Big Rock Park
Field Improvements

28430 NE Big Rock Road
Duvall, WA 98019

Technical Information Report
July 12, 2016

The information contained in this report was prepared by and under the direct supervision of the undersigned:

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BIG ROCK PARK
FIELD IMPROVEMENTS
TECHNICAL INFORMATION REPORT
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BIG ROCK PARK
FIELD IMPROVEMENTS
TECHNICAL INFORMATION REPORT
JULY 12, 2016

PROJECT OVERVIEW

This Technical Information Report (TIR) is for the field renovations at Big Rock Park, located at 28430 NE Big Rock Road in Duvall, Washington. The project will include replacing the natural grass playfields on the east side of the site with synthetic turf fields and additional parking along the south. The total project disturbance area is approximately 4.12 acres. See Figure 1 – TIR Worksheet for general project information. The park is located on one parcel (2129700250), with a total area of approximately 9.75 acres. The project site is located in the northwest portion of Section 19, Township 26 North, Range 7 East, Willamette Meridian. Refer to Figure 2 – Vicinity Map.

EXISTING CONDITIONS

The existing park property is bounded by NE Big Rock Road to the southwest and forested area on all other sides. There is one driveway from NE Big Rock Road to the existing parking lot, which forms an L-shape around the southwest corner of the property. The site has three existing playfields encompassing the majority of the site, with a paved plaza and small playground facility. A skate park is located near the southwest corner, adjacent to the parking lot. Refer to Figure 3 – Existing Conditions and Impervious Area for a layout of the existing conditions in the project area.

This project will involve the renovation of the two easternmost fields, which include a softball field, with a compacted dirt infield and natural grass outfield, and a natural grass soccer field. The topography in the field area is relatively flat. The softball field slopes from southwest to northeast at approximately 0.8% grade, towards a swale that runs between the softball and soccer fields. The soccer field on the east side slopes from northeast to southwest toward the swale at approximately 1.5% slope. The swale flows to the north, where it is collected by a culvert, and conveyed into the existing stormwater pond to the north. Refer to the Downstream Analysis section of this report for a complete description of the downstream drainage system.

The project site is located within the Snoqualmie Southeast drainage basin, which is a sub-basin of the Snoqualmie River Watershed. Based on City of Duvall mapping, the site is within the upper Weiss Creek drainage basin.

According to the USDA Natural Resources Conservation Service, the soils within the project area consist of Tokul gravelly medial loam, 8-15 percent slopes. Refer to Figure 4 – Soils Map. The Tokul soils are to be classified as till for the purposes of stormwater modeling. According to the project's geotechnical report, conducted by Associated Earth Sciences, Inc., dated February 1, 2016, the subsurface soils include existing fill up to 12.5 feet deep with underlying Vashon lodgment till.

DOWNSTREAM ANALYSIS

The following is a summary of the downstream drainage course from the project site. There are two separate discharge points from the site which combine within a quarter mile downstream of the project site. For the eastern portion of the site, which includes the two fields being renovated, runoff generally flows to a swale between the fields and flows to the north into the existing detention pond in the northeast corner of the site. From the northeast detention pond, the downstream drainage course is as follows:

1. The existing northeast detention pond discharges onto the ground surface within the park site, and flows continue offsite to the northwest onto adjacent property.
2. Based upon King County iMap contours the flows appear to continue to the north and northwest to a wooded and vegetated channel location between NE 138th Place and NE Roney Road.
3. The channel flows west and southwest between adjacent properties towards NE Big Rock Road.
4. At NE Big Rock Road, the flow from the channel is collected by a culvert and combines with the flows from the western portion of the site, which are described below.

The western portion of the site includes the existing baseball field to remain, the concrete plaza/backstop area and the existing asphalt parking lot. Flows from the asphalt parking area, and a portion of the concrete plaza are routed to an existing biofiltration swale along the west portion parking area for water quality treatment prior to discharging into a stormwater detention pond in the northwest area of the site. Runoff from the existing baseball field is conveyed directly to the northwest detention pond, and not routed through the biofiltration swale. From the northwest detention pond, the downstream drainage course is as follows:

5. The discharge from existing northwest detention pond is conveyed to the west and outfalls into the existing roadway ditch along the east side of NE Big Rock Road.
6. The ditch flows north along east side NE Big Rock Road, for approximately 650 feet, where it is collected by 24-inch culvert. The 24-inch culvert appears to convey flows to a manhole within the center of the roadway.
7. Flow from the manhole is assumed to continue to the north with the piped system along NE Big Rock Road, for approximately 750 feet, to a point midway between NE Roney Road and NE 138th Place. At this point the flows combine with the flows from the eastern portion of the site, and are discharged to the east side of the roadway onto adjacent property.
8. The flows generally continue to the west and southwest eventually discharging to Loutsis Pond that is ultimately tributary to Snoqualmie River, approximately two miles downstream from the project site.

FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

The project proposes to attenuate flows from the proposed synthetic turf fields by installing a flow control structure on the outlet of the underdrain system and temporarily utilizing storage within the network of underdrain pipes and the permeable gravel base materials for temporary stormwater storage.

Rain falling upon the proposed synthetic turf surfaces will drain vertically through the permeable layers of the field section. No surface runoff is anticipated from the synthetic turf surface because of the permeable nature of the materials. The synthetic turf surface includes a tufted fiber and woven synthetic backing that is perforated to allow a minimum infiltration rate of 20 inches per hour. The synthetic turf is infilled with a mixture of rounded sand particles and granulated rubber that do not interlock and are also highly permeable, with a minimum vertical infiltration rate of 20 inches per hour. Below the synthetic turf surface is a top course and base course constructed of a specially graded sand and gravel mixture that results in a permeable aggregate sub-base. The vertical infiltration rates are tested by an independent third party testing agency after manufacture of the turf. Testing of the permeable aggregate occurs on site after placement and compaction.

Stormwater will percolate vertically, and more gradually horizontally, through the base aggregate layers to the nearest drainage lateral trench. Refer to the field cross section on Sheet F-2.1 in Appendix A. Once stormwater infiltrates into the drainage lateral trenches, it will be conveyed via 4-inch perforated drain lines to a 10-inch main collector drain line that runs south/north between the two fields. The 10-inch main collector line will drain to the north, to the flow control structure. The flow control structure which discharge the mitigated flow to the northeast detention pond. Refer to Sheet F-1.3 in Appendix A, which is the storm drainage plan for the site.

The total area tributary to the field underdrain system includes the synthetic turf field surfaces and the concrete walkway located between the two fields. Per Figure 3.2.2.C of the KCSWDM, the underdrained synthetic turf surface has been considered as 25% effective impervious and 75% grass for the purposes of stormwater modeling. In addition there is a gravel walkway and the proposed parking improvements that will flow to the west and not be tributary to the field detention system. These areas have been accounted for as bypass in the field modeling. A portion of proposed gravel is replacing the existing gravel pathway. This area is just top dressing and was not counted as new or replaced impervious area. The following table shows a breakdown of the proposed effective impervious surfaces for the modeling of the field. Also refer to Figure 6 – Proposed Conditions, which shows the proposed site conditions and a summary of the surface areas

Table 1 – Proposed Area Tributary to Field Detention System

Impervious Area	*SF*	*Acres*
25% of Synthetic Field Area	32,973	0.757
Concrete Walkways	4,829	0.111
Total Impervious Area	**37,802**	**0.868**
Pervious Area	*SF*	*Acres*
75% of Synthetic Field Area	98,917	2.271
Grass/Landscaping	13,102	0.301
Total Pervious Area	**112,019**	**2.572**
Total Area Tributary to Field Drainage System	**149,820**	**3.440**

Table 2 – Bypass Area

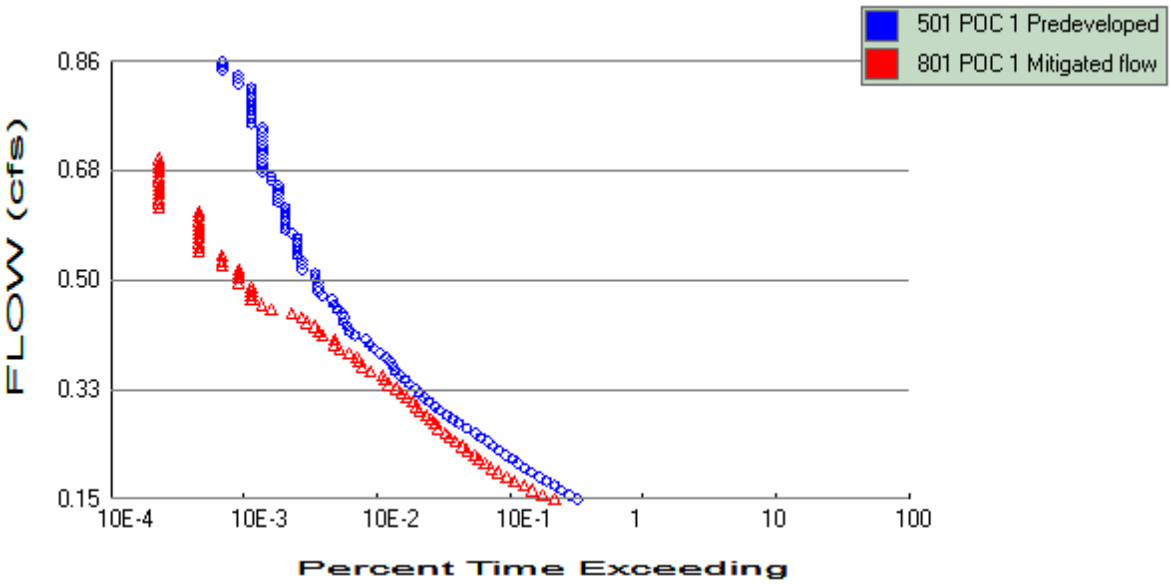
Impervious Area	*SF*	*Acres*
Concrete Walkways	6,070	0.139
Asphalt Paving	7,594	0.174
Gravel Pathways	5,993	0.138
Total Bypass Impervious Area	**19,657**	**0.451**

As noted previously, the proposed project will utilize temporary storage within the underdrain pipe system and within the void space of the permeable gravel base materials. Due to the unique nature of the storage volume within the field's underdrain system, a custom Stage Storage Discharge (SSD) table has been created within the WWHM program. Refer to the Field Storage Volume Spreadsheet, included in Appendix B, which was used to determine the storage volume within the underdrain system at a given elevation. By using a range of elevations, a SSD table was created with the varying storage volumes for each elevation that was used in the WWHM Model. A copy of the SSD table spreadsheet is included within Appendix B.

Once the SSD table element was created within the WWHM program, the control structure was manually adjusted in order to match the duration for the existing conditions. The field flow control structure includes a single orifice. Refer to the plans for the orifice diameter. The temporary storage volume provided within the field facility is approximately 12,816 cubic feet at the elevation of the top of the flow control riser.

Refer to the complete output from WWHM provided in Appendix B. Also refer to Sheet F-2.3, which details the flow control structure. Graph 1 below shows the duration analysis graph from WWHM.

Graph 1 –Field Duration Curves from WWHM



WATER QUALITY TREATMENT

The project proposes more than 5,000 square feet of pollution generating impervious surface (PGIS), therefore water quality treatment for the proposed parking area along the south will be required. The proposed parking area and a portion of the new concrete plaza will sheet flow onto the existing asphalt parking lot to the west, which is eventually collected by two existing catch basins along the western edge of the parking lot and routed to the grass biofiltration swale.

The existing grass biofiltration swale has been analyzed to determine if there is adequate capacity to treat the additional flows from the proposed parking area. The total area tributary to the existing biofiltration swale is shown on Figure 6 – Proposed Conditions, which totals 55,340 sf (1.27 acres) including the proposed improvements. Using WWHM with 15-minute time steps, the water quality design flow (60% of the 2-year flow rate) was determined to be 0.267 cfs.

Based upon existing survey information and field measurements, the existing swale bottom is approximately 113 feet long by 4.5 feet wide, and has a slope of approximately 0.5% to the north. Using Equations 6-3, 6-4 and 6-5 from Section 6.3.1.1 of the KCSWDM, the required length of swale is 100.6 feet, which is less than the actual length of the existing swale. Refer to the Biofiltration Swale Water Quality Analysis Spreadsheet included in Appendix B. In addition, the flow depth for the swale is less than 0.33 feet (4-inches) and the flow velocity during the water quality design storm event is less than 1.0 feet per second. Therefore the existing grass biofiltration swale will have adequate capacity to treat flows from the proposed parking lot.

CONVEYANCE SYSTEMS ANALYSIS AND DESIGN

Per the section 1.2.4.1 of the 2009 KCSWDM, new pipe systems must be sized to convey the 25-year peak storm event at a minimum. The 10-inch collector pipe was analyzed for conveyance of the 100-

year storm as a conservative measure. The tributary area to the collector pipe includes both proposed fields, the paved walkway between them, and areas of landscape/walkway/driveway to the south of the fields.

The full flow capacity of the proposed 10-inch collector pipe (n=0.012) assuming a slope of 0.4% is 1.51 cubic feet per second (cfs) using Manning's equation. Using WWHM, with a 15-minute time step, the peak 100-year runoff rate from the tributary area is 1.32 cfs. Therefore, the 10-inch collector pipe appears to have adequate conveyance capacity to convey flows from the proposed conditions. Refer to the conveyance sizing spreadsheet and associated WWHM output included in Appendix B of this report.

Special Reports and Studies

A geotechnical report has been prepared by Associated Earth Sciences, Inc., dated February 1, 2016. This report is available upon request under separate cover.

Other Permits

The project will disturb over one acre of land and thus will require an NPDES Construction Stormwater General Permit through the Department of Ecology (DOE). This permit will be applied for directly with DOE.

CSWPPP

The construction stormwater pollution prevention plan (CSWPPP) consists of the TESC plan in the drawing set and a Stormwater Pollution Prevention Plan narrative (SWPPP) based upon the DOE's Construction Stormwater General Permit SWPPP Template. A preliminary SWPPP narrative is attached within Appendix C, while the TESC plan is included in Appendix A of this report.

Bond Quantities, Facility Summaries, and Declaration of Covenant

A Bond Quantities Worksheet is not expected to be required since the owner is the City of Duvall, which is a public agency; no bonding is required.

Operations and Maintenance Manual

Recommended operations and maintenance guidelines for the stormwater drainage facilities implemented in the project are provided in Appendix D of this report.

FIGURES

Figure 1: TIR Worksheet

Figure 2: Vicinity Map

Figure 3: Existing Conditions and Impervious Area

Figure 4: Soils Map

Figure 5: Downstream Drainage Map

Figure 6: Proposed Conditions

Figure 1 - TIR Worksheet

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 1 PROJECT OWNER AND PROJECT ENGINEER

Project Owner City of Duvall
Phone (425) 788-3434
Address 14525 Main St NE
Duvall, WA 98019
Project Engineer Ben Hughes, PE
Company LPD Engineering, PLLC
Phone (206) 725-1211

Part 2 PROJECT LOCATION AND DESCRIPTION

Project Name Big Rock Park
DDES Permit #
Location Township 26 N
Range 7 E
Section 19
Site Address 28430 NE Big Rock Rd
Duvall, WA 98019

Part 3 TYPE OF PERMIT APPLICATION

- ☐ Landuse Services
  Subdivison / Short Subd. / UPD
- ☐ Building Services
  M/F / Commerical / SFR
- ☒ Clearing and Grading
- ☐ Right-of-Way Use
- ☐ Other

Part 4 OTHER REVIEWS AND PERMITS

- ☐ DFW HPA
- ☐ COE 404
- ☐ DOE Dam Safety
- ☐ FEMA Floodplain
- ☐ COE Wetlands
- ☐ Other
- ☐ Shoreline Management
- ☐ Structural Rockery/Vault/
- ☐ ESA Section 7

Part 5 PLAN AND REPORT INFORMATION

Technical Information Report		Site Improvement Plan (Engr. Plans)	
Type of Drainage Review (circle):	(Full) / Targeted / Large Site	Type (circle one):	(Full) / Modified / Small Site
Date (include revision dates):	7/12/16	Date (include revision dates):	
Date of Final:		Date of Final:	

Part 6 ADJUSTMENT APPROVALS

Type (circle one): Standard / Complex / Preapplication / Experimental / Blanket

Description: (include conditions in TIR Section 2)

Date of Approval:

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 7 MONITORING REQUIREMENTS

Monitoring Required: Yes / (No)

Start Date: _____

Completion Date: _____

Describe: _____

Part 8 SITE COMMUNITY AND DRAINAGE BASIN

Community Plan : N/A

Special District Overlays: N/A

Drainage Basin: Snoqualmie River

Stormwater Requirements: _____

Part 9 ONSITE AND ADJACENT SENSITIVE AREAS

- ☐ River/Stream _____
- ☐ Lake _____
- ☒ Wetlands Adjacent to east
- ☐ Closed Depression _____
- ☐ Floodplain _____
- ☐ Other _____
- ☐ Steep Slope _____
- ☐ Erosion Hazard _____
- ☐ Landslide Hazard _____
- ☐ Coal Mine Hazard _____
- ☐ Seismic Hazard _____
- ☐ Habitat Protection _____
- ☐ _____

Part 10 SOILS

Soil Type	Slopes	Erosion Potential
Tokul gravelly medial loam	8-15%	unknown

- ☐ High Groundwater Table (within 5 feet)
- ☐ Other _____
- ☐ Sole Source Aquifer
- ☐ Seeps/Springs

☐ Additional Sheets Attached

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 11 DRAINAGE DESIGN LIMITATIONS	
REFERENCE	LIMITATION / SITE CONSTRAINT
☐ Core 2 – Offsite Analysis	
☐ Sensitive/Critical Areas	
☐ SEPA	
☐ Other	
☐	
☐ Additional Sheets Attached	

Part 12 TIR SUMMARY SHEET	(provide one TIR Summary Sheet per Threshold Discharge Area)
Threshold Discharge Area: (name or description)	Loutsis Pond
Core Requirements (all 8 apply)	
Discharge at Natural Location	Number of Natural Discharge Locations: 1
Offsite Analysis	Level: (1) / 2 / 3 dated: 7/12/16
Flow Control (incl. facility summary sheet)	Level: 1 / 2 / 3 or Exemption Number _____ Small Site BMPs _____
Conveyance System	Spill containment located at: N/A
Erosion and Sediment Control	ESC Site Supervisor: Contact Phone: TBD After Hours Phone:
Maintenance and Operation	Responsibility: Private / (Public) If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: Yes / (No)
Water Quality (include facility summary sheet)	Type: (Basic) / Sens. Lake / Enhanced Basicm / Bog or Exemption No. _____ Landscape Management Plan: Yes / (No)
Special Requirements (as applicable)	
Area Specific Drainage Requirements	Type: CDA / SDO / MDP / BP / LMP / Shared Fac. / (None) Name: _____
Floodplain/Floodway Delineation	Type: Major / Minor / Exemption / (None) 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe: N/A
Source Control (comm./industrial landuse)	Describe landuse: park Describe any structural controls: none

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Oil Control	High-use Site: Yes / (No) Treatment BMP: _____ Maintenance Agreement: Yes / (No) with whom? _____
Other Drainage Structures	
Describe: none	

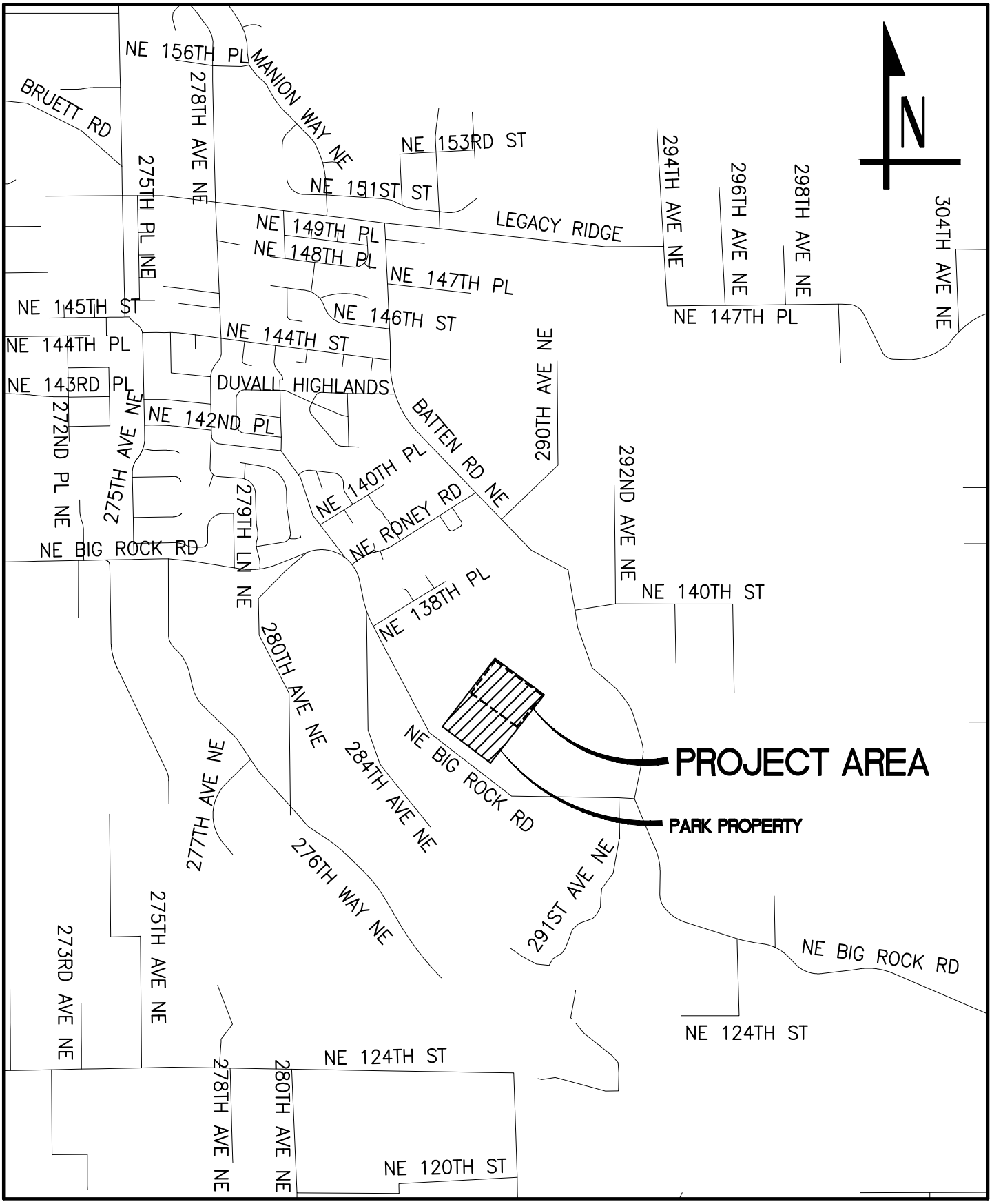
Part 13 EROSION AND SEDIMENT CONTROL REQUIREMENTS		
MINIMUM ESC REQUIREMENTS DURING CONSTRUCTION		MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION
☒ Clearing Limits		☒ Stabilize Exposed Surfaces
☒ Cover Measures		☒ Remove and Restore Temporary ESC Facilities
☒ Perimeter Protection		☒ Clean and Remove All Silt and Debris, Ensure Operation of Permanent Facilities
☒ Traffic Area Stabilization		☐ Flag Limits of SAO and open space preservation areas
☒ Sediment Retention		☐ Other _____
☒ Surface Water Collection		
☒ Dewatering Control		
☒ Dust Control		
☒ Flow Control		

Part 14 STORMWATER FACILITY DESCRIPTIONS (Note: Include Facility Summary and Sketch)				
Flow Control	Type/Description		Water Quality	Type/Description
☒ Detention	Flow control riser, field detention system		☒ Biofiltration	swale
☐ Infiltration	_____		☐ Wetpool	_____
☐ Regional Facility	_____		☐ Media Filtration	_____
☐ Shared Facility	_____		☐ Oil Control	_____
☐ Flow Control BMPs	_____		☐ Spill Control	_____
☐ Other	_____		☐ Flow Control BMPs	_____
			☐ Other	_____

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

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

Part 17 SIGNATURE OF PROFESSIONAL ENGINEER
I, or a civil engineer under my supervision, have visited the site. Actual site conditions as observed were incorporated into this worksheet and the attached Technical Information Report. To the best of my knowledge the information provided here is accurate.
Ken Hefner 7/12/16
Signed/Date



BIG ROCK PARK

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DESCRIPTION

JULY 12, 2016

VICINITY MAP

FIGURE

2

s:\lpd engineering pllc\projects\da hogan\big rock park\drainage\tir exhibits\figure 1 – vicinity map.dwg andreww 7/12/2016 8:49 AM

N

0 60 120

Scale 1"= 120'

EXISTING IMPERVIOUS AREA	
Existing Impervious	1.34 AC
Total Site Area	9.75 AC
Percentage of Site Impervious	13.7%

s:\lpd engineering pllc\projects\da hogan\big rock park\drainage\tir exhibits\figure 2 – existing impervious coverage.dwg andrew 7/12/2016 9:07 AM

BIG ROCK PARK

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EXISTING CONDITIONS & IMPERVIOUS COVERAGE

FIGURE

3

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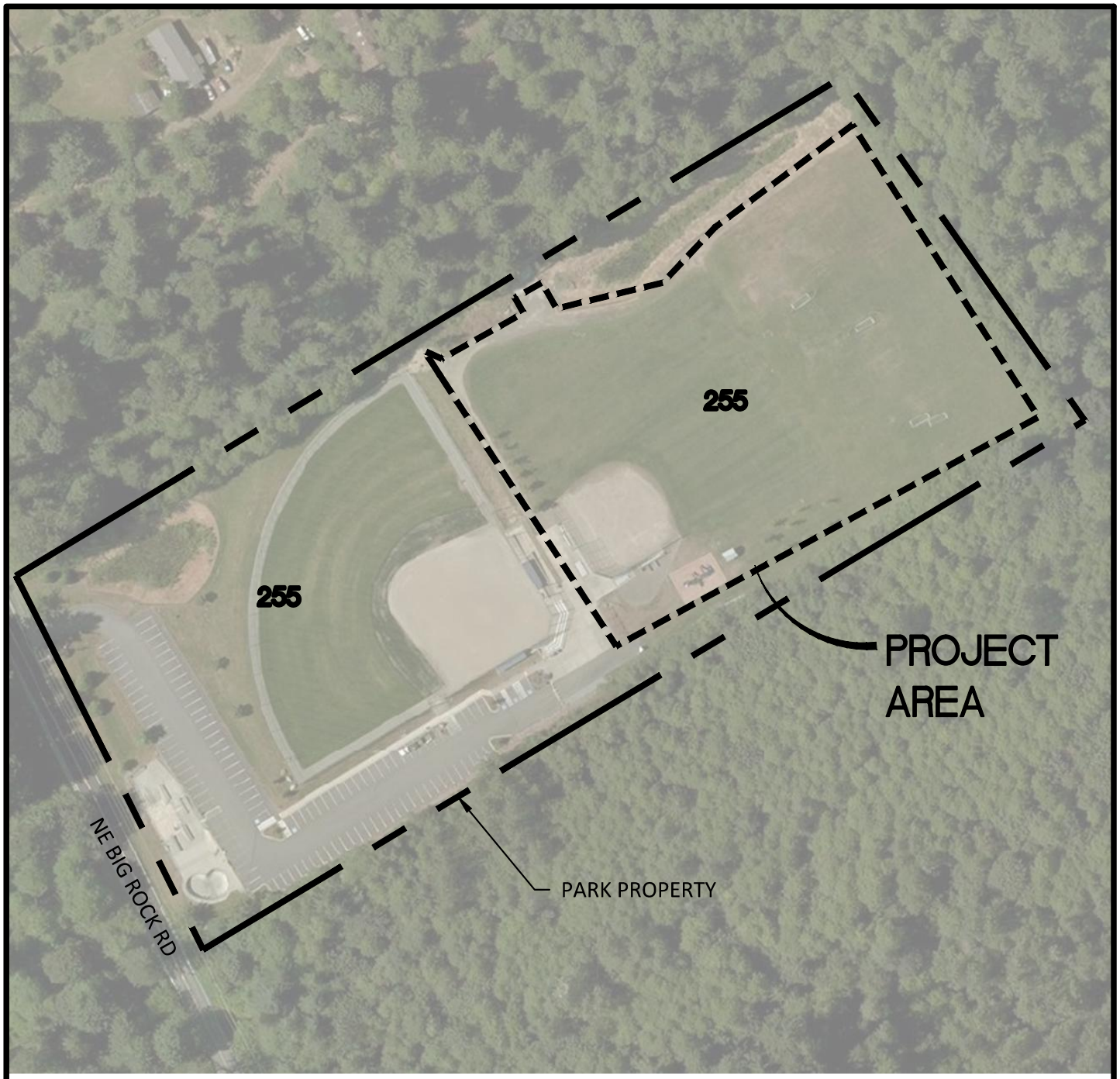

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SNOQUALMIE PASS AREA, WASHINGTON (WA634)

MAP UNIT SYMBOL	MAP UNIT NAME
255	Tokul Gravelly Medial Loam, 8% to 15% slopes

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DESCRIPTION

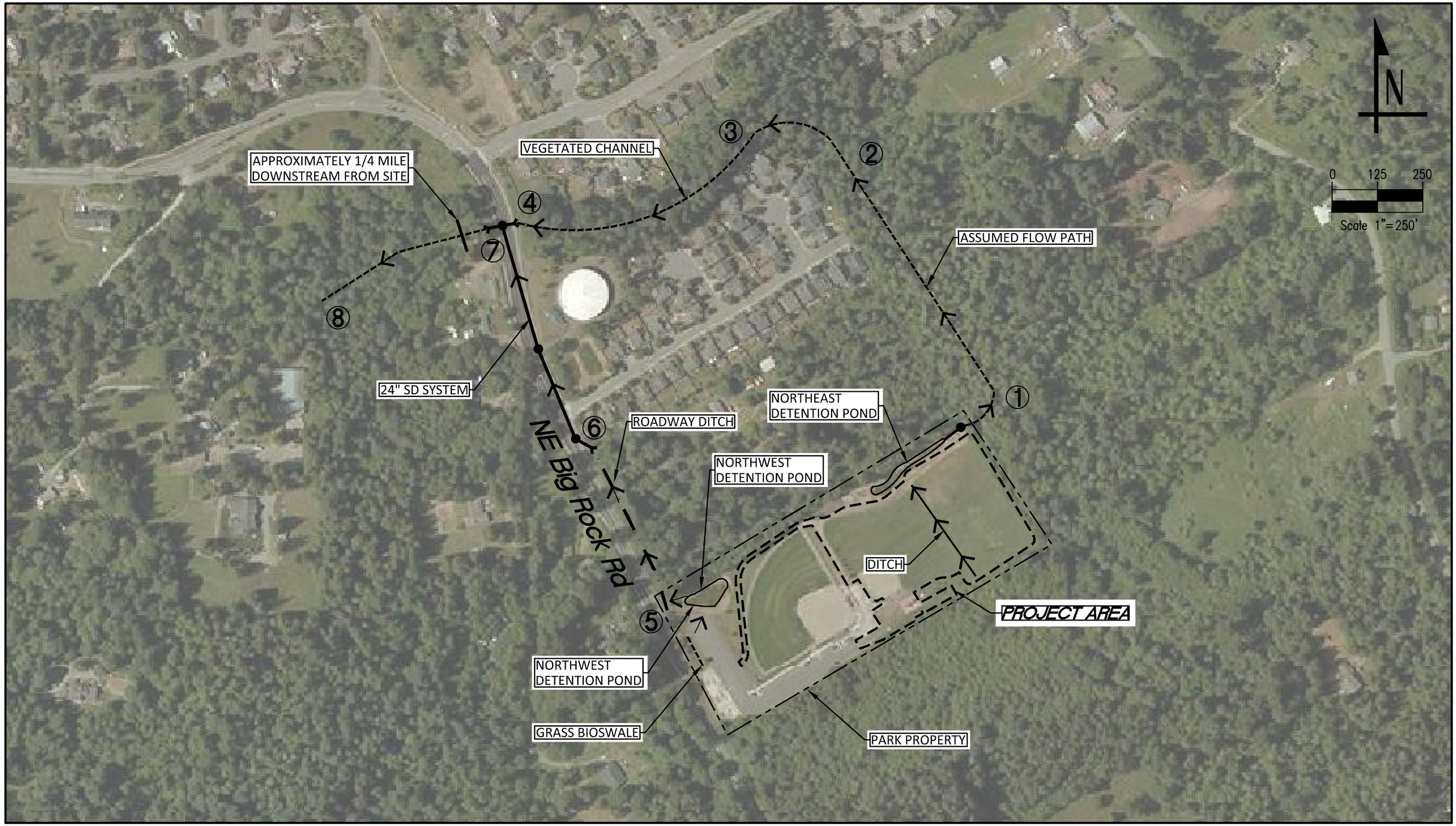
JULY 12, 2016

SOILS MAP

FIGURE

4

s:\lpd engineering pllc\projects\da hogan\big rock park\drainage\tir exhibits\figure 5 – downstream drainage map.dwg andreww 7/12/2016 9:48 AM



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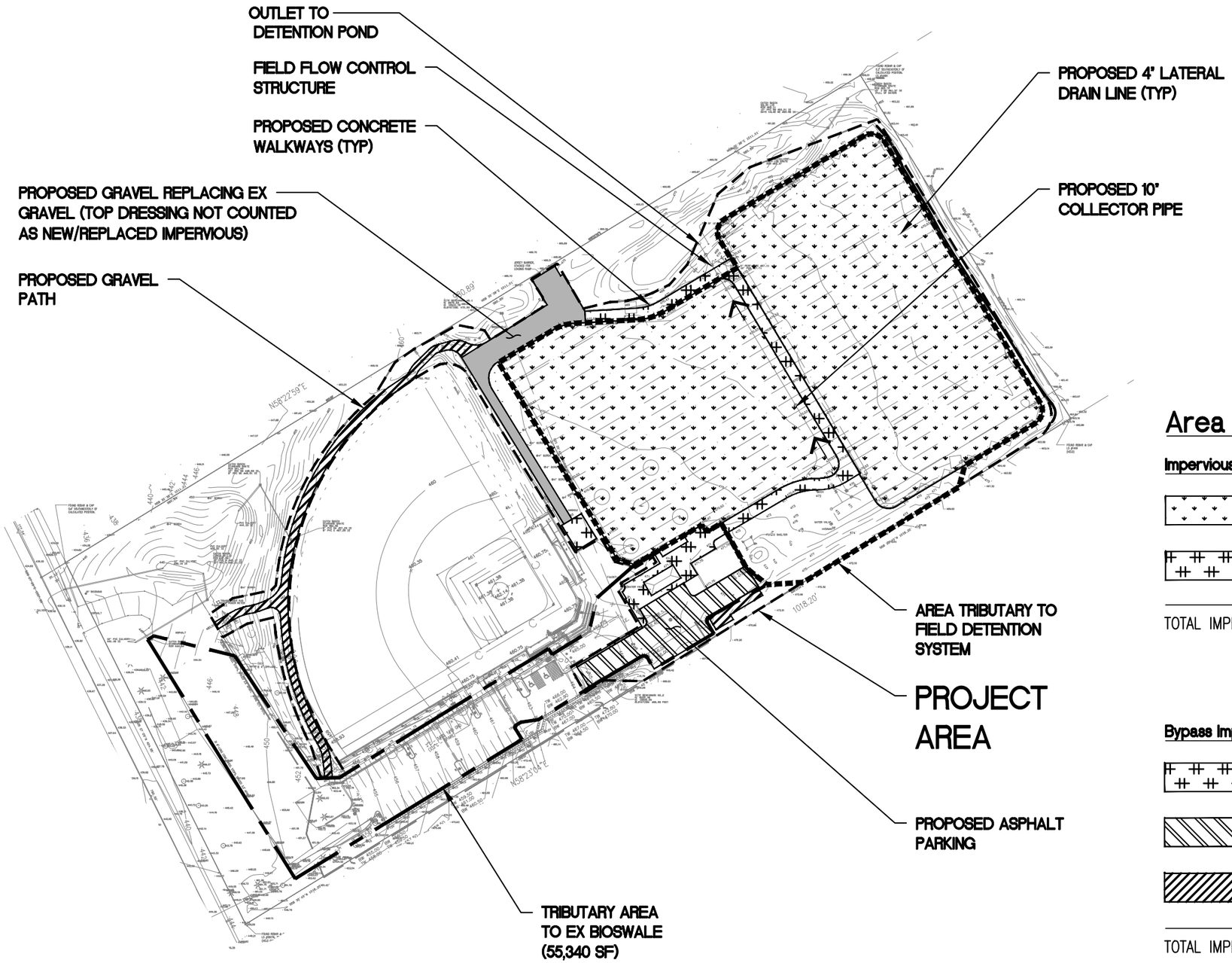
DESCRIPTION

JULY 12, 2016

DOWNSTREAM DRAINAGE MAP

FIGURE

5



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Scale 1"= 120'

Area Summary

Impervious Areas Tributary To Field

	SYNTHETIC TURF FIELD (131,890 SF AT 25% EFFECTIVE IMPERVIOUS)	32,973 SF (0.757 AC)
	CONCRETE WALKWAYS (100% EFFECTIVE IMPERVIOUS)	4,829 SF (0.111 AC)
	TOTAL IMPERVIOUS AREA TO FIELD DETENTION SYSTEM	37,802 SF (0.868 AC)

Bypass Impervious Area

	CONCRETE WALKWAYS (100% EFFECTIVE IMPERVIOUS)	6,070 SF (0.139 AC)
	ASPHALT PAVING (100% EFFECTIVE IMPERVIOUS)	7,594 SF (0.174 AC)
	GRAVEL PATHWAYS (100% EFFECTIVE IMPERVIOUS)	5.993 SF (0.138 AC)
	TOTAL IMPERVIOUS AREA TO BYPASS	19,657 SF (0.451 AC)

BIG ROCK PARK

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DESCRIPTION

PROPOSED CONDITIONS

JULY 12, 2016

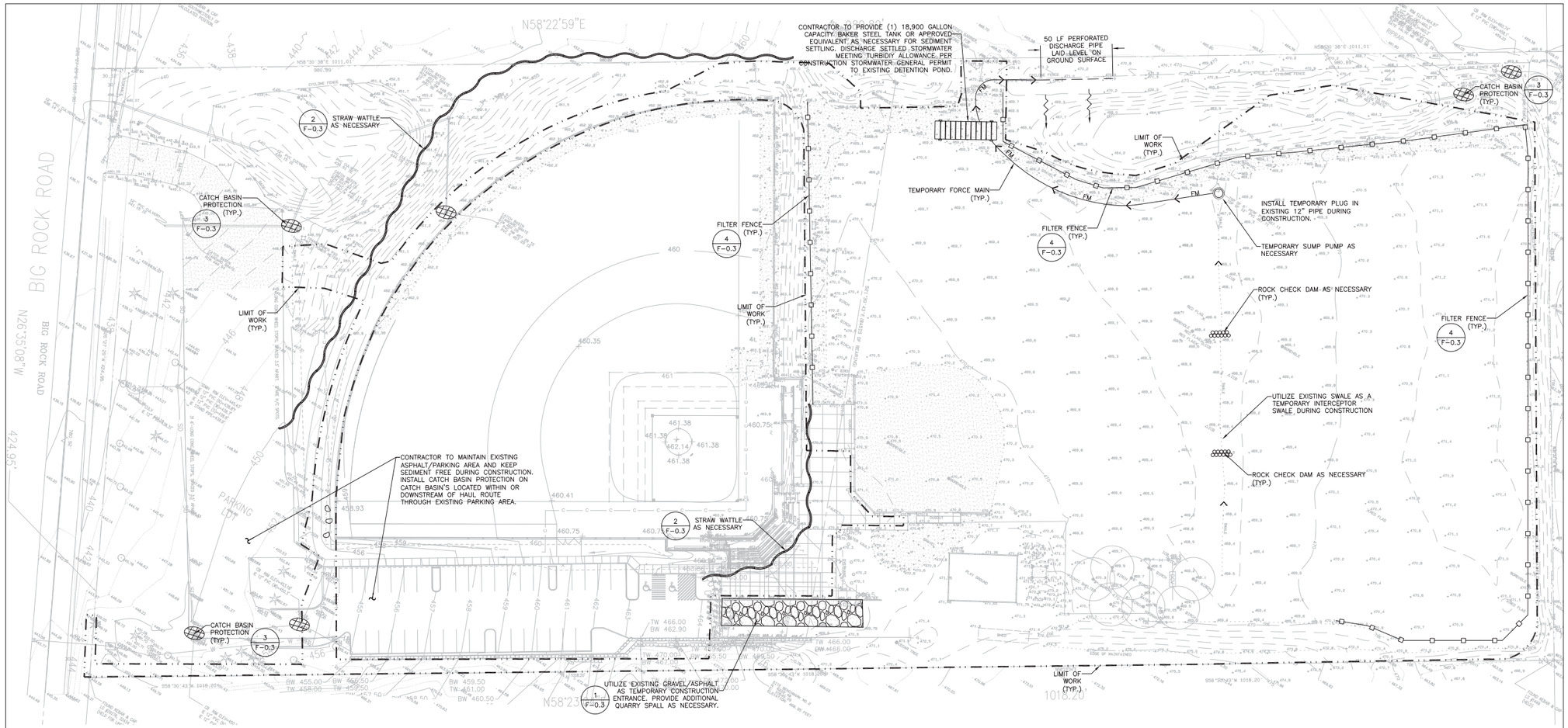
FIGURE

6

s:\lpd engineering pllc\projects\da hogan\big rock park\drainage\tir exhibits\figure 6 – proposed conditions.dwg andreww 8/15/2016 10:49 AM

APPENDIX A

Design Drawings



T.E.S.C. NOTES

T.E.S.C. NOTES SEE SHEET F-0.3

TESC LEGEND

- FILTER FENCE (4 / F-0.3)
- TEMPORARY INTERCEPTOR SWALE
- ROCK CHECK DAM
- FORCE MAIN
- BAKER TANK
- TEMPORARY STORAGE TANK
- STRAW WATTLE
- CATCH BASIN PROTECTION (3 / F-0.3)
- LIMIT OF WORK
- TEMPORARY CONSTRUCTION ENTRANCE (1 / F-0.3)

INSTALL CATCH BASIN PROTECTION AT ALL INLETS DOWNSTREAM OF THE SITE WITHIN 300' OF PROJECT LIMITS

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

File: F-0.1 Big Rock CURRENT 30x42.dwg Plotted by: Cornelisw Date: 12-Aug-16 2:21:53pm

REVISION	DATE

City of Duvall
Small Town. Real Life.

BIG ROCK PARK MULTI PURPOSE FIELD

DA HOGAN
119 1st Avenue South, Suite 110
Seattle, Washington 98104
p. 206.285.0400
f. 206.285.0480

STATE OF WASHINGTON
ROBERT S. HANDYSIDE
LANDSCAPE ARCHITECT

NORTH

0 30' 60'
SCALE: 1" = 30'

SEPA SET

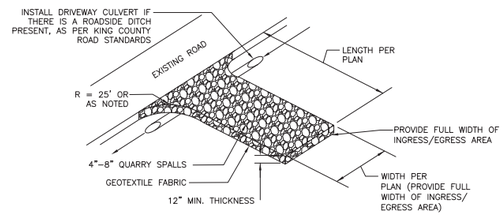
DATE	8-12-16
SCALE	1"=30'
DRAWN	CPW/JNM
CHECKED	RSH

COPYRIGHT © 2016 D.A. HOGAN & ASSOCIATES

T.E.S.C. PLAN

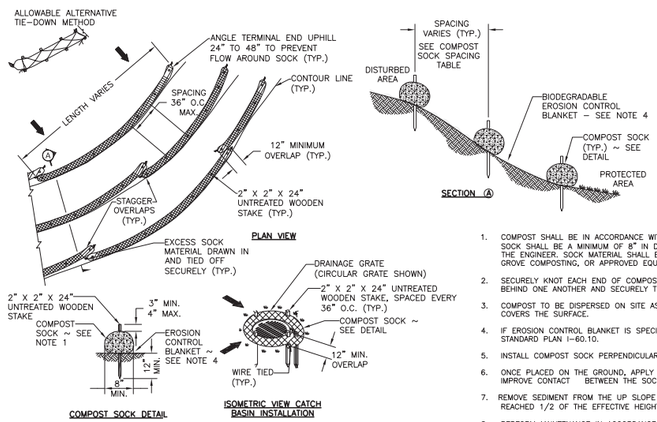
SHEET

F-0.2



1 / F-0.3 TEMPORARY CONSTRUCTION ENTRANCE

NOT TO SCALE

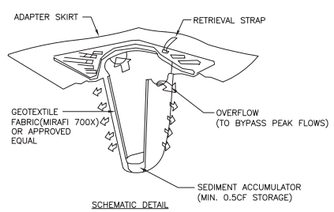


8" DIAMETER COMPOST SOCK SPACING TABLE	
SLOPE	MAXIMUM SPACING
1H : 1V	10' – 0"
2H : 1V	20' – 0"
3H : 1V	30' – 0"
4H : 1V	40' – 0"

1. COMPOST SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 9.14.5(6). COMPOST SOCK SHALL BE A MINIMUM OF 8" IN DIAMETER OR SIZED TO SUIT CONDITIONS AS SPECIFIED BY THE ENGINEER. SOCK MATERIAL SHALL BE BIO-DEGRADABLE, PROVIDE COMPOST SOCK BY CEDAR GROVE COMPOSTING, OR APPROVED EQUIVALENT.
2. SECURELY KNOT EACH END OF COMPOST SOCK. OVERLAP ADJACENT COMPOST SOCK ENDS 12" BEHIND ONE ANOTHER AND SECURELY TIE TOGETHER.
3. COMPOST TO BE DISPERSED ON SITE AS DETERMINED BY THE ENGINEER, WHEN VEGETATION COVERS THE SURFACE.
4. IF EROSION CONTROL BLANKET IS SPECIFIED, PLACE COMPOST SOCK ON TOP OF BLANKET. SEE STANDARD PLAN I-60.10.
5. INSTALL COMPOST SOCK PERPENDICULAR TO FLOW ALONG CONTOURS.
6. ONCE PLACED ON THE GROUND, APPLY WEIGHT TO THE SOCK BY WALKING ON OR ROLLING TO IMPROVE CONTACT BETWEEN THE SOCK AND THE GROUND SURFACE.
7. REMOVE SEDIMENT FROM THE UP SLOPE SIDE OF THE COMPOST SOCK WHEN ACCUMULATION HAS REACHED 1/2 OF THE EFFECTIVE HEIGHT OF THE COMPOST SOCK.
8. PERFORM MAINTENANCE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATION 8-01.3(15).
9. REFER TO WSDOT STANDARD SPECIFICATION 8-01.3(16) FOR REMOVAL.

2 / F-0.3 COMPOST FILTER SOCK

NOT TO SCALE

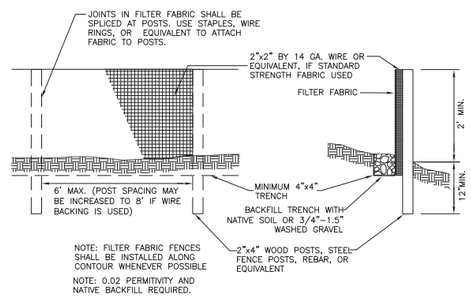


PROVIDE "STREAMGUARD SEDIMENT CATCH BASIN INSERT" OR APPROVED EQUAL

MANUFACTURER'S NAME: BOWHEAD ENVIRONMENTAL & SAFETY
ADDRESS: PO BOX 375 PRESTON, WA 98050
TELEPHONE: FOR INFORMATION: (800) 909-3677
WWW.SHOPBOWHEAD.COM

3 / F-0.3 CATCH BASIN INSERT

NOT TO SCALE



4 / F-0.3 REINFORCED SILT FENCE

NOT TO SCALE

T.E.S.C. NOTES

1. THE TESC FACILITIES SHOWN ON THE APPROVED PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS AND SHALL BE CONSTRUCTED AND IMPLEMENTED PRIOR TO ANY EXTENSIVE GRADING OR LAND CLEARING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL THE CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ONSITE EROSION HAS PASSED. THE TESC PLANS ARE TO BE CONSIDERED A DYNAMIC MINIMUM GUIDELINE AND AS SUCH WILL MOST LIKELY HAVE TO BE CONTINUALLY EVALUATED AND/OR MODIFIED DEPENDING ON SITE CONDITIONS.
2. THE IMPLEMENTATION OF THESE TESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE TESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS APPROVED.
3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
4. THE TESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT LADEN WATER DOES NOT ENTER THE DRAINAGE SYSTEM OR VIOLATE APPLICABLE WATER STANDARDS.
5. THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
6. THE TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A STORM EVENT.
7. DURING THE TIME PERIOD OF APRIL 1 THROUGH SEPTEMBER 30: ALL AREA STRIPPED OF VEGETATION THAT ARE TO BE LEFT UNWORKED FOR MORE THAN15 DAYS SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED TESC METHODS (E.G., SEEDING, MULCHING, NETTING, EROSION BLANKETS, ETC.). PHASING THE VEGETATION STRIPPING IN ORDER TO MINIMIZE THE EFFORT COVERING THE AREA IS THE BEST MANAGEMENT PRACTICE OF ALL.
8. DURING THE TIME PERIOD OF APRIL 1 THROUGH SEPTEMBER 30: ANY AREA NEEDING TESC MEASURES, NOT REQUIRING IMMEDIATE ATTENTION, SHALL BE ADDRESSED WITHIN FIFTEEN (15) DAYS.
9. DURING THE TIME PERIOD OF OCTOBER 1 THROUGH MARCH 31, ALL PROJECT DISTURBED AREAS GREATER THAN 5,000 SQUARE FEET THAT ARE TO BE LEFT UNWORKED FOR MORE THAN 12 HOURS SHALL BE COVERED BY ONE OF THE FOLLOWING COVER MEASURES: MULCH, SODDING, PLASTIC COVERING OR JUTE-MATTING.
10. AT NO TIME SHALL MORE THAN ONE-FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO FINAL CITY APPROVAL. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO THE DOWNSTREAM SYSTEM.
11. STABILIZED CONSTRUCTION ENTRANCES AND WASH PADS SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT. (RCW 46.61.655).
12. ANY PERMANENT RETENTION/DETENTION FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES AND SHALL PROVIDE ADEQUATE STORAGE CAPACITY. IF THE PERMANENT FACILITY IS TO FUNCTION ULTIMATELY AS AN INFILTRATION OR DISPERSION SYSTEM, THE FACILITY SHALL NOT BE USED AS A TEMPORARY SETTLING BASIN.
13. WHERE SEEDING FOR TEMPORARY EROSION CONTROL IS REQUIRED, FAST GERMINATING GRASSES SHALL BE APPLIED AT AN APPROPRIATE RATE (SEE HYDRO-SEEDING SPECIFICATIONS).
14. WHERE STRAW MULCH FOR TEMPORARY EROSION CONTROL IS REQUIRED, IT SHALL BE APPLIED AT A MINIMUM THICKNESS OF TWO INCHES OR SUFFICIENT THICKNESS TO COMPLETELY COVER THE SOIL, WHICHEVER IS GREATER.
15. WHERE DISTURBED AREAS HAVE SLOPES ARE GREATER THAN 15% JUTE MATTING SHALL BE USED TO COVER AND PROTECT THE EARTH SURFACE.

REVISION	DATE

City of Duvall
Small Town. Real Life.

BIG ROCK PARK MULTI PURPOSE FIELD

DA HOGAN
119 1st Avenue South, Suite 110 Seattle, Washington 98104
p. 206.285.0400 f. 206.285.0480

STATE OF WASHINGTON ROBERT S. HARDING LANDSCAPE ARCHITECT

SEPA SET

DATE	8-12-16
SCALE	NTS
DRAWN	CPW
CHECKED	RSH

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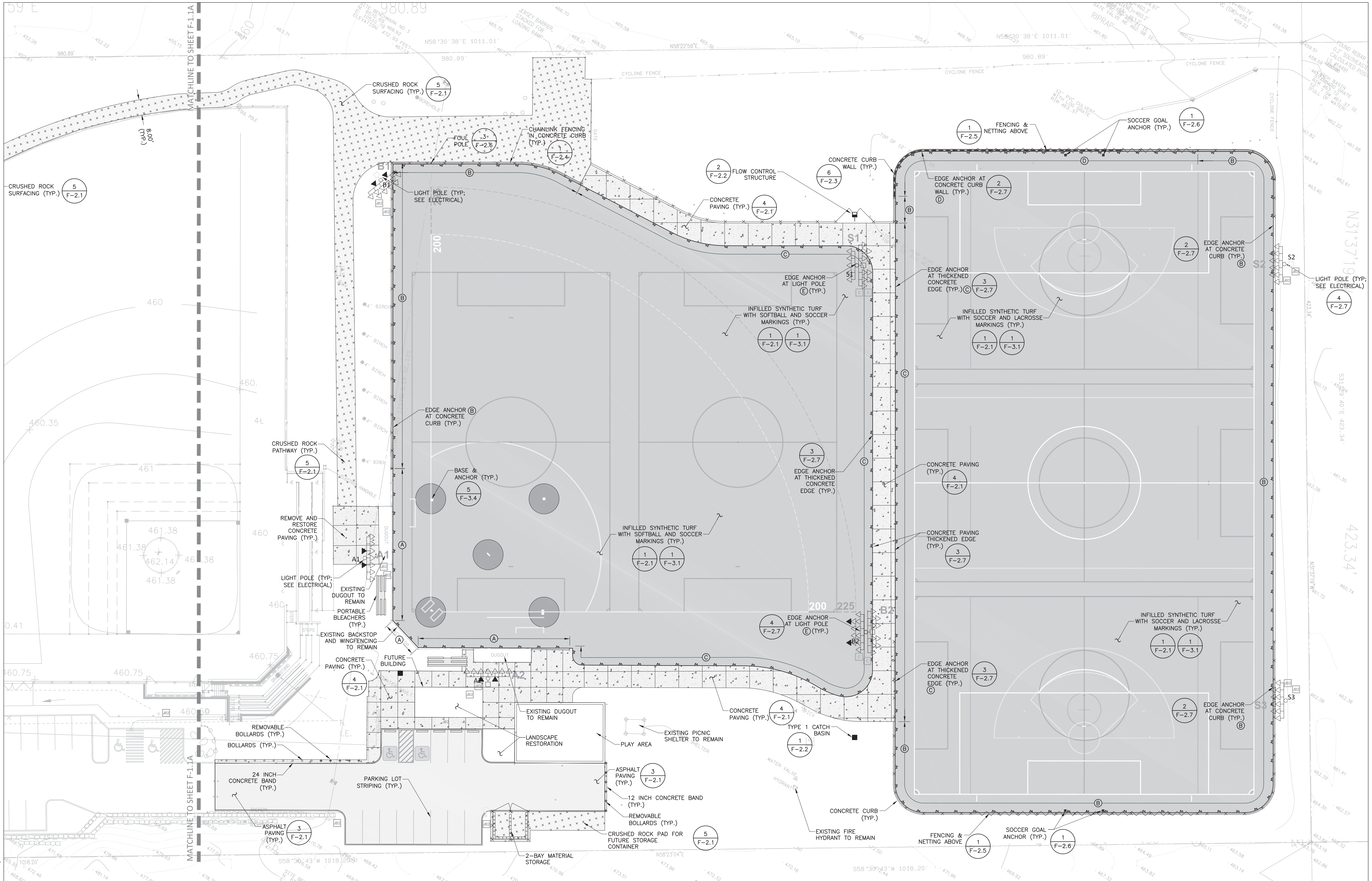
TESC DETAILS & NOTES

SHEET

F-0.3

File: F-0.3 TESC Details.dwg Plotted by: CorneliaW Date: 12-Aug-16 12:44:37pm



EDGE ANCHOR KEY

- (A) EDGE ANCHOR AT EXISTING CONCRETE CURB — 2 / F-2.7
- (B) EDGE ANCHOR AT NEW CONCRETE CURB — 2 / F-2.7
- (C) EDGE ANCHOR AT THICKENED CONCRETE EDGE — 3 / F-2.7
- (D) EDGE ANCHOR AT CONCRETE CURB WALL — 6 / F-2.3
- (E) EDGE ANCHOR AT LIGHTPOLE — 4 / F-2.7

LAYOUT NOTES

NOTE LEGEND
1. (INDICATES GENERAL CONSTRUCTION NOTE)
(3) (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

1. MAINTAIN EXISTING FENCING AND/OR PROVIDE 6 FOOT HIGH TEMPORARY CHAINLINK FENCING TO SECURE THE PROJECT AREA.
2. INSTALL TURF ANCHOR AROUND THE ENTIRE PERIMETER OF THE NEW SYNTHETIC TURF FIELD EVENT AREA.
3. PROTECT ALL STRUCTURES TO REMAIN.
4. SEE FENCING PLAN FOR FENCE HEIGHT AND TYPE.
5. COORDINATE WITH ELECTRICAL DRAWINGS FOR LIGHTPOLE AND BOX LOCATIONS.
6. RESTORE AND HYDROSEED ALL DISTURBED NON-SURFACES PERIMETER AREAS TO BETTER OR ORIGINAL CONDITION UNLESS OTHERWISE NOTED.
7. MEET AND MATCH EXISTING ADJACENT SURFACE.
8. SEE LANDSCAPE PLANTING PLAN FOR LIMIT OF SITE RESTORATION.

LAYOUT LEGEND

- GREEN OR BROWN COLORED SYNTHETIC TURF AND PERMEABLE AGGREGATE
- CRUSHED ROCK
- ASPHALT PAVING
- CONCRETE PAVING
- CHAINLINK FENCE AND CONCRETE CURB
- CHAINLINK FENCE
- CHAINLINK FENCE AND NETTING ABOVE
- CONCRETE CURBING
- LIMIT OF SYNTHETIC TURF AND CONCRETE EDGE ANCHOR
- CONCRETE CURB WALL
- FLOW CONTROL STRCUTURE
- CATCH BASIN INLET (C.B.I.) TYPE 1

File: F-0.1 Big Rock CURRENT 30x42.dwg Plotted by: CornellW Date: 12-Aug-16 2:34:42pm

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City of Duvall
Small Town. Real Life.

BIG ROCK PARK MULTI PURPOSE FIELD

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STATE OF WASHINGTON — ROBERT S. HARDING — LANDSCAPE ARCHITECT

NORTH

0 — 20' — 40'
SCALE: 1" = 20'

SEPA SET

DATE	8-12-16
SCALE	1"=20'
DRAWN	CPW
CHECKED	RSH

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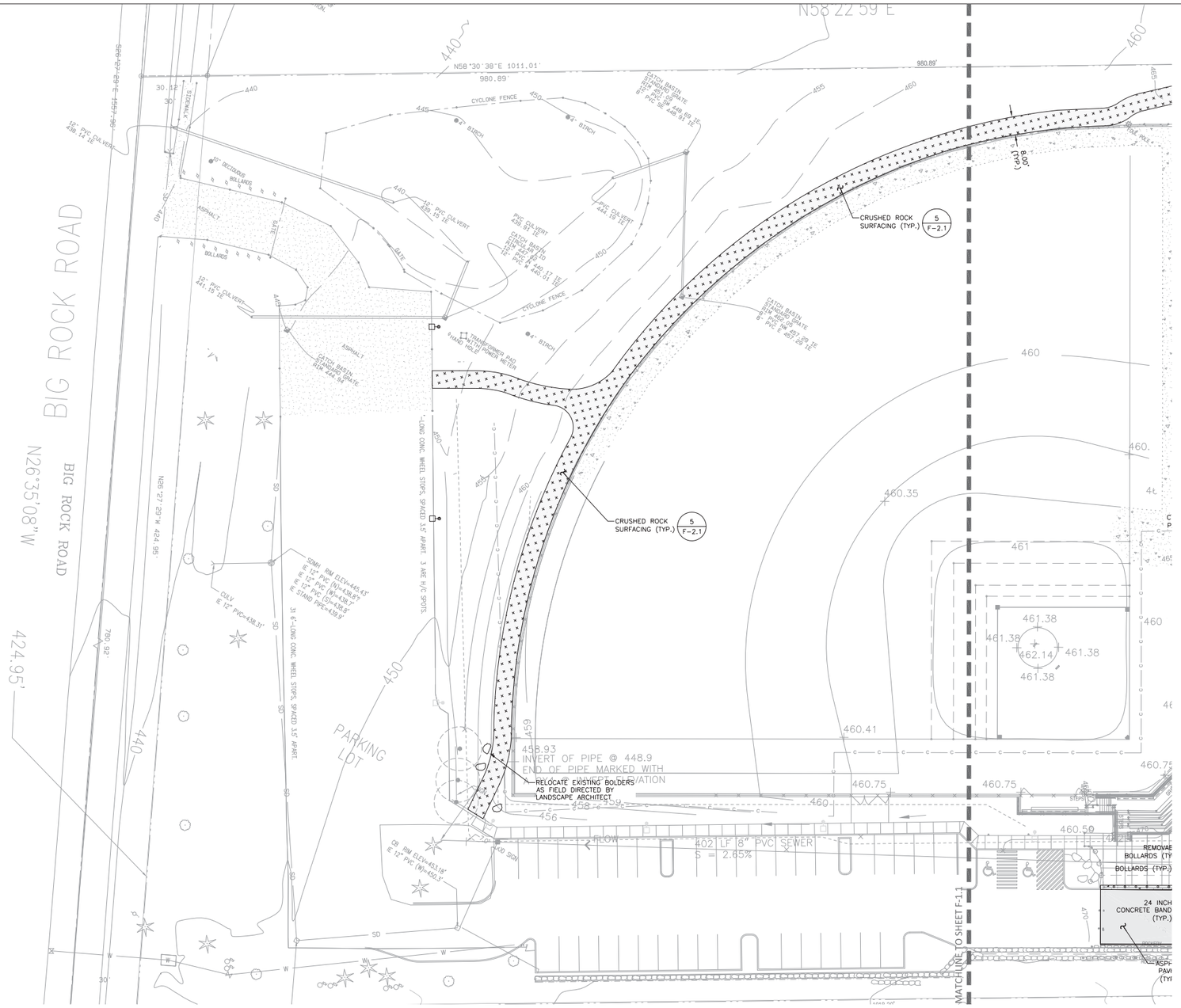
ATHLETIC FIELDS LAYOUT PLAN

SHEET

F-1.1



LAYOUT NOTES

1. MAINTAIN EXISTING FENCING AND/OR PROVIDE 6 FOOT HIGH TEMPORARY CHAINLINK FENCING TO SECURE THE PROJECT AREA.
2. PROTECT ALL STRUCTURES TO REMAIN.
3. COORDINATE WITH ELECTRICAL DRAWINGS FOR LIGHTPOLE AND BOX LOCATIONS.
4. RESTORE AND HYDROSEED ALL DISTURBED NON-SURFACES PERIMETER AREAS TO BETTER OR ORIGINAL CONDITION UNLESS OTHERWISE NOTED.
5. MEET AND MATCH EXISTING ADJACENT SURFACE.

NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)
3. (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

LAYOUT LEGEND

- CRUSHED ROCK
- ASPHALT PAVING
- CONCRETE PAVING
- LANDSCAPE RESTORATION

REVISION	DATE

City of Duvall
Small Town. Real Life.

BIG ROCK PARK
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STATE OF WASHINGTON
ROBERT S. HOGAN
LANDSCAPE ARCHITECT

NORTH

0 20' 40'
SCALE: 1" = 20'

SEPA SET

DATE	8-12-16
SCALE	1"=20'
DRAWN	CPW
CHECKED	RSH

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PARKING LOT &
PATHWAY
LAYOUT PLAN

SHEET

F-1.1A

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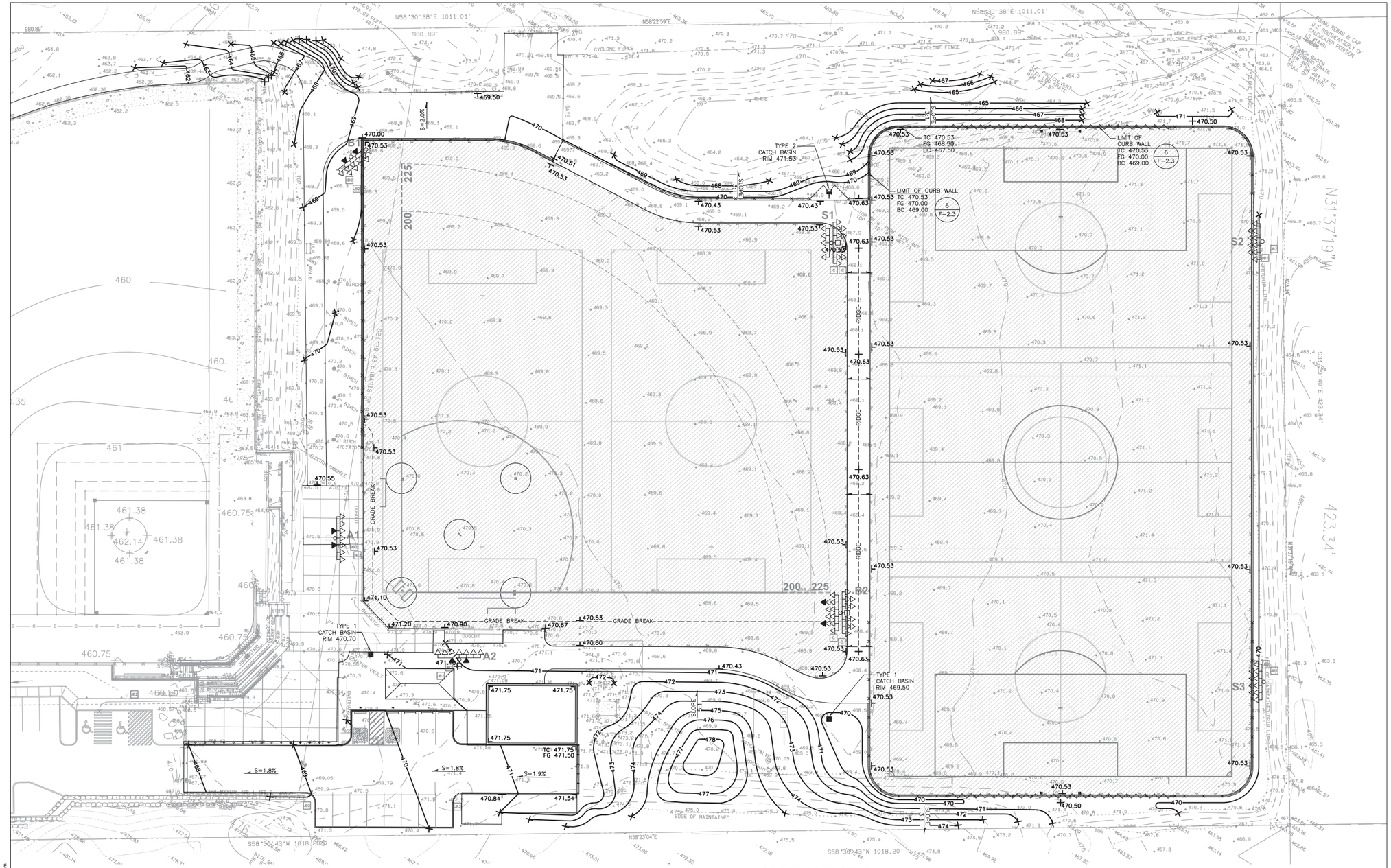

FIELD AND TRACK ELEVATIONS

SYNTHETIC TURF FIELD:

MULTIPURPOSE FIELD (NORTH):

FINISH GRADE OF SYNTHETIC TURF INFILL:	470.53
FINISH GRADE OF ELASTIC LAYER PAD:	470.42
FINISH GRADE OF TOP COURSE PERMEABLE AGGREGATE:	470.33
FINISH GRADE OF BASE COURSE PERMEABLE AGGREGATE:	470.16
SUBGRADE ELEVATION:	470.50

SOFTBALL FIELD (SOUTH):

FINISH GRADE OF SYNTHETIC TURF INFILL:	470.53
FINISH GRADE OF ELASTIC LAYER PAD:	470.42
FINISH GRADE OF TOP COURSE PERMEABLE AGGREGATE:	470.33
FINISH GRADE OF BASE COURSE PERMEABLE AGGREGATE:	470.16
SUBGRADE ELEVATION:	470.50

GRADING NOTES

1. THE CONTRACTOR SHALL CALL AND NOTIFY DIGALERT AT 8-1-1 A MINIMUM OF 2 WORKING DAYS BEFORE DEMOLITION, DIGGING, OR GRADING OPERATIONS OCCUR.
2. NEW CONTOURS SHOWN ARE FINISH GRADE ELEVATIONS.
3. BACKFILL AND COMPACT EXCAVATED AREAS RESULTING FROM DEMOLITION ACTIVITIES WITH SELECT FILL TO 95% WITH 12" MAX LIFTS.
4. STRIP FIELD AREA OF EXISTING SOD AND ORGANIC MATERIALS AND DISPOSE OF OFF SITE. ALL EXCESS AND UNSUITABLE SOIL MATERIALS SHALL BE REMOVED AND DISPOSED OF OFF SITE.
5. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS, GROUNDWATER OR DISCREPANCIES IN THE EXISTING CONDITIONS AS NOTED ON THE PLANS.
6. ALL PERIMETER PAVING SHALL MEET AND MATCH ADJACENT SURFACES.

NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)
3. (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

GRADING LEGEND

110	EXISTING CONTOUR LINES
470.53	SPOT ELEVATION
470	NEW CONTOUR LINES
470.5	NEW HALF CONTOUR LINES
S=2.0%	SURFACE SLOPE
C	CONSTANT SURFACE SLOPE
	MATCH TO EXISTING
	LIMIT OF PERMEABLE AGGREGATE
	CONCRETE CURB WALL
	TYPE 1 CATCH BASIN
	FLOW CONTROL STRUCTURE
	CHAINLINK FENCE AND CONCRETE CURB
	CHAINLINK FENCE
TC 474.85	TOP OF CURB WALL ELEVATION
BC 469.40	BOTTOM OF CURB WALL ELEVATION
FG 470.40	FINISH GRADE ELEVATION AT CURB WALL

TC
CURB WALL
FG
BC

Know what's below. Call before you dig.

File: F-0.1 Big Rock CURRENT 30x42.dwg Plotted by: CorneliaW Date: 12-Aug-16 2:38:20pm

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BIG ROCK PARK
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f. 206.285.0480

STATE OF WASHINGTON
ROBERT S. HOGAN
LANDSCAPE ARCHITECT

NORTH

0 20' 40'
SCALE: 1" = 20'

SEPA SET

DATE	8-12-16
SCALE	1"=20'
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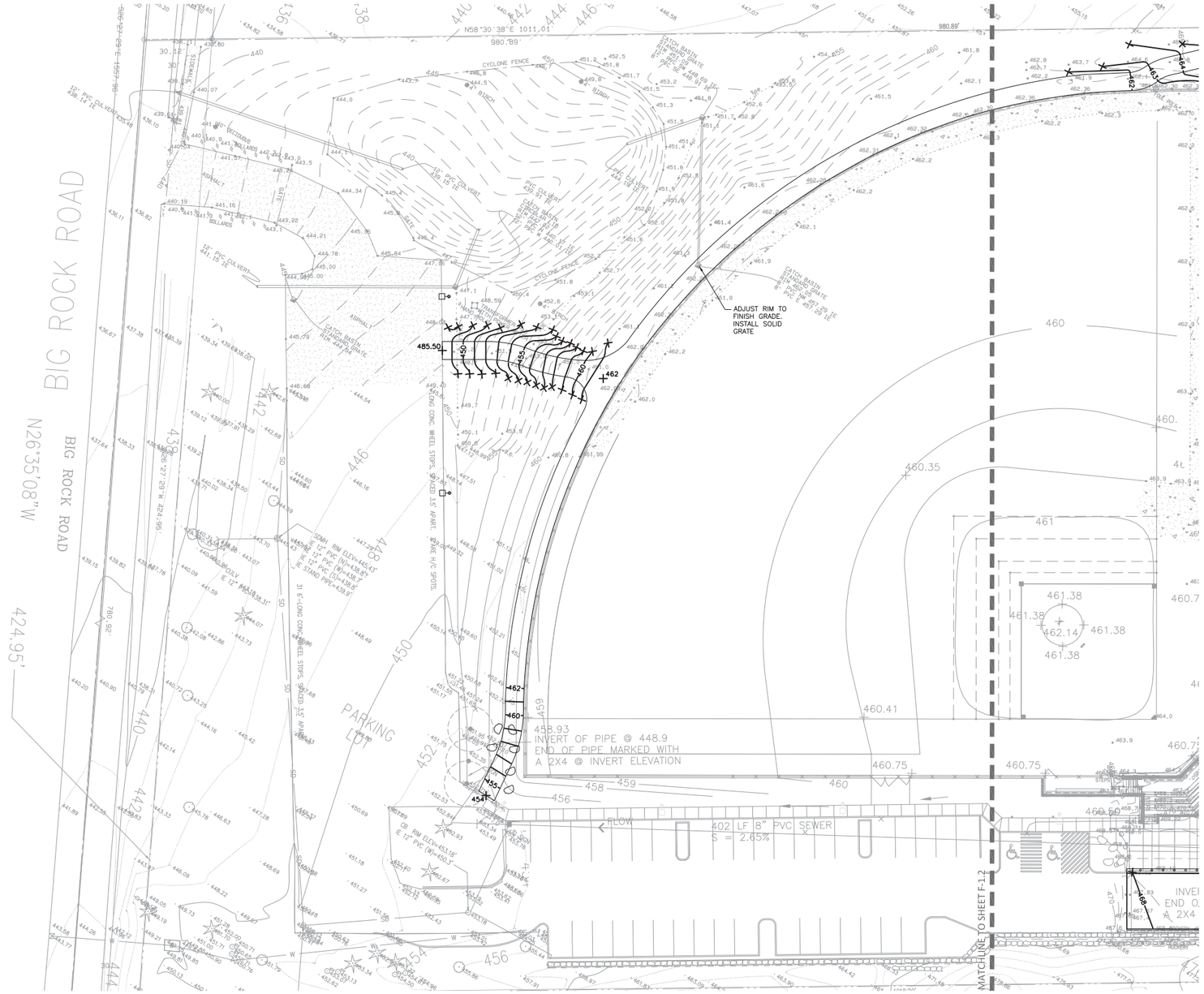
ATHLETIC FIELDS
GRADING PLAN

SHEET
F-1.2



GRADING NOTES

1. THE CONTRACTOR SHALL CALL AND NOTIFY DIGALERT AT 8-1-1 A MINIMUM OF 2 WORKING DAYS BEFORE DEMOLITION, DIGGING, OR GRADING OPERATIONS OCCUR.
2. NEW CONTOURS SHOWN ARE FINISH GRADE ELEVATIONS.
3. BACKFILL AND COMPACT EXCAVATED AREAS RESULTING FROM DEMOLITION ACTIVITIES WITH SELECT FILL TO 95% WITH 12" MAX LIFTS.
4. STRIP FIELD AREA OF EXISTING SOD AND ORGANIC MATERIALS AND DISPOSE OF OFF SITE. ALL EXCESS AND UNSUITABLE SOIL MATERIALS SHALL BE REMOVED AND DISPOSED OF OFF SITE.
5. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS, GROUNDWATER OR DISCREPANCIES IN THE EXISTING CONDITIONS AS NOTED ON THE PLANS.
6. ALL PERIMETER PAVING SHALL MEET AND MATCH ADJACENT SURFACES.

NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)
3. (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

GRADING LEGEND

110	EXISTING CONTOUR LINES		CHAINLINK FENCE AND CONCRETE CURB
470.53	SPOT ELEVATION		CHAINLINK FENCE
470	NEW CONTOUR LINES		
470.5	NEW HALF CONTOUR LINES		
S=2.0%	SURFACE SLOPE		
c	CONSTANT SURFACE SLOPE		
	MATCH TO EXISTING		

Know what's below. Call before you dig.

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STATE OF WASHINGTON
ROBERT S. HOGAN
LICENSED LANDSCAPE ARCHITECT

NORTH

0 20' 40'
SCALE: 1" = 20'

SEPA SET

DATE	8-12-16
SCALE	1"=20'
DRAWN	CPW
CHECKED	RSH

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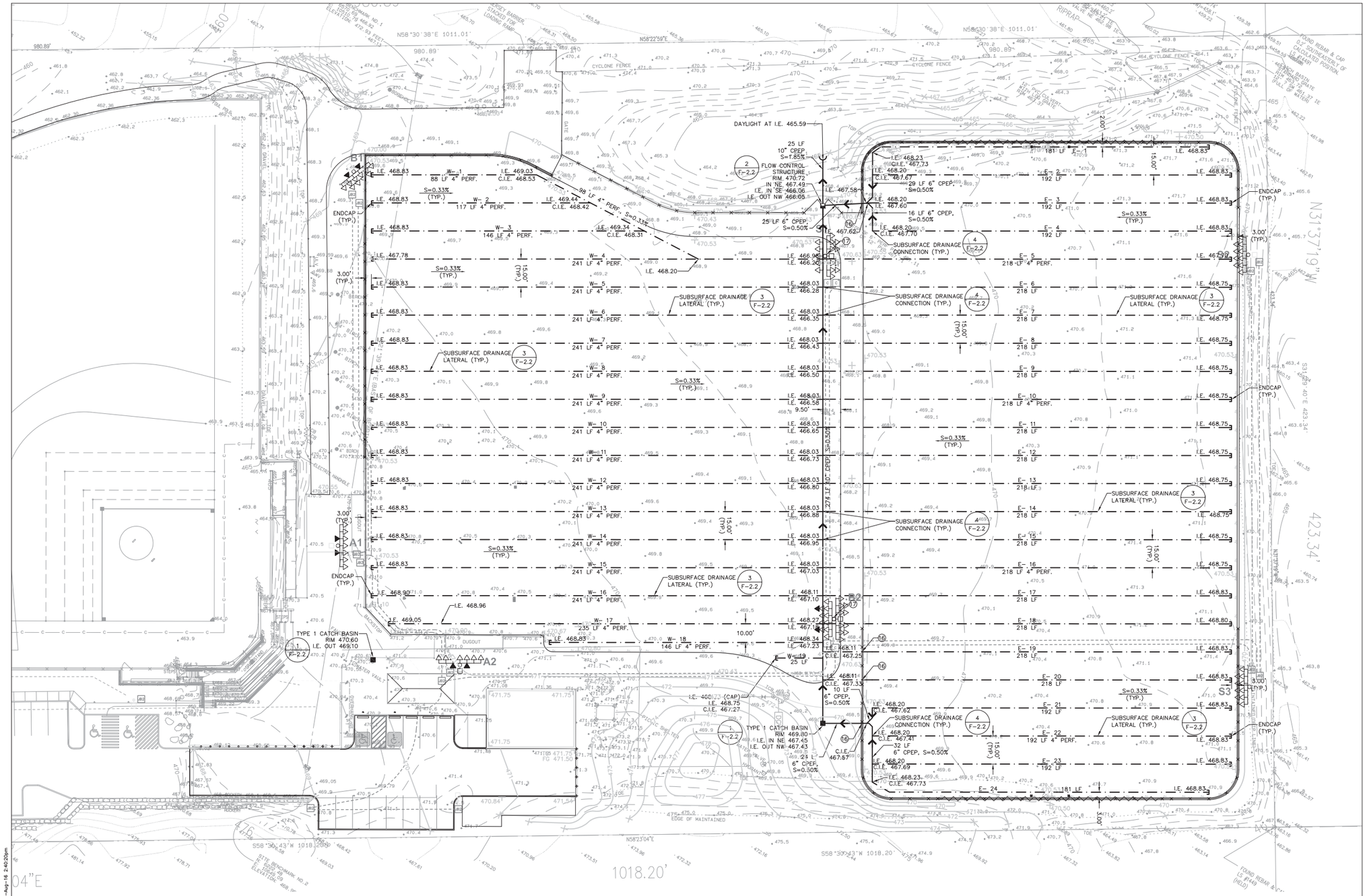
PARKING LOT &
PATHWAY
GRADING PLAN

SHEET

F-1.2A



DRAINAGE NOTES

1. SUBSURFACE DRAINAGE COLLECTOR PIPE CAN BE INSTALLED PRIOR TO FINAL ACCEPTANCE OF THE FIELD SUBGRADE.
2. COORDINATION: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT THE IRRIGATION PIPING IS INSTALLED AT A SUFFICIENT DEPTH BELOW SUBGRADE BEFORE THE TRENCHING FOR THE SUBSURFACE DRAINAGE SYSTEMS TO AVOID CONFLICTS BETWEEN SYSTEMS.
3. TRENCHING FOR THE SUBSURFACE DRAINAGE LATERALS SHALL NOT PROCEED UNTIL THE IRRIGATION SYSTEM PIPING HAS BEEN BACKFILLED AND COMPACTED AND THE FIELD SUBGRADE IS APPROVED BY ENGINEER.
4. TRENCH EXCAVATION SHALL BE MADE TO THE ALIGNMENT, ELEVATION, GRADE AND SLOPE AS INDICATED ON THE DRAWINGS. TRENCHING SHALL BE ACCOMPLISHED UTILIZING EQUIPMENT WITH SLOPE AND DEPTH CONTROL, SUCH AS "LASER PLANE CONTROL SYSTEM", SO AS TO ENSURE ACCURACY IN THE BOTTOM OF THE TRENCH.
5. NO HIGH POINTS ABOVE DESIGNATED INVERT OR CALCULATED TRENCH BOTTOM ELEVATION WILL BE PERMITTED. NO SLOUGHING OF SITE MATERIAL OR LOOSE EXCAVATED SOIL WILL BE PERMITTED TO REMAIN IN THE TRENCHES.
6. SURPLUS EXCAVATED SOIL SHALL BE REMOVED FROM THE FIELD AREA PRIOR TO COMMENCING ON THE NEXT ADJACENT TRENCH. EXCAVATED MATERIAL MAY NOT REMAIN ON SUBGRADE.
7. PROVIDE A SMOOTH, EVEN SUBGRADE AFTER REMOVAL OF THE TRENCH MATERIAL. SUBGRADE TO BE COMPACTED TO 95%. LEAVE NO LOOSE MATERIAL ON THE SUBGRADE.
8. EXCAVATION BELOW INVERT GRADE MUST BE ESTABLISHED TO A DEPTH SO AS TO PROVIDE FOR SPECIFIED PLACEMENT OF PEA GRAVEL BEDDING AT BOTTOM OF PIPE ELEVATION PRIOR TO LAYING THE PERFORATED PIPE.
9. NO FOREIGN MATERIAL WILL BE PERMITTED INSIDE, ALONGSIDE, UNDER, OR ON TOP OF THE PERFORATED DRAIN PIPE.
10. THE BACKFILL FOR ALL PERFORATED PIPE SHALL BE CLEAN WASHED PEA GRAVEL. REFER TO THE SPECIFICATIONS FOR THE GRADATION REQUIREMENTS.
11. ALL TRENCHES TO HAVE BACKFILL MATERIAL "CROWNED" A MINIMUM OF 2" ABOVE SUBGRADE TO PROTECT FROM FOREIGN MATERIAL AND PROVIDE FOR EASE OF LOCATION IDENTIFICATION. CROWNS WITH FOREIGN MATERIAL CONTAMINATION SHALL BE REMOVED PRIOR TO PLACEMENT OF BASE AGGREGATE.
12. DURING PLACEMENT OF SPECIFIED TRENCH BACKFILL, PIPE MUST BE HELD IN PLACE TO PREVENT DISPLACEMENT AND PROVIDE FOR ACHIEVING SPECIFIED INVERT ELEVATION. DO NOT DAMAGE PIPE OR ALLOW PIPE TO BE DISPLACED BY PLACEMENT OF BACKFILL MATERIAL.
13. CAP THE ENDS OF ALL LATERAL RUNS. ALL OPEN ENDS DURING CONSTRUCTION ARE TO BE TEMPORARILY CAPPED OR PLUGGED.
14. CONNECTION OF LATERALS TO COLLECTOR DRAINS SHALL BE MADE WITH A COMBINATION REDUCING TEE AND REDUCING SADDLE TEE.
15. NO TRUCKS OR EQUIPMENT WILL BE ALLOWED TO DRIVE OVER THE TOP OF THE TRENCHES EXCEPT TRACK-EQUIPPED MACHINERY UTILIZED IN SPREADING BASE AGGREGATE. BACKFILLED TRENCHES ARE TO BE STAKED AND FLAGGED 3' ABOVE GRADE AT MAXIMUM 30' SPACING FOR IDENTITY.
16. COORDINATE SUBSURFACE DRAINAGE COLLECTOR LOCATION TO AVOID FENCE POST LOCATIONS.
17. COORDINATE SUBSURFACE DRAINAGE COLLECTOR LOCATION TO AVOID FIGHT POLE FOUNDATIONS.
18. ALL LATERAL-COLLECTOR CONNECTIONS SHALL BE A SIDE INLET CONNECTION FROM 6" MIN-24" MAX. SWITCH TO DROP CONNECTION 24" AND ABOVE.

NOTE LEGEND

1. (INDICATES GENERAL CONSTRUCTION NOTE)
3. (INDICATES SPECIFIC CONSTRUCTION KEYNOTE)

DRAINAGE LEGEND

E— · —	END CAP
— · — · —	4" PERF. CORR. POLY DRAIN TUBING
———	CPEP SUBSURFACE DRAINAGE COLLECTOR OR STORM DRAIN PIPE
S=0.33%	SLOPE
←	FLOW DIRECTION
IE 464.30	INVERT ELEVATION
CIE 463.00	COLLECTOR INVERT ELEVATION

File: F-0.1 Big Rock CURRENT 30x42.dwg Plotted by: CorneliaW Date: 12-Aug-16 2:40:20pm

REVISION	DATE

City of Duvall
Small Town. Real Life.

BIG ROCK PARK
MULTI PURPOSE
FIELD

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STATE OF WASHINGTON
ROBERT S. HANSEN
LANDSCAPE ARCHITECT

NORTH

0 20' 40'
SCALE: 1" = 20'

SEPA SET

DATE	8-12-16
SCALE	1"=30'
DRAWN	CPW
CHECKED	RSH

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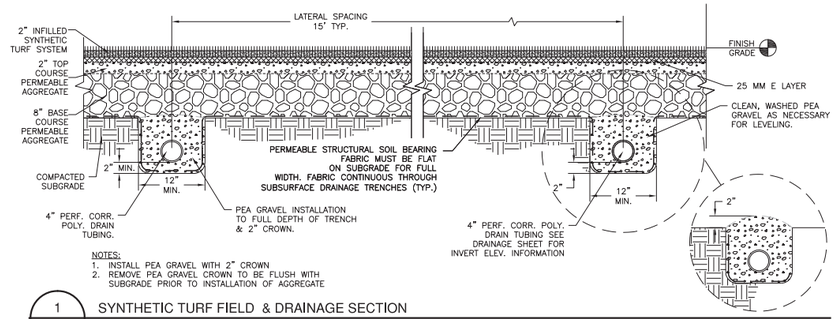
ATHLETIC FIELDS
DRAINAGE PLAN

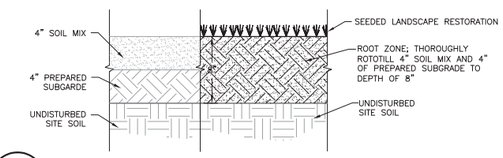
SHEET
F-1.3



NOTES:
1. INSTALL PEA GRAVEL WITH 2" CROWN
2. REMOVE PEA GRAVEL CROWN TO BE FLUSH WITH SUBGRADE PRIOR TO INSTALLATION OF AGGREGATE

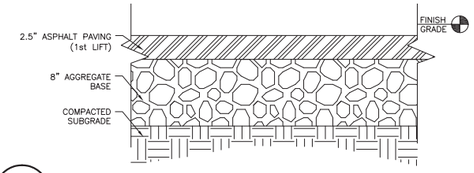
1 / F-2.1 SYNTHETIC TURF FIELD & DRAINAGE SECTION

NOT TO SCALE



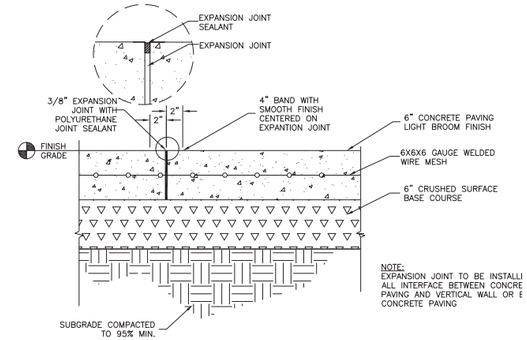
2 / F-2.1 SITE RESTORATION SOIL BASED

NOT TO SCALE

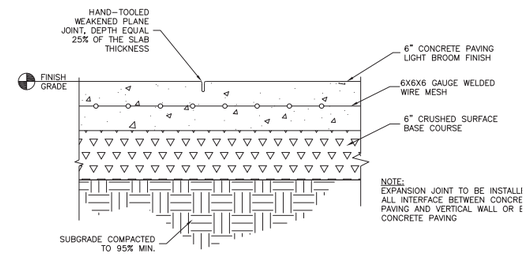


3 / F-2.1 ASPHALT PAVING SECTION

NOT TO SCALE



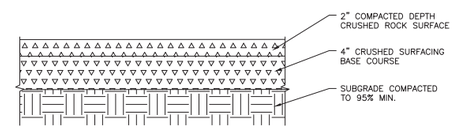
A: CONCRETE PAVING AT EXPANSION JOINT



B: CONCRETE PAVING WITH WEAKENED PLANE JOINT

4 / F-2.1 CONCRETE PAVING

NOT TO SCALE



5 / F-2.1 CRUSHED ROCK SURFACING

NOT TO SCALE

REVISION	DATE

City of Duvall
Small Town. Real Life.

BIG ROCK PARK MULTI PURPOSE FIELD

DA HOGAN
119 1st Avenue South, Suite 110
Seattle, Washington 98104
p. 206.285.0400
f. 206.285.0480

STATE OF WASHINGTON
ROBERT S. HOGAN
CERTIFICATE NO. 1114
LANDSCAPE ARCHITECT

SEPA SET

DATE	8-12-16
SCALE	NTS
DRAWN	CPW/DMD
CHECKED	RSH

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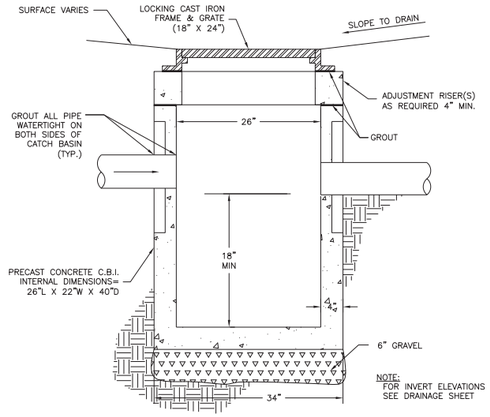
SITE SECTIONS & DETAILS

SHEET

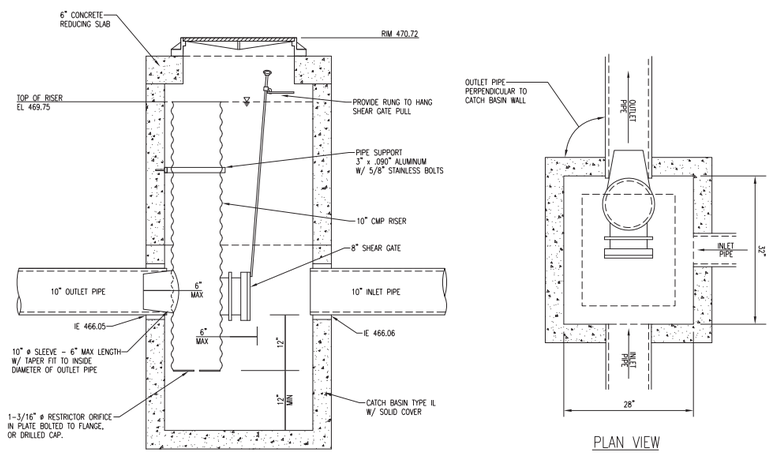
F-2.1

File: F-2.1 Site Sections & Details.dwg Plotted by: CornelisW Date: 12-Aug-16 1:11:55pm



1 / F-2.2 TYPE 1 CATCH BASIN

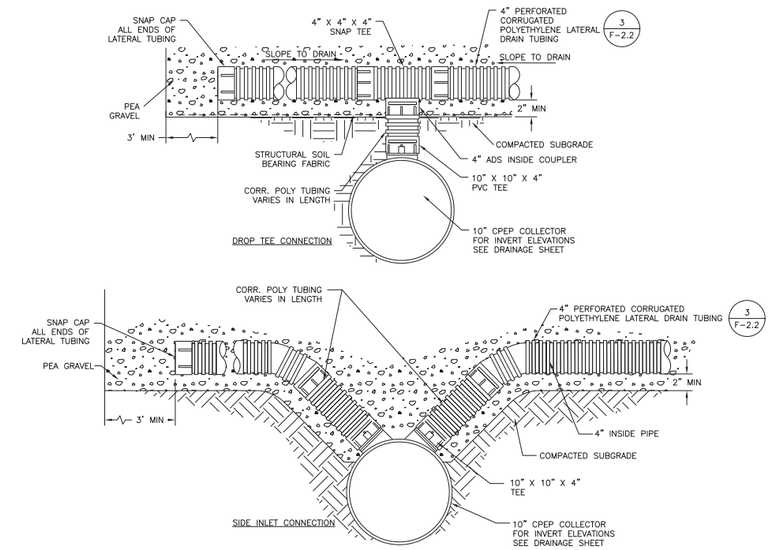
NOT TO SCALE



2 / F-2.2 FLOW CONTROL STRCUTURE

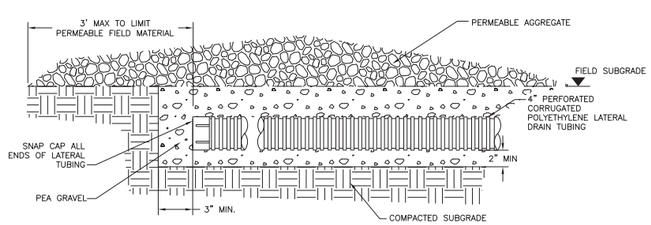
CB TYPE 1-L

NOT TO SCALE



4 / F-2.2 SUBSURFACE DRAINAGE CONNECTION

NOT TO SCALE



3 / F-2.2 SUBSURFACE DRAINAGE LATERAL

NOT TO SCALE

File: F-2.2 Drainage Details.dwg Plotted by: CorneliuM Date: 12-Aug-16 1:12:56pm

REVISION	DATE

City of Duvall
Small Town. Real Life.

BIG ROCK PARK MULTI PURPOSE FIELD

DA HOGAN
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STATE OF WASHINGTON
ROBERT S. HARDING
LANDSCAPE ARCHITECT

SEPA SET

DATE	8-12-16
SCALE	NTS
DRAWN	CPW/DMD
CHECKED	RSH

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DRAINAGE DETAILS

SHEET

F-2.2

APPENDIX B

Design Calculations and Supporting Information

Big Rock Park - Field Storage Volume Spreadsheet

top surface of field at lowest Pt:	470.53	feet
Turf Layer	2	inches
Top gravel course Layer	2	inches
gravel base above lateral trenches:	8	inches
Total Depth of surfacing	12	inches
top elevation of the lowest lateral trench:	469.53	feet
top surface of water stored in trenches:	469.53	feet
top surface of water stored in gravel base:	469.75	
depth of gravel beneath lateral pipe invert:	2	inches
lateral trench width:	12	inches
void ratio of lateral trench gravel:	0.3	
Field Area:	131890	sf
Field Slope	0	
Water Surface Area:	**131,890.0**	square feet
Total Volume Stored in Trenches and Pipes:	4,111	cubic feet
Total Volume Stored Above Trenches:	8,705	cubic feet
Total Volume Stored :	**12,816.2**	cubic feet
Maximum Depth Ponded in Base Layer:	2.64	inches

<--This elevation is the lowest elevation in the field that is tributary to the sub-surface drainage system

Water Surface Elevation 469.75

Main Collector Pipe(s):

Run #	Length	Diameter (in)	IE upstream	IE downstream	Slope	Pipe X-sect Area @ Upstream End	Pipe X-sect Area @ Downstream End	Volume in Pipe	
Cb#3	274	10	467.43	466.06	0.005	0.545	0.545	149.44	149.444
					Total Volume in Collector Pipes:			149.44	

Drainage Lateral Pipes:

						Volume Stored in Pipe			Volume Stored in Lateral Trenches										
Run #	Length	Diameter	IE upstream	IE downstream	Slope	Pipe X-sect Area @ Upstream End	Pipe X-sect Area @ Downstream End	Volume in Pipe	Water Depth @ Upstream End	Water Depth @ Downstream End	trench width	X-sect Area of Stored Water in Lateral Trench @ Upstream End	X-sect Area of Stored Water in Lateral Trench @ Downstream End	Total Volume of Lateral Trench	Total Volume - Pipe Volume	Volume Stored in Lateral Trench (w/ void ratio applied)	Length of Trench Used (LF)	Water Surface Area (SF)
E-1	181	4	468.83	468.23	0.0033	0.087	0.087	15.80	0.867	1.464	12	0.867	1.464	210.9	195.1	58.5	181.0	181.00
E-2	192	4	468.83	468.20	0.0033	0.087	0.087	16.76	0.867	1.500	12	0.867	1.500	227.2	210.5	63.1	192.0	192.00
E-3	192	4	468.83	468.20	0.0033	0.087	0.087	16.76	0.867	1.500	12	0.867	1.500	227.2	210.5	63.1	192.0	192.00
E-4	192	4	468.83	468.20	0.0033	0.087	0.087	16.76	0.867	1.500	12	0.867	1.500	227.2	210.5	63.1	192.0	192.00
E-5	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-6	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-7	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-8	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-9	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-10	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-11	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-12	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-13	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-14	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-15	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-16	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-17	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-18	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-19	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-20	218	4	468.75	468.03	0.0033	0.087	0.087	19.02	0.947	1.666	12	0.947	1.666	284.8	265.8	79.7	218.0	218.00
E-21	192	4	468.83	468.20	0.0033	0.087	0.087	16.76	0.867	1.500	12	0.867	1.500	227.2	210.5	63.1	192.0	192.00
E-22	192	4	468.83	468.20	0.0033	0.087	0.087	16.76	0.867	1.500	12	0.867	1.500	227.2	210.5	63.1	192.0	192.00
E-23	192	4	468.83	468.20	0.0033	0.087	0.087	16.76	0.867	1.500	12	0.867	1.500	227.2	210.5	63.1	192.0	192.00
E-24	181	4	468.83	468.23	0.0033	0.087	0.087	15.80	0.867	1.464	12	0.867	1.464	210.9	195.1	58.5	181.0	181.00
W-1	186	4	468.83	468.22	0.0033	0.087	0.087	16.23	0.867	1.480	12	0.867	1.480	218.3	202.1	60.6	186.0	186.00
W-2	117	4	468.83	468.44	0.0033	0.087	0.087	10.21	0.867	1.253	12	0.867	1.253	124.0	113.8	34.1	117.0	117.00
W-3	146	4	468.83	468.35	0.0033	0.087	0.087	12.74	0.867	1.348	12	0.867	1.348	161.7	149.0	44.7	146.0	146.00
W-4	241	4	467.78	466.98	0.0033	0.087	0.087	21.03	1.917	2.712	12	1.917	2.712	557.8	536.7	161.0	241.0	241.00
W-5	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-6	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-7	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-8	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-9	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-10	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-11	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-12	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-13	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-14	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-15	241	4	468.83	468.03	0.0033	0.087	0.087	21.03	0.867	1.662	12	0.867	1.662	304.7	283.7	85.1	241.0	241.00
W-16	241	4	469.40	468.03	0.0057	0.032	0.087	14.31	0.297	1.667	12	0.297	1.667	236.6	222.3	66.7	241.0	241.00
W-17	235	4	469.50	468.03	0.0063	0.004	0.087	10.71	0.197	1.667	12	0.197	1.667	218.9	208.2	62.5	235.0	235.00
W-18	147	4	468.83	468.10	0.0050	0.087	0.087	12.83	0.867	1.597	12	0.867	1.597	181.1	168.2	50.5	147.0	147.00
W-19	25	4	468.83	468.75	0.0033	0.087	0.087	2.18	0.867	0.949	12	0.867	0.949	22.7	20.5	6.2	25.0	25.00
						Total Volume in Lateral Pipes:		768.10						Total Volume in Lateral Trenches:		3193.9		
															Total Area in Lateral Trenches:			8991.00 SF
																		0.206404959 AC

Big Rock Park - SSD Table Spreadsheet

Actual Plan Elevation (ft)	Stage Hieght (ft)	Water Surface Area (sf)	Water Surface Area (AC)	Storage (CF)	Storage (AC-Feet)	
466.06	0	0	0	0	0	
466.56	0.5	0	0	17	0.000392202	
467.06	1	23	0.000523833	55	0.001273824	
467.56	1.5	174	0.004002143	107	0.00245382	
468.06	2	478	0.01097227	218	0.004994099	
468.56	2.5	5,892	0.13527042	990	0.022727272	
469.06	3	8,861	0.203417118	2,787	0.063990461	
469.50	3.44	8,991	0.206404959	4,029	0.092502881	
469.53	3.47	8,991	0.206404959	4,111	0.094386251	Storage Above Trenches Begins
469.63	3.57	131,890	3.027777778	8,068	0.185219584	
469.73	3.67	131,890	3.027777778	12,025	0.276052917	
469.83	3.77	131,890	3.027777778	15,982	0.366886251	
469.93	3.87	131,890	3.027777778	19,938	0.457719584	
470.03	3.97	131,890	3.027777778	23,895	0.548552917	Max Stage
470.13	4.07	131,890	3.027777778	27,852	0.639386251	

Legend:

Values Inputted from Field Storage Spreadsheet.

Columns Exported to WWHM (create a "comma delineated" file with only these values)

WWHM4
PROJECT REPORT

Project Name: Field-Detention
Site Name: Big Rock Park
Site Address: 28430 NE Big Rock Rd
City : Duvall
Report Date: 8/15/2016
Gage : Seatac
Data Start : 1948/10/01
Data End : 1998/09/30
Precip Scale: 1.17
Version : 2015/03/18

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Lawn, Flat	3.891
Pervious Total	3.891

Impervious Land Use	Acres
Impervious Total	0
Basin Total	3.891

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres

C, Lawn, Flat	**2.572**
Pervious Total	**2.572**

Impervious Land Use	**Acres**
SIDEWALKS FLAT	**0.868**
Impervious Total	**0.868**
Basin Total	**3.44**

Element Flows To:

Surface	**Interflow**	**Groundwater**
SSD Table 1	SSD Table 1	

Name : bypass
Bypass: Yes

GroundWater: No

Pervious Land Use	**Acres**
Pervious Total	**0**

Impervious Land Use	**Acres**
SIDEWALKS FLAT	**0.451**
Impervious Total	**0.451**
Basin Total	**0.451**

Element Flows To:

Surface	**Interflow**	**Groundwater**

Name : SSD Table 1
Depth: 4.07 ft.

Element Flows To:

Outlet 1	**Outlet 2**

SSD Table Hydraulic Table

Stage	**Area**	**Volume**	**Outlet**

(ft)	(ac)	(ac-ft)	Struct	NotUsed	NotUsed	NotUsed	NotUsed
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.026	0.000	0.000	0.000	0.000
1.000	0.001	0.001	0.037	0.000	0.000	0.000	0.000
1.500	0.004	0.002	0.045	0.000	0.000	0.000	0.000
2.000	0.011	0.005	0.052	0.000	0.000	0.000	0.000
2.500	0.135	0.023	0.059	0.000	0.000	0.000	0.000
3.000	0.203	0.064	0.064	0.000	0.000	0.000	0.000
3.440	0.206	0.093	0.069	0.000	0.000	0.000	0.000
3.470	0.206	0.094	0.069	0.000	0.000	0.000	0.000
3.570	3.028	0.185	0.070	0.000	0.000	0.000	0.000
3.670	3.028	0.276	0.071	0.000	0.000	0.000	0.000
3.770	3.028	0.367	0.256	0.000	0.000	0.000	0.000
3.870	3.028	0.458	0.693	0.000	0.000	0.000	0.000
3.970	3.028	0.549	1.276	0.000	0.000	0.000	0.000

ANALYSIS RESULTS

Predeveloped Landuse Totals for POC #1
Total Pervious Area:3.891
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:2.572
Total Impervious Area:1.319

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.29566
5 year	0.454362
10 year	0.571512
25 year	0.732557
50 year	0.861709
100 year	0.998573

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.216031
5 year	0.302418
10 year	0.369974
25 year	0.468135
50 year	0.551255
100 year	0.643562

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.365	0.203
1950	0.885	0.262
1951	0.460	0.465

1952	0.217	0.178
1953	0.170	0.164
1954	0.284	0.187
1955	0.354	0.198
1956	0.346	0.241
1957	0.407	0.217
1958	0.267	0.194
1959	0.187	0.170
1960	0.378	0.386
1961	0.256	0.172
1962	0.162	0.175
1963	0.262	0.173
1964	0.294	0.192
1965	0.203	0.176
1966	0.251	0.180
1967	0.419	0.241
1968	0.373	0.259
1969	0.234	0.174
1970	0.258	0.182
1971	0.264	0.179
1972	0.585	0.353
1973	0.207	0.167
1974	0.304	0.182
1975	0.480	0.223
1976	0.259	0.173
1977	0.131	0.194
1978	0.333	0.236
1979	0.182	0.209
1980	0.404	0.261
1981	0.354	0.225
1982	0.676	0.526
1983	0.242	0.223
1984	0.270	0.179
1985	0.157	0.177
1986	0.472	0.295
1987	0.419	0.361
1988	0.159	0.153
1989	0.134	0.159
1990	0.970	0.704
1991	0.820	0.448
1992	0.256	0.182
1993	0.168	0.142
1994	0.087	0.156
1995	0.228	0.184
1996	0.577	0.457
1997	0.430	0.457
1998	0.343	0.212

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.9698	0.7039
2	0.8855	0.5259
3	0.8200	0.4645
4	0.6761	0.4566
5	0.5853	0.4566
6	0.5769	0.4481

7	0.4803	0.3862
8	0.4723	0.3612
9	0.4596	0.3531
10	0.4295	0.2946
11	0.4194	0.2619
12	0.4188	0.2612
13	0.4072	0.2588
14	0.4036	0.2410
15	0.3784	0.2406
16	0.3735	0.2359
17	0.3650	0.2250
18	0.3538	0.2228
19	0.3535	0.2228
20	0.3457	0.2167
21	0.3435	0.2117
22	0.3326	0.2089
23	0.3041	0.2025
24	0.2940	0.1977
25	0.2842	0.1940
26	0.2701	0.1938
27	0.2675	0.1924
28	0.2642	0.1871
29	0.2617	0.1837
30	0.2589	0.1823
31	0.2577	0.1822
32	0.2563	0.1816
33	0.2556	0.1797
34	0.2512	0.1788
35	0.2424	0.1787
36	0.2338	0.1779
37	0.2280	0.1774
38	0.2165	0.1756
39	0.2073	0.1749
40	0.2026	0.1737
41	0.1873	0.1732
42	0.1824	0.1730
43	0.1696	0.1725
44	0.1676	0.1701
45	0.1624	0.1674
46	0.1592	0.1645
47	0.1573	0.1591
48	0.1342	0.1563
49	0.1313	0.1528
50	0.0871	0.1416

POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1478	1410	950	67	Pass
0.1550	1216	774	63	Pass
0.1623	1059	647	61	Pass
0.1695	945	561	59	Pass
0.1767	827	469	56	Pass
0.1839	731	416	56	Pass

0.1911	635	357	56	Pass
0.1983	562	319	56	Pass
0.2055	501	283	56	Pass
0.2127	457	255	55	Pass
0.2199	410	238	58	Pass
0.2271	361	209	57	Pass
0.2344	330	194	58	Pass
0.2416	297	171	57	Pass
0.2488	264	154	58	Pass
0.2560	240	143	59	Pass
0.2632	207	127	61	Pass
0.2704	181	120	66	Pass
0.2776	162	112	69	Pass
0.2848	146	103	70	Pass
0.2920	131	92	70	Pass
0.2993	119	86	72	Pass
0.3065	108	81	75	Pass
0.3137	98	73	74	Pass
0.3209	91	67	73	Pass
0.3281	85	62	72	Pass
0.3353	78	54	69	Pass
0.3425	71	50	70	Pass
0.3497	65	48	73	Pass
0.3569	60	39	65	Pass
0.3642	58	34	58	Pass
0.3714	55	32	58	Pass
0.3786	51	31	60	Pass
0.3858	46	27	58	Pass
0.3930	42	23	54	Pass
0.4002	39	21	53	Pass
0.4074	36	21	58	Pass
0.4146	30	17	56	Pass
0.4218	27	16	59	Pass
0.4291	26	15	57	Pass
0.4363	25	13	52	Pass
0.4435	25	12	48	Pass
0.4507	24	10	41	Pass
0.4579	22	7	31	Pass
0.4651	21	6	28	Pass
0.4723	20	5	25	Pass
0.4795	17	5	29	Pass
0.4867	16	5	31	Pass
0.4940	16	5	31	Pass
0.5012	16	4	25	Pass
0.5084	15	4	26	Pass
0.5156	15	4	26	Pass
0.5228	12	4	33	Pass
0.5300	12	3	25	Pass
0.5372	12	3	25	Pass
0.5444	11	3	27	Pass
0.5516	11	2	18	Pass
0.5589	11	2	18	Pass
0.5661	11	2	18	Pass
0.5733	11	2	18	Pass
0.5805	10	2	20	Pass
0.5877	9	2	22	Pass
0.5949	9	2	22	Pass

0.6021	9	2	22	Pass
0.6093	9	2	22	Pass
0.6165	9	2	22	Pass
0.6237	9	1	11	Pass
0.6310	8	1	12	Pass
0.6382	8	1	12	Pass
0.6454	8	1	12	Pass
0.6526	8	1	12	Pass
0.6598	8	1	12	Pass
0.6670	7	1	14	Pass
0.6742	7	1	14	Pass
0.6814	6	1	16	Pass
0.6886	6	1	16	Pass
0.6959	6	1	16	Pass
0.7031	6	1	16	Pass
0.7103	6	0	0	Pass
0.7175	6	0	0	Pass
0.7247	6	0	0	Pass
0.7319	6	0	0	Pass
0.7391	6	0	0	Pass
0.7463	6	0	0	Pass
0.7535	6	0	0	Pass
0.7608	5	0	0	Pass
0.7680	5	0	0	Pass
0.7752	5	0	0	Pass
0.7824	5	0	0	Pass
0.7896	5	0	0	Pass
0.7968	5	0	0	Pass
0.8040	5	0	0	Pass
0.8112	5	0	0	Pass
0.8184	5	0	0	Pass
0.8257	4	0	0	Pass
0.8329	4	0	0	Pass
0.8401	4	0	0	Pass
0.8473	3	0	0	Pass
0.8545	3	0	0	Pass
0.8617	3	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0 **acre-feet**
On-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**
Off-line facility target flow: 0 **cfs.**
Adjusted for 15 min: 0 **cfs.**

Perlnd and Implnd Changes

No changes have been made.

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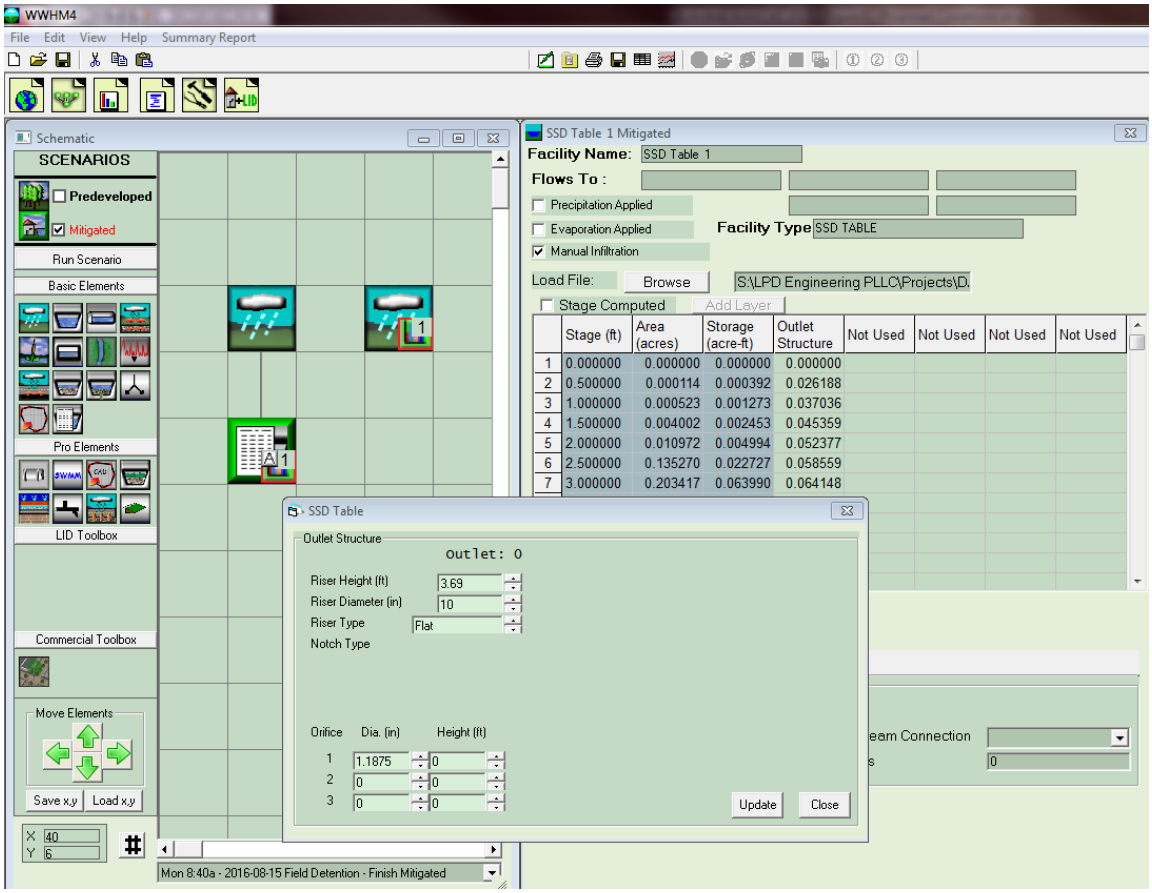
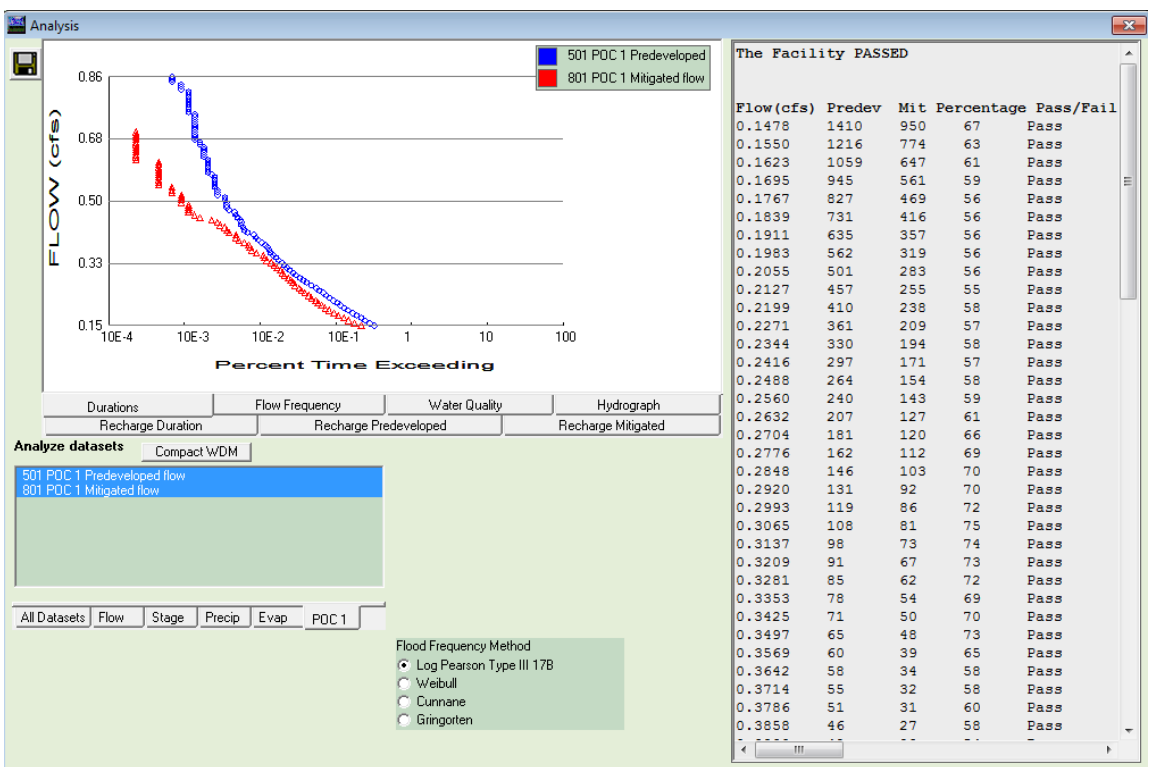

WWHM4
File Edit View Help Summary Report
Schematic
SCENARIOS
Predeveloped
Mitigated
Run Scenario
Basic Elements
Pro Elements
LID Toolbox
Commercial Toolbox
Move Elements
Save x,y
Load x,y
X 40
Y 6
Mon 8:40a - 2016-08-15 Field Detention - Finish Mitigated
SSD Table 1 Mitigated
Facility Name: SSD Table 1
Flows To :
Precipitation Applied
Evaporation Applied
Manual Infiltration
Facility Type SSD TABLE
Load File: Browse S:\LPD Engineering PLLC\Projects\D
Stage Computed
Add Layer
Stage (ft) | Area (acres) | Storage (acre-ft) | Outlet Structure | Not Used | Not Used | Not Used | Not Used
1 0.000000 0.000000 0.000000 0.000000
2 0.500000 0.000114 0.000392 0.026188
3 1.000000 0.000523 0.001273 0.037036
4 1.500000 0.004002 0.002453 0.045359
5 2.000000 0.010972 0.004994 0.052377
6 2.500000 0.135270 0.022727 0.058559
7 3.000000 0.203417 0.063990 0.064148
SSD Table
Outlet Structure
outlet: 0
Riser Height (ft) 3.69
Riser Diameter (in) 10
Riser Type Flat
Notch Type
Orifice Dia. (in) Height (ft)
1 1.1875 0
2 0 0
3 0 0
Update
Close


Analysis
501 POC 1 Predeveloped
801 POC 1 Mitigated flow
FLOW (cfs)
0.86
0.68
0.50
0.33
0.15
10E-4
10E-3
10E-2
10E-1
1
10
100
Percent Time Exceeding
Durations
Flow Frequency
Water Quality
Hydrograph
Recharge Duration
Recharge Predeveloped
Recharge Mitigated
Analyze datasets
Compact WDM
501 POC 1 Predeveloped flow
801 POC 1 Mitigated flow
All Datasets
Flow
Stage
Precip
Evap
POC 1
Flood Frequency Method
Log Pearson Type III 17B
Weibull
Cunnane
Gringorten
The Facility PASSED
Flow(cfs) Predev Mit Percentage Pass/Fail
0.1478 1410 950 67 Pass
0.1550 1216 774 63 Pass
0.1623 1059 647 61 Pass
0.1695 945 561 59 Pass
0.1767 827 469 56 Pass
0.1839 731 416 56 Pass
0.1911 635 357 56 Pass
0.1983 562 319 56 Pass
0.2055 501 283 56 Pass
0.2127 457 255 55 Pass
0.2199 410 238 58 Pass
0.2271 361 209 57 Pass
0.2344 330 194 58 Pass
0.2416 297 171 57 Pass
0.2488 264 154 58 Pass
0.2560 240 143 59 Pass
0.2632 207 127 61 Pass
0.2704 181 120 66 Pass
0.2776 162 112 69 Pass
0.2848 146 103 70 Pass
0.2920 131 92 70 Pass
0.2993 119 86 72 Pass
0.3065 108 81 75 Pass
0.3137 98 73 74 Pass
0.3209 91 67 73 Pass
0.3281 85 62 72 Pass
0.3353 78 54 69 Pass
0.3425 71 50 70 Pass
0.3497 65 48 73 Pass
0.3569 60 39 65 Pass
0.3642 58 34 58 Pass
0.3714 55 32 58 Pass
0.3786 51 31 60 Pass
0.3858 46 27 58 Pass

Big Rock Park 7/12/2016

Conveyance Analysis Spreadsheet

Pipe Run	Size *(inches)*	Mannings N	Plan Slope *(ft/ft)*	Qfull *(cfs)*	Tributary Basins	Qtrib, 100-year (WWHM, 15 min) *(cfs)*	% Full
Main Collector Line	10	0.012	0.005	**1.68**	Soccer and Softball Field	**1.32**	**79%**

WWHM4
PROJECT REPORT

Project Name: Field-Conveyance
Site Name: Big Rock Park
Site Address: 28430 NE Big Rock Rd
City : Duvall
Report Date: 8/15/2016
Gage : Seatac
Data Start : 1948/10/01
Data End : 1998/09/30
Precip Scale: 1.17
Version : 2015/03/18

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Lawn, Flat	3.44
Pervious Total	3.44

Impervious Land Use	Acres
Impervious Total	0
Basin Total	3.44

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Lawn, Flat	2.572

Pervious Total	**2.572**

Impervious Land Use	**Acres**
SIDEWALKS FLAT	**0.868**

Impervious Total	**0.868**
Basin Total	**3.44**

Element Flows To:

Surface	**Interflow**	**Groundwater**

ANALYSIS RESULTS

Predeveloped Landuse Totals for POC #1
Total Pervious Area:3.44
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:2.572
Total Impervious Area:0.868

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.245333
5 year	0.41985
10 year	0.565953
25 year	0.78892
50 year	0.985214
100 year	1.209404

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.481053
5 year	0.670954
10 year	0.810177
25 year	1.001925
50 year	1.156598
100 year	1.321692

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Sediment Tank Sizing Calculations

Per the 2009 King County Surface Water Design Manual

Project Name: Big Rock Park

Required Sediment Trap Surface Area (SA):

SA =2*Q/Vsed

Where:

Q = 2-year developed flow rate from WWHM

Vsed = Settling Velocity (0.00096 ft/sec)

Calculation:

multiplier =	2	
Q =	0.4861	cfs
Vsed =	0.00096	fps
Required SA =	**1012.7**	**square feet**

Equivalent Sediment Trap Volume:

To determine the minimum sediment trap volume, an equivalent sediment trap was sized based upon the required surface area.

Length of Top Surface Area =	32	feet
Width of Top Surface Area =	32	feet
Surface Area Provided =	1024	square feet
Side Slope =	3	(H:1V)
Total Depth of Sediment Trap =	3.5	feet
Bottom Length of Sediment Trap =	11	feet
Bottom Width of Sediment Trap =	11	feet
Total pond Volume =	**2003.75**	cubic feet
	14988.05	gallons

WWHM4
PROJECT REPORT

Project Name: TESC Sizing
Site Name: Big Rock Park
Site Address: 28430 NE Big Rock Rd
City : Duvall
Report Date: 8/15/2016
Gage : Seatac
Data Start : 1948/10/01
Data End : 1998/09/30
Precip Scale: 1.00
Version : 2015/03/18

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Flat	4.688
Pervious Total	4.688

Impervious Land Use	Acres
Impervious Total	0
Basin Total	4.688

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Lawn, Flat	3.369

Pervious Total	**3.369**

Impervious Land Use	**Acres**
SIDEWALKS FLAT	**1.319**

Impervious Total	**1.319**
Basin Total	**4.688**

Element Flows To:

Surface	**Interflow**	**Groundwater**

ANALYSIS RESULTS

Predeveloped Landuse Totals for POC #1
Total Pervious Area:4.688
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:3.369
Total Impervious Area:1.319

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.117986
5 year	0.182825
10 year	0.217962
25 year	0.253672
50 year	0.274875
100 year	0.292299

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.486126
5 year	0.643511
10 year	0.754369
25 year	0.902301
50 year	1.018375
100 year	1.139607

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APPENDIX C

Construction Stormwater Pollution Prevention Plan (SWPPP) Narrative

BIG ROCK PARK
FIELD IMPROVEMENTS
PRELIMINARY CONSTRUCTION SWPPP NARRATIVE
JULY 12, 2016

The following Preliminary Construction Storm Water Pollution Prevention Plan (SWPPP) Narrative is for the Big Rock Park field renovation at 28430 NE Big Rock Road in Duvall, Washington. The narrative supplements the Temporary Erosion and Sediment Control (TESC) plan. This narrative has been prepared per Section 3.2.1 of Volume II of the 2012 Department of Ecology (DOE) Stormwater Management Manual for Western Washington. This is a preliminary narrative and is intended to be used as starting point for the contractor to further update depending upon site conditions and personnel, in order to complete the required documentation for the Construction Stormwater General Permit (NPDES). Refer to the TESC plans (Sheet F-0.2) and TESC details (Sheet F-0.3) for more information regarding any erosion or sedimentation control measures involved in this project.

1. CONSTRUCTION STORMWATER POLLUTION PREVENTION ELEMENTS

1) **Mark Clearing Limits:** Clearing limits will be delineated on the TESC and Site Demolition plan with a "Limit of Work" line. The actual limits of clearing will likely be smaller than the limit of work, but this identifies the maximum extent of the clearing limits. Areas impacted and not anticipated to be covered with final measures shall be stabilized using approved permanent TESC methods.

2) **Establish Construction Access:** Construction access will be provided with the existing gravel/asphalt driveway southwest of the project area. Temporary quarry spalls (BMP C105) may be used as necessary. The Contractor shall provide wheel wash if necessary.

3) **Control Flow Rates:** Stormwater flow control during construction is anticipated to be mitigated by routing runoff to a temporary sediment storage tank. Refer to the Sediment Tank Sizing calculations and the KCRTS output included within Appendix B of the project's Technical Information Report. Permanent flow control facilities include a flow control structure at the downstream end of the field underdrain system.

4) **Install Sediment Controls:** DOE approved BMPs for sediment controls are shown on the TESC plan. Sediment will be controlled using silt fences (BMP C233), storm drain inlet protection (BMP C220), and straw wattles (BMP C235).

5) **Stabilize Soils:** It is possible that some of the earthwork and grading may occur in wet weather conditions. The site must be stabilized and no soils will be allowed to remain unstabilized for more than two days between October 1st and April 30th. From May 1 through September 30, install cover measures to protect disturbed areas that will remain unworked for seven days or more. By October 8, seed all areas that will remain unworked from October 1 through April 30. Mulch all seeded areas.

   Exposed slopes will be protected by DOE-approved coverage methods. BMPs including, but not limited to: C101, Preserving Natural Vegetation; C121, Mulching; C123, Plastic Covering; C130, Surface Roughening; C140, Dust Control; and T5.13 Post Construction Soil Amendment will be used to stabilize on-site soils during construction.

6) **Protect Slopes:** The DOE-approved BMPs for slope protection will be utilized during construction. Concentrated discharges shall not be allowed to flow over the top of steep slopes. BMPs including, but not limited to C101, Preserving Natural Vegetation; C121, Mulching; C123, Plastic Covering; C130, Surface Roughening; C140, Dust Control; C208, Triangular Silt Dike; C207, Check Dams; and C233, Silt Fence are to be utilized to protect slopes during construction.

7) **Protect Drain Inlets:** Drainage structures in areas where no work occurs will remain and will be protected; discharge points to the public storm drain main line will also be protected. To prevent discharge of turbid water downstream, all existing catch basins located within the disturbance area and outside of the disturbance area within approximately 300 feet downstream of the site will be protected with storm drain inlet protection (BMP C220). The Contractor shall remove inlet protection at the end of the project without releasing captured sediment into the storm system.

8) **Stabilize Channels and Outlets:** The existing swale between the two fields will be utilized to convey stormwater the sediment sump & pump facility. DOE-approved BMPs for channel stabilization include, but are not limited to: C200, Interceptor Dike and Swale; and C207, Check Dams. There will not be any channels in the proposed conditions.

9) **Control Pollutants:** Temporary protection of the disturbed soils provides the first level of protection for pollution control, and perimeter measures downstream will mitigate the remaining pollutants. The temporary protection of disturbed soils may be mitigated with a temporary sump and pump facility to provide the second level of interception of pollutants. This collection system filters sediments prior to the pump system. The pump system will then route stormwater via force mains into the temporary sediment settling tank. The sediment settling tank shall have at least 18,900 gallons of storage located near the northwest corner of the project disturbance area. Construction debris will be removed from the site. The Contractor will be responsible for managing their construction equipment per DOE-approved BMPs. If a truck wheel wash is required, truck wheel wash water and concrete truck washout water shall be collected and discharged to the public sanitary sewer (SS) system. To apply for and obtain a SS release, contact the local sewer purveyors (City of Duvall and King County Metro) for authorization.

10) **Control De-Watering:** The majority of the earthwork on the project will be constructed during the dry season, therefore it is not anticipated that groundwater will be encountered in the excavations for this project. In the event that perched groundwater is encountered during any wet season construction, the Contractor shall route it to the sediment settling facility by pumping it out of the excavation.

11) **Maintain BMPs:** DOE-approved standard BMP maintenance will be required in accordance with the City of Duvall TESC plan notes, provided in the project drawings (Sheet F-0.3).

12) **Manage the Project:** All phases of construction will be managed by the Contractor. The site must be stabilized and no soils will be allowed to remain exposed and unworked for more than two days between October 1st and April 30th and for more than seven days between May 1st and September 30th. The Contractor will provide maintenance and monitoring of TESC BMPs. Work of all contractors will be coordinated to minimize the duration of disturbance on the site. The best management practices shown on the TESC plan are minimum requirements. Failure to maintain SWPPP measures in accordance

with adopted standards may result in the work being performed at the City's direction and the costs assessed as a lien against the property where such facilities are located.

2. Project Description

The project will include the renovation of the existing natural grass softball field and soccer field with a new synthetic turf surface. In addition the project proposes an additional parking area and concrete walkways along the south, and a gravel pathway along the north. The existing baseball field on the west side of the site will remain.

Water quality treatment is required for the proposed parking area because it exceed 5,000 square feet of pollution-generating impervious surface (PGIS). Refer to the project's technical information report for more information.

Estimated earthwork quantities for the project include approximately 1,500 cubic yards of export material to be hauled offsite for disposal. Earthwork associated with onsite cut/full is expected to be about 3,800 cubic yards. There will be an estimated 6,000 cubic yards of import material for the proposed base materials. These quantities are estimates only and intended for municipal permitting. These quantities shall not be used by the Contractor as a basis for any contractual information. The Contractor shall prepare their own earthwork quantities based upon the information provided in the contract documents.

3. Existing Site Conditions

The topography within the proposed fields to be renovated is relatively flat. The softball field slopes from southwest to northeast at approximately 0.8% grade, towards a swale that runs between the softball and soccer fields. The soccer field on the east side slopes from northeast to southwest toward the ditch at approximately 1.5% slope. The ditch flows to the north, where it is collected by a culvert, and conveyed into the existing stormwater pond to the north. Refer to the Downstream Analysis section of this report for a complete description of the downstream drainage system.

The project site is located within the Snoqualmie Southeast drainage basin, which is a sub-basin of the Snoqualmie River Watershed. Based on City of Duvall mapping, the site is within the upper Weiss Creek drainage basin.

4. Adjacent Areas

The existing park property is bounded by NE Big Rock Road to the southwest and forested area on all other sides. There is one access driveway from NE Big Rock Road, to the existing parking lot, which forms an L-shape around the southwest corner of the property.

5. Critical Areas

Based on King County iMap, there is wetland east of the project area. There are no other environmentally critical areas within or in close proximity to the site.

6. Soils

According to the USDA Natural Resources Conservation Service, the soils within the project area consist of Tokul gravelly medial loam, 8-15 percent slopes. According to the project's geotechnical report, prepared by Associated Earth Sciences, Inc., dated February 1, 2016, the subsurface soils include existing fill up to 12.5 feet deep with underlying Vashon lodgment till.

7. Potential Erosion Problem Areas

The site is not within an erosion hazard or channel migration area. Per the proposed contract documents, the contractor is to provide protection for soils to limit the exposure to erosion. The limitation of disturbance, adequate cover practices, seasonal work limitation, and runoff control are the most effective methods for reduction of turbidity in stormwater runoff. Any runoff that occurs will be directed to the temporary sump and then pumped to the sediment settling tank. Areas that have not been permanently stabilized will be addressed using DOE-approved BMPs, per the construction documents.

8. Construction Phasing

At this time it is not expected that the project will be formally phased. The contractor is responsible for coordinating work of all subcontractors to keep the duration of site disturbance limited to the maximum extent possible.

9. Construction Schedule

Construction is expected to begin in summer of 2016 and be completed in fall 2016.

Earthwork activities are not expected to take place in the wet season, October 1st to April 30th. Should any wet weather conditions occur during construction, the contractor shall implement the de-watering procedures outlined in this SWPPP and applicable BMPs including, but not limited to C123, Plastic Covering; C121, Mulching; C122, Nets and Blankets; C126, Polyacrylamide for Soil Erosion Protection; C130, Surface Roughening.

10. Financial/Ownership Responsibilities

This property is owned and operated by the City of Duvall. The accepted low bidder on the project will be responsible for posting a performance and payment bond with the City, and thus will be the responsible party for any liability associated with erosion and sedimentation impact.

11. Engineering Calculations

A copy of any calculations performed during design of the project and relevant storm drainage modeling discussions is included in the project's Technical Information Report.

APPENDIX D

Operations and Maintenance Guidelines

NO. 4 – CONTROL STRUCTURE/FLOW RESTRICTOR

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the structure opening or is blocking capacity of the structure by more than 10%.	No Trash or debris blocking or potentially blocking entrance to structure.
		Trash or debris in the structure that exceeds $^1/_3$ the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the structure.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Sediment	Sediment exceeds 60% of the depth from the bottom of the structure to the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section.	Sump of structure contains no sediment.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering structure through cracks, or maintenance person judges that structure is unsound.	Structure is sealed and structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering structure through cracks.	No cracks more than $^1/_4$ inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the structure at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Ladder rungs missing or unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
FROP-T Section	Damage	T section is not securely attached to structure wall and outlet pipe structure should support at least 1,000 lbs of up or down pressure.	T section securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight or show signs of deteriorated grout.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes—other than designed holes—in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or missing	Cleanout gate is missing.	Replace cleanout gate.

NO. 4 – CONTROL STRUCTURE/FLOW RESTRICTOR

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
		Cleanout gate is not watertight.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
Orifice Plate	Damaged or missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
	Deformed or damaged lip	Lip of overflow pipe is bent or deformed.	Overflow pipe does not allow overflow at an elevation lower than design
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Metal Grates (If Applicable)	Unsafe grate opening	Grate with opening wider than $^{7}/_{8}$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris. footnote to guidelines for disposal
	Damaged or missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open structure requires urgent maintenance.**	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Sediment	Sediment exceeds 60% of the depth from the bottom of the catch basin to the invert of the lowest pipe into or out of the catch basin or is within 6 inches of the invert of the lowest pipe into or out of the catch basin.	Sump of catch basin contains no sediment.
	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of the catch basin by more than 10%.	No Trash or debris blocking or potentially blocking entrance to catch basin.
		Trash or debris in the catch basin that exceeds $^1/_3$ the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (If applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that catch basin is unsound.	Catch basin is sealed and structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than $^1/_4$ inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the catch basin at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

NO. 5 – CATCH BASINS AND MANHOLES

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Metal Grates (Catch Basins)	Unsafe grate opening	Grate with opening wider than $^{7}/_{8}$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris. footnote to guidelines for disposal
	Damaged or missing	Grate missing or broken member(s) of the grate. **Any open structure requires urgent maintenance**.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. **Any open structure requires urgent maintenance**.	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

NO. 6 – CONVEYANCE PIPES AND DITCHES

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & debris accumulation	Accumulated sediment or debris that exceeds 20% of the diameter of the pipe.	Water flows freely through pipes.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.
Ditches	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment accumulation	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that it matches design.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion damage to slopes	Any erosion observed on a ditch slope.	Slopes are not eroding.
	Rock lining out of place or missing (If Applicable)	One layer or less of rock exists above native soil area 5 square feet or more, any exposed native soil.	Replace rocks to design standards.