



**US Army Corps  
of Engineers** ®  
Rock Island District

# PUBLIC NOTICE

Applicant: Buena Vista County Conservation Board

Date: March 17, 2022

Expires: April 15, 2022

CEMVR-RD-2021-1254

Section 404

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**Joint Public Notice  
US Army Corps of Engineers  
Iowa Department of Natural Resources**

1. **Applicant:** Buena Vista County Conservation Board, c/o Mr. Greg Johnson, 377 440<sup>th</sup> Street, Peterson, Iowa 51047.

2. **Project Location:**

- Linn Grove Dam in the Little Sioux River
- Section 8, Township 93 North, Range 37 West
- Buena Vista County, Iowa
- UTM NAD-83 Zone 15
- Lat 42.8947, Long -95.2456.

3. **Project Description and Purpose.**

a. The applicant proposes to stabilize existing site conditions and restore recreational opportunities in the Little Sioux River at the Linn Grove Dam after a 2019 flood event breached the earthen south extension of the dam. The newly eroded channel south of the dam and former river channel will be stabilized and partially filled to restore the former dam crest elevation, however the new channel will be maintained as an additional conveyance channel to expand the unit width of the overall structure. A total of 3,980 linear feet of rock bank stabilization (mostly Iowa DOT Class D and some Class B quarry rock revetment) are proposed. Rootwads will be installed at the left descending bank of the new channel for a distance of 203 linear feet at the upstream end, and 100 linear feet at the downstream end where a floodplain channel will be reconnected to the new channel. The rootwads will be collected from the project site where tree removal is unavoidable due to site restoration earthwork.

b. In-stream structures consist of a seven step pool complex in the channel downstream of the dam. The newly formed channel in-stream structures include the installation of nine rock arch rapids with two pools. A berm will be installed on the left descending bank of the new channel. This will remove the existing hydraulic connection to the floodplain wetlands to the south. The applicant proposes to restore the hydrology by excavating a new backwater channel. Construction

of this channel may include the discharge of fill material by the removal of tree rootwads and would permanently impact 0.167 acres of forested wetland. If the applicant can excavate the channel around existing trees that does not cause a discharge, then this would be a non-regulated activity. As currently proposed a new parking lot will permanently impact 0.14 acres of forested wetland. The parking lot configuration may change to impact less than 0.10 acres of wetland. In the event the backwater channel can be excavated without a discharge and the parking lot impacts minimized to less than 0.10 acres of wetland then no compensatory wetland mitigation would be required. The applicant is currently working through these options. The Corps will review their final proposal for these components to ensure avoidance and minimization measures.

c. If the current proposal is permitted, then permanent impacts would be 0.307 acres of forested wetland. There are no mitigation banks with forested wetland credits available. If the project permanently impacts greater than 0.10 acres of forested wetland the applicant is proposing permittee responsible mitigation. The Corps will review the final mitigation plan and ensure compliance with 33 CFR 332 (Mitigation Rule). Since the project is designed to stabilize the channels, prevent erosion and sedimentation, and restore the stream overall, no stream mitigation is proposed as this would result in an increase in functions and services of the river.

d. The Corps issued a nationwide permit 14 on August 12, 2021, as permit CEMVR-RD-2021-900, for the Weaver Street bridge replacement. This bridge is located immediately downstream of Linn Grove Dam and within the proposed project area. The bridge replacement permit included bank stabilization in the same geographic location as the furthest most downstream bank stabilization of the proposed project. Based on current information construction of both projects may occur at the same time. While occurring within the same geographic area, and potentially occurring simultaneously, the bridge replacement has a separate and independent purpose and need. They are not considered integrally related and therefore separate permits for these projects are appropriate.

e. The applicant's stated purpose and need statement is an increase in water quality and recreation. The project will restore the breach location from a 2019 flood event, will modify the dam to include a pair of rock arch rapids for fish passage, and provide improvements to navigation by paddle-craft. A copy of the applicants' decision matrix for avoidance and minimization measures and an alternatives analysis are provided in this public notice.

#### 4. Agency Review.

a. Department of the Army, Corps of Engineers. The Department of the Army application is being processed under the provisions of Section 404 of the Clean Water Act (33 U.S.C. 1344).

b. State of Iowa. The project plans have been submitted to the Iowa Department of Natural Resources (IDNR) for state certification of the proposed work in accordance with Section 401 of the Clean Water Act. The certification, if issued, will express the Department's opinion that the proposed activity will comply with Iowa's water quality standards (Chapter 61 IAC). The applicant has also applied for authorization of work in the floodplain pursuant to Chapter 455B of the Iowa Code and other applicable state permits. Written comments concerning possible impacts to waters of Iowa should be addressed to: Iowa Department of Natural Resources, 502 East 9<sup>th</sup> Street, Des Moines, Iowa 50319. A copy of the comments should be provided to the Corps of Engineers office (see paragraph 11. of this public notice for address).

## 5. Historical/Archaeological.

a. This project is receiving federal funds through Federal Emergency Management Agency (FEMA). FEMA is the lead federal agency for compliance with Section 106 of the National Historic Preservation Act (NHPA) and is currently working through NHPA concerns. The Corps will review FEMA's final determination for concurrence.

b. The recent state-wide low-head dam study prepared for the Iowa Department of Natural Resources has evaluated the Linn Grove Dam as not eligible for listing on the National Register due to multiple episodes of rebuilding in response to floods over the course of its life and little of the dam associated with its period of significance remains intact. The dam lacks the necessary integrity to be evaluated and considered a significant historic resource. The project will have no effect on this historical resource.

c. Little Sioux River Bridge was evaluated as eligible for listing on the National Register for purposes of Section 106 of the National Historic Preservation Act during the cultural resources inventory performed for this action. None of the alternatives developed to treat the dam involves any impacts to the bridge. The applicant has stated that the proposed efforts will provide further protection of the bridge by stabilizing the river in its current course. The proposed action will not affect this potentially historic property.

## 6. Endangered Species.

a. District staff has performed a preliminary review of this application for the potential impact on threatened or endangered species pursuant to Section 7 of the Endangered Species Act as amended. The following all have potential habitat in Buena Vista County, Iowa.

- Northern Long-eared Bat (*Myotis septentrionalis*),
- Monarch Butterfly (*Danaus plexippus*),
- Prairie Bush-clover (*Lespedeza leptostachya*),
- Western Prairie Fringed Orchid (*Platanthera praeclara*).

b. This project is receiving federal funds through FEMA. FEMA is the lead federal agency for compliance with Section 7 of the Endangered Species Act and has made a determination of “no effect” on the monarch butterfly, prairie bush-clover, and the western prairie fringed orchid. The project “may affect but is not likely to adversely affect” the northern long-eared bat provided all tree clearing occur between October 1 to March 31.

**7. Dredge/Fill Material Guidelines.** The evaluation of the impact of the proposed activity on the public interest will also include application of the guidelines promulgated by the Administrator of the United States Environmental Protection Agency under authority of Section 404(b) of the Clean Water Act (40 CFR Part 230).

**8. Public Interest Review.** The decision whether to issue the Corps permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal

must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

9. **Who Should Reply.** The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity. These statements should be submitted on or before the expiration date specified at the top of page 1. These statements should bear upon the adequacy of plans and suitability of locations and should, if appropriate, suggest any changes considered desirable.

10. **Public Hearing Requests.** Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. A request may be denied if substantive reasons for holding a hearing are not provided.

11. **Reply to the Corps.** Comments concerning the Corps permit should be addressed to the US Army Corps of Engineers, Rock Island District, Attn: RD (K. Brown), Clock Tower Building - Post Office Box 2004, Rock Island, Illinois 61204-2004. **Ms. Kirsten Brown** may be contacted for additional information at (309) 794-5369 or email at [Kirsten.L.Brown@usace.army.mil](mailto:Kirsten.L.Brown@usace.army.mil).

Attach  
Plan

Ms. Kirsten L. Brown  
Project Manager, Western Branch  
Regulatory Division

Construction Plans – 21 pages

# BUENA VISTA COUNTY CONSERVATION BOARD

## LINN GROVE DAM AND PARK RESTORATION (100% DESIGN STAGE)

### LINN GROVE, BUENA VISTA COUNTY, IOWA

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA

AARON L. GWINNUP, P.E.  
 REG. NO. 22558 DATE \_\_\_\_\_  
 MY LICENSE RENEWAL DATE IS \_\_\_\_\_  
 PAGES OR SHEETS COVERED BY THIS SEAL:  
 A1-3 B3-4, D1-3, D13, G1, Q5-10, R5-6, S2, U3, U9-15, W SHEETS

I HEREBY CERTIFY THAT THE PORTION OF THE TECHNICAL SUBMISSION DESCRIBED BELOW WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF IOWA

DEREK R. LASH, P.E.  
 REG. NO. 21838 DATE \_\_\_\_\_  
 MY LICENSE RENEWAL DATE IS 12/31/2022  
 PAGES OR SHEETS COVERED BY THIS SEAL:  
 C1-11, J1-6, K5, Q1-4, R1-4, R7, U1-2, Z SHEETS

I HEREBY CERTIFY THAT THE PORTION OF THE TECHNICAL SUBMISSION DESCRIBED BELOW WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF IOWA

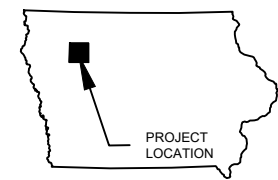
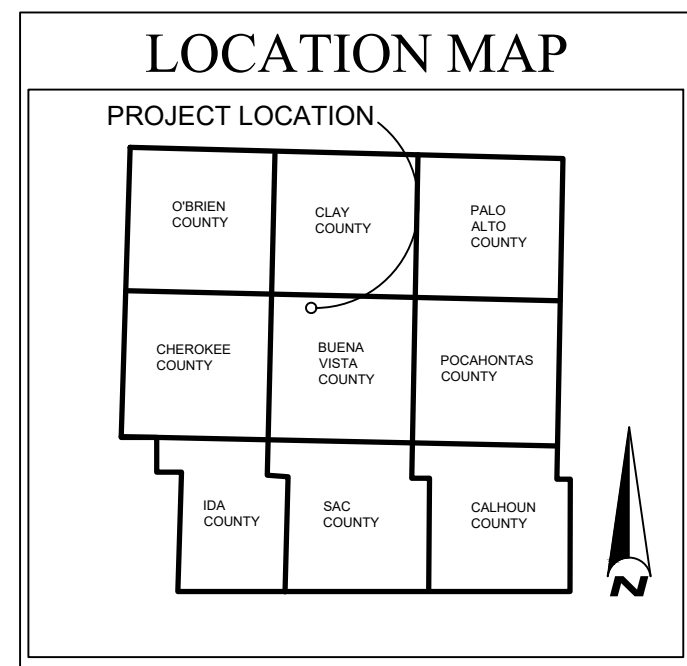
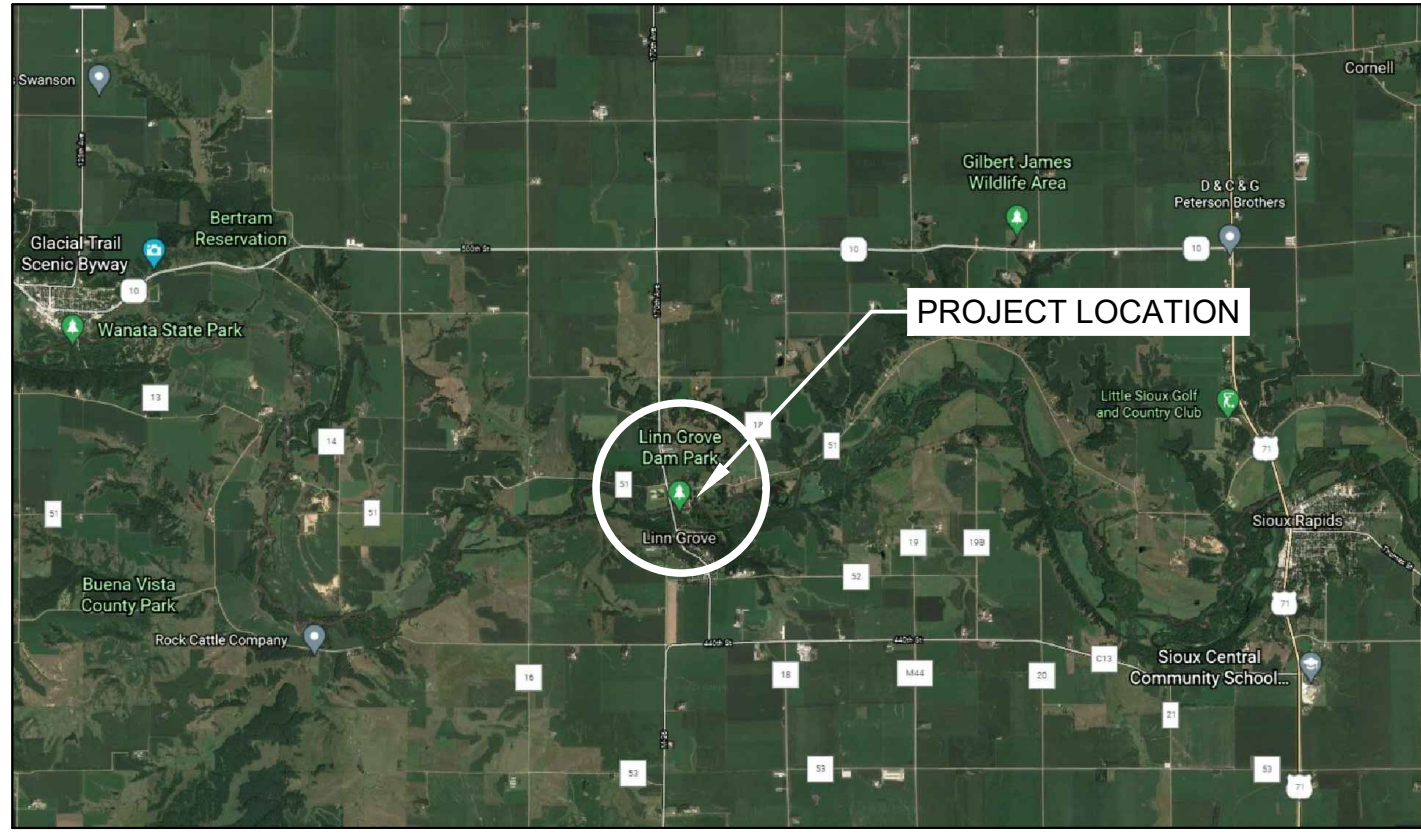
BRITTA M. HANSEN, PLA  
 REG. NO. 00696 DATE \_\_\_\_\_  
 MY LICENSE RENEWAL DATE IS 06/20/2022  
 PAGES OR SHEETS COVERED BY THIS SEAL:  
 K1-4, K6-8, S1

I HEREBY CERTIFY THAT THE PORTION OF THE TECHNICAL SUBMISSION DESCRIBED BELOW WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF IOWA

QUINN DONNELLY, P.E.  
 REG. NO. 27176 DATE \_\_\_\_\_  
 MY LICENSE RENEWAL DATE IS 12/31/2023  
 PAGES OR SHEETS COVERED BY THIS SEAL:  
 B1-2, D4-12, U4-8

I HEREBY CERTIFY THAT THE PORTION OF THE TECHNICAL SUBMISSION DESCRIBED BELOW WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED LANDSCAPE ARCHITECT UNDER THE LAWS OF THE STATE OF IOWA

TERRY A. COLE, P.E.  
 REG. NO. 13297 DATE \_\_\_\_\_  
 MY LICENSE RENEWAL DATE IS 12/31/2022  
 PAGES OR SHEETS COVERED BY THIS SEAL:  
 V SHEETS



<b>CLIENT</b> <b>BUENA VISTA COUNTY CONSERVATION BOARD</b> 377 440TH ST PETERSON, IA 51047	<b>ENGINEER</b> <b>EMMONS &amp; OLIVIER RESOURCES, INC.</b> 1919 UNIVERSITY AVE W. SUITE 300 ST. PAUL, MN 55104 TELEPHONE: (651) 770-8448 FAX: (651) 770-2552 eorinc.com
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NO	DATE	BY	REVISION
6	01/11/22	ERK	100% FINAL DESIGN
5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS

SUBMISSION DATE:  
01-11-2022

DESIGN BY: EOR    DRAWN BY: BR    CHECKED BY: DRL

EOR PROJECT NO.  
1594-0004

1919 University Ave W,  
Suite 300, St Paul, MN 55104  
Tele: 651.770.8448  
www.eorinc.com

LINN GROVE DAM AND PARK RESTORATION LINN GROVE, BUENA VISTA COUNTY, IOWA	STATE PROJECT NO. ---    CITY PROJECT NO. ###	A.1 - TITLE SHEET
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Plot Date: 01/14/2022  
 Drawing name: X:\clients\county\01594\_buena\_vista\_cnv\cna\0004\_linn\_grove\_dam\_300\_GINSGang\CD\Drawing\_Subset\1594-4\_CD\_Subset-A.dwg  
 Xref:

Title Sheets	
A1	Title Page
A2	Sheet List
A3	Legend, Symbols, Abbreviations
Typical Sections	
B1	North Channel Typical Sections
B2	South Channel Typical Sections
B3	South Levee Typical Section
B4	Southwest Channel Typical Section
Notes, Quantities, Existing Conditions	
C1	General Notes
C2	Estimated Quantities 1
C3	Estimated Quantities 2
C4	Reference Information 1
C5	Reference Information 2
C5	Reference Information 3
C6	Existing Conditions Overview 1
C7	Existing Conditions - Area 1
C8	Existing Conditions - Area 2
C9	Existing Conditions - Area 3
C10	Existing Conditions - Area 4
C11	Existing Conditions - Area 5
Plan and Profiles	
D1	South Levee Plan & Profile
D2	Line of Control Plan & Profile
D3	Southwest Channel Plan & Profile
D4	In-Channel Improvements Overview
D5	South Channel Plan & Profile - Area 1
D6	South Channel Plan & Profile - Area 2
D7	South Channel Sections - Area 1
D8	South Channel Sections - Area 2
D9	North Channel Plan & Profile - Area 1
D10	North Channel Plan & Profile - Area 2
D11	North Channel Sections - Area 1
D12	North Channel Sections - Area 1
D13	Clay Core and South Channel Approach Plan & Profile
Survey and Alignments	
G1	Survey Sheets
Traffic Control and Phasing	
J1	Project Access Plan
J2	Traffic Control Plan
J3	Phase 1
J4	Phase 2
J5	Phase 3
J6	Phase 4 & 5
Landscaping and Restoration	
K1	Landscape Restoration Plan
K2	Landscape Planting Plan
K3	Plant Schedules & Seed Tables
K4	Hardscape Plan
K5	Parking Lot Plan
K6	Landscape Notes
K7	North Terrace Plan
K8	South Channel Access Plan

Removals and Grading	
Q1	Removals and Demolition Plan Overview
Q2	Removals and Demolition Plan - Area 1
Q3	Removals and Demolition Plan - Area 2
Q4	Removals and Demolition Plan - Area 3
Q5	Grading Plan Overview
Q6	Grading Plan - Area 1
Q7	Grading Plan - Area 2
Q8	Grading Plan - Area 3
Q9	Grading Plan - Area 4
Q10	Grading Plan - Area 5
Erosion and Sediment Control	
R1	Erosion and Sediment Control Plan Overview
R2	Erosion and Sediment Control Plan - Area 1
R3	Erosion and Sediment Control Plan - Area 2
R4	Erosion and Sediment Control Plan - Area 3
R5	Riverbank Stabilization Overview
R6	Island Restoration Plan
R7	Stormwater Pollution Prevention Plan - Site Plan
River Access Trails, Portages, & Landings	
S1	Signage
S2	SW Trail and Culvert
Details	
U1	Details Sheet 1
U2	Details Sheet 2
U3	Details Sheet 3
U4	Boulder Placement & Variance Details
U5	North & South Channel BGCS & RAR Details
U6	North Channel BGCS Details
U7	South Channel RAR Details
U8	Boulder Matrix Structure Details
U9	Details Sheet 9 - Revetment type 1 & 2
U10	Details Sheet 10 - Revetment Type 3 & 4
U11	Details Sheet 11
U12	Details Sheet 12
U13	Details Sheet 13
U14	Details Sheet 14
U15	Details Sheet 15
Structural	
V1	Quantity Summary 7 General Notes
V2	General Plan
V3	Typical Section Details
V4	Plan and Profile - Segment "A"
V5	Plan and Profile - Segment "B"
V6	Plan and Profile - Segment "C"
V7	Plan and Profile - Segment "D"
Mainline Cross Sections	
W1	Cross-Sections South Levee
W2	Cross-Sections South Levee
W3	Cross-Sections Main Channel
W4	Cross-Sections Main Channel
W5	Cross-Sections Main Channel
W6	Cross-Sections Main Channel
W7	Cross-Sections Main Channel
W8	Cross-Sections Main Channel
W9	Cross-Sections Main Channel
W10	Cross-Sections Main Channel

Soil Borings	
Z1	Soil Borings Map
Z2	Soil Borings Sheet 1
Z3	Soil Borings Sheet 2
Z4	Soil Borings Sheet 3
Z5	Soil Borings Sheet 4
Z6	Soil Borings Sheet 5
Z7	Soil Borings Sheet 6
Z8	Soil Borings Sheet 7
Z9	Soil Borings Sheet 8
Z10	Soil Borings Sheet 9
Z11	Soil Borings Sheet 10
Z12	Soil Borings Sheet 11
Z13	Soil Borings Sheet 12
Z14	Soil Borings Sheet 13
Z15	Soil Borings Sheet 14
Z16	Soil Borings Sheet 15
Z17	Soil Borings Sheet 16

\* THIS PLAN SET CONTAINS 128 PLAN SHEETS

- NOTES:**
- DATUM: NAVD 88
  - PLANS SHOULD BE PRINTED IN COLOR FOR READABILITY AND 11x17 PLAN SHEET SIZE.

**GOVERNING SPECIFICATIONS**  
 THE 2021 REVISED EDITION OF THE SUDAS "STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS) MANUAL, 2015 IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND SPECIAL PROVISIONS SHALL GOVERN.  
 ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM TO IOWA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, INCLUDING FIELD MANUAL FOR TEMPORARY CONTROL ZONE LAYOUTS.

**CONSTRUCTION NOTE**  
 CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN OPERATION OF EXISTING UTILITIES THROUGHOUT THE DURATION OF THE PROJECT. IN THE EVENT THAT AN INTERRUPTION OF SERVICE IS UNAVOIDABLE IN ORDER TO COMPLETE THE WORK, CONTRACTOR SHALL PROVIDE ADEQUATE NOTIFICATION TO ALL AFFECTED BUSINESSES AND/OR RESIDENCES A MINIMUM OF 3 WORKING DAYS IN ADVANCE OF ANY INTERRUPTION. AN INTERRUPTION SHALL BE LIMITED TO THE MINIMUM DURATION POSSIBLE.

**RESOURCE LIST**

OWNER INFO:  
**BUENA VISTA COUNTY CONSERVATION BOARD**  
 377 440TH ST  
 PETERSON, IA 51047

PRIMARY CONTACT:  
 DIRECTOR: GREG JOHNSON  
 712-295-7985  
 DIRECTOR@BVCOUNTYPARKS.COM

ELECTRIC: ALLIANT  
 GAS: ALLIANT  
 TELECOM: WINDSTREAM COMMUNICATIONS  
 WATER: CITY OF LINN GROVE  
 SEWER: CITY OF LINN GROVE

THE LOCATION OF UNDERGROUND FACILITIES AND/OR STRUCTURES AS SHOWN ON THE PLANS ARE BASED ON AVAILABLE RECORD AT THE TIME THE PLANS WERE PREPARED AND ARE NOT GUARANTEED TO BE COMPLETE OR CORRECT.  
 THE SUBSURFACE UTILITY INFORMATION SHOWN IS UTILITY QUALITY LEVEL D, AS DETERMINED USING THE GUIDELINES OF "C/ASCE 38-02 STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."  
 THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING ALL UTILITIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION TO DETERMINE THE EXACT LOCATION OF ALL FACILITIES AND TO PROVIDE ADEQUATE PROTECTION OF SAID UTILITIES DURING THE COURSE OF WORK.

**IOWA ONE CALL**

**Required 48-Hour Notice**  
 Prior to the commencement of any excavation planned or scheduled to occur within the state of Iowa, all excavators (persons planning to engage in any form of excavating) must contact the Iowa One Call Notification System and provide notice of the planned excavation at least 48-hours prior to the commencement of the planned excavation - excluding Saturdays, Sundays and legal holidays.  
 Failure to notify the Iowa One Call System prior to engaging in any type of digging or excavating is a serious breach of Iowa law. Contractors and professional excavators perform more activities that disturb the earth than any other sector and the rules and regulations involving excavation safety and underground damage prevention are critical to the professional contractor and excavator.

**Methods of Providing Information for Locate Requests**  
 The IOC Call Center can be Reached 24-Hours a Day, 7 Days a Week via your landline or cellular telephone:  
 Simply dial 811 or call 800-292-8989  
 Online Ticket Entry System: WWW.IOWAONECALL.COM  
 The new "iTic" system provides a user-friendly internet-based application for submitting and tracking Iowa One Call locate requests.

Each locate request that is processed is assigned a serial number by the computer. This number contains all the information about your call. It is important to write this number down and keep it with your records. Iowa One Call retains this information for six years.  
 Excavators may be liable for any damages they may cause to buried facilities. Simply calling Iowa One Call does not necessarily relieve an excavator of these potential liabilities. For example, a damaged fiber optics line may be extremely costly to repair and the financial obligation of the contractor/excavator responsible for the damage.  
 Excavators need to take precautions and dig safely to avoid damaging buried facilities. In the event the locate markings are clearly inaccurate the liability for damage may shift to the facility operator.

Plot Date: 01/14/2022  
 Drawing Name: X:\clients\county\01594\_buena\_vista\_cnty\cma\0004\_linn\_grove\_dam\_3109\_GINMS\dwg\CD-Drawing\_Subset11594-4\_CD\_Subset-A.dwg  
 Xrefs:

6	01/11/22	ERK	100% FINAL DESIGN
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NO	DATE	BY	REVISION



SUBMISSION DATE: 01-11-2022		
DESIGN BY EOR	DRAWN BY BR	CHECKED BY DRL
EOR PROJECT NO. 1594-0004		

**EOR** Emmons & Olivier Resources, Inc.  
 1919 University Ave W,  
 Suite 300, St Paul, MN 55104  
 Tel: 651.770.8448  
 www.eorinc.com



LINN GROVE DAM AND PARK RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA  
 STATE PROJECT NO. ... CITY PROJECT NO. ###

A.2 - SHEET LIST

# LEGEND

FEATURE	EXISTING	PROPOSED
SILT FENCE		
CONSTRUCTION FENCE		
9" FILTER LOG		
PROPOSED CONSTRUCTION ENTRANCE		
RECP TYPE 4		
RECP TYPE 1		
DELINEATED WETLAND		
UTILITY POLE		
SHEETPILE		
STREET LIGHT		
OVERHEAD ELECTRIC LINES		
BURIED ELECTRIC LINES		
FIBER OPTIC LINES		
GAS LINES		
EXISTING TREE LINE		
EXISTING TREES		
FIRE HYDRANT		
PROPOSED MAJOR CONTOURS		
PROPOSED MINOR CONTOURS		
EXISTING CONTOURS		
PROJECT LIMITS		
GRADING LIMITS		
CENTER LINE ROADWAY		
ROADWAY		
GRAVEL ROAD		
GRAVEL TRAIL		
TOP OF BANK		
SANITARY SEWER LINE		
STORM SEWER OR CULVERT		
WATERMAIN		
SOIL BORING		
FLOW		
CONTROL POINT		

# ABBREVIATIONS

FEATURE	EXISTING	PROPOSED	ABBREVIATIONS	DEFINITION
SEED A: NATIVE GRASS SHORELINE MIX			PIP	PROTECT IN PLACE
SEED B: WET WOODLAND MIX			BGCS	BOULDER GRADE CONTROL STRUCTURE
SEED C: DIVERSE NATIVE UPLAND MIX			SWE	SURFACE WATER ELEVATION
SEED D: LOW MAINTENANCE TURF			CFS	CUBIC FEET PER SECOND
DECIDUOUS TREE			TYP	TYPICAL
DECIDUOUS SHRUBS			RAR	ROCK ARCH RAPIDS
TYPE 1 BANK STABILIZATION			WM	WATER MAIN
TYPE 2 BANK STABILIZATION			NTS	NOT TO SCALE
TYPE 4 BANK STABILIZATION			RECP	ROLLED EROSION CONTROL PRODUCT
GRAVEL PATH			BOF	BOTTOM OF FOOTER
RIPRAP				
CLEARING AND GRUBBING AREA				
TEMPORARY FILL TO BLOCK DITCH				
COARSE ALLUVIUM				
ROOTWAD				

Plot Date: 01/14/2022  
 Drawing Name: X:\clients\comfy\01594\_buena\_vista\_cmy\_cona\0004\_linn\_grove\_dam\_300\_gm\50\wg\CD\Drawing\_Subset11594-4\_CD\_Subset-A.dwg  
 Xrefs:

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1	05/27/21	DEM	CONCEPT DESIGN PLANS



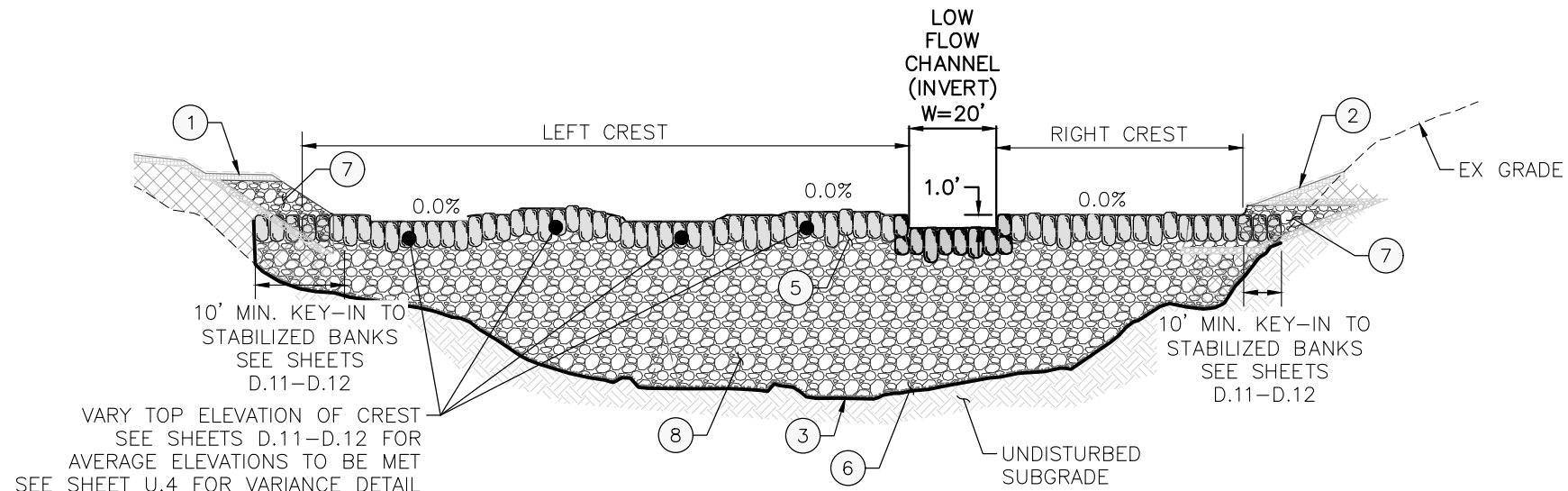
SUBMISSION DATE: 01-11-2022
DESIGN BY: EOR    DRAWN BY: BR    CHECKED BY: DRL
EOR PROJECT NO. 1594-0004

**EOR** Emmons & Olivier Resources, Inc.  
 1919 University Ave W, Suite 300, St Paul, MN 55104  
 ecology    Tele: 651.770.8448  
 community    www.eorinc.com



LINN GROVE DAM AND PARK RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA  
 STATE PROJECT NO. ...    CITY PROJECT NO. ###

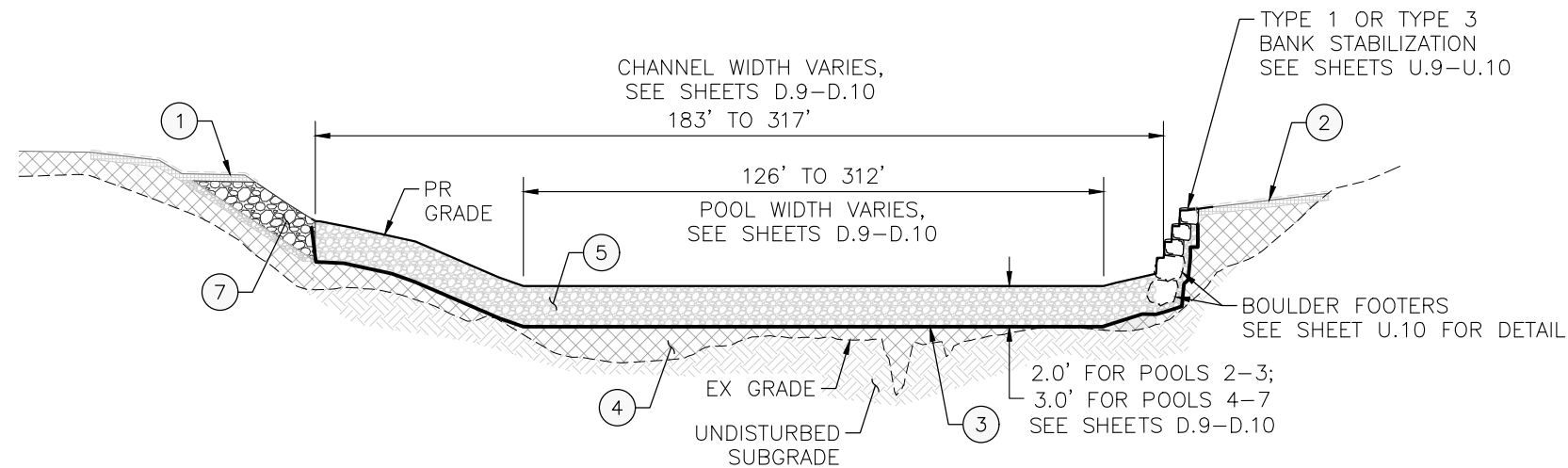
A.3 - LEGEND & SYMBOLS



1 NORTH CHANNEL - BOULDER GRADE CONTROL STRUCTURE (BGCS) 4-7 TYP. SECTION  
 B.1  
 HORIZ. SCALE: 1" = 20'  
 VERT. EXAGGERATION: 3X

CONSTRUCTION NOTES:

- ① SEE SHEET Q.9 FOR ISLAND GRADING.
- ② SEE SHEET Q.6-Q.7 FOR NORTH BANK GRADING.
- ③ PLACE GEOTEXTILE BENEATH PAVEMENT LAYER. SEE GEOTECHNICAL SPECIFICATIONS.
- ④ STRUCTURAL FILL SUBPAVEMENT LAYER. SEE GEOTECHNICAL SPECIFICATIONS.
- ⑤ COARSE ALLUVIUM PAVEMENT LAYER. SEE SPECIFICATIONS FOR GRADATION
- ⑥ PLACE 3" THICKNESS CLASS I BEDDING MATERIAL FOR FABRIC PROTECTION. SEE SPECIFICATIONS FOR GRADATION.
- ⑦ SEE SHEET U.9 FOR BANK STABILIZATION DETAIL
- ⑧ CLASS D RIPRAP FOUNDATION LAYER SEE GEOTECHNICAL SPECIFICATIONS.



2 NORTH CHANNEL - POOL TYP. SECTION  
 B.1  
 HORIZ. SCALE: 1" = 20'  
 VERT. EXAGGERATION: 3X

LEGEND:

- SELECT BOULDER
- STRUCTURE BOULDER
- CLASS I BEDDING MATERIAL
- COARSE ALLUVIUM PAVEMENT LAYER
- STRUCTURAL FILL SUBPAVEMENT LAYER
- CLASS D RIPRAP FOUNDATION LAYER

\* SEE SPECIFICATIONS FOR GRADATION AND MATERIAL REQUIREMENTS

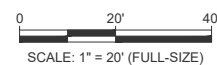
SEE SHEETS D.11 AND D.12 FOR DETAILED SECTIONS

File Date: 01/02/2022  
 Project: Linn Grove Dam and Park Restoration  
 Xrefs: 151944\_Tile\_Block\_RRD

NO	DATE	BY	REVISION
6			
5			
4			
3	01/11/22	ARH	100% FINAL DESIGN
2	10/07/21	ARH	90% PRELIMINARY DESIGN
1	10/07/21	ARH	60% PRELIMINARY DESIGN

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EOR PROJECT NO.  
01594-0004



RiverRestoration.org, LLC  
 818 Industry Place  
 Carbondale, CO 81623  
 P: 970.947.9568  
 www.riverrestoration.org

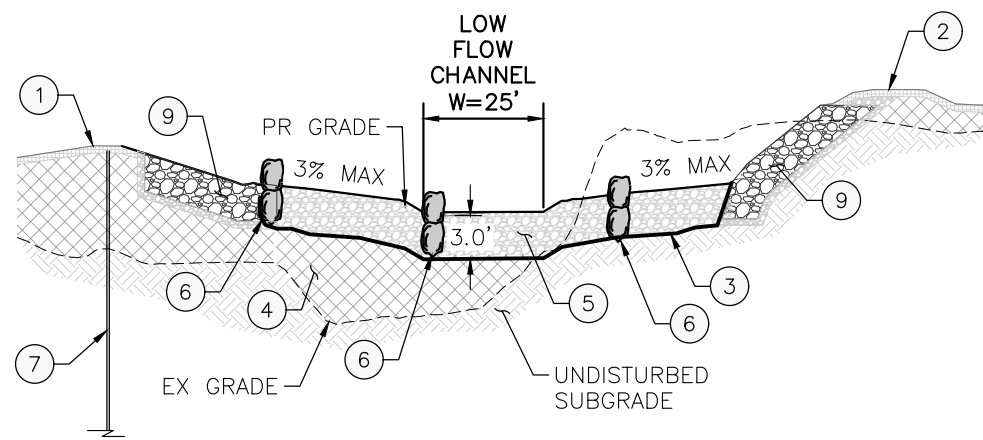


LINN GROVE DAM AND PARK  
 RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA

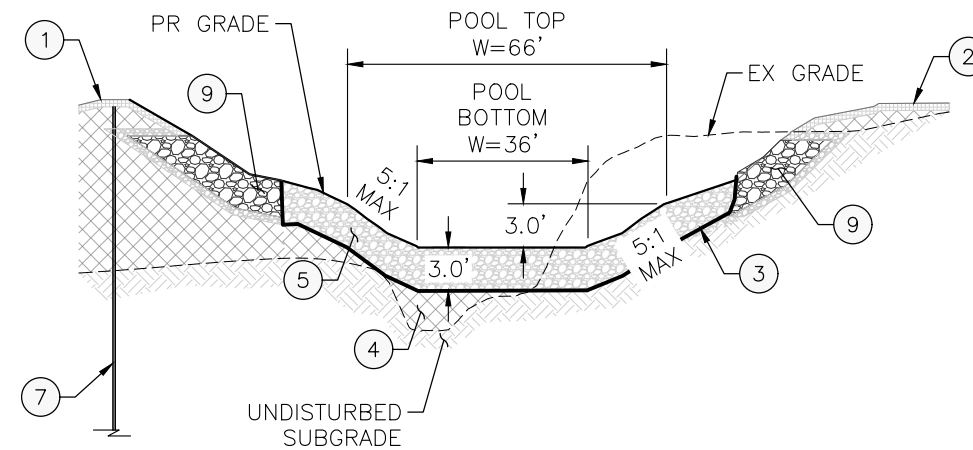
B.1 - NORTH CHANNEL  
 TYPICAL SECTIONS

STATE PROJECT NO. ---    CITY PROJECT NO. ###





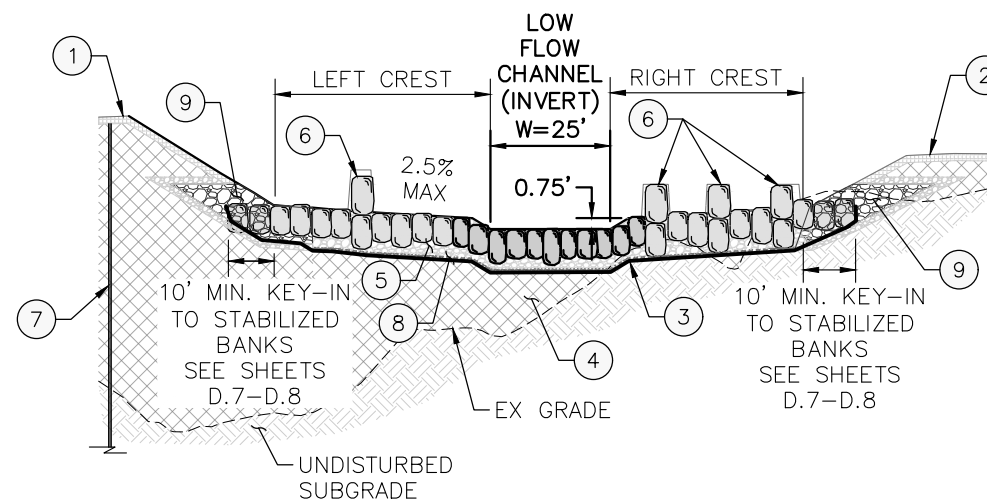
1  
B.2 SOUTH CHANNEL - RIFFLE TYP. SECTION  
HORIZ. SCALE: 1" = 20'  
VERT. EXAGGERATION: 3X



2  
B.2 SOUTH CHANNEL - POOL TYP. SECTION  
HORIZ. SCALE: 1" = 20'  
VERT. EXAGGERATION: 3X

CONSTRUCTION NOTES:

- 1 SEE SHEET D.1 FOR SOUTH LEVEE GRADING.
- 2 SEE SHEET Q.9 FOR ISLAND GRADING.
- 3 PLACE GEOTEXTILE BENEATH PAVEMENT LAYER. SEE GEOTECHNICAL SPECIFICATIONS.
- 4 STRUCTURAL FILL SUBPAVEMENT LAYER. SEE GEOTECHNICAL SPECIFICATIONS.
- 5 COARSE ALLUVIUM PAVEMENT LAYER. MIN THICKNESS = 36". SEE SPECIFICATIONS FOR GRADATION
- 6 HABITAT BOULDERS. SEE DETAIL, SHEET U.7
- 7 SEE SHEETS V.1-V.3 FOR SHEET PILE DETAILS.
- 8 PLACE 3" THICKNESS CLASS I BEDDING MATERIAL FOR FABRIC PROTECTION. SEE SPECIFICATIONS FOR GRADATION.
- 9 SEE SHEET U.9 FOR BANK STABILIZATION DETAIL



3  
B.2 SOUTH CHANNEL - ROCK ARCH RAPIDS (RAR) TYP. SECTION  
HORIZ. SCALE: 1" = 20'  
VERT. EXAGGERATION: 3X

LEGEND:

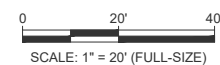
- SELECT BOULDER
- STRUCTURE BOULDER
- HABITAT BOULDER
- CLASS I BEDDING MATERIAL
- COARSE ALLUVIUM PAVEMENT LAYER
- STRUCTURAL FILL SUBPAVEMENT LAYER

\* SEE SPECIFICATIONS FOR GRADATION AND MATERIAL REQUIREMENTS

SEE SHEETS D.7 AND D.8 FOR DETAILED SECTIONS

Plot Date: 01/02/2022  
 User: jrb  
 Xref: P:\15944\_Tile\_Block\_RRD

NO	DATE	BY	REVISION
6			
5			
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3	01/11/22	ARH	100% FINAL DESIGN
2	12/03/21	ARH	90% PRELIMINARY DESIGN
1	10/07/21	ARH	60% PRELIMINARY DESIGN



SUBMISSION DATE:  
01-11-2022

DESIGN BY: ARH  
DRAWN BY: ARH  
CHECKED BY: QLD

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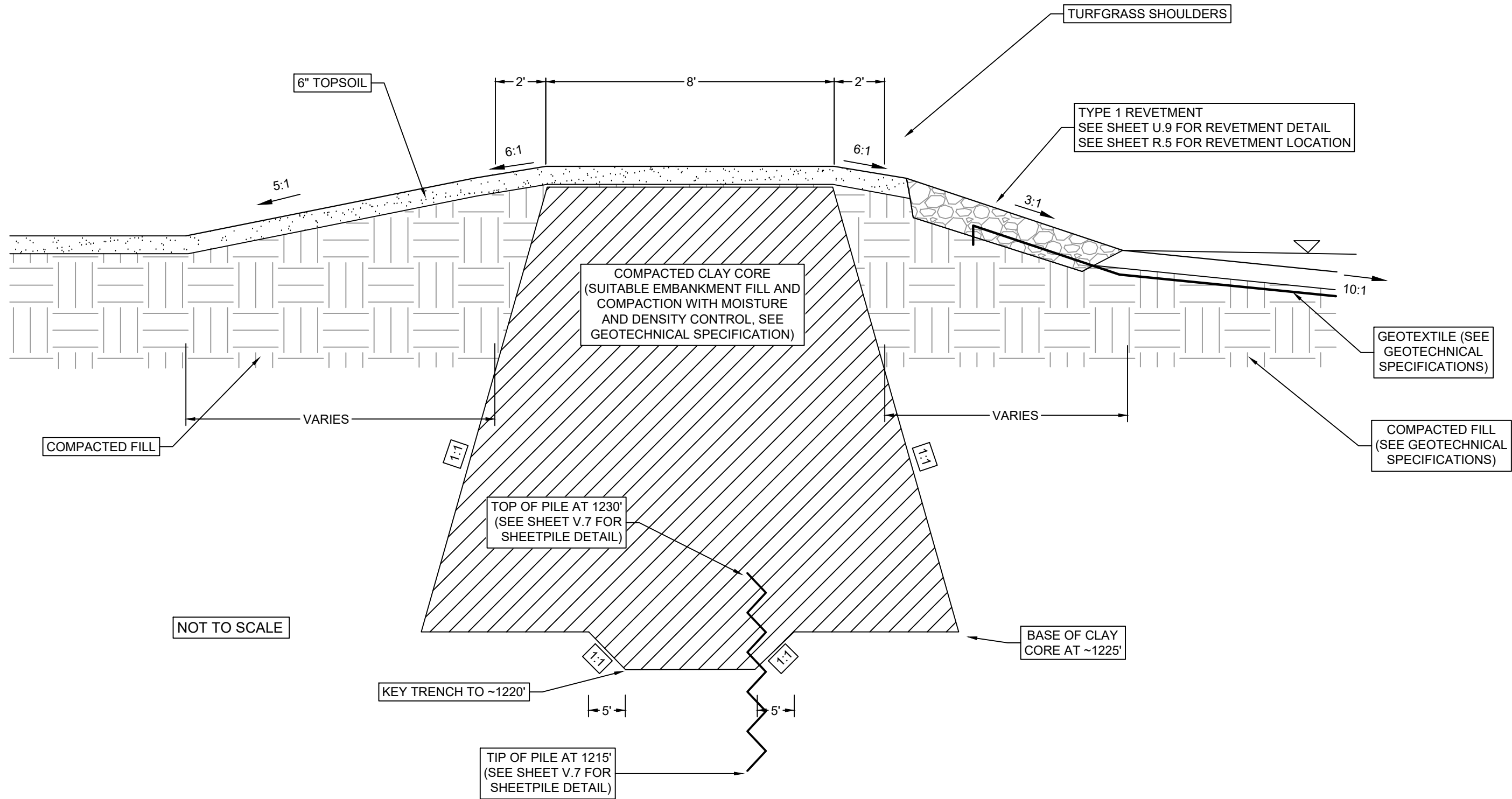


LINN GROVE DAM AND PARK  
RESTORATION  
LINN GROVE, BUENA VISTA COUNTY, IOWA

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B.2 - SOUTH CHANNEL  
TYPICAL SECTIONS

- NOTE:
1. SEE GEOTECHNICAL ENGINEERING REPORT FOR ADDITIONAL CLAY CORE DETAILS
  2. LEVEE CORE EXTENDS FROM 3+00 TO 7+00 (SEE SHEET D1 FOR SHEET PILE)



NOT TO SCALE

Plot Date: 01/14/2022  
 Drawing Name: X:\clients\buena\_vista\_cmy\1594\1594\_4\_CD\_SubsetB.dwg  
 Xrefs: 1594\_4\_X-Bases2, 1594\_4\_P-Bases2, 1594\_4\_P-PROF

NO	DATE	BY	REVISION
6	01/11/22	ERK	100% FINAL DESIGN
5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



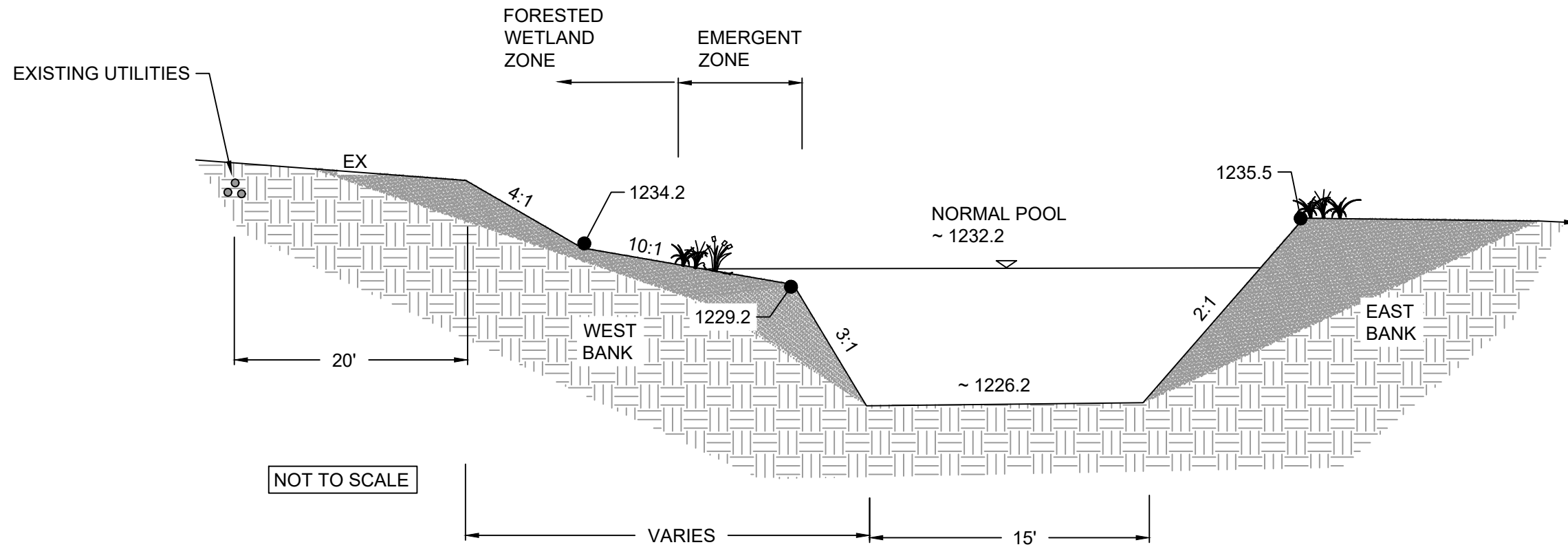
SUBMISSION DATE: 01-11-2022		
DESIGN BY EOR	DRAWN BY BR	CHECKED BY DRL
EOR PROJECT NO. 1594-0004		

**EOR** Emmons & Olivier Resources, Inc.  
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 Suite 300, St Paul, MN 55104  
 ecology community  
 Tel: 651.770.8448  
 www.eorinc.com



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B.3 - SOUTH LEVEE TYPICAL SECTIONS



Plot Date: 01/14/2022  
 Drawing Name: X:\clients\com\01594\_buena\_vista\_cmy\com\0004\_linn\_grove\_dam\_309\_GIMS\dwg\CD\Drawing\_Subset11594-4\_CD\_Subset-B.dwg  
 Xref: 1594\_4\_X-Bases2, 1594\_4\_P-Bases2, 1594\_4\_P-PROF

NO	DATE	BY	REVISION
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5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



SUBMISSION DATE: 01-11-2022		
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B.4 - SOUTHWEST CHANNEL TYPICAL SECTIONS

COUNTY CAMPGROUND

AREA 1

AREA 2

MAIN STREET

SENSITIVE AREA (TYP.)

BLUEBIRD PARKING LOT

EXISTING BOAT LANDING

PROTECT BRIDGE ABUTMENT

BLUEBIRD BOAT LANDING

EXISTING M36 /  
WEAVER ST BRIDGE

ISLAND PARK

BREACH  
CHANNEL

LITTLE SIOUX RIVER

PROJECT LIMITS (TYP.)

AREA 3

AREA 4

TRESTLE BRIDGE  
(NO ACCESS ALLOWED)

WEAVER STREET

AREA 5

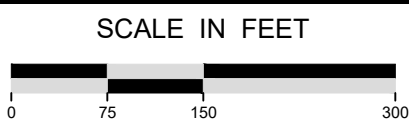
MAIN STREET

RAILROAD STREET



Proj Date: 01/14/2022  
Drawing Name: X:\clients\buena\_vista\_cmy\cna\0004\_linn\_grove\_dam\_3009\_GINSOng\CD\Drawing\_Subset\1594-4\_CD\_Aerial.dwg  
Xrefs: 1594-4\_P\_Base2\_1594-4\_L\_Base2\_1594-4\_Property\_Boundaries\_22\_1594-4\_X\_Base

NO	DATE	BY	REVISION
6	01/11/22	ERK	100% FINAL DESIGN
5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



SUBMISSION DATE: 01-11-2022

DESIGN BY: EOR    DRAWN BY: BR    CHECKED BY: DRL

EOR PROJECT NO. 1594-0004

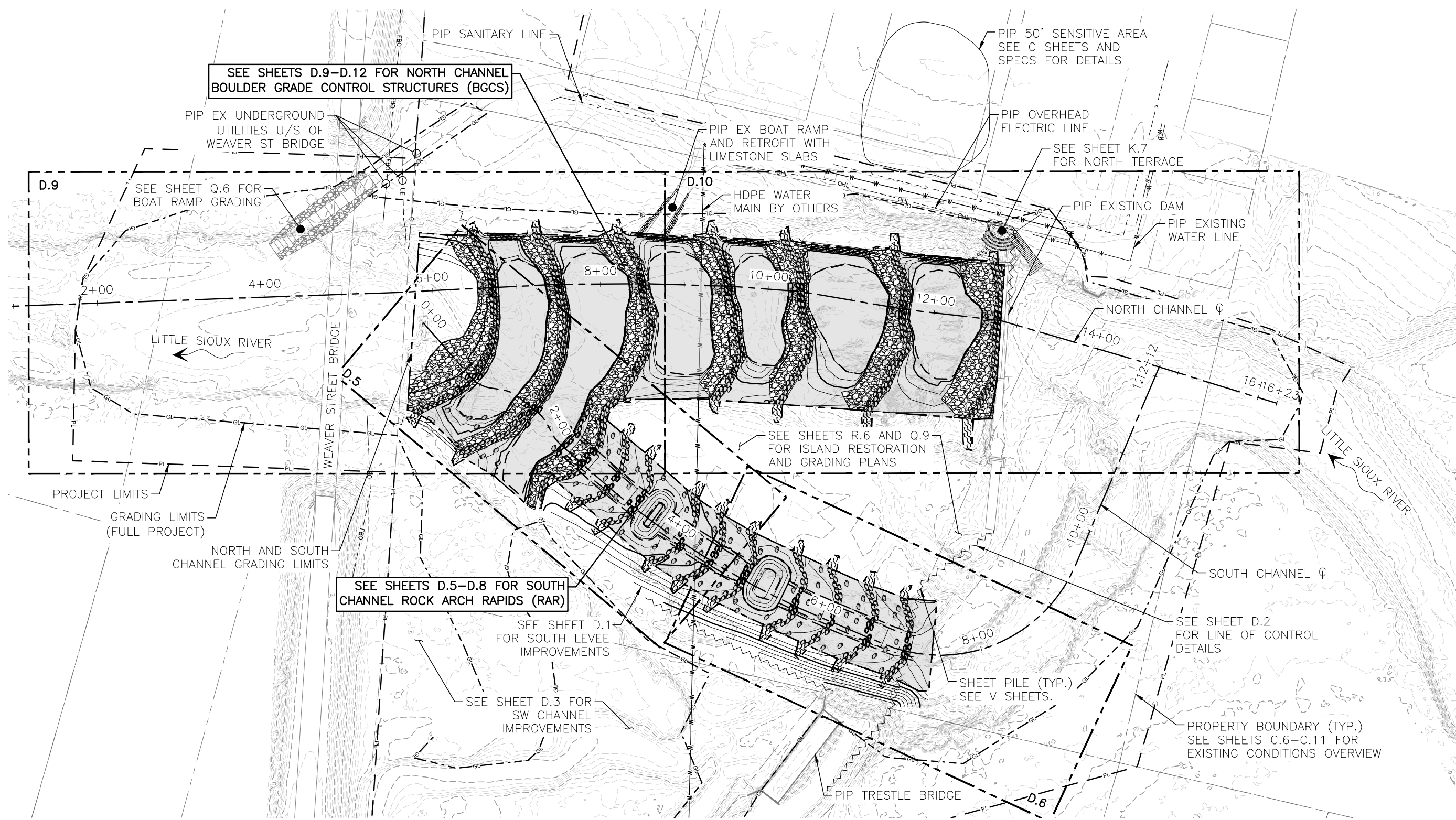
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 1919 University Ave W, Suite 300, St Paul, MN 55104  
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C.7 - EXISTING CONDITONS OVERVIEW 1

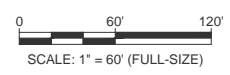


PLAN VIEW



File Date: 01/02/2022  
 Project: RECREATION\IA\2005\_LinnGroveDam\2005DRAWINGS\Sheet\2005\_D4\_RiverChannel.dwg  
 User: P1594\_4 Title: Block\_PROJ\_x:2005\_RROConcept\Linework2\_1594\_4\_Property\_Boundaries2\_LGD\_L\_Base

6			
5			
4			
3	01/11/22	ARH	100% FINAL DESIGN
2	12/03/21	ARH	90% PRELIMINARY DESIGN
1	10/07/21	ARH	60% PRELIMINARY DESIGN
NO	DATE	BY	REVISION



SUBMISSION DATE: 01-11-2022
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EOR PROJECT NO. 01594-0004



RiverRestoration.org, LLC  
 818 Industry Place  
 Carbondale, CO 81623  
 P: 970.947.9568  
 www.riverrestoration.org










LINN GROVE DAM AND PARK  
 RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA

D.4 - IN-CHANNEL IMPROVEMENTS OVERVIEW

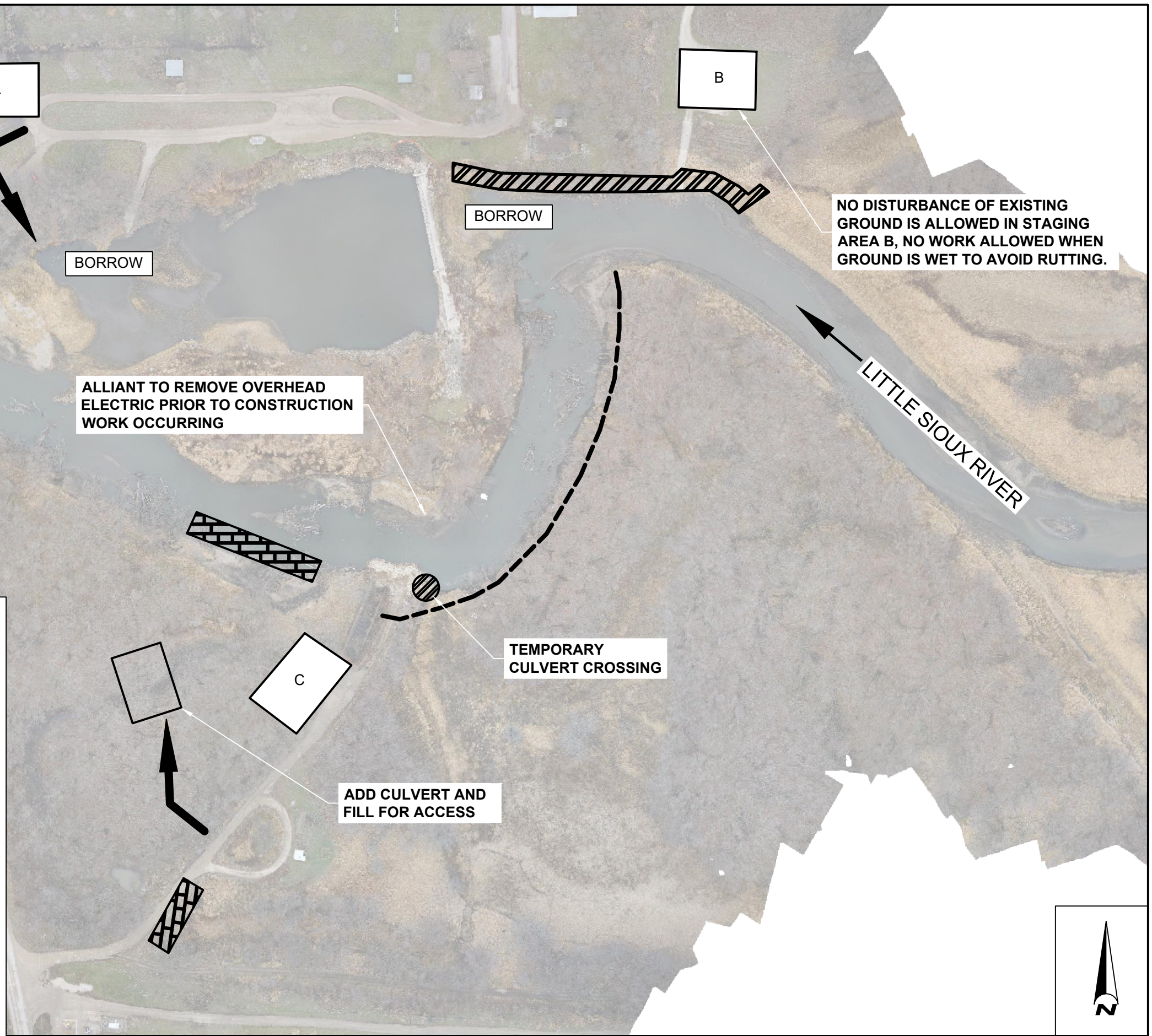
STATE PROJECT NO. --- CITY PROJECT NO. ###

**LEGEND**

-  TEMPORARY FILL TO BLOCK DITCH
-  ACCESS ROUTE PREPARATION
-  BORROW SITE
-  CULVERT
-  TEMPORARY FIELD ROAD
-  CONTRACTOR MATERIAL STORAGE AREAS
-  BANK GRADING AND STABILIZATION SEE SHEET U.9 FOR TYPE 2 BANK STABILIZATION DETAIL

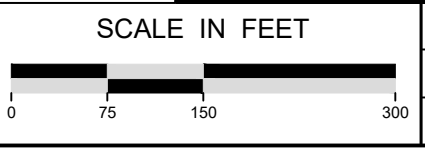
**PHASE 1 STAGING PLAN**

- PHASE 1A:**
- IOWA ONE CALL UTILITY LOCATING AND CLEARANCE
  - SITE PREPARATION & ELEVATION CONTROL (MOBILIZE JOB TRAILERS, TEMPORARY FENCING, PROJECT SIGNAGE, SWPPP CONTROLS, TEMPORARY UTILITIES, ETC.)
  - INSTALL TRAFFIC CONTROL (AS NECESSARY FOR PHASE 1)
  - TREE GRUBBING
  - LOCATE AND PREPARE FIELD ROADS AND ACCESS ROUTES
- PHASE 1B:**
- REMOVE DERELICT CONCRETE FROM DAM SEGMENT A AND B
  - REMOVE ISLAND RESTROOM
  - REMOVE ISLAND PIPES AND CABLES
  - REMOVE ISLAND PARKING BOLLARDS
  - REMOVE PARKING BOLLARDS FOR NEW BOAT LANDING
- PHASE 1C:**
- NORTH ABUTMENT WORK
  - ADD RIPRAP TO NORTH BANK EAST OF DAM (NORTHEAST BANK IMPROVEMENTS)
  - START BANK GRADING, REMOVE TOPSOIL, PLACE FILL FOR EAST BANK OF SOUTH CHANNEL



Proj Date: 01/14/2022  
 Drawing Name: X:\clients\county\01594\_buena\_vista\_cnty\cna\0004\_linn\_grove\_dam\_300\_GINS\dwg\CD\Drawing\_Subset11594-4\_CD\_Subset1-Phasing\_Plan.dwg  
 Xrefs:

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5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS
NO	DATE	BY	REVISION



SUBMISSION DATE: 01-11-2022

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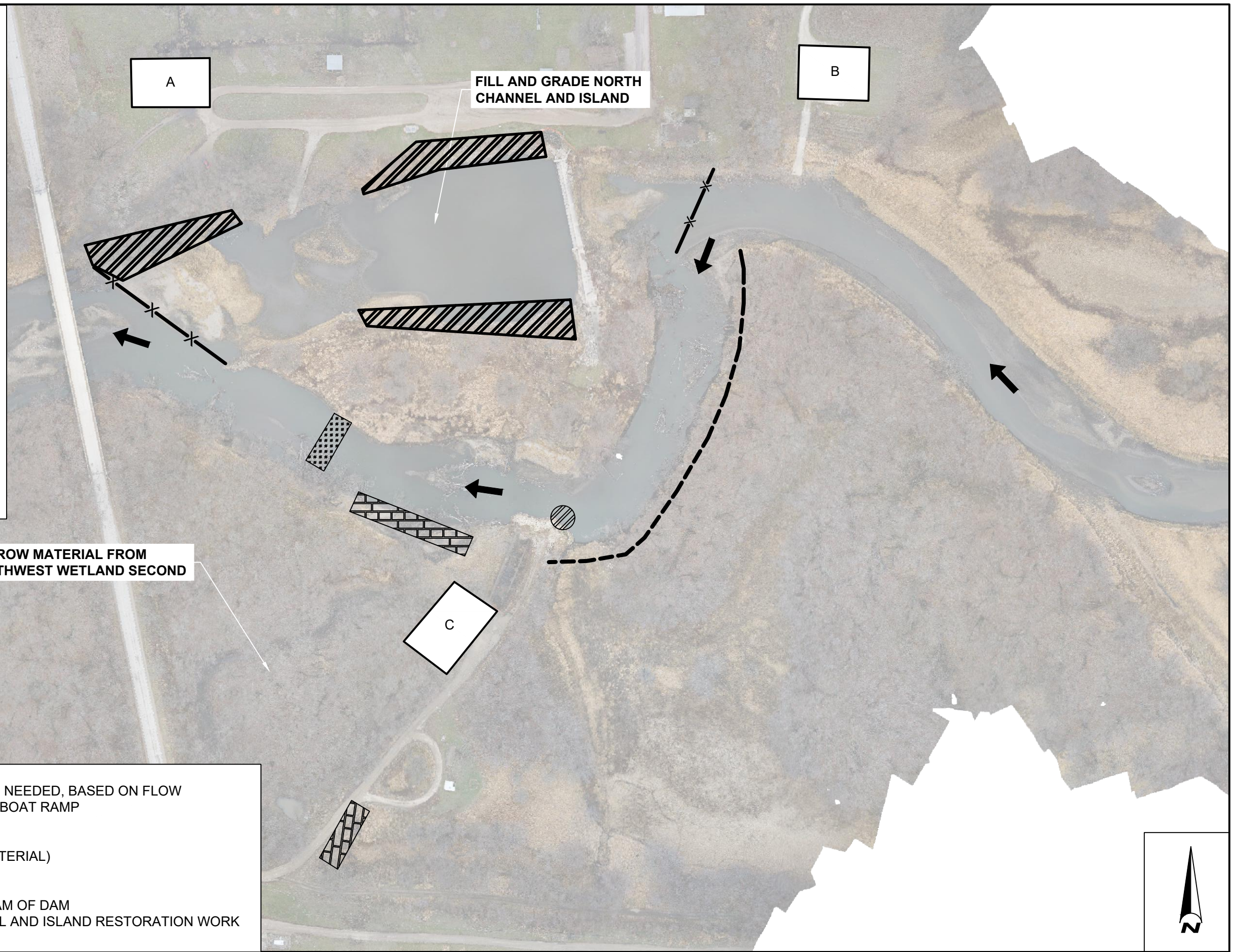
LINN GROVE DAM AND PARK RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA

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J.3 - PHASE 1

**LEGEND**

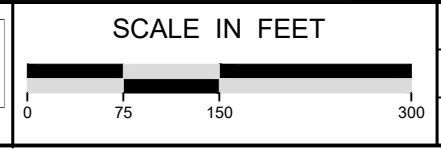
-  TEMPORARY FILL TO BLOCK DITCH
-  RIVER FLOW LOW WATER CROSSING
-  BLOCK FLOW (REFER SHEET U15 FOR OPTIONAL METHODS)
-  CONTRACTOR MATERIAL STORAGE AREAS
-  CONTRACTOR MATERIAL STORAGE AREAS
-  TEMPORARY CULVERT
-  TEMPORARY FIELD ROAD
-  BANK GRADING AND STABILIZATION SEE SHEET U.9 FOR TYPE 2 BANK STABILIZATION DETAIL



- PHASE 2 STAGING PLAN**
- BLOCK NORTH CHANNEL AT EACH END AS NEEDED, BASED ON FLOW
  - ROUGH GRADING OF NEW DOWNSTREAM BOAT RAMP
  - DEWATER AS NECESSARY:
    - NORTH CHANNEL
    - SOUTHWEST WETLAND (BORROW MATERIAL)
  - PRIMARY WORK ITEMS:
    - NORTH CHANNEL FILL
    - ALL NORTH BANK WORK DOWNSTREAM OF DAM
    - ALL SOUTH BANK OF NORTH CHANNEL AND ISLAND RESTORATION WORK

Proj Date: 01/14/2022  
 Drawing Name: X:\clients\com\01594\_buena\_vista\_cmy\cna\0004\_linn\_grove\_dam\_300\_gm\swg\CD\Drawing\_Subset\1594-4\_CD\_Subset\J\_Phasing\_Plan.dwg  
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NO	DATE	BY	REVISION
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4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	06/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



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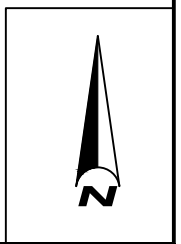
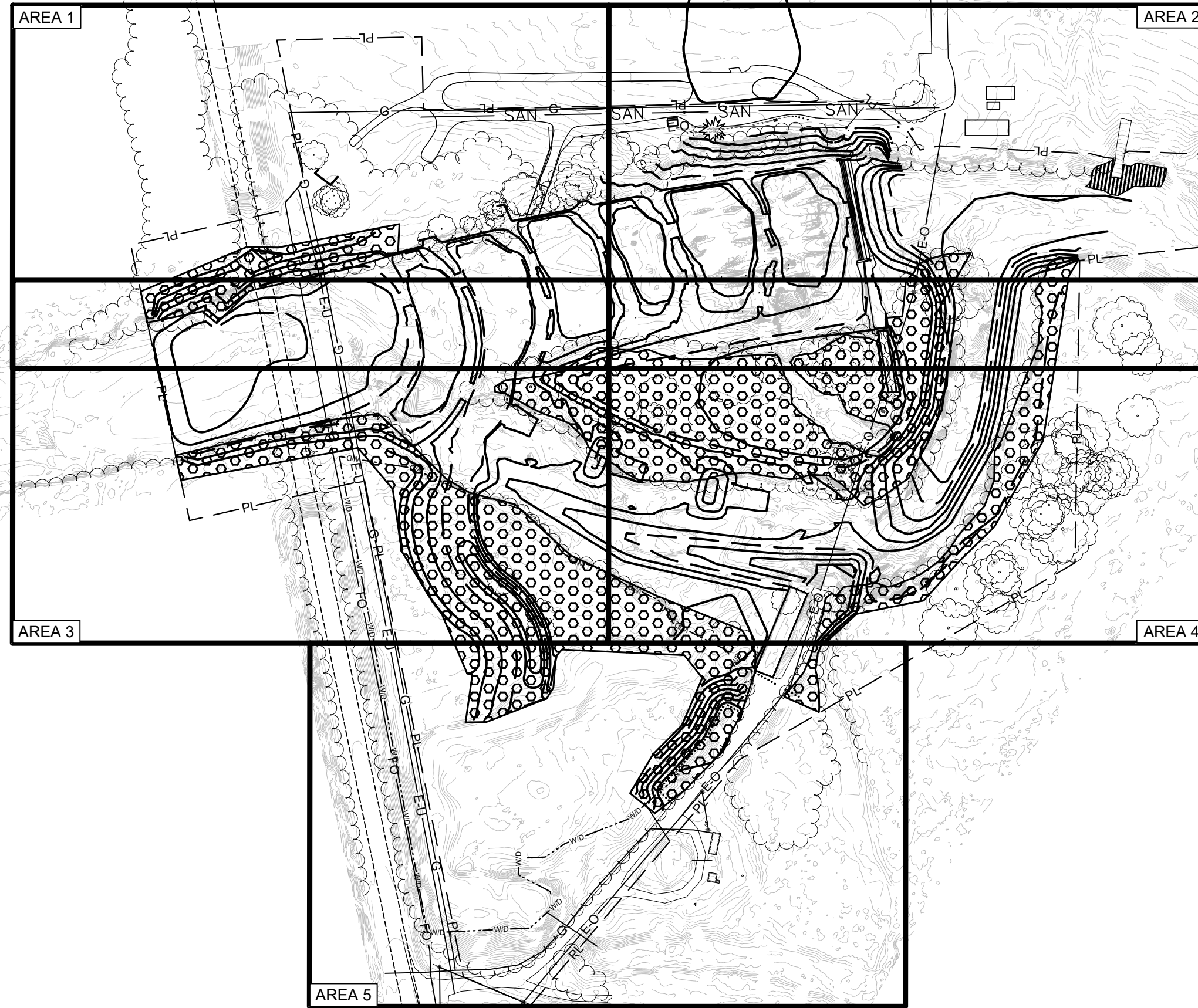
LINN GROVE DAM AND PARK RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA

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J.4 - PHASE 2

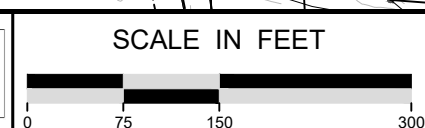
**NOTES:**

1. SMALL TREE CLEARING PROVIDED BY OTHERS IN ADVANCE, LARGE TREES WILL BE TOPPED AND LEFT STANDING IN PREPARATION FOR USE AS TOE.
2. GRUB ROOTS ONLY AS NEEDED FOR GRADING.
3. REMOVE REMAINING TREES ALONG NORTH BANK ONLY IF NEEDED FOR WORK, AND WITH APPROVAL BY BVCCB.
4. PROTECT TREES NOT INTENDED FOR REMOVAL.



Plt Date: 01/14/2022  
 Drawing Name: X:\iainits.com\01594\_buena\_vista\_cmy\_cona\0004\_linn\_grove\_dam\_300\_GIMS\dwg\CD\Drawing\_Subset11594-4\_CD\_Subset-Q.dwg  
 Xrefs: 1594\_4\_X\_Base2, 1594-4\_P-Base

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4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
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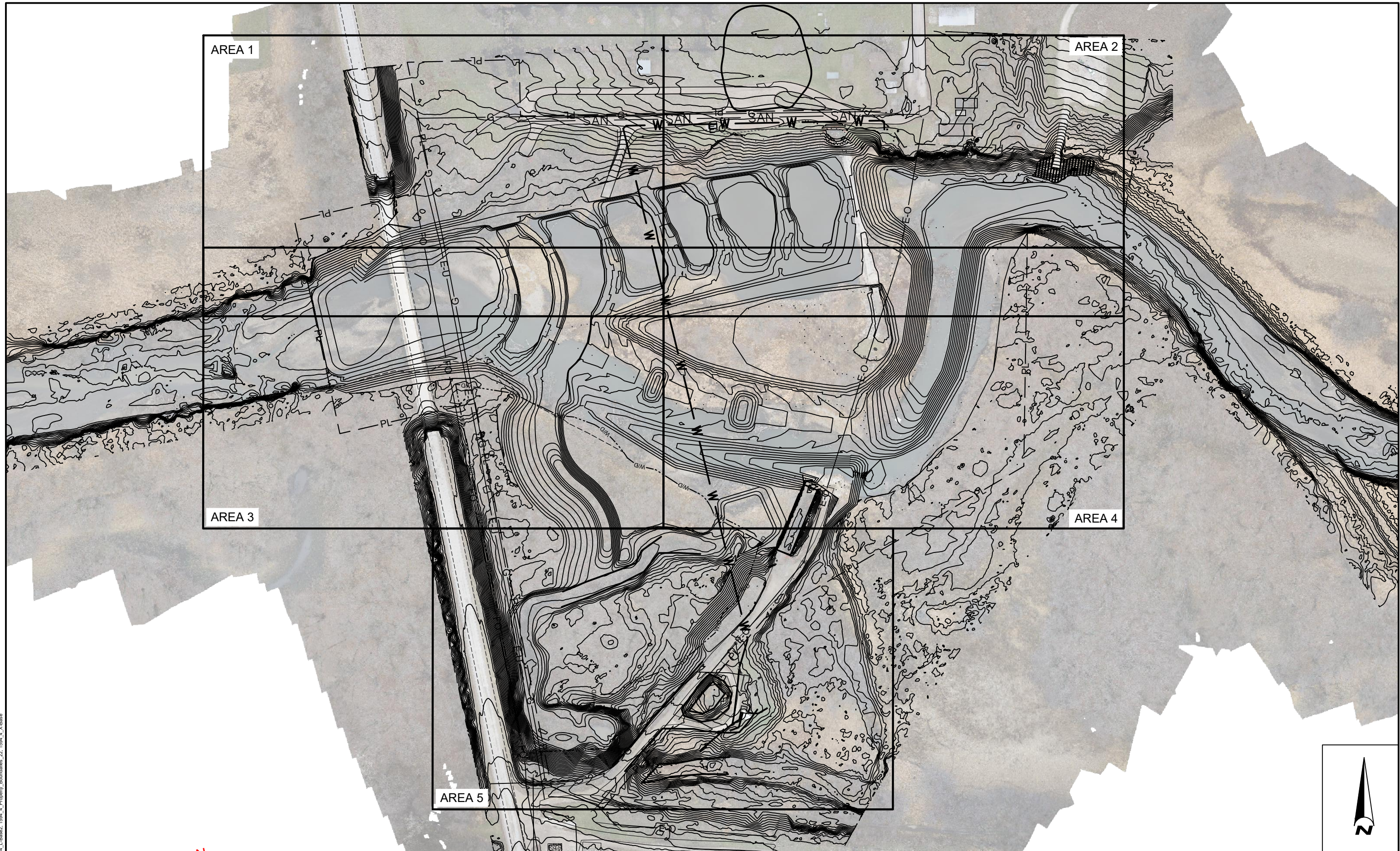


LINN GROVE DAM AND PARK RESTORATION  
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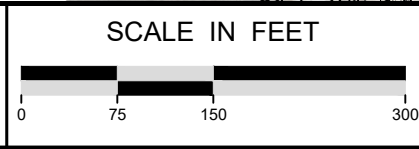
Q.1 - REMOVALS & DEMOLITION PLAN OVERVIEW





Plt Date: 01/14/2022  
 Drawing Name: X:\clients\buena\_vista\_cmy\cna\0004\_linn\_grove\_dam\309\_GINS\dwg\CD\Drawing\_Subset1\194-4\_CD\_Aerial.dwg  
 Xrefs: 194-4\_P\_Base2, 194-4\_L\_Base2, 194-4\_Property\_Boundaries\_22, 194-4\_X\_Base

NO	DATE	BY	REVISION
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2	06/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



SUBMISSION DATE: 01-11-2022

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EOR	BR	DRL

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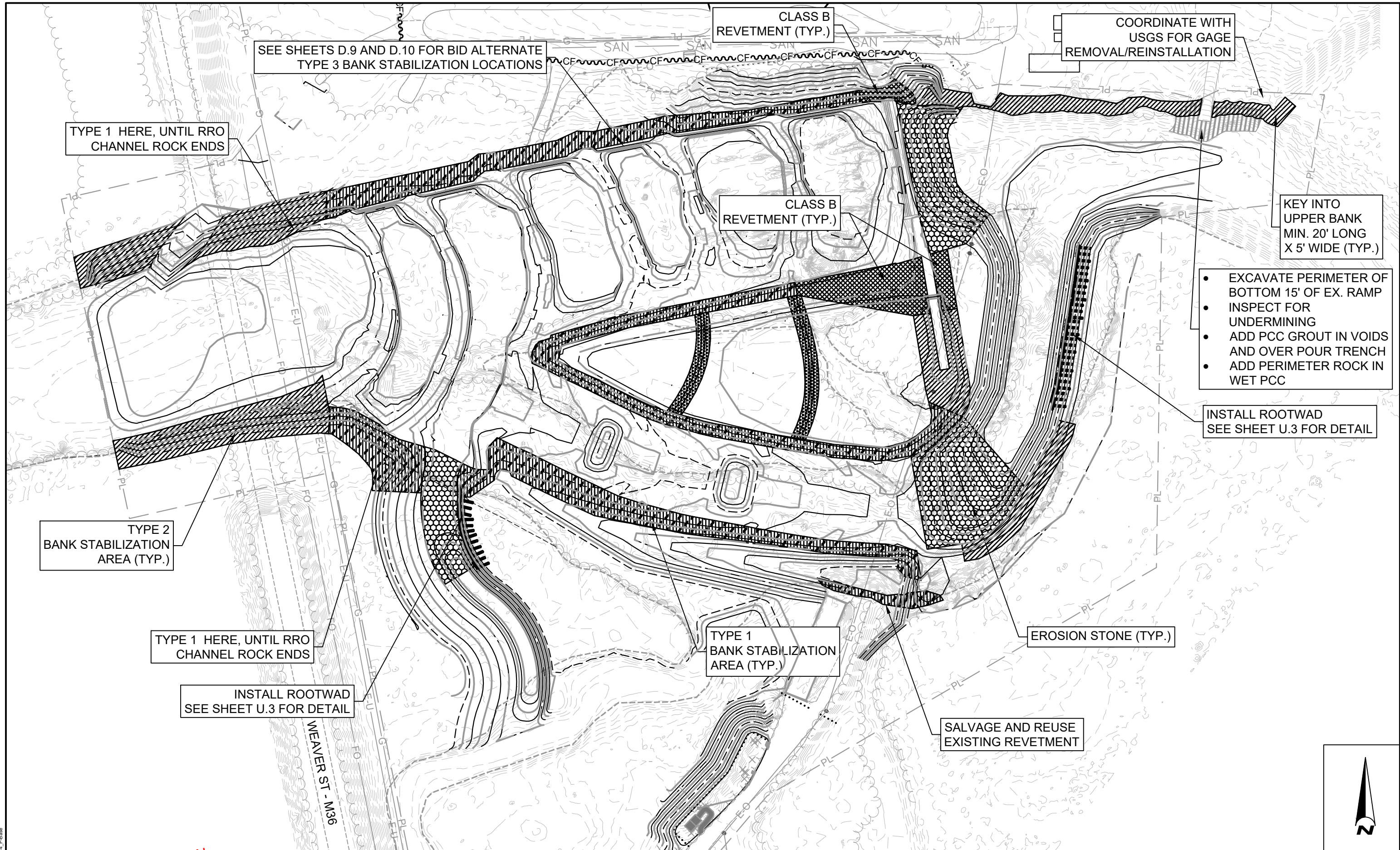


LINN GROVE DAM AND PARK RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA

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Q.5 - GRADING PLAN OVERVIEW 1

NOT FOR CONSTRUCTION



SEE SHEETS D.9 AND D.10 FOR BID ALTERNATE TYPE 3 BANK STABILIZATION LOCATIONS

TYPE 1 HERE, UNTIL RRO CHANNEL ROCK ENDS

CLASS B REVETMENT (TYP.)

COORDINATE WITH USGS FOR GAGE REMOVAL/REINSTALLATION

CLASS B REVETMENT (TYP.)

KEY INTO UPPER BANK MIN. 20' LONG X 5' WIDE (TYP.)

- EXCAVATE PERIMETER OF BOTTOM 15' OF EX. RAMP
- INSPECT FOR UNDERMINING
- ADD PCC GROUT IN VOIDS AND OVER POUR TRENCH
- ADD PERIMETER ROCK IN WET PCC

INSTALL ROOTWAD SEE SHEET U.3 FOR DETAIL

TYPE 2 BANK STABILIZATION AREA (TYP.)

TYPE 1 HERE, UNTIL RRO CHANNEL ROCK ENDS

TYPE 1 BANK STABILIZATION AREA (TYP.)

EROSION STONE (TYP.)

INSTALL ROOTWAD SEE SHEET U.3 FOR DETAIL

SALVAGE AND REUSE EXISTING REVETMENT

WEAVER ST - M36

Plt Date: 01/14/2022  
 Drawing Name: X:\iainms.com\01594\_buena\_vista\_cmy.com\0004\_linn\_grove\_dam\_300\_GINSGW\CD\Drawing\_Subset11594-4\_CD\_Subset-R.dwg  
 Xrefs: 1594\_4\_X-Base2, 1594-4\_P-Base

NO	DATE	BY	REVISION
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5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



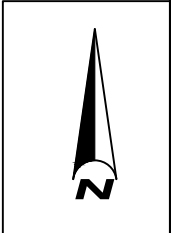
SUBMISSION DATE:	01-11-2022
DESIGN BY:	EOR
DRAWN BY:	BR
CHECKED BY:	DRL
EOR PROJECT NO.	1594-0004

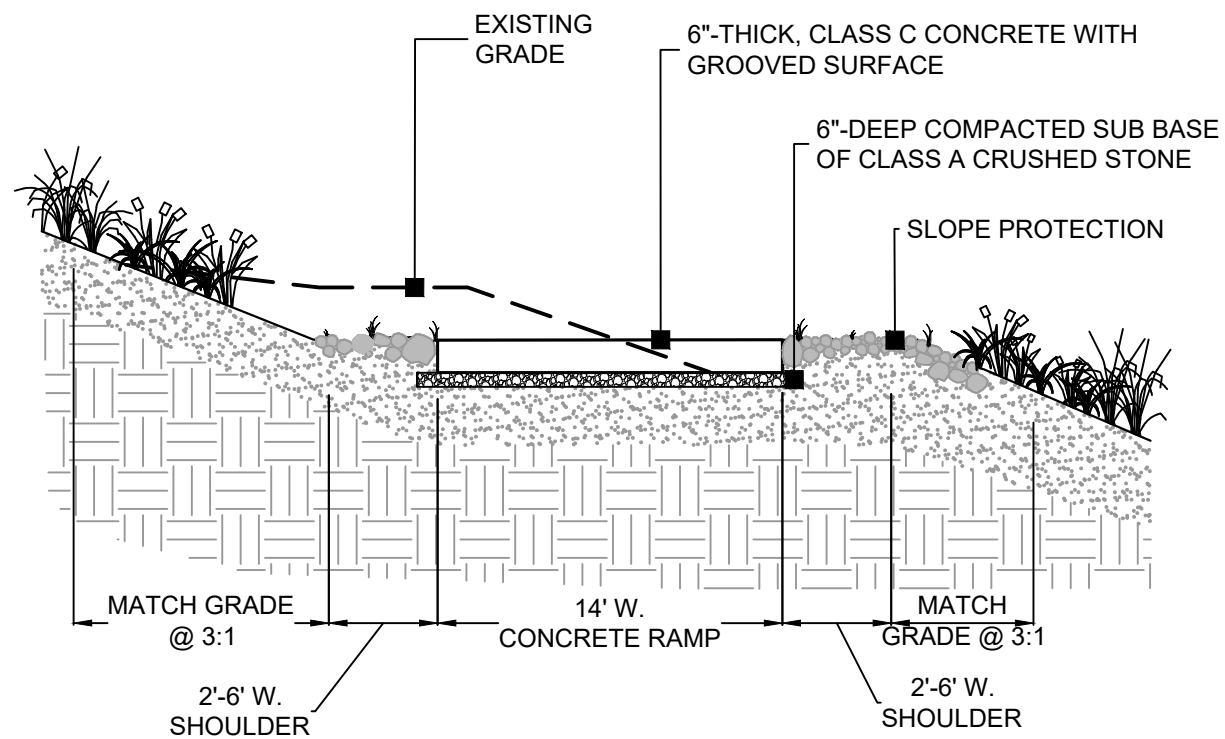
**EOR** Emmons & Olivier Resources, Inc.  
 1919 University Ave W,  
 Suite 300, St Paul, MN 55104  
 ecology Tele: 651.770.8448  
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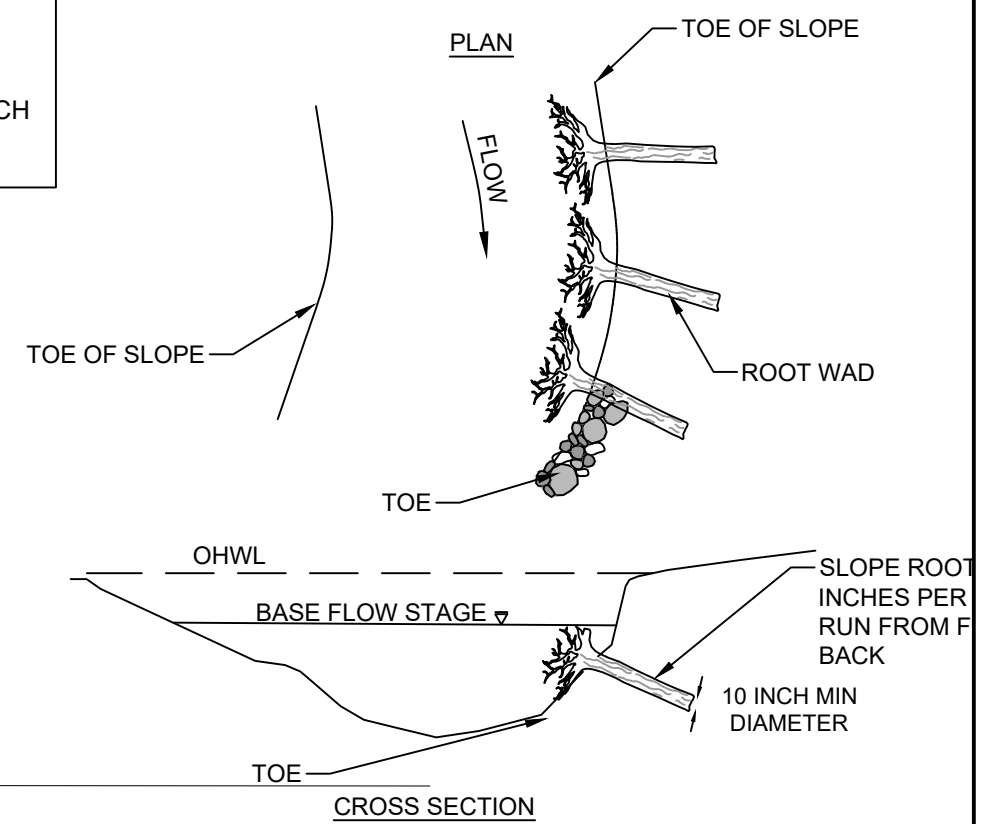
R.5 - RIVERBANK STABILIZATION OVERVIEW



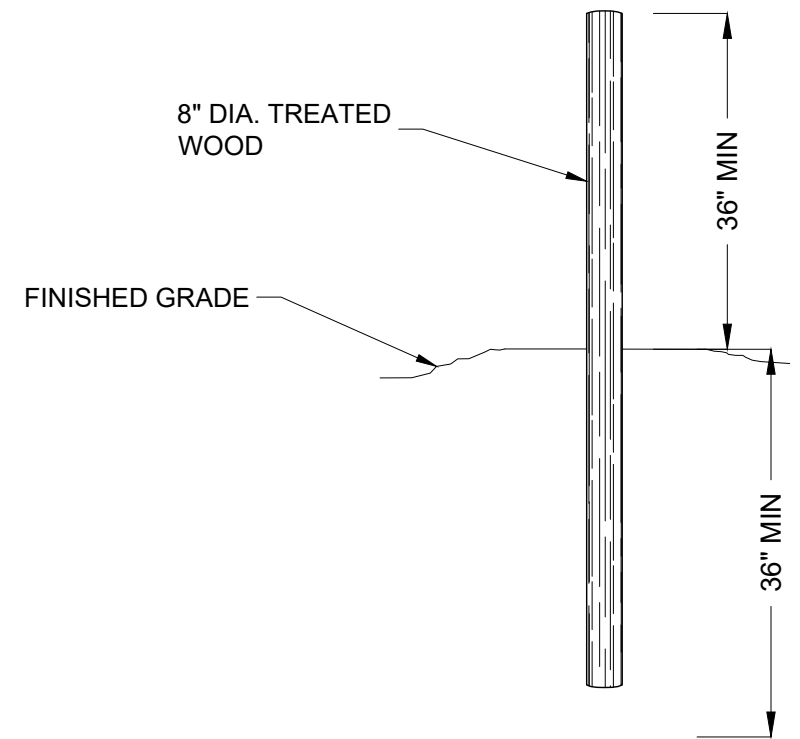


01 BOAT LANDING DETAIL  
U.3

- NOTES:
1. INCORPORATE ROCKS AROUND ROOTWADS AT DOWNSTREAM END OF PRACTICE WHERE INDICATED ON PLAN VIEWS
  2. PLACE ROOTWADS SO THAT TIPS OF REMAINING ROOTS ARE TOUCHING EACH OTHER (NO GAPS)



02 ROOTWAD  
U.3



03 BOLLARD  
U.3

P:\Data\01142022\Buena Vista\1594\_1\_X-Bas2\_LinnGrove\_CareofWaterDetails\_BR02\_Dam\_Detail\_Drawing\_BR2\_Detail Drawings\_BR  
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NO	DATE	BY	REVISION
6	01/11/22	ERK	100% FINAL DESIGN
5	12/09/21	BR	PRELIMINARY DESIGN PLANS
4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



SUBMISSION DATE: 01-11-2022
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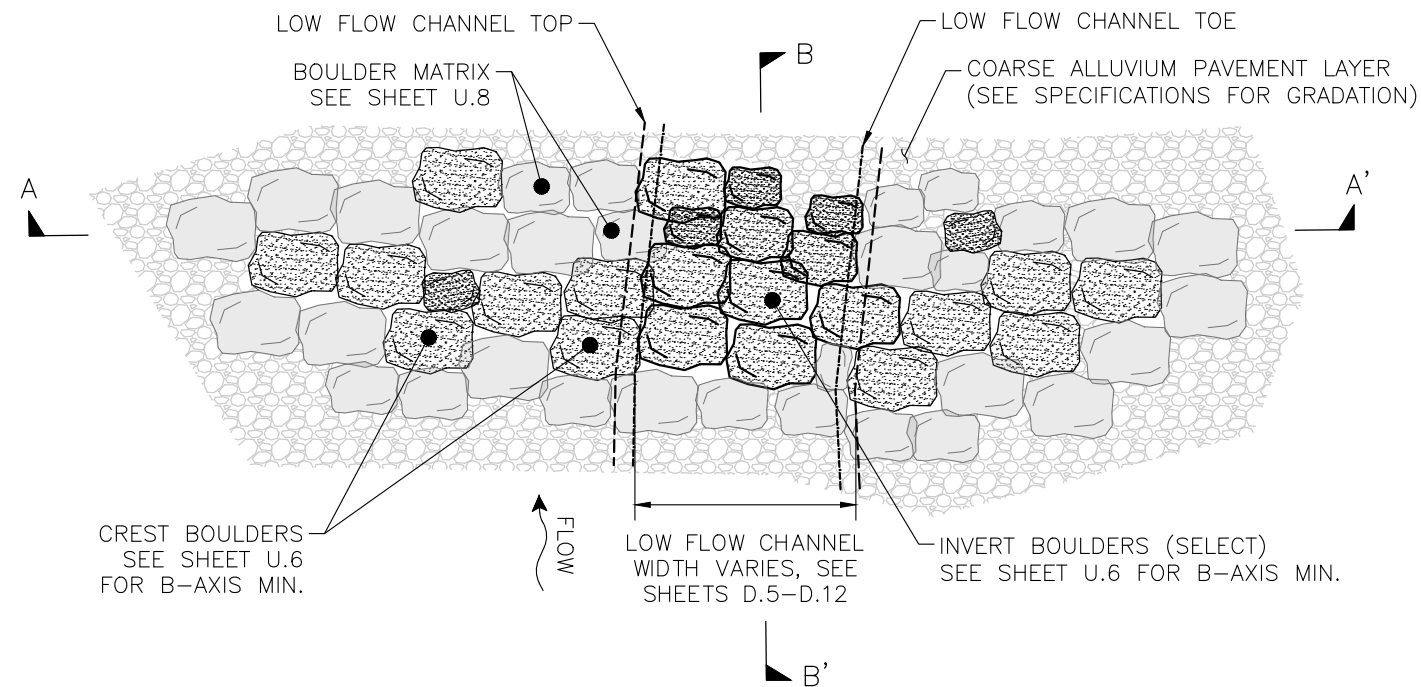
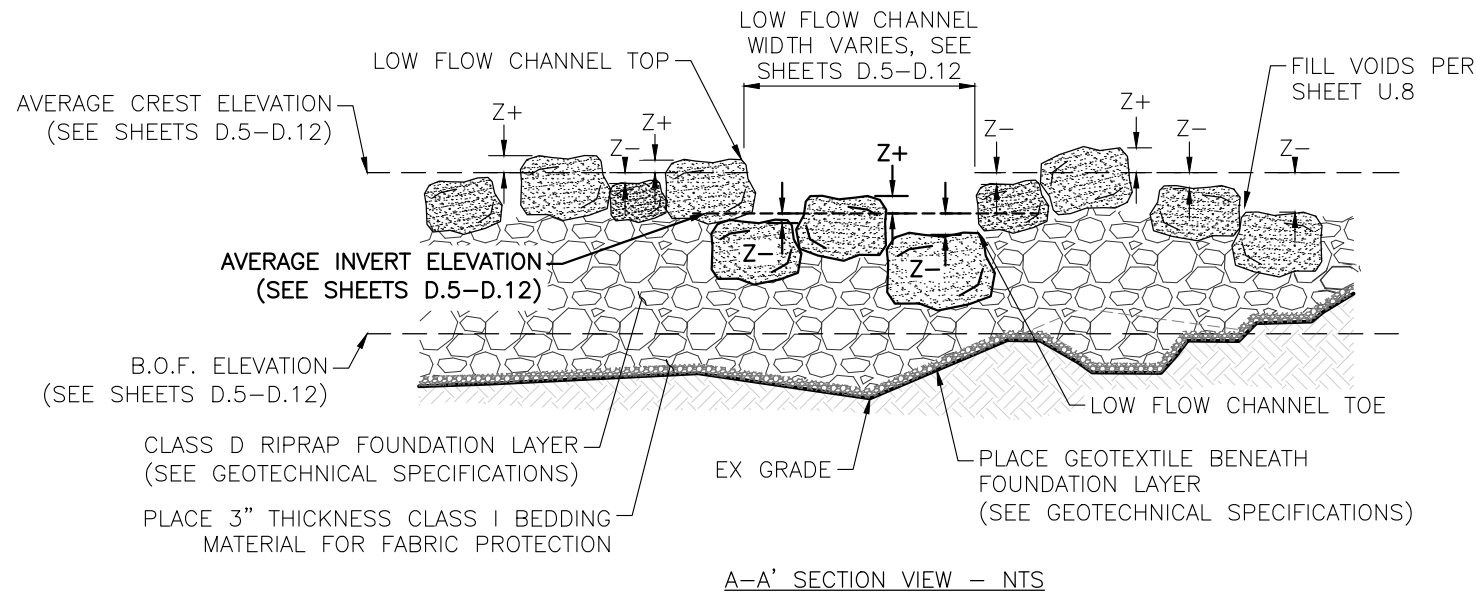


LINN GROVE DAM AND PARK RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA  
 STATE PROJECT NO. --- CITY PROJECT NO. ###

U.3 - DETAILS SHEET 3

NOTES:

1. CONSTRUCTION OF BOULDER STRUCTURES SHALL INCLUDE SELECTION, ROTATION, PLACEMENT, AND ADJUSTMENT OF EACH INDIVIDUAL BOULDER TO MINIMIZE VOID SPACE AND MAXIMIZE INTIMATE CONTACT BETWEEN BOULDERS.
2. SELECT BOULDERS SHALL BE PLACED WITH ENGINEER OR ENGINEER'S REPRESENTATIVE ON SITE.
3. SEE SPECIFICATIONS FOR BOULDER AND COARSE ALLUVIUM GRADATION.
4. SEE SHEET U.8 FOR MORE DETAILS ON CONSTRUCTION OF THE BOULDER MATRIX.

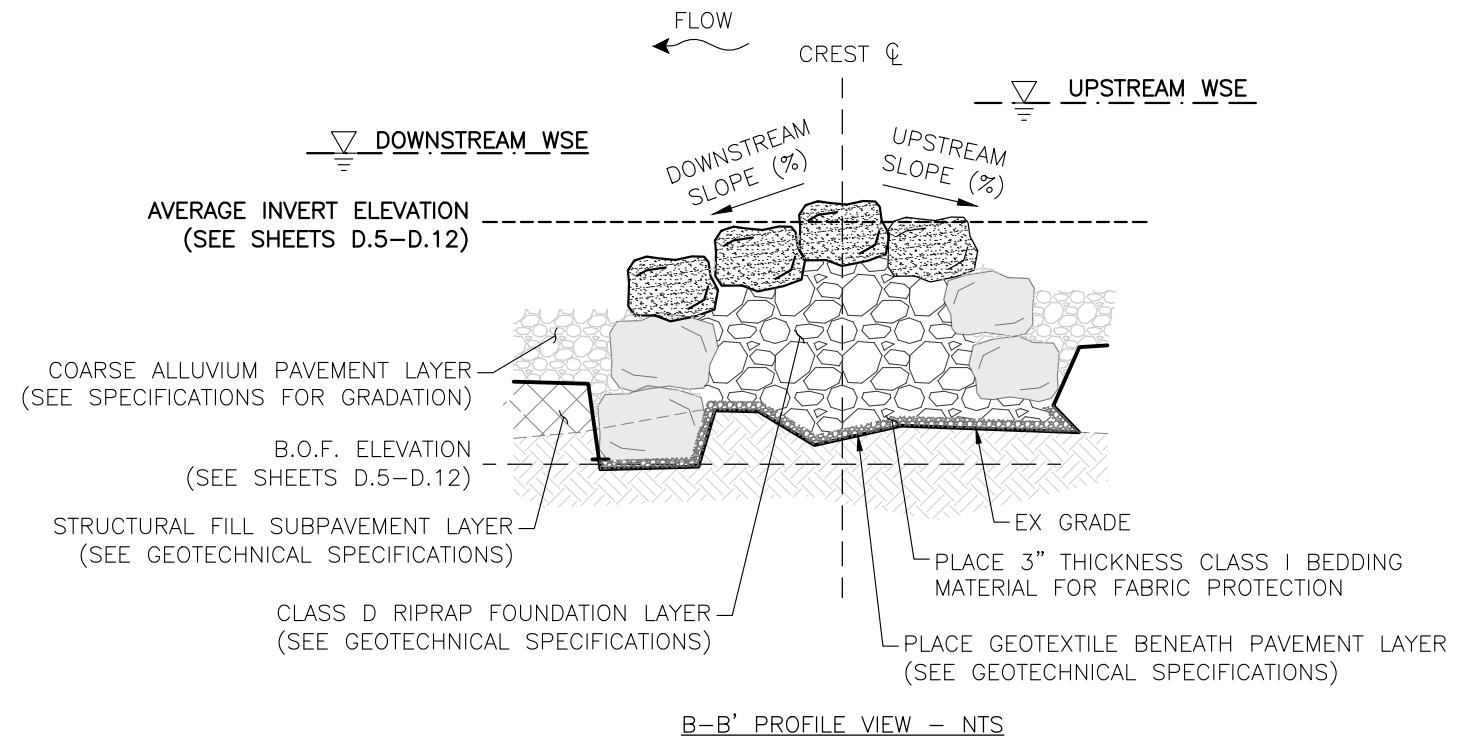


1 U.4 BOULDER ELEVATION VARIANCE (TYP)  
PLAN VIEW - NTS

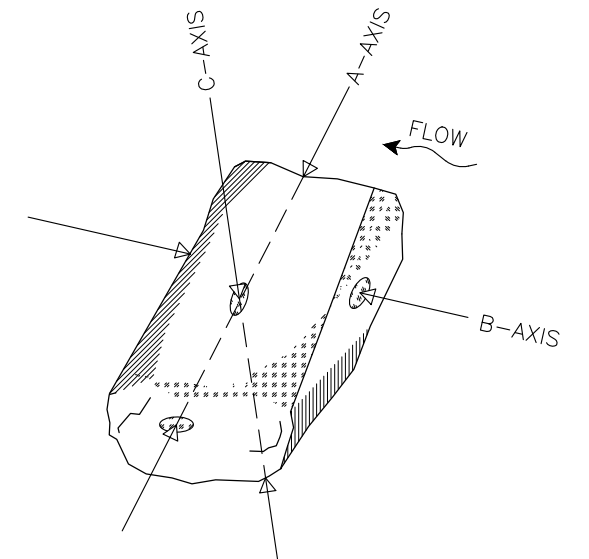
SLOPE VARIANCE (%)	BOULDER		ALLUVIUM
	CREST	INVERTS & SELECT BOULDERS	POOLS & RIFFLES
DOWNSTREAM (+/-)	0.5%	0.1%	1.0%
UPSTREAM (+/-)	0.5%	0.1%	1.0%
AVERAGE	0.0%	0.0%	0.0%

VERTICAL FINISHED GRADE TOLERANCE (FT)	BOULDER		ALLUVIUM
	CREST	INVERTS & SELECT BOULDERS	POOLS & RIFFLES
MAX Z (+/-)	0.5'	0.0'	0.5'
MIN Z (+/-)	0.5'	0.0'	0.0'
AVG CREST ELEV	0.0'	0.0'	0.0'
AVG INVERT ELEV	0.0'	0.0'	0.0'
B.O.F ELEV	0.0'	0.0'	0.0'

HORIZONTAL PLAN VARIANCE (FT)	BOULDER		ALLUVIUM
	CREST	INVERTS & SELECT BOULDERS	POOLS & RIFFLES
MAX X (+/-)	2.0'	0.5'	1.0'
AVG X (+/-)	0.0'	0.0'	0.0'



B-B' PROFILE VIEW - NTS



NOTES:  
1. SEE SPECIFICATIONS FOR BOULDER GRADATION.  
2 U.4 BOULDER AXIAL PLACEMENT (TYP)  
NTS

Plot Date: 01/02/2022  
 User: jrb  
 Title: 13540-20005\_U4-U8\_Details.dwg  
 Xref: 13540-20005\_RRD02.k20005\_RRD02concept.dwg

NO	DATE	BY	REVISION
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5			
4			
3	01/11/22	ARH	100% FINAL DESIGN
2	12/03/21	ARH	90% PRELIMINARY DESIGN
1	10/07/21	ARH	60% PRELIMINARY DESIGN



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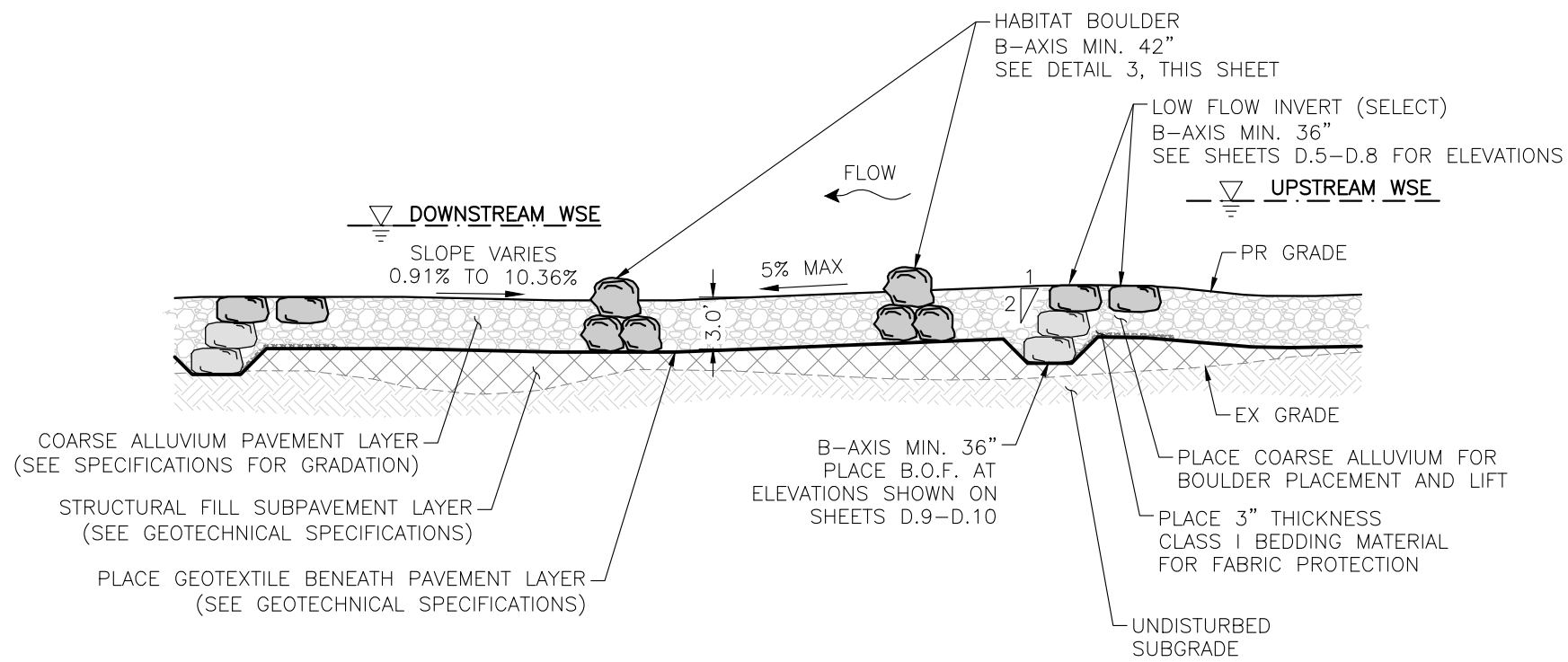
RiverRestoration.org, LLC  
 818 Industry Place  
 Carbondale, CO 81623  
 P: 970.947.9568  
 www.riverrestoration.org



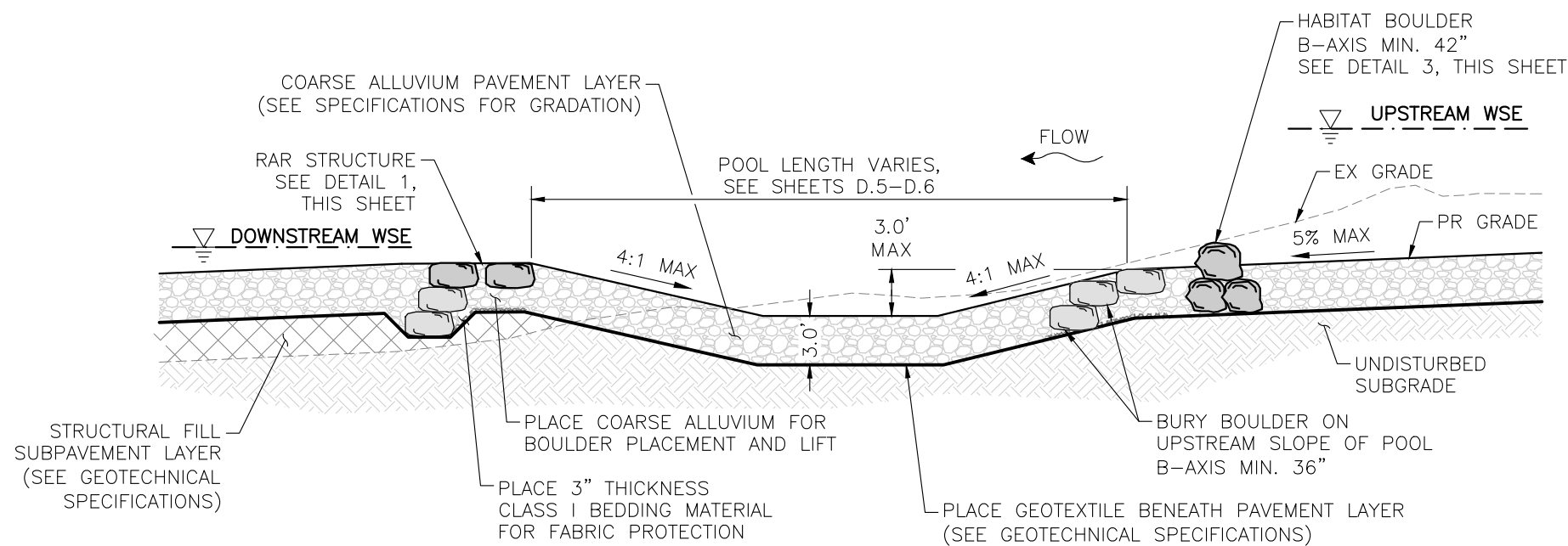
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 LINN GROVE, BUENA VISTA COUNTY, IOWA  
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U.4 - BOULDER PLACEMENT & VARIANCE DETAILS

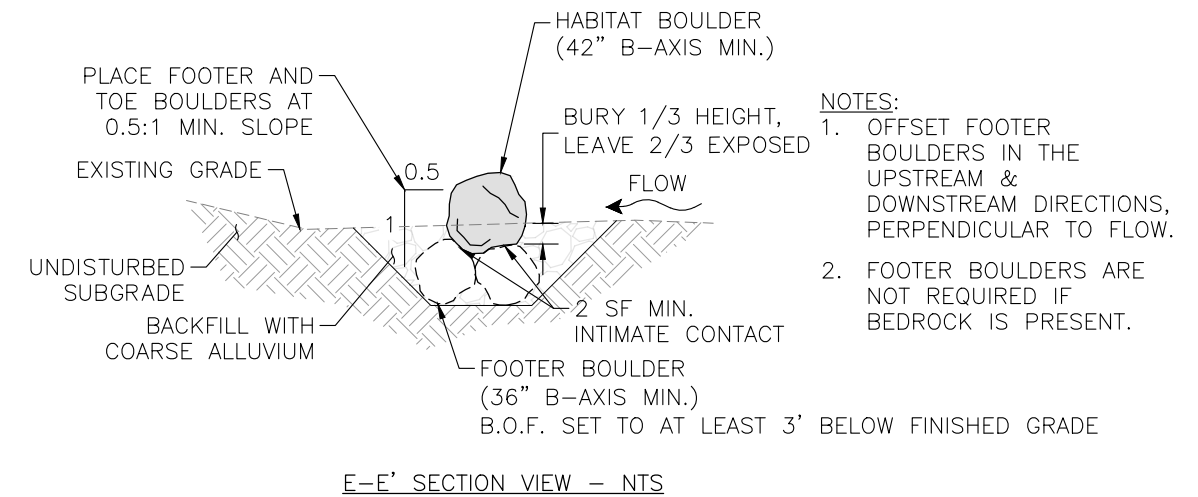




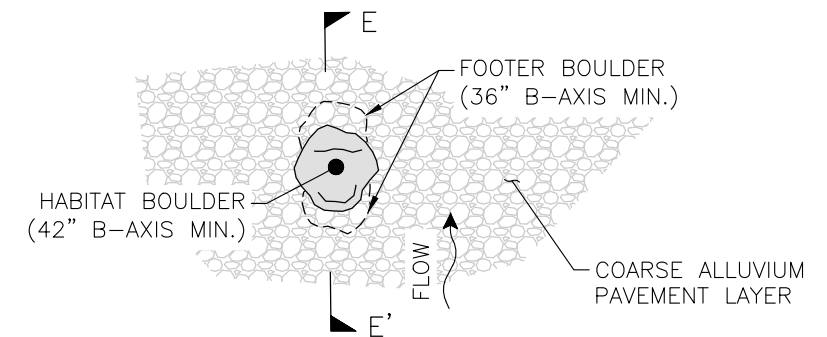
1  
U.7  
ROCK ARCH RAPID (RAR) - WITH RAMP (TYP)  
C-C' PROFILE VIEW - NTS



2  
U.7  
ROCK ARCH RAPID (RAR) - WITH POOL (TYP)  
D-D' PROFILE VIEW - NTS



- NOTES:
1. OFFSET FOOTER BOULDERS IN THE UPSTREAM & DOWNSTREAM DIRECTIONS, PERPENDICULAR TO FLOW.
  2. FOOTER BOULDERS ARE NOT REQUIRED IF BEDROCK IS PRESENT.



3  
U.7  
HABITAT BOULDER (TYP)  
PLAN VIEW - NTS

NOTES:

1. CONSTRUCTION OF BOULDER STRUCTURES SHALL INCLUDE SELECTION, ROTATION, PLACEMENT, AND ADJUSTMENT OF EACH INDIVIDUAL BOULDER TO MINIMIZE VOID SPACE AND MAXIMIZE INTIMATE CONTACT BETWEEN BOULDERS.
2. SELECT BOULDERS SHALL BE PLACED WITH ENGINEER OR ENGINEER'S REPRESENTATIVE ON SITE.
3. SEE SPECIFICATIONS FOR BOULDER GRADATION.
4. SEE SPECIFICATIONS FOR COARSE ALLUVIUM GRADATION.
5. SEE SPECIFICATIONS FOR CLASS I BEDDING MATERIAL GRADATION.

LEGEND:

- SELECT BOULDER
- STRUCTURE BOULDER
- HABITAT BOULDER
- CLASS I BEDDING MATERIAL
- COARSE ALLUVIUM PAVEMENT LAYER
- STRUCTURAL FILL SUBPAVEMENT LAYER

\* SEE SPECIFICATIONS FOR GRADATION AND MATERIAL REQUIREMENTS

Plot Date: 01/02/2022  
 User: jrb  
 Xrefs: P15944\_Tile\_Block\_RRD2\_x29005\_RRD2conceptNetwork

NO	DATE	BY	REVISION
6			
5			
4			
3	01/11/22	ARH	100% FINAL DESIGN
2	10/04/21	ARH	90% PRELIMINARY DESIGN
1	10/07/21	ARH	60% PRELIMINARY DESIGN



SUBMISSION DATE: 01-11-2022		
DESIGN BY: ARH	DRAWN BY: ARH	CHECKED BY: QLD
EOR PROJECT NO. 01594-0004		

RiverRestoration.org, LLC  
 818 Industry Place  
 Carbondale, CO 81623  
 P: 970.947.9568  
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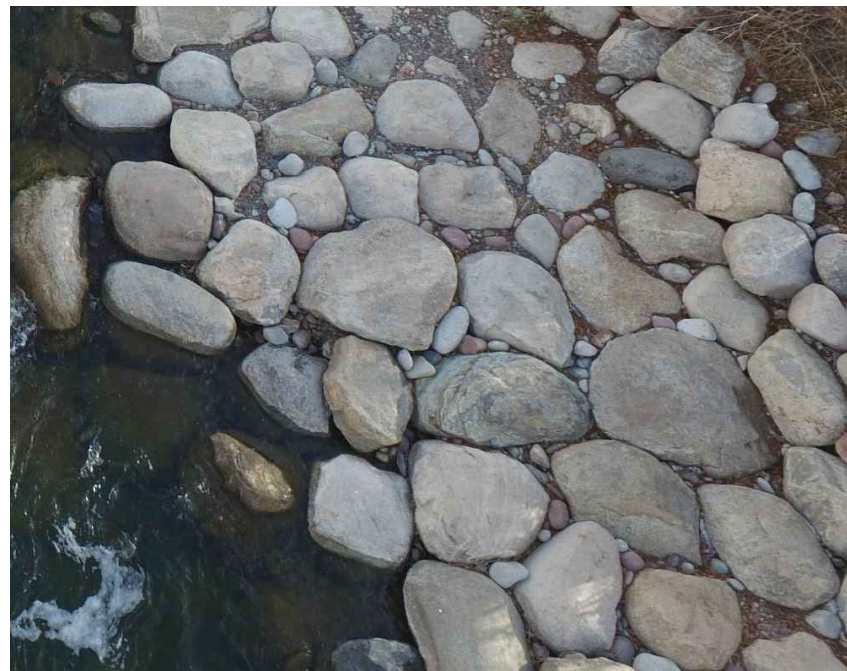
LINN GROVE DAM AND PARK  
 RESTORATION  
 LINN GROVE, BUENA VISTA COUNTY, IOWA

U.7 - SOUTH CHANNEL  
 RAR DETAILS



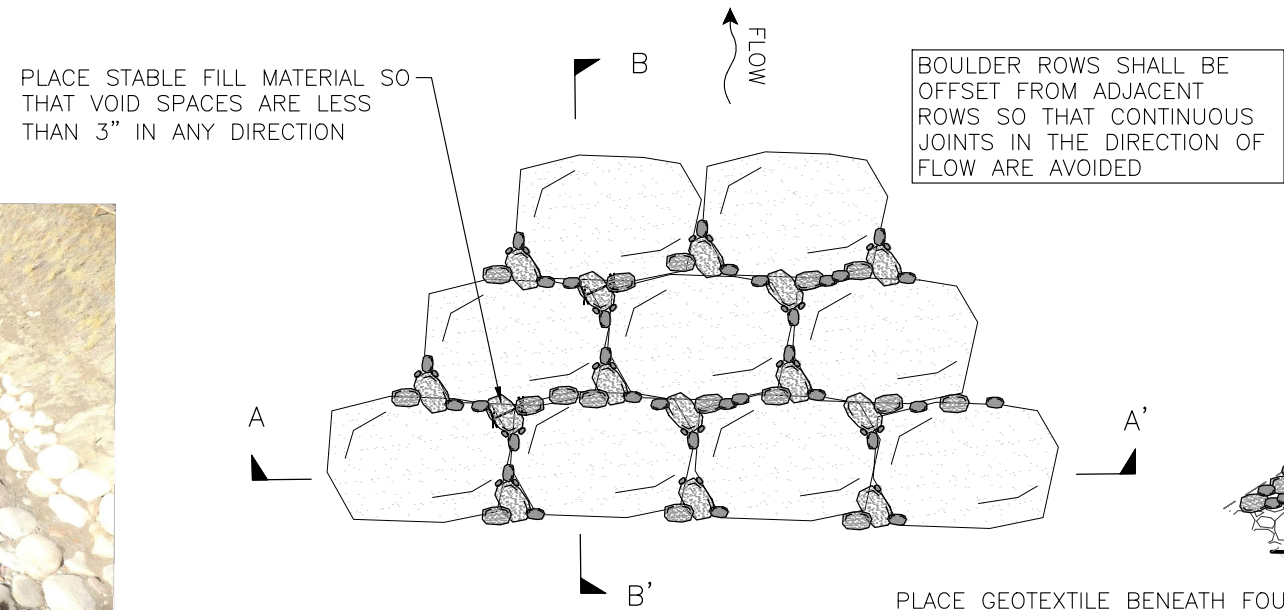
EXAMPLE OF BOULDER MATRIX PLACED TO MAXIMIZE CONTACT AND MINIMIZE GAPS BETWEEN BOULDERS

1  
U.8

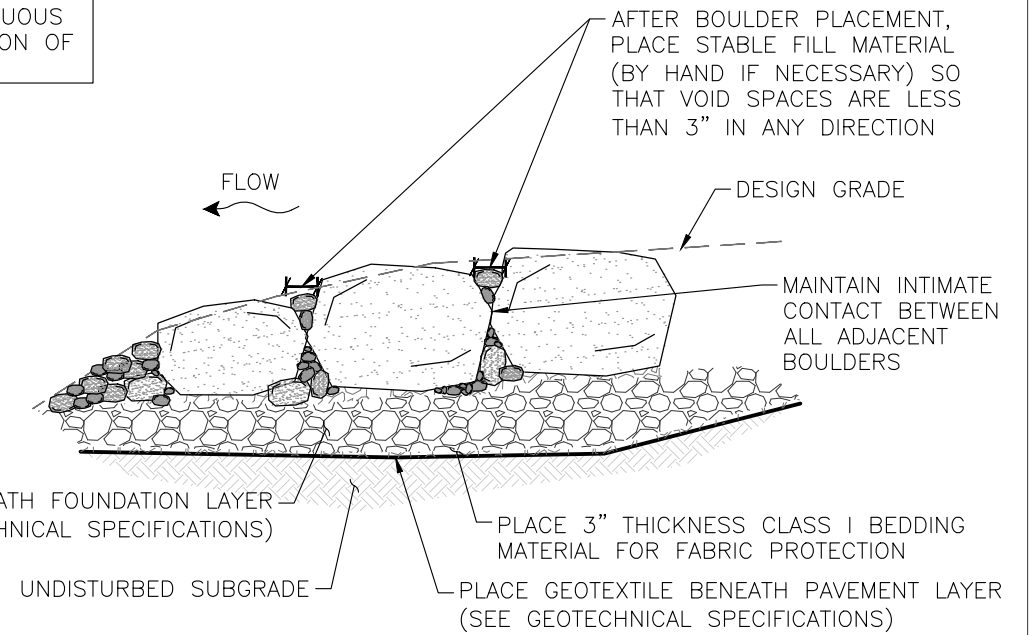


EXAMPLE OF BOULDER GAPS FILLED WITH STABLE MATERIAL

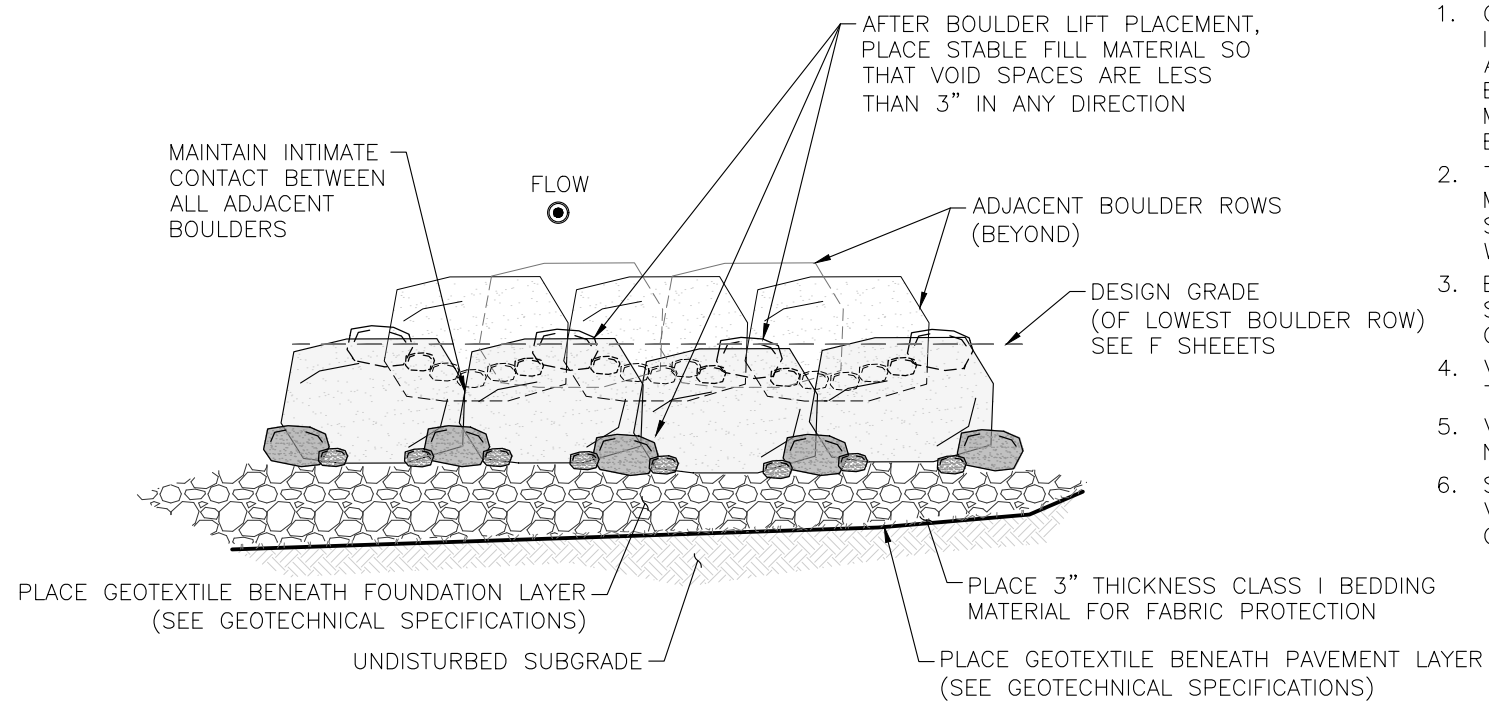
2  
U.8



3 BOULDER MATRIX STRUCTURE  
U.8 PLAN VIEW - NTS



5 BOULDER MATRIX STRUCTURE - UPSTREAM FACE  
U.8 B-B' PROFILE VIEW - NTS



4 BOULDER MATRIX STRUCTURE - UPSTREAM FACE  
U.8 A-A' 3D SECTION (DASHED LINES BEYOND) - NTS

NOTES:

1. CONSTRUCTION OF BOULDER MATRIX SHALL INCLUDE SELECTION, ROTATION, PLACEMENT, AND ADJUSTMENT OF EACH INDIVIDUAL BOULDER TO MINIMIZE VOID SPACES AND MAXIMIZE INTIMATE CONTACT BETWEEN BOULDERS.
2. THE BOULDER MATRIX INCLUDES STABLE FILL MATERIAL IN VOID SPACES. VOID SPACES SHALL BE FILLED AS SPECIFIED ON PLANS OR WITH COARSE ALLUVIUM IF NOT SPECIFIED.
3. BOULDER MATRIX STRUCTURE, INCLUDING STABLE FILL MATERIAL, SHALL BE CONSTRUCTED TO MEET DESIGN GRADES.
4. VOID SPACES SHALL BE REDUCED TO LESS THAN 3 INCHES IN WIDTH.
5. VOID SPACES SHALL BE FILLED BY HAND IF NECESSARY.
6. SUBSTANDARD WORK MAY BE REJECTED IF VOID SPACE SPECIFICATIONS OR DESIGN GRADES ARE NOT MET.

Plot Date: 01/02/2022  
 User: jbellier\jbellier\AppData\Local\Temp\AcDbPlotter\1354020005\_U4-U8\_Details.dwg  
 Xrefs: P:\15944\_Tile\_Block\_RR02.k28005\_RR02concept.dwg

NO	DATE	BY	REVISION
6			
5			
4			
3	01/11/22	ARH	100% FINAL DESIGN
2	10/04/21	ARH	90% PRELIMINARY DESIGN
1	10/07/21	ARH	60% PRELIMINARY DESIGN

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EOR PROJECT NO. 01594-0004

**RIVER RESTORATION**

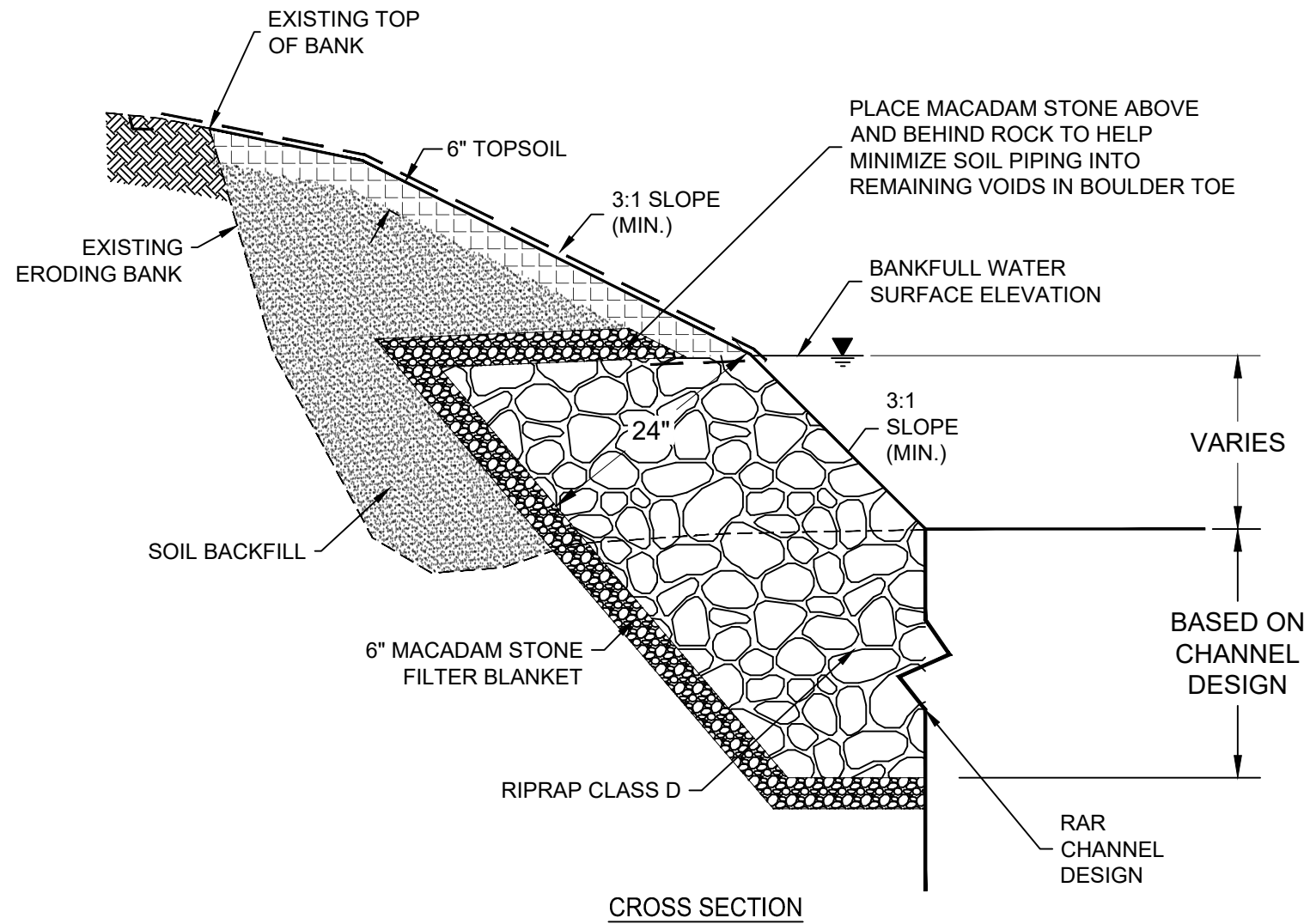
RiverRestoration.org, LLC  
818 Industry Place  
Carbondale, CO 81623  
P: 970.947.9568  
www.riverrestoration.org

**BUENA VISTA COUNTY CONSERVATION BOARD**

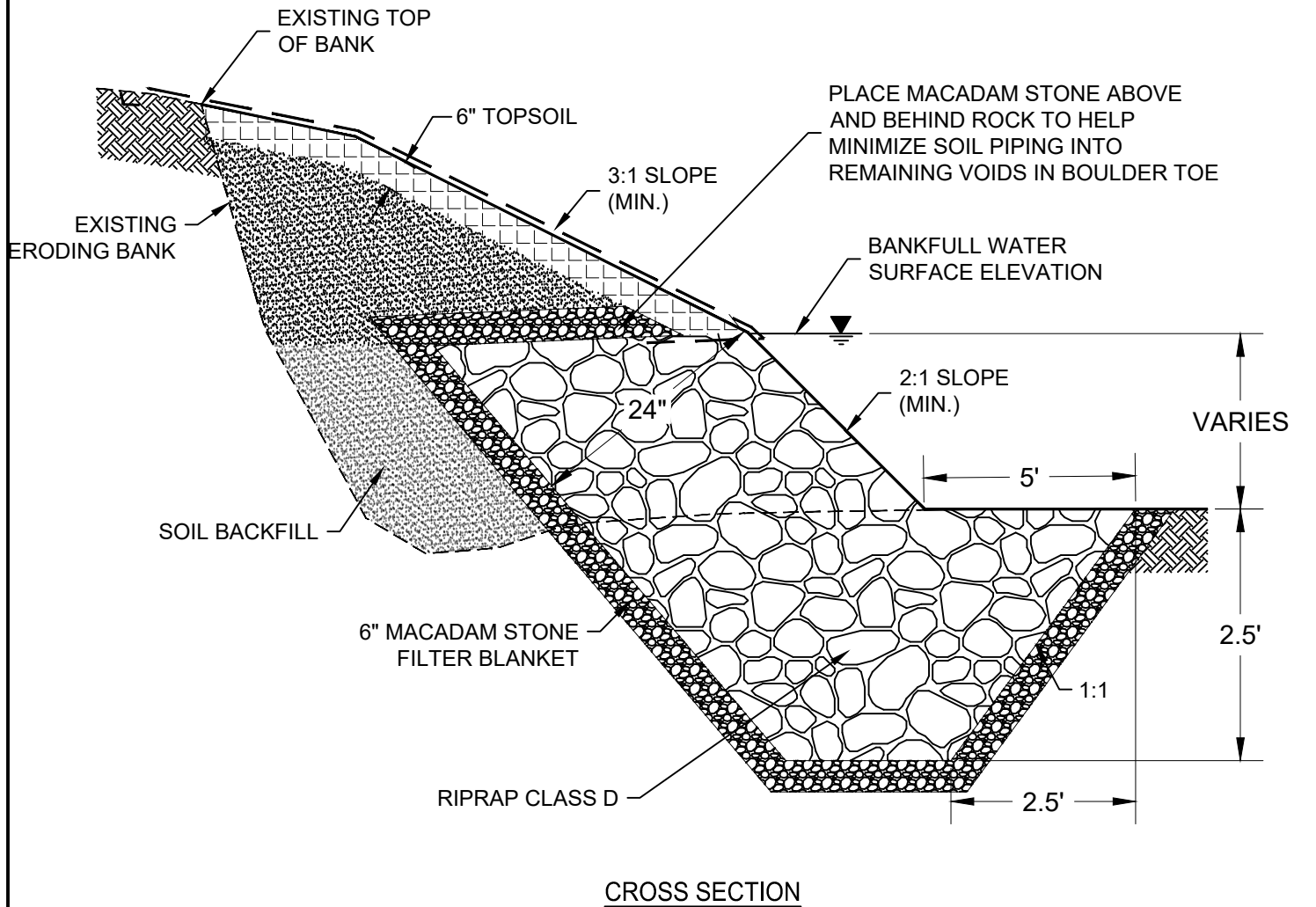
LINN GROVE DAM AND PARK RESTORATION  
LINN GROVE, BUENA VISTA COUNTY, IOWA

STATE PROJECT NO. --- | CITY PROJECT NO. ###

U.8 - BOULDER MATRIX STRUCTURE DETAILS



CROSS SECTION



CROSS SECTION

01 BANK STABILIZATION REVETMENT DETAIL - TYPE 1  
U.9 NOT TO SCALE

02 BANK STABILIZATION REVETMENT DETAIL - TYPE 2  
U.9 NOT TO SCALE

Proj Date: 01/14/2022  
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NO	DATE	BY	REVISION
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4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



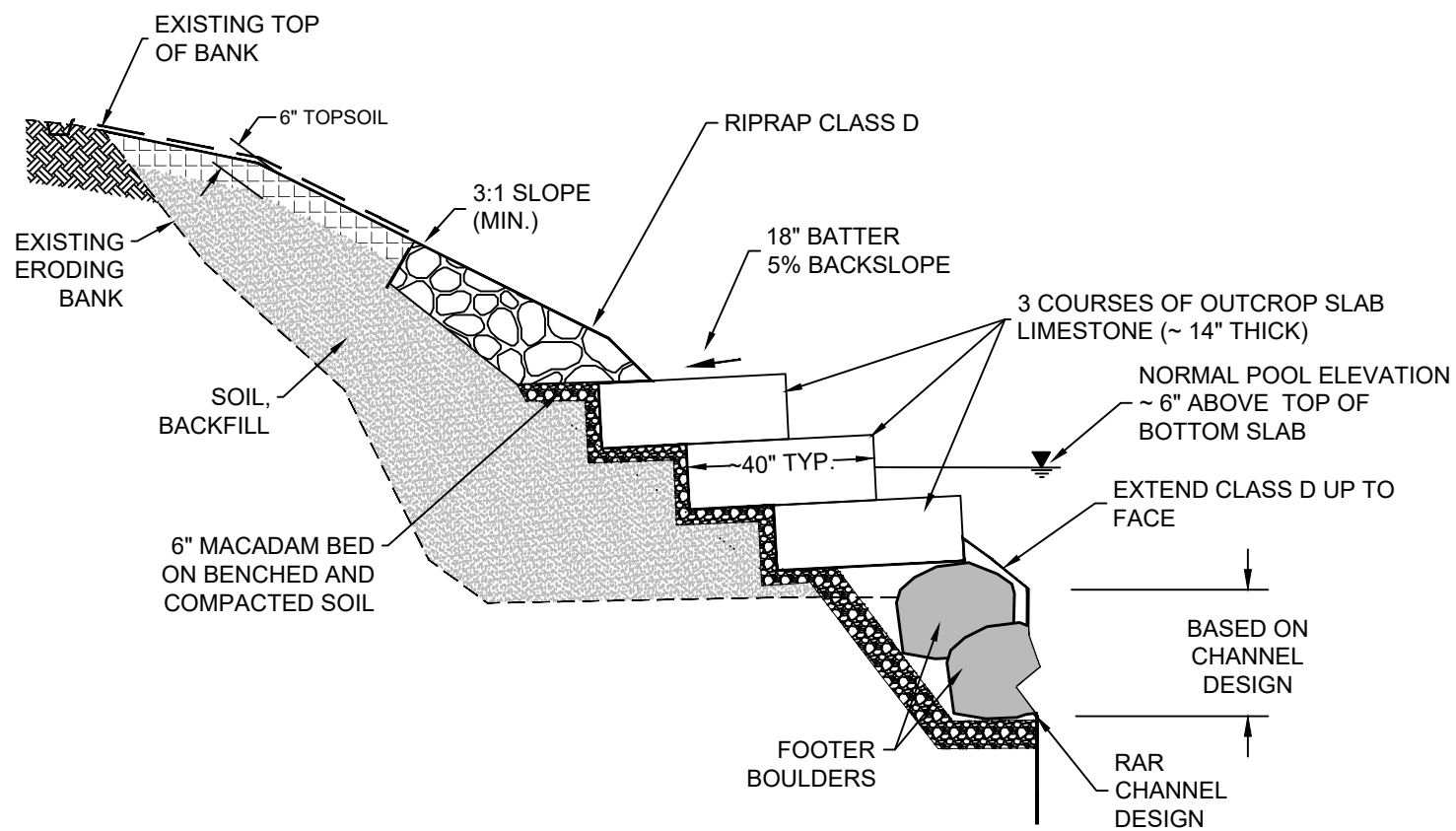
SUBMISSION DATE: 01-11-2022
DESIGN BY: EOR DRAWN BY: BR CHECKED BY: DRL
EOR PROJECT NO. 1594-0004

**EOR** Emmons & Olivier Resources, Inc.  
 1919 University Ave W,  
 Suite 300, St Paul, MN 55104  
 ecology Tele: 651.770.8448  
 community www.eorinc.com



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CROSS SECTION

01 BANK STABILIZATION REVETMENT DETAIL - TYPE 3 (BID ALTERNATE)  
U.10 NOT TO SCALE

Plt Date: 01/14/2022  
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NO	DATE	BY	REVISION
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4	10/07/21	BR	PRELIMINARY DESIGN PLANS
3	08/27/21	BR	CDP - REVISION TWO FOR PERMIT SUBMITTAL
2	08/10/21	DRL	CONCEPT DESIGN PLANS - REVISION ONE
1	05/27/21	DEM	CONCEPT DESIGN PLANS



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LINN GROVE DAM AND PARK RESTORATION  
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U.10 - DETAILS SHEET 10

### Decision Matrix for Linn Grove Dam Restoration Options (September 15, 2020)

Factor >	Operations and Maintenance	Recreation Goals	Regulatory Effort	Ecological Impact / Goals	Funding Availability	Hydraulics and Flood Profile	Public Safety	Total Cost	Overall Recommendation	
Criteria >	Considers the long-term cost and complexity of maintaining the option 1 = low O&M 5 = high O&M	Primary goals include: Fishing (shore and boat) Canoeing / Kayaking 1 = Fully Meets goals 5 = Does not meet goals	Effort required to secure approvals from all known agencies 1 = Simple 5 = Extensive	Impacts to river and surroundings 1 = Improves conditions 5 = Degrades conditions	Different options have varying funding sources 1 - More funding available 5 - less funding available	Considers hydraulics, flood profile, and climate resiliency 1 = Decreased flood risk 5 = Increased flood risk	Considers the overall risk to public safety 1 = low safety risk 5 = High safety Risk	Rough estimates of Cost for design, permitting, and construction 1 = Lower cost 5 = Higher cost	Mathematical average 1 = Higher Recommendation 5 = Lower Recommendation	<b>Weighted average</b> <b>1 = Higher Recommendation</b> <b>5 = Lower Recommendation</b>
BVCCB Concern Ranking	1	1	6	2	4	5	3	5		
OPTION #1 Full Height Dam and Park Restoration (with Improvements)	4	4	1	4	3	3	5	5		
	Expect some repairs in future ("5" without the upgrades)	Previous dam and side channel were known fishing holes; limited paddling options / safety	Relatively simple, however improvements may still require advanced approval	Similar, but ecological obstruction	75% FEMA 10% State 15% County	Similar to existing	Low head dams (aka "drowning machines") are notorious risks	\$5.62M (\$4.03M without missing items and upgrades)	3.6	<b>3.93</b>
OPTION #2A Conversion to Rock Arch Rapids (full height, dam only)	3	3	2	2	2	3	3	5		
	Generally stable and simple maintenance; narrower than 2B, 2c, 4	Combining fishing nodes / kayak chute has limits; could recreate south slough	Relatively simple, RAR at dam ht will increase flood profile on backslope	Reduced obstruction, improved aeration, RAR is "habitat friendly"	Similar to 1 above, possibility of various IDNR funding sources	RAR at dam ht will increase flood profile on backslope, min change at bridge	Better than the dam, former island should be considered emergency overflow	\$6.34M	2.9	<b>2.83</b>
OPTION #2B Full Height Double Rock Arch Rapids (Kayak* Channel & Fishway)	2	3	2	2	3	2	2	4		
	Generally stable and simple maintenance; wider flow yeilds less shear stress	No south slough, and *creating a paddle-safe RAR may be challenging	RAR at full dam ht will increase flood profile on backslope	Reduced obstruction, improved aeration, RAR is a "habitat friendly" design	Similar to 2A above (*focus on "whitewater" can preclude conservation funding)	Profile increase should be less than 2A with 2 channels	More safe all around, entire area from N bank to bridge becomes an emergency overflow	\$4.92M	2.5	<b>2.45</b>
OPTION #2C Reduce dam 2'-3', add Double Rock Arch Rapids (Main Channel and Fishway)	2	2	3	2	1	1	2	3		
	Wider flow & lower slope yeilds even less shear stress	Easier to create a paddle-safe channel with split flows; partial fishing slough is possible	Flood profile increase can be avoided, but altering the dam may involve SHPO mitigation	Reduced obstruction, improved aeration, RAR is a "habitat friendly" design	Similar to 2A above, even better possibility of various IDNR funding sources	Profile increase should be avoided	More safe all around, entire area from N bank to bridge becomes an emergency overflow	\$4.46M	2.0	<b>1.93</b>
OPTION #3 Complete Dam Removal - Channel and Park Restoration	1	4	4	2	2	3	1	1		
	River bank upkeep similar to any river, expect sediment flux from upstream	Paddle-safe, but lack of a hydraulic feature will eliminate the fishing hotspot	This would likely require SHPO mitigation	Eliminates obstruction, but no aeration / habitat provided	Similar to 1 above, possibility of various IDNR funding sources	Flood profile is better upstream; lowering water table upstream will have drawbacks	Entire dam safety risk is eliminated	\$4.16M	2.3	<b>2.14</b>
OPTION #4 Stabilize Existing Dam as Emergency Overflow and Re-route Primary Flow Though New Channel Rock Arch Rapids	3	1	1	2	1	2	2	1		
	Flood scale flows may result in some repairs depending on upgrades selected	Former channel below dam would be "new" fishing slough; excellent portage / access options	Flood profile increase can be avoided, and the dam would be preserved	Reduced obstruction, improved aeration, RAR is a "habitat friendly" design	Similar to 2A above, even better possibility of various IDNR funding sources	New crest ht would be lowered(~2ft?) So flood profile should be similar	More safe all around, entire area from N bank to bridge becomes an emergency overflow	\$3.98M (up to \$4.3M with options)	1.6	<b>1.79</b>
<b>Legend &gt;</b>	1 = Best option for this criterion		2 = A good option, with minor caveats		3 = Average, pros are similar to cons		4 = Less preferrable option		5 = Not a good option for this criterion	