MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Road North
St. Paul, MN 55155-4194

# Antidegradation assessment

## Water Quality Certification Applicants

401 Certification

*Doc Type: 401 Certification*

**Instructions:** This form provides general guidance on information that may be necessary for antidegradation review. The Minnesota Pollution Control Agency (MPCA) reserves the right to request information from the applicant in addition to that provided in this form.

Section 401 of the Clean Water Act requires any applicant for a federal license or permit that authorizes an activity that may result in a discharge to Waters of the United States to obtain certification from the state or tribe in which the discharge originates to ensure compliance with applicable water quality standards. In addition to completing the Joint Application Form, https://bwsr.state.mn.us/joint-application-form, applicants whose proposed projects may require an MPCA Individual 401 Water Quality Certification for work in aquatic resources must also provide the information necessary to demonstrate compliance with the Minnesota antidegradation water quality standards (Minn. R. 7050.0265, https://www.revisor.mn.gov/rules/7050.0265/). Applicants should review the antidegradation requirements in Minn. R. 7050.0285 (https://www.revisor.mn.gov/rules/7050.0285/) prior to completing this form.

The purpose of the antidegradation requirements is to achieve and maintain the highest possible quality in surface waters of the state. To accomplish this purpose, antidegradation requires:

A. The protection of existing uses and the level of water quality necessary to protect existing uses;
B. The minimization of degradation of high water quality, and only to extent necessary to accommodate important economic or social development;
C. The protection of outstanding resource value waters; and
D. Consideration of thermal discharges.

## Applicant information

Applicant name/Project name/USACE ID number: Compo/Hay Creek Culvert Replacement

Date submitted (mm/dd/yyyy): 05/28/2026

### 1. Environmental Assessment Worksheet (EAW)/Environmental Impact Statement (EIS)

**Note:** The MPCA cannot make any certification decision until the Environmental Review process is complete.

Is environmental review (Environmental Assessment Worksheet, Environmental Impact Statement, Categorical Exclusion (Catex), etc.) **required** for this project? ☐ Yes ☒ No

If yes, include the date record of decision (ROD) / finding of fact (FOF) was completed and the decision: _____

For responses for questions 2 through 12, if you are referencing other documents, please attach them and provide an exact citation to where the information can be found. If the project manager cannot find it, the antidegradation may be sent back as incomplete.

### 2. Analysis of alternatives to project design that avoid or minimize degradation

(This does not include the Preferred Alternative discussed below.)

Describe your analysis of at least two prudent and feasible alternative project designs that would avoid or minimize degradation and avoid or minimize net increases in loading of pollutants or other causes of degradation to surface water (such as wetlands, lakes, stream, etc.). The analysis of each alternative must include a description of how impacts to surface waters are avoided and/or minimized; information on any design considerations and constraints; expected performance, construction, operation, and maintenance costs; and reliability for each alternative. If one of the alternatives is no build, an explanation must be provided why that is not feasible. Minn. R. 7050.0280, subp. 2

See attachment

## 3. Preferred alternative project design:

Describe the analysis of your preferred alternative project design that avoids or minimizes net increases in loading of pollutants or other causes of degradation. The analysis must include a description of how impacts to surface waters are avoided and/or minimized; information on any design considerations and constraints; expected performance, construction, operation, and maintenance costs; and reliability for each alternative. In addition, the analysis must verify that the preferred alternative is the least degrading prudent and feasible alternative for surface water. If the preferred alternative is not the least degrading alternative, then you must provide an explanation of the constraints. Explanation of least impacts should also include pollutant loading. For example: hard-armoring a stream bank might reduce TSS, but could increase velocity and create downstream erosion or loss of habitat for aquatic organisms. Minn. R. 7050.0280, subp.2

See attachment

## 4. Water quality parameters of concern

List the water quality parameters of concern for the project. These parameters should relate to the proposed project or activity type. *Examples*: *Total Suspended Solids (TSS), Dissolved Oxygen (DO), Mercury (Hg), Temperature, PCBs, flow volume, velocity, etc.*

Hay Creek, Impaired for TSS (Total Suspended Solids). Peak flow velocities.

## 5. Existing uses and level of water quality necessary to protect uses

Antidegradation requires the protection of existing uses and the protection of the water quality necessary to protect those uses (Minn. R. 7050.0265, subp. 2). Existing use is defined as *those uses actually attained in the surface water on or after November 8, 1975* (Minn. R. 7050.0255 subp. 15).

**Example 1:** A surface water is in pristine condition on November 28, 1975, but development or other impacts have degraded that same water and it is no longer a high quality surface water. The existing use is the pristine water.

**Example 2:** A stream is highly degraded for several decades until it is restored to a trout stream in 1990. The existing use is the restored trout stream.

**In the table below:**

Identify all streams, rivers, wetlands and lakes within a mile radius of the project location by Waterbody Identification Number (WID). WIDs, and other information, can be found by using the map at: EDA: Surface water data. Identify the use classification and existing use for **all** surface waters potentially impacted by this project. Include surface waters that are not directly within the project area but may be *potentially impacted even if they are more than one mile away*. Review Minn. R. 7050.0415 – 7050.0430 for the use classification that fits the waters potentially impacted by your project. Use classifications are also located at https://www.revisor.mn.gov/rules/?id=7050.

Also, identify the existing water quality of each surface water for the water quality parameters of concern. The methods for determining existing water quality are found in Minn. R. 7050.0260.

**Streams and rivers**
If the waterbody is a stream/river and not listed in *Beneficial use designations for stream reaches* the beneficial uses are 2Bg, 3, 4A, 4B, 5 and 6.

**Lakes and wetlands**
To find beneficial use designations for lakes and wetlands, check Minn. R. 7050.0470. Waterbodies described in both documents are arranged by major watershed basins in this document. If the waterbody is a wetland and not listed in Minn. R. 7050.0470, the unlisted default beneficial uses are 2D, 3, 4A, 4B, 5 and 6. If the waterbody is a lake and not listed in Minn. R. 7050.0470 the beneficial uses are 2B, 3, 4A, 4B, 5 and 6.

Exceptions: Water bodies in the Boundary Waters Canoe Area Wilderness and in Voyageurs National Park **that are not listed**, may have different Use Classifications (Beneficial use designations).

| | **Name of surface water/Waterbody and Waterbody Identification Number (AUID), if applicable.** | **Use classification** | **Existing use (highest quality attained from November 28, 1975 to present)** | **Existing water quality** |
|---|---|---|---|---|
| *ex.)* | *Seelye Brook – Headwaters to Rum River 07010207-528* | *2Bg, 3, 4A, 4B, 5, 6* | *Livestock and wildlife watering, navigation* | *Dissolved Oxygen (DO) meets levels for existing use* |
| *ex.)* | *Wetland 1 (wetlands do not have WIDs)* | *2D, 3, 4A* | *Flood prevention, stormwater retention, wildlife habitat* | |
| | Hay Creek: Unnamed cr to MIdway R (Stream) 04010201-751 | 1B,2Ag | general cold water (trout waters), drinking water | standards met for aquatic life, impaired for E.coli |
| | Hay Creek Trib: Headwaters to Hay Cr | 1B, 2Ag | general cold water (trout waters), drinking water | Not enough data available |
| | | | | |
| | | | | |

## 6. Water quality comparison before and after project

For each surface water listed in Section 5, describe the anticipated water quality after the project is fully complete and operational. If any portion of the surface area of a water resource will be permanently impacted, a Mitigation Plan will be required (see Section 12). If water quality improvements are anticipated, please provide calculations or a detailed explanation of how you came to this conclusion.

| Name of surface water/Waterbody and Waterbody Identification Number (AUID), if applicable. | Anticipated Water Quality |
|---|---|
| Hay Creek: Unnamed cr to Midway R (Stream) 04010201-751 | Maintain/Improve Aquatic Life (Fish Passage) See attachment |
| Hay Creek Trib: Headwaters to Hay Cr | Maintain/Improve Aquatic Life (Fish Passage) See attachment |
| | |

## 7. Impaired waters and Total Maximum Daily Loads (TMDL)

Identify ALL surface waters listed in Section 5 that are listed on the Minnesota Impaired Waters List (https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list). List the impairment for each surface water identified and state whether or not a total maximum daily load study (TMDL) has been completed for the waterbody.

| Name of waterbody | Impairment | TMDL completed? (Y/N) |
|---|---|---|
| Hay Creek: Unnamed cr to MIdway R (Stream) 04010201-751 | E.coli | ☒ Yes ☐ No |
| | | ☐ Yes ☐ No |
| | | ☐ Yes ☐ No |

## 8. Physical alterations of surface waters

Identify ALL surface waters listed in Section 5 that are listed on the Minnesota Impaired Waters List (https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list). List the physical alteration including hydraulic impacts such as volume, inundation and velocity and the extent/volume of the alteration, also state if the alteration will be permanent (longer than one year) or temporary.

| Name of waterbody | Physical alteration | Extent of alteration (include units) | Temporary or permanent |
|---|---|---|---|
| Hay Creek: Unnamed cr to Midway R (Stream) 04010201-751 | Yes | Up to 10' upstream/downstream of culvert, 50' length total. | Permanent |
| Hay Creek: Unnamed cr to Midway R (Stream) 04010201-751 | Some | Up to 20' upstream/downstream of culvert, 70' length total. | Temporary |
| | | | Choose one |

## 9. Indirect impacts

For all surface waters where partial physical alteration of the function or acreage of the surface water will occur, describe the potential indirect impacts to the remaining surface water and the potential indirect impacts to nearby surface waters. For all surface waters where physical alteration will affect the entire function or acreage of the surface water, describe the potential indirect impacts to nearby surface waters. Indirect impacts may include changes in water source chemistry, timing, water quality (including temperature), water volume or velocity, aquatic species health or population, impervious surfaces and chemical runoff (chloride, petroleum products, etc), vegetation or macroinvertebrate (bug) populations, etc.

See attachment

## 10. Loading and degradation to surface waters

For all surface waters where physical alterations are proposed, describe all anticipated net increases in loading at the project site and downstream. Include all potential causes of degradation expected in each surface water when your preferred alternative project design is fully implemented.

*Example 1: Filling of a wetland that causes another wetland to backup and inundate, (the inundated wetland can be on or off the project site).*

*Example 2: A discharge from the project site that increases flow to another surface water on or off the project site.*

*Example 3: Upsizing a culvert can increase downstream velocity and may increase flooding and erosion or require additional disturbance to the stream to replace downstream culverts or infrastructure being negatively impacted.*

See attachment

## 11. Comparison of existing and expected economic conditions and social services

Provide a comparison of existing and expected economic conditions and social services when the proposed project (preferred alternative) is fully implemented. Include a description of economic gains or losses attributable to the proposed activity; contribution to social services; prevention/remediation of environmental or public health threats; climate change considerations, trade-offs between environmental media; the value of the water resources; and other relevant environmental, social, and economic impacts of the proposed activity. Minn. R. 7050.0265, subp. 5(B)

See attachment

## 12. Description of the Compensatory Mitigation Plan Minn. R. 7050.0285, subp. 2 (A-E)

The applicant may propose to mitigate the project's permanent wetland impacts through an approved wetland bank if the proposed mitigation is for the same resource quality type surface water ("type-for-type") AND the proposed mitigation is located in the same major watershed (https://www.pca.state.mn.us/water/watersheds). The applicant may propose to mitigate other surface water resource types with on-site, project-specific mitigation if the mitigation is of the same resource type as the impacted water resource.

Describe any proposed permanent surface water impacts. Include the name of the surface water and AUID if appropriate, the type of impact, and the extent of the impact.

See attached joint permit

Describe mitigation proposed for permanent surface water impacts.

Project is exempt, no wetland mitigation is required

For each surface water listed above, describe how the proposed compensatory mitigation will replace existing uses and maintain the current level of water quality at the proposed project site (e.g., wetland types, replacement ratio, water monitoring data if available).

Project is exempt, no wetland mitigation is required

Describe how the compensatory mitigation will be maintained and the monitoring activities that will be conducted to ensure the proposed mitigation is viable over the long-term. Include a timeline for reporting progress and an intervention/remediation plan to be implemented if the mitigation fails.

**Applicant signature**

Print name: Alyssa Bloss Title: Carlton SWCD District Manager

Phone: (218) 384-3891 Email: alyssa.bloss@carltonswcd.org Date (mm/dd/yyyy): 05/28/2026

Signature: _____

Attachment includes the signed plans for the proposed work, including all quantities and construction details.

# Antidegradation Assessment Attachment

**2. Analysis of alternatives to project design that avoid or minimize degradation**

1. Traditional Pipe Culvert: Since the purpose of this project is to improve fish passage, climate resilience, and water quality by mimicking natural stream habitat and geomorphology at the stream crossing, it is infeasible to replace the existing crossing with pipe culverts. Pipe culverts become perched over time while increasing velocity - cutting off fish passage and creating artificial stream bottoms, increasing sediment loading, and having significantly less ecological and geomorphic benefit in the long term. Due to the low road embankment, multiple smaller pipe culverts would need to be installed, further cutting off flow and increasing debris blockage risk.

2. No Action Alternative: If no action is taken, Hay Creek will continue to be high-risk for cold water trout species loss, potentially to the point of becoming impaired for aquatic life designated uses in the future. It also increases the risk of road washout which can lead to additional sediment loading and stream instability ultimately affecting water quality and fish health. Taking no action is not feasible as it will prevent the stream from experiencing habitat uplift, including increases in fish species richness and diversity and improvements to natural sediment transport and riparian wetland function. In addition, the no action alternative is not feasible as we have state and federal grants we are obliged to spend on this work, as well as local and regional support for these actions.

**3. Preferred alternative project design**

Aluminum Box Culvert

The crossing below Avery Compo's driveway is located on Hay Creek and has a watershed area of approximately 9 square miles, with a Cloquet/St. Louis Regional Curve estimated bankfull width of 23 feet and a field-measured bankfull width of 14 feet. The existing crossing consists of a 4.5' round CMP culvert stream-left, 3.5' round CMP culvert in the center, and 5' concrete culvert stream-right. The culverts are estimated to be 17' in length and there is approximately 0.5'-1.0' feet of embankment depth over the culverts to the 19' wide gravel road above. Due to the limited vertical clearance and in order to effectively transition from the narrower upstream channel to the wider downstream channel a 20' 6" span x7' 3" rise aluminum box culvert is suggested for this crossing. The culvert would be placed on an aluminum invert and sunk below the channel bottom; it would be filled with ~2' of cobble and coarse aggregate interspersed with larger boulders to simulate a natural stream bed. The total proposed culvert length is 22 lineal feet.

The low height of the road embankment reinforces the benefit of an open -bottom crossing design sized for bankfull flows, which would meet the ecological and hydraulic goals of the crossing. The culvert would be rated for a HL-93 load to allow for heavy machinery to use the crossing. A survey of the site has been obtained, and a hydraulic analysis of the crossing has been performed to ensure adequate culvert hydraulics and footing design. Existing on-site riprap will be salvaged by the contractor with an excavator and stockpiled within the construction access area in upland areas (the existing roadway) to be reinstalled as end protection. Storage areas will incorporate appropriate perimeter control per the MPCA Construction Stormwater general permit.

This design will achieve the following goals:

- Resiliency to the increasing frequency of extreme hydrologic events,
- Providing the best option for sediment transport,
- Providing the best option for improved connectivity to the floodplain,
- Removing fish passage barriers,
- Installing a crossing that is structurally sound
- Allowing for continued access to homesteads

Carlton SWCD has state funding in place to complete the work as well as completed permits and design plans. This is a priority project in the St. Louis River One Watershed One Plan.

**6. Water quality comparison before and after project**

**I**n order to improve aquatic organism passage, this crossing design follows MNDNR MESBOAC principles to improve aquatic organism passage which incorporate:

-Matching the culvert width to bankfull stream width. Several cross-sections were measured upstream and downstream of the proposed culvert site and engineering judgement as well as comparison with the regional curve for C-channels inferred an average bankfull width of about 17 feet, leading to the proposed culvert span of 20.5' (including some room for terrestrial organism passage).

-Extending the culvert length through the side slope of the road. We are lengthening the overall culvert length by 3 feet from the existing condition to achieve this.

-Setting the culvert slope the same as the stream slope. We collected a longitudinal thalweg profile survey for a few hundred feet upstream and downstream of the crossing, and used those slopes to set the elevation of the grade control riprap at the ends of the culvert, matching the existing channel slope ( 0.2%) while allowing the open bottom of the culvert to fill with sediment over time, broken up by in-structure boulders to provide variability in the culvert substrate.

-Burying the culvert. The bottom of the culvert is set 2.5'+ lower than the proposed stream thalweg, both to allow for the formation of a streambed composed of natural materials, and to reduce the risk of scour.

-Offsetting multiple culverts. We elected to install a single-span culvert over multiple offset main-channel culverts, in order to reduce the risk of debris blockage and improve hydraulic capacity. We are incorporating one floodplain culvert to provide for more diffuse flows during peak storm events, following the guidance of the MNDNR Geomorphic Approach grant team.

-Align the culvert with the stream channel. This was done, supported by our longitudinal stream thalweg profile survey.

-Consider headcuts and cutoffs. This was done during our existing stream survey, we determined that there is low risk for headcuts and cutoffs given the succeeding culvert downstream under Canosia Road, the stable profile and substrate downstream, and the relatively low slope and good floodplain connectivity upstream.

The proposed culvert will be replacing three undersized, aging, and moderately perched culverts with a single-span, simulated natural streambed crossing, while improving culvert hydraulic capacity and reducing road overtopping/washout potential, all targeting the goal of improving aquatic organism passage and reducing TSS. There is no explicit pre/post project aquatic organism population survey planned, but regular monitoring is built in to the grant funding for this project and future work in the Hay Creek watershed. Culvert replacements for watershed connectivity were identified as a priority in the 2025 MPCA Midway River Watershed Protection Study, and this design methodology for improving

aquatic organism passage is detailed more fully in the 2019 Minnesota Guide for Stream Connectivity and Aquatic Organism passage Through Culverts (MNDoT/MNDNR).

**8.Physical alterations of surface waters**

**Permanent Impacts:** 19 lineal feet of stream: 9ft upstream of the culvert, and 10 feet downstream of the culvert. 22 lineal feet of buried aluminum arch culvert will be installed, with natural sand/cobble bed material and end protection.
**Temporary Impacts:** 57 lineal feet total including the culvert and permanent impacts: 20 feet upstream of the culvert, 15 feet downstream of the culvert, or 16 lineal feet total of only temporary impacts, excluding the culvert (22 LF) and permanent impacts (19 LF).

**9. Indirect impacts**

For all surface waters where partial physical alteration of the function or acreage of the surface water will occur, describe the potential indirect impacts to the remaining surface water and the potential indirect impacts to nearby surface waters. For all surface waters where physical alteration will affect the entire function or acreage of the surface water, describe the potential indirect impacts to nearby surface waters. Indirect impacts may include changes in water source timing, water quality (including temperature), aquatic species health or population, vegetation or macroinvertebrate (bug) populations, etc.

Temporary physical alteration will occur Hay Creek as culverts are removed and replaced. All construction activities will follow stream diversion and stormwater best management practices and any conditions on a 401 certification, but potential indirect impacts during construction may include temporary sediment releases, including during storm events. Temporary sediment releases may also occur as impounded water upstream of the undersized culverts is released. Other indirect impacts will be positive, and include improvements in fish passage for brook trout and other aquatic organisms seeking to access coldwater habitat in the Midway River. This project has the potential to increase and diversify aquatic organism populations in the St. Louis River Watershed, especially for coldwater obligate species. Other positive indirect impacts will include improved geomorphology (i.e., smaller width-to-depth ratio in the over-widened impoundment upstream of the crossing, simulated natural channel bottom under the bridge) and riparian wetland function (i.e., more natural floodplain connection, a diverse planting of native wetland species on the streambank after the bridge is in place).

**10. Loading and degradation to surface waters**

For all surface waters where physical alterations are proposed, describe all anticipated net increases in loading and other causes of degradation expected in each surface water when your preferred alternative project design is fully implemented.

When the preferred alternative project design is fully implemented, there may be temporary sediment releases that occur as impounded water upstream of the undersized culverts is released and the stream reverts more to its natural morphology. However, long-term loading and degradation to surface waters is not anticipated.

**11. Comparison of existing and expected economic conditions and social services**

Provide a comparison of existing and expected economic conditions and social services when the proposed project (preferred alternative) is fully implemented. Include a description of economic gains or losses attributable to the proposed activity; contribution to social services; prevention/remediation of environmental or public health threats; trade-offs between environmental media; the value of the water resources;

The current crossing features undersized culverts, which are at risk of failing during floods due to their poor capacity; economic conditions, social services and public health, as well as environmental health

and water quality, would all be impacted negatively if the crossing were to fail. The open box culvert is better suited for the stream crossing. It will support environmental health and water quality by allowing for more natural hydrology and fish passage. It will support economic conditions, public health and social services by providing a safe and lasting crossing for landowners using the driveway. Moreover, the enhanced crossing will improve the water quality and economic value of the Hay Creek fishery, a key factor in the regional outdoor industry which ultimately benefits the entire system flowing downstream into the St. Louis River.

The total quantity of riprap used in the plan is:
62 CY of Riprap Class Special (a 50/50 mix of MNDOT Class III Riprap and MNDOT 3601.2-2 Granular Filter Aggregate)
This riprap is used within the stream to set the grade of the channel at the upstream and downstream ends of the aluminum box culvert, and to protect the ends of the buried culvert from scour.

14 CY of MNDOT Class III.
This riprap is used above the stream along the haunches of the aluminum box culvert and floodplain culvert, lined with geotextile fabric, to protect the embankment along the culvert ends from erosive force during peak flow events.

## APPLICABLE SPECIFICATIONS

APPLICABLE MN DOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2025 EDITION, GOVERN THIS PROJECT

## DRAWING NOTES

COORDINATES ARE IN UTM ZONE 15N COORDINATE SYSTEM, AND ELEVATIONS ARE IN NAVD 88 DATUM.

ALL EARTHWORK QUANTITIES ARE CALCULATED AS IN PLACE QUANTITIES, ANY CONSTRUCTION RELATED EXPANSION OR CONTRACTION IN EARTH WORK QUANTITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

EXISTING UTILITIES SHOWN ON THE PLANS ARE UTILITY QUALITY LEVEL D.

BEFORE THE START OF CONSTRUCTION THE OWNERS OF ANY UTILITIES MUST BE NOTIFIED. THE EXCAVATOR IS RESPONSIBLE FOR GIVING THIS NOTICE BY CALLING "GOPHER STATE ONE CALL" AT (800) 252–1166 AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION.

CHANGES IN THE DRAWINGS OR SPECIFICATIONS MUST BE AUTHORIZED BY THE ENGINEER.

THE CONTRACTOR IS RESPONSIBLE FOR ENSURING LOCAL, STATE, AND FEDERAL PERMITS OR OTHER PERMISSION NECESSARY TO PERFORM THE WORK HAVE BEEN OBTAINED.

AN ON–SITE PRE–CONSTRUCTION MEETING WITH THE CONTRACTOR, HIRED SUBCONTRACTOR(S), ENGINEER(S), OWNER(S), AND OTHER ESSENTIAL PARTIES, SHALL OCCUR PRIOR TO THE START OF WORK.

THE CONTRACTOR SHALL NOTIFY ENGINEER 24 HOURS BEFORE WORK BEGINS.

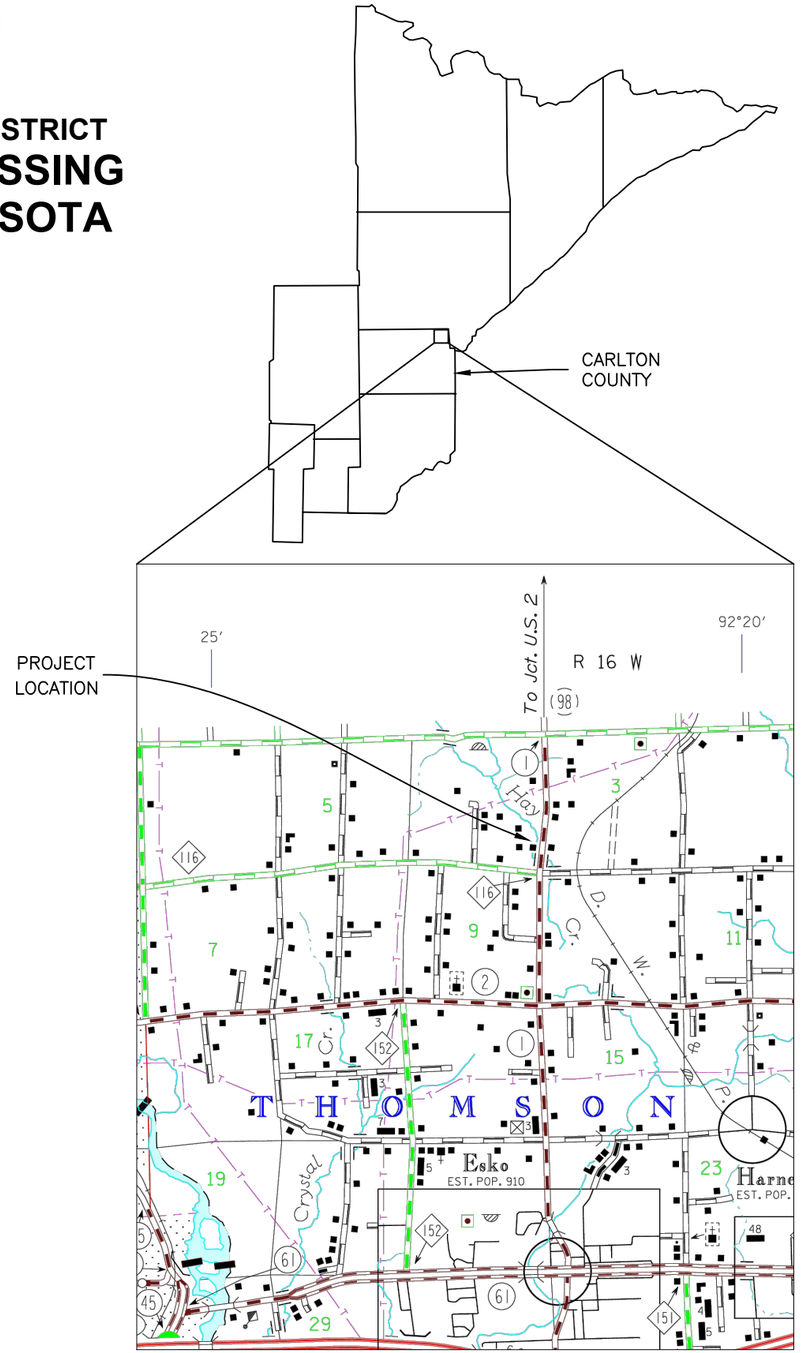
MN PREVAILING WAGE LAW APPLIES TO ALL WORK BY CONTRACTORS AND SUB–CONTRACTORS IN THIS PLAN.

# TECHNICAL SERVICE AREA III
# IN COOPERATION WITH
# CARLTON COUNTY
# SOIL AND WATER CONSERVATION DISTRICT
# HAY CREEK CULVERT CROSSING
# CARLTON COUNTY, MINNESOTA

## DRAWING INDEX



| NO. | ITEM | MNDOT SPECIFICATION | QUANTITY | UNIT |
|---|---|---|---|---|
| 1 | MOBILIZATION | 2021 | 1 | LUMP SUM |
| 2 | REMOVE & DISPOSE EXISTING 2 CSP ROUND CULVERTS | 2104 | 1 | LUMP SUM |
| 3 | REMOVE & DISPOSE EXISTING CONCRETE ROUND CULVERT | 2104 | 1 | LUMP SUM |
| 4 | TRAFFIC CONTROL (F&I) | 2554 | 1 | LUMP SUM |
| 5 | TEMPORARY STREAM DIVERSION SYSTEM | 2106 | 1 | LUMP SUM |
| 6 | CUT COMMON EXCAVATION (P) | 2106 | 283 | CU YD |
| 7 | MNDOT TYPE 5 GEOTEXTILE FABRIC (P) | 2108 | 125 | SQ YD |
| 8 | AGGREGATE BASE (CV) CLASS 5 (P) | 2211 | 125 | CU YD |
| 9 | 20'–6" X 7'–3" ALUMINUM BOX CULVERT WITH FULL METAL INVERT | 2501 | 22 | LIN FT |
| 10 | 35" SPAN X 24" RISE X 30 LF LENGTH CAS ARCH CULVERT (COMPLETE) | 2501 | 30 | LIN FT |
| 11 | RANDOM RIPRAP CLASS SPECIAL (P) | 2511 | 62 | CU YD |
| 12 | MNDOT CLASS III RIP RAP (P) | 2511, 3601.2–1 | 14 | CU YD |
| 13 | MNDOT COARSE AGGREGATE BEDDING, WITH SAND (CV) (P) | 2511, 3149.2G.2 | 41 | CU YD |
| 14 | SILT FENCE, TYPE HI (P) | 2573 | 90 | LIN FT |
| 15 | COMMON TOPSOIL BORROW | 2575 | 1 | LUMP SUM |
| 16 | SUBCANOPY NATIVE PLUGS, SIZE APB | 2571 | 29 | EACH |
| 17 | NATIVE PLUGS, SIZE D48 | 2571 | 61 | EACH |
| 18 | BWSR 34–362 RIPARIAN NORTHEAST SEED | BWSR SEED MANUAL | 0.2 | POUNDS |
| 19 | BWSR 34–372 WET MEADOW NE | BWSR SEED MANUAL | 0.2 | POUNDS |
| 20 | MNDOT CAT. 20 ROLLED EROSION PREVENTION (NATURAL NETTING, COMPLETE) | 2575 | 44 | SQ YD |
| 21 | MNDOT CAT. 30 ROLLED EROSION PREVENTION (NATURAL NETTING, COMPLETE) | 2575 | 23 | SQ YD |
| 22 | MNDOT CAT. 47 ROLLED EROSION PREVENTION (COMPLETE) | 2575 | 14 | SQ. YD |
| 23 | MNDOT NORTHEAST ROADSIDE SEED MIX | 2024 SEED MANUAL | 0.2 | POUNDS |
| 24 | CONSTRUCTION ACCESS RESTORATION (COMPLETE) | 2572 | 1 | LUMP SUM |




LOCATION MAP

NOT TO SCALE
327 CANOSIA RD.
ESKO, MN 55733
UTM 548437.44 mE
5177979.48 mN


TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865


PROJECT:

HAY CREEK CULVERT CROSSING

LOCATION:

327 CANOSIA RD.
ESKO, MN 55733

DISTRICT:

CARLTON SWCD

NOTES:

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: MATÍAS VALERO

SIGNATURE: Matías Valero

DATE: 2026/5/5 LIC. NO 55607

DESIGNED:MV DATE: 05/24/2024

DRAWN: BAS DATE: 04/09/2026

CHECKED: DATE:

| REVISION: | BY: | DATE: | APPROVED: |
|---|---|---|---|
| ---- | ---- | ---- | ---- |
| ---- | ---- | ---- | ---- |
| ---- | ---- | ---- | ---- |
| ---- | ---- | ---- | ---- |
| ---- | ---- | ---- | ---- |

1- TITLE

| TABLE 3601.2-1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| RANDOM RIPRAP GRADATION REQUIREMENTS | | | | | | | | | |
| CLASS | MEDIAN PARTICLE DIAMETER (inch) | Minimum and Maximum Allowable Particle Size (inches) | | | | | | | |
| | | D15 | | D50 | | D85 | | D100 | |
| | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| I | 3 | 1 | 3 | 2 | 4 | 3 | 5 | 4 | 6 |
| II | 6 | 3 | 6 | 5 | 8 | 7 | 11 | 9 | 12 |
| III | 9 | 6 | 8 | 8 | 11 | 11 | 15 | 15 | 18 |
| IV | 12 | 8 | 10 | 10 | 14 | 15 | 19 | 21 | 24 |
| V | 15 | 9 | 12 | 12 | 17 | 19 | 23 | 27 | 30 |

| Table 3601.2-2 | |
|---|---|
| Granular Filter Material | |
| SIEVE SIZE | PERCENT PASSING BY WEIGHT |
| 6 INCH | 100 |
| 3 INCH | 75-100 |
| 1 INCH | 35-75 |
| NO. 4 | 10-40 |
| NO. 10 | 5-25 |
| NO. 40 | 0-15 |
| NO. 200 | 0-8 |

| Table 3419.2-7 | |
|---|---|
| Coarse Aggregate Bedding | |
| SIEVE SIZE | PERCENT PASSING |
| 1 1/2 INCH | 100 |
| NO. 4 | 0-10 |

| Table 3138.2-3 | | | | | | |
|---|---|---|---|---|---|---|
| Base and Surfacing Aggregate | | | | | | |
| | PERCENT PASSING | | | | | |
| SIEVE SIZE | CLASS 1 (SURFACING) | CLASS 2 (SURFACING) | CLASS 3 (SUBBASE) | CLASS 4 (SUBBASE) | CLASS 5 (BASE) | CLASS 6 (BASE) |
| 2 INCH | - | - | 100 | 100 | - | - |
| 1 1/2 INCH | - | - | - | - | 100 | 100 |
| 1 INCH | - | - | - | - | - | - |
| 3/4 INCH | 100 | 100 | - | - | 70-100 | 70-100 |
| 3/8 INCH | 65-95 | 65-90 | - | - | 45-90 | 45-85 |
| NO. 4 | 40-85 | 35-70 | 35-100 | 35-100 | 35-80 | 35-70 |
| NO. 10 | 25-70 | 25-45 | 20-100 | 20-100 | 20-65 | 20-55 |
| NO. 40 | 10-45 | 12-35 | 5-50 | 5-35 | 10-35 | 10-30 |
| NO. 200 | 8.0-15.0 | 5.0-16.0 | 5.0-10.0 | 4.0-10.10 | 3.0-10.0 | 3.0-7.0 |

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

PROJECT:

HAY CREEK CULVERT CROSSING

LOCATION:

327 CANOSIA RD.
ESKO, MN 55733

DISTRICT:

CARLTON SWCD

NOTES:

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PRINTED NAME: MATÍAS VALERO

SIGNATURE:

DATE: 2026/5/5 LIC. NO 55607

DESIGNED:MV DATE: 05/24/2024

DRAWN: BAS DATE: 04/09/2026

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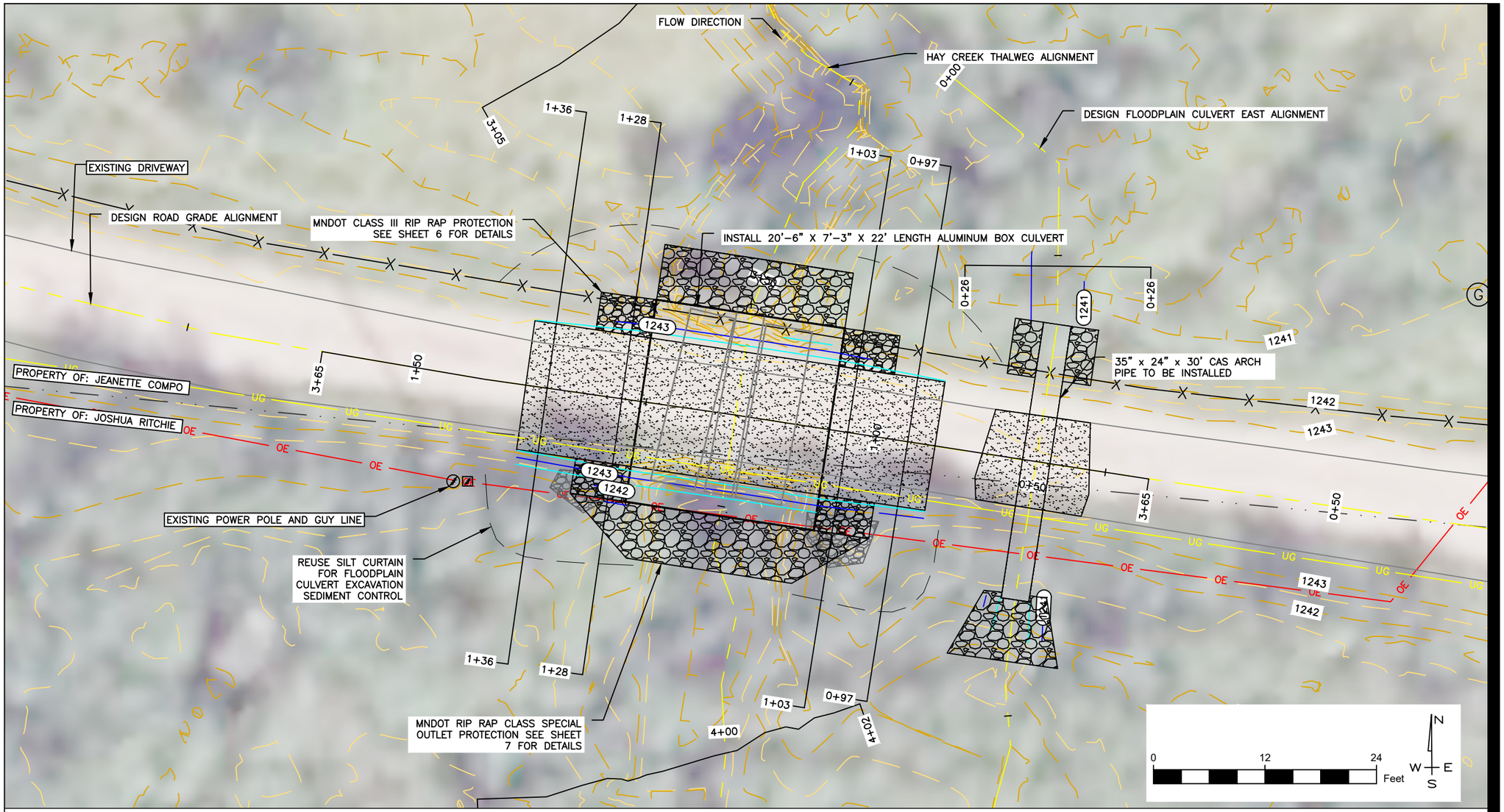
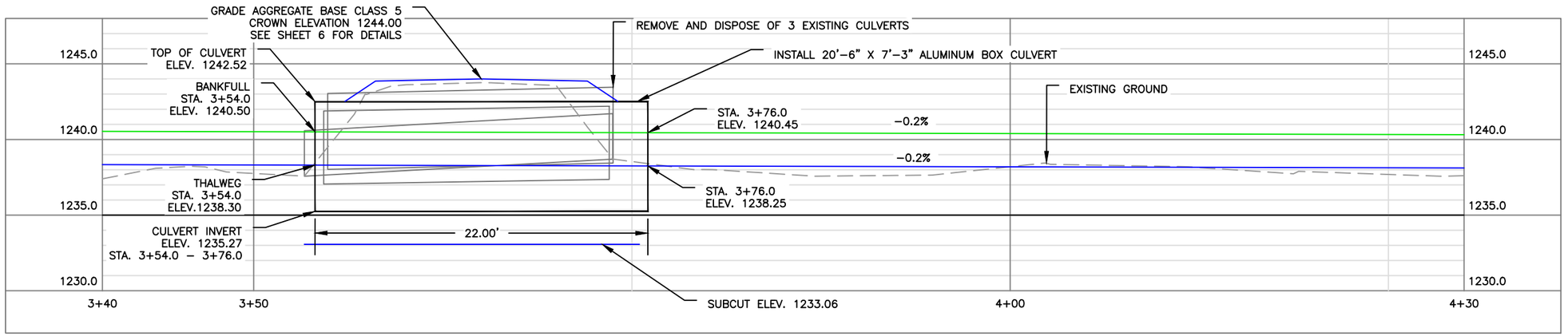
2- GRADATION TABLES




HAY CREEK THALWEG

## LEGEND

- DESIGN CONTOURS AND ASSOCIATED ELEVATION MARKERS
- EXISTING CONTOURS AND ASSOCIATED ELEVATION MARKERS
- EXISTING ELECTRIC FENCE
- OVERHEAD ELECTRIC UTILITY
- BURIED GAS UTILITY
- TEMPORARY SILT FENCE INSTALLED
- EXISTING RIP RAP TO BE SALVAGED
- EXISTING 5' CMP, 3' CMP, AND 4' CONCRETE PIPE CULVERTS TO REMOVED
- GRAVEL DRIVE TO BE RESTORED

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

PROJECT: HAY CREEK CULVERT CROSSING

LOCATION: 327 CANOSIA RD, ESKO, MN 55733

DISTRICT: CARLTON SWCD

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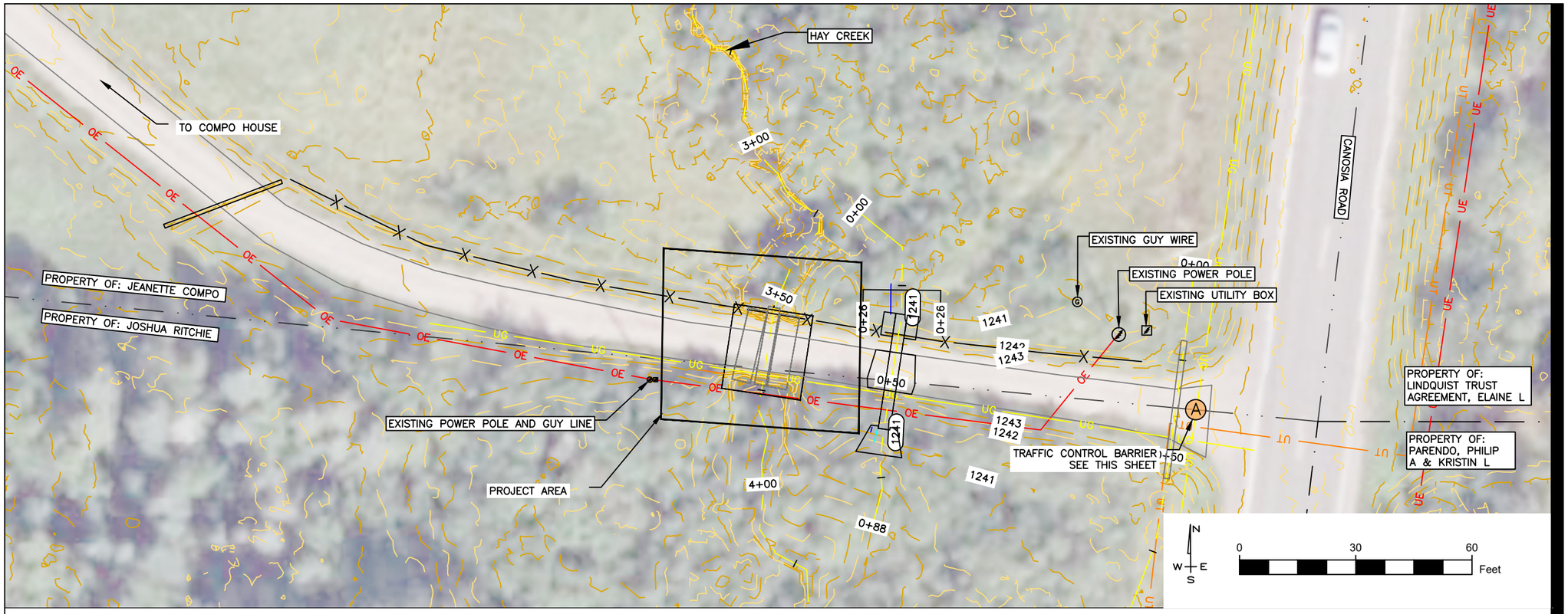
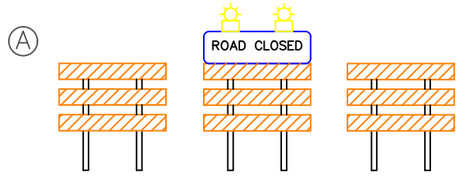
3- PLAN AND PROFILE




## TYPE II BARRICADE

NOTES:
1. 48" MINIMUM WIDTH X 60" MINIMUM HEIGHT
2. 2 TYPE A FLASHING WARNING LIGHTS PLACED ON SIDE WITH TRAFFIC
3. INCIDENTAL WITH LINE ITEM 4 "TRAFFIC CONTROL"

## TRAFFIC CONTROL BARRIERS

NOT TO SCALE

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

PROJECT:

# HAY CREEK CULVERT CROSSING

LOCATION:

327 CANOSIA RD.
ESKO, MN 55733

DISTRICT:

CARLTON SWCD

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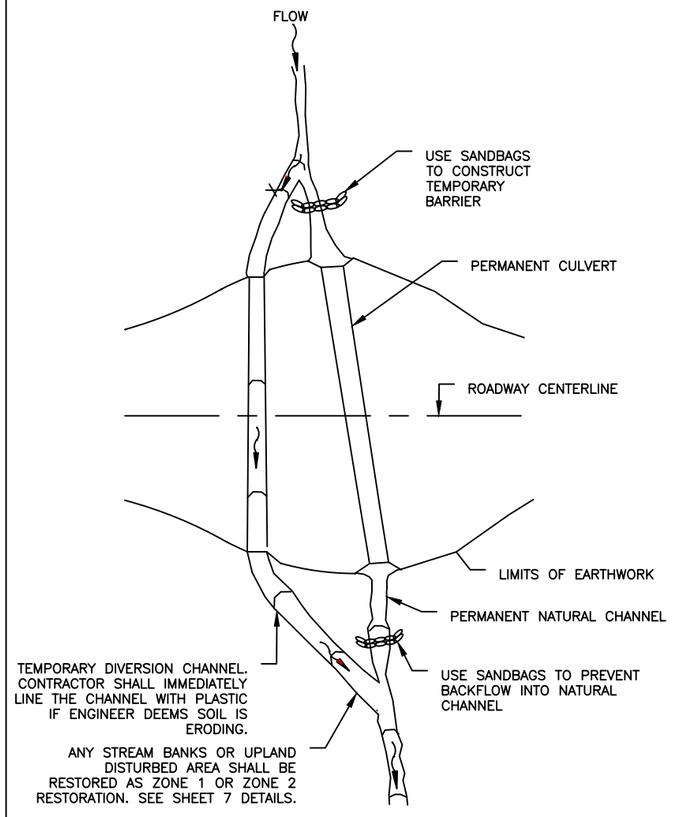
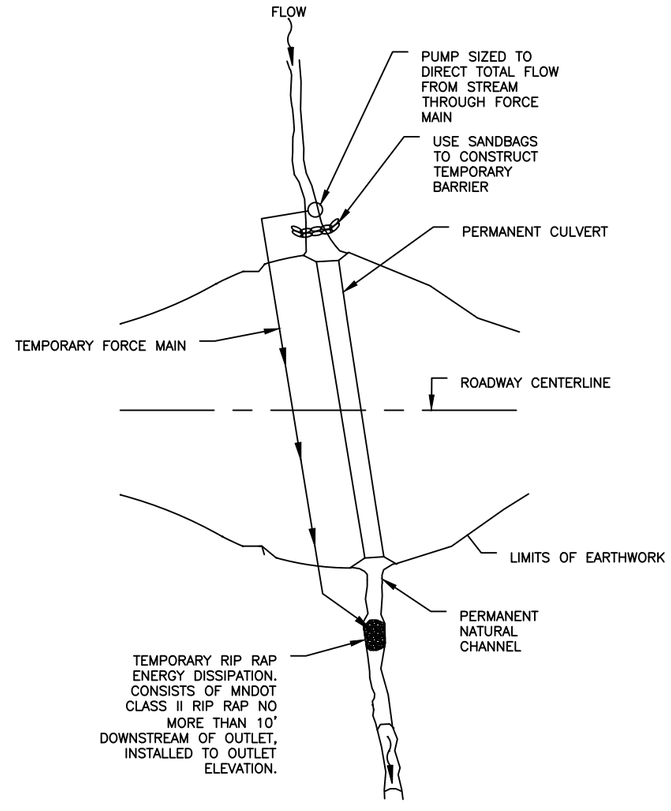
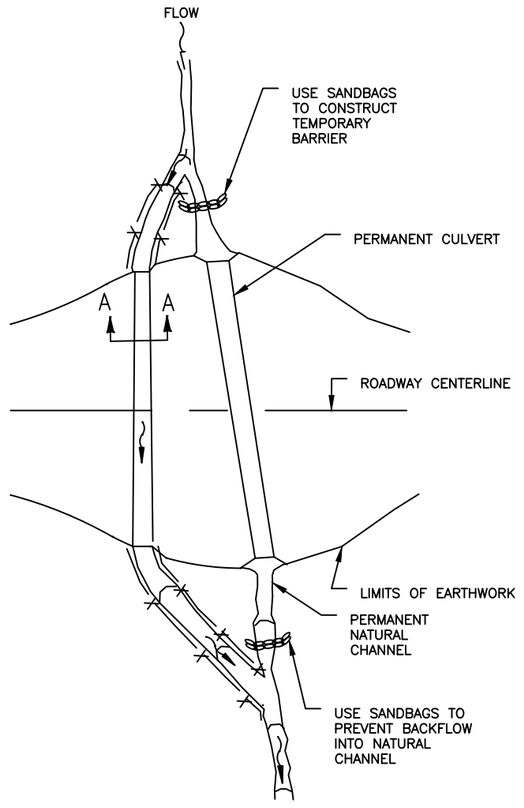
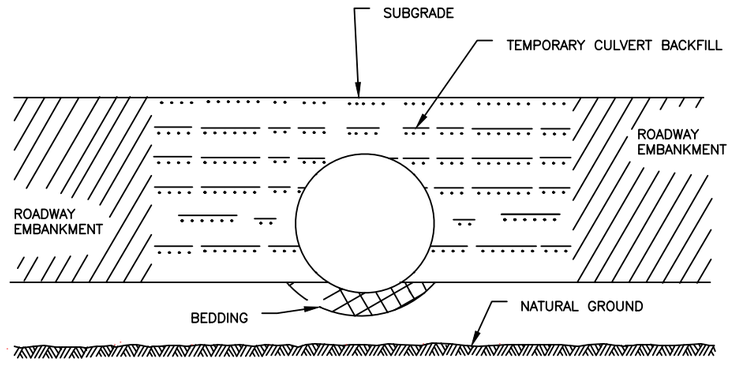
4- TRAFFIC CONTROL

CONSTRUCTION NOTES:
1. CONTRACTOR SHALL SUBMIT DIVERSION AND PUMPING PLAN TO ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION START DATE.
2. DIVERSION PLAN SHALL DIVERT FLOWING WATER AROUND CONSTRUCTION SITE WHILE WORK IS BEING PERFORMED AND SHALL BE CAPABLE OF CONVEYANCE IN PUMP, OPEN CHANNEL, OR PIPED DIVERSION.
3. IF ANY OF THE SITE REQUIRES DEWATERING FOR THE INSTALLATION OF STREAM RELATED STRUCTURES, ALL DEWATERING WATER SHALL BE DISCHARGED A MINIMUM OF 75 FEET FROM THE STREAM. IN ADDITION, A TEMPORARY BASIN SHALL BE CONSTRUCTED FROM STRAW BALES OR DEWATERING FILTER BAGS SHALL BE UTILIZED. THE BASIN SHALL MAXIMIZE THE FILTERING OF FINE SEDIMENTS BEFORE THE DEWATERING WATER IS RETURNED TO THE RIVER. THIS WORK AND MATERIALS IS CONSIDERED INCIDENTAL TO ITEM NO. 2105.601 "TEMPORARY STREAM DIVERSION SYSTEM"
4. STREAM TRANSFER PUMP, BYPASS CHANNEL, AND DIVERSION CHANNEL SHALL BE SIZED FOR A MINIMUM 2 YEAR 24 HOUR EVENT AT THIS CROSSING. (EST. 130 FT^3/S)
5. PAYMENT FOR ITEM NO. 2105.601 "TEMPORARY STREAM DIVERSION SYSTEM" (LUMP SUM) SHALL INCLUDE ALL ITEMS NECESSARY CONSTRUCT A FULLY FUNCTIONING, COMPLIANT DIVERSION SYSTEM CONFORMING TO ONE OF THE SHOWN EXAMPLES OR AN ALTERNATIVE SITE PLAN SUBMITTED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER.




TEMPORARY CULVERT– SECTION VIEW

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

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HAY CREEK CULVERT CROSSING

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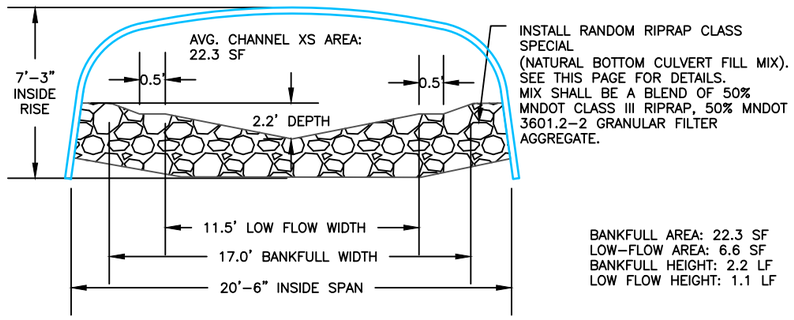
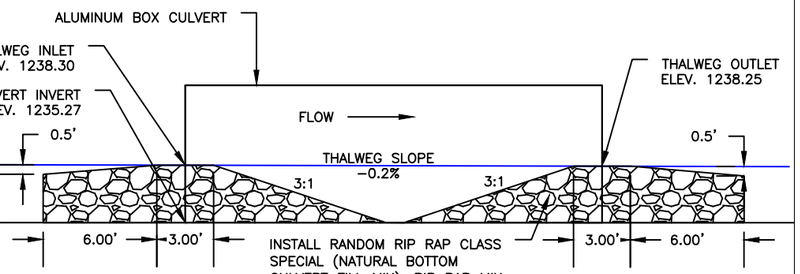
5- STREAM DIVERSION



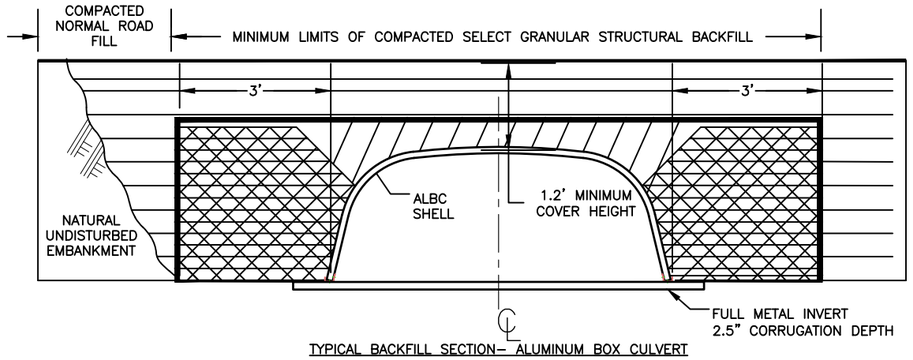

MEDIUM PROFILE STRUCTURAL PLATE ARCH

NOT TO SCALE




CULVERT FILL PROFILE DETAIL

NOT TO SCALE




TYPICAL BACKFILL SECTION- ALUMINUM BOX CULVERT

NOT TO SCALE

CRITICAL BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.

INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR (D-4 OR SMALLER) DRAWN EQUIPMENT.

SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

NOTES:

1. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (6"-8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-99.
2. COMPLETE AND REGULAR MONITORING OF THE ALUMINUM BOX CULVERT SHAPE IS NECESSARY DURING ALL BACKFILLING OF THE STRUCTURE.
3. PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
4. TRENCH WIDTH OTHER THAN 3ft. SHALL BE BY DIRECTION OF THE ENGINEER OF RECORD.

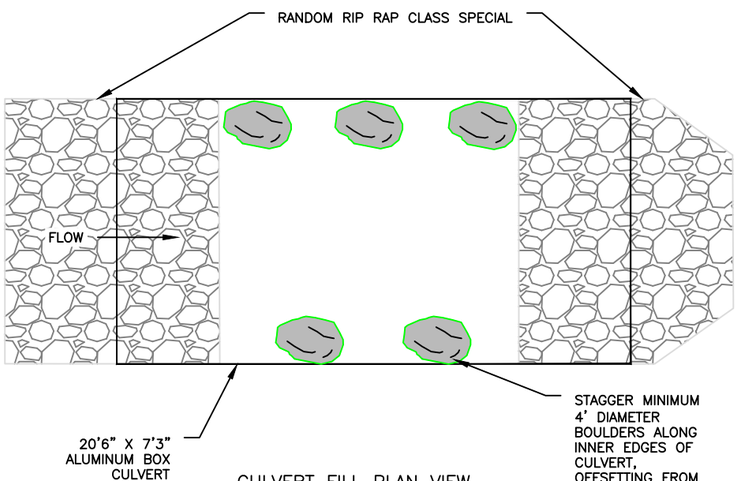
ADDITIONAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2, A-3. BACKFILL MUST BE REPLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 6" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-99.

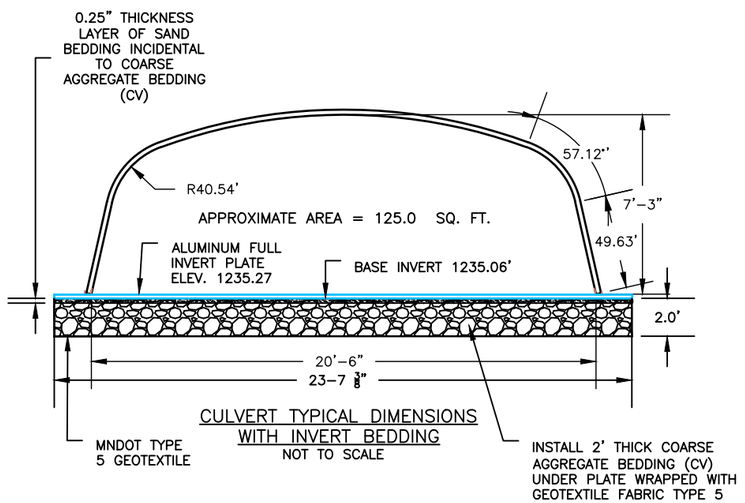
A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION.

DURING BACKFILL, ONLY SMALL TRACKED VEHICLES (D-4 OR SMALLER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE.



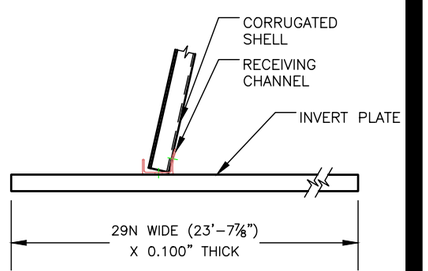

CULVERT FILL PLAN VIEW

NOT TO SCALE




CULVERT TYPICAL DIMENSIONS WITH INVERT BEDDING

NOT TO SCALE




INVERT

NOT TO SCALE

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

PROJECT:

HAY CREEK CULVERT CROSSING

LOCATION:

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ESKO, MN 55733

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CARLTON SWCD

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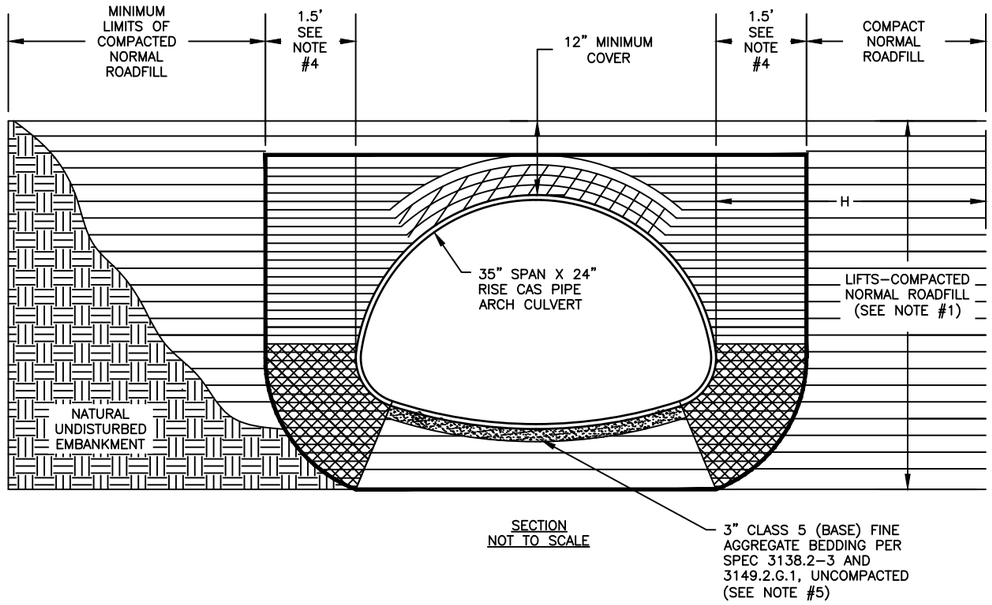
6- CULVERT DETAILS



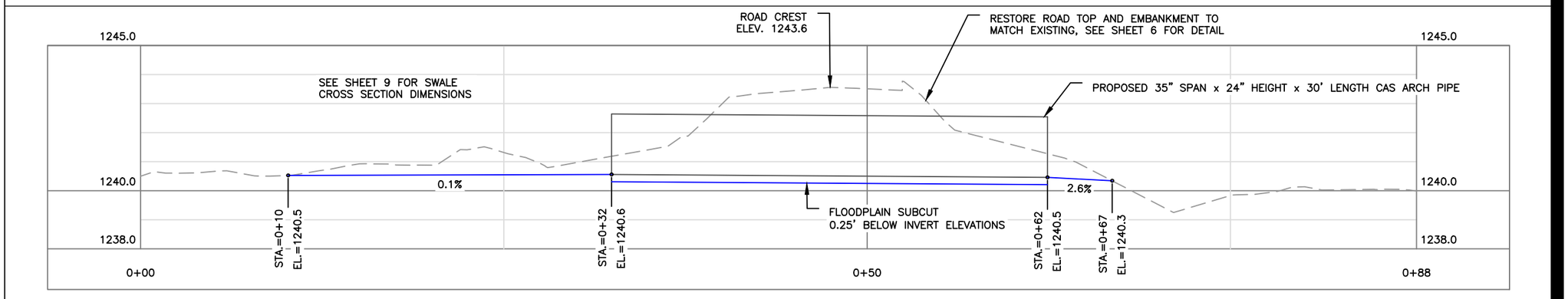

CRITICAL BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.

INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR (D-4 OR SMALLER) DRAWN EQUIPMENT.

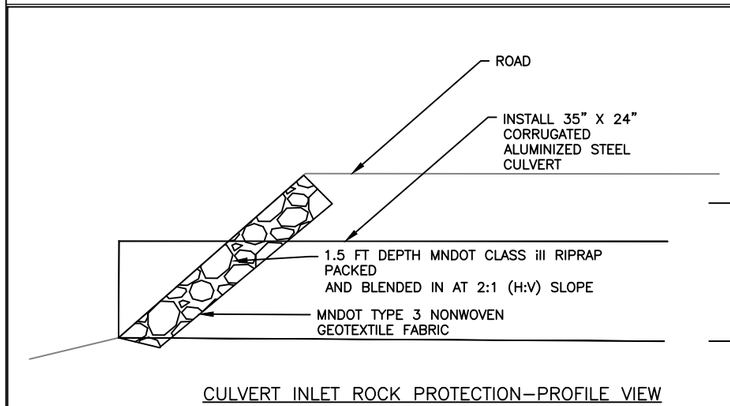
SELECT GRANULAR BORROW STRUCTURAL BACKFILL LIMITS.

BEDDING NOTES:

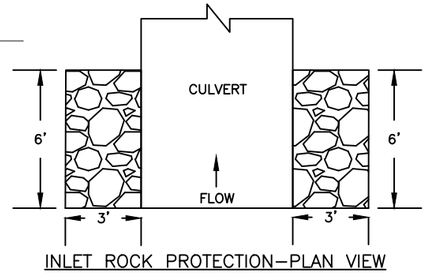
1. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (6"-8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
2. COMPLETE AND REGULAR MONITORING OF THE CAS ARCH SHAPE IS NECESSARY DURING ALL BACKFILLING OF THE STRUCTURE.
3. PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
4. THIS WIDTH SHOULD BE EQUAL TO 1/2 SPAN TO ONE SPAN WIDTH TYPICALLY. GREATER OR LESSER DISTANCE MAY BE REQUIRED. DISTANCE DEPENDS ON BEARING LOAD FOR ANY GIVEN LOADING, STRUCTURE SHAPE AND BACKFILL MATERIAL. THIS MUST BE EVALUATED BY THE PROJECT ENGINEER FOR EACH SPECIFIC SITUATION.
5. SHAPED BED FOR A MINIMUM WIDTH OF SPAN/2. MINIMUM BEDDING THICKNESS IS TWICE THE CORRUGATION DEPTH. ESTIMATED 2 CY MATERIAL INCIDENTAL TO LINE ITEM X "35" X 24" CAS PIPE ARCH CULVERT".
6. EMBANKMENT WIDTH (H) TO BE SUCH THAT A STABLE EMBANKMENT CAPABLE OF RESISTING SIDE PRESSURES FROM CAS PIPE-ARCH SHAPE WILL BE MAINTAINED THROUGHOUT THE LIFE OF INSTALLATION. THIS WIDTH TO BE DETERMINED BY THE PROJECT ENGINEER.



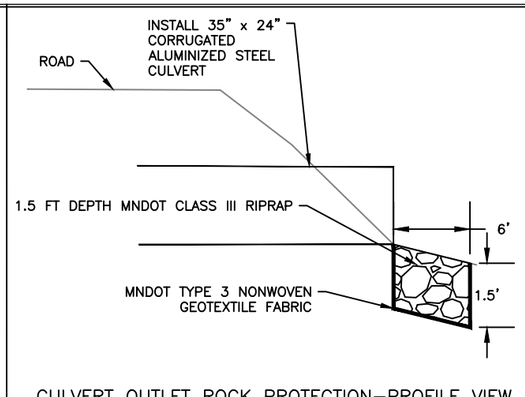

DESIGN EAST FLOODPLAIN CULVERT



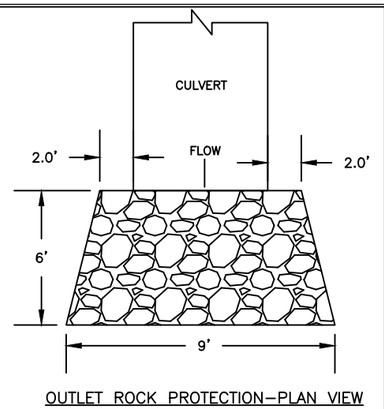

CULVERT INLET ROCK PROTECTION-PROFILE VIEW
NOT TO SCALE




INLET ROCK PROTECTION-PLAN VIEW
NOT TO SCALE




CULVERT OUTLET ROCK PROTECTION-PROFILE VIEW
NOT TO SCALE




OUTLET ROCK PROTECTION-PLAN VIEW
NOT TO SCALE

TECHNICAL SERVICE AREA III

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DULUTH MN, 55811
(218) 723 - 4865

PROJECT:

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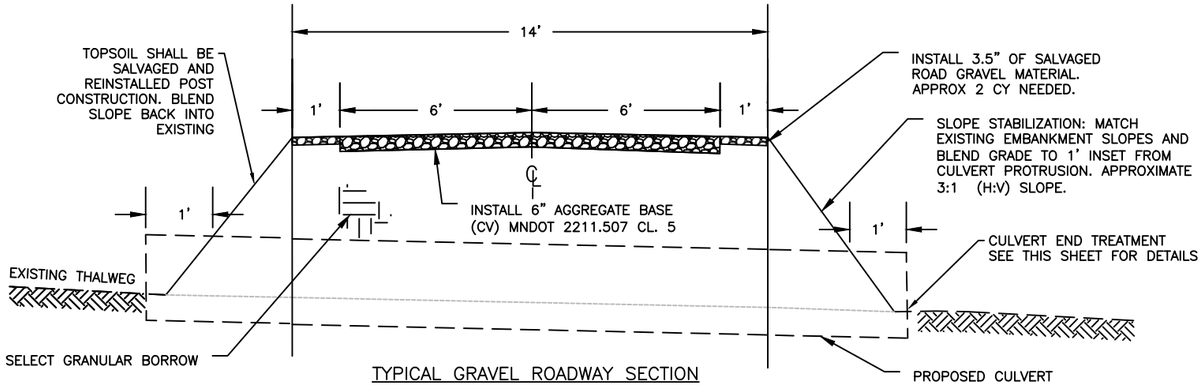
7 - FLOODPLAIN CULVERT PROFILE & DETAL

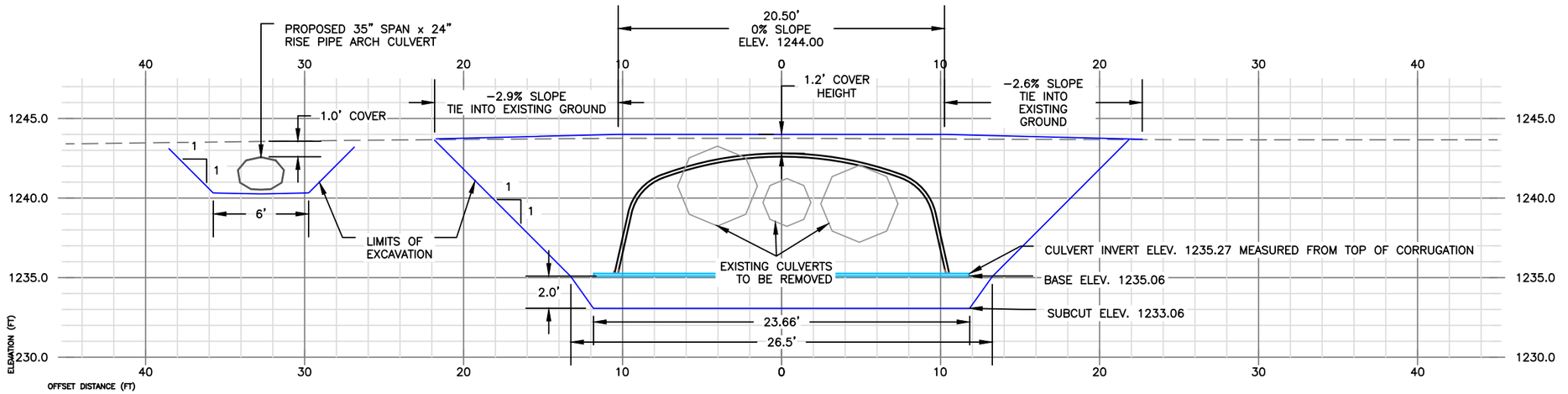
GENERAL NOTES:

1. NATIVE TOPSOIL SHALL BE SALVAGED FROM DISTURBED EMBANKMENT SLOPES AND REPLACED ON ALL CONSTRUCTED SLOPES WITH A DEPTH OF NOT LESS THAN 3". THE CONTRACTOR WILL BE REQUIRED TO TRANSPORT TOPSOIL TO SIDE ROADS AND ENTRANCE AREAS FOR STORAGE DURING GRADING. THE SALVAGING, TRANSPORTING, AND PLACING OF TOPSOIL WILL BE INCIDENTAL TO "COMMON TOPSOIL BORROW" PAY ITEM.
2. CONTRACTOR SHALL USE QUALITY COMPACTION METHOD MNDOT 2105.3 (F2) ON ROAD CONSTRUCTION. CONTRACTOR SHALL ALLOW COMPACTION TESTING BY THE ENGINEER.
3. EMBANKMENT SLOPES SHALL MATCH EXISTING OR SHALL BE A MINIMUM OF 1.5:1.
4. SELECT GRANULAR BORROW SHALL BE FREE OF ROCKS AND ORGANIC MATERIAL.
5. FINAL ELEVATION, ORIENTATION, AND LOCATION OF CULVERT TO BE STAKED BY ENGINEER.

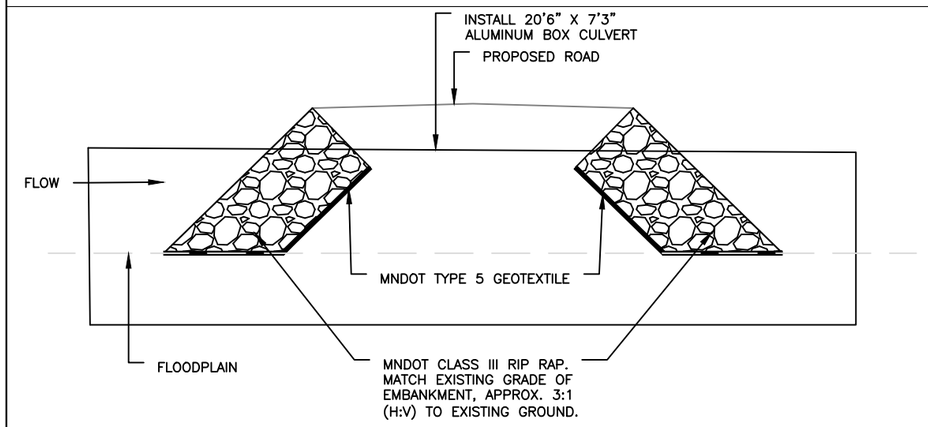



TYPICAL GRAVEL ROADWAY SECTION

NOT TO SCALE

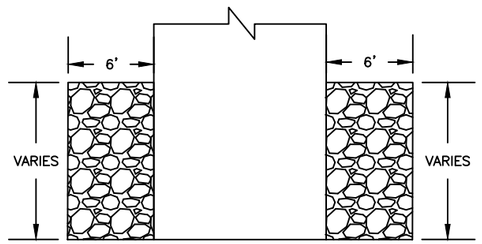



STA. 3+65 ALONG HAY CREEK THALWEG (Ft)



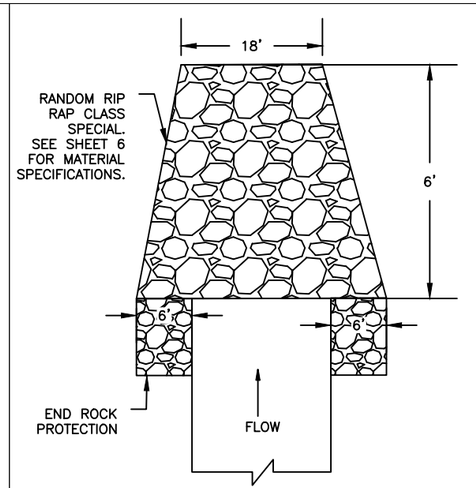

CULVERT END PROTECTION– PROFILE VIEW

NOT TO SCALE




END PROTECTION – PLAN VIEW

NOT TO SCALE




CULVERT OUTLET PROTECTION – PLAN VIEW

NOT TO SCALE

TECHNICAL SERVICE AREA III

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DULUTH MN, 55811
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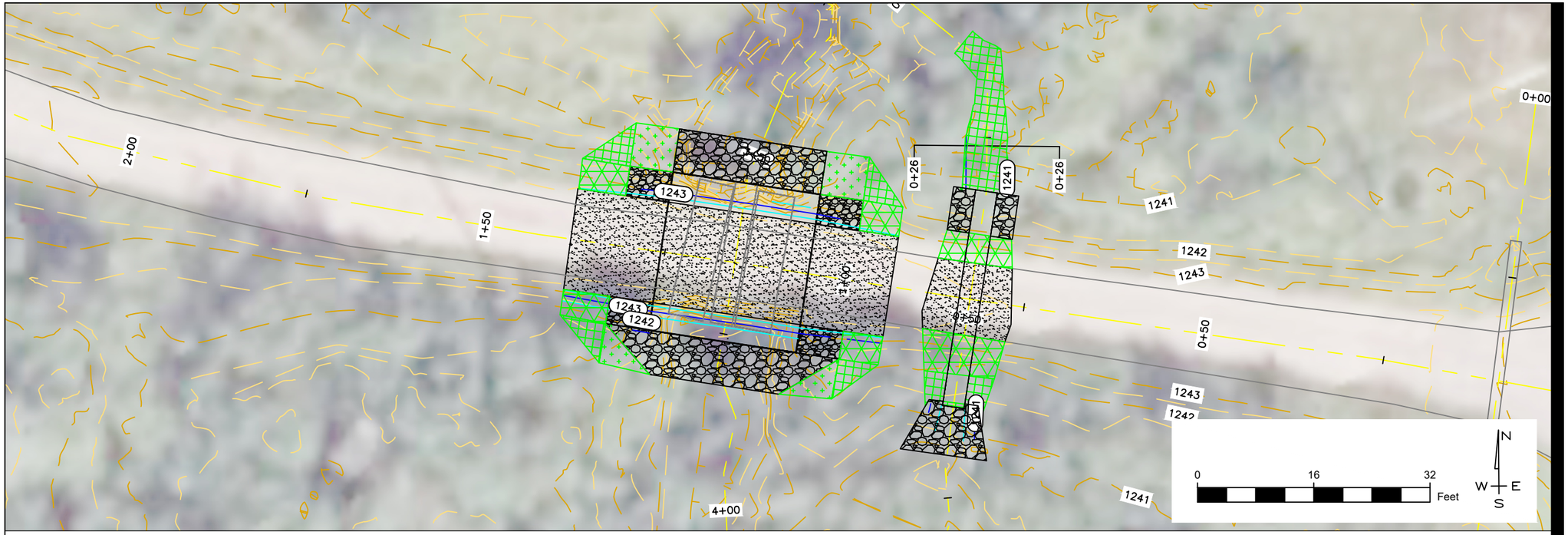
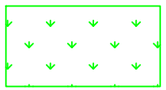
8- CULVERT END PROTECTION AND DESIGN ROAD DETAILS



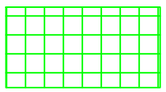
## ZONE ONE– STREAM EDGE

PLANTING AREA: ESTIMATED 114 SF
ANY DISTURBED AREA WITHIN 6' OF STREAM EDGE UPSTREAM AND DOWNSTREAM

SEED AND BLANKET:
SEED WITH BWSR 34–372 WET MEADOW AT A RATE OF 60 LBS/AC FOR A TOTAL OF 0.2 LBS.

700 GRAM OPEN WEAVE COIR BLANKET WITH MNDOT CAT. 20 EROSION CONTROL BLANKET WITH NATURAL NETTING BACKER. INSTALL PER MANUFACTURERS SPECIFICATIONS.

SUBCANOPY:
PLANT ONE PLUG EVERY 4 SQ. FT., CONTAINER SIZE APB (2.25 X 2.25 X 5") ALONG STREAMBANK AT THE FOLLOWING RATE FOR A TOTAL OF 29:
34% RED ELDERBERRY (SAMBUCUS RACEMOSA)
33: SWEET GALE (MYRICA GALE)
33: NATIVE WILLOW (SALIX SPP.)



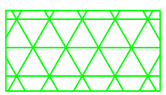
## ZONE TWO– UPLAND

PLANTING AREA: ESTIMATED 245 SF
ANY DISTURBED AREA OUTSIDE OF ZONE 1 STREAM EDGE; FLOODPLAIN INLET AND OUTLET SWALE.

SEED AND BLANKET:
SEED WITH BWSR 34–362 RIPARIAN NORTHEAST AT A RATE OF 60 LBS/AC OR SWCD APPROVED ALTERNATIVE FOR A TOTAL OF 0.3 LBS.

MNDOT CAT. 20 EROSION CONTROL BLANKET WITH NATURAL NETTING. INSTALL PER MANUFACTURERS SPECIFICATIONS.

PLUGS:
PLANT CONTAINER SIZE D48 (2.25 X 1.5 X 3"), 1 EVERY 4 SQ. FT FROM CARLTON SWCD PLANT LIST FOR A TOTAL OF 61.



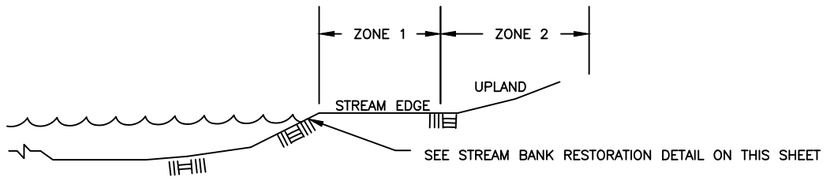
## ZONE THREE– ROAD EMBANKMENT

PLANTING AREA: ESTIMATED 208 SF
ROAD EMBANKMENT SLOPES

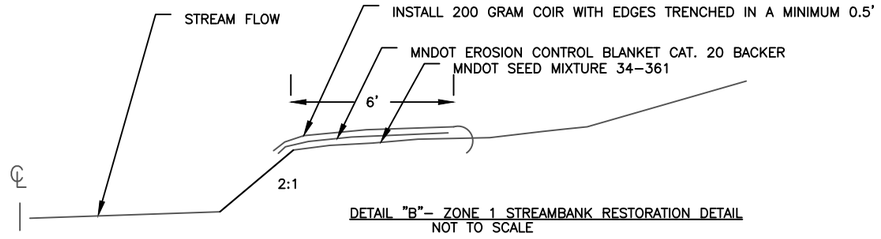
SEED AND BLANKET:
SEED WITH MNDOT NORTHEAST ROADSIDE (PREVIOUSLY MNDOT 36–311 WOODLAND EDGE NORTHEAST) AT A RATE OF 33.5 LBS/AC FOR A TOTAL OF 0.2 LBS

BLANKET WITH MNDOT CAT. 30 EROSION CONTROL BLANKET WITH NATURAL NETTING. INSTALL PER MANUFACTURER'S GUIDELINES.

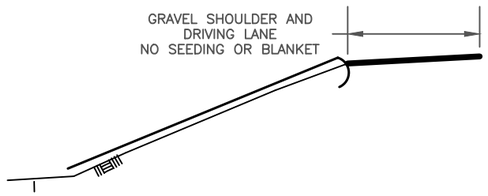
CONSTRUCTION ACCESS RESTORATION: RESTORE AREAS DISTURBED DUE TO ACCESS WITH MNDOT NORTHEAST ROADSIDE SEED MIX AND MNDOT CATEGORY 20 ROLLED EROSION PREVENTION PRODUCT. ALL ITEMS INCIDENTAL TO LINE ITEM 24 "CONSTRUCTION ACCESS RESTORATION (COMPLETE)".




NOT TO SCALE




DETAIL "B"– ZONE 1 STREAMBANK RESTORATION DETAIL
NOT TO SCALE




DETAIL "C" –ZONE 3 EROSION CONTROL BLANKET ROAD EMBANKMENT INSTALLMENT DETAILS
NOT TO SCALE

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

PROJECT:

HAY CREEK CULVERT CROSSING

LOCATION:

327 CANOSIA RD.
ESKO, MN 55733

DISTRICT:

CARLTON SWCD

NOTES:

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: MATÍAS VALERO

SIGNATURE:

DATE: 2026/5/5 LIC. NO 55607

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|---|---|
| DESIGNED: MV | DATE: 05/24/2024 |
| DRAWN: BAS | DATE: 04/09/2026 |
| CHECKED: | DATE: |

| REVISION: | BY: | DATE: | APPROVED: |
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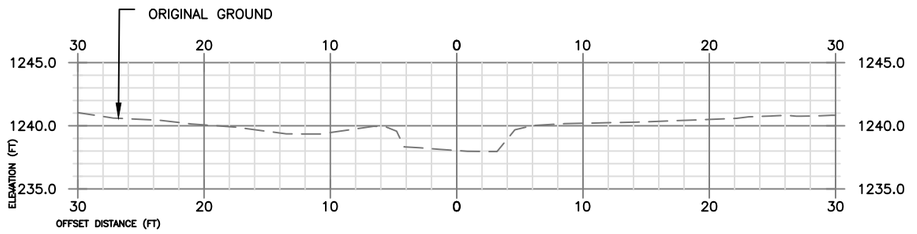
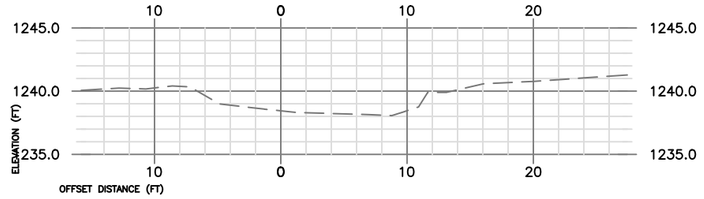
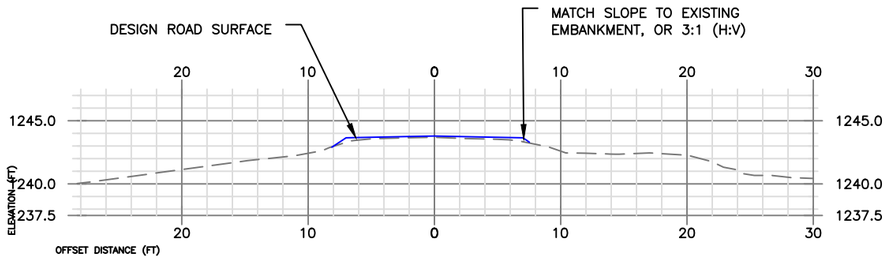
9- SITE RESTORATION



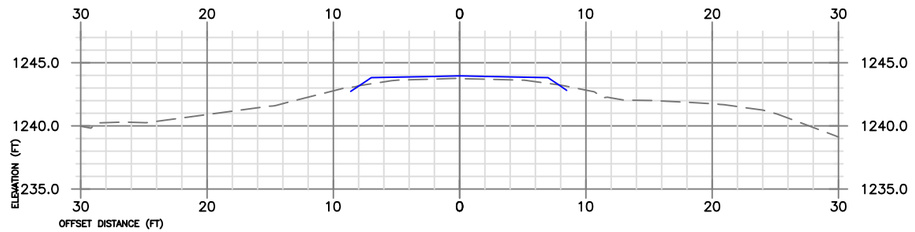

STA. 3+05 ALONG HAY CREEK THALWEG (Ft)



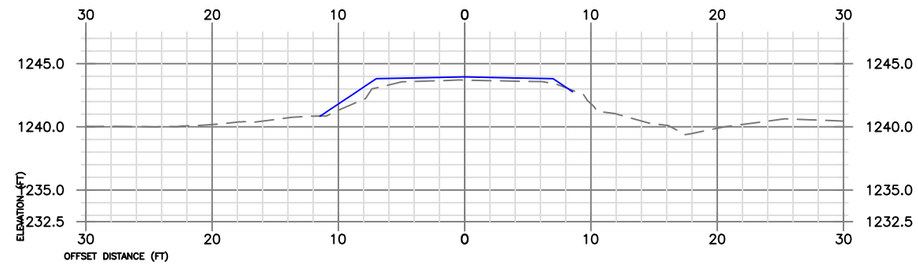

STA. 4+02 ALONG HAY CREEK THALWEG (Ft)



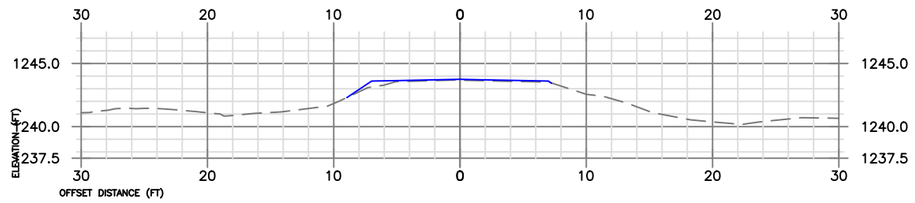

STA. 0+97 ALONG ROAD CENTERLINE (Ft)



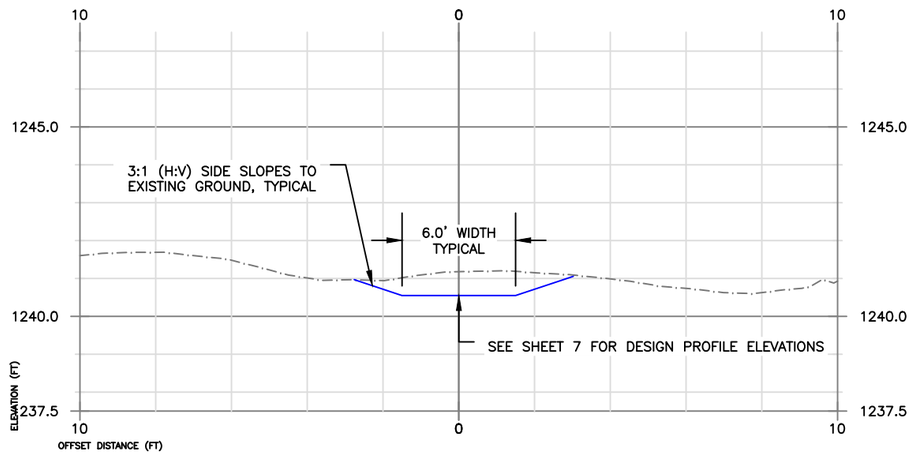

STA. 1+03 ALONG ROAD CENTERLINE (Ft)




STA. 1+28 ALONG ROAD CENTERLINE (Ft)




STA. 1+36 ALONG ROAD CENTERLINE (Ft)




STA. 0+26 ALONG DESIGN EAST FLOODPLAIN CULVERT (Ft)

TECHNICAL SERVICE AREA III

4215 ENTERPRISE CIRCLE
DULUTH MN, 55811
(218) 723 - 4865

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10 - CROSS SECTIONS