OSBORN
CONSULTING
INCORPORATED

City of Sammamish
Washington

Sammamish Louis Thompson Road Tightline Project

DRAFT TECHNICAL INFORMATION REPORT

APRIL 2023

1800 112th Ave NE, Suite 220-E | Bellevue, WA 98004 | 425.451.4009 | OsbornConsulting.com

DRAFT TECHNICAL INFORMATION REPORT

SAMMAMISH 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

April 2023

Certificate of Engineer

The report and data contained in this report for the **Sammamish Louis Thompson Road Tightline Project: DRAFT 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.

JANINA S. GLOVATCHI
STATE OF WASHINGTON
53915
REGISTERED
PROFESSIONAL ENGINEER

Janina Glovatchi, PE

Stormwater Design Lead

Osborn Consulting, Inc.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

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**.

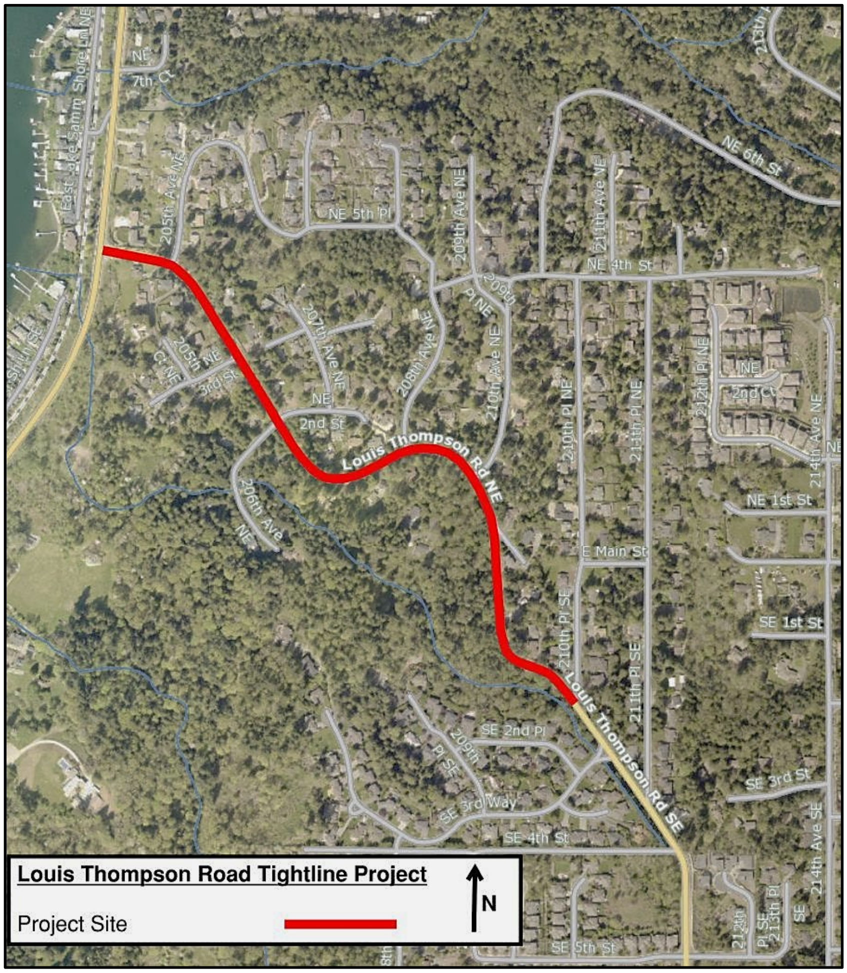


Figure 2. Site Location Map

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.

2 CONDITIONS AND REQUIREMENTS SUMMARY

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, Inc. (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 plus replaced 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 shall be 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. Maintenance and operation of drainage facilities installed as part of this Project will be conducted by the City of Sammamish. Operation and maintenance procedures for detention tank facilities follow the standard maintenance recommendations in the KCSWDM. 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 as the drainage facilities will be owned and maintained by the City of Sammamish.

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, as 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; therefore, 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 generally 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 relatively 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	+0.015	Culvert 1_Flow Analysis
Culvert 2	-0.115	Culvert 02_Flow Control_Iteration2
Culvert 3	-0.057	Culvert 03_Flow Control_Iteration2
Culvert 4	-0.064	Culvert 04_Flow Control_Iteration2
Existing Pond	-0.476	To Pond_Flow Control_Iteration2

Notes:
cfs – cubic feet per second

4 FLOW CONTROL, LOW IMPACT DEVELOPMENT, AND WATER QUALITY FACILITY ANALYSIS 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)#(TDA #) – #(Discharge Location/CB)#(Subbasin #)P/I(P for pervious areas, I for Impervious)” on **Figure 3**. Although there are trees within the offsite area, 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.

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 is a total of 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 remaining flow control facility is sited upstream of the existing pond east of 205th Ave NE to detain new impervious area in TDA 3 to historic pre-developed flow conditions prior to discharging to the pond. 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. 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 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.

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.

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 2, 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 2 model contains the stage-storage pipe detention data and orifices are sized to detain flows below existing 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. The offline water quality flow rates contributing to each facility were calculated using MGSFlood and the smallest StormFilter unit able to treat the water quality flows was selected. 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	Off-line Water Quality Flow Rate (cfs)	StormFilter Facility Size, Number of Filter Cartridges	StormFilter Treatment Provided (cfs)
WQ – 1	0.02	SFMH48, 3 ZPG	0.075
WQ – 2	0.04	SFMH48, 3 ZPG	0.075
WQ – 3	0.31	SFMH96, 14 ZPG	0.350
WQ – 4	0.29	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 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 generally 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.

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:

- Draft Geotechnical Report, AESI
- Draft Critical Areas Report, DEA
- Final Cultural Resources Report, ERSI
- Existing Conditions Memorandum, DEA

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 permitting will be coordinated with the City of Sammamish following this draft report submittal, though clearing and grading permits are anticipated for parcel driveway grading as indicated in the TIR Worksheet shown on **Figure 1**. This Section and TIR Worksheet will be updated at a future submittal date.

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 which 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, which include:

- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- and BMP C153: Material Delivery, Storage and Containment.

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 QUANTITIES, 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. A separate operations and maintenance manual is provided in **Appendix E** for the water quality facilities proposed on this Project as they are proprietary systems.

11 REFERENCES

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.

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 # TBD
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 ______

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: ______

Site Improvement Plan (Engr. Plans)

Plan Type (check one):
☒ Full
☐ Modified
☐ Simplified

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

Part 6 SWDM ADJUSTMENT APPROVALS

Type (circle one): Standard / Experimental / Blanket

Description: (include conditions in TIR Section 2)

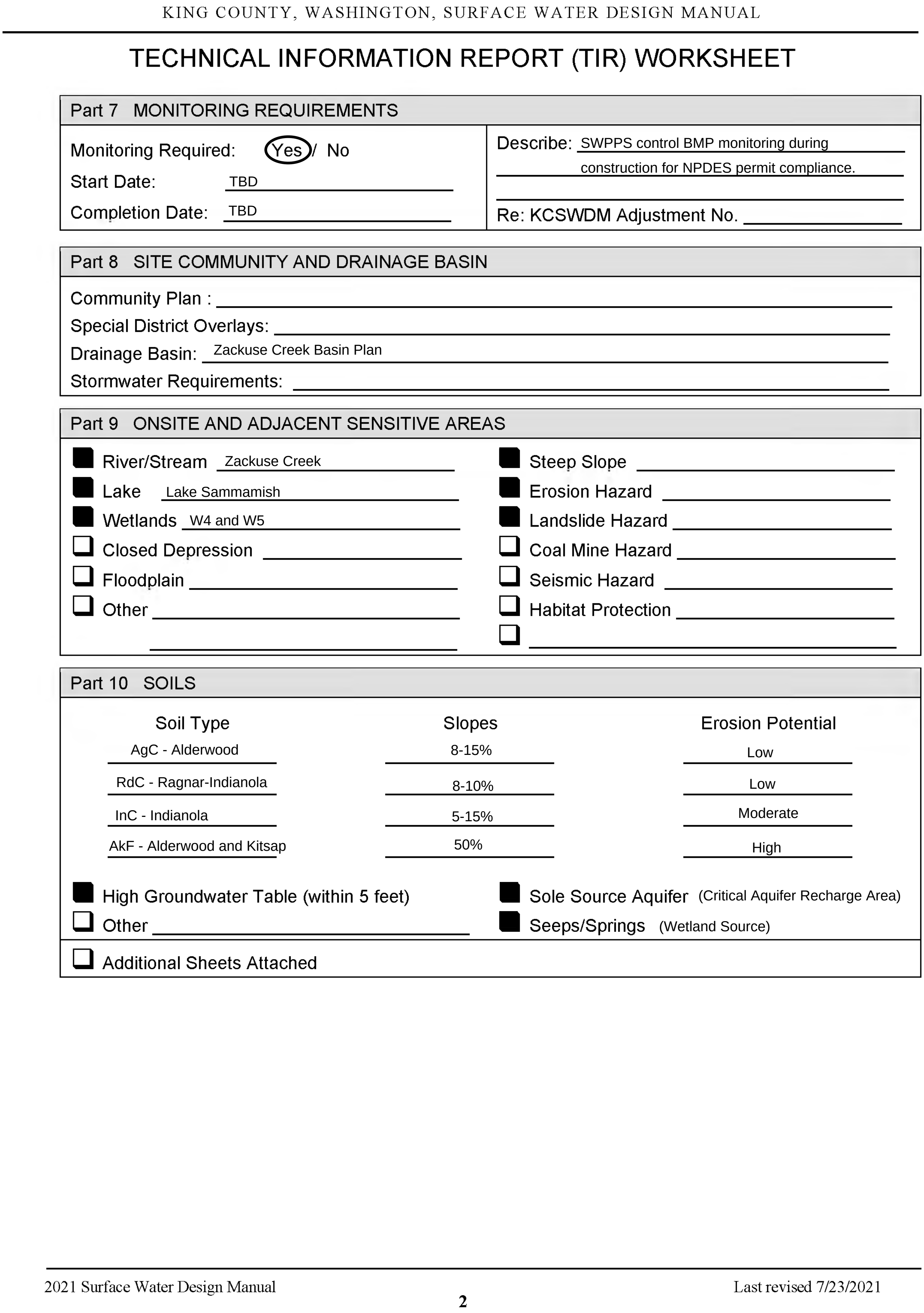
N/A

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



KING COUNTY, WASHINGTON, SURFACE WATER DESIGN MANUAL

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

☒ River/Stream Zackuse Creek

☒ Lake Lake Sammamish

☒ Wetlands W4 and W5

☐ Closed Depression ______

☐ Floodplain ______

☐ Other ______

☒ Steep Slope ______

☒ Erosion Hazard ______

☒ 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

☒ High Groundwater Table (within 5 feet)

☐ Other ______

☒ Sole Source Aquifer (Critical Aquifer Recharge Area)

☒ Seeps/Springs (Wetland Source)

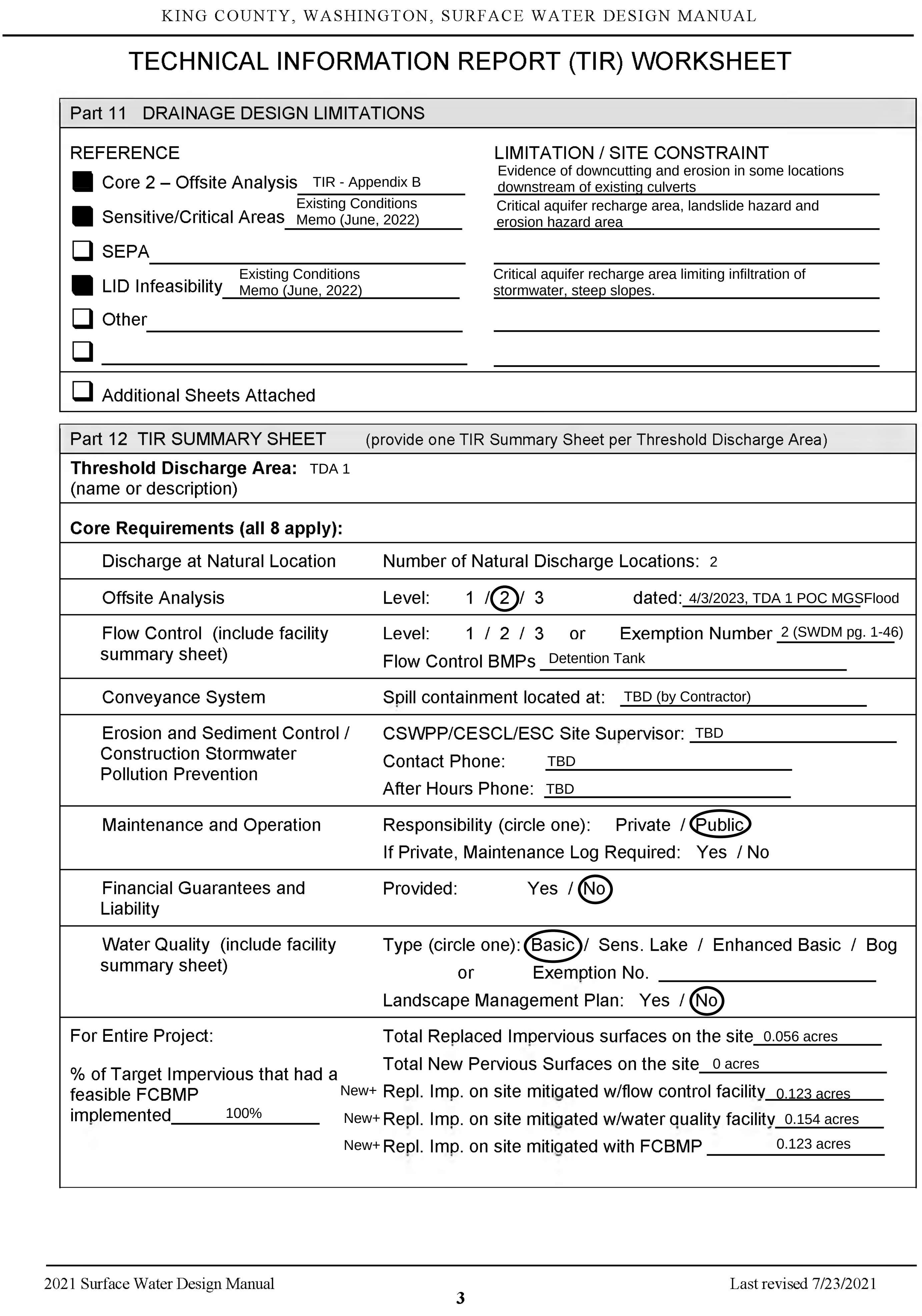
☐ Additional Sheets Attached

2021 Surface Water Design Manual

2

Last revised 7/23/2021

FIGURE 1. TIR WORKSHEET



KING COUNTY, WASHINGTON, SURFACE WATER DESIGN MANUAL

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: 4/3/2023, 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 0.056 acres

Total New Pervious Surfaces on the site 0 acres

New+ Repl. Imp. on site mitigated w/flow control facility 0.123 acres

New+ Repl. Imp. on site mitigated w/water quality facility 0.154 acres

New+ Repl. Imp. on site mitigated with FCBMP 0.123 acres

2021 Surface Water Design Manual 3 Last revised 7/23/2021

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

- ☑ 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

MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION

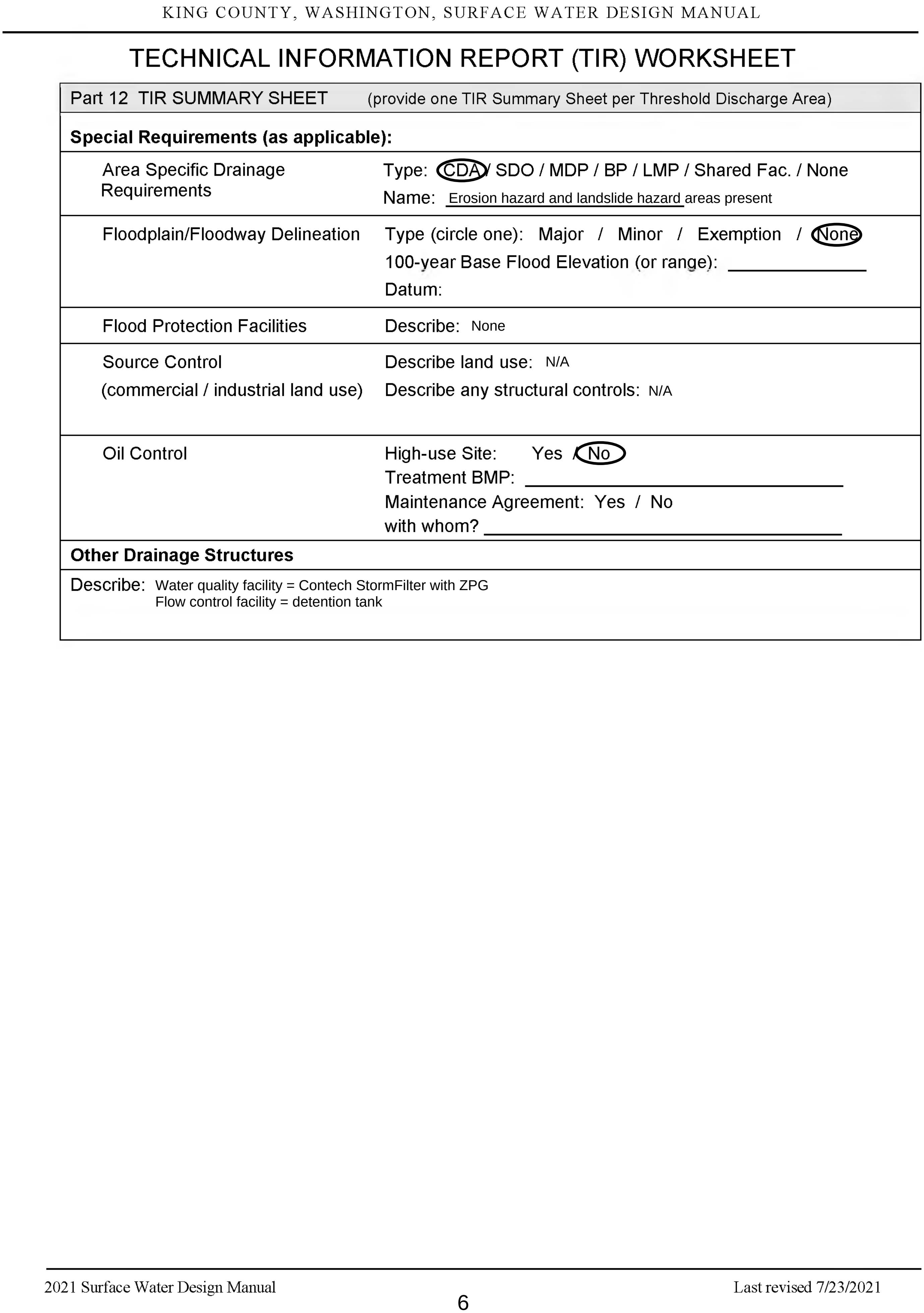
- ☑ Stabilize exposed surfaces
- ☑ Remove and restore Temporary ESC Facilities
- ☑ Clean and remove all silt and debris, ensure operation of Permanent Facilities, restore operation of Flow Control BMP Facilities as necessary
- ☐ Flag limits of SAO and open space preservation areas
- ☐ Other ______________________

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: 2
Offsite Analysis	Level: 1 / [✓ 2] / 3 dated: 3/23/2023, 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 0.186 acres Total New Pervious Surfaces on the site 0 acres New+ Repl. Imp. on site mitigated w/flow control facility 0.215 acres New+ Repl. Imp. on site mitigated w/water quality facility 3.294 acres New+ Repl. Imp. on site mitigated with FCBMP 0.091 acres

FIGURE 1. TIR WORKSHEET



KING COUNTY, WASHINGTON, SURFACE WATER DESIGN MANUAL

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

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

Special Requirements (as applicable):

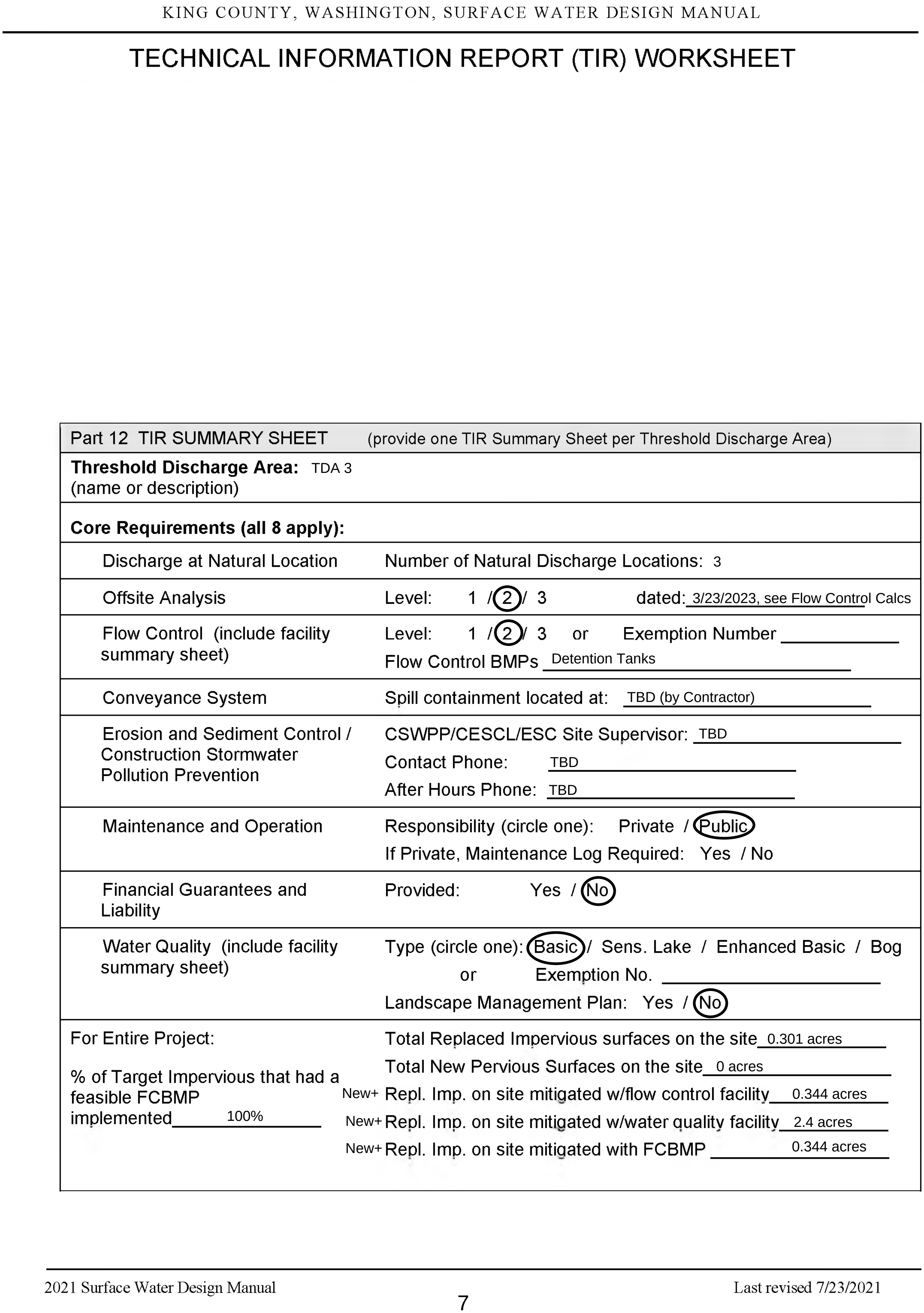
Area Specific Drainage Requirements	Type: [✓ CDA] / SDO / MDP / BP / LMP / Shared Fac. / None Name: Erosion hazard and landslide hazard areas present
Floodplain/Floodway Delineation	Type (circle one): Major / Minor / Exemption / [✓ None] 100-year Base Flood Elevation (or range): ______________ Datum:
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

2021 Surface Water Design Manual Last revised 7/23/2021

FIGURE 1. TIR WORKSHEET



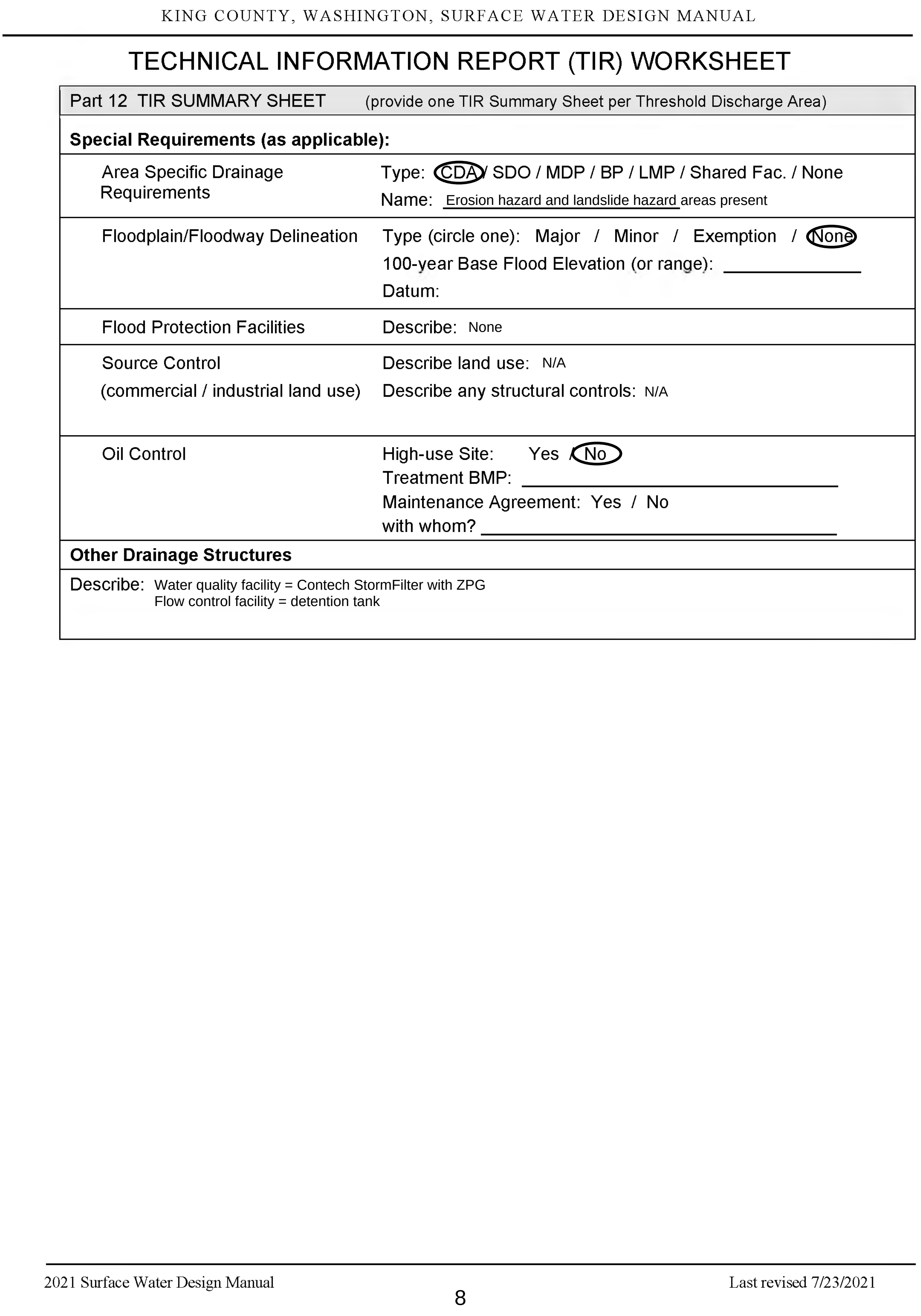
KING COUNTY, WASHINGTON, SURFACE WATER DESIGN MANUAL

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: 3
Offsite Analysis	Level: 1 / [✓ 2] / 3 dated: 3/23/2023, 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 0.301 acres Total New Pervious Surfaces on the site 0 acres New+ Repl. Imp. on site mitigated w/flow control facility 0.344 acres New+ Repl. Imp. on site mitigated w/water quality facility 2.4 acres New+ Repl. Imp. on site mitigated with FCBMP 0.344 acres

2021 Surface Water Design Manual Last revised 7/23/2021

FIGURE 1. TIR WORKSHEET



KING COUNTY, WASHINGTON, SURFACE WATER DESIGN MANUAL

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? ___________________________________

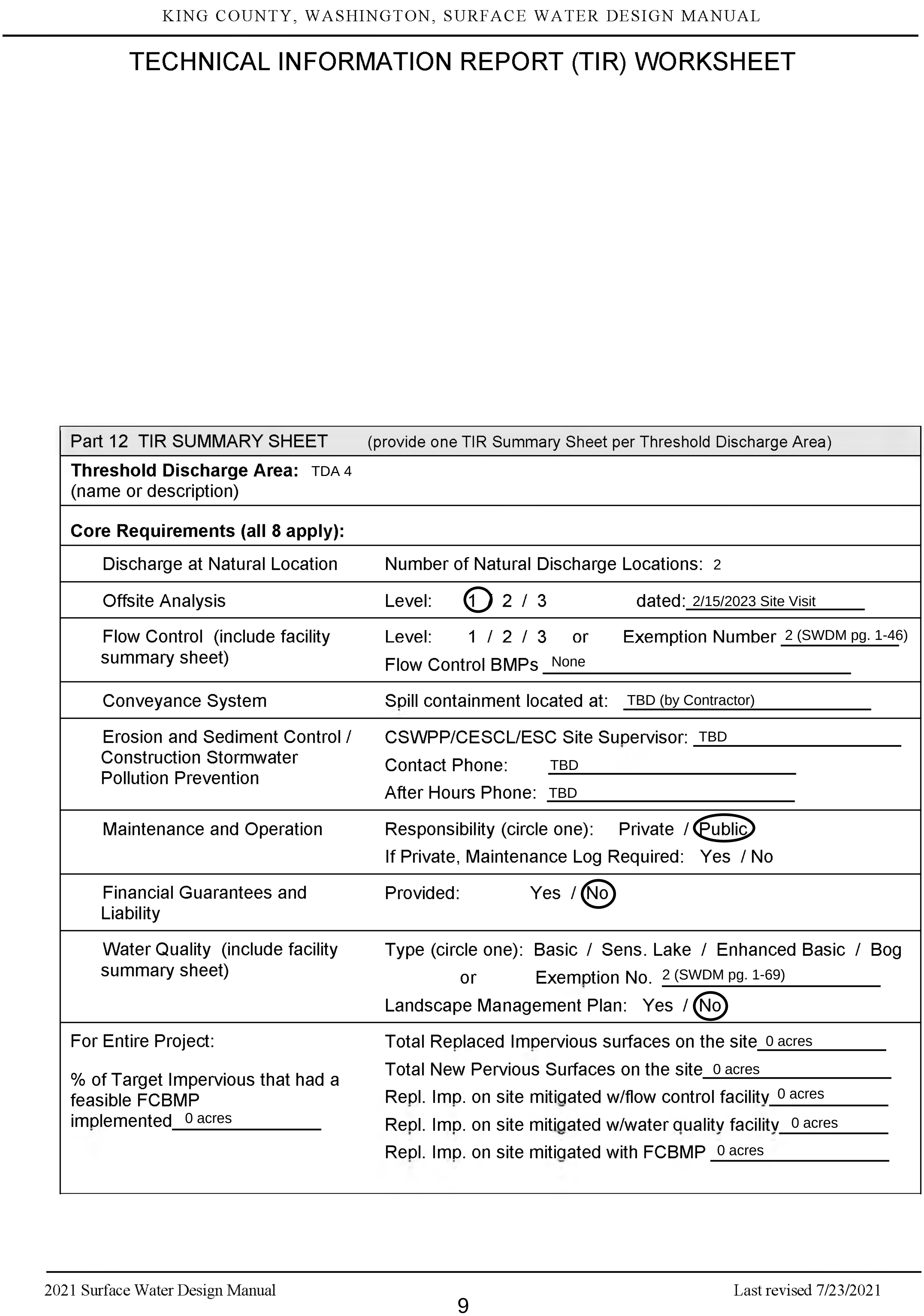
Other Drainage Structures

Describe: Water quality facility = Contech StormFilter with ZPG
Flow control facility = detention tank

2021 Surface Water Design Manual Last revised 7/23/2021

8

FIGURE 1. TIR WORKSHEET



KING COUNTY, WASHINGTON, SURFACE WATER DESIGN MANUAL

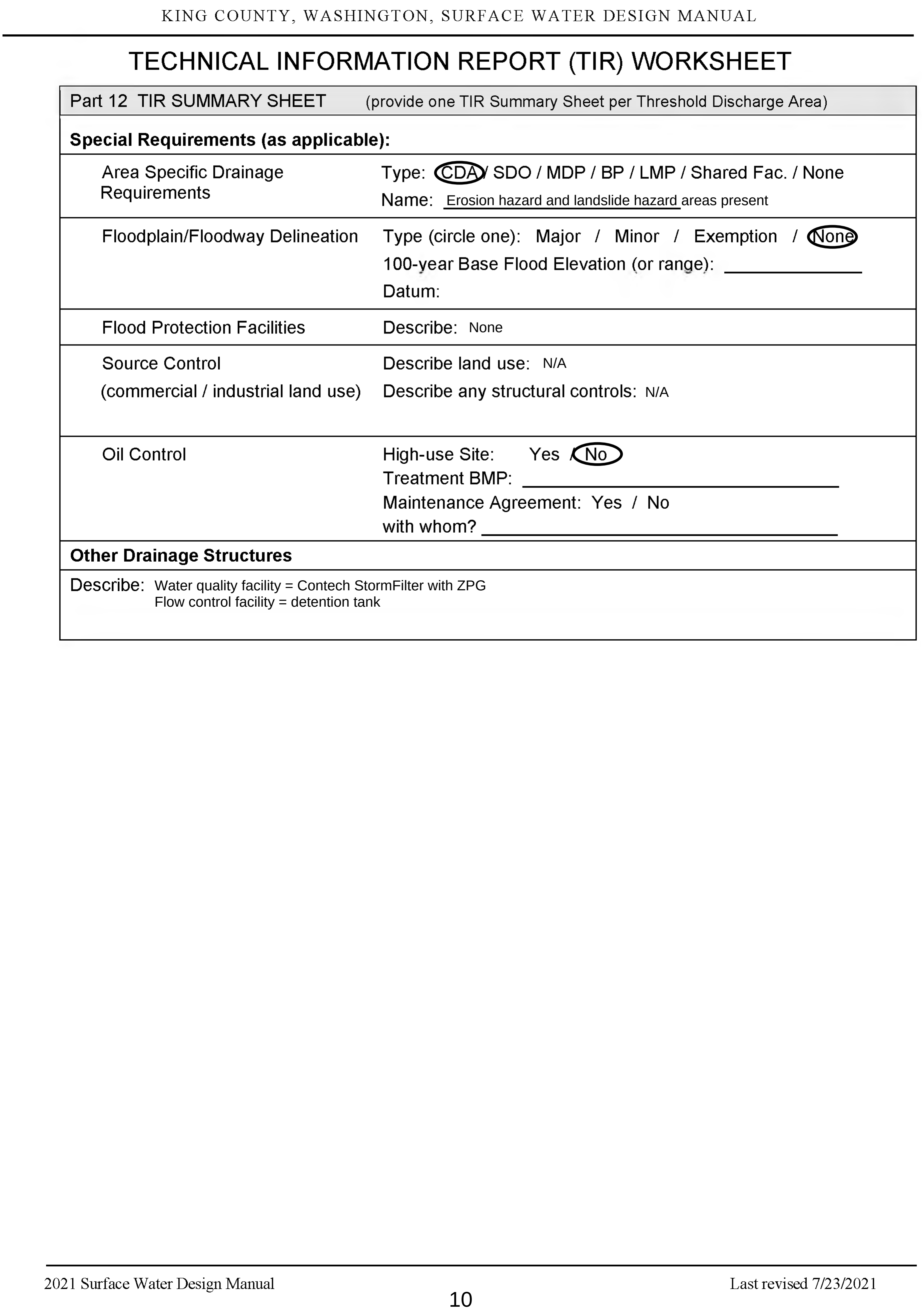
TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

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) 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

2021 Surface Water Design Manual

Last revised 7/23/2021

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

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

☐ Drainage Easement
☐ Covenant
☐ Native Growth Protection Covenant
☐ Tract
☐ Other ______________________

Part 16 STRUCTURAL ANALYSIS

☐ Cast in Place Vault
☒ Retaining Wall Calculations included under separate cover
☐ Rockery > 4' High
☐ Structural on Steep Slope
☐ 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.

Janine Glovatchi 4/10/2023

Signed/Date

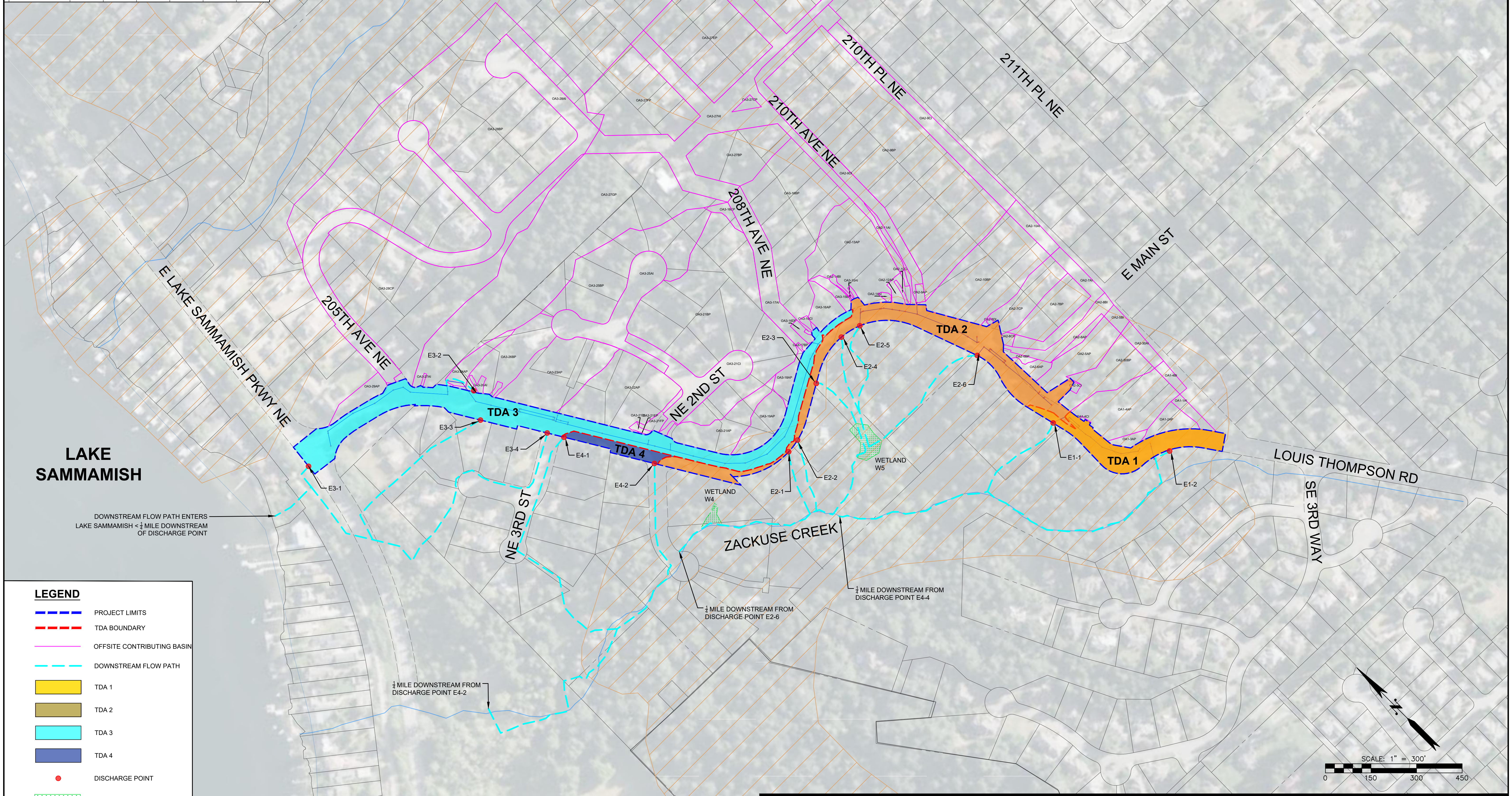
FIGURE 1. TIR WORKSHEET

OFFSITE CONTRIBUTING BASIN #	BASIN AREA		IMPERVIOUS AREA		PERVIOUS AREA GRASS	
	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)
OA1-1	9,233	0.21	1,966	0.05	7,266	0.17
OA1-2	13,656	0.31	7,528	0.17	26,409	0.61
OA1-3	11,089	0.25	10,276	0.24	24,654	0.57
OA1-4	55,622	1.28	137,398	3.15	528,981	12.14
OA2-10	90,443	2.08	4,698	0.11	0	0.00
OA2-11	4,698	0.11	4,052	0.09	63,756	1.46
OA2-12	6,468	0.15	7,883	0.18	30,698	0.70
OA2-14	67,809	1.56	2,274	0.05	10,448	0.24
OA2-30	38,580	0.89	143,283	3.29	521,872	11.98
OA2-5	33,937	0.78	1,116	0.03	12,541	0.29
OA2-6	12,722	0.29	5,593	0.13	5,496	0.13
OA2-7	65,435	1.50	11,612	0.27	78,832	1.81
OA2-8	28,686	0.66	8,653	0.20	46,970	1.08
OA2-9	336,698	7.73	1,493	0.03	4,975	0.11

OFFSITE CONTRIBUTING BASIN #	BASIN AREA		IMPERVIOUS AREA		PERVIOUS AREA GRASS	
	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)
OA3-15	6,444	0.15	15,869	0.36	49,565	1.14
OA3-16	120,418	2.76	20,221	0.46	8,466	0.19
OA3-17	32,621	0.75	82,676	1.90	254,022	5.83
OA3-18	17,605	0.40	1,035	0.02	5,409	0.12
OA3-19	34,931	0.80	3,371	0.08	117,046	2.69
OA3-20	261,250	6.00	32,290	0.74	331	0.01
OA3-22	74,125	1.70	5,855	0.13	11,750	0.27
OA3-23	62,530	1.44	44,277	1.02	216,973	4.98
OA3-24	132,937	3.05	2,793	0.06	12,483	0.29
OA3-26	42,533	0.98	7,444	0.17	66,682	1.53
OA3-27	666,379	15.30	4,292	0.10	58,239	1.34
OA3-28	665,154	15.27	43,519	1.00	89,417	2.05
OA3-29	15,276	0.35	5,735	0.13	36,798	0.84

NOTES

1. THE OFFSITE AREAS ARE DESIGNATED AS "OA(OFFSITE AREA)#(TDA #)-#(DISCHARGE LOCATION/CB)#(SUBBASIN)P/I(P FOR PARTIAL PERVIOUS AREA, I FOR IMPERVIOUS)



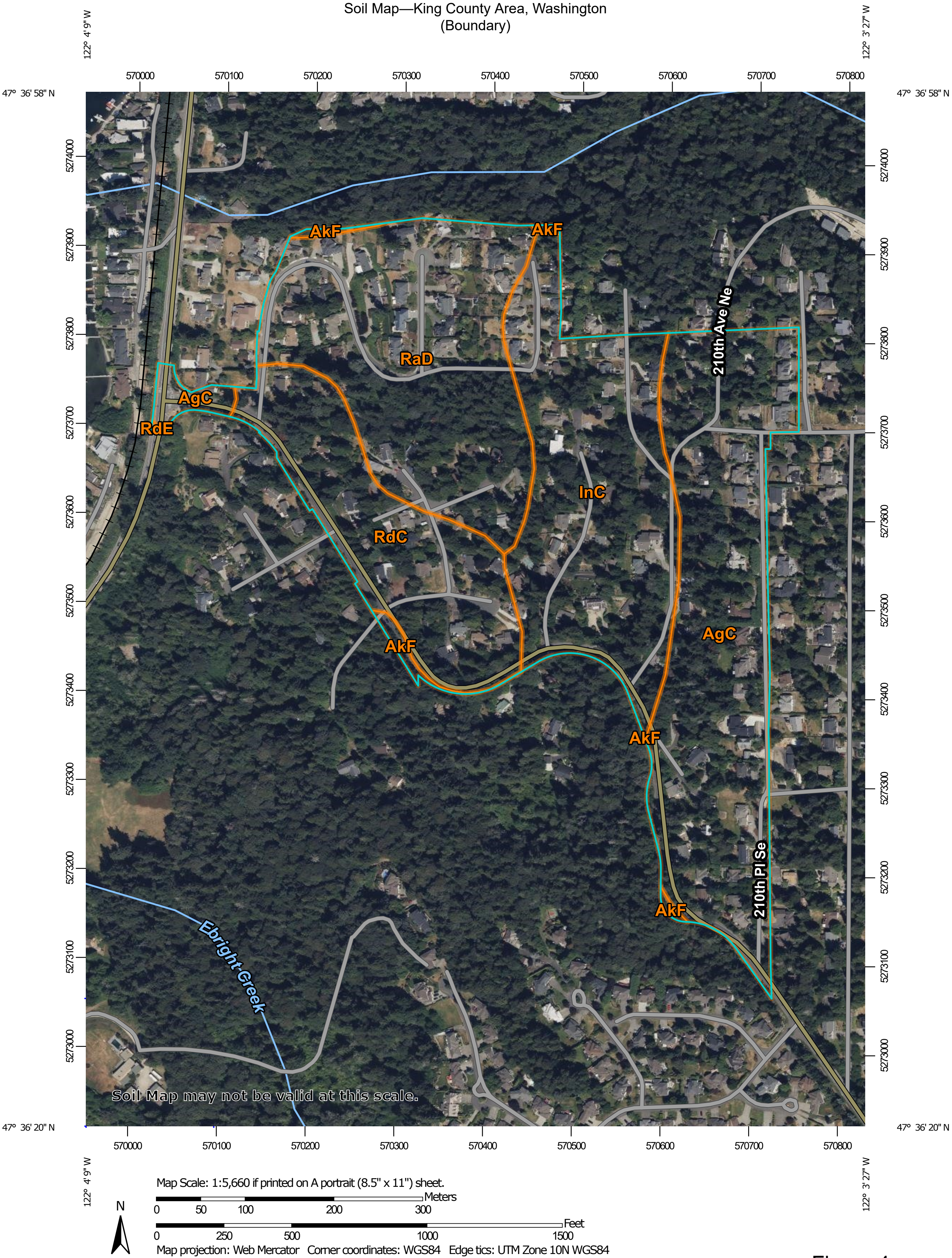
Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT	JOB# / DWG 10-210058	DATE APRIL 2023
BASIN MAP	SCALE H: 1"=300' V: N/A	FIGURE NUMBER 3

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31497\F_10-210058_BASINS.DWG
PLOT TIME: 4/27/2023 8:27 AM
USER NAME: LELAND OHANLON

Soil Map—King County Area, Washington
(Boundary)



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

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

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%**

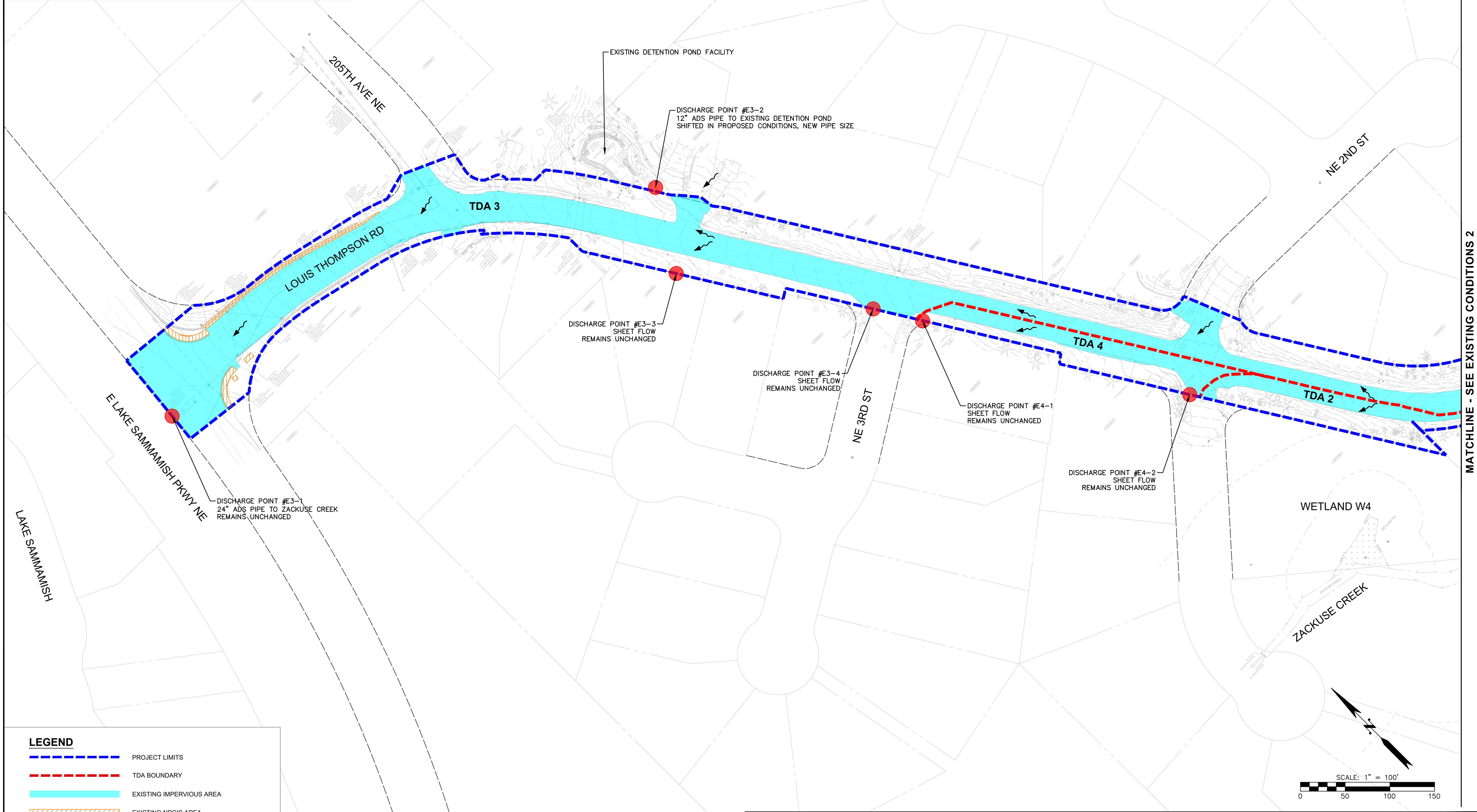
Figure 4

SUMMARY OF EXISTING AREAS PER TDA

TDA #	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
1	20,709	0.475	0	0	20,709	0.475	19,333	0.444
2	44,196	1.015	0	0	44,196	1.015	40,584	0.932
3	70,711	1.623	1,702	0.039	69,009	1.584	63,762	1.464
4	6,619	0.152	0	0	6,619	0.152	4,719	0.108
TOTAL	142,235	3.265	1,702	0.039	140,533	3.226	128,398	2.948

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

DISCHARGE POINT #E3-3
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E3-4
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E4-1
SHEET FLOW
REMAINS UNCHANGED

DISCHARGE POINT #E4-2
SHEET FLOW
REMAINS UNCHANGED

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

LEGEND

▬ ▬ ▬	PROJECT LIMITS
▬ ▬ ▬	TDA BOUNDARY
▬	EXISTING IMPERVIOUS AREA
▨	EXISTING NPGIS AREA
●	EXISTING DISCHARGE POINT
←	SURFACE FLOW DIRECTION

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31497\F_10-210058_EXISTTALLY.DWG
PLOT TIME: 4/27/2023 8:27 AM
USER NAME: LELAND OHANLON

OSBORN
CONSULTING
INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISTING CONDITIONS (1 OF 2)

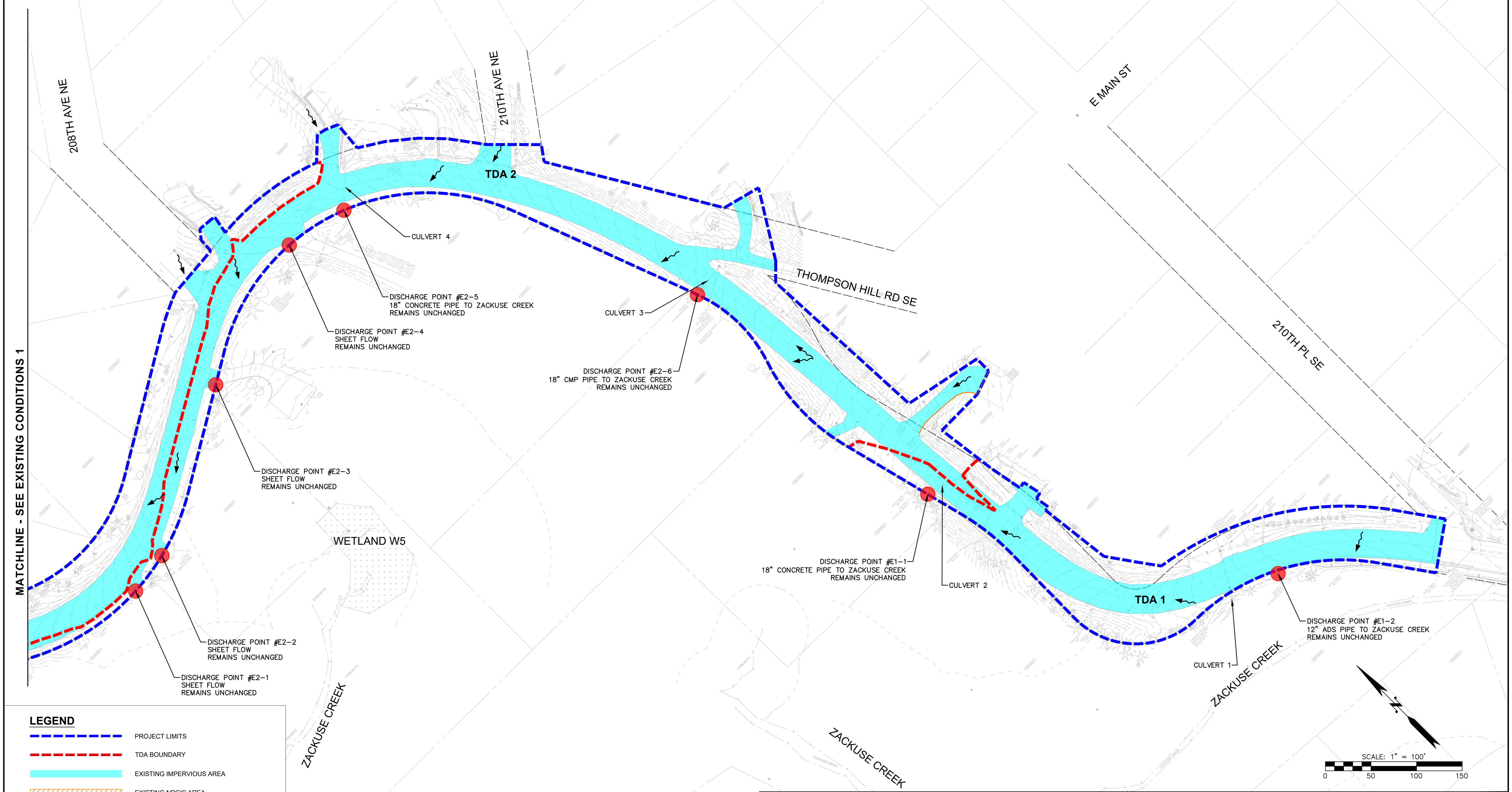
JOB# / DWG	DATE
10-210058	APRIL 2023
SCALE H: 1"=100' V: N/A	FIGURE NUMBER 5

SUMMARY OF EXISTING AREAS PER TDA

TDA #	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
1	20,709	0.475	0	0	20,709	0.475	19,333	0.444
2	44,196	1.015	0	0	44,196	1.015	40,584	0.932
3	70,711	1.623	1,702	0.039	69,009	1.584	63,762	1.464
4	6,619	0.152	0	0	6,619	0.152	4,719	0.108
TOTAL	142,235	3.265	1,702	0.039	140,533	3.226	128,398	2.948

NOTES

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



LEGEND

- - -	PROJECT LIMITS
- - -	TDA BOUNDARY
🟦	EXISTING IMPERVIOUS AREA
▨	EXISTING NPGIS AREA
●	EXISTING DISCHARGE POINT
←	SURFACE FLOW DIRECTION

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISTING CONDITIONS (2 OF 2)

JOB# / DWG	10-210058
DATE	APRIL 2023
SCALE	H: 1"=100' V: N/A
FIGURE NUMBER	5

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31497\F_10-210058_EXISTTALLY.DWG
PLOT TIME: 4/27/2023 8:27 AM
USER NAME: LELAND OHANLON

SUMMARY OF TDA 1 AREAS

SURFACE TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	4,124	0.095	3,449	0.079	675	0.015	0	0
REPLACED	2,428	0.056	0	0	2,428	0.056	0	0
EX. TO REMAIN	18,490	0.424	0	0	18,281	0.419	15,009	0.345
TOTAL	25,042	0.575	3,449	0.079	21,384	0.490	15,009	0.345

SUMMARY OF TDA 2 AREAS

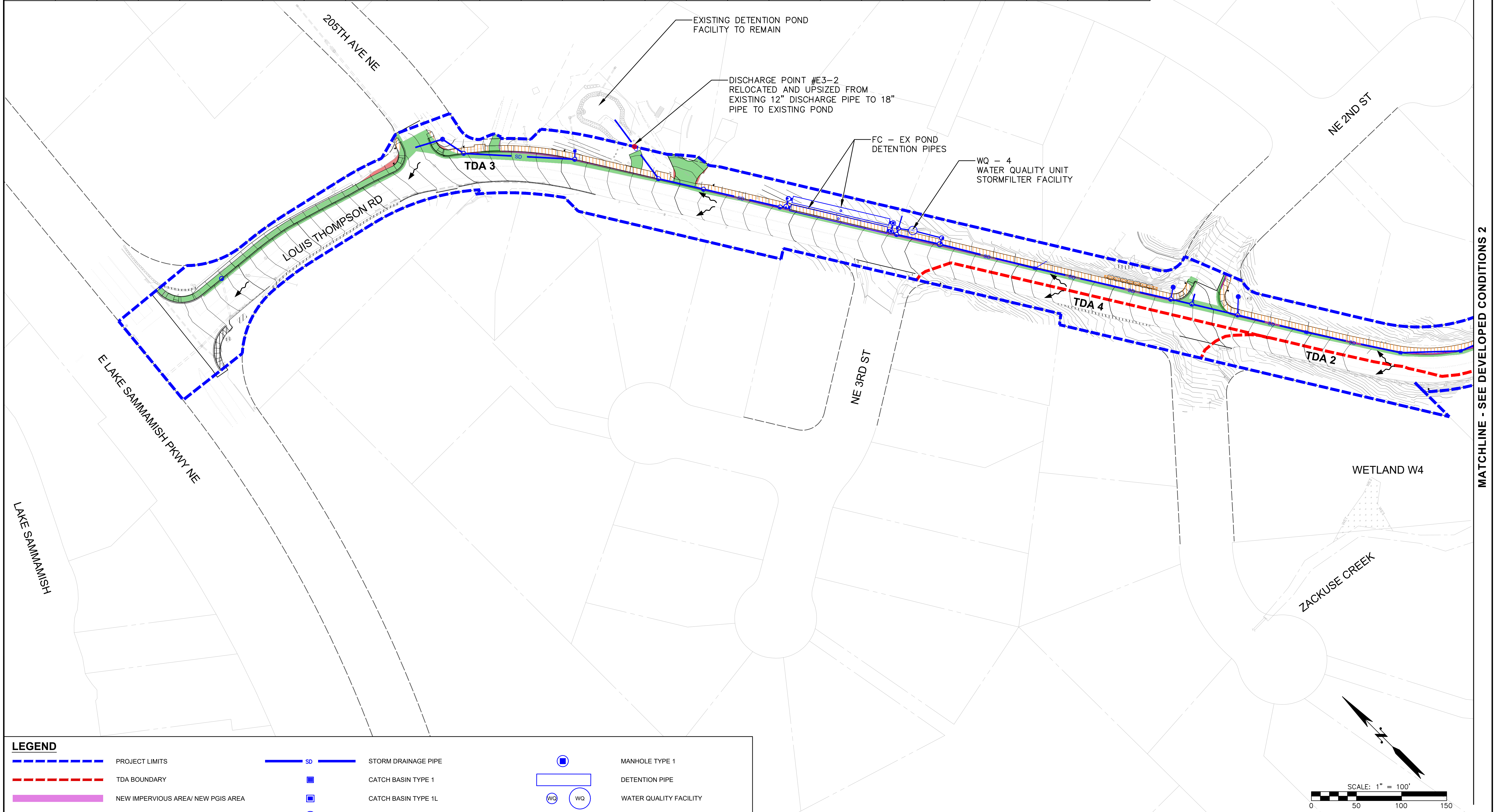
SURFACE TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	6,929	0.159	4,540	0.104	2,389	0.055	0	0
REPLACED	8,118	0.186	0	0	8,118	0.186	0	0
EX. TO REMAIN	36,353	0.835	0	0	36,078	0.829	33,302	0.765
TOTAL	51,400	1.180	4,540	0.104	46,585	1.07	33,302	0.765

SUMMARY OF TDA 3 AREAS

SURFACE TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	13,646	0.313	11,260	0.258	2,386	0.055	0	0
REPLACED	13,114	0.301	0	0	13,114	0.301	0	0
EX. TO REMAIN	55,225	1.268	1,702	0.039	55,895	1.283	52,244	1.199
TOTAL	81,985	1.882	12,962	0.297	71,395	1.639	52,244	1.199

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.



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	WQ WQ	WATER QUALITY FACILITY
▨	NEW NPGIS AREA	◙	CATCH BASIN TYPE 2 WITH GRATE		
🟩	REPLACED IMPERVIOUS AREA	◉	CATCH BASIN TYPE 2 WITH SOLID LID		
●	PROPOSED DISCHARGE POINT (NEW OR ALTERED LOCATION FROM EXISTING POINTS ONLY)	◉	CATCH BASIN TYPE 2 WITH DEBRIS CAGE		

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

DEVELOPED CONDITIONS (1 OF 2)

JOB# / DWG	10-210058
SCALE	H: 1"=20' V: N/A
DATE	APRIL 2023
FIGURE NUMBER	6

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31497\F_10-210058_PROPTALLY_UPDATED.DWG
PLOT TIME: 4/27/2023 8:28 AM
USER NAME: LELAND OHANLON

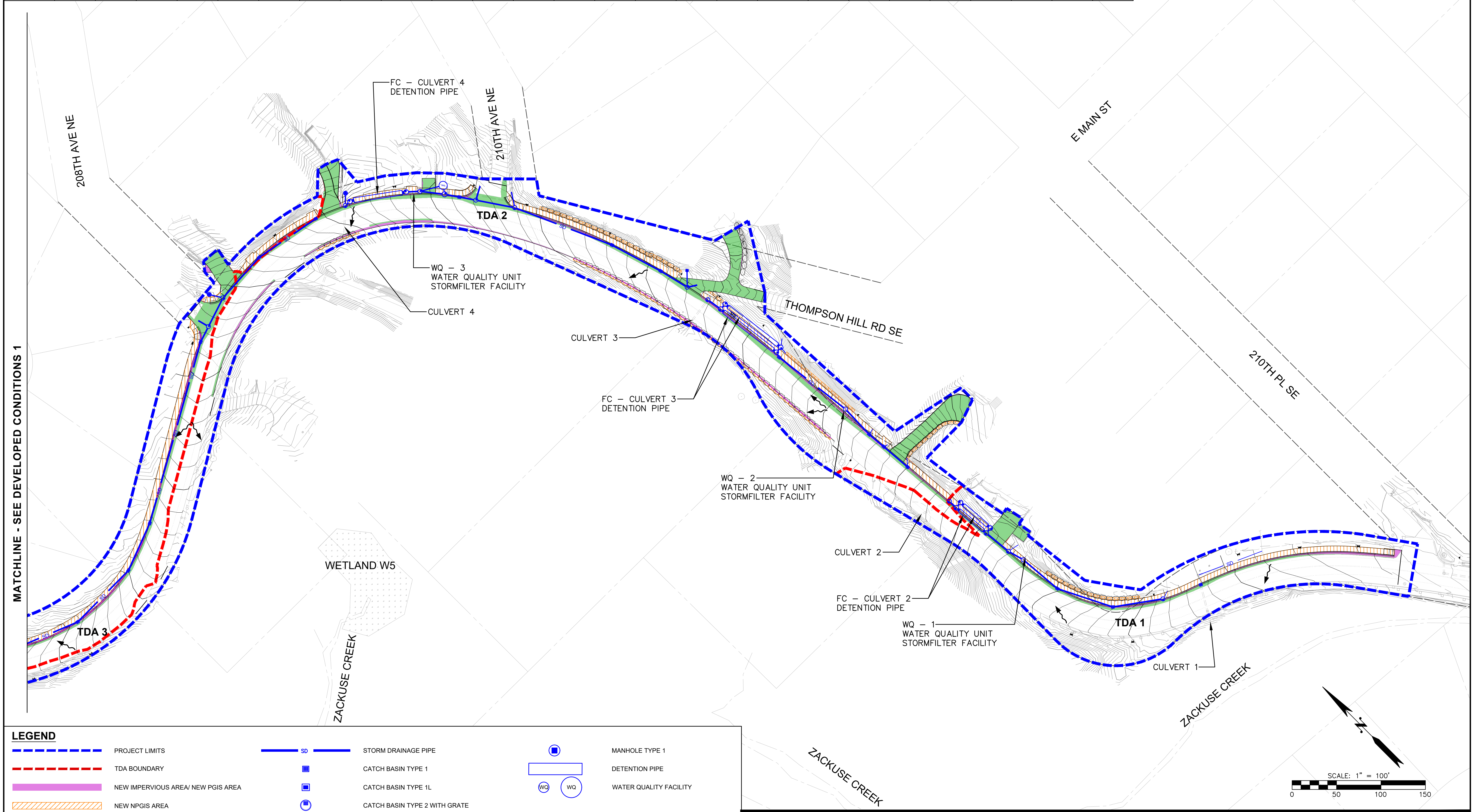
SUMMARY OF TDA 1 AREAS								
SURFACE TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	4,124	0.095	3,449	0.079	675	0.015	0	0
REPLACED	2,428	0.056	0	0	2,428	0.056	0	0
EX. TO REMAIN	18,490	0.424	0	0	18,281	0.419	15,009	0.345
TOTAL	25,042	0.575	3,449	0.079	21,384	0.490	15,009	0.345

SUMMARY OF TDA 2 AREAS								
SURFACE TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	6,929	0.159	4,540	0.104	2,389	0.055	0	0
REPLACED	8,118	0.186	0	0	8,118	0.186	0	0
EX. TO REMAIN	36,353	0.835	0	0	36,078	0.829	33,302	0.765
TOTAL	51,400	1.180	4,540	0.104	46,585	1.07	33,302	0.765

SUMMARY OF TDA 3 AREAS								
SURFACE TYPE	IMPERVIOUS AREA		NPGIS AREA		PGIS AREA		PERVIOUS AREA	
	SF	AC	SF	AC	SF	AC	SF	AC
NEW	13,646	0.313	11,260	0.258	2,386	0.055	0	0
REPLACED	13,114	0.301	0	0	13,114	0.301	0	0
EX. TO REMAIN	55,225	1.268	1,702	0.039	55,895	1.283	52,244	1.199
TOTAL	81,985	1.882	12,962	0.297	71,395	1.639	52,244	1.199

NOTES

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



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	WQ WQ	WATER QUALITY FACILITY
▨	NEW NPGIS AREA	⊙	CATCH BASIN TYPE 2 WITH GRATE		
🟩	REPLACED IMPERVIOUS AREA	⊙	CATCH BASIN TYPE 2 WITH SOLID LID		
●	PROPOSED DISCHARGE POINT (NEW OR ALTERED LOCATION FROM EXISTING POINTS ONLY)	⊙	CATCH BASIN TYPE 2 WITH DEBRIS CAGE		

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

DEVELOPED CONDITIONS (2 OF 2)

JOB# / DWG
10-210058

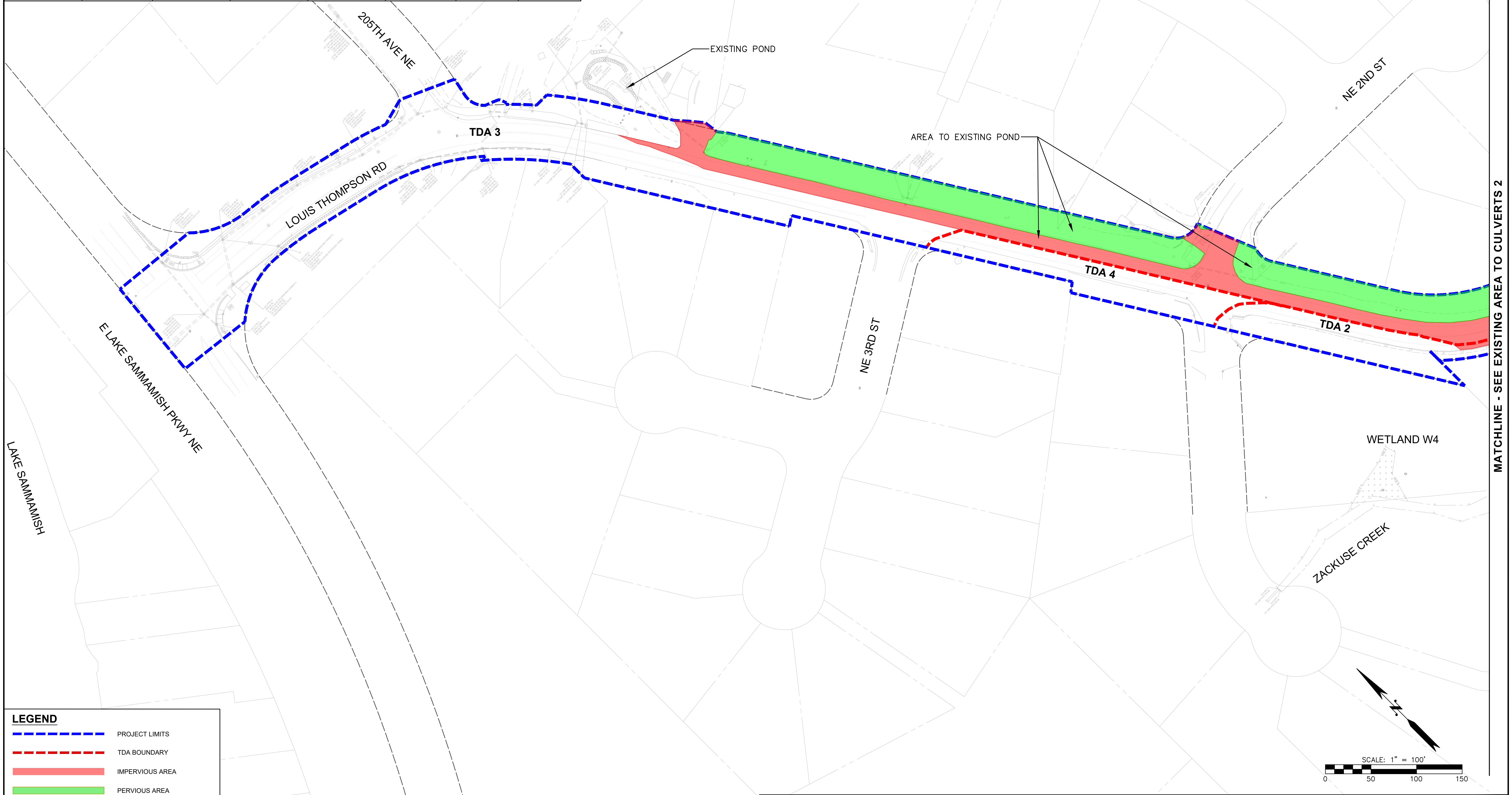
SCALE
H: 1"=20'
V: N/A

DATE
APRIL 2023

FIGURE NUMBER
6

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31497\F_10-210058_PROPTALLY_UPDATED.DWG
PLOT TIME: 4/27/2023 8:28 AM
USER NAME: LELAND OHANLON

OUTFLOW LOCATION	EXISITNG						
	UNMITIGATED AREA		MIGITGATED AREA	BYPASS FLOW	OFF-SITE AREA		TOTAL (AC)
	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	
Culvert 1	0.014	0.143	0	0			0.157
Culvert 2	0.216	0.171	0	0	0	0.115	0.387
Culvert 3	0.01	0.232	0.123	0	0.267	1.23	0.365
Culvert 4	0	0.295	0.091	0.055	2.702	8.885	0.441
Ex Pond	0.33	0.951	0.344	0	1.556	21.938	1.625



LEGEND

🟦 - - -	PROJECT LIMITS
🟥 - - -	TDA BOUNDARY
🟥	IMPERVIOUS AREA
🟩	PERVIOUS AREA
🟪	IMPERVIOUS BYPASS AREA

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31758\EXISTING AREA CULVERTS FIGURE.DWG
PLOT TIME: 4/27/2023 8:29 AM
USER NAME: LELAND OHANLON

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

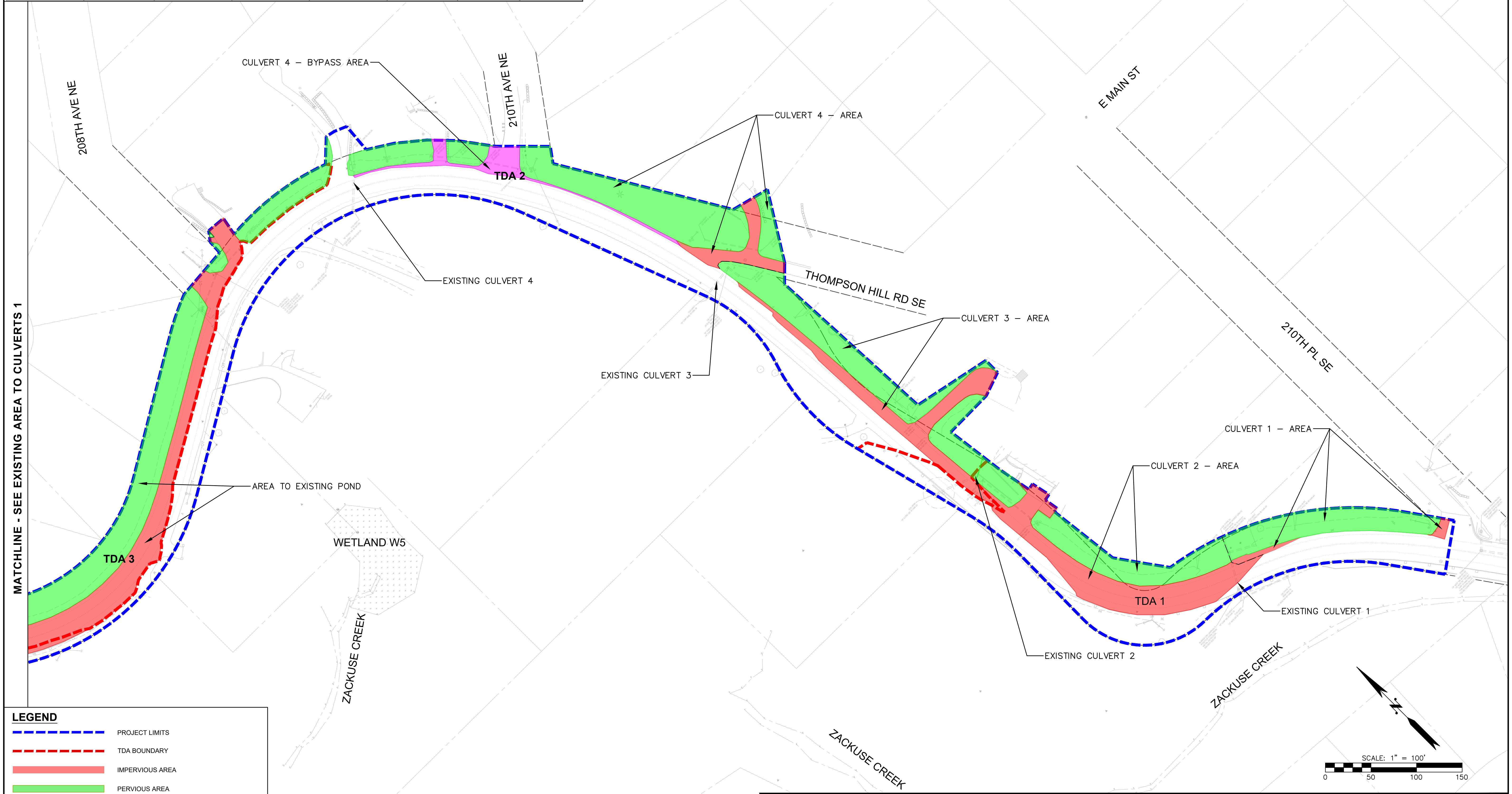
City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISITNG AREA TO CULVERTS (1 OF 2)

JOB# / DWG: 10-210058
SCALE: H: 1"=20' V: N/A
DATE: APRIL 2023
FIGURE NUMBER: 7

OUTFLOW LOCATION	EXISITNG						
	UNMITIGATED AREA		MIGITGATED AREA	BYPASS FLOW	OFF-SITE AREA		TOTAL (AC)
	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	
Culvert 1	0.014	0.143	0	0			0.157
Culvert 2	0.216	0.171	0	0	0	0.115	0.387
Culvert 3	0.01	0.232	0.123	0	0.267	1.23	0.365
Culvert 4	0	0.295	0.091	0.055	2.702	8.885	0.441
Ex Pond	0.33	0.951	0.344	0	1.556	21.938	1.625



MATCHLINE - SEE EXISTING AREA TO CULVERTS 1

LEGEND

🟦 - - -	PROJECT LIMITS
🟥 - - -	TDA BOUNDARY
🟥	IMPERVIOUS AREA
🟩	PERVIOUS AREA
🟪	IMPERVIOUS BYPASS AREA

OSBORN
CONSULTING
INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

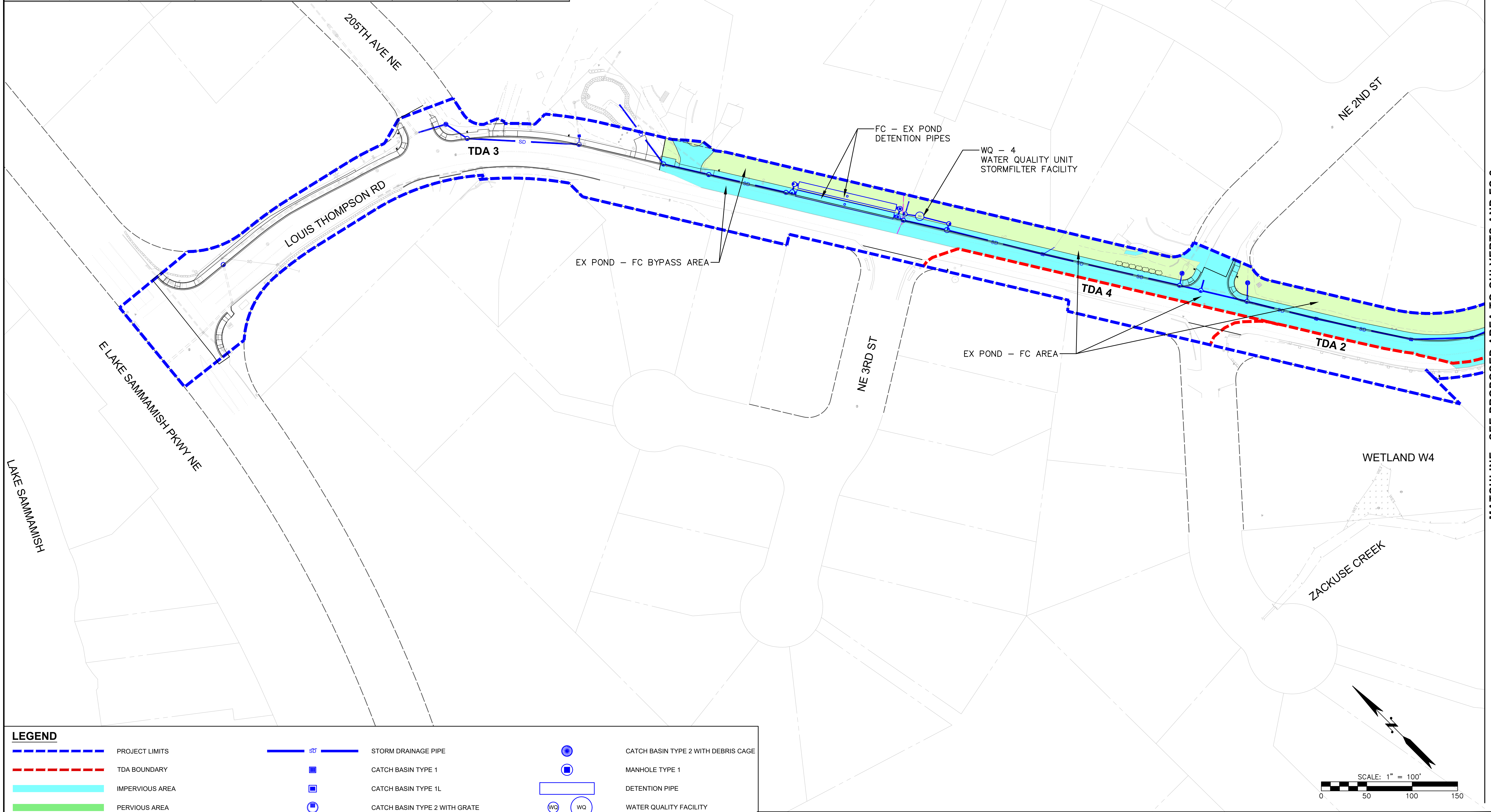
LOUIS THOMPSON ROAD TIGHTLINE PROJECT

EXISITNG AREA TO CULVERTS (2 OF 2)

JOB# / DWG 10-210058
SCALE H: 1"=20' V: N/A
DATE APRIL 2023
FIGURE NUMBER 7

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31758\EXISTING AREA CULVERTS FIGURE.DWG
PLOT TIME: 4/27/2023 8:29 AM
USER NAME: LELAND OHANLON

OUTFLOW LOCATION	PROPOSED							
	UNMITIGATED AREA		MIGITGATED AREA	BYPASS FLOW		OFF-SITE AREA		TOTAL (AC)
	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	
Culvert 1	0.06	0.095	0	0	0	0	0	0.155
Culvert 2	0.211	0.092	0	0.055	0.027	0	0.115	0.385
Culvert 3	0.047	0.125	0.123	0.027	0.039	0.267	1.23	0.361
Culvert 4	0.055	0.228	0.091	0.032	0.044	2.702	8.885	0.45
Ex Pond	0.477	0.576	0.344	0.152	0.121	1.556	21.938	1.67



LEGEND

– – – –	PROJECT LIMITS	—SD—	STORM DRAINAGE PIPE	◉	CATCH BASIN TYPE 2 WITH DEBRIS CAGE
– – – –	TDA BOUNDARY	▣	CATCH BASIN TYPE 1	◙	MANHOLE TYPE 1
🟦	IMPERVIOUS AREA	▣	CATCH BASIN TYPE 1L	▭	DETENTION PIPE
🟩	PERVIOUS AREA	⊡	CATCH BASIN TYPE 2 WITH GRATE	WQ WQ	WATER QUALITY FACILITY
		⊙	CATCH BASIN TYPE 2 WITH SOLID LID		

OSBORN
CONSULTING
INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

PROPOSED AREA TO CULVERTS AND FC (1 OF 2)

JOB# / DWG
10-210058

SCALE
H: 1"=20'
V: N/A

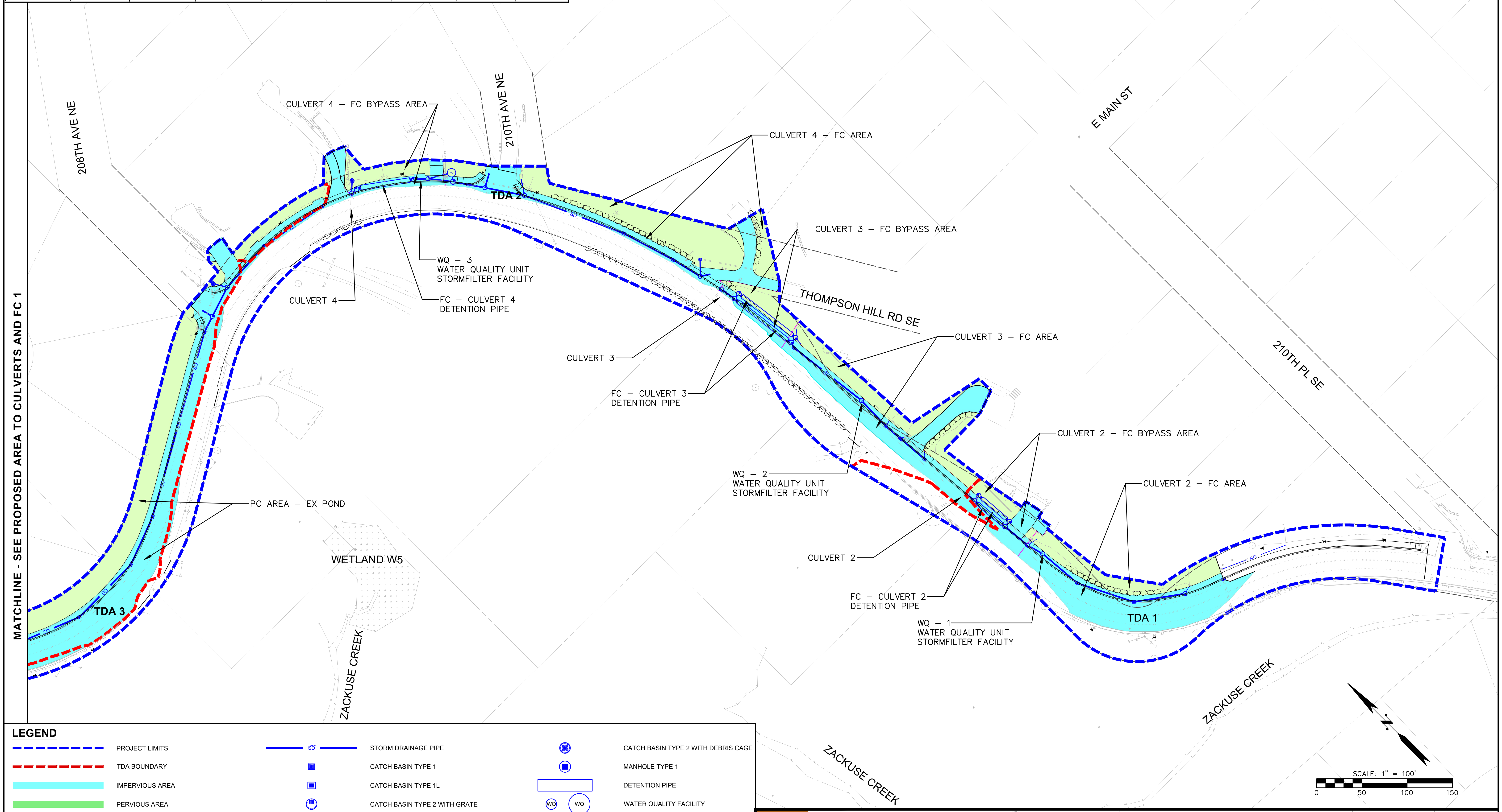
DATE
APRIL 2023

FIGURE NUMBER
8

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31758\PROPOSED AREA TO FC AND CULVERTS FIGURE.DWG
PLOT TIME: 4/27/2023 8:30 AM
USER NAME: LELAND OHANLON

OUTFLOW LOCATION	PROPOSED							
	UNMITIGATED AREA		MIGITGATED AREA	BYPASS FLOW		OFF-SITE AREA		TOTAL (AC)
	IMPERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	PERVIOUS (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	
Culvert 1	0.06	0.095	0	0	0	0	0	0.155
Culvert 2	0.211	0.092	0	0.055	0.027	0	0.115	0.385
Culvert 3	0.047	0.125	0.123	0.027	0.039	0.267	1.23	0.361
Culvert 4	0.055	0.228	0.091	0.032	0.044	2.702	8.885	0.45
Ex Pond	0.477	0.576	0.344	0.152	0.121	1.556	21.938	1.67

MATCHLINE - SEE PROPOSED AREA TO CULVERTS AND FC 1



LEGEND

▬ ▬ ▬	PROJECT LIMITS	── SD ──	STORM DRAINAGE PIPE	◉	CATCH BASIN TYPE 2 WITH DEBRIS CAGE
▬ ▬ ▬	TDA BOUNDARY	▣	CATCH BASIN TYPE 1	⊡	MANHOLE TYPE 1
🟦	IMPERVIOUS AREA	▣	CATCH BASIN TYPE 1L	▭	DETENTION PIPE
🟩	PERVIOUS AREA	⊞	CATCH BASIN TYPE 2 WITH GRATE	WQ WQ	WATER QUALITY FACILITY
		⊙	CATCH BASIN TYPE 2 WITH SOLID LID		

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT

PROPOSED AREA TO CULVERTS AND FC (2 OF 2)

JOB# / DWG: 10-210058
DATE: APRIL 2023
SCALE: H: 1"=20' V: N/A
FIGURE NUMBER: 8

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LELAND OHANLON\DMS31758\PROPOSED AREA TO FC AND CULVERTS FIGURE.DWG
PLOT TIME: 4/27/2023 8:31 AM
USER NAME: LELAND OHANLON

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.

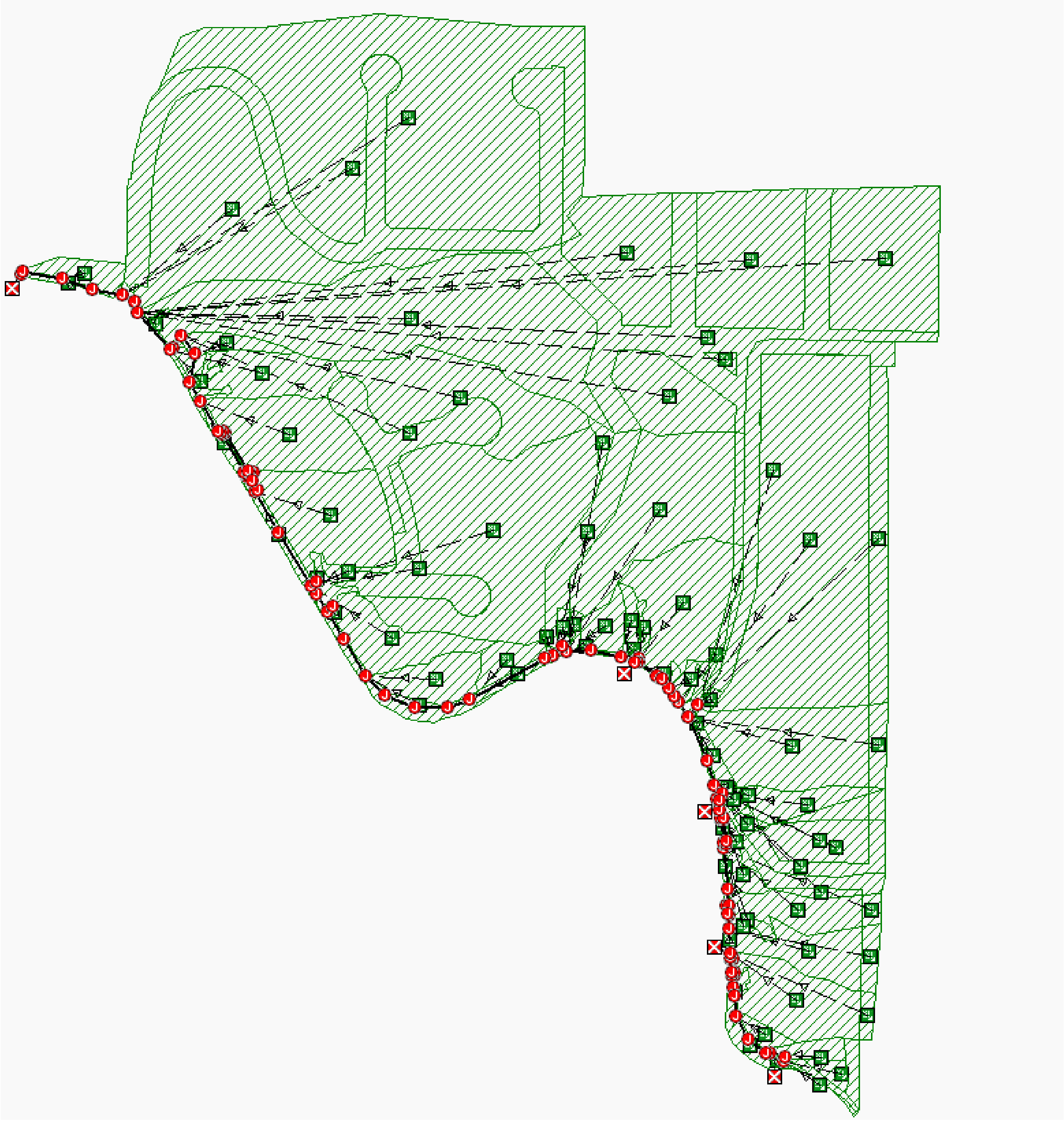
Photograph 12. Forest area downstream of culvert 1 at station 43+00.

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	C:\pw_oci_workingdir\osbornconsulting-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	Jan 11, 2023	00:00:00
End Analysis On	Jan 13, 2023	00:00:00
Start Reporting On	Jan 11, 2023	00:00:00
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	85
Nodes	101
Junctions	96
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	101
Channels	0
Pipes	101
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	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}.OA1-1AI	0.12	484.00	85.00	3.45	1.97	0.23	0.06	0 00:05:00
2	{Catch Basin Boundaries}.OA1-2AP	0.29	484.00	90.20	3.45	2.42	0.69	0.18	0 00:05:00
3	{Catch Basin Boundaries}.OA1-3AP	0.12	484.00	86.95	3.45	2.13	0.26	0.07	0 00:05:00
4	{Catch Basin Boundaries}.OA1-4AP	1.08	484.00	88.90	3.45	2.30	2.48	0.64	0 00:05:00
5	{Catch Basin Boundaries}.OA1-4BI	0.09	484.00	98.00	3.45	3.22	0.30	0.07	0 00:05:00
6	{Catch Basin Boundaries}.OA1-4CI	0.11	484.00	98.00	3.45	3.22	0.34	0.09	0 00:05:00
7	{Catch Basin Boundaries}.OA2-10AI	0.22	484.00	98.00	3.45	3.22	0.70	0.18	0 00:05:00
8	{Catch Basin Boundaries}.OA2-10BP	1.70	484.00	87.60	3.45	2.19	3.72	0.95	0 00:05:00
9	{Catch Basin Boundaries}.OA2-10CI	0.05	484.00	98.00	3.45	3.21	0.15	0.04	0 00:05:00
10	{Catch Basin Boundaries}.OA2-11AI	0.11	484.00	98.00	3.45	3.22	0.35	0.09	0 00:05:00
11	{Catch Basin Boundaries}.OA2-12AP	0.11	484.00	77.00	3.45	1.39	0.16	0.03	0 00:05:00
12	{Catch Basin Boundaries}.OA2-13AP	1.46	484.00	82.25	3.45	1.76	2.57	0.61	0 00:05:00
13	{Catch Basin Boundaries}.OA2-14AI	0.05	484.00	98.00	3.45	3.21	0.15	0.04	0 00:05:00
14	{Catch Basin Boundaries}.OA2-14BI	0.05	484.00	98.00	3.45	3.21	0.14	0.04	0 00:05:00
15	{Catch Basin Boundaries}.OA2-30AI	0.16	484.00	98.00	3.45	3.22	0.53	0.14	0 00:05:00
16	{Catch Basin Boundaries}.OA2-30BP	0.70	484.00	88.25	3.45	2.25	1.58	0.41	0 00:05:00
17	{Catch Basin Boundaries}.OA2-5AP	0.60	484.00	86.95	3.45	2.13	1.27	0.32	0 00:05:00
18	{Catch Basin Boundaries}.OA2-5BI	0.09	484.00	98.00	3.45	3.22	0.28	0.07	0 00:05:00
19	{Catch Basin Boundaries}.OA2-5CI	0.09	484.00	98.00	3.45	3.22	0.28	0.07	0 00:05:00
20	{Catch Basin Boundaries}.OA2-6AP	0.15	484.00	95.40	3.45	2.93	0.45	0.12	0 00:05:00
21	{Catch Basin Boundaries}.OA2-6BP	0.09	484.00	85.00	3.45	1.97	0.17	0.04	0 00:05:00
22	{Catch Basin Boundaries}.OA2-7AI	0.36	484.00	98.00	3.45	3.22	1.17	0.30	0 00:05:00
23	{Catch Basin Boundaries}.OA2-7BP	0.58	484.00	83.30	3.45	1.84	1.07	0.26	0 00:05:00
24	{Catch Basin Boundaries}.OA2-7CP	0.54	484.00	89.89	3.45	2.39	1.30	0.34	0 00:05:00
25	{Catch Basin Boundaries}.OA2-8AP	0.08	484.00	85.00	3.45	1.97	0.16	0.04	0 00:05:00
26	{Catch Basin Boundaries}.OA2-8BI	0.37	484.00	98.00	3.45	3.22	1.20	0.30	0 00:05:00
27	{Catch Basin Boundaries}.OA2-8CP	0.05	484.00	77.00	3.45	1.39	0.07	0.02	0 00:05:00
28	{Catch Basin Boundaries}.OA2-8DI	0.01	484.00	98.00	3.45	2.97	0.04	0.01	0 00:05:00
29	{Catch Basin Boundaries}.OA2-9AP	0.04	484.00	77.00	3.45	1.38	0.05	0.01	0 00:05:00
30	{Catch Basin Boundaries}.OA2-9BP	5.78	484.00	88.90	3.45	2.30	13.30	3.43	0 00:05:00
31	{Catch Basin Boundaries}.OA2-9CI	0.89	484.00	98.00	3.45	3.22	2.85	0.73	0 00:05:00
32	{Catch Basin Boundaries}.OA2-9DI	1.01	484.00	98.00	3.45	3.22	3.24	0.82	0 00:05:00
33	{Catch Basin Boundaries}.OA3-15AI	0.02	484.00	98.00	3.45	3.20	0.08	0.02	0 00:05:00
34	{Catch Basin Boundaries}.OA3-15BP	0.12	484.00	81.20	3.45	1.68	0.21	0.05	0 00:05:00
35	{Catch Basin Boundaries}.OA3-16AP	0.29	484.00	80.15	3.45	1.61	0.46	0.11	0 00:05:00
36	{Catch Basin Boundaries}.OA3-16BP	2.25	484.00	83.30	3.45	1.84	4.14	1.01	0 00:05:00
37	{Catch Basin Boundaries}.OA3-16CI	0.03	484.00	98.00	3.45	3.21	0.10	0.03	0 00:05:00
38	{Catch Basin Boundaries}.OA3-16CP	0.08	484.00	85.40	3.45	2.00	0.17	0.04	0 00:05:00
39	{Catch Basin Boundaries}.OA3-16DP	0.06	484.00	77.00	3.45	1.39	0.08	0.02	0 00:05:00
40	{Catch Basin Boundaries}.OA3-17AI	0.74	484.00	98.00	3.45	3.22	2.39	0.61	0 00:05:00
41	{Catch Basin Boundaries}.OA3-17BP	0.01	484.00	77.00	3.45	0.18	0.00	0.00	0 00:05:00
42	{Catch Basin Boundaries}.OA3-18AP	0.27	484.00	83.30	3.45	1.84	0.49	0.12	0 00:05:00
43	{Catch Basin Boundaries}.OA3-19AP	0.57	484.00	80.15	3.45	1.61	0.91	0.21	0 00:05:00
44	{Catch Basin Boundaries}.OA3-21AP	0.78	484.00	85.40	3.45	2.01	1.57	0.39	0 00:05:00
45	{Catch Basin Boundaries}.OA3-21BP	4.07	484.00	84.35	3.45	1.92	7.81	1.92	0 00:05:00
46	{Catch Basin Boundaries}.OA3-21CI	0.79	484.00	98.00	3.45	3.22	2.53	0.64	0 00:05:00
47	{Catch Basin Boundaries}.OA3-21DI	0.23	484.00	98.00	3.45	3.22	0.74	0.19	0 00:05:00
48	{Catch Basin Boundaries}.OA3-21EP	0.02	484.00	77.00	3.45	1.30	0.02	0.01	0 00:05:00
49	{Catch Basin Boundaries}.OA3-21FP	0.10	484.00	77.00	3.45	1.39	0.14	0.03	0 00:05:00
50	{Catch Basin Boundaries}.OA3-22AP	1.53	484.00	84.35	3.45	1.92	2.93	0.72	0 00:05:00
51	{Catch Basin Boundaries}.OA3-23AP	1.33	484.00	83.30	3.45	1.84	2.45	0.59	0 00:05:00
52	{Catch Basin Boundaries}.OA3-24AP	0.23	484.00	77.00	3.45	1.39	0.32	0.07	0 00:05:00
53	{Catch Basin Boundaries}.OA3-25AI	1.00	484.00	98.00	3.45	3.22	3.21	0.82	0 00:05:00
54	{Catch Basin Boundaries}.OA3-25BP	1.82	484.00	85.40	3.45	2.01	3.64	0.91	0 00:05:00
55	{Catch Basin Boundaries}.OA3-26AI	0.13	484.00	98.00	3.45	3.22	0.42	0.10	0 00:05:00
56	{Catch Basin Boundaries}.OA3-26BP	0.84	484.00	83.30	3.45	1.84	1.55	0.38	0 00:05:00
57	{Catch Basin Boundaries}.OA3-27AI	0.03	484.00	98.00	3.45	3.21	0.11	0.03	0 00:05:00
58	{Catch Basin Boundaries}.OA3-27BP	1.00	484.00	81.20	3.45	1.68	1.69	0.40	0 00:05:00
59	{Catch Basin Boundaries}.OA3-27CP	0.05	484.00	77.00	3.45	1.39	0.07	0.02	0 00:05:00
60	{Catch Basin Boundaries}.OA3-27DP	2.20	484.00	90.20	3.45	2.42	5.31	1.38	0 00:05:00
61	{Catch Basin Boundaries}.OA3-27EP	2.08	484.00	83.30	3.45	1.84	3.83	0.93	0 00:05:00
62	{Catch Basin Boundaries}.OA3-27FP	1.57	484.00	83.30	3.45	1.84	2.88	0.70	0 00:05:00
63	{Catch Basin Boundaries}.OA3-27GP	5.21	484.00	79.10	3.45	1.53	8.00	1.80	0 00:05:00
64	{Catch Basin Boundaries}.OA3-28AI	3.28	484.00	98.00	3.45	3.22	10.55	2.69	0 00:05:00
65	{Catch Basin Boundaries}.OA3-28BP	8.32	484.00	83.30	3.45	1.84	15.31	3.71	0 00:05:00
66	{Catch Basin Boundaries}.OA3-28CP	3.63	484.00	83.30	3.45	1.84	6.68	1.62	0 00:05:00
67	{Catch Basin Boundaries}.OA3-29AP	0.29	484.00	86.95	3.45	2.13	0.61	0.16	0 00:05:00
68	{Catch Basin Boundaries}.PA1-1BI	0.05	484.00	98.00	3.45	3.21	0.14	0.04	0 00:05:00
69	{Catch Basin Boundaries}.PA1-2BI	0.03	484.00	98.00	3.45	3.20	0.08	0.02	0 00:05:00
70	{Catch Basin Boundaries}.PA1-3BI	0.13	484.00	98.00	3.45	3.22	0.41	0.10	0 00:05:00
71	{Catch Basin Boundaries}.PA2-10CP	0.11	484.00	77.00	3.45	1.39	0.15	0.03	0 00:05:00
72	{Catch Basin Boundaries}.PA2-30CI	0.02	484.00	98.00	3.45	3.19	0.05	0.02	0 00:05:00
73	{Catch Basin Boundaries}.PA2-5DI	0.03	484.00	98.00	3.45	3.20	0.09	0.02	0 00:05:00
74	{Catch Basin Boundaries}.PA2-5EP	0.01	484.00	85.00	3.45	0.48	0.00	0.00	0 00:05:00
75	{Catch Basin Boundaries}.PA2-6CI	0.03	484.00	98.00	3.45	3.20	0.08	0.02	0 00:05:00
76	{Catch Basin Boundaries}.PA2-7DP	0.01	484.00	77.00	3.45	0.65	0.01	0.00	0 00:05:00
77	{Catch Basin Boundaries}.PA2-7EP	0.04	484.00	85.00	3.45	1.96	0.08	0.02	0 00:05:00
78	{Catch Basin Boundaries}.PA2-8EP	0.01	484.00	77.00	3.45	0.65	0.01	0.00	0 00:05:00
79	{Catch Basin Boundaries}.PA3-16FI	0.05	484.00	98.00	3.45	3.21	0.14	0.04	0 00:05:00
80	{Catch Basin Boundaries}.PA3-18BI	0.13	484.00	98.00	3.45	3.22	0.43	0.11	0 00:05:00
81	{Catch Basin Boundaries}.PA3-19BI	0.24	484.00	98.00	3.45	3.22	0.76	0.19	0 00:05:00
82	{Catch Basin Boundaries}.PA3-22BI	0.17	484.00	98.00	3.45	3.22	0.55	0.14	0 00:05:00
83	{Catch Basin Boundaries}.PA3-23BI	0.10	484.00	98.00	3.45	3.22	0.32	0.08	0 00:05:00
84	{Catch Basin Boundaries}.PA3-29BI	0.06	484.00	98.00	3.45	3.21	0.21	0.05	0 00:05:00
85	OA3-27HI	3.17	484.00	85.00	3.45	1.97	6.26	1.55	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	116	Junction	319.25	324.04	319.25	323.04	0.00	0.37	319.38	0.00	4.67	0 00:00	0.00	0.00
2	124	Junction	312.14	321.15	312.14	320.15	0.00	0.08	312.23	0.00	8.91	0 00:00	0.00	0.00
3	125	Junction	311.62	315.52	311.62	314.52	0.00	0.08	312.16	0.00	3.36	0 00:00	0.00	0.00
4	126	Junction	312.10	317.12	312.10	316.12	0.00	0.01	312.15	0.00	4.97	0 00:00	0.00	0.00
5	129	Junction	312.12	315.52	312.12	314.52	0.00	0.02	312.16	0.00	3.46	0 00:00	0.00	0.00
6	131	Junction	301.77	304.77	301.77	303.77	0.00	0.56	301.91	0.00	2.85	0 00:00	0.00	0.00
7	141	Junction	138.50	139.66	138.50	138.66	0.00	0.00	138.50	0.00	1.16	0 00:00	0.00	0.00
8	144	Junction	109.33	112.83	109.33	111.83	0.00	5.57	110.15	0.00	2.68	0 00:00	0.00	0.00
9	145	Junction	113.37	121.97	113.37	120.97	0.00	5.58	113.91	0.00	8.06	0 00:00	0.00	0.00
10	147	Junction	96.10	98.79	96.10	97.79	0.00	11.47	97.17	0.00	1.62	0 00:00	0.00	0.00
11	149	Junction	138.35	141.85	138.35	140.85	0.00	6.39	138.87	0.00	2.98	0 00:00	0.00	0.00
12	153	Junction	342.07	359.60	342.07	358.60	0.00	0.00	342.07	0.00	17.54	0 00:00	0.00	0.00
13	159	Junction	302.65	318.40	302.65	317.40	0.00	0.00	302.65	0.00	15.75	0 00:00	0.00	0.00
14	161	Junction	304.99	320.67	304.99	319.67	0.00	0.00	304.99	0.00	15.68	0 00:00	0.00	0.00
15	169	Junction	138.28	142.39	138.28	141.39	0.00	1.50	138.58	0.00	3.82	0 00:00	0.00	0.00
16	172	Junction	134.60	139.51	134.60	138.51	0.00	1.49	135.44	0.00	4.07	0 00:00	0.00	0.00
17	175	Junction	245.83	248.93	245.83	247.93	0.00	0.61	246.22	0.00	2.71	0 00:00	0.00	0.00
18	CB-10	Junction	343.39	347.38	343.39	346.38	0.00	0.09	343.51	0.00	3.87	0 00:00	0.00	0.00
19	CB-100	Junction	288.54	292.68	288.54	291.68	0.00	1.01	288.79	0.00	3.89	0 00:00	0.00	0.00
20	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
21	CB-110	Junction	281.90	292.27	281.90	291.27	0.00	1.01	282.26	0.00	10.01	0 00:00	0.00	0.00
22	CB-110A	Junction	281.38	285.84	281.38	284.84	0.00	0.66	282.24	0.00	3.60	0 00:00	0.00	0.00
23	CB-110B	Junction	281.88	285.84	281.88	284.84	0.00	0.56	282.23	0.00	3.65	0 00:00	0.00	0.00
24	CB-115	Junction	281.95	292.34	281.95	291.34	0.00	0.35	282.18	0.00	10.16	0 00:00	0.00	0.00
25	CB-115A	Junction	281.43	285.89	281.43	284.89	0.00	0.33	282.17	0.00	3.72	0 00:00	0.00	0.00
26	CB-115B	Junction	281.93	285.89	281.93	284.89	0.00	0.26	282.16	0.00	3.77	0 00:00	0.00	0.00
27	CB-120	Junction	281.86	287.54	281.86	286.54	0.00	0.70	282.12	0.00	5.43	0 00:00	0.00	0.00
28	CB-125	Junction	281.91	287.65	281.91	286.65	0.00	0.24	282.15	0.00	5.50	0 00:00	0.00	0.00
29	CB-130	Junction	281.49	286.04	281.49	285.04	0.00	0.80	281.72	0.00	4.32	0 00:00	0.00	0.00
30	CB-135	Junction	280.50	284.00	280.50	283.00	0.00	0.90	280.67	0.00	3.33	0 00:00	0.00	0.00
31	CB-140	Junction	277.25	280.76	277.25	279.76	0.00	1.29	277.48	0.00	3.28	0 00:00	0.00	0.00
32	CB-141	Junction	281.07	283.97	281.07	282.97	0.00	0.90	281.40	0.00	2.58	0 00:00	0.00	0.00
33	CB-150	Junction	272.74	276.40	272.74	275.40	0.00	1.29	272.95	0.00	3.46	0 00:00	0.00	0.00
34	CB-160	Junction	263.22	267.43	263.22	266.43	0.00	7.45	263.82	0.00	3.62	0 00:00	0.00	0.00
35	CB-161	Junction	267.00	270.32	267.00	269.32	0.00	4.98	267.61	0.00	2.72	0 00:00	0.00	0.00
36	CB-165	Junction	260.00	264.27	260.00	263.27	0.00	7.54	260.74	0.00	3.53	0 00:00	0.00	0.00
37	CB-170	Junction	258.50	262.86	258.50	261.86	0.00	7.54	259.31	0.00	3.55	0 00:00	0.00	0.00
38	CB-180	Junction	257.22	260.39	257.22	259.39	0.00	7.59	257.97	0.00	2.42	0 00:00	0.00	0.00
39	CB-190	Junction	246.41	258.14	246.41	257.14	0.00	7.59	247.74	0.00	10.40	0 00:00	0.00	0.00
40	CB-190A	Junction	245.91	258.14	245.91	257.14	0.00	7.56	247.61	0.00	10.53	0 00:00	0.00	0.00
41	CB-190B	Junction	246.41	252.52	246.41	251.52	0.00	7.57	247.52	0.00	5.00	0 00:00	0.00	0.00
42	CB-20	Junction	337.37	343.03	337.37	342.03	0.00	0.20	337.45	0.00	5.58	0 00:00	0.00	0.00
43	CB-200	Junction	246.38	252.52	246.38	251.52	0.00	7.46	247.19	0.00	5.33	0 00:00	0.00	0.00
44	CB-210	Junction	245.40	251.85	245.40	250.85	0.00	7.75	246.03	0.00	5.83	0 00:00	0.00	0.00
45	CB-220	Junction	245.58	249.25	245.58	248.25	0.00	0.07	245.63	0.00	3.62	0 00:00	0.00	0.00
46	CB-250	Junction	239.67	243.34	239.67	242.34	0.00	0.07	239.72	0.00	3.62	0 00:00	0.00	0.00
47	CB-260	Junction	234.51	238.07	234.51	237.07	0.00	1.30	234.71	0.00	3.36	0 00:00	0.00	0.00
48	CB-261	Junction	234.76	237.48	234.76	236.48	0.00	0.00	234.76	0.00	2.72	0 00:00	0.00	0.00
49	CB-265	Junction	231.01	234.66	231.01	233.66	0.00	1.89	231.31	0.00	3.35	0 00:00	0.00	0.00
50	CB-270	Junction	229.14	232.64	229.14	231.64	0.00	1.90	229.38	0.00	3.26	0 00:00	0.00	0.00
51	CB-280	Junction	211.13	215.30	211.13	214.30	0.00	2.12	211.40	0.00	3.90	0 00:00	0.00	0.00
52	CB-290	Junction	205.53	209.99	205.53	208.99	0.00	2.12	205.79	0.00	4.20	0 00:00	0.00	0.00
53	CB-30	Junction	332.08	335.75	332.08	334.75	0.00	0.20	332.16	0.00	3.59	0 00:00	0.00	0.00
54	CB-300	Junction	197.49	201.15	197.49	200.15	0.00	2.12	197.75	0.00	3.40	0 00:00	0.00	0.00
55	CB-310	Junction	190.13	193.80	190.13	192.80	0.00	2.12	190.41	0.00	3.39	0 00:00	0.00	0.00
56	CB-320	Junction	184.86	188.53	184.86	187.53	0.00	2.50	185.15	0.00	3.37	0 00:00	0.00	0.00
57	CB-330	Junction	175.77	179.43	175.77	178.43	0.00	2.50	176.06	0.00	3.38	0 00:00	0.00	0.00
58	CB-340	Junction	168.39	172.23	168.39	171.23	0.00	2.67	168.70	0.00	3.53	0 00:00	0.00	0.00
59	CB-341	Junction	170.66	173.66	170.66	172.66	0.00	0.00	170.66	0.00	3.00	0 00:00	0.00	0.00
60	CB-345	Junction	163.77	167.27	163.77	166.27	0.00	2.67	164.10	0.00	3.17	0 00:00	0.00	0.00
61	CB-350	Junction	161.65	165.61	161.65	164.61	0.00	5.56	162.08	0.00	3.52	0 00:00	0.00	0.00
62	CB-351	Junction	163.86	166.86	163.86	165.86	0.00	0.00	163.86	0.00	3.00	0 00:00	0.00	0.00
63	CB-360	Junction	148.00	151.67	148.00	150.67	0.00	5.56	148.44	0.00	3.23	0 00:00	0.00	0.00
64	CB-370	Junction	134.56	139.07	134.56	138.07	0.00	6.35	135.40	0.00	3.67	0 00:00	0.00	0.00
65	CB-390	Junction	122.42	138.65	122.42	137.65	0.00	6.34	123.31	0.00	15.34	0 00:00	0.00	0.00
66	CB-390A	Junction	121.89	128.92	121.89	127.92	0.00	3.56	123.27	0.00	5.65	0 00:00	0.00	0.00
67	CB-390B	Junction	122.39	128.92	122.39	127.92	0.00	3.35	123.24	0.00	5.68	0 00:00	0.00	0.00
68	CB-395	Junction	122.37	138.83	122.37	137.83	0.00	2.69	123.27	0.00	15.56	0 00:00	0.00	0.00
69	CB-395A	Junction	121.84	128.87	121.84	127.87	0.00	2.50	123.27	0.00	5.61	0 00:00	0.00	0.00
70	CB-395B	Junction	122.37	128.87	122.37	127.87	0.00	1.87	123.26	0.00	5.62	0 00:00	0.00	0.00
71	CB-40	Junction	325.96	329.62	325.96	328.62	0.00	0.37	326.08	0.00	3.54	0 00:00	0.00	0.00
72	CB-400	Junction	122.35	131.29	122.35	130.29	0.00	1.73	123.24	0.00	8.05	0 00:00	0.00	0.00
73	CB-405	Junction	122.30	129.56	122.30	128.56	0.00	4.51	123.20	0.00	6.37	0 00:00	0.00	0.00
74	CB-410	Junction	122.26	128.59	122.26	127.59	0.00	4.49	122.76	0.00	5.83	0 00:00	0.00	0.00
75	CB-420	Junction	118.40	122.25	118.40	121.25	0.00	4.80	118.84	0.00	3.41	0 00:00	0.00	0.00
76	CB-430	Junction	114.95	118.45	114.95	117.45	0.00	4.81	115.76	0.00	2.69	0 00:00	0.00	0.00
77	CB-450	Junction	107.85	110.85	107.85	109.85	0.00	5.79	108.28	0.00	2.58	0 00:00	0.00	0.00
78	CB-460	Junction	97.75	101.64	97.75	100.64	0.00	11.53	98.79	0.00	2.86	0 00:00	0.00	0.00
79	CB-470EX	Junction	89.17	97.66	89.17	96.66	0.00	19.17	90.45	0.00	7.21	0 00:00	0.00	0.00
80	CB-480EX	Junction	82.12	90.03	82.12	89.03	0.00	19.17	82.78	0.00	7.26	0 00:00	0.00	0.00
81	CB-490	Junction	60.90	67.64	60.90	66.64	0.00	19.36	62.13	0.00	5.51	0 00:00	0.00	0.00
82	CB-490EX	Junction	75.53	80.48	75.53	79.48	0.00	19.36	76.41	0.00	4.08	0 00:00	0.00	0.00
83	CB-495EX	Junction	61.80	68.14	61.80	67.14	0.00	19.35	64.45	0.00	3.68	0 00:00	0.00	0.00
84	CB-50	Junction	312.06	321.03	312.06	320.03	0.00	0.37	312.28	0.00	8.76	0 00:00	0.00	0.00
85	CB-50A	Junction	311.54	315.44	311.54	314.44	0.00	0.28	312.25	0.00	3.19	0 00:00	0.00	0.00
86	CB-50B	Junction	312.04	315.44	312.04	314.44	0.00	0.24	312.25	0.00	3.29	0 00:00	0.00	0.00
87	CB-60	Junction	312.02	317.04	312.02	316.04	0.00	0.23	312.15	0.00	4.89	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 (ft^2)	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)
88	CB-70	Junction	311.75	316.01	311.75	315.01	0.00	0.92	311.93	0.00	4.08	0 00:00	0.00	0.00
89	CB-80	Junction	306.46	309.96	306.46	308.96	0.00	0.56	306.59	0.00	3.37	0 00:00	0.00	0.00
90	CB-90	Junction	303.04	306.71	303.04	305.71	0.00	0.56	303.21	0.00	3.50	0 00:00	0.00	0.00
91	Out-1143	Junction	114.20	120.20	114.20	119.20	0.00	4.84	114.71	0.00	5.49	0 00:00	0.00	0.00
92	Out-183	Junction	281.00	284.98	281.00	283.98	0.00	0.00	281.00	0.00	3.98	0 00:00	0.00	0.00
93	WQ-1	Junction	320.24	326.00	320.24	325.00	0.00	0.37	320.38	0.00	5.62	0 00:00	0.00	0.00
94	WQ-2	Junction	296.00	301.80	296.00	300.80	0.00	0.55	296.14	0.00	5.66	0 00:00	0.00	0.00
95	WQ-3	Junction	253.03	258.83	253.03	257.83	0.00	7.59	254.56	0.00	4.27	0 00:00	0.00	0.00
96	WQ-4	Junction	134.68	140.48	134.68	139.48	0.00	1.50	135.47	0.00	5.01	0 00:00	0.00	0.00
97	Out-144	Outfall	56.00					19.35	56.86					
98	Out-15	Outfall	343.17					0.09	343.28					
99	Out-151	Outfall	308.34					0.92	308.51					
100	Out-155	Outfall	280.30					0.80	280.50					
101	Out-175	Outfall	241.65					7.73	242.13					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	11 (1)	Pipe	CB-370	CB-390	7.22	134.56	133.83	10.1100	18.000	0.0120	6.34	36.18	0.18	9.07	0.63	0.42	0.00	Calculated
2	117 (1)	Pipe	CB-250	CB-260	60.74	239.67	234.51	8.4900	18.000	0.0120	0.07	33.17	0.00	1.04	0.13	0.08	0.00	Calculated
3	118 (1)	Pipe	CB-270	CB-280	211.91	229.14	211.13	8.5000	18.000	0.0120	1.89	33.18	0.06	9.38	0.26	0.17	0.00	Calculated
4	118 (2) (1)	Pipe	CB-265	CB-270	19.36	231.01	229.14	9.6700	18.000	0.0120	1.90	35.39	0.05	8.80	0.27	0.18	0.00	Calculated
5	120 (1)	Pipe	CB-300	CB-310	77.38	197.49	190.13	9.5100	18.000	0.0120	2.12	35.10	0.06	9.79	0.27	0.18	0.00	Calculated
6	123 (1)	Pipe	CB-340	CB-345	52.16	168.39	163.77	8.8600	18.000	0.0120	2.67	33.87	0.08	9.58	0.32	0.21	0.00	Calculated
7	123 (1) (1)	Pipe	CB-345	CB-350	24.04	163.77	161.65	8.8200	18.000	0.0120	2.66	33.79	0.08	7.93	0.38	0.26	0.00	Calculated
8	3	Pipe	CB-470EX	CB-480EX	75.22	89.17	82.12	9.3700	18.000	0.0150	19.17	27.87	0.69	16.12	0.97	0.65	0.00	Calculated
9	4	Pipe	CB-10EX	CB-10	11.09	344.23	343.49	6.6800	18.000	0.0120	0.00	29.41	0.00	0.00	0.01	0.01	0.00	Calculated
10	5	Pipe	CB-10	Out-15	43.29	343.39	343.17	0.5000	18.000	0.0120	0.09	8.05	0.01	1.51	0.11	0.08	0.00	Calculated
11	6	Pipe	CB-80	CB-90	35.28	306.46	302.92	10.0500	18.000	0.0120	0.56	35.43	0.02	6.04	0.15	0.10	0.00	Calculated
12	7	Pipe	WQ-3	CB-190	8.05	253.03	252.99	0.5000	18.000	0.0120	7.59	8.02	0.95	4.71	1.28	0.86	0.00	Calculated
13	9	Pipe	CB-341	CB-340	20.38	170.66	168.80	9.1100	12.000	0.0120	0.00	11.65	0.00	0.00	0.00	0.00	0.00	Calculated
14	11	Pipe	CB-360	149	117.04	148.00	138.35	8.2400	18.000	0.0120	5.56	32.68	0.17	11.52	0.48	0.32	0.00	Calculated
15	25	Pipe	CB-420	CB-430	51.69	118.40	114.95	6.6700	18.000	0.0120	4.81	29.40	0.16	6.89	0.62	0.42	0.00	Calculated
16	32	Pipe	CB-50A	CB-50B	35.05	311.54	311.54	0.0000	42.000	0.0120	0.24	130.18	0.00	0.33	0.46	0.13	0.00	Calculated
17	33	Pipe	CB-110A	CB-110B	55.00	281.38	281.38	0.0000	48.000	0.0120	0.56	148.37	0.00	0.48	0.60	0.15	0.00	Calculated
18	36	Pipe	CB-390A	CB-390B	110.00	121.89	121.89	0.0000	72.000	0.0120	3.35	309.32	0.01	0.98	1.12	0.19	0.00	Calculated
19	37	Pipe	CB-395A	CB-395B	110.00	121.84	121.84	0.0000	72.000	0.0120	1.87	318.47	0.01	0.60	1.16	0.19	0.00	Calculated
20	40	Pipe	CB-60	CB-70	10.65	312.02	311.75	2.5700	18.000	0.0120	0.22	18.25	0.01	2.63	0.14	0.10	0.00	Calculated
21	41	Pipe	CB-50B	CB-60	4.62	312.04	312.02	0.4300	36.000	0.0120	0.23	47.57	0.00	1.49	0.17	0.06	0.00	Calculated
22	42	Pipe	CB-50	CB-50A	4.63	312.06	312.04	0.4300	36.000	0.0120	0.28	47.49	0.01	1.58	0.21	0.07	0.00	Calculated
23	43	Pipe	CB-40	WQ-1	50.05	325.96	322.54	6.8300	18.000	0.0120	0.37	29.75	0.01	5.60	0.12	0.08	0.00	Calculated
24	44	Pipe	CB-490	Out-144	43.12	60.90	56.00	11.3500	18.000	0.0150	19.35	30.68	0.63	14.77	1.05	0.70	0.00	Calculated
25	45	Pipe	CB-110B	CB-120	4.61	281.88	281.86	0.4300	36.000	0.0120	0.52	47.57	0.01	1.44	0.30	0.10	0.00	Calculated
26	46	Pipe	CB-110	CB-110A	4.65	281.90	281.88	0.4300	36.000	0.0120	0.66	47.39	0.01	1.70	0.36	0.12	0.00	Calculated
27	48	Pipe	CB-90	131	21.38	302.04	301.77	1.2600	18.000	0.0120	0.56	27.74	0.02	5.77	0.15	0.10	0.00	Calculated
28	49	Pipe	CB-190B	CB-200	4.62	246.41	246.38	0.5400	36.000	0.0120	7.46	53.14	0.14	4.24	0.95	0.32	0.00	Calculated
29	50	Pipe	CB-100	CB-110	10.47	288.54	287.79	7.2000	18.000	0.0120	1.01	30.53	0.03	6.43	0.22	0.15	0.00	Calculated
30	51	Pipe	CB-70	Out-151	42.42	311.75	308.34	8.0300	18.000	0.0120	0.92	32.25	0.03	7.58	0.18	0.12	0.00	Calculated
31	52	Pipe	CB-190	CB-190A	4.67	246.43	246.41	0.5300	36.000	0.0120	7.56	52.84	0.14	2.97	1.24	0.42	0.00	Calculated
32	53	Pipe	CB-400	CB-405	8.92	122.31	122.26	0.5600	18.000	0.0120	1.75	8.52	0.21	1.61	0.89	0.60	0.00	Calculated
33	55	Pipe	CB-130	Out-155	38.35	281.49	280.30	3.1000	18.000	0.0120	0.80	20.05	0.04	5.11	0.21	0.14	0.00	Calculated
34	57	Pipe	CB-120	CB-130	20.27	281.86	281.49	1.8200	18.000	0.0120	0.70	15.35	0.05	3.79	0.24	0.16	0.00	Calculated
35	58	Pipe	CB-190A	CB-190B	55.00	245.91	245.91	0.0000	60.000	0.0120	7.57	269.02	0.03	1.77	1.41	0.28	0.00	Calculated
36	59	Pipe	CB-390	CB-390A	4.64	122.42	122.39	0.6500	36.000	0.0120	3.56	58.10	0.06	2.22	0.88	0.30	0.00	Calculated
37	60	Pipe	CB-395	CB-395A	4.61	122.37	122.34	0.6500	36.000	0.0120	2.50	58.27	0.04	1.76	0.91	0.30	0.00	Calculated
38	61	Pipe	CB-390B	CB-405	4.65	122.39	122.37	0.4300	36.000	0.0120	3.04	47.38	0.06	2.08	0.84	0.28	0.00	Calculated
39	62	Pipe	CB-395B	CB-400	4.65	122.34	122.31	0.6500	36.000	0.0120	1.73	47.39	0.04	1.00	0.89	0.30	0.00	Calculated
40	64	Pipe	CB-140	CB-150	62.06	277.25	272.74	7.2700	18.000	0.0120	1.29	30.68	0.04	8.23	0.22	0.14	0.00	Calculated
41	66	Pipe	CB-150	CB-160	120.88	272.74	263.22	7.8700	18.000	0.0120	1.28	31.93	0.04	3.68	0.40	0.27	0.00	Calculated
42	68	Pipe	CB-351	CB-350	13.54	163.86	162.65	8.9200	12.000	0.0120	0.00	11.53	0.00	0.00	0.00	0.00	0.00	Calculated
43	69	Pipe	CB-170	CB-180	23.89	258.50	257.22	5.3700	18.000	0.0120	7.55	26.37	0.29	8.16	0.78	0.52	0.00	Calculated
44	72	Pipe	CB-160	CB-165	40.83	263.22	260.00	7.8900	18.000	0.0120	7.45	31.96	0.23	9.75	0.67	0.45	0.00	Calculated
45	72 (1)	Pipe	CB-165	CB-170	18.97	260.00	258.50	7.8900	18.000	0.0120	7.54	31.96	0.24	8.29	0.77	0.52	0.00	Calculated
46	74	Pipe	CB-200	CB-210	7.08	246.13	245.40	10.3700	18.000	0.0120	7.15	42.43	0.17	8.90	0.70	0.48	0.00	Calculated
47	75	Pipe	CB-210	Out-175	39.50	245.40	241.65	9.4800	18.000	0.0120	7.73	35.04	0.22	13.09	0.55	0.37	0.00	Calculated
48	76	Pipe	CB-141	CB-135	18.88	281.07	280.50	3.0200	12.000	0.0120	0.90	6.71	0.13	5.93	0.25	0.25	0.00	Calculated
49	80	Pipe	CB-350	CB-360	154.42	161.65	148.00	8.8400	18.000	0.0120	5.56	33.83	0.16	13.04	0.44	0.29	0.00	Calculated
50	82	Pipe	CB-135	CB-140	34.97	280.50	277.25	9.2900	18.000	0.0120	0.89	34.69	0.03	6.49	0.20	0.13	0.00	Calculated
51	83	Pipe	Out-183	CB-135	6.06	281.00	280.50	8.2500	18.000	0.0130	0.00	30.17	0.00	0.00	0.08	0.06	0.00	Calculated
52	84	Pipe	CB-110	CB-115	7.32	281.90	281.95	-0.6800	18.000	0.0120	0.35	9.40	0.04	1.45	0.29	0.20	0.00	Calculated
53	85	Pipe	CB-125	CB-120	7.26	281.91	281.86	0.6900	18.000	0.0120	0.24	9.44	0.03	1.37	0.25	0.17	0.00	Calculated
54	86	Pipe	CB-115	CB-115A	4.70	281.95	281.93	0.4300	36.000	0.0120	0.33	47.14	0.01	1.62	0.23	0.08	0.00	Calculated
55	87	Pipe	CB-390	CB-395	9.30	122.42	122.37	0.5400	18.000	0.0120	2.69	8.34	0.32	2.67	0.89	0.60	0.00	Calculated
56	88	Pipe	CB-115A	CB-115B	55.00	281.43	281.43	0.0000	48.000	0.0120	0.26	148.37	0.00	0.32	0.49	0.12	0.00	Calculated

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
57	89	Pipe	CB-115B	CB-125	4.62	281.93	281.91	0.4300	36.000	0.0120	0.24	47.52	0.00	0.95	0.23	0.08	0.00	Calculated
58	90	Pipe	CB-480EX	CB-490EX	78.87	82.12	75.63	8.2300	18.000	0.0150	8.96	26.11	0.34	10.92	0.72	0.48	0.00	Calculated
59	91	Pipe	CB-405	CB-410	6.88	122.26	122.22	0.5800	18.000	0.0120	4.49	8.68	0.52	5.58	0.70	0.47	0.00	Calculated
60	92	Pipe	CB-410	CB-420	87.13	122.22	118.40	4.3800	18.000	0.0120	4.49	23.95	0.19	9.57	0.47	0.31	0.00	Calculated
61	93	Pipe	CB-490EX	CB-495EX	101.21	75.53	61.87	13.5000	18.000	0.0150	19.35	33.45	0.58	12.90	1.19	0.79	0.00	Calculated
62	94	Pipe	CB-495EX	CB-490	6.93	61.80	60.90	13.0400	18.000	0.0150	19.36	32.87	0.59	11.46	1.37	0.91	0.00	Calculated
63	98	Pipe	CB-261	CB-260	15.95	234.76	234.60	1.0000	12.000	0.0120	0.00	3.87	0.00	0.00	0.06	0.06	0.00	Calculated
64	104	Pipe	CB-50	124	7.24	312.06	312.14	-1.1000	18.000	0.0120	0.08	11.96	0.01	0.81	0.15	0.10	0.00	Calculated
65	105	Pipe	124	125	4.60	312.14	312.12	0.4300	36.000	0.0120	0.08	47.64	0.00	1.64	0.08	0.03	0.00	Calculated
66	106	Pipe	125	129	35.00	311.62	311.62	0.0000	42.000	0.0120	0.02	130.27	0.00	0.05	0.29	0.08	0.00	Calculated
67	107	Pipe	129	126	4.66	312.12	312.10	0.4300	36.000	0.0120	0.01	47.35	0.00	0.67	0.04	0.01	0.00	Calculated
68	108	Pipe	126	CB-60	7.50	312.10	312.02	1.0700	18.000	0.0120	0.01	11.75	0.00	0.51	0.09	0.06	0.00	Calculated
69	109	Pipe	WQ-1	116	19.31	320.24	319.25	5.1300	18.000	0.0120	0.37	25.77	0.01	4.78	0.13	0.09	0.00	Calculated
70	111	Pipe	CB-20	CB-30	57.22	337.37	332.08	9.2500	18.000	0.0120	0.20	34.60	0.01	5.24	0.08	0.06	0.00	Calculated
71	112	Pipe	CB-30	CB-40	65.78	332.08	325.96	9.3000	18.000	0.0120	0.20	34.71	0.01	3.85	0.10	0.07	0.00	Calculated
72	117	Pipe	CB-220	CB-250	77.49	245.58	239.67	7.6300	18.000	0.0120	0.07	31.43	0.00	3.64	0.05	0.03	0.00	Calculated
73	118	Pipe	CB-260	CB-265	36.15	234.51	231.01	9.6700	18.000	0.0120	1.30	35.39	0.04	6.82	0.25	0.17	0.00	Calculated
74	119	Pipe	CB-280	CB-290	58.35	211.13	205.53	9.6000	18.000	0.0120	2.12	35.25	0.06	10.00	0.27	0.18	0.00	Calculated
75	120	Pipe	CB-290	CB-300	81.20	205.53	197.49	9.9000	18.000	0.0120	2.12	35.81	0.06	10.23	0.26	0.17	0.00	Calculated
76	121	Pipe	CB-310	CB-320	66.71	190.13	184.86	7.9000	18.000	0.0120	2.12	31.98	0.07	9.08	0.29	0.19	0.00	Calculated
77	122	Pipe	CB-320	CB-330	106.88	184.86	175.77	8.5000	18.000	0.0120	2.50	33.19	0.08	10.44	0.29	0.19	0.00	Calculated
78	123	Pipe	CB-330	CB-340	78.49	175.77	168.39	9.4000	18.000	0.0120	2.50	34.89	0.07	10.04	0.30	0.20	0.00	Calculated
79	127	Pipe	CB-450	CB-460	123.28	107.85	97.75	8.1900	18.000	0.0120	5.79	32.57	0.18	8.31	0.71	0.48	0.00	Calculated
80	128	Pipe	CB-460	147	28.16	97.75	96.10	5.8500	18.000	0.0120	11.47	27.51	0.42	8.70	1.05	0.70	0.00	Calculated
81	130	Pipe	116	CB-50	32.22	319.25	317.15	6.5100	18.000	0.0120	0.37	29.04	0.01	5.41	0.12	0.08	0.00	Calculated
82	132	Pipe	131	WQ-2	39.08	301.77	298.30	8.8800	18.000	0.0120	0.55	33.91	0.02	6.78	0.14	0.09	0.00	Calculated
83	133	Pipe	WQ-2	CB-100	102.92	296.00	288.54	7.2500	18.000	0.0120	0.55	30.64	0.02	4.21	0.19	0.13	0.00	Calculated
84	142	Pipe	172	CB-370	7.05	134.60	134.56	0.5700	18.000	0.0120	1.59	8.57	0.19	1.68	0.83	0.56	0.00	Calculated
85	143	Pipe	CB-430	Out-1143	74.00	114.95	114.20	1.0100	18.000	0.0120	4.80	11.46	0.42	6.37	0.66	0.44	0.00	Calculated
86	146	Pipe	145	144	37.12	113.37	109.74	9.7700	18.000	0.0150	5.57	28.45	0.20	10.96	0.49	0.33	0.00	Calculated
87	148	Pipe	147	CB-470EX	33.88	96.10	94.39	5.0600	18.000	0.0120	11.45	25.60	0.45	10.63	0.88	0.59	0.00	Calculated
88	150	Pipe	149	169	6.91	138.35	138.30	0.7200	18.000	0.0120	1.50	9.68	0.15	3.30	0.46	0.31	0.00	Calculated
89	151	Pipe	WQ-4	172	16.06	134.68	134.60	0.5000	18.000	0.0120	1.49	8.03	0.19	1.54	0.81	0.54	0.00	Calculated
90	152	Pipe	153	CB-20	10.13	342.07	341.13	9.2300	4.000	0.0120	0.00	0.63	0.00	0.00	0.00	0.00	0.00	Calculated
91	155	Pipe	144	CB-450	9.39	109.33	107.85	15.7500	12.000	0.0120	5.58	15.32	0.36	10.88	0.62	0.62	0.00	Calculated
92	157	Pipe	161	CB-90	4.61	304.99	304.15	18.1200	4.000	0.0120	0.00	0.88	0.00	0.00	0.00	0.00	0.00	Calculated
93	158	Pipe	159	131	6.88	302.65	302.06	8.4800	6.000	0.0120	0.00	1.77	0.00	0.00	0.00	0.00	0.00	Calculated
94	170	Pipe	169	WQ-4	24.09	138.28	136.98	5.4000	18.000	0.0120	1.50	26.44	0.06	7.02	0.27	0.18	0.00	Calculated
95	171	Pipe	149	CB-370	40.75	138.35	134.56	9.3000	12.000	0.0120	4.89	11.77	0.42	9.06	0.67	0.68	0.00	Calculated
96	173	Pipe	141	172	14.56	138.50	134.70	26.0900	12.000	0.0120	0.00	19.72	0.00	0.00	0.37	0.37	0.00	Calculated
97	174	Pipe	CB-180	WQ-3	28.46	257.22	255.33	6.6400	18.000	0.0120	7.59	29.33	0.26	10.69	0.64	0.42	0.00	Calculated
98	176	Pipe	175	CB-210	13.92	245.83	245.76	0.5000	12.000	0.0120	0.61	2.73	0.22	2.43	0.36	0.36	0.00	Calculated
99	Link-01	Pipe	CB-480EX	CB-490EX	79.01	82.12	75.53	8.3400	18.000	0.0130	10.21	30.34	0.34	11.38	0.77	0.51	0.00	Calculated
100	Link-02	Pipe	CB-161	CB-160	16.64	267.00	264.26	16.4600	12.000	0.0130	4.97	14.46	0.34	12.68	0.51	0.51	0.00	Calculated
101	Link-04	Pipe	Out-1143	145	54.47	114.20	113.37	1.5200	60.000	0.0150	4.83	278.63	0.02	4.39	0.53	0.11	0.00	Calculated

Subbasin Hydrology

Subbasin : {Catch Basin Boundaries}.OA1-1AI

Input Data

Area (ac)	0.12
Peak Rate Factor	484.00
Weighted Curve Number	85.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.12	B	85.00
-	0.05	B	85.00
Composite Area & Weighted CN	0.17		85.00

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)	3.45
Total Runoff (in)	1.97
Peak Runoff (cfs)	0.06
Weighted Curve Number	85.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-2AP

Input Data

Area (ac)	0.29
Peak Rate Factor	484.00
Weighted Curve Number	90.20
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.29	B	90.20
Composite Area & Weighted CN	0.29		90.20

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)	0.18
Weighted Curve Number	90.20
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-3AP

Input Data

Area (ac) 0.12
Peak Rate Factor 484.00
Weighted Curve Number 86.95
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.12	B	86.95
Composite Area & Weighted CN	0.12		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) 0.07
Weighted Curve Number 86.95
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-4AP

Input Data

Area (ac)	1.08
Peak Rate Factor	484.00
Weighted Curve Number	88.90
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.08	B	88.90
Composite Area & Weighted CN	1.08		88.90

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.30
Peak Runoff (cfs)	0.64
Weighted Curve Number	88.90
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-4BI

Input Data

Area (ac) 0.09
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98.00
Composite Area & Weighted CN	0.09		98.00

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 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-4CI

Input Data

Area (ac)	0.11
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	B	98.00
Composite Area & Weighted CN	0.11		98.00

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)	0.09
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-10AI

Input Data

Area (ac) 0.22
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.22	B	98.00
Composite Area & Weighted CN	0.22		98.00

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) 0.18
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-10BP

Input Data

Area (ac)	1.70
Peak Rate Factor	484.00
Weighted Curve Number	87.60
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.70	B	87.60
Composite Area & Weighted CN	1.70		87.60

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	87.60
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-10CI

Input Data

Area (ac) 0.05
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	98.00
-	0.03	A	98.00
Composite Area & Weighted CN	0.08		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 3.21
Peak Runoff (cfs) 0.04
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-11AI

Input Data

Area (ac)	0.11
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	A	98.00
Composite Area & Weighted CN	0.11		98.00

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)	0.09
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-12AP

Input Data

Area (ac) 0.11
Peak Rate Factor 484.00
Weighted Curve Number 77.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	A	77.00
Composite Area & Weighted CN	0.11		77.00

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) 0.03
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-13AP

Input Data

Area (ac) 1.46
Peak Rate Factor 484.00
Weighted Curve Number 82.25
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.46	A	82.25
Composite Area & Weighted CN	1.46		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) 0.61
Weighted Curve Number 82.25
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-14AI

Input Data

Area (ac)	0.05
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	98.00
Composite Area & Weighted CN	0.05		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	3.21
Peak Runoff (cfs)	0.04
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-14BI

Input Data

Area (ac) 0.05
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	98.00
Composite Area & Weighted CN	0.05		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 3.21
Peak Runoff (cfs) 0.04
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-30AI

Input Data

Area (ac)	0.16
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	B	98.00
Composite Area & Weighted CN	0.16		98.00

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	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-30BP

Input Data

Area (ac)	0.70
Peak Rate Factor	484.00
Weighted Curve Number	88.25
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.70	B	88.25
Composite Area & Weighted CN	0.70		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)	0.41
Weighted Curve Number	88.25
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-5AP

Input Data

Area (ac)	0.60
Peak Rate Factor	484.00
Weighted Curve Number	86.95
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.60	B	86.95
Composite Area & Weighted CN	0.60		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)	0.32
Weighted Curve Number	86.95
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-5BI

Input Data

Area (ac)	0.09
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98.00
Composite Area & Weighted CN	0.09		98.00

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	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-5CI

Input Data

Area (ac) 0.09
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98.00
Composite Area & Weighted CN	0.09		98.00

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 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-6AP

Input Data

Area (ac) 0.15
Peak Rate Factor 484.00
Weighted Curve Number 95.40
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.15	B	95.40
Composite Area & Weighted CN	0.15		95.40

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.93
Peak Runoff (cfs) 0.12
Weighted Curve Number 95.40
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-6BP

Input Data

Area (ac) 0.09
Peak Rate Factor 484.00
Weighted Curve Number 85.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	85.00
Composite Area & Weighted CN	0.09		85.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 1.97
Peak Runoff (cfs) 0.04
Weighted Curve Number 85.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-7AI

Input Data

Area (ac)	0.36
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.36	A	98.00
-	0.08	B	98.00
Composite Area & Weighted CN	0.44		98.00

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)	0.30
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-7BP

Input Data

Area (ac) 0.58
Peak Rate Factor 484.00
Weighted Curve Number 83.30
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.58	A	83.30
Composite Area & Weighted CN	0.58		83.30

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) 0.26
Weighted Curve Number 83.30
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-7CP

Input Data

Area (ac) 0.54
Peak Rate Factor 484.00
Weighted Curve Number 89.89
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.54	B	90.20
-	0.01	A	77.00
Composite Area & Weighted CN	0.55		89.89

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.39
Peak Runoff (cfs) 0.34
Weighted Curve Number 89.89
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8AP

Input Data

Area (ac) 0.08
Peak Rate Factor 484.00
Weighted Curve Number 85.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	B	85.00
Composite Area & Weighted CN	0.08		85.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 1.97
Peak Runoff (cfs) 0.04
Weighted Curve Number 85.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8BI

Input Data

Area (ac)	0.37
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.37	A	98.00
Composite Area & Weighted CN	0.37		98.00

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)	0.30
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8CP

Input Data

Area (ac) 0.05
Peak Rate Factor 484.00
Weighted Curve Number 77.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	77.00
Composite Area & Weighted CN	0.05		77.00

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) 0.02
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8DI

Input Data

Area (ac) 0.01
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.01	A	98.00
Composite Area & Weighted CN	0.01		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.97
Peak Runoff (cfs) 0.01
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9AP

Input Data

Area (ac) 0.04
Peak Rate Factor 484.00
Weighted Curve Number 77.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.04	A	77.00
Composite Area & Weighted CN	0.04		77.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 1.38
Peak Runoff (cfs) 0.01
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9BP

Input Data

Area (ac)	5.78
Peak Rate Factor	484.00
Weighted Curve Number	88.90
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.78	B	88.90
Composite Area & Weighted CN	5.78		88.90

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.45
Total Runoff (in)	2.30
Peak Runoff (cfs)	3.43
Weighted Curve Number	88.90
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9CI

Input Data

Area (ac)	0.89
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.89	B	98.00
Composite Area & Weighted CN	0.89		98.00

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	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9DI

Input Data

Area (ac)	1.01
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.01	A/B	98.00
Composite Area & Weighted CN	1.01		98.00

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)	0.82
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-15AI

Input Data

Area (ac) 0.02
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.02	A	98.00
Composite Area & Weighted CN	0.02		98.00

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	116	319.25	324.04	4.79	319.25	0.00	323.04	-1.00	0.00	39.51
2	124	312.14	321.15	9.01	312.14	0.00	320.15	-1.00	0.00	72.10
3	125	311.62	315.52	3.90	311.62	0.00	314.52	-1.00	0.00	4.85
4	126	312.10	317.12	5.02	312.10	0.00	316.12	-1.00	0.00	24.24
5	129	312.12	315.52	3.40	312.12	0.00	314.52	-1.00	0.00	4.85
6	131	301.77	304.77	3.00	301.77	0.00	303.77	-1.00	0.00	17.94
7	141	138.50	139.66	1.16	138.50	0.00	138.66	-1.00	0.00	1.92
8	144	109.33	112.83	3.50	109.33	0.00	111.83	-1.00	0.00	19.04
9	145	113.37	121.97	8.60	113.37	0.00	120.97	-1.00	0.00	43.20
10	147	96.10	98.79	2.69	96.10	0.00	97.79	-1.00	0.00	14.26
11	149	138.35	141.85	3.50	138.35	0.00	140.85	-1.00	0.00	24.00
12	153	342.07	359.60	17.54	342.07	0.00	358.60	-1.00	0.00	206.42
13	159	302.65	318.40	15.75	302.65	0.00	317.40	-1.00	0.00	183.03
14	161	304.99	320.67	15.68	304.99	0.00	319.67	-1.00	0.00	184.17
15	169	138.28	142.39	4.11	138.28	0.00	141.39	-1.00	0.00	31.08
16	172	134.60	139.51	4.91	134.60	0.00	138.51	-1.00	0.00	40.87
17	175	245.83	248.93	3.10	245.83	0.00	247.93	-1.00	0.00	25.20
18	CB-10	343.39	347.38	3.99	343.39	0.00	346.38	-1.00	0.00	28.68
19	CB-100	288.54	292.68	4.14	288.54	0.00	291.68	-1.00	0.00	31.70
20	CB-10EX	344.23	348.02	3.79	344.23	0.00	347.02	-1.00	0.00	27.50
21	CB-110	281.90	292.27	10.37	281.90	0.00	291.27	-1.00	0.00	35.80
22	CB-110A	281.38	285.84	4.46	281.38	0.00	284.84	-1.00	0.00	5.48
23	CB-110B	281.88	285.84	3.96	281.88	0.00	284.84	-1.00	0.00	5.48
24	CB-115	281.95	292.34	10.39	281.95	0.00	291.34	-1.00	0.00	88.66
25	CB-115A	281.43	285.89	4.46	281.43	0.00	284.89	-1.00	0.00	5.48
26	CB-115B	281.93	285.89	3.96	281.93	0.00	284.89	-1.00	0.00	5.48
27	CB-120	281.86	287.54	5.68	281.86	0.00	286.54	-1.00	0.00	32.21
28	CB-125	281.91	287.65	5.74	281.91	0.00	286.65	-1.00	0.00	32.90
29	CB-130	281.49	286.04	4.55	281.49	0.00	285.04	-1.00	0.00	36.55
30	CB-135	280.50	284.00	3.50	280.50	0.00	283.00	-1.00	0.00	23.99
31	CB-140	277.25	280.76	3.51	277.25	0.00	279.76	-1.00	0.00	24.08
32	CB-141	281.07	283.97	2.90	281.07	0.00	282.97	-1.00	0.00	22.83
33	CB-150	272.74	276.40	3.66	272.74	0.00	275.40	-1.00	0.00	25.96
34	CB-160	263.22	267.43	4.21	263.22	0.00	266.43	-1.00	0.00	26.10
35	CB-161	267.00	270.32	3.32	267.00	0.00	269.32	-1.00	0.00	27.87
36	CB-165	260.00	264.27	4.27	260.00	0.00	263.27	-1.00	0.00	33.26
37	CB-170	258.50	262.86	4.35	258.50	0.00	261.86	-1.00	0.00	34.25
38	CB-180	257.22	260.39	3.17	257.22	0.00	259.39	-1.00	0.00	20.03
39	CB-190	246.41	258.14	11.73	246.41	0.00	257.14	-1.00	0.00	43.78
40	CB-190A	245.91	258.14	12.23	245.91	0.00	257.14	-1.00	0.00	86.80
41	CB-190B	246.41	252.52	6.12	246.41	0.00	251.52	-1.00	0.00	19.41
42	CB-20	337.37	343.03	5.66	337.37	0.00	342.03	-1.00	0.00	18.84
43	CB-200	246.38	252.52	6.14	246.38	0.00	251.52	-1.00	0.00	37.71
44	CB-210	245.40	251.85	6.46	245.40	0.00	250.85	-1.00	0.00	59.51
45	CB-220	245.58	249.25	3.67	245.58	0.00	248.25	-1.00	0.00	26.03
46	CB-250	239.67	243.34	3.67	239.67	0.00	242.34	-1.00	0.00	26.03
47	CB-260	234.51	238.07	3.56	234.51	0.00	237.07	-1.00	0.00	24.74
48	CB-261	234.76	237.48	2.72	234.76	0.00	236.48	-1.00	0.00	20.70
49	CB-265	231.01	234.66	3.65	231.01	0.00	233.66	-1.00	0.00	25.75
50	CB-270	229.14	232.64	3.50	229.14	0.00	231.64	-1.00	0.00	24.01
51	CB-280	211.13	215.30	4.17	211.13	0.00	214.30	-1.00	0.00	32.04
52	CB-290	205.53	209.99	4.46	205.53	0.00	208.99	-1.00	0.00	35.54
53	CB-30	332.08	335.75	3.67	332.08	0.00	334.75	-1.00	0.00	26.04
54	CB-300	197.49	201.15	3.66	197.49	0.00	200.15	-1.00	0.00	25.96
55	CB-310	190.13	193.80	3.67	190.13	0.00	192.80	-1.00	0.00	26.01
56	CB-320	184.86	188.53	3.67	184.86	0.00	187.53	-1.00	0.00	26.02
57	CB-330	175.77	179.43	3.66	175.77	0.00	178.43	-1.00	0.00	25.95
58	CB-340	168.39	172.23	3.84	168.39	0.00	171.23	-1.00	0.00	28.08
59	CB-341	170.66	173.66	3.00	170.66	0.00	172.66	-1.00	0.00	24.00
60	CB-345	163.77	167.27	3.50	163.77	0.00	166.27	-1.00	0.00	24.03
61	CB-350	161.65	165.61	3.96	161.65	0.00	164.61	-1.00	0.00	23.49
62	CB-351	163.86	166.86	3.00	163.86	0.00	165.86	-1.00	0.00	23.99
63	CB-360	148.00	151.67	3.67	148.00	0.00	150.67	-1.00	0.00	26.00
64	CB-370	134.56	139.07	4.51	134.56	0.00	138.07	-1.00	0.00	36.16
65	CB-390	122.42	138.65	16.23	122.42	0.00	137.65	-1.00	0.00	39.87
66	CB-390A	121.89	128.92	7.03	121.89	0.00	127.92	-1.00	0.00	12.40
67	CB-390B	122.39	128.92	6.53	122.39	0.00	127.92	-1.00	0.00	12.40
68	CB-395	122.37	138.83	16.46	122.37	0.00	137.83	-1.00	0.00	161.55
69	CB-395A	121.84	128.87	7.03	121.84	0.00	127.87	-1.00	0.00	12.40
70	CB-395B	122.37	128.87	6.50	122.37	0.00	127.87	-1.00	0.00	12.40
71	CB-40	325.96	329.62	3.66	325.96	0.00	328.62	-1.00	0.00	25.95
72	CB-400	122.35	131.29	8.94	122.35	0.00	130.29	-1.00	0.00	71.82
73	CB-405	122.30	129.56	7.26	122.30	0.00	128.56	-1.00	0.00	50.31
74	CB-410	122.26	128.59	6.33	122.26	0.00	127.59	-1.00	0.00	58.48
75	CB-420	118.40	122.25	3.85	118.40	0.00	121.25	-1.00	0.00	28.22
76	CB-430	114.95	118.45	3.50	114.95	0.00	117.45	-1.00	0.00	24.02
77	CB-450	107.85	110.85	3.00	107.85	0.00	109.85	-1.00	0.00	18.05
78	CB-460	97.75	101.64	3.89	97.75	0.00	100.64	-1.00	0.00	28.68
79	CB-470EX	89.17	97.66	8.49	89.17	0.00	96.66	-1.00	0.00	21.26
80	CB-480EX	82.12	90.03	7.91	82.12	0.00	89.03	-1.00	0.00	76.94
81	CB-490	60.90	67.64	6.75	60.90	0.00	66.64	-1.00	0.00	62.97
82	CB-490EX	75.53	80.48	4.95	75.53	0.00	79.48	-1.00	0.00	40.21
83	CB-495EX	61.80	68.14	6.34	61.80	0.00	67.14	-1.00	0.00	57.18
84	CB-50	312.06	321.03	8.97	312.06	0.00	320.03	-1.00	0.00	28.59
85	CB-50A	311.54	315.44	3.90	311.54	0.00	314.44	-1.00	0.00	4.85
86	CB-50B	312.04	315.44	3.40	312.04	0.00	314.44	-1.00	0.00	4.85
87	CB-60	312.02	317.04	5.02	312.02	0.00	316.04	-1.00	0.00	24.21
88	CB-70	311.75	316.01	4.27	311.75	0.00	315.01	-1.00	0.00	33.21

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)
89	CB-80	306.46	309.96	3.50	306.46	0.00	308.96	-1.00	0.00	24.04
90	CB-90	303.04	306.71	3.67	303.04	0.00	305.71	-1.00	0.00	26.67
91	Out-1143	114.20	120.20	6.00	114.20	0.00	119.20	-1.00	0.00	12.00
92	Out-183	281.00	284.98	3.98	281.00	0.00	283.98	-1.00	0.00	29.81
93	WQ-1	320.24	326.00	5.76	320.24	0.00	325.00	-1.00	0.00	23.58
94	WQ-2	296.00	301.80	5.80	296.00	0.00	300.80	-1.00	0.00	24.02
95	WQ-3	253.03	258.83	5.80	253.03	0.00	257.83	-1.00	0.00	23.94
96	WQ-4	134.68	140.48	5.80	134.68	0.00	139.48	-1.00	0.00	24.05

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	116	0.37	0.00	319.38	0.13	0.00	4.67	319.28	0.03	0 08:05	0 00:00	0.00	0.00
2	124	0.08	0.00	312.23	0.09	0.00	8.91	312.15	0.01	0 08:14	0 00:00	0.00	0.00
3	125	0.08	0.00	312.16	0.54	0.00	3.36	312.04	0.42	0 10:28	0 00:00	0.00	0.00
4	126	0.01	0.00	312.15	0.05	0.00	4.97	312.11	0.01	0 08:27	0 00:00	0.00	0.00
5	129	0.02	0.00	312.16	0.04	0.00	3.46	312.13	0.01	0 10:21	0 00:00	0.00	0.00
6	131	0.56	0.00	301.91	0.14	0.00	2.85	301.80	0.03	0 08:03	0 00:00	0.00	0.00
7	141	0.00	0.00	138.50	0.00	0.00	1.16	138.50	0.00	0 00:00	0 00:00	0.00	0.00
8	144	5.57	0.00	110.15	0.82	0.00	2.68	109.49	0.16	0 08:28	0 00:00	0.00	0.00
9	145	5.58	1.72	113.91	0.54	0.00	8.06	113.50	0.13	0 08:27	0 00:00	0.00	0.00
10	147	11.47	0.00	97.17	1.07	0.00	1.62	96.31	0.21	0 08:06	0 00:00	0.00	0.00
11	149	6.39	0.86	138.87	0.52	0.00	2.98	138.44	0.09	0 08:00	0 00:00	0.00	0.00
12	153	0.00	0.00	342.07	0.00	0.00	17.54	342.07	0.00	0 00:00	0 00:00	0.00	0.00
13	159	0.00	0.00	302.65	0.00	0.00	15.75	302.65	0.00	0 00:00	0 00:00	0.00	0.00
14	161	0.00	0.00	304.99	0.00	0.00	15.68	304.99	0.00	0 00:00	0 00:00	0.00	0.00
15	169	1.50	0.00	138.58	0.30	0.00	3.82	138.33	0.05	0 08:02	0 00:00	0.00	0.00
16	172	1.49	0.00	135.44	0.84	0.00	4.07	134.72	0.12	0 08:09	0 00:00	0.00	0.00
17	175	0.61	0.61	246.22	0.39	0.00	2.71	245.90	0.07	0 08:01	0 00:00	0.00	0.00
18	CB-10	0.09	0.09	343.51	0.12	0.00	3.87	343.41	0.02	0 08:00	0 00:00	0.00	0.00
19	CB-100	1.01	0.47	288.79	0.25	0.00	3.89	288.58	0.04	0 08:02	0 00:00	0.00	0.00
20	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
21	CB-110	1.01	0.00	282.26	0.36	0.00	10.01	281.98	0.08	0 08:08	0 00:00	0.00	0.00
22	CB-110A	0.66	0.00	282.24	0.86	0.00	3.60	281.93	0.55	0 08:13	0 00:00	0.00	0.00
23	CB-110B	0.56	0.00	282.23	0.35	0.00	3.65	281.96	0.08	0 08:15	0 00:00	0.00	0.00
24	CB-115	0.35	0.00	282.18	0.23	0.00	10.16	281.99	0.04	0 08:13	0 00:00	0.00	0.00
25	CB-115A	0.33	0.00	282.17	0.74	0.00	3.72	281.91	0.48	0 08:29	0 00:00	0.00	0.00
26	CB-115B	0.26	0.00	282.16	0.23	0.00	3.77	281.97	0.04	0 08:28	0 00:00	0.00	0.00
27	CB-120	0.70	0.00	282.12	0.26	0.00	5.43	281.92	0.06	0 08:21	0 00:00	0.00	0.00
28	CB-125	0.24	0.00	282.15	0.24	0.00	5.50	281.95	0.04	0 08:25	0 00:00	0.00	0.00
29	CB-130	0.80	0.20	281.72	0.23	0.00	4.32	281.54	0.05	0 08:21	0 00:00	0.00	0.00
30	CB-135	0.90	0.00	280.67	0.17	0.00	3.33	280.53	0.03	0 08:01	0 00:00	0.00	0.00
31	CB-140	1.29	0.39	277.48	0.23	0.00	3.28	277.29	0.04	0 08:00	0 00:00	0.00	0.00
32	CB-141	0.90	0.90	281.40	0.33	0.00	2.58	281.13	0.06	0 08:00	0 00:00	0.00	0.00
33	CB-150	1.29	0.00	272.95	0.21	0.00	3.46	272.78	0.04	0 08:02	0 00:00	0.00	0.00
34	CB-160	7.45	1.20	263.82	0.60	0.00	3.62	263.32	0.10	0 08:00	0 00:00	0.00	0.00
35	CB-161	4.98	4.98	267.61	0.61	0.00	2.72	267.09	0.09	0 08:00	0 00:00	0.00	0.00
36	CB-165	7.54	0.09	260.74	0.74	0.00	3.53	260.11	0.11	0 08:01	0 00:00	0.00	0.00
37	CB-170	7.54	0.00	259.31	0.81	0.00	3.55	258.63	0.13	0 08:02	0 00:00	0.00	0.00
38	CB-180	7.59	0.03	257.97	0.75	0.00	2.42	257.34	0.12	0 08:05	0 00:00	0.00	0.00
39	CB-190	7.59	0.00	247.74	1.33	0.00	10.40	246.70	0.29	0 08:08	0 00:00	0.00	0.00
40	CB-190A	7.56	0.00	247.61	1.70	0.00	10.53	246.65	0.74	0 08:14	0 00:00	0.00	0.00
41	CB-190B	7.57	0.00	247.52	1.11	0.00	5.00	246.66	0.25	0 08:11	0 00:00	0.00	0.00
42	CB-20	0.20	0.20	337.45	0.08	0.00	5.58	337.39	0.02	0 08:00	0 00:00	0.00	0.00
43	CB-200	7.46	0.00	247.19	0.81	0.00	5.33	246.50	0.12	0 08:08	0 00:00	0.00	0.00
44	CB-210	7.75	0.08	246.03	0.63	0.00	5.83	245.51	0.11	0 08:09	0 00:00	0.00	0.00
45	CB-220	0.07	0.07	245.63	0.05	0.00	3.62	245.59	0.01	0 08:01	0 00:00	0.00	0.00
46	CB-250	0.07	0.00	239.72	0.05	0.00	3.62	239.68	0.01	0 08:04	0 00:00	0.00	0.00
47	CB-260	1.30	1.23	234.71	0.20	0.00	3.36	234.55	0.04	0 08:01	0 00:00	0.00	0.00
48	CB-261	0.00	0.00	234.76	0.00	0.00	2.72	234.76	0.00	0 00:00	0 00:00	0.00	0.00
49	CB-265	1.89	0.61	231.31	0.30	0.00	3.35	231.07	0.06	0 08:01	0 00:00	0.00	0.00
50	CB-270	1.90	0.00	229.38	0.24	0.00	3.26	229.19	0.05	0 08:03	0 00:00	0.00	0.00
51	CB-280	2.12	0.23	211.40	0.27	0.00	3.90	211.18	0.05	0 08:03	0 00:00	0.00	0.00
52	CB-290	2.12	0.00	205.79	0.26	0.00	4.20	205.58	0.05	0 08:04	0 00:00	0.00	0.00
53	CB-30	0.20	0.00	332.16	0.08	0.00	3.59	332.10	0.02	0 08:01	0 00:00	0.00	0.00
54	CB-300	2.12	0.00	197.75	0.26	0.00	3.40	197.54	0.05	0 08:05	0 00:00	0.00	0.00
55	CB-310	2.12	0.00	190.41	0.28	0.00	3.39	190.18	0.05	0 08:07	0 00:00	0.00	0.00
56	CB-320	2.50	0.40	185.15	0.29	0.00	3.37	184.92	0.06	0 08:05	0 00:00	0.00	0.00
57	CB-330	2.50	0.00	176.06	0.29	0.00	3.38	175.83	0.06	0 08:06	0 00:00	0.00	0.00
58	CB-340	2.67	0.19	168.70	0.31	0.00	3.53	168.45	0.06	0 08:06	0 00:00	0.00	0.00
59	CB-341	0.00	0.00	170.66	0.00	0.00	3.00	170.66	0.00	0 00:00	0 00:00	0.00	0.00
60	CB-345	2.67	0.00	164.10	0.33	0.00	3.17	163.83	0.06	0 08:08	0 00:00	0.00	0.00
61	CB-350	5.56	2.99	162.08	0.43	0.00	3.52	161.73	0.08	0 08:05	0 00:00	0.00	0.00
62	CB-351	0.00	0.00	163.86	0.00	0.00	3.00	163.86	0.00	0 00:00	0 00:00	0.00	0.00
63	CB-360	5.56	0.00	148.44	0.44	0.00	3.23	148.09	0.09	0 08:05	0 00:00	0.00	0.00
64	CB-370	6.35	0.00	135.40	0.84	0.00	3.67	134.69	0.13	0 08:07	0 00:00	0.00	0.00
65	CB-390	6.34	0.00	123.31	0.89	0.00	15.34	122.61	0.19	0 08:11	0 00:00	0.00	0.00
66	CB-390A	3.56	0.00	123.27	1.38	0.00	5.65	122.56	0.67	0 08:24	0 00:00	0.00	0.00
67	CB-390B	3.35	0.00	123.24	0.85	0.00	5.68	122.58	0.19	0 08:26	0 00:00	0.00	0.00
68	CB-395	2.69	0.00	123.27	0.90	0.00	15.56	122.57	0.20	0 08:26	0 00:00	0.00	0.00
69	CB-395A	2.50	0.00	123.27	1.43	0.00	5.61	122.53	0.69	0 08:24	0 00:00	0.00	0.00
70	CB-395B	1.87	0.00	123.26	0.89	0.00	5.62	122.56	0.19	0 08:26	0 00:00	0.00	0.00
71	CB-40	0.37	0.17	326.08	0.12	0.00	3.54	325.98	0.02	0 08:01	0 00:00	0.00	0.00
72	CB-400	1.73	0.00	123.24	0.89	0.00	8.05	122.54	0.19	0 08:27	0 00:00	0.00	0.00
73	CB-405	4.51	0.00	123.20	0.90	0.00	6.37	122.51	0.21	0 08:25	0 00:00	0.00	0.00
74	CB-410	4.49	0.00	122.76	0.50	0.00	5.83	122.37	0.11	0 08:27	0 00:00	0.00	0.00
75	CB-420	4.80	0.67	118.84	0.44	0.00	3.41	118.50	0.10	0 08:27	0 00:00	0.00	0.00
76	CB-430	4.81	0.00	115.76	0.81	0.00	2.69	115.14	0.19	0 08:29	0 00:00	0.00	0.00
77	CB-450	5.79	0.48	108.28	0.43	0.00	2.58	107.96	0.11	0 08:29	0 00:00	0.00	0.00
78	CB-460	11.53	6.79	98.79	1.04	0.00	2.86	97.95	0.20	0 08:05	0 00:00	0.00	0.00
79	CB-470EX	19.17	7.99	90.45	1.28	0.00	7.21	89.40	0.23	0 08:05	0 00:00	0.00	0.00
80	CB-480EX	19.17	0.00	82.78	0.66	0.00	7.26	82.26	0.14	0 08:05	0 00:00	0.00	0.00
81	CB-490	19.36	0.00	62.13	1.23	0.00	5.51	61.11	0.21	0 08:06	0 00:00	0.00	0.00
82	CB-490EX	19.36	0.21	76.41	0.88	0.00	4.08	75.71	0.18	0 08:06	0 00:00	0.00	0.00
83	CB-495EX	19.35	0.00	64.45	2.65	0.00	3.68	62.10	0.30	0 08:06	0 00:00	0.00	0.00
84	CB-50	0.37	0.00	312.28	0.22	0.00	8.76	312.11	0.05	0 08:10	0 00:00	0.00	0.00
85	CB-50A	0.28	0.00	312.25	0.71	0.00	3.19	312.05	0.51	0 08:17	0 00:00	0.00	0.00
86	CB-50B	0.24	0.00	312.25	0.21	0.00	3.29	312.09	0.05	0 08:19	0 00:00	0.00	0.00
87	CB-60	0.23	0.00	312.15	0.13	0.00	4.89	312.05	0.03	0 08:23	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)
88	CB-70	0.92	0.80	311.93	0.18	0.00	4.08	311.79	0.04	0 08:05	0 00:00	0.00	0.00
89	CB-80	0.56	0.56	306.59	0.13	0.00	3.37	306.49	0.03	0 08:00	0 00:00	0.00	0.00
90	CB-90	0.56	0.00	303.21	0.17	0.00	3.50	303.07	0.03	0 08:01	0 00:00	0.00	0.00
91	Out-1143	4.84	0.07	114.71	0.51	0.00	5.49	114.32	0.12	0 08:31	0 00:00	0.00	0.00
92	Out-183	0.00	0.00	281.00	0.00	0.00	3.98	281.00	0.00	0 00:00	0 00:00	0.00	0.00
93	WQ-1	0.37	0.00	320.38	0.14	0.00	5.62	320.27	0.03	0 08:02	0 00:00	0.00	0.00
94	WQ-2	0.55	0.00	296.14	0.14	0.00	5.66	296.03	0.03	0 08:04	0 00:00	0.00	0.00
95	WQ-3	7.59	0.00	254.56	1.53	0.00	4.27	253.28	0.25	0 08:05	0 00:00	0.00	0.00
96	WQ-4	1.50	0.00	135.47	0.79	0.00	5.01	134.79	0.11	0 08:08	0 00:00	0.00	0.00

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
1	11 (1)	7.22	134.56	0.00	133.83	11.41	0.73	10.1100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
2	117 (1)	60.74	239.67	0.00	234.51	0.00	5.16	8.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
3	118 (1)	211.91	229.14	0.00	211.13	0.00	18.01	8.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
4	118 (2) (1)	19.36	231.01	0.00	229.14	0.00	1.87	9.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
5	120 (1)	77.38	197.49	0.00	190.13	0.00	7.36	9.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
6	123 (1)	52.16	168.39	0.00	163.77	0.00	4.62	8.8600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
7	123 (1) (1)	24.04	163.77	0.00	161.65	0.00	2.12	8.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
8	3	75.22	89.17	0.00	82.12	0.00	7.05	9.3700	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
9	4	11.09	344.23	0.00	343.49	0.10	0.74	6.6800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
10	5	43.29	343.39	0.00	343.17	0.00	0.22	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
11	6	35.28	306.46	0.00	302.92	-0.12	3.54	10.0500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
12	7	8.05	253.03	0.00	252.99	6.59	0.04	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
13	9	20.38	170.66	0.00	168.80	0.41	1.86	9.1100	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
14	11	117.04	148.00	0.00	138.35	0.00	9.65	8.2400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
15	25	51.69	118.40	0.00	114.95	0.00	3.45	6.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
16	32	35.05	311.54	0.00	311.54	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No
17	33	55.00	281.38	0.00	281.38	-0.50	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No
18	36	110.00	121.89	0.00	121.89	-0.50	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No
19	37	110.00	121.84	0.00	121.84	-0.53	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No
20	40	10.65	312.02	0.00	311.75	0.00	0.27	2.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
21	41	4.62	312.04	0.00	312.02	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
22	42	4.63	312.06	0.00	312.04	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
23	43	50.05	325.96	0.00	322.54	2.30	3.42	6.8300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
24	44	43.12	60.90	0.00	56.00	0.00	4.90	11.3500	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
25	45	4.61	281.88	0.00	281.86	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
26	46	4.65	281.90	0.00	281.88	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
27	48	21.38	302.04	-1.00	301.77	0.00	0.27	1.2600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
28	49	4.62	246.41	0.00	246.38	0.00	0.03	0.5400	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
29	50	10.47	288.54	0.00	287.79	5.89	0.75	7.2000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
30	51	42.42	311.75	0.00	308.34	0.00	3.41	8.0300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
31	52	4.67	246.43	0.03	246.41	0.50	0.03	0.5300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
32	53	8.92	122.31	-0.04	122.26	-0.04	0.05	0.5600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
33	55	38.35	281.49	0.00	280.30	0.00	1.19	3.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
34	57	20.27	281.86	0.00	281.49	0.00	0.37	1.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
35	58	55.00	245.91	0.00	245.91	-0.50	0.00	0.0000	CIRCULAR	60.000	60.000	0.0120	0.5000	0.5000	0.0000	0.00	No
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
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
38	61	4.65	122.39	0.00	122.37	0.07	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
39	62	4.65	122.34	-0.03	122.31	-0.04	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
40	64	62.06	277.25	0.00	272.74	0.00	4.51	7.2700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
41	66	120.88	272.74	0.00	263.22	0.00	9.52	7.8700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
42	68	13.54	163.86	0.00	162.65	1.00	1.21	8.9200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
43	69	23.89	258.50	0.00	257.22	0.00	1.28	5.3700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
44	72	40.83	263.22	0.00	260.00	0.00	3.22	7.8900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
45	72 (1)	18.97	260.00	0.00	258.50	0.00	1.50	7.8900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
46	74	7.08	246.13	-0.25	245.40	0.00	0.73	10.3700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
47	75	39.50	245.40	0.00	241.65	0.00	3.75	9.4800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
48	76	18.88	281.07	0.00	280.50	0.00	0.57	3.0200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
49	80	154.42	161.65	0.00	148.00	0.00	13.65	8.8400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
50	82	34.97	280.50	0.00	277.25	0.00	3.25	9.2900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
51	83	6.06	281.00	0.00	280.50	0.00	0.50	8.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No
52	84	7.32	281.90	0.00	281.95	0.00	-0.05	-0.6800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
53	85	7.26	281.91	0.00	281.86	0.00	0.05	0.6900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
54	86	4.70	281.95	0.00	281.93	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
55	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
56	88	55.00	281.43	0.00	281.43	-0.50	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No
57	89	4.62	281.93	0.00	281.91	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
58	90	78.87	82.12	0.00	75.63	0.10	6.49	8.2300	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
59	91	6.88	122.26	-0.04	122.22	-0.04	0.04	0.5800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
60	92	87.13	122.22	-0.04	118.40	0.00	3.82	4.3800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
61	93	101.21	75.53	0.00	61.87	0.07	13.66	13.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
62	94	6.93	61.80	0.00	60.90	0.00	0.90	13.0400	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
63	98	15.95	234.76	0.00	234.60	0.09	0.16	1.0000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
64	104	7.24	312.06	0.00	312.14	0.00	-0.08	-1.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
65	105	4.60	312.14	0.00	312.12	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
66	106	35.00	311.62	0.00	311.62	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No
67	107	4.66	312.12	0.00	312.10	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
68	108	7.50	312.10	0.00	312.02	0.00	0.08	1.0700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
69	109	19.31	320.24	0.00	319.25	0.00	0.99	5.1300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
70	111	57.22	337.37	0.00	332.08	0.00	5.29	9.2500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
71	112	65.78	332.08	0.00	325.96	0.00	6.12	9.3000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
72	117	77.49	245.58	0.00	239.67	0.00	5.91	7.6300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
73	118	36.15	234.51	0.00	231.01	0.00	3.50	9.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
74	119	58.35	211.13	0.00	205.53	0.00	5.60	9.6000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
75	120	81.20	205.53	0.00	197.49	0.00	8.04	9.9000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
76	121	66.71	190.13	0.00	184.86	0.00	5.27	7.9000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
77	122	106.88	184.86	0.00	175.77	0.00	9.09	8.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
78	123	78.49	175.77	0.00	168.39	0.00	7.38	9.4000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
79	127	123.28	107.85	0.00	97.75	0.00	10.10	8.1900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
80	128	28.16	97.75	0.00	96.10	0.00	1.65	5.8500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
81	130	32.22	319.25	0.00	317.15	5.09	2.10	6.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
82	132	39.08	301.77	0.00	298.30	2.30	3.47	8.8800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
83	133	102.92	296.00	0.00	288.54	0.00	7.46	7.2500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
84	142	7.05	134.60	0.00	134.56	0.00	0.04	0.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
85	143	74.00	114.95	0.00	114.20	0.00	0.75	1.0100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
86	146	37.12	113.37	0.00	109.74	0.41	3.63	9.7700	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
87	148	33.88	96.10	0.00	94.39	5.22	1.71	5.0600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
88	150	6.91	138.35	0.00	138.30	0.02	0.05	0.7200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No

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
89	151	16.06	134.68	0.00	134.60	0.00	0.08	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
90	152	10.13	342.07	0.00	341.13	3.76	0.94	9.2300	CIRCULAR	3.960	3.960	0.0120	0.5000	0.5000	0.0000	0.00	No
91	155	9.39	109.33	0.00	107.85	0.00	1.48	15.7500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
92	157	4.61	304.99	0.00	304.15	1.11	0.84	18.1200	CIRCULAR	3.960	3.960	0.0120	0.5000	0.5000	0.0000	0.00	No
93	158	6.88	302.65	0.00	302.06	0.29	0.58	8.4800	CIRCULAR	6.000	6.000	0.0120	0.5000	0.5000	0.0000	0.00	No
94	170	24.09	138.28	0.00	136.98	2.30	1.30	5.4000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
95	171	40.75	138.35	0.00	134.56	0.00	3.79	9.3000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
96	173	14.56	138.50	0.00	134.70	0.10	3.80	26.0900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
97	174	28.46	257.22	0.00	255.33	2.30	1.89	6.6400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
98	176	13.92	245.83	0.00	245.76	0.36	0.07	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
99	Link-01	79.01	82.12	0.00	75.53	0.00	6.59	8.3400	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No
100	Link-02	16.64	267.00	0.00	264.26	1.04	2.74	16.4600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
101	Link-04	54.47	114.20	0.00	113.37	0.00	0.83	1.5200	CIRCULAR	60.000	60.000	0.0150	0.5000	0.5000	0.0000	0.00	No

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	11 (1)	6.34	0 08:08	36.18	0.18	9.07	0.01	0.63	0.42	0.00		Calculated
2	117 (1)	0.07	0 08:04	33.17	0.00	1.04	0.97	0.13	0.08	0.00		Calculated
3	118 (1)	1.89	0 08:03	33.18	0.06	9.38	0.38	0.26	0.17	0.00		Calculated
4	118 (2) (1)	1.90	0 08:02	35.39	0.05	8.80	0.04	0.27	0.18	0.00		Calculated
5	120 (1)	2.12	0 08:06	35.10	0.06	9.79	0.13	0.27	0.18	0.00		Calculated
6	123 (1)	2.67	0 08:06	33.87	0.08	9.58	0.09	0.32	0.21	0.00		Calculated
7	123 (1) (1)	2.66	0 08:06	33.79	0.08	7.93	0.05	0.38	0.26	0.00		Calculated
8	3	19.17	0 08:05	27.87	0.69	16.12	0.08	0.97	0.65	0.00		Calculated
9	4	0.00	0 00:00	29.41	0.00	0.00		0.01	0.01	0.00		Calculated
10	5	0.09	0 08:00	8.05	0.01	1.51	0.48	0.11	0.08	0.00		Calculated
11	6	0.56	0 08:00	35.43	0.02	6.04	0.10	0.15	0.10	0.00		Calculated
12	7	7.59	0 08:06	8.02	0.95	4.71	0.03	1.28	0.86	0.00		Calculated
13	9	0.00	0 00:00	11.65	0.00	0.00		0.00	0.00	0.00		Calculated
14	11	5.56	0 08:05	32.68	0.17	11.52	0.17	0.48	0.32	0.00		Calculated
15	25	4.81	0 08:28	29.40	0.16	6.89	0.13	0.62	0.42	0.00		Calculated
16	32	0.24	0 08:11	130.18	0.00	0.33	1.77	0.46	0.13	0.00		Calculated
17	33	0.56	0 08:09	148.37	0.00	0.48	1.91	0.60	0.15	0.00		Calculated
18	36	3.35	0 08:11	309.32	0.01	0.98	1.87	1.12	0.19	0.00		Calculated
19	37	1.87	0 08:10	318.47	0.01	0.60	3.06	1.16	0.19	0.00		Calculated
20	40	0.22	0 08:24	18.25	0.01	2.63	0.07	0.14	0.10	0.00		Calculated
21	41	0.23	0 08:19	47.57	0.00	1.49	0.05	0.17	0.06	0.00		Calculated
22	42	0.28	0 08:04	47.49	0.01	1.58	0.05	0.21	0.07	0.00		Calculated
23	43	0.37	0 08:02	29.75	0.01	5.60	0.15	0.12	0.08	0.00		Calculated
24	44	19.35	0 08:07	30.68	0.63	14.77	0.05	1.05	0.70	0.00		Calculated
25	45	0.52	0 08:15	47.57	0.01	1.44	0.05	0.30	0.10	0.00		Calculated
26	46	0.66	0 08:00	47.39	0.01	1.70	0.05	0.36	0.12	0.00		Calculated
27	48	0.56	0 08:01	27.74	0.02	5.77	0.06	0.15	0.10	0.00		Calculated
28	49	7.46	0 08:11	53.14	0.14	4.24	0.02	0.95	0.32	0.00		Calculated
29	50	1.01	0 08:04	30.53	0.03	6.43	0.03	0.22	0.15	0.00		Calculated
30	51	0.92	0 08:05	32.25	0.03	7.58	0.09	0.18	0.12	0.00		Calculated
31	52	7.56	0 08:09	52.84	0.14	2.97	0.03	1.24	0.42	0.00		Calculated
32	53	1.75	0 08:30	8.52	0.21	1.61	0.09	0.89	0.60	0.00		Calculated
33	55	0.80	0 08:21	20.05	0.04	5.11	0.13	0.21	0.14	0.00		Calculated
34	57	0.70	0 08:23	15.35	0.05	3.79	0.09	0.24	0.16	0.00		Calculated
35	58	7.57	0 08:08	269.02	0.03	1.77	0.52	1.41	0.28	0.00		Calculated
36	59	3.56	0 08:10	58.10	0.06	2.22	0.03	0.88	0.30	0.00		Calculated
37	60	2.50	0 08:11	58.27	0.04	1.76	0.04	0.91	0.30	0.00		Calculated
38	61	3.04	0 08:14	47.38	0.06	2.08	0.04	0.84	0.28	0.00		Calculated
39	62	1.73	0 08:27	47.39	0.04	1.00	0.08	0.89	0.30	0.00		Calculated
40	64	1.29	0 08:01	30.68	0.04	8.23	0.13	0.22	0.14	0.00		Calculated
41	66	1.28	0 08:02	31.93	0.04	3.68	0.55	0.40	0.27	0.00		Calculated
42	68	0.00	0 00:00	11.53	0.00	0.00		0.00	0.00	0.00		Calculated
43	69	7.55	0 08:03	26.37	0.29	8.16	0.05	0.78	0.52	0.00		Calculated
44	72	7.45	0 08:01	31.96	0.23	9.75	0.07	0.67	0.45	0.00		Calculated
45	72 (1)	7.54	0 08:02	31.96	0.24	8.29	0.04	0.77	0.52	0.00		Calculated
46	74	7.15	0 08:08	42.43	0.17	8.90	0.01	0.70	0.48	0.00		Calculated
47	75	7.73	0 08:09	35.04	0.22	13.09	0.05	0.55	0.37	0.00		Calculated
48	76	0.90	0 08:00	6.71	0.13	5.93	0.05	0.25	0.25	0.00		Calculated
49	80	5.56	0 08:05	33.83	0.16	13.04	0.20	0.44	0.29	0.00		Calculated
50	82	0.89	0 08:01	34.69	0.03	6.49	0.09	0.20	0.13	0.00		Calculated
51	83	0.00	0 00:00	30.17	0.00	0.00		0.08	0.06	0.00		Calculated
52	84	0.35	0 08:09	9.40	0.04	1.45	0.08	0.29	0.20	0.00		Calculated
53	85	0.24	0 08:36	9.44	0.03	1.37	0.09	0.25	0.17	0.00		Calculated
54	86	0.33	0 08:12	47.14	0.01	1.62	0.05	0.23	0.08	0.00		Calculated
55	87	2.69	0 08:09	8.34	0.32	2.67	0.06	0.89	0.60	0.00		Calculated
56	88	0.26	0 08:15	148.37	0.00	0.32	2.86	0.49	0.12	0.00		Calculated
57	89	0.24	0 08:35	47.52	0.00	0.95	0.08	0.23	0.08	0.00		Calculated
58	90	8.96	0 08:05	26.11	0.34	10.92	0.12	0.72	0.48	0.00		Calculated
59	91	4.49	0 08:27	8.68	0.52	5.58	0.02	0.70	0.47	0.00		Calculated
60	92	4.49	0 08:27	23.95	0.19	9.57	0.15	0.47	0.31	0.00		Calculated
61	93	19.35	0 08:06	33.45	0.58	12.90	0.13	1.19	0.79	0.00		Calculated
62	94	19.36	0 08:06	32.87	0.59	11.46	0.01	1.37	0.91	0.00		Calculated
63	98	0.00	0 00:00	3.87	0.00	0.00		0.06	0.06	0.00		Calculated
64	104	0.08	0 08:11	11.96	0.01	0.81	0.15	0.15	0.10	0.00		Calculated
65	105	0.08	0 08:16	47.64	0.00	1.64	0.05	0.08	0.03	0.00		Calculated
66	106	0.02	0 09:16	130.27	0.00	0.05	11.67	0.29	0.08	0.00		Calculated
67	107	0.01	0 10:24	47.35	0.00	0.67	0.12	0.04	0.01	0.00		Calculated
68	108	0.01	0 08:16	11.75	0.00	0.51	0.25	0.09	0.06	0.00		Calculated
69	109	0.37	0 08:03	25.77	0.01	4.78	0.07	0.13	0.09	0.00		Calculated
70	111	0.20	0 08:00	34.60	0.01	5.24	0.18	0.08	0.06	0.00		Calculated
71	112	0.20	0 08:01	34.71	0.01	3.85	0.28	0.10	0.07	0.00		Calculated
72	117	0.07	0 08:01	31.43	0.00	3.64	0.35	0.05	0.03	0.00		Calculated
73	118	1.30	0 08:01	35.39	0.04	6.82	0.09	0.25	0.17	0.00		Calculated
74	119	2.12	0 08:03	35.25	0.06	10.00	0.10	0.27	0.18	0.00		Calculated
75	120	2.12	0 08:05	35.81	0.06	10.23	0.13	0.26	0.17	0.00		Calculated
76	121	2.12	0 08:06	31.98	0.07	9.08	0.12	0.29	0.19	0.00		Calculated
77	122	2.50	0 08:05	33.19	0.08	10.44	0.17	0.29	0.19	0.00		Calculated
78	123	2.50	0 08:06	34.89	0.07	10.04	0.13	0.30	0.20	0.00		Calculated
79	127	5.79	0 08:29	32.57	0.18	8.31	0.25	0.71	0.48	0.00		Calculated
80	128	11.47	0 08:05	27.51	0.42	8.70	0.05	1.05	0.70	0.00		Calculated
81	130	0.37	0 08:05	29.04	0.01	5.41	0.10	0.12	0.08	0.00		Calculated
82	132	0.55	0 08:03	33.91	0.02	6.78	0.10	0.14	0.09	0.00		Calculated
83	133	0.55	0 08:04	30.64	0.02	4.21	0.41	0.19	0.13	0.00		Calculated
84	142	1.59	0 08:13	8.57	0.19	1.68	0.07	0.83	0.56	0.00		Calculated
85	143	4.80	0 08:30	11.46	0.42	6.37	0.19	0.66	0.44	0.00		Calculated
86	146	5.57	0 08:28	28.45	0.20	10.96	0.06	0.49	0.33	0.00		Calculated
87	148	11.45	0 08:07	25.60	0.45	10.63	0.05	0.88	0.59	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
88	150	1.50	0 08:02	9.68	0.15	3.30	0.03	0.46	0.31	0.00		Calculated
89	151	1.49	0 08:05	8.03	0.19	1.54	0.17	0.81	0.54	0.00		Calculated
90	152	0.00	0 00:00	0.63	0.00	0.00		0.00	0.00	0.00		Calculated
91	155	5.58	0 08:29	15.32	0.36	10.88	0.01	0.62	0.62	0.00		Calculated
92	157	0.00	0 00:00	0.88	0.00	0.00		0.00	0.00	0.00		Calculated
93	158	0.00	0 00:00	1.77	0.00	0.00		0.00	0.00	0.00		Calculated
94	170	1.50	0 08:04	26.44	0.06	7.02	0.06	0.27	0.18	0.00		Calculated
95	171	4.89	0 08:05	11.77	0.42	9.06	0.07	0.67	0.68	0.00		Calculated
96	173	0.00	0 00:00	19.72	0.00	0.00		0.37	0.37	0.00		Calculated
97	174	7.59	0 08:05	29.33	0.26	10.69	0.04	0.64	0.42	0.00		Calculated
98	176	0.61	0 08:02	2.73	0.22	2.43	0.10	0.36	0.36	0.00		Calculated
99	Link-01	10.21	0 08:05	30.34	0.34	11.38	0.12	0.77	0.51	0.00		Calculated
100	Link-02	4.97	0 08:00	14.46	0.34	12.68	0.02	0.51	0.51	0.00		Calculated
101	Link-04	4.83	0 08:31	278.63	0.02	4.39	0.21	0.53	0.11	0.00		Calculated

100-Year Storm Event

Project Description

File Name	SSA_Model.SPF
Description	C:\pw_oci_workingdir\osbornconsulting-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	Jan 11, 2023	00:00:00
End Analysis On	Jan 13, 2023	00:00:00
Start Reporting On	Jan 11, 2023	00:00:00
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	85
Nodes	101
Junctions	96
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	101
Channels	0
Pipes	101
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	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}.OA1-1AI	0.12	484.00	85.00	3.95	2.41	0.28	0.07	0 00:05:00
2	{Catch Basin Boundaries}.OA1-2AP	0.29	484.00	90.20	3.95	2.89	0.83	0.22	0 00:05:00
3	{Catch Basin Boundaries}.OA1-3AP	0.12	484.00	86.95	3.95	2.58	0.32	0.08	0 00:05:00
4	{Catch Basin Boundaries}.OA1-4AP	1.08	484.00	88.90	3.95	2.77	2.98	0.77	0 00:05:00
5	{Catch Basin Boundaries}.OA1-4BI	0.09	484.00	98.00	3.95	3.71	0.34	0.08	0 00:05:00
6	{Catch Basin Boundaries}.OA1-4CI	0.11	484.00	98.00	3.95	3.71	0.39	0.10	0 00:05:00
7	{Catch Basin Boundaries}.OA2-10AI	0.22	484.00	98.00	3.95	3.72	0.81	0.20	0 00:05:00
8	{Catch Basin Boundaries}.OA2-10BP	1.70	484.00	87.60	3.95	2.65	4.50	1.16	0 00:05:00
9	{Catch Basin Boundaries}.OA2-10CI	0.05	484.00	98.00	3.95	3.71	0.18	0.05	0 00:05:00
10	{Catch Basin Boundaries}.OA2-11AI	0.11	484.00	98.00	3.95	3.71	0.40	0.10	0 00:05:00
11	{Catch Basin Boundaries}.OA2-12AP	0.11	484.00	77.00	3.95	1.77	0.20	0.05	0 00:05:00
12	{Catch Basin Boundaries}.OA2-13AP	1.46	484.00	82.25	3.95	2.18	3.18	0.78	0 00:05:00
13	{Catch Basin Boundaries}.OA2-14AI	0.05	484.00	98.00	3.95	3.71	0.18	0.05	0 00:05:00
14	{Catch Basin Boundaries}.OA2-14BI	0.05	484.00	98.00	3.95	3.71	0.17	0.04	0 00:05:00
15	{Catch Basin Boundaries}.OA2-30AI	0.16	484.00	98.00	3.95	3.72	0.61	0.16	0 00:05:00
16	{Catch Basin Boundaries}.OA2-30BP	0.70	484.00	88.25	3.95	2.71	1.90	0.49	0 00:05:00
17	{Catch Basin Boundaries}.OA2-5AP	0.60	484.00	86.95	3.95	2.59	1.54	0.40	0 00:05:00
18	{Catch Basin Boundaries}.OA2-5BI	0.09	484.00	98.00	3.95	3.71	0.32	0.08	0 00:05:00
19	{Catch Basin Boundaries}.OA2-5CI	0.09	484.00	98.00	3.95	3.71	0.32	0.08	0 00:05:00
20	{Catch Basin Boundaries}.OA2-6AP	0.15	484.00	95.40	3.95	3.42	0.53	0.14	0 00:05:00
21	{Catch Basin Boundaries}.OA2-6BP	0.09	484.00	85.00	3.95	2.41	0.20	0.05	0 00:05:00
22	{Catch Basin Boundaries}.OA2-7AI	0.36	484.00	98.00	3.95	3.72	1.35	0.34	0 00:05:00
23	{Catch Basin Boundaries}.OA2-7BP	0.58	484.00	83.30	3.95	2.27	1.32	0.33	0 00:05:00
24	{Catch Basin Boundaries}.OA2-7CP	0.54	484.00	89.89	3.95	2.86	1.56	0.41	0 00:05:00
25	{Catch Basin Boundaries}.OA2-8AP	0.08	484.00	85.00	3.95	2.41	0.19	0.05	0 00:05:00
26	{Catch Basin Boundaries}.OA2-8BI	0.37	484.00	98.00	3.95	3.72	1.38	0.35	0 00:05:00
27	{Catch Basin Boundaries}.OA2-8CP	0.05	484.00	77.00	3.95	1.77	0.08	0.02	0 00:05:00
28	{Catch Basin Boundaries}.OA2-8DI	0.01	484.00	98.00	3.95	3.61	0.05	0.01	0 00:05:00
29	{Catch Basin Boundaries}.OA2-9AP	0.04	484.00	77.00	3.95	1.76	0.07	0.02	0 00:05:00
30	{Catch Basin Boundaries}.OA2-9BP	5.78	484.00	88.90	3.95	2.77	15.99	4.15	0 00:05:00
31	{Catch Basin Boundaries}.OA2-9CI	0.89	484.00	98.00	3.95	3.72	3.30	0.84	0 00:05:00
32	{Catch Basin Boundaries}.OA2-9DI	1.01	484.00	98.00	3.95	3.72	3.74	0.95	0 00:05:00
33	{Catch Basin Boundaries}.OA3-15AI	0.02	484.00	98.00	3.95	3.71	0.09	0.02	0 00:05:00
34	{Catch Basin Boundaries}.OA3-15BP	0.12	484.00	81.20	3.95	2.09	0.26	0.06	0 00:05:00
35	{Catch Basin Boundaries}.OA3-16AP	0.29	484.00	80.15	3.95	2.01	0.58	0.14	0 00:05:00
36	{Catch Basin Boundaries}.OA3-16BP	2.25	484.00	83.30	3.95	2.27	5.11	1.27	0 00:05:00
37	{Catch Basin Boundaries}.OA3-16CI	0.03	484.00	98.00	3.95	3.71	0.12	0.03	0 00:05:00
38	{Catch Basin Boundaries}.OA3-16CP	0.08	484.00	85.40	3.95	2.44	0.21	0.05	0 00:05:00
39	{Catch Basin Boundaries}.OA3-16DP	0.06	484.00	77.00	3.95	1.77	0.10	0.02	0 00:05:00
40	{Catch Basin Boundaries}.OA3-17AI	0.74	484.00	98.00	3.95	3.72	2.76	0.70	0 00:05:00
41	{Catch Basin Boundaries}.OA3-17BP	0.01	484.00	77.00	3.95	0.36	0.00	0.00	0 00:05:00
42	{Catch Basin Boundaries}.OA3-18AP	0.27	484.00	83.30	3.95	2.27	0.61	0.15	0 00:05:00
43	{Catch Basin Boundaries}.OA3-19AP	0.57	484.00	80.15	3.95	2.01	1.14	0.27	0 00:05:00
44	{Catch Basin Boundaries}.OA3-21AP	0.78	484.00	85.40	3.95	2.45	1.92	0.49	0 00:05:00
45	{Catch Basin Boundaries}.OA3-21BP	4.07	484.00	84.35	3.95	2.36	9.58	2.40	0 00:05:00
46	{Catch Basin Boundaries}.OA3-21CI	0.79	484.00	98.00	3.95	3.72	2.93	0.74	0 00:05:00
47	{Catch Basin Boundaries}.OA3-21DI	0.23	484.00	98.00	3.95	3.72	0.85	0.22	0 00:05:00
48	{Catch Basin Boundaries}.OA3-21EP	0.02	484.00	77.00	3.95	1.73	0.03	0.01	0 00:05:00
49	{Catch Basin Boundaries}.OA3-21FP	0.10	484.00	77.00	3.95	1.77	0.18	0.04	0 00:05:00
50	{Catch Basin Boundaries}.OA3-22AP	1.53	484.00	84.35	3.95	2.36	3.60	0.90	0 00:05:00
51	{Catch Basin Boundaries}.OA3-23AP	1.33	484.00	83.30	3.95	2.27	3.03	0.75	0 00:05:00
52	{Catch Basin Boundaries}.OA3-24AP	0.23	484.00	77.00	3.95	1.77	0.41	0.09	0 00:05:00
53	{Catch Basin Boundaries}.OA3-25AI	1.00	484.00	98.00	3.95	3.72	3.70	0.94	0 00:05:00
54	{Catch Basin Boundaries}.OA3-25BP	1.82	484.00	85.40	3.95	2.45	4.45	1.13	0 00:05:00
55	{Catch Basin Boundaries}.OA3-26AI	0.13	484.00	98.00	3.95	3.71	0.49	0.12	0 00:05:00
56	{Catch Basin Boundaries}.OA3-26BP	0.84	484.00	83.30	3.95	2.27	1.91	0.48	0 00:05:00
57	{Catch Basin Boundaries}.OA3-27AI	0.03	484.00	98.00	3.95	3.71	0.13	0.03	0 00:05:00
58	{Catch Basin Boundaries}.OA3-27BP	1.00	484.00	81.20	3.95	2.10	2.10	0.51	0 00:05:00
59	{Catch Basin Boundaries}.OA3-27CP	0.05	484.00	77.00	3.95	1.77	0.09	0.02	0 00:05:00
60	{Catch Basin Boundaries}.OA3-27DP	2.20	484.00	90.20	3.95	2.89	6.35	1.66	0 00:05:00
61	{Catch Basin Boundaries}.OA3-27EP	2.08	484.00	83.30	3.95	2.27	4.72	1.17	0 00:05:00
62	{Catch Basin Boundaries}.OA3-27FP	1.57	484.00	83.30	3.95	2.27	3.56	0.88	0 00:05:00
63	{Catch Basin Boundaries}.OA3-27GP	5.21	484.00	79.10	3.95	1.93	10.06	2.36	0 00:05:00
64	{Catch Basin Boundaries}.OA3-28AI	3.28	484.00	98.00	3.95	3.72	12.19	3.09	0 00:05:00
65	{Catch Basin Boundaries}.OA3-28BP	8.32	484.00	83.30	3.95	2.27	18.88	4.69	0 00:05:00
66	{Catch Basin Boundaries}.OA3-28CP	3.63	484.00	83.30	3.95	2.27	8.23	2.04	0 00:05:00
67	{Catch Basin Boundaries}.OA3-29AP	0.29	484.00	86.95	3.95	2.59	0.74	0.19	0 00:05:00
68	{Catch Basin Boundaries}.PA1-1BI	0.05	484.00	98.00	3.95	3.71	0.17	0.04	0 00:05:00
69	{Catch Basin Boundaries}.PA1-2BI	0.03	484.00	98.00	3.95	3.71	0.10	0.02	0 00:05:00
70	{Catch Basin Boundaries}.PA1-3BI	0.13	484.00	98.00	3.95	3.71	0.48	0.12	0 00:05:00
71	{Catch Basin Boundaries}.PA2-10CP	0.11	484.00	77.00	3.95	1.77	0.19	0.04	0 00:05:00
72	{Catch Basin Boundaries}.PA2-30CI	0.02	484.00	98.00	3.95	3.70	0.06	0.02	0 00:05:00
73	{Catch Basin Boundaries}.PA2-5DI	0.03	484.00	98.00	3.95	3.71	0.10	0.02	0 00:05:00
74	{Catch Basin Boundaries}.PA2-5EP	0.01	484.00	85.00	3.95	0.78	0.01	0.00	0 00:05:00
75	{Catch Basin Boundaries}.PA2-6CI	0.03	484.00	98.00	3.95	3.71	0.09	0.02	0 00:05:00
76	{Catch Basin Boundaries}.PA2-7DP	0.01	484.00	77.00	3.95	1.36	0.01	0.01	0 00:05:00
77	{Catch Basin Boundaries}.PA2-7EP	0.04	484.00	85.00	3.95	2.40	0.10	0.03	0 00:05:00
78	{Catch Basin Boundaries}.PA2-8EP	0.01	484.00	77.00	3.95	1.36	0.02	0.01	0 00:05:00
79	{Catch Basin Boundaries}.PA3-16FI	0.05	484.00	98.00	3.95	3.71	0.17	0.04	0 00:05:00
80	{Catch Basin Boundaries}.PA3-18BI	0.13	484.00	98.00	3.95	3.71	0.50	0.13	0 00:05:00
81	{Catch Basin Boundaries}.PA3-19BI	0.24	484.00	98.00	3.95	3.72	0.87	0.22	0 00:05:00
82	{Catch Basin Boundaries}.PA3-22BI	0.17	484.00	98.00	3.95	3.72	0.63	0.16	0 00:05:00
83	{Catch Basin Boundaries}.PA3-23BI	0.10	484.00	98.00	3.95	3.71	0.36	0.09	0 00:05:00
84	{Catch Basin Boundaries}.PA3-29BI	0.06	484.00	98.00	3.95	3.71	0.24	0.06	0 00:05:00
85	OA3-27HI	3.17	484.00	85.00	3.95	2.41	7.66	1.93	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	116	Junction	319.25	324.04	319.25	323.04	0.00	0.44	319.39	0.00	4.65	0 00:00	0.00	0.00
2	124	Junction	312.14	321.15	312.14	320.15	0.00	0.10	312.25	0.00	8.90	0 00:00	0.00	0.00
3	125	Junction	311.62	315.52	311.62	314.52	0.00	0.10	312.19	0.00	3.34	0 00:00	0.00	0.00
4	126	Junction	312.10	317.12	312.10	316.12	0.00	0.03	312.16	0.00	4.96	0 00:00	0.00	0.00
5	129	Junction	312.12	315.52	312.12	314.52	0.00	0.05	312.19	0.00	3.43	0 00:00	0.00	0.00
6	131	Junction	301.77	304.77	301.77	303.77	0.00	0.67	301.93	0.00	2.84	0 00:00	0.00	0.00
7	141	Junction	138.50	139.66	138.50	138.66	0.00	0.00	138.50	0.00	1.16	0 00:00	0.00	0.00
8	144	Junction	109.33	112.83	109.33	111.83	0.00	7.10	110.64	0.00	2.19	0 00:00	0.00	0.00
9	145	Junction	113.37	121.97	113.37	120.97	0.00	6.95	113.96	0.00	8.01	0 00:00	0.00	0.00
10	147	Junction	96.10	98.79	96.10	97.79	0.00	14.44	97.42	0.00	1.37	0 00:00	0.00	0.00
11	149	Junction	138.35	141.85	138.35	140.85	0.00	7.86	138.95	0.00	2.90	0 00:00	0.00	0.00
12	153	Junction	342.07	359.60	342.07	358.60	0.00	0.00	342.07	0.00	17.54	0 00:00	0.00	0.00
13	159	Junction	302.65	318.40	302.65	317.40	0.00	0.00	302.65	0.00	15.75	0 00:00	0.00	0.00
14	161	Junction	304.99	320.67	304.99	319.67	0.00	0.00	304.99	0.00	15.68	0 00:00	0.00	0.00
15	169	Junction	138.28	142.39	138.28	141.39	0.00	1.95	138.62	0.00	3.77	0 00:00	0.00	0.00
16	172	Junction	134.60	139.51	134.60	138.51	0.00	1.94	135.58	0.00	3.93	0 00:00	0.00	0.00
17	175	Junction	245.83	248.93	245.83	247.93	0.00	0.78	246.28	0.00	2.65	0 00:00	0.00	0.00
18	CB-10	Junction	343.39	347.38	343.39	346.38	0.00	0.11	343.52	0.00	3.86	0 00:00	0.00	0.00
19	CB-100	Junction	288.54	292.68	288.54	291.68	0.00	1.22	288.82	0.00	3.86	0 00:00	0.00	0.00
20	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
21	CB-110	Junction	281.90	292.27	281.90	291.27	0.00	1.22	282.30	0.00	9.97	0 00:00	0.00	0.00
22	CB-110A	Junction	281.38	285.84	281.38	284.84	0.00	0.78	282.27	0.00	3.57	0 00:00	0.00	0.00
23	CB-110B	Junction	281.88	285.84	281.88	284.84	0.00	0.76	282.23	0.00	3.65	0 00:00	0.00	0.00
24	CB-115	Junction	281.95	292.34	281.95	291.34	0.00	0.44	282.22	0.00	10.12	0 00:00	0.00	0.00
25	CB-115A	Junction	281.43	285.89	281.43	284.89	0.00	0.42	282.21	0.00	3.68	0 00:00	0.00	0.00
26	CB-115B	Junction	281.93	285.89	281.93	284.89	0.00	0.32	282.21	0.00	3.72	0 00:00	0.00	0.00
27	CB-120	Junction	281.86	287.54	281.86	286.54	0.00	0.94	282.16	0.00	5.38	0 00:00	0.00	0.00
28	CB-125	Junction	281.91	287.65	281.91	286.65	0.00	0.29	282.19	0.00	5.47	0 00:00	0.00	0.00
29	CB-130	Junction	281.49	286.04	281.49	285.04	0.00	1.06	281.75	0.00	4.28	0 00:00	0.00	0.00
30	CB-135	Junction	280.50	284.00	280.50	283.00	0.00	1.08	280.69	0.00	3.31	0 00:00	0.00	0.00
31	CB-140	Junction	277.25	280.76	277.25	279.76	0.00	1.54	277.50	0.00	3.26	0 00:00	0.00	0.00
32	CB-141	Junction	281.07	283.97	281.07	282.97	0.00	1.08	281.43	0.00	2.54	0 00:00	0.00	0.00
33	CB-150	Junction	272.74	276.40	272.74	275.40	0.00	1.54	272.96	0.00	3.44	0 00:00	0.00	0.00
34	CB-160	Junction	263.22	267.43	263.22	266.43	0.00	8.92	263.90	0.00	3.54	0 00:00	0.00	0.00
35	CB-161	Junction	267.00	270.32	267.00	269.32	0.00	5.93	267.70	0.00	2.62	0 00:00	0.00	0.00
36	CB-165	Junction	260.00	264.27	260.00	263.27	0.00	9.02	260.85	0.00	3.42	0 00:00	0.00	0.00
37	CB-170	Junction	258.50	262.86	258.50	261.86	0.00	9.03	259.42	0.00	3.43	0 00:00	0.00	0.00
38	CB-180	Junction	257.22	260.39	257.22	259.39	0.00	9.08	258.08	0.00	2.31	0 00:00	0.00	0.00
39	CB-190	Junction	246.41	258.14	246.41	257.14	0.00	9.08	247.89	0.00	10.25	0 00:00	0.00	0.00
40	CB-190A	Junction	245.91	258.14	245.91	257.14	0.00	9.11	247.74	0.00	10.40	0 00:00	0.00	0.00
41	CB-190B	Junction	246.41	252.52	246.41	251.52	0.00	8.92	247.62	0.00	4.90	0 00:00	0.00	0.00
42	CB-20	Junction	337.37	343.03	337.37	342.03	0.00	0.24	337.46	0.00	5.57	0 00:00	0.00	0.00
43	CB-200	Junction	246.38	252.52	246.38	251.52	0.00	9.09	247.33	0.00	5.20	0 00:00	0.00	0.00
44	CB-210	Junction	245.40	251.85	245.40	250.85	0.00	9.52	246.12	0.00	5.73	0 00:00	0.00	0.00
45	CB-220	Junction	245.58	249.25	245.58	248.25	0.00	0.09	245.64	0.00	3.61	0 00:00	0.00	0.00
46	CB-250	Junction	239.67	243.34	239.67	242.34	0.00	0.09	239.73	0.00	3.61	0 00:00	0.00	0.00
47	CB-260	Junction	234.51	238.07	234.51	237.07	0.00	1.64	234.74	0.00	3.33	0 00:00	0.00	0.00
48	CB-261	Junction	234.76	237.48	234.76	236.48	0.00	0.00	234.76	0.00	2.72	0 00:00	0.00	0.00
49	CB-265	Junction	231.01	234.66	231.01	233.66	0.00	2.32	231.35	0.00	3.31	0 00:00	0.00	0.00
50	CB-270	Junction	229.14	232.64	229.14	231.64	0.00	2.32	229.41	0.00	3.23	0 00:00	0.00	0.00
51	CB-280	Junction	211.13	215.30	211.13	214.30	0.00	2.59	211.43	0.00	3.87	0 00:00	0.00	0.00
52	CB-290	Junction	205.53	209.99	205.53	208.99	0.00	2.59	205.82	0.00	4.17	0 00:00	0.00	0.00
53	CB-30	Junction	332.08	335.75	332.08	334.75	0.00	0.24	332.17	0.00	3.58	0 00:00	0.00	0.00
54	CB-300	Junction	197.49	201.15	197.49	200.15	0.00	2.59	197.78	0.00	3.37	0 00:00	0.00	0.00
55	CB-310	Junction	190.13	193.80	190.13	192.80	0.00	2.59	190.44	0.00	3.36	0 00:00	0.00	0.00
56	CB-320	Junction	184.86	188.53	184.86	187.53	0.00	3.07	185.19	0.00	3.34	0 00:00	0.00	0.00
57	CB-330	Junction	175.77	179.43	175.77	178.43	0.00	3.07	176.09	0.00	3.34	0 00:00	0.00	0.00
58	CB-340	Junction	168.39	172.23	168.39	171.23	0.00	3.26	168.74	0.00	3.49	0 00:00	0.00	0.00
59	CB-341	Junction	170.66	173.66	170.66	172.66	0.00	0.00	170.66	0.00	3.00	0 00:00	0.00	0.00
60	CB-345	Junction	163.77	167.27	163.77	166.27	0.00	3.26	164.15	0.00	3.12	0 00:00	0.00	0.00
61	CB-350	Junction	161.65	165.61	161.65	164.61	0.00	6.82	162.14	0.00	3.47	0 00:00	0.00	0.00
62	CB-351	Junction	163.86	166.86	163.86	165.86	0.00	0.00	163.86	0.00	3.00	0 00:00	0.00	0.00
63	CB-360	Junction	148.00	151.67	148.00	150.67	0.00	6.82	148.49	0.00	3.18	0 00:00	0.00	0.00
64	CB-370	Junction	134.56	139.07	134.56	138.07	0.00	7.80	135.53	0.00	3.54	0 00:00	0.00	0.00
65	CB-390	Junction	122.42	138.65	122.42	137.65	0.00	7.80	123.44	0.00	15.21	0 00:00	0.00	0.00
66	CB-390A	Junction	121.89	128.92	121.89	127.92	0.00	4.51	123.40	0.00	5.52	0 00:00	0.00	0.00
67	CB-390B	Junction	122.39	128.92	122.39	127.92	0.00	4.10	123.37	0.00	5.55	0 00:00	0.00	0.00
68	CB-395	Junction	122.37	138.83	122.37	137.83	0.00	3.19	123.40	0.00	15.43	0 00:00	0.00	0.00
69	CB-395A	Junction	121.84	128.87	121.84	127.87	0.00	2.95	123.39	0.00	5.48	0 00:00	0.00	0.00
70	CB-395B	Junction	122.37	128.87	122.37	127.87	0.00	2.30	123.38	0.00	5.49	0 00:00	0.00	0.00
71	CB-40	Junction	325.96	329.62	325.96	328.62	0.00	0.44	326.09	0.00	3.53	0 00:00	0.00	0.00
72	CB-400	Junction	122.35	131.29	122.35	130.29	0.00	2.09	123.37	0.00	7.93	0 00:00	0.00	0.00
73	CB-405	Junction	122.30	129.56	122.30	128.56	0.00	5.59	123.32	0.00	6.24	0 00:00	0.00	0.00
74	CB-410	Junction	122.26	128.59	122.26	127.59	0.00	5.58	122.82	0.00	5.77	0 00:00	0.00	0.00
75	CB-420	Junction	118.40	122.25	118.40	121.25	0.00	5.98	118.90	0.00	3.35	0 00:00	0.00	0.00
76	CB-430	Junction	114.95	118.45	114.95	117.45	0.00	5.98	115.89	0.00	2.57	0 00:00	0.00	0.00
77	CB-450	Junction	107.85	110.85	107.85	109.85	0.00	7.25	108.33	0.00	2.52	0 00:00	0.00	0.00
78	CB-460	Junction	97.75	101.64	97.75	100.64	0.00	14.51	99.05	0.00	2.59	0 00:00	0.00	0.00
79	CB-470EX	Junction	89.17	97.66	89.17	96.66	0.00	23.83	93.39	0.00	4.28	0 00:00	0.00	0.00
80	CB-480EX	Junction	82.12	90.03	82.12	89.03	0.00	23.49	82.85	0.00	7.19	0 00:00	0.00	0.00
81	CB-490	Junction	60.90	67.64	60.90	66.64	0.00	23.66	63.66	0.00	3.98	0 00:00	0.00	0.00
82	CB-490EX	Junction	75.53	80.48	75.53	79.48	0.00	23.75	76.74	0.00	3.74	0 00:00	0.00	0.00
83	CB-495EX	Junction	61.80	68.14	61.80	67.14	0.00	23.66	66.92	0.00	1.22	0 00:00	0.00	0.00
84	CB-50	Junction	312.06	321.03	312.06	320.03	0.00	0.44	312.30	0.00	8.74	0 00:00	0.00	0.00
85	CB-50A	Junction	311.54	315.44	311.54	314.44	0.00	0.33	312.28	0.00	3.17	0 00:00	0.00	0.00
86	CB-50B	Junction	312.04	315.44	312.04	314.44	0.00	0.28	312.27	0.00	3.27	0 00:00	0.00	0.00
87	CB-60	Junction	312.02	317.04	312.02	316.04	0.00	0.25	312.16	0.00	4.88	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)
88	CB-70	Junction	311.75	316.01	311.75	315.01	0.00	1.11	311.95	0.00	4.06	0 00:00	0.00	0.00
89	CB-80	Junction	306.46	309.96	306.46	308.96	0.00	0.67	306.61	0.00	3.36	0 00:00	0.00	0.00
90	CB-90	Junction	303.04	306.71	303.04	305.71	0.00	0.67	303.22	0.00	3.49	0 00:00	0.00	0.00
91	Out-1143	Junction	114.20	120.20	114.20	119.20	0.00	6.02	114.78	0.00	5.42	0 00:00	0.00	0.00
92	Out-183	Junction	281.00	284.98	281.00	283.98	0.00	0.00	281.00	0.00	3.98	0 00:00	0.00	0.00
93	WQ-1	Junction	320.24	326.00	320.24	325.00	0.00	0.44	320.39	0.00	5.61	0 00:00	0.00	0.00
94	WQ-2	Junction	296.00	301.80	296.00	300.80	0.00	0.66	296.15	0.00	5.65	0 00:00	0.00	0.00
95	WQ-3	Junction	253.03	258.83	253.03	257.83	0.00	9.08	254.76	0.00	4.07	0 00:00	0.00	0.00
96	WQ-4	Junction	134.68	140.48	134.68	139.48	0.00	1.96	135.62	0.00	4.86	0 00:00	0.00	0.00
97	Out-144	Outfall	56.00					23.66	56.99					
98	Out-15	Outfall	343.17					0.11	343.29					
99	Out-151	Outfall	308.34					1.11	308.53					
100	Out-155	Outfall	280.30					1.06	280.53					
101	Out-175	Outfall	241.65					9.51	242.18					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	11 (1)	Pipe	CB-370	CB-390	7.22	134.56	133.83	10.1100	18.000	0.0120	7.80	36.18	0.22	9.37	0.72	0.48	0.00	Calculated
2	117 (1)	Pipe	CB-250	CB-260	60.74	239.67	234.51	8.4900	18.000	0.0120	0.09	33.17	0.00	1.10	0.14	0.09	0.00	Calculated
3	118 (1)	Pipe	CB-270	CB-280	211.91	229.14	211.13	8.5000	18.000	0.0120	2.32	33.18	0.07	9.88	0.29	0.19	0.00	Calculated
4	118 (2) (1)	Pipe	CB-265	CB-270	19.36	231.01	229.14	9.6700	18.000	0.0120	2.32	35.39	0.07	9.18	0.30	0.20	0.00	Calculated
5	120 (1)	Pipe	CB-300	CB-310	77.38	197.49	190.13	9.5100	18.000	0.0120	2.59	35.10	0.07	10.28	0.30	0.20	0.00	Calculated
6	123 (1)	Pipe	CB-340	CB-345	52.16	168.39	163.77	8.8600	18.000	0.0120	3.26	33.87	0.10	9.93	0.36	0.24	0.00	Calculated
7	123 (1) (1)	Pipe	CB-345	CB-350	24.04	163.77	161.65	8.8200	18.000	0.0120	3.25	33.79	0.10	8.23	0.43	0.29	0.00	Calculated
8	3	Pipe	CB-470EX	CB-480EX	75.22	89.17	82.12	9.3700	18.000	0.0150	23.49	27.87	0.84	16.72	1.11	0.74	0.00	Calculated
9	4	Pipe	CB-10EX	CB-10	11.09	344.23	343.49	6.6800	18.000	0.0120	0.00	29.41	0.00	0.00	0.01	0.01	0.00	Calculated
10	5	Pipe	CB-10	Out-15	43.29	343.39	343.17	0.5000	18.000	0.0120	0.11	8.05	0.01	1.57	0.13	0.08	0.00	Calculated
11	6	Pipe	CB-80	CB-90	35.28	306.46	302.92	10.0500	18.000	0.0120	0.67	35.43	0.02	6.28	0.16	0.11	0.00	Calculated
12	7	Pipe	WQ-3	CB-190	8.05	253.03	252.99	0.5000	18.000	0.0120	9.08	8.02	1.13	5.48	1.33	0.89	0.00	> CAPACITY
13	9	Pipe	CB-341	CB-340	20.38	170.66	168.80	9.1100	12.000	0.0120	0.00	11.65	0.00	0.00	0.00	0.00	0.00	Calculated
14	11	Pipe	CB-360	149	117.04	148.00	138.35	8.2400	18.000	0.0120	6.82	32.68	0.21	11.84	0.54	0.36	0.00	Calculated
15	25	Pipe	CB-420	CB-430	51.69	118.40	114.95	6.6700	18.000	0.0120	5.98	29.40	0.20	7.15	0.72	0.48	0.00	Calculated
16	32	Pipe	CB-50A	CB-50B	35.05	311.54	311.54	0.0000	42.000	0.0120	0.28	130.18	0.00	0.37	0.49	0.14	0.00	Calculated
17	33	Pipe	CB-110A	CB-110B	55.00	281.38	281.38	0.0000	48.000	0.0120	0.76	148.37	0.01	0.62	0.62	0.16	0.00	Calculated
18	36	Pipe	CB-390A	CB-390B	110.00	121.89	121.89	0.0000	72.000	0.0120	4.10	309.32	0.01	1.05	1.24	0.21	0.00	Calculated
19	37	Pipe	CB-395A	CB-395B	110.00	121.84	121.84	0.0000	72.000	0.0120	2.30	318.47	0.01	0.63	1.28	0.21	0.00	Calculated
20	40	Pipe	CB-60	CB-70	10.65	312.02	311.75	2.5700	18.000	0.0120	0.23	18.25	0.01	2.64	0.16	0.11	0.00	Calculated
21	41	Pipe	CB-50B	CB-60	4.62	312.04	312.02	0.4300	36.000	0.0120	0.25	47.57	0.01	1.53	0.18	0.06	0.00	Calculated
22	42	Pipe	CB-50	CB-50A	4.63	312.06	312.04	0.4300	36.000	0.0120	0.33	47.49	0.01	1.57	0.23	0.08	0.00	Calculated
23	43	Pipe	CB-40	WQ-1	50.05	325.96	322.54	6.8300	18.000	0.0120	0.44	29.75	0.01	5.86	0.13	0.09	0.00	Calculated
24	44	Pipe	CB-490	Out-144	43.12	60.90	56.00	11.3500	18.000	0.0150	23.66	30.68	0.77	15.10	1.24	0.83	0.00	Calculated
25	45	Pipe	CB-110B	CB-120	4.61	281.88	281.86	0.4300	36.000	0.0120	0.77	47.57	0.02	1.93	0.33	0.11	0.00	Calculated
26	46	Pipe	CB-110	CB-110A	4.65	281.90	281.88	0.4300	36.000	0.0120	0.78	47.39	0.02	1.71	0.39	0.13	0.00	Calculated
27	48	Pipe	CB-90	131	21.38	302.04	301.77	1.2600	18.000	0.0120	0.67	27.74	0.02	6.02	0.17	0.11	0.00	Calculated
28	49	Pipe	CB-190B	CB-200	4.62	246.41	246.38	0.5400	36.000	0.0120	9.09	53.14	0.17	4.15	1.08	0.36	0.00	Calculated
29	50	Pipe	CB-100	CB-110	10.47	288.54	287.79	7.2000	18.000	0.0120	1.22	30.53	0.04	6.64	0.24	0.16	0.00	Calculated
30	51	Pipe	CB-70	Out-151	42.42	311.75	308.34	8.0300	18.000	0.0120	1.11	32.25	0.03	7.96	0.20	0.13	0.00	Calculated
31	52	Pipe	CB-190	CB-190A	4.67	246.43	246.41	0.5300	36.000	0.0120	9.11	52.84	0.17	3.23	1.39	0.47	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	1.69	1.02	0.68	0.00	Calculated
33	55	Pipe	CB-130	Out-155	38.35	281.49	280.30	3.1000	18.000	0.0120	1.06	20.05	0.05	5.49	0.25	0.17	0.00	Calculated
34	57	Pipe	CB-120	CB-130	20.27	281.86	281.49	1.8200	18.000	0.0120	0.93	15.35	0.06	4.00	0.28	0.19	0.00	Calculated
35	58	Pipe	CB-190A	CB-190B	55.00	245.91	245.91	0.0000	60.000	0.0120	8.92	269.02	0.03	1.93	1.53	0.31	0.00	Calculated
36	59	Pipe	CB-390	CB-390A	4.64	122.42	122.39	0.6500	36.000	0.0120	4.51	58.10	0.08	2.31	1.01	0.34	0.00	Calculated
37	60	Pipe	CB-395	CB-395A	4.61	122.37	122.34	0.6500	36.000	0.0120	2.95	58.27	0.05	1.78	1.04	0.35	0.00	Calculated
38	61	Pipe	CB-390B	CB-405	4.65	122.39	122.37	0.4300	36.000	0.0120	3.73	47.38	0.08	2.10	0.96	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	47.39	0.04	1.02	1.01	0.34	0.00	Calculated
40	64	Pipe	CB-140	CB-150	62.06	277.25	272.74	7.2700	18.000	0.0120	1.54	30.68	0.05	8.64	0.24	0.16	0.00	Calculated
41	66	Pipe	CB-150	CB-160	120.88	272.74	263.22	7.8700	18.000	0.0120	1.54	31.93	0.05	3.78	0.45	0.30	0.00	Calculated
42	68	Pipe	CB-351	CB-350	13.54	163.86	162.65	8.9200	12.000	0.0120	0.00	11.53	0.00	0.00	0.00	0.00	0.00	Calculated
43	69	Pipe	CB-170	CB-180	23.89	258.50	257.22	5.3700	18.000	0.0120	9.03	26.37	0.34	8.30	0.89	0.59	0.00	Calculated
44	72	Pipe	CB-160	CB-165	40.83	263.22	260.00	7.8900	18.000	0.0120	8.92	31.96	0.28	9.89	0.76	0.51	0.00	Calculated
45	72 (1)	Pipe	CB-165	CB-170	18.97	260.00	258.50	7.8900	18.000	0.0120	9.03	31.96	0.28	8.39	0.89	0.59	0.00	Calculated
46	74	Pipe	CB-200	CB-210	7.08	246.13	245.40	10.3700	18.000	0.0120	9.00	42.43	0.21	9.10	0.83	0.56	0.00	Calculated
47	75	Pipe	CB-210	Out-175	39.50	245.40	241.65	9.4800	18.000	0.0120	9.51	35.04	0.27	13.56	0.63	0.42	0.00	Calculated
48	76	Pipe	CB-141	CB-135	18.88	281.07	280.50	3.0200	12.000	0.0120	1.08	6.71	0.16	6.15	0.28	0.28	0.00	Calculated
49	80	Pipe	CB-350	CB-360	154.42	161.65	148.00	8.8400	18.000	0.0120	6.82	33.83	0.20	13.72	0.49	0.32	0.00	Calculated
50	82	Pipe	CB-135	CB-140	34.97	280.50	277.25	9.2900	18.000	0.0120	1.08	34.69	0.03	6.80	0.22	0.15	0.00	Calculated
51	83	Pipe	Out-183	CB-135	6.06	281.00	280.50	8.2500	18.000	0.0130	0.00	30.17	0.00	0.00	0.09	0.06	0.00	Calculated
52	84	Pipe	CB-110	CB-115	7.32	281.90	281.95	-0.6800	18.000	0.0120	0.44	9.40	0.05	1.53	0.33	0.22	0.00	Calculated
53	85	Pipe	CB-125	CB-120	7.26	281.91	281.86	0.6900	18.000	0.0120	0.31	9.44	0.03	1.42	0.29	0.19	0.00	Calculated
54	86	Pipe	CB-115	CB-115A	4.70	281.95	281.93	0.4300	36.000	0.0120	0.42	47.14	0.01	1.60	0.27	0.09	0.00	Calculated
55	87	Pipe	CB-390	CB-395	9.30	122.42	122.37	0.5400	18.000	0.0120	3.19	8.34	0.38	2.78	1.02	0.68	0.00	Calculated
56	88	Pipe	CB-115A	CB-115B	55.00	281.43	281.43	0.0000	48.000	0.0120	0.32	148.37	0.00	0.38	0.52	0.13	0.00	Calculated

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
57	89	Pipe	CB-115B	CB-125	4.62	281.93	281.91	0.4300	36.000	0.0120	0.29	47.52	0.01	1.05	0.27	0.09	0.00	Calculated
58	90	Pipe	CB-480EX	CB-490EX	78.87	82.12	75.63	8.2300	18.000	0.0150	11.10	26.11	0.43	10.95	0.91	0.61	0.00	Calculated
59	91	Pipe	CB-405	CB-410	6.88	122.26	122.22	0.5800	18.000	0.0120	5.58	8.68	0.64	5.90	0.79	0.53	0.00	Calculated
60	92	Pipe	CB-410	CB-420	87.13	122.22	118.40	4.3800	18.000	0.0120	5.58	23.95	0.23	9.93	0.53	0.36	0.00	Calculated
61	93	Pipe	CB-490EX	CB-495EX	101.21	75.53	61.87	13.5000	18.000	0.0150	23.66	33.45	0.71	14.09	1.34	0.90	0.00	Calculated
62	94	Pipe	CB-495EX	CB-490	6.93	61.80	60.90	13.0400	18.000	0.0150	23.66	32.87	0.72	13.39	1.50	1.00	18.00	SURCHARGED
63	98	Pipe	CB-261	CB-260	15.95	234.76	234.60	1.0000	12.000	0.0120	0.00	3.87	0.00	0.00	0.07	0.07	0.00	Calculated
64	104	Pipe	CB-50	124	7.24	312.06	312.14	-1.1000	18.000	0.0120	0.10	11.96	0.01	0.89	0.17	0.11	0.00	Calculated
65	105	Pipe	124	125	4.60	312.14	312.12	0.4300	36.000	0.0120	0.10	47.64	0.00	1.64	0.09	0.03	0.00	Calculated
66	106	Pipe	125	129	35.00	311.62	311.62	0.0000	42.000	0.0120	0.04	130.27	0.00	0.12	0.32	0.09	0.00	Calculated
67	107	Pipe	129	126	4.66	312.12	312.10	0.4300	36.000	0.0120	0.03	47.35	0.00	0.91	0.06	0.02	0.00	Calculated
68	108	Pipe	126	CB-60	7.50	312.10	312.02	1.0700	18.000	0.0120	0.03	11.75	0.00	0.80	0.10	0.06	0.00	Calculated
69	109	Pipe	WQ-1	116	19.31	320.24	319.25	5.1300	18.000	0.0120	0.44	25.77	0.02	4.98	0.15	0.10	0.00	Calculated
70	111	Pipe	CB-20	CB-30	57.22	337.37	332.08	9.2500	18.000	0.0120	0.24	34.60	0.01	5.54	0.09	0.06	0.00	Calculated
71	112	Pipe	CB-30	CB-40	65.78	332.08	325.96	9.3000	18.000	0.0120	0.24	34.71	0.01	4.06	0.11	0.07	0.00	Calculated
72	117	Pipe	CB-220	CB-250	77.49	245.58	239.67	7.6300	18.000	0.0120	0.09	31.43	0.00	3.89	0.06	0.04	0.00	Calculated
73	118	Pipe	CB-260	CB-265	36.15	234.51	231.01	9.6700	18.000	0.0120	1.63	35.39	0.05	7.18	0.28	0.19	0.00	Calculated
74	119	Pipe	CB-280	CB-290	58.35	211.13	205.53	9.6000	18.000	0.0120	2.59	35.25	0.07	10.49	0.30	0.20	0.00	Calculated
75	120	Pipe	CB-290	CB-300	81.20	205.53	197.49	9.9000	18.000	0.0120	2.59	35.81	0.07	10.76	0.29	0.19	0.00	Calculated
76	121	Pipe	CB-310	CB-320	66.71	190.13	184.86	7.9000	18.000	0.0120	2.59	31.98	0.08	9.53	0.32	0.21	0.00	Calculated
77	122	Pipe	CB-320	CB-330	106.88	184.86	175.77	8.5000	18.000	0.0120	3.07	33.19	0.09	10.98	0.32	0.22	0.00	Calculated
78	123	Pipe	CB-330	CB-340	78.49	175.77	168.39	9.4000	18.000	0.0120	3.06	34.89	0.09	10.55	0.33	0.22	0.00	Calculated
79	127	Pipe	CB-450	CB-460	123.28	107.85	97.75	8.1900	18.000	0.0120	7.25	32.57	0.22	8.49	0.87	0.58	0.00	Calculated
80	128	Pipe	CB-460	147	28.16	97.75	96.10	5.8500	18.000	0.0120	14.44	27.51	0.52	8.85	1.31	0.87	0.00	Calculated
81	130	Pipe	116	CB-50	32.22	319.25	317.15	6.5100	18.000	0.0120	0.44	29.04	0.02	5.65	0.13	0.09	0.00	Calculated
82	132	Pipe	131	WQ-2	39.08	301.77	298.30	8.8800	18.000	0.0120	0.66	33.91	0.02	7.08	0.15	0.10	0.00	Calculated
83	133	Pipe	WQ-2	CB-100	102.92	296.00	288.54	7.2500	18.000	0.0120	0.66	30.64	0.02	4.34	0.22	0.14	0.00	Calculated
84	142	Pipe	172	CB-370	7.05	134.60	134.56	0.5700	18.000	0.0120	2.06	8.57	0.24	1.79	0.97	0.65	0.00	Calculated
85	143	Pipe	CB-430	Out-1143	74.00	114.95	114.20	1.0100	18.000	0.0120	5.97	11.46	0.52	6.68	0.76	0.51	0.00	Calculated
86	146	Pipe	145	144	37.12	113.37	109.74	9.7700	18.000	0.0150	7.10	28.45	0.25	11.11	0.73	0.49	0.00	Calculated
87	148	Pipe	147	CB-470EX	33.88	96.10	94.39	5.0600	18.000	0.0120	14.41	25.60	0.56	10.93	1.06	0.71	0.00	Calculated
88	150	Pipe	149	169	6.91	138.35	138.30	0.7200	18.000	0.0120	1.95	9.68	0.20	3.54	0.53	0.35	0.00	Calculated
89	151	Pipe	WQ-4	172	16.06	134.68	134.60	0.5000	18.000	0.0120	1.94	8.03	0.24	1.64	0.96	0.64	0.00	Calculated
90	152	Pipe	153	CB-20	10.13	342.07	341.13	9.2300	4.000	0.0120	0.00	0.63	0.00	0.00	0.00	0.00	0.00	Calculated
91	155	Pipe	144	CB-450	9.39	109.33	107.85	15.7500	12.000	0.0120	7.00	15.32	0.46	11.22	0.74	0.74	0.00	Calculated
92	157	Pipe	161	CB-90	4.61	304.99	304.15	18.1200	4.000	0.0120	0.00	0.88	0.00	0.00	0.00	0.00	0.00	Calculated
93	158	Pipe	159	131	6.88	302.65	302.06	8.4800	6.000	0.0120	0.00	1.77	0.00	0.00	0.00	0.00	0.00	Calculated
94	170	Pipe	169	WQ-4	24.09	138.28	136.98	5.4000	18.000	0.0120	1.96	26.44	0.07	7.45	0.31	0.21	0.00	Calculated
95	171	Pipe	149	CB-370	40.75	138.35	134.56	9.3000	12.000	0.0120	5.90	11.77	0.50	9.32	0.78	0.78	0.00	Calculated
96	173	Pipe	141	172	14.56	138.50	134.70	26.0900	12.000	0.0120	0.00	19.72	0.00	0.00	0.44	0.44	0.00	Calculated
97	174	Pipe	CB-180	WQ-3	28.46	257.22	255.33	6.6400	18.000	0.0120	9.08	29.33	0.31	11.01	0.71	0.48	0.00	Calculated
98	176	Pipe	175	CB-210	13.92	245.83	245.76	0.5000	12.000	0.0120	0.78	2.73	0.29	2.58	0.41	0.41	0.00	Calculated
99	Link-01	Pipe	CB-480EX	CB-490EX	79.01	82.12	75.53	8.3400	18.000	0.0130	12.42	30.34	0.41	11.42	0.96	0.65	0.00	Calculated
100	Link-02	Pipe	CB-161	CB-160	16.64	267.00	264.26	16.4600	12.000	0.0130	5.93	14.46	0.41	12.97	0.57	0.57	0.00	Calculated
101	Link-04	Pipe	Out-1143	145	54.47	114.20	113.37	1.5200	60.000	0.0150	6.02	278.63	0.02	4.86	0.58	0.12	0.00	Calculated

Subbasin Hydrology

Subbasin : {Catch Basin Boundaries}.OA1-1AI

Input Data

Area (ac)	0.12
Peak Rate Factor	484.00
Weighted Curve Number	85.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.12	B	85.00
-	0.05	B	85.00
Composite Area & Weighted CN	0.17		85.00

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)	3.95
Total Runoff (in)	2.41
Peak Runoff (cfs)	0.07
Weighted Curve Number	85.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-2AP

Input Data

Area (ac) 0.29
Peak Rate Factor 484.00
Weighted Curve Number 90.20
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.29	B	90.20
Composite Area & Weighted CN	0.29		90.20

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) 0.22
Weighted Curve Number 90.20
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-3AP

Input Data

Area (ac) 0.12
Peak Rate Factor 484.00
Weighted Curve Number 86.95
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.12	B	86.95
Composite Area & Weighted CN	0.12		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) 0.08
Weighted Curve Number 86.95
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-4AP

Input Data

Area (ac) 1.08
Peak Rate Factor 484.00
Weighted Curve Number 88.90
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.08	B	88.90
Composite Area & Weighted CN	1.08		88.90

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) 0.77
Weighted Curve Number 88.90
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA1-4BI

Input Data

```
Area (ac) ....................................................................... 0.09
Peak Rate Factor ........................................................... 484.00
Weighted Curve Number ............................................... 98.00
Rain Gage ID ................................................................. StormData
```

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98.00
Composite Area & Weighted CN	0.09		98.00

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 ............................................... 98.00
Time of Concentration (days hh:mm:ss) ........................ 0 00:05:00
```

Subbasin : {Catch Basin Boundaries}.OA1-4CI

Input Data

```
Area (ac) ....................................................................... 0.11
Peak Rate Factor .......................................................... 484.00
Weighted Curve Number .............................................. 98.00
Rain Gage ID ................................................................ StormData
```

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	B	98.00
Composite Area & Weighted CN	0.11		98.00

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) .......................................................... 0.10
Weighted Curve Number .............................................. 98.00
Time of Concentration (days hh:mm:ss) ....................... 0 00:05:00
```

Subbasin : {Catch Basin Boundaries}.OA2-10AI

Input Data

Area (ac) 0.22
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.22	B	98.00
Composite Area & Weighted CN	0.22		98.00

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) 0.20
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-10BP

Input Data

Area (ac) 1.70
Peak Rate Factor 484.00
Weighted Curve Number 87.60
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.70	B	87.60
Composite Area & Weighted CN	1.70		87.60

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) 1.16
Weighted Curve Number 87.60
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-10CI

Input Data

```
Area (ac) ........................................................................ 0.05
Peak Rate Factor ........................................................... 484.00
Weighted Curve Number ............................................... 98.00
Rain Gage ID ................................................................. StormData
```

Composite Curve Number

```
                                                        Area      Soil     Curve
Soil/Surface Description                             (acres)     Group    Number
-                                                       0.05         A     98.00
-                                                       0.03         A     98.00
Composite Area & Weighted CN                            0.08               98.00
```

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) ........................................................... 0.05
Weighted Curve Number ............................................... 98.00
Time of Concentration (days hh:mm:ss) ........................ 0 00:05:00
```

Subbasin : {Catch Basin Boundaries}.OA2-11AI

Input Data

Area (ac) 0.11
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	A	98.00
Composite Area & Weighted CN	0.11		98.00

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) 0.10
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-12AP

Input Data

Area (ac) 0.11
Peak Rate Factor 484.00
Weighted Curve Number 77.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	A	77.00
Composite Area & Weighted CN	0.11		77.00

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) 0.05
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-13AP

Input Data

Area (ac)	1.46
Peak Rate Factor	484.00
Weighted Curve Number	82.25
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.46	A	82.25
Composite Area & Weighted CN	1.46		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)	0.78
Weighted Curve Number	82.25
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-14AI

Input Data

Area (ac)	0.05
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	98.00
Composite Area & Weighted CN	0.05		98.00

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)	0.05
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-14BI

Input Data

Area (ac)	0.05
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	98.00
Composite Area & Weighted CN	0.05		98.00

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)	0.04
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-30AI

Input Data

Area (ac)	0.16
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	B	98.00
Composite Area & Weighted CN	0.16		98.00

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	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-30BP

Input Data

Area (ac) 0.70
Peak Rate Factor 484.00
Weighted Curve Number 88.25
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.70	B	88.25
Composite Area & Weighted CN	0.70		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) 0.49
Weighted Curve Number 88.25
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-5AP

Input Data

Area (ac) 0.60
Peak Rate Factor 484.00
Weighted Curve Number 86.95
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.60	B	86.95
Composite Area & Weighted CN	0.60		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) 0.40
Weighted Curve Number 86.95
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-5BI

Input Data

Area (ac)	0.09
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98.00
Composite Area & Weighted CN	0.09		98.00

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	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-5CI

Input Data

Area (ac) 0.09
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	98.00
Composite Area & Weighted CN	0.09		98.00

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 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-6AP

Input Data

Area (ac)	0.15
Peak Rate Factor	484.00
Weighted Curve Number	95.40
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.15	B	95.40
Composite Area & Weighted CN	0.15		95.40

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	3.42
Peak Runoff (cfs)	0.14
Weighted Curve Number	95.40
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-6BP

Input Data

Area (ac) 0.09
Peak Rate Factor 484.00
Weighted Curve Number 85.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	B	85.00
Composite Area & Weighted CN	0.09		85.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.95
Total Runoff (in) 2.41
Peak Runoff (cfs) 0.05
Weighted Curve Number 85.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-7AI

Input Data

Area (ac)	0.36
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.36	A	98.00
-	0.08	B	98.00
Composite Area & Weighted CN	0.44		98.00

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)	0.34
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-7BP

Input Data

Area (ac)	0.58
Peak Rate Factor	484.00
Weighted Curve Number	83.30
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.58	A	83.30
Composite Area & Weighted CN	0.58		83.30

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)	0.33
Weighted Curve Number	83.30
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-7CP

Input Data

Area (ac)	0.54
Peak Rate Factor	484.00
Weighted Curve Number	89.89
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.54	B	90.20
-	0.01	A	77.00
Composite Area & Weighted CN	0.55		89.89

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in)	3.95
Total Runoff (in)	2.86
Peak Runoff (cfs)	0.41
Weighted Curve Number	89.89
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8AP

Input Data

```
Area (ac) ........................................................................ 0.08
Peak Rate Factor ........................................................... 484.00
Weighted Curve Number ............................................... 85.00
Rain Gage ID ................................................................. StormData
```

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	B	85.00
Composite Area & Weighted CN	0.08		85.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

```
Total Rainfall (in) ............................................................ 3.95
Total Runoff (in) ............................................................. 2.41
Peak Runoff (cfs) ........................................................... 0.05
Weighted Curve Number ............................................... 85.00
Time of Concentration (days hh:mm:ss) ........................ 0 00:05:00
```

Subbasin : {Catch Basin Boundaries}.OA2-8BI

Input Data

Area (ac)	0.37
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.37	A	98.00
Composite Area & Weighted CN	0.37		98.00

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)	0.35
Weighted Curve Number	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8CP

Input Data

Area (ac) 0.05
Peak Rate Factor 484.00
Weighted Curve Number 77.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	A	77.00
Composite Area & Weighted CN	0.05		77.00

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) 0.02
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-8DI

Input Data

Area (ac) 0.01
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.01	A	98.00
Composite Area & Weighted CN	0.01		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.95
Total Runoff (in) 3.61
Peak Runoff (cfs) 0.01
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9AP

Input Data

Area (ac) 0.04
Peak Rate Factor 484.00
Weighted Curve Number 77.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.04	A	77.00
Composite Area & Weighted CN	0.04		77.00

Time of Concentration

User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.95
Total Runoff (in) 1.76
Peak Runoff (cfs) 0.02
Weighted Curve Number 77.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9BP

Input Data

Area (ac)	5.78
Peak Rate Factor	484.00
Weighted Curve Number	88.90
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.78	B	88.90
Composite Area & Weighted CN	5.78		88.90

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)	4.15
Weighted Curve Number	88.90
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9CI

Input Data

Area (ac)	0.89
Peak Rate Factor	484.00
Weighted Curve Number	98.00
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.89	B	98.00
Composite Area & Weighted CN	0.89		98.00

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	98.00
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA2-9DI

Input Data

```
Area (ac) ........................................................................ 1.01
Peak Rate Factor ........................................................... 484.00
Weighted Curve Number ............................................... 98.00
Rain Gage ID ................................................................. StormData
```

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.01	A/B	98.00
Composite Area & Weighted CN	1.01		98.00

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 ............................................... 98.00
Time of Concentration (days hh:mm:ss) ........................ 0 00:05:00
```

Subbasin : {Catch Basin Boundaries}.OA3-15AI

Input Data

Area (ac) 0.02
Peak Rate Factor 484.00
Weighted Curve Number 98.00
Rain Gage ID .... StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.02	A	98.00
Composite Area & Weighted CN	0.02		98.00

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 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : {Catch Basin Boundaries}.OA3-15BP

Input Data

Area (ac)	0.12
Peak Rate Factor	484.00
Weighted Curve Number	81.20
Rain Gage ID	StormData

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.12	A	81.20
Composite Area & Weighted CN	0.12		81.20

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	116	319.25	324.04	4.79	319.25	0.00	323.04	-1.00	0.00	39.51
2	124	312.14	321.15	9.01	312.14	0.00	320.15	-1.00	0.00	72.10
3	125	311.62	315.52	3.90	311.62	0.00	314.52	-1.00	0.00	4.85
4	126	312.10	317.12	5.02	312.10	0.00	316.12	-1.00	0.00	24.24
5	129	312.12	315.52	3.40	312.12	0.00	314.52	-1.00	0.00	4.85
6	131	301.77	304.77	3.00	301.77	0.00	303.77	-1.00	0.00	17.94
7	141	138.50	139.66	1.16	138.50	0.00	138.66	-1.00	0.00	1.92
8	144	109.33	112.83	3.50	109.33	0.00	111.83	-1.00	0.00	19.04
9	145	113.37	121.97	8.60	113.37	0.00	120.97	-1.00	0.00	43.20
10	147	96.10	98.79	2.69	96.10	0.00	97.79	-1.00	0.00	14.26
11	149	138.35	141.85	3.50	138.35	0.00	140.85	-1.00	0.00	24.00
12	153	342.07	359.60	17.54	342.07	0.00	358.60	-1.00	0.00	206.42
13	159	302.65	318.40	15.75	302.65	0.00	317.40	-1.00	0.00	183.03
14	161	304.99	320.67	15.68	304.99	0.00	319.67	-1.00	0.00	184.17
15	169	138.28	142.39	4.11	138.28	0.00	141.39	-1.00	0.00	31.08
16	172	134.60	139.51	4.91	134.60	0.00	138.51	-1.00	0.00	40.87
17	175	245.83	248.93	3.10	245.83	0.00	247.93	-1.00	0.00	25.20
18	CB-10	343.39	347.38	3.99	343.39	0.00	346.38	-1.00	0.00	28.68
19	CB-100	288.54	292.68	4.14	288.54	0.00	291.68	-1.00	0.00	31.70
20	CB-10EX	344.23	348.02	3.79	344.23	0.00	347.02	-1.00	0.00	27.50
21	CB-110	281.90	292.27	10.37	281.90	0.00	291.27	-1.00	0.00	35.80
22	CB-110A	281.38	285.84	4.46	281.38	0.00	284.84	-1.00	0.00	5.48
23	CB-110B	281.88	285.84	3.96	281.88	0.00	284.84	-1.00	0.00	5.48
24	CB-115	281.95	292.34	10.39	281.95	0.00	291.34	-1.00	0.00	88.66
25	CB-115A	281.43	285.89	4.46	281.43	0.00	284.89	-1.00	0.00	5.48
26	CB-115B	281.93	285.89	3.96	281.93	0.00	284.89	-1.00	0.00	5.48
27	CB-120	281.86	287.54	5.68	281.86	0.00	286.54	-1.00	0.00	32.21
28	CB-125	281.91	287.65	5.74	281.91	0.00	286.65	-1.00	0.00	32.90
29	CB-130	281.49	286.04	4.55	281.49	0.00	285.04	-1.00	0.00	36.55
30	CB-135	280.50	284.00	3.50	280.50	0.00	283.00	-1.00	0.00	23.99
31	CB-140	277.25	280.76	3.51	277.25	0.00	279.76	-1.00	0.00	24.08
32	CB-141	281.07	283.97	2.90	281.07	0.00	282.97	-1.00	0.00	22.83
33	CB-150	272.74	276.40	3.66	272.74	0.00	275.40	-1.00	0.00	25.96
34	CB-160	263.22	267.43	4.21	263.22	0.00	266.43	-1.00	0.00	26.10
35	CB-161	267.00	270.32	3.32	267.00	0.00	269.32	-1.00	0.00	27.87
36	CB-165	260.00	264.27	4.27	260.00	0.00	263.27	-1.00	0.00	33.26
37	CB-170	258.50	262.86	4.35	258.50	0.00	261.86	-1.00	0.00	34.25
38	CB-180	257.22	260.39	3.17	257.22	0.00	259.39	-1.00	0.00	20.03
39	CB-190	246.41	258.14	11.73	246.41	0.00	257.14	-1.00	0.00	43.78
40	CB-190A	245.91	258.14	12.23	245.91	0.00	257.14	-1.00	0.00	86.80
41	CB-190B	246.41	252.52	6.12	246.41	0.00	251.52	-1.00	0.00	19.41
42	CB-20	337.37	343.03	5.66	337.37	0.00	342.03	-1.00	0.00	18.84
43	CB-200	246.38	252.52	6.14	246.38	0.00	251.52	-1.00	0.00	37.71
44	CB-210	245.40	251.85	6.46	245.40	0.00	250.85	-1.00	0.00	59.51
45	CB-220	245.58	249.25	3.67	245.58	0.00	248.25	-1.00	0.00	26.03
46	CB-250	239.67	243.34	3.67	239.67	0.00	242.34	-1.00	0.00	26.03
47	CB-260	234.51	238.07	3.56	234.51	0.00	237.07	-1.00	0.00	24.74
48	CB-261	234.76	237.48	2.72	234.76	0.00	236.48	-1.00	0.00	20.70
49	CB-265	231.01	234.66	3.65	231.01	0.00	233.66	-1.00	0.00	25.75
50	CB-270	229.14	232.64	3.50	229.14	0.00	231.64	-1.00	0.00	24.01
51	CB-280	211.13	215.30	4.17	211.13	0.00	214.30	-1.00	0.00	32.04
52	CB-290	205.53	209.99	4.46	205.53	0.00	208.99	-1.00	0.00	35.54
53	CB-30	332.08	335.75	3.67	332.08	0.00	334.75	-1.00	0.00	26.04
54	CB-300	197.49	201.15	3.66	197.49	0.00	200.15	-1.00	0.00	25.96
55	CB-310	190.13	193.80	3.67	190.13	0.00	192.80	-1.00	0.00	26.01
56	CB-320	184.86	188.53	3.67	184.86	0.00	187.53	-1.00	0.00	26.02
57	CB-330	175.77	179.43	3.66	175.77	0.00	178.43	-1.00	0.00	25.95
58	CB-340	168.39	172.23	3.84	168.39	0.00	171.23	-1.00	0.00	28.08
59	CB-341	170.66	173.66	3.00	170.66	0.00	172.66	-1.00	0.00	24.00
60	CB-345	163.77	167.27	3.50	163.77	0.00	166.27	-1.00	0.00	24.03
61	CB-350	161.65	165.61	3.96	161.65	0.00	164.61	-1.00	0.00	23.49
62	CB-351	163.86	166.86	3.00	163.86	0.00	165.86	-1.00	0.00	23.99
63	CB-360	148.00	151.67	3.67	148.00	0.00	150.67	-1.00	0.00	26.00
64	CB-370	134.56	139.07	4.51	134.56	0.00	138.07	-1.00	0.00	36.16
65	CB-390	122.42	138.65	16.23	122.42	0.00	137.65	-1.00	0.00	39.87
66	CB-390A	121.89	128.92	7.03	121.89	0.00	127.92	-1.00	0.00	12.40
67	CB-390B	122.39	128.92	6.53	122.39	0.00	127.92	-1.00	0.00	12.40
68	CB-395	122.37	138.83	16.46	122.37	0.00	137.83	-1.00	0.00	161.55
69	CB-395A	121.84	128.87	7.03	121.84	0.00	127.87	-1.00	0.00	12.40
70	CB-395B	122.37	128.87	6.50	122.37	0.00	127.87	-1.00	0.00	12.40
71	CB-40	325.96	329.62	3.66	325.96	0.00	328.62	-1.00	0.00	25.95
72	CB-400	122.35	131.29	8.94	122.35	0.00	130.29	-1.00	0.00	71.82
73	CB-405	122.30	129.56	7.26	122.30	0.00	128.56	-1.00	0.00	50.31
74	CB-410	122.26	128.59	6.33	122.26	0.00	127.59	-1.00	0.00	58.48
75	CB-420	118.40	122.25	3.85	118.40	0.00	121.25	-1.00	0.00	28.22
76	CB-430	114.95	118.45	3.50	114.95	0.00	117.45	-1.00	0.00	24.02
77	CB-450	107.85	110.85	3.00	107.85	0.00	109.85	-1.00	0.00	18.05
78	CB-460	97.75	101.64	3.89	97.75	0.00	100.64	-1.00	0.00	28.68
79	CB-470EX	89.17	97.66	8.49	89.17	0.00	96.66	-1.00	0.00	21.26
80	CB-480EX	82.12	90.03	7.91	82.12	0.00	89.03	-1.00	0.00	76.94
81	CB-490	60.90	67.64	6.75	60.90	0.00	66.64	-1.00	0.00	62.97
82	CB-490EX	75.53	80.48	4.95	75.53	0.00	79.48	-1.00	0.00	40.21
83	CB-495EX	61.80	68.14	6.34	61.80	0.00	67.14	-1.00	0.00	57.18
84	CB-50	312.06	321.03	8.97	312.06	0.00	320.03	-1.00	0.00	28.59
85	CB-50A	311.54	315.44	3.90	311.54	0.00	314.44	-1.00	0.00	4.85
86	CB-50B	312.04	315.44	3.40	312.04	0.00	314.44	-1.00	0.00	4.85
87	CB-60	312.02	317.04	5.02	312.02	0.00	316.04	-1.00	0.00	24.21
88	CB-70	311.75	316.01	4.27	311.75	0.00	315.01	-1.00	0.00	33.21

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)
89	CB-80	306.46	309.96	3.50	306.46	0.00	308.96	-1.00	0.00	24.04
90	CB-90	303.04	306.71	3.67	303.04	0.00	305.71	-1.00	0.00	26.67
91	Out-1143	114.20	120.20	6.00	114.20	0.00	119.20	-1.00	0.00	12.00
92	Out-183	281.00	284.98	3.98	281.00	0.00	283.98	-1.00	0.00	29.81
93	WQ-1	320.24	326.00	5.76	320.24	0.00	325.00	-1.00	0.00	23.58
94	WQ-2	296.00	301.80	5.80	296.00	0.00	300.80	-1.00	0.00	24.02
95	WQ-3	253.03	258.83	5.80	253.03	0.00	257.83	-1.00	0.00	23.94
96	WQ-4	134.68	140.48	5.80	134.68	0.00	139.48	-1.00	0.00	24.05

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	116	0.44	0.00	319.39	0.14	0.00	4.65	319.28	0.03	0 08:04	0 00:00	0.00	0.00
2	124	0.10	0.00	312.25	0.11	0.00	8.90	312.15	0.01	0 08:13	0 00:00	0.00	0.00
3	125	0.10	0.00	312.19	0.57	0.00	3.34	312.05	0.43	0 09:12	0 00:00	0.00	0.00
4	126	0.03	0.00	312.16	0.06	0.00	4.96	312.11	0.01	0 08:24	0 00:00	0.00	0.00
5	129	0.05	0.00	312.19	0.07	0.00	3.43	312.13	0.01	0 09:19	0 00:00	0.00	0.00
6	131	0.67	0.00	301.93	0.16	0.00	2.84	301.80	0.03	0 08:02	0 00:00	0.00	0.00
7	141	0.00	0.00	138.50	0.00	0.00	1.16	138.50	0.00	0 00:00	0 00:00	0.00	0.00
8	144	7.10	0.00	110.64	1.31	0.00	2.19	109.51	0.18	0 08:29	0 00:00	0.00	0.00
9	145	6.95	2.06	113.96	0.59	0.00	8.01	113.51	0.14	0 08:21	0 00:00	0.00	0.00
10	147	14.44	0.00	97.42	1.32	0.00	1.37	96.34	0.24	0 08:06	0 00:00	0.00	0.00
11	149	7.86	1.07	138.95	0.60	0.00	2.90	138.45	0.10	0 07:59	0 00:00	0.00	0.00
12	153	0.00	0.00	342.07	0.00	0.00	17.54	342.07	0.00	0 00:00	0 00:00	0.00	0.00
13	159	0.00	0.00	302.65	0.00	0.00	15.75	302.65	0.00	0 00:00	0 00:00	0.00	0.00
14	161	0.00	0.00	304.99	0.00	0.00	15.68	304.99	0.00	0 00:00	0 00:00	0.00	0.00
15	169	1.95	0.00	138.62	0.34	0.00	3.77	138.34	0.06	0 08:02	0 00:00	0.00	0.00
16	172	1.94	0.00	135.58	0.98	0.00	3.93	134.74	0.14	0 08:08	0 00:00	0.00	0.00
17	175	0.78	0.78	246.28	0.45	0.00	2.65	245.91	0.08	0 08:01	0 00:00	0.00	0.00
18	CB-10	0.11	0.11	343.52	0.13	0.00	3.86	343.42	0.03	0 08:00	0 00:00	0.00	0.00
19	CB-100	1.22	0.56	288.82	0.28	0.00	3.86	288.59	0.05	0 08:02	0 00:00	0.00	0.00
20	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
21	CB-110	1.22	0.00	282.30	0.40	0.00	9.97	281.99	0.09	0 08:08	0 00:00	0.00	0.00
22	CB-110A	0.78	0.00	282.27	0.89	0.00	3.57	281.94	0.56	0 08:08	0 00:00	0.00	0.00
23	CB-110B	0.76	0.00	282.23	0.35	0.00	3.65	281.96	0.08	0 08:09	0 00:00	0.00	0.00
24	CB-115	0.44	0.00	282.22	0.27	0.00	10.12	282.00	0.05	0 08:11	0 00:00	0.00	0.00
25	CB-115A	0.42	0.00	282.21	0.78	0.00	3.68	281.92	0.49	0 08:23	0 00:00	0.00	0.00
26	CB-115B	0.32	0.00	282.21	0.28	0.00	3.72	281.98	0.05	0 08:21	0 00:00	0.00	0.00
27	CB-120	0.94	0.00	282.16	0.30	0.00	5.38	281.92	0.06	0 08:15	0 00:00	0.00	0.00
28	CB-125	0.29	0.00	282.19	0.28	0.00	5.47	281.96	0.05	0 08:17	0 00:00	0.00	0.00
29	CB-130	1.06	0.24	281.75	0.26	0.00	4.28	281.55	0.06	0 08:15	0 00:00	0.00	0.00
30	CB-135	1.08	0.00	280.69	0.19	0.00	3.31	280.54	0.04	0 08:01	0 00:00	0.00	0.00
31	CB-140	1.54	0.46	277.50	0.25	0.00	3.26	277.30	0.05	0 08:00	0 00:00	0.00	0.00
32	CB-141	1.08	1.08	281.43	0.36	0.00	2.54	281.13	0.06	0 08:00	0 00:00	0.00	0.00
33	CB-150	1.54	0.00	272.96	0.22	0.00	3.44	272.79	0.05	0 08:01	0 00:00	0.00	0.00
34	CB-160	8.92	1.46	263.90	0.68	0.00	3.54	263.34	0.12	0 08:00	0 00:00	0.00	0.00
35	CB-161	5.93	5.93	267.70	0.70	0.00	2.62	267.10	0.10	0 08:00	0 00:00	0.00	0.00
36	CB-165	9.02	0.10	260.85	0.85	0.00	3.42	260.13	0.13	0 08:00	0 00:00	0.00	0.00
37	CB-170	9.03	0.00	259.42	0.92	0.00	3.43	258.64	0.14	0 08:02	0 00:00	0.00	0.00
38	CB-180	9.08	0.05	258.08	0.86	0.00	2.31	257.35	0.13	0 08:04	0 00:00	0.00	0.00
39	CB-190	9.08	0.00	247.89	1.48	0.00	10.25	246.73	0.32	0 08:11	0 00:00	0.00	0.00
40	CB-190A	9.11	0.00	247.74	1.83	0.00	10.40	246.68	0.77	0 08:10	0 00:00	0.00	0.00
41	CB-190B	8.92	0.00	247.62	1.21	0.00	4.90	246.69	0.28	0 08:06	0 00:00	0.00	0.00
42	CB-20	0.24	0.24	337.46	0.09	0.00	5.57	337.39	0.02	0 07:59	0 00:00	0.00	0.00
43	CB-200	9.09	0.00	247.33	0.95	0.00	5.20	246.52	0.14	0 08:13	0 00:00	0.00	0.00
44	CB-210	9.52	0.09	246.12	0.72	0.00	5.73	245.52	0.12	0 08:16	0 00:00	0.00	0.00
45	CB-220	0.09	0.09	245.64	0.06	0.00	3.61	245.59	0.01	0 08:00	0 00:00	0.00	0.00
46	CB-250	0.09	0.00	239.73	0.06	0.00	3.61	239.68	0.01	0 08:03	0 00:00	0.00	0.00
47	CB-260	1.64	1.55	234.74	0.23	0.00	3.33	234.55	0.04	0 08:00	0 00:00	0.00	0.00
48	CB-261	0.00	0.00	234.76	0.00	0.00	2.72	234.76	0.00	0 00:00	0 00:00	0.00	0.00
49	CB-265	2.32	0.70	231.35	0.34	0.00	3.31	231.07	0.06	0 08:01	0 00:00	0.00	0.00
50	CB-270	2.32	0.00	229.41	0.27	0.00	3.23	229.20	0.06	0 08:02	0 00:00	0.00	0.00
51	CB-280	2.59	0.28	211.43	0.30	0.00	3.87	211.19	0.06	0 08:02	0 00:00	0.00	0.00
52	CB-290	2.59	0.00	205.82	0.29	0.00	4.17	205.59	0.06	0 08:03	0 00:00	0.00	0.00
53	CB-30	0.24	0.00	332.17	0.09	0.00	3.58	332.10	0.02	0 08:01	0 00:00	0.00	0.00
54	CB-300	2.59	0.00	197.78	0.29	0.00	3.37	197.55	0.06	0 08:04	0 00:00	0.00	0.00
55	CB-310	2.59	0.00	190.44	0.31	0.00	3.36	190.19	0.06	0 08:06	0 00:00	0.00	0.00
56	CB-320	3.07	0.49	185.19	0.33	0.00	3.34	184.93	0.07	0 08:05	0 00:00	0.00	0.00
57	CB-330	3.07	0.00	176.09	0.32	0.00	3.34	175.83	0.06	0 08:06	0 00:00	0.00	0.00
58	CB-340	3.26	0.22	168.74	0.35	0.00	3.49	168.46	0.07	0 08:05	0 00:00	0.00	0.00
59	CB-341	0.00	0.00	170.66	0.00	0.00	3.00	170.66	0.00	0 00:00	0 00:00	0.00	0.00
60	CB-345	3.26	0.00	164.15	0.38	0.00	3.12	163.84	0.07	0 08:07	0 00:00	0.00	0.00
61	CB-350	6.82	3.67	162.14	0.49	0.00	3.47	161.74	0.09	0 08:04	0 00:00	0.00	0.00
62	CB-351	0.00	0.00	163.86	0.00	0.00	3.00	163.86	0.00	0 00:00	0 00:00	0.00	0.00
63	CB-360	6.82	0.00	148.49	0.49	0.00	3.18	148.10	0.10	0 08:05	0 00:00	0.00	0.00
64	CB-370	7.80	0.00	135.53	0.97	0.00	3.54	134.71	0.15	0 08:07	0 00:00	0.00	0.00
65	CB-390	7.80	0.00	123.44	1.02	0.00	15.21	122.63	0.21	0 08:15	0 00:00	0.00	0.00
66	CB-390A	4.51	0.00	123.40	1.51	0.00	5.52	122.59	0.70	0 08:22	0 00:00	0.00	0.00
67	CB-390B	4.10	0.00	123.37	0.98	0.00	5.55	122.60	0.21	0 08:23	0 00:00	0.00	0.00
68	CB-395	3.19	0.00	123.40	1.03	0.00	15.43	122.59	0.22	0 08:25	0 00:00	0.00	0.00
69	CB-395A	2.95	0.00	123.39	1.55	0.00	5.48	122.56	0.72	0 08:24	0 00:00	0.00	0.00
70	CB-395B	2.30	0.00	123.38	1.01	0.00	5.49	122.58	0.21	0 08:25	0 00:00	0.00	0.00
71	CB-40	0.44	0.20	326.09	0.13	0.00	3.53	325.99	0.03	0 08:01	0 00:00	0.00	0.00
72	CB-400	2.09	0.00	123.37	1.02	0.00	7.93	122.57	0.22	0 08:26	0 00:00	0.00	0.00
73	CB-405	5.59	0.00	123.32	1.02	0.00	6.24	122.53	0.23	0 08:24	0 00:00	0.00	0.00
74	CB-410	5.58	0.00	122.82	0.56	0.00	5.77	122.39	0.13	0 08:25	0 00:00	0.00	0.00
75	CB-420	5.98	0.84	118.90	0.50	0.00	3.35	118.52	0.12	0 08:26	0 00:00	0.00	0.00
76	CB-430	5.98	0.00	115.89	0.94	0.00	2.57	115.16	0.21	0 08:27	0 00:00	0.00	0.00
77	CB-450	7.25	0.59	108.33	0.48	0.00	2.52	107.98	0.13	0 08:30	0 00:00	0.00	0.00
78	CB-460	14.51	8.56	99.05	1.30	0.00	2.59	97.98	0.23	0 08:05	0 00:00	0.00	0.00
79	CB-470EX	23.83	9.79	93.39	4.22	0.00	4.28	89.45	0.28	0 08:05	0 00:00	0.00	0.00
80	CB-480EX	23.49	0.00	82.85	0.73	0.00	7.19	82.28	0.16	0 08:05	0 00:00	0.00	0.00
81	CB-490	23.66	0.00	63.66	2.76	0.00	3.98	61.15	0.25	0 08:08	0 00:00	0.00	0.00
82	CB-490EX	23.75	0.25	76.74	1.21	0.00	3.74	75.73	0.20	0 08:07	0 00:00	0.00	0.00
83	CB-495EX	23.66	0.00	66.92	5.12	0.00	1.22	62.17	0.37	0 08:07	0 00:00	0.00	0.00
84	CB-50	0.44	0.00	312.30	0.24	0.00	8.74	312.11	0.05	0 08:10	0 00:00	0.00	0.00
85	CB-50A	0.33	0.00	312.28	0.74	0.00	3.17	312.06	0.52	0 08:19	0 00:00	0.00	0.00
86	CB-50B	0.28	0.00	312.27	0.23	0.00	3.27	312.09	0.05	0 08:19	0 00:00	0.00	0.00
87	CB-60	0.25	0.00	312.16	0.14	0.00	4.88	312.05	0.03	0 08:24	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)
88	CB-70	1.11	0.96	311.95	0.20	0.00	4.06	311.79	0.04	0 08:01	0 00:00	0.00	0.00
89	CB-80	0.67	0.67	306.61	0.15	0.00	3.36	306.49	0.03	0 08:00	0 00:00	0.00	0.00
90	CB-90	0.67	0.00	303.22	0.18	0.00	3.49	303.07	0.03	0 08:00	0 00:00	0.00	0.00
91	Out-1143	6.02	0.09	114.78	0.58	0.00	5.42	114.34	0.14	0 08:26	0 00:00	0.00	0.00
92	Out-183	0.00	0.00	281.00	0.00	0.00	3.98	281.00	0.00	0 00:00	0 00:00	0.00	0.00
93	WQ-1	0.44	0.00	320.39	0.15	0.00	5.61	320.27	0.03	0 08:01	0 00:00	0.00	0.00
94	WQ-2	0.66	0.00	296.15	0.15	0.00	5.65	296.03	0.03	0 08:03	0 00:00	0.00	0.00
95	WQ-3	9.08	0.00	254.76	1.73	0.00	4.07	253.31	0.28	0 08:05	0 00:00	0.00	0.00
96	WQ-4	1.96	0.00	135.62	0.94	0.00	4.86	134.80	0.12	0 08:08	0 00:00	0.00	0.00

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
1	11 (1)	7.22	134.56	0.00	133.83	11.41	0.73	10.1100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
2	117 (1)	60.74	239.67	0.00	234.51	0.00	5.16	8.4900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
3	118 (1)	211.91	229.14	0.00	211.13	0.00	18.01	8.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
4	118 (2) (1)	19.36	231.01	0.00	229.14	0.00	1.87	9.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
5	120 (1)	77.38	197.49	0.00	190.13	0.00	7.36	9.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
6	123 (1)	52.16	168.39	0.00	163.77	0.00	4.62	8.8600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
7	123 (1) (1)	24.04	163.77	0.00	161.65	0.00	2.12	8.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
8	3	75.22	89.17	0.00	82.12	0.00	7.05	9.3700	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
9	4	11.09	344.23	0.00	343.49	0.10	0.74	6.6800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
10	5	43.29	343.39	0.00	343.17	0.00	0.22	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
11	6	35.28	306.46	0.00	302.92	-0.12	3.54	10.0500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
12	7	8.05	253.03	0.00	252.99	6.59	0.04	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
13	9	20.38	170.66	0.00	168.80	0.41	1.86	9.1100	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
14	11	117.04	148.00	0.00	138.35	0.00	9.65	8.2400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
15	25	51.69	118.40	0.00	114.95	0.00	3.45	6.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
16	32	35.05	311.54	0.00	311.54	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No
17	33	55.00	281.38	0.00	281.38	-0.50	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No
18	36	110.00	121.89	0.00	121.89	-0.50	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No
19	37	110.00	121.84	0.00	121.84	-0.53	0.00	0.0000	CIRCULAR	72.000	72.000	0.0120	0.5000	0.5000	0.0000	0.00	No
20	40	10.65	312.02	0.00	311.75	0.00	0.27	2.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
21	41	4.62	312.04	0.00	312.02	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
22	42	4.63	312.06	0.00	312.04	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
23	43	50.05	325.96	0.00	322.54	2.30	3.42	6.8300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
24	44	43.12	60.90	0.00	56.00	0.00	4.90	11.3500	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
25	45	4.61	281.88	0.00	281.86	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
26	46	4.65	281.90	0.00	281.88	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
27	48	21.38	302.04	-1.00	301.77	0.00	0.27	1.2600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
28	49	4.62	246.41	0.00	246.38	0.00	0.03	0.5400	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
29	50	10.47	288.54	0.00	287.79	5.89	0.75	7.2000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
30	51	42.42	311.75	0.00	308.34	0.00	3.41	8.0300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
31	52	4.67	246.43	0.03	246.41	0.50	0.03	0.5300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
32	53	8.92	122.31	-0.04	122.26	-0.04	0.05	0.5600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
33	55	38.35	281.49	0.00	280.30	0.00	1.19	3.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
34	57	20.27	281.86	0.00	281.49	0.00	0.37	1.8200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
35	58	55.00	245.91	0.00	245.91	-0.50	0.00	0.0000	CIRCULAR	60.000	60.000	0.0120	0.5000	0.5000	0.0000	0.00	No
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
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
38	61	4.65	122.39	0.00	122.37	0.07	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
39	62	4.65	122.34	-0.03	122.31	-0.04	0.03	0.6500	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
40	64	62.06	277.25	0.00	272.74	0.00	4.51	7.2700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
41	66	120.88	272.74	0.00	263.22	0.00	9.52	7.8700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
42	68	13.54	163.86	0.00	162.65	1.00	1.21	8.9200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
43	69	23.89	258.50	0.00	257.22	0.00	1.28	5.3700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
44	72	40.83	263.22	0.00	260.00	0.00	3.22	7.8900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
45	72 (1)	18.97	260.00	0.00	258.50	0.00	1.50	7.8900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
46	74	7.08	246.13	-0.25	245.40	0.00	0.73	10.3700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
47	75	39.50	245.40	0.00	241.65	0.00	3.75	9.4800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
48	76	18.88	281.07	0.00	280.50	0.00	0.57	3.0200	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
49	80	154.42	161.65	0.00	148.00	0.00	13.65	8.8400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
50	82	34.97	280.50	0.00	277.25	0.00	3.25	9.2900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
51	83	6.06	281.00	0.00	280.50	0.00	0.50	8.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No
52	84	7.32	281.90	0.00	281.95	0.00	-0.05	-0.6800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
53	85	7.26	281.91	0.00	281.86	0.00	0.05	0.6900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
54	86	4.70	281.95	0.00	281.93	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
55	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
56	88	55.00	281.43	0.00	281.43	-0.50	0.00	0.0000	CIRCULAR	48.000	48.000	0.0120	0.5000	0.5000	0.0000	0.00	No
57	89	4.62	281.93	0.00	281.91	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
58	90	78.87	82.12	0.00	75.63	0.10	6.49	8.2300	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
59	91	6.88	122.26	-0.04	122.22	-0.04	0.04	0.5800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
60	92	87.13	122.22	-0.04	118.40	0.00	3.82	4.3800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
61	93	101.21	75.53	0.00	61.87	0.07	13.66	13.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
62	94	6.93	61.80	0.00	60.90	0.00	0.90	13.0400	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
63	98	15.95	234.76	0.00	234.60	0.09	0.16	1.0000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
64	104	7.24	312.06	0.00	312.14	0.00	-0.08	-1.1000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
65	105	4.60	312.14	0.00	312.12	0.50	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
66	106	35.00	311.62	0.00	311.62	-0.50	0.00	0.0000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No
67	107	4.66	312.12	0.00	312.10	0.00	0.02	0.4300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No
68	108	7.50	312.10	0.00	312.02	0.00	0.08	1.0700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
69	109	19.31	320.24	0.00	319.25	0.00	0.99	5.1300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
70	111	57.22	337.37	0.00	332.08	0.00	5.29	9.2500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
71	112	65.78	332.08	0.00	325.96	0.00	6.12	9.3000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
72	117	77.49	245.58	0.00	239.67	0.00	5.91	7.6300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
73	118	36.15	234.51	0.00	231.01	0.00	3.50	9.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
74	119	58.35	211.13	0.00	205.53	0.00	5.60	9.6000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
75	120	81.20	205.53	0.00	197.49	0.00	8.04	9.9000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
76	121	66.71	190.13	0.00	184.86	0.00	5.27	7.9000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
77	122	106.88	184.86	0.00	175.77	0.00	9.09	8.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
78	123	78.49	175.77	0.00	168.39	0.00	7.38	9.4000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
79	127	123.28	107.85	0.00	97.75	0.00	10.10	8.1900	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
80	128	28.16	97.75	0.00	96.10	0.00	1.65	5.8500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
81	130	32.22	319.25	0.00	317.15	5.09	2.10	6.5100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
82	132	39.08	301.77	0.00	298.30	2.30	3.47	8.8800	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
83	133	102.92	296.00	0.00	288.54	0.00	7.46	7.2500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
84	142	7.05	134.60	0.00	134.56	0.00	0.04	0.5700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
85	143	74.00	114.95	0.00	114.20	0.00	0.75	1.0100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
86	146	37.12	113.37	0.00	109.74	0.41	3.63	9.7700	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No
87	148	33.88	96.10	0.00	94.39	5.22	1.71	5.0600	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
88	150	6.91	138.35	0.00	138.30	0.02	0.05	0.7200	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No

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
89	151	16.06	134.68	0.00	134.60	0.00	0.08	0.5000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
90	152	10.13	342.07	0.00	341.13	3.76	0.94	9.2300	CIRCULAR	3.960	3.960	0.0120	0.5000	0.5000	0.0000	0.00	No
91	155	9.39	109.33	0.00	107.85	0.00	1.48	15.7500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
92	157	4.61	304.99	0.00	304.15	1.11	0.84	18.1200	CIRCULAR	3.960	3.960	0.0120	0.5000	0.5000	0.0000	0.00	No
93	158	6.88	302.65	0.00	302.06	0.29	0.58	8.4800	CIRCULAR	6.000	6.000	0.0120	0.5000	0.5000	0.0000	0.00	No
94	170	24.09	138.28	0.00	136.98	2.30	1.30	5.4000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
95	171	40.75	138.35	0.00	134.56	0.00	3.79	9.3000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
96	173	14.56	138.50	0.00	134.70	0.10	3.80	26.0900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
97	174	28.46	257.22	0.00	255.33	2.30	1.89	6.6400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
98	176	13.92	245.83	0.00	245.76	0.36	0.07	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
99	Link-01	79.01	82.12	0.00	75.53	0.00	6.59	8.3400	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No
100	Link-02	16.64	267.00	0.00	264.26	1.04	2.74	16.4600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No
101	Link-04	54.47	114.20	0.00	113.37	0.00	0.83	1.5200	CIRCULAR	60.000	60.000	0.0150	0.5000	0.5000	0.0000	0.00	No

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)	7.80	0 08:08	36.18	0.22	9.37	0.01	0.72	0.48	0.00		Calculated
2	117 (1)	0.09	0 08:03	33.17	0.00	1.10	0.92	0.14	0.09	0.00		Calculated
3	118 (1)	2.32	0 08:02	33.18	0.07	9.88	0.36	0.29	0.19	0.00		Calculated
4	118 (2) (1)	2.32	0 08:02	35.39	0.07	9.18	0.04	0.30	0.20	0.00		Calculated
5	120 (1)	2.59	0 08:05	35.10	0.07	10.28	0.13	0.30	0.20	0.00		Calculated
6	123 (1)	3.26	0 08:06	33.87	0.10	9.93	0.09	0.36	0.24	0.00		Calculated
7	123 (1) (1)	3.25	0 08:06	33.79	0.10	8.23	0.05	0.43	0.29	0.00		Calculated
8	3	23.49	0 08:06	27.87	0.84	16.72	0.07	1.11	0.74	0.00		Calculated
9	4	0.00	0 00:00	29.41	0.00	0.00		0.01	0.01	0.00		Calculated
10	5	0.11	0 08:01	8.05	0.01	1.57	0.46	0.13	0.08	0.00		Calculated
11	6	0.67	0 08:00	35.43	0.02	6.28	0.09	0.16	0.11	0.00		Calculated
12	7	9.08	0 08:06	8.02	1.13	5.48	0.02	1.33	0.89	0.00		> CAPACITY
13	9	0.00	0 00:00	11.65	0.00	0.00		0.00	0.00	0.00		Calculated
14	11	6.82	0 08:05	32.68	0.21	11.84	0.16	0.54	0.36	0.00		Calculated
15	25	5.98	0 08:26	29.40	0.20	7.15	0.12	0.72	0.48	0.00		Calculated
16	32	0.28	0 08:11	130.18	0.00	0.37	1.58	0.49	0.14	0.00		Calculated
17	33	0.76	0 08:11	148.37	0.01	0.62	1.48	0.62	0.16	0.00		Calculated
18	36	4.10	0 08:12	309.32	0.01	1.05	1.75	1.24	0.21	0.00		Calculated
19	37	2.30	0 08:12	318.47	0.01	0.63	2.91	1.28	0.21	0.00		Calculated
20	40	0.23	0 08:25	18.25	0.01	2.64	0.07	0.16	0.11	0.00		Calculated
21	41	0.25	0 08:10	47.57	0.01	1.53	0.05	0.18	0.06	0.00		Calculated
22	42	0.33	0 08:01	47.49	0.01	1.57	0.05	0.23	0.08	0.00		Calculated
23	43	0.44	0 08:01	29.75	0.01	5.86	0.14	0.13	0.09	0.00		Calculated
24	44	23.66	0 08:08	30.68	0.77	15.10	0.05	1.24	0.83	0.00		Calculated
25	45	0.77	0 08:10	47.57	0.02	1.93	0.04	0.33	0.11	0.00		Calculated
26	46	0.78	0 07:59	47.39	0.02	1.71	0.05	0.39	0.13	0.00		Calculated
27	48	0.67	0 08:01	27.74	0.02	6.02	0.06	0.17	0.11	0.00		Calculated
28	49	9.09	0 08:08	53.14	0.17	4.15	0.02	1.08	0.36	0.00		Calculated
29	50	1.22	0 08:03	30.53	0.04	6.64	0.03	0.24	0.16	0.00		Calculated
30	51	1.11	0 08:02	32.25	0.03	7.96	0.09	0.20	0.13	0.00		Calculated
31	52	9.11	0 08:06	52.84	0.17	3.23	0.02	1.39	0.47	0.00		Calculated
32	53	2.12	0 08:29	8.52	0.25	1.69	0.09	1.02	0.68	0.00		Calculated
33	55	1.06	0 08:16	20.05	0.05	5.49	0.12	0.25	0.17	0.00		Calculated
34	57	0.93	0 08:15	15.35	0.06	4.00	0.08	0.28	0.19	0.00		Calculated
35	58	8.92	0 08:04	269.02	0.03	1.93	0.47	1.53	0.31	0.00		Calculated
36	59	4.51	0 08:09	58.10	0.08	2.31	0.03	1.01	0.34	0.00		Calculated
37	60	2.95	0 08:07	58.27	0.05	1.78	0.04	1.04	0.35	0.00		Calculated
38	61	3.73	0 08:16	47.38	0.08	2.10	0.04	0.96	0.32	0.00		Calculated
39	62	2.09	0 08:27	47.39	0.04	1.02	0.08	1.01	0.34	0.00		Calculated
40	64	1.54	0 08:00	30.68	0.05	8.64	0.12	0.24	0.16	0.00		Calculated
41	66	1.54	0 08:01	31.93	0.05	3.78	0.53	0.45	0.30	0.00		Calculated
42	68	0.00	0 00:00	11.53	0.00	0.00		0.00	0.00	0.00		Calculated
43	69	9.03	0 08:03	26.37	0.34	8.30	0.05	0.89	0.59	0.00		Calculated
44	72	8.92	0 08:01	31.96	0.28	9.89	0.07	0.76	0.51	0.00		Calculated
45	72 (1)	9.03	0 08:02	31.96	0.28	8.39	0.04	0.89	0.59	0.00		Calculated
46	74	9.00	0 08:15	42.43	0.21	9.10	0.01	0.83	0.56	0.00		Calculated
47	75	9.51	0 08:16	35.04	0.27	13.56	0.05	0.63	0.42	0.00		Calculated
48	76	1.08	0 08:00	6.71	0.16	6.15	0.05	0.28	0.28	0.00		Calculated
49	80	6.82	0 08:04	33.83	0.20	13.72	0.19	0.49	0.32	0.00		Calculated
50	82	1.08	0 08:01	34.69	0.03	6.80	0.09	0.22	0.15	0.00		Calculated
51	83	0.00	0 00:00	30.17	0.00	0.00		0.09	0.06	0.00		Calculated
52	84	0.44	0 08:08	9.40	0.05	1.53	0.08	0.33	0.22	0.00		Calculated
53	85	0.31	0 08:28	9.44	0.03	1.42	0.09	0.29	0.19	0.00		Calculated
54	86	0.42	0 08:11	47.14	0.01	1.60	0.05	0.27	0.09	0.00		Calculated
55	87	3.19	0 08:08	8.34	0.38	2.78	0.06	1.02	0.68	0.00		Calculated
56	88	0.32	0 08:08	148.37	0.00	0.38	2.41	0.52	0.13	0.00		Calculated
57	89	0.29	0 08:29	47.52	0.01	1.05	0.07	0.27	0.09	0.00		Calculated
58	90	11.10	0 08:06	26.11	0.43	10.95	0.12	0.91	0.61	0.00		Calculated
59	91	5.58	0 08:25	8.68	0.64	5.90	0.02	0.79	0.53	0.00		Calculated
60	92	5.58	0 08:26	23.95	0.23	9.93	0.15	0.53	0.36	0.00		Calculated
61	93	23.66	0 08:08	33.45	0.71	14.09	0.12	1.34	0.90	0.00		Calculated
62	94	23.66	0 08:08	32.87	0.72	13.39	0.01	1.50	1.00	18.00		SURCHARGED
63	98	0.00	0 00:00	3.87	0.00	0.00		0.07	0.07	0.00		Calculated
64	104	0.10	0 08:10	11.96	0.01	0.89	0.14	0.17	0.11	0.00		Calculated
65	105	0.10	0 08:16	47.64	0.00	1.64	0.05	0.09	0.03	0.00		Calculated
66	106	0.04	0 08:44	130.27	0.00	0.12	4.86	0.32	0.09	0.00		Calculated
67	107	0.03	0 09:21	47.35	0.00	0.91	0.09	0.06	0.02	0.00		Calculated
68	108	0.03	0 09:24	11.75	0.00	0.80	0.16	0.10	0.06	0.00		Calculated
69	109	0.44	0 08:02	25.77	0.02	4.98	0.06	0.15	0.10	0.00		Calculated
70	111	0.24	0 08:00	34.60	0.01	5.54	0.17	0.09	0.06	0.00		Calculated
71	112	0.24	0 08:01	34.71	0.01	4.06	0.27	0.11	0.07	0.00		Calculated
72	117	0.09	0 08:00	31.43	0.00	3.89	0.33	0.06	0.04	0.00		Calculated
73	118	1.63	0 08:01	35.39	0.05	7.18	0.08	0.28	0.19	0.00		Calculated
74	119	2.59	0 08:03	35.25	0.07	10.49	0.09	0.30	0.20	0.00		Calculated
75	120	2.59	0 08:04	35.81	0.07	10.76	0.13	0.29	0.19	0.00		Calculated
76	121	2.59	0 08:06	31.98	0.08	9.53	0.12	0.32	0.21	0.00		Calculated
77	122	3.07	0 08:05	33.19	0.09	10.98	0.16	0.32	0.22	0.00		Calculated
78	123	3.06	0 08:06	34.89	0.09	10.55	0.12	0.33	0.22	0.00		Calculated
79	127	7.25	0 08:30	32.57	0.22	8.49	0.24	0.87	0.58	0.00		Calculated
80	128	14.44	0 08:05	27.51	0.52	8.85	0.05	1.31	0.87	0.00		Calculated
81	130	0.44	0 08:05	29.04	0.02	5.65	0.10	0.13	0.09	0.00		Calculated
82	132	0.66	0 08:03	33.91	0.02	7.08	0.09	0.15	0.10	0.00		Calculated
83	133	0.66	0 08:03	30.64	0.02	4.34	0.40	0.22	0.14	0.00		Calculated
84	142	2.06	0 08:12	8.57	0.24	1.79	0.07	0.97	0.65	0.00		Calculated
85	143	5.97	0 08:28	11.46	0.52	6.68	0.18	0.76	0.51	0.00		Calculated
86	146	7.10	0 08:25	28.45	0.25	11.11	0.06	0.73	0.49	0.00		Calculated
87	148	14.41	0 08:07	25.60	0.56	10.93	0.05	1.06	0.71	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
88	150	1.95	0 08:05	9.68	0.20	3.54	0.03	0.53	0.35	0.00		Calculated
89	151	1.94	0 08:08	8.03	0.24	1.64	0.16	0.96	0.64	0.00		Calculated
90	152	0.00	0 00:00	0.63	0.00	0.00		0.00	0.00	0.00		Calculated
91	155	7.00	0 08:30	15.32	0.46	11.22	0.01	0.74	0.74	0.00		Calculated
92	157	0.00	0 00:00	0.88	0.00	0.00		0.00	0.00	0.00		Calculated
93	158	0.00	0 00:00	1.77	0.00	0.00		0.00	0.00	0.00		Calculated
94	170	1.96	0 08:03	26.44	0.07	7.45	0.05	0.31	0.21	0.00		Calculated
95	171	5.90	0 08:05	11.77	0.50	9.32	0.07	0.78	0.78	0.00		Calculated
96	173	0.00	0 00:00	19.72	0.00	0.00		0.44	0.44	0.00		Calculated
97	174	9.08	0 08:05	29.33	0.31	11.01	0.04	0.71	0.48	0.00		Calculated
98	176	0.78	0 08:01	2.73	0.29	2.58	0.09	0.41	0.41	0.00		Calculated
99	Link-01	12.42	0 08:06	30.34	0.41	11.42	0.12	0.96	0.65	0.00		Calculated
100	Link-02	5.93	0 08:00	14.46	0.41	12.97	0.02	0.57	0.57	0.00		Calculated
101	Link-04	6.02	0 08:28	278.63	0.02	4.86	0.19	0.58	0.12	0.00		Calculated

OSBORN
CONSULTING
INCORPORATED

Louis Thompson Tightline Project
Flow Splitter for WQ Facilities

Structure Elevations (ft)	
Rim	108.50
Invert	100.00

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)	14.14
Baffle Riser Height Above WQ Outlet(ft)	1
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 ($2*pi*r^2$)
h = head on weir crest in feet

Wall Height/Orifice Diam. Ratio 4.0 >= 2.0

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:

Total 100-yr discharge to flow splitter = 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	
96" MH - 14 Cartridge Max WQ Rate	0.351	cfs	At Weir height/design WQ surface

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	4.706	0.354	4.352	
102.20	12.673	0.362	12.311	
102.30	22.986	0.370	22.616	*100-yr Design Discharge (~16 cfs), WQ Rate < 10% Above WQ Rate*
102.40	35.198	0.378	34.820	
102.50	49.048	0.386	48.662	
102.60	64.362	0.394	63.968	
102.70	81.010	0.401	80.609	
102.80	98.893	0.409	98.485	
102.90	117.932	0.416	117.516	
103.00	138.060	0.423	137.637	
103.10	159.220	0.430	158.790	
103.20	181.365	0.437	180.928	
103.30	204.452	0.444	204.009	
103.40	228.446	0.450	227.995	
103.50	253.311	0.457	252.855	
103.60	279.020	0.463	278.557	

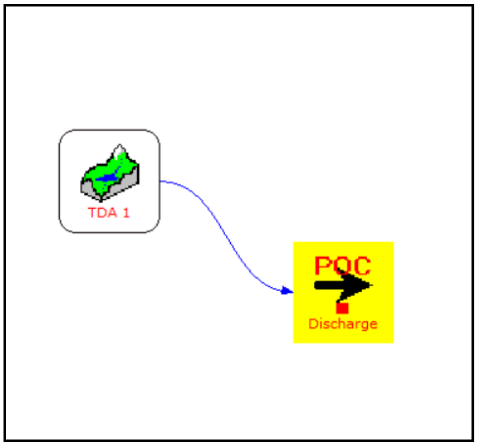
APPENDIX C
FLOW CONTROL AND WATER QUALITY CALCULATIONS

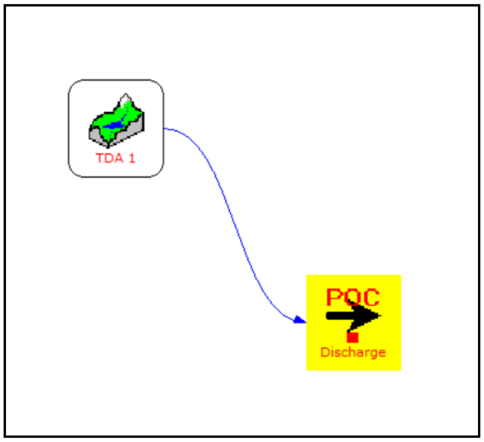
Flow Control Requirement Applicability Check: MGSFlood Model Results

Flow Control Detention Pipe and Vault Sizing Calculations: MGSFlood and Detention Pipe Stage-Storage

Water Quality Facility Sizing MGSFlood Model Results

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: 04/03/2023 10:54 AM
Report Generation Date: 04/03/2023 10:55 AM

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)	0.100	0.100
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.100	0.100

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

```
 ---------- Subbasin : TDA 1 ----------
                   -------Area (Acres) --------
Till Forest             0.100
-------------------------------------------
Subbasin Total          0.100
```

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

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

	-------Area (Acres) --------
Impervious	0.100
Subbasin Total	0.100

New Impervious Area in TDA 1

************************* **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	20.541
Link: Discharge	0.000

Total: 20.541

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: 0.130 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): 15.58
Inflow Volume Including PPT-Evap (ac-ft): 15.58
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): 15.58
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: 1

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

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 55.65
Inflow Volume Including PPT-Evap (ac-ft): 55.65
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): 55.65
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: 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              3.049E-03               2-Year          3.971E-02
  5-Year              4.898E-03               5-Year          5.203E-02
  10-Year             6.124E-03               10-Year         6.157E-02
  25-Year             9.185E-03               25-Year         7.262E-02
  50-Year             1.134E-02               50-Year         8.807E-02
  100-Year            1.181E-02               100-Year            0.103
  200-Year            1.984E-02               200-Year            0.107
  500-Year            3.065E-02               500-Year            0.111
 ** Record too Short to Compute Peak Discharge for These Recurrence Intervals
```

Flow Difference (cfs) = 0.091 cfs < 0.15 cfs

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/24/2023 10:20 AM
Report Generation Date: 04/24/2023 10:20 AM

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)	0.157	0.155
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.157	0.155

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

Number of Subbasins: 1

---------- Subbasin : Culvert 1 ----------

	-------Area (Acres) --------
Till Grass	0.143
Impervious	0.014
Subbasin Total	0.157

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


  ---------- Subbasin : Culvert 1 ----------
                         -------Area (Acres) --------
Till Grass                    0.095
Impervious                    0.060
---------------------------------------------
Subbasin Total                0.155



************************* 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: Culvert 1 19.155
Link: Discharge 0.000

Total: 19.155

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Culvert 1	12.725
Link: Discharge	0.000
Total:	12.725

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.121 ac-ft/year, Post Developed: 0.081 ac-ft/year

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

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

Number of Links: 1

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

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 49.49
Inflow Volume Including PPT-Evap (ac-ft): 49.49
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): 49.49
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): 61.09
Inflow Volume Including PPT-Evap (ac-ft): 61.09
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): 61.09
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: 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                  2.539E-02        2-Year          3.720E-02
   5-Year                  3.718E-02        5-Year          4.946E-02
   10-Year                 4.896E-02        10-Year         6.212E-02
   25-Year                 6.681E-02        25-Year         7.623E-02
   50-Year                 8.853E-02        50-Year             0.106
   100-Year                    0.105        100-Year            0.120
   200-Year                    0.106        200-Year            0.124
   500-Year                    0.108        500-Year            0.129
 ** Record too Short to Compute Peak Discharge for These Recurrence Intervals
```

Flow Difference (cfs) = +0.015 cfs

MGSFlood Flow Control Calculations

Includes Flow Control Models:

1) Culvert 2 (Iterations 1 and 2)
2) Culvert 3 (Iterations 1, 2, and 3)
3) Culvert 4 (Iterations 1, 2, and 3)
4) To EX Pond (Iterations 1, 3, and 3)

Note:

For detention facilities Culvert 3, Culvert 4, and To EX Pond:
-Iteration #1 = auto-sized detention volume from target FC areas
-Iteration #2 = detention pipe design to meet FC requirements with stage-storage volume
-Iteration #3 = Iteration #2 with Off-site Bypass flow through areas

For Culvert 2, where FC is not required, iteration #2 includes off-site bypass area.

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 03/23/2023 9:09 AM
Report Generation Date: 03/23/2023 9:11 AM

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)	0.386	0.385
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.386	0.385

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

Number of Subbasins: 1

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

	-------Area (Acres) --------
Till Grass	0.171
Impervious	0.216

Subbasin Total	0.386

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

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

	-------Area (Acres) --------
Till Grass	0.092
Impervious	0.211
--	
Subbasin Total	0.303

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

	-------Area (Acres) --------
Till Grass	0.027
Impervious	0.055
--	
Subbasin Total	0.082

*************************** 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) : 100.0
Pond Bottom Width (ft) : 2.0
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 200.
Area at Riser Crest El (sq-ft) : 200.

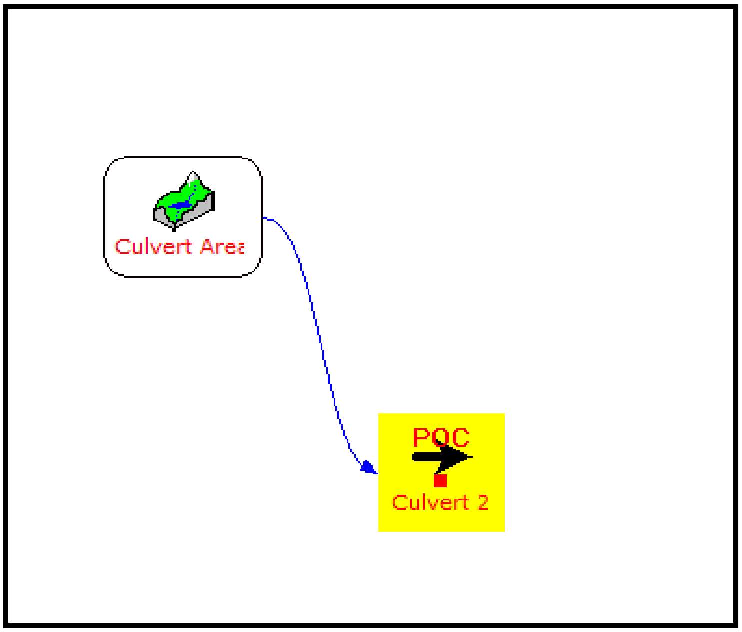
```
                         (acres)  :      0.005
Volume at Riser Crest (cu-ft)     :     500.
                         (ac-ft)  :     0.011
Area at Max Elevation   (sq-ft)   :     200.
                         (acres)  :      0.005
Vol at Max Elevation   (cu-ft)    :    600.
                         (ac-ft)  :     0.014

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             : 103.00 ft

 Hydraulic Structure Geometry

Number of Devices:      2

      ---Device Number     1 ---
Device Type              :   Circular Orifice
Control Elevation (ft)   :   100.50
Diameter (in)            :   1.49
Orientation              : Horizontal
Elbow                    : No

      --- Device Number    2 ---
Device Type              : Vertical Rectangular Orifice
Control Elevation (ft)   :   101.31
Length (in)              :    0.25
Height (in)              :    20.29
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
```

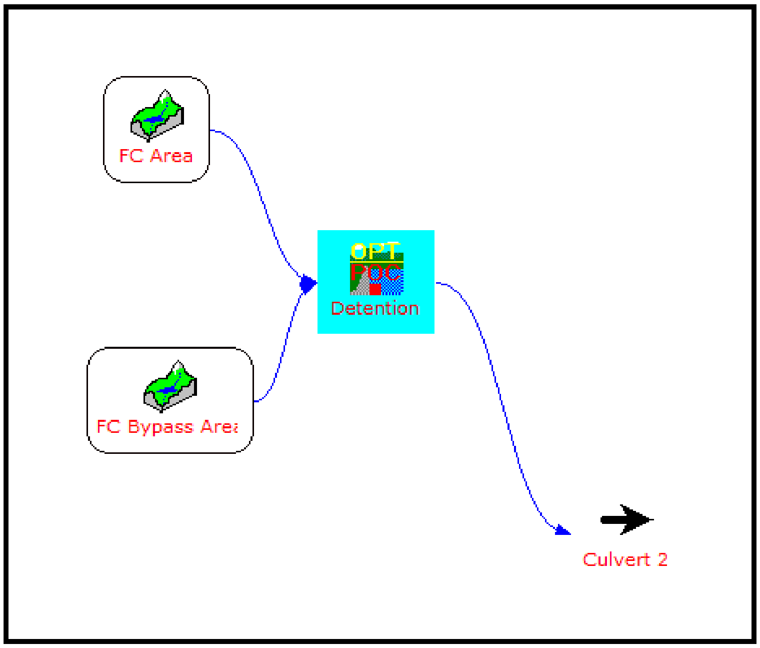
```
********** Link: Detention                                          **********      Link WSEL
Stats
 WSEL Frequency Data(ft)
 (Recurrence Interval Computed Using Gringorten Plotting Position)
Tr (yrs)           WSEL Peak (ft)
=======================================
   1.05-Year     101.183
   1.11-Year     101.259
   1.25-Year     101.364
   2.00-Year     101.640
   3.33-Year     101.830
      5-Year     101.981
     10-Year     102.185
     25-Year     102.479
     50-Year     102.685
   100-Year      102.783


 ***********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            22.839
Link:       Culvert 2             0.000
____________________________________________
Total:                                      22.839

                Total Post Developed Recharge During Simulation
Model Element                              Recharge Amount (ac-ft)
-----------------------------------------------------------------------------------------------
Subbasin: FC Area                 12.324
Subbasin: FC Bypass Area                   3.617
Link:       Detention             0.000
Link:       Culvert 2             Not Applicable
____________________________________________
Total:                                              15.940

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped:     0.145 ac-ft/year,    Post Developed:     0.101 ac-ft/year

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

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

Number of Links:   1


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

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

```
 Inflow Volume (ac-ft):   169.81
 Inflow Volume Including PPT-Evap (ac-ft):   169.81
 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):   169.81
 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):   1543. cu-ft
 Computed Large Wet Pond Volume, 1.5*Basic Volume:   2314. cu-ft


 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   182.72
 Inflow Volume Including PPT-Evap (ac-ft):   182.72
 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):   183.34
 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                    0.111             2-Year            7.407E-02
   5-Year                    0.144             5-Year                0.103
   10-Year                   0.178             10-Year               0.122
   25-Year                   0.212             25-Year               0.153
   50-Year                   0.287             50-Year               0.176
   100-Year                  0.324             100-Year              0.188
   200-Year                  0.337             200-Year              0.201
   500-Year                  0.354             500-Year              0.219
 ** 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%):            -20.4%    PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):         -20.4%    PASS
```

Maximum Excursion from Q2 to Q50 (Must be less than 10%): -51.3% PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%): 0.0% PASS

MEETS ALL FLOW DURATION DESIGN CRITERIA: PASS


Predeveloped


Postdeveloped

Flow Control 1

Detention Pipe Volume Calculator

MGS Software LLC

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser	500	cu ft
20% Contingency Target	600	cu ft
% Contingency Provided	22%	

Storage Volume Provided by Horizontal Pipe of Diameter d

Pipe Diameter (d)	3.5	ft
Pipe Length	70	ft
Overflow Elevation:	103.50	ft

***Dual Pipes 1/2 this Distance Each Pipe**

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.		Wetted Area	storage	storage
ft	y/d	s.f.	cu.ft.	(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**

DON'T INCLUDE THE COLUMN HEADINGS!

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

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/18/2023 10:56 AM
Report Generation Date: 04/18/2023 10:58 AM

Input File Name: Culvert 02_Flow Control_Iteration2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 2 Flow Control Iteration 2
Comments: Modeling detention pipe stage-storage volume contributing areas and bypass area to calculate the total postdeveloped flow at Culvert 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)	0.386	0.385
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.386	0.385

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

Number of Subbasins: 1

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

	-------Area (Acres) --------
Till Grass	0.171
Impervious	0.216

```
Subbasin Total              0.386

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


  ---------- Subbasin : FC Area ----------
                        -------Area (Acres) --------
Till Grass                  0.092
Impervious                  0.211
----------------------------------------------
Subbasin Total              0.303


  ---------- Subbasin : FC Bypass Area ----------
                        -------Area (Acres) --------
Till Grass                  0.027
Impervious                  0.055
----------------------------------------------
Subbasin Total              0.082



************************ 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 : 103.00 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 0.38
Orientation : Horizontal
Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 102.00
Diameter (in) : 0.50
Orientation : Horizontal
Elbow : Yes

--

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

*************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	22.839
Link: Culvert 2	0.000
Total:	22.839

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: FC Area	12.324
Subbasin: FC Bypass Area	3.617
Link: Detention	Not Computed
Link: Culvert 2	0.000
Total:	15.940

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.145 ac-ft/year, Post Developed: 0.101 ac-ft/year

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

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

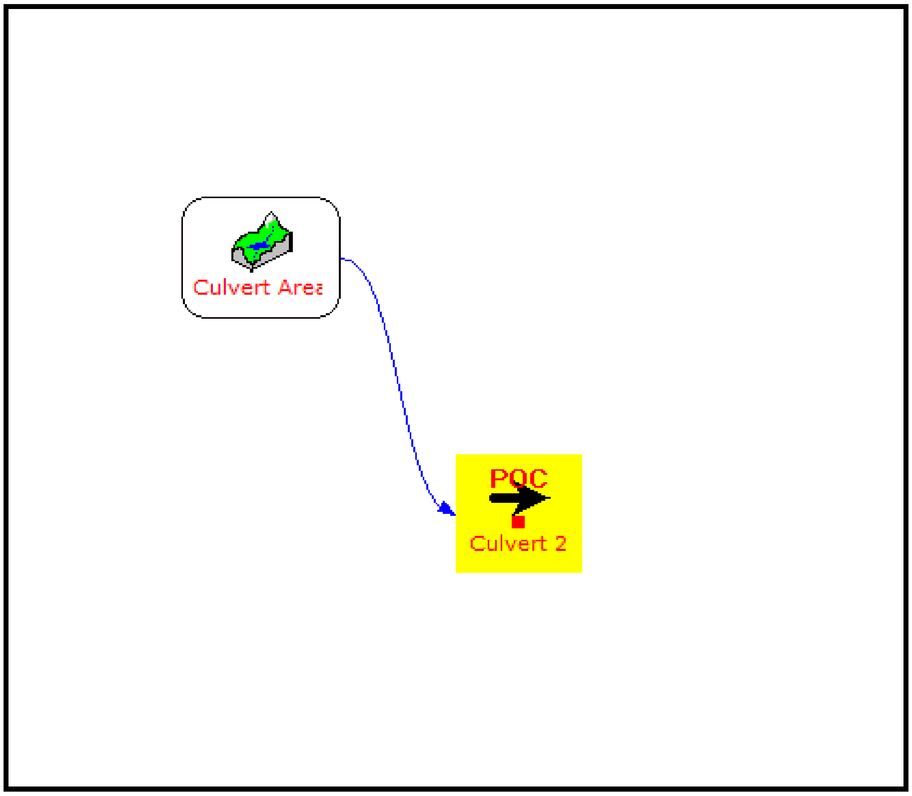
Number of Links: 1

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

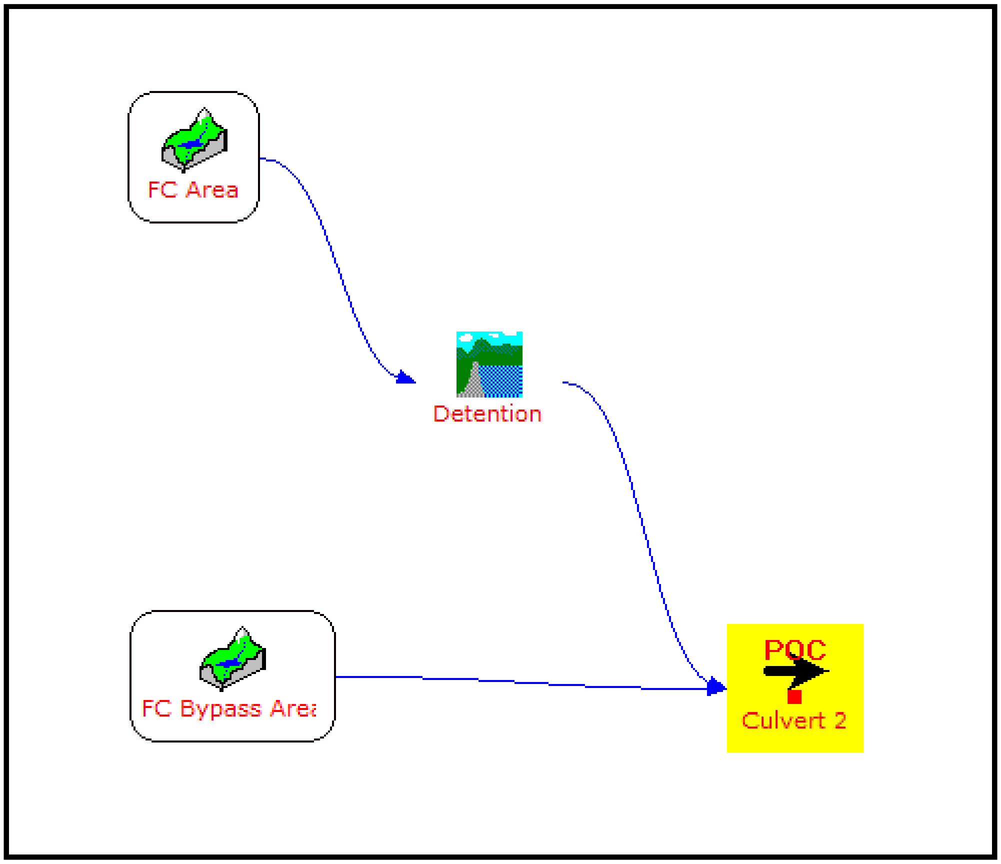
Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 169.81
Inflow Volume Including PPT-Evap (ac-ft): 169.81
Total Runoff Infiltrated (ac-ft): 0.00, 0.00%
Total Runoff Filtered (ac-ft): 0.00, 0.00%
Primary Outflow To Downstream System (ac-ft): 169.81
Secondary Outflow To Downstream 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: Culvert 2                                                          **********

 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   182.81
 Inflow Volume Including PPT-Evap (ac-ft):   182.81
 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):   182.81
 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                    0.111               2-Year            9.068E-02
    5-Year                    0.144               5-Year                 0.128
    10-Year                   0.178               10-Year                0.152
    25-Year                   0.212               25-Year                0.186
    50-Year                   0.287               50-Year                0.207
    100-Year                  0.324               100-Year               0.210
    200-Year                  0.337               200-Year               0.233
    500-Year                  0.354               500-Year               0.264
 ** 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%):               -29.8%    PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):            -15.6%    PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):                         -17.4%    PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):                           0.0%    PASS

-------------------------------------------------------------------------------------------
MEETS ALL FLOW DURATION DESIGN CRITERIA:     PASS
-------------------------------------------------------------------------------------------
```

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 03/30/2023 3:06 PM
Report Generation Date: 03/30/2023 3:08 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)	0.365	0.363
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.365	0.363

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

Number of Subbasins: 2

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

	-------Area (Acres) --------
Till Grass	0.232
Impervious	0.010

```
Subbasin Total              0.242


  ---------- Subbasin : Mitigated Existing ----------
                            -------Area (Acres) --------
Till Forest                 0.123
--------------------------------------------
Subbasin Total              0.123

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


  ---------- Subbasin : Unmitigated Area ----------
                            -------Area (Acres) --------
Till Grass                  0.126
Impervious                  0.047
--------------------------------------------
Subbasin Total              0.173


  ---------- Subbasin : Mitigated Area ----------
                            -------Area (Acres) --------
Impervious                  0.123
--------------------------------------------
Subbasin Total              0.123


  ---------- Subbasin : FC Bypass Area ----------
                            -------Area (Acres) --------
Till Grass                  0.039
Impervious                  0.028
--------------------------------------------
Subbasin Total              0.067



************************* 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) : 67.2
Pond Bottom Width (ft) : 13.4
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 902.
Area at Riser Crest El (sq-ft) : 902.
(acres) : 0.021
Volume at Riser Crest (cu-ft) : 1,354.
(ac-ft) : 0.031
Area at Max Elevation (sq-ft) : 902.
(acres) : 0.021
Vol at Max Elevation (cu-ft) : 1,805.
(ac-ft) : 0.041

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) : 0.044
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) : 0.89
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 102.27
Length (in) : 0.53
Height (in) : 8.78
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     102.008
    1.11-Year     102.088
    1.25-Year     102.157
    2.00-Year     102.354
    3.33-Year     102.471
        5-Year    102.576
       10-Year    102.700
       25-Year    102.831
       50-Year    102.869
    100-Year      102.947



 ***********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  31.077
Subbasin: Mitigated Existing    25.265
Link:       Culvert 3            0.000
_______________________________________________
Total:                                     56.342

                   Total Post Developed Recharge During Simulation
Model Element                                    Recharge Amount (ac-ft)
-----------------------------------------------------------------------------------------------
Subbasin: Unmitigated Area      16.811
Subbasin: Mitigated Area        0.000
Subbasin: FC Bypass Area                 5.264
Link:       Detention           0.000
Link:       Culvert 3           Not Applicable
_______________________________________________
```

Total: 22.075

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.357 ac-ft/year, Post Developed: 0.140 ac-ft/year

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

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

Number of Links: 1

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 92.38
Inflow Volume Including PPT-Evap (ac-ft): 92.38
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): 92.38
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): 1267. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1900. cu-ft

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 158.18
Inflow Volume Including PPT-Evap (ac-ft): 158.18
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): 158.30
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

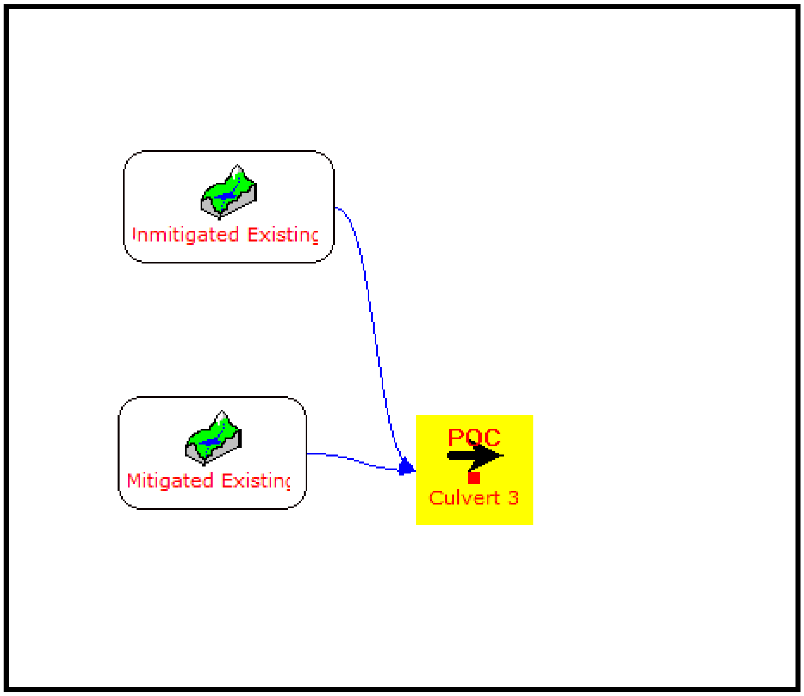
***** Point of Compliance Flow Frequency Data *****
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff Postdevelopment Runoff

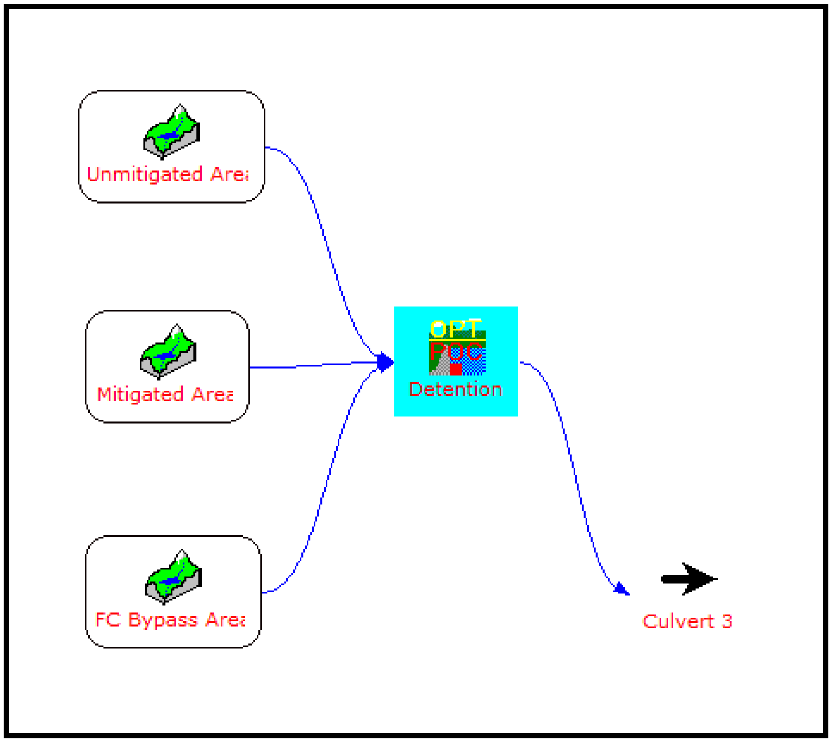
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	3.838E-02	2-Year	2.264E-02
5-Year	5.880E-02	5-Year	4.208E-02
10-Year	7.922E-02	10-Year	5.659E-02
25-Year	0.112	25-Year	7.404E-02
50-Year	0.137	50-Year	7.961E-02
100-Year	0.161	100-Year	9.120E-02
200-Year	0.171	200-Year	9.491E-02
500-Year	0.184	500-Year	9.956E-02

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

Predeveloped



Postdeveloped



Flow Control 2

Detention Pipe Volume Calculator

MGS Software LLC

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser	1354	cu ft
20% Contingency	1625	cu ft
% Contingency Provided	-8%	

Storage Volume Provided by Horizontal Pipe of Diameter d

Pipe Diameter (d)	4.0	ft
Pipe Length	140	ft
Overflow Elevation:	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**

DON'T INCLUDE THE COLUMN HEADINGS!

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: 04/18/2023 12:50 PM
Report Generation Date: 04/18/2023 12:50 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)	0.365	0.361
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.365	0.361

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

Number of Subbasins: 2

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

	-------Area (Acres) --------
Till Grass	0.232
Impervious	0.010
Subbasin Total	0.242

```
 ---------- Subbasin : Mitigated Existing ----------
                     -------Area (Acres) --------
Till Forest               0.123
----------------------------------------------
Subbasin Total            0.123

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


 ---------- Subbasin : Unmitigated Area ----------
                     -------Area (Acres) --------
Till Grass                0.123
Impervious                0.047
----------------------------------------------
Subbasin Total            0.170


 ---------- Subbasin : Mitigated Area ----------
                     -------Area (Acres) --------
Impervious                0.123
----------------------------------------------
Subbasin Total            0.123


 ---------- Subbasin : FC Bypass Area ----------
                     -------Area (Acres) --------
Till Grass                0.039
Impervious                0.028
----------------------------------------------
Subbasin Total            0.067



************************* 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 : 103.73 ft

Hydraulic Structure Geometry

Number of Devices: 2

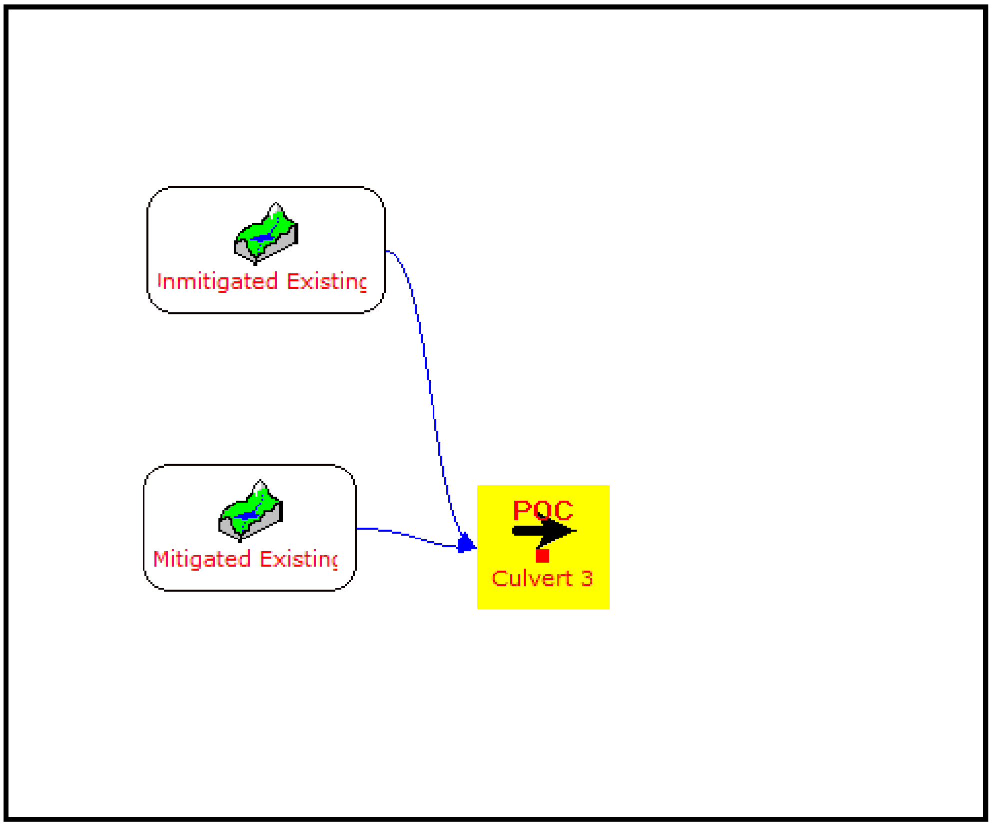
---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 0.62
Orientation : Horizontal

```
Elbow                    : No

      ---Device Number     2 ---
Device Type              :   Circular Orifice
Control Elevation (ft)   :   103.44
Diameter (in)            :   1.37
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     101.624
    1.11-Year     101.820
    1.25-Year     101.960
    2.00-Year     102.411
    3.33-Year     102.966
       5-Year     103.276
      10-Year     103.622
      25-Year     103.750
      50-Year     103.755
    100-Year      103.759



 ***********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  31.077
Subbasin: Mitigated Existing    25.265
Link:        Culvert 3          0.000
```

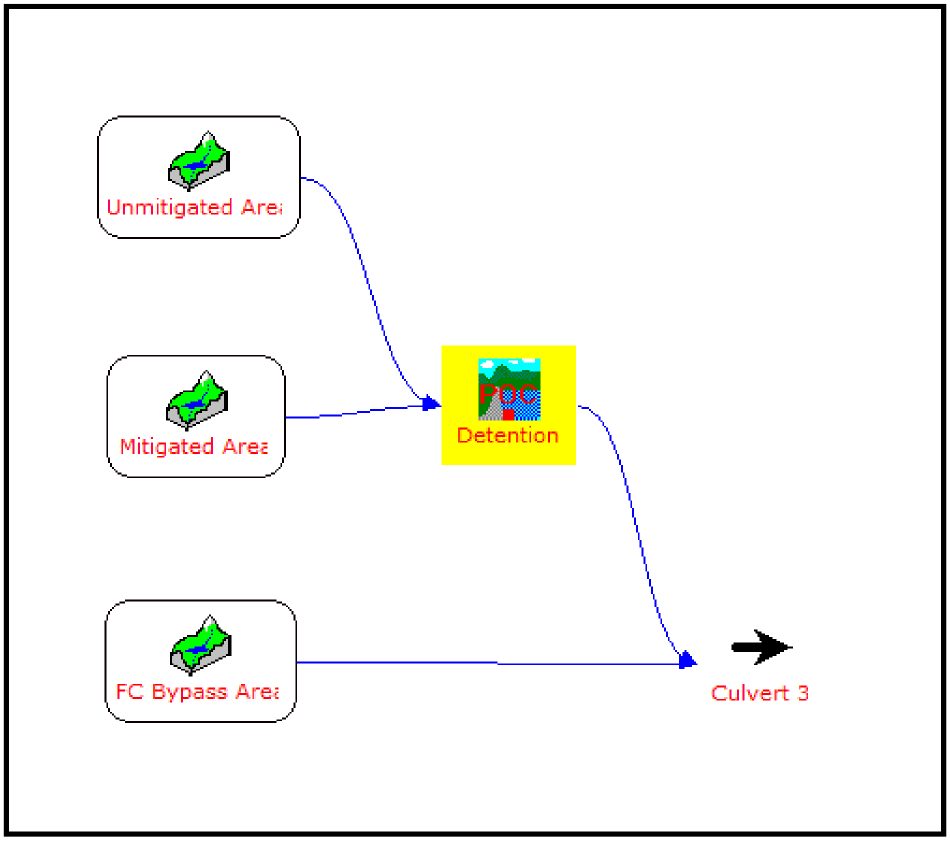
```
______________________________________________
Total:                                        56.342

             Total Post Developed Recharge During Simulation
Model Element                          Recharge Amount (ac-ft)
-----------------------------------------------------------------------
Subbasin: Unmitigated Area      16.530
Subbasin: Mitigated Area        0.000
Subbasin: FC Bypass Area                5.264
Link:     Detention             0.000
Link:     Culvert 3             Not Applicable
______________________________________________
Total:                                                21.794

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped:    0.357 ac-ft/year,   Post Developed:    0.138 ac-ft/year

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

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

Number of Links:   1


********** Link: Culvert 3                                                      **********

 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   92.38
 Inflow Volume Including PPT-Evap (ac-ft):   92.38
 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):   92.38
 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):   1061. cu-ft
 Computed Large Wet Pond Volume, 1.5*Basic Volume:   1591. cu-ft


 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   130.81
 Inflow Volume Including PPT-Evap (ac-ft):   130.81
 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):   131.10
 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%


 ***********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              3.838E-02            2-Year         1.441E-02
   5-Year              5.880E-02            5-Year         1.737E-02
   10-Year             7.922E-02            10-Year        3.887E-02
   25-Year                 0.112            25-Year        9.181E-02
   50-Year                 0.137            50-Year            0.112
   100-Year                0.161            100-Year           0.129
   200-Year                0.171            200-Year           0.132
   500-Year                0.184            500-Year           0.136
 ** 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%):          -64.2%   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%):                      5.5%   PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):                      0.9%   PASS

-------------------------------------------------------------------------------------------------
MEETS ALL FLOW DURATION DESIGN CRITERIA:    PASS
-------------------------------------------------------------------------------------------------
```

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/18/2023 12:51 PM
Report Generation Date: 04/18/2023 12:52 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:	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)	1.862	1.860
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.862	1.860

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

Number of Subbasins: 3

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

	-------Area (Acres) --------
Till Grass	0.232
Impervious	0.010
Subbasin Total	0.242

```
  ---------- Subbasin : Mitigated Existing ----------
                         -------Area (Acres) --------
Till Forest                 0.123
----------------------------------------------
Subbasin Total              0.123


  ---------- Subbasin : Offsite Bypass ----------
                         -------Area (Acres) --------
Till Grass                  1.230
Impervious                  0.267
----------------------------------------------
Subbasin Total              1.497

----------------------SCENARIO: POSTDEVELOPED
Number of Subbasins:   4


  ---------- Subbasin : Unmitigated Area ----------
                         -------Area (Acres) --------
Till Grass                  0.126
Impervious                  0.047
----------------------------------------------
Subbasin Total              0.173


  ---------- Subbasin : Mitigated Area ----------
                         -------Area (Acres) --------
Impervious                  0.123
----------------------------------------------
Subbasin Total              0.123


  ---------- Subbasin : Bypass ----------
                         -------Area (Acres) --------
Till Grass                  0.039
Impervious                  0.028
----------------------------------------------
Subbasin Total              0.067


  ---------- Subbasin : Offsite Bypass ----------
                         -------Area (Acres) --------
Till Grass                  1.230
Impervious                  0.267
----------------------------------------------
Subbasin Total              1.497


************************* 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            : 103.73 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)  :   103.44
Diameter (in)           :   1.37
Orientation             : Horizontal
Elbow                   : Yes


-----------------------------------------
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:   4
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     103.757
   1.11-Year     103.762
   1.25-Year     103.772
   2.00-Year     103.797
   3.33-Year     103.810
      5-Year     103.816
```

10-Year	103.835
25-Year	103.848
50-Year	103.860
100-Year	103.863

***********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	31.077
Subbasin: Mitigated Existing	25.265
Subbasin: Offsite Bypass	164.761
Link: Culvert 3	0.000
Total:	221.103

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	16.811
Subbasin: Mitigated Area	0.000
Subbasin: Bypass	5.264
Subbasin: Offsite Bypass	164.761
Link: Detention	0.000
Link: Culvert 3	Not Applicable
Total:	186.836

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.399 ac-ft/year, Post Developed: 1.183 ac-ft/year

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

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

Number of Links: 1

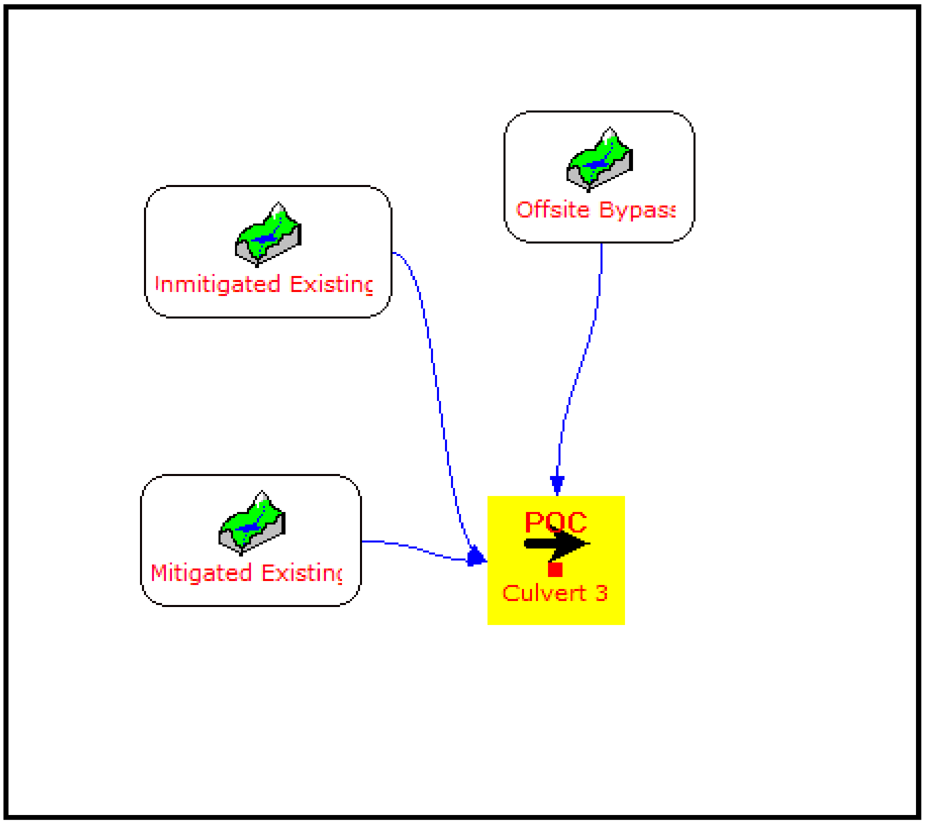
********** Link: Culvert 3 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 599.65
Inflow Volume Including PPT-Evap (ac-ft): 599.65
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): 599.65
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%

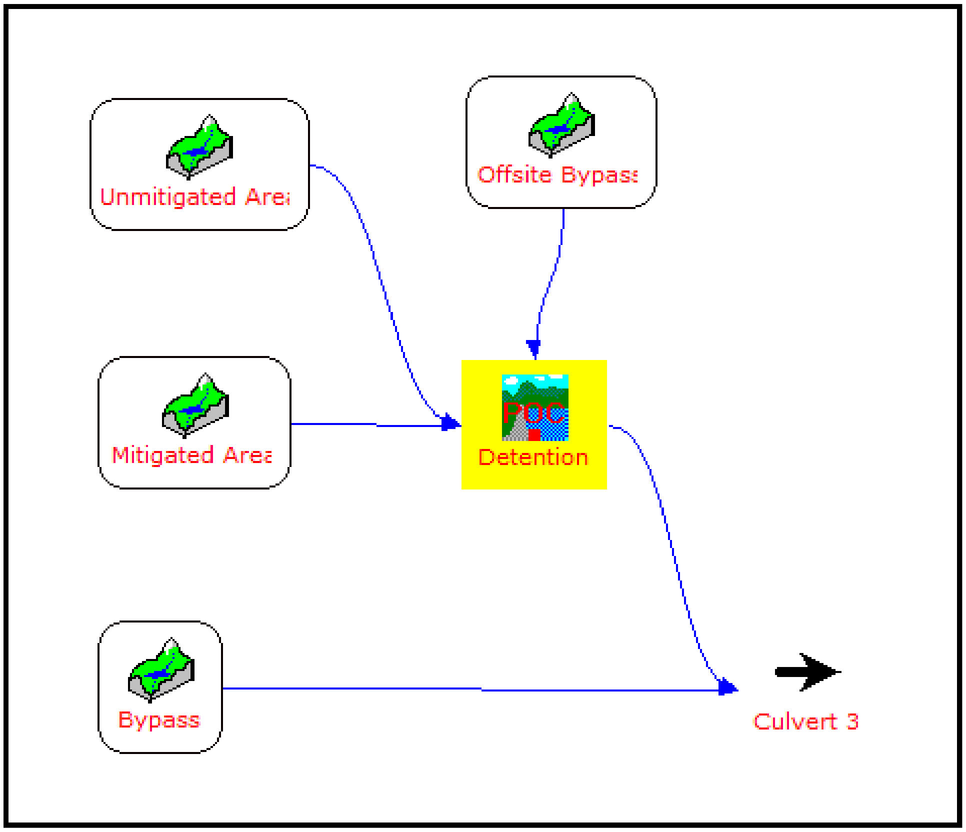
---------------------SCENARIO: POSTDEVELOPED

```
Number of Links:   2


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

 Basic Wet Pond Volume (91% Exceedance):   4583. cu-ft
 Computed Large Wet Pond Volume, 1.5*Basic Volume:   6874. cu-ft


 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   638.68
 Inflow Volume Including PPT-Evap (ac-ft):   638.68
 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):   639.17
 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%


 ***********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                   0.314              2-Year                0.322
   5-Year                   0.449              5-Year                0.450
   10-Year                  0.581              10-Year               0.591
   25-Year                  0.781              25-Year               0.694
   50-Year                  1.044              50-Year               0.794
   100-Year                 1.209              100-Year              0.818
   200-Year                 1.228              200-Year              1.066
   500-Year                 1.250              500-Year              1.398
 ** 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%):             26.7%    FAIL
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):          27.0%    FAIL
Maximum Excursion from Q2 to Q50 (Must be less than 10%):                       26.0%    FAIL
Percent Excursion from Q2 to Q50 (Must be less than 50%):                       43.7%    PASS

-------------------------------------------------------------------------------------
FLOW DURATION DESIGN CRITERIA:    FAIL
-------------------------------------------------------------------------------------
```

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 03/30/2023 3:50 PM
Report Generation Date: 03/30/2023 3:51 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)	0.441	0.450
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.441	0.450

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

Number of Subbasins: 3

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

	-------Area (Acres) --------
Till Grass	0.295
Subbasin Total	0.295

```
 ---------- Subbasin : Mitigated Existing ----------
                         -------Area (Acres) --------
Till Forest                 0.091
---------------------------------------------
Subbasin Total              0.091


 ---------- Subbasin : Bypass Culvert ----------
                         -------Area (Acres) --------
Impervious                  0.055
---------------------------------------------
Subbasin Total              0.055

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


 ---------- Subbasin : Unmitigated Area ----------
                         -------Area (Acres) --------
Till Grass                  0.228
Impervious                  0.055
---------------------------------------------
Subbasin Total              0.283


 ---------- Subbasin : Mitigated Area ----------
                         -------Area (Acres) --------
Impervious                  0.091
---------------------------------------------
Subbasin Total              0.091


 ---------- Subbasin : FC Bypass ----------
                         -------Area (Acres) --------
Till Grass                  0.044
Impervious                  0.032
---------------------------------------------
Subbasin Total              0.076


************************* 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)            :      29.5
Pond Bottom Width (ft)             :      5.9
Pond Side Slopes (ft/ft)           : L1= 0.00    L2= 0.00   W1= 0.00   W2= 0.00
Bottom Area (sq-ft)                :     174.
Area at Riser Crest El (sq-ft)     :     174.
                           (acres) :      0.004
Volume at Riser Crest (cu-ft)      :     435.
                           (ac-ft) :     0.010
Area at Max Elevation   (sq-ft)    :     174.
                           (acres) :      0.004
Vol at Max Elevation   (cu-ft)     :    522.
                           (ac-ft) :     0.012

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)                 : 0.025
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)             :   1.05
Orientation               : Horizontal
Elbow                     : No

      --- Device Number     2 ---
Device Type               : Vertical Rectangular Orifice
Control Elevation (ft)    :   101.10
Length (in)               :    0.30
Height (in)               :    16.79
```

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	100.722
1.11-Year	100.803
1.25-Year	100.952
2.00-Year	101.312
3.33-Year	101.544
5-Year	101.681
10-Year	101.916
25-Year	102.211
50-Year	102.387
100-Year	102.474

***********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	39.516
Subbasin: Mitigated Existing	18.692
Subbasin: Bypass Culvert	0.000
Link: Culvert 4	0.000
Total:	58.208

Total Post Developed Recharge During Simulation

Model Element Recharge Amount (ac-ft)

Subbasin: Unmitigated Area 30.541
Subbasin: Mitigated Area 0.000
Subbasin: FC Bypass 5.894
Link: Detention 0.000
Link: Culvert 4 Not Applicable

Total: 36.435

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.368 ac-ft/year, Post Developed: 0.231 ac-ft/year

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

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

Number of Links: 1

********** Link: Culvert 4 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 130.81
Inflow Volume Including PPT-Evap (ac-ft): 130.81
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): 130.81
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 **********

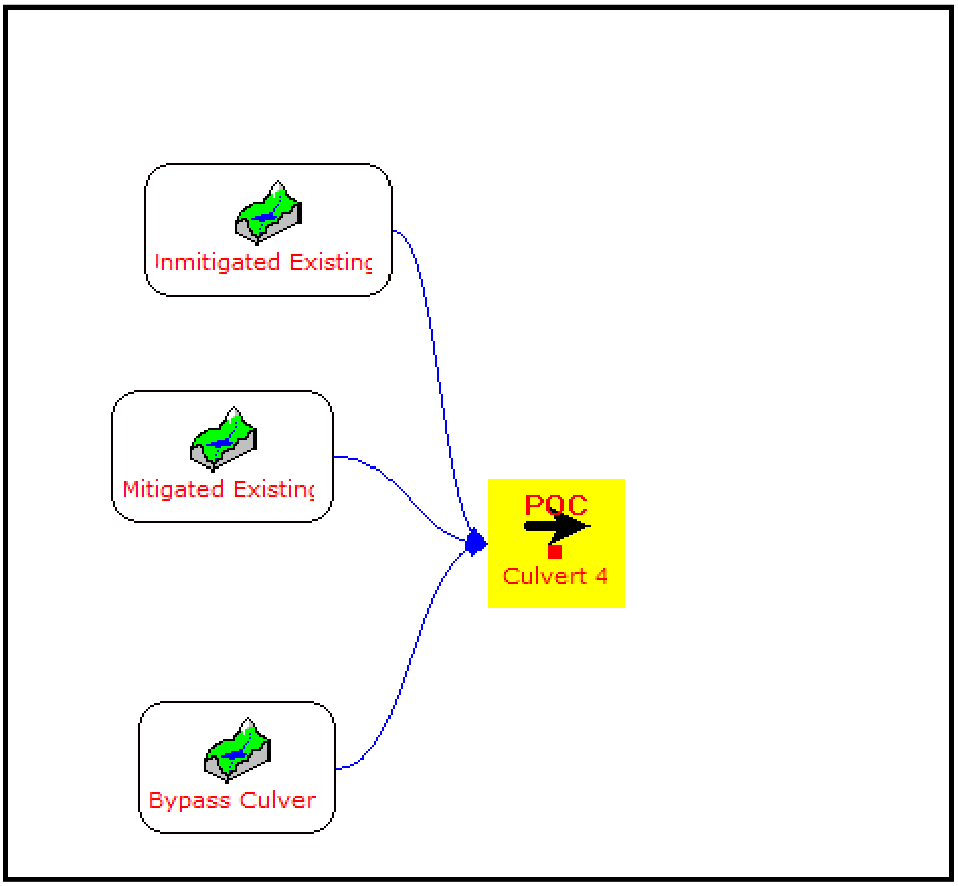
Basic Wet Pond Volume (91% Exceedance): 1119. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 1679. cu-ft

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 147.73
Inflow Volume Including PPT-Evap (ac-ft): 147.73
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): 148.10
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%

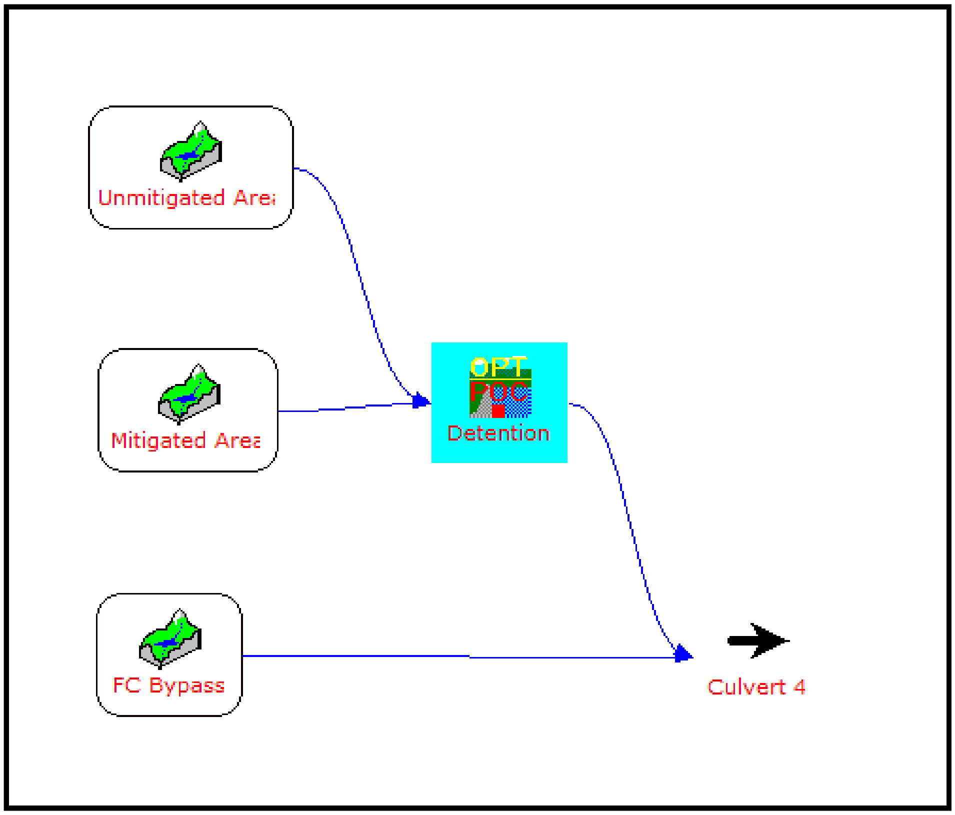
*************Compliance Point Results ***************

```
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                  6.421E-02           2-Year           4.053E-02
   5-Year                  9.224E-02           5-Year           6.808E-02
   10-Year                     0.119           10-Year          9.033E-02
   25-Year                     0.163           25-Year              0.123
   50-Year                     0.216           50-Year              0.143
   100-Year                    0.245           100-Year             0.154
   200-Year                    0.248           200-Year             0.156
   500-Year                    0.251           500-Year             0.157
 ** Record too Short to Compute Peak Discharge for These Recurrence Intervals
```

Predeveloped



Postdeveloped



Flow Control 3

Detention Pipe Volume Calculator

MGS Software LLC

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser	435	cu ft
20% Contingency	522	cu ft
% Contingency Provided	15%	

Storage Volume Provided by Horizontal Pipe of Diameter d

Pipe Diameter (d)	5.0	ft
Pipe Length	55	ft
Overflow Elevation:	105.00	ft

Pond Volume at Overflow (cu ft):	502
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	7	0.000
100.40	0.080	0.360	20	0.000
100.50	0.100	0.501	28	0.001
100.60	0.120	0.654	36	0.001
100.80	0.160	0.993	55	0.001
101.00	0.200	1.370	75	0.002
101.20	0.240	1.775	98	0.002
101.40	0.280	2.205	121	0.003
101.60	0.320	2.655	146	0.003
101.80	0.360	3.119	172	0.004
102.00	0.400	3.594	198	0.005
102.20	0.440	4.077	224	0.005
102.40	0.480	4.566	251	0.006
102.60	0.520	5.056	278	0.006
102.80	0.560	5.544	305	0.007
103.00	0.600	6.027	331	0.008
103.20	0.640	6.502	358	0.008
103.40	0.680	6.967	383	0.009
103.60	0.720	7.416	408	0.009
103.80	0.760	7.845	431	0.010
104.00	0.800	8.252	454	0.010
104.20	0.840	8.628	475	0.011
104.40	0.880	8.967	493	0.011
104.60	0.920	9.261	509	0.012
104.80	0.960	9.493	522	0.012
105.00	1.000	9.621	529	0.012
105.20	1.040	9.621	529	0.012
105.40	1.080	9.621	529	0.012
105.60	1.120	9.621	529	0.012
105.80	1.160	9.621	529	0.012
106.00	1.200	9.621	529	0.012
106.20	1.240	9.621	529	0.012
106.40	1.280	9.621	529	0.012
106.60	1.320	9.621	529	0.012
106.80	1.360	9.621	529	0.012
107.00	1.400	9.621	529	0.012
107.20	1.440	9.621	529	0.012
107.40	1.480	9.621	529	0.012
107.60	1.520	9.621	529	0.012
107.80	1.560	9.621	529	0.012
108.00	1.600	9.621	529	0.012

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**

DON'T INCLUDE THE COLUMN HEADINGS!

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	8.4.
100.80	10.5	27.1.
101.00	10.6	47.8.
101.20	10.7	70.1.
101.40	10.8	93.7.
101.60	10.9	118.4.
101.80	11.0	144.0.
102.00	11.1	170.1.
102.20	11.2	196.7.
102.40	11.3	223.6.
102.60	11.4	250.5.
102.80	11.5	277.4.
103.00	11.6	303.9.
103.20	11.7	330.1.
103.40	11.8	355.6.
103.60	11.9	380.3.
103.80	12.0	403.9.
104.00	12.1	426.3.
104.20	12.2	447.0.
104.40	12.3	465.6.
104.60	12.4	481.8.
104.80	12.5	494.5.
105.00	12.6	501.6.
105.20	12.7	502.6.
105.40	12.8	503.6.
105.60	12.9	504.6.
105.80	13.0	505.6.
106.00	13.1	506.6.
106.20	13.2	507.6.
106.40	13.3	508.6.
106.60	13.4	509.6.
106.80	13.5	510.6.
107.00	13.6	511.6.
107.20	13.7	512.6.
107.40	13.8	513.6.
107.60	13.9	514.6.
107.80	14.0	515.6.
108.00	14.1	516.6.

*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: 04/18/2023 11:50 AM
Report Generation Date: 04/18/2023 11:51 AM

Input File Name: Culvert 04_Flow Control_Iteration2.fld
Project Name: Louis Thompson Tightline Project
Analysis Title: Culvert 3 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)	0.441	0.450
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	0.441	0.450

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

Number of Subbasins: 3

---------- Subbasin : Unmitigated Area ----------
-------Area (Acres) --------
Till Grass 0.295

Subbasin Total 0.295

```
 ---------- Subbasin : Mitigated Area ----------
                     -------Area (Acres) --------
Till Forest               0.091
----------------------------------------------
Subbasin Total            0.091


 ---------- Subbasin : Bypass Area ----------
                     -------Area (Acres) --------
Impervious                0.055
----------------------------------------------
Subbasin Total            0.055

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


 ---------- Subbasin : Unmitigated Area ----------
                     -------Area (Acres) --------
Till Grass                0.228
Impervious                0.055
----------------------------------------------
Subbasin Total            0.283


 ---------- Subbasin : Bypass Area ----------
                     -------Area (Acres) --------
Till Grass                0.044
Impervious                0.032
----------------------------------------------
Subbasin Total            0.076


 ---------- Subbasin : Mitigated Area ----------
                     -------Area (Acres) --------
Impervious                0.091
----------------------------------------------
Subbasin Total            0.091


************************ 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                  8.
    100.80                  27.
    101.00                  48.
    101.20                  70.
    101.40                  94.
    101.60                  118.
    101.80                  144.
    102.00                  170.
    102.20                  197.
    102.40                  224.
    102.60                  251.
    102.80                  277.
    103.00                  304.
    103.20                  330.
    103.40                  356.
    103.60                  380.
    103.80                  404.
    104.00                  426.
    104.20                  447.
    104.40                  466.
    104.60                  482.
    104.80                  495.
    105.00                  502.
    105.20                  503.
    105.40                  504.
    105.60                  505.
    105.80                  506.
    106.00                  507.
    106.20                  508.
    106.40                  509.
    106.60                  510.
    106.80                  511.
    107.00                  512.
    107.20                  513.
    107.40                  514.
    107.60                  515.
    107.80                  516.
    108.00                  517.

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                   : 104.80 ft

 Hydraulic Structure Geometry

Number of Devices:       2

        ---Device Number     1 ---
Device Type                    :   Circular Orifice
Control Elevation (ft)         :   100.50
Diameter (in)                  :   0.75
Orientation                    : Horizontal
Elbow                          : No

        ---Device Number     2 ---
Device Type                    :   Circular Orifice
Control Elevation (ft)         :   104.25
Diameter (in)                  :   3.50
Orientation                    : Horizontal
Elbow                          : Yes


------------------------------------------
Link Name: Culvert 2
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     102.154
    1.11-Year     102.353
    1.25-Year     102.632
    2.00-Year     103.422
    3.33-Year     104.258
        5-Year     104.274
```

10-Year	104.304
25-Year	104.400
50-Year	104.444
100-Year	104.475

***********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	39.516
Subbasin: Mitigated Area	18.692
Subbasin: Bypass Area	0.000
Link: Culvert 2	0.000
Total:	58.208

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	30.541
Subbasin: Bypass Area	5.894
Subbasin: Mitigated Area	0.000
Link: Detention	0.000
Link: Culvert 2	Not Applicable
Total:	36.435

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.368 ac-ft/year, Post Developed: 0.231 ac-ft/year

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

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

Number of Links: 1

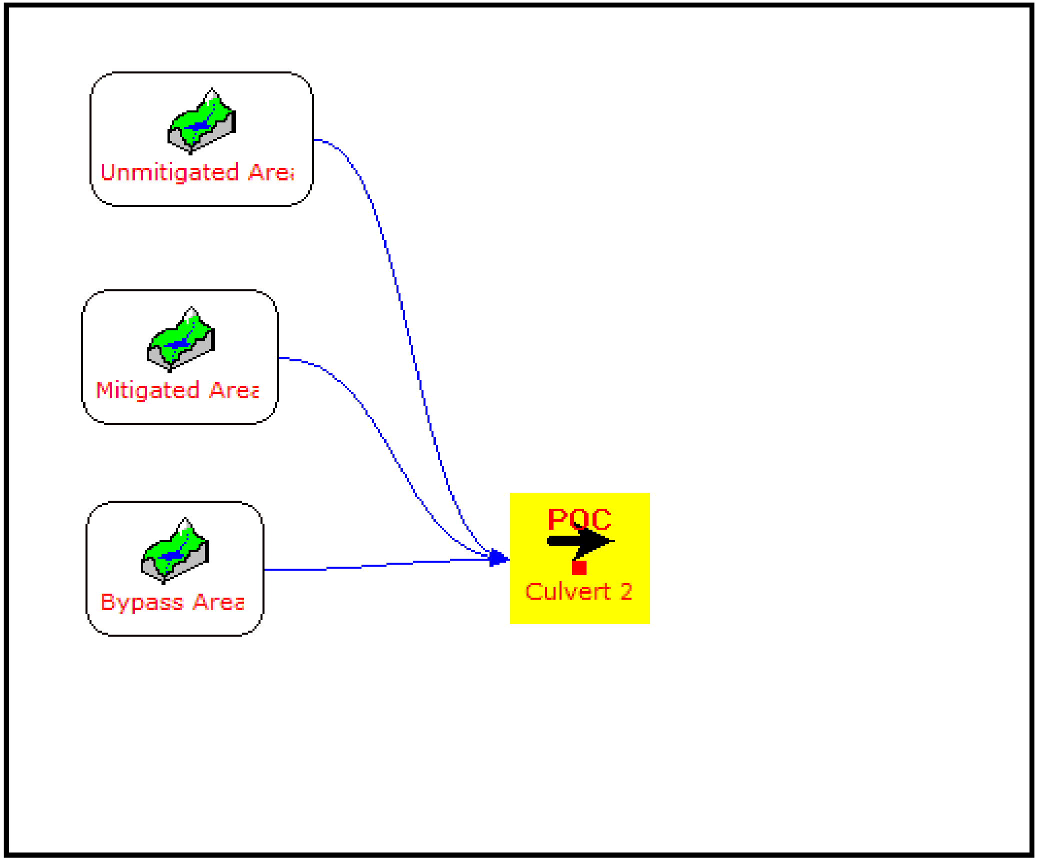
********** Link: Culvert 2 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 130.81
Inflow Volume Including PPT-Evap (ac-ft): 130.81
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): 130.81
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%

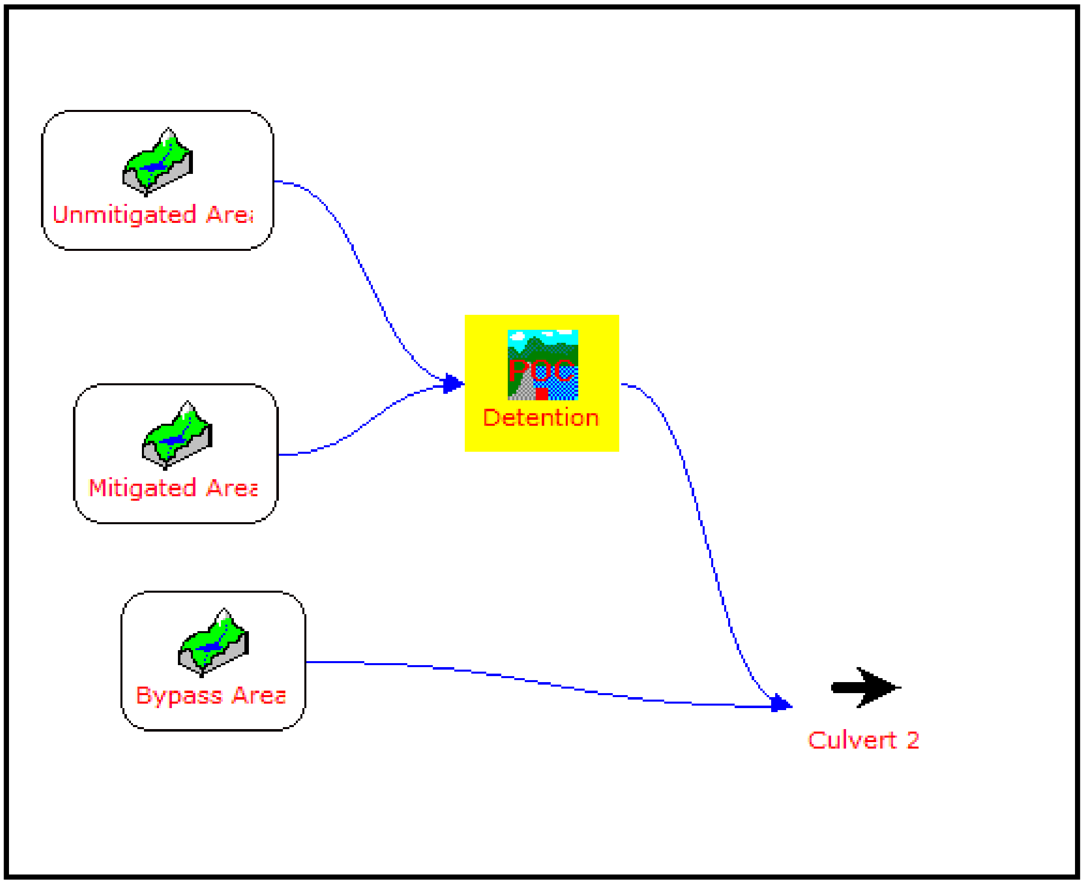
---------------------SCENARIO: POSTDEVELOPED

```
Number of Links:   2


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

 Basic Wet Pond Volume (91% Exceedance):   1119. cu-ft
 Computed Large Wet Pond Volume, 1.5*Basic Volume:   1679. cu-ft


 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   147.73
 Inflow Volume Including PPT-Evap (ac-ft):   147.73
 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):   148.03
 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                6.421E-02            2-Year           2.566E-02
   5-Year                9.224E-02            5-Year           7.633E-02
   10-Year                  0.119             10-Year              0.101
   25-Year                  0.163             25-Year              0.148
   50-Year                  0.216             50-Year              0.166
   100-Year                 0.245             100-Year             0.177
   200-Year                 0.248             200-Year             0.196
   500-Year                 0.251             500-Year             0.222
 ** 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%):              -53.8%    PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):           -30.1%    PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):                          6.5%    PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):                          2.5%    PASS

-------------------------------------------------------------------------
MEETS ALL FLOW DURATION DESIGN CRITERIA:    PASS
-------------------------------------------------------------------------
```

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/18/2023 11:52 AM
Report Generation Date: 04/18/2023 11:52 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: 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)	12.028	12.037
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	12.028	12.037

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

Number of Subbasins: 4

---------- Subbasin : Unmitigated Existing ----------
-------Area (Acres) --------
Till Grass 0.295

Subbasin Total 0.295

```
 ---------- Subbasin : Mitigated Existing ----------
                         -------Area (Acres) --------
Till Forest                   0.091
----------------------------------------------
Subbasin Total                0.091


 ---------- Subbasin : Offsite Bypass ----------
                         -------Area (Acres) --------
Till Grass                    8.885
Impervious                    2.702
----------------------------------------------
Subbasin Total                11.587


 ---------- Subbasin : Bypass ----------
                         -------Area (Acres) --------
Impervious                    0.055
----------------------------------------------
Subbasin Total                0.055

--------------------SCENARIO: POSTDEVELOPED
Number of Subbasins:   4


 ---------- Subbasin : Unmitigated Area ----------
                         -------Area (Acres) --------
Till Grass                    0.228
Impervious                    0.055
----------------------------------------------
Subbasin Total                0.283


 ---------- Subbasin : Mitigated Area ----------
                         -------Area (Acres) --------
Impervious                    0.091
----------------------------------------------
Subbasin Total                0.091


 ---------- Subbasin : Bypass ----------
                         -------Area (Acres) --------
Till Grass                    0.044
Impervious                    0.032
----------------------------------------------
Subbasin Total                0.076


 ---------- Subbasin : Offsite Bypass ----------
                         -------Area (Acres) --------
Till Grass                    8.885
Impervious                    2.702
----------------------------------------------
Subbasin Total                11.587
```

```
************************ 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                  8.
    100.80                  27.
    101.00                  48.
    101.20                  70.
    101.40                  94.
    101.60                  118.
    101.80                  144.
    102.00                  170.
    102.20                  197.
    102.40                  224.
    102.60                  251.
    102.80                  277.
    103.00                  304.
    103.20                  330.
    103.40                  356.
    103.60                  380.
    103.80                  404.
    104.00                  426.
    104.20                  447.
    104.40                  466.
    104.60                  482.
    104.80                  495.
    105.00                  502.
    105.20                  503.
    105.40                  504.
    105.60                  505.
    105.80                  506.
    106.00                  507.
```

106.20	508.
106.40	509.
106.60	510.
106.80	511.
107.00	512.
107.20	513.
107.40	514.
107.60	515.
107.80	516.
108.00	517.

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 : 104.80 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 0.75
Orientation : Horizontal
Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 104.25
Diameter (in) : 3.50
Orientation : Horizontal
Elbow : No

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

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

---------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 4
Number of Links: 1

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

Number of Subbasins: 4
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	104.930
1.11-Year	104.958
1.25-Year	104.978
2.00-Year	105.058
3.33-Year	105.111
5-Year	105.141
10-Year	105.224
25-Year	105.363
50-Year	105.793
100-Year	106.118

***********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	39.516
Subbasin: Mitigated Existing	18.692
Subbasin: Offsite Bypass	1190.163
Subbasin: Bypass	0.000
Link: Culvert 3	0.000
Total:	1248.371

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	30.541
Subbasin: Mitigated Area	0.000
Subbasin: Bypass	5.894
Subbasin: Offsite Bypass	1190.163
Link: Detention	0.000
Link: Culvert 3	Not Applicable
Total:	1226.598

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 7.901 ac-ft/year, Post Developed: 7.763 ac-ft/year

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

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

Number of Links: 1

********** Link: Culvert 3 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 4225.40
Inflow Volume Including PPT-Evap (ac-ft): 4225.40
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): 4225.40
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): 30433. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 45649. cu-ft

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 4242.32
Inflow Volume Including PPT-Evap (ac-ft): 4242.32
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): 4247.76
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	2.341	2-Year	2.367
5-Year	3.283	5-Year	3.308
10-Year	4.205	10-Year	4.229
25-Year	5.477	25-Year	5.497
50-Year	7.463	50-Year	7.499
100-Year	8.582	100-Year	8.614
200-Year	8.776	200-Year	8.814

500-Year	9.005	500-Year	9.049

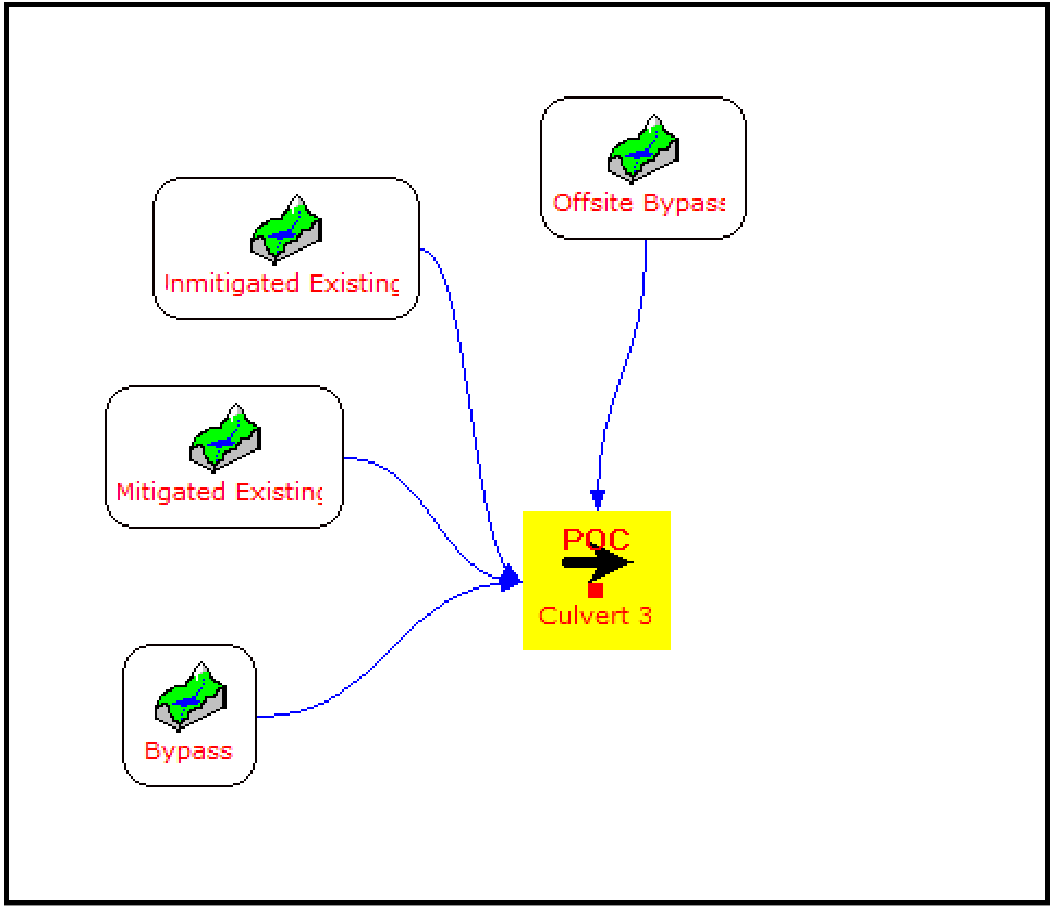
** Record too Short to Compute Peak Discharge for These Recurrence Intervals

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

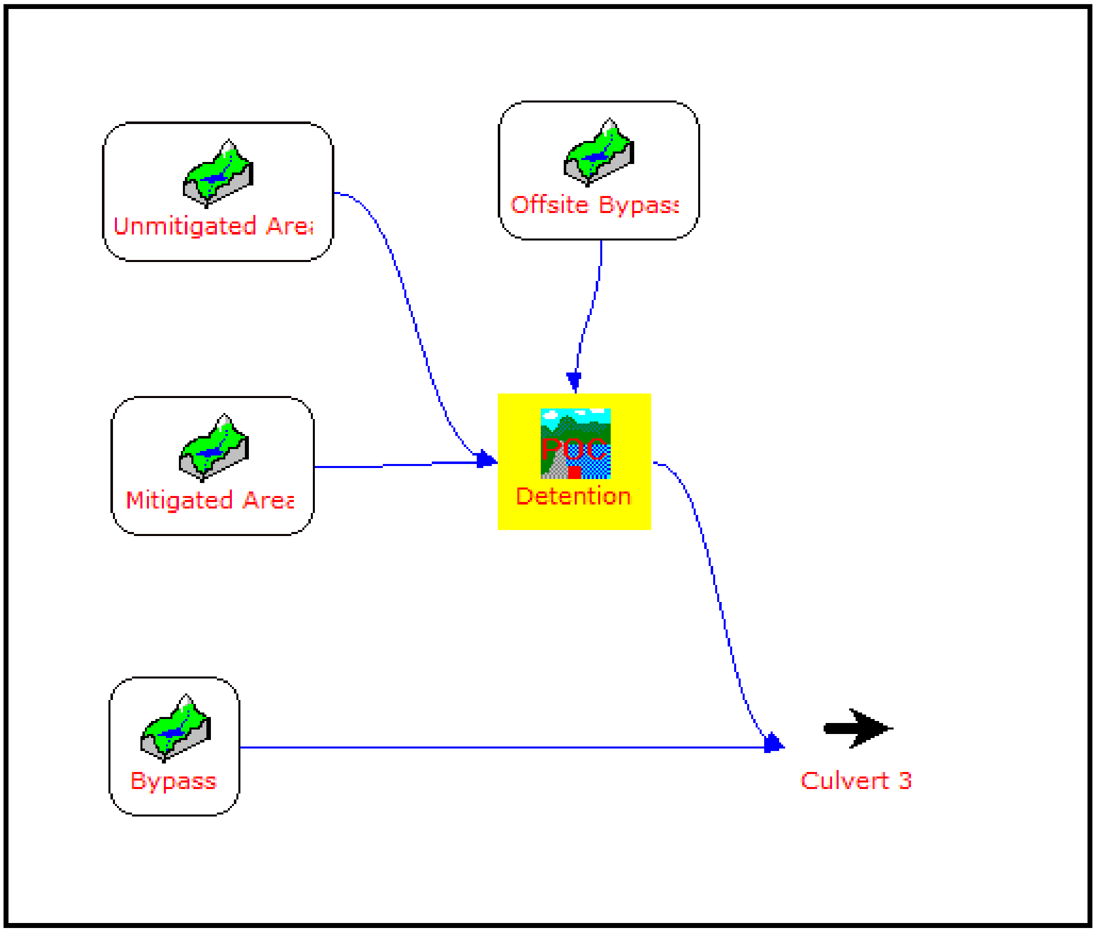
Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%):	3.9%	FAIL
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):	5.3%	FAIL
Maximum Excursion from Q2 to Q50 (Must be less than 10%):	99999.0%	FAIL
Percent Excursion from Q2 to Q50 (Must be less than 50%):	45.7%	PASS

FLOW DURATION DESIGN CRITERIA: FAIL

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 03/23/2023 1:24 PM
Report Generation Date: 03/23/2023 1:25 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 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)	1.625	1.670
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.625	1.670

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

Number of Subbasins: 2

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

	-------Area (Acres) --------
Till Grass	0.951
Impervious	0.330

```
Subbasin Total            1.281


  ---------- Subbasin : Mitigated Exisitng ----------
                          -------Area (Acres) --------
Till Forest               0.344
----------------------------------------------
Subbasin Total            0.344

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


  ---------- Subbasin : Unmitigated Area ----------
                          -------Area (Acres) --------
Till Grass                0.576
Impervious                0.477
----------------------------------------------
Subbasin Total            1.053


  ---------- Subbasin : Mitigated Area ----------
                          -------Area (Acres) --------
Impervious                0.344
----------------------------------------------
Subbasin Total            0.344


  ---------- Subbasin : FC Bypass Area ----------
                          -------Area (Acres) --------
Till Grass                0.121
Impervious                0.152
----------------------------------------------
Subbasin Total            0.273


************************* 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) : 44.4
Pond Bottom Width (ft) : 8.9
Pond Side Slopes (ft/ft) : L1= 0.00 L2= 0.00 W1= 0.00 W2= 0.00
Bottom Area (sq-ft) : 395.
Area at Riser Crest El (sq-ft) : 395.
(acres) : 0.009
Volume at Riser Crest (cu-ft) : 1,975.
(ac-ft) : 0.045
Area at Max Elevation (sq-ft) : 395.
(acres) : 0.009
Vol at Max Elevation (cu-ft) : 2,172.
(ac-ft) : 0.050

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) : 1.79
Orientation : Horizontal
Elbow : No

--- Device Number 2 ---
Device Type : Vertical Rectangular Orifice
Control Elevation (ft) : 102.28
Length (in) : 0.41
Height (in) : 32.60
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     101.823
    1.11-Year     102.144
    1.25-Year     102.415
    2.00-Year     103.004
    3.33-Year     103.411
        5-Year    103.629
      10-Year     103.996
      25-Year     104.572
      50-Year     104.947
    100-Year      105.008



 ***********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  127.388
Subbasin: Mitigated Exisitng      70.660
Link:        To Pond                   0.000
_____________________________________
Total:                                          198.048

                   Total Post Developed Recharge During Simulation
Model Element                                 Recharge Amount (ac-ft)
-----------------------------------------------------------------------------------------------
Subbasin: Unmitigated Area        77.156
Subbasin: Mitigated Area           0.000
Subbasin: FC Bypass Area                    16.208
Link:        Detention                 0.000
Link:        To Pond                   Not Applicable
_____________________________________
```

Total: 93.365

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.253 ac-ft/year, Post Developed: 0.591 ac-ft/year

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

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

Number of Links: 1

********** Link: To Pond **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 514.55
Inflow Volume Including PPT-Evap (ac-ft): 514.55
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): 514.55
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): 5082. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 7623. cu-ft

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 624.83
Inflow Volume Including PPT-Evap (ac-ft): 624.83
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): 626.66
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 *************

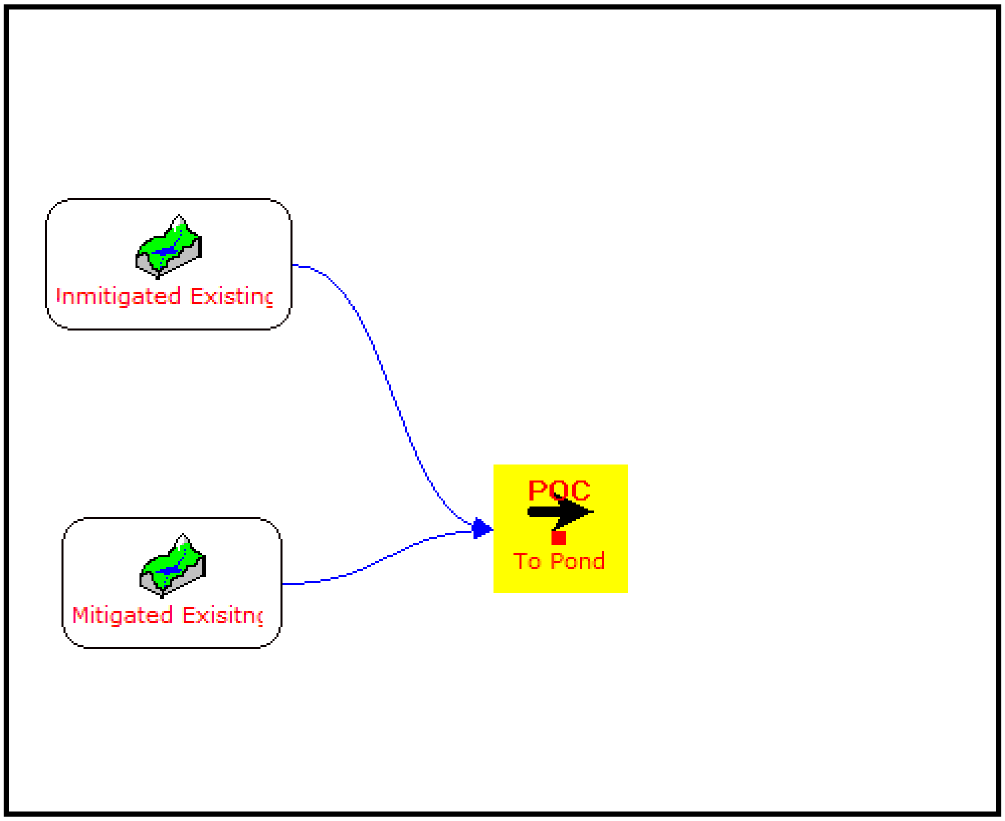
Scenario Predeveloped Compliance Link: To Pond
Scenario Postdeveloped Compliance Link: Detention

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

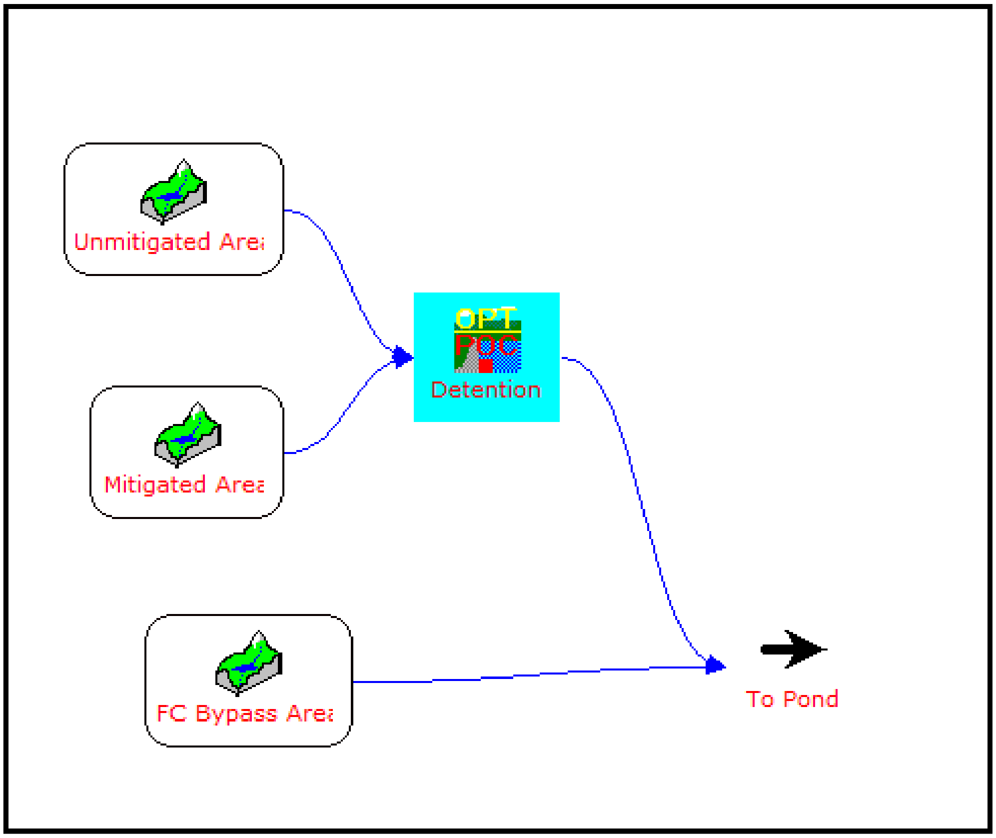
Predevelopment Runoff Postdevelopment Runoff

```
Tr (Years)         Discharge (cfs)              Tr (Years)        Discharge (cfs)
------------------------------------------------------------------------------------------------------------------
     2-Year                        0.268                  2-Year                 0.205
     5-Year                        0.372                  5-Year                 0.307
     10-Year                       0.474                  10-Year                0.377
     25-Year                       0.626                  25-Year                0.501
     50-Year                       0.846                  50-Year                0.589
     100-Year                      0.945                  100-Year               0.625
     200-Year                      0.961                  200-Year               0.626
     500-Year                      0.981                  500-Year               0.627
  ** Record too Short to Compute Peak Discharge for These Recurrence Intervals
```

Predeveloped



Postdeveloped



Flow Control 4

Detention Pipe Volume Calculator

MGS Software LLC

Blue Indicates Data Entry Cells, the rest are calculated.

Iteration 1: Volume at Riser	1975	cu ft
20% Contingency	2370	cu ft
% Contingency Provided	3%	

Storage Volume Provided by Horizontal Pipe of Diameter d

Pipe Diameter (d)	6.0	ft
Pipe Length	220	ft
Overflow Elevation:	106.00	ft

Pond Volume at Overflow (cu ft):	2037
Target Volume from MGSFlood:	

2 Dual Pipes (each 110 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	65	0.001
100.50	0.080	0.360	79	0.002
100.60	0.100	0.501	110	0.003
100.80	0.130	0.735	162	0.004
101.00	0.170	1.084	239	0.005
101.20	0.200	1.370	301	0.007
101.40	0.230	1.672	368	0.008
101.60	0.270	2.096	461	0.011
101.80	0.300	2.428	534	0.012
102.00	0.330	2.769	609	0.014
102.20	0.370	3.236	712	0.016
102.40	0.400	3.594	791	0.018
102.60	0.430	3.956	870	0.020
102.80	0.470	4.443	977	0.022
103.00	0.500	4.811	1058	0.024
103.20	0.530	5.178	1139	0.026
103.40	0.570	5.666	1246	0.029
103.60	0.600	6.027	1326	0.030
103.80	0.630	6.385	1405	0.032
104.00	0.670	6.853	1508	0.035
104.20	0.700	7.193	1583	0.036
104.40	0.730	7.525	1656	0.038
104.60	0.770	7.949	1749	0.040
104.80	0.800	8.252	1815	0.042
105.00	0.830	8.537	1878	0.043
105.20	0.870	8.886	1955	0.045
105.40	0.900	9.120	2006	0.046
105.60	0.930	9.325	2051	0.047
105.80	0.970	9.537	2098	0.048
106.00	1.000	9.621	2117	0.049
106.20	1.030	9.621	2117	0.049
106.40	1.070	9.621	2117	0.049
106.60	1.100	9.621	2117	0.049
106.80	1.130	9.621	2117	0.049
107.00	1.170	9.621	2117	0.049
107.20	1.200	9.621	2117	0.049
107.40	1.230	9.621	2117	0.049
107.60	1.270	9.621	2117	0.049
107.80	1.300	9.621	2117	0.049
108.00	1.330	9.621	2117	0.049

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**

DON'T INCLUDE THE COLUMN HEADINGS!

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	31.0.
100.80	10.5	82.5.
101.00	10.6	159.3.
101.20	10.7	222.1.
101.40	10.8	288.6.
101.60	10.9	381.9.
101.80	11.0	454.9.
102.00	11.1	529.8.
102.20	11.2	632.8.
102.40	11.3	711.5.
102.60	11.4	791.0.
102.80	11.5	898.2.
103.00	11.6	979.1.
103.20	11.7	1059.9.
103.40	11.8	1167.2.
103.60	11.9	1246.7.
103.80	12.0	1325.4.
104.00	12.1	1428.4.
104.20	12.2	1503.3.
104.40	12.3	1576.3.
104.60	12.4	1669.6.
104.80	12.5	1736.1.
105.00	12.6	1798.9.
105.20	12.7	1875.7.
105.40	12.8	1927.2.
105.60	12.9	1972.2.
105.80	13.0	2018.8.
106.00	13.1	2037.4.
106.20	13.2	2038.4.
106.40	13.3	2039.4.
106.60	13.4	2040.4.
106.80	13.5	2041.4.
107.00	13.6	2042.4.
107.20	13.7	2043.4.
107.40	13.8	2044.4.
107.60	13.9	2045.4.
107.80	14.0	2046.4.
108.00	14.1	2047.4.

*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: 04/07/2023 9:54 AM
Report Generation Date: 04/07/2023 9:55 AM

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)	1.625	1.670
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.625	1.670

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

Number of Subbasins: 2

---------- Subbasin : Unmitigated Area ----------

	-------Area (Acres) --------
Till Grass	0.951
Impervious	0.330
Subbasin Total	1.281

```
  ---------- Subbasin : Mitigated Area ----------
                         -------Area (Acres) --------
Impervious                    0.344
----------------------------------------------
Subbasin Total                0.344

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


  ---------- Subbasin : Unmitigated Area ----------
                         -------Area (Acres) --------
Till Grass                    0.576
Impervious                    0.477
----------------------------------------------
Subbasin Total                1.053


  ---------- Subbasin : FC Bypass Area ----------
                         -------Area (Acres) --------
Till Grass                    0.121
Impervious                    0.152
----------------------------------------------
Subbasin Total                0.273


  ---------- Subbasin : Mitigated Area ----------
                         -------Area (Acres) --------
Impervious                    0.344
----------------------------------------------
Subbasin Total                0.344


************************* 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	31.
100.80	83.
101.00	159.
101.20	222.
101.40	289.
101.60	382.
101.80	455.
102.00	530.
102.20	633.
102.40	712.
102.60	791.
102.80	898.
103.00	979.
103.20	1060.
103.40	1167.
103.60	1247.
103.80	1325.
104.00	1428.
104.20	1503.
104.40	1576.
104.60	1670.
104.80	1736.
105.00	1799.
105.20	1876.
105.40	1927.
105.60	1972.
105.80	2019.
106.00	2037.
106.20	2038.
106.40	2039.
106.60	2040.
106.80	2041.
107.00	2042.
107.20	2043.
107.40	2044.
107.60	2045.
107.80	2046.
108.00	2047.

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   : 105.50 ft

```
 Hydraulic Structure Geometry

Number of Devices:      2

      ---Device Number    1 ---
Device Type                :   Circular Orifice
Control Elevation (ft)     :   100.50
Diameter (in)              :   1.25
Orientation                : Horizontal
Elbow                      : No

      ---Device Number    2 ---
Device Type                :   Circular Orifice
Control Elevation (ft)     :   104.00
Diameter (in)              :   6.00
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    103.877
   1.11-Year    104.010
   1.25-Year    104.017
   2.00-Year    104.047
   3.33-Year    104.106
      5-Year    104.152
     10-Year    104.226
     25-Year    104.353
     50-Year    104.469
   100-Year     104.616
```

*************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	127.388
Subbasin: Mitigated Area	0.000
Link: To Pond	0.000
Total:	127.388

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	77.156
Subbasin: FC Bypass Area	16.208
Subbasin: Mitigated Area	0.000
Link: Detention	0.000
Link: To Pond	Not Applicable
Total:	93.365

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.806 ac-ft/year, Post Developed: 0.591 ac-ft/year

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

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

Number of Links: 1

********** Link: To Pond **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 652.38
Inflow Volume Including PPT-Evap (ac-ft): 652.38
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): 652.38
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

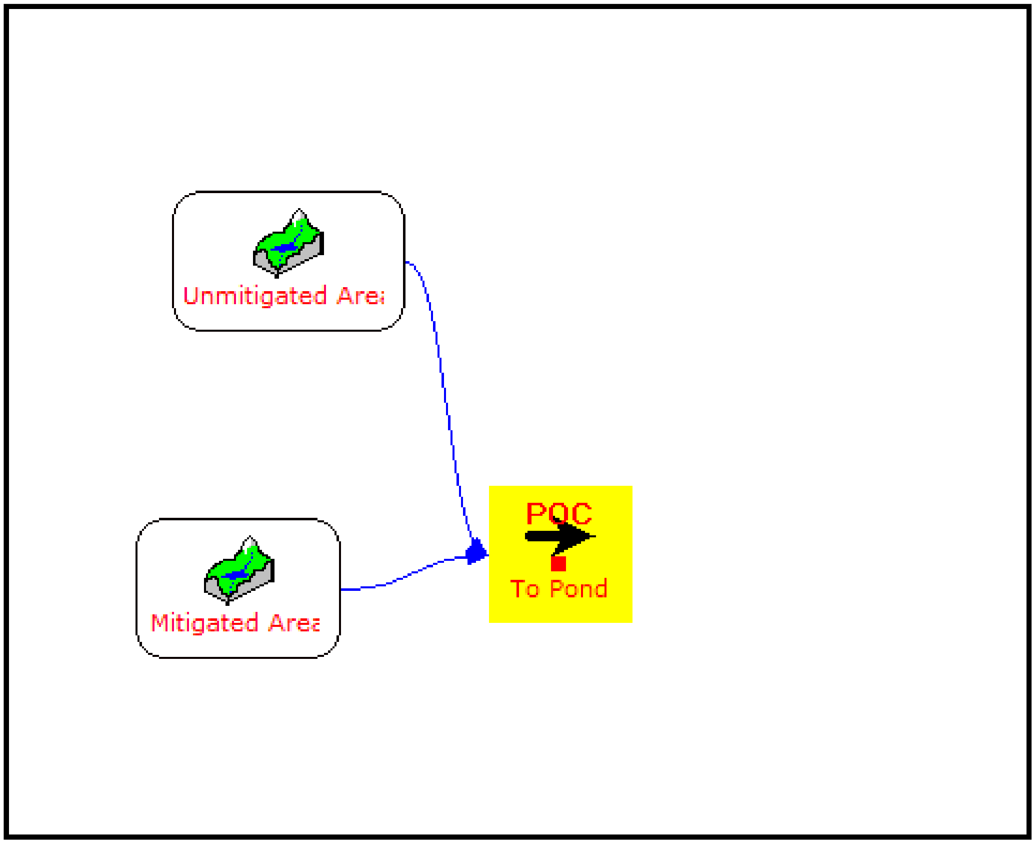
Number of Links: 2

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

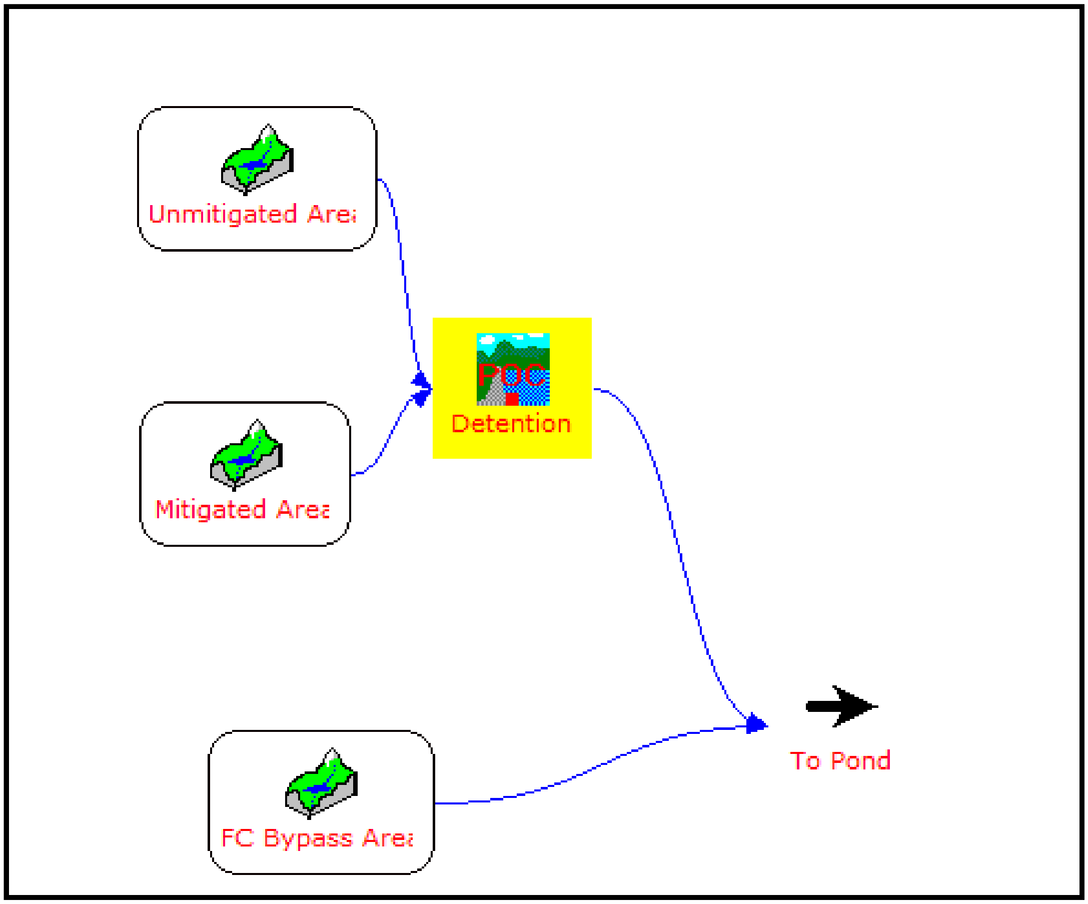
Basic Wet Pond Volume (91% Exceedance): 5082. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 7623. cu-ft

```
 Infiltration/Filtration Statistics--------------------
 Inflow Volume (ac-ft):   624.83
 Inflow Volume Including PPT-Evap (ac-ft):   624.83
 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):   626.86
 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: 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                      0.401             2-Year                0.275
   5-Year                      0.528             5-Year                0.430
   10-Year                     0.667             10-Year               0.512
   25-Year                     0.809             25-Year               0.623
   50-Year                     1.130             50-Year               0.707
   100-Year                    1.276             100-Year              0.800
   200-Year                    1.319             200-Year              0.891
   500-Year                    1.373             500-Year              1.010
 ** 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%):              -42.8%    PASS
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%):           -38.7%    PASS
Maximum Excursion from Q2 to Q50 (Must be less than 10%):                        -43.1%    PASS
Percent Excursion from Q2 to Q50 (Must be less than 50%):                          0.0%    PASS

-------------------------------------------------------------------------------------------
MEETS ALL FLOW DURATION DESIGN CRITERIA:     PASS
-------------------------------------------------------------------------------------------
```

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 03/23/2023 1:40 PM
Report Generation Date: 03/23/2023 1:40 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)	25.119	25.164
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	25.119	25.164

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

Number of Subbasins: 3

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

	-------Area (Acres) --------
Till Grass	0.951
Impervious	0.330
Subbasin Total	1.281

```
 ---------- Subbasin : Mitigated Existing ----------
                      -------Area (Acres) --------
Till Forest               0.344
-------------------------------------------
Subbasin Total            0.344


 ---------- Subbasin : Offsite Bypass ----------
                      -------Area (Acres) --------
Till Grass                21.938
Impervious                1.556
-------------------------------------------
Subbasin Total            23.494

--------------------SCENARIO: POSTDEVELOPED
Number of Subbasins:   4


 ---------- Subbasin : Unmitigated Area ----------
                      -------Area (Acres) --------
Till Grass                0.576
Impervious                0.477
-------------------------------------------
Subbasin Total            1.053


 ---------- Subbasin : Mitigated Area ----------
                      -------Area (Acres) --------
Impervious                0.344
-------------------------------------------
Subbasin Total            0.344


 ---------- Subbasin : FC Bypass Area ----------
                      -------Area (Acres) --------
Till Grass                0.121
Impervious                0.152
-------------------------------------------
Subbasin Total            0.273


 ---------- Subbasin : Offsite Bypass ----------
                      -------Area (Acres) --------
Till Grass                21.938
Impervious                1.556
-------------------------------------------
Subbasin Total            23.494


************************* 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	31.
100.80	83.
101.00	159.
101.20	222.
101.40	289.
101.60	382.
101.80	455.
102.00	530.
102.20	633.
102.40	712.
102.60	791.
102.80	898.
103.00	979.
103.20	1060.
103.40	1167.
103.60	1247.
103.80	1325.
104.00	1428.
104.20	1503.
104.40	1576.
104.60	1670.
104.80	1736.
105.00	1799.
105.20	1876.
105.40	1927.
105.60	1972.
105.80	2019.
106.00	2037.
106.20	2038.
106.40	2039.
106.60	2040.
106.80	2041.
107.00	2042.
107.20	2043.

107.40	2044.
107.60	2045.
107.80	2046.
108.00	2047.

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 : 105.50 ft

Hydraulic Structure Geometry

Number of Devices: 2

---Device Number 1 ---
Device Type : Circular Orifice
Control Elevation (ft) : 100.50
Diameter (in) : 1.25
Orientation : Horizontal
Elbow : No

---Device Number 2 ---
Device Type : Circular Orifice
Control Elevation (ft) : 104.00
Diameter (in) : 6.00
Orientation : Horizontal
Elbow : Yes

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

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

---------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 3
Number of Links: 1

---------------------SCENARIO: POSTDEVELOPED
Number of Subbasins: 4
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	105.527
1.11-Year	105.599
1.25-Year	105.639
2.00-Year	105.754
3.33-Year	105.830
5-Year	105.868
10-Year	105.973
25-Year	106.146
50-Year	106.503
100-Year	106.918

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

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

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Existing	127.388
Subbasin: Mitigated Existing	70.660
Subbasin: Offsite Bypass	2938.638
Link: Culvert 3	0.000
Total:	3136.686

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: Unmitigated Area	77.156
Subbasin: Mitigated Area	0.000
Subbasin: FC Bypass Area	16.208
Subbasin: Offsite Bypass	2938.638
Link: Detention	0.000
Link: Culvert 3	Not Applicable
Total:	3032.003

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 19.852 ac-ft/year, Post Developed: 19.190 ac-ft/year

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

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

Number of Links: 1

********** Link: Culvert 3 **********

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

Inflow Volume (ac-ft): 7777.93
Inflow Volume Including PPT-Evap (ac-ft): 7777.93
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): 7777.93
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): 57449. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 86173. cu-ft

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 7888.20
Inflow Volume Including PPT-Evap (ac-ft): 7888.20
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): 7892.84
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

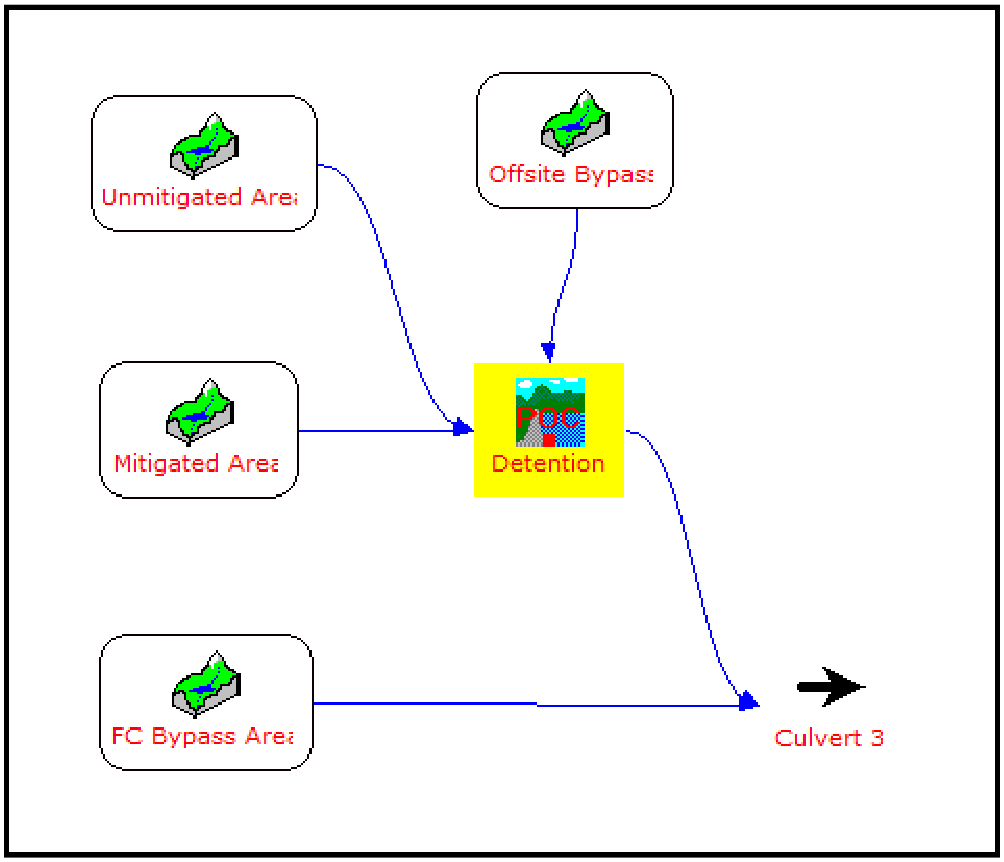
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	3.938	2-Year	4.024
5-Year	5.794	5-Year	5.922
10-Year	7.659	10-Year	7.791
25-Year	10.493	25-Year	10.634
50-Year	13.863	50-Year	14.095
100-Year	16.441	100-Year	16.665
200-Year	16.615	200-Year	16.873
500-Year	16.804	500-Year	17.103

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

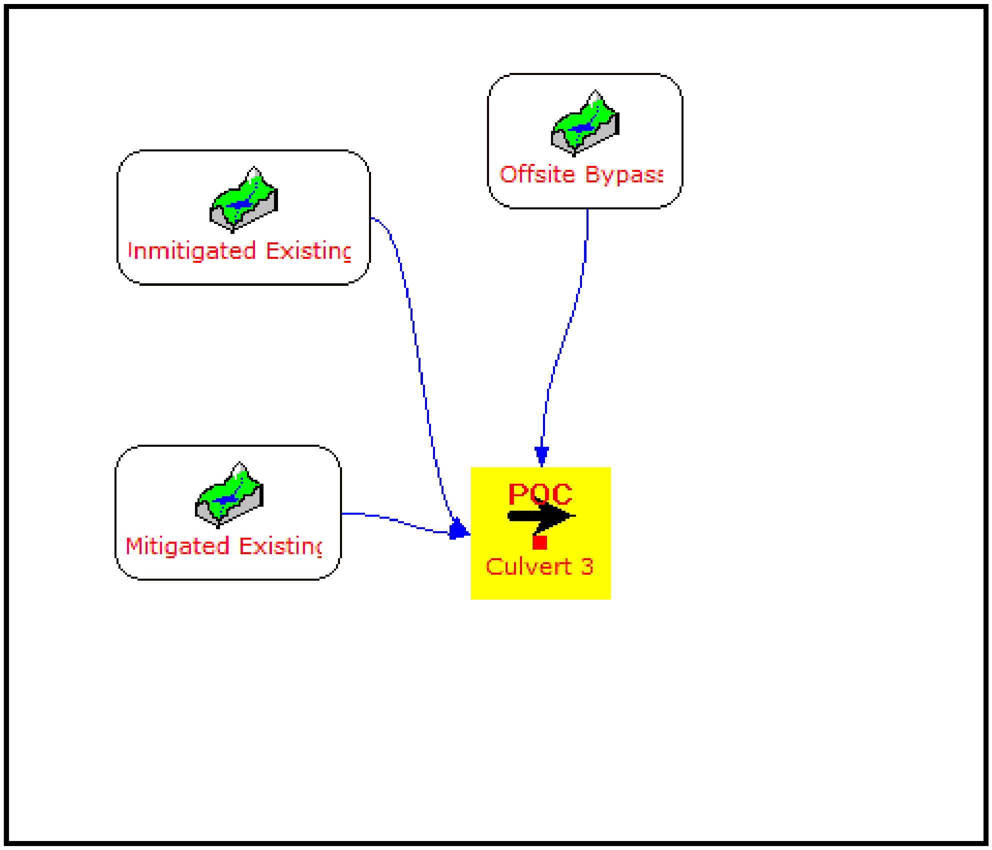
****** Flow Duration Performance ******
Excursion at Predeveloped 50%Q2 (Must be Less Than or Equal to 0%): 8.6% FAIL
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than or Equal to 0%): 11.3% FAIL

Maximum Excursion from Q2 to Q50 (Must be less than 10%): 99999.0% FAIL
Percent Excursion from Q2 to Q50 (Must be less than 50%): 65.0% FAIL

FLOW DURATION DESIGN CRITERIA: FAIL



Predeveloped



Postdeveloped

MGSFlood Water Quality Flow Rate Calculations

-Offline water quality flow rates to WQ Facilities #1 - 4
-Water quality rates used to determine Contech StormFilter units

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/07/2023 10:00 AM
Report Generation Date: 04/07/2023 10:00 AM

```
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)                     0.564              0.564
 Area of Links that Include Precip/Evap (acres)  0.000              0.000
 Total (acres)                                   0.564              0.564
```

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

```
Number of Subbasins:   1


 ---------- Subbasin : WQ Area ----------
                         -------Area (Acres) --------
Till Grass                  0.410
Impervious                  0.154
----------------------------------------------
Subbasin Total              0.564
```

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


  ---------- Subbasin : WQ Area ----------
                         -------Area (Acres) --------
Till Grass                    0.410
Impervious                    0.154
--------------------------------------------
Subbasin Total                0.564



************************* 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:   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: WQ Area 54.920
Link: WQ 1 0.000

Total: 54.920

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

Subbasin: WQ Area 54.920
Link: WQ 1 0.000

Total: 54.920

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.348 ac-ft/year, Post Developed: 0.348 ac-ft/year

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

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

Number of Links: 1

********** Link: WQ 1 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 205.26
Inflow Volume Including PPT-Evap (ac-ft): 205.26
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): 205.26
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%

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

Number of Links: 1

********** Link: WQ 1 **********

Basic Wet Pond Volume (91% Exceedance): 1482. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 2223. cu-ft

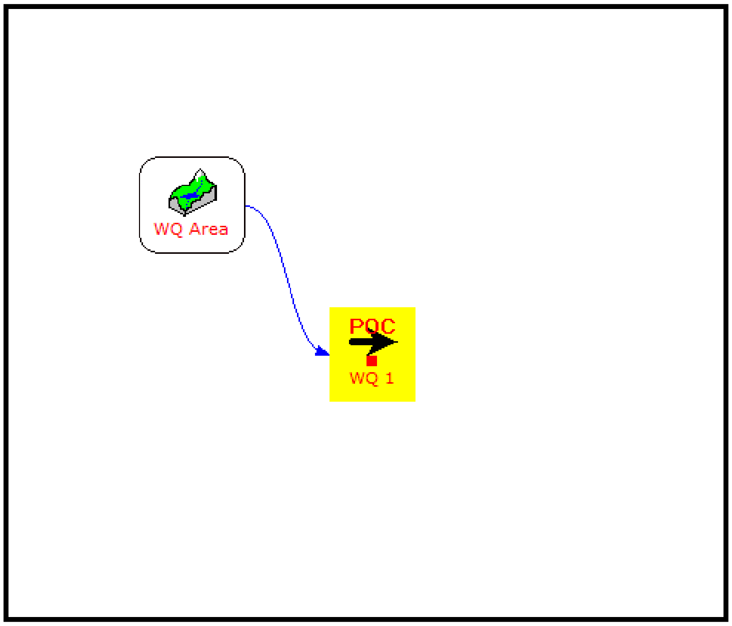
2-Year Discharge Rate : 0.118 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.03 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.02 cfs

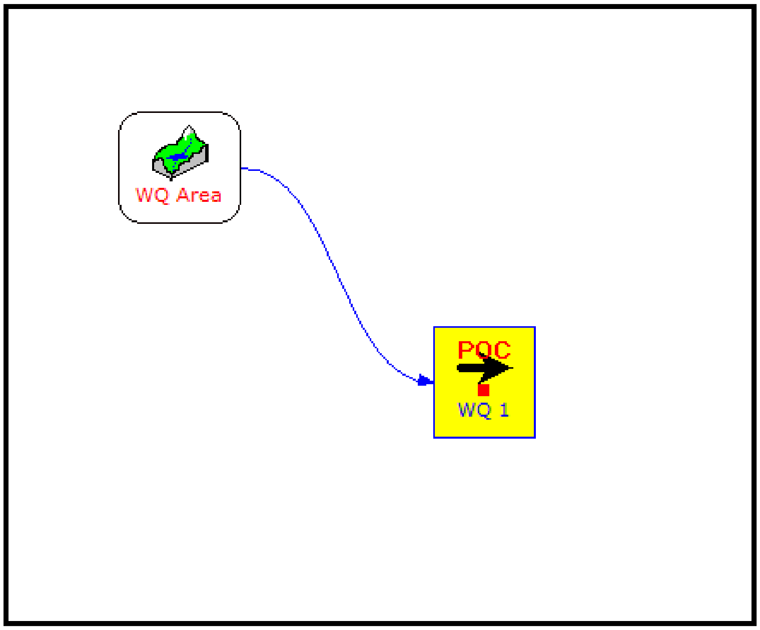
Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 205.26
Inflow Volume Including PPT-Evap (ac-ft): 205.26

```
 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):   205.26
 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: 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                    0.118              2-Year                 0.118
   5-Year                    0.161              5-Year                 0.161
   10-Year                   0.206              10-Year                0.206
   25-Year                   0.264              25-Year                0.264
   50-Year                   0.362              50-Year                0.362
   100-Year                  0.414              100-Year               0.414
   200-Year                  0.425              200-Year               0.425
   500-Year                  0.437              500-Year               0.437
 ** Record too Short to Compute Peak Discharge for These Recurrence Intervals
```

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/07/2023 10:14 AM
Report Generation Date: 04/07/2023 10:14 AM

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)	1.662	1.662
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	1.662	1.662

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

Number of Subbasins: 1

---------- Subbasin : WQ Area ----------

	-------Area (Acres) --------
Till Grass	1.308
Impervious	0.354
Subbasin Total	1.662

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


  ---------- Subbasin : WQ Area ----------
                         -------Area (Acres) --------
Till Grass                    1.308
Impervious                    0.354
--------------------------------------------
Subbasin Total                1.662



************************* 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:   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: WQ Area 175.209
Link: WQ 2 0.000

Total: 175.209

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

Subbasin: WQ Area 175.209
Link: WQ 2 0.000

Total: 175.209

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.109 ac-ft/year, Post Developed: 1.109 ac-ft/year

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

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

Number of Links: 1

********** Link: WQ 2 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 578.42
Inflow Volume Including PPT-Evap (ac-ft): 578.42
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): 578.42
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 **********

Basic Wet Pond Volume (91% Exceedance): 4131. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 6197. cu-ft

2-Year Discharge Rate : 0.317 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.07 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.04 cfs

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 578.42
Inflow Volume Including PPT-Evap (ac-ft): 578.42

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): 578.42
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 ****************

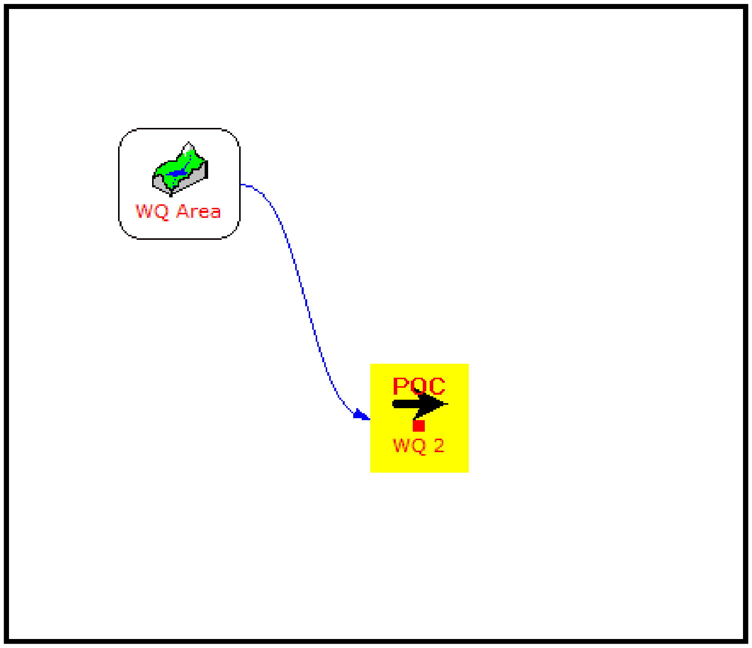
Scenario Predeveloped Compliance Link: WQ 2
Scenario Postdeveloped Compliance Link: WQ 2

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

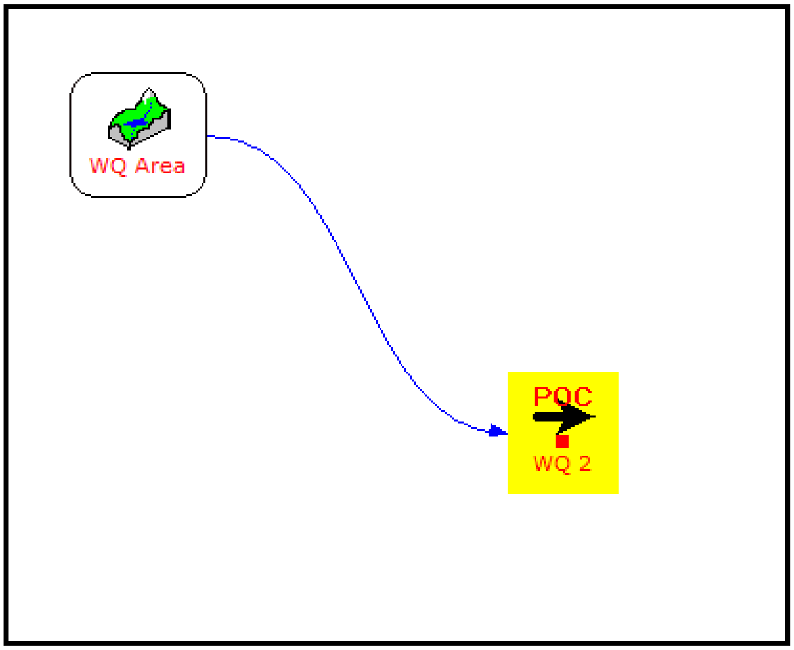
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	0.317	2-Year	0.317
5-Year	0.449	5-Year	0.449
10-Year	0.577	10-Year	0.577
25-Year	0.755	25-Year	0.755
50-Year	1.025	50-Year	1.025
100-Year	1.184	100-Year	1.184
200-Year	1.209	200-Year	1.209
500-Year	1.239	500-Year	1.239

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

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/07/2023 10:10 AM
Report Generation Date: 04/07/2023 10:11 AM

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)	11.450	11.450
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	11.450	11.450

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

Number of Subbasins: 1

---------- Subbasin : WQ Area ----------

	-------Area (Acres) --------
Till Grass	8.510
Impervious	2.940
Subbasin Total	11.450

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

---------- Subbasin : WQ Area ----------

	-------Area (Acres) --------
Till Grass	8.510
Impervious	2.940
--	
Subbasin Total	11.450

************************** **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: 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: WQ Area 1139.931
Link: WQ 3 0.000

Total: 1139.931

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

Subbasin: WQ Area 1139.931
Link: WQ 3 0.000

Total: 1139.931

Total Predevelopment Recharge Equals Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 7.215 ac-ft/year, Post Developed: 7.215 ac-ft/year

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

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

Number of Links: 1

********** Link: WQ 3 **********

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 4117.67
Inflow Volume Including PPT-Evap (ac-ft): 4117.67
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): 4117.67
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: WQ 3 **********

Basic Wet Pond Volume (91% Exceedance): 29620. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 44430. cu-ft

2-Year Discharge Rate : 2.344 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.55 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.31 cfs

Infiltration/Filtration Statistics--------------------
Inflow Volume (ac-ft): 4117.67
Inflow Volume Including PPT-Evap (ac-ft): 4117.67

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): 4117.67
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: WQ 3
Scenario Postdeveloped Compliance Link: WQ 3

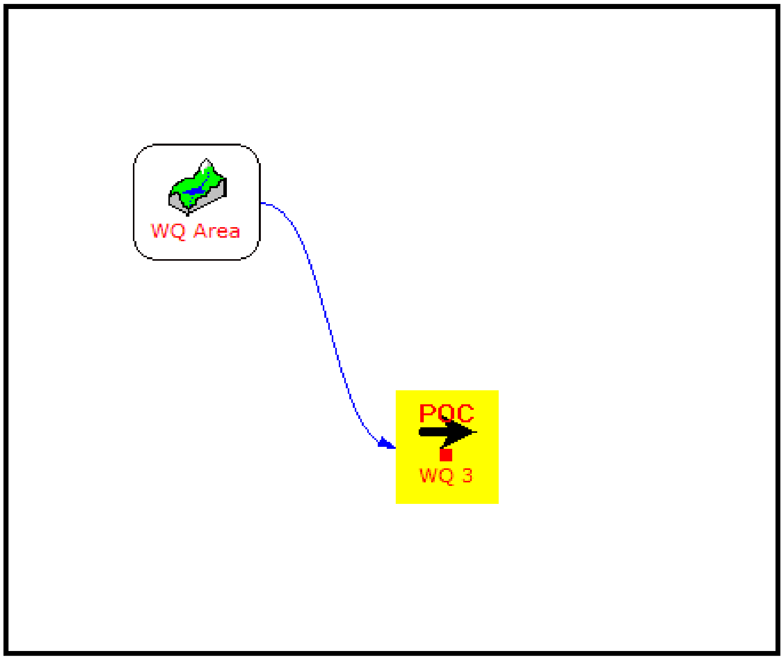
*** Point of Compliance Flow Frequency Data ***

Recurrence Interval Computed Using Gringorten Plotting Position

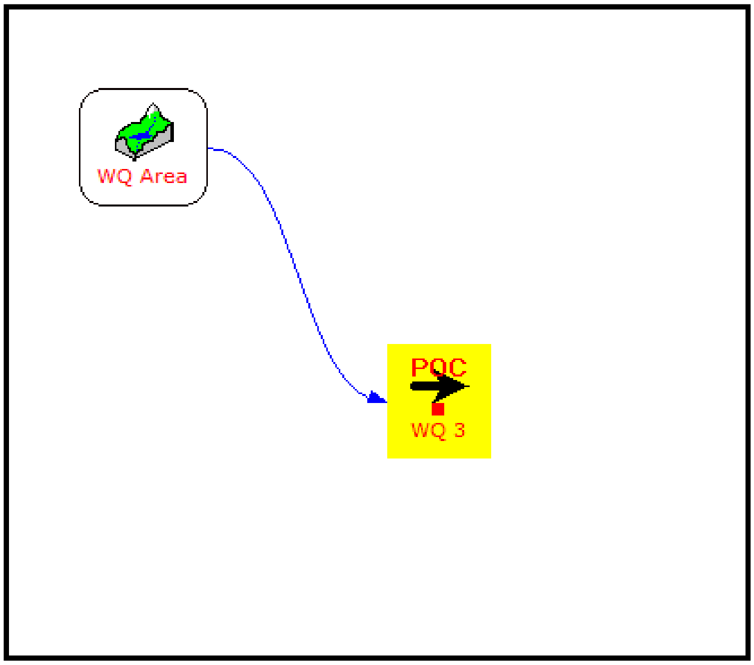
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.344	2-Year	2.344
5-Year	3.225	5-Year	3.225
10-Year	4.133	10-Year	4.133
25-Year	5.309	25-Year	5.309
50-Year	7.277	50-Year	7.277
100-Year	8.335	100-Year	8.335
200-Year	8.540	200-Year	8.540
500-Year	8.784	500-Year	8.784

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

Predeveloped



Postdeveloped



MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.55
Program License Number: 201010003
Project Simulation Performed on: 04/07/2023 10:17 AM
Report Generation Date: 04/07/2023 10:17 AM

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)	12.550	12.550
Area of Links that Include Precip/Evap (acres)	0.000	0.000
Total (acres)	12.550	12.550

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

Number of Subbasins: 1

---------- Subbasin : WQ Area ----------

	-------Area (Acres) --------
Till Grass	10.150
Impervious	2.400
--	
Subbasin Total	12.550

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


  ---------- Subbasin : WQ Area ----------
                          -------Area (Acres) --------
Till Grass                  10.150
Impervious                  2.400
--------------------------------------------
Subbasin Total              12.550


************************* 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:   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: WQ Area 1359.612
Link: WQ 4 0.000

Total: 1359.612

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

Subbasin: WQ Area 1359.612
Link: WQ 4 0.000

Total: 1359.612

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): 4295.43
Inflow Volume Including PPT-Evap (ac-ft): 4295.43
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): 4295.43
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 **********

Basic Wet Pond Volume (91% Exceedance): 30590. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 45885. cu-ft

2-Year Discharge Rate : 2.336 cfs

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): 4295.43
Inflow Volume Including PPT-Evap (ac-ft): 4295.43

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): 4295.43
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 ***************

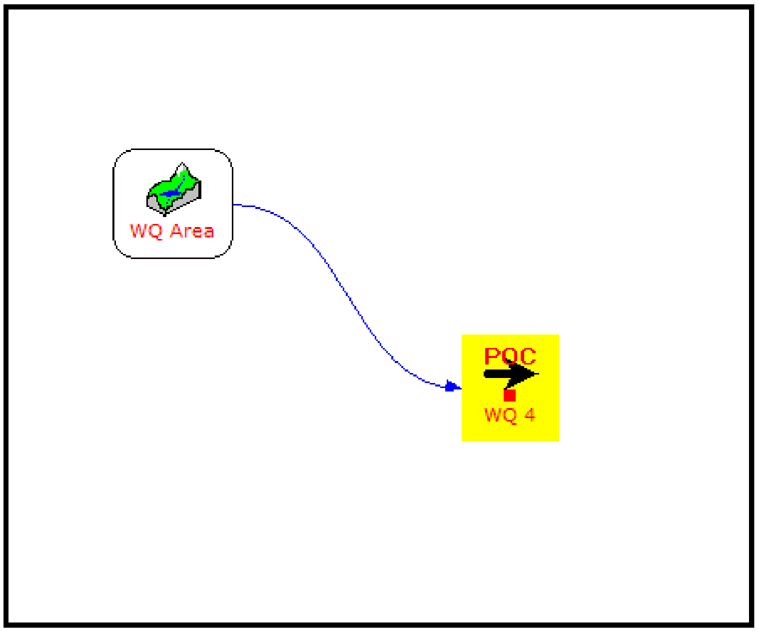
Scenario Predeveloped Compliance Link: WQ 4
Scenario Postdeveloped Compliance Link: WQ 4

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

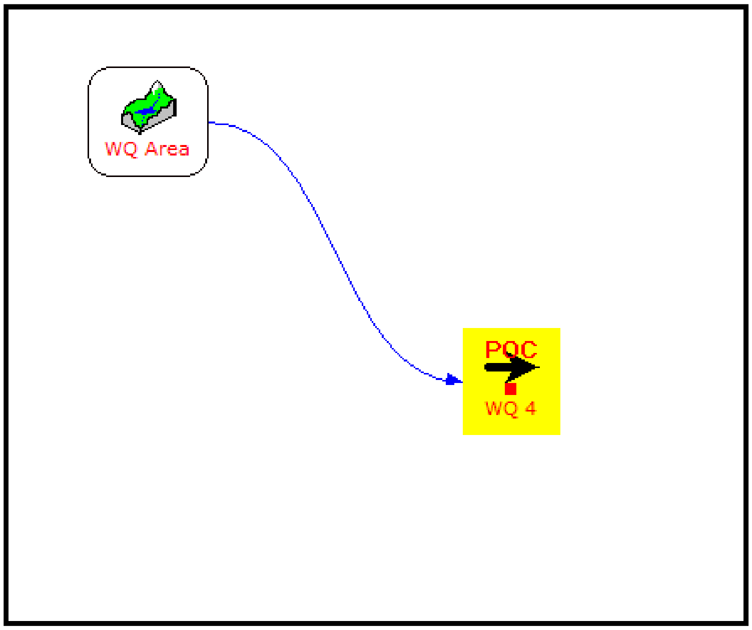
Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.336	2-Year	2.336
5-Year	3.316	5-Year	3.316
10-Year	4.282	10-Year	4.282
25-Year	5.642	25-Year	5.642
50-Year	7.624	50-Year	7.624
100-Year	8.841	100-Year	8.841
200-Year	9.017	200-Year	9.017
500-Year	9.223	500-Year	9.223

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

Predeveloped



Postdeveloped



STORMWATER FACILITY SUMMARY SHEET

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location)*

DPER Permit No. ____________________
Date ____________________
NPDES Permit No. ____________________

OVERVIEW:

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Parcel No. N/A - Public Right-of-Way
Retired Parcel No. ____________________

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 1

Project includes Landscape Management Plan? yes ☐
(include copy with TIR as Appendix) no ☒

GENERAL FACILITY INFORMATION:

Detention		**Infiltration**		**Water Quality**		**Flow Control Performance Std**
Type	***# of***	***Type***	***# of***	***Type***	***# of***	
Ponds		Ponds		Ponds		☐ Basic
Vaults		Tanks		Vaults	1	☐ Conservation
Tanks	2-42"	renches		Tanks		☐ Flood Problem

Declarations of Covenant	Recording No.
Leachable Metals	
Impervious Surface Limit	
Flow Control BMPs	
Clearing Limit	
Drainage Facility	
Landscape Management Plan	

If no flow control facility, check one:

- ☐ Project qualifies for KCSWDM Exemption (KCSWDM 1.2.3):
  - ☐ Basic Exemption
  - ☐ Impervious Surface Exemption for Transportation Redevelopment projects
  - ☐ Cost Exemption for Parcel Redevelopment projects
  - ☐ Direct Discharge Exemption
  - ☐ Other ____________________
- ☒ Project qualifies for 0.1 cfs Exception per KCSWDM 1.2.3
- ☐ No flow control required per approved KCSWDM Adjustment No. ____________________
- ☐ Flow control provided in regional/shared facility per approved approved KCSWDM Adjustment No. ____________________
  Shared Facility Name/Location: ____________________
- ☐ No flow control required (other, provide justification):
  ____

TREATMENT SUMMARY FOR TOTAL IMPERVIOUS SURFACES		
(Applies to Commercial parcels only)	Area	% of Total
Total Acreage **(ac)**		-----
Total Impervious Acreage **(ac)**		
Total impervious surface served by flow control facility(ies) **(sq ft)**		
Impervious surface served by flow control facility(ies) designed 1990 or later **(sq ft)**		
Impervious surface served by pervious surface absorption **(sq ft)**		
Impervious surface served by approved water quality facility(ies) **(sq ft)**		

Public Right-of-Way Project, Section N/A

PROVIDE FACILITY DETAILS AND FACILITY SKETCH FOR EACH FACILITY ON REVERSE. USE ADDITIONAL SHEETS AS NEEDED FOR ADDITIONAL FACILITIES

STORMWATER FACILITY SUMMARY SHEET

DPER Permit No. ________

(provide one Stormwater Facility Summary Sheet per Natural Discharge Location)

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 1

FLOW CONTROL FACILITY: Basin:

Facility Name/Number FC - Culvert 2
Facility Location Station 40+00 (LT), near 22 Louis Thompson Rd SE, Sammamish

☒ New Facility
☐ Existing Facility

UIC? ☐ yes ☒ no **UIC Site ID:**

Live Storage Volume 559 ☒ cu.ft. ☐ ac.ft.
Live Storage Depth (ft) 2.5
Volume Factor of Safety N/A

Project Impervious Acres Served 0.211
% of Total Project Impervious Acres Served 5.6
No. of Lots Served N/A

Control Structure location: Station 39+62.8 (LT), CB-60

Type of Control Structure:
☐ Riser in vault
☒ Riser in Type II CB
☐ Weir in Type II CB

No. of Orifices/Restrictions 2
Size of Orifice/Restriction (in.) (numbered starting with lowest orifice): (inches in decimal format)
No.1 0.38
No.2 0.50
No.3 ____
No.4 ____

Dam Safety Regulations (WA State Dept of Ecology):

Reservoir Volume above natural grade	0	☒ cu.ft. ☐ ac.ft.
Depth of Reservoir above natural grade	0	(ft)

WATER QUALITY FACILITIES

Indicate no. of water quality facilities/BMPs for each type:

____ Flow dispersion
____ Filter strip
____ Biofiltration swale ☐ *regular,* ☐ *wet or* ☐ *continuous inflow*
____ Wetvault ☐ *combined w/detention*
____ Wetpond ☐ *basic* ☐ *large* ☐ *combined w/detention*
____ Pre-settling pond
____ Stormwater wetland
____ Sand filter ☐ *basic* ☐ *large* ☐ *regular* ☐ *linear* ☐ *vault*
Sand bed depth (inches) ____

Design Information

Water Quality design flow (cfs)	0.02
Water Quality treated volume (sandfilter) (cu.ft.)	
Water Quality storage volume (wetpool) (cu.ft.)	

☐ **Landscape management plan** ☐ **Farm management plan**

____ High flow bypass structure (e.g., flow-splitter catch basin)
____ Oil/water separator ☐ *baffle* ☐ *coalescing plate*
1 Storm filter
____ Pre-settling structure (Manufacturer: ____)
____ Catch basin inserts (Manufacturer: ____)
____ Source controls

- Is facility lined? ☐ yes ☒ no If so, what marker is used above liner? What type of liner is used? ____

Facility Summary Sheet Sketch: All detention, infiltration and water quality facilities must include a detailed sketch (11"x17" reduced size plan sheets preferred).

STORMWATER FACILITY SUMMARY SHEET

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location)*

DPER Permit No. ____________________
Date ____________________
NPDES Permit No. ____________________

OVERVIEW:

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Parcel No. N/A - Public Right-of-Way
Retired Parcel No. ____________________

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 2 - Culvert 3

Project includes Landscape Management Plan? yes ☐
(include copy with TIR as Appendix) no ☒

GENERAL FACILITY INFORMATION:

Detention		**Infiltration**		**Water Quality**		**Flow Control Performance Std**
Type	***# of***	***Type***	***# of***	***Type***	***# of***	
Ponds		Ponds		Ponds		☐ Basic
Vaults		Tanks		Vaults	1	☒ Conservation
Tanks	2-48"	renches		Tanks		☐ Flood Problem

<u>Declarations of Covenant</u>	<u>Recording No.</u>
Leachable Metals	
Impervious Surface Limit	
Flow Control BMPs	
Clearing Limit	
Drainage Facility	
Landscape Management Plan	

If no flow control facility, check one:

- ☐ Project qualifies for KCSWDM Exemption (KCSWDM 1.2.3):
  - ☐ Basic Exemption
  - ☐ Impervious Surface Exemption for Transportation Redevelopment projects
  - ☐ Cost Exemption for Parcel Redevelopment projects
  - ☐ Direct Discharge Exemption
  - ☐ Other ____________________
- ☐ Project qualifies for 0.1 cfs Exception per KCSWDM 1.2.3
- ☐ No flow control required per approved KCSWDM Adjustment No. ____________________
- ☐ Flow control provided in regional/shared facility per approved approved KCSWDM Adjustment No. ____________________
  Shared Facility Name/Location: ____________________
- ☐ No flow control required (other, provide justification):
  ____

TREATMENT SUMMARY FOR TOTAL IMPERVIOUS SURFACES

(Applies to Commercial parcels only)	Area	% of Total
Total Acreage **(ac)**		-----
Total Impervious Acreage **(ac)**		
Total impervious surface served by flow control facility(ies) **(sq ft)**		
Impervious surface served by flow control facility(ies) designed 1990 or later **(sq ft)**		
Impervious surface served by pervious surface absorption **(sq ft)**		
Impervious surface served by approved water quality facility(ies) **(sq ft)**		

Public Right-of-Way Project, Section N/A

PROVIDE FACILITY DETAILS AND FACILITY SKETCH FOR EACH FACILITY ON REVERSE. USE ADDITIONAL SHEETS AS NEEDED FOR ADDITIONAL FACILITIES

STORMWATER FACILITY SUMMARY SHEET

DPER Permit No. ________________

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location)*

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 2 - Culvert 3

FLOW CONTROL FACILITY: Basin:

Facility Name/Number FC - Culvert 3
Facility Location Station 36+50 (LT), NW of Thomspon Hill Rd & Louis Thompson Rd

☒ New Facility
☐ Existing Facility

UIC? ☐ yes ☒ no **UIC Site ID:**

Live Storage Volume 1,203 ☒ cu.ft. ☐ ac.ft.
Live Storage Depth (ft) 3.23
Volume Factor of Safety N/A

Project Impervious Acres Served 0.123
% of Total Project Impervious Acres Served 3.2
No. of Lots Served N/A

Control Structure location: Station 36+17.5 (LT), CB-120

Type of Control Structure:
☐ Riser in vault
☒ Riser in Type II CB
☐ Weir in Type II CB

No. of Orifices/Restrictions 2
Size of Orifice/Restriction (in.) (numbered starting with lowest orifice): (inches in decimal format)
No.1 0.62
No.2 1.37
No.3 ______
No.4 ______

Dam Safety Regulations (WA State Dept of Ecology):

Reservoir Volume above natural grade	0	☒ cu.ft. ☐ ac.ft.
Depth of Reservoir above natural grade	0	(ft)

WATER QUALITY FACILITIES

Indicate no. of water quality facilities/BMPs for each type:

______ Flow dispersion
______ Filter strip
______ Biofiltration swale ☐ *regular,* ☐ *wet or* ☐ *continuous inflow*
______ Wetvault ☐ *combined w/detention*
______ Wetpond ☐ *basic* ☐ *large* ☐ *combined w/detention*
______ Pre-settling pond
______ Stormwater wetland
______ Sand filter ☐ *basic* ☐ *large* ☐ *regular* ☐ *linear* ☐ *vault*
Sand bed depth (inches) ______

Design Information

Water Quality design flow (cfs)	0.04
Water Quality treated volume (sandfilter) (cu.ft.)	
Water Quality storage volume (wetpool) (cu.ft.)	

☐ **Landscape management plan** ☐ **Farm management plan**

______ High flow bypass structure (e.g., flow-splitter catch basin)
______ Oil/water separator ☐ *baffle* ☐ *coalescing plate*
1 Storm filter
______ Pre-settling structure (Manufacturer: ________________)
______ Catch basin inserts (Manufacturer: ________________)
______ Source controls ________________

● Is facility lined? ☐ yes ☒ no If so, what marker is used above liner? What type of liner is used? ________

Facility Summary Sheet Sketch: All detention, infiltration and water quality facilities must include a detailed sketch (11"x17" reduced size plan sheets preferred).

STORMWATER FACILITY SUMMARY SHEET

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location)*

DPER Permit No. ____________________
Date ____________________
NPDES Permit No. ____________________

OVERVIEW:

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Parcel No. N/A - Public Right-of-Way
Retired Parcel No. ____________________

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 2 - Culvert 4

Project includes Landscape Management Plan? yes ☐
(include copy with TIR as Appendix) no ■

GENERAL FACILITY INFORMATION:

Detention		**Infiltration**		**Water Quality**		**Flow Control Performance Std**
Type	***# of***	***Type***	***# of***	***Type***	***# of***	
Ponds		Ponds		Ponds		☐ Basic
Vaults		Tanks		Vaults	1	■ Conservation
Tanks	1-60"	renches		Tanks		☐ Flood Problem

Declarations of Covenant	Recording No.
Leachable Metals	
Impervious Surface Limit	
Flow Control BMPs	
Clearing Limit	
Drainage Facility	
Landscape Management Plan	

If no flow control facility, check one:

- ☐ Project qualifies for KCSWDM Exemption (KCSWDM 1.2.3):
  - ☐ Basic Exemption
  - ☐ Impervious Surface Exemption for Transportation Redevelopment projects
  - ☐ Cost Exemption for Parcel Redevelopment projects
  - ☐ Direct Discharge Exemption
  - ☐ Other ____________________
- ☐ Project qualifies for 0.1 cfs Exception per KCSWDM 1.2.3
- ☐ No flow control required per approved KCSWDM Adjustment No. ____________________
- ☐ Flow control provided in regional/shared facility per approved approved KCSWDM Adjustment No. ____________________
  Shared Facility Name/Location: ____________________
- ☐ No flow control required (other, provide justification):
  ____

TREATMENT SUMMARY FOR TOTAL IMPERVIOUS SURFACES

(Applies to Commercial parcels only)	Area	% of Total
Total Acreage **(ac)**		-----
Total Impervious Acreage **(ac)**		
Total impervious surface served by flow control facility(ies) **(sq ft)**		
Impervious surface served by flow control facility(ies) designed 1990 or later **(sq ft)**		
Impervious surface served by pervious surface absorption **(sq ft)**		
Impervious surface served by approved water quality facility(ies) **(sq ft)**		

Public Right-of-Way Project, Section N/A

PROVIDE FACILITY DETAILS AND FACILITY SKETCH FOR EACH FACILITY ON REVERSE. USE ADDITIONAL SHEETS AS NEEDED FOR ADDITIONAL FACILITIES

STORMWATER FACILITY SUMMARY SHEET

DPER Permit No. ________________

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location)*

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 2 - Culvert 4

FLOW CONTROL FACILITY: Basin:

Facility Name/Number FC - Culvert 4
Facility Location Station 23+00 (LT), SW of 210th Ave NE and Louis Thompson Rd

☒ New Facility
☐ Existing Facility

UIC? ☐ yes ☒ no **UIC Site ID:**

Live Storage Volume 495 ☒ cu.ft. ☐ ac.ft.
Live Storage Depth (ft) 4.3
Volume Factor of Safety N/A

Project Impervious Acres Served 2.94
% of Total Project Impervious Acres Served 77.6
No. of Lots Served N/A

Control Structure location: Station 31+85.6 (LT), CB-200
Type of Control Structure:
☐ Riser in vault
☒ Riser in Type II CB
☐ Weir in Type II CB

No. of Orifices/Restrictions 2
Size of Orifice/Restriction (in.) (numbered starting with lowest orifice): (inches in decimal format)
No.1 0.75
No.2 3.50
No.3 ______
No.4 ______

Dam Safety Regulations (WA State Dept of Ecology):

Reservoir Volume above natural grade	0	☒ cu.ft. ☐ ac.ft.
Depth of Reservoir above natural grade	0	(ft)

WATER QUALITY FACILITIES

Indicate no. of water quality facilities/BMPs for each type:

______ Flow dispersion
______ Filter strip
______ Biofiltration swale ☐ *regular,* ☐ *wet or* ☐ *continuous inflow*
______ Wetvault ☐ *combined w/detention*
______ Wetpond ☐ *basic* ☐ *large* ☐ *combined w/detention*
______ Pre-settling pond
______ Stormwater wetland
______ Sand filter ☐ *basic* ☐ *large* ☐ *regular* ☐ *linear* ☐ *vault*
Sand bed depth (inches) ______

Design Information

Water Quality design flow (cfs)	0.31
Water Quality treated volume (sandfilter) (cu.ft.)	
Water Quality storage volume (wetpool) (cu.ft.)	

☐ **Landscape management plan** ☐ **Farm management plan**

1 High flow bypass structure (e.g., flow-splitter catch basin)
______ Oil/water separator ☐ *baffle* ☐ *coalescing plate*
1 Storm filter
______ Pre-settling structure (Manufacturer: ________________)
______ Catch basin inserts (Manufacturer: ________________)
______ Source controls

- Is facility lined? ☐ yes ☒ no If so, what marker is used above liner? What type of liner is used? ________________

Facility Summary Sheet Sketch: All detention, infiltration and water quality facilities must include a detailed sketch (11"x17" reduced size plan sheets preferred).

STORMWATER FACILITY SUMMARY SHEET

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location)*

DPER Permit No. ____________
Date ____________
NPDES Permit No. ____________

OVERVIEW:

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Parcel No. N/A - Public Right-of-Way
Retired Parcel No. ____________

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 3 - To Existing Pond

Project includes Landscape Management Plan? yes ☐
(include copy with TIR as Appendix) no ☒

GENERAL FACILITY INFORMATION:

Detention		**Infiltration**		**Water Quality**		**Flow Control Performance Std**
Type	***# of***	***Type***	***# of***	***Type***	***# of***	
Ponds		Ponds		Ponds		☐ Basic
Vaults		Tanks		Vaults	1	☒ Conservation
Tanks	2-72"	renches		Tanks		☐ Flood Problem

Declarations of Covenant	Recording No.
Leachable Metals	
Impervious Surface Limit	
Flow Control BMPs	
Clearing Limit	
Drainage Facility	
Landscape Management Plan	

If no flow control facility, check one:

- ☐ Project qualifies for KCSWDM Exemption (KCSWDM 1.2.3):
  - ☐ Basic Exemption
  - ☐ Impervious Surface Exemption for Transportation Redevelopment projects
  - ☐ Cost Exemption for Parcel Redevelopment projects
  - ☐ Direct Discharge Exemption
  - ☐ Other ____________
- ☐ Project qualifies for 0.1 cfs Exception per KCSWDM 1.2.3
- ☐ No flow control required per approved KCSWDM Adjustment No. ____________
- ☐ Flow control provided in regional/shared facility per approved approved KCSWDM Adjustment No. ____________
  Shared Facility Name/Location: ____________
- ☐ No flow control required (other, provide justification):
  ____

TREATMENT SUMMARY FOR TOTAL IMPERVIOUS SURFACES

(Applies to Commercial parcels only)	Area	% of Total
Total Acreage **(ac)**		-----
Total Impervious Acreage **(ac)**		
Total impervious surface served by flow control facility(ies) **(sq ft)**		
Impervious surface served by flow control facility(ies) designed 1990 or later **(sq ft)**		
Impervious surface served by pervious surface absorption **(sq ft)**		
Impervious surface served by approved water quality facility(ies) **(sq ft)**		

Public Right-of-Way Project, Section N/A

PROVIDE FACILITY DETAILS AND FACILITY SKETCH FOR EACH FACILITY ON REVERSE. USE ADDITIONAL SHEETS AS NEEDED FOR ADDITIONAL FACILITIES

STORMWATER FACILITY SUMMARY SHEET

DPER Permit No. ______________

(provide one Stormwater Facility Summary Sheet per Natural Discharge Location)

Project Name
Louis Thompson Road Tightline Project

Project Location
Louis Thompson Road and East Lake Sammamish Parkway

Downstream Drainage Basins:
Major Basin Name East Lake Sammamish
Immediate Basin Name TDA 3 - To Existing Pond

FLOW CONTROL FACILITY: Basin:

Facility Name/Number FC - EX Pond
Facility Location Station 18+00 (LT), SW of NE 3rd St and Louis Thompson Rd

☒ New Facility
☐ Existing Facility

UIC? ☐ yes ☒ no **UIC Site ID:**

Live Storage Volume 1,949 ☒ cu.ft. ☐ ac.ft.
Live Storage Depth (ft) 5.0
Volume Factor of Safety N/A

Project Impervious Acres Served 2.4
% of Total Project Impervious Acres Served X
No. of Lots Served N/A

Control Structure location: Station 17+43.9 (LT), CB-405
Type of Control Structure:
☐ Riser in vault
☒ Riser in Type II CB
☐ Weir in Type II CB

No. of Orifices/Restrictions 2
Size of Orifice/Restriction (in.) (numbered starting with lowest orifice): (inches in decimal format)
No.1 1.25
No.2 6.00
No.3 ______
No.4 ______

Dam Safety Regulations (WA State Dept of Ecology):

Reservoir Volume above natural grade	0	☒ cu.ft. ☐ ac.ft.
Depth of Reservoir above natural grade	0	(ft)

WATER QUALITY FACILITIES

Indicate no. of water quality facilities/BMPs for each type:

______ Flow dispersion
______ Filter strip
______ Biofiltration swale ☐ *regular,* ☐ *wet or* ☐ *continuous inflow*
______ Wetvault ☐ *combined w/detention*
______ Wetpond ☐ *basic* ☐ *large* ☐ *combined w/detention*
______ Pre-settling pond
______ Stormwater wetland
______ Sand filter ☐ *basic* ☐ *large* ☐ *regular* ☐ *linear* ☐ *vault*
Sand bed depth (inches) ______

Design Information

Water Quality design flow (cfs)	0.29
Water Quality treated volume (sandfilter) (cu.ft.)	
Water Quality storage volume (wetpool) (cu.ft.)	

☐ **Landscape management plan** ☐ **Farm management plan**

1 High flow bypass structure (e.g., flow-splitter catch basin)
______ Oil/water separator ☐ *baffle* ☐ *coalescing plate*
1 Storm filter
______ Pre-settling structure (Manufacturer: ______________)
______ Catch basin inserts (Manufacturer: ______________)
______ Source controls

- Is facility lined? ☐ yes ☒ no If so, what marker is used above liner? What type of liner is used? ______________

Facility Summary Sheet Sketch: All detention, infiltration and water quality facilities must include a detailed sketch (11"x17" reduced size plan sheets preferred).

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

May 1, 2023

Project Construction Dates

Activity / Phase	Start Date	End Date
Site Development and Roadway Improvements	TBD	TBD

Table of Contents

Appendices

List of Acronyms and Abbreviations

Acronym / Abbreviation	**Explanation**
303(d)	section of the Clean Water Act pertaining to impaired waterbodies
BMP(s)	Best Management Practice
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/Site Name: Louis Thompson Tightline Project (LTTP)

Street/Location: Louis Thompson Road between East Lake Sammamish Parkway NE to 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 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 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. Should field conditions during construction require additional BMPs or changes to the temporary BMPs, this document shall be modified by the Contractor. 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 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 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 6.23 acres.
Disturbed acreage	The total disturbed area is 4.16 acres.
Existing structures/utilities	• Existing storm: currently, stormwater flows through culvert pipe connections and ditches on Louis Thompson Road, connecting with existing stream flows and surface flows south to Zackuse Creek, then west to Lake Sammamish. Underground storm pipes are present on the western end of the project. This project includes stormwater utility improvements to install a pipe network along Louis Thompson Road. • 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. • Underground water are servicing residents along the extents of the project site limits. Sewer lines only exist at limited locations within the project site (e.g., intersection with 205th Avenue NE) • Buried communication lines service residents adjacent to the project site. • 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 then 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 consists generally 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 delineated along Zackuse Creek to the southeast of the project site. Wetlands were not delineated within the project site. **Streams**: Zackuse Creek is an existing stream 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 suspected and/or 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 installation of temporary erosion and sediment control measures, clearing and grubbing, implementation of the storm water pollution prevention plan, and site restoration following completion of construction.

The project will include 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 construction phasing and schedule is to be developed by the Contractor per the requirements in the project specifications. Prior to the start of construction, the Contractor must prepare and receive approval of the CSWPP and dewatering plan, including construction sequencing and water quality monitoring plan. Erosion and sediment control BMPs must be in place prior to the start of 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**), but these locations may be updated or eliminated pending the Contractor’s proposed construction phasing.

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. Once final stabilization has been 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 in 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 will be implemented per Plan prior to the beginning of construction activities:

- BMP C101: Preserving Natural Vegetation
- BMP C103: High Visibility Plastic or Metal Fence (see Plans)
- BMP C105: Stabilized Construction Access, as needed
- BMP C106: Wheel Wash, as needed
- BMP C107: Construction Road/Parking Area Stabilization – for parking/staging areas, as needed
- BMP C120: Temporary and Permanent Seeding
- BMP C122: Nets and Blankets, as needed
- BMP C123: Plastic Covering
- BMP C150: Materials on Hand
- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- BMP C153: Material Delivery, Storage, and Containment
- BMP C154: Concrete Washout Area
- BMP C160: Certified Erosion and Sediment Control Lead
- BMP C220: Inlet Protection
- BMP C252: High pH Neutralization Using CO_2
- Trench Dewatering
- 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, and 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 BMPs 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 deemed necessary by the ESC Lead.

2.1 ELEMENT 1: PRESERVE VEGETATION/MARK CLEARING LIMITS

Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers to remain, and trees that are 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
- BMP C103: High Visibility Plastic or Metal Fence (see Plans)

2.2 ELEMENT 2: ESTABLISH CONSTRUCTION ACCESS

Construction vehicles entering and exiting the project site will use only identified and approved access points. Construction access points shall be determined by the contractor before the start of 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 brush and/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. Sediment shall be removed from roads by manual shoveling and/or dry sweeping and the collected sediments 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 turbid water is appropriately managed and treated prior to discharge. Street wash wastewater shall be controlled by pumping back on-site, or otherwise be 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:

- BMP C105: Stabilized Construction Access, as needed
- BMP C106: Wheel Wash
- BMP C107: Construction Road/Parking Area Stabilization – for parking/staging areas, as needed

2.3 ELEMENT 3: CONTROL FLOW RATES

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 (see Technical Information Report for pipe capacity calculations). Any proposed detention pipes used for flow control during construction, shall being cleaned of sediment before the end of construction.

Offsite run-on ditch flows along Louis Thompson Road will also be maintained and routed around the construction limits during construction.

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, etc., 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 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
- BMP C105: Stabilized Construction Access, as needed
- BMP C220: Inlet Protection
- 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 weekends or when rain is a possibility. Per Ecology guidelines, summarized in **Table 3**, no soils shall remain exposed and unworked for more than 7 days in the dry season and more than 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 if needed based on the weather forecast.

Selected BMPs for Element 4:

- BMP C120: Temporary and Permanent Seeding
- BMP C122: Nets and Blankets, as needed
- BMP C123: Plastic Covering, as needed

2.6 ELEMENT 5: PROTECT SLOPES

Slopes along the south edge of the project site are considered steep slopes. BMPs will be installed immediately after any disturbance to steep slope areas. 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:

- BMP C120: Temporary and Permanent Seeding
- BMP C122: Nets and Blankets, as needed
- BMP C123: Plastic Covering, as needed

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 the start of 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:

- BMP C220: 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:

- BMP C120: Temporary and Permanent Seeding
- BMP C122: Nets and Blankets
- BMP C123: Plastic Covering
- BMP C209: Outlet Protection
- 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 handled and disposed of in a manner that does not cause contamination of storm water or 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/or 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 onto 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
	Cement kiln dust
	Fly ash

TABLE 4 | PH-MODIFYING SOURCES

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 (i.e., calcium lignosulfate) [please describe]

Selected BMPs for Element 8:

- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- BMP C153: Material Delivery, Storage, and Containment
- BMP C154: Concrete Washout Area
- BMP C252: 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:

- Trench Dewatering

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 particular 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
- BMP C160: Certified Erosion and Sediment Control Lead

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(s)	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/ 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 documentation 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:

- 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**.

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 point(s) are indicated on the Erosion and Sediment Control Plan (see **Appendix A**) 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/Turbidimeter (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 but 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/or 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 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. https://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 begin the process to fully implement and maintain appropriate source control and/or 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" (i.e., greater than 1000 cubic yards poured concrete or recycled concrete over the life of the project).The use of engineered soils (soil amendments including but 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 it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are 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 the 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 the use of 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:

- 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:

- 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 inspection(s) or investigation(s) 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 is 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 proposed corrective actions will be coordinated by the Contractor with the Project Representative.
2. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
3. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results 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

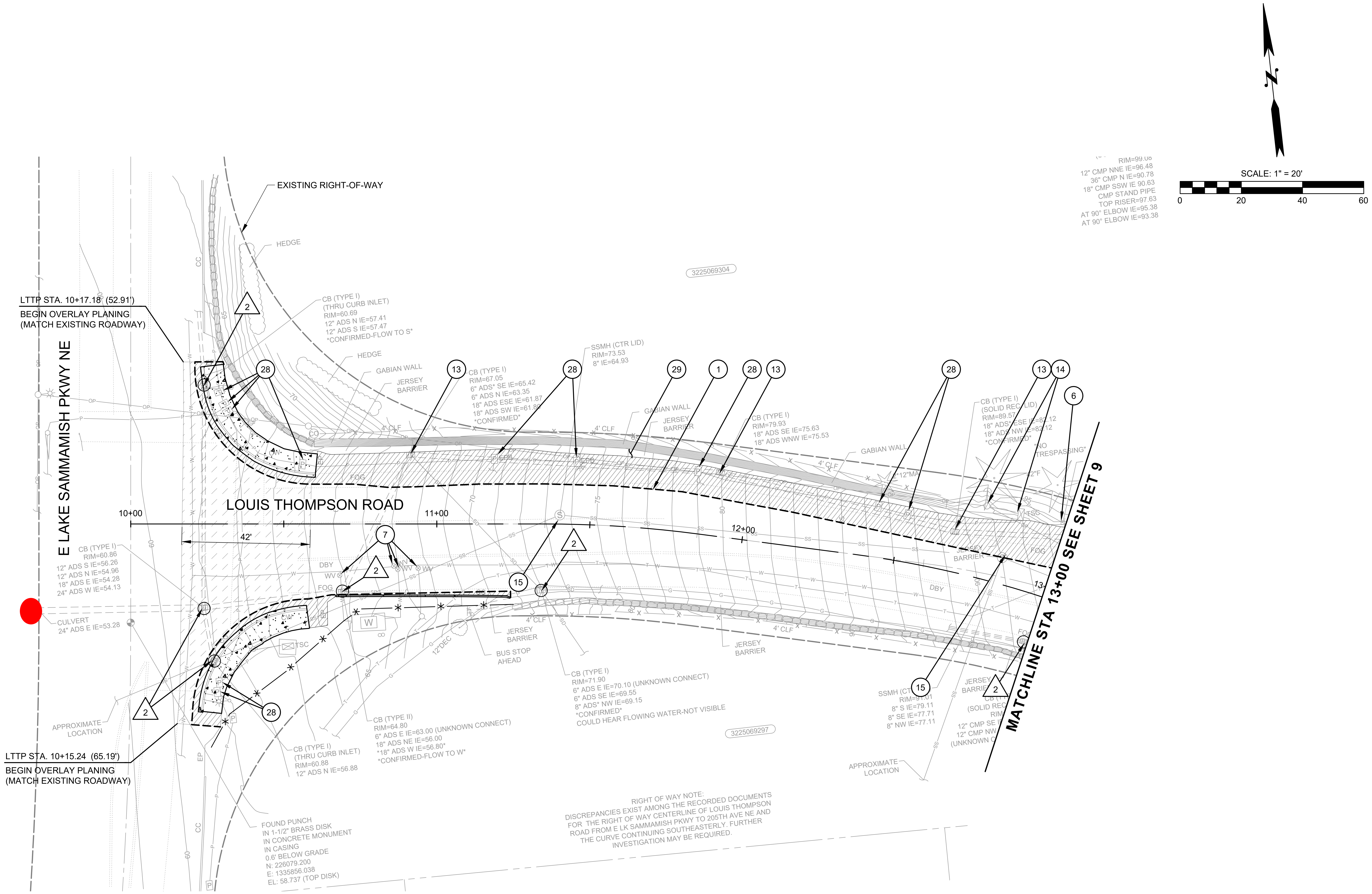
Include the following information:

1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / 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. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

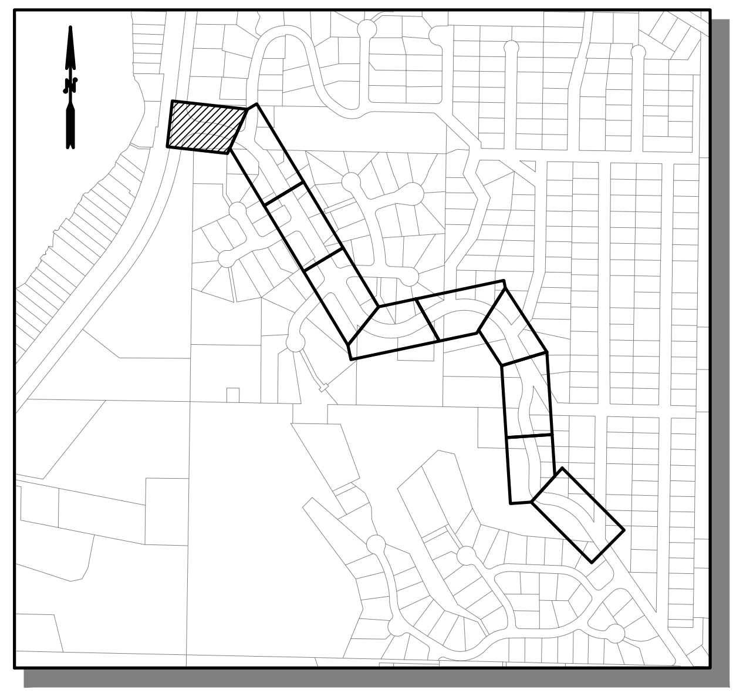
LEGEND

- - - - - - -	SAW CUT
〰〰〰	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
——*——	HIGH VISIBILITY SILT FENCE
————	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▦	REMOVE CONCRETE PAVEMENT
▧	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811

Know what's **below.**
Call before you dig.

Potential Monitoring Location ●



KEY MAP

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com			
DRAWN BY LT/LO/FJ					
CHECKED BY LR			NO.	DATE	REVISION	BY

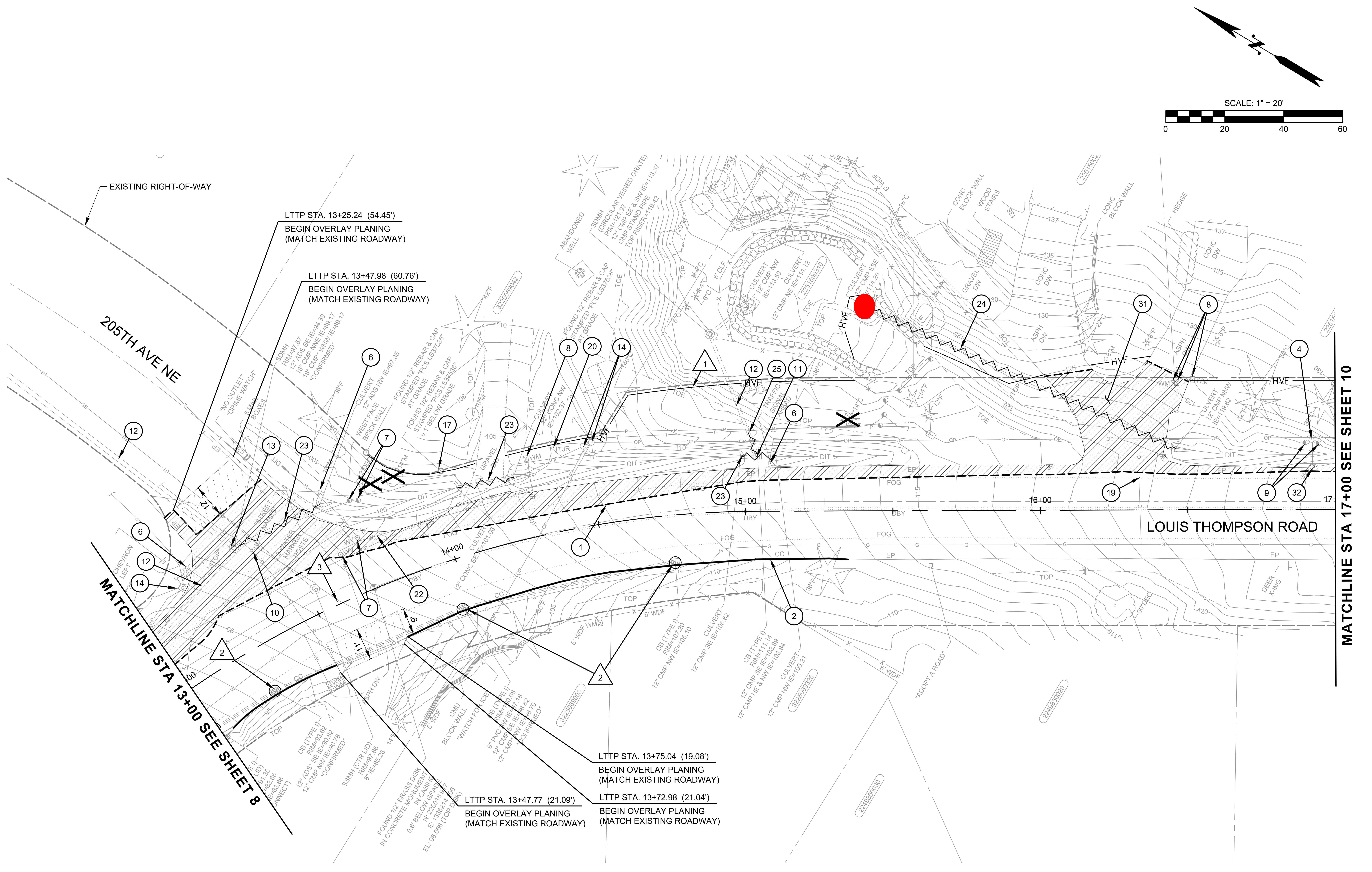
City of Sammamish Washington

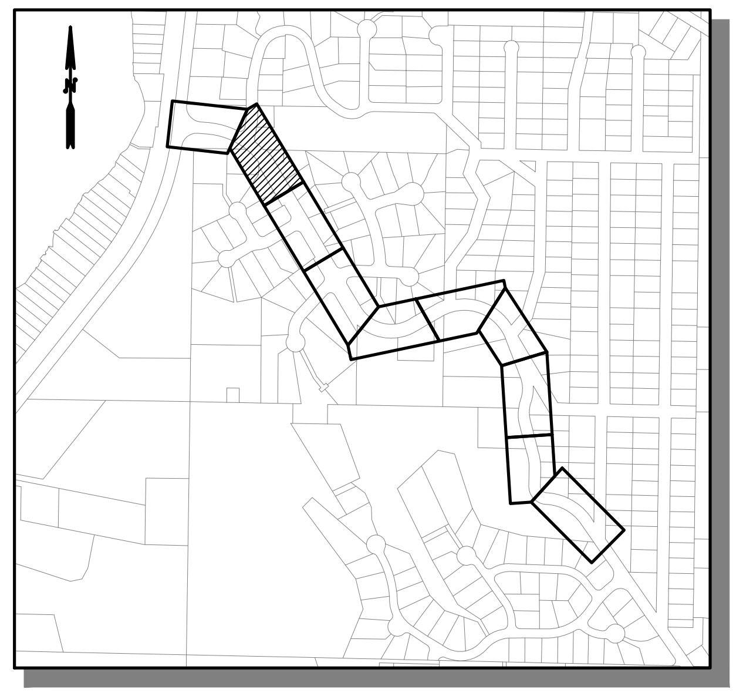
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG 10-210058
SCALE H: 1"=20' V: N/A
DATE 04/28/2023
ER01
SHEET 8 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:02 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.





KEY MAP

Potential Monitoring Location ●

GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△## EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

(##) SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

LEGEND

– – – – – –	SAW CUT
⁄\/\/\/\	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
——*——	HIGH VISIBILITY SILT FENCE
———	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▩	REMOVE CONCRETE PAVEMENT
▧	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	
DRAWN BY LT/LO/FJ			
CHECKED BY LR			

NO.	DATE	REVISION	BY

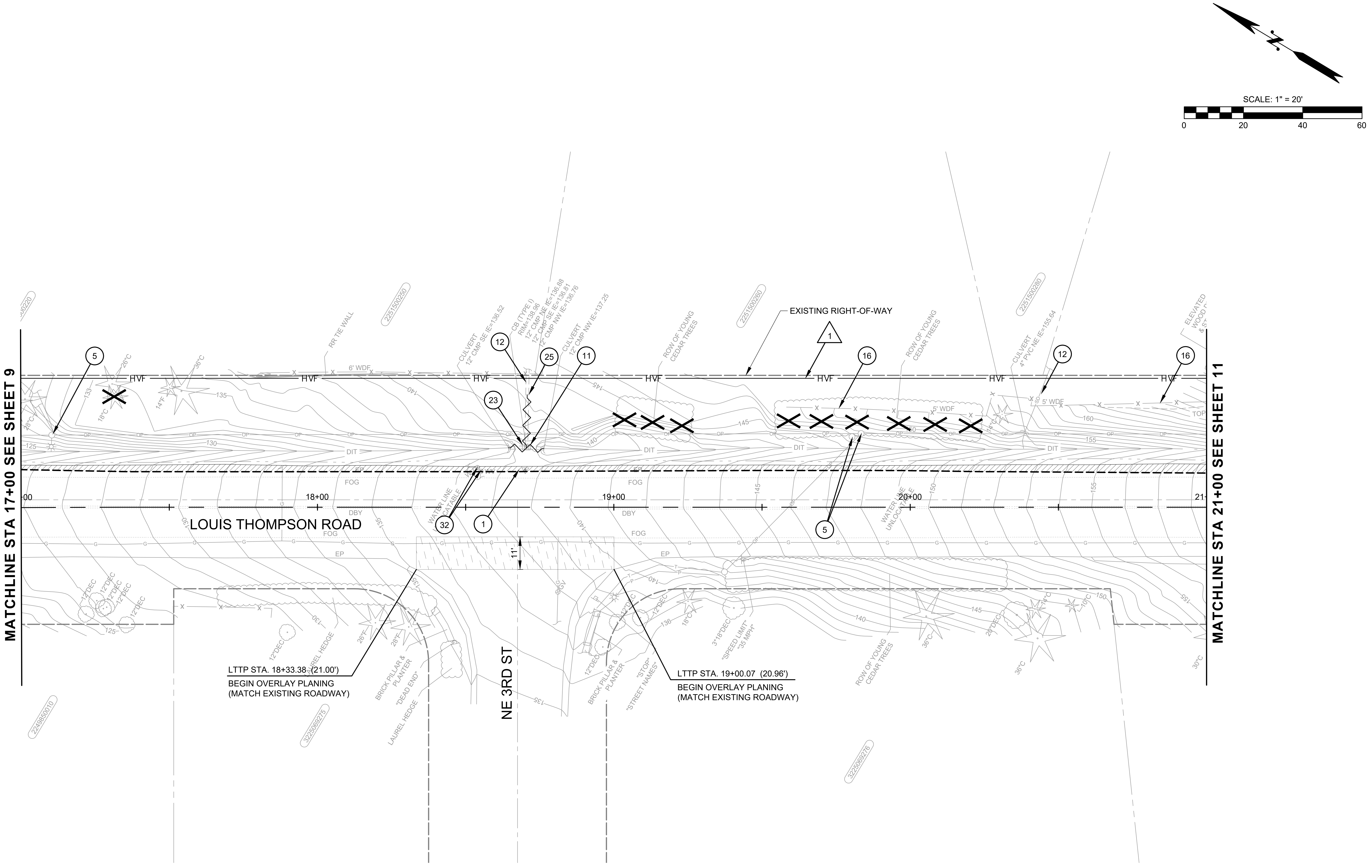
City of Sammamish Washington

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 04/28/2023
ER02
SHEET 9 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:02 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△ EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

○ SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

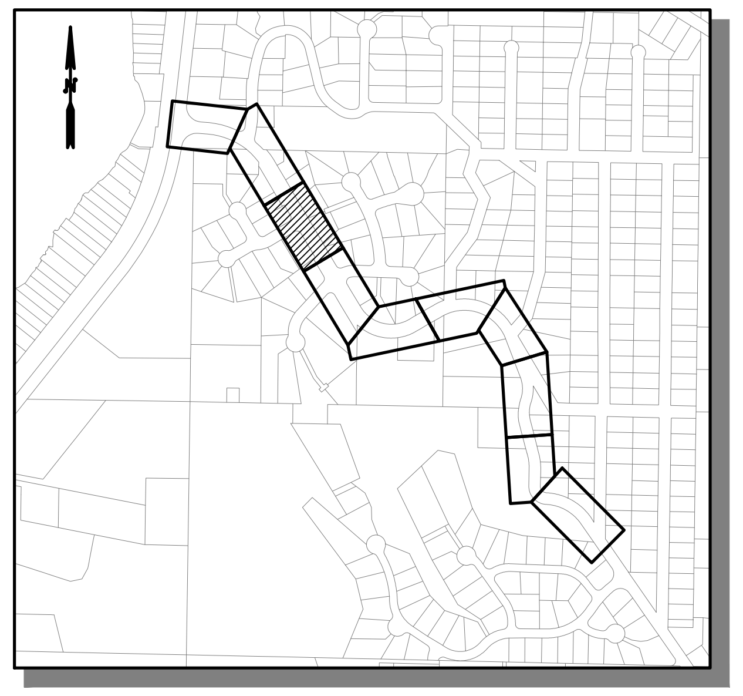
LEGEND

- - - - - -	SAW CUT
∿∿∿∿	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
——*——	HIGH VISIBILITY SILT FENCE
——	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▨	REMOVE CONCRETE PAVEMENT
▨	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

Know what's **below.** Call before you dig.

Potential Monitoring Location ●

60% SUBMITTAL (NOT FOR CONSTRUCTION)



KEY MAP

DESIGNED BY MP	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	
DRAWN BY LT/LO/FJ			
CHECKED BY LR			

NO.	DATE	REVISION	BY

City of Sammamish Washington

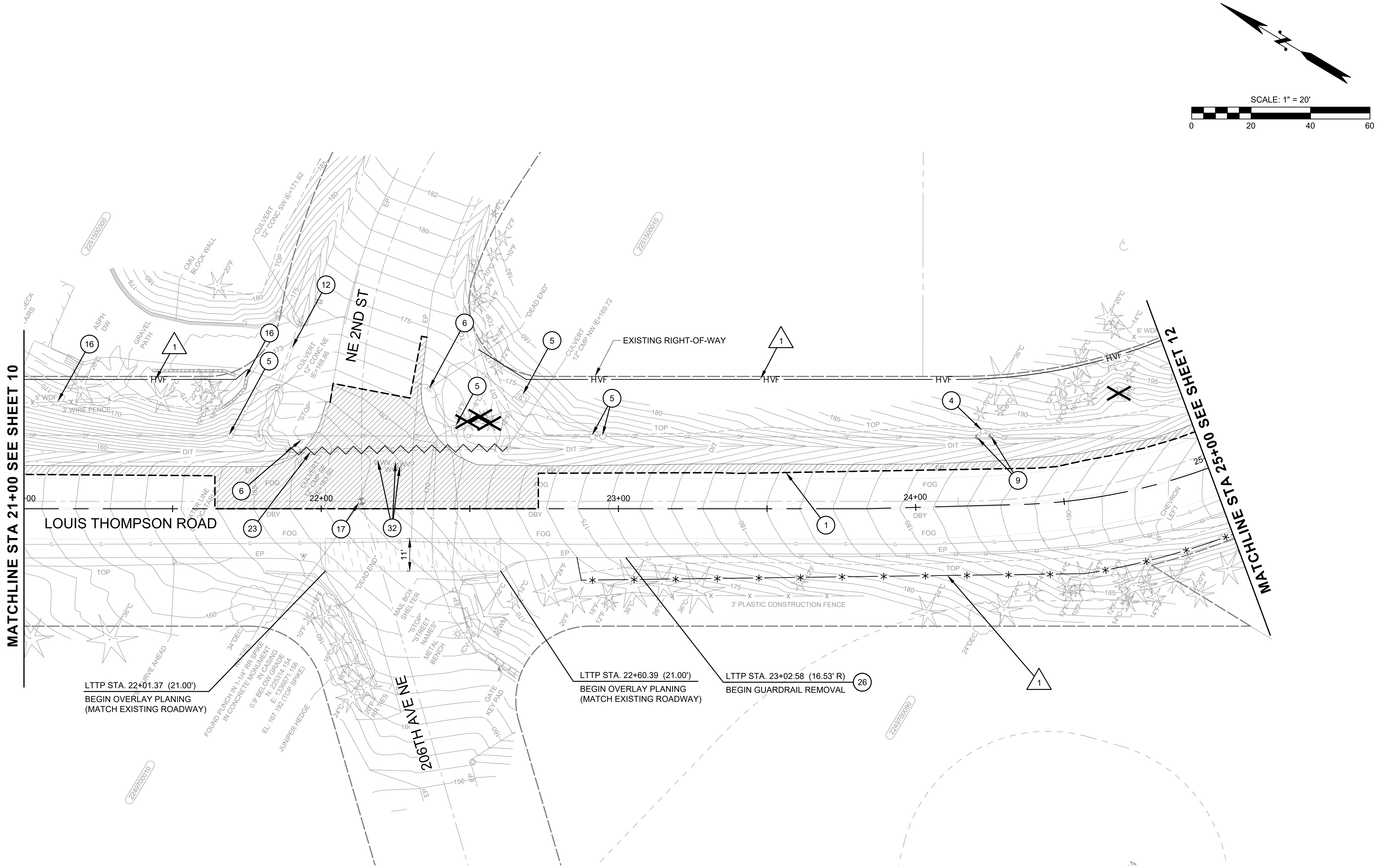
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH

EROSION CONTROL AND SITE PREPARATION PLAN

JOB# / DWG 10-210058
SCALE H: 1"=20' V: N/A
DATE 04/28/2023
ER03
SHEET 10 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:02 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

SITE PREPARATION NOTES:

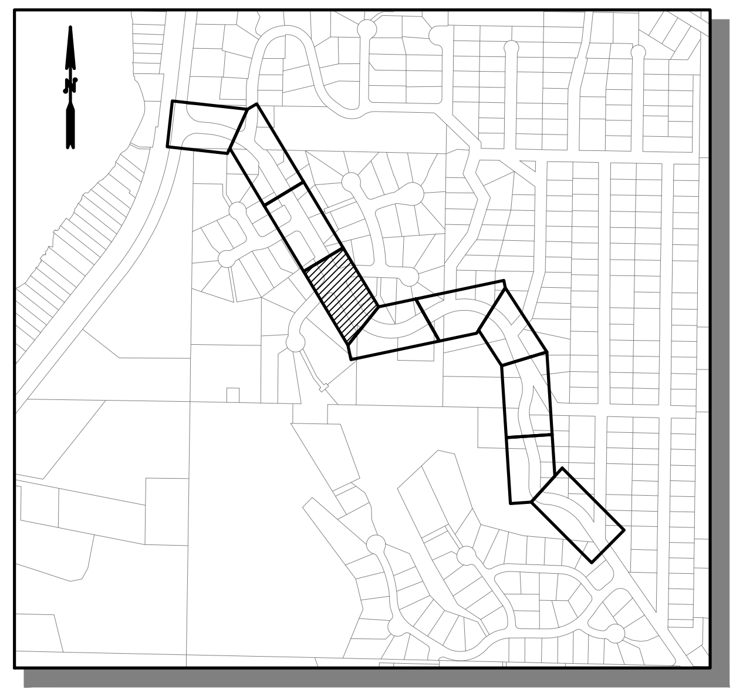
1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

LEGEND

– – – – – – –	SAW CUT
⁄\⁄\⁄\⁄\	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
—— * ——	HIGH VISIBILITY SILT FENCE
———	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▩	REMOVE CONCRETE PAVEMENT
▨	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.

Potential Monitoring Location ●



KEY MAP

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY
MP
DRAWN BY
LT/LO/FJ
CHECKED BY
LR

OSBORN CONSULTING INCORPORATED
Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

NO.	DATE	REVISION	BY

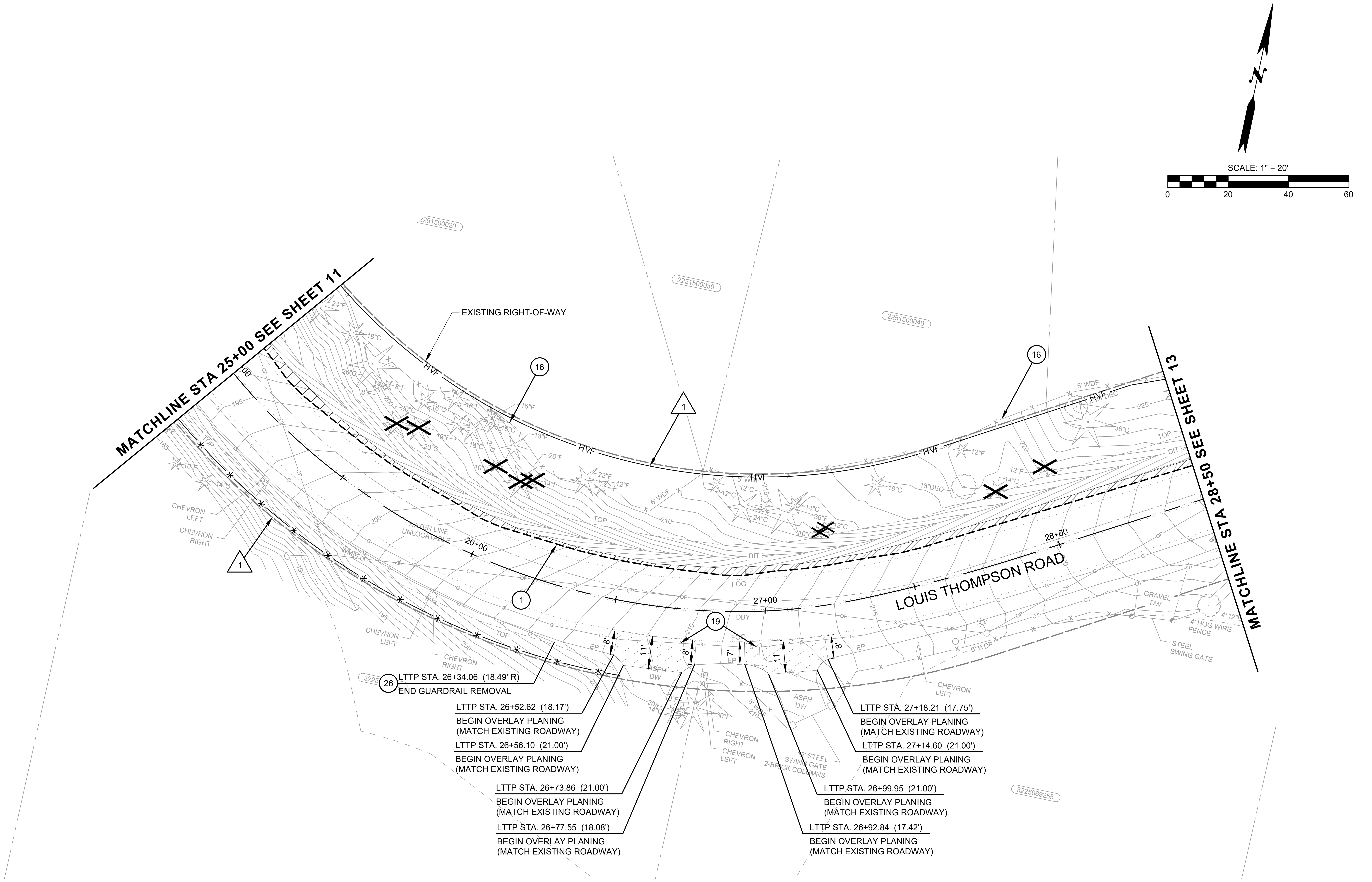
City of Sammamish Washington

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
04/28/2023
ER04
SHEET 11 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:02 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

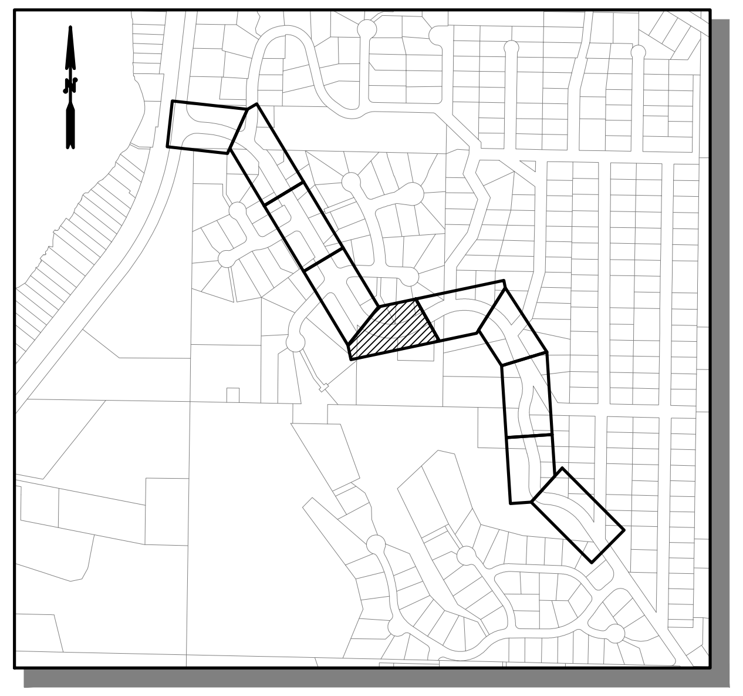
LEGEND

- - - - - -	SAW CUT
∿∿∿∿	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
——*——	HIGH VISIBILITY SILT FENCE
———	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
⁘	REMOVE CONCRETE PAVEMENT
▨	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.

Potential Monitoring Location ●

60% SUBMITTAL (NOT FOR CONSTRUCTION)



KEY MAP

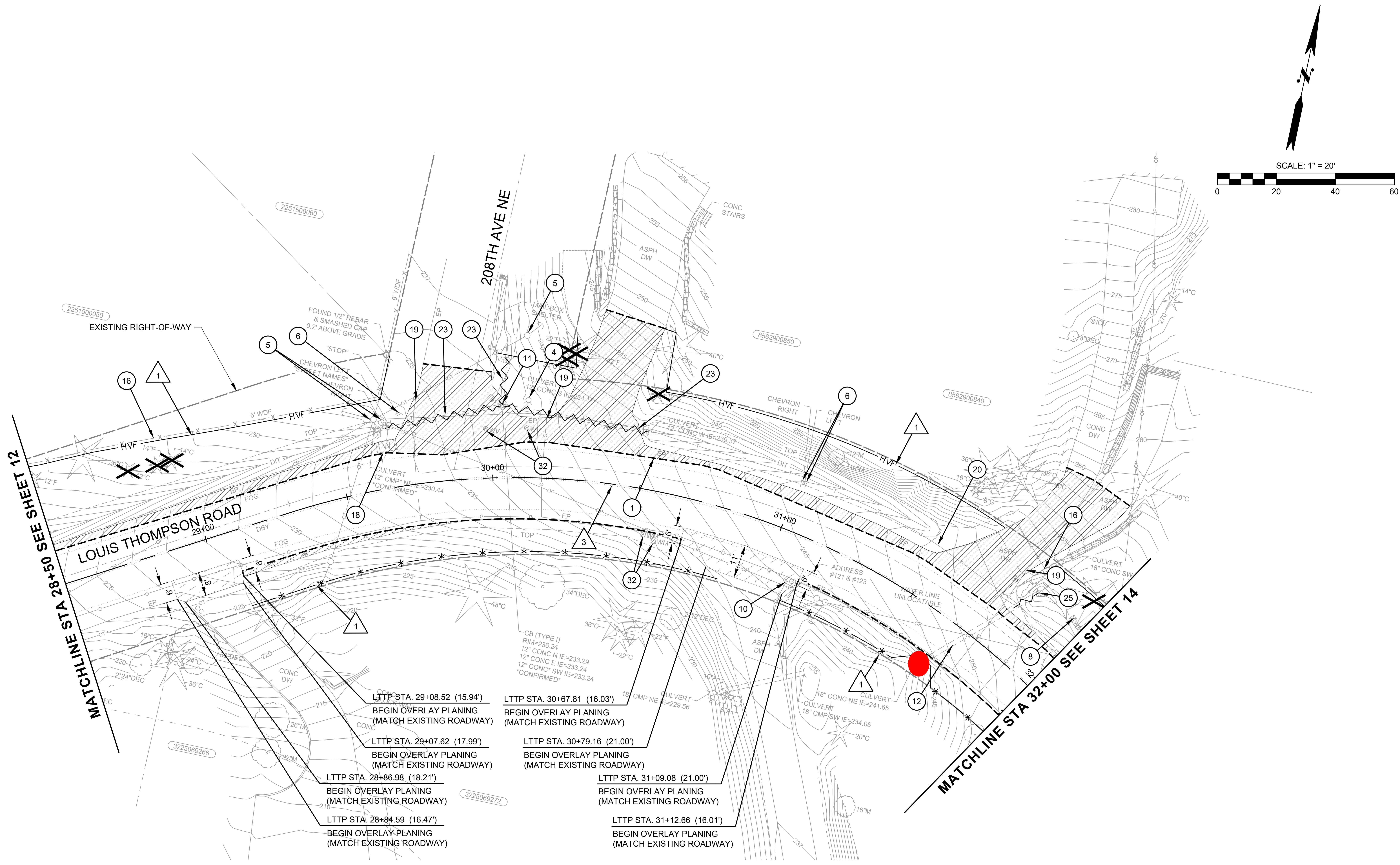
DESIGNED BY MP DRAWN BY LT/LO/FJ CHECKED BY LR	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	NO. | DATE | REVISION | BY	City of Sammamish Washington

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 04/28/2023
ER05
SHEET 12 of 101

FILE NAME: C:\PW_OCI_WORKING\DIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:02 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△## EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

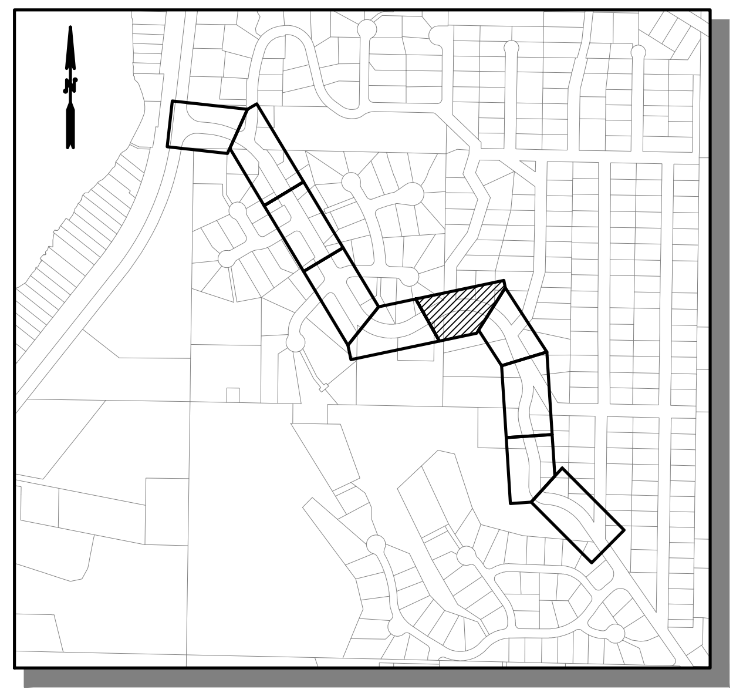
(##) SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

LEGEND

– – – – – – –	SAW CUT
⁄\/\/\/\	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
——*——	HIGH VISIBILITY SILT FENCE
———	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▩	REMOVE CONCRETE PAVEMENT
▧	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.



KEY MAP

Potential Monitoring Location ●

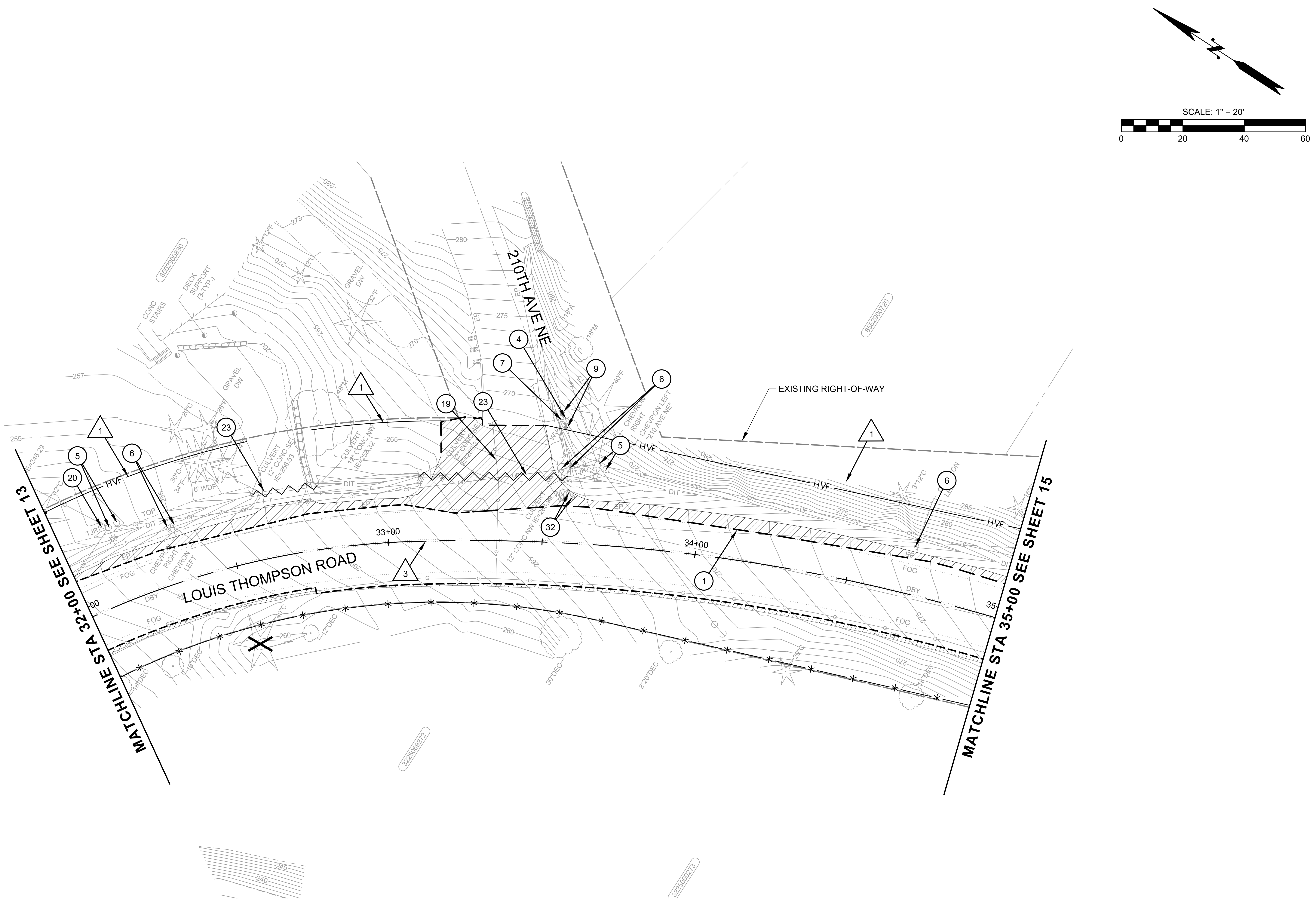
60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP	Osborn Consulting, Inc. Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	LOUIS THOMPSON ROAD TIGHTLINE PROJECT CITY OF SAMMAMISH	JOB# / DWG 10-210058
DRAWN BY LT/LO/FJ		EROSION CONTROL AND SITE PREPARATION PLAN	SCALE H: 1"=20' V: N/A
CHECKED BY LR			DATE 04/28/2023
			ER06 SHEET 13 of 101

NO.	DATE	REVISION	BY

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:03 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△ EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

○ SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

LEGEND

- - - - - -	SAW CUT
∿∿∿∿	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—HVF—	HIGH VISIBILITY FENCE
—*—	HIGH VISIBILITY SILT FENCE
——	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▩	REMOVE CONCRETE PAVEMENT
▨	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.

KEY MAP

Potential Monitoring Location ●

60% SUBMITTAL (NOT FOR CONSTRUCTION)

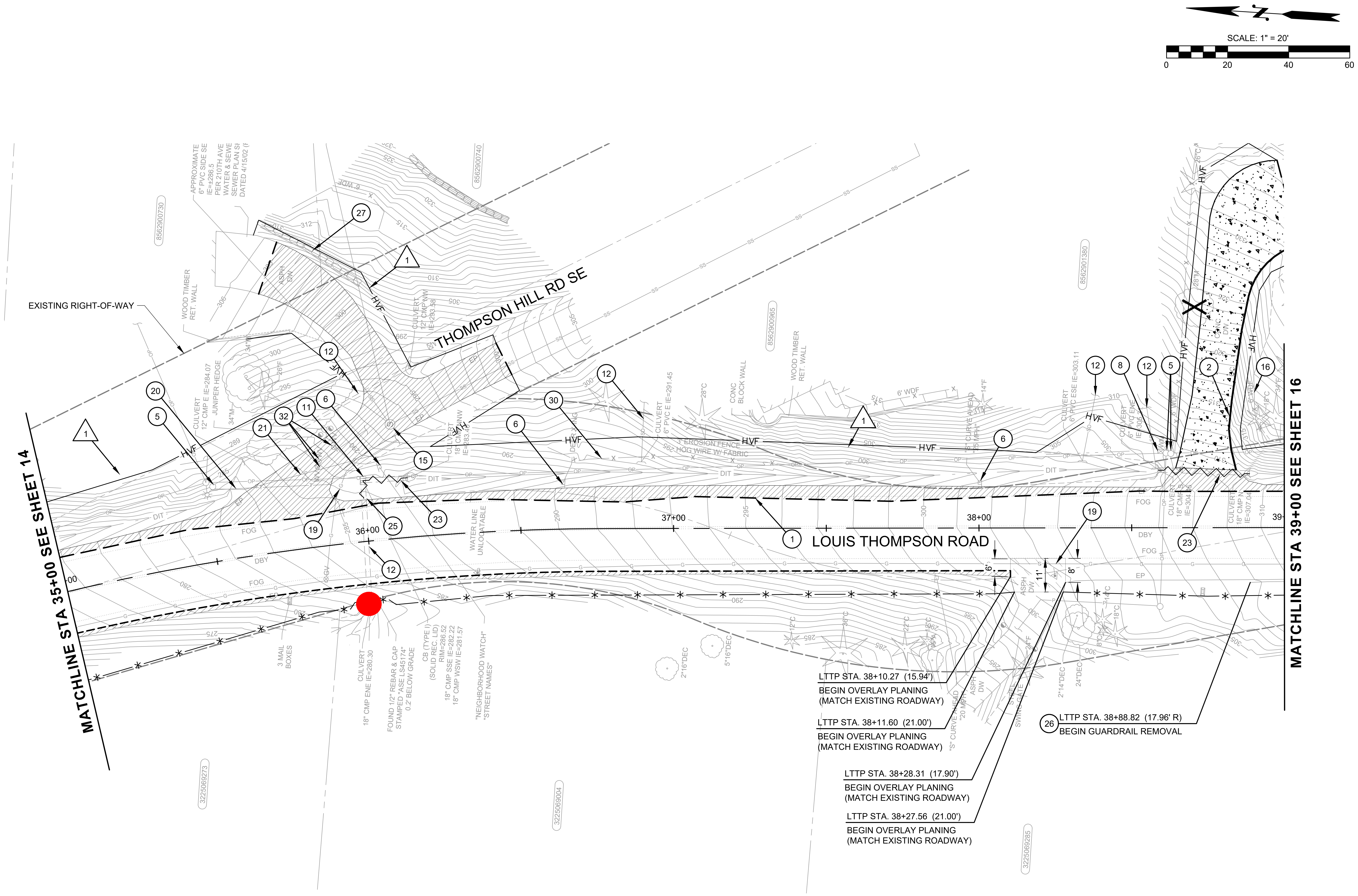
DESIGNED BY MP	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	NO.	DATE	REVISION	BY
DRAWN BY LT/LO/FJ						
CHECKED BY LR						

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT CITY OF SAMMAMISH	JOB# / DWG 10-210058	DATE 04/28/2023
EROSION CONTROL AND SITE PREPARATION PLAN	SCALE H: 1"=20' V: N/A	**ER07** SHEET 14 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:03 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.



GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△ EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

○ SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

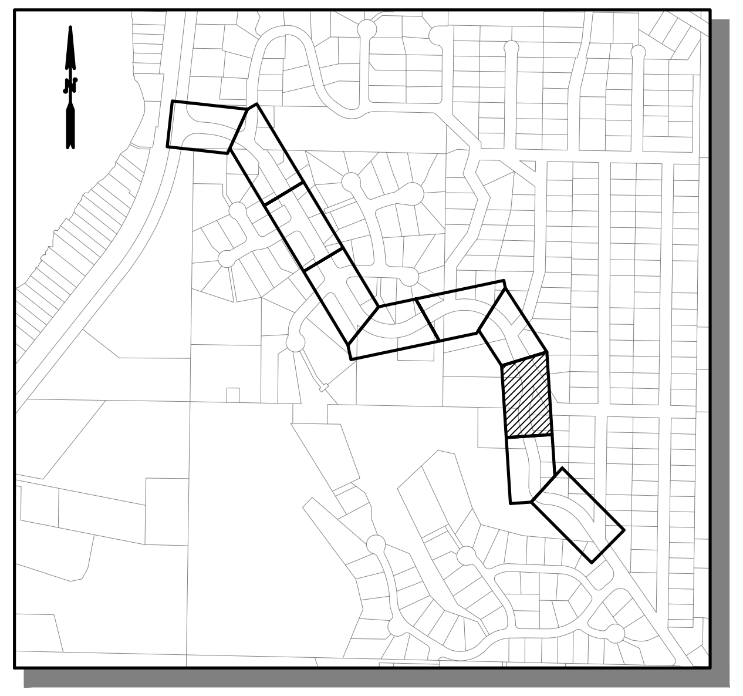
LEGEND

- - - - - - -	SAW CUT
〰〰	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—HVF—	HIGH VISIBILITY FENCE
—*—	HIGH VISIBILITY SILT FENCE
——	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▦	REMOVE CONCRETE PAVEMENT
▨	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.

Potential Monitoring Location ●

60% SUBMITTAL (NOT FOR CONSTRUCTION)



KEY MAP

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:03 PM
USER NAME: LAURA TURNIDGE

DESIGNED BY	MP
DRAWN BY	LT/LO/FJ
CHECKED BY	LR

OSBORN CONSULTING INCORPORATED
Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

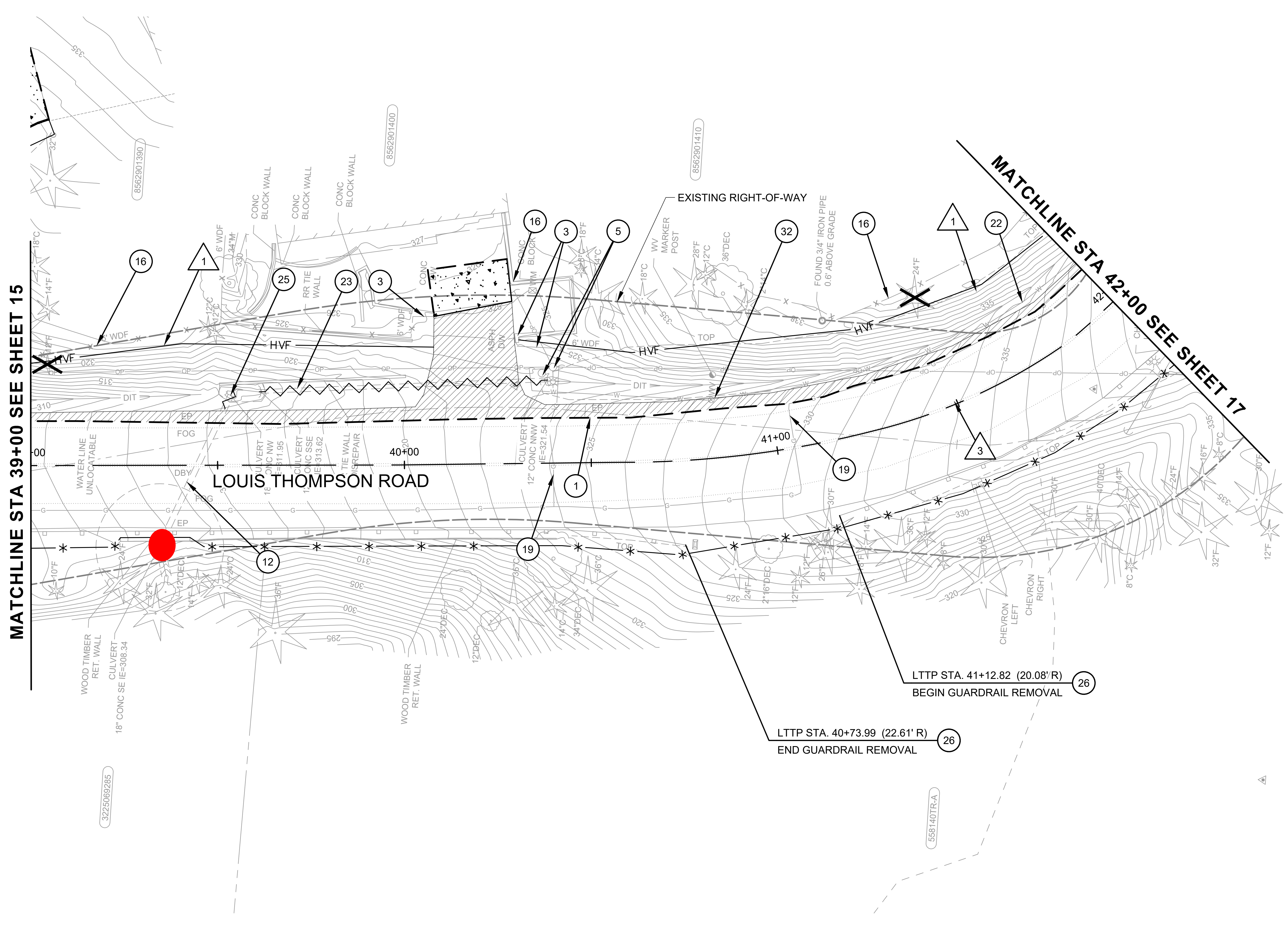
NO.	DATE	REVISION	BY

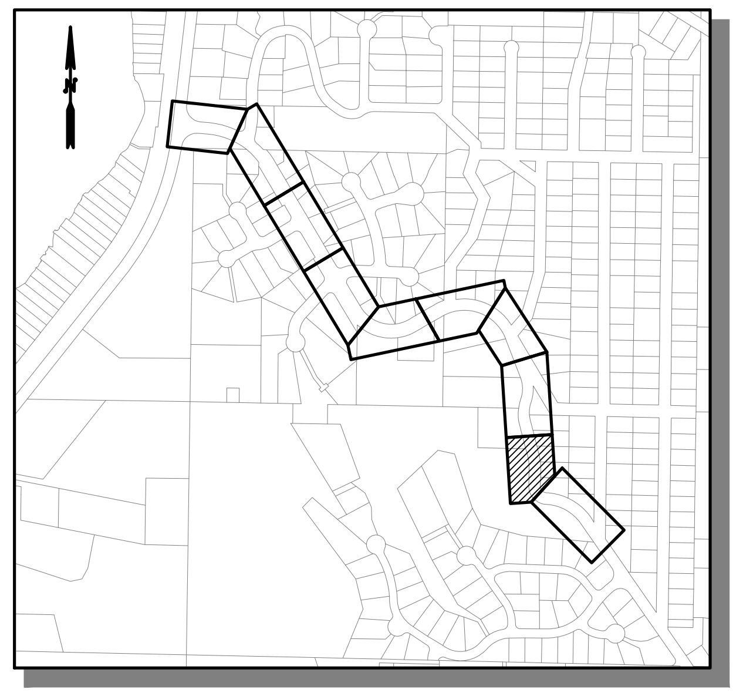
City of Sammamish Washington

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	04/28/2023
	ER08
SHEET	15 of 101

SEC. 32, T. 25N, R. 6E, W.M.





KEY MAP

GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△## EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

(##) SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

LEGEND

- - - - - -	SAW CUT
⌇⌇⌇⌇	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—HVF—	HIGH VISIBILITY FENCE
—*—	HIGH VISIBILITY SILT FENCE
——	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▦	REMOVE CONCRETE PAVEMENT
▧	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's **below.**
Call before you dig.

Potential Monitoring Location ●

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP
DRAWN BY LT/LO/FJ
CHECKED BY LR

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

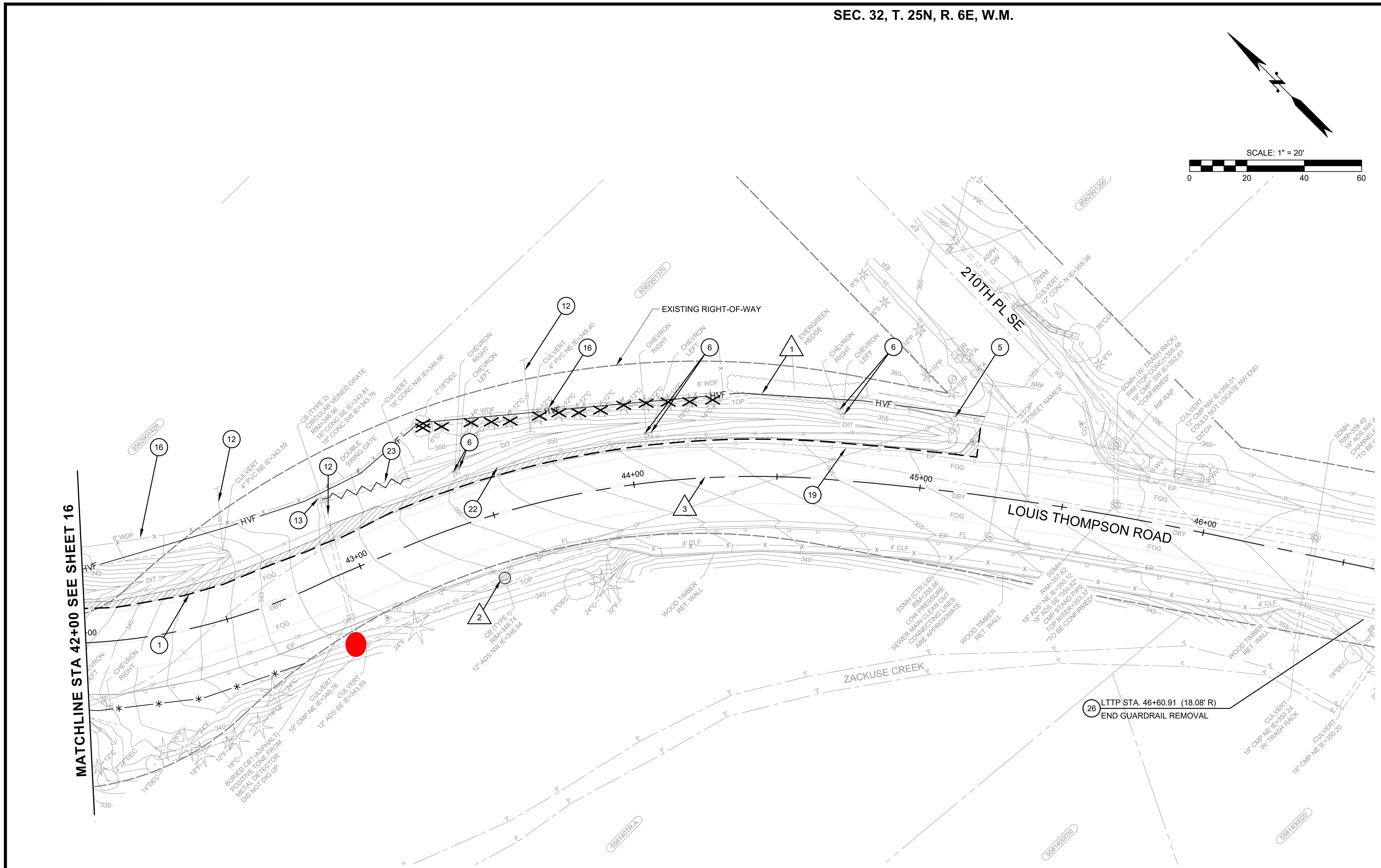
NO.	DATE	REVISION	BY

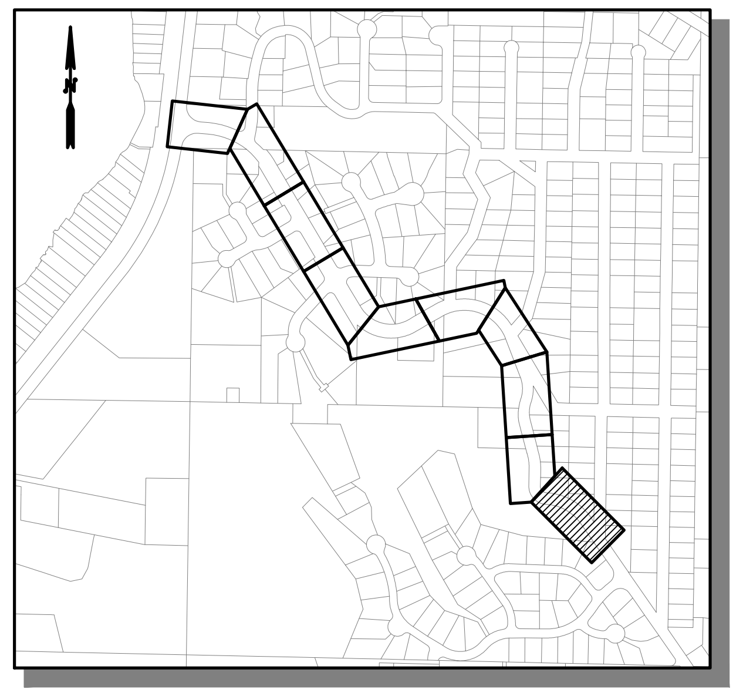
City of Sammamish Washington

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 04/28/2023
ER09
SHEET 16 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:03 PM
USER NAME: LAURA TURNIDGE





KEY MAP

Potential Monitoring Location ●

GENERAL NOTES:

1. PRESERVE AND PROTECT ANY EXISTING FEATURES TO REMAIN WITHIN THE PROJECT LIMITS.
2. ADJUST ALL SURFACE UTILITIES AND MONUMENTS WITHIN THE PAVING AREA TO GRADE AFTER OVERLAY. FOR OVERLAY LIMITS SEE SHEETS 46-55.
3. 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.
4. 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 8-17.
5. PROTECT EXISTING TREE WITHIN THE WORK AREA AND WITHIN 5 FEET FROM THE WORK LIMITS IN ACCORDANCE WITH SHEET 18 DETAIL 1 OR 2 AS FEASIBLE TO PERFORM WORK.
6. INLET PROTECTION MEASURES MUST BE INSTALLED ON PROPOSED STORM DRAINAGE STRUCTURES WHICH RECEIVE CONSTRUCTION STORMWATER RUNOFF.

△ ## EROSION CONTROL NOTES:

1. INSTALL HIGH VISIBILITY FENCE/HIGH VISIBILITY SILT FENCE.
2. INSTALL STORM DRAIN INLET PROTECTION.
3. REDIRECT RUNOFF FROM WORK ZONE ALONG ROADWAY SUPER ELEVATION.

(##) SITE PREPARATION NOTES:

1. SAWCUT AND REMOVE FULL DEPTH EXISTING HMA PAVEMENT.
2. REMOVE EXISTING CONCRETE CURB.
3. TEMPORARY REMOVE AND RESET EXISTING FENCE/LANDSCAPE BLOCKS AFTER CONSTRUCTION.
4. EXISTING HYDRANT TO BE RELOCATED BY OTHERS.
5. EXISTING POWER POLE, RISERS, CABINETS AND/OR ASSOCIATED CABINETS TO BE RELOCATED BY OTHERS.
6. RELOCATE EXISTING SIGN SEE SHEETS 57-66 FOR PROPOSED LOCATION.
7. PROTECT AND ADJUST EXISTING WATER VALVE/WATER VALVE MARKERS TO FINISH GRADE.
8. PROTECT EXISTING WATER METER.
9. REMOVE EXISTING BOLLARD.
10. ADJUST EXISTING GAS VALVE TO FINISH GRADE.
11. REMOVE EXISTING CATCH BASIN.
12. PROTECT EXISTING CULVERT.
13. PROTECT EXISTING CATCH BASIN.
14. PROTECT EXISTING POWER POLE, RISERS, CABINETS.
15. PROTECT AND ADJUST EXISTING SEWER MANHOLE TO FINISH GRADE.
16. PROTECT EXISTING FENCE/RETAINING WALL.
17. PROTECT EXISTING MONUMENT.
18. EXISTING WATER MAIN STRUCTURE TO BE RELOCATED BY OTHERS.
19. PROTECT EXISTING GAS LINE.
20. EXISTING COMMUNICATION LINE/STRUCTURE TO BE RELOCATED BY OTHERS .
21. PROTECT UNDERGROUND POWER LINE.
22. EXISTING WATER LINE TO BE RELOCATED BY OTHERS.
23. REMOVE EXISTING CULVERT OR STORM DRAIN.
24. ABANDON EXISTING CULVERT OR STORM DRAIN.
25. TRIM EXISTING CULVERT OR STORM DRAIN TO LENGTH.
26. REMOVE EXISTING GUARDRAIL, POSTS, TERMINALS AND ANCHORS. BACKFILL POSTS AND ANCHORS TO GRADE.
27. REMOVE TIMBER LANDSCAPE WALL.
28. PROTECT AND ADJUST EXISTING JUNCTION BOXES TO FINISHED GRADE.
29. REMOVE FULL LENGTH OF EXISTING JERSEY BARRIER AT THIS VICINITY.
30. REMOVE EXISTING FENCE.
31. REMOVE AND RESET SOLAR LIGHTS WITHIN DRIVEWAYS.
32. EXISTING WATER VALVE TO BE ADJUSTED/RELOCATED BY OTHERS.

LEGEND

– – – – – – – –	SAW CUT
∧∧∧∧∧	REMOVE/PLUG/TRIM EXISTING CULVERT OR STORM DRAIN PIPE
—— HVF ——	HIGH VISIBILITY FENCE
——*——	HIGH VISIBILITY SILT FENCE
————	REMOVE CURB
▨	REMOVE ASPHALT PAVEMENT
▩	REMOVE CONCRETE PAVEMENT
▧	PLANE FOR OVERLAY
✕	REMOVE TREE
○	INLET PROTECTION

811
Know what's below.
Call before you dig.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	
DRAWN BY LT/LO/FJ			
CHECKED BY LR			

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 04/28/2023
ER10
SHEET 17 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_TESC.DWG
PLOT TIME: 4/27/2023 7:03 PM
USER NAME: LAURA TURNIDGE

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				

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

(To be included with next submittal)

APPENDIX E
OPERATION AND MAINTENANCE MANUAL

Contech StormFilter Operation and Maintenance Guide

OSBORN
CONSULTING
INCORPORATED

City of Sammamish Washington

Sammamish Louis Thompson Road Tightline Project

OPERATIONS AND MAINTENANCE MANUAL

APRIL 2023

1800 112th Ave NE, Suite 220-E | 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

April 2023

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

The purpose of this Operations and Maintenance (O&M) manual is to describe the runoff treatment Best Management Practice (BMP) proposed on Louis Thompson Road, what the BMP does, how it works, maintenance tasks, and frequency of task. This manual also includes a maintenance activity log for the BMP.

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. Refer to the project's Technical Information Report, for design details associated with the proposed BMP.

1.1 BACKGROUND AND PROJECT OVERVIEW

The proposed design of the Louis Thompson Road tightline project would 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 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 would address high velocities and erosion within the ditch systems, reduce flooding risk, and mitigate stormwater impacts from future 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.

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 unit is an underground biofiltration system providing high percentage pollutant removal of TSS. The Stormfilter is approved for General Use Level Designation (GULD) for basic treatment. The unit works by percolating stormwater through media-filled cartridges, which trap particulates and may remove pollutants such a dissolved metals, nutrients, and hydrocarbons. The process also filters out surface scum and floating oil and grease. The stormwater will be released from the cartridges and discharge to the stormwater pipe system. The system has limited high flow bypass capabilities, so an external bypass is proposed where the flows exceed the maximum flow.

1.2 VICINITY MAP

Figure 1. Project Vicinity Map

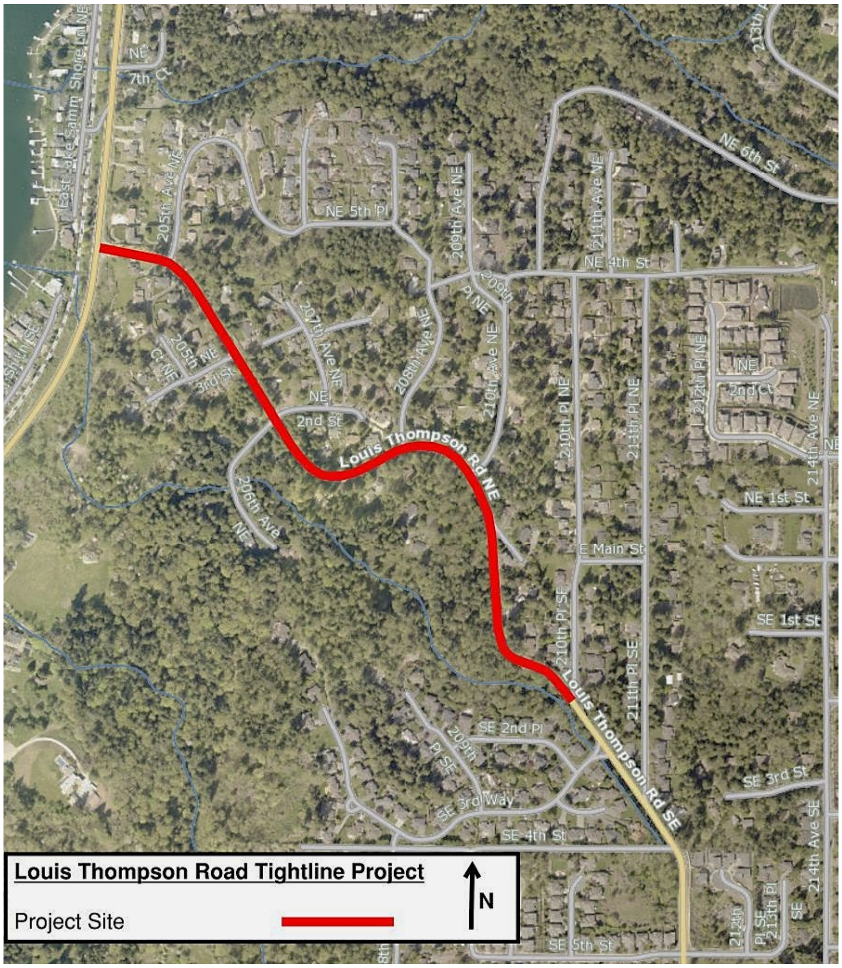


Figure 2. Project Site Map

2 MAINTENANCE LOCATIONS

The following section provides a brief description of the proposed water quality facility maintenance locations.

2.1 WQ - 1

WQ – 1 is located on the east side of Louis Thompson Road and within the proposed sidewalk, south of 22 Louis Thompson Road SE, Sammamish, WA 98074. See **Figure 3** below**.**

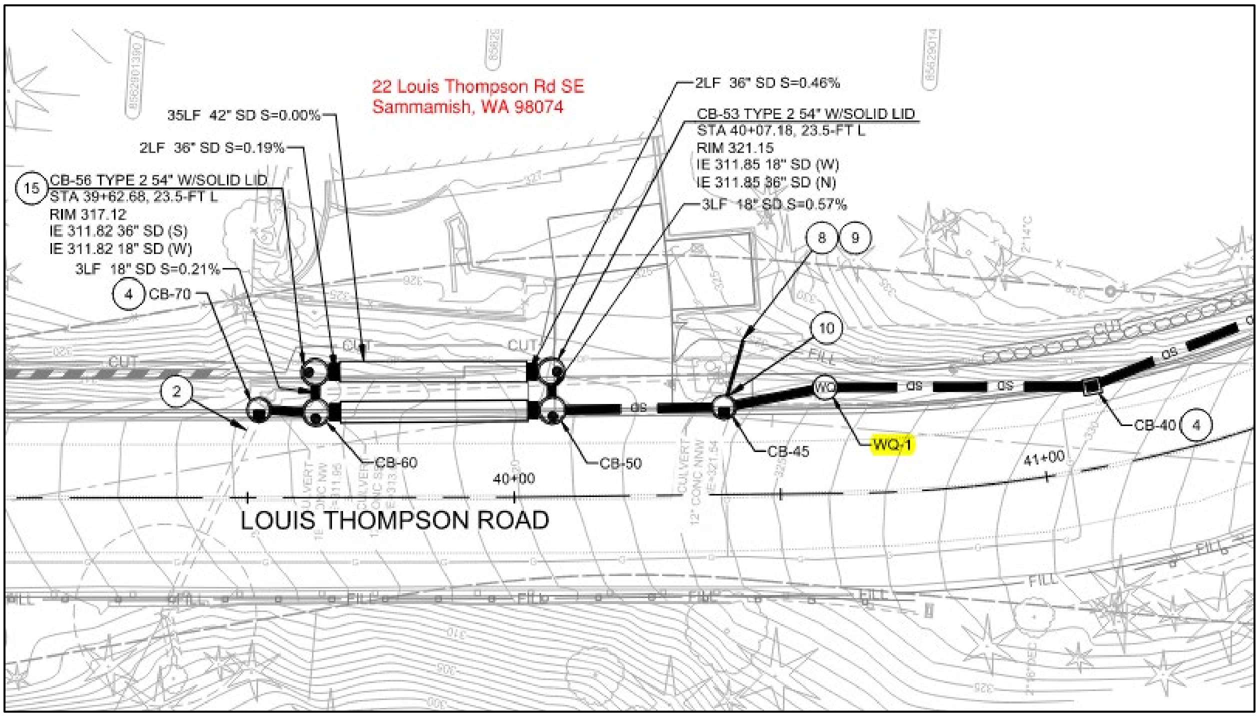


Figure 3. Maintenance Location – WQ-1

2.2 WQ – 2

WQ – 2 is located on the east side of Louis Thompson Rd and within the proposed sidewalk, south of Thompson Hill Road SE. See **Figure 4** below**.**

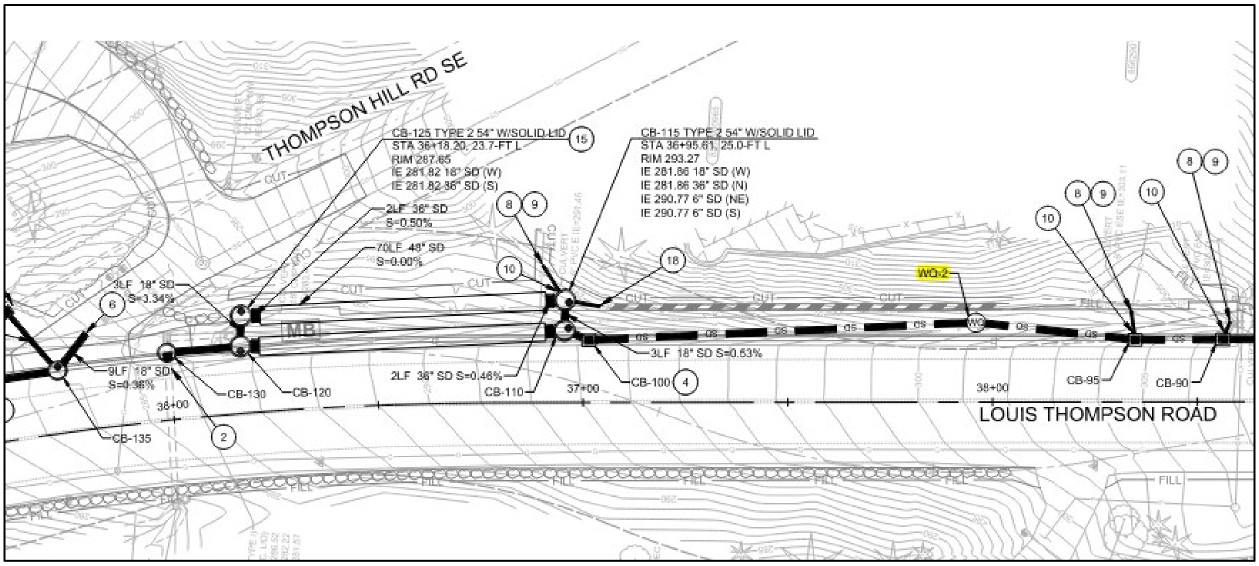


Figure 4. Maintenance Location – WQ-2

2.3 WQ – 3

WQ – 3 is located on the north-east side of Louis Thompson Road, north-west of 210th Avenue NE. See **Figure 5** below. A flow splitter catch basin is included in the system for the bypass of high flows upstream of WQ-3 (CB-180).

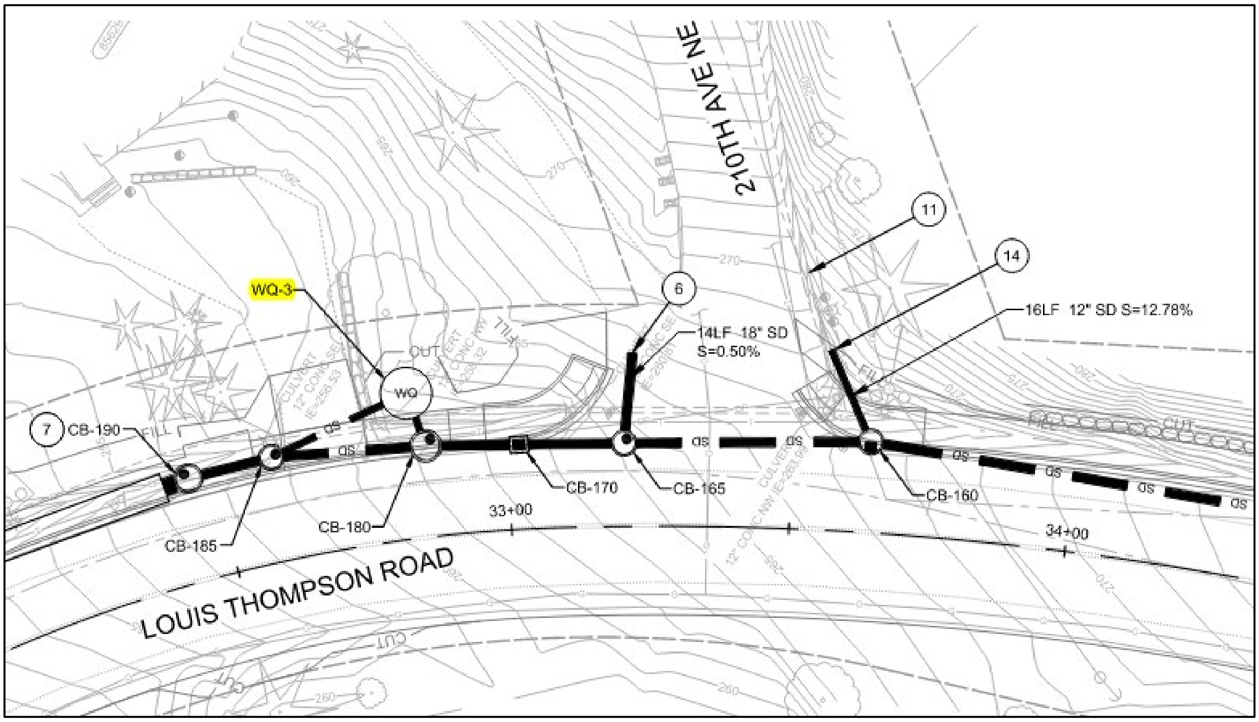


Figure 5. Maintenance Location – WQ-3

2.4 WQ – 4

WQ – 4 is located on the north-east side of Louis Thompson Road, at the intersection with NE 3rd Street. See **Figure 6** below**.** A flow splitter catch basin is included in the system for the bypass of high flows upstream of WQ-4 (CB-365).

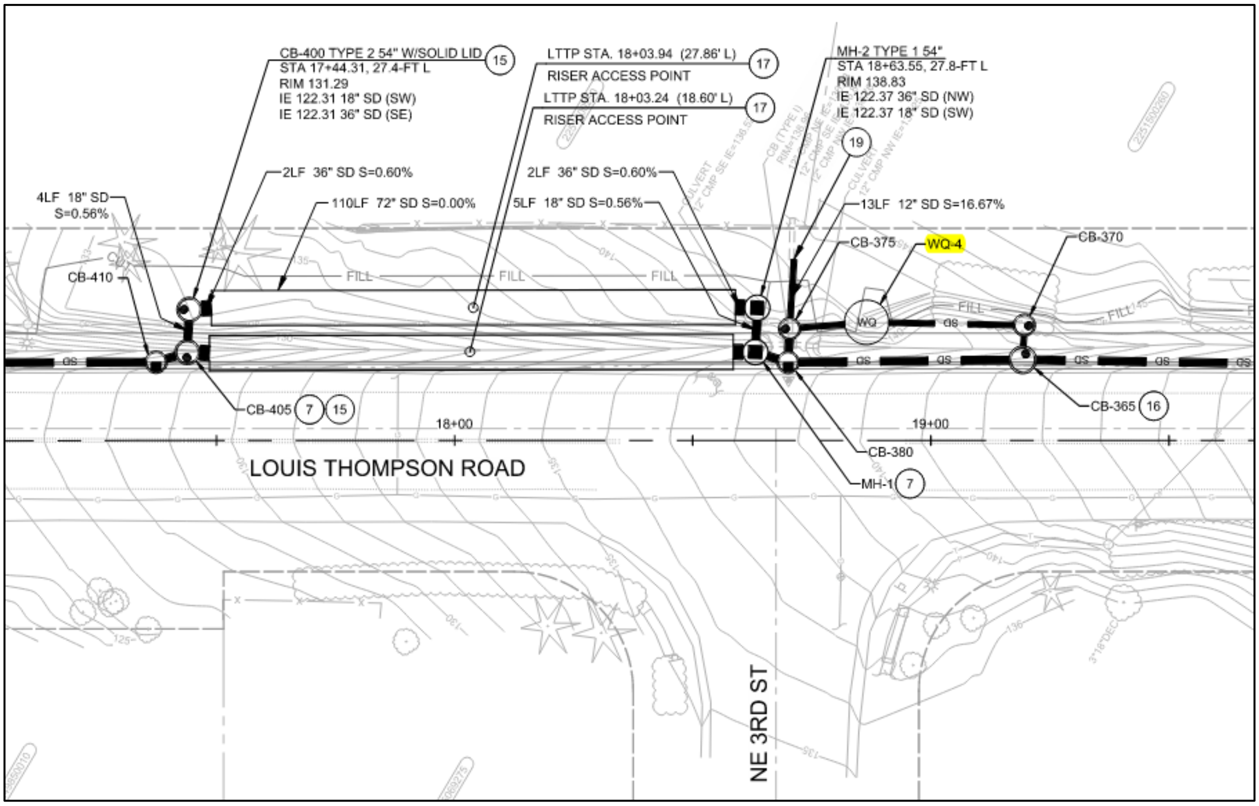


Figure 6. Maintenance Location – WQ-4

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 of Sammamish maintenance personnel. See **Figure 7** and **Figure 8** for the locations of the Stormfilter cartridges for the two facility sizes proposed.

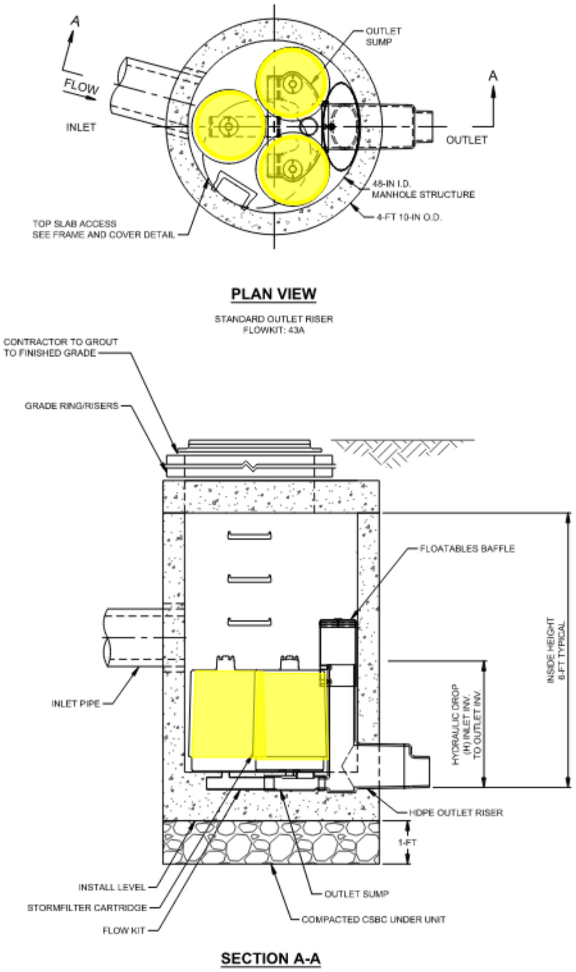
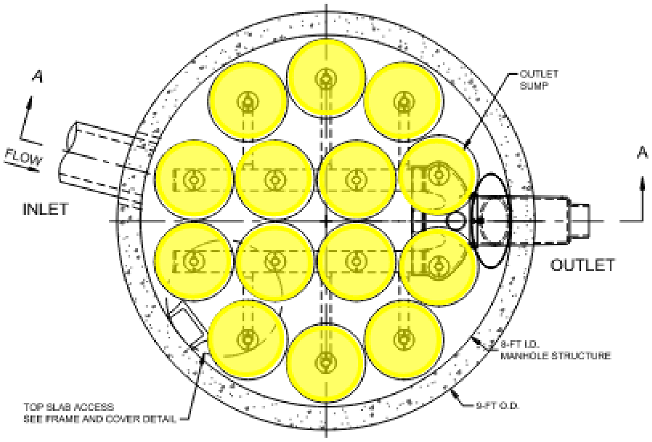
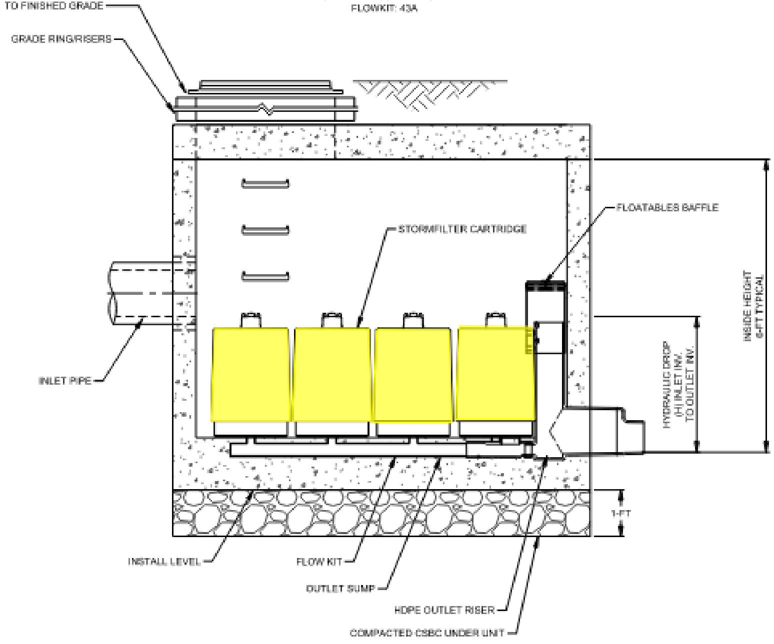


Figure 7. StormFilter Facility Details: 4-foot Diameter Manhole (WQ-1 and WQ-2)



PLAN VIEW

STANDARD OUTLET RISER
FLOWKIT: 43A



SECTION A-A

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.

APPENDIX A
STORMFILTER MAINTENANCE GUIDE

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.

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.

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.

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

CONTECH
ENGINEERED SOLUTIONS

800-338-1122

www.ContechES.com

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.

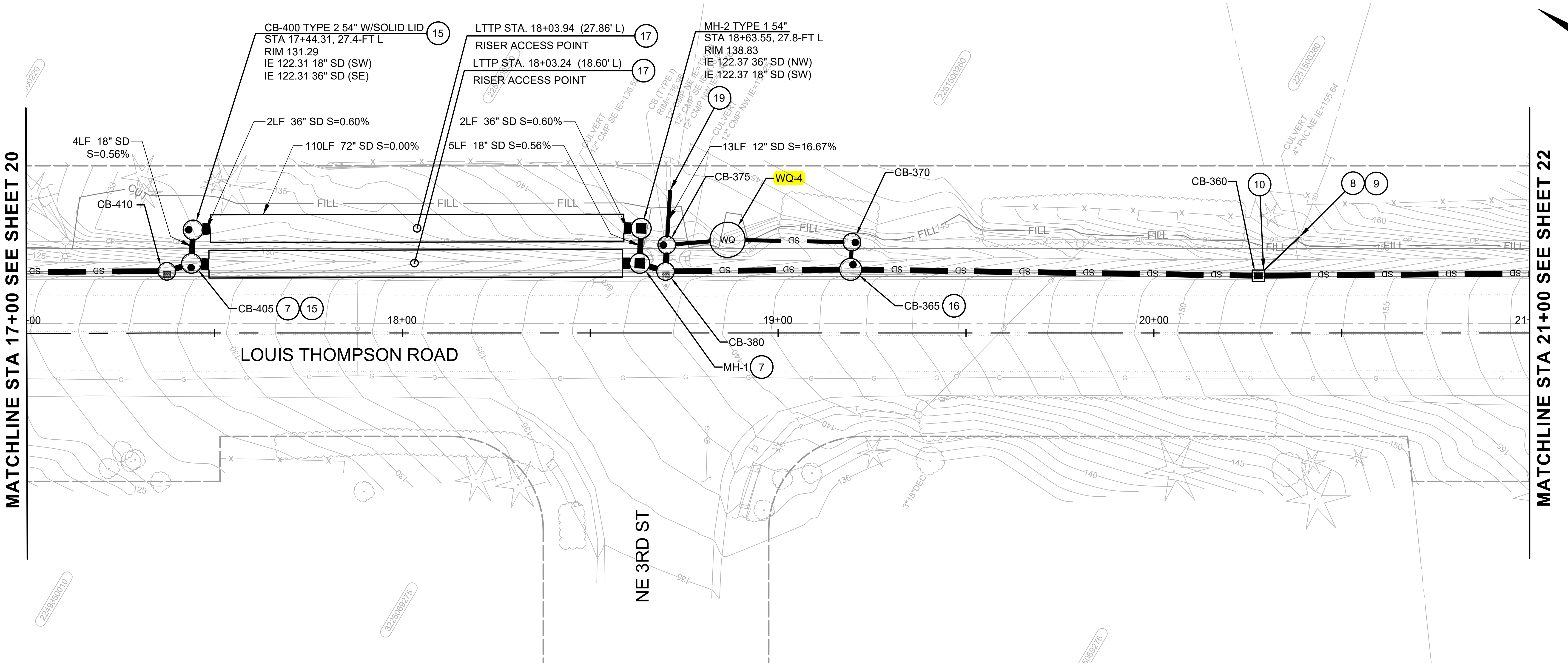
Support

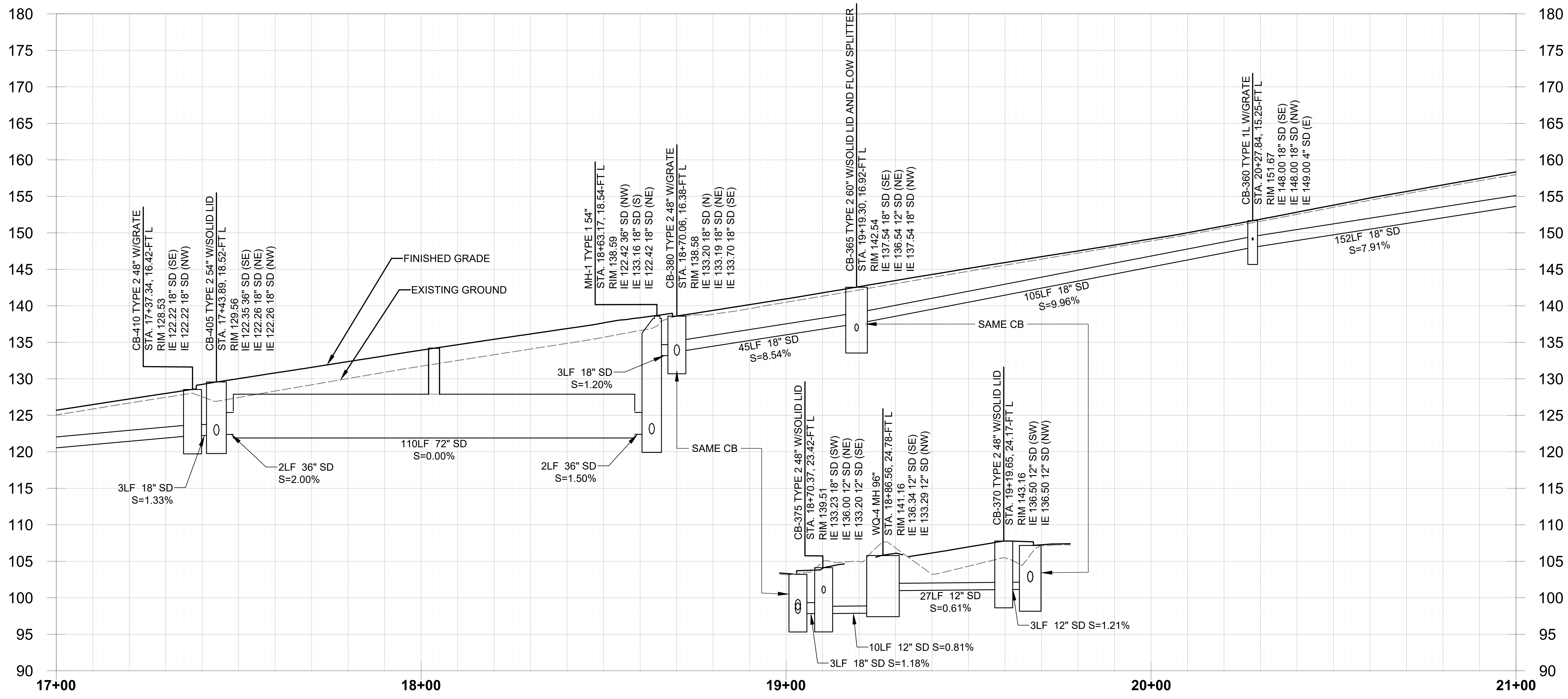
- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

800.338.1122
www.conteches.com

APPENDIX B
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.
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 8-17.
5. FOR RETAINING WALLS, SIDEWALKS, DRIVEWAYS AND OTHER NON-MOTORIZED IMPROVEMENTS, SEE SHEETS 46-55.

CONSTRUCTION NOTES:

1. CONNECT TO EXISTING STRUCTURE.
2. CONNECT PROPOSED STRUCTURE TO EXISTING PIPE.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20-02.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT FOR FUTURE CONNECTION.
7. INSTALL SOLID LID WITH SLIP RESISTANT FINISH.
8. RECONNECT OFFSITE LATERAL WITH TEE-CONNECTION AT 0.5 PERCENT MINIMUM SLOPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT UPSTREAM OF TEE-CONNECTION AT EXISTING LATERAL. CONNECT NEW DRAIN PER WSDOT STANDARD PLAN B-85.40-00.
10. CONNECT OFFSITE LATERAL TO CATCH BASIN.
11. DITCH MAINTENANCE PER SPEC SECTION 2-03.
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 29.
16. INSTALL FLOW SPLITTER WITH RISER SYSTEM PER DETAIL 1 SHEET 32.
17. INSTALL DETENTION PIPE ACCESS PER DETAIL 1 SHEET 29.
18. CONNECT WALL UNDERDRAIN TO PROPOSED STRUCTURE.
19. CONNECT PIPE TO EXISTING PIPE WITH TRANSITION COUPLING.

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 WQ	WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS

HORIZONTAL SCALE: 1" = 20' (0, 20, 40, 60)

VERTICAL SCALE: 1" = 10' (0, 10, 20, 30)

KEY MAP

811 Know what's below. Call before you dig.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP
DRAWN BY LT/LO/FJ
CHECKED BY LR

OSBORN CONSULTING INCORPORATED
Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

NO.	DATE	REVISION	BY

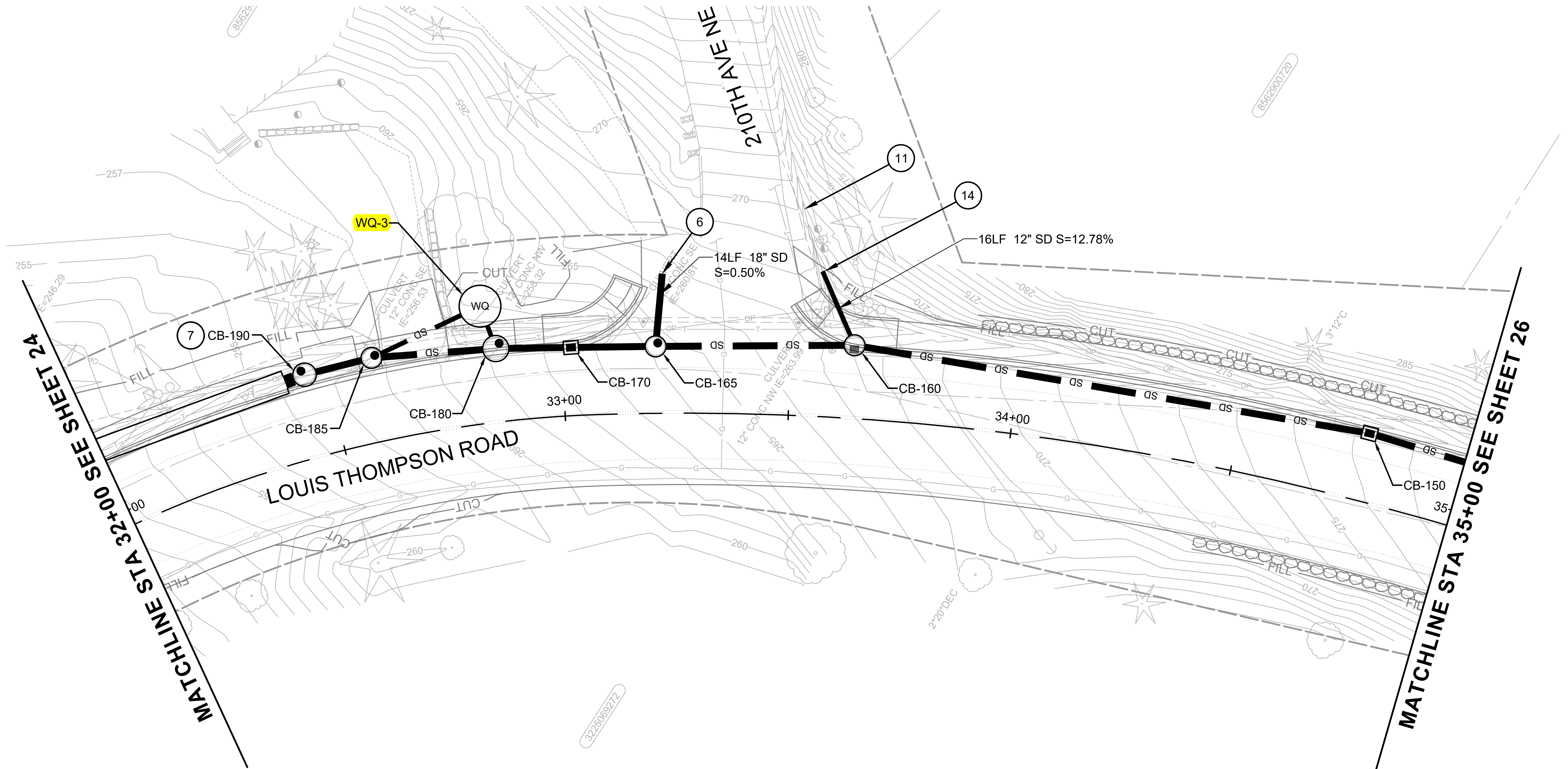
City of Sammamish Washington

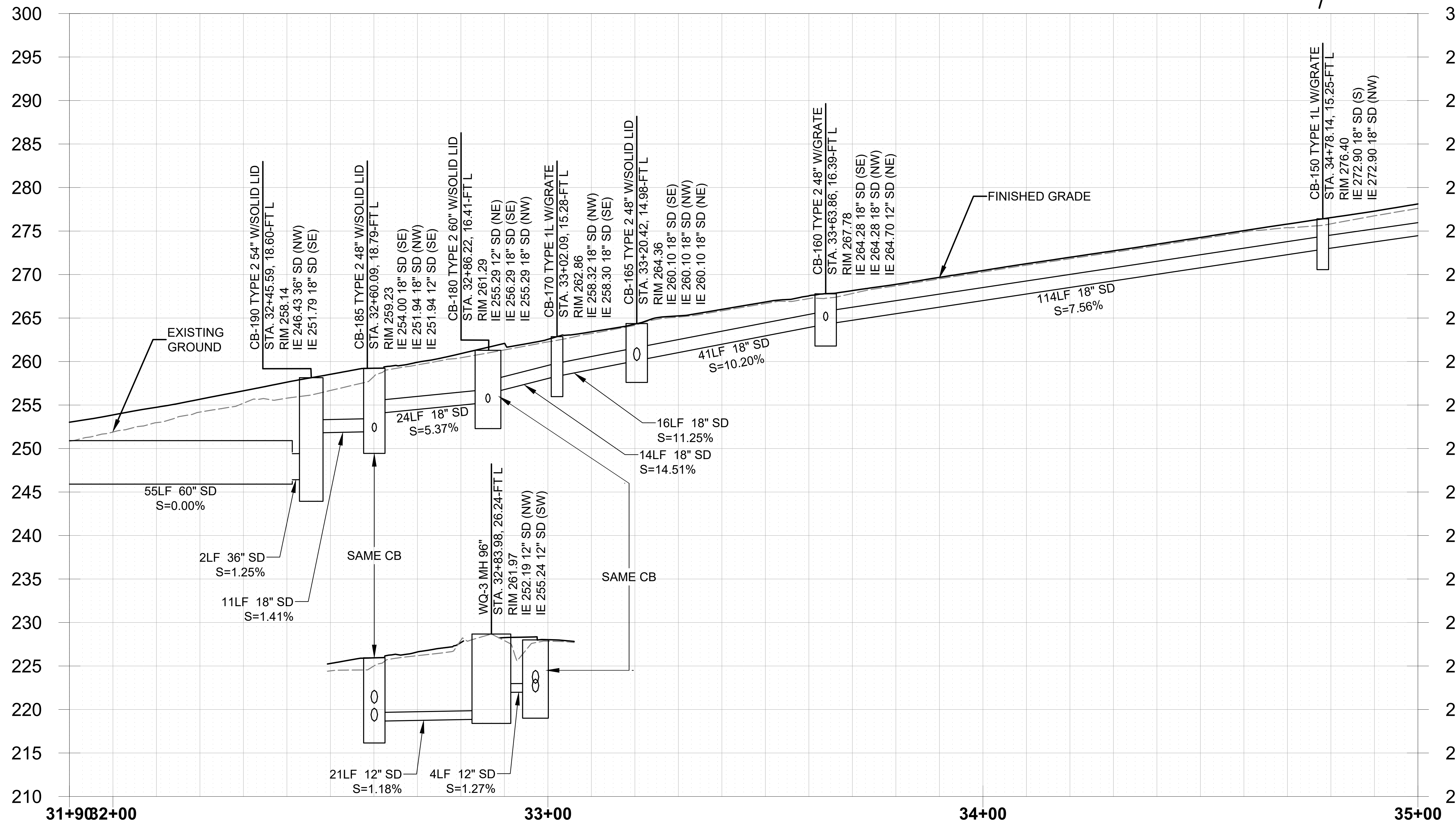
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
SCALE H: 1"=20' V: 1"=10'
DATE 04/28/2023
DR03
SHEET 21 of 101

FILE NAME: C:\PW_OCI_WORKING\DIROSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_STRM.DWG
PLOT TIME: 4/27/2023 7:03 PM
USER NAME: LAURA TURNIDGE

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.
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 8-17.
5. FOR RETAINING WALLS, SIDEWALKS, DRIVEWAYS AND OTHER NON-MOTORIZED IMPROVEMENTS, SEE SHEETS 46-55.

(##) CONSTRUCTION NOTES:

1. CONNECT TO EXISTING STRUCTURE.
2. CONNECT PROPOSED STRUCTURE TO EXISTING PIPE.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20-02.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT FOR FUTURE CONNECTION.
7. INSTALL SOLID LID WITH SLIP RESISTANT FINISH.
8. RECONNECT OFFSITE LATERAL WITH TEE-CONNECTION AT 0.5 PERCENT MINIMUM SLOPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT UPSTREAM OF TEE-CONNECTION AT EXISTING LATERAL. CONNECT NEW DRAIN PER WSDOT STANDARD PLAN B-85.40-00.
10. CONNECT OFFSITE LATERAL TO CATCH BASIN.
11. DITCH MAINTENANCE PER SPEC SECTION 2-03.
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 29.
16. INSTALL FLOW SPLITTER WITH RISER SYSTEM PER DETAIL 1 SHEET 32.
17. INSTALL DETENTION PIPE ACCESS PER DETAIL 1 SHEET 29.
18. CONNECT WALL UNDERDRAIN TO PROPOSED STRUCTURE.
19. CONNECT PIPE TO EXISTING PIPE WITH TRANSITION COUPLING.

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) (WQ)	WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS

HORIZONTAL SCALE: 1" = 20' 0 20 40 60

VERTICAL SCALE: 1" = 10' 0 10 20 30

KEY MAP

811

Know what's below.
Call before you dig.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY	MP
DRAWN BY	LT/LO/FJ
CHECKED BY	LR

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue \| Seattle \| Spokane \| Bellingham
www.osbornconsulting.com

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'

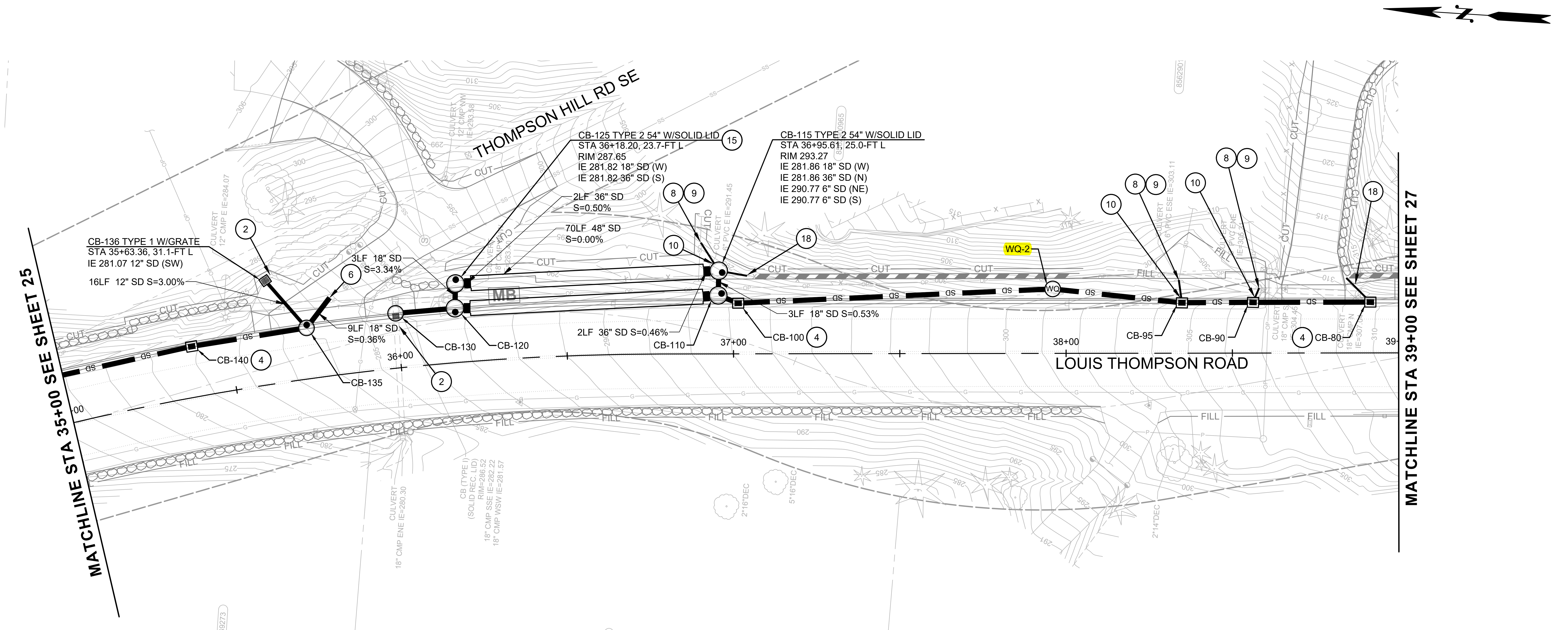
DATE 04/28/2023

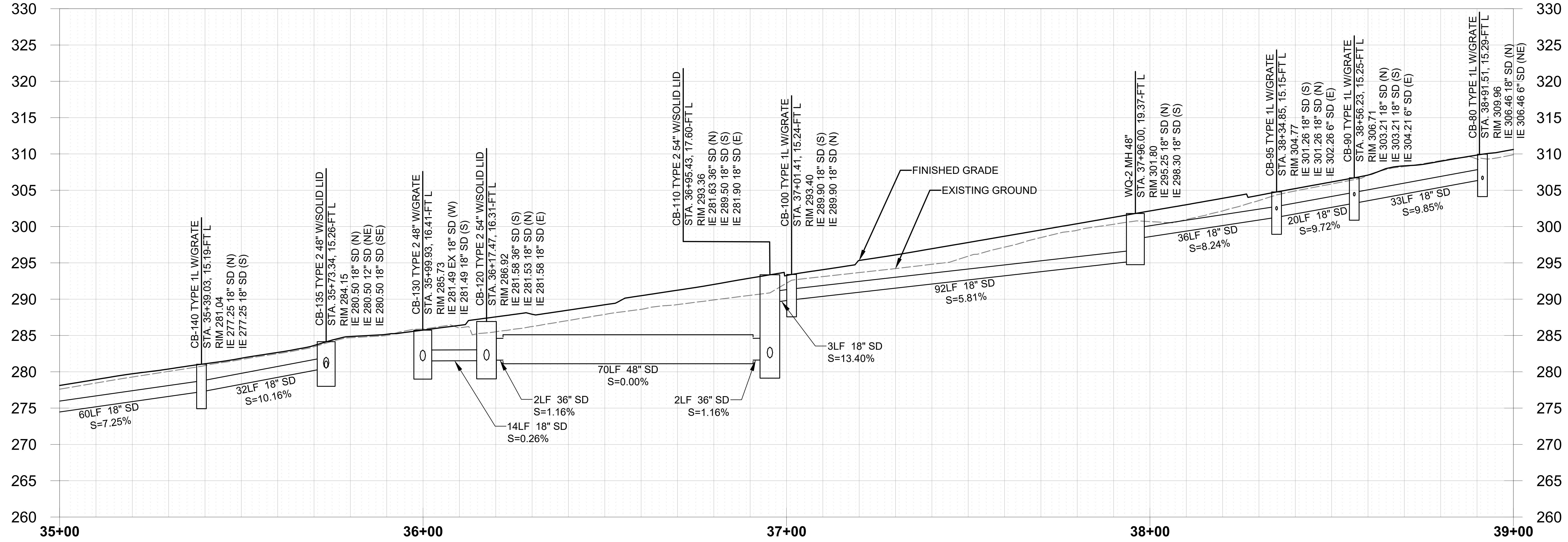
DR07

SHEET 25 of 101

FILE NAME: C:\PW_OC_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_STRM.DWG
PLOT TIME: 4/27/2023 7:04 PM
USER NAME: LAURA TURNIDGE

SEC. 32, T. 25N, R. 6E, W.M.





GENERAL NOTES:

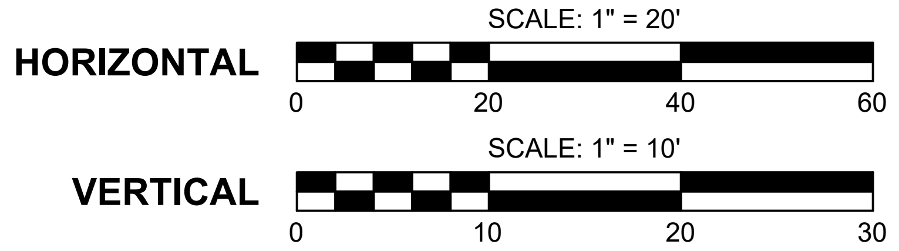
1. CONTRACTOR SHALL VERIFY/CONFIRM THE ACCURACY OF UTILITY LOCATIONS SHOWN AND OTHER UTILITIES.
2. ALL DRAINAGE STRUCTURES ARE LOCATED BY STATION AND OFFSET TO THE CENTER OF THE STRUCTURE.
3. THE ROADWAY CENTERLINE STATIONING IS USED FOR THE PROFILES. EXISTING AND PROPOSED SURFACES ARE SHOWN ON TOP OF THE STORM PIPE NETWORK.
4. FOR SITE PREPARATION SEE SHEETS 8-17.
5. FOR RETAINING WALLS, SIDEWALKS, DRIVEWAYS AND OTHER NON-MOTORIZED IMPROVEMENTS, SEE SHEETS 46-55.

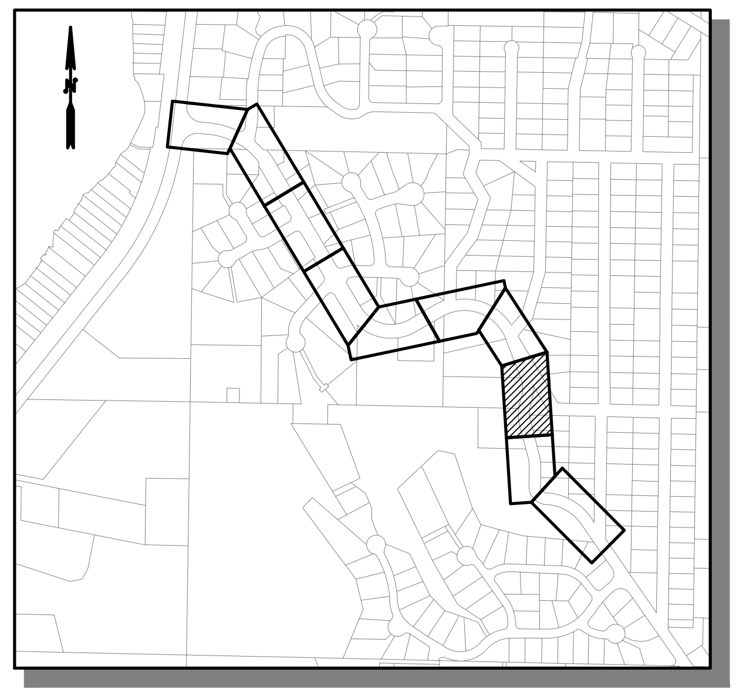
(##) CONSTRUCTION NOTES:

1. CONNECT TO EXISTING STRUCTURE.
2. CONNECT PROPOSED STRUCTURE TO EXISTING PIPE.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20-02.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT FOR FUTURE CONNECTION.
7. INSTALL SOLID LID WITH SLIP RESISTANT FINISH.
8. RECONNECT OFFSITE LATERAL WITH TEE-CONNECTION AT 0.5 PERCENT MINIMUM SLOPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT UPSTREAM OF TEE-CONNECTION AT EXISTING LATERAL. CONNECT NEW DRAIN PER WSDOT STANDARD PLAN B-85.40-00.
10. CONNECT OFFSITE LATERAL TO CATCH BASIN.
11. DITCH MAINTENANCE PER SPEC SECTION 2-03.
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 29.
16. INSTALL FLOW SPLITTER WITH RISER SYSTEM PER DETAIL 1 SHEET 32.
17. INSTALL DETENTION PIPE ACCESS PER DETAIL 1 SHEET 29.
18. CONNECT WALL UNDERDRAIN TO PROPOSED STRUCTURE.
19. CONNECT PIPE TO EXISTING PIPE WITH TRANSITION COUPLING.

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





KEY MAP

811
Know what's below.
Call before you dig.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY	MP
DRAWN BY	LT/LO/FJ
CHECKED BY	LR

OSBORN CONSULTING INCORPORATED

Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

NO.	DATE	REVISION	BY

City of Sammamish Washington

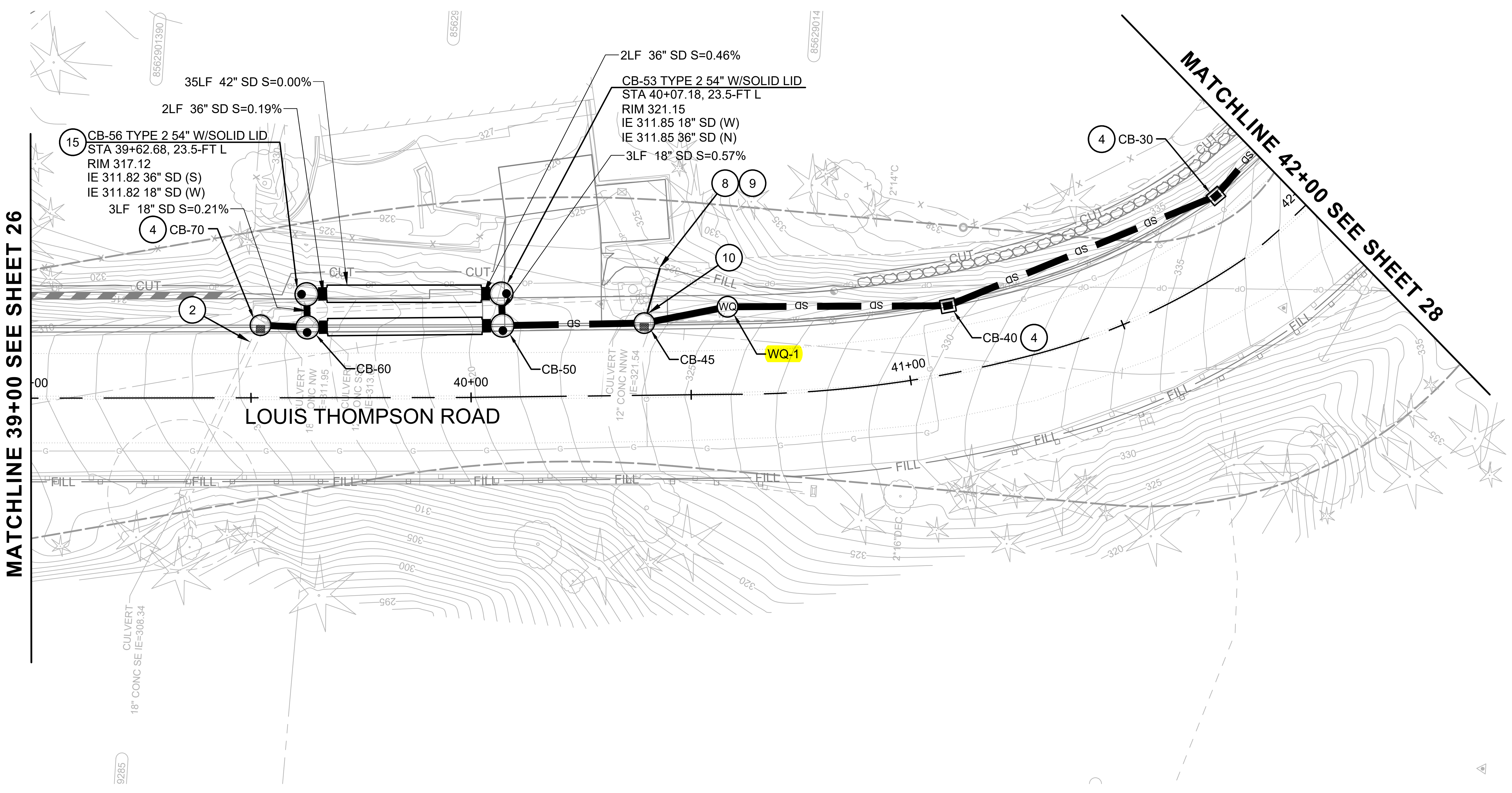
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH

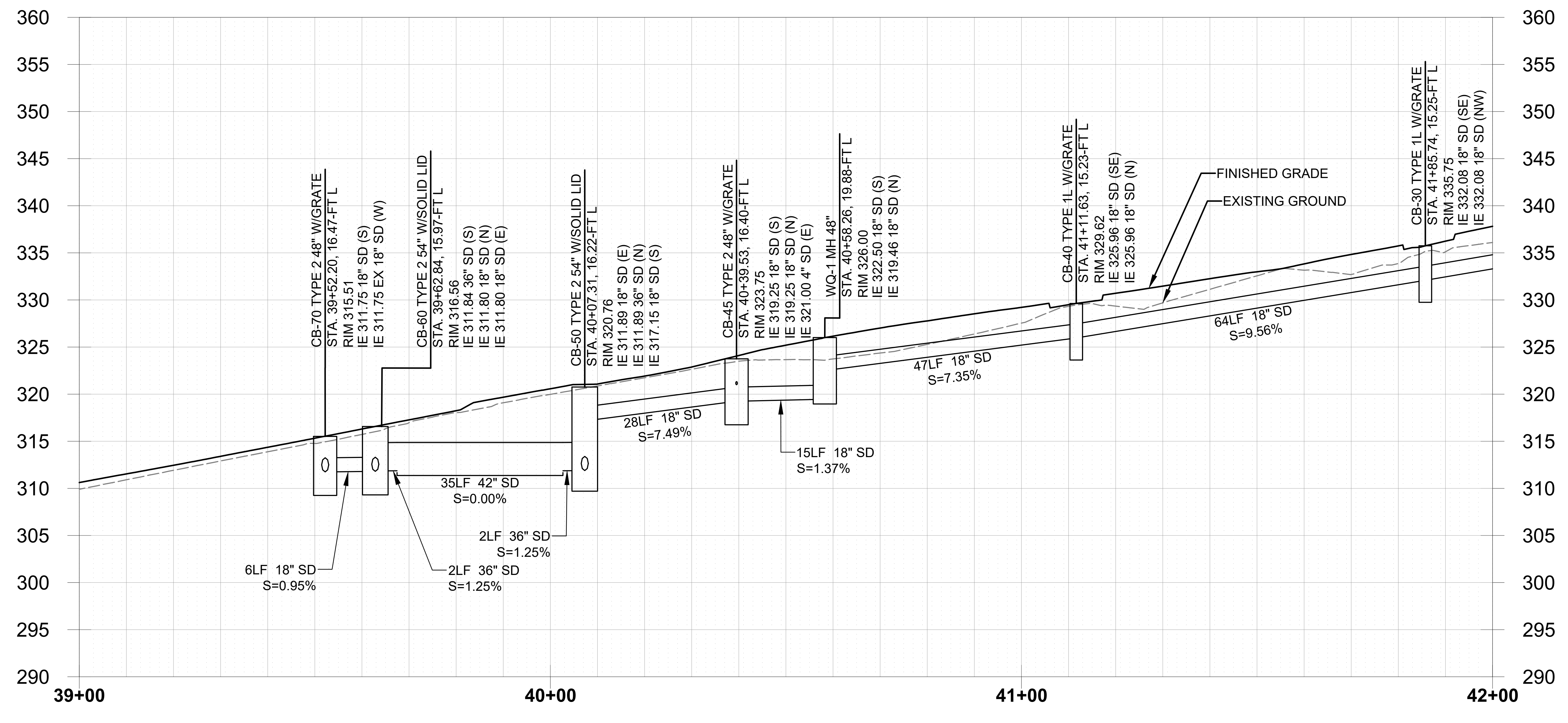
STORM DRAINAGE PLAN AND PROFILE

JOB# / DWG 10-210058
SCALE H: 1"=20' V: 1"=10'
DATE 04/28/2023
DR08
SHEET 26 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_STRM.DWG
PLOT TIME: 4/27/2023 7:04 PM
USER NAME: LAURA TURNIDGE

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.
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 8-17.
5. FOR RETAINING WALLS, SIDEWALKS, DRIVEWAYS AND OTHER NON-MOTORIZED IMPROVEMENTS, SEE SHEETS 46-55.

CONSTRUCTION NOTES:

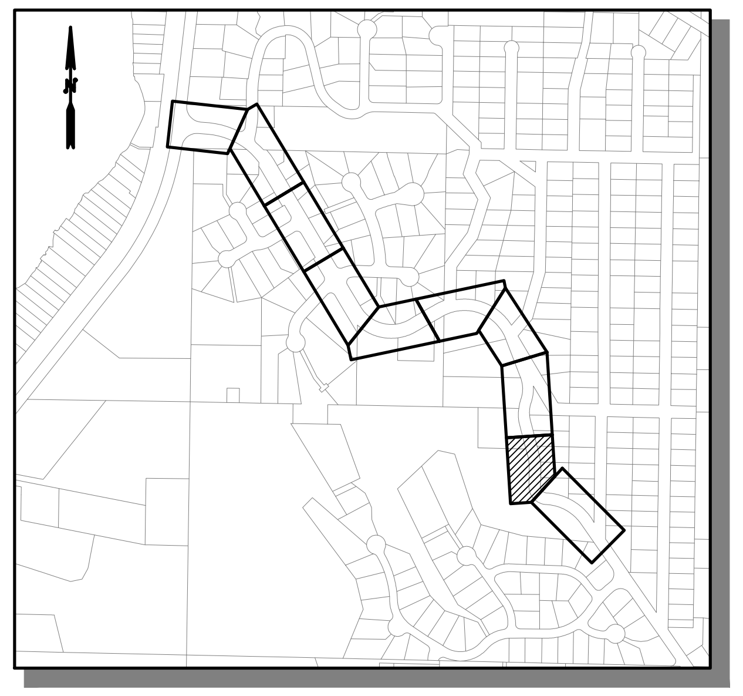
1. CONNECT TO EXISTING STRUCTURE.
2. CONNECT PROPOSED STRUCTURE TO EXISTING PIPE.
3. ADJUST EXISTING DRAINAGE STRUCTURE RIM TO GRADE.
4. INSTALL COMBINATION INLET PER WSDOT STANDARD PLAN B-25.20-02.
5. INSTALL DEBRIS CAGE ON CATCH BASIN TYPE 2 PER DETAIL 2 ON SHEET 32.
6. INSTALL STUB-OUT FOR FUTURE CONNECTION.
7. INSTALL SOLID LID WITH SLIP RESISTANT FINISH.
8. RECONNECT OFFSITE LATERAL WITH TEE-CONNECTION AT 0.5 PERCENT MINIMUM SLOPE. FIELD VERIFY LOCATION.
9. INSTALL CLEANOUT UPSTREAM OF TEE-CONNECTION AT EXISTING LATERAL. CONNECT NEW DRAIN PER WSDOT STANDARD PLAN B-85.40-00.
10. CONNECT OFFSITE LATERAL TO CATCH BASIN.
11. DITCH MAINTENANCE PER SPEC SECTION 2-03.
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 29.
16. INSTALL FLOW SPLITTER WITH RISER SYSTEM PER DETAIL 1 SHEET 32.
17. INSTALL DETENTION PIPE ACCESS PER DETAIL 1 SHEET 29.
18. CONNECT WALL UNDERDRAIN TO PROPOSED STRUCTURE.
19. CONNECT PIPE TO EXISTING PIPE WITH TRANSITION COUPLING.

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 WQ	WATER QUALITY FACILITY, SEE SHEETS 30-31 FOR DETAILS

HORIZONTAL SCALE: 1" = 20' (0, 20, 40, 60)

VERTICAL SCALE: 1" = 10' (0, 10, 20, 30)



KEY MAP

811
Know what's below.
Call before you dig.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

FILE NAME: C:\PW_OC_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_STRM.DWG
PLOT TIME: 4/27/2023 7:04 PM
USER NAME: LAURA TURNIDGE

DESIGNED BY MP	OSBORN CONSULTING INCORPORATED	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	
DRAWN BY LT/LO/FJ			
CHECKED BY LR			

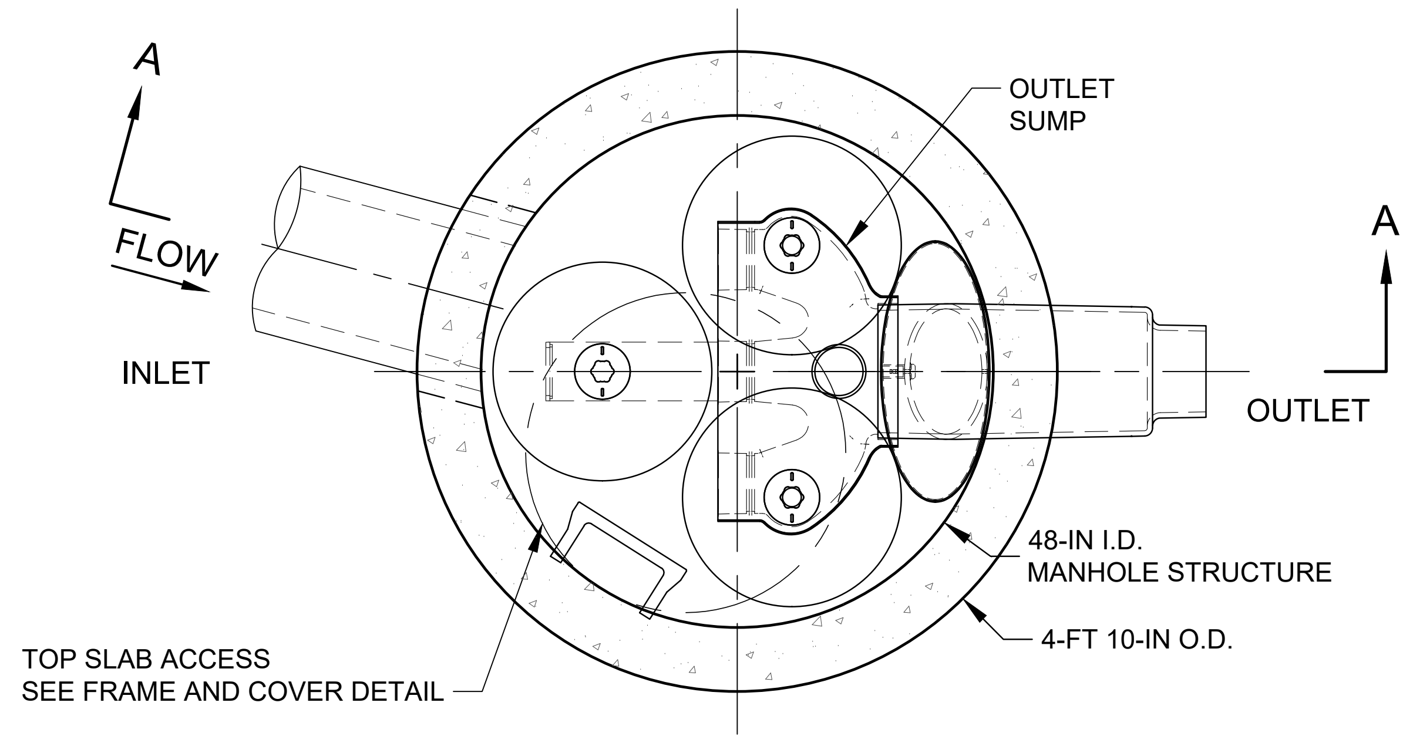
NO.	DATE	REVISION	BY

City of Sammamish Washington

LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE PLAN AND PROFILE

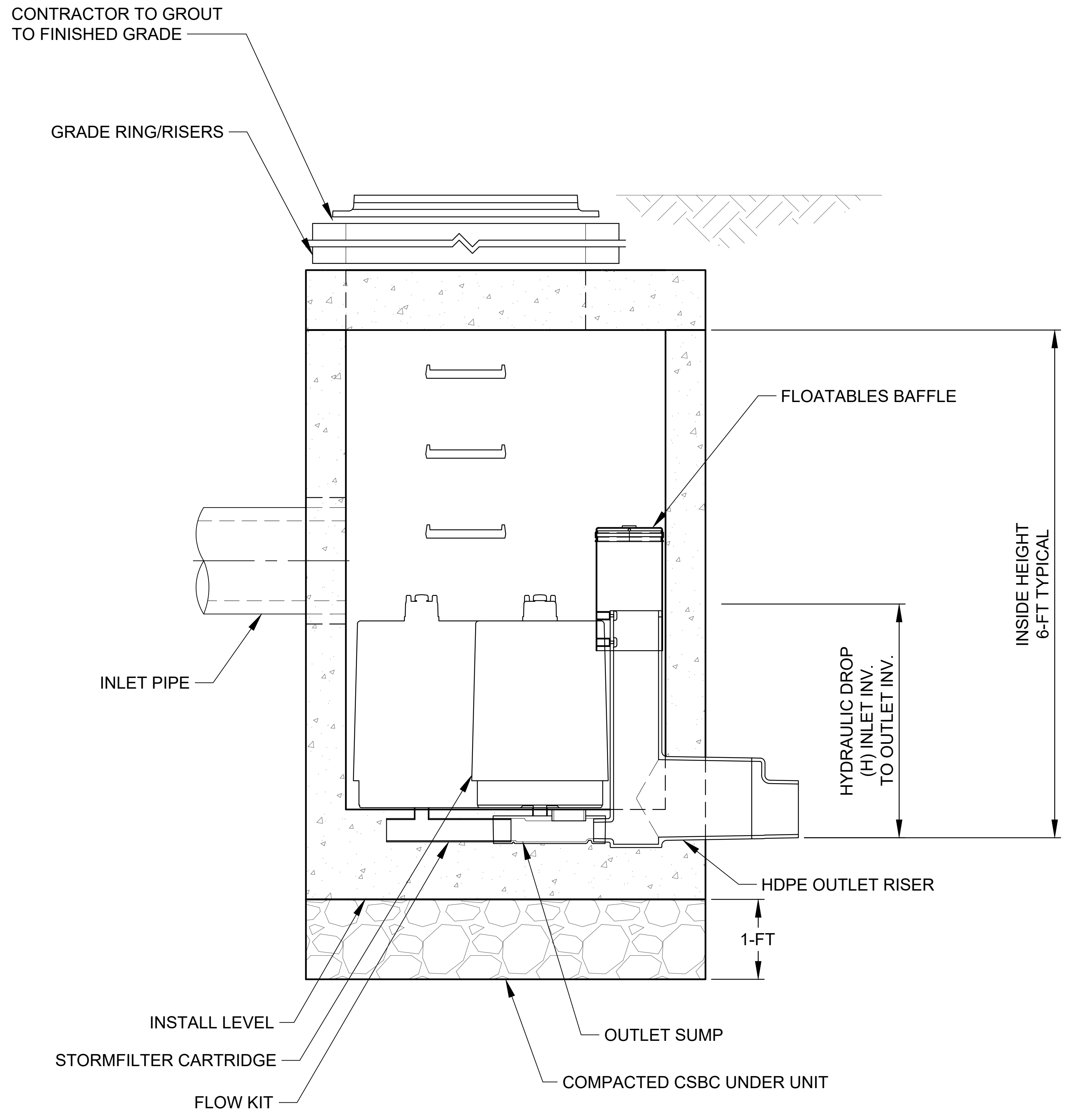
JOB# / DWG 10-210058
SCALE H: 1"=20' V: 1"=10'
DATE 04/28/2023
DR09
SHEET 27 of 101

FILE NAME: C:\PW_OCI_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_STRM_DETL.DWG
PLOT TIME: 4/27/2023 7:04 PM
USER NAME: LAURA TURNIDGE

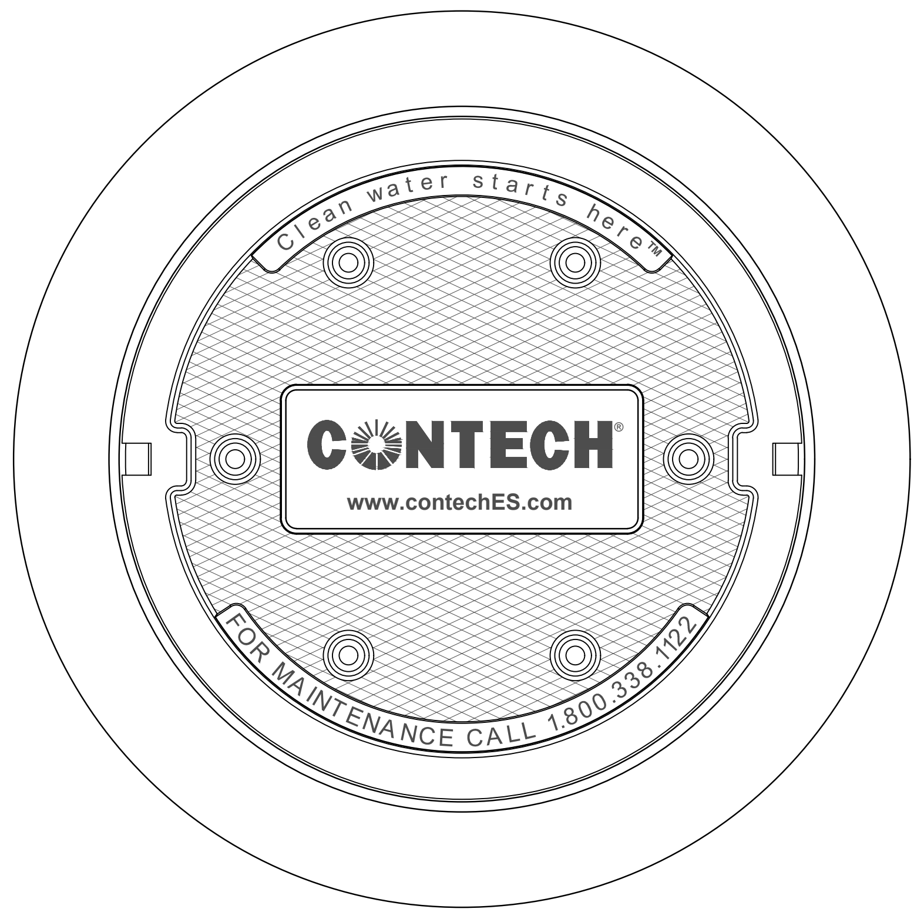


PLAN VIEW

STANDARD OUTLET RISER
FLOWKIT: 43A



SECTION A-A



FRAME AND COVER

(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			WQ-1
WATER QUALITY FLOW RATE (cfs)			0.016
PEAK FLOW RATE (cfs)			0.44
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	322.54	TBD	18-IN
OUTLET PIPE	319.49	TBD	18-IN
RIM ELEVATION			326.00
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			WQ-2
WATER QUALITY FLOW RATE (cfs)			0.040
PEAK FLOW RATE (cfs)			0.67
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
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			
* 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 19-28.

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
26,27

WATER QUALITY FACILITY (WQ-1 AND WQ-2)

N.T.S.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP
DRAWN BY LT/LO/FJ
CHECKED BY LR

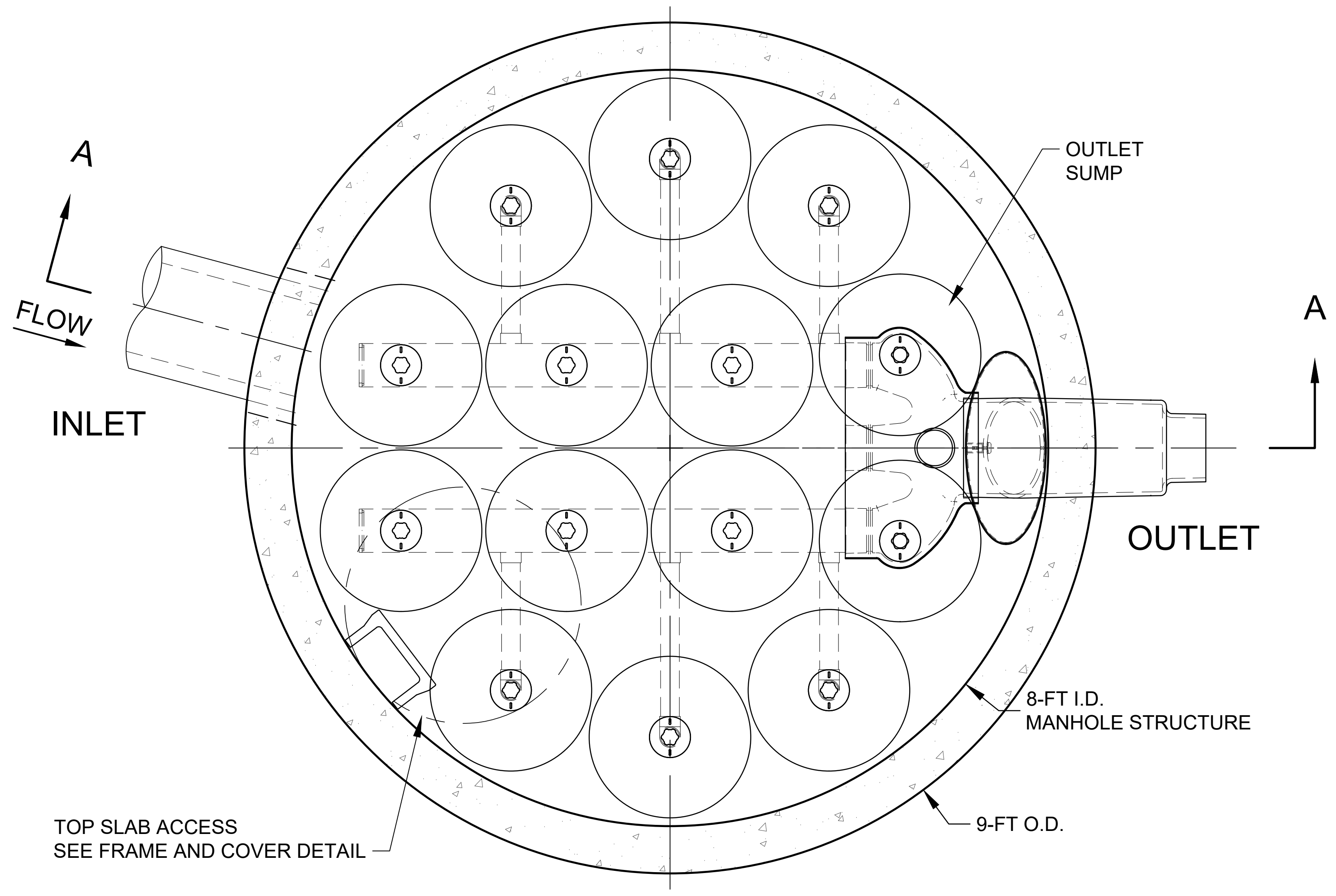
OSBORN CONSULTING INCORPORATED
Osborn Consulting, Inc.
Bellevue | Seattle | Spokane | Bellingham
www.osbornconsulting.com

NO.	DATE	REVISION	BY

City of Sammamish Washington

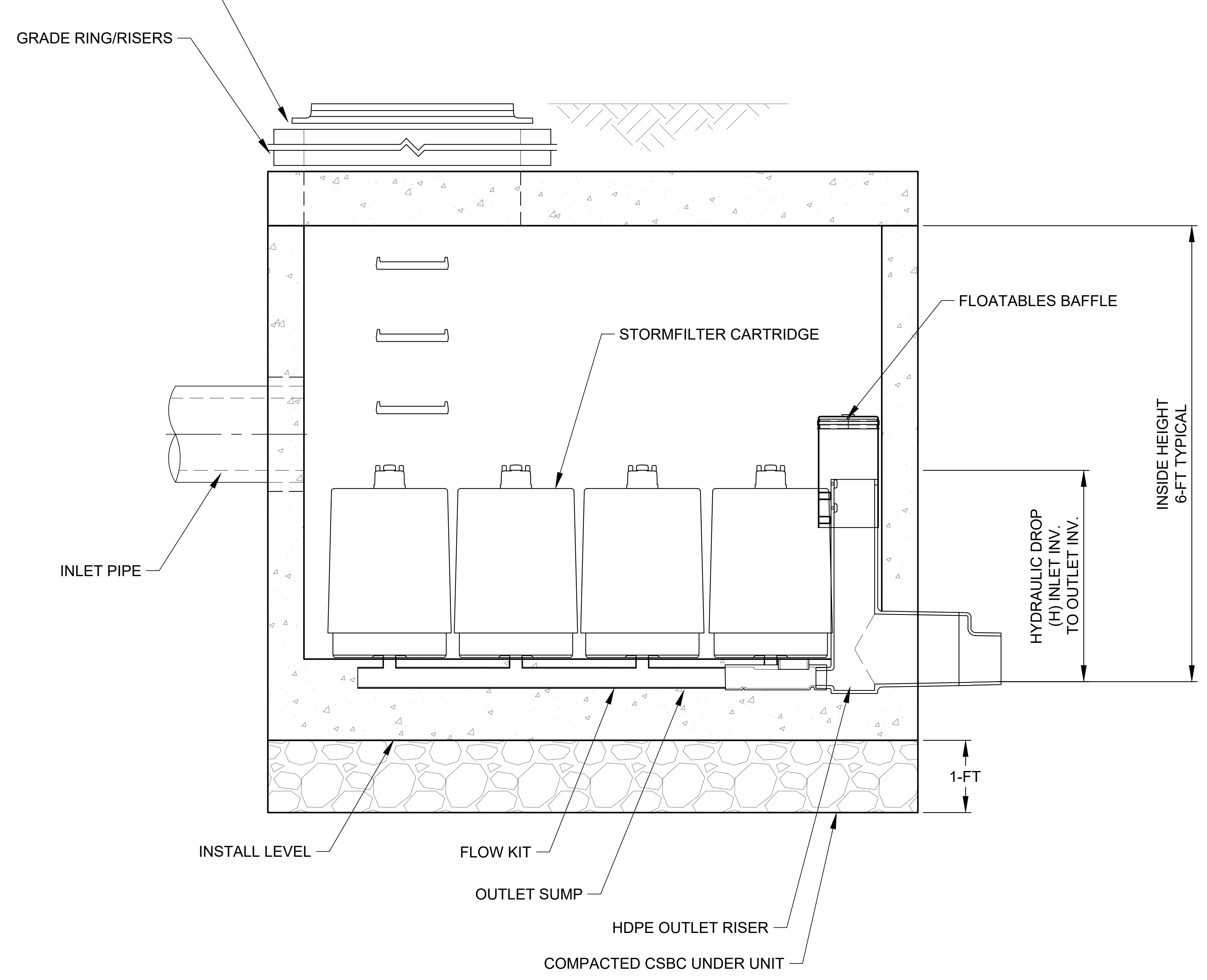
LOUIS THOMPSON ROAD TIGHTLINE PROJECT
CITY OF SAMMAMISH
STORM DRAINAGE DETAILS

JOB# / DWG 10-210058
SCALE H: N/A V: N/A
DATE 04/28/2023
DR12
SHEET 30 of 101

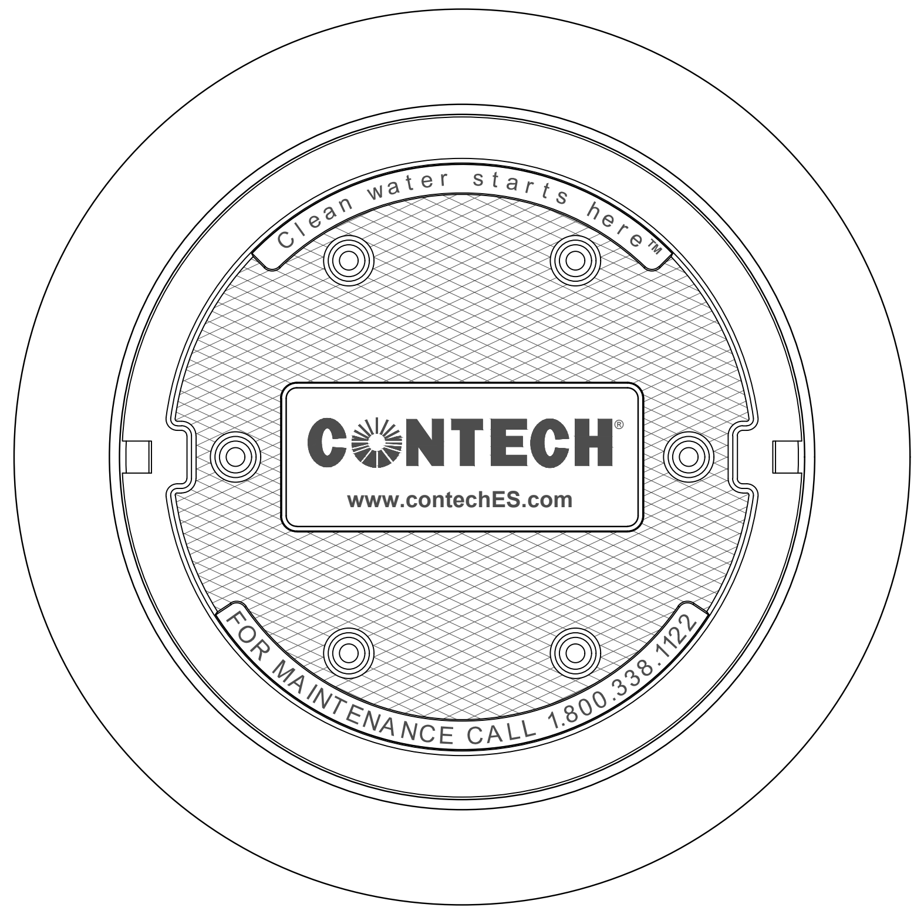


PLAN VIEW

STANDARD OUTLET RISER
FLOWKIT: 43A



SECTION A-A



FRAME AND COVER

(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			WQ-3
WATER QUALITY FLOW RATE (cfs)			0.311
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	255.19	TBD	12-IN
RIM ELEVATION			261.97
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			

* 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	136.86	TBD	12-IN
OUTLET PIPE	133.81	TBD	12-IN
RIM ELEVATION			141.16
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		TBD	TBD
NOTES/SPECIAL REQUIREMENTS:			

* 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 19-28.

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 WATER QUALITY FACILITY (WQ-3 AND WQ-4)

21,25

N.T.S.

60% SUBMITTAL (NOT FOR CONSTRUCTION)

DESIGNED BY MP	**Osborn Consulting, Inc.** Bellevue | Seattle | Spokane | Bellingham www.osbornconsulting.com	NO.	DATE	REVISION	BY	**LOUIS THOMPSON ROAD TIGHTLINE PROJECT** CITY OF SAMMAMISH STORM DRAINAGE DETAILS
DRAWN BY LT/LO/FJ						JOB# / DWG 10-210058
CHECKED BY LR						SCALE H: N/A V: N/A
						DATE 04/28/2023
						DR13 SHEET 31 of 101

FILE NAME: C:\PW_OC_WORKINGDIR\OSBORNCONSULTING-PW.BENTLEY.COM_OSBORNCONSULTING-PW-01\LAURA TURNIDGE\DMS26566\P_10-210058_STRM_DETL.DWG
PLOT TIME: 4/27/2023 7:04 PM
USER NAME: LAURA TURNIDGE