

# Brown's Creek Park Stormwater Project

## A. Project Location

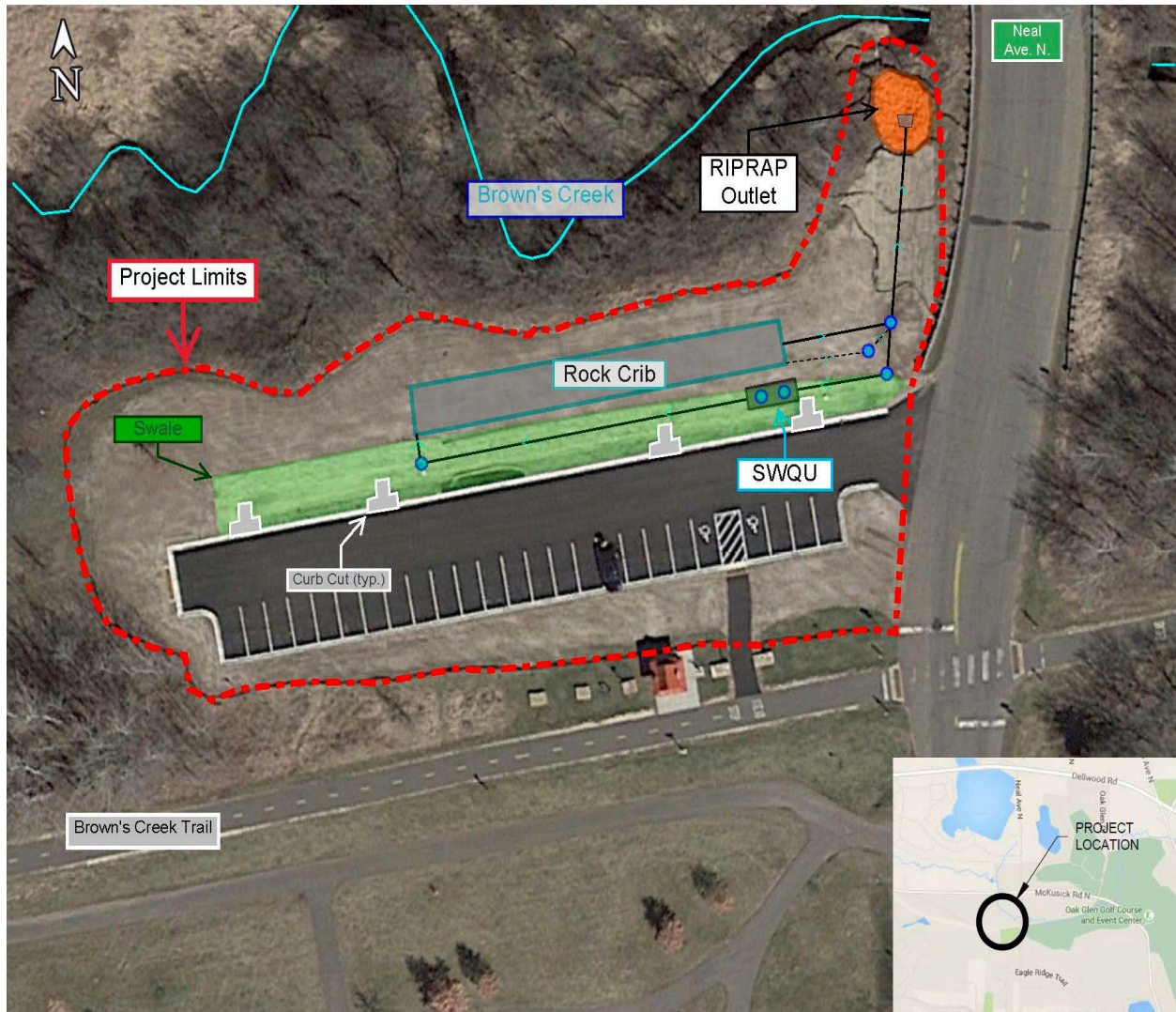


Figure 1. Location map for Brown's Creek Park Stormwater Project

Project Location	Immediate Waterbodies Impacted	Predicted BMP Performance		
		TSS Reduction (lbs/yr)	N Reduction (lbs/yr)	P Reduction (lbs/yr)
<u>Brown's Creek Park Stormwater Project:</u> located south of McKusick Road and west of Neal Avenue North in the City of Stillwater, MN (Figure 1)	Brown's Creek	121	N/A	0.40

## B. Description of Facility

### I. General Site Description

Partners	Project Purpose	Drainage Size	Project Completed	Maintenance Requirement
BCWD, City of Stillwater	Reduce thermal and sediment loading from the parking lot area and Neal Ave from directly draining untreated water into Brown's Creek.	1.6 Acres	Spring 2017	Minimum of 25 Years (until 2042)

### II. Parts Inventory

Item #	MN/DOT SPEC. NO.	Item	Quantity	
1	2574.525	FILTER TOPSOIL BORROW (80:20 SAND COMPOST MIX)	144	CY
2	2502.573	6" HDPE PERFORATED PIPE DRAIN	216	LF
3	2502.541	6" PVE CLEAN OUT W/ SCREW CAP	3	EA
4	2502.541	6" VALTERRA KNIFE GATE VALVE AND 12" PVC HOUSING	2	EA
5	2503.511	8" HDPE PERFORATED PIPE DRAIN	104	LF
6	2503.511	12" HDPE PERFORATED PIPE DRAIN	37	LF
7	2503.511	8" PVC, C-900 PIPE SEWER	46	LF
8	2503.511	6" HDPE PIPE SEWER	32	LF
9	2503.511	12" HDPE PIPE SEWER	210	LF
10	2503.511	18" RCAP PIPE SEWER (22"X13")	19	LF
11	2503.511	18" RCP PIPE SEWER (W/ PLUG)	10	LF
12	2503.511	21" RCP PIPE SEWER	1	EA
13	2501.515	21" RCP PIPE APRON	1	EA
14	2501.569	8" GATE VALVE	1	EA
15	2506.502	48" DIA PRECAST CONCRETE MANHOLE	1	EA
16	2506.502	60" DIA PRECAST CONCRETE MANHOLE	2	EA
17	2506.502	WATER QUALITY TANK (PRINSCO SWQU 6020)	1	EA
18	2506.516	FRAMES AND CASTINGS	9	EA
19	2511.501	RIPRAP, CLASS 3	20	CY
20	SPECIAL	GEOTEXTILE FABRIC, TYPE IV	1066	SY
21	SPECIAL	EPDM LINER, 45-MIL	1066	SY
22	2451.509	WASHED AGGREGATE – 1.5" TO 3" DIA STONE, (CV)	630	TON
23	2575.502	SEED, MNDOT MIXTURE 33-262 (DRY SWALE / POND)	2	LB
24	2575.502	SEED, MNDOT MIXTURE 34-261 (RIPARIAN SOUH & WEST)	2	LB
25	2575.502	SEED, MNDOT MIXTURE 32-241 (NATIVE CONSTRUCTION)	4	LB
26	2575.502	SEED, MNDOT MIXTURE 25-131 (LOW MAINT. TURF)	132	LB
27	2571.502	DECIDUOUS TREE, 2.5" CALIPER – BUR OAKS	2	EA
28	2571.502	DECIDUOUS TREE, 2.0" CALIPER – AUTUM BLAZE MAPLE	2	EA

### III. Stormwater Management Facilities

The drainage path of the project is as follows: paved driveway with curb, gutter, area intakes, and curb cuts directs site drainage through a bio swale into a single Prinsco underground stormwater quality unit (SWQU). The 5-foot diameter by 20-foot long underground storage tank is designed to capture debris collected in runoff including trash, sediment, oils and other suspended solids. After depositing debris and sediment into the SWQU, stormwater flows are then sent through the rock crib to address thermal loadings. After passing through the Rock Crib, the cooler and cleaner stormwater flows are then outflowed into Brown's Creek. Higher flows by pass the system and are sent directly to Brown's Creek through an underground pipe.

Best Management Practices (BMPs) included in this project are an underground Prinsco HDPE SWQU, a large Rock Crib Structure, four curb cuts, inlet catch basins with grates, outlet pipes and manhole structures, as well as asphalt pavement, curb, gutter, and a riprapped outlet pipe apron.

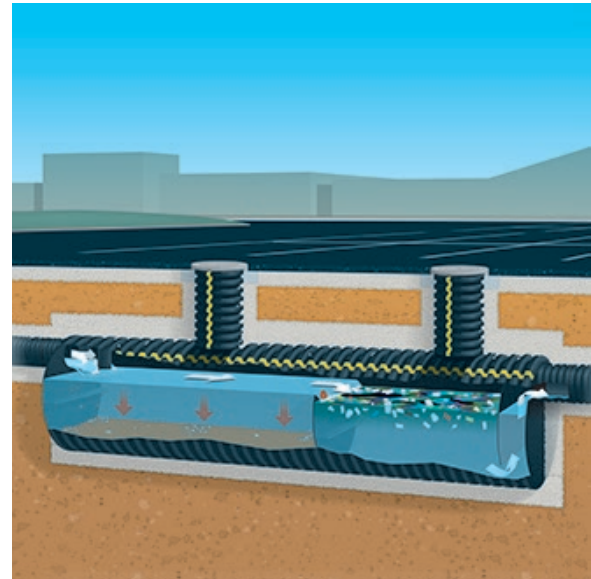


Figure 2: Prinsco Underground SWQU

Prinsco's underground retention/detention systems provide a solution to effectively manage and store stormwater runoff utilizing a series of pipes and fittings. As the stormwater moves through the system, sediment and debris will tend to settle out of the water and collect in the pretreatment chamber side before it is able to enter the retention/detention chamber. This will require regular inspection and cleaning in order for the system to perform as originally designed and extend the service life.

The constructed underground rock crib thermal reduction system provides a solution to effectively reduce elevated stormwater temperatures. Stormwater is gravity fed through a series of laterals through the 1.5" – 3.0" river rock where it is cooled. This system too will require regular inspection and occasional cleaning to ensure it is efficiently operating.

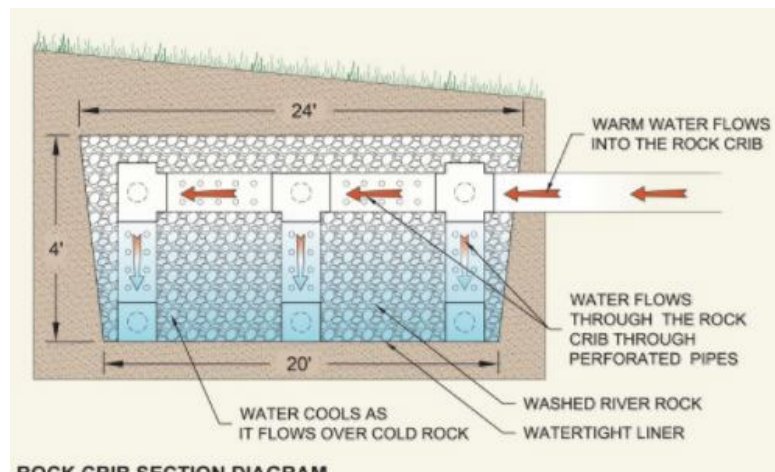


Figure 3: Rock Crib Design

### IV. Accessibility

To maintain the SWQU, access occurs at the adjacent parking lot. Manhole risers were installed on top of the SWQU to access debris, sediment, and trash from inside the SWQU. There are three PVC cleanouts located on either side of the SWQU and on the western edge of the Rock Crib to assist in flushing out the system. The weight of maintenance vehicles required to conduct the clean out typically weigh 10 to 15 tons dry with a gross weight approaching 30 tons. The SWQU and Rock Crib are located close enough to the edge of the parking lot that equipment will not have to enter the vegetated area.

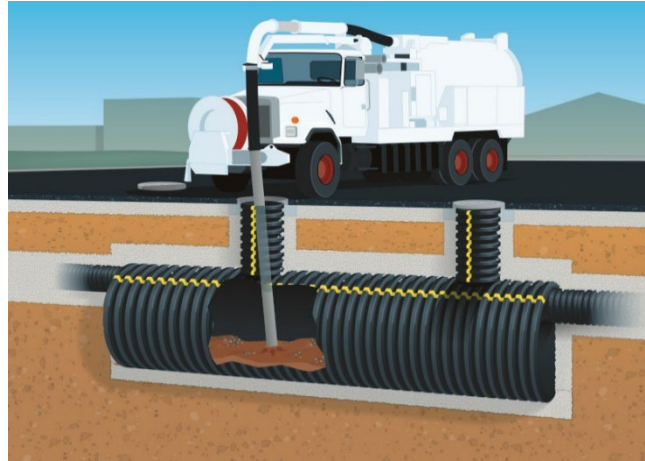


Figure 4: Maintenance of WQU

**V. Start-Up and Operating Procedures**

**a. Process Description**

*Not Applicable for this project*

**b. Controls**

*Not Applicable for this project*

**c. Start – up Procedures**

*Not Applicable for this project*

**d. Normal Operating Procedures**

The following personnel can be contacted for normal operating procedure questions.

Contact Personnel		Contact Number	Organization
<b>Primary</b>	Karen Kill, Administrator	651-330-8220 x26	BCWD
<b>Secondary</b>	Derek R. Lash, P.E., CPESC, Project Engineer	651-770-8448	Emmons & Olivier Resources, Inc.

**e. Common Operating Problems**

Maintaining the SWQU is important for the long-term functionality of the device. Due to nearby wooded areas, this system tends to collect leaves and sand. If the SWQU becomes plugged, water from large storm events will bypass the system entirely and flow directly into the Rock Crib which is not designed to handle highly concentrated sediment loads.

**C. Maintenance and Inspection Requirements**

## I. Planning Maintenance and Inspections

Inspections should be made two to three times per year between the months of April and November. The system should be cleaned out annually with a vacuum truck to maintain system efficiency.

### a. Inspection Procedures

Item	Item Location	Parameter Measured	Inspection Frequency
<b>Stormwater Manhole G</b>	East edge of project site.	Accumulation of debris, sediment or grass in the manhole or on the manhole top.	1 or 2 times per year.
<b>Catch Basin E</b>	East edge of project site directly south of Stormwater Manhole G.	Debris, grass, or sediment covering the basin grate.	2 to 3 times per year
<b>Gate Valve</b>	East edge of project site located approximately 5 feet southwest of Stormwater Manhole G.	Functionality of the gate valve.	1 or 2 times per year.
<b>SWQU East Access Manhole</b>	Just north of the northeast corner of the parking lot. Directly west of Catch Basin E.	Sediment depth	2 to 3 times per year
<b>SWQU West Access Manhole</b>	Directly west of SWQU East Access Manhole.	Debris accumulation, sediment depth	2 to 3 times per year
<b>Catch Basin F</b>	Western most catch basin on the site. Located approximately 125 feet west of the SWQU and 5 feet south of the rock crib's south west corner.	Debris, grass, or sediment covering the basin grate.	2 to 3 times per year
<b>Outlet Pipe Apron H</b>	Northeast corner of project area. Outlets into Brown's Creek.	Accumulation of any sediment or debris. Also note any noticeable change in riprap location.	1 or 2 times per year.
<b>Curb Cuts</b>	Along the northern edge of the parking lot.	Note any accumulation of debris or sediment that would cause blockage of stormwater runoff.	1 or 2 times per year.
<b>Cleanouts</b>	Along the centerline of the bioswale.	Functionality of the clean outs.	1 or 2 times per year.

Inspections should include documentation (Outlined in Section H, Record of Annual Inspection and Maintenance Program) and measurements of the following BMP components:

1. Document the presence of sediment, leaf litter, or other debris on the paved surface or covering the catch basin grates. Such conditions could inadvertently direct runoff over the SWQU and run directly into Brown's Creek.

2. Document the presence of sediment, leaf litter, or other debris in each of the two catch basin manholes. Such conditions could block runoff from entering the SWQU and inadvertently direct runoff to the high-flow bypass pipe.
3. Measure the depth of sediment and/or organic layer in each of the two access manholes. The measurement should be recorded from the top of the access manhole rim to the sediment and/or organic layer. Initial measurements can be taken with a large stick or piece of string with a flat weight on the end. These measurements will allow for inspection measurements to be taken from outside of the system, eliminating the need for confined space entrance. During inspections, elevations of sediment height should be taken from each riser and cleanout. These elevations should be recorded on the Inspection and Maintenance log sheet. Inspections should also document any blockages to inlet or outlet stubs. Inspection of the pre-treatment unit upstream of the system should always be inspected during every site visit.
4. Document the presence of sediment, leaf litter, or other debris in the manhole leaving the SWQU. The presence of discharged material could indicate the SWQU unit is inadvertently discharging sediment and/or debris because the unit is full and requires clean-out.
5. Document the presence of sediment, debris, or erosion in the bio-swale.
6. Document the presence of sediment, debris, or erosion at the end of the outlet pipe.

**b. Maintenance procedures**

Item	Corrective Action	Maintained by	Maintenance Frequency	Estimated Annual Cost (Based on 2024 Estimate)
<b>Stormwater Manhole G</b>	Clear with hand tools	BCWD	As determined by inspections	\$125
<b>Catch Basin E</b>	Clear with hand tools	BCWD	As determined by inspections	\$125
<b>Gate Valve</b>	Check with gate valve key	BCWD	Minimum	\$125
<b>SWQU Unit</b>	Vacuum Truck	Contracted party	Minimum Biennial	\$1,500 (\$3,000)
<b>Catch Basin F</b>	Clear with hand tools	BCWD	Once yearly	\$125
<b>Outlet Pipe Apron</b>	Clear with hand tools	BCWD	Minimum	\$125
<b>Curb Cuts</b>	Clear with hand tools	BCWD	Once yearly	\$125
<b>Bio-Swale Cleanouts</b>	Clear with hand tools	BCWD	Minimum	\$125
<b>Inspections</b>		BCWD	Biennial	\$700

<b>Anticipated Total Yearly Cost:</b>	<b>\$3,075</b>
<b>Note : Maintenance must be provided for a minimum of 25 years (until 2042).</b>	
*SWQU cleaning shows an annual cost, as well as a biennial frequency cost. The costs include contracted services and 30% professional fees & expenses.	

Buildup of debris can obstruct flow through the laterals or block the entranceway of the outlet pipe in a retention or detention system. This may result in ineffective operation or complete failure of the system. Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues. The BCWD will perform between two to four inspections from April through November. Inspection summaries shall be completed by the District at the time of each visit. Please refer to subsequent section **C., Inspection Procedures**, for further details on the inspection process.

**The BMPs shall be maintained and repaired by the District within 90-days of the following BMP deficiencies:**

1. Sediment, leaf litter, or other debris collected on the paved surface or covering the two catch basin grates shall be removed so runoff can enter the SWQU. Material shall be removed when an obstruction obviously directs runoff over the curb, and/or when less than 50% of the catch basin grate surface is visible.
2. Sediment, leaf litter, or other debris collected in the two catch basin manholes shall be removed on a regular schedule (detailed below) so runoff can enter the SWQU rather than spill over the curb and into Brown’s Creek. Material shall be removed when the pipes are found to have 25% or greater of the pipe inlet blocked.
3. Sediment, leaf litter, or other debris will be removed from the SWQU through a cleaning process by vacuum truck or other appropriate means when remaining storage in the SWQU is found to be 50% or less of its original capacity.
4. If sediment, leaf litter, or other debris has accumulated in the manhole leaving the SWQU, inspection of the SWQU should take place to determine if the SWQU storage has reached 50% of its original capacity and if a cleaning process should be planned.
5. Sediment, leaf litter, or other debris will be removed from the outlet pipe when accumulation is restricting flow through the pipe by 50% of the original capacity.
6. Any areas of erosion, scouring, or destabilization associated with any of the aforementioned BMP components shall be corrected by the District on an as-needed basis.

System Cleaning

When using a water jet and vacuum truck, the high-pressure nozzle with rear facing jets is attached to a hose and pulled downstream, washing sediment and debris downstream with it. Therefore, the vacuum truck needs to be located on the downstream end of the pipe to remove the sediment and debris with the vacuum hose. Multiple passes of the water jet may be needed to clean the run, dependent on the amount of sediment or debris.

## II. Corrective Actions and Modifications

Corrective actions and modifications are driven based on the performance of the SWQU, change in drainage area, and weather patterns.

## III. In-house Verses Contracted Labor

Costs to maintain the water quality unit using vacuum services are anticipated to be approximately \$4,000 per cleaning (including professional fees & expenses), but costs can vary depending on the sediment volume. For a large vacuum truck, each cleaning is anticipated to take 2 to 3 hours and may require one or two dump trips to complete a single cleaning (as described above under **B. (iv), Accessibility**).

## D. Maintenance Responsibilities and Agreements

BCWD is responsible for and will complete regular maintenance to remove trapped sediment and debris. Sediment and debris on catch basins will be cleared out by hand or shovel. BCWD is also responsible for securing a water jet and a vacuum truck once or twice a year to remove sediment in the system.

### I. Manufacturer's Recommendations

Before the system is cleaned, the following considerations should be made:

- The system will be much easier to clean when there is little to no flow in the system and the system does not have any standing water. For this reason, cleaning should be scheduled around dry weather.
- Before cleaning begins, all outlet stubs should be blocked off. If this is not done, sediment loading could back up or plug downstream pipelines and add to cleaning expenses. Blocking the stubs will also prevent debris or pollutants from migrating downstream.
- When beginning the cleaning process, all upstream pipelines and pre-treatment units should be cleaned prior to starting on the retention or detention system.
- When cleaning the retention or detention system, it is best to start at the highest elevation of the system and work towards the lowest elevation.
- Stationing the vacuum truck above the downstream manifold and jetting the debris from the laterals to the downstream manifold provides an effective capture point for the vacuum line.

### II. Safety

Before entering a retention or detention system, ensure all OSHA and local safety regulations are being followed. Only personnel with appropriate confined space permits and personal protective equipment should be allowed to enter the system.

## E. Records and Reporting

Records and reporting should be submitted to and maintained by BCWD. The following information should be recorded during all inspection visits: Sediment depth and water levels in the pre-treatment tank, sediment and debris levels in the catch basins, and note any sediment or debris at the outlet.

## Record of Annual Inspection and Maintenance Program:

Inspector Information				
Visit Number:				
Name				
Date:				
Identifier Number	Structure Description	Debris / Sediment	Sediment Depth (in)	Notes
1.	Paved Surface / Curb Cuts	Y / N		
2.	Catch Basins (E, F)			
	Gate Valve	Functioning? Y / N		
	Cleanouts	Y / N		
3.	Water Quality Unit			
	East Access Manhole	Y / N		
	West Access Manhole	Y / N		
	Note: Sediment should be no closer than 5.90-feet from the manhole lids to the top of sediment. The measurements would result in 22-inches of collected sediment, and trigger vacuuming.			
4.	Outlet Pipe Apron	Y / N		
<b>Maintenance Description:</b>				
Contractor / Maintenance Crew Information				
Date:				
Name:				
Phone:				
Address:				
<b>Maintenance Description:</b>				

## I. Sampling and Performance Monitoring

After completion of construction, BCWD will retain responsibility to assess the effectiveness of the system and maintain the Project in perpetuity, which may involve reconstruction of the Project to restore its effectiveness.

### a. Sampling and Analysis

BCWD is responsible for coordination of routine sampling. Water quality sampling is to be added to normal inspection procedures.

### b. Performance monitoring

BCWD is responsible for recording and interpreting results of samples. If a field sample is believed to be contaminated, further lab testing may be required. Consult the BCWD Administrator if samples collected from the system appear to be contaminated (e.g., oily sheen in water or sediment, greasy/gassy smell, odd sediment colors).

## F. Emergency Plan and Operating Procedures

### I. Emergency Plan

Issues that would trigger the Emergency Operating Procedure consist of large oil or other contaminant spills that enter the SWQU. Always call 911 in a situation that presents a risk of immediate bodily harm to yourself or the surrounding community.

### II. Emergency Operating Procedures

In the event on an operational emergency, please contact the following personnel for further assistance.

Contact Personnel		Contact Number	Organization
Primary	Karen Kill, Administrator	651-330-8220 x26	BCWD
Secondary	Derek R. Lash, P.E., CPESC, Project Engineer	651-770-8448	Emmons & Olivier Resources, Inc.

## G. Appendices

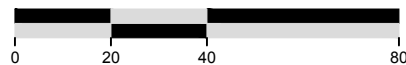
### I. Construction Plans

### II. Agreements

- a. COOPERATIVE AGREEMENT BETWEEN CITY OF STILLWATER AND BROWN'S CREEK WATERSHED DISTRICT FOR THE BROWN'S CREEK PARK STORMWATER MANAGEMENT PROJECT.
- b. STILLWATER'S RIGHTS AND COMMITMENTS AND GRANT TO BCWD OF ACCESS, CONSTRUCTION AND MAINTENANCE RIGHTS.



SCALE IN FEET



TRIBUTARY TO BROWN'S CREEK

PROPOSED STORMWATER MANAGEMENT SYSTEM (TYP.)

BROWN'S CREEK

NEAL AVENUE

EXISTING GRAVEL PARKING LOT (TYP.)

RELOCATED STORAGE CONTAINER BY CITY

PRELIMINARY WETLAND DELINEATION LIMITS (TYP.)

PROPOSED STORM SEWER IN NEAL AVENUE TO BE PART OF CITY ROAD RECONSTRUCTION PROJECT (TYP.)

EXISTING FIRE RING

PROPOSED REPLACEMENT TREE (TYP.)

TREE LINE (TYP.)

BLDG

EXISTING SIGNS TO BE RELOCATED BY CITY

SIGN

BLDG

SIGN

SIGN

SIGN

PROPOSED PAVED PARKING LOT WITH CURB AND GUTTER - SEE ADD ALTERNATE 1 (TYP.)

EXISTING STORAGE CONTAINER TO BE RELOCATED BY CITY

EXISTING TRAIL KIOSK STRUCTURE

DNR RIGHT-OF-WAY (TYP.)

DNR TRAIL CENTERLINE (TYP.)



Plot Date: 06/15/2016  
Drawing name: X:\Clients\_VD\041\_BCMVD0282\_Improvements\_BC\_Park09\_GHMS\_ProjectName\dwg\41-282\_P-Base.dwg  
Xrefs: 41-282\_X-Base

NO	DATE	BY	REVISION
6	06/15/2016	DRL	FINAL PLAN -REVISION 1
5	06/02/2016	DRL	FINAL PLAN
4	05/20/2016	DRL	PRELIMINARY PLAN - REVISION 2
3	04/16/2016	DRL	PRELIMINARY PLAN - REVISION 1
2	04/04/2016	DRL	PRELIMINARY PLAN
1	12/01/2015	DRL	CONCEPT PLAN

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

*Derek R. Lash*  
DEREK R. LASH  
DATE: 06-15-2016 LICENSE # 45156

SUBMISSION DATE:  
05-20-2016

DESIGN BY: DRL DRAWN BY: DRL

EOR PROJECT NO.:

**EOR**  
water ecology community

Emmons & Olivier Resources, Inc.  
651 Hale Avenue North  
Oakdale, MN 55128  
Tele: 651.770.8448  
www.eorinc.com

BROWN'S CREEK WATERSHED DISTRICT  
455 HAYWARD AVE N  
OAKDALE, MN 55128

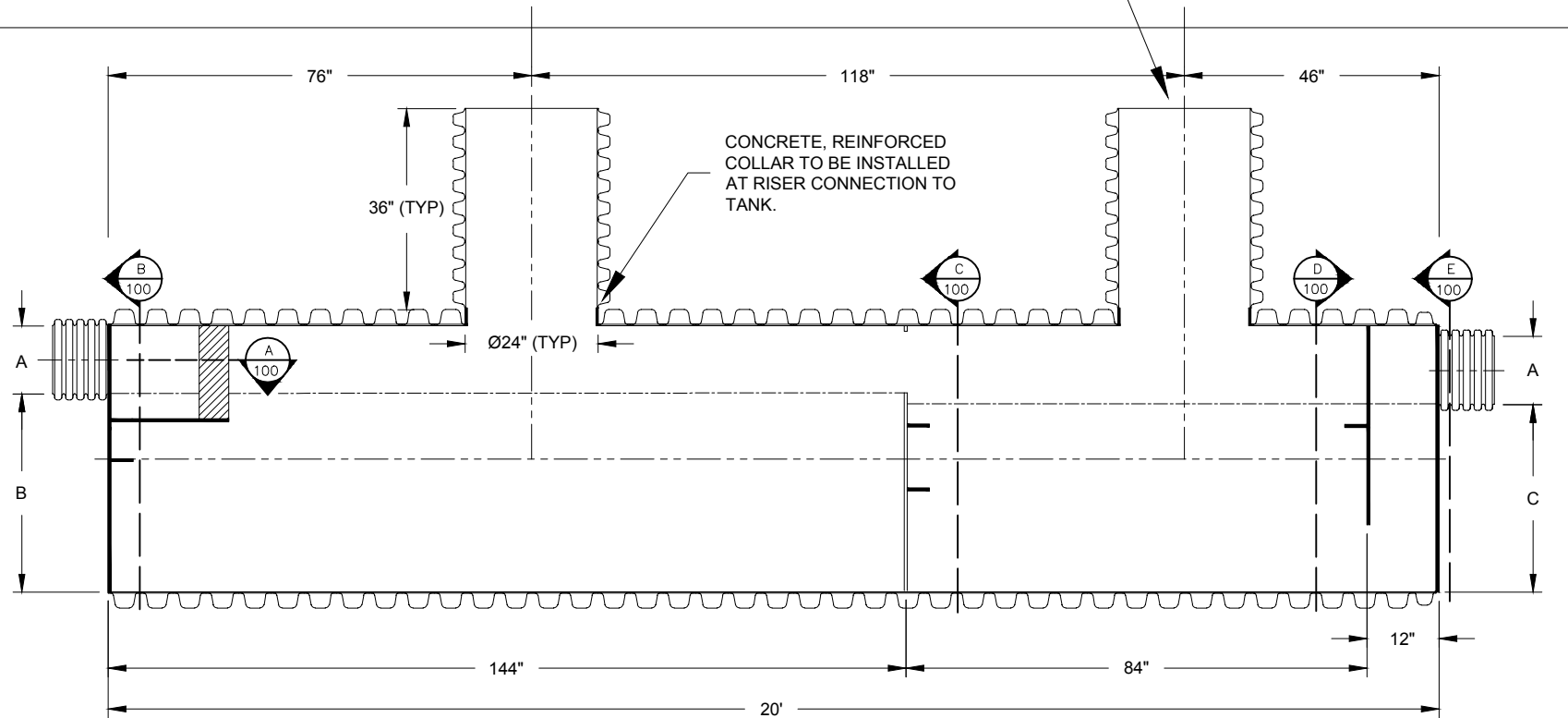
BROWN'S CREEK PARK STORMWATER PROJECT  
STILLWATER, WASHINGTON COUNTY, MN

STATE PROJECT NO. \_\_\_\_\_ CITY PROJECT NO. \_\_\_\_\_

SITE PLAN

SHEET 05 OF 16 SHEETS

SEE MANHOLE CAP DETAIL FOR CONCRETE, REINFORCED COLLAR, TOP SLAB SUPPORT, AND FRAME & CASTING



Prinsco Product Number	SWQU Dia.	Sediment Chamber Storage Volume ft <sup>3</sup>	Oil Chamber Storage Volume ft <sup>3</sup>	Total Storage Volume ft <sup>3</sup>	Inlet /Outlet Stub Diameter (A) in.	SWQU Inlet Invert (B) in. Nominal	SWQU Outlet Orifice Invert (C) in. Nominal	Max Treated Flow Rate @ 140 Sieve Size (CFS)	Max Treated Flow Rate @ 200 Sieve Size (CFS)	Outlet Orifice Dia (D) in.
WQU3620A	36"	72	42	114	10	25.50	23.50	1.51	-	6.6
WQU3620B	36"	72	42	114	10	25.50	23.50	-	0.75	4.7
WQU4220A	42"	92.9	54.2	147.1	12	29.75	27.75	1.77	-	6.9
WQU4220B	42"	92.9	54.2	147.1	12	29.75	27.75	-	0.88	4.9
WQU4820A	48"	121.3	70.8	192.1	12	35.88	33.88	2.31	-	7.9
WQU4820B	48"	121.3	70.8	192.1	12	35.88	33.88	-	1.15	5.6
WQU6020A	60"	172.7	100.7	273.4	15	44.63	42.63	2.97	-	8.5
WQU6020B	60"	172.7	100.7	273.4	15	44.63	42.63	-	1.48	6

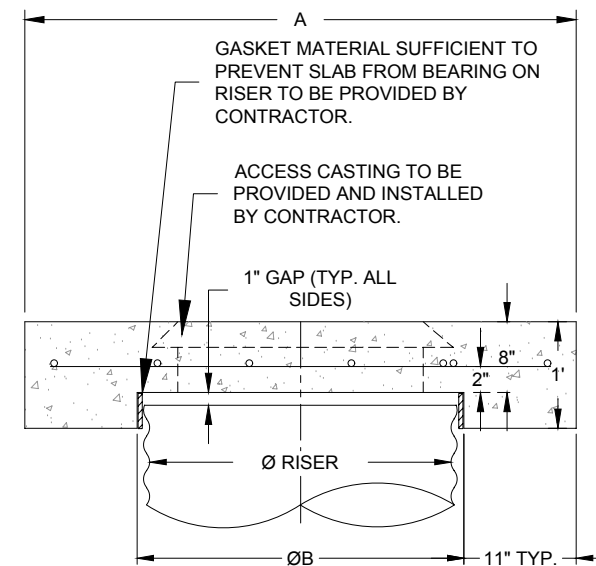
THIS DETAIL DEPICTS RECOMMENDED INSTALLATION PRACTICES AND IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS. PRINSCO BEARS NO RESPONSIBILITY FOR ANY ALTERATIONS, REVISION AND/OR DEVIATION FROM THIS STANDARD DETAIL. PRINSCO HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICE FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION TO VERIFY SUITABILITY. © PRINSCO, INC.



SWQU 20FT PRODUCT DETAIL

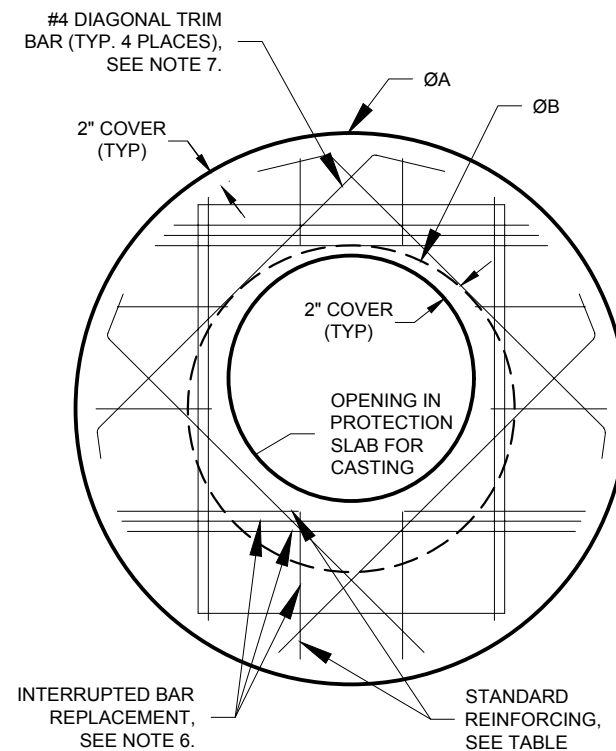
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SHEET: 1 of 2	

**01** WATER QUALITY PRE-TREATMENT TANK PROFILE  
(No Scale)

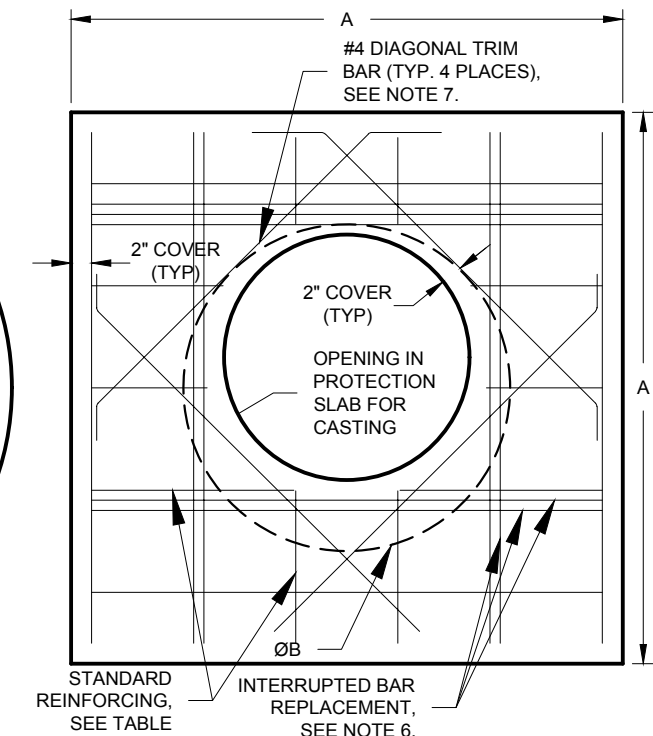


Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	Ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

\*\* ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
- DESIGN LOAD HS25.
- EARTH COVER = 1' MAX.
- CONCRETE STRENGTH = 3,500 psi
- REINFORCING STEEL = ASTM A615, GRADE 60.
- PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
- TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
- PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
- PROVIDE MINIMUM 12" COMPACTED AGGREGATE BASE BELOW TOP SLAB

**02** MANHOLE CAP DETAIL  
(No Scale)

Plot Date: 06/15/2016  
 Drawing Name: X:\Clients\WQD041\_BCD\WQD0292\_Improvements\_BC\_Park09\_GHMS\_ProjectName\dwg\41-292\_X\_Base.dwg  
 Xrefs: 41-292\_P\_Base.dwg

NO	DATE	BY	REVISION
6	06/15/2016	DRL	FINAL PLAN -REVISION 1
5	06/02/2016	DRL	FINAL PLAN
4	05/20/2016	DRL	PRELIMINARY PLAN - REVISION 2
3	04/16/2016	DRL	PRELIMINARY PLAN - REVISION 1
2	04/04/2016	DRL	PRELIMINARY PLAN
1	12/01/2015	DRL	CONCEPT PLAN

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DEREK R. LASH  
DATE: 06-15-2016 LICENSE # 45156

SUBMISSION DATE: 05-20-2016  
 DESIGN BY: DRL DRAWN BY: DRL  
 EOR PROJECT NO. 00041-0262

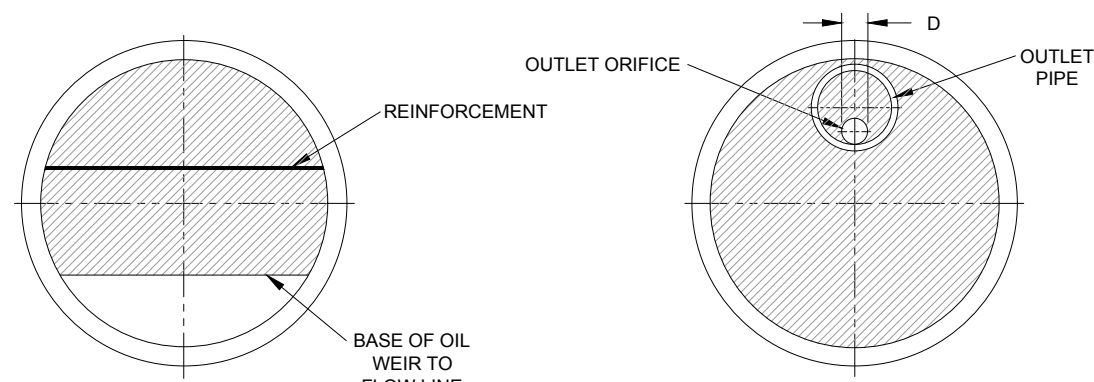
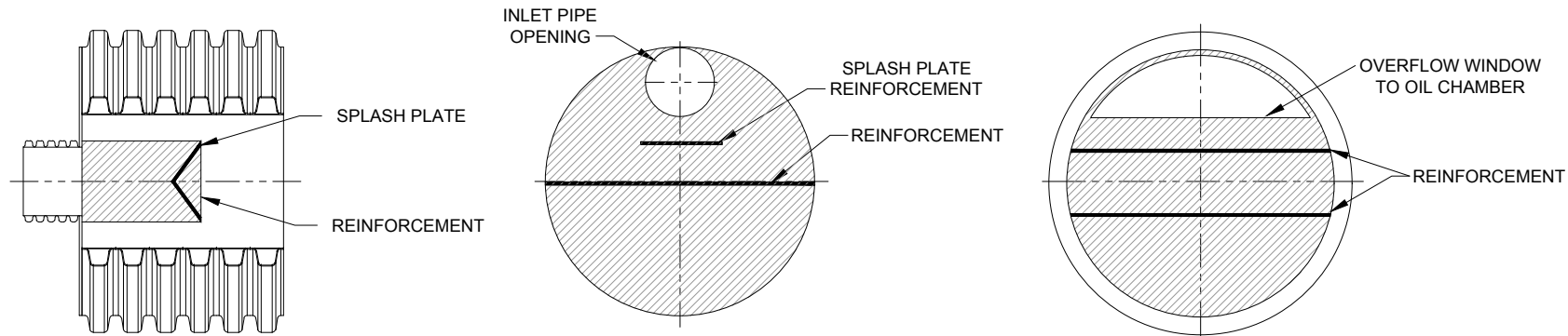
**EOR** Emmons & Olivier Resources, Inc.  
 651 Hale Avenue North  
 Oakdale, MN 55128  
 Tele: 651.770.8448  
 www.eorinc.com

BROWN'S CREEK WATERSHED DISTRICT  
 455 HAYWARD AVE N  
 OAKDALE, MN 55128

BROWN'S CREEK PARK STORMWATER PROJECT  
 STILLWATER, WASHINGTON COUNTY, MN  
 STATE PROJECT NO. ... CITY PROJECT NO. 00041-0262

DETAILS-1

SHEET 13 OF 16 SHEETS



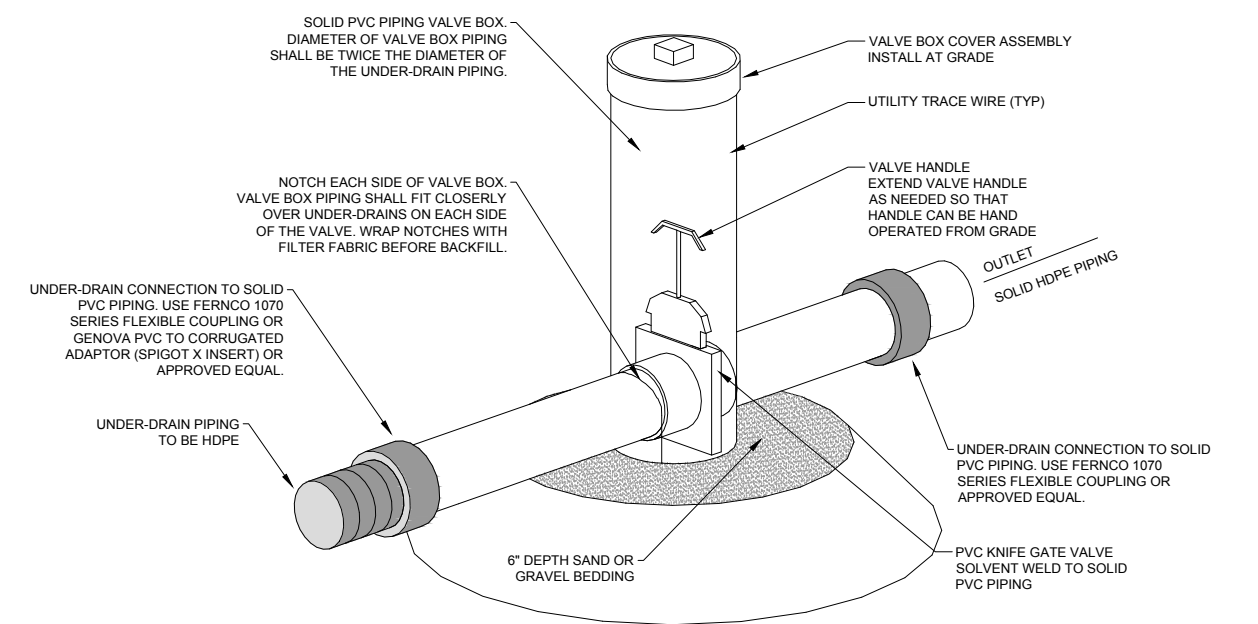
NOTES:  
 • SWQU SHOWN IS PRINSCO'S STANDARD SWQU. CUSTOM UNITS ARE AVAILABLE, PLEASE CONTACT YOUR PRINSCO SALES REPRESENTATIVE FOR MORE INFORMATION.

THIS DETAIL DEPICTS RECOMMENDED INSTALLATION PRACTICES AND IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS. PRINSCO BEARS NO RESPONSIBILITY FOR ANY ALTERATIONS, REVISION AND/OR DEVIATION FROM THIS STANDARD DETAIL. PRINSCO HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICE FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION TO VERIFY SUITABILITY. © PRINSCO, INC.



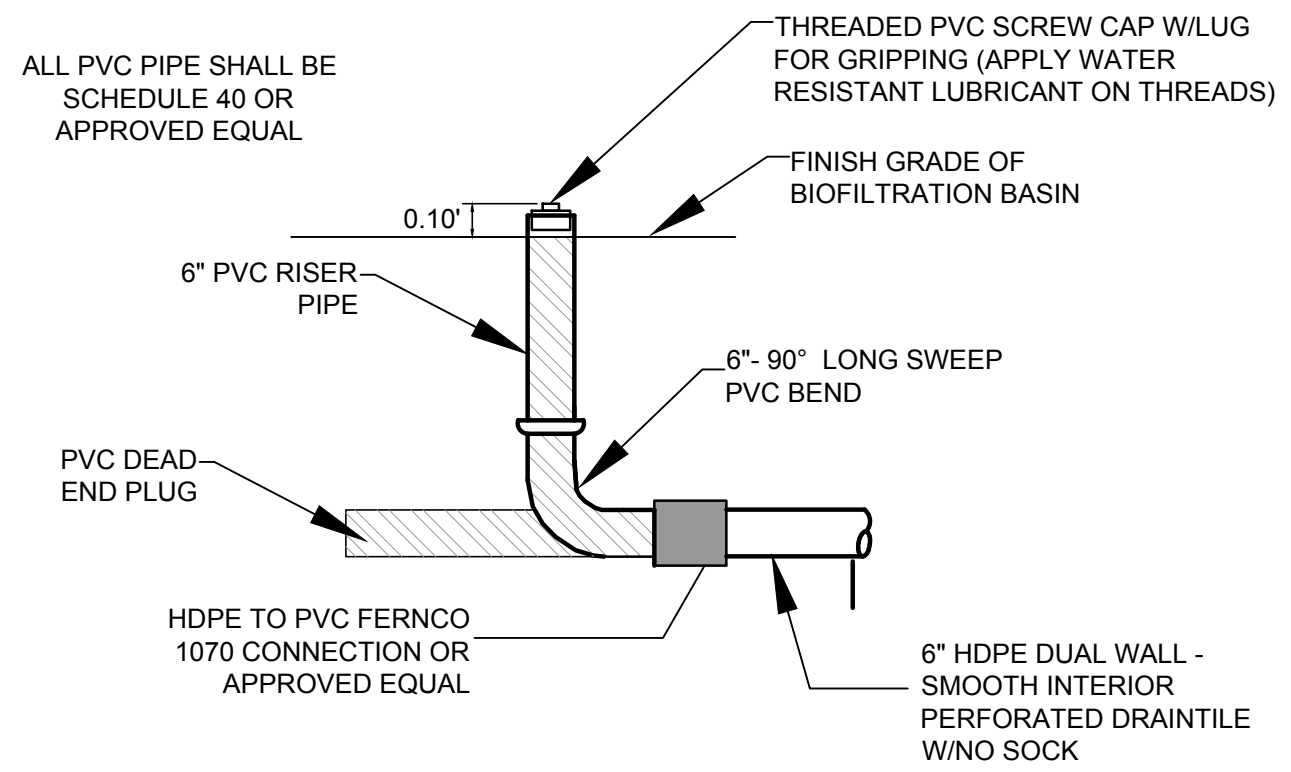
SWQU 20FT PRODUCT DETAIL	
DRAWN BY: RWM	DRAWING NUMBER: D-4-100
DATE: 01/05/2011	
SCALE: NTS	
SHEET: 2 of 2	

**01 WATER QUALITY PRE-TREATMENT TANK DETAIL**  
(No Scale)



NOTES:  
 1. SOLID PIPING AND FITTINGS SHALL BE PVC SCHEDULE 40 UNLESS NOTED OTHERWISE. PIPING DIAMETERS AND ELEVATIONS SHALL BE AS SHOWN ON THE APPROVED PLANS. ALL SOLID PIPE FITTING AND JOINTS SHALL BE SOLVENT WELDED OR HAVE MECHANICAL COUPLER TO PROVIDE WATERTIGHT CONNECTIONS.  
 2. THE KNIFE GATE VALVE SHALL BE A VALTERRA GKV PVC SCHEDULE 40 WITH 304 STAINLESS STEEL PADDLE SNA METAL HANDLE OR APPROVED EQUAL. THE VALVE DIAMETER SHALL MATCH THE DIAMETER OF THE UNDER-DRAIN PIPING UNLESS NOTED OTHERWISE.  
 3. VALVE BOX COVER ASSEMBLY INCLUDES PVC CLEAN-OUT ADAPTER WITH THREADED PLUG TO ACCESS VALVE HANDLE AND TRACE WIRES FROM GRADE.  
 4. THE UTILITY TRACE WIRE SHALL BE INSULATED 12 GAUGE COPPER INSTALLED ALONG ALL PIPE RUNS. PROVIDE ACCESS TO WIRES INSIDE OF THE VALVE BOX.  
 5. THE VALVE SHALL BE INSTALLED IN THE FULL OPEN POSITION. THE SWCD WILL OBSERVE THE TEMPORARY POOL FOLLOWING A RAIN EVENT AND WILL ADJUST THE VALVE AS NEEDED TO ACHIEVE THE OPTIMUM DRAIN DOWN TIME OF APPROXIMATELY 12 HOURS. FURTHER VALVE ADJUSTMENT SHOULD NOT BE NEEDED UNLESS PLANTS SHOW SIGNS OF STRESS.

**02 6" KNIFE GATE VALVE**  
(No Scale)



**04 PVC CLEANOUT DETAIL**  
(No Scale)

Plot Date: 06/15/2016  
 Drawing name: X:\Clients\_V\010111\_BCM\020222\_Improvements\_BC\_Park09\_GNIS\_ProjectName\041-262\_Details.dwg  
 Xrefs: 41-262\_P\_Base; 41-262\_X\_Base

NO	DATE	BY	REVISION
6	06/15/2016	DRL	FINAL PLAN -REVISION 1
5	06/02/2016	DRL	FINAL PLAN
4	05/20/2016	DRL	PRELIMINARY PLAN - REVISION 2
3	04/16/2016	DRL	PRELIMINARY PLAN - REVISION 1
2	04/04/2016	DRL	PRELIMINARY PLAN
1	12/01/2015	DRL	CONCEPT PLAN

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

*Derek R. Lash*  
 DEREK R. LASH  
 DATE: 06-15-2016 LICENSE # 45156

SUBMISSION DATE: 05-20-2016

DESIGN BY: DRL DRAWN BY: DRL

FOR PROJECT NO. 00041-0262

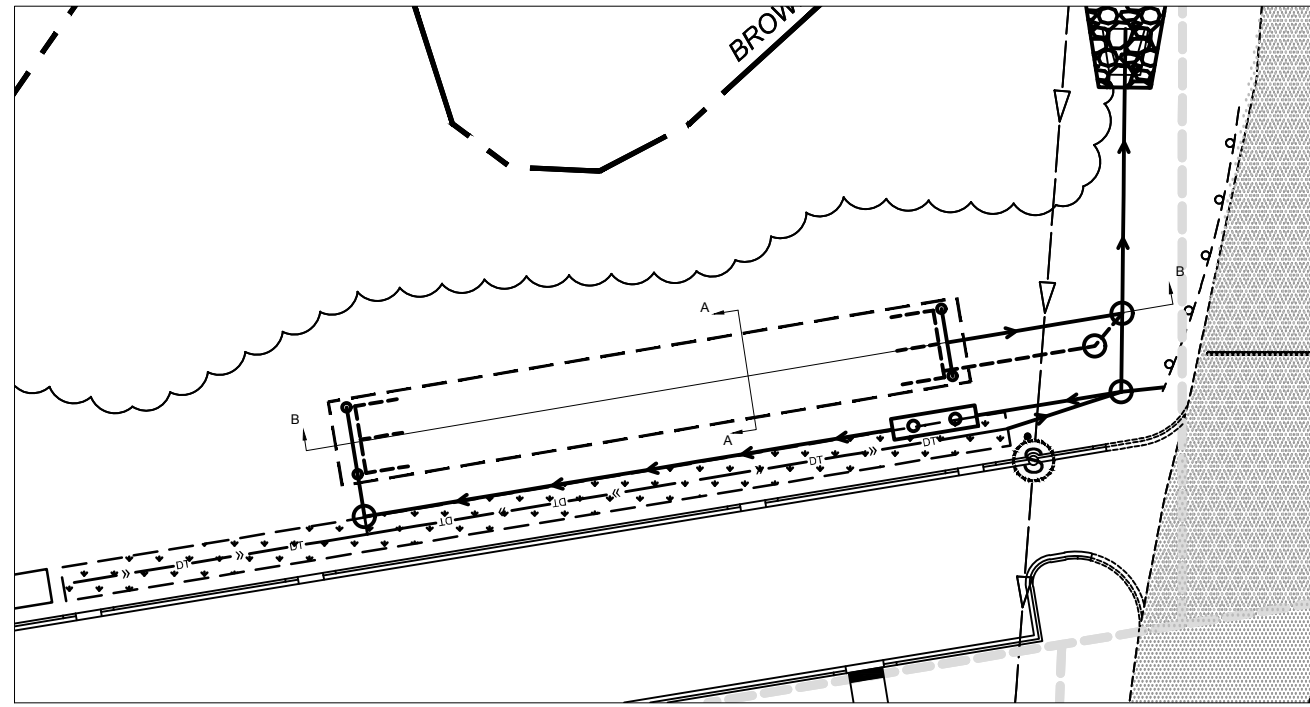
**EOR** water ecology community  
 Emmons & Olivier Resources, Inc.  
 651 Hale Avenue North Oakdale, MN 55128  
 Tele: 651.770.8448  
 www.eorinc.com

BROWN'S CREEK WATERSHED DISTRICT  
 455 HAYWARD AVE N OAKDALE, MN 55128

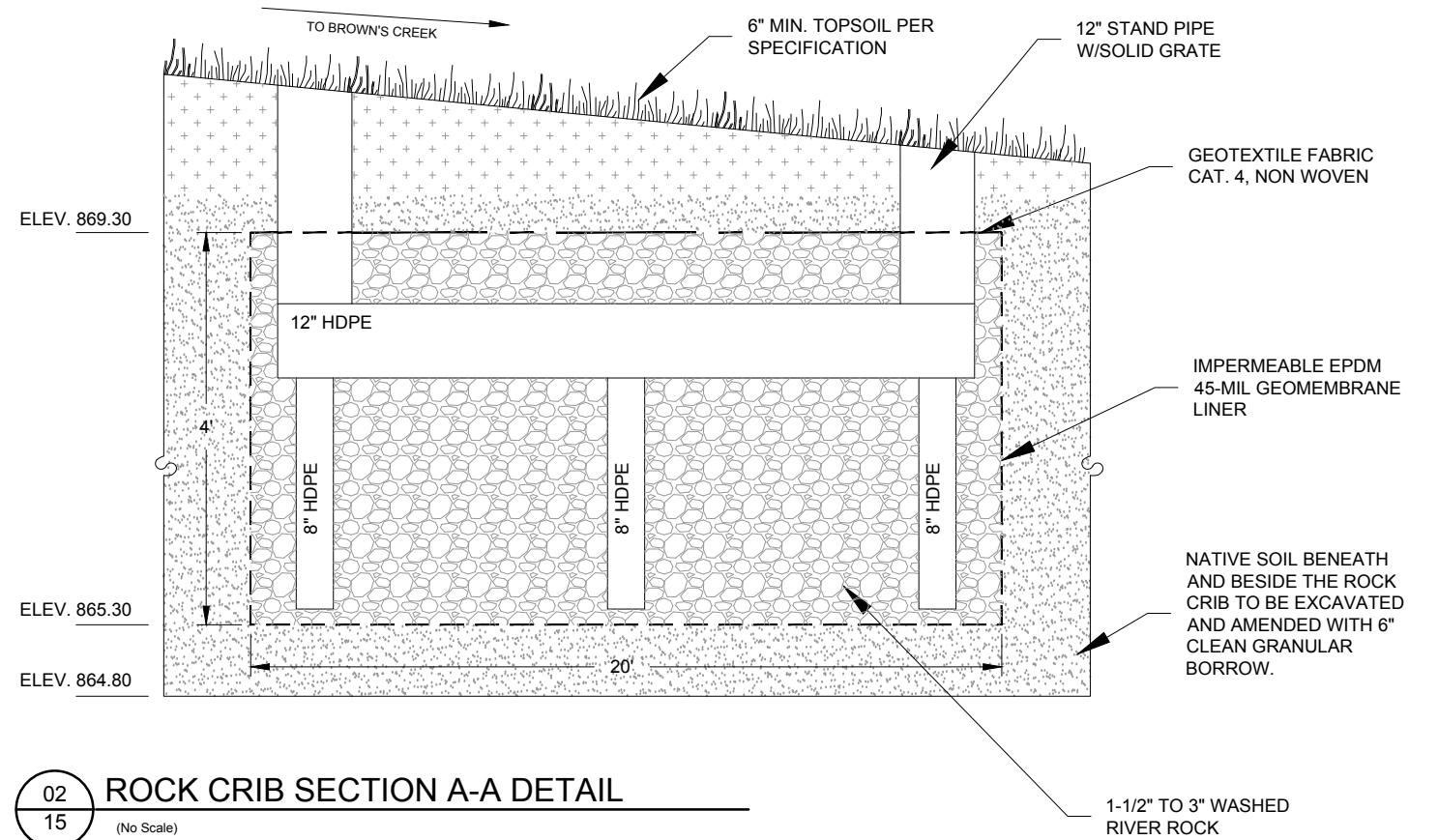
BROWN'S CREEK PARK STORMWATER PROJECT  
 STILLWATER, WASHINGTON COUNTY, MN

STATE PROJECT NO. ... CITY PROJECT NO. 00041-0262

DETAILS-2  
 SHEET 14 OF 16 SHEETS



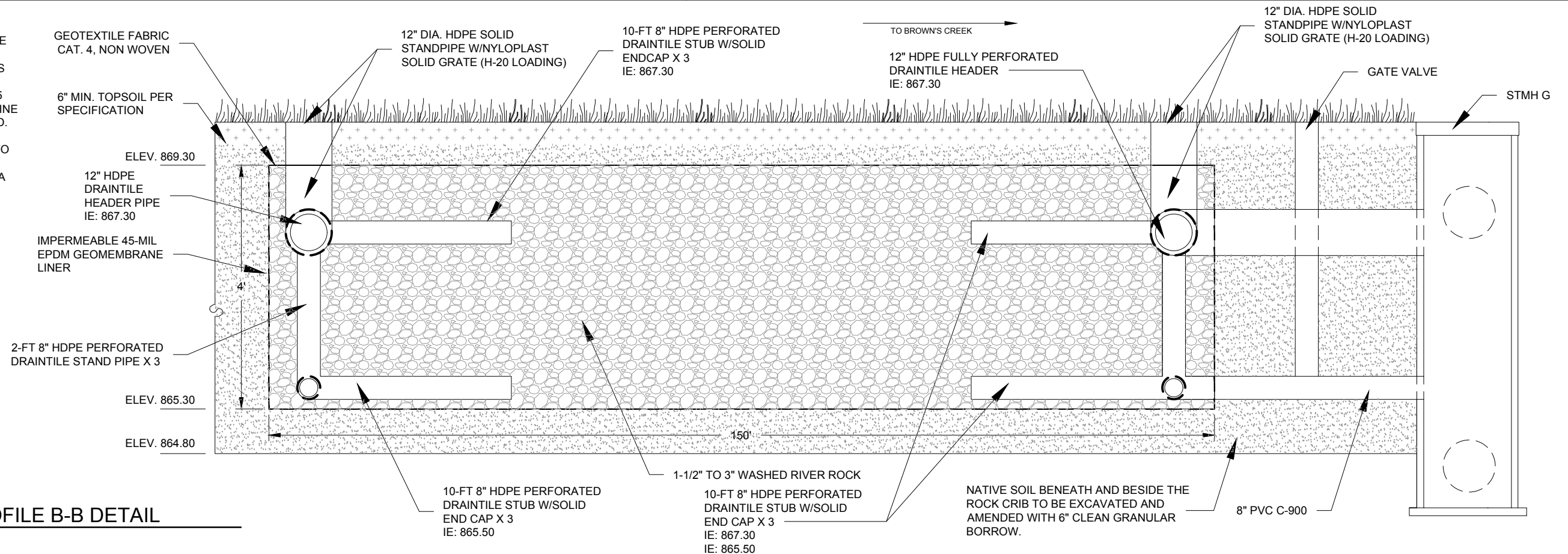
01 ROCK CRIB PLAN DETAIL  
15 (No Scale)



02 ROCK CRIB SECTION A-A DETAIL  
15 (No Scale)

NOTE:

- CONTRACTOR TO INSTALL 12" HDPE SOLID DRAINTILE, AND MANUALLY FABRICATE PERFORATIONS. HOLES TO BE NO MORE THAN 3/8-INCH DIAMETER, 6-INCHES O.C., AND IN 5 ROWS STARTING AT THE CENTERLINE OF THE PIPE AND MOVING UPWARD.
- PERFORATIONS THROUGH LINER TO BE MADE PER MANUFACTURER'S RECOMMENDATIONS TO PROVIDE A WATER TIGHT SEAL.



03 ROCK CRIB PROFILE B-B DETAIL  
15 (No Scale)

Plot Date: 06/15/2016  
 Drawing name: C:\Users\dash\Desktop\Projects\2016\06150232\_Improvements\_BC\_Park\09\_GIMS\_ProjectName.dwg  
 Xrefs: 41-232\_P\_Base.dwg

NO	DATE	BY	REVISION
6	06/15/2016	DRL	FINAL PLAN - REVISION 1
5	06/02/2016	DRL	FINAL PLAN
4	05/20/2016	DRL	PRELIMINARY PLAN - REVISION 2
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2	04/04/2016	DRL	PRELIMINARY PLAN
1	12/01/2015	DRL	CONCEPT PLAN

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*Derek R. Lash*  
 DEREK R. LASH  
 DATE: 06-15-2016 LICENSE # 45156

SUBMISSION DATE:  
05-20-2016

DESIGN BY: DRL DRAWN BY: DRL

EOR PROJECT NO.  
00041-0262

**EOR**  
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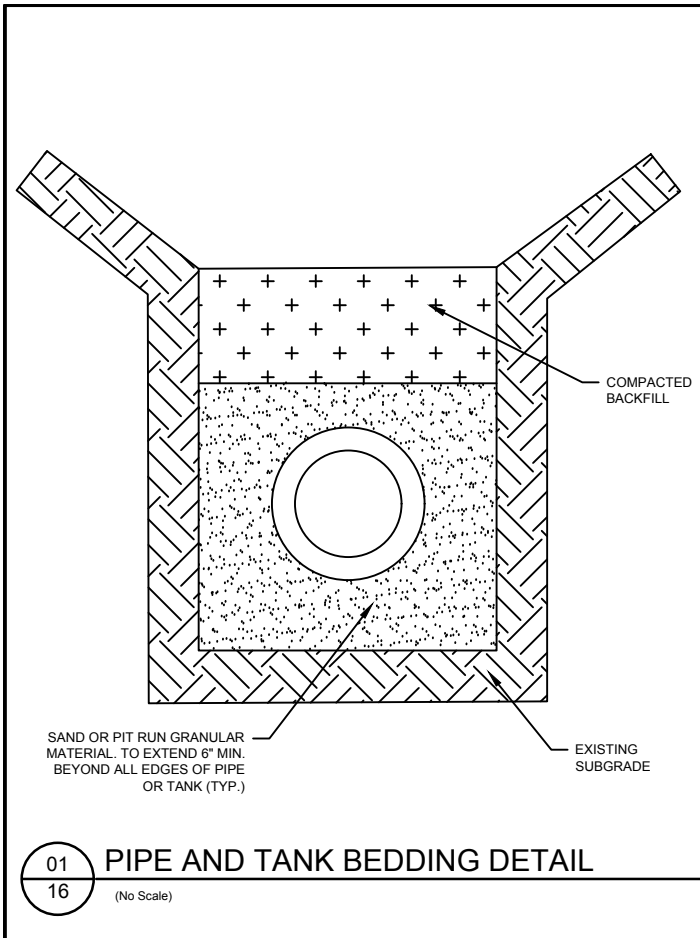
**BROWN'S CREEK WATERSHED DISTRICT**  
 455 HAYWARD AVE N  
 OAKDALE, MN 55128

**BROWN'S CREEK PARK STORMWATER PROJECT**  
 STILLWATER, WASHINGTON COUNTY, MN

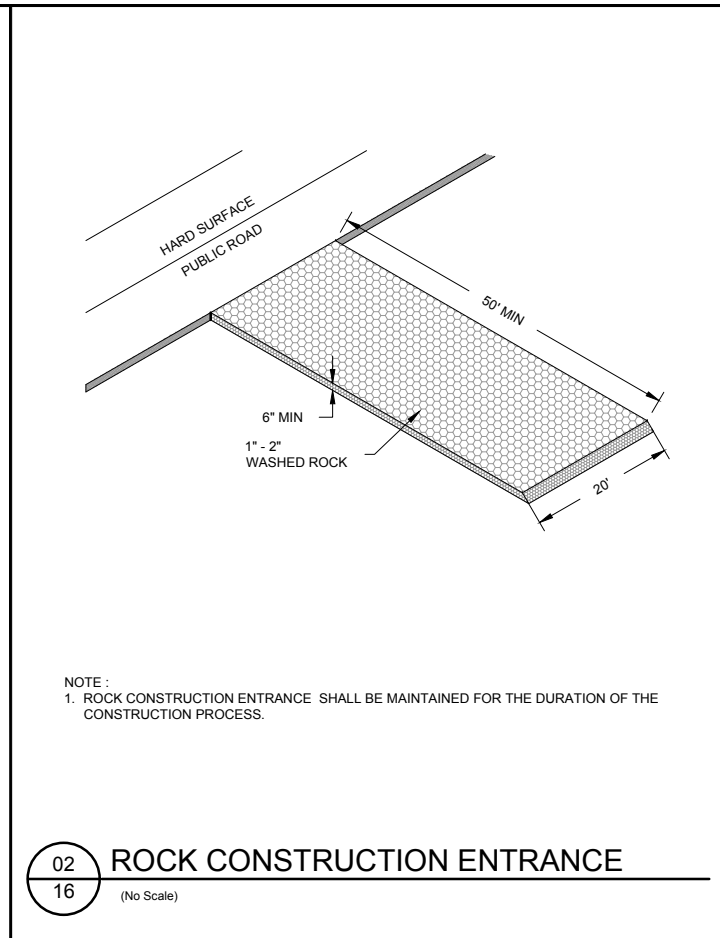
STATE PROJECT NO. ... CITY PROJECT NO. 00041-0262

DETAILS-3

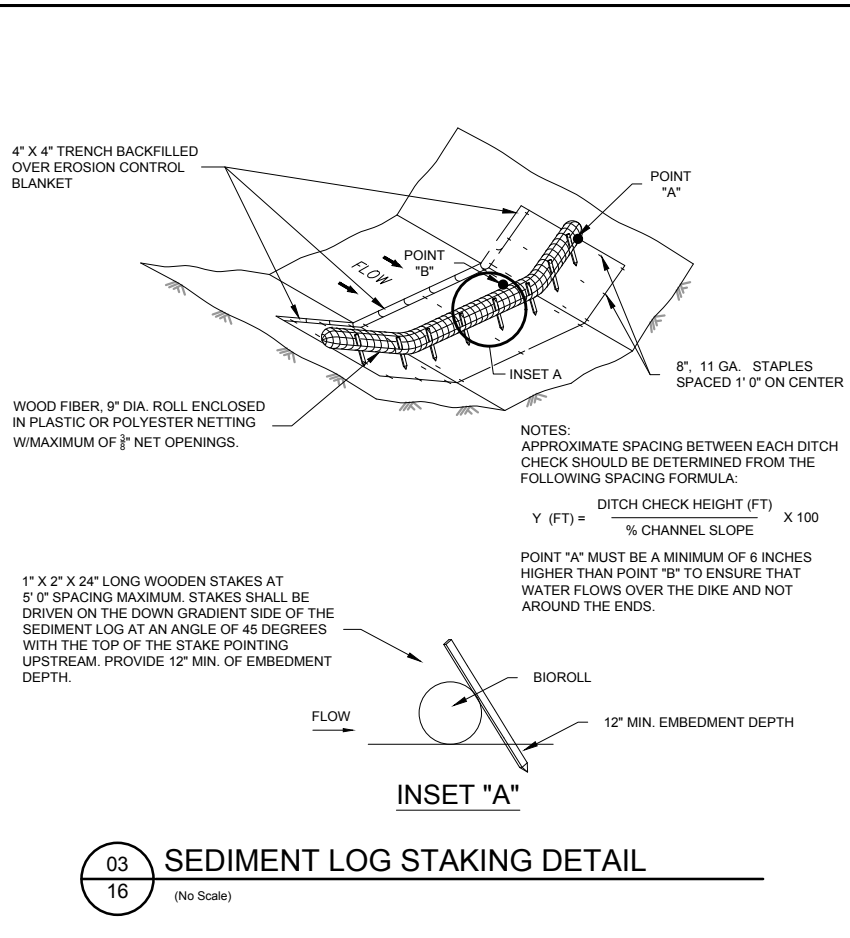
SHEET 15 OF 16 SHEETS



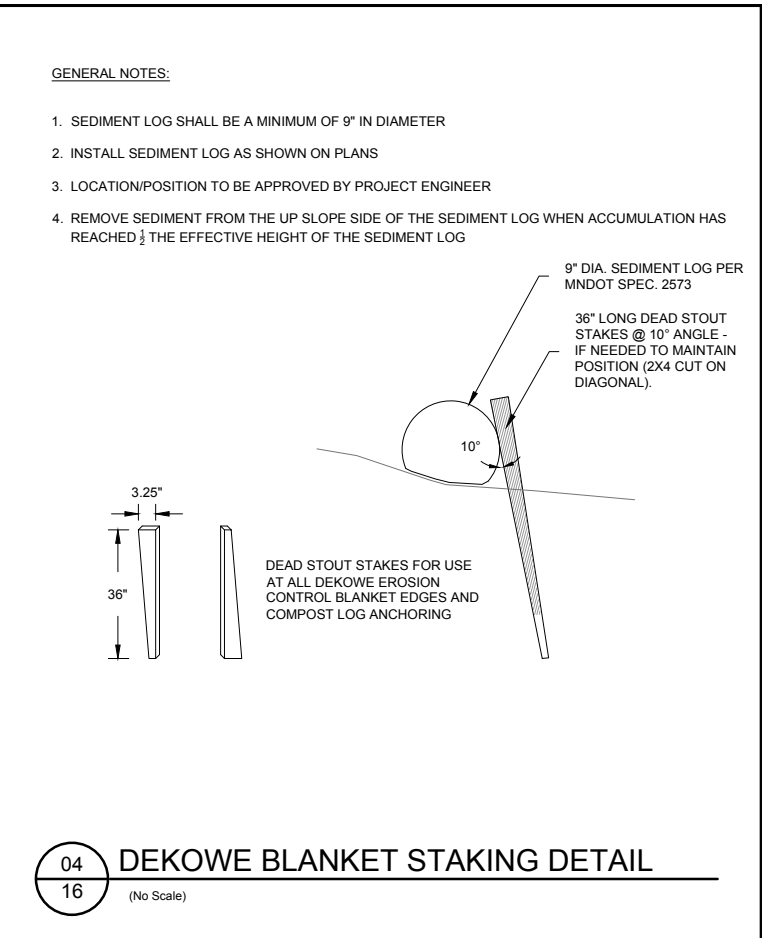
01 PIPE AND TANK BEDDING DETAIL  
16 (No Scale)



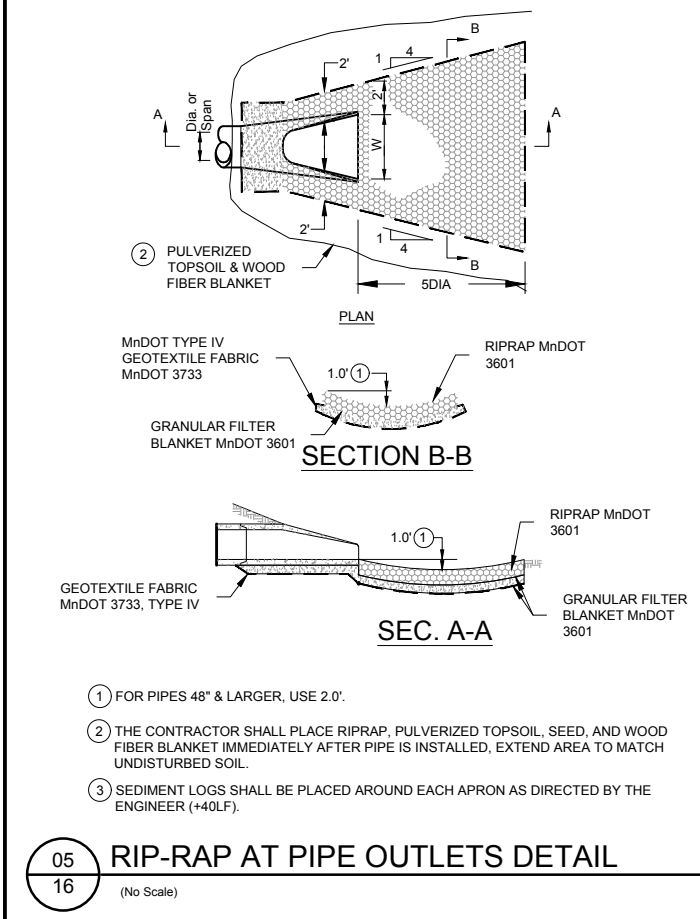
02 ROCK CONSTRUCTION ENTRANCE  
16 (No Scale)



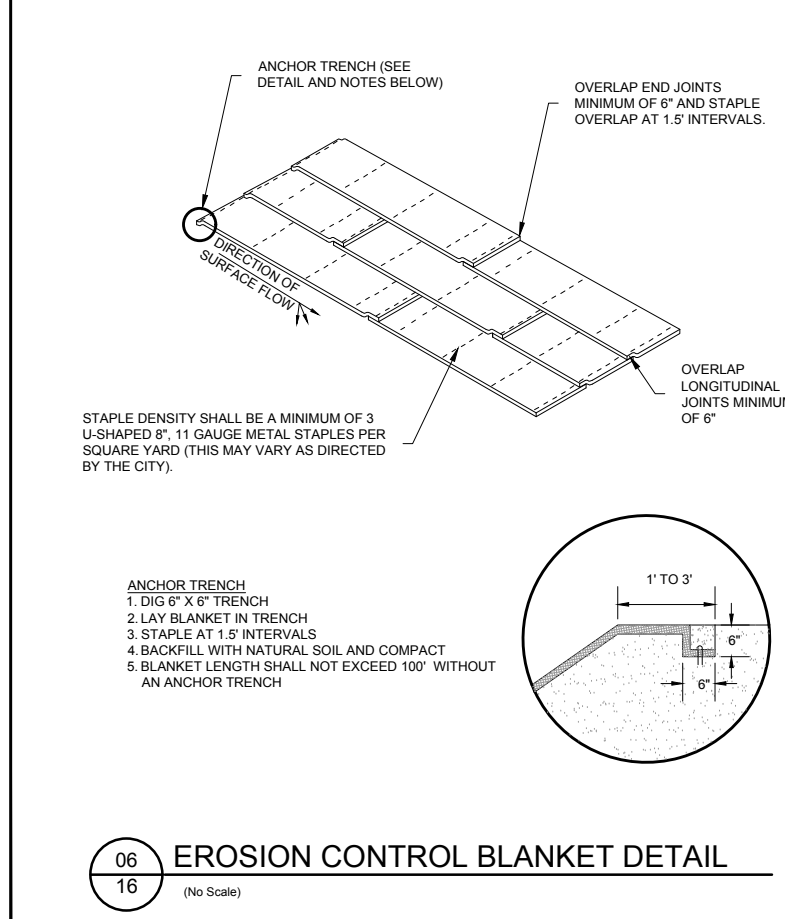
03 SEDIMENT LOG STAKING DETAIL  
16 (No Scale)



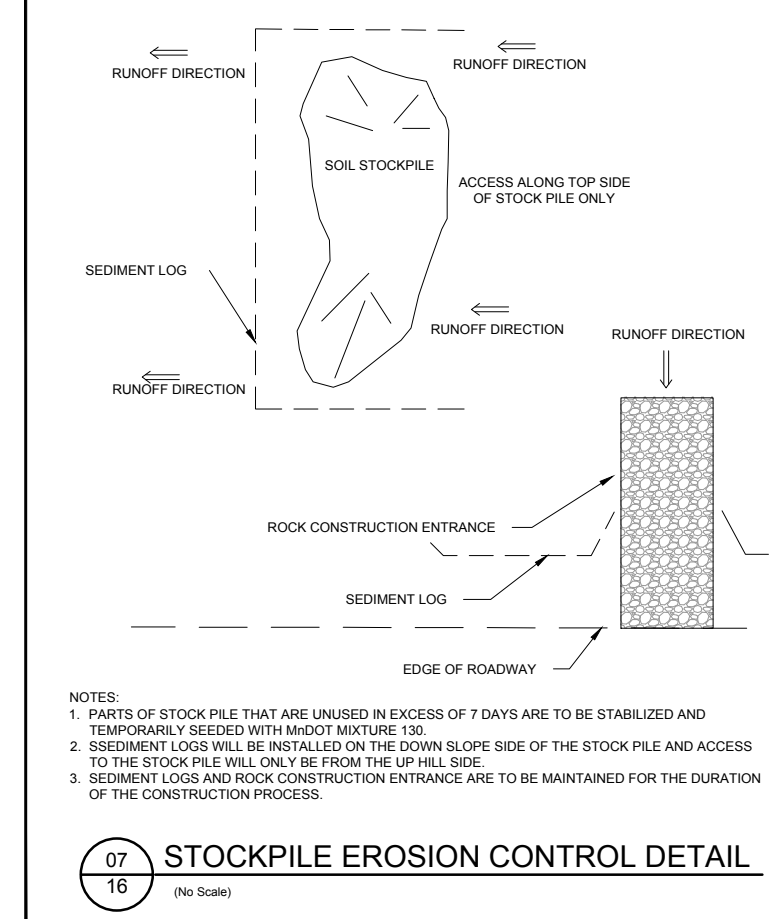
04 DEKOWE BLANKET STAKING DETAIL  
16 (No Scale)



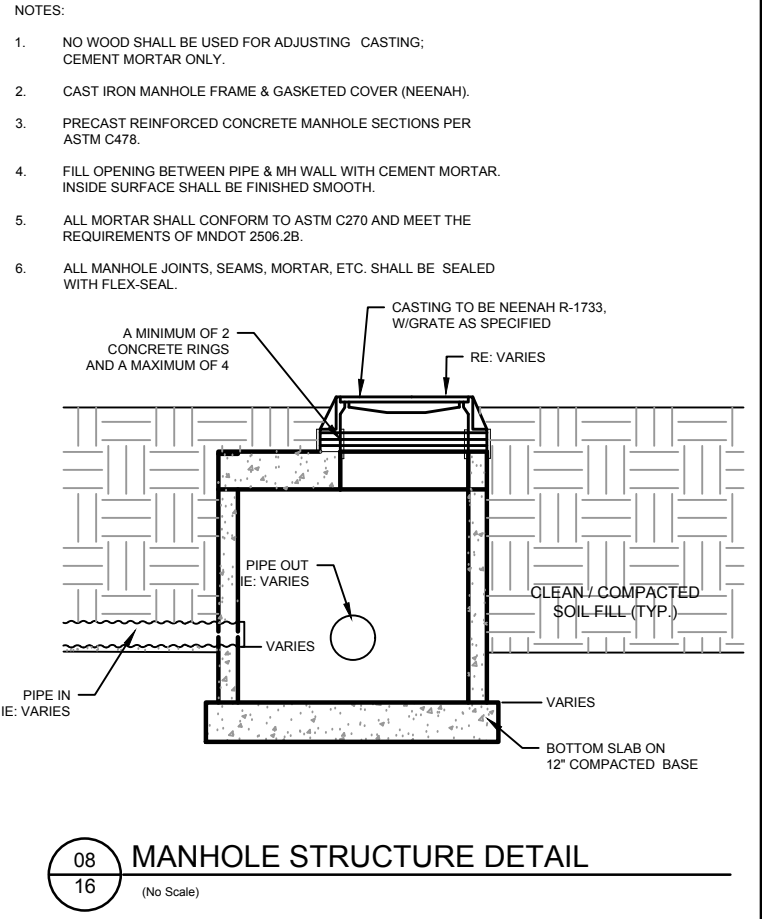
05 RIP-RAP AT PIPE OUTLETS DETAIL  
16 (No Scale)



06 EROSION CONTROL BLANKET DETAIL  
16 (No Scale)



07 STOCKPILE EROSION CONTROL DETAIL  
16 (No Scale)



08 MANHOLE STRUCTURE DETAIL  
16 (No Scale)

Plot Date: 06/15/2016  
 Drawing Name: C:\Users\dash\Desktop\Projects\201606150202\_Improvements\_BC\_Park\09\_GIMS\_ProjectName\dwg\41-202\_Details.dwg  
 Xrefs: 41-202\_P\_Base.dwg

NO	DATE	BY	REVISION
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STATE PROJECT NO. ... CITY PROJECT NO. 00041-0262

DETAILS-4

SHEET 16 OF 16 SHEETS