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Technical Memorandum

Prepared for: City of Puyallup

Project Title: 4th Avenue Storm Drain Capacity Evaluation and 30 Percent Design Drawings

Project No.: 153448

Subject: 4th Ave Storm Drain Capacity Evaluation

Date: February 27, 2020

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List of Abbreviations

BC	Brown and Caldwell
BNSF	Burlington Northern Santa Fe
CCI	Construction Cost Index
CIP	Capital Improvement Project
City	City of Puyallup
ENR	Engineering News-Record
ft	foot/feet
fps	feet per second
GIS	Geographic Information System
HSPF	Hydrologic Simulation Program-Fortran
LF	linear foot/feet
MG	million gallons
PCSWMM	Personal Computer Storm Water Management Model
SWMM	Storm Water Management Model
TESC	temporary erosion and sediment control
TM	technical memorandum

Section 1: Introduction

The City of Puyallup (City) asked Brown and Caldwell (BC) to evaluate the capacity of a new north-alignment storm drain connecting the Sound Transit redevelopment area (near 3rd Ave NW and 5th St NW) to the 54-inch system (north of River Rd and 4th St NW) that connects to Puyallup River Outfall 14. The City also asked BC to evaluate the feasibility of routing other phased portions (Phases 3, 4, 5 and 6) of CIP-ST-2 to the north reroute project, which would reduce or eliminate the need for Phases 1 and 2 of CIP-ST-2. Routing portions of CIP-ST-2 to the north was determined feasible with hydraulic modeling. The City asked BC to develop 30 percent design drawings for the new storm drain between the Sound Transit area and the 54-inch system and prepare planning-level costs for all conveyance routed to the north in the modeling exercise.

This Technical Memorandum discusses the updates to the existing hydrologic and hydraulic models required to perform the capacity evaluation, summarizes the hydraulic analysis results for the north reroute, and compares 2020 planning-level costs for the north reroute project with the updated 2020 costs for CIP-ST-2. Both the north reroute project and CIP-ST-2 project address flooding in the City's downtown area.

Section 2: Background

In 2012, the City identified two projects in its Comprehensive Storm Drainage Plan (Comp Plan [BC 2012a]) to help reduce flooding in the City's downtown area—the 15th St NW Storm Drain Extension (CIP-ST-1) and the 4th Ave Storm Drainage project (CIP-ST-2). CIP-ST-1 diverts flows from the storm drain in 4th Ave SW north at 15th St NW to an existing gravity system that outfalls to the Puyallup River (Outfall 18). The City completed CIP-ST-1 in 2014. CIP-ST-2 has not been constructed.

CIP-ST-2 is a storm drain upsizing project that spans west from 7th St SE along 4th Ave SE/SW to the diversion at 15th St SW and includes improvements along W Stewart Ave and along 5th St SW/NW between W Stewart Ave and 4th Ave SW. See Figure 1. CIP-ST-2 flows are diverted from 4th Ave SW at 15th St SW. Subsequent to the Comp Plan, the City divided CIP-ST-2 into six phases for ease of financing and construction implementation. The project is phased so that the most downstream section (Phase 1) would be constructed first and most upstream areas along W Stewart Ave and 5th St NW (Phase 6) would be constructed last.

Currently, redevelopment is being planned for the Sound Transit station, which is in the drainage area for Phase 6 of CIP-ST-2 (roughly 3rd Ave NW and 5th St NW). Because the Sound Transit area is redeveloping before Phases 1 through 5 of CIP-ST-2 are scheduled to begin, the City would like to evaluate rerouting storm flows from the Sound Transit area to an existing outfall to the Puyallup River (Outfall 14). In 2018, BC evaluated the feasibility of routing flows north to the existing 54-inch system based on City infrastructure and contour GIS data (BC 2018a). This preliminary evaluation found that routing flows to the north would be feasible if there is sufficient capacity in the 54-inch system; therefore, the study recommended using the City's hydrologic and hydraulic models of the storm drainage system to assess the capacity of the existing storm drain system immediately upstream of Outfall 14 to accommodate additional flow from the Sound Transit area and portions of CIP-ST-2 project. See Figure 2 for north alignment and connectivity to Phases 3, 4, 5, and 6 of CIP-ST-2.

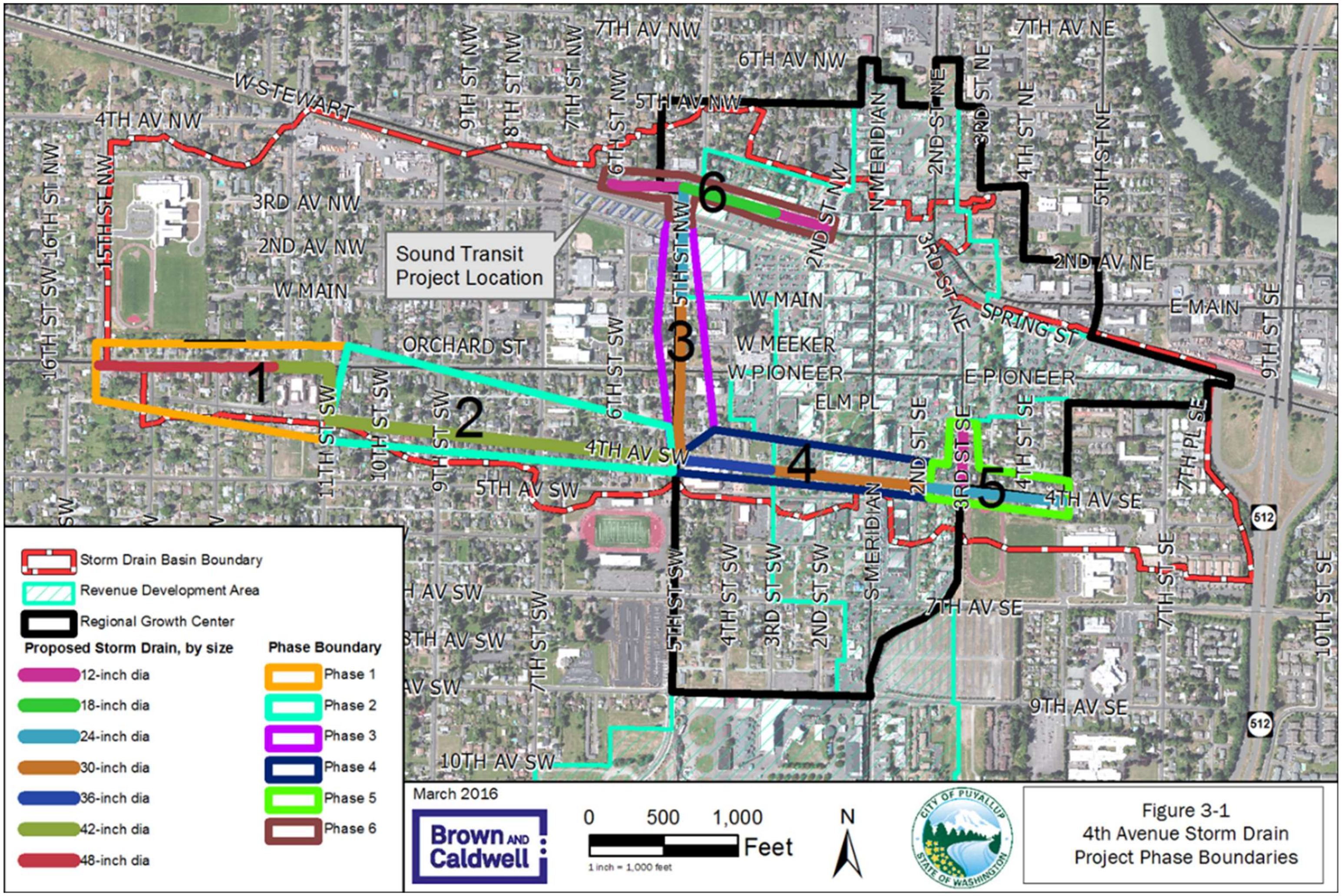


Figure 1. 4th Ave Storm Drain Project Phase Boundaries (CIP-ST-2)

Figure from "4th Avenue SW Storm Drainage Improvement" by BC (2016)

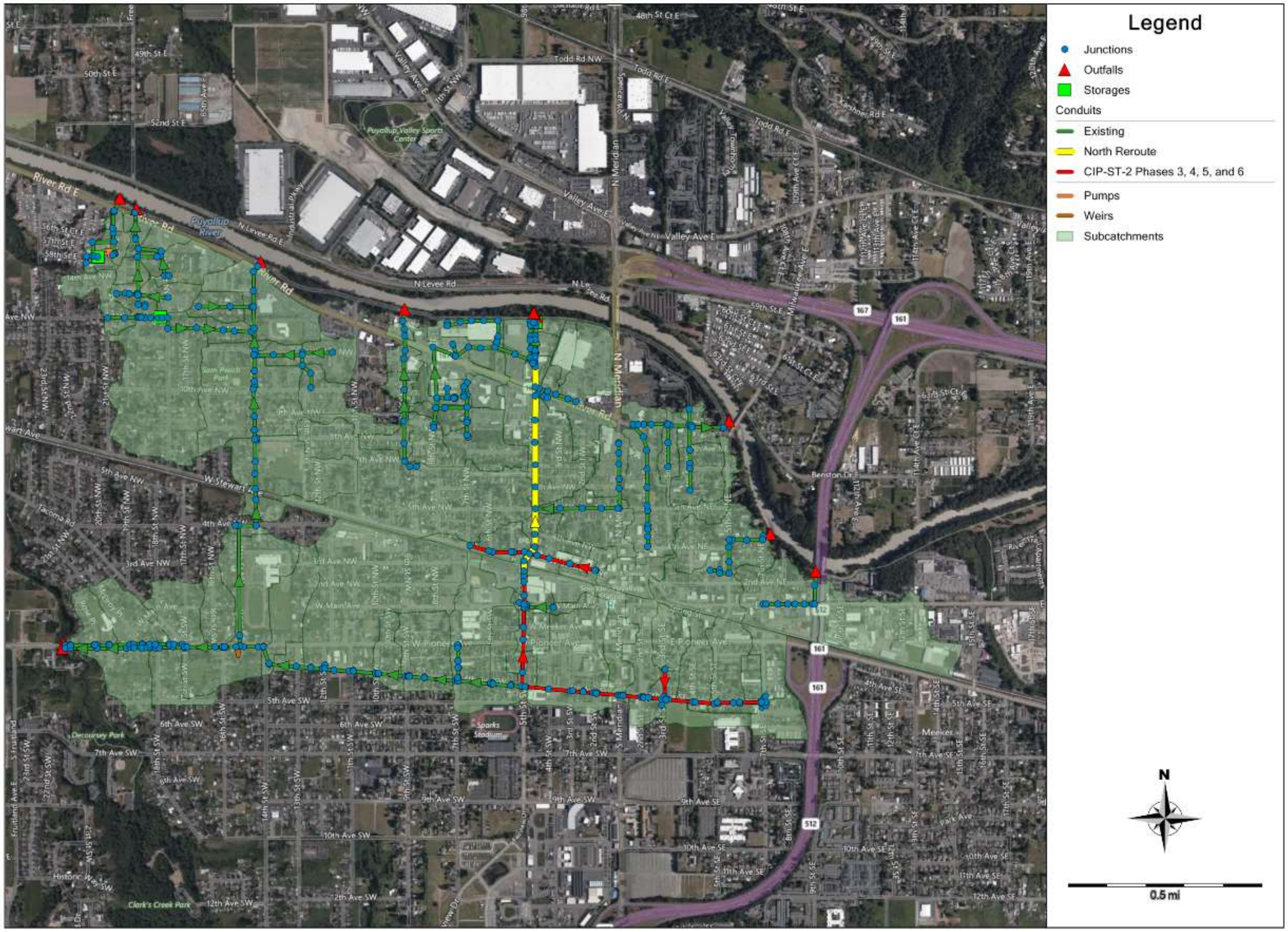


Figure 2. Proposed north reroute project alignment and connecting phases of CIP-ST-2

Section 3: Methodology

To evaluate the north reroute project and compare with CIP-ST-2, BC:

- Developed an existing condition model by updating existing models of two separate drainage basins and then combining the models to represent the north reroute alignment.
- Determined the 25-year and 100-year design storms to evaluate the combined existing and north re-route alignments based on past storm flow frequency analyses.
- Developed and evaluated a north reroute alignment based on City design requirements.
- Developed project timing and phasing for the north reroute project and compared it to the existing CIP-ST-2-planned project.

The sections below provide details on these activities.

3.1 Existing Condition Model

BC combined two existing PCSWMM[1] models from two separate drainage area models (Downtown and Backwater models) to simulate existing conditions for 2014 land use (impervious coverage) and stormwater infrastructure.

The Downtown model was calibrated with monitored flows under a separate project in 2014 and represents the areas contributing to CIP-ST-1 and CIP-ST-2. The development and calibration of the Downtown model is described in the 2014 technical memorandum, “4th Avenue Stormwater Model Calibration and CIP Refinement” (2014 study) (BC 2014). The hydrology approach for the Downtown model in SWMM uses subcatchments (which are model objects representing basins or tributary areas) to simulate the short-term (i.e., surface) runoff and the RTK unit hydrograph (UH) method to generate the medium- and long-term (i.e., groundwater) contributions to the storm system. Impervious coverage represented in the Downtown model subcatchments are based on values estimated during the Comp Plan modeling using GIS information. During calibration of the Downtown model in the 2014 study, percent impervious of each subcatchment was varied in SWMM so the simulated peak runoff response matched the flow monitoring data.

The Backwater model includes areas north of downtown adjacent to and directly discharging to the Puyallup River. The Backwater model consists of PCSWMM hydraulics and HSPF[2] hydrology. The hydrology of the Backwater model was developed in an HSPF model that was based on parameters developed for models used in the City’s State Highway Basin Plan (BC 2012a). The HSPF model is not calibrated. However, during the Comp Plan analysis, simulated flows were compared to flow gauge data in the Clarks Creek Basin and captured the major features of the observed creek flow data, and therefore supported the use of the HSPF model to estimate surface water runoff for the Comp Plan . The impervious coverage of the HSPF model was updated for Comp Plan analyses using 2012 land use codes and effective impervious methodologies (BC 2012a). The HSPF flow time series are imported into the Backwater model at junctions to represent

[1] PCSWMM is a Graphical User Interface for running EPA SWMM developed and supported by Computational Hydraulics International (CHI) located in Guelph, Ontario, Canada. More information on PCSWMM is available at https://www.pcswmm.com/.

[2] HSPF, or Hydrologic Simulation Program-Fortran, is a physically based hydrologic modeling program that is maintained and distributed by the U.S. Environmental Protection Agency (EPA). HSPF translates rainfall into runoff and other hydrologic processes that generate stormwater flow. HSPF has been widely used across the country for more than 3 decades and was the modeling platform used for the City’s State Highway Basin Plan.

catchment runoff inflows into the hydraulic system. Figure 3 shows the extent of the Downtown and Backwater models and the locations within the model where HSPF flows are imported into the model.

The combined existing condition model was updated with recent (2019) survey data collected along the proposed alignment between 3rd Ave NW and the 54-inch-diameter system north of River Road. The single existing conditions model of the combined drainages was then modified to create the north reroute proposed condition model.

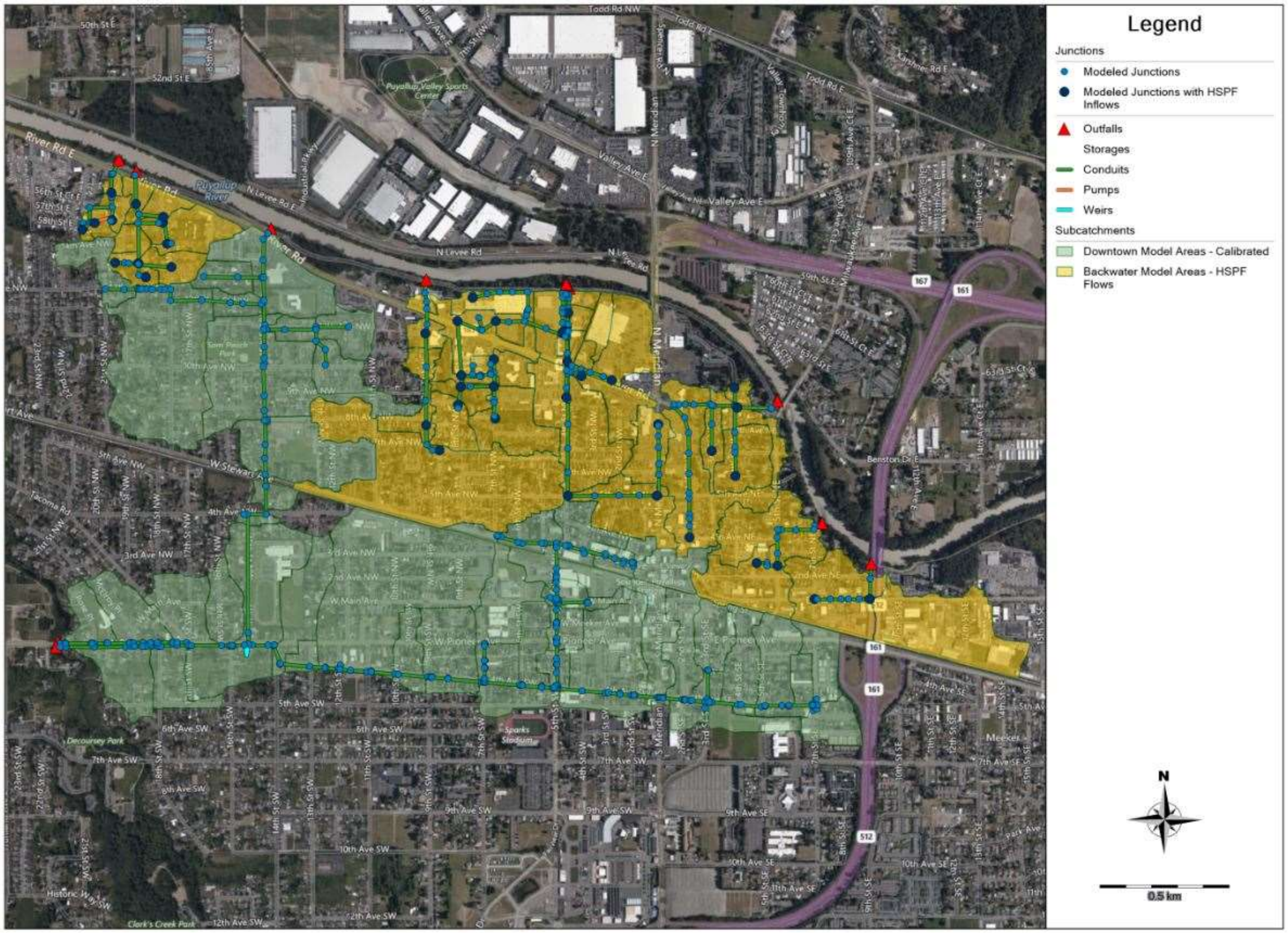


Figure 3. Combined existing conditions model extent

3.2 Frequency Analysis

For the Comp Plan, frequency analysis performed on simulated flows determined that an event of roughly 25-year magnitude occurred on September 17, 1969. This recurrence interval is of interest because the City's level of service (LOS) standard states that stormwater pipes must convey the 25-year peak flow with the hydraulic grade line (HGL) below the rim of the catch basin. As part of the update of the Downtown model in the 2014 study, the storm flow frequency analysis was updated with results from a long-term simulation using the newly calibrated model. The simulated flows at the outlet of the Downtown model were used in the frequency analysis. The 2014 study analysis indicated that the September 1969 event is the largest peak simulated flow for the period of record for the Downtown basins, corresponding to a recurrence interval of approximately 100 years. The 25-year event is better represented by the October 20, 2003, storm event for the Downtown basins. The difference between the two events, however, is relatively small. The simulated peak flow for the 1969 event is about 7 percent higher than the October 2003. At the time of the 2014 study, the City decided to continue to use the September 1969 event as the 25-year event for planning and conveyance sizing. This approach is considered conservative with respect to flood protection and conveyance sizing.

3.3 North Reroute Model

The north reroute proposed condition model was developed in conjunction with the 30 percent design drawings for the alignment between the Sound Transit area and the existing 54-inch-diameter outfall system. The north reroute model was developed to meet a number of design goals. The goals are listed in order of preference:

- Provide sufficient cover under the Burlington Northern Santa Fe (BNSF) railway; a general guideline is to provide a cover depth equivalent to double the diameter of a jack-and-bore sleeve for the new pipe plus an additional three feet.
- Convey flow with no flooding at the manhole rim for the 25-year storm flow identified for the Comp Plan (25-year storm flows generated from 9/17/1969 storm) per the City's design standard for stormwater conveyance (City 2019).
- Ensure overflow from a 100-year storm flow does not create or aggravate an existing flooding or erosion problem per the City's design standard for stormwater conveyance (City 2019).
- Achieve minimum design velocity at full flow of 3 feet per second (fps) per the City's design standard for stormwater conveyance (City 2019).
- Achieve maximum design velocity less than 8 fps as a general guideline to minimize forces on pipe joints.
- Reduce construction costs by adjusting pipe slope and alignment to avoid utility conflicts rather than relocating utilities, especially sewer lines.
- Create a single drainage conveyance line by connecting local flows along pipe alignment.
- Maximize contributing area from Phases 3, 4 and 5 of CIP-ST-2.
- Use existing infrastructure when possible to reduce construction costs or provide interim project phasing opportunities.

3.4 Project Cost and Phasing

Planning-level cost estimates for the north reroute are based on CIP-ST-2 costing methodologies (BC 2018a) and updated with 2020 construction costs using *Engineering News-Record* Construction Cost Index (ENR CCI). Similar to the cost estimates developed for CIP-ST-2, the north reroute project costs are divided into phases. Each phase cost is based on three construction line-items:

- Mobilization, traffic control, temporary erosion and sediment control (TESC), miscellaneous utility relocates, etc.
- Stormwater conveyance (per linear feet [LF])
- Road demolition and installation

The following assumptions are used for other costs:

- Contractor overhead and profit
- Construction contingency
- Washington State, Pierce County and City sales tax
- Owner management, engineering design and permitting

The cost estimates are Class 5 cost estimates per the Association for the Advancement of Cost Engineering (AACE), with an expected cost range of -50 to +100 percent.

Section 4: Hydraulic Analysis and Results

4.1 North Reroute Description

Based on the design goals outlined in Section 3, the modeled north reroute project routes flows west along 4th Ave SE/SW and then north along 5th St SW/NW and 4th St NW to discharge at Outfall 14 of the Puyallup River north of River Road. The alignment is shown in Figure 4. Conveyance pipes and contributing areas are color coded to distinguish the phasing for funding and construction. Costs are developed per phase and described in Section 5.

Beginning with the most upstream location, the north reroute project includes:

- Increased pipe sizing along 4th Ave SE/SW between 2nd St SE and 5th St SW (18- to 36-inch pipe)
- Connection to existing storm drainage inlets and pipes along 4th Ave SE/SW
- Overflow weir at 4th Ave SW and 5th St SW that routes high flows to the west along 4th Ave SW in existing conveyance to the diversion at 15th St SW and low flows to the north along 5th St SW/NW & 4th St NW (36-inch diameter pipe)
- Connection to existing storm drainage inlets and pipes along 5th St SW/NW and 4th St NW
- Connection to 54-inch-diameter system north of River Road at MH061809p-37

The north reroute project was developed based on design goals outlined in Section 3. The phase extents for the north reroute project are similar to the phases of CIP-ST-2. The names are changed based on construction timing. Table 1 provides a cross comparison of the phases for the north reroute and CIP-ST-2 projects. Figure 1 shows the boundaries of each phase of CIP-ST-2 for comparison purposes (Phase 1 to 6). Figure 4 shows the boundaries of each phase of the north reroute project (Phases N-1 to N-5).

Table 1. 4th Ave Storm Drainage Project Phase Descriptions

CIP-ST-2	North reroute project	Description
–	Phase N-1	Starting near 5th St NW and 3rd Ave NW to north of River Road along 5th St NW and 4th St NW
Phase 1	–	Starting at 11 St SW and 4th Ave SW to 15th St SW and W Pioneer Ave along 4th Ave SW and W Pioneer Ave
Phase 2	–	Starting at the 5th St SW and 4th Ave SW to 11th St SW and 4th Ave SW along 4th Ave SW
Phase 3	Phase N-2	Starting at 5th St SW and 4th Ave SW to 5th St NW and 3rd Ave NW along 5th St SW/NW
Phase 4	Phase N-3	Starting near 2nd St SE and 4th Ave SE to 5th St SW and 4th Ave SW along 4th Ave SE/SW
Phase 5	Phase N-4	Starting at 7th St SE and 4th Ave SE to 2nd St SE and 4th Ave SE along 4th Ave SE
Phase 6	Phase N-5	Starting at 2nd St NW and W Stewart Ave to 7th St NW to W Stewart Ave along W Stewart Ave

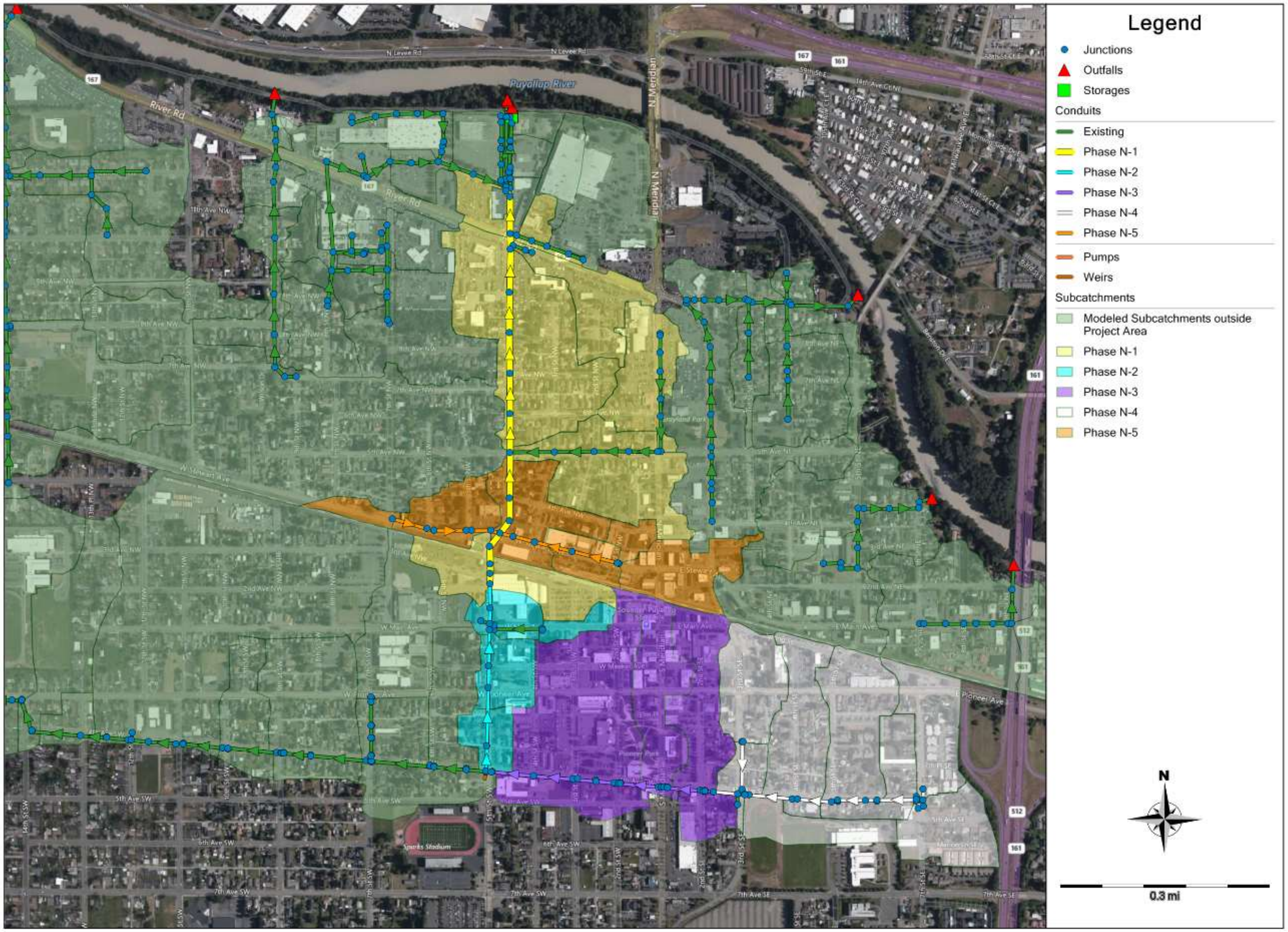


Figure 4. Alignment and phase of the modeled north reroute project

4.2 Hydraulic Analysis

The hydraulic analysis for the north reroute project included evaluating pipe capacity and minimum and maximum flow velocity for the 25-year storm flow.

4.2.1 Pipe Capacity

The north reroute project pipe capacity was evaluated using the 25-year storm flows. Pipe capacity is evaluated based on the depth of flow in the pipe for a level-of-service storm or on the height of the hydraulic grade line above the pipe crown if the pipe is surcharging. The City's pipe capacity design criteria specifies that pipes convey flow with no flooding at the manhole rim for the 25-year storm flow.

The 25-year storm simulation of the north reroute project resulted in no flooding and provided at least 1.5 feet of freeboard between the ground and the simulated hydraulic grade line for the entire extent of the five-phase project. This indicates that the project would meet the project design goals.

Figure 5 shows the north reroute project profile with hydraulic grade line for Phase N-1, N-2, N-3 and N-4. Key profile elements are noted on the profile figure, including the beginning location at 7th St SE and 4th Ave SE, the overflow weir at 5th St SW and 4th Ave SW, BNSF railroad crossing location and relative elevation (represented by a dummy node in the model), pipe alignment street reference, and Outfall 14. Appendix A includes profiles for each phase of the north reroute project. Appendix B includes the 30 percent drawing set for Phase N-I of the north reroute project.

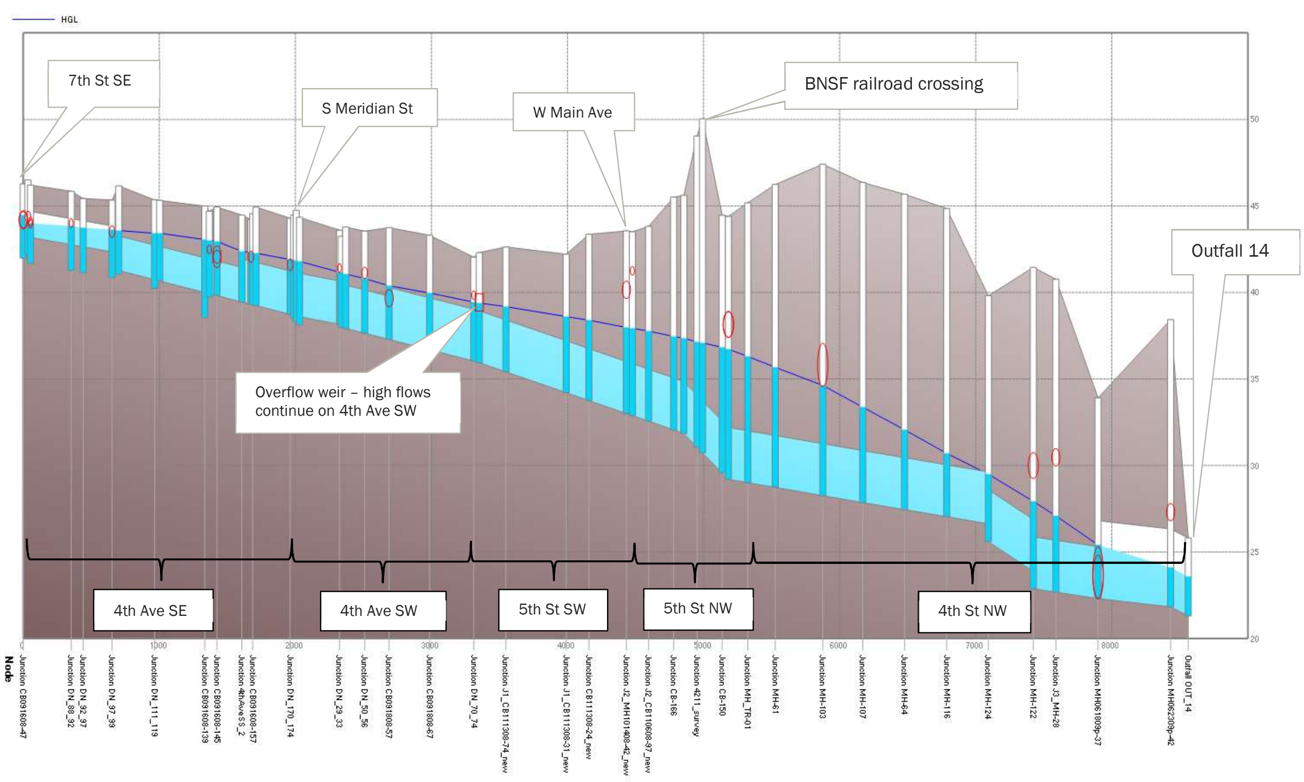


Figure 5. North Reroute Project Profile from 7th St SE to Puyallup River Outfall 14

Flow Velocities

The hydraulic analysis also included an evaluation of simulated flow velocities. Model results were used to confirm the simulated velocities between 3 and 8 fps in the new pipeline and in the existing 54-inch-diameter outfall system. These flow velocities were achieved for the 25-year storm flow simulation except in pipes located in Phase N-4 (along 4th Ave SE between 7th St SE and 2nd St SE) and Phase N-5 (along W Stewart St west of 5th St NW), where velocities ranged between 2 and 3 fps (see Figure 6). These pipes with low velocities were deemed acceptable given the relative flatness of the overall system. The City regularly inspects and cleans its storm drainage pipes in systems with low slopes and historically low flows.

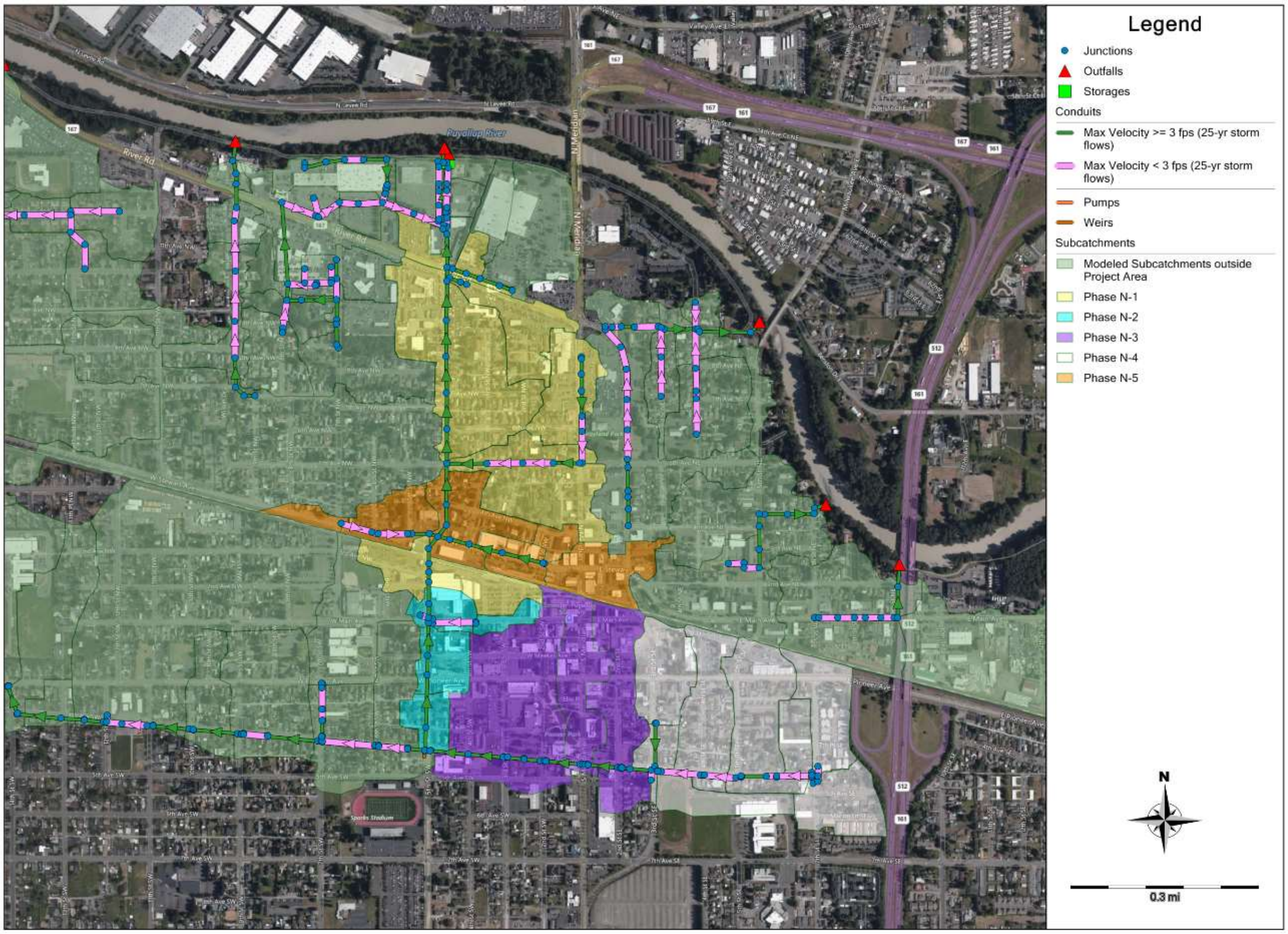


Figure 6. North reroute project, pipes with velocity less than 3 fps

4.2.2 Response to 100-year storm

The north reroute project model was evaluated for the September 19, 1969 storm which was determined to generate the 25-year storm flows for the Comp Plan analysis and the 100-year storm flows for the 2014 study (Downtown model update and calibration). At the time of the 2014 study, the City decided to continue to use the September 1969 event as the 25-year event for planning and conveyance sizing. This approach is considered conservative with respect to flood protection and conveyance sizing.

Section 5: Costs

BC developed planning-level project costs for phased construction of the north reroute project in 2020 dollars. The phased costs and a comparison of total project cost with the existing CIP-ST-2 planned project are summarized in this section. Also included is a proposed design and construction schedule with annual escalated costs over a 12-year total project duration.

5.1 Project Costs by Phase

BC developed five phases, with the first construction priority assigned to the system at the Sound Transit station. Figure 4 shows the boundaries of each phase of the project (Phases N-1 to N-5). For phases N-1 and N-2, the cost estimates assume the new storm drain will replace the existing storm line in place but at much greater depths. For Phase N-2, the new pipe will be placed at a slope opposite the existing storm drainage. All connections will be transferred to the new line. Some connections will require a drop structure. The existing storm infrastructure line will be removed or abandoned in place.

For phases N-3, N-4, and N-5, the cost estimates assume that the new storm drain will replace the existing pipe and all connections will be transferred to the new line. The updated estimate does not include costs to assess or rehabilitate the existing storm drain west of 5th St SW (Phase 1 and 2 of CIP-ST). All new pipe between 12 inches and 24 inches in diameter is assumed to be polyvinyl chloride pipe, and all pipe greater than or equal to 30 inches in diameter is assumed to be steel reinforced polyethylene pipe.

5.1.1 Phase N-1

Phase N-1 encompasses the northern most portion of the north reroute project and is the phase with the longest alignment and highest cost. This section begins at 5th St NW from 3rd Ave NW and progresses north for approximately 3,134 LF, terminating at the existing 54-inch system just north of River Road. The stormwater line will consist of 36-inch-diameter pipe. This phase passes underneath the railroad just north of 3rd Ave NW. We anticipate that the railroad crossing will require jack-and-bore installation. Table 2 shows the cost estimate for Phase N-1.

Table 2. Phase N-1 Planning-level Cost Estimates

Item	Cost [a]
Mobilization, traffic control, TESC, miscellaneous utility relocates, etc.	$837,000
Stormwater conveyance (3,134 LF)	$1,027,000
Road demolition and installation	$470,000
Subtotal line-item costs	$2,334,000
Contractor overhead, profit, and mobilization (25% of subtotal of line-item costs)	$2,917,000
Construction contingency (30% of all above construction costs)	$875,000
Washington State, Pierce County, and City sales tax (9.9% of all above construction costs)	$375,000
Subtotal construction costs	$4,167,000
Owner management, engineering design, and permitting (35% of construction costs)	$1,459,000
Total Phase N-1 project cost	$5,626,000

a. Class 5 estimate in 2020 dollars

5.1.2 Phase N-2

Phase N-2 begins at the intersection of 4th Ave SW and 5th St SW and travels north 1,403 LF along 5th St SW/NW to the intersection of 5th St NW and 3rd Ave NW, just south of the railroad crossing. The stormwater line will consist of 36-inch-diameter pipe. Table 3 shows the cost estimate for Phase N-2.

Table 3. Phase N-2 Planning-level Cost Estimates	
Item	Cost [a]
Mobilization, traffic control, TESC, miscellaneous utility relocates, etc.	$300,000
Stormwater conveyance (1,403 LF)	$506,000
Road demolition and installation	$352,000
Subtotal line-item costs	$1,158,000
Contractor overhead, profit, and mobilization (25% of subtotal of line-item costs)	$1,446,000
Construction contingency (30% of all above construction costs)	$434,000
Washington State, Pierce County, and City sales tax (9.9% of all above construction costs)	$186,000
Subtotal construction costs	$2,066,000
Owner management, engineering design, and permitting (35% of construction costs)	$723,000
Total Phase N-2 project cost	$2,789,000

a. Class 5 estimate in 2020 dollars

5.1.3 Phase N-3

Phase N-3 begins at the intersection of 4th Ave SE and 2nd St SE and extends 1,724 LF west to the intersection of 4th Ave SW and 5th St SW. Moving from east to west, this phase consists of 1,093 LF of 30-inch-diameter pipe and 631 LF of 36-inch-diameter pipe. Table 4 shows the cost estimate for Phase N-3.

Table 4. Phase N-3 Planning-level Cost Estimates	
Item	Cost [a]
Mobilization, traffic control, TESC, miscellaneous utility relocates, etc.	$209,000
Stormwater conveyance (1,724 LF)	$494,000
Road demolition and installation	$424,000
Subtotal line-item costs	$1,127,000
Contractor overhead, profit, and mobilization (25% of subtotal of line-item costs)	$1,410,000
Construction contingency (30% of all above construction costs)	$423,000
Washington State, Pierce County, and City sales tax (9.9% of all above construction costs)	$181,000
Subtotal construction costs	$2,014,000
Owner management, engineering design, and permitting (35% of construction costs)	$705,000
Total Phase N-3 project cost	$2,719,000

a. Class 5 estimate in 2020 dollars

Phase N-4

Phase N-4 begins at the intersection of 4th Ave SE and 7th St SE and travels 905 LF west along 4th Ave SE to the intersection with 2nd St SE. This phase also includes a 412 LF reach going north from the intersection of 4th Ave SE and 3rd St SE. The east–west reach along 4th Ave SE will be 24 inches in diameter, and the north–south reach along 3rd St SE will be 12 inches in diameter. Table 5 shows the cost estimate for Phase N-4.

Table 5. Phase N-4 Planning-level Cost Estimates

Item	Cost [a]
Mobilization, traffic control, TESC, miscellaneous utility relocates, etc.	$209,000
Stormwater conveyance (1,317 LF)	$378,000
Road demolition and installation	$280,000
Subtotal line-item costs	$867,000
Contractor overhead, profit, and mobilization (25% of subtotal of line-item costs)	$1,083,000
Construction contingency (30% of all above construction costs)	$325,000
Washington State, Pierce County, and City sales tax (9.9% of all above construction costs)	$139,000
Subtotal construction costs	$1,547,000
Owner management, engineering design, and permitting (35% of construction costs)	$542,000
Total Phase N-4 project cost	$2,089,000

a. Class 5 estimate in 2020 dollars

5.1.4 Phase N-5

Phase N-5 includes 1,484 LF along W Stewart St between 7th St NW to the west and 2nd St NW to the east. This phase consists of 1484 LF of 18-inch-diameter pipe. Table 6 shows the cost estimate for Phase N-5.

Table 6. Phase N-5 Planning-level Cost Estimates

Item	Cost [a]
Mobilization, traffic control, TESC, miscellaneous utility relocates, etc.	$209,000
Stormwater conveyance (1,484 LF)	$414,000
Road demolition and installation	$283,000
Subtotal line-item costs	$906,000
Contractor overhead, profit, and mobilization (25% of subtotal of line-item costs)	$1,133,000
Construction contingency (30% of all above construction costs)	$340,000
Washington State, Pierce County, and City sales tax (9.9% of all above construction costs)	$146,000
Subtotal construction costs	$1,619,000
Owner management, engineering design, and permitting (35% of construction costs)	$566,000
Total Phase N-5 project cost	$2,185,000

a. Class 5 estimate in 2020 dollars

5.2 Total Cost Estimate and Cost Comparison

Table 7 compares the updated combined cost estimate for all phases of CIP-ST-2 and the north reroute project. Overall, the north reroute project has a lower cost because the alignment is shorter (9,062 ft versus 10,610 ft).

Table 7. Combined Planning-level Cost Estimate Comparison

Item	CIP-ST-2 Cost [a]	North Reroute Cost [a]
Mobilization, traffic control, TESC, miscellaneous utility relocates, etc.	$2,115,000	$1,764,000
Stormwater conveyance (10,610 ft [CIP-ST-2], 9,062 ft [north reroute])	$3,453,000	$2,818,000
Road demolition and installation	$1,813,000	$1,809,000
Subtotal line-item costs	$7,381,000	$6,391,000
Contractor overhead, profit, and mobilization (25% of subtotal of line-item costs)	$9,226,000	$7,989,000
Construction contingency (30% of all above construction costs)	$2,768,000	$2,397,000
Washington State, Pierce County, and City sales tax (9.9% of all above construction costs)	$1,187,000	$1,028,000
Subtotal construction costs	$13,181,000	$11,413,000
Owner management, engineering design, and permitting (35% of construction costs)	$4,613,000	$3,995,000
Total project cost	$17,794,000	$15,408,000

a. Class 5 estimate in 2020 dollars

5.3 Cost Escalation

The cost estimates presented above are based on 2020 dollars. Constructing the project in phases will extend the time frame. Construction costs are likely to escalate over time because of inflation; therefore, the 2020 costs were escalated at the current annual ENR CCI rate of 2.7 percent. To allow time for funding (i.e., grant and loan) applications, BC assumes that a construction project will occur every other year, and that separate phase design will initiate every other year, as well. With this pattern, and assuming that design started in 2019 with the 30 percent design, all five phases of the north reroute of the 4th Avenue SW Storm Drainage Improvement project should be completed by 2030.

Table 8 shows the spending patterns and total project costs through 2030, and Figure 7 shows the total escalated costs.

Table 8. Total Project Cost Projections and Escalation													
	Description	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Phase N-1	% design/soft cost to be spent	5	20	20	55	0	0	0	0	0	0	0	0
	% construction cost to be spent	0	0	0	100	0	0	0	0	0	0	0	0
	Subtotal	$72,950	$291,800	$291,800	$4,969,450	$0	$0	$0	$0	$0	$0	$0	$0
	Cost projection	$75,000	$308,000	$317,000	$5,529,000	$0	$0	$0	$0	$0	$0	$0	$0
Phase N-2	% design/soft cost to be spent	0	0	0	20	20	60	0	0	0	0	0	0
	% construction cost to be spent	0	0	0	0	0	100	0	0	0	0	0	0
	Subtotal	$0	$0	$0	$144,600	$144,600	$2,499,800	$0	$0	$0	$0	$0	$0
	Cost projection	$0	$0	$0	$161,000	$166,000	$2,934,000	$0	$0	$0	$0	$0	$0
Phase N-3	%design/soft cost to be spent	0	0	0	0	0	20	20	60	0	0	0	0
	%construction cost to be spent	0	0	0	0	0	0	0	100	0	0	0	0
	Subtotal	$0	$0	$0	$0	$0	$141,000	$141,000	$2,437,000	$0	$0	$0	$0
	Cost projection	$0	$0	$0	$0	$0	$166,000	$170,000	$3,016,000	$0	$0	$0	$0
Phase N-4	% design/soft cost to be spent	0	0	0	0	0	0	0	20	20	60	0	0
	% construction cost to be spent	0	0	0	0	0	0	0	0	0	100%	0	0
	Subtotal	$0	$0	$0	$0	$0	$0	$0	$108,400	$108,400	$1,872,200	$0	$0
	Cost projection	$0	$0	$0	$0	$0	$0	$0	$135,000	$138,000	$2,444,000	$0	$0
Phase N-5	% design/soft cost to be spent	0	0	0	0	0	0	0	0	0	20	20	60
	% construction cost to be spent	0	0	0	0	0	0	0	0	0	0	0	100
	Subtotal	$0	$0	$0	$0	$0	$0	$0	$0	$0	$113,200	$113,200	$1,957,600
	Cost projection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$148,000	$152,000	$2,696,000
Totals	Un-escalated total	$72,950	$291,800	$291,800	$5,114,050	$144,600	$2,640,800	$141,000	$2,545,400	$108,400	$1,985,400	$113,200	$1,957,600
	Escalated total	$75,000	$308,000	$317,000	$5,690,000	$166,000	$3,100,000	$170,000	$3,151,000	$138,000	$2,592,000	$152,000	$2,696,000
	Cumulative spent (escalated)	$75,000	$383,000	$700,000	$6,390,000	$6,556,000	$9,656,000	$9,826,000	$12,977,000	$13,115,000	$15,707,000	$15,859,000	$18,555,000

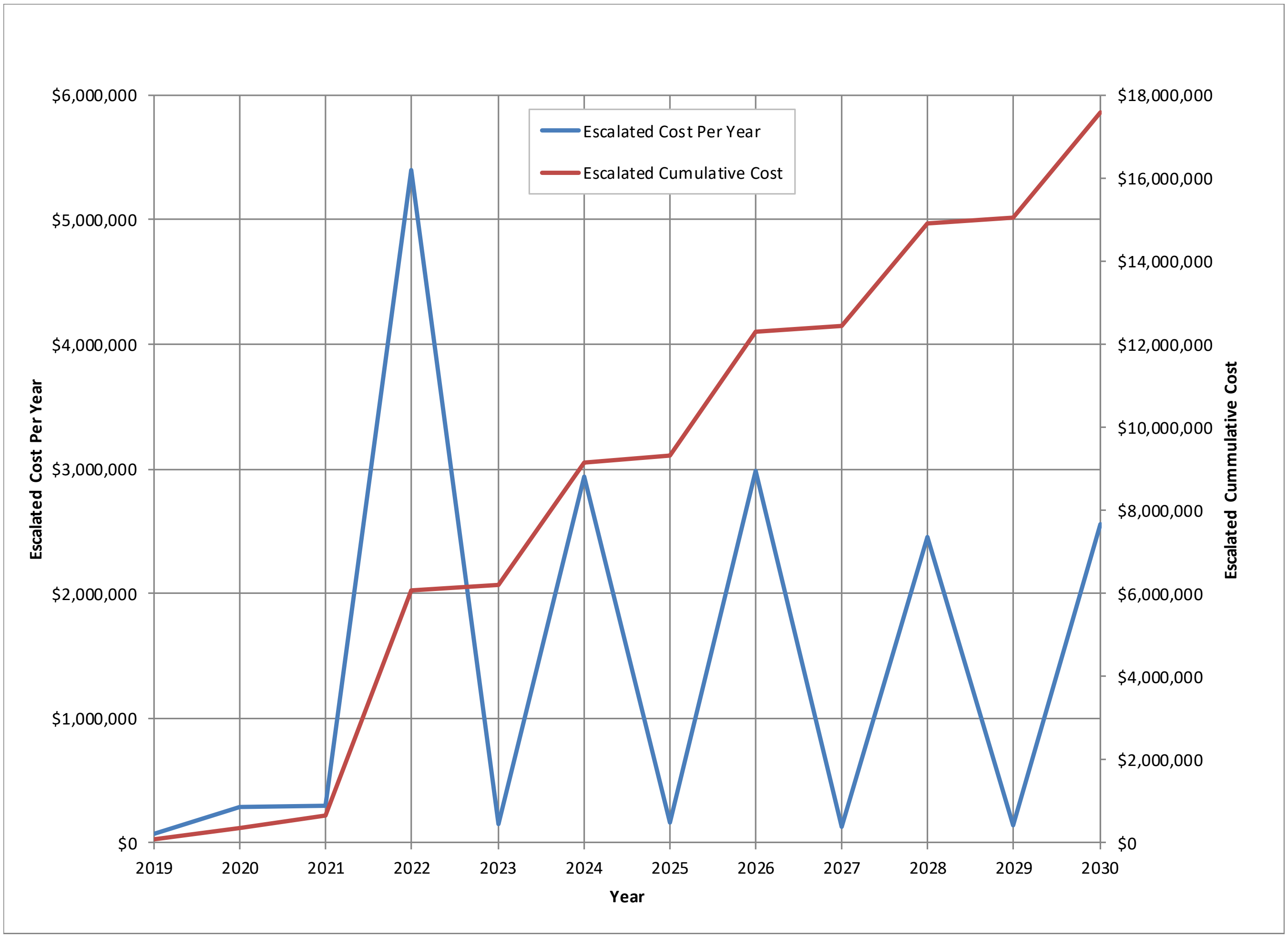


Figure 7. Annual and cumulative escalated cost projection

Section 6: Recommendations

The hydrologic and hydraulic modeling work for this project capacity evaluation is based on an existing condition model containing portions of the uncalibrated Backwater model. Currently the Backwater model hydrology is based on corroborated HSPF (Hydrological Simulation Program–Fortran) flows, which are suitable for planning-level analyses in areas with no known flooding. For design, BC recommends performing flow monitoring in pipes contributing flow to the north reroute alignment in the Backwater model area. Flow monitoring will provide flow time series necessary to calibrate the Backwater model to better assess the capacity of the proposed north reroute and the existing 54-inch outfall system.

Additional field inspection is recommended for the storm systems to the two outfall systems (Outfall 12 and 13) near the 54-inch outfall system (Outfall 14). Based on City GIS data, the three outfalls appear to be connected. Minor discrepancies between project survey data and City GIS shapefiles exist in the vicinity of the 54-inch outfall system. Resolving the discrepancies will provide better information for calibration of the Backwater model.

Section 7: Summary

The City of Puyallup asked BC to evaluate an alternative alignment for a planned storm drainage pipe upsizing project to help meet near-term redevelopment needs in the city's downtown. The evaluation demonstrated that rerouting flows from the Sound Transit station area north to an existing 54-inch-diameter pipe and outfall system north of River Road and 4th St NW is feasible based on City design guidelines for stormwater conveyance. In addition, the work demonstrated that an extension of the proposed project to the south can incorporate four of the six phases of the CIP-ST-2 pipe upsizing project and eliminate the need for the remaining two phases.

While a cost comparison between the north reroute and CIP-ST-2 projects show north reroute is approximately $2.4 million (approximately 13 percent) less than the estimate for CIP-ST-2, the cost difference between the two projects is small compared to the overall cost range of the Class 5 estimate. The greatest benefit of the north reroute project is the construction phasing, which provides timely improved drainage for the Sound Transit redevelopment and other downtown areas anticipated to redevelop in the near term.

References

Brown and Caldwell (BC), 2007. State Highway Basin Plan Recommendations Memorandum. February.

BC. 2012a. *City of Puyallup Comprehensive Storm Drainage Plan*. March.

BC. 2012b. Storm Flow Monitoring Plan. March

BC. 2014. *4th Avenue Stormwater Model Calibration and CIP Refinement*. October.

BC. 2015. *4th Avenue SW Storm Drain Project Phasing*. December.

BC. 2016. *4th Avenue SW Storm Drain Phasing*. March.

BC. 2018a. *4th Avenue SW Storm Drainage 2018 Cost Update.* April.

BC. 2018b. *4th Avenue SW Storm Drainage Improvement 2018 Feasibility of Flow Re-route North.* April.

City of Puyallup (City), 2019. Public Works Engineering & Construction Standards. https://www.cityofpuyallup.org/464/Public-Works-Engineering-Construction-St. November.

Attachment A: North Reroute Proposed Condition PCSWMM Model, Phase N-1 through N-5 profiles

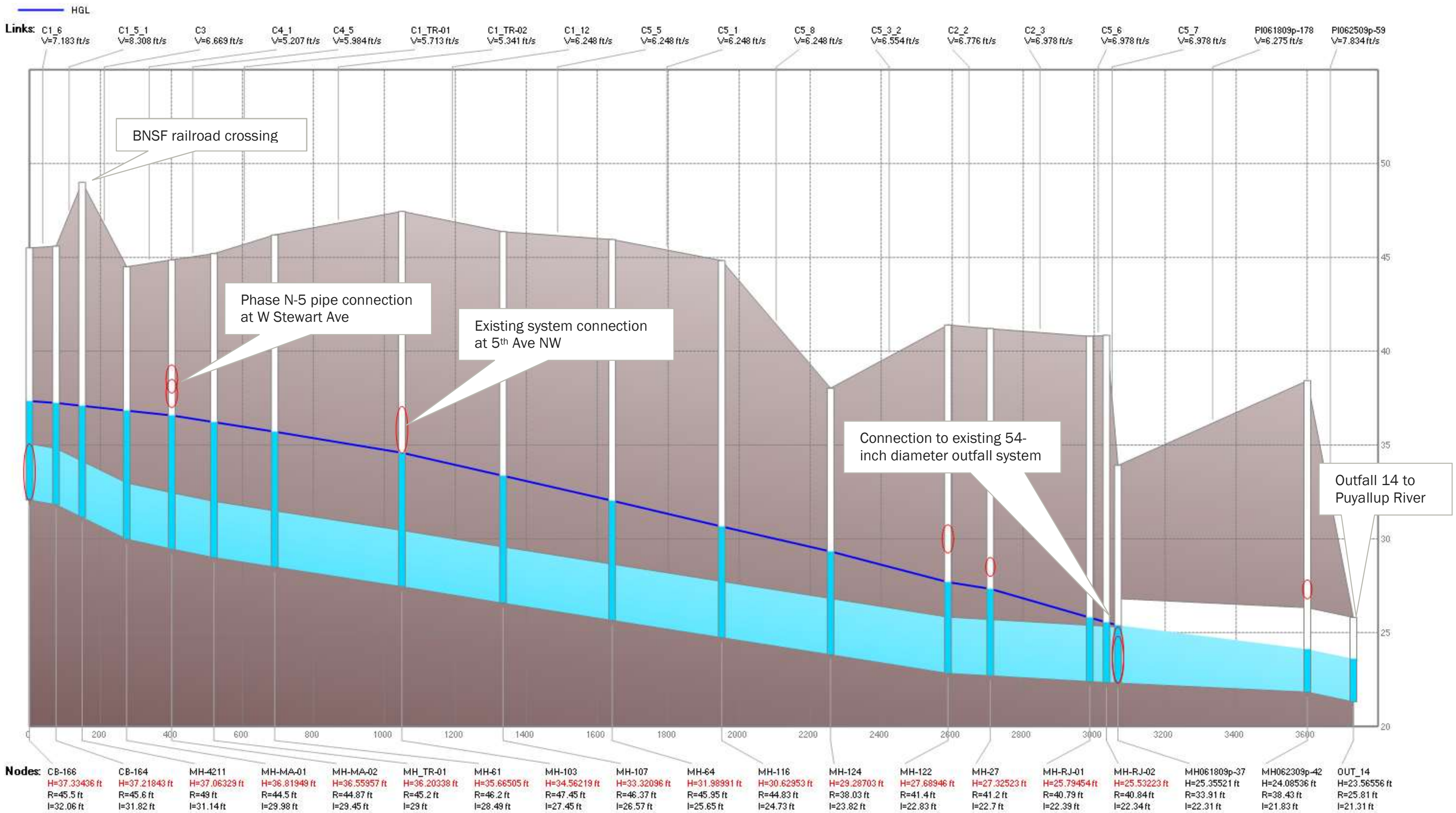


Figure A-1. Phase N-1 Along 5th St NW from 3rd Ave NW to north of River Rd

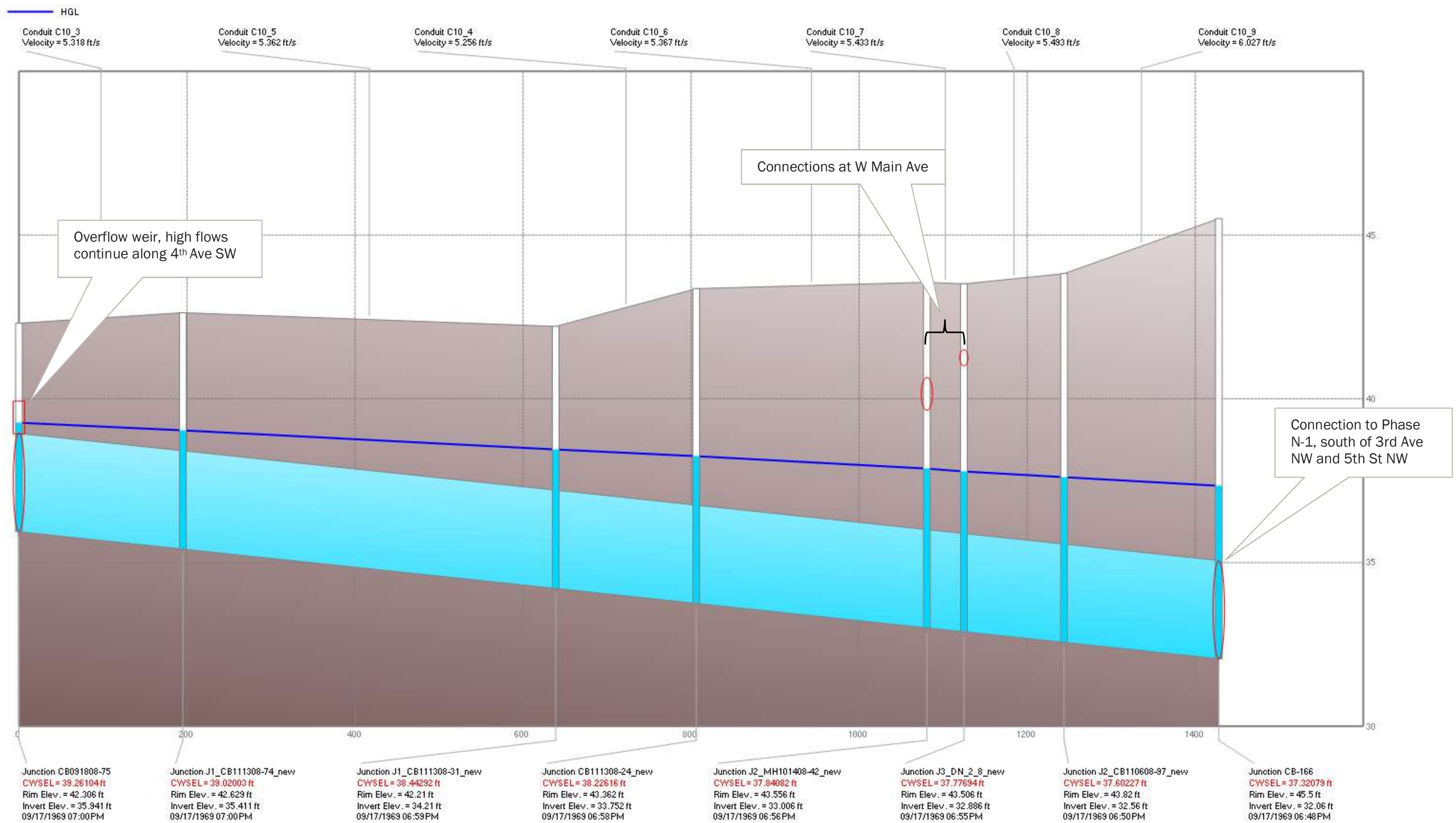


Figure A-2. Phase N-2 Along 5th St SW/NW from 4rd Ave SW to 3rd Ave NW

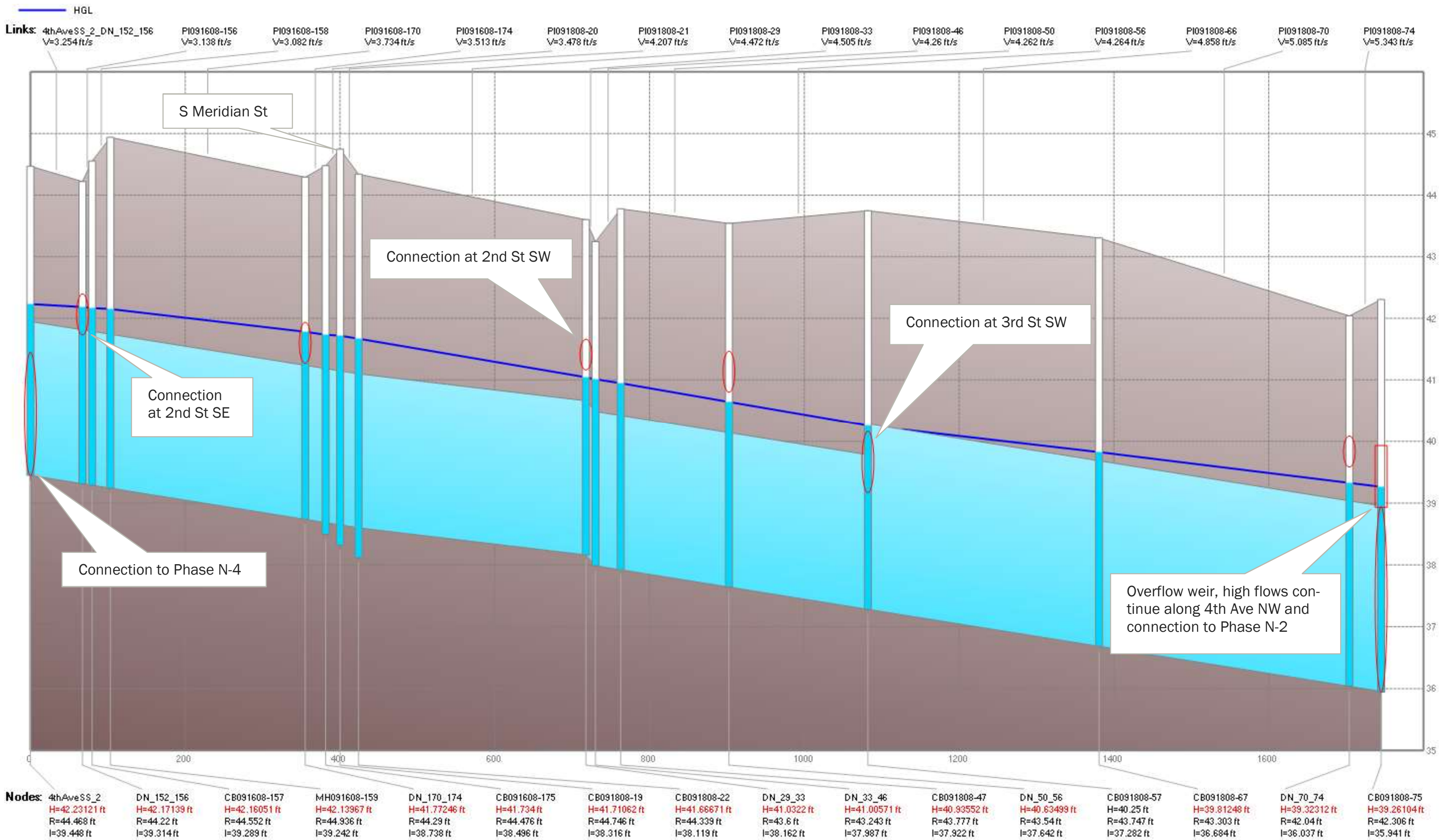


Figure A-3. Phase N-3 Along 4th Ave SE/SW from 2nd St SE to 5th St NW

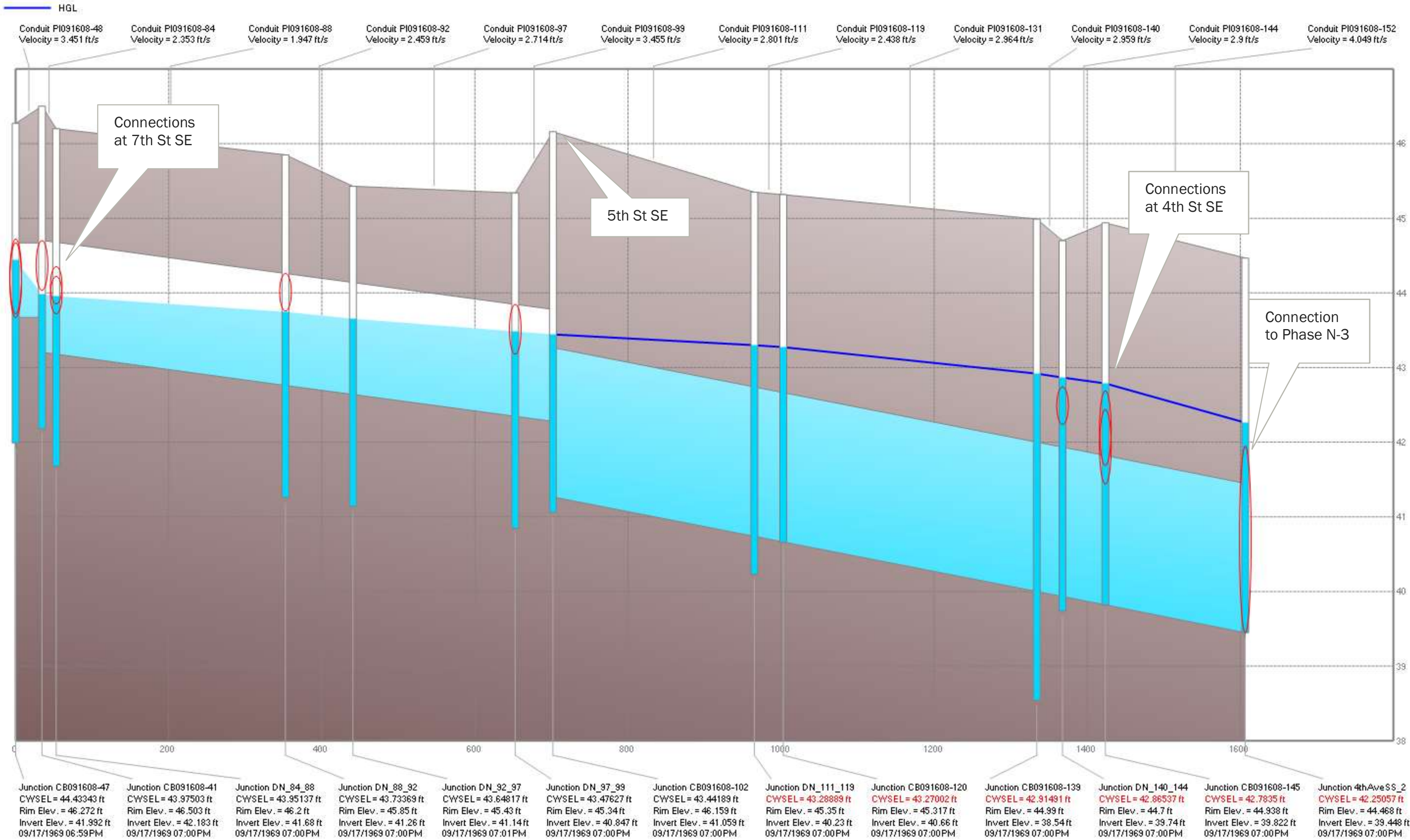


Figure A-4. Phase N-4 Along 4th Ave SE from 7th St SE to 2nd St SE

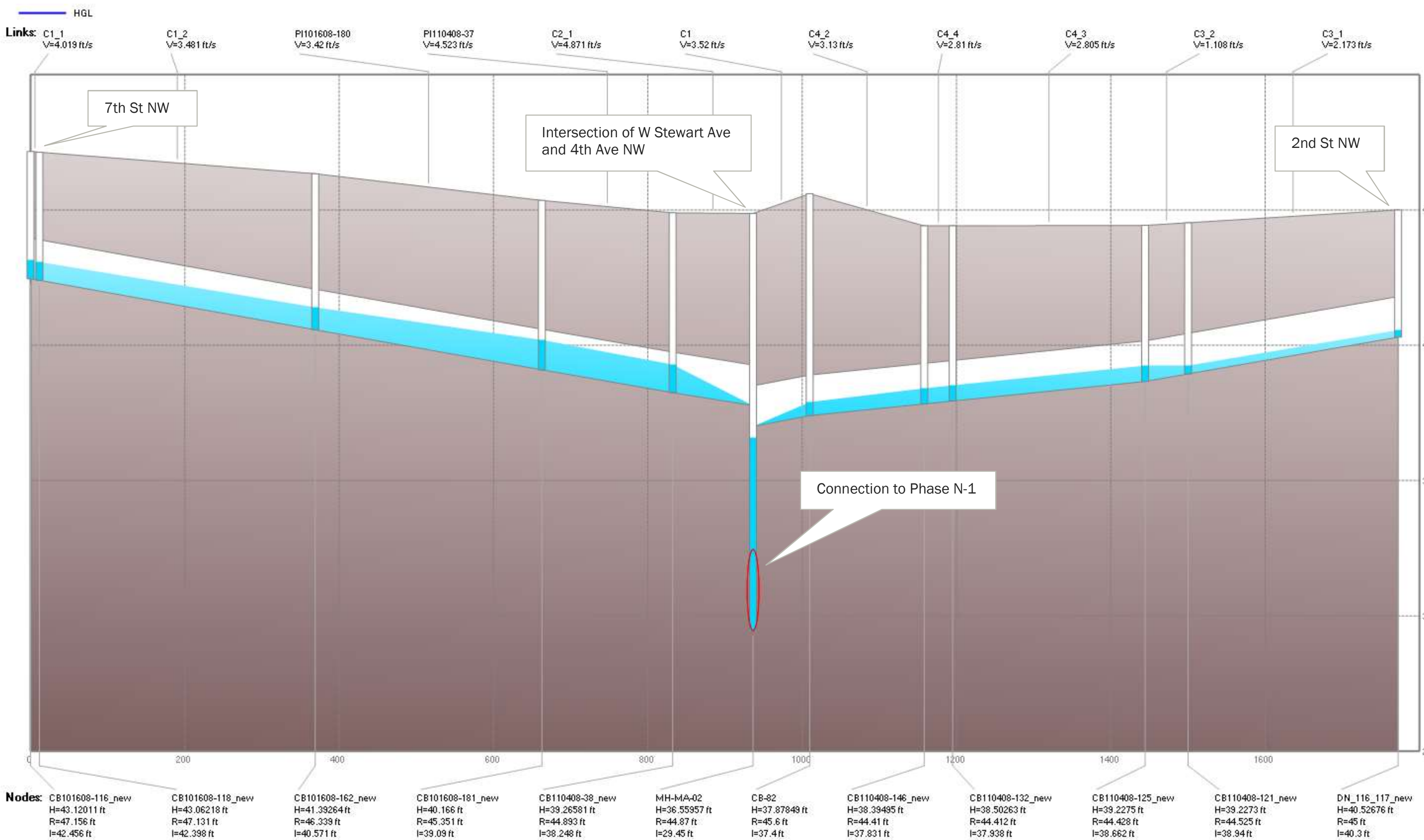


Figure A-5. Phase N-5 Along W Stewart Ave from 7th St NW to 2nd St NW

Attachment B: 30 Percent Design Drawings

CITY OF PUYALLUP

PIERCE COUNTY, WASHINGTON

CITY OFFICIALS

Julie Door
Mayor

Ken Davies
Interim Public Works Director

Hans Hunger, P.E.
City Engineer

Paul Marrinan, P.E.
Project Manager

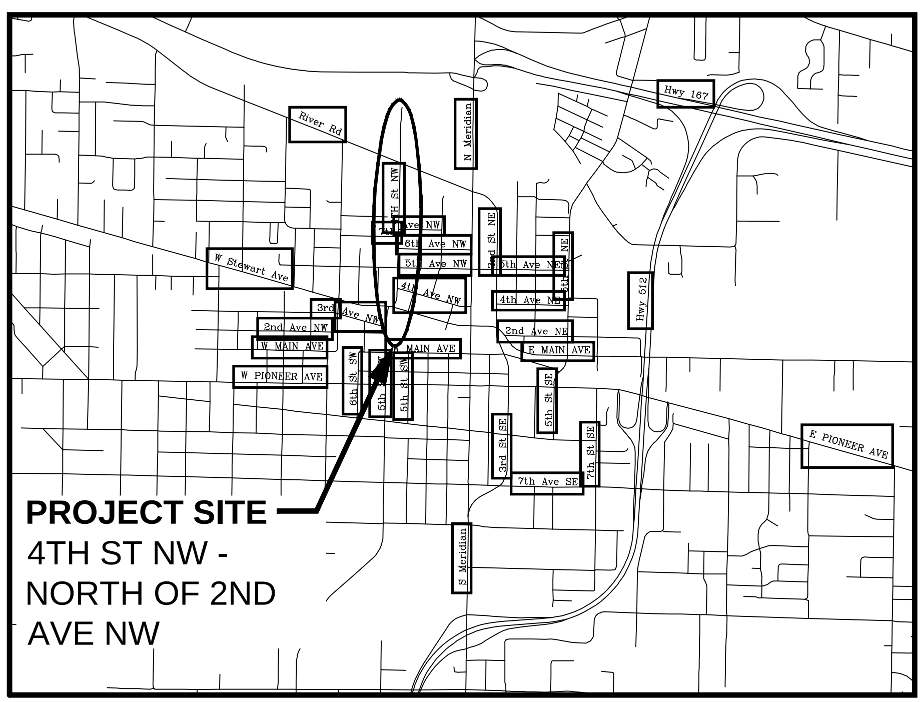
4TH AVENUE NW STORM DRAIN

PROJECT NO. 153448
CONTRACT NO. xxx

DRAWING INDEX

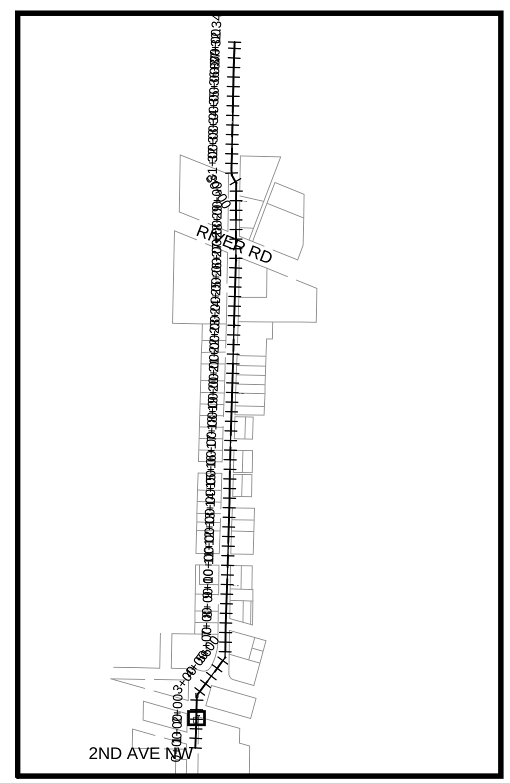
GENERAL

SHEET NO.	DWG. NO.	TITLE
1.	G-01	COVER SHEET, VICINITY MAP AND SHEET INDEX
2.	G-02	ABBREVIATIONS AND LEGEND
3.	G-03	SURVEY CONTROL PLAN
4.	G-04	GENERAL NOTES
CIVIL		
5.	C-01	STORMWATER PIPING PLAN AND PROFILE - 1
6.	C-02	STORMWATER PIPING PLAN AND PROFILE - 2
7.	C-03	STORMWATER PIPING PLAN AND PROFILE - 3
8.	C-04	STORMWATER PIPING PLAN AND PROFILE - 4
9.	C-11	DETAILS -1
10.	C-12	DETAILS -2



VICINITY MAP
SCALE: 1" = 1500'

PLAN
NORTH
N



LOCATION MAP
SCALE: 1" = 500'

30% DESIGN SUBMITTAL FOR REVIEW ONLY

Project No. 153448

Brown AND Caldwell
SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME
153448-G-01.DWG
BC PROJECT NUMBER
153448
CLIENT PROJECT NUMBER

APPROVED

BY ____________
CITY OF PUYALLUP
ENGINEERING SERCICES

DATE ____________

NOTE: THIS APPROVAL IS VOID AFTER 1 YEAR FROM APPROVAL DATE.
THE CITY WILL NOTE BE RESPONSIBLE FOR ERRORS AND/OR OMISSIONS ON THESE PLANS.
FIELD CONDITIOND MAY DICTATE CHANGES TO THESE PLANS AS DETERMINED BY THE ENGINEERING SERVICES MANAGER.

GENERAL

COVER SHEET,
VICINITY MAP AND
SHEET INDEX

DRAWING NUMBER
G-01

SHEET NUMBER
OF

LEGEND

EXISTING		PROPOSED	
P	PAINTED POWER		WATER
T	PAINTED TELEPHONE		SEWER
FO	PAINTED FIBER OPTIC		STORM DRAIN
W	PAINTED WATER		EDGE OF PAVEMENT
G G	PAINTED GAS		EDGE OF GRAVEL
SD	STORM		CONTOUR
S	SEWER		CONCRETE
	BUILDING		ASPHALT
	PAINTED STRIPE		GRAVEL
	EDGE OF PAVEMENT		STORM DRAIN TO BE DECOMMISSIONED
	FLOWLINE		
	CONTOUR		
	CONCRETE		
	GRAVEL		
	GRASS		
	ROCKERY		
AC	ASPHALT/CONCRETE		
FF	FINISHED FLOOR		

SYMBOLS

EXISTING		PROPOSED	
	GAS VALVE		WATER VALVE
	WATER VALVE		YARD HYDRANT
	WATER METER	CO	SEWER CLEANOUT
W	WATER VAULT LID		GUARD POST
	FIRE HYDRANT		FLOW ARROW
U	UTILITY VAULT LID		
GP	GUARD POST		
	SIGN		
	MAG NAIL/SPIKE		
	CATCH BASIN		
	SEWER MANHOLE		
P	POWER RISER		
	JUNCTION BOX		

ABREVIATIONS

AC	ASPHALT CONCRETE PAVEMENT	MON	MONUMENT
APPROX	APPROXIMATE	NA	NOT APPLICABLE
ASSY	ASSEMBLY	NAD	NORTH AMERICAN DATUM
AVE	AVENUE	NAVD	NORTH AMERICAN VERTICAL DATUM
BLDG	BUILDING	NO.	NUMBER
BM	BENCH MARK	NST	NO STEEPER THAN
BOT	BOTTOM	NTS	NOT TO SCALE
BOW	BACK OF WALK	O.C.	ON CENTER
BTWN	BETWEEN	P	POWER
CB	CATCH BASIN	P.E.	PROFESSIONAL ENGINEER
CDF	CONTROLLED DENSITY FILL	P.I.	POINT OF INTERSECTION
CONC	CEMENT CONCRETE	PL	PROPERTY LINE
CL, C, C/L.	CLASS, CENTERLINE	PNT	POINT
CG	CURB & GUTTER	POC	POINT ON CURB
CO	CLEANOUT	PROP	PROPOSED
CoP	CITY OF PUYALLUP	PSE	PUGET SOUND ENERGY
CONN	CONNECT	PSF	POUNDS PER SQUARE FOOT
CONST	CONSTRUCT, CONSTRUCTION	PVC	POLYVINYL CHLORIDE or POINT OF VERTICAL CURVATURE
CONT	CONTINUED/CONTINUOUS		
COR	CORNER	RD	ROAD
CSBC	CRUSHED SURFACING BASE COURSE	REF	REFERENCE
CSTC	CRUSHED SURFACING TOP COURSE	RPM	RAISED PAVEMENT MARKER
CTL	BASELINE CONTROL POINT, CONTROL	RR	RAILROAD
D	DEPTH	RT	RIGHT
DET	DETAIL, DETECTOR/DETECTION LOOPS	R/W, ROW	RIGHT OF WAY
DI	DUCTILE IRON	S	SEWER
DIA	DIAMETER	SD	STORM DRAIN
DR	DRIVE	SDMH	STORM DRAIN MANHOLE
DWG	DRAWING	SEC	SECTION
EA	EACH	SQ	SQUARE
EC	END OF CURVATURE	SHT	SHEET
EL, ELEV	ELEVATION	SIG	SIGNAL
ENGR.	ENGINEER	SMH	SANITARY SEWER MANHOLE
EOP	END OF PROJECT, EDGE OF PAVEMENT	SMIC	MONUMENT (IN CASE)
EX, EXIST	EXISTING	SMON	MONUMENT (SURFACE)
FCA	FLANGE COUPLING ADAPTOR	SS/#" S	SANITARY SEWER/SIZE IN INCHES
FH	FIRE HYDRANT	SST	STAINLESS STEEL
FL	FLOW LINE/CURB GUTTER PAN, FLANGE	SSW	SINGLE SOLID WHITE
FO	FIBER OPTIC	SSY	SINGLE SOLID YELLOW
FOC	FACE OF CURB	ST	STREET
FT	FEET/FOOT	STA	STATION
G	GAS LINE	STD	STANDARD
GIS	GEOGRAPHICAL INFORMATION SYSTEMS	S/W	SIDEWALK
HGL	HYDRAULIC GRADE LINE	SV	SURVEY
HMA	HOT MIX ASPHALT	SWMM	STORMWATER MANAGEMENT MANUAL
HOR	HORIZONTAL	TMH	TELEPHONE MANHOLE
HP	HIGH POINT	TV	TELEVISION
HT	HEIGHT	TYP.	TYPICAL
HWY.	HIGHWAY	U/G	UNDERGROUND
INV	INVERT	UP	UTILITY POLE
IN	INCH/INCHES	UPA	UTILITY POLE ANCHOR
INT	INTERSECTION	UTIL	UTILITY
INTER	INTERCONNECT CABLES	VERT	VERTICAL
JB, J-BOX	JUNCTION BOX	VEH	VEHICLE
L	LENGTH OF ARC	W	WATER
LB(S)	POUND, POUNDS	WA	WASHINGTON
LED	LIGHT EMITTING DIODE	W/	WITH
LF	LINEAL FOOT/FEET	WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
LOC	LOCATION		
LP	LOW POINT	WV	WATER VALVE
LT	LEFT		
MAX	MAXIMUM		
MH	MANHOLE		
MIN	MINIMUM		

PROJECT BENCHMARKS

SURVEY NOTES:

HORIZONTAL DATUM:
WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/91.

VERTICAL DATUM:
NAVD 88

811 Know what's below. Call before you dig.

Brown AND Caldwell
SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME 153448-G-02.DWG
BC PROJECT NUMBER 153448
CLIENT PROJECT NUMBER

GENERAL

ABBREVIATIONS AND LEGEND

DRAWING NUMBER G-02

SHEET NUMBER
OF

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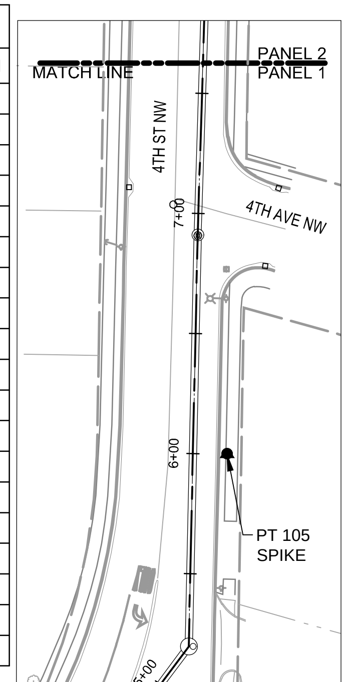
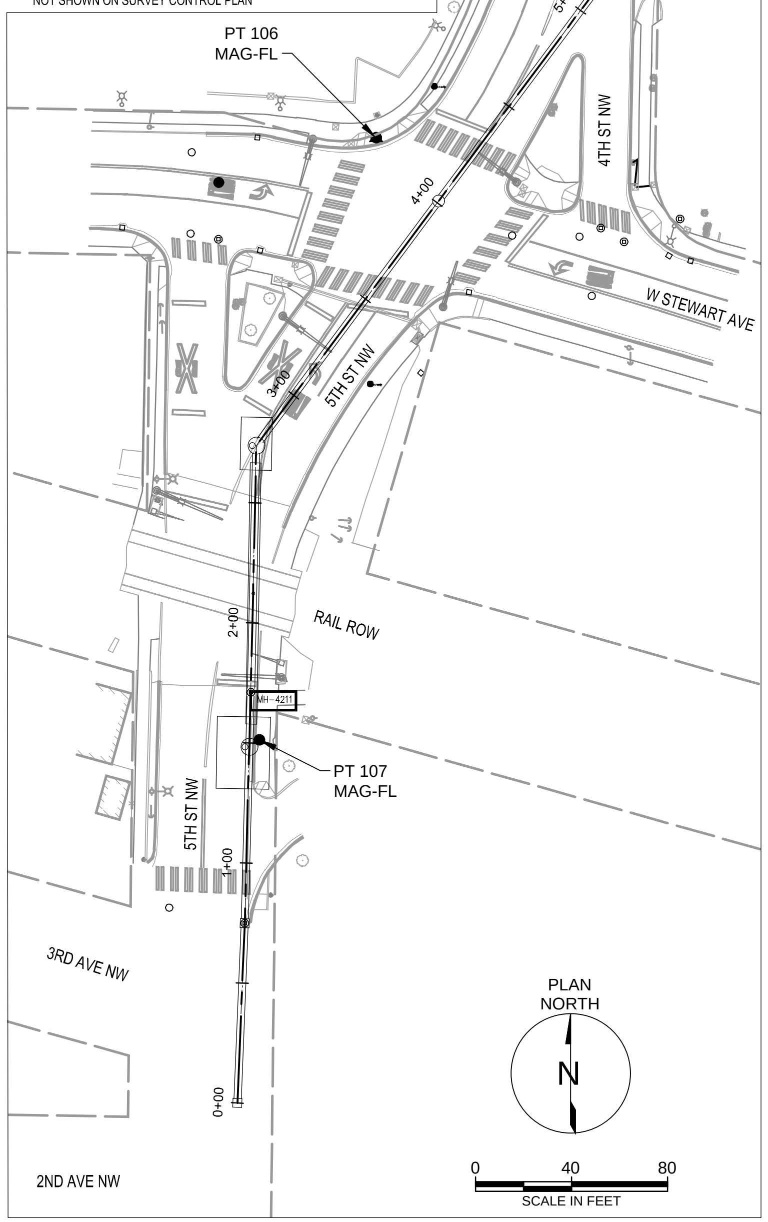
CONTROL POINT LIST				
PT #	DESCRIPTION	NORTHING	EASTING	ELEVATION
100*	SPIKE	686036.74	1192904.71	42.05'
101	SPIKE	685742.77	1193367.69	41.81'
102	SPIKE	685124.69	1193403.01	44.28'
103	SPIKE	684722.59	1193392.19	45.63'
104	SPIKE	684119.50	1193330.31	47.34'
105	SPIKE	683723.09	1193369.07	46.10'
106	MAG-FL	683573.89	1193256.13	45.31'
107	MAG-FL	683323.20	1193207.51	48.49'
111*	SPIKE	682369.38	1193189.42	43.00'
112*	PK	681464.32	1193129.81	41.39'
114*	PK	682864.09	1193150.88	43.61'
200	SPIKE	685868.37	1193374.05	40.07'
201	MAG-FL	686118.71	1193425.79	34.25'
202*	SPIKE	684183.31	1193058.70	45.91'
204*	MAG-FL	684145.69	1193712.74	47.71'
210	MAG-FL	686767.61	1193405.12	42.69'
250*	MAG-FL	686208.89	1192440.74	42.37'
251*	MAG-FL	686322.96	1192152.32	42.62'
300	SPIKE	686436.12	1193387.91	34.09'

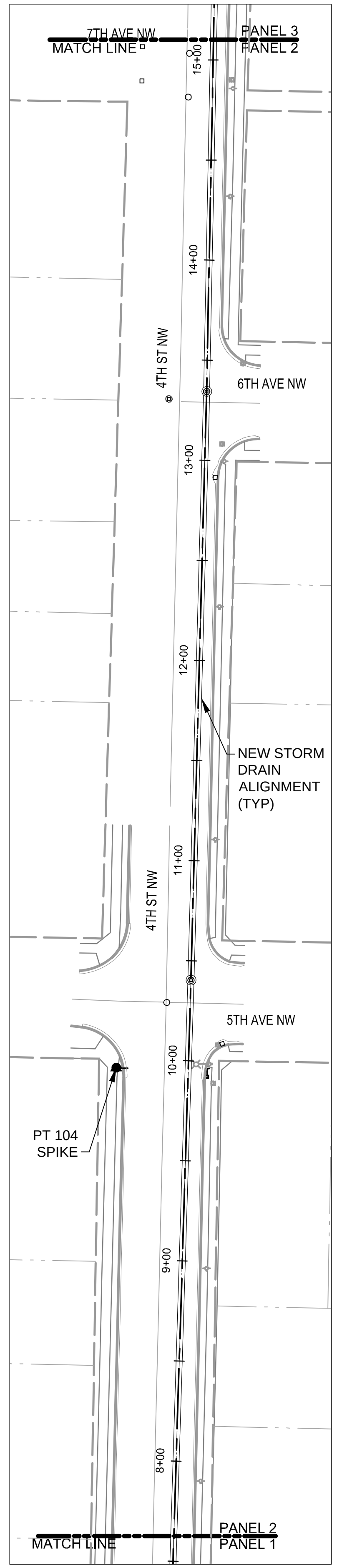
* NOT SHOWN ON SURVEY CONTROL PLAN





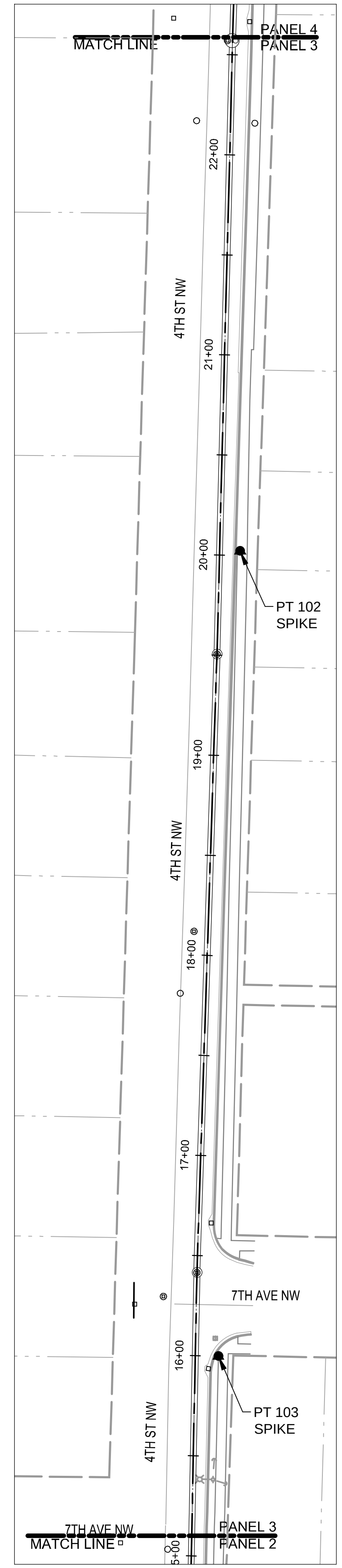
PANEL 1 PLAN

SCALE: 1" = 40'



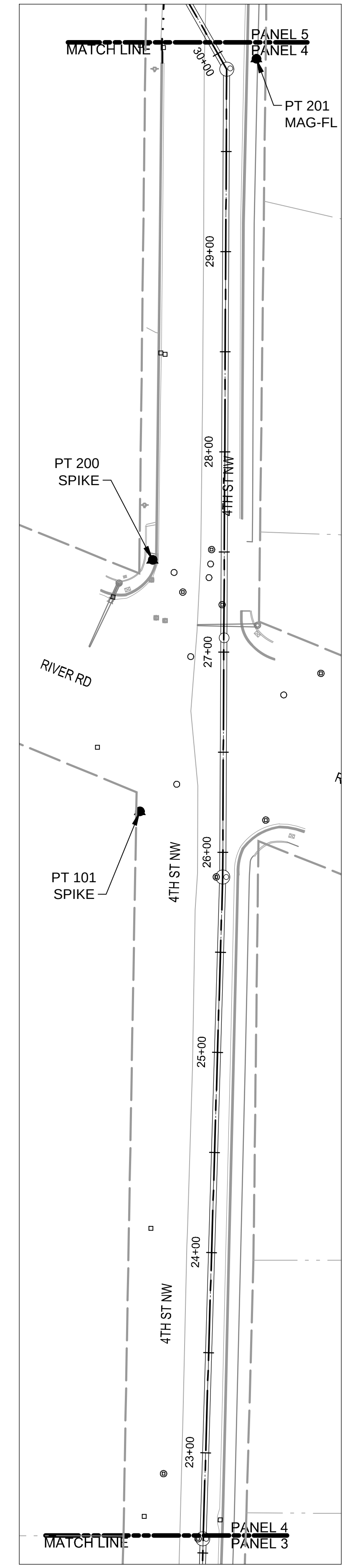
PANEL 2 PLAN

SCALE: 1" = 40'



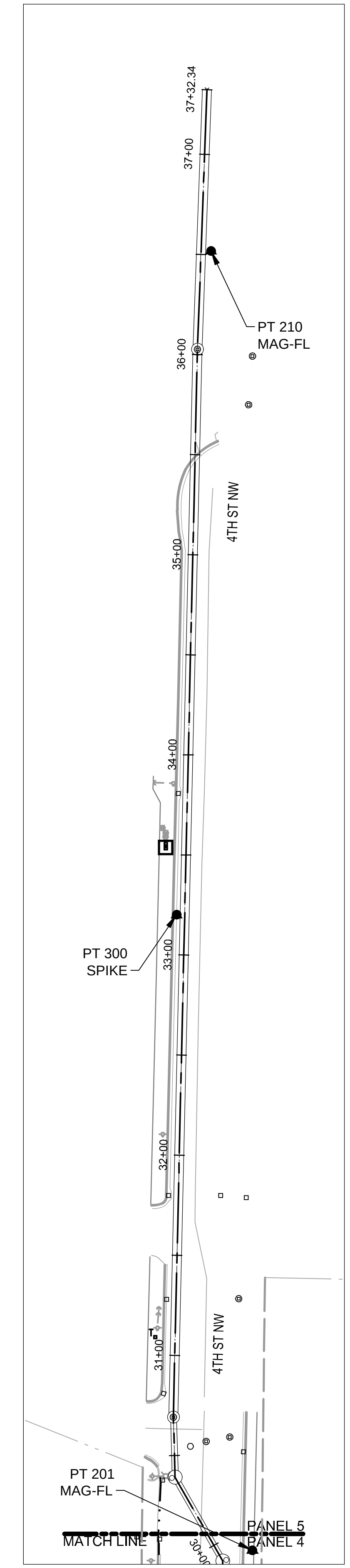
PANEL 2 PLAN

SCALE: 1" = 40'



PANEL 4 PLAN

SCALE: 1" = 40'



PANEL 5 PLAN

SCALE: 1" = 40'

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SEATTLE, WASHINGTON

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CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME
153448-G-03.DWG
BC PROJECT NUMBER
153448
CLIENT PROJECT NUMBER

GENERAL

SURVEY CONTROL PLAN

DRAWING NUMBER
G-03
SHEET NUMBER
OF

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GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL LAWS.

2. CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UTILITIES IN THE VICINITY OF WORK.

3. SITE SHALL REMAIN SECURE DURING CONSTRUCTION. WORK SHALL BE COORDINATED WITH FACILITY.

4. PROTECTION OF THE ENVIRONMENT: NO CONSTRUCTION RELATED ACTIVITY SHALL CONTRIBUTE TO THE DEGRADATION OF THE ENVIRONMENT, ALLOW MATERIAL TO ENTER SURFACE OF GROUND WATERS, OR ALLOW PARTICULATE EMISSIONS TO THE ATMOSPHERE, WHICH EXCEED STATE OF FEDERAL STANDARDS. ANY ACTIONS THAT POTENTIALLY ALLOW A DISCHARGE TO STATE WATERS MUST HAVE PRIOR APPROVAL OF THE WASHINGTON STATE DEPORTMENT OF ECOLOGY.

5. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE CITY OF PUYALLUP'S REQUIREMENTS AND SPECIFICATIONS.

6. STANDARD PLANS SHALL BE THE LATEST EDITION AND SPECIFICATIONS SHALL BE 2018 WSDOT/APWA AS MODIFIED BY THE CITY OF PUYALLUP, INCLUDING PUYALLUP STANDARD DETAILS. A COPY OF THESE APPROVED PLANS AND APPLICABLE DETAILS SHALL BE ON SITE DURING CONSTRUCTION.

7. PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR SHALL CALL ONE-CALL (811) FOR UTILITY LOCATIONS.

8. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE REQUIRED TO CONTROL ON-SITE STORM WATER RUNOFF BY USING TEMPORARY OR PERMANENT DRAINAGE EROSION/SILTATION CONTROL PROCEDURES.

9. LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE TRUE DEPTHS AND LOCATIONS OF ALL UNDERGROUND UTILITIES.

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SEATTLE, WASHINGTON

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CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

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DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME
153448-G-04.DWG

BC PROJECT NUMBER
153448

CLIENT PROJECT NUMBER

GENERAL

GENERAL NOTES

DRAWING NUMBER
G-04

SHEET NUMBER
OF

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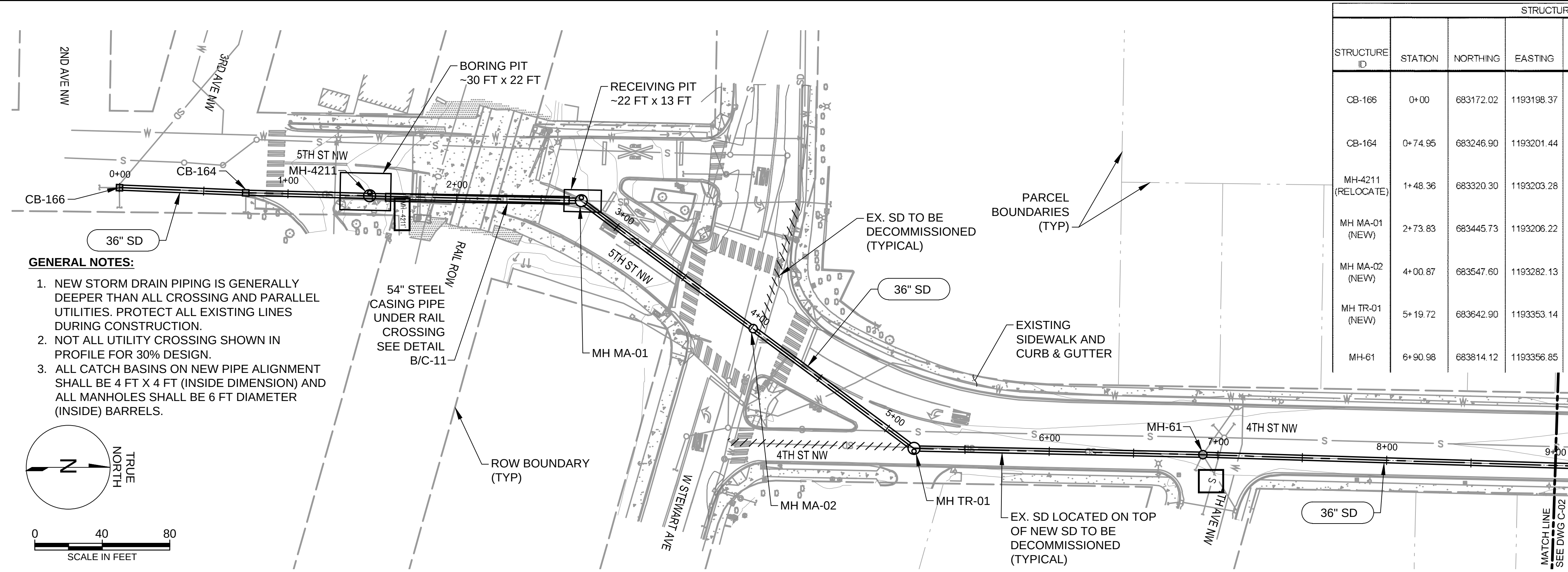


PLAN

SCALE: 1" = 40'

GENERAL NOTES:

1. NEW STORM DRAIN PIPING IS GENERALLY DEEPER THAN ALL CROSSING AND PARALLEL UTILITIES. PROTECT ALL EXISTING LINES DURING CONSTRUCTION.
2. NOT ALL UTILITY CROSSING SHOWN IN PROFILE FOR 30% DESIGN.
3. ALL CATCH BASINS ON NEW PIPE ALIGNMENT SHALL BE 4 FT X 4 FT (INSIDE DIMENSION) AND ALL MANHOLES SHALL BE 6 FT DIAMETER (INSIDE) BARRELS.

STRUCTURE DESIGN DATA TABLE

STRUCTURE ID	STATION	NORTHING	EASTING	FINISHED GRADE	PIPE INVERT PIPE DIAMETER (DIRECTION)				
					SOUTH	NORTH	OTHER	OTHER	OTHER
CB-166	0+00	683172.02	1193198.37	44.5	38.60 15"	**32.06 36"**	39.95 15" (E)	39.95 15" (W)	--
CB-164	0+74.95	683246.90	1193201.44	45.6	**31.82 36"**	**31.82 36"**	40.16 12" (E)	--	--
MH-4211 (RELOCATE)	1+48.36	683320.30	1193203.28	47.9	**31.14 36"**	**31.14 36"**	--	--	--
MH MA-01 (NEW)	2+73.83	683445.73	1193206.22	48.4	**29.98 36"**	41.35 15"	**29.98 36" (NE)**	--	--
MH MA-02 (NEW)	4+00.87	683547.60	1193282.13	44.8	--	--	**29.45 36" (SW)**	**29.45 36" (NE)**	41.10 12" (E) *
MH TR-01 (NEW)	5+19.72	683642.90	1193353.14	45.6	--	**29.00 36"**	**29.00 36" (SW)**	**39.50 18" (W)**	**39.75 18" (E)**
MH-61	6+90.98	683814.12	1193356.85	46.2	**28.49 36"**	**28.49 36"**	42.30 8" (E) *	42.20 8" (NW) *	42.40 8" (NE) *

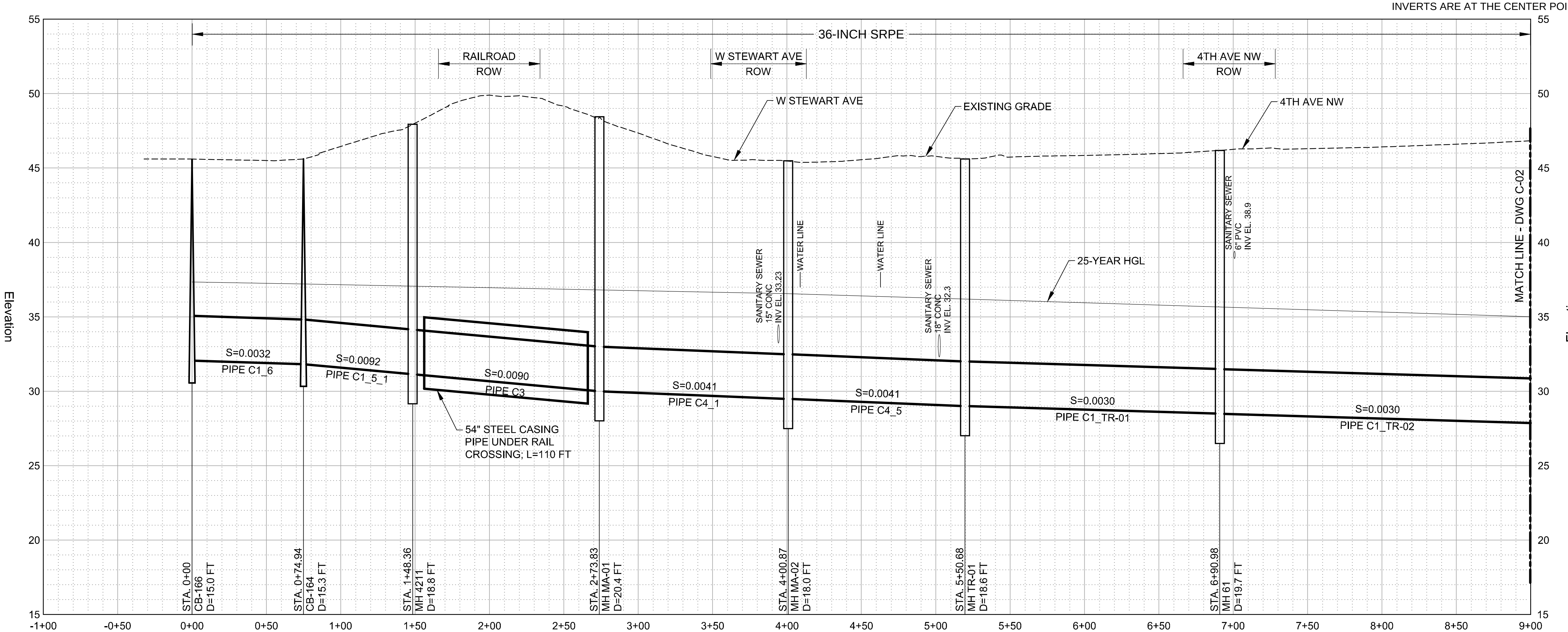
TABLE NOTES

* - DUE TO THE DEPTH OF THE NEW STRUCTURE RELATIVE TO EXISTING PIPING AT STRUCTURE, A DROP PIPE MAY BE REQUIRED FOR THESE PIPES AT CONNECTION TO STRUCTURE..

1) MANHOLES WITH THE (NEW) DESIGNATION INDICATE MANHOLES THAT DO NOT CORRESPOND WITH EXISTING STRUCTURE LOCATIONS.

2) BOLD TEXT FOR PIPE ENTRIES IN THE TABLE INDICATE A NEW PIPE AT THE STRUCTURE. SCREENED TEXT ENTRIES ARE FOR THE EXISTING STORM PIPE CONNECTIONS.

3) COORDINATE POINTS, STATIONING AND PIPE INVERTS ARE AT THE CENTER POINT OF STRUCTURES.



PROFILE

SCALE: H:1" = 40', V:1" = 4'

30% REVIEW

CITY OF PUYALLUP · STATE OF WASHINGTON

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME
153448-C-01.DWG
BC PROJECT NUMBER
153448
CLIENT PROJECT NUMBER

CIVIL

STORMWATER PIPING PLAN AND PROFILE - 1

DRAWING NUMBER
C-01

SHEET NUMBER
OF

Path: P:\PUYALLUP, CITY OF\153448 4TH AVE STORM DRAIN\CAD\30% DESIGN\02-SHEETS FILENAME: 153448-C-01.DWG PLOT DATE: 2/3/2020 4:30 PM CAD USER: BOB JACOBSEN

Puyallup_City-Seal_color_white_cr.gif

GENERAL NOTES:

1. NEW STORM DRAIN PIPING IS GENERALLY DEEPER THAN ALL CROSSING AND PARALLEL UTILITIES. PROTECT ALL EXISTING LINES DURING CONSTRUCTION.
2. NOT ALL UTILITY CROSSING SHOWN IN PROFILE FOR 30% DESIGN.
3. ALL MANHOLES ON NEW PIPE ALIGNMENT SHALL BE 6 FT DIAMETER (INSIDE) BARRELS.

STRUCTURE DESIGN DATA TABLE

STRUCTURE ID	STATION	NORTHING	EASTING	FINISHED GRADE	PIPE INVERT / PIPE DIAMETER (DIRECTION) SOUTH	NORTH	OTHER	OTHER	OTHER
MH-103	10+40.30	684163.28	1193367.62	47.3	**27.45** **36"**	**27.45** **36"**	34.56 30" (E)	43.41 8" (SE) *	--
MH-107	13+34.35	684457.22	1193375.43	46.2	**26.57** **36"**	**26.57** 36"	--	--	--
MH-64	16+41.48	684764.30	1193381.48	45.5	**25.65** **36"**	**25.65** 36"	41.69 8" (NE) *	--	--

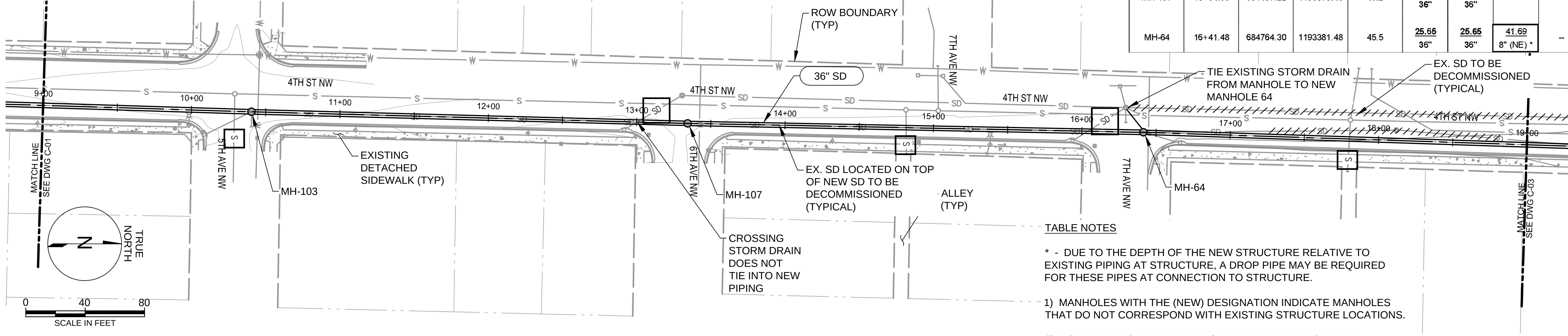


TABLE NOTES

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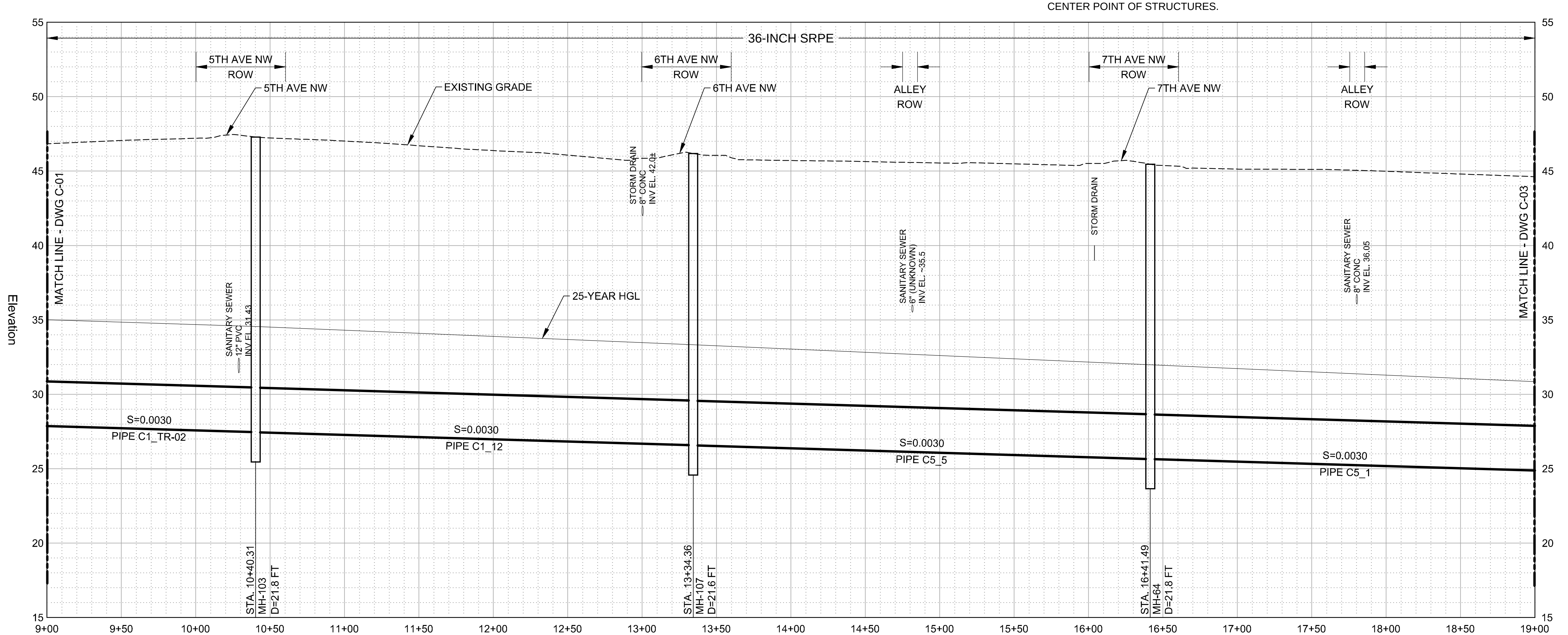
3) COORDINATE POINTS, STATIONING AND PIPE INVERTS ARE AT THE CENTER POINT OF STRUCTURES.

PLAN

SCALE: 1" = 40'



PROFILE

SCALE: H:1" = 40', V:1" = 4'

Brown AND Caldwell

SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP STATE OF WASHINGTON

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME 153448-C-02.DWG
BC PROJECT NUMBER 153448
CLIENT PROJECT NUMBER

CIVIL

STORMWATER PIPING PLAN AND PROFILE - 2

DRAWING NUMBER C-02

SHEET NUMBER OF

Path: P:\PUYALLUP, CITY OF\153448 4TH AVE STORM DRAIN\CAD\30% DESIGN\02-SHEETS FILENAME: 153448-C-02.DWG PLOT DATE: 2/3/2020 5:02 PM CAD USER: BOB JACOBSEN

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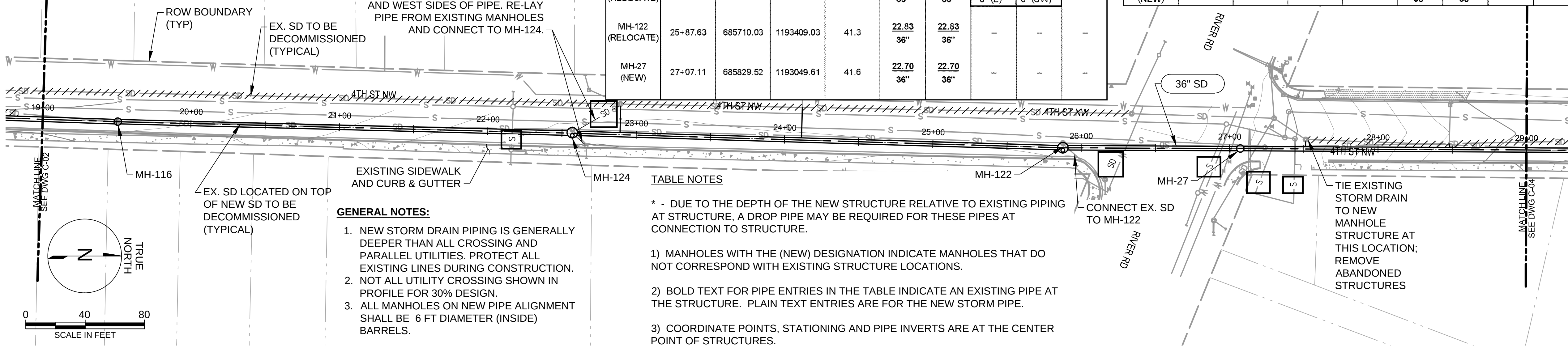
STRUCTURE DESIGN DATA TABLE									
					PIPE INVERT PIPE DIAMETER (DIRECTION)				
STRUCTURE ID	STATION	NORTHING	EASTING	FINISHED GRADE	SOUTH	NORTH	OTHER		OTHER
MH-116	19+50.51	685073.16	1193391.48	44.3	**24.73** **36"**	**24.73** **36"**	--	--	--
MH-124 (RELOCATE)	22+56.96	685379.51	1193399.27	40.6	**23.82** **36"**	**23.82** **36"**	34.50 8" (E) *	37.00 8" (SW) *	--
MH-122 (RELOCATE)	25+87.63	685710.03	1193409.03	41.3	**22.83** **36"**	**22.83** **36"**	--	--	--
MH-27 (NEW)	27+07.11	685829.52	1193049.61	41.6	**22.70** **36"**	**22.70** **36"**	--	--	--

STRUCTURE DESIGN DATA TABLE (MHs SHOWN ON SHEET C-04)									
					PIPE INVERT PIPE DIAMETER (DIRECTION)				
STRUCTURE ID	STATION	NORTHING	EASTING	FINISHED GRADE	SOUTH	NORTH	OTHER		OTHER
MH-RJ01 (RELOCATE)	29+91.10	686113.50	1193410.99	33.9	**22.39** **36"**	**22.39** **36"**	--	--	--
MH-RJ02 (NEW)	30+39.15	686155.23	1193387.17	33.4	**22.34** **36"**	**22.34** **36"**	--	--	--



GENERAL NOTES:

1. NEW STORM DRAIN PIPING IS GENERALLY DEEPER THAN ALL CROSSING AND PARALLEL UTILITIES. PROTECT ALL EXISTING LINES DURING CONSTRUCTION.
2. NOT ALL UTILITY CROSSING SHOWN IN PROFILE FOR 30% DESIGN.
3. ALL MANHOLES ON NEW PIPE ALIGNMENT SHALL BE 6 FT DIAMETER (INSIDE) BARRELS.

TABLE NOTES

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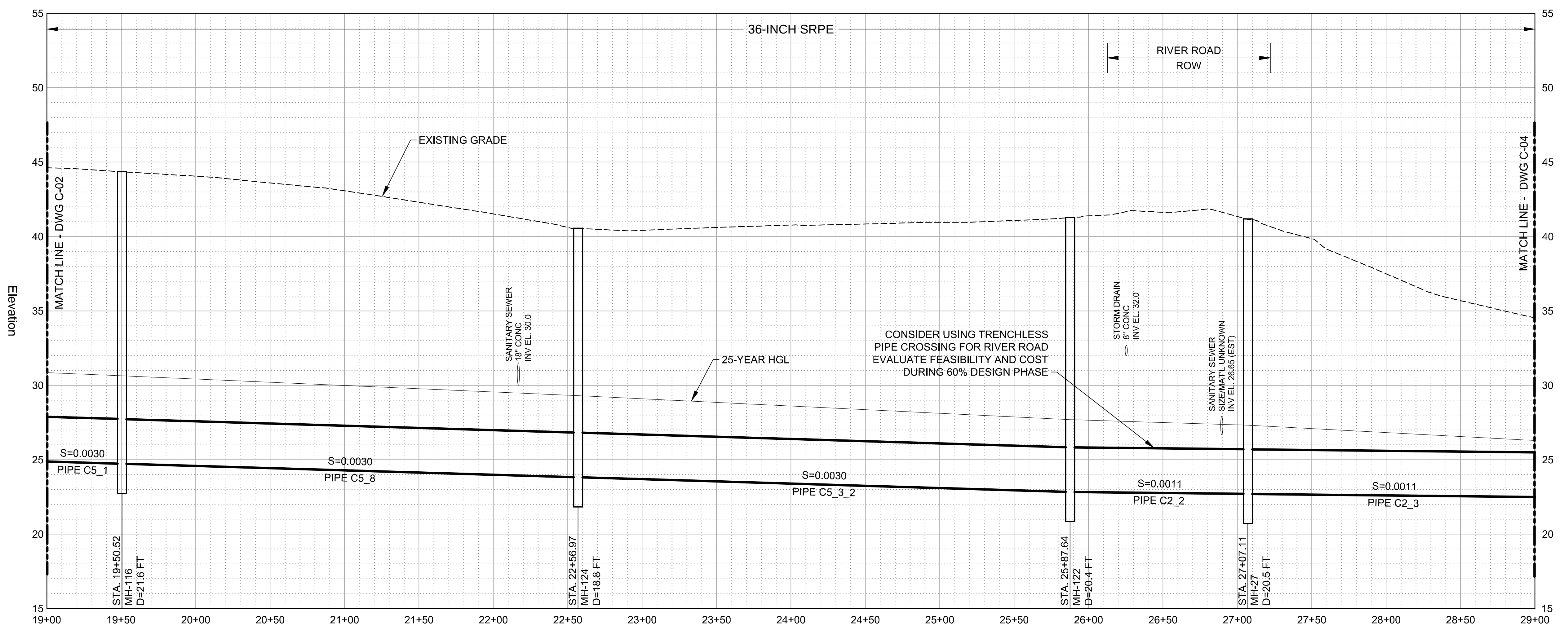
PLAN

SCALE: 1" = 40'



PROFILE

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Brown AND Caldwell

SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP STATE OF WASHINGTON

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME
153448-C-03.DWG
BC PROJECT NUMBER
153448
CLIENT PROJECT NUMBER

CIVIL

STORMWATER PIPING PLAN AND PROFILE - 3

DRAWING NUMBER
C-03

SHEET NUMBER
OF

Path: P:\PUYALLUP, CITY OF\153448 4TH AVE STORM DRAIN\CAD\30% DESIGN\02-SHEETS FILENAME: 153448-C-03.DWG PLOT DATE: 2/3/2020 4:58 PM CAD USER: BOB JACOBSEN

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GENERAL NOTES:

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2. NOT ALL UTILITY CROSSING SHOWN IN PROFILE FOR 30% DESIGN.
3. ALL MANHOLES ON NEW PIPE ALIGNMENT SHALL BE 6 FT DIAMETER (INSIDE) BARRELS.

STRUCTURE DESIGN DATA TABLE									
					PIPE INVERT PIPE DIAMETER (DIRECTION)				
STRUCTURE ID	STATION	NORTHING	EASTING	FINISHED GRADE	SOUTH	NORTH	OTHER	OTHER	OTHER
MH-37 (EXIST)	30+69.15	686185.22	1193386.28	33.7	**22.31 36"**	22.31 54"	22.31 36" (E)	22.41 36" (W)	28.11 6" (SW)
MH-42 (EXIST)	36+02.61	686718.54	1193398.35	38.4	21.83 54"	21.83 54"	26.80 12" (W)	--	--
OUT_14 (EXIST)	37+32.52	686848.16	1193403.09	25.8	21.31 54"	–	–	–	--

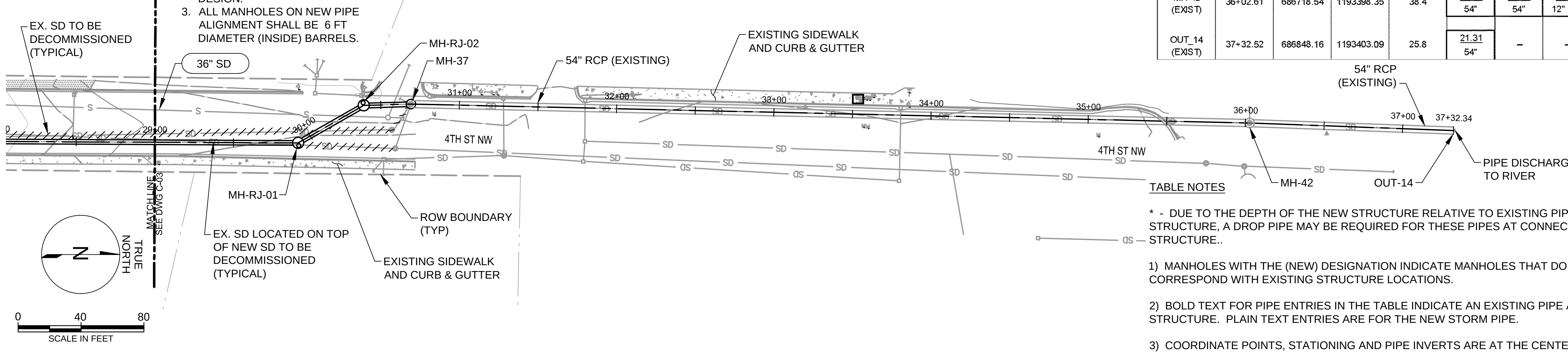

TABLE NOTES

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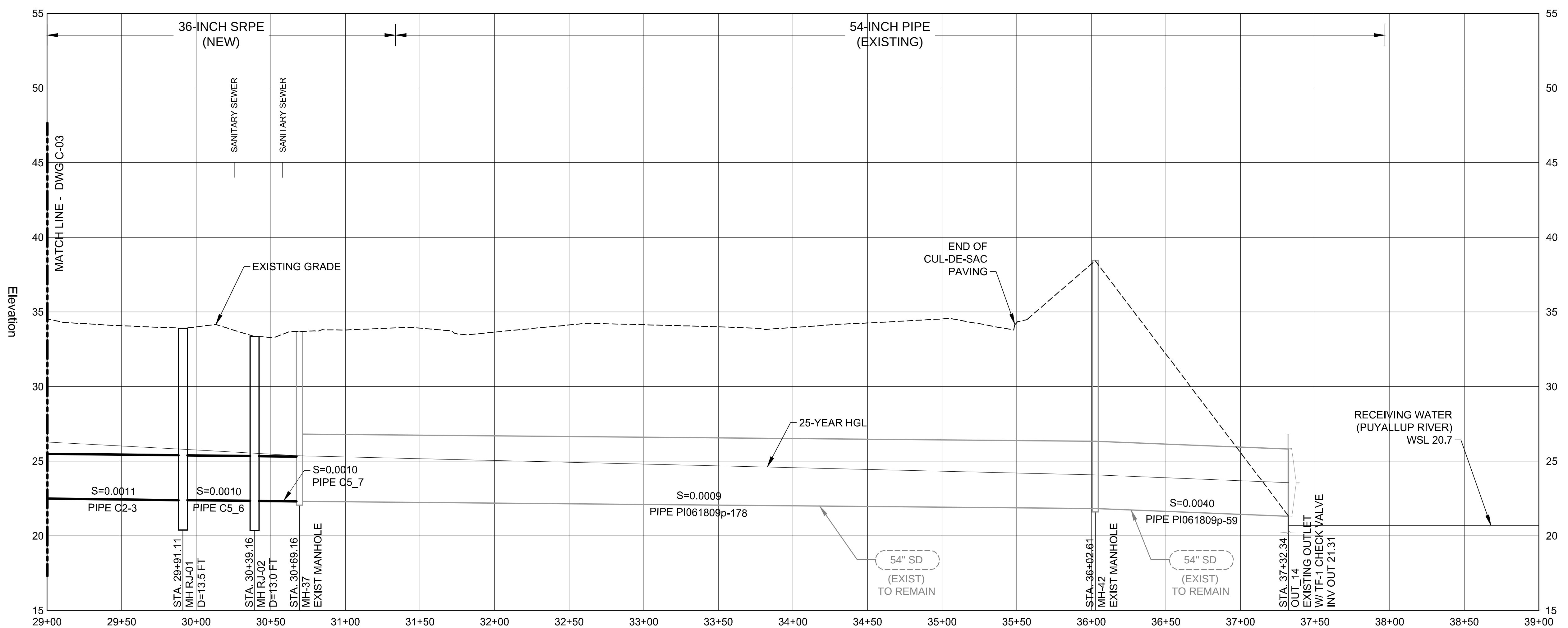
3) COORDINATE POINTS, STATIONING AND PIPE INVERTS ARE AT THE CENTER POINT OF STRUCTURES.

4) ALL STRUCTURES INCLUDED IN THE TABLE ON THIS SHEET ARE EXISTING AND WILL REMAIN IN PLACE. MH-37 WILL BE MODIFIED TO ACCOMMODATE A NEW PIPE PENETRATION FROM THE SOUTH. STRUCTURES MH-RJ-01 AND MH-RJ-02 SHOWN ON C-03.

PLAN

SCALE: 1" = 40'



PROFILE

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Brown AND Caldwell

SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP STATE OF WASHINGTON

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS		
REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME
153448-C-04.DWG

BC PROJECT NUMBER
153448

CLIENT PROJECT NUMBER

CIVIL

STORMWATER PIPING PLAN AND PROFILE - 4

DRAWING NUMBER
C-04

SHEET NUMBER
OF

Path: P:\PUYALLUP, CITY OF\153448 4TH AVE STORM DRAIN\CAD\30% DESIGN\02-SHEETS FILENAME: 153448-C-04.DWG PLOT DATE: 2/3/2020 5:00 PM CAD USER: BOB JACOBSEN

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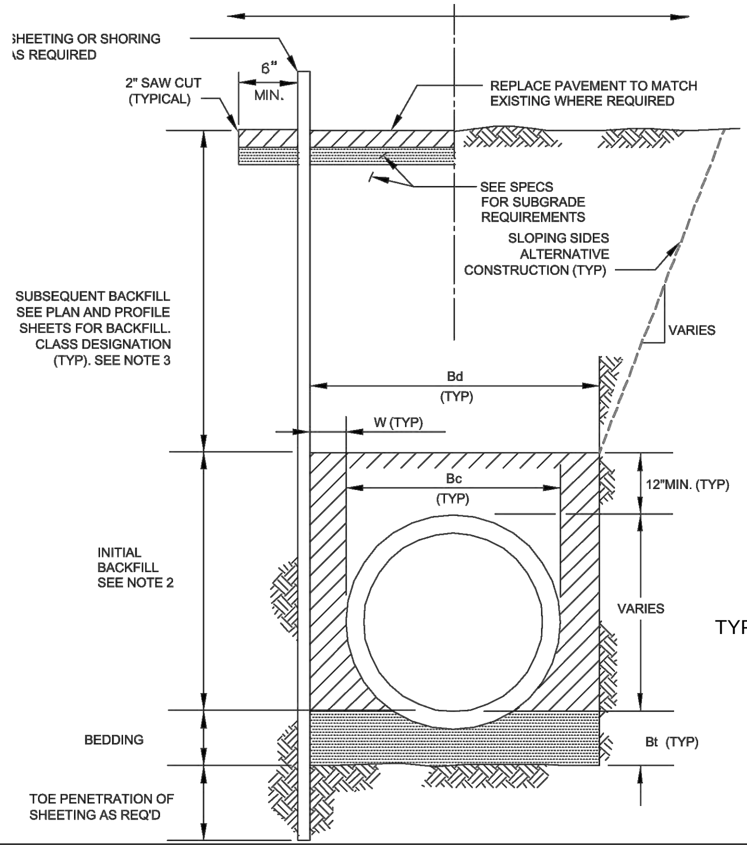
1 2 3 4 5 6



NOTES:

1. FOR BEDDING TYPES SEE DETAIL ____.
2. INITIAL BACKFILL: SEE TABLE A, SECTION 02200.
3. SUBSEQUENT BACKFILL: SEE TABLE A, SECTION 02200.

TYPICAL TRENCH LIMITATIONS:

Bd =WIDTH FROM BOTTOM TO 12" ABOVE PIPE
W =CLEARANCE TO WALL, EXCLUDING SHEETING, I.E. TO EARTH
D =PIPE INSIDE DIAMETER, I.E. NOMINAL PIPE SIZE
Bc =PIPE OUTSIDE DIAMETER
Bt =DEPTH OF BEDDING FROM INVERT OF PIPE TO BOTTOM OF TRENCH

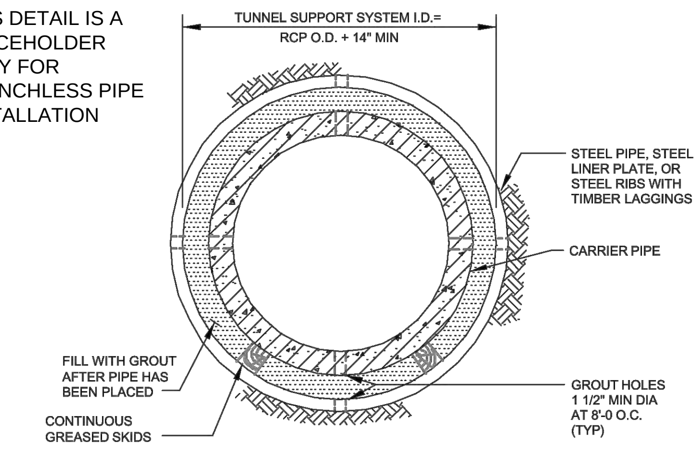
D, IN.	W MIN, IN.	Bd MAX, IN.	Bt MIN, IN.
0-6	6	Bc +24	3
8-24	8	Bc +24	6
27-60	12	Bc +36	12
OVER 60	18	Bc +42	12

TYPICAL TRENCH SECTION

DETAIL A / VAR

NO SCALE

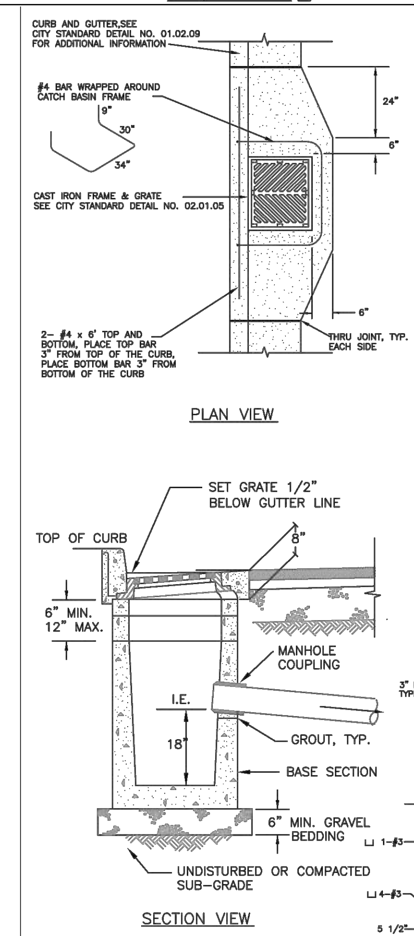
THIS DETAIL IS A PLACEHOLDER ONLY FOR TRENCHLESS PIPE INSTALLATION



TUNNELED PIPE SECTION

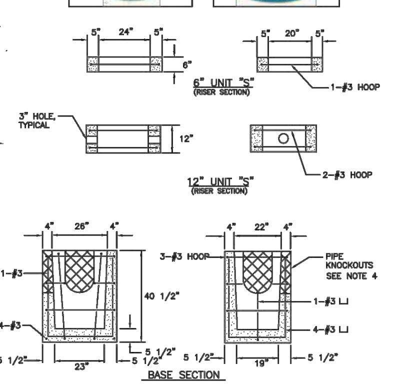
DETAIL B / C-01

NO SCALE



NOTES:

1. MAXIMUM LENGTH OF PIPE BETWEEN CATCH BASINS SHALL BE 400'.
2. MAXIMUM GUTTER LINE FLOW LENGTH SHALL BE 300'.
3. TYPE I CATCH BASIN IS USED FOR DEPTHS LESS THAN 5'-0" FROM TOP OF GRATE TO I.E.(PIPE INVERT). *
4. PRECAST BASE SECTION SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. KNOCKOUTS SHALL BE ON 4 SIDES WITH A MAXIMUM DIAMETER OF 20" TO PROVIDE FOR A MINIMUM SUMP DEPTH OF 18".
5. REINFORCING BARS SHALL BE CUT OR BENT AS REQUIRED TO CLEAR CUTOUTS.
6. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION SHALL NOT EXCEEED 1/2" PER FOOT.
7. CATCH BASIN SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C 478 (AASHTO M 199) AND ASTM C 890 UNLESS OTHERWISE NOTED.
8. THE APRON SHALL BE 8" IN DEPTH.
9. CATCH BASIN MARKER WILL BE AFFIXED WITH MANUFACTURER'S EPOXY IN DRY WEATHER, 40 DEGREES OR WARMER. IF CURB EXISTS MARKER IS PLACED ON TOP OF CURB, IF A RAISED EDGE PLACE MARKER ON THE WEDGE, IF NO CURB PLACE ON PAVEMENT ON SIDE LEAST EXPOSED TO TRAFFIC

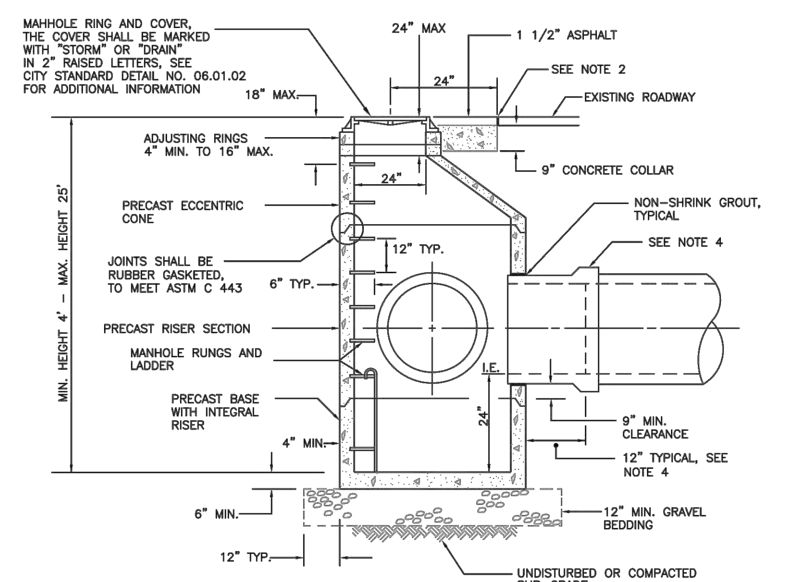


CITY OF PUYALLUP CATCH BASIN TYPE 1 (GUTTER DRAIN)

DETAIL C / VAR

NO SCALE

* NEW CATCH BASIN ARE DEEP. DETAIL WILL BE MODIFIED



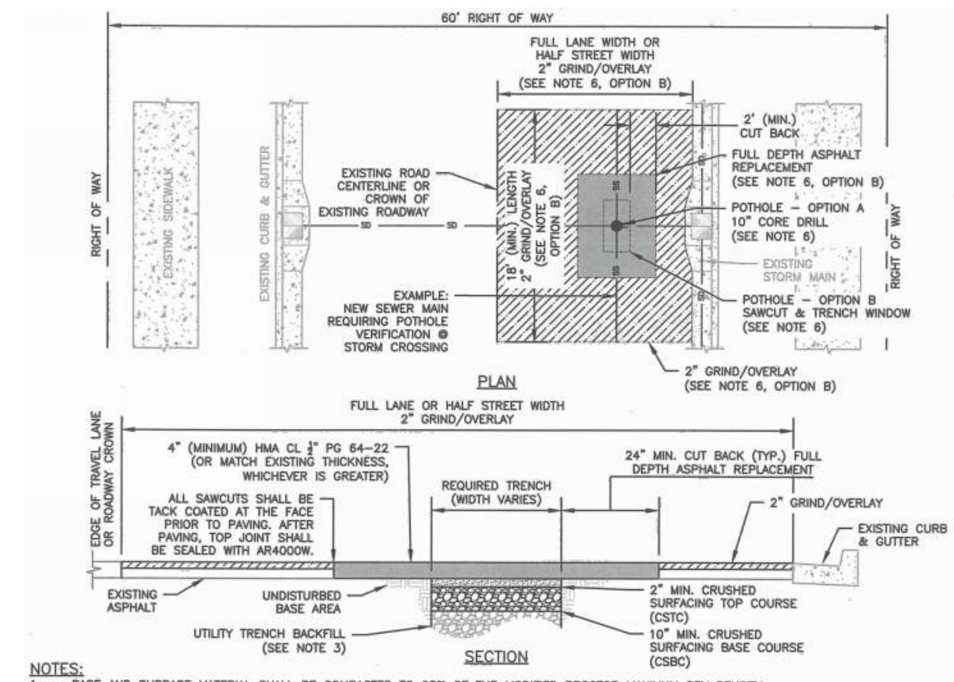
NOTES:

1. THE CONSTRUCTION AND INSTALLATION OF STORM SEWER MANHOLES SHALL CONFORM TO THE REQUIREMENTS OF WSDOT SPEC. SECTION 7-05 AND ASTM C 478.
2. THE FACE OF NEAT LINE CUTS IN EXISTING ASPHALT PAVEMENT SHALL BE TACK COATED AND THE TOP OF THE JOINT SHALL BE SEALED WITH A HOT PAVING GRADE ASPHALT.
3. PRECAST RISER SECTION OR PRECAST BASE WITH INTEGRAL RISER SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS WITH A MINIMUM WALL THICKNESS OF 2". THE SIZE OF THE KNOCKOUT SHALL BE EQUAL TO THE PIPE OUTER DIAMETER PLUS THE MANHOLE WALL THICKNESS. THE MAXIMUM HOLE SIZE IS 36" FOR A 48" MANHOLE, 42" FOR A 54" MANHOLE, 60" FOR A 72" MANHOLE, AND 84" FOR A 96" MANHOLE.
4. A FLEXIBLE GASKETED JOINT SHALL BE INSTALLED WITHIN 12" OF EACH CONNECTION TO A MANHOLE. THE CONNECTION OF CONCRETE OR DUCTILE IRON PIPE TO A MANHOLE SHALL BE CEMENT MORTARED. DUCTILE IRON PIPE SHALL BE SEALED WITH MASTIC AT THE CONNECTION POINT PRIOR TO BEING MORTARED. THE CONNECTION OF PVC PIPE TO A MANHOLE SHALL UTILIZE A MANHOLE COUPLING (SAND COLLAR) WITH A RUBBER GASKET.
5. THE MANHOLE COVER SHALL BE MARKED WITH "STORM" OR "DRAIN" IN 2 INCH RAISED LETTERS. MANHOLE RING AND COVER SHALL CONFORM TO CITY STANDARD DETAIL NO. 06.01.03
6. MANHOLE STEP AND LADDER SHALL CONFORM TO CITY STANDARD DETAILS NO. 06.01.04 AND 06.01.05

CITY OF PUYALLUP STORM SEWER MANHOLE

DETAIL D / VAR

NO SCALE



NOTES:

1. BASE AND SUBBASE MATERIAL SHALL BE COMPACTED TO 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY.
2. ALL DEPTHS INDICATED ARE A MINIMUM COMPACTED DEPTH.
3. INITIAL BACKFILLING SHALL BE PERFORMED ONLY AFTER INSPECTION AND APPROVAL OF THE INSTALLED PIPE OR STRUCTURE. THE TRENCH BACKFILL MATERIAL SHALL BE IN ACCORDANCE WITH CITY STANDARD DETAIL NO. 06.01.01.
4. ALL BACKFILL FOR PIPE TRENCHES SHALL BE MECHANICALLY COMPACTED BY A POWER-OPERATED MECHANICAL TAMPER(S) AS SPECIFIED IN WSDOT STANDARD SPEC. 2-03.3 (14)C, COMPACTING EARTH EMBANKMENTS, METHOD C OF THE WSDOT STANDARD SPECIFICATIONS.
5. IF PAVING SURFACES ADJACENT TO THE TRENCH OPENING MAY BE DAMAGED WHERE TRENCHES ARE MADE PARALLEL TO THE STREET, OR WHERE A NUMBER OF CROSS TRENCHES ARE LAID IN CLOSE PROXIMITY TO ONE ANOTHER OR WHERE THE EQUIPMENT USED MAY CAUSE SUCH DAMAGE, THE CITY ENGINEER MAY REQUIRE A NEGOTIATED CONTRIBUTION FROM THE PERMITTEE FOR RESURFACING IN LIEU OF PATCHING.

   IF THE TOTAL AREA OF THE PROPOSED PATCH OR PROBABLE DAMAGED AREA EXCEEDS 25 PERCENT OF THE TOTAL PAVEMENT SURFACING BETWEEN CURB FACES OR BETWEEN CONCRETE GUTTER EDGES IN ANY BLOCK, SUCH NEGOTIATIONS SHALL BE CARRIED ON AND CONTRIBUTIONS AGREED UPON PRIOR TO ISSUANCE OF A PERMIT. SUCH CONTRIBUTIONS SHALL BE IN ADDITION TO THE STANDARD PERMIT FEE.
6. POTHOLING FOR UTILITIES:

   OPTION A – UP TO A 10" DIAMETER CORE DRILL IS ALLOWED. CORE HOLES MADE DURING UTILITY POTHOLES SHALL BE BACKFILLED WITH CDF TO WITHIN 4" OF FINISHED GRADE. 4" OF HMA SHALL THEN BE PLACED AND COMPACTED, FLUSH WITH EXISTING GRADE.

   OPTION B – FOR POTHOLE WINDOWS LARGER THAN 10" IN DIAMETER OR TRENCHING COMPLETED IN EXISTING ROADWAY, THE CONTRACTOR SHALL MEET CITY STANDARD 06.01.01 FOR PIPE BEDDING AND BACKFILL REQUIREMENTS. PAVEMENT RESTORATION SHALL BE ACCOMPLISHED BY INSTALLING THE TRENCH PATCH, AS SHOWN HEREIN, AND THEN GRINDING/OVERLAYING TO A MINIMUM DEPTH OF 2". THE LIMITS OF THE REQUIRED GRIND/OVERLAY SHALL BE TO THE NEAREST LANE LINE, OR HALF STREET, AND SHALL BE A MINIMUM OF 18 FEET LONG (LONGITUDINALLY ALONG ROADWAY) CENTERED AT LOCATION OF PATCH. NOTE: IF EXISTING ASPHALT THICKNESS IS LESS THAN 3", FULL DEPTH PAVEMENT REPLACEMENT, IN LIEU OF GRIND/OVERLAY, TO MEET A MINIMUM ASPHALT THICKNESS OF 4" WILL BE REQUIRED.

   WHERE LOCATION OF TRENCH OR POTHOLE WINDOW INTERSECTS ROAD CENTERLINE, A MINIMUM GRIND AND OVERLAY OF ONE FULL LANE WIDTH (12') IS REQUIRED CENTERED ON ROADWAY. NO LONGITUDINAL JOINTS WILL BE ALLOWED IN THE WHEEL PATH.
7. ALL MANHOLE FRAMES, VALVE FRAMES AND MONUMENT COVERS SHALL BE INSTALLED AFTER PLACEMENT OF ASPHALT. IF MORE THAN ONE LIFT IS NECESSARY, FRAMES AND LIDS WILL BE ADJUSTED TO FINISH GRADE AT FIRST LIFT AS DIRECTED BY THE CITY.

CITY OF PUYALLUP STREET PATCH

DETAIL E / VAR

NO SCALE

NOTE: STANDARD DETAILS ARE PROVIDED AS INFORMATIONAL ONLY FOR THE 30% DESIGN. THEY ARE INCLUDED TO INDICATE SOME OF THE DETAILS THAT WILL BE NEEDED, AND WILL BE DEVELOPED FURTHER IN LATER DESIGN PHASES

Brown AND Caldwell

SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP · STATE OF WASHINGTON

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

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FILENAME
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BC PROJECT NUMBER
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CIVIL

DETAILS - 1

DRAWING NUMBER
C-11

SHEET NUMBER
OF

Path: V:\PUYALLUP, CITY OF\153448 4TH AVE STORM DRAIN\CAD\30% DESIGN\02-SHEETS FILENAME: 153448-C-11.DWG PLOT DATE: 1/7/2020 12:48 PM CAD USER: RICHARD JOHNSON
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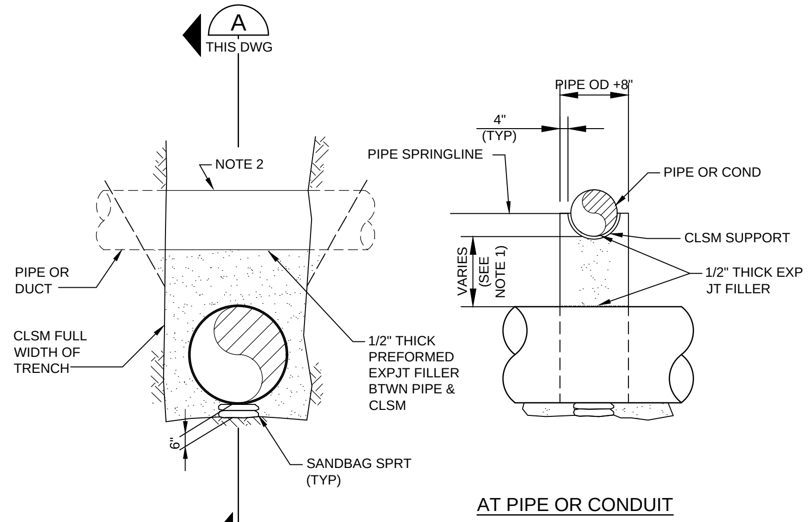


SECTION A THIS DWG

NO SCALE

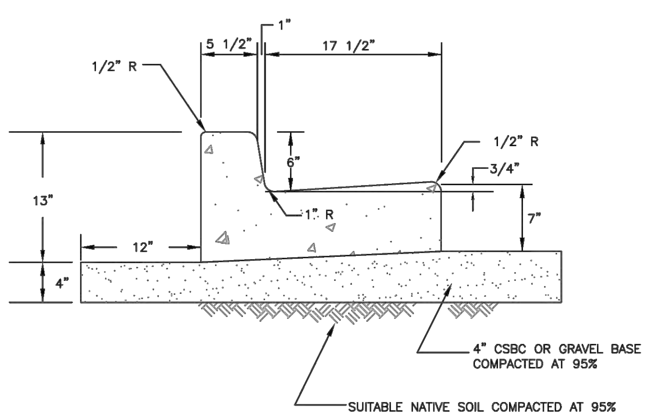
NOTES:

1. USE THIS DETAIL WHERE CLEARANCE IS LESS THAN OR EQUAL TO 2.0 FEET ONLY. BACKFILL TO BE BROUGHT UP UNIFORMLY ON BOTH SIDES OF SUPPORT.
2. DETERMINE THE REQUIREMENTS OF PROVIDING ALL TEMPORARY SUPPORTS TO SUSPEND EXISTING UTILITIES IN OR ACROSS TRENCH DURING THE CONSTRUCTION OF THE NEW PIPE AND PRIOR TO THE COMPLETION OF THIS NEW SUPPORT.

UTILITY SUPPORT

DETAIL A VAR

NO SCALE



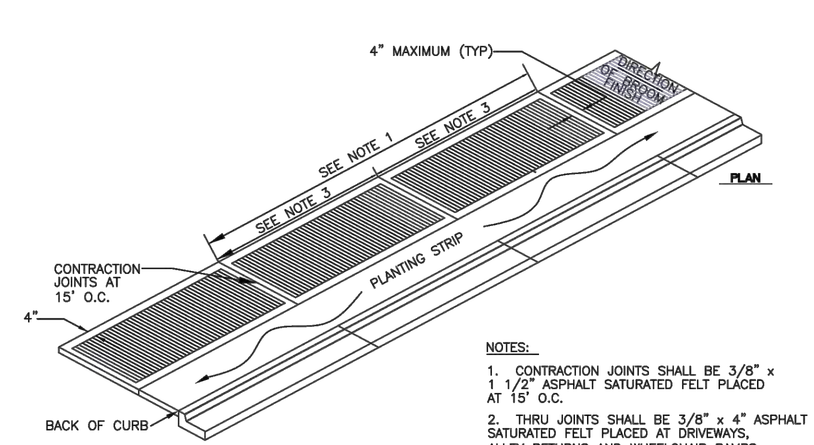
NOTES:

1. CONTRACTION JOINTS SHALL BE 3/8" x 2 1/4" ASPHALT SATURATED FELT PLACED IN ALL EXPOSED SURFACES OF CURB AND GUTTER AND SPACED AT 15' MAX. 10' MIN. O.C.
2. THRU JOINTS SHALL BE 3/8" ASPHALT SATURATED FELT PLACED AT POINTS OF TANGENCY ON CURVES, AT CATCH BASINS, AND AT EDGES OF ALLEY AND DRIVEWAYS. THE MAXIMUM DISTANCE BETWEEN THRU JOINTS SHALL BE 100'.
3. CONCRETE SHALL BE CLASS 3000 COMMERCIAL CONCRETE, 5.5 SACK MINIMUM, AASHTO GRADING 467 COARSE AGGREGATE, NO FLY ASH.
4. FORMS SHALL BE STEEL UNLESS PRIOR APPROVAL IS GIVEN BY THE CITY ENGINEER. FORMS SHALL BE SET TRUE TO LINE AND GRADE AND SECURELY STAKED PRIOR TO CONCRETE PLACEMENT. FULL DEPTH DIVISION PLATES ARE ONLY TO BE USED WHERE THRU JOINTS ARE TO BE PLACED.
5. THE 1" RADIUS ON THE UPPER FACE OF THE CURB MAY BE FORMED BY AN EDGER TOOL OR BUILT INTO THE FACE FORM. THE 1" RADIUS AT THE BOTTOM FACE OF THE CURB SHALL BE FORMED BY THE FACE FORM.

CITY OF PUYALLUP CURB AND GUTTER

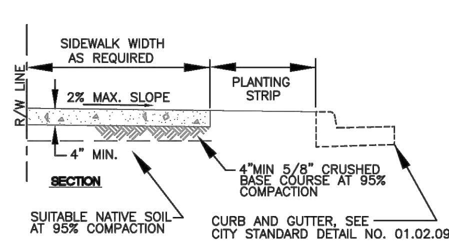
DETAIL B VAR

NO SCALE



MINIMUM SIDEWALK WIDTHS

- 5'(RS ZONES) SINGLE FAMILY RESIDENTIAL AREAS (DETACHED DWELLINGS)
- 8'(RS ZONES) COMMERCIAL USES, WHEN REQUIRED BY DEVELOPMENT SERVICES MANAGER
- 8'(RM ZONES) MEDIUM AND HIGH DENSITY MULTI-FAMILY RESIDENTIAL AREAS
- 8'(ML ZONES) INDUSTRIAL AREAS
- 8'(CG, CBD ZONES) COMMERCIAL AREAS
- 8'(PF ZONES) PUBLIC FACILITIES AREAS
- 8'(F ZONES) FAIR AREAS
- * MATCH GREATEST WIDTH FOR ANY ADJACENT ZONE



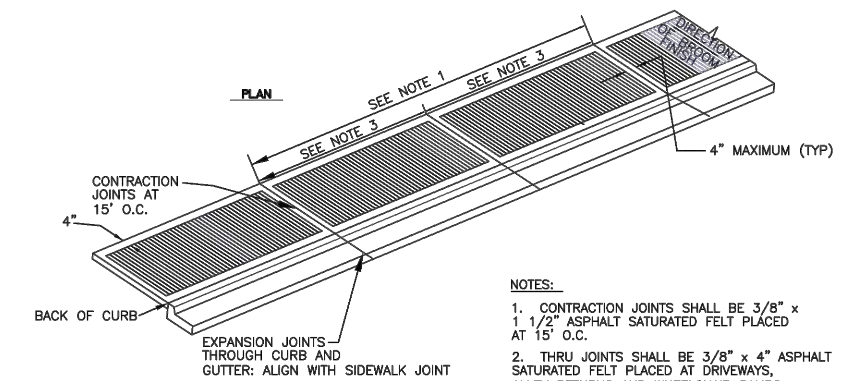
NOTES:

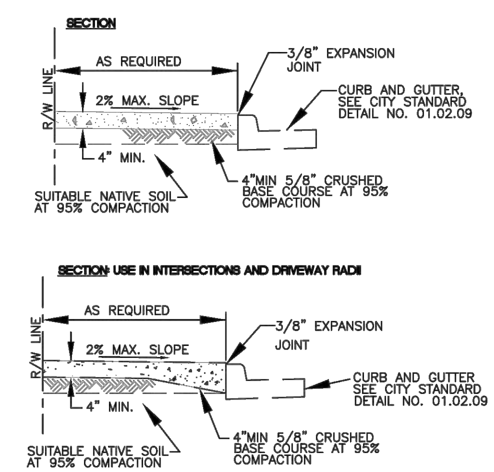
1. CONTRACTION JOINTS SHALL BE 3/8" x 1 1/2" ASPHALT SATURATED FELT PLACED AT 15' O.C.
2. THRU JOINTS SHALL BE 3/8" x 4" ASPHALT SATURATED FELT PLACED AT DRIVEWAYS, ALLEY RETURNS AND WHEELCHAIR RAMPS AND RADII.
3. V-GROOVEMARKS SHALL BE 1/8" DEEP AND 1/4" WIDE PLACED AT 5' O.C. FOR 5' SIDEWALKS AND 7.5' O.C. FOR 8' SIDEWALKS.
4. ALL JOINTS SHALL BE CLEAN AND EDGED TO A 1/4" RADIUS. JOINTS SHALL BE FLUSH WITH THE FINISHED SURFACE.
5. ALL UTILITY POLES AND STREET SIGN POSTS IN SIDEWALK AREA NOT REQUIRED TO BE RELOCATED SHALL HAVE A SQUARE SECTION OF CONCRETE SURROUNDED BY 3/8" EXPANSION JOINT MATERIAL AROUND THE POLE. THE JOINT SHALL BE NO CLOSER THAN 6" TO ANY SIDE OF THE POLE SIDE OF THE POLE.
6. FORMS SHALL BE EITHER WOOD OR STEEL AND SHALL MEET ALL REQUIREMENTS OF THESE SPECIFICATIONS.
7. CONCRETE SHALL BE CLASS 3000 COMMERCIAL CONCRETE, 5.5 SACK MINIMUM, AASHTO GRADING 467 COARSE AGGREGATE, NO FLY ASH.
8. SIDEWALK MINIMUM UNOBSTRUCTED CLEAR WIDTH SHALL BE 4', EXCLUSIVE OF THE WIDTH OF THE CURB.
9. GRATINGS, ACCESS COVERS, JUNCTION BOXES, CABLE VAULTS, PULL BOXES AND OTHER APPURTENANCES WITHIN THE SIDEWALK (RIGHT OF WAY) MUST HAVE SLIP RESISTANT SURFACES AND MATCH THE GRADE OF THE SIDEWALK.
10. CURB RAMPS SHALL BE CONSTRUCTED AT INTERSECTIONS USING A DESIGN PREPARED BY A LICENSED PROFESSIONAL ENGINEER. WHEN A RAMP DESIGN FAILS TO MEET ALL APPLICABLE DESIGN STANDARDS, THE ENGINEER SHALL DOCUMENT WHY THE PROPOSED RAMP ACHIEVES DESIGN STANDARDS TO THE MAXIMUM EXTENT FEASIBLE.

CITY OF PUYALLUP SIDEWALK WITH PLANTING STRIP

DETAIL C VAR

NO SCALE





MINIMUM SIDEWALK WIDTHS

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- 8'(RS ZONES) COMMERCIAL USES, WHEN REQUIRED BY DEVELOPMENT SERVICES MANAGER
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- * MATCH GREATEST WIDTH FOR ANY ADJACENT ZONE

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CITY OF PUYALLUP SIDEWALK WITHOUT PLANTING

DETAIL D VAR

NO SCALE

NOTE: STANDARD DETAILS ARE PROVIDED AS INFORMATIONAL ONLY FOR THE 30% DESIGN. THEY ARE INCLUDED TO INDICATE SOME OF THE DETAILS THAT WILL BE NEEDED, AND WILL BE DEVELOPED FURTHER IN LATER DESIGN PHASES

Brown AND Caldwell

SEATTLE, WASHINGTON

30% REVIEW

CITY OF PUYALLUP
4TH AVENUE NW
STORM DRAIN

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED: T. ROSSILLON
DRAWN: R. JOHNSON
CHECKED: A. LEAVITT
CHECKED:
APPROVED:

FILENAME 153448-C-12.DWG
BC PROJECT NUMBER 153448
CLIENT PROJECT NUMBER

CIVIL

DETAILS - 2

DRAWING NUMBER C-12

SHEET NUMBER OF

Path: V:\PUYALLUP, CITY OF\153448 4TH AVE STORM DRAIN\CAD\30% DESIGN\02-SHEETS FILENAME: 153448-C-12.DWG PLOT DATE: 1/7/2020 12:51 PM CAD USER: RICHARD JOHNSON

Puyallup_City-Seal_color_white_cr.gif