Purchasing Division
Finance Department

Room 120
411 West First Street
Duluth, Minnesota 55802

218-730-5340
purchasing@duluthmn.gov

Addendum 1
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 insurance requirements specified in the standard contract are revised to include the St. Louis and Lake Counties Regional Rail Authority as an additional insured for the Public/General Liability, Auto Liability, and Excess/Umbrella Liability insurance. A certificate of insurance evidencing such coverage must be submitted to the City Purchasing office prior to contract execution and maintained in full effect for the duration of the project.

2. The insurance requirements specified in the standard contract are further revised to remove the requirement for builder's risk insurance for this project.

3. The pre-bid meeting sign-in sheet has been uploaded to the Bid Express solicitation and the City Purchasing website.

4. The City intends to award all sites to a single contractor. The breakdown by site is for FEMA reporting and billing.

5. Revised drawings are attached to this addendum.
   Revised drawings include:
   - G0.0.0 Title Sheet
   - C0.0.0 General Project Notes
   - C1.0.4 Phasing Plan Sites B-H
   - C2.9.0 Coastal Details
   - C2.9.1 Coastal Details
   - C2.9.2 Civil Details

6. New drawings have been added to the plan set and are attached to this addendum.
   New drawings include:
   - 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

7. Updates to the Project Specifications are summarized and attached to this addendum.

8. A site visit of Lot D (shaded in red below and located at approximately 900 W. Railroad St., Duluth, MN) with City of Duluth personnel and AMI Consulting Engineers, P.A. will be conducted on Wednesday, August 4th, 2021 at 8:00 A.M. Attendees should meet near the large rock pile.

9. Phase IV will include a native grass seed mix along the slope. Additional vegetation such as native trees and shrubs will not be required for this project but will be a part of a future phase of the Lakewalk rehabilitation. Reference detail 4/C2.9.2 for additional information.

10. The Bid Form has been revised.
    Revisions include:
    Alt 5 added to Site A for crack repairs to the existing concrete retaining wall.

11. The Contractor shall properly prepare (equipment, labor, and materials) for a wide range of bedrock conditions. The Contractor shall anticipate and properly prepare to drill through igneous basalt bedrock extrusions, sedimentary rock formations (mudstone), and weathering/fractured bedrock conditions. The Contractor shall scale and remove any loose bedrock/riprap materials prior to drilling (reference Toe Stone Installation Determination Procedure notes on Drawing Sheet C2.9.0).

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 1 on the paper bid form (paper bid forms must be requested five (5) business days prior to bid opening).

Posted: **August 2, 2021**

CITY OF DULUTH SHORELINE REHAB

LAKEWALK PHASE 4

DULUTH, MN

VICINITY MAP

SITE IMAGE

OWNER

OWNER CONTACT

CITY OF DULUTH
MIKE LEBEAU
MLEBEAU@DULUTHMN.GOV
1532 W. MICHIGAN ST.
DULUTH, MN 55806

DESIGN TEAM

COASTAL ENGINEER

AMI CONSULTING ENGINEERS, P.A.
ZAC MORRIS, PE
ZAC.MORRIS@AMIENGINEERS.COM
3276 FANUM ROAD, STE 100
ST. PAUL, MN 55110
715-718-5721

STRUCTURAL ENGINEER

AMI CONSULTING ENGINEERS, P.A.
CHASE DEWHIRST, PE
CHASE.DEWHIRST@AMIENGINEERS.COM
91 MAIN STREET
SUPERIOR, WI 54880
715-718-5638

Know what's below. Call before you dig.

STATE LAW: 48 HOURS BEFORE EXCAVATING OR DEMOLISHING BUILDINGS, CALL 811 FOR FIELD LOCATION OF UNDERGROUND UTILITY LINES. THIS SERVICE LOCATES UTILITY OWNED LINES BUT NOT PRIVATE LINES.

THE LOCATIONS OF UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED. THE EXACT LOCATION OF ALL UTILITIES (PUBLIC AND PRIVATE) MUST BE DETERMINED BEFORE COMMENCING WORK.

Survey Layout Information
Coordinate System: US State Plane 1983 – MN North 2201
Datum: NAD 1983
Geoid: G12B–US

1

GOVERNING SPECIFICATIONS

SPECIFICATIONS ISSUED BY AMI CONSULTING ENGINEERS SHALL GOVERN, FOLLOWED BY THE CURRENT EDITION OF THE CITY OF DULUTH, MN CONSTRUCTION STANDARDS, AND THEN CURRENT EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION.

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: ZACHARY MORRIS
SIGNATURE:
DATE: 7/16/2021
LIC. No: 56405

DATE:	REV:	DESCRIPTION	REV. BY:
07/16/2021	0	ISSUED FOR BID	RRD
07/29/2021	1	ISSUED FOR ADDENDUM 1	RRD
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CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

TITLE SHEET

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

SHEET: G0.0.0

SHEET INDEX

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

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NAME: ZACHARY MORRIS
SIGNATURE:
DATE: 7/16/2021 LIC. No: 56405

DATE:	REV:	DESCRIPTION	REV. BY:
07/16/2021	0	ISSUED FOR BID	RRD
07/29/2021	1	ISSUED FOR ADDENDUM 1	RRD
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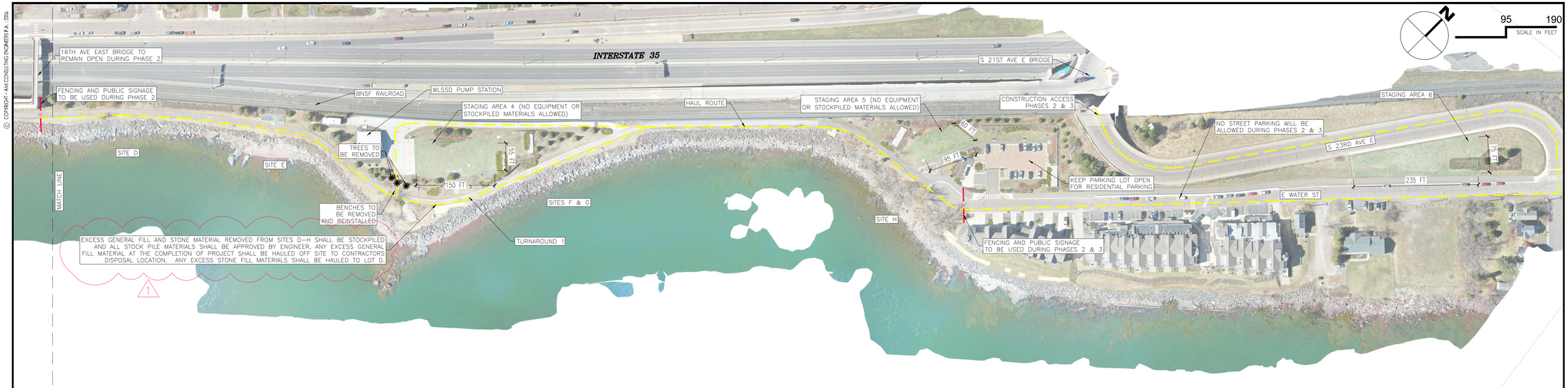
CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

GENERAL PROJECT NOTES

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

SHEET: C0.0.0



1 / C1.0.4 PHASE 2 MAP

PHASING LEGEND:

- HAUL ROUTE
- FENCE
- STAGING AREA

STAGING NOTES:

1. PHASE 2
   - 1.1. STAGING AREA 1 – LOT D
   - 1.2. STAGING AREA 4 – WLSSD PUMP STATION
   - 1.3. STAGING AREA 5 – GREEN SPACE NEAR E WATER ST PUBLIC PARKING
   - 1.4. STAGING AREA 6 – S 23RD AVE EAST AND E WATER STREET
2. PHASE 3
   - 1.1. STAGING AREA 1 – LOT D
   - 1.2. STAGING AREA 3 – TURNAROUND 2 AREA
   - 1.3. STAGING AREA 4 – WLSSD PUMP STATION
   - 1.4. STAGING AREA 5 – GREEN SPACE NEAR E WATER ST PUBLIC PARKING
   - 1.5. STAGING AREA 6 – S 23RD AVE EAST AND E WATER STREET

2 / C1.0.4 PHASE 3 MAP

1. SEE SHEET C1.0.1 FOR CONSTRUCTION PHASING NOTES AND LIMITATIONS.
2. SEE SHEET C1.0.5 FOR ADDITIONAL INFORMATION ON DETOURS AND PEDESTRIAN ACCESS.

AMI Consulting Engineers P.A.
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NAME: ZACHARY MORRIS
SIGNATURE:
DATE: 7/14/2021
LIC. No.: 54405

REV.	DATE:	DESCRIPTION
0	07/16/2021	ISSUED FOR BID
1	07/29/2021	ISSUED FOR ADDENDUM 1
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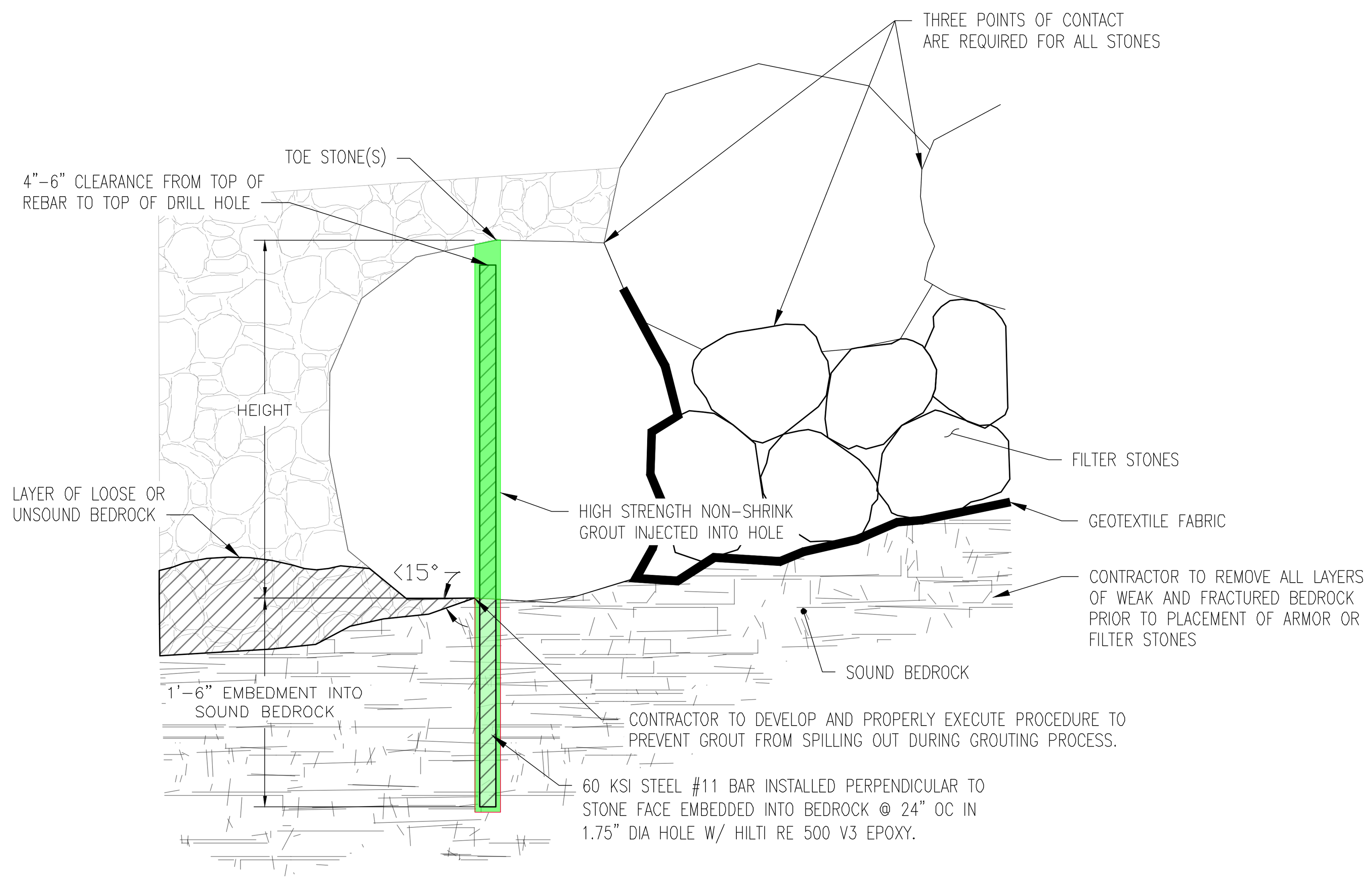
CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

PHASING PLAN
SITES B-H

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

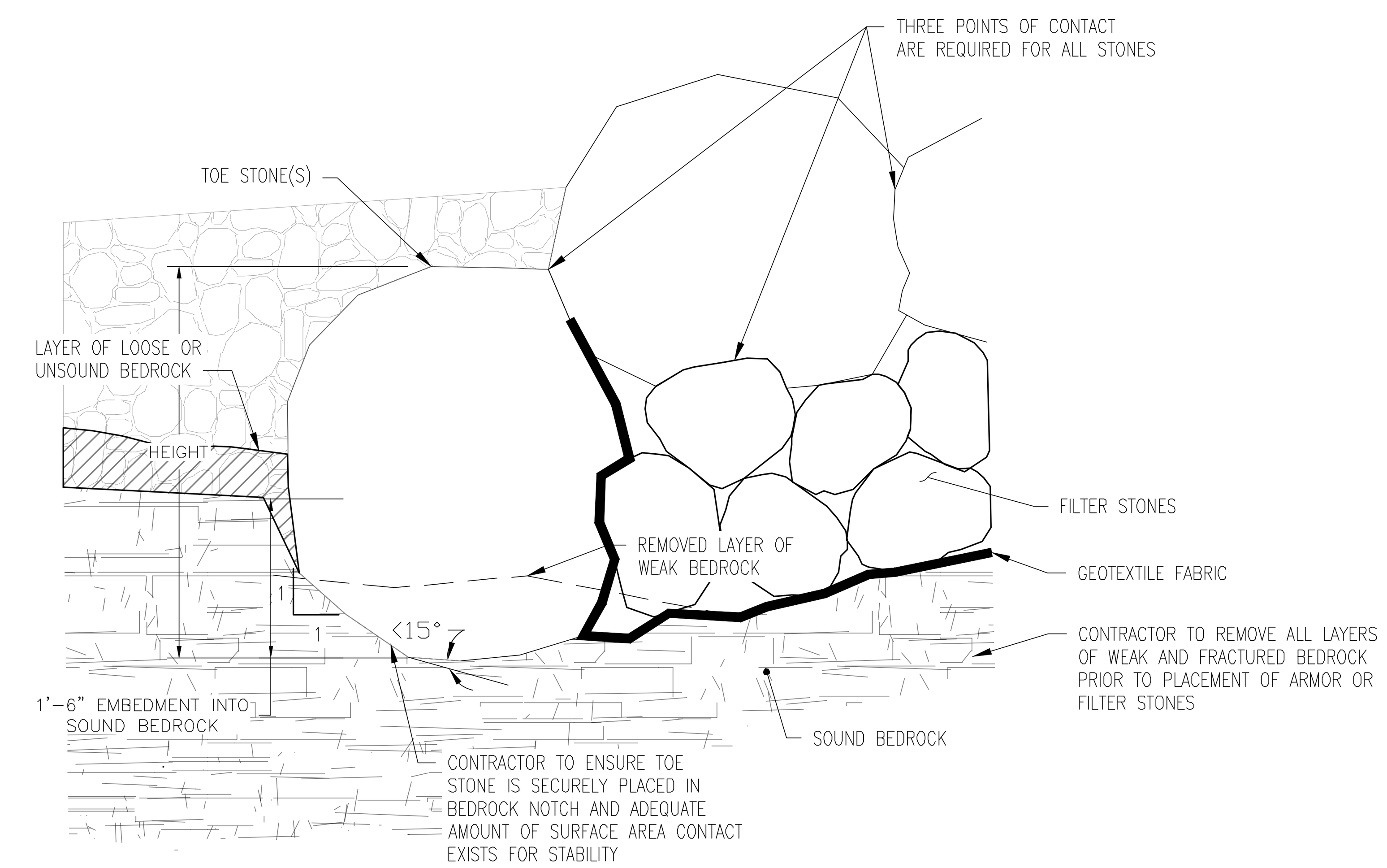
SHEET:
C1.0.4



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



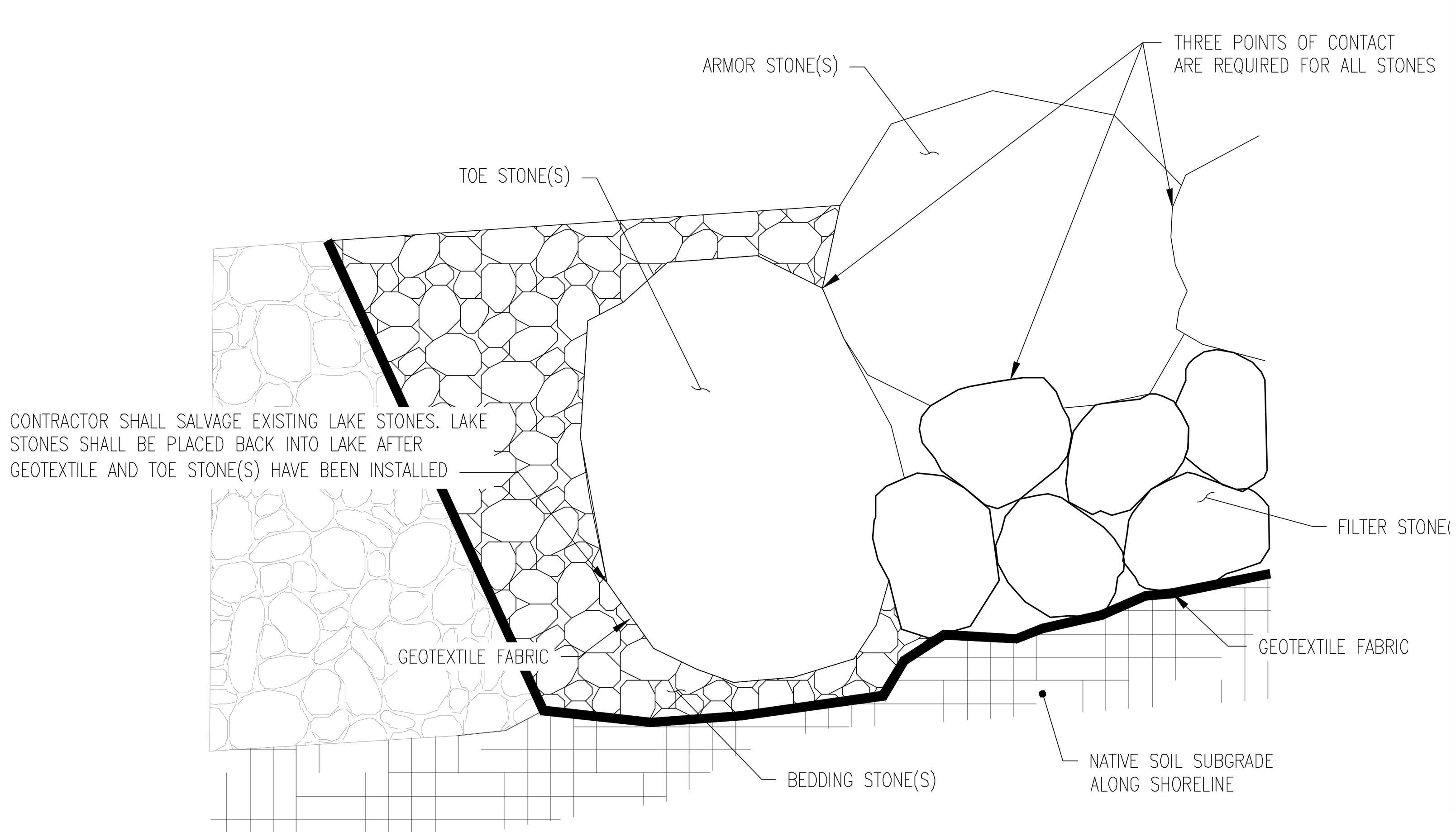
2 / C2.9.0 TYPICAL TOE STONE TRENCHED INTO BEDROCK
NOT TO SCALE

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

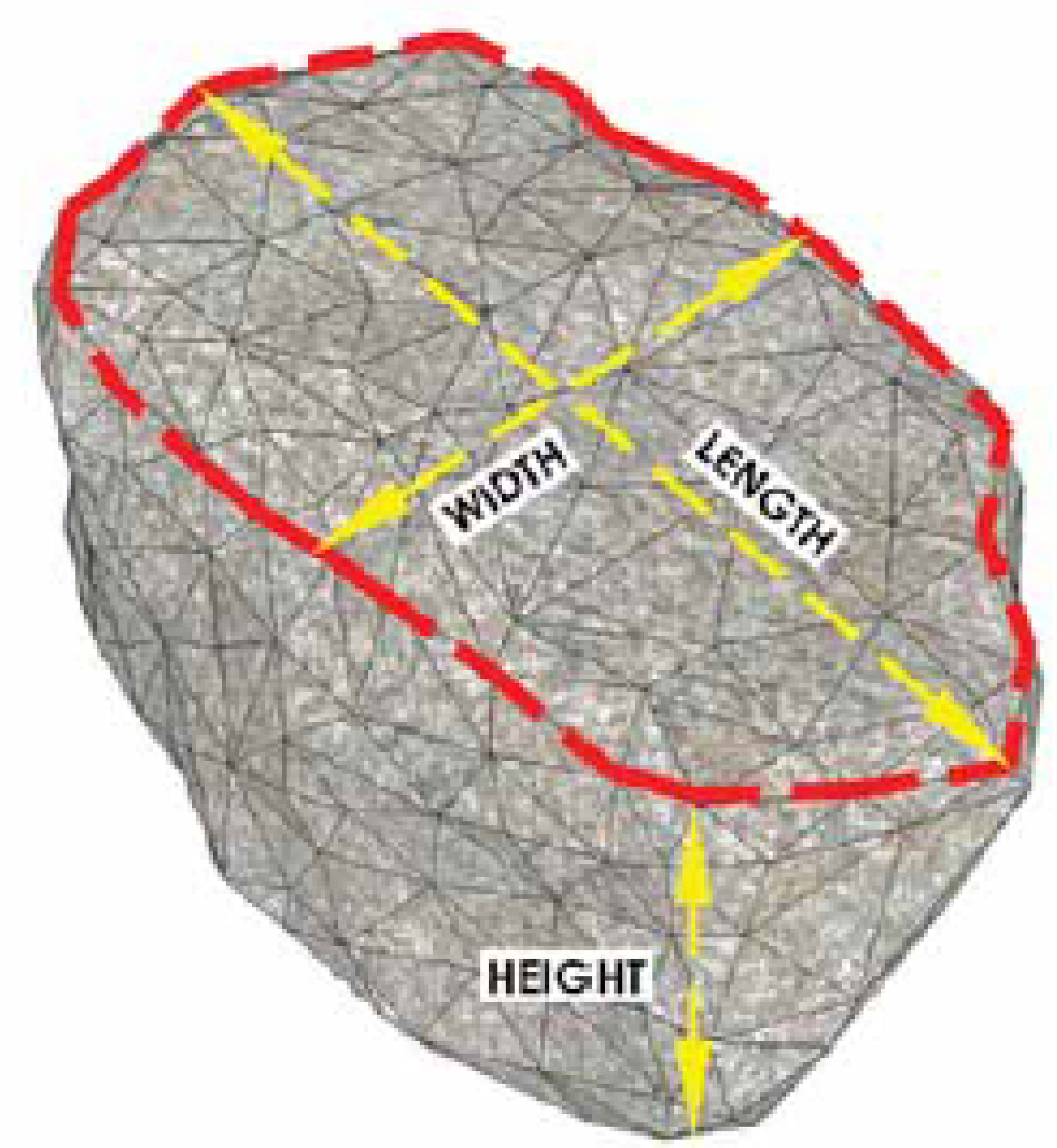
1. CONTRACTOR SHALL EXCAVATE AT THE PROPOSED LOCATION OF THE TOE STONE TO EITHER:
   1.a. EXISTING BEDROCK ELEVATION
   1.b. 3 FT BELOW EXISTING GRADE (BEG) OR ELEVATION 598 FT, WHICHEVER IS GREATER
   1.c. IF EXCAVATION IS REQUIRED TO BELOW ELEVATION 598 FT (WITH AT LEAST 2 FT EMBEDMENT), THE CONTRACTOR 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:

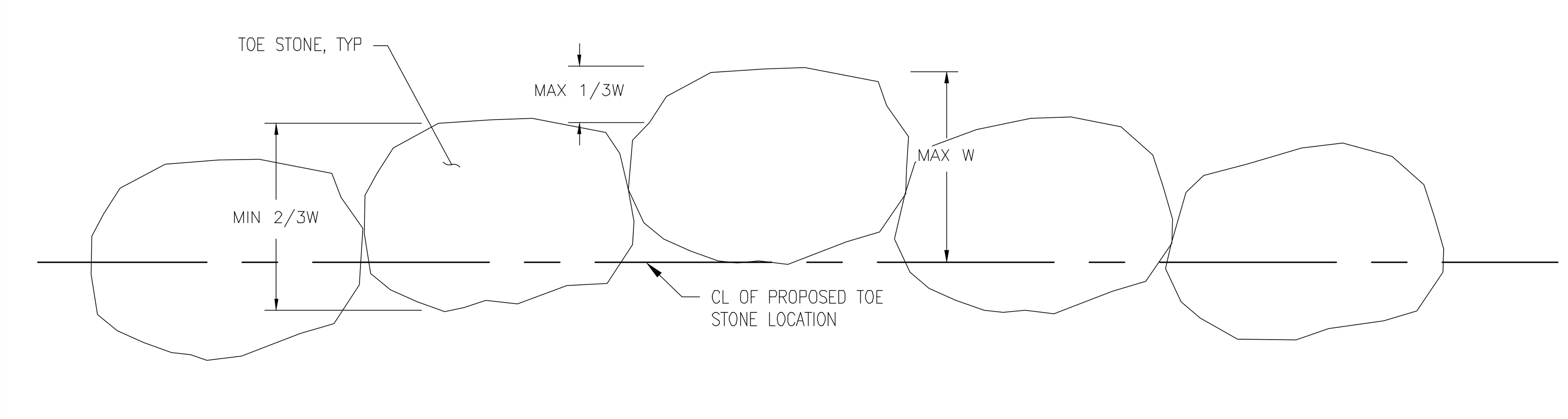
1. HEIGHT TOLERANCE (2'-6" TO 4'-6")
2. MAX ASPECT RATIO TOLERANCE (3:1)
3. WEIGHT RANGE (6 TO 12 TONS)
4. 4 FT MINIMUM EMBEDMENT



4 / C2.9.0 STONE ASPECT RATIO DETAIL
NOT TO SCALE

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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LIC. No. 56405

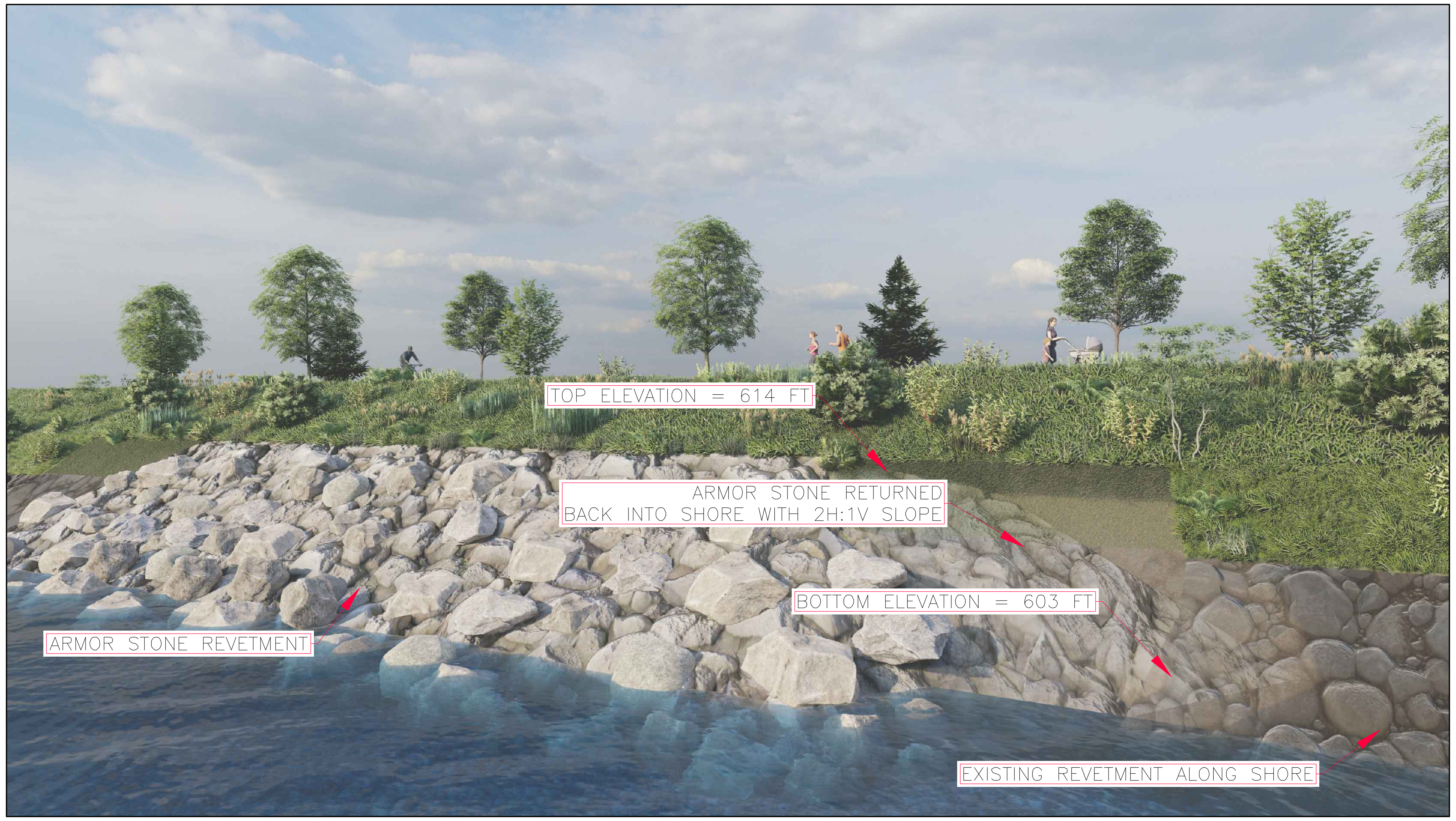
DATE:	REV:	DESCRIPTION	REV. BY:
07/16/2021	0	ISSUED FOR BID	RRD
07/29/2021	1	ISSUED FOR ADDENDUM 1	RRD

CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

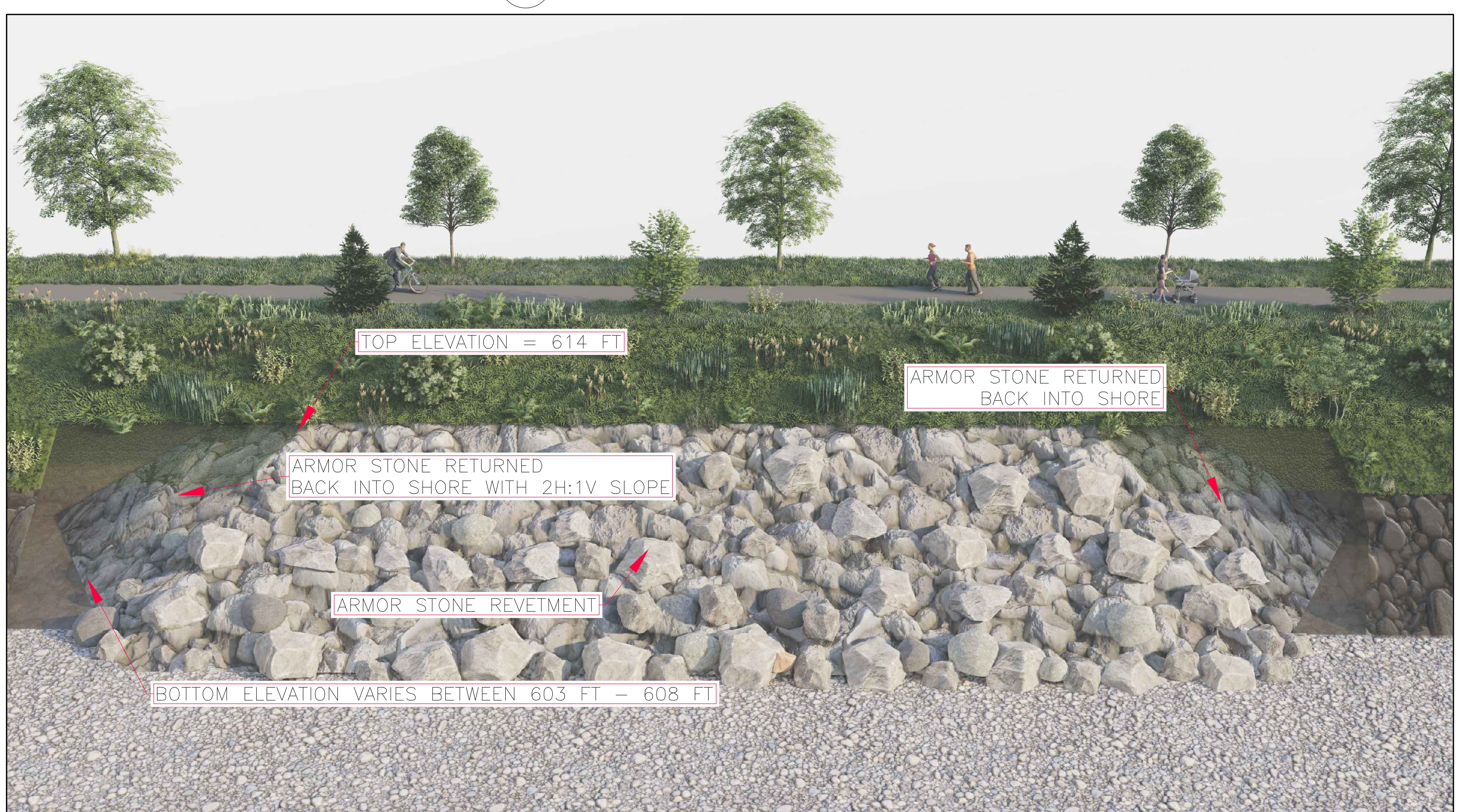
COASTAL DETAILS

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

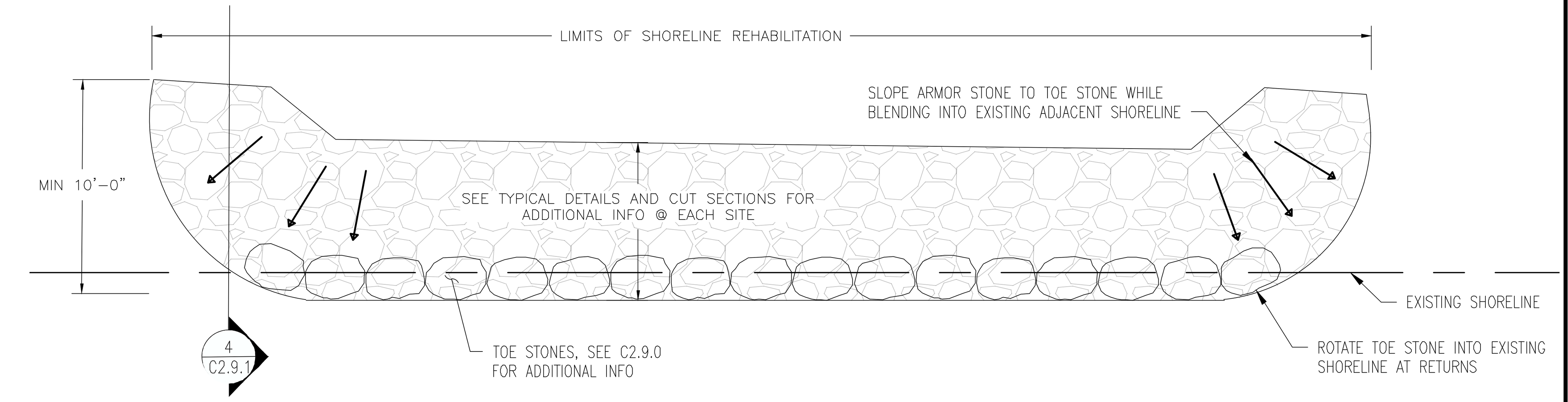
SHEET: C2.9.0



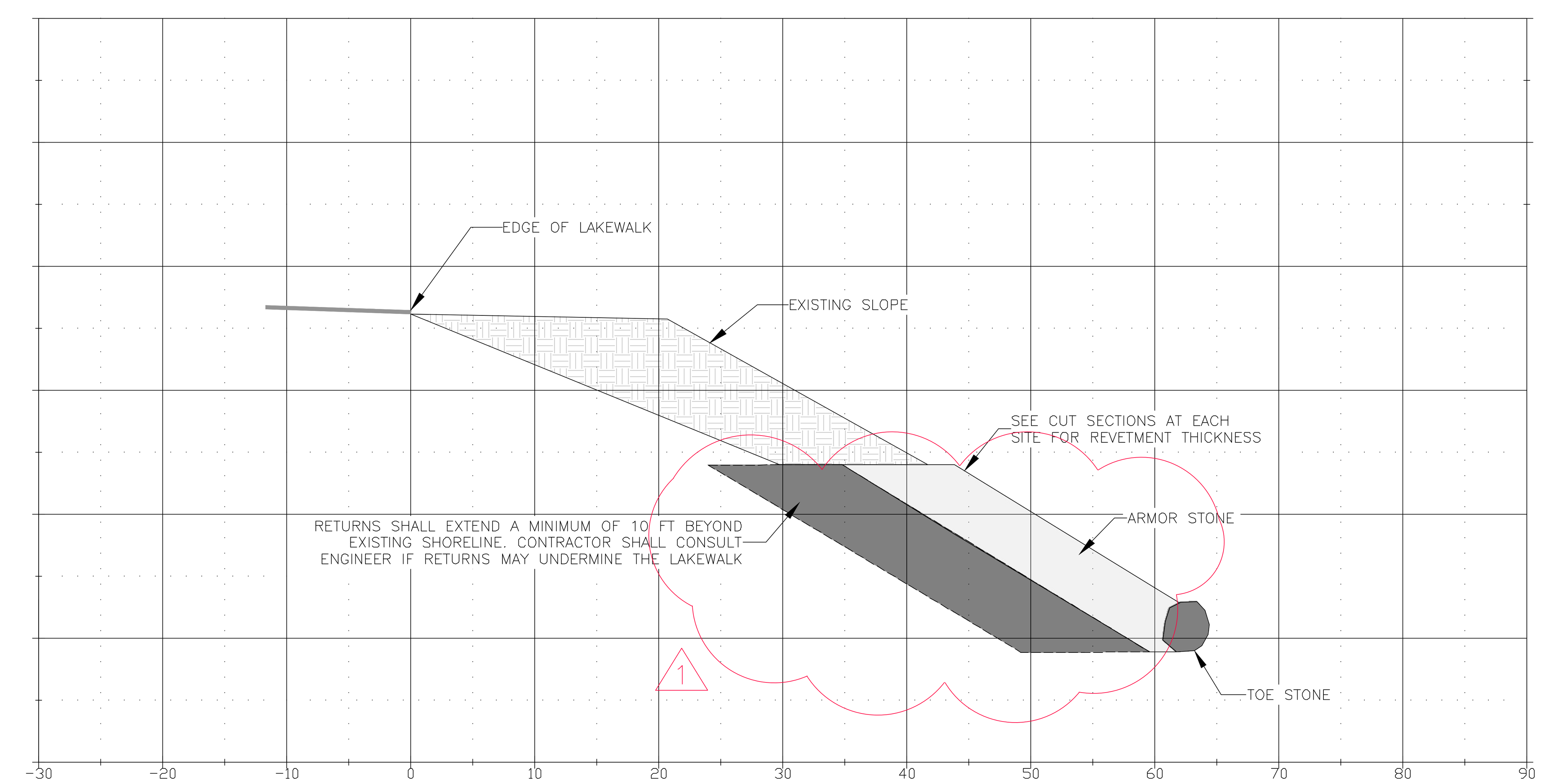
1 C2.9.1 TYPICAL REVETMENT RETURN DETAIL



2 C2.9.1 REVETMENT RETURN DETAIL



3 C2.9.1 TYPICAL RETURN DETAIL



4 C2.9.1 TYPICAL RETURN CROSS-SECTION

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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: ZACHARY MORRIS
SIGNATURE:
DATE: 7/16/2021
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CITY OF DULUTH SHORELINE REHAB
LAKEWALK PHASE 4
DULUTH, MN

COASTAL DETAILS

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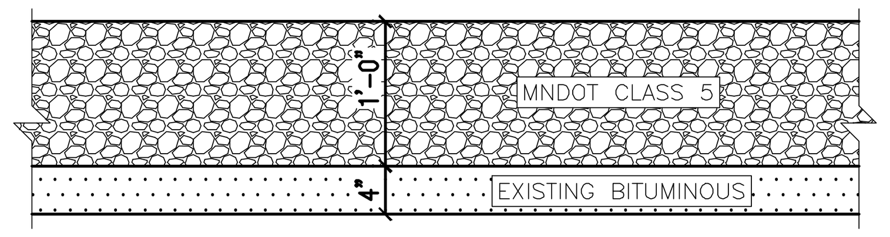
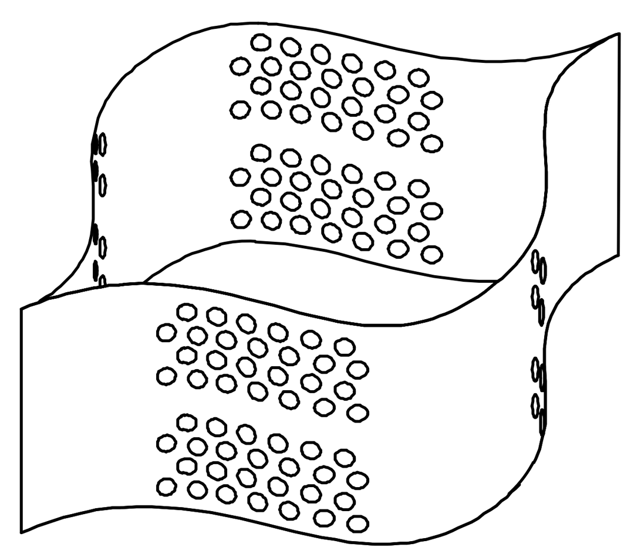


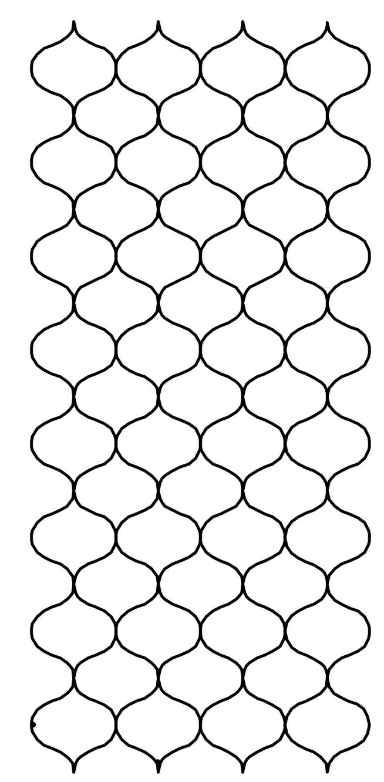
1 C2.9.2 LAKEWALK PROTECTION DETAIL
SCALE: 3/4"=1'-0"

NOTES:

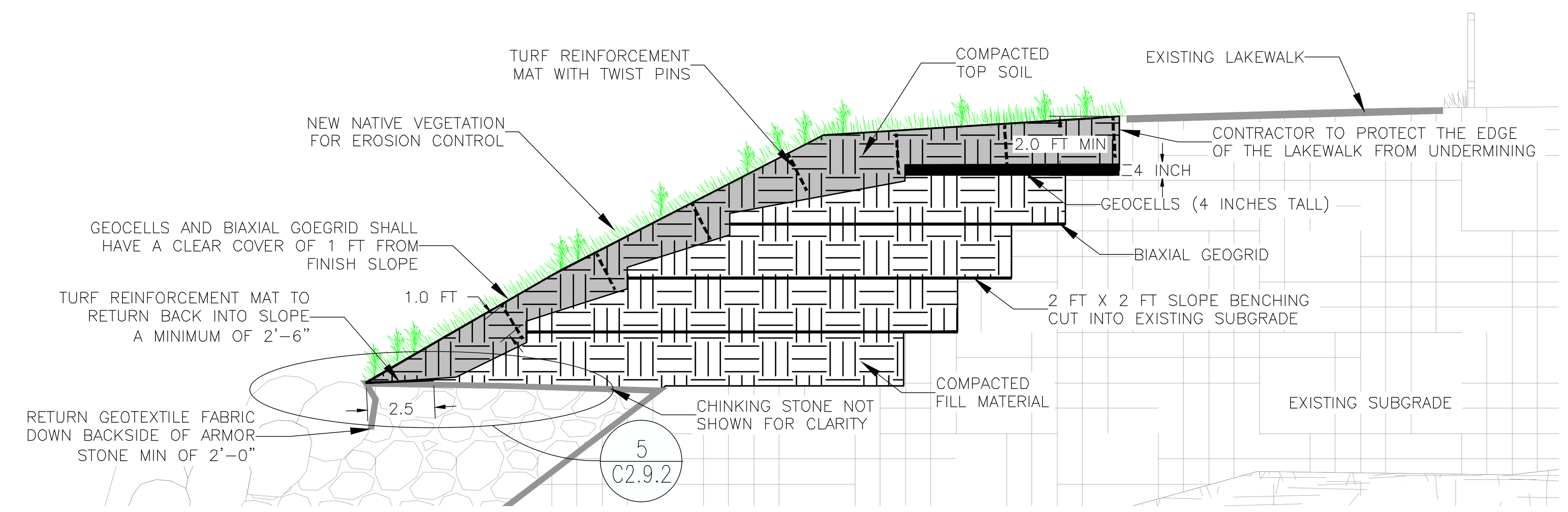
1. ASSUMED THICKNESS OF THE EXISTING BITUMINOUS IS 4 INCHES



2 C2.9.2 INDIVIDUAL CELL DETAIL
NOT TO SCALE



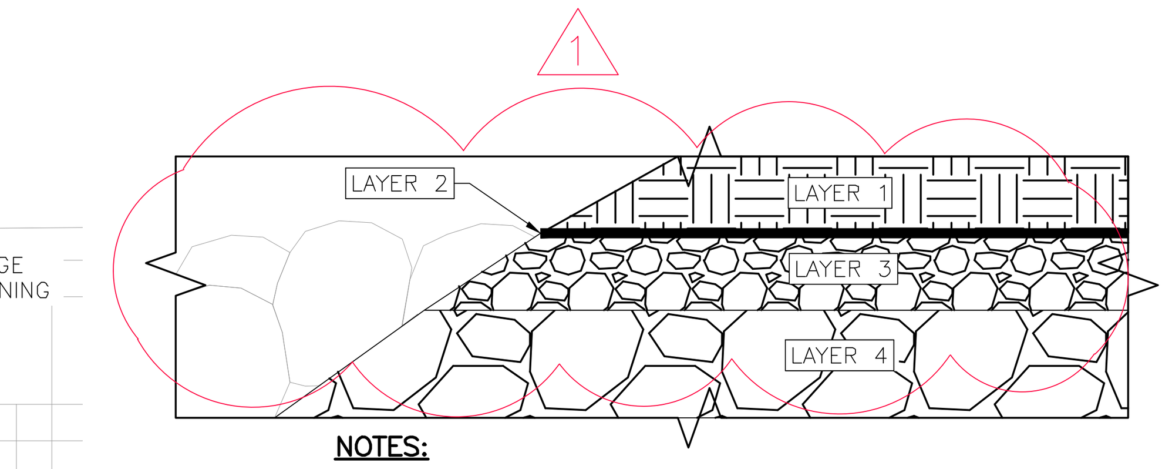
3 C2.9.2 GEOCELL PLAN VIEW
NOT TO SCALE



4 C2.9.2 SLOPE STABILIZATION OVERVIEW
NOT TO SCALE

NOTES:

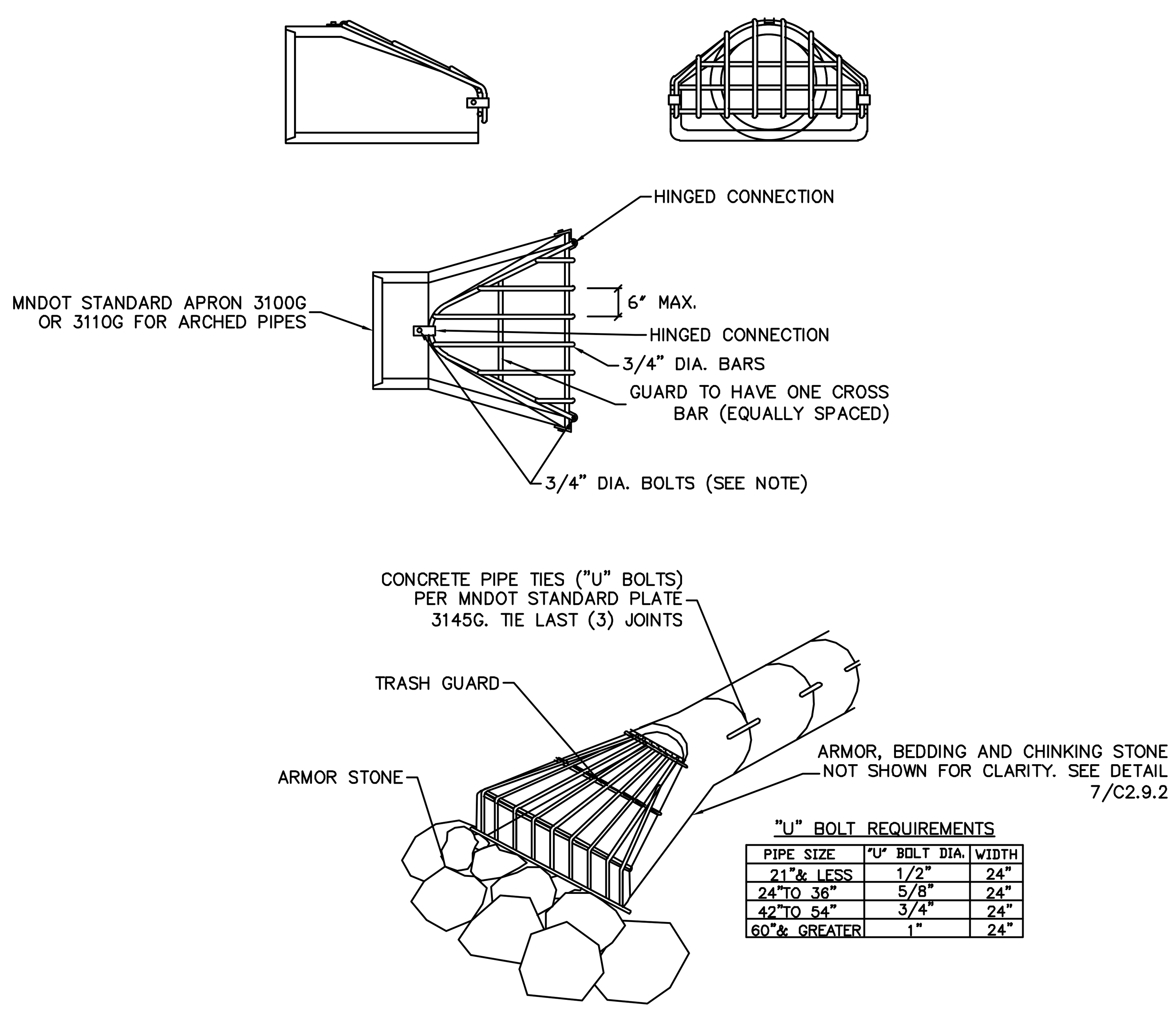
1. IF SLOPE RESTORATION AREA IS LESS THAN 2 FT DEEP (VERTICAL), TURF REINFORCEMENT MAT WITH TWIST PIN AREA REQUIRED.



NOTES:

1. LAYER 1 – COMPACTED FILL MATERIAL
2. LAYER 2 – HIGH STRENGTH NON–WOVEN GEOTEXTILE
3. LAYER 3 – ONE LAYER OF 6"–12" CHINKING STONE
   3.1. THE STONE MAY NOT APPEAR AS AN ADDITIONAL LAYER BUT WILL FILL THE VOIDS BETWEEN THE SALVAGED STONES CREATING A LEVEL BASE.
4. LAYER 4 – SALVAGED STONE

5 C2.9.2 SLOPE FOUNDATION DETAIL
NOT TO SCALE



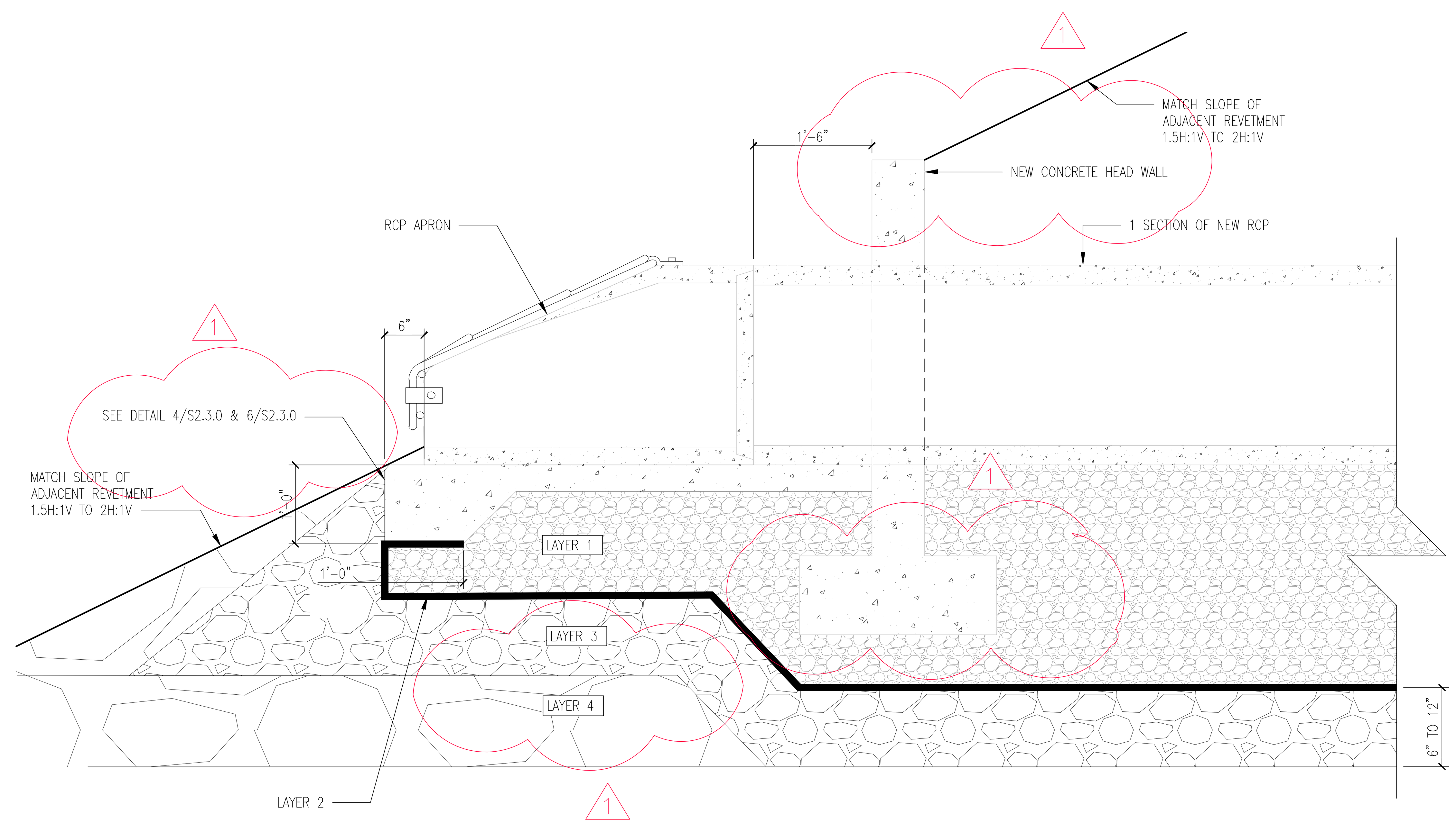
"U" BOLT REQUIREMENTS

PIPE SIZE	"U" BOLT DIA.	WIDTH
21"& LESS	1/2"	24"
24"TO 36"	5/8"	24"
42"TO 54"	3/4"	24"
60"& GREATER	1"	24"

NOTES:

1. TWO –"U" BOLT FASTENERS TO BE INSTALLED ACROSS EACH JOINT, ONE ON EACH SIDE OF THE PIPE AT 60° FROM THE TOP OF THE PIPE.
2. AFTER FABRICATION – HOT DIP GALVANIZE PER MNDOT 3392, OR APPROVED EQUAL. FASTEN FIRST THREE JOINTS.
3. BOLT HOLES (7/8") TO BE DRILLED IN CONCRETE AT INSTALLATION.

6 C2.9.2 RCP APRON WITH TRASH GUARD DETAIL
NOT TO SCALE



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4. LAYER 4 – SALVAGED STONE

7 C2.9.2 RCP HEADWALL DETAIL
1/2"=1'-0"

NOTES:

1. SEE SHEETS S2.0.0 – S2.2.0 FOR CONCRETE HEADWALL DIMENSIONS

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JOB No: 211009
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SHEET:
C2.9.2

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.

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

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"

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.

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

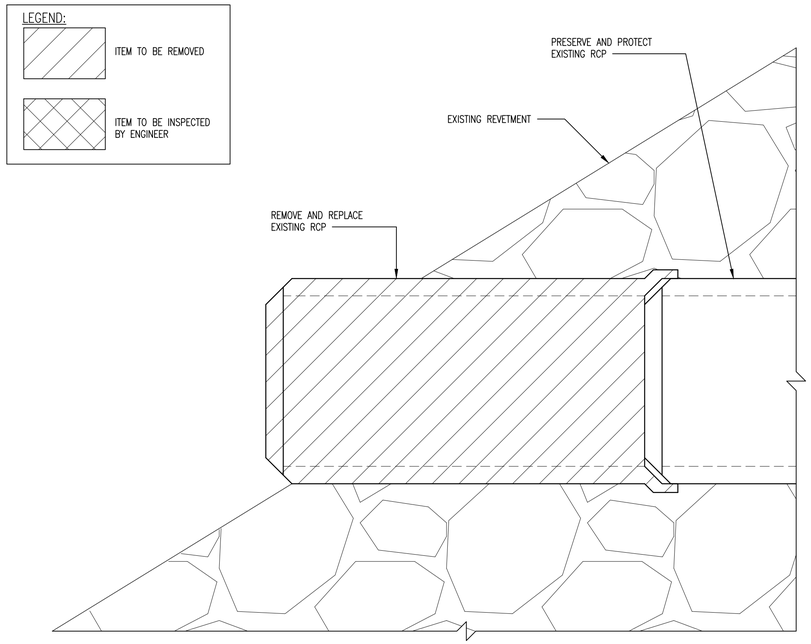
REV: BY:	DATE:	REV:	DESCRIPTION
CAD	7/29/21	1	ISSUED FOR ADDENDUM 1

CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

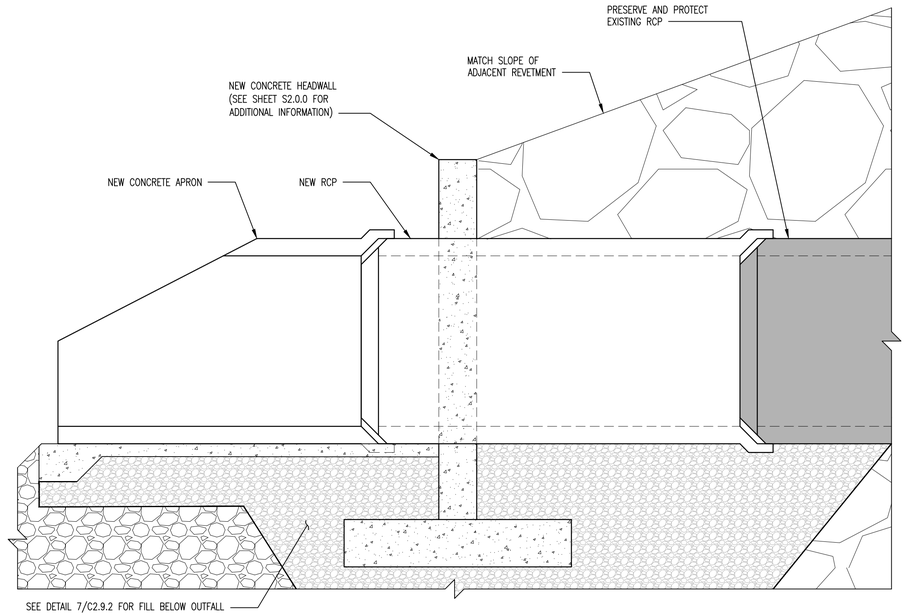
OUTFALL NOTES AND SCHEDULES

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

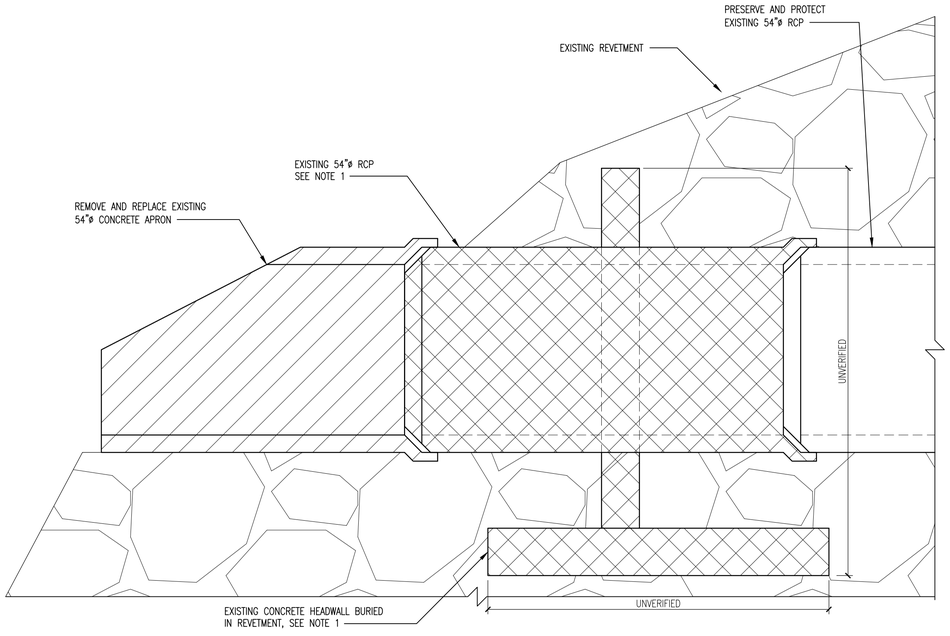
SHEET: S0.0.0



1 S1.0.0 EXISTING / REMOVAL OUTFALL - TYP
1/2" = 1'-0"

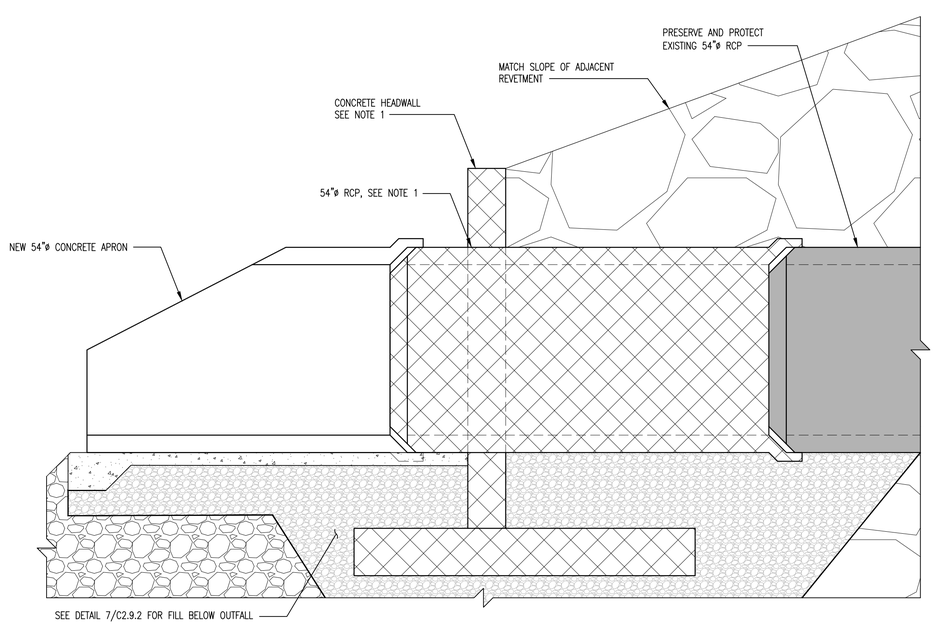


2 S1.0.0 REPLACEMENT EXTENTS OUTFALL - TYP
1/2" = 1'-0"



3 S1.0.0 EXISTING / REMOVAL OUTFALL - SITE D
1/2" = 1'-0"

1. CONTRACTOR SHALL NOTIFY ENGINEER WHEN EXISTING CONCRETE HEADWALL IS EXPOSED FOR INSPECTION. ENGINEER WILL DETERMINE EXISTING HEADWALL CONDITION. CONTRACTOR SHALL BID FOR REMOVAL AND REPLACEMENT OF CONCRETE HEADWALL AND SECTION OF RCP. IF ENGINEER DETERMINES EXISTING HEADWALL IS IN GOOD CONDITION AND SHALL REMAIN, CONTRACTOR SHALL SUBMIT DEDUCTION TO CONTRACT PRICE.



4 S1.0.0 REPLACEMENT EXTENTS OUTFALL - SITE D
1/2" = 1'-0"

1. CONTRACTOR SHALL NOTIFY ENGINEER WHEN EXISTING CONCRETE HEADWALL IS EXPOSED FOR INSPECTION. ENGINEER WILL DETERMINE EXISTING HEADWALL CONDITION. CONTRACTOR SHALL BID FOR REMOVAL AND REPLACEMENT OF CONCRETE HEADWALL AND SECTION OF RCP. IF ENGINEER DETERMINES EXISTING HEADWALL IS IN GOOD CONDITION AND SHALL REMAIN, CONTRACTOR SHALL SUBMIT DEDUCTION TO CONTRACT PRICE.

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

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

CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

OUTFALL REMOVAL AND REPLACEMENT EXTENTS

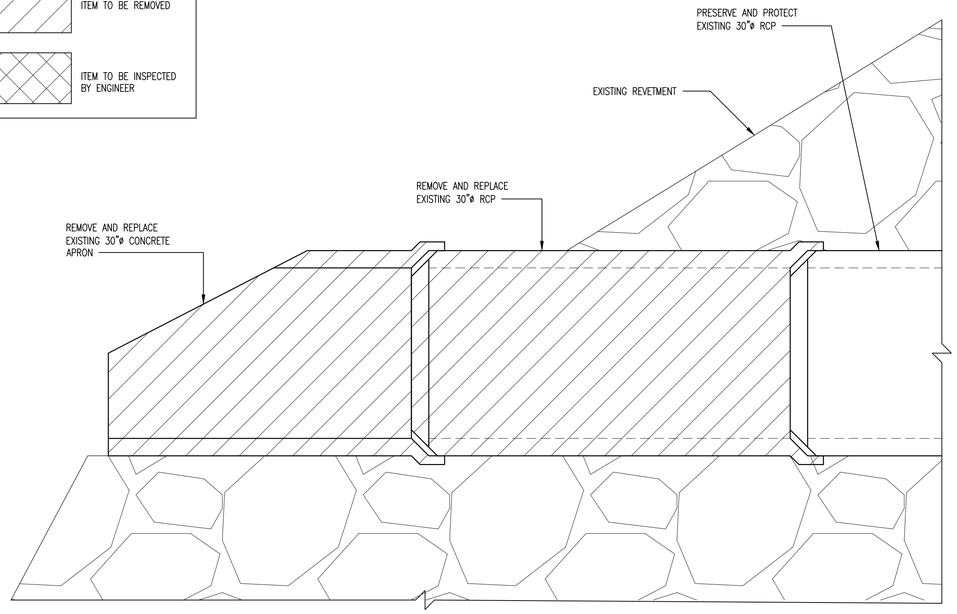
JOB No: 211009
DATE: 7/29/2021
DRAWN BY: SAJ
DESIGNED BY: KKM

SHEET:
S1.0.0

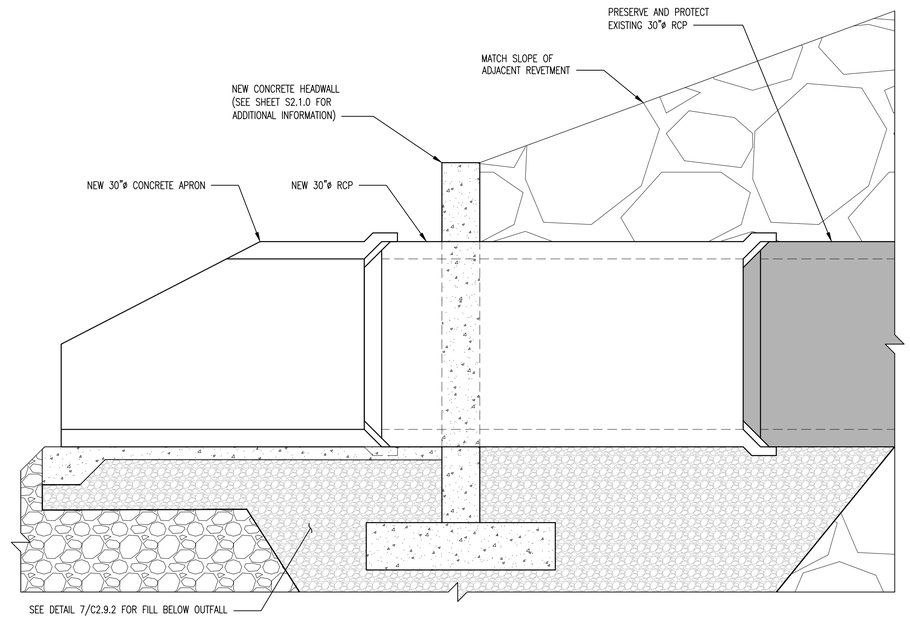
LEGEND:

ITEM TO BE REMOVED

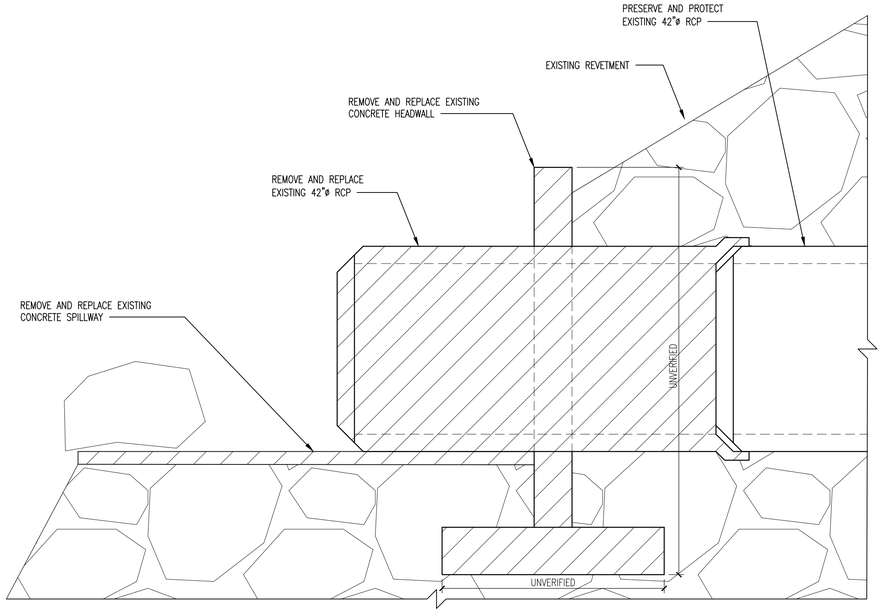
ITEM TO BE INSPECTED BY ENGINEER



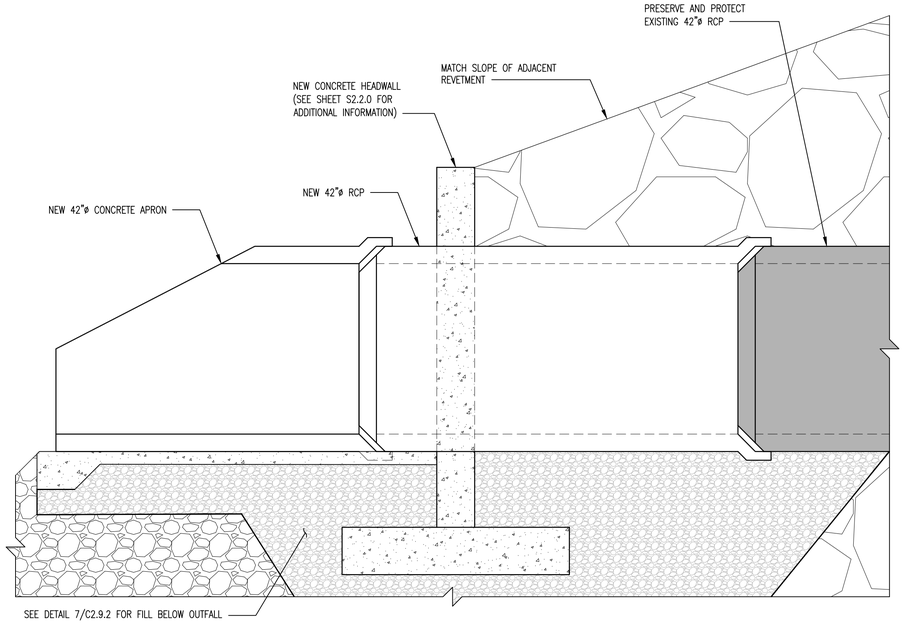
1 S1.1.0 EXISTING / REMOVAL OUTFALL - SITE F
1/2" = 1'-0"



2 S1.1.0 REPLACEMENT EXTENTS OUTFALL - SITE F
1/2" = 1'-0"



3 S1.1.0 EXISTING / REMOVAL OUTFALL - SITE G
1/2" = 1'-0"



4 S1.1.0 REPLACEMENT EXTENTS OUTFALL - SITE G
1/2" = 1'-0"

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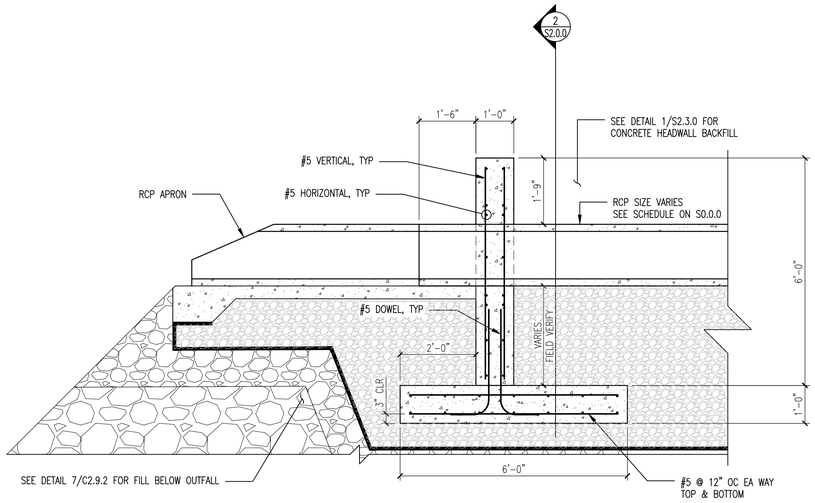
CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

OUTFALL REMOVAL AND REPLACEMENT EXTENTS

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

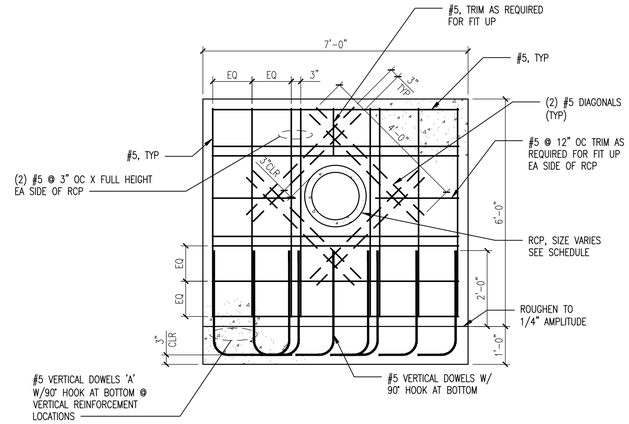
SHEET: S1.1.0



1 S2.0.0 OUTFALL HEADWALL DETAIL - TYP (24"Ø OR LESS OUTFALL)

1/2" = 1'-0"

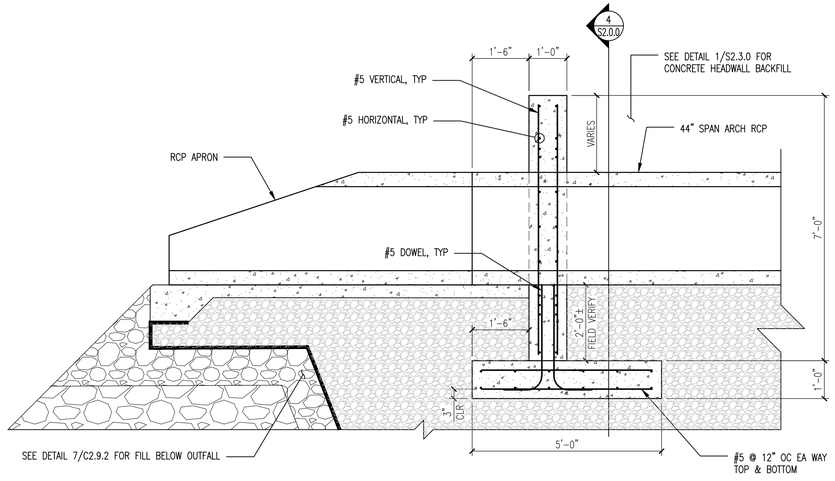
1. SEE CIVIL DRAWINGS FOR REVETMENT DETAILS.



2 S2.0.0 TYPE I OUTFALL HEADWALL SECTION

1/2" = 1'-0"

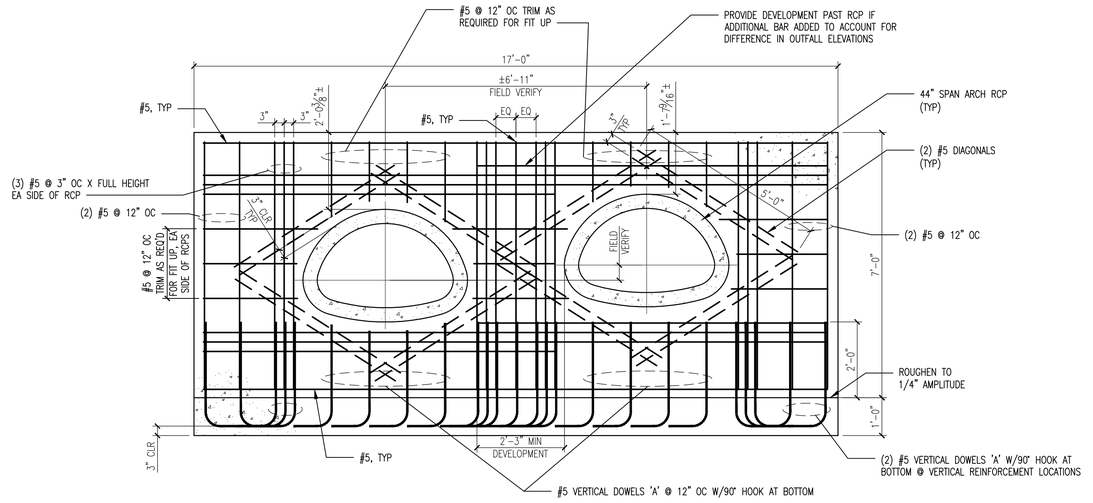
1. FOOTING REINFORCEMENT NOT SHOWN FOR CLARITY
2. SEE DETAIL 3/S2.2.0 FOR VERTICAL DOWEL 'A' DETAIL



3 S2.0.0 44" SPAN ARCH OUTFALL HEADWALL DETAIL

1/2" = 1'-0"

1. SEE CIVIL DRAWINGS FOR REVETMENT DETAILS.



4 S2.0.0 44" SPAN ARCH OUTFALL HEADWALL SECTION

1/2" = 1'-0"

1. FOOTING REINFORCEMENT NOT SHOWN FOR CLARITY
2. SEE DETAIL 3/S2.2.0 FOR VERTICAL DOWEL 'A' DETAIL

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CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

OUTFALL REPLACEMENT DETAILS

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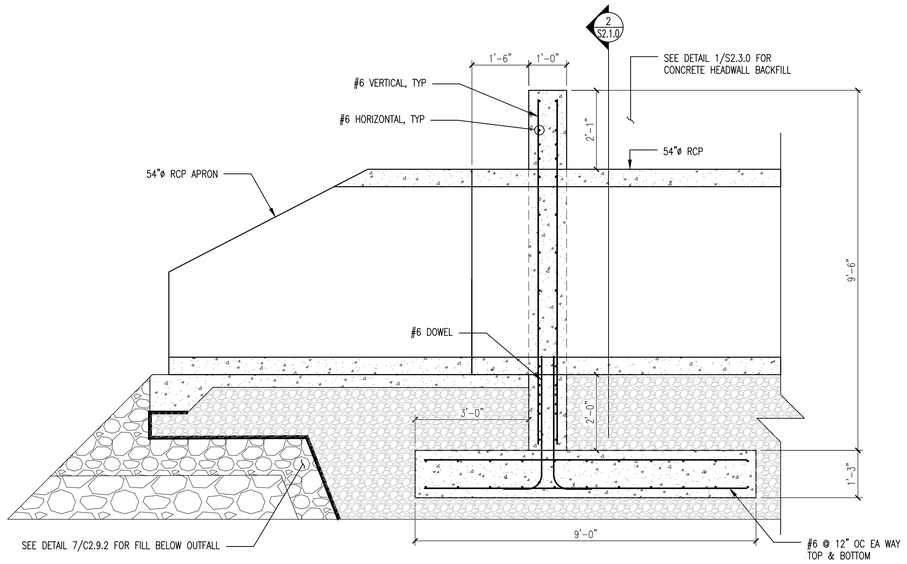
DESIGNED BY: KKM

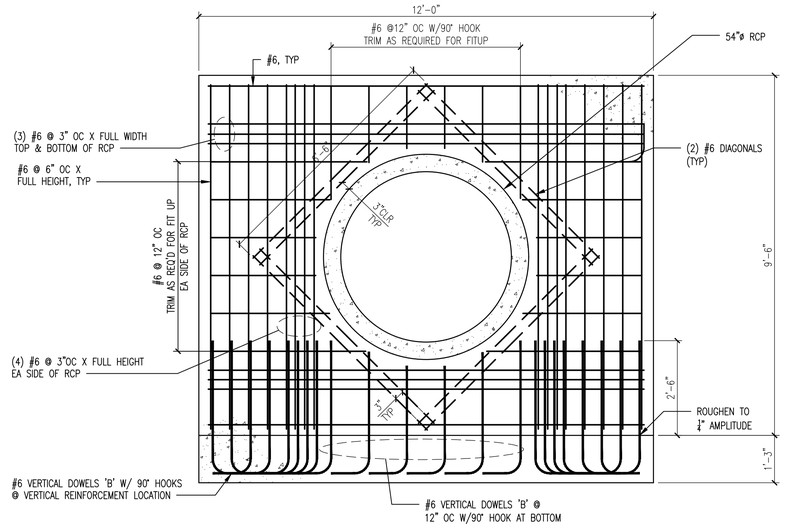
SHEET:
S2.0.0



1 S2.1.0 SITE D: 54"Ø OUTFALL HEADWALL DETAIL

1/2" = 1'-0"

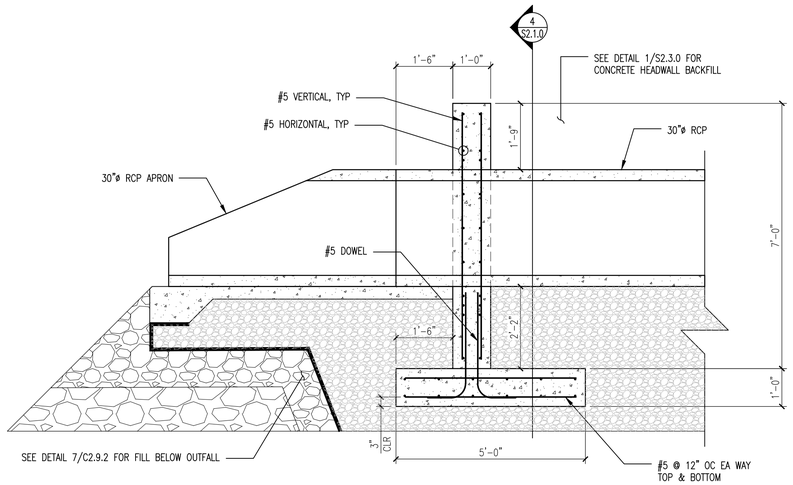
1. SEE CIVIL DRAWINGS FOR REVETMENT DETAILS.



2 S2.1.0 SITE D: 54"Ø OUTFALL HEADWALL SECTION

1/2" = 1'-0"

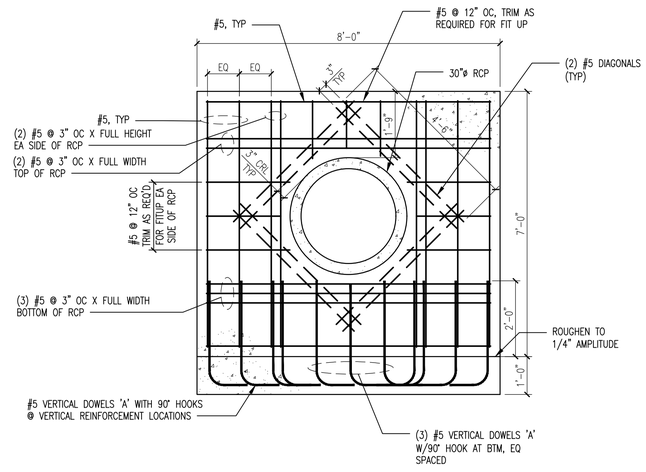
1. FOOTING REINFORCEMENT NOT SHOWN FOR CLARITY
2. SEE DETAIL 3/S2.2.0 FOR VERTICAL DOWEL 'B' DETAIL



3 S2.1.0 SITE F: 30"Ø OUTFALL HEADWALL DETAIL

1/2" = 1'-0"

1. SEE CIVIL DRAWINGS FOR REVETMENT DETAILS.



4 S2.1.0 SITE F: 30"Ø OUTFALL HEADWALL SECTION

1/2" = 1'-0"

1. FOOTING REINFORCEMENT NOT SHOWN FOR CLARITY
2. SEE DETAIL 3/S2.2.0 FOR VERTICAL DOWEL 'A' DETAIL

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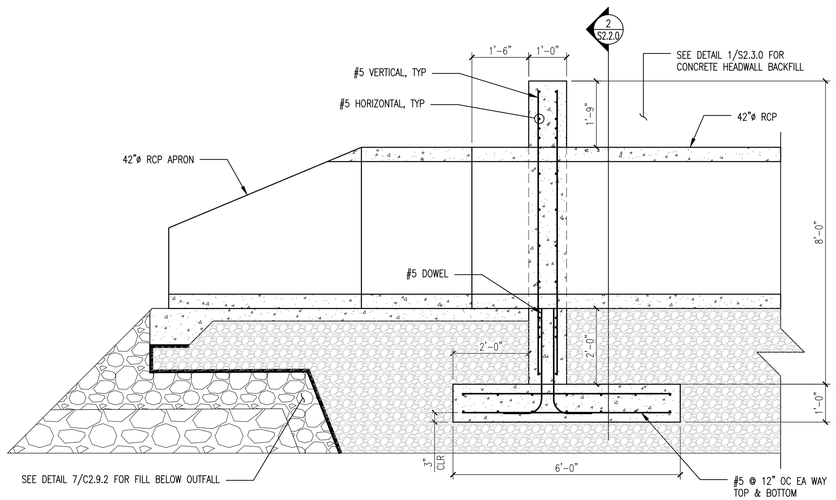
CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

OUTFALL REPLACEMENT DETAILS

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

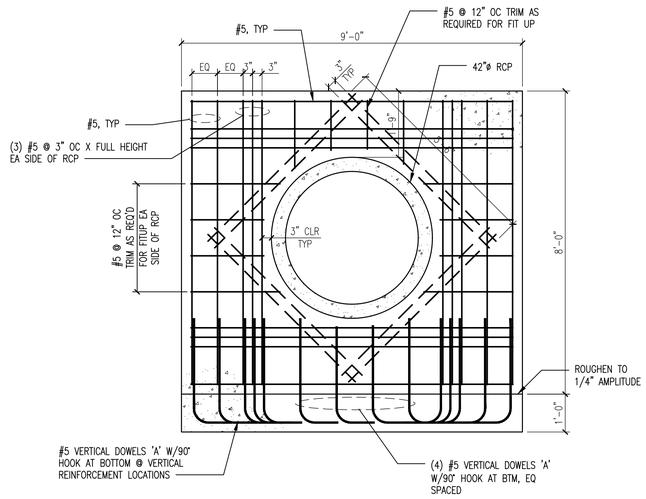
SHEET:
S2.1.0



1 S2.2.0 SITE G: 42"Ø OUTFALL HEADWALL DETAIL

1/2" = 1'-0"

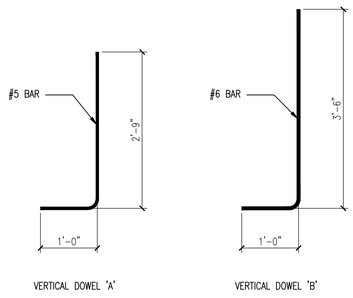
1. SEE CIVIL DRAWINGS FOR REVETMENT DETAILS.



2 S2.2.0 SITE G: 42"Ø OUTFALL HEADWALL SECTION

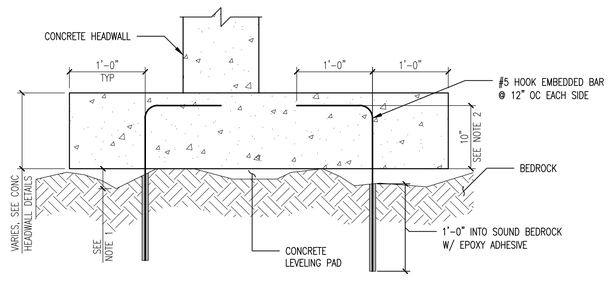
1/2" = 1'-0"

1. FOOTING REINFORCEMENT NOT SHOWN FOR CLARITY
2. SEE DETAIL 3/S2.2.0 FOR VERTICAL DOWEL 'A' DETAIL



3 S2.2.0 VERTICAL DOWEL DETAIL

3/4" = 1'-0"



4 S2.2.0 FOOTING ON BEDROCK

1" = 1'-0"

1. IF BEDROCK IS LOCATED LESS THAN 12" BELOW PROPOSED CONCRETE HEADWALL FOOTING, FOOTING SHALL BE ANCHORED TO BEDROCK AND CONCRETE FILL SHALL BE PLACED BELOW FOOTING.
2. 10" MINIMUM REQUIREMENT IS MEASURED FROM ABOVE CONCRETE LEVELING PAD.
3. EPOXY ADHESIVE SHALL BE HILTI HIT-RE 500 V3 OR APPROVED EQUAL. EPOXY SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

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CITY OF DULUTH
LAKEWALK PHASE 4
DULUTH, MN

OUTFALL REPLACEMENT DETAILS

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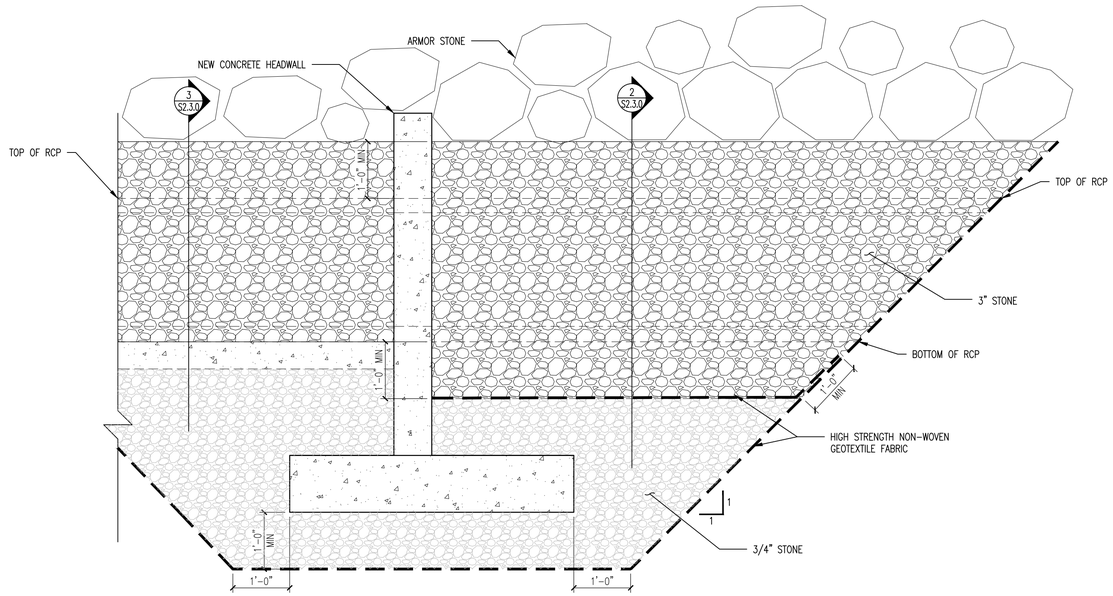
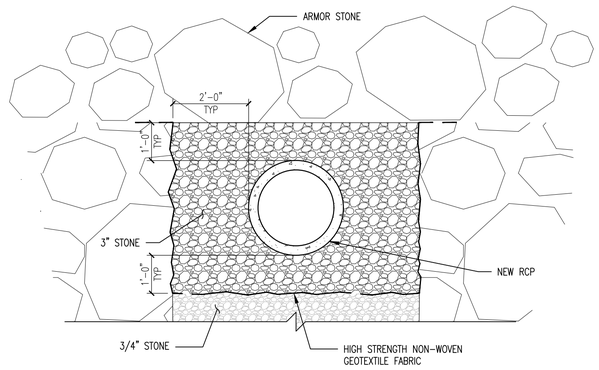
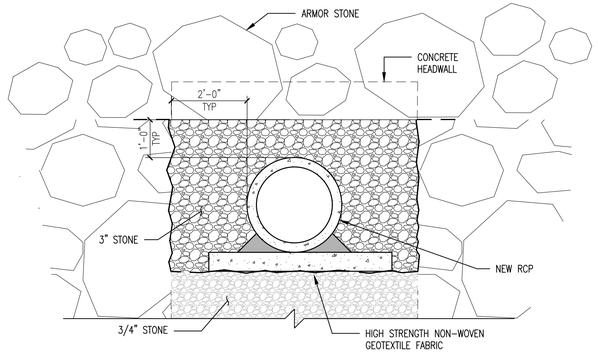


1 S2.3.0 CONCRETE HEADWALL BACKFILL DETAIL
3/4" = 1'-0"



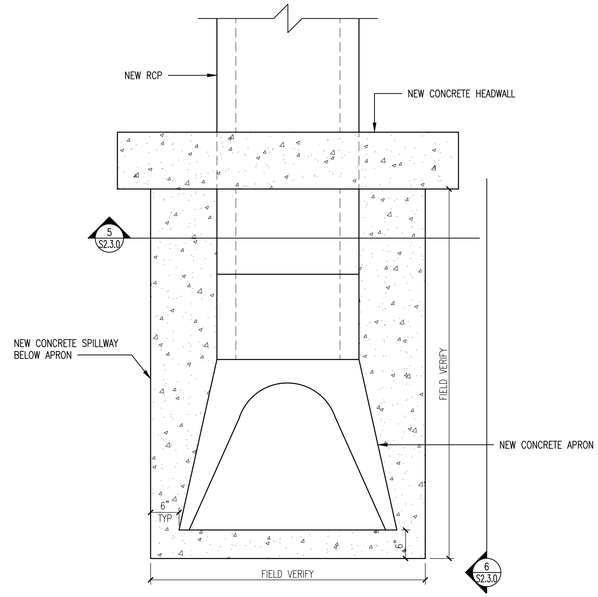
2 S2.3.0 RCP BACKFILL SECTION
1/2" = 1'-0"

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



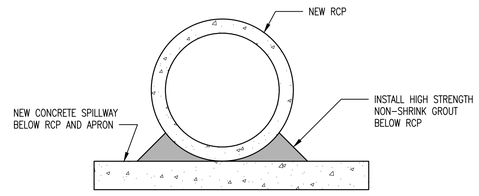
3 S2.3.0 RCP BACKFILL SECTION AT CONCRETE SPILLWAY
1/2" = 1'-0"

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

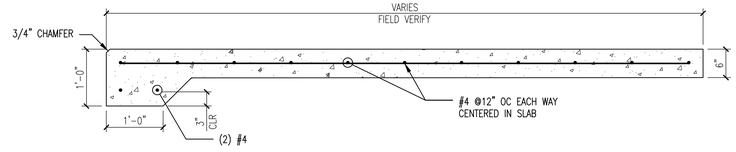


4 S2.3.0 CONCRETE SPILLWAY AT OUTFALLS
3/4" = 1'-0"

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"

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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

AMI
Consulting Engineers P.A.

July 30, 2021

Re: City of Duluth Shoreline Rehabilitation – Lakewalk Phase IV:
Summary of Specification Updates
AMI Project Number: 211009

Revisions are shown in red.

SPECIFICATIONS:

Unit Prices – 01 22 00

Add:
1.7 – Item #05:
Payment: Payment for excavation and disposal will be made at the contract unit for lump sum according to the plans. This item includes all labor, equipment, and materials to excavate soil and miscellaneous debris and haul off site according to the details shown in the plans and specifications. This item also includes any salvaged stone, which has been determined to be acceptable filter, armor, toe, or chinker stone, not used on the project to be transported to Lot D.

Remove:
1.7 – Item #11:
Payment: Payment for armor stone will be made at the contract unit price per ton according to the plans and verified using scaled weight tickets. This item includes all labor, equipment, and materials to validate excavation limits~~, place filter stone,~~ and place armor stone according to the details shown in the plans and specifications.

Revise:
1.7 – Item #14:
Measurement: Square yards, as measured ~~by slope 3D surface~~ along the slope surface.

Vehicular Access and Parking – 01 55 00

1. Include S 23rd Ave E to the highlighted section of Figure 1 and language to 3.2.A & 3.2.A.1
2. Include language requiring contractor to perform a pre & post condition survey to Water St & 23rd Ave by 3rd party consultant

Revise:
3.2.A: If the Contractor elects to transport the stone and associated materials in by truck for Sites B-H, the Contractor shall repair any damages to East Water Street and South

91 MAIN STREET
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PH: (715) 718-2193
FAX: (877) 761-7058

23rd Avenue East between the Northeastern intersection of South 23rd Avenue East and Water Street down to the end of the cul-de-sac at the Southwestern end of East Water Street and up to the Northwestern intersection of South 23rd Avenue East and South 21st Ave East as shown in Figure 1. Damage and replacement of East Water Street shall be determined based upon the following criteria:

3.2.A.1: If any additional cracks, depressions, ruts, or blowouts are noted along East Water Street during construction, the Contractor shall replace the entire asphalt pavement surface including subbase as required. The Contractor shall not assume that spot repairs will be accepted. The only acceptable repairs shall be full replacement for the entire width of East Water Street and/or South 23rd Avenue East and a minimum distance of ~~50~~ 25 lineal feet along East Water Street and/or South 23rd Avenue East for each location damaged. If the Contractor anticipates some level of damage along the entire length of East Water Street and/or South 23rd Avenue East highlighted in Figure 1, then the Contractor should anticipate replacing the entire area highlighted in Figure 1.

Figure 1: Increased the size of the highlighted road to include the above revisions.

Add:

3.2.A.5: The Contractor shall perform a pre-construction and post-construction road condition survey of South 23rd Avenue East and East Water Street.

3.2.A.5.a: These surveys shall be performed by and independent 3rd party consultant.

Earth Moving – 31 20 00

Revise:

2.2.C.2: Topsoil shall be fertile, friable, organic surface soil from the types A and B soil horizons (NRCS).

Stone Placement – 31 37 16.13

Revise:

3.2.D: Barrier stones shall be installed at the top edge of the slope for all sites except sites A & H. This stone shall meet all the requirements given for armor stone regarding rock size and quality.

Stormwater Utilities – 33 40 00

These sections of the specifications have been updated to address the following changes:

1.4.A.4: Structure Installation (Including concrete wall outfall ~~seal~~), and

2.2: Remove:

1. Specifications for flexible pipe couplings
2. Specifications for Corrugated Steel Pipe
3. Specifications for Steal Aprons

Add:

1. Reinforced Concrete Pipe Specifications

2. Reinforced Concrete Pipe Apron Specifications

3.3: Remove:

3.3.C: Install Flexible Pipe Couplings in accordance with manufacturer's recommendations.

Revise:

3.3.B.2: Diversion of drainage or dewatering of trenches during construction shall be ~~provided, as necessary.~~ performed, as necessary, by the contractor.

SECTION 01 22 00 – UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. List of unit prices, for use in preparing Bids.
2. Measurement and payment criteria applicable to Work performed under a unit price payment method.

1.2 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services, and incidentals; erection, application or installation of an item of the Work; overhead and profit

1.3 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

B. Refer to specification section 00 41 00 for Bid Form with Estimated Quantities.

1.4 MEASUREMENT OF QUANTITIES

A. Take all measurements and compute quantities. Measurements and quantities will be verified by Engineer.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

C. Measurement Devices: Measurement devices shall be capable of producing accuracy of one decimal place greater than the quantity provided within the bid form.

D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

E. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Engineer prior to starting work.

1.5 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Engineer, multiplied by the unit price.

1.6 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not conforming to specified requirements.

1.7 SCHEDULE OF UNIT PRICES

A. Measurement and payment for unit prices will be as follows. For bid items not listed, refer to MnDOT Standard Specifications for Construction, 2020 edition as modified by the plans, specifications, and project Special Provisions.

SECTION 01 22 00 – UNIT PRICES

Item: #01 Mobilization and Demobilization

Measurement: Lump sum

Payment: Payment for mobilization and demobilization will be made at the contract unit price for lump sum according to the plans. Payment for this item shall be made in three installments. The first payment is 60 percent of the lump sum price and shall be made on the first pay request, after mobilization is complete. The second payment is 30 percent of the lump sum price and shall be made after substantial completion. The final payment is the remaining 10 percent and shall be made on the final pay request. The Mobilization and Demobilization bid item includes all labor, equipment, and materials to provide and remove (where applicable) a field office, provide a dumpster, provide temporary construction fence, protect existing utility poles, protect specified trees, protect historic structures, and protect storm utility features according to the details shown in the plans and specifications. This bid item also includes all mobilization and demobilization of equipment and personnel to the project site.

Item: #02 Erosion and Sediment Control

Measurement: Lump sum

Payment: Payment for erosion and sediment control will be made at the contract unit price for lump sum according to the plans. This item includes all labor, equipment, and materials to construct rock construction entrances and staging areas, install and maintain silt curtain, place sediment control logs, install erosion control blankets and anchoring system, install turf reinforcement mats and anchoring system, furnishing, and sowing seed, and provide maintenance, supervision, and inspection according to the details shown in the plans and specifications.

Item: #03 Traffic Control & Signage

Measurement: Lump sum

Payment: Payment for traffic control and signage will be made at the contract unit price for lump sum according to the plans. This item includes all labor, equipment, and materials to place traffic signage and provide traffic control according to the details shown in the plans and specifications. This item also includes any coordination with the Railroad and flaggers as required by the Railroad.

Item: #04 Site Preparation and Demolition

Measurement: Lump sum

Payment: Payment for site preparation and demolition will be made at the contract unit for lump sum according to the plans. This item includes all labor, equipment, and materials to remove stone, grub trees, perform general clearing and grubbing, salvage picnic tables, salvage benches, salvage signs, and to haul off site according to the details shown in the plans and specifications.

Item: #05 Excavation and Disposal

Measurement: Lump sum

Payment: Payment for excavation and disposal will be made at the contract unit for lump sum according to the plans. This item includes all labor, equipment, and materials to excavate soil and miscellaneous debris and haul off site according to the details shown in the plans and specifications. This item also includes any

salvaged stone, which has been determined to be acceptable filter, armor, toe, or chinker stone, not used on the project to be transported to Lot D.

Item: #06 Site Restoration

Measurement: Lump sum

Payment: Payment for site restoration will be made at the contract unit for lump sum according to the plans. This item includes all labor, equipment, and materials to restore and clean-up project site according to the details shown in the plans and specifications.

Item: #07 Haul Roads

Measurement: Lump sum

Payment: Payment for maintenance and replacement of haul roads will be made at the contract unit price per lump sum according to the plans. This item includes all labor, equipment, and materials to: 1) protect and maintain the haul roads including furnishing and placement of 12 inches of Class 5 Aggregate over the Lakewalk, and 2) to maintain and replace the haul roads including saw cut, remove bituminous pavement, remove concrete pavement, remove concrete curb and gutter (if damaged), haul off site and properly dispose of materials, provide traffic control, re-compact subbase materials, replace wet subbase materials, place new bituminous pavement, place new concrete pavement, place new concrete in-kind according to the details shown in the plans and specifications, and perform all material and density testing associated with maintenance and replacement of haul road efforts. This item also includes any work associated with barge haul routes including draft analysis, proper sizing of vessels and barges, obstruction determination, and certification of vessels and barges for compliance with United States Coast Guard.

Item: #08 Bonds

Measurement: Lump sum

Payment: Payment for payment and performance bonds will be made at the contract unit price for lump sum according to the plans. This item includes all labor, equipment, and materials to furnish payment and performance bonds.

Item: #09 Salvaged Stone and Soil

Measurement: Lump sum

Payment: Payment for salvaged stone and soil will be made at the contract unit for lump sum according to the plans. This item includes all labor, equipment, and materials to salvage onsite materials approved by the Engineer, sort materials, stockpile materials and transport to other project sites within this project (with the exception of Site A), and reinstall according to the details shown in the plans and specifications and the Engineer. All chinking stone is to be salvaged onsite.

Item: #10 Filter Stone

Measurement: Ton

Payment: Payment for filter stone will be made at the contract unit price per ton according to the plans and verified using scaled weight tickets. This item includes all labor, equipment, and materials to place filter stone according to the details shown in the plans and specifications.

Item: #11 Armor Stone

Measurement: Ton

Payment: Payment for armor stone will be made at the contract unit price per ton according to the plans and verified using scaled weight tickets. This item includes all labor, equipment, and materials to validate excavation limits~~, place filter stone,~~ and place armor stone according to the details shown in the plans and specifications.

Item: #12 Armor Stone Barrier Wall

Measurement: Ton

Payment: Payment for armor stone barrier wall will be made at the contract unit price per ton according to the plans and verified using scaled weight tickets. This item includes all labor, equipment, and materials to furnish new and install armor stone barrier walls according to the details shown in the plans and specifications.

Item: #13 Toe Stone

Measurement: Ton

Payment: Payment for toe stone will be made at the contract unit price per ton according to the plans and verified using scaled weight tickets. This item includes all labor, equipment, and materials to validate excavation limits, excavate and place toe stone according to the details shown in the plans and specifications. The work associated with embedding the toe stone into the existing beach soils is incidental to this item. Note that anchoring and/or trenching are covered under subsequent bid items.

Item: #14 Geotextile

Measurement: Square yards, as measured ~~by slope 3D surface~~ along the slope surface.

Payment: Payment for geotextile will be made at the contract unit price per square yard according to the plans. This item includes all labor, equipment, and materials to place geotextile according to the details shown in the plans and specifications. Waste and overlap geotextile are incidental to this bid item.

Item: #15 Toe Stone Anchoring (Under Water Line)

Measurement: Each

Payment: Payment for toe stone anchoring under the water line will be made at the contract unit price per each unit according to the plans. Under water line anchoring is defined as when the start of drilling at the top of the toe stone is under the water line. This item includes all labor, equipment, and materials including removal of loose bedrock materials, positioning and leveling of toe stones, drilling, coring, cleaning drill/core holes, furnishing and cutting and installing reinforcement anchors, grouting anchors, topping off anchors to have

grout surface flush with top of toe stone drill hole surface, and cleaning excess grout off of toe stones according to the details shown in the plans and specifications.

Item: #16 Toe Stone Anchoring (Above Water Line)

Measurement: Each

Payment: Payment for toe stone anchoring above the water line will be made at the contract unit price per each unit according to the plans. Above water line anchoring is defined as when the start of drilling at the top of the toe stone is above the water line. This item includes all labor, equipment, and materials including removal of loose bedrock materials, positioning and leveling of toe stones, drilling, coring, cleaning drill/core holes, furnishing and cutting and installing reinforcement anchors, grouting anchors, topping off anchors to have grout surface flush with top of toe stone drill hole surface, and cleaning excess grout off of toe stones according to the details shown in the plans and specifications.

Item: #17 Backfill

Measurement: Cubic yards, as measured in-place

Payment: Payment for backfill will be made at the contract unit price per cubic yard according to the plans. This item includes all labor, equipment, and materials to place sandy clay backfill according to the details shown in the plans and specifications.

Item: #18 Geocells

Measurement: Square feet, as measured by plan view

Payment: Payment for geocells will be made at the contract unit price per square yard according to the plans. This item includes all labor, equipment, and materials to place geocells according to the details shown in the plans and specifications. Waste and overlap geocells are incidental to this bid item.

Item: #19 Geogrid

Measurement: Square yards, as measured by plan view

Payment: Payment for geogrid will be made at the contract unit price per square yard according to the plans. This item includes all labor, equipment, and materials to place geogrid according to the details shown in the plans and specifications. Waste and overlap geogrid are incidental to this bid item.

Item: #20 Storm Sewer Headwalls

Measurement: Each

Payment: Payment for storm sewer headwalls will be made at the contract unit price per each unit according to the plans. This item includes all labor, equipment, and materials to excavate, remove existing headwall structure and

section(s) of pipe as detailed in the plans, place granular bedding material, place concrete apron, install storm sewer headwalls, and install aprons according to the details shown in the plans and specifications. Placement of geotextile is included in Bid Item #14.

Item: #21 12”-15” RCP Sewer

Measurement: Linear feet

Payment: Payment for 12”-15” RCP Sewer will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove existing damaged aprons and damaged pipe sections, excavate, place and compact fill material, and place 12”-15” RCP Sewer according to the details shown in the plans and specifications. Placement of geotextile is included in Bid Item #14.

Item: #22 30”-42” RCP Sewer

Measurement: Linear feet

Payment: Payment for 30”-42” RCP Sewer will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove existing damaged aprons and damaged pipe sections, excavate, place and compact fill material, and place 30”-42” RCP Sewer according to the details shown in the plans and specifications. Placement of geotextile is included in Bid Item #14.

Item: #23 44” Arch RCP Sewer

Measurement: Linear feet

Payment: Payment for 44” Arch RCP Sewer will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove existing damaged aprons and damaged pipe sections, excavate, place and compact fill material, and place 44” Arch RCP Sewer according to the details shown in the plans and specifications. Placement of geotextile is included in Bid Item #14.

Item: #24 48”-54” RCP Sewer

Measurement: Linear feet

Payment: Payment for 48”-54” RCP Sewer will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove existing damaged aprons and damaged pipe sections, excavate, place and compact fill material, and place 48”-54” RCP Sewer according to the details shown in the plans and specifications. Placement of geotextile is included in Bid Item #14.

Item: #ALT 1 Trenching toe stone into bedrock (no mechanical anchoring) - 1 to 100 LF

Measurement: Linear feet

Payment: Payment for trenching toe stone into bedrock for 1 to 100 lineal feet of trench will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove bedrock to proper depth, width, and length to install toe stone anchors according to the details shown in the plans and specifications.

Item: #ALT 2 Trenching toe stone into bedrock (no mechanical anchoring) - 100 to 500 LF

Measurement: Linear feet

Payment: Payment for trenching toe stone into bedrock for 100 to 500 lineal feet of trench will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove bedrock to proper depth, width, and length to install toe stone anchors according to the details shown in the plans and specifications.

Item: #ALT 3 Trenching toe stone into bedrock (no mechanical anchoring) – 500+ LF

Measurement: Linear feet

Payment: Payment for trenching toe stone into bedrock for 500+ lineal feet of trench will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to remove bedrock to proper depth, width, and length to install toe stone anchors according to the details shown in the plans and specifications.

Item: #ALT 4 Additional 135 LF beyond ends of concrete retaining wall at Site A (includes all work associated within this work area)

Measurement: Linear feet

Payment: Payment for the additional 135 lineal feet of shoreline beyond the ends of the existing concrete retaining wall at Site A will be made at the contract unit price per linear foot according to the plans. This item includes all labor, equipment, and materials to restore the 135 lineal feet of shoreline according to the details shown in the plans and specifications.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END OF SECTION

SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Vehicle access
2. Contractor Parking
3. Traffic Control Signage

1.2 REFERENCES

A. Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction 2020 Edition.

B. City of Duluth, MN Standard Specifications for Construction.

C. United States Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices (MUTCD).

D. Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD).

1.3 SUBMITTALS

A. Barge haul route plan

B. Access and Haul Plans, Locations, and Certifications:

1. Initial written plan, with drawings that includes the following:
    a. Detailed narrative describing access and haul plan for the Work, including:
        i. Truck routes, number, frequency of trucks, and times of operation
        ii. Load areas and access into and out of the construction staging areas
        iii. An alternate location necessary to stage trucks during times of site congestion
        iv. On-site roads required to transport materials
        v. Locations where on-street parking should be removed, or traffic lanes closed, to allow adequate truck access and turning movements
        vi. Schedule for parking removals and/or traffic lane closures required to provide safe construction activities, including truck turning movements
    b. Survey and documentation of pre-existing roadway conditions along proposed haul routes
2. Submit updates to reflect modifications and/or alternative plans

C. Weekly Haul Summary Reports

D. Road closure and detour signage plan

E. Lakewalk trail protection and quality control plan

SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING

1.4 QUALITY CONTROL

A. Contractor shall establish and maintain a quality control plan for the Lakewalk trail and associated haul roads including East Water Street and South Street.

1.5 QUALITY ASSURANCE

A. See Section 01 40 00 – Quality Requirements

1.6 SEQUENCING & SCHEDULING

A. Road closure and detour signage shall be installed prior to mobilization of equipment, materials, or supplies to the project site.

B. Provide proper advance notification to regulatory authorities in accordance with applicable code and permit requirements for observation and inspection.

PART 2 - PRODUCTS

2.1 SIGNAGE

A. The contractor shall furnish and install all signage in accordance with the approved road closure and detour plan.

1. The Contractor is responsible for determining the quantities of signage material necessary for completing the Work.
2. Provide barricades to prohibit unauthorized entry to project site at the locations marked in the Drawings.

B. Sign materials shall be in accordance with MnDOT Specification 3352 and MN MUTCD.

C. Sheet sign panels of aluminum alloy 6061-T6 or 5052-H38 conforming to ASTM B209.

1. Nominal 0.040-inch-thick sheet.

D. Signposts shall be in accordance with MnDOT Specification 3401 and MN MUTCD.

1. Signposts shall be galvanized high carbon billet Grade SP-80 steel U-channel posts at 3.0 pounds per foot minimum and eight feet in length.

E. Sign finish shall be in accordance with MnDOT Specification 3352 and MN MUTCD.

1. Standard No. 2 reflective sheeting (High Intensity) material shall be used on all signs.
2. Reflective sheeting material shall carry a ten-year warranty.
3. A fabrications sticker showing the month and year of fabrication shall be affixed to each sign plate.

F. Sign accessories shall be in accordance with MnDOT Specification 3352 and MN MUTCD

1. U-bolts and Washer shall be Grade B8, Class 1 stainless steel, ASTM A320.
2. Nuts shall be Grade B8F, self-locking nylon insert type, ASTM A320

SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING

PART 3 - EXECUTION

3.1 GENERAL

A. Parking or staging of haul vehicles will not be allowed on city streets.

B. Workmen may only park in sites designated for parking in the Drawings.

C. Equipment and materials may enter the site at the southwestern end of East Water Street (southwestern end of Beacon Pointe) or by barge. Equipment shall not enter the site at any other location.

D. Station flaggers at vehicle access points in construction wall or fencing to ensure safety of vehicles and pedestrians while vehicle access gates are open.

E. Maintain all haul route roadways related to construction activities in safe, good condition and repair as necessary or as directed by the Engineer, at no additional cost to the City of Duluth.

F. Contractor shall protect the existing Lakewalk trail from damage due to construction equipment. The contractor shall submit a Lakewalk protection plan for review and approval by the engineer.

1. Tracked equipment may not be operated on the Lakewalk trail. Tracked equipment must be hauled within 100 feet of the intended Work.

3.2 EAST WATER STREET

A. If the Contractor elects to transport the stone and associated materials in by truck for Sites B-H, the Contractor shall repair any damages to East Water Street and South 23rd Avenue East between the Northeastern intersection of South 23rd Avenue East and Water Street down to the end of the cul-de-sac at the Southwestern end of East Water Street and up to the Northwestern intersection of South 23rd Avenue East and South 21st Ave East as shown in Figure 1. Damage and replacement of East Water Street shall be determined based upon the following criteria:

1. If any additional cracks, depressions, ruts, or blowouts are noted along East Water Street during construction, the Contractor shall replace the entire asphalt pavement surface including subbase as required. The Contractor shall not assume that spot repairs will be accepted. The only acceptable repairs shall be full replacement for the entire width of East Water Street and/or South 23rd Avenue East and a minimum distance of ~~50~~ 25 lineal feet along East Water Street and/or South 23rd Avenue East for each location damaged. If the Contractor anticipates some level of damage along the entire length of East Water Street and/or South 23rd Avenue East highlighted in Figure 1, then the Contractor should anticipate replacing the entire area highlighted in Figure 1.

2. The subbase material must be graded and compacted to Engineer's satisfaction. Any loose or wet subbase material shall be replaced with MnDOT Class 5 Aggregate material and compacted at no additional cost to the Owner.

3. The bituminous pavement shall be placed in two lifts totaling 4.0 inches (base course lift of 2.25 inches and wear course lift of 1.75 inches) thick after compaction. All pavement construction shall be in compliance with the City of Duluth and MnDOT standard construction specifications.
4. Any material and density testing associated with the replacement of East Water Street shall be performed by the Contractor at no additional cost to the Owner.
5. The Contractor shall perform a pre-construction and post-construction road condition survey of South 23rd Avenue East and East Water Street.
   a. These surveys shall be performed by and independent 3rd party consultant.
6. The Contractor shall include all associated costs with respect to East Water Street under the *Haul Roads* bid item.

Figure 1: East Water Street exhibit.

3.3 BARGE

A. Site A shall only be accessed by barge.

1. Exceptions may be made if the contractor receives approval from the City of Duluth for a temporary secondary haul route.

2. Contractor shall request use of a secondary haul route from the City of Duluth if desired.

3. The Contractor shall assume that a haul route through Leif Erickson Park will not be permitted. Further, the Contractor shall assume that a haul route behind Fitgers along the Lakewalk will also not be permitted.

B. Staging area 1 as shown on the drawings, or other approved location, will be used to stockpile the material and equipment that must be barged into site A. If staging Area 1 is utilized, the Contractor shall only load via the Sheet Pile Dock Wall. The Contractor shall closely monitor the dock wall and cease all loading operations in the event that movement is detected. The Contractor shall notify the City and Engineer immediately if movement is detected.

END OF SECTION

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation and Embankments.
2. Soil Correction.
3. Furnishing and Placing Borrow Material.
4. Topsoil.
5. Temporary Staging Areas.
6. Special Precautions.
7. Disposal of Material.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM International).

B. Contract, General, Supplementary and Other Conditions of Division 00, the General Requirements Sections of Division 01 and the Drawings apply to Work of this Section.

C. Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction 2020 Edition.

D. Minnesota Pollution Control Agency “Protecting Water Quality in Urban Areas, Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota” (BMP’s).

E. Occupational Safety and Health Administration (OSHA) 29 CFR, Part 1926, Sub Part P, "Excavations and Trenches" which states that excavation safety is the sole responsibility of the Contractor.

F. United States Department of Agriculture, Natural Resources Conservation Service (NRCS).

G. City of Duluth, MN Standard Specifications for Construction.

1.3 SUBMITTALS

A. Pre-Work photographs or video before Work begins.

B. Materials under the provisions of Division 01 sections.

C. Observation reports.

D. Stockpile locations.

E. Project Record Documents shall include:

1. In place dimensions of soil correction areas at a maximum 25-foot grid at beginning and completion of excavation.

2. All borrow material delivered to the site; indicating type, weight, and moisture content; at appropriate intervals to assure uninterrupted progress.
3. Grade verification survey of the following elements at the specified maximum intervals.
    a. Subgrade and finished grade at lawn areas and open spaces on a fifty-foot grid and at 25-foot intervals at ridges, swales, toe, and top of slopes.
4. All measurements for soil correction and grade verification shall be completed by an experienced Land Surveyor with at least four (4) years of surveying experience related to the Work. The experienced Land Surveyor shall complete all Survey Work under the direct supervision of a Licensed Land Surveyor or Professional Engineer.

1.4 QUALITY CONTROL

A. Contractor to provide notification:
    1. Contact Gopher One-Call online, at (651) 454-0002 or at (800) 252-1166 to arrange for utility location services 48 hours minimum prior to performing any work on site.
    2. Provide proper advance notification to regulatory authorities in accordance with applicable code and permit requirements for observation and inspection.
B. The Contractor is solely responsible for the cleanup of any rivers, streams, lakes, ground or roadway surfaces or other property damaged by construction activity related to this project.
C. Remove temporary devices after protected areas have been stabilized.
D. Contractor is to repair or replace any damaged utility line or structure at no additional cost to the Owner.
E. When alterations to existing utilities are shown to avoid conflicts, Contractor is to coordinate the removal and/or relocation of conflicting existing utilities with the utility's Owner at no additional cost to the Owner.
F. Maintain benchmarks, monuments, and other reference points.
    1. If benchmarks, monuments, and other reference points are disturbed or destroyed, benchmarks, monuments and other reference points shall be replaced or relocated by a Licensed Land Surveyor.
    2. Cost of replacing or relocating benchmarks, monuments and other reference points shall be incidental to the project.
G. Comply with conditions for drainage as specified herein.

1.5 QUALITY ASSURANCE

A. Use equipment adequate in size, capacity, and number to accomplish the Work in a timely manner.

B. Comply with governing EPA notification regulations before beginning Work. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Conform to applicable Federal and Minnesota State Statutes and Rules, MnDOT Specifications, City of Duluth Specifications, the Minnesota State Building Code, and local codes and ordinances for performance of Work, dewatering, transport and disposal of excess material, dust and run-off control, and emergency access to the site.

D. All excavations and trenches shall comply with the requirements of OSHA.

1.6 SEQUENCING & SCHEDULING

A. Do not begin work until temporary erosion prevention and sedimentation control is in place.

B. Comply with conditions for unwatering and drainage as specified in Related Documents and References Section.

C. Obtain prior written approval from the Owner and/or regulatory authorities before deviating from the following sequence of initiation of work elements:

1. Do not begin work until applicable permits are issued by authorities having jurisdiction
2. Contractor to stage Work to minimize, as practicable, large expanses of exposed soil.
3. Install temporary erosion prevention and sedimentation control measures and devices.
4. Construct temporary construction access, parking, and staging areas.
5. Conduct mass excavation and embankment of the site.
6. Remove debris and cleanup site.
    a. Conduct finish grading and topsoil spreading operations per BMPs.

D. Coordinate the schedule for earth moving Work necessary to maintain the Critical Path for subsequent work specified in related sections.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall schedule the delivery of material to arrive as near as possible to the time of the placement of the material for incorporation into the Work.

1. The Contractor shall ship material near its optimum moisture content and protect the material from adverse weather conditions during transport.

B. Material from offsite sources shall not be accepted for delivery until tested and approved, or certified, as specified Acceptance at Site.

1. Material from offsite sources shall not be accepted for temporary storage until stockpile areas have been approved or verified.
2. Materials in a frozen condition, containing ice or snow, or with excessive moisture content, shall not be accepted for delivery.

C. Verify, or obtain approval of, locations for temporary stockpiles.
   1. Construct stockpiles to provide free drainage of water from top of stockpiles and across site.
   2. Provide coordination for provision of protection of stockpiles to prevent erosion by wind and water.
   3. Protect stockpiles from contamination.
   4. Secure stockpiles against unauthorized use or removal.

D. Excess Material Management
   1. Excess material and unsuitable material becomes the property of the Contractor and shall be removed from the site.
   2. The Contractor is responsible for determining the quantities of material necessary for the Work including the costs of removal of excess and unsuitable material.
   3. The Contractor is not permitted to maintain a consistent high elevation within the stated tolerance to avoid removal of excess.
   4. Brokerage of excess material on the site is not permitted or must be completed within 7 days.

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contractor is responsible for determining the quantities of material necessary for completing the Work.

B. Unless otherwise indicated, all required materials shall be furnished by the Contractor.

C. Should the quantity of suitable on-site material be insufficient to complete the Work, suitable borrow material shall be provided by the Contractor.

D. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations

E. To the greatest extent practical, soil materials used for the Work shall consist of suitable material, as generated during prosecution of the Work until such supply of on-site material is depleted.

F. Fill shall be near optimum moisture content at the time of placement and compaction.
   1. Remove and replace or uniformly apply moisture to dry material and blend until suitable moisture content is obtained.
   2. Remove and replace or scarify and dry material that is too wet until suitable moisture content is obtained.

G. Do not use materials that are frozen or that contain frost, ice, or snow.

H. Materials shall be free from chemical contaminants including, but not limited to:

1. Direct contamination or contamination of runoff from industrial areas.
2. Insecticides and herbicides used in commercial agricultural or nursery production.

I. Materials shall not contain rocks larger than six inches in greatest dimension and not more than fifteen percent of the rocks, by weight, larger than 2.5 inches in the greatest dimension unless noted otherwise on the Drawings.

1. Do not permit rocks having a dimension greater than 2.5 in the upper six inches of subsoil fill or embankment, and greater than one inch within the topsoil.

J. Unless specifically noted, materials shall not contain any amount of slag, recycled bituminous or concrete material.

2.2 MATERIAL PROPERTIES

A. Subsoil shall be clean mineral soils.

B. Recycled material is not permitted.

C. Topsoil shall meet the requirements of MnDOT Specification 3877.

1. Topsoil shall be organic surface soils stripped and stockpiled on site or imported from offsite.
2. Topsoil shall be fertile, friable, organic surface soil from the types A and B soil horizons (NRCS).
3. Topsoil shall be free of subsoil, brush, turf grasses, weeds, roots, stones larger than one inch and other deleterious matter.
4. Maximum organic content of topsoil shall be 25 percent.

D. Granular materials shall meet the requirements of MnDOT Specification 3149.2F

PART 3 - EXECUTION

3.1 EXAMINATION

A. Identify required lines, levels, and contours and verify that survey benchmark and intended elevations for the Work are as indicated on the Plans.

B. Notify affected Public and Private utility providers and comply with their requirements.

1. Conduct investigative excavations as necessary to ensure that no conflicts exist with the proposed Work.
2. Notify Owner's authorized representative upon discovery of conflicts and provide documentation as requested.

3.2 PREPARATION

A. Verify that erosion and sedimentation control devices are in place prior to beginning Work.

B. Verify that Work of related sections necessary for initiation of Site Grading has been completed and approved.

1. Provide notification to Owner's authorized representative of unsatisfactory conditions preventing timely and proper completion of the Work.

2. Beginning Site Grading without notification indicates acceptance and assumed responsibility.

C. Verify locations for temporary material stockpiles.

1. Refer to Drawings to ensure that protected vegetation areas remain unaffected by the temporary material stockpiles.

D. Provide barricades to prohibit unauthorized entry to project site.

1. Maintain secured and protected egress and access at all times.

E. Slopes of excavations shall comply with OSHA requirements and applicable building codes and ordinances.

1. Provide necessary shoring and bracing where adequate slopes are prohibited by space restrictions and/or stability of material encountered.

2. Close excavations with side slopes steeper than three horizontal to one vertical at the end of the workday or barricade and post with warning lights.

F. The Owner's activities may continue in and about the site during construction.

1. Install barricades necessary to provide a safe zone between construction work and Owner's operations. Refer to the Storm Water Pollution Prevention Plan to ensure that these barricades do not impact proper drainage.

G. Protect existing plant material within the construction limits which are to remain.

1. Provide or maintain temporary barricades and fencing consistent with Division 01 requirements.

2. Do not allow stockpiling of material, storage of equipment, or vehicle parking beneath trees.

H. Protect utilities, equipment, and structures within the construction limits which are newly constructed or are to remain.

1. Provide bracing, underpinning, or shoring as needed to prevent movement or settlement.

2. Monitor use of heavy equipment and provide alternate methods if risk of damage is present.

3. Provide soil cover, planks, or other protective covering over roads, walking paths, and soft soils that must be crossed to prevent damage by extreme loads, or lugged/tracked equipment.

4. Provide overfill of material at utilities with less than three feet of cover until ready for finish grading.

3.3 INSTALLATION

A. All grading shall be in accordance with MnDOT Specifications 2106, 2108, 2112, and per these Specifications.

B. Perform excavation, including soil correction, and construct embankments of every type of material encountered to the lines, grades and elevations indicated on the Plans and specified herein.

C. Use of explosives is not permitted.

D. Repair or replace property which is to remain, that is damaged by the work, to the satisfaction of the Owner.

E. Obtain writing permission or permits from adjacent property owners, public and private, if construction activities will infringe upon or limit access to their property.

F. When subsoil materials change or vary, as observed by the Testing Laboratory, the Contractor shall allow sufficient time for sampling and testing for suitability prior to placing the material in embankments.

   1. Allow sufficient time for testing of exposed subgrades and each lift of embankment material prior to placing additional material.

   2. All exposed subgrades and completed embankments beneath pavements and structures, including oversize, shall be proof rolled in the presence of, and under the recommendations of, the Testing Laboratory.

G. Excavated material shall be classified for reuse as being either suitable or unsuitable, subject to selective controls.

   1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

      a. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.

      b. Topsoil shall be segregated from other materials during the excavation embankment and stockpiling operations.

   2. To the extent practical, granular materials shall be segregated from other materials during the excavation and stockpiling operations so as to permit the best use of the available materials at the time of embankment.

H. On slopes steeper than five horizontal to one vertical prepare the slope by over-excavating and flattening the slope in terraces not less than ten feet in width prior to placing embankment.

   1. Place suitable fill material in maximum eight-inch loose lifts, or as otherwise specified, prior to compaction.

   2. Subsoil in embankments shall not contain rocks larger than six inches in greatest dimension within the top twelve inches or larger than three inches within the top six inches of the completed embankment unless noted otherwise in the Drawings.

I. Do not place backfill or fill material on surfaces that are muddy, frozen, covered with snow, or contain frost or ice.

1. Protect excavation bottoms and bearing surfaces against freezing when temperatures are below 35 degrees Fahrenheit and falling.

J. For finish grading provide uniformly smooth and blend slopes within the specified tolerance, including adjacent transition areas.

1. Provide uniform slopes between points where spot elevations are shown on the Plans or between such points and existing surfaces.

2. Where a change in slope is indicated on the Plans; in the absence of a distinct toe, top, or ridgeline; construct a uniform rolled transition with a nominal radius of eight feet, unless prohibited by adjacent conditions or such transition will prohibit drainage.

3. Provide a positive slope of not less than two percent away from structures

K. Recondition or replace soft or yielding areas resulting from construction operations, freezing, or wetting of soils.

1. Scarify and rework as necessary in areas sensitive to over compaction.

L. Immediately notify Owner's authorized representative upon discovery of rock that would affect the critical path of the project.

M. Provide for observation and testing of exposed surfaces at termination depth of soil excavation.

1. Surface compact, scarify and recompact, or provide additional soil correction excavation.

N. Provide embankment with suitable material as specified for General Earthwork Construction.

1. Use material obtained from site grading, trench excavation or structure excavation prior to importing from off-site sources.

2. Provide compaction as specified for each use area.

O. Excavate and fill in a manner and sequence that will provide proper drainage at all times.

P. Construct accurately to the cross section and grades shown on the Plans.

Q. Do not deposit excavated materials or store other materials or equipment within three feet of the top of the side slopes.

R. The Contractor shall assume total responsibility for design, construction, and maintenance of access and haul roads, and construction parking and staging areas.

1. Use of permanent facilities for these purposes will require prior written approval from the Owner's authorized representative.

S. Excavate soil or construct embankment to provide for a minimum of four inches of topsoil in areas indicated on Drawings.

1. Import topsoil to provide the minimum depth of topsoil required if there is insufficient amount of topsoil available on the site.
    a. All associated costs of importing topsoil are incidental to the project.

T. Spread topsoil in a loose lift thickness of five inches and do not compact.

3.4 SITE TOLERANCES

A. Lawns and Open Areas:
1. Subgrade surfaces – 0.10 feet
2. Thickness of topsoil – 0.05 feet
3. Deviation from design slope – no more than 0.4% in 50 feet

3.5 FIELD QUALITY CONTROL

A. The Independent Testing Laboratory shall conduct testing of materials proposed for use on the project, perform observation of earthwork operations and provide recommendations to the Owner as subsoil conditions and/or materials may vary; including but not limited to the following:
1. Testing and approval of materials from off site locations shall be provided.
2. Testing and classification for suitability of use of materials encountered during excavation.
3. Observation of proof rolling and testing of all exposed subgrades and excavated bases beneath footings, slabs, pavements, and other structures and prior to placing embankments or backfilling.
4. Observation and reports of groundwater conditions encountered.
5. Recommendations for over excavation and soil correction or surface compaction of subsoil.
6. Observation, testing, and reports of embankment construction, fill, and backfill.
7. Other tests as recommended by the Testing Laboratory and approved by the Owner.

B. Methods of testing shall be conducted in accordance with Section References or as recommended by the Testing Laboratory and approved by the Owner.

C. Frequency of density tests shall be:
1. Lawns, Open Areas:
    a. One per lift per 10,000 square feet but not less than three per lift total.
2. Any additional testing recommended by the Testing Laboratory, to verify constructability or compliance with the specifications, and as approved by the Owner.

D. Compaction shall be not less than the following percentages of maximum dry density as determined by the Standard Proctor test (ASTM D1557), or equivalent density standard determined by other method(s).

1. All subsoil, unless otherwise noted on the plans or specifications: 95 percent.
2. Embankments in basins, upper three feet of lawn and open areas, and planting beds: Compact as recommended by the Testing Laboratory to minimize risk of settlement without inhibiting drainage through topsoil, planting material, and subsoil, and subsequent establishment of vegetation.

3.6 PROTECTION AND MAINTENANCE

A. Protect newly graded areas from traffic.

1. Provide coordination for erosion protection of completed graded surfaces.

B. Repair and reestablish grades and material density, within 48 hours, in areas affected by traffic or subsequent construction operations, in areas subject to erosion, or any settlement of material

END OF SECTION

SECTION 31 37 16.13 – STONE PLACEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Armor Stone Revetment Placement.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM International).

B. Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction 2020 Edition.

C. City of Duluth, MN Standard Specifications for Construction.

1.3 SUBMITTALS

A. Provide copies of all permits received along with any special conditions or requirements of compliance.

B. Submit product data for all materials required for a complete installation prior to installation demonstrating that materials meet the specifications.

1.4 QUALITY CONTROL

A. The Contractor is responsible for, and shall establish and maintain, quality control for all stone production and transport under this contract to assure compliance with the specifications.

B. The Contractor shall exercise care in loading, hauling, and unloading of stone during all phases of construction to prevent cracking and splitting that would otherwise lead to rejection at the job site.

1.5 QUALITY ASSURANCE

A. Use equipment adequate in size, capacity, and number to accomplish the Work in a timely manner.

B. Conform to applicable Minnesota State Statutes and Rules, MnDOT Specifications, City of Duluth Construction Specifications, and local codes and ordinances for performance of Work, transport and disposal of excess material, dust and run-off control, and emergency access to the site.

1.6 SEQUENCING & SCHEDULING

A. Comply with conditions for dewatering, unwatering, and drainage as specified in Related Sections.

B. Verify actual locations of other construction into which systems must fit by accurate field measurements before installation.

C. Coordinate the schedule for Stonework necessary to maintain the Critical Path for subsequent work specified in related sections.

PART 2 - PRODUCTS

SECTION 31 37 16.13 – STONE PLACEMENT

2.1 SYSTEM DESCRIPTION

A. General

1. The Contractor is responsible for determining the quantities of material necessary for completing the Work.
2. Unless otherwise indicated, all required materials shall be furnished by the Contractor.
3. Materials required for this Work shall be new material conforming to the requirements of the referenced Specifications for the class, kind, type, size grade and other details indicated in these Specifications or on the Plans.
    a. An exception is made in regards to the salvageable filter stone on site.

B. Delivery, Storage, and Handling

1. Stone shall be placed in staging areas in a manner to not allow fracturing or significant deformations that would affect the quality, weight and size.
2. Excess Material Management
    a. Excess material and unsuitable material become the property of the Contractor and shall be removed from the site.
        i. Unsuitable materials are those that do not meet the requirements of Subsection 3.2 Installation, Paragraph A.2.b
    b. The Contractor is responsible for determining the quantities of material necessary for the Work including the costs of removal of excess and unsuitable material.

2.2 MATERIAL PROPERTIES

A. Gradations

1. Material having the gradations listed below shall be placed in the work at the locations as shown on the Drawings. Gradation limits are in-place requirements. Adjustments in production, transportation and placement methods shall be made as necessary to assure final placed materials are within specified ranges. Stone shall be well graded, and not exhibit gap grading or scalping from individual size ranges. The existing soil conditions are shown on the Drawings.

TYPE	WEIGHT RANGE	MEDIAN WEIGHT
New Filter Stone	0.2-0.4 tons	0.3 tons
New Armor Stone	3-4 tons	3.5 tons
New Toe Stone	6-12 tons	9 tons

2. All armor stone shall align with the properties described below. The armor stone should also have an in place minimum density of 165 lb/ft^3.

Property	ASTM Reference	MABV[1]
Specific Gravity (Saturated Surface-Dry Basis)	ASTM C127	> 2.70[2]
Water Absorption (24 Hour Immersion)	ASTM CA27	< 2.0%
Soundness Loss	ASTM C88	< 13.0%
Abrasion and Impact	ASTM C535	< 30.0%
Compressive Strength	ASTM C-42	> 2.70

[1] Minimum Average Bulk Value

[2] Based on water having a specific gravity of 62.4 lb/ft^3

3. The maximum aspect ratio (greatest dimension: least dimension) shall not be greater than 3:1 for any piece of armor or filter stone and 5:1 for any toe stone, when measured on mutually perpendicular axes

B. All stone materials shall be produced at an approved quarry. Stones shall be angular in shape (i.e., field stone is not acceptable). The stone shall be free of damage resulting from blasting during production.

C. For all City of Duluth projects involving armor stone, the shock cord and its components must be removed from the stone prior to delivery.

1. Any stone with cords, explosive materials, or remnants of materials used for detonation will not be accepted.

2.3 QUALITY REQUIREMENTS

A. All stone shall be highly resistant to weathering and disintegration under freezing/thawing and wetting/drying conditions and shall be of a quality to provide permanence of the structure in the climate in which it is to be used. The stone shall be durable, sound, and free from detrimental cracks, seams and other defects that tend to increase deterioration from natural causes or cause breakage in handling and/or placing. Argillaceous stone or stone with high shale content is more susceptible to weathering, abrasion, thin bedding, close fracturing and other undesirable rock properties and will not be accepted.

B. All stones should be angular in nature and produced in a quarry. Blast cracks that have the potential of causing more than 20% loss of weight of an individual stone, if the crack opens in service, are not acceptable. Stones with minor cracking may be re-worked at the Contractor's option, with cracked portions being removed by jacking or other suitable method. The remaining stone, if within the gradation limits, may be re-evaluated by Engineer for acceptance.

C. Armor stones shall have an average diameter between 3.6 ft and 4 feet with a minimum average diameter of 3 ft. Diameters are measured on mutually perpendicular axes. No armor stone shall have a nominal diameter less than 2.5 ft or greater than 5 ft (6.25 ft for toe stones). Nominal diameter is the average of the stone dimension in height, width, and depth.

D. The Contractor is responsible for testing of stone materials.

1. A drop test provides an immediate evaluation of the durability of very large stone during handling of the stone including placement into a structure. For comparability, the test stone(s) shall be dropped from a bucket or by other means from a height of not less than half the average diameter of the stone onto a rigid surface or second stone of comparable size. The stone shall be examined carefully before as well as after the completion of the test. Failure criteria is the development of new cracks, opening of old cracks, and the loss of piece from the surface of the stone.
    a. Drop testing will be conducted on a total of three Scour Stones at the Quarry.
    b. Each stone shall be dropped a total of five times for evaluation purposes with examination after each drop.
    c. Provide all necessary equipment and operating personnel to help perform the testing.
    d. Dumping from a truck is not acceptable.
2. 30 days prior to mobilization the Contractor shall provide a Quality Control Program (QCP) and an appropriate full-time stone source(s) and loading facility inspector(s), who shall verify that all stone produced and delivered to the job site or staging areas conforms to the requirements of this section. This plan will be approved by the Engineer, or Owners Representative.
3. The QCP and inspector(s) activities will include, but not be limited to, the following general elements:
    a. Visually inspecting every armor stone to verify that the stone meets the quality requirements of this section.
    b. Measuring every armor stone on three mutually perpendicular axes and computing its weight based on the unit weight of that stone type.
    c. Periodically checking measured weights against scale weights using a system approved by the Engineer; the selected/approved quarry needs to have a weight scale on-site.
    d. Clearly marking every armor stone using a color and/or symbol system approved by the Engineer.
    e. Maintaining separate stockpiles of stone materials by stone classification.
    f. Maintaining a clear, legible daily log of activities and observations in a format to be approved by the Engineer.
4. The Contractor shall maintain records of all quality control tests, surveys, inspections, and corrective actions, and submit copies to the Engineer.

E. In addition to quality control gradations conducted by the Contractor's stone source inspector, quality assurance gradations shall be performed by the QCP inspector in the presence of the Engineer at the stone source. The Engineer may also perform quality assurance gradations at the project site. Quality assurance gradation procedures for each stone classification will be as presented below.

1. Filter stone - The Engineer will select a random sample of stone equal to up to 30 times the median stone weight, or the total amount of required stone, in each classification. Each individual piece in the sample will be measured along three mutually perpendicular axes. Weights will be computed from measurements and recorded in table format. Using this recorded information, a gradation curve will be assembled. Quality assurance gradations will be performed at intervals selected by the Engineer. It is anticipated that three to five gradation tests will be conducted for each stone type, unless gradation test results or observations of stone materials indicate additional gradations are required.

2. Toe/Armor stone - The Engineer will select 10 stones with each stone measured and evaluated as described above.

F. The Engineer will visually inspect a random sampling of armor stones that have passed the Contractor's QCP for conformance with the quality requirements of this section. The right is reserved not to accept the materials found deficient based on quality requirements. The material rejection shall not be grounds for a time extension or change in contract price.

G. The Contractor shall provide equipment and operators to turn and handle questionable stones for further evaluation by the Engineer. In addition, rejected stones shall be segregated and removed from the stockpile area.

H. The Engineer may elect to obtain samples of any stone type for laboratory testing of material quality.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that all required geotextile fabric is installed where noted in the Drawings and in accordance with Section 31 32 19.23 – Geotextile Layer Separation.

3.2 INSTALLATION

A. Layers

1. Base Layer – Existing Soil

a. The existing soil shall be as shown on the Drawings.

2. Filter Stone

a. Provide two layers of 18-inch filter stone (36-inch total thickness) as shown on the drawings.

b. Durable stone between 10” and 24” salvaged from the work site shall be classified as salvaged filter stone. The Contractor shall quantify and report to the Engineer how much salvage stone they anticipates being reused prior to procurement of new filter stone.

i. Any unused salvage stone shall become the property of the Contractor and must be removed from the site.

ii. If one site has an excess of salvaged filter stone, the salvaged stone may be transported for use at one of the other sites included in the work.

3. Armor & Toe Stone

a. Carefully place 36-inch (minimum) armor stone as specified on the drawings.

b. Carefully place largest armor stone delivered at the toe of the slope as specified on the drawings.

4. Chinking Stones:

a. Install salvaged 12-inch chinking stones as specified in the Drawings.

B. Stone Placement

1. Place stones such that each stone placed is resting firmly on the stones beneath and has the weight of other stones above to hold it in place.

2. Place stone in small sections to the grades shown on the Drawings with the tolerances described in this section.

a. Placement of the stone shall start at the bottom of the slope unless noted otherwise in the Drawings.

3. Place stone in such a manner as to avoid displacing or placing undue impact force on underlying materials and to minimize cracking or chipping of stones.

a. All stones shall not be dropped or thrown from a height or distance that could cause fractures.

4. Each stone placed shall have a minimum of three points of contact from the surrounding stones to assure sufficient interlock is obtained in the revetment.

C. Toe Stone Anchorage

1. Before anchoring the toe stone, the contractor will remove weak and/or fractured bedrock until competent bedrock is reached.

a. Toe stones shall be anchored with 60 ksi steel in accordance with the Drawings.

b. Rebar anchors shall be embedded one foot into sound bedrock and epoxied in place with marine grade epoxy HILTI Hit-RE 500 V3 or approved equal.

c. Drill and clean holes in accordance with epoxy grout manufacture’s recommendations

D. Barrier stones shall be installed at the top edge of the slope for all sites except sites A & H. This stone shall meet all the requirements given for armor stone regarding rock size and quality.

1. Refer to the Drawings for typical spacing and placement of barrier stones.

3.3 IMPROPER & PROPER INSTALLATION OF ARMOR STONES

A. Armor stone must be placed one stone at a time using an excavator or other equipment deemed suitable by the Engineer.

1. If armor stone material is improperly installed, the material will be removed and replaced at the contractor's expense.

B. Armor stone is not the same as heavy riprap. Armor stone is of a more consistent sizing and is meant to interlock with itself.

1. Figures 1 and 2 show proper and improper revetment installation.

Figure 1. Properly constructed revetment

Figure 2. Heavy Riprap that was improperly installed by end dumping.

3.4 CLEANUP/REPAIR

A. Clean the site of all debris and unused materials and remove from site.

B. Clean adjacent structures and dust, dirt, and debris caused by Work operations. Return adjacent areas to condition existing before Work operations began.

C. Repair or replace existing property which is to remain that is damaged by the Work of this Section at no cost to the Owner.

END OF SECTION

SECTION 33 40 00 – STORMWATER UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Site storm drainpipes and appurtenances
2. Materials,
    a. Installation and removal.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

B. Minnesota Department of Transportation (MNDOT) Standard Specifications for Construction 2020 Edition.

C. City of Duluth, MN Standard Specifications for Construction.

1.3 SUBMITTALS

A. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Owner prior to installation.

B. Materials: Copies of manufacturer's brochure, data/reports for applicable pipe specifications shall be delivered to the Engineer 30 days before pipe is installed.

C. Installation Procedures: The Contractor shall submit to the Engineer for approval details giving the method and equipment to be used for the installation of the storm drainage system 30 days prior to the start of construction.

1.4 QUALITY CONTROL

A. The Contractor shall establish and maintain quality control for work under this section to ensure compliance with contract requirements and maintain records of his quality control for all construction including, but not limited to, the following:

1. Quality of Materials.
2. Excavation, Bedding, and Backfilling.
3. Structure Installation (Including concrete wall outfall ~~seal~~), and
4. Finished Elevation of Materials And structures.

1.5 QUALITY ASSURANCE

A. See Section 01 40 00 – Quality Requirements

1.6 SEQUENCING & SCHEDULING

A. Comply with conditions for dewatering and drainage as specified in Related Sections.

B. Contractor to provide notification:

1. Contact Gopher One-Call online, at (651) 454-0002 or at (800) 252-1166 to arrange for utility location services 48 hours minimum prior to performing any work on site.

2. Provide proper advance notification to regulatory authorities in accordance with applicable code and permit requirements for observation and inspection.

C. Verify actual locations of storm drainage system with other construction into which the system must fit by accurate field measurements before installation.

D. Stormwater utilities shall be installed in sequence with stone placement to prevent damage due to stone placement.

1. Stormwater utilities shall be protected from damage due to stone placement after installation.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. The Contractor is responsible for determining the quantities of material necessary for completing the Work.

B. Unless otherwise indicated, all required materials shall be furnished by the Contractor.

C. Materials required for this Work shall be new material conforming to the requirements of the referenced Specifications for the class, kind, type, size, grade, and other details indicated in these Specifications or on the Plans.

2.2 MATERIAL PROPERTIES

~~A. Flexible Pipe Couplings:~~

~~1. Conform to ASTM D5926 and CI 173~~

~~2. Maximum operating temperature of 140° F~~

~~3. Minimum operating temperature of – 30° F~~

~~4. Maximum test pressure: 4.3 PSI~~

~~5. Preapproved products are as follows:~~

~~a. Fernco:~~

~~i. F10061212 – 12-inch RCP to 12-inch CI~~

~~ii. F10061515 – 15-inch RCP to 15-inch CI~~

~~iii. SP-F10063030 – 12-inch RCP to 30-inch CI~~

~~iv. SP-F10064242 – 42-inch RCP to 42-inch CI~~

~~v. SP-F10064848 – 48-inch RCP to 48-inch CI~~

~~vi. SP-F10065454 – 54-inch RCP to 54-inch CI~~

B. Reinforced Concrete Pipe:

1. Conform to MnDOT Standard Plate 3000M

C. Reinforced Concrete Arch Pipe

1. Conform to MnDOT Standard Plate 3014K

D. RCP Aprons:

1. Conform to MnDOT Standard Plate 3123J

E. RCP-A Aprons:

1. Conform to MnDOT Standard Plate 3022C

PART 3 - EXECUTION

3.1 EXAMINATION

A. Mark all existing drainage outfalls within the bounds of the Work using lath and flagging.

3.2 PREPARATION

A. Ensure existing outfalls and storm pipes are excavated sufficiently so new piping can be effectively connected to the existing piping.

B. Preform trenching and backfilling in accordance with Section 31 23 33 – Trenching and Backfilling.

C. Each pipe shall be carefully examined before being laid. Defective or damaged pipe shall not be used.

3.3 INSTALLATION

A. Base course of bedding stone shall be installed below stormwater outfalls as indicated in the Drawings.

B. Stormwater pipes and outfalls shall be laid to the grades and alignment indicated on the Drawings. Existing rock and/or stone shall be removed, as necessary, for new pipe installation.

1. No pipe shall be laid when trench conditions are unsuitable.

2. Diversion of drainage or dewatering of trenches during construction shall be performed, as necessary, by the contractor.

~~C. Install Flexible Pipe Couplings in accordance with manufacturer's recommendations.~~

D. Pipes damaged during placement shall be removed and replaced at no additional cost to the City of Duluth.

E. Joints and connections shall be inspected and approved by the Engineer prior to the placement of backfill.

F. Backfill storm pipes with suitable excavated trench material.

1. The backfill material shall be placed in layers not exceeding eight inches loose thickness.
2. The backfill shall be brought up evenly on both sides of pipe for full length of pipe.

G. Any pipes damaged due to the compaction of backfill material shall be replaced at Contractor's expense.

1. Movement of construction machinery over a culvert or storm drain, at any stage of construction, shall be the Contractor's risk.
2. Hand-operated compaction equipment shall be used until cover over piping is at least two feet.

END OF SECTION

BID FORM - SITE A

NOTE: All costs are to be considered in-place costs. Include cost for all materials, hardware, shipping, fabrication, labor, equipment, insurance, bonds, permits state and local taxes, overhead and profit to properly install items listed under each system.

System	Item	Type	Unit	Qty	Cost per Unit	TOTAL COST
BASE BID ITEMS - LAKEWALK PHASE IV - SITE A						
01	Mob/Demob	Mobilization/Demobilization (Assuming all 8 sites are completed as one project)	LS	1	$ -	$ -
02	Erosion & Sediment Control	Erosion and Sediment Control including all BMPs and Silt Curtain	LS	1	$ -	$ -
03	Traffic Control & Signage	Traffic Control & Signage to protect and safetly detour public	LS	1	$ -	$ -
04	Site Preparation and Demolition	Includes Site Preparation, Site Layout, Demolition and Salvaging	LS	1	$ -	$ -
05	Excavation & Disposal	Excavate existing soils and haul off debris/trees	LS	1	$ -	$ -
06	Site Restoration	Site Restoration and cleanup of project site	LS	1	$ -	$ -
07	**INTENTIONALLY LEFT BLANK**	**INTENTIONALLY LEFT BLANK**	---	---	---	---
08	Bonds	Performance and Payment Bonds	LS	1	$ -	$ -
09	Salvaged Stone and Soil	Salvaging onsite stone materials and soil and re-installing per plans	LS	1	$ -	$ -
10	Filter Stone	Filter Stone	TN	600	$ -	$ -
11	Armor Stone	Armor Stone for Armor Stone Revetment	TN	2,700	$ -	$ -
12	**INTENTIONALLY LEFT BLANK**	**INTENTIONALLY LEFT BLANK**	---	---	---	---
13	Toe Stone	Toe Stone	TN	690	$ -	$ -
14	Geotextile	High Strength Non-woven Geotextile (Propex Geotex 1600)	SY	1,200	$ -	$ -
15	Toe Stone Anchoring (under water line)	Includes reinforcement anchoring and associated work and materials	EA	75	$ -	$ -
16	Toe Stone Anchoring (above water line)	Includes reinforcement anchoring and associated work and materials	EA	13	$ -	$ -
17	**INTENTIONALLY LEFT BLANK**	**INTENTIONALLY LEFT BLANK**	---	---	---	---
18	**INTENTIONALLY LEFT BLANK**	**INTENTIONALLY LEFT BLANK**	---	---	---	---
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24	**INTENTIONALLY LEFT BLANK**	**INTENTIONALLY LEFT BLANK**	---	---	---	---
ALTERNATE BID ITEMS - LAKEWALK PHASE IV - SITE A						
ALT 1	Toe Stone Trenching	Trenching toe stone into bedrock (no mechanical anchoring) - 1 to 100 LF	LF	1 to 100		
ALT 2	Toe Stone Trenching	Trenching toe stone into bedrock (no mechanical anchoring) - 100 to 500 LF	LF	100 to 500		
ALT 3	Toe Stone Trenching	Trenching toe stone into bedrock (no mechanical anchoring) - 500+ LF	LF	500+		
ALT 4	Site A - West & East Ends	Additional 135 LF beyond ends of concrete retaining wall (includes all work associate	LS	1	$ -	
ALT 5	Retaining Wall Repairs	Crack Repair and Injection > 1/8"	LF	85	$ -	
	Retaining Wall Repairs	Crack Repair and Injection < 1/8"	LF	175	$ -	

PROJECT TOTALS

BASE BID TOTAL	**$ -**
ALTERNATE 4 TOTAL	**$ -**
TOTAL WITH ALTERNATE 4	**$ -**
ALTERNATE 5 TOTAL	**$ -**
TOTAL WITH ALTERNATE 5	**$ -**