

Applicant: Julie Long; City of Bloomington
Consultant: Tom MacDonald; Barr Engineering
Project: Stream Channel Stabilization
Location: 2251 Overlook Drive – Lower Valley of Nine Mile Creek: Bloomington
Rule(s): 2, 5, 7 and 10
Reviewer: BCO

General Background & Comments

The proposed project involves maintenance repairs at two locations in the most downstream section of Nine Mile Creek in the Lower Valley of the creek in Bloomington on park property owned by the City. This section of the creek is impacted by the backwater and flood conditions of the Minnesota River. Such was the case in the spring and summer of 2019 when the area was inundated by the high water conditions of the river for several months. As the inundation receded and with the saturated underlying soils of the banks of Nine Mile Creek, two erosion areas developed that now require stabilization. The upstream of the two erosion areas, scarp 1, is approximately 80 feet in length and 6 feet in height. The second erosion area, scarp 2 located approximately 100 feet downstream of scarp 1, is approximately 125 feet in length and 5 feet high. Scarp 2 abuts a non-paved (wood chips) walkway that follows the base of the valley wall from the Overlook Drive residential area to the creek/floodplain area. Continued erosion of scarp 2 would first impact the walking trail and then the valley wall (that is more than 100 feet in height) if stabilization is not undertaken.

The proposed stabilization is a combination of field stone toe boulders, field stone rip-rap, root wads and vegetated geogrid to comply with the requirements of District Rule 7.0, Shoreline and Stream Bank Improvements. Similar methods of stabilization has been used in other areas of the Lower Valley that have required maintenance since the 1991 Lower Valley Stabilization project was completed. To benefit from the authorization available under Department of Natural Resources General Permit #97-6112 issued for work in the Nine Mile Creek watershed, the city will need to comply with the terms and conditions of General Permit #97-6112.

The stabilization project will restore the creek to its location and cross-sectional area prior to the 2019 high water conditions. The material used for the stabilization (primarily 424 cubic yards of field stone rip-rap material, 4 new root wads and 3 salvaged and replace root wads) will replace the material that eroded and washed downstream. Reestablishing the banks to the pre-high water condition will not result in a reduction in floodplain volume from that which existed prior to the 2019 flooding. A detailed survey of the entire Lower Valley was completed prior to an after the 1991 stabilization project. A survey grid was developed that enables the meandering of the creek to be monitored on an on-going basis. In addition, City staff inspects the entire creek reach at a minimum annually and after significant rain storm event to

determine if problems have developed. When the project was undertaken in 1991, it was with the understanding that the creek would be able to naturally meander within the confines of the valley walls but not allow the creek to encroach or impact the valley walls. It was expected that on-going maintenance would be required if the creek is to be left as natural. During the 2019 high water conditions of the Minnesota River, inundation in the section of the creek was greater than 10 feet above the thalweg (bottom) elevation of the creek.

Since the fill material used for the stabilization will not result in a reduction of flood volume as compared to pre-2019 high water conditions and that Rule 2.3.2 requires compensatory storage for fill placed below the flood elevation of the creek, a Rule 10.0 exemption from this requirement is requested to be considered.

The project will disturb more than 50 cubic yards of earth and more than 5000 square feet of surface area. The District's Stormwater Rule (4) applies since the project will meet Rule 4.2.1a. However since there are no impermeable areas associated with the project that will be created to generate runoff, the requirements of Rules 4.3.1a) volume retention, b) limit peak flow rates for the 2, 10, and 100 year storm events to existing conditions and c) water quality management and 4.3.3 Chloride management are not imposed. The District's Erosion and Sediment Control Rule (5.2.1a) applies to the project because of the volume of disturbance proposed. The District's Shoreline and Streambank Improvements Rule (7) applies to the project because of the city's plan involves installation of a streambank improvement.

Exhibits

1. Permit Application dated December 12, 2019.
2. Plan sheets 1-5 dated October 28, 2019 prepared by the City of Bloomington and plan sheets 6-10 prepared by Barr Engineering dated November 13, 2019. Barr's involvement in the design was requested by the City and authorized by the District Administrator.
3. A copy of e-mail correspondence dated December 19, 2019 from the MDNR to the City of Bloomington stating the project falls under the MDNR's General Permit with the NMCWD and that the MDNR defers to the NMCWD for review of the permit.

2.0 Floodplain Management and Drainage Alterations

At flood stage, the backwater from the Minnesota River will inundate the lower reach of the creek with more than 25 feet of flood water (river flood elevation 725 M.S.L.). The stabilization as previously described, field stone toe boulders and rip-rap, involves placement of fill below the 100-year flood elevation of Nine Mile Creek, elevation 710 M.S.L., triggering a Rule 2 permit requirement in subsection 2.2.1 of the District rules. Rule 2.3.2 requires that the fill placement in the floodplain of the creek must be fully compensated at the same elevation +/-1 foot. As previously stated, the stabilization will repair two creek bank erosion areas that developed as a result of several months of high backwater conditions from the Minnesota River.

2.3.1: The low floor elevation of all new and reconstructed structures must be constructed in accordance with the NMCWD Stormwater Rule, subsection 4.3.3

This section of the rule does not apply to the proposed project because no new or reconstructed structures are proposed.

2.3.2: *Placement of fill below the 100-year flood elevation is prohibited unless fully compensatory storage is provided within the floodplain and:*

- a. at the same elevation +/- 1 foot for fill in the floodplain and:*
- b. at or below the same elevation for fill in the floodplain of a water basin or constructed stormwater facility.*

The plan, as stated, is to stabilize two areas along the creek in its current location to pre-2019 high water conditions. Four hundred twenty-four (424) cubic yards of field stone toe boulders, field stone rip-rap, root wads and bioengineering will be used to reduce the further introduction of sediment into the creek and not result in a reduction of the flood volume available prior to the erosion occurring.

2.3.3. *The District will issue a permit to alter surface flows only if it finds that the alteration will not have an adverse impact on any upstream or downstream landowner and will not adversely affect flood risk, basin or channel stability, groundwater hydrology, stream base-flow, water quality or aquatic or riparian habitat.*

The stabilization project will not result in a rise of the District's management elevation for the creek (710 M.S.L.) since there will be no reduction in the pre-high water flood volume. The project will not alter the creek channel or the stability of the channel itself but will provide a stable creek bank. The project will not affect the groundwater hydrology or stream base flow conditions. The work is to be completed during the 2020 winter months when flow conditions in the creek are low. The stabilization will improve the water quality of the creek (reduce the sediment loading) and will restore any aquatic or riparian habitat that may have existed.

2.3.4 *No structure may be placed, constructed or reconstructed and no surface may be paved within 50 feet of the centerline of any water course, except that this provision does not apply to:*

- a. Bridges, culverts, and other structures and associated impervious surface regulated under Rule 6.0;*
- b. Trails 10 feet wide or less, designed primarily for nonmotorized use.*

No structure or trail is proposed.

5.0 Erosion and Sediment Control

The work proposed is to be undertaken during the 2019-2020 winter months typically a low flow period. A washed gravel check dam will be constructed within the creek channel downstream of the construction area for erosion control. The project contact is Steve Gurney, City of Bloomington.

7.0 Shoreline and Streambank Improvements

Rule 7.0 states that it is the policy of the Board of Managers to prevent erosion of shorelines and streambanks and to foster the use of natural materials and bioengineering for the maintenance and restoration of shorelines.

Rule 7.0 applies, under paragraph 7.2, to the proposed work because it will involve stabilization of two sections of Nine Mile Creek streambank, 80 and 125 feet in length,

respectively. The stabilization will include using field stone toe boulders, field stone rip-rap, root wads and vegetated geogrid.

Rule 7.3.1 states, *An applicant for a shoreline alteration permit must demonstrate a need to prevent shoreline erosion or restore eroded shoreline:*

This lower reach of the creek is impacted by the backwater and flood conditions of the Minnesota River. Such was the case in the spring and summer of 2019 when the area was inundated by the backwater of the river for several months. As the inundation receded and with the saturated soil conditions of the banks of Nine Mile Creek, two erosion areas developed requiring stabilization. If not stabilized, the NMCWD engineer expects that 2020 spring runoff flows in the creek will continue to erode the scarp area causing further sedimentation of the creek and downstream resources.

Rule 7.3.2 states, *An applicant must first consider maintenance or restoration of a shoreline using bioengineering. If bioengineering cannot provide a stable shoreline, a combination of rip-rap and bioengineering may be used to restore or maintain shoreline. If a combination of rip-rap and bioengineering cannot provide a stable shoreline within a reasonable period, rip-rap may be used to restore or maintain shoreline:*

As stated, the eroded bank is to be stabilized in its current location with field stone toe boulders, field stone rip-rap, root wads and vegetated geogrid stabilization. The rock stabilization will be at and below the anticipated normal level of the creek with the bioengineering located at elevations above. Structural stabilization as proposed, rock toe protection, is required to minimize the impacts that flows in the creek will have on the eroded sand banks of the creek (10-year (discharge) flow rate – 1,300 c.f.s.; 100-year (discharge) flow rate – 2,200 c.f.s.) will have on the creek channel in this area. The base flow in this reach of the creek is approximately 20 c.f.s. Bioengineering alone will not provide the structural component required for these discharges. In addition, the natural vegetation will not survive being inundated for several months by several feet of water for an extended period of time as occurred in 2019.

Rule 7.3.2a states, *Live plantings incorporated in shoreline bioengineering must be native aquatic vegetation and/or native upland plants:*

The rock stabilization will provided the foundation of the stabilization proposed. The geo grid is to be vegetated with a wetland seed mixture, MnDOT 35-241, at the lower elevations and a native grass mixture, MnDOT 34-261 at the higher elevations.

Rule 7.3.2b states: *Riprap to be used in shoreline erosion protection must be sized appropriately in relation to the erosion potential of the wave or current action of the particular water body, but in no case shall the riprap rock average less than six inches in diameter or more than 30 inches in diameter. Riprap shall be durable, natural stone and of a gradation that will result in a stable shoreline embankment. Stone, granular filter and geotextile material shall conform to standard Minnesota Department of Transportation specifications, except that neither limestone nor dolomite shall be used for shoreline or stream bank riprap, but may be used at stormwater outfalls. All materials used must be free from organic material, soil, clay, debris, trash or any other material that may cause siltation or pollution:*

The project proposes the use of Class II, IV and V field stone rip-rap, MnDot 2511 and 3601, having a maximum size of 12-inch, 24-inch and 30-inch, respectively with 6-inches of granular

filter material, MnDot 3601. The objective is to maintain the natural characteristics of the creek system yet provide for a stable slope that forms the creek bank.

Rule 7.3.2c states: *Riprap shall be placed to conform to the natural alignment of the shoreline.*

The stabilization will restore the creek bank to its pre-erosion location and elevation, matching the top and toe of the restore bank with the existing bank both upstream and downstream of the eroded area. The stabilization will not move, alter or change the location of the channel from its current location. The stabilization will follow the alignment of the existing stream channel.

Rule 7.3.2d states: *A transitional layer consisting of graded gravel, at least six inches deep, and an appropriate geotextile filter fabric shall be placed between the existing shoreline and any riprap. The thickness of riprap layers should be at least 1.25 times the maximum stone diameter. Toe boulders, if used, must be at least 50 percent buried.*

Filter material used will be 6-inches in depth complying with MnDot 3601. A North American Green C125BN geotextile filter fabric is to be used between the granular filter material and the native soil. The toe boulders are shown to be installed half buried below the normal level of the creek.

Rule 7.3.2e states: *Riprap must not cover emergent vegetation unless authorized by a Department of Natural Resources permit.*

The rip-rap to be installed will not cover emergent vegetation.

Rule 7.3.2f states: *Riprap shall extend no higher than the top of bank or two feet above the 100-year high water elevation, whichever is lower.*

The thalweg of the creek in this area is approximately 694 +/- M.S.L. The toe boulders and field stone rip-rap will extend to elevation 700 M.S.L. The bioengineering will continue approximately 5 feet to the top the eroded section. The 100-year flood elevation of the creek at this location is 710 M.S.L. The area above elevation 705 M.S.L. and not been subject to erosion will remain in its current condition.

Rule 7.3.3 states: *The finished slope of any shoreline shall not be steeper than 3:1 (horizontal to vertical).*

The plans show the stabilized channel banks at a slope of 5:1.

Rule 7.3.4 states: *Horizontal encroachment from a shoreline shall be the minimal amount necessary to permanently stabilize the shoreline and shall not unduly interfere with water flow or navigation. No riprap or filter material shall be placed more than six feet waterward of the OHW. Streambank riprap shall not reduce the cross-sectional area of the channel or result in a stage increase of more than 0.01 feet at or upstream of the treatment.*

The pre-inundation channel cross-sectional area will not be changed by the project. Navigation within this reach of the creek is not applicable.

Rule 7.3.5 states: *The design of any shoreline erosion protection shall reflect the engineering properties of the underlying soils and any soil corrections or reinforcements necessary. The design shall conform to engineering principles for dispersion of wave energy and resistance to deformation from ice pressures and movement, considering prevailing winds, fetch and other factors that induce wave energy.*

The stabilization methods have been sized to provide a stable condition with the creek in its current location thereby minimizing further disturbance that would result from the project. Similar stabilization techniques have been used for other sites in the Lower Valley where erosion problems have resulted. These erosion issues have developed from the high flows being conveyed in the creek from upstream watershed runoff. This is the first stabilization required that has resulted from the high water conditions of the Minnesota River. Ice loading and wave energy is not applicable for stream channel stabilization.

Rule 7.3.6 states: *Placement of rip-rap for merely cosmetic purposes is prohibited.*

The project is to provide a stable creek section and is not for cosmetic purposes

Rule 7.3.7 states: *Retaining walls extending below the OHW of a water body are prohibited except where:*

- a. *There is a demonstrable need for a retaining wall in a public improvement project and*
- b. *The design of the retaining wall has been certified by a registered engineer.*

This rule does not apply in this instance.

10.0 Variances and Exceptions

Rule 10.2 Exceptions states; The Board of Managers may approve an exception from a provision of the rules requiring a particular treatment or management strategy, or setting forth a design specification, if an applicant demonstrates that better natural resource protection or enhancement can be achieved by the project as proposed, with such further conditions as the Board of Managers may impose, than would strict compliance with the provision.

As previously stated, the proposed stabilization will result in 424 cubic yards of field stone boulders and rip-rap, considered fill, placed below elevation 710 M.S.L., the 100-year frequency flood elevation of the creek, and 725 M.S.L., the 100-year frequency flood elevation of the Minnesota River. District Rule 2.3.2 as previously described in the floodplain discussion, requires that compensatory storage be provided for the placement of fill within the floodplain. The fill will re-establish the creek to its pre-2019 high water condition and will not result in a reduction in flood volume.

In light of the unique hydrodynamics in this area of the watershed, influenced by the creek interaction with the river to which it is tributary, the NMCWD engineer finds that stabilization proposed is necessary to prevent further movement and failure of the creek banks which would result in further sediment loading into the creek and greatly outweighs the harm (excessive sedimentation) that would result from failing to stabilize the creek. (Stabilization of areas that are eroding along the entire length of the creek will minimize the potential of the MPCA from relisting the creek as impaired for turbidity).

Since the benefits of the bank stabilization provide for a better natural resource protection and the filling does not reduce the volume that was available prior to the 2019 high water conditions, the engineer finds that there is ample factual and analytical basis for a determination by the managers that an Exception is warranted from compliance with 2.3.2.

11.0 Fees

Because the property owner is a public entity, no fees are charged.

Rules 2.0-6.0 \$0

12.0 Sureties

Because the property owner is a public entity, the District’s financial assurance requirements do not apply.

Sureties for the project are: \$0

Findings

1. The proposed project includes the information necessary, plan sheets and erosion control plan for review.
2. Rules 2, 5 and 7 are met.
3. The proposed stabilization project provides substantial natural resource protection with no flood-risk created resulting from the placement of toe boulders, rip-rap and root wads to be installed with the storage volume being re-established to the pre-2019 high water conditions.

Recommendation

Approval, contingent upon:

1. General Conditions

By accepting the permit, when issued, the applicant agrees to the following stipulations:

1. A recorded drawing of the completed restoration submitted to the District’s files.
2. No activity affecting the bed of a protected watercourse may be conducted between March 15 and June 15.

Board Action

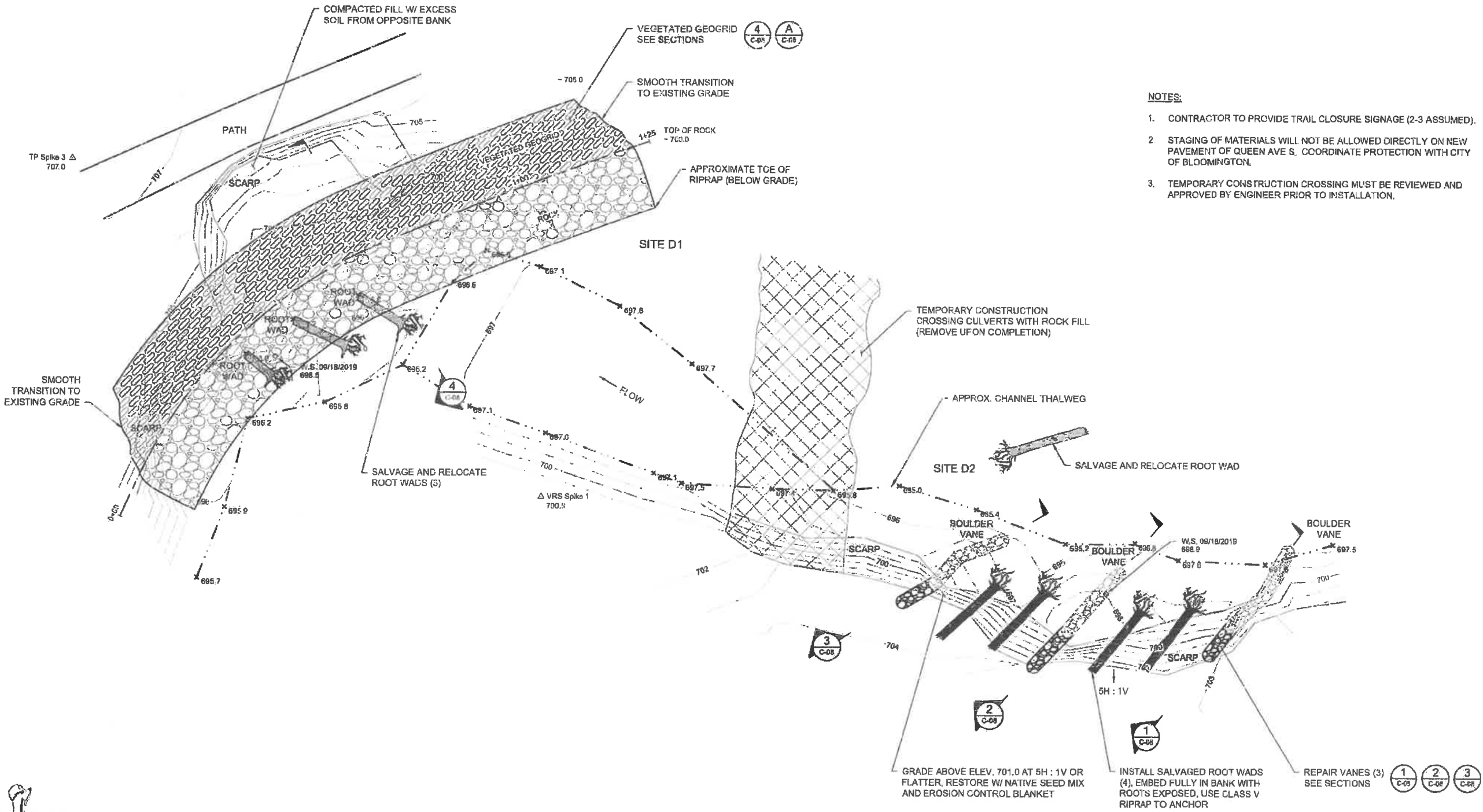
It was moved by Manager _____, seconded by Manager _____ to approve permit application No. 19-142 with the conditions recommended by staff.

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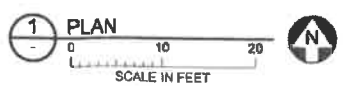


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CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.



- NOTES:**
- CONTRACTOR TO PROVIDE TRAIL CLOSURE SIGNAGE (2-3 ASSUMED);
 - STAGING OF MATERIALS WILL NOT BE ALLOWED DIRECTLY ON NEW PAVEMENT OF QUEEN AVE S. COORDINATE PROTECTION WITH CITY OF BLOOMINGTON;
 - TEMPORARY CONSTRUCTION CROSSING MUST BE REVIEWED AND APPROVED BY ENGINEER PRIOR TO INSTALLATION.



NO.	BY	CHK	APP	DATE	REVISION DESCRIPTION

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: **THOMAS E. MACDONALD**
SIGNATURE: *Thomas E. Macdonald*
DATE: 11/19/2019 LICENSE # 23503

CLIENT	BID	CONSTRUCTION	RELEASED TO/FOR	DATE RELEASED

BARR
Corporate Headquarters
Minneapolis, Minnesota
Ph: 1-800-832-2277

Project Office:
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (612) 832-2601
www.barr.com

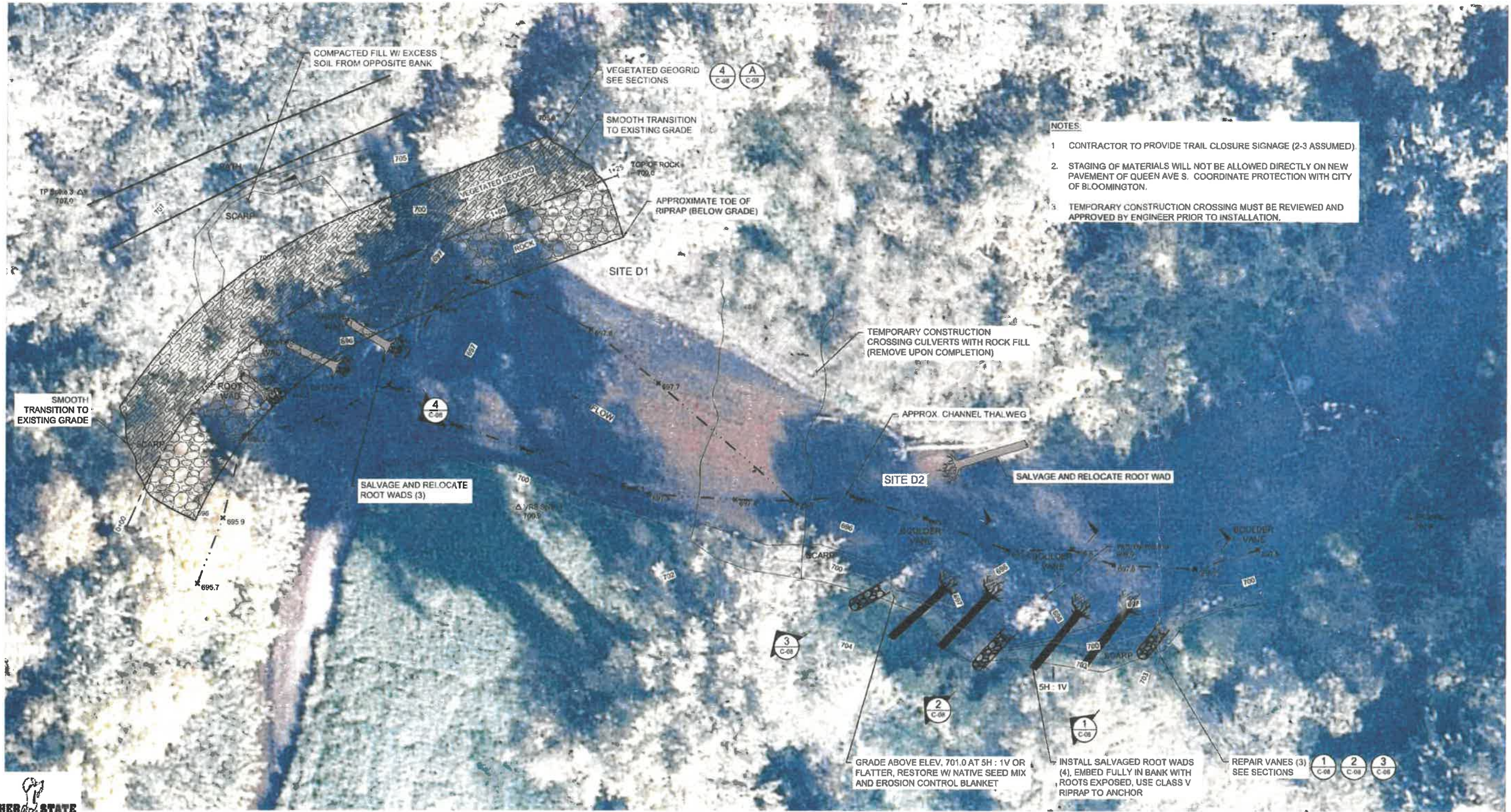
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Date	11/5/2019
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Checked	TEM
Design	TEM
Approved	TEM

CITY OF BLOOMINGTON
BLOOMINGTON, MINNESOTA

**NINE MILE CREEK
LOWER VALLEY
CREEK STABILIZATION
PLAN**

BARR PROJECT No.	23/27-0140.00
CLIENT PROJECT No.	
DWG. No.	C-06
REV. No.	0

RELEASED FOR CONSTRUCTION



- NOTES**
- 1 CONTRACTOR TO PROVIDE TRAIL CLOSURE SIGNAGE (2-3 ASSUMED)
 - 2 STAGING OF MATERIALS WILL NOT BE ALLOWED DIRECTLY ON NEW PAVEMENT OF QUEEN AVE S. COORDINATE PROTECTION WITH CITY OF BLOOMINGTON.
 - 3 TEMPORARY CONSTRUCTION CROSSING MUST BE REVIEWED AND APPROVED BY ENGINEER PRIOR TO INSTALLATION.



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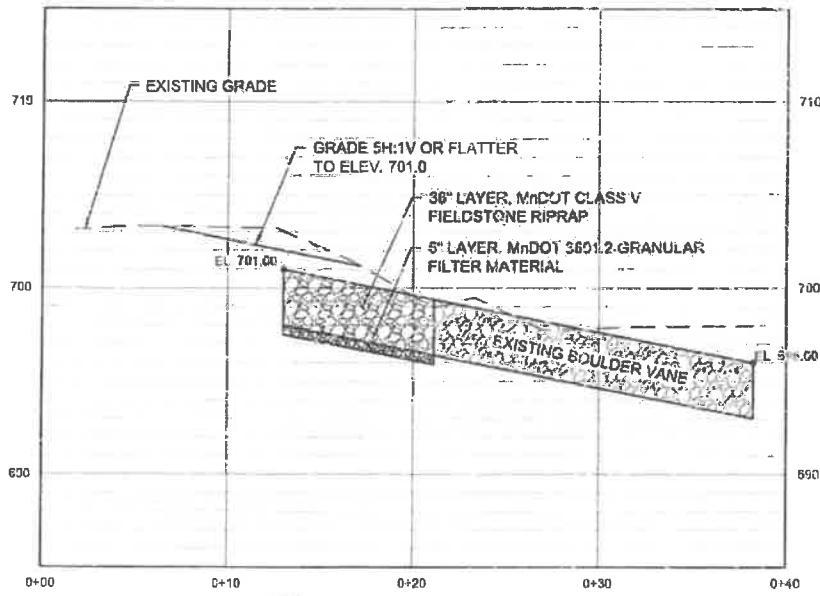
CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.



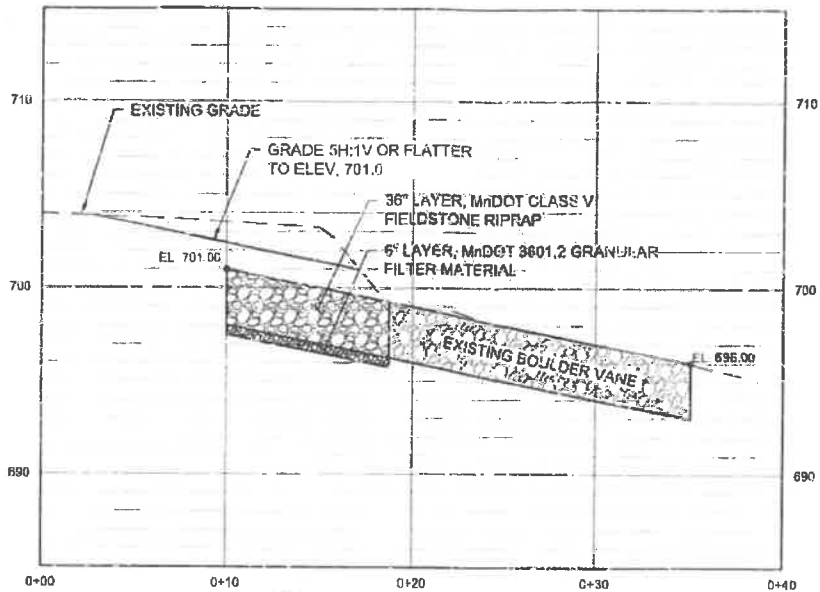
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CONSTRUCTION

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: THOMAS E. MACDONALD SIGNATURE: <i>Thomas E. Macdonald</i> DATE: 11/5/2019 LICENSE #: 23225		CLIENT: BARR ENGINEERING CO. PROJECT: NINE MILE CREEK LOWER VALLEY CREEK STABILIZATION PLAN (IMAGE BACKGROUND)	PROJECT OFFICE: BARR ENGINEERING CO. 4300 MARKETPOINTE DRIVE SUITE 200 MINNEAPOLIS, MN 55435 Ph: 1-800-632-2277 Fax: (952) 832-2601 www.barr.com	Scale: AS SHOWN Date: 11/5/2019 Drawn: GGN Checked: TEM Design: TEM Approved: TEM	CITY OF BLOOMINGTON BLOOMINGTON, MINNESOTA	NINE MILE CREEK LOWER VALLEY CREEK STABILIZATION PLAN (IMAGE BACKGROUND)	BARR PROJECT No: 23/27-0140.00 CLIENT PROJECT No: DWG. No.: C-07 REV No.: 0
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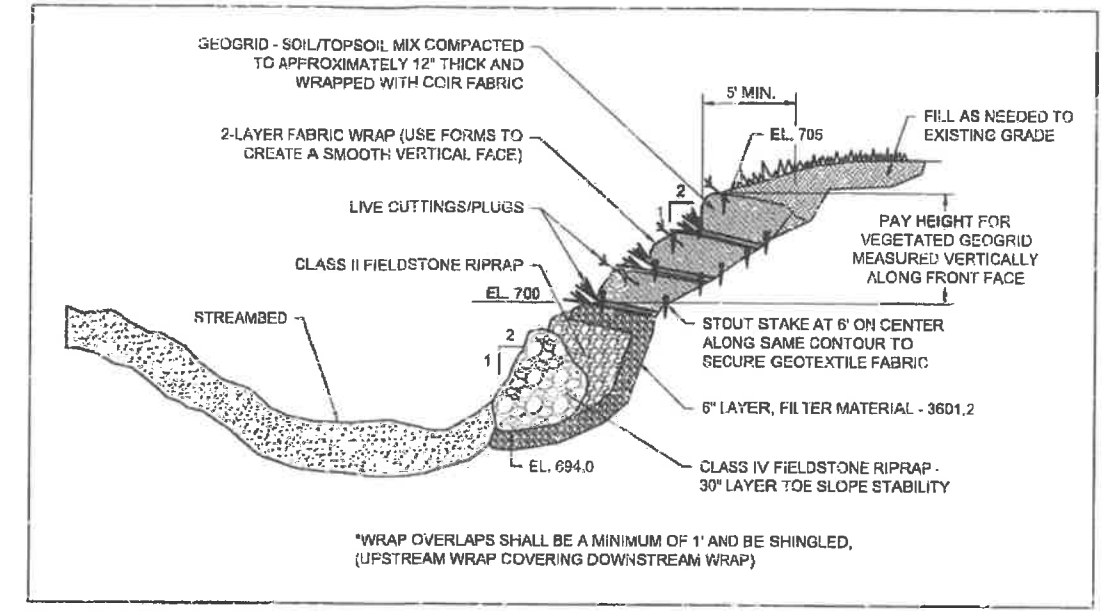
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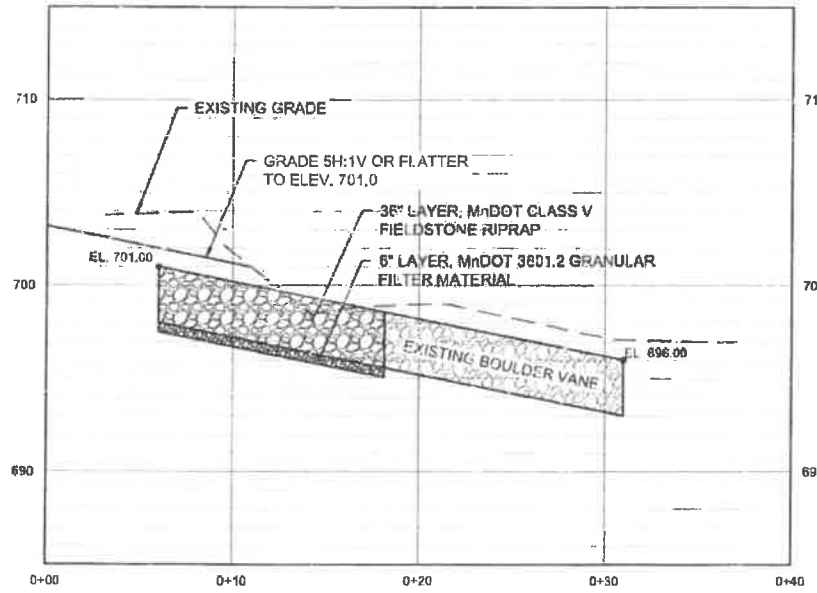
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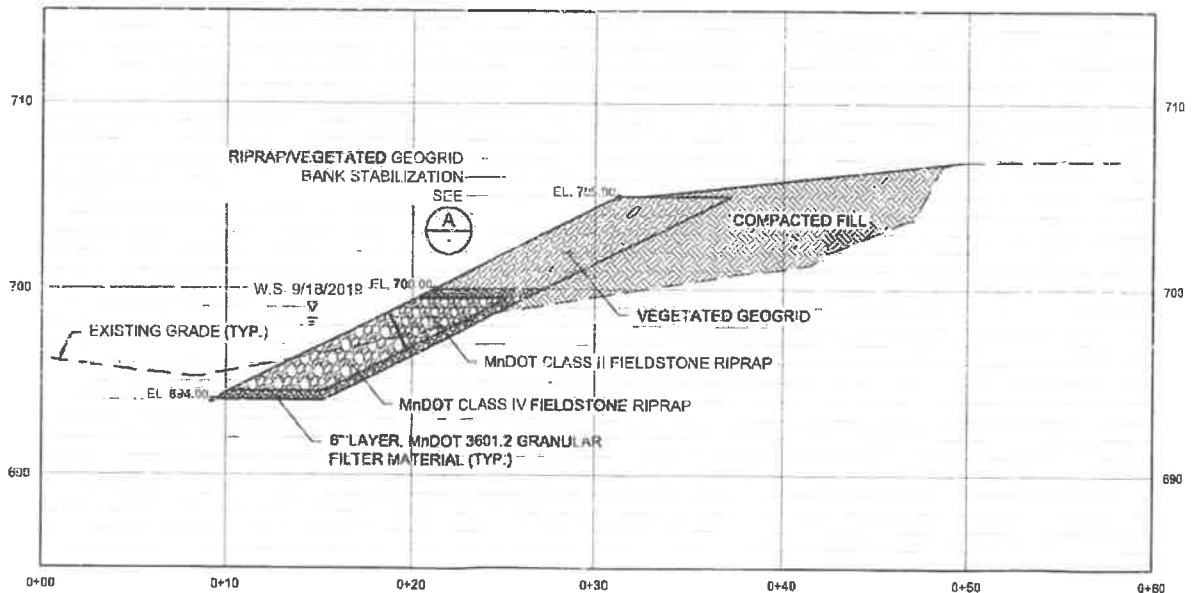
3 SECTION
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A SECTION: RIPRAP/VEGETATED GEOGRID BANK STABILIZATION
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2 SECTION
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4 SECTION
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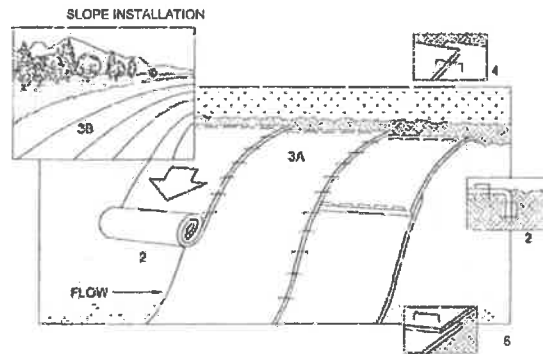
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RELEASED FOR CONSTRUCTION

CADD USER: Greg Nelson FILE: M:\DESIGN\2370-10\00014_BMC LOWER VALLEY 2019\2370-10\00014_BMC LOWER VALLEY REPAIR.DWG PLOT SCALE: 1:2 PLOT DATE: 11/15/2019 1:13:40 AM

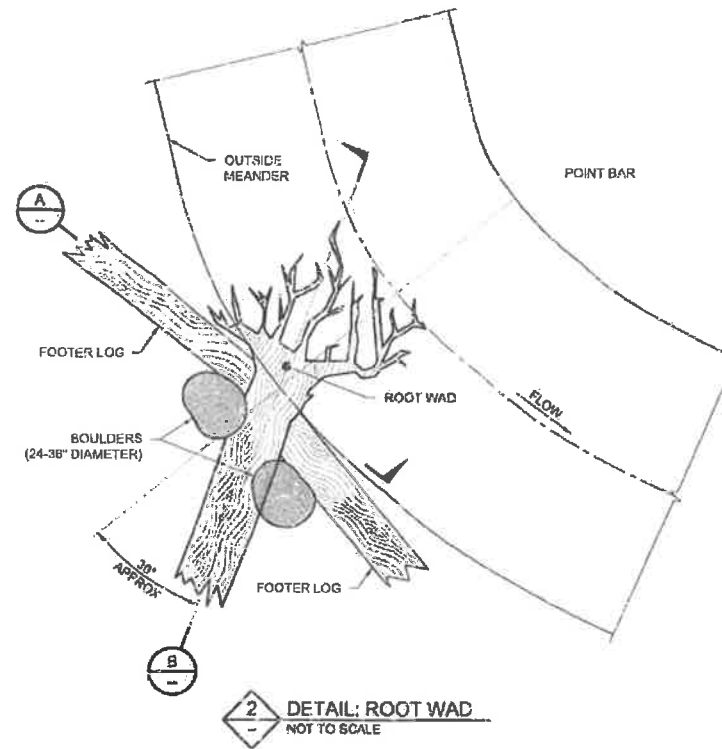
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.		CLIENT BID CONSTRUCTION	PROJECT NO. 011229	<p>Corporate Headquarters Minneapolis, Minnesota Ph: 1-800-632-2277 Fax: 1-800-632-2801 www.barr.com</p>	Project Office: BARR ENGINEERING CO. 4300 MARKETPOINTE DRIVE Suite 200 MINNEAPOLIS, MN 55435 Ph: 1-800-632-2277 Fax: (612) 632-2801 www.barr.com	Scale Date Drawn Checked Designed Approved	AS SHOWN 11/5/2019 GGN TEM TEM TEM	<p>CITY OF BLOOMINGTON BLOOMINGTON, MINNESOTA</p>	<p>NINE MILE CREEK LOWER VALLEY CREEK STABILIZATION SECTIONS</p>	BARR PROJECT No. 23/27-0140.00 CLIENT PROJECT No.	DWG. No. C-08 REV. No. 0
NO.	BY	CHK.	APP.		DATE	REVISION DESCRIPTION	RELEASED TO/FOR			DATE RELEASED	<p>THOMAS J. MACDONALD</p> <p>11/15/2019 LICENSE # 2356</p>



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
7. STAPLES SHALL BE STEEL WIRE, 11 GAUGE, 10-IN MINIMUM LENGTH

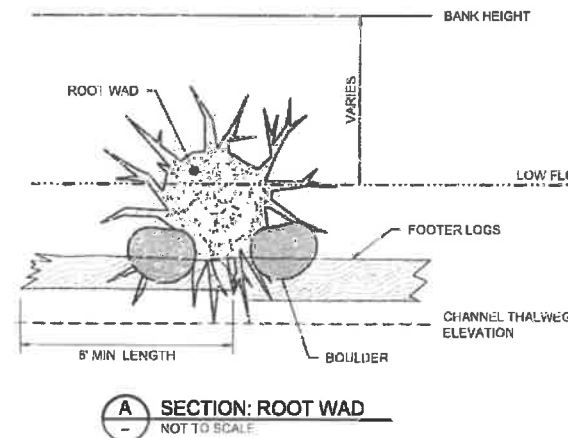
1 **DETAIL: EROSION CONTROL BLANKET - INSTALLATION**
NOT TO SCALE



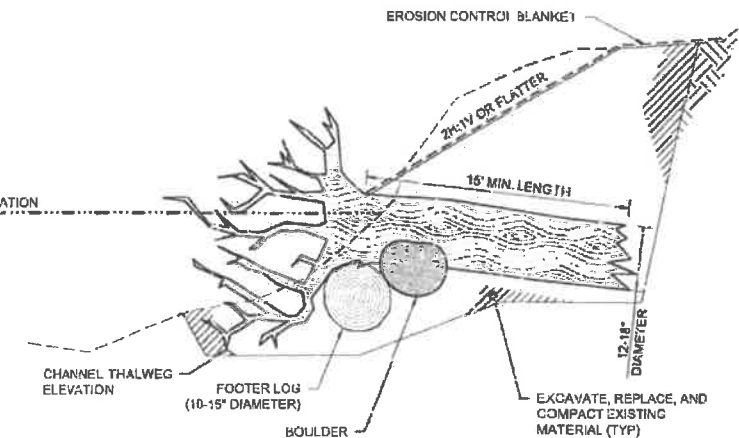
2 **DETAIL: ROOT WAD**
NOT TO SCALE

GENERAL NOTES:

1. THE ENGINEER MUST BE NOTIFIED AT LEAST 3 DAYS PRIOR TO ROOT WAD INSTALLATION AND MUST BE ON SITE DURING INSTALLATION!
2. TO THE EXTENT POSSIBLE, ROOT WADS SHOULD BE CREATED FROM TREES THAT WILL BE REMOVED FROM THE SITES WITHIN THE PROJECT AREA
3. CONSTRUCTION SHOULD PROCEED FROM DOWNSTREAM TO UPSTREAM IN AREAS WHERE MORE THAN ONE ROOT WAD WILL BE INSTALLED AS SHOWN ON THE DRAWINGS
4. EXCAVATE A TRENCH ALONG THE STREAMBANK TOE FOR THE FOOTER LOGS
5. PLACE THE FOOTER LOGS INTO THE TRENCH, WITH THE TOPS OF THE LOGS AT SPECIFIED ELEVATIONS FOR EACH SITE
6. EXCAVATE A TRENCH IN WHICH TO PLACE THE ROOT WAD. IN SOFT SOILS IT MAY BE POSSIBLE TO DRIVE THE ROOT WAD INTO THE BANK WITH EQUIPMENT AFTER SHARPENING THE END TO A POINT. CARE SHALL BE TAKEN NOT TO DAMAGE THE ROOT WAD
7. THE ROOT WAD MUST BE PLACED IN THE BANK SO THAT THE BACK OF THE ROOT FAN RESTS AGAINST THE FRONT OF THE FOOTER LOG
8. THE ROOT FAN MUST BE PLACED SUCH THAT THE FAN IS ANGLED UPSTREAM AS SHOWN AND AS DIRECTED BY THE ENGINEER
9. MOVING UPSTREAM, THE PROCESS IS REPEATED FOR EACH ADDITIONAL ROOT WAD AS SHOWN ON THE DRAWINGS
10. LARGE BOULDERS ARE PLACED ON EITHER SIDE OF THE TRUNK OF EACH ROOT WAD
11. PLACE BACK FILL OVER THE BOULDERS AS NECESSARY WITH A COARSE FILTER AGGREGATE (MNDOT STANDARD SPECIFICATION 3142 2H) AND MATCH EXISTING GRADE WITH 6" OF TOPSOIL
12. REVEGETATE AND STABILIZE WITH EROSION CONTROL BLANKET AS SPECIFIED FOR EACH SITE AS SHOWN IN THE DRAWINGS AND DIRECTED BY THE ENGINEER
13. TRIM THE ROOTS THAT EXTEND ABOVE THE STREAM BANK TO A HEIGHT SLIGHTLY BELOW BANK HEIGHT AS DIRECTED BY THE ENGINEER



A **SECTION: ROOT WAD**
NOT TO SCALE



B **SECTION: ROOT WAD**
NOT TO SCALE



GOPHER STATE ONE CALL
CALL BEFORE YOU DIG.
1-800-252-1166

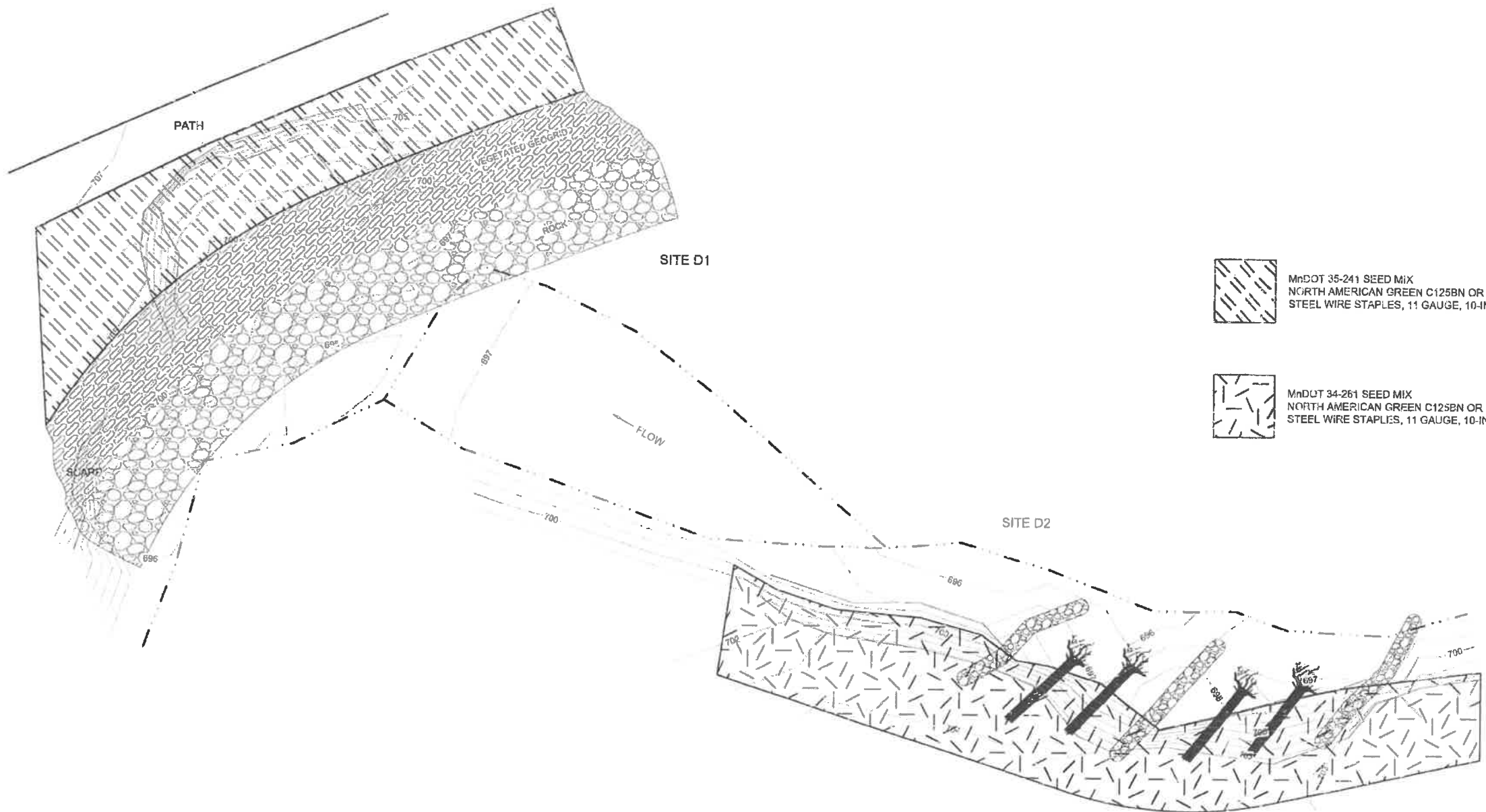
CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.


RELEASED FOR
CONSTRUCTION


I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A FULLY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA. PRINTED NAME: THOMAS E. MACDONALD SIGNATURE: <i>Thomas E. Macdonald</i> DATE: 11/13/2019 LICENSE # 23205		CLIENT: BARR ENGINEERING CO BID: 2019-001 CONSTRUCTION: 2019-001 RELEASED TO/FOR: A B C 0 1 2 3 DATE RELEASED:		Project Office: BARR ENGINEERING CO 4300 MARKETPOINTE DRIVE Suite 200 MINNEAPOLIS, MN 55435 Corporate Headquarters Minneapolis, Minnesota Ph: 1-800-432-2277 Fax: (652) 832-2601 www.barr.com		Scale: AS SHOWN Date: 11/5/2019 Drawn: GGN Checked: TEM Designer: BARR Approved: TEM		CITY OF BLOOMINGTON BLOOMINGTON, MINNESOTA		2019-XXX NINE MILE CREEK LOWER VALLEY BANK STABILIZATION CREEK STABILIZATION DETAILS		BARR PROJECT No. 23/27-0140.00 CLIENT PROJECT No.		DWG. No. C-09 REV. No. 0	
NO.	BY	CHK	APP.	DATE	REVISION DESCRIPTION										

CAD USER: Greg Nelson FILE: MNDOT\BARR\2019\2327\2019-001\2327-0140.DWG PLOT SCALE: 1:2500 DATE: 11/19/2019 11:26 AM

CAD USER: Ggn Mchert FILE: MDESIGN2370140 02014_BMC LOWER VALLEY 2018032704000_RESTITUTION PLAN.DWG PLOT SCALE: 1:2 PLOT DATE: 11/16/2019 11:28 AM



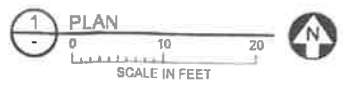
- 
MNDOT 35-241 SEED MIX
 NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL
 STEEL WIRE STAPLES, 11 GAUGE, 10-INCH MIN.

- 
MNDOT 34-261 SEED MIX
 NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL
 STEEL WIRE STAPLES, 11 GAUGE, 10-INCH MIN.



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CALL BEFORE YOU DIG.
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RELEASED FOR CONSTRUCTION

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		RELEASED TO/FOR: _____ DATE RELEASED: _____			CLIENT PROJECT No. _____						DWG. No. C-10	REV. No. 0
NO.	BY	CHK	APP.	DATE	REVISION DESCRIPTION							