



P.O. Box 720 • 10045 Old Frontier Road NW
Silverdale, Washington 98383
(360) 692-5525
www.map-limited.com

ENGINEERING • PLANNING

PRELIMINARY DRAINAGE REPORT

The NORA & VALARI Residences

Parcel No.'s 142601-3-138-2008 & 142601-3-139-2007

SECTION 14, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M.

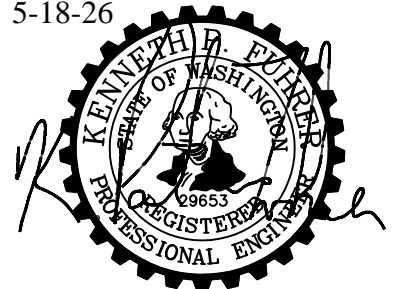
PREPARED FOR: Jensen Ave Holdings, LLC
20081 Viking Ave. N.W., Suite 117
Poulsbo, WA 98370

PREPARED BY: Pat Fuhrer, P.E.
MAP, Ltd.
J# 6931
patf@map-limited.com

DATE: May 13, 2026

“I hereby state that this Drainage Report has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. The analysis has been prepared utilizing procedures and practices specified by the City of Poulsbo and within the standard accepted practices of the industry. I understand that the City of Poulsbo does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities prepared by me.”

5-18-26



NOTE: THIS DOCUMENT IS INSCRIBED
WITH A DIGITIZED SIGNATURE BY THE
ENGINEER AS PROVIDED BY WAC
196-23-070(2)

REFERENCES

Kitsap County Stormwater Design Manual. Kitsap County, October 4, 2021

Stormwater Management Manual for Western Washington. Washington State Department of Ecology, 2024

USDA Natural Resources Conservation Services National Cooperative Soil Survey

Topographic Map. AES Consultants, Inc., November 11, 2025

Hydraflow Hydrograph Extension for AutoCAD Civil 3D 2026, Autodesk Inc.

WWHM2012 Version Date May 13, 2025 Version 4.3.2, Clear Creek Solutions, Inc.

TABLE OF CONTENTS

I.	PROJECT DESCRIPTION	1
II.	EXISTING CONDITIONS	2
<i>A.</i>	<i>TOPOGRAPHY AND FEATURES</i>	<i>2</i>
1.	Existing Conditions	3
2.	Aerial	4
3.	July 7, 1994 Aerial	5
<i>B.</i>	<i>CRITICAL AREAS</i>	<i>5</i>
<i>C.</i>	<i>SOILS</i>	<i>5</i>
4.	Soil Survey Map	6
III.	DEVELOPED CONDITIONS	8
<i>A.</i>	<i>LAND COVER</i>	<i>8</i>
<i>B.</i>	<i>PRELIMINARY DRAINAGE CATCHMENT PLAN</i>	<i>9</i>
<i>C.</i>	<i>STORM WATER MANAGEMENT REQUIREMENTS</i>	<i>10</i>
5.	Minimum Requirement # 1	10
6.	Minimum Requirement #2	10
7.	Minimum Requirement #3	10
8.	Minimum Requirement #4	11
9.	Minimum Requirement #5	11
10.	Minimum Requirement #6	15
11.	Minimum Requirement #7	15
12.	Minimum Requirement #8	15
13.	Minimum Requirement #9	16
14.	Preliminary Drainage Plan	17
IV.	MODULAR DETENTION VAULT SIZING	18
<i>A.</i>	<i>SBUH 100-YR DEVELOPED HYDROGRAPH</i>	<i>18</i>
<i>B.</i>	<i>STAGE-STORAGE-DISCHARGE</i>	<i>20</i>
<i>C.</i>	<i>LEVEL-POOL ROUTE RESULTS</i>	<i>21</i>
V.	BIPOD™ VAULT WATER QUALITY SIZING	23
VI.	UPSTREAM BASIN	27
VII.	DOWNSTREAM ANALYSIS	27
VIII.	SILT AND EROSION CONTROL	27
APPENDIX A	VICINITY MAP	i
APPENDIX B	DOWNSTREAM BASIN MAP	ii
APPENDIX C	2020 PDSR POULSBO PLACE 2 DIVISION 8	iii
APPENDIX D	DETERMINING CONSTRUCTION SITE SEDIMENT DAMAGE POTENTIAL	iv

PRELIMINARY DRAINAGE REPORT FOR The NORA & VALARI Residences

I. PROJECT DESCRIPTION

The site is located north and east of the Poulsbo Post Office, and is bounded by 3rd Avenue and Jensen Way, in Section 14, Township 26 North, Range 1 East, W.M., in Kitsap County, Washington, and is the redevelopment of an area of old military housing near downtown Poulsbo. The project will consist of two multifamily buildings. The west parcel will be an 82,833 sf building over 4 stories with 40 residential units and 1400 sf of commercial space in the NW corner. The building will include 2 levels of underbuilding parking, a landscaped forecourt along Jensen and several resident amenities including a gym, club room and roof deck. The east parcel will contain a 4 story, 89,334 sf residential building with 44 units (of which 22 are ADUs), underbuilding parking, resident storage and amenities including a gym, club room, secured e-bike parking/charging and a pocket park at the north end of the building.

A previous project known as Poulsbo Place II Division 8 went through several iterations of Master Plan Amendment applications and Site Plan Review approvals in recent history, the latest in 2020. The Preliminary Storm Drainage Report for the project at the time included a detailed downstream stormwater capacity analysis, and is attached in Appendix B herein. In summary, it was determined that providing on-site detention of the runoff from this site and attenuating the peak flow from the 100-yr, 24 hour design storm prevented the downstream overtopping of catch basins.

A Stormwater Pollution Prevention Plan and Narrative will be provided at the future sitework grading/utility and building permit submittals including details and specifications to prevent silt laden runoff from leaving the site causing siltation in the downstream drainage course. A Construction Stormwater Discharge permit will also be required to be obtained from the Dept. of Ecology since ground-disturbing activities will exceed one acre.



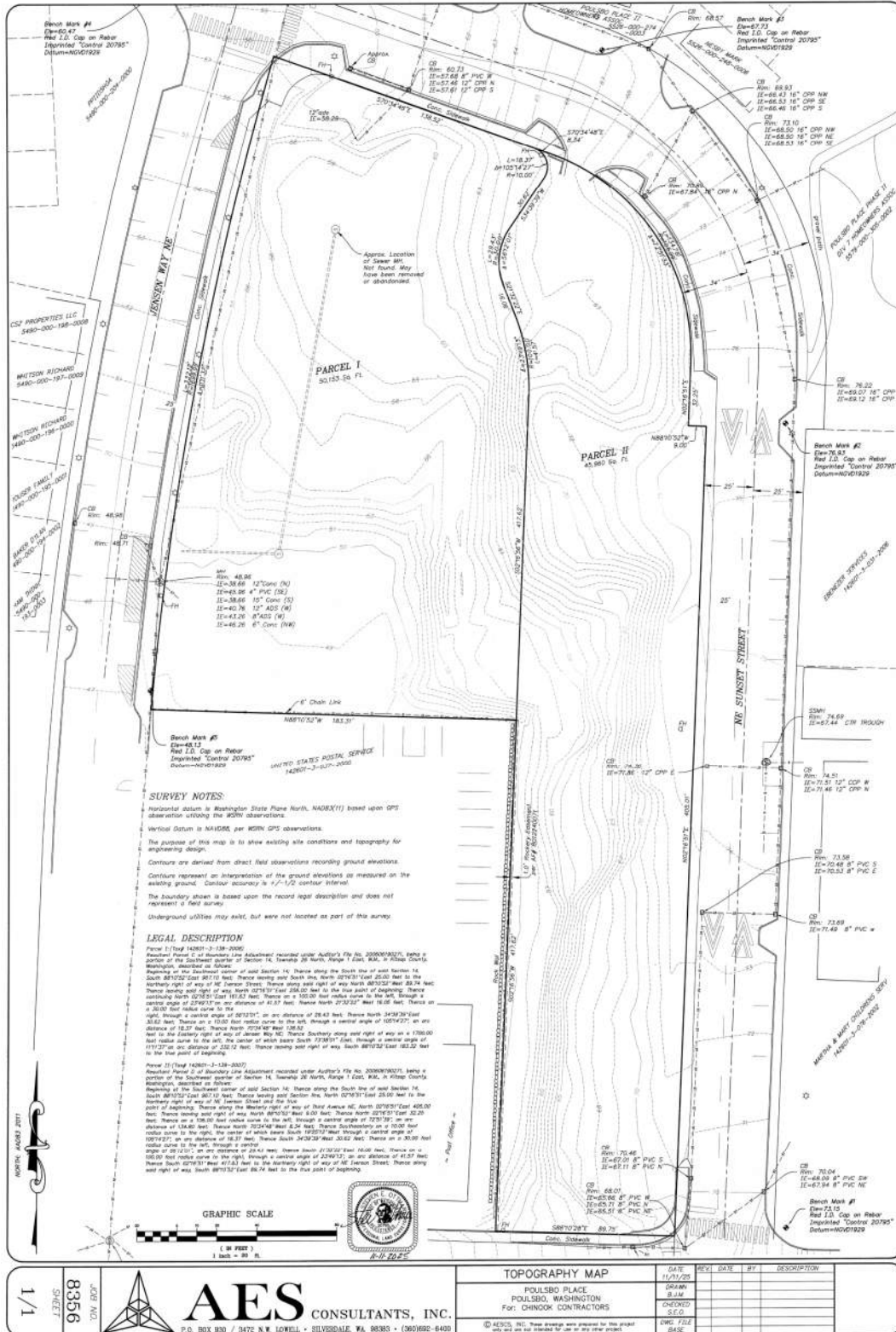
II. EXISTING CONDITIONS

A. TOPOGRAPHY AND FEATURES

A topographic survey was prepared for the project by AES Consultants and is shown below and in the Preliminary Grading & Utilities Planset as the Existing Conditions Plan submitted for this project. The lower part of the site fronting Jensen Way that previously had housing and utilities is moderately sloped, with slopes varying 3%-12%, with a gradient towards Jensen Way. The upper part of the site bordering Sunset Street and lying east of the Post Office has flat/moderate/steep slopes ranging from 4% to 67% above the Post Office. After the former housing was demolished, the site was used as a laydown yard for the various phases of the Poulsbo Place construction and for erosion control. There is 26 feet of elevation difference across the site from Sunset to Jensen.



1. Existing Conditions



2. *Aerial*



3. July 7, 1994 Aerial



B. CRITICAL AREAS

The site is identified as a moderate/high seismic hazard area on the Kitsap County GIS critical area overlay.

C. SOILS

According to the NRCS National Cooperative Soil Survey, on-site soils are classified as Kitsap Silt Loam. Local stormwater codes classify these soils as lying in Hydrologic Soil Group C. These soils are relatively impermeable and shallow above till and not conducive to on-site stormwater infiltration in the opinion of the Project Civil Engineer, and when coupled with the site's previous grading/ground disturbance, and surrounding infrastructure, infiltration Best Management Practices are not feasible for this project.



4. Soil Survey Map



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

4/21/2026
Page 1 of 3



Engineering • Planning

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
28	Kitsap silt loam, 2 to 8 percent slopes	1.1	51.9%
30	Kitsap silt loam, 15 to 30 percent slopes	1.0	48.1%
Totals for Area of Interest		2.2	100.0%



III. DEVELOPED CONDITIONS

A. LAND COVER

This project proposes 71,695 s.f. (1.6459 Ac.) of new/replaced hard surface area, with a total project disturbance footprint of 131,235 s.f. (2.0576 Ac.), or 80% impervious surface coverage.

On-site improvements used for the preliminary sizing of the stormwater facilities are shown on the catchment plan on the next page and consist of:

- 51,885 s.f. of rooftops
- 12,260 s.f. of Driveway
- 5,735 s.f. of Sidewalk
- 13,820 s.f. of Landscaping



C. STORM WATER MANAGEMENT REQUIREMENTS

According to the Flow Charts for New and Re-Development for the project and City Development Engineering Staff review comments from the pre-application meeting, Stormwater Minimum Requirements #1 – #9 are required to be demonstrated as part of the Land Use permit review process and are discussed below.

5. Minimum Requirement # 1

1	Preparation of Stormwater Site Plans	Projects shall prepare a Stormwater Site Plan, providing comprehensive reporting of the technical information and analysis necessary to review compliance with the Stormwater Code.
---	--------------------------------------	---

Minimum Requirement #1 will be met. This preliminary drainage report and the accompanying Preliminary Drainage and Utility Plans are provided at the Site Plan Review application level to demonstrate that compliance with the City Stormwater Code is feasible, and the project will be conditioned to provide final design and construction permitting reports, plans, and specifications after land use permit approvals by the City of Poulsbo and before any land disturbing activities commence.

6. Minimum Requirement #2

2	Construction Stormwater Pollution Prevention	Requires projects to prevent erosion and discharge of sediment and other pollutants into receiving waters during construction activities.
---	--	---

Minimum requirement #2 will be met. Future Grade and Fill permit plans will include silt fencing, jute matting of slopes, a stabilized construction entrance, and a temporary sediment pond along with all details and notes for controlling discharge of sediment and other pollutants during construction. A SWPP Narrative will also be included with the permit documents outlining BMP’s and project management to ensure no silt-laden runoff is discharged from the project during construction.

7. Minimum Requirement #3

3	Source Control of Pollution	All known, available and reasonable source control BMPs shall be applied to all projects.
---	-----------------------------	---

Source control of pollution from this type of proposed residential and small retail/commercial mixed-use projects is generally not required.



8. Minimum Requirement #4

4	Preservation of Natural Drainage Systems and Outfalls	Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site shall not cause a significant adverse impact to downstream receiving waters and downgradient properties. All outfalls shall provide energy dissipation.
---	---	--

Minimum Requirement #4 will be met by maintain the existing stormwater connections to the Jensen Avenue stormwater conveyance system, and the manner in which it is connected to the downstream receiving stormwater conveyance system will not cause adverse impacts to downstream properties.

9. Minimum Requirement #5

5	On-site Stormwater Management	Projects shall employ On-site Stormwater Management BMPs in accordance with the prescribed projects thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on-site to the extent feasible without causing flooding or erosion impacts.
---	-------------------------------	--



Figure I-3.3: Flow Chart for Determining MR #5 Requirements

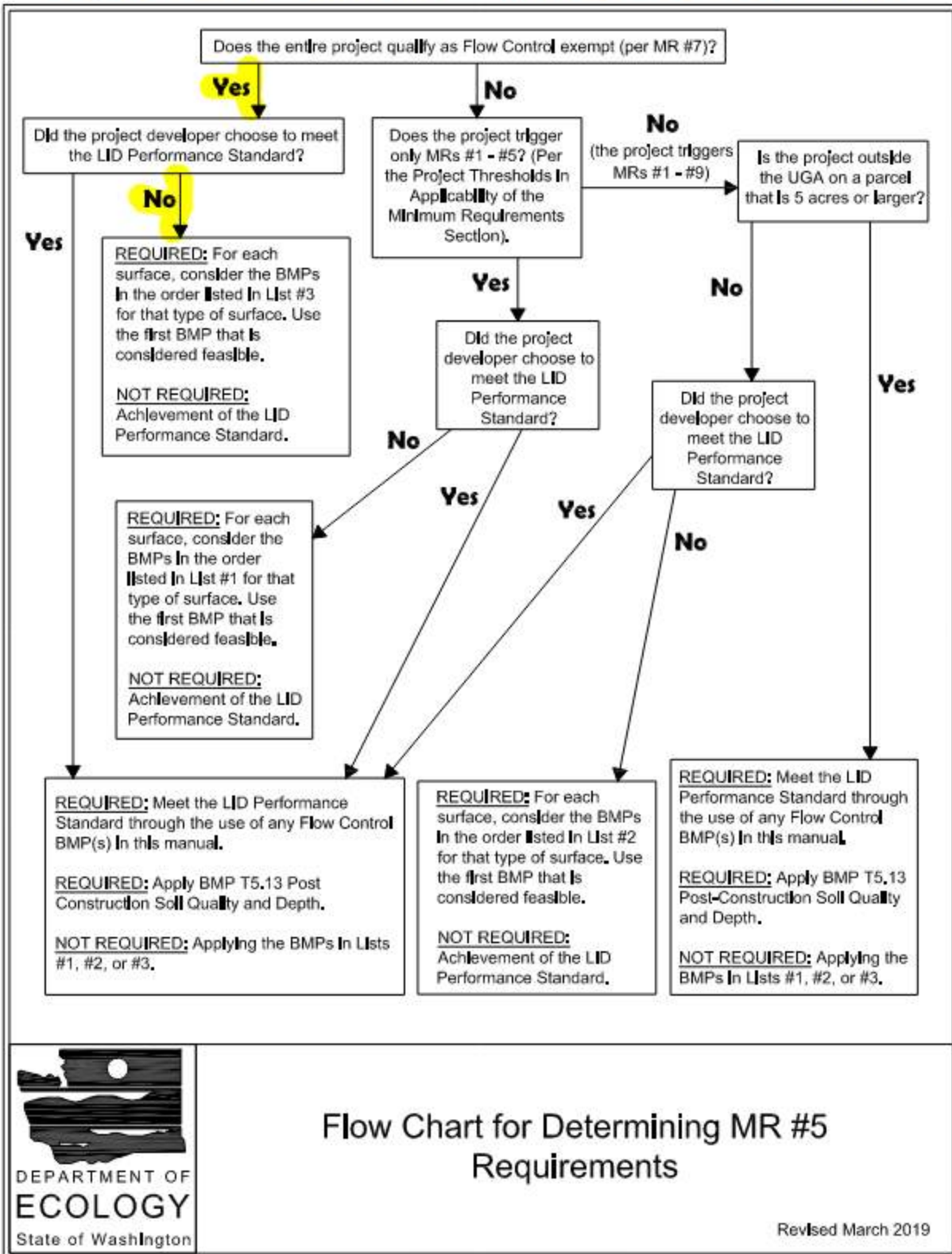


Table I-3.2: The List Approach for MR5 Compliance

List #1 (For MR #1 - #5 Projects That Are Not Flow Control Exempt)	List #2 (For MR #1 - #9 Projects That Are Not Flow Control Exempt)	List #3 (For Flow Control Exempt Projects)
Surface Type: Lawn and Landscaped Areas		
BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth	BMP T5.13: Post-Construction Soil Quality and Depth
Surface Type: Roofs		
1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.30: Full Dispersion or BMP T5.10A: Downspout Full Infiltration	1. BMP T5.10A: Downspout Full Infiltration
2. BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T7.30: Bioretention	2. BMP T5.10B: Downspout Dispersion Systems
3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10B: Downspout Dispersion Systems	3. BMP T5.10C: Perforated Stub-out Connections
4. BMP T5.10C: Perforated Stub-out Connections	4. BMP T5.10C: Perforated Stub-out Connections	
Surface Type: Other Hard Surfaces		
1. BMP T5.30: Full Dispersion	1. BMP T5.30: Full Dispersion	BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion
2. BMP T5.15: Permeable Pavement or BMP T5.14: Rain Gardens or BMP T7.30: Bioretention	2. BMP T5.15: Permeable Pavement	
3. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	3. BMP T7.30: Bioretention 4. BMP T5.12: Sheet Flow Dispersion or BMP T5.11: Concentrated Flow Dispersion	



The MR#5 List #3 Feasibilities for this project are discussed and are determined by the Project Engineer to be Feasible or Infeasible as follows:

Lawn and Landscaped areas:

- *Post-Construction Soil Quality and Depth in Accordance with BMP T5.13 of Volume 5*

Soil amendment will be provided for all landscaped and disturbed graded areas with constructed slopes less than 33% (3H:1V), and these areas and the soil installation requirements will be specified on the final civils and landscape plans.

Roofs:

- *BMP T5.10A Downspout Full Infiltration: Not feasible due to site's soils and potential for slope destabilization, foundation surcharging, and adjoining structure basement flooding.*
- *BMP T5.10B Downspout Dispersion Systems: Not feasible on this project due to the lack of a downstream flowpath and adjacent slopes.*
- *BMP T5.10C Perforated stub-out connections: Not feasible on this site due to the potential for surface flow to enter and impact down-gradient structures and slopes.*

Other Hard Surfaces:

- *BMP T5.12 Sheet Flow Dispersion: Not feasible due to lack of sufficient flow path adjacent to the hard surfaces through native vegetation and slopes.*
- *BMP T5.11 Concentrated flow Dispersion: Not feasible due to lack of sufficient flow path adjacent to the hard surfaces through native vegetation and slopes..*

Minimum Requirement #5 will be met for this site with the use of soil amendment for landscaped and other pervious disturbed areas having a grade less than or equal to 33% (3H:1V).



10. Minimum Requirement #6

6	Runoff Treatment	Projects shall provide runoff treatment to reduce pollutant loads and concentrations in stormwater runoff using physical, biological, and chemical removal mechanisms so that beneficial uses of receiving waters are maintained and, where applicable, restored.
---	------------------	---

Minimum Requirement #6 is required to be met for this project since there is more than 5000 s.f. of pollution-generating hard surface area proposed. A Biopod™ water quality vault is proposed upstream of the detention system and will treat over 91% of the runoff volume from the project’s areas and provide Enhanced Treatment of the runoff prior to discharge to Liberty Bay. The clean runoff from the rooftops will be separately conveyed around the water quality vault and connected directly to the underground modular detention vault.

Preliminary sizing of the Bipod™ vault is included in this report, and MR #6 is satisfied.

11. Minimum Requirement #7

7	Flow Control	Projects shall provide flow control to reduce the impacts of stormwater runoff from hard surfaces and land cover conversions.
---	--------------	---

Flow control is required for this project to reduce the potential for downstream flooding due to capacity-limiting man-made storm conveyances in Jensen Avenue to its discharge location in Liberty Bay, especially during king tide events in the winter season. As shown in the attached reports performed for other projects on this site in Appendix B, a maximum 100-yr, 24 hour peak flow of 0.67 cfs or less is necessary to prevent overtopping of downstream catch basins in Jensen Ave. This maximum flow was based on an assumed site coverage of 95% impervious, which is greater than the proposed 80% coverage proposed with this application.

Preliminary sizing of the underground detention modular facility is included in this report, and MR #7 is satisfied.

12. Minimum Requirement #8

8	Wetlands Protection	Projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system shall comply with Volume II, Chapter 6 of this manual.
---	---------------------	---

This project does not directly or indirectly through a conveyance system discharge to a wetland, therefore Minimum Requirement #8 is satisfied.



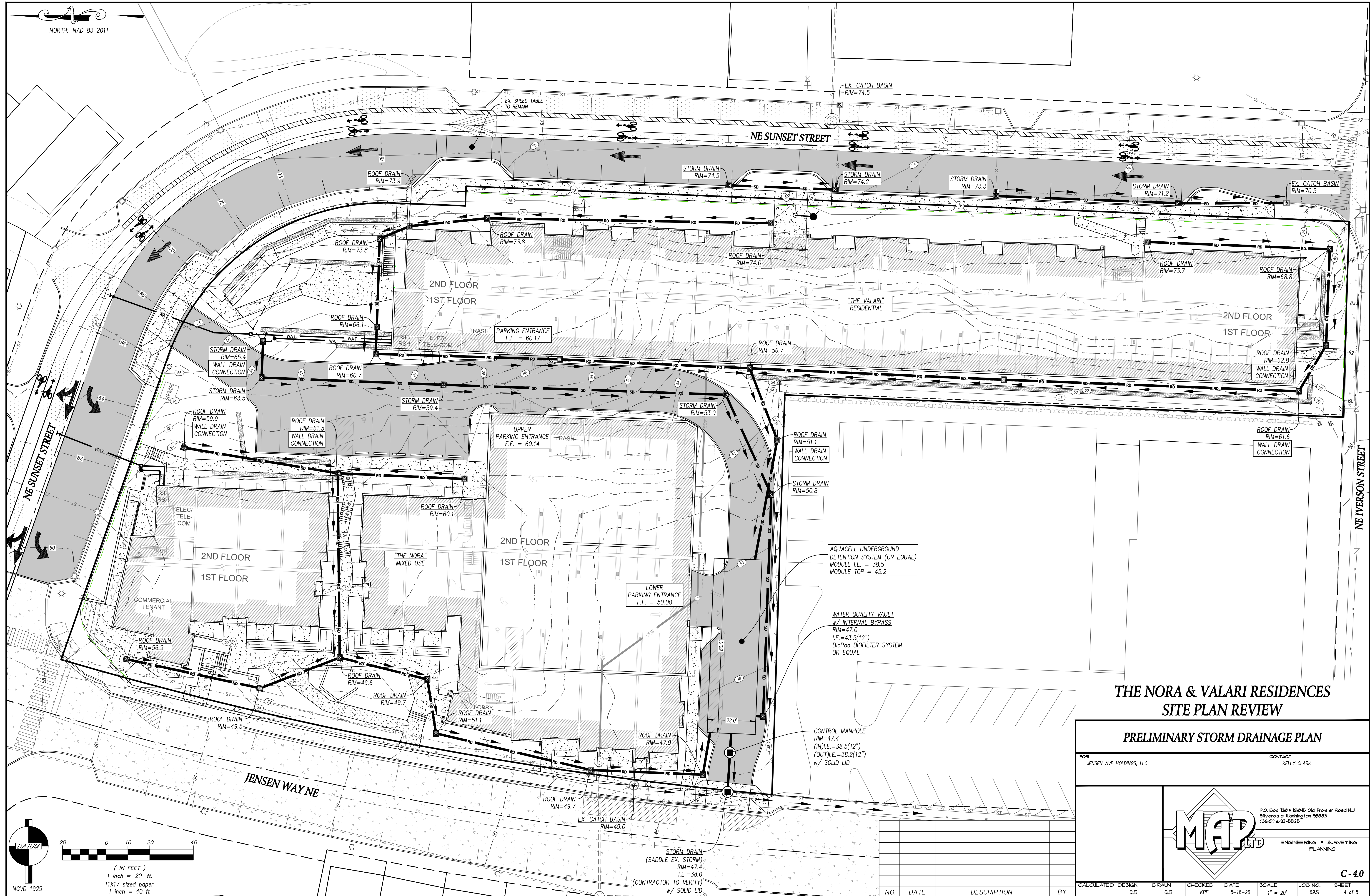
13. Minimum Requirement #9

9	Operation and Maintenance	An operation and maintenance manual that is consistent with the provisions in Volume II, Chapter 7 of this manual shall be provided for proposed stormwater facilities and BMPs, and the party (or parties) responsible for maintenance and operation shall be identified.
---	---------------------------	--

A Stormwater Operations and Maintenance Manual will be provided for the stormwater facilities associated with this project as a requirement of the Clearing and Grading Permit. MR #9 is satisfied.



NORTH: NAD 83 2011



**THE NORA & VALARI RESIDENCES
SITE PLAN REVIEW**

PRELIMINARY STORM DRAINAGE PLAN

FOR: JENSEN AVE HOLDINGS, LLC CONTACT: KELLY CLARK

C-4.0

NO.	DATE	DESCRIPTION	BY

CALCULATED	DESIGN Q.D.	DRAWN Q.D.	CHECKED KPF	DATE 5-18-26	SCALE 1" = 20'	JOB NO. 6931	SHEET 4 of 5
------------	-------------	------------	-------------	--------------	----------------	--------------	--------------

NGVD 1929

IV. Modular Detention Vault sizing

A. SBUH 100-YR DEVELOPED HYDROGRAPH

From the catchment plan on Page 8, we will input the land coverages with their associate runoff curve number into the SBUH model to calculate to 100-yr developed runoff hydrograph from the project.

Impervious surfaces include rooftops (1.911 Acres), driveways (0.2815 Acres), and sidewalks/patios (0.1733 Acres) totaling 1.6459 Acres.

Pervious landscaping areas total 0.4117 acres.

Runoff Curve numbers of 98 and 86 are selected based on the Type C soils for the impervious and pervious landscaping areas:

Table III-2.5: Post-Development Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Areas (continued)

Cover type and hydro-logic condition	CNs for Hydrologic Soil Group			
	A	B	C	D
Good (woods are protected from grazing, and litter and brush adequately cover the soil)	30	55	70	77
Open Space (Lawns, parks, golf courses, cemeteries, landscaping, etc.)¹:				
Fair Condition (grass cover 50% to 75% of the area)	77	85	90	92
Good Condition (grass cover >75% of the area)	68	80	86	90

$$\text{The composite CN} = \frac{(1.911 + 0.2815 + 0.1733)98 + (0.4117)86}{2.0576} = 96$$

A Time of Concentration of 5 minutes was inputted into the SBUH model, a conservative estimate as it only includes the initial collection time at the start of the storm event and does not include any travel time.

A 100-yr 24 hour precipitation value of 4.5 inches was used for the Poulsbo-area design storm event.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

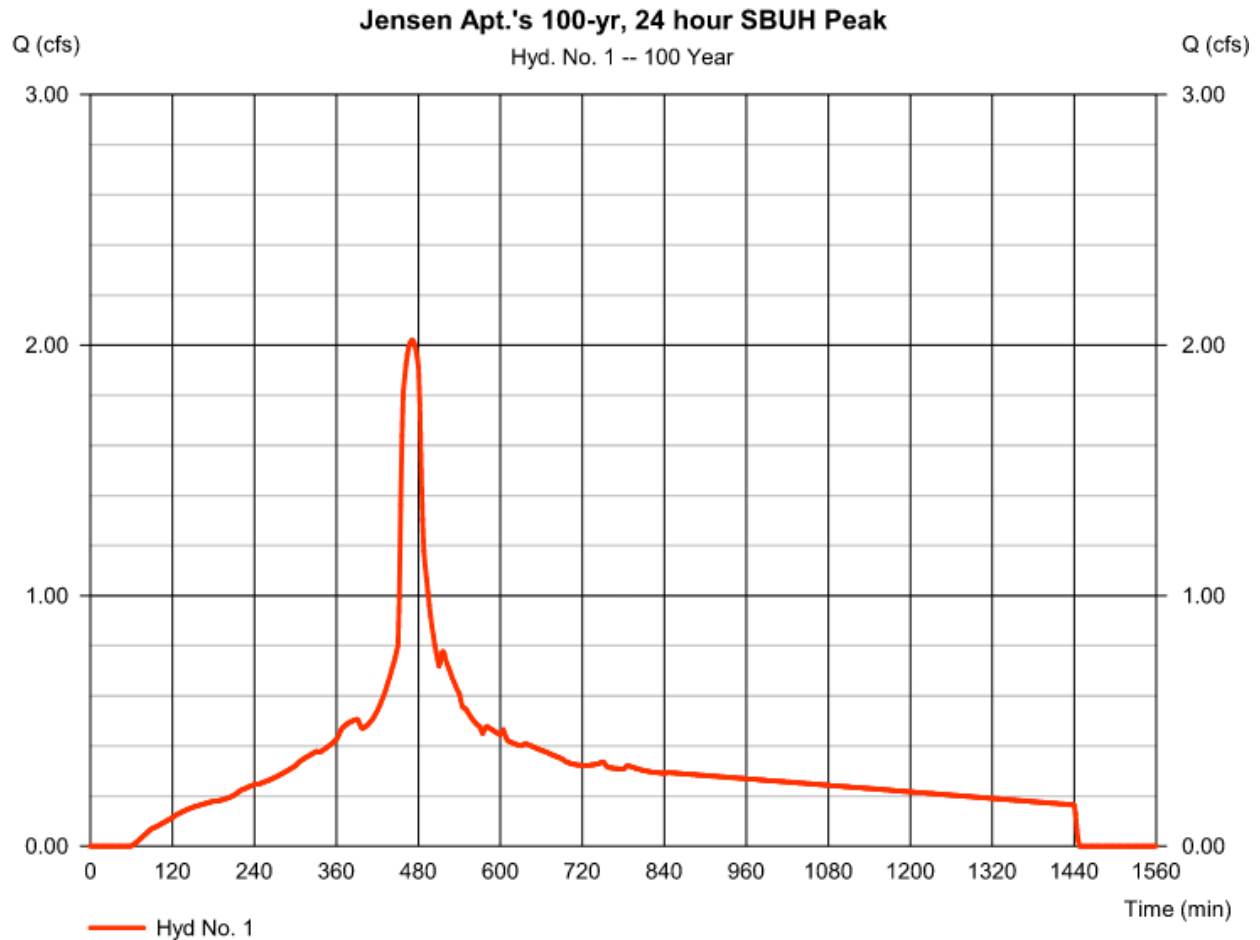
Tuesday, 04 / 21 / 2026

Hyd. No. 1

Jensen Apt.'s 100-yr, 24 hour SBUH Peak

Hydrograph type	= SCS Runoff	Peak discharge	= 2.019 cfs
Storm frequency	= 100 yrs	Time to peak	= 470 min
Time interval	= 2 min	Hyd. volume	= 28,294 cuft
Drainage area	= 2.060 ac	Curve number	= 96*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.646 x 98) + (0.412 x 86)] / 2.060



B. STAGE-STORAGE-DISCHARGE

Using the stage-storage-discharge data previously calculated for the prior development plans and making several iterations, we found that an Aquacell™ underground detention gallery 3.98’ tall x 20’ wide x 80’ long coupled with a 3-3/4” lower orifice and a riser elevation 3.88-ft above the vault met the desired maximum 0.67 cfs 100-yr, 24 hour flow rate from the developed site:

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Tuesday, 04 / 21 / 2026

Pond No. 1 - UNDERGROUND MODULES

Pond Data

UG Chambers -invert elev. = 38.50 ft, Rise x Span = 3.98 x 20.00 ft, Barrel Len = 80.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	38.50	n/a	0	0
0.40	38.90	n/a	637	637
0.80	39.30	n/a	637	1,274
1.19	39.69	n/a	637	1,911
1.59	40.09	n/a	637	2,548
1.99	40.49	n/a	637	3,185
2.39	40.89	n/a	637	3,822
2.79	41.29	n/a	637	4,458
3.18	41.68	n/a	637	5,095
3.58	42.08	n/a	637	5,732
3.98	42.48	n/a	637	6,369

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.75	Inactive	Inactive
Span (in)	= 12.00	3.75	0.00	3.50
No. Barrels	= 1	1	0	1
Invert El. (ft)	= 38.50	38.50	0.00	38.50
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.62	0.60	0.62
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	0.00	0.00	0.00
Crest El. (ft)	= 42.38	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	38.50	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.40	637	38.90	0.18 ic	0.17 ic	---	0.00	0.00	---	---	---	---	---	0.170
0.80	1,274	39.30	0.28 ic	0.28 ic	---	0.00	0.00	---	---	---	---	---	0.280
1.19	1,911	39.69	0.37 ic	0.36 ic	---	0.00	0.00	---	---	---	---	---	0.362
1.59	2,548	40.09	0.44 ic	0.43 ic	---	0.00	0.00	---	---	---	---	---	0.430
1.99	3,185	40.49	0.50 ic	0.49 ic	---	0.00	0.00	---	---	---	---	---	0.489
2.39	3,822	40.89	0.56 ic	0.54 ic	---	0.00	0.00	---	---	---	---	---	0.542
2.79	4,458	41.29	0.60 ic	0.59 ic	---	0.00	0.00	---	---	---	---	---	0.591
3.18	5,095	41.68	0.64 ic	0.64 ic	---	0.00	0.00	---	---	---	---	---	0.637
3.58	5,732	42.08	0.69 ic	0.68 ic	---	0.00	0.00	---	---	---	---	---	0.679
3.98	6,369	42.48	1.04 ic	0.71 ic	---	0.00	0.33	---	---	---	---	---	1.040



C. LEVEL-POOL ROUTE RESULTS

1

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

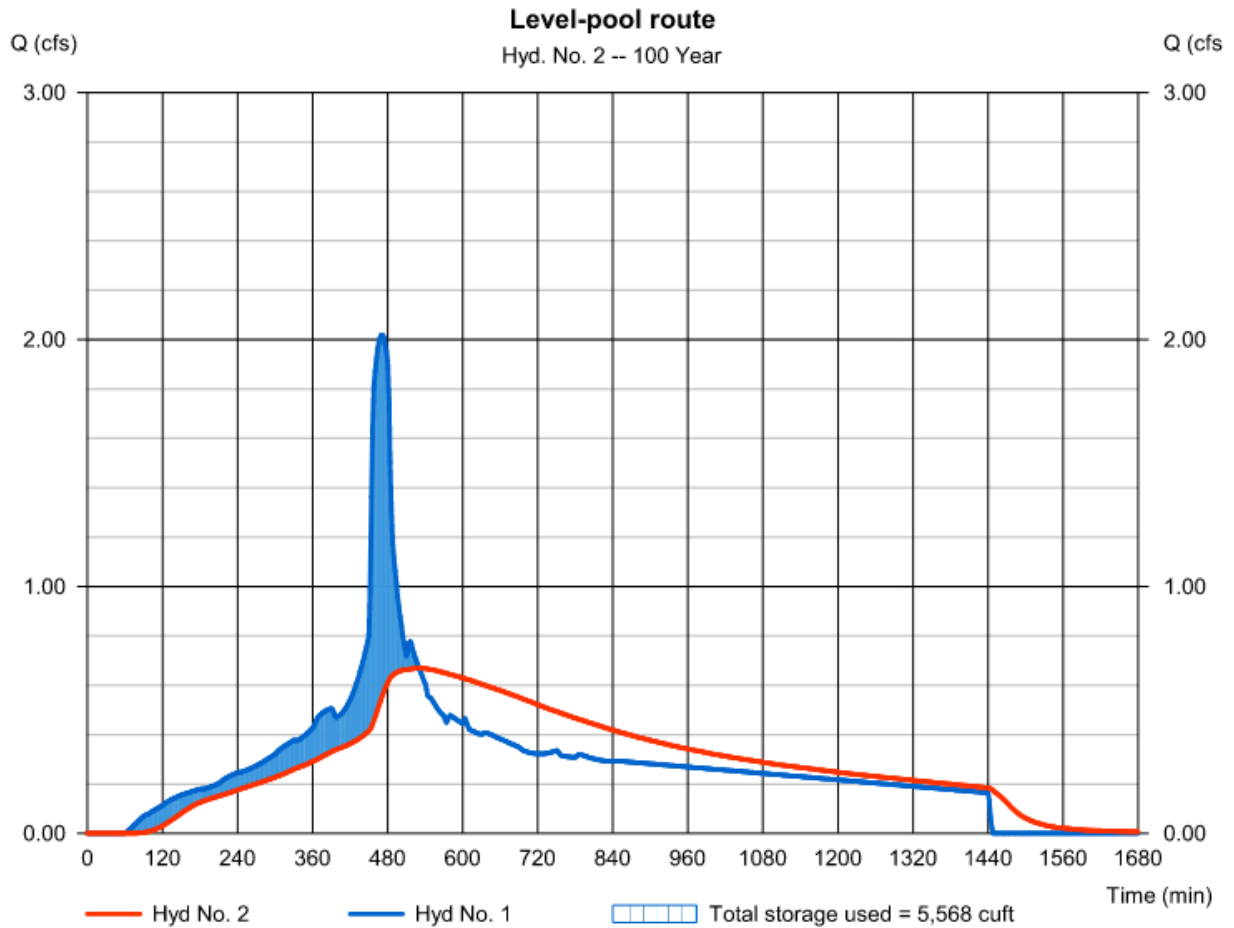
Tuesday, 04 / 21 / 2026

Hyd. No. 2

Level-pool route

Hydrograph type	= Reservoir	Peak discharge	= 0.669 cfs
Storm frequency	= 100 yrs	Time to peak	= 530 min
Time interval	= 2 min	Hyd. volume	= 28,274 cuft
Inflow hyd. No.	= 1 - Jensen Apt.'s 100-yr, 24 hr U.S. 2-yr, 24 hr	Max. El. Peak	= 41.98 ft
Reservoir name	= UNDERGROUND MODULES	Max. Storage	= 5,568 cuft

Storage Indication method used.





AquaCell

Product Description

Geocellular units for detention and infiltration of rainwater.

The optimal solution for fast installation and total access for inspection and cleaning.



Technical information

Dimensions		
Length	48 in	1200 mm
Width	24 in	600 mm
Height	16 in	400 mm
Gross volume (without bottom)	10,25 cf	
Void ratio*		94-96%
Weight main unit	24 lb	11kg
Pipe connections	6-12 in	160-315 mm
Tank volume per truck	<11406 ft ³	<323 m ³

*Void ratio varies based on number of system layers & side panels

Accessibility		
Vertical access	10 in	250 mm
Width inspection channel (bottom)	8 in	200 mm
Accessible surface area	54%	

General	
Material	Recycled polypropylene
Color	Black
Connectors	Integrated
Standard	EN17152-1

Type of Load	Window of Application*	
	Regular	Extra strong
H-10 Traffic Loading	d=12in. / H= 14.4ft	d=12in. / H=26.2 ft
HS-20 Traffic Loading	d=24 in. / H=14.4ft	d=18 in. / H=26.2ft
HS-25 Traffic Loading	d=32in. / H=14.1 ft	d=22in. / H=26.1 ft

*General indication for installation above groundwater level, according to instructions for single layer tanks. For multi-layer tanks, the window of application may be limited. Wavin always recommends a minimum cover of 12 inches (0.3 meter). For specific projects, seek advice of Wavin.



@Montréal 9.2025

Orbia's Building and Infrastructure business Wavin is an innovative solutions provider for the global building and infrastructure industry. Backed by more than 60 years of product development experience, Wavin is advancing life around the world by building healthy, sustainable environments for global citizens. Whether it's to improve the distribution of clean drinking water, to make sanitation accessible for everyone, to create climate resilient cities, or to design comfortable living spaces, Wavin collaborates with municipal leaders, engineers, contractors, and installers to help future-proof communities, buildings and homes. Wavin has 12,000+ employees around 65 production sites worldwide, serving over 80 countries through a global sales and distribution network.

Wavin 950 Winter Street, South Entrance 1st Floor, Waltham, MA 02451, United States | Phone US 514-735-3632 / 1800-763-3632 | E-mail customer.service@orbial.com | wavin.us

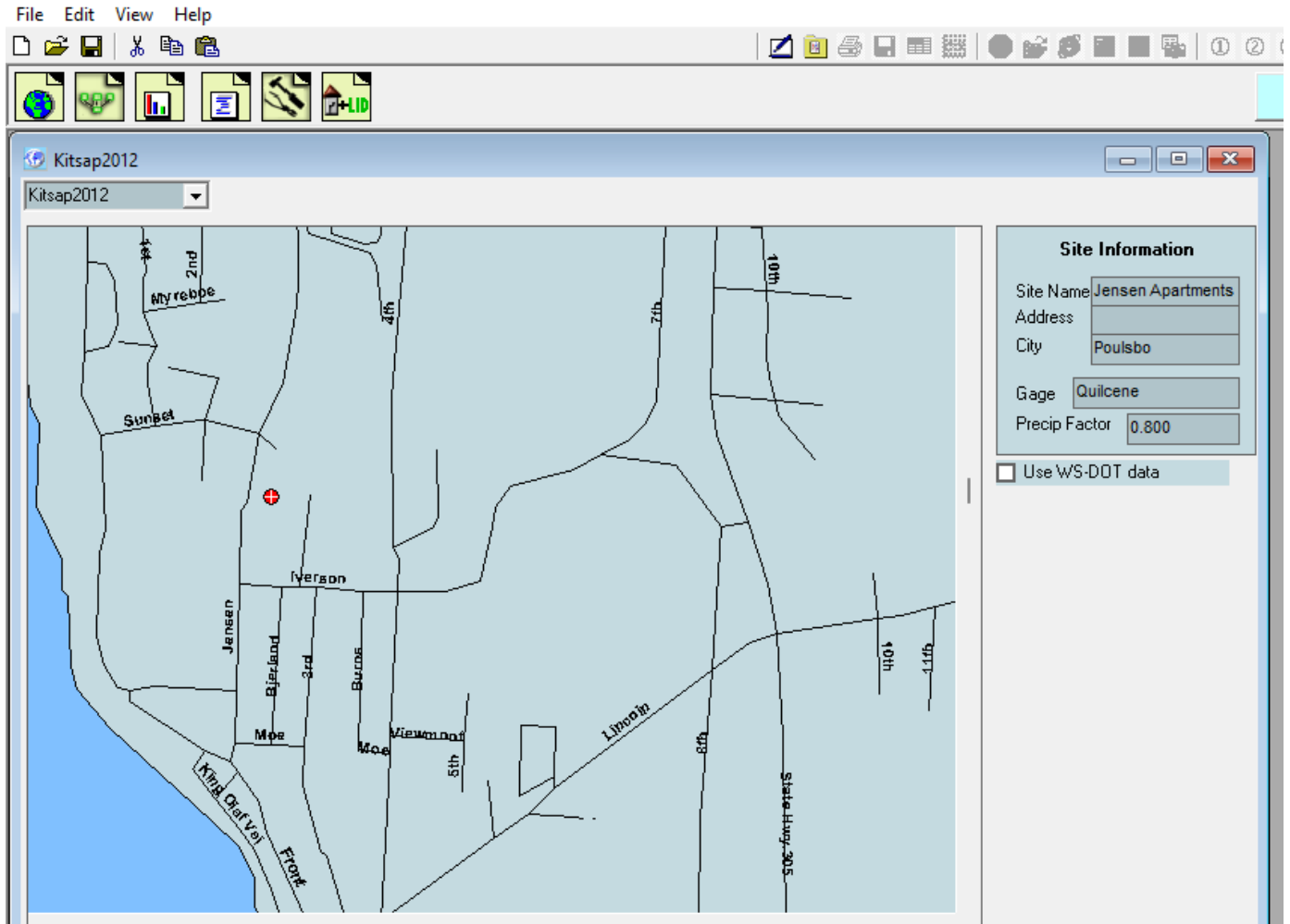
© 2025 Wavin Wavin reserves the right to make alterations without prior notice. Due to continuous product development, changes in technical specifications may change. Installation must comply with the installation instructions.



Engineering • Planning

V. Biopod™ Vault Water Quality Sizing

The Pollution Generating Impervious Surfaces consist of the 0.2815 acres of driveway, 0.0416 acres of sidewalk, and 0.0944 Acres of Landscaping (sidewalks and Landscaping including from the proposed Pocket Park) were inputted into the Mitigated Land Use Basin in the WWHM2012 model:



WWHM2012 WQ Flow Calc with park

File Edit View Help

Basin Help

Schematics

SCENARIOS

Predeveloped

Mitigated

Run Scenario

Basic Elements

Pro Elements

LID Toolbox

Commercial Toolbox

Move Elements

Save x,y Load x,y

Basin 1 Mitigated

Subbasin Name: Basin 1 Designate as Bypass for POC

Flows To: Surface Interflow Groundwater

Area in Basin Show Only Selected

Available Pervious	Acres	Available Impervious	Acres
<input checked="" type="checkbox"/> C, Pasture, Mod	.0944	<input checked="" type="checkbox"/> ROADS/MOD	.2815
		<input checked="" type="checkbox"/> SIDEWALKS/MOD	.0416

Pervious Total: 0.0944 Acres

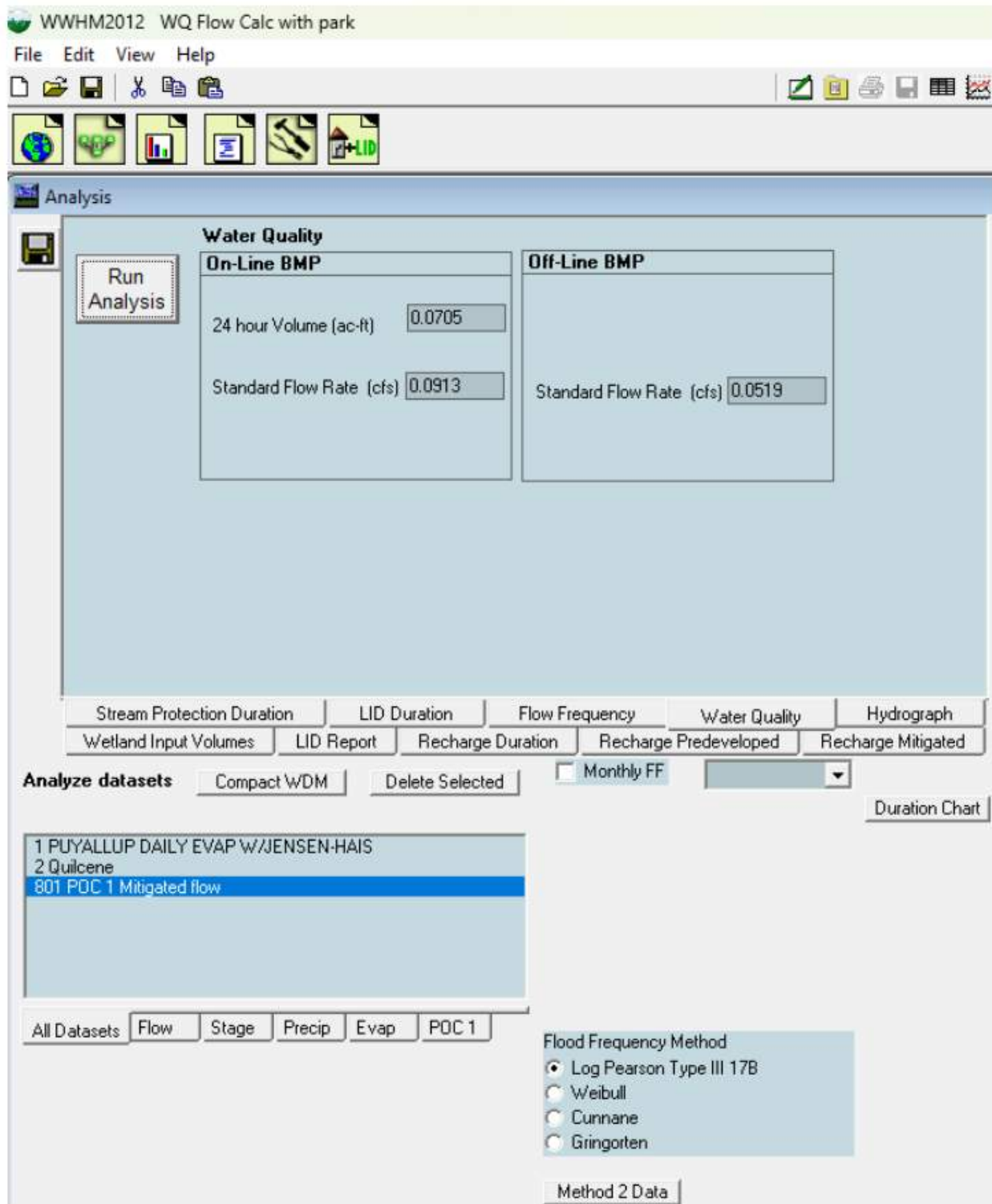
Impervious Total: 0.3231 Acres

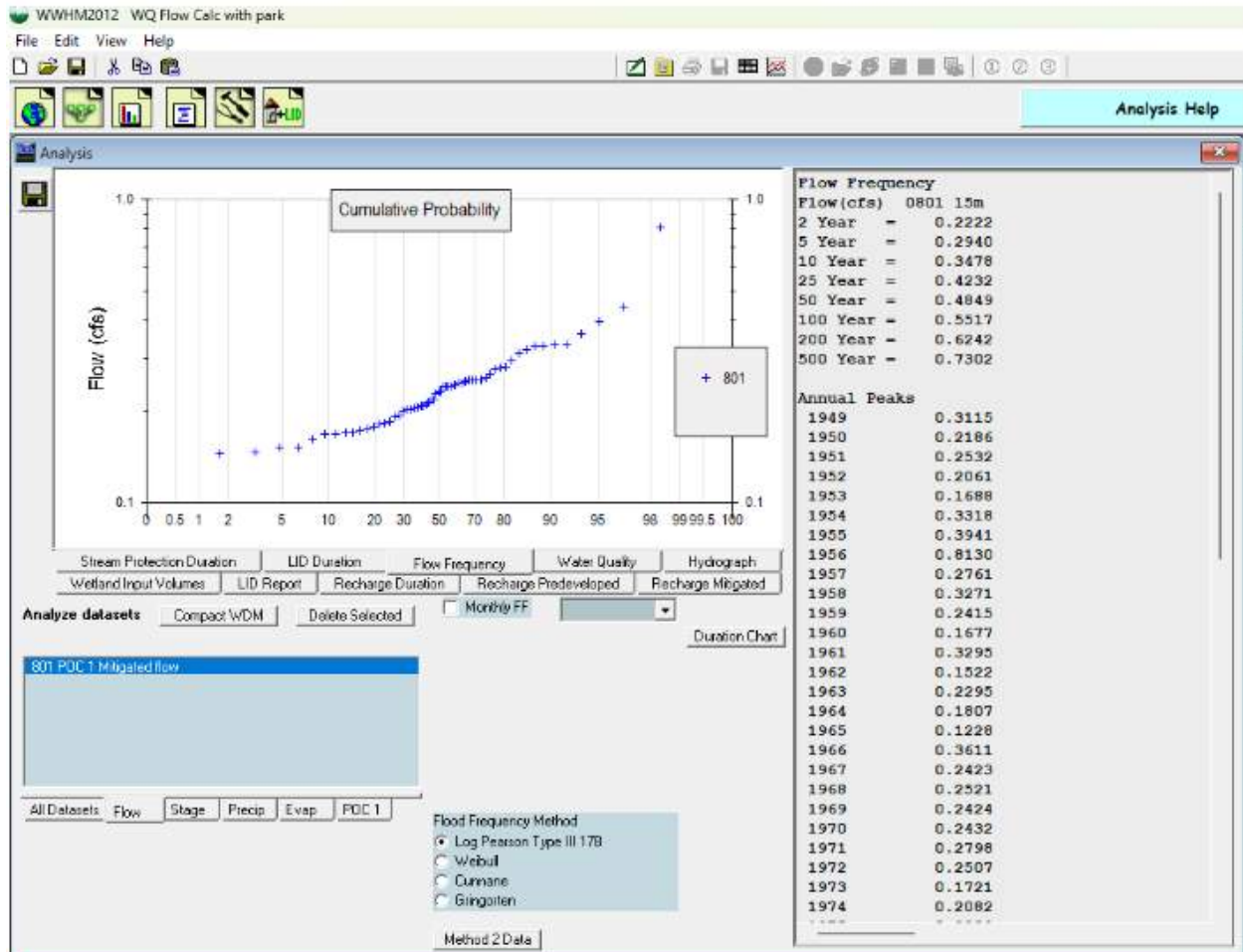
Basin Total: 0.4175 Acres

Deselect Zero Select By: GO

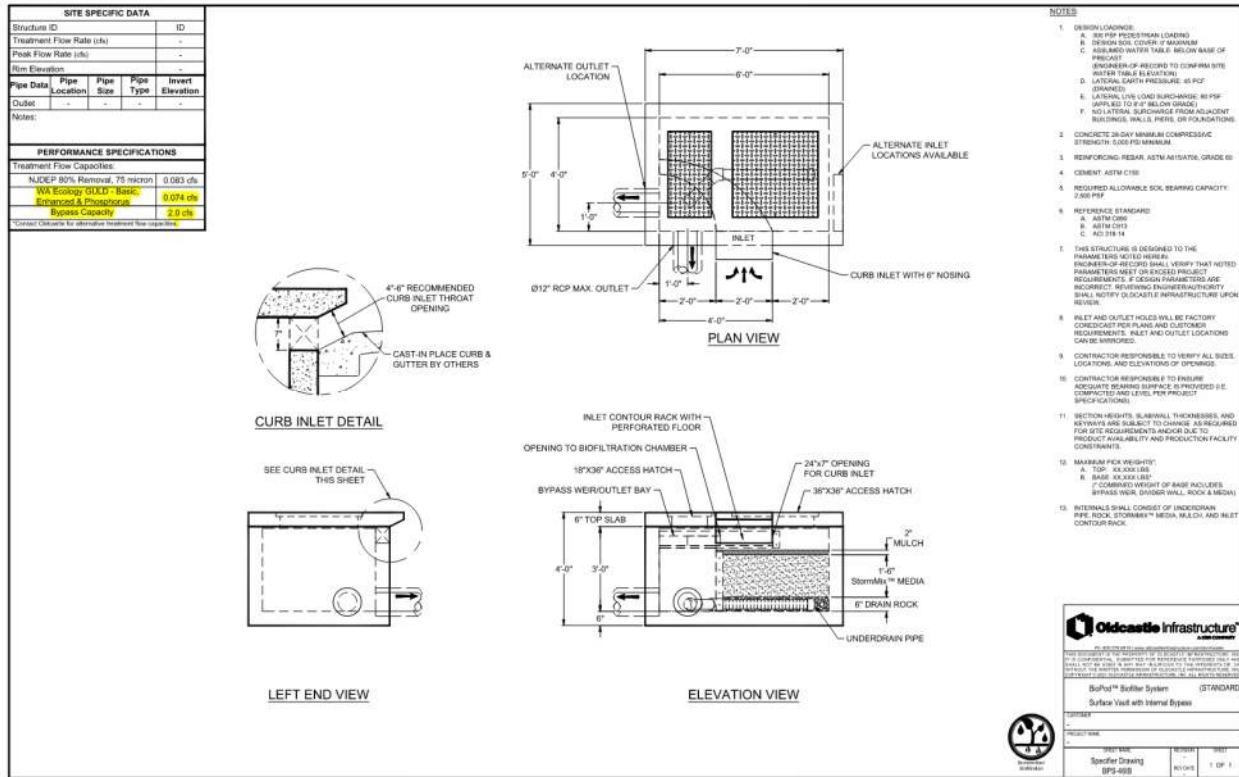


The water quality off-line BMP flow rate of 0.0519 cfs and a 100-yr peak flow of 0.55 cfs were outputs from the PGIS and non-PGIS surfaces considered in the water quality catchment areas:





With these calculated flows, a BioPod™ Biofilter System Surface Vault BPS-461B with internal bypass was selected for it’s treatment capacity, bypass capacity, and DOE GULD for Enhanced Treatment capacity.



VI. UPSTREAM BASIN

There are no upstream basins contributing runoff onto the NORA & VALARI Residences project site given all of it’s public road frontages and their separated stormwater conveyances.

VII. DOWNSTREAM ANALYSIS

An extensive downstream analysis was required by the City of Poulsbo and was performed by the Project Engineer in 2020 for a previous proposal known as Poulsbo Place 2 Division 8. The findings and results of this downstream analysis are attached in Appendix B. In summary, the downstream analysis concluded that no downstream catch basin surcharging was determined with the 100-yr, 24 hour peak flow from the developed site being restricted to 0.67 cfs by way of a detention system.

VIII. SILT AND EROSION CONTROL

A Storm Water Pollution Prevention Plan and Narrative will be prepared and included in the future clearing and grading permit construction drawings following Site Plan Approval by the

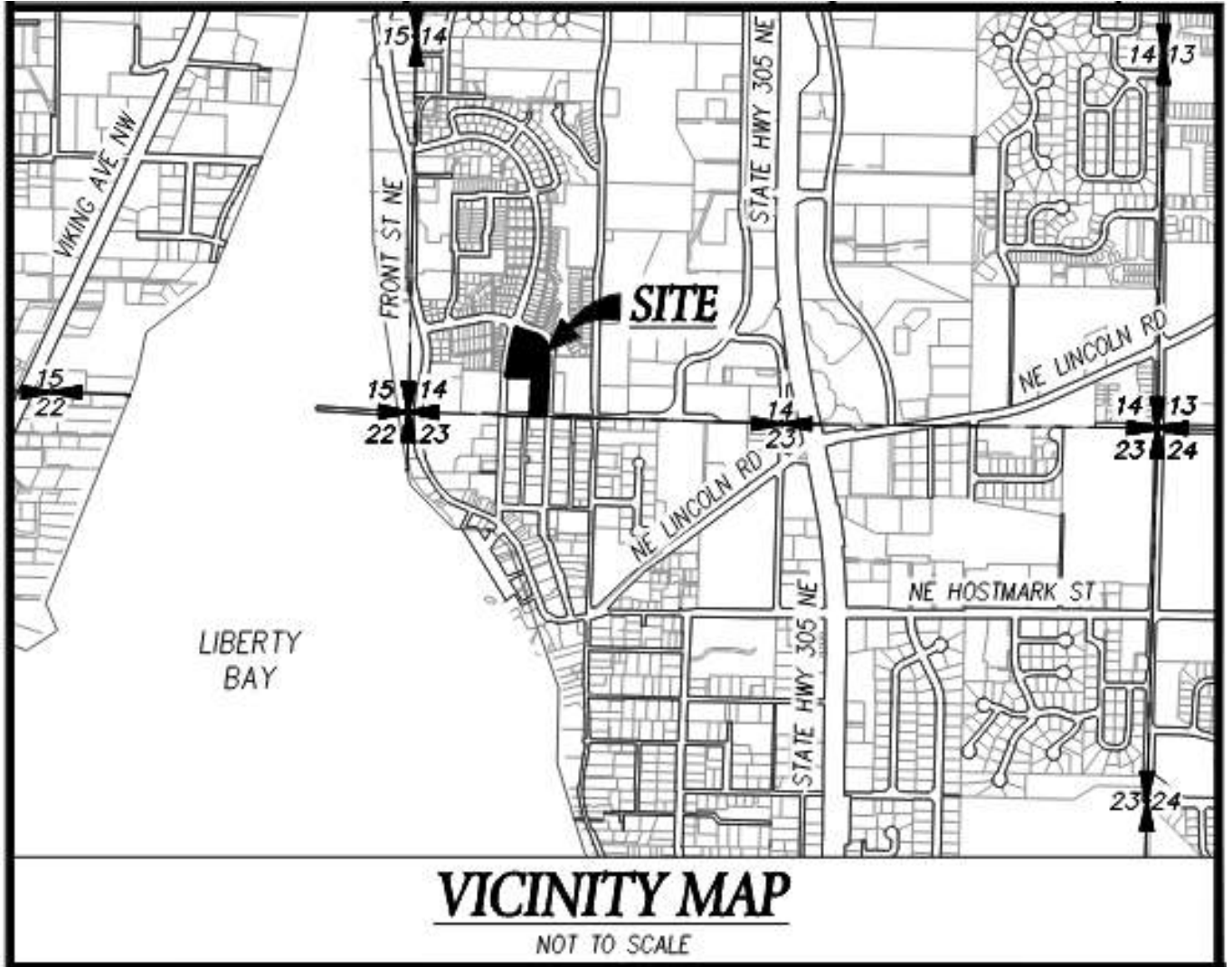


City of Poulsbo. Silt fencing will be placed along the down-gradient side of the clearing limits both for sedimentation control and to delineate the boundary of grading activity limits. Stabilized rock Construction entrances will be provided to keep sediments from tracking onto the adjacent public streets. Jute matting will be specified on all slopes exceeding 33%, and all disturbed soils will receive soil amendment as part of the landscaping installation. Additionally, the SWPPP will include notes for Erosion and Sediment Control should additional BMP's during construction be identified, as well as for specifying maintenance requirements and responsible parties.

An Erosion Control Performance Bond will be required to be kept during the life of construction and remain in force until the site is stabilized. Lastly, a Construction Stormwater Discharge Permit will be required to be obtained by the applicant from the WA State Department of Ecology prior to commencing site clearing activities, and any runoff discharge monitored and reported to DOE by a Certified Erosion Control Lead



APPENDIX A VICINITY MAP





POULSBO PLACE II DIVISION 8

**DOWNSTREAM CONCERN:
CB BUBBLE UP DURING
STORM EVENTS**

**DOWNSTREAM CONCERN: 18" PVC
SLEEVE PLACED IN COLLAPSED 30"
CMP OUTFALL PIPE**

SDMH-26 TYPE II 48"
RIM ELEV 49.11
INV ELEV 46.49-6" CONC IN NW
46.43-4" PVC IN E
43.64-6" CONC IN W
41.23-9" CONC IN W
38.83-12" CONC IN N
38.81-15" CONC OUT S

CB-19 TYPE I w/GRATE
RIM ELEV 44.96
INV ELEV 43.31-?" OUT W
(CANNOT REMOVE LID)

SDMH-11 TYPE II 48"
RIM ELEV 44.85
INV ELEV 41.68-8" PVC IN E
41.17-8" CONC IN NW
40.42-12" PVC IN SE
40.37-10" CONC IN E
37.64-12" PVC IN W
37.59-12" CONC IN W
32.25-15" CONC IN N
32.09-15" PVC OUT S

SDMH-1 TYPE II 48"
RIM ELEV 33.84
INV ELEV 31.68-6" CONC IN NW
32.18-6" CONC IN NE
29.27-6" CONC IN W
27.27-15" CONC IN N
27.16-15" CONC OUT S

SDMH-3 TYPE II 48"
RIM ELEV 21.03
INV ELEV 14.15-7" CONC IN NE
14.27-18" CONC IN NW
14.27-18" CMP OUT S

INV ELEV 15.13-15" CONC IN N
14.34-15" CONC OUT SW

SDMH-4 TYPE II 48"
RIM ELEV 18.22
INV ELEV 11.35-18" CMP IN N
11.27-18" PVC IN N
11.34-18" CMP OUT SW

SDMH-5 TYPE II 48"
RIM ELEV 18.22
INV ELEV 11.35-18" CMP IN N
11.27-18" PVC IN N
11.34-18" CMP OUT SW

SDMH-8 TYPE II 48"
RIM ELEV 17.99
INV ELEV 15.00-10" PVC IN N
9.08-18" PVC IN NW
8.73-18" PVC OUT SW

CB-12 TYPE II
RIM ELEV 15.77
INV ELEV 12.18-12" CONC IN NE
11.84-12" PVC OUT SE

SDMH-7 TYPE II 48"
RIM ELEV 15.30
INV ELEV 11.53-6" PVC IN NW
11.44-12" PVC IN NW
9.45-6" PVC IN E
9.43-12" PVC IN SE (SDMH-10)
7.96-18" PVC IN N
7.95-18" PVC OUT SW

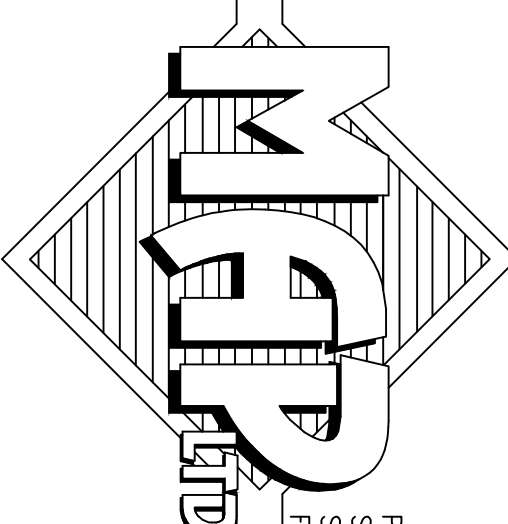
SDMH-10 TYPE II 48"
RIM ELEV 15.95
INV ELEV 9.67-12" PVC IN NE
9.00-18" PVC IN SE
8.90-18" PVC IN SW
9.36-12" PVC OUT NW (SDMH-10)

SDMH-8 TYPE II 48"
RIM ELEV 10.97
INV ELEV 6.56-18" PVC IN NE
6.48-18" PVC OUT SW

SDMH-9 TYPE II 48"
RIM ELEV 9.68
INV ELEV 3.05-24" CONC IN NE
6.74-6" PVC IN W (DROP)
3.73-18" PVC IN NE (DROP)
-3.31-24" CONC OUT SW

OUTFALL INV. EL. = -7.1

CALCULATED	DESIGN	DRAWN	CHECKED	DATE	SCALE	JOB NO.	SHEET
		KPF		3/19/14	1" = 50'	5987	



MTP
ENGINEERING PLANNING

P.O. Box 720 • 11309 Clear Creek Road N.W.
Silverdale, Washington 98383
Silverdale 692-5525 • Seattle (206) 682-557
Fax (360) 698-0546

FOR
**POULSBO PLACE DIVISION 8
DOWNSTREAM ANALYSIS**

The NORA & VALARI Residences

**APPENDIX C 2020 PDSR POULSBO PLACE 2
DIVISION 8**



Engineering • Planning



P.O. Box 720 • 10045 Old Frontier Road NW
Silverdale, Washington 98383
(360) 692-5525 • Seattle (206) 682-5574
www.map-limited.com

ENGINEERING • SURVEYING • PLANNING

**POULSBO PLACE 2 DIV. 8
REDEVELOPMENT MASTER PLAN AMENDMENT
AND SITE PLAN REVIEW
PRELIMINARY STORM DRAINAGE REPORT**

**For: Phase II, LLC
c/o David Smith & Mike Brown
3256 Weed Lane
Poulsbo, WA 98370
Phone: (360) 779-4614**

**Preparation Date: 3-17-20
Job No. 5987.00**

“I hereby state that this Drainage Report has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community of professional engineers. The analysis has been prepared utilizing procedures and practices specified by the City of Poulsbo and within the standard accepted practices of the industry. I understand that the City of Poulsbo does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities prepared by me.

3-23-20



NOTE: THIS DOCUMENT IS INSCRIBED
WITH A DIGITIZED SIGNATURE BY THE
ENGINEER AS PROVIDED BY WAC
196-23-070(2)

TABLE OF CONTENTS

PROJECT OVERVIEW3

INTRODUCTION3

REFERENCES4

DOWNSTREAM ANALYSIS5

 A. Existing Basin Conditions.....6

 B. Basin with PP2 Div. 8 Project On-Line7

 C. Staff Question: Which tide level causes no surcharge in the pipe network?8

 D. Staff Question: Would a larger outfall pipe eliminate the surcharge of pipes at a MHHW tidal event?.....9

 E. Analysis: One pipe upsized, no detention at PP 2 Div 8.....11

 F. Analysis: One pipe upsize, CMP Pipe replaced, no PP@ Div 8 Detention12

 G. Analysis: One pipe upsize and PP2 Div 8 with detention.....13

 H. Analysis: One pipe upgrade, PP@ Div 8 with detention, and 24" outfall improvement
 14

 I. Analysis: No downstream pipe improvements, PP2 Div 8 with detention and no junction CB rim surcharges15

 J. Analysis: PP2 Div 8 with detention, outfall upgrade to 24"16

 K. Output: Comparison of maximum water surface elevations existing condition versus basin with PP2 Div 8 detention with $Q < 0.67$ cfs.....17

DETERMINING CONSTRUCTION SITE SEDIMENT DAMAGE POTENTIAL18

 Appendix: A – K Output Reports for Analyses
 L- As-Built Info
 M- Technical Memorandum Sizing Underground Detention Vault

POULSBO PLACE 2 DIV. 8
2020 MASTER PLAN AMENDMENT & SITE PLAN REVIEW
PRELIMINARY STORM DRAINAGE REPORT

PROJECT OVERVIEW

Poulsbo Place is the redevelopment of an area of Old Military Housing near downtown Poulsbo. The Poulsbo Place 2 project is the second phase of the overall project, and Divisions 5, 6 & 7 have been completed. The last phase is Division 8, and a Mixed-Use Building and Multi-family building(s) are proposed. The site is located north and east of the Poulsbo Post Office, and is bounded by 3rd Avenue and Jensen Way, in Section 14, Township 26 North, Range 1 East, W.M., in Kitsap County, Washington.

INTRODUCTION

This Preliminary Storm Drainage Report (PSDR) is being prepared at the request of The City of Poulsbo Engineering Department based upon comments received in a Pre-Application Conference letter dated December 17, 2012 for Division 8, Poulsbo Place Master Plan Amendment, as well as follow-up Pre-Application Meetings held on July 31, 2018, December 18, 2018, and February 18, 2020. The comments found on Page 10 of 24 are as follows:

14. *All temporary and permanent storm system and erosion control measures shall be designed, constructed, maintained, and governed per the following, as adopted by the City of Poulsbo:*
 - a. *The Washington state Department of Ecology (DOE) Stormwater Management Manual for the Puget Sound Basin (1992)*
 - b. *The Kitsap County Stormwater Management Design Manual (1997)*
 - c. *City of Poulsbo standards and ordinances*
 - d. *All conditions of approval associated with any clearing and/or grading permits*
 - e. *Recommendations of the geo-technical engineer*

15. *A preliminary storm drainage report (PSDR) and plan was submitted and accepted for Poulsbo Place II in April 2002 and revised in January 2004 with the Master site plan application. A final drainage report shall include an analysis of the current proposed drainage design and how it follows the 2004 accepted design concepts, which satisfies the City Engineer that the design complies with all City requirements and protects downstream properties and the surrounding area from damage and any adverse impacts. Appropriate documentation such as calculations and manufacturer product specifications should accompany the updated drainage report.*

16. *There are some downstream pipe capacity and flow concerns that will need to be addressed for this project. Projects that have potential to create downstream flooding cannot be approved without addressing the outstanding issues. The City*

has no immediate plans to address these issues, so the applicant may need to investigate possible corrections in order to allow use of the street drainage pipes. While the original PSDR supposedly accounted for existing street drain capacity, with the below identified issues the previous PSDR assumptions may not be valid. Record drawings are available for some sections of the Jensen conveyance but field verification would be wise. Joe Walker in the Public Works Department may be able to give some history of repair attempts for the below situations. Pat Fuhrer was provided with storm drainage plan sheets for Jensen Way to assist with flow evaluation.

- a) The CB on Jensen in front of the Post Office driveway backs up creating minor street “flooding during any sizeable rain events. The Public Works Department has explored this situation and believes there is a compromised pipe downstream of this CB. The fact that some of the drain pipes in this vicinity are a relatively small 12" size likely does not improve matters for adding the increased flow that Div. 8 would be adding.*
- b) Ultimate discharge of this pipe system to Liberty Bay happens at an outfall near the Anderson Parkway gazebo. Formerly a 30" CMP pipe, this has been reduced to an 18" PVC sleeve section when the CMP collapsed. This final outfall diameter might also affect the new ultimate capacity of the Jensen conveyance.*

Previous PSDR’s prepared by MAP, Ltd. which were submitted with prior land use and final construction applications for Poulsbo Place 2, are based upon a vested PSDR entitled “Poulsbo Place II Preliminary Storm Drainage Report” prepared by Triad Associates dated April 5, 2002, with a January 16, 2004 revision date.

In 2015, a pre-application was held and City Engineering Staff requested a revised downstream pipe capacity analysis, as the 2004 Triad PSDR downstream pipe network backwater flow capacity analysis was not calculated with a submerged outlet at a Mean Higher High Water tidal event at the outfall at Anderson Parkway. Over the course of several months, City Staff researched as-built records and performed several dye tests on the downstream pipe network, particularly below Front Street in Anderson Parkway, to identify the existing pipe network. This additional information was inputted into a hydraulic model to determine the existing capacity of the trunk line at a 100-yr., 24 hr. peak stormwater event occurring simultaneously at a MHHW tide event for the Existing Drainage Basin condition and with the Poulsbo Place 2 Division 8 project on-line.

The existing drainage basin condition analysis shows that one catch basin, located on the east side of Jensen Avenue and labeled as “J10”, surcharges 1.43 feet (17”) in the existing condition and 1.81 feet (22”) with the PP@ Div. 8 project on-line.

REFERENCES

Poulsbo Place II – Preliminary Storm Drainage Report, TRIAD Associates (TRIAD), issued April 5, 2002, and revised January 16, 2004.

Anderson Parkway Outfall Capacity – Technical Memorandum, Parametrix (PMX), dated December 15, 2014.

Storm and Sanitary Analysis (SSA) 2014 SP1, Autodesk, Inc., Version 8.1.62.1, July 17, 2014.

Hydraflow Hydrograph Extension for AutoCAD Civil 3D 2015, Version 10.4, Autodesk Inc.

Relation between various datum planes Location 67 Poulsbo, U.S. Army Corps of Engineers, website source.

Front Street Reconstruction Storm Drain Plan “As-Built”, Roats Engineering, February 10, 1989.

Jensen Way N.E. Road, Storm and Sanitary Sewer Plan/Profile, Pac-Tech Engineers, Inc., December 1991.

DOWNSTREAM ANALYSIS

Pre- and Post-Division 8 drainage sub-basins were identified as shown in the Appendices based upon previous basin descriptions in the TRIAD PSDR and PMX Outfall Capacity Analysis TM, and modified based upon LIDAR topographic contour information provided by Kitsap County.

Topographic survey information gathered for the original Poulsbo Place project was used in the TRIAD PSDR for the downstream stormwater trunkline pipe analysis, but was supplemented for this analysis after detailed investigative work was performed by City Engineering Staff. As-built information was found for the Front Street improvements from 1989, which provided additional critical information that provides better predictions of hydrologic and tidal events and impacts for this analysis.

The storm trunkline was found to contain an additional 24” concrete pipe inlet to Junction 1 in Anderson Parkway, that was found to still be “live”. This 24” pipe purportedly goes under the building and a basement at the southwest corner of Front Street and the entrance to Anderson Parkway, however the location of the “videoed” catch basin was never found. This basement floor elevation was measured and found to be essentially the same elevation as a MHHW tide event of 8.7 ft. NAVD 88 datum.

From this 24” terminus at an assumed J-16 defined in the model, a 12” pipe was found by video inspection to exist and connect to J-15 and then to J-5. Based upon this new information J-5 was found to be essentially a “flow-splitter”, and was defined as such in the model. The 18” trunkline reaches its capacity, then excess water spills into the 12” overflow pipe and drains to J-1 via the 24” pipe.

Upstream of J-5 (SDMH-7 on the Basin Map), the system in Jensen Way N.E. is found to be consistent with the Pac-Tech drawings as verified by the ADA topography survey for the Poulsbo Place 2 project.

In this 2020 update to the PDSR, please note the prior reference to ALC (Assisted Living Center) in the report are no longer valid for the project as currently proposed. Additionally, a Technical Memo from the Project Engineer is attached in the Appendices and concludes that an underground concrete detention vault is more suitable for this project due to the invert elevation and covering height limitations. Also, a concrete detention vault is thought to be a more structurally-enhanced feature with it’s proximity to surcharging from adjacent foundations.

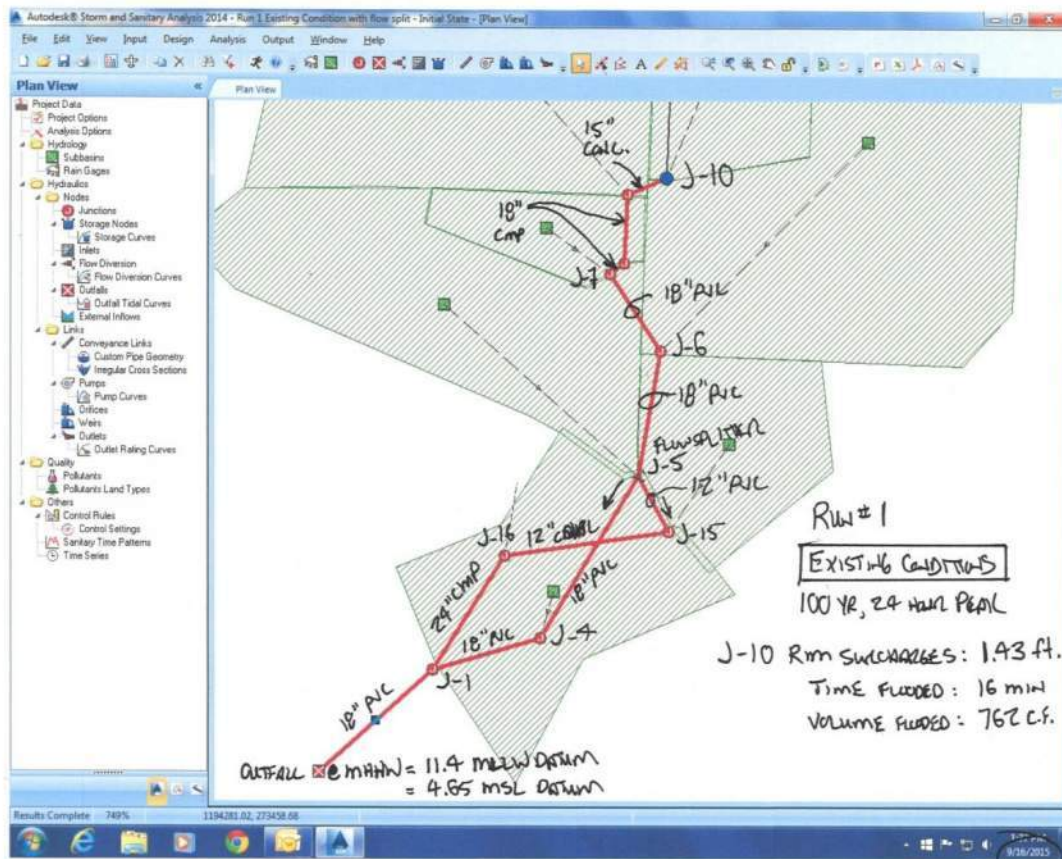
A. Existing Basin Conditions

SSA Model inputs and output findings are detailed in the appendices, and summarized below as follows:

The existing Basin Analysis performed by the SSA Software yielded the results shown in the appendices, for a 100-yr., 24 hr. peak storm event occurring at a mean higher high tide event of 11.4 MLLW datum (consistent with PMX TM).

Summary:

- All pipes are surcharged below J-10 (SDMH-2 on Basin Maps)
- J-10 is surcharged and would bubble-up 1.43 feet for 16 minutes and flow 5700 gallons of water along the east side of Jensen Avenue.

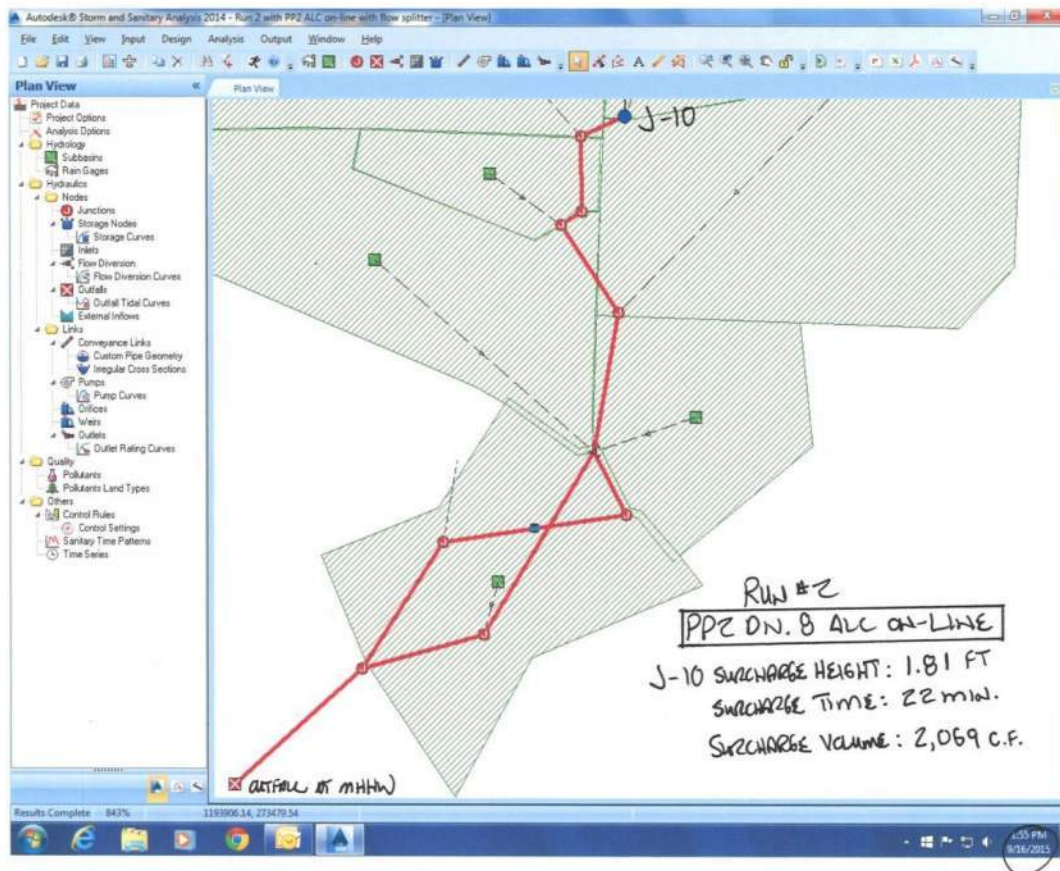


B. Basin with PP2 Div. 8 Project On-Line

A 95% impervious surface coverage was inputted for the PP2 Division 8 proposed site (Note: the KPUD Fiber Node site developed conditions were also utilized for this analysis).

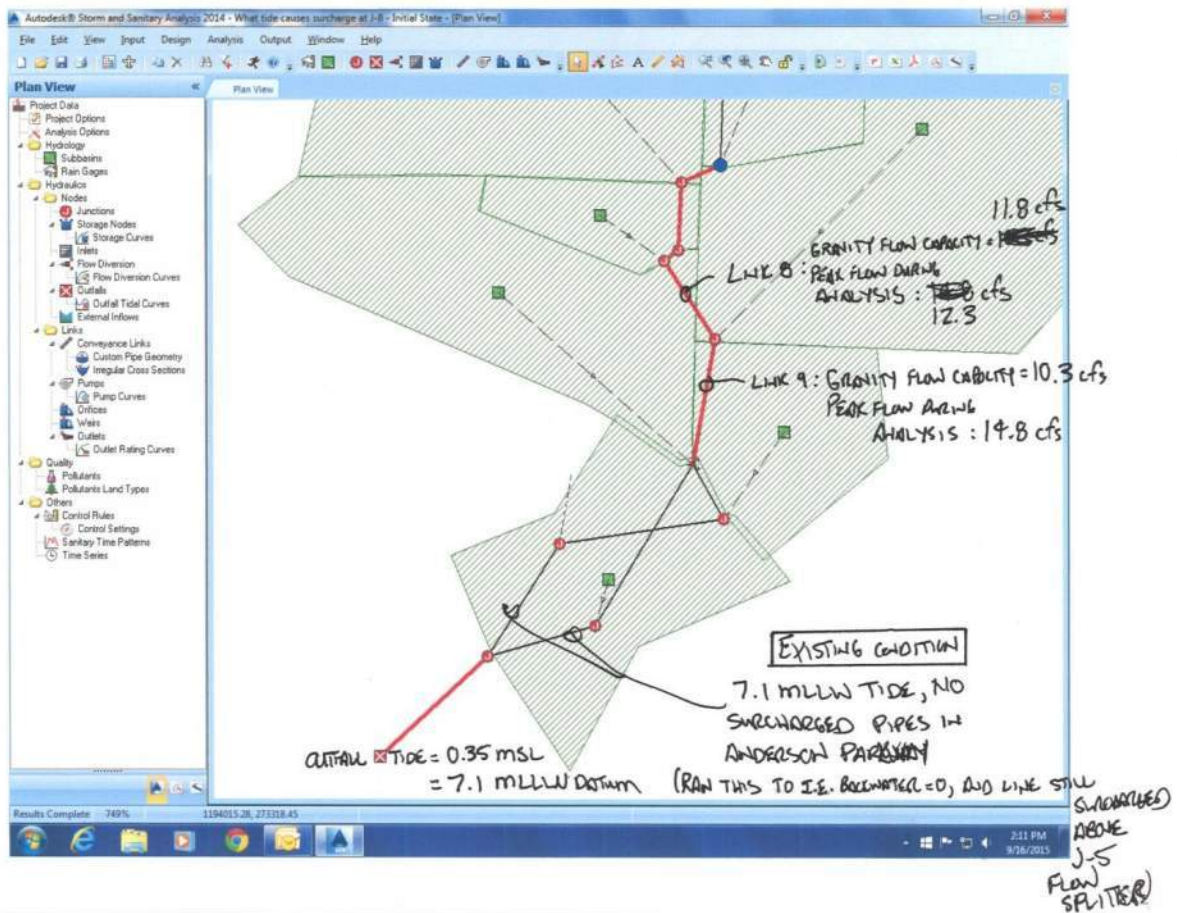
Summary:

- All pipes surcharged below J-10
- J-10 is surcharged and would bubble-up 1.81 feet for 22 minutes and flow approximately 15,500 gallons of stormwater along the east side of Jensen Avenue



C. Staff Question: Which tide level causes no surcharge in the pipe network?

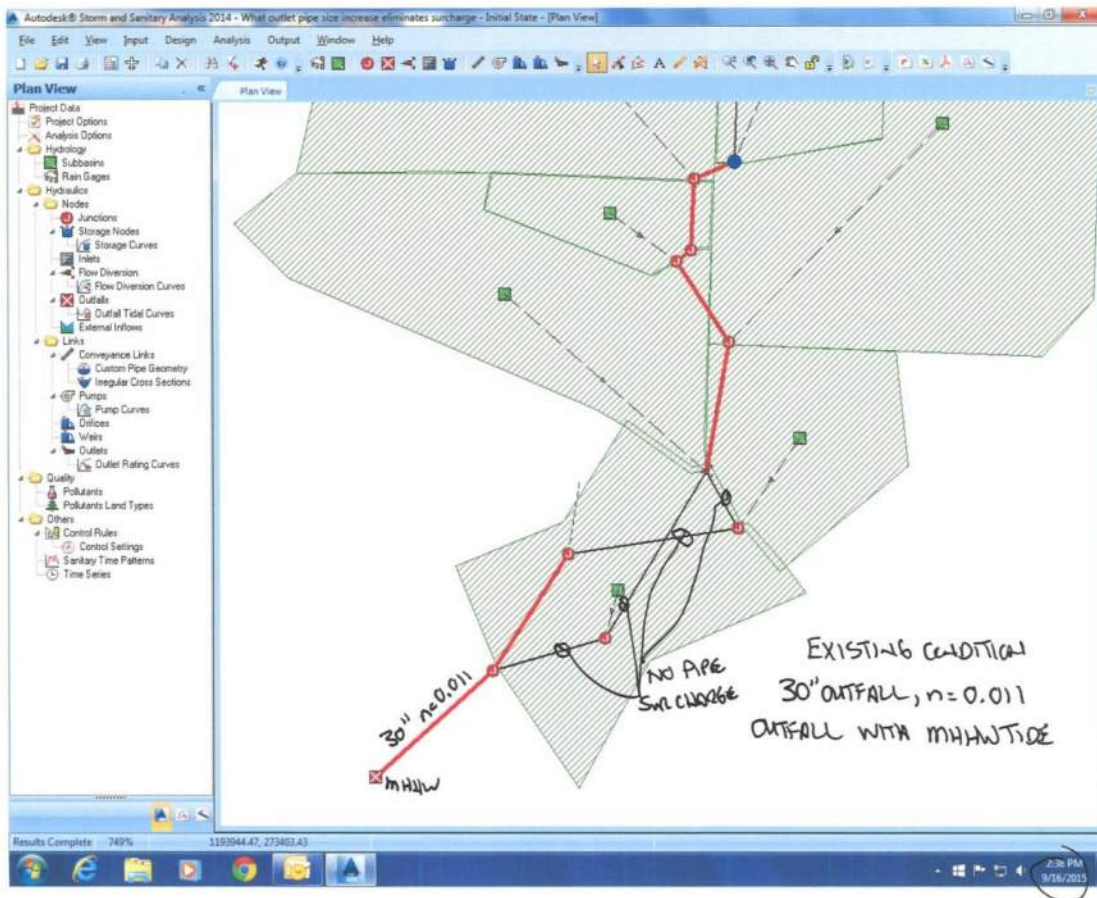
For the existing condition, we iteratively lowered the tailwater tidal elevation to 7.1 MLLW datum, and found this tide event had no backwater effect upon the storm pipe trunkline in Anderson Parkway. However, we found that the storm pipe network above the flowsplitter J-5 remained surcharged up to J-10.

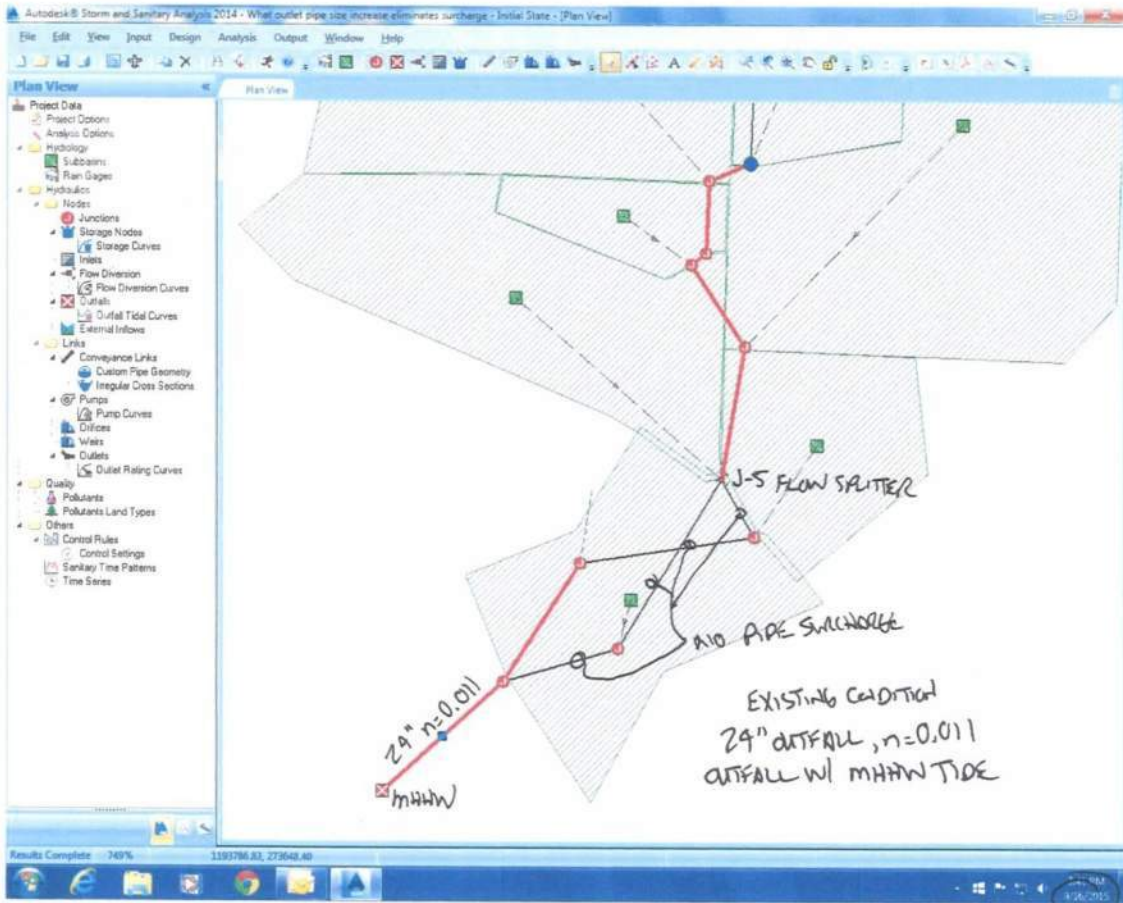


D. Staff Question: Would a larger outfall pipe eliminate the surcharge of pipes at a MHHW tidal event?

For this scenario, we upsized the outfall from the current 18" to 24", and then to 30", with the output shown in the appendices and summarized below.

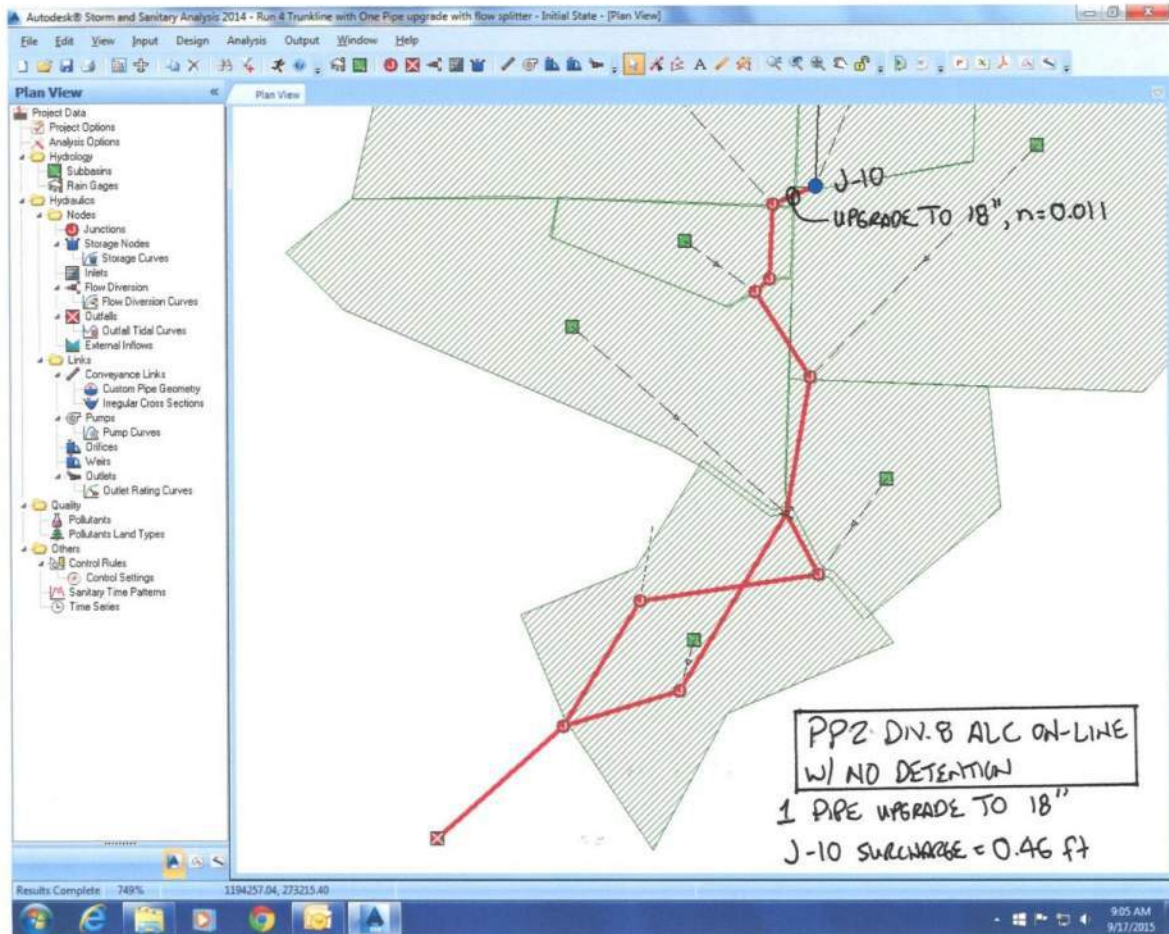
We found that at a MHHW tide event, the 24" pipe under the building remained surcharged, however both the larger outfall pipes relieved the surcharge in the pipe system below J-5 flow-splitter.





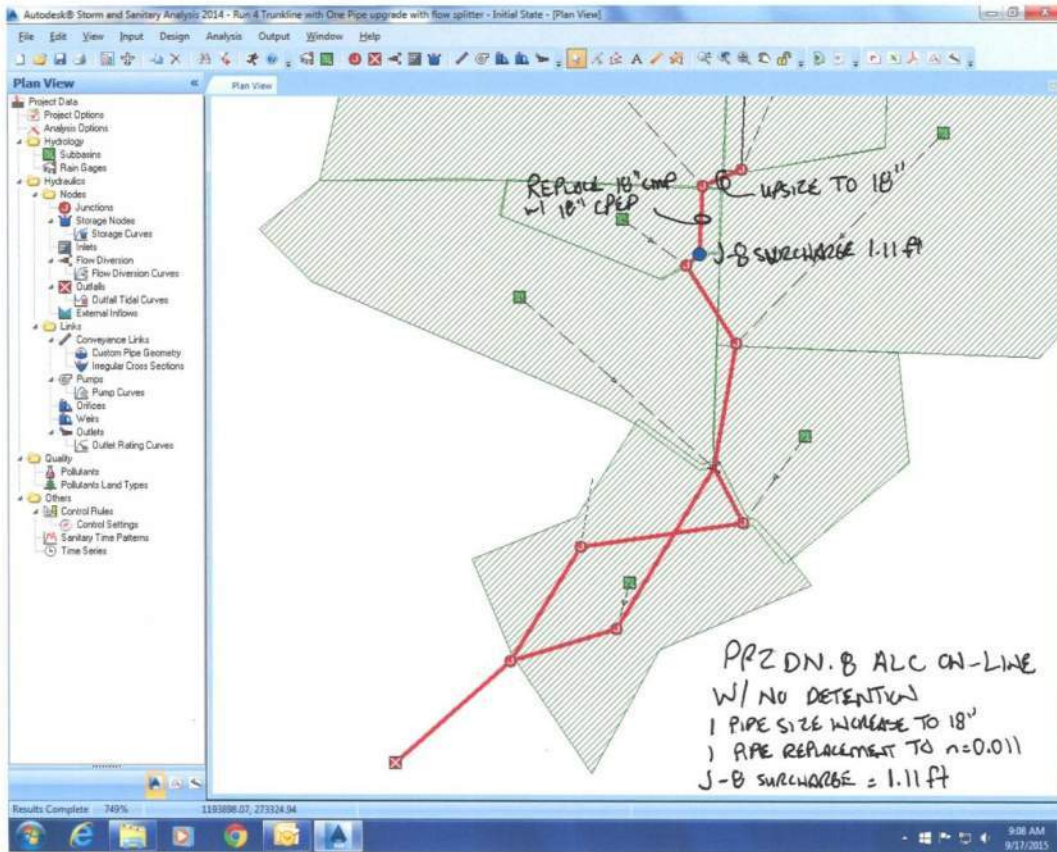
E. Analysis: One pipe upsized, no detention at PP 2 Div 8

For this possible downstream improvement alternative to eliminate the surcharge at J-10, we upsized the 15" pipe between J-10 and J-9 to 18". The model still showed an approximately 6" surcharge at J-10.



F. Analysis: One pipe upside, CMP Pipe replaced, no PP@ Div 8 Detention

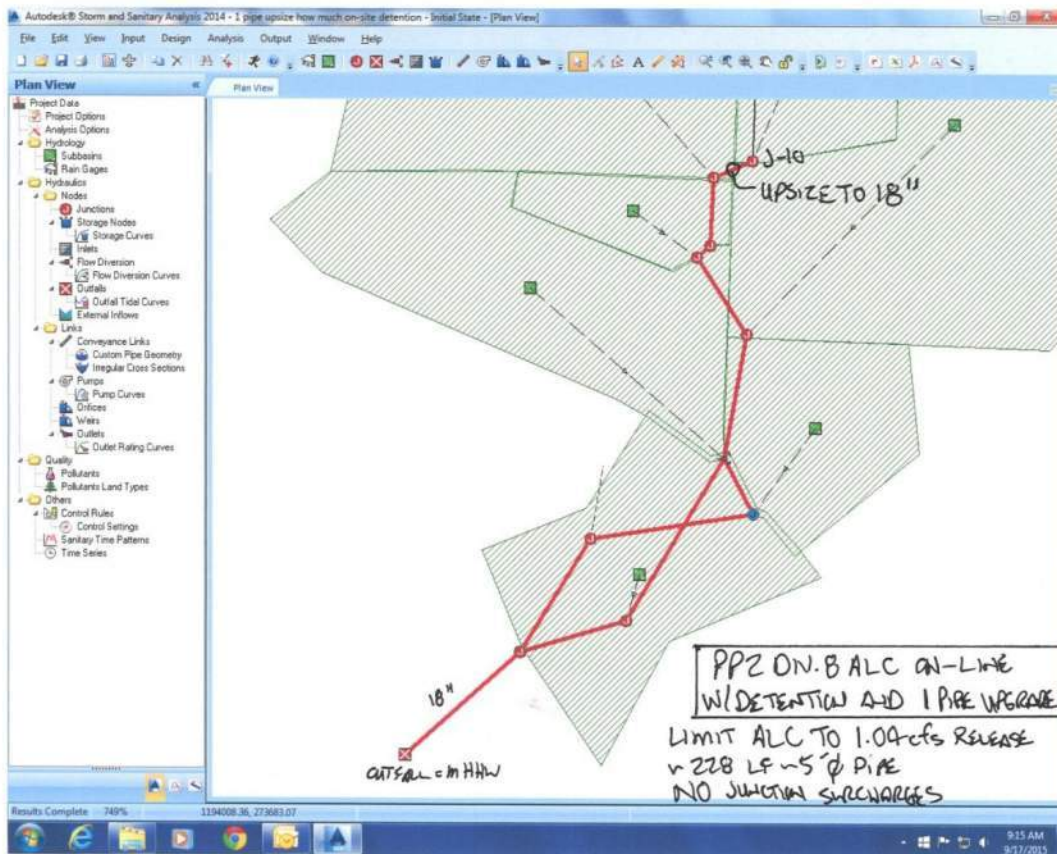
Another potential downstream scenario was analyzed whereby the 18" CMP (n=0.022) between J-9 and J-8 was modeled as an 18" pipe with a smoother friction factor of n=0.011. This improvement, together with the 18" pipe enlargement from J-10 eliminated the surcharge at J-10 but caused a surcharge at J-8 of 1.11 ft., along the curb line in west side of Jensen by the Old City Hall building.



G. Analysis: One pipe upside and PP2 Div 8 with detention

This alternative was analyzed to determine how much on-site detention would be required at the PP2 Div 8 site with the one pipe upside to 18" below J-10. The SSA model showed no surcharge at J-10 when the flow was restricted to 1.04 cfs from the PP2 Div 8 site.

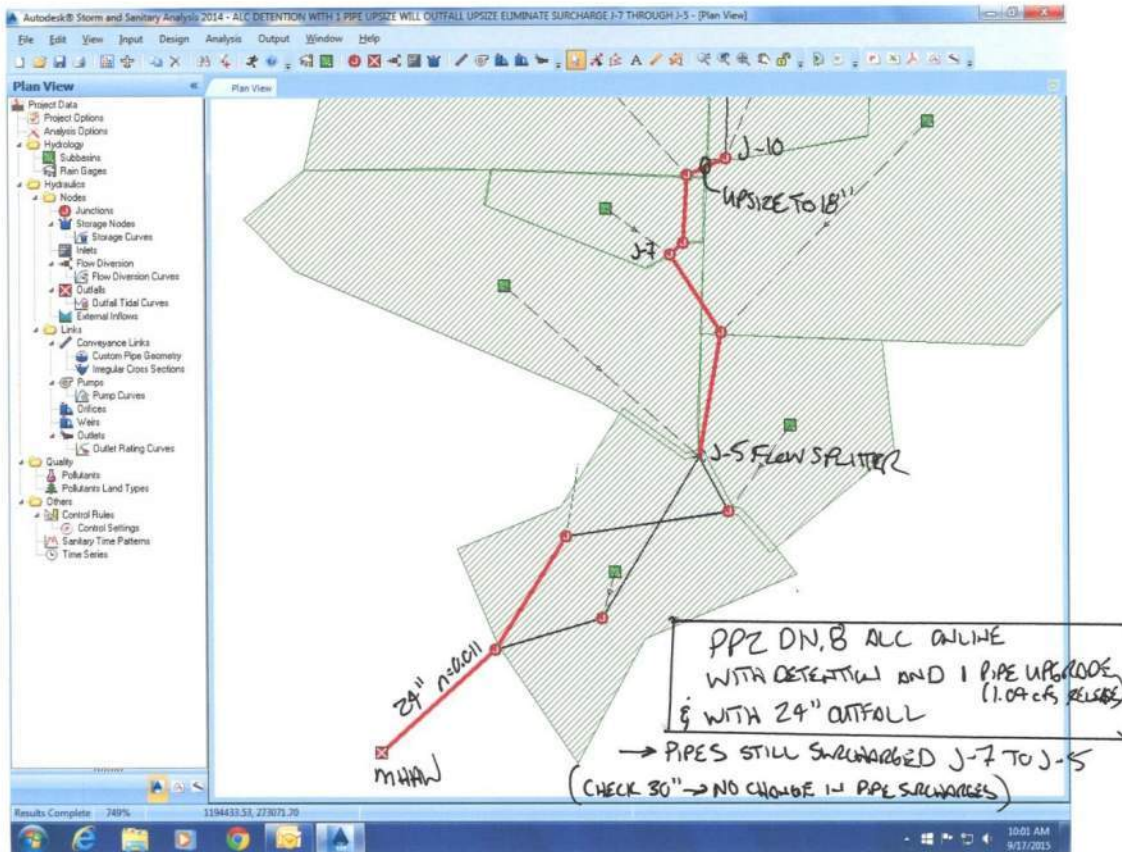
Using the hydraflow hydrograph extension software and performing level-pool routing, we found that 228 lineal feet of 60" diameter underground pipe would be needed to restrict the 100-yr. 24 hr. peak flow from the PP2 Div 8 site to 1.04 cfs.



H. Analysis: One pipe upgrade, PP@ Div 8 with detention, and 24" outfall improvement

This analysis was performed to verify if a larger diameter outfall pipe, coupled with the one pipe enlargement and on-site detention at the ALC site, would reduce the pipe surcharges downstream of J-10.

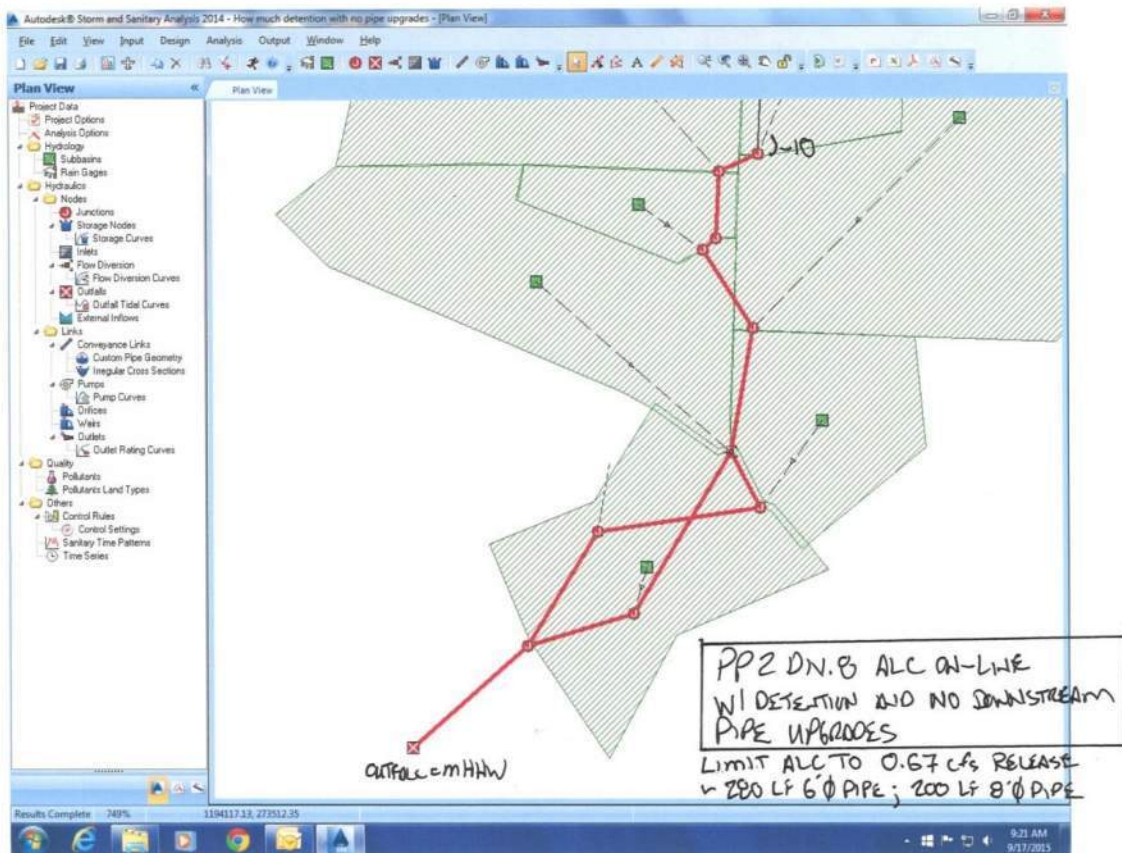
This analysis shows that consistent with the analysis done in Part (D), the pipe surcharges in Anderson Parkway, except for the 24" pipe under the building, are eliminated with the larger outfall pipe installed. However, even with the PP@ Div 8 site restricting its peak flow to 1.04 cfs, the pipe network is surcharged from J-10 to J-5 flow splitter.



I. Analysis: No downstream pipe improvements, PP2 Div 8 with detention and no junction CB rim surcharges

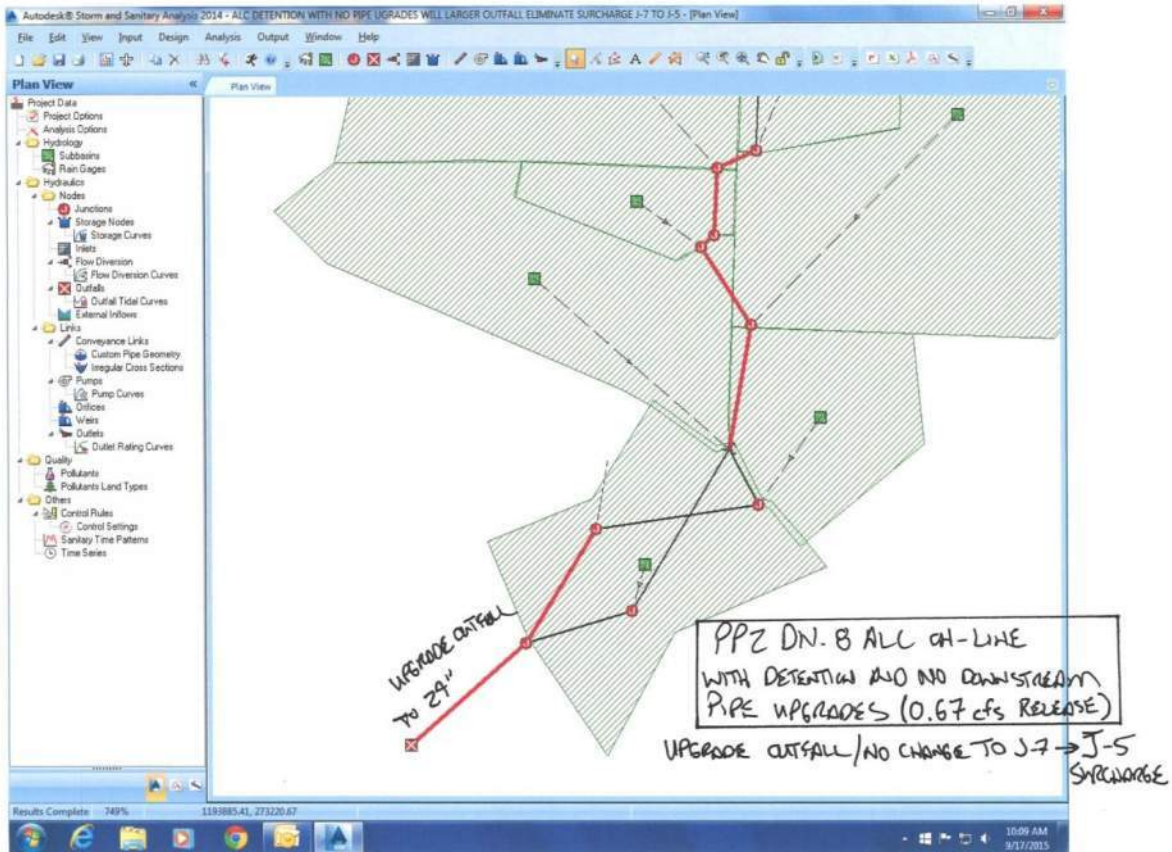
This analysis found that by restricting the flow from the PP2 Division 8 site to 0.67 cfs, no structure surcharges occur.

Using the hydraflow hydrograph extension software, we find that 280 lf of 72" or 200 lf of 98" diameter pipe will provide the necessary detention volume to restrict the peak flow to 0.67 cfs from the PP2 DIV 8 Site. However, based upon nearby structural loading concerns from adjacent foundations, an underground concrete vault 80'x20'x5' deep with 6" of dead storage was found to meet the necessary volume to restrict the peak flow to 0.67 cfs.



J. Analysis: PP2 Div 8 with detention, outfall upgrade to 24"

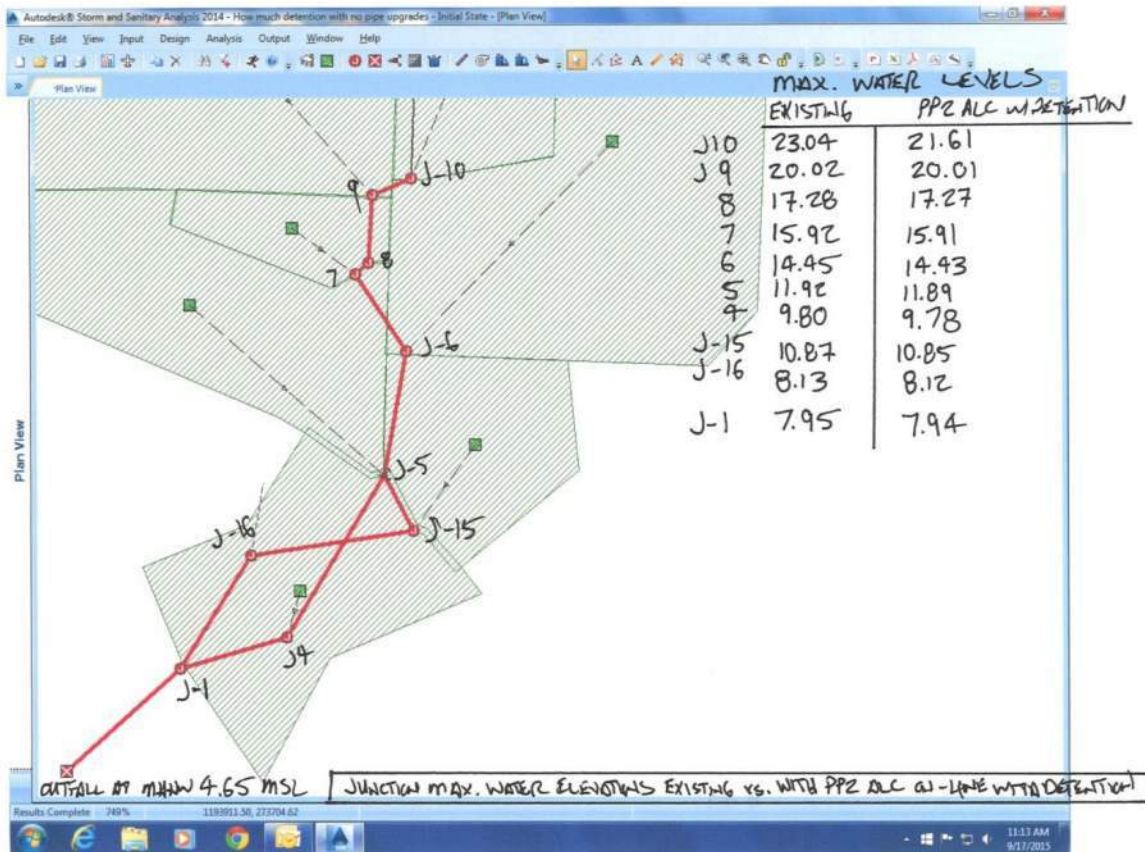
This analysis shows that the pipes are surcharged between J-10 and the flow splitter J-5, even with a larger outfall pipe installed.



K. Output: Comparison of maximum water surface elevations existing condition versus basin with PP2 Div 8 detention with $Q < 0.67$ cfs

This graphical analysis shows the SSA Model predicted maximum water levels in the structures downstream of J-10 in the existing condition (Part A herein) and with the PP2 Division 8 site with detention and restricting the outflow to 0.67 cfs (Part I herein)

In summary, we find that maximum water levels in all junctions are slightly lower with the flow restriction of 0.67 cfs and detention provided on-site limiting the post-developed peak flow to 0.67 cfs. No existing downstream flooding risk is increased with this flow restriction installed on the PP 2 Div 8 site.



DETERMINING CONSTRUCTION SITE SEDIMENT DAMAGE POTENTIAL

The following rating system allows objective evaluation of a particular development site's potential to discharge sediment. Permittees may use the rating system below or develop alternative process designed to identify site-specific features, which indicate that the site must be inspected prior to clearing and construction. Any alternative evaluation process must be documented and provide for equivalent environmental review.

Step 1 is to determine if there is a sediment/erosion sensitive feature downstream of the development site. If there is such a site downstream complete step two, assessment of hydraulic nearness. If there is a sediment/erosion sensitive feature and it is hydraulically near the site then go to step three to determine the construction site sediment transport potential.

STEP 1 - Sediment/Erosion Sensitive Feature Identification

Sediment/erosion sensitive features are areas subject to significant degradation due to the effect of sediment deposition or erosion. Special protection must be provided to protect them. Sediment/erosion sensitive features include but are not limited to:

A. Salmonid bearing fresh water streams and their tributaries or freshwater streams that would be Salmonid bearing if not for anthropogenic barriers;

No

B. Lakes; No

C. Wetlands; No

D. Marine near-shore habitat; Yes

E. Sites containing contaminated soils where erosion could cause dispersal of contaminants;

None known

F. Steep slopes (25% or greater) associated with one of the above features. No

Identify any sediment/erosion sensitive features, and proceed to step two. If there are none the assessment is complete.

Marine near-shore environment of Liberty Bay, at the outfall of the City storm system.

STEP 2 - Hydraulic Nearness Assessment

Sites are hydraulically near a feature if the pollutant load and peak quantity of runoff from the site will not be naturally attenuated before entering the feature. The conditions that render a site hydraulically near to a feature include, but are not limited to, the following:

A. The feature or a buffer to protect the feature is within 200 feet downstream of the site. No

B. Runoff from the site is tight-lined to the feature or flows to the feature through a channel or ditch. Yes

C. A site is not hydraulically near a feature if one of the following takes place to provide attenuation before runoff from the site enters the feature:

1. Sheet flow through a vegetated area with dense ground cover (Western Washington Phase II Municipal Stormwater Permit, January 17,2007 Appendix 7- Determining Sediment Damage Potential, Page 2 of 3) No.

2. Flow through a wetland not included as a sensitive feature No

3. Flow through a significant shallow or adverse slope, not in a conveyance channel, between the site and the sensitive feature. No

Identify any of the sediment/erosion sensitive features from step one that are hydraulically near the site, and proceed to step three. If none of the sediment/erosion sensitive features are hydraulically near the site the assessment is complete.

Site is hydraulically connected to the marine near-shore habitat, therefore on to Step 3

STEP 3 - Construction Site Sediment Transport Potential

Using the worksheet below, determine the total points for each development site. Assign points based on the most critical condition that affects 10% or more of the site. If soil testing has been performed on site, the results should be used to determine the predominant soil type on the site. Otherwise, soil information should be obtained from the county soil survey to determine Hydrologic Soil Group (Table of Engineering Index Properties for step 1.D) and Erosion Potential (Table of Water Features for step 1.E).

When using the county soil survey, the dominant soil type may be in question, particularly when the site falls on a boundary between two soil types or when one of two soil types may be present on a site. In this case, the soil type resulting in the most points on the rating system will be assumed unless site soil tests indicate that another soil type dominates the site. Use the point score from Step 3 to determine whether the development site has a high potential for sediment transport off of the site.

Total Score Transport Rating

<100 Low

≥100 High

A high transport rating indicates a higher risk that the site will generate sediment contaminated runoff.

Construction Site Sediment Transport Potential Worksheet

A. Existing slope of site (average, weighted by aerial extent): Points

2% or less.....0

>2-5%..... 5

>5-10%.....15

>10-15%.....**30**

>15%.....50

B. Site Area to be cleared and/or graded:

<5,000 sq. ft..... 0

5,000 sq. ft. – 1 acre.....30

>1 acres.....**50**

Quantity of cut and/or fill on site:

<500 cubic yards.....0

500 - 5,000 cubic yards.....**5**

>5,000 - 10,000 cubic yards.....10
>10,000- 20,000 cubic yards.....25
>20,000 cubic yards.....40

Runoff potential of predominant soils(Natural Resources Conservation Service):

Hydrologic soil group A.....0
Hydrologic soil group B.....10
Hydrologic soil group C.....**20**
Hydrologic soil group D.....40

Erosion Potential of predominant soils(Natural Resource Conservation Service):

GW,GP,SW, SP soils.....0
Dual Classifications(GW-GM,GP-GM,GW-GC, GP-GC,
SW-SM,SW-SC, SP-SM,SP-SC)10
GM, GC, SM, SC soils.....**20**
ML, CL, MH, CH soils..... **40**

Surface or Groundwater entering site identified and intercepted:

Yes..... **0**
No..... 25

G. Depth of cut or height of fill >10 feet:

Yes..... **25**
No**0**

H. Clearing and grading will occur in the wet season (October 1 - May 1):

Yes 50
No**0**

TOTAL POINTS.....**170**

1 If no surface or groundwater enters site, give 0 points.

Since the rating exceeds 100, this site has a higher degree of risk of sediment transport

APPENDIX A
EXISTING BASIN CONDITIONS



Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Project Description

File Name Run 1 Existing Condition with flow split_SPF
 Description Poulsbo Place 2 Div 8
 Downstream Existing Conditions

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method Santa Barbara UH
 Time of Concentration (TOC) Method User-Defined
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes NO
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On Oct 01, 2013 00:00:00
 End Analysis On Oct 02, 2013 00:00:00
 Start Reporting On Oct 01, 2013 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 10
 Nodes 15
 Junctions 13
 Outfalls 1
 Flow Diversions 1
 Inlets 0
 Storage Nodes 0
 Links 15
 Channels 0
 Pipes 15
 Pumps 0
 Offices 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	Rain Gage-01	Time Series	TS-01	Cumulative	inches	Washington	Kitsap	100	4.70	SCS Type IA 24-hr

**Poulsbo Place Division 8
Assisted Living Center**

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 Sub-03	5.31	79.00	98.00	86.00	4.69	4.18	22.19	5.47	0 00:06:00
2 Sub-04	2.62	87.00	98.00	86.00	4.89	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4 Sub-08	0.90	87.00	98.00	86.00	4.69	4.03	3.63	0.90	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.83	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.89	4.39	1.18	0.29	0 00:06:00
8 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	86.00	4.89	4.39	4.29	1.05	0 00:08:00
10 sub-2	2.10	21.00	98.00	86.00	4.89	3.42	7.17	1.42	0 00:22:30

Poulsbo Place Division 8

Assisted Living Center

Node Summary

Downstream Stormwater Backwater Analysis

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 (ft)	Max Surcharge Depth (ft)	Min Freeboard (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	21.92	7.95	0.00	0.73	0 00:00	0.00	0.00
2	Jun-04	Junction	6.48	10.97	8.48	10.97	0.00	12.40	9.80	0.00	1.17	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.09	14.45	0.00	3.54	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	11.79	15.92	0.00	2.28	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.51	17.28	0.00	0.94	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.51	20.02	0.00	1.01	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.81	0.00	10.33	21.61	0.00	0.00	0 08:00	0.21	18.00
8	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	9.44	28.11	0.00	5.73	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	6.85	32.91	0.00	11.94	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	1.42	32.97	0.00	12.03	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	1.42	40.23	0.00	8.88	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.74	10.87	0.00	4.28	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.59	8.13	0.00	2.87	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.92	4.85					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.36	11.92				0.00	0.00

23.04 AFTER
ITERATIVELY RAISING
RIM ELEVATION

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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 Total Depth Ratio	Total Time Reported (min)	Reported Condition
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	1.42	10.30	0.14	5.78	0.32	0.25	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	1.42	7.70	0.18	2.70	0.62	0.50	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	6.85	9.66	0.71	7.97	0.89	0.71	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	9.44	14.57	0.65	9.78	1.10	0.88	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	15.000	0.0120	9.54	3.01	3.17	7.78	1.25	1.00	30.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.33	4.8100	18.000	0.0220	11.51	13.60	0.85	7.00	1.50	1.00	29.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.89	9.1700	18.000	0.0220	11.53	18.80	0.61	6.53	1.50	1.00	34.00	SURCHARGED
8	link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.08	0.9000	18.000	0.0110	11.81	11.75	1.01	6.68	1.50	1.00	39.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.09	10.32	1.36	7.97	1.50	1.00	41.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	11.37	11.25	1.01	6.47	1.50	1.00	32.00	SURCHARGED
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	12.40	20.54	0.60	7.02	1.50	1.00	34.00	SURCHARGED
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	21.92	20.66	1.06	12.40	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	57.57	9.43	9.36	0.1200	12.000	0.0110	4.14	1.47	2.82	5.34	1.00	1.00	18.00	SURCHARGED
14	Link-14	Pipe	Jun-15	Jun-16	147.94	8.90	2.04	4.6400	12.000	0.0120	4.64	8.31	0.56	5.91	1.00	1.00	21.00	SURCHARGED
15	Link-15	Pipe	Jun-16	Jun-01	119.81	2.04	-3.05	4.2500	24.000	0.0220	9.59	27.55	0.35	3.56	2.00	1.00	1438.00	SURCHARGED

Pouisbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Junction Input

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	8.48	10.97	4.49	8.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	8.88	11.34	0.00	18.22	0.00	0.00	0.00
8 Jun-09	14.27	21.03	6.76	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.81	7.27	14.34	0.00	21.81	0.00	0.00	0.00
8 Jun-11	27.18	33.84	6.68	27.18	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.78	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-18	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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 Jun-01	21.92	0.00	7.95	11.28	0.00	0.73	4.82	8.13	0 07:55	0 00:00	0.00	0.00
2 Jun-04	12.40	1.05	9.80	3.32	0.00	1.17	6.89	0.41	0 07:55	0 00:00	0.00	0.00
3 Jun-06	14.09	2.46	14.45	5.72	0.00	3.54	9.36	0.63	0 07:55	0 00:00	0.00	0.00
4 Jun-07	11.79	0.29	15.92	6.10	0.00	2.28	10.37	0.55	0 07:55	0 00:00	0.00	0.00
5 Jun-08	11.51	0.00	17.28	5.94	0.00	0.94	11.77	0.43	0 07:55	0 00:00	0.00	0.00
6 Jun-09	11.51	2.19	20.02	5.75	0.00	1.01	14.73	0.46	0 07:55	0 00:00	0.00	0.00
7 Jun-10	10.33	0.90	21.81	7.27	0.00	0.00	15.06	0.72	0 07:49	0 08:00	0.21	16.00
8 Jun-11	9.44	2.60	28.11	0.95	0.00	5.73	27.45	0.29	0 08:00	0 00:00	0.00	0.00
9 Jun-12	8.85	5.46	32.91	0.82	0.00	11.94	32.40	0.31	0 08:00	0 00:00	0.00	0.00
10 Jun-13	1.42	0.00	32.97	0.42	0.00	12.03	32.72	0.17	0 08:00	0 00:00	0.00	0.00
11 Jun-14	1.42	1.42	40.23	1.42	0.00	8.88	40.05	1.24	0 08:06	0 00:00	0.00	0.00
12 Jun-15	4.74	0.63	10.87	1.97	0.00	4.28	8.99	0.09	0 07:55	0 00:00	0.00	0.00
13 Jun-18	9.59	0.00	8.13	6.09	0.00	2.87	4.83	2.79	0 07:55	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Pipe Input

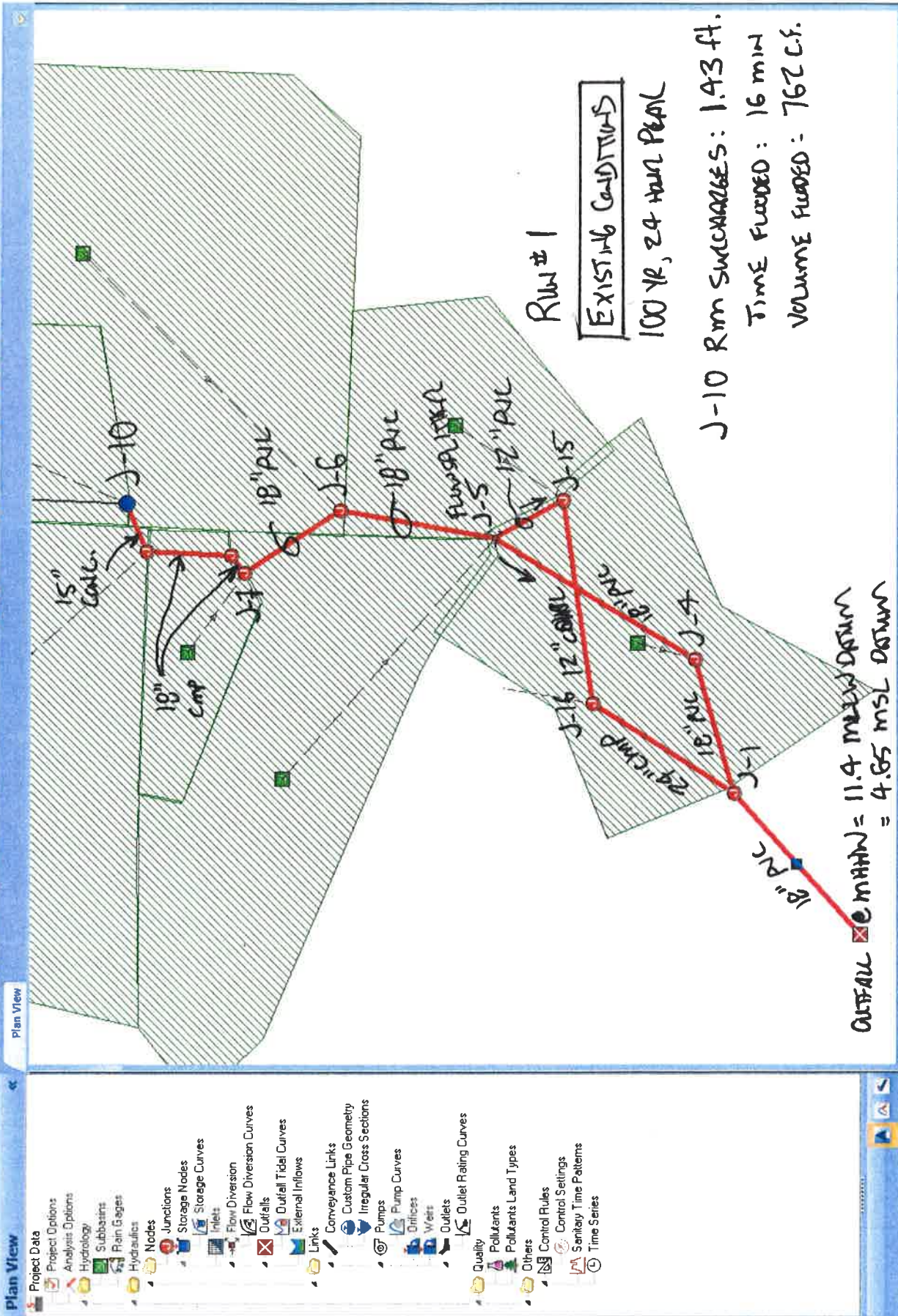
SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate	Flap	No. of Barrels
1 Link-01	293.62	39.91	1.10	33.55	1.00	6.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2 Link-02	36.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3 Link-03	258.55	32.09	0.00	27.16	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4 Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5 Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
6 Link-06	61.07	14.27	0.00	11.33	-0.01	2.94	4.8100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7 Link-07	15.81	11.34	0.00	9.89	0.07	1.45	9.1700	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
8 link-08	82.81	9.82	0.00	9.08	0.35	0.74	0.9000	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
9 Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10 Link-10	169.20	7.95	0.00	8.58	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11 Link-11	100.45	8.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12 Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13 Link-13	57.57	9.43	1.48	9.36	0.46	0.07	0.1200	CIRCULAR	12.000	12.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
14 Link-14	147.94	8.90	0.00	2.04	0.00	6.86	4.6400	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15 Link-15	119.81	2.04	0.00	-3.05	0.26	5.09	4.2500	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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 Link-01	1.42	0 08:06	10.30	0.14	5.78	0.85	0.32	0.25	0.00		Calculated
2 Link-02	1.42	0 08:06	7.70	0.18	2.70	0.23	0.62	0.50	0.00		Calculated
3 Link-03	6.85	0 08:00	9.66	0.71	7.97	0.54	0.89	0.71	0.00		Calculated
4 Link-04	9.44	0 08:00	14.57	0.65	9.78	0.47	1.10	0.88	0.00		Calculated
5 Link-05	9.54	0 08:04	3.01	3.17	7.78	0.08	1.25	1.00	30.00		SURCHARGED
6 Link-06	11.51	0 08:04	13.60	0.85	7.00	0.15	1.50	1.00	29.00		SURCHARGED
7 Link-07	11.53	0 08:05	18.80	0.61	6.53	0.04	1.50	1.00	34.00		SURCHARGED
8 link-08	11.81	0 08:05	11.75	1.01	6.68	0.21	1.50	1.00	39.00		SURCHARGED
9 Link-09	14.09	0 08:00	10.32	1.36	7.97	0.24	1.50	1.00	41.00		SURCHARGED
10 Link-10	11.37	0 07:41	11.25	1.01	6.47	0.44	1.50	1.00	32.00		SURCHARGED
11 Link-11	12.40	0 07:55	20.54	0.60	7.02	0.24	1.50	1.00	34.00		SURCHARGED
12 Link-12	21.92	0 00:00	20.66	1.06	12.40	0.18	1.50	1.00	1440.00		SURCHARGED
13 Link-13	4.14	0 07:48	1.47	2.82	5.34	0.18	1.00	1.00	18.00		SURCHARGED
14 Link-14	4.64	0 07:55	8.31	0.56	5.91	0.42	1.00	1.00	21.00		SURCHARGED
15 Link-15	9.59	0 00:01	27.55	0.35	3.58	0.56	2.00	1.00	1436.00		SURCHARGED

File Edit View Input Design Analysis Output Window Help



Run #1

EXISTING CONDITIONS

100 YR, 24 HOUR PEAK

J-10 RIM SURCHARGES: 1.93 ft.

TIME FLOODED: 16 MIN

VOLUME FLOODED: 762 C.F.

OUTFALL MATHN = 11.4 MGD DRAIN
= 4.65 MSL DRAIN

- Project Data
- Project Options
- Analysis Options
- Hydrology
- Subbasins
- Rain Gages
- Hydraulics
- Nodes
- Junctions
- Storage Nodes
- Storage Curves
- Inlets
- Flow Diversion
- Flow Diversion Curves
- Outfalls
- Outfall Tidal Curves
- External Inflows
- Links
- Conveyance Links
- Custom Pipe Geometry
- Irregular Cross Sections
- Pumps
- Pump Curves
- Drifts
- Wells
- Outlets
- Outlet Rating Curves
- Quality
- Pollutants
- Pollutants Land Types
- Others
- Control Rules
- Control Settings
- Sanitary Time Patterns
- Time Series

APPENDIX B
BASIN WITH PP2 DIV. 8 ALC ON-LINE



Poulsbo Place Division 8

Assisted Living Center

Project Description

Downstream Stormwater Backwater Analysis

File Name Run 2 with PP2 ALC on-line with flow splitter.SPF
 Description Poulsbo Place 2 Div 8
 Downstream Existing Conditions

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method Santa Barbara UH
 Time of Concentration (TOC) Method User-Defined
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes NO
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On Oct 01, 2013 00:00:00
 End Analysis On Oct 02, 2013 00:00:00
 Start Reporting On Oct 01, 2013 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 10
 Nodes 15
 Junctions 13
 Outfalls 1
 Flow Diversions 1
 Inlets 0
 Storage Nodes 0
 Links 15
 Channels 0
 Pipes 15
 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	Rain Gage-01	Time Series	TS-01	Cumulative	inches	Washington	Kitsap	100	4.70	SCS Type IA 24-hr

Poulsbo Place Division 8

Assisted Living Center

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN	Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-03	4.78	87.00	98.00	86.00	4.69	4.29	20.48	5.04	0 00:06:00
2	Sub-04	2.82	87.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3	Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4	Sub-08	0.90	87.00	98.00	86.00	4.69	4.03	3.63	0.90	0 00:06:00
5	Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6	Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.83	0 00:06:00
7	Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.18	0.29	0 00:06:00
8	Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9	Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10	sub-2	2.82	95.00	98.00	86.00	4.69	4.39	11.51	2.83	0 00:06:00

**Poulsbo Place Division 8
Assisted Living Center**

Node Summary

Downstream Stormwater Backwater Analysis

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)
1	Jun-01	Junction	-3.31	6.68	-3.31	6.68	0.00	21.03	7.95	0.00	0.73	0 00:00	0.00	0.00
2	Jun-04	Junction	6.48	10.97	6.48	10.97	0.00	12.39	9.79	0.00	1.18	0 00:00	0.00	0.00
3	Jun-06	Junction	6.73	17.99	6.73	17.99	0.00	14.10	14.44	0.00	3.55	0 00:00	0.00	0.00
4	Jun-07	Junction	9.62	18.20	9.82	18.20	0.00	11.92	15.91	0.00	2.29	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	16.22	0.00	11.72	17.27	0.00	0.95	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.76	20.01	0.00	1.02	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.61	0.00	11.35	21.61	0.00	0.00	0 07:57	0.55	21.00
6	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	10.47	26.27	0.00	5.57	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	7.88	33.00	0.00	11.85	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	2.83	33.26	0.00	11.74	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.61	49.11	0.00	2.83	40.38	0.00	6.73	0 00:00	0.00	0.00
12	Jun-15	Junction	6.90	15.15	6.90	15.15	0.00	4.75	10.86	0.00	4.29	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.18	6.13	0.00	2.87	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.03	4.85					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.36	11.90				0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (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 Reported (min)	Reported Condition
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	2.83	10.30	0.27	6.95	0.46	0.37	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	2.83	7.70	0.37	3.36	0.81	0.65	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	7.87	9.66	0.81	8.22	1.01	0.81	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	10.46	14.57	0.72	9.78	1.18	0.94	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	15.000	0.0120	9.78	3.01	3.25	7.97	1.25	1.00	33.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0220	11.72	13.57	0.86	7.05	1.50	1.00	32.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.89	9.1700	18.000	0.0220	11.66	18.80	0.62	6.60	1.50	1.00	37.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.08	0.9000	18.000	0.0110	11.90	11.75	1.01	6.73	1.50	1.00	41.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.09	10.32	1.37	7.97	1.50	1.00	42.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	11.41	11.25	1.01	6.52	1.50	1.00	35.00	SURCHARGED
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	12.39	20.54	0.60	7.01	1.50	1.00	36.00	SURCHARGED
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	21.03	20.66	1.02	12.00	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	56.13	9.43	9.36	0.1200	12.000	0.0110	4.18	1.49	2.81	5.42	1.00	1.00	22.00	SURCHARGED
14	Link-14	Pipe	Jun-15	Jun-16	146.79	8.90	2.04	4.6700	12.000	0.0120	4.65	8.34	0.56	5.92	1.00	1.00	24.00	SURCHARGED
15	Link-15	Pipe	Jun-16	Jun-01	119.84	2.04	-3.05	4.2500	24.000	0.0220	9.16	27.55	0.33	3.57	2.00	1.00	1439.00	SURCHARGED

**Poulsbo Place Division 8
Assisted Living Center**

Junction Input

Downstream Stormwater Backwater Analysis

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	6.68	0.00	0.00	0.00
2 Jun-04	6.48	10.97	4.49	6.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	6.38	9.82	0.00	16.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	16.22	0.00	0.00	0.00
6 Jun-09	14.27	21.03	6.76	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.81	7.27	14.34	0.00	21.81	0.00	0.00	0.00
6 Jun-11	27.16	33.84	6.68	27.16	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.76	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	6.96	2.04	0.00	11.00	0.00	0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 Jun-01	21.03	0.00	7.95	11.26	0.00	0.73	4.85	6.16	0 07:58	0 00:00	0.00	0.00
2 Jun-04	12.39	1.05	9.79	3.31	0.00	1.18	6.91	0.43	0 07:58	0 00:00	0.00	0.00
3 Jun-06	14.10	2.46	14.44	5.71	0.00	3.55	9.39	0.66	0 07:59	0 00:00	0.00	0.00
4 Jun-07	11.92	0.29	15.91	6.09	0.00	2.29	10.42	0.60	0 07:59	0 00:00	0.00	0.00
5 Jun-08	11.72	0.00	17.27	5.93	0.00	0.95	11.83	0.49	0 07:59	0 00:00	0.00	0.00
6 Jun-09	11.76	2.19	20.01	5.74	0.00	1.02	14.76	0.51	0 07:59	0 00:00	0.00	0.00
7 Jun-10	11.35	0.90	21.61	7.27	0.00	0.00	15.11	0.77	0 07:46	0 07:57	0.55	21.00
6 Jun-11	10.47	2.60	26.27	1.11	0.00	5.57	27.45	0.29	0 07:57	0 00:00	0.00	0.00
9 Jun-12	7.86	5.04	33.00	0.91	0.00	11.85	32.40	0.31	0 07:54	0 00:00	0.00	0.00
10 Jun-13	2.83	0.00	33.26	0.71	0.00	11.74	32.77	0.22	0 07:55	0 00:00	0.00	0.00
11 Jun-14	2.83	2.83	40.38	1.57	0.00	8.73	40.05	1.24	0 07:55	0 00:00	0.00	0.00
12 Jun-15	4.75	0.83	10.86	1.96	0.00	4.29	9.00	0.10	0 07:58	0 00:00	0.00	0.00
13 Jun-16	9.16	0.00	8.13	6.09	0.00	2.87	4.85	2.61	0 07:59	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 Link-01	293.62	39.91	1.10	33.55	1.00	8.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2 Link-02	38.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3 Link-03	258.55	32.09	0.00	27.18	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4 Link-04	277.57	27.18	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5 Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
6 Link-06	61.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7 Link-07	15.81	11.34	0.00	9.89	0.07	1.45	9.1700	CIRCULAR	18.000	18.000	0.0220	0.5000	0.8000	0.0000	0.00	No	1
8 link-08	82.61	9.82	0.00	9.08	0.35	0.74	0.9000	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
9 Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10 Link-10	169.20	7.95	0.00	6.56	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11 Link-11	100.45	8.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12 Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13 Link-13	56.13	9.43	1.48	9.36	0.46	0.07	0.1200	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14 Link-14	148.79	8.90	0.00	2.04	0.00	6.86	4.8700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15 Link-15	119.84	2.04	0.00	-3.05	0.26	5.09	4.2500	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

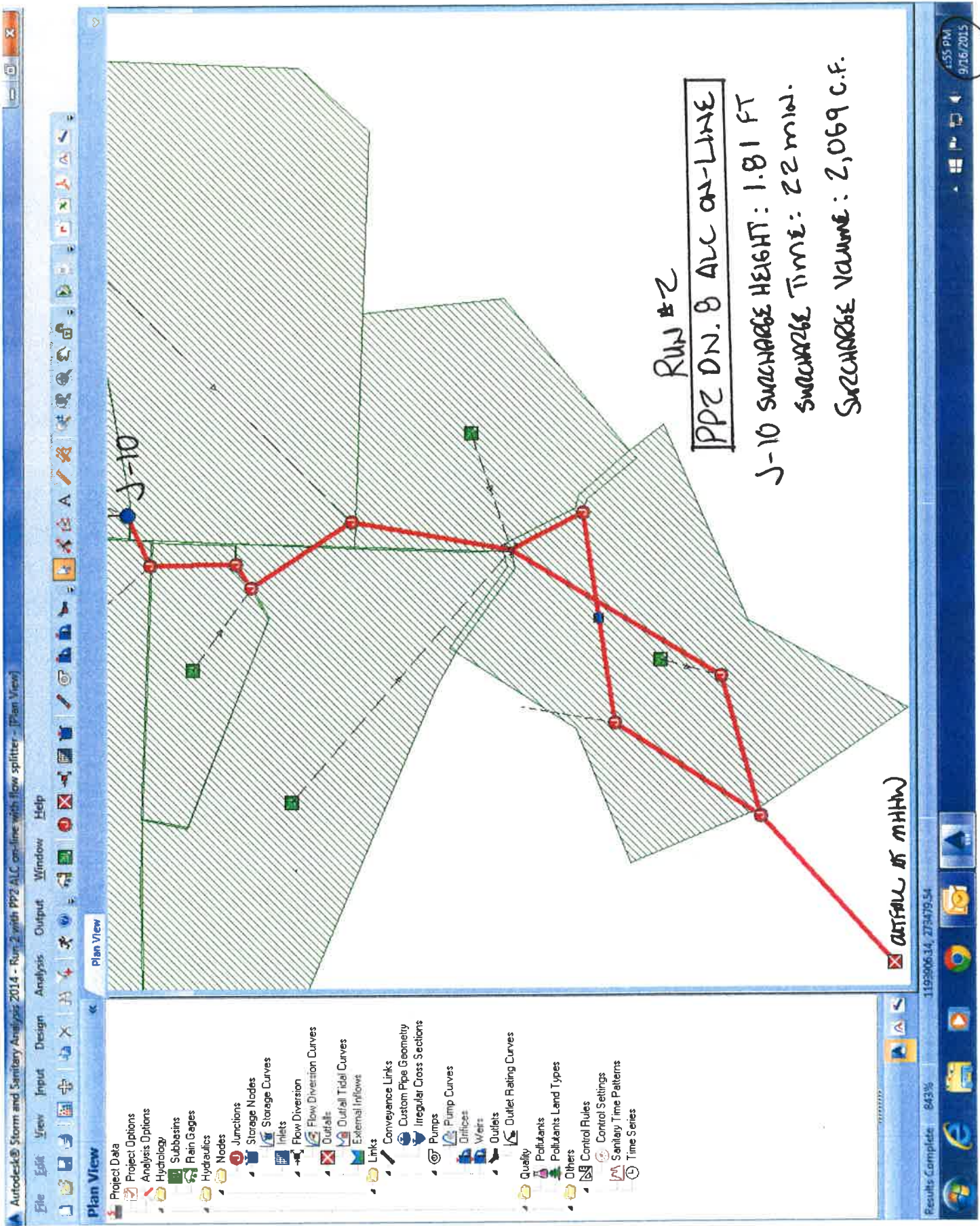
Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Link-01	2.83	0 07:55	10.30	0.27	8.95	0.70	0.46	0.37	0.00		Calculated
2 Link-02	2.83	0 07:55	7.70	0.37	3.36	0.19	0.81	0.85	0.00		Calculated
3 Link-03	7.87	0 07:55	9.66	0.81	8.22	0.52	1.01	0.81	0.00		Calculated
4 Link-04	10.46	0 07:57	14.57	0.72	9.78	0.47	1.18	0.94	0.00		Calculated
5 Link-05	9.78	0 07:46	3.01	3.25	7.97	0.08	1.25	1.00	33.00		SURCHARGED
8 Link-06	11.72	0 07:46	13.57	0.86	7.05	0.14	1.50	1.00	32.00		SURCHARGED
7 Link-07	11.66	0 07:46	18.80	0.62	6.60	0.04	1.50	1.00	37.00		SURCHARGED
8 Link-08	11.90	0 08:07	11.75	1.01	8.73	0.20	1.50	1.00	41.00		SURCHARGED
9 Link-09	14.09	0 08:00	10.32	1.37	7.97	0.24	1.50	1.00	42.00		SURCHARGED
10 Link-10	11.41	0 07:40	11.25	1.01	6.52	0.43	1.50	1.00	35.00		SURCHARGED
11 Link-11	12.39	0 07:58	20.54	0.60	7.01	0.24	1.50	1.00	36.00		SURCHARGED
12 Link-12	21.03	0 00:00	20.66	1.02	12.00	0.19	1.50	1.00	1440.00		SURCHARGED
13 Link-13	4.18	0 07:46	1.49	2.81	5.42	0.17	1.00	1.00	22.00		SURCHARGED
14 Link-14	4.65	0 07:56	8.34	0.56	5.92	0.41	1.00	1.00	24.00		SURCHARGED
15 Link-15	9.16	0 00:01	27.55	0.33	3.57	0.56	2.00	1.00	1439.00		SURCHARGED



RUN #2
 PPZ DN. 8 ALC ON-LINE
 J-10 SURCHARGE HEIGHT: 1.81 FT
 SURCHARGE TIME: 22 min.
 SURCHARGE VOLUME: 2,069 C.F.

OUTFALL OF MHHW

APPENDIX C
STAFF QUESTION: WHICH TIDE LEVEL
CAUSES NO SURCHARGE IN THE PIPE
NETWORK?



**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Project Description

File Name What tide causes surcharge et J-8.SPF
 Description Poulsbo Place 2 Div 8
 Downstream Existing Conditions

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method Santa Barbara UH
 Time of Concentration (TOC) Method User-Defined
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes NO
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On Oct 01, 2013 00:00:00
 End Analysis On Oct 02, 2013 00:00:00
 Start Reporting On Oct 01, 2013 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.....	10
Nodes.....	15
<i>Junctions</i>	13
<i>Outfalls</i>	1
<i>Flow Diversions</i>	1
<i>Inlets</i>	0
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	0
<i>Pipes</i>	15
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rein Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Reinfall Distribution
1	Rain Gage-01	Time Series	TS-01	Cumulative	inches	Washington	Kitsap	100	4.70	SCS Type IA 24-hr

**Pouisbo Place Division 8
Assisted Living Center**

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 Sub-03	5.31	79.00	98.00	86.00	4.69	4.18	22.19	5.47	0 00:06:00
2 Sub-04	2.62	67.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4 Sub-08	0.90	67.00	98.00	86.00	4.69	4.03	3.63	0.90	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
8 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.63	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.18	0.29	0 00:06:00
8 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10 sub-2	2.10	21.00	98.00	86.00	4.69	3.42	7.17	1.42	0 00:22:30

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	17.71	3.91	0.00	4.77	0 00:00	0.00	0.00
2	Jun-04	Junction	6.48	10.97	6.48	10.97	0.00	14.22	7.75	0.00	3.22	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.76	13.54	0.00	4.45	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	12.32	15.17	0.00	3.03	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	12.03	16.70	0.00	1.52	0 00:00	0.00	0.00
8	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	12.04	19.77	0.00	1.28	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.81	14.34	21.61	0.00	10.33	21.61	0.00	0.00	0 08:00	0.06	10.00
8	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	9.44	28.11	0.00	5.73	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	6.85	32.88	0.00	11.99	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	1.42	32.97	0.00	12.03	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	1.42	40.23	0.00	8.68	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	3.50	9.35	0.00	5.80	0 00:00	0.00	0.00
13	Jun-18	Junction	2.04	11.00	2.04	11.00	0.00	3.50	4.01	0.00	6.99	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					17.71	0.35					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	18.03	10.75				0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (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 Reported Surcharged (min)	Reported Condition
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	1.42	10.30	0.14	5.78	0.32	0.25	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	1.42	7.70	0.18	2.79	0.59	0.47	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0110	6.85	10.54	0.65	8.29	0.86	0.69	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	9.44	14.57	0.65	9.77	1.10	0.88	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	15.000	0.0120	9.97	3.01	3.31	8.12	1.25	1.00	29.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.33	4.8100	18.000	0.0220	12.03	13.60	0.89	7.00	1.50	1.00	28.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.89	9.1700	18.000	0.0220	12.04	18.80	0.64	6.82	1.50	1.00	34.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.08	0.9800	18.000	0.0110	12.32	11.75	1.05	6.97	1.50	1.00	39.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.8900	18.000	0.0110	14.76	10.32	1.43	8.35	1.50	1.00	41.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	13.17	11.25	1.17	7.59	1.43	0.95	0.00	> CAPACITY
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	14.22	20.54	0.69	10.30	1.09	0.73	0.00	Calculated
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	17.71	20.66	0.86	10.02	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	57.57	9.43	9.36	0.1200	12.000	0.0110	2.86	1.47	1.95	3.98	0.86	0.86	0.00	> CAPACITY
14	Link-14	Pipe	Jun-15	Jun-16	147.94	8.90	2.04	4.6400	12.000	0.0120	3.50	8.31	0.42	7.56	0.73	0.73	0.00	Calculated
15	Link-15	Pipe	Jun-16	Jun-01	119.81	2.04	-3.05	4.2500	24.000	0.0220	3.49	27.55	0.13	1.11	1.99	0.99	0.00	Calculated

**Pouisbo Place Division 8
Assisted Living Center**

Junction Input

Downstream Stormwater Backwater Analysis

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	6.48	10.97	4.49	6.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	18.22	0.00	0.00	0.00
6 Jun-09	14.27	21.03	6.78	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.61	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.16	33.84	6.68	27.18	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.78	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-18	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

**Pouisbo Place Division 8
Assisted Living Center**

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surcharga Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 Jun-01	17.71	0.00	3.91	7.22	0.00	4.77	0.53	3.84	0 07:59	0 00:00	0.00	0.00
2 Jun-04	14.22	1.05	7.75	1.27	0.00	3.22	8.92	0.44	0 07:54	0 00:00	0.00	0.00
3 Jun-06	14.76	2.46	13.54	4.81	0.00	4.45	9.35	0.82	0 07:54	0 00:00	0.00	0.00
4 Jun-07	12.32	0.29	15.17	5.35	0.00	3.03	10.37	0.55	0 07:54	0 00:00	0.00	0.00
5 Jun-08	12.03	0.00	16.70	5.36	0.00	1.52	11.77	0.43	0 07:54	0 00:00	0.00	0.00
6 Jun-09	12.04	2.19	19.77	5.50	0.00	1.28	14.72	0.45	0 07:54	0 00:00	0.00	0.00
7 Jun-10	10.33	0.90	21.61	7.27	0.00	0.00	15.06	0.72	0 07:52	0 08:00	0.06	10.00
8 Jun-11	9.44	2.60	28.11	0.95	0.00	5.73	27.45	0.29	0 08:00	0 00:00	0.00	0.00
9 Jun-12	6.85	5.46	32.86	0.77	0.00	11.99	32.38	0.29	0 08:00	0 00:00	0.00	0.00
10 Jun-13	1.42	0.00	32.97	0.42	0.00	12.03	32.72	0.17	0 08:06	0 00:00	0.00	0.00
11 Jun-14	1.42	1.42	40.23	1.42	0.00	8.88	40.05	1.24	0 08:06	0 00:00	0.00	0.00
12 Jun-15	3.50	0.63	9.35	0.45	0.00	5.80	8.98	0.08	0 07:54	0 00:00	0.00	0.00
13 Jun-16	3.50	0.00	4.01	1.97	0.00	8.99	2.14	0.10	0 07:59	0 00:00	0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	293.62	39.91	1.10	33.55	1.00	6.38	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2	Link-02	38.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3	Link-03	258.55	32.09	0.00	27.18	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0110	0.5000	0.5000	0.0000	0.00	No	1
4	Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5	Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
6	Link-06	61.07	14.27	0.00	11.33	-0.01	2.94	4.8100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7	Link-07	15.81	11.34	0.00	9.89	0.07	1.45	9.1700	CIRCULAR	18.000	18.000	0.0220	0.5000	0.8000	0.0000	0.00	No	1
8	link-08	82.61	9.82	0.00	9.08	0.35	0.74	0.9000	CIRCULAR	18.000	18.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
9	Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
10	Link-10	169.20	7.95	0.00	6.58	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
11	Link-11	100.45	8.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
12	Link-12	138.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13	Link-13	57.57	9.43	1.48	9.36	0.46	0.07	0.1200	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14	Link-14	147.94	8.90	0.00	2.04	0.00	6.86	4.6400	CIRCULAR	12.000	12.000	0.0120	0.5000	0.8000	0.0000	0.00	No	1
15	Link-15	119.81	2.04	0.00	-3.05	0.28	5.09	4.2500	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

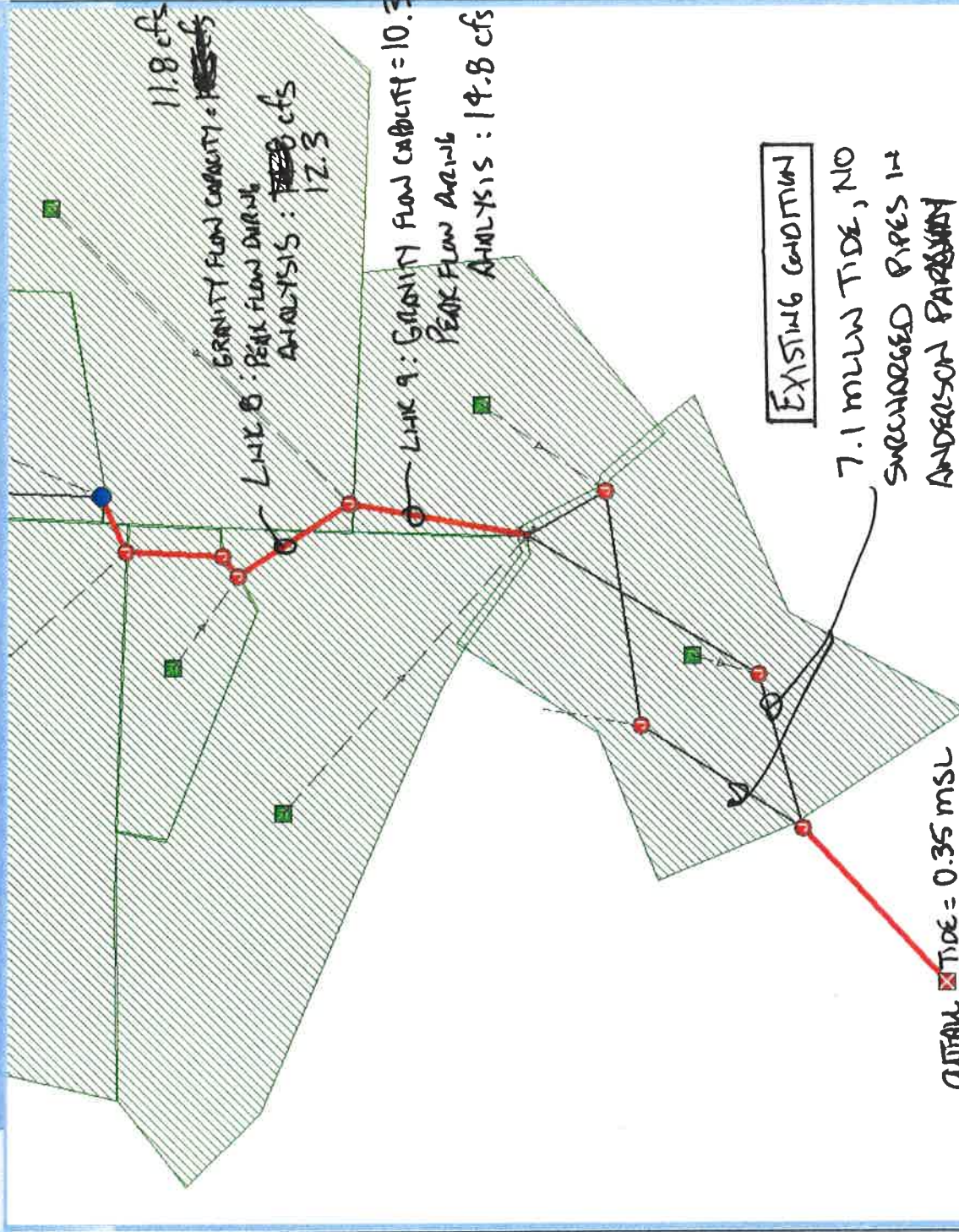
Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Link-01	1.42	0 08:06	10.30	0.14	5.78	0.85	0.32	0.25	0.00		Calculated
2 Link-02	1.42	0 08:06	7.70	0.18	2.79	0.23	0.59	0.47	0.00		Calculated
3 Link-03	6.85	0 08:00	10.54	0.65	8.29	0.52	0.86	0.69	0.00		Calculated
4 Link-04	9.44	0 08:00	14.57	0.65	9.77	0.47	1.10	0.88	0.00		Calculated
5 Link-05	9.97	0 08:02	3.01	3.31	8.12	0.08	1.25	1.00	29.00		SURCHARGED
6 Link-06	12.03	0 08:02	13.60	0.89	7.00	0.15	1.50	1.00	28.00		SURCHARGED
7 Link-07	12.04	0 08:02	18.80	0.64	6.82	0.04	1.50	1.00	34.00		SURCHARGED
8 link-08	12.32	0 08:02	11.75	1.05	6.97	0.20	1.50	1.00	39.00		SURCHARGED
9 Link-09	14.76	0 07:55	10.32	1.43	8.35	0.23	1.50	1.00	41.00		SURCHARGED
10 Link-10	13.17	0 07:54	11.25	1.17	7.59	0.37	1.43	0.95	0.00		> CAPACITY
11 Link-11	14.22	0 07:54	20.54	0.69	10.30	0.16	1.09	0.73	0.00		Calculated
12 Link-12	17.71	0 07:59	20.66	0.86	10.02	0.23	1.50	1.00	1440.00		SURCHARGED
13 Link-13	2.86	0 07:54	1.47	1.95	3.98	0.24	0.86	0.86	0.00		> CAPACITY
14 Link-14	3.50	0 07:54	8.31	0.42	7.56	0.33	0.73	0.73	0.00		Calculated
15 Link-15	3.49	0 08:00	27.55	0.13	1.11	1.80	1.99	0.99	0.00		Calculated



APPENDIX D
STAFF QUESTION: WOULD A LARGER
OUTFALL PIPE ELIMINATE SURCHARGE OF
PIPES AT A MHHW TIDAL EVENT?



**Pouisbo Place Division 8
Assisted Living Center**

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 Sub-03	5.31	79.00	98.00	86.00	4.69	4.18	22.19	5.47	0 00:06:00
2 Sub-04	2.62	87.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4 Sub-08	0.90	67.00	98.00	86.00	4.69	4.03	3.63	0.90	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.83	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.18	0.29	0 00:06:00
8 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10 sub-2	2.10	21.00	98.00	86.00	4.69	3.42	7.17	1.42	0 00:22:30

**Poulsbo Place Division 8
Assisted Living Center**

Node Summary

Downstream Stormwater Backwater Analysis

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)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	59.11	8.60	0.00	0.08	0 00:00	0.00	0.00
2	Jun-04	Junction	6.48	10.97	8.48	10.97	0.00	14.22	7.71	0.00	3.26	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.76	13.54	0.00	4.45	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	12.32	15.17	0.00	3.03	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	12.03	18.70	0.00	1.52	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	12.04	19.77	0.00	1.26	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.81	14.34	21.81	0.00	10.33	21.61	0.00	0.00	0 08:00	0.08	10.00
8	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	9.44	28.11	0.00	5.73	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	6.85	32.91	0.00	11.94	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	1.42	32.97	0.00	12.03	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	1.42	40.23	0.00	8.88	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	3.50	9.38	0.00	5.77	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	15.34	8.11	0.00	2.89	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					59.11	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	16.03	10.75				0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Link Summary

Downstream Stormwater Backwater Analysis

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Total Depth Ratio	Total Time Reported	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.56	2.1700	15.000	0.0120	1.42	10.30	0.14	5.78	0.32	0.25	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	1.42	7.70	0.18	2.70	0.62	0.50	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	6.85	9.66	0.71	8.00	0.89	0.71	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	9.44	14.57	0.65	9.77	1.10	0.88	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	15.000	0.0120	9.97	3.01	3.31	8.12	1.25	1.00	29.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.33	4.8100	18.000	0.0220	12.03	13.60	0.89	7.00	1.50	1.00	28.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.89	9.1700	18.000	0.0220	12.04	18.80	0.64	6.82	1.50	1.00	34.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.08	0.9000	18.000	0.0110	12.32	11.75	1.05	6.97	1.50	1.00	39.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.76	10.32	1.43	8.35	1.50	1.00	41.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	13.17	11.25	1.17	7.59	1.43	0.95	0.00	> CAPACITY
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	14.22	20.54	0.69	9.26	1.22	0.81	0.00	Calculated
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	30.000	0.0110	59.11	80.67	0.73	12.04	2.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	57.57	9.43	9.36	0.1200	12.000	0.0110	2.86	1.47	1.95	3.98	0.86	0.86	0.00	> CAPACITY
14	Link-14	Pipe	Jun-15	Jun-16	147.94	8.90	2.04	4.6400	12.000	0.0120	3.50	8.31	0.42	5.60	0.74	0.74	0.00	Calculated
15	Link-15	Pipe	Jun-16	Jun-01	119.81	2.04	-3.05	4.2500	24.000	0.0220	15.34	27.55	0.56	6.27	2.00	1.00	1439.00	SURCHARGED

Poulsbo Place Division 8

Assisted Living Center

Junction Input

Downstream Stormwater Backwater Analysis

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	8.48	10.97	4.49	6.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	18.22	0.00	0.00	0.00
8 Jun-09	14.27	21.03	8.78	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.61	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.16	33.84	6.68	27.16	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.78	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	8.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surge 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 Jun-01	59.11	0.00	6.60	11.91	0.00	0.08	4.66	7.97	0 00:00	0 00:00	0.00	0.00
2 Jun-04	14.22	1.05	7.71	1.23	0.00	3.26	6.88	0.40	0 07:54	0 00:00	0.00	0.00
3 Jun-08	14.76	2.46	13.54	4.61	0.00	4.45	9.35	0.62	0 07:54	0 00:00	0.00	0.00
4 Jun-07	12.32	0.29	15.17	5.35	0.00	3.03	10.37	0.55	0 07:54	0 00:00	0.00	0.00
5 Jun-08	12.03	0.00	16.70	5.36	0.00	1.52	11.77	0.43	0 07:54	0 00:00	0.00	0.00
6 Jun-09	12.04	2.19	19.77	5.50	0.00	1.26	14.72	0.45	0 07:54	0 00:00	0.00	0.00
7 Jun-10	10.33	0.90	21.61	7.27	0.00	0.00	15.06	0.72	0 07:52	0 08:00	0.06	10.00
6 Jun-11	9.44	2.60	28.11	0.95	0.00	5.73	27.45	0.29	0 06:00	0 00:00	0.00	0.00
9 Jun-12	6.85	5.46	32.91	0.62	0.00	11.94	32.40	0.31	0 08:00	0 00:00	0.00	0.00
10 Jun-13	1.42	0.00	32.97	0.42	0.00	12.03	32.72	0.17	0 06:00	0 00:00	0.00	0.00
11 Jun-14	1.42	1.42	40.23	1.42	0.00	6.88	40.05	1.24	0 08:06	0 00:00	0.00	0.00
12 Jun-15	3.50	0.63	9.38	0.48	0.00	5.77	6.98	0.08	0 07:54	0 00:00	0.00	0.00
13 Jun-16	15.34	0.00	6.11	6.07	0.00	2.89	4.66	2.62	0 00:01	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	293.62	39.91	1.10	33.55	1.00	6.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2	Link-02	36.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3	Link-03	258.55	32.09	0.00	27.18	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5	Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
6	Link-06	61.07	14.27	0.00	11.33	-0.01	2.94	4.8100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7	Link-07	15.81	11.34	0.00	9.89	0.07	1.45	9.1700	CIRCULAR	18.000	18.000	0.0220	0.5000	0.8000	0.0000	0.00	No	1
8	link-08	82.61	9.82	0.00	9.08	0.35	0.74	0.9000	CIRCULAR	18.000	18.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
9	Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.8900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10	Link-10	169.20	7.95	0.00	6.56	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11	Link-11	100.45	6.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12	Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	30.000	30.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13	Link-13	57.57	9.43	1.48	9.38	0.48	0.07	0.1200	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14	Link-14	147.94	8.90	0.00	2.04	0.00	6.86	4.6400	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15	Link-15	119.81	2.04	0.00	-3.05	0.26	5.09	4.2500	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

Poulsbo Place Division 8

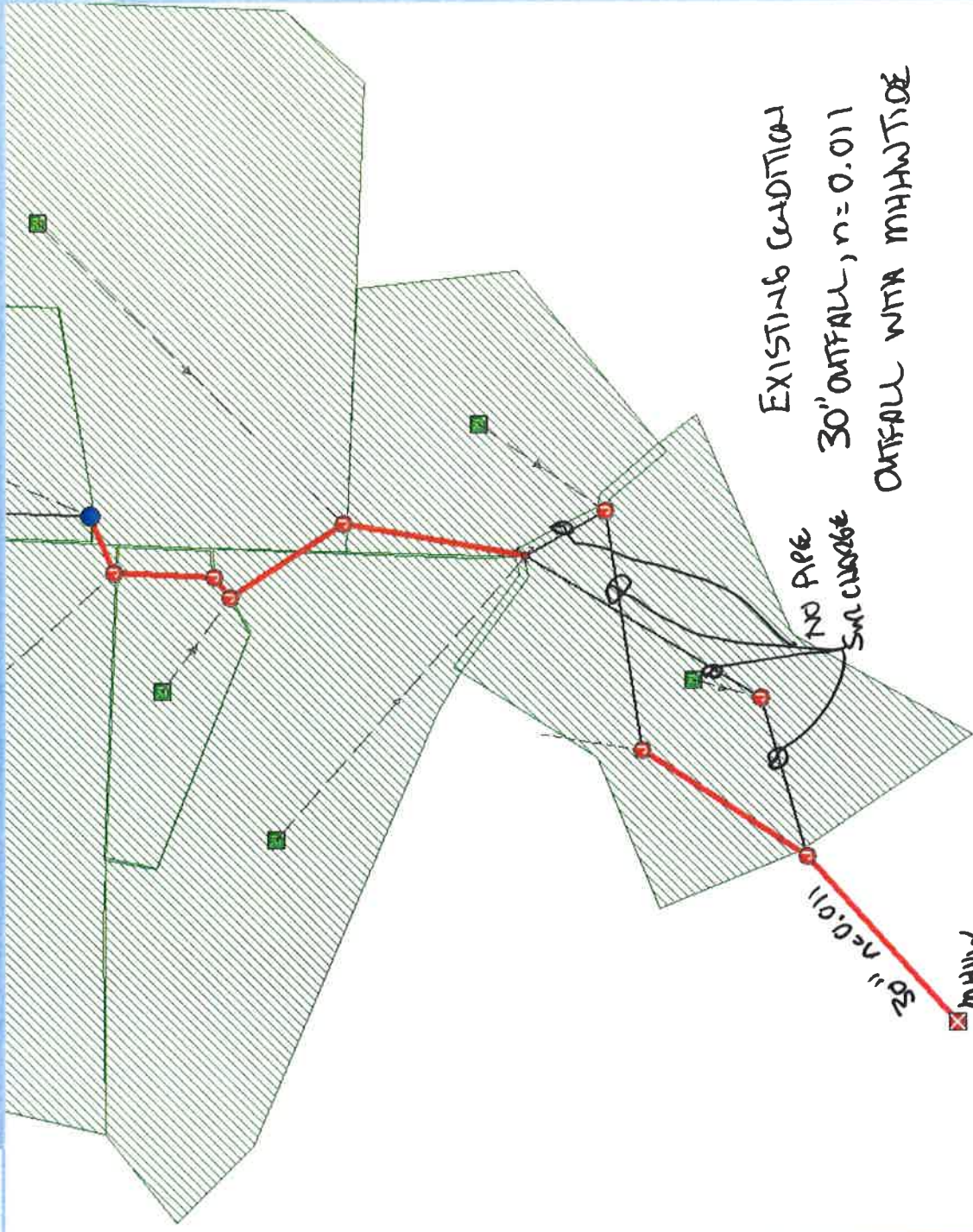
Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Link-01	1.42	0 08:06	10.30	0.14	5.78	0.85	0.32	0.25	0.00		Calculated
2 Link-02	1.42	0 08:06	7.70	0.18	2.70	0.23	0.62	0.50	0.00		Calculated
3 Link-03	6.85	0 08:00	9.66	0.71	8.00	0.54	0.89	0.71	0.00		Calculated
4 Link-04	9.44	0 08:00	14.57	0.65	9.77	0.47	1.10	0.88	0.00		Calculated
5 Link-05	9.97	0 08:02	3.01	3.31	8.12	0.08	1.25	1.00	29.00		SURCHARGED
8 Link-06	12.03	0 08:02	13.60	0.89	7.00	0.15	1.50	1.00	28.00		SURCHARGED
7 Link-07	12.04	0 08:02	18.80	0.64	8.82	0.04	1.50	1.00	34.00		SURCHARGED
8 link-08	12.32	0 08:02	11.75	1.05	6.97	0.20	1.50	1.00	39.00		SURCHARGED
9 Link-09	14.76	0 07:55	10.32	1.43	8.35	0.23	1.50	1.00	41.00		SURCHARGED
10 Link-10	13.17	0 07:54	11.25	1.17	7.59	0.37	1.43	0.95	0.00		> CAPACITY
11 Link-11	14.22	0 07:54	20.54	0.69	9.28	0.18	1.22	0.81	0.00		Calculated
12 Link-12	59.11	0 00:00	80.67	0.73	12.04	0.19	2.50	1.00	1440.00		SURCHARGED
13 Link-13	2.88	0 07:54	1.47	1.95	3.98	0.24	0.88	0.88	0.00		> CAPACITY
14 Link-14	3.50	0 07:54	8.31	0.42	5.60	0.44	0.74	0.74	0.00		Calculated
15 Link-15	15.34	0 00:00	27.55	0.56	6.27	0.32	2.00	1.00	1439.00		SURCHARGED

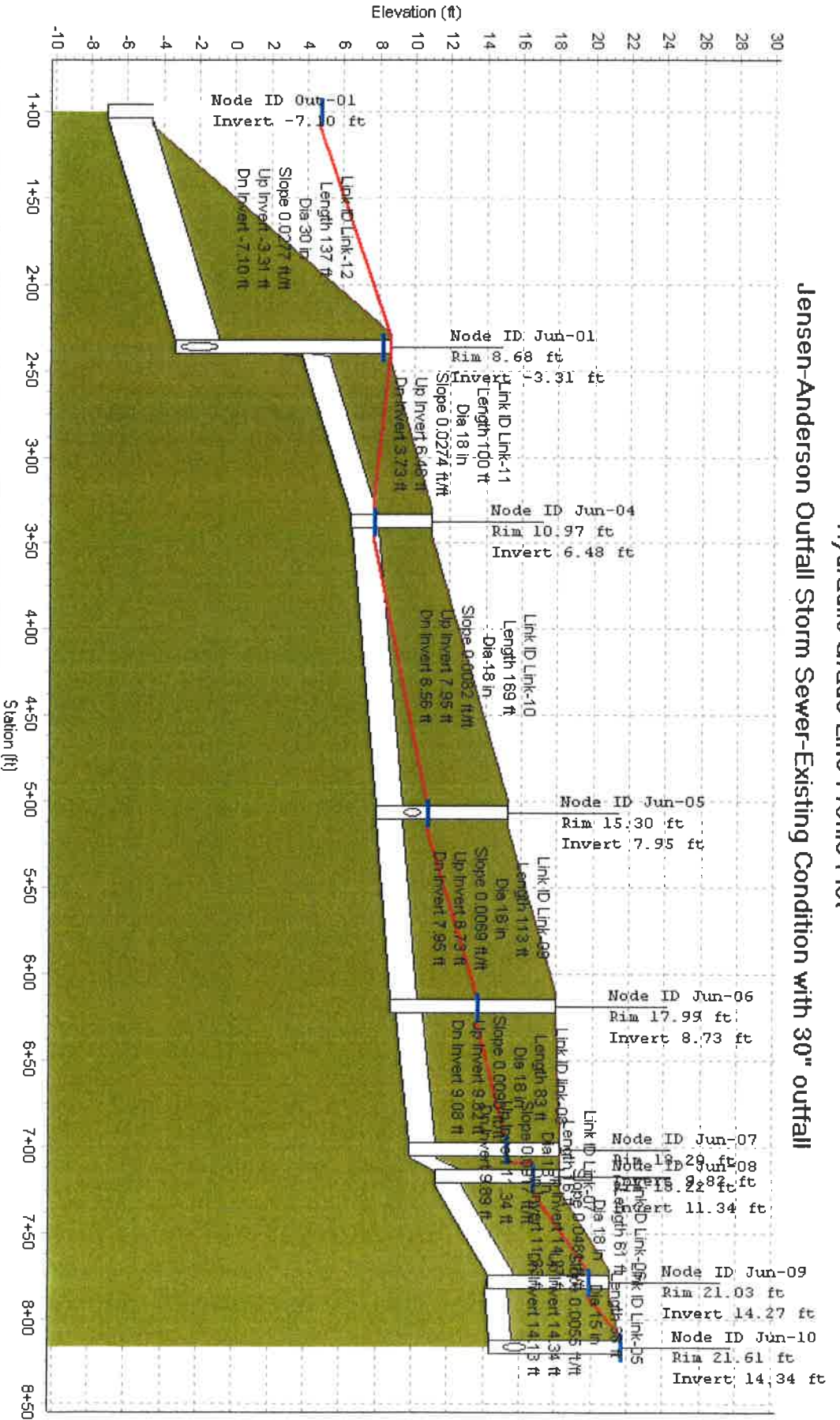
- File
 - Edit
 - View
 - Input
 - Design
 - Analysis
 - Output
 - Window
 - Help
- Plan View
- Project Data
 - Project Options
 - Analysis Options
 - Hydrology
 - Subbasins
 - Rain Gages
 - Hydraulics
 - Nodes
 - Junctions
 - Storage Nodes
 - Storage Curves
 - Inlets
 - Flow Diversion
 - Flow Diversion Curves
 - Outfalls
 - Outfall Tidal Curves
 - External Inflows
 - Links
 - Conveyance Links
 - Custom Pipe Geometry
 - Irregular Cross Sections
 - Pumps
 - Pump Curves
 - Orifices
 - Weirs
 - Outlets
 - Outlet Rating Curves
 - Quality
 - Pollutants
 - Pollutants Land Types
 - Others
 - Control Rules
 - Control Settings
 - Sanitary Time Patterns
 - Time Series



EXISTING CONDITION
30" OUTFALL, n=0.011
NO PIPE SURCHARGE
MHW

Hydraulic Grade Line Profile Plot

Jensen-Anderson Outfall Storm Sewer-Existing Condition with 30" outfall



Link ID:	Length (ft):	Dia (in):	Slope (ft/ft):	Up Invert (ft):	Dn Invert (ft):	Max HGL (ft):
Link-12	137	30	0.0277	-3.31	-7.10	8.60
Link-11	100	18	0.0274	6.48	2.91	7.71
Link-10	169	18	0.0082	7.95	6.56	10.75
Link-09	113	18	0.0069	8.73	7.95	13.54
Link-08	83	18	0.0090	9.82	9.08	15.16
Link-07	16	18	0.0917	11.34	12.04	15.16
Link-06	61	18	0.0481	14.27	12.03	19.77
Link-05	38	15	0.0055	14.34	9.97	21.61
Link-04	38	15	0.0055	14.34	9.97	21.61
Link-03	38	15	0.0055	14.34	9.97	21.61
Link-02	38	15	0.0055	14.34	9.97	21.61
Link-01	38	15	0.0055	14.34	9.97	21.61
Link-00	38	15	0.0055	14.34	9.97	21.61

Autodesk® Storm and Sanitary Analysis 2014 - What outlet pipe size increase eliminates surcharge - Initial State - [Plan View]

File Edit View Input Design Analysis Output Window Help

Plan View

Project Data
 Project Options
 Analysts Options
 Hydrology
 Subbasins
 Rain Gages
 Hydraulics
 Nodes
 Junctions
 Storage Nodes
 Storage Curves
 Inlets
 Flow Diversion
 Flow Diversion Curves
 Outfalls
 Outfall Tidal Curves
 External Inflows
 Links
 Conveyance Links
 Custom Pipe Geometry
 Irregular Cross Sections
 Pumps
 Pump Curves
 Driftices
 Weirs
 Outlets
 Outlet Rating Curves
 Quality
 Pollutants
 Pollutants Land Types
 Others
 Control Rules
 Control Settings
 Sanitary Time Patterns
 Time Series

24" n=0.011

MHHW

J-S FLOW SPLITTER

N10 PIPE SURCHARGE

EXISTING CONDITION
 24" OUTFALL, n=0.011
 OUTFALL W/ MHHW TIDE

1193786.63, 273640.40

Results Complete 749%

9/16/2015

APPENDIX E
ANALYSIS: ONE PIPE UPSIZED, NO
DETENTION AT ALC



Poulsbo Place Division 8

Assisted Living Center

Project Description

Downstream Stormwater Backwater Analysis

File Name Run 4 Trunkline with One Pipe upgrade with flow splitter.SPF
 Description Poulsbo Place 2 Div 8
 Downstream Existing Conditions

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method Santa Barbara UH
 Time of Concentration (TOC) Method User-Defined
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes NO
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On Oct 01, 2013 00:00:00
 End Analysis On Oct 02, 2013 00:00:00
 Start Reporting On Oct 01, 2013 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Waather) 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 10
 Nodes 15
 Junctions 13
 Outfalls 1
 Flow Diversions 1
 Inlets 0
 Storage Nodes 0
 Links 15
 Channels 0
 Pipes 15
 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	Rain Gage-01	Time Series	TS-01	Cumulative	inches	Washington	Kitsap	100	4.70	SCS Type IA 24-hr

**Pouisbo Place Division 8
Assisted Living Center**

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN	Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-03	4.76	87.00	98.00	86.00	4.69	4.29	20.48	5.04	0 00:06:00
2	Sub-04	2.62	67.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3	Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	6.91	2.19	0 00:06:00
4	Sub-08	0.90	76.00	98.00	86.00	4.69	4.17	3.76	0.93	0 00:06:00
5	Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6	Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.63	0 00:06:00
7	Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.16	0.29	0 00:06:00
8	Sub-12	1.16	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9	Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10	sub-2	2.62	95.00	98.00	86.00	4.69	4.39	11.51	2.83	0 00:06:00

**Poulsbo Place Division 8
Assisted Living Center**

Node Summary

Downstream Stormwater Backwater Analysis

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rlm (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)	Mln Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	21.92	8.10	0.00	0.58	0 00:00	0.00	0.00
2	Jun-04	Junction	8.48	10.97	6.48	10.97	0.00	12.87	10.03	0.00	0.94	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.48	14.93	0.00	3.06	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	12.26	18.51	0.00	1.69	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	12.00	17.96	0.00	0.26	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	12.00	20.89	0.00	0.14	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.61	0.00	11.38	21.61	0.00	0.00	0 07:58	0.43	19.00
8	Jun-11	Junction	27.18	33.84	27.16	33.84	0.00	10.47	28.27	0.00	5.57	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	7.86	33.00	0.00	11.85	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	2.83	33.26	0.00	11.74	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	2.83	40.38	0.00	8.73	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.77	11.16	0.00	3.99	0 00:00	0.00	0.00
13	Jun-18	Junction	2.04	11.00	2.04	11.00	0.00	9.58	8.29	0.00	2.71	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.92	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.75	12.25				0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (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 Total Depth Ratio	Total Time Reported (min)	Reported Condition
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	2.83	10.30	0.27	6.95	0.46	0.37	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	2.83	7.70	0.37	3.36	0.81	0.65	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	7.87	9.66	0.81	8.25	1.01	0.81	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	10.46	14.57	0.72	10.63	1.18	0.94	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	18.000	0.0110	10.09	5.34	1.89	5.71	1.50	1.00	32.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0220	12.00	13.57	0.88	7.13	1.50	1.00	32.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.82	9.6100	18.000	0.0220	12.01	19.25	0.62	6.80	1.50	1.00	37.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.06	0.9200	18.000	0.0111	12.28	11.80	1.04	6.95	1.50	1.00	40.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.48	10.32	1.40	8.19	1.50	1.00	42.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	11.62	11.25	1.03	6.58	1.50	1.00	35.00	SURCHARGED
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	12.67	20.54	0.62	7.17	1.50	1.00	36.00	SURCHARGED
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	21.92	20.66	1.06	12.40	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	55.92	9.43	9.36	0.1300	12.000	0.0110	4.21	1.49	2.83	5.43	1.00	1.00	22.00	SURCHARGED
14	Link-14	Pipe	Jun-15	Jun-16	146.92	8.90	2.04	4.6700	12.000	0.0120	4.76	8.34	0.57	6.06	1.00	1.00	25.00	SURCHARGED
15	Link-15	Pipe	Jun-16	Jun-01	120.02	2.04	-3.05	4.2400	24.000	0.0220	9.58	27.53	0.35	3.56	2.00	1.00	1438.00	SURCHARGED

**Pouisbo Place Division 8
Assisted Living Center**

Junction Input

Downstream Stormwater Backwater Analysis

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	8.48	10.97	4.49	8.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	18.22	0.00	0.00	0.00
8 Jun-09	14.27	21.03	6.76	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.81	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.18	33.84	6.68	27.16	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.78	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ec-in)	(min)
1 Jun-01	21.92	0.00	6.10	11.41	0.00	0.58	4.84	6.15	0 07:54	0 00:00	0.00	0.00
2 Jun-04	12.67	1.05	10.03	3.55	0.00	0.94	6.91	0.43	0 07:54	0 00:00	0.00	0.00
3 Jun-06	14.48	2.46	14.93	6.20	0.00	3.06	9.38	0.65	0 07:54	0 00:00	0.00	0.00
4 Jun-07	12.26	0.29	16.51	6.69	0.00	1.69	10.40	0.58	0 07:54	0 00:00	0.00	0.00
5 Jun-08	12.00	0.00	17.96	6.62	0.00	0.26	11.79	0.45	0 07:54	0 00:00	0.00	0.00
6 Jun-09	12.00	2.19	20.89	6.62	0.00	0.14	14.75	0.48	0 07:54	0 00:00	0.00	0.00
7 Jun-10	11.38	0.92	21.61	7.27	0.00	0.00	15.03	0.69	0 07:46	0 07:58	0.43	19.00
8 Jun-11	10.47	2.60	28.27	1.11	0.00	5.57	27.46	0.30	0 07:57	0 00:00	0.00	0.00
9 Jun-12	7.86	5.04	33.00	0.91	0.00	11.85	32.41	0.32	0 07:54	0 00:00	0.00	0.00
10 Jun-13	2.83	0.00	33.26	0.71	0.00	11.74	32.76	0.23	0 07:55	0 00:00	0.00	0.00
11 Jun-14	2.83	2.83	40.38	1.57	0.00	6.73	40.09	1.26	0 07:55	0 00:00	0.00	0.00
12 Jun-15	4.77	0.63	11.16	2.26	0.00	3.99	6.99	0.09	0 07:54	0 00:00	0.00	0.00
13 Jun-16	9.58	0.00	6.29	6.25	0.00	2.71	4.84	2.80	0 07:54	0 00:00	0.00	0.00

**Pouisbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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)	Menning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate	Flap (cfs)	No. of Barrels
1 Link-01	293.62	39.91	1.10	33.55	1.00	6.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2 Link-02	36.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3 Link-03	258.55	32.09	0.00	27.16	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4 Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5 Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
6 Link-06	61.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7 Link-07	15.81	11.34	0.00	9.82	0.00	1.52	9.8100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
8 link-08	82.61	9.82	0.00	9.06	0.33	0.78	0.9200	CIRCULAR	18.000	18.000	0.0111	0.5000	0.6000	0.0000	0.00	No	1
9 Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.8900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10 Link-10	189.20	7.95	0.00	8.58	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11 Link-11	100.45	8.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12 Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13 Link-13	55.92	9.43	1.48	9.36	0.46	0.07	0.1300	CIRCULAR	12.000	12.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
14 Link-14	146.92	8.90	0.00	2.04	0.00	8.86	4.8700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15 Link-15	120.02	2.04	0.00	-3.05	0.28	5.09	4.2400	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

Pouisbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

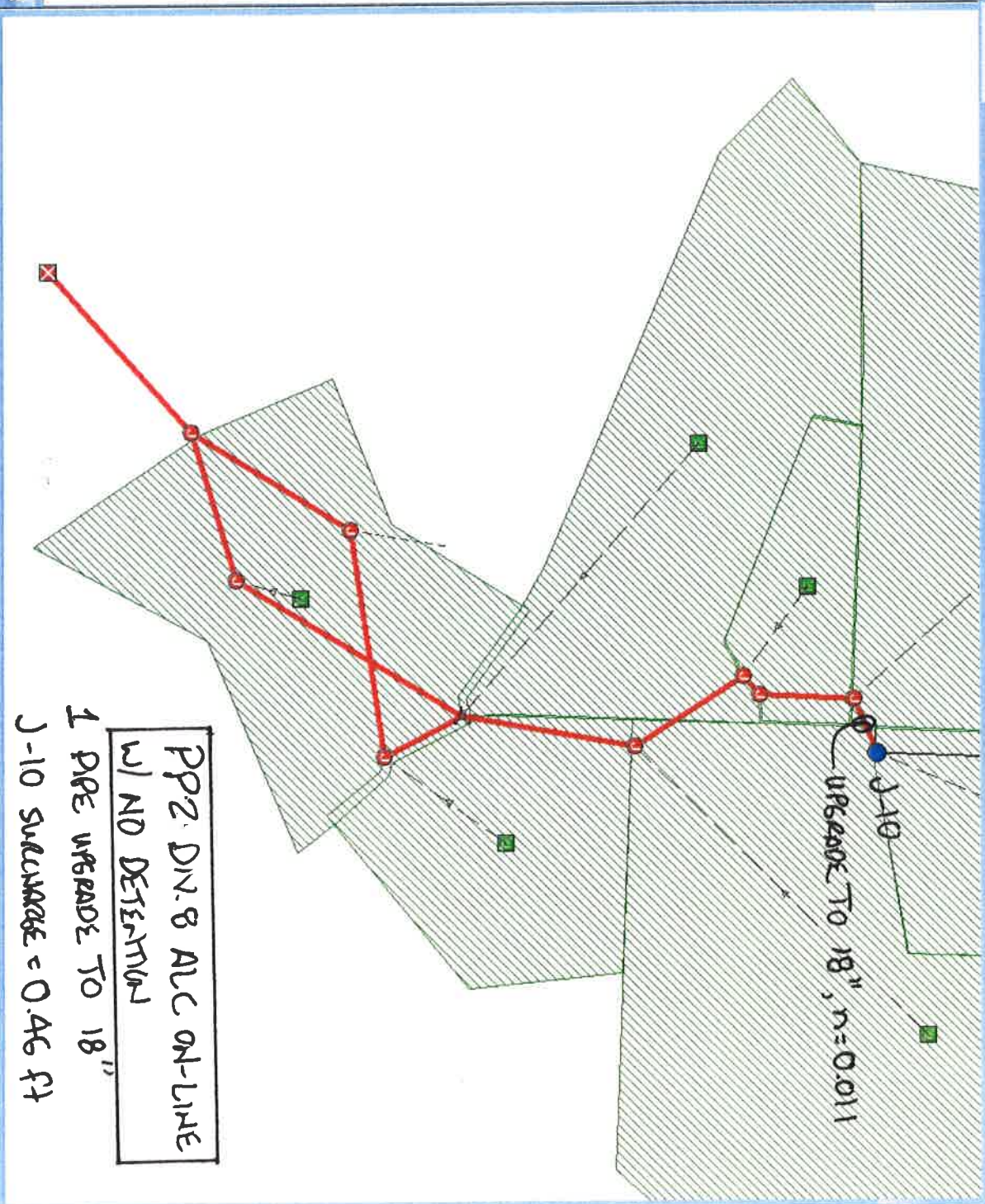
Pipe Results

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 Link-01	2.83	0 07:55	10.30	0.27	6.95	0.70	0.46	0.37	0.00		Calculated
2 Link-02	2.83	0 07:55	7.70	0.37	3.36	0.19	0.81	0.85	0.00		Calculated
3 Link-03	7.87	0 07:55	9.66	0.81	8.25	0.52	1.01	0.81	0.00		Calculated
4 Link-04	10.46	0 07:57	14.57	0.72	10.63	0.44	1.18	0.94	0.00		Calculated
5 Link-05	10.09	0 08:06	5.34	1.89	5.71	0.11	1.50	1.00	32.00		SURCHARGED
6 Link-06	12.00	0 08:06	13.57	0.88	7.13	0.14	1.50	1.00	32.00		SURCHARGED
7 Link-07	12.01	0 06:06	19.25	0.82	6.80	0.04	1.50	1.00	37.00		SURCHARGED
8 Link-08	12.28	0 06:06	11.80	1.04	6.95	0.20	1.50	1.00	40.00		SURCHARGED
9 Link-09	14.48	0 08:00	10.32	1.40	8.19	0.23	1.50	1.00	42.00		SURCHARGED
10 Link-10	11.62	0 07:54	11.25	1.03	6.58	0.43	1.50	1.00	35.00		SURCHARGED
11 Link-11	12.87	0 07:54	20.54	0.62	7.17	0.23	1.50	1.00	36.00		SURCHARGED
12 Link-12	21.92	0 00:00	20.66	1.06	12.40	0.18	1.50	1.00	1440.00		SURCHARGED
13 Link-13	4.21	0 07:45	1.49	2.83	5.43	0.17	1.00	1.00	22.00		SURCHARGED
14 Link-14	4.76	0 07:54	8.34	0.57	6.06	0.40	1.00	1.00	25.00		SURCHARGED
15 Link-15	9.58	0 00:01	27.53	0.35	3.56	0.58	2.00	1.00	1436.00		SURCHARGED

File Edit View Input Design Analysis Output Window Help

Plan View

- Project Data
- Project Options
- Analytic Options
- Hydrology
- Subbasins
- Rain Gages
- Hydraulics
- Nodes
- Junctions
- Storage Nodes
- Storage Curves
- Inlets
- Flow Diversion
- Flow Diversion Curves
- Outfalls
- Outfall Tidal Curves
- External Inflows
- Links
- Conveyance Links
- Custom Pipe Geometry
- Irregular Cross Sections
- Pumps
- Pump Curves
- Orifices
- Weirs
- Outlet
- Outlet Rating Curves
- Quality
- Polkarns
- Polkarns Land Types
- Others
- Control Rules
- Sanitary Time Patterns
- Time Series

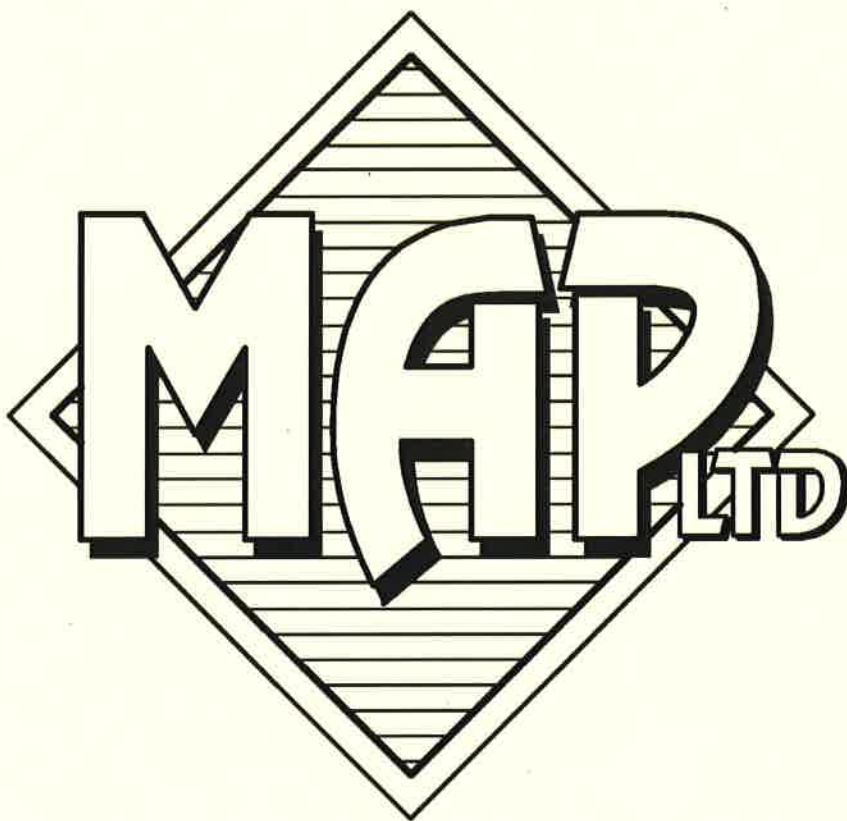


Results Complete 749%

11/9/2015 11:27:04 AM, 273215.40

9:05 AM 9/17/2015

APPENDIX F
ANALYSIS: ONE PIPE UPSIZE, CMP PIPE
REPLACED, NO ALC DETENTION



**Poulsbo Place Division 8
Assisted Living Center**

Project Description

Downstream Stormwater Backwater Analysis

File Name Run 4 Trunkline with One Pipe upgrade with flow splitter.SPF
 Description Poulsbo Place 2 Div 8
 Downstream Existing Conditions

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method Santa Barbara UH
 Time of Concentration (TOC) Method User-Defined
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes NO
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On Oct 01, 2013 00:00:00
 End Analysis On Oct 02, 2013 00:00:00
 Start Reporting On Oct 01, 2013 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 10
 Nodes 15
 Junctions 13
 Outfalls 1
 Flow Diversions 1
 Inlets 0
 Storage Nodes 0
 Links 15
 Channels 0
 Pipes 15
 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	Rain Gage-01	Tima Series	TS-01	Cumulative	inches	Washington	Kitsap	100	4.70	SCS Type IA 24-hr

**Pouisbo Place Division 8
Assisted Living Center**

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area Impervious Area (ac)	Impervious Area Curve Number (%)	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)	
1 Sub-03	4.78	87.00	98.00	86.00	4.69	4.29	20.48	5.04	0 00:06:00
2 Sub-04	2.62	87.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	6.91	2.19	0 00:06:00
4 Sub-08	0.90	78.00	98.00	86.00	4.69	4.17	3.76	0.93	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.63	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.16	0.29	0 00:06:00
6 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10 sub-2	2.82	95.00	98.00	86.00	4.69	4.39	11.51	2.83	0 00:06:00

**Poulsbo Place Division 8
Assisted Living Center**

Node Summary

Downstream Stormwater Backwater Analysis

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)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	21.92	8.16	0.00	0.52	0 00:00	0.00	0.00
2	Jun-04	Junction	8.48	10.97	8.48	10.97	0.00	12.78	10.12	0.00	0.85	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.68	15.12	0.00	2.87	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	12.50	16.73	0.00	1.47	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	13.58	18.22	0.00	0.00	0 07:56	0.37	18.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	13.58	19.96	0.00	1.07	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.81	14.34	21.61	0.00	11.38	20.99	0.00	0.62	0 00:00	0.00	0.00
8	Jun-11	Junction	27.16	33.84	27.18	33.84	0.00	10.47	28.18	0.00	5.66	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	7.86	33.01	0.00	11.84	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	2.83	33.27	0.00	11.73	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	2.83	40.38	0.00	8.73	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.80	11.27	0.00	3.88	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.58	8.35	0.00	2.65	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.92	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.90	12.38				0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Reported (min)	Reported Condition
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	2.83	10.30	0.27	6.95	0.46	0.37	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	2.83	7.70	0.37	3.33	0.82	0.66	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	7.87	9.66	0.81	8.32	0.97	0.78	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	10.46	14.57	0.72	11.28	1.14	0.91	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	18.000	0.0110	11.38	5.34	2.13	6.44	1.50	1.00	28.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0110	13.58	27.15	0.50	8.58	1.50	1.00	28.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.82	9.6100	18.000	0.0220	12.24	19.25	0.64	6.93	1.50	1.00	36.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.06	0.9200	18.000	0.0111	12.51	11.80	1.06	7.08	1.50	1.00	40.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.68	10.32	1.42	8.31	1.50	1.00	42.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	11.73	11.25	1.04	6.64	1.50	1.00	35.00	SURCHARGED
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	12.78	20.54	0.62	7.23	1.50	1.00	36.00	SURCHARGED
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	21.92	20.66	1.06	12.40	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	55.92	9.43	9.36	0.1300	12.000	0.0110	4.21	1.49	2.83	5.43	1.00	1.00	22.00	SURCHARGED
14	Link-14	Pipe	Jun-15	Jun-16	146.92	8.90	2.04	4.6700	12.000	0.0120	4.80	8.34	0.58	6.11	1.00	1.00	25.00	SURCHARGED
15	Link-15	Pipe	Jun-16	Jun-01	120.02	2.04	-3.05	4.2400	24.000	0.0220	9.58	27.53	0.35	3.56	2.00	1.00	1438.00	SURCHARGED

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Junction Input

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	6.48	10.97	4.49	8.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	18.22	0.00	0.00	0.00
6 Jun-09	14.27	21.03	6.76	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.81	7.27	14.34	0.00	21.81	0.00	0.00	0.00
8 Jun-11	27.18	33.84	6.66	27.18	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.76	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surchage Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooding Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 Jun-01	21.92	0.00	8.16	11.47	0.00	0.52	4.84	8.15	0 07:54	0 00:00	0.00	0.00
2 Jun-04	12.78	1.05	10.12	3.64	0.00	0.85	8.91	0.43	0 07:54	0 00:00	0.00	0.00
3 Jun-06	14.68	2.46	15.12	6.39	0.00	2.87	9.39	0.66	0 07:54	0 00:00	0.00	0.00
4 Jun-07	12.50	0.29	16.73	6.91	0.00	1.47	10.40	0.58	0 07:54	0 00:00	0.00	0.00
5 Jun-08	13.58	0.00	18.22	6.88	0.00	0.00	11.79	0.45	0 07:47	0 07:56	0.37	18.00
6 Jun-09	13.56	2.19	19.96	5.69	0.00	1.07	14.63	0.36	0 07:56	0 00:00	0.00	0.00
7 Jun-10	11.38	0.92	20.99	6.65	0.00	0.62	14.98	0.64	0 07:56	0 00:00	0.00	0.00
8 Jun-11	10.47	2.60	28.18	1.02	0.00	5.66	27.46	0.30	0 07:56	0 00:00	0.00	0.00
9 Jun-12	7.86	5.04	33.01	0.92	0.00	11.84	32.41	0.32	0 07:54	0 00:00	0.00	0.00
10 Jun-13	2.83	0.00	33.27	0.72	0.00	11.73	32.78	0.23	0 07:55	0 00:00	0.00	0.00
11 Jun-14	2.83	2.83	40.38	1.57	0.00	8.73	40.09	1.28	0 07:55	0 00:00	0.00	0.00
12 Jun-15	4.80	0.63	11.27	2.37	0.00	3.88	8.99	0.09	0 07:54	0 00:00	0.00	0.00
13 Jun-18	9.56	0.00	8.35	6.31	0.00	2.65	4.84	2.80	0 07:54	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Downstream Stormwater Backwater Analysis

Pipe Input

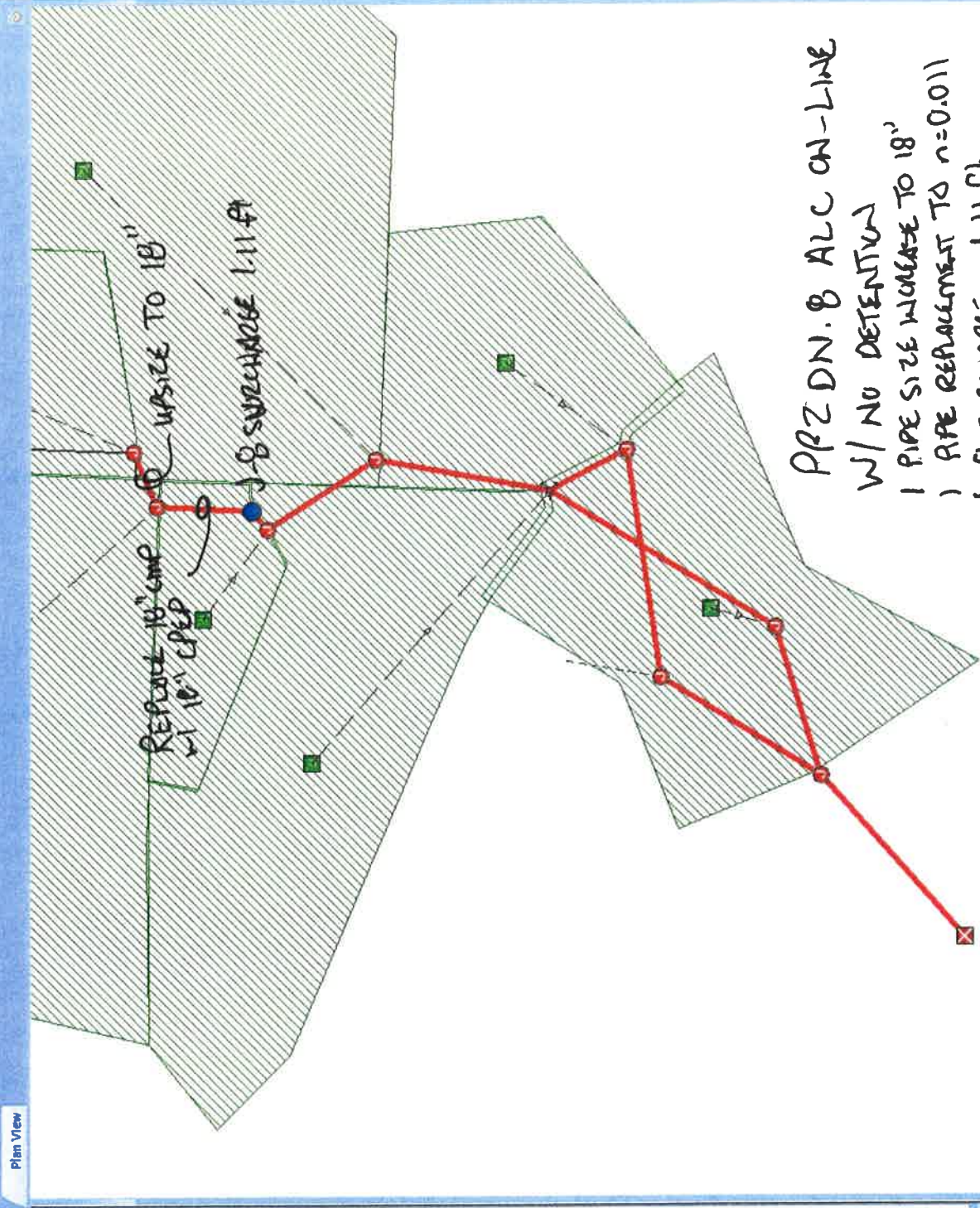
SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate (cfs)	Flap	No. of Barrels
1	Link-01	293.62	39.91	1.10	33.55	1.00	6.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2	Link-02	38.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3	Link-03	258.55	32.09	0.00	27.16	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5	Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
6	Link-06	61.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
7	Link-07	15.81	11.34	0.00	9.82	0.00	1.52	9.6100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
8	link-08	82.61	9.82	0.00	9.06	0.33	0.76	0.9200	CIRCULAR	18.000	18.000	0.0111	0.5000	0.6000	0.0000	0.00	No	1
9	Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10	Link-10	169.20	7.95	0.00	6.56	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11	Link-11	100.45	6.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12	Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13	Link-13	55.92	9.43	1.48	9.36	0.46	0.07	0.1300	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14	Link-14	146.92	8.90	0.00	2.04	0.00	6.86	4.8700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15	Link-15	120.02	2.04	0.00	-3.05	0.26	5.09	4.2400	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

**Poulsbo Place Division 8
Assisted Living Center**

Pipe Results

Downstream Stormwater Backwater Analysis

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow (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	Link-01	2.83	0 07:55	10.30	0.27	6.95	0.70	0.46	0.37	0.00		Calculated
2	Link-02	2.83	0 07:55	7.70	0.37	3.33	0.19	0.82	0.66	0.00		Calculated
3	Link-03	7.87	0 07:55	9.66	0.81	8.32	0.52	0.97	0.78	0.00		Calculated
4	Link-04	10.46	0 07:56	14.57	0.72	11.28	0.41	1.14	0.91	0.00		Calculated
5	Link-05	11.38	0 07:56	5.34	2.13	8.44	0.10	1.50	1.00	28.00		SURCHARGED
6	Link-06	13.58	0 07:56	27.15	0.50	8.58	0.12	1.50	1.00	28.00		SURCHARGED
7	Link-07	12.24	0 08:05	19.25	0.64	6.93	0.04	1.50	1.00	36.00		SURCHARGED
8	link-08	12.51	0 08:05	11.80	1.08	7.08	0.19	1.50	1.00	40.00		SURCHARGED
9	Link-09	14.68	0 08:05	10.32	1.42	8.31	0.23	1.50	1.00	42.00		SURCHARGED
10	Link-10	11.73	0 07:54	11.25	1.04	6.64	0.42	1.50	1.00	35.00		SURCHARGED
11	Link-11	12.78	0 07:54	20.54	0.62	7.23	0.23	1.50	1.00	36.00		SURCHARGED
12	Link-12	21.92	0 00:00	20.86	1.06	12.40	0.18	1.50	1.00	1440.00		SURCHARGED
13	Link-13	4.21	0 07:45	1.49	2.83	5.43	0.17	1.00	1.00	22.00		SURCHARGED
14	Link-14	4.80	0 07:54	8.34	0.56	6.11	0.40	1.00	1.00	25.00		SURCHARGED
15	Link-15	9.58	0 00:01	27.53	0.35	3.56	0.56	2.00	1.00	1438.00		SURCHARGED



PRZDN. 8 ALC ON-LINE
W/ NO DETENTION
1 PIPE SIZE INCREASE TO 18"
1 APE REPLACEMENT TO n=0.011
J-B SURCHARGE = 1.11 ft

- Project Data
- Project Options
- Analysis Options
- Hydrology
- Subbasins
- Rain Gages
- Hydraulics
- Nodes
 - Junctions
 - Storage Nodes
 - Storage Curves
 - Inlets
 - Flow Diversion
 - Flow Diversion Curves
 - Dutifalls
 - Dutifall Tidal Curves
 - External Inflows
- Links
 - Conveyance Links
 - Custom Pipe Geometry
 - Irregular Cross Sections
 - Pumps
 - Pump Curves
 - Driftices
 - Weirs
 - Outlets
 - Outlet Rating Curves
- Quality
- Pollutants
- Pollutants Land Types
- Others
 - Control Rules
 - Control Settings
 - Sanitary Time Patterns
 - Time Series

APPENDIX G
ANALYSIS: ONE PIPE UPSIZE AND ALC WITH
DETENTION



Poulsbo Place Division 8

Assisted Living Center

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 Sub-03	4.78	87.00	98.00	86.00	4.69	4.29	20.46	5.04	0 00:06:00
2 Sub-04	2.62	87.00	98.00	86.00	4.89	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4 Sub-08	0.90	78.00	98.00	86.00	4.69	4.17	3.76	0.93	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.63	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.18	0.29	0 00:06:00
8 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	88.00	4.69	4.39	4.29	1.05	0 00:06:00
10 sub-2	2.62	0.00	98.00	71.00	4.69	1.88	4.94	1.04	0 00:06:00

Pouisbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	21.92	8.09	0.00	0.59	0 00:00	0.00	0.00
2	Jun-04	Junction	8.48	10.97	6.48	10.97	0.00	12.64	10.00	0.00	0.97	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.45	14.68	0.00	3.11	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	12.01	16.46	0.00	1.74	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.72	17.91	0.00	0.31	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.73	20.84	0.00	0.19	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.61	0.00	9.55	21.56	0.00	0.05	0 00:00	0.00	0.00
8	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	8.65	28.02	0.00	5.82	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	8.05	32.84	0.00	12.01	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	1.03	32.88	0.00	12.12	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	1.03	40.18	0.00	8.93	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.75	11.12	0.00	4.03	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.58	8.27	0.00	2.73	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.92	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.72	12.21				0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Reported (min)	Reported Condition
1	Link-01	Pipe	Jun-14 Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	1.03	10.30	0.10	5.28	0.27	0.22	0.00	Calculated
2	Link-02	Pipe	Jun-13 Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	1.03	7.70	0.13	2.08	0.54	0.43	0.00	Calculated
3	Link-03	Pipe	Jun-12 Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	6.05	9.66	0.63	7.82	0.81	0.64	0.00	Calculated
4	Link-04	Pipe	Jun-11 Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	8.63	14.57	0.59	10.51	1.06	0.84	0.00	Calculated
5	Link-05	Pipe	Jun-10 Jun-09	37.89	14.34	14.13	0.5500	18.000	0.0110	9.55	5.34	1.79	5.40	1.50	1.00	26.00	SURCHARGED
6	Link-06	Pipe	Jun-09 Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0220	11.72	13.57	0.86	7.13	1.50	1.00	26.00	SURCHARGED
7	Link-07	Pipe	Jun-08 Jun-07	15.81	11.34	9.82	9.6100	18.000	0.0220	11.73	19.25	0.61	6.64	1.50	1.00	31.00	SURCHARGED
8	Link-08	Pipe	Jun-07 Jun-06	82.61	9.82	9.06	0.9200	18.000	0.0111	12.04	11.80	1.02	6.81	1.50	1.00	35.00	SURCHARGED
9	Link-09	Pipe	Jun-06 Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.45	10.32	1.40	8.18	1.50	1.00	37.00	SURCHARGED
10	Link-10	Pipe	Jun-05 Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	11.59	11.25	1.03	6.56	1.50	1.00	30.00	SURCHARGED
11	Link-11	Pipe	Jun-04 Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	12.64	20.54	0.62	7.15	1.50	1.00	32.00	SURCHARGED
12	Link-12	Pipe	Jun-01 Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	21.92	20.66	1.06	12.40	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05 Jun-15	55.92	9.43	9.36	0.1300	12.000	0.0110	4.12	1.49	2.77	5.25	1.00	1.00	14.00	SURCHARGED
14	Link-14	Pipe	Jun-15 Jun-16	146.92	8.90	2.04	4.6700	12.000	0.0120	4.75	8.34	0.57	6.05	1.00	1.00	17.00	SURCHARGED
15	Link-15	Pipe	Jun-16 Jun-01	120.02	2.04	-3.05	4.2400	24.000	0.0220	9.58	27.53	0.35	3.56	2.00	1.00	1438.00	SURCHARGED

**Poulsbo Place Division 8
Assisted Living Center**

Junction Input

Downstream Stormwater Backwater Analysis

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	6.48	10.97	4.49	6.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	16.22	6.68	11.34	0.00	16.22	0.00	0.00	0.00
8 Jun-09	14.27	21.03	6.78	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.61	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.16	33.84	8.68	27.16	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.78	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surchage Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 Jun-01	21.92	0.00	8.09	11.40	0.00	0.59	4.81	8.12	0 08:00	0 00:00	0.00	0.00
2 Jun-04	12.64	1.05	10.00	3.52	0.00	0.97	6.88	0.40	0 08:00	0 00:00	0.00	0.00
3 Jun-06	14.45	2.46	14.88	6.15	0.00	3.11	9.34	0.61	0 08:00	0 00:00	0.00	0.00
4 Jun-07	12.01	0.29	18.48	6.84	0.00	1.74	10.35	0.53	0 08:00	0 00:00	0.00	0.00
5 Jun-08	11.72	0.00	17.91	8.57	0.00	0.31	11.74	0.40	0 08:00	0 00:00	0.00	0.00
6 Jun-09	11.73	2.19	20.84	6.57	0.00	0.19	14.71	0.44	0 08:00	0 00:00	0.00	0.00
7 Jun-10	9.55	0.92	21.56	7.22	0.00	0.05	14.97	0.63	0 08:00	0 00:00	0.00	0.00
8 Jun-11	8.65	2.60	28.02	0.86	0.00	5.82	27.44	0.28	0 08:00	0 00:00	0.00	0.00
9 Jun-12	6.05	5.04	32.84	0.75	0.00	12.01	32.38	0.29	0 07:54	0 00:00	0.00	0.00
10 Jun-13	1.03	0.00	32.88	0.33	0.00	12.12	32.68	0.13	0 08:00	0 00:00	0.00	0.00
11 Jun-14	1.03	1.03	40.18	1.37	0.00	8.93	39.84	1.03	0 08:00	0 00:00	0.00	0.00
12 Jun-15	4.75	0.63	11.12	2.22	0.00	4.03	8.99	0.09	0 08:00	0 00:00	0.00	0.00
13 Jun-18	9.58	0.00	8.27	6.23	0.00	2.73	4.81	2.77	0 08:00	0 00:00	0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Pipe Input

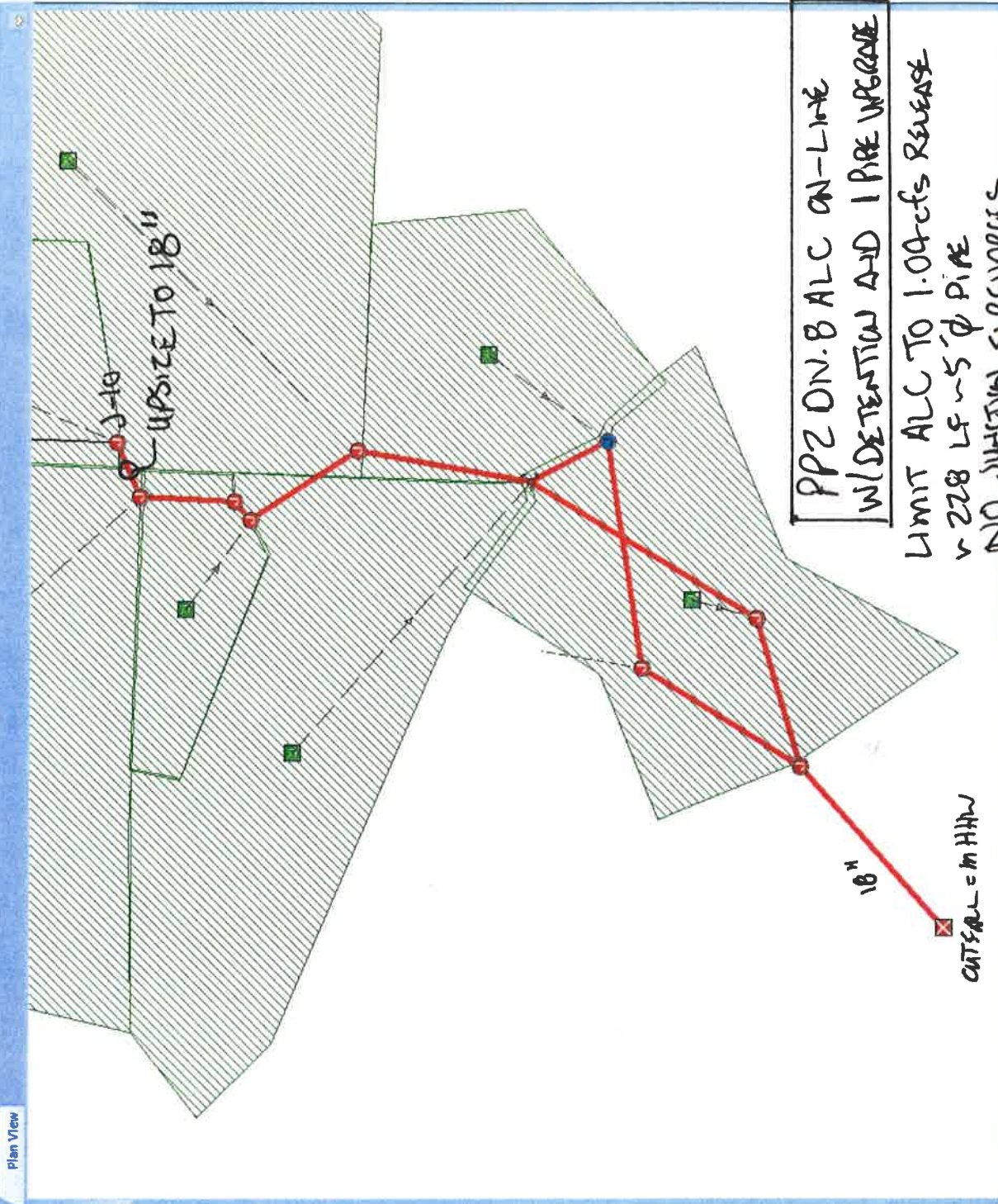
SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	293.82	39.91	1.10	33.55	1.00	6.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2	Link-02	38.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3	Link-03	258.55	32.09	0.00	27.16	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5	Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
6	Link-06	61.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7	Link-07	15.81	11.34	0.00	9.82	0.00	1.52	9.6100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.8000	0.0000	0.00	No	1
8	link-08	82.81	9.82	0.00	9.06	0.33	0.76	0.9200	CIRCULAR	18.000	18.000	0.0111	0.5000	0.6000	0.0000	0.00	No	1
9	Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.8900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10	Link-10	189.20	7.95	0.00	8.56	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11	Link-11	100.45	8.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12	Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13	Link-13	55.92	9.43	1.48	9.36	0.46	0.07	0.1300	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14	Link-14	148.92	8.90	0.00	2.04	0.00	8.86	4.6700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15	Link-15	120.02	2.04	0.00	-3.05	0.26	5.09	4.2400	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

**Pouisbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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 Link-01	1.03	0 08:00	10.30	0.10	5.28	0.93	0.27	0.22	0.00		Calculated
2 Link-02	1.03	0 08:00	7.70	0.13	2.08	0.30	0.54	0.43	0.00		Calculated
3 Link-03	6.05	0 08:00	9.66	0.83	7.82	0.55	0.81	0.84	0.00		Calculated
4 Link-04	8.63	0 08:00	14.57	0.59	10.51	0.44	1.06	0.84	0.00		Calculated
5 Link-05	9.55	0 08:00	5.34	1.79	5.40	0.12	1.50	1.00	26.00		SURCHARGED
6 Link-06	11.72	0 08:00	13.57	0.86	7.13	0.14	1.50	1.00	26.00		SURCHARGED
7 Link-07	11.73	0 08:01	19.25	0.61	6.64	0.04	1.50	1.00	31.00		SURCHARGED
8 link-08	12.04	0 08:01	11.80	1.02	8.81	0.20	1.50	1.00	35.00		SURCHARGED
9 Link-09	14.45	0 08:00	10.32	1.40	8.16	0.23	1.50	1.00	37.00		SURCHARGED
10 Link-10	11.59	0 08:00	11.25	1.03	8.56	0.43	1.50	1.00	30.00		SURCHARGED
11 Link-11	12.64	0 08:00	20.54	0.62	7.15	0.23	1.50	1.00	32.00		SURCHARGED
12 Link-12	21.92	0 00:00	20.66	1.06	12.40	0.18	1.50	1.00	1440.00		SURCHARGED
13 Link-13	4.12	0 08:00	1.49	2.77	5.25	0.18	1.00	1.00	14.00		SURCHARGED
14 Link-14	4.75	0 08:00	8.34	0.57	8.05	0.40	1.00	1.00	17.00		SURCHARGED
15 Link-15	9.56	0 00:01	27.53	0.35	3.56	0.56	2.00	1.00	1438.00		SURCHARGED

File Edit View Input Design Analysis Output Window Help



PPZ ON-B ALC ON-LINE
W/ DETENTION AND 1 PIPE UPGRADE
LIMIT ALC TO 1.04 cfs RELEASE
v 228 LF ~ 5" PIPE
NO JUNCTION SURCHARGES

Plan View

- Project Data
- Project Options
- Analysis Options
- Hydrology
 - Subbasins
 - Rain Gages
 - Hydraulics
- Nodes
 - Junctions
 - Storage Nodes
 - Storage Curves
 - Inlets
 - Flow Diversion
 - Flow Diversion Curves
 - Outfalls
 - Outfall Tidal Curves
 - External Inflows
- Links
 - Conveyance Links
 - Custom Pipe Geometry
 - Irregular Cross Sections
 - Pumps
 - Unitices
 - Wells
 - Outlets
 - Outlet Rating Curves
- Quality
- Pollutants
- Pollutants Land Types
- Others
 - Control Rules
 - Control Settings
 - Sanitary Time Patterns
 - Time Series

APPENDIX H
ANALYSIS: ONE PIPE UPGRADE, ALC WITH
DETENTION, AND 24" OUTFALL
IMPROVEMENT



Poulsbo Place Division 8

Assisted Living Center

Project Description

Downstream Stormwater Backwater Analysis

File Name ALC DETENTION WITH 1 PIPE UPSIZE WILL OUTFALL UPSIZE ELIMINATE SURCHARGE J-7 THROUGH J-5.SPF
 Description
 Poulsbo Place 2 Div 8
 Downstream Existing Conditions

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method Santa Barbara UH
 Time of Concentration (TOC) Method User-Defined
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes NO
 Skip Steady State Analysis Time Periods NO

Analysis Options

Start Analysis On Oct 01, 2013 00:00:00
 End Analysis On Oct 02, 2013 00:00:00
 Start Reporting On Oct 01, 2013 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 10
 Nodes 15
 Junctions 13
 Outfalls 1
 Flow Diversions 1
 Inlets 0
 Storage Nodes 0
 Links 15
 Channels 0
 Pipes 15
 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	Rain Gage-01	Tima Series	TS-01	Cumulative	inches	Washington	Kitsap	100	4.70	SCS Type IA 24-hr

Poulsbo Place Division 8

Assisted Living Center

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN	Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-03	4.78	87.00	98.00	86.00	4.69	4.29	20.48	5.04	0 00:06:00
2	Sub-04	2.82	87.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3	Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4	Sub-08	0.90	78.00	98.00	86.00	4.69	4.17	3.76	0.93	0 00:06:00
5	Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
8	Sub-10	0.59	95.00	98.00	86.00	4.89	4.39	2.57	0.63	0 00:06:00
7	Sub-11	0.27	95.00	98.00	86.00	4.89	4.39	1.18	0.29	0 00:06:00
8	Sub-12	1.18	95.00	98.00	86.00	4.89	4.39	5.19	1.28	0 00:06:00
9	Sub-14	0.98	95.00	98.00	86.00	4.89	4.39	4.29	1.05	0 00:06:00
10	sub-2	2.62	0.00	98.00	71.00	4.89	1.86	4.94	1.04	0 00:06:00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.88	0.00	37.96	8.04	0.00	2.84	0 00:00	0.00	0.00
2	Jun-04	Junction	8.48	10.97	6.48	10.97	0.00	14.07	7.78	0.00	3.19	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.49	13.37	0.00	4.82	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	12.04	14.96	0.00	3.24	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.75	16.41	0.00	1.81	0 00:00	0.00	0.00
8	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.75	19.38	0.00	1.67	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.81	14.34	21.81	0.00	9.56	20.08	0.00	1.53	0 00:00	0.00	0.00
8	Jun-11	Junction	27.18	33.84	27.18	33.84	0.00	8.65	27.94	0.00	5.90	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	8.05	32.85	0.00	12.00	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	1.03	32.88	0.00	12.12	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	1.03	40.18	0.00	8.93	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	3.36	9.39	0.00	5.78	0 00:00	0.00	0.00
13	Jun-18	Junction	2.04	11.00	2.04	11.00	0.00	13.63	8.10	0.00	2.90	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					37.96	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.76	10.69				0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (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	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	1.03	10.30	0.10	5.28	0.27	0.22	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	1.03	7.70	0.13	2.07	0.55	0.44	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	6.05	9.66	0.63	7.86	0.77	0.62	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	8.64	14.57	0.59	10.51	1.02	0.81	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	18.000	0.0110	9.56	5.34	1.79	5.41	1.50	1.00	25.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0220	11.75	13.57	0.87	7.13	1.50	1.00	25.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.82	9.6100	18.000	0.0220	11.75	19.25	0.61	6.65	1.50	1.00	31.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.06	0.9200	18.000	0.0111	12.04	11.80	1.02	6.82	1.50	1.00	35.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.49	10.32	1.40	8.20	1.50	1.00	37.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	13.02	11.25	1.16	7.51	1.42	0.95	0.00	> CAPACITY
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	14.07	20.54	0.69	8.19	1.40	0.93	0.00	Calculated
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	24.000	0.0110	37.96	44.49	0.85	12.08	2.00	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	55.92	9.43	9.36	0.1300	12.000	0.0110	2.73	1.49	1.83	3.83	0.85	0.85	0.00	> CAPACITY
14	Link-14	Pipe	Jun-15	Jun-16	146.92	8.90	2.04	4.6700	12.000	0.0120	3.36	8.34	0.40	5.35	0.75	0.75	0.00	Calculated
15	Link-15	Pipe	Jun-16	Jun-01	120.02	2.04	-3.05	4.2400	24.000	0.0220	13.63	27.53	0.50	4.67	2.00	1.00	1439.00	SURCHARGED

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Junction Input

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (In)
1 Jun-01	-3.31	6.88	11.99	-3.31	0.00	6.68	0.00	0.00	0.00
2 Jun-04	6.48	10.97	4.49	6.48	0.00	10.97	0.00	0.00	0.00
3 Jun-08	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	8.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	18.22	0.00	0.00	0.00
6 Jun-09	14.27	21.03	6.76	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.61	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.16	33.84	6.68	27.16	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.76	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

Pouisbo Place Division 8

Assisted Living Center

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 Jun-01	37.96	0.00	6.04	9.35	0.00	2.64	4.89	8.00	0 00:01	0 00:00	0.00	0.00
2 Jun-04	14.07	1.05	7.78	1.30	0.00	3.19	6.87	0.39	0 08:00	0 00:00	0.00	0.00
3 Jun-06	14.49	2.46	13.37	4.64	0.00	4.62	9.33	0.60	0 08:00	0 00:00	0.00	0.00
4 Jun-07	12.04	0.29	14.96	5.14	0.00	3.24	10.34	0.52	0 08:00	0 00:00	0.00	0.00
5 Jun-08	11.75	0.00	16.41	5.07	0.00	1.81	11.74	0.40	0 08:00	0 00:00	0.00	0.00
6 Jun-09	11.75	2.19	19.36	5.09	0.00	1.67	14.70	0.43	0 08:00	0 00:00	0.00	0.00
7 Jun-10	9.56	0.92	20.08	5.74	0.00	1.53	14.96	0.82	0 08:00	0 00:00	0.00	0.00
8 Jun-11	8.65	2.60	27.94	0.78	0.00	5.90	27.44	0.28	0 08:00	0 00:00	0.00	0.00
9 Jun-12	8.05	5.04	32.85	0.76	0.00	12.00	32.38	0.29	0 08:00	0 00:00	0.00	0.00
10 Jun-13	1.03	0.00	32.88	0.33	0.00	12.12	32.68	0.13	0 08:00	0 00:00	0.00	0.00
11 Jun-14	1.03	1.03	40.18	1.37	0.00	8.93	39.84	1.03	0 08:00	0 00:00	0.00	0.00
12 Jun-15	3.36	0.63	9.39	0.49	0.00	5.76	8.98	0.08	0 08:00	0 00:00	0.00	0.00
13 Jun-18	13.63	0.00	8.10	6.06	0.00	2.90	4.89	2.65	0 00:01	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center
Downstream Stormwater Backwater Analysis**

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 Gate (cfs)	Flap	No. of Barrels
1	Link-01	293.62	39.91	1.10	33.55	1.00	8.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2	Link-02	36.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3	Link-03	258.55	32.09	0.00	27.16	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5	Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
6	Link-06	81.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7	Link-07	15.81	11.34	0.00	9.82	0.00	1.52	9.6100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.8000	0.0000	0.00	No	1
8	link-08	82.61	9.82	0.00	9.06	0.33	0.76	0.9200	CIRCULAR	18.000	18.000	0.0111	0.5000	0.6000	0.0000	0.00	No	1
9	Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10	Link-10	169.20	7.95	0.00	6.56	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11	Link-11	100.45	6.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12	Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	24.000	24.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13	Link-13	55.92	9.43	1.48	9.36	0.46	0.07	0.1300	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14	Link-14	146.92	8.90	0.00	2.04	0.00	6.86	4.6700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15	Link-15	120.02	2.04	0.00	-3.05	0.26	5.09	4.2400	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

Pouisbo Place Division 8

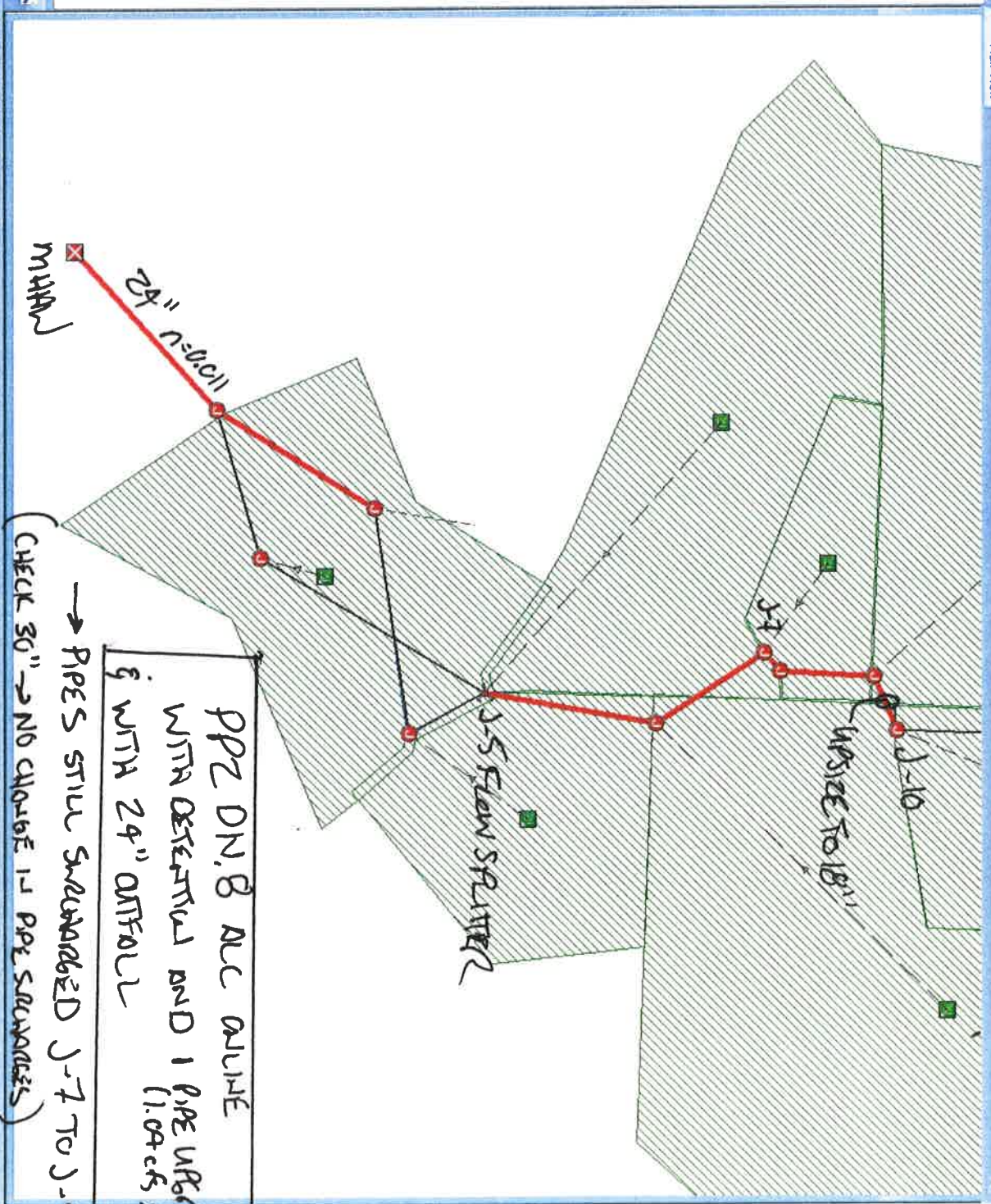
Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Link-01	1.03	0 08:00	10.30	0.10	5.28	0.93	0.27	0.22	0.00		Calculated
2 Link-02	1.03	0 08:00	7.70	0.13	2.07	0.31	0.55	0.44	0.00		Calculated
3 Link-03	6.05	0 08:00	9.66	0.63	7.86	0.55	0.77	0.82	0.00		Calculated
4 Link-04	8.64	0 08:00	14.57	0.59	10.51	0.44	1.02	0.81	0.00		Calculated
5 Link-05	9.56	0 08:00	5.34	1.79	5.41	0.12	1.50	1.00	25.00		SURCHARGED
8 Link-08	11.75	0 08:00	13.57	0.87	7.13	0.14	1.50	1.00	25.00		SURCHARGED
7 Link-07	11.75	0 08:00	19.25	0.61	6.65	0.04	1.50	1.00	31.00		SURCHARGED
8 link-08	12.04	0 08:00	11.80	1.02	8.82	0.20	1.50	1.00	35.00		SURCHARGED
9 Link-09	14.49	0 08:00	10.32	1.40	8.20	0.23	1.50	1.00	37.00		SURCHARGED
10 Link-10	13.02	0 08:00	11.25	1.18	7.51	0.38	1.42	0.95	0.00		> CAPACITY
11 Link-11	14.07	0 08:00	20.54	0.69	8.19	0.20	1.40	0.93	0.00		Calculated
12 Link-12	37.96	0 00:00	44.49	0.85	12.08	0.19	2.00	1.00	1440.00		SURCHARGED
13 Link-13	2.73	0 08:00	1.49	1.83	3.83	0.24	0.85	0.85	0.00		> CAPACITY
14 Link-14	3.36	0 08:00	8.34	0.40	5.35	0.46	0.75	0.75	0.00		Calculated
15 Link-15	13.63	0 00:01	27.53	0.50	4.67	0.43	2.00	1.00	1439.00		SURCHARGED

- Project Data
- Project Options
- Analysis Options
- Hydrology
- Subbasins
- Rain G apps
- Hydraulics
- Nodes
 - Junctions
 - Storage Nodes
- Storage Curves
- Inlets
- Flow Diversion
- Flow Diversion Curves
- Outfalls
- Outfall Tidal Curves
- External Inflows
- Links
 - Conveyance Links
 - Custom Pipe Geometry
 - Irregular Cross Sections
- Pumps
- Pump Curves
- Drifts
- Weirs
- Outlets
 - Outlet Rating Curves
- Quality
- Pollutants
- Pollutants Land Types
- Others
 - Control Rules
 - Control Settings
 - Sanitary Time Patterns
 - Time Series



PPZ DN.8 ALL ONLINE
WITH DETENTION AND 1 PIPE WRKROCK
(1.09 cfs PERSEC)
& WITH 24" OUTFALL
→ PIPES STILL SURCHARGED J-7 TO J-5
(CHECK 30" → NO CHANGE IN PPE SURCHARGES)

Hydrograph Report

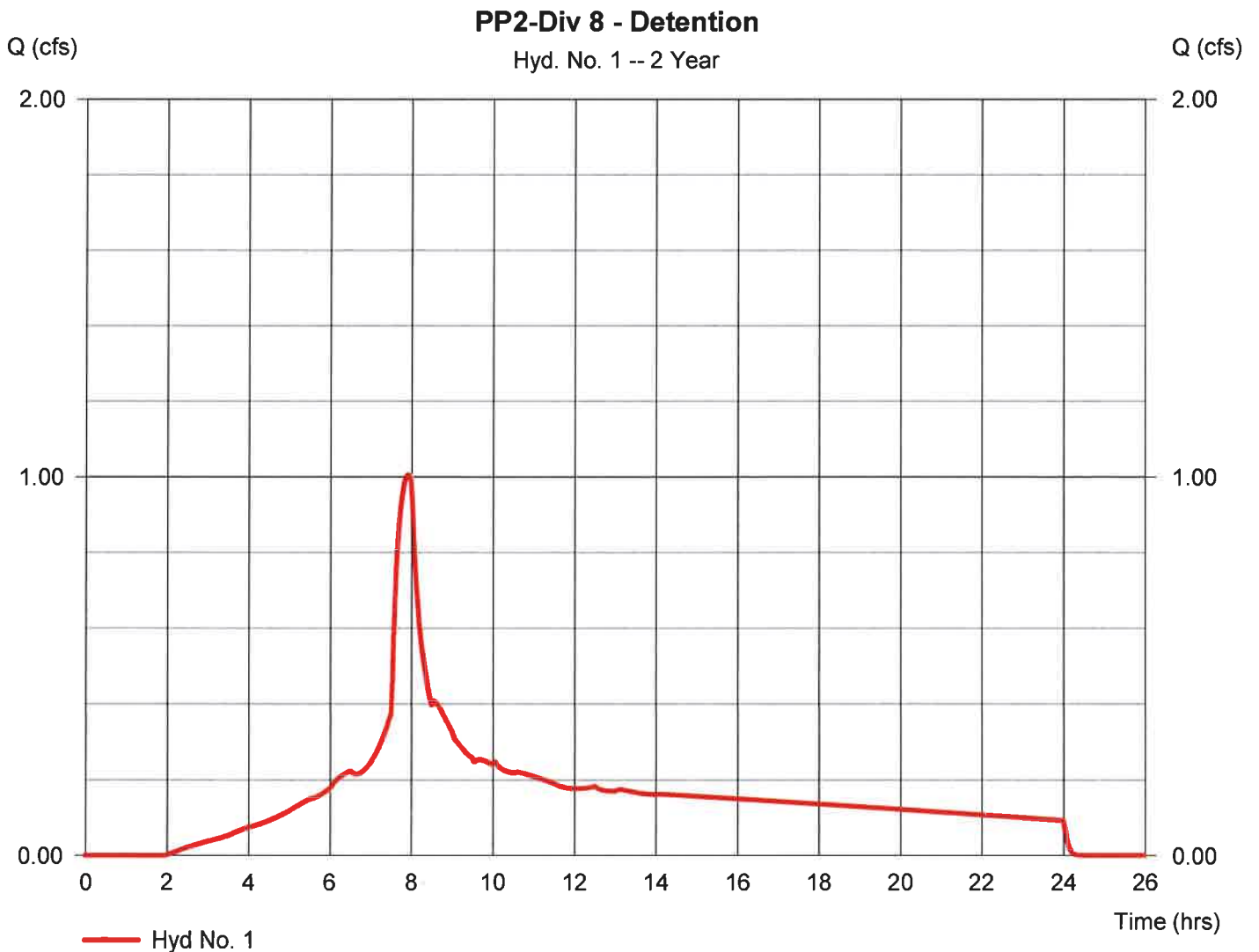
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 10 / 1 / 2015

Hyd. No. 1

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.005 cfs
Storm frequency	= 2 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 14,115 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.30 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

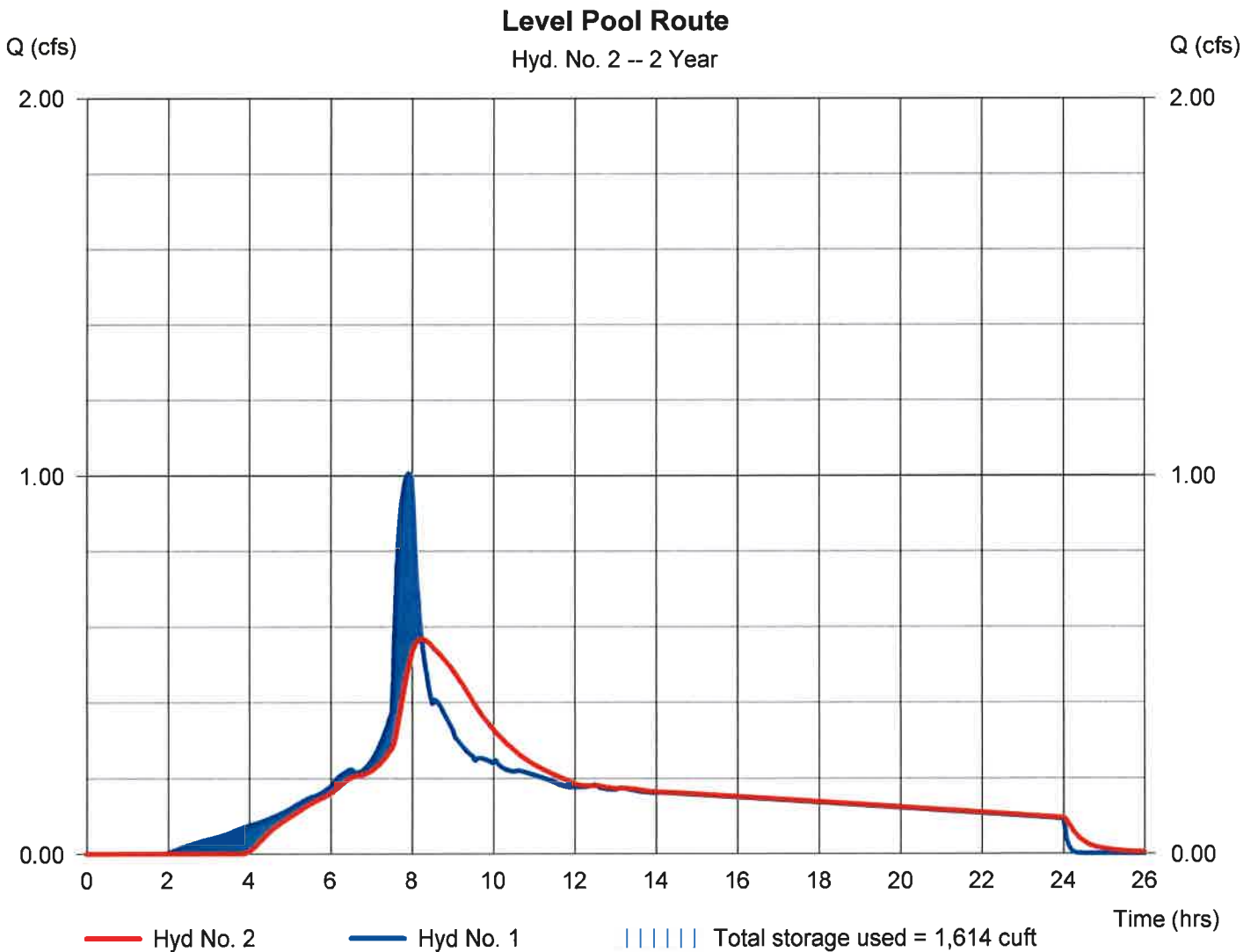
Thursday, 10 / 1 / 2015

Hyd. No. 2

Level Pool Route

Hydrograph type	= Reservoir	Peak discharge	= 0.568 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.23 hrs
Time interval	= 2 min	Hyd. volume	= 13,874 cuft
Inflow hyd. No.	= 1 - PP2-Div 8 - Detention	Max. Elevation	= 46.95 ft
Reservoir name	= Underground Detention	Max. Storage	= 1,614 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Underground Detention

Pond Data

UG Chambers -Invert elev. = 45.00 ft, Rise x Span = 5.00 x 5.00 ft, Barrel Len = 228.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	45.00	n/a	0	0
0.50	45.50	n/a	233	233
1.00	46.00	n/a	405	638
1.50	46.50	n/a	492	1,130
2.00	47.00	n/a	542	1,673
2.50	47.50	n/a	567	2,239
3.00	48.00	n/a	567	2,806
3.50	48.50	n/a	542	3,348
4.00	49.00	n/a	492	3,840
4.50	49.50	n/a	405	4,245
5.00	50.00	n/a	233	4,478

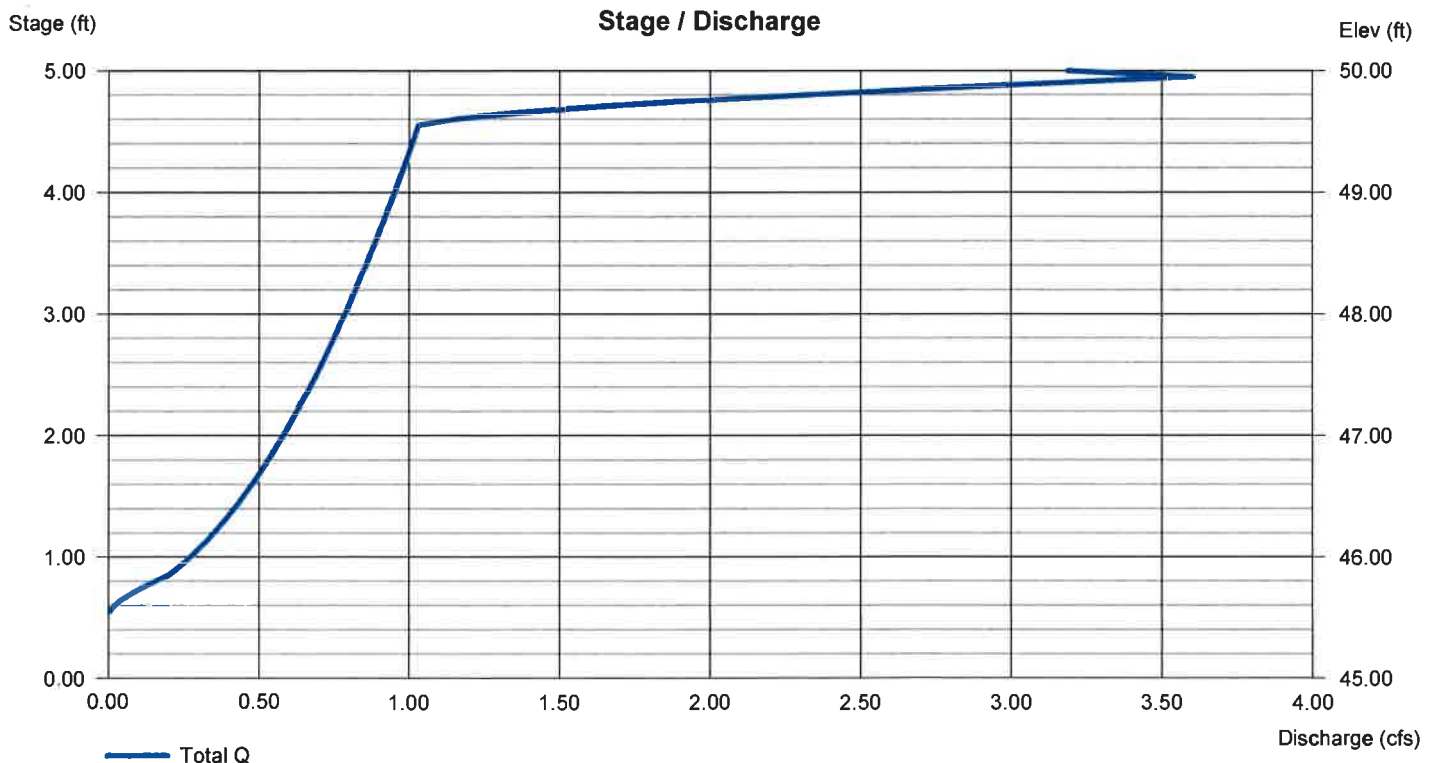
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	4.50	Inactive	Inactive
Span (in)	= 12.00	4.50	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 45.50	45.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.62	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	Inactive	Inactive	Inactive
Crest El. (ft)	= 49.55	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 45.10			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

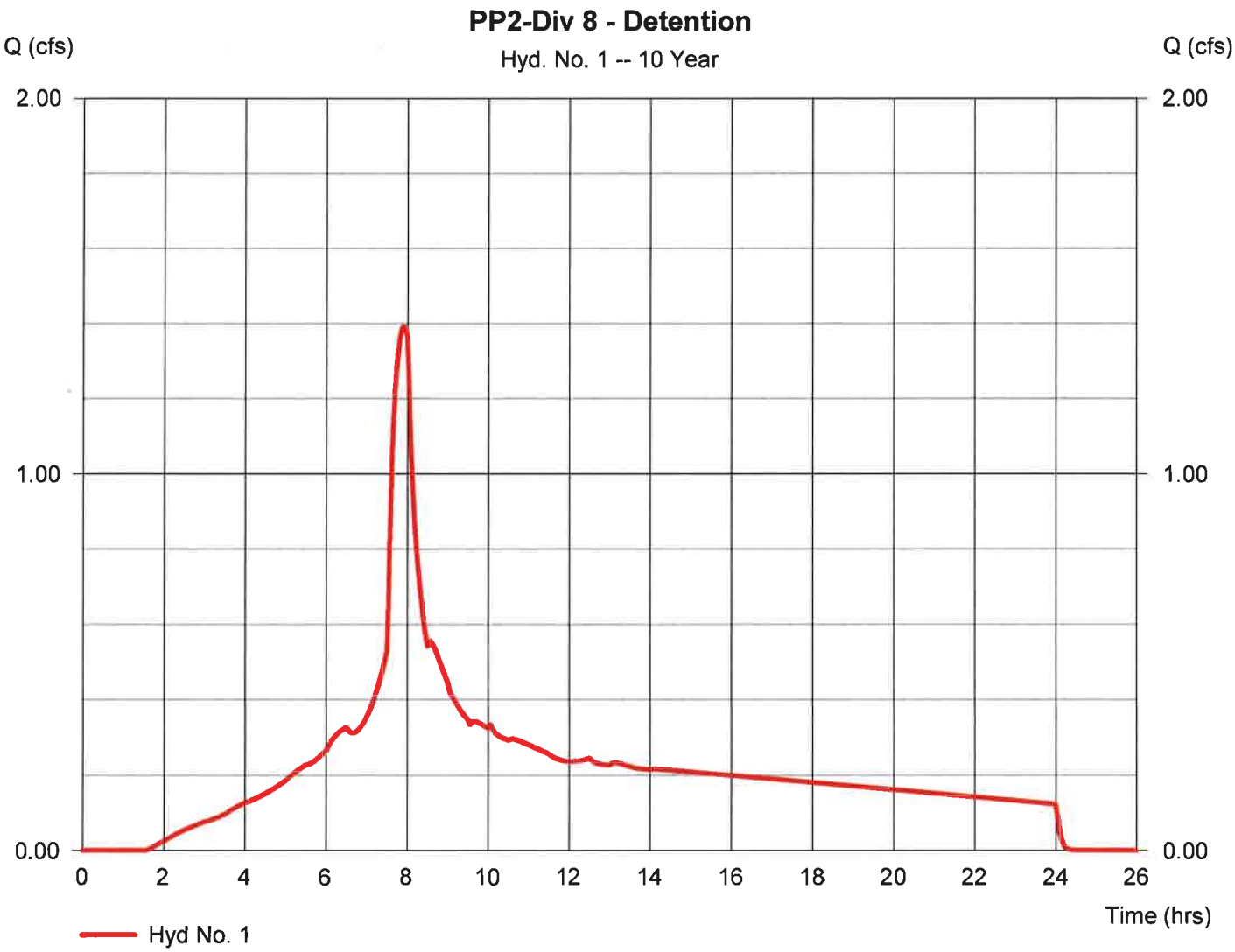
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 10 / 1 / 2015

Hyd. No. 1

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.392 cfs
Storm frequency	= 10 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 19,530 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

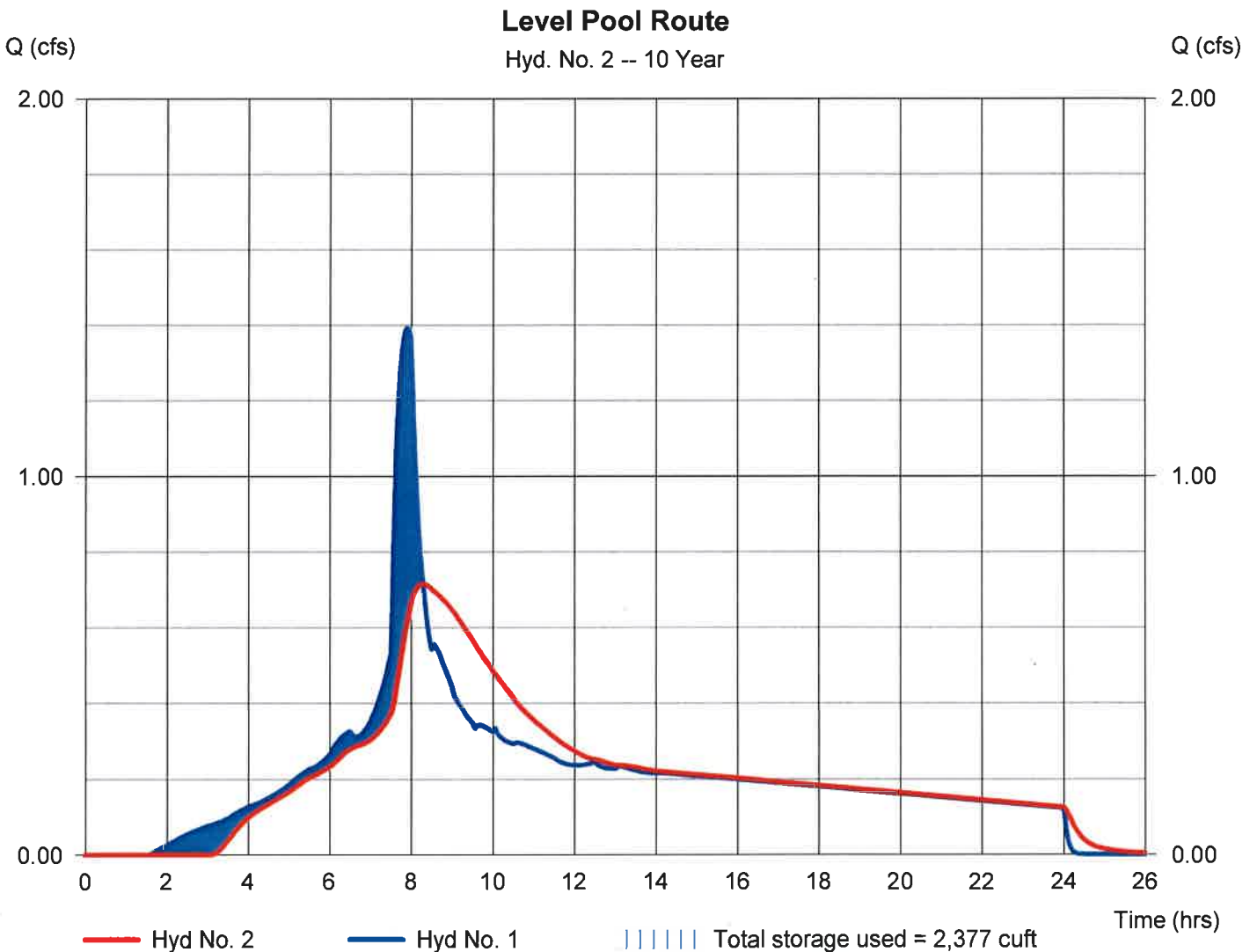
Thursday, 10 / 1 / 2015

Hyd. No. 2

Level Pool Route

Hydrograph type	= Reservoir	Peak discharge	= 0.716 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.30 hrs
Time interval	= 2 min	Hyd. volume	= 19,289 cuft
Inflow hyd. No.	= 1 - PP2-Div 8 - Detention	Max. Elevation	= 47.62 ft
Reservoir name	= Underground Detention	Max. Storage	= 2,377 cuft

Storage Indication method used.



Hydrograph Report

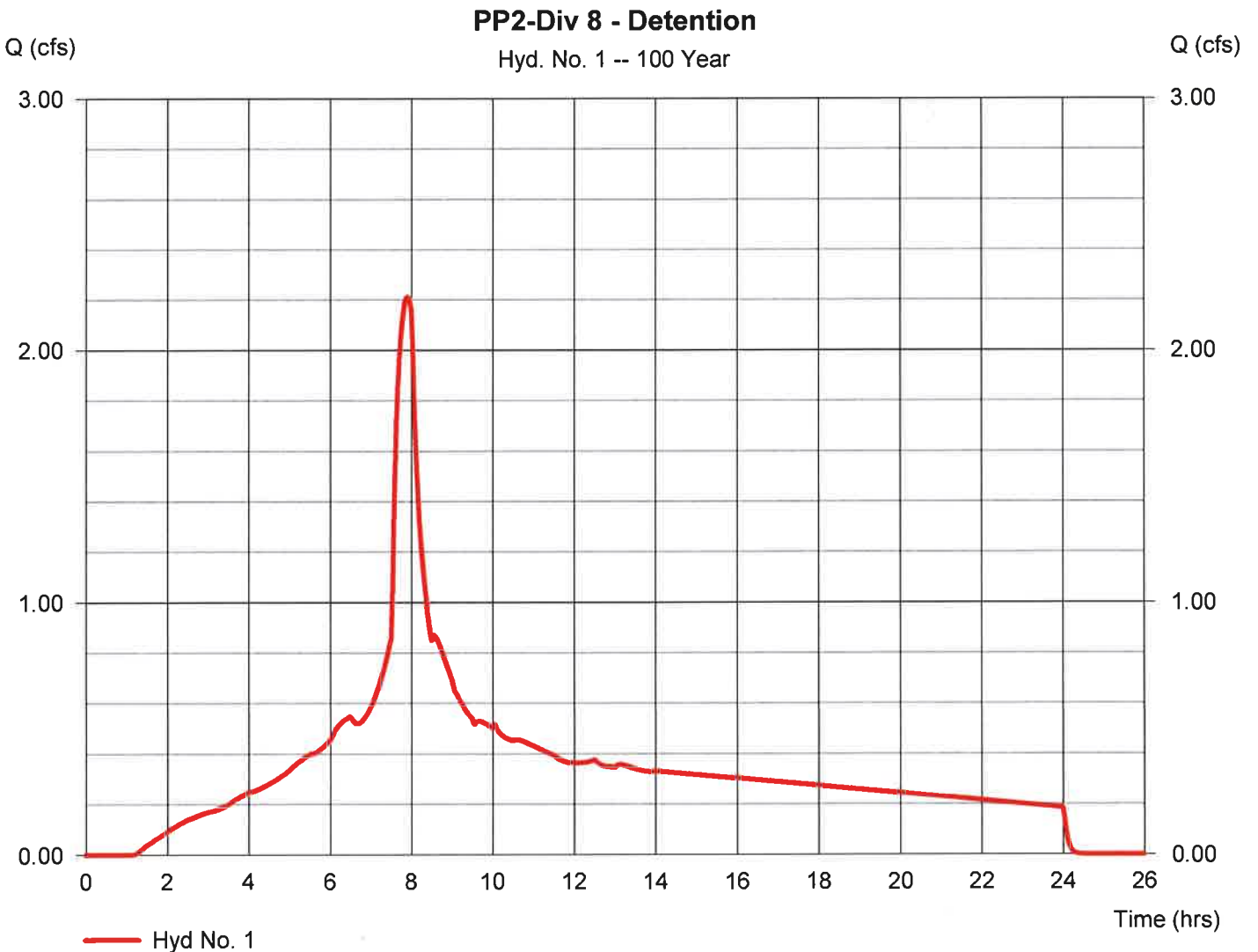
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 10 / 1 / 2015

Hyd. No. 1

PP2-Div 8 - Detention

Hydrograph type	=	SBUH Runoff	Peak discharge	=	2.213 cfs
Storm frequency	=	100 yrs	Time to peak	=	7.90 hrs
Time interval	=	2 min	Hyd. volume	=	31,293 cuft
Drainage area	=	2.197 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 10 / 1 / 2015

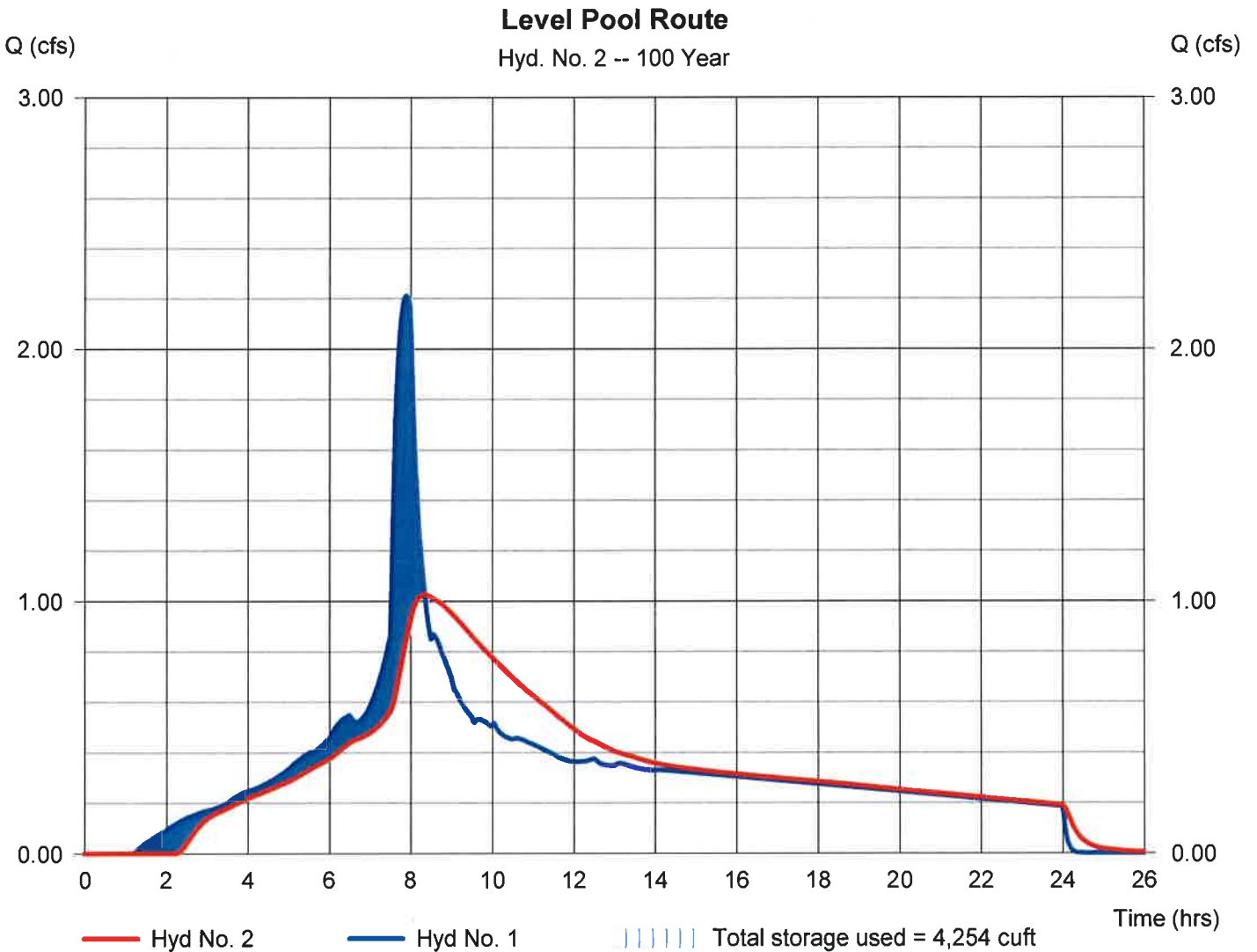
Hyd. No. 2

Level Pool Route

Hydrograph type	= Reservoir	Peak discharge	= 1.028 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.37 hrs
Time interval	= 2 min	Hyd. volume	= 31,053 cuft
Inflow hyd. No.	= 1 - PP2-Div 8 - Detention	Max. Elevation	= 49.52 ft
Reservoir name	= Underground Detention	Max. Storage	= 4,254 cuft



Storage Indication method used.



APPENDIX I
ANALYSIS: NO DOWNSTREAM PIPE
IMPROVEMENTS, ALC WITH DETENTION, NO
JUNCTION CB RIM SURCHARGES



**Poulsbo Place Division 8
Assisted Living Center**

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 Sub-03	4.78	87.00	98.00	86.00	4.69	4.29	20.48	5.04	0 00:06:00
2 Sub-04	2.82	87.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4 Sub-08	0.90	78.00	98.00	86.00	4.69	4.17	3.78	0.93	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
6 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.63	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.18	0.29	0 00:06:00
8 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10 sub-2	2.62	0.00	98.00	65.00	4.69	1.45	3.80	0.87	0 00:06:00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

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)
1	Jun-01	Junction	-3.31	8.88	-3.31	8.88	0.00	21.92	7.94	0.00	0.74	0 00:00	0.00	0.00
2	Jun-04	Junction	6.48	10.97	6.48	10.97	0.00	12.38	9.78	0.00	1.19	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.08	14.43	0.00	3.56	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	11.64	15.91	0.00	2.29	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.36	17.27	0.00	0.95	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.37	20.01	0.00	1.02	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.61	0.00	9.19	21.61	0.00	0.00	0 08:00	0.00	1.00
8	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	8.28	27.99	0.00	5.85	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	5.68	32.81	0.00	12.04	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	0.66	32.81	0.00	12.19	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	0.67	40.13	0.00	8.98	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.65	10.85	0.00	4.30	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.58	8.12	0.00	2.88	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.92	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.35	11.89				0.00	0.00

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Link Summary

SN ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	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 Reported Surcharged (min)	Reported Condition
1	Link-01	Pipe	Jun-14 Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	0.66	10.30	0.06	4.64	0.22	0.17	0.00	Calculated
2	Link-02	Pipe	Jun-13 Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	0.67	7.70	0.09	1.64	0.49	0.39	0.00	Calculated
3	Link-03	Pipe	Jun-12 Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	5.68	9.66	0.59	7.67	0.77	0.62	0.00	Calculated
4	Link-04	Pipe	Jun-11 Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	8.27	14.57	0.57	9.70	1.04	0.83	0.00	Calculated
5	Link-05	Pipe	Jun-10 Jun-09	37.89	14.34	14.13	0.5500	15.000	0.0120	9.17	3.01	3.05	7.47	1.25	1.00	25.00	SURCHARGED
6	Link-06	Pipe	Jun-09 Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0220	11.36	13.57	0.84	7.14	1.50	1.00	24.00	SURCHARGED
7	Link-07	Pipe	Jun-08 Jun-07	15.81	11.34	9.82	9.6100	18.000	0.0220	11.36	19.25	0.59	6.43	1.50	1.00	30.00	SURCHARGED
8	Link-08	Pipe	Jun-07 Jun-06	82.61	9.82	9.06	0.9200	18.000	0.0111	11.66	11.80	0.99	6.60	1.50	1.00	34.00	SURCHARGED
9	Link-09	Pipe	Jun-06 Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.08	10.32	1.36	7.97	1.50	1.00	36.00	SURCHARGED
10	Link-10	Pipe	Jun-05 Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	11.33	11.25	1.01	6.42	1.50	1.00	29.00	SURCHARGED
11	Link-11	Pipe	Jun-04 Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	12.37	20.54	0.60	7.00	1.50	1.00	31.00	SURCHARGED
12	Link-12	Pipe	Jun-01 Out-01	136.85	-3.31	-7.10	2.7700	18.000	0.0110	21.92	20.66	1.06	12.40	1.50	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05 Jun-15	55.92	9.43	9.36	0.1300	12.000	0.0110	4.02	1.49	2.70	5.19	1.00	1.00	11.00	SURCHARGED
14	Link-14	Pipe	Jun-15 Jun-16	146.92	8.90	2.04	4.6700	12.000	0.0120	4.65	8.34	0.56	5.92	1.00	1.00	15.00	SURCHARGED
15	Link-15	Pipe	Jun-16 Jun-01	120.02	2.04	-3.05	4.2400	24.000	0.0220	9.58	27.53	0.35	3.56	2.00	1.00	1438.00	SURCHARGED

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

Junction Input

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	8.68	11.99	-3.31	0.00	8.68	0.00	0.00	0.00
2 Jun-04	8.48	10.97	4.49	8.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	8.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	6.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	18.22	6.88	11.34	0.00	18.22	0.00	0.00	0.00
8 Jun-09	14.27	21.03	6.78	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.61	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.18	33.84	6.68	27.18	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.76	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.81	49.11	10.30	38.81	0.00	49.11	0.00	0.00	0.00
12 Jun-15	8.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-18	2.04	11.00	8.96	2.04	0.00	11.00	0.00	0.00	0.00

Pouisbo Place Division 8

Assisted Living Center

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 Jun-01	21.92	0.00	7.94	11.25	0.00	0.74	4.81	8.12	0 08:00	0 00:00	0.00	0.00
2 Jun-04	12.38	1.05	9.78	3.30	0.00	1.19	8.88	0.40	0 08:00	0 00:00	0.00	0.00
3 Jun-06	14.08	2.46	14.43	5.70	0.00	3.56	9.33	0.60	0 08:00	0 00:00	0.00	0.00
4 Jun-07	11.64	0.29	15.91	6.09	0.00	2.29	10.34	0.52	0 08:00	0 00:00	0.00	0.00
5 Jun-08	11.36	0.00	17.27	5.93	0.00	0.95	11.73	0.39	0 08:00	0 00:00	0.00	0.00
6 Jun-09	11.37	2.19	20.01	5.74	0.00	1.02	14.70	0.43	0 08:00	0 00:00	0.00	0.00
7 Jun-10	9.19	0.92	21.61	7.27	0.00	0.00	15.01	0.67	0 07:59	0 08:00	0.00	1.00
8 Jun-11	8.28	2.60	27.99	0.83	0.00	5.85	27.43	0.27	0 08:00	0 00:00	0.00	0.00
9 Jun-12	5.68	5.04	32.81	0.72	0.00	12.04	32.37	0.28	0 07:54	0 00:00	0.00	0.00
10 Jun-13	0.66	0.00	32.81	0.26	0.00	12.19	32.66	0.11	0 07:54	0 00:00	0.00	0.00
11 Jun-14	0.67	0.67	40.13	1.32	0.00	8.98	39.77	0.96	0 08:00	0 00:00	0.00	0.00
12 Jun-15	4.65	0.63	10.85	1.95	0.00	4.30	8.99	0.09	0 08:00	0 00:00	0.00	0.00
13 Jun-16	9.58	0.00	8.12	6.08	0.00	2.88	4.81	2.77	0 08:00	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Pipe Input

Downstream Stormwater Backwater Analysis

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 Link-01	293.62	39.91	1.10	33.55	1.00	6.36	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2 Link-02	38.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3 Link-03	258.55	32.09	0.00	27.18	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
4 Link-04	277.57	27.18	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5 Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
6 Link-06	61.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7 Link-07	15.81	11.34	0.00	9.82	0.00	1.52	9.6100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
8 link-08	82.61	9.82	0.00	9.06	0.33	0.76	0.9200	CIRCULAR	18.000	18.000	0.0111	0.5000	0.6000	0.0000	0.00	No	1
9 Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10 Link-10	169.20	7.95	0.00	6.58	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11 Link-11	100.45	8.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12 Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	18.000	18.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13 Link-13	55.92	9.43	1.48	9.36	0.46	0.07	0.1300	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14 Link-14	146.92	8.90	0.00	2.04	0.00	6.86	4.8700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.8000	0.0000	0.00	No	1
15 Link-15	120.02	2.04	0.00	-3.05	0.26	5.09	4.2400	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

Pouisbo Place Division 8

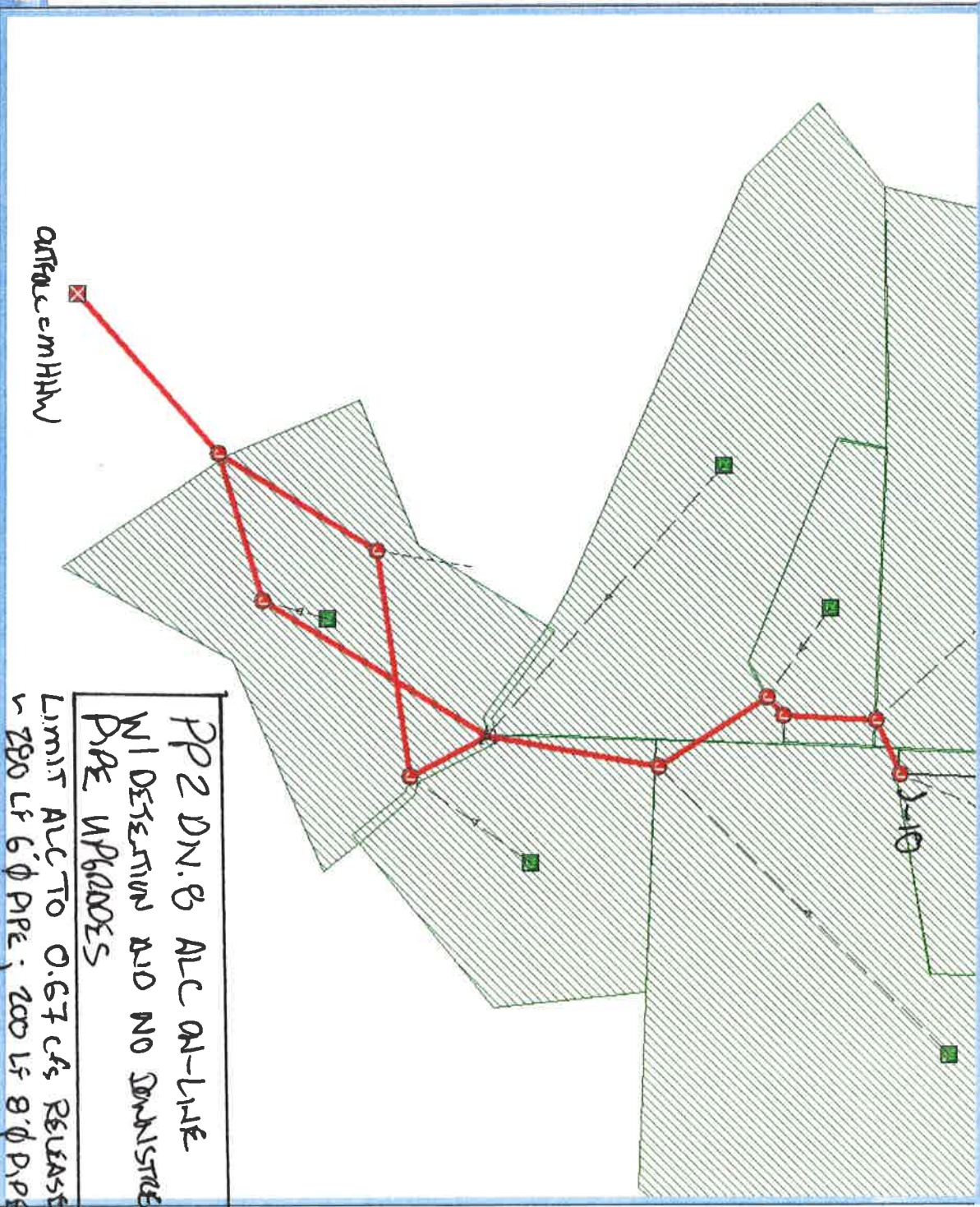
Assisted Living Center

Downstream Stormwater Backwater Analysis

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 Link-01	0.66	0 08:01	10.30	0.08	4.64	1.05	0.22	0.17	0.00		Calculated
2 Link-02	0.67	0 08:00	7.70	0.09	1.64	0.39	0.49	0.39	0.00		Calculated
3 Link-03	5.68	0 08:00	9.66	0.59	7.67	0.56	0.77	0.62	0.00		Calculated
4 Link-04	8.27	0 08:00	14.57	0.57	9.70	0.48	1.04	0.83	0.00		Calculated
5 Link-05	9.17	0 08:00	3.01	3.05	7.47	0.08	1.25	1.00	25.00		SURCHARGED
6 Link-06	11.36	0 07:59	13.57	0.84	7.14	0.14	1.50	1.00	24.00		SURCHARGED
7 Link-07	11.36	0 08:01	19.25	0.59	6.43	0.04	1.50	1.00	30.00		SURCHARGED
8 Link-08	11.66	0 08:01	11.80	0.99	6.80	0.21	1.50	1.00	34.00		SURCHARGED
9 Link-09	14.08	0 08:00	10.32	1.36	7.97	0.24	1.50	1.00	36.00		SURCHARGED
10 Link-10	11.33	0 08:00	11.25	1.01	6.42	0.44	1.50	1.00	29.00		SURCHARGED
11 Link-11	12.37	0 08:00	20.54	0.60	7.00	0.24	1.50	1.00	31.00		SURCHARGED
12 Link-12	21.92	0 00:00	20.66	1.08	12.40	0.18	1.50	1.00	1440.00		SURCHARGED
13 Link-13	4.02	0 08:00	1.49	2.70	5.19	0.18	1.00	1.00	11.00		SURCHARGED
14 Link-14	4.65	0 08:00	8.34	0.56	5.92	0.41	1.00	1.00	15.00		SURCHARGED
15 Link-15	9.58	0 00:01	27.53	0.35	3.56	0.56	2.00	1.00	1438.00		SURCHARGED

- Project Data
- Analysis Options
- Hydrology
- Subbasins
- Rain Gages
- Hydraulics
- Nodes
- Junctions
- Storage Nodes
- Inlets
- Flow Diversion
- Flow Diversion Curves
- Outfalls
- Outfall Tidal Curves
- External Inflows
- Links
- Conveyance Links
- Custom Pipe Geometry
- Irregular Cross Sections
- Pumps
- Pump Curves
- Orifices
- Wells
- Outlets
- Outlet Rating Curves
- Quality
- Pollutants
- Pollutants Land Types
- Others
- Control Rules
- Control Settings
- Sanitary Time Patterns
- Time Series



PP2 DN.8 ALC ON-LINE
W/ DETENTION AND NO DOWNSTREAM
PRE UPGRADES
LIMIT ALC TO 0.67 CFS RELEASE
w 280 LF 6" Ø PRE; 200 LF 8" Ø PIPE

Hydrograph Report

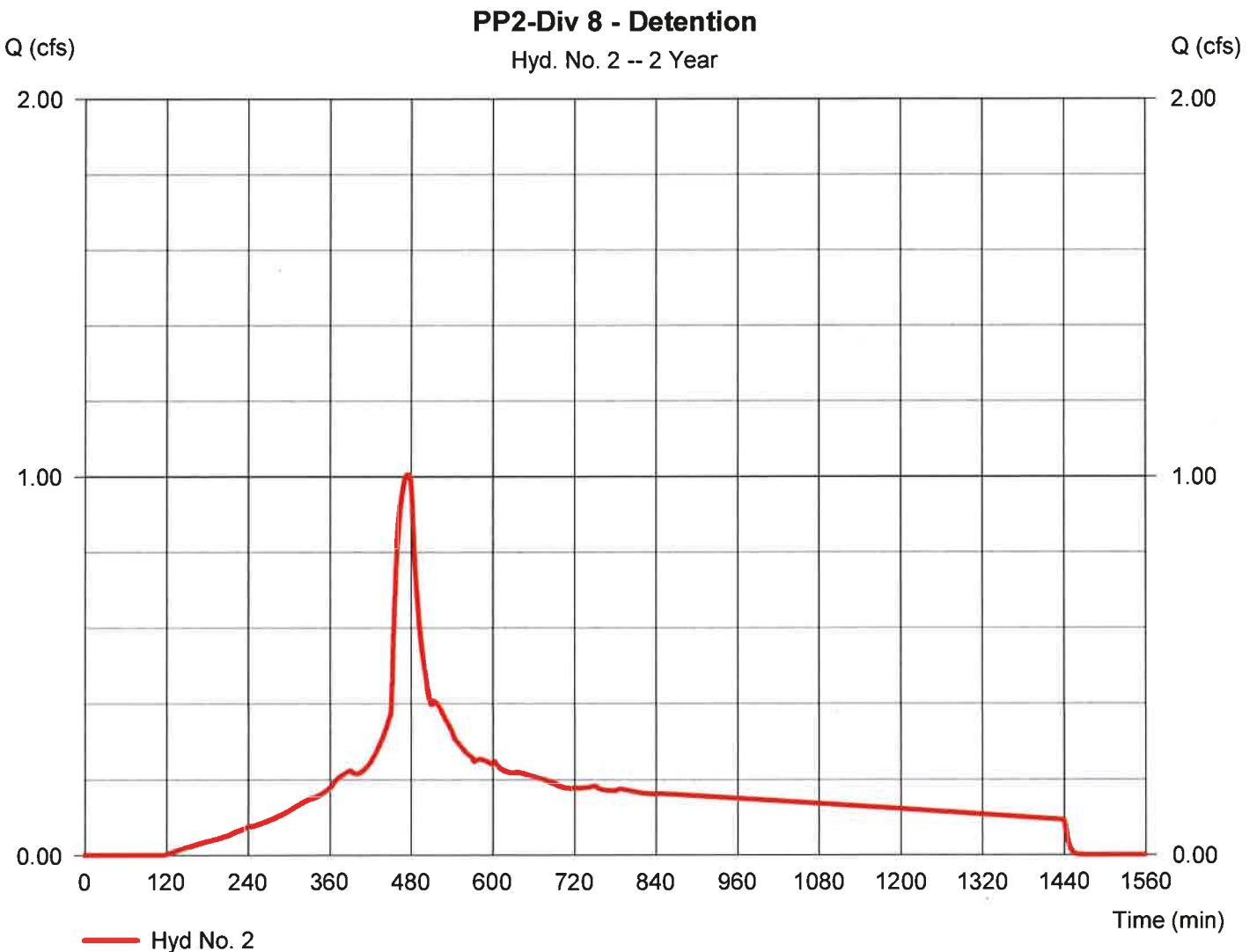
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 09 / 30 / 2015

Hyd. No. 2

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.005 cfs
Storm frequency	= 2 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 14,115 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.30 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

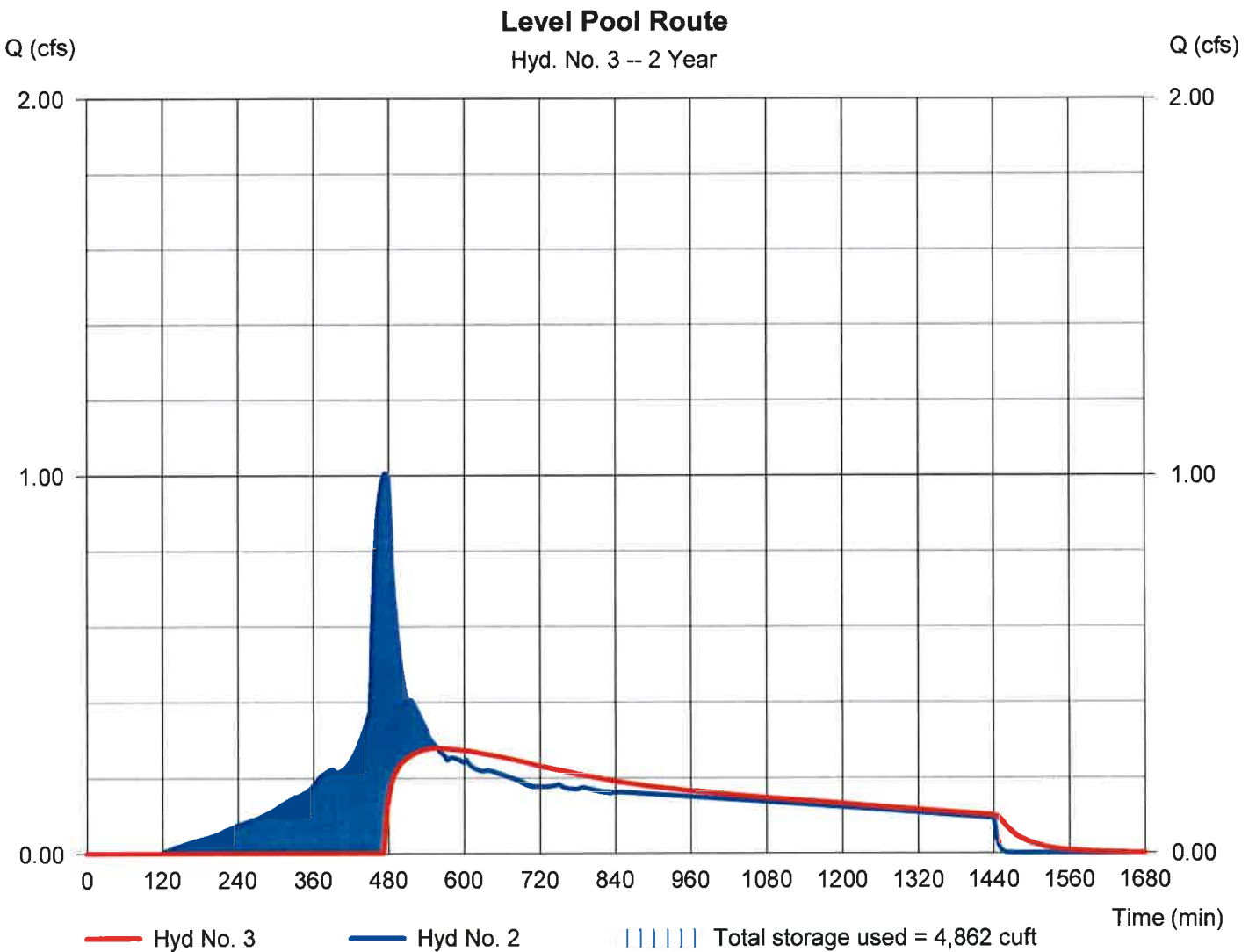
Wednesday, 09 / 30 / 2015

Hyd. No. 3

Level Pool Route

Hydrograph type	= Reservoir	Peak discharge	= 0.279 cfs
Storm frequency	= 2 yrs	Time to peak	= 558 min
Time interval	= 2 min	Hyd. volume	= 10,599 cuft
Inflow hyd. No.	= 2 - PP2-Div 8 - Detention	Max. Elevation	= 45.90 ft
Reservoir name	= Underground Detention	Max. Storage	= 4,862 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Underground Detention

Pond Data

UG Chambers -Invert elev. = 42.00 ft, Rise x Span = 8.00 x 8.00 ft, Barrel Len = 200.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	42.00	n/a	0	0
0.80	42.80	n/a	523	523
1.60	43.60	n/a	909	1,433
2.40	44.40	n/a	1,106	2,538
3.20	45.20	n/a	1,218	3,756
4.00	46.00	n/a	1,272	5,029
4.80	46.80	n/a	1,272	6,301
5.60	47.60	n/a	1,218	7,519
6.40	48.40	n/a	1,105	8,624
7.20	49.20	n/a	909	9,533
8.00	50.00	n/a	523	10,055

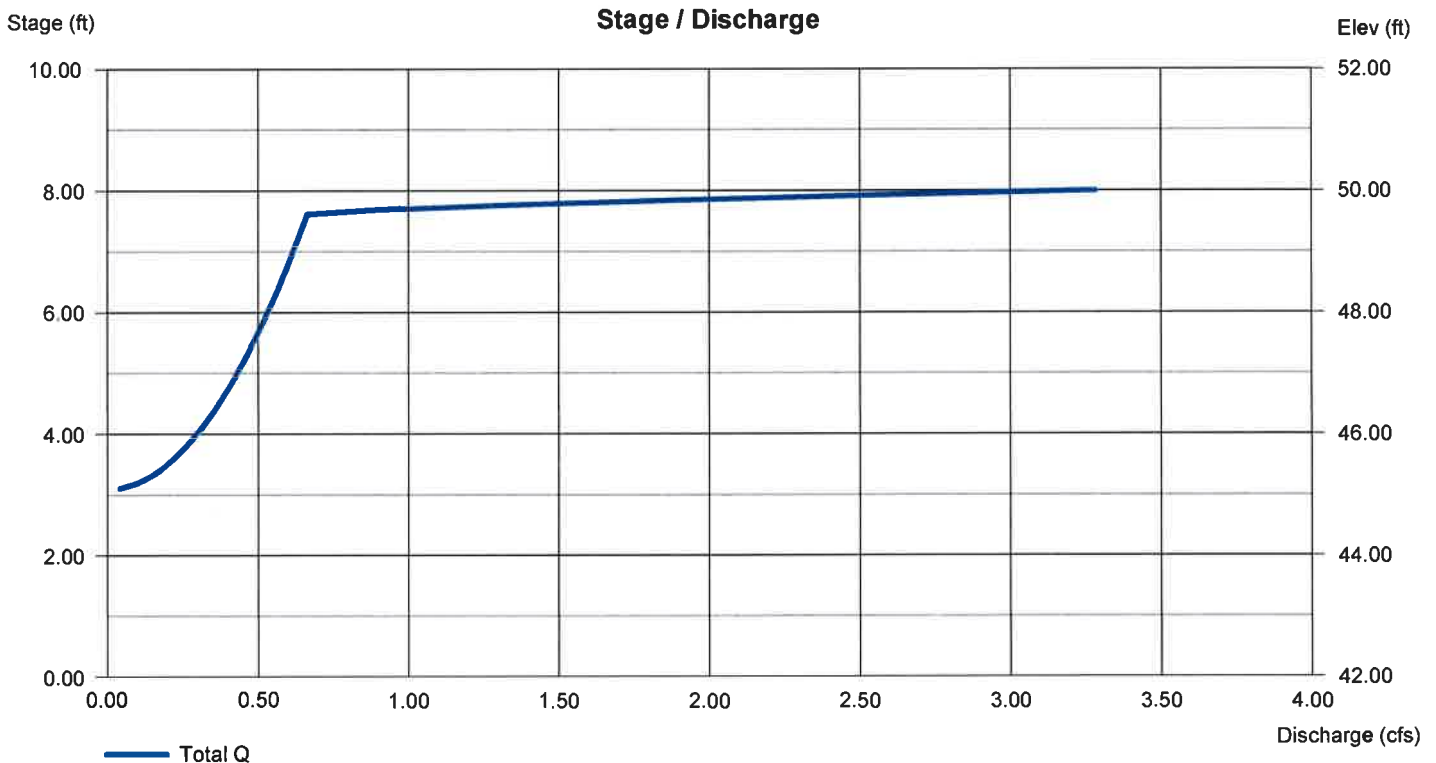
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.40	Inactive	Inactive
Span (in)	= 12.00	3.40	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 42.50	42.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.62	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	Inactive	Inactive	Inactive
Crest El. (ft)	= 49.60	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 45.10			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

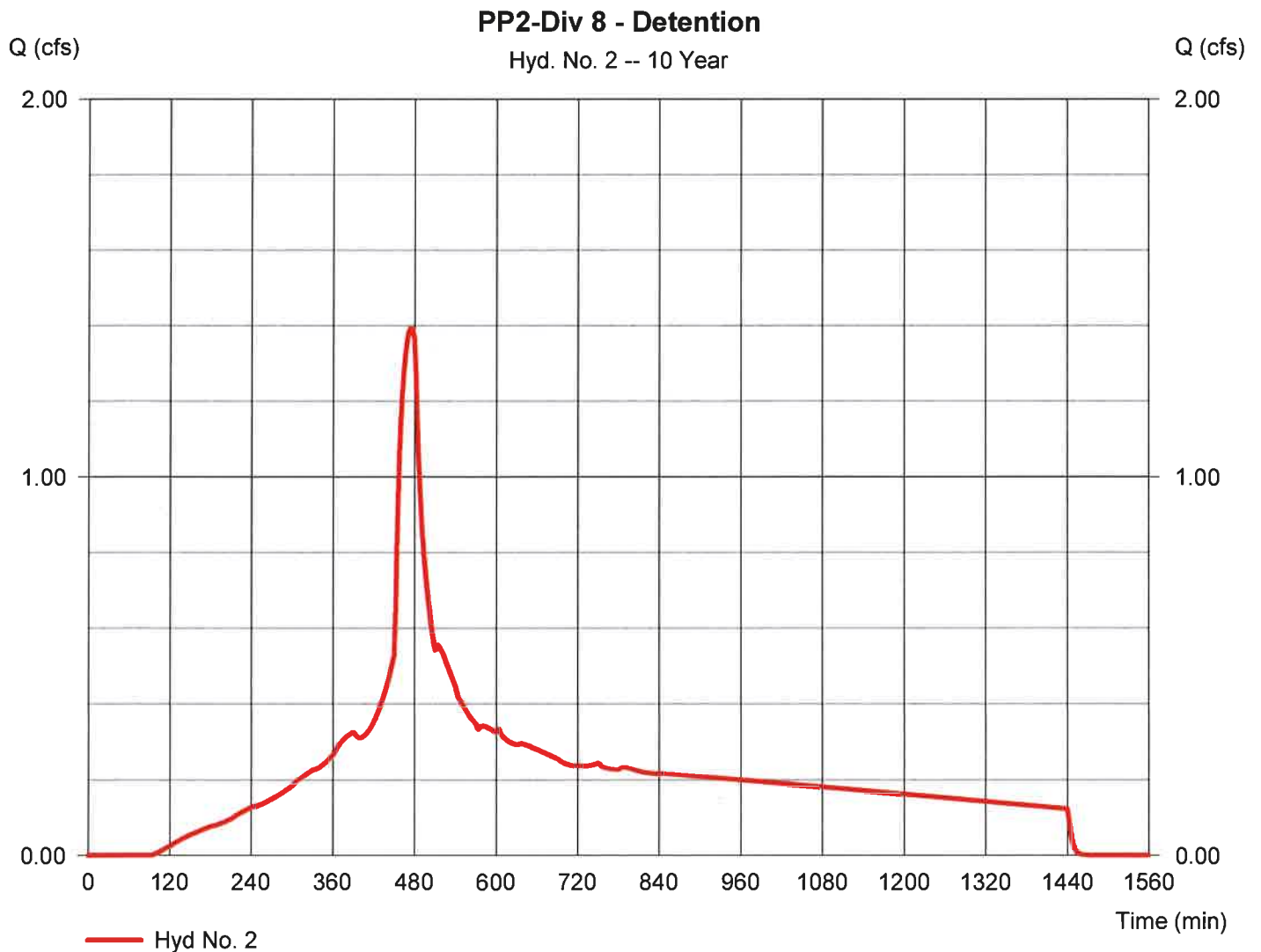
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 09 / 30 / 2015

Hyd. No. 2

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.392 cfs
Storm frequency	= 10 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 19,530 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

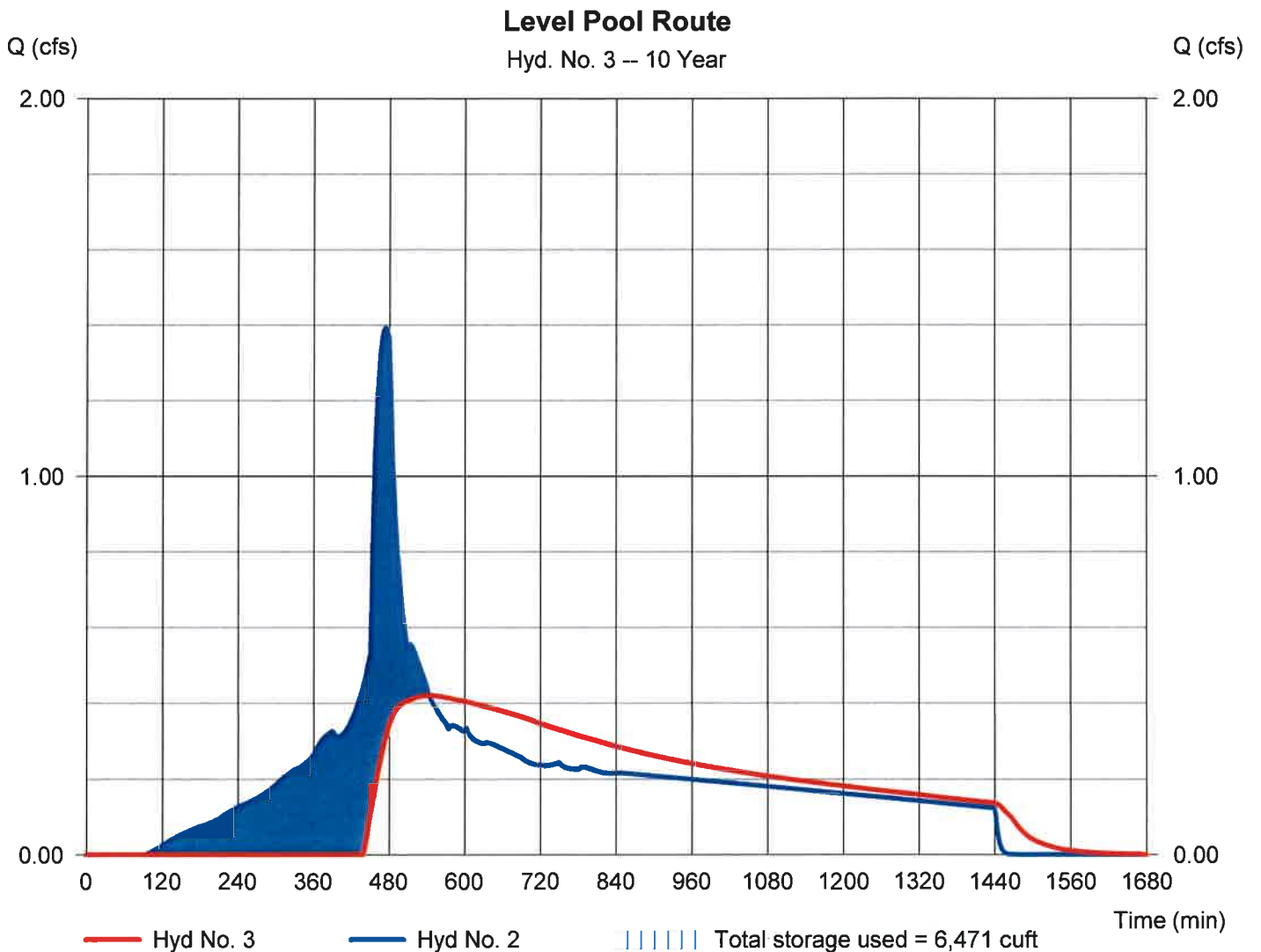
Wednesday, 09 / 30 / 2015

Hyd. No. 3

Level Pool Route

Hydrograph type	= Reservoir	Peak discharge	= 0.421 cfs
Storm frequency	= 10 yrs	Time to peak	= 544 min
Time interval	= 2 min	Hyd. volume	= 16,014 cuft
Inflow hyd. No.	= 2 - PP2-Div 8 - Detention	Max. Elevation	= 46.91 ft
Reservoir name	= Underground Detention	Max. Storage	= 6,471 cuft

Storage Indication method used.



Hydrograph Report

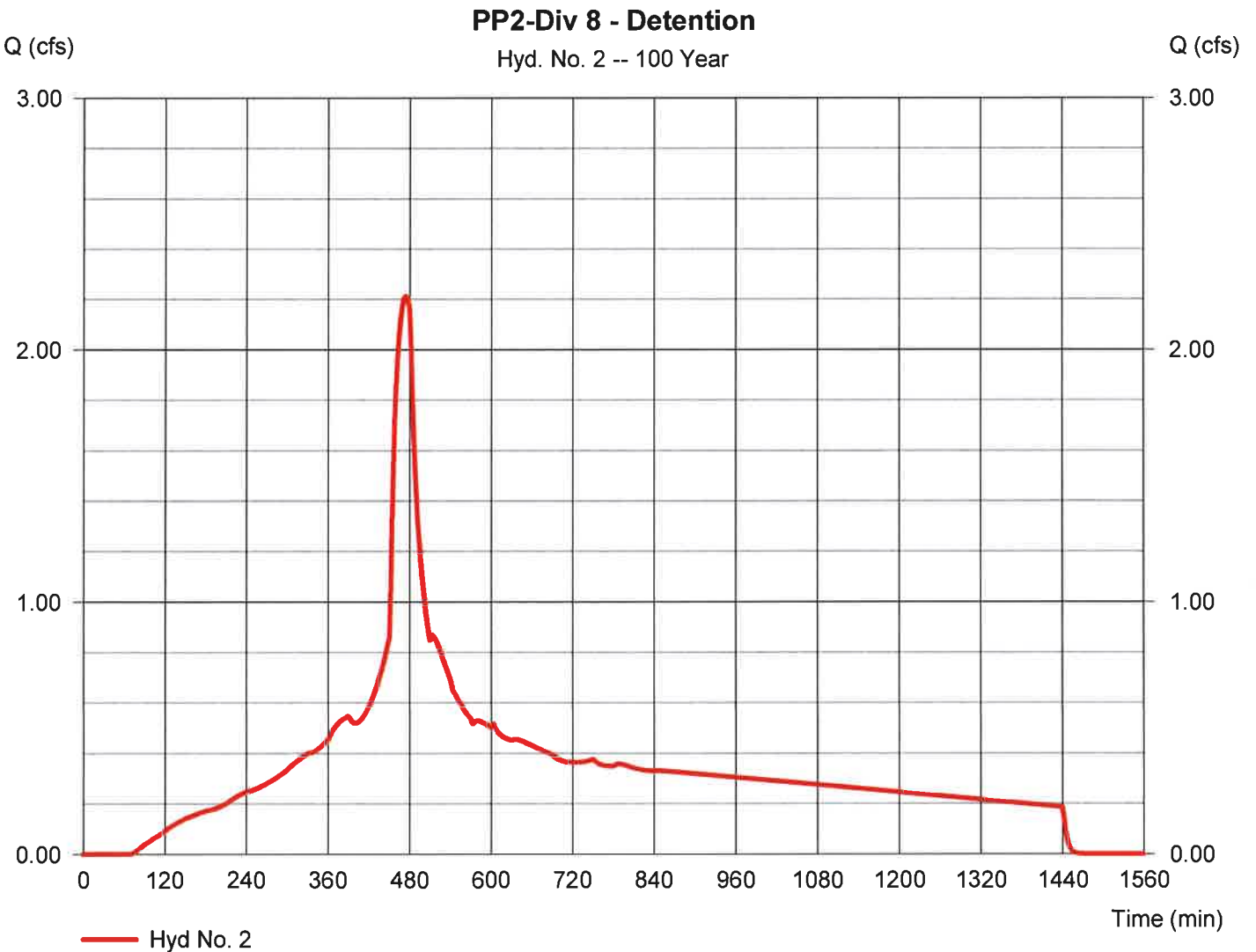
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Wednesday, 09 / 30 / 2015

Hyd. No. 2

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.213 cfs
Storm frequency	= 100 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 31,293 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

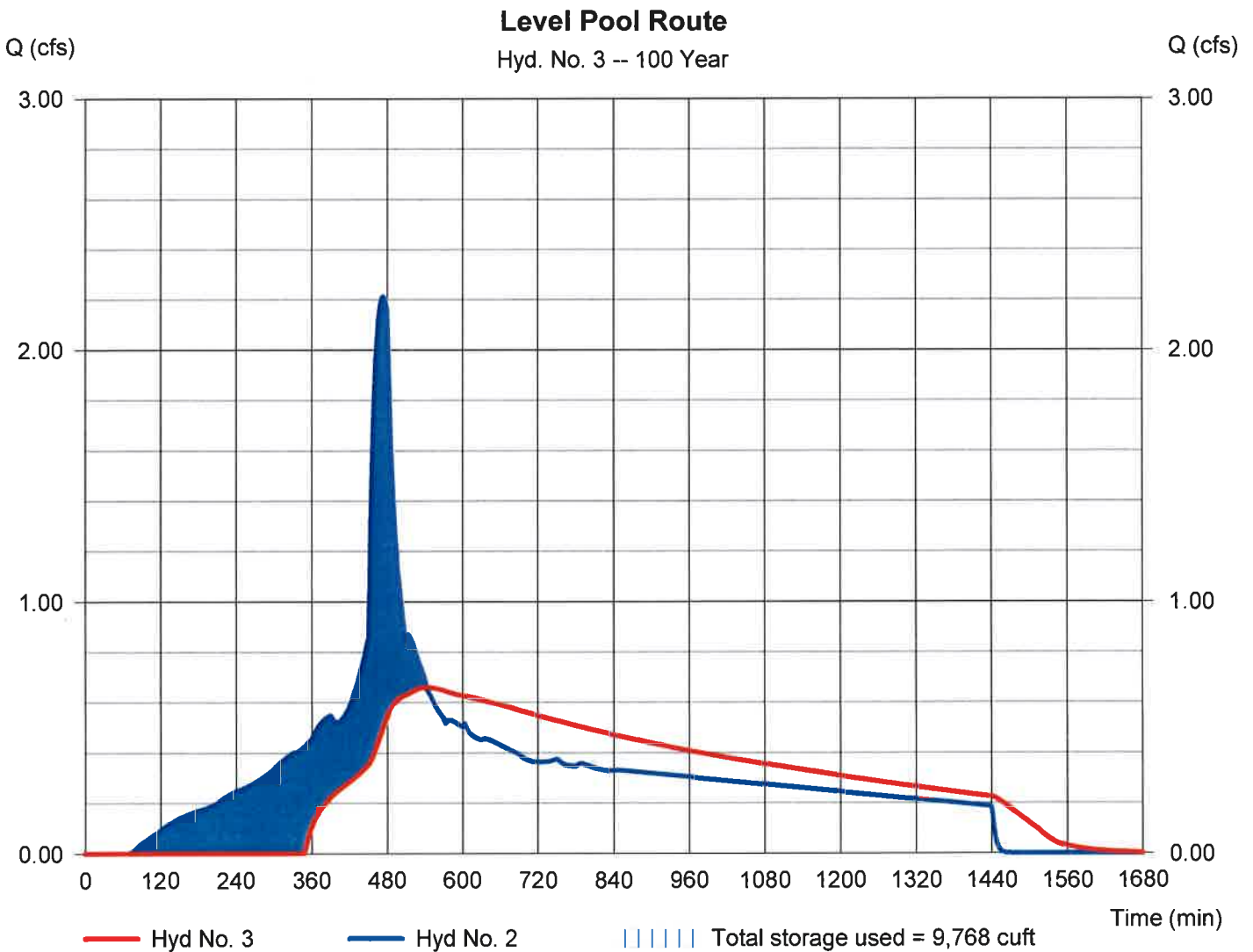
Wednesday, 09 / 30 / 2015

Hyd. No. 3

Level Pool Route

Hydrograph type	= Reservoir	Peak discharge	= <u>0.660 cfs</u>
Storm frequency	= 100 yrs	Time to peak	= 544 min
Time interval	= 2 min	Hyd. volume	= 27,778 cuft
Inflow hyd. No.	= 2 - PP2-Div 8 - Detention	Max. Elevation	= 49.56 ft
Reservoir name	= Underground Detention	Max. Storage	= 9,768 cuft

Storage Indication method used.



APPENDIX J
ANALYSIS: ALC WITH DETENTION, OUTFALL
UPGRADE TO 24"



Poulsbo Place Division 8

Assisted Living Center

Subbasin Summary

Downstream Stormwater Backwater Analysis

SN Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1 Sub-03	4.78	87.00	98.00	86.00	4.69	4.29	20.48	5.04	0 00:06:00
2 Sub-04	2.82	67.00	98.00	86.00	4.69	4.03	10.54	2.60	0 00:06:00
3 Sub-07	2.17	73.00	98.00	86.00	4.69	4.11	8.91	2.19	0 00:06:00
4 Sub-08	0.90	78.00	98.00	86.00	4.69	4.17	3.76	0.93	0 00:06:00
5 Sub-09	2.42	74.00	98.00	86.00	4.69	4.12	9.98	2.46	0 00:06:00
8 Sub-10	0.59	95.00	98.00	86.00	4.69	4.39	2.57	0.63	0 00:06:00
7 Sub-11	0.27	95.00	98.00	86.00	4.69	4.39	1.18	0.29	0 00:06:00
8 Sub-12	1.18	95.00	98.00	86.00	4.69	4.39	5.19	1.28	0 00:06:00
9 Sub-14	0.98	95.00	98.00	86.00	4.69	4.39	4.29	1.05	0 00:06:00
10 sub-2	2.62	0.00	98.00	65.00	4.69	1.45	3.80	0.67	0 00:06:00

**Poulsbo Place Division 8
Assisted Living Center**

Node Summary

Downstream Stormwater Backwater Analysis

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft ²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	37.96	8.04	0.00	2.64	0 00:00	0.00	0.00
2	Jun-04	Junction	8.48	10.97	6.48	10.97	0.00	13.90	7.75	0.00	3.22	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.12	13.18	0.00	4.83	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	11.67	14.65	0.00	3.55	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.38	16.02	0.00	2.20	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.38	18.78	0.00	2.25	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.81	0.00	9.19	20.39	0.00	1.22	0 00:00	0.00	0.00
8	Jun-11	Junction	27.18	33.84	27.18	33.84	0.00	8.28	27.92	0.00	5.92	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.65	0.00	5.68	32.82	0.00	12.03	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	0.66	32.82	0.00	12.18	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	0.67	40.13	0.00	8.98	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	3.17	9.37	0.00	5.78	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	13.63	8.10	0.00	2.90	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					37.96	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.39	10.81				0.00	0.00

Pouisbo Place Division 8

Assisted Living Center

Link Summary

Downstream Stormwater Backwater Analysis

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 Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-01	Pipe	Jun-14	Jun-13	293.62	39.91	33.55	2.1700	15.000	0.0120	0.66	10.30	0.06	4.64	0.22	0.17	0.00	Calculated
2	Link-02	Pipe	Jun-13	Jun-12	38.02	32.55	32.09	1.2100	15.000	0.0120	0.67	7.70	0.09	1.64	0.50	0.40	0.00	Calculated
3	Link-03	Pipe	Jun-12	Jun-11	258.55	32.09	27.16	1.9100	15.000	0.0120	5.68	9.66	0.59	7.71	0.75	0.60	0.00	Calculated
4	Link-04	Pipe	Jun-11	Jun-10	277.57	27.16	15.13	4.3300	15.000	0.0120	8.27	14.57	0.57	9.69	1.01	0.81	0.00	Calculated
5	Link-05	Pipe	Jun-10	Jun-09	37.89	14.34	14.13	0.5500	15.000	0.0120	9.19	3.01	3.06	7.49	1.25	1.00	24.00	SURCHARGED
6	Link-06	Pipe	Jun-09	Jun-08	61.07	14.27	11.35	4.7800	18.000	0.0220	11.38	13.57	0.84	7.14	1.50	1.00	23.00	SURCHARGED
7	Link-07	Pipe	Jun-08	Jun-07	15.81	11.34	9.82	9.6100	18.000	0.0220	11.38	19.25	0.59	6.44	1.50	1.00	29.00	SURCHARGED
8	Link-08	Pipe	Jun-07	Jun-06	82.61	9.82	9.06	0.9200	18.000	0.0111	11.68	11.80	0.99	6.61	1.50	1.00	34.00	SURCHARGED
9	Link-09	Pipe	Jun-06	Jun-05	112.81	8.73	7.95	0.6900	18.000	0.0110	14.12	10.32	1.37	7.99	1.50	1.00	36.00	SURCHARGED
10	Link-10	Pipe	Jun-05	Jun-04	169.20	7.95	6.56	0.8200	18.000	0.0110	12.85	11.25	1.14	7.42	1.42	0.95	0.00	> CAPACITY
11	Link-11	Pipe	Jun-04	Jun-01	100.45	6.48	3.73	2.7400	18.000	0.0110	13.90	20.54	0.68	8.14	1.39	0.92	0.00	Calculated
12	Link-12	Pipe	Jun-01	Out-01	136.85	-3.31	-7.10	2.7700	24.000	0.0110	37.96	44.49	0.85	12.08	2.00	1.00	1440.00	SURCHARGED
13	Link-13	Pipe	Jun-05	Jun-15	55.92	9.43	9.36	0.1300	12.000	0.0110	2.54	1.49	1.71	3.61	0.84	0.84	0.00	> CAPACITY
14	Link-14	Pipe	Jun-15	Jun-16	146.92	8.90	2.04	4.6700	12.000	0.0120	3.17	8.34	0.38	5.14	0.73	0.73	0.00	Calculated
15	Link-15	Pipe	Jun-16	Jun-01	120.02	2.04	-3.05	4.2400	24.000	0.0220	13.63	27.53	0.50	4.67	2.00	1.00	1439.00	SURCHARGED

**Pouisbo Place Division 8
Assisted Living Center**

Junction Input

Downstream Stormwater Backwater Analysis

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1 Jun-01	-3.31	6.68	11.99	-3.31	0.00	6.68	0.00	0.00	0.00
2 Jun-04	6.48	10.97	4.49	6.48	0.00	10.97	0.00	0.00	0.00
3 Jun-06	6.73	17.99	9.26	8.73	0.00	17.99	0.00	0.00	0.00
4 Jun-07	9.82	18.20	6.38	9.82	0.00	18.20	0.00	0.00	0.00
5 Jun-08	11.34	16.22	6.68	11.34	0.00	16.22	0.00	0.00	0.00
6 Jun-09	14.27	21.03	6.76	14.27	0.00	21.03	0.00	0.00	0.00
7 Jun-10	14.34	21.61	7.27	14.34	0.00	21.61	0.00	0.00	0.00
8 Jun-11	27.16	33.84	6.68	27.16	0.00	33.84	0.00	0.00	0.00
9 Jun-12	32.09	44.85	12.76	32.09	0.00	44.85	0.00	0.00	0.00
10 Jun-13	32.55	45.00	12.45	32.55	0.00	45.00	0.00	0.00	0.00
11 Jun-14	38.61	49.11	10.30	38.61	0.00	49.11	0.00	0.00	0.00
12 Jun-15	6.90	15.15	6.25	8.90	0.00	15.15	0.00	0.00	0.00
13 Jun-16	2.04	11.00	6.96	2.04	0.00	11.00	0.00	0.00	0.00

**Pouisbo Piac Division 8
Assisted Living Center**

Junction Results

Downstream Stormwater Backwater Analysis

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(deys hh:mm)	(ac-in)	(min)
1 Jun-01	37.96	0.00	6.04	9.35	0.00	2.64	4.69	8.00	0 00:01	0 00:00	0.00	0.00
2 Jun-04	13.90	1.05	7.75	1.27	0.00	3.22	8.87	0.39	0 08:00	0 00:00	0.00	0.00
3 Jun-06	14.12	2.46	13.16	4.43	0.00	4.63	9.33	0.60	0 08:00	0 00:00	0.00	0.00
4 Jun-07	11.67	0.29	14.65	4.83	0.00	3.55	10.34	0.52	0 08:00	0 00:00	0.00	0.00
5 Jun-08	11.38	0.00	16.02	4.68	0.00	2.20	11.73	0.39	0 08:00	0 00:00	0.00	0.00
6 Jun-09	11.38	2.19	18.78	4.51	0.00	2.25	14.69	0.42	0 08:00	0 00:00	0.00	0.00
7 Jun-10	9.19	0.92	20.39	8.05	0.00	1.22	15.01	0.87	0 08:00	0 00:00	0.00	0.00
8 Jun-11	8.28	2.60	27.92	0.76	0.00	5.92	27.43	0.27	0 08:00	0 00:00	0.00	0.00
9 Jun-12	5.68	5.04	32.82	0.73	0.00	12.03	32.37	0.28	0 08:00	0 00:00	0.00	0.00
10 Jun-13	0.66	0.00	32.82	0.27	0.00	12.18	32.66	0.11	0 08:00	0 00:00	0.00	0.00
11 Jun-14	0.67	0.67	40.13	1.32	0.00	8.98	39.77	0.96	0 08:00	0 00:00	0.00	0.00
12 Jun-15	3.17	0.63	9.37	0.47	0.00	5.78	8.98	0.08	0 08:00	0 00:00	0.00	0.00
13 Jun-16	13.63	0.00	8.10	8.06	0.00	2.90	4.69	2.65	0 00:01	0 00:00	0.00	0.00

**Poulsbo Place Division 8
Assisted Living Center**

Pipe Input

Downstream Stormwater Backwater Analysis

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 Link-01	293.62	39.91	1.10	33.55	1.00	6.38	2.1700	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
2 Link-02	38.02	32.55	0.00	32.09	0.00	0.46	1.2100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
3 Link-03	258.55	32.09	0.00	27.16	0.00	4.93	1.9100	CIRCULAR	15.000	15.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4 Link-04	277.57	27.16	0.00	15.13	0.79	12.03	4.3300	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
5 Link-05	37.89	14.34	0.00	14.13	-0.14	0.21	0.5500	CIRCULAR	15.000	15.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
6 Link-06	61.07	14.27	0.00	11.35	0.01	2.92	4.7800	CIRCULAR	18.000	18.000	0.0220	0.5000	0.6000	0.0000	0.00	No	1
7 Link-07	15.81	11.34	0.00	9.82	0.00	1.52	9.6100	CIRCULAR	18.000	18.000	0.0220	0.5000	0.8000	0.0000	0.00	No	1
8 link-08	82.61	9.82	0.00	9.06	0.33	0.76	0.9200	CIRCULAR	18.000	18.000	0.0111	0.5000	0.6000	0.0000	0.00	No	1
9 Link-09	112.81	8.73	0.00	7.95	0.00	0.78	0.6900	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
10 Link-10	169.20	7.95	0.00	8.56	0.08	1.39	0.8200	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
11 Link-11	100.45	6.48	0.00	3.73	7.04	2.75	2.7400	CIRCULAR	18.000	18.000	0.0110	0.5000	0.6000	0.0000	0.00	No	1
12 Link-12	136.85	-3.31	0.00	-7.10	0.00	3.79	2.7700	CIRCULAR	24.000	24.000	0.0110	0.5000	0.0000	0.0000	0.00	No	1
13 Link-13	55.92	9.43	1.48	9.36	0.46	0.07	0.1300	CIRCULAR	12.000	12.000	0.0110	0.5000	0.8000	0.0000	0.00	No	1
14 Link-14	148.92	8.90	0.00	2.04	0.00	6.86	4.8700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.6000	0.0000	0.00	No	1
15 Link-15	120.02	2.04	0.00	-3.05	0.26	5.09	4.2400	CIRCULAR	24.000	24.000	0.0220	0.5000	0.5000	0.0000	0.00	No	1

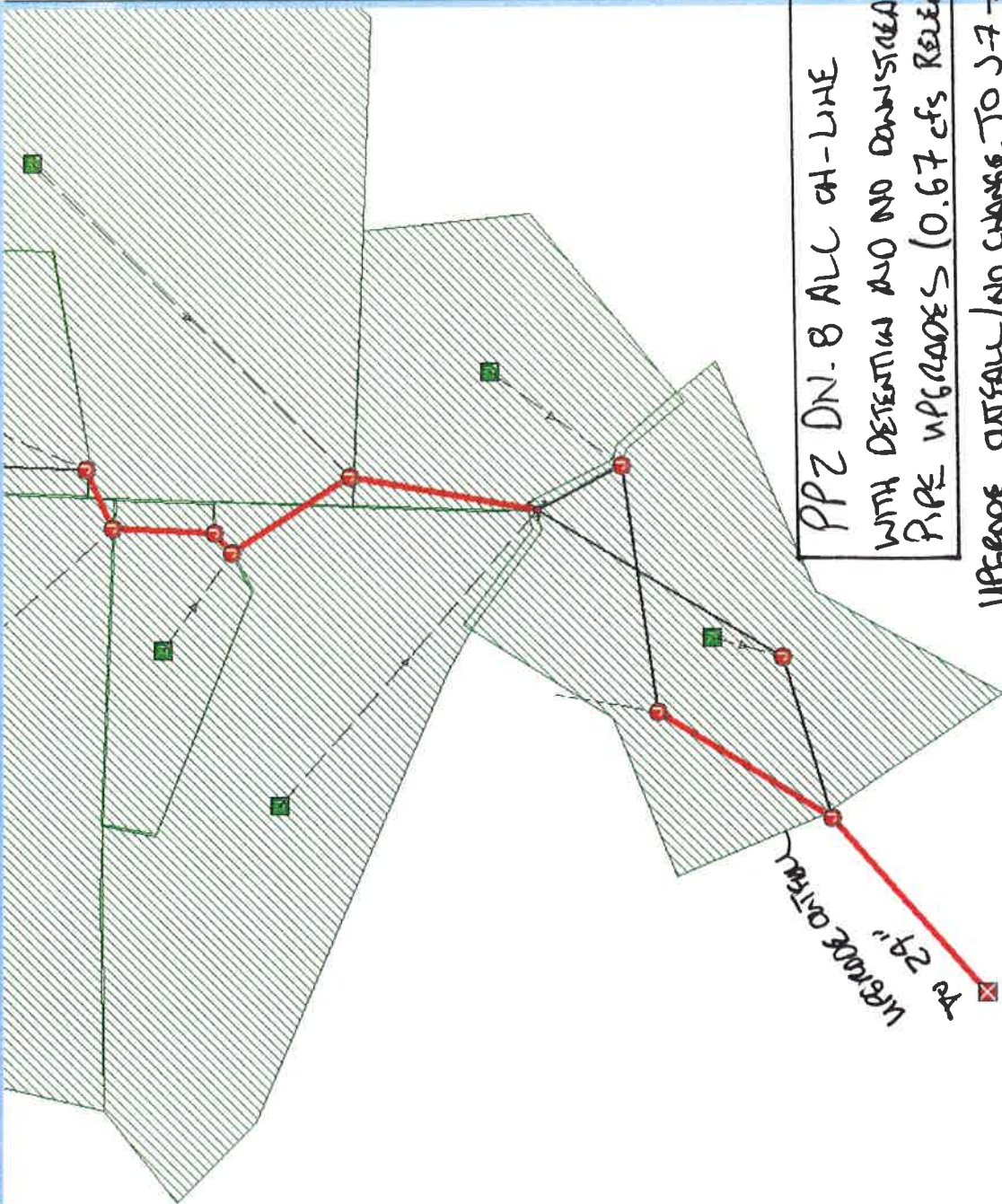
**Poulsbo Place Division 8
Assisted Living Center**

Pipe Results

Downstream Stormwater Backwater Analysis

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 Link-01	0.66	0 08:01	10.30	0.06	4.84	1.05	0.22	0.17	0.00		Calculated
2 Link-02	0.67	0 08:00	7.70	0.09	1.64	0.39	0.50	0.40	0.00		Calculated
3 Link-03	5.68	0 08:00	9.66	0.59	7.71	0.56	0.75	0.60	0.00		Calculated
4 Link-04	6.27	0 08:00	14.57	0.57	9.69	0.48	1.01	0.81	0.00		Calculated
5 Link-05	9.19	0 08:00	3.01	3.06	7.49	0.08	1.25	1.00	24.00		SURCHARGED
6 Link-06	11.38	0 08:00	13.57	0.84	7.14	0.14	1.50	1.00	23.00		SURCHARGED
7 Link-07	11.38	0 08:00	19.25	0.59	6.44	0.04	1.50	1.00	29.00		SURCHARGED
8 link-08	11.88	0 08:00	11.80	0.99	6.81	0.21	1.50	1.00	34.00		SURCHARGED
9 Link-09	14.12	0 08:00	10.32	1.37	7.99	0.24	1.50	1.00	36.00		SURCHARGED
10 Link-10	12.65	0 08:00	11.25	1.14	7.42	0.38	1.42	0.95	0.00		> CAPACITY
11 Link-11	13.90	0 08:00	20.54	0.68	6.14	0.21	1.39	0.92	0.00		Calculated
12 Link-12	37.96	0 00:00	44.49	0.85	12.08	0.19	2.00	1.00	1440.00		SURCHARGED
13 Link-13	2.54	0 08:00	1.49	1.71	3.61	0.26	0.84	0.84	0.00		> CAPACITY
14 Link-14	3.17	0 08:00	8.34	0.38	5.14	0.48	0.73	0.73	0.00		Calculated
15 Link-15	13.63	0 00:01	27.53	0.50	4.67	0.43	2.00	1.00	1439.00		SURCHARGED

- Project Data
- Project Options
- Analysis Options
- Hydrology
- Substrata
- Rain Gages
- Hydraulics
- Nodes
 - Junctions
 - Storage Nodes
 - Storage Curves
 - Inlets
 - Flow Diversion
 - Flow Diversion Curves
 - Outfalls
 - Outfall Tidal Curves
 - External Inflows
- Links
 - Conveyance Links
 - Custom Pipe Geometry
 - Irregular Cross Sections
 - Pumps
 - Pump Curves
 - Drifts
 - Wells
 - Outlets
 - Outlet Rating Curves
- Quality
- Pollutants
- Pollutants Land Types
- Others
 - Control Rules
 - Control Settings
 - Sanitary Time Patterns
 - Time Series



PPZ DN. 8 ALL CH-LINE
WITH DETENTION AND NO CONVEYANCE
PIPE UPGRADES (0.67 cfs RELEASE)

UPGRADE OUTFALL/NO CHANGE TO J-7 -> J-5
SURCHARGE

APPENDIX K
OUTPUT: COMPARISON OF MAXIMUM WATER
SURFACE ELEVATIONS IN THE EXISTING
CONDITION VERSUS BASIN WITH ALC ON-LINE
WITH $Q < 0.67$ CFS



EXISTING GDOTW (SEE APPENDIX A)

Poulsbo Place Division 8
Assisted Living Center

Node Summary

Downstream Stormwater Backwater Analysis

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)
1 Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	21.92	7.95	0.00	0.73	0 00:00	0.00	0.00
2 Jun-04	Junction	8.48	10.97	6.48	10.97	0.00	12.40	9.80	0.00	1.17	0 00:00	0.00	0.00
3 Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.09	14.45	0.00	3.54	0 00:00	0.00	0.00
4 Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	11.79	15.92	0.00	2.28	0 00:00	0.00	0.00
5 Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.51	17.28	0.00	0.94	0 00:00	0.00	0.00
8 Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.51	20.02	0.00	1.01	0 00:00	0.00	0.00
7 Jun-10	Junction	14.34	21.61	14.34	21.61	0.00	10.33	21.61	0.00	0.00	0 08:00	0.21	18.00
8 Jun-11	Junction	27.18	33.84	27.18	33.84	0.00	9.44	28.11	0.00	5.73	0 00:00	0.00	0.00
9 Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	8.85	32.91	0.00	11.94	0 00:00	0.00	0.00
10 Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	1.42	32.97	0.00	12.03	0 00:00	0.00	0.00
11 Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	1.42	40.23	0.00	8.88	0 00:00	0.00	0.00
12 Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.74	10.87	0.00	4.28	0 00:00	0.00	0.00
13 Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.59	8.13	0.00	2.87	0 00:00	0.00	0.00
14 Out-01	Outfall	-7.10					21.92	4.65					
15 Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.36	11.92				0.00	0.00

23.04 AFTER
ITERATIVELY RAISING
RIM ELEVATION

BOSW w/ ALC INTO DETENTION AND $Q \leq 0.67$ CFS (APPROX)

Poulsbo Place Division 8

Assisted Living Center

Downstream Stormwater Backwater Analysis

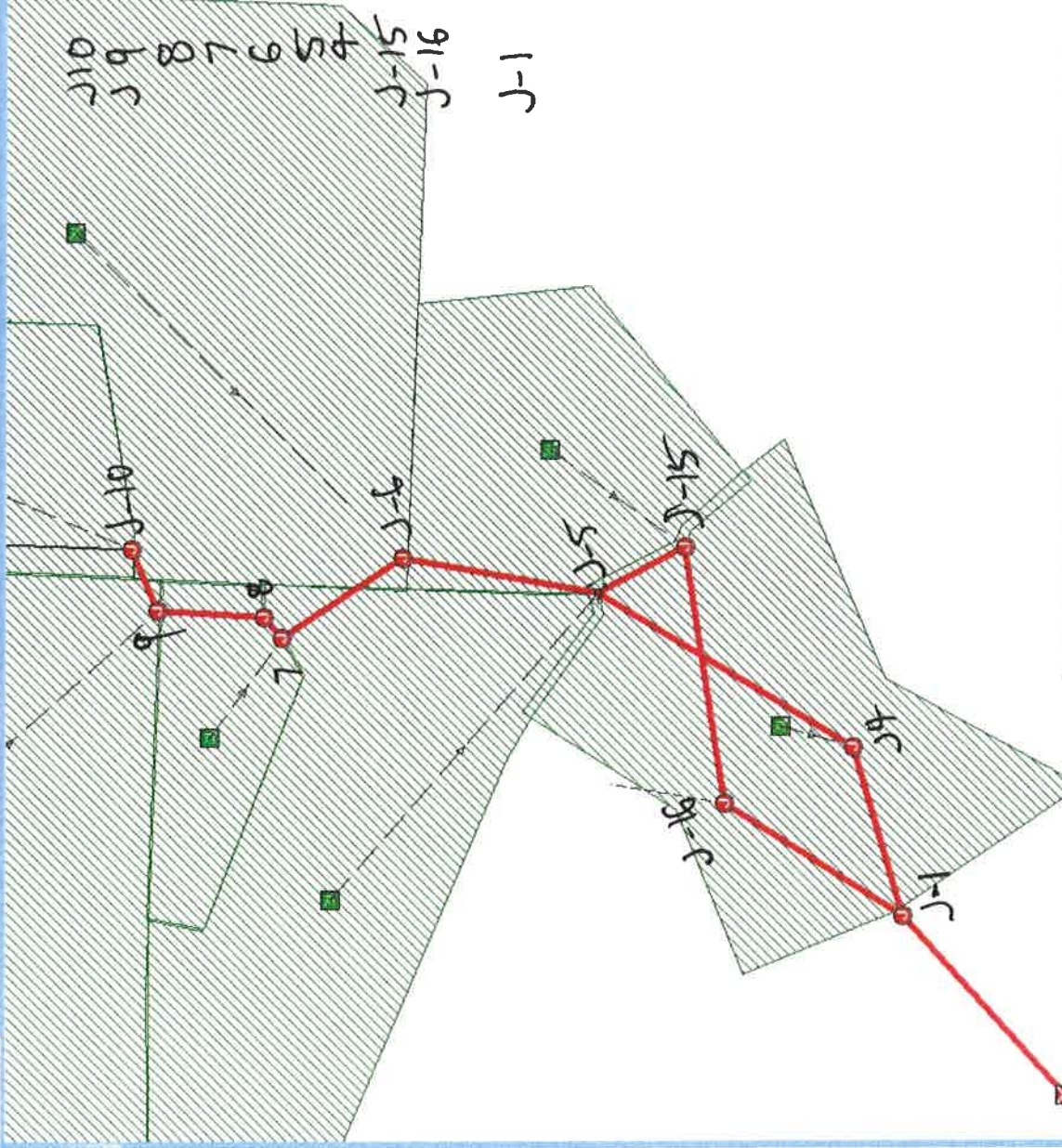
Node Summary

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)
1	Jun-01	Junction	-3.31	8.68	-3.31	8.68	0.00	21.92	7.94	0.00	0.74	0 00:00	0.00	0.00
2	Jun-04	Junction	6.48	10.97	6.48	10.97	0.00	12.38	9.78	0.00	1.19	0 00:00	0.00	0.00
3	Jun-06	Junction	8.73	17.99	8.73	17.99	0.00	14.08	14.43	0.00	3.56	0 00:00	0.00	0.00
4	Jun-07	Junction	9.82	18.20	9.82	18.20	0.00	11.64	15.91	0.00	2.29	0 00:00	0.00	0.00
5	Jun-08	Junction	11.34	18.22	11.34	18.22	0.00	11.36	17.27	0.00	0.95	0 00:00	0.00	0.00
6	Jun-09	Junction	14.27	21.03	14.27	21.03	0.00	11.37	20.01	0.00	1.02	0 00:00	0.00	0.00
7	Jun-10	Junction	14.34	21.61	14.34	21.61	0.00	9.19	21.61	0.00	0.00	0 08:00	0.00	1.00
8	Jun-11	Junction	27.16	33.84	27.16	33.84	0.00	8.28	27.99	0.00	5.85	0 00:00	0.00	0.00
9	Jun-12	Junction	32.09	44.85	32.09	44.85	0.00	5.66	32.81	0.00	12.04	0 00:00	0.00	0.00
10	Jun-13	Junction	32.55	45.00	32.55	45.00	0.00	0.68	32.81	0.00	12.19	0 00:00	0.00	0.00
11	Jun-14	Junction	38.81	49.11	38.81	49.11	0.00	0.67	40.13	0.00	8.98	0 00:00	0.00	0.00
12	Jun-15	Junction	8.90	15.15	8.90	15.15	0.00	4.65	10.85	0.00	4.30	0 00:00	0.00	0.00
13	Jun-16	Junction	2.04	11.00	2.04	11.00	0.00	9.58	8.12	0.00	2.88	0 00:00	0.00	0.00
14	Out-01	Outfall	-7.10					21.92	4.65					
15	Jun-05	Flow Diversions	7.95	15.30	7.95		0.00	15.35	11.89				0.00	0.00

MAX. WATER LEVELS

EXISTING PPZ ALL W/ DETENTION

Junction	Existing	PPZ All w/ Detention
J-10	23.04	21.61
J-9	20.02	20.01
J-8	17.28	17.27
J-7	15.92	15.91
J-6	14.45	14.43
J-5	11.92	11.89
J-4	9.80	9.78
J-15	10.87	10.85
J-16	8.13	8.12
J-1	7.95	7.94

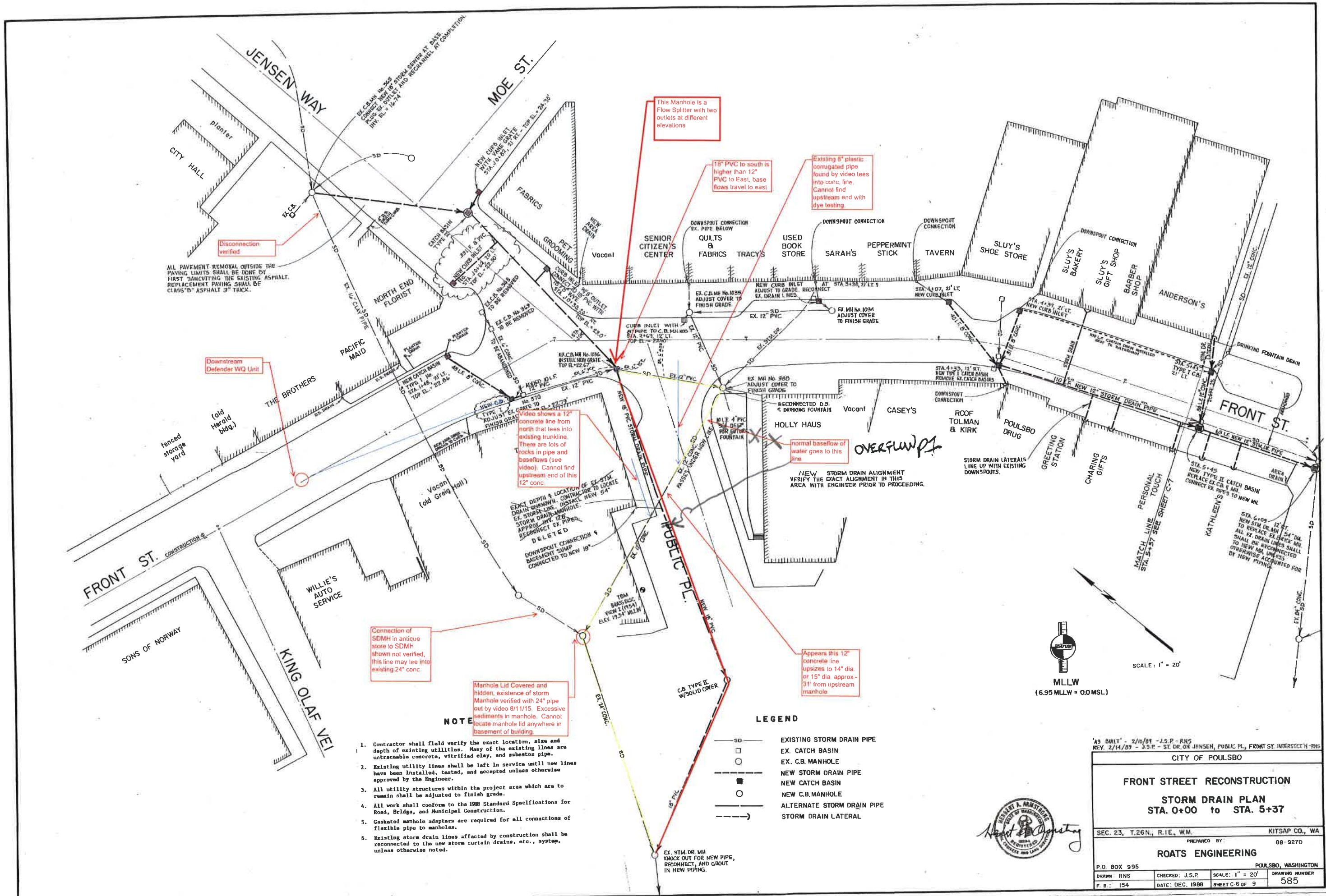


CUTFALL AT MAXIMUM 4.65 MSL

JUNCTION MAX. WATER ELEVATIONS EXISTING VS. WITH PPZ ALL W/ DETENTION

APPENDIX L
AS-BUILT INFORMATION/OTHER REFERENCE
INFORMATION





Disconnection verified

ALL PAVEMENT REMOVAL OUTSIDE THE PAVING LIMITS SHALL BE DONE BY FIRST SAWCUTTING THE EXISTING ASPHALT. REPLACEMENT PAVING SHALL BE CLASS "B" ASPHALT 3" THICK.

Downstream Defender WQ Unit

Video shows a 12" concrete line from north that tees into existing trunkline. There are lots of rocks in pipe and baseflows (see video). Cannot find upstream end of this 12" conc.

Connection of SDMM in antique store to SDMM shown not verified, this line may tee into existing 24" conc.

Manhole Lid Covered and hidden, existence of storm Manhole verified with 24" pipe out by video 8/11/15. Excessive sediments in manhole. Cannot locate manhole lid anywhere in basement of building.

This Manhole is a Flow Splitter with two outlets at different elevations

18" PVC to south is higher than 12" PVC to East, base flows travel to east

Existing 6" plastic corrugated pipe found by video tees into conc. line. Cannot find upstream end with dye testing

normal baseflow of water goes to this line

Appears this 12" concrete line upsizes to 14" dia. or 15" dia. approx. 31' from upstream manhole

NEW STORM DRAIN ALIGNMENT VERIFY THE EXACT ALIGNMENT IN THIS AREA WITH ENGINEER PRIOR TO PROCEEDING.

- NOTE**
1. Contractor shall field verify the exact location, size and depth of existing utilities. Many of the existing lines are untraceable concrete, vitrified clay, and asbestos pipe.
 2. Existing utility lines shall be left in service until new lines have been installed, tested, and accepted unless otherwise approved by the Engineer.
 3. All utility structures within the project area which are to remain shall be adjusted to finish grade.
 4. All work shall conform to the 1988 Standard Specifications for Road, Bridge, and Municipal Construction.
 5. Gasketed manhole adapters are required for all connections of flexible pipe to manholes.
 6. Existing storm drain lines affected by construction shall be reconnected to the new storm curtain drains, etc., system, unless otherwise noted.

LEGEND

- SD — EXISTING STORM DRAIN PIPE
- — EX. CATCH BASIN
- — EX. C.B. MANHOLE
- — — — NEW STORM DRAIN PIPE
- — NEW CATCH BASIN
- — NEW C.B. MANHOLE
- — — — ALTERNATE STORM DRAIN PIPE
- — — — STORM DRAIN LATERAL



MLLW
(6.95 MLLW = 0.0MSL)

SCALE: 1" = 20'

'AS BUILT' - 2/18/81 - J.S.P.-RNS
REV. 2/14/89 - J.S.P. - ST. DR. ON JENSEN, PUBLIC PL., FRONT ST. INTERSECT'N PHS

CITY OF POULSBORO

FRONT STREET RECONSTRUCTION
STORM DRAIN PLAN
STA. 0+00 to STA. 5+37

SEC. 23, T.26N., R.1E., W.M. KITSAP CO., WA

PREPARED BY: **ROATS ENGINEERING** 88-9270

P.O. BOX 995 POULSBORO, WASHINGTON

DRAWN: RNS	CHECKED: J.S.P.	SCALE: 1" = 20'	DRAWING NUMBER
F. B.: 154	DATE: DEC. 1988	SHEET C-6 OF 9	585

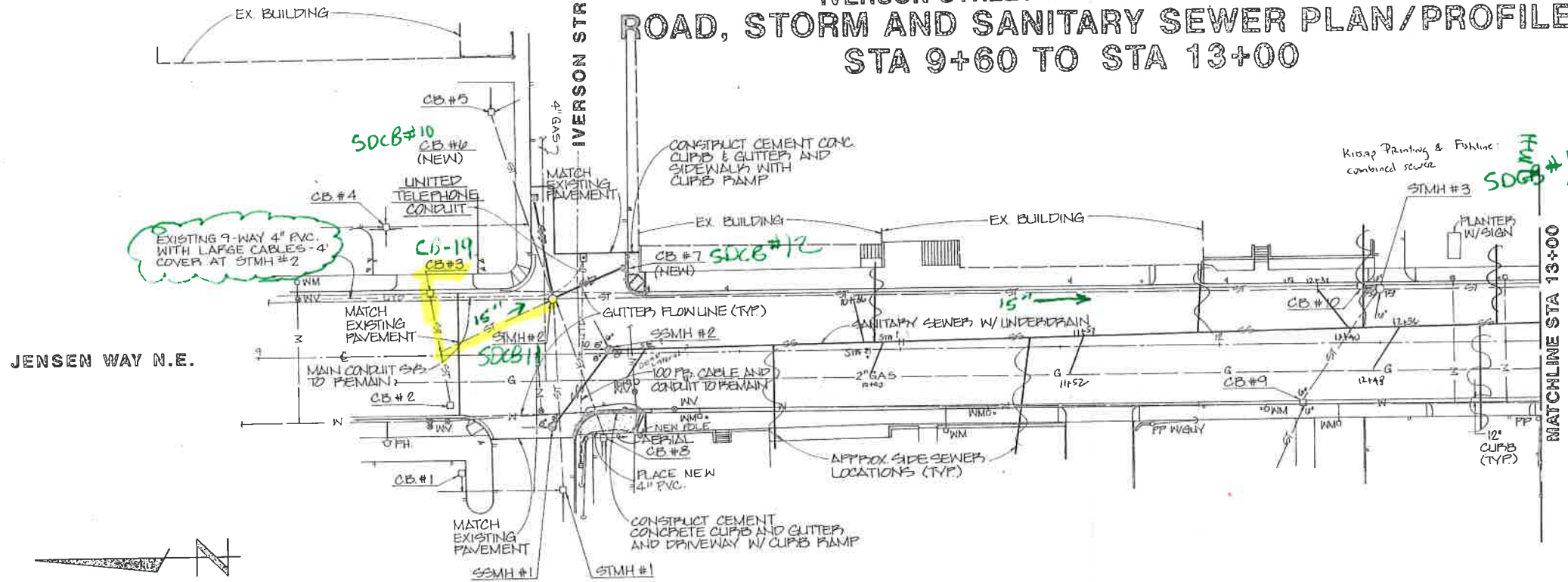


JENSEN WAY N.E.

A PORTION OF SECTION 23, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M.
POULSBO, WASHINGTON

IVERSON STREET N.E. TO MOE STREET N.E.

ROAD, STORM AND SANITARY SEWER PLAN/PROFILE STA 9+60 TO STA 13+00



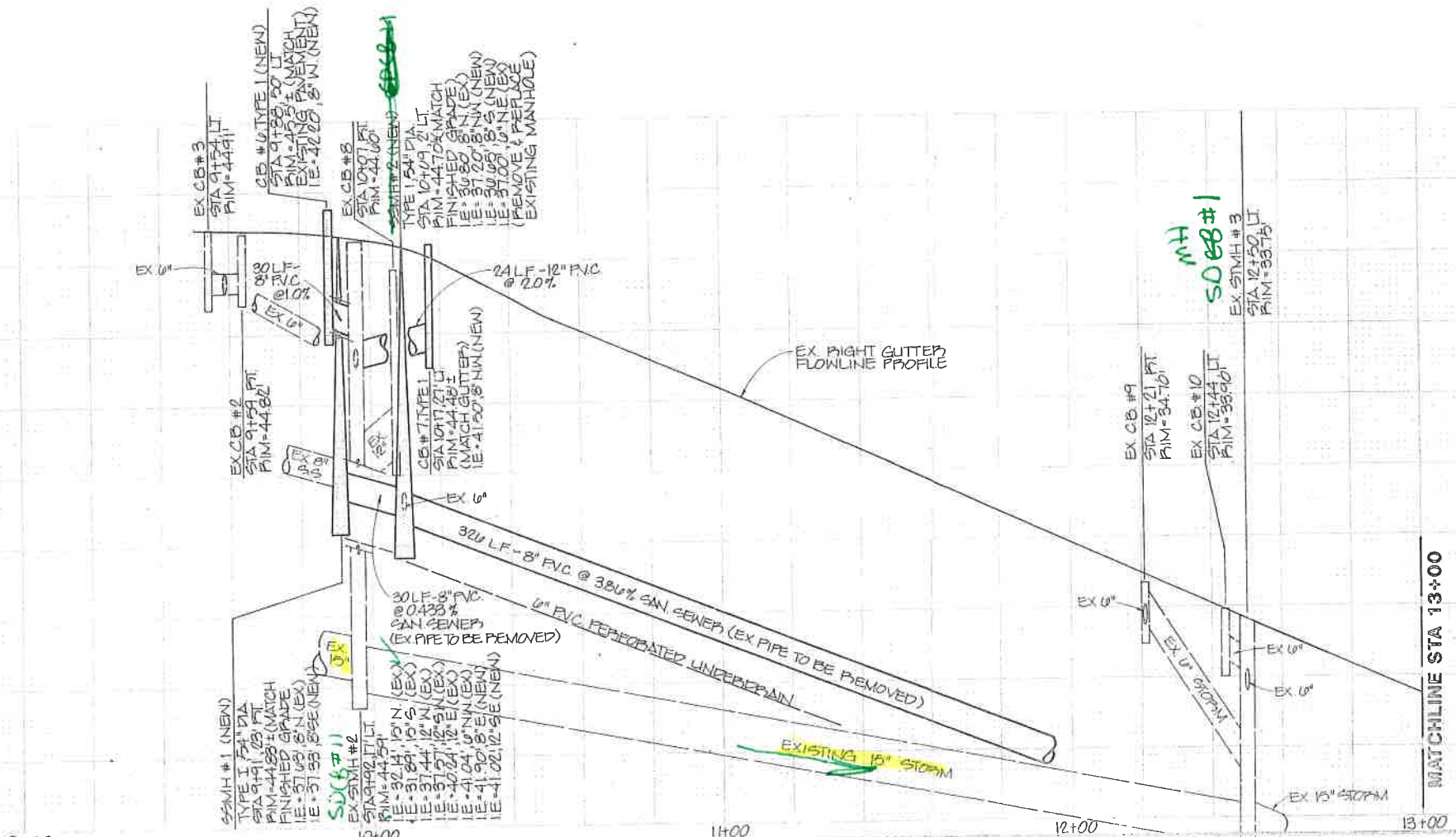
LEGEND

- ASPHALT CONCRETE PAVEMENT CLASS 'B' WITH SURFACING
- MONOLITHIC CURBS AND GUTTERS W/ SIDEWALKS OR DRIVEWAY
- NEW SANITARY SEWER MANHOLE
- NEW CATCH BASIN
- NEW SANITARY SEWER MAIN W/ 10" UNDERDRAIN
- NEW STORM DRAINAGE PIPE

THE LOCATION OF APPROX. 13 EXISTING SIDE SEWER CONNECTIONS IS UNKNOW. THE CONTRACTOR SHALL IDENTIFY ALL SIDE SEWER LOCATIONS BY DISTANCE FROM DOWNSTREAM MANHOLE TO NEAREST CB# AND SHALL PROVIDE DIAMETERS AND DIRECTION OF PIPE.

GUTTER CONTROL ELEVATION

STA.	LT.	RT.
44	94+3 EX. GFL	EX. GFL
	94+8 EX. GFL	EX. GFL
42	10+00 144.59	44.54'
	10+20 EX. GFL	EX. GFL



DESIGN J. TIMMIS
DRAWN D. COLE
CHECKED CTS
SEC. 23, T. 26N, R. 1E
FIELD BK. DATE 12-91
SCALE 1"=20' H., 1"=2' V.

REV. NO.	REVISION DESCRIPTION	DATE BY
1	PERMANENT REVIEW COMMENT 1-10-92	



TITLE JENSEN WAY N.E.
IVERSON STREET N.E. TO MOE STREET N.E.
ROAD, STORM AND SANITARY SEWER
PLAN/PROFILE STA 9+60 TO STA 13+00
CLIENT CITY OF POULSBO
501 2nd Ave N
POULSBO, WA 99670
253-7171

PAC-TECH ENGINEERING, INC.
Engineers / Planners / Surveyors
47004
200 150th St N
Tulsa, WA 99504
907-444-0211
FAC: 7-247-110



SHEET 4 OF 4
JOB NO. 90299

PRINTED
JUN 12 1992
PAC-TECH ENGINEERING, INC.

COP Iverson to Moe Street
Improvements
Road Storm Sewer 9+60-13+00

JENSEN WAY N.E.

A PORTION OF SECTION 23, TOWNSHIP 26 NORTH, RANGE 1 EAST, W.M.
POULSBORO, WASHINGTON

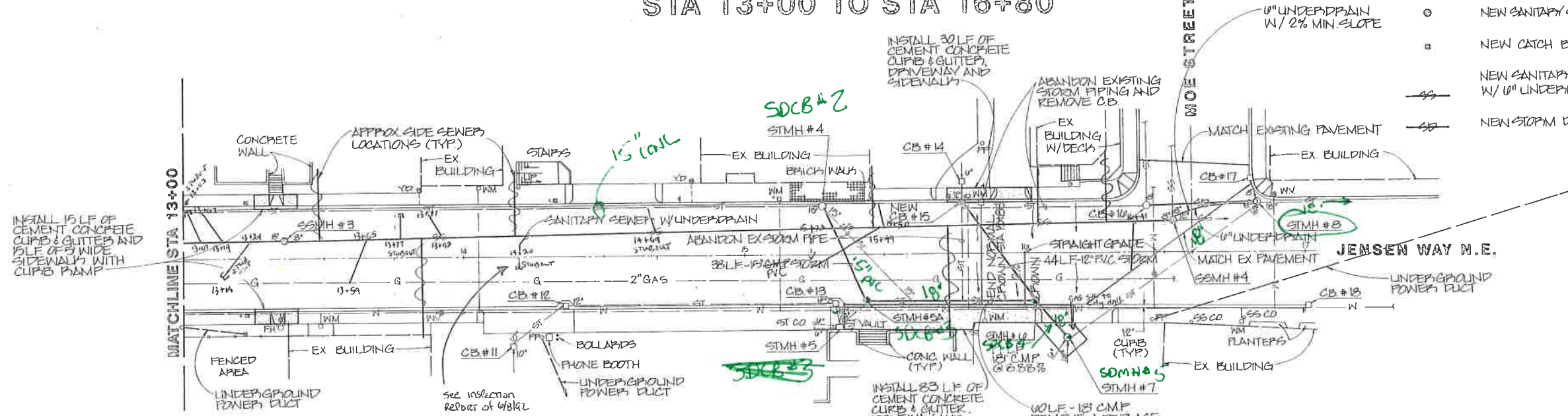
IVERSON STREET N.E. TO MOE STREET N.E.

ROAD, STORM AND SANITARY SEWER PLAN/PROFILE

STA 13+00 TO STA 16+80

LEGEND

- ASPHALT CONCRETE PAVEMENT CLASS 1B WITH SURFACING
- MANULITHIC CURBS AND GUTTER W/ SIDEWALK OR DRIVEWAY
- NEW SANITARY SEWER MANHOLE
- NEW CATCH BASIN
- NEW SANITARY SEWER MAIN W/ 12" UNDERDRAIN
- NEW STORM DRAINAGE PIPE



INSTALL 15 LF OF CEMENT CONCRETE CURBS & GUTTER AND 15 LF OF 3' WIDE SIDEWALK WITH CURB PAMP

INSTALL 30 LF OF CEMENT CONCRETE CURBS & GUTTER, DRIVEWAY AND SIDEWALK

ABANDON EXISTING STORM PIPING AND REMOVE CB

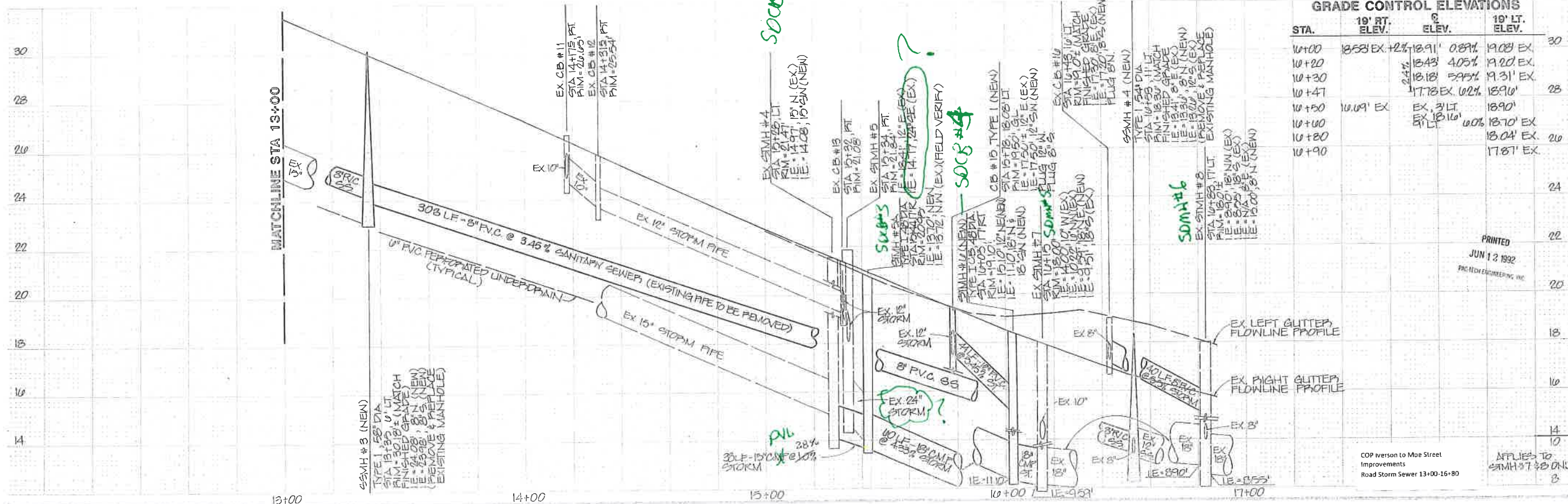
12" UNDERDRAIN W/ 2% MIN. SLOPE

MATCH EXISTING PAVEMENT

MATCH EX PAVEMENT

JENSEN WAY N.E.

THE LOCATION OF APPROX 13 EXISTING SIDE SEWER CONNECTIONS IS UNKNOWN. THE CONTRACTOR SHALL IDENTIFY ALL SIDE SEWER LOCATIONS BY DISTANCE FROM DOWNSTREAM MANHOLE TO NEAREST OS AND SHALL PROVIDE DIAMETER AND DIRECTION OF PIPE.



TITLE: JENSEN WAY N.E. IVERSON STREET N.E. TO MOE STREET N.E. ROAD, STORM AND SANITARY SEWER PLAN/PROFILE STA 13+00 TO STA 16+80

CLIENT: CITY OF POULSBORO
POULSBORO WA 98370
200-714-2078

PACITECH ENGINEERING, INC.
Engineers / Planners / Surveyors



COP Iverson to Moe Street Improvements
Road Storm Sewer 13+00-16+80

APPLIED TO SMH #7 & 8 ONLY

SHEET 5 OF 7
JUN 12 1992

APPENDIX M
TECHNICAL MEMORANDUM
SIZING UNDERGROUND
CONCRETE VAULT





P.O. Box 720 • 11309 Clear Creek Road N.W.
Silverdale, Washington 98383
Silverdale (360) 692-5525 • Seattle (206) 682-5574
Fax (360) 698-0546

Engineering • Surveying • Planning

TECHNICAL MEMORANDUM APRIL 27, 2016

FROM: Pat Fuhrer, P.E.

RE: Poulsbo Place 2, Division 8
Assisted Living Facility Master Plan Amendment

The current revision to the Site Plan proposes a lower parking garage access, which will require lower final grade elevations in the parking area off of Jensen Way NE. A 96" diameter detention pipe manifold was previously proposed and calculations included in the PDSR submitted with the Master Plan Amendment.

With the lower parking area finish grades, there is about 54" of working detention volume height available above the 6" of dead storage. As such, an underground concrete vault would likely prove to be more cost-effective than a smaller-diameter pipe manifold.

Attached please find the stage-storage-discharge calculations for an 80'x20'x4.5' live storage vault volume, over 6" of dead storage. The release rate is fixed at less than 0.67 cfs to mitigate downstream capacity limitations as discussed in the PDSR submitted for this project.

Final dimensioning of the tank will occur at the time of final construction design and permitting.

Enclosures
KPF:lrs
#5987.00



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 04 / 25 / 2016

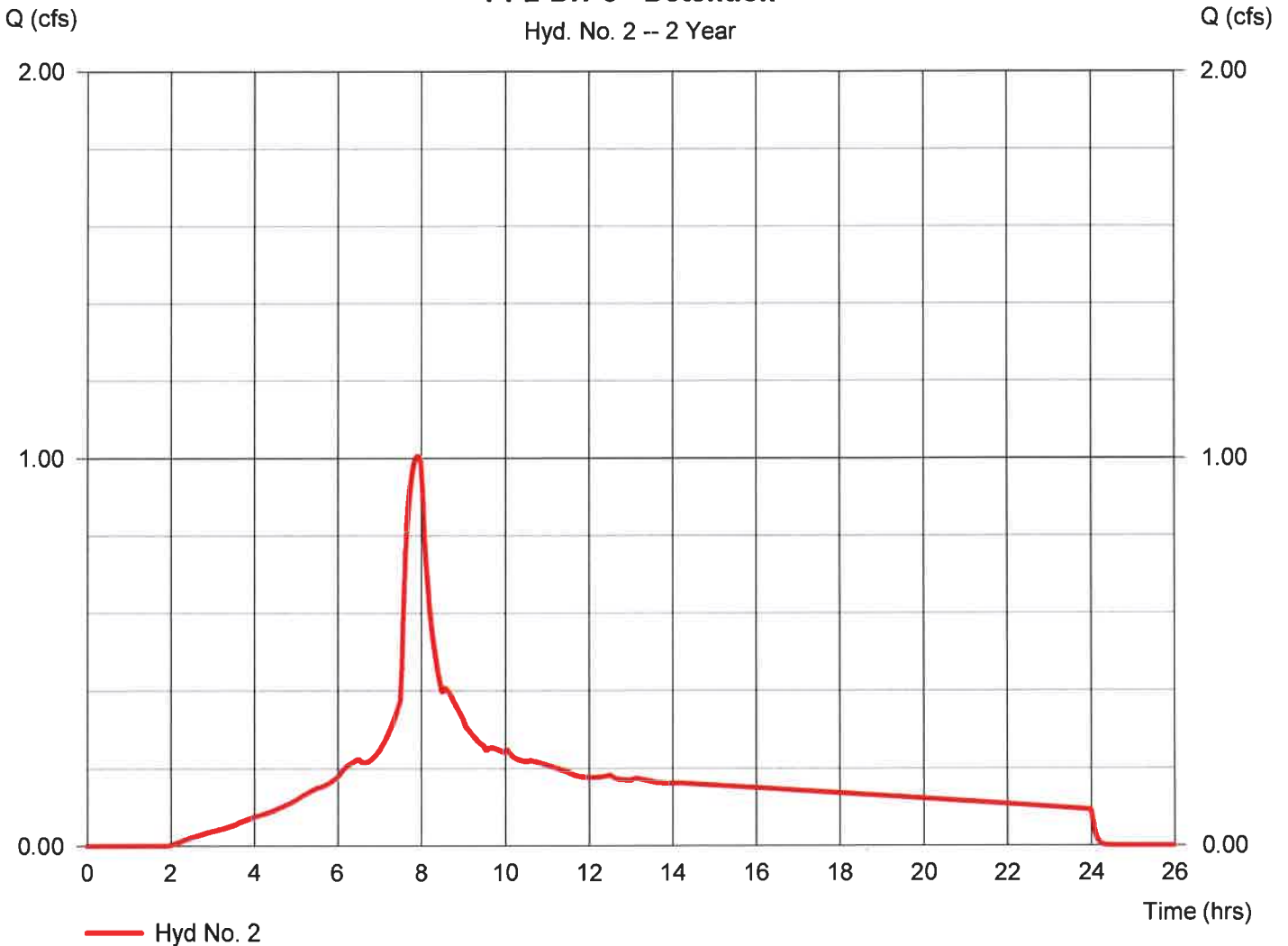
Hyd. No. 2

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.005 cfs
Storm frequency	= 2 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 14,115 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.30 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

PP2-Div 8 - Detention

Hyd. No. 2 -- 2 Year



Hydrograph Report

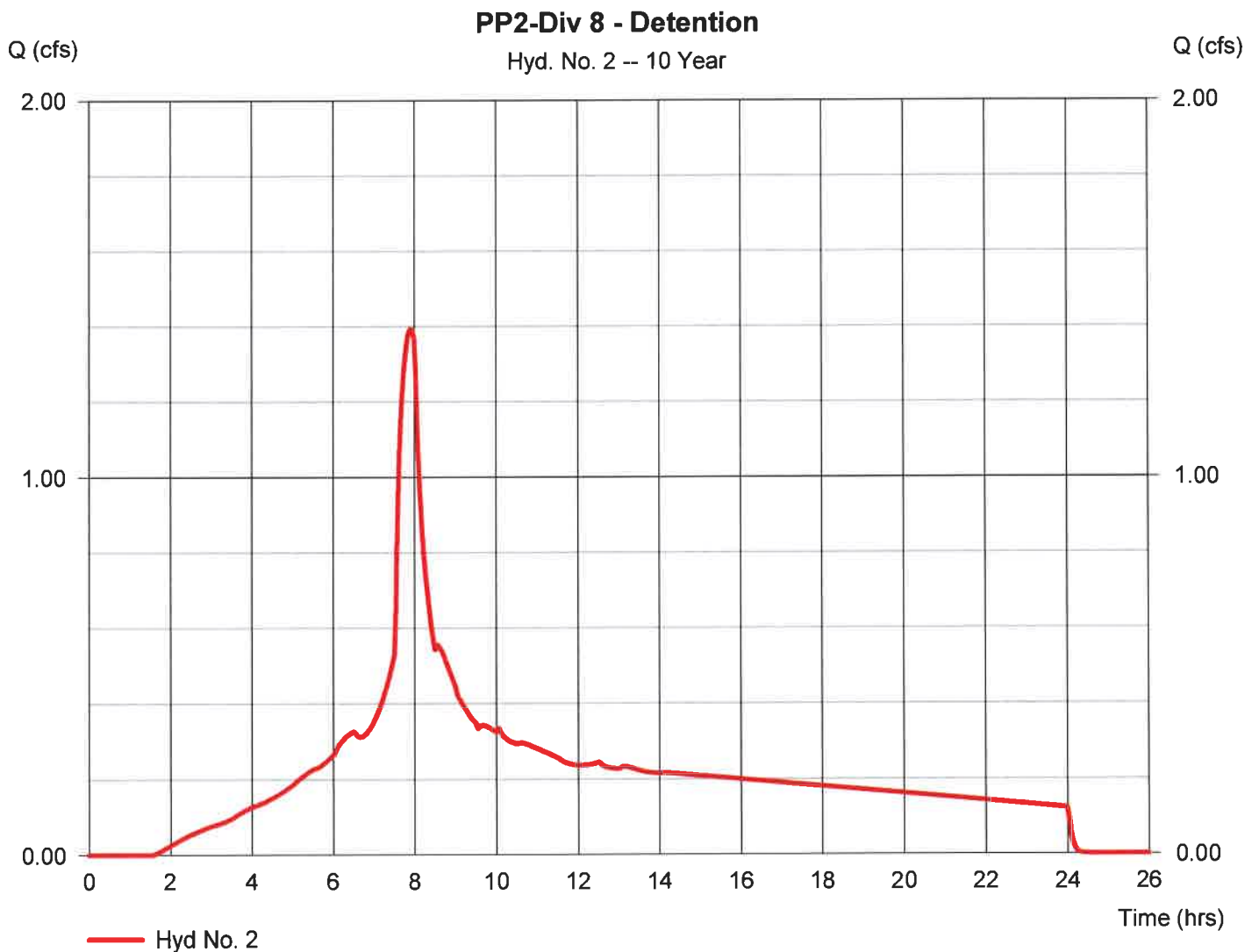
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 04 / 25 / 2016

Hyd. No. 2

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.392 cfs
Storm frequency	= 10 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 19,530 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

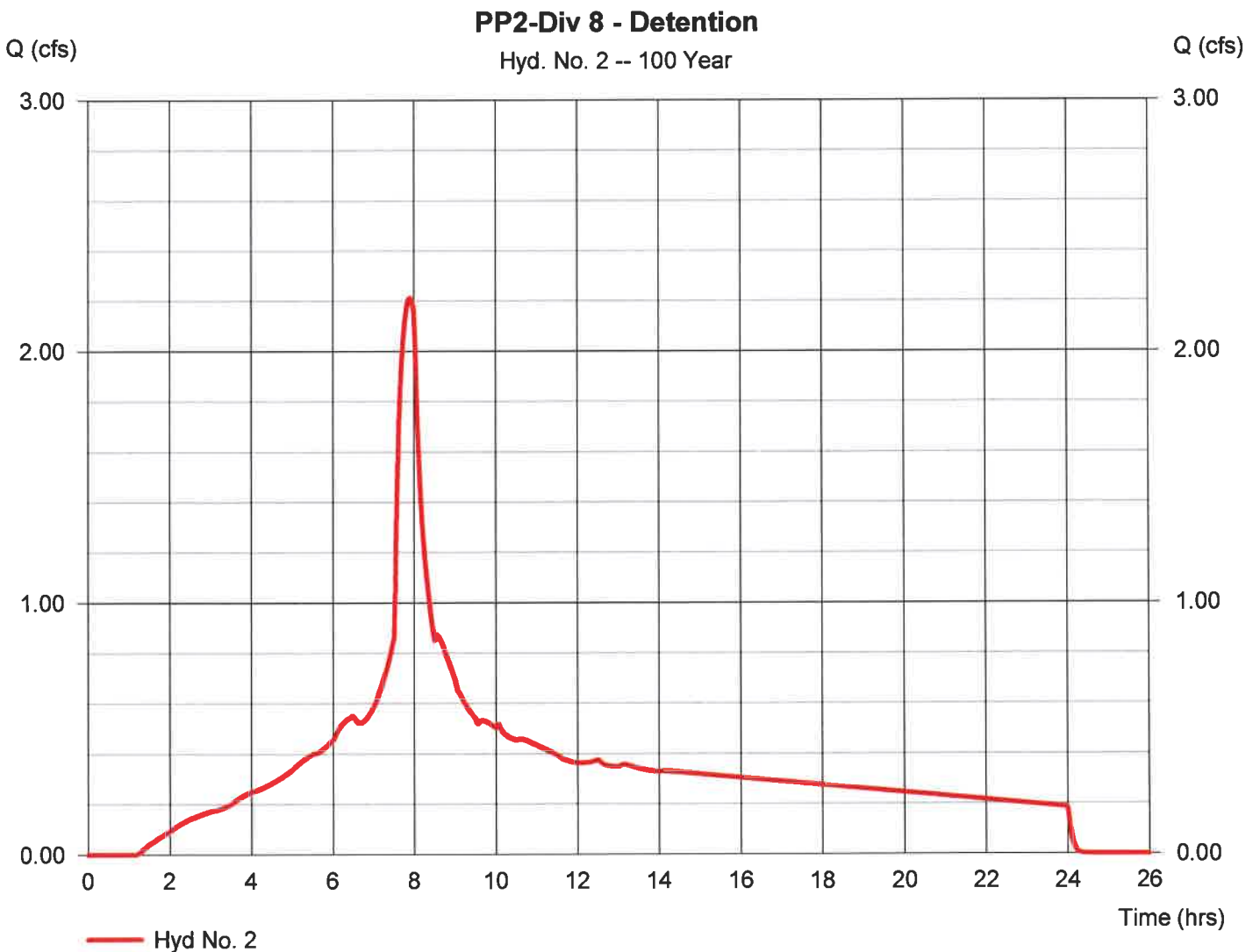
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Monday, 04 / 25 / 2016

Hyd. No. 2

PP2-Div 8 - Detention

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.213 cfs
Storm frequency	= 100 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 31,293 cuft
Drainage area	= 2.197 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Pond Report

Pond No. 2 - VAULT

Pond Data

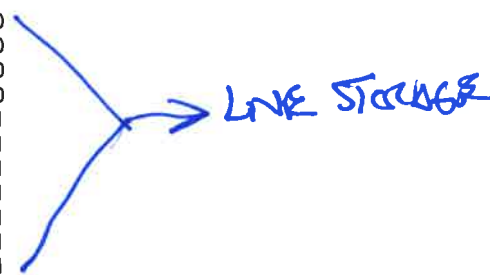
UG Chambers -Invert elev. = 43.50 ft, Rise x Span = 4.50 x 20.00 ft, Barrel Len = 80.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

IE AT STREET = +/- 42.0

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	43.50	n/a	0	0
0.45	43.95	n/a	720	720
0.90	44.40	n/a	720	1,440
1.35	44.85	n/a	720	2,160
1.80	45.30	n/a	720	2,881
2.25	45.75	n/a	720	3,601
2.70	46.20	n/a	720	4,321
3.15	46.65	n/a	720	5,041
3.60	47.10	n/a	720	5,761
4.05	47.55	n/a	720	6,481
4.50	48.00	n/a	720	7,201

4.3 - DEAD STORAGE, BOTTOM OF VAULT



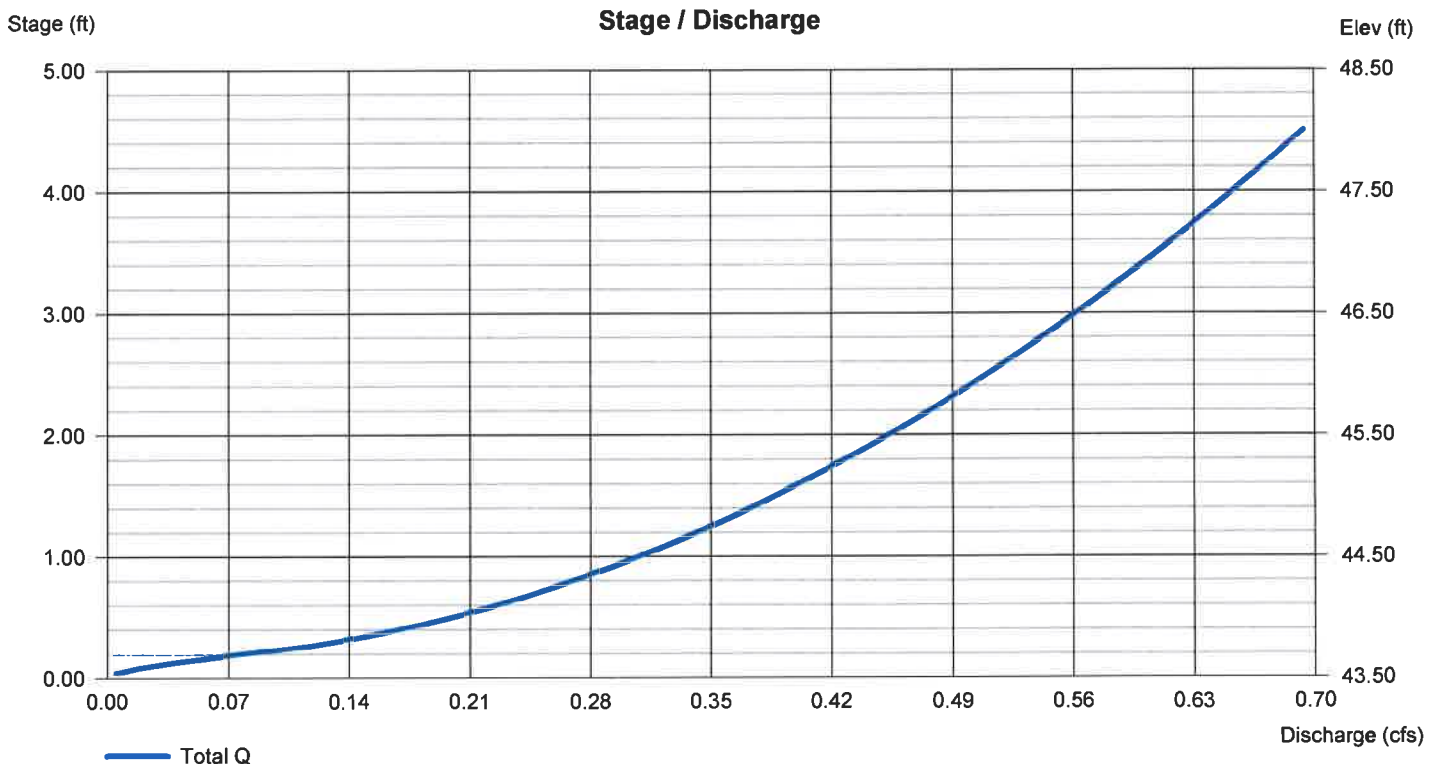
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	3.50	Inactive	Inactive
Span (in)	= 0.00	3.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 0.00	43.50	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.62	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	Inactive
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s)



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

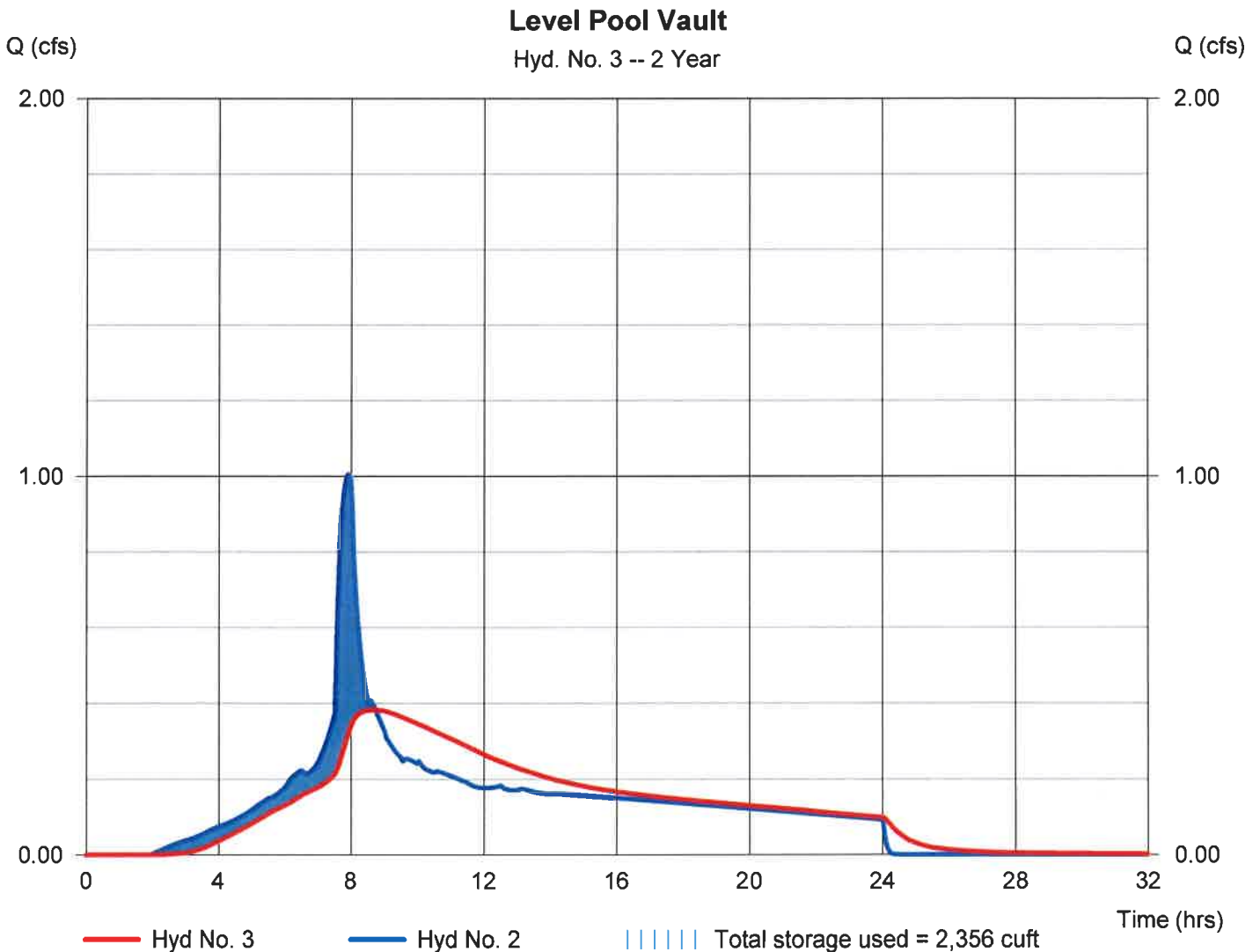
Monday, 04 / 25 / 2016

Hyd. No. 3

Level Pool Vault

Hydrograph type	= Reservoir	Peak discharge	= 0.383 cfs ✓
Storm frequency	= 2 yrs ←	Time to peak	= 8.73 hrs
Time interval	= 2 min	Hyd. volume	= 14,100 cuft
Inflow hyd. No.	= 2 - PP2-Div 8 - Detention	Max. Elevation	= 44.97 ft
Reservoir name	= VAULT	Max. Storage	= 2,356 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

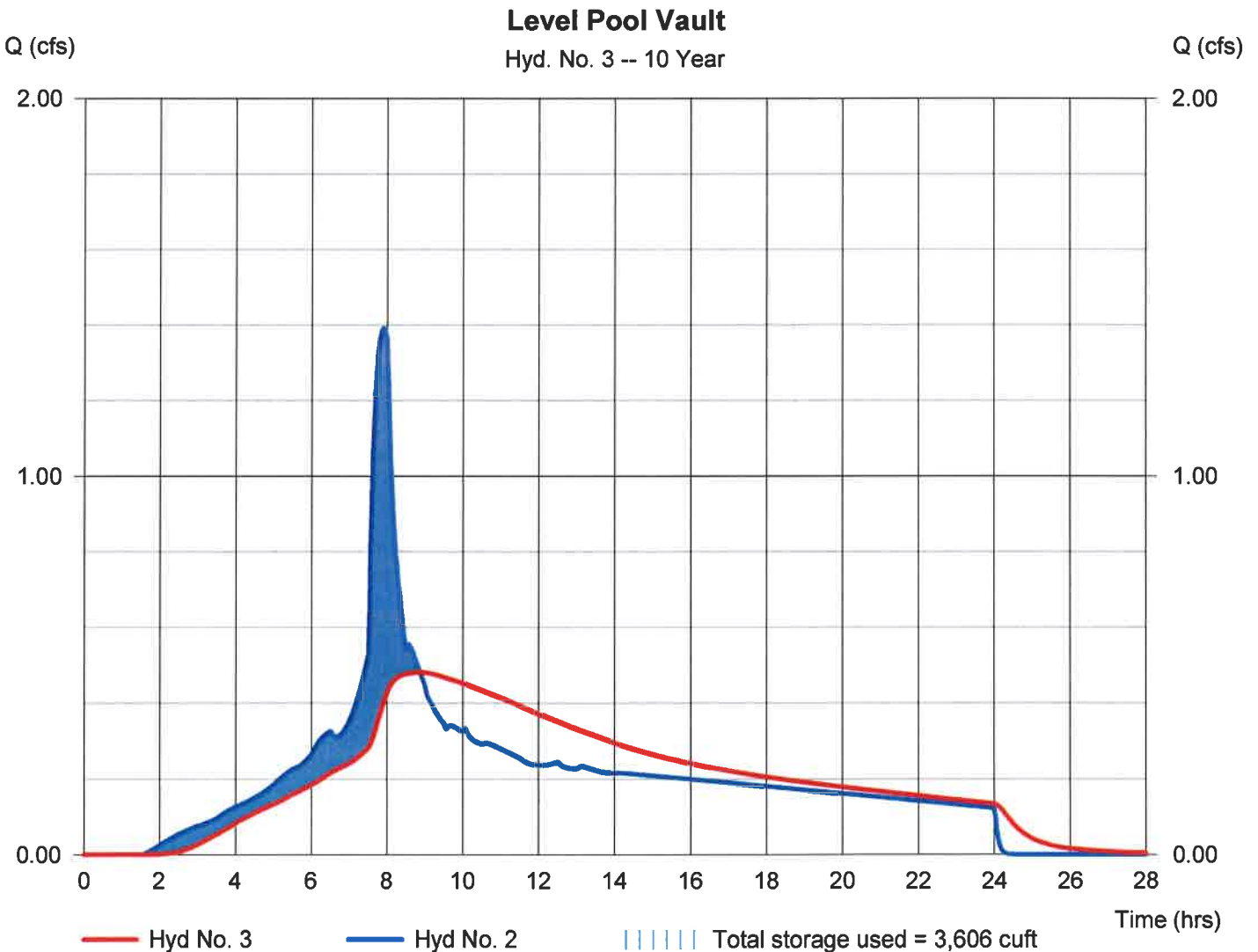
Monday, 04 / 25 / 2016

Hyd. No. 3

Level Pool Vault

Hydrograph type	= Reservoir	Peak discharge	= 0.483 cfs ✓
Storm frequency	= 10 yrs ←	Time to peak	= 8.87 hrs
Time interval	= 2 min	Hyd. volume	= 19,515 cuft
Inflow hyd. No.	= 2 - PP2-Div 8 - Detention	Max. Elevation	= 45.75 ft
Reservoir name	= VAULT	Max. Storage	= 3,606 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

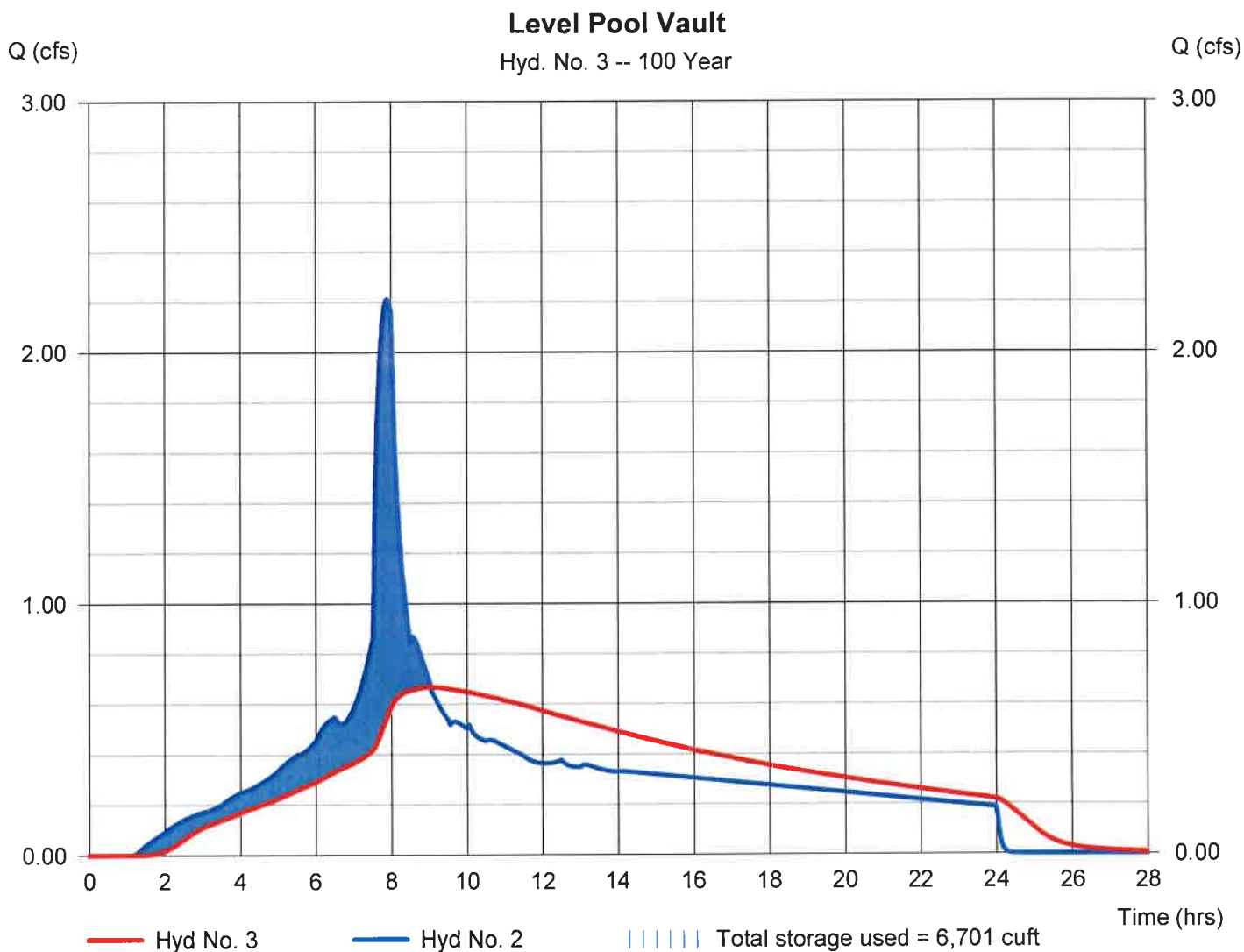
Monday, 04 / 25 / 2016

Hyd. No. 3

Level Pool Vault

Hydrograph type	= Reservoir	Peak discharge	= 0.668 cfs ✓
Storm frequency	= 100 yrs ←	Time to peak	= 9.03 hrs
Time interval	= 2 min	Hyd. volume	= 31,278 cuft
Inflow hyd. No.	= 2 - PP2-Div 8 - Detention	Max. Elevation	= 47.69 ft (2" of cover 2 min) ✓
Reservoir name	= VAULT	Max. Storage	= 6,701 cuft

Storage Indication method used.





P.O. Box 720 • 10045 Old Frontier Road NW
Silverdale, Washington 98383
(360) 692-5525 • Seattle (206) 682-5574
www.map-limited.com

ENGINEERING • SURVEYING • PLANNING

TECHNICAL MEMORANDUM

Date: November 18, 2020

To: Anthony Burgess, Engineer 1
City of Poulsbo Engineering Department

From: Pat Fuhrer, P.E.

Subject: Poulsbo Place 2 Div. 8 2020 Master Plan Amendment and Site Plan Review

Cc: Mike Brown

11-17-20



NOTE: THIS DOCUMENT IS INSCRIBED
WITH A DIGITIZED SIGNATURE BY THE
ENGINEER AS PROVIDED BY WAC
196-23-070(2)

INTRODUCTION

Pursuant to the City's 3/3/2020 Pre-Application summary Comment #15 and your October 5, 2020 memorandum to Wenzlau Architects, the purpose of this TM is to update the 2015 Preliminary Drainage Report for the above-referenced project with specificity given to the current proposal, and summarize the proposed stormwater management design concept in narrative form. The storm system preliminary layout indicating the use of a proposed detention vault as discussed in the 2015 PDR was included in the project application materials. The storm system proposed for this project generally follows the vested Master Plan for Poulsbo Place II, and references in the 2015 PDSR are presented for historical background of previous approvals and coordination with City Engineering Staff at the time.

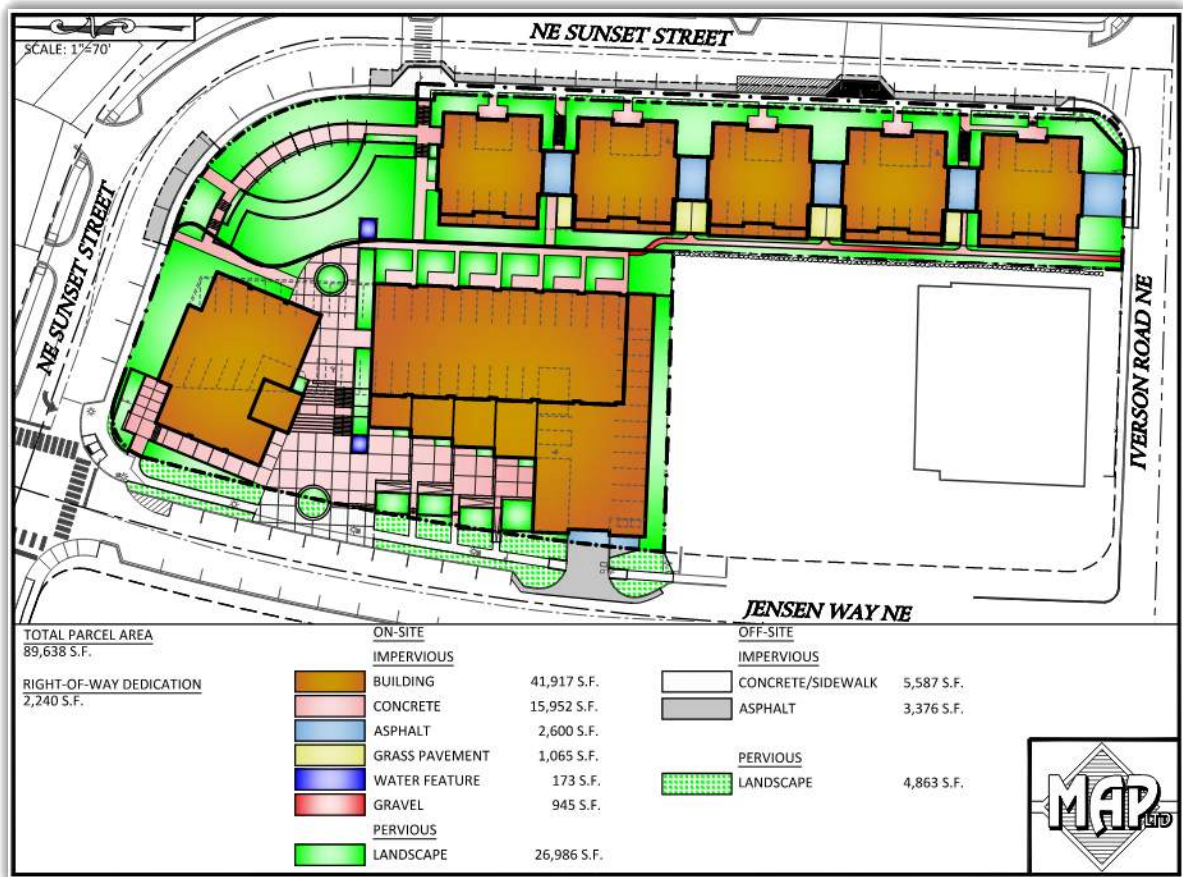
GENERAL PROJECT NARRATIVE

The proposed project will complete the last phase of Poulsbo Place, originally envisioned as a mixed-use neighborhood adjoining the original Poulsbo downtown. The site, comprised of two different land use designations, is designed as one integrated site plan combining the lower mixed-use building with multi-family buildings on the upper portion of the sloping site. Each frontage is designed to support existing character and use patterns, and to ensure complementary aesthetic to both the previously completed phases and the surrounding context. The architecture is meant to evoke aspects of traditional Nordic design (aka Bergen merchant houses).

The program includes 5,000sf of retail oriented to Jensen Way and the existing mixed-use buildings across the street. The mixed-use building will have 29 residential units above below grade parking. The upper site will have 5 multi-family buildings, each containing 4 residential units above structured parking. These buildings will define two main outdoor spaces; the lower retail plaza, and the upper community park.

DEVELOPED CONDITIONS SUMMARY

The proposed site plan legend below contains the following on-site and off-site impervious and pervious areas (to-scale original attached):



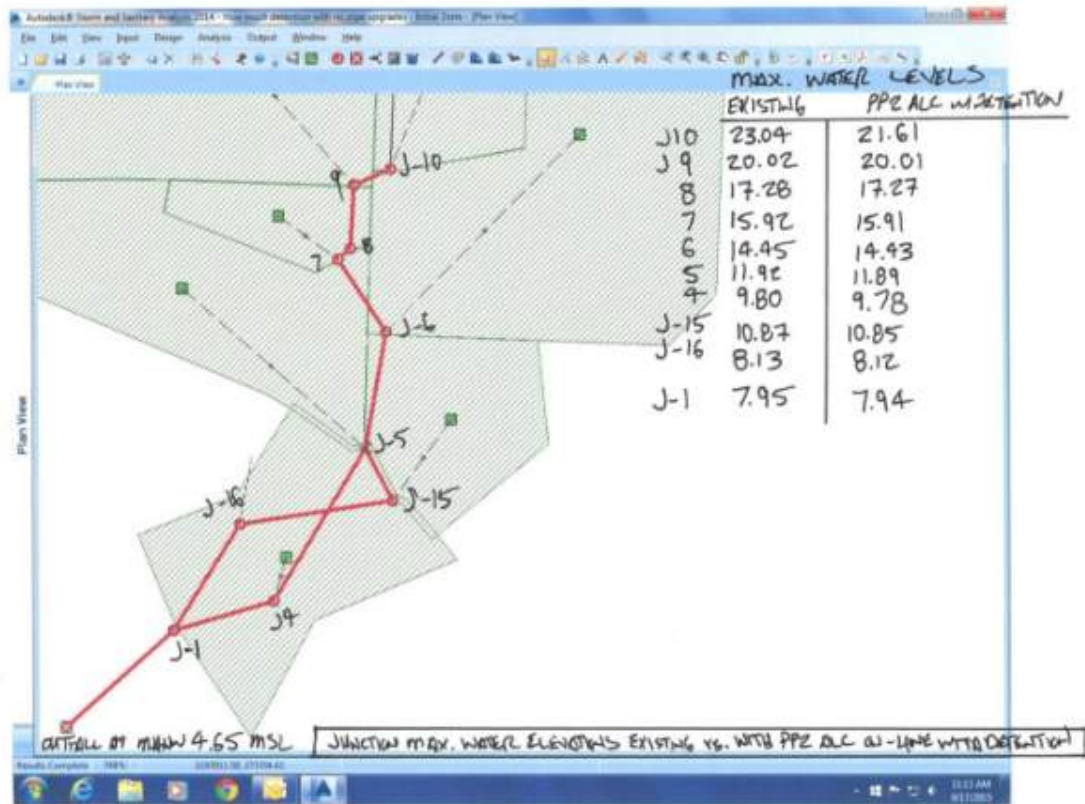
As shown above, the total on-site impervious coverage is 62,652 s.f., which comprises 70% of the project site. The 3-23-20 PDSR on page 7 discusses that a 95% impervious surface coverage was assumed for the PP2 Division 8 site, as well as full buildout of the former KPUD Fiber Node hub project, so the downstream drainage analysis is conservative.

Appendix M of the 3-23-20 PDSR contains a Technical Memorandum that discusses the required on-site detention volume and restricted release rate of 0.67 cfs that was found in the downstream analysis to eliminate any surcharge of stormwater structures in the downstream drainage course. A summary of structure maximum water levels in the existing condition and with PP2 Div 8 on-line with the proposed detention vault and restricted flow is on page 17 of the 3-23-20 PDSR and repeated below:

K. Output: Comparison of maximum water surface elevations existing condition versus basin with PP2 Div 8 detention with $Q < 0.67$ cfs

This graphical analysis shows the SSA Model predicted maximum water levels in the structures downstream of J-10 in the existing condition (Part A herein) and with the PP2 Division 8 site with detention and restricting the outflow to 0.67 cfs (Part I herein)

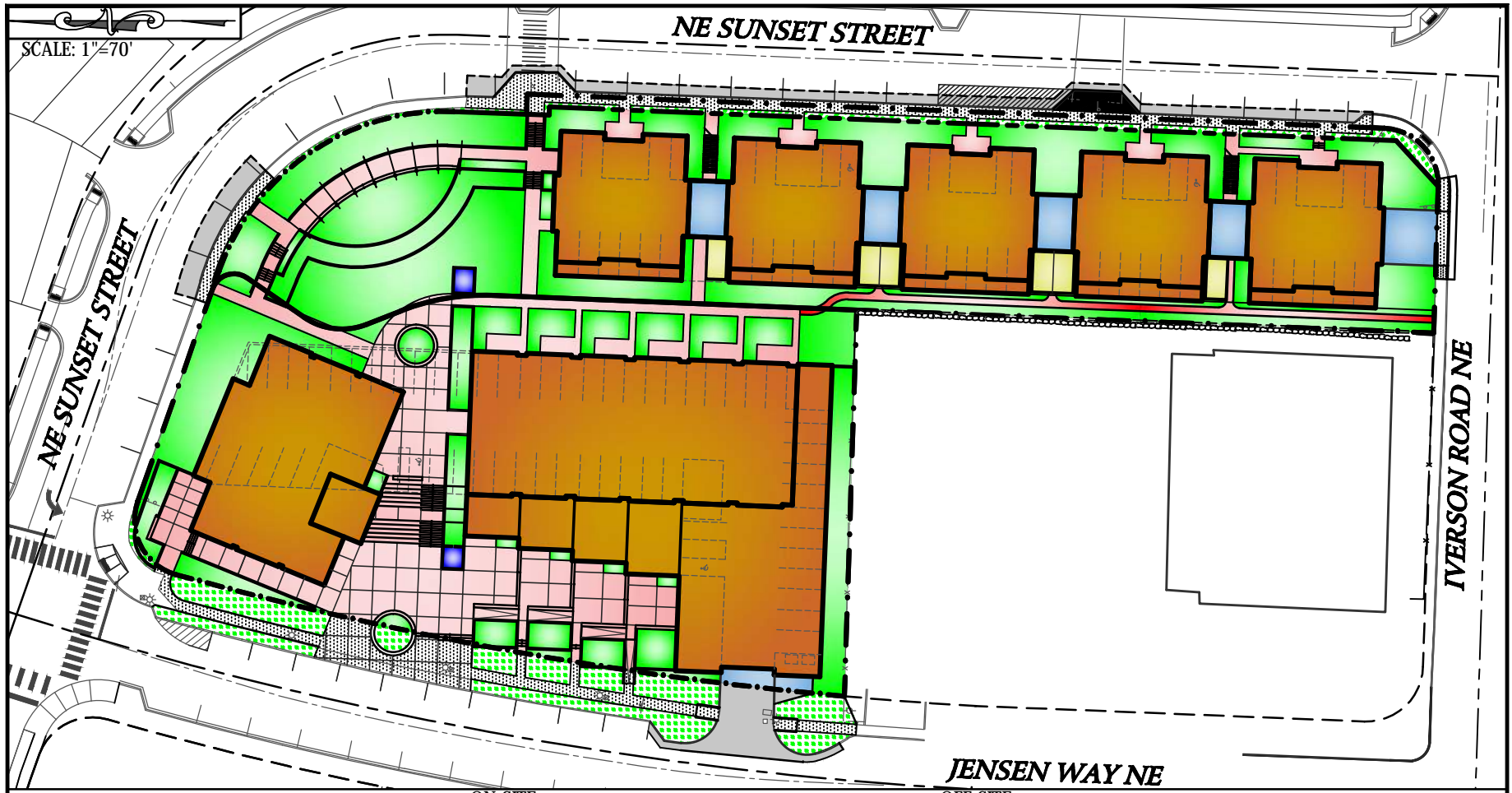
In summary, we find that maximum water levels in all junctions are slightly lower with the flow restriction of 0.67 cfs and detention provided on-site limiting the post-developed peak flow to 0.67 cfs. No existing downstream flooding risk is increased with this flow restriction installed on the PP 2 Div 8 site.



Water Quality stormwater mitigation was originally proposed for Division 8 in the Master Plan amendment for Poulsbo Place II with a Downstream Defender™ vortex-type separator and was shown in the PDSR dated April 5, 2002 and revised January 16, 2004. The site plan for Division 8 had surface parking features and more PGIS areas than is currently proposed with the underground-parked project.




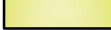



The on-site PGIS proposed is 2,600 s.f., and the off-site PGIS proposed is 3,376 s.f. and is not all contiguous-asphalt surfacing. Since neither of these surfaces exceed 5000 s.f., (Current code MR #6 2014 DOE SSMWW), no additional water quality infrastructure is proposed beyond the 6” of dead storage for sediment settling capture in the proposed detention vault.



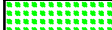
SCALE: 1"=70'



TOTAL PARCEL AREA
89,638 S.F.

RIGHT-OF-WAY DEDICATION
2,240 S.F.

ON-SITE	
IMPERVIOUS	
	BUILDING 41,917 S.F.
	CONCRETE 15,952 S.F.
	ASPHALT 2,600 S.F.
	GRASS PAVEMENT 1,065 S.F.
	WATER FEATURE 173 S.F.
	GRAVEL 945 S.F.
PERVIOUS	
	LANDSCAPE 26,986 S.F.

OFF-SITE	
IMPERVIOUS	
	CONCRETE/SIDEWALK 5,587 S.F.
	ASPHALT 3,376 S.F.
PERVIOUS	
	LANDSCAPE 4,863 S.F.



The NORA & VALARI Residences

APPENDIX D DETERMINING CONSTRUCTION SITE SEDIMENT DAMAGE POTENTIAL

The following rating system allows objective evaluation of a particular development site's potential to discharge sediment. Permittees may use the rating system below or develop alternative process designed to identify site-specific features, which indicate that the site must be inspected prior to clearing and construction. Any alternative evaluation process must be documented and provide for equivalent environmental review.

Step 1 is to determine if there is a sediment/erosion sensitive feature downstream of the development site. If there is such a site downstream complete step two, assessment of hydraulic nearness. If there is a sediment/erosion sensitive feature and it is hydraulically near the site then go to step three to determine the construction site sediment transport potential.

STEP 1 - Sediment/Erosion Sensitive Feature Identification

Sediment/erosion sensitive features are areas subject to significant degradation due to the effect of sediment deposition or erosion. Special protection must be provided to protect them. Sediment/erosion sensitive features include but are not limited to:

A. Salmonid bearing fresh water streams and their tributaries or freshwater streams that would be Salmonid bearing if not for anthropogenic barriers;

No

B. Lakes; No

C. Wetlands; No

D. Marine near-shore habitat; Yes

E. Sites containing contaminated soils where erosion could cause dispersal of contaminants; None known

F. Steep slopes (25% or greater) associated with one of the above features. No

Identify any sediment/erosion sensitive features, and proceed to step two. If there are none the assessment is complete.

Marine near-shore environment of Liberty Bay, at the outfall of the City storm system.

STEP 2 - Hydraulic Nearness Assessment

Sites are hydraulically near a feature if the pollutant load and peak quantity of runoff from the site will not be naturally attenuated before entering the feature. The conditions that render a site hydraulically near to a feature include, but are not limited to, the following:

A. The feature or a buffer to protect the feature is within 200 feet downstream of the site. No

B. Runoff from the site is tight-lined to the feature or flows to the feature through a channel or ditch. Yes

C. A site is not hydraulically near a feature if one of the following takes place to provide attenuation before runoff from the site enters the feature:

1. Sheet flow through a vegetated area with dense ground cover (Western Washington Phase II Municipal Stormwater Permit, January 17,2007 Appendix 7- Determining Sediment Damage Potential, Page 2 of 3) No.

2. Flow through a wetland not included as a sensitive feature No

3. Flow through a significant shallow or adverse slope, not in a conveyance channel, between the site and the sensitive feature. No



The NORA & VALARI Residences

Identify any of the sediment/erosion sensitive features from step one that are hydraulically near the site, and proceed to step three. If none of the sediment/erosion sensitive features are hydraulically near the site the assessment is complete.

Site is hydraulically connected to the marine near-shore habitat, therefore on to Step 3

STEP 3 - Construction Site Sediment Transport Potential

Using the worksheet below, determine the total points for each development site. Assign points based on the most critical condition that affects 10% or more of the site. If soil testing has been performed on site, the results should be used to determine the predominant soil type on the site. Otherwise, soil information should be obtained from the county soil survey to determine Hydrologic Soil Group (Table of Engineering Index Properties for step 1.D) and Erosion Potential (Table of Water Features for step 1.E).

When using the county soil survey, the dominant soil type may be in question, particularly when the site falls on a boundary between two soil types or when one of two soil types may be present on a site. In this case, the soil type resulting in the most points on the rating system will be assumed unless site soil tests indicate that another soil type dominates the site. Use the point score from Step 3 to determine whether the development site has a high potential for sediment transport off of the site.

Total Score Transport Rating

<100 Low
≥100 High

A high transport rating indicates a higher risk that the site will generate sediment contaminated runoff.

Construction Site Sediment Transport Potential Worksheet

A. Existing slope of site (average, weighted by aerial extent): Points

2% or less.....0
>2-5%..... 5
>5-10%.....15
>10-15%.....**30**
>15%.....50

B. Site Area to be cleared and/or graded:

<5,000 sq. ft..... 0
5,000 sq. ft. – 1 acre.....30



Engineering • Planning

The NORA & VALARI Residences

>1 acres.....**50**

Quantity of cut and/or fill on site:

<500 cubic yards.....0

500 - 5,000 cubic yards.....**5**

>5,000 - 10,000 cubic yards.....10

>10,000- 20,000 cubic yards.....25

>20,000 cubic yards.....40

Runoff potential of predominant soils(Natural Resources Conservation Service):

Hydrologic soil group A.....0

Hydrologic soil group B.....10

Hydrologic soil group C.....**20**

Hydrologic soil group D.....40

Erosion Potential of predominant soils(Natural Resource Conservation Service):

GW,GP,SW, SP soils.....0

Dual Classifications(GW-GM,GP-GM,GW-GC, GP-GC,
SW-SM,SW-SC, SP-SM,SP-SC)10

GM, GC, SM, SC soils.....**20**

ML, CL, MH, CH soils..... **40**

Surface or Groundwater entering site identified and intercepted:

Yes..... **0**

No..... 25

G. Depth of cut or height of fill >10 feet:

Yes..... **25**

No**0**



The NORA & VALARI Residences

H. Clearing and grading will occur in the wet season (October 1 - May 1):

Yes 50

No0

TOTAL POINTS.....**170**

1 If no surface or groundwater enters site, give 0 points.

Since the rating exceeds 100, this site has a higher degree of risk of sediment transport

