:05:00
23	{Catch Basin Boundaries}.OA3-220DI	0.03	484.00	98.00	3.95	3.71	0.11	0.02	0 00:05:00
24	{Catch Basin Boundaries}.OA3-220EP	0.11	484.00	81.20	3.95	2.09	0.23	0.06	0 00:05:00
25	{Catch Basin Boundaries}.OA3-260EP	0.25	484.00	80.15	3.95	2.01	0.50	0.12	0 00:05:00
26	{Catch Basin Boundaries}.OA3-260GP	2.31	484.00	83.30	3.95	2.27	5.23	1.30	0 00:05:00
27	{Catch Basin Boundaries}.OA3-260HI	0.02	484.00	98.00	3.95	3.71	0.09	0.02	0 00:05:00
28	{Catch Basin Boundaries}.OA3-260IJ	0.73	484.00	98.00	3.95	3.72	2.70	0.69	0 00:05:00
29	{Catch Basin Boundaries}.OA3-260KP	0.08	484.00	85.40	3.95	2.44	0.21	0.05	0 00:05:00
30	{Catch Basin Boundaries}.OA3-280CP	0.18	484.00	83.30	3.95	2.27	0.41	0.10	0 00:05:00
31	{Catch Basin Boundaries}.OA3-320CP	0.42	484.00	80.15	3.95	2.01	0.84	0.20	0 00:05:00
32	{Catch Basin Boundaries}.OA3-350DP	0.68	484.00	85.40	3.95	2.45	1.66	0.42	0 00:05:00
33	{Catch Basin Boundaries}.OA3-350EI	0.81	484.00	98.00	3.95	3.72	3.02	0.76	0 00:05:00
34	{Catch Basin Boundaries}.OA3-350FP	4.08	484.00	84.35	3.95	2.36	9.61	2.41	0 00:05:00
35	{Catch Basin Boundaries}.OA3-350GP	0.10	484.00	77.00	3.95	1.77	0.18	0.04	0 00:05:00
36	{Catch Basin Boundaries}.OA3-380DP	1.37	484.00	84.35	3.95	2.36	3.24	0.81	0 00:05:00
37	{Catch Basin Boundaries}.OA3-430GP	2.00	484.00	83.30	3.95	2.27	4.55	1.13	0 00:05:00
38	{Catch Basin Boundaries}.OA3-460DP	5.17	484.00	80.15	3.95	2.01	10.41	2.48	0 00:05:00
39	{Catch Basin Boundaries}.OA3-460EI	0.01	484.00	98.00	3.95	1.93	0.01	0.01	0 00:05:00
40	{Catch Basin Boundaries}.OA3-460GP	1.01	484.00	81.20	3.95	2.10	2.11	0.51	0 00:05:00
41	{Catch Basin Boundaries}.OA3-460HP	0.05	484.00	77.00	3.95	1.77	0.09	0.02	0 00:05:00
42	{Catch Basin Boundaries}.OA3-460IP	1.57	484.00	83.30	3.95	2.27	3.57	0.89	0 00:05:00
43	{Catch Basin Boundaries}.OA3-460JP	2.09	484.00	83.30	3.95	2.27	4.74	1.17	0 00:05:00
44	{Catch Basin Boundaries}.OA3-460KP	2.20	484.00	90.20	3.95	2.89	6.36	1.66	0 00:05:00
45	{Catch Basin Boundaries}.OA3-470AI	3.29	484.00	98.00	3.95	3.72	12.21	3.09	0 00:05:00
46	{Catch Basin Boundaries}.OA3-470BP	3.61	484.00	83.30	3.95	2.27	8.19	2.03	0 00:05:00
47	{Catch Basin Boundaries}.OA3-470CP	8.34	484.00	83.30	3.95	2.27	18.92	4.70	0 00:05:00
48	{Catch Basin Boundaries}.OA3-490CP	0.23	484.00	86.95	3.95	2.59	0.60	0.15	0 00:05:00
49	{Catch Basin Boundaries}.OA3-PondAP	0.23	484.00	77.00	3.95	1.77	0.40	0.09	0 00:05:00
50	{Catch Basin Boundaries}.OA3-PondBP	1.82	484.00	85.40	3.95	2.45	4.46	1.13	0 00:05:00
51	{Catch Basin Boundaries}.OA3-PondCI	1.00	484.00	98.00	3.95	3.72	3.71	0.94	0 00:05:00
52	{Catch Basin Boundaries}.PA2-130AI	0.03	484.00	98.00	3.95	3.71	0.12	0.03	0 00:05:00
53	{Catch Basin Boundaries}.PA2-140BP	0.04	484.00	90.00	3.95	2.86	0.12	0.03	0 00:05:00
54	{Catch Basin Boundaries}.PA2-160BP	0.12	484.00	90.00	3.95	2.87	0.36	0.10	0 00:05:00
55	{Catch Basin Boundaries}.PA2-20AI	0.03	484.00	98.00	3.95	3.71	0.09	0.02	0 00:05:00
56	{Catch Basin Boundaries}.PA2-40AI	0.13	484.00	98.00	3.95	3.71	0.49	0.13	0 00:05:00
57	{Catch Basin Boundaries}.PA2-80AI	0.02	484.00	98.00	3.95	3.70	0.07	0.02	0 00:05:00
58	{Catch Basin Boundaries}.PA3-220AI	0.03	484.00	98.00	3.95	3.71	0.12	0.03	0 00:05:00
59	{Catch Basin Boundaries}.PA3-260AI	0.05	484.00	98.00	3.95	3.71	0.19	0.05	0 00:05:00
60	{Catch Basin Boundaries}.PA3-280AI	0.14	484.00	98.00	3.95	3.72	0.54	0.14	0 00:05:00
61	{Catch Basin Boundaries}.PA3-320AI	0.24	484.00	98.00	3.95	3.72	0.88	0.22	0 00:05:00
62	{Catch Basin Boundaries}.PA3-380AI	0.17	484.00	98.00	3.95	3.72	0.63	0.16	0 00:05:00
63	{Catch Basin Boundaries}.PA3-430AI	0.16	484.00	98.00	3.95	3.72	0.61	0.16	0 00:05:00
64	{Catch Basin Boundaries}.PA3-490AI	0.07	484.00	98.00	3.95	3.71	0.27	0.07	0 00:05:00
65	OA1-10CP	0.10	484.00	90.20	3.95	2.89	0.30	0.08	0 00:05:00
66	OA1-10DP	0.11	484.00	86.95	3.95	2.58	0.29	0.07	0 00:05:00
67	OA2-170DI	0.02	484.00	98.00	3.95	3.70	0.07	0.02	0 00:05:00
68	OA3-220CI	0.01	484.00	98.00	3.95	3.61	0.04	0.01	0 00:05:00
69	OA3-260II	0.01	484.00	98.00	3.95	1.93	0.01	0.01	0 00:05:00
70	OA3-350HI	0.03	484.00	86.00	3.95	2.47	0.07	0.02	0 00:05:00
71	OA3-430EI	0.02	484.00	98.00	3.95	3.61	0.06	0.01	0 00:05:00
72	OA3-430FI	0.03	484.00	98.00	3.95	3.71	0.12	0.03	0 00:05:00
73	OA3-460FI	2.98	484.00	98.00	3.95	3.72	11.06	2.80	0 00:05:00
74	OA3-470DP	0.03	484.00	90.00	3.95	2.84	0.08	0.02	0 00:05:00
75	PA1-10AI	0.05	484.00	98.00	3.95	3.71	0.17	0.04	0 00:05:00

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
76	PA1-10BP	0.09	484.00	90.00	3.95	2.87	0.26	0.07	0 00:05:00
77	PA2-100AI	0.11	484.00	98.00	3.95	3.71	0.40	0.10	0 00:05:00
78	PA2-100BP	0.07	484.00	90.00	3.95	2.87	0.21	0.05	0 00:05:00
79	PA2-130BP	0.05	484.00	90.00	3.95	2.86	0.13	0.03	0 00:05:00
80	PA2-140AI	0.08	484.00	98.00	3.95	3.71	0.28	0.07	0 00:05:00
81	PA2-140CP	0.03	484.00	90.00	3.95	2.85	0.09	0.02	0 00:05:00
82	PA2-160AI	0.06	484.00	98.00	3.95	3.71	0.24	0.06	0 00:05:00
83	PA2-170AI	0.03	484.00	98.00	3.95	3.71	0.12	0.03	0 00:05:00
84	PA2-170BP	0.01	484.00	90.00	3.95	1.24	0.01	0.01	0 00:05:00
85	PA2-20BP	0.02	484.00	90.00	3.95	2.82	0.06	0.01	0 00:05:00
86	PA2-210AI	0.04	484.00	98.00	3.95	3.71	0.14	0.04	0 00:05:00
87	PA2-210BP	0.01	484.00	90.00	3.95	2.68	0.03	0.01	0 00:05:00
88	PA2-210CP	0.04	484.00	90.00	3.95	2.86	0.10	0.03	0 00:05:00
89	PA2-40BP	0.02	484.00	90.00	3.95	2.82	0.06	0.01	0 00:05:00
90	PA2-45AI	0.06	484.00	98.00	3.95	3.71	0.21	0.05	0 00:05:00
91	PA2-45BP	0.03	484.00	90.00	3.95	2.84	0.08	0.02	0 00:05:00
92	PA2-70AI	0.05	484.00	98.00	3.95	3.71	0.19	0.05	0 00:05:00
93	PA2-70BP	0.01	484.00	90.00	3.95	1.24	0.01	0.01	0 00:05:00
94	PA2-70CP	0.02	484.00	90.00	3.95	2.84	0.07	0.02	0 00:05:00
95	PA2-80BP	0.02	484.00	90.00	3.95	2.84	0.07	0.02	0 00:05:00
96	PA2-80CI	0.02	484.00	98.00	3.95	3.61	0.06	0.01	0 00:05:00
97	PA3-220BP	0.01	484.00	90.00	3.95	2.68	0.03	0.01	0 00:05:00
98	PA3-260BP	0.04	484.00	90.00	3.95	2.86	0.10	0.03	0 00:05:00
99	PA3-260CP	0.01	484.00	90.00	3.95	1.24	0.01	0.01	0 00:05:00
100	PA3-260DP	0.01	484.00	90.00	3.95	1.24	0.01	0.01	0 00:05:00
101	PA3-280BP	0.10	484.00	90.00	3.95	2.87	0.29	0.08	0 00:05:00
102	PA3-320BP	0.15	484.00	90.00	3.95	2.87	0.43	0.12	0 00:05:00
103	PA3-350AI	0.18	484.00	98.00	3.95	3.72	0.66	0.17	0 00:05:00
104	PA3-350BP	0.11	484.00	90.00	3.95	2.87	0.31	0.08	0 00:05:00
105	PA3-350CP	0.01	484.00	90.00	3.95	2.68	0.04	0.01	0 00:05:00
106	PA3-380BP	0.14	484.00	90.00	3.95	2.87	0.41	0.11	0 00:05:00
107	PA3-380CI	0.01	484.00	98.00	3.95	1.93	0.01	0.01	0 00:05:00
108	PA3-430BP	0.11	484.00	90.00	3.95	2.87	0.33	0.09	0 00:05:00
109	PA3-430CP	0.01	484.00	90.00	3.95	1.24	0.01	0.01	0 00:05:00
110	PA3-430DP	0.01	484.00	90.00	3.95	2.68	0.04	0.01	0 00:05:00
111	PA3-460AI	0.06	484.00	98.00	3.95	3.71	0.22	0.05	0 00:05:00
112	PA3-460BP	0.09	484.00	90.00	3.95	2.87	0.27	0.07	0 00:05:00
113	PA3-460CP	0.01	484.00	90.00	3.95	1.24	0.01	0.01	0 00:05:00
114	PA3-490BP	0.05	484.00	90.00	3.95	2.86	0.14	0.04	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-10	Junction	343.39	347.29	343.39	346.29	0.00	0.26	343.49	0.00	3.80	0 00:00	0.00	0.00
2	CB-100	Junction	289.90	293.31	289.90	292.31	0.00	1.29	290.24	0.00	3.07	0 00:00	0.00	0.00
3	CB-10EX	Junction	344.23	348.02	344.23	347.02	0.00	0.00	344.23	0.00	3.79	0 00:00	0.00	0.00
4	CB-110	Junction	281.63	293.45	281.63	292.45	0.00	1.29	282.10	0.00	11.35	0 00:00	0.00	0.00
5	CB-110A	Junction	281.10	285.84	281.10	284.84	0.00	1.07	282.08	0.00	3.76	0 00:00	0.00	0.00
6	CB-110B	Junction	281.10	285.56	281.10	285.56	0.00	0.99	282.07	0.00	3.49	0 00:00	0.00	0.00
7	CB-115	Junction	281.86	293.61	281.86	292.61	0.00	0.22	282.03	0.00	11.58	0 00:00	0.00	0.00
8	CB-115A	Junction	281.34	285.80	281.34	285.80	0.00	0.21	281.93	0.00	3.86	0 00:00	0.00	0.00
9	CB-115B	Junction	281.34	285.80	281.34	285.80	0.00	0.18	281.93	0.00	3.86	0 00:00	0.00	0.00
10	CB-120	Junction	281.53	287.37	281.53	286.37	0.00	0.92	281.96	0.00	5.41	0 00:00	0.00	0.00
11	CB-125	Junction	281.82	288.17	281.82	287.17	0.00	0.10	281.96	0.00	6.21	0 00:00	0.00	0.00
12	CB-130	Junction	281.49	285.66	281.49	284.66	0.00	0.87	281.73	0.00	3.93	0 00:00	0.00	0.00
13	CB-132	Junction	281.03	283.33	281.03	282.33	0.00	1.10	281.42	0.00	1.91	0 00:00	0.00	0.00
14	CB-135	Junction	280.23	283.80	280.23	282.80	0.00	1.10	280.47	0.00	3.33	0 00:00	0.00	0.00
15	CB-140	Junction	279.09	282.54	279.09	281.54	0.00	1.60	279.34	0.00	3.20	0 00:00	0.00	0.00
16	CB-145EX	Junction	113.37	119.91	113.37	118.91	0.00	7.41	113.89	0.00	6.02	0 00:00	0.00	0.00
17	CB-150	Junction	272.90	276.31	272.90	275.31	0.00	1.60	273.13	0.00	3.18	0 00:00	0.00	0.00
18	CB-160	Junction	264.28	267.62	264.28	266.62	0.00	9.09	264.91	0.00	2.71	0 00:00	0.00	0.00
19	CB-161	Junction	267.00	268.00	267.00	268.00	0.00	0.00	267.00	0.00	1.00	0 00:00	0.00	0.00
20	CB-165	Junction	260.10	264.54	260.10	263.54	0.00	9.08	260.91	0.00	3.63	0 00:00	0.00	0.00
21	CB-170	Junction	258.30	262.66	258.30	261.66	0.00	9.32	259.00	0.00	3.66	0 00:00	0.00	0.00
22	CB-180	Junction	255.29	261.76	255.29	260.76	0.00	9.33	255.84	0.00	5.92	0 00:00	0.00	0.00
23	CB-185	Junction	251.20	259.05	251.20	258.05	0.00	9.39	252.96	0.00	6.09	0 00:00	0.00	0.00
24	CB-190	Junction	245.48	258.53	245.48	257.53	0.00	9.30	247.04	0.00	11.49	0 00:00	0.00	0.00
25	CB-190A	Junction	244.95	250.35	244.95	250.35	0.00	9.16	246.94	0.00	3.42	0 00:00	0.00	0.00
26	CB-190B	Junction	244.95	250.35	244.95	250.35	0.00	8.84	246.91	0.00	3.44	0 00:00	0.00	0.00
27	CB-20	Junction	337.37	342.99	337.37	341.99	0.00	0.13	337.44	0.00	5.55	0 00:00	0.00	0.00
28	CB-200	Junction	245.43	252.54	245.43	251.54	0.00	8.65	246.78	0.00	5.76	0 00:00	0.00	0.00
29	CB-20EX	Junction	341.53	346.77	341.53	345.77	0.00	0.26	341.65	0.00	5.12	0 00:00	0.00	0.00
30	CB-210	Junction	245.40	251.58	245.40	250.58	0.00	9.14	246.10	0.00	5.48	0 00:00	0.00	0.00
31	CB-211	Junction	246.84	249.52	246.84	248.52	0.00	0.00	246.84	0.00	2.69	0 00:00	0.00	0.00
32	CB-220	Junction	245.58	249.16	245.58	248.16	0.00	0.13	245.65	0.00	3.51	0 00:00	0.00	0.00
33	CB-250	Junction	239.67	243.25	239.67	242.25	0.00	0.13	239.74	0.00	3.51	0 00:00	0.00	0.00
34	CB-260	Junction	234.51	237.78	234.51	236.78	0.00	2.40	234.80	0.00	2.98	0 00:00	0.00	0.00
35	CB-261	Junction	234.49	237.58	234.49	236.58	0.00	0.07	234.81	0.00	2.77	0 00:00	0.00	0.00
36	CB-265	Junction	231.01	234.85	231.01	233.85	0.00	2.42	231.36	0.00	3.49	0 00:00	0.00	0.00
37	CB-270	Junction	229.14	232.76	229.14	231.76	0.00	2.43	229.43	0.00	3.33	0 00:00	0.00	0.00
38	CB-280	Junction	211.41	215.22	211.41	214.22	0.00	2.73	211.73	0.00	3.49	0 00:00	0.00	0.00
39	CB-290	Junction	206.34	209.91	206.34	208.91	0.00	2.73	206.63	0.00	3.28	0 00:00	0.00	0.00
40	CB-30	Junction	332.08	335.68	332.08	334.68	0.00	0.13	332.15	0.00	3.53	0 00:00	0.00	0.00
41	CB-300	Junction	197.45	201.07	197.45	200.07	0.00	2.73	197.75	0.00	3.32	0 00:00	0.00	0.00
42	CB-310	Junction	190.10	193.71	190.10	192.71	0.00	2.73	190.42	0.00	3.29	0 00:00	0.00	0.00
43	CB-320	Junction	184.85	188.45	184.85	187.45	0.00	3.25	185.19	0.00	3.26	0 00:00	0.00	0.00
44	CB-330	Junction	175.77	179.34	175.77	178.34	0.00	3.25	176.09	0.00	3.25	0 00:00	0.00	0.00
45	CB-340	Junction	168.39	172.14	168.39	171.14	0.00	3.25	168.77	0.00	3.37	0 00:00	0.00	0.00
46	CB-341	Junction	170.66	173.82	170.66	172.82	0.00	0.00	170.66	0.00	3.16	0 00:00	0.00	0.00
47	CB-345	Junction	163.77	167.16	163.77	166.16	0.00	3.25	164.06	0.00	3.10	0 00:00	0.00	0.00
48	CB-350	Junction	160.02	165.52	160.02	164.52	0.00	7.00	160.54	0.00	4.98	0 00:00	0.00	0.00
49	CB-351	Junction	160.06	166.95	160.06	165.95	0.00	0.06	160.54	0.00	6.41	0 00:00	0.00	0.00
50	CB-360	Junction	148.00	151.58	148.00	150.58	0.00	7.00	148.47	0.00	3.11	0 00:00	0.00	0.00
51	CB-361	Junction	138.38	143.48	138.38	142.48	0.00	6.99	139.01	0.00	4.47	0 00:00	0.00	0.00
52	CB-365	Junction	136.54	143.15	136.54	142.15	0.00	7.03	137.20	0.00	5.95	0 00:00	0.00	0.00
53	CB-370	Junction	136.50	143.23	136.50	142.23	0.00	1.71	137.07	0.00	6.16	0 00:00	0.00	0.00
54	CB-375	Junction	133.23	139.43	133.23	138.43	0.00	1.74	134.82	0.00	4.61	0 00:00	0.00	0.00
55	CB-376	Junction	138.50	143.22	138.50	142.22	0.00	0.00	138.50	0.00	4.72	0 00:00	0.00	0.00
56	CB-380	Junction	133.20	138.53	133.20	137.53	0.00	8.05	134.79	0.00	3.74	0 00:00	0.00	0.00
57	CB-390A	Junction	121.89	128.92	121.89	128.92	0.00	4.77	123.36	0.00	5.56	0 00:00	0.00	0.00
58	CB-390B	Junction	121.89	128.92	121.89	128.92	0.00	4.33	123.35	0.00	5.57	0 00:00	0.00	0.00
59	CB-395A	Junction	121.84	128.87	121.84	128.87	0.00	3.10	123.36	0.00	5.51	0 00:00	0.00	0.00
60	CB-395B	Junction	121.84	128.87	121.84	128.87	0.00	2.28	123.36	0.00	5.51	0 00:00	0.00	0.00
61	CB-40	Junction	325.96	329.53	325.96	328.53	0.00	0.34	326.06	0.00	3.47	0 00:00	0.00	0.00
62	CB-400	Junction	122.31	130.98	122.31	129.98	0.00	2.09	123.34	0.00	7.64	0 00:00	0.00	0.00
63	CB-405	Junction	122.26	129.24	122.26	128.24	0.00	5.78	123.30	0.00	5.94	0 00:00	0.00	0.00
64	CB-410	Junction	122.22	128.09	122.22	127.09	0.00	5.77	122.71	0.00	5.38	0 00:00	0.00	0.00
65	CB-420	Junction	117.16	122.83	117.16	121.83	0.00	5.77	117.77	0.00	5.06	0 00:00	0.00	0.00
66	CB-430	Junction	114.91	117.98	114.91	116.98	0.00	6.46	116.11	0.00	1.87	0 00:00	0.00	0.00
67	CB-440	Junction	109.33	112.83	109.33	111.83	0.00	7.42	110.26	0.00	2.57	0 00:00	0.00	0.00
68	CB-45	Junction	319.25	323.11	319.25	322.11	0.00	0.41	319.35	0.00	3.76	0 00:00	0.00	0.00
69	CB-450	Junction	107.35	110.80	107.35	109.80	0.00	7.40	107.91	0.00	2.89	0 00:00	0.00	0.00
70	CB-455	Junction	101.37	105.52	101.37	104.52	0.00	7.41	101.93	0.00	3.59	0 00:00	0.00	0.00
71	CB-460	Junction	97.60	101.55	97.60	100.55	0.00	15.42	98.69	0.00	2.86	0 00:00	0.00	0.00
72	CB-465	Junction	94.85	98.89	94.85	97.89	0.00	15.38	95.73	0.00	3.16	0 00:00	0.00	0.00
73	CB-470EX	Junction	89.17	97.22	89.17	96.22	0.00	24.89	92.10	0.00	5.12	0 00:00	0.00	0.00
74	CB-480EX	Junction	82.12	90.03	82.12	89.03	0.00	24.89	82.86	0.00	7.17	0 00:00	0.00	0.00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
75	CB-490	Junction	60.90	67.08	60.90	66.08	0.00	25.09	63.45	0.00	3.63	0 00:00	0.00	0.00
76	CB-490EX	Junction	75.53	80.48	75.63	79.48	0.00	25.17	76.88	0.00	3.60	0 00:00	0.00	0.00
77	CB-495EX	Junction	61.80	68.14	61.80	67.14	0.00	25.08	66.95	0.00	1.18	0 00:00	0.00	0.00
78	CB-50	Junction	311.89	321.06	311.89	320.06	0.00	0.41	312.04	0.00	9.02	0 00:00	0.00	0.00
79	CB-50A	Junction	311.37	315.27	311.37	315.27	0.00	0.33	312.04	0.00	3.22	0 00:00	0.00	0.00
80	CB-50B	Junction	311.87	315.27	311.87	315.27	0.00	0.18	312.04	0.00	3.33	0 00:00	0.00	0.00
81	CB-53	Junction	311.85	321.82	311.85	320.82	0.00	0.13	311.94	0.00	9.88	0 00:00	0.00	0.00
82	CB-53A	Junction	311.33	315.23	311.33	315.23	0.00	0.18	311.94	0.00	3.29	0 00:00	0.00	0.00
83	CB-53B	Junction	311.83	315.23	311.83	315.23	0.00	0.05	311.94	0.00	3.39	0 00:00	0.00	0.00
84	CB-56	Junction	311.82	317.02	311.82	316.02	0.00	0.05	311.94	0.00	5.08	0 00:00	0.00	0.00
85	CB-60	Junction	311.80	316.99	311.80	315.99	0.00	0.16	311.95	0.00	5.04	0 00:00	0.00	0.00
86	CB-70	Junction	311.75	315.46	311.75	314.46	0.00	0.91	311.93	0.00	3.53	0 00:00	0.00	0.00
87	CB-80	Junction	306.46	309.88	306.46	308.88	0.00	0.68	306.61	0.00	3.27	0 00:00	0.00	0.00
88	CB-90	Junction	303.21	306.62	303.21	305.62	0.00	0.68	303.37	0.00	3.25	0 00:00	0.00	0.00
89	CB-95	Junction	301.27	304.68	301.27	303.68	0.00	0.68	301.43	0.00	3.25	0 00:00	0.00	0.00
90	MH-1	Junction	122.42	138.57	122.42	137.57	0.00	8.06	123.42	0.00	15.15	0 00:00	0.00	0.00
91	MH-2	Junction	122.37	141.94	122.37	140.94	0.00	3.28	123.37	0.00	18.57	0 00:00	0.00	0.00
92	Pond	Junction	114.70	120.00	114.70	120.00	0.00	6.45	115.23	0.00	4.77	0 00:00	0.00	0.00
93	WQ-1	Junction	319.46	326.02	319.46	325.02	0.00	0.34	319.68	0.00	6.34	0 00:00	0.00	0.00
94	WQ-2	Junction	295.25	301.82	295.25	300.82	0.00	0.68	295.41	0.00	6.41	0 00:00	0.00	0.00
95	WQ-3	Junction	252.19	261.73	252.19	260.73	0.00	1.33	252.98	0.00	8.75	0 00:00	0.00	0.00
96	WQ-4	Junction	133.29	140.43	133.29	139.43	0.00	1.71	134.84	0.00	5.59	0 00:00	0.00	0.00
97	CB-500EX	Outfall	56.00					25.09	56.88					
98	Culver-2	Outfall	308.34					0.91	308.51					
99	Culvert-1	Outfall	340.76					0.26	340.87					
100	Culvert-3	Outfall	280.30					0.87	280.51					
101	Culvert-4	Outfall	241.65					9.14	242.17					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	11 (1)	Pipe	CB-380	MH-1	7.37	133.20	133.16	0.4900	18.000	0.0120	8.06	7.95	1.01	4.95	1.30	0.87	0.00	> CAPACITY
2	117 (1)	Pipe	CB-250	CB-260	64.97	239.67	234.51	7.9400	18.000	0.0120	0.13	32.07	0.00	1.20	0.18	0.12	0.00	Calculated
3	118 (1)	Pipe	CB-270	CB-280	212.62	229.14	211.66	8.2200	18.000	0.0120	2.42	32.63	0.07	10.58	0.28	0.19	0.00	Calculated
4	118 (2) (1)	Pipe	CB-265	CB-270	19.68	231.01	229.14	9.5100	18.000	0.0120	2.43	35.10	0.07	9.08	0.31	0.21	0.00	Calculated
5	120 (1)	Pipe	CB-300	CB-310	77.51	197.45	190.10	9.4800	18.000	0.0120	2.73	35.04	0.08	10.39	0.31	0.21	0.00	Calculated
6	123 (1)	Pipe	CB-340	CB-345	59.93	168.39	163.77	7.7100	18.000	0.0120	3.25	31.60	0.10	11.19	0.33	0.22	0.00	Calculated
7	123 (1) (1)	Pipe	CB-345	CB-350	16.88	163.77	160.02	22.2400	18.000	0.0120	3.24	53.66	0.06	9.11	0.40	0.27	0.00	Calculated
8	3	Pipe	CB-470EX	CB-480EX	75.55	89.17	82.12	9.3300	18.000	0.0120	24.89	34.76	0.72	18.21	1.12	0.75	0.00	Calculated
9	4	Pipe	CB-10EX	CB-10	11.39	344.23	343.39	7.3800	18.000	0.0120	0.00	30.92	0.00	0.00	0.05	0.03	0.00	Calculated
10	5	Pipe	CB-10	CB-20EX	30.38	343.39	341.53	6.1200	18.000	0.0120	0.26	28.14	0.01	4.28	0.11	0.07	0.00	Calculated
11	6	Pipe	CB-80	CB-90	35.43	306.46	303.21	9.1700	18.000	0.0120	0.68	34.47	0.02	6.83	0.16	0.11	0.00	Calculated
12	7	Pipe	CB-185	CB-190	10.45	251.20	251.15	0.5000	18.000	0.0120	9.30	8.03	1.16	5.59	1.34	0.89	0.00	> CAPACITY
13	9	Pipe	CB-341	CB-340	20.90	170.66	168.80	8.8800	12.000	0.0120	0.00	11.50	0.00	0.00	0.00	0.00	0.00	Calculated
14	11	Pipe	CB-360	CB-361	97.29	148.00	138.38	9.8900	18.000	0.0120	6.99	35.79	0.20	11.93	0.55	0.37	0.00	Calculated
15	25	Pipe	CB-420	CB-430	64.25	117.16	114.91	3.5100	18.000	0.0120	5.78	21.31	0.27	5.19	0.91	0.60	0.00	Calculated
16	32	Pipe	CB-50A	CB-50B	35.07	311.37	311.37	0.0000	42.000	0.0120	0.18	130.15	0.00	0.29	0.43	0.12	0.00	Calculated
17	33	Pipe	CB-110A	CB-110B	70.00	281.10	281.10	0.0000	48.000	0.0120	0.99	69.59	0.01	0.43	0.97	0.24	0.00	Calculated
18	36	Pipe	CB-390A	CB-390B	110.00	121.89	121.89	0.0000	72.000	0.0120	4.33	205.18	0.02	0.87	1.47	0.24	0.00	Calculated
19	37	Pipe	CB-395A	CB-395B	110.00	121.84	121.84	0.0000	72.000	0.0120	2.28	205.18	0.01	0.48	1.52	0.25	0.00	Calculated
20	40	Pipe	CB-60	CB-70	10.65	311.80	311.75	0.5400	18.000	0.0120	0.11	8.33	0.01	1.69	0.17	0.11	0.00	Calculated
21	41	Pipe	CB-50B	CB-60	4.63	311.87	311.84	0.5400	36.000	0.0120	0.16	53.11	0.00	1.55	0.15	0.05	0.00	Calculated
22	42	Pipe	CB-50	CB-50A	4.61	311.89	311.37	11.3800	36.000	0.0120	0.33	243.79	0.00	0.93	0.41	0.14	0.00	Calculated
23	43	Pipe	CB-40	WQ-1	50.04	325.96	319.46	12.9900	18.000	0.0120	0.34	41.01	0.01	3.60	0.16	0.10	0.00	Calculated
24	44	Pipe	CB-490	CB-500EX	42.92	60.90	56.00	11.4100	18.000	0.0120	25.09	38.44	0.65	16.92	1.19	0.79	0.00	Calculated
25	45	Pipe	CB-110B	CB-120	4.58	281.60	281.58	0.5000	36.000	0.0120	0.92	51.19	0.02	1.67	0.42	0.14	0.00	Calculated
26	46	Pipe	CB-110	CB-110A	4.64	281.63	281.60	0.5000	36.000	0.0120	1.07	50.86	0.02	1.78	0.47	0.16	0.00	Calculated
27	48	Pipe	CB-90	CB-95	21.47	303.21	301.27	9.0600	18.000	0.0120	0.68	34.25	0.02	6.56	0.16	0.11	0.00	Calculated
28	49	Pipe	CB-190B	CB-200	4.62	245.45	245.43	0.5000	36.000	0.0120	8.65	50.97	0.17	2.68	1.40	0.47	0.00	Calculated
29	50	Pipe	CB-100	CB-110	6.22	289.90	289.50	6.4600	18.000	0.0120	1.29	28.92	0.04	5.89	0.27	0.18	0.00	Calculated
30	51	Pipe	CB-70	Culver-2	42.05	311.75	308.34	8.1000	18.000	0.0120	0.91	32.39	0.03	7.59	0.18	0.12	0.00	Calculated
31	52	Pipe	CB-190	CB-190A	4.67	245.48	245.45	0.4900	36.000	0.0120	9.16	50.69	0.18	3.05	1.51	0.51	0.00	Calculated
32	53	Pipe	CB-400	CB-405	8.92	122.31	122.26	0.5600	18.000	0.0120	2.12	8.52	0.25	1.67	1.03	0.69	0.00	Calculated
33	55	Pipe	CB-130	Culvert-3	37.87	281.49	280.30	3.1400	18.000	0.0120	0.87	20.17	0.04	5.25	0.22	0.15	0.00	Calculated
34	57	Pipe	CB-120	CB-130	17.99	281.53	281.49	0.2000	18.000	0.0120	0.81	5.09	0.16	2.27	0.38	0.26	0.00	Calculated
35	58	Pipe	CB-190A	CB-190B	55.00	244.95	244.95	0.0000	60.000	0.0120	8.84	126.18	0.07	1.27	1.97	0.39	0.00	Calculated
36	59	Pipe	MH-1	CB-390A	4.64	122.42	122.39	0.6500	36.000	0.0120	4.77	58.10	0.08	2.57	0.98	0.33	0.00	Calculated
37	60	Pipe	MH-2	CB-395A	4.61	122.37	122.34	0.6500	36.000	0.0120	3.10	58.27	0.05	1.93	1.01	0.34	0.00	Calculated
38	61	Pipe	CB-390B	CB-405	4.65	122.39	122.35	0.8600	36.000	0.0120	3.97	67.00	0.06	2.30	0.95	0.32	0.00	Calculated
39	62	Pipe	CB-395B	CB-400	4.65	122.34	122.31	0.6500	36.000	0.0120	2.09	58.04	0.04	1.07	1.02	0.34	0.00	Calculated
40	64	Pipe	CB-140	CB-150	83.44	279.09	272.90	7.4200	18.000	0.0120	1.60	31.00	0.05	8.82	0.24	0.16	0.00	Calculated
41	66	Pipe	CB-150	CB-160	117.45	272.90	264.28	7.3400	18.000	0.0120	1.60	30.83	0.05	4.25	0.43	0.29	0.00	Calculated
42	68	Pipe	CB-351	CB-350	14.00	160.06	160.02	0.2900	12.000	0.0120	0.06	2.09	0.03	0.30	0.50	0.50	0.00	Calculated
43	69	Pipe	CB-170	CB-180	17.02	258.30	255.29	17.6900	18.000	0.0120	9.33	47.86	0.20	13.79	0.62	0.41	0.00	Calculated
44	72	Pipe	CB-160	CB-165	44.73	264.28	260.10	9.3400	18.000	0.0120	9.08	34.79	0.26	10.86	0.72	0.48	0.00	Calculated
45	72 (1)	Pipe	CB-165	CB-170	19.07	260.10	258.30	9.4400	18.000	0.0120	9.09	34.96	0.26	10.42	0.75	0.50	0.00	Calculated
46	74	Pipe	CB-200	CB-210	7.28	245.43	245.40	0.4800	18.000	0.0120	8.64	7.89	1.09	6.71	1.03	0.68	0.00	> CAPACITY
47	75	Pipe	CB-210	Culvert-4	39.23	245.40	241.65	9.5500	18.000	0.0120	9.14	35.16	0.26	13.47	0.61	0.41	0.00	Calculated

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
48	76	Pipe	CB-132	CB-135	12.08	281.03	280.73	2.4500	12.000	0.0120	1.10	6.04	0.18	4.68	0.34	0.34	0.00	Calculated
49	80	Pipe	CB-350	CB-360	154.90	160.02	148.00	7.7600	18.000	0.0120	7.00	31.70	0.22	13.78	0.49	0.33	0.00	Calculated
50	84	Pipe	CB-110	CB-115	7.40	281.90	281.86	0.5000	18.000	0.0120	0.22	8.05	0.03	1.92	0.18	0.12	0.00	Calculated
51	85	Pipe	CB-125	CB-120	7.24	281.82	281.58	3.2300	18.000	0.0120	0.10	20.46	0.00	0.66	0.26	0.17	0.00	Calculated
52	86	Pipe	CB-115	CB-115A	4.63	281.86	281.84	0.5000	36.000	0.0120	0.21	50.94	0.00	1.68	0.15	0.05	0.00	Calculated
53	87	Pipe	MH-1	MH-2	9.30	122.42	122.37	0.5400	18.000	0.0120	3.28	8.34	0.39	2.95	0.99	0.66	0.00	Calculated
54	88	Pipe	CB-115A	CB-115B	70.02	281.34	281.34	0.0000	48.000	0.0120	0.14	69.59	0.00	0.72	0.59	0.15	0.00	Calculated
55	89	Pipe	CB-115B	CB-125	4.63	281.84	281.82	0.5400	36.000	0.0120	0.07	53.08	0.00	1.28	0.10	0.03	0.00	Calculated
56	90	Pipe	CB-480EX	CB-490EX	79.14	82.12	75.63	8.2000	18.000	0.0150	11.52	26.07	0.44	10.79	0.99	0.66	0.00	Calculated
57	91	Pipe	CB-405	CB-410	7.08	122.26	122.22	0.5700	18.000	0.0120	5.77	8.55	0.67	6.40	0.76	0.51	0.00	Calculated
58	92	Pipe	CB-410	CB-420	74.14	122.22	117.16	6.8200	18.000	0.0120	5.77	29.73	0.19	9.87	0.55	0.37	0.00	Calculated
59	93	Pipe	CB-490EX	CB-495EX	101.21	75.53	61.80	13.5700	18.000	0.0150	25.08	33.53	0.75	14.58	1.42	0.95	0.00	Calculated
60	94	Pipe	CB-495EX	CB-490	7.47	61.80	60.90	12.1000	18.000	0.0120	25.09	39.59	0.63	14.20	1.50	1.00	18.00	SURCHARGED
61	98	Pipe	CB-261	CB-260	14.02	234.49	234.60	-0.8200	12.000	0.0120	0.07	3.50	0.02	0.60	0.26	0.26	0.00	Calculated
62	104	Pipe	CB-50	CB-53	6.96	311.89	311.85	0.5700	18.000	0.0120	0.13	8.62	0.01	2.58	0.10	0.07	0.00	Calculated
63	105	Pipe	CB-53	CB-53A	4.60	311.85	311.33	11.3700	36.000	0.0120	0.13	243.61	0.00	0.79	0.35	0.12	0.00	Calculated
64	106	Pipe	CB-53A	CB-53B	35.00	311.33	311.33	0.0000	42.000	0.0120	0.05	130.27	0.00	0.29	0.36	0.10	0.00	Calculated
65	107	Pipe	CB-53B	CB-56	4.66	311.83	311.82	0.1900	36.000	0.0120	0.05	32.31	0.00	0.93	0.12	0.04	0.00	Calculated
66	108	Pipe	CB-56	CB-60	6.97	311.82	311.80	0.2200	18.000	0.0120	0.05	5.28	0.01	0.72	0.13	0.09	0.00	Calculated
67	109	Pipe	WQ-1	CB-45	25.08	319.46	319.25	0.8400	18.000	0.0120	0.34	10.41	0.03	3.42	0.16	0.11	0.00	Calculated
68	111	Pipe	CB-20	CB-30	57.34	337.37	332.08	9.2300	18.000	0.0120	0.13	34.57	0.00	4.65	0.07	0.05	0.00	Calculated
69	112	Pipe	CB-30	CB-40	65.84	332.08	325.96	9.2900	18.000	0.0120	0.13	34.69	0.00	3.53	0.08	0.05	0.00	Calculated
70	117	Pipe	CB-220	CB-250	77.62	245.58	239.67	7.6100	18.000	0.0120	0.13	31.40	0.00	4.37	0.07	0.05	0.00	Calculated
71	118	Pipe	CB-260	CB-265	32.34	234.51	231.01	10.8100	18.000	0.0120	2.42	37.42	0.06	9.00	0.31	0.21	0.00	Calculated
72	119	Pipe	CB-280	CB-290	58.54	211.41	206.34	8.6600	18.000	0.0120	2.73	33.49	0.08	10.53	0.30	0.20	0.00	Calculated
73	120	Pipe	CB-290	CB-300	81.37	206.34	197.45	10.9300	18.000	0.0120	2.73	37.61	0.07	11.14	0.29	0.20	0.00	Calculated
74	121	Pipe	CB-310	CB-320	66.91	190.10	184.85	7.8500	18.000	0.0120	2.73	31.88	0.09	9.55	0.33	0.22	0.00	Calculated
75	122	Pipe	CB-320	CB-330	107.29	184.85	175.77	8.4600	18.000	0.0120	3.25	33.10	0.10	11.19	0.33	0.22	0.00	Calculated
76	123	Pipe	CB-330	CB-340	78.84	175.77	168.39	9.3600	18.000	0.0120	3.25	34.82	0.09	10.31	0.35	0.23	0.00	Calculated
77	127	Pipe	CB-450	CB-455	75.57	107.35	101.37	7.9200	18.000	0.0120	7.41	32.02	0.23	12.29	0.56	0.37	0.00	Calculated
78	128	Pipe	CB-460	CB-465	28.61	97.60	94.85	9.6100	18.000	0.0120	15.38	35.28	0.44	13.33	0.99	0.66	0.00	Calculated
79	130	Pipe	CB-45	CB-50	26.54	319.25	313.56	21.4400	18.000	0.0120	0.41	52.69	0.01	8.47	0.10	0.06	0.00	Calculated
80	132	Pipe	CB-95	WQ-2	39.21	301.27	298.30	7.5600	18.000	0.0120	0.68	31.29	0.02	6.66	0.16	0.11	0.00	Calculated
81	133	Pipe	WQ-2	CB-100	94.80	295.25	289.90	5.6400	18.000	0.0120	0.68	27.03	0.03	3.59	0.25	0.17	0.00	Calculated
82	142	Pipe	CB-375	CB-380	7.52	133.23	133.20	0.4700	18.000	0.0120	1.77	7.76	0.23	1.00	1.50	1.00	10.00	SURCHARGED
83	143	Pipe	CB-430	Pond	74.00	114.91	114.70	0.2700	18.000	0.0120	6.45	5.96	1.08	6.10	0.87	0.58	0.00	> CAPACITY
84	146	Pipe	CB-145EX	CB-440	37.30	113.37	109.33	10.8300	18.000	0.0120	7.42	37.45	0.20	9.12	0.73	0.48	0.00	Calculated
85	148	Pipe	CB-465	CB-470EX	34.10	94.85	89.17	16.6600	18.000	0.0120	15.77	46.45	0.34	12.31	1.19	0.79	0.00	Calculated
86	150	Pipe	CB-365	CB-370	7.26	136.54	136.50	0.5000	18.000	0.0120	1.71	8.01	0.21	2.56	0.61	0.41	0.00	Calculated
87	151	Pipe	WQ-4	CB-375	16.25	133.29	133.21	0.5200	18.000	0.0120	1.74	6.92	0.25	0.98	1.50	1.00	7.00	SURCHARGED
88	155	Pipe	CB-440	CB-450	9.96	109.33	107.35	19.8900	12.000	0.0120	7.40	17.21	0.43	11.93	0.75	0.75	0.00	Calculated
89	170	Pipe	CB-370	WQ-4	33.10	136.50	136.34	0.4900	18.000	0.0120	1.71	7.94	0.22	3.16	0.52	0.35	0.00	Calculated
90	171	Pipe	CB-365	CB-380	49.40	136.54	133.70	5.7500	12.000	0.0120	5.29	9.26	0.57	8.61	0.83	0.83	0.00	Calculated
91	173	Pipe	CB-376	CB-375	14.78	138.50	136.00	16.9200	12.000	0.0120	0.00	15.88	0.00	0.00	0.00	0.00	0.00	Calculated
92	174	Pipe	CB-180	CB-185	32.95	255.29	251.20	12.4100	18.000	0.0120	8.00	40.09	0.20	6.24	1.02	0.68	0.00	Calculated
93	176	Pipe	CB-211	CB-210	13.22	246.84	246.80	0.2900	12.000	0.0120	0.00	2.10	0.00	0.00	0.00	0.00	0.00	Calculated
94	Link-01	Pipe	CB-480EX	CB-490EX	79.01	82.12	75.53	8.3400	18.000	0.0120	13.40	32.86	0.41	11.79	1.04	0.69	0.00	Calculated

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
95	Link-02	Pipe	CB-161	CB-160	18.43	267.00	264.70	12.4800	12.000	0.0120	0.00	13.63	0.00	0.00	0.10	0.10	0.00	Calculated
96	Link-04	Pipe	Pond	CB-145EX	54.47	114.20	113.37	1.5200	60.000	0.0150	6.46	353.10	0.02	5.89	0.52	0.10	0.00	Calculated
97	Link-05	Pipe	CB-20EX	Culvert-1	17.15	341.53	340.76	4.4900	18.000	0.0120	0.26	24.12	0.01	4.13	0.12	0.08	0.00	Calculated
98	Link-07	Pipe	CB-135	CB-140	11.44	280.23	279.09	9.9800	18.000	0.0150	1.10	28.76	0.04	6.06	0.24	0.16	0.00	Calculated
99	Link-08	Pipe	CB-180	WQ-3	9.63	255.29	255.24	0.5200	18.000	0.0150	1.33	6.56	0.20	2.67	0.49	0.33	0.00	Calculated
100	Link-09	Pipe	WQ-3	CB-185	31.88	252.19	251.70	1.5400	18.000	0.0150	1.40	11.29	0.12	2.39	1.02	0.68	0.00	Calculated
101	Link-10	Pipe	CB-361	CB-365	11.92	138.38	136.54	15.4200	18.000	0.0120	7.03	44.68	0.16	9.70	0.65	0.43	0.00	Calculated
102	Link-11	Pipe	CB-455	CB-460	48.20	101.37	97.60	7.8200	18.000	0.0120	7.41	31.81	0.23	8.85	0.79	0.52	0.00	Calculated

Subbasin Hydrology

Subbasin : {Catch Basin Boundaries}.OA2-100CP

Input Data

Area (ac) 0.66
Peak Rate Factor 484
Weighted Curve Number 86.95
Rain Gage ID ..... StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.66	B	86.95
Composite Area & Weighted CN	0.66		86.95

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.95
Total Runoff (in) 2.59
Peak Runoff (cfs) 0.44
Weighted Curve Number 86.95
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-100DI

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98
Composite Area & Weighted CN	0.09		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.71
Peak Runoff (cfs)	0.08
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-130CP

Input Data

Area (ac)	0.05
Peak Rate Factor	484
Weighted Curve Number	91.5
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	B	91.5
Composite Area & Weighted CN	0.05		91.5

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.01
Peak Runoff (cfs)	0.04
Weighted Curve Number	91.5
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140DI

Input Data

Area (ac)	0.32
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.32	A	98
Composite Area & Weighted CN	0.32		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.29
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140EP

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	B	86.95
Composite Area & Weighted CN	0.08		86.95

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.58
Peak Runoff (cfs)	0.06
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140FP

Input Data

Area (ac)	1.38
Peak Rate Factor	484
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.38	A	86.95
Composite Area & Weighted CN	1.38		86.95

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.59
Peak Runoff (cfs)	0.91
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-140GI

Input Data

Area (ac)	0.2
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.2	A	98
Composite Area & Weighted CN	0.2		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.19
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160CP

Input Data

Area (ac)	1.71
Peak Rate Factor	484
Weighted Curve Number	87.6
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.69	B	87.6
Composite Area & Weighted CN	1.69		87.6

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.65
Peak Runoff (cfs)	1.17
Weighted Curve Number	87.6
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160DI

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.22	B	98
Composite Area & Weighted CN	0.22		98

Time of Concentration

User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.2
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160EI

Input Data

Area (ac)	1.01
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.01	A/B	98
Composite Area & Weighted CN	1.01		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.95
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160FP

Input Data

Area (ac)	5.84
Peak Rate Factor	484
Weighted Curve Number	88.9
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	5.84	B	88.9
Composite Area & Weighted CN	5.84		88.9

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.77
Peak Runoff (cfs)	4.2
Weighted Curve Number	88.9
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-160GI

Input Data

Area (ac)	0.89
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.89	B	98
Composite Area & Weighted CN	0.89		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.84
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-170CI

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	A	98
Composite Area & Weighted CN	0.08		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.71
Peak Runoff (cfs)	0.08
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-170EP

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.25	A	77
Composite Area & Weighted CN	0.25		77

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	1.77
Peak Runoff (cfs)	0.1
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-20CP

Input Data

Area (ac)	0.13
Peak Rate Factor	484
Weighted Curve Number	90.2
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.13	B	90.2
Composite Area & Weighted CN	0.13		90.2

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.89
Peak Runoff (cfs)	0.1
Weighted Curve Number	90.2
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-210DI

Input Data

Area (ac)	0.02
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.02	A	98
Composite Area & Weighted CN	0.02		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.7
Peak Runoff (cfs)	0.02
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-210EP

Input Data

Area (ac)	1.42
Peak Rate Factor	484
Weighted Curve Number	82.25
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	1.42	A	82.25
Composite Area & Weighted CN	1.42		82.25

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.18
Peak Runoff (cfs)	0.76
Weighted Curve Number	82.25
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-40CP

Input Data

Area (ac)	0.1
Peak Rate Factor	484
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.09	B	86.95
Composite Area & Weighted CN	0.09		86.95

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.58
Peak Runoff (cfs)	0.07
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-70DP

Input Data

Area (ac)	1.02
Peak Rate Factor	484
Weighted Curve Number	88.9
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.02	B	88.9
Composite Area & Weighted CN	1.02		88.9

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.77
Peak Runoff (cfs)	0.74
Weighted Curve Number	88.9
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-70EI

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98
Composite Area & Weighted CN	0.09		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.71
Peak Runoff (cfs)	0.08
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-80DP

Input Data

Area (ac)	0.68
Peak Rate Factor	484
Weighted Curve Number	88.25
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.68	B	88.25
Composite Area & Weighted CN	0.68		88.25

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.71
Peak Runoff (cfs)	0.48
Weighted Curve Number	88.25
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-80EI

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	B	98
Composite Area & Weighted CN	0.16		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.16
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-220DI

Input Data

Area (ac)	0.03
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.03	A	98
Composite Area & Weighted CN	0.03		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.71
Peak Runoff (cfs)	0.02
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-220EP

Input Data

Area (ac)	0.11
Peak Rate Factor	484
Weighted Curve Number	81.2
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.11	A	81.2
Composite Area & Weighted CN	0.11		81.2

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.09
Peak Runoff (cfs)	0.06
Weighted Curve Number	81.2
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260EP

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	80.15
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.25	A	80.15
Composite Area & Weighted CN	0.25		80.15

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.01
Peak Runoff (cfs)	0.12
Weighted Curve Number	80.15
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260GP

Input Data

Area (ac)	2.31
Peak Rate Factor	484
Weighted Curve Number	83.3
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	2.31	A	83.3
Composite Area & Weighted CN	2.31		83.3

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.27
Peak Runoff (cfs)	1.3
Weighted Curve Number	83.3
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260HI

Input Data

Area (ac)	0.02
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.02	B	98
Composite Area & Weighted CN	0.02		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.71
Peak Runoff (cfs)	0.02
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260IJ

Input Data

Area (ac)	0.73
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.73	A	98
Composite Area & Weighted CN	0.73		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.69
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-260KP

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	85.4
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.08	A	85.4
Composite Area & Weighted CN	0.08		85.4

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.44
Peak Runoff (cfs)	0.05
Weighted Curve Number	85.4
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-280CP

Input Data

Area (ac)	0.18
Peak Rate Factor	484
Weighted Curve Number	83.3
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.18	A	83.3
Composite Area & Weighted CN	0.18		83.3

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.27
Peak Runoff (cfs)	0.1
Weighted Curve Number	83.3
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-320CP

Input Data

Area (ac)	0.42
Peak Rate Factor	484
Weighted Curve Number	80.15
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.42	A	80.15
Composite Area & Weighted CN	0.42		80.15

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.01
Peak Runoff (cfs)	0.2
Weighted Curve Number	80.15
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-350DP

Input Data

Area (ac)	0.68
Peak Rate Factor	484
Weighted Curve Number	85.4
Rain Gage ID	StormData

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.68	A	85.4
Composite Area & Weighted CN	0.68		85.4

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.45
Peak Runoff (cfs)	0.42
Weighted Curve Number	85.4
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-350EI

Input Data

Area (ac)	0.81
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.81	A	98
Composite Area & Weighted CN	0.81		98

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.72
Peak Runoff (cfs)	0.76
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-350FP

Input Data

Area (ac)	4.08
Peak Rate Factor	484
Weighted Curve Number	84.35
Rain Gage ID	StormData

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	4.08	A	84.35
Composite Area & Weighted CN	4.08		84.35

Time of Concentration

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	CB-10	343.39	347.29	3.90	343.39	0.00	346.29	-1.00	0.00	0.00
2	CB-100	289.90	293.31	3.41	289.90	0.00	292.31	-1.00	0.00	0.00
3	CB-10EX	344.23	348.02	3.79	344.23	0.00	347.02	-1.00	0.00	0.00
4	CB-110	281.63	293.45	11.82	281.63	0.00	292.45	-1.00	0.00	0.00
5	CB-110A	281.10	285.84	4.73	281.10	0.00	284.84	-1.00	0.00	0.00
6	CB-110B	281.10	285.56	4.46	281.10	0.00	285.56	0.00	0.00	0.00
7	CB-115	281.86	293.61	11.75	281.86	0.00	292.61	-1.00	0.00	0.00
8	CB-115A	281.34	285.80	4.46	281.34	0.00	285.80	0.00	0.00	0.00
9	CB-115B	281.34	285.80	4.46	281.34	0.00	285.80	0.00	0.00	0.00
10	CB-120	281.53	287.37	5.84	281.53	0.00	286.37	-1.00	0.00	0.00
11	CB-125	281.82	288.17	6.36	281.82	0.00	287.17	-1.00	0.00	0.00
12	CB-130	281.49	285.66	4.17	281.49	0.00	284.66	-1.00	0.00	0.00
13	CB-132	281.03	283.33	2.30	281.03	0.00	282.33	-1.00	0.00	0.00
14	CB-135	280.23	283.80	3.57	280.23	0.00	282.80	-1.00	0.00	0.00
15	CB-140	279.09	282.54	3.45	279.09	0.00	281.54	-1.00	0.00	0.00
16	CB-145EX	113.37	119.91	6.54	113.37	0.00	118.91	-1.00	0.00	0.00
17	CB-150	272.90	276.31	3.41	272.90	0.00	275.31	-1.00	0.00	0.00
18	CB-160	264.28	267.62	3.34	264.28	0.00	266.62	-1.00	0.00	0.00
19	CB-161	267.00	268.00	1.00	267.00	0.00	268.00	0.00	0.00	0.00
20	CB-165	260.10	264.54	4.44	260.10	0.00	263.54	-1.00	0.00	0.00
21	CB-170	258.30	262.66	4.36	258.30	0.00	261.66	-1.00	0.00	0.00
22	CB-180	255.29	261.76	6.47	255.29	0.00	260.76	-1.00	0.00	0.00
23	CB-185	251.20	259.05	7.85	251.20	0.00	258.05	-1.00	0.00	0.00
24	CB-190	245.48	258.53	13.05	245.48	0.00	257.53	-1.00	0.00	0.00
25	CB-190A	244.95	250.35	5.40	244.95	0.00	250.35	0.00	0.00	0.00
26	CB-190B	244.95	250.35	5.40	244.95	0.00	250.35	0.00	0.00	0.00
27	CB-20	337.37	342.99	5.62	337.37	0.00	341.99	-1.00	0.00	0.00
28	CB-200	245.43	252.54	7.11	245.43	0.00	251.54	-1.00	0.00	0.00
29	CB-20EX	341.53	346.77	5.24	341.53	0.00	345.77	-1.00	0.00	0.00
30	CB-210	245.40	251.58	6.18	245.40	0.00	250.58	-1.00	0.00	0.00
31	CB-211	246.84	249.52	2.69	246.84	0.00	248.52	-1.00	0.00	0.00
32	CB-220	245.58	249.16	3.58	245.58	0.00	248.16	-1.00	0.00	0.00
33	CB-250	239.67	243.25	3.58	239.67	0.00	242.25	-1.00	0.00	0.00
34	CB-260	234.51	237.78	3.27	234.51	0.00	236.78	-1.00	0.00	0.00
35	CB-261	234.49	237.58	3.10	234.49	0.00	236.58	-1.00	0.00	0.00
36	CB-265	231.01	234.85	3.84	231.01	0.00	233.85	-1.00	0.00	0.00
37	CB-270	229.14	232.76	3.62	229.14	0.00	231.76	-1.00	0.00	0.00
38	CB-280	211.41	215.22	3.81	211.41	0.00	214.22	-1.00	0.00	0.00
39	CB-290	206.34	209.91	3.57	206.34	0.00	208.91	-1.00	0.00	0.00
40	CB-30	332.08	335.68	3.60	332.08	0.00	334.68	-1.00	0.00	0.00
41	CB-300	197.45	201.07	3.62	197.45	0.00	200.07	-1.00	0.00	0.00
42	CB-310	190.10	193.71	3.61	190.10	0.00	192.71	-1.00	0.00	0.00
43	CB-320	184.85	188.45	3.60	184.85	0.00	187.45	-1.00	0.00	0.00
44	CB-330	175.77	179.34	3.57	175.77	0.00	178.34	-1.00	0.00	0.00
45	CB-340	168.39	172.14	3.75	168.39	0.00	171.14	-1.00	0.00	0.00
46	CB-341	170.66	173.82	3.16	170.66	0.00	172.82	-1.00	0.00	0.00
47	CB-345	163.77	167.16	3.39	163.77	0.00	166.16	-1.00	0.00	0.00
48	CB-350	160.02	165.52	5.50	160.02	0.00	164.52	-1.00	0.00	0.00
49	CB-351	160.06	166.95	6.89	160.06	0.00	165.95	-1.00	0.00	0.00
50	CB-360	148.00	151.58	3.58	148.00	0.00	150.58	-1.00	0.00	0.00
51	CB-361	138.38	143.48	5.11	138.38	0.00	142.48	-1.00	0.00	0.00
52	CB-365	136.54	143.15	6.61	136.54	0.00	142.15	-1.00	0.00	0.00
53	CB-370	136.50	143.23	6.73	136.50	0.00	142.23	-1.00	0.00	0.00
54	CB-375	133.23	139.43	6.20	133.23	0.00	138.43	-1.00	0.00	0.00
55	CB-376	138.50	143.22	4.72	138.50	0.00	142.22	-1.00	0.00	0.00
56	CB-380	133.20	138.53	5.34	133.20	0.00	137.53	-1.00	0.00	0.00
57	CB-390A	121.89	128.92	7.03	121.89	0.00	128.92	0.00	0.00	0.00
58	CB-390B	121.89	128.92	7.03	121.89	0.00	128.92	0.00	0.00	0.00
59	CB-395A	121.84	128.87	7.03	121.84	0.00	128.87	0.00	0.00	0.00
60	CB-395B	121.84	128.87	7.03	121.84	0.00	128.87	0.00	0.00	0.00
61	CB-40	325.96	329.53	3.57	325.96	0.00	328.53	-1.00	0.00	0.00
62	CB-400	122.31	130.98	8.67	122.31	0.00	129.98	-1.00	0.00	0.00
63	CB-405	122.26	129.24	6.98	122.26	0.00	128.24	-1.00	0.00	0.00
64	CB-410	122.22	128.09	5.87	122.22	0.00	127.09	-1.00	0.00	0.00
65	CB-420	117.16	122.83	5.67	117.16	0.00	121.83	-1.00	0.00	0.00
66	CB-430	114.91	117.98	3.07	114.91	0.00	116.98	-1.00	0.00	0.00
67	CB-440	109.33	112.83	3.50	109.33	0.00	111.83	-1.00	0.00	0.00
68	CB-45	319.25	323.11	3.86	319.25	0.00	322.11	-1.00	0.00	0.00
69	CB-450	107.35	110.80	3.45	107.35	0.00	109.80	-1.00	0.00	0.00
70	CB-455	101.37	105.52	4.15	101.37	0.00	104.52	-1.00	0.00	0.00
71	CB-460	97.60	101.55	3.95	97.60	0.00	100.55	-1.00	0.00	0.00
72	CB-465	94.85	98.89	4.04	94.85	0.00	97.89	-1.00	0.00	0.00
73	CB-470EX	89.17	97.22	8.05	89.17	0.00	96.22	-1.00	0.00	0.00
74	CB-480EX	82.12	90.03	7.91	82.12	0.00	89.03	-1.00	0.00	0.00
75	CB-490	60.90	67.08	6.18	60.90	0.00	66.08	-1.00	0.00	0.00

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
76	CB-490EX	75.53	80.48	4.95	75.63	0.10	79.48	-1.00	0.00	0.00
77	CB-495EX	61.80	68.14	6.34	61.80	0.00	67.14	-1.00	0.00	0.00
78	CB-50	311.89	321.06	9.17	311.89	0.00	320.06	-1.00	0.00	0.00
79	CB-50A	311.37	315.27	3.90	311.37	0.00	315.27	0.00	0.00	0.00
80	CB-50B	311.87	315.27	3.40	311.87	0.00	315.27	0.00	0.00	0.00
81	CB-53	311.85	321.82	9.97	311.85	0.00	320.82	-1.00	0.00	0.00
82	CB-53A	311.33	315.23	3.90	311.33	0.00	315.23	0.00	0.00	0.00
83	CB-53B	311.83	315.23	3.40	311.83	0.00	315.23	0.00	0.00	0.00
84	CB-56	311.82	317.02	5.20	311.82	0.00	316.02	-1.00	0.00	0.00
85	CB-60	311.80	316.99	5.19	311.80	0.00	315.99	-1.00	0.00	0.00
86	CB-70	311.75	315.46	3.71	311.75	0.00	314.46	-1.00	0.00	0.00
87	CB-80	306.46	309.88	3.42	306.46	0.00	308.88	-1.00	0.00	0.00
88	CB-90	303.21	306.62	3.41	303.21	0.00	305.62	-1.00	0.00	0.00
89	CB-95	301.27	304.68	3.42	301.27	0.00	303.68	-1.00	0.00	0.00
90	MH-1	122.42	138.57	16.15	122.42	0.00	137.57	-1.00	0.00	0.00
91	MH-2	122.37	141.94	19.57	122.37	0.00	140.94	-1.00	0.00	0.00
92	Pond	114.70	120.00	5.30	114.70	0.00	120.00	0.00	0.00	0.00
93	WQ-1	319.46	326.02	6.56	319.46	0.00	325.02	-1.00	0.00	0.00
94	WQ-2	295.25	301.82	6.57	295.25	0.00	300.82	-1.00	0.00	0.00
95	WQ-3	252.19	261.73	9.54	252.19	0.00	260.73	-1.00	0.00	0.00
96	WQ-4	133.29	140.43	7.14	133.29	0.00	139.43	-1.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-10	0.26	0.26	343.49	0.10	0.00	3.80	343.41	0.02	0 07:59	0 00:00	0.00	0.00
2	CB-100	1.29	0.62	290.24	0.34	0.00	3.07	289.96	0.06	0 08:01	0 00:00	0.00	0.00
3	CB-10EX	0.00	0.00	344.23	0.00	0.00	3.79	344.23	0.00	0 00:00	0 00:00	0.00	0.00
4	CB-110	1.29	0.00	282.10	0.47	0.00	11.35	281.73	0.10	0 08:09	0 00:00	0.00	0.00
5	CB-110A	1.07	0.00	282.08	0.98	0.00	3.76	281.68	0.58	0 08:13	0 00:00	0.00	0.00
6	CB-110B	0.99	0.00	282.07	0.97	0.00	3.49	281.67	0.57	0 08:12	0 00:00	0.00	0.00
7	CB-115	0.22	0.00	282.03	0.17	0.00	11.58	281.87	0.01	0 08:13	0 00:00	0.00	0.00
8	CB-115A	0.21	0.00	281.93	0.59	0.00	3.86	281.76	0.42	0 08:59	0 00:00	0.00	0.00
9	CB-115B	0.18	0.00	281.93	0.59	0.00	3.86	281.76	0.42	0 08:55	0 00:00	0.00	0.00
10	CB-120	0.92	0.00	281.96	0.43	0.00	5.41	281.64	0.11	0 08:18	0 00:00	0.00	0.00
11	CB-125	0.10	0.00	281.96	0.15	0.00	6.21	281.82	0.01	0 08:22	0 00:00	0.00	0.00
12	CB-130	0.87	0.12	281.73	0.24	0.00	3.93	281.55	0.06	0 08:19	0 00:00	0.00	0.00
13	CB-132	1.10	1.10	281.42	0.39	0.00	1.91	281.10	0.07	0 08:00	0 00:00	0.00	0.00
14	CB-135	1.10	0.00	280.47	0.24	0.00	3.33	280.28	0.05	0 08:01	0 00:00	0.00	0.00
15	CB-140	1.60	0.51	279.34	0.25	0.00	3.20	279.14	0.05	0 08:00	0 00:00	0.00	0.00
16	CB-145EX	7.41	2.15	113.89	0.52	0.00	6.02	113.50	0.13	0 08:21	0 00:00	0.00	0.00
17	CB-150	1.60	0.00	273.13	0.23	0.00	3.18	272.95	0.05	0 08:01	0 00:00	0.00	0.00
18	CB-160	9.09	7.49	264.91	0.63	0.00	2.71	264.39	0.11	0 08:00	0 00:00	0.00	0.00
19	CB-161	0.00	0.00	267.00	0.00	0.00	1.00	267.00	0.00	0 00:00	0 00:00	0.00	0.00
20	CB-165	9.08	0.00	260.91	0.81	0.00	3.63	260.23	0.13	0 08:00	0 00:00	0.00	0.00
21	CB-170	9.32	0.23	259.00	0.70	0.00	3.66	258.41	0.11	0 08:01	0 00:00	0.00	0.00
22	CB-180	9.33	0.00	255.84	0.55	0.00	5.92	255.38	0.09	0 08:04	0 00:00	0.00	0.00
23	CB-185	9.39	0.00	252.96	1.76	0.00	6.09	251.48	0.28	0 08:05	0 00:00	0.00	0.00
24	CB-190	9.30	0.00	247.04	1.56	0.00	11.49	245.79	0.31	0 08:11	0 00:00	0.00	0.00
25	CB-190A	9.16	0.00	246.94	1.99	0.00	3.42	245.73	0.78	0 08:13	0 00:00	0.00	0.00
26	CB-190B	8.84	0.00	246.91	1.96	0.00	3.44	245.73	0.78	0 08:14	0 00:00	0.00	0.00
27	CB-20	0.13	0.13	337.44	0.07	0.00	5.55	337.38	0.01	0 08:00	0 00:00	0.00	0.00
28	CB-200	8.65	0.00	246.78	1.35	0.00	5.76	245.68	0.25	0 08:15	0 00:00	0.00	0.00
29	CB-20EX	0.26	0.00	341.65	0.12	0.00	5.12	341.55	0.02	0 08:01	0 00:00	0.00	0.00
30	CB-210	9.14	0.85	246.10	0.70	0.00	5.48	245.52	0.12	0 08:15	0 00:00	0.00	0.00
31	CB-211	0.00	0.00	246.84	0.00	0.00	2.69	246.84	0.00	0 00:00	0 00:00	0.00	0.00
32	CB-220	0.13	0.13	245.65	0.07	0.00	3.51	245.60	0.02	0 08:00	0 00:00	0.00	0.00
33	CB-250	0.13	0.00	239.74	0.07	0.00	3.51	239.68	0.01	0 08:01	0 00:00	0.00	0.00
34	CB-260	2.40	2.27	234.80	0.29	0.00	2.98	234.57	0.06	0 07:57	0 00:00	0.00	0.00
35	CB-261	0.07	0.00	234.81	0.32	0.00	2.77	234.60	0.11	0 07:54	0 00:00	0.00	0.00
36	CB-265	2.42	0.00	231.36	0.35	0.00	3.49	231.07	0.06	0 07:59	0 00:00	0.00	0.00
37	CB-270	2.43	0.00	229.43	0.29	0.00	3.33	229.20	0.06	0 08:01	0 00:00	0.00	0.00
38	CB-280	2.73	0.31	211.73	0.32	0.00	3.49	211.47	0.06	0 08:01	0 00:00	0.00	0.00
39	CB-290	2.73	0.00	206.63	0.29	0.00	3.28	206.40	0.06	0 08:02	0 00:00	0.00	0.00
40	CB-30	0.13	0.00	332.15	0.07	0.00	3.53	332.09	0.01	0 08:01	0 00:00	0.00	0.00
41	CB-300	2.73	0.00	197.75	0.30	0.00	3.32	197.51	0.06	0 08:03	0 00:00	0.00	0.00
42	CB-310	2.73	0.00	190.42	0.32	0.00	3.29	190.16	0.06	0 08:04	0 00:00	0.00	0.00
43	CB-320	3.25	0.54	185.19	0.34	0.00	3.26	184.92	0.07	0 08:05	0 00:00	0.00	0.00
44	CB-330	3.25	0.00	176.09	0.32	0.00	3.25	175.83	0.06	0 08:06	0 00:00	0.00	0.00
45	CB-340	3.25	0.00	168.77	0.38	0.00	3.37	168.46	0.07	0 08:07	0 00:00	0.00	0.00
46	CB-341	0.00	0.00	170.66	0.00	0.00	3.16	170.66	0.00	0 00:00	0 00:00	0.00	0.00
47	CB-345	3.25	0.00	164.06	0.29	0.00	3.10	163.82	0.05	0 08:09	0 00:00	0.00	0.00
48	CB-350	7.00	3.91	160.54	0.52	0.00	4.98	160.12	0.10	0 08:01	0 00:00	0.00	0.00
49	CB-351	0.06	0.00	160.54	0.48	0.00	6.41	160.14	0.08	0 07:58	0 00:00	0.00	0.00
50	CB-360	7.00	0.00	148.47	0.47	0.00	3.11	148.10	0.10	0 08:02	0 00:00	0.00	0.00
51	CB-361	6.99	0.00	139.01	0.63	0.00	4.47	138.48	0.10	0 07:59	0 00:00	0.00	0.00
52	CB-365	7.03	0.00	137.20	0.66	0.00	5.95	136.65	0.11	0 08:05	0 00:00	0.00	0.00
53	CB-370	1.71	0.00	137.07	0.57	0.00	6.16	136.60	0.10	0 08:06	0 00:00	0.00	0.00
54	CB-375	1.74	0.00	134.82	1.59	0.00	4.61	133.49	0.26	0 08:03	0 00:00	0.00	0.00
55	CB-376	0.00	0.00	138.50	0.00	0.00	4.72	138.50	0.00	0 00:00	0 00:00	0.00	0.00
56	CB-380	8.05	1.08	134.79	1.60	0.00	3.74	133.47	0.28	0 08:03	0 00:00	0.00	0.00
57	CB-390A	4.77	0.00	123.36	1.47	0.00	5.56	122.57	0.68	0 08:21	0 00:00	0.00	0.00
58	CB-390B	4.33	0.00	123.35	1.46	0.00	5.57	122.57	0.68	0 08:23	0 00:00	0.00	0.00
59	CB-395A	3.10	0.00	123.36	1.52	0.00	5.51	122.52	0.68	0 08:26	0 00:00	0.00	0.00
60	CB-395B	2.28	0.00	123.36	1.52	0.00	5.51	122.52	0.68	0 08:24	0 00:00	0.00	0.00
61	CB-40	0.34	0.21	326.06	0.10	0.00	3.47	325.98	0.02	0 08:00	0 00:00	0.00	0.00
62	CB-400	2.09	0.00	123.34	1.03	0.00	7.64	122.53	0.22	0 08:22	0 00:00	0.00	0.00
63	CB-405	5.78	0.00	123.30	1.04	0.00	5.94	122.50	0.24	0 08:23	0 00:00	0.00	0.00
64	CB-410	5.77	0.00	122.71	0.49	0.00	5.38	122.33	0.11	0 08:23	0 00:00	0.00	0.00
65	CB-420	5.77	0.00	117.77	0.61	0.00	5.06	117.29	0.13	0 08:25	0 00:00	0.00	0.00
66	CB-430	6.46	1.42	116.11	1.20	0.00	1.87	115.19	0.28	0 08:26	0 00:00	0.00	0.00
67	CB-440	7.42	0.00	110.26	0.93	0.00	2.57	109.50	0.17	0 08:25	0 00:00	0.00	0.00
68	CB-45	0.41	0.07	319.35	0.10	0.00	3.76	319.27	0.02	0 08:03	0 00:00	0.00	0.00
69	CB-450	7.40	0.00	107.91	0.56	0.00	2.89	107.49	0.14	0 08:26	0 00:00	0.00	0.00
70	CB-455	7.41	0.00	101.93	0.56	0.00	3.59	101.50	0.13	0 08:33	0 00:00	0.00	0.00
71	CB-460	15.42	9.64	98.69	1.09	0.00	2.86	97.82	0.22	0 08:05	0 00:00	0.00	0.00
72	CB-465	15.38	0.00	95.73	0.88	0.00	3.16	95.01	0.16	0 08:05	0 00:00	0.00	0.00
73	CB-470EX	24.89	9.81	92.10	2.93	0.00	5.12	89.43	0.26	0 08:04	0 00:00	0.00	0.00
74	CB-480EX	24.89	0.00	82.86	0.74	0.00	7.17	82.28	0.16	0 08:00	0 00:00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
75	CB-490	25.09	0.00	63.45	2.55	0.00	3.63	61.15	0.25	0 08:05	0 00:00	0.00	0.00
76	CB-490EX	25.17	0.26	76.88	1.35	0.00	3.60	75.74	0.21	0 08:05	0 00:00	0.00	0.00
77	CB-495EX	25.08	0.00	66.95	5.15	0.00	1.18	62.19	0.39	0 08:05	0 00:00	0.00	0.00
78	CB-50	0.41	0.00	312.04	0.15	0.00	9.02	311.92	0.03	0 08:19	0 00:00	0.00	0.00
79	CB-50A	0.33	0.00	312.04	0.67	0.00	3.22	311.86	0.49	0 08:16	0 00:00	0.00	0.00
80	CB-50B	0.18	0.00	312.04	0.17	0.00	3.33	311.91	0.04	0 08:22	0 00:00	0.00	0.00
81	CB-53	0.13	0.00	311.94	0.09	0.00	9.88	311.88	0.03	0 10:48	0 00:00	0.00	0.00
82	CB-53A	0.18	0.00	311.94	0.61	0.00	3.29	311.79	0.46	0 11:00	0 00:00	0.00	0.00
83	CB-53B	0.05	0.00	311.94	0.11	0.00	3.39	311.87	0.04	0 11:03	0 00:00	0.00	0.00
84	CB-56	0.05	0.00	311.94	0.12	0.00	5.08	311.86	0.04	0 11:08	0 00:00	0.00	0.00
85	CB-60	0.16	0.00	311.95	0.15	0.00	5.04	311.85	0.05	0 08:12	0 00:00	0.00	0.00
86	CB-70	0.91	0.89	311.93	0.18	0.00	3.53	311.79	0.04	0 08:04	0 00:00	0.00	0.00
87	CB-80	0.68	0.68	306.61	0.15	0.00	3.27	306.49	0.03	0 08:00	0 00:00	0.00	0.00
88	CB-90	0.68	0.00	303.37	0.16	0.00	3.25	303.24	0.03	0 08:00	0 00:00	0.00	0.00
89	CB-95	0.68	0.00	301.43	0.17	0.00	3.25	301.30	0.04	0 08:02	0 00:00	0.00	0.00
90	MH-1	8.06	0.00	123.42	1.00	0.00	15.15	122.63	0.21	0 08:15	0 00:00	0.00	0.00
91	MH-2	3.28	0.00	123.37	1.00	0.00	18.57	122.58	0.21	0 08:25	0 00:00	0.00	0.00
92	Pond	6.45	0.00	115.23	0.53	0.00	4.77	114.83	0.13	0 08:27	0 00:00	0.00	0.00
93	WQ-1	0.34	0.00	319.68	0.22	0.00	6.34	319.50	0.04	0 08:02	0 00:00	0.00	0.00
94	WQ-2	0.68	0.00	295.41	0.16	0.00	6.41	295.28	0.03	0 08:03	0 00:00	0.00	0.00
95	WQ-3	1.33	0.00	252.98	0.79	0.00	8.75	252.26	0.07	0 08:07	0 00:00	0.00	0.00
96	WQ-4	1.71	0.00	134.84	1.55	0.00	5.59	133.52	0.23	0 08:04	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	No. of Barrels
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)					(cfs)		
1	11 (1)	7.37	133.20	0.00	133.16	10.74	0.04	0.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
2	117 (1)	64.97	239.67	0.00	234.51	0.00	5.16	7.9400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
3	118 (1)	212.62	229.14	0.00	211.66	0.25	17.48	8.2200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	118 (2) (1)	19.68	231.01	0.00	229.14	0.00	1.87	9.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
5	120 (1)	77.51	197.45	0.00	190.10	0.00	7.35	9.4800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
6	123 (1)	59.93	168.39	0.00	163.77	0.00	4.62	7.7100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
7	123 (1) (1)	16.88	163.77	0.00	160.02	0.00	3.75	22.2400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
8	3	75.55	89.17	0.00	82.12	0.00	7.05	9.3300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
9	4	11.39	344.23	0.00	343.39	0.00	0.84	7.3800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
10	5	30.38	343.39	0.00	341.53	0.00	1.86	6.1200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
11	6	35.43	306.46	0.00	303.21	0.00	3.25	9.1700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
12	7	10.45	251.20	0.00	251.15	5.67	0.05	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
13	9	20.90	170.66	0.00	168.80	0.41	1.86	8.8800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
14	11	97.29	148.00	0.00	138.38	0.00	9.63	9.8900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
15	25	64.25	117.16	0.00	114.91	0.00	2.25	3.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
16	32	35.07	311.37	0.00	311.37	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
17	33	70.00	281.10	0.00	281.10	0.00	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
18	36	110.00	121.89	0.00	121.89	0.00	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
19	37	110.00	121.84	0.00	121.84	0.00	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
20	40	10.65	311.80	0.00	311.75	0.00	0.06	0.5400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
21	41	4.63	311.87	0.00	311.84	0.04	0.03	0.5400	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
22	42	4.61	311.89	0.00	311.37	0.00	0.52	11.3800	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
23	43	50.04	325.96	0.00	319.46	0.00	6.50	12.9900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
24	44	42.92	60.90	0.00	56.00	0.00	4.90	11.4100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
25	45	4.58	281.60	0.50	281.58	0.05	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
26	46	4.64	281.63	0.00	281.60	0.50	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
27	48	21.47	303.21	0.00	301.27	0.00	1.94	9.0600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
28	49	4.62	245.45	0.50	245.43	0.00	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
29	50	6.22	289.90	0.00	289.50	7.87	0.40	6.4600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
30	51	42.05	311.75	0.00	308.34	0.00	3.41	8.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
31	52	4.67	245.48	0.00	245.45	0.50	0.02	0.4900	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
32	53	8.92	122.31	0.00	122.26	0.00	0.05	0.5600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
33	55	37.87	281.49	0.00	280.30	0.00	1.19	3.1400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
34	57	17.99	281.53	0.00	281.49	0.00	0.04	0.2000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
35	58	55.00	244.95	0.00	244.95	0.00	0.00	0.0000	CIRCULAR	60.000	60.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
36	59	4.64	122.42	0.00	122.39	0.50	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
37	60	4.61	122.37	0.00	122.34	0.50	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
38	61	4.65	122.39	0.50	122.35	0.09	0.04	0.8600	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
39	62	4.65	122.34	0.50	122.31	0.00	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
40	64	83.44	279.09	0.00	272.90	0.00	6.19	7.4200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
41	66	117.45	272.90	0.00	264.28	0.00	8.62	7.3400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
42	68	14.00	160.06	0.00	160.02	0.00	0.04	0.2900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
43	69	17.02	258.30	0.00	255.29	0.00	3.01	17.6900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
44	72	44.73	264.28	0.00	260.10	0.00	4.18	9.3400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
45	72 (1)	19.07	260.10	0.00	258.30	0.00	1.80	9.4400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
46	74	7.28	245.43	0.00	245.40	0.00	0.04	0.4800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
47	75	39.23	245.40	0.00	241.65	0.00	3.75	9.5500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
48	76	12.08	281.03	0.00	280.73	0.50	0.30	2.4500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
49	80	154.90	160.02	0.00	148.00	0.00	12.02	7.7600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
50	84	7.40	281.90	0.27	281.86	0.00	0.04	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
51	85	7.24	281.82	0.00	281.58	0.05	0.23	3.2300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
52	86	4.63	281.86	0.00	281.84	0.50	0.02	0.5000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
53	87	9.30	122.42	0.00	122.37	0.00	0.05	0.5400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
54	88	70.02	281.34	0.00	281.34	0.00	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
55	89	4.63	281.84	0.50	281.82	0.00	0.02	0.5400	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
56	90	79.14	82.12	0.00	75.63	0.10	6.49	8.2000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
57	91	7.08	122.26	0.00	122.22	0.00	0.04	0.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
58	92	74.14	122.22	0.00	117.16	0.00	5.06	6.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
59	93	101.21	75.53	0.00	61.80	0.00	13.73	13.5700	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
60	94	7.47	61.80	0.00	60.90	0.00	0.90	12.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
61	98	14.02	234.49	0.00	234.60	0.09	-0.11	-0.8200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
62	104	6.96	311.89	0.00	311.85	0.00	0.04	0.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
63	105	4.60	311.85	0.00	311.33	0.00	0.52	11.3700	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
64	106	35.00	311.33	0.00	311.33	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
65	107	4.66	311.83	0.00	311.82	0.00	0.01	0.1900	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
66	108	6.97	311.82	0.00	311.80	0.00	0.01	0.2200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
67	109	25.08	319.46	0.00	319.25	0.00	0.21	0.8400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
68	111	57.34	337.37	0.00	332.08	0.00	5.29	9.2300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
69	112	65.84	332.08	0.00	325.96	0.00	6.12	9.2900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
70	117	77.62	245.58	0.00	239.67	0.00	5.91	7.6100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
71	118	32.34	234.51	0.00	231.01	0.00	3.50	10.8100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
72	119	58.54	211.41	0.00	206.34	0.00	5.07	8.6600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
73	120	81.37	206.34	0.00	197.45	0.00	8.89	10.9300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
74	121	66.91	190.10	0.00	184.85	0.00	5.25	7.8500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
75	122	107.29	184.85	0.00	175.77	0.00	9.08	8.4600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
76	123	78.84	175.77	0.00	168.39	0.00	7.38	9.3600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
77	127	75.57	107.35	0.00	101.37	0.00	5.98	7.9200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
78	128	28.61	97.60	0.00	94.85	0.00	2.75	9.6100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
79	130	26.54	319.25	0.00	313.56	1.67	5.69	21.4400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
80	132	39.21	301.27	0.00	298.30	3.05	2.96	7.5600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
81	133	94.80	295.25	0.00	289.90	0.00	5.35	5.6400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
82	142	7.52	133.23	0.00	133.20	0.00	0.03	0.4700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
83	143	74.00	114.91	0.00	114.70	0.00	0.20	0.2700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
84	146	37.30	113.37	0.00	109.33	0.00	4.04	10.8300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
85	148	34.10	94.85	0.00	89.17	0.00	5.68	16.6600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
86	150	7.26	136.54	0.00	136.50	0.00	0.04	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
87	151	16.25	133.29	0.00	133.21	-0.03	0.08	0.5200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
88	155	9.96	109.33	0.00	107.35	0.00	1.98	19.8900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
89	170	33.10	136.50	0.00	136.34	3.05	0.16	0.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
90	171	49.40	136.54	0.00	133.70	0.50	2.84	5.7500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
91	173	14.78	138.50	0.00	136.00	2.77	2.50	16.9200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
92	174	32.95	255.29	0.00	251.20	0.00	4.09	12.4100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
93	176	13.22	246.84	0.00	246.80	1.40	0.04	0.2900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
94	Link-01	79.01	82.12	0.00	75.53	0.00	6.59	8.3400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
95	Link-02	18.43	267.00	0.00	264.70	0.42	2.30	12.4800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
96	Link-04	54.47	114.20	-0.50	113.37	0.00	0.83	1.5200	CIRCULAR	60.000	60.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
97	Link-05	17.15	341.53	0.00	340.76	0.00	0.77	4.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
98	Link-07	11.44	280.23	0.00	279.09	0.00	1.14	9.9800	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
99	Link-08	9.63	255.29	0.00	255.24	3.05	0.05	0.5200	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
100	Link-09	31.88	252.19	0.00	251.70	0.50	0.49	1.5400	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
101	Link-10	11.92	138.38	0.00	136.54	0.00	1.84	15.4200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
102	Link-11	48.20	101.37	0.00	97.60	0.00	3.77	7.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	11 (1)	8.06	0 08:05	7.95	1.01	4.95	0.02	1.30	0.87	0.00		> CAPACITY
2	117 (1)	0.13	0 08:01	32.07	0.00	1.20	0.90	0.18	0.12	0.00		Calculated
3	118 (1)	2.42	0 08:01	32.63	0.07	10.58	0.33	0.28	0.19	0.00		Calculated
4	118 (2) (1)	2.43	0 08:00	35.10	0.07	9.08	0.04	0.31	0.21	0.00		Calculated
5	120 (1)	2.73	0 08:04	35.04	0.08	10.39	0.12	0.31	0.21	0.00		Calculated
6	123 (1)	3.25	0 08:07	31.60	0.10	11.19	0.09	0.33	0.22	0.00		Calculated
7	123 (1) (1)	3.24	0 08:09	53.66	0.06	9.11	0.03	0.40	0.27	0.00		Calculated
8	3	24.89	0 08:04	34.76	0.72	18.21	0.07	1.12	0.75	0.00		Calculated
9	4	0.00	0 00:00	30.92	0.00	0.00		0.05	0.03	0.00		Calculated
10	5	0.26	0 08:00	28.14	0.01	4.28	0.12	0.11	0.07	0.00		Calculated
11	6	0.68	0 08:00	34.47	0.02	6.83	0.09	0.16	0.11	0.00		Calculated
12	7	9.30	0 08:06	8.03	1.16	5.59	0.03	1.34	0.89	0.00		> CAPACITY
13	9	0.00	0 00:00	11.50	0.00	0.00		0.00	0.00	0.00		Calculated
14	11	6.99	0 08:02	35.79	0.20	11.93	0.14	0.55	0.37	0.00		Calculated
15	25	5.78	0 08:26	21.31	0.27	5.19	0.21	0.91	0.60	0.00		Calculated
16	32	0.18	0 08:04	130.15	0.00	0.29	2.02	0.43	0.12	0.00		Calculated
17	33	0.99	0 08:09	69.59	0.01	0.43	2.71	0.97	0.24	0.00		Calculated
18	36	4.33	0 08:09	205.18	0.02	0.87	2.11	1.47	0.24	0.00		Calculated
19	37	2.28	0 08:10	205.18	0.01	0.48	3.82	1.52	0.25	0.00		Calculated
20	40	0.11	0 08:25	8.33	0.01	1.69	0.10	0.17	0.11	0.00		Calculated
21	41	0.16	0 08:22	53.11	0.00	1.55	0.05	0.15	0.05	0.00		Calculated
22	42	0.33	0 07:59	243.79	0.00	0.93	0.08	0.41	0.14	0.00		Calculated
23	43	0.34	0 08:00	41.01	0.01	3.60	0.23	0.16	0.10	0.00		Calculated
24	44	25.09	0 08:06	38.44	0.65	16.92	0.04	1.19	0.79	0.00		Calculated
25	45	0.92	0 08:12	51.19	0.02	1.67	0.05	0.42	0.14	0.00		Calculated
26	46	1.07	0 07:58	50.86	0.02	1.78	0.04	0.47	0.16	0.00		Calculated
27	48	0.68	0 08:01	34.25	0.02	6.56	0.05	0.16	0.11	0.00		Calculated
28	49	8.65	0 08:14	50.97	0.17	2.68	0.03	1.40	0.47	0.00		Calculated
29	50	1.29	0 08:03	28.92	0.04	5.89	0.02	0.27	0.18	0.00		Calculated
30	51	0.91	0 08:04	32.39	0.03	7.59	0.09	0.18	0.12	0.00		Calculated
31	52	9.16	0 08:07	50.69	0.18	3.05	0.03	1.51	0.51	0.00		Calculated
32	53	2.12	0 08:28	8.52	0.25	1.67	0.09	1.03	0.69	0.00		Calculated
33	55	0.87	0 08:19	20.17	0.04	5.25	0.12	0.22	0.15	0.00		Calculated
34	57	0.81	0 08:19	5.09	0.16	2.27	0.13	0.38	0.26	0.00		Calculated
35	58	8.84	0 08:12	126.18	0.07	1.27	0.72	1.97	0.39	0.00		Calculated
36	59	4.77	0 08:06	58.10	0.08	2.57	0.03	0.98	0.33	0.00		Calculated
37	60	3.10	0 08:06	58.27	0.05	1.93	0.04	1.01	0.34	0.00		Calculated
38	61	3.97	0 08:11	67.00	0.06	2.30	0.03	0.95	0.32	0.00		Calculated
39	62	2.09	0 08:26	58.04	0.04	1.07	0.07	1.02	0.34	0.00		Calculated
40	64	1.60	0 08:00	31.00	0.05	8.82	0.16	0.24	0.16	0.00		Calculated
41	66	1.60	0 08:01	30.83	0.05	4.25	0.46	0.43	0.29	0.00		Calculated
42	68	0.06	0 07:39	2.09	0.03	0.30	0.78	0.50	0.50	0.00		Calculated
43	69	9.33	0 08:03	47.86	0.20	13.79	0.02	0.62	0.41	0.00		Calculated
44	72	9.08	0 08:00	34.79	0.26	10.86	0.07	0.72	0.48	0.00		Calculated
45	72 (1)	9.09	0 08:01	34.96	0.26	10.42	0.03	0.75	0.50	0.00		Calculated
46	74	8.64	0 08:15	7.89	1.09	6.71	0.02	1.03	0.68	0.00		> CAPACITY
47	75	9.14	0 08:16	35.16	0.26	13.47	0.05	0.61	0.41	0.00		Calculated
48	76	1.10	0 08:01	6.04	0.18	4.68	0.04	0.34	0.34	0.00		Calculated
49	80	7.00	0 08:01	31.70	0.22	13.78	0.19	0.49	0.33	0.00		Calculated
50	84	0.22	0 08:09	8.05	0.03	1.92	0.06	0.18	0.12	0.00		Calculated
51	85	0.10	0 08:12	20.46	0.00	0.66	0.18	0.26	0.17	0.00		Calculated
52	86	0.21	0 08:15	50.94	0.00	1.68	0.05	0.15	0.05	0.00		Calculated
53	87	3.28	0 08:05	8.34	0.39	2.95	0.05	0.99	0.66	0.00		Calculated
54	88	0.14	0 08:07	69.59	0.00	0.72	1.62	0.59	0.15	0.00		Calculated
55	89	0.07	0 08:24	53.08	0.00	1.28	0.06	0.10	0.03	0.00		Calculated
56	90	11.52	0 08:04	26.07	0.44	10.79	0.12	0.99	0.66	0.00		Calculated
57	91	5.77	0 08:23	8.55	0.67	6.40	0.02	0.76	0.51	0.00		Calculated
58	92	5.77	0 08:24	29.73	0.19	9.87	0.13	0.55	0.37	0.00		Calculated
59	93	25.08	0 08:06	33.53	0.75	14.58	0.12	1.42	0.95	0.00		Calculated
60	94	25.09	0 08:06	39.59	0.63	14.20	0.01	1.50	1.00	18.00		SURCHARGED
61	98	0.07	0 07:41	3.50	0.02	0.60	0.39	0.26	0.26	0.00		Calculated
62	104	0.13	0 08:21	8.62	0.01	2.58	0.04	0.10	0.07	0.00		Calculated
63	105	0.13	0 08:25	243.61	0.00	0.79	0.10	0.35	0.12	0.00		Calculated
64	106	0.05	0 08:26	130.27	0.00	0.29	2.01	0.36	0.10	0.00		Calculated
65	107	0.05	0 08:15	32.31	0.00	0.93	0.08	0.12	0.04	0.00		Calculated
66	108	0.05	0 08:13	5.28	0.01	0.72	0.16	0.13	0.09	0.00		Calculated
67	109	0.34	0 08:03	10.41	0.03	3.42	0.12	0.16	0.11	0.00		Calculated
68	111	0.13	0 08:00	34.57	0.00	4.65	0.21	0.07	0.05	0.00		Calculated
69	112	0.13	0 08:01	34.69	0.00	3.53	0.31	0.08	0.05	0.00		Calculated
70	117	0.13	0 08:00	31.40	0.00	4.37	0.30	0.07	0.05	0.00		Calculated
71	118	2.42	0 07:58	37.42	0.06	9.00	0.06	0.31	0.21	0.00		Calculated
72	119	2.73	0 08:02	33.49	0.08	10.53	0.09	0.30	0.20	0.00		Calculated
73	120	2.73	0 08:03	37.61	0.07	11.14	0.12	0.29	0.20	0.00		Calculated
74	121	2.73	0 08:05	31.88	0.09	9.55	0.12	0.33	0.22	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
75	122	3.25	0 08:05	33.10	0.10	11.19	0.16	0.33	0.22	0.00		Calculated
76	123	3.25	0 08:06	34.82	0.09	10.31	0.13	0.35	0.23	0.00		Calculated
77	127	7.41	0 08:27	32.02	0.23	12.29	0.10	0.56	0.37	0.00		Calculated
78	128	15.38	0 08:05	35.28	0.44	13.33	0.04	0.99	0.66	0.00		Calculated
79	130	0.41	0 08:04	52.69	0.01	8.47	0.05	0.10	0.06	0.00		Calculated
80	132	0.68	0 08:03	31.29	0.02	6.66	0.10	0.16	0.11	0.00		Calculated
81	133	0.68	0 08:03	27.03	0.03	3.59	0.44	0.25	0.17	0.00		Calculated
82	142	1.77	0 08:06	7.76	0.23	1.00	0.13	1.50	1.00	10.00		SURCHARGED
83	143	6.45	0 08:26	5.96	1.08	6.10	0.20	0.87	0.58	0.00		> CAPACITY
84	146	7.42	0 08:22	37.45	0.20	9.12	0.07	0.73	0.48	0.00		Calculated
85	148	15.77	0 08:07	46.45	0.34	12.31	0.05	1.19	0.79	0.00		Calculated
86	150	1.71	0 08:04	8.01	0.21	2.56	0.05	0.61	0.41	0.00		Calculated
87	151	1.74	0 08:07	6.92	0.25	0.98	0.28	1.50	1.00	7.00		SURCHARGED
88	155	7.40	0 08:26	17.21	0.43	11.93	0.01	0.75	0.75	0.00		Calculated
89	170	1.71	0 08:07	7.94	0.22	3.16	0.17	0.52	0.35	0.00		Calculated
90	171	5.29	0 08:07	9.26	0.57	8.61	0.10	0.83	0.83	0.00		Calculated
91	173	0.00	0 00:00	15.88	0.00	0.00		0.00	0.00	0.00		Calculated
92	174	8.00	0 08:04	40.09	0.20	6.24	0.09	1.02	0.68	0.00		Calculated
93	176	0.00	0 00:00	2.10	0.00	0.00		0.00	0.00	0.00		Calculated
94	Link-01	13.40	0 08:03	32.86	0.41	11.79	0.11	1.04	0.69	0.00		Calculated
95	Link-02	0.00	0 00:00	13.63	0.00	0.00		0.10	0.10	0.00		Calculated
96	Link-04	6.46	0 08:28	353.10	0.02	5.89	0.15	0.52	0.10	0.00		Calculated
97	Link-05	0.26	0 08:02	24.12	0.01	4.13	0.07	0.12	0.08	0.00		Calculated
98	Link-07	1.10	0 08:01	28.76	0.04	6.06	0.03	0.24	0.16	0.00		Calculated
99	Link-08	1.33	0 08:04	6.56	0.20	2.67	0.06	0.49	0.33	0.00		Calculated
100	Link-09	1.40	0 07:58	11.29	0.12	2.39	0.22	1.02	0.68	0.00		Calculated
101	Link-10	7.03	0 08:02	44.68	0.16	9.70	0.02	0.65	0.43	0.00		Calculated
102	Link-11	7.41	0 08:27	31.81	0.23	8.85	0.09	0.79	0.52	0.00		Calculated

Louis Thompson Tightline Project
Flow Splitter for WQ Facilities WQ-3 and WQ-4

Prepared By: J. Glovatchi
Reviewed By: L. Ruppert

Structure Elevations (ft)	
Rim of Splitter to WQ-3 (CB-180)	106.35
Rim of Splitter to WQ-4 (CB-365)	106.50
Invert	100.00

*Relative elevations, see profiles for details

Flow to WQ Facility
Orifice Diameter (inches) 3.00

Orifice Equation
$Q = Cd * A * (2gh)^{1/2}$
Cd = coefficient of discharge
A = area of orifice (SF)
g = acceleration from gravity (32.2 ft/s/s)
h = head acting on the orifice centerline (ft)

Overflow to Bypass Pipe
Top of Riser Elev.(ft) 102.00
Baffle Riser Length (Weir) (ft) 9.42
Baffle Riser Height Above WQ Outlet(ft) 2.00
Baffle Riser Diameter (in) 36

Weir Equation (per DOE Fig 3.2.16)
$Q = 3.099 * L * h^{3/2}$
L = length of weir crest in feet (2*pi*r)
h = head on weir crest in feet

Key Elevations to be Input into Plans:

Orifice to WQ Facility (Oulet IE)	=	100.00 ft
Top of Baffle Wall to Bypass	=	102.00 ft

100-yr Design Discharge Analysis (See Water Quality Facility Calculations)
Total 100-yr discharge to flow splitter to WQ-3 = 9.3 cfs
Total 100-yr discharge to flow splitter to WQ-4 7.0 cfs

Flow to WQ Facility
27" Cartridge, 3.05' Drop Flow Rate 11.25 gpm
27" Cartridge, 3.05' Drop Flow Rate 0.025 cfs
Target 96" MH - 14 Cartridge Max WQ Rate 0.351 cfs At Weir height/design WQ surface

Check Flow to WQ Facility at 100-yr Event < 1.10 x Design WQ Flow (KCSWDM 6.2.5.2)
1.10 x Design WQ Flow 0.380 cfs
100-yr Flow Rate to WQ Facility 0.370 cfs (*check higher 100-yr WSE, rounded up rate noted per table, actual interpolated rate is less)
100-yr WQ Flow Rate < 1.1 x Design WQ Flow? YES

Flow Splitter Design Rating Table

Depth	Total	WQ	Overflow	
100.00	0.000	0.000	0.000	*Invert/Orifice Elevation*
100.10	0.077	0.077	0.000	
100.20	0.109	0.109	0.000	
100.30	0.134	0.134	0.000	
100.40	0.154	0.154	0.000	
100.50	0.173	0.173	0.000	
100.60	0.189	0.189	0.000	
100.70	0.204	0.204	0.000	
100.80	0.218	0.218	0.000	
100.90	0.232	0.232	0.000	
101.00	0.244	0.244	0.000	
101.10	0.256	0.256	0.000	
101.20	0.268	0.268	0.000	
101.30	0.278	0.278	0.000	
101.40	0.289	0.289	0.000	
101.50	0.299	0.299	0.000	
101.60	0.309	0.309	0.000	
101.70	0.318	0.318	0.000	
101.80	0.328	0.328	0.000	
101.90	0.337	0.337	0.000	
102.00	0.345	0.345	0.000	*Top of Riser to Bypass, Design WQ Flow Rate*
102.10	3.256	0.354	2.902	
102.20	8.569	0.362	8.207	*WQ-4 Rounded 100-yr Design Discharge*
102.30	15.448	0.370	15.077	*WQ-3 Rounded 100-yr Design Discharge*
102.40	23.591	0.378	23.213	
102.50	32.827	0.386	32.441	
102.60	43.039	0.394	42.645	
102.70	54.140	0.401	53.739	
102.80	66.065	0.409	65.656	
102.90	78.760	0.416	78.344	
103.00	92.181	0.423	91.758	
103.10	106.290	0.430	105.860	
103.20	121.056	0.437	120.619	
103.30	136.450	0.444	136.006	
103.40	152.447	0.450	151.997	
103.50	169.027	0.457	168.570	
103.60	186.168	0.463	185.705	

Osborn Consulting

APPENDIX C
FLOW CONTROL AND WATER QUALITY CALCULATIONS

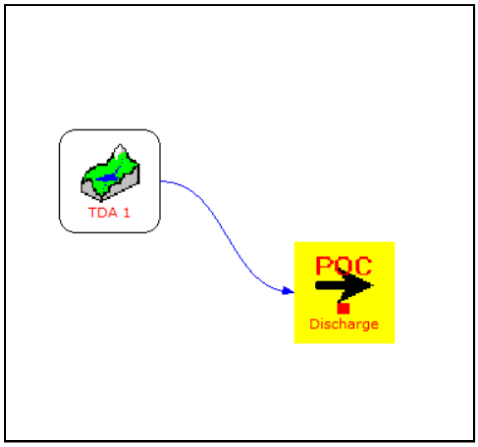
Flow Control Requirement Applicability Check: MGSFlood Model Results

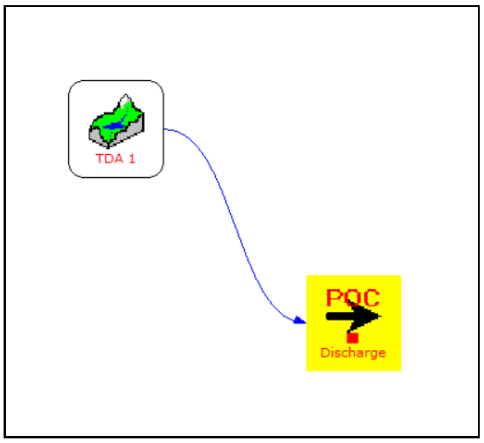
Flow Control Detention Tank Sizing Calculations: MGSFlood and Detention Stage-Storage

Water Quality Facility Sizing MGSFlood Model Results

Culvert 01

MGSFlood - TDA 1 Flow Control Point of Compliance (POC) Calculations





MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/04/2024 1:47 PM
Report Generation Date: 01/04/2024 1:48 PM

Input File Name: TDA 1_POC.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TDA 1 POC
Comments: Evaluate flow control requirement

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.098	0.098
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.098	0.098

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

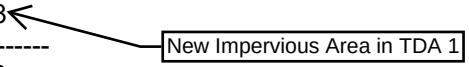
---------- Subbasin : TDA 1 ----------

	-------Area (Acres) --------
Till Forest	0.098
Subbasin Total	0.098

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : TDA 1 ----------
-------Area (Acres) --------
Impervious 0.098

Subbasin Total 0.098



********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Discharge
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Discharge
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: TDA 1 20.130
Link: Discharge 0.000

Total: 20.130

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: TDA 1	0.000
Link: Discharge	0.000
Total:	0.000

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.127 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Discharge **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 15.27
Inflow Volume Including PPT-Evap (ac-ft): 15.27
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 15.27
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Discharge **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 54.53
Inflow Volume Including PPT-Evap (ac-ft): 54.53
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 54.53
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Discharge
Scenario Postdeveloped Compliance Link: Discharge

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.988E-03	2-Year	3.891E-02
5-Year	4.800E-03	5-Year	5.099E-02
10-Year	6.001E-03	10-Year	6.034E-02
25-Year	9.001E-03	25-Year	7.116E-02
50-Year	1.112E-02	50-Year	8.631E-02
100-Year	1.157E-02	100-Year	0.101
200-Year	1.944E-02	200-Year	0.105
500-Year	3.004E-02	500-Year	0.109

Flow Difference (cfs) = 0.0998 cfs
< 0.15 cfs

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 11/30/2023 2:38 PM
Report Generation Date: 11/30/2023 2:39 PM

Input File Name: Culvert 1_Flow Analysis.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 1 - Pre and Post Development Flows
Comments: Evaluate existing vs. post-developed flows at culvert 1

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.155	0.157
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.155	0.157

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Drainage Area ----------

	-------Area (Acres) --------
Till Grass	0.140
Impervious	0.015
Subbasin Total	0.155

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Discharge Area ----------
-------Area (Acres) --------

Till Grass	0.097
Impervious	0.060
Subbasin Total	0.157

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 1
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Culvert 1
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)

Subbasin: Drainage Area 18.753
Link: Culvert 1 0.000

Total: 18.753

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Discharge Area	12.993
Link: Culvert 1	0.000
Total:	12.993

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.119 ac-ft/year, Post Developed: 0.082 ac-ft/year

*************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 1 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 49.17
Inflow Volume Including PPT-Evap (ac-ft): 49.17
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 49.17
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Culvert 1 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 61.67
Inflow Volume Including PPT-Evap (ac-ft): 61.67
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 61.67
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results **************

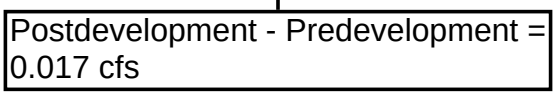
Scenario Predeveloped Compliance Link: Culvert 1
Scenario Postdeveloped Compliance Link: Culvert 1

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

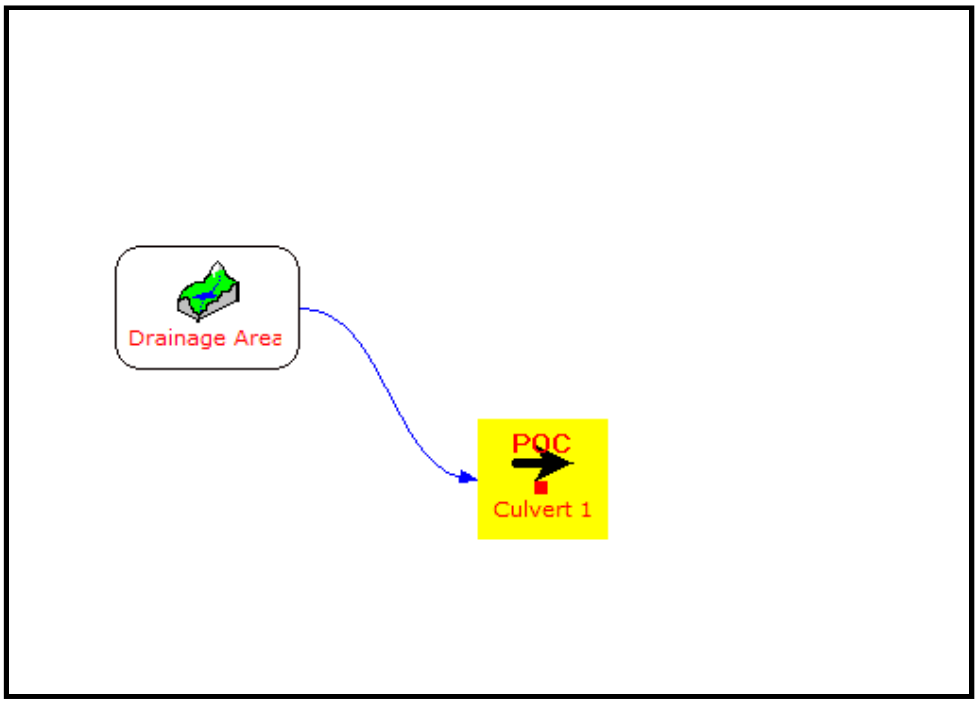
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.529E-02	2-Year	3.748E-02
5-Year	3.702E-02	5-Year	4.993E-02
10-Year	4.865E-02	10-Year	6.267E-02
25-Year	6.628E-02	25-Year	7.705E-02
50-Year	8.790E-02	50-Year	0.107
100-Year	0.104	100-Year	0.121
200-Year	0.105	200-Year	0.125
500-Year	0.107	500-Year	0.130

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

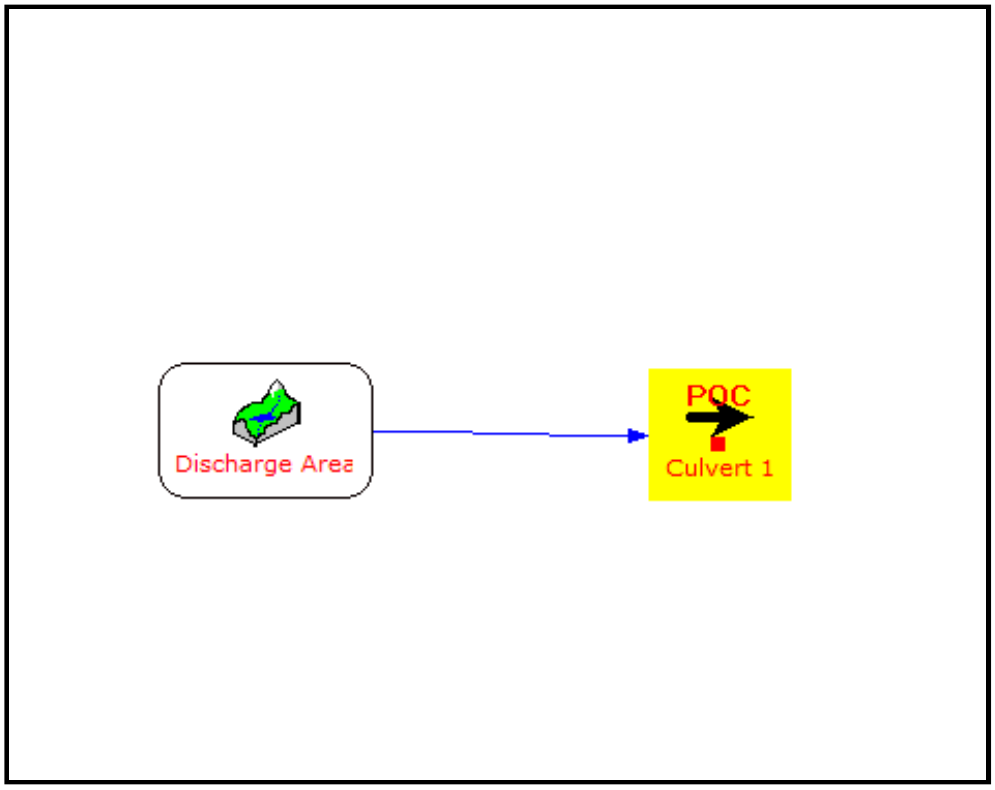


Culvert 1 - Pre and Post Development Flows

Predeveloped



Postdeveloped



Culvert 02

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/05/2023 12:02 PM
Report Generation Date: 12/05/2023 12:02 PM

Input File Name: Culvert 02_Flow Control_Iteration1.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 2 Flow Control Iteration 1
Comments: Auto-size determination of approximate detention volume required to reduce developed flows at or below existing

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.366	0.367
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.366	0.367

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Culvert Area ----------

	-------Area (Acres) --------
Till Grass	0.145
Impervious	0.221

Subbasin Total 0.366

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : FC Area ----------

	-------Area (Acres) --------
Till Grass	0.064
Impervious	0.219
Subbasin Total	0.283

---------- Subbasin : FC Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.026
Impervious	0.058
Subbasin Total	0.084

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 2
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 2

Prismatic Pond Option Used

Pond Floor Elevation (ft)	:	100.50
Riser Crest Elevation (ft)	:	103.00
Max Pond Elevation (ft)	:	103.50
Storage Depth (ft)	:	2.50
Pond Bottom Length (ft)	:	73.2
Pond Bottom Width (ft)	:	1.5
Pond Side Slopes (ft/ft)	:	L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft)	:	107.
Area at Riser Crest El (sq-ft)	:	107.

(acres) : 0.002
Volume at Riser Crest (cu-ft) : 268.
(ac-ft) : 0.006
Area at Max Elevation (sq-ft) : 107.
(acres) : 0.002
Vol at Max Elevation (cu-ft) : 321.
(ac-ft) : 0.007

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.012
Riser Crest Elevation : 103.00 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 1.67
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 101.00
Length (in) : 0.14
Height (in) : 24.00
Orientation : Vertical
Elbow : No

Link Name: Culvert 2
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats

WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.931
1.11-Year	101.018
1.25-Year	101.090
2.00-Year	101.334
3.33-Year	101.498
5-Year	101.608
10-Year	101.875
25-Year	102.144
50-Year	102.413
100-Year	102.612

*************Groundwater Recharge Summary **************

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin:	Culvert Area	19.396
Link:	Culvert 2	0.000
Total:		19.396

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin:	FC Area	8.573
Subbasin:	FC Bypass Area	3.483
Link:	Detention	0.000
Link:	Culvert 2	Not Applicable
Total:		12.056

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.123 ac-ft/year, Post Developed: 0.076 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 2 **********

Infiltration/Filtration Statistics----------

Inflow Volume (ac-ft): 165.09
Inflow Volume Including PPT-Evap (ac-ft): 165.09
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 165.09
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 1219. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1828. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 140.53
Inflow Volume Including PPT-Evap (ac-ft): 140.53
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 140.65
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results **************

Scenario Predeveloped Compliance Link: Culvert 2
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.109	2-Year	7.445E-02
5-Year	0.142	5-Year	9.378E-02
10-Year	0.172	10-Year	0.114
25-Year	0.209	25-Year	0.135
50-Year	0.278	50-Year	0.157
100-Year	0.313	100-Year	0.174
200-Year	0.326	200-Year	0.194
500-Year	0.343	500-Year	0.221

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-43.6%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-43.6%	PASS

Maximum Excursion from Q2 to Q50 (Must be less than 10%):	-74.5%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

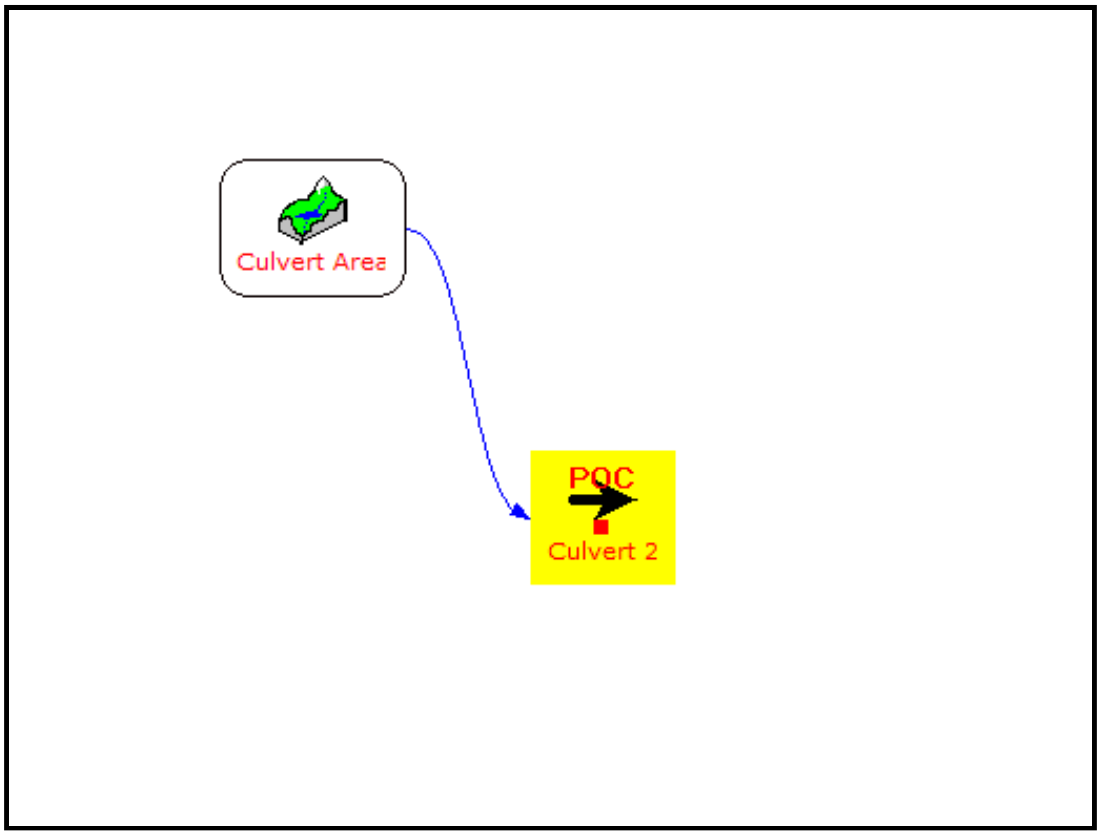
****** LID Duration Performance ******

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%):	-9.2%	PASS
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%):	-9.1%	PASS

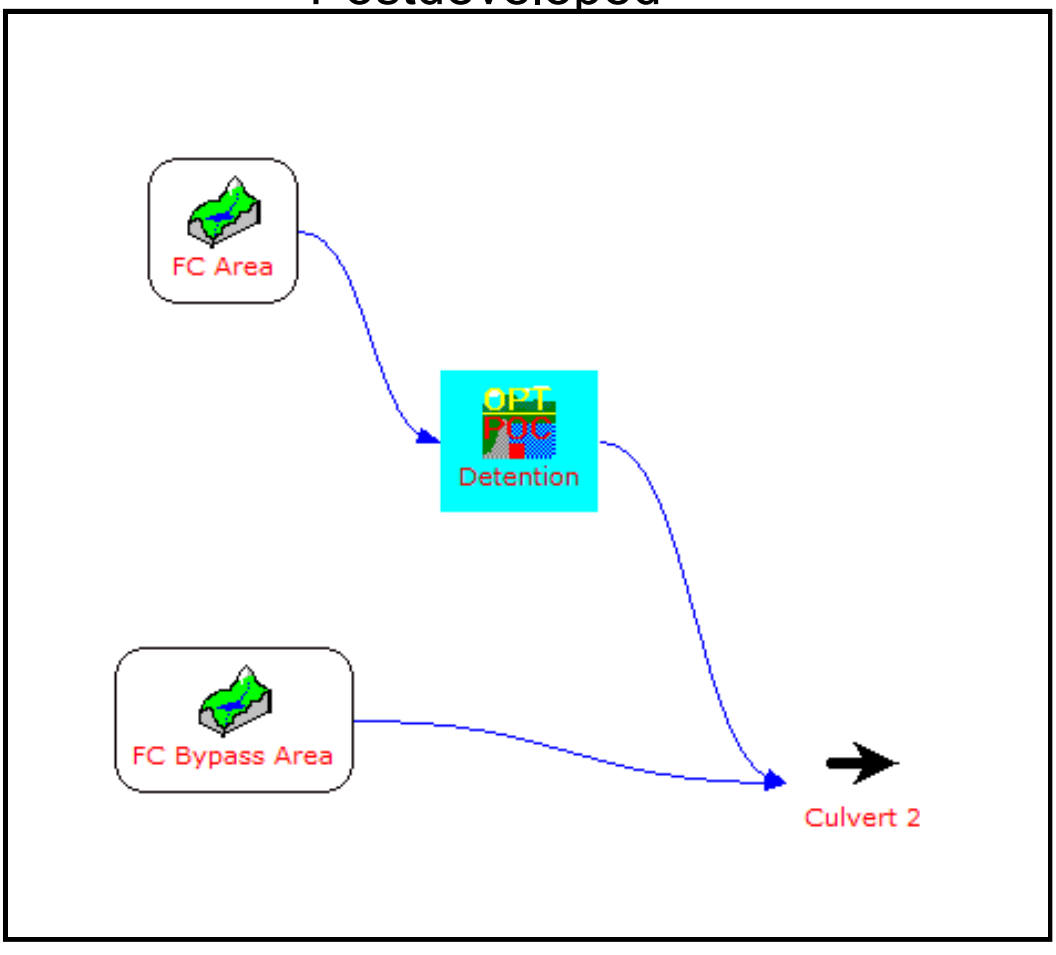
MEETS ALL LID DURATION DESIGN CRITERIA: PASS

Culvert 2 Flow Control Iteration 1

Predeveloped



Postdeveloped



Culvert 02 - Flow Control

Detention Pipe Volume Calculator

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser 268 cu ft

Storage Volume Provided by Horizontal Pipe of Diameter d
Pipe Diameter (d) 3.5 ft
Pipe Length 70 ft *Dual Pipes 1/2 this Distance Each Pipe
Relative Elevation at pipe Crest: 103.50 ft

Pond Volume at Overflow (cu ft): 610
Target Volume from MGSFlood:

2 Dual Pipes (each 35 ft long)

Pond Volume Table
Circular Section Geometry Read from CircularSections Tab

elev. ft	y/d	Wetted Area s.f.	storage cu.ft.	storage (ac.ft)
100.00	0.000	0.000	0	0
100.20	0.060	0.235	16	0.000
100.40	0.110	0.576	40	0.001
100.50	0.140	0.818	57	0.001
100.60	0.170	1.084	76	0.002
100.80	0.230	1.672	117	0.003
101.00	0.290	2.315	162	0.004
101.20	0.340	2.885	202	0.005
101.40	0.400	3.594	252	0.006
101.60	0.460	4.321	302	0.007
101.80	0.510	4.933	345	0.008
102.00	0.570	5.666	397	0.009
102.20	0.630	6.385	447	0.010
102.40	0.690	7.081	496	0.011
102.60	0.740	7.633	534	0.012
102.80	0.800	8.252	578	0.013
103.00	0.860	8.803	616	0.014
103.20	0.910	9.192	643	0.015
103.40	0.970	9.537	668	0.015
103.60	1.030	9.621	673	0.015
103.80	1.090	9.621	673	0.015
104.00	1.140	9.621	673	0.015
104.20	1.200	9.621	673	0.015
104.40	1.260	9.621	673	0.015
104.60	1.310	9.621	673	0.015
104.80	1.370	9.621	673	0.015
105.00	1.430	9.621	673	0.015
105.20	1.490	9.621	673	0.015
105.40	1.540	9.621	673	0.015
105.60	1.600	9.621	673	0.015
105.80	1.660	9.621	673	0.015
106.00	1.710	9.621	673	0.015

Iteration 2: Modeled Detention Pipe Volume
Note: Volume is increased by 1 for Elevations Greater than Pipe Diameter
Because Routing Routine Requires Increasing Pond Volume
***** Copy shaded Table below to MGSFlood Program Elevation Volume Input Screen**

ELEV (FT)	Top Area (Dummy)	VOLUME (CU FT) - 6" SEDIMENT STORAGE
100.00	10.0	0.0.
100.20	10.1	0.0.
100.40	10.2	0.0.
100.50	10.3	0.0.
100.60	10.4	18.6.
100.80	10.5	59.8.
101.00	10.6	104.8.
101.20	10.7	144.7.
101.40	10.8	194.3.
101.60	10.9	245.2.
101.80	11.0	288.0.
102.00	11.1	339.3.
102.20	11.2	389.6.
102.40	11.3	438.4.
102.60	11.4	477.0.
102.80	11.5	520.3.
103.00	11.6	558.9.
103.20	11.7	586.2.
103.40	11.8	610.3.
103.60	11.9	616.2.
103.80	12.0	617.2.
104.00	12.1	618.2.
104.20	12.2	619.2.
104.40	12.3	620.2.
104.60	12.4	621.2.
104.80	12.5	622.2.
105.00	12.6	623.2.
105.20	12.7	624.2.
105.40	12.8	625.2.
105.60	12.9	626.2.
105.80	13.0	627.2.
106.00	13.1	628.2.

*Edited table to remove storage volume below 6" to account for sediment storage, added 100.50 row

Note: Iteration 2 was not used for Culvert 02 because in TDA 1 the post development flow minus the pre-development flow is less than 0.15cfs.

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/08/2023 10:21 AM
Report Generation Date: 12/08/2023 10:21 AM

Input File Name: Culvert 02_Flow Control_Iteration3.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 2 Flow Control Iteration 3
Comments: Culvert 02 Pre - Post-Developed comparsion with offiste flows

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	2.070	2.071
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	2.070	2.071

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Culvert Area ----------

	-------Area (Acres) --------
Till Grass	0.145
Impervious	0.221
Subbasin Total	0.366

---------- Subbasin : Off Site Area ----------

	-------Area (Acres) --------
Till Grass	1.345
Impervious	0.359
Subbasin Total	1.704

----------SCENARIO: POSTDEVELOPED

Number of Subbasins: 3

---------- Subbasin : FC Area ----------

	-------Area (Acres) --------
Till Grass	0.064
Impervious	0.219
Subbasin Total	0.283

---------- Subbasin : FC Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.026
Impervious	0.058
Subbasin Total	0.084

---------- Subbasin : Off-Site Area ----------

	-------Area (Acres) --------
Till Grass	1.345
Impervious	0.359
Subbasin Total	1.704

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED

Number of Links: 1

Link Name: Culvert 2

Link Type: Copy

Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 2

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	19.
100.80	60.
101.00	105.
101.20	145.
101.40	194.
101.60	245.
101.80	288.
102.00	339.
102.20	390.
102.40	438.
102.60	477.
102.80	520.
103.00	559.
103.20	586.
103.40	610.
103.60	616.
103.80	617.
104.00	618.
104.20	619.
104.40	620.
104.60	621.
104.80	622.
105.00	623.
105.20	624.
105.40	625.
105.60	626.
105.80	627.
106.00	628.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.010
Riser Crest Elevation : 103.40 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50

Diameter (in) : 2.50
Orientation : Horizontal
Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 102.00
Diameter (in) : 5.00
Orientation : Horizontal
Elbow : Yes

Link Name: Culvert 2
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

************ Subbasin: Culvert Area ************

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.109
5-Year	0.142
10-Year	0.172
25-Year	0.209
50-Year	0.278
100-Year	0.313
200-Year	0.326
500-Year	0.343

************ Subbasin: Off Sites Area ************

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.324
5-Year	0.459
10-Year	0.590
25-Year	0.773
50-Year	1.049
100-Year	1.212
200-Year	1.238
500-Year	1.269

********** Link: Culvert 2 ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.437
5-Year	0.596
10-Year	0.762
25-Year	0.970
50-Year	1.336
100-Year	1.524
200-Year	1.564
500-Year	1.611

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Subbasin: FC Area **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	9.752E-02
5-Year	0.122
10-Year	0.151
25-Year	0.180
50-Year	0.231
100-Year	0.260
200-Year	0.272
500-Year	0.289

********** Subbasin: FC Bypass Area **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.722E-02
5-Year	3.479E-02
10-Year	4.239E-02
25-Year	5.100E-02
50-Year	6.620E-02
100-Year	7.449E-02
200-Year	7.787E-02
500-Year	8.235E-02

********** Subbasin: Off-Site Area **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.324
5-Year	0.459
10-Year	0.590
25-Year	0.773
50-Year	1.049
100-Year	1.212
200-Year	1.238
500-Year	1.269

********** Link: Detention ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.425
5-Year	0.578
10-Year	0.737
25-Year	0.936
50-Year	1.292
100-Year	1.471
200-Year	1.510
500-Year	1.558

********** Link: Detention ********** Link Outflow 1
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.356
5-Year	0.513
10-Year	0.626
25-Year	0.868
50-Year	0.950
100-Year	1.010
200-Year	1.248
500-Year	1.567

********** Link: Detention ********** Link WSEL
Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	101.378

1.11-Year	101.562
1.25-Year	101.782
2.00-Year	102.055
3.33-Year	102.141
5-Year	102.218
10-Year	102.392
25-Year	102.923
50-Year	103.147
100-Year	103.326

********** Link: Culvert 2 ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.379
5-Year	0.543
10-Year	0.667
25-Year	0.913
50-Year	1.006
100-Year	1.065
200-Year	1.317
500-Year	1.655

************Groundwater Recharge Summary **************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin:	Culvert Area	19.396
Subbasin:	Off Sites Area	180.165
Link:	Culvert 2	0.000
Total:		199.562

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin:	FC Area	8.573
Subbasin:	FC Bypass Area	3.483
Subbasin:	Off-Site Area	180.165
Link:	Detention	0.000
Link:	Culvert 2	0.000
Total:		192.221

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.263 ac-ft/year, Post Developed: 1.217 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 2 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 757.09
Inflow Volume Including PPT-Evap (ac-ft): 757.09
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 757.09
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 5335. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 8002. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 732.53
Inflow Volume Including PPT-Evap (ac-ft): 732.53
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 732.53
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: Culvert 2 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 772.83
Inflow Volume Including PPT-Evap (ac-ft): 772.83
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 772.83
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Culvert 2

Scenario Postdeveloped Compliance Link: Culvert 2

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.437	2-Year	0.379
5-Year	0.596	5-Year	0.543
10-Year	0.762	10-Year	0.667
25-Year	0.970	25-Year	0.913
50-Year	1.336	50-Year	1.006
100-Year	1.524	100-Year	1.065
200-Year	1.564	200-Year	1.317
500-Year	1.611	500-Year	1.655

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

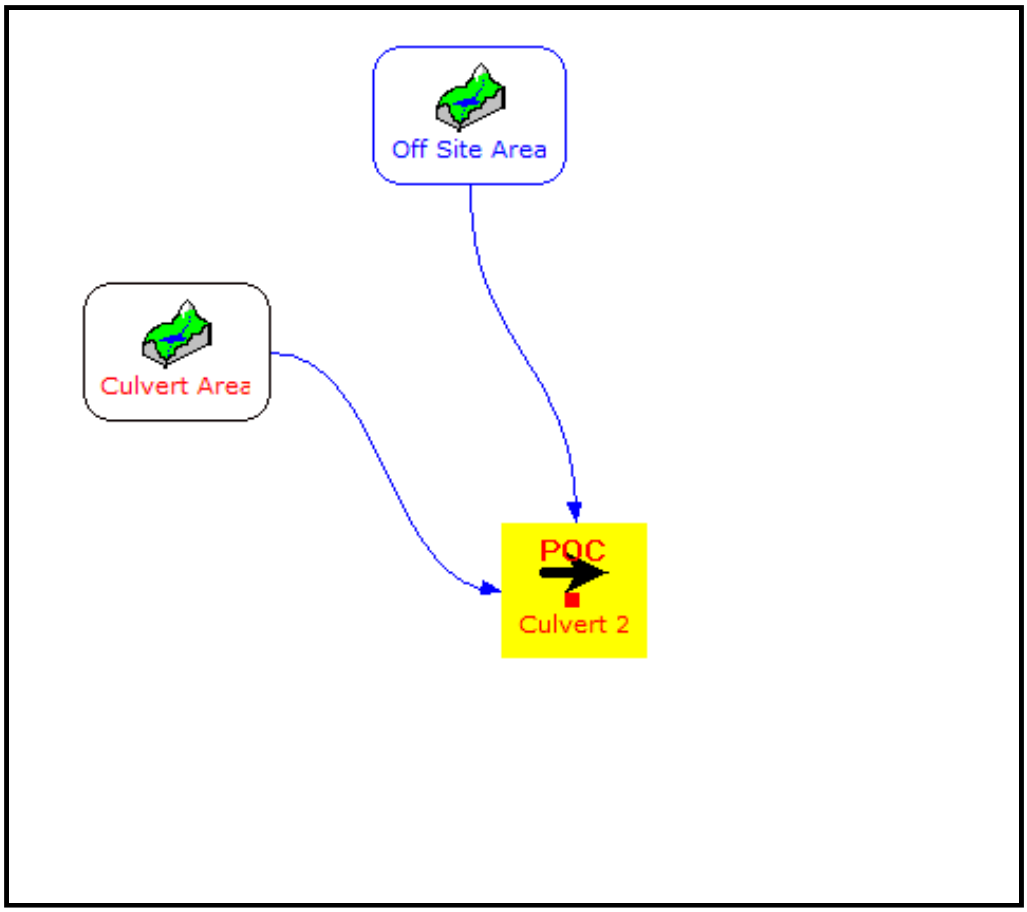
****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-40.8%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-9.1%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	8.2%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	1.7%	PASS

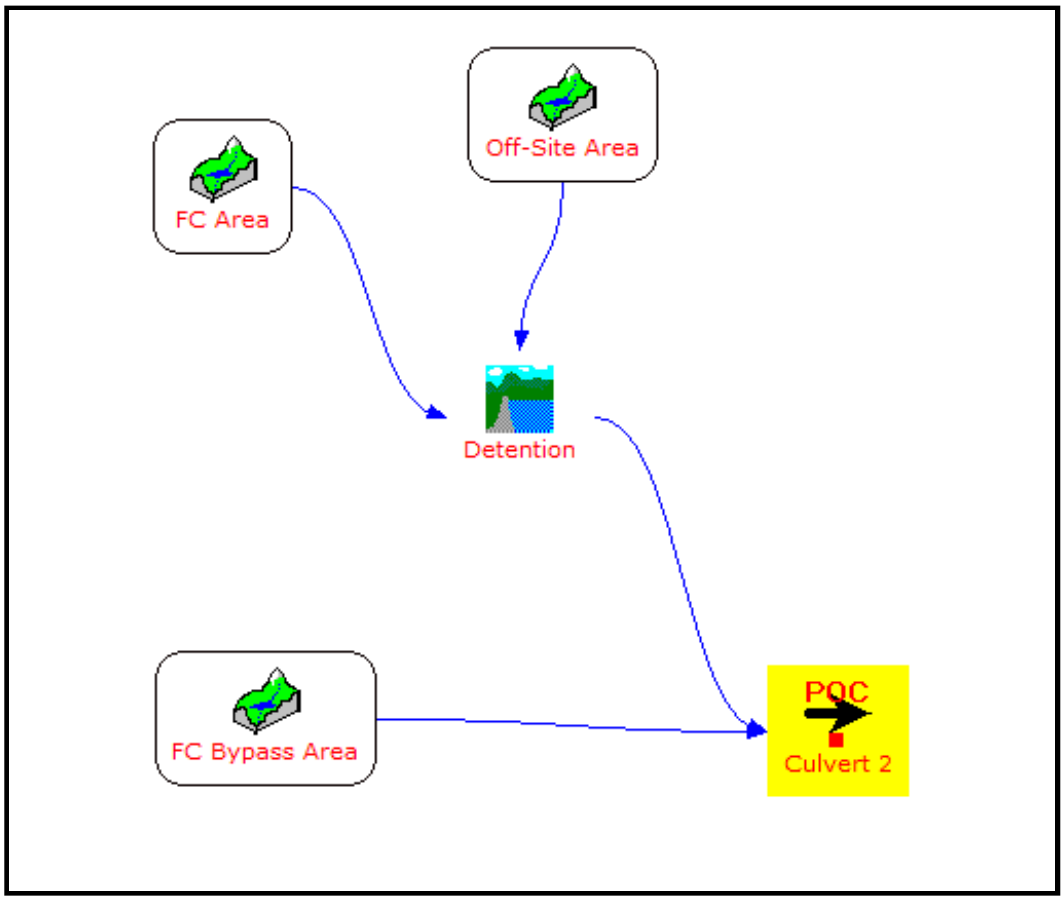
MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

Culvert 2 Flow Control Iteration 3

Predeveloped



Postdeveloped



Culvert 03

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/05/2023 12:04 PM
Report Generation Date: 12/05/2023 12:04 PM

Input File Name: Culvert 03_Flow Control_Iteration1.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 3 Flow Control Iteration 1
Comments: Auto-size determination of approximate detention volume required to reduce developed flows at or below existing and meet FC requirements in TDA 2

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.362	0.358
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.362	0.358

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Unmitigated Existing ----------

	-------Area (Acres) --------
Till Grass	0.227
Impervious	0.024

Subbasin Total 0.251

---------- Subbasin : Mitigated Existing ----------
-------Area (Acres) --------
Till Forest 0.111

Subbasin Total 0.111

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------
-------Area (Acres) --------
Till Grass 0.100
Impervious 0.071

Subbasin Total 0.171

---------- Subbasin : Mitigated Area ----------
-------Area (Acres) --------
Impervious 0.111

Subbasin Total 0.111

---------- Subbasin : FC Bypass Area ----------
-------Area (Acres) --------
Till Grass 0.043
Impervious 0.033

Subbasin Total 0.076

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 3
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 3

Prismatic Pond Option Used
Pond Floor Elevation (ft) : 101.50
Riser Crest Elevation (ft) : 103.00
Max Pond Elevation (ft) : 103.50
Storage Depth (ft) : 1.50
Pond Bottom Length (ft) : 43.8
Pond Bottom Width (ft) : 8.8
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 384.
Area at Riser Crest El (sq-ft) : 384.
(acres) : 0.009
Volume at Riser Crest (cu-ft) : 577.
(ac-ft) : 0.013
Area at Max Elevation (sq-ft) : 384.
(acres) : 0.009
Vol at Max Elevation (cu-ft) : 769.
(ac-ft) : 0.018

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.042
Riser Crest Elevation : 103.00 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 101.50
Diameter (in) : 0.96
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 102.20
Length (in) : 0.50
Height (in) : 9.62
Orientation : Vertical
Elbow : No

Link Name: Culvert 3

Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	102.143
1.11-Year	102.207
1.25-Year	102.307
2.00-Year	102.443
3.33-Year	102.555
5-Year	102.628
10-Year	102.722
25-Year	102.881
50-Year	102.983
100-Year	102.992

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Unmitigated Existing		30.407
Subbasin: Mitigated Existing		22.800
Link:	Culvert 3	0.000
Total:		53.207

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Unmitigated Area		13.395
Subbasin: Mitigated Area		0.000
Subbasin: FC Bypass Area		5.760
Link:	Detention	0.000
Link:	Culvert 3	Not Applicable

Total: 19.155

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.337 ac-ft/year, Post Developed: 0.121 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 96.85
Inflow Volume Including PPT-Evap (ac-ft): 96.85
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 96.85
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 1087. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1630. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 130.44
Inflow Volume Including PPT-Evap (ac-ft): 130.44
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 130.98
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Culvert 3
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

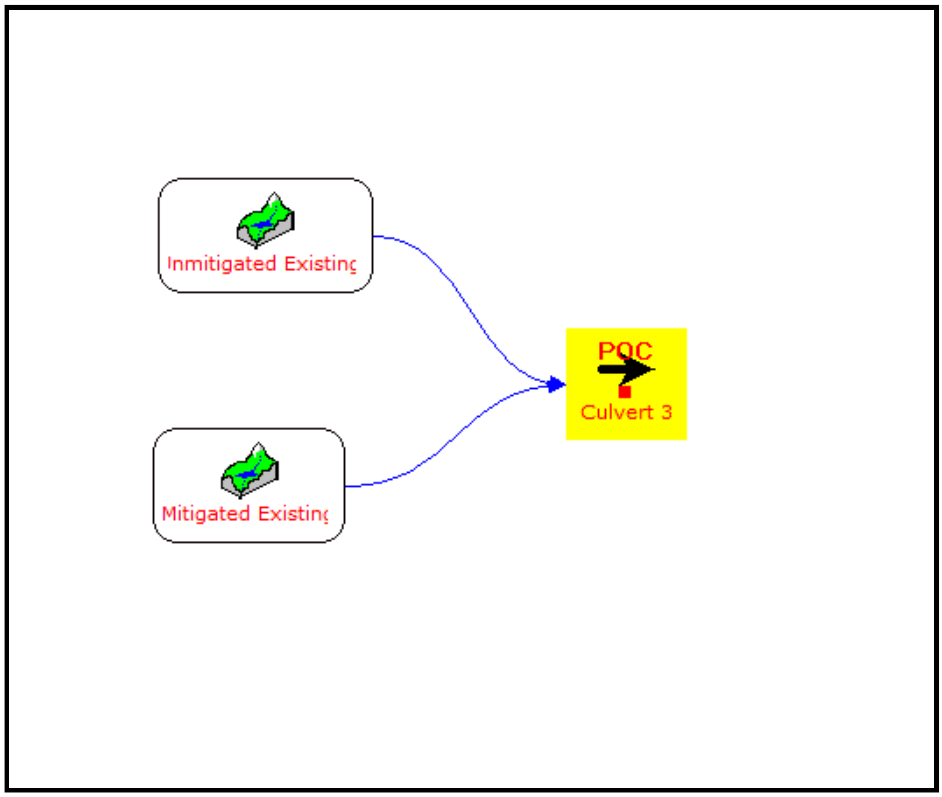
Predevelopment Runoff Postdevelopment Runoff

Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	4.275E-02	2-Year	3.751E-02
5-Year	6.370E-02	5-Year	5.761E-02
10-Year	8.405E-02	10-Year	6.946E-02
25-Year	0.118	25-Year	9.168E-02
50-Year	0.149	50-Year	0.107
100-Year	0.172	100-Year	0.109
200-Year	0.178	200-Year	0.112
500-Year	0.186	500-Year	0.117

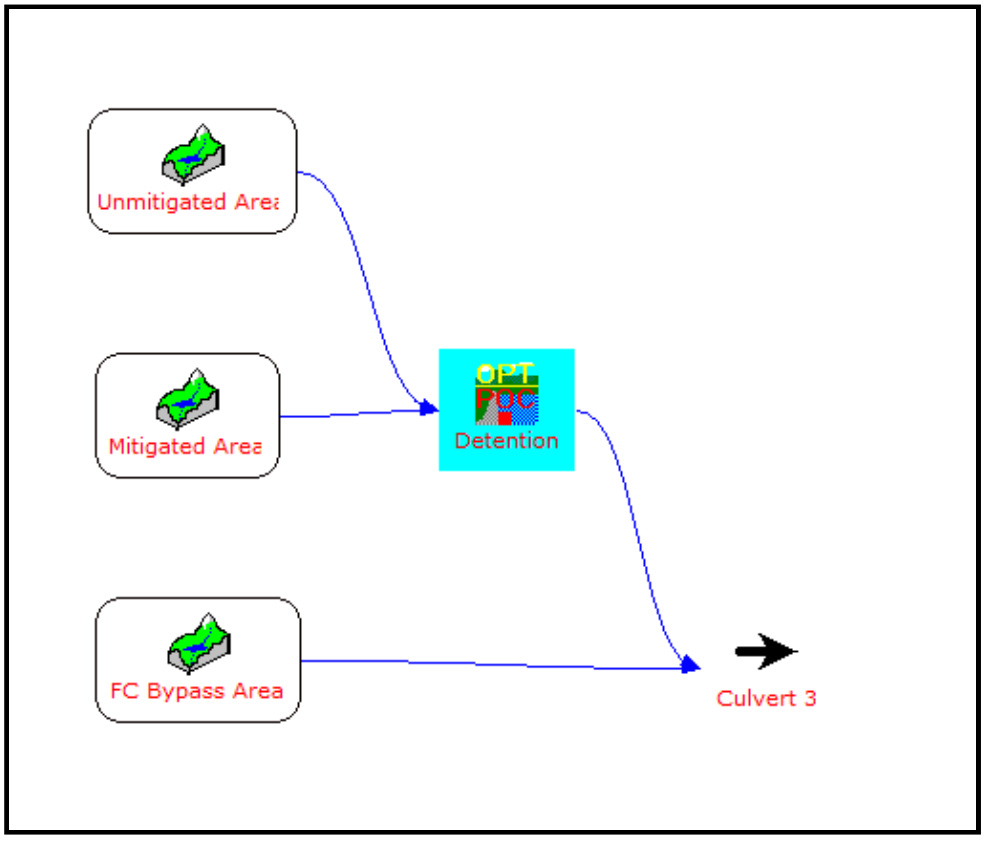
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Culvert 3 Flow Control Iteration 1

Predeveloped



Postdeveloped



Culvert 03 - Flow Control

Detention Pipe Volume Calculator

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser 577 cu ft

Storage Volume Provided by Horizontal Pipe of Diameter d

Pipe Diameter (d)	4.0	ft
Pipe Length	140	ft
Relative Elevation at pipe Crest:	104.00	ft

Pond Volume at Overflow (cu ft): 1244

Target Volume from MGSFlood:

2 Dual Pipes (each 70 ft long)

Pond Volume Table

Circular Section Geometry Read from CircularSections Tab

elev. ft	y/d	Wetted Area s.f.	storage cu.ft.	storage (ac.ft)
100.00	0.000	0.000	0	0
100.20	0.050	0.180	25	0.001
100.40	0.100	0.501	70	0.002
100.50	0.130	0.735	103	0.002
100.60	0.150	0.905	127	0.003
100.80	0.200	1.370	192	0.004
101.00	0.250	1.880	263	0.006
101.20	0.300	2.428	340	0.008
101.40	0.350	3.001	420	0.010
101.60	0.400	3.594	503	0.012
101.80	0.450	4.199	588	0.013
102.00	0.500	4.811	673	0.015
102.20	0.550	5.422	759	0.017
102.40	0.600	6.027	844	0.019
102.60	0.650	6.620	927	0.021
102.80	0.700	7.193	1007	0.023
103.00	0.750	7.740	1084	0.025
103.20	0.800	8.252	1155	0.027
103.40	0.850	8.716	1220	0.028
103.60	0.900	9.120	1277	0.029
103.80	0.950	9.441	1322	0.030
104.00	1.000	9.621	1347	0.031
104.20	1.050	9.621	1347	0.031
104.40	1.100	9.621	1347	0.031
104.60	1.150	9.621	1347	0.031
104.80	1.200	9.621	1347	0.031
105.00	1.250	9.621	1347	0.031
105.20	1.300	9.621	1347	0.031
105.40	1.350	9.621	1347	0.031
105.60	1.400	9.621	1347	0.031
105.80	1.450	9.621	1347	0.031
106.00	1.500	9.621	1347	0.031

Iteration 2: Modeled Detention Pipe Volume

Note: Volume is increased by 1 for Elevations Greater than Pipe Diameter
Because Routing Routine Requires Increasing Pond Volume

***** Copy shaded Table below to MGSFlood Program Elevation Volume Input Screen**

ELEV (FT)	Top Area (Dummy)	
100.00	10.0	0.0.
100.20	10.1	0.0.
100.40	10.2	0.0.
100.50	10.3	0.0.
100.60	10.4	23.8.
100.80	10.5	88.8.
101.00	10.6	160.4.
101.20	10.7	237.0.
101.40	10.8	317.3.
101.60	10.9	400.3.
101.80	11.0	485.0.
102.00	11.1	570.6.
102.20	11.2	656.2.
102.40	11.3	740.9.
102.60	11.4	823.9.
102.80	11.5	904.1.
103.00	11.6	980.6.
103.20	11.7	1052.3.
103.40	11.8	1117.3.
103.60	11.9	1173.9.
103.80	12.0	1218.9.
104.00	12.1	1244.1.
104.20	12.2	1245.1.
104.40	12.3	1246.1.
104.60	12.4	1247.1.
104.80	12.5	1248.1.
105.00	12.6	1249.1.
105.20	12.7	1250.1.
105.40	12.8	1251.1.
105.60	12.9	1252.1.
105.80	13.0	1253.1.
106.00	13.1	1254.1.

*Edited table to remove storage volume below 6" to account for sediment storage, added 100.50 row

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/05/2023 3:50 PM
Report Generation Date: 12/05/2023 3:50 PM

Input File Name: Culvert 03_Flow Control_Iteration2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 3 Flow Control Iteration 2
Comments: Stage-storage detention pipe analysis to determine required detention volume.

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.362	0.358
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.362	0.358

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Unmitigated Existing ----------

	-------Area (Acres) --------
Till Grass	0.227
Impervious	0.024
Subbasin Total	0.251

---------- Subbasin : Mitigated Existing ----------

	-------Area (Acres) --------
Till Forest	0.111
Subbasin Total	0.111

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------

	-------Area (Acres) --------
Till Grass	0.100
Impervious	0.071
Subbasin Total	0.171

---------- Subbasin : Mitigated Area ----------

	-------Area (Acres) --------
Impervious	0.111
Subbasin Total	0.111

---------- Subbasin : FC Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.043
Impervious	0.033
Subbasin Total	0.076

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 3
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention

Link Type: Structure
Downstream Link Name: Culvert 3

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	24.
100.80	89.
101.00	160.
101.20	237.
101.40	317.
101.60	400.
101.80	485.
102.00	571.
102.20	656.
102.40	741.
102.60	824.
102.80	904.
103.00	981.
103.20	1052.
103.40	1117.
103.60	1174.
103.80	1219.
104.00	1244.
104.20	1245.
104.40	1246.
104.60	1247.
104.80	1248.
105.00	1249.
105.20	1250.
105.40	1251.
105.60	1252.
105.80	1253.
106.00	1254.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.020
Riser Crest Elevation : 103.84 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 0.62
Orientation : Horizontal

Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 103.00
Diameter (in) : 1.00
Orientation : Horizontal
Elbow : Yes

Link Name: Culvert 3
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	101.679
1.11-Year	101.895
1.25-Year	102.039
2.00-Year	102.470
3.33-Year	102.988
5-Year	103.160
10-Year	103.498
25-Year	103.861
50-Year	103.864
100-Year	103.866

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Existing	30.407
Subbasin: Mitigated Existing	22.800
Link: Culvert 3	0.000

Total:	53.207

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	13.395
Subbasin: Mitigated Area	0.000
Subbasin: FC Bypass Area	5.760
Link: Detention	0.000
Link: Culvert 3	Not Applicable
Total:	19.155

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.337 ac-ft/year, Post Developed: 0.121 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 96.85
Inflow Volume Including PPT-Evap (ac-ft): 96.85
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 96.85
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 1087. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1630. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 130.44
Inflow Volume Including PPT-Evap (ac-ft): 130.44
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 130.75
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00

Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

************Compliance Point Results **************

Scenario Predeveloped Compliance Link: Culvert 3
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	4.275E-02	2-Year	1.463E-02
5-Year	6.370E-02	5-Year	2.712E-02
10-Year	8.405E-02	10-Year	3.593E-02
25-Year	0.118	25-Year	9.074E-02
50-Year	0.149	50-Year	0.104
100-Year	0.172	100-Year	0.113
200-Year	0.178	200-Year	0.127
500-Year	0.186	500-Year	0.146

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

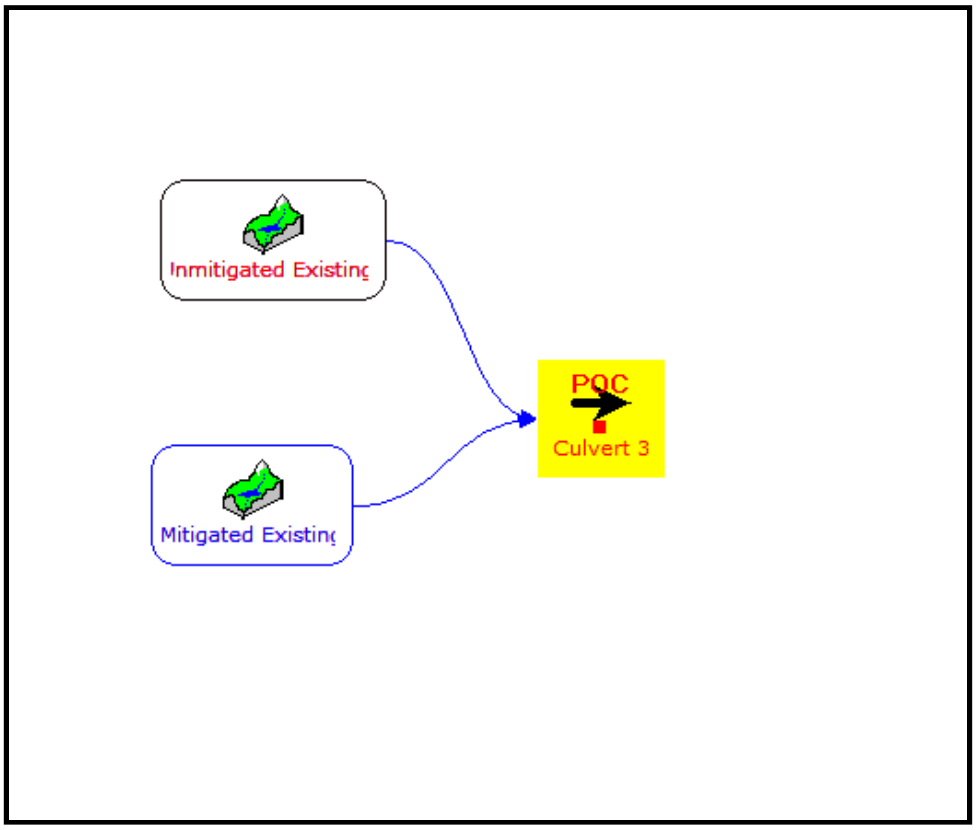
****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-24.0%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	0.0%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	-39.1%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

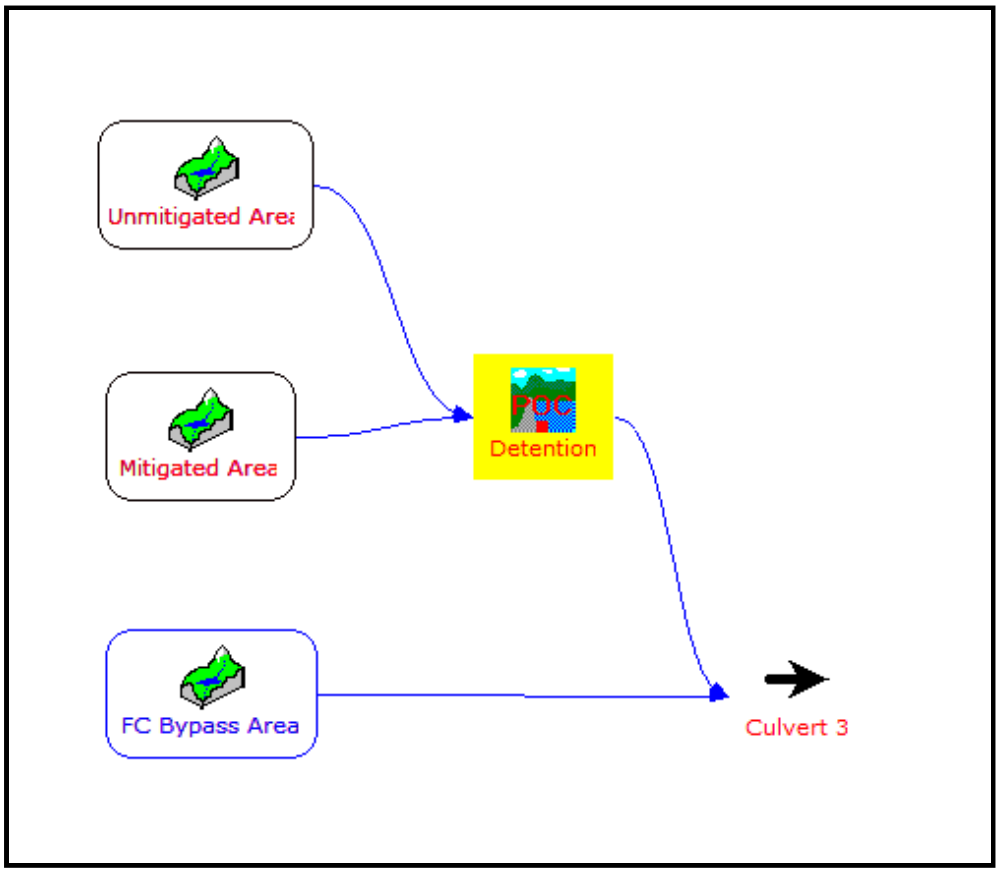
MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

Culvert 3 Flow Control Iteration 2

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/05/2023 3:55 PM
Report Generation Date: 12/05/2023 3:55 PM

Input File Name: Culvert 03_Flow Control_Iteration3.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 3 Flow Control Iteration 3
Comments: Culvert 03 Pre- and Post-Developed comparison with offsite flow.

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	2.319	2.315
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	2.319	2.315

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Existing Area ----------

	-------Area (Acres) --------
Till Grass	0.227
Impervious	0.135
Subbasin Total	0.362

---------- Subbasin : Offsite Bypass ----------

	-------Area (Acres) --------
Till Grass	1.532
Impervious	0.425
Subbasin Total	1.957

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Proposed Area ----------

	-------Area (Acres) --------
Till Grass	0.100
Impervious	0.182
Subbasin Total	0.282

---------- Subbasin : Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.043
Impervious	0.033
Subbasin Total	0.076

---------- Subbasin : Offsite Bypass ----------

	-------Area (Acres) --------
Till Grass	1.532
Impervious	0.425
Subbasin Total	1.957

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 3
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 3

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	24.
100.80	89.
101.00	160.
101.20	237.
101.40	317.
101.60	400.
101.80	485.
102.00	571.
102.20	656.
102.40	741.
102.60	824.
102.80	904.
103.00	981.
103.20	1052.
103.40	1117.
103.60	1174.
103.80	1219.
104.00	1244.
104.20	1245.
104.40	1246.
104.60	1247.
104.80	1248.
105.00	1249.
105.20	1250.
105.40	1251.
105.60	1252.
105.80	1253.
106.00	1254.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.020
Riser Crest Elevation : 103.84 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50

Diameter (in) : 0.62
Orientation : Horizontal
Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 103.00
Diameter (in) : 1.00
Orientation : Horizontal
Elbow : Yes

Link Name: Culvert 3
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

************ Subbasin: Existing Area ************

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	8.544E-02
5-Year	0.114
10-Year	0.143
25-Year	0.177
50-Year	0.247
100-Year	0.279
200-Year	0.288
500-Year	0.298

************ Subbasin: Offsite Bypass ************

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.376
5-Year	0.530
10-Year	0.681
25-Year	0.891
50-Year	1.211
100-Year	1.397
200-Year	1.427
500-Year	1.463

********** Link: Culvert 3 ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.461
5-Year	0.644
10-Year	0.822
25-Year	1.068
50-Year	1.459
100-Year	1.675
200-Year	1.715
500-Year	1.762

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Subbasin: Proposed Area **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	8.792E-02
5-Year	0.113
10-Year	0.137
25-Year	0.167
50-Year	0.218
100-Year	0.245
200-Year	0.256
500-Year	0.270

********** Subbasin: Bypass Area **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	1.928E-02
5-Year	2.507E-02
10-Year	3.169E-02
25-Year	3.815E-02
50-Year	5.335E-02
100-Year	6.023E-02
200-Year	6.232E-02
500-Year	6.493E-02

********** Subbasin: Offsite Bypass **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.376
5-Year	0.530
10-Year	0.681
25-Year	0.891
50-Year	1.211
100-Year	1.397
200-Year	1.427
500-Year	1.463

********** Link: Detention ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.468
5-Year	0.639
10-Year	0.818
25-Year	1.045
50-Year	1.437
100-Year	1.641
200-Year	1.683
500-Year	1.733

********** Link: Detention ********** Link Outflow 1
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.425
5-Year	0.613
10-Year	0.800
25-Year	0.970
50-Year	1.173
100-Year	1.463
200-Year	1.499
500-Year	1.546

********** Link: Detention ********** Link WSEL
Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	103.881

1.11-Year	103.886
1.25-Year	103.895
2.00-Year	103.923
3.33-Year	103.939
5-Year	103.949
10-Year	103.971
25-Year	103.991
50-Year	104.011
100-Year	104.040

********** Link: Culvert 3 ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.442
5-Year	0.637
10-Year	0.832
25-Year	1.007
50-Year	1.217
100-Year	1.516
200-Year	1.556
500-Year	1.608

************Groundwater Recharge Summary **************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin:	Existing Area	30.407
Subbasin:	Offsite Bypass	205.214
Link:	Culvert 3	0.000
Total:		235.622

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin:	Proposed Area	13.395
Subbasin:	Bypass Area	5.760
Subbasin:	Offsite Bypass	205.214
Link:	Detention	0.000
Link:	Culvert 3	0.000
Total:		224.370

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.491 ac-ft/year, Post Developed: 1.420 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 824.58
Inflow Volume Including PPT-Evap (ac-ft): 824.58
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 824.58
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 5877. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 8815. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 813.69
Inflow Volume Including PPT-Evap (ac-ft): 813.69
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 813.69
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 845.14
Inflow Volume Including PPT-Evap (ac-ft): 845.14
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 845.14
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Culvert 3

Scenario Postdeveloped Compliance Link: Culvert 3

***** Point of Compliance Flow Frequency Data *****

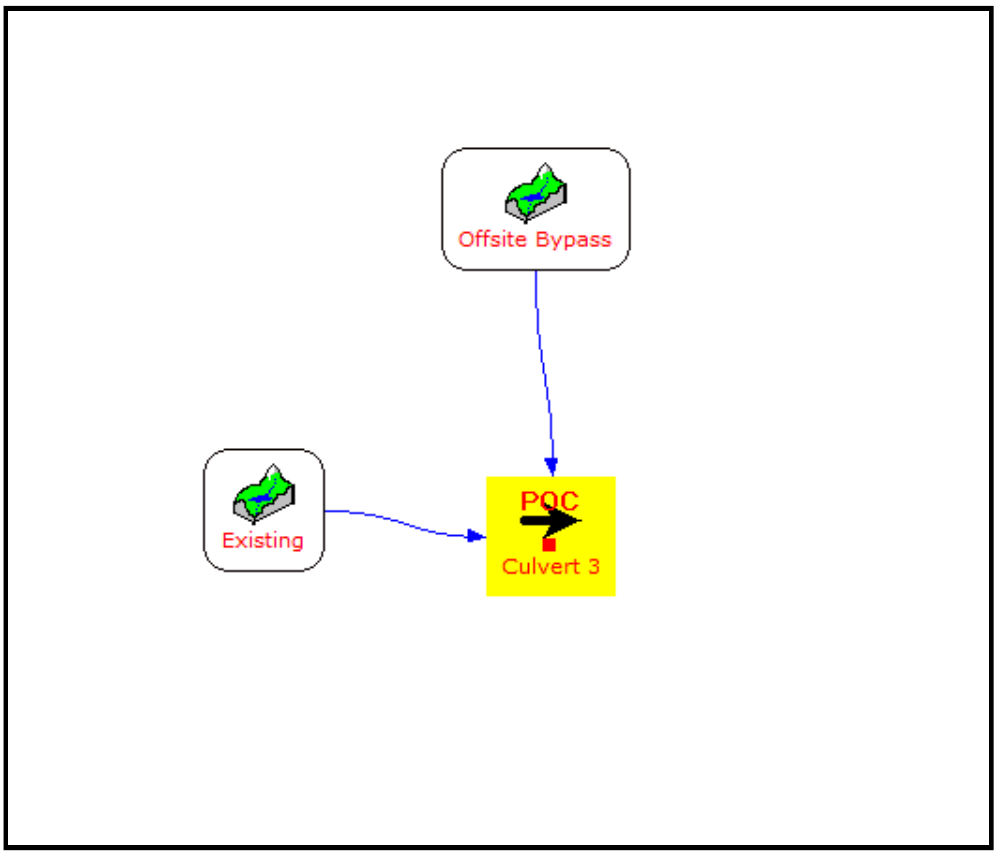
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.461	2-Year	0.442
5-Year	0.644	5-Year	0.637
10-Year	0.822	10-Year	0.832
25-Year	1.068	25-Year	1.007
50-Year	1.459	50-Year	1.217
100-Year	1.675	100-Year	1.516
200-Year	1.715	200-Year	1.556
500-Year	1.762	500-Year	1.608

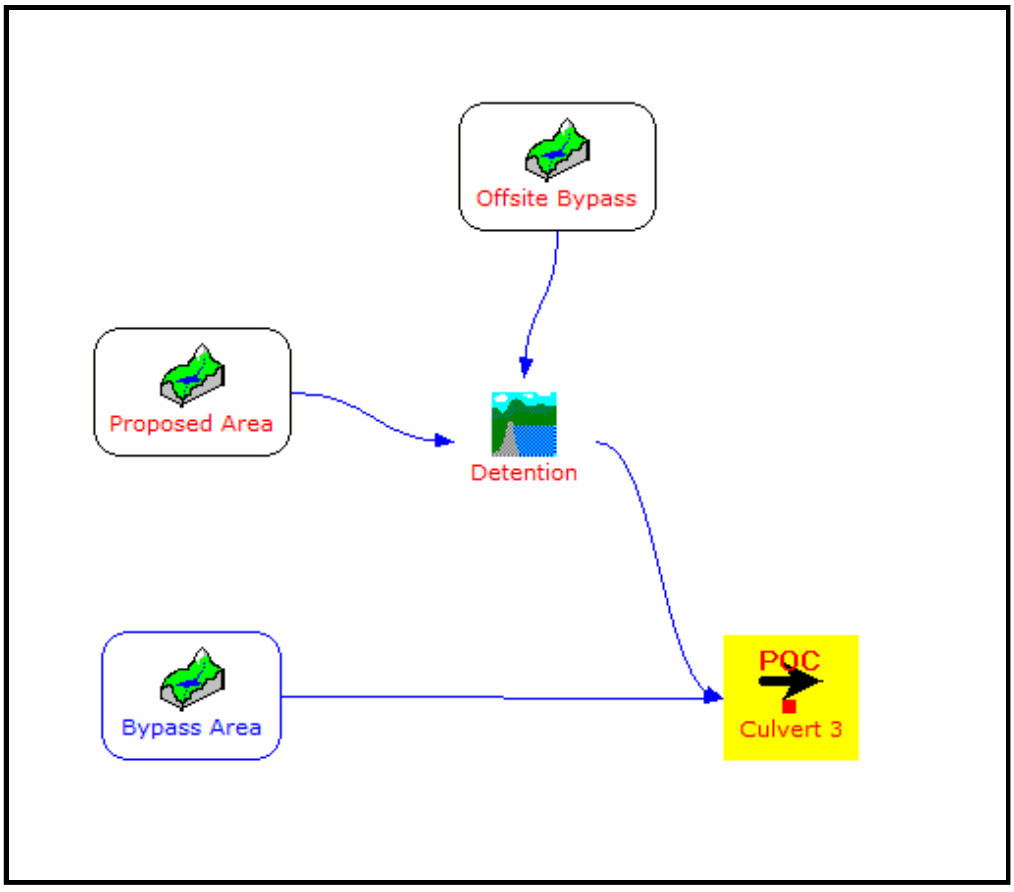
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Culvert 3 Flow Control Iteration 3

Predeveloped



Postdeveloped



Culvert 04

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/05/2023 12:20 PM
Report Generation Date: 12/05/2023 12:20 PM

Input File Name: Culvert 04_Flow Control_Iteration1.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 4 Flow Control Iteration 1
Comments: Auto-size determination of approximate detention volume required to reduce developed flows at or below existing and meet TDA 2 FC requirements

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.462	0.462
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.462	0.462

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Existing ----------

	-------Area (Acres) --------
Till Grass	0.315
Subbasin Total	0.315

---------- Subbasin : Mitigated Existing ----------

	-------Area (Acres) --------
Till Forest	0.089
Subbasin Total	0.089

---------- Subbasin : Bypass Culvert ----------

	-------Area (Acres) --------
Impervious	0.058
Subbasin Total	0.058

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------

	-------Area (Acres) --------
Till Grass	0.201
Impervious	0.081
Subbasin Total	0.282

---------- Subbasin : Mitigated Area ----------

	-------Area (Acres) --------
Impervious	0.089
Subbasin Total	0.089

---------- Subbasin : FC Bypass ----------

	-------Area (Acres) --------
Till Grass	0.050
Impervious	0.041
Subbasin Total	0.091

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 4
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 4

Prismatic Pond Option Used
Pond Floor Elevation (ft) : 100.00
Riser Crest Elevation (ft) : 102.50
Max Pond Elevation (ft) : 103.00
Storage Depth (ft) : 2.50
Pond Bottom Length (ft) : 30.4
Pond Bottom Width (ft) : 6.1
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 184.
Area at Riser Crest El (sq-ft) : 184.
(acres) : 0.004
Volume at Riser Crest (cu-ft) : 461.
(ac-ft) : 0.011
Area at Max Elevation (sq-ft) : 184.
(acres) : 0.004
Vol at Max Elevation (cu-ft) : 553.
(ac-ft) : 0.013

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.026
Riser Crest Elevation : 102.50 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.00
Diameter (in) : 1.09
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 101.09
Length (in) : 0.31
Height (in) : 16.91

Orientation : Vertical
Elbow : No

Link Name: Culvert 4
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	100.768
1.11-Year	100.880
1.25-Year	101.002
2.00-Year	101.343
3.33-Year	101.570
5-Year	101.708
10-Year	101.903
25-Year	102.193
50-Year	102.377
100-Year	102.470

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Existing	42.195
Subbasin: Mitigated Existing	18.281
Subbasin: Bypass Culvert	0.000
Link: Culvert 4	0.000
Total:	60.476

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)

Subbasin: Unmitigated Area	26.924	
Subbasin: Mitigated Area	0.000	
Subbasin: FC Bypass		6.698
Link: Detention	0.000	
Link: Culvert 4	Not Applicable	
Total:		33.622

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.383 ac-ft/year, Post Developed: 0.213 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 4 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 138.00
Inflow Volume Including PPT-Evap (ac-ft): 138.00
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 138.00
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 1188. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1782. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 153.21
Inflow Volume Including PPT-Evap (ac-ft): 153.21
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 153.65
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Culvert 4
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****

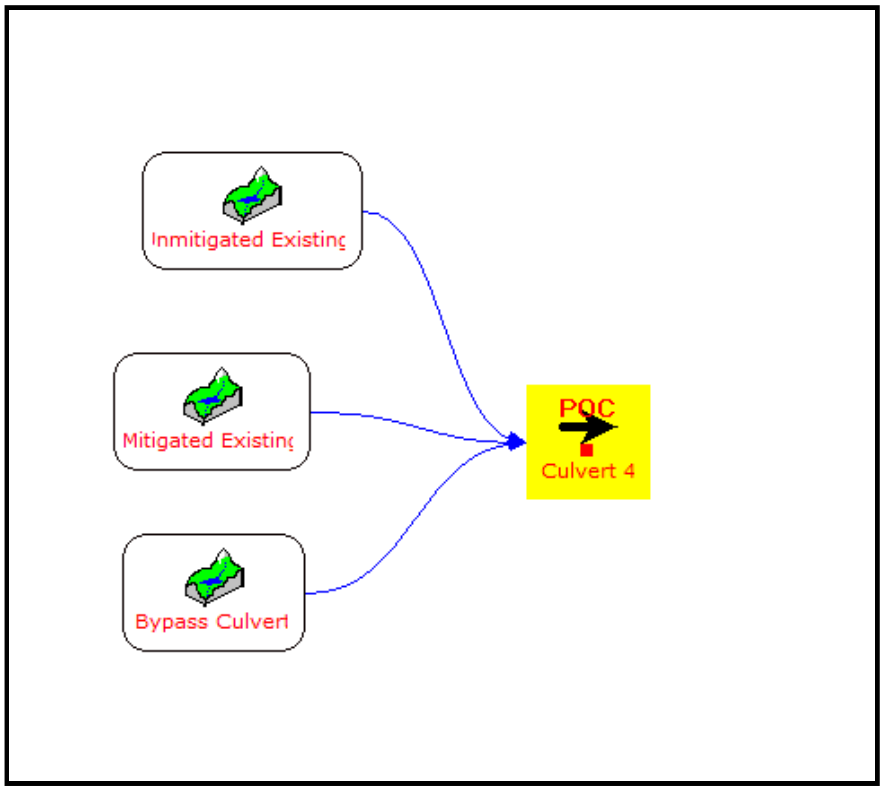
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	6.808E-02	2-Year	4.537E-02
5-Year	9.788E-02	5-Year	7.463E-02
10-Year	0.127	10-Year	9.395E-02
25-Year	0.173	25-Year	0.126
50-Year	0.229	50-Year	0.149
100-Year	0.261	100-Year	0.161
200-Year	0.264	200-Year	0.162
500-Year	0.267	500-Year	0.162

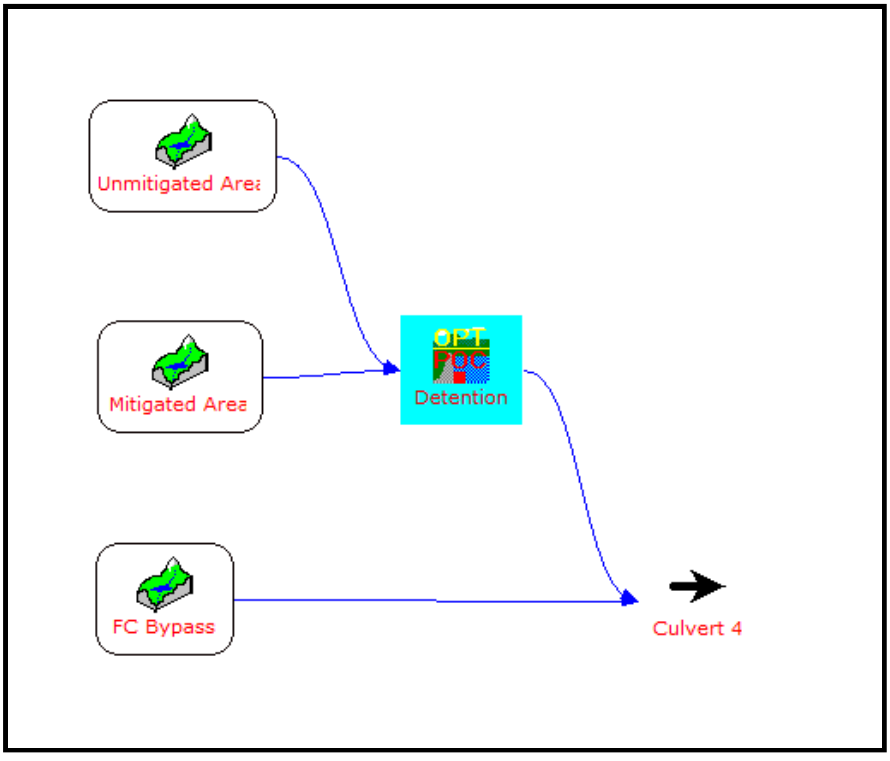
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Culvert 4 Flow Control Iteration 1

Predeveloped



Postdeveloped



Culvert 04 - Flow Control

Detention Pipe Volume Calculator

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser 461 cu ft

Storage Volume Provided by Horizontal Pipe of Diameter d

Pipe Diameter (d)	5.0	ft
Pipe Length	60	ft
Relative Elevation at pipe Crest:	105.00	ft

Pond Volume at Overflow (cu ft): 547
Target Volume from MGSFlood:

Pond Volume Table
Circular Section Geometry Read from CircularSections Tab

elev. ft	y/d	Wetted Area s.f.	storage cu.ft.	storage (ac.ft)
100.00	0.000	0.000	0	0
100.20	0.040	0.129	8	0.000
100.40	0.080	0.360	22	0.000
100.50	0.100	0.501	30	0.001
100.60	0.120	0.654	39	0.001
100.80	0.160	0.993	60	0.001
101.00	0.200	1.370	82	0.002
101.20	0.240	1.775	107	0.002
101.40	0.280	2.205	132	0.003
101.60	0.320	2.655	159	0.004
101.80	0.360	3.119	187	0.004
102.00	0.400	3.594	216	0.005
102.20	0.440	4.077	245	0.006
102.40	0.480	4.566	274	0.006
102.60	0.520	5.056	303	0.007
102.80	0.560	5.544	333	0.008
103.00	0.600	6.027	362	0.008
103.20	0.640	6.502	390	0.009
103.40	0.680	6.967	418	0.010
103.60	0.720	7.416	445	0.010
103.80	0.760	7.845	471	0.011
104.00	0.800	8.252	495	0.011
104.20	0.840	8.628	518	0.012
104.40	0.880	8.967	538	0.012
104.60	0.920	9.261	556	0.013
104.80	0.960	9.493	570	0.013
105.00	1.000	9.621	577	0.013
105.20	1.040	9.621	577	0.013
105.40	1.080	9.621	577	0.013
105.60	1.120	9.621	577	0.013
105.80	1.160	9.621	577	0.013
106.00	1.200	9.621	577	0.013
106.20	1.240	9.621	577	0.013
106.40	1.280	9.621	577	0.013
106.60	1.320	9.621	577	0.013
106.80	1.360	9.621	577	0.013
107.00	1.400	9.621	577	0.013
107.20	1.440	9.621	577	0.013
107.40	1.480	9.621	577	0.013
107.60	1.520	9.621	577	0.013
107.80	1.560	9.621	577	0.013
108.00	1.600	9.621	577	0.013

Iteration 2: Modeled Detention Pipe Volume
Note: Volume is increased by 1 for Elevations Greater than Pipe Diameter
Because Routing Routine Requires Increasing Pond Volume
***** Copy shaded Table below to MGSFlood Program Elevation Volume Input Screen**

ELEV (FT)	Top Area (Dummy)		
100.00	10.0	0.0.	
100.20	10.1	0.0.	
100.40	10.2	0.0.	
100.50	10.3	0.0.	*Edited table to remove storage volume below 6"
100.60	10.4	9.2.	to account for sediment storage, added 100.50 row
100.80	10.5	29.5.	
101.00	10.6	52.1.	
101.20	10.7	76.4.	
101.40	10.8	102.2.	
101.60	10.9	129.2.	
101.80	11.0	157.1.	
102.00	11.1	185.6.	
102.20	11.2	214.5.	
102.40	11.3	243.9.	
102.60	11.4	273.3.	
102.80	11.5	302.6.	
103.00	11.6	331.6.	
103.20	11.7	360.1.	
103.40	11.8	387.9.	
103.60	11.9	414.9.	
103.80	12.0	440.6.	
104.00	12.1	465.0.	
104.20	12.2	487.6.	
104.40	12.3	508.0.	
104.60	12.4	525.6.	
104.80	12.5	539.5.	
105.00	12.6	547.2.	
105.20	12.7	548.2.	
105.40	12.8	549.2.	
105.60	12.9	550.2.	
105.80	13.0	551.2.	
106.00	13.1	552.2.	
106.20	13.2	553.2.	
106.40	13.3	554.2.	
106.60	13.4	555.2.	
106.80	13.5	556.2.	
107.00	13.6	557.2.	
107.20	13.7	558.2.	
107.40	13.8	559.2.	
107.60	13.9	560.2.	
107.80	14.0	561.2.	
108.00	14.1	562.2.	

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/14/2023 8:31 AM
Report Generation Date: 12/14/2023 8:31 AM

Input File Name: Culvert 04_Flow Control_Iteration2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 4 Flow Control Iteration 2
Comments: Stage-storage detention pipe analysis to determine required detention volume.

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.462	0.462
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.462	0.462

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Existing ----------

	-------Area (Acres) --------
Till Grass	0.315
Subbasin Total	0.315

---------- Subbasin : Mitigated Existing ----------

	-------Area (Acres) --------
Till Forest	0.089
Subbasin Total	0.089

---------- Subbasin : Bypass Area ----------

	-------Area (Acres) --------
Impervious	0.058
Subbasin Total	0.058

----------SCENARIO: POSTDEVELOPED

Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------

	-------Area (Acres) --------
Till Grass	0.201
Impervious	0.081
Subbasin Total	0.282

---------- Subbasin : Mitigated Area ----------

	-------Area (Acres) --------
Impervious	0.089
Subbasin Total	0.089

---------- Subbasin : FC Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.041
Impervious	0.050
Subbasin Total	0.091

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED

Number of Links: 1

Link Name: Culvert 3

Link Type: Copy

Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 3

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	9.
100.80	30.
101.00	52.
101.20	76.
101.40	102.
101.60	129.
101.80	157.
102.00	186.
102.20	215.
102.40	244.
102.60	273.
102.80	303.
103.00	332.
103.20	360.
103.40	388.
103.60	415.
103.80	441.
104.00	465.
104.20	488.
104.40	508.
104.60	526.
104.80	540.
105.00	547.
105.20	548.
105.40	549.
105.60	550.
105.80	551.
106.00	552.
106.20	553.
106.40	554.
106.60	555.
106.80	556.
107.00	557.
107.20	558.
107.40	559.
107.60	560.
107.80	561.
108.00	562.
108.20	563.
108.40	564.
108.60	565.
108.80	566.
109.00	567.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Rectangular
Riser Length (ft) : 6.00
Riser Width (ft) : 0.02
Common Length (ft) : 0.000
Riser Crest Elevation : 104.50 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 0.87
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Rectangular Weir that Intersects the Riser Top
Invert Elevation (ft) : 103.60
Length (ft) : 3.000

Link Name: Culvert 3
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	101.909
1.11-Year	102.081

1.25-Year	102.313
2.00-Year	102.947
3.33-Year	103.610
5-Year	103.627
10-Year	103.636
25-Year	103.651
50-Year	103.659
100-Year	103.660

*************Groundwater Recharge Summary ***************

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Unmitigated Existing		42.195
Subbasin: Mitigated Existing		18.281
Subbasin: Bypass Area		0.000
Link:	Culvert 3	0.000
Total:		60.476

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Unmitigated Area		26.924
Subbasin: Mitigated Area		0.000
Subbasin: FC Bypass Area		5.492
Link:	Detention	0.000
Link:	Culvert 3	Not Applicable
Total:		32.416

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.383 ac-ft/year, Post Developed: 0.205 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 138.00
Inflow Volume Including PPT-Evap (ac-ft): 138.00
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 138.00
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00

Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 1188. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1782. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 153.21
Inflow Volume Including PPT-Evap (ac-ft): 153.21
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 153.60
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

************Compliance Point Results **************

Scenario Predeveloped Compliance Link: Culvert 3
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	6.808E-02	2-Year	3.196E-02
5-Year	9.788E-02	5-Year	7.996E-02
10-Year	0.127	10-Year	0.108
25-Year	0.173	25-Year	0.154
50-Year	0.229	50-Year	0.181
100-Year	0.261	100-Year	0.184
200-Year	0.264	200-Year	0.193
500-Year	0.267	500-Year	0.206

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

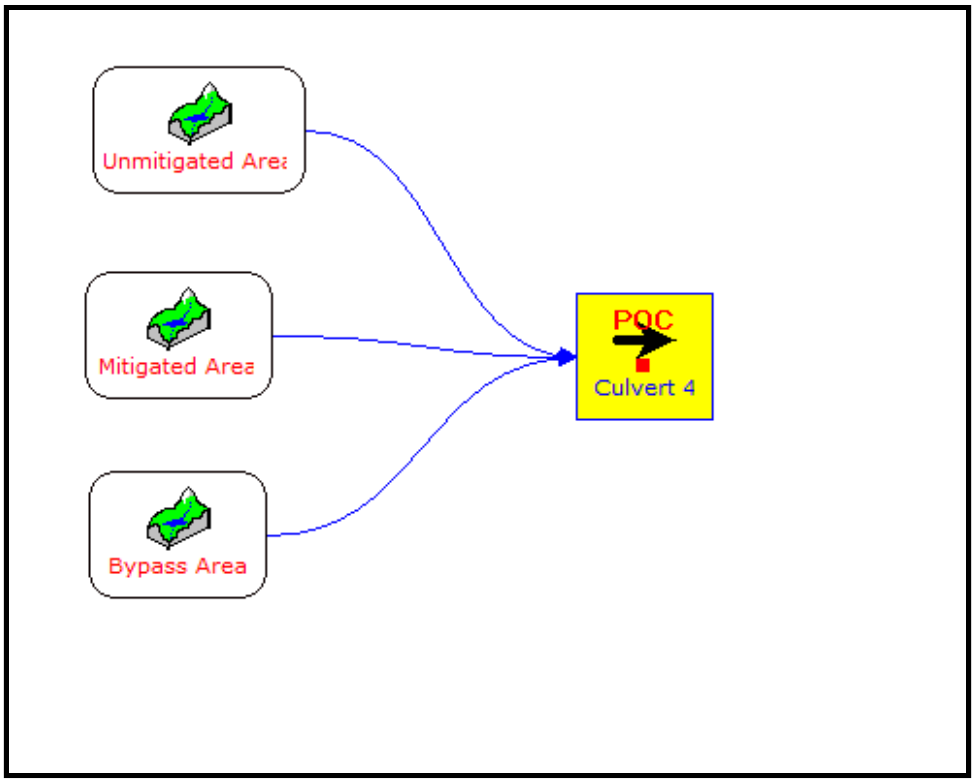
****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-14.3%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-14.3%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	9.0%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	5.7%	PASS

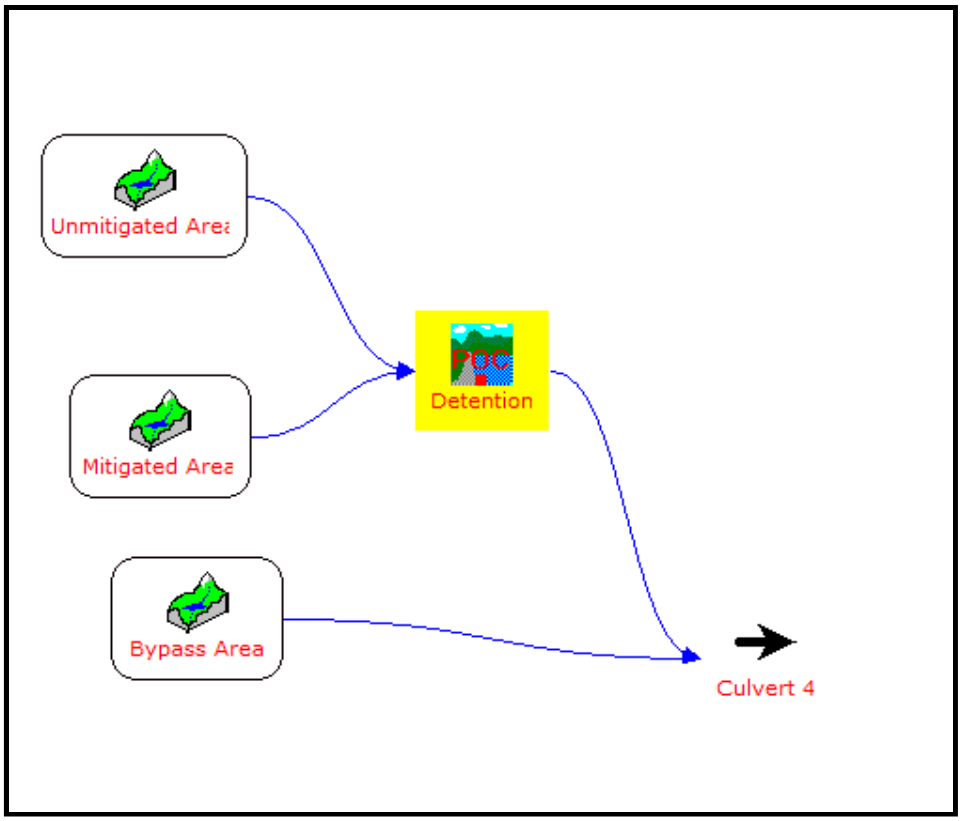
MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

Culvert 4 Flow Control Iteration 2

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/14/2023 8:35 AM
Report Generation Date: 12/14/2023 8:36 AM

Input File Name: Culvert 04_Flow Control_Iteration3.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 4 Flow Control Iteration 3
Comments: Culvert 04 Pre- and Post-Developed comparsion with offsite flow.

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	14.349	14.349
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	14.349	14.349

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Existing Area ----------

	-------Area (Acres) --------
Till Grass	0.333
Impervious	0.071
Subbasin Total	0.404

---------- Subbasin : Offsite Bypass ----------

	-------Area (Acres) --------
Till Grass	10.922
Impervious	2.965
Subbasin Total	13.887

---------- Subbasin : Bypass Area ----------

	-------Area (Acres) --------
Impervious	0.058
Subbasin Total	0.058

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Proposed Area ----------

	-------Area (Acres) --------
Till Grass	0.201
Impervious	0.170
Subbasin Total	0.371

---------- Subbasin : Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.050
Impervious	0.041
Subbasin Total	0.091

---------- Subbasin : Offsite Bypass ----------

	-------Area (Acres) --------
Till Grass	10.922
Impervious	2.965
Subbasin Total	13.887

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Culvert 4
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: Culvert 4

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	9.
100.80	30.
101.00	52.
101.20	76.
101.40	102.
101.60	129.
101.80	157.
102.00	186.
102.20	215.
102.40	244.
102.60	273.
102.80	303.
103.00	332.
103.20	360.
103.40	388.
103.60	415.
103.80	441.
104.00	465.
104.20	488.
104.40	508.
104.60	526.
104.80	540.
105.00	547.
105.20	548.
105.40	549.
105.60	550.
105.80	551.
106.00	552.
106.20	553.
106.40	554.
106.60	555.
106.80	556.
107.00	557.
107.20	558.
107.40	559.
107.60	560.
107.80	561.
108.00	562.
108.20	563.
108.40	564.
108.60	565.

108.80	566.
109.00	567.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Rectangular
Riser Length (ft) : 6.00
Riser Width (ft) : 0.01
Common Length (ft) : 0.000
Riser Crest Elevation : 104.50 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 0.87
Orientation : Horizontal
Elbow : Yes

--- Device Number 2 ---
Device Type : Rectangular Weir that Intersects the Riser Top
Invert Elevation (ft) : 103.60
Length (ft) : 3.000

Link Name: Culvert 4
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3
Number of Links: 1

************ Subbasin: Existing Area ************

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	7.385E-02
5-Year	0.105
10-Year	0.136
25-Year	0.180
50-Year	0.243

100-Year	0.282
200-Year	0.288
500-Year	0.294

********** **Subbasin: Offsite Bypass** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.653
5-Year	3.751
10-Year	4.821
25-Year	6.310
50-Year	8.569
100-Year	9.893
200-Year	10.107
500-Year	10.358

********** **Subbasin: Bypass Area** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.303E-02
5-Year	3.018E-02
10-Year	3.571E-02
25-Year	4.212E-02
50-Year	5.108E-02
100-Year	5.977E-02
200-Year	6.188E-02
500-Year	6.467E-02

********** Link: Culvert 4 ********** Link Inflow Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.749
5-Year	3.884
10-Year	4.989
25-Year	6.526
50-Year	8.867
100-Year	10.233
200-Year	10.456
500-Year	10.717

----------SCENARIO: POSTDEVELOPED

Number of Subbasins: 3
Number of Links: 2

********** **Subbasin: Proposed Area** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	9.662E-02
5-Year	0.126
10-Year	0.158
25-Year	0.189
50-Year	0.263
100-Year	0.297
200-Year	0.308
500-Year	0.321

********** **Subbasin: Bypass Area** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.355E-02
5-Year	3.071E-02
10-Year	3.850E-02
25-Year	4.613E-02
50-Year	6.438E-02
100-Year	7.267E-02
200-Year	7.524E-02
500-Year	7.848E-02

********** **Subbasin: Offsite Bypass** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.653
5-Year	3.751
10-Year	4.821
25-Year	6.310
50-Year	8.569
100-Year	9.893
200-Year	10.107
500-Year	10.358

********** Link: Detention ********** Link Inflow Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.748
5-Year	3.875
10-Year	4.973
25-Year	6.498
50-Year	8.836
100-Year	10.190
200-Year	10.415
500-Year	10.679

********** Link: Detention ********** Link Outflow 1

Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.729
5-Year	3.856
10-Year	4.963
25-Year	6.483
50-Year	8.798
100-Year	10.142
200-Year	10.265
500-Year	10.392

********** Link: Detention ********** Link WSEL

Stats

WSEL Frequency Data(ft)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	103.837
1.11-Year	103.878
1.25-Year	103.908
2.00-Year	104.025
3.33-Year	104.098
5-Year	104.139
10-Year	104.242
25-Year	104.373
50-Year	104.554
100-Year	104.653

********** Link: Culvert 4 ********** Link Inflow

Frequency Stats

Flood Frequency Data(cfs)

(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.752

5-Year	3.886
10-Year	4.999
25-Year	6.529
50-Year	8.863
100-Year	10.215
200-Year	10.340
500-Year	10.471

*************Groundwater Recharge Summary **************

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Existing Area		44.606
Subbasin: Offsite Bypass		1463.023
Subbasin: Bypass Area		0.000
Link:	Culvert 4	0.000
Total:		1507.629

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Proposed Area		26.924
Subbasin: Bypass Area		6.698
Subbasin: Offsite Bypass		1463.023
Link:	Detention	0.000
Link:	Culvert 4	0.000
Total:		1496.645

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 9.542 ac-ft/year, Post Developed: 9.472 ac-ft/year

*************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Culvert 4 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 5003.86
Inflow Volume Including PPT-Evap (ac-ft): 5003.86
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 5003.86
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 35667. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 53501. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 4988.18
Inflow Volume Including PPT-Evap (ac-ft): 4988.18
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 4988.18
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: Culvert 4 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 5030.54
Inflow Volume Including PPT-Evap (ac-ft): 5030.54
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 5030.54
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results **************

Scenario Predeveloped Compliance Link: Culvert 4
Scenario Postdeveloped Compliance Link: Culvert 4

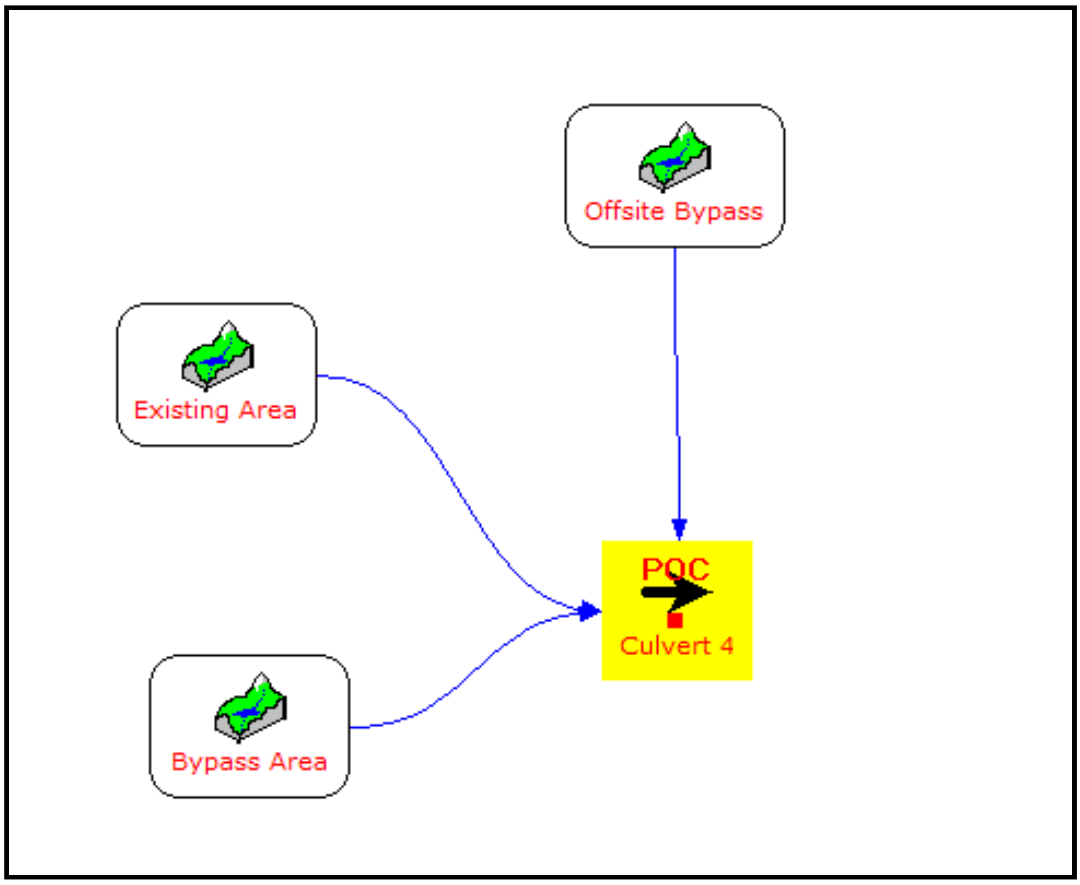
***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.749	2-Year	2.752
5-Year	3.884	5-Year	3.886
10-Year	4.989	10-Year	4.999
25-Year	6.526	25-Year	6.529
50-Year	8.867	50-Year	8.863
100-Year	10.233	100-Year	10.215
200-Year	10.456	200-Year	10.340
500-Year	10.717	500-Year	10.471

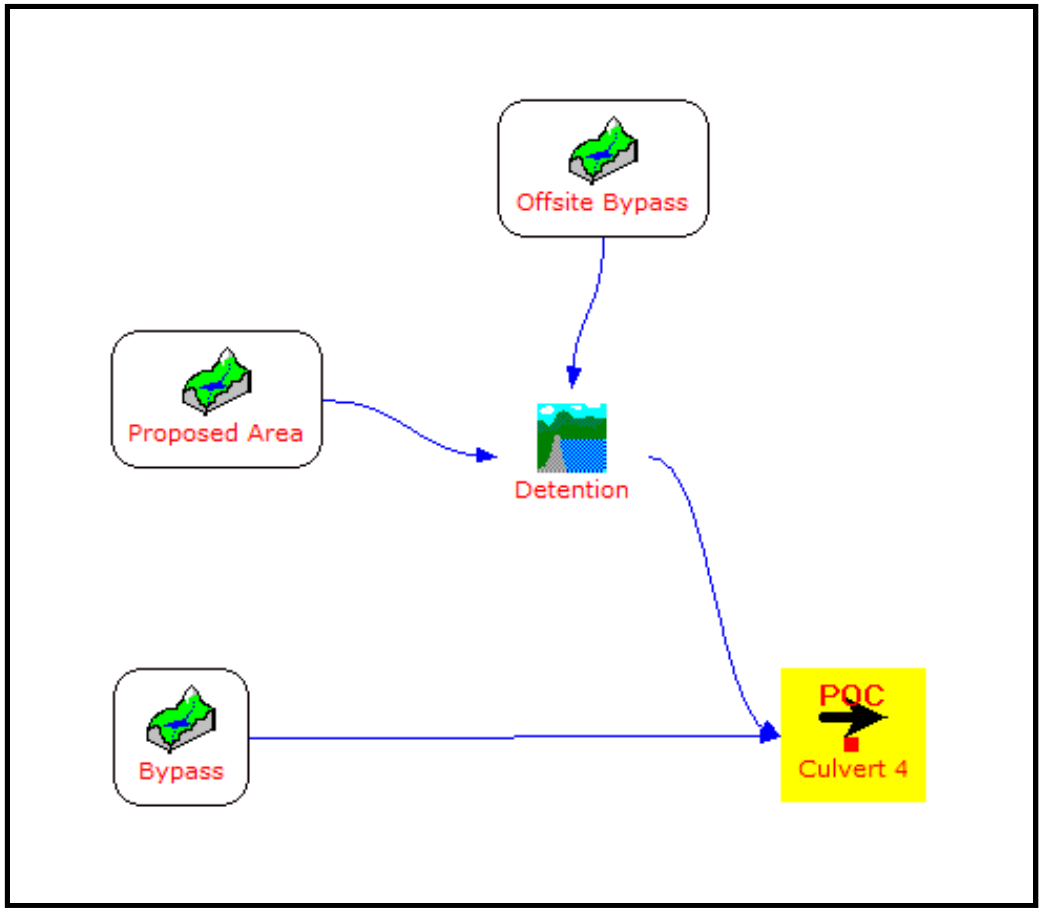
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

Culvert 4 Flow Control Iteration 3

Predeveloped



Postdeveloped



To Pond

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/05/2023 12:00 PM
Report Generation Date: 12/05/2023 12:01 PM

Input File Name: To Pond_Flow Control_Iteration1.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: To Pond Flow Control Iteration 1
Comments: Auto-size determination of approximate detention volume required to reduce developed flows at or below existing and meet FC requirements in TDA 3

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	1.604	1.664
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.604	1.664

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Unmitigated Existing ----------

	-------Area (Acres) --------
Till Grass	0.954
Impervious	0.341

Subbasin Total 1.295

---------- Subbasin : Mitigated Exisitng ----------
-------Area (Acres) --------
Till Forest 0.309

Subbasin Total 0.309

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------
-------Area (Acres) --------
Till Grass 0.578
Impervious 0.494

Subbasin Total 1.072

---------- Subbasin : Mitigated Area ----------
-------Area (Acres) --------
Impervious 0.309

Subbasin Total 0.309

---------- Subbasin : FC Bypass Area ----------
-------Area (Acres) --------
Till Grass 0.126
Impervious 0.157

Subbasin Total 0.283

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: To Pond
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: To Pond

Prismatic Pond Option Used
Pond Floor Elevation (ft) : 100.00
Riser Crest Elevation (ft) : 105.00
Max Pond Elevation (ft) : 105.50
Storage Depth (ft) : 5.00
Pond Bottom Length (ft) : 43.7
Pond Bottom Width (ft) : 8.7
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 382.
Area at Riser Crest El (sq-ft) : 382.
(acres) : 0.009
Volume at Riser Crest (cu-ft) : 1,912.
(ac-ft) : 0.044
Area at Max Elevation (sq-ft) : 382.
(acres) : 0.009
Vol at Max Elevation (cu-ft) : 2,103.
(ac-ft) : 0.048

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 18.00
Common Length (ft) : 0.034
Riser Crest Elevation : 105.00 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.00
Diameter (in) : 1.81
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 102.27
Length (in) : 0.41
Height (in) : 32.77
Orientation : Vertical
Elbow : No

Link Name: To Pond

Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	101.760
1.11-Year	102.077
1.25-Year	102.338
2.00-Year	102.947
3.33-Year	103.357
5-Year	103.579
10-Year	103.954
25-Year	104.525
50-Year	104.911
100-Year	104.984

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Unmitigated Existing		127.790
Subbasin: Mitigated Exisitng		63.470
Link:	To Pond	0.000
Total:		191.261

Total Post Developed Recharge During Simulation

Model Element		Recharge Amount (ac-ft)
Subbasin: Unmitigated Area		77.424
Subbasin: Mitigated Area		0.000
Subbasin: FC Bypass Area		16.878
Link:	Detention	0.000
Link:	To Pond	Not Applicable

Total: 94.302

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.211 ac-ft/year, Post Developed: 0.597 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: To Pond **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 516.10
Inflow Volume Including PPT-Evap (ac-ft): 516.10
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 516.10
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 4993. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 7489. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 615.39
Inflow Volume Including PPT-Evap (ac-ft): 615.39
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 617.20
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: To Pond
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

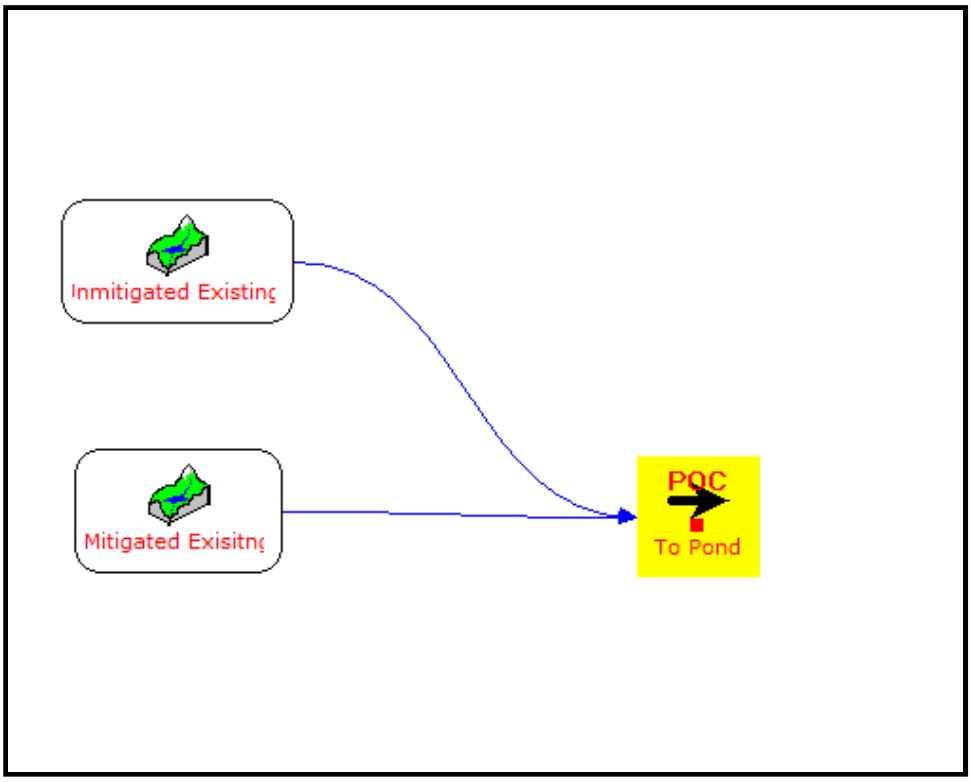
Predevelopment Runoff Postdevelopment Runoff

Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.273	2-Year	0.202
5-Year	0.377	5-Year	0.303
10-Year	0.479	10-Year	0.375
25-Year	0.631	25-Year	0.497
50-Year	0.855	50-Year	0.588
100-Year	0.956	100-Year	0.606
200-Year	0.974	200-Year	0.613
500-Year	0.996	500-Year	0.623

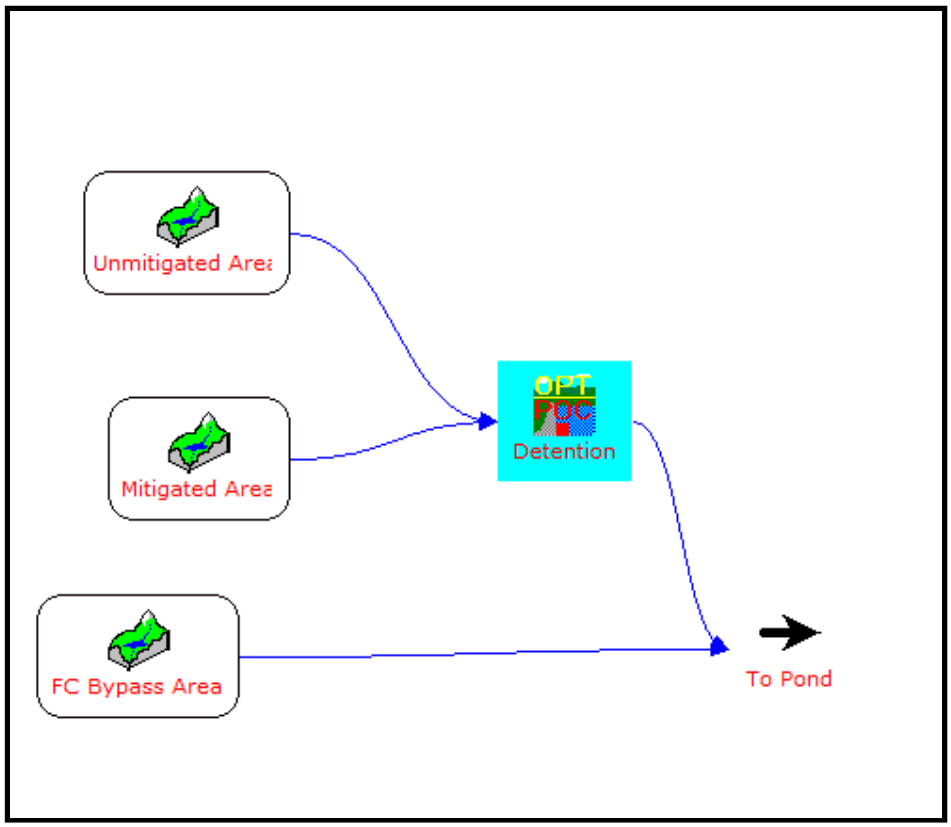
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

To Pond Flow Control Iteration 1

Predeveloped



Postdeveloped



To Pond - Flow Control

Detention Pipe Volume Calculator

Blue Indicates Data Entry Cells, the rest are calculated.

MGS Software LLC

Iteration 1: Volume at Riser 1912 cu ft

Storage Volume Provided by Horizontal Pipe of Diameter d
Pipe Diameter (d) 6.0 ft
Pipe Length 230 ft
Relative Elevation at pipe Crest: 106.00 ft

Pond Volume at Overflow (cu ft): 2130
Target Volume from MGSFlood:

2 Dual Pipes (each 115 ft long)

Pond Volume Table
Circular Section Geometry Read from CircularSections Tab

elev. ft	y/d	Wetted Area s.f.	storage cu.ft.	storage (ac.ft)
100.00	0.000	0.000	0	0
100.20	0.030	0.085	19	0.000
100.40	0.070	0.296	68	0.002
100.50	0.080	0.360	83	0.002
100.60	0.100	0.501	115	0.003
100.80	0.130	0.735	169	0.004
101.00	0.170	1.084	249	0.006
101.20	0.200	1.370	315	0.007
101.40	0.230	1.672	385	0.009
101.60	0.270	2.096	482	0.011
101.80	0.300	2.428	558	0.013
102.00	0.330	2.769	637	0.015
102.20	0.370	3.236	744	0.017
102.40	0.400	3.594	827	0.019
102.60	0.430	3.956	910	0.021
102.80	0.470	4.443	1022	0.023
103.00	0.500	4.811	1106	0.025
103.20	0.530	5.178	1191	0.027
103.40	0.570	5.666	1303	0.030
103.60	0.600	6.027	1386	0.032
103.80	0.630	6.385	1468	0.034
104.00	0.670	6.853	1576	0.036
104.20	0.700	7.193	1654	0.038
104.40	0.730	7.525	1731	0.040
104.60	0.770	7.949	1828	0.042
104.80	0.800	8.252	1898	0.044
105.00	0.830	8.537	1964	0.045
105.20	0.870	8.886	2044	0.047
105.40	0.900	9.120	2098	0.048
105.60	0.930	9.325	2145	0.049
105.80	0.970	9.537	2193	0.050
106.00	1.000	9.621	2213	0.051
106.20	1.030	9.621	2213	0.051
106.40	1.070	9.621	2213	0.051
106.60	1.100	9.621	2213	0.051
106.80	1.130	9.621	2213	0.051
107.00	1.170	9.621	2213	0.051
107.20	1.200	9.621	2213	0.051
107.40	1.230	9.621	2213	0.051
107.60	1.270	9.621	2213	0.051
107.80	1.300	9.621	2213	0.051
108.00	1.330	9.621	2213	0.051

Iteration 2: Modeled Detention Pipe Volume
Note: Volume is increased by 1 for Elevations Greater than Pipe Diameter
Because Routing Routine Requires Increasing Pond Volume
***** Copy shaded Table below to MGSFlood Program Elevation Volume Input Screen**

ELEV (FT)	Top Area (Dummy)	
100.00	10.0	0.0.
100.20	10.1	0.0.
100.40	10.2	0.0.
100.50	10.3	0.0.
100.60	10.4	32.4.
100.80	10.5	86.2.
101.00	10.6	166.5.
101.20	10.7	232.2.
101.40	10.8	301.8.
101.60	10.9	399.2.
101.80	11.0	475.6.
102.00	11.1	553.9.
102.20	11.2	661.5.
102.40	11.3	743.8.
102.60	11.4	826.9.
102.80	11.5	939.1.
103.00	11.6	1023.6.
103.20	11.7	1108.1.
103.40	11.8	1220.3.
103.60	11.9	1303.4.
103.80	12.0	1385.6.
104.00	12.1	1493.3.
104.20	12.2	1571.6.
104.40	12.3	1648.0.
104.60	12.4	1745.4.
104.80	12.5	1815.0.
105.00	12.6	1880.7.
105.20	12.7	1961.0.
105.40	12.8	2014.8.
105.60	12.9	2061.8.
105.80	13.0	2110.6.
106.00	13.1	2130.0.
106.20	13.2	2131.0.
106.40	13.3	2132.0.
106.60	13.4	2133.0.
106.80	13.5	2134.0.
107.00	13.6	2135.0.
107.20	13.7	2136.0.
107.40	13.8	2137.0.
107.60	13.9	2138.0.
107.80	14.0	2139.0.
108.00	14.1	2140.0.

*Edited table to remove storage volume below 6" to account for sediment storage, added 100.50 row

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/08/2023 12:38 PM
Report Generation Date: 12/08/2023 12:38 PM

Input File Name: To Pond_Flow Control_Iteration2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: To Pond Flow Control
Comments: Stage-storage detention pipe analysis to determine required detention volume.

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	1.604	1.664
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.604	1.664

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Unmitigated Area ----------

	-------Area (Acres) --------
Till Grass	0.954
Impervious	0.341
Subbasin Total	1.295

---------- Subbasin : Mitigated Area ----------

	-------Area (Acres) --------
Till Forest	0.309
Subbasin Total	0.309

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------

	-------Area (Acres) --------
Till Grass	0.578
Impervious	0.494
Subbasin Total	1.072

---------- Subbasin : FC Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.126
Impervious	0.157
Subbasin Total	0.283

---------- Subbasin : Mitigated Area ----------

	-------Area (Acres) --------
Impervious	0.309
Subbasin Total	0.309

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: To Pond
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention

Link Type: Structure
Downstream Link Name: To Pond

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	32.
100.80	86.
101.00	167.
101.20	232.
101.40	302.
101.60	399.
101.80	476.
102.00	554.
102.20	662.
102.40	744.
102.60	827.
102.80	939.
103.00	1024.
103.20	1108.
103.40	1220.
103.60	1303.
103.80	1386.
104.00	1493.
104.20	1572.
104.40	1648.
104.60	1745.
104.80	1815.
105.00	1881.
105.20	1961.
105.40	2015.
105.60	2062.
105.80	2111.
106.00	2130.
106.20	2131.
106.40	2132.
106.60	2133.
106.80	2134.
107.00	2135.
107.20	2136.
107.40	2137.
107.60	2138.
107.80	2139.
108.00	2140.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient
Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 24.00
Common Length (ft) : 0.010
Riser Crest Elevation : 105.90 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---

Device Type	:	Circular Orifice
Control Elevation (ft)	:	100.50
Diameter (in)	:	1.63
Orientation	:	Horizontal
Elbow	:	No

---Device Number 2 ---

Device Type	:	Circular Orifice
Control Elevation (ft)	:	104.85
Diameter (in)	:	3.00
Orientation	:	Horizontal
Elbow	:	Yes

Link Name: To Pond
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** Link: Detention ********** Link WSEL Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	102.611
1.11-Year	102.855
1.25-Year	103.174
2.00-Year	104.101
3.33-Year	104.939
5-Year	105.164
10-Year	105.624
25-Year	105.943
50-Year	105.958
100-Year	105.960

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	127.790
Subbasin: Mitigated Area	63.470
Link: To Pond	0.000
Total:	191.261

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	77.424
Subbasin: FC Bypass Area	16.878
Subbasin: Mitigated Area	0.000
Link: Detention	0.000
Link: To Pond	Not Applicable
Total:	94.302

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.211 ac-ft/year, Post Developed: 0.597 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: To Pond **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 516.10
Inflow Volume Including PPT-Evap (ac-ft): 516.10
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 516.10
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 4993. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 7489. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 615.39
Inflow Volume Including PPT-Evap (ac-ft): 615.39
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 617.26
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

************Compliance Point Results **************

Scenario Predeveloped Compliance Link: To Pond
Scenario Postdeveloped Compliance Link: Detention

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.273	2-Year	0.134
5-Year	0.377	5-Year	0.280
10-Year	0.479	10-Year	0.360
25-Year	0.631	25-Year	0.598
50-Year	0.855	50-Year	0.702
100-Year	0.956	100-Year	0.721
200-Year	0.974	200-Year	0.777
500-Year	0.996	500-Year	0.852

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

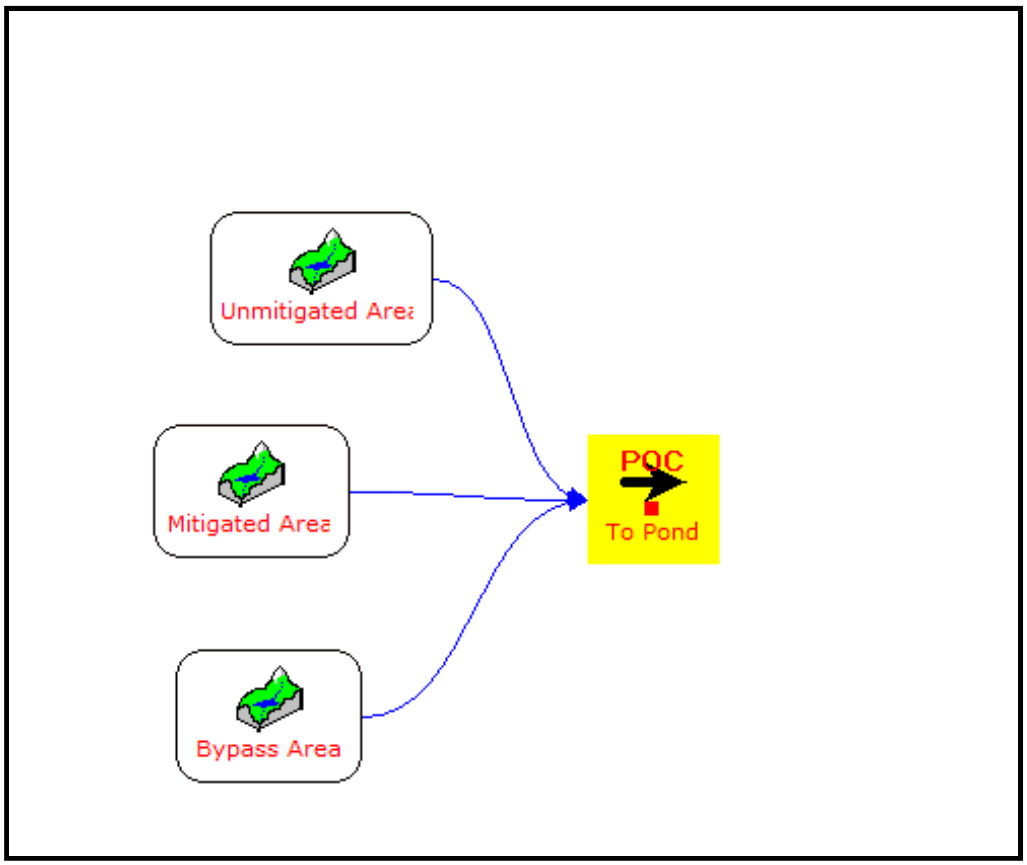
****** Flow Duration Performance ******

Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	-4.1%	PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	-2.9%	PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	0.0%	PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):	0.0%	PASS

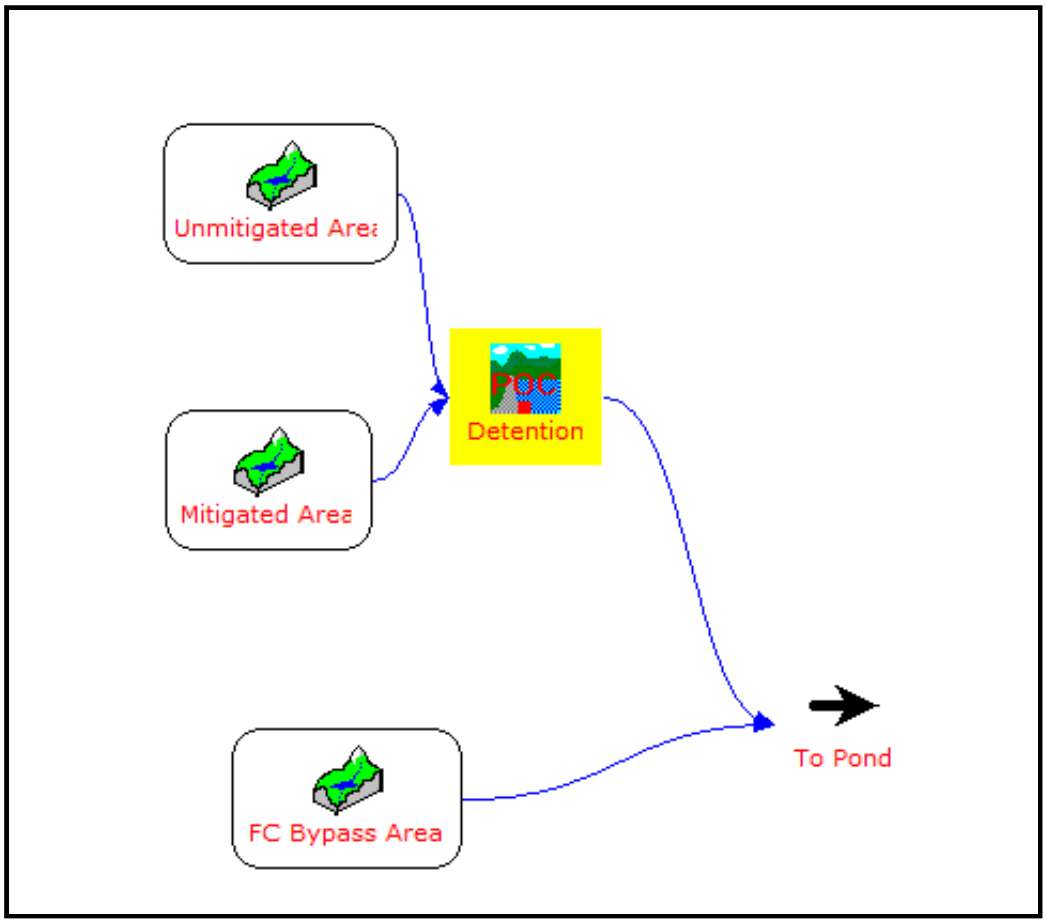
MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS

To Pond Flow Control Iteration 2

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 12/08/2023 3:24 PM
Report Generation Date: 12/08/2023 3:24 PM

Input File Name: To Pond_Flow Control_Iteration3.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: To Pond Flow Control Iteration 3
Comments: Stage-storage detention pipe, with off-site bypass flow

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	16.610	16.535
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	16.610	16.535

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Exisitng Area ----------

	-------Area (Acres) --------
Till Grass	0.954
Impervious	0.650
Subbasin Total	1.604

---------- Subbasin : Offsite Bypass ----------

	-------Area (Acres) --------
Till Grass	12.289
Impervious	2.660
Subbasin Total	14.949

---------- Subbasin : Bypass Area ----------

	-------Area (Acres) --------
Impervious	0.057
Subbasin Total	0.057

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3

---------- Subbasin : Proposed Area ----------

	-------Area (Acres) --------
Till Grass	0.578
Impervious	0.803
Subbasin Total	1.381

---------- Subbasin : FC Bypass Area ----------

	-------Area (Acres) --------
Till Grass	0.100
Impervious	0.105
Subbasin Total	0.205

---------- Subbasin : Offsite Bypass ----------

	-------Area (Acres) --------
Till Grass	12.289
Impervious	2.660
Subbasin Total	14.949

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: To Pond
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 2

Link Name: Detention
Link Type: Structure
Downstream Link Name: To Pond

User Specified Elevation Volume Table Used

Elevation (ft)	Pond Volume (cu-ft)
100.50	0.
100.60	32.
100.80	86.
101.00	167.
101.20	232.
101.40	302.
101.60	399.
101.80	476.
102.00	554.
102.20	662.
102.40	744.
102.60	827.
102.80	939.
103.00	1024.
103.20	1108.
103.40	1220.
103.60	1303.
103.80	1386.
104.00	1493.
104.20	1572.
104.40	1648.
104.60	1745.
104.80	1815.
105.00	1881.
105.20	1961.
105.40	2015.
105.60	2062.
105.80	2111.
106.00	2130.
106.20	2131.
106.40	2132.
106.60	2133.
106.80	2134.
107.00	2135.
107.20	2136.
107.40	2137.
107.60	2138.
107.80	2139.
108.00	2140.

Hydraulic Conductivity (in/hr) : 0.00
Massmann Regression Used to Estimate Hydralic Gradient

Depth to Water Table (ft) : 100.00
Bio-Fouling Potential : Low
Maintenance : Average or Better

Riser Geometry
Riser Structure Type : Circular
Riser Diameter (in) : 24.00
Common Length (ft) : 0.010
Riser Crest Elevation : 105.90 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 1.63
Orientation : Horizontal
Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 104.85
Diameter (in) : 3.00
Orientation : Horizontal
Elbow : Yes

Link Name: To Pond
Link Type: Copy
Downstream Link: None

**************************FLOOD FREQUENCY AND DURATION STATISTICS*********************

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 3
Number of Links: 1

************ Subbasin: Exisitng Area ************

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.392
5-Year	0.518
10-Year	0.653
25-Year	0.795
50-Year	1.110
100-Year	1.254
200-Year	1.296
500-Year	1.348

********** **Subbasin: Offsite Bypass** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.740
5-Year	3.897
10-Year	5.042
25-Year	6.678
50-Year	8.997
100-Year	10.459
200-Year	10.658
500-Year	10.889

********** **Subbasin: Bypass Area** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.263E-02
5-Year	2.966E-02
10-Year	3.509E-02
25-Year	4.139E-02
50-Year	5.020E-02
100-Year	5.874E-02
200-Year	6.081E-02
500-Year	6.355E-02

********** Link: To Pond ********** Link Inflow Frequency Stats

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	3.132
5-Year	4.439
10-Year	5.719
25-Year	7.509
50-Year	10.172
100-Year	11.769
200-Year	12.014
500-Year	12.301

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 3
Number of Links: 2

********** **Subbasin: Proposed Area** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	0.403
5-Year	0.523
10-Year	0.644
25-Year	0.774
50-Year	1.038
100-Year	1.169
200-Year	1.217
500-Year	1.280

********** **Subbasin: FC Bypass Area** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	5.606E-02
5-Year	7.279E-02
10-Year	9.135E-02
25-Year	0.108
50-Year	0.149
100-Year	0.168
200-Year	0.175
500-Year	0.183

********** **Subbasin: Offsite Bypass** **********

Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	2.740
5-Year	3.897
10-Year	5.042
25-Year	6.678
50-Year	8.997
100-Year	10.459
200-Year	10.658
500-Year	10.889

********** Link: Detention ********** Link Inflow Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	3.114
5-Year	4.404

10-Year	5.663
25-Year	7.415
50-Year	10.066
100-Year	11.625
200-Year	11.875
500-Year	12.168

********** Link: Detention ********** Link Outflow 1
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	3.113
5-Year	4.404
10-Year	5.663
25-Year	7.414
50-Year	10.063
100-Year	11.619
200-Year	11.868
500-Year	12.160

********** Link: Detention ********** Link WSEL
Stats
WSEL Frequency Data(ft)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	WSEL Peak (ft)
1.05-Year	106.023
1.11-Year	106.051
1.25-Year	106.076
2.00-Year	106.152
3.33-Year	106.206
5-Year	106.232
10-Year	106.305
25-Year	106.404
50-Year	106.574
100-Year	106.707

********** Link: To Pond ********** Link Inflow
Frequency Stats
Flood Frequency Data(cfs)
(Recurrence Interval Computed Using Gringorten Plotting Position)

Tr (yrs)	Flood Peak (cfs)
2-Year	3.167
5-Year	4.475
10-Year	5.749
25-Year	7.521
50-Year	10.216

100-Year	11.787
200-Year	12.042
500-Year	12.343

*************Groundwater Recharge Summary ***************

Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Exisitng Area	127.790
Subbasin: Offsite Bypass	1646.136
Subbasin: Bypass Area	0.000
Link: To Pond	0.000
Total:	1773.926

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Proposed Area	77.424
Subbasin: FC Bypass Area	13.395
Subbasin: Offsite Bypass	1646.136
Link: Detention	0.000
Link: To Pond	0.000
Total:	1736.955

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 11.227 ac-ft/year, Post Developed: 10.993 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: To Pond **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 5735.51
Inflow Volume Including PPT-Evap (ac-ft): 5735.51
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 5735.51
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 2

********** Link: Detention **********

Basic Wet Pond Volume (91% Exceedance): 40554. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 60832. cu-ft

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 5679.28
Inflow Volume Including PPT-Evap (ac-ft): 5679.28
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 5679.28
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

********** Link: To Pond **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 5775.75
Inflow Volume Including PPT-Evap (ac-ft): 5775.75
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 5775.75
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: To Pond
Scenario Postdeveloped Compliance Link: To Pond

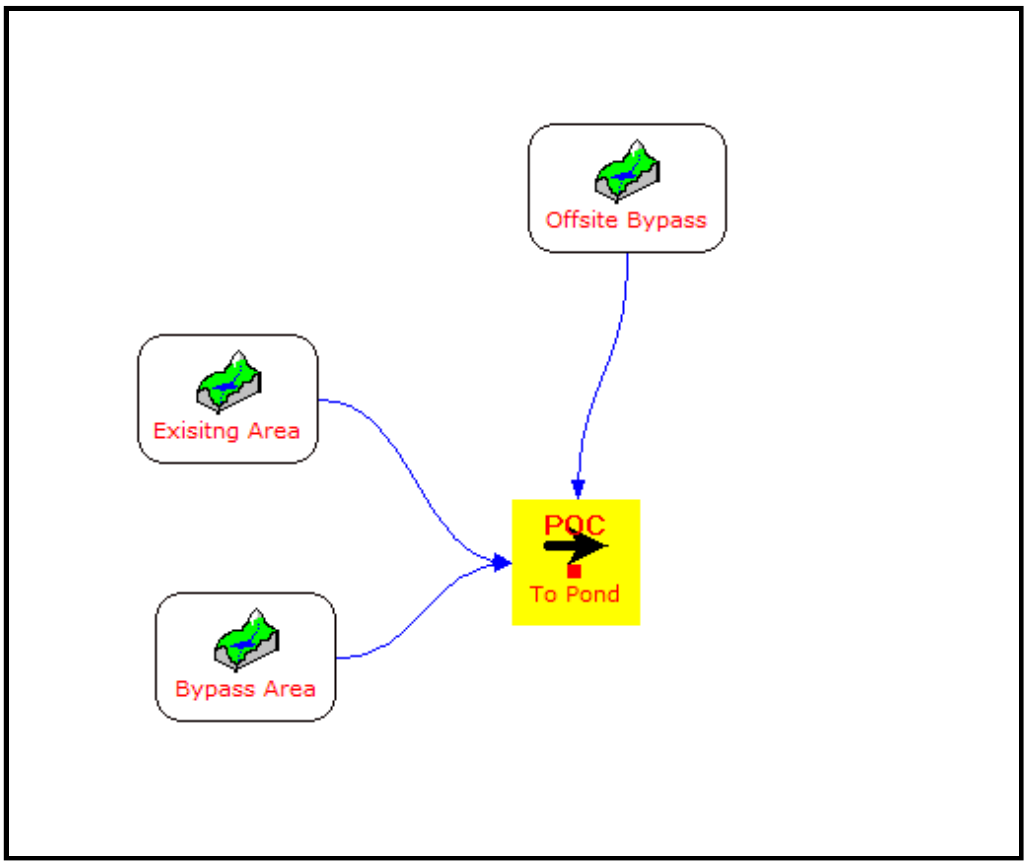
***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	3.132	2-Year	3.167
5-Year	4.439	5-Year	4.475
10-Year	5.719	10-Year	5.749
25-Year	7.509	25-Year	7.521
50-Year	10.172	50-Year	10.216
100-Year	11.769	100-Year	11.787
200-Year	12.014	200-Year	12.042
500-Year	12.301	500-Year	12.343

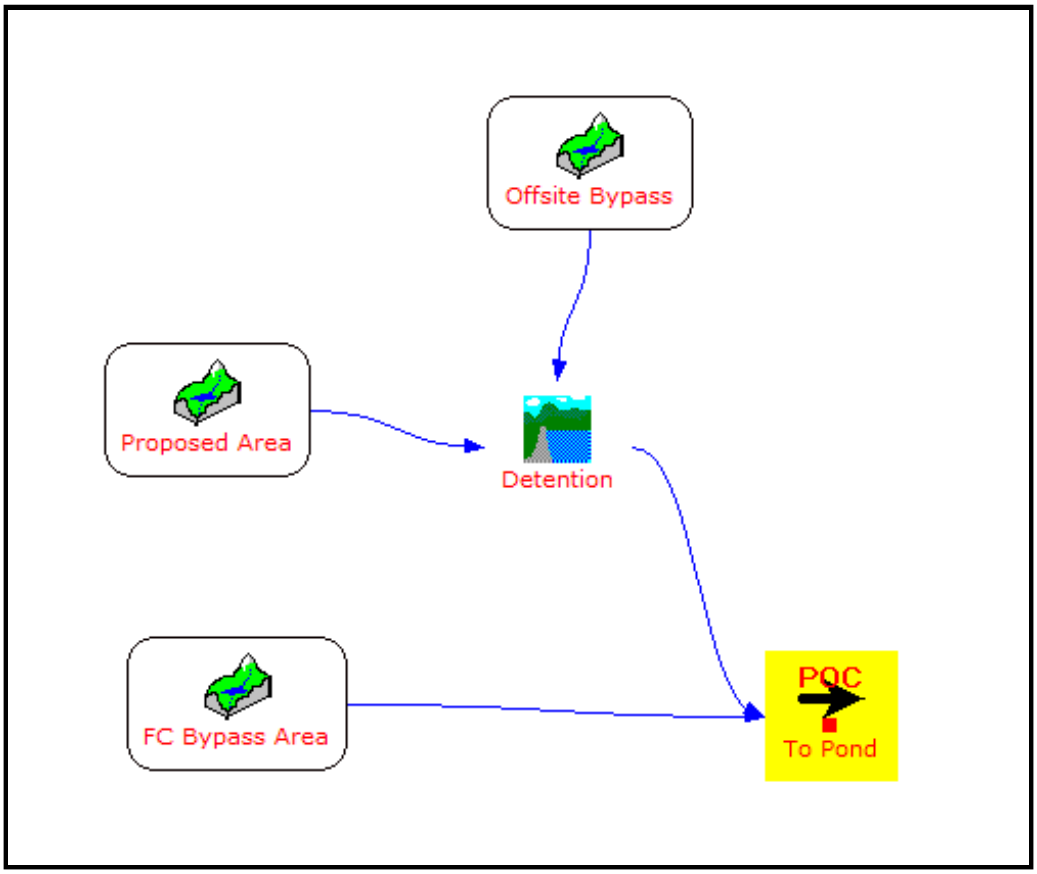
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

To Pond Flow Control Iteration 3

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 12:27 PM
Report Generation Date: 01/05/2024 12:27 PM

Input File Name: WQ 1.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Water Quality Unit 1 Sizing
Comments: Offline WQ Flow Rate

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.512	0.512
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.512	0.512

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	0.231
Subbasin Total	0.231

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.067
Impervious	0.215
Subbasin Total	0.281

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	0.231
Subbasin Total	0.231

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.067
Impervious	0.215
Subbasin Total	0.281

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: WQ 1
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: WQ 1
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 1

************Groundwater Recharge Summary **************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	30.903
Subbasin: Project Area	8.908
Link: WQ 1	0.000
Total:	39.811

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	30.903
Subbasin: Project Area	8.908
Link: WQ 1	0.000
Total:	39.811

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.252 ac-ft/year, Post Developed: 0.252 ac-ft/year

************Water Quality Facility Data **************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: WQ 1 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 206.09
Inflow Volume Including PPT-Evap (ac-ft): 206.09
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 206.09
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: WQ 1 **********

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.04 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.02 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 206.09
Inflow Volume Including PPT-Evap (ac-ft): 206.09
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 206.09
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

**********Compliance Point Results **********

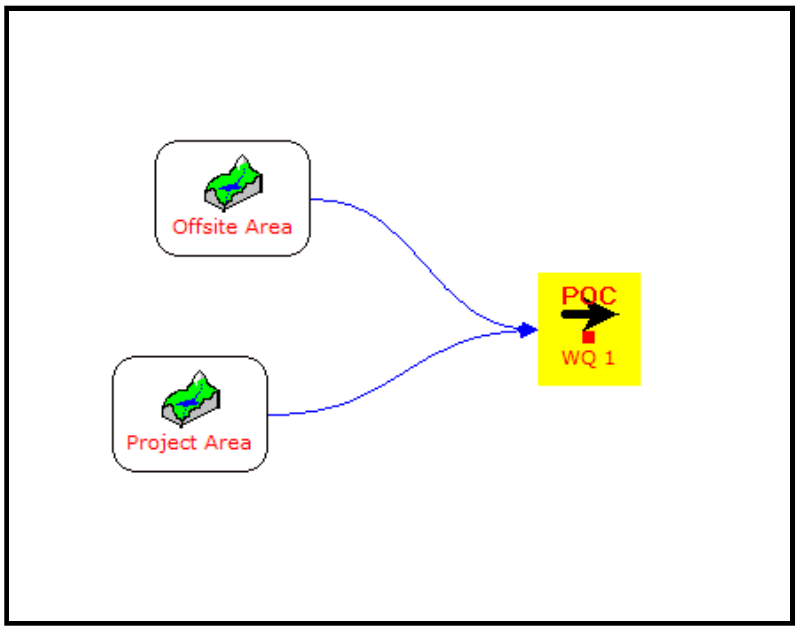
Scenario Predeveloped Compliance Link: WQ 1
Scenario Postdeveloped Compliance Link: WQ 1

*** Point of Compliance Flow Frequency Data ***
Recurrence Interval Computed Using Gringorten Plotting Position

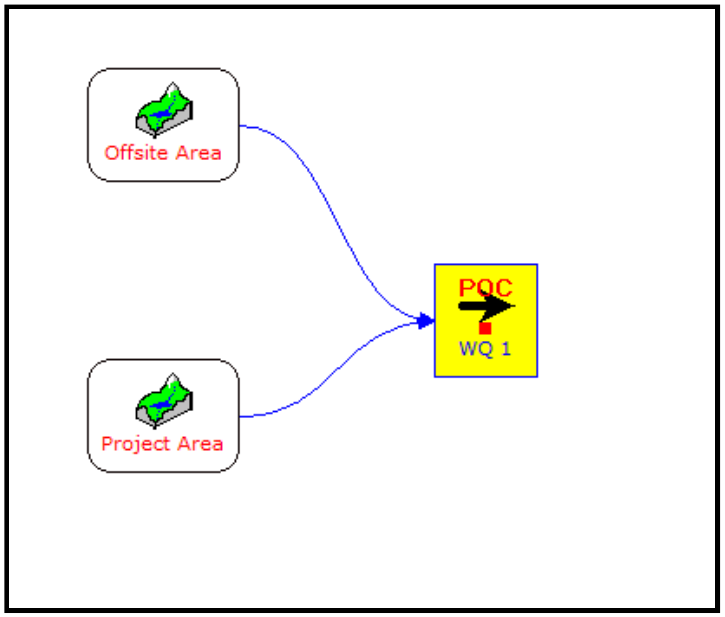
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.127	2-Year	0.127
5-Year	0.167	5-Year	0.167
10-Year	0.211	10-Year	0.211
25-Year	0.255	25-Year	0.255
50-Year	0.357	50-Year	0.357
100-Year	0.403	100-Year	0.403
200-Year	0.416	200-Year	0.416
500-Year	0.434	500-Year	0.434

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

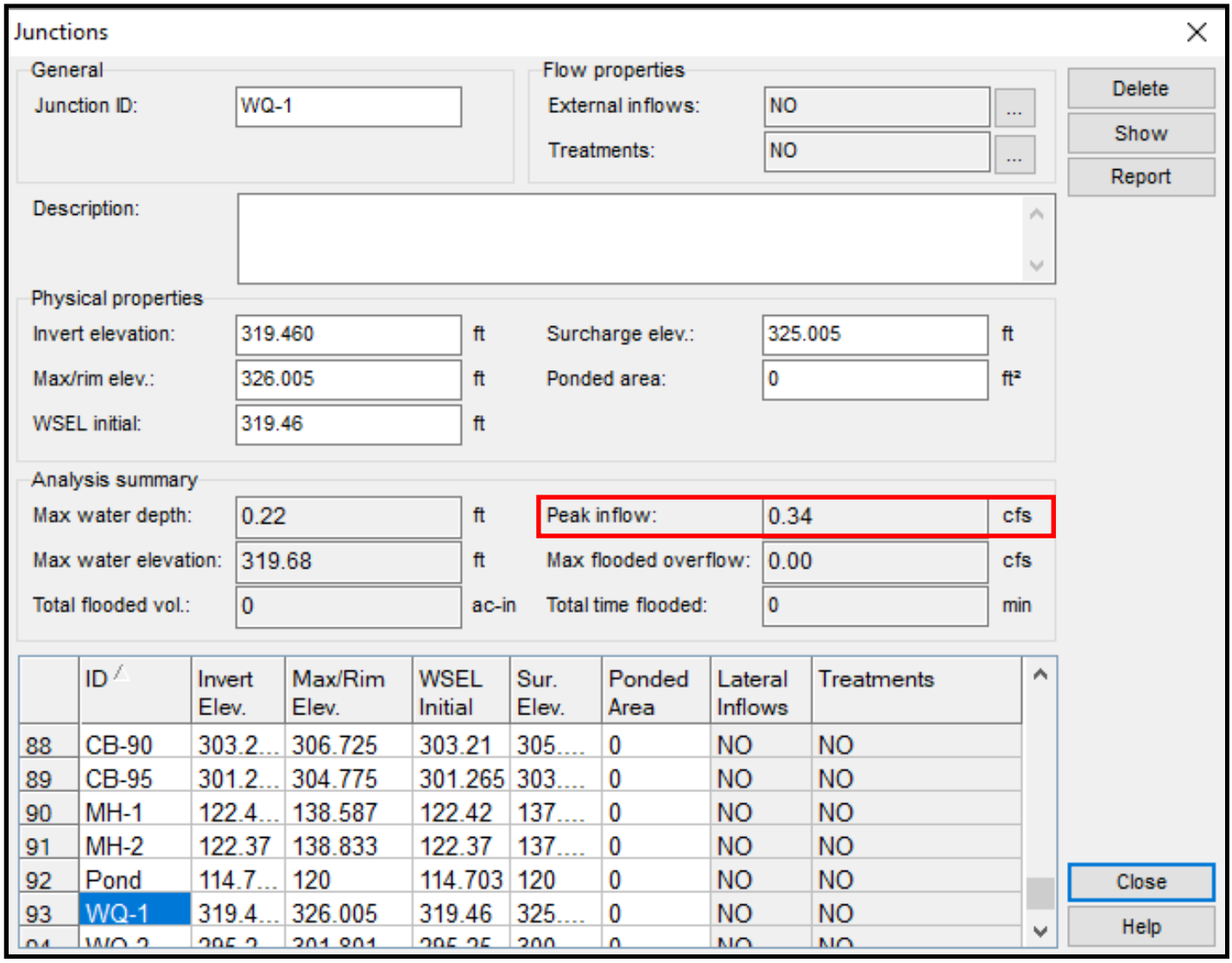
Predeveloped



Postdeveloped



Peak Flow from 100yr Storm Event per Sanitary Sewer and Storm Analysis



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 12:36 PM
Report Generation Date: 01/05/2024 12:37 PM

Input File Name: WQ 2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Water Quality Unit 2 Sizing
Comments: Offline WQ Flow Rate

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	1.831	1.831
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.831	1.831

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	1.342
Impervious	0.250
Subbasin Total	1.592

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.096
Impervious	0.143
Subbasin Total	0.239

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	1.342
Impervious	0.250
Subbasin Total	1.592

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.096
Impervious	0.143
Subbasin Total	0.239

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: WQ 2
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: WQ 2
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 1

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	179.737
Subbasin: Project Area	12.873
Link: WQ 2	0.000
Total:	192.610

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	179.737
Subbasin: Project Area	12.873
Link: WQ 2	0.000
Total:	192.610

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.219 ac-ft/year, Post Developed: 1.219 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: WQ 2 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 637.95
Inflow Volume Including PPT-Evap (ac-ft): 637.95
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 637.95
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: WQ 2 **********

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.08 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.04 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 637.95
Inflow Volume Including PPT-Evap (ac-ft): 637.95
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 637.95
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

**********Compliance Point Results **********

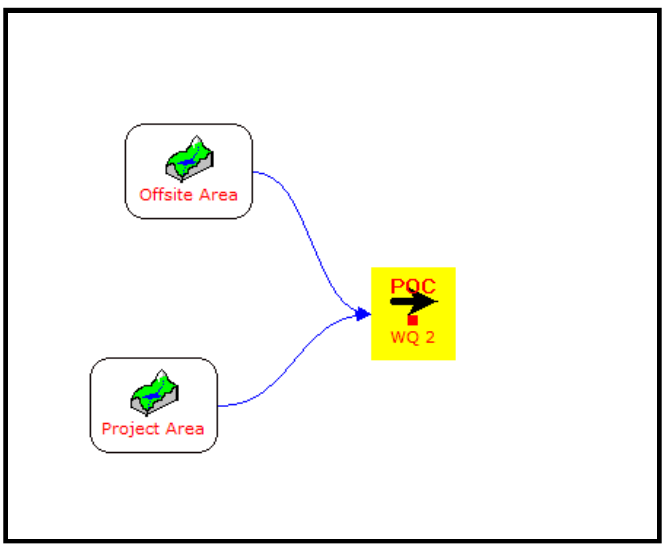
Scenario Predeveloped Compliance Link: WQ 2
Scenario Postdeveloped Compliance Link: WQ 2

*** Point of Compliance Flow Frequency Data ***
Recurrence Interval Computed Using Gringorten Plotting Position

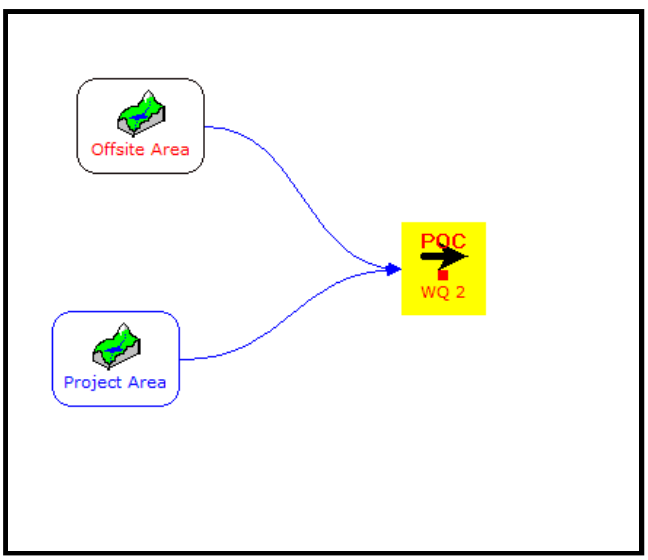
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.350	2-Year	0.350
5-Year	0.495	5-Year	0.495
10-Year	0.636	10-Year	0.636
25-Year	0.832	25-Year	0.832
50-Year	1.131	50-Year	1.131
100-Year	1.305	100-Year	1.305
200-Year	1.333	200-Year	1.333
500-Year	1.367	500-Year	1.367

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

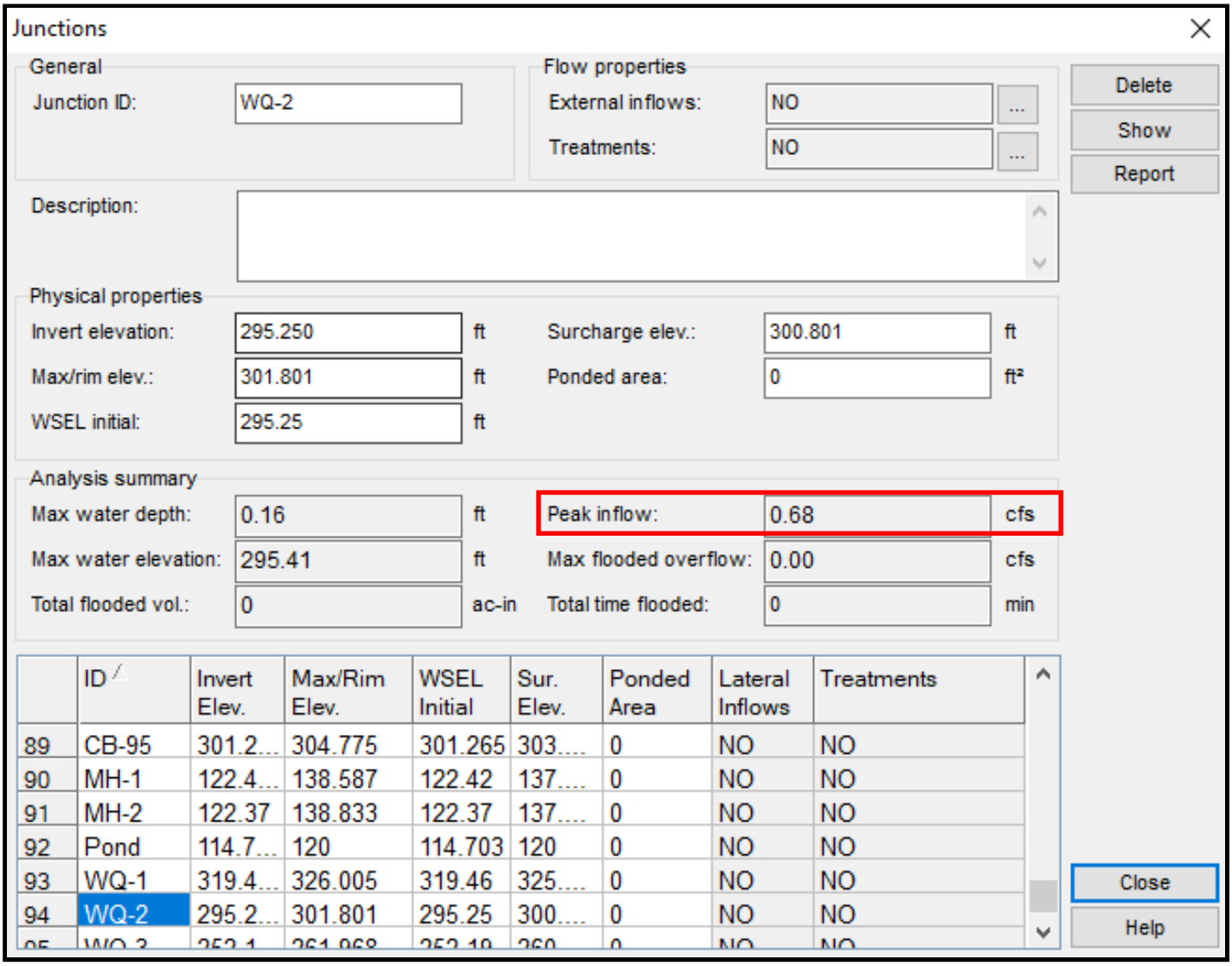
Predeveloped



Postdeveloped



Peak Flow from 100yr Storm Event per Sanitary Sewer and Storm Analysis



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/08/2024 2:49 PM
Report Generation Date: 01/08/2024 2:49 PM

Input File Name: WQ 3.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Water Quality Unit 3 Sizing
Comments: Offline WQ Flow Rate

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	12.360	12.360
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	12.360	12.360

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	9.251
Impervious	2.737
Subbasin Total	11.988

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.201
Impervious	0.171
Subbasin Total	0.372

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	9.251
Impervious	2.737
Subbasin Total	11.988

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.201
Impervious	0.171
Subbasin Total	0.372

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: WQ 3
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: WQ 3
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 1

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	1239.163
Subbasin: Project Area	26.898
Link: WQ 3	0.000
Total:	1266.060

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	1239.163
Subbasin: Project Area	26.898
Link: WQ 3	0.000
Total:	1266.060

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 8.013 ac-ft/year, Post Developed: 8.013 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: WQ 3 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 4374.51
Inflow Volume Including PPT-Evap (ac-ft): 4374.51
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 4374.51
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: WQ 3 **********

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.56 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.32 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 4374.51
Inflow Volume Including PPT-Evap (ac-ft): 4374.51
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 4374.51
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

************Compliance Point Results **************

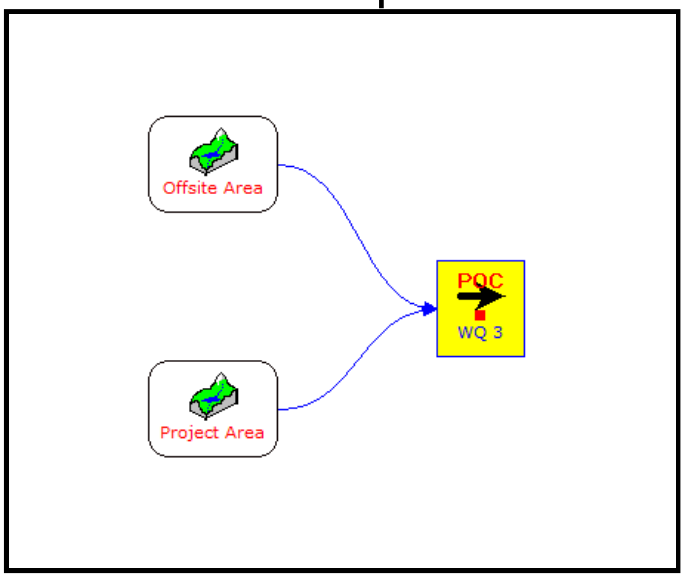
Scenario Predeveloped Compliance Link: WQ 3
Scenario Postdeveloped Compliance Link: WQ 3

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

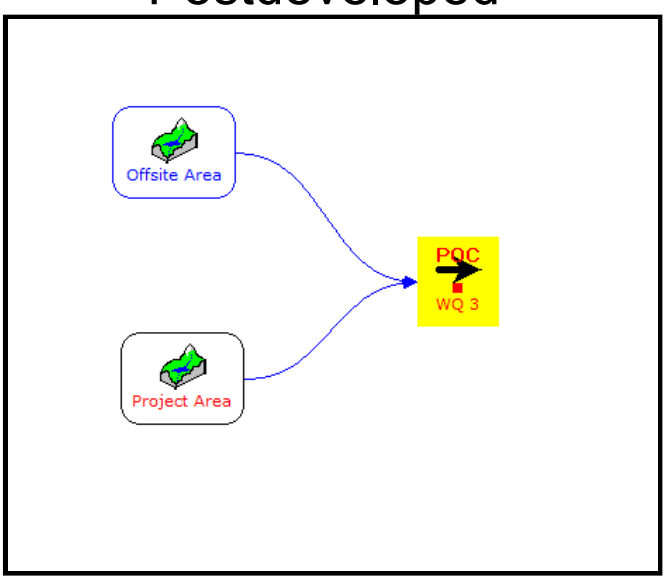
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.437	2-Year	2.437
5-Year	3.410	5-Year	3.410
10-Year	4.362	10-Year	4.362
25-Year	5.674	25-Year	5.674
50-Year	7.741	50-Year	7.741
100-Year	8.902	100-Year	8.902
200-Year	9.108	200-Year	9.108
500-Year	9.351	500-Year	9.351

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

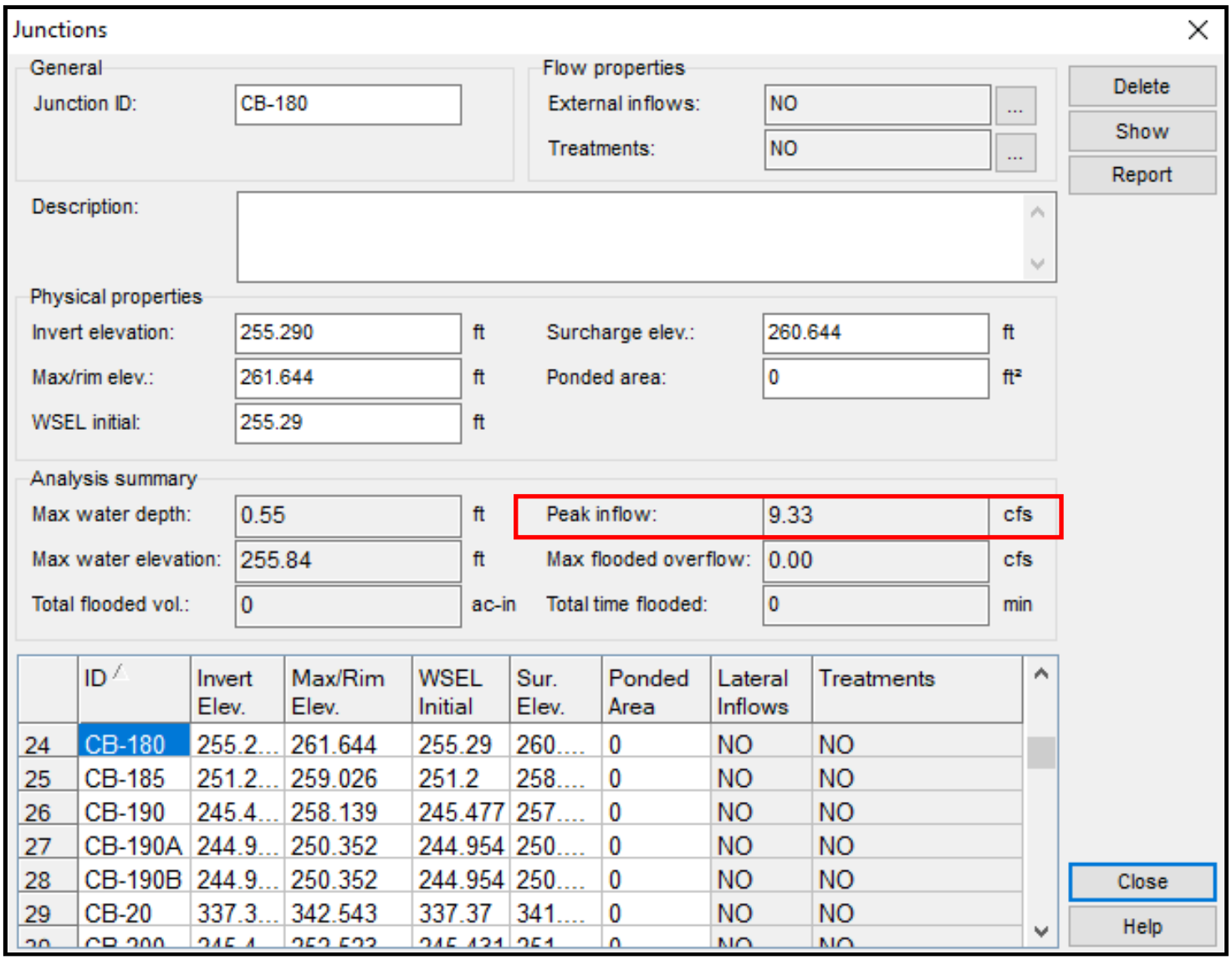
Predeveloped



Postdeveloped



Peak Flow from 100yr Storm Event per Sanitary Sewer and Storm Analysis



	ID	Invert Elev.	Max/Rim Elev.	WSEL Initial	Sur. Elev.	Ponded Area	Lateral Inflows	Treatments
24	CB-180	255.2...	261.644	255.29	260....	0	NO	NO
25	CB-185	251.2...	259.026	251.2	258....	0	NO	NO
26	CB-190	245.4...	258.139	245.477	257....	0	NO	NO
27	CB-190A	244.9...	250.352	244.954	250....	0	NO	NO
28	CB-190B	244.9...	250.352	244.954	250....	0	NO	NO
29	CB-20	337.3...	342.543	337.37	341....	0	NO	NO

For Water Quantity - Max Peak flow of 1.8 cfs

*CB-180 is a Flow Splitter - see calc for more details

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 12:56 PM
Report Generation Date: 01/05/2024 12:56 PM

Input File Name: WQ 4.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Water Quality Unit 4 Sizing
Comments: Offline WQ Flow Rate

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	12.598	12.598
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	12.598	12.598

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	9.578
Impervious	1.633
Subbasin Total	11.211

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.572
Impervious	0.815
Subbasin Total	1.387

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2

---------- Subbasin : Offsite Area ----------

	-------Area (Acres) --------
Till Grass	9.578
Impervious	1.633
Subbasin Total	11.211

---------- Subbasin : Project Area ----------

	-------Area (Acres) --------
Till Grass	0.572
Impervious	0.815
Subbasin Total	1.387

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: WQ 4
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: WQ 4
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 2
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 2
Number of Links: 1

*************Groundwater Recharge Summary ***************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	1283.005
Subbasin: Project Area	76.634
Link: WQ 4	0.000
Total:	1359.639

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Offsite Area	1283.005
Subbasin: Project Area	76.634
Link: WQ 4	0.000
Total:	1359.639

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 8.605 ac-ft/year, Post Developed: 8.605 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: WQ 4 **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 4322.31
Inflow Volume Including PPT-Evap (ac-ft): 4322.31
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 4322.31
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: WQ 4 **********

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.51 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.29 cfs

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 4322.31
Inflow Volume Including PPT-Evap (ac-ft): 4322.31
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 4322.31
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

************Compliance Point Results **************

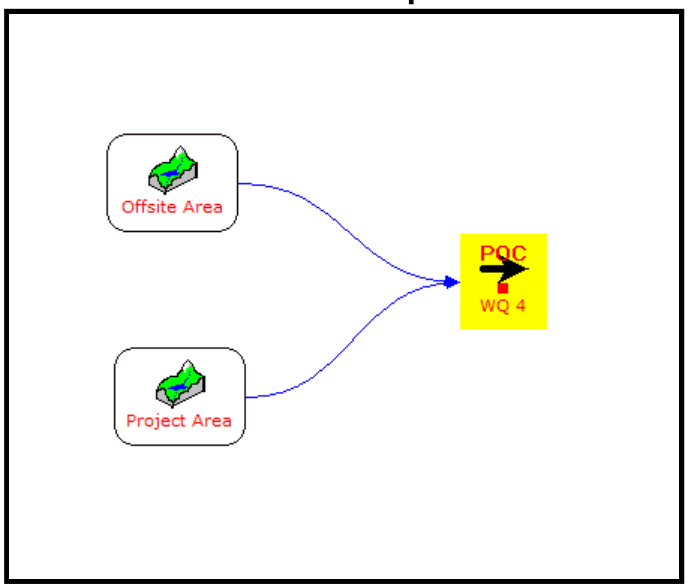
Scenario Predeveloped Compliance Link: WQ 4
Scenario Postdeveloped Compliance Link: WQ 4

***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

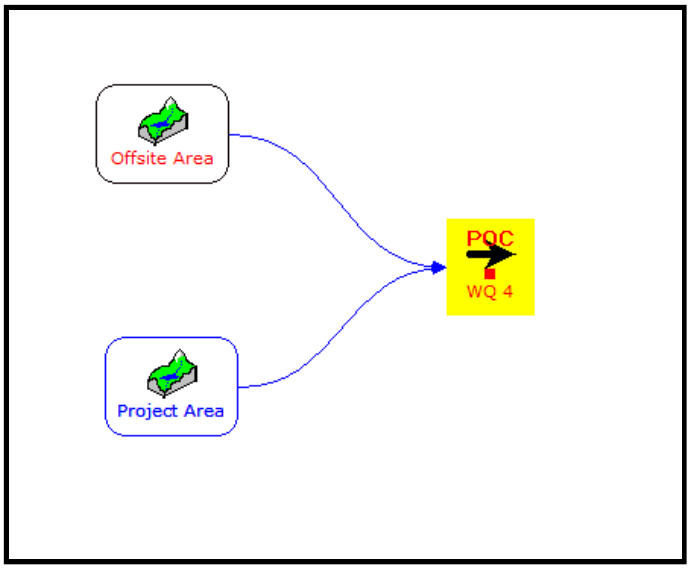
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.353	2-Year	2.353
5-Year	3.339	5-Year	3.339
10-Year	4.310	10-Year	4.310
25-Year	5.672	25-Year	5.672
50-Year	7.670	50-Year	7.670
100-Year	8.889	100-Year	8.889
200-Year	9.068	200-Year	9.068
500-Year	9.278	500-Year	9.278

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

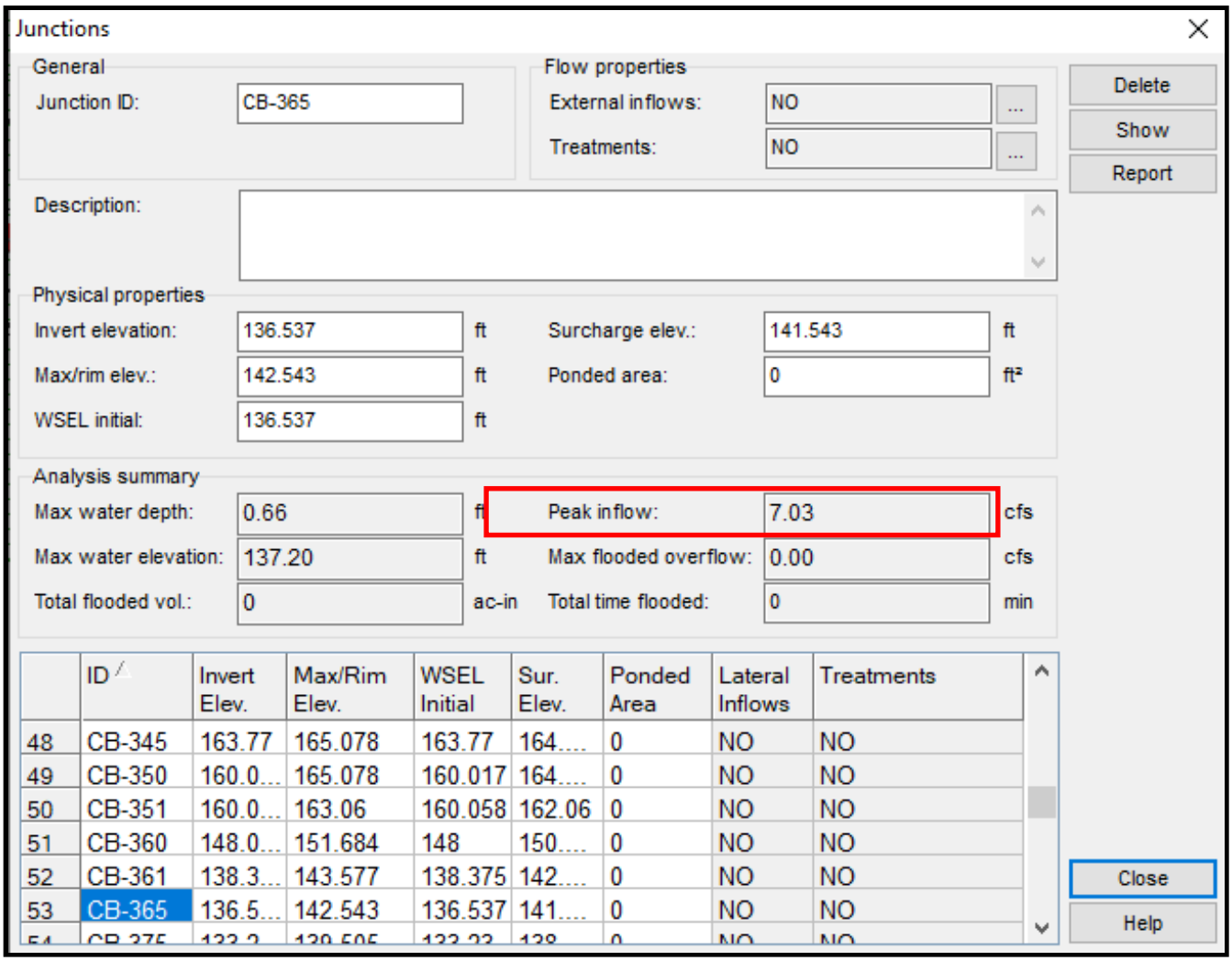
Predeveloped



Postdeveloped



Peak Flow from 100yr Storm Event per Sanitary Sewer and Storm Analysis



	ID	Invert Elev.	Max/Rim Elev.	WSEL Initial	Sur. Elev.	Ponded Area	Lateral Inflows	Treatments
48	CB-345	163.77	165.078	163.77	164....	0	NO	NO
49	CB-350	160.0...	165.078	160.017	164....	0	NO	NO
50	CB-351	160.0...	163.06	160.058	162.06	0	NO	NO
51	CB-360	148.0...	151.684	148	150....	0	NO	NO
52	CB-361	138.3...	143.577	138.375	142....	0	NO	NO
53	CB-365	136.5...	142.543	136.537	141....	0	NO	NO

For Water Quantity - Max Peak flow of 1.8 cfs

*CB-365 is a Flow Splitter - see calc for more details

APPENDIX D
CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

Construction Stormwater General Permit (CSWGP)

Construction Stormwater Pollution Prevention Plan (CSWPP)

for

Louis Thompson Road Tightline Project

Prepared for:

The Washington State Department of Ecology

Northwest Regional Office

Owner	Permittee	Developer	Operator / Contractor
City of Sammamish	City of Sammamish	TBD	TBD

City of Sammamish, Washington

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	CESCL ID	Contact Phone Number
TBD	TBD	TBD	TBD

CSWPP Prepared By

Name	Organization	Contact Phone Number
Maria Peraki	Osborn Consulting, Inc.	(425) 372-7667

CSWPP Preparation Date

January 25, 2024

Project Construction Dates

Activity / Phase	Start Date	End Date
TBD	TBD	TBD

Table of Contents

Appendices

Appendix A – Erosion and Sediment Control Plan

Appendix B – Correspondence – None at the time

Appendix C – Site Inspection Form

Appendix D – Construction Stormwater General Permit (CSWGP) – Not yet obtained

Appendix E – Contaminated Site Information – Not used

Appendix F – Engineering Calculations

List of Acronyms and Abbreviations

Abbreviation	Explanation
303(d)	section of the Clean Water Act pertaining to impaired waterbodies
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO_2	carbon dioxide
CSWGP	Construction Stormwater General Permit
CSWPP	Construction Stormwater Pollution Prevention Plan
Ecology	Washington State Department of Ecology
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
LTTP	Louis Thompson Tightline Project
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
pH	potential of hydrogen
SWMMWW	Stormwater Management Manual for Western Washington
TESC	Temporary Erosion and Sediment Control
TMDL	Total Maximum Daily Load

This construction stormwater pollution prevention plan (CSWPP) should be revised and updated to address changes in site conditions, new or revised government regulations, and additional on-site storm water pollution controls.

All revisions to the CSWPP must be documented on the CSWPP Revision Documentation Form, which should include the information shown below. The authorized facility representative who approves the CSWPP should be an individual at or near the top of the facility's management organization, such as the president, vice president, construction manager, site supervisor, or environmental manager. The signature of this representative attests that the CSWPP revision information is true and accurate. All CSWPP revisions will either be drafted or approved by the City of Sammamish and the Project Representative.

CSWPP Revision Documentation Form

Number	Date	Author	Company Representative Signature
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

1 PROJECT INFORMATION

Project or Site Name: Louis Thompson Tightline Project (LTTP)

Location: Louis Thompson Rd between East Lake Sammamish Pkwy NE and 210th Pl SE

City: Sammamish **State:** Washington **Zip code:** 98074

Receiving waterbody: Zackuse Creek which drains to Lake Sammamish

This CSWPP documents the sediment control and water quality measures to be implemented during construction of the Louis Thompson Road Tightline project, including non-motorized and stormwater drainage improvements as well as water main relocation and overlay work along Louis Thompson Road. The CSWPP covers all on-site and off-site work.

The 13 elements of the CSWPP, according to the Department of Ecology (Ecology) and the associated King County CSWPPP Standards per Appendix D of the King County Stormwater Drainage Manual (KCSWDM) are documented in the following sections. Best management practices (BMPs) are documented in the following sections.

The CSWPP is designed to establish an overall summary of where and how specific BMPs will be implemented to prevent erosion and transport of sediment from and on the project side during construction. The Contractor is required to prepare a separate and updated CSWPP to meet the Contractor's means and methods, construction schedule, and project permit requirements.

The CSWPP is an active document that reflects the current conditions and changes throughout the life of the project. The Contractor is responsible for keeping the CSWPP updated and changes to the CSWPP shall be documented in the CSWPP Revision Documentation Form included in this report. If field conditions during construction should require additional BMPs or changes to the temporary BMPs, the Contractor shall modify this document accordingly. During active construction, the Contractor is required to keep this report, associated plans, and permit copy on-site.

1.1 EXISTING SITE CONDITIONS

Louis Thompson Road is a collector arterial roadway that runs north/south through Sammamish and connects 212th Avenue SE with East Lake Sammamish Parkway NE. The project extends approximately 0.67 miles, between East Lake Sammamish Parkway NE and 210th Pl SE, with an existing 2-lane cross section with ditches and culverts on the north side and an unimproved slope leading to Zackuse Creek on the south side. The private developments around Louis Thompson were primarily constructed in the 1970s and 1980s, with little to no construction work done to improve runoff in the neighborhood since then. As a result, the corridor has historically been impacted by uncontrolled stormwater runoff. This project intends to mitigate flooding, erosion, and landslide hazards. The existing area topography, vegetation, critical areas, and drainage patterns are summarized in **Table 1**.

TABLE 1 | EXISTING SITE CONDITIONS	
Total acreage within the limits of construction (LOC) including staging areas	The project site encompasses a total of 6.36 acres.
Disturbed acreage	The total disturbed area is 4.16 acres.
Existing structures and utilities	**Stormwater Drainage:** Currently, stormwater flows through existing culvert pipe connections and ditches along Louis Thompson Road, connecting with existing stream flows and surface flows south to Zackuse Creek and west to Lake Sammamish. Underground storm pipes are present on the western end of the project. This project includes a stormwater utility improvement plan to install a pipe network along Louis Thompson Road. **Existing Utilities:** Overhead power and communication lines exist along the northern edge of Louis Thompson Road, switching to the southern edge part way through the extent of the project site limits. Buried communication lines service residents adjacent to the project site. Underground water serves residents along the extents of the project site limits. Sewer lines only exist at limited locations within the project site, such as at one intersection with 205th Avenue NE. **Other Structures:** Roadway signage exists on both sides of the roadway along the extents of the project site limits. Guardrails exist along the southern edge of Louis Thompson Road between 206th Avenue NE and 210th Place SE.
Landscape topography	Along the south side of the project site, there is a forested steep hillside between 206th Avenue NE and 210th Place SE. The properties adjacent to the north edge of the road slope steeply southwest. Louis Thompson Road has multiple bends in the roadway but generally slopes west toward Lake Sammamish.
Drainage patterns	In general, surface and groundwater flow downstream across the project site from the east to the west through a system of drainage ditches and culverts. Culverts cross Louis Thompson Road and outfall to Zackuse Creek to the south. A culvert under East Lake Sammamish Parkway connects the project site flows to Lake Sammamish. Groundwater seeps also emerge throughout the hillside and flow as small surface water discharges towards the toe of the slope or to Zackuse Creek.
Existing Vegetation	The project area mostly consists of paved roadway with heavily forested area along the southern portion of the roadway on steep slopes. Residential parcels adjacent to the project limits have landscaped yards with mature trees existing on their properties.

Critical Areas (wetlands, streams, high erosion risk, steep or difficult to stabilize slopes)	**Wetlands:** Wetlands are present along Zackuse Creek to the southeast of the project site, but are not present within the limits of the project site. **Streams**: Zackuse Creek is a stream that is to the southeast of the project site. **Steep Slopes:** A section of the south side of the project site has steep slopes between 206th Avenue NE and 210th Place SE, mapped as an erosion and landslide hazard area by City of Sammamish GIS.

Table 2 presents a summary of the suspected and known contaminants associated with the construction of the project.

TABLE 2 | SUMMARY OF PROBABLE SITE POLLUTANT CONSTITUENTS			
Constituent (pollutant)	**Location**	**Depth**	**Concentration**
Concrete mix water	Project site	Surface	N/A
Vehicle fuels and lubricants	Project site	Surface	N/A

There are no known contaminants present on site.

1.2 PROPOSED CONSTRUCTION ACTIVITIES

Work on the project will include site preparation and the installation of temporary erosion and sediment control measures, clearing and grubbing, implementation of the storm water pollution prevention plan, and site restoration following the completion of construction.

The project will include the removal and replacement of existing pavement, overlay work, installation of a new storm sewer conveyance system, construction of sidewalks, curbs, gutters, reconstruction of private driveways, and retaining wall construction.

1.2.1 CONSTRUCTION PHASING

The Contractor will develop the construction phasing and schedule per the requirements in the project specifications. Before starting construction, the Contractor must prepare and receive approval for the CSWPP and dewatering plan, including the construction sequencing and water quality monitoring plan. Erosion and sediment control BMPs must be in place before any land disturbing activities.

During construction, the Contractor must control stormwater runoff per Section 2.2.3 of this report and test stormwater runoff per Section 4 of this Report for compliance with the National Pollutant Discharge Elimination System (NPDES) permit and other applicable project permit requirements. Potential monitoring locations have been identified on the erosion control plan drawings (**Appendix A** – Erosion and Sediment Control Plan). However, pending the Contractor's proposed construction phasing, these locations may be updated or eliminated.

Erosion and sediment control BMPs must be monitored throughout the phased construction of the project to ensure the BMPs are functioning to meet water quality discharge standards. After final stabilization is achieved at the end of the project, the Contractor must remove the temporary erosion and sediment control BMPs and coordinate approval with the project representative.

1.2.2 CONSTRUCTION SCHEDULE

Construction is expected to start during the second quarter of 2024. The Contractor will develop the construction schedule in line with the Project Specifications.

2 CONSTRUCTION STORMWATER BEST MANAGEMENT PRACTICES (BMPS)

To control on-site sediment, the following BMPs per the KCSWDM, unless otherwise noted, will be implemented per Plan prior to starting any construction activities:

- Ecology's BMP C101: Preserving Natural Vegetation
- Ecology's BMP C103: High Visibility Plastic or Metal Fence (see Plans)
- Ecology's BMP C150: Materials on Hand
- D.2.1.2.3 Nets and Blankets, as needed
- D.2.1.2.4 Plastic Covering, as needed
- D.2.1.2.6 Temporary and Permanent Seeding
- D.2.1.3.1 Silt Fence (see Plans)
- D.2.1.4.1 Stabilized Construction Entrance, as needed
- D.2.1.4.2 Construction Road/Parking Area Stabilization – for parking/staging areas, as needed
- D.2.1.4.3 Wheel Wash
- D.2.1.5.3 Storm Drain Inlet Protection
- D.2.1.6.5 Outlet Protection (see Plans)
- D.2.1.7 Dewatering Control
- D.2.2.1 Concrete Handling
- D.2.2.3 Sawcutting and Surfacing Pollution Prevention
- D.2.2.4 Material Delivery, Storage, and Containment
- D.2.2.2 Concrete Washout Area
- D.2.2.7 High pH Neutralization Using CO2
- D.2.3.1 CSWPP Supervisor
- Redirect Runoff from Work Zone Along Roadway Super Elevation
- Street Cleaning
- Temporary Stormwater Bypass
- Temporary Cofferdams
- Temporary Storage Tanks (Baker Tanks)

These BMPs will be maintained throughout the project and will be inspected at regular intervals and following significant storm events, as required by the City of Sammamish, Ecology rules and regulations, as well as other applicable project permits and project specifications. The Contractor will provide a maintenance and inspection plan that includes identification and contact information for the Erosion and Sediment Control (ESC) project lead and backup contacts.

Although every attempt has been made to identify appropriate BMPs at specific locations throughout the project, situations will arise that require additional BMPs to be implemented. Therefore, erosion prevention and sediment control materials are to be kept on the project site at all times to be used for emergency situations, such as unexpected heavy summer rains. Ecology BMP C150 lists recommended materials and quantities to be kept on site. The construction manager shall verify that materials on hand are in place prior to construction and regularly inventoried during construction.

The following sections outline the 13 elements required for a CSWPP according to the Ecology Stormwater Management Manual for Western Washington (SWMMWW) and the corresponding selected CSWPP Standards per Appendix D of the KCSWDM that may be installed at the project site during construction. All identified BMPs and BMPs shown on the plans are minimum requirements based on the

known conditions. Construction sites have ever changing conditions. As a result, additional BMPs may have to be provided as the ESC Lead deems necessary.

2.1 ELEMENT 1: CLEARING LIMITS

Prior to any land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas, and their buffers to remain, as well as the trees to be preserved within the construction area. These shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts. Plastic, metal, or stake wire fence may be used to mark the clearing limits. The duff layer, native topsoil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable. If it is not practicable to retain the duff layer in place, it should be stockpiled on-site, covered to prevent erosion, and replaced immediately upon completion of the ground disturbing activities.

Special consideration will be given to construction activities immediately adjacent to sensitive areas. Stormwater conveyances and drainage ways will be given special consideration on this project so that all construction personnel understand the requirement to prevent the degradation of water quality.

Selected BMPs for Element 1:

- BMP C101: Preserving Natural Vegetation
- Ecology's BMP C103: High Visibility Plastic or Metal Fence (see Plans)
- D.2.1.3.1 Silt Fence (see Plans)

2.2 ELEMENT 4: TRAFFIC AREA STABILIZATION

Construction vehicles entering and exiting the project site will use only identified and approved access points. The Contractor shall determine construction access points before starting the project. Approved construction access points will be marked on plans and in the field, as necessary, to prevent unauthorized access and to limit further disturbance of environmental resources and surrounding neighborhoods.

Sediment drag-out onto the street will be limited by effective implementation of construction road and entrance stabilization measures. Only essential equipment will be allowed in the disturbed areas and all equipment will be cleaned of loosed sediment prior to moving offsite. Equipment will be cleaned using a brush or broom and, if necessary, wheel washing stations. The construction entrance will be maintained, as needed, to prevent offsite transport of sediment.

If sediment is tracked off site, public roads shall be cleared thoroughly at the end of each workday, or more frequently during wet weather, if necessary, to prevent sediment from entering waters of the State. Manual shoveling or dry sweeping shall be employed to remove sediment from the roads, and the collected sediment shall be transported to a controlled sediment disposal area. Use of water to wash down surfaces will be prohibited unless specifically approved by the ESC Lead to assure that turbid water is appropriately managed and treated prior to discharge. Street wash wastewater shall be controlled by pumping back on-site or otherwise prevented from discharging into the downstream waters of the State. The Contractor shall maintain all public roadways with street sweeping as necessary to remove sediment.

Selected BMPs for Element 2:

- D.2.1.4.1 Stabilized Construction Entrance, as needed
- D.2.1.4.3 Wheel Wash
- D.2.1.4.2 Construction Road/Parking Area Stabilization – for parking/staging areas, as needed

2.3 ELEMENT 9: FLOW CONTROL

To protect properties and waterways downstream of the project site from erosion and the associated discharge of turbid waters, stormwater discharges from the site will be controlled. Permanent detention tanks are proposed on the project site to limit flows from the proposed site development. During construction, the Contractor may use temporary storage tanks or temporary sediment traps. The proposed detention pipes may be used during construction. For pipe capacity calculations, see the Technical Information Report, Appendix C – Flow Control and Water Quality Calculations. Any proposed detention pipes used for flow control during construction shall being cleaned of sediment before the end of construction.

During construction, offsite run-on ditch flows along Louis Thompson Road will also be maintained and routed around the construction limits.

Selected BMPs for Element 3:

- Temporary Cofferdams
- Temporary Storage Tanks (Baker Tanks)

2.4 ELEMENT 4: INSTALL SEDIMENT CONTROLS

To minimize the discharge of pollutants from the project, effective erosion and sediment control measures are to be installed and maintained at the site. Construction activities such as excavation, clearing and grubbing, and grading will result in disturbed ground and increased risk of turbid water. Limiting the amount of disturbed area, phasing construction, and preserving natural vegetation to the maximum extent feasible will help to reduce the potential for sediment tracking off-site. All stormwater runoff from disturbed ground areas shall pass through appropriate sediment removal BMPs before leaving the construction site.

Prior to construction, general soil management procedures shall be established with respect to dust suppression, soil screening, stockpiling, sampling, transportation, and disposal. When temporary stockpile storage is needed on-site, the soil must be covered with plastic sheeting and secured at the edges to prevent wind erosion and saturation with rain.

Inlet protection will be utilized for existing and newly installed catch basins and drainage structures that have the potential for receiving construction stormwater. Where necessary, check dams will be installed in existing and new conveyance ditches to collect sediment. Silt fence, temporary curb, and wattles are also other perimeter sediment control best management practices (BMPs) that may be utilized to contain sediment on-site. Street cleaning, stabilized construction entrances, and wheel washes may also be utilized to control sediment track-out onto existing paved roads.

Selected BMPs for Element 3:

- BMP C101: Preserving Natural Vegetation
- D.2.1.4.1 Stabilized Construction Entrance, as needed
- D.2.1.5.3 Storm Drain Inlet Protection (see Plans)
- Street Cleaning

To avoid any potential sediment control issues, the project CESCL will immediately implement alternative BMPs at the first sign that any of the existing BMPs are ineffective or failing.

2.5 ELEMENT 4: STABILIZE SOILS

Exposed and unworked soils will be protected with temporary seeding and mulching as well as plastic sheeting over gravel or stockpiles over the weekends and when there is a possibility of rain. Per KCSWM guidelines, summarized in **Table 3**, no soils shall remain exposed and unworked for more than seven (7) days in the dry season and more than two (2) days during the wet season. The project is expected to be completed over the course of several months in different seasons of weather.

TABLE 3 | SOIL STABILIZATION REQUIREMENTS FOR THE WET AND DRY SEASON WEST OF THE CASCADE MOUNTAIN CREST

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	May 1 – September 30	7 days
During the Wet Season	October 1 – April 30	2 days

Soils must be stabilized at the end of the shift before a holiday or a weekend, as necessary, based on the weather forecast.

Selected BMPs for Element 4:

- D.2.1.2.6 Temporary and Permanent Seeding
- D.2.1.2.3 Nets and Blankets, as needed
- D.2.1.2.4 Plastic Covering, as needed

2.6 ELEMENT 5: PROTECT SLOPES

The slopes along the south edge of the project site can be categorized as steep slopes. BMPs will be installed immediately after any disturbance to the steep slopes. When temporary stockpile storage is needed on-site, soil must be covered with plastic sheeting and secured at the edges to prevent wind erosion and infiltration of rain.

Selected BMPs for Element 5:

- D.2.1.2.6 Temporary and Permanent Seeding
- D.2.1.2.3 Nets and Blankets, as needed
- D.2.1.2.4 Plastic Covering, as needed
- D.2.1.3.1 Silt Fence (see Plans)

2.7 ELEMENT 6: PROTECT DRAIN INLETS

There are several existing storm drain structures within the project site, which will need to be protected prior to starting construction. Any newly installed catch basins, which may receive construction stormwater runoff, should also receive Storm Drain Inlet Protection. Temporary curb may also be used to divert construction stormwater away from drainage systems where needed.

Selected BMPs for Element 6:

- D.2.1.5.3 Storm Drain Inlet Protection

2.8 ELEMENT 7: STABILIZE OUTLETS

If temporary drainage pipes are installed for offsite flow conveyance or conveyance of construction work zone area flows, outlet protection will be placed at the pipe ends to reduce erosion and scour at the outlet locations. If the Contractor installs temporary on-site conveyance pipes or channels, they shall be designed, constructed, and stabilized to prevent erosion from the peak 10-year, 24-hour storm event.

Selected BMPs for Element 7:

- D.2.1.2.6 Temporary and Permanent Seeding
- D.2.1.2.3 Nets and Blankets,
- D.2.1.2.4 Plastic Covering
- D.2.1.6.5 Outlet Protection (see Plans)
- Temporary Stormwater Bypass

2.9 ELEMENT 8: CONTROL POLLUTANTS

All pollutants including waste materials and demolition debris that occur on site during construction shall be managed and disposed of in a manner that does not cause contamination of storm water or the waters of the State. The construction site will be kept clean, well organized, and free of debris. The potential pollutants anticipated to be at the site are summarized in **Table 2**.

The Contractor shall prevent visible dust during excavation, transportation, and placement operations. The Contractor shall implement dust control measures, such as spraying soil with water during excavation and grading operations. Contaminated soil spillage and airborne dust during transportation should be prevented. All soil must be covered during transport.

The Contractor will provide a containment plan for handling concrete mix water, vehicle fuels and lubricants, and for water main disinfection at the time of the new water main construction and connection. Containment will be implemented prior to the start of any of these pollution-generating activities.

Maintenance, fueling, and repair of heavy equipment and vehicles is expected to occur onsite the contractor will be required to provide a final list of chemicals, fuels, or oils that will be on site. In addition, a security and containment plan will need to be approved and implemented prior to bringing any chemicals, fuels, or oils on to the site. The Contractor is required to prepare a Pollution Prevention and Spill Contingency Response Plan per project specifications.

A list of known pH-modifying sources that are expected to be on-site is presented in **Table 4**. Concrete wastewater will be fully contained at the time of concrete placement. All pumping and mixer washouts will be temporarily placed into containment, hauled off site, and properly disposed of. Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

TABLE 4 | PH-MODIFYING SOURCES

	None
X	Bulk cement

TABLE 4 | PH-MODIFYING SOURCES	
	Cement kiln dust
	Fly ash
X	Other cementitious materials
X	New concrete washing or curing waters
X	Waste streams generated from concrete grinding and sawing
X	Exposed aggregate processes
X	Dewatering concrete vaults
X	Concrete pumping and mixer washout waters
	Recycled concrete
	Other (for example, calcium lignosulfate) [please describe]

Selected BMPs for Element 8:

- D.2.2.1 Concrete Handling
- D.2.2.3 Sawcutting and Surfacing Pollution Prevention
- D.2.2.4 Material Delivery, Storage, and Containment
- D.2.2.2 Concrete Washout Area
- D.2.2.7 High pH Neutralization Using CO_2

2.10 ELEMENT 9: CONTROL DE-WATERING

Dewatering is expected to be required for the project site. Installation of the dewatering system and containment will be completed prior to any trench excavation. All sediment-laden water is required to be properly disposed of to prevent discharge to Waters of the State. Proper disposal methods are summarized in **Table 5**.

TABLE 5 | DEWATERING BMPS	
	Infiltration
X	Transport off-site in a vehicle (vacuum truck for legal disposal)
X	Ecology-approved on-site chemical treatment or other suitable treatment technologies
X	Sanitary or combined sewer discharge with local sewer district approval (last resort)
X	Use of sedimentation bag with discharge to ditch or swale (small volumes of localized dewatering)

The Contractor will be required to provide a dewatering plan that includes turbidity sampling. Inspection and documentation will be completed at minimum intervals and after significant storms as required and defined by the project permits and specifications. The maintenance and inspection plan to be provided by the Contractor, will include identification and contact information for the ESC project lead and backup contacts. The Contractor will identify a responsible person, and City staff will provide oversight.

Selected BMPs for Element 9:

- D.2.1.7 Dewatering Control

2.11 ELEMENT 10: MAINTAIN BMPS

All temporary and permanent ESC BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each BMP specification (see *Volume II of the SWMMWW*).

Visual monitoring of all BMPs installed at the site will be conducted per project specifications. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed or as directed by the Project Representative.

Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Additionally, protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed, and the facility shall be returned to conditions specified in the construction documents.

Selected BMPs for Element 10:

- BMP C150: Materials on Hand
- D.2.3.1 CSWPP Supervisor

2.12 ELEMENT 11: MANAGE THE PROJECT

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be considered.
- Inspection and monitoring:
    - Inspection, maintenance, and repair of all BMPs will occur as needed to ensure performance of their intended function.
    - Site inspections, monitoring, and sampling locations will be in accordance with the Construction Stormwater General Permit (CSWGP).
    - A CESCL shall be on-site or on-call at all times.
- Maintain an updated CSWPP.
    - As site work progresses the CSWPP will be modified routinely to reflect changing site conditions. The CSWPP will be reviewed monthly to ensure the content is current.

Applicable Management BMPs are identified in **Table 6**.

TABLE 6 | DEWATERING BMPS	
X	Design the project to fit the existing topography, soils, and drainage patterns
X	Emphasize erosion control rather than sediment control
X	Minimize the extent and duration of the area exposed

TABLE 6 | DEWATERING BMPS	
X	Keep runoff velocities low
X	Retain sediment on-site
X	Thoroughly monitor site and maintain all ESC measures
X	Schedule major earthwork during the dry season
	Other [please describe]

A template for a phased BMP implementation schedule is provided in **Table 7**. This form shall be updated and modified as the project progresses.

TABLE 7 | BMP IMPLEMENTATION SCHEDULE

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season
Site Preparation	*BMP C103*	*[MM/DD/YYY]*	[Insert season]
[Insert construction activity]	[Insert BMP]	[MM/DD/YYY]	[Insert season]

2.13 ELEMENT 12: PROTECT LOW IMPACT DEVELOPMENT (LID) BMPS

No LID BMP facilities will be installed in this project. There are also no known existing LID BMPs within project limits.

3 POLLUTION PREVENTION TEAM

Table 8 is provided as a template for team member information and coordination as members are identified.

TABLE 8 | TEAM INFORMATION

Title	Name	Phone Number	Email
Certified Erosion and Sediment Control Lead (CESCL)	[TBD]	[TBD]	[TBD]
Resident Engineer	[TBD]	[TBD]	[TBD]
Emergency Ecology Contact	[TBD]	[TBD]	[TBD]
Emergency Permittee or Owner Contact (City of Sammamish)	Jed Ireland, P.E.	(425) 295-0563	jireland@ sammamish.us
Non-Emergency Owner Contact (City of Sammamish)	Toby Coenen, P.E.	(425) 295-0567	tcoenen@ sammamish.us
Monitoring Personnel	[TBD]	[TBD]	[TBD]
Ecology Regional Office	Northwest Regional Office	(425) 549-0000	nwroerts@ ecy.wa.gov

4 MONITORING AND SAMPLING REQUIREMENTS

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documenting of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include the following:

- A record of the implementation of the CSWPP and other permit requirements
- Site inspections
- Stormwater sampling data

A blank form is provided as a template in **Appendix C** – Site Inspection Form.

The site log book must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

4.1 SITE INSPECTION

Site inspections will be conducted per project specifications and per the Project Representative. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

The discharge points are indicated on the Erosion and Sediment Control Plan (see **Appendix A** – Erosion and Sediment Control Plan) and in accordance with the applicable requirements of the CSWGP.

4.2 STORMWATER QUALITY SAMPLING

4.2.1 TURBIDITY SAMPLING

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Sampling will be conducted at all discharge points per the project specifications.

Method for sampling turbidity is per **Table 9**:

TABLE 9 | TURBIDITY SAMPLING METHOD	
X	Turbidity Meter or Nephelometer (required for disturbances 5 acres or greater in size)
	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters. If the discharge's turbidity is 26 to 249 NTU **or** the transparency is less than 33 cm and equal to or greater than 6 cm, the following steps will be conducted:

1. Review the CSWPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If **either** the turbidity exceeds 250 NTU **or** the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours, which can be accessed athttps://www.ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue.
    - Northwest Region (King, Kitsap, Island, San Juan, Skagit, Snohomish, Whatcom): (425) 649-7000
2. Immediately start the process to fully implement and maintain appropriate source control and treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period
3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
    - Turbidity is 25 NTU (or lower).
    - Transparency is 33 cm (or greater).
    - Compliance with the water quality limit for turbidity is achieved.
        - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
        - 1% - 10% over background turbidity, if background is 50 NTU or greater

The discharge stops or is eliminated.

4.2.2 pH SAMPLING

pH monitoring is required for "significant concrete work," that is, poured concrete or recycled concrete that amounts to greater than 1000 cubic yards over the lifetime of the project. The use of engineered soils, specifically soil amendments that include but are not limited to Portland cement-treated base [CTB], cement kiln dust [CKD], or fly ash, also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until the concrete is cured, which is typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling starts when the engineered soils or recycled concrete is first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to a range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to using any chemical treatment other than CO_2 sparging or dry ice.

Method for sampling pH per **Table 10**:

TABLE 10 | pH SAMPLING METHOD

X	pH meter
	pH test kit

5 DISCHARGES TO 303(D) OR TOTAL MAXIMUM DAILY LOAD (TMDL) WATERBODIES

5.1 303(D) LISTED WATERBODIES

Per March 2023 data received through Ecology's Water Quality Atlas tool, no known 303(d) listed waterbodies exist within the project site.

6 REPORTING AND RECORD KEEPING

6.1 RECORD KEEPING

6.1.1 SITE LOG BOOK

A site log book will be maintained for all on-site construction activities and will include the following:

- A record of the implementation of the CSWPP and other permit requirements
- Site inspections
- Sample logs

6.1.2 RECORDS RETENTION

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- CSWPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the CSWPP or access to the CSWPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

6.1.3 UPDATING THE CSWPP

The CSWPP will be modified if either one of the following occurs:

- The CSWPP is found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The CSWPP will be modified within seven (7) days if inspections or investigations determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

6.2 REPORTING

6.2.1 DISCHARGE MONITORING REPORTS

Cumulative soil disturbance is greater than one (1) acre; therefore, Discharge Monitoring Reports will be submitted to Ecology as water quality sampling will be required during construction.

6.2.2 NOTIFICATION OF NONCOMPLIANCE

If any of the terms and conditions of the permit are not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. The Project Representative will be notified within 24 hours of the failure to comply, and the Contractor will coordinate the proposed corrective actions with the Project Representative.
2. Within 24 hours of the failure to comply, the applicable Regional office ERTS phone number will be called to notify Ecology. (Regional office numbers listed below.)
3. Immediate action will be taken to prevent the discharge or pollution or to otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately, and the results will be submitted to Ecology within five (5) days of becoming aware of the violation.
4. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis, as required by Special Condition S5.A of the CSWGP.

- Northwest Region at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County

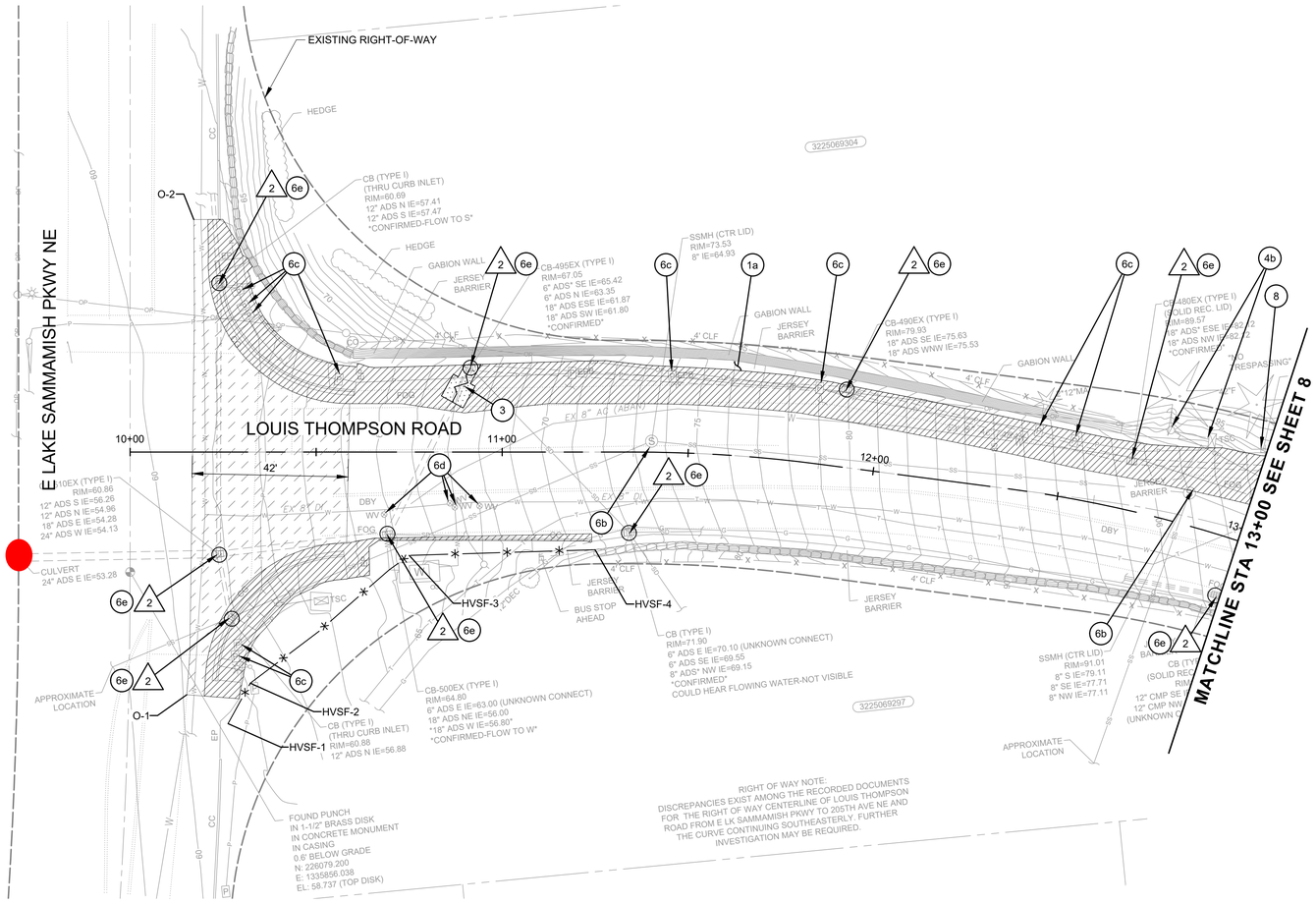
Include the following information:

1. Your name and Phone number
2. Permit number
3. City or County of project
4. Sample results
5. Date and Time of call
6. Date and Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water.

APPENDIX A – EROSION AND SEDIMENT CONTROL PLAN

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. LOCATION OF UTILITIES SHOWN ON PLANS ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY ALL UTILITY LOCATIONS WITHIN THE PROJECT LIMITS, INCLUDING SERVICE LINES WITHIN PRIVATE PROPERTIES AND DRIVEWAYS.
2. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
3. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
4. CONTRACTOR TO NOTIFY PROPERTY OWNER(S) TWO (2) WEEKS PRIOR TO CONSTRUCTION, TO COORDINATE DRIVEWAY ACCESS. DRIVEWAY INGRESS/EGRESS MUST BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE AGREED TO BY THE PROPERTY OWNER.
5. DISTURBANCE AND CLEARING LIMITS SHALL BE MINIMIZED TO THE AREA NECESSARY FOR INSTALLATION OF TEMPORARY AND PERMANENT ELEMENTS. ONLY REMOVE THE MINIMUM VEGETATION NEEDED FOR CONSTRUCTION ACTIVITIES. CLEARING LIMITS SHALL BE DELINEATED USING A HVF AND GENERALLY MATCH THE ROW AND TCE LIMITS, UNLESS OTHERWISE SHOWN IN SHEETS 7-16.
6. PROTECT EXISTING TREE WITHIN THE WORK AREA, UNLESS SHOWN AS TO BE REMOVED IN SHEETS 7-16 AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 17 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
7. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.
8. SEE APPENDIX X OF PROJECT'S SPECIAL PROVISIONS FOR WORK (SITE PREPARATION AND PROPOSED CONDITION) RELATED TO THE WATER LINE, HYDRANTS, AND METERS/VALVES FROM STA 13+50 TO STA 45+50. THE EXISTING AC WATER MAIN WILL BE ABANDONED IN PLACE WITHIN THESE LIMITS AND ONLY BE REMOVED AT LOCATIONS WHERE IT IS CONFLICTING WITH THE PROPOSED WORK.
9. FOR ROADWAY EXCAVATION INCLUDING HAUL, SEE SHEET 44 AND DETAIL 3 SHEET 17.
10. OVERHEAD COMMUNICATION WIRES WILL BE RAISED APPROX. 20 FT FROM EXISTING GROUND AND SLACK REMOVED.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE PER WSDOT STANDARD PLAN I-10.10/I-30.17.
2. INSTALL STORM DRAIN INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

SITE PREPARATION NOTES:

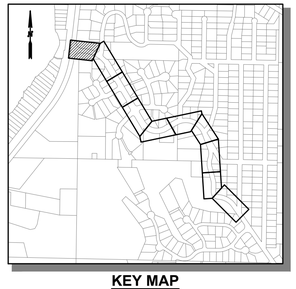
1. REMOVAL OF STRUCTURES AND OBSTRUCTIONS
   a. REMOVE EXISTING CONCRETE BARRIER (FULL LENGTH) AT THIS VICINITY.
   b. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
   c. REMOVE BOLLARD.
   d. REMOVE TIMBER LANDSCAPING WALL.
   e. REMOVE AND RELOCATE MAILBOX. SEE SHEET 53 FOR NEW LOCATION.
   f. REMOVE EXISTING FENCE.
   g. REMOVE AND RESET EXISTING FENCE.
   h. REMOVE AND RESET EXISTING LANDSCAPE BLOCKS.
   i. REMOVE EXISTING CONCRETE CURB
   j. REMOVE EXISTING CONCRETE UTILITY VAULT
2. PLUG EXISTING PIPE.
3. TRIM EXISTING PIPE TO LENGTH FOR CONNECTION TO DRAINAGE STRUCTURE. SEE SHEETS 18-27.
4. PROTECT IN-PLACE
   a. EXISTING CULVERT
   b. EXISTING POWER POLE, RISER, CABINET
   c. EXISTING FENCE OR RETAINING WALL
   d. EXISTING MONUMENT
   e. EXISTING UNDERGROUND POWER LINE
   f. EXISTING GAS LINE
5. EXISTING UTILITY WORK BY OTHERS
   a. POWER POLE TO BE RELOCATED BY PSE PRIOR TO CONSTRUCTION.
   b. PSE TO DE-ENERGIZE SPAN DURING DETENTION PIPE AND SOLDIER PILE WALL CONSTRUCTION. CONTRACTOR TO COORDINATE WITH PSE FOR TIME FRAME.
   c. COMMUNICATION LINE TO BE RELOCATED BY ZIPLY OR COMCAST DURING CONSTRUCTION.
   d. COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY ZIPLY OR COMCAST PRIOR TO CONSTRUCTION.
   e. EXISTING COMMUNICATION LINE TO BE ABANDONED IN PLACE.
   f. GAS LINE TO BE RELOCATED PRIOR TO CONSTRUCTION.
6. PROTECT AND ADJUST TO FINISH GRADE
   a. EXISTING GAS VALVE
   b. EXISTING SEWER MANHOLE
   c. EXISTING JUNCTION BOXES
   d. EXISTING WATER VALVE/WATER VALVE MARKERS
   e. EXISTING CATCH BASIN
7. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS, AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
8. RELOCATE EXISTING SIGN. SEE SHEETS 57-66 FOR PROPOSED LOCATION.
9. REMOVE
   a. EXISTING DRAINAGE STRUCTURE
   b. EXISTING CULVERT OR STORM DRAIN

LEGEND

- PERMANENT EASEMENT
- TEMPORARY EASEMENT
- REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
- HVF — HIGH VISIBILITY FENCE
- HIGH VISIBILITY SILT FENCE
- REMOVE CURB
- STRUCTURE EXCAVATION CLASS B INCLUDING HAUL
- ROADWAY EXCAVATION INCLUDING HAUL
- PLANE PRIOR TO OVERLAY. CONTRACT TO FIELD VERIFY PLANING DEPTH.
- REMOVE TREE
- INLET PROTECTION
- X-## CONTROL POINT, SEE SHEET 17 FOR CONTROL POINT TABLE

100% SUBMITTAL (NOT FOR CONSTRUCTION)

Know what's below. Call before you dig.



KEY MAP

Potential Monitoring Location

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
SHEET: ER01 7 of 102

MARIA DRAKE STATE OF WASHINGTON 23016353 REGISTERED PROFESSIONAL ENGINEER

FILE NAME: C:\PW_0C_WORKING\DIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS26566\P_10-210058_TESC.DWG
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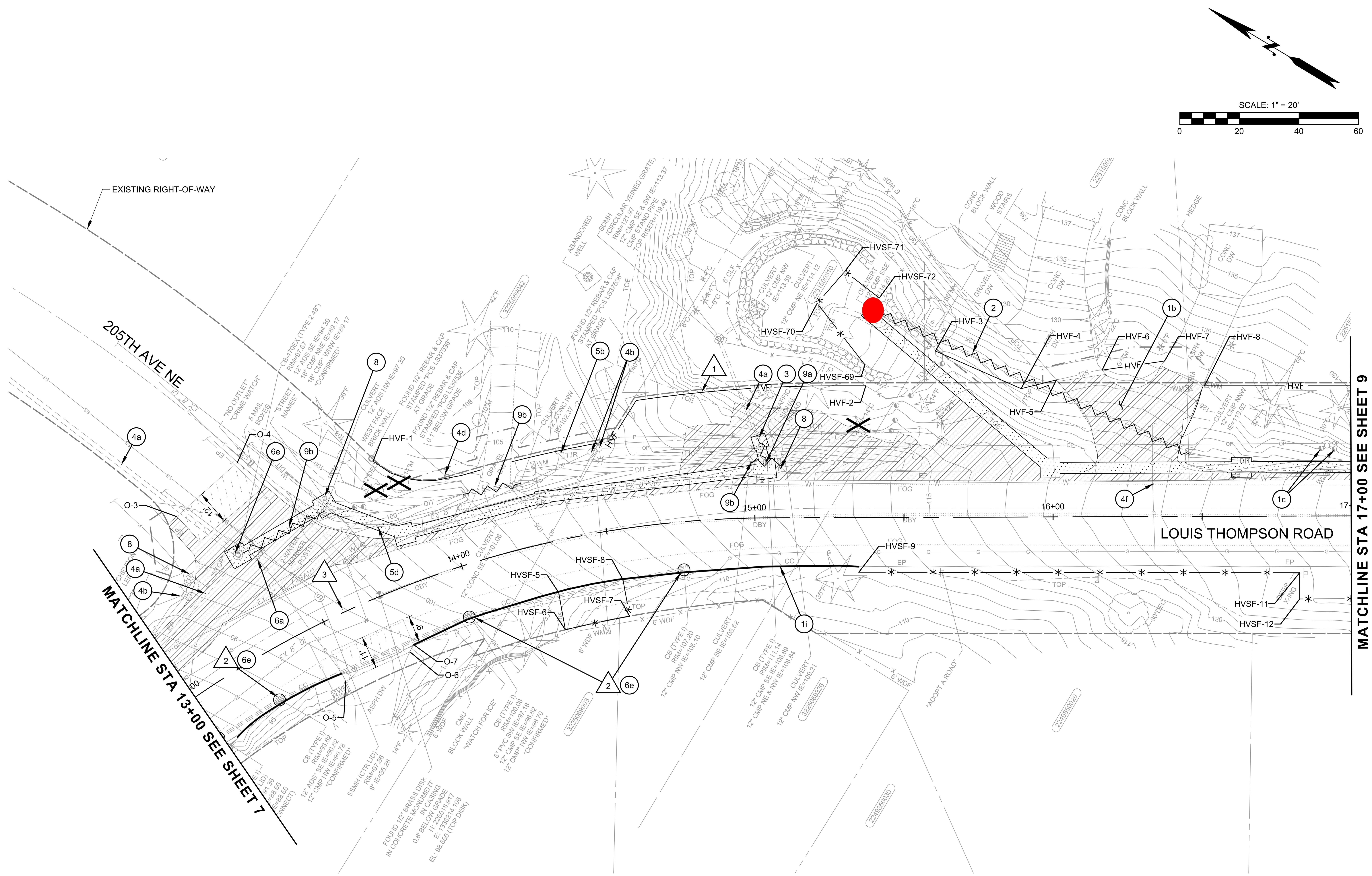
USER NAME: ALEKSANDRA SLATALA

SEC. 32, T. 25N, R. 6E, W.M.



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   c. EXISTING FENCE OR RETAINING WALL
   d. EXISTING MONUMENT
   e. EXISTING UNDERGROUND POWER LINE
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5. EXISTING UTILITY WORK BY OTHERS
   a. POWER POLE TO BE RELOCATED BY PSE PRIOR TO CONSTRUCTION.
   b. PSE TO DE-ENERGIZE SPAN DURING DETENTION PIPE AND SOLDIER PILE WALL CONSTRUCTION. CONTRACTOR TO COORDINATE WITH PSE FOR TIME FRAME.
   c. COMMUNICATION LINE TO BE RELOCATED BY ZIPLY OR COMCAST DURING CONSTRUCTION.
   d. COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY ZIPLY OR COMCAST PRIOR TO CONSTRUCTION.
   e. EXISTING COMMUNICATION LINE TO BE ABANDONED IN PLACE.
   f. GAS LINE TO BE RELOCATED PRIOR TO CONSTRUCTION.
6. PROTECT AND ADJUST TO FINISH GRADE
   a. EXISTING GAS VALVE
   b. EXISTING SEWER MANHOLE
   c. EXISTING JUNCTION BOXES
   d. EXISTING WATER VALVE/WATER VALVE MARKERS
   e. EXISTING CATCH BASIN
7. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS, AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
8. RELOCATE EXISTING SIGN. SEE SHEETS 57-66 FOR PROPOSED LOCATION.
9. REMOVE
   a. EXISTING DRAINAGE STRUCTURE
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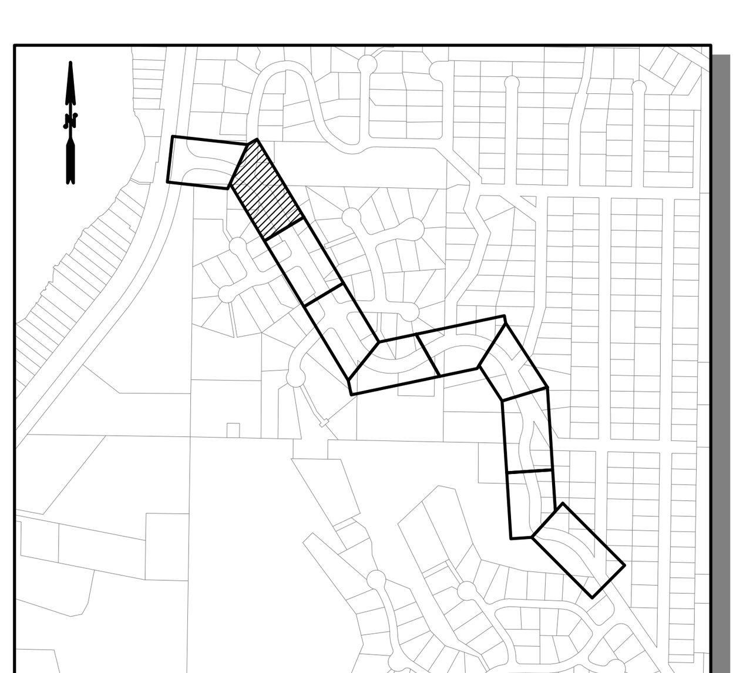
811 Know what's below. Call before you dig.

LEGEND

PERMANENT EASEMENT	ROADWAY EXCAVATION INCLUDING HAUL
TEMPORARY EASEMENT	PLANE PRIOR TO OVERLAY. CONTRACTOR TO FIELD VERIFY PLANING DEPTH.
REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE	REMOVE TREE
HVF — HIGH VISIBILITY FENCE	INLET PROTECTION
HIGH VISIBILITY SILT FENCE	X-## CONTROL POINT, SEE SHEET 17 FOR CONTROL POINT TABLE
REMOVE CURB	
STRUCTURE EXCAVATION CLASS B INCLUDING HAUL	

Potential Monitoring Location

100% SUBMITTAL (NOT FOR CONSTRUCTION)


KEY MAP

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:32 PM
USER NAME: ALEKSANDRA SLATALA

MARIA PERAKI, STATE OF WASHINGTON, 23016353, REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	MP
DRAWN BY	LT/LO/FJ
CHECKED BY	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

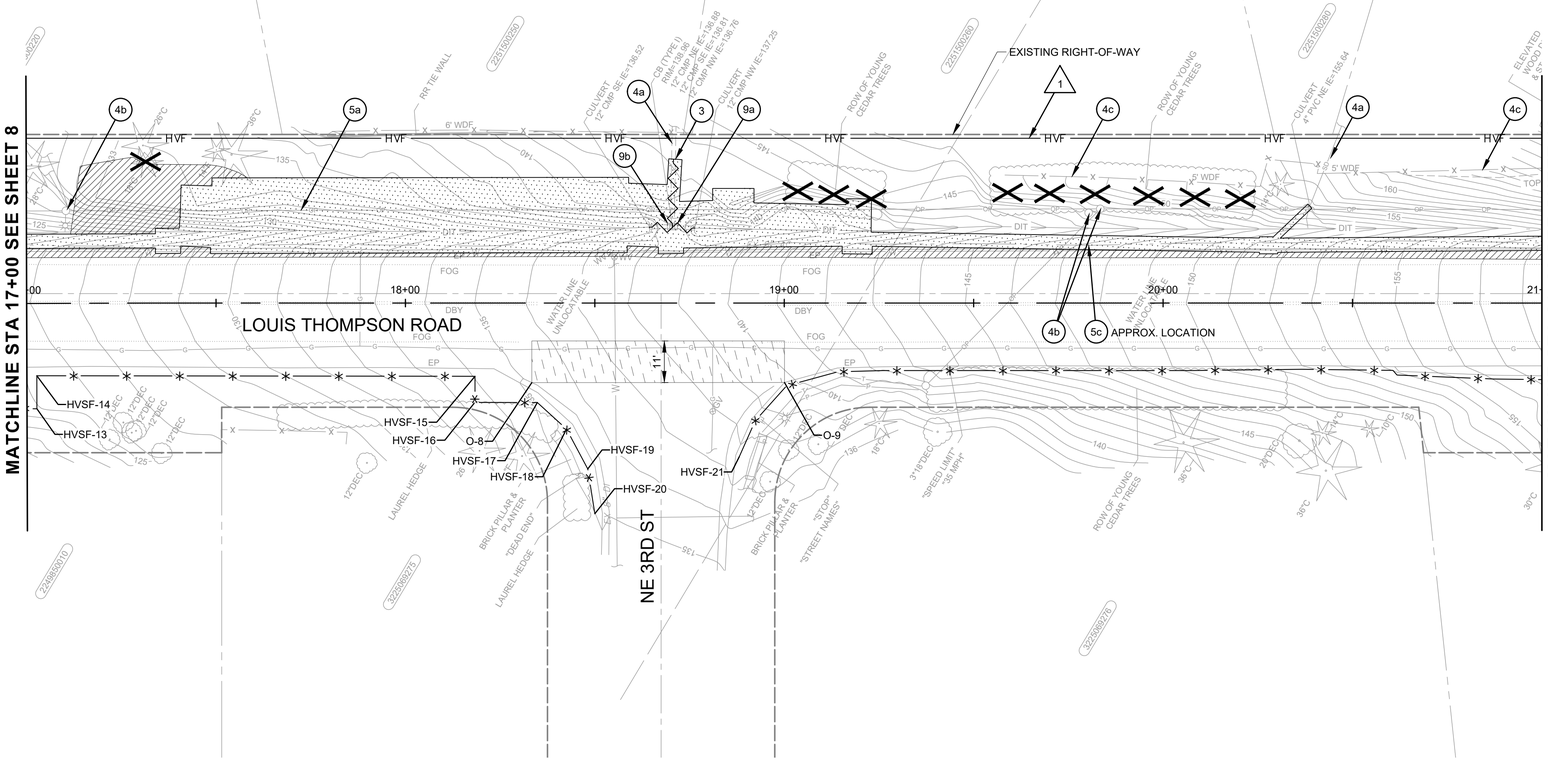
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG	10-210058	DATE	01/29/2024
SCALE	H: 1"=20' V: N/A		ER02
		SHEET	8 of 102

SEC. 32, T. 25N, R. 6E, W.M.

SCALE: 1" = 20'

0 20 40 60



KEY MAP

Potential Monitoring Location

GENERAL NOTES:

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2. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
3. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
4. CONTRACTOR TO NOTIFY PROPERTY OWNER(S) TWO (2) WEEKS PRIOR TO CONSTRUCTION, TO COORDINATE DRIVEWAY ACCESS. DRIVEWAY INGRESS/EGRESS MUST BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE AGREED TO BY THE PROPERTY OWNER.
5. DISTURBANCE AND CLEARING LIMITS SHALL BE MINIMIZED TO THE AREA NECESSARY FOR INSTALLATION OF TEMPORARY AND PERMANENT ELEMENTS. ONLY REMOVE THE MINIMUM VEGETATION NEEDED FOR CONSTRUCTION ACTIVITIES. CLEARING LIMITS SHALL BE DELINEATED USING A HVF AND GENERALLY MATCH THE ROW AND TCE LIMITS, UNLESS OTHERWISE SHOWN IN SHEETS 7-16.
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7. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.
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9. FOR ROADWAY EXCAVATION INCLUDING HAUL, SEE SHEET 44 AND DETAIL 3 SHEET 17.
10. OVERHEAD COMMUNICATION WIRES WILL BE RAISED APPROX. 20 FT FROM EXISTING GROUND AND SLACK REMOVED.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE PER WSDOT STANDARD PLAN I-10.10/I-30.17.
2. INSTALL STORM DRAIN INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

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1. REMOVAL OF STRUCTURES AND OBSTRUCTIONS
   a. REMOVE EXISTING CONCRETE BARRIER (FULL LENGTH) AT THIS VICINITY.
   b. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
   c. REMOVE BOLLARD.
   d. REMOVE TIMBER LANDSCAPING WALL.
   e. REMOVE AND RELOCATE MAILBOX. SEE SHEET 53 FOR NEW LOCATION.
   f. REMOVE EXISTING FENCE.
   g. REMOVE AND RESET EXISTING FENCE.
   h. REMOVE AND RESET EXISTING LANDSCAPE BLOCKS.
   i. REMOVE EXISTING CONCRETE CURB
   j. REMOVE EXISTING CONCRETE UTILITY VAULT
2. PLUG EXISTING PIPE.
3. TRIM EXISTING PIPE TO LENGTH FOR CONNECTION TO DRAINAGE STRUCTURE. SEE SHEETS 18-27.
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   a. EXISTING CULVERT
   b. EXISTING POWER POLE, RISER, CABINET
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100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERAKIS STATE OF WASHINGTON 23016353 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER03
SHEET 9 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA.SLATALA\ID\MS26566\P_10-210058_TESC.DWG
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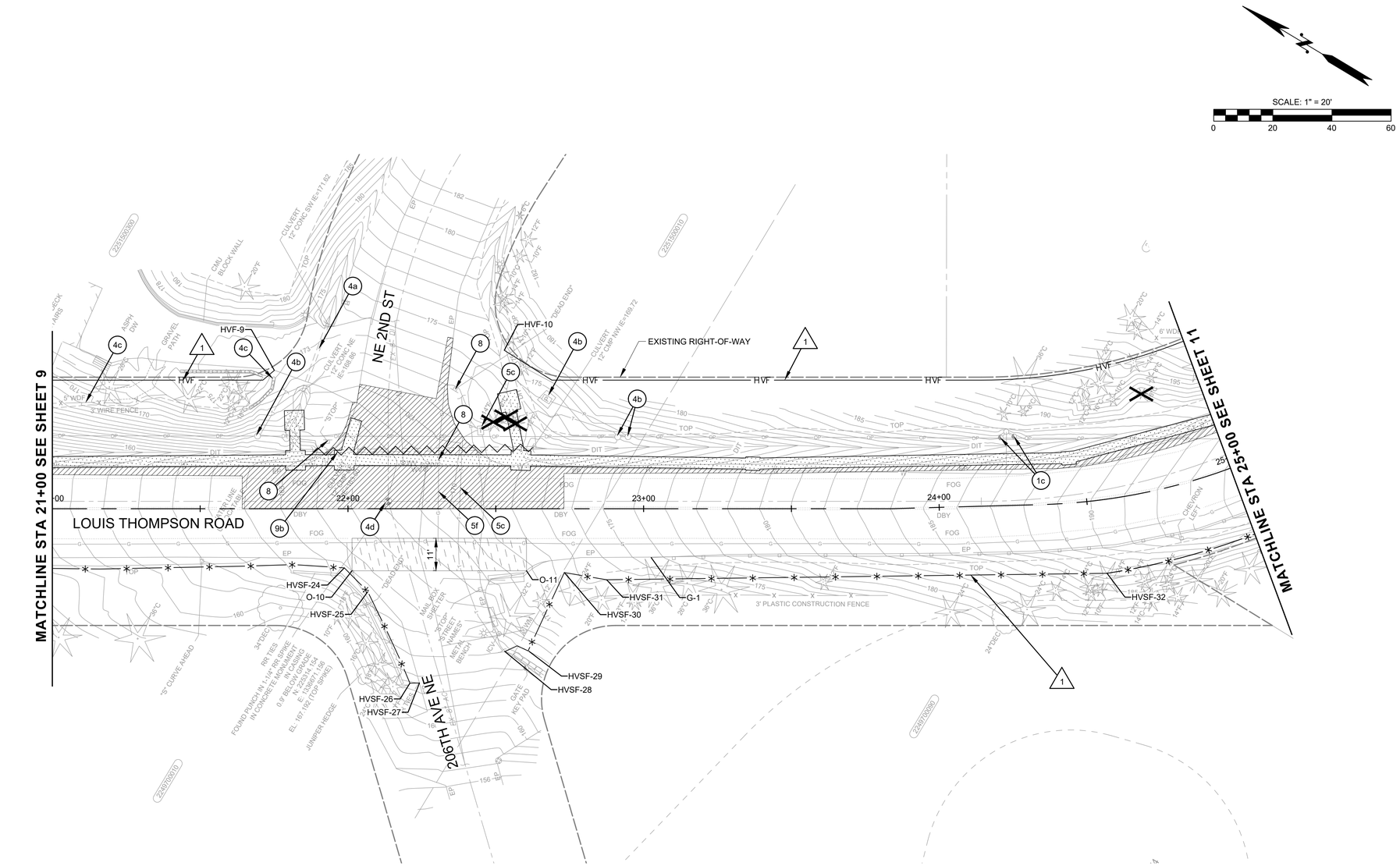

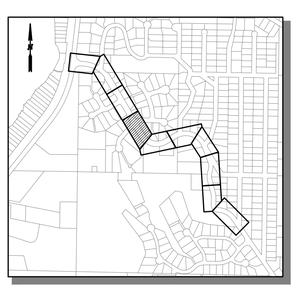

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811 Know what's below. Call before you dig.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERAM — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	MP
DRAWN BY	LT/LO/FJ
CHECKED BY	LR

Osborn Consulting

NO.	DATE	REVISION	BY

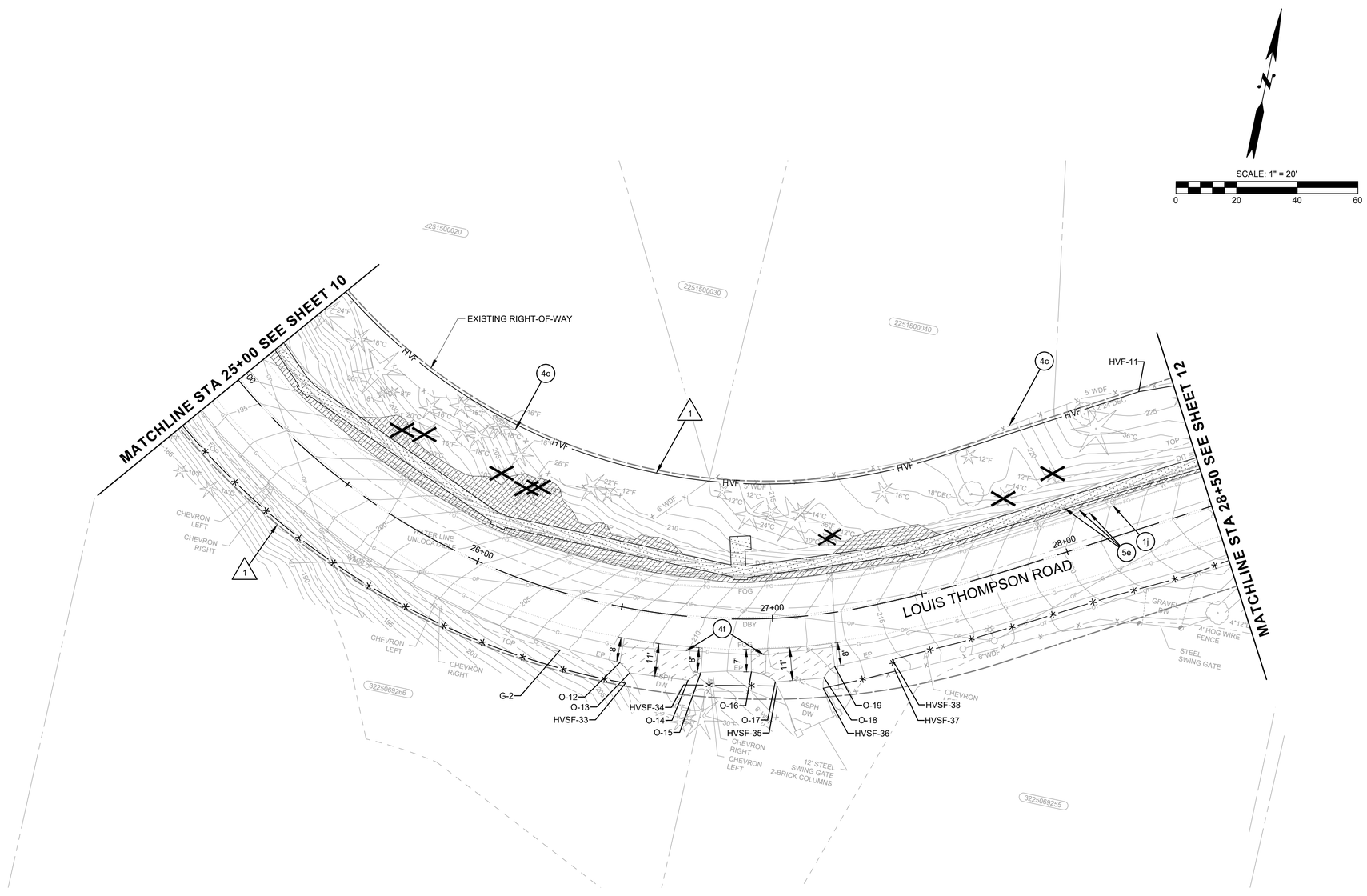
City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER04
SHEET 10 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA.SLATALA\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:32 PM
USER NAME: ALEKSANDRA.SLATALA

SEC. 32, T. 25N, R. 6E, W.M.



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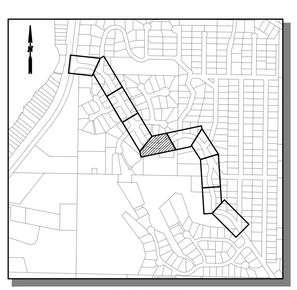

KEY MAP

Potential Monitoring Location

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PEANA — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

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CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER05
SHEET 11 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALA\DMS26566\P_10-210058_TESC.DWG
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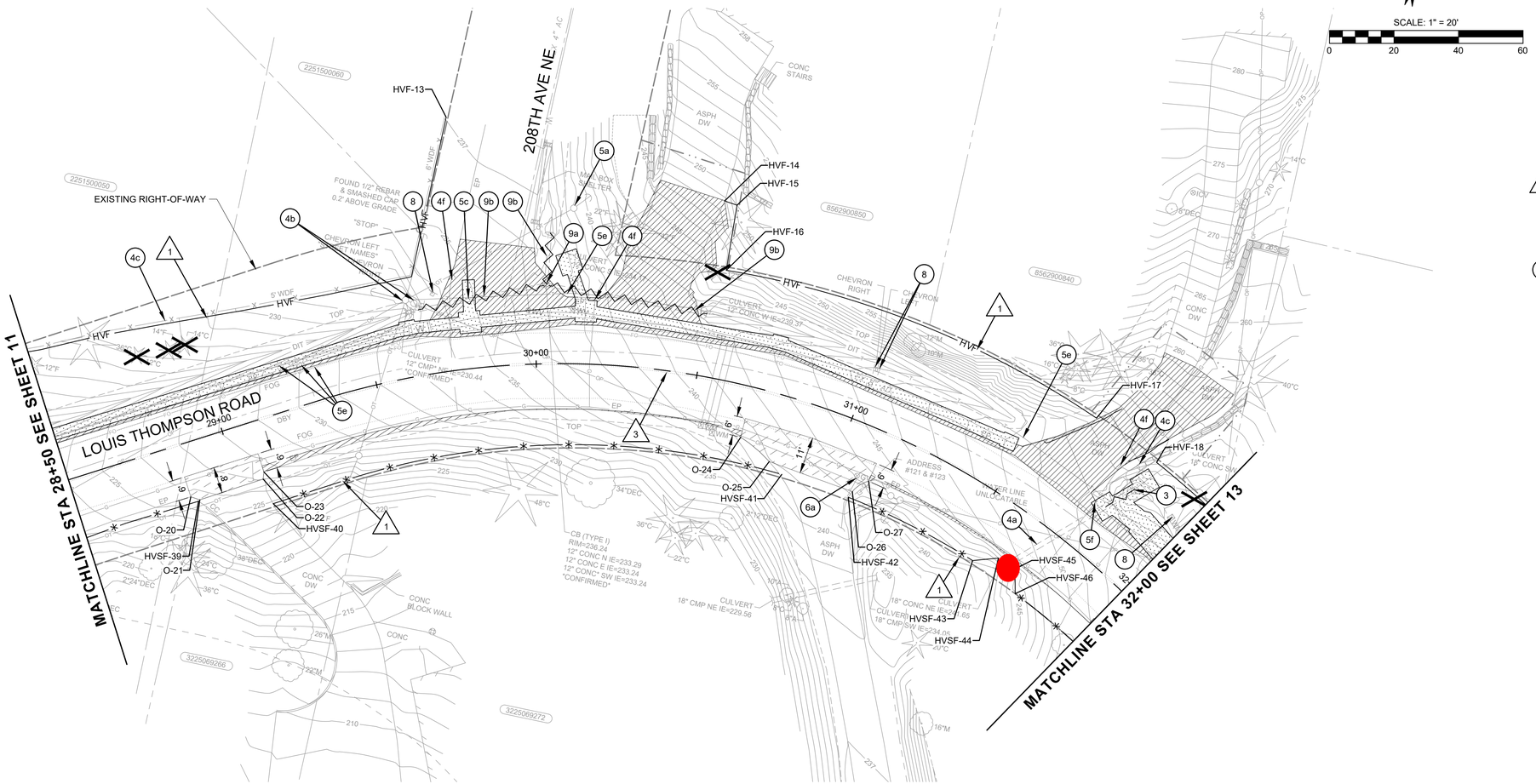

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7. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.
8. SEE APPENDIX X OF PROJECT'S SPECIAL PROVISIONS FOR WORK (SITE PREPARATION AND PROPOSED CONDITION) RELATED TO THE WATER LINE, HYDRANTS, AND METERS/VALVES FROM STA 13+50 TO STA 45+50. THE EXISTING AC WATER MAIN WILL BE ABANDONED IN PLACE WITHIN THESE LIMITS AND ONLY BE REMOVED AT LOCATIONS WHERE IT IS CONFLICTING WITH THE PROPOSED WORK.
9. FOR ROADWAY EXCAVATION INCLUDING HAUL, SEE SHEET 44 AND DETAIL 3 SHEET 17.
10. OVERHEAD COMMUNICATION WIRES WILL BE RAISED APPROX. 20 FT FROM EXISTING GROUND AND SLACK REMOVED.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE PER WSDOT STANDARD PLAN I-10.10/I-30.17.
2. INSTALL STORM DRAIN INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

SITE PREPARATION NOTES:

1. REMOVAL OF STRUCTURES AND OBSTRUCTIONS
   a. REMOVE EXISTING CONCRETE BARRIER (FULL LENGTH) AT THIS VICINITY.
   b. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
   c. REMOVE BOLLARD.
   d. REMOVE TIMBER LANDSCAPING WALL.
   e. REMOVE AND RELOCATE MAILBOX. SEE SHEET 53 FOR NEW LOCATION.
   f. REMOVE EXISTING FENCE.
   g. REMOVE AND RESET EXISTING FENCE.
   h. REMOVE AND RESET EXISTING LANDSCAPE BLOCKS.
   i. REMOVE EXISTING CONCRETE CURB
   j. REMOVE EXISTING CONCRETE UTILITY VAULT
2. PLUG EXISTING PIPE.
3. TRIM EXISTING PIPE TO LENGTH FOR CONNECTION TO DRAINAGE STRUCTURE. SEE SHEETS 18-27.
4. PROTECT IN-PLACE
   a. EXISTING CULVERT
   b. EXISTING POWER POLE, RISER, CABINET
   c. EXISTING FENCE OR RETAINING WALL
   d. EXISTING MONUMENT
   e. EXISTING UNDERGROUND POWER LINE
   f. EXISTING GAS LINE
5. EXISTING UTILITY WORK BY OTHERS
   a. POWER POLE TO BE RELOCATED BY PSE PRIOR TO CONSTRUCTION.
   b. PSE TO DE-ENERGIZE SPAN DURING DETENTION PIPE AND SOLDIER PILE WALL CONSTRUCTION. CONTRACTOR TO COORDINATE WITH PSE FOR TIME FRAME.
   c. COMMUNICATION LINE TO BE RELOCATED BY ZIPLY OR COMCAST DURING CONSTRUCTION.
   d. COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY ZIPLY OR COMCAST PRIOR TO CONSTRUCTION.
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   f. GAS LINE TO BE RELOCATED PRIOR TO CONSTRUCTION.
6. PROTECT AND ADJUST TO FINISH GRADE
   a. EXISTING GAS VALVE
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   c. EXISTING JUNCTION BOXES
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   e. EXISTING CATCH BASIN
7. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS, AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
8. RELOCATE EXISTING SIGN. SEE SHEETS 57-66 FOR PROPOSED LOCATION.
9. REMOVE
   a. EXISTING DRAINAGE STRUCTURE
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LEGEND

- PERMANENT EASEMENT
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- X-## CONTROL POINT, SEE SHEET 17 FOR CONTROL POINT TABLE

Know what's below. Call before you dig.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

KEY MAP

Potential Monitoring Location

MARIA PERRAS — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

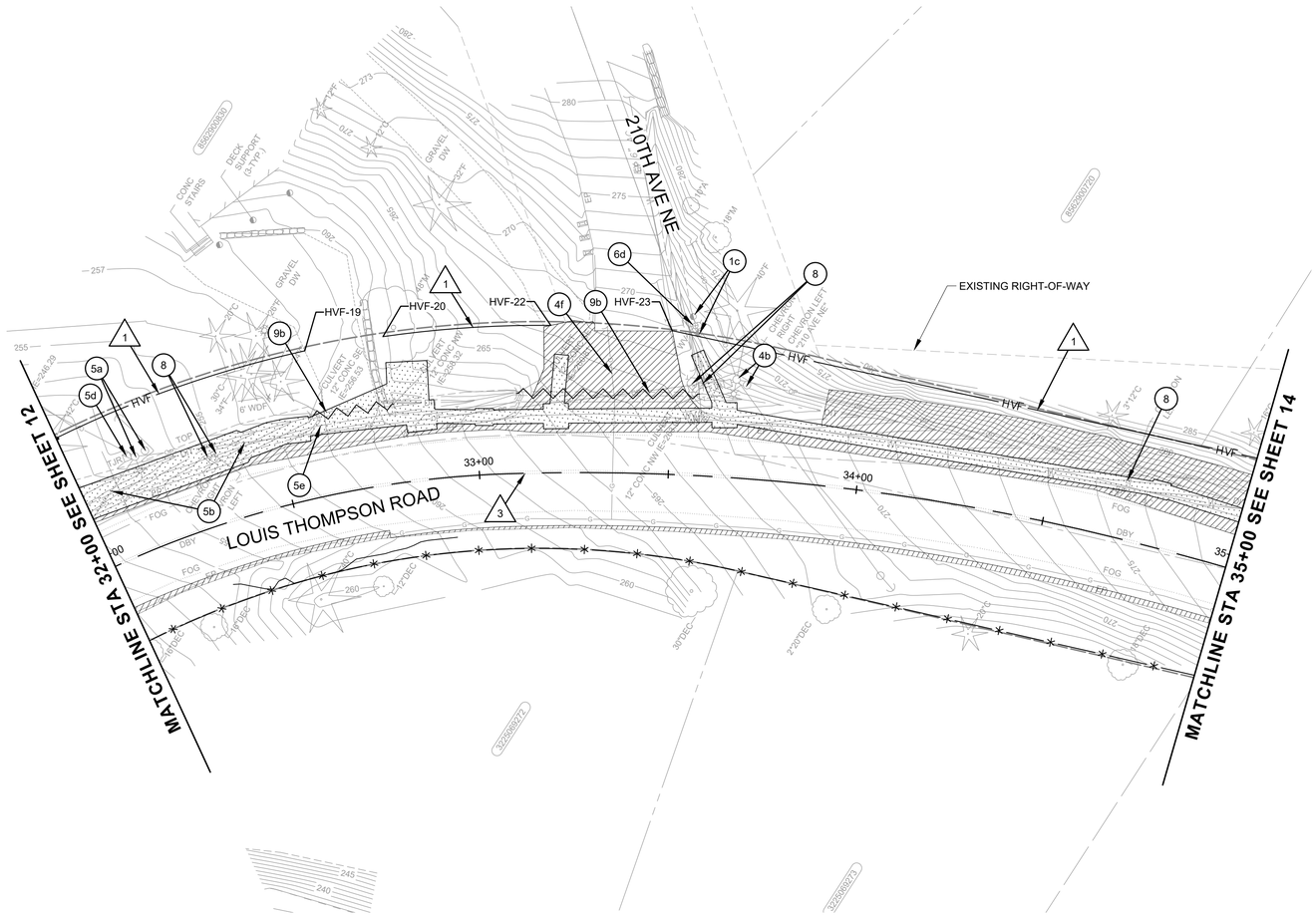
City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER06
SHEET 12 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:32 PM
USER NAME: ALEKSANDRA SLATALA

SEC. 32, T. 25N, R. 6E, W.M.



KEY MAP

Potential Monitoring Location

GENERAL NOTES:

1. LOCATION OF UTILITIES SHOWN ON PLANS ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY ALL UTILITY LOCATIONS WITHIN THE PROJECT LIMITS, INCLUDING SERVICE LINES WITHIN PRIVATE PROPERTIES AND DRIVEWAYS.
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3. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
4. CONTRACTOR TO NOTIFY PROPERTY OWNER(S) TWO (2) WEEKS PRIOR TO CONSTRUCTION, TO COORDINATE DRIVEWAY ACCESS. DRIVEWAY INGRESS/EGRESS MUST BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE AGREED TO BY THE PROPERTY OWNER.
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   a. REMOVE EXISTING CONCRETE BARRIER (FULL LENGTH) AT THIS VICINITY.
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   e. REMOVE AND RELOCATE MAILBOX. SEE SHEET 53 FOR NEW LOCATION.
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100% SUBMITTAL (NOT FOR CONSTRUCTION)

811 Know what's below. Call before you dig.

MARIA PERAKIS — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

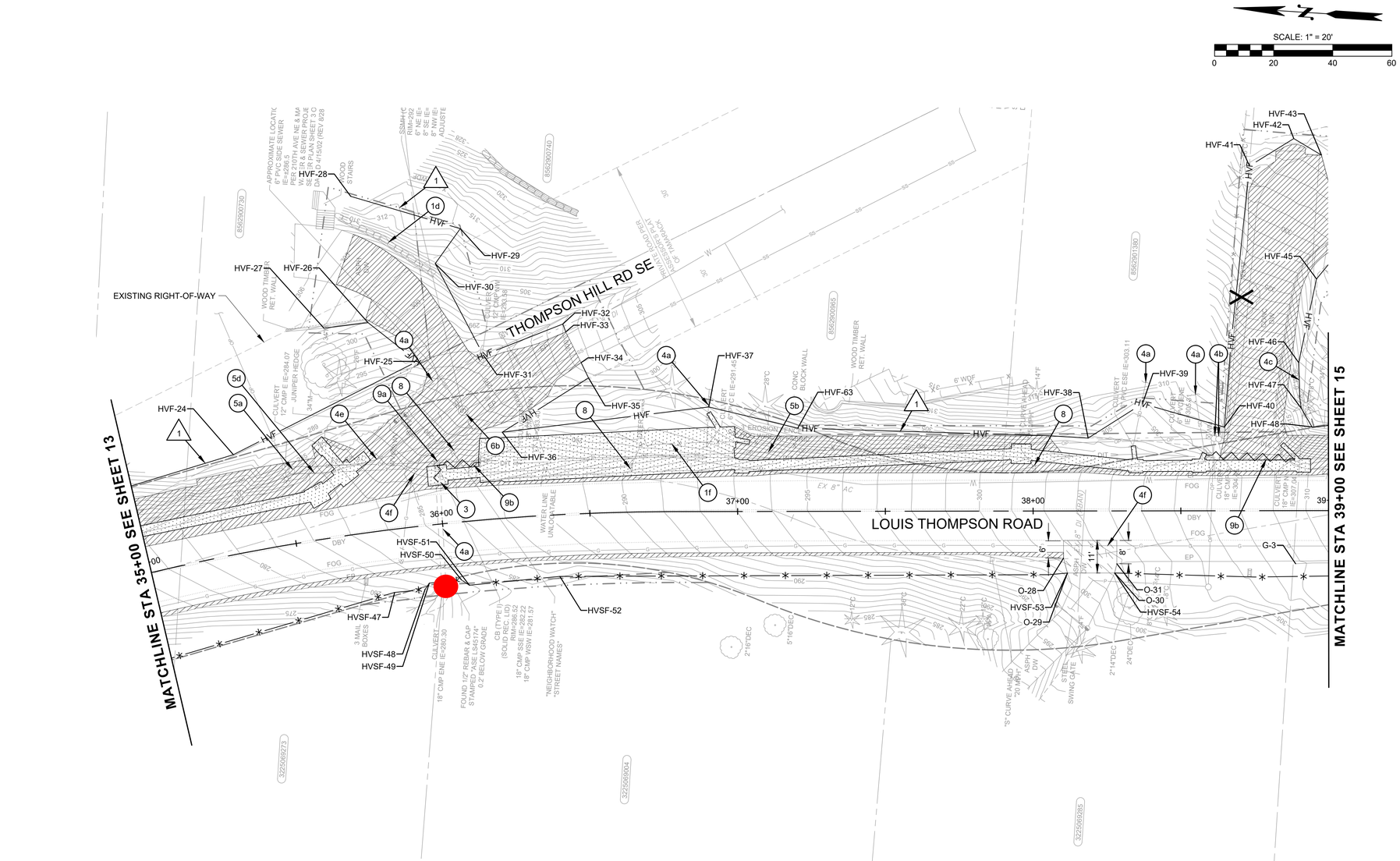
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH

EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER07
SHEET 13 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA SLATALA\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:33 PM
USER NAME: ALEKSANDRA SLATALA

SEC. 32, T. 25N, R. 6E, W.M.



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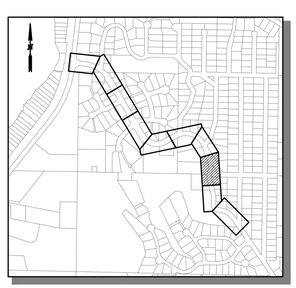
Potential Monitoring Location



KEY MAP

811 Know what's below. Call before you dig.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERAM — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER08
SHEET 14 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA.SLATALA\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:33 PM
USER NAME: ALEKSANDRA.SLATALA

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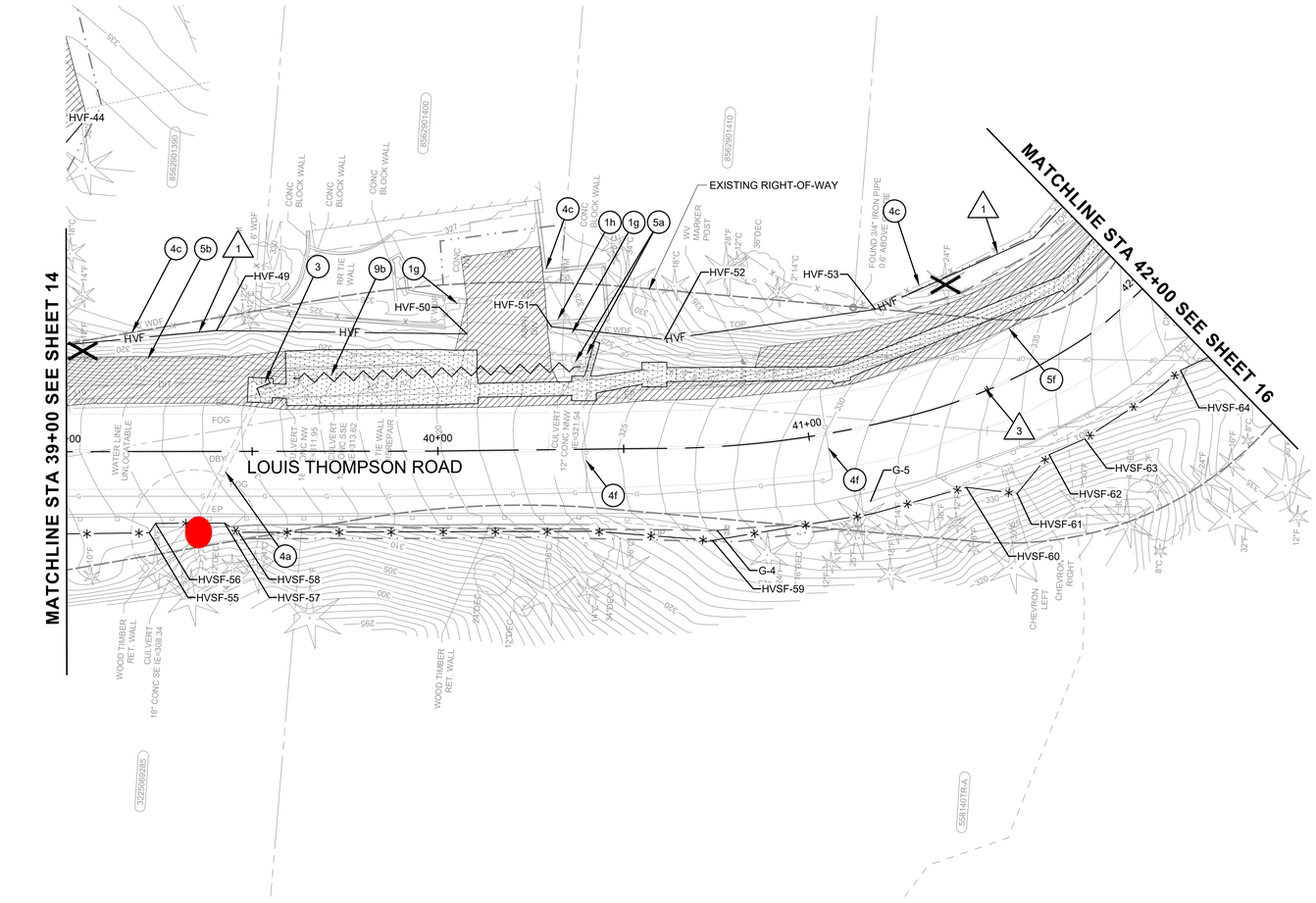

SCALE: 1" = 20'

0 20 40 60

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MARIA PEAKE — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

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DESIGNED BY	DRAWN BY	CHECKED BY
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Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

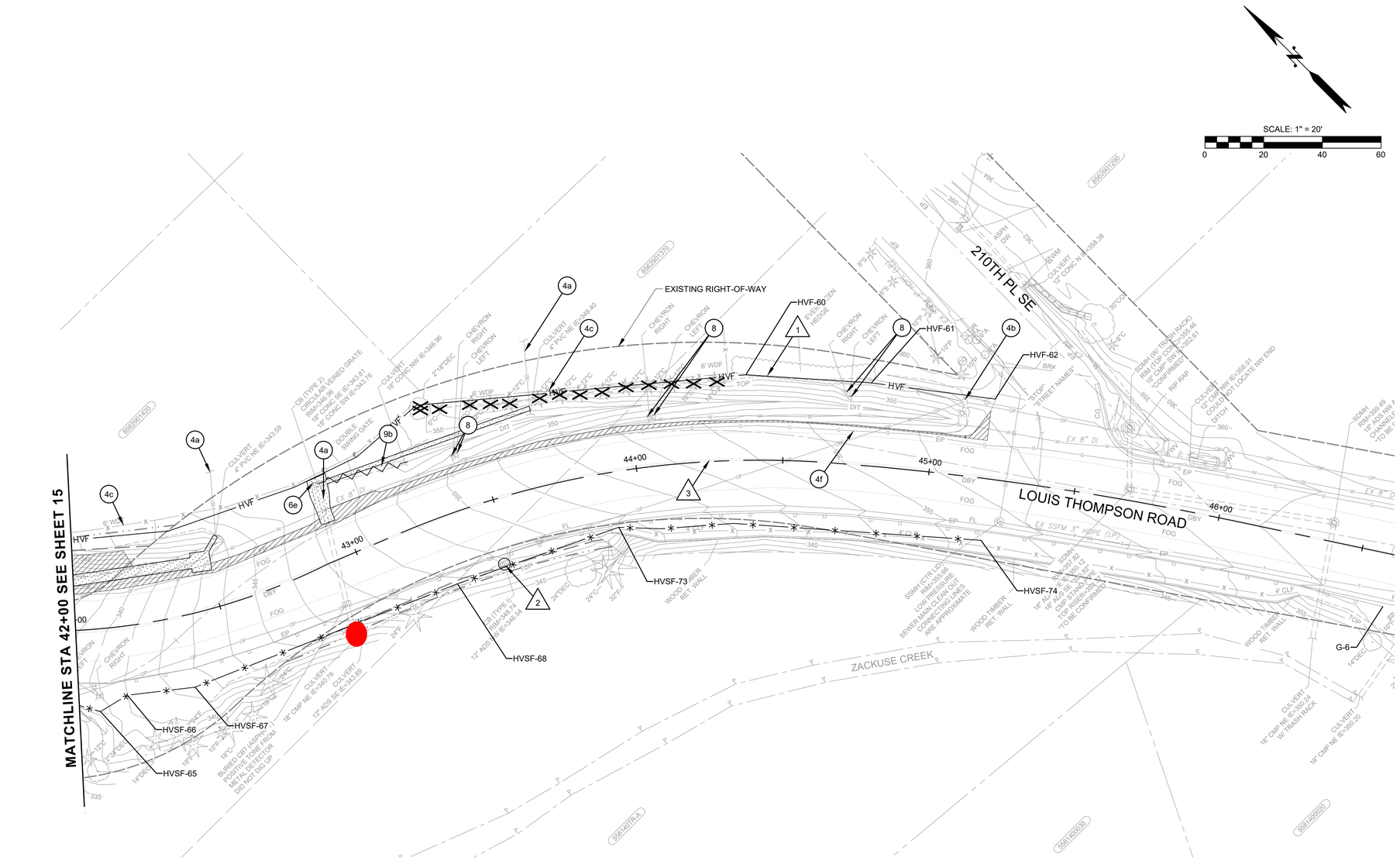
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH

EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
SCALE: H: 1"=20' V: N/A
DATE: 01/29/2024
ER09
SHEET 15 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\ADMS265669P_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:33 PM
USER NAME: ALEKSANDRA SLATALA

SEC. 32, T. 25N, R. 6E, W.M.



KEY MAP

Potential Monitoring Location

GENERAL NOTES:

1. LOCATION OF UTILITIES SHOWN ON PLANS ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY ALL UTILITY LOCATIONS WITHIN THE PROJECT LIMITS, INCLUDING SERVICE LINES WITHIN PRIVATE PROPERTIES AND DRIVEWAYS.
2. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
3. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
4. CONTRACTOR TO NOTIFY PROPERTY OWNER(S) TWO (2) WEEKS PRIOR TO CONSTRUCTION, TO COORDINATE DRIVEWAY ACCESS. DRIVEWAY INGRESS/EGRESS MUST BE MAINTAINED AT ALL TIMES UNLESS OTHERWISE AGREED TO BY THE PROPERTY OWNER.
5. DISTURBANCE AND CLEARING LIMITS SHALL BE MINIMIZED TO THE AREA NECESSARY FOR INSTALLATION OF TEMPORARY AND PERMANENT ELEMENTS. ONLY REMOVE THE MINIMUM VEGETATION NEEDED FOR CONSTRUCTION ACTIVITIES. CLEARING LIMITS SHALL BE DELINEATED USING A HVF AND GENERALLY MATCH THE ROW AND TCE LIMITS, UNLESS OTHERWISE SHOWN IN SHEETS 7-16.
6. PROTECT EXISTING TREE WITHIN THE WORK AREA, UNLESS SHOWN AS TO BE REMOVED IN SHEETS 7-16 AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 17 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
7. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.
8. SEE APPENDIX X OF PROJECT'S SPECIAL PROVISIONS FOR WORK (SITE PREPARATION AND PROPOSED CONDITION) RELATED TO THE WATER LINE, HYDRANTS, AND METERS/VALVES FROM STA 13+50 TO STA 45+50. THE EXISTING AC WATER MAIN WILL BE ABANDONED IN PLACE WITHIN THESE LIMITS AND ONLY BE REMOVED AT LOCATIONS WHERE IT IS CONFLICTING WITH THE PROPOSED WORK.
9. FOR ROADWAY EXCAVATION INCLUDING HAUL, SEE SHEET 44 AND DETAIL 3 SHEET 17.
10. OVERHEAD COMMUNICATION WIRES WILL BE RAISED APPROX. 20 FT FROM EXISTING GROUND AND SLACK REMOVED.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE PER WSDOT STANDARD PLAN I-10.10/I-30.17.
2. INSTALL STORM DRAIN INLET PROTECTION PER WSDOT STANDARD PLAN I-40.20.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

SITE PREPARATION NOTES:

1. REMOVAL OF STRUCTURES AND OBSTRUCTIONS
   a. REMOVE EXISTING CONCRETE BARRIER (FULL LENGTH) AT THIS VICINITY.
   b. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
   c. REMOVE BOLLARD.
   d. REMOVE TIMBER LANDSCAPING WALL.
   e. REMOVE AND RELOCATE MAILBOX. SEE SHEET 53 FOR NEW LOCATION.
   f. REMOVE EXISTING FENCE.
   g. REMOVE AND RESET EXISTING FENCE.
   h. REMOVE AND RESET EXISTING LANDSCAPE BLOCKS.
   i. REMOVE EXISTING CONCRETE CURB
   j. REMOVE EXISTING CONCRETE UTILITY VAULT
2. PLUG EXISTING PIPE.
3. TRIM EXISTING PIPE TO LENGTH FOR CONNECTION TO DRAINAGE STRUCTURE. SEE SHEETS 18-27.
4. PROTECT IN-PLACE
   a. EXISTING CULVERT
   b. EXISTING POWER POLE, RISER, CABINET
   c. EXISTING FENCE OR RETAINING WALL
   d. EXISTING MONUMENT
   e. EXISTING UNDERGROUND POWER LINE
   f. EXISTING GAS LINE
5. EXISTING UTILITY WORK BY OTHERS
   a. POWER POLE TO BE RELOCATED BY PSE PRIOR TO CONSTRUCTION.
   b. PSE TO DE-ENERGIZE SPAN DURING DETENTION PIPE AND SOLDIER PILE WALL CONSTRUCTION. CONTRACTOR TO COORDINATE WITH PSE FOR TIME FRAME.
   c. COMMUNICATION LINE TO BE RELOCATED BY ZIPLY OR COMCAST DURING CONSTRUCTION.
   d. COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY ZIPLY OR COMCAST PRIOR TO CONSTRUCTION.
   e. EXISTING COMMUNICATION LINE TO BE ABANDONED IN PLACE.
   f. GAS LINE TO BE RELOCATED PRIOR TO CONSTRUCTION.
6. PROTECT AND ADJUST TO FINISH GRADE
   a. EXISTING GAS VALVE
   b. EXISTING SEWER MANHOLE
   c. EXISTING JUNCTION BOXES
   d. EXISTING WATER VALVE/WATER VALVE MARKERS
   e. EXISTING CATCH BASIN
7. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS, AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
8. RELOCATE EXISTING SIGN. SEE SHEETS 57-66 FOR PROPOSED LOCATION.
9. REMOVE
   a. EXISTING DRAINAGE STRUCTURE
   b. EXISTING CULVERT OR STORM DRAIN

LEGEND

- PERMANENT EASEMENT
- TEMPORARY EASEMENT
- REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
- HVF — HIGH VISIBILITY FENCE
- HIGH VISIBILITY SILT FENCE
- REMOVE CURB
- STRUCTURE EXCAVATION CLASS B INCLUDING HAUL
- ROADWAY EXCAVATION INCLUDING HAUL
- PLANE PRIOR TO OVERLAY. CONTRACT TO FIELD VERIFY PLANING DEPTH.
- REMOVE TREE
- INLET PROTECTION
- X-## CONTROL POINT, SEE SHEET 17 FOR CONTROL POINT TABLE

Know what's below. Call before you dig.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERAM — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: N/A
ER10
SHEET 16 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA.SLATALA\DMS26566IP_10-210058_TESC.DWG
PLOT TIME: 1/24/2024 2:33 PM
USER NAME: ALEKSANDRA.SLATALA

APPENDIX B – CORRESPONDENCE

(Not Used)

APPENDIX C – SITE INSPECTION FORM

Construction Stormwater Site Inspection Form

Project Name _____ Permit # _____ Inspection Date _____ Time _____

Name of Certified Erosion Sediment Control Lead (CESCL) or qualified inspector if *less than one acre*
Print Name: _____

Approximate rainfall amount since the last inspection (in inches): _____

Approximate rainfall amount in the last 24 hours (in inches): _____

Current Weather Clear ☐ Cloudy ☐ Mist ☐ Rain ☐ Wind ☐ Fog ☐

A. Type of inspection: Weekly ☐ Post Storm Event ☐ Other ☐

B. Phase of Active Construction (*check all that apply*):

Pre Construction/installation of erosion/sediment controls	☐	Clearing/Demo/Grading	☐	Infrastructure/storm/roads	☐
Concrete pours	☐	Vertical Construction/buildings	☐	Utilities	☐
Offsite improvements	☐	Site temporary stabilized	☐	Final stabilization	☐

C. Questions:

1. Were all areas of construction and discharge points inspected? Yes ___ No ___
2. Did you observe the presence of suspended sediment, turbidity, discoloration, or oil sheen Yes ___ No ___
3. Was a water quality sample taken during inspection? (*refer to permit conditions S4 & S5*) Yes ___ No ___
4. Was there a turbid discharge 250 NTU or greater, or Transparency 6 cm or less?* Yes ___ No ___
5. If yes to #4 was it reported to Ecology? Yes ___ No ___
6. Is pH sampling required? pH range required is 6.5 to 8.5. Yes ___ No ___

If answering yes to a discharge, describe the event. Include when, where, and why it happened; what action was taken, and when.

_____

_____

_____

_____

*If answering yes to # 4 record NTU/Transparency with continual sampling daily until turbidity is 25 NTU or less/ transparency is 33 cm or greater.

Sampling Results: Date: _____

Parameter	Method (circle one)	Result			Other/Note
		NTU	cm	pH	
Turbidity	tube, meter, laboratory				
pH	Paper, kit, meter				

Construction Stormwater Site Inspection Form

D. Check the observed status of all items. Provide "Action Required "details and dates.

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
1 Clearing Limits	Before beginning land disturbing activities are all clearing limits, natural resource areas (streams, wetlands, buffers, trees) protected with barriers or similar BMPs? (high visibility recommended)						
2 Construction Access	Construction access is stabilized with quarry spalls or equivalent BMP to prevent sediment from being tracked onto roads?						
	Sediment tracked onto the road way was cleaned thoroughly at the end of the day or more frequent as necessary.						
3 Control Flow Rates	Are flow control measures installed to control stormwater volumes and velocity during construction and do they protect downstream properties and waterways from erosion?						
	If permanent infiltration ponds are used for flow control during construction, are they protected from siltation?						
4 Sediment Controls	All perimeter sediment controls (e.g. silt fence, wattles, compost socks, berms, etc.) installed, and maintained in accordance with the Stormwater Pollution Prevention Plan (SWPPP).						
	Sediment control BMPs (sediment ponds, traps, filters etc.) have been constructed and functional as the first step of grading.						
	Stormwater runoff from disturbed areas is directed to sediment removal BMP.						
5 Stabilize Soils	Have exposed un-worked soils been stabilized with effective BMP to prevent erosion and sediment deposition?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
5 Stabilize Soils Cont.	Are stockpiles stabilized from erosion, protected with sediment trapping measures and located away from drain inlet, waterways, and drainage channels?						
	Have soils been stabilized at the end of the shift, before a holiday or weekend if needed based on the weather forecast?						
6 Protect Slopes	Has stormwater and ground water been diverted away from slopes and disturbed areas with interceptor dikes, pipes and or swales?						
	Is off-site storm water managed separately from stormwater generated on the site?						
	Is excavated material placed on uphill side of trenches consistent with safety and space considerations?						
	Have check dams been placed at regular intervals within constructed channels that are cut down a slope?						
7 Drain Inlets	Storm drain inlets made operable during construction are protected.						
	Are existing storm drains within the influence of the project protected?						
8 Stabilize Channel and Outlets	Have all on-site conveyance channels been designed, constructed and stabilized to prevent erosion from expected peak flows?						
	Is stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream conveyance systems?						
9 Control Pollutants	Are waste materials and demolition debris handled and disposed of to prevent contamination of stormwater?						
	Has cover been provided for all chemicals, liquid products, petroleum products, and other material?						
	Has secondary containment been provided capable of containing 110% of the volume?						
	Were contaminated surfaces cleaned immediately after a spill incident?						
	Were BMPs used to prevent contamination of stormwater by a pH modifying sources?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
9 Cont.	Wheel wash wastewater is handled and disposed of properly.						
10 Control Dewatering	Concrete washout in designated areas. No washout or excess concrete on the ground.						
	Dewatering has been done to an approved source and in compliance with the SWPPP.						
	Were there any clean non turbid dewatering discharges?						
11 Maintain BMP	Are all temporary and permanent erosion and sediment control BMPs maintained to perform as intended?						
12 Manage the Project	Has the project been phased to the maximum degree practicable?						
	Has regular inspection, monitoring and maintenance been performed as required by the permit?						
	Has the SWPPP been updated, implemented and records maintained?						
13 Protect LID	Is all Bioretention and Rain Garden Facilities protected from sedimentation with appropriate BMPs?						
	Is the Bioretention and Rain Garden protected against over compaction of construction equipment and foot traffic to retain its infiltration capabilities?						
	Permeable pavements are clean and free of sediment and sediment laden-water runoff. Muddy construction equipment has not been on the base material or pavement.						
	Have soiled permeable pavements been cleaned of sediments and pass infiltration test as required by stormwater manual methodology?						
	Heavy equipment has been kept off existing soils under LID facilities to retain infiltration rate.						

E. Check all areas that have been inspected. ✔

All in place BMPs ☐ All disturbed soils ☐ All concrete wash out area ☐ All material storage areas ☐
All discharge locations ☐ All equipment storage areas ☐ All construction entrances/exits ☐

F. Elements checked "Action Required" (section D) describe corrective action to be taken. List the element number; be specific on location and work needed. Document, initial, and date when the corrective action has been completed and inspected.

Element #	Description and Location	Action Required	Completion Date	Initials

Attach additional page if needed

Sign the following certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"

Inspected by: (print) _____ (Signature) _____ Date: _____

Title/Qualification of Inspector: _____

APPENDIX D – CONSTRUCTION STORMWATER GENERAL PERMIT (CSWGP)

(To Be Included Once the Project Permit is Available)

APPENDIX E – CONTAMINATED SITE INFORMATION

(Not Used)

APPENDIX F – ENGINEERING CALCULATIONS

Project: City of Sammamish Louis Thompson Tightline
OCI Project #: 10-210058
Calculation: Construction Stormwater Volume and Flow Rates

Disturbed Area	10 YEAR DESIGN STORM				
	Construction Work Zone Area (acres)	Peak Flow Rates from MGSFlood (cfs)	Predicted Runoff Volume from SBUH (cu. ft)*	Flow rate based on Volume (gpm)	Required Number of Baker Tanks Based on Predicted Runoff Volume from SBUH*
	Impervious	10-year, 15-min	10-year, 24-hr	10-year, 24-hr	
Zone 1	0.21	0.13	2,126	11	1 Medium
Zone 2	0.18	0.11	1,790	9	1 Medium
Zone 3	0.27	0.17	2,664	14	1 Large
Zone 4	0.49	0.30	4,936	26	1 Large and 1 Medium
Zone 5	0.41	0.25	4,135	22	1 Large and 1 Small
Zone 6	0.25	0.15	2,470	13	1 Medium

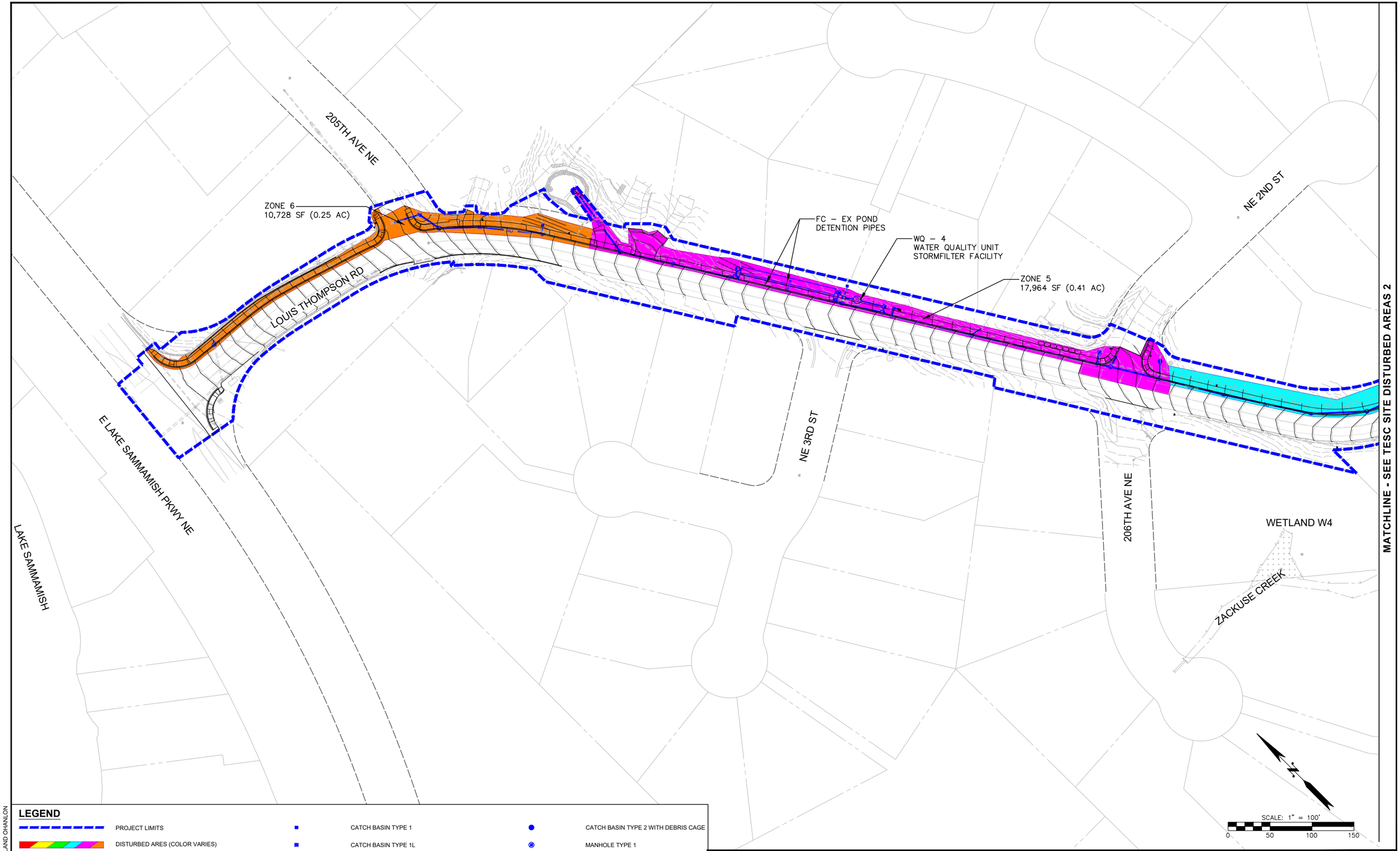
*As an alternative, 50% of the volume generated from SBUH could be considered as the required storage for untreated stormwater (WSDOT TESC Manual - Appendix C: CESF bypass system).

Baker Tank Capacity (Typ.)					
Size	Capacity (gallons)	Capacity (cu.ft)	Length (ft)	Width (ft)	Height (ft)
Small	10,000	1,336	25	8	9
Medium	18,100	2,420	43	8	10.5
Large	21,000	2,807	43	8	12

Project: City of Sammamish Louis Thompson Tightline
OCI Project #: 10-210058
Calculation: Proposed Detention Tank Volumes

Notes:
The storage capacities of the proposed detention tanks are listed below. These detention tanks may be used by the Contrator for temporary settling of construction stormwater once constructed provided they are cleaned prior to the end of consturction.

Proposed Detention Tank Volumes					Disturbed Area Zone
Proposed Detention Tank	# of Pipes	Lengths (FT)	Diameter (FT)	Total Volume (CF)	
FC - Culvert 2	2	35	3.5	674	1
FC - Culvert 3	2	70	4	1,760	2
FC - Culvert 4	1	60	5	1,179	3
FC - To Pond	2	115	6	6,504	4,5



LEGEND

- PROJECT LIMITS
- DISTURBED ARES (COLOR VARIES)
- SD STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

TESC SITE DISTURBED AREAS FIGURE

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 1 OF 2

FILE NAME: C:\PW_OCL\WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS33523\SITE DIS FIGURE.DWG
PLOT TIME: 1/9/2024 7:58 AM
USER NAME: LELAND OHANLON

208TH AVE NE

210TH AVE NE

E MAIN ST

210TH PL SE

THOMPSON HILL RD SE

ZONE 3
11,571 SF (0.27 AC)

WQ – 3
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 4

FC – CULVERT 4
DETENTION PIPE

CULVERT 3

FC – CULVERT 3
DETENTION PIPE

ZONE 4
21,442 SF (0.49 AC)

ZONE 2
7,776 SF (0.18 AC)

WQ – 2
WATER QUALITY UNIT
STORMFILTER FACILITY

CULVERT 2

FC – CULVERT 2
DETENTION PIPE

WQ – 1
WATER QUALITY UNIT
STORMFILTER FACILITY

ZONE 1
9,237 SF (0.21 AC)

WETLAND W5

ZACKUSE CREEK

ZACKUSE CREEK

ZACKUSE CREEK

MATCHLINE - SEE TESC SITE DISTURBED AREAS 1

SCALE: 1" = 100'

0 50 100 150

LEGEND

- PROJECT LIMITS
- DISTURBED ARES (COLOR VARIES)
- SD — STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY

Osborn Consulting

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

TESC SITE DISTURBED AREAS FIGURE

JOB# / DWG	DATE
10-210058	JAN 2024
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 2 OF 2

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS33523\SITE DIS FIGURE.DWG
PLOT TIME: 1/9/2024 7:58 AM
USER NAME: LELAND OHANLON

Project: City of Sammamish Louis Thompson Tightline
Compute: 10-YR Stormwater Runoff Volume for the Construction Work Zone 1 (SBUH Hydrograph)
Construction Work Area : 0.21 acres

INPUT

Given:

Total Project Area		
A_t=	9,237	ft^2
P_t=	3	inches
d_t=	10	min
T_c=	5	min
w=	0.5	

Pervious Area[1]		Impervious Area[1]		Units
A_p=	0	A_i=	9,237	ft^2
CN_p=	89	CN_i=	98	
S_p=	1.236	S_i=	0.204	inches
$0.2S_p$=	0.247	$0.2S_i$=	0.041	inches

1) Assume all area within the construction work zone area is impervious

Time			Rainfall			Pevious Area		Impervious Area		Total Runoff/Hydrographs		
Time Step No. #	Time (hr)	Time (min)	Rainfall Distri-bution (% of Pt)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Total Project Runoff (inches)	Instant Hydrograph (cfs)	Design Hydrograph (cfs)
0	0.00	0	0.00	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	6	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.20	12	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.30	18	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.40	24	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.50	30	0.20	0.00600	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.60	36	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.70	42	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.80	48	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.90	54	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	60	0.20	0.00600	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.10	66	0.30	0.00900	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.20	72	0.30	0.00900	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	1.30	78	0.30	0.00900	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.00
14	1.40	84	0.30	0.00900	0.10	0.00	0.00	0.01	0.00	0.00	0.00	0.00
15	1.50	90	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.00	0.00
16	1.60	96	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.00
17	1.70	102	0.30	0.00900	0.12	0.00	0.00	0.02	0.00	0.00	0.01	0.01
18	1.80	108	0.30	0.00900	0.13	0.00	0.00	0.03	0.00	0.00	0.01	0.01
19	1.90	114	0.30	0.00900	0.14	0.00	0.00	0.03	0.00	0.00	0.01	0.01
20	2.00	120	0.30	0.00900	0.15	0.00	0.00	0.04	0.01	0.01	0.01	0.01
21	2.10	126	0.30	0.00900	0.16	0.00	0.00	0.04	0.01	0.01	0.01	0.01
22	2.20	132	0.30	0.00900	0.17	0.00	0.00	0.05	0.01	0.01	0.01	0.01
23	2.30	138	0.40	0.01200	0.18	0.00	0.00	0.06	0.01	0.01	0.01	0.01
24	2.40	144	0.30	0.00900	0.19	0.00	0.00	0.06	0.01	0.01	0.01	0.01
25	2.50	150	0.30	0.00900	0.20	0.00	0.00	0.07	0.01	0.01	0.01	0.01
26	2.60	156	0.30	0.00900	0.21	0.00	0.00	0.07	0.01	0.01	0.01	0.01
27	2.70	162	0.30	0.00900	0.22	0.00	0.00	0.08	0.01	0.01	0.01	0.01
28	2.80	168	0.40	0.01200	0.23	0.00	0.00	0.09	0.01	0.01	0.01	0.01
29	2.90	174	0.30	0.00900	0.24	0.00	0.00	0.10	0.01	0.01	0.01	0.01
30	3.00	180	0.30	0.00900	0.25	0.00	0.00	0.10	0.01	0.01	0.01	0.01
31	3.10	186	0.30	0.00900	0.26	0.00	0.00	0.11	0.01	0.01	0.01	0.01
32	3.20	192	0.30	0.00900	0.26	0.00	0.00	0.12	0.01	0.01	0.01	0.01
33	3.30	198	0.30	0.00900	0.27	0.00	0.00	0.12	0.01	0.01	0.01	0.01
34	3.40	204	0.30	0.00900	0.28	0.00	0.00	0.13	0.01	0.01	0.01	0.01
35	3.50	210	0.30	0.00900	0.29	0.00	0.00	0.14	0.01	0.01	0.01	0.01
36	3.60	216	0.30	0.00900	0.30	0.00	0.00	0.15	0.01	0.01	0.01	0.01
37	3.70	222	0.40	0.01200	0.31	0.00	0.00	0.15	0.01	0.01	0.01	0.01
38	3.80	228	0.40	0.01200	0.32	0.00	0.00	0.16	0.01	0.01	0.01	0.01
39	3.90	234	0.30	0.00900	0.33	0.01	0.00	0.17	0.01	0.01	0.01	0.01
40	4.00	240	0.40	0.01200	0.35	0.01	0.00	0.18	0.01	0.01	0.01	0.01
41	4.10	246	0.40	0.01200	0.36	0.01	0.00	0.19	0.01	0.01	0.01	0.01
42	4.20	252	0.30	0.00900	0.37	0.01	0.00	0.20	0.01	0.01	0.01	0.01
43	4.30	258	0.40	0.01200	0.38	0.01	0.00	0.21	0.01	0.01	0.01	0.01
44	4.40	264	0.40	0.01200	0.39	0.01	0.00	0.22	0.01	0.01	0.01	0.01
45	4.50	270	0.40	0.01200	0.40	0.02	0.00	0.23	0.01	0.01	0.01	0.01
46	4.60	276	0.40	0.01200	0.41	0.02	0.00	0.24	0.01	0.01	0.01	0.01
47	4.70	282	0.40	0.01200	0.43	0.02	0.00	0.25	0.01	0.01	0.01	0.01
48	4.80	288	0.40	0.01200	0.44	0.03	0.00	0.26	0.01	0.01	0.01	0.01
49	4.90	294	0.50	0.01500	0.45	0.03	0.00	0.28	0.01	0.01	0.02	0.02
50	5.00	300	0.40	0.01200	0.47	0.03	0.00	0.29	0.01	0.01	0.01	0.02
51	5.10	306	0.50	0.01500	0.48	0.04	0.00	0.30	0.01	0.01	0.02	0.02
52	5.20	312	0.40	0.01200	0.49	0.04	0.00	0.31	0.01	0.01	0.01	0.02
53	5.30	318	0.50	0.01500	0.51	0.05	0.00	0.32	0.01	0.01	0.02	0.02
54	5.40	324	0.50	0.01500	0.52	0.05	0.00	0.34	0.01	0.01	0.02	0.02
55	5.50	330	0.50	0.01500	0.54	0.06	0.01	0.35	0.01	0.01	0.02	0.02
56	5.60	336	0.50	0.01500	0.55	0.06	0.01	0.37	0.01	0.01	0.02	0.02
57	5.70	342	0.50	0.01500	0.57	0.07	0.01	0.38	0.01	0.01	0.02	0.02
58	5.80	348	0.50	0.01500	0.58	0.07	0.01	0.39	0.01	0.01	0.02	0.02
59	5.90	354	0.50	0.01500	0.60	0.08	0.01	0.41	0.01	0.01	0.02	0.02
60	6.00	360	0.60	0.01800	0.62	0.08	0.01	0.42	0.02	0.02	0.02	0.02
61	6.10	366	0.60	0.01800	0.63	0.09	0.01	0.44	0.02	0.02	0.02	0.02
62	6.20	372	0.60	0.01800	0.65	0.10	0.01	0.46	0.02	0.02	0.02	0.02
63	6.30	378	0.60	0.01800	0.67	0.11	0.01	0.47	0.02	0.02	0.02	0.02
64	6.40	384	0.70	0.02100	0.69	0.12	0.01	0.49	0.02	0.02	0.03	0.02

65	6.50	390	0.60	0.01800	0.71	0.13	0.01	0.51	0.02	0.02	0.02	0.02
66	6.60	396	0.60	0.01800	0.73	0.13	0.01	0.53	0.02	0.02	0.02	0.02
67	6.70	402	0.60	0.01800	0.74	0.14	0.01	0.55	0.02	0.02	0.02	0.02
68	6.80	408	0.60	0.01800	0.76	0.15	0.01	0.56	0.02	0.02	0.02	0.02
69	6.90	414	0.60	0.01800	0.78	0.16	0.01	0.58	0.02	0.02	0.02	0.02
70	7.00	420	0.70	0.02100	0.80	0.17	0.01	0.60	0.02	0.02	0.03	0.02
71	7.10	426	0.70	0.02100	0.82	0.18	0.01	0.62	0.02	0.02	0.03	0.03
72	7.20	432	0.80	0.02400	0.85	0.20	0.01	0.64	0.02	0.02	0.03	0.03
73	7.30	438	0.80	0.02400	0.87	0.21	0.01	0.67	0.02	0.02	0.03	0.03
74	7.40	444	0.90	0.02700	0.90	0.22	0.02	0.69	0.03	0.03	0.03	0.03
75	7.50	450	1.00	0.03000	0.93	0.24	0.02	0.72	0.03	0.03	0.04	0.04
76	7.60	456	2.10	0.06300	0.99	0.28	0.04	0.78	0.06	0.06	0.08	0.06
77	7.70	462	2.40	0.07200	1.06	0.32	0.04	0.85	0.07	0.07	0.09	0.08
78	7.80	468	2.40	0.07200	1.13	0.37	0.05	0.92	0.07	0.07	0.09	0.09
79	7.90	474	2.40	0.07200	1.21	0.42	0.05	0.99	0.07	0.07	0.09	0.09
80	8.00	480	2.20	0.06600	1.27	0.46	0.05	1.06	0.06	0.06	0.08	0.09
81	8.10	486	1.40	0.04200	1.31	0.49	0.03	1.10	0.04	0.04	0.05	0.07
82	8.20	492	1.30	0.03900	1.35	0.52	0.03	1.14	0.04	0.04	0.05	0.05
83	8.30	498	1.00	0.03000	1.38	0.54	0.02	1.17	0.03	0.03	0.04	0.04
84	8.40	504	1.00	0.03000	1.41	0.57	0.02	1.19	0.03	0.03	0.04	0.04
85	8.50	510	0.80	0.02400	1.44	0.58	0.02	1.22	0.02	0.02	0.03	0.03
86	8.60	516	0.90	0.02700	1.46	0.60	0.02	1.24	0.03	0.03	0.03	0.03
87	8.70	522	0.90	0.02700	1.49	0.62	0.02	1.27	0.03	0.03	0.03	0.03
88	8.80	528	0.70	0.02100	1.51	0.64	0.02	1.29	0.02	0.02	0.03	0.03
89	8.90	534	0.80	0.02400	1.54	0.66	0.02	1.32	0.02	0.02	0.03	0.03
90	9.00	540	0.70	0.02100	1.56	0.67	0.02	1.34	0.02	0.02	0.03	0.03
91	9.10	546	0.70	0.02100	1.58	0.69	0.02	1.36	0.02	0.02	0.03	0.03
92	9.20	552	0.60	0.01800	1.60	0.70	0.01	1.37	0.02	0.02	0.02	0.02
93	9.30	558	0.60	0.01800	1.61	0.72	0.01	1.39	0.02	0.02	0.02	0.02
94	9.40	564	0.60	0.01800	1.63	0.73	0.01	1.41	0.02	0.02	0.02	0.02
95	9.50	570	0.50	0.01500	1.65	0.74	0.01	1.43	0.01	0.01	0.02	0.02
96	9.60	576	0.60	0.01800	1.67	0.76	0.01	1.44	0.02	0.02	0.02	0.02
97	9.70	582	0.50	0.01500	1.68	0.77	0.01	1.46	0.01	0.01	0.02	0.02
98	9.80	588	0.60	0.01800	1.70	0.78	0.01	1.48	0.02	0.02	0.02	0.02
99	9.90	594	0.50	0.01500	1.71	0.80	0.01	1.49	0.01	0.01	0.02	0.02
100	10.00	600	0.50	0.01500	1.73	0.81	0.01	1.51	0.01	0.01	0.02	0.02
101	10.10	606	0.50	0.01500	1.74	0.82	0.01	1.52	0.01	0.01	0.02	0.02
102	10.20	612	0.50	0.01500	1.76	0.83	0.01	1.53	0.01	0.01	0.02	0.02
103	10.30	618	0.50	0.01500	1.77	0.84	0.01	1.55	0.01	0.01	0.02	0.02
104	10.40	624	0.40	0.01200	1.79	0.85	0.01	1.56	0.01	0.01	0.02	0.02
105	10.50	630	0.50	0.01500	1.80	0.86	0.01	1.58	0.01	0.01	0.02	0.02
106	10.60	636	0.50	0.01500	1.82	0.88	0.01	1.59	0.01	0.01	0.02	0.02
107	10.70	642	0.40	0.01200	1.83	0.89	0.01	1.60	0.01	0.01	0.02	0.02
108	10.80	648	0.50	0.01500	1.84	0.90	0.01	1.62	0.01	0.01	0.02	0.02
109	10.90	654	0.50	0.01500	1.86	0.91	0.01	1.63	0.01	0.01	0.02	0.02
110	11.00	660	0.40	0.01200	1.87	0.92	0.01	1.64	0.01	0.01	0.02	0.02
111	11.10	666	0.40	0.01200	1.88	0.93	0.01	1.66	0.01	0.01	0.02	0.02
112	11.20	672	0.50	0.01500	1.90	0.94	0.01	1.67	0.01	0.01	0.02	0.02
113	11.30	678	0.40	0.01200	1.91	0.95	0.01	1.68	0.01	0.01	0.02	0.02
114	11.40	684	0.40	0.01200	1.92	0.96	0.01	1.70	0.01	0.01	0.02	0.02
115	11.50	690	0.40	0.01200	1.93	0.97	0.01	1.71	0.01	0.01	0.02	0.02
116	11.60	696	0.40	0.01200	1.94	0.98	0.01	1.72	0.01	0.01	0.02	0.02
117	11.70	702	0.40	0.01200	1.96	0.99	0.01	1.73	0.01	0.01	0.02	0.02
118	11.80	708	0.40	0.01200	1.97	1.00	0.01	1.74	0.01	0.01	0.02	0.02
119	11.90	714	0.30	0.00900	1.98	1.01	0.01	1.75	0.01	0.01	0.01	0.01
120	12.00	720	0.40	0.01200	1.99	1.02	0.01	1.76	0.01	0.01	0.02	0.01
121	12.10	726	0.40	0.01200	2.00	1.03	0.01	1.78	0.01	0.01	0.02	0.02
122	12.20	732	0.30	0.00900	2.01	1.04	0.01	1.78	0.01	0.01	0.01	0.01
123	12.30	738	0.40	0.01200	2.02	1.05	0.01	1.80	0.01	0.01	0.02	0.01
124	12.40	744	0.40	0.01200	2.03	1.06	0.01	1.81	0.01	0.01	0.02	0.02
125	12.50	750	0.40	0.01200	2.05	1.07	0.01	1.82	0.01	0.01	0.02	0.02
126	12.60	756	0.40	0.01200	2.06	1.08	0.01	1.83	0.01	0.01	0.02	0.02
127	12.70	762	0.30	0.00900	2.07	1.08	0.01	1.84	0.01	0.01	0.01	0.01
128	12.80	768	0.40	0.01200	2.08	1.09	0.01	1.85	0.01	0.01	0.02	0.01
129	12.90	774	0.30	0.00900	2.09	1.10	0.01	1.86	0.01	0.01	0.01	0.01
130	13.00	780	0.40	0.01200	2.10	1.11	0.01	1.87	0.01	0.01	0.02	0.01
131	13.10	786	0.40	0.01200	2.11	1.12	0.01	1.89	0.01	0.01	0.02	0.02
132	13.20	792	0.30	0.00900	2.12	1.13	0.01	1.89	0.01	0.01	0.01	0.01
133	13.30	798	0.40	0.01200	2.13	1.14	0.01	1.91	0.01	0.01	0.02	0.01
134	13.40	804	0.40	0.01200	2.15	1.15	0.01	1.92	0.01	0.01	0.02	0.02
135	13.50	810	0.30	0.00900	2.15	1.16	0.01	1.93	0.01	0.01	0.01	0.01
136	13.60	816	0.30	0.00900	2.16	1.16	0.01	1.94	0.01	0.01	0.01	0.01
137	13.70	822	0.40	0.01200	2.18	1.17	0.01	1.95	0.01	0.01	0.02	0.01
138	13.80	828	0.30	0.00900	2.18	1.18	0.01	1.96	0.01	0.01	0.01	0.01
139	13.90	834	0.40	0.01200	2.20	1.19	0.01	1.97	0.01	0.01	0.02	0.01
140	14.00	840	0.30	0.00900	2.21	1.20	0.01	1.98	0.01	0.01	0.01	0.01
141	14.10	846	0.30	0.00900	2.21	1.21	0.01	1.99	0.01	0.01	0.01	0.01
142	14.20	852	0.40	0.01200	2.23	1.22	0.01	2.00	0.01	0.01	0.02	0.01
143	14.30	858	0.30	0.00900	2.24	1.23	0.01	2.01	0.01	0.01	0.01	0.01
144	14.40	864	0.30	0.00900	2.24	1.23	0.01	2.02	0.01	0.01	0.01	0.01
145	14.50	870	0.40	0.01200	2.26	1.24	0.01	2.03	0.01	0.01	0.02	0.01
146	14.60	876	0.30	0.00900	2.27	1.25	0.01	2.04	0.01	0.01	0.01	0.01
147	14.70	882	0.30	0.00900	2.27	1.26	0.01	2.05	0.01	0.01	0.01	0.01
148	14.80	888	0.40	0.01200	2.29	1.27	0.01	2.06	0.01	0.01	0.02	0.01
149	14.90	894	0.30	0.00900	2.30	1.28	0.01	2.07	0.01	0.01	0.01	0.01
150	15.00	900	0.30	0.00900	2.30	1.28	0.01	2.08	0.01	0.01	0.01	0.01
151	15.10	906	0.30	0.00900	2.31	1.29	0.01	2.08	0.01	0.01	0.01	0.01

152	15.20	912	0.40	0.01200	2.33	1.30	0.01	2.10	0.01	0.01	0.02	0.01
153	15.30	918	0.30	0.00900	2.33	1.31	0.01	2.11	0.01	0.01	0.01	0.01
154	15.40	924	0.30	0.00900	2.34	1.32	0.01	2.11	0.01	0.01	0.01	0.01
155	15.50	930	0.30	0.00900	2.35	1.33	0.01	2.12	0.01	0.01	0.01	0.01
156	15.60	936	0.30	0.00900	2.36	1.33	0.01	2.13	0.01	0.01	0.01	0.01
157	15.70	942	0.40	0.01200	2.37	1.34	0.01	2.14	0.01	0.01	0.02	0.01
158	15.80	948	0.30	0.00900	2.38	1.35	0.01	2.15	0.01	0.01	0.01	0.01
159	15.90	954	0.30	0.00900	2.39	1.36	0.01	2.16	0.01	0.01	0.01	0.01
160	16.00	960	0.30	0.00900	2.40	1.37	0.01	2.17	0.01	0.01	0.01	0.01
161	16.10	966	0.30	0.00900	2.41	1.38	0.01	2.18	0.01	0.01	0.01	0.01
162	16.20	972	0.30	0.00900	2.42	1.38	0.01	2.19	0.01	0.01	0.01	0.01
163	16.30	978	0.30	0.00900	2.43	1.39	0.01	2.20	0.01	0.01	0.01	0.01
164	16.40	984	0.30	0.00900	2.44	1.40	0.01	2.21	0.01	0.01	0.01	0.01
165	16.50	990	0.30	0.00900	2.45	1.41	0.01	2.22	0.01	0.01	0.01	0.01
166	16.60	996	0.30	0.00900	2.45	1.41	0.01	2.23	0.01	0.01	0.01	0.01
167	16.70	1002	0.30	0.00900	2.46	1.42	0.01	2.23	0.01	0.01	0.01	0.01
168	16.80	1008	0.30	0.00900	2.47	1.43	0.01	2.24	0.01	0.01	0.01	0.01
169	16.90	1014	0.30	0.00900	2.48	1.44	0.01	2.25	0.01	0.01	0.01	0.01
170	17.00	1020	0.30	0.00900	2.49	1.45	0.01	2.26	0.01	0.01	0.01	0.01
171	17.10	1026	0.30	0.00900	2.50	1.45	0.01	2.27	0.01	0.01	0.01	0.01
172	17.20	1032	0.30	0.00900	2.51	1.46	0.01	2.28	0.01	0.01	0.01	0.01
173	17.30	1038	0.30	0.00900	2.52	1.47	0.01	2.29	0.01	0.01	0.01	0.01
174	17.40	1044	0.30	0.00900	2.53	1.48	0.01	2.30	0.01	0.01	0.01	0.01
175	17.50	1050	0.30	0.00900	2.54	1.49	0.01	2.31	0.01	0.01	0.01	0.01
176	17.60	1056	0.30	0.00900	2.54	1.49	0.01	2.31	0.01	0.01	0.01	0.01
177	17.70	1062	0.20	0.00600	2.55	1.50	0.01	2.32	0.01	0.01	0.01	0.01
178	17.80	1068	0.30	0.00900	2.56	1.51	0.01	2.33	0.01	0.01	0.01	0.01
179	17.90	1074	0.30	0.00900	2.57	1.51	0.01	2.34	0.01	0.01	0.01	0.01
180	18.00	1080	0.30	0.00900	2.58	1.52	0.01	2.35	0.01	0.01	0.01	0.01
181	18.10	1086	0.30	0.00900	2.59	1.53	0.01	2.36	0.01	0.01	0.01	0.01
182	18.20	1092	0.20	0.00600	2.59	1.54	0.01	2.36	0.01	0.01	0.01	0.01
183	18.30	1098	0.30	0.00900	2.60	1.54	0.01	2.37	0.01	0.01	0.01	0.01
184	18.40	1104	0.30	0.00900	2.61	1.55	0.01	2.38	0.01	0.01	0.01	0.01
185	18.50	1110	0.30	0.00900	2.62	1.56	0.01	2.39	0.01	0.01	0.01	0.01
186	18.60	1116	0.20	0.00600	2.62	1.56	0.01	2.40	0.01	0.01	0.01	0.01
187	18.70	1122	0.30	0.00900	2.63	1.57	0.01	2.40	0.01	0.01	0.01	0.01
188	18.80	1128	0.30	0.00900	2.64	1.58	0.01	2.41	0.01	0.01	0.01	0.01
189	18.90	1134	0.20	0.00600	2.65	1.59	0.01	2.42	0.01	0.01	0.01	0.01
190	19.00	1140	0.30	0.00900	2.66	1.59	0.01	2.43	0.01	0.01	0.01	0.01
191	19.10	1146	0.30	0.00900	2.67	1.60	0.01	2.44	0.01	0.01	0.01	0.01
192	19.20	1152	0.20	0.00600	2.67	1.61	0.01	2.44	0.01	0.01	0.01	0.01
193	19.30	1158	0.30	0.00900	2.68	1.62	0.01	2.45	0.01	0.01	0.01	0.01
194	19.40	1164	0.20	0.00600	2.69	1.62	0.01	2.46	0.01	0.01	0.01	0.01
195	19.50	1170	0.30	0.00900	2.70	1.63	0.01	2.47	0.01	0.01	0.01	0.01
196	19.60	1176	0.30	0.00900	2.71	1.64	0.01	2.48	0.01	0.01	0.01	0.01
197	19.70	1182	0.20	0.00600	2.71	1.64	0.01	2.48	0.01	0.01	0.01	0.01
198	19.80	1188	0.30	0.00900	2.72	1.65	0.01	2.49	0.01	0.01	0.01	0.01
199	19.90	1194	0.20	0.00600	2.73	1.65	0.01	2.50	0.01	0.01	0.01	0.01
200	20.00	1200	0.30	0.00900	2.74	1.66	0.01	2.51	0.01	0.01	0.01	0.01
201	20.10	1206	0.20	0.00600	2.74	1.67	0.01	2.51	0.01	0.01	0.01	0.01
202	20.20	1212	0.30	0.00900	2.75	1.68	0.01	2.52	0.01	0.01	0.01	0.01
203	20.30	1218	0.20	0.00600	2.76	1.68	0.01	2.53	0.01	0.01	0.01	0.01
204	20.40	1224	0.20	0.00600	2.76	1.69	0.01	2.53	0.01	0.01	0.01	0.01
205	20.50	1230	0.30	0.00900	2.77	1.70	0.01	2.54	0.01	0.01	0.01	0.01
206	20.60	1236	0.20	0.00600	2.78	1.70	0.01	2.55	0.01	0.01	0.01	0.01
207	20.70	1242	0.30	0.00900	2.79	1.71	0.01	2.56	0.01	0.01	0.01	0.01
208	20.80	1248	0.20	0.00600	2.79	1.71	0.01	2.56	0.01	0.01	0.01	0.01
209	20.90	1254	0.20	0.00600	2.80	1.72	0.01	2.57	0.01	0.01	0.01	0.01
210	21.00	1260	0.30	0.00900	2.81	1.73	0.01	2.58	0.01	0.01	0.01	0.01
211	21.10	1266	0.20	0.00600	2.81	1.73	0.01	2.58	0.01	0.01	0.01	0.01
212	21.20	1272	0.20	0.00600	2.82	1.74	0.01	2.59	0.01	0.01	0.01	0.01
213	21.30	1278	0.30	0.00900	2.83	1.75	0.01	2.60	0.01	0.01	0.01	0.01
214	21.40	1284	0.20	0.00600	2.83	1.75	0.01	2.60	0.01	0.01	0.01	0.01
215	21.50	1290	0.20	0.00600	2.84	1.76	0.01	2.61	0.01	0.01	0.01	0.01
216	21.60	1296	0.30	0.00900	2.85	1.76	0.01	2.62	0.01	0.01	0.01	0.01
217	21.70	1302	0.20	0.00600	2.86	1.77	0.01	2.62	0.01	0.01	0.01	0.01
218	21.80	1308	0.20	0.00600	2.86	1.78	0.01	2.63	0.01	0.01	0.01	0.01
219	21.90	1314	0.20	0.00600	2.87	1.78	0.01	2.64	0.01	0.01	0.01	0.01
220	22.00	1320	0.20	0.00600	2.87	1.79	0.01	2.64	0.01	0.01	0.01	0.01
221	22.10	1326	0.30	0.00900	2.88	1.79	0.01	2.65	0.01	0.01	0.01	0.01
222	22.20	1332	0.20	0.00600	2.89	1.80	0.01	2.66	0.01	0.01	0.01	0.01
223	22.30	1338	0.20	0.00600	2.89	1.81	0.01	2.66	0.01	0.01	0.01	0.01
224	22.40	1344	0.20	0.00600	2.90	1.81	0.01	2.67	0.01	0.01	0.01	0.01
225	22.50	1350	0.20	0.00600	2.91	1.82	0.01	2.68	0.01	0.01	0.01	0.01
226	22.60	1356	0.20	0.00600	2.91	1.82	0.01	2.68	0.01	0.01	0.01	0.01
227	22.70	1362	0.20	0.00600	2.92	1.83	0.01	2.69	0.01	0.01	0.01	0.01
228	22.80	1368	0.20	0.00600	2.92	1.83	0.01	2.69	0.01	0.01	0.01	0.01
229	22.90	1374	0.20	0.00600	2.93	1.84	0.01	2.70	0.01	0.01	0.01	0.01
230	23.00	1380	0.20	0.00600	2.94	1.84	0.01	2.71	0.01	0.01	0.01	0.01
231	23.10	1386	0.20	0.00600	2.94	1.85	0.01	2.71	0.01	0.01	0.01	0.01
232	23.20	1392	0.20	0.00600	2.95	1.85	0.01	2.72	0.01	0.01	0.01	0.01
233	23.30	1398	0.20	0.00600	2.95	1.86	0.01	2.72	0.01	0.01	0.01	0.01
234	23.40	1404	0.20	0.00600	2.96	1.86	0.01	2.73	0.01	0.01	0.01	0.01
235	23.50	1410	0.20	0.00600	2.97	1.87	0.01	2.74	0.01	0.01	0.01	0.01
236	23.60	1416	0.20	0.00600	2.97	1.88	0.01	2.74	0.01	0.01	0.01	0.01
237	23.70	1422	0.20	0.00600	2.98	1.88	0.01	2.75	0.01	0.01	0.01	0.01
238	23.80	1428	0.20	0.00600	2.98	1.89	0.01	2.75	0.01	0.01	0.01	0.01

	239	23.90	1434	0.20	0.00600	2.99	1.89	0.01	2.76	0.01	0.01	0.01	0.01
	240	24.00	1440	0.20	0.00600	3.00	1.90	0.01	2.77	0.01	0.01	0.01	0.01
Volume:	2126											Max:	0.09
	0.048813												

Project: City of Sammamish Louis Thompson Tightline
Compute: 10-YR Stormwater Runoff Volume for the Construction Work Zone 2 (SBUH Hydrograph)
Construction Work Area : 0.18 acres

INPUT

Given:

Total Project Area		
A_t=	7,776	ft^2
P_t=	3	inches
d_t=	10	min
T_c=	5	min
w=	0.5	

Pervious Area[1]		Impervious Area[1]		Units
A_p=	0	A_i=	7776	ft^2
CN_p=	60	CN_i=	98	
S_p=	6.667	S_i=	0.204	inches
$0.2S_p$=	1.333	$0.2S_i$=	0.041	inches

1) Assume all area within the construction work zone area is impervious

Time			Rainfall			Pevious Area		Impervious Area		Total Runoff/Hydrographs		
Time Step No. #	Time (hr)	Time (min)	Rainfall Distri-bution (% of Pt)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Total Project Runoff (inches)	Instant Hydrograph (cfs)	Design Hydrograph (cfs)
0	0.00	0	0.00	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	6	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.20	12	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.30	18	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.40	24	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.50	30	0.20	0.00600	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.60	36	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.70	42	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.80	48	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.90	54	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	60	0.20	0.00600	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.10	66	0.30	0.00900	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.20	72	0.30	0.00900	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	1.30	78	0.30	0.00900	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.00
14	1.40	84	0.30	0.00900	0.10	0.00	0.00	0.01	0.00	0.00	0.00	0.00
15	1.50	90	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.00	0.00
16	1.60	96	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.00	0.00
17	1.70	102	0.30	0.00900	0.12	0.00	0.00	0.02	0.00	0.00	0.00	0.00
18	1.80	108	0.30	0.00900	0.13	0.00	0.00	0.03	0.00	0.00	0.00	0.00
19	1.90	114	0.30	0.00900	0.14	0.00	0.00	0.03	0.00	0.00	0.01	0.01
20	2.00	120	0.30	0.00900	0.15	0.00	0.00	0.04	0.01	0.01	0.01	0.01
21	2.10	126	0.30	0.00900	0.16	0.00	0.00	0.04	0.01	0.01	0.01	0.01
22	2.20	132	0.30	0.00900	0.17	0.00	0.00	0.05	0.01	0.01	0.01	0.01
23	2.30	138	0.40	0.01200	0.18	0.00	0.00	0.06	0.01	0.01	0.01	0.01
24	2.40	144	0.30	0.00900	0.19	0.00	0.00	0.06	0.01	0.01	0.01	0.01
25	2.50	150	0.30	0.00900	0.20	0.00	0.00	0.07	0.01	0.01	0.01	0.01
26	2.60	156	0.30	0.00900	0.21	0.00	0.00	0.07	0.01	0.01	0.01	0.01
27	2.70	162	0.30	0.00900	0.22	0.00	0.00	0.08	0.01	0.01	0.01	0.01
28	2.80	168	0.40	0.01200	0.23	0.00	0.00	0.09	0.01	0.01	0.01	0.01
29	2.90	174	0.30	0.00900	0.24	0.00	0.00	0.10	0.01	0.01	0.01	0.01
30	3.00	180	0.30	0.00900	0.25	0.00	0.00	0.10	0.01	0.01	0.01	0.01
31	3.10	186	0.30	0.00900	0.26	0.00	0.00	0.11	0.01	0.01	0.01	0.01
32	3.20	192	0.30	0.00900	0.26	0.00	0.00	0.12	0.01	0.01	0.01	0.01
33	3.30	198	0.30	0.00900	0.27	0.00	0.00	0.12	0.01	0.01	0.01	0.01
34	3.40	204	0.30	0.00900	0.28	0.00	0.00	0.13	0.01	0.01	0.01	0.01
35	3.50	210	0.30	0.00900	0.29	0.00	0.00	0.14	0.01	0.01	0.01	0.01
36	3.60	216	0.30	0.00900	0.30	0.00	0.00	0.15	0.01	0.01	0.01	0.01
37	3.70	222	0.40	0.01200	0.31	0.00	0.00	0.15	0.01	0.01	0.01	0.01
38	3.80	228	0.40	0.01200	0.32	0.00	0.00	0.16	0.01	0.01	0.01	0.01
39	3.90	234	0.30	0.00900	0.33	0.00	0.00	0.17	0.01	0.01	0.01	0.01
40	4.00	240	0.40	0.01200	0.35	0.00	0.00	0.18	0.01	0.01	0.01	0.01
41	4.10	246	0.40	0.01200	0.36	0.00	0.00	0.19	0.01	0.01	0.01	0.01
42	4.20	252	0.30	0.00900	0.37	0.00	0.00	0.20	0.01	0.01	0.01	0.01
43	4.30	258	0.40	0.01200	0.38	0.00	0.00	0.21	0.01	0.01	0.01	0.01
44	4.40	264	0.40	0.01200	0.39	0.00	0.00	0.22	0.01	0.01	0.01	0.01
45	4.50	270	0.40	0.01200	0.40	0.00	0.00	0.23	0.01	0.01	0.01	0.01
46	4.60	276	0.40	0.01200	0.41	0.00	0.00	0.24	0.01	0.01	0.01	0.01
47	4.70	282	0.40	0.01200	0.43	0.00	0.00	0.25	0.01	0.01	0.01	0.01
48	4.80	288	0.40	0.01200	0.44	0.00	0.00	0.26	0.01	0.01	0.01	0.01
49	4.90	294	0.50	0.01500	0.45	0.00	0.00	0.28	0.01	0.01	0.01	0.01
50	5.00	300	0.40	0.01200	0.47	0.00	0.00	0.29	0.01	0.01	0.01	0.01
51	5.10	306	0.50	0.01500	0.48	0.00	0.00	0.30	0.01	0.01	0.01	0.01
52	5.20	312	0.40	0.01200	0.49	0.00	0.00	0.31	0.01	0.01	0.01	0.01
53	5.30	318	0.50	0.01500	0.51	0.00	0.00	0.32	0.01	0.01	0.01	0.01
54	5.40	324	0.50	0.01500	0.52	0.00	0.00	0.34	0.01	0.01	0.01	0.01
55	5.50	330	0.50	0.01500	0.54	0.00	0.00	0.35	0.01	0.01	0.01	0.01
56	5.60	336	0.50	0.01500	0.55	0.00	0.00	0.37	0.01	0.01	0.01	0.01
57	5.70	342	0.50	0.01500	0.57	0.00	0.00	0.38	0.01	0.01	0.01	0.01
58	5.80	348	0.50	0.01500	0.58	0.00	0.00	0.39	0.01	0.01	0.01	0.01
59	5.90	354	0.50	0.01500	0.60	0.00	0.00	0.41	0.01	0.01	0.02	0.01
60	6.00	360	0.60	0.01800	0.62	0.00	0.00	0.42	0.02	0.02	0.02	0.02

61	6.10	366	0.60	0.01800	0.63	0.00	0.00	0.44	0.02	0.02	0.02	0.02
62	6.20	372	0.60	0.01800	0.65	0.00	0.00	0.46	0.02	0.02	0.02	0.02
63	6.30	378	0.60	0.01800	0.67	0.00	0.00	0.47	0.02	0.02	0.02	0.02
64	6.40	384	0.70	0.02100	0.69	0.00	0.00	0.49	0.02	0.02	0.02	0.02
65	6.50	390	0.60	0.01800	0.71	0.00	0.00	0.51	0.02	0.02	0.02	0.02
66	6.60	396	0.60	0.01800	0.73	0.00	0.00	0.53	0.02	0.02	0.02	0.02
67	6.70	402	0.60	0.01800	0.74	0.00	0.00	0.55	0.02	0.02	0.02	0.02
68	6.80	408	0.60	0.01800	0.76	0.00	0.00	0.56	0.02	0.02	0.02	0.02
69	6.90	414	0.60	0.01800	0.78	0.00	0.00	0.58	0.02	0.02	0.02	0.02
70	7.00	420	0.70	0.02100	0.80	0.00	0.00	0.60	0.02	0.02	0.02	0.02
71	7.10	426	0.70	0.02100	0.82	0.00	0.00	0.62	0.02	0.02	0.02	0.02
72	7.20	432	0.80	0.02400	0.85	0.00	0.00	0.64	0.02	0.02	0.02	0.02
73	7.30	438	0.80	0.02400	0.87	0.00	0.00	0.67	0.02	0.02	0.02	0.02
74	7.40	444	0.90	0.02700	0.90	0.00	0.00	0.69	0.03	0.03	0.03	0.03
75	7.50	450	1.00	0.03000	0.93	0.00	0.00	0.72	0.03	0.03	0.03	0.03
76	7.60	456	2.10	0.06300	0.99	0.00	0.00	0.78	0.06	0.06	0.07	0.05
77	7.70	462	2.40	0.07200	1.06	0.00	0.00	0.85	0.07	0.07	0.08	0.07
78	7.80	468	2.40	0.07200	1.13	0.00	0.00	0.92	0.07	0.07	0.08	0.08
79	7.90	474	2.40	0.07200	1.21	0.00	0.00	0.99	0.07	0.07	0.08	0.08
80	8.00	480	2.20	0.06600	1.27	0.00	0.00	1.06	0.06	0.06	0.07	0.07
81	8.10	486	1.40	0.04200	1.31	0.00	0.00	1.10	0.04	0.04	0.04	0.06
82	8.20	492	1.30	0.03900	1.35	0.00	0.00	1.14	0.04	0.04	0.04	0.04
83	8.30	498	1.00	0.03000	1.38	0.00	0.00	1.17	0.03	0.03	0.03	0.04
84	8.40	504	1.00	0.03000	1.41	0.00	0.00	1.19	0.03	0.03	0.03	0.03
85	8.50	510	0.80	0.02400	1.44	0.00	0.00	1.22	0.02	0.02	0.03	0.03
86	8.60	516	0.90	0.02700	1.46	0.00	0.00	1.24	0.03	0.03	0.03	0.03
87	8.70	522	0.90	0.02700	1.49	0.00	0.00	1.27	0.03	0.03	0.03	0.03
88	8.80	528	0.70	0.02100	1.51	0.00	0.00	1.29	0.02	0.02	0.02	0.03
89	8.90	534	0.80	0.02400	1.54	0.01	0.00	1.32	0.02	0.02	0.03	0.02
90	9.00	540	0.70	0.02100	1.56	0.01	0.00	1.34	0.02	0.02	0.02	0.02
91	9.10	546	0.70	0.02100	1.58	0.01	0.00	1.36	0.02	0.02	0.02	0.02
92	9.20	552	0.60	0.01800	1.60	0.01	0.00	1.37	0.02	0.02	0.02	0.02
93	9.30	558	0.60	0.01800	1.61	0.01	0.00	1.39	0.02	0.02	0.02	0.02
94	9.40	564	0.60	0.01800	1.63	0.01	0.00	1.41	0.02	0.02	0.02	0.02
95	9.50	570	0.50	0.01500	1.65	0.01	0.00	1.43	0.01	0.01	0.02	0.02
96	9.60	576	0.60	0.01800	1.67	0.02	0.00	1.44	0.02	0.02	0.02	0.02
97	9.70	582	0.50	0.01500	1.68	0.02	0.00	1.46	0.01	0.01	0.02	0.02
98	9.80	588	0.60	0.01800	1.70	0.02	0.00	1.48	0.02	0.02	0.02	0.02
99	9.90	594	0.50	0.01500	1.71	0.02	0.00	1.49	0.01	0.01	0.02	0.02
100	10.00	600	0.50	0.01500	1.73	0.02	0.00	1.51	0.01	0.01	0.02	0.02
101	10.10	606	0.50	0.01500	1.74	0.02	0.00	1.52	0.01	0.01	0.02	0.02
102	10.20	612	0.50	0.01500	1.76	0.03	0.00	1.53	0.01	0.01	0.02	0.02
103	10.30	618	0.50	0.01500	1.77	0.03	0.00	1.55	0.01	0.01	0.02	0.02
104	10.40	624	0.40	0.01200	1.79	0.03	0.00	1.56	0.01	0.01	0.01	0.01
105	10.50	630	0.50	0.01500	1.80	0.03	0.00	1.58	0.01	0.01	0.02	0.01
106	10.60	636	0.50	0.01500	1.82	0.03	0.00	1.59	0.01	0.01	0.02	0.02
107	10.70	642	0.40	0.01200	1.83	0.03	0.00	1.60	0.01	0.01	0.01	0.01
108	10.80	648	0.50	0.01500	1.84	0.04	0.00	1.62	0.01	0.01	0.02	0.01
109	10.90	654	0.50	0.01500	1.86	0.04	0.00	1.63	0.01	0.01	0.02	0.02
110	11.00	660	0.40	0.01200	1.87	0.04	0.00	1.64	0.01	0.01	0.01	0.01
111	11.10	666	0.40	0.01200	1.88	0.04	0.00	1.66	0.01	0.01	0.01	0.01
112	11.20	672	0.50	0.01500	1.90	0.04	0.00	1.67	0.01	0.01	0.02	0.01
113	11.30	678	0.40	0.01200	1.91	0.05	0.00	1.68	0.01	0.01	0.01	0.01
114	11.40	684	0.40	0.01200	1.92	0.05	0.00	1.70	0.01	0.01	0.01	0.01
115	11.50	690	0.40	0.01200	1.93	0.05	0.00	1.71	0.01	0.01	0.01	0.01
116	11.60	696	0.40	0.01200	1.94	0.05	0.00	1.72	0.01	0.01	0.01	0.01
117	11.70	702	0.40	0.01200	1.96	0.05	0.00	1.73	0.01	0.01	0.01	0.01
118	11.80	708	0.40	0.01200	1.97	0.06	0.00	1.74	0.01	0.01	0.01	0.01
119	11.90	714	0.30	0.00900	1.98	0.06	0.00	1.75	0.01	0.01	0.01	0.01
120	12.00	720	0.40	0.01200	1.99	0.06	0.00	1.76	0.01	0.01	0.01	0.01
121	12.10	726	0.40	0.01200	2.00	0.06	0.00	1.78	0.01	0.01	0.01	0.01
122	12.20	732	0.30	0.00900	2.01	0.06	0.00	1.78	0.01	0.01	0.01	0.01
123	12.30	738	0.40	0.01200	2.02	0.06	0.00	1.80	0.01	0.01	0.01	0.01
124	12.40	744	0.40	0.01200	2.03	0.07	0.00	1.81	0.01	0.01	0.01	0.01
125	12.50	750	0.40	0.01200	2.05	0.07	0.00	1.82	0.01	0.01	0.01	0.01
126	12.60	756	0.40	0.01200	2.06	0.07	0.00	1.83	0.01	0.01	0.01	0.01
127	12.70	762	0.30	0.00900	2.07	0.07	0.00	1.84	0.01	0.01	0.01	0.01
128	12.80	768	0.40	0.01200	2.08	0.08	0.00	1.85	0.01	0.01	0.01	0.01
129	12.90	774	0.30	0.00900	2.09	0.08	0.00	1.86	0.01	0.01	0.01	0.01
130	13.00	780	0.40	0.01200	2.10	0.08	0.00	1.87	0.01	0.01	0.01	0.01
131	13.10	786	0.40	0.01200	2.11	0.08	0.00	1.89	0.01	0.01	0.01	0.01
132	13.20	792	0.30	0.00900	2.12	0.08	0.00	1.89	0.01	0.01	0.01	0.01
133	13.30	798	0.40	0.01200	2.13	0.09	0.00	1.91	0.01	0.01	0.01	0.01
134	13.40	804	0.40	0.01200	2.15	0.09	0.00	1.92	0.01	0.01	0.01	0.01
135	13.50	810	0.30	0.00900	2.15	0.09	0.00	1.93	0.01	0.01	0.01	0.01
136	13.60	816	0.30	0.00900	2.16	0.09	0.00	1.94	0.01	0.01	0.01	0.01
137	13.70	822	0.40	0.01200	2.18	0.09	0.00	1.95	0.01	0.01	0.01	0.01
138	13.80	828	0.30	0.00900	2.18	0.10	0.00	1.96	0.01	0.01	0.01	0.01
139	13.90	834	0.40	0.01200	2.20	0.10	0.00	1.97	0.01	0.01	0.01	0.01
140	14.00	840	0.30	0.00900	2.21	0.10	0.00	1.98	0.01	0.01	0.01	0.01
141	14.10	846	0.30	0.00900	2.21	0.10	0.00	1.99	0.01	0.01	0.01	0.01
142	14.20	852	0.40	0.01200	2.23	0.11	0.00	2.00	0.01	0.01	0.01	0.01

143	14.30	858	0.30	0.00900	2.24	0.11	0.00	2.01	0.01	0.01	0.01	0.01
144	14.40	864	0.30	0.00900	2.24	0.11	0.00	2.02	0.01	0.01	0.01	0.01
145	14.50	870	0.40	0.01200	2.26	0.11	0.00	2.03	0.01	0.01	0.01	0.01
146	14.60	876	0.30	0.00900	2.27	0.11	0.00	2.04	0.01	0.01	0.01	0.01
147	14.70	882	0.30	0.00900	2.27	0.12	0.00	2.05	0.01	0.01	0.01	0.01
148	14.80	888	0.40	0.01200	2.29	0.12	0.00	2.06	0.01	0.01	0.01	0.01
149	14.90	894	0.30	0.00900	2.30	0.12	0.00	2.07	0.01	0.01	0.01	0.01
150	15.00	900	0.30	0.00900	2.30	0.12	0.00	2.08	0.01	0.01	0.01	0.01
151	15.10	906	0.30	0.00900	2.31	0.13	0.00	2.08	0.01	0.01	0.01	0.01
152	15.20	912	0.40	0.01200	2.33	0.13	0.00	2.10	0.01	0.01	0.01	0.01
153	15.30	918	0.30	0.00900	2.33	0.13	0.00	2.11	0.01	0.01	0.01	0.01
154	15.40	924	0.30	0.00900	2.34	0.13	0.00	2.11	0.01	0.01	0.01	0.01
155	15.50	930	0.30	0.00900	2.35	0.14	0.00	2.12	0.01	0.01	0.01	0.01
156	15.60	936	0.30	0.00900	2.36	0.14	0.00	2.13	0.01	0.01	0.01	0.01
157	15.70	942	0.40	0.01200	2.37	0.14	0.00	2.14	0.01	0.01	0.01	0.01
158	15.80	948	0.30	0.00900	2.38	0.14	0.00	2.15	0.01	0.01	0.01	0.01
159	15.90	954	0.30	0.00900	2.39	0.14	0.00	2.16	0.01	0.01	0.01	0.01
160	16.00	960	0.30	0.00900	2.40	0.15	0.00	2.17	0.01	0.01	0.01	0.01
161	16.10	966	0.30	0.00900	2.41	0.15	0.00	2.18	0.01	0.01	0.01	0.01
162	16.20	972	0.30	0.00900	2.42	0.15	0.00	2.19	0.01	0.01	0.01	0.01
163	16.30	978	0.30	0.00900	2.43	0.15	0.00	2.20	0.01	0.01	0.01	0.01
164	16.40	984	0.30	0.00900	2.44	0.16	0.00	2.21	0.01	0.01	0.01	0.01
165	16.50	990	0.30	0.00900	2.45	0.16	0.00	2.22	0.01	0.01	0.01	0.01
166	16.60	996	0.30	0.00900	2.45	0.16	0.00	2.23	0.01	0.01	0.01	0.01
167	16.70	1002	0.30	0.00900	2.46	0.16	0.00	2.23	0.01	0.01	0.01	0.01
168	16.80	1008	0.30	0.00900	2.47	0.17	0.00	2.24	0.01	0.01	0.01	0.01
169	16.90	1014	0.30	0.00900	2.48	0.17	0.00	2.25	0.01	0.01	0.01	0.01
170	17.00	1020	0.30	0.00900	2.49	0.17	0.00	2.26	0.01	0.01	0.01	0.01
171	17.10	1026	0.30	0.00900	2.50	0.17	0.00	2.27	0.01	0.01	0.01	0.01
172	17.20	1032	0.30	0.00900	2.51	0.18	0.00	2.28	0.01	0.01	0.01	0.01
173	17.30	1038	0.30	0.00900	2.52	0.18	0.00	2.29	0.01	0.01	0.01	0.01
174	17.40	1044	0.30	0.00900	2.53	0.18	0.00	2.30	0.01	0.01	0.01	0.01
175	17.50	1050	0.30	0.00900	2.54	0.18	0.00	2.31	0.01	0.01	0.01	0.01
176	17.60	1056	0.30	0.00900	2.54	0.19	0.00	2.31	0.01	0.01	0.01	0.01
177	17.70	1062	0.20	0.00600	2.55	0.19	0.00	2.32	0.01	0.01	0.01	0.01
178	17.80	1068	0.30	0.00900	2.56	0.19	0.00	2.33	0.01	0.01	0.01	0.01
179	17.90	1074	0.30	0.00900	2.57	0.19	0.00	2.34	0.01	0.01	0.01	0.01
180	18.00	1080	0.30	0.00900	2.58	0.20	0.00	2.35	0.01	0.01	0.01	0.01
181	18.10	1086	0.30	0.00900	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.01
182	18.20	1092	0.20	0.00600	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.01
183	18.30	1098	0.30	0.00900	2.60	0.20	0.00	2.37	0.01	0.01	0.01	0.01
184	18.40	1104	0.30	0.00900	2.61	0.21	0.00	2.38	0.01	0.01	0.01	0.01
185	18.50	1110	0.30	0.00900	2.62	0.21	0.00	2.39	0.01	0.01	0.01	0.01
186	18.60	1116	0.20	0.00600	2.62	0.21	0.00	2.40	0.01	0.01	0.01	0.01
187	18.70	1122	0.30	0.00900	2.63	0.21	0.00	2.40	0.01	0.01	0.01	0.01
188	18.80	1128	0.30	0.00900	2.64	0.22	0.00	2.41	0.01	0.01	0.01	0.01
189	18.90	1134	0.20	0.00600	2.65	0.22	0.00	2.42	0.01	0.01	0.01	0.01
190	19.00	1140	0.30	0.00900	2.66	0.22	0.00	2.43	0.01	0.01	0.01	0.01
191	19.10	1146	0.30	0.00900	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.01
192	19.20	1152	0.20	0.00600	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.01
193	19.30	1158	0.30	0.00900	2.68	0.23	0.00	2.45	0.01	0.01	0.01	0.01
194	19.40	1164	0.20	0.00600	2.69	0.23	0.00	2.46	0.01	0.01	0.01	0.01
195	19.50	1170	0.30	0.00900	2.70	0.23	0.00	2.47	0.01	0.01	0.01	0.01
196	19.60	1176	0.30	0.00900	2.71	0.23	0.00	2.48	0.01	0.01	0.01	0.01
197	19.70	1182	0.20	0.00600	2.71	0.24	0.00	2.48	0.01	0.01	0.01	0.01
198	19.80	1188	0.30	0.00900	2.72	0.24	0.00	2.49	0.01	0.01	0.01	0.01
199	19.90	1194	0.20	0.00600	2.73	0.24	0.00	2.50	0.01	0.01	0.01	0.01
200	20.00	1200	0.30	0.00900	2.74	0.24	0.00	2.51	0.01	0.01	0.01	0.01
201	20.10	1206	0.20	0.00600	2.74	0.25	0.00	2.51	0.01	0.01	0.01	0.01
202	20.20	1212	0.30	0.00900	2.75	0.25	0.00	2.52	0.01	0.01	0.01	0.01
203	20.30	1218	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
204	20.40	1224	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
205	20.50	1230	0.30	0.00900	2.77	0.26	0.00	2.54	0.01	0.01	0.01	0.01
206	20.60	1236	0.20	0.00600	2.78	0.26	0.00	2.55	0.01	0.01	0.01	0.01
207	20.70	1242	0.30	0.00900	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.01
208	20.80	1248	0.20	0.00600	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.01
209	20.90	1254	0.20	0.00600	2.80	0.26	0.00	2.57	0.01	0.01	0.01	0.01
210	21.00	1260	0.30	0.00900	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.01
211	21.10	1266	0.20	0.00600	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.01
212	21.20	1272	0.20	0.00600	2.82	0.27	0.00	2.59	0.01	0.01	0.01	0.01
213	21.30	1278	0.30	0.00900	2.83	0.27	0.00	2.60	0.01	0.01	0.01	0.01
214	21.40	1284	0.20	0.00600	2.83	0.28	0.00	2.60	0.01	0.01	0.01	0.01
215	21.50	1290	0.20	0.00600	2.84	0.28	0.00	2.61	0.01	0.01	0.01	0.01
216	21.60	1296	0.30	0.00900	2.85	0.28	0.00	2.62	0.01	0.01	0.01	0.01
217	21.70	1302	0.20	0.00600	2.86	0.28	0.00	2.62	0.01	0.01	0.01	0.01
218	21.80	1308	0.20	0.00600	2.86	0.29	0.00	2.63	0.01	0.01	0.01	0.01
219	21.90	1314	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
220	22.00	1320	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
221	22.10	1326	0.30	0.00900	2.88	0.29	0.00	2.65	0.01	0.01	0.01	0.01
222	22.20	1332	0.20	0.00600	2.89	0.29	0.00	2.66	0.01	0.01	0.01	0.01
223	22.30	1338	0.20	0.00600	2.89	0.30	0.00	2.66	0.01	0.01	0.01	0.01
224	22.40	1344	0.20	0.00600	2.90	0.30	0.00	2.67	0.01	0.01	0.01	0.01

	225	22.50	1350	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	226	22.60	1356	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	227	22.70	1362	0.20	0.00600	2.92	0.30	0.00	2.69	0.01	0.01	0.01	0.01
	228	22.80	1368	0.20	0.00600	2.92	0.31	0.00	2.69	0.01	0.01	0.01	0.01
	229	22.90	1374	0.20	0.00600	2.93	0.31	0.00	2.70	0.01	0.01	0.01	0.01
	230	23.00	1380	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	231	23.10	1386	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	232	23.20	1392	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	233	23.30	1398	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	234	23.40	1404	0.20	0.00600	2.96	0.32	0.00	2.73	0.01	0.01	0.01	0.01
	235	23.50	1410	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	236	23.60	1416	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	237	23.70	1422	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	238	23.80	1428	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	239	23.90	1434	0.20	0.00600	2.99	0.33	0.00	2.76	0.01	0.01	0.01	0.01
	240	24.00	1440	0.20	0.00600	3.00	0.33	0.00	2.77	0.01	0.01	0.01	0.01
Volume:	1790											Max:	0.08
	0.041092												

Project: City of Sammamish Louis Thompson Tightline
Compute: 10-YR Stormwater Runoff Volume for the Construction Work Zone 3 (SBUH Hydrograph)
Construction Work Area : 0.27 acres

INPUT

Given:

Total Project Area		
A_t=	11,571	ft^2
P_t=	3	inches
d_t=	10	min
T_c=	5	min
w=	0.5	

Pervious Area[1]		Impervious Area[1]		Units
A_p=	0	A_i=	11571	ft^2
CN_p=	60	CN_i=	98	
S_p=	6.667	S_i=	0.204	inches
$0.2S_p$=	1.333	$0.2S_i$=	0.041	inches

1) Assume all area within the construction work zone area is impervious

Time			Rainfall			Pevious Area		Impervious Area		Total Runoff/Hydrographs		
Time Step No. #	Time (hr)	Time (min)	Rainfall Distri-bution (% of Pt)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Total Project Runoff (inches)	Instant Hydrograph (cfs)	Design Hydrograph (cfs)
0	0.00	0	0.00	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	6	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.20	12	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.30	18	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.40	24	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.50	30	0.20	0.00600	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.60	36	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.70	42	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.80	48	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.90	54	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	60	0.20	0.00600	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.10	66	0.30	0.00900	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.20	72	0.30	0.00900	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	1.30	78	0.30	0.00900	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.00
14	1.40	84	0.30	0.00900	0.10	0.00	0.00	0.01	0.00	0.00	0.01	0.00
15	1.50	90	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
16	1.60	96	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
17	1.70	102	0.30	0.00900	0.12	0.00	0.00	0.02	0.00	0.00	0.01	0.01
18	1.80	108	0.30	0.00900	0.13	0.00	0.00	0.03	0.00	0.00	0.01	0.01
19	1.90	114	0.30	0.00900	0.14	0.00	0.00	0.03	0.00	0.00	0.01	0.01
20	2.00	120	0.30	0.00900	0.15	0.00	0.00	0.04	0.01	0.01	0.01	0.01
21	2.10	126	0.30	0.00900	0.16	0.00	0.00	0.04	0.01	0.01	0.01	0.01
22	2.20	132	0.30	0.00900	0.17	0.00	0.00	0.05	0.01	0.01	0.01	0.01
23	2.30	138	0.40	0.01200	0.18	0.00	0.00	0.06	0.01	0.01	0.01	0.01
24	2.40	144	0.30	0.00900	0.19	0.00	0.00	0.06	0.01	0.01	0.01	0.01
25	2.50	150	0.30	0.00900	0.20	0.00	0.00	0.07	0.01	0.01	0.01	0.01
26	2.60	156	0.30	0.00900	0.21	0.00	0.00	0.07	0.01	0.01	0.01	0.01
27	2.70	162	0.30	0.00900	0.22	0.00	0.00	0.08	0.01	0.01	0.01	0.01
28	2.80	168	0.40	0.01200	0.23	0.00	0.00	0.09	0.01	0.01	0.01	0.01
29	2.90	174	0.30	0.00900	0.24	0.00	0.00	0.10	0.01	0.01	0.01	0.01
30	3.00	180	0.30	0.00900	0.25	0.00	0.00	0.10	0.01	0.01	0.01	0.01
31	3.10	186	0.30	0.00900	0.26	0.00	0.00	0.11	0.01	0.01	0.01	0.01
32	3.20	192	0.30	0.00900	0.26	0.00	0.00	0.12	0.01	0.01	0.01	0.01
33	3.30	198	0.30	0.00900	0.27	0.00	0.00	0.12	0.01	0.01	0.01	0.01
34	3.40	204	0.30	0.00900	0.28	0.00	0.00	0.13	0.01	0.01	0.01	0.01
35	3.50	210	0.30	0.00900	0.29	0.00	0.00	0.14	0.01	0.01	0.01	0.01
36	3.60	216	0.30	0.00900	0.30	0.00	0.00	0.15	0.01	0.01	0.01	0.01
37	3.70	222	0.40	0.01200	0.31	0.00	0.00	0.15	0.01	0.01	0.02	0.01
38	3.80	228	0.40	0.01200	0.32	0.00	0.00	0.16	0.01	0.01	0.02	0.02
39	3.90	234	0.30	0.00900	0.33	0.00	0.00	0.17	0.01	0.01	0.01	0.01
40	4.00	240	0.40	0.01200	0.35	0.00	0.00	0.18	0.01	0.01	0.02	0.01
41	4.10	246	0.40	0.01200	0.36	0.00	0.00	0.19	0.01	0.01	0.02	0.02
42	4.20	252	0.30	0.00900	0.37	0.00	0.00	0.20	0.01	0.01	0.01	0.01
43	4.30	258	0.40	0.01200	0.38	0.00	0.00	0.21	0.01	0.01	0.02	0.01
44	4.40	264	0.40	0.01200	0.39	0.00	0.00	0.22	0.01	0.01	0.02	0.02
45	4.50	270	0.40	0.01200	0.40	0.00	0.00	0.23	0.01	0.01	0.02	0.02
46	4.60	276	0.40	0.01200	0.41	0.00	0.00	0.24	0.01	0.01	0.02	0.02
47	4.70	282	0.40	0.01200	0.43	0.00	0.00	0.25	0.01	0.01	0.02	0.02
48	4.80	288	0.40	0.01200	0.44	0.00	0.00	0.26	0.01	0.01	0.02	0.02
49	4.90	294	0.50	0.01500	0.45	0.00	0.00	0.28	0.01	0.01	0.02	0.02
50	5.00	300	0.40	0.01200	0.47	0.00	0.00	0.29	0.01	0.01	0.02	0.02
51	5.10	306	0.50	0.01500	0.48	0.00	0.00	0.30	0.01	0.01	0.02	0.02
52	5.20	312	0.40	0.01200	0.49	0.00	0.00	0.31	0.01	0.01	0.02	0.02
53	5.30	318	0.50	0.01500	0.51	0.00	0.00	0.32	0.01	0.01	0.02	0.02
54	5.40	324	0.50	0.01500	0.52	0.00	0.00	0.34	0.01	0.01	0.02	0.02
55	5.50	330	0.50	0.01500	0.54	0.00	0.00	0.35	0.01	0.01	0.02	0.02
56	5.60	336	0.50	0.01500	0.55	0.00	0.00	0.37	0.01	0.01	0.02	0.02
57	5.70	342	0.50	0.01500	0.57	0.00	0.00	0.38	0.01	0.01	0.02	0.02
58	5.80	348	0.50	0.01500	0.58	0.00	0.00	0.39	0.01	0.01	0.02	0.02
59	5.90	354	0.50	0.01500	0.60	0.00	0.00	0.41	0.01	0.01	0.02	0.02
60	6.00	360	0.60	0.01800	0.62	0.00	0.00	0.42	0.02	0.02	0.03	0.02

61	6.10	366	0.60	0.01800	0.63	0.00	0.00	0.44	0.02	0.02	0.03	0.03
62	6.20	372	0.60	0.01800	0.65	0.00	0.00	0.46	0.02	0.02	0.03	0.03
63	6.30	378	0.60	0.01800	0.67	0.00	0.00	0.47	0.02	0.02	0.03	0.03
64	6.40	384	0.70	0.02100	0.69	0.00	0.00	0.49	0.02	0.02	0.03	0.03
65	6.50	390	0.60	0.01800	0.71	0.00	0.00	0.51	0.02	0.02	0.03	0.03
66	6.60	396	0.60	0.01800	0.73	0.00	0.00	0.53	0.02	0.02	0.03	0.03
67	6.70	402	0.60	0.01800	0.74	0.00	0.00	0.55	0.02	0.02	0.03	0.03
68	6.80	408	0.60	0.01800	0.76	0.00	0.00	0.56	0.02	0.02	0.03	0.03
69	6.90	414	0.60	0.01800	0.78	0.00	0.00	0.58	0.02	0.02	0.03	0.03
70	7.00	420	0.70	0.02100	0.80	0.00	0.00	0.60	0.02	0.02	0.03	0.03
71	7.10	426	0.70	0.02100	0.82	0.00	0.00	0.62	0.02	0.02	0.03	0.03
72	7.20	432	0.80	0.02400	0.85	0.00	0.00	0.64	0.02	0.02	0.04	0.03
73	7.30	438	0.80	0.02400	0.87	0.00	0.00	0.67	0.02	0.02	0.04	0.04
74	7.40	444	0.90	0.02700	0.90	0.00	0.00	0.69	0.03	0.03	0.04	0.04
75	7.50	450	1.00	0.03000	0.93	0.00	0.00	0.72	0.03	0.03	0.05	0.04
76	7.60	456	2.10	0.06300	0.99	0.00	0.00	0.78	0.06	0.06	0.10	0.07
77	7.70	462	2.40	0.07200	1.06	0.00	0.00	0.85	0.07	0.07	0.11	0.11
78	7.80	468	2.40	0.07200	1.13	0.00	0.00	0.92	0.07	0.07	0.11	0.11
79	7.90	474	2.40	0.07200	1.21	0.00	0.00	0.99	0.07	0.07	0.11	0.11
80	8.00	480	2.20	0.06600	1.27	0.00	0.00	1.06	0.06	0.06	0.10	0.11
81	8.10	486	1.40	0.04200	1.31	0.00	0.00	1.10	0.04	0.04	0.07	0.08
82	8.20	492	1.30	0.03900	1.35	0.00	0.00	1.14	0.04	0.04	0.06	0.06
83	8.30	498	1.00	0.03000	1.38	0.00	0.00	1.17	0.03	0.03	0.05	0.05
84	8.40	504	1.00	0.03000	1.41	0.00	0.00	1.19	0.03	0.03	0.05	0.05
85	8.50	510	0.80	0.02400	1.44	0.00	0.00	1.22	0.02	0.02	0.04	0.04
86	8.60	516	0.90	0.02700	1.46	0.00	0.00	1.24	0.03	0.03	0.04	0.04
87	8.70	522	0.90	0.02700	1.49	0.00	0.00	1.27	0.03	0.03	0.04	0.04
88	8.80	528	0.70	0.02100	1.51	0.00	0.00	1.29	0.02	0.02	0.03	0.04
89	8.90	534	0.80	0.02400	1.54	0.01	0.00	1.32	0.02	0.02	0.04	0.04
90	9.00	540	0.70	0.02100	1.56	0.01	0.00	1.34	0.02	0.02	0.03	0.04
91	9.10	546	0.70	0.02100	1.58	0.01	0.00	1.36	0.02	0.02	0.03	0.03
92	9.20	552	0.60	0.01800	1.60	0.01	0.00	1.37	0.02	0.02	0.03	0.03
93	9.30	558	0.60	0.01800	1.61	0.01	0.00	1.39	0.02	0.02	0.03	0.03
94	9.40	564	0.60	0.01800	1.63	0.01	0.00	1.41	0.02	0.02	0.03	0.03
95	9.50	570	0.50	0.01500	1.65	0.01	0.00	1.43	0.01	0.01	0.02	0.03
96	9.60	576	0.60	0.01800	1.67	0.02	0.00	1.44	0.02	0.02	0.03	0.03
97	9.70	582	0.50	0.01500	1.68	0.02	0.00	1.46	0.01	0.01	0.02	0.03
98	9.80	588	0.60	0.01800	1.70	0.02	0.00	1.48	0.02	0.02	0.03	0.03
99	9.90	594	0.50	0.01500	1.71	0.02	0.00	1.49	0.01	0.01	0.02	0.03
100	10.00	600	0.50	0.01500	1.73	0.02	0.00	1.51	0.01	0.01	0.02	0.02
101	10.10	606	0.50	0.01500	1.74	0.02	0.00	1.52	0.01	0.01	0.02	0.02
102	10.20	612	0.50	0.01500	1.76	0.03	0.00	1.53	0.01	0.01	0.02	0.02
103	10.30	618	0.50	0.01500	1.77	0.03	0.00	1.55	0.01	0.01	0.02	0.02
104	10.40	624	0.40	0.01200	1.79	0.03	0.00	1.56	0.01	0.01	0.02	0.02
105	10.50	630	0.50	0.01500	1.80	0.03	0.00	1.58	0.01	0.01	0.02	0.02
106	10.60	636	0.50	0.01500	1.82	0.03	0.00	1.59	0.01	0.01	0.02	0.02
107	10.70	642	0.40	0.01200	1.83	0.03	0.00	1.60	0.01	0.01	0.02	0.02
108	10.80	648	0.50	0.01500	1.84	0.04	0.00	1.62	0.01	0.01	0.02	0.02
109	10.90	654	0.50	0.01500	1.86	0.04	0.00	1.63	0.01	0.01	0.02	0.02
110	11.00	660	0.40	0.01200	1.87	0.04	0.00	1.64	0.01	0.01	0.02	0.02
111	11.10	666	0.40	0.01200	1.88	0.04	0.00	1.66	0.01	0.01	0.02	0.02
112	11.20	672	0.50	0.01500	1.90	0.04	0.00	1.67	0.01	0.01	0.02	0.02
113	11.30	678	0.40	0.01200	1.91	0.05	0.00	1.68	0.01	0.01	0.02	0.02
114	11.40	684	0.40	0.01200	1.92	0.05	0.00	1.70	0.01	0.01	0.02	0.02
115	11.50	690	0.40	0.01200	1.93	0.05	0.00	1.71	0.01	0.01	0.02	0.02
116	11.60	696	0.40	0.01200	1.94	0.05	0.00	1.72	0.01	0.01	0.02	0.02
117	11.70	702	0.40	0.01200	1.96	0.05	0.00	1.73	0.01	0.01	0.02	0.02
118	11.80	708	0.40	0.01200	1.97	0.06	0.00	1.74	0.01	0.01	0.02	0.02
119	11.90	714	0.30	0.00900	1.98	0.06	0.00	1.75	0.01	0.01	0.01	0.02
120	12.00	720	0.40	0.01200	1.99	0.06	0.00	1.76	0.01	0.01	0.02	0.02
121	12.10	726	0.40	0.01200	2.00	0.06	0.00	1.78	0.01	0.01	0.02	0.02
122	12.20	732	0.30	0.00900	2.01	0.06	0.00	1.78	0.01	0.01	0.01	0.02
123	12.30	738	0.40	0.01200	2.02	0.06	0.00	1.80	0.01	0.01	0.02	0.02
124	12.40	744	0.40	0.01200	2.03	0.07	0.00	1.81	0.01	0.01	0.02	0.02
125	12.50	750	0.40	0.01200	2.05	0.07	0.00	1.82	0.01	0.01	0.02	0.02
126	12.60	756	0.40	0.01200	2.06	0.07	0.00	1.83	0.01	0.01	0.02	0.02
127	12.70	762	0.30	0.00900	2.07	0.07	0.00	1.84	0.01	0.01	0.01	0.02
128	12.80	768	0.40	0.01200	2.08	0.08	0.00	1.85	0.01	0.01	0.02	0.02
129	12.90	774	0.30	0.00900	2.09	0.08	0.00	1.86	0.01	0.01	0.01	0.02
130	13.00	780	0.40	0.01200	2.10	0.08	0.00	1.87	0.01	0.01	0.02	0.02
131	13.10	786	0.40	0.01200	2.11	0.08	0.00	1.89	0.01	0.01	0.02	0.02
132	13.20	792	0.30	0.00900	2.12	0.08	0.00	1.89	0.01	0.01	0.01	0.02
133	13.30	798	0.40	0.01200	2.13	0.09	0.00	1.91	0.01	0.01	0.02	0.02
134	13.40	804	0.40	0.01200	2.15	0.09	0.00	1.92	0.01	0.01	0.02	0.02
135	13.50	810	0.30	0.00900	2.15	0.09	0.00	1.93	0.01	0.01	0.01	0.02
136	13.60	816	0.30	0.00900	2.16	0.09	0.00	1.94	0.01	0.01	0.01	0.01
137	13.70	822	0.40	0.01200	2.18	0.09	0.00	1.95	0.01	0.01	0.02	0.02
138	13.80	828	0.30	0.00900	2.18	0.10	0.00	1.96	0.01	0.01	0.01	0.02
139	13.90	834	0.40	0.01200	2.20	0.10	0.00	1.97	0.01	0.01	0.02	0.02
140	14.00	840	0.30	0.00900	2.21	0.10	0.00	1.98	0.01	0.01	0.01	0.02
141	14.10	846	0.30	0.00900	2.21	0.10	0.00	1.99	0.01	0.01	0.01	0.01
142	14.20	852	0.40	0.01200	2.23	0.11	0.00	2.00	0.01	0.01	0.02	0.02

143	14.30	858	0.30	0.00900	2.24	0.11	0.00	2.01	0.01	0.01	0.01	0.02
144	14.40	864	0.30	0.00900	2.24	0.11	0.00	2.02	0.01	0.01	0.01	0.01
145	14.50	870	0.40	0.01200	2.26	0.11	0.00	2.03	0.01	0.01	0.02	0.02
146	14.60	876	0.30	0.00900	2.27	0.11	0.00	2.04	0.01	0.01	0.01	0.02
147	14.70	882	0.30	0.00900	2.27	0.12	0.00	2.05	0.01	0.01	0.01	0.01
148	14.80	888	0.40	0.01200	2.29	0.12	0.00	2.06	0.01	0.01	0.02	0.02
149	14.90	894	0.30	0.00900	2.30	0.12	0.00	2.07	0.01	0.01	0.01	0.02
150	15.00	900	0.30	0.00900	2.30	0.12	0.00	2.08	0.01	0.01	0.01	0.01
151	15.10	906	0.30	0.00900	2.31	0.13	0.00	2.08	0.01	0.01	0.01	0.01
152	15.20	912	0.40	0.01200	2.33	0.13	0.00	2.10	0.01	0.01	0.02	0.02
153	15.30	918	0.30	0.00900	2.33	0.13	0.00	2.11	0.01	0.01	0.01	0.02
154	15.40	924	0.30	0.00900	2.34	0.13	0.00	2.11	0.01	0.01	0.01	0.01
155	15.50	930	0.30	0.00900	2.35	0.14	0.00	2.12	0.01	0.01	0.01	0.01
156	15.60	936	0.30	0.00900	2.36	0.14	0.00	2.13	0.01	0.01	0.01	0.01
157	15.70	942	0.40	0.01200	2.37	0.14	0.00	2.14	0.01	0.01	0.02	0.02
158	15.80	948	0.30	0.00900	2.38	0.14	0.00	2.15	0.01	0.01	0.01	0.02
159	15.90	954	0.30	0.00900	2.39	0.14	0.00	2.16	0.01	0.01	0.01	0.01
160	16.00	960	0.30	0.00900	2.40	0.15	0.00	2.17	0.01	0.01	0.01	0.01
161	16.10	966	0.30	0.00900	2.41	0.15	0.00	2.18	0.01	0.01	0.01	0.01
162	16.20	972	0.30	0.00900	2.42	0.15	0.00	2.19	0.01	0.01	0.01	0.01
163	16.30	978	0.30	0.00900	2.43	0.15	0.00	2.20	0.01	0.01	0.01	0.01
164	16.40	984	0.30	0.00900	2.44	0.16	0.00	2.21	0.01	0.01	0.01	0.01
165	16.50	990	0.30	0.00900	2.45	0.16	0.00	2.22	0.01	0.01	0.01	0.01
166	16.60	996	0.30	0.00900	2.45	0.16	0.00	2.23	0.01	0.01	0.01	0.01
167	16.70	1002	0.30	0.00900	2.46	0.16	0.00	2.23	0.01	0.01	0.01	0.01
168	16.80	1008	0.30	0.00900	2.47	0.17	0.00	2.24	0.01	0.01	0.01	0.01
169	16.90	1014	0.30	0.00900	2.48	0.17	0.00	2.25	0.01	0.01	0.01	0.01
170	17.00	1020	0.30	0.00900	2.49	0.17	0.00	2.26	0.01	0.01	0.01	0.01
171	17.10	1026	0.30	0.00900	2.50	0.17	0.00	2.27	0.01	0.01	0.01	0.01
172	17.20	1032	0.30	0.00900	2.51	0.18	0.00	2.28	0.01	0.01	0.01	0.01
173	17.30	1038	0.30	0.00900	2.52	0.18	0.00	2.29	0.01	0.01	0.01	0.01
174	17.40	1044	0.30	0.00900	2.53	0.18	0.00	2.30	0.01	0.01	0.01	0.01
175	17.50	1050	0.30	0.00900	2.54	0.18	0.00	2.31	0.01	0.01	0.01	0.01
176	17.60	1056	0.30	0.00900	2.54	0.19	0.00	2.31	0.01	0.01	0.01	0.01
177	17.70	1062	0.20	0.00600	2.55	0.19	0.00	2.32	0.01	0.01	0.01	0.01
178	17.80	1068	0.30	0.00900	2.56	0.19	0.00	2.33	0.01	0.01	0.01	0.01
179	17.90	1074	0.30	0.00900	2.57	0.19	0.00	2.34	0.01	0.01	0.01	0.01
180	18.00	1080	0.30	0.00900	2.58	0.20	0.00	2.35	0.01	0.01	0.01	0.01
181	18.10	1086	0.30	0.00900	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.01
182	18.20	1092	0.20	0.00600	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.01
183	18.30	1098	0.30	0.00900	2.60	0.20	0.00	2.37	0.01	0.01	0.01	0.01
184	18.40	1104	0.30	0.00900	2.61	0.21	0.00	2.38	0.01	0.01	0.01	0.01
185	18.50	1110	0.30	0.00900	2.62	0.21	0.00	2.39	0.01	0.01	0.01	0.01
186	18.60	1116	0.20	0.00600	2.62	0.21	0.00	2.40	0.01	0.01	0.01	0.01
187	18.70	1122	0.30	0.00900	2.63	0.21	0.00	2.40	0.01	0.01	0.01	0.01
188	18.80	1128	0.30	0.00900	2.64	0.22	0.00	2.41	0.01	0.01	0.01	0.01
189	18.90	1134	0.20	0.00600	2.65	0.22	0.00	2.42	0.01	0.01	0.01	0.01
190	19.00	1140	0.30	0.00900	2.66	0.22	0.00	2.43	0.01	0.01	0.01	0.01
191	19.10	1146	0.30	0.00900	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.01
192	19.20	1152	0.20	0.00600	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.01
193	19.30	1158	0.30	0.00900	2.68	0.23	0.00	2.45	0.01	0.01	0.01	0.01
194	19.40	1164	0.20	0.00600	2.69	0.23	0.00	2.46	0.01	0.01	0.01	0.01
195	19.50	1170	0.30	0.00900	2.70	0.23	0.00	2.47	0.01	0.01	0.01	0.01
196	19.60	1176	0.30	0.00900	2.71	0.23	0.00	2.48	0.01	0.01	0.01	0.01
197	19.70	1182	0.20	0.00600	2.71	0.24	0.00	2.48	0.01	0.01	0.01	0.01
198	19.80	1188	0.30	0.00900	2.72	0.24	0.00	2.49	0.01	0.01	0.01	0.01
199	19.90	1194	0.20	0.00600	2.73	0.24	0.00	2.50	0.01	0.01	0.01	0.01
200	20.00	1200	0.30	0.00900	2.74	0.24	0.00	2.51	0.01	0.01	0.01	0.01
201	20.10	1206	0.20	0.00600	2.74	0.25	0.00	2.51	0.01	0.01	0.01	0.01
202	20.20	1212	0.30	0.00900	2.75	0.25	0.00	2.52	0.01	0.01	0.01	0.01
203	20.30	1218	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
204	20.40	1224	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
205	20.50	1230	0.30	0.00900	2.77	0.26	0.00	2.54	0.01	0.01	0.01	0.01
206	20.60	1236	0.20	0.00600	2.78	0.26	0.00	2.55	0.01	0.01	0.01	0.01
207	20.70	1242	0.30	0.00900	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.01
208	20.80	1248	0.20	0.00600	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.01
209	20.90	1254	0.20	0.00600	2.80	0.26	0.00	2.57	0.01	0.01	0.01	0.01
210	21.00	1260	0.30	0.00900	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.01
211	21.10	1266	0.20	0.00600	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.01
212	21.20	1272	0.20	0.00600	2.82	0.27	0.00	2.59	0.01	0.01	0.01	0.01
213	21.30	1278	0.30	0.00900	2.83	0.27	0.00	2.60	0.01	0.01	0.01	0.01
214	21.40	1284	0.20	0.00600	2.83	0.28	0.00	2.60	0.01	0.01	0.01	0.01
215	21.50	1290	0.20	0.00600	2.84	0.28	0.00	2.61	0.01	0.01	0.01	0.01
216	21.60	1296	0.30	0.00900	2.85	0.28	0.00	2.62	0.01	0.01	0.01	0.01
217	21.70	1302	0.20	0.00600	2.86	0.28	0.00	2.62	0.01	0.01	0.01	0.01
218	21.80	1308	0.20	0.00600	2.86	0.29	0.00	2.63	0.01	0.01	0.01	0.01
219	21.90	1314	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
220	22.00	1320	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
221	22.10	1326	0.30	0.00900	2.88	0.29	0.00	2.65	0.01	0.01	0.01	0.01
222	22.20	1332	0.20	0.00600	2.89	0.29	0.00	2.66	0.01	0.01	0.01	0.01
223	22.30	1338	0.20	0.00600	2.89	0.30	0.00	2.66	0.01	0.01	0.01	0.01
224	22.40	1344	0.20	0.00600	2.90	0.30	0.00	2.67	0.01	0.01	0.01	0.01

	225	22.50	1350	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	226	22.60	1356	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	227	22.70	1362	0.20	0.00600	2.92	0.30	0.00	2.69	0.01	0.01	0.01	0.01
	228	22.80	1368	0.20	0.00600	2.92	0.31	0.00	2.69	0.01	0.01	0.01	0.01
	229	22.90	1374	0.20	0.00600	2.93	0.31	0.00	2.70	0.01	0.01	0.01	0.01
	230	23.00	1380	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	231	23.10	1386	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	232	23.20	1392	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	233	23.30	1398	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	234	23.40	1404	0.20	0.00600	2.96	0.32	0.00	2.73	0.01	0.01	0.01	0.01
	235	23.50	1410	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	236	23.60	1416	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	237	23.70	1422	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	238	23.80	1428	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	239	23.90	1434	0.20	0.00600	2.99	0.33	0.00	2.76	0.01	0.01	0.01	0.01
	240	24.00	1440	0.20	0.00600	3.00	0.33	0.00	2.77	0.01	0.01	0.01	0.01
Volume:	2664											Max:	0.11
	0.061149												

Project: City of Sammamish Louis Thompson Tightline
Compute: 10-YR Stormwater Runoff Volume for the Construction Work Zone 4 (SBUH Hydrograph)
Construction Work Area : 0.49 acres

INPUT

Given:

Total Project Area		
A_t=	21,442	ft^2
P_t=	3	inches
d_t=	10	min
T_c=	5	min
w=	0.5	

Pervious Area[1]		Impervious Area[1]		Units
A_p=	0	A_i=	21442	ft^2
CN_p=	60	CN_i=	98	
S_p=	6.667	S_i=	0.204	inches
$0.2S_p$=	1.333	$0.2S_i$=	0.041	inches

1) Assume all area within the construction work zone area is impervious

Time			Rainfall			Pevious Area		Impervious Area		Total Runoff/Hydrographs		
Time Step No. #	Time (hr)	Time (min)	Rainfall Distri-bution (% of Pt)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Total Project Runoff (inches)	Instant Hydrograph (cfs)	Design Hydrograph (cfs)
0	0.00	0	0.00	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	6	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.20	12	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.30	18	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.40	24	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.50	30	0.20	0.00600	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.60	36	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.70	42	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.80	48	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.90	54	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	60	0.20	0.00600	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.10	66	0.30	0.00900	0.07	0.00	0.00	0.00	0.00	0.00	0.01	0.00
12	1.20	72	0.30	0.00900	0.08	0.00	0.00	0.01	0.00	0.00	0.01	0.01
13	1.30	78	0.30	0.00900	0.09	0.00	0.00	0.01	0.00	0.00	0.01	0.01
14	1.40	84	0.30	0.00900	0.10	0.00	0.00	0.01	0.00	0.00	0.01	0.01
15	1.50	90	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
16	1.60	96	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
17	1.70	102	0.30	0.00900	0.12	0.00	0.00	0.02	0.00	0.00	0.01	0.01
18	1.80	108	0.30	0.00900	0.13	0.00	0.00	0.03	0.00	0.00	0.01	0.01
19	1.90	114	0.30	0.00900	0.14	0.00	0.00	0.03	0.00	0.00	0.01	0.01
20	2.00	120	0.30	0.00900	0.15	0.00	0.00	0.04	0.01	0.01	0.02	0.01
21	2.10	126	0.30	0.00900	0.16	0.00	0.00	0.04	0.01	0.01	0.02	0.02
22	2.20	132	0.30	0.00900	0.17	0.00	0.00	0.05	0.01	0.01	0.02	0.02
23	2.30	138	0.40	0.01200	0.18	0.00	0.00	0.06	0.01	0.01	0.02	0.02
24	2.40	144	0.30	0.00900	0.19	0.00	0.00	0.06	0.01	0.01	0.02	0.02
25	2.50	150	0.30	0.00900	0.20	0.00	0.00	0.07	0.01	0.01	0.02	0.02
26	2.60	156	0.30	0.00900	0.21	0.00	0.00	0.07	0.01	0.01	0.02	0.02
27	2.70	162	0.30	0.00900	0.22	0.00	0.00	0.08	0.01	0.01	0.02	0.02
28	2.80	168	0.40	0.01200	0.23	0.00	0.00	0.09	0.01	0.01	0.03	0.02
29	2.90	174	0.30	0.00900	0.24	0.00	0.00	0.10	0.01	0.01	0.02	0.02
30	3.00	180	0.30	0.00900	0.25	0.00	0.00	0.10	0.01	0.01	0.02	0.02
31	3.10	186	0.30	0.00900	0.26	0.00	0.00	0.11	0.01	0.01	0.02	0.02
32	3.20	192	0.30	0.00900	0.26	0.00	0.00	0.12	0.01	0.01	0.02	0.02
33	3.30	198	0.30	0.00900	0.27	0.00	0.00	0.12	0.01	0.01	0.02	0.02
34	3.40	204	0.30	0.00900	0.28	0.00	0.00	0.13	0.01	0.01	0.02	0.02
35	3.50	210	0.30	0.00900	0.29	0.00	0.00	0.14	0.01	0.01	0.02	0.02
36	3.60	216	0.30	0.00900	0.30	0.00	0.00	0.15	0.01	0.01	0.02	0.02
37	3.70	222	0.40	0.01200	0.31	0.00	0.00	0.15	0.01	0.01	0.03	0.03
38	3.80	228	0.40	0.01200	0.32	0.00	0.00	0.16	0.01	0.01	0.03	0.03
39	3.90	234	0.30	0.00900	0.33	0.00	0.00	0.17	0.01	0.01	0.02	0.03
40	4.00	240	0.40	0.01200	0.35	0.00	0.00	0.18	0.01	0.01	0.03	0.03
41	4.10	246	0.40	0.01200	0.36	0.00	0.00	0.19	0.01	0.01	0.03	0.03
42	4.20	252	0.30	0.00900	0.37	0.00	0.00	0.20	0.01	0.01	0.02	0.03
43	4.30	258	0.40	0.01200	0.38	0.00	0.00	0.21	0.01	0.01	0.03	0.03
44	4.40	264	0.40	0.01200	0.39	0.00	0.00	0.22	0.01	0.01	0.03	0.03
45	4.50	270	0.40	0.01200	0.40	0.00	0.00	0.23	0.01	0.01	0.03	0.03
46	4.60	276	0.40	0.01200	0.41	0.00	0.00	0.24	0.01	0.01	0.03	0.03
47	4.70	282	0.40	0.01200	0.43	0.00	0.00	0.25	0.01	0.01	0.03	0.03
48	4.80	288	0.40	0.01200	0.44	0.00	0.00	0.26	0.01	0.01	0.03	0.03
49	4.90	294	0.50	0.01500	0.45	0.00	0.00	0.28	0.01	0.01	0.04	0.04
50	5.00	300	0.40	0.01200	0.47	0.00	0.00	0.29	0.01	0.01	0.03	0.04
51	5.10	306	0.50	0.01500	0.48	0.00	0.00	0.30	0.01	0.01	0.04	0.04
52	5.20	312	0.40	0.01200	0.49	0.00	0.00	0.31	0.01	0.01	0.03	0.04
53	5.30	318	0.50	0.01500	0.51	0.00	0.00	0.32	0.01	0.01	0.04	0.04
54	5.40	324	0.50	0.01500	0.52	0.00	0.00	0.34	0.01	0.01	0.04	0.04
55	5.50	330	0.50	0.01500	0.54	0.00	0.00	0.35	0.01	0.01	0.04	0.04
56	5.60	336	0.50	0.01500	0.55	0.00	0.00	0.37	0.01	0.01	0.04	0.04
57	5.70	342	0.50	0.01500	0.57	0.00	0.00	0.38	0.01	0.01	0.04	0.04
58	5.80	348	0.50	0.01500	0.58	0.00	0.00	0.39	0.01	0.01	0.04	0.04
59	5.90	354	0.50	0.01500	0.60	0.00	0.00	0.41	0.01	0.01	0.04	0.04
60	6.00	360	0.60	0.01800	0.62	0.00	0.00	0.42	0.02	0.02	0.05	0.05

61	6.10	366	0.60	0.01800	0.63	0.00	0.00	0.44	0.02	0.02	0.05	0.05
62	6.20	372	0.60	0.01800	0.65	0.00	0.00	0.46	0.02	0.02	0.05	0.05
63	6.30	378	0.60	0.01800	0.67	0.00	0.00	0.47	0.02	0.02	0.05	0.05
64	6.40	384	0.70	0.02100	0.69	0.00	0.00	0.49	0.02	0.02	0.06	0.05
65	6.50	390	0.60	0.01800	0.71	0.00	0.00	0.51	0.02	0.02	0.05	0.05
66	6.60	396	0.60	0.01800	0.73	0.00	0.00	0.53	0.02	0.02	0.05	0.05
67	6.70	402	0.60	0.01800	0.74	0.00	0.00	0.55	0.02	0.02	0.05	0.05
68	6.80	408	0.60	0.01800	0.76	0.00	0.00	0.56	0.02	0.02	0.05	0.05
69	6.90	414	0.60	0.01800	0.78	0.00	0.00	0.58	0.02	0.02	0.05	0.05
70	7.00	420	0.70	0.02100	0.80	0.00	0.00	0.60	0.02	0.02	0.06	0.06
71	7.10	426	0.70	0.02100	0.82	0.00	0.00	0.62	0.02	0.02	0.06	0.06
72	7.20	432	0.80	0.02400	0.85	0.00	0.00	0.64	0.02	0.02	0.07	0.06
73	7.30	438	0.80	0.02400	0.87	0.00	0.00	0.67	0.02	0.02	0.07	0.07
74	7.40	444	0.90	0.02700	0.90	0.00	0.00	0.69	0.03	0.03	0.08	0.07
75	7.50	450	1.00	0.03000	0.93	0.00	0.00	0.72	0.03	0.03	0.09	0.08
76	7.60	456	2.10	0.06300	0.99	0.00	0.00	0.78	0.06	0.06	0.18	0.13
77	7.70	462	2.40	0.07200	1.06	0.00	0.00	0.85	0.07	0.07	0.21	0.19
78	7.80	468	2.40	0.07200	1.13	0.00	0.00	0.92	0.07	0.07	0.21	0.21
79	7.90	474	2.40	0.07200	1.21	0.00	0.00	0.99	0.07	0.07	0.21	0.21
80	8.00	480	2.20	0.06600	1.27	0.00	0.00	1.06	0.06	0.06	0.19	0.20
81	8.10	486	1.40	0.04200	1.31	0.00	0.00	1.10	0.04	0.04	0.12	0.16
82	8.20	492	1.30	0.03900	1.35	0.00	0.00	1.14	0.04	0.04	0.11	0.12
83	8.30	498	1.00	0.03000	1.38	0.00	0.00	1.17	0.03	0.03	0.09	0.10
84	8.40	504	1.00	0.03000	1.41	0.00	0.00	1.19	0.03	0.03	0.09	0.09
85	8.50	510	0.80	0.02400	1.44	0.00	0.00	1.22	0.02	0.02	0.07	0.08
86	8.60	516	0.90	0.02700	1.46	0.00	0.00	1.24	0.03	0.03	0.08	0.07
87	8.70	522	0.90	0.02700	1.49	0.00	0.00	1.27	0.03	0.03	0.08	0.08
88	8.80	528	0.70	0.02100	1.51	0.00	0.00	1.29	0.02	0.02	0.06	0.07
89	8.90	534	0.80	0.02400	1.54	0.01	0.00	1.32	0.02	0.02	0.07	0.07
90	9.00	540	0.70	0.02100	1.56	0.01	0.00	1.34	0.02	0.02	0.06	0.07
91	9.10	546	0.70	0.02100	1.58	0.01	0.00	1.36	0.02	0.02	0.06	0.06
92	9.20	552	0.60	0.01800	1.60	0.01	0.00	1.37	0.02	0.02	0.05	0.06
93	9.30	558	0.60	0.01800	1.61	0.01	0.00	1.39	0.02	0.02	0.05	0.05
94	9.40	564	0.60	0.01800	1.63	0.01	0.00	1.41	0.02	0.02	0.05	0.05
95	9.50	570	0.50	0.01500	1.65	0.01	0.00	1.43	0.01	0.01	0.04	0.05
96	9.60	576	0.60	0.01800	1.67	0.02	0.00	1.44	0.02	0.02	0.05	0.05
97	9.70	582	0.50	0.01500	1.68	0.02	0.00	1.46	0.01	0.01	0.04	0.05
98	9.80	588	0.60	0.01800	1.70	0.02	0.00	1.48	0.02	0.02	0.05	0.05
99	9.90	594	0.50	0.01500	1.71	0.02	0.00	1.49	0.01	0.01	0.04	0.05
100	10.00	600	0.50	0.01500	1.73	0.02	0.00	1.51	0.01	0.01	0.04	0.04
101	10.10	606	0.50	0.01500	1.74	0.02	0.00	1.52	0.01	0.01	0.04	0.04
102	10.20	612	0.50	0.01500	1.76	0.03	0.00	1.53	0.01	0.01	0.04	0.04
103	10.30	618	0.50	0.01500	1.77	0.03	0.00	1.55	0.01	0.01	0.04	0.04
104	10.40	624	0.40	0.01200	1.79	0.03	0.00	1.56	0.01	0.01	0.04	0.04
105	10.50	630	0.50	0.01500	1.80	0.03	0.00	1.58	0.01	0.01	0.04	0.04
106	10.60	636	0.50	0.01500	1.82	0.03	0.00	1.59	0.01	0.01	0.04	0.04
107	10.70	642	0.40	0.01200	1.83	0.03	0.00	1.60	0.01	0.01	0.04	0.04
108	10.80	648	0.50	0.01500	1.84	0.04	0.00	1.62	0.01	0.01	0.04	0.04
109	10.90	654	0.50	0.01500	1.86	0.04	0.00	1.63	0.01	0.01	0.04	0.04
110	11.00	660	0.40	0.01200	1.87	0.04	0.00	1.64	0.01	0.01	0.04	0.04
111	11.10	666	0.40	0.01200	1.88	0.04	0.00	1.66	0.01	0.01	0.04	0.04
112	11.20	672	0.50	0.01500	1.90	0.04	0.00	1.67	0.01	0.01	0.04	0.04
113	11.30	678	0.40	0.01200	1.91	0.05	0.00	1.68	0.01	0.01	0.04	0.04
114	11.40	684	0.40	0.01200	1.92	0.05	0.00	1.70	0.01	0.01	0.04	0.04
115	11.50	690	0.40	0.01200	1.93	0.05	0.00	1.71	0.01	0.01	0.04	0.04
116	11.60	696	0.40	0.01200	1.94	0.05	0.00	1.72	0.01	0.01	0.04	0.04
117	11.70	702	0.40	0.01200	1.96	0.05	0.00	1.73	0.01	0.01	0.04	0.04
118	11.80	708	0.40	0.01200	1.97	0.06	0.00	1.74	0.01	0.01	0.04	0.04
119	11.90	714	0.30	0.00900	1.98	0.06	0.00	1.75	0.01	0.01	0.03	0.03
120	12.00	720	0.40	0.01200	1.99	0.06	0.00	1.76	0.01	0.01	0.04	0.03
121	12.10	726	0.40	0.01200	2.00	0.06	0.00	1.78	0.01	0.01	0.04	0.04
122	12.20	732	0.30	0.00900	2.01	0.06	0.00	1.78	0.01	0.01	0.03	0.03
123	12.30	738	0.40	0.01200	2.02	0.06	0.00	1.80	0.01	0.01	0.04	0.03
124	12.40	744	0.40	0.01200	2.03	0.07	0.00	1.81	0.01	0.01	0.04	0.04
125	12.50	750	0.40	0.01200	2.05	0.07	0.00	1.82	0.01	0.01	0.04	0.04
126	12.60	756	0.40	0.01200	2.06	0.07	0.00	1.83	0.01	0.01	0.04	0.04
127	12.70	762	0.30	0.00900	2.07	0.07	0.00	1.84	0.01	0.01	0.03	0.03
128	12.80	768	0.40	0.01200	2.08	0.08	0.00	1.85	0.01	0.01	0.04	0.03
129	12.90	774	0.30	0.00900	2.09	0.08	0.00	1.86	0.01	0.01	0.03	0.03
130	13.00	780	0.40	0.01200	2.10	0.08	0.00	1.87	0.01	0.01	0.04	0.03
131	13.10	786	0.40	0.01200	2.11	0.08	0.00	1.89	0.01	0.01	0.04	0.04
132	13.20	792	0.30	0.00900	2.12	0.08	0.00	1.89	0.01	0.01	0.03	0.03
133	13.30	798	0.40	0.01200	2.13	0.09	0.00	1.91	0.01	0.01	0.04	0.03
134	13.40	804	0.40	0.01200	2.15	0.09	0.00	1.92	0.01	0.01	0.04	0.04
135	13.50	810	0.30	0.00900	2.15	0.09	0.00	1.93	0.01	0.01	0.03	0.03
136	13.60	816	0.30	0.00900	2.16	0.09	0.00	1.94	0.01	0.01	0.03	0.03
137	13.70	822	0.40	0.01200	2.18	0.09	0.00	1.95	0.01	0.01	0.04	0.03
138	13.80	828	0.30	0.00900	2.18	0.10	0.00	1.96	0.01	0.01	0.03	0.03
139	13.90	834	0.40	0.01200	2.20	0.10	0.00	1.97	0.01	0.01	0.04	0.03
140	14.00	840	0.30	0.00900	2.21	0.10	0.00	1.98	0.01	0.01	0.03	0.03
141	14.10	846	0.30	0.00900	2.21	0.10	0.00	1.99	0.01	0.01	0.03	0.03
142	14.20	852	0.40	0.01200	2.23	0.11	0.00	2.00	0.01	0.01	0.04	0.03

143	14.30	858	0.30	0.00900	2.24	0.11	0.00	2.01	0.01	0.01	0.03	0.03
144	14.40	864	0.30	0.00900	2.24	0.11	0.00	2.02	0.01	0.01	0.03	0.03
145	14.50	870	0.40	0.01200	2.26	0.11	0.00	2.03	0.01	0.01	0.04	0.03
146	14.60	876	0.30	0.00900	2.27	0.11	0.00	2.04	0.01	0.01	0.03	0.03
147	14.70	882	0.30	0.00900	2.27	0.12	0.00	2.05	0.01	0.01	0.03	0.03
148	14.80	888	0.40	0.01200	2.29	0.12	0.00	2.06	0.01	0.01	0.04	0.03
149	14.90	894	0.30	0.00900	2.30	0.12	0.00	2.07	0.01	0.01	0.03	0.03
150	15.00	900	0.30	0.00900	2.30	0.12	0.00	2.08	0.01	0.01	0.03	0.03
151	15.10	906	0.30	0.00900	2.31	0.13	0.00	2.08	0.01	0.01	0.03	0.03
152	15.20	912	0.40	0.01200	2.33	0.13	0.00	2.10	0.01	0.01	0.04	0.03
153	15.30	918	0.30	0.00900	2.33	0.13	0.00	2.11	0.01	0.01	0.03	0.03
154	15.40	924	0.30	0.00900	2.34	0.13	0.00	2.11	0.01	0.01	0.03	0.03
155	15.50	930	0.30	0.00900	2.35	0.14	0.00	2.12	0.01	0.01	0.03	0.03
156	15.60	936	0.30	0.00900	2.36	0.14	0.00	2.13	0.01	0.01	0.03	0.03
157	15.70	942	0.40	0.01200	2.37	0.14	0.00	2.14	0.01	0.01	0.04	0.03
158	15.80	948	0.30	0.00900	2.38	0.14	0.00	2.15	0.01	0.01	0.03	0.03
159	15.90	954	0.30	0.00900	2.39	0.14	0.00	2.16	0.01	0.01	0.03	0.03
160	16.00	960	0.30	0.00900	2.40	0.15	0.00	2.17	0.01	0.01	0.03	0.03
161	16.10	966	0.30	0.00900	2.41	0.15	0.00	2.18	0.01	0.01	0.03	0.03
162	16.20	972	0.30	0.00900	2.42	0.15	0.00	2.19	0.01	0.01	0.03	0.03
163	16.30	978	0.30	0.00900	2.43	0.15	0.00	2.20	0.01	0.01	0.03	0.03
164	16.40	984	0.30	0.00900	2.44	0.16	0.00	2.21	0.01	0.01	0.03	0.03
165	16.50	990	0.30	0.00900	2.45	0.16	0.00	2.22	0.01	0.01	0.03	0.03
166	16.60	996	0.30	0.00900	2.45	0.16	0.00	2.23	0.01	0.01	0.03	0.03
167	16.70	1002	0.30	0.00900	2.46	0.16	0.00	2.23	0.01	0.01	0.03	0.03
168	16.80	1008	0.30	0.00900	2.47	0.17	0.00	2.24	0.01	0.01	0.03	0.03
169	16.90	1014	0.30	0.00900	2.48	0.17	0.00	2.25	0.01	0.01	0.03	0.03
170	17.00	1020	0.30	0.00900	2.49	0.17	0.00	2.26	0.01	0.01	0.03	0.03
171	17.10	1026	0.30	0.00900	2.50	0.17	0.00	2.27	0.01	0.01	0.03	0.03
172	17.20	1032	0.30	0.00900	2.51	0.18	0.00	2.28	0.01	0.01	0.03	0.03
173	17.30	1038	0.30	0.00900	2.52	0.18	0.00	2.29	0.01	0.01	0.03	0.03
174	17.40	1044	0.30	0.00900	2.53	0.18	0.00	2.30	0.01	0.01	0.03	0.03
175	17.50	1050	0.30	0.00900	2.54	0.18	0.00	2.31	0.01	0.01	0.03	0.03
176	17.60	1056	0.30	0.00900	2.54	0.19	0.00	2.31	0.01	0.01	0.03	0.03
177	17.70	1062	0.20	0.00600	2.55	0.19	0.00	2.32	0.01	0.01	0.02	0.02
178	17.80	1068	0.30	0.00900	2.56	0.19	0.00	2.33	0.01	0.01	0.03	0.02
179	17.90	1074	0.30	0.00900	2.57	0.19	0.00	2.34	0.01	0.01	0.03	0.03
180	18.00	1080	0.30	0.00900	2.58	0.20	0.00	2.35	0.01	0.01	0.03	0.03
181	18.10	1086	0.30	0.00900	2.59	0.20	0.00	2.36	0.01	0.01	0.03	0.03
182	18.20	1092	0.20	0.00600	2.59	0.20	0.00	2.36	0.01	0.01	0.02	0.02
183	18.30	1098	0.30	0.00900	2.60	0.20	0.00	2.37	0.01	0.01	0.03	0.02
184	18.40	1104	0.30	0.00900	2.61	0.21	0.00	2.38	0.01	0.01	0.03	0.03
185	18.50	1110	0.30	0.00900	2.62	0.21	0.00	2.39	0.01	0.01	0.03	0.03
186	18.60	1116	0.20	0.00600	2.62	0.21	0.00	2.40	0.01	0.01	0.02	0.02
187	18.70	1122	0.30	0.00900	2.63	0.21	0.00	2.40	0.01	0.01	0.03	0.02
188	18.80	1128	0.30	0.00900	2.64	0.22	0.00	2.41	0.01	0.01	0.03	0.03
189	18.90	1134	0.20	0.00600	2.65	0.22	0.00	2.42	0.01	0.01	0.02	0.02
190	19.00	1140	0.30	0.00900	2.66	0.22	0.00	2.43	0.01	0.01	0.03	0.02
191	19.10	1146	0.30	0.00900	2.67	0.22	0.00	2.44	0.01	0.01	0.03	0.03
192	19.20	1152	0.20	0.00600	2.67	0.22	0.00	2.44	0.01	0.01	0.02	0.02
193	19.30	1158	0.30	0.00900	2.68	0.23	0.00	2.45	0.01	0.01	0.03	0.02
194	19.40	1164	0.20	0.00600	2.69	0.23	0.00	2.46	0.01	0.01	0.02	0.02
195	19.50	1170	0.30	0.00900	2.70	0.23	0.00	2.47	0.01	0.01	0.03	0.02
196	19.60	1176	0.30	0.00900	2.71	0.23	0.00	2.48	0.01	0.01	0.03	0.03
197	19.70	1182	0.20	0.00600	2.71	0.24	0.00	2.48	0.01	0.01	0.02	0.02
198	19.80	1188	0.30	0.00900	2.72	0.24	0.00	2.49	0.01	0.01	0.03	0.02
199	19.90	1194	0.20	0.00600	2.73	0.24	0.00	2.50	0.01	0.01	0.02	0.02
200	20.00	1200	0.30	0.00900	2.74	0.24	0.00	2.51	0.01	0.01	0.03	0.02
201	20.10	1206	0.20	0.00600	2.74	0.25	0.00	2.51	0.01	0.01	0.02	0.02
202	20.20	1212	0.30	0.00900	2.75	0.25	0.00	2.52	0.01	0.01	0.03	0.02
203	20.30	1218	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.02	0.02
204	20.40	1224	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.02	0.02
205	20.50	1230	0.30	0.00900	2.77	0.26	0.00	2.54	0.01	0.01	0.03	0.02
206	20.60	1236	0.20	0.00600	2.78	0.26	0.00	2.55	0.01	0.01	0.02	0.02
207	20.70	1242	0.30	0.00900	2.79	0.26	0.00	2.56	0.01	0.01	0.03	0.02
208	20.80	1248	0.20	0.00600	2.79	0.26	0.00	2.56	0.01	0.01	0.02	0.02
209	20.90	1254	0.20	0.00600	2.80	0.26	0.00	2.57	0.01	0.01	0.02	0.02
210	21.00	1260	0.30	0.00900	2.81	0.27	0.00	2.58	0.01	0.01	0.03	0.02
211	21.10	1266	0.20	0.00600	2.81	0.27	0.00	2.58	0.01	0.01	0.02	0.02
212	21.20	1272	0.20	0.00600	2.82	0.27	0.00	2.59	0.01	0.01	0.02	0.02
213	21.30	1278	0.30	0.00900	2.83	0.27	0.00	2.60	0.01	0.01	0.03	0.02
214	21.40	1284	0.20	0.00600	2.83	0.28	0.00	2.60	0.01	0.01	0.02	0.02
215	21.50	1290	0.20	0.00600	2.84	0.28	0.00	2.61	0.01	0.01	0.02	0.02
216	21.60	1296	0.30	0.00900	2.85	0.28	0.00	2.62	0.01	0.01	0.03	0.02
217	21.70	1302	0.20	0.00600	2.86	0.28	0.00	2.62	0.01	0.01	0.02	0.02
218	21.80	1308	0.20	0.00600	2.86	0.29	0.00	2.63	0.01	0.01	0.02	0.02
219	21.90	1314	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.02	0.02
220	22.00	1320	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.02	0.02
221	22.10	1326	0.30	0.00900	2.88	0.29	0.00	2.65	0.01	0.01	0.03	0.02
222	22.20	1332	0.20	0.00600	2.89	0.29	0.00	2.66	0.01	0.01	0.02	0.02
223	22.30	1338	0.20	0.00600	2.89	0.30	0.00	2.66	0.01	0.01	0.02	0.02
224	22.40	1344	0.20	0.00600	2.90	0.30	0.00	2.67	0.01	0.01	0.02	0.02

	225	22.50	1350	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.02	0.02
	226	22.60	1356	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.02	0.02
	227	22.70	1362	0.20	0.00600	2.92	0.30	0.00	2.69	0.01	0.01	0.02	0.02
	228	22.80	1368	0.20	0.00600	2.92	0.31	0.00	2.69	0.01	0.01	0.02	0.02
	229	22.90	1374	0.20	0.00600	2.93	0.31	0.00	2.70	0.01	0.01	0.02	0.02
	230	23.00	1380	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.02	0.02
	231	23.10	1386	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.02	0.02
	232	23.20	1392	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.02	0.02
	233	23.30	1398	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.02	0.02
	234	23.40	1404	0.20	0.00600	2.96	0.32	0.00	2.73	0.01	0.01	0.02	0.02
	235	23.50	1410	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.02	0.02
	236	23.60	1416	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.02	0.02
	237	23.70	1422	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.02	0.02
	238	23.80	1428	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.02	0.02
	239	23.90	1434	0.20	0.00600	2.99	0.33	0.00	2.76	0.01	0.01	0.02	0.02
	240	24.00	1440	0.20	0.00600	3.00	0.33	0.00	2.77	0.01	0.01	0.02	0.02
Volume:	4936											Max:	0.21
	0.113312												

Project: City of Sammamish Louis Thompson Tightline
Compute: 10-YR Stormwater Runoff Volume for the Construction Work Zone 5 (SBUH Hydrograph)
Construction Work Area : 0.41 acres

INPUT

Given:

Total Project Area		
A_t=	17,964	ft^2
P_t=	3	inches
d_t=	10	min
T_c=	5	min
w=	0.5	

Pervious Area[1]		Impervious Area[1]		Units
A_p=	0	A_i=	17964	ft^2
CN_p=	60	CN_i=	98	
S_p=	6.667	S_i=	0.204	inches
$0.2S_p$=	1.333	$0.2S_i$=	0.041	inches

1) Assume all area within the construction work zone area is impervious

Time			Rainfall			Pevious Area		Impervious Area		Total Runoff/Hydrographs		
Time Step No. #	Time (hr)	Time (min)	Rainfall Distri-bution (% of Pt)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Total Project Runoff (inches)	Instant Hydrograph (cfs)	Design Hydrograph (cfs)
0	0.00	0	0.00	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	6	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.20	12	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.30	18	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.40	24	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.50	30	0.20	0.00600	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.60	36	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.70	42	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.80	48	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.90	54	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	60	0.20	0.00600	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.10	66	0.30	0.00900	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.20	72	0.30	0.00900	0.08	0.00	0.00	0.01	0.00	0.00	0.01	0.01
13	1.30	78	0.30	0.00900	0.09	0.00	0.00	0.01	0.00	0.00	0.01	0.01
14	1.40	84	0.30	0.00900	0.10	0.00	0.00	0.01	0.00	0.00	0.01	0.01
15	1.50	90	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
16	1.60	96	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
17	1.70	102	0.30	0.00900	0.12	0.00	0.00	0.02	0.00	0.00	0.01	0.01
18	1.80	108	0.30	0.00900	0.13	0.00	0.00	0.03	0.00	0.00	0.01	0.01
19	1.90	114	0.30	0.00900	0.14	0.00	0.00	0.03	0.00	0.00	0.01	0.01
20	2.00	120	0.30	0.00900	0.15	0.00	0.00	0.04	0.01	0.01	0.01	0.01
21	2.10	126	0.30	0.00900	0.16	0.00	0.00	0.04	0.01	0.01	0.01	0.01
22	2.20	132	0.30	0.00900	0.17	0.00	0.00	0.05	0.01	0.01	0.01	0.01
23	2.30	138	0.40	0.01200	0.18	0.00	0.00	0.06	0.01	0.01	0.02	0.02
24	2.40	144	0.30	0.00900	0.19	0.00	0.00	0.06	0.01	0.01	0.01	0.02
25	2.50	150	0.30	0.00900	0.20	0.00	0.00	0.07	0.01	0.01	0.02	0.01
26	2.60	156	0.30	0.00900	0.21	0.00	0.00	0.07	0.01	0.01	0.02	0.02
27	2.70	162	0.30	0.00900	0.22	0.00	0.00	0.08	0.01	0.01	0.02	0.02
28	2.80	168	0.40	0.01200	0.23	0.00	0.00	0.09	0.01	0.01	0.02	0.02
29	2.90	174	0.30	0.00900	0.24	0.00	0.00	0.10	0.01	0.01	0.02	0.02
30	3.00	180	0.30	0.00900	0.25	0.00	0.00	0.10	0.01	0.01	0.02	0.02
31	3.10	186	0.30	0.00900	0.26	0.00	0.00	0.11	0.01	0.01	0.02	0.02
32	3.20	192	0.30	0.00900	0.26	0.00	0.00	0.12	0.01	0.01	0.02	0.02
33	3.30	198	0.30	0.00900	0.27	0.00	0.00	0.12	0.01	0.01	0.02	0.02
34	3.40	204	0.30	0.00900	0.28	0.00	0.00	0.13	0.01	0.01	0.02	0.02
35	3.50	210	0.30	0.00900	0.29	0.00	0.00	0.14	0.01	0.01	0.02	0.02
36	3.60	216	0.30	0.00900	0.30	0.00	0.00	0.15	0.01	0.01	0.02	0.02
37	3.70	222	0.40	0.01200	0.31	0.00	0.00	0.15	0.01	0.01	0.02	0.02
38	3.80	228	0.40	0.01200	0.32	0.00	0.00	0.16	0.01	0.01	0.02	0.02
39	3.90	234	0.30	0.00900	0.33	0.00	0.00	0.17	0.01	0.01	0.02	0.02
40	4.00	240	0.40	0.01200	0.35	0.00	0.00	0.18	0.01	0.01	0.02	0.02
41	4.10	246	0.40	0.01200	0.36	0.00	0.00	0.19	0.01	0.01	0.03	0.03
42	4.20	252	0.30	0.00900	0.37	0.00	0.00	0.20	0.01	0.01	0.02	0.02
43	4.30	258	0.40	0.01200	0.38	0.00	0.00	0.21	0.01	0.01	0.03	0.02
44	4.40	264	0.40	0.01200	0.39	0.00	0.00	0.22	0.01	0.01	0.03	0.03
45	4.50	270	0.40	0.01200	0.40	0.00	0.00	0.23	0.01	0.01	0.03	0.03
46	4.60	276	0.40	0.01200	0.41	0.00	0.00	0.24	0.01	0.01	0.03	0.03
47	4.70	282	0.40	0.01200	0.43	0.00	0.00	0.25	0.01	0.01	0.03	0.03
48	4.80	288	0.40	0.01200	0.44	0.00	0.00	0.26	0.01	0.01	0.03	0.03
49	4.90	294	0.50	0.01500	0.45	0.00	0.00	0.28	0.01	0.01	0.03	0.03
50	5.00	300	0.40	0.01200	0.47	0.00	0.00	0.29	0.01	0.01	0.03	0.03
51	5.10	306	0.50	0.01500	0.48	0.00	0.00	0.30	0.01	0.01	0.03	0.03
52	5.20	312	0.40	0.01200	0.49	0.00	0.00	0.31	0.01	0.01	0.03	0.03
53	5.30	318	0.50	0.01500	0.51	0.00	0.00	0.32	0.01	0.01	0.03	0.03
54	5.40	324	0.50	0.01500	0.52	0.00	0.00	0.34	0.01	0.01	0.03	0.03
55	5.50	330	0.50	0.01500	0.54	0.00	0.00	0.35	0.01	0.01	0.03	0.03
56	5.60	336	0.50	0.01500	0.55	0.00	0.00	0.37	0.01	0.01	0.03	0.03
57	5.70	342	0.50	0.01500	0.57	0.00	0.00	0.38	0.01	0.01	0.03	0.03
58	5.80	348	0.50	0.01500	0.58	0.00	0.00	0.39	0.01	0.01	0.03	0.03
59	5.90	354	0.50	0.01500	0.60	0.00	0.00	0.41	0.01	0.01	0.03	0.03
60	6.00	360	0.60	0.01800	0.62	0.00	0.00	0.42	0.02	0.02	0.04	0.04

61	6.10	366	0.60	0.01800	0.63	0.00	0.00	0.44	0.02	0.02	0.04	0.04
62	6.20	372	0.60	0.01800	0.65	0.00	0.00	0.46	0.02	0.02	0.04	0.04
63	6.30	378	0.60	0.01800	0.67	0.00	0.00	0.47	0.02	0.02	0.04	0.04
64	6.40	384	0.70	0.02100	0.69	0.00	0.00	0.49	0.02	0.02	0.05	0.05
65	6.50	390	0.60	0.01800	0.71	0.00	0.00	0.51	0.02	0.02	0.04	0.05
66	6.60	396	0.60	0.01800	0.73	0.00	0.00	0.53	0.02	0.02	0.04	0.04
67	6.70	402	0.60	0.01800	0.74	0.00	0.00	0.55	0.02	0.02	0.04	0.04
68	6.80	408	0.60	0.01800	0.76	0.00	0.00	0.56	0.02	0.02	0.04	0.04
69	6.90	414	0.60	0.01800	0.78	0.00	0.00	0.58	0.02	0.02	0.04	0.04
70	7.00	420	0.70	0.02100	0.80	0.00	0.00	0.60	0.02	0.02	0.05	0.05
71	7.10	426	0.70	0.02100	0.82	0.00	0.00	0.62	0.02	0.02	0.05	0.05
72	7.20	432	0.80	0.02400	0.85	0.00	0.00	0.64	0.02	0.02	0.06	0.05
73	7.30	438	0.80	0.02400	0.87	0.00	0.00	0.67	0.02	0.02	0.06	0.06
74	7.40	444	0.90	0.02700	0.90	0.00	0.00	0.69	0.03	0.03	0.06	0.06
75	7.50	450	1.00	0.03000	0.93	0.00	0.00	0.72	0.03	0.03	0.07	0.07
76	7.60	456	2.10	0.06300	0.99	0.00	0.00	0.78	0.06	0.06	0.15	0.11
77	7.70	462	2.40	0.07200	1.06	0.00	0.00	0.85	0.07	0.07	0.17	0.16
78	7.80	468	2.40	0.07200	1.13	0.00	0.00	0.92	0.07	0.07	0.17	0.17
79	7.90	474	2.40	0.07200	1.21	0.00	0.00	0.99	0.07	0.07	0.18	0.18
80	8.00	480	2.20	0.06600	1.27	0.00	0.00	1.06	0.06	0.06	0.16	0.17
81	8.10	486	1.40	0.04200	1.31	0.00	0.00	1.10	0.04	0.04	0.10	0.13
82	8.20	492	1.30	0.03900	1.35	0.00	0.00	1.14	0.04	0.04	0.10	0.10
83	8.30	498	1.00	0.03000	1.38	0.00	0.00	1.17	0.03	0.03	0.07	0.08
84	8.40	504	1.00	0.03000	1.41	0.00	0.00	1.19	0.03	0.03	0.07	0.07
85	8.50	510	0.80	0.02400	1.44	0.00	0.00	1.22	0.02	0.02	0.06	0.07
86	8.60	516	0.90	0.02700	1.46	0.00	0.00	1.24	0.03	0.03	0.07	0.06
87	8.70	522	0.90	0.02700	1.49	0.00	0.00	1.27	0.03	0.03	0.07	0.07
88	8.80	528	0.70	0.02100	1.51	0.00	0.00	1.29	0.02	0.02	0.05	0.06
89	8.90	534	0.80	0.02400	1.54	0.01	0.00	1.32	0.02	0.02	0.06	0.06
90	9.00	540	0.70	0.02100	1.56	0.01	0.00	1.34	0.02	0.02	0.05	0.06
91	9.10	546	0.70	0.02100	1.58	0.01	0.00	1.36	0.02	0.02	0.05	0.05
92	9.20	552	0.60	0.01800	1.60	0.01	0.00	1.37	0.02	0.02	0.04	0.05
93	9.30	558	0.60	0.01800	1.61	0.01	0.00	1.39	0.02	0.02	0.04	0.04
94	9.40	564	0.60	0.01800	1.63	0.01	0.00	1.41	0.02	0.02	0.04	0.04
95	9.50	570	0.50	0.01500	1.65	0.01	0.00	1.43	0.01	0.01	0.04	0.04
96	9.60	576	0.60	0.01800	1.67	0.02	0.00	1.44	0.02	0.02	0.04	0.04
97	9.70	582	0.50	0.01500	1.68	0.02	0.00	1.46	0.01	0.01	0.04	0.04
98	9.80	588	0.60	0.01800	1.70	0.02	0.00	1.48	0.02	0.02	0.04	0.04
99	9.90	594	0.50	0.01500	1.71	0.02	0.00	1.49	0.01	0.01	0.04	0.04
100	10.00	600	0.50	0.01500	1.73	0.02	0.00	1.51	0.01	0.01	0.04	0.04
101	10.10	606	0.50	0.01500	1.74	0.02	0.00	1.52	0.01	0.01	0.04	0.04
102	10.20	612	0.50	0.01500	1.76	0.03	0.00	1.53	0.01	0.01	0.04	0.04
103	10.30	618	0.50	0.01500	1.77	0.03	0.00	1.55	0.01	0.01	0.04	0.04
104	10.40	624	0.40	0.01200	1.79	0.03	0.00	1.56	0.01	0.01	0.03	0.03
105	10.50	630	0.50	0.01500	1.80	0.03	0.00	1.58	0.01	0.01	0.04	0.03
106	10.60	636	0.50	0.01500	1.82	0.03	0.00	1.59	0.01	0.01	0.04	0.04
107	10.70	642	0.40	0.01200	1.83	0.03	0.00	1.60	0.01	0.01	0.03	0.03
108	10.80	648	0.50	0.01500	1.84	0.04	0.00	1.62	0.01	0.01	0.04	0.03
109	10.90	654	0.50	0.01500	1.86	0.04	0.00	1.63	0.01	0.01	0.04	0.04
110	11.00	660	0.40	0.01200	1.87	0.04	0.00	1.64	0.01	0.01	0.03	0.03
111	11.10	666	0.40	0.01200	1.88	0.04	0.00	1.66	0.01	0.01	0.03	0.03
112	11.20	672	0.50	0.01500	1.90	0.04	0.00	1.67	0.01	0.01	0.04	0.03
113	11.30	678	0.40	0.01200	1.91	0.05	0.00	1.68	0.01	0.01	0.03	0.03
114	11.40	684	0.40	0.01200	1.92	0.05	0.00	1.70	0.01	0.01	0.03	0.03
115	11.50	690	0.40	0.01200	1.93	0.05	0.00	1.71	0.01	0.01	0.03	0.03
116	11.60	696	0.40	0.01200	1.94	0.05	0.00	1.72	0.01	0.01	0.03	0.03
117	11.70	702	0.40	0.01200	1.96	0.05	0.00	1.73	0.01	0.01	0.03	0.03
118	11.80	708	0.40	0.01200	1.97	0.06	0.00	1.74	0.01	0.01	0.03	0.03
119	11.90	714	0.30	0.00900	1.98	0.06	0.00	1.75	0.01	0.01	0.02	0.03
120	12.00	720	0.40	0.01200	1.99	0.06	0.00	1.76	0.01	0.01	0.03	0.03
121	12.10	726	0.40	0.01200	2.00	0.06	0.00	1.78	0.01	0.01	0.03	0.03
122	12.20	732	0.30	0.00900	2.01	0.06	0.00	1.78	0.01	0.01	0.02	0.03
123	12.30	738	0.40	0.01200	2.02	0.06	0.00	1.80	0.01	0.01	0.03	0.03
124	12.40	744	0.40	0.01200	2.03	0.07	0.00	1.81	0.01	0.01	0.03	0.03
125	12.50	750	0.40	0.01200	2.05	0.07	0.00	1.82	0.01	0.01	0.03	0.03
126	12.60	756	0.40	0.01200	2.06	0.07	0.00	1.83	0.01	0.01	0.03	0.03
127	12.70	762	0.30	0.00900	2.07	0.07	0.00	1.84	0.01	0.01	0.02	0.03
128	12.80	768	0.40	0.01200	2.08	0.08	0.00	1.85	0.01	0.01	0.03	0.03
129	12.90	774	0.30	0.00900	2.09	0.08	0.00	1.86	0.01	0.01	0.02	0.03
130	13.00	780	0.40	0.01200	2.10	0.08	0.00	1.87	0.01	0.01	0.03	0.03
131	13.10	786	0.40	0.01200	2.11	0.08	0.00	1.89	0.01	0.01	0.03	0.03
132	13.20	792	0.30	0.00900	2.12	0.08	0.00	1.89	0.01	0.01	0.02	0.03
133	13.30	798	0.40	0.01200	2.13	0.09	0.00	1.91	0.01	0.01	0.03	0.03
134	13.40	804	0.40	0.01200	2.15	0.09	0.00	1.92	0.01	0.01	0.03	0.03
135	13.50	810	0.30	0.00900	2.15	0.09	0.00	1.93	0.01	0.01	0.02	0.03
136	13.60	816	0.30	0.00900	2.16	0.09	0.00	1.94	0.01	0.01	0.02	0.02
137	13.70	822	0.40	0.01200	2.18	0.09	0.00	1.95	0.01	0.01	0.03	0.03
138	13.80	828	0.30	0.00900	2.18	0.10	0.00	1.96	0.01	0.01	0.02	0.03
139	13.90	834	0.40	0.01200	2.20	0.10	0.00	1.97	0.01	0.01	0.03	0.03
140	14.00	840	0.30	0.00900	2.21	0.10	0.00	1.98	0.01	0.01	0.02	0.03
141	14.10	846	0.30	0.00900	2.21	0.10	0.00	1.99	0.01	0.01	0.02	0.02
142	14.20	852	0.40	0.01200	2.23	0.11	0.00	2.00	0.01	0.01	0.03	0.03

143	14.30	858	0.30	0.00900	2.24	0.11	0.00	2.01	0.01	0.01	0.02	0.03
144	14.40	864	0.30	0.00900	2.24	0.11	0.00	2.02	0.01	0.01	0.02	0.02
145	14.50	870	0.40	0.01200	2.26	0.11	0.00	2.03	0.01	0.01	0.03	0.03
146	14.60	876	0.30	0.00900	2.27	0.11	0.00	2.04	0.01	0.01	0.02	0.03
147	14.70	882	0.30	0.00900	2.27	0.12	0.00	2.05	0.01	0.01	0.02	0.02
148	14.80	888	0.40	0.01200	2.29	0.12	0.00	2.06	0.01	0.01	0.03	0.03
149	14.90	894	0.30	0.00900	2.30	0.12	0.00	2.07	0.01	0.01	0.02	0.03
150	15.00	900	0.30	0.00900	2.30	0.12	0.00	2.08	0.01	0.01	0.02	0.02
151	15.10	906	0.30	0.00900	2.31	0.13	0.00	2.08	0.01	0.01	0.02	0.02
152	15.20	912	0.40	0.01200	2.33	0.13	0.00	2.10	0.01	0.01	0.03	0.03
153	15.30	918	0.30	0.00900	2.33	0.13	0.00	2.11	0.01	0.01	0.02	0.03
154	15.40	924	0.30	0.00900	2.34	0.13	0.00	2.11	0.01	0.01	0.02	0.02
155	15.50	930	0.30	0.00900	2.35	0.14	0.00	2.12	0.01	0.01	0.02	0.02
156	15.60	936	0.30	0.00900	2.36	0.14	0.00	2.13	0.01	0.01	0.02	0.02
157	15.70	942	0.40	0.01200	2.37	0.14	0.00	2.14	0.01	0.01	0.03	0.03
158	15.80	948	0.30	0.00900	2.38	0.14	0.00	2.15	0.01	0.01	0.02	0.03
159	15.90	954	0.30	0.00900	2.39	0.14	0.00	2.16	0.01	0.01	0.02	0.02
160	16.00	960	0.30	0.00900	2.40	0.15	0.00	2.17	0.01	0.01	0.02	0.02
161	16.10	966	0.30	0.00900	2.41	0.15	0.00	2.18	0.01	0.01	0.02	0.02
162	16.20	972	0.30	0.00900	2.42	0.15	0.00	2.19	0.01	0.01	0.02	0.02
163	16.30	978	0.30	0.00900	2.43	0.15	0.00	2.20	0.01	0.01	0.02	0.02
164	16.40	984	0.30	0.00900	2.44	0.16	0.00	2.21	0.01	0.01	0.02	0.02
165	16.50	990	0.30	0.00900	2.45	0.16	0.00	2.22	0.01	0.01	0.02	0.02
166	16.60	996	0.30	0.00900	2.45	0.16	0.00	2.23	0.01	0.01	0.02	0.02
167	16.70	1002	0.30	0.00900	2.46	0.16	0.00	2.23	0.01	0.01	0.02	0.02
168	16.80	1008	0.30	0.00900	2.47	0.17	0.00	2.24	0.01	0.01	0.02	0.02
169	16.90	1014	0.30	0.00900	2.48	0.17	0.00	2.25	0.01	0.01	0.02	0.02
170	17.00	1020	0.30	0.00900	2.49	0.17	0.00	2.26	0.01	0.01	0.02	0.02
171	17.10	1026	0.30	0.00900	2.50	0.17	0.00	2.27	0.01	0.01	0.02	0.02
172	17.20	1032	0.30	0.00900	2.51	0.18	0.00	2.28	0.01	0.01	0.02	0.02
173	17.30	1038	0.30	0.00900	2.52	0.18	0.00	2.29	0.01	0.01	0.02	0.02
174	17.40	1044	0.30	0.00900	2.53	0.18	0.00	2.30	0.01	0.01	0.02	0.02
175	17.50	1050	0.30	0.00900	2.54	0.18	0.00	2.31	0.01	0.01	0.02	0.02
176	17.60	1056	0.30	0.00900	2.54	0.19	0.00	2.31	0.01	0.01	0.02	0.02
177	17.70	1062	0.20	0.00600	2.55	0.19	0.00	2.32	0.01	0.01	0.01	0.02
178	17.80	1068	0.30	0.00900	2.56	0.19	0.00	2.33	0.01	0.01	0.02	0.02
179	17.90	1074	0.30	0.00900	2.57	0.19	0.00	2.34	0.01	0.01	0.02	0.02
180	18.00	1080	0.30	0.00900	2.58	0.20	0.00	2.35	0.01	0.01	0.02	0.02
181	18.10	1086	0.30	0.00900	2.59	0.20	0.00	2.36	0.01	0.01	0.02	0.02
182	18.20	1092	0.20	0.00600	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.02
183	18.30	1098	0.30	0.00900	2.60	0.20	0.00	2.37	0.01	0.01	0.02	0.02
184	18.40	1104	0.30	0.00900	2.61	0.21	0.00	2.38	0.01	0.01	0.02	0.02
185	18.50	1110	0.30	0.00900	2.62	0.21	0.00	2.39	0.01	0.01	0.02	0.02
186	18.60	1116	0.20	0.00600	2.62	0.21	0.00	2.40	0.01	0.01	0.01	0.02
187	18.70	1122	0.30	0.00900	2.63	0.21	0.00	2.40	0.01	0.01	0.02	0.02
188	18.80	1128	0.30	0.00900	2.64	0.22	0.00	2.41	0.01	0.01	0.02	0.02
189	18.90	1134	0.20	0.00600	2.65	0.22	0.00	2.42	0.01	0.01	0.01	0.02
190	19.00	1140	0.30	0.00900	2.66	0.22	0.00	2.43	0.01	0.01	0.02	0.02
191	19.10	1146	0.30	0.00900	2.67	0.22	0.00	2.44	0.01	0.01	0.02	0.02
192	19.20	1152	0.20	0.00600	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.02
193	19.30	1158	0.30	0.00900	2.68	0.23	0.00	2.45	0.01	0.01	0.02	0.02
194	19.40	1164	0.20	0.00600	2.69	0.23	0.00	2.46	0.01	0.01	0.01	0.02
195	19.50	1170	0.30	0.00900	2.70	0.23	0.00	2.47	0.01	0.01	0.02	0.02
196	19.60	1176	0.30	0.00900	2.71	0.23	0.00	2.48	0.01	0.01	0.02	0.02
197	19.70	1182	0.20	0.00600	2.71	0.24	0.00	2.48	0.01	0.01	0.01	0.02
198	19.80	1188	0.30	0.00900	2.72	0.24	0.00	2.49	0.01	0.01	0.02	0.02
199	19.90	1194	0.20	0.00600	2.73	0.24	0.00	2.50	0.01	0.01	0.01	0.02
200	20.00	1200	0.30	0.00900	2.74	0.24	0.00	2.51	0.01	0.01	0.02	0.02
201	20.10	1206	0.20	0.00600	2.74	0.25	0.00	2.51	0.01	0.01	0.01	0.02
202	20.20	1212	0.30	0.00900	2.75	0.25	0.00	2.52	0.01	0.01	0.02	0.02
203	20.30	1218	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.02
204	20.40	1224	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
205	20.50	1230	0.30	0.00900	2.77	0.26	0.00	2.54	0.01	0.01	0.02	0.02
206	20.60	1236	0.20	0.00600	2.78	0.26	0.00	2.55	0.01	0.01	0.01	0.02
207	20.70	1242	0.30	0.00900	2.79	0.26	0.00	2.56	0.01	0.01	0.02	0.02
208	20.80	1248	0.20	0.00600	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.02
209	20.90	1254	0.20	0.00600	2.80	0.26	0.00	2.57	0.01	0.01	0.01	0.01
210	21.00	1260	0.30	0.00900	2.81	0.27	0.00	2.58	0.01	0.01	0.02	0.02
211	21.10	1266	0.20	0.00600	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.02
212	21.20	1272	0.20	0.00600	2.82	0.27	0.00	2.59	0.01	0.01	0.01	0.01
213	21.30	1278	0.30	0.00900	2.83	0.27	0.00	2.60	0.01	0.01	0.02	0.02
214	21.40	1284	0.20	0.00600	2.83	0.28	0.00	2.60	0.01	0.01	0.01	0.02
215	21.50	1290	0.20	0.00600	2.84	0.28	0.00	2.61	0.01	0.01	0.01	0.01
216	21.60	1296	0.30	0.00900	2.85	0.28	0.00	2.62	0.01	0.01	0.02	0.02
217	21.70	1302	0.20	0.00600	2.86	0.28	0.00	2.62	0.01	0.01	0.01	0.02
218	21.80	1308	0.20	0.00600	2.86	0.29	0.00	2.63	0.01	0.01	0.01	0.01
219	21.90	1314	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
220	22.00	1320	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
221	22.10	1326	0.30	0.00900	2.88	0.29	0.00	2.65	0.01	0.01	0.02	0.02
222	22.20	1332	0.20	0.00600	2.89	0.29	0.00	2.66	0.01	0.01	0.01	0.02
223	22.30	1338	0.20	0.00600	2.89	0.30	0.00	2.66	0.01	0.01	0.01	0.01
224	22.40	1344	0.20	0.00600	2.90	0.30	0.00	2.67	0.01	0.01	0.01	0.01

	225	22.50	1350	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	226	22.60	1356	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	227	22.70	1362	0.20	0.00600	2.92	0.30	0.00	2.69	0.01	0.01	0.01	0.01
	228	22.80	1368	0.20	0.00600	2.92	0.31	0.00	2.69	0.01	0.01	0.01	0.01
	229	22.90	1374	0.20	0.00600	2.93	0.31	0.00	2.70	0.01	0.01	0.01	0.01
	230	23.00	1380	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	231	23.10	1386	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	232	23.20	1392	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	233	23.30	1398	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	234	23.40	1404	0.20	0.00600	2.96	0.32	0.00	2.73	0.01	0.01	0.01	0.01
	235	23.50	1410	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	236	23.60	1416	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	237	23.70	1422	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	238	23.80	1428	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	239	23.90	1434	0.20	0.00600	2.99	0.33	0.00	2.76	0.01	0.01	0.01	0.01
	240	24.00	1440	0.20	0.00600	3.00	0.33	0.00	2.77	0.01	0.01	0.01	0.01
Volume:	4135											Max:	0.18
	0.09493												

Project: City of Sammamish Louis Thompson Tightline
Compute: 10-YR Stormwater Runoff Volume for the Construction Work Zone 6 (SBUH Hydrograph)
Construction Work Area : 0.25 acres

INPUT

Given:

Total Project Area		
A_t=	10,728	ft^2
P_t=	3	inches
d_t=	10	min
T_c=	5	min
w=	0.5	

Pervious Area[1]		Impervious Area[1]		Units
A_p=	0	A_i=	10728	ft^2
CN_p=	60	CN_i=	98	
S_p=	6.667	S_i=	0.204	inches
$0.2S_p$=	1.333	$0.2S_i$=	0.041	inches

1) Assume all area within the construction work zone area is impervious

Time			Rainfall			Pevious Area		Impervious Area		Total Runoff/Hydrographs		
Time Step No. #	Time (hr)	Time (min)	Rainfall Distri-bution (% of Pt)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Accumlated Runoff (inches)	Incremental Rainfall (inches)	Total Project Runoff (inches)	Instant Hydrograph (cfs)	Design Hydrograph (cfs)
0	0.00	0	0.00	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	6	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.20	12	0.20	0.00600	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.30	18	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.40	24	0.20	0.00600	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.50	30	0.20	0.00600	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.60	36	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.70	42	0.20	0.00600	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.80	48	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.90	54	0.20	0.00600	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	60	0.20	0.00600	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	1.10	66	0.30	0.00900	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.20	72	0.30	0.00900	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	1.30	78	0.30	0.00900	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.00
14	1.40	84	0.30	0.00900	0.10	0.00	0.00	0.01	0.00	0.00	0.00	0.00
15	1.50	90	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
16	1.60	96	0.30	0.00900	0.11	0.00	0.00	0.02	0.00	0.00	0.01	0.01
17	1.70	102	0.30	0.00900	0.12	0.00	0.00	0.02	0.00	0.00	0.01	0.01
18	1.80	108	0.30	0.00900	0.13	0.00	0.00	0.03	0.00	0.00	0.01	0.01
19	1.90	114	0.30	0.00900	0.14	0.00	0.00	0.03	0.00	0.00	0.01	0.01
20	2.00	120	0.30	0.00900	0.15	0.00	0.00	0.04	0.01	0.01	0.01	0.01
21	2.10	126	0.30	0.00900	0.16	0.00	0.00	0.04	0.01	0.01	0.01	0.01
22	2.20	132	0.30	0.00900	0.17	0.00	0.00	0.05	0.01	0.01	0.01	0.01
23	2.30	138	0.40	0.01200	0.18	0.00	0.00	0.06	0.01	0.01	0.01	0.01
24	2.40	144	0.30	0.00900	0.19	0.00	0.00	0.06	0.01	0.01	0.01	0.01
25	2.50	150	0.30	0.00900	0.20	0.00	0.00	0.07	0.01	0.01	0.01	0.01
26	2.60	156	0.30	0.00900	0.21	0.00	0.00	0.07	0.01	0.01	0.01	0.01
27	2.70	162	0.30	0.00900	0.22	0.00	0.00	0.08	0.01	0.01	0.01	0.01
28	2.80	168	0.40	0.01200	0.23	0.00	0.00	0.09	0.01	0.01	0.01	0.01
29	2.90	174	0.30	0.00900	0.24	0.00	0.00	0.10	0.01	0.01	0.01	0.01
30	3.00	180	0.30	0.00900	0.25	0.00	0.00	0.10	0.01	0.01	0.01	0.01
31	3.10	186	0.30	0.00900	0.26	0.00	0.00	0.11	0.01	0.01	0.01	0.01
32	3.20	192	0.30	0.00900	0.26	0.00	0.00	0.12	0.01	0.01	0.01	0.01
33	3.30	198	0.30	0.00900	0.27	0.00	0.00	0.12	0.01	0.01	0.01	0.01
34	3.40	204	0.30	0.00900	0.28	0.00	0.00	0.13	0.01	0.01	0.01	0.01
35	3.50	210	0.30	0.00900	0.29	0.00	0.00	0.14	0.01	0.01	0.01	0.01
36	3.60	216	0.30	0.00900	0.30	0.00	0.00	0.15	0.01	0.01	0.01	0.01
37	3.70	222	0.40	0.01200	0.31	0.00	0.00	0.15	0.01	0.01	0.01	0.01
38	3.80	228	0.40	0.01200	0.32	0.00	0.00	0.16	0.01	0.01	0.01	0.01
39	3.90	234	0.30	0.00900	0.33	0.00	0.00	0.17	0.01	0.01	0.01	0.01
40	4.00	240	0.40	0.01200	0.35	0.00	0.00	0.18	0.01	0.01	0.01	0.01
41	4.10	246	0.40	0.01200	0.36	0.00	0.00	0.19	0.01	0.01	0.02	0.01
42	4.20	252	0.30	0.00900	0.37	0.00	0.00	0.20	0.01	0.01	0.01	0.01
43	4.30	258	0.40	0.01200	0.38	0.00	0.00	0.21	0.01	0.01	0.02	0.01
44	4.40	264	0.40	0.01200	0.39	0.00	0.00	0.22	0.01	0.01	0.02	0.02
45	4.50	270	0.40	0.01200	0.40	0.00	0.00	0.23	0.01	0.01	0.02	0.02
46	4.60	276	0.40	0.01200	0.41	0.00	0.00	0.24	0.01	0.01	0.02	0.02
47	4.70	282	0.40	0.01200	0.43	0.00	0.00	0.25	0.01	0.01	0.02	0.02
48	4.80	288	0.40	0.01200	0.44	0.00	0.00	0.26	0.01	0.01	0.02	0.02
49	4.90	294	0.50	0.01500	0.45	0.00	0.00	0.28	0.01	0.01	0.02	0.02
50	5.00	300	0.40	0.01200	0.47	0.00	0.00	0.29	0.01	0.01	0.02	0.02
51	5.10	306	0.50	0.01500	0.48	0.00	0.00	0.30	0.01	0.01	0.02	0.02
52	5.20	312	0.40	0.01200	0.49	0.00	0.00	0.31	0.01	0.01	0.02	0.02
53	5.30	318	0.50	0.01500	0.51	0.00	0.00	0.32	0.01	0.01	0.02	0.02
54	5.40	324	0.50	0.01500	0.52	0.00	0.00	0.34	0.01	0.01	0.02	0.02
55	5.50	330	0.50	0.01500	0.54	0.00	0.00	0.35	0.01	0.01	0.02	0.02
56	5.60	336	0.50	0.01500	0.55	0.00	0.00	0.37	0.01	0.01	0.02	0.02
57	5.70	342	0.50	0.01500	0.57	0.00	0.00	0.38	0.01	0.01	0.02	0.02
58	5.80	348	0.50	0.01500	0.58	0.00	0.00	0.39	0.01	0.01	0.02	0.02
59	5.90	354	0.50	0.01500	0.60	0.00	0.00	0.41	0.01	0.01	0.02	0.02
60	6.00	360	0.60	0.01800	0.62	0.00	0.00	0.42	0.02	0.02	0.02	0.02

61	6.10	366	0.60	0.01800	0.63	0.00	0.00	0.44	0.02	0.02	0.03	0.02
62	6.20	372	0.60	0.01800	0.65	0.00	0.00	0.46	0.02	0.02	0.03	0.03
63	6.30	378	0.60	0.01800	0.67	0.00	0.00	0.47	0.02	0.02	0.03	0.03
64	6.40	384	0.70	0.02100	0.69	0.00	0.00	0.49	0.02	0.02	0.03	0.03
65	6.50	390	0.60	0.01800	0.71	0.00	0.00	0.51	0.02	0.02	0.03	0.03
66	6.60	396	0.60	0.01800	0.73	0.00	0.00	0.53	0.02	0.02	0.03	0.03
67	6.70	402	0.60	0.01800	0.74	0.00	0.00	0.55	0.02	0.02	0.03	0.03
68	6.80	408	0.60	0.01800	0.76	0.00	0.00	0.56	0.02	0.02	0.03	0.03
69	6.90	414	0.60	0.01800	0.78	0.00	0.00	0.58	0.02	0.02	0.03	0.03
70	7.00	420	0.70	0.02100	0.80	0.00	0.00	0.60	0.02	0.02	0.03	0.03
71	7.10	426	0.70	0.02100	0.82	0.00	0.00	0.62	0.02	0.02	0.03	0.03
72	7.20	432	0.80	0.02400	0.85	0.00	0.00	0.64	0.02	0.02	0.03	0.03
73	7.30	438	0.80	0.02400	0.87	0.00	0.00	0.67	0.02	0.02	0.03	0.03
74	7.40	444	0.90	0.02700	0.90	0.00	0.00	0.69	0.03	0.03	0.04	0.04
75	7.50	450	1.00	0.03000	0.93	0.00	0.00	0.72	0.03	0.03	0.04	0.04
76	7.60	456	2.10	0.06300	0.99	0.00	0.00	0.78	0.06	0.06	0.09	0.07
77	7.70	462	2.40	0.07200	1.06	0.00	0.00	0.85	0.07	0.07	0.10	0.10
78	7.80	468	2.40	0.07200	1.13	0.00	0.00	0.92	0.07	0.07	0.10	0.10
79	7.90	474	2.40	0.07200	1.21	0.00	0.00	0.99	0.07	0.07	0.10	0.10
80	8.00	480	2.20	0.06600	1.27	0.00	0.00	1.06	0.06	0.06	0.10	0.10
81	8.10	486	1.40	0.04200	1.31	0.00	0.00	1.10	0.04	0.04	0.06	0.08
82	8.20	492	1.30	0.03900	1.35	0.00	0.00	1.14	0.04	0.04	0.06	0.06
83	8.30	498	1.00	0.03000	1.38	0.00	0.00	1.17	0.03	0.03	0.04	0.05
84	8.40	504	1.00	0.03000	1.41	0.00	0.00	1.19	0.03	0.03	0.04	0.04
85	8.50	510	0.80	0.02400	1.44	0.00	0.00	1.22	0.02	0.02	0.04	0.04
86	8.60	516	0.90	0.02700	1.46	0.00	0.00	1.24	0.03	0.03	0.04	0.04
87	8.70	522	0.90	0.02700	1.49	0.00	0.00	1.27	0.03	0.03	0.04	0.04
88	8.80	528	0.70	0.02100	1.51	0.00	0.00	1.29	0.02	0.02	0.03	0.04
89	8.90	534	0.80	0.02400	1.54	0.01	0.00	1.32	0.02	0.02	0.04	0.03
90	9.00	540	0.70	0.02100	1.56	0.01	0.00	1.34	0.02	0.02	0.03	0.03
91	9.10	546	0.70	0.02100	1.58	0.01	0.00	1.36	0.02	0.02	0.03	0.03
92	9.20	552	0.60	0.01800	1.60	0.01	0.00	1.37	0.02	0.02	0.03	0.03
93	9.30	558	0.60	0.01800	1.61	0.01	0.00	1.39	0.02	0.02	0.03	0.03
94	9.40	564	0.60	0.01800	1.63	0.01	0.00	1.41	0.02	0.02	0.03	0.03
95	9.50	570	0.50	0.01500	1.65	0.01	0.00	1.43	0.01	0.01	0.02	0.02
96	9.60	576	0.60	0.01800	1.67	0.02	0.00	1.44	0.02	0.02	0.03	0.02
97	9.70	582	0.50	0.01500	1.68	0.02	0.00	1.46	0.01	0.01	0.02	0.02
98	9.80	588	0.60	0.01800	1.70	0.02	0.00	1.48	0.02	0.02	0.03	0.02
99	9.90	594	0.50	0.01500	1.71	0.02	0.00	1.49	0.01	0.01	0.02	0.02
100	10.00	600	0.50	0.01500	1.73	0.02	0.00	1.51	0.01	0.01	0.02	0.02
101	10.10	606	0.50	0.01500	1.74	0.02	0.00	1.52	0.01	0.01	0.02	0.02
102	10.20	612	0.50	0.01500	1.76	0.03	0.00	1.53	0.01	0.01	0.02	0.02
103	10.30	618	0.50	0.01500	1.77	0.03	0.00	1.55	0.01	0.01	0.02	0.02
104	10.40	624	0.40	0.01200	1.79	0.03	0.00	1.56	0.01	0.01	0.02	0.02
105	10.50	630	0.50	0.01500	1.80	0.03	0.00	1.58	0.01	0.01	0.02	0.02
106	10.60	636	0.50	0.01500	1.82	0.03	0.00	1.59	0.01	0.01	0.02	0.02
107	10.70	642	0.40	0.01200	1.83	0.03	0.00	1.60	0.01	0.01	0.02	0.02
108	10.80	648	0.50	0.01500	1.84	0.04	0.00	1.62	0.01	0.01	0.02	0.02
109	10.90	654	0.50	0.01500	1.86	0.04	0.00	1.63	0.01	0.01	0.02	0.02
110	11.00	660	0.40	0.01200	1.87	0.04	0.00	1.64	0.01	0.01	0.02	0.02
111	11.10	666	0.40	0.01200	1.88	0.04	0.00	1.66	0.01	0.01	0.02	0.02
112	11.20	672	0.50	0.01500	1.90	0.04	0.00	1.67	0.01	0.01	0.02	0.02
113	11.30	678	0.40	0.01200	1.91	0.05	0.00	1.68	0.01	0.01	0.02	0.02
114	11.40	684	0.40	0.01200	1.92	0.05	0.00	1.70	0.01	0.01	0.02	0.02
115	11.50	690	0.40	0.01200	1.93	0.05	0.00	1.71	0.01	0.01	0.02	0.02
116	11.60	696	0.40	0.01200	1.94	0.05	0.00	1.72	0.01	0.01	0.02	0.02
117	11.70	702	0.40	0.01200	1.96	0.05	0.00	1.73	0.01	0.01	0.02	0.02
118	11.80	708	0.40	0.01200	1.97	0.06	0.00	1.74	0.01	0.01	0.02	0.02
119	11.90	714	0.30	0.00900	1.98	0.06	0.00	1.75	0.01	0.01	0.01	0.02
120	12.00	720	0.40	0.01200	1.99	0.06	0.00	1.76	0.01	0.01	0.02	0.02
121	12.10	726	0.40	0.01200	2.00	0.06	0.00	1.78	0.01	0.01	0.02	0.02
122	12.20	732	0.30	0.00900	2.01	0.06	0.00	1.78	0.01	0.01	0.01	0.02
123	12.30	738	0.40	0.01200	2.02	0.06	0.00	1.80	0.01	0.01	0.02	0.02
124	12.40	744	0.40	0.01200	2.03	0.07	0.00	1.81	0.01	0.01	0.02	0.02
125	12.50	750	0.40	0.01200	2.05	0.07	0.00	1.82	0.01	0.01	0.02	0.02
126	12.60	756	0.40	0.01200	2.06	0.07	0.00	1.83	0.01	0.01	0.02	0.02
127	12.70	762	0.30	0.00900	2.07	0.07	0.00	1.84	0.01	0.01	0.01	0.02
128	12.80	768	0.40	0.01200	2.08	0.08	0.00	1.85	0.01	0.01	0.02	0.02
129	12.90	774	0.30	0.00900	2.09	0.08	0.00	1.86	0.01	0.01	0.01	0.02
130	13.00	780	0.40	0.01200	2.10	0.08	0.00	1.87	0.01	0.01	0.02	0.02
131	13.10	786	0.40	0.01200	2.11	0.08	0.00	1.89	0.01	0.01	0.02	0.02
132	13.20	792	0.30	0.00900	2.12	0.08	0.00	1.89	0.01	0.01	0.01	0.02
133	13.30	798	0.40	0.01200	2.13	0.09	0.00	1.91	0.01	0.01	0.02	0.02
134	13.40	804	0.40	0.01200	2.15	0.09	0.00	1.92	0.01	0.01	0.02	0.02
135	13.50	810	0.30	0.00900	2.15	0.09	0.00	1.93	0.01	0.01	0.01	0.02
136	13.60	816	0.30	0.00900	2.16	0.09	0.00	1.94	0.01	0.01	0.01	0.01
137	13.70	822	0.40	0.01200	2.18	0.09	0.00	1.95	0.01	0.01	0.02	0.02
138	13.80	828	0.30	0.00900	2.18	0.10	0.00	1.96	0.01	0.01	0.01	0.02
139	13.90	834	0.40	0.01200	2.20	0.10	0.00	1.97	0.01	0.01	0.02	0.02
140	14.00	840	0.30	0.00900	2.21	0.10	0.00	1.98	0.01	0.01	0.01	0.02
141	14.10	846	0.30	0.00900	2.21	0.10	0.00	1.99	0.01	0.01	0.01	0.01
142	14.20	852	0.40	0.01200	2.23	0.11	0.00	2.00	0.01	0.01	0.02	0.02

143	14.30	858	0.30	0.00900	2.24	0.11	0.00	2.01	0.01	0.01	0.01	0.02
144	14.40	864	0.30	0.00900	2.24	0.11	0.00	2.02	0.01	0.01	0.01	0.01
145	14.50	870	0.40	0.01200	2.26	0.11	0.00	2.03	0.01	0.01	0.02	0.02
146	14.60	876	0.30	0.00900	2.27	0.11	0.00	2.04	0.01	0.01	0.01	0.02
147	14.70	882	0.30	0.00900	2.27	0.12	0.00	2.05	0.01	0.01	0.01	0.01
148	14.80	888	0.40	0.01200	2.29	0.12	0.00	2.06	0.01	0.01	0.02	0.02
149	14.90	894	0.30	0.00900	2.30	0.12	0.00	2.07	0.01	0.01	0.01	0.02
150	15.00	900	0.30	0.00900	2.30	0.12	0.00	2.08	0.01	0.01	0.01	0.01
151	15.10	906	0.30	0.00900	2.31	0.13	0.00	2.08	0.01	0.01	0.01	0.01
152	15.20	912	0.40	0.01200	2.33	0.13	0.00	2.10	0.01	0.01	0.02	0.02
153	15.30	918	0.30	0.00900	2.33	0.13	0.00	2.11	0.01	0.01	0.01	0.02
154	15.40	924	0.30	0.00900	2.34	0.13	0.00	2.11	0.01	0.01	0.01	0.01
155	15.50	930	0.30	0.00900	2.35	0.14	0.00	2.12	0.01	0.01	0.01	0.01
156	15.60	936	0.30	0.00900	2.36	0.14	0.00	2.13	0.01	0.01	0.01	0.01
157	15.70	942	0.40	0.01200	2.37	0.14	0.00	2.14	0.01	0.01	0.02	0.02
158	15.80	948	0.30	0.00900	2.38	0.14	0.00	2.15	0.01	0.01	0.01	0.02
159	15.90	954	0.30	0.00900	2.39	0.14	0.00	2.16	0.01	0.01	0.01	0.01
160	16.00	960	0.30	0.00900	2.40	0.15	0.00	2.17	0.01	0.01	0.01	0.01
161	16.10	966	0.30	0.00900	2.41	0.15	0.00	2.18	0.01	0.01	0.01	0.01
162	16.20	972	0.30	0.00900	2.42	0.15	0.00	2.19	0.01	0.01	0.01	0.01
163	16.30	978	0.30	0.00900	2.43	0.15	0.00	2.20	0.01	0.01	0.01	0.01
164	16.40	984	0.30	0.00900	2.44	0.16	0.00	2.21	0.01	0.01	0.01	0.01
165	16.50	990	0.30	0.00900	2.45	0.16	0.00	2.22	0.01	0.01	0.01	0.01
166	16.60	996	0.30	0.00900	2.45	0.16	0.00	2.23	0.01	0.01	0.01	0.01
167	16.70	1002	0.30	0.00900	2.46	0.16	0.00	2.23	0.01	0.01	0.01	0.01
168	16.80	1008	0.30	0.00900	2.47	0.17	0.00	2.24	0.01	0.01	0.01	0.01
169	16.90	1014	0.30	0.00900	2.48	0.17	0.00	2.25	0.01	0.01	0.01	0.01
170	17.00	1020	0.30	0.00900	2.49	0.17	0.00	2.26	0.01	0.01	0.01	0.01
171	17.10	1026	0.30	0.00900	2.50	0.17	0.00	2.27	0.01	0.01	0.01	0.01
172	17.20	1032	0.30	0.00900	2.51	0.18	0.00	2.28	0.01	0.01	0.01	0.01
173	17.30	1038	0.30	0.00900	2.52	0.18	0.00	2.29	0.01	0.01	0.01	0.01
174	17.40	1044	0.30	0.00900	2.53	0.18	0.00	2.30	0.01	0.01	0.01	0.01
175	17.50	1050	0.30	0.00900	2.54	0.18	0.00	2.31	0.01	0.01	0.01	0.01
176	17.60	1056	0.30	0.00900	2.54	0.19	0.00	2.31	0.01	0.01	0.01	0.01
177	17.70	1062	0.20	0.00600	2.55	0.19	0.00	2.32	0.01	0.01	0.01	0.01
178	17.80	1068	0.30	0.00900	2.56	0.19	0.00	2.33	0.01	0.01	0.01	0.01
179	17.90	1074	0.30	0.00900	2.57	0.19	0.00	2.34	0.01	0.01	0.01	0.01
180	18.00	1080	0.30	0.00900	2.58	0.20	0.00	2.35	0.01	0.01	0.01	0.01
181	18.10	1086	0.30	0.00900	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.01
182	18.20	1092	0.20	0.00600	2.59	0.20	0.00	2.36	0.01	0.01	0.01	0.01
183	18.30	1098	0.30	0.00900	2.60	0.20	0.00	2.37	0.01	0.01	0.01	0.01
184	18.40	1104	0.30	0.00900	2.61	0.21	0.00	2.38	0.01	0.01	0.01	0.01
185	18.50	1110	0.30	0.00900	2.62	0.21	0.00	2.39	0.01	0.01	0.01	0.01
186	18.60	1116	0.20	0.00600	2.62	0.21	0.00	2.40	0.01	0.01	0.01	0.01
187	18.70	1122	0.30	0.00900	2.63	0.21	0.00	2.40	0.01	0.01	0.01	0.01
188	18.80	1128	0.30	0.00900	2.64	0.22	0.00	2.41	0.01	0.01	0.01	0.01
189	18.90	1134	0.20	0.00600	2.65	0.22	0.00	2.42	0.01	0.01	0.01	0.01
190	19.00	1140	0.30	0.00900	2.66	0.22	0.00	2.43	0.01	0.01	0.01	0.01
191	19.10	1146	0.30	0.00900	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.01
192	19.20	1152	0.20	0.00600	2.67	0.22	0.00	2.44	0.01	0.01	0.01	0.01
193	19.30	1158	0.30	0.00900	2.68	0.23	0.00	2.45	0.01	0.01	0.01	0.01
194	19.40	1164	0.20	0.00600	2.69	0.23	0.00	2.46	0.01	0.01	0.01	0.01
195	19.50	1170	0.30	0.00900	2.70	0.23	0.00	2.47	0.01	0.01	0.01	0.01
196	19.60	1176	0.30	0.00900	2.71	0.23	0.00	2.48	0.01	0.01	0.01	0.01
197	19.70	1182	0.20	0.00600	2.71	0.24	0.00	2.48	0.01	0.01	0.01	0.01
198	19.80	1188	0.30	0.00900	2.72	0.24	0.00	2.49	0.01	0.01	0.01	0.01
199	19.90	1194	0.20	0.00600	2.73	0.24	0.00	2.50	0.01	0.01	0.01	0.01
200	20.00	1200	0.30	0.00900	2.74	0.24	0.00	2.51	0.01	0.01	0.01	0.01
201	20.10	1206	0.20	0.00600	2.74	0.25	0.00	2.51	0.01	0.01	0.01	0.01
202	20.20	1212	0.30	0.00900	2.75	0.25	0.00	2.52	0.01	0.01	0.01	0.01
203	20.30	1218	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
204	20.40	1224	0.20	0.00600	2.76	0.25	0.00	2.53	0.01	0.01	0.01	0.01
205	20.50	1230	0.30	0.00900	2.77	0.26	0.00	2.54	0.01	0.01	0.01	0.01
206	20.60	1236	0.20	0.00600	2.78	0.26	0.00	2.55	0.01	0.01	0.01	0.01
207	20.70	1242	0.30	0.00900	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.01
208	20.80	1248	0.20	0.00600	2.79	0.26	0.00	2.56	0.01	0.01	0.01	0.01
209	20.90	1254	0.20	0.00600	2.80	0.26	0.00	2.57	0.01	0.01	0.01	0.01
210	21.00	1260	0.30	0.00900	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.01
211	21.10	1266	0.20	0.00600	2.81	0.27	0.00	2.58	0.01	0.01	0.01	0.01
212	21.20	1272	0.20	0.00600	2.82	0.27	0.00	2.59	0.01	0.01	0.01	0.01
213	21.30	1278	0.30	0.00900	2.83	0.27	0.00	2.60	0.01	0.01	0.01	0.01
214	21.40	1284	0.20	0.00600	2.83	0.28	0.00	2.60	0.01	0.01	0.01	0.01
215	21.50	1290	0.20	0.00600	2.84	0.28	0.00	2.61	0.01	0.01	0.01	0.01
216	21.60	1296	0.30	0.00900	2.85	0.28	0.00	2.62	0.01	0.01	0.01	0.01
217	21.70	1302	0.20	0.00600	2.86	0.28	0.00	2.62	0.01	0.01	0.01	0.01
218	21.80	1308	0.20	0.00600	2.86	0.29	0.00	2.63	0.01	0.01	0.01	0.01
219	21.90	1314	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
220	22.00	1320	0.20	0.00600	2.87	0.29	0.00	2.64	0.01	0.01	0.01	0.01
221	22.10	1326	0.30	0.00900	2.88	0.29	0.00	2.65	0.01	0.01	0.01	0.01
222	22.20	1332	0.20	0.00600	2.89	0.29	0.00	2.66	0.01	0.01	0.01	0.01
223	22.30	1338	0.20	0.00600	2.89	0.30	0.00	2.66	0.01	0.01	0.01	0.01
224	22.40	1344	0.20	0.00600	2.90	0.30	0.00	2.67	0.01	0.01	0.01	0.01

	225	22.50	1350	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	226	22.60	1356	0.20	0.00600	2.91	0.30	0.00	2.68	0.01	0.01	0.01	0.01
	227	22.70	1362	0.20	0.00600	2.92	0.30	0.00	2.69	0.01	0.01	0.01	0.01
	228	22.80	1368	0.20	0.00600	2.92	0.31	0.00	2.69	0.01	0.01	0.01	0.01
	229	22.90	1374	0.20	0.00600	2.93	0.31	0.00	2.70	0.01	0.01	0.01	0.01
	230	23.00	1380	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	231	23.10	1386	0.20	0.00600	2.94	0.31	0.00	2.71	0.01	0.01	0.01	0.01
	232	23.20	1392	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	233	23.30	1398	0.20	0.00600	2.95	0.32	0.00	2.72	0.01	0.01	0.01	0.01
	234	23.40	1404	0.20	0.00600	2.96	0.32	0.00	2.73	0.01	0.01	0.01	0.01
	235	23.50	1410	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	236	23.60	1416	0.20	0.00600	2.97	0.32	0.00	2.74	0.01	0.01	0.01	0.01
	237	23.70	1422	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	238	23.80	1428	0.20	0.00600	2.98	0.33	0.00	2.75	0.01	0.01	0.01	0.01
	239	23.90	1434	0.20	0.00600	2.99	0.33	0.00	2.76	0.01	0.01	0.01	0.01
	240	24.00	1440	0.20	0.00600	3.00	0.33	0.00	2.77	0.01	0.01	0.01	0.01
Volume:	2470											Max:	0.10
	0.056693												

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 9:50 AM
Report Generation Date: 01/05/2024 9:50 AM

Input File Name: Site-Zone1.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TESC Volumes - Site Zone 1
Comments: Potential Disturbed Area

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.210	0.210
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.210	0.210

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 1 ----------

	-------Area (Acres) --------
Impervious	0.210
Subbasin Total	0.210

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 1 ----------
-------Area (Acres) --------
Impervious 0.210

Subbasin Total 0.210

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: Zone 1 0.000
Link: Outfall 0.000

Total: 0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Zone 1	0.000
Link: Outfall	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 116.86
Inflow Volume Including PPT-Evap (ac-ft): 116.86
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 116.86
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 116.86
Inflow Volume Including PPT-Evap (ac-ft): 116.86
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 116.86
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Outfall
Scenario Postdeveloped Compliance Link: Outfall

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	8.338E-02	2-Year	8.338E-02
5-Year	0.109	5-Year	0.109
10-Year	0.129	10-Year	0.129
25-Year	0.152	25-Year	0.152
50-Year	0.185	50-Year	0.185
100-Year	0.216	100-Year	0.216
200-Year	0.224	200-Year	0.224
500-Year	0.234	500-Year	0.234

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 9:53 AM
Report Generation Date: 01/05/2024 9:54 AM

Input File Name: Site-Zone 2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TESC Volumes - Site Zone 2
Comments: Potential Disturbed Area

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.180	0.180
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.180	0.180

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 2 ----------

	-------Area (Acres) --------
Impervious	0.180
Subbasin Total	0.180

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 2 ----------

	-------Area (Acres) --------
Impervious	0.180
Subbasin Total	0.180

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: Zone 2	0.000
Link: Outfall	0.000

Total: 0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Zone 2	0.000
Link: Outfall	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 100.16
Inflow Volume Including PPT-Evap (ac-ft): 100.16
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 100.16
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 100.16
Inflow Volume Including PPT-Evap (ac-ft): 100.16
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 100.16
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Outfall
Scenario Postdeveloped Compliance Link: Outfall

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	7.147E-02	2-Year	7.147E-02
5-Year	9.365E-02	5-Year	9.365E-02
10-Year	0.111	10-Year	0.111
25-Year	0.131	25-Year	0.131
50-Year	0.159	50-Year	0.159
100-Year	0.185	100-Year	0.185
200-Year	0.192	200-Year	0.192
500-Year	0.201	500-Year	0.201

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 9:56 AM
Report Generation Date: 01/05/2024 9:56 AM

Input File Name: Site-Zone 3.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TESC Volumes - Site Zone 3
Comments: Potential Disturbed Area

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.270	0.270
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.270	0.270

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 3 ----------

	-------Area (Acres) --------
Impervious	0.270
Subbasin Total	0.270

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 3 ----------
-------Area (Acres) --------
Impervious 0.270

Subbasin Total 0.270

********** LINK DATA **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

********** LINK DATA **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

Groundwater Recharge Summary ********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: Zone 3 0.000
Link: Outfall 0.000

Total: 0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Zone 3	0.000
Link: Outfall	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 150.24
Inflow Volume Including PPT-Evap (ac-ft): 150.24
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 150.24
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 150.24
Inflow Volume Including PPT-Evap (ac-ft): 150.24
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 150.24
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Outfall
Scenario Postdeveloped Compliance Link: Outfall

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.107	2-Year	0.107
5-Year	0.140	5-Year	0.140
10-Year	0.166	10-Year	0.166
25-Year	0.196	25-Year	0.196
50-Year	0.238	50-Year	0.238
100-Year	0.278	100-Year	0.278
200-Year	0.288	200-Year	0.288
500-Year	0.301	500-Year	0.301

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 9:58 AM
Report Generation Date: 01/05/2024 9:58 AM

Input File Name: Site-Zone 4.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TESC Volumes - Site Zone 4
Comments: Potential Disturbed Area

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.490	0.490
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.490	0.490

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 4 ----------

	-------Area (Acres) --------
Impervious	0.490
Subbasin Total	0.490

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 4 ----------

	-------Area (Acres) --------
Impervious	0.490
Subbasin Total	0.490

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Model Element	Total Predeveloped Recharge During Simulation Recharge Amount (ac-ft)
Subbasin: Zone 4	0.000
Link: Outfall	0.000

Total: 0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Zone 4	0.000
Link: Outfall	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 272.67
Inflow Volume Including PPT-Evap (ac-ft): 272.67
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 272.67
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 272.67
Inflow Volume Including PPT-Evap (ac-ft): 272.67
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 272.67
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Outfall
Scenario Postdeveloped Compliance Link: Outfall

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.195	2-Year	0.195
5-Year	0.255	5-Year	0.255
10-Year	0.302	10-Year	0.302
25-Year	0.356	25-Year	0.356
50-Year	0.432	50-Year	0.432
100-Year	0.505	100-Year	0.505
200-Year	0.523	200-Year	0.523
500-Year	0.546	500-Year	0.546

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 9:59 AM
Report Generation Date: 01/05/2024 9:59 AM

Input File Name: Site-Zone 5.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TESC Volumes - Site Zone 5
Comments: Potential Disturbed Area

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.410	0.410
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.410	0.410

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 5 ----------

	-------Area (Acres) --------
Impervious	0.410
Subbasin Total	0.410

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 5 ----------
-------Area (Acres) --------
Impervious 0.410

Subbasin Total 0.410

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: Zone 5 0.000
Link: Outfall 0.000

Total: 0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Zone 5	0.000
Link: Outfall	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 228.15
Inflow Volume Including PPT-Evap (ac-ft): 228.15
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 228.15
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 228.15
Inflow Volume Including PPT-Evap (ac-ft): 228.15
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 228.15
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Outfall
Scenario Postdeveloped Compliance Link: Outfall

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.163	2-Year	0.163
5-Year	0.213	5-Year	0.213
10-Year	0.252	10-Year	0.252
25-Year	0.298	25-Year	0.298
50-Year	0.361	50-Year	0.361
100-Year	0.422	100-Year	0.422
200-Year	0.437	200-Year	0.437
500-Year	0.457	500-Year	0.457

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 01/05/2024 10:01 AM
Report Generation Date: 01/05/2024 10:01 AM

Input File Name: Site-Zone 6.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: TESC Volumes - Site Zone 6
Comments: Potential Disturbed Area

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Time Series Selected
Climatic Region Number: 17

Full Period of Record Available used for Routing
Precipitation Station : 96004805 Puget East 48 in_5min 10/01/1939-10/01/2097
Evaporation Station : 961048 Puget East 48 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) **********

********** WATERSHED DEFINITION **********

Predevelopment/Post Development Tributary Area Summary

	Predeveloped	Post Developed
Total Subbasin Area (acres)	0.250	0.250
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.250	0.250

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 6 ----------

	-------Area (Acres) --------
Impervious	0.250
Subbasin Total	0.250

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : Zone 6 ----------
-------Area (Acres) --------
Impervious 0.250

Subbasin Total 0.250

********** **LINK DATA** **********

----------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

********** **LINK DATA** **********

----------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: Outfall
Link Type: Copy
Downstream Link: None

**********FLOOD FREQUENCY AND DURATION STATISTICS**********

----------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

**********Groundwater Recharge Summary **********
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation
Model Element Recharge Amount (ac-ft)

Subbasin: Zone 6 0.000
Link: Outfall 0.000

Total: 0.000

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Zone 6	0.000
Link: Outfall	0.000
Total:	0.000

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.000 ac-ft/year, Post Developed: 0.000 ac-ft/year

*************Water Quality Facility Data ***************

----------SCENARIO: PREDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 139.12
Inflow Volume Including PPT-Evap (ac-ft): 139.12
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 139.12
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

----------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: Outfall **********

Infiltration/Filtration Statistics----------
Inflow Volume (ac-ft): 139.12
Inflow Volume Including PPT-Evap (ac-ft): 139.12
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 139.12
Secondary Outflow To Downstream System (ac-ft): 0.00
Volume Lost to ET (ac-ft): 0.00
Percent Treated (Infiltrated+Filtered+ET)/Total Volume: 0.00%

*************Compliance Point Results ***************

Scenario Predeveloped Compliance Link: Outfall
Scenario Postdeveloped Compliance Link: Outfall

***** Point of Compliance Flow Frequency Data *****

Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	9.927E-02	2-Year	9.927E-02
5-Year	0.130	5-Year	0.130
10-Year	0.154	10-Year	0.154
25-Year	0.182	25-Year	0.182
50-Year	0.220	50-Year	0.220
100-Year	0.258	100-Year	0.258
200-Year	0.267	200-Year	0.267
500-Year	0.279	500-Year	0.279

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

APPENDIX E
OPERATION AND MAINTENANCE MANUAL

Osborn Consulting

City of Sammamish Washington

Sammamish Louis Thompson Road Tightline Project

Operations and Maintenance Manual

January 2024

1800 112th Ave NE, Suite 220E | Bellevue, WA 98004 | 425.451.4009 | OsbornConsulting.com

OPERATIONS AND MAINTENANCE MANUAL

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

Prepared for:

City of Sammamish Public Works
801 228th Avenue SE
Sammamish, Washington 98075

Prepared by:

Osborn Consulting, Incorporated
1800 112th Avenue Northeast, 220E
Bellevue, Washington 98004

January 2024

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LIST OF APPENDICES

1 INTRODUCTION

The purpose of this Operations and Maintenance (O&M) manual is to describe the runoff treatment and flow control Best Management Practices (BMP) proposed on Louis Thompson Road, BMP function, maintenance tasks, and frequency of task. A log of maintenance activities must be retained by the City of Sammamish (City) that indicates the maintenance actions taken.

StormFilter Media Cartridge Filtration Systems by Contech are proposed to treat stormwater runoff within roadway right-of-way (ROW) for improvements required in association with the Louis Thompson Road Tightline Project. Flow control is provided through several detention tanks with flow control structures. Refer to the project's Technical Information Report, for design details associated with the proposed BMPs.

The project will also install catch basins, storm drains, detention tanks, flow control restrictor devices, and swales at the back of the sidewalk that should be maintained per standard City maintenance practices to ensure the facilities are free of sediment and debris and are functioning as designed.

1.1 BACKGROUND AND PROJECT OVERVIEW

The proposed design of the Louis Thompson Road tightline project upgrades the existing ditch and culvert system on Louis Thompson Road to a tightline system that includes a storm sewer pipe and structures for the collection and conveyance of stormwater runoff. The project area in relation to the general vicinity is shown on **Figure 1**. The proposed work extends from 210th Place SE to East Lake Sammamish Parkway NE (approximately 0.67 miles), as shown in **Figure 2**. The existing outfalls within the project site are proposed to be maintained. This project addresses high velocities and erosion within the ditch systems, reduces flooding risk, and mitigates stormwater impacts from the project development. This project is part of the City's commitment to protecting Zackuse Creek and Lake Sammamish and is listed as a high-priority capital improvement project in the Final Zackuse Creek Basin Plan.

The runoff treatment facilities proposed are StormFilter Media Cartridge Filtration Systems by Contech. The filter media is proposed to consist of Zeolite-Perlite-Granular Activated Carbon (ZPG), as approved by the 2021 King County Surface Water Design Manual. The StormFilter facilities are an underground biofiltration system providing high percentage pollutant removal of TSS. StormFilter is approved for General Use Level Designation (GULD) for basic treatment. The facilities work by percolating stormwater through media-filled cartridges, which trap particulates and remove pollutants such a dissolved metals, nutrients, and hydrocarbons. The treatment process also filters out surface scum and floating oil and grease. The stormwater released from the cartridges discharges to the downstream stormwater pipe system. The StormFilter facilities have limited high flow bypass capabilities, so an external bypass via an upstream flow splitter structure is proposed where the flows to the facility exceed the maximum flow.

The flow control facilities are corrugated metal pipe detention tanks, provided as a single tank, or in series at various locations downstream of the water quality facilities.

1.2 PROJECT VICINITY AND SITE

This section includes the project vicinity map and the project site map.

Figure 1. Project Vicinity Map

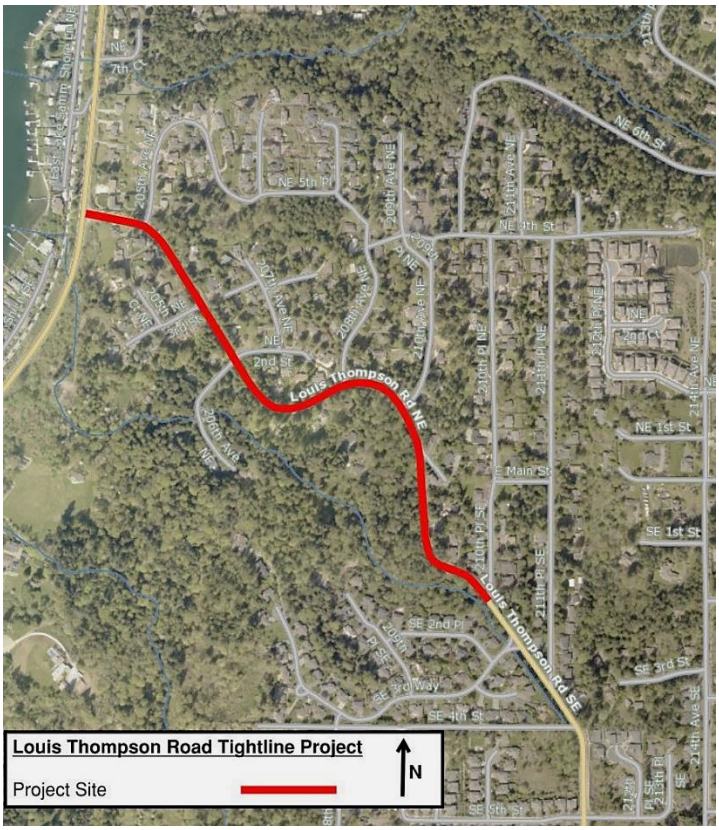


Figure 2. Project Site Map

2 MAINTENANCE LOCATIONS

The following section provides a brief description of the proposed water quality and flow control facility maintenance locations.

2.1 WQ-1 AND FLOW CONTROL FACILITY

WQ-1 is located on the east side of Louis Thompson Road and within the proposed sidewalk, southwest of 22 Louis Thompson Road SE, Sammamish, WA 98074. Dual detention tank pipes are located downstream of the water quality facility with a flow restrictor in CB-60**.**

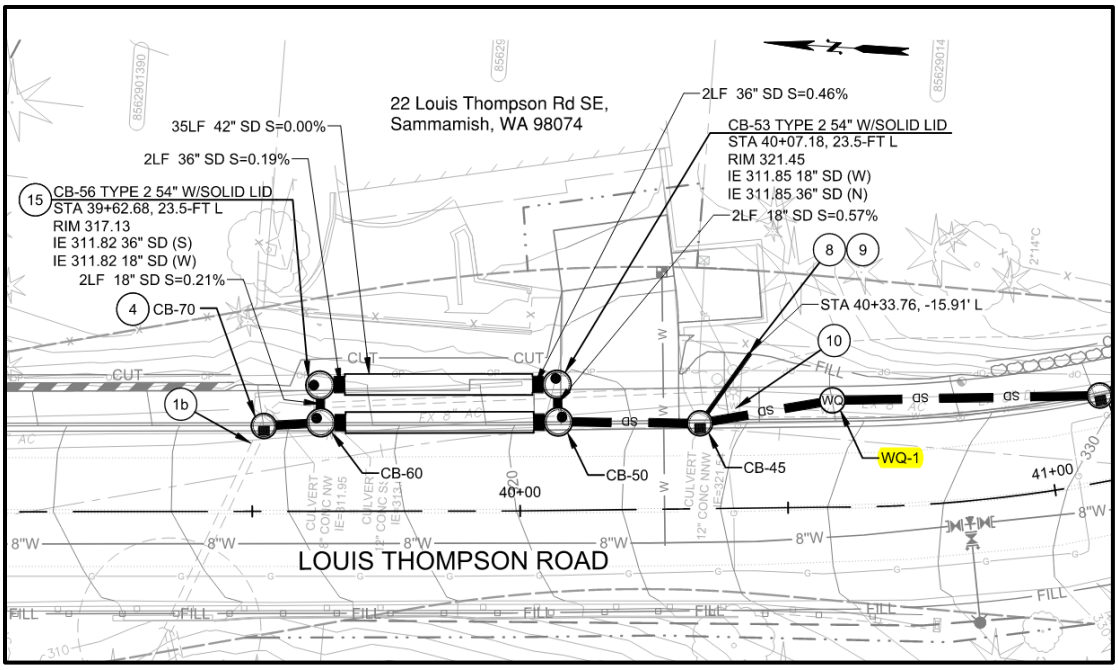


Figure 3. Maintenance Location – WQ-1 and Flow Control Facility

2.2 WQ-2 AND FLOW CONTROL FACILITY

WQ-2 is located on the east side of Louis Thompson Rd and within the proposed sidewalk, south of Thompson Hill Road SE and west of 10 Louis Thompson Rd NE, Sammamish, WA 98074. Dual detention tank pipes are located downstream of the water quality facility with a flow restrictor in CB-120. See **Figure 4** below**.**

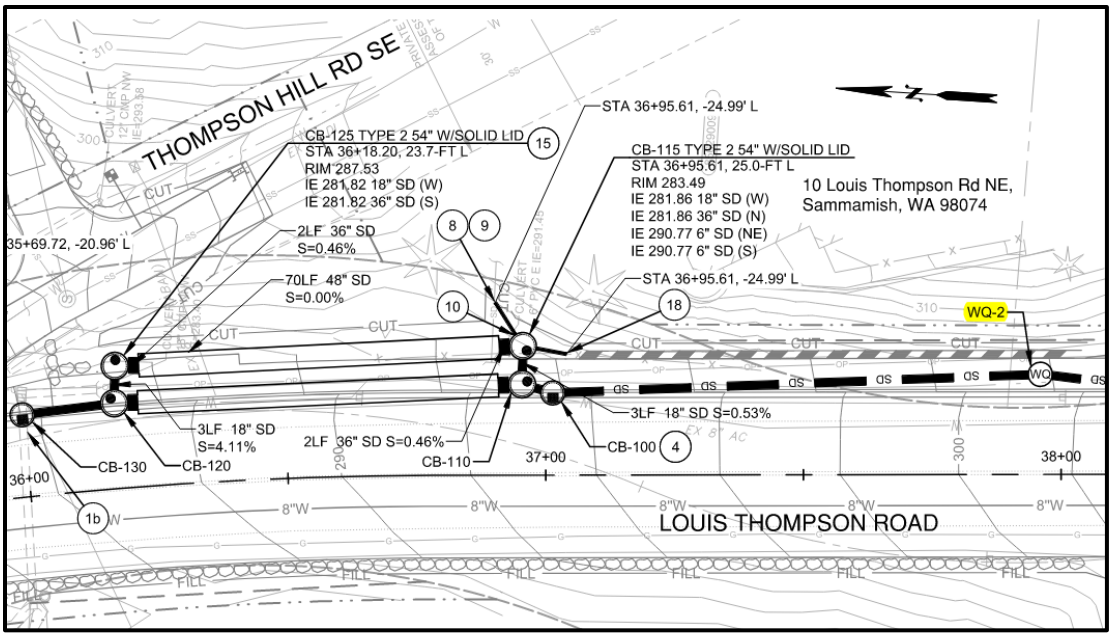


Figure 4. Maintenance Location – WQ-2 and Flow Control Facility

2.3 WQ-3 AND FLOW CONTROL FACILITY

WQ-3 is located on the north-east side of Louis Thompson Road, north-west of 210th Avenue NE and south of 108 Louis Thompson Rd NE, Sammamish, WA 98074. A flow splitter catch basin is included in the system for the bypass of high flows upstream of WQ-3 (CB-180). A detention tank is located downstream of the water quality facility with a flow restrictor in CB-200. See **Figure 5** below**.**

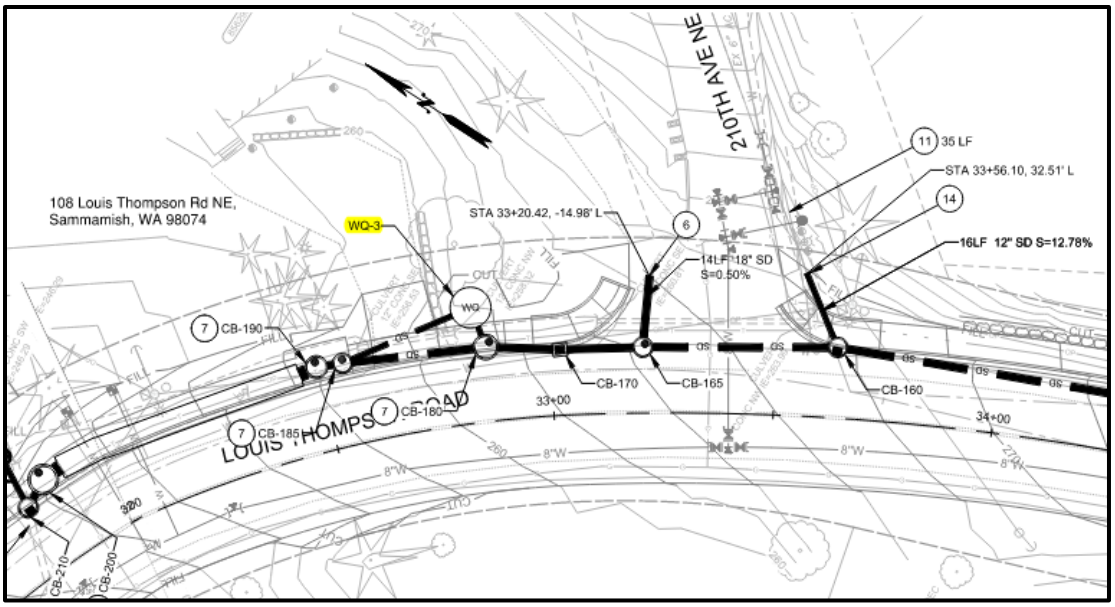


Figure 5. Maintenance Location – WQ-3 and Flow Control Facility

2.4 WQ-4 AND FLOW CONTROL FACILITY

WQ-4 is located on the north-east side of Louis Thompson Road, at the intersection with NE 3rd Street and west of 305 207th Ave NE, Sammamish, WA 98074. A flow splitter catch basin is included in the system for the bypass of high flows upstream of WQ-4 (CB-365). A detention tank is located downstream of the water quality facility with a flow restrictor in CB-405. See **Figure 6** below**.**

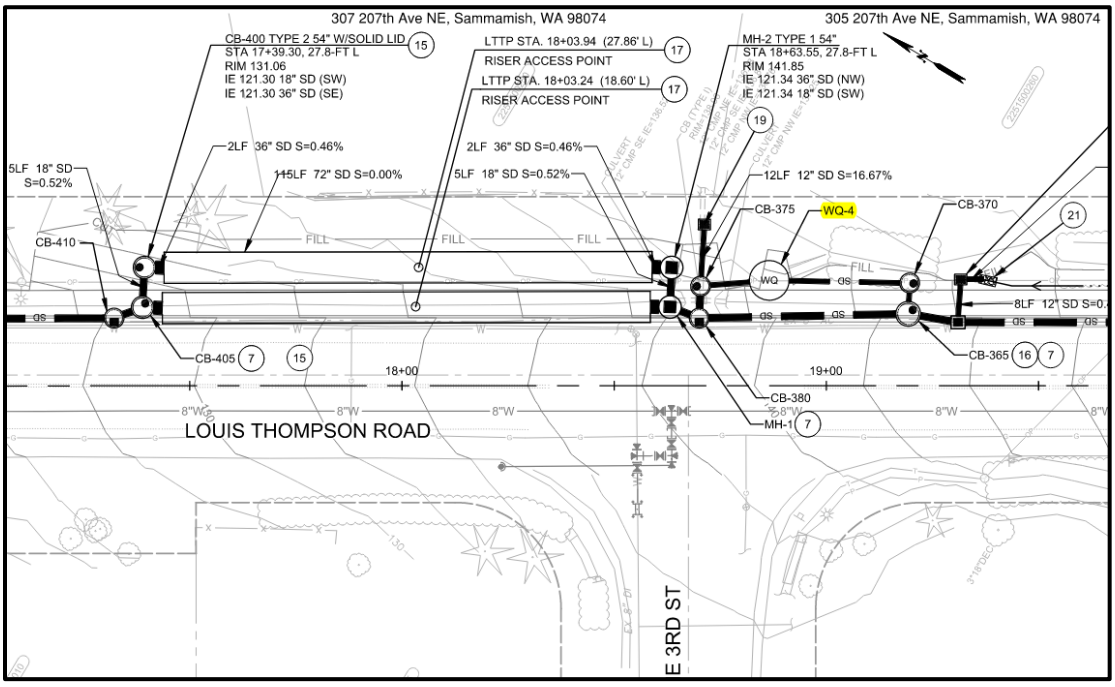


Figure 6. Maintenance Location – WQ-4 and Flow Control Facility

3 MAINTENANCE PROCEDURE

This section provides a description of the maintenance equipment, frequency, cautions, inspection procedures, and data collection forms.

3.1 WATER QUALITY FACILITY – STORMFILTER WITH ZPG

An operations and maintenance guide for the StormFilter with ZPG units is provided in Appendix A. The StormFilter units are located within the right-of-way of Louis Thompson Road SE and are to be maintained by City maintenance personnel. See **Figure 7** and **Figure 8** for the locations of the StormFilter cartridges for the two facility sizes proposed.

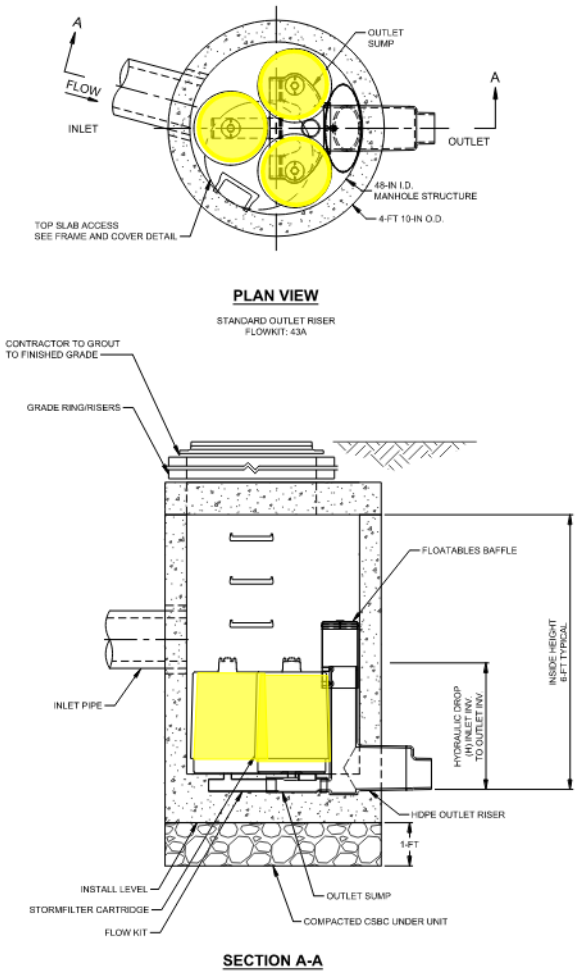


Figure 7. StormFilter Facility Details: 4-foot Diameter Manhole (WQ-1 and WQ-2)

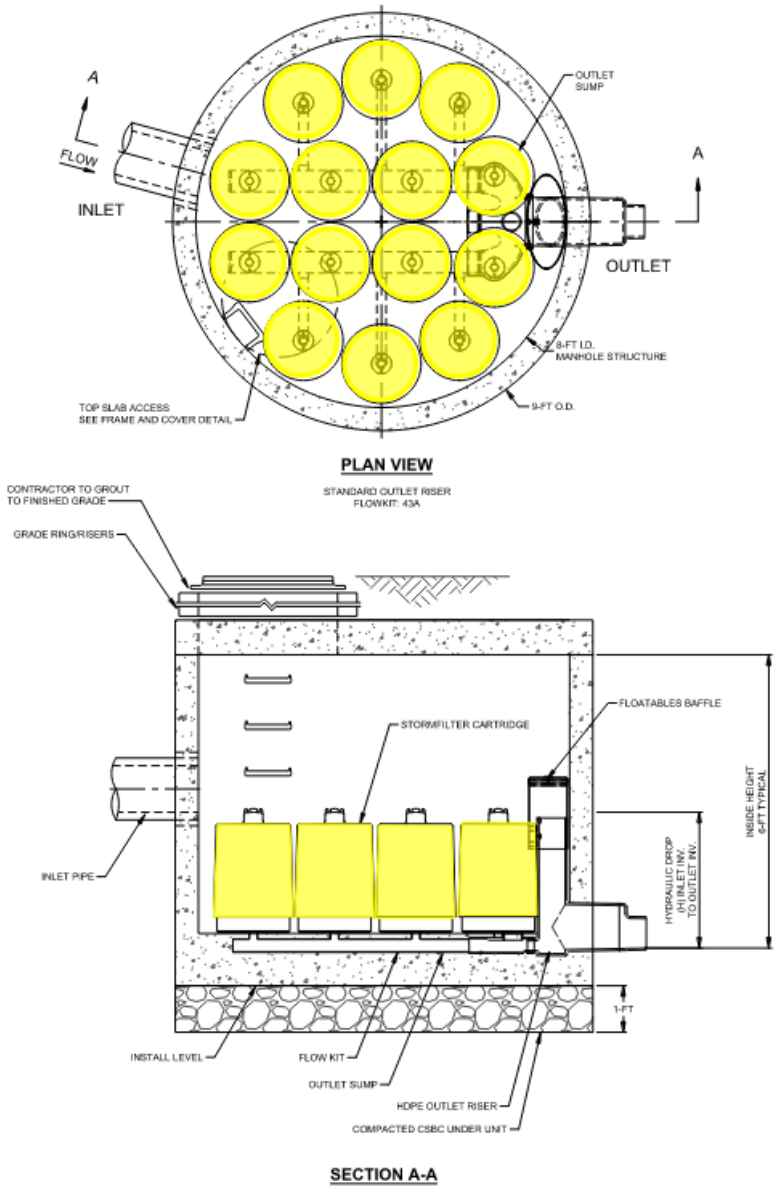


Figure 8. StormFilter Facility Details: 8-foot Diameter Manhole (WQ-3 and WQ-4)

Typical inspections and maintenance need to occur every 12 months with replacing the media cartridges and removing accumulated sediment from the vault.

3.2 WATER QUALITY FLOW SPILLTER

Standard maintenance requirements from the King County Surface Water Manual are included in Appendix B for recommended flow splitter maintenance procedures. The flow splitters are located within the right-of-way of Louis Thompson Road SE and will be maintained by City of Sammamish maintenance personnel. The flow splitters are located within CB-180 and CB-365.

3.3 FLOW CONTROL FACILITY – DETENTION TANK

Standard maintenance requirements from the King County Surface Water Manual are included in Appendix B for recommended detention tank and flow restrictor maintenance procedures. The flow restrictors are located within the right-of-way of Louis Thompson Road SE and will be maintained by City of Sammamish maintenance personnel. The flow restrictors are located within CB-60, CB-120, CB-200, and CB-405.

3.4 CATCH BASINS, MANHOLES, CONVEYANCE PIPES, AND DITCHES

Standard maintenance requirements from the King County Surface Water Manual are included in Appendix B for recommended catch basin, manhole, conveyance pipe, and ditch maintenance procedures. The catch basins and manholes are located within the right-of-way of Louis Thompson Road SE and will be maintained by City maintenance personnel.

4 CONCLUSION

This O&M manual provides suggested maintenance practices for stormwater elements installed as part of the City's Louis Thompson Road tightline project. Maintaining these stormwater elements following these standard practices will help ensure the system continues to function as intended.

APPENDIX A
STORMFILTER MAINTENANCE GUIDE

CONTECH®
ENGINEERED SOLUTIONS

StormFilter Inspection and Maintenance Procedures

The Stormwater Management StormFilter®

Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. **Inspection**
   - Inspection of the vault interior to determine the need for maintenance.
2. **Maintenance**
   - Cartridge replacement
   - Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/ maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..

Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit and the unit's role, relative to detention or retention facilities onsite.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered).

Please note Stormwater Management StormFilter devices installed downstream of, or integrated within, a stormwater storage facility typically have different operational parameters (i.e. draindown time). In these cases, the inspector must understand the relationship between the retention/detention facility and the treatment system by evaluating site specific civil engineering plans, or contacting the engineer of record, and make adjustments to the below guidance as necessary. Sediment deposition depths and patterns within the StormFilter are likely to be quite different compared to systems without upstream storage and therefore shouldn't be used exclusively to evaluate a need for maintenance.

1. Sediment loading on the vault floor.
   a. If >4" of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
   a. If >1/4" of accumulation, maintenance is required.
3. Submerged cartridges.
   a. If >4" of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
   a. While not required in all cases, inspection of the media within the cartridge may provide valuable additional information.
   b. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
   a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
   a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
   a. If pronounced scum line (say ≥ 1/4" thick) is present above top cap, maintenance is required.

Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

   Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

B. Remove the used cartridges (up to 250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

C. Set the used cartridge aside or load onto the hauling truck.

D. Continue steps a through c until all cartridges have been removed.

Method 2:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

B. Unscrew the cartridge cap.

C. Remove the cartridge hood and float.

D. At location under structure access, tip the cartridge on its side.

E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.

F. Set the empty, used cartridge aside or load onto the hauling truck.

G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

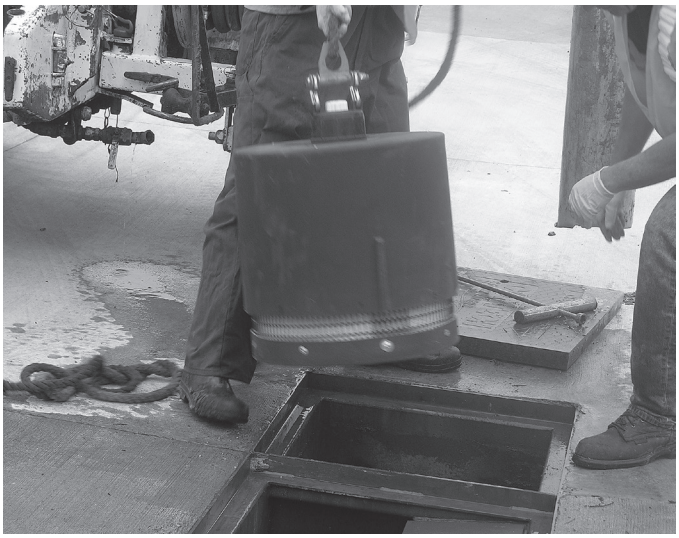
Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.



Inspection Report

Date: _____ Personnel: _____

Location: _____ System Size: _____ Months in Service: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other: _____

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water: _____

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal: _____

☐ Minor Structural Repairs: _____

☐ Drainage Area Report _____

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

Items Needing Further Work: _____

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other: _____

List Safety Procedures and Equipment Used: _____

_____

_____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: _____

Replace Cartridges: Yes ☐ No ☐ Details: _____

Sediment Removed: Yes ☐ No ☐ Details: _____

Quantity of Sediment Removed (estimate?):

Minor Structural Repairs: Yes ☐ No ☐ Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:

_____

_____

_____

_____

_____

_____

_____

RECYCLED PAPER

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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit www.ContechES.com or call 800.338.1122.

Support

- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

APPENDIX B
KING COUNTY STANDARD MAINTENANCE PROCEDURES

NO. 3 – DETENTION TANKS AND VAULTS

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Site	Trash and debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping.	Trash and debris cleared from site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Tank or Vault Storage Area	Trash and debris	Any trash and debris accumulated in vault or tank (includes floatables and non-floatables).	No trash or debris in vault.
	Sediment accumulation	Accumulated sediment depth exceeds 10% of the diameter of the storage area for ½ length of storage vault or any point depth exceeds 15% of diameter. Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than ½ length of tank.	All sediment removed from storage area.
Tank Structure	Plugged air vent	Any blockage of the vent.	Tank or vault freely vents.
	Tank bent out of shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape.	Tank repaired or replaced to design.
	Gaps between sections, damaged joints or cracks or tears in wall	A gap wider than ½-inch at the joint of any tank sections or any evidence of soil particles entering the tank at a joint or through a wall.	No water or soil entering tank through joints or walls.
Vault Structure	Damage to wall, frame, bottom, and/or top slab	Cracks wider than ½-inch, any evidence of soil entering the structure through cracks or qualified inspection personnel determines that the vault is not structurally sound.	Vault is sealed and structurally sound.
Inlet/Outlet Pipes	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

NO. 3 – DETENTION TANKS AND VAULTS

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open manhole requires immediate maintenance.**	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
	Ladder rungs unsafe	Missing rungs, misalignment, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.
Large access doors/plate	Damaged or difficult to open	Large access doors or plates cannot be opened/removed using normal equipment.	Replace or repair access door so it can opened as designed.
	Gaps, doesn't cover completely	Large access doors not flat and/or access opening not completely covered.	Doors close flat; covers access opening completely.
	Lifting Rings missing, rusted	Lifting rings not capable of lifting weight of door or plate.	Lifting rings sufficient to lift or remove door or plate.

NO. 4 – CONTROL STRUCTURE/FLOW RESTRICTOR

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the structure opening or is blocking capacity of the structure by more than 10%.	No Trash or debris blocking or potentially blocking entrance to structure.
		Trash or debris in the structure that exceeds $^1/_3$ the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the structure.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Sediment	Sediment exceeds 60% of the depth from the bottom of the structure to the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section.	Sump of structure contains no sediment.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering structure through cracks, or maintenance person judges that structure is unsound.	Structure is sealed and structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering structure through cracks.	No cracks more than $^1/_4$ inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the structure at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Ladder rungs missing or unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
FROP-T Section	Damage	T section is not securely attached to structure wall and outlet pipe structure should support at least 1,000 lbs of up or down pressure.	T section securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight or show signs of deteriorated grout.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes—other than designed holes—in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or missing	Cleanout gate is missing.	Replace cleanout gate.

NO. 4 – CONTROL STRUCTURE/FLOW RESTRICTOR

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
		Cleanout gate is not watertight.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
Orifice Plate	Damaged or missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
	Deformed or damaged lip	Lip of overflow pipe is bent or deformed.	Overflow pipe does not allow overflow at an elevation lower than design
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Metal Grates (If Applicable)	Unsafe grate opening	Grate with opening wider than $^{7}/_{8}$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris.
	Damaged or missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open structure requires urgent maintenance.**	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Sediment	Sediment exceeds 60% of the depth from the bottom of the catch basin to the invert of the lowest pipe into or out of the catch basin or is within 6 inches of the invert of the lowest pipe into or out of the catch basin.	Sump of catch basin contains no sediment.
	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of the catch basin by more than 10%.	No Trash or debris blocking or potentially blocking entrance to catch basin.
		Trash or debris in the catch basin that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that catch basin is unsound.	Catch basin is sealed and is structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the catch basin at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

NO. 5 – CATCH BASINS AND MANHOLES

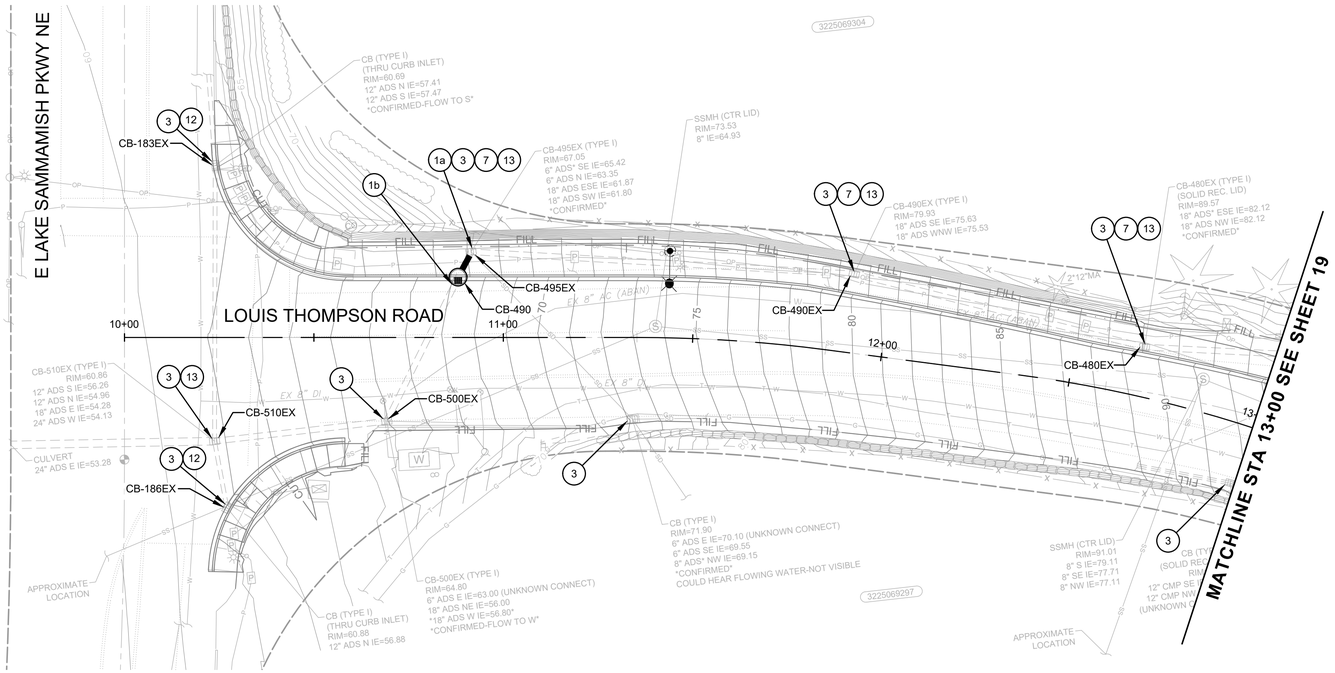
Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Metal Grates (Catch Basins)	Unsafe grate opening	Grate with opening wider than $^{7}/_{8}$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris.
	Damaged or missing	Grate missing or broken member(s) of the grate. **Any open structure requires urgent maintenance.**	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open structure requires urgent maintenance.**	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

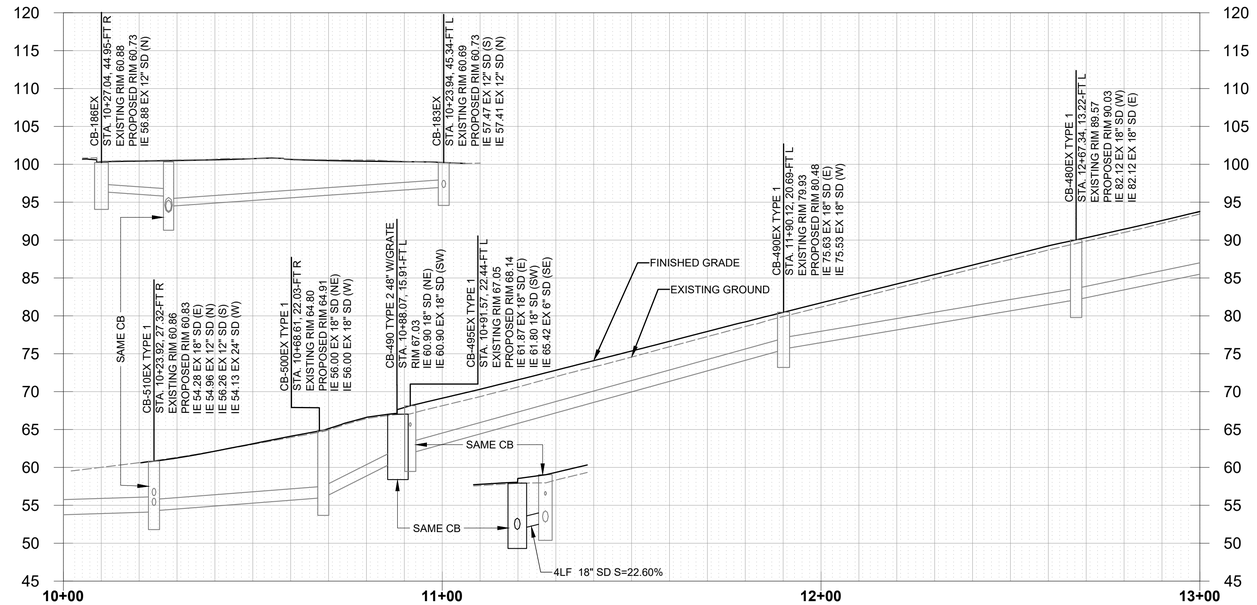
NO. 6 – CONVEYANCE PIPES AND DITCHES

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & debris accumulation	Accumulated sediment or debris that exceeds 20% of the diameter of the pipe.	Water flows freely through pipes.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.
Ditches	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment accumulation	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that it matches design.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion damage to slopes	Any erosion observed on a ditch slope.	Slopes are not eroding.
	Rock lining out of place or missing (If Applicable)	One layer or less of rock exists above native soil area 5 square feet or more, any exposed native soil.	Replace rocks to design standards.

APPENDIX C
DRAINAGE PLAN AND DETAIL CONTRACT PLAN SUBSET

SEC. 32, T. 25N, R. 6E, W.M.





GENERAL NOTES:

1. CONTRACTOR SHALL VERIFY/CONFIRM THE ACCURACY OF UTILITY LOCATIONS SHOWN AND OTHER UTILITIES.
2. ALL DRAINAGE STRUCTURES ARE LOCATED BY STATION AND OFFSET TO THE CENTER OF THE STRUCTURE IN THESE SHEETS. SEE SHEET 29 FOR ELEVATION AT THE CENTER OF LID OR GRATE.
3. THE ROADWAY CENTERLINE STATIONING IS USED FOR THE PROFILES. EXISTING AND PROPOSED SURFACES ARE SHOWN ON TOP OF THE STORM PIPE NETWORK.
4. FOR SITE PREPARATION, SEE SHEETS 7-16.
5. FOR RETAINING WALLS, SIDEWALKS, DRIVEWAYS AND OTHER NON-MOTORIZED IMPROVEMENTS, SEE SHEETS 46-55.
6. LOCATION OF UTILITY CROSSINGS SHOWN ON PROFILES ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY ALL UTILITY CROSSING LOCATIONS AND DEPTHS PRIOR TO EXCAVATION ACTIVITIES, INCLUDING SERVICE LINES WITHIN PRIVATE DRIVEWAYS.
7. SEE APPENDIX X OF PROJECT'S SPECIAL PROVISIONS FOR WORK (SITE PREPARATION AND PROPOSED CONDITION) RELATED TO THE WATER LINE, HYDRANTS, AND METERS/VALVES FROM STA 13+50 TO STA 45+50. PROPOSED WATER MAIN AND ASSOCIATED ELEMENTS ARE SHOWN FOR REFERENCE IN THESE SHEETS.

(##) CONSTRUCTION NOTES:

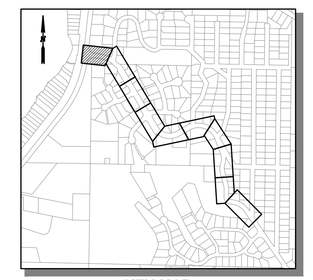
1. CONNECTION TO DRAINAGE STRUCTURE
   a. CONNECTION TO EXISTING STRUCTURE
   b. CONNECT EXISTING PIPE TO PROPOSED STRUCTURE
2. CONSTRUCT OUTFALL PAD PER DETAIL 1 ON SHEET 33.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT WITH WATER TIGHT REMOVAL PLUG FOR FUTURE CONNECTION.
7. INSTALL COMPOSITE SOLID LID WITH SLIP RESISTANT FINISH.
8. CONNECT OFFSITE LATERAL TO 8-IN STORM SEWER PIPE AT 0.5 PERCENT MINIMUM SLOPE. MINIMUM PIPE COVER PER MANUFACTURER'S RECOMMENDATION. INSTALL PIPE REDUCER AND COUPLER TO MATCH EXISTING PIPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT AT NEW PIPE CONNECTION TO OFFSITE LATERAL PER WSDOT STANDARD PLAN B-85.40.
10. CONNECT OFFSITE LATERAL TO CATCH BASIN.
11. DITCH MAINTENANCE.
12. REPLACE EXISTING GRATE WITH RECTANGULAR BI-DIRECTIONAL VANED GRATE.
13. REPLACE EXISTING GRATE WITH RECTANGULAR SOLID METAL COVER.
14. INSTALL BEVELED END PIPE SECTION WITH PIPE END TRASH RACK PER C.O.S FIG 7-01 AND FIG 7-02.
15. INSTALL DETENTION PIPE FLOW RESTRICTOR PER DETAIL 2 SHEET 28.
16. INSTALL FLOW SPLITTER WITH RISER SYSTEM PER DETAIL 1 SHEET 32.
17. INSTALL DETENTION PIPE ACCESS PER DETAIL 1 SHEET 28. ACCESS LOCATED BY STATION AND OFFSET TO THE CENTER OF THE RISER.
18. CONNECT WALL UNDERDRAIN TO PROPOSED STRUCTURE.
19. CONSTRUCT GRASS-LINED V-DITCH PER DETAIL 2 SHEET 33.
20. CONSTRUCT DITCH FLOW COLLECTION SYSTEM PER DETAIL 3 SHEET 33.
21. INSTALL DETENTION PIPE FLOW RESTRICTOR (BAFFLE) PER DETAIL 1 SHEET 29.
22. INSTALL DETENTION PIPE AIR VENT PER DETAIL 3 ON SHEET 28.

LEGEND

- STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WQ — WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS
- GRASS-LINED V-DITCH
- OUTFALL PAD

SCALE: 1" = 20'
HORIZONTAL 0 20 40 60

SCALE: 1" = 10'
VERTICAL 0 10 20 30



KEY MAP

100% SUBMITTAL (NOT FOR CONSTRUCTION)

811 Know what's below. Call before you dig.

MARIA PARANCHUK STATE OF WASHINGTON 23016353 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY MP	Osborn Consulting	NO.	DATE	REVISION	BY
DRAWN BY LT/LO/FJ					
CHECKED BY LR					

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
DATE 01/29/2024
SCALE H: 1"=20' V: 1"=10'
DR01
SHEET 18 of 102

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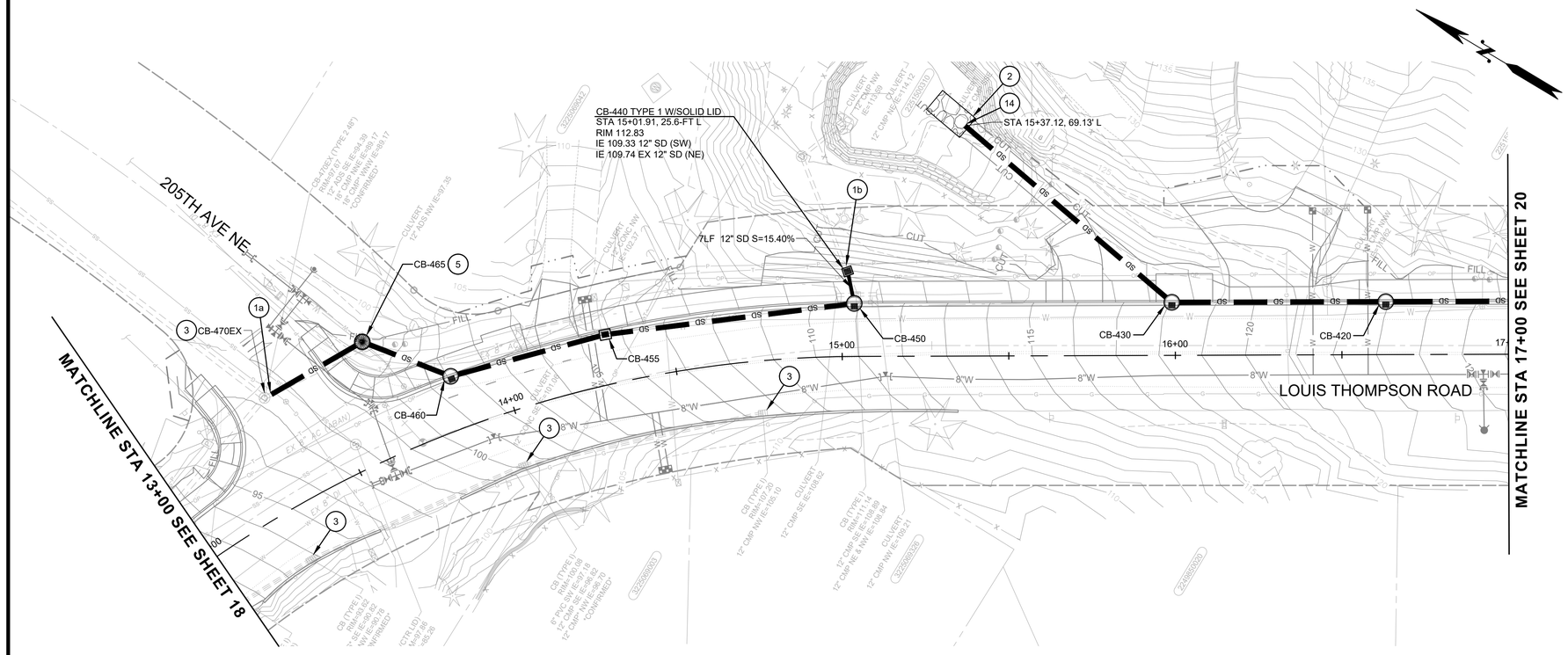

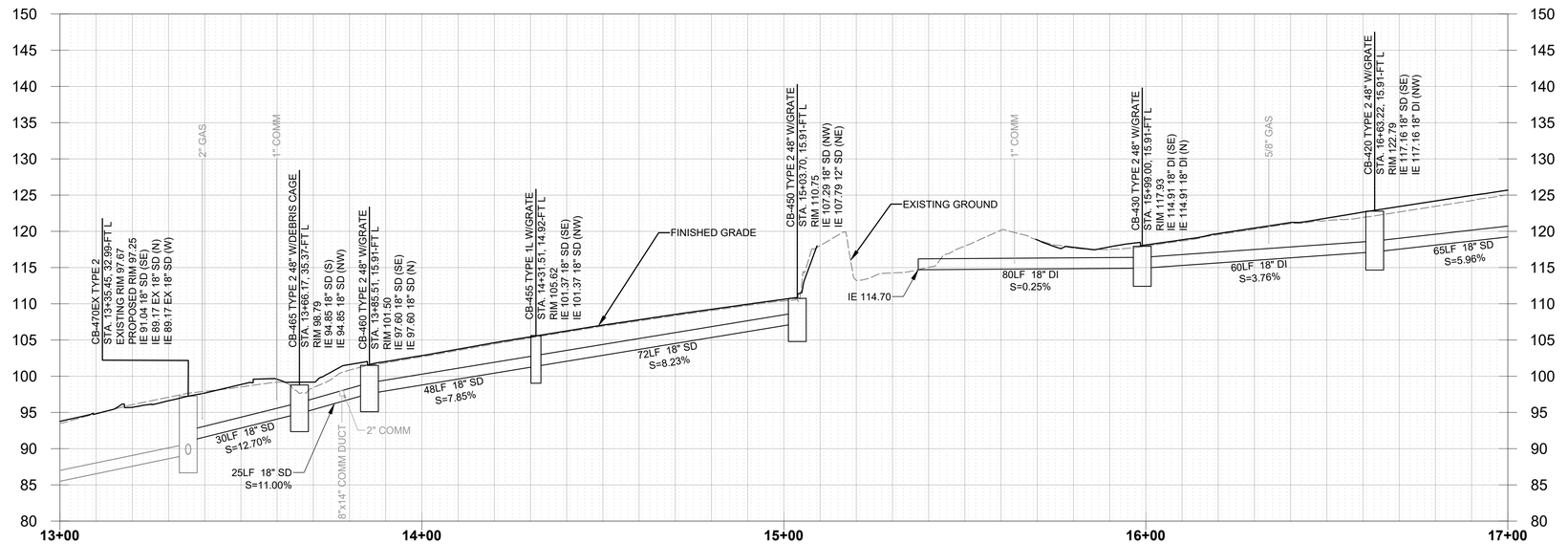

GENERAL NOTES:

1. CONTRACTOR SHALL VERIFY/CONFIRM THE ACCURACY OF UTILITY LOCATIONS SHOWN AND OTHER UTILITIES.
2. ALL DRAINAGE STRUCTURES ARE LOCATED BY STATION AND OFFSET TO THE CENTER OF THE STRUCTURE IN THESE SHEETS. SEE SHEET 29 FOR ELEVATION AT THE CENTER OF LID OR GRATE.
3. THE ROADWAY CENTERLINE STATIONING IS USED FOR THE PROFILES. EXISTING AND PROPOSED SURFACES ARE SHOWN ON TOP OF THE STORM PIPE NETWORK.
4. FOR SITE PREPARATION, SEE SHEETS 7-16.
5. FOR RETAINING WALLS, SIDEWALKS, DRIVEWAYS AND OTHER NON-MOTORIZED IMPROVEMENTS, SEE SHEETS 46-55.
6. LOCATION OF UTILITY CROSSINGS SHOWN ON PROFILES ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY ALL UTILITY CROSSING LOCATIONS AND DEPTHS PRIOR TO EXCAVATION ACTIVITIES, INCLUDING SERVICE LINES WITHIN PRIVATE DRIVEWAYS.
7. SEE APPENDIX X OF PROJECT'S SPECIAL PROVISIONS FOR WORK (SITE PREPARATION AND PROPOSED CONDITION) RELATED TO THE WATER LINE, HYDRANTS, AND METERS/VALVES FROM STA 13+50 TO STA 45+50. PROPOSED WATER MAIN AND ASSOCIATED ELEMENTS ARE SHOWN FOR REFERENCE IN THESE SHEETS.

(##) CONSTRUCTION NOTES:

1. CONNECTION TO DRAINAGE STRUCTURE
   a. CONNECTION TO EXISTING STRUCTURE
   b. CONNECT EXISTING PIPE TO PROPOSED STRUCTURE
2. CONSTRUCT OUTFALL PAD PER DETAIL 1 ON SHEET 33.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT WITH WATER TIGHT REMOVAL PLUG FOR FUTURE CONNECTION.
7. INSTALL COMPOSITE SOLID LID WITH SLIP RESISTANT FINISH.
8. CONNECT OFFSITE LATERAL TO 8-IN STORM SEWER PIPE AT 0.5 PERCENT MINIMUM SLOPE. MINIMUM PIPE COVER PER MANUFACTURER'S RECOMMENDATION. INSTALL PIPE REDUCER AND COUPLER TO MATCH EXISTING PIPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT AT NEW PIPE CONNECTION TO OFFSITE LATERAL PER WSDOT STANDARD PLAN B-85.40.
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13. REPLACE EXISTING GRATE WITH RECTANGULAR SOLID METAL COVER.
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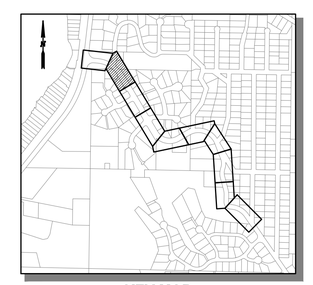
18. CONNECT WALL UNDERDRAIN TO PROPOSED STRUCTURE.
19. CONSTRUCT GRASS-LINED V-DITCH PER DETAIL 2 SHEET 33.
20. CONSTRUCT DITCH FLOW COLLECTION SYSTEM PER DETAIL 3 SHEET 33.
21. INSTALL DETENTION PIPE FLOW RESTRICTOR (BAFFLE) PER DETAIL 1 SHEET 29.
22. INSTALL DETENTION PIPE AIR VENT PER DETAIL 3 ON SHEET 28.

LEGEND

- STORM DRAINAGE PIPE (SD)
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS (WQ)
- GRASS-LINED V-DITCH
- OUTFALL PAD

HORIZONTAL SCALE: 1" = 20'
0 20 40 60

VERTICAL SCALE: 1" = 10'
0 10 20 30



KEY MAP

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LOUIS THOMPSON ROAD TIGHTLINE PROJECT
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DR02
SHEET 19 of 102

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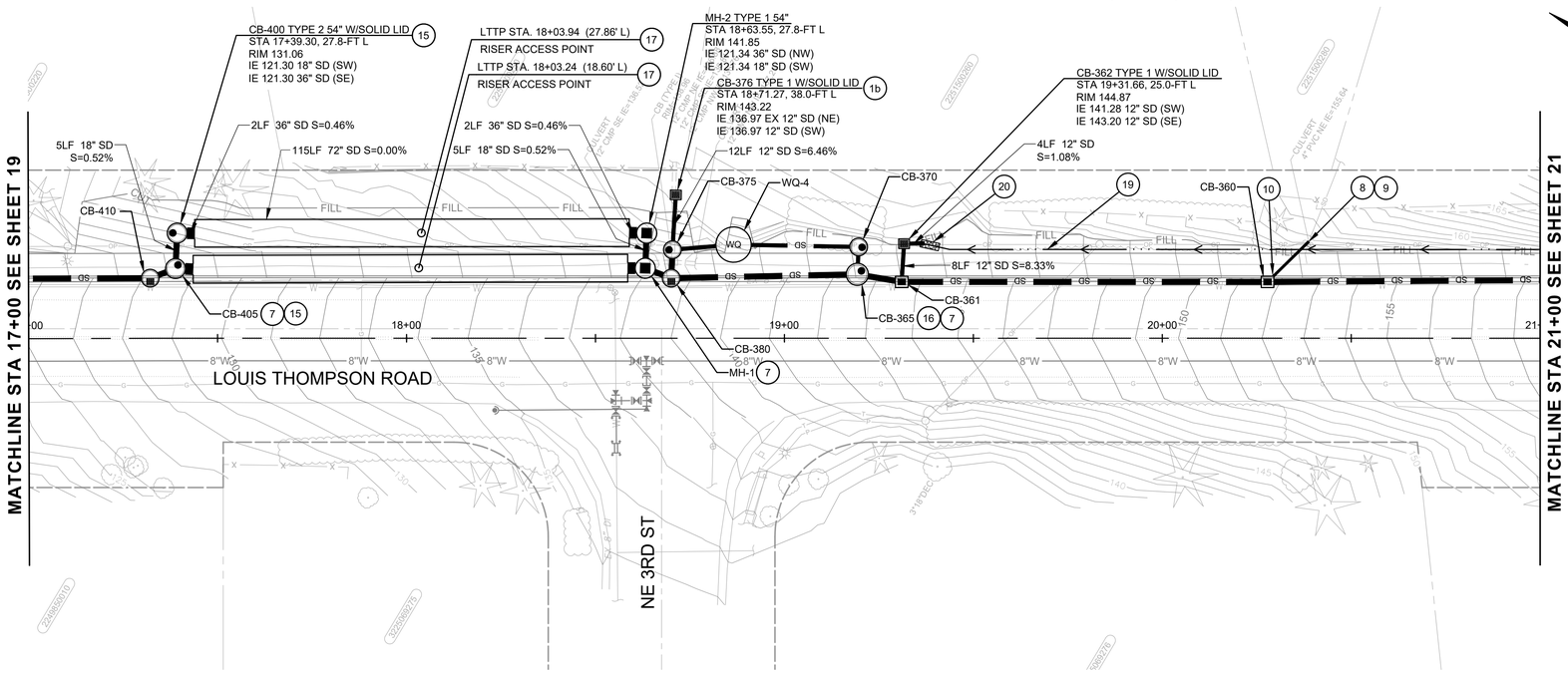
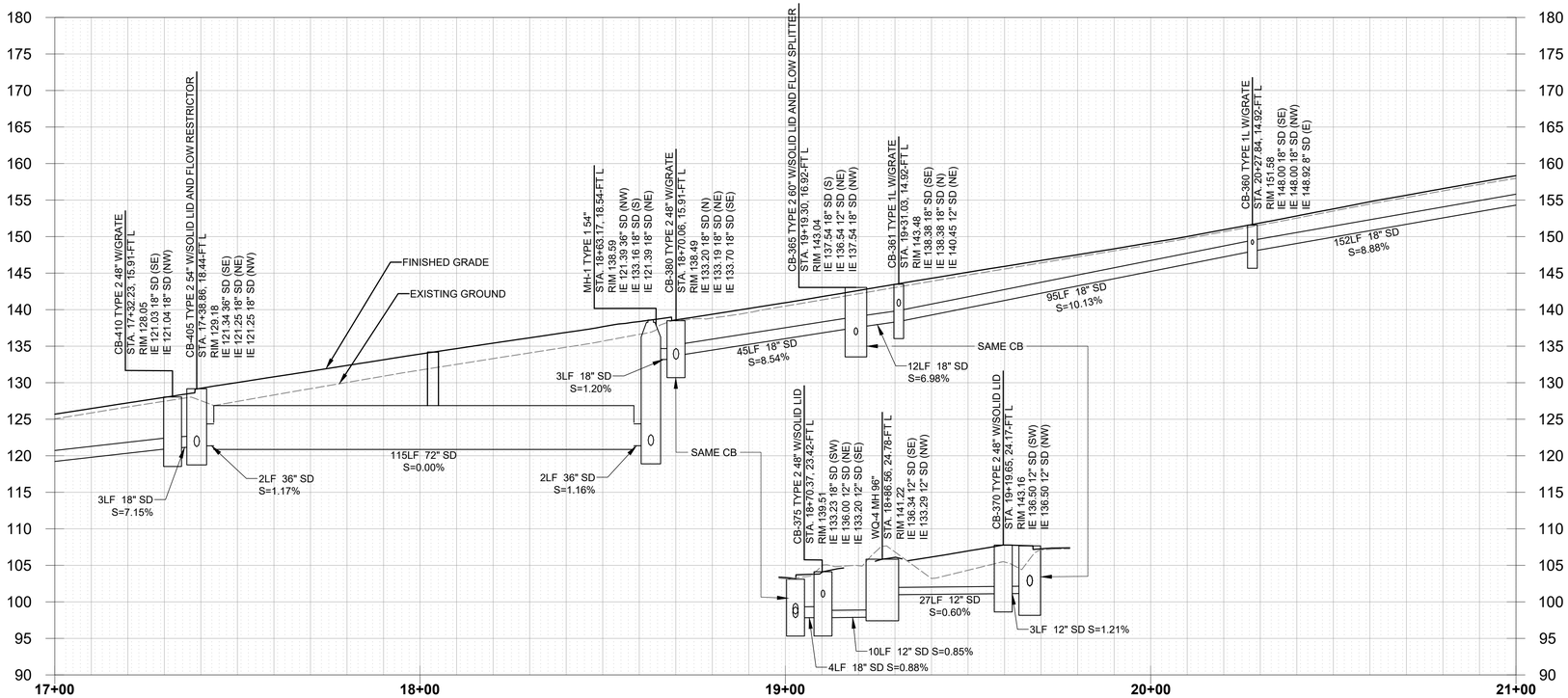
SEC. 32, T. 25N, R. 6E, W.M.





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7. INSTALL COMPOSITE SOLID LID WITH SLIP RESISTANT FINISH.
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9. INSTALL CLEANOUT AT NEW PIPE CONNECTION TO OFFSITE LATERAL PER WSDOT STANDARD PLAN B-85.40.
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22. INSTALL DETENTION PIPE AIR VENT PER DETAIL 3 ON SHEET 28.

LEGEND

- SD — STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WQ — WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS
- GRASS-LINED V-DITCH
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HORIZONTAL SCALE: 1" = 20' (0, 20, 40, 60)

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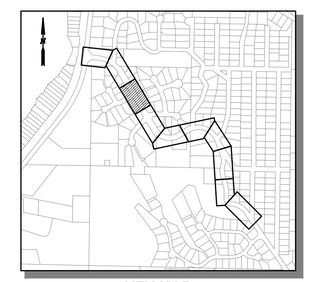

KEY MAP

100% SUBMITTAL (NOT FOR CONSTRUCTION)

811 Know what's below. Call before you dig.

MARIA PERANICH — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	MP		
DRAWN BY	LT/LO/FJ		
CHECKED BY	LR		

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: 1"=20' V: 1"=10'
DR03
SHEET 20 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALA\DMS265661P_10-210058_STRM.DWG
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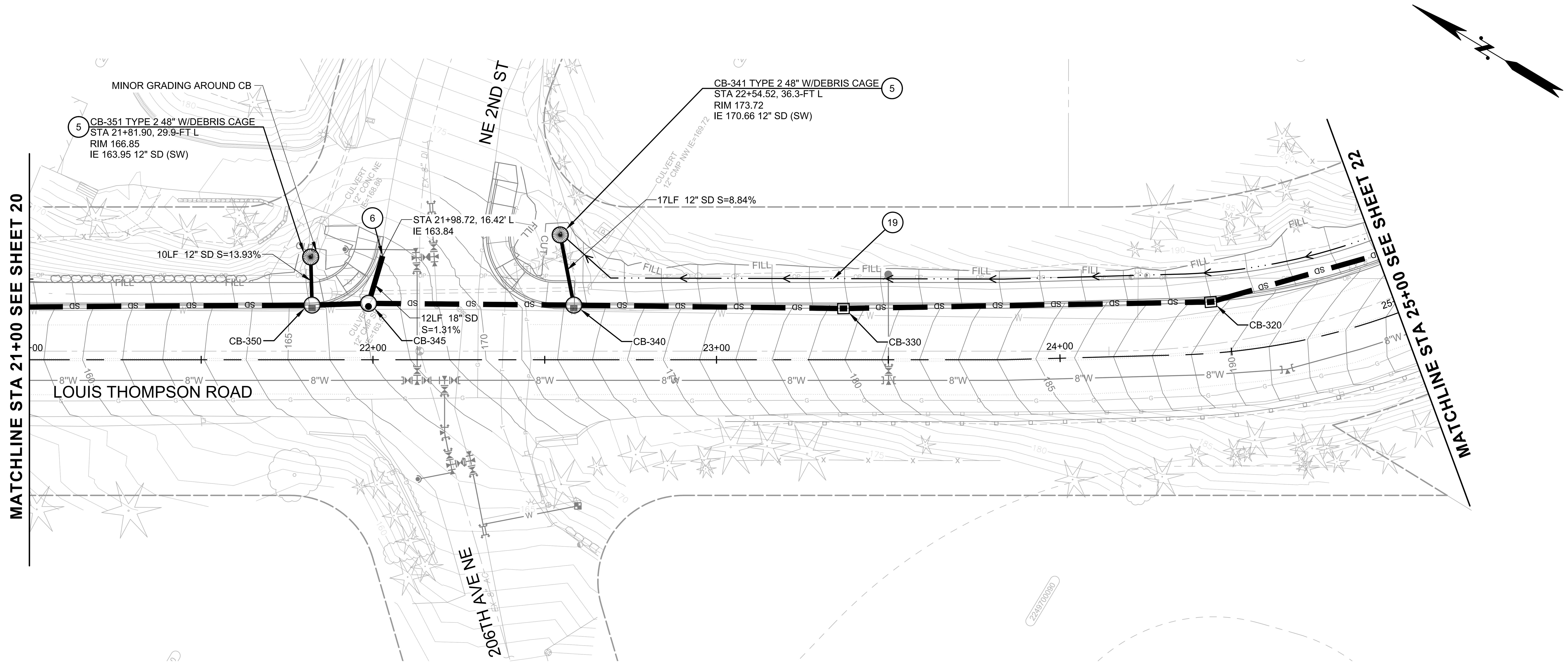
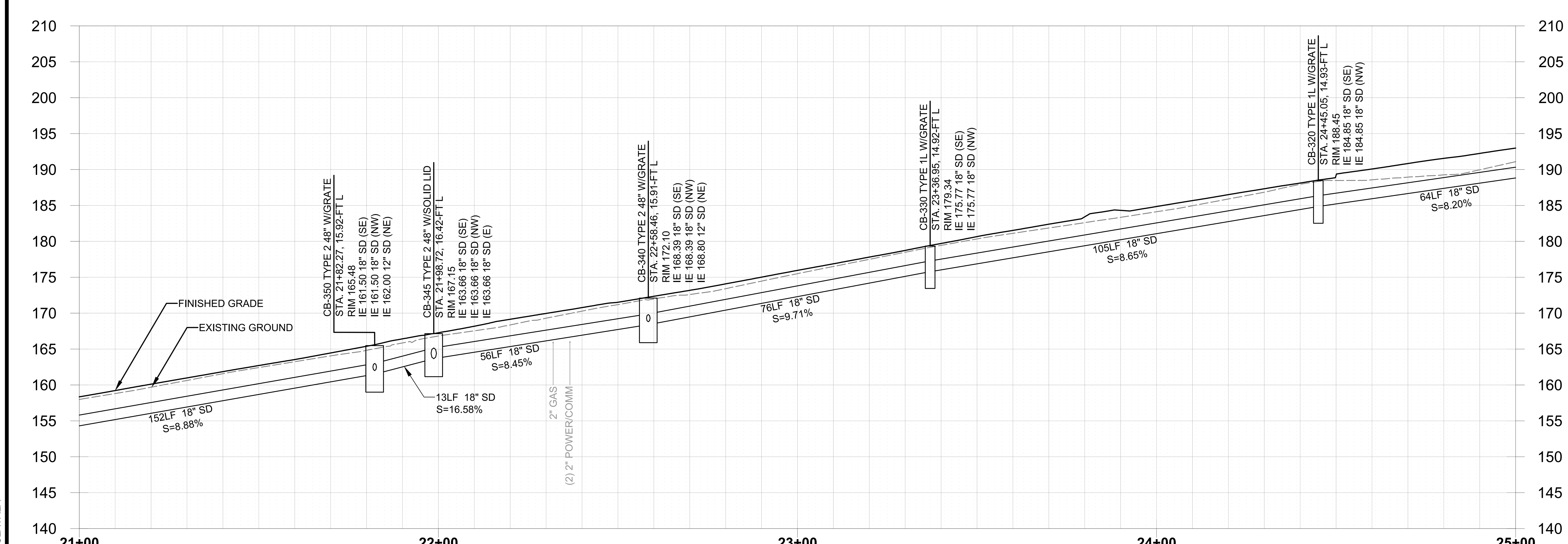
USER NAME: ALEKSANDRA.SLATALA

SEC. 32, T. 25N, R. 6E, W.M.





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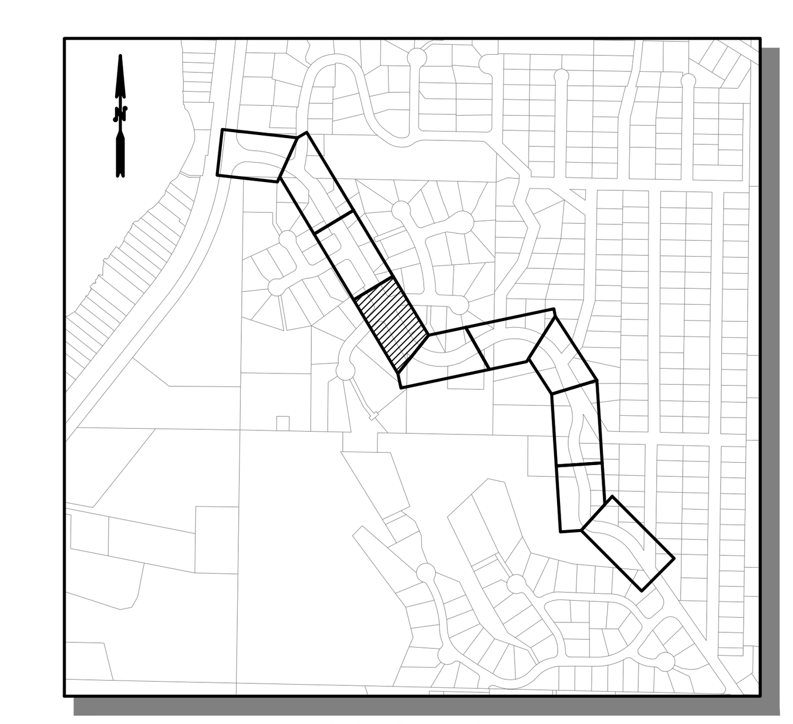

KEY MAP

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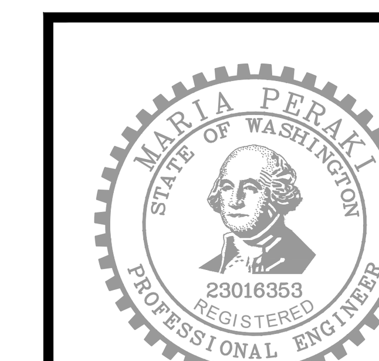

100% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY	MP
DRAWN BY	LT/LO/FJ
CHECKED BY	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG: 10-210058
SCALE: H: 1"=20' V: 1"=10'
DATE: 01/29/2024
DR04
SHEET 21 of 102

FILE NAME: C:\PW_OCI_WORKING\DIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS26566\P_10-210058_STRM.DWG
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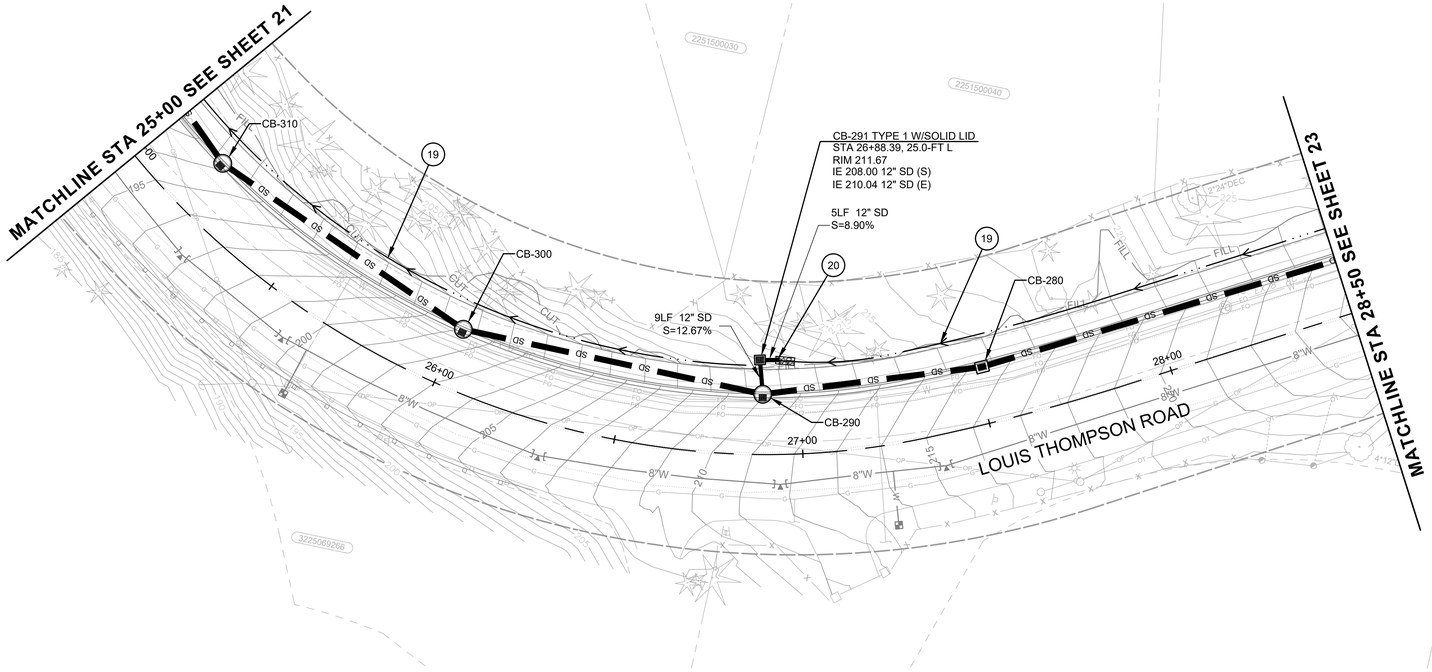
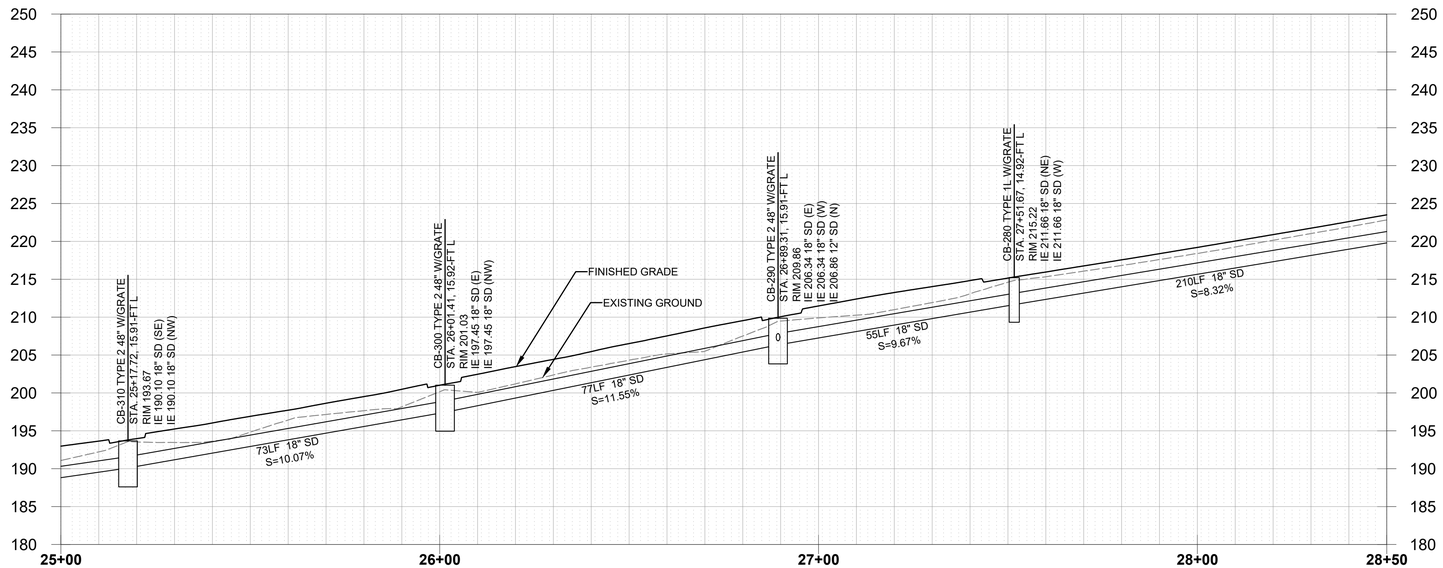
USER NAME: ALEKSANDRA SLATALA

SEC. 32, T. 25N, R. 6E, W.M.





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KEY MAP

100% SUBMITTAL (NOT FOR CONSTRUCTION)

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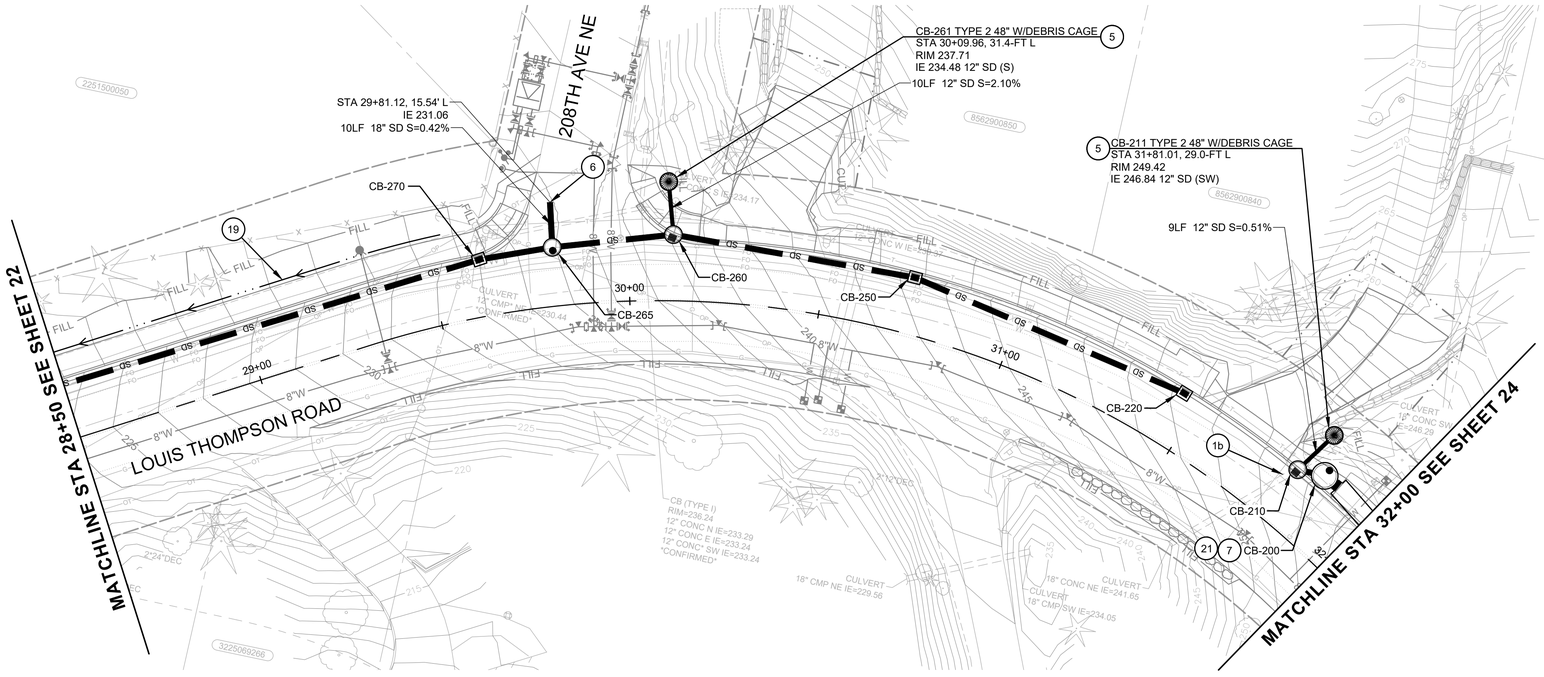
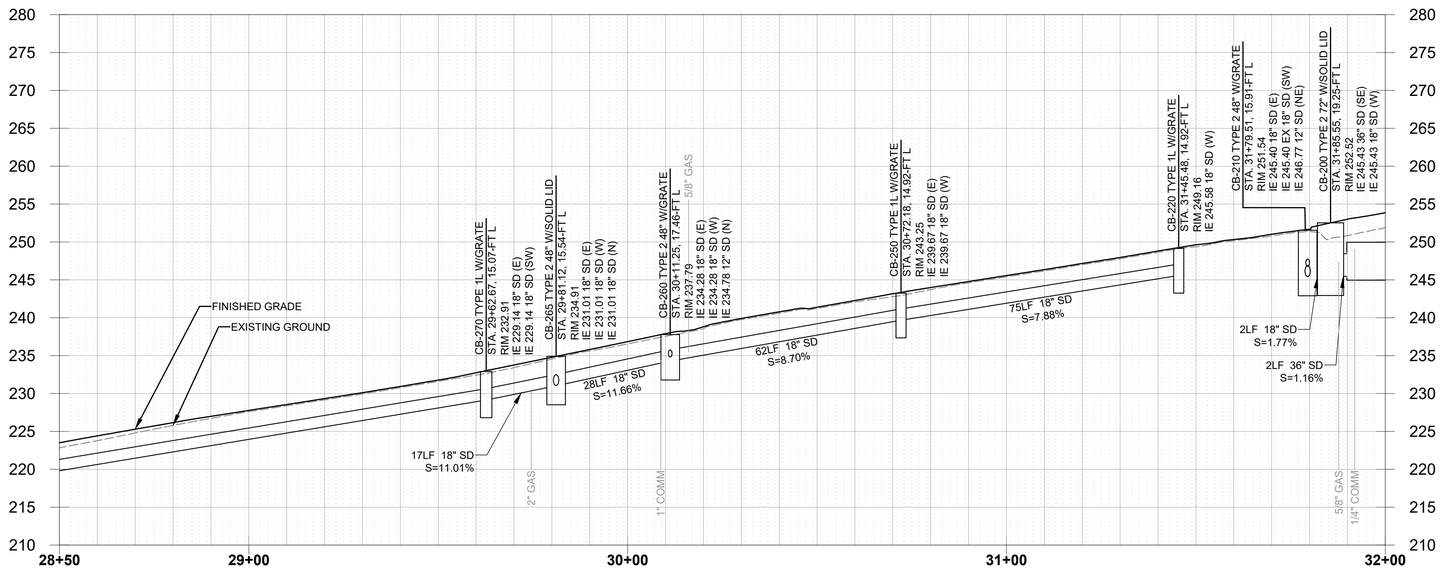
MARIA PRAKKEN STATE OF WASHINGTON 23016353 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY MP	Osborn Consulting					LOUIS THOMPSON ROAD TIGHTLINE PROJECT CITY OF SAMMAMISH STORM DRAINAGE PLAN AND PROFILE	JOB# / DWG 10-210058	DATE 01/29/2024
DRAWN BY LT/LO/FJ							SCALE H: 1"=20' V: 1"=10'	DR05
CHECKED BY LR		NO.	DATE	REVISION	BY	City of Sammamish Washington		SHEET 22 of 102

FILE NAME: C:\PW_OC1_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALA\DMS265661P_10-210058_STRM.DWG
PLOT TIME: 1/24/2024 2:35 PM
USER NAME: ALEKSANDRA.SLATALA

SEC. 32, T. 25N, R. 6E, W.M.





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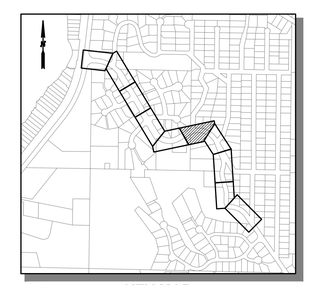

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DRAWN BY LT/LO/FJ					
CHECKED BY LR					

City of Sammamish Washington

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CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
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SCALE H: 1"=20' V: 1"=10'
DR06
SHEET 23 of 102

FILE NAME: C:\PW_OC1_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA.SLATALA\DMS265661\P_10-210058_STRM.DWG
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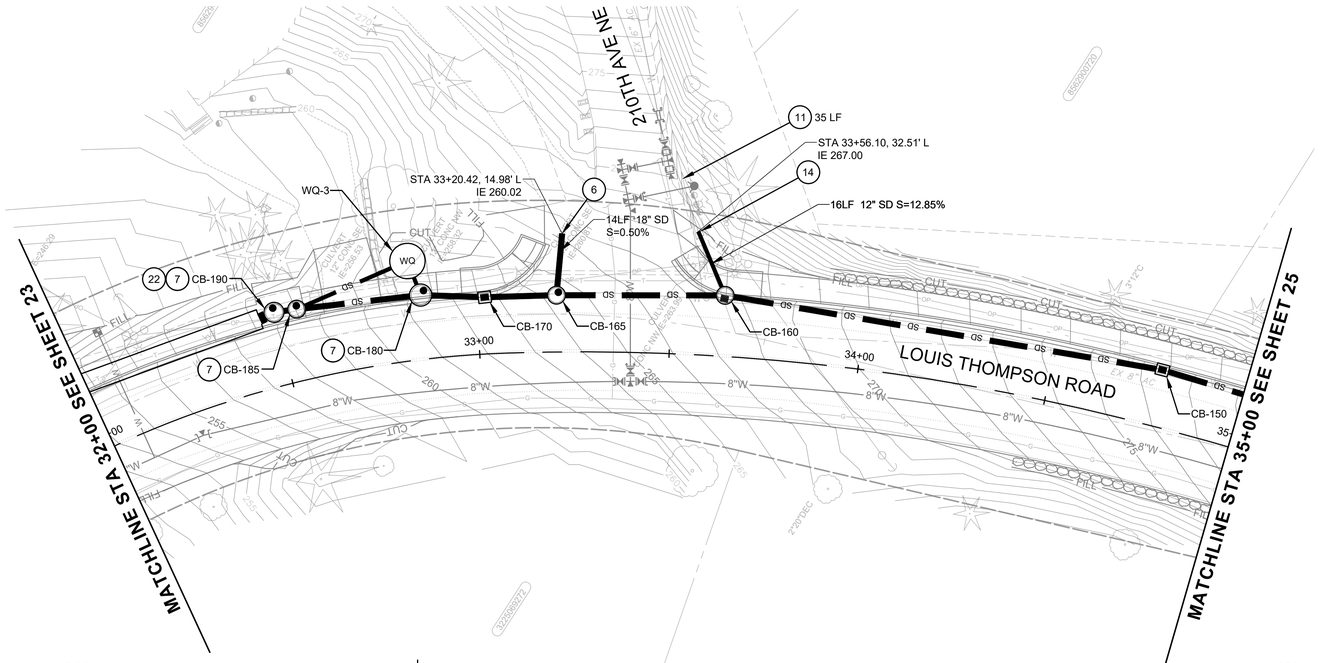

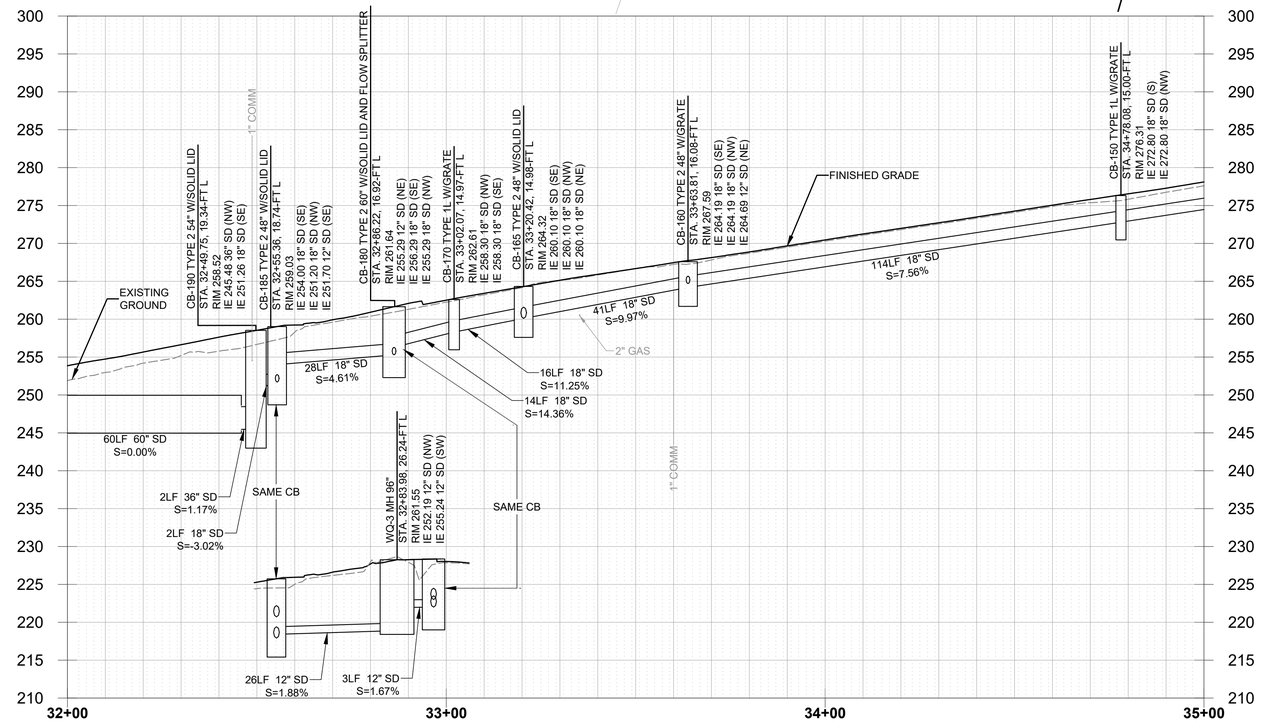

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   a. CONNECTION TO EXISTING STRUCTURE
   b. CONNECT EXISTING PIPE TO PROPOSED STRUCTURE
2. CONSTRUCT OUTFALL PAD PER DETAIL 1 ON SHEET 33.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT WITH WATER TIGHT REMOVAL PLUG FOR FUTURE CONNECTION.
7. INSTALL COMPOSITE SOLID LID WITH SLIP RESISTANT FINISH.
8. CONNECT OFFSITE LATERAL TO 8-IN STORM SEWER PIPE AT 0.5 PERCENT MINIMUM SLOPE. MINIMUM PIPE COVER PER MANUFACTURER'S RECOMMENDATION. INSTALL PIPE REDUCER AND COUPLER TO MATCH EXISTING PIPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT AT NEW PIPE CONNECTION TO OFFSITE LATERAL PER WSDOT STANDARD PLAN B-85.40.
10. CONNECT OFFSITE LATERAL TO CATCH BASIN.
11. DITCH MAINTENANCE.
12. REPLACE EXISTING GRATE WITH RECTANGULAR BI-DIRECTIONAL VANED GRATE.
13. REPLACE EXISTING GRATE WITH RECTANGULAR SOLID METAL COVER.
14. INSTALL BEVELED END PIPE SECTION WITH PIPE END TRASH RACK PER C.O.S FIG 7-01 AND FIG 7-02.
15. INSTALL DETENTION PIPE FLOW RESTRICTOR PER DETAIL 2 SHEET 28.
16. INSTALL FLOW SPLITTER WITH RISER SYSTEM PER DETAIL 1 SHEET 32.
17. INSTALL DETENTION PIPE ACCESS PER DETAIL 1 SHEET 28. ACCESS LOCATED BY STATION AND OFFSET TO THE CENTER OF THE RISER.
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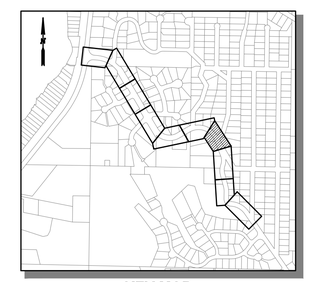
20. CONSTRUCT DITCH FLOW COLLECTION SYSTEM PER DETAIL 3 SHEET 33.
21. INSTALL DETENTION PIPE FLOW RESTRICTOR (BAFFLE) PER DETAIL 1 SHEET 29.
22. INSTALL DETENTION PIPE AIR VENT PER DETAIL 3 ON SHEET 28.

LEGEND

- SD — STORM DRAINAGE PIPE
- CATCH BASIN TYPE 1
- CATCH BASIN TYPE 1L
- CATCH BASIN TYPE 2 WITH GRATE
- CATCH BASIN TYPE 2 WITH SOLID LID
- CATCH BASIN TYPE 2 WITH DEBRIS CAGE
- MANHOLE TYPE 1
- DETENTION PIPE
- WQ — WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS
- GRASS-LINED V-DITCH
- OUTFALL PAD

SCALE: 1" = 20'
HORIZONTAL 0 20 40 60
SCALE: 1" = 10'
VERTICAL 0 10 20 30



KEY MAP

100% SUBMITTAL (NOT FOR CONSTRUCTION)

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MARIA PERANICH STATE OF WASHINGTON 23016353 REGISTERED PROFESSIONAL ENGINEER

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DRAWN BY	LT/LO/FJ		
CHECKED BY	LR		

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
DATE 01/29/2024
SCALE H: 1"=20' V: 1"=10'
DR07
SHEET 24 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALAUDMS265661P_10-210058_STRM.DWG
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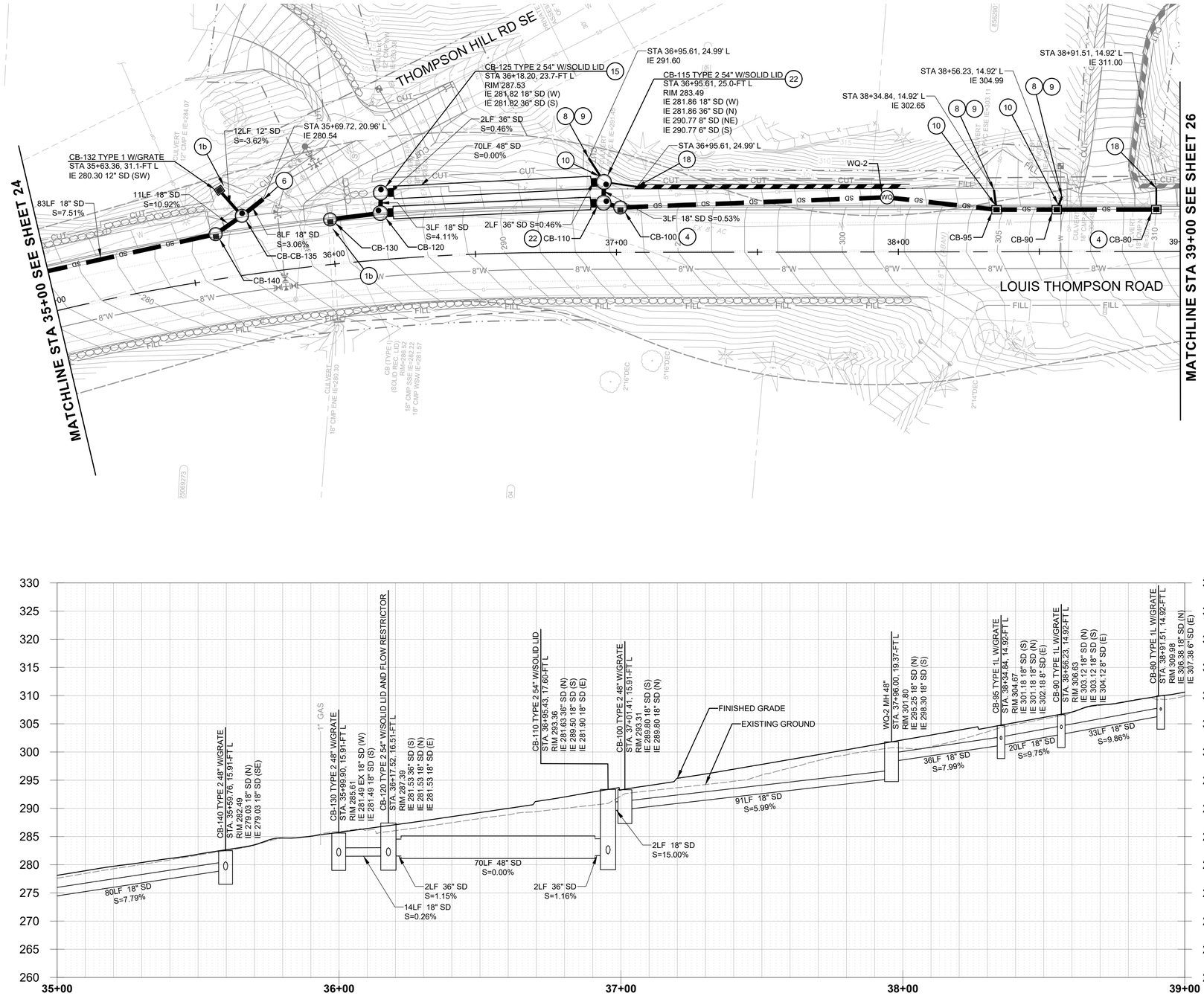

SEC. 32, T. 25N, R. 6E, W.M.

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◉	CATCH BASIN TYPE 2 WITH SOLID LID
❂	CATCH BASIN TYPE 2 WITH DEBRIS CAGE
⊡	MANHOLE TYPE 1
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· · · ⟶	GRASS-LINED V-DITCH
▨	OUTFALL PAD

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MARIA PERAKI
23016353

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DRAWN BY LT/LO/FJ					
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City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
SCALE H: 1"=20' V: 1"=10'
DATE 01/29/2024
DR08
SHEET 25 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS26566\P_10-210058_STRM.DWG
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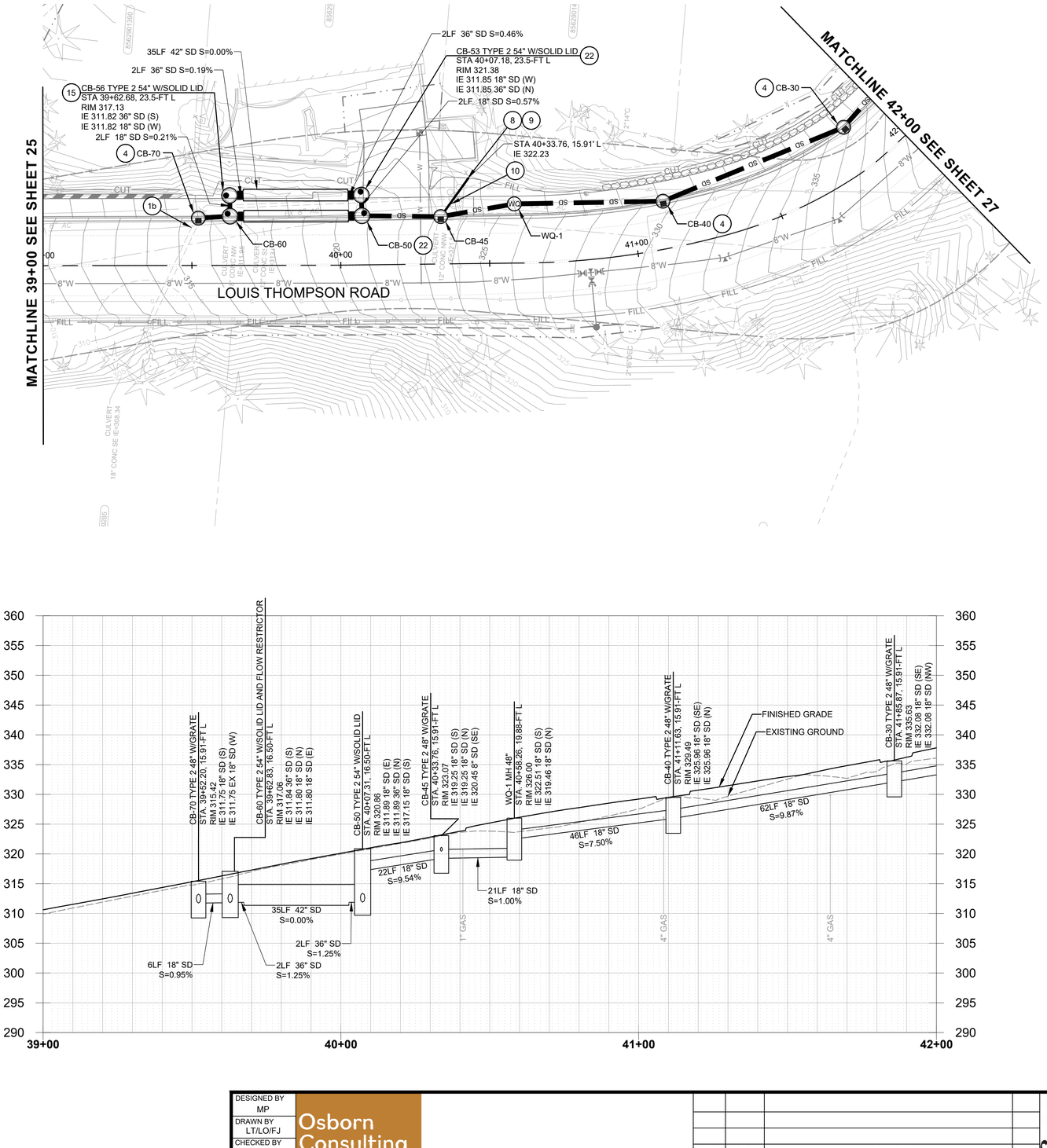
SEC. 32, T. 25N, R. 6E, W.M.



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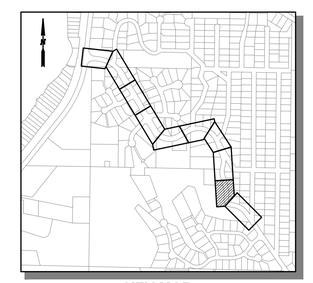

KEY MAP

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MARK PARKINSON STATE OF WASHINGTON 23016353 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY MP	Osborn Consulting	NO.	DATE	REVISION	BY
DRAWN BY LT/LO/FJ					
CHECKED BY LR					

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
SCALE H: 1"=20' V: 1"=10'
DATE 01/29/2024
DR09
SHEET 26 of 102

FILE NAME: C:\PW_OC1_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALA\DMS26566\P_10-210058_STRM.DWG
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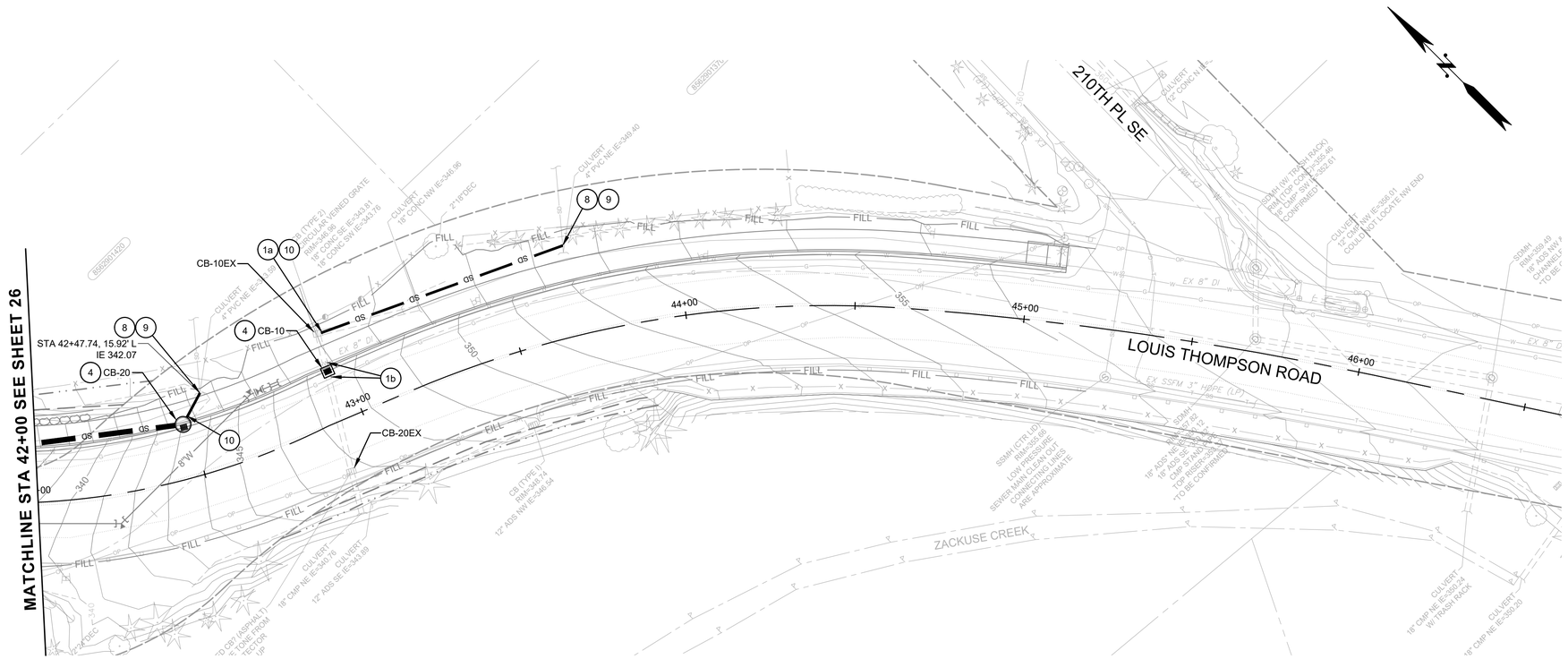

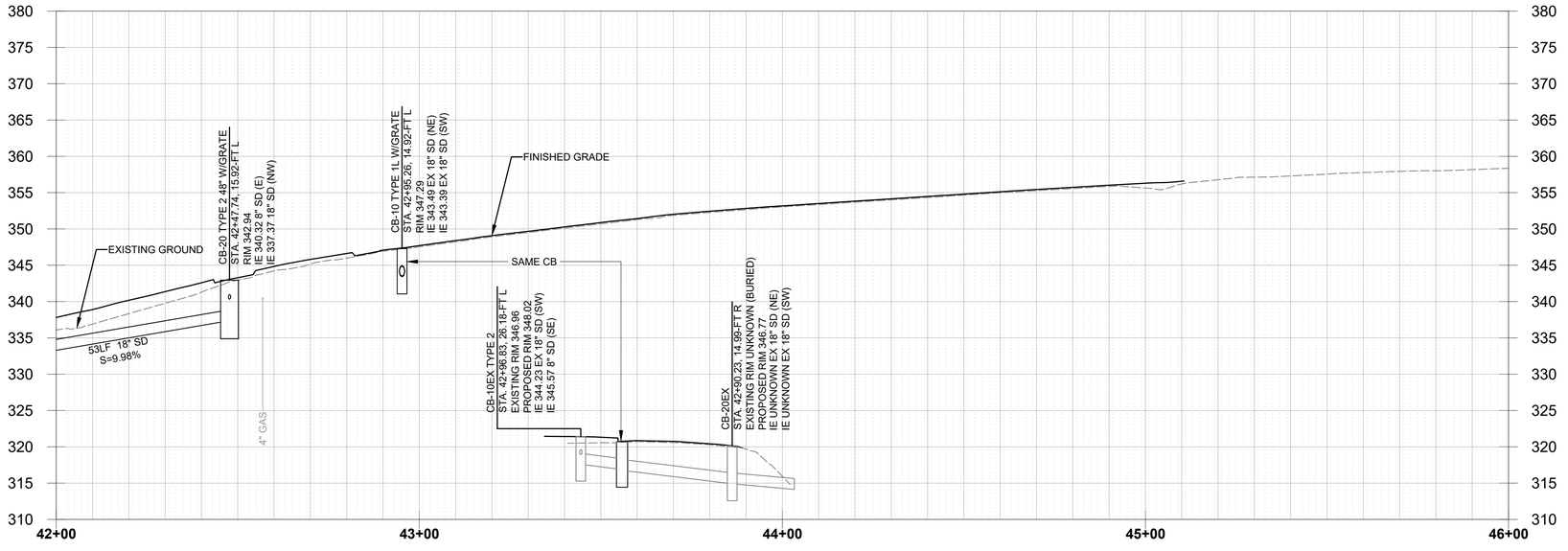

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DRAWN BY LT/LO/FJ					JOB# / DWG 10-210058
CHECKED BY LR					SCALE H: 1"=20' V: 1"=10'
	NO.	DATE	REVISION	BY	DATE 01/29/2024
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					SHEET 27 of 102

City of Sammamish Washington

FILE NAME: C:\PW_OC1_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALA\DMS26566\P_10-210058_STRM.DWG
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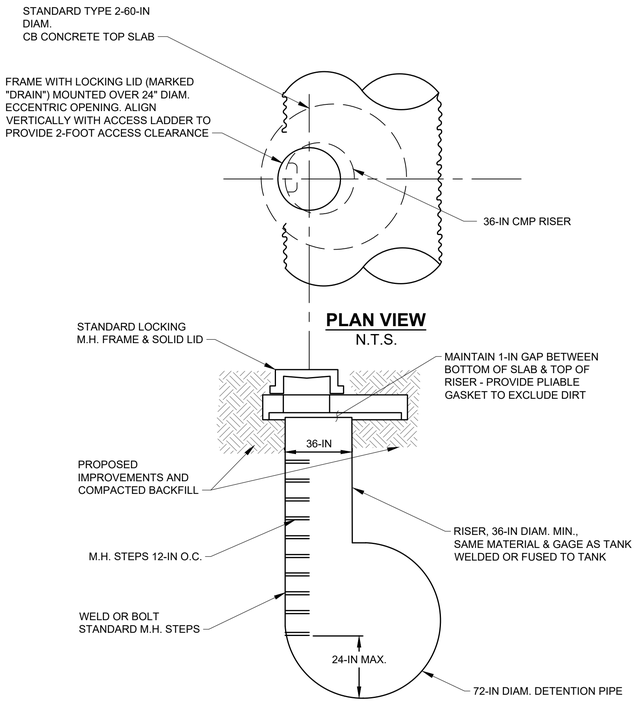


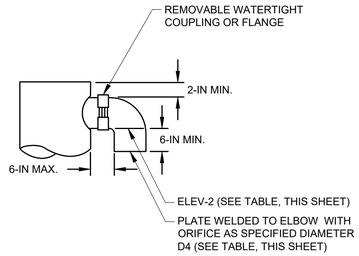
PLAN VIEW
N.T.S.

SECTION A-A
N.T.S.

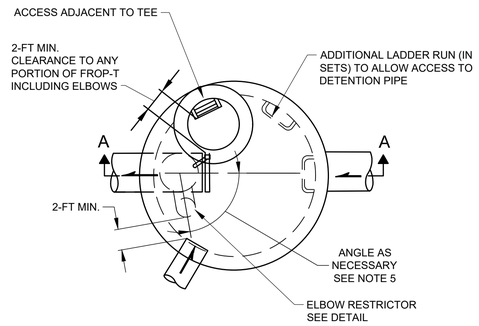
NOTES:

1. USE ADJUSTING BLOCKS AS REQUIRED TO BRING FRAME TO GUIDE.
2. ALL MATERIALS TO BE ALUMINUM OR GALVANIZED AND ASPHALT COATED (TREATMENT 1 OR BETTER), OR STAINLESS STEEL OR ALUMINIZED STEEL.
3. MUST BE LOCATED FOR ACCESS BY MAINTENANCE VEHICLES.
4. MAY SUBSTITUTE WSDOT SPECIAL TYPE IV MANHOLE (RCP ONLY).

1 DETENTION PIPE ACCESS
20
N.T.S.



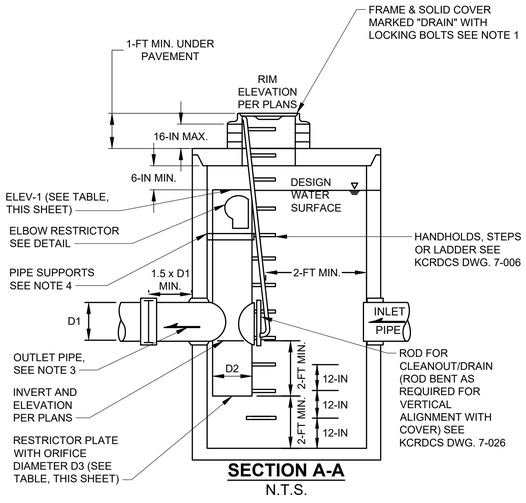
ELBOW RESTRICTOR DETAIL
N.T.S.



PLAN VIEW
N.T.S.

NOTES:

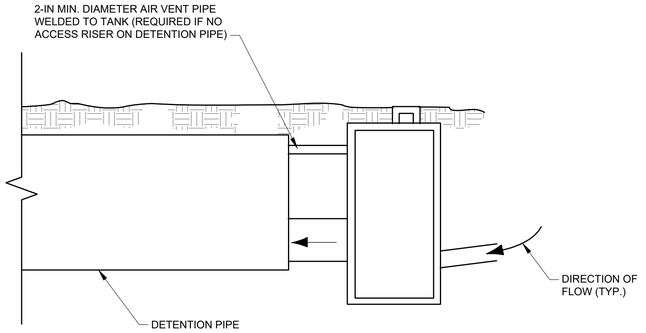
1. METAL PARTS: CORROSION RESISTANT. STAINLESS STEEL OR ALUMINIZED STEEL.
2. FRAME AND LADDER OR STEPS OFFSET SO:
   A. CLEANOUT GATE IS VISIBLE FROM TOP.
   B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE.
   C. FRAME IS CLEAR OF CURB.
3. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4-IN.
4. PROVIDE AT LEAST ONE 3-IN X .090 GAGE SUPPORT BRACKET ANCHORED TO CONCRETE WALL. (MAXIMUM 3-FT-0-IN VERTICAL SPACING)
5. LOCATE ELBOW RESTRICTOR(S) AS NECESSARY TO PROVIDE MINIMUM CLEARANCE AS SHOWN.
6. LOCATE ADDITIONAL LADDER RUNGS IN STRUCTURES USED AS ACCESS TO TANKS AND VAULT TO ALLOW ACCESS WHEN CATCH BASIN IS FILLED WITH WATER.
7. TEE SHALL BE CONSTRUCTED OF ALUMINUM CMP OR ALUMINIZED STEEL CMP MEETING WSDOT/APWA STANDARDS.



SECTION A-A
N.T.S.

FLOW RESTRICTOR STRUCTURE	RISER DIAMETER (IN.) [D2]	RISER CREST ELEVATION (FT) [ELEV-1]	RESTRICTOR PLATE ORIFICE DIAMETER (IN.) [D3]	ELBOW RESTRICTOR ORIFICE DIAMETER (IN.) [D4]	ELBOW RESTRICTOR PIPE DIAMETER (IN.)	ELBOW RESTRICTOR INVERT ELEVATION (FT) [ELEV-2]
CB-60	18	314.70	2.50	5.00	6	313.30
CB-120	18	284.87	0.62	1.00	2	284.03
CB-405	24	126.65	1.63	3.00	4	125.60

2 DETENTION PIPE FLOW RESTRICTOR (TEE)
20,25,26
N.T.S.



3 DETENTION PIPE AIR VENT
25,26
24
N.T.S.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERAZA — STATE OF WASHINGTON — 23016353 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	MP		
DRAWN BY	LT/LO/FJ		
CHECKED BY	LR		

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: N/A V: N/A
DR11
SHEET 28 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA SLATALA\DMS26566\P_10-210058_STRM_DETL.DWG
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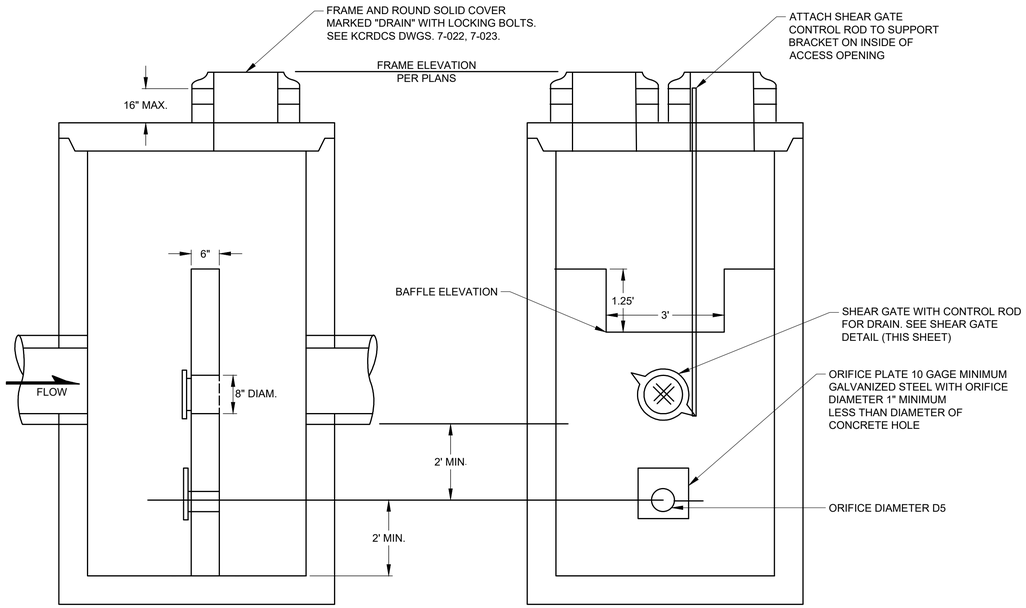
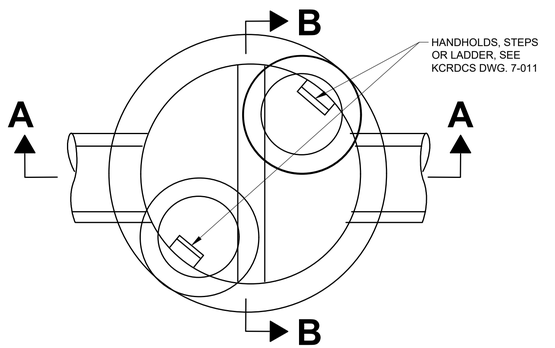
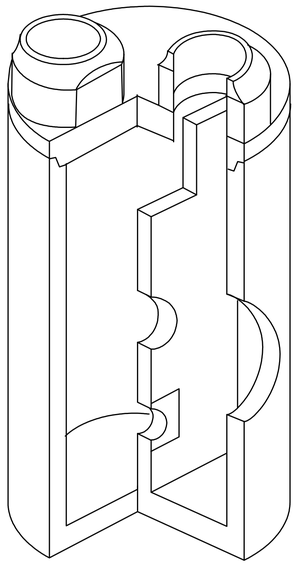


SECTION A-A
NTS

SECTION B-B
NTS



PLAN VIEW
NTS



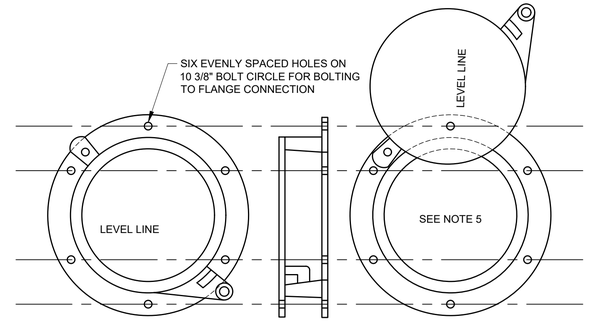
ISOMETRIC
NTS

FLOW RESTRICTOR STRUCTURE	ORIFICE DIAMETER (IN) [D5]	BAFFLE ELEVATION (FT)
CB-200	0.87	248.53

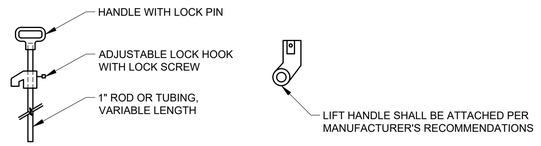
NOTES:

1. METAL PARTS: CORROSION RESISTANT STEEL PARTS STAINLESS STEEL OR ALUMINIZED STEEL.
2. PIPE SIZE, SLOPES, AND ELEVATIONS: PER PLANS. STRUCTURE TYPE, RIM: PER PLANS.
3. COVERS SHALL BE MAKED "DRAIN" WITH LOCKING BOLTS.
4. BAFFLE WALL SHALL HAVE #4 BAR AT 12 IN. SPACING EACH WAY.
5. PRECAST BAFFLE WALL SHALL BE KEYED AND GROUTED IN PLACE.
6. BOTTOM ORIFICE PLATE TO BE 1/4 IN. MIN. NON-GALVANIZED CORROSIVE RESISTANT MATERIAL AND ATTACHED WITH 1/2 IN. STAINLESS STEEL BOLTS.
7. SEE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTING REQUIREMENTS.

1/23 DETENTION PIPE FLOW RESTRICTOR (BAFFLE)
N.T.S.



FRONT **SIDE** **MAXIMUM OPENING OF GATE**



LIFT HANDLE

NOTES:

1. SHEAR GATE SHALL BE ALUMINUM ALLOY PER ASTM B-26-ZG-32a OR CAST IRON ASTM A48 CLASS 30B AS REQUIRED.
2. GATE SHALL BE 8 IN. DIAM. UNLESS OTHERWISE SPECIFIED.
3. GATE SHALL BE JOINED TO TEE SECTION BY BOLTING (THROUGH FLANGE), WELDING, OR OTHER SECURE MEANS.
4. LIFT ROD: AS SPECIFIED BY MFR. WITH HANDLE EXTENDING TO WITHIN ONE FOOT OF COVER AND ADJUSTABLE HOOK LOCK FASTENED TO FRAME OR UPPER HANDHOLD.
5. GATE SHALL NOT OPEN BEYOND THE CLEAR OPENING BY LIMITED HINGE MOVEMENT, STOP TAB, OR SOME OTHER DEVICE.
6. NEOPRENE RUBBER GASKET REQUIRED BETWEEN RISER MOUNTING FLANGE AND GATE FLANGE.
7. MATING SURFACES OF LID AND BODY TO BE MACHINED FOR PROPER FIT.
8. FLANGE MOUNTING BOLTS SHALL BE 3/8 IN. DIAM. STAINLESS STEEL.
9. ALTERNATE CLEANOUT/SHEAR GATES TO THE DESIGN SHOWN ARE ACCEPTABLE, PROVIDED THEY MEET THE MATERIAL SPECIFICATIONS ABOVE AND HAVE A SIX BOLT, 10 3/8 IN. BOLT CIRCLE FOR BOLTING TO THE FLANGE CONNECTION.
10. SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTINGS REQUIREMENTS.

2 SHEAR GATE
N.T.S.

STRUCTURE LID/GRATE CONTROL POINT TABLE

STRUCTURE	TYPE	STA	OFFSET	ELEVATION
CB-10	COMBINATION INLET	42+95.26	14.92' L	347.29
CB-10EX	SOLID LID	42+96.83	26.18' L	348.02
CB-20	COMBINATION INLET	42+47.74	15.02' L	342.99
CB-20EX	SOLID LID	42+90.23	14.99' R	346.77
CB-30	COMBINATION INLET	41+85.87	15.01' L	335.68
CB-40	COMBINATION INLET	41+11.62	15.02' L	329.53
CB-45	VANNED GRATE	40+33.76	15.01' L	323.11
CB-50	SOLID LID	40+08.03	17.39' L	321.06
CB-53	SOLID LID	40+06.94	24.59' L	321.82
CB-56	SOLID LID	39+61.53	23.49' L	317.02
CB-60	SOLID LID	39+62.04	17.33' L	316.99
CB-70	COMBINATION INLET	39+52.20	15.01' L	315.46
CB-80	COMBINATION INLET	38+91.51	14.92' L	309.88
CB-90	VANNED GRATE	38+56.23	14.92' L	306.62
CB-95	VANNED GRATE	38+34.84	14.92' L	304.68
CB-100	VANNED GRATE	37+01.41	15.01' L	293.31
CB-110	SOLID LID	36+96.44	18.15' L	293.45
CB-113EX	VANNED GRATE	11+34.10	21.66' R	71.97
CB-115	SOLID LID	36+96.35	24.12' L	293.61
CB-120	SOLID LID	36+16.93	17.48' L	287.37
CB-125	SOLID LID	36+18.36	24.85' L	288.17
CB-130	VANNED GRATE	35+99.90	15.01' L	285.66
CB-132	VANNED GRATE	35+63.36	31.10' L	283.33
CB-135	SOLID LID	35+69.90	21.84' L	283.80
CB-140	VANNED GRATE	35+59.76	15.01' L	282.54
CB-150	VANNED GRATE	34+78.08	15.00' L	276.31
CB-160	VANNED GRATE	33+63.68	15.19' L	267.62
CB-165	SOLID LID	33+20.90	15.73' L	264.54
CB-170	VANNED GRATE	33+02.07	14.97' L	262.66
CB-180	SOLID LID	32+87.04	18.01' L	261.76
CB-183EX	BI-DIRECTIONAL VANNED GRATE	10+23.94	45.34' L	60.61
CB-185	SOLID LID	32+55.46	19.63' L	259.05
CB-186EX	BI-DIRECTIONAL VANNED GRATE	10+27.04	44.95' R	60.73
CB-190	SOLID LID	32+49.69	20.49' L	258.53
CB-200	SOLID LID	31+85.58	21.15' L	252.54
CB-210	VANNED GRATE	31+79.50	15.01' L	251.58
CB-211	DEBRIS CAGE	31+81.01	29.03' L	249.52
CB-220	VANNED GRATE	31+45.48	14.92' L	249.16
CB-250	VANNED GRATE	30+72.18	14.92' L	243.25
CB-260	VANNED GRATE	30+10.94	16.62' L	237.78
CB-261	DEBRIS CAGE	30+09.96	31.41' L	237.58
CB-265	SOLID LID	29+81.14	14.64' L	234.85
CB-270	VANNED GRATE	29+62.67	15.07' L	232.76
CB-280	VANNED GRATE	27+51.67	14.92' L	215.22
CB-290	VANNED GRATE	26+89.31	15.02' L	209.91
CB-291	SOLID LID	26+88.39	24.97' L	211.67
CB-300	VANNED GRATE	26+01.41	15.02' L	201.07
CB-310	VANNED GRATE	25+17.72	15.01' L	193.71
CB-320	VANNED GRATE	24+45.05	14.93' L	188.45
CB-330	VANNED GRATE	23+36.95	14.92' L	179.34
CB-340	VANNED GRATE	22+58.46	15.01' L	172.14
CB-341	DEBRIS CAGE	22+54.52	36.35' L	173.82
CB-345	SOLID LID	21+98.70	15.52' L	167.16
CB-350	VANNED GRATE	21+82.27	15.02' L	165.52
CB-351	DEBRIS CAGE	21+81.90	29.91' L	166.95
CB-360	VANNED GRATE	20+27.84	14.92' L	151.58
CB-361	VANNED GRATE	19+31.03	14.92' L	143.48
CB-362	SOLID LID	19+31.66	25.00' L	144.87
CB-365	SOLID LID	19+20.36	17.83' L	143.15
CB-370	SOLID LID	19+20.55	24.07' L	143.23
CB-375	SOLID LID	18+69.47	23.40' L	139.43
CB-376	SOLID LID	18+71.27	37.96' L	143.22
CB-380	VANNED GRATE	18+70.07	15.01' L	138.53
CB-400	SOLID LID	17+38.16	27.88' L	130.98
CB-405	SOLID LID	17+39.51	19.39' L	129.24
CB-410	VANNED GRATE	17+32.23	15.01' L	128.09
CB-420	VANNED GRATE	16+63.22	15.01' L	122.83
CB-430	VANNED GRATE	15+99.00	15.01' L	117.98
CB-440	SOLID LID	15+01.91	25.57' L	112.83
CB-450	VANNED GRATE	15+03.70	15.01' L	110.80
CB-455	VANNED GRATE	14+31.51	14.92' L	105.52
CB-460	VANNED GRATE	13+85.52	15.01' L	101.55
CB-465	DEBRIS CAGE	13+66.17	35.37' L	98.89
CB-470EX	SOLID LID	13+35.45	32.99' L	97.22
CB-480EX	SOLID LID	12+67.34	13.22' L	90.03
CB-490	VANNED GRATE	10+88.07	15.01' L	67.08
CB-490EX	SOLID LID	11+90.12	20.69' L	80.48
CB-495EX	SOLID LID	10+91.57	22.44' L	68.14
CB-500EX	VANNED GRATE	10+68.61	22.03' R	64.81
CB-510EX	SOLID LID	10+23.92	27.32' R	60.83
MH-1	SOLID LID	18+63.13	17.39' L	138.57
MH-2	SOLID LID	18+64.70	27.79' L	141.94
WQ-1	SOLID LID	40+58.26	20.78' L	326.02
WQ-2	SOLID LID	37+96.06	20.27' L	301.82
WQ-3	SOLID LID	32+86.23	24.72' L	261.73
WQ-4	SOLID LID	18+86.34	21.89' L	140.43

NOTES:

1. THE ELEVATIONS, STATION, AND OFFSET IN THIS TABLE ARE LOCATED AT THE CENTER OF THE STRUCTURE LID OR GRATE. THE ROADWAY CENTERLINE STATIONING IS USED.
2. FOR ALL STRUCTURES WITH A GRATE, THE GRATE ELEVATION IS SET AT 0.1 FT LOWER THAN THE FINISHED SURFACE ELEVATION.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PRADA
STATE OF WASHINGTON
23016353
REGISTERED
PROFESSIONAL ENGINEER

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-011\ALEKSANDRA.SLATALA\DMS265661P_10-210058_STRM_DETL.DWG
PLOT TIME: 1/25/2024 3:37 PM
USER NAME: ALEKSANDRA.SLATALA

DESIGNED BY	DRAWN BY	CHECKED BY

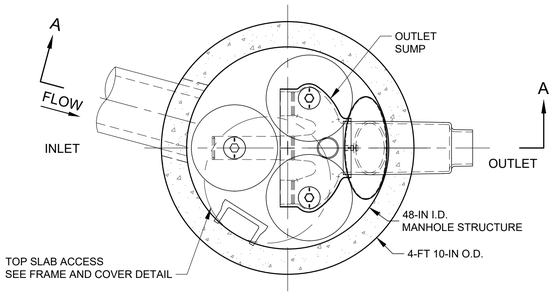
Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

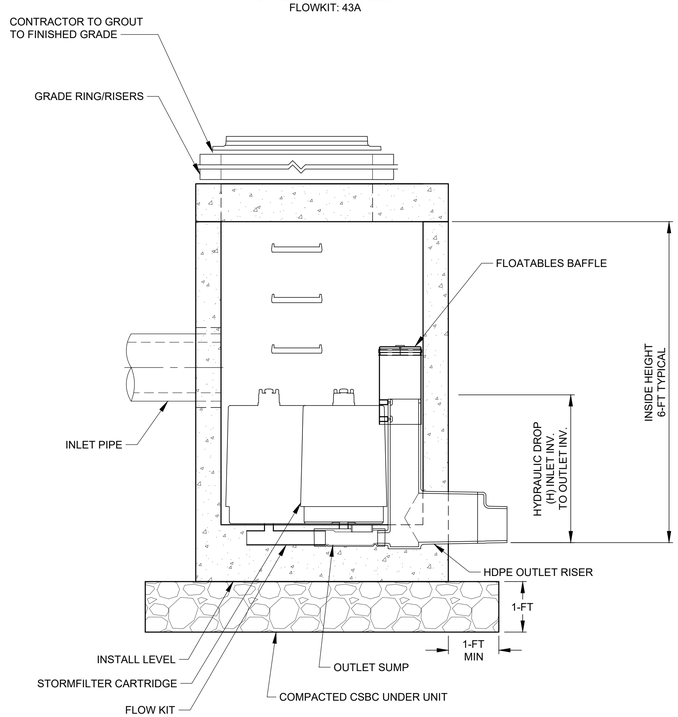
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: N/A V: N/A
DR12
SHEET 29 of 102



PLAN VIEW

STANDARD OUTLET RISER
FLOWKIT: 43A



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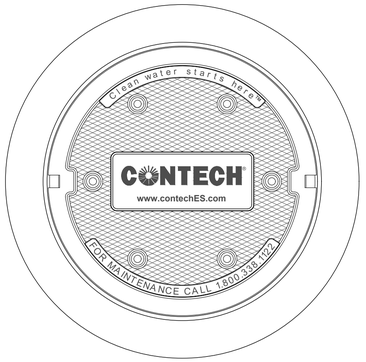

FRAME AND COMPOSITE COVER

(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			WQ-1
WATER QUALITY FLOW RATE (cfs)			0.040
PEAK FLOW RATE (cfs)			0.34
RETURN PERIOD OF PEAK FLOW (yrs)			100
CARTRIDGE HEIGHT			27-IN
NUMBER OF CARTRIDGES REQUIRED			3
CARTRIDGE FLOW RATE (gpm)			11.25
MEDIA TYPE (PERLITE, ZPG, PSORB)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	322.51	TBD	18-IN
OUTLET PIPE	319.46	TBD	18-IN
RIM ELEVATION			326.00
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		N/A	N/A

NOTES/SPECIAL REQUIREMENTS:
COMPOSITE COVER WITH SLIP RESISTANT FINISH FOR ACCESS RISER
* PER ENGINEER OF RECORD

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			WQ-2
WATER QUALITY FLOW RATE (cfs)			0.075
PEAK FLOW RATE (cfs)			0.68
RETURN PERIOD OF PEAK FLOW (yrs)			100
CARTRIDGE HEIGHT			27-IN
NUMBER OF CARTRIDGES REQUIRED			3
CARTRIDGE FLOW RATE (gpm)			11.25
MEDIA TYPE (PERLITE, ZPG, PSORB)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	298.30	TBD	18-IN
OUTLET PIPE	295.25	TBD	18-IN
RIM ELEVATION			301.80
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		N/A	N/A

NOTES/SPECIAL REQUIREMENTS:
COMPOSITE COVER WITH SLIP RESISTANT FINISH FOR ACCESS RISER
* PER ENGINEER OF RECORD

GENERAL NOTES:

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. WWW.CONTECHES.COM
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' [1524 MM] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES [178 MM]. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (GPM) [L/S] DIVIDED BY THE FILTER CONTACT SURFACE AREA (SQ FT)[M2/].
8. STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.
9. FOR THE LOCATION OF INLET AND OUTLET PIPES, REFER TO SHEETS 18-27.

INSTALLATION NOTES:

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
5. CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES [200 MM], CONTRACTOR TO REMOVE THE 8 INCH [200 MM] OUTLET STUB AT MOLDED-IN CUT LINE. COUPLING BY FERNCO OR EQUAL AND PROVIDED BY CONTRACTOR.
6. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

1 25,26 **WATER QUALITY FACILITY (WQ-1 AND WQ-2)**
N.T.S.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PEANA
STATE OF WASHINGTON
23016353
REGISTERED
PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

JOB# / DWG: 10-210058
DATE: 01/29/2024
SCALE: H: N/A V: N/A
DR13
SHEET 30 of 102

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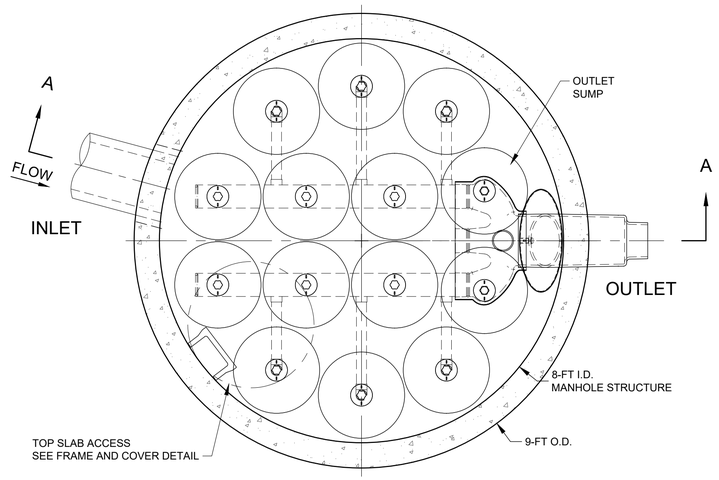
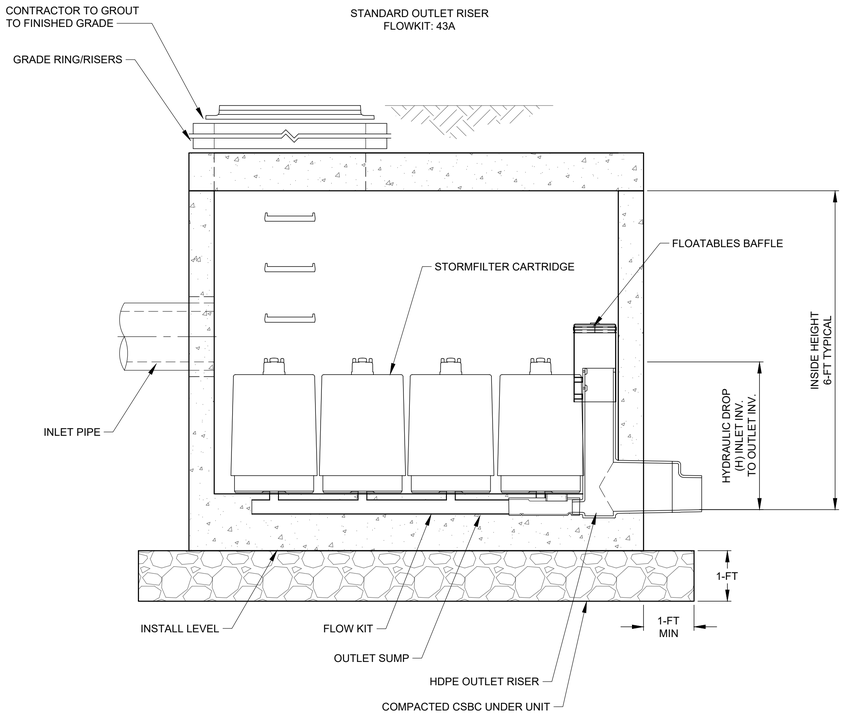
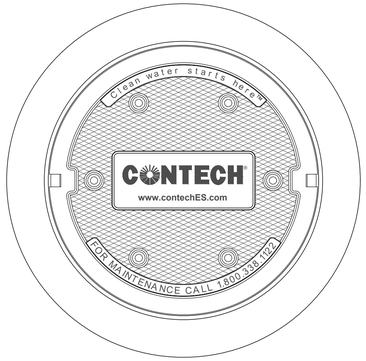


PLAN VIEW

STANDARD OUTLET RISER
FLOWKIT: 43A



SECTION A-A



FRAME AND COMPOSITE COVER

(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			WQ-3
WATER QUALITY FLOW RATE (cfs)			0.32
PEAK FLOW RATE (cfs)			1.8
RETURN PERIOD OF PEAK FLOW (yrs)			100
CARTRIDGE HEIGHT			27-IN
NUMBER OF CARTRIDGES REQUIRED			14
CARTRIDGE FLOW RATE (gpm)			11.25
MEDIA TYPE (PERLITE, ZPG, PSORB)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	255.24	TBD	12-IN
OUTLET PIPE	252.19	TBD	12-IN
RIM ELEVATION			261.55
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		N/A	N/A
NOTES/SPECIAL REQUIREMENTS: COMPOSITE COVER FOR ACCESS RISER * PER ENGINEER OF RECORD			

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			WQ-4
WATER QUALITY FLOW RATE (cfs)			0.289
PEAK FLOW RATE (cfs)			1.8
RETURN PERIOD OF PEAK FLOW (yrs)			100
CARTRIDGE HEIGHT			27-IN
NUMBER OF CARTRIDGES REQUIRED			14
CARTRIDGE FLOW RATE (gpm)			11.25
MEDIA TYPE (PERLITE, ZPG, PSORB)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	136.34	TBD	12-IN
OUTLET PIPE	133.29	TBD	12-IN
RIM ELEVATION			141.22
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		N/A	N/A
NOTES/SPECIAL REQUIREMENTS: COMPOSITE COVER FOR ACCESS RISER * PER ENGINEER OF RECORD			

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5. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' [1524 MM] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES [178 MM]. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (GPM) [L/S] DIVIDED BY THE FILTER CONTACT SURFACE AREA (SQ FT)[M2/].
8. STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.
9. FOR THE LOCATION OF INLET AND OUTLET PIPES, REFER TO SHEETS 18-27.

INSTALLATION NOTES:

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
5. CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES [200 MM], CONTRACTOR TO REMOVE THE 8 INCH [200 MM] OUTLET STUB AT MOLDED-IN CUT LINE. COUPLING BY FERNCO OR EQUAL AND PROVIDED BY CONTRACTOR.
6. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

1 / 20,24 WATER QUALITY FACILITY (WQ-3 AND WQ-4)

N.T.S.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERAKI
STATE OF WASHINGTON
23016353
REGISTERED
PROFESSIONAL ENGINEER

DESIGNED BY	DRAWN BY	CHECKED BY
MP	LT/LO/FJ	LR

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

JOB# / DWG: 10-210058
SCALE: H: N/A V: N/A
DATE: 01/29/2024
DR14
SHEET 31 of 102

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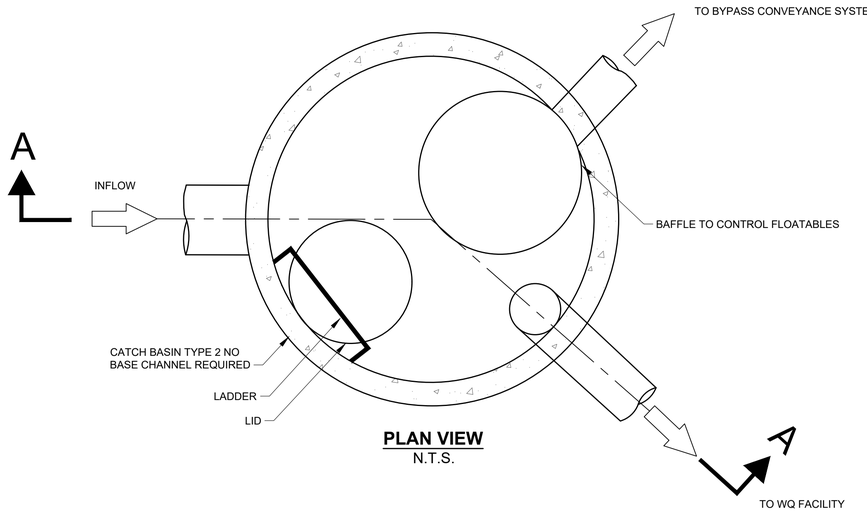
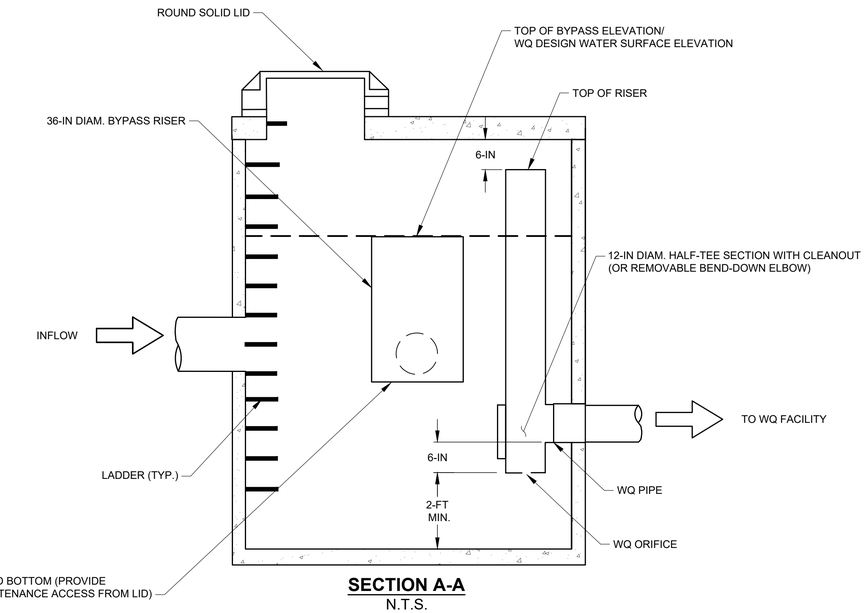


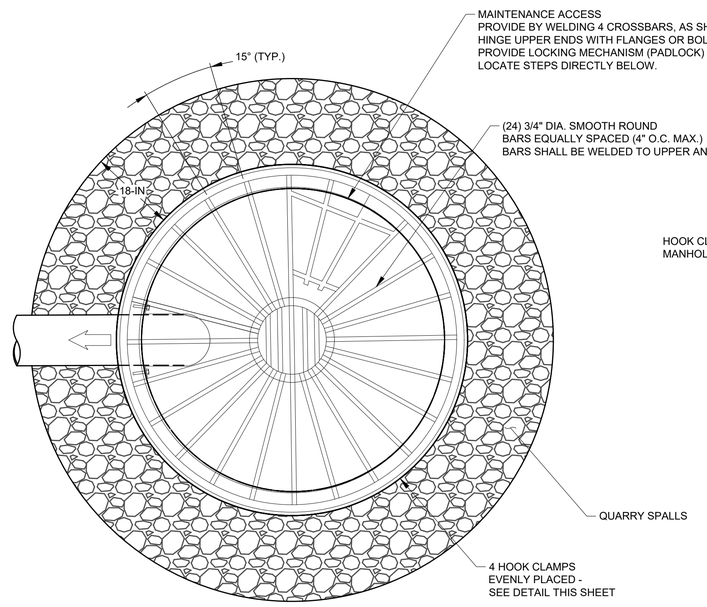
PLAN VIEW
N.T.S.



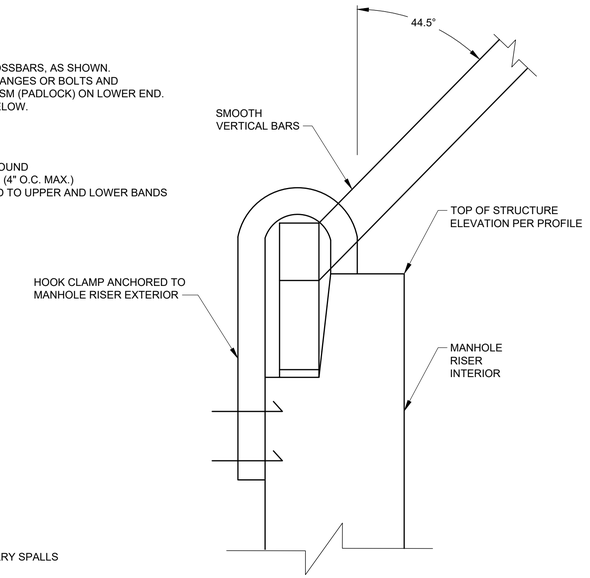
SECTION A-A
N.T.S.

STRUCTURE ID	WQ PIPE IE	WQ ORIFICE DIA (IN)	TOP OF BYPASS ELEVATION
CB-365	136.54	3.0	138.54
CB-180	255.29	3.0	257.29

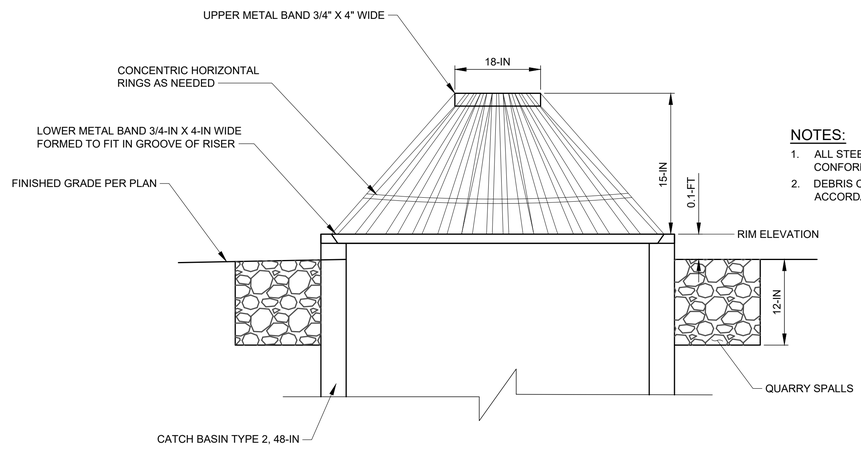
1 FLOW SPLITTER WITH RISER SYSTEM
20,24 N.T.S.



PLAN VIEW



DETAIL HOOK CLAMP



DETAIL CAGE

NOTES:
1. ALL STEEL IN PLATES, BARS AND BANDS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A38.
2. DEBRIS CAGE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A123 (AASHTO M111).

2 DEBRIS CAGE DETAIL
19,21 N.T.S.
23

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PRANCO
STATE OF WASHINGTON
23016353
REGISTERED
PROFESSIONAL ENGINEER

DESIGNED BY	MP	JOB# / DWG	10-210058
DRAWN BY	LT/LO/FJ	DATE	01/29/2024
CHECKED BY	LR	SCALE	H: N/A V: N/A
		SHEET	DR15
			32 of 102

Osborn Consulting

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

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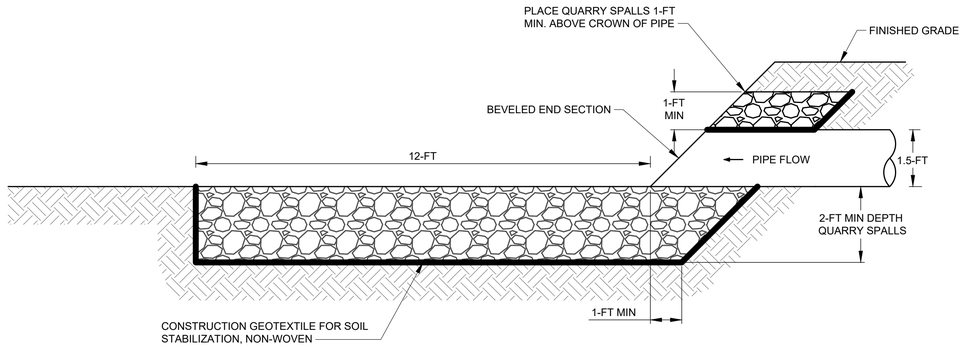
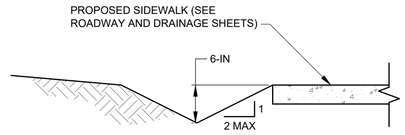
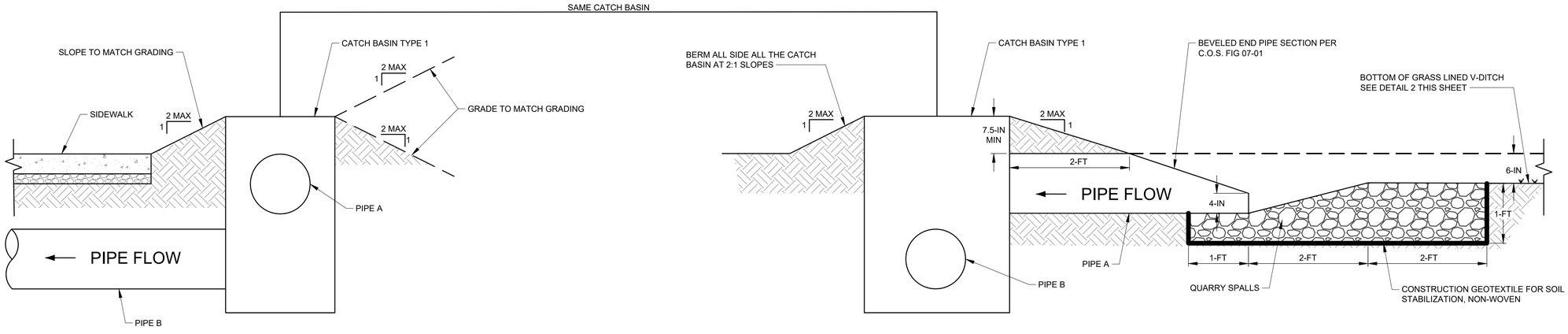


1 OUTFALL PROTECTION PAD
19 N.T.S.



NOTE:
HYDROSEED DITCH WITH WILD FLOWER SEED MIX. LONGITUDINAL SLOPE TO MATCH EXISTING TOPOGRAPHY MIN SLOPE SHALL BE 0.5%.

2 GRASS-LINED V-DITCH TYPICAL DETAIL
20 N.T.S.



3 GRASS-LINED V DITCH FLOW COLLECTION SYSTEM
20,22 N.T.S.

100% SUBMITTAL (NOT FOR CONSTRUCTION)

MARIA PERKINS
STATE OF WASHINGTON
23016353
REGISTERED
PROFESSIONAL ENGINEER

DESIGNED BY MP	Osborn Consulting		
DRAWN BY LT/LO/FJ			
CHECKED BY LR			

NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

JOB# / DWG	DATE
10-210058	01/29/2024
SCALE H: N/A V: N/A	DR16
	SHEET 33 of 102

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\ALEKSANDRA SLATALA\DMS28566\P_10-210058_STRM_DETL.DWG
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