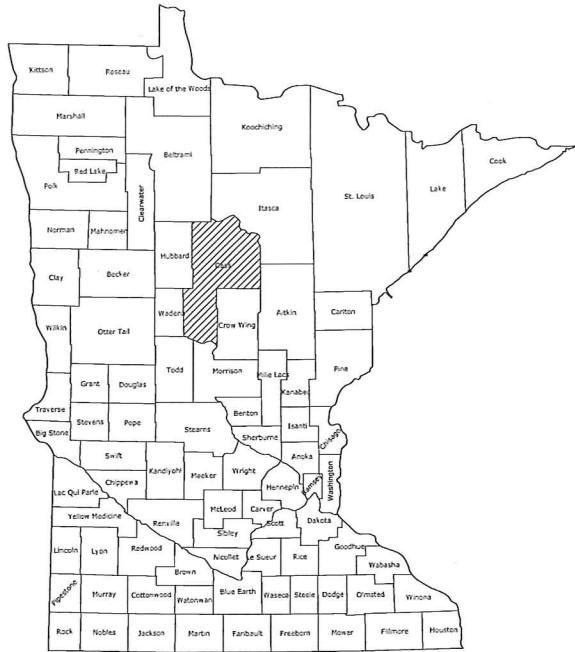


CONSTRUCTION PLANS FOR
CASS COUNTY SWCD
GIRL LAKE ROCK ARCH RAPIDS
LONGVILLE, MINNESOTA
NOVEMBER, 2023

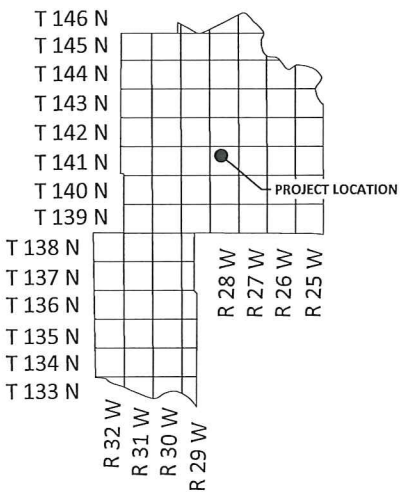


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STATE COUNTY MAP



CASS COUNTY



LOCATION MAP

SHEET INDEX:

- 1 COVER SHEET
- 2 ROCK ARCH RAPIDS PLAN & PROFILE
- 3 ROCK ARCH RAPIDS LAYOUT
- 4-5 ROCK ARCH RAPIDS DETAILS

GOVERNING SPECIFICATIONS:

STANDARD SPECIFICATIONS FOR CONSTRUCTION ADOPTED BY THE MINNESOTA DEPARTMENT OF TRANSPORTATION, 2020 EDITION, STANDARD DRAWINGS CURRENTLY IN EFFECT, AND OTHER CONTRACT PREVISIONS SUBMITTED HEREIN.

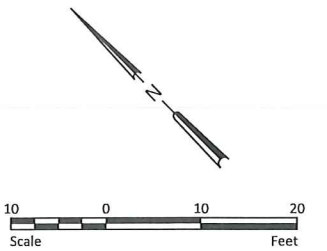
UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AS-BUILT MAPS AS PROVIDED BY MUNICIPALITIES OR UTILITY COMPANIES, AND/OR EXISTING DRAWINGS. THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN INDICATE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. NOR IS THERE A GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY RESULT FROM THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.

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.

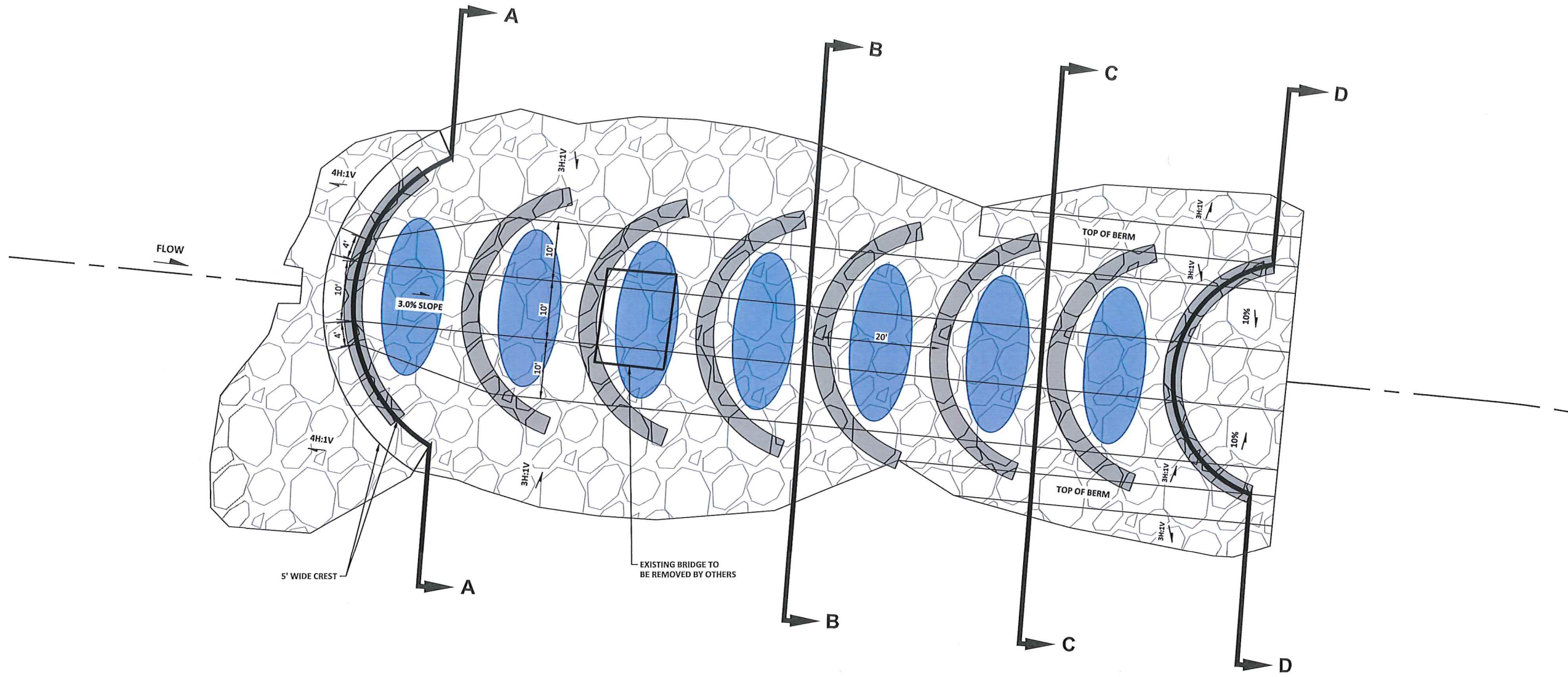

Erik S. Jones License
No. 41161

Date: 11/28/2023



- ROCK WEIR
- ROCK ARCH RAPIDS
- POOL

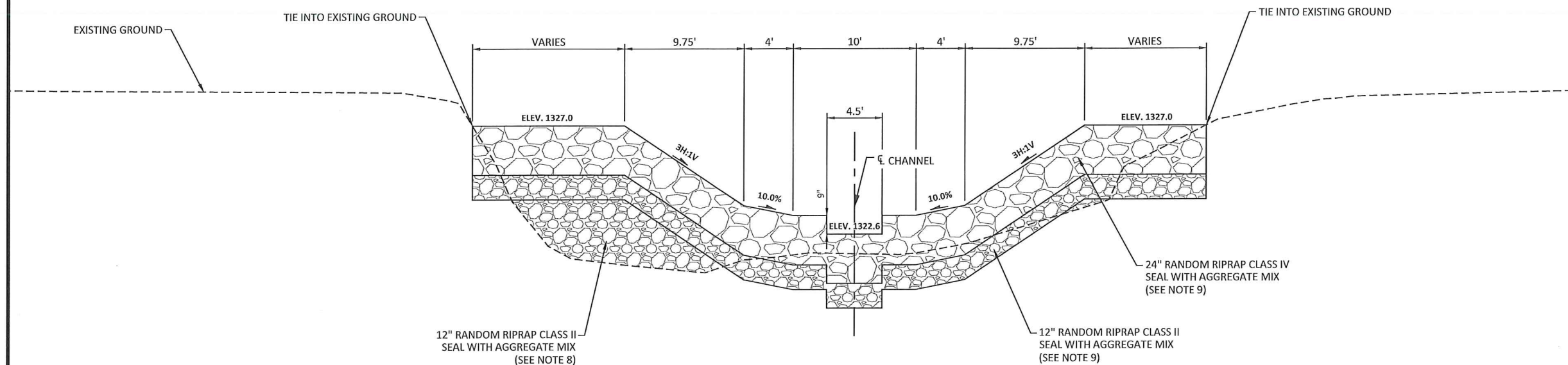
- NOTES:
- EXCAVATE RESTING POOLS 2FT BELOW NEXT DOWNSTREAM WEIR INVERT.
 - POOLS SHALL BE CONSTRUCTED WITH 2H:1V SIDE SLOPES, OR AS DIRECTED BY THE ENGINEER.



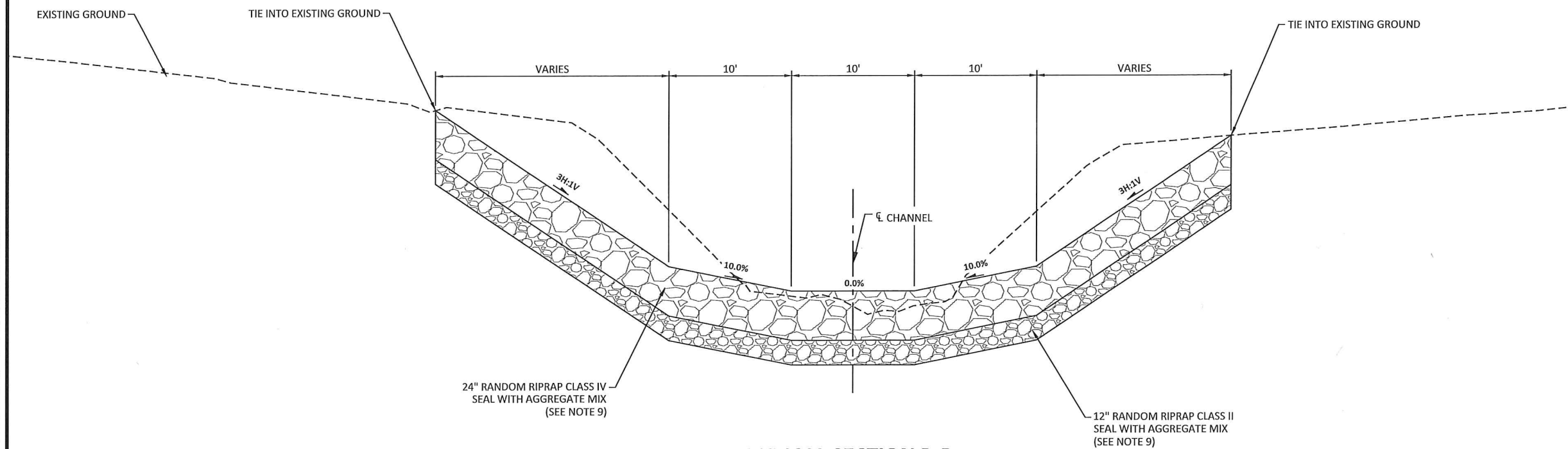
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				I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota. <i>Erik S. Jones</i> 11/28/2023 Erik S. Jones License No. 41161		 HOUSTON engineering, inc.	Drawn by VPG	Date 11/27/2023	GIRL LAKE ROCK ARCH RAPIDS CASS COUNTY SWCD LONGVILLE, MINNESOTA		ROCK ARCH RAPIDS LAYOUT PROJECT NO. 12017-0001		SHEET 3	
							Checked by ESJ	Scale AS SHOWN						
No.	Revision	Date	By											

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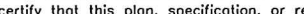
TYPICAL CREST SECTION A-A
NOT TO SCALE



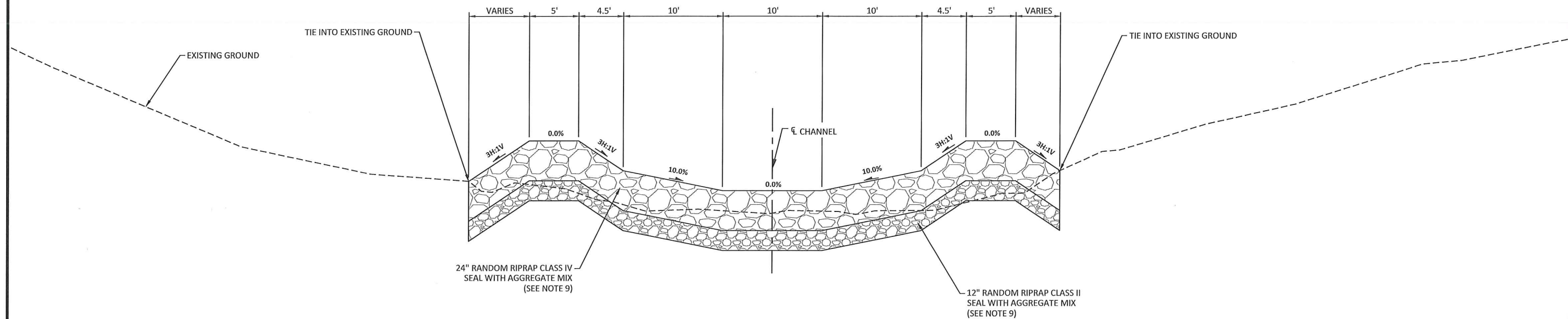
TYPICAL SECTION B-B
NOT TO SCALE

NOTES:

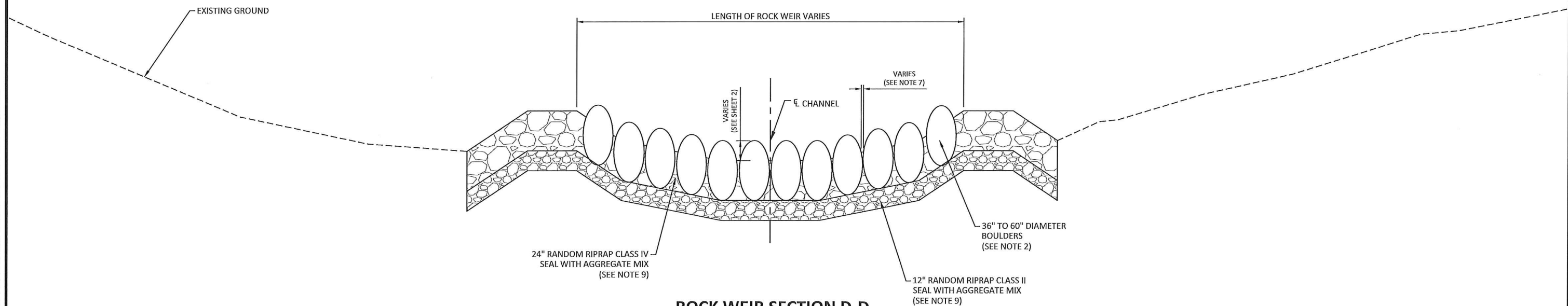
1. NUMBER OF BOULDERS FOR EACH ROCK-ARCH IS DEPENDENT ON SIZE AND SPACING OF BOULDERS.
2. ROCK WEIRS SHALL CONSIST OF 36" TO 60" BOULDERS. TOP OF BOULDERS SHALL BE SET ABOVE RANDOM RIPRAP CLASS IV AS SHOWN ON THE PROFILE TO RESULT IN WEIRS SPACED AT APPROXIMATELY 20' CREST TO CREST.
3. BOULDER WEIRS ARE TO BE FILLED WITH RANDOM RIPRAP CLASS II AND THE AGGREGATE MIX DESCRIBED IN NOTE #9, APPLIED AS A SINGLE, WELL-MIXED MATERIAL TO REDUCE LEAKAGE AND CREATE POOLS.
4. ADDITIONAL BOULDERS WILL BE ADDED RANDOMLY TO ADD TO AESTHETICS AS DIRECTED BY THE ENGINEER OR REPRESENTATIVE IN THE FIELD (ESTIMATED AT 14 TOTAL ADDITIONAL BOULDERS FOR THE GIRL LAKE ROCK ARCH RAPIDS). THE NUMBER OF ADDITIONAL BOULDERS SHALL BE MEASURED AS EACH AND PAID FOR UNDER THE BID ITEM "ROCK BOULDERS (36" TO 60" DIAMETER BOULDERS)".
5. ADDITIONAL FLAT ROCK BOULDERS WILL BE ADDED AS DIRECTED BY THE ENGINEER. FLAT ROCK BOULDERS SHALL BE GENERALLY FLAT ON ONE SIDE AND PLACED WITH THE FLAT SIDE FACING UP (ESTIMATED AT 4 ADDITIONAL BOULDERS). FLAT ROCK BOULDERS SHALL BE MEASURED AS EACH AND PAID FOR UNDER THE BID ITEM "FLAT ROCK BOULDERS (48" TO 72" DIAMETER BOULDERS)".
6. THE WEIRS FUNCTION TO PROVIDE ADDED STABILITY TO THE RAPIDS, RESTING AREA FOR THE MIGRATION OF FISH, DIRECTING FLOW TOWARDS MID-CHANNEL (REDUCING STRESS ON BANKS) AND INCREASING SAFETY BY CREATING LOW VELOCITIES NEAR BANKS.
7. WEIRS ARE TO BE INTEGRATED INTO THE CONSTRUCTED BANKS, THE GAPS BETWEEN BOULDERS SHALL BE COORDINATED WITH ON-SITE DNR PERSONNEL AND THE RESIDENT PROJECT REPRESENTATIVE. THE GAPS TYPICALLY RANGE FROM 0" TO 12".
8. ALL FILL MATERIAL UNDER RIPRAP RAMP TO BE RANDOM RIPRAP CLASS II SEAL WITH AGGREGATE MIX. FILL MATERIAL UNDER RIPRAP RAMP IS ACCOUNTED FOR IN THE PLAN QUANTITY UNDER THE BID ITEM "RANDOM RIPRAP CLASS II". NO ADDITIONAL MEASUREMENT OR PAYMENT WILL BE MADE FOR FILL MATERIAL UNDER RIPRAP RAMP.
9. RIPRAP TO BE MIXED WITH A WELL GRADED MIX OF AGGREGATE VARYING FROM THE NO. 40 SIEVE UP TO 3 INCH STONES AND APPLIED AS A SINGLE, WELL-MIXED BUILDING MATERIAL TO FORM A SOLID, NO-VOID RAMP. THE MIX OF AGGREGATE SHOULD BE SUCH THAT IT IS NOT BLOWN OUT OF THE RIPRAP BY THE RIVERS CURRENT BUT INSTEAD FORCES FLOW OVER THE RIPRAP. EXCESS CHANNEL EXCAVATION CAN BE USED FOR FILLING VOIDS WITH ENGINEERS APPROVAL. SOME CONTRACTORS HAVE ESTIMATED THE QTY TO BE NEAR 1 CY OF WELL GRADED MIX OF AGGREGATE TO 1 CY OF RIPRAP. ENGINEER MAY REQUIRE ADDITIONAL AGGREGATE MIX TO BE INSTALLED. THE WELL GRADED MIX OF AGGREGATE IS CONSIDERED INCIDENTAL TO RIPRAP.

					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.		 HOUSTON engineering, inc.	Drawn by VPG	Date 11/27/2023	GIRL LAKE ROCK ARCH RAPIDS CASS COUNTY SWCD LONGVILLE, MINNESOTA	ROCK ARCH RAPIDS DETAILS PROJECT NO. 12017-0001	SHEET 4
No.	Revision	Date	By	Erik S. Jones License No. 41161	 11/29/2023 Date	Checked by ESJ		Scale AS SHOWN				

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TYPICAL SECTION C-C
NOT TO SCALE



ROCK WEIR SECTION D-D
NOT TO SCALE

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No.	Revision	Date	By					Checked by ESJ Scale AS SHOWN				