Purchasing Division
Finance Department

Room 120
411 West First Street
Duluth, Minnesota 55802

218-730-5340
purchasing@duluthmn.gov

Addendum 2
Solicitation 21-99575
Lakewalk Shoreline Rehabilitation – Phase IV

This addendum serves to notify all bidders of the following changes to the solicitation documents:

1. The bid deadline has been extended to **Friday, August 13, 2021 at 10:00 am**.

2. Sites B and C have been removed from this solicitation, pending final execution of a FEMA grant. Revised plans and specs reflecting this change will be issued early next week via addendum.

3. Contractor shall assume Lot D will not be available for use. Contractor shall base their bid on Contractor's designated barge loading location.

4. Storm events will be addressed with the following:
    a. A significant storm event (>12 ft significant wave height at NOAA buoy 45028) will be handled on a Time & Materials (T&M) not-to-exceed basis. The Contractor shall make every effort to protect the existing revetment slope. Determination of T&M fees will be based on guidance from emergency management agencies. It is the Engineer's responsibility for determining the storm event based on wave conditions. No additional compensation will be made to the Contractor for storm events which are not determined to be significant by the Engineer.

5. Revised drawings are attached to this addendum.
   Revised drawings include:
   C0.0.0 General Project Notes
   C2.9.0 Coastal Details
   S0.0.0 Outfall Notes and Schedules
   S2.3.0 Outfall Replacement Details

6. New drawings have been added to the plan set and are attached to this addendum.
   New drawings include:
   C2.9.3 Bedrock Examples

7. Clarification to the Bid Form:

a. Bid Item 15, Toe Stone Anchoring (under water line) is per toe stone anchor, assuming anchors at 2ft on center, with a minimum of two anchors per toe stone.
b. Bid Item 16, Toe Stone Anchoring (above water line) is per toe stone anchor, assuming anchors at 2ft on center, with a minimum of two anchors per toe stone.

8. Clarification to Unit Prices:
    a. Item #20 Storm Sewer Headwalls: 3" stone and ¾" stone shown in detail 1/S2.3.0 is incidental to the Storm Sewer Headwalls.

9. Clarification to Addendum No. 1, Item 11
    a. The Contractor shall properly prepare (equipment, labor, and materials) for a range of bedrock conditions. The Contractor shall anticipate and properly prepare to drill through igneous basalt bedrock extrusions (sound to medium quality bedrock) and sedimentary rock formations (medium quality bedrock) which are determined to be competent, with respect to their formation, by the Engineer. Drilling through highly weathered and/or fractured bedrock conditions is not anticipated. If highly weathered and/or fractured bedrock conditions are encountered, the Contractor shall remove those materials down to a depth which provides for a proper 3 ft toe stone embedment. Reference Revised Drawing Sheet C2.9.0. As previously addressed, the contractor shall remove any loose bedrock/riprap materials prior to drilling (reference Toe Stone Installation Determination Procedure notes on Drawing Sheet C2.9.0). Reference sheet C2.9.3 for bedrock examples.

Please acknowledge receipt of this Addendum by checking the acknowledgment box within the www.bidexpress.com solicitation or by initialing and dating next to Addendum 2 on the paper bid form if you requested one five (5) business days prior to bid opening.

Posted: **August 6, 2021**

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SHEET INDEX

G0.0.0 TITLE SHEET
C0.0.0 GENERAL PROJECT NOTES
C1.0.0 EXISTING CONDITIONS OVERVIEW
C1.0.1 STAGING AND ACCESS PLAN – PHASE 1, SITE A (BARGE)
C1.0.2 STAGING AND ACCESS PLAN – PHASES 2 & 3, SITES B–H (TRUCK)
C1.0.3 STAGING AND ACCESS PLAN – PHASES 2 & 3, SITES B–H (BARGE)
C1.0.4 PHASING PLAN
C1.0.5 PEDESTRIAN ACCESS AND SIGNAGE PLAN

EXISTING CONDITIONS
C1.1.0 EXISTING CONDITIONS AND DEMO PLAN – SITE A
C1.1.1 EXISTING CROSS–SECTION – SITE A
C1.2.0 EXISTING CONDITIONS AND DEMO PLAN – SITE B
C1.2.1 EXISTING CROSS–SECTION – SITE B
C1.3.0 EXISTING CONDITIONS AND DEMO PLAN – SITE C
C1.3.1 EXISTING CROSS–SECTION – SITE C
C1.4.0 EXISTING CONDITIONS AND DEMO PLAN – SITE D
C1.4.1 EXISTING CROSS–SECTION – SITE D
C1.5.0 EXISTING CONDITIONS AND DEMO PLAN – SITE E
C1.5.1 EXISTING CROSS–SECTION – SITE E
C1.6.0 EXISTING CONDITIONS AND DEMO PLAN – SITE F&G
C1.6.1 EXISTING CROSS–SECTION – SITE F
C1.6.2 EXISTING CROSS–SECTION – SITE G
C1.7.0 EXISTING CONDITIONS AND DEMO PLAN – SITE H
C1.7.1 EXISTING CROSS–SECTION – SITE H

PROPOSED CONDITIONS
C2.1.0 SITE AND GRADING PLANS – SITE A
C2.1.1 TYPICAL CROSS–SECTION – SITE A
C2.1.2 COASTAL CROSS–SECTIONS – SITE A
C2.1.3 COASTAL CROSS–SECTIONS – SITE A
C2.2.0 SITE AND GRADING PLANS – SITE B
C2.2.1 TYPICAL CROSS–SECTION – SITE B
C2.2.2 COASTAL CROSS–SECTIONS – SITE B
C2.2.3 COASTAL CROSS–SECTIONS – SITE B
C2.3.0 SITE AND GRADING PLANS – SITE C
C2.3.1 TYPICAL CROSS–SECTION – SITE C
C2.3.2 COASTAL CROSS–SECTIONS – SITE C
C2.3.3 COASTAL CROSS–SECTIONS – SITE C
C2.4.0 SITE AND GRADING PLANS – SITE D
C2.4.1 TYPICAL CROSS–SECTION – SITE D
C2.4.2 COASTAL CROSS–SECTIONS – SITE D
C2.5.0 SITE AND GRADING PLANS – SITE E
C2.5.1 TYPICAL CROSS–SECTION – SITE E
C2.5.2 COASTAL CROSS–SECTIONS – SITE E
C2.6.0 SITE AND GRADING PLANS – SITE F
C2.6.1 TYPICAL CROSS–SECTION – SITE F
C2.6.2 COASTAL CROSS–SECTIONS – SITE F
C2.7.0 SITE AND GRADING PLANS – SITE G
C2.7.1 TYPICAL CROSS–SECTION – SITE G
C2.7.2 COASTAL CROSS–SECTIONS – SITE G
C2.8.0 SITE AND GRADING PLANS – SITE H
C2.8.1 TYPICAL CROSS–SECTION – SITE H
C2.8.2 COASTAL CROSS–SECTIONS – SITE H
C2.8.3 COASTAL CROSS–SECTIONS – SITE H

TECHNICAL DETAILS
C2.9.0 COASTAL DETAILS
C2.9.1 COASTAL DETAILS
C2.9.2 CIVIL DETAILS
C2.9.3 BEDROCK EXAMPLES

EROSION CONTROL AND VEGETATION PLANS
C3.1.0 EROSION AND SEDIMENT CONTROL PLANS – SITE A
C3.2.0 EROSION AND SEDIMENT CONTROL PLANS – SITE B
C3.3.0 EROSION AND SEDIMENT CONTROL PLANS – SITE C
C3.4.0 EROSION AND SEDIMENT CONTROL PLANS – SITE D
C3.5.0 EROSION AND SEDIMENT CONTROL PLANS – SITE E
C3.6.0 EROSION AND SEDIMENT CONTROL PLANS – SITE F&G
C3.7.0 EROSION AND SEDIMENT CONTROL PLANS – SITE H
C3.8.0 EROSION AND SEDIMENT CONTROL PLANS – DETAILS
C3.8.1 EROSION AND SEDIMENT CONTROL PLANS – DETAILS

STRUCTURAL SHEETS
S0.0.0 OUTFALL NOTES AND SCHEDULES
S1.0.0 OUTFALL REMOVAL AND REPLACEMENT EXTENTS
S1.1.0 OUTFALL REMOVAL AND REPLACEMENT EXTENTS
S2.0.0 OUTFALL REPLACEMENT DETAILS
S2.1.0 OUTFALL REPLACEMENT DETAILS
S2.2.0 OUTFALL REPLACEMENT DETAILS
S2.3.0 OUTFALL REPLACEMENT DETAILS

1

2

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GENERAL

- ELEVATIONS SHOWN, EXCEPT AS NOTED, ARE BASED ON THE 1985 LAKE SUPERIOR INTERNATIONAL GREAT LAKES DATUM (IGLD).
- ON GENERAL ARRANGEMENT DRAWINGS, ELEVATIONS ARE ALSO SHOWN RELATIVE TO THE IGLD ORDINARY HIGH–WATER MARK (OHWM).
- THE IGLD (OHWM) IS 603.1 FT AND THE IGLD 1985 ORDINARY LOW WATER MARK (OLWM) = 601.1 FT. EXISTING WATER ELEVATIONS MAY VARY ABOVE AND BELOW THE IGLD OHWM AND LWD, RESPECTIVELY, THROUGHOUT THE DURATION OF THE PROJECT. VARIATIONS ABOVE THE OHWM AND BELOW THE LWD ARE GENERALLY DUE TO ENVIRONMENTAL CHANGES, I.E. RAINFALL, WIND, RUNOFF, PRESSURE, AND CYCLICAL CHANGES IN WATER LEVELS.
- ALL PLAN DIMENSIONS ON THE DRAWINGS ARE MEASURED IN A TRUE HORIZONTAL PLANE UNLESS NOTED OTHERWISE.
- ALL MATERIALS AND INSTALLATION MUST MEET THE SPECIFICATIONS LISTED IN THE GENERAL PROJECT NOTES.
- NEW OPENINGS, VOIDS OR SLOPE FAILURES NOT SHOWN IN THE CONSTRUCTION DOCUMENTS CAUSED BY EROSION SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTING THE WORK.
- PLANS, SECTIONS, AND DETAILS SHALL NOT BE SCALED FOR DETERMINATION OF SIZE, QUANTITIES, LENGTHS, ETC.
- THE CONTRACTOR IS RESPONSIBLE FOR ADEQUATE SHORING, BRACING, ETC DURING CONSTRUCTION.
- CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF ANY AND ALL STREETS, UTILITIES, EXISTING STRUCTURES, EQUIPMENT, ETC.
- CONTRACTOR IS RESPONSIBLE TO FOLLOW ALL LOCAL, STATE, & FEDERAL PERMIT REQUIREMENTS AT ALL TIMES.
- EXISTING CONDITIONS, RELATED DIMENSIONS, ELEVATIONS INDICATED IN THE CONSTRUCTION DOCUMENTS SHALL BE FIELD VERIFIED AS SITE CONDITIONS MAY HAVE CHANGED SINCE LAST INSPECTION BY ENGINEER. ANY VERIFIED CONDITIONS THAT DIFFER FROM THAT INDICATED IN THE CONTRACT DOCUMENTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO STARTING WORK.
- WHERE A SPECIFIC MODEL, MANUFACTURER, OR GEOMETRIC SIZE/SHAPE OF AN ITEM ARE IDENTIFIED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THE MODEL, MANUFACTURER, OR GEOMETRIC SIZE/SHAPE IDENTIFIED ARE THE BASIS OF THE DESIGN. ITEMS OF OTHER MODEL, MANUFACTURER, OR GEOMETRIC SIZE/SHAPE OF EQUAL DESIGN WHICH ARE ACCEPTED BY THE ENGINEER THAT REQUIRE ANY ADDITIONAL DRAWINGS, ENGINEERING DEVIATIONS, OR CONSTRUCTION/QUANTITY CHANGES ARE THE RESPONSIBILITY OF THE CONTRACTOR INCLUDING ALL ASSOCIATED COSTS.
- THE ACCURACY OF ANY EXISTING UNDERGROUND UTILITIES AND STRUCTURES ARE NOT GUARANTEED AND NOT INCLUSIVE. FIELD CONDITIONS SHALL BE VERIFIED PRIOR TO ANY EXCAVATION.
- THE GENERAL COASTAL NOTES GIVEN IN THE CONSTRUCTION DOCUMENTS MAY NOT BE INCLUSIVE TO THE ENTIRE PROJECT. SEE FULL PROJECT SPECIFICATIONS (IF PROVIDED) FOR ADDITIONAL INFORMATION.
- COASTAL EROSION PROTECTION STRUCTURES SUCH AS CONCRETE RETAINING WALLS AND ARMOR STONE REVETMENTS, AROUND THE GREAT LAKES ARE TYPICALLY DESIGNED FOR A 40 TO 50–YEAR DESIGN LIFE. IT IS IMPORTANT TO RECOGNIZE THAT THIS ASSUMPTION IS NO GUARANTEE THAT THE COASTAL STRUCTURE WILL LAST FOR ITS INTENDED DESIGN LIFE AS WEATHER CAN BE UNPREDICTABLE. A STORM EVENT THAT EXCEEDS THESE SELECT DESIGN CONDITIONS, AS SPECIFIED IN THE DESIGN CRITERIA SECTION; MAY OCCUR IN ANY GIVEN YEAR BUT SHOULD NOT ALWAYS BE USED AS A DESIGN CONSTRAINT. IN ORDER TO DETERMINE APPROPRIATE DESIGN CRITERIA, RISK OF FAILURE MUST BE ASSESSED ON A LEVEL THAT ACCURATELY REPRESENTS THE EXISTING COASTAL ENVIRONMENT, THE CONSEQUENCES OF A STRUCTURE FAILURE, AND ALSO ALLOWS FOR COASTAL DEVELOPMENT WITHIN REASONABLE RISK TOLERANCES.

DESIGN CRITERIA

- CODES AND SPECIFICATIONS
  ALL DESIGN, UNLESS OTHERWISE NOTED, ARE IN ACCORDANCE WITH THE FOLLOWING:
  I. LOCAL & STATE CODES FOR WHICH THE PROJECT IS ERECTED
  II. INTERNATIONAL BUILDING CODE (IBC)
  III. ASCE STANDARD 7
- COASTAL DESIGN CONDITIONS
  A. DESIGN WATER LEVEL = 605.0 FT (INCLUDING STORM SURGE, SEICHE, AND WAVE SETUP)
  B. DESIGN BREAKING WAVE HEIGHT, Hb = 8.0 FT
  B. DESIGN ICE THICKNESS = 20.5 INCHES

ARMOR STONE

- FURNISH DURABLE FIELD OR QUARRY STONE THAT IS SOUND, HARD, DENSE, RESISTANT TO THE ACTION OF ICE, AIR & WATER, AND FREE OF SEAMS, CRACKS, DELETERIOUS MATERIALS, OR OTHER STRUCTURAL DEFECTS.
- THE CONTRACTOR MAY PLACE ARMOR STONE BY ANY MECHANICAL MEANS THAT PRODUCE A COMPLETED JOB WITHIN REASONABLE TOLERANCES OF THE TYPICAL SECTION THE PLANS SHOW.
- THE ARMOR STONE SHALL MEET THE MINIMUM REQUIREMENTS:

ASTM C127: SPECIFIC GRAVITY (SATURATED SURFACE–DRY BASIS):	> 2.70
ASTM CA27: WATER ABSORPTION (24 HR IMMERSION):	< 2.0%
ASTM C88: SOUNDNESS LOSS:	< 13.0%
ASTM C535: ABRASION AND IMPACT:	< 30%
ASTM C–42: COMPRESSIVE STRENGTH:	> 3000 PSI

- EACH STONE SHALL HAVE THREE POINTS OF CONTACT TO ENSURE PROPER INTERLOCK.
- ARMOR STONE SHALL BE PLACED SUCH THAT EACH STONE IS RESTING FIRMLY ON THE STONES BENEATH AND HAS THE WEIGHT OF OTHER STONES ABOVE TO HOLD IT IN PLACE.
- ARMOR STONE SHALL BE INSTALLED TO THE DIMENSIONS AND LOCATIONS AS INDICATED IN THE DRAWINGS.
- ARMOR STONE SHALL BE INSTALLED FROM THE BOTTOM OF THE SLOPE WORKING UP THE SLOPE.
- ROUND FIELD STONE IS NOT ACCEPTABLE, UNLESS SPECIFICALLY DESIGNATED ON THE DRAWINGS.

GEOTEXTILE FABRIC

- GEOTEXTILE SHALL BE A PERVIOUS SHEET OF PLASTIC YARN NON–WOVEN INTO A UNIFORM PATTERN WITH DISTINCT AND MEASURABLE OPENINGS. IT SHALL BE RESISTANT TO ULTRA–VIOLET AND/OR HEAT EXPOSURE.
- GEOTEXTILE SHALL HAVE EXTREMELY HIGH STRENGTH CHARACTERISTICS, BE ROT PROOF, MILDEW PROOF, AND COMPLETELY UNAFFECTED BY MOISTURE AND EXCELLENT RESISTANCE TO ACIDS AND ALKALIS.
- THE NON–WOVEN GEOTEXTILE SHALL MEET THE MINIMUM REQUIREMENTS:

ASTM D4632: TENSILE STRENGTH (LBS)	300 MIN
ASTM D4632: ELONGATION AT BREAK	50% MIN
ASTM D3786: MULLEN BURST STRENGTH (PSI)	585 MIN
ASTM D4833: PUNCTURE RESISTANCE (LBS)	175 MIN
ASTM D4751: AOS (U.S. STANDARD SIEVE)	100
ASTM D4355: UV RESISTANCE, % RETAINED	70 MIN
PERCENT OPEN AREA	4% MIN
PERMEABILITY (CM/SEC)	0.1 MIN

- GEOTEXTILE SHALL BE PLACED AT THE LOCATIONS AS SHOWN ON THE DRAWINGS.
- THE CLOTH SHALL BE LAID LOOSELY BUT WITHOUT WRINKLES OR CREASES.
- THERE SHALL BE A MINIMUM OVERLAP OF 2 FEET.
- ALL FABRIC DAMAGED DURING INSTALLATION OR DURING PLACEMENT OF STONE SHALL BE REPLACED BY THE CONTRACTOR AT NO COST TO THE OWNER.

TREE REMOVAL COUNT

SITE	DIAMETER	QUANTITY
A	3"–6"	2
	6"–12"	0
	12"–18"	0
B	3"–6"	0
	6"–12"	0
	12"–18"	0
C	3"–6"	11
	6"–12"	1
	12"–18"	0
D	3"–6"	1
	6"–12"	0
	12"–18"	0
E	3"–6"	0
	6"–12"	0
	12"–18"	0
F	3"–6"	0
	6"–12"	0
	12"–18"	0
G	3"–6"	0
	6"–12"	0
	12"–18"	0
H	3"–6"	3
	6"–12"	6
	12"–18"	0
TURNAROUND 1 (IF TRUCKING IS USED)	3"–6"	0
	6"–12"	3
	12"–18"	0
TURNAROUND 2 (IF TRUCKING IS USED)	3"–6"	0
	6"–12"	6
	12"–18"	4

*ANY TREES AND SHRUBS LESS THAN 3" IN DIAMETER IN THE SPECIFIED PROJECT AREA SHALL BE REMOVED AT THE CONTRACTORS EXPENSE. QUANTITIES SHALL BE FIELD VERIFIED BY THE CONTRACTOR.

CONCRETE CRACK REPAIR INJECTION NOTES

- EPOXY INJECTION SYSTEM SHALL BE USED FOR CRACK REPAIR. CONTRACTOR SHALL SUBMIT PROPOSED EPOXY INJECTION SYSTEM TO ENGINEER FOR REVIEW AND APPROVAL. SUBMITAL SHALL INCLUDE MANUFACTURER DATA SHEETS AND INSTALLATION PLAN.
- WORK SHALL CONFORM TO THE REQUIREMENTS OF ACI 503.7, "SPECIFICATION FOR CRACK REPAIR BY EPOXY INJECTION".
- INJECTION EPOXY SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C 881.
- ALL CONCRETE, IN THE AREA OF REPAIR, SHALL BE CLEANED OF SCALE, BIOLOGICAL GROWTH, AND OTHER CONTAMINANTS PRIOR TO CRACK REPAIR. TAKE CARE NOT TO IMPACT ANY DEBRIS INTO THE CRACK DURING CLEANING.
- BLOW OUT THE CRACK WITH CLEAN COMPRESSED AIR TO REMOVE ANY DUST, DEBRIS OR STANDING WATER.
- DO NOT INJECT ADHESIVE IF THE TEMPERATURE OF THE CONCRETE IS NOT WITHIN THE RANGE OF APPLICATION TEMPERATURES RECOMMENDED BY THE MANUFACTURER OF THE ADHESIVE.
- INSTALL INJECTION PORTS AND CAPSEAL IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- INJECT EPOXY IN PORTS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- REMOVE INJECTION PORTS AND CAPSEAL. CONTRACTOR MAY USE HEAT, CHIPPING, GRINDING, OR OTHER MECHANICAL MEANS. IF SOCKET–MOUNTED PORTS ARE USED, SOCKETS SHALL E SEALED AFTER EPOXY INJECTION.
- MAINTAIN A WRITTEN DAILY LOG FOR EACH DAY OF INJECTION WORK THAT INCLUDES, AMBIENT TEMPERATURE AT THE START AND END OF THE WORKDAY, WEATHER CONDITIONS, CRACK CLEANING METHOD, AND RECORD OF INJECTION ADHESIVE. SUBMIT LOG TO THE ENGINEER EACH WORKDAY.

AMI Consulting Engineers P.A.
91 MAIN STREET SUPERIOR, WI
715-718-2193 - amiengineers.com
TWIN CITIES - IRON RANGE

I HEREBY CERRIFY 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.

NAME: ZACHARY MORRIS
SIGNATURE:
DATE: 7/14/2021
LIC. No.: 54405

REV.:	DATE:	DESCRIPTION	REV. BY:
0	07/14/2021	ISSUED FOR BID	RRD
1	07/29/2021	ISSUED FOR ADDENDUM 1	RRD
2	08/06/2021	ISSUED FOR ADDENDUM 2	RRD
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CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

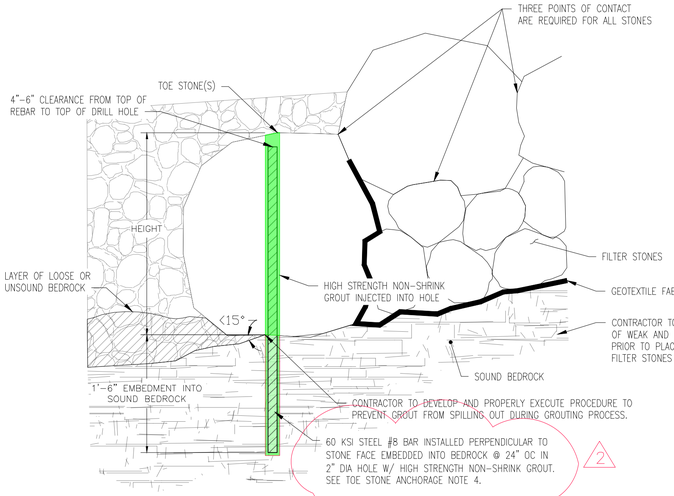
GENERAL PROJECT NOTES

JOB No: 211009
DATE: 07/16/2021
DRAWN BY: RRD
DESIGNED BY: ZLM

SHEET:
C0.0.0

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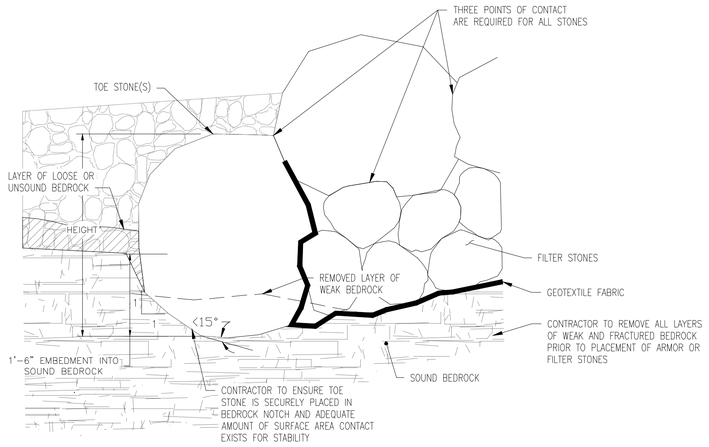
1 C2.9.0 TYPICAL TOE STONE ANCHORAGE DETAIL
NOT TO SCALE

TOE STONE ACCEPTANCE CRITERIA FOR TOE STONE WITH ANCHORAGE:

1. LENGTH TOLERANCE (6'-0" TO 10'-0") (POSITIONED PARALLEL TO SHORELINE)
2. WIDTH TOLERANCE (2'-6" TO 4'-6")
3. HEIGHT TOLERANCE (2'-6" TO 4'-6")
4. ASPECT RATIO TOLERANCE (1.5:1 TO 4:1) ASPECT RATIO = LENGTH/(WIDTH OR HEIGHT (WHICHEVER IS SMALLER) SEE 4/C2.9.0 FOR ADDITIONAL INFO)
5. WEIGHT RANGE (6 TO 12 TONS)
6. A MINIMUM OF TWO ANCHORS ARE REQUIRED TO BE INSTALLED IN EACH TOE STONE

TOE STONE ANCHORAGE:

1. HIGH STRENGTH NON-SHRINK GROUT INSTALLED SHALL BE UNDERWATER GROUT WHEN INSTALLED BELOW THE WATERLINE.
2. CONTRACTOR SHALL FOLLOW ALL MANUFACTURERS RECOMMENDATIONS OF POT LIFE AND TEMPERATURE REQUIREMENTS DURING MIXING AND PLACEMENT OF PRODUCT.
3. CONTRACTOR SHALL MONITOR AND RECORD WATER AND AMBIENT TEMPERATURE DAILY DURING GROUT INSTALLATION. TEMPERATURE RECORDS SHALL BE SUBMITTED TO ENGINEER.
4. IF WATER AND SURFACE TEMPERATURE FALL BELOW 40°F, TOE STONE ANCHORS SHALL BE INSTALLED WITH HILTI RE 500 V3 EPOXY OR EQUAL.
5. HOLE DIAMETER FOR INSTALLATION WITH EPOXY SHALL BE MAX 1 1/2" DIA. CONTRACTOR WILL NOT BE ALLOWED TO EXCEED THIS HOLE DIAMETER. WATER AND SURFACE TEMPERATURE SHALL BE ABOVE 23°F. CONTRACTOR SHALL FOLLOW EPOXY MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
6. CONTRACTOR SHALL DEVELOP AND SUBMIT TO ENGINEER FOR APPROVAL TOE STONE ANCHOR INSTALLATION PROCEDURES AND TEMPERATURE MONITORING PLAN.
7. GROUT SHALL BE PROTECTED FROM FREEZING UNTIL IT REACHES A MINIMUM STRENGTH OF 1,000 PSI.
8. REBAR CENTRALIZERS SHALL BE USED TO ENSURE ALIGNMENTS OF TOE STONE ANCHOR IN CENTER OF HOLE.
9. ANY ABANDONED HOLES SHALL BE FILLED W/ HIGH STRENGTH NON-SHRINK GROUT.



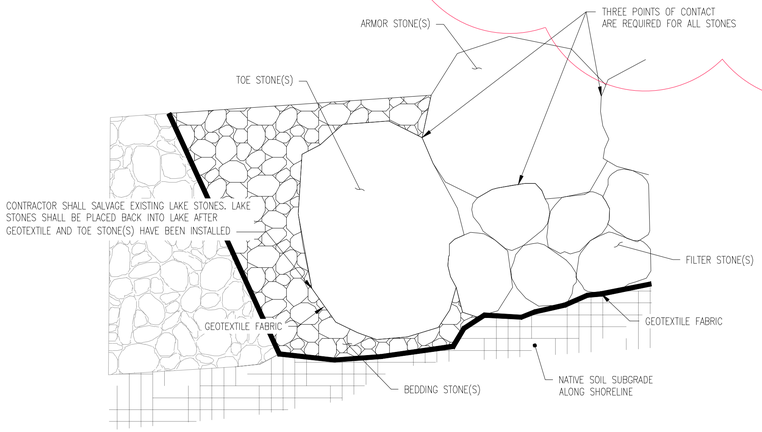
2 C2.9.0 TYPICAL TOE STONE TRENCHED INTO BEDROCK
NOT TO SCALE

TOE STONE ACCEPTANCE CRITERIA FOR TOE STONE TRENCHED INTO BEDROCK:

1. HEIGHT TOLERANCE (2'-6" TO 4'-6")
2. MAX ASPECT RATIO TOLERANCE (3:1)
3. WEIGHT RANGE (6 TO 12 TONS)

TOE STONE INSTALLATION DETERMINATION PROCEDURE

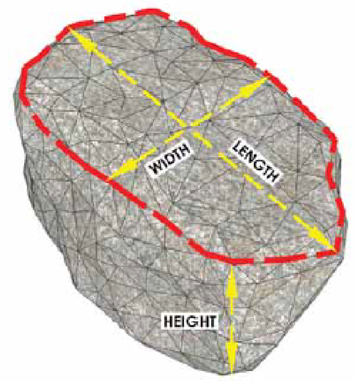
1. CONTRACTOR SHALL EXCAVATE AT THE PROPOSED LOCATION OF THE TOE STONE TO EITHER:
   - 1.a. EXISTING BEDROCK ELEVATION
   - 1.b. 3 FT BELOW EXISTING GRADE (BEG) OR ELEVATION 598 FT, WHICHEVER IS GREATER
   - 1.c. IF EXCAVATION IS REQUIRED TO BELOW ELEVATION 598 FT (WITH AT LEAST 2 FT EMBEDMENT), THE CONTRACTOR SHALL COORDINATE WITH ENGINEER ON ADJUSTING SLOPE OF REVETMENT OR POSITIONING OF THE TOE STONE. THE CONTRACTOR SHALL ASSUME THAT PLACEMENT OF TOE STONES INTO SOILS WILL NOT BE REQUIRED UNDER ELEVATION 595.0 FT
2. IF EXCAVATION IS 3 FEET BEG OR TO ELEVATION 598 FT, WHICHEVER IS GREATER, THE CONTRACTOR SHALL INSTALL THE TOE STONE ACCORDING TO DETAIL 3/C2.9.0
3. IF BEDROCK IS EXPOSED, CONTRACTOR SHALL SCALE THE SURFACE OF THE BEDROCK TO REMOVE ANY LOOSE, LAYERED OR UNSOUND SECTIONS
4. ONCE LOOSE OR UNSOUND BEDROCK IS REMOVED, CONTRACTOR SHALL DETERMINE THE SLOPE OF THE BEDROCK SURFACE. IF THE SURFACE OF THE BEDROCK IS LESS THAN 15 DEGREES FROM THE HORIZONTAL, THE CONTRACTOR SHALL INSTALL TOE STONES ACCORDING TO DETAIL 1/C2.9.0
5. IF THE SURFACE OF THE BEDROCK IS GREATER THAN 15 DEGREES, THE CONTRACTOR SHALL EITHER:
   - 5.a. RELOCATE THE TOE STONE TO AN AREA WHERE EXISTING BEDROCK SLOPE IS LESS THAN 15 DEGREES (SEE NOTE 6 BELOW FOR LOCATION TOLERANCES ON TOE STONES) AND INSTALL ACCORDING TO DETAIL 1/C2.9.0
   - 5.b. SCALE AND CHIP THE BEDROCK SURFACE UNTIL SLOPE IS LESS THAN 15 DEGREES AND INSTALL ACCORDING TO DETAIL 1/C2.9.0
   - 5.c. SCALE AND CHIP THE BEDROCK SURFACE TO CREATE A TRENCH FOR THE TOE STONE. THE TRENCH SHALL BE A MINIMUM OF 1'-6" DEEP WITH THE OUTER EDGE OF THE TRENCH AT A MINIMUM OF 1:1 SLOPE. THE BOTTOM OF THE TRENCH SHALL BE AT THE SLOPE LESS THAN 15 DEGREES. IF THE TRENCH IS PREPARED IN ACCORDANCE WITH THE MINIM PARAMETERS DESCRIBED ABOVE, THE CONTRACTOR SHALL INSTALL THE TOE STONE ACCORDING TO DETAIL 2/C2.9.0
6. THE CONTRACTOR SHALL NOT RELOCATE THE TOE STONE MORE THAN 1/3 THE WIDTH OF THE STONE AWAY FROM THE ADJACENT TOE STONE OR MORE THAN (1) TYPICAL TOE STONE WIDTH FROM THE LOCATION SPECIFIED ON PLAN. SEE DETAIL 5/C2.9.0 FOR ADDITIONAL INFORMATION



3 C2.9.0 TYPICAL TOE STONE EMBEDMENT DETAIL
NOT TO SCALE

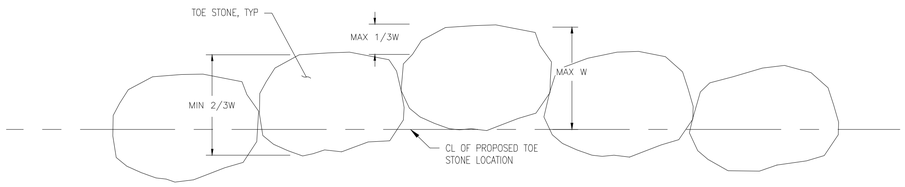
TOE STONE ACCEPTANCE CRITERIA FOR TOE STONE EMBEDDED INTO NATIVE SOILS:

1. HEIGHT TOLERANCE (2'-6" TO 4'-6")
2. MAX ASPECT RATIO TOLERANCE (3:1)
3. WEIGHT RANGE (6 TO 12 TONS)
4. 4 FT MINIMUM EMBEDMENT



4 C2.9.0 STONE ASPECT RATIO DETAIL
NOT TO SCALE

1 ASPECT RATIO = LENGTH/(MIN WIDTH OR MIN HEIGHT (WHICHEVER IS SMALLER))
LENGTH = LARGEST DIMENSION



W = WIDTH OF TOE STONE

5 C2.9.0 LONGITUDINAL TOE STONE PLACEMENT TOLERANCES
NOT TO SCALE

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715-718-2193 - amiengineers.com
TWIN CITIES - IRON RANGE

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NAME: ZACHARY MORRIS
SIGNATURE:
DATE: 7/14/2021
LIC. No.: 54405

REV:	DATE:	DESCRIPTION	REV. BY:
0	07/14/2021	ISSUED FOR BID	RRD
1	07/29/2021	ISSUED FOR ADDENDUM 1	RRD
2	08/06/2021	ISSUED FOR ADDENDUM 2	RRD
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CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

COASTAL DETAILS

JOB No: 211009
DATE: 07/16/2021
DRAWN BY: RRD
DESIGNED BY: ZLM

SHEET:
C2.9.0

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1 C2.9.3 EXAMPLE PHOTO



2 C2.9.3 EXAMPLE PHOTO

NOTES:
1. CONTRACTOR SHALL FIELD VERIFY EXISTING BEDROCK CONDITIONS FOR EACH SITE.
2. CONTRACTOR SHALL NOTIFY ENGINEER WHEN BEDROCK SURFACE IS CLEANED OFF OF SOIL AND DEBRIS, AT EACH SITE, FOR A BEDROCK INSPECTION WALK THROUGH. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A PROPOSED ALIGNMENT FOR THE TOE STONES AT EACH SITE.
   2.a. EXAMPLE ALIGNMENTS INCLUDE SPRAY PAINT OR RUNNING A STRING LINE
3. TOE STONE ANCHORAGE TYPE WILL DEPEND ON BEDROCK CONDITION AS APPROVED BY ENGINEER.
4. SOUND BEDROCK WILL BE DEFINED AS INTACT ROCK CONTAINING ZERO DISCONTINUITIES, SUCH AS, JOINTS, FRACTURES AND FISSURES
5. MEDIUM QUALITY BEDROCK WILL BE DEFINED AS BEDROCK WITH FEW DISCONTINUITIES (LESS THAN 30% DISCONTINUITIES AND/OR BEDROCK WITH IRREGULAR LAYERING).
6. HIGHLY FRACTURED/LOW QUALITY BEDROCK WILL BE DEFINED AS BEDROCK WITH GREATER THAN 30% DISCONTINUITIES AND/OR BEDROCK WITH HORIZONTAL LAYERING THAT CAN BE REMOVED.
7. THE GREATER THE DISCONTINUITIES THE MORE SCALING REQUIRED TO FIND SOUND BEDROCK.

KEY NOTES:

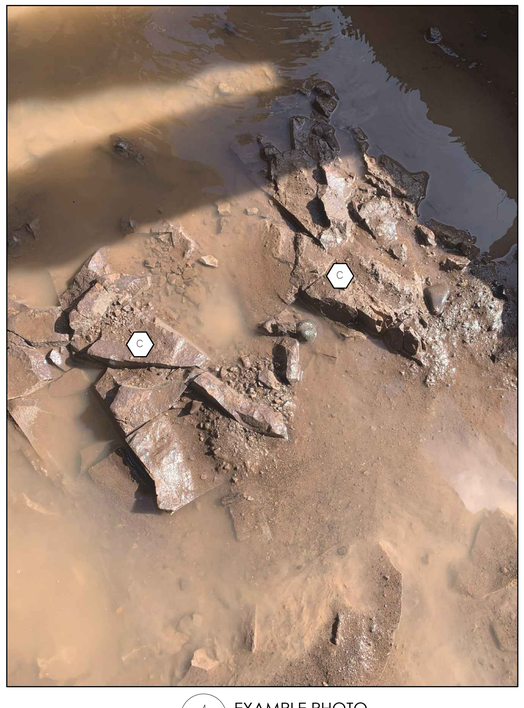
A SOUND BEDROCK

B MEDIUM QUALITY BEDROCK

C HIGHLY FRACTURED/LOW QUALITY BEDROCK



3 C2.9.3 EXAMPLE PHOTO



4 C2.9.3 EXAMPLE PHOTO



5 C2.9.3 EXAMPLE PHOTO - SITE A

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715-718-2193 - amiengineers.com
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NAME: ZACHARY MORRIS
SIGNATURE:
DATE: 08/06/2021
LIC. No.: 54405

DATE:	REV:	DESCRIPTION	REV. BY:
08/06/2021	0	ISSUED FOR ADDENDUM 2	RRD

CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

BEDROCK EXAMPLES

JOB No: 211009
DATE: 08/06/2021
DRAWN BY: RRD
DESIGNED BY: ZLM

SHEET:
C2.9.3

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GENERAL
- ALL PLAN DIMENSIONS ON THE DRAWINGS ARE MEASURED IN A TRUE HORIZONTAL PLANE UNLESS NOTED OTHERWISE.
- ALL MATERIALS AND INSTALLATION MUST MEET THE STANDARD SPECIFICATIONS LISTED IN THE DESIGN CRITERIA SECTION OF THE STRUCTURAL NOTES AND THE PROJECT SPECIFICATIONS.
- THE STRUCTURAL DRAWINGS ARE TO BE WORKED TOGETHER WITH THE COASTAL DRAWINGS AND SPECIFICATIONS FOR ALL INTER-DISCIPLINE INTERFACE WORK WHICH MAY NOT BE INCLUSIVE ON THE STRUCTURAL DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR COORDINATION AND SHALL REPORT ANY DISCREPANCY TO THE ENGINEER PRIOR TO COMMENCING THE WORK.
- OPENINGS AND PENETRATIONS NOT SHOWN IN THE CONTRACT DOCUMENTS THROUGH ANY STRUCTURAL ELEMENTS OR ITEMS EMBEDDED IN THE STRUCTURAL ELEMENTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTING THE WORK.
- PLANS, SECTIONS, AND DETAILS SHALL NOT BE SCALED FOR DETERMINATION OF SIZE, QUANTITIES, LENGTHS, ETC.
- ALL MEMBERS ARE DESIGNED TO RESIST THE DESIGN LOADS WITHIN THE COMPLETED SYSTEM. CONTRACTOR IS RESPONSIBLE FOR ADEQUATE SHORING, BRACING, ETC DURING CONSTRUCTION.
- EXISTING CONDITIONS, RELATED DIMENSIONS, ELEVATIONS INDICATED IN THE CONTRACT DOCUMENTS SHALL BE FIELD VERIFIED AS SITE CONDITIONS MAY HAVE CHANGED SINCE LAST INSPECTION BY ENGINEER. ANY VERIFIED CONDITIONS THAT DIFFER FROM THAT INDICATED IN THE CONTRACT DOCUMENTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PRODUCTION OF SHOP DRAWINGS & FABRICATION.
- WHERE A SPECIFIC MODEL, MANUFACTURER, OR GEOMETRIC SIZE/SHAPE OF AN ITEM ARE IDENTIFIED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THE MODEL, MANUFACTURER, OR GEOMETRIC SIZE/SHAPE IDENTIFIED ARE THE BASIS OF THE DESIGN. ITEMS OF OTHER MODEL, MANUFACTURER, OR GEOMETRIC SIZE/SHAPE OF EQUAL DESIGN WHICH ARE ACCEPTED BY THE ENGINEER THAT REQUIRE ANY ADDITIONAL DRAWINGS, ENGINEERING DEVIATIONS, OR CONSTRUCTION/QUANTITY CHANGES ARE THE RESPONSIBILITY OF THE CONTRACTOR INCLUDING ALL ASSOCIATED COSTS.
- THE ACCURACY OF EXISTING UNDERGROUND UTILITIES AND STRUCTURES ARE NOT GUARANTEED AND NOT INCLUSIVE. FIELD CONDITIONS SHALL BE VERIFIED PRIOR TO ANY EXCAVATION.
- THE GENERAL STRUCTURAL NOTES GIVEN IN THE CONSTRUCTION DOCUMENTS MAY NOT BE INCLUSIVE TO THE ENTIRE PROJECT. SEE FULL PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.

DESIGN CRITERIA
- CODES AND SPECIFICATIONS
  ALL DESIGN, UNLESS OTHERWISE NOTED, ARE IN ACCORDANCE WITH THE FOLLOWING:
  I. LOCAL & STATE CODES FOR WHICH THE PROJECT IS ERECTED
  II. INTERNATIONAL BUILDING CODE (IBC)
  III. ASCE STANDARD 7
- DESIGN LOADS
  A. THE STRUCTURES HAVE BEEN DESIGNED TO RESIST DESIGN LOADS ONLY AS COMPLETED STRUCTURES, UNLESS OTHERWISE NOTED ON THE DRAWINGS. ANY PROPOSED APPLICATION OF CONSTRUCTION LOADS WHICH EXCEED THE DESIGN LOADS MUST BE APPROVED BY THE ENGINEER.

TESTING NOTES
- CONTRACTOR SHALL PERFORM ALL QUALITY CONTROL TESTING PER THE SPECIFICATIONS AND SUBMIT REPORTS TO OWNER/ENGINEER WEEKLY.
- CONTRACTOR SHALL COORDINATE AND COOPERATE WITH THE ENGINEER AND OWNER'S TESTING AGENCY ENGINEER TO ALLOW FOR PERFORMANCE & QUALITY TESTING OF ALL MATERIALS.
- THE OWNER/ENGINEER WILL PERFORM OR ENGAGE A REPRESENTATIVE FIRM(S) FOR THE INDEPENDENT TESTING OF THE FOLLOWING ITEMS:
  A. CONCRETE: ONE SET OF FIVE CONCRETE TEST CYLINDERS WILL BE TAKEN FOR EACH INDIVIDUAL CONCRETE STRUCTURE (I.E. OUTFALL HEADWALL, ETC.) OR EVERY 50 CUBIC YARDS OR LESS OF CONCRETE PLACED DAILY. TEST ONE CYLINDER AT SEVEN DAYS AND THREE AT 28 DAYS AND RESERVE ONE CYLINDER FOR CONTINGENCY TESTING AT 56 DAYS. CONCRETE TEST REPORTS TO BE SUBMITTED TO THE ENGINEER. AIR CONTENT AND SLUMP TESTS SHALL BE TAKEN FOR EACH SET OF TEST CYLINDERS.

REINFORCED CONCRETE PIPE
- CONCRETE PIPE TIES SHALL BE INSTALLED IN ACCORDANCE WITH DETAIL 6/C2.9.2 TO ALL NEW REINFORCED CONCRETE PIPE.
- CONTRACTOR SHALL INSPECT ANY EXISTING RCP PIPE SECTIONS AND PIPE TIES EXPOSED DURING EXCAVATION.
- IF EXPOSED EXISTING PIPE TIES SHOW DETERIORATION, CONTRACTOR SHALL REMOVE AND REPLACE PIPE TIES.

2

CONCRETE
- ALL TOPSIDE CONCRETE AND CONCRETE MATERIALS TO BE DESIGNED, MIXED AND PLACED IN ACCORDANCE WITH THE STANDARDS AND RECOMMENDATIONS OF THE LATEST ACI-318 CODE FOR REINFORCED CONCRETE.
- ALL NEW CONCRETE PLACED UNDERWATER SHALL FOLLOW CHAPTER 8 OF ACI 304R "GUIDE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE" AND ALL EXISTING CONCRETE BELOW THE WATER SHALL BE REPAIRED IN ACCORDANCE TO ACI 546.2R "GUIDE TO UNDERWATER REPAIR OF CONCRETE".
- CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5000 PSI.
- CONCRETE SLUMP SHALL BE 4" ± 1" WITH ALLOWANCE TO USE SUPERPLASTICIZING ADMIXTURE TO INCREASE UP TO 8" IF DESIRED.
- ENTRAINED AIR SHALL BE 6% ± 1.5% (MEASURED AT TRUCK DISCHARGE).
- MAXIMUM COARSE-AGGREGATE SIZE OF SHALL BE ¾".
- CONCRETE SHALL BE DESIGNED TO A MINIMUM WATER-CEMENTITIOUS MATERIAL RATIO TO LIMIT SHRINKAGE AND PRODUCE MAXIMUM DURABILITY. MAXIMUM WATER-CEMENTITIOUS RATIO SHALL BE 0.40.
- CEMENT USED SHALL BE PORTLAND CEMENT MEETING THE REQUIREMENTS OF ASTM C150, TYPE II.
- ALL AGGREGATES SHALL CONFORM TO ASTM C33.
- ALL FLY ASH INCLUDED IN THE CONCRETE SHALL BE TYPE F MEETING THE REQUIREMENTS OF ASTM C618.
- ALL SLAG CEMENT INCLUDED IN THE CONCRETE SHALL MEET THE REQUIREMENTS OF ASTM C989.
- ALL SILICA FUME INCLUDED IN THE CONCRETE SHALL MEET THE REQUIREMENTS OF ASTM C1240.
- ALL HORIZONTAL REINFORCING BARS SHALL BE CONTINUOUS AROUND CORNERS.
- WATER USED TO BE POTABLE AND FREE OF DEBRIS, OIL, AND OTHER DELETERIOUS SUBSTANCES AND MEET THE REQUIREMENTS OF ASTM C1602.
- CONCRETE PLACED SHALL BE THOROUGHLY COMPACTED DURING PLACEMENT BY VIBRATING.
- FOLLOW ACI 305 AND ACI 306 FOR HOT AND COLD WEATHER CONSTRUCTION WHEN APPLICABLE.
- ALL FORMING SHALL BE TRUE AND STRAIGHT IN ACCORDANCE WITH ACI STANDARDS.
- ALL HORIZONTAL CONCRETE SURFACES SHALL HAVE A BROOM FINISH. ALL OTHER SURFACES SHALL HAVE SMOOTH FORM FINISH APPROVED BY THE ENGINEER; THIS FINISH SHALL NOT HAVE HONEYCOMBING, BUG HOLES OVER ¼", AND SHALL COMPLY WITH ACI SMOOTH FORM FINISH GUIDELINES.
- SUFFICIENT CURING SHALL BE PROVIDED FOR CONCRETE. WET CURE WITH BURLAP AND WATER IMMEDIATELY AFTER FINISHING AND FOR A MINIMUM OF 7 DAYS. ALTERNATELY USE CURING COMPOUND ON FORMED SIDES, ONLY AFTER REMOVAL OF FORMS. CURE AS PER ACI STANDARDS.
- ALL EMBEDDED ITEMS AND OPENINGS REQUIRED FOR UTILITY SERVICES SHALL BE INCORPORATED INTO THE STRUCTURES WHETHER OR NOT THEY ARE DETAILED OR INDICATED ON THE STRUCTURAL DRAWINGS
- ALL ITEMS EMBEDDED INTO CONCRETE SHALL BE CLEANED TO REMOVE ALL LOOSE SCALE, RUST, AND MARINE GROWTH. REFER TO THE RESPECTIVE DRAWINGS FOR THE DETAILS OF EMBEDDED ITEMS AND OPENINGS.
- ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED ¾" BY ¾" UNLESS SHOWN OTHERWISE.
- THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO OWNERS REPRESENTATIVE FOR REINFORCING STEEL BEFORE PROCEEDING WITH FABRICATION.

REINFORCING STEEL
- ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60, WITH A MINIMUM YIELD POINT OF 60,000 PSI.
- ALL REINFORCING BAR DIMENSIONS SHOWN ON THE DRAWINGS ARE TO CENTERLINE OF BARS UNLESS NOTED OTHERWISE.
- DETAIL REINFORCING STEEL IN ACCORDANCE WITH "ACI DETAILING MANUAL" ACI SP66 AND "CRSI: MANUAL OF STANDARD PRACTICE AND RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS", EXCEPT WHERE SHOWN OTHERWISE.
- DEVELOPMENT LENGTH AND LAP SPLICE LENGTH OF REINFORCING BARS SHALL BE AS SHOWN ON THE PLANS. ALL REINFORCING BAR SPLICES SHALL BE CLASS "B" TENSION LAP SPLICES, UNLESS NOTED OTHERWISE.
- REINFORCING MEETING ASTM A615 SHALL NOT BE WELDED WITHOUT PRIOR APPROVAL FROM ENGINEER.

EARTHWORK
- NON-FROST SUSCEPTIBLE SOIL SHALL BE MATERIAL THAT DOES NOT DISPLAY SIGNIFICANT DETRIMENTAL ICE SEGREGATION DURING FREEZING. GENERALLY SOILS WITH LESS THAN 6% BY MASS PASSING A #200 SIEVE.
- ALL STRUCTURAL FILL MATERIAL PLACED IN WATER DEPTH GREATER THAN ONE FOOT SHALL BE VIBROCOMPACTED.
- CONTRACTOR SHALL SUBMIT VIBROCOMPACTION EQUIPMENT AND PROCEDURES FOR APPROVAL PRIOR TO STARTING WORK

SUBMITTALS
THE FOLLOWING ITEMS SHALL BE SUBMITTED AND APPROVED BY THE ENGINEER OR OWNERS REPRESENTATIVE PRIOR TO THE PURCHASE AND INSTALLATION OF THE ITEM

- CONCRETE
  A. MIX DESIGNS AND MATERIAL SPECIFICATIONS INCLUDING NON-SHRINK GROUT
  B. STEEL REINFORCING MATERIAL SPECIFICATIONS AND PLACEMENT DRAWINGS THAT DETAIL FABRICATION, BENDING, PLACEMENT, BAR SIZES, LENGTHS, AND SPLICE LENGTHS
  C. HOT/COLD WEATHER CONSTRUCTION PROCEDURES
  D. EPOXY ADHESIVE PRODUCT, SPECIFICATIONS, AND INSTALLATION PROCEDURES
  E. CONCRETE CURING PROCEDURE AND MATERIALS
  F. FORM-RELEASE AGENT
  G. PATCHING MATERIALS INCLUDING BONDING AGENT
  H. JOINT LAYOUT
  I. COMPRESSIBLE FILLER BOARD
  J. SILICONE JOINT SEALER
  K. CONCRETE FINISH
- EARTHWORK
  A. MATERIAL SOURCE AND GENERAL DESCRIPTION
  B. BULK UNIT WEIGHT
  C. SIEVE ANALYSIS
  D. VIBROCOMPACTION EQUIPMENT AND PROCEDURES

BIDDING ASSUMPTION
- REMOVALS: EXISTING RCP TO BE REMOVED SHALL BE BID AS 8'-0" SECTIONS. CONTRACTOR SHALL SUBMIT DEDUCTION TO CONTRACT PRICE IF EXISTING RCP IS FOUND TO BE SHORTER IN FIELD.
- EXISTING CONCRETE HEADWALLS SHALL BE BID FOR REMOVAL AND REPLACEMENT. IF AFTER EXCAVATION AND EXPOSURE OF EXISTING HEADWALL, ENGINEER DETERMINES EXISTING HEADWALL IS IN GOOD CONDITION AND SHALL REMAIN, CONTRACTOR SHALL SUBMIT A DEDUCTION TO CONTRACT PRICE.

CIRCULAR OUTFALLS

LOCATION	INSIDE DIAMETER	OUTFALL REPLACEMENT TYPE	REMOVAL DETAIL	REPLACEMENT EXTENTS DETAILS	HEADWALL DETAIL	EXISTING INLET ELEVATION	EXISTING TOP OF PIPE	ESTIMATED BOTTOM OF FOOTING**
	(in)					(SEE NOTE 1)	(ft)	(ft) FIELD VERIFY
SITE B	12	TYP	1/S1.0.0	2/S1.0.0	1/S2.0.0	606.7	608.0	603.5
SITE D	54	-	3/S1.0.0	4/S1.0.0	1/S2.1.0	602.9	607.9	599.2
SITE E	15	TYP	1/S1.0.0	2/S1.0.0	1/S2.0.0	606.3	608.6	603.1
SITE F	30	-	1/S1.1.0	2/S1.1.0	3/S2.1.0	606.5	609.7	603.2
SITE G	42	-	3/S1.1.0	4/S1.1.0	1/S2.2.0	603.8	607.6	600.4
SITE H	15	TYP	1/S1.0.0	2/S1.0.0	1/S2.0.0	606.3	608.1	603.1

1. NEW RCP PIPE SECTIONS SHALL BE INSTALLED TO MATCH EXISTING SLOPE. A MINIMUM 0.5% SHALL BE MAINTAINED. CONTRACTOR SHALL FIELD VERIFY NEW INVERT ELEVATION.
** CONCRETE PLACED UNDERWATER SHALL BE PLACED WITH UNDERWATER PLACEMENT PROCEDURES

ARCH OUTFALLS

LOCATION	EQUIVALENT DIAMETER	SPAN	RISE	OUTFALL REPLACEMENT TYPE	REMOVAL DETAIL	REPLACEMENT EXTENTS DETAILS	HEADWALL DETAIL	EXISTING INLET ELEVATION	EXISTING TOP OF PIPE	ESTIMATED BOTTOM OF FOOTING**
	(in)	(in)	(in)					(SEE NOTE 1)	(ft)	(ft) FIELD VERIFY
SITE E	36	44	26 5/8	TYP	1/S1.0.0	2/S1.0.0	3/S2.0.0	607.5	609.8	603.75
SITE E	36	44	26 5/8	TYP	1/S1.0.0	2/S1.0.0	3/S2.0.0	607.1	609.6	603.75

1. NEW RCP PIPE SECTIONS SHALL BE INSTALLED TO MATCH EXISTING SLOPE. A MINIMUM 0.5% SHALL BE MAINTAINED. CONTRACTOR SHALL FIELD VERIFY NEW INVERT ELEVATION.
** CONCRETE PLACED UNDERWATER SHALL BE PLACED WITH UNDERWATER PLACEMENT PROCEDURES

CONCRETE REINFORCEMENT TENSION DEVELOPMENT AND LAP SPLICE LENGTHS

BAR SIZE	LAP SPLICE CLASS	CONCRETE COVER = 0.75"		CONCRETE COVER = 1.00"		CONCRETE COVER = 1.50"		CONCRETE COVER ≥ 2.00"	
		TOP	OTHER	TOP	OTHER	TOP	OTHER	TOP	OTHER
#3	A	12	12	12	12	12	12	12	12
	B	16	16	16	16	16	16	16	16
#4	A	19	15	15	12	15	12	15	12
	B	24	19	20	16	20	16	20	16
#5	A	28	21	22	17	19	15	19	15
	B	36	28	29	22	24	19	24	19
#6	A	37	29	31	24	22	17	22	17
	B	48	37	40	31	29	22	29	22
#7	A	60	46	50	38	37	28	33	25
	B	78	60	64	50	48	37	42	33
#8	A	74	57	62	48	47	36	37	29
	B	96	74	80	62	60	47	48	37
#9	A	90	69	76	58	57	44	46	36
	B	117	90	98	76	74	57	60	46
#10	A	108	83	92	70	70	54	57	44
	B	140	108	119	92	91	70	74	57
#11	A	127	98	108	83	84	64	68	53
	B	165	127	141	108	109	84	89	68

NOTES:
1. TABULATED VALUES ARE BASED ON GRADE 60 UNCOATED REINFORCING BARS AND 4000 PSI NORMAL WEIGHT CONCRETE. LENGTHS ARE IN INCHES.
2. TENSION DEVELOPMENT LENGTH AND LAP SPLICE LENGTHS ARE CALCULATED PER ACI 318-11, SECTIONS 12.2.3 AND 12.15.
3. TENSION DEVELOPMENT LENGTH = 1.0 x CLASS A LAP SPLICE
4. FOR 3000 PSI AND 5000 PSI CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.16 AND 0.90 RESPECTIVELY.
5. BAR c. - c. SPACING WAS ASSUMED TO BE GREATER THAN TWICE THE CONCRETE COVER PLUS ONE BAR DIAMETER.
6. TOP BARS ARE DEFINED AS HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.
7. FOR LIGHTWEIGHT AGGREGATE CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.
8. FOR EPOXY COATED REBAR, MULTIPLY THE TABULATED VALUES BY 1.2.
9. FOR LAP SPLICE LENGTHS IN MASONRY SEE MASONRY NOTES.
10. COVER IS CLEAR DISTANCE FROM THE CONCRETE SURFACE TO OUTERMOST SURFACE OF REINFORCING.

CONCRETE REINFORCEMENT PROTECTION

EXPOSURE	STRUCTURAL ELEMENTS	BAR SIZE	CLEAR COVER
CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	ALL	ALL	3"
CONCRETE EXPOSED TO EARTH OR WEATHER	ALL	NO. 6 THRU NO. 18 BARS NO. 5 BAR, W31 OR D31 WIRE AND SMALLER	2" 1 1/2"
CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	SLABS, WALLS, JOISTS	NO. 14 AND NO. 18 BARS NO. 11 BAR AND SMALLER	1 1/2" 3/4"
	BEAMS, COLUMNS	PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS	1 1/2"

INDEX	
SHEET	DESCRIPTION
S0.0.0	OUTFALL NOTES & SCHEDULES
S1.0.0	OUTFALL REMOVAL AND REPLACEMENT EXTENTS
S1.1.0	OUTFALL REMOVAL AND REPLACEMENT EXTENTS
S2.0.0	OUTFALL REPLACEMENT DETAILS
S2.1.0	OUTFALL REPLACEMENT DETAILS
S2.2.0	OUTFALL REPLACEMENT DETAILS
S2.3.0	OUTFALL REPLACEMENT DETAILS

AMI Consulting Engineers P.A.
91 Main Street SUPERIOR, WI
715.718.2193 - amiengineers.com
TWIN CITIES - IRON RANGE

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NAME: CHASE A DEWHIRST
SIGNATURE:
LIC. No: 49838
DATE: 7/29/21

REV:	DATE:	DESCRIPTION
CAD		
CAD	1 7/29/21	ISSUED FOR ADDENDUM 1
	2 8/6/21	ISSUED FOR ADDENDUM 2

CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

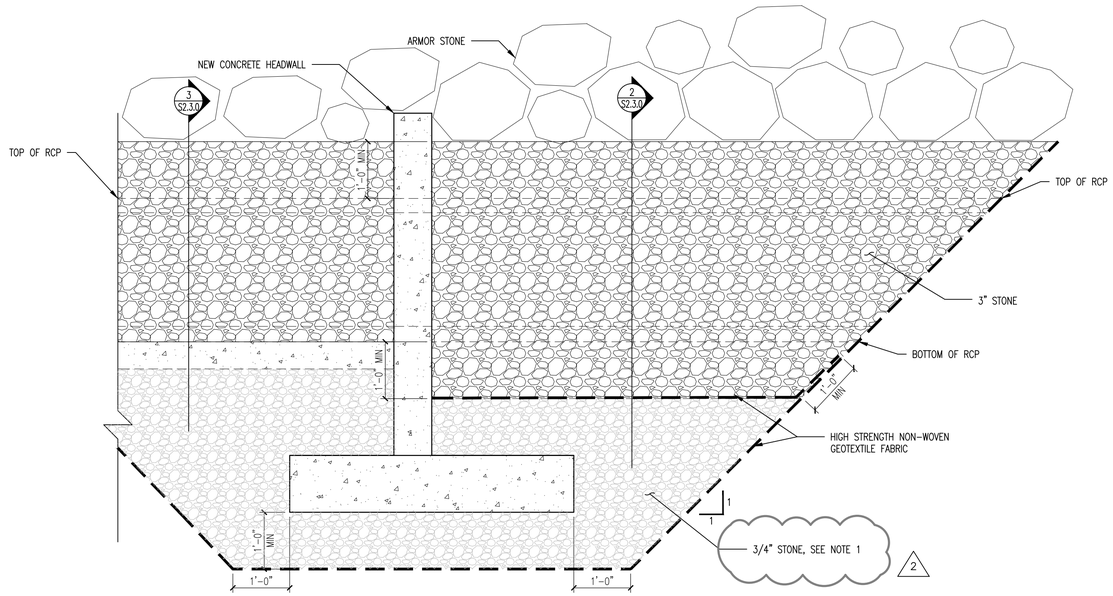
OUTFALL NOTES AND SCHEDULES

JOB No: 211009
DATE: 7/29/2021
DRAWN BY: SAJ
DESIGNED BY: KKM

SHEET: S0.0.0

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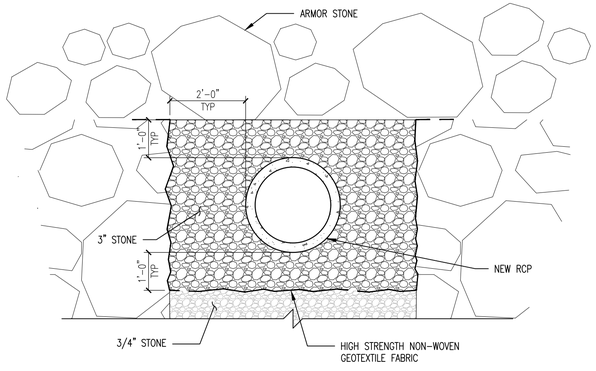


1 S2.3.0 CONCRETE HEADWALL BACKFILL DETAIL

3/4" = 1'-0"

1. 3/4" STONE SHALL BE NON-FROST SUSCEPTIBLE.

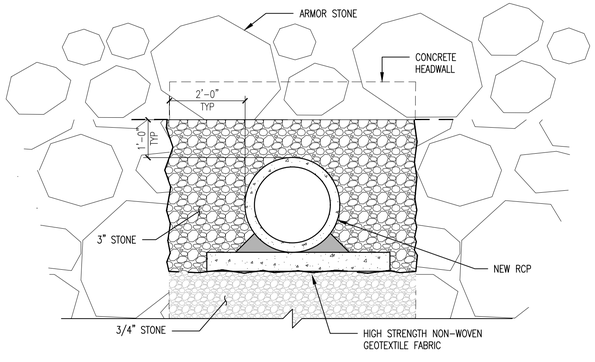
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2 S2.3.0 RCP BACKFILL SECTION

1/2" = 1'-0"

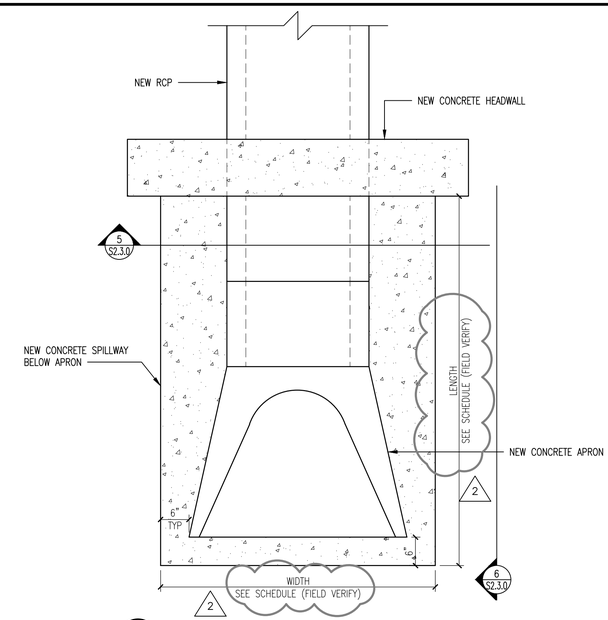
1. GEOTEXTILE FABRIC SHALL WRAP UNDER RCP BACKFILL SECTION AND BE SECURED IN ARMOR STONE.



3 S2.3.0 RCP BACKFILL SECTION AT CONCRETE SPILLWAY

1/2" = 1'-0"

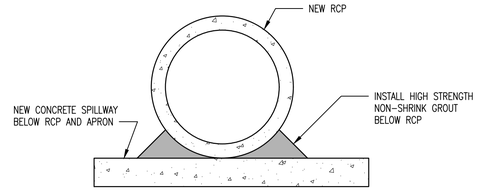
1. GEOTEXTILE FABRIC SHALL WRAP UNDER RCP BACKFILL SECTION AND BE SECURED IN ARMOR STONE.



4 S2.3.0 CONCRETE SPILLWAY AT OUTFALLS

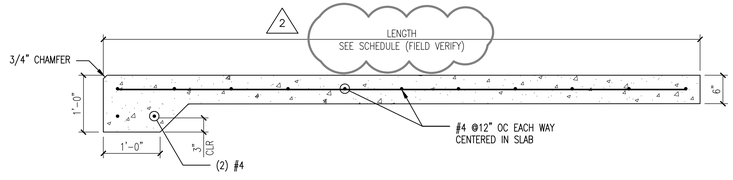
3/4" = 1'-0"

1. CONCRETE HEADWALL FOOTING NOT SHOWN FOR CLARITY



5 S2.3.0 RCP GROUT AT CONCRETE SPILLWAY DETAIL

3/4" = 1'-0"



6 S2.3.0 CONCRETE SPILLWAY SECTION

3/4" = 1'-0"

CONCRETE SPILLWAY SCHEDULE

CIRCULAR OUTFALLS			
LOCATION	INSIDE DIAMETER (in)	ESTIMATED CONCRETE SPILLWAY LENGTH	ESTIMATED CONCRETE SPILLWAY WIDTH
SITE B	12	8'-1"	3'-4"
SITE D	54	10'-2"	9'-5"
SITE E	15	8'-1"	3'-11"
SITE F	30	8'-2"	6'-7"
SITE G	42	10'-2"	8'-3"
SITE H	15	8'-1"	9'-5"
ARCH OUTFALLS			
LOCATION	EQUIVALENT DIAMETER (in)	ESTIMATED CONCRETE SPILLWAY LENGTH	ESTIMATED CONCRETE SPILLWAY WIDTH
SITE E	TWO 36	10'-0"	14'-8"

2

AMI Consulting Engineers P.A.
91 Main Street SUPERIOR, WI
715.718.2193 - amiengineers.com
TWIN CITIES - IRON RANGE

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

NAME: CHASE A DEWHIRST
SIGNATURE:
LIC. No: 49838
DATE: 7/29/21

DATE:	REV:	DESCRIPTION	REV. BY:
7/29/21	1	ISSUED FOR ADDENDUM 1	CAD
8/6/21	2	ISSUED FOR ADDENDUM 2	CAD

CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

OUTFALL REPLACEMENT DETAILS

JOB No: 211009
DATE: 7/29/2021
DRAWN BY: SAJ
DESIGNED BY: KKM

SHEET:
S2.3.0

7/29/2021 3:58 PM
J:\2021\21109\CAD\Shoreline Rehab Phase IV\Moline\3_CAD\OUTFALL DETAILS.dwg