

## **Barr Engineering Co.**

### **MEMORANDUM**

**To:** Board of Managers: Nine Mile Creek Watershed District  
**From:** Barr Engineering Company  
**Subject:** Permit #2018-90: Normandale Lake Drawdown: Bloomington  
**Date:** July 16, 2018

Plans and a grading and land alteration permit application were received on July 11, 2018 for the proposed drawdown of Normandale Lake. This is the first phase of the overall Normandale Lake Water Quality Improvement project being undertaken by the City of Bloomington and the Nine Mile Creek Watershed District. The project submittal, attached to this memorandum includes a summary of the project, with a progression through the District's rules, a set of the construction plans (that are referenced in the project summary) and a reference memorandum regarding the modeling analysis completed for the project.

The project is in compliance with the District rules, adopted April 10, 2018 with the exception that fill for the temporary weir to maintain the water surface elevation in the wetland upstream of West 84<sup>th</sup> Street while the lake is being drawn down and fill (rip rap) to dissipate energy and prevent erosion upstream and downstream of the proposed bypass pipe is below the 100-year frequency flood elevation of the creek and lake, Rule 2.3.2. This will require a variance and is discussed in the attached memorandum. This filling will not have an impact on the flood storage volume provided within the lake since flood volume is determined above the normal elevation of the lake – "live storage". The filling for the weir is below the normal elevation of the lake, 808.1 M.S.L. – referred to as "dead-storage".

A point of clarification needs to be made regarding the modeling results indicating a temporary rise, 0.02 feet, in the 100-year frequency high water elevation from the construction of the temporary embankment to maintain the water levels in the wetland area upstream of West 84<sup>th</sup> Street. This rise, in the opinion of the District's engineer, is within the accuracy of engineering calculations and compliance with District rules 2.3.2 and 2.3.3 is met. Rule 4.3.3, Low floor elevation states that a minimum separation of 2 feet is required between all new and reconstructed buildings and the flood elevation of a water body. No new structures or stormwater management facilities are being constructed as part of the proposed project. The properties adjacent to Nine Mile Creek in the areas upstream of West 84<sup>th</sup> Street were developed in 1999 or later. Although the NMCWD policies and rules have changed considerably since 1999, the policies and rules since 1999 have required that low floor elevations of structures be at least two feet above the Nine Mile Creek flood management elevation. Accordingly, the structures of properties adjacent to Nine Mile Creek in the area

upstream of West 84th Street that required a NMCWD permit were to provide at least two feet of freeboard from the 100-year flood elevation.

### **Findings**

The proposed project includes the information necessary, plan sheets and erosion control plan, for review.

1. Rules 3, 4, 5, 6 and 7 are met.
2. Because the property owner is a public entity, no fees are charged or the District's financial assurance requirements do not apply.
3. Rule 2 is met with concurrence of the variance as presented.

### **Recommendation**

Approval, contingent upon:

1. General Conditions

## Memorandum

**To:** Randy Anhorn, NMCWD Administrator  
**From:** Shanna Braun and Janna Kieffer  
**Subject:** Normandale Lake Drawdown Project- NMCWD Permit Application  
**Date:** July 16, 2018

Nine Mile Creek Watershed District (District), in coordination with the City of Bloomington, is planning a water quality improvement project on Normandale Lake to address concerns associated with a prevalence of curly-leaf pondweed in the lake and release of phosphorus from lake-bottom sediments (internal loading). Improvement approaches include lake-level drawdown, herbicide treatment, alum treatment, possible aquatic plant harvesting, and possible in-lake oxygenation. This permit application is for the lake drawdown portion of the overall water quality improvement project.

Normandale Lake was created as part of the Mount Normandale Lake flood-control project implemented by NMCWD in the mid-1970s, which included construction of a dam across Nine Mile Creek to the west of Normandale Boulevard. The U.S. Army Corp of Engineers (USACE) issued a Section 404 permit in 1979 for construction of the dam.

Drawdown of Normandale Lake will involve using a temporary pump and the existing 18-inch bypass pipe (located on the southeast side of Normandale Lake) to draw the lake down in late-summer while installing a larger (36-inch) bypass outlet to maintain the lake drawdown and decrease potential impacts of rainfall or snowmelt events during the drawdown period. A new 36-inch bypass pipe and stop log structure will be installed on the north side of the existing outlet structure (see attached plans). The pipe will extend into the deepest spot in Normandale Lake and convey water from the lake to Nine Mile Creek downstream of the existing outlet weir. Riprap will be installed to dissipate energy at the downstream outlet location. The existing 18-inch bypass pipe will be utilized during the drawdown and abandoned at the end of the lake drawdown period, prior to refilling of the lake.

This method of lake drawdown will provide permanent infrastructure for potential future drawdowns, while also allowing the drawdown to begin in late-summer (with the temporary pump) to minimize impacts to the lake's resident turtle population. Based on project communications with the Minnesota Department of Natural Resources, (MDNR), the agency prefers that lake drawdown occur prior to September 15 to minimize impacts to the area's turtle community as it prepares for winter hibernation.

In addition, a temporary water control structure (weir) will be installed in Nine Mile Creek between the wetland area north of West 84<sup>th</sup> Street and the lake to prevent lowering of the water levels in this wetland area during the lake drawdown (see attached plans). The temporary weir will consist of an earthen berm covered by a geosynthetic clay liner (GCL). The temporary weir will be removed in June 2019 following the

DNR's work restriction time period (March 15-June 15 for non trout streams) and the area will be restored to pre-construction conditions.

The project has been reviewed for consistency with District rules and will require permit coverage under the following rules, as described further in the sections below:

- Rule 2 – Floodplain Management and Drainage Alterations
- Rule 4 – Stormwater Management
- Rule 5 – Erosion and Sediment Control
- Rule 6 – Waterbody Crossings and Structures
- Rule 7 – Shoreline and Streambank Improvements
- Rule 10 – Variances and Exceptions

## **Rule 2 – Floodplain Management and Drainage Alterations**

### **Temporary Weir**

The project includes construction of a temporary weir in Nine Mile Creek just south of West 84<sup>th</sup> Street to prevent drawdown of the water levels in the wetland area north of West 84<sup>th</sup> Street during the lake drawdown. The temporary weir will constitute placement of temporary fill within the floodplain of Nine Mile Creek; as such, the District's Floodplain Management and Drainage Alterations rule applies.

Approximately 94 cubic yards of fill (a combination of riprap and earthen fill wrapped in geotextile fabric) will be temporarily placed within the Nine Mile Creek floodplain to construct the temporary weir. The temporary weir will be installed prior to commencement of lake drawdown (mid-August 2018) and will be removed in June 2019 once the drawdown is complete, with the area restored to pre-construction conditions. The control elevation of the weir is designed to be 0.4 feet lower than the normal elevation of the creek and downstream Normandale Lake to ensure upstream water levels are maintained at levels similar to existing conditions, while preventing increases in flood elevations. The placement of fill below the 100-year flood elevation without compensatory storage, even temporary, requires a variance from Rule 2.3.2. The fill will not have an effect on the flood elevation or flood storage required, since the temporary weir will be constructed entirely below the existing normal elevation of this portion of the creek and flood storage is calculated above the normal elevation of a storage area.

Hydrologic and hydraulic modeling was completed to document that 100-year flood elevations upstream of the proposed temporary weir will not increase as a result of the project. Modeling results indicate the minor temporary increases (up to 0.02 feet) in the 100-year flood elevation in several locations upstream of the temporary weir (see Table 1). However, the minor increases can be considered to be within the level of engineering accuracy of the modeling and will only last for the duration of the project (mid-August 2018 through June 2019). The attached memo provides a more detailed summary of the findings of the hydrologic and hydraulic modeling analysis of the proposed temporary weir.

**Table 1. Comparison of 100-year flood elevations for existing and proposed conditions.**

XP-SWMM Model Node	Location Description	100-year Flood Elevation <sup>1</sup> (feet)			NMCWD 100-year Flood Management Elevation (feet)
		Existing Conditions	Proposed Conditions	Difference	
BlmCrk5	Nine Mile Creek upstream of West 84th Street	813.68	813.70	0.02	814.5
BlmCrk4	South Fork of Nine Mile Creek upstream of American Boulevard/Norman Center Drive	814.43	814.45	0.02	814.5
WBlmCrk5	South Fork of Nine Mile Creek upstream of East Bush Lake Road	815.18	815.20	0.02	816.0
WBlmCrk4	South Fork of Nine Mile Creek downstream of Hwy 494	815.90	815.91	0.01	819.5
BlmCrk3	North Fork of Nine Mile Creek upstream of American Boulevard/Norman Center Drive	815.16	815.18	0.02	816.5
BlmCrk2	North Fork of Nine Mile Creek downstream of Green Valley Drive	816.87	816.88	0.01	817.0
<sup>1</sup> Modeled elevations in NGVD 29					

Figure 1 shows the area between I-494 and West 84th Street. Review of LiDAR elevation data indicates that no structures are within the 100-year floodplain in these areas under existing or proposed (i.e. with the temporary weir) conditions. The 100-year flood elevations under proposed conditions are below the District's historic flood management elevations for all locations evaluated.

The properties adjacent to Nine Mile Creek in the area shown in Figure 1 were developed in 1999 or later. Although the NMCWD policies and rules have changed considerably since 1999, the policies and rules since 1999 have required that low floor elevations of structures be at least two feet above the Nine Mile Creek flood management elevation. Accordingly, the structures of properties adjacent to Nine Mile Creek in the area upstream of West 84th Street that required a NMCWD permit were to provide at least two feet of freeboard from the 100-year flood elevation. No new structures, as defined by the current NMCWD rules, or stormwater management facilities are being constructed as part of this proposed project.

The proposed temporary weir will be constructed at or below the normal water level of Normandale Lake and the wetland area upstream of West 84th Street, thus maintaining the amount of flood storage available. Therefore, creation of offsetting storage capacity will not be necessary.

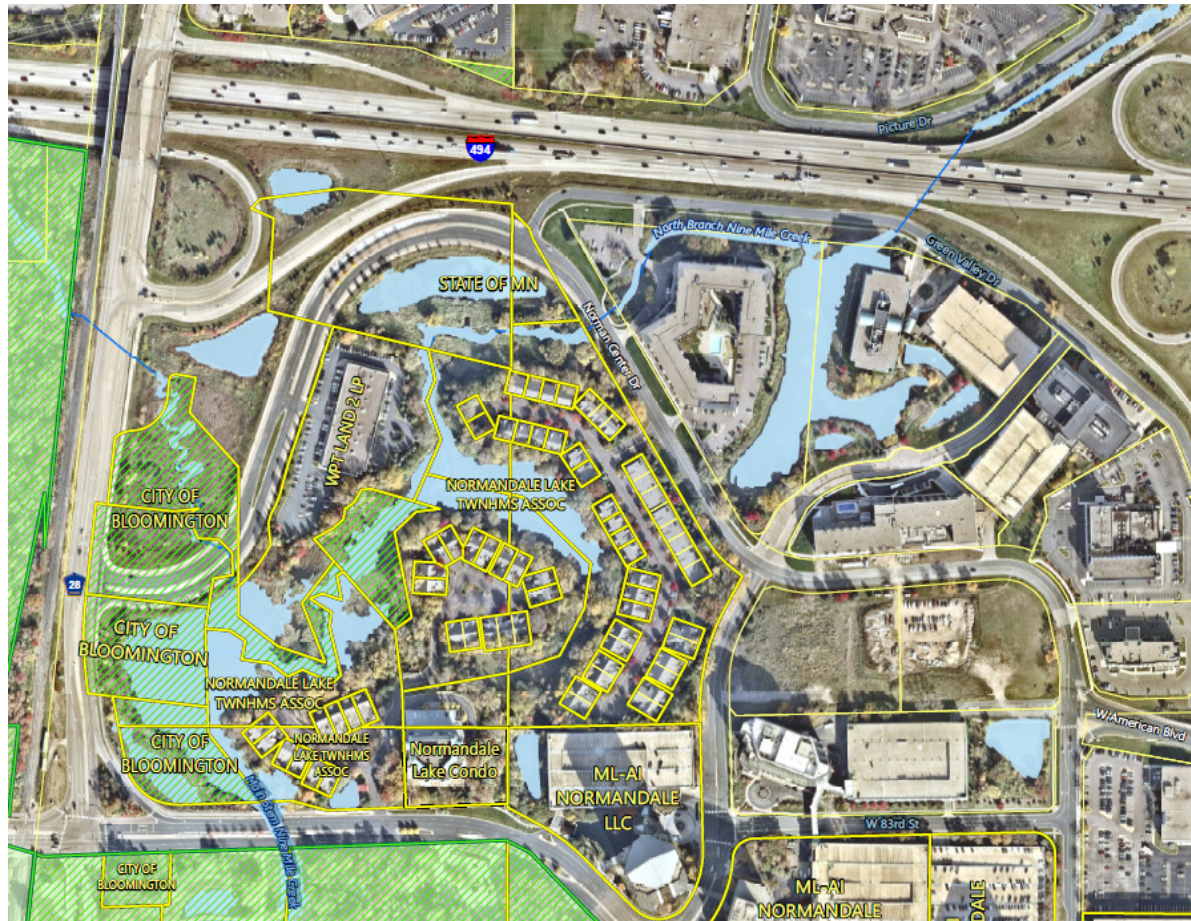


Figure 1. Nine Mile Creek upstream of West 84<sup>th</sup> Street

### Rip rap

The project includes construction of a new 36-inch bypass pipe and stop log structure on the north side of the existing Normandale Lake outlet. The pipe will extend into the deepest spot in Normandale Lake and convey water from the lake to Nine Mile Creek downstream of the existing outlet weir. A small amount of riprap will be installed (approximately 4 cubic yards at the pipe intake and approximately 4 cubic yards at the outfall) to dissipate energy at the upstream and downstream outlet locations. The rip rap will be installed below the normal water level of Normandale Lake and downstream channel, thus maintaining the amount of flood storage available. Therefore, creation of offsetting storage capacity will not be necessary.

### Overall

The proposed temporary weir and installation of rip rap upstream and downstream of the proposed bypass pipe will not adversely affect channel stability, groundwater hydrology, or stream base flow. The temporary weir will be constructed with clean sand (versus clay) to prevent water quality impacts to Normandale Lake during construction. In addition, erosion control measure will be installed downstream

of the temporary weir to further minimize impacts during construction. During the drawdown, it is anticipated that the temporary weir will not harm water quality.

The proposed project will temporarily impact aquatic habitat. Installation of the temporary weir upstream of the lake will temporarily impact fish passage, but will not prevent passage, as fish can still flow over the weir. Drawdown of the lake will also temporarily impact the fish, amphibian, and turtle populations. See the Environmental Assessment Worksheet (EAW) Normandale Lake Water Quality Improvement Project ([https://www.ninemilecreek.org/wp-content/uploads/Normandale-Lake-EAW-Submittal-Package\\_signed.pdf](https://www.ninemilecreek.org/wp-content/uploads/Normandale-Lake-EAW-Submittal-Package_signed.pdf)) and the Findings of Fact (<https://www.ninemilecreek.org/wp-content/uploads/Findings-of-Fact-and-EIS-Needs-Determination-for-the-Normandale-Water-Quality-Improvement-Project.pdf>) for additional information on potential impacts and related mitigation measures.

The proposed project will be constructed by NMCWD on land owned by the City of Bloomington. The NMCWD has entered into a cooperative agreement with the City of Bloomington which grants necessary permissions for work within this portion of Nine Mile Creek.

### **Rule 3 – Wetlands Management**

The project includes manipulation of Normandale Lake, which the MDNR classifies as a public waterbody. Impacts to public waters are regulated separate from the Wetland Conservation Act (WCA). The City of Bloomington is the WCA local government unit.

NMCWD Rule 3.4 indicates that any activity for which a permit is required under any District rule(s) must provide buffer on all wetlands disturbed by the activity and on all wetlands downgradient from the activity. Normandale Lake is classified as a public water, versus a public water wetland. Since the project will not result in permanent draining, excavation, or filling of a wetland regulated by the WCA and given that the property is not owned by the NMCWD (applicant), the buffer provisions of the District's Wetlands Management rule are not applicable.

For areas of the shoreline altered by the proposed project, the disturbed areas will be restored in a naturalized condition using a native seed mix to retain the natural resources and ecological value.

### **Rule 4 – Stormwater Management**

The project will disturb approximately 134 cubic yards of earth as summarized in Table 2 below. Construction will also result in disturbance greater than 5,000 square feet, triggering the District's Stormwater Management rule.

**Table 2. Summary of anticipated volume of disturbance below the 812.9 M.S.L. flood elevation of Normandale Lake.**

Project Component	Type of Fill	Volume in Cubic Yards
Temporary Weir	Riprap	44
Temporary Weir	Earthen berm wrapped in geotextile fabric	50
36" Bypass Pipe	Riprap	8 (4 in Normandale Lake and 4 in channel at outlet)
36" Bypass Pipe	HDPE	28 (25 in Normandale Lake and 3 in channel at outlet)

Though the project results in levels of disturbance in excess of those listed in Section 4.2.1a and 4.2.1b of the NMCWD Stormwater Management rule, the project will not result in generation of impervious surface. Because no impervious surfaces will be disturbed, created or reconstructed by the proposed work, no storm water management facilities need to be provided to meet the criteria in subsection 4.3.1. District Rule 5, Erosion and Sediment Control also applies to the project.

### **Rule 5 – Erosion and Sediment Control**

As noted above, the project will result in surface disturbance greater than 5,000 square feet (Rule 5.2.1b); as such, the District's Erosion and Sediment Control rule applies. An Erosion Control Plan has been prepared for the project and is enclosed with the attached project plans. The Erosion Control Plan identifies site stabilization measures, as well as inspection and maintenance procedures. The construction specifications require that the contractor will properly manage and dispose of all construction waste.

### **Rule 6 – Waterbody Crossings and Structures**

Construction of the temporary weir constitutes placement of a temporary structure on Nine Mile Creek; as such, the District's Waterbody Crossings and Structures rule applies. The following text describes the project's relationship to criteria set forth in Section 6.3 of the Waterbody Crossings and Structures Rule.

- 6.3.1a – Must retain adequate hydraulic capacity and assure no net increase in the flood stage of the pertinent waterbody;
  - *Hydraulic capacity will be maintained and potential increases in upstream flood elevations as a result of the temporary weir in Nine Mile Creek just downstream of West 84<sup>th</sup> Street are minor (0.02 feet) and temporary in nature. See Floodplain Management and Drainage Alterations discussion.*
- 6.3.1b – Must retain adequate navigational capacity pursuant to any requirements of the waterbody's classification by the District;
  - *Navigational capacity will not be permanently altered.*



- 6.3.1c – Must not adversely affect water quality, change the existing flowline/gradient, or cause increased scour, erosion, or sedimentation;
  - *Water quality and the hydraulic gradient will not be permanently altered. The channel will be restored to pre-construction conditions upon removal of the temporary weir. Design of the temporary weir includes use of clean sand, versus clay, to minimize water quality impacts during construction. Installation of riprap directly upstream and downstream of the temporary weir will minimize erosion.*
- 6.3.1d – Must preserve existing wildlife passage along each bank and riparian area;
  - *The project has been designed to allow for passage of turtles and other small, terrestrial wildlife at crossings below-grade of surrounding roadways. Passage of fish wishing to travel upstream will be temporarily impeded for the duration that the temporary weir is in place. However, this connection will be restored upon weir removal. This has been presented in detail in the permit application to the Minnesota Department of natural Resources.*
- 6.3.1e – Must represent the “minimal impact” solution to a specific need with respect to all other reasonable alternatives, based on analysis of at least two reasonable alternatives, one of which may be not undertaking the proposed work.
  - *Construction of the temporary weir is the only option to satisfy upstream property owners who expressed concern over potential loss of wetland and backwater areas during the lake drawdown period. An alternative temporary weir configuration that included a piped “pass through” was considered. However, this alternative was cost-prohibitive considering the temporary nature and will require use of soil (clay) with greater potential for erosion and water quality impacts during construction.*
- 6.3.2 – Projects involving directional boring or horizontal drilling must provide for minimum clearance of 3 feet below the bed of a waterbody and a minimum setback of 50 feet from any stream bank for pilot, entrance and exit holes.
  - *Not applicable.*
- 6.3.3a – Removal of structures or other waterway obstructions must maintain the original cross-section and bed conditions to the greatest extent practicable;
  - *Upon removal of the temporary weir, creek banks will be revegetated with native species and the bed and banks of the creek will be restored to pre-project conditions.*
- 6.3.3b – Removal of structures or other waterway obstructions must achieve complete removal of the structure, including any footings or pilings that impede navigation; and
  - *The temporary weir will be completely removed in June 2019.*
- 6.3.3c – Removal of structures or other waterway obstructions must not involve the removal of a water-level control device.
  - *Not applicable.*
- 6.3.4 – No activity affecting the bed of a protected water may be conducted between March 15 and June 15 on watercourses, or between April 1 and June 30 on all other public water waterbodies, to minimize impacts on fish spawning and migration.

- *It is anticipated that the temporary weir in Nine Mile Creek just downstream of West 84<sup>th</sup> Street will be removed after June 15, 2019.*
- 6.3.5 – A separate permit under District Rule 7.0 is not required for shoreline or streambank stabilization associated with a waterbody crossing or structure, but such stabilization must comply with the criteria 7.3.2d to f.
  - *It is noted that the temporary weir will not require a separate permit under District Rule 7.0; however, construction of the new bypass pipe at the Normandale Lake outlet will require a permit under District Rule 7, as described below.*

## **Rule 7 – Shoreline and Streambank Improvements**

Installation of the new bypass pipe at the Normandale Lake outlet will require alteration of the Normandale Lake shoreline, which is classified as a public water; as such, the District's Shoreline and Streambank Improvements permit is required.

As shown on the attached plan sheets, the new bypass pipe will be installed north of the existing outlet and will require placement of riprap around the pipe to protect from erosion. In addition, a riprap apron will be constructed downstream of the outlet, where the bypass pipe will discharge to Nine Mile Creek. Riprap will primarily be placed below the ordinary high water level. Areas of disturbed shoreline will be restored with native plant species to match the surrounding vegetation.

The proposed installation of the new bypass pipe and placement of riprap in the channel downstream of the outlet was included in the District's Public Waters Work Permit Application, which was submitted to the MDNR on June 1, 2018.

### **1.0 Rule 8 – Sediment Removal**

The project does not include sediment removal; District Rule 8 is not applicable.

### **Rule 9 – Appropriation of Surface Waters**

Based on project coordination with the MDNR, the drawdown of Normandale Lake does not constitute an appropriation of public surface waters and a MDNR Water Appropriations Permit is not required. It is expected that District Rule 9 will follow the precedent established by MNDNR with respect to surface water appropriation and that District Rule 9 will not be applicable to the project.

### **Rule 10 – Variances and Exceptions**

As stated in the Floodplain Management and Drainage Alteration discussion, a variance from District Rule 2.3.2 is required because 94 cubic yards of material will be placed, on a temporary basis, below the 100-year frequency flood elevation of Nine Mile Creek and Normandale Lake for the construction of the temporary weir downstream of West 84th Street and 8 cubic yards of material (rip rap) will be placed below the 100-year frequency flood elevation of Normandale Lake and Nine Mile Creek to minimize

**To:** Randy Anhorn, NMCWD Administrator  
**From:** Shanna Braun and Janna Kieffer  
**Subject:** Normandale Lake Drawdown Project- NMCWD Permit Application  
**Date:** July 16, 2018  
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erosion from the new 36-inch bypass pipe. To grant a variance, the Board of Managers must find, based on demonstration by the applicant:

10.1.1 *That because of unique conditions inherent to the subject property, which do not apply generally to other land or structures in the District, undue hardship on the applicant, not mere inconveniences, will result from strict application of the rule:*

The filling, 94 cubic yards, as proposed below the flood elevation of Nine Mile Creek is for the construction of a temporary weir downstream of West 84<sup>th</sup> Street. The weir is for maintaining the water surface level of the wetland during the drawdown of the lake. Flood storage is the volume calculated above the normal elevation of a waterbody for detaining the runoff from the 100-year frequency storm event. Since the temporary weir will be constructed entirely below the existing normal elevation of this portion of the creek (and the lake) and the control elevation of the temporary weir is to be 0.4 feet lower than the normal level of the lake, the amount of available flood storage will not be impacted by the filling.

The filling, 8 cubic yards, as proposed below the flood elevation of Normandale Lake and Nine Mile Creek is to dissipate energy and provide erosion protection at the upstream and downstream ends of the new 36-inch bypass pipe on the north side of the existing Normandale Lake outlet. Since the rip rap will be installed below the normal water level of Normandale Lake and downstream channel, the amount of available flood storage will not be impacted by the filling.

10.1.2 *That the hardship was not created by the landowner, the landowner's agent or representative, or a contractor, and is unique to the property. Economic hardship alone may not serve as grounds for issuing a variance if any reasonable use of the property exists under the terms of the District rules;*

As stated above, the purpose of the filling for the weir is for maintaining the water level in the wetland upstream of West 84<sup>th</sup> Street while the lake is being drawn down. The filling will not have an impact on the flood storage provided.

As stated above the purpose of the filling for the riprap is to dissipate energy and provide erosion protection at the upstream and downstream ends of the new 36-inch bypass pipe. The filling will not have an impact on the flood storage provided.

10.1.3 *That the activity for which the variance is sought will not materially adversely affect water resources, flood levels, drainage or the general welfare in the District.*

This has been addressed in the response to 10.1.1 and 10.1.2

10.1.4 *That there is no feasible and prudent alternative to the proposed activity requiring a variance.*

The alternative would be to excavate a depression somewhere along the shoreline or within the lake below elevation 808 M.S.L. that would provide a compensatory volume of 102 cubic yards.

## Technical Memorandum

**To:** Jason Spiegel, Minnesota Department of Natural Resources  
**From:** Janna Kieffer, Barr Engineering  
**Subject:** Hydraulic Analysis of Proposed Temporary Weir in Nine Mile Creek upstream of Normandale Lake  
**Date:** June 1, 2018  
**c:** Erica Sniegowski, Nine Mile Creek Watershed District  
Randy Anhorn, Nine Mile Creek Watershed District

The Nine Mile Creek Watershed District (NMCWD), in coordination with the City of Bloomington, is planning an improvement project on Normandale Lake to protect and improve the native aquatic plant community and to address water quality concerns associated with a prevalence of curly-leaf pondweed in the lake and release of phosphorus from lake-bottom sediments (internal loading). The proposed improvement project includes a lake-level drawdown to freeze a large portion of the lake bottom and kill the curly-leaf pondweed turions in the sediment.

As part of the project, a temporary water level control structure (weir) will be installed in Nine Mile Creek between West 84<sup>th</sup> Street and Normandale Lake to prevent lowering of the water levels in the wetland area upstream of West 84<sup>th</sup> Street during the lake drawdown. The temporary weir would consist of an earthen berm covered with a geosynthetic clay liner (GCL). The temporary weir would be removed in spring 2019 once the drawdown is complete and the area would be restored to pre-construction conditions.

The purpose of this memorandum is to provide a summary of the hydraulic modeling completed to document that the 100-year flood elevations upstream of the proposed temporary water level control structure do not increase as a result of the project. The NMCWD developed detailed XP-SWMM hydrologic and hydraulic models of the watershed in the early-2000s to update the 100-year flood management elevations along Nine Mile Creek. The NMCWD models were submitted to FEMA and served as the basis for the Federal Emergency Management Administration (FEMA) Hennepin County map updates effective in 2016. The NMCWD updated their hydrologic and hydraulic models in 2015 based on the revised National Oceanic and Atmospheric Administration's (NOAA) precipitation frequency estimates ("Atlas 14"). The NMCWD has had flood management elevations in place for decades based on past computations that used future land use development projections. As part of the 2015 Atlas 14 modeling updates, the historic Nine Mile Creek flood management elevations were compared to the updated Atlas 14 flood elevations and the higher of these elevations were adopted (2016) as the revised regulatory flood management elevations.

**To:** Jason Spiegel, Minnesota Department of Natural Resources  
**From:** Janna Kieffer, Barr Engineering  
**Subject:** Hydraulic Analysis of Proposed Temporary Weir in Nine Mile Creek upstream of Normandale Lake  
**Date:** June 1, 2018  
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The NMCWD's 2015 Atlas 14 XP-SWMM model of the creek system was used as a baseline model for the hydraulic analysis of the proposed temporary weir. Modeling of the channel between West 84<sup>th</sup> Street and Normandale Lake was refined by incorporating additional cross-sections; previously this channel was not explicitly modeled and instead was included as part of the Normandale Lake "storage". The updated "existing conditions" 100-year flood elevations upstream of Normandale Lake as a result of the model refinements are summarized in Table 1.

The proposed temporary weir was incorporated into the "proposed conditions" model based on the design shown on Sheet C-05 of the NMCWD Normandale Lake Drawdown preliminary (60%) design drawings (attached). The proposed weir consists of an earthen berm of approximately 40 feet in length across the channel just upstream of the existing footbridge at elevation 808.1 feet MSL (control elevation of existing Normandale Lake outlet weir), with a 20 foot notch in the weir at 807.7 feet MSL. The "notch" will be centered in accordance with the existing Nine Mile Creek stream centerline, with the intent of channelizing the conveyance of baseflows (approximately 5 cfs) and reducing the potential for downstream erosion.

Table 1 summarizes the "proposed condition" 100-year flood elevations for locations along Nine Mile Creek upstream of Normandale Lake as a result of the proposed temporary weir structure. Note that elevations included in Table 1 are based on the National Geodetic Vertical Datum of 1929 (NGVD 29), whereas elevations shown on Sheet C-05 of the preliminary design drawings are based on North American Vertical Datum of 1988 (NAVD 88). The conversion of elevations from NGVD 29 to NAVD 88 in the project area is approximately 0.2 feet.

As shown in Table 1, model results indicate minor temporary increases in the 100-year flood elevation in several locations upstream of the proposed temporary water level control weir. However, the minor increases will only last for the duration of the project (anticipated fall 2018 through spring 2019). Review of LiDAR elevation data indicates that no structures are within the 100-year floodplain in these areas under existing or proposed conditions. The 100-year flood elevations under proposed conditions are below the NMCWD's historic flood management elevations for all locations identified in Table 1, with exception of BlmCrk2 (North Fork of Nine Mile Creek downstream of Green Valley Drive) which has an existing and proposed flood elevation that is slightly higher than the NMCWD regulatory flood management elevation. The slightly higher flood elevations, as compared with the NMCWD historic flood management elevation, are likely due to the additional refinements made to the model in the channel between West 84<sup>th</sup> Street and Normandale Lake.

**To:** Jason Spiegel, Minnesota Department of Natural Resources  
**From:** Janna Kieffer, Barr Engineering  
**Subject:** Hydraulic Analysis of Proposed Temporary Weir in Nine Mile Creek upstream of Normandale Lake  
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**Table 1. Comparison of 100-year flood elevations for existing and proposed conditions.**

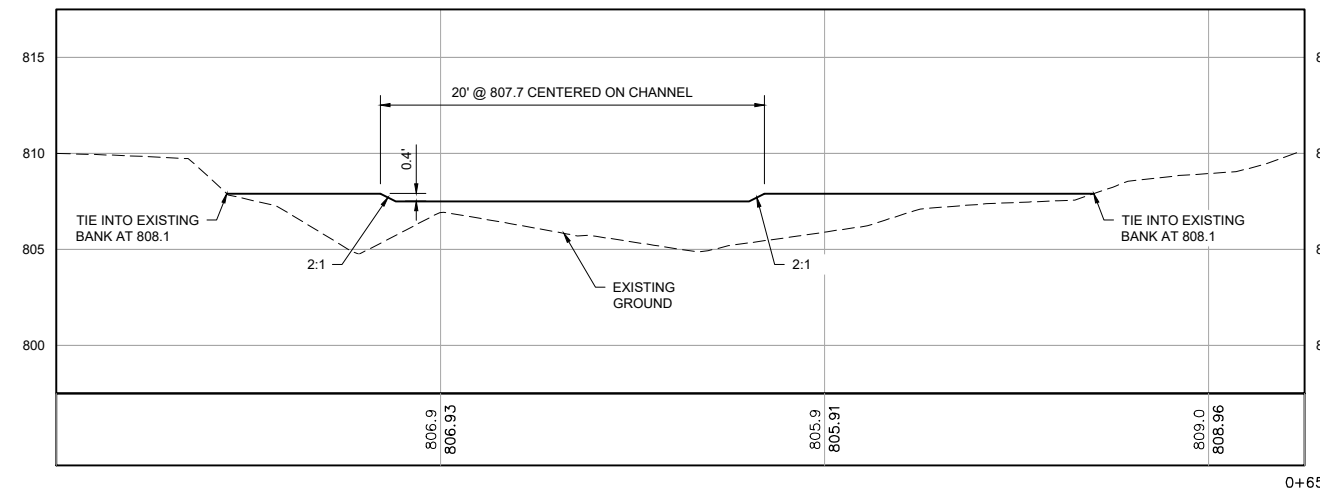
XP-SWMM Model Node	Location Description	100-year Flood Elevation <sup>1</sup> (feet)			NMCWD 100-year Flood Management Elevation (feet)
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BlmCrk3	North Fork of Nine Mile Creek upstream of American Boulevard	815.16	815.18	0.02	816.5
BlmCrk2	North Fork of Nine Mile Creek downstream of Green Valley Drive	816.87	816.88	0.01	816.8
<sup>1</sup> Modeled elevations in NGVD 29					

Attachments:

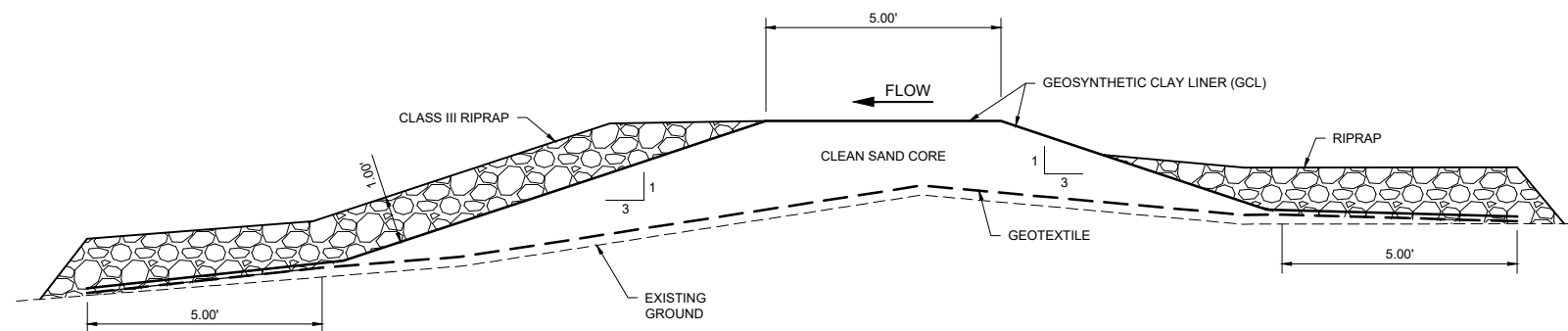
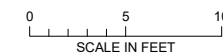
Plan sheet C-05



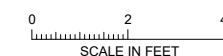
**1 PLAN: INLET TEMPORARY WEIR**  
 C-01 1"=10'  
 SCALE IN FEET



**2 PROFILE: INLET TEMPORARY WEIR**  
 1"=5'



**3 SECTION: INLET TEMPORARY WEIR**  
 1"=2'



PRELIMINARY  
DRAFT

CADD USER: Amanda Rammanden FILE: M:\DESIGN\23271645.00\C-05 INLET TEMPORARY WEIR.DWG PLOT SCALE: 1:2 PLOT DATE: 6/1/2018 5:38 PM  
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NO.	BY	CHK	APP.	DATE	REVISION DESCRIPTION
A	JAM4	BJS	JMK2	6/1/2018	DRAFT FOR AGENCY REVIEW

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.  
 PRINTED NAME: \_\_\_\_\_  
 SIGNATURE: \_\_\_\_\_  
 DATE: \_\_\_\_\_ LICENSE #: \_\_\_\_\_

CLIENT	BID	CONSTRUCTION	AGENCY	RELEASED TO/FOR	A	B	C	0	1	2	3
BARR ENGINEERING CO.			9/1/18								

**BARR**  
 Project Office:  
 BARR ENGINEERING CO.  
 4300 MARKETPOINTE DRIVE  
 Suite 200  
 MINNEAPOLIS, MN 55435  
 Corporate Headquarters:  
 Minneapolis, Minnesota  
 Ph: 1-800-632-2277  
 Fax: (952) 832-2601  
 www.barr.com

Scale	AS SHOWN
Date	05/23/2018
Drawn	JAM4
Checked	BJS
Designed	BJS
Approved	JAK

**9 MILE CREEK WATERSHED DISTRICT**  
 MINNEAPOLIS, MINNESOTA

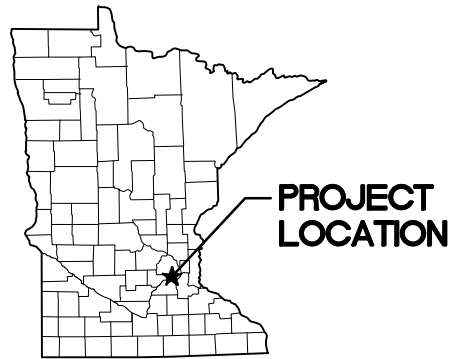
**NORMANDALE LAKE DRAWDOWN**  
 BLOOMINGTON, MINNESOTA  
**INLET TEMPORARY WEIR**  
 PLAN AND DETAILS

BARR PROJECT No.		23271645.00
CLIENT PROJECT No.		
DWG. No.	C-05	REV. No.
		A

# NINE MILE CREEK WATERSHED DISTRICT

## NORMANDALE LAKE DRAWDOWN

### BLOOMINGTON, MINNESOTA



LOCATION MAP



VICINITY MAP

SHEET NO.	TITLE
<u>GENERAL DRAWINGS</u>	
G-01	TITLE SHEET AND DRAWING INDEX
G-02	STORMWATER POLLUTION PREVENTION PLAN

<u>CIVIL DRAWINGS</u>	
C-01	EROSION CONTROL, PLAN
C-02	EROSION CONTROL, DETAILS
C-03	EROSION CONTROL, DETAILS
C-04	GENERAL PLAN
C-05	INLET TEMPORARY WEIR, PLAN, PROFILE, AND SECTION
C-06	OUTLET BYPASS, PLAN AND PROFILE
C-07	OUTLET BYPASS, DETAILS
C-08	OUTLET BYPASS STOPLOG STRUCTURE, PLAN AND DETAILS

LINETYPE LEGEND

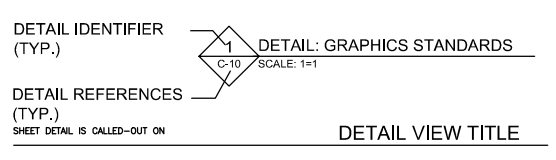
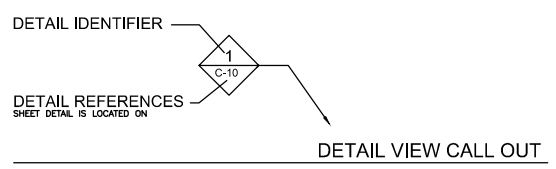
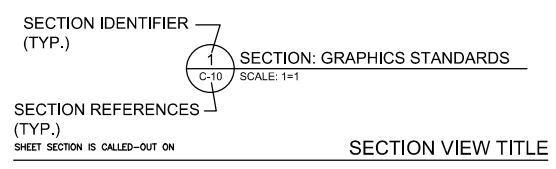
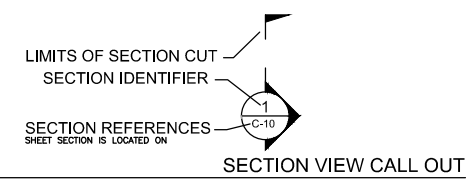
- CONSTRUCTION LIMITS
- WATER EDGE
- HIDDEN
- CENTERLINE

ABBREVIATIONS:

- CONC CONCRETE
- CMP CORRUGATED METAL PIPE
- DIA DIAMETER
- DS DOWNSTREAM
- DTR DECIDUOUS TREE
- EL ELEVATION
- GALV GALVANIZED
- GPM GALLONS PER MINUTE
- HDPE HIGH DENSITY POLYETHYLENE
- NWL NORMAL WATER LEVEL
- HWL HIGH WATER LEVEL
- ID IDENTIFIER
- INV INVERT
- RCP REINFORCED CONCRETE PIPE
- TO TOP OF
- TYP TYPICAL
- US UPSTREAM

ISSUED FOR  
BID

VERTICAL DATUM = NAVD88



CADD USER: Joseph A. Milbushus FILE: M:\DESIGN\23271645.00\G-01 TITLE SHEET.DWG PLOT SCALE: 1:2 PLOT DATE: 7/13/2018 2:05 PM  
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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.				CLIENT: 9 MILE CREEK WATERSHED DISTRICT BID: 23271645.00 CONSTRUCTION: 7/12/18 AGENCY: 8/1/18 7/3/18				Project Office: BARR ENGINEERING CO. 4300 MARKETPOINTE DRIVE Suite 200 MINNEAPOLIS, MN 55435 Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277 Fax: (952) 832-2601 www.barr.com				Scale: AS SHOWN Date: 05/23/2018 Drawn: JAM4 Checked: JMK2/JNB Designed: BJS Approved: BJS				9 MILE CREEK WATERSHED DISTRICT EDEN PRAIRIE, MINNESOTA				NORMANDALE LAKE DRAWDOWN BLOOMINGTON, MINNESOTA				BARR PROJECT No. 23271645.00 CLIENT PROJECT No.			
NO. BY CHK. APP. DATE REVISION DESCRIPTION				PRINTED NAME: BRIAN SILJENBERG SIGNATURE:  DATE: 7/12/18 LICENSE # 50033				RELEASED TO/FOR: A B C 0 1 2 3 DATE RELEASED				TITLE SHEET AND DRAWING INDEX				DWG. No. G-01		REV. No. 0									

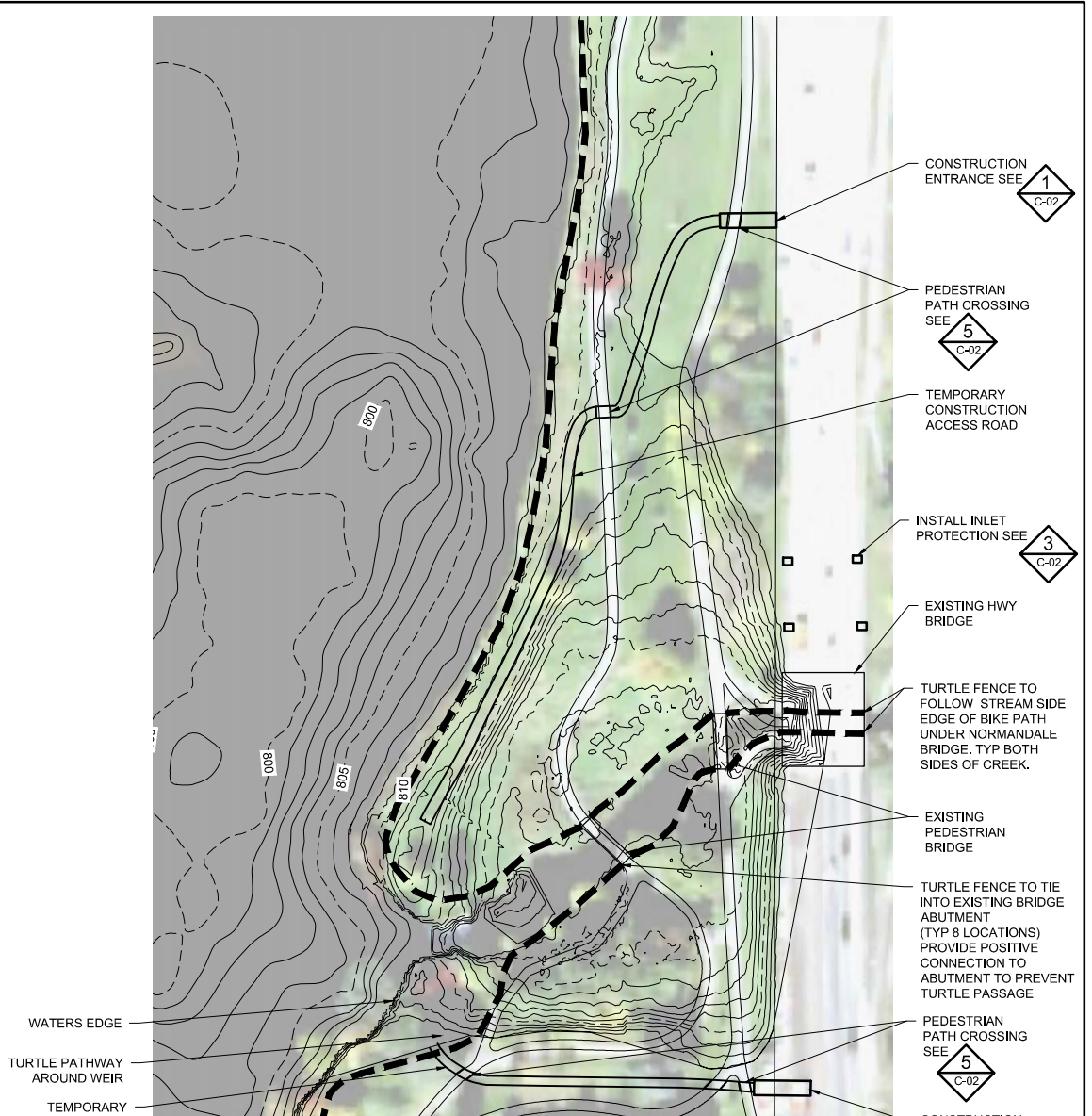




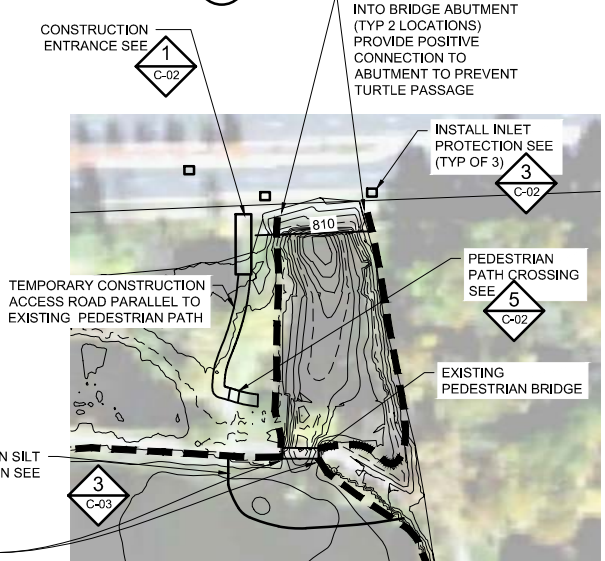
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1 PLAN: EROSION CONTROL  
 SCALE IN FEET 0 200 400



2 PLAN: DRAW DOWN AND OUTLET BYPASS  
 SCALE IN FEET 0 80 160



3 PLAN: INLET TEMPORARY WEIR  
 SCALE IN FEET 0 80 160

- EROSION CONTROL NOTES**
- MINIMIZE BOTH THE AREA AND TIME OF SOIL DISTURBANCE AT THE SITE, THROUGHOUT THE DURATION OF THE PROJECT.
  - MANAGE STORM WATER MOVING ACROSS THE SITE, BY REDUCING THE VELOCITY AND VOLUME OF THE RUNOFF, THE IMPACT TO EXPOSED SOILS WILL BE REDUCED.
  - INSTALL EROSION AND SEDIMENT CONTROL MEASURES EARLY AND KEEP THEM WELL MAINTAINED, ESPECIALLY IMPORTANT DURING MONTHS THAT RECEIVE HEAVY RAIN EVENTS.
  - KEEP SEDIMENT FROM LEAVING THE SITE. SLOWING DOWN THE RUNOFF BEFORE IT LEAVES THE SITE WILL PREVENT SEDIMENT FROM GETTING INTO ENVIRONMENTALLY SENSITIVE AREAS.
  - ESTABLISHING TEMPORARY VEGETATION BY SEED WILL REDUCE EROSION BY UP TO 90%.
  - STREET SWEEPING: STREETS LEADING TO AND FROM THE CONSTRUCTION ENTRANCE WILL BE CHECKED DAILY FOR EVIDENCE OF OFF-SITE SEDIMENT TRACKING ONTO PAVED SURFACES. THESE AREAS WILL BE SWEEPED CLEAN OF ANY TRACKED MATERIALS AS SOON AS POSSIBLE WITH COMPLETION WITHIN 24 HOURS OF DISCOVERY. SWEEPING SHALL EXTEND TO THE EXTREMITY OF ANY OFF SITE SEDIMENT TRACKING. ADDITIONAL INLET PROTECTION MAY BE REQUIRED ALONG HAUL ROUTES AND SHALL BE INSTALLED AT LOCATIONS DETERMINED BY THE CONTRACTOR OR AS DIRECTED BY THE ENGINEER.
  - ALL STORM SEWER INLETS AND OUTLETS SHALL BE PROTECTED BY APPROPRIATE BMPs DURING CONSTRUCTION. THESE PRACTICES SHALL REMAIN IN PLACE UNTIL THE POTENTIAL SOURCES FOR DISCHARGING SEDIMENT TO INLETS HAVE BEEN STABILIZED.
  - SEED (M/IDOT SEED MIX 33-261) AND PROVIDE EROSION CONTROL BLANKET (SEE 2/C-02) FOR ALL DISTURBED AREAS.

ISSUED FOR BID

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	JAM4	BJS	JMK2	7/12/2018	ISSUED FOR BID
B	JAM4	BJS	JMK2	7/3/2018	DRAFT FOR CLIENT REVIEW
A	JAM4	BJS	JMK2	6/1/2018	DRAFT FOR AGENCY REVIEW

PRINTED NAME: BRIAN SILJENBERG  
 SIGNATURE: *[Signature]*  
 DATE: 7/12/18 LICENSE # 50033

CLIENT	DATE	CONSTRUCTION AGENCY	RELEASED TO/FOR	DATE RELEASED
BARR ENGINEERING CO.	7/3/18	9/1/18	A B C 0 1 2 3	

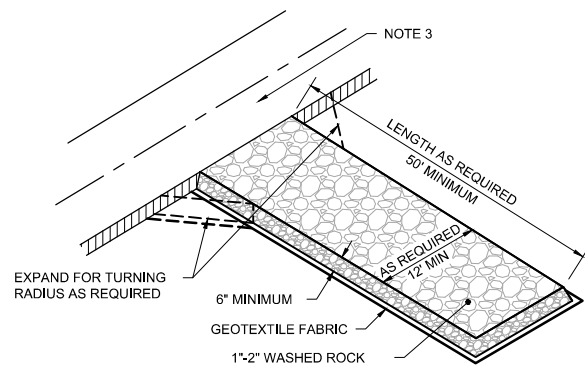
**BARR**  
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Designed	BJS
Approved	JAK

9 MILE CREEK WATERSHED DISTRICT  
 EDEN PRAIRIE, MINNESOTA

NORMANDALE LAKE DRAWDOWN  
 BLOOMINGTON, MINNESOTA  
 EROSION CONTROL  
 PLAN

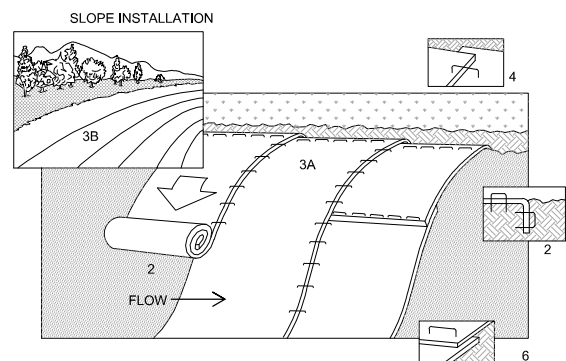
BARR PROJECT No.	23271645.00
CLIENT PROJECT No.	
DWG. No.	C-01
REV. No.	0



**NOTES:**

1. MAINTAIN ENTRANCE THROUGHOUT THE CONSTRUCTION PERIOD AND REPAIR OR REPLACE AS REQUIRED TO PREVENT TRACKING OFFSITE.
2. REMOVE ENTRANCE IN CONJUNCTION WITH FINAL GRADING AND SITE STABILIZATION.
3. REMOVAL OF MATERIAL TRACKED ON TO STREET IS REQUIRED AT THE END OF EACH DAY, OR WITHIN HOUR DIRECTED BY THE ENGINEER

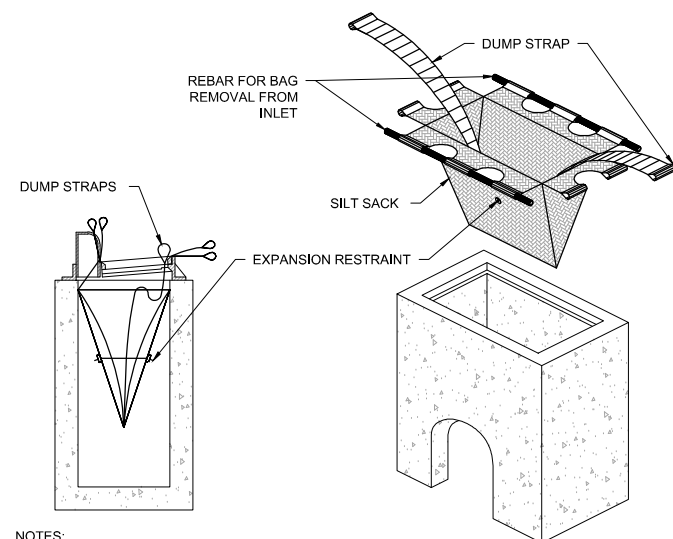
**1** DETAIL: CONSTRUCTION ENTRANCE - ROCK  
NOT TO SCALE



**NOTES:**

1. REFER TO MANUFACTURER RECOMMENDATIONS FOR STAPLE PATTERNS FOR SLOPE INSTALLATIONS.
2. PREPARE SOIL BY LOOSENING TOP 1-2 INCHES AND APPLY SEED (AND FERTILIZER WHERE REQUIRED) PRIOR TO INSTALLING BLANKETS. GROUND SHOULD BE SMOOTH AND FREE OF DEBRIS.
3. BEGIN (A) AT THE TOP OF THE SLOPE AND ROLL THE BLANKETS DOWN OR (B) AT ONE END OF THE SLOPE AND ROLL THE BLANKETS HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 6" OVERLAP, WITH THE UPHILL BLANKET ON TOP.
5. WHEN BLANKETS MUST BE SPICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 6" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
6. BLANKET MATERIALS SHALL BE AS SPECIFIED OR AS APPROVED BY ENGINEER.

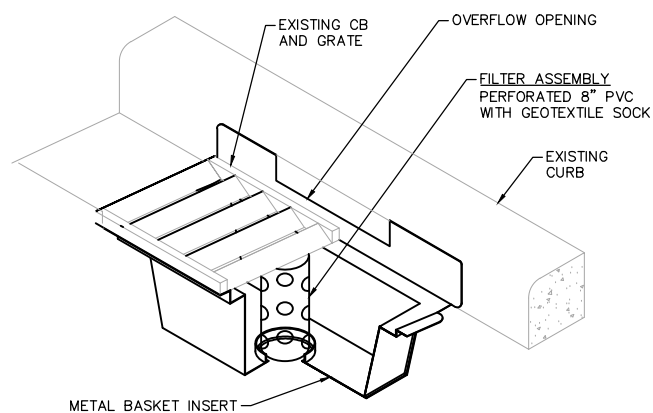
**2** DETAIL: EROSION CONTROL BLANKET - INSTALLATION  
NOT TO SCALE



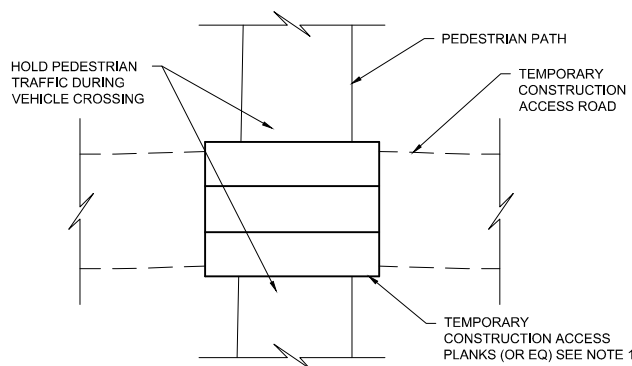
**NOTES:**

1. INSTALL INLET PROTECTION PRIOR TO ANY GRADING WORK IN THE AREA TO BE PROTECTED OR IMMEDIATELY FOLLOWING ANY CATCHBASIN INSTALLATION AND MAINTAIN THROUGHOUT THE CONSTRUCTION PERIOD.
2. MATERIALS SHALL BE SUFFICIENT TO ALLOW FLOW WHILE BLOCKING SEDIMENT. NO HOLES OR GAPS SHALL BE PRESENT IN AROUND FILTER SACK.
3. CLEAN FILTER SACK AND REMOVE ACCUMULATED SEDIMENT AS REQUIRED TO ALLOW FLOW INTO THE CATCHBASIN AND PREVENT SEDIMENT FROM LEAVING THE DEVICE.
4. REMOVE DEVICE AND ANY ACCUMULATED SEDIMENT IN CONJUNCTION WITH THE FINAL GRADING AND SITE STABILIZATION.
5. USE 4/C-02 AT CONTRACTORS OPTION.

**3** DETAIL: INLET PROTECTION - FILTER SACK  
NOT TO SCALE



**4** DETAIL: INLET PROTECTION, METAL BASKET TYPE  
NOT TO SCALE



**NOTES:**

1. ALL DAMAGE TO EXISTING PATH TO BE REPAIRED AT CONTRACTORS EXPENSE
2. REMOVE PLANKS WITHIN ONE HOUR OF USE TO MINIMIZE IMPACT TO PEDESTRIAN PATH

**5** DETAIL: PEDESTRIAN CROSSING  
NOT TO SCALE

CADD USER: Joseph A. Milshaus FILE: M:\DESIGN\23271645.00 C-02 EROSION DETAILS.DWG PLOT SCALE: 1:2 PLOT DATE: 7/12/2018 6:53 PM

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
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B	JAM4	BJS	JMK2	7/3/2018	DRAFT FOR CLIENT REVIEW
A	JAM4	BJS	JMK2	6/1/2018	DRAFT FOR AGENCY REVIEW

CLIENT	7/3/18
BID	
CONSTRUCTION	7/12/18
AGENCY	8/1/18
RELEASED TO/FOR	A B C 0 1 2 3
DATE RELEASED	

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
Suite 200  
MINNEAPOLIS, MN 55435

Project Office:  
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4300 MARKETPOINTE DRIVE  
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MINNEAPOLIS, MN 55435

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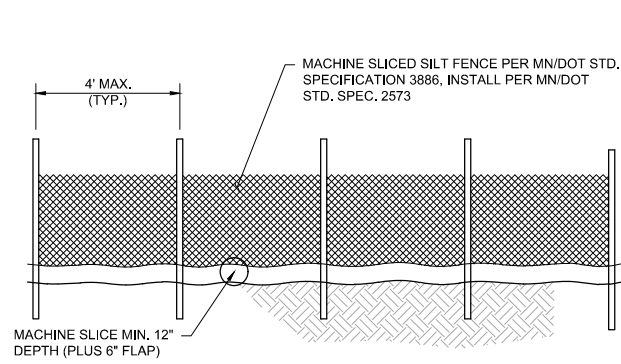
**9 MILE CREEK WATERSHED DISTRICT**  
EDEN PRAIRIE, MINNESOTA

**NORMANDALE LAKE DRAWDOWN**  
BLOOMINGTON, MINNESOTA

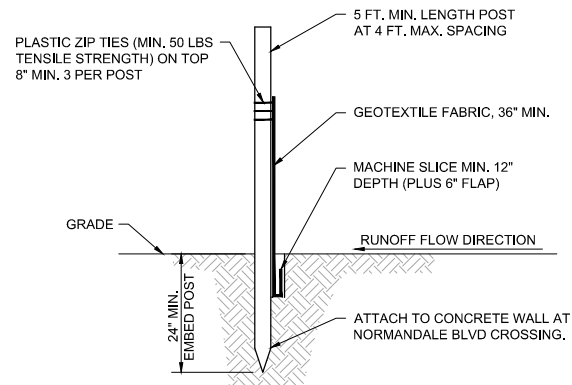
**EROSION CONTROL DETAILS**

BARR PROJECT No.	23271645.00
CLIENT PROJECT No.	
DWG. No.	C-02
REV. No.	0

ISSUED FOR BID



**DOWNSTREAM VIEW**



**SECTION VIEW**

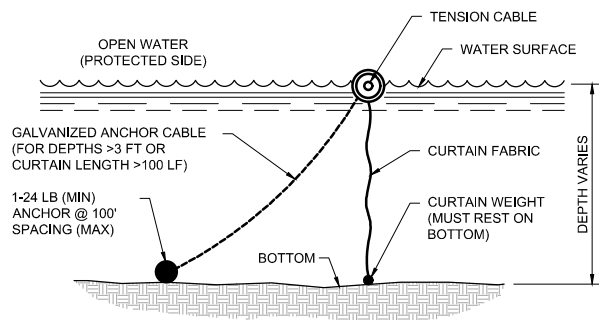
**NOTES:**

- INSTALL SILT FENCE PRIOR TO ANY GRADING WORK IN THE AREA TO BE PROTECTED AND MAINTAIN THROUGHOUT THE CONSTRUCTION PERIOD. REMOVE SILT FENCE / TURTLE FENCE AND ANY ACCUMULATED SEDIMENT IN CONJUNCTION WITH THE PROJECT COMPLETION.
- SILT FENCE MATERIALS AND INSTALLATION SHALL MEET THE REQUIREMENTS OF MN/DOT SPECIFICATIONS 2573 AND 3886.
- NO HOLES OR GAPS SHALL BE PRESENT IN/UNDER SILT FENCE. PREPARE AREA AS NEEDED TO SMOOTH SURFACE OR REMOVE DEBRIS. PROVIDE POSITIVE CONNECTION USING ZIP TIES OR OTHER TO PREVENT TURTLE PASSAGE.
- REMOVE ACCUMULATED SEDIMENT WHEN BUILD UP REACHES 1/3 OF FENCE HEIGHT. OR INSTALL A SECOND SILT FENCE DOWNSTREAM OF THE ORIGINAL FENCE AT A SUITABLE DISTANCE.
- WHEN SPLICES ARE NECESSARY MAKE SPLICE AT POST ACCORDING TO SPLICE DETAIL. PLACE THE END POST OF THE SECOND FENCE INSIDE THE END POST OF THE FIRST FENCE. ROTATE BOTH POSTS TOGETHER AT LEAST 180 DEGREES TO CREATE A TIGHT SEAL WITH THE FABRIC MATERIAL. CUT THE FABRIC NEAR THE BOTTOM OF THE POSTS TO ACCOMMODATE THE 6 INCH FLAP, THEN DRIVE BOTH POSTS AND BURY THE FLAP AND COMPACT BACKFILL.
- TURTLE FENCE TO BE PLACED ALONG MOW LINE BETWEEN TRAIL AND WATERS EDGE, OR ALONG WATERS EDGE IF NO MOW LINE, PRIOR TO THE BEGINNING OF THE DEWATERING.
- SEE SUMMARY OF WORK FOR INSTALL AND REMOVAL DATES.
- TURTLE FENCE SERVES AS EROSION CONTROL. ADDITIONAL EROSION CONTROL MAY BE REQUIRED.
- OPENINGS IN TURTLE FENCING AS REQUIRED FOR CONSTRUCTION ACTIVITY SHALL BE CLOSED WHEN SITE IS NOT OCCUPIED TO PREVENT TURTLE PASSAGE.

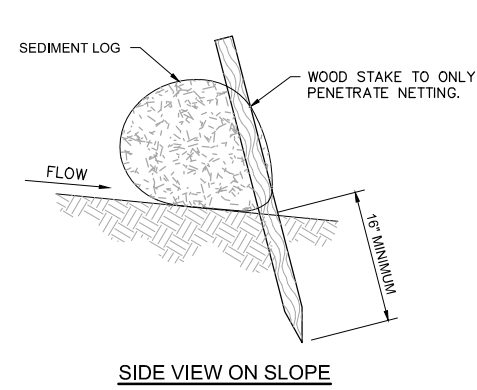
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NOT TO SCALE

**NOTES:**

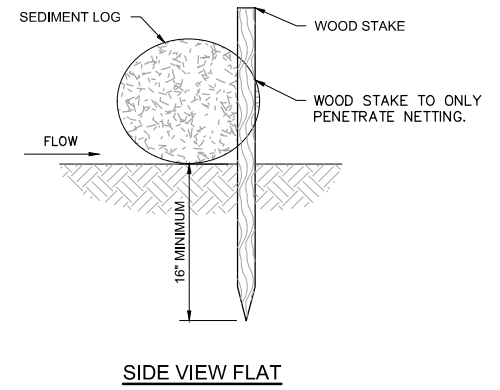
- INSTALL SILT CURTAIN PRIOR TO ANY CONSTRUCTION ACTIVITIES IN AREAS DRAINING TO OPEN WATER OR WORK IN WATER.
- ANCHOR TENSION CABLE AT SHORE AT BOTH END WITH STEEL POSTS OF DIAMETER AND LENGTH SUFFICIENT TO PREVENT BENDING AND PULL-OUT.
- ELIMINATE ANCHOR AND CABLE FOR WATER DEPTHS LESS THAN 3'-0" OR DISTANCE BETWEEN SHORE ANCHORS FOR TENSION CABLE OF LESS THAN 100'
- CURTAIN WEIGHT SHALL BE HEAVY ENOUGH TO HOLD CURTAIN VERTICAL IN CURRENT AND WAVES TYPICAL FOR THE SITE.
- SILT CURTAIN MATERIALS SHALL CONFORM TO MN/DOT SPECIFICATION 3887.
- MAINTAIN SILT CURTAIN AND REPAIR OR REPLACE AS REQUIRED TO PREVENT DISCHARGE OF SEDIMENT TO PROTECTED WATER BODY.
- REMOVE ANY ACCUMULATED SEDIMENT PRIOR TO REMOVAL OF SILT CURTAIN.
- REMOVE SILT CURTAIN FOLLOWING SITE STABILIZATION OR AS DIRECTED BY ENGINEER.



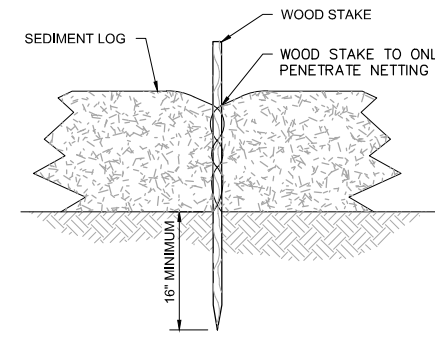
**3** **DETAIL: FLOTATION SILT CURTAIN**  
NOT TO SCALE



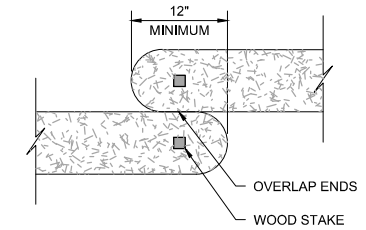
**SIDE VIEW ON SLOPE**



**SIDE VIEW FLAT**



**FRONT VIEW**

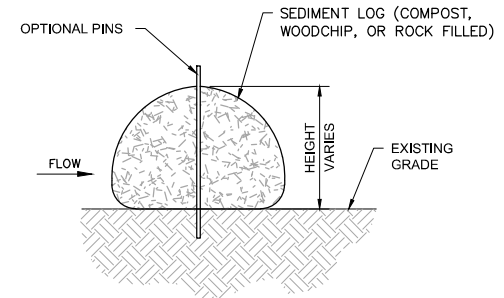


**TOP VIEW**

**NOTES:**

- INSTALL SEDIMENT LOG ALONG CONTOURS (CONSTANT ELEVATION).
- NO GAPS SHALL BE PRESENT UNDER SEDIMENT LOG. PREPARE AREA AS NEEDED TO SMOOTH SURFACE OR REMOVE DEBRIS.
- REMOVE ACCUMULATED SEDIMENT WHEN REACHING 1/3 OF LOG HEIGHT.
- MAINTAIN SEDIMENT LOG THROUGHOUT THE CONSTRUCTION PERIOD AND REPAIR OR REPLACED AS REQUIRED.
- USE FOR EROSION CONTROL AT CONTRACTOR'S OPTION UNLESS SILT FENCE IS REQUIRED IN THE DRAWINGS

**2** **DETAIL: EROSION LOG - STAKING**  
NOT TO SCALE



**NOTES:**

- STAKE FREE SEDIMENT LOG TO BE USED IN AREAS THAT ARE RELATIVELY FLAT AND SHOULD BE INSTALLED ALONG CONTOURS (CONSTANT ELEVATION).
- NO GAPS SHALL BE PRESENT UNDER SEDIMENT LOG. PREPARE AREA AS NEEDED TO SMOOTH SURFACE OR REMOVE DEBRIS.
- ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN REACHING 1/2 OF LOG HEIGHT.
- SEDIMENT LOG SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD AND REPAIRED OR REPLACED AS REQUIRED.
- USE FOR EROSION CONTROL AT CONTRACTOR'S OPTION UNLESS SILT FENCE IS REQUIRED IN THE DRAWINGS.

**4** **DETAIL: SEDIMENT LOG - STAKE FREE**  
NOT TO SCALE

ISSUED FOR  
BID

CADD USER: Joseph A. Miloshius FILE: M:\DESIGN\2327\645.00\2327\645.00 C-03 EROSION DETAILS.DWG PLOT SCALE: 1:2 PLOT DATE: 7/13/2018 2:12 PM  
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PRINTED NAME: **BRIAN SILJENBERG**

SIGNATURE: *[Signature]*

DATE: 7/12/18 LICENSE # 50033

CLIENT	7/3/18							
BID								
CONSTRUCTION								
AGENCY	8/1/18							
RELEASED TO/FOR	A	B	C	0	1	2	3	
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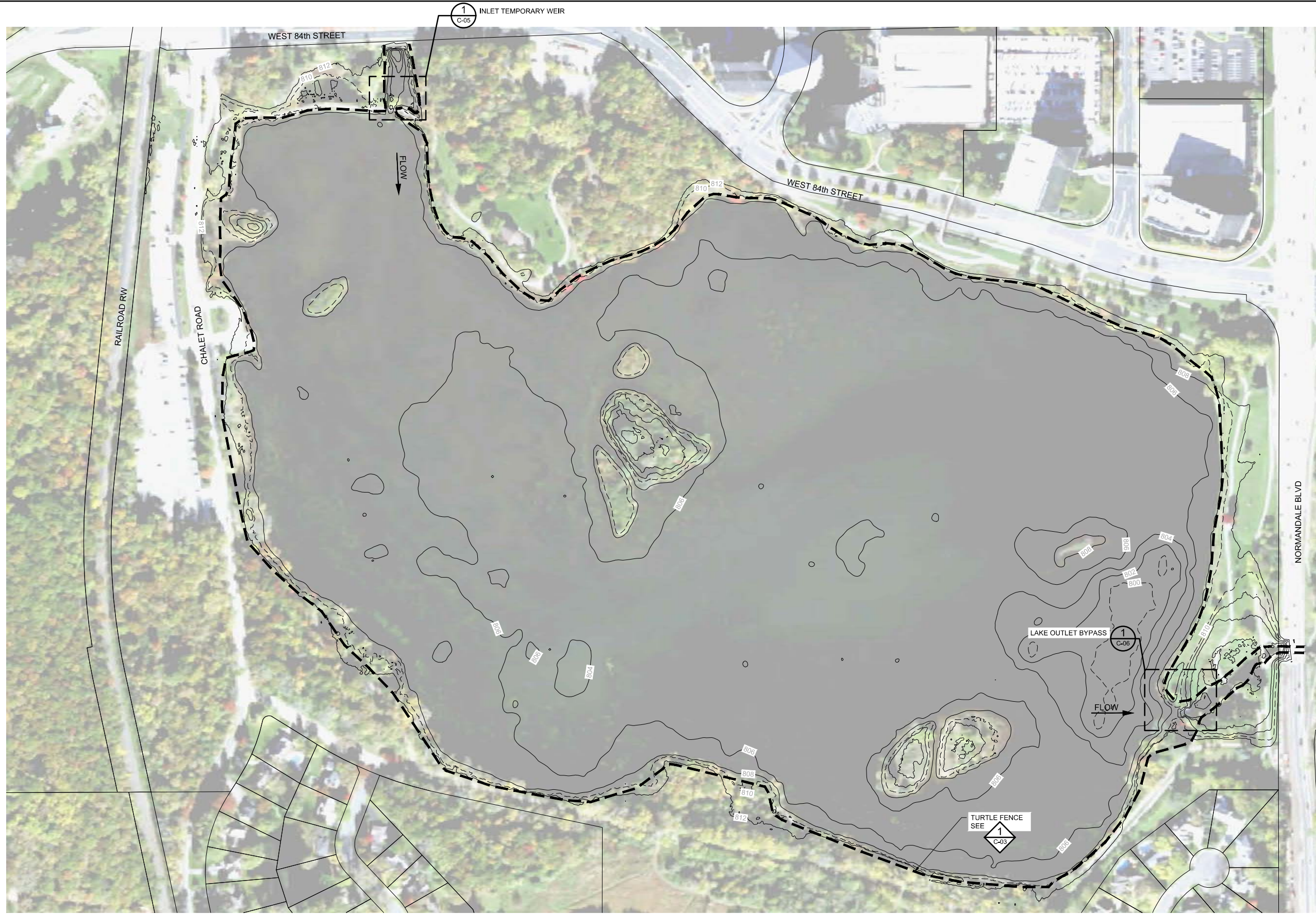
**9 MILE CREEK WATERSHED DISTRICT**  
EDEN PRAIRIE, MINNESOTA

**NORMANDELE LAKE DRAWDOWN**  
BLOOMINGTON, MINNESOTA

**EROSION CONTROL**  
DETAILS

BARR PROJECT No. 23271645.00	
CLIENT PROJECT No.	
DWG. No. C-03	REV. No. 0

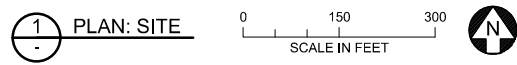
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**LINETYPE LEGEND**

	TURTLE FENCE
	5 FOOT MAJOR CONTOUR LINES
	2 FOOT MINOR CONTOUR LINES

**SHEET NOTES:**  
 1. ALL DISTURBED AREAS TO BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN EXISTING CONDITIONS.  
 2. SEE C-01 FOR CONSTRUCTION ACCESS AND EROSION CONTROL.



ISSUED FOR  
 BID

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	JAM4	BJS	JMK2	7/12/2018	ISSUED FOR BID
B	JAM4	BJS	JMK2	7/3/2018	DRAFT FOR CLIENT REVIEW
A	JAM4	BJS	JMK2	6/1/2018	DRAFT FOR AGENCY REVIEW

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.

PRINTED NAME: **BRIAN SILJENBERG**  
 SIGNATURE:   
 DATE: 7/12/18 LICENSE # 50033

CLIENT	7/3/18								
BID									
CONSTRUCTION				7/12/18					
AGENCY	8/1/18								
RELEASED TO/FOR	A	B	C	0	1	2	3		
DATE RELEASED									

Project Office:  
**BARR ENGINEERING CO.**  
 10000 WILSON DRIVE  
 EDEN PRAIRIE, MN 55435  
 Phone: 952.885.2000  
 Fax: 952.885.2077

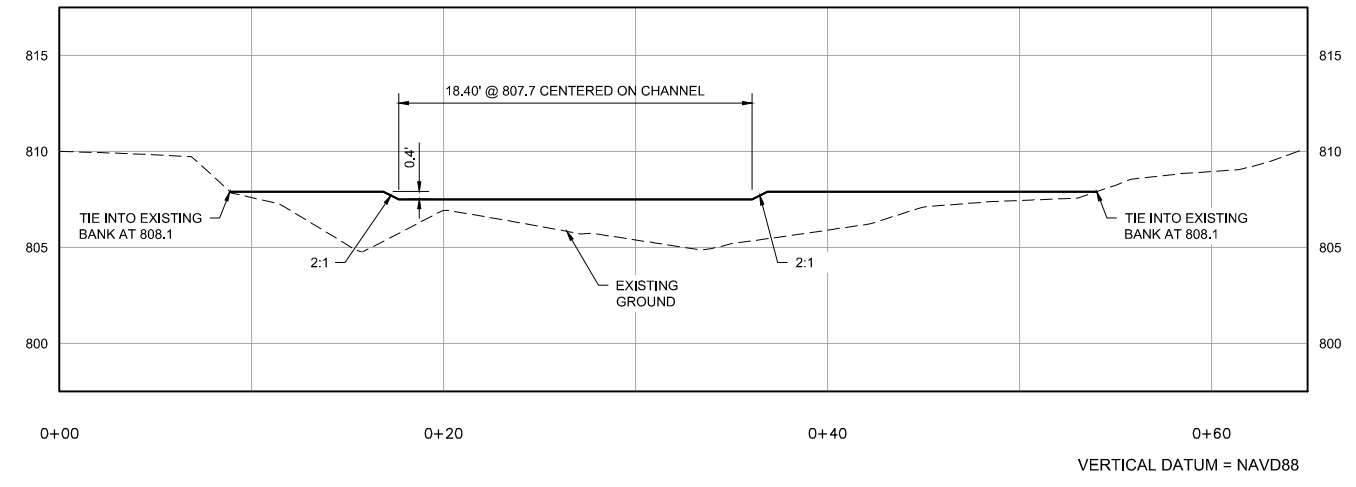
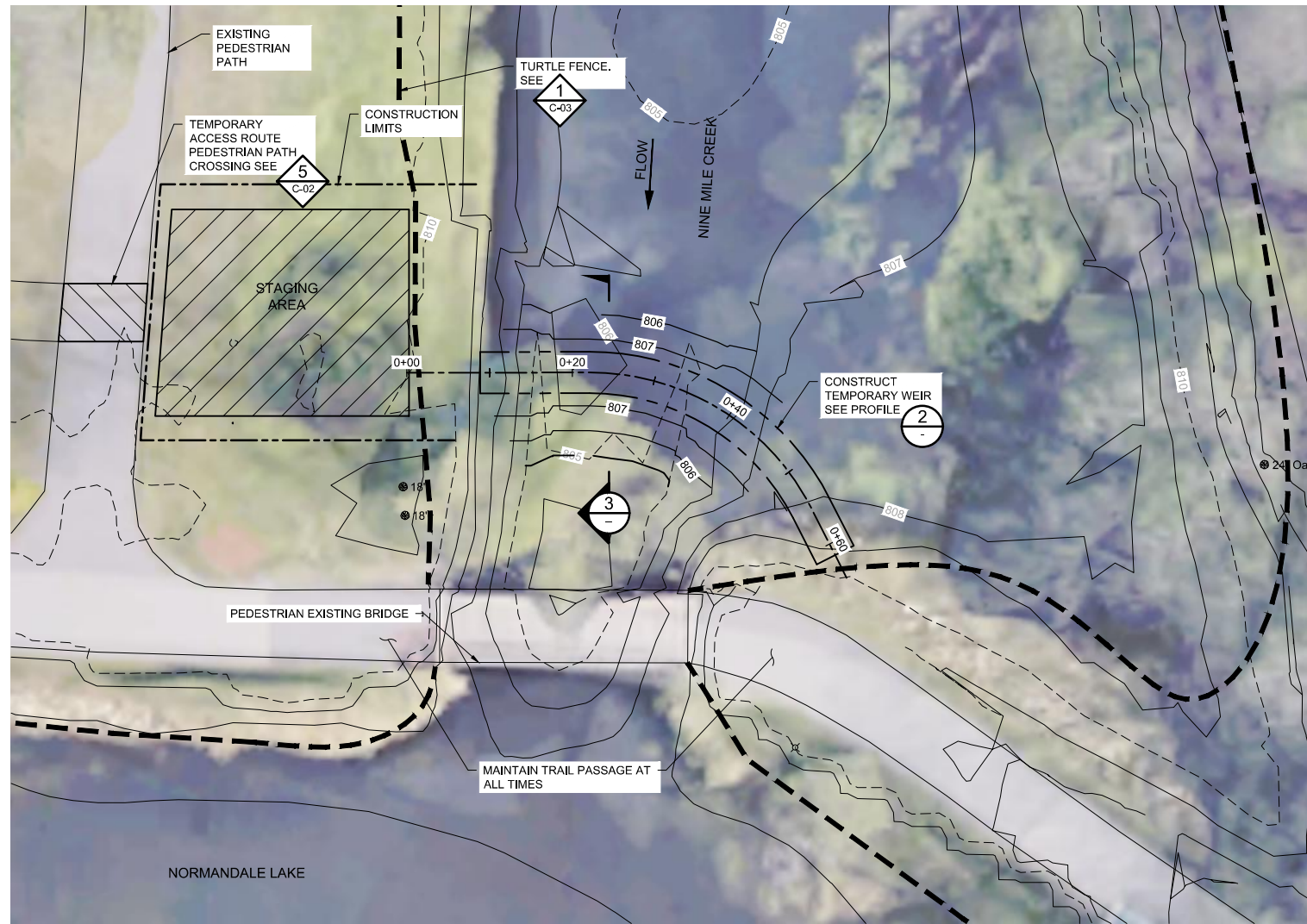
Scale	AS SHOWN
Date	05/23/2018
Drawn	JAM4
Checked	JMK2/JNB
Designed	BJS
Approved	BJS

**9 MILE CREEK WATERSHED DISTRICT**  
 EDEN PRAIRIE, MINNESOTA

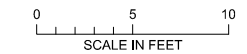
**NORMANDALE LAKE DRAWDOWN**  
 BLOOMINGTON, MINNESOTA

GENERAL PLAN

BARR PROJECT No.		23271645.00
CLIENT PROJECT No.		
DWG. No.	C-04	REV. No.
		0



2 PROFILE: INLET TEMPORARY WEIR  
1"=5'

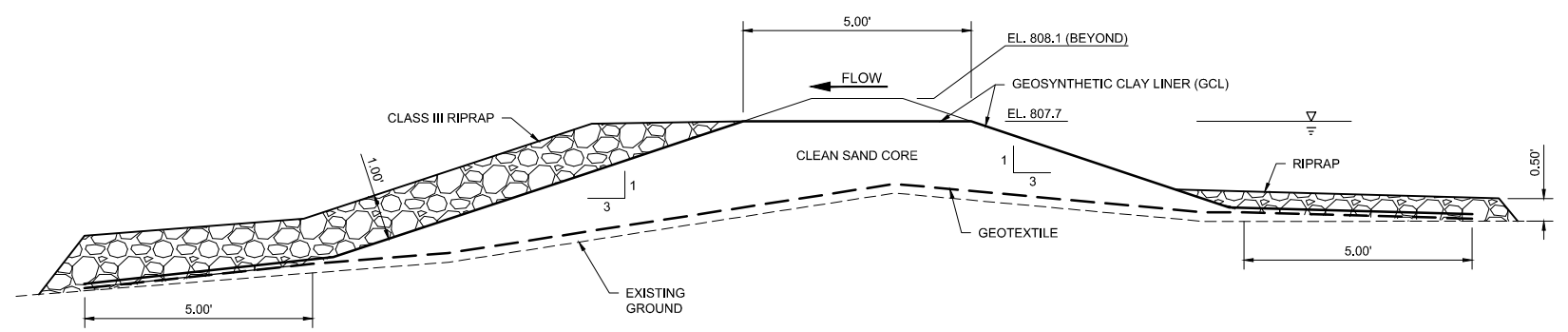
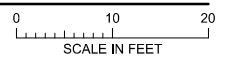


**LINETYPE LEGEND**

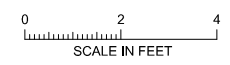
- TURTLE FENCE
- 5 FOOT MAJOR CONTOUR LINES
- 2 FOOT MINOR CONTOUR LINES
- CONSTRUCTION LIMITS
- TEMPORARY WEIR
- WEIR CENTERLINE

**PLAN NOTE:**  
1. USE MN/DOT 25-131 SEED MIX FOR SITE RESTORATION AT INLET STAGING AREA AND TEMPORARY ACCESS ROAD. USE MN/DOT 33-261 SEED MIX FOR RESTORATION OF UNMOWED AREAS.

1 PLAN: INLET TEMPORARY WEIR  
1"=10'



3 SECTION: INLET TEMPORARY WEIR  
1"=2'

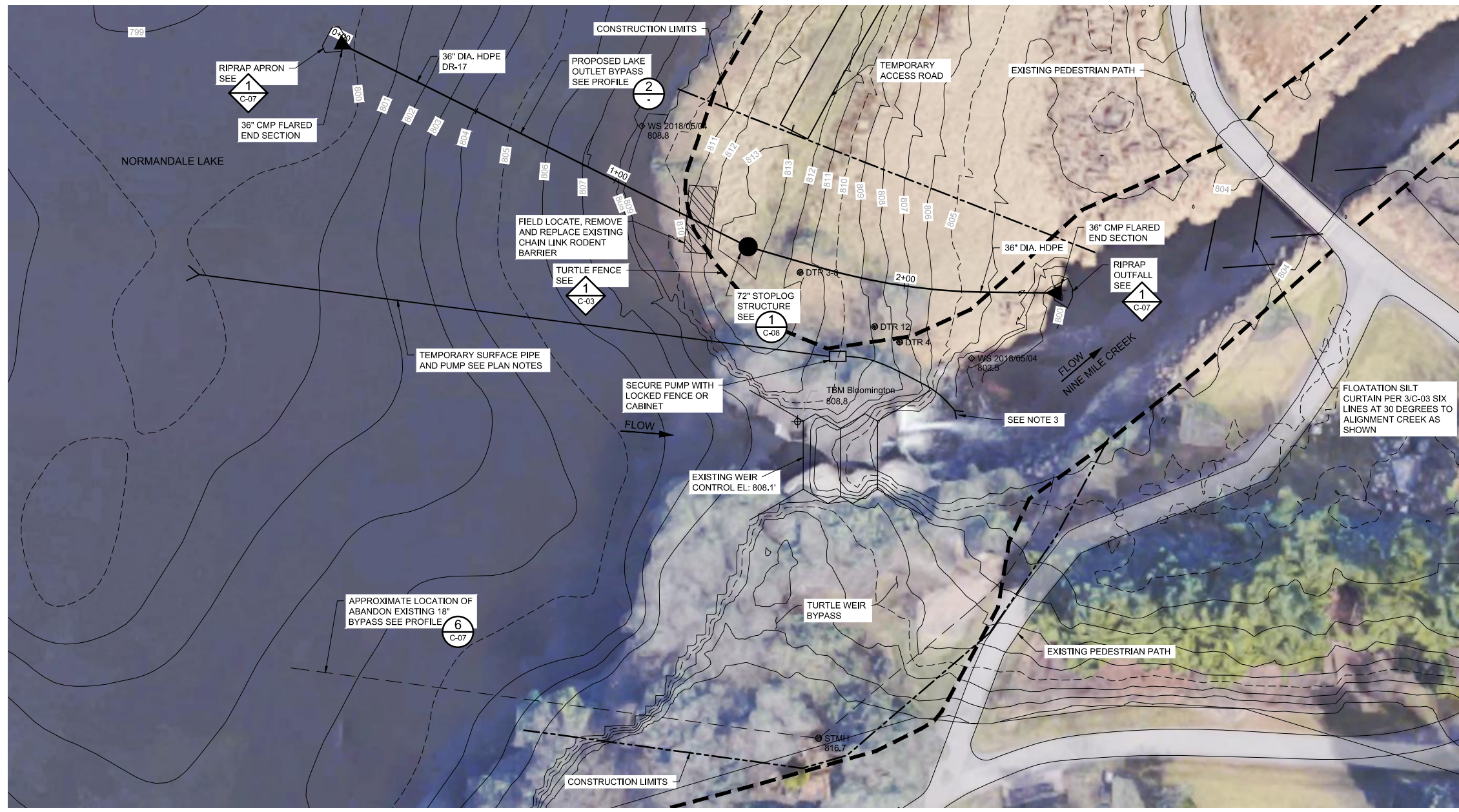


ISSUED FOR BID

CADD USER: Joseph A. Milstadius FILE: M:\DESIGN\2327\645\00\2327\645\00 C-05 INLET TEMPORARY WEIR DWG PLOT SCALE: 1:2 PLOT DATE: 7/13/2018 2:23 PM

BARR M:\AutoCAD\2011\AutoCAD 2011 Support\enu\Template\Barr\_2011\_Template.dwt Plot at 1: 10/05/2010 14:03:50

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. PRINTED NAME: <b>BRIAN SILJENBERG</b> SIGNATURE: <i>[Signature]</i> DATE: 7/12/18 LICENSE # 50033				CLIENT: <b>9 MILE CREEK WATERSHED DISTRICT</b> BID: <b>23271645.00</b> CONSTRUCTION AGENCY: <b>EDEN PRAIRIE, MINNESOTA</b> RELEASED TO/FOR: <b>A B C 0 1 2 3</b> DATE RELEASED: <b>7/12/18</b>				<b>BARR ENGINEERING CO.</b> 4300 MARKETPOINTE DRIVE SUITE 200 MINNEAPOLIS, MN 55435 Ph: 1-800-632-2277 Fax: (952) 832-2601 www.barr.com				Scale: <b>AS SHOWN</b> Date: <b>05/23/2018</b> Drawn: <b>JAM4</b> Checked: <b>JMK2/JNB</b> Designed: <b>BJS</b> Approved: <b>BJS</b>				<b>9 MILE CREEK WATERSHED DISTRICT</b> EDEN PRAIRIE, MINNESOTA				<b>NORMANDALE LAKE DRAWDOWN</b> BLOOMINGTON, MINNESOTA INLET TEMPORARY WEIR PLAN, PROFILE, AND SECTION				BARR PROJECT No. <b>23271645.00</b> CLIENT PROJECT No.		DWG. No. <b>C-05</b> REV. No. <b>0</b>	
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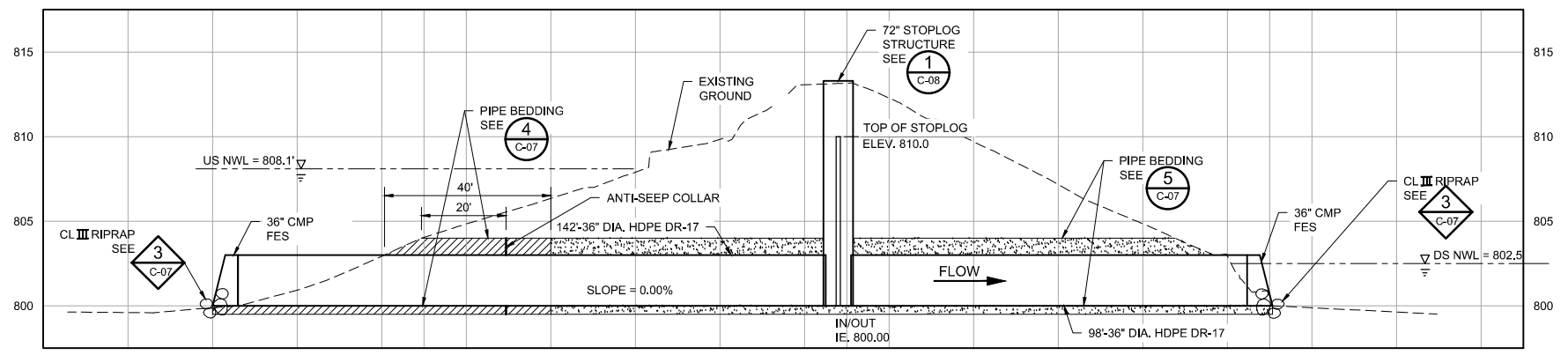


**LINETYPE LEGEND**

---	5 FOOT MAJOR CONTOUR LINES
---	1 FOOT MINOR CONTOUR LINES
---	CONSTRUCTION LIMITS

- PLAN NOTES:**
- 4,600 GPM CAPACITY TEMPORARY PUMP.
  - DRAIN LAKE TO EL. 802.5.
  - PROTECT TEMPORARY OUTLET AGAINST EROSION.
  - PUMP AND SURFACE PIPE LOCATION CONTRACTOR'S OPTION.
  - USE MN/DOT 25-131 SEED MIX FOR SITE RESTORATION OF MOWED AREAS AND TEMPORARY ACCESS ROAD. USE MN/DOT 33-261 SEED MIX FOR RESTORATION OF UNMOWED AREAS.

**1 PLAN: BYPASS PIPE**  
 1"=20'  
 SCALE IN FEET

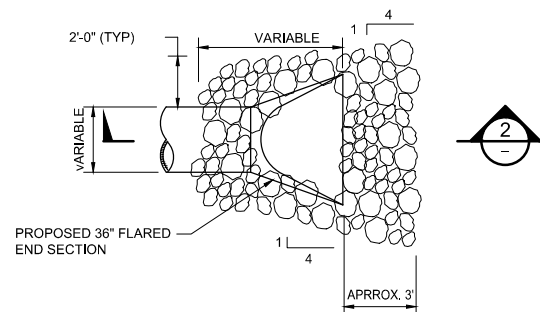


**2 PROFILE: BYPASS PIPE**  
 1"=5' V 1"=20' H  
 SCALE IN FEET  
 VERTICAL DATUM = NAVD88

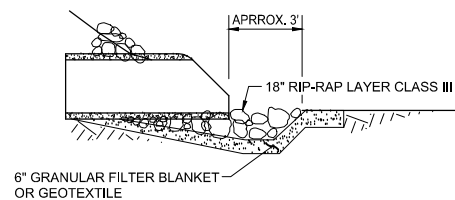
ISSUED FOR  
 BID

CADD USER: Joseph A. Milstadius FILE: M:\DESIGN\2327\645\00\2327\645\00 C-06 OUTLET BYPASS PLAN AND PROFILE.DWG PLOT SCALE: 1:2 PLOT DATE: 7/13/2018 2:27 PM  
 BARR M:\AutoCAD\2011\AutoCAD 2011 Support\enu\Template\Bar\_2011\_Template.dwt Plot at 1: 10/05/2010 14:03:50

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. PRINTED NAME: <b>BRIAN SILJENBERG</b> SIGNATURE: <i>[Signature]</i> DATE: 7/12/18 LICENSE # 50033				CLIENT: 9/1/18 BID: 7/12/18 CONSTRUCTION AGENCY: 8/1/18 RELEASED TO/FOR: A B C 0 1 2 3 DATE RELEASED:				Project Office: <b>BARR ENGINEERING CO.</b> 4300 MARKETPOINTE DRIVE Suite 200 MINNEAPOLIS, MN 55435 Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277 Fax: (952) 832-2601 www.barr.com				Scale: AS SHOWN Date: 05/23/2018 Drawn: JAM4 Checked: JMK2/JNB Designed: BJS Approved: BJS				<b>9 MILE CREEK WATERSHED DISTRICT</b> EDEN PRAIRIE, MINNESOTA				<b>NORMANDALE LAKE DRAWDOWN</b> BLOOMINGTON, MINNESOTA				BARR PROJECT No. 23271645.00 CLIENT PROJECT No.			
NO. BY CHK. APP. DATE REVISION DESCRIPTION				NO. BY CHK. APP. DATE REVISION DESCRIPTION				NO. BY CHK. APP. DATE REVISION DESCRIPTION				NO. BY CHK. APP. DATE REVISION DESCRIPTION				NO. BY CHK. APP. DATE REVISION DESCRIPTION											
0 JAM4 BJS JMK2 7/12/2018 ISSUED FOR BID				1 JAM4 BJS JMK2 7/12/2018 DRAFT FOR CLIENT REVIEW				2 JAM4 BJS JMK2 6/1/2018 DRAFT FOR AGENCY REVIEW				3 JAM4 BJS JMK2 6/1/2018 DRAFT FOR AGENCY REVIEW				4 JAM4 BJS JMK2 6/1/2018 DRAFT FOR AGENCY REVIEW											
DWG. No. C-06				REV. No. 0				DWG. No. C-06				REV. No. 0															



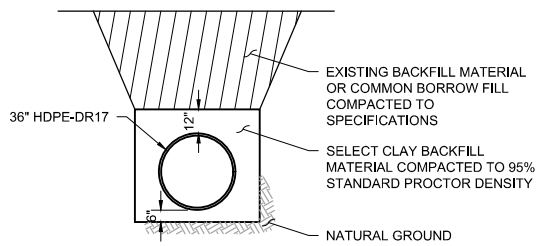
**1** DETAIL: RIP-RAP APRON  
C-06 NOT TO SCALE



**2** SECTION: PIPE AND RIP-RAP  
NOT TO SCALE

**NOTE:**

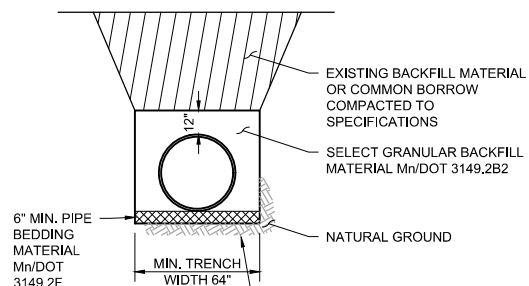
- THE CONTRACTOR, AT HIS OPTION, MAY SUBSTITUTE A GEOTEXTILE FABRIC, SPEC. 3733, FOR THE GRANULAR FILTER BLANKET UNLESS OTHERWISE SPECIFIED IN THE PLANS. THE FABRIC SHOULD COVER THE AREA OF THE RIP-RAP AND EXTEND UNDER THE PIPE 3'.
- REFERENCE Mn/DOT STANDARD PLATE NO. 3133D.



**NOTES:**

- SELECT CLAY BACKFILL MATERIAL SHALL BE A MINERAL PRODUCT CONSISTING OF SOUND DURABLE PARTICLES WHICH MAY BE CLAY/SILT MATERIAL HAVING ONE HUNDRED PERCENT (100%) FINER THAN ONE (1) INCH IN DIAMETER AND FIFTY PERCENT (50%) PASSING A #200 SIEVE.
- CLAY MATERIAL SHALL HAVE A LIQUID LIMIT NOT EXCEEDING THIRTY FIVE (35) AND A PLASTICITY INDEX GREATER THEN NINE (9).

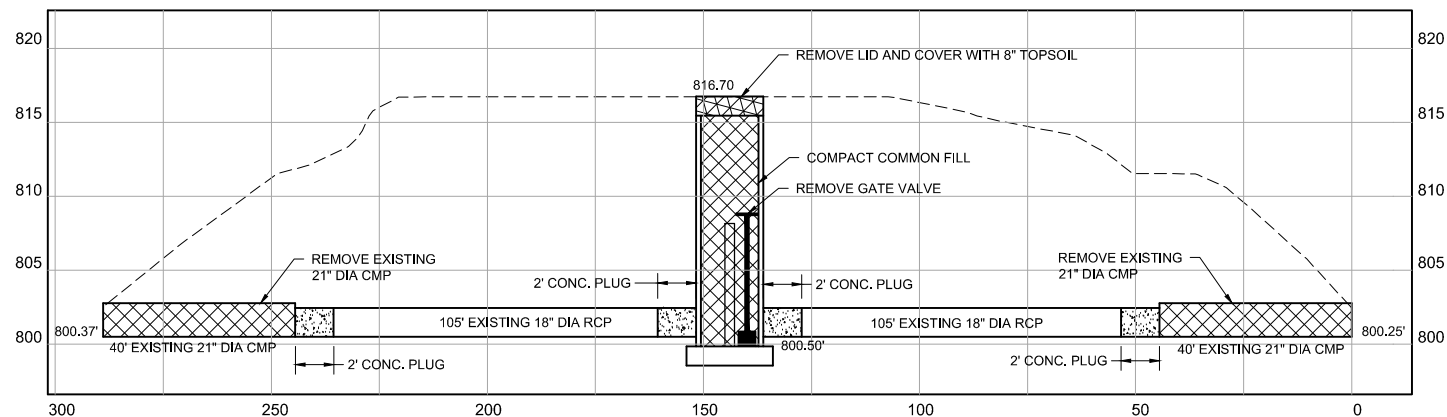
**4** DETAIL: PIPE BEDDING SEAL ON PIPE INLET END  
C-06 NOT TO SCALE



**NOTES:**

- IMPORTED PIPE EMBEDMENT MATERIAL PER Mn/DOT SPEC. 3149.2F GRANULAR BEDDING, 100% PASSING 1" SIEVE AND AND NOT MORE THAN 10.5% PASSING THE #200 SIEVE.
- IMPORTED PIPE EMBEDMENT MATERIAL SHALL BE COMPACTED IN UNIFORM LIFTS, 8" OR LESS IN DEPTH, LOOSE MATERIAL MEASURE, TO 95% STANDARD PROCTOR DENSITY FROM THE BEDDING TO A MINIMUM DEPTH OF AT LEAST 12" ABOVE THE CROWN OF THE PIPE.

**5** DETAIL: STANDARD PIPE BEDDING FOR HDPE PIPE  
C-06 NOT TO SCALE



**PROFILE NOTES:**

- REMOVE EXISTING GATE AND CLEAR PIPE TO ASSIST IN INITIAL DE-WATERING. ABANDON ONLY AFTER NEW 36" Ø BYPASS IS IN SERVICE.
- STATIONING AND ELEVATION ARE APPROXIMATE AND BASED ON EXISTING RECORD DRAWINGS. EXACT LOCATION UNKNOWN.

**6** PROFILE: EXISTING ABANDONMENT  
C-06 NOT TO SCALE

ISSUED FOR  
BID

CADD USER: Joseph A. Milstadius FILE: M:\DESIGN\2327\645.00\2327\645.00 C-07 DETAILS.DWG PLOT SCALE: 1:2 PLOT DATE: 7/12/2018 7:10 PM  
BARR\K\AutoCAD 2011\AutoCAD 2011\Support\enu\Template\Barr\_2011\_Template.dwt Plot at 1: 10/05/2010 14:03:50

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	JAM4	BJS	JMK2	7/12/2018	ISSUED FOR BID
B	JAM4	BJS	JMK2	7/3/2018	DRAFT FOR CLIENT REVIEW
A	JAM4	BJS	JMK2	6/1/2018	DRAFT FOR AGENCY REVIEW

CLIENT	7/3/18						
BID							
CONSTRUCTION	7/12/18						
AGENCY	8/1/18						
RELEASED TO/FOR	A	B	C	0	1	2	3
DATE RELEASED							

**BARR**  
Project Office:  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
Suite 200  
MINNEAPOLIS, MN 55435  
Corporate Headquarters:  
Minneapolis, Minnesota  
Ph: 1-800-632-2277  
Ph: 1-952-832-2601  
www.barr.com

Scale	AS SHOWN
Date	05/23/2018
Drawn	JAM4
Checked	JMK2/JNB
Designed	BJS
Approved	BJS

**9 MILE CREEK WATERSHED DISTRICT**  
EDEN PRAIRIE, MINNESOTA

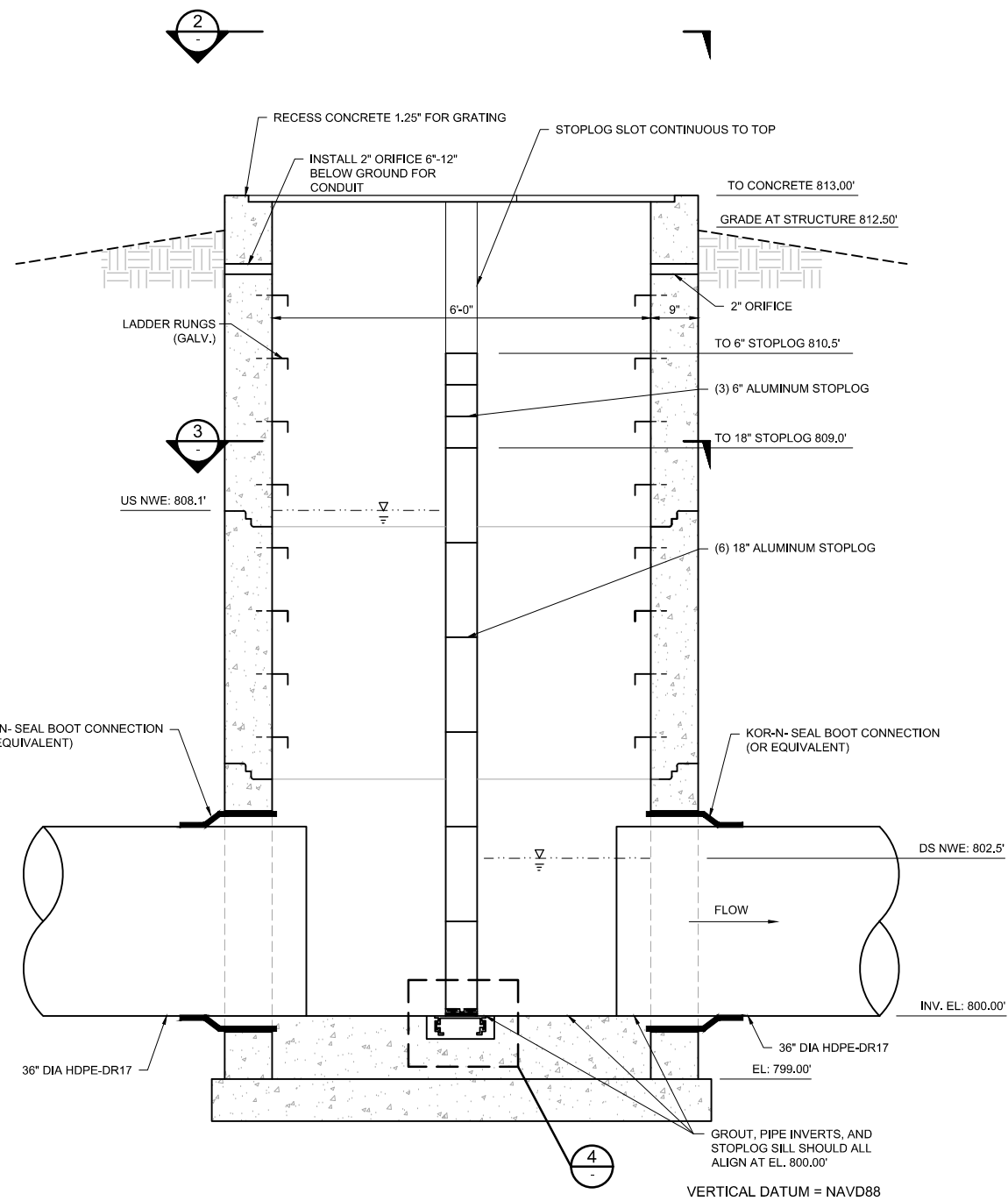
**NORMANDALE LAKE DRAWDOWN**  
BLOOMINGTON, MINNESOTA  
**OUTLET BYPASS**  
DETAILS

BARR PROJECT No.	23271645.00
CLIENT PROJECT No.	
DWG. No.	C-07
REV. No.	0

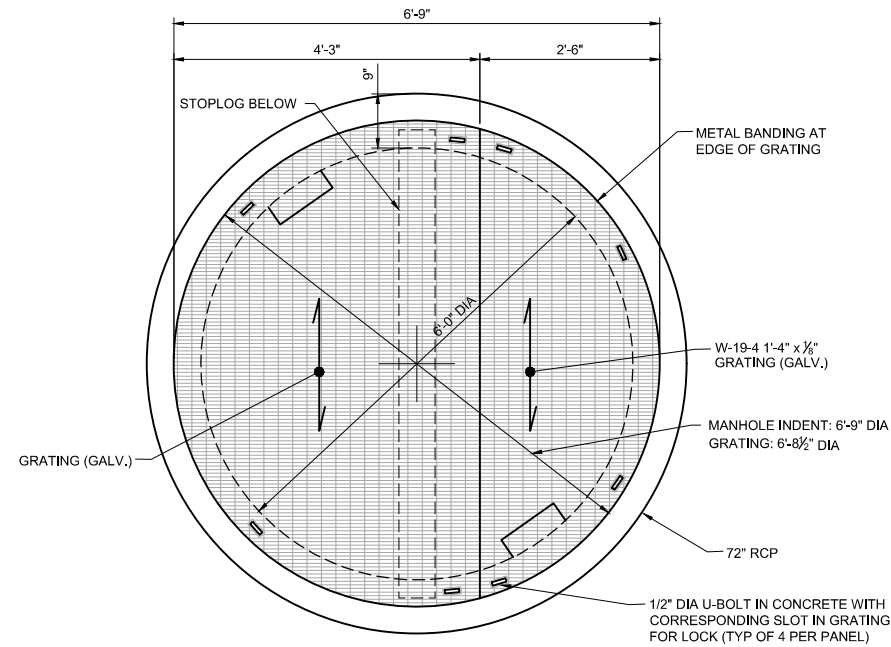


CADD USER: Joseph A. Milstadius FILE: M:\DESIGN\23271645.00\23271645.00 C-08 STOPLOG PLAN AND DETAILS.DWG PLOT SCALE: 1:2 PLOT DATE: 7/12/2018 7:12 PM

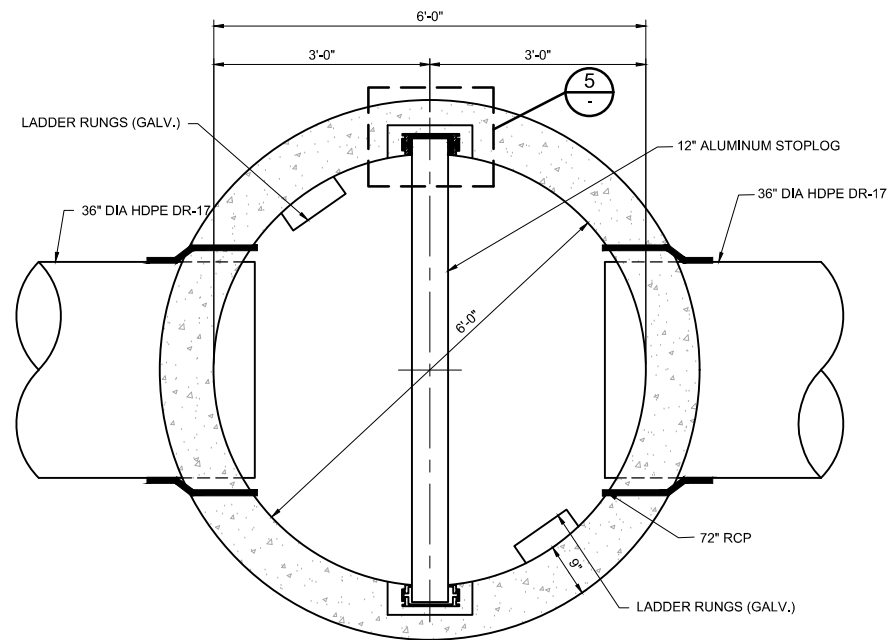
www.MJDesign23271645.00\23271645.00 C-07 Stoplog Plan and Details.dwg Plt at 0: 05/02/2018 17:23:30



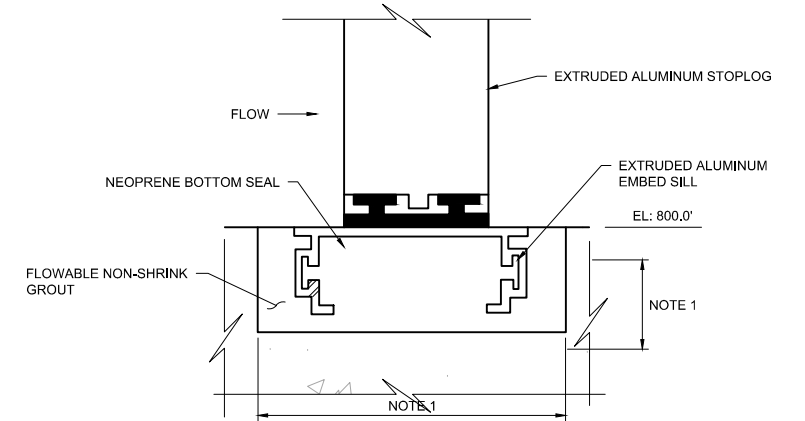
**1 SECTION: BYPASS STRUCTURE (72" DIA)**  
 C-06 3/4"=1'-0"  
 SCALE



**2 PLAN: BYPASS STRUCTURE TOP GRATING**  
 3/4"=1'-0"  
 SCALE

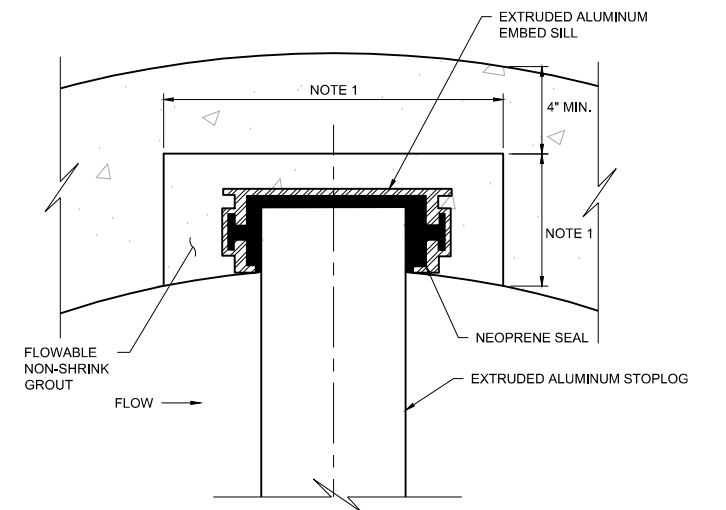


**3 PLAN: BYPASS STRUCTURE STOPLOGS**  
 3/4"=1'-0"  
 SCALE



**SECTION NOTES:**  
 1. COORDINATE WITH STOPLOG SUPPLIER

**4 SECTION: SILL EMBED**  
 3"=1'-0"



**SECTION NOTES:**  
 1. COORDINATE WITH STOPLOG SUPPLIER

**5 SECTION: SLOT EMBED**  
 3"=1'-0"

ISSUED FOR  
 BID

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NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION																						
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