



Received
Planning Division
05/01/2024

Land Use Drainage Report

Pointer Rd Park

7385 SW Canyon Ln
Beaverton, Oregon 97006

Date:

September 20, 2023

Revised November 8, 2023

Revised April 26, 2024

Owner:

Tualatin Hills Parks & Recreation District
15707 SW Walker Rd
Beaverton, OR 97006

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EXPIRES 6-30-2024

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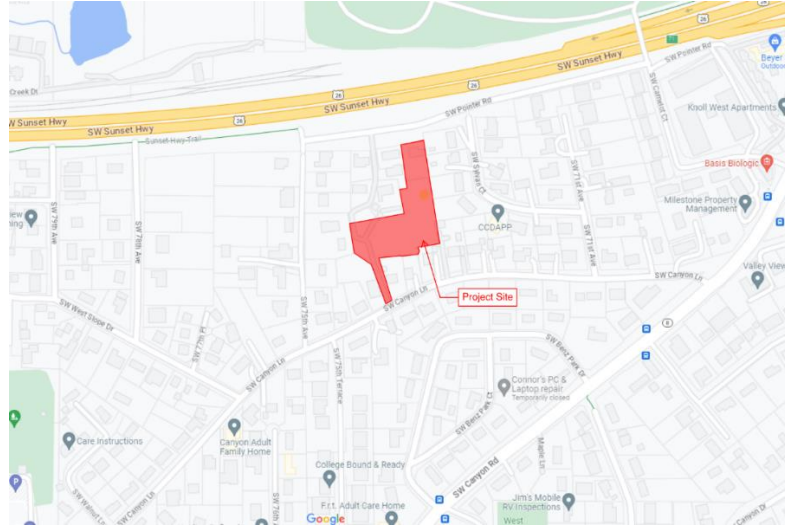
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Project Overview and Description

Location 7385 SW Canyon Ln, Beaverton, OR 97006

Site Area 84,217 sf (1.93 acres)

Vicinity Map



Zoning Residential Mixed C (RMC)

Existing Conditions The site consists of grassy field with some gravel and asphalt drive to the south and west of the site.

Existing Drainage Site Topography: The site's highest elevation is ± 657 feet along the northeastern portion of the site and the lowest elevation of ± 617 feet along the southern driveway connection.

Soil Type: The existing site falls under Hydrologic Soil Group C and consists of Cornelius and Kinton silt loams, 2 to 7 percent slopes.

Site Drainage: Currently, onsite stormwater flows generally to the south. The existing asphalt drive on the south portion of the site flows west to a drainage ditch and ultimately connects to the stormwater system in SW Canyon Lane.

Development Description Development of a new neighborhood public park that includes play structures, paved walkways, and a single picnic shelter, as well as a single ADA parking stall at the north end of the site. The project will also reconstruct the existing driveway access to the south, which serves multiple neighboring sites, as a mixed drive and pedestrian connection.

Project Design Criteria Meeting the City of Beaverton Engineering Design Manual (EDM) and standards outlined in Clean Water Services Design and Construction Standards Chapter 4 and conveyance calculations that accommodate up to a 25-year storm event.

Project CWS Hydromodification Category Category 2 (medium project 12,000 – 80,000 SF, Developed/Low)

Design Methodology

Relevant Design Storms

WQ – 0.36 inches, 3 hrs (EDM)
2-yr – 2.50 inches, 24hrs (CWS)
5-yr – 3.10 inches, 24hrs (CWS)
10yr – 3.45 inches, 24hrs (CWS)
25yr – 3.90 inches, 24hrs (CWS)

Infiltration Testing Results

Geotechnical infiltration was conducted in two borings and found no measurable infiltration.

Proposed Stormwater Management System

Table 530.1 in the EDM was reviewed in determining stormwater management for the site. There are no existing public SWM facilities near the site. The existing right of way and shallow depth of storm system does not allow for a new public vegetated SWM facility. A Private vegetated SWM facility is proposed for the site. Stormwater runoff from the majority of the site will be managed for water quality and quantity via a flow-through stormwater basin with orifice flow control. Runoff from 17,360 sf of proposed impervious area and 40,133 sf of pervious area will be directed to the basin. The remainder of the site cannot be routed to the stormwater basin for grading reasons; This area is largely landscaped around the perimeter of the site but also includes 1,842 sf of site walkway, which will drain to landscape, and 1,366 sf of asphalt paving for access to single family residential homes with driveway access through the site.

The remaining that can be collected is the access road from Canyon Lane and consists of 2,064 sf of impervious asphalt. For this area, a street-side LIDA Swale/Planter is not possible due to site the shallow connection point for the storm system and critical grading needed to provide an accessible pedestrian entrance to the park. Therefore, a fee in lieu of providing water quantity control is requested. For water quality, a private proprietary treatment facility is proposed.

Analysis

Computation Methods & Software

HydroCAD software was used to develop the Santa Barbara Urban Hydrograph (SBUH), Type 1A storm for the peak-flow matching detention and water quality design, in accordance with the Beaverton Engineering and Design Manual and Table 4-6 and 4-7 of the CWS standards to analyze the stormwater runoff from the project site.

Curve Numbers A CN of 79 was used for all pre-developed pervious surfaces. A CN of 75 was used for all pre-developed impervious areas. Post-developed Curve Numbers (CN) of 98 and 79 were used for impervious and landscaped areas.

Time of Concentration A T_c of 22.6 minutes was calculated using HydroCAD for pre-developed on-site conditions. The calculation assumed a 300-foot flow path of sheet flow at a 4.1% slope over short grass with a Manning’s coefficient of 0.15 and a 245-foot shallow concentrated flow at a 4.9% slope over short grass. A T_c of 10 minutes was chosen for the post-developed condition.

Water Quantity Flow control (Hydromodification and Conveyance) will be achieved via a flow-through stormwater basin with an orifice flow control structure. The flow control structure will have a 2-inch orifice aligned with the bottom of the rock storage that will control the 2 yr storm. An additional 1.8” orifice will control the remaining storm events. An overflow weir set to 6” of maximum ponding in the stormwater basin will be provided in the flow control manhole. See calculations in appendix B

Water Quality Water Quality for a majority of the site will be provided via a flow through vegetated stormwater basin. The ditch inlet in the basin is set 3” above soil to allow for the entire water quality storm to filter through the growing medium prior to the ditch inlet. 65 percent total phosphorus removal will be provided by filtering the entire water quality storm through the growing medium. A Perfilter® concrete catch basin with a single 12-inch cartridge will be utilized to meet water quality for the narrow access road from Canyon Ln. See calculations in appendix B

Table 1 – Catchment and Facility Summary-Water Quantity

Catchment or Facility ID	Area Type	Area (sf)	Facility	Facility Size
Catchment A	Walkway	17,360	Vegetated Non-Structural Flow-Through Basin	550 sf (bottom area)
	Pervious/Landscape	40,133		
SUBTOTAL		57,493		
Catchment B	Vehicular Paving	2,064	Fee in Lieu	
Catchment C	Walkway & Vehicular	3,208	Draining to landscape Not collected	
	Pervious/Landscape	36,031		
TOTAL		84,217		

Table 2 – Pre vs. Post Construction Flow Rates

Catchment or Facility ID	Peak Flow Discharge Rate (cfs)							
	2 yr		5 yr		10 yr		25 yr	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Catchment A	0.134	0.134	0.239	0.221	0.306	0.287	0.399	0.388

Engineering Conclusions

Water Quantity

The project will use a flow-through stormwater basin with a flow control orifice structure to meet quantity control for Hydromodification and Conveyance as required by the Beaverton Engineering Design Manual and Clean Water Services

Water Quality

The project will use a flow-through stormwater basin and a Perfilter® catch basin to meet water quality requirements from the Beaverton Engineering Design Manual and Clean Water Services

Conveyance

Calculations have been performed using HydroCAD to determine the stormwater conveyance design for the development based on Clean Water Services standards.

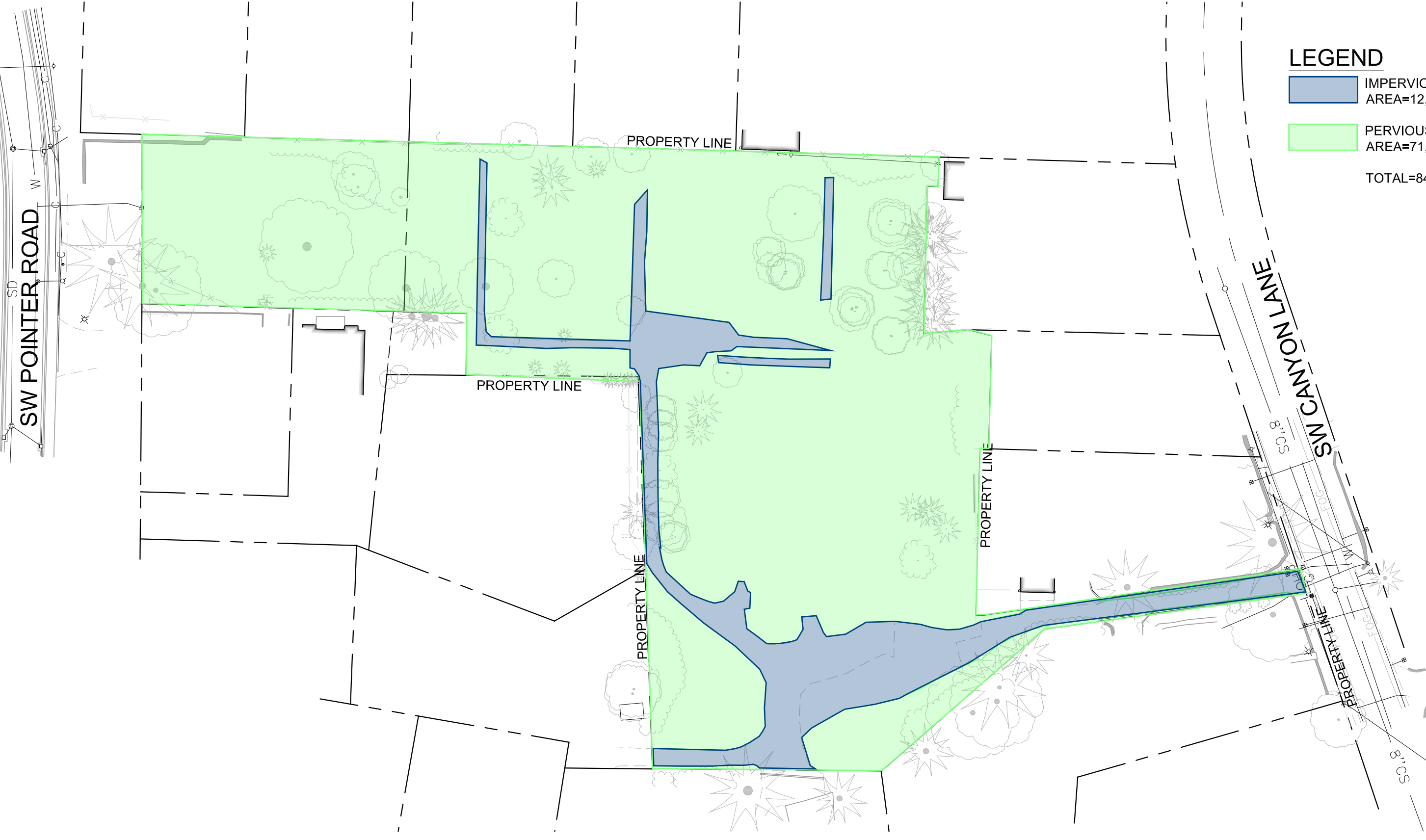
Appendix A - Stormwater Facility Details / Exhibits

Pre-Developed Impervious Area Map
Post-Developed Impervious Area Map
Utility Plan
Stormwater Facility Details

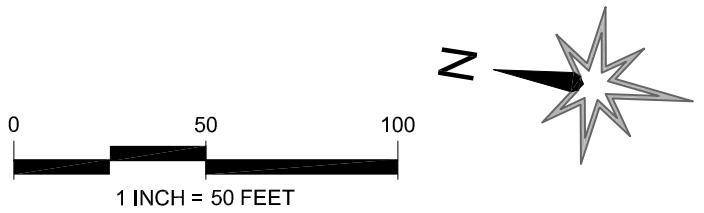
LEGEND

- IMPERVIOUS
AREA=12,580 SF
- PERVIOUS/LANDSCAPE
AREA=71,637

TOTAL=84,217 SF



PRE-DEVELOPED IMPERVIOUS AREA MAP

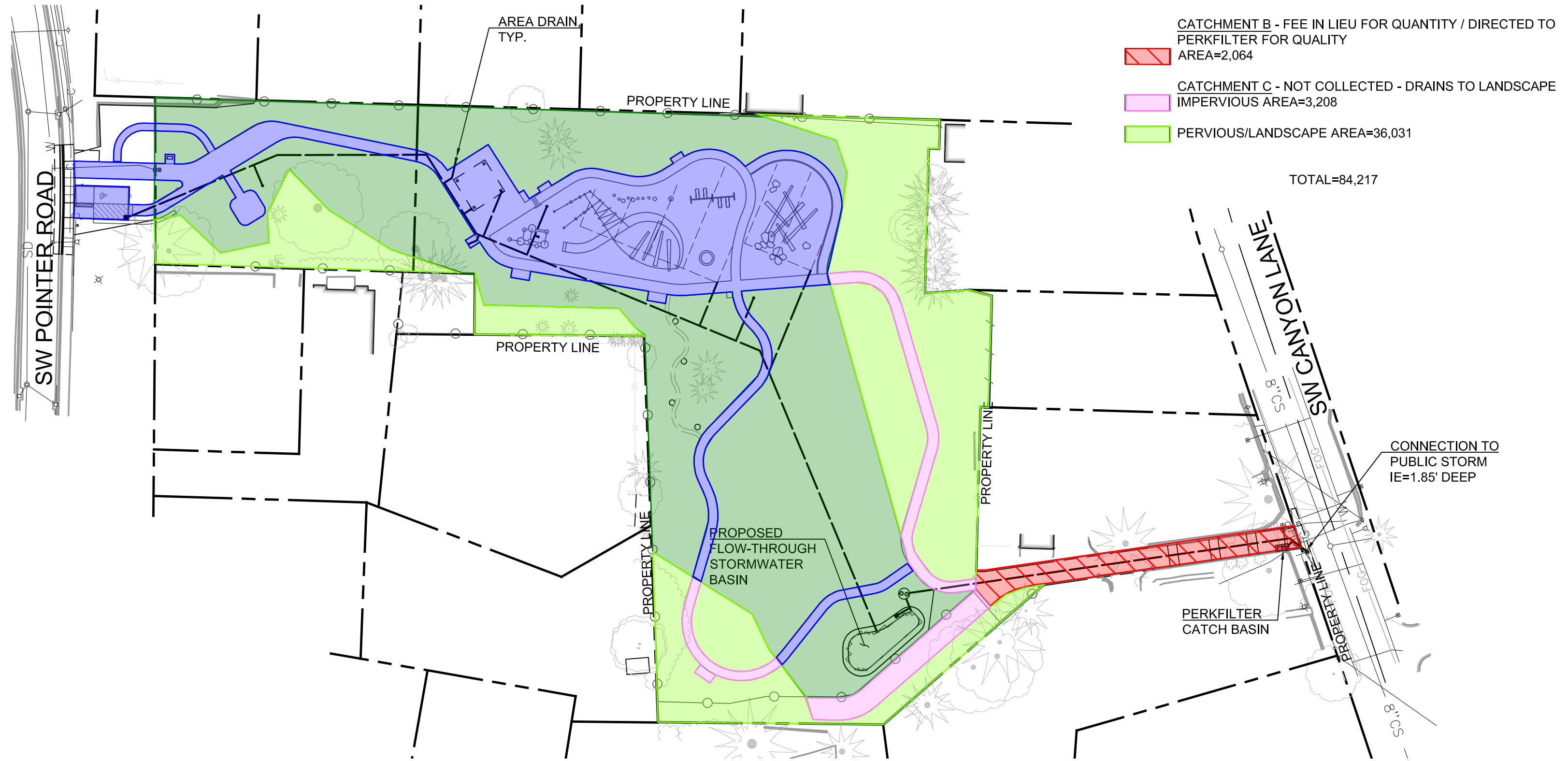


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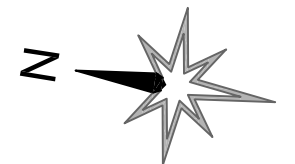
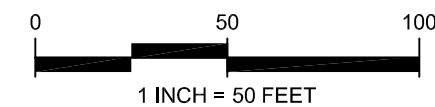
█ CATCHMENT A-COLLECTED AND ROUTED TO BASIN
 IMPERVIOUS AREA=17,360
█ PERVIOUS/LANDSCAPE AREA=40,133
 SUBTOTAL=57,493

▨ CATCHMENT B - FEE IN LIEU FOR QUANTITY / DIRECTED TO PERKFILTER FOR QUALITY
 AREA=2,064

█ CATCHMENT C - NOT COLLECTED - DRAINS TO LANDSCAPE
 IMPERVIOUS AREA=3,208
█ PERVIOUS/LANDSCAPE AREA=36,031
 TOTAL=84,217

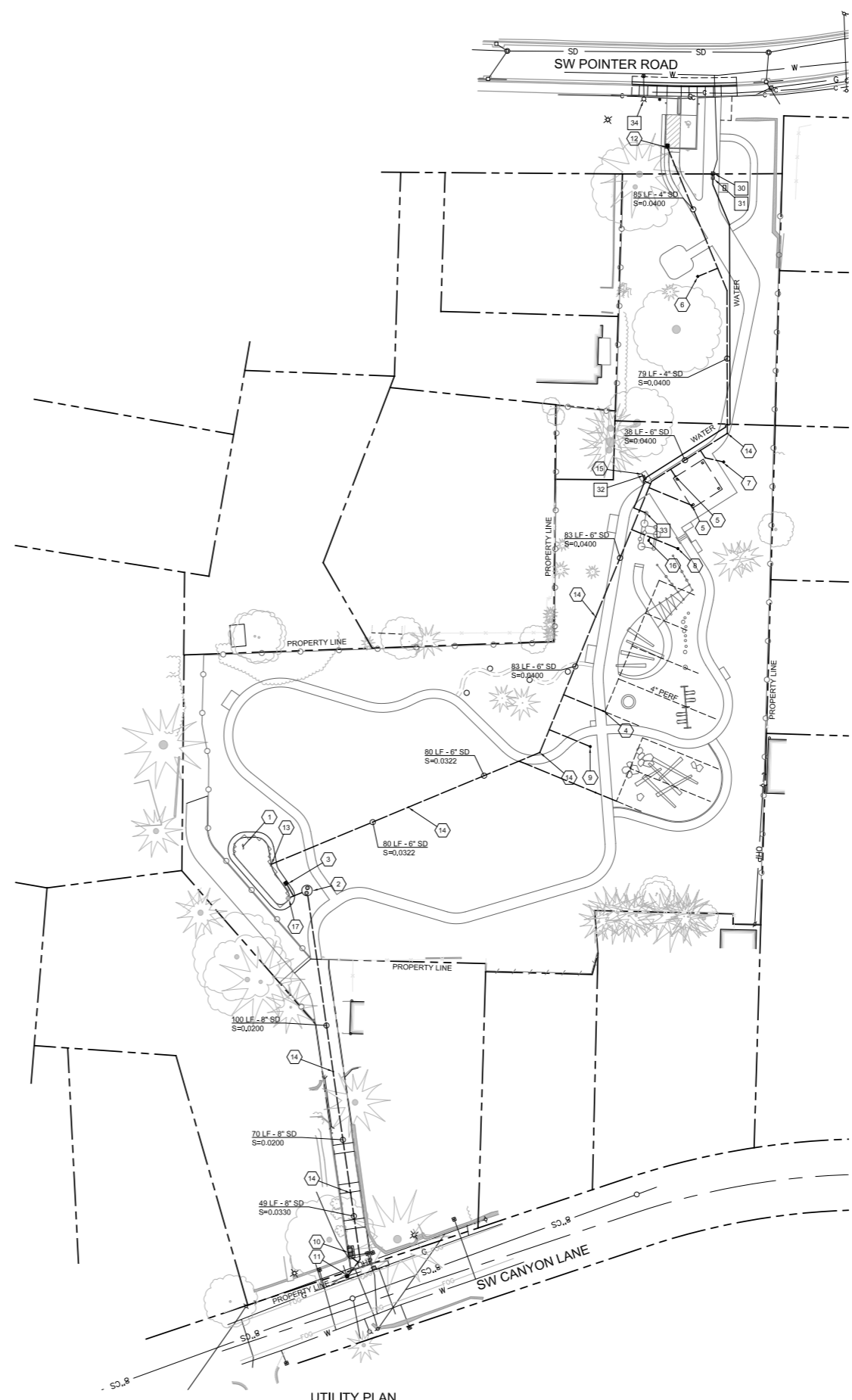


POST-DEVELOPED IMPERVIOUS AREA MAP



NOT FOR
CONSTRUCTION

POINTER ROAD PARK
7360 SW POINTER ROAD
BEAVERTON, OR 97225



GENERAL NOTES

- PERFORATED PIPE TO CONNECT TO SOLID STORM PIPE WITH A CLEANCHECK BACKWATER VALVE.

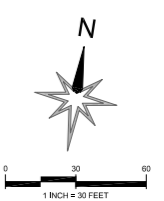
STORMWATER NOTES

- STORMWATER BASIN PER DETAIL 1/C3.00
BOTTOM AREA=550 SF
FG=625.08
- OUTFLOW CONTROL STRUCTURE PER DETAIL 2/C3.00
RIM=626.75
WEIR ELEVATION=625.58
1.8" ORIFICE=621.80
2" ORIFICE=620.08
- DITCH INLET PER DETAIL 6/C3.00
RIM=625.33
IE=623.17
- INSTALL CLEANCHECK BACKWATER VALVE AT CONNECTION TO SOLID PIPE FROM PERFORATED PIPE UNDER PLAY AREA
- DOWNSPOUT CONNECTION FROM PICNIC SHELTER
- AREA DRAIN WITH ATRIUM GRATE PER DETAIL 3/C3.00
RIM=646.75
IE=643.25
- AREA DRAIN WITH FLAT GRATE PER DETAIL 3/C3.00
RIM=642.00
IE=639.00
- AREA DRAIN WITH ATRIUM GRATE PER DETAIL 3/C3.00
RIM=638.87
IE=636.87
- AREA DRAIN WITH ATRIUM GRATE PER DETAIL 3/C3.00
RIM=637.50
IE=634.50
- OLDCASTLE PERKFILTER CATCH BASIN WITH (1) 12" PERKFILTER CARTRIDGE
RIM=617.36
IE=615.36
- STORM CONNECTION TO PUBLIC CATCH BASIN
RIM=616.89
EX. 6" IE, IN (NW)=615.84
NEW 6" IE, IN (N)=615.09
EX. 8" IE, IN (NE)=615.09
EX. 8" IE, OUT (SW)=615.04
- CATCH BASIN PER DETAIL 5/C3.00
RIM=649.52
IE=645.52
- STORMWATER DISCHARGE TO PLANTER
IE=625.08
- STORMWATER CLEANOUT TO GRADE PER DETAIL 7/C3.00
- STORM CONNECTION FROM WATER FOUNTAIN
- STORM CONNECTION FROM WATER PLAY
- CUDO ACCESS RISER
RIM=625.08
IE=620.58
- 1104 CF CUDO DETENTION SYSTEM PER DETAIL 9/C3.00
TOP=622.58
BOTTOM=620.58

DOMESTIC WATER NOTES

- EXISTING WATER METER
- NEW "X" DOMESTIC WATER BACKFLOW INSTALLED BEHIND EXISTING METER
- 3/4" WATER CONNECTION TO DRINKING FOUNTAIN
- "X" WATER CONNECTION TO WATER PLAY AREA
- PROTECT EXISTING HYDRANT

UTILITY PLAN
SCALE: 1"=30'



REVISIONS

100% DESIGN DEVELOPMENT
NOVEMBER 8, 2023

DRAWN BY BAH
CHECKED BY MSW

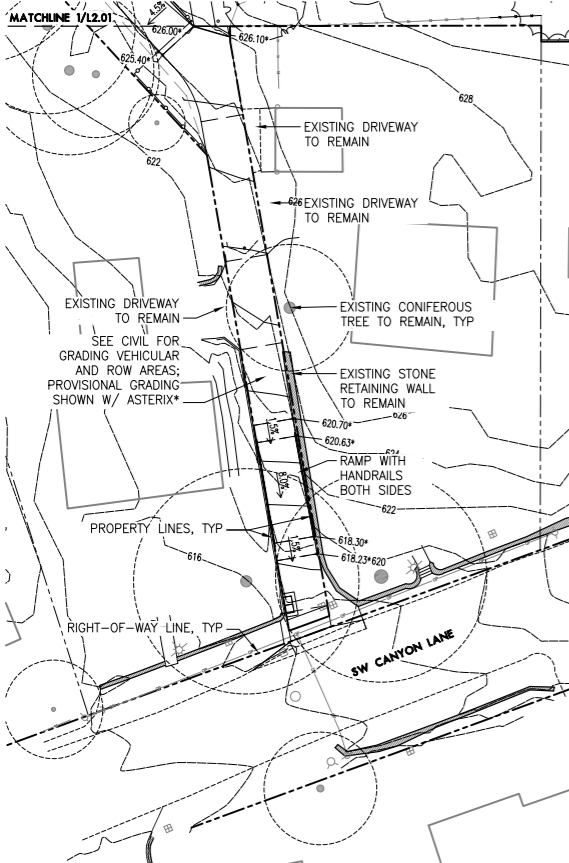
SCALE 1"=30'

UTILITY PLAN

C2.00

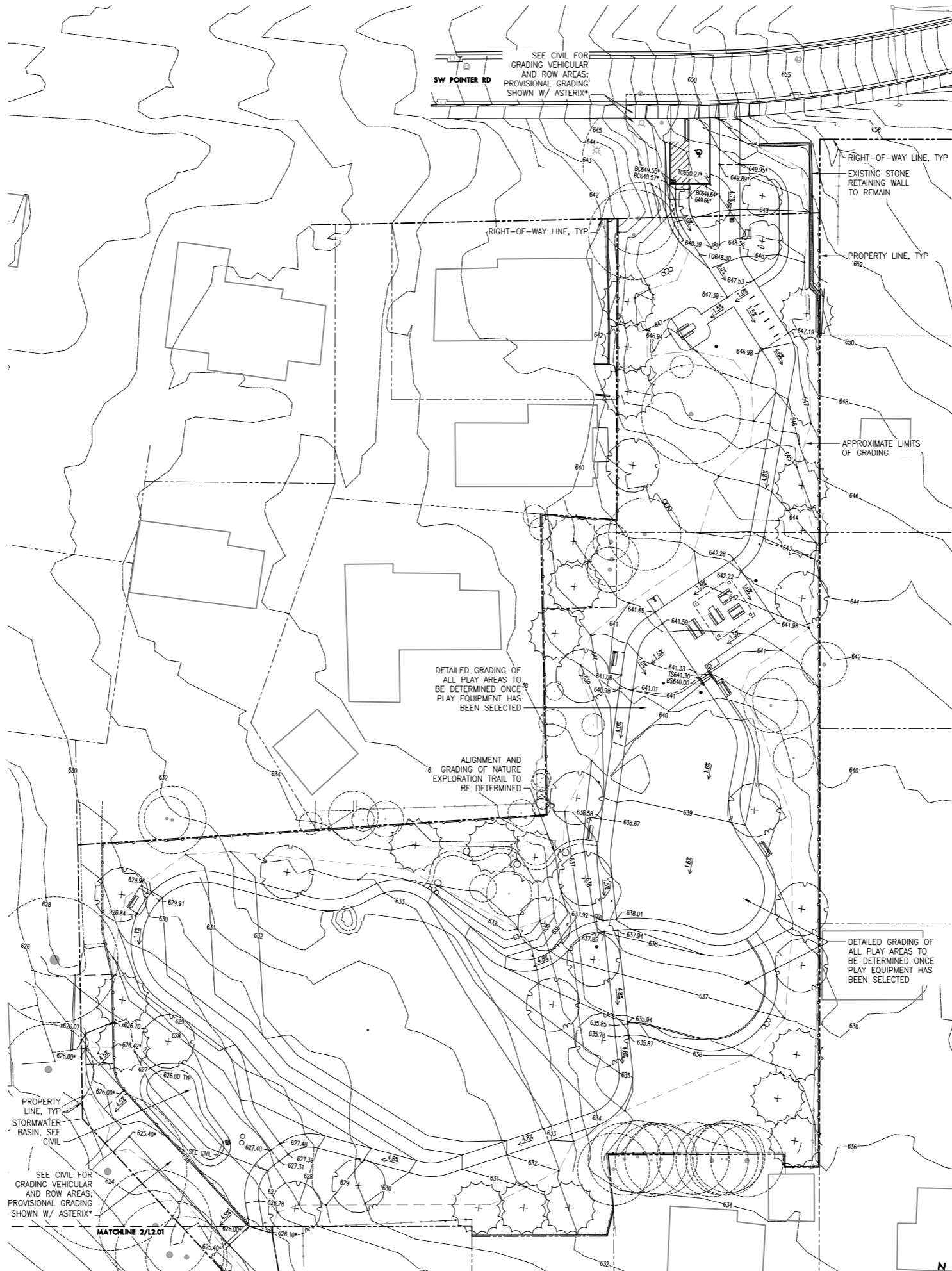
DD GRADING COORDINATION NOTES:

- A. THE INTENT IS TO BALANCE CUT AND FILL ON SITE. FINAL GRADING WILL DEPEND IN LARGE PART ON PLAY AREA DESIGN AND STORMWATER FACILITY REQUIREMENTS.**
- B. CIVIL WILL BE RESPONSIBLE FOR GRADING ALL VEHICULAR AREAS AND AREAS WITHIN THE RIGHT-OF-WAY. GRADES SHOWN ON THIS PLAN ARE FOR COORDINATION.**
- C. PLAY AREA GRADES WILL DEPEND IN PART ON SPECIFIC PLAY EQUIPMENT SELECTIONS, STILL TO BE DETERMINED.**



2 GRADING PLAN - SOUTH DRIVEWAY

SCALE: 1" = 20'



1 GRADING PLAN - MAIN SITE

SCALE: 1" = 20'



LEGEND

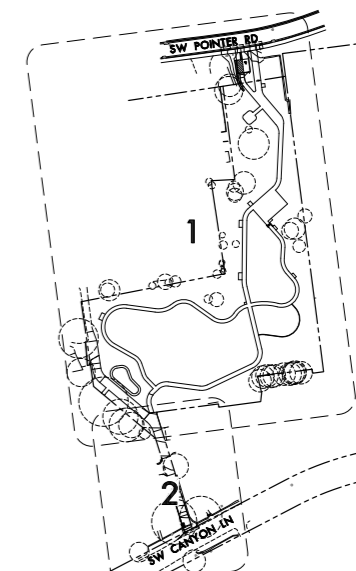
- PROPERTY LINE/RIGHT-OF-WAY
- - - - - EXISTING 1' CONTOUR
- - - - - PROPOSED 1' CONTOUR
- - - - - GRADE BREAK LINE
- 626.25x EXISTING SPOT ELEVATION
- 626.25 PROPOSED SPOT ELEVATION
- 626.25* DRAFT SPOT ELEVATION (CIVIL SCOPE)
- 4.85 PERCENTAGE OF SLOPE
- ← DIRECTION OF SLOPE
- PROPOSED CATCHBASIN, SEE CIVIL
- EXISTING CATCHBASIN
- ⊙ EXISTING MANHOLES, TYPE VARIES
- ⊕ EXISTING WATER METER AND HYDRANT
- ⊗ EXISTING OVERHEAD POWER AND POLE
- ⊕ PROPOSED TREES
- ⊗ EXISTING TREES TO REMAIN

GRADING NOTES

1. THIS PLAN IS BASED ON A SURVEY BY COMPASS ENGINEERING DATED JULY 2022. 2' CONTOURS ON ADJACENT PROPERTIES DERIVED FROM METRO GIS DATA. NOTIFY OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES IDENTIFIED ON SITE RELATED TO SURVEY INFORMATION PRIOR TO INSTALLATION.
2. PROTECT EXISTING VEGETATION TO REMAIN. SEE SHEET L0.01 AND SPECIFICATION SECTION 015639 FOR FENCING AND OTHER REQUIREMENTS.
3. SEE CIVIL DRAWINGS FOR ALL VEHICULAR AREA IMPROVEMENTS, INCLUDING PAVING, CURBS, DRIVEWAY APRONS, STRIPING AND SIGNAGE, AS WELL AS ANY VEHICULAR AND PEDESTRIAN PAVING IMPROVEMENTS WITHIN THE RIGHT-OF-WAY.
4. SEE CIVIL DRAWINGS FOR STORMWATER AND UNDERGROUND UTILITY INFORMATION.
5. SET STRAIGHT GRADES BETWEEN GIVEN ELEVATIONS UNLESS OTHERWISE INDICATED.
6. GRADE BREAK LINES ARE SHOWN GRAPHICALLY TO ILLUSTRATE DRAINAGE PATTERNS, AND ARE NOT INTENDED TO BE ACTUAL JOINT LINES, UNLESS THEY FALL ON EXPANSION JOINT LOCATIONS.
7. SPOT ELEVATIONS TAKE PRECEDENCE OVER LANDSCAPE CONTOURS.
8. DO NOT DISTURB AREAS NOT TO BE GRADED.
9. ADJUSTMENTS OF SOFT SWALE AREAS ±2" MAY BE NECESSARY TO IMPROVE DRAINAGE. THESE ADJUSTMENTS SHALL BE DONE AT NO COST TO THE OWNER.
10. CONCRETE PAVING ELEVATIONS AT BACK OF CURB TO MATCH TOP OF CURB ELEVATIONS, UNLESS OTHERWISE NOTED, SEE CIVIL DRAWINGS FOR CURB ELEVATIONS.
11. ALL ADA PARKING STALL AND WALKWAYS TO MEET LOCAL, STATE AND FEDERAL ADA REQUIREMENTS. PRIOR TO FORMING HARD SURFACE MATERIALS, CONTRACTOR TO VERIFY GRADES FOR CURB RAMPS AND PARKING LOT SPACES MEET ADA REQUIREMENTS.

ABBREVIATIONS

AD	AREA DRAIN (RIM ELEVATION)	LP	LOW POINT MATCH
BC	BOTTOM OF CURB	ME	MATCH EXISTING GRADE
BW	BOTTOM OF WALL (FINISHED GRADE)	MAX	MAXIMUM
CB	CATCH BASIN (RIM ELEVATION)	MIN	MINIMUM
EL	ELEVATION	RIM	RIM ELEVATION
EQ	EQUAL	SIM	SIMILAR
EX	EXISTING	TC	TOP OF CURB
FS	FINISH SURFACE	TF	TOP OF FOOTING
HP	HIGH POINT	TW	TOP OF WALL (FINISHED)
IE	INVERT ELEVATION	TYP	TYPICAL



KEY PLAN

SCALE: 1" = 100'

NOT FOR CONSTRUCTION

POINTER ROAD PARK
7360 SW POINTER ROAD
BEAVERTON, OR 97225

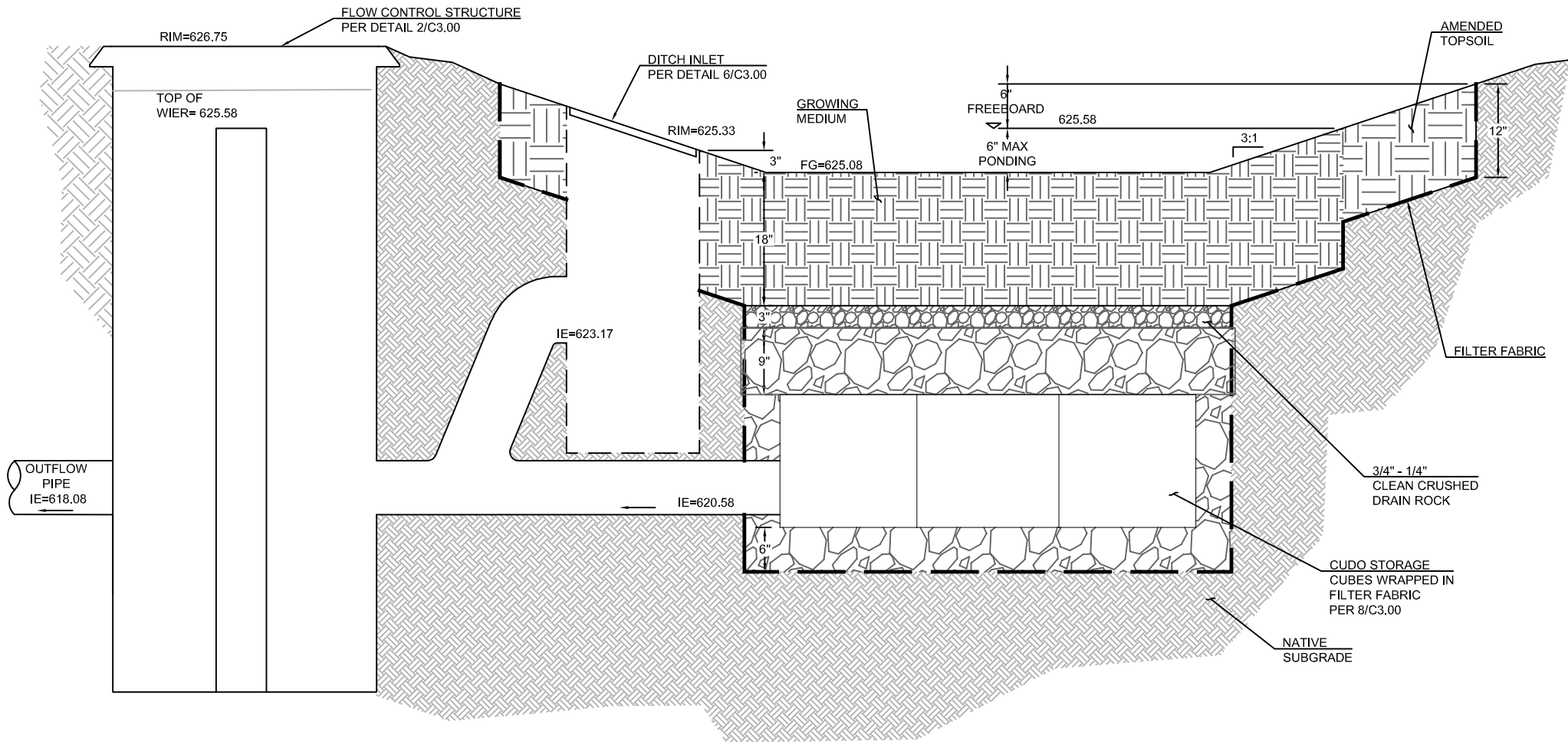
REVISIONS

100% DESIGN DEVELOPMENT
NOVEMBER 8, 2023

DRAWN BY K5
CHECKED BY KL

SCALE 1"=20'

GRADING PLAN



NOTES

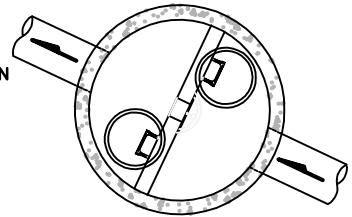
1. PLANTING PER LANDSCAPE PLANS.
2. TREATMENT AREA SHALL HAVE HIGH DENSITY JUTE OR COCONUT MATTING OVER 18" MINIMUM OF GROWING MEDIUM, OR BASE STABILIZATION METHOD AS APPROVED BY THE DISTRICT.
3. CONSTRUCT ROCK SPLASH PAD AT OUTFALL.
4. ATTACH IMPERMEABLE LINER TO CONCRETE 2" BELOW TOP OF SOIL. IMPERMEABLE LINER SHALL BE 30 MIL MINIMUM. PROVIDE WATERTIGHT PENETRATION THROUGH IMPERMEABLE LINER FOR OUTFLOW FROM OVERFLOW DRAIN.

1 FLOW-THROUGH STORMWATER BASIN

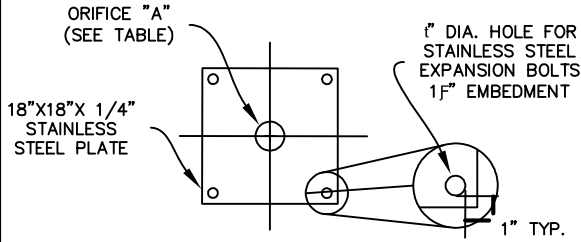
NTS

NOTES:

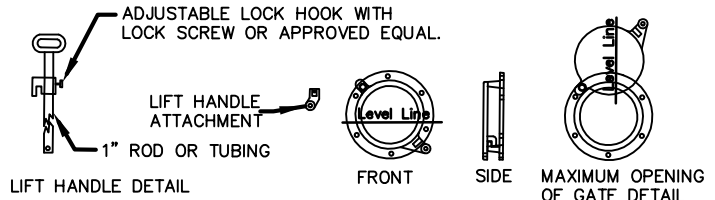
1. BAFFLE WALL SHALL HAVE #4 BAR AT 12" SPACING EACH WAY.
2. PRECAST BAFFLE SHALL BE KEYPED AND GROUTED IN PLACE. JOINT BETWEEN CONCRETE BAFFLE AND MANHOLE WALL SHALL BE WATERTIGHT.
3. UPPER FLOW ORIFICE SHALL BE ALUMINUM, ALUMINIZED STEEL OR TREATMENT 1 GALVANIZED STEEL.
4. FRAME AND LADDER OR STEPS ARE TO BE OFFSET SO THAT SHEAR GATE IS VISIBLE FROM THE TOP; CLIMB-DOWN SPACE IS CLEAR OF RISER AND GATE; FRAME IS CLEAR OF CURB.
5. RESTRICTOR PLATE WITH ORIFICE AS SPECIFIED IN THE CONTRACT. OPENING IS TO BE CUT ROUND AND SMOOTH. NEOPRENE GASKET SHALL BE INSTALLED BETWEEN THE ORIFICE PLATE AND CONCRETE BAFFLE TO PROVIDE A WATERTIGHT SEAL.
6. SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26M AND ASTM B 275.
7. DESIGNATION Zg32A OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B. LIFT HANDLE MAY BE SOLID ROD OR HOLLOW TUBING WITH ADJUSTABLE HOOK AS REQUIRED. NEOPRENE RUBBER GASKET REQUIRED BETWEEN RISER MOUNTING FLANGE AND GATE FLANGE. MATING SURFACES OF LID AND BODY SHALL BE MACHINED FOR PROPER FIT. FLANGE MOUNTING BOLTS SHALL BE 3/8" X 16 X 3" LG SS REDHEADS.
8. SHEAR GATE MAXIMUM OPENING SHALL BE CONTROLLED BY LIMITED HINGE MOVEMENT, STOP TAB OR SOME OTHER DEVICE.
9. ALTERNATE SHEAR GATES DESIGNS ARE ACCEPTABLE, IF MATERIAL SPECIFICATIONS ARE MET AND FLANGE BOLT PATTERN MATCHES.
10. ALL MANHOLE FLAT TOPS SHALL CONFORM TO ASTM C-478 AND ARE DESIGNED TO MEET H-20 TRAFFIC LOADING.



PLAN



RESTRICTOR PLATE, ORIFICE



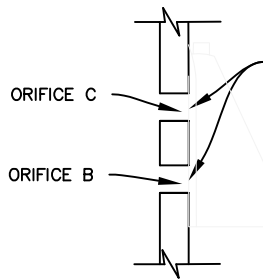
SHEAR GATE
MANUFACTURED BY KENNEDY VALVE OR EQUAL

INSTALLATION NOTE:

POSITION HOOD SUCH THAT BOTTOM FLANGE IS MIN 2" BELOW THE ORIFICE B INVERT.

ONE SNOOT MAY BE USED FOR BOTH ORIFICE C AND B.

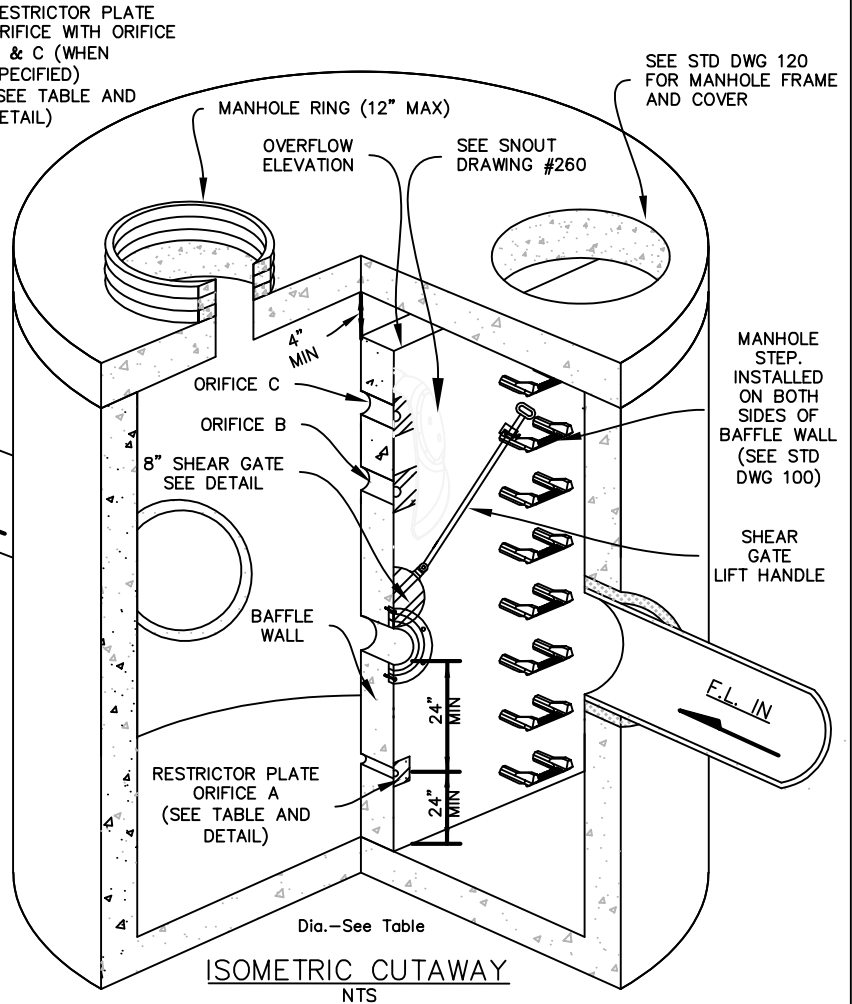
IT MAY BE NECESSARY TO USE TWO SNOOTS ON OFFSET ORIFICES TO MEET PLAN ELEVATION.



SNOOT DETAIL

FLOW CONTROL STRUCTURE TABLE

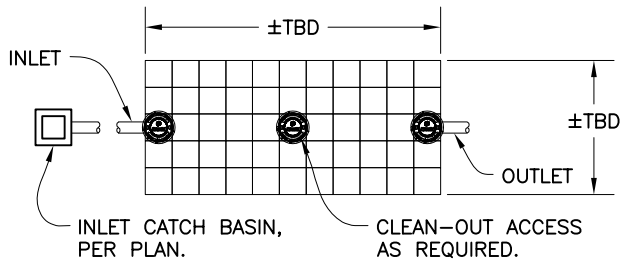
Diameter Of Manhole (In.)	60" MIN	60"
F.L. (In)		620.08
F.L. (Out)		620.08
Outlet Pipe Diameter (In.)		8"
Number Of Orifice		2
Orifice A Elevation		620.08
Diameter Of Orifice A (In.)		2.00"
Orifice B Elevation		621.80
Diameter Of Orifice B (In.)		1.80"
Orifice C Elevation		
Diameter Of Orifice C (In)		
Overflow Elevation		625.58
Rim Elevation		626.75



ISOMETRIC CUTAWAY
NTS

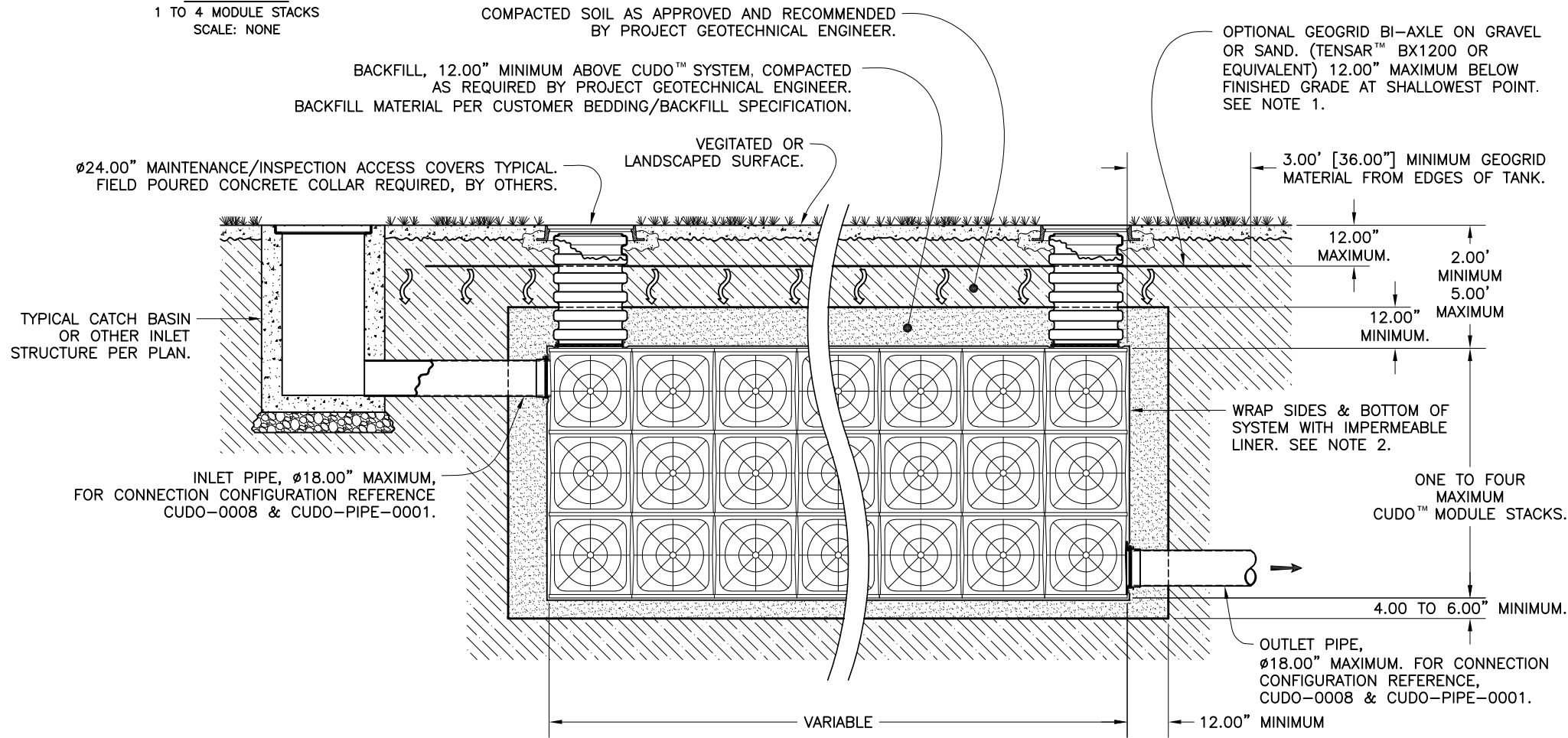
FLOW CONTROL STRUCTURE
DETAIL





PLAN VIEW

1 TO 4 MODULE STACKS
SCALE: NONE



SECTION / CUTAWAY VIEW

SCALE: NONE

- NOTES:
1. INSTALL GEOGRID LAYER, (TENSAR™ BX1200 OR EQUIVALENT) IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
 2. SYSTEM ENCASED ENTIRELY WITH 36 MIL REINFORCED POLYETHYLENE IMPERMEABLE LINER OR EQUIVALENT AS REQUIRED.
 3. FIELD POURED CONCRETE COLLAR REQUIRED AROUND ALL ACCESS COVERS & HATCHES, BY OTHERS.
 4. ALL EXTERNAL PIPING & ANGLES BY OTHERS. REFER TO PLANS.



CUDO®
Stormwater Detention
System - Typical Installation Detail
Vegetated Permeable Area



Oldcastle®
Stormwater Solutions

7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com
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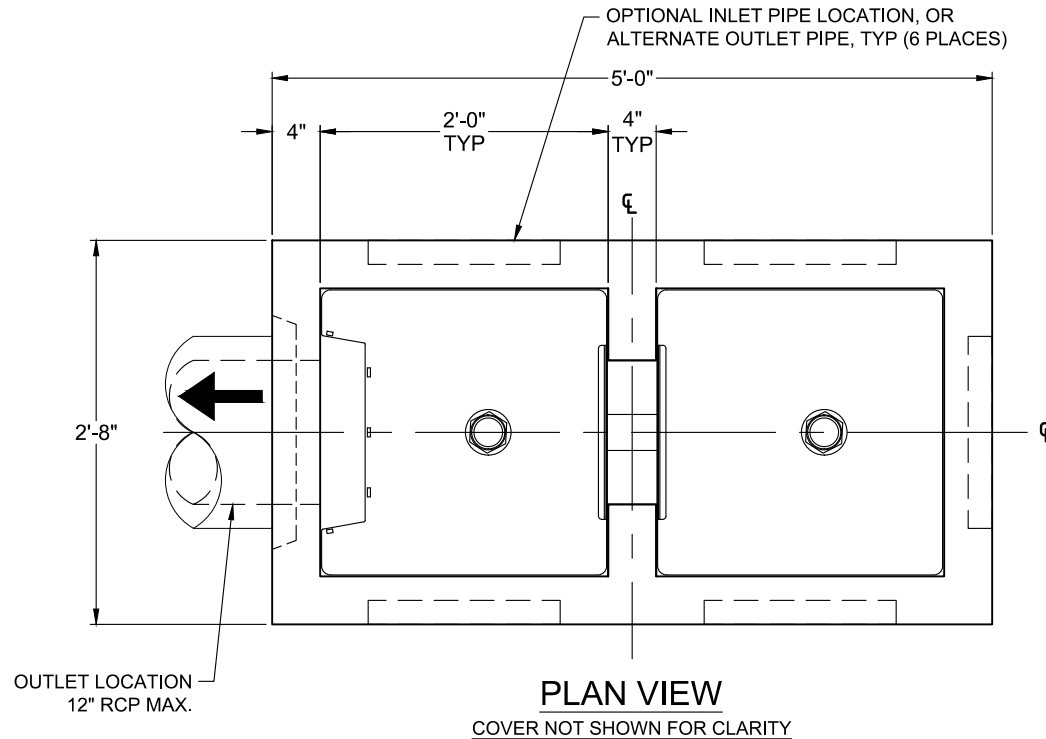
DRAWING NO. CUDO-DT-0003	REV C	ECO ECO-0154 ZHD 2/6/18	DATE JPR 7/21/08	SHEET 1 OF 1
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SITE SPECIFIC DATA				
Structure ID	ID			
Treatment Flow Rate (cfs)	-			
Peak Flow Rate (cfs)	1.3 cfs			
Rim Elevation	617.36			
Pipe Data	Pipe Location	Pipe Size	Pipe Type	Invert Elevation
Outlet	SOUTH	12"	PVC	615.36
Inlet	XXX	XX"	XXX	X.XX'
Notes: -				

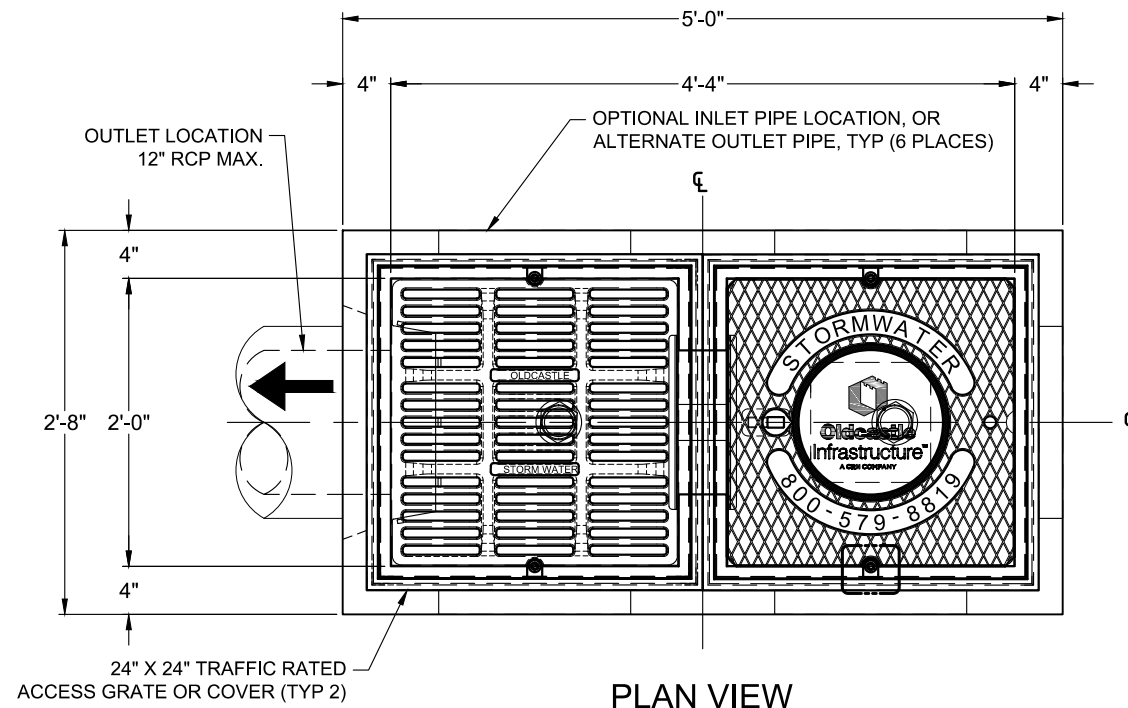
PERFORMANCE SPECIFICATIONS	
Treatment Flow Capacities:*	
NJDEP 80% Removal, 75 micron	0.054 cfs
WA Ecology GULD - Basic & Phosphorus	0.030 cfs
*Contact Oldcastle for alternative treatment flow capacities.	

NOTES:

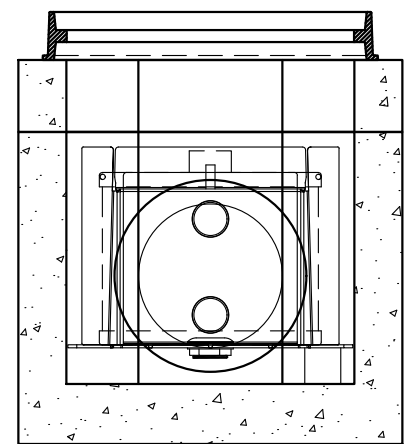
- DESIGN LOADINGS:
 - AASHTO HS-20-44 W/ IMPACT.
 - STANDARD DESIGN FILL: MAX TOP OF STRUCTURE.
 - ASSUMED WATER TABLE: BELOW STRUCTURE.
 - DRY LATERAL EARTH PRESSURE (EFP) = 45 PCF.
 - LATERAL LIVE LOAD SURCHARGE = 80 PSF (APPLIED TO 8' BELOW GRADE).
 - NO LATERAL SURCHARGE FROM ADJACENT BUILDINGS, WALLS, PIERS, OR FOUNDATIONS.
- CONCRETE 28 DAY COMPRESSIVE STRENGTH SHALL BE 5,000 PSI MINIMUM.
- STEEL REINFORCEMENT: REBAR, ASTM A-615 OR A-706, GRADE 60.
- CEMENT: ASTM C-150 SPECIFICATION.
- REQUIRED ALLOWABLE SOIL BEARING PRESSURE = 2,500 PSF. CONTRACTOR RESPONSIBLE TO ENSURE ADEQUATE BEARING SURFACE IS PROVIDED (I.E. COMPACTED AND LEVEL PER PROJECT SPECIFICATIONS).
- REFERENCE STANDARD:
 - ASTM C 890
 - ASTM C 913
 - ACI 318-14
- OUTLET HOLES WILL BE FACTORY CORED/CAST PER PLANS/CUSTOMER REQUIREMENTS. OUTLET LOCATIONS CAN BE CHANGED.
- MAXIMUM PICK WEIGHT (COMBINED WEIGHT OF BASE, CARTRIDGE & ACCESS COVER) = TBD.
- FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT OLDCASTLE INFRASTRUCTURE.



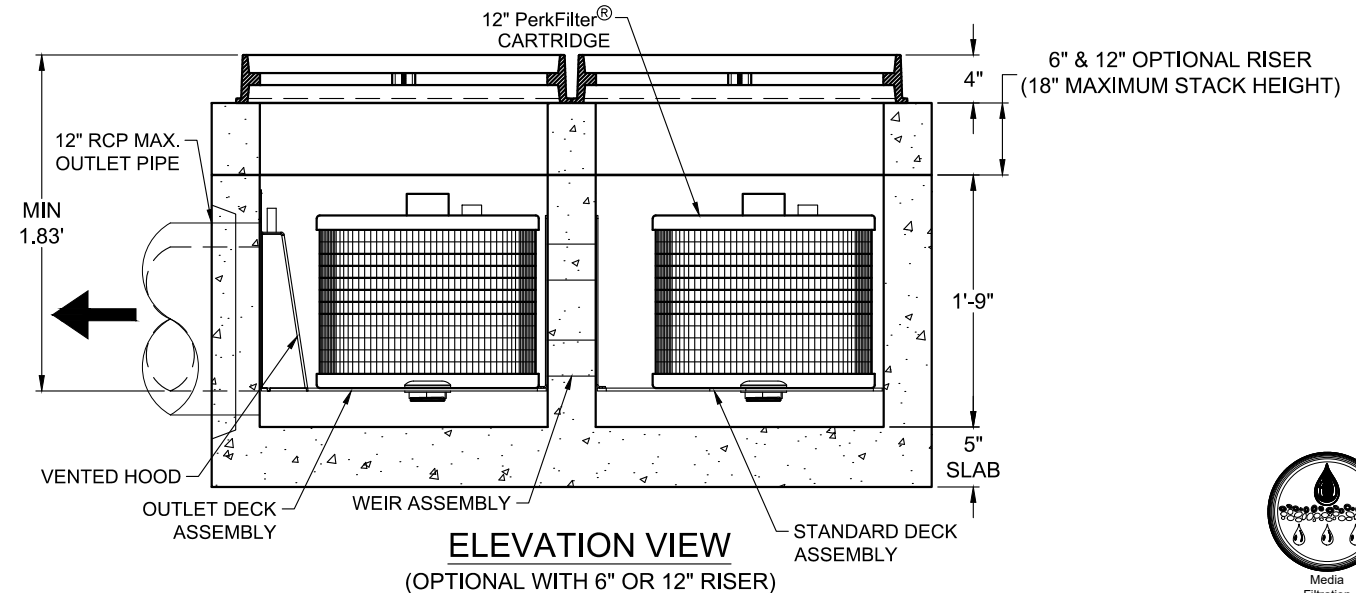
PLAN VIEW
COVER NOT SHOWN FOR CLARITY



PLAN VIEW



LEFT END VIEW
(OPTIONAL WITH 6" OR 12" RISER)



ELEVATION VIEW
(OPTIONAL WITH 6" OR 12" RISER)

**- PRELIMINARY -
NOT FOR CONSTRUCTION**



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PerkFilter® Concrete Catch Basin 12" Cartridge					
CUSTOMER					
PROJECT NAME					
DATE	MFG	DRAWN	ENGINEER	CHECKED	SALES ORDER
--/--/22	-	-	-	-	-
SHEET NAME				REVISION	SHEET
Specifier Drawing				-	1 OF 1
PFCB-25-1x12				REV DATE	



Appendix B - Calculations

Water Quantity HydroCAD Report
Water Quality HydroCAD Report
Perkfilter® Calculations

Pointer Rd Park

Prepared by Vega Civil Engineering, LLC

HydroCAD® 10.00-26 s/n 10966 © 2020 HydroCAD Software Solutions LLC

Type IA 24-hr 2-yr Rainfall=2.50"

Printed 4/26/2024

Page 1

Summary for Subcatchment 1S: Pre-Developed

Runoff = 0.134 cfs @ 8.22 hrs, Volume= 3,775 cf, Depth= 0.79"

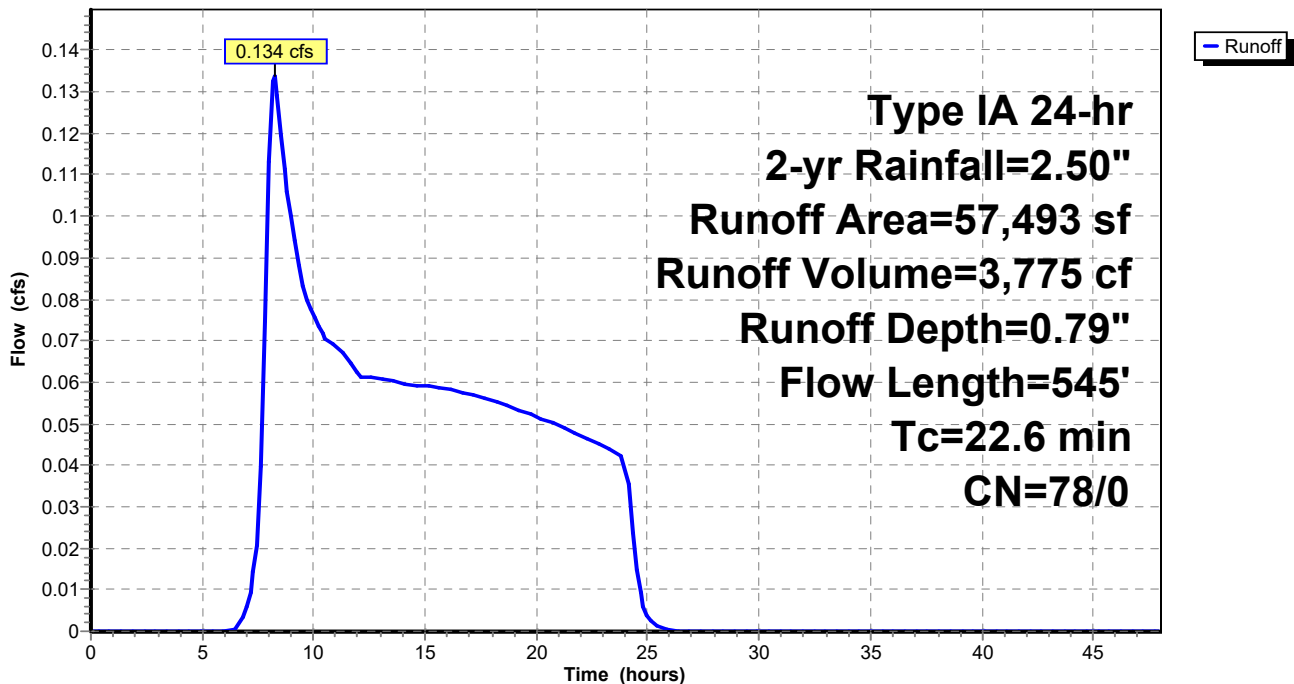
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 2-yr Rainfall=2.50"

Area (sf)	CN	Description
8,845	75	per CWS
48,648	79	Pasture/grassland/range, Fair, HSG C
57,493	78	Weighted Average
57,493	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	300	0.0412	0.25		Sheet Flow, Sheet flow Grass: Short n= 0.150 P2= 2.50"
2.6	245	0.0490	1.55		Shallow Concentrated Flow, Shallow Concentrated Flow Short Grass Pasture Kv= 7.0 fps
22.6	545	Total			

Subcatchment 1S: Pre-Developed

Hydrograph



Pointer Rd Park

Prepared by Vega Civil Engineering, LLC

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Type IA 24-hr 2-yr Rainfall=2.50"

Printed 4/26/2024

Page 2

Summary for Subcatchment 2S: Post-Developed

Runoff = 0.340 cfs @ 8.04 hrs, Volume= 6,086 cf, Depth= 1.27"

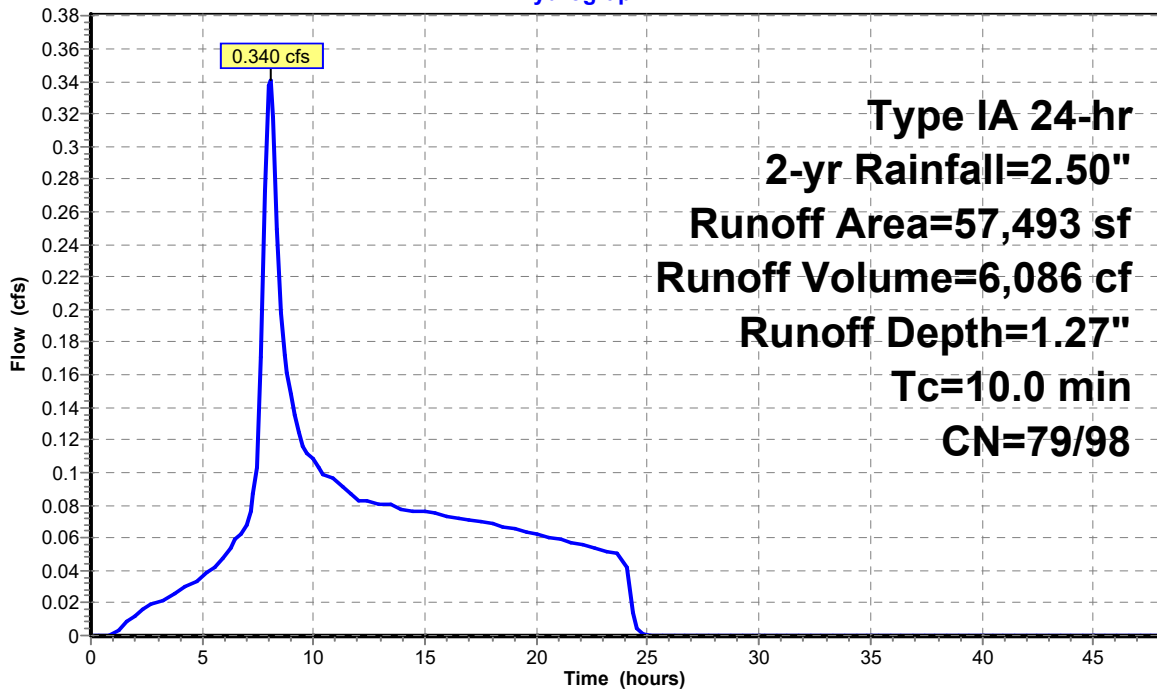
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 2-yr Rainfall=2.50"

	Area (sf)	CN	Description
*	17,360	98	
	40,133	79	50-75% Grass cover, Fair, HSG C
	57,493	85	Weighted Average
	40,133	79	69.81% Pervious Area
	17,360	98	30.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Developed

Hydrograph



Runoff

Pointer Rd Park

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Type IA 24-hr 2-yr Rainfall=2.50"

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Page 3

Summary for Pond 3P: Basin

Inflow Area = 57,493 sf, 30.19% Impervious, Inflow Depth = 1.27" for 2-yr event
 Inflow = 0.340 cfs @ 8.04 hrs, Volume= 6,086 cf
 Outflow = 0.134 cfs @ 9.20 hrs, Volume= 6,086 cf, Atten= 61%, Lag= 70.0 min
 Primary = 0.134 cfs @ 9.20 hrs, Volume= 6,086 cf

Routing by Stor-Ind method, Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
 Peak Elev= 621.80' @ 9.20 hrs Surf.Area= 550 sf Storage= 720 cf

Plug-Flow detention time= 48.0 min calculated for 6,064 cf (100% of inflow)
 Center-of-Mass det. time= 48.0 min (816.1 - 768.1)

Volume	Invert	Avail.Storage	Storage Description
#1	620.08'	2,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.08	550	0.0	0	0
620.58	550	30.0	83	83
622.58	550	95.0	1,045	1,128
623.58	550	30.0	165	1,293
625.08	550	20.0	165	1,458
626.08	898	100.0	724	2,182

Device	Routing	Invert	Outlet Devices
#1	Primary	620.08'	2.000" Vert. Orifice/Grate C= 0.600
#2	Primary	621.80'	1.800" Vert. Orifice/Grate C= 0.600
#3	Primary	625.58'	12.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.134 cfs @ 9.20 hrs HW=621.80' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 0.134 cfs @ 6.16 fps)
- 2=Orifice/Grate (Controls 0.000 cfs)
- 3=Orifice/Grate (Controls 0.000 cfs)

Pointer Rd Park

Prepared by Vega Civil Engineering, LLC

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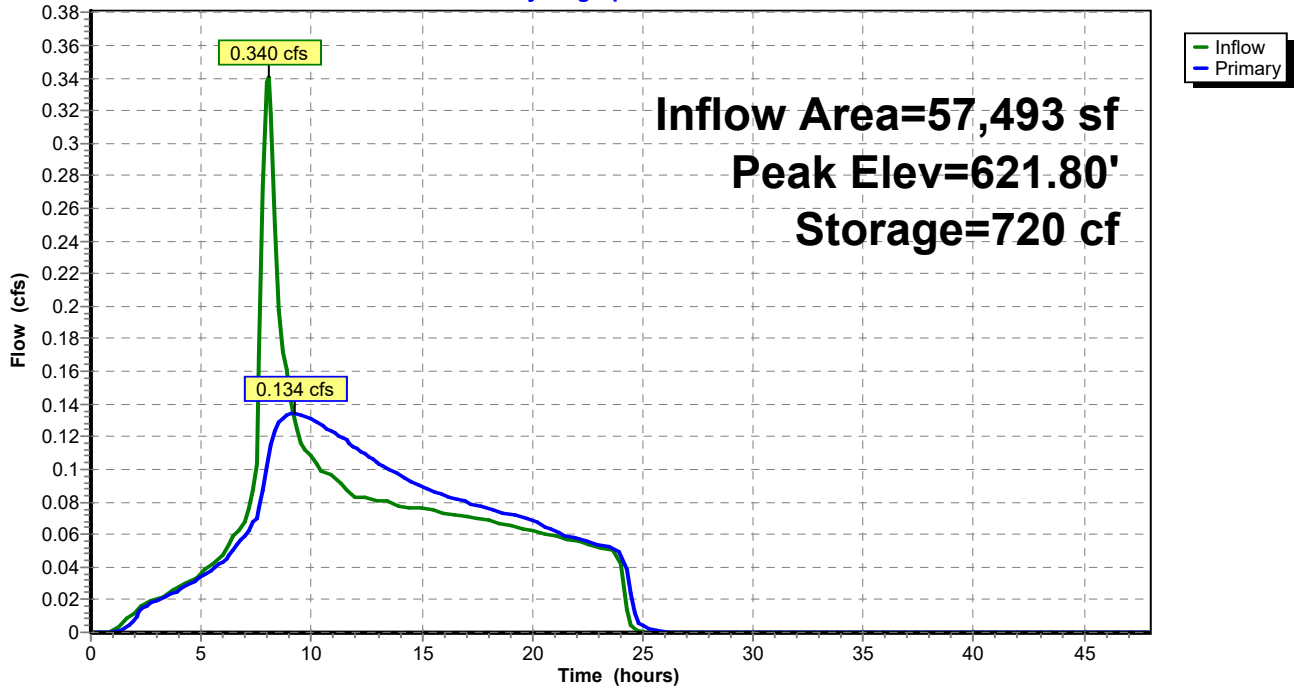
Type IA 24-hr 2-yr Rainfall=2.50"

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Page 4

Pond 3P: Basin

Hydrograph



Pointer Rd Park

Prepared by Vega Civil Engineering, LLC

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Type IA 24-hr 5-yr Rainfall=3.10"

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Page 5

Summary for Subcatchment 1S: Pre-Developed

Runoff = 0.239 cfs @ 8.19 hrs, Volume= 5,752 cf, Depth= 1.20"

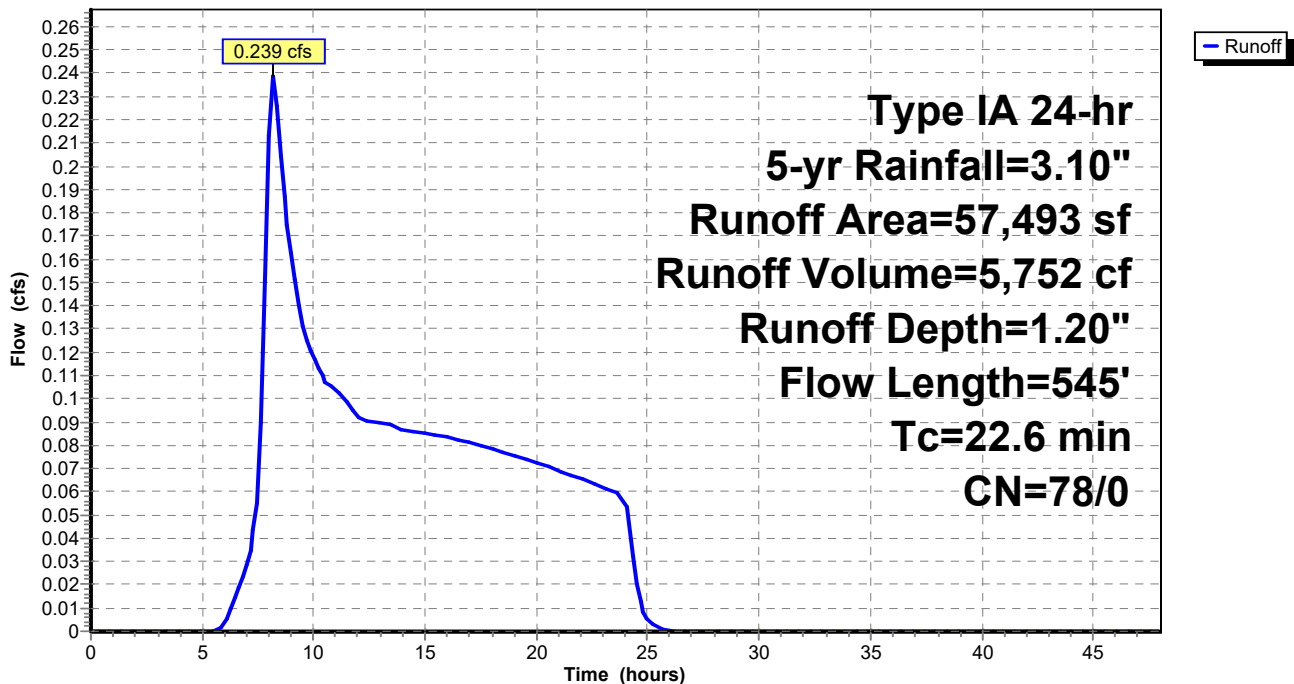
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 5-yr Rainfall=3.10"

Area (sf)	CN	Description
8,845	75	per CWS
48,648	79	Pasture/grassland/range, Fair, HSG C
57,493	78	Weighted Average
57,493	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	300	0.0412	0.25		Sheet Flow, Sheet flow Grass: Short n= 0.150 P2= 2.50"
2.6	245	0.0490	1.55		Shallow Concentrated Flow, Shallow Concentrated Flow Short Grass Pasture Kv= 7.0 fps
22.6	545	Total			

Subcatchment 1S: Pre-Developed

Hydrograph



Pointer Rd Park

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Type IA 24-hr 5-yr Rainfall=3.10"

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Page 6

Summary for Subcatchment 2S: Post-Developed

Runoff = 0.488 cfs @ 8.03 hrs, Volume= 8,370 cf, Depth= 1.75"

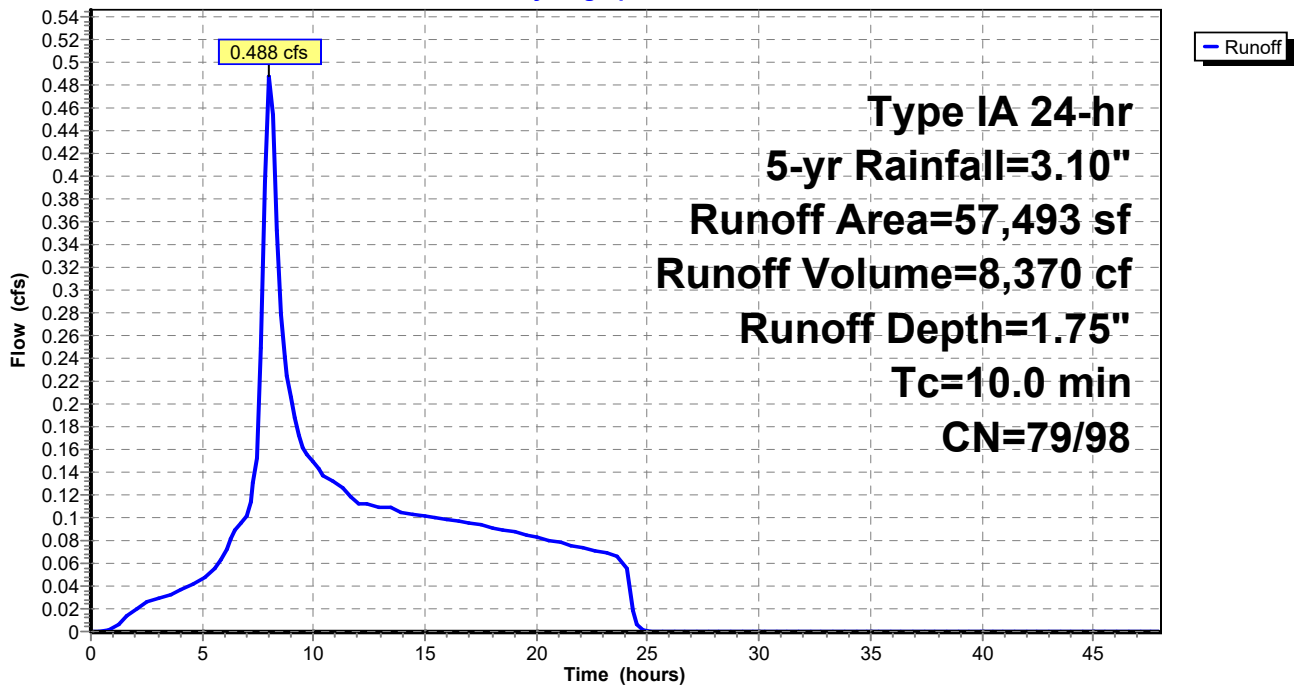
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 5-yr Rainfall=3.10"

	Area (sf)	CN	Description
*	17,360	98	
	40,133	79	50-75% Grass cover, Fair, HSG C
	57,493	85	Weighted Average
	40,133	79	69.81% Pervious Area
	17,360	98	30.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Developed

Hydrograph



Pointer Rd Park

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Type IA 24-hr 5-yr Rainfall=3.10"

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Summary for Pond 3P: Basin

Inflow Area = 57,493 sf, 30.19% Impervious, Inflow Depth = 1.75" for 5-yr event
 Inflow = 0.488 cfs @ 8.03 hrs, Volume= 8,370 cf
 Outflow = 0.221 cfs @ 8.88 hrs, Volume= 8,370 cf, Atten= 55%, Lag= 50.8 min
 Primary = 0.221 cfs @ 8.88 hrs, Volume= 8,370 cf

Routing by Stor-Ind method, Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
 Peak Elev= 622.42' @ 8.88 hrs Surf.Area= 550 sf Storage= 1,046 cf

Plug-Flow detention time= 62.5 min calculated for 8,340 cf (100% of inflow)
 Center-of-Mass det. time= 62.5 min (821.8 - 759.3)

Volume	Invert	Avail.Storage	Storage Description	
#1	620.08'	2,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.08	550	0.0	0	0
620.58	550	30.0	83	83
622.58	550	95.0	1,045	1,128
623.58	550	30.0	165	1,293
625.08	550	20.0	165	1,458
626.08	898	100.0	724	2,182

Device	Routing	Invert	Outlet Devices	
#1	Primary	620.08'	2.000" Vert. Orifice/Grate	C= 0.600
#2	Primary	621.80'	1.800" Vert. Orifice/Grate	C= 0.600
#3	Primary	625.58'	12.000" Horiz. Orifice/Grate	C= 0.600
Limited to weir flow at low heads				

Primary OutFlow Max=0.221 cfs @ 8.88 hrs HW=622.42' (Free Discharge)
 1=Orifice/Grate (Orifice Controls 0.158 cfs @ 7.24 fps)
 2=Orifice/Grate (Orifice Controls 0.063 cfs @ 3.56 fps)
 3=Orifice/Grate (Controls 0.000 cfs)

Pointer Rd Park

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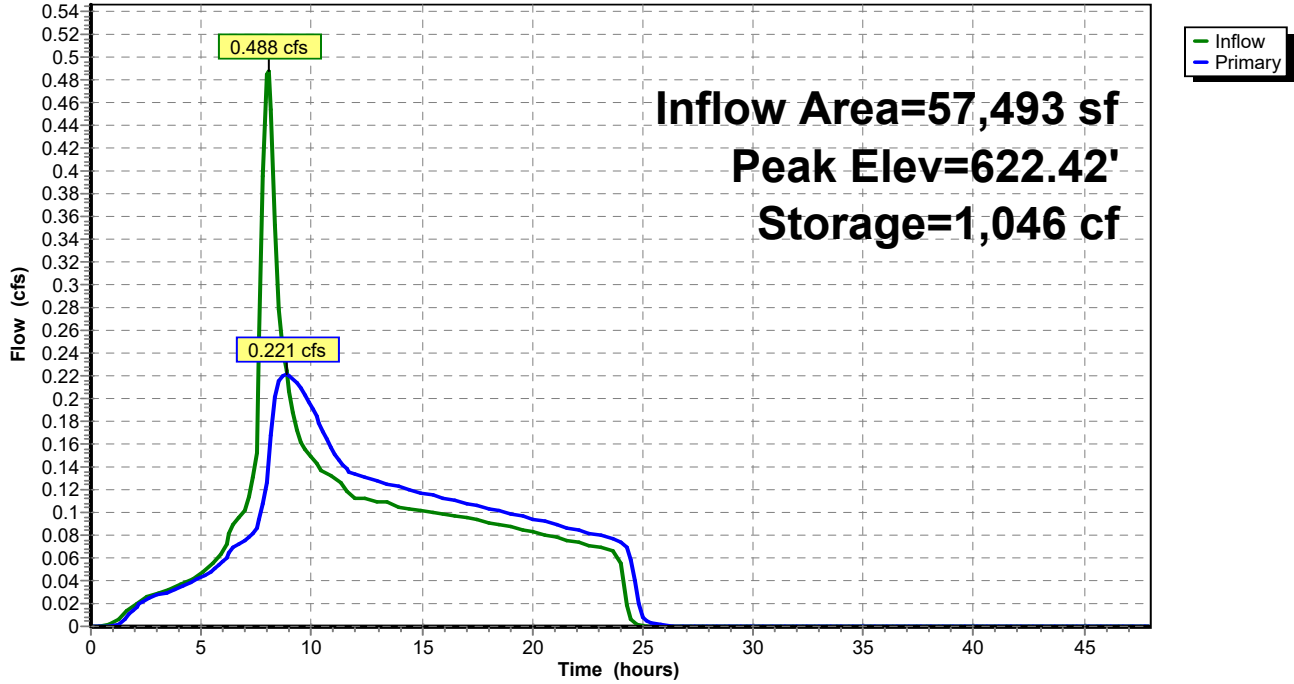
Type IA 24-hr 5-yr Rainfall=3.10"

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Pond 3P: Basin

Hydrograph



Pointer Rd Park

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Type IA 24-hr 10-yr Rainfall=3.45"

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Summary for Subcatchment 1S: Pre-Developed

Runoff = 0.306 cfs @ 8.18 hrs, Volume= 6,993 cf, Depth= 1.46"

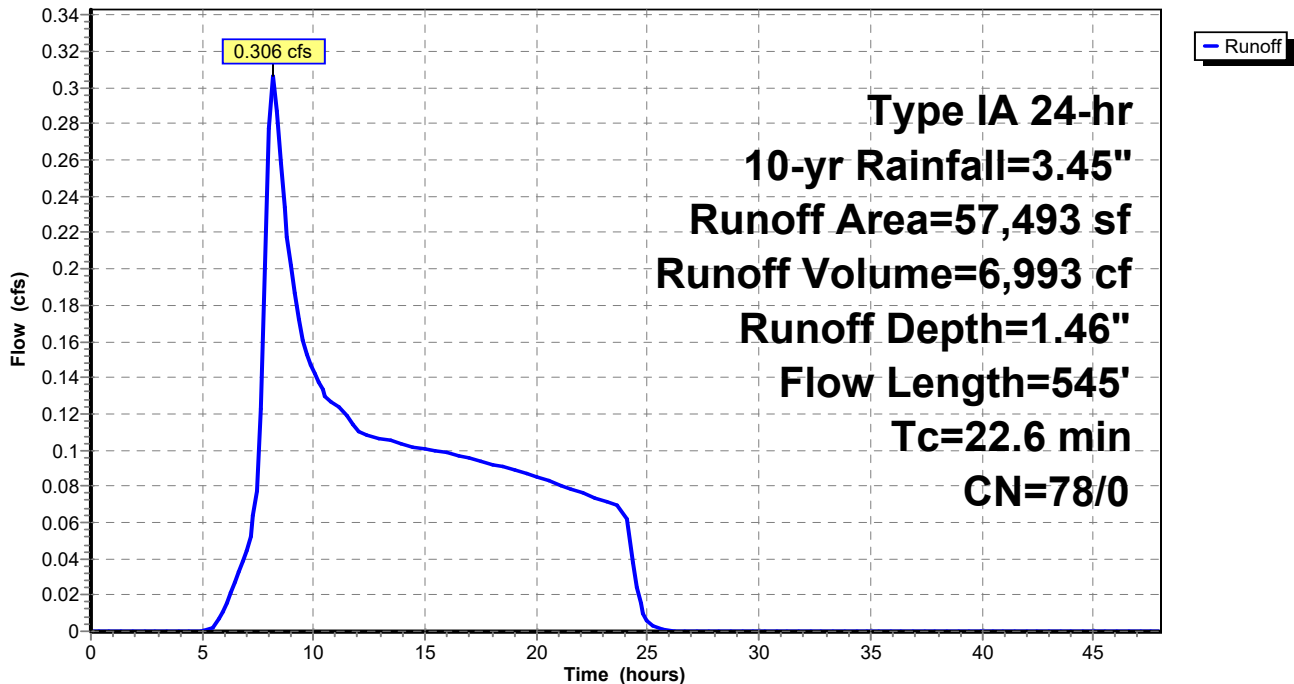
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 10-yr Rainfall=3.45"

Area (sf)	CN	Description
8,845	75	per CWS
48,648	79	Pasture/grassland/range, Fair, HSG C
57,493	78	Weighted Average
57,493	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	300	0.0412	0.25		Sheet Flow, Sheet flow Grass: Short n= 0.150 P2= 2.50"
2.6	245	0.0490	1.55		Shallow Concentrated Flow, Shallow Concentrated Flow Short Grass Pasture Kv= 7.0 fps
22.6	545	Total			

Subcatchment 1S: Pre-Developed

Hydrograph



Pointer Rd Park

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Type IA 24-hr 10-yr Rainfall=3.45"

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Summary for Subcatchment 2S: Post-Developed

Runoff = 0.579 cfs @ 8.03 hrs, Volume= 9,761 cf, Depth= 2.04"

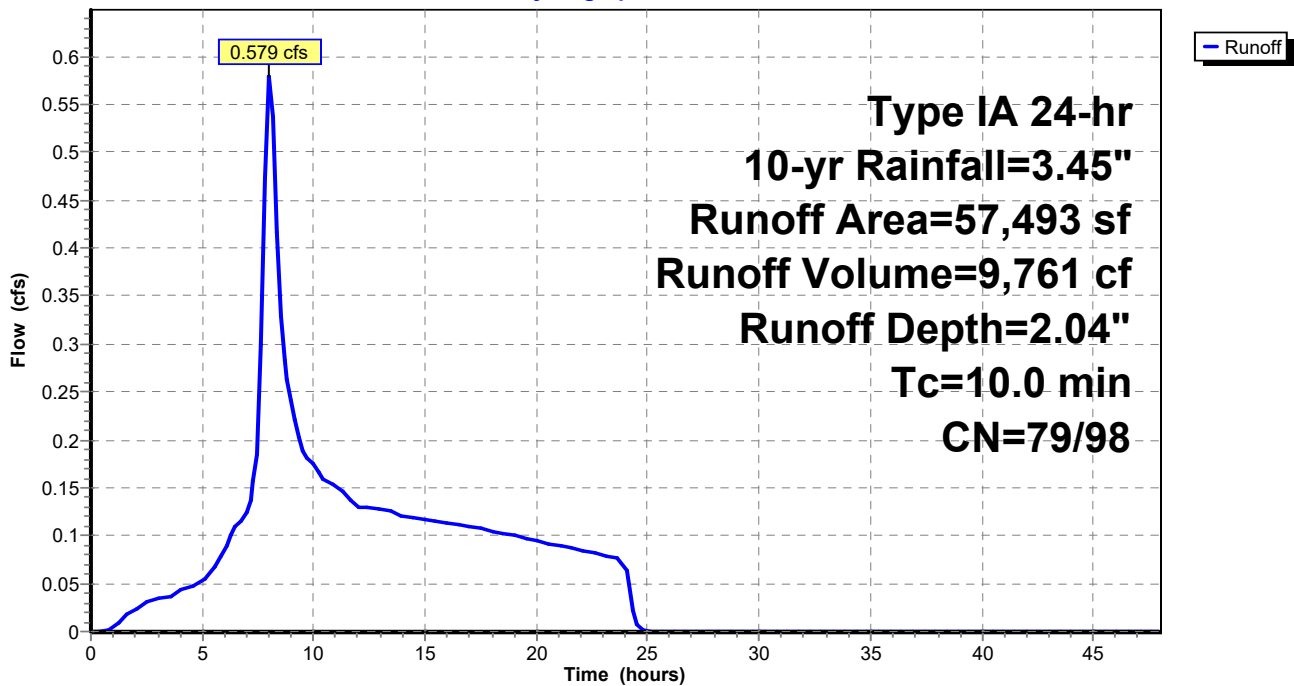
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 10-yr Rainfall=3.45"

	Area (sf)	CN	Description
*	17,360	98	
	40,133	79	50-75% Grass cover, Fair, HSG C
	57,493	85	Weighted Average
	40,133	79	69.81% Pervious Area
	17,360	98	30.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Developed

Hydrograph



Pointer Rd Park

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Type IA 24-hr 10-yr Rainfall=3.45"

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Summary for Pond 3P: Basin

Inflow Area = 57,493 sf, 30.19% Impervious, Inflow Depth = 2.04" for 10-yr event
 Inflow = 0.579 cfs @ 8.03 hrs, Volume= 9,761 cf
 Outflow = 0.287 cfs @ 8.70 hrs, Volume= 9,761 cf, Atten= 50%, Lag= 40.1 min
 Primary = 0.287 cfs @ 8.70 hrs, Volume= 9,761 cf

Routing by Stor-Ind method, Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
 Peak Elev= 623.29' @ 8.70 hrs Surf.Area= 550 sf Storage= 1,244 cf

Plug-Flow detention time= 68.0 min calculated for 9,727 cf (100% of inflow)
 Center-of-Mass det. time= 68.0 min (822.7 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	620.08'	2,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.08	550	0.0	0	0
620.58	550	30.0	83	83
622.58	550	95.0	1,045	1,128
623.58	550	30.0	165	1,293
625.08	550	20.0	165	1,458
626.08	898	100.0	724	2,182

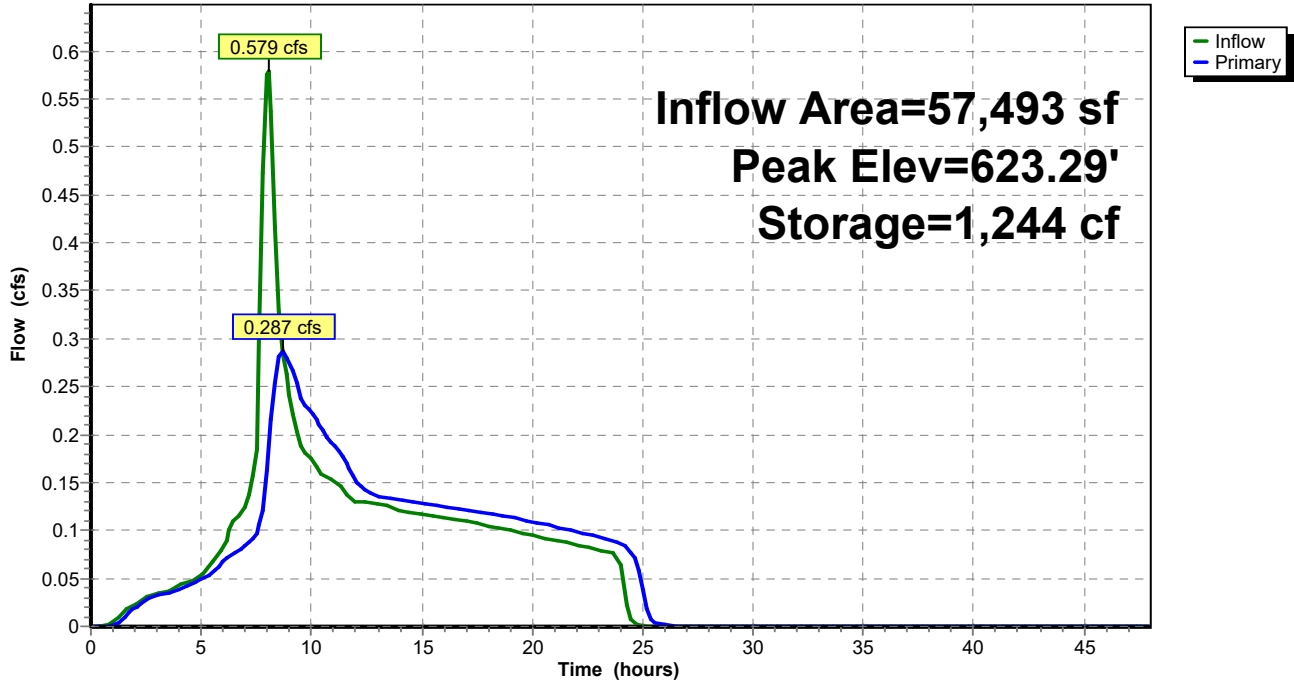
Device	Routing	Invert	Outlet Devices
#1	Primary	620.08'	2.000" Vert. Orifice/Grate C= 0.600
#2	Primary	621.80'	1.800" Vert. Orifice/Grate C= 0.600
#3	Primary	625.58'	12.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.286 cfs @ 8.70 hrs HW=623.28' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 0.185 cfs @ 8.50 fps)
- 2=Orifice/Grate (Orifice Controls 0.101 cfs @ 5.70 fps)
- 3=Orifice/Grate (Controls 0.000 cfs)

Pond 3P: Basin

Hydrograph



Pointer Rd Park

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Type IA 24-hr 25-yr Rainfall=3.90"

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Summary for Subcatchment 1S: Pre-Developed

Runoff = 0.399 cfs @ 8.17 hrs, Volume= 8,660 cf, Depth= 1.81"

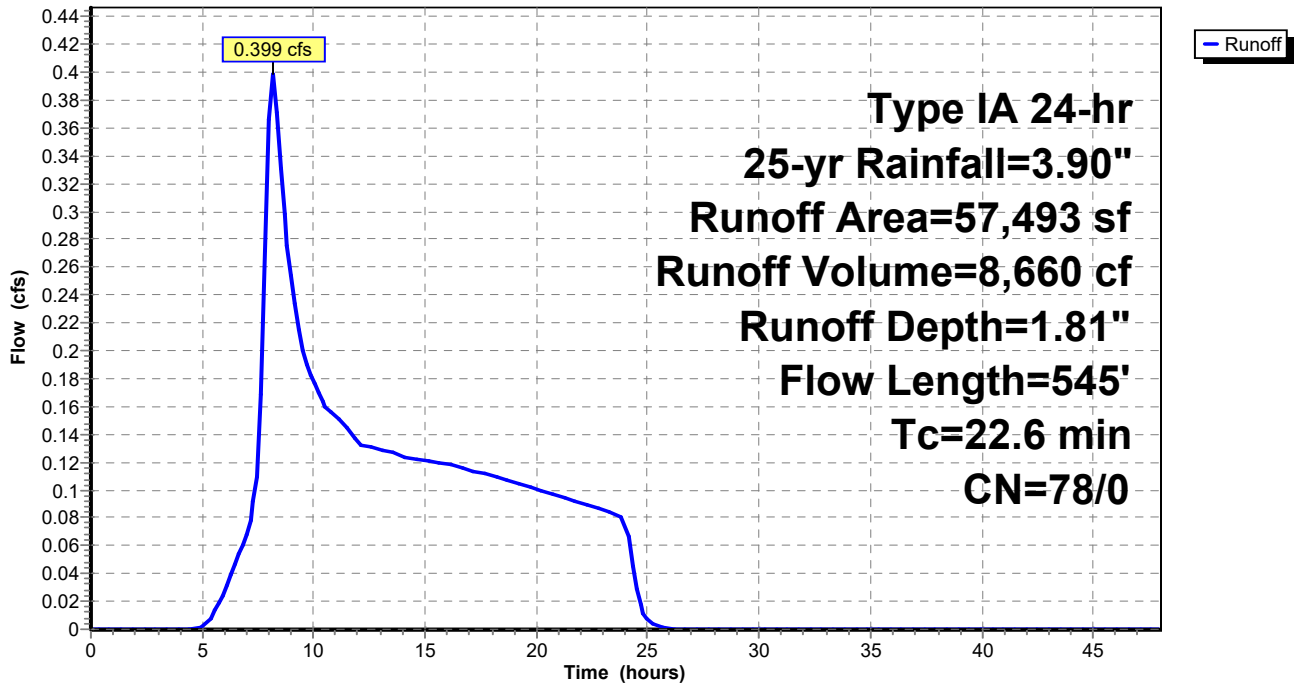
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 25-yr Rainfall=3.90"

Area (sf)	CN	Description
8,845	75	per CWS
48,648	79	Pasture/grassland/range, Fair, HSG C
57,493	78	Weighted Average
57,493	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0	300	0.0412	0.25		Sheet Flow, Sheet flow Grass: Short n= 0.150 P2= 2.50"
2.6	245	0.0490	1.55		Shallow Concentrated Flow, Shallow Concentrated Flow Short Grass Pasture Kv= 7.0 fps
22.6	545	Total			

Subcatchment 1S: Pre-Developed

Hydrograph



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Type IA 24-hr 25-yr Rainfall=3.90"

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Summary for Subcatchment 2S: Post-Developed

Runoff = 0.700 cfs @ 8.03 hrs, Volume= 11,599 cf, Depth= 2.42"

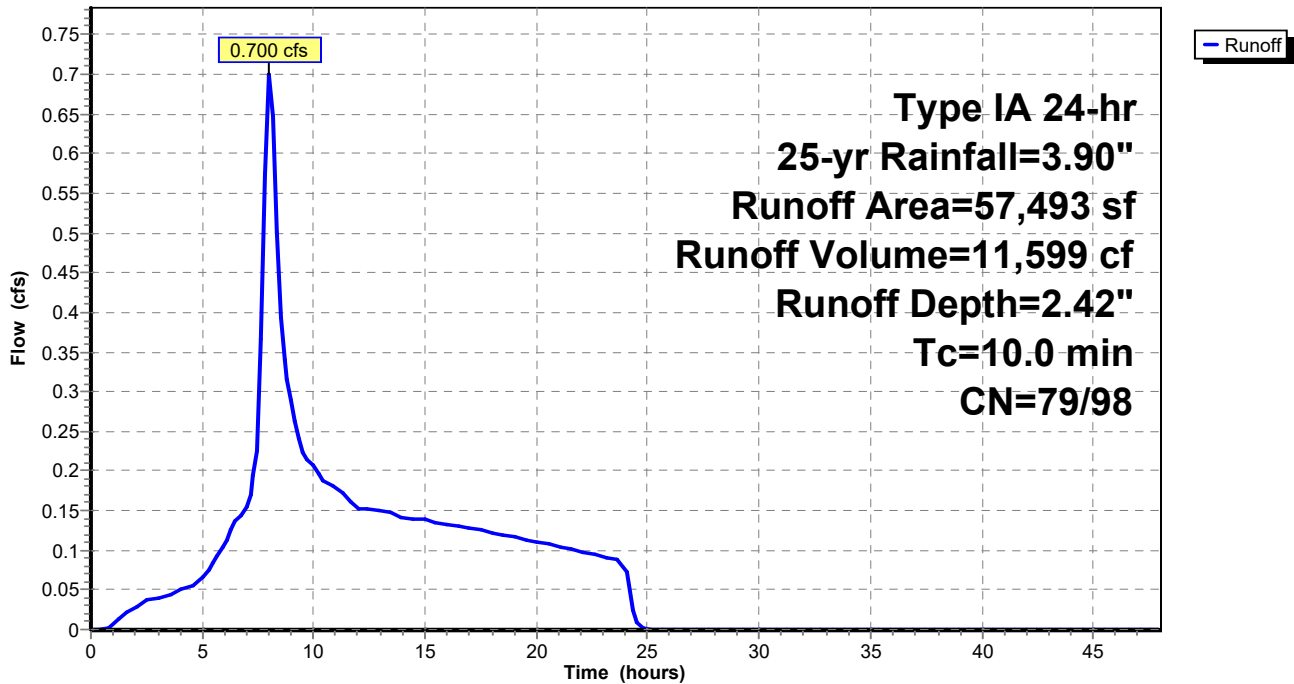
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
 Type IA 24-hr 25-yr Rainfall=3.90"

	Area (sf)	CN	Description
*	17,360	98	
	40,133	79	50-75% Grass cover, Fair, HSG C
	57,493	85	Weighted Average
	40,133	79	69.81% Pervious Area
	17,360	98	30.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Developed

Hydrograph



Pointer Rd Park

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Type IA 24-hr 25-yr Rainfall=3.90"

Printed 4/26/2024

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Summary for Pond 3P: Basin

Inflow Area = 57,493 sf, 30.19% Impervious, Inflow Depth = 2.42" for 25-yr event
 Inflow = 0.700 cfs @ 8.03 hrs, Volume= 11,599 cf
 Outflow = 0.388 cfs @ 8.57 hrs, Volume= 11,599 cf, Atten= 45%, Lag= 32.7 min
 Primary = 0.388 cfs @ 8.57 hrs, Volume= 11,599 cf

Routing by Stor-Ind method, Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
 Peak Elev= 625.13' @ 8.57 hrs Surf.Area= 569 sf Storage= 1,488 cf

Plug-Flow detention time= 71.1 min calculated for 11,558 cf (100% of inflow)
 Center-of-Mass det. time= 71.2 min (820.4 - 749.2)

Volume	Invert	Avail.Storage	Storage Description
#1	620.08'	2,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.08	550	0.0	0	0
620.58	550	30.0	83	83
622.58	550	95.0	1,045	1,128
623.58	550	30.0	165	1,293
625.08	550	20.0	165	1,458
626.08	898	100.0	724	2,182

Device	Routing	Invert	Outlet Devices
#1	Primary	620.08'	2.000" Vert. Orifice/Grate C= 0.600
#2	Primary	621.80'	1.800" Vert. Orifice/Grate C= 0.600
#3	Primary	625.58'	12.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.386 cfs @ 8.57 hrs HW=625.10' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 0.233 cfs @ 10.70 fps)
- 2=Orifice/Grate (Orifice Controls 0.153 cfs @ 8.65 fps)
- 3=Orifice/Grate (Controls 0.000 cfs)

Pointer Rd Park

Prepared by Vega Civil Engineering, LLC

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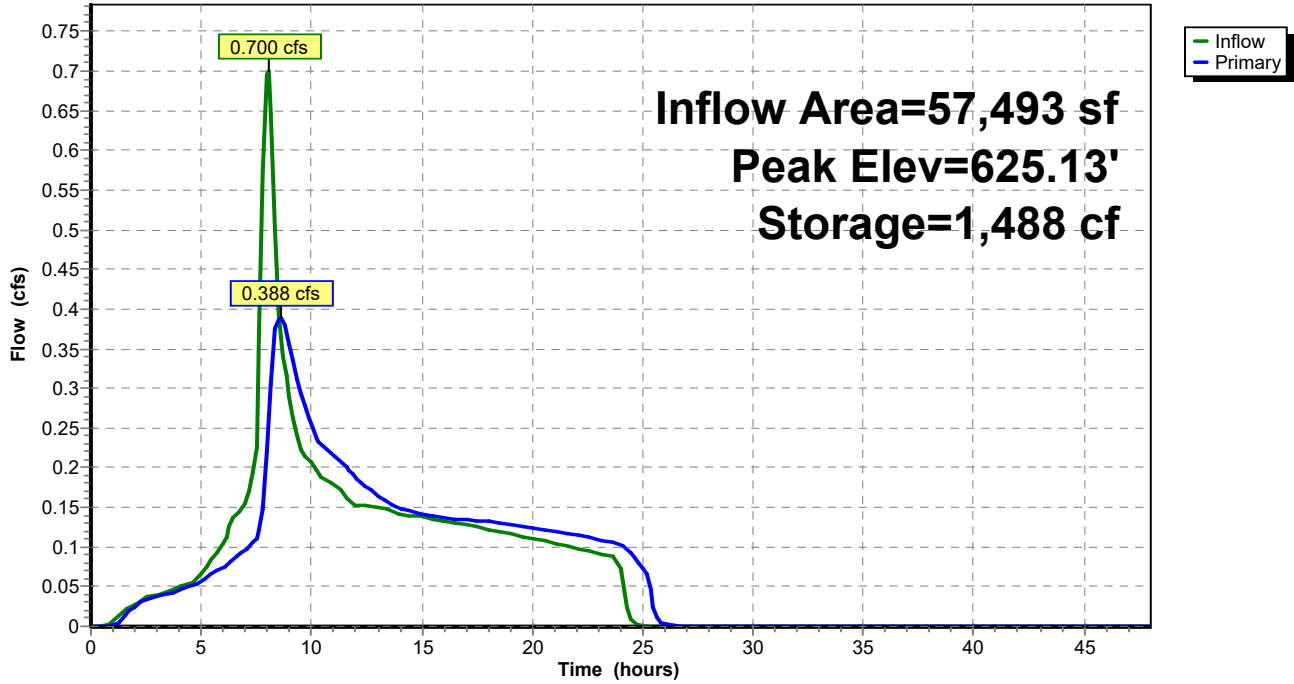
Type IA 24-hr 25-yr Rainfall=3.90"

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Pond 3P: Basin

Hydrograph



Pointer Rd Park

Type IA 24-hr 3.00 hrs WQ-BEAV Rainfall=0.36"

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Page 1

Summary for Subcatchment 2S: Post-Developed

Runoff = 0.060 cfs @ 1.24 hrs, Volume= 282 cf, Depth= 0.06"

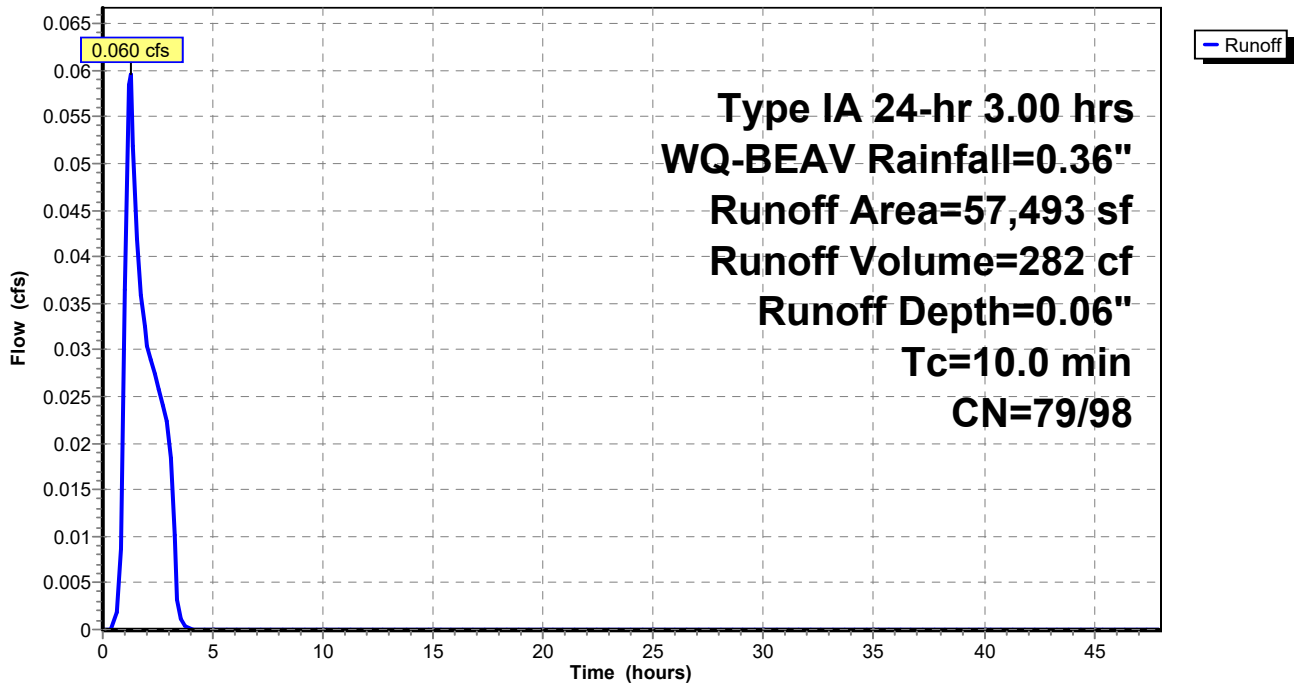
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
Type IA 24-hr 3.00 hrs WQ-BEAV Rainfall=0.36"

	Area (sf)	CN	Description
*	17,360	98	
	40,133	79	50-75% Grass cover, Fair, HSG C
	57,493	85	Weighted Average
	40,133	79	69.81% Pervious Area
	17,360	98	30.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 2S: Post-Developed

Hydrograph



Pointer Rd Park

Type IA 24-hr 3.00 hrs WQ-BEAV Rainfall=0.36"

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Page 2

Summary for Pond 2P: Basin - WQ

Inflow Area = 57,493 sf, 30.19% Impervious, Inflow Depth = 0.06" for WQ-BEAV event
 Inflow = 0.060 cfs @ 1.24 hrs, Volume= 282 cf
 Outflow = 0.027 cfs @ 2.40 hrs, Volume= 282 cf, Atten= 54%, Lag= 69.9 min
 Primary = 0.027 cfs @ 2.40 hrs, Volume= 282 cf

Routing by Stor-Ind method, Time Span= 0.00-47.94 hrs, dt= 0.17 hrs
 Peak Elev= 625.20' @ 2.40 hrs Surf.Area= 586 sf Storage= 66 cf

Plug-Flow detention time= 28.6 min calculated for 281 cf (100% of inflow)
 Center-of-Mass det. time= 28.6 min (141.4 - 112.8)

Volume	Invert	Avail.Storage	Storage Description		
#1	625.08'	717 cf	Custom Stage Data (Conic) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
625.08	550	0	0	550	
626.08	898	717	717	911	

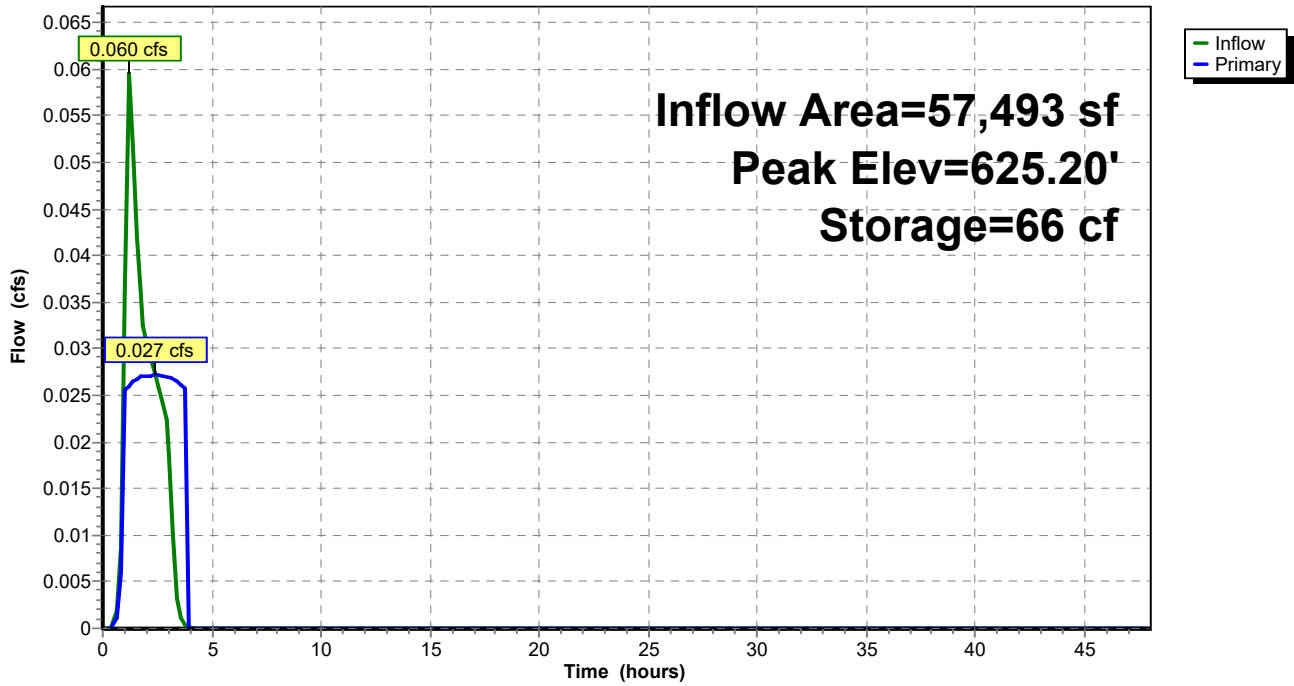
Device	Routing	Invert	Outlet Devices	
#1	Primary	625.58'	12.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Primary	625.08'	2.000 in/hr Exfiltration over Wetted area	

Primary OutFlow Max=0.027 cfs @ 2.40 hrs HW=625.20' (Free Discharge)

- 1=Orifice/Grate (Controls 0.000 cfs)
- 2=Exfiltration (Exfiltration Controls 0.027 cfs)

Pond 2P: Basin - WQ

Hydrograph



PerkFilter Water Quality Calculations

$$\text{Water Quality Volume} = \frac{0.36 \text{ (in)} \times 2,064 \text{ (ft}^2\text{)}}{12 \text{ (in/ft)}} = 61.92 \text{ ft}^3$$

$$\text{Water Quality Flow} = \frac{61.92 \text{ (ft}^3\text{)}}{(3 \text{ hr})(60 \text{ hr/min})(60 \text{ min/sec)}} = 0.006 \text{ (ft}^3\text{/sec)}$$

2. **Water Quality Volume (WQV)**

The WQV is the volume of water that is produced by the water quality storm. The WQV equals 0.36 inches over the impervious area that is required to be treated as shown in the formula below:

$$\text{Water Quality Volume (cu.ft.)} = \frac{0.36 \text{ (in.)} \times \text{Area (sq.ft.)}}{12 \text{ (in./ft.)}}$$

3. **Water Quality Flow (WQF)**

The WQF is the average design flow anticipated from the water quality storm as shown in the formulas below:

$$\text{Water Quality Flow (cfs)} = \frac{\text{Water Quality Volume (cu.ft.)}}{14,400 \text{ seconds}}$$

or

$$\text{Water Quality Flow (cfs)} = \frac{0.36 \text{ (in.)} \times \text{Area (sq.ft.)}}{12 \text{ (in/ft)}(4 \text{ hr})(60 \text{ min/hr})(60 \text{ sec/min)}}$$

Project Name:	Pointer Road Park
Location:	Beaverton, OR
Unit ID:	
Design Engineer:	Vega Civil Engineering LLC
OI Engineer:	A Deiters

Design Flow Rates

Water Quality Flow Rate (WQF):	0.014	cfs
Peak Flow Rate:	<1.3	cfs

Sizing Methodology

Hydraulic Loading Rate:	Washington GULD (1.5 gpm/sq ft)
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Cartridge Size/Stack Configuration

Cartridge Stack Height:	12"	
Cartridge Quantity:	1	
Treatment Flow Rate:	0.015	cfs

Structure Information

Structure Type/Inside Dimensions:	2' x 5' Concrete Catch Basin
Outlet Pipe Diameter (in.):	12
Standard Minimum Depth (ft):	1.83
System Head Loss (ft):	1.70
Total Flow Capacity (cfs):	1.30

Site Information

Rim Elevation:	5
Inlet IE:	3
Outlet IE:	3
Depth:	2
Drop:	0
Upstream WSE:	4.70
Drainage Area (ac):	
Design Storm Intensity (in/hr)	
Runoff Coefficient:	
Calculated WQF (cfs):	

Appendix C – Associated Reports

Geotechnical Report