SECTION 00 90 20
ADDENDUM No. 2

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. Changes to Document 00 41 10 Bid Schedule
B. Changes to Section 01 12 00 Special Provision
C. Clarifications

1.2 CONSTRUCTION CONTRACT

A. The Construction Contract is known as *SU078 OBE Weber River Surf Wave Project*
B. Date of this Addendum is Dec 2, 2025

PART 2 CHANGES

2.1 CHANGES TO PRIOR ADDENDA

A. None

2.2 CHANGES TO BIDDING REQUIREMENTS

A. Document 00 41 00 BID SCHEDULE Part 3 Measure and Payment
   1. Bid Item No. 75 Furnish and Install Air Line and Telemetry
      i. Added “rebar” and “compaction” to part B which now reads, “Payment covers complete cost of furnishing and installing all cables, lines and conduits and connections originating from the control building per the Drawings and Specifications. Work includes trenching, bedding, installation of lines and conduits, rebar, installing a secure transition into the control building, installation of cables, and backfill and compaction of trenches. Includes any and all incidentals including marking trenches, installing sweeps, making and sealing punchouts, protecting lines, connecting to manholes and pull boxes, labeling lines, caping and terminating lines and connecting lines.”

2.3 CHANGES TO AGREEMENT AND OTHER CONTRACT FORMS

A. None

2.4 CHANGES TO CONDITIONS OF THE CONTRACT

A. None

2.5 CHANGES TO SPECIFICATIONS

A. Section 01 12 00 Special Provision
    1. 6.02 Pneumatic Gate System
        i. 01100.12 Control Building
        - Part C Power: Replaced “2000” Amp electrical panel with “200” Amp electrical panel

B. Appendix A Project Drawings
    1. Updated the Project Drawings with the revised sheets

2.6 CHANGES TO DRAWINGS

A. Sheet G03
    1. Demo Tree Updates
        i. Increased tree demo quantities and added different sizes of tree demo

B. Sheet R03
    1. CDF or CLSM fill to replace compacted structural fill

C. Sheet R05
    1. CDF or CLSM fill to replace compacted structural fill

D. Sheet R07
    1. Control Building and Airline updates
        i. Shifted location of control building to the NW
        ii. Removed easement limits
        iii. The approximate path of airline and telemetry from the control building to MH1 was shifted to align with the new control building location

E. Sheet L01
    1. Demo Tree updates
        i. Increased quantity of trees to demo

F. Sheet D02
    1. Callout update on 2 DO2
        i. Replaced the callout: “Continuous Mirafi 180N filter fabric with 4’ drainage net 10’ O.C. intimate contact w/ undisturbed bank” with the callout “8 oz non-woven filter fabric wrapped on both sides”

G. Sheet D13
    1. 8” PVC pipe update
        i. Replaced 9” PVC with 8” PVC

H. Sheet S-303
    1. Foundation fill description update
        i. Added callouts “2’-0” MIN CDF OR CLSM FILL” to change foundation material from compacted structural fill to CDF or CLSM fill.

2.7 CLARIFICATIONS

A. The control building (which Ogden has already purchased and includes the delivery to the prepared location) ALSO includes an electric package that consists of the following: 4’ LED light fixture, switch, 1 LED exterior light photocell controlled, 100 amp breaker panel, louvered exhaust fan, intake with hood, GFI, 2 wall vents. However, this is <u>not</u> the electric package for the pneumatic system.

B. OHI or equal sub will need to perform the integration of the telemetry lines

C. On sheet D13, 3 of the 9 sections of the air line bedding details (#4 D13, #6 D13, #8 D13) show rebar reinforcement required as specified on S-502. This trench rebar is only for the structural penetrations at the abutment walls and other structural penetrations and should be finalized as a submittal. The CDF or CLSM Fill shown on D13 is covered under the CDF fill bid item No. 37, 51.

END OF SECTION

DOCUMENT 00 41 10
BID SCHEDULE

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. Bid schedules.
B. Measurement and payment provisions.

1.2 CONSTRUCTION CONTRACT

A. The Construction Contract is known as:

SU078 OBE Weber River Surf Wave Project

1.3 REFERENCES

A. APWA 01 29 00: Payment Procedures.
B. Document 00 50 00: Agreement.

1.4 SCHEDULE TO BE ADDED TO THE AGREEMENT

A. This document will be added to the Bid and Agreement by reference.

PART 2 BID SCHEDULES

2.1 BASE BID

A. Bid Schedule No. 1 below describes work basic to the Contract.

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BID SCHEDULE No. 1

SU078 OBE Weber River Surf Wave Project

BID ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	Site Preparation				
1	Construction Access, Staging, and Repair	1	LS		
2	Erosion Control and General BMPs	1	LS		
3	Protect In Place (PIP)	2	LS		
4	Demo Large Trees (24”-32” dia.)	1	EA		
4a	Demo Medium Trees (12”-23.9” dia.)	8	EA		
4b	Demo Small Trees (6”-11.9” dia.)	30	EA		
5	Care of Water	1	LS		
				Sub Total:	
	Weir Demolition				
6	Existing Concrete Demolition and Haul Off and Disposal	186	CY		
				Sub Total:	
	River Right Bank Restoration				
7	General Excavation and Stockpiling	120	CY		
8	Haul and Disposal of Alluvial Material Offsite	93	CY		
9	Furnish and Install Boulder	189	TON		
10	Place Alluvial Backfill	27	CY		
11	8 oz Non-Woven Filter Fabric	212	SY		
12	Erosion Control Blanket Type 1	137	SY		
				Sub Total:	
	River Left Bank Restoration				
13	General Excavation and Stockpiling	1,241	CY		
14	Haul and Disposal of Alluvial Material Offsite	1,166	CY		
15	Furnish and Install Boulder	533	TON		
16	Furnish and Install Slabstone	455	TON		
17	Place Alluvial Backfill	76	CY		
18	8 oz Non-Woven Filter Fabric	637	SY		
19	Furnish and Install Topsoil	181	CY		
20	Seed Mix	1,667	SY		
21	Hydromulch	543	SY		
22	Erosion Control Blanket Type 1	771	SY		
				Sub Total:	
	Access Ramp				
23	General Excavation and Stockpiling	41	CY		
24	Over Excavation for Boat Ramp	81	CY		
25	Haul and Disposal of Alluvial Material Offsite	118	CY		
26	Furnish and Install Clean Sand or Gravel Fill	66	CY		
27	Furnish and Install Reinforced Concrete Slab (8")	15	CY		

BID ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
28	8-oz non-woven filter fabric	70	SY		
29	Furnish and Install Boulder	20	TON		
30	Place Alluvial Backfilll (ramp Boulder Toe)	3	CY		
				Sub Total:	
	Downstream Engineered Riffle Grade Control				
31	General Excavation and Stockpiling	524	CY		
32	Haul and Disposal of Alluvial Material Offsite	476	CY		
33	Furnish and Install Boulder	332	TON		
34	Place Alluvial Backfill	47	CY		
35	Steel Plate protection at crest	38	SF		
36	Cast in Place Concrete Including Rebar	32	CY		
37	CDF or CLSM Fill	46	CY		
38	8oz Non-Woven Filter Fabric	376	SY		
				Sub Total:	
	River Bed /Pool Regrading				
39	General Excavation and Stockpiling	1,417	CY		
40	Haul and Disposal of Alluvial Material Offsite	963	CY		
41	Place Alluvial Backfill	454	CY		
				Sub Total:	
	Concrete Surf Wave and Fish Passage Channel				
	Boulder Drops & Fish Passage				
42	General Excavation and Stockpiling	232	CY		
43	Haul and Disposal of Alluvial Material Offsite	166	CY		
44	Furnish & Install Boulder	466	TON		
45	Place Alluvial Backfill for fabric protection	66	CY		
46	8oz Non-Woven Filter Fabric	283	SY		
47	Steel Plate protection at crest and walls upstream edge	25	SF		
	Concrete Surf Wave & Concrete pad for OHI Rubber Rocks on River Right				
48	General Excavation and Stockpiling	368	CY		
49	Haul and Disposal of Alluvial Material Offsite	325	CY		
50	Cast in Place Concrete Including Rebar	149	CY		
51	CDF or CLSM Fill	432	CY		
52	8oz Non-Woven Filter Fabric	344	SY		
53	Steel Plate protection at crest	58	SF		
54	Sheet Pile	2,413	SF		
55	Furnish & Install Boulders	303	TON		
56	Place Alluvial Backfill for fabric protection	43	CY		
57	Grout	17	CY		
				Sub Total:	

BID ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
58	**Furnish and Install Pneumatic Gate System - (*) items below included in LS**	1	LS		
	Upper wave and upstream Control				
59	Furnish and Install OHI Steel Gate - Surf Wave (*)	3	EA		
60	Furnish and Install OHI Rubber Rock - Upstream control (4'x12') (*)	2	EA		
61	Furnish and Install OHI Rubber Rock - Upstream control (4'x9') (*)	1	EA		
62	Furnish and Install OHI Rubber Rock - Upstream control (3'x3') (*)	1	EA		
63	Furnish and Install OHI Rubber Rock - Upstream control (4'x7') (*)	2	EA		
	Downstream Control Drop				
64	Furnish and Install OHI Rubber Rock - Downstream control (2'x12.5') (*)	6	EA		
	PLC, furniture and installation				
65	IR R7.5I-115 10HP Rotary Screw Air Compressor with Dryer & Tank (*)	1	EA		
66	Square D M340 PLC Based Control System (*)	1	EA		
67	15 Zone Air Control Panel (*)	1	EA		
68	Vacuum assist (*)	1	EA		
69	Installation supervision (*)	1	LS		
70	Freight out (*)	1	LS		
71	Gate Position Sensors for Steel Gates (*)	3	LS		
72	Abutment Plates - 1/4" stainless steel (*)	2	EA		
73	Establish Control Building	1	LS		
74	Concrete Manholes	6	EA		
75	Furnish and Install Air Lines and Telemetry	1	LS		
76	Furnish and install Survey Monument Cap and Base	1	LS		
77	Pour Concrete Base and furnish and Install Web camera poles	2	EA		
				Sub Total:	
A4	Traffic Control	1	LS		
A12	Bonding and Insurance	1	LS		
A13	Mobilization and Demobilization	1	LS		
A22	Construction Survey Staking	1	LS		
				Sub Total:	
				Totals:	

Total = $ _____

Schedule Total in Words _____

Signature _____

PART 3 MEASUREMENTS AND PAYMENT

3.1 GENERAL

A. See measurement and payment procedures in 2025 APWA Section 01 29 00.

B. ENGINEER will take all measurements and compute all quantities.

C. CONTRACTOR will verify measurement and quantities.

D. CONTRACTOR will provide all equipment, workers, and survey crews to assist ENGINEER in making measurements.

E. Units of measurement are listed above in the bid schedule.

3.2 BID ITEM DESCRIPTIONS

Bid Item No. 1
CONSTRUCTION ACCESS, STAGING AND REPAIR

A. Measurement is per Lump Sum (LS).

B. Work includes the installation, maintenance and removal of Staging Area and temporary access roads, temporary haul roads, access ramps and other access points required for access to construction of the project. Work covers furnishing all materials, equipment, labor, and incidentals necessary to complete the work. Restoration of the staging and temporary access areas is considered a part of the work. Payment covers the complete installation and removal of any and all structures required to protect the work, perform the work and protect the Public from the work.

Bid Item No. A4
TRAFFIC CONTROL

A. Measurement is per Lump Sum (LS).

B. Meet or Exceed APWA 2025 Standard Specification 01 55 26 and Technical Specifications Section 00 90 00, 2.5. Costs include developing plan, seeking approvals and permits, implementing, maintaining and restoring traffic control and related activities for construction that addresses vehicle, pedestrian and river traffic on the surrounding roads, Weber bike path and pathways and the Weber River.

Bid Item No. A12
BONDING AND INSURANCE

A. Measurement is per Lump Sum (LS).

B. Work includes providing all required bonds and insurance and Union Pacific (UP) Permit fee (see section 2.03.04 and Appendix C within Section 01 12 00 Special Provision)

C. Payment also includes submitting the Union Pacific agreement and following all their requirements coordination with Union Pacific on project timeline, and additional insurance

policy that includes railroad liability coverage on the contractors insurance policy as stated in section 2.03.04 and Appendix C.

Bid Item No. A13
MOBILIZATION AND DEMOBILIZATION
A. Measurement is per Lump Sum (LS).

B. Work includes but is not limited to: mobilization; demobilization; installation of temporary work area facilities; bringing and removing all necessary construction equipment to and from the site; weed control before grubbing: invasive species and noxious weed seeds shall be removed from the staging area, ingress and egress, and all areas disturbed by construction activities prior to mobilization into the site ; obtaining and adhering to permits; establishing Temporary Facilities; and protecting general public; obtaining access permission, contracting, scheduling, inspections, delays and any and all incidentals.

C. Payment will be made on a percentage basis as follows.

Percent of Original Contract Amount Earned	Percent of Amount Bid for Mobilization to be Paid
5	40
15	20
40	30
50	10

Bid Item No. A22
CONSTRUCTION SURVEY STAKING
A. Measurement is per Lump Sum (LS).

B. Payment will be payment in full for furnishing all material, equipment, labor, and incidentals necessary to stake out the work, control the tolerances of work and provide as-builts of the work. Costs include protecting in place survey control or reestablishing control with permanent monuments tied to local project datums. No separate or additional payment will be made for any temporary protection and direction of traffic measures including flaggers and signing necessary for the performance of the construction survey work and as-built drawings. No separate or additional payment will be made for preparing survey documents including but not limited to office time, preparing and checking survey notes, and all other related preparation work. Costs incurred caused by survey errors will be at no additional cost to the OWNER. Repair any damage to the Work caused by CONTRACTORS's survey errors at no additional cost to the OWNER. The ENGINEER may make an equitable adjustment, which may decrease the Contract Amount, if the required survey work is not performed by CONTRACTOR.

Bid Item No. 2
EROSION CONTROL (EC) & GENERAL BMP'
A. Measurement is per Lump Sum (LS).

B. EC Work covers development of an Erosion and Sediment Control (ESC) Plan to minimize environmental impact and non-point source pollution and submittal of the plan to the OWNER for review acceptance.

C. EC Work covers the development, implementation, and management of the project ESC program. This works includes all materials, equipment, labor and incidentals associated with implementing the ESC plan, performing regular inspections and documentation of installed ESC BMPs and cleanout, maintenance, or replacement of ESC BMPs as required during project construction including approval delays and any and all incidentals.

D. EC Work covers development of a Spill Prevention Control and Countermeasures (SPCC) Plan, and Equipment Operating with Certified Biodegradable Hydraulic Fluid, and submittal to the OWNER for review.

E. EC Work covers the development, implementation, furnish, install and management of the project SPCC program. This works includes all materials, equipment, labor and incidentals associated with finalizing the SPCC plan, installing the SPCC plan, performing regular inspections and documentation of installed SPCC BMPs and cleanout, maintenance, and/or replacement of SPCC BMPs as required during project construction, including delays and any and all incidentals.

F. General BMP's Payment covers the complete installation and removal of any and all structures required to minimize environmental impact and non-point source pollution. Work includes but is not limited to purchasing and delivery of all materials; delays due to non-conformance; weather delays; installation of temporary work; work stoppage due to inadequate installations; maintaining and replacing work; removal of work and restoration of the site and any and all access to the site; and any and all incidentals including fees or fines levied for negligent damage to the environment or other permit violations.

Bid Item No. 3
PROTECT IN PLACE (PIP)
A. Measurement is per Lump Sum (LS) to be protected.

B. Payment covers the complete cost associated with the protection of existing mature trees, utilities, structures, pavement, fences and other features not specifically identified for removal, modification or construction herein. Work includes but is not limited to: video documentation of preconstruction conditions; labor, pruning, equipment, invasive species control, and materials required for protecting in place or restoration of incidental damage. CONTRACTOR is responsible for locating and protecting in place existing utilities. Any cost associated with temporary outages or repairing utility, as determined by OWNER, shall be wholly the

responsibility of the CONTRACTOR. Any cost associated with temporary outages or repairing utilities, as determined by OWNER, shall be wholly the responsibility of the CONTRACTOR.

Bid Item No. 4
DEMO LARGE TREES (24”-32” dia.)
A. Measurement is per Each (EA) to be demolished.

B. Payment covers complete cost of demolition of trees with a diameter at breast height (DBH) between 24” and 32”. Trees shall be removed down to surface level. Including but not limited to, cutting, felling, handling, disposal, and stabilizing and redistribution onsite of topsoil and upland soils. Does not include any root excavation. All root removal, if required, is included under separate excavation bid items. All debris and vegetation shall be disposed of in an offsite facility. All tree cutting should occur outside of the bird migratory nesting season, delays associated with seasonal restrictions are included in this Bid Item.

Bid Item No. 4a
DEMO MEDIUM TREES (12”-23.9” dia.)
A. Measurement is per Each (EA) to be demolished.

B. Payment covers complete cost of demolition of trees with a diameter at breast height (DBH) between 12” and 23.9”. Trees shall be removed down to surface level. Including but not limited to, cutting, felling, handling, disposal, and stabilizing and redistribution onsite of topsoil and upland soils. Does not include any root excavation. All root removal, if required, is included under separate excavation bid items. All debris and vegetation shall be disposed of in an offsite facility. All tree cutting should occur outside of the bird migratory nesting season, delays associated with seasonal restrictions are included in this Bid Item.

Bid Item No. 4b
DEMO SMALL TREES (6”-11.9” dia.)
A. Measurement is per Each (EA) to be demolished.

B. Payment covers complete cost of demolition of trees with a diameter at breast height (DBH) between 6” and 11.9”. Trees shall be removed down to surface level. Including but not limited to, cutting, felling, handling, disposal, and stabilizing and redistribution onsite of topsoil and upland soils. Does not include any root excavation. All root removal, if required, is included under separate excavation bid items. All debris and vegetation shall be disposed of in an offsite facility. All tree cutting should occur outside of the bird migratory nesting season, delays associated with seasonal restrictions are included in this Bid Item.

Bid Item No. 5
CARE OF WATER
A. Measurement is per Lump Sum (LS).

B. Work covers complete cost of development, implementation and management of a COW Plan to control environmental impacts and simultaneously provide construction access, for the duration of the project. Work includes installation of turbidity curtains, coffer dams, temporary bridges (Per table 2 listed in Section 12.02), river diversions, oil booms, pumps and filters, and intermittent excavation operations if exceeding turbidity limits, and all BMPs necessary for open bank excavations and channel work in the wet, and Care of Water and 401/404 permit conditions adherence. Payment covers methods, precautions, delays due to high water, installations, modifications, maintenance, replacement, and materials for water control structures and removal and disposal of structures and incidentals required to complete work including controlling ice frozen ground.

C. Work covers maintaining necessary de-watering during construction. This may include gravity feed dewatering systems or pumped systems as the CONTRACTOR deems necessary. Work associated with this bid item also includes removal and proper disposal of equipment and materials required for de-watering once no longer required on site. Work covers furnishing all equipment, labor, and incidentals (to include but not limited to permitting and/or fuel/power to operate pumps) necessary to complete the work as specified.

D. Work covers filtering water to meet local and state environmental requirements prior to discharging into the river. Work covers furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

Bid Item No. 6

EXISTING CONCRETE DEMOLITION AND HAUL OFF AND DISPOSAL

A. Measurement per Cubic Yard (CY) to be demolished.

B. Payment covers complete cost of concrete demolition including but not limited to excavation, cutting, capping, stockpiling, handling, sorting, surface preparation, stabilizing, and redistribution of the existing concrete structures up to three feet below proposed grade to allow structural fill and concrete placement. Includes excavation of all necessary concrete, hauling to a qualified disposal area and all incidental work and materials, including disposal fees. Includes BMPs, care of water, disposal fees and other incidentals.

Bid Items No. 7, 13,23,31,39,42,48

GENERAL EXCAVATION AND STOCKPILING

A. Measurement per Cubic Yard (CY) of excavated material.

B. Payment covers complete cost of salvage, excavation, stockpiling, handling, sorting, stabilizing or incidental redistribution onsite of existing alluvium, subgrade, topsoil or upland soils, including root cutting and excavation down to subgrade level. Includes grading and stabilizing in designated onsite stockpiling areas and all incidental work or materials including removal and disposal of trash, woody debris, shrubs, bushes, willows, trees with diameter at breast height below 6”, and roots. Includes BMPs, care of water, handling of suitable materials for reuse including sorting and stockpiling and any other incidentals.

Bid Item No. 8, 14, 25, 32, 40, 43,49
HAUL AND DISPOSAL OF ALLUVIAL MATERIAL OFFSITE

A. Measurement is per Cubic Yard (CY) of offsite disposal of alluvial material per limits of excavation defined in plans.

B. Payment covers complete cost of handling, dewatering materials onsite and disposing of alluvial materials to an offsite location. Ogden City has a specific disposal site property where clean Sand, Gravel and Cobble only will be able to be disposed of, free of charge. Debris, vegetation concrete or other trash or waste must be disposed of at a qualified facility. Work includes but is not limited to: BMPs; supplying equipment; loading; hauling; handling; disposal fees; and any and all incidentals such as disposal fees.

Bid Items No. 9,15,29,33,44,55
FURNISH AND INSTALL BOULDER

A. Measurement is per Ton (TON) of furnished boulders per certified scale tickets.

B. Payment covers complete cost of furnishing and placement of imported boulder as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to purchase boulder, deliver boulder, stockpile boulder, sort boulder and dispose of excess boulder. Payment for this line item will only cover boulder installed at the site per the Drawings and Specifications or the ENGINEER'S direction. Excess, poor quality or rejected boulder delivered to the site will be disposed offsite at the CONTRACTOR's expense. Work includes but is not limited to all equipment, materials, labor and incidentals associated with: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; placement of material. Furnishing and installing aggregate bedding/backing as shown in plans and protecting or replacing the filter fabric in good condition are considered incidental to the work and are included.

Bid Items No. 10,17,30, 34, 41, 45, 56
PLACE ALLUVIAL BACKFILL

A. Measurement per Cubic Yard (CY) of alluvial cobble / pit-run installed.

B. Payment covers complete cost of stockpile, sorting and placing of alluvial cobble from site (not imported material) as shown on the plans and described in the technical specifications. Work includes but is not limited to all equipment, materials, labor and incidentals associated with: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; placement of material. Cost includes all labor, equipment and materials required to complete the work.

Bid Items No. 11, 18, 28, 38, 46, 52
8 OZ NON-WOVEN FILTER FABRIC

A. Measurement is per square yard (SY) of installed non-woven filter fabric as installed between the embankment and boulders. Embedded lengths of erosion control fabrics, vertical faces, and overlapped fabric shall not be measured for payment.

B. Payment covers the complete cost of furnishing and installing non-woven filter fabric. Work includes but is not limited to: BMP's; providing all necessary good quality materials; labor; fasteners; excavation; installation per manufacturers recommendations; and any and all incidentals such as overlap and tucking into bank; storing and protecting fabric from tears or damage replacement throughout construction.

Bid Items No. 12, 22
EROSION CONTROL BLANKET TYPE 1

A. Measurement is per square yard (SY) of installed erosion control blanket surface. Embedded lengths of erosion control fabrics, vertical faces, and overlapped fabric shall not be measured for payment.

B. Payment covers the complete cost of furnishing and installing erosion control blankets per manufacturers' recommendations. Work includes but is not limited to: BMP's; providing all necessary good quality materials; labor; excavation; installation; and any and all incidentals such as excavating and backfilling key downs at edges and stakes; differing fabrics and installations for appropriate application. Ship lap with upstream on top.

Bid Item No. 16
FURNISH AND INSTALL SLABSTONE

A. Measurement is per Ton (TON) of furnished Slab stones per certified scale tickets.

B. Payment covers complete cost of furnishing and placement of imported slab stones as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to purchase slab stones, deliver slab stones, stockpile slab stones, sort slab stones and dispose of excess slab stones. Payment for this line item will only cover slab stone installed at the site per the Drawings and Specifications and/or the ENGINEER'S direction. Excess, poor quality or rejected slab stones delivered to the site will be disposed off site at the CONTRACTOR's expense. Work includes but is not limited to all equipment, materials, labor and incidentals associated with: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; placement of material. Furnishing and aggregate bedding/backing as shown in plans is considered incidental to the work.

Bid Item No. 19
FURNISH AND INSTALL TOPSOIL

A. Measurement is per Cubic Yard (CY) per plans.

B. Payment covers complete cost of furnishing topsoil, stockpiling, installing and grading a 6" lift to final grading. Work includes but is not limited to: BMP's; erosion and sediment control; excavation; loading, hauling, handling and stockpiling material; placement of all materials; and any and all incidentals. Topsoil shall be free from invasive and noxious weeds, cheatgrass, and puncturevine and topsoil shall be approved before importing to the job site. Includes all equipment, labor, materials and incidentals needed to complete the work.

Bid Item No. 20
SEED MIX
A. Measurement is per Square Yard (SY) of seeded area as measured in place.

B. Payment covers the complete cost of furnishing and installing Riparian and Upland Seed Mix on river left and river right, as shown in the Project Drawings and described in the technical specifications. Work includes: BMP's; loading, hauling, handling and stockpiling material; supplying equipment; seeding; raking; grading; special guarantees; any and all incidentals such as initial watering. Includes all equipment, labor, materials and incidentals needed to complete the work.

Bid Item No. 21
HYDROMULCH
A. Measurement is per Square Yard (SY) of sprayed area as measured in place.

B. Payment covers the complete cost of furnishing and installing hydro mulch as shown in the Project Drawings and described in the technical specifications. Work includes: BMP's; loading, hauling, handling and stockpiling material; supplying equipment; seeding (drilling or raking); special guarantees; any and all incidentals such as initial watering. Includes all equipment, labor, materials and incidentals needed to complete the work.

Bid Item No. 24
OVER EXCAVATION FOR BOAT RAMP
A. Measurement per Cubic Yard (CY) of excavated material.

B. Payment covers complete cost of salvage, excavation, stockpiling, handling, sorting, stabilizing or incidental redistribution onsite of existing subgrade, topsoil and upland soils. Includes hauling to and stabilizing in designated onsite stockpiling areas and all incidental work or materials including removal and disposal of trash and debris. Includes BMPs, care of water, handling of suitable materials for reuse including sorting and stockpiling and any other incidentals.

C. Payment includes removal and disposal of material that cannot be reused onsite. Includes any root cutting, removal, and disposal of roots within boat ramp excavation area.

Bid Item No. 26
FURNISH AND INSTALL CLEAN SAND OR GRAVEL FILL
A. Measurement per Cubic Yard (CY) of imported material.

B. Payment covers complete cost of furnishing, installing, grading and compacting clean sand or gravel fill over prepared subgrade. Material shall be granular, free draining, unified soils classification GW, GP, GM, or SW, maximum aggregate size of 3" and no more than 7% passing a number 200 sieve. Material shall be placed in lifts no greater than 6" in depth and compacted to 95% (see sheet S-001-foundation section, point E). Includes BMPs, care of water, handling of suitable materials for reuse including sorting and stockpiling and any other incidentals.

Bid Item No. 27
FURNISH AND INSTALL REINFORCED CONCRETE SLAB (8")
A. Measurement is per Cubic Yard (CY) of cast in place concrete with structural steel.

B. Payment covers the complete cost of constructing the reinforced concrete boat ramp as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, material, labor, and incidentals associated with: BMPs, preparing subgrade, creating concrete forms, furnishing and installing steel reinforcement, furnishing and placing concrete; finishing surfaces; epoxies and mastics; site clean-up; and any and all incidentals including stabilizing temperatures during curing, control of ground water and shoring. Cost includes required geotechnical inspections prior to concrete pour and concrete testing per APWA 03 30 05.

Bid Items No. 35, 47, 53
STEEL PLATE PROTECTION AT CREST
A. Measurement is per Square Feet (SF) of installed structural steel plate protection.

B. Payment covers the complete cost of furnishing and installing structural steel plate protection at the crest of structures and wave walls as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, material, labor, and incidentals associated with: BMPs, installing steel reinforcement, epoxies and mastics; site clean-up; and any and all incidentals.

Bid Items No. 36, 50
CAST IN PLACE CONCRETE INCLUDING REBAR
A. Measurement is per Cubic Yard (CY) of cast in place concrete with structural steel.

B. Payment covers the complete cost of constructing the reinforced concrete surf wave ramp,

walls, and drops crest as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, material, labor, and incidentals associated with: BMPs, preparing subgrade, creating concrete forms, furnishing and installing steel reinforcement, furnishing and placing concrete; finished surface as per technical concrete specifications; epoxies and mastics; site clean-up; and any and all incidentals including control of ground water and shoring. Cost includes required geotechnical inspections prior to concrete pour and concrete testing per APWA 03 30 05.

Bid Item No. 37, 51
CDF OR CLSM FILL

A. Measurement is per Cubic Yard (CY) of CDF or CLSM fill material per certified scale tickets.

B. Payment covers complete cost of furnishing and stockpiling CDF or CLSM fill material applied over and around existing concrete structure and in area between sheet pile walls to excavation depth as required by demo plan, and the conduit trenches, as shown in the plans and described in the technical specifications and stockpiling onsite. Work includes, but is not limited to all equipment, materials and labor required to purchase, deliver, stockpile and disposal of excess bedding material. Payment for this line item will only cover bedding material installed at the site for the plans and the specifications, including any necessary materials testing. Excess, poor quality or rejected bedding material delivered to the site will be removed at the CONTRACTOR's expense.

Bid Item No. 54
SHEET PILE

A. Measured is per Square Foot (SF) designed.

B. Payment covers the complete cost of furnishing, finishing, installing and cutting sheet pile to the lines, grades and limits as shown on the plans and described in the technical specifications. Work includes, but is not limited to all equipment, material, labor and incidentals associated with: BMP's, furnishing and stockpiling material and supplying equipment, installing sheets in coarse subgrade, securing sheets and other miscellaneous tasks required to complete the work such as incidental excavation, moving boulders, realignment, achieving piling depths, or cutting sheets to elevation tolerances. All fasteners and other hardware as well as pre-drilling to facilitate driving sheet pile to the designated elevations are considered incidental to the work.

Bid Item No. 57
GROUT

A. Measurement per Cubic Yard (CY) of grout properly placed, installed and cured onsite.

B. Payment covers complete cost of furnish and install grout in the construction of the grouted boulder section as shown on the construction drawings and specifications. Work includes but is not limited to: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; supplying equipment and required incidentals. Cost includes all labor, equipment and materials required to complete the work including geotechnical testing.

Installation of excess, poor quality, or rejected grout will be at the CONTRACTOR's expense, including removal and disposal.

Bid Item No. 58
FURNISH AND INSTALL PNEUMATIC GATE SYSTEM

A. Measurement is per Lump Sum (LS) composed of Bid Items # 59 to # 72 .

B. Payment covers complete cost of furnishing, placement and installation of pneumatic gate system as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to furnish, install and test the complete pneumatic gates system including but not limited to three (3) steel gates, twelve (12) rubber rocks, mechanical systems, three (3) pressure transducers, three (3) Gate position Sensors and two (2) Abutment Plates for Steel Gates. Payment includes any and all incidentals including but not limited to: shop drawings, submittals, O&M manual, programming, equipment, controls, utility connections, airlines, conduits, concrete modification and sealing.

Bid Item No. 73
ESTABLISH CONTROL BUILDING

A. Measurement is per Lump Sum (LS) to be installed.

B. Payment covers complete cost of establishing the Control Building. Control building structure will be furnished and placed by the City of Ogden, shown in the Project Drawings (D10, D11 and D12) and described in technical specifications. Work includes but is not limited to all equipment, materials and labor required to establish the Control Building such as: submittal of equipment layout; furnish and prepare sub-base foundation (Including compaction testing by third party to confirm 95% compaction); grading for drainage away from building; excavate shared utility trench from Stockman Way to the control building, furnish and install 4" PVC power conduit with 36" radius Fiberglass sweeps, and install 1-1/4" PVC fiber conduit (fiber conduit furnished by others) per detail D12, and backfill utility trench; set power meter; connection knockouts; connecting incoming utilities; testing building systems; providing building operations manual and wiring diagram. Building structure, building placement, meter, power and fiber utility wire furnished and installed from Stockman Way to control building by others. Work includes any and all incidentals including stockpiling materials, repairs, inspections or delays.

C. Final stamped Schweitzer control building drawings are available upon request. These drawings do NOT show how the OHI pneumatic system should be laid out and installed, these are only for the building itself

Bid Item No. 74
CONCRETE MANHOLES

A. Measurement is per Each (EA) to be furnished and installed.

B. Payment covers complete cost of furnishing, placement and installation of the 6 feet Diameter concrete manhole shown in the Project Drawings and described in the technical specifications, including shop drawings. Work includes, but is not limited to all equipment, materials and labor required to furnish and install the concrete manholes such as furnishing and installing manhole, base slab to support manhole against buoyant forces included, excavation, dewatering, backfill, preparing sub grade, connection knockouts; risers, grates, and covers; ladder rungs; grouting; rebar dowels; connection to existing and/or new conduits, material compaction and testing and all other items needed to complete the work including cleaning and placing structures in service.

C. If manholes are cast in place in the field, the excavated area must be fully dewatered.

D. Payment includes root cutting, removal, and disposal within manhole excavation area

Bid Item No. 75
FURNISH AND INSTALL AIR LINE AND TELEMETRY
A. Measurement is per Lump Sum (LS).

B. Payment covers complete cost of furnishing and installing all cables, lines and conduits and connections originating from the control building per the Drawings and Specifications. Work includes trenching, bedding, installation of lines and conduits, rebar, installing a secure transition into the control building, installation of cables, and backfill and compaction of trenches. Includes any and all incidentals including marking trenches, installing sweeps, making and sealing punchouts, protecting lines, connecting to manholes and pull boxes, labeling lines, caping and terminating lines and connecting lines.

C. Payment includes any root cutting, removal, disposal and pruning within trench zone

Bid Item No. 76
FURNISH AND INSTALL SURVEY MONUMENT CAP AND BASE
A. Measurement is per Lump Sum (LS).

B. Payment covers complete cost of furnishing, placement and installation of the Survey Monument Cap and Base as shown in the Project Drawings and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to furnish and install the Survey Monument Cap furnished by Ogden City.

Bid Item No. 77
POUR CONCRETE BASE AND FURNISH AND INSTALL WEB CAMERA POLES
A. Measurement is per Each (EA) to be furnished and installed.

B. Payment covers complete cost of furnishing and installation of concrete base and 15 feet camera poles as shown in the Project Drawings and described in the technical specifications, including junction box, 2" PVC conduit, rebar, copper grounds, and concrete collar. Concrete collar shall be 6" thick and extend 9" out from the outside edge of the pole. Concrete base shall be 4' deep and 18" in diameter per sheet D09. Camera and camera wiring will be furnished and installed by Ogden City. 15ft tall polls to be furnished and installed by the Contractor. Work includes, but is not limited to all equipment, materials and labor required to install concrete base and install the web camera poles and conduits per the Drawings and Specification.

C. Payment includes trenching, bedding, furnish and installation of 2" PVC conduit from the control building to each pole base, and backfill and compaction of trenches; root cutting, removal, disposal and pruning within trench zone.

END OF DOCUMENT

SECTION 01 12 00
SPECIAL PROVISION

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
WEBER RIVER – OGDEN, UTAH

TECHNICAL SPECIFICATIONS

October 2025

Prepared by:
RiverRestoration.org

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This document supplements APWA 2025 Standard Specifications.
Meet or exceed all APWA Standard Specifications and those supplemented herein, including but not limited to:

015526, 015700, 017113, 017123, 017124, 310510, 310513, 310519, 310521, 311100, 312316, 312317, 312323, 312326, 312500, 313119, 320190, 320191, 320193, 328423, 329119, 329200, 329313, 329343.

Utah Department of Transportation 2012 Individual Standard Specifications (http://udot.utah.gov) are also referenced herein, including but not limited to Section 02743 and other sections reference therein.

Special Provision Table of Contents

SECTION 01

SUMMARY OF WORK

PART 1 GENERAL

A. The Work to be performed under this Contract shall consist of furnishing all labor, tools, equipment, materials, supplies, and manufactured articles for the Project. It shall also include the furnishing of all transportation and services, including fuel, power, water, and essential communications, and for the performance of all labor, work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Work under this Contract generally includes but is not limited to construction of the following: "General Activities, Care of Water, upper and lower drops including, rock placement, concrete casting and pouring, OHI gates system and peripherals, pool grading, Access Ramp, bank restoration and all appurtenant work in accordance with the Drawings and Specifications" prepared by the Engineer, RiverRestoration.org LLC (ENGINEER).

B. The project is located on the Weber River in Ogden, UT. The geographic coordinates of the project are: Latitude: 41.227738° N, Longitude: 111.987759° W

1.2 BEGINNING AND COMPLETION OF THE WORK

A. Time is the essence of the Contract. In accordance with the provisions of Article 2 of the Agreement, the Contractor shall begin the Work on the date specified in the written Notice to Proceed from the City and shall complete all of the Work included in the Contract within the time specified in said Notice. Time stated for completion shall include final cleanup of the premises.

1.3 CONTRACT METHOD

A. The Work hereunder will be constructed under a Unit Price contract.

B. The Contractor shall include the requirements of the General Conditions and Supplementary General Conditions of the Contract as a part of all of its subcontract agreements.

1.4 ORDER OF THE WORK

A. The Work shall be carried on at such places on the project and also in such order or precedence as may be found necessary by the Engineer to expedite completion of the Project. After work has begun on any portion of a designated part of the Project, it shall be carried forward to its final completion as rapidly as practicable. The order and time to complete shall conform to the requirements of the approved Contractor's schedule as submitted under the provisions for *"Contractor's Schedules" in*

Section 01 33 00, "Contractor Submittals" and the requirements of Section 01 32 16, "CPM Construction Schedule."

1.5 WORK BY OTHERS

A. General: The Contractor's attention is directed to the fact that other contractors may conduct work at the site during the performance of the Work under this contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the Work of such other contractors and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform their respective contracts.

B. Interference With Work on Utilities: The Contractor shall cooperate fully with all utility forces of the City or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the Work, and shall schedule the Work so as to minimize interference with said relocation, altering, or other rearranging of facilities.

C. Concurrent Work by Other Contractors: The Contractor's attention is directed to the fact that work *may* be conducted *at or adjacent to* the site by other contractors during the performance of the Work of this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the work of such other contractors.

1.6 WORK SEQUENCE

A. Construct Work in stages to accommodate OWNER use of premises during construction.

1. Coordinate Progress Schedule during construction. At the City's discretion a notice to proceed for each schedule will be issued as progress is made on previous authorized schedules.
2. Provide for continuous public usage. Roads should not be closed without the consent of the City's representative during any phase of construction.

1.7 PROJECT MEETINGS

A. Preconstruction Conference: Prior to the commencement of Work at the site, a preconstruction conference will be held at a mutually agreed time and place which shall be attended by the Contractor, its superintendent, and its subcontractors as appropriate. Other attendees will be:

1. Engineer or Representative.
2. Representatives of City.
3. Other Governmental representatives as appropriate.
4. Others as requested by Contractor, City, or Engineer.

B. Unless previously submitted to the Engineer, the Contractor shall bring to the conference one copy each of the following:

1. Tentative Look Ahead Construction Schedule.
2. Procurement schedule of major equipment and materials and items requiring long lead-time.
3. Rock Sourcing Plan.
4. Shop Drawing/Sample/Substitute or "Or Equal" submittal schedule.
5. Schedule of values (Unit Price Contract) for progress payment purposes.
6. Erosion and Sediment Control Plan (ESCP).
7. Spill Prevention, Control and Countermeasure Plan (SPCC).

8. Care of Water Pan (CW).
9. Traffic Control Plan (TC).
10. Stormwater Protection Plan (SWPP)

C. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date, which may include the following:

1. Contractor's tentative schedules.
2. Transmittal, review, and distribution of Contractor's submittals.
3. Processing applications for payment.
4. Maintaining of record documents.
5. Critical work sequencing.
6. Field decisions and Change Orders.
7. Use of project site, office and storage areas, security, housekeeping, and City's needs.
8. Major equipment deliveries and priorities.
9. Contractor's assignments for safety and first aid.

D. The *City's designated Construction Manager* will preside at the preconstruction conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

E. Progress Meetings: The Contractor shall schedule and hold regular on-site progress meetings at least bi-*weekly* and at other times as requested by the City or Engineer or as required by progress of the Work. The Contractor, Engineer, City, and all subcontractors active on the site shall be represented at each meeting. Contractor may at its discretion request attendance by representatives of its suppliers, manufacturer's, and other subcontractors.

F. The Contractor shall preside at the meetings and provide for keeping and distribution of the minutes. The purpose of the meetings will be to review the progress of the Work maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

END OF SECTION

SECTION 1 SCOPE OF WORK

1.00 INTRODUCTION

These TECHNICAL SPECIFICATIONS documents are for the construction of the Ogden Business Exchange Surf Wave Project on the Weber River, in Ogden, Utah.

1.01 GENERAL

The proposed Ogden Business Exchange Wave Project (Project) is located in Ogden, Utah, along the Weber River in the Ogden Business Exchange development area approximately a quarter mile downstream of the kayak park. Ogden City is hoping to expand on the whitewater recreation opportunities provided by the kayak park to add a standing wave surfable with surf boards, body boards, and standup paddle boards (SUPs) at the project site. The project would provide fish passage over the structure and add aquatic habitat to the project reach The proposed project includes in-channel and bank improvements in and along the Weber River with a total project length of approximately 340 feet.

The geographic coordinates of the project are:
Latitude: 41.227738° N, Longitude: 111.987759° W

The purpose of the project is to:

1) Install one (1) upper main whitewater feature composed of a concrete ramp off the main grade control on river left to generate supercritical flow with a pneumatic, adjustable gate system composed of three (3) Steel Gates placed at the bottom of the ramp to redirect the jet upward, forming a wave.
2) Install one (1) boulder-formed fish passage channel off the main grade control on river right including five (5) engineered riffle structures.
3) Install six (6) adjustable gates (Rubber Rock) placed across the crest of the main grade control to control the headwater surface elevation and flow split into the recreation and fish passage channels during low flow periods. At high flows the gate would lower to increase flood conveyance.
4) Install one (1) grade control structure downstream of the surf wave to control the tailwater elevation at the main feature.
5) Install six (6) adjustable gates (Rubber Rock) placed across the crest of the downstream grade control structure to control the water surface elevations at low flows. Gates would be fully lowered during high flow events.
6) Regrade the channel between the two structures to increase the pool depth and width below the surf wave and the fish passage channel.
7) Install bank improvements on river left between and beyond the two structures which will include natural seating areas and bank stabilization measures.
8) Install a single (1) concrete access ramp and associated boulder access stairs
9) Install a single (1) overlook

The primary construction tasks associated with the project are the partial demolition of existing concrete diversion weir structure, abandoned headgate, installation of two new whitewater structures, boulder and slab stone bank terracing and revegetation. Construction of an overlook and concrete access ramp.

The Project is expected to complete, upland and channel grading work during summer and early fall of 2026, with concrete work being completed before freezing season of 2026. All in-channel work shall be done outside of runoff flow periods, or significant storm flow events. The CONTRACTOR shall be responsible to monitor weather patterns and storm flow events. Construction Sequencing and Care of Water to maximize access to work and minimize impacts to aquatic and riparian resources shall be implemented at all times during construction. The CONTRACTOR is responsible for compliance with the 404/401 State Joint Stream Alteration permit.

The General Scope of the Project shall be completed in accordance with these Specifications and as shown on the Project Drawings. Project Drawings include:

Sheet No.	Sheet Title
G01	Cover Sheet
G02	Base Map & Horizontal Control Plan
G03	Demolition & Protect In Place Plan I
G04	Demolition & Protect In Place Plan - Section & Profiles
CW00	Care of Water Overview & Notes
CW01	Care of water & Access Stage 1 Plan
CW02	Care of water & Access Stage 2 Plan
CW03	Care of water & Access Stage 3 Plan
CW04	Care of water & Access Stage 4 Plan
CW05	Care of water Staging Area
CW06	Care of water & Access Plan Details (1/2)
CW07	Care of water & Access Plan Details (2/2)
CW08	Erosion Control Details
R00	Plan View, Profile & Index
R01	Plan View & Profile Surf Wave
R02	Plan View & Profile Fish Passage
R03	Plan View & Profile Engineered Riffle Grade Control
R04	Plan View & Profile Access Ramp
R05	Profile and Sections
R06	Bank Restoration Typical Sections
R07	Obermeyer Hydro Inc, Rubber Rock and Steel Gate Layout
R08	Rubber & Steel Gates Surf Wave Plan View
R09	Rubber & Steel Gates Engineered Riffle Plan View
L00	Seeding Notes
L01	Seeding Plan
L02	Erosion Control Blanket Installation
D01	Boulder Toe and Slab Stone Bank Terracing Detail
D02	Boulder Toe Protection / Slab Stone Terracing with 3:1 Vegetated Slope Detail
D03	Concrete Access Ramp Detail
D04	Obermeyer Hydro Inc Details

Sheet No.	Sheet Title
D05	Obermeyer Hydro Inc Details
D06	Obermeyer Hydro Inc Rubber Rock Details
D07	Obermeyer Hydro Inc Steel Gate Details
D08	Ogden City Details – Survey Monument
D09	Ogden City Details – Concrete Base for Camera Pole
D10-12	CXT Precast Products – 10.5’ x 20’ Control Building
D13	Airline Bedding Detail
S-001	General Structural Notes
S-002	General Structural Notes
S-100	Overall Plan
S-101	Surf Wave Area and Riffle
S-102	Access Ramp
S-103	Wingwall & Headwall Plans
S-201	Headwall & Wingwall Elevation
S-301	Structural Sections
S-302	Structural Sections
S-303	Structural Sections
S-304	Structural Sections
S-501	Structural Details
S-502	Structural Details
S-901	Typical Structural Details

1.1.1 Reference Drawings

a. Manual of Standard Plans published in 2025 by the Utah Chapter of the American Public Works Association.

1.02 KEY PROJECT PERSONNEL CONTACTS

The following is a list of Project stakeholders and their contact information. CONTRACTOR shall notify all stakeholders 7 days prior to construction via email with read receipt confirmation. References to the OWNER are to Ogden City Corporation.

1.02.01 OWNER

Ogden City Corporation
Engineering Division
2549 Washington Blvd Ogden, UT 84401

OWNERS CONTACT:
Mr. Taylor Nielsen
City Engineer
(801) 629-8983
TaylorNielsen@ogdencity.com

1.02.02 ENGINEER

RiverRestoration.org, LLC.
Mr. Jason Carey, PE
PO Box 248
Carbondale, CO 81623
(970) 947-9568 (w)
jason.carey@riverrestoration.org

Engineer's Representatives:
Francois Escorihuela, River Engineer
(970) 947-9568 (w)
francois@riverrestoration.org

END OF SECTION

SECTION 2 GENERAL CONSTRUCTION METHODS

2.01 GENERAL CONSTRUCTION METHODS

This section provides additional detail to append to the Manual of Standard Specifications (APWA, 2025) for general work necessary for the construction including, but not limited to, permits; setting up and taking down temporary offices, buildings, utilities, and sanitary facilities; equipment and materials to and from the site; and preparation of the site for construction as specified. General construction includes: Permits, Project Limits, Site Integrity, Temporary Facilities, Traffic Control, Utility Locates, Manufactured Goods, Construction Staking and Special Guarantees.

2.02 PROJECT LIMITS

Meet or Exceed APWA 2025 Standard Specification 01 71 23 or as modified herein.

All construction activity shall be confined to the Project Limits as defined on the Plans. There are several different Property Owners adjacent to the Project. The boundary of the Project Limits shall be surveyed by the CONTRACTOR prior to construction activities.

Active Project Limits shall be flagged by CONTRACTOR in field for each setup. The CONTRACTOR is wholly responsible for protecting property lines and to limit disturbances to within defined Project Limits.

2.03 PERMITS AND REQUIREMENTS

The CONTRACTOR shall comply with all applicable requirements set forth in all permits obtained for this project. Required permits, with associated terms and conditions, include:

2.03.01 Joint Stream Alteration Permit

This project requires a Joint Stream Alteration Permit (Clean Water Act Section 404 and State Water Quality Certificate 401) issued by the Utah Division of Water Rights for discharge of materials into the waters of the United States. Permits have been applied for; the CONTRACTOR shall adhere to all general and special conditions of the permit when authorized. The CONTRACTOR is responsible for compliance with the 401 and 404 Permits which have term limits and the CONTRACTOR is responsible for obtaining necessary extensions. The CONTRACTOR is responsible for time changes to the Project permits.

2.03.02 UPDES General Permit No. UTG070000

A construction dewatering permit (UPDES General Permit No. UTG070000) from the STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY may be required if Contractor chosen construction methods include returning any pumped water is to the river or routed to storm water inlets. This permit is wholly the responsibility of the Contractor.

2.03.03 UPDES General Permit for Construction Activities UTRC00000

A general construction activities stormwater discharge permit (UPDES General Permit No. UTG070000) from the STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY is required if construction disturbance is required greater than 1.0 acres. The CONTRACTOR is responsible for being in compliance with all regulatory requirements. The estimated project limits for this project are **2.99** acres. A Storm Water Pollution Prevention Plan SWPPP is required. This permit is wholly the responsibility of the Contractor.

2.03.04 Local Construction Permits

The CONTRACTOR is responsible for compliance with access agreements and obtaining all other local permits necessary for construction. Especially the Contractor's Right of Entry Agreement with Union Pacific for project N 0803248. (See Appendix C)

2.04 CONTRACTOR SUBMITTALS

The CONTRACTOR shall submit for review by the OWNER the following operating plans, schedules, and documentation. All plans and documentation shall be submitted a minimum of 21 days prior to beginning construction. Rejected plans and documentation shall be modified per review comments and re-submitted. Plans shall incorporate all appropriate detailed BMPs, means, methods, and materials necessary for achieving project performance, safety, and protection targets.

2.04.01 Erosion and Sediment Control (ESC) Plan

CONTRACTOR shall submit an Erosion and Sediment Control (ESC) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to prevent and/or mitigate erosion and sediment mobilization within and surrounding all in-channel and upland construction and staging areas. The ESC Plan shall include a detailed Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors.

2.04.02 Spill Prevention, Control and Countermeasure (SPCC) Plan

CONTRACTOR shall submit a Spill Prevention, Control and Countermeasures (SPCC) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to prevent and/or mitigate spills or other releases of fuels, chemicals, oils, sewage, and other contaminants within and surrounding all in-channel and upland construction and staging areas, and from entering Waters of the US and State of Utah. SPCC Plan shall include a detailed Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors. SPCC Plan shall identify and provide contacts for all Qualified Subcontractors, OWNER, UDEQ REPRESENTATIVE, and ENGINEER. SPCC Plan shall be posted on-site at all times during construction.

A release of any chemical, oil, petroleum product, sewage, etc., which may enter waters of the State of Utah (which include surface water, ground water and dry gullies or storm sewers leading to surface water) shall be reported to the Utah Department of Environmental Quality (UDEQ). It is wholly the responsibility of the CONTRACTOR to identify and notify the appropriate agencies in the event of a spill or release.

Releases of petroleum products and certain hazardous substances listed under the Federal Clean Water Act (40 CFR Part 116) must be reported to the National Response Center as well as to UDEQ as required

under the Clean Water Act and the Oil Pollution Act. Furthermore, contact must be made immediately, reporting any spill incident, with the UDEQ, the OWNER and ENGINEER.

2.04.03 Traffic Control (TC) Plan

Meet or Exceed APWA 2025 Standard Specification 01 55 26 or as modified herein.

CONTRACTOR shall submit a Traffic Control (TC) Plan, to include the Roads, Parking Areas, Walking Paths, Boat Ramps, River Navigation, and Construction Access to be approved by the OWNER. The (TC) Plan shall detail all of the proposed BMPs, means, methods and materials used to maintain street traffic surrounding all construction and staging areas, and to isolate construction and staging areas from the public. TC Plan shall include Site Access, Traffic Control, and Public Safety plans for all stages of construction, and shall include a detailed Narrative as well as specific Locations, Maps, and Schedules. TC Plan shall identify and provide contacts for all Qualified Subcontractors, OWNER, ENGINEER, and 24-Hour Emergency Traffic Control Technician. No construction activities shall impede public traffic patterns prior to written approval from the OWNER. If CONTRACTOR finds it necessary to close any Paths or re-route traffic, the OWNER shall work with CONTRACTOR to approve a reasonable alternative route.

2.04.04 Care of Water (CW) Plan

CONTRACTOR shall submit a Care of Water (CW) Plan which details all of the proposed BMPs, means, methods, and materials used to manage and treat waters in all construction and staging areas. On-site waters could include surface flows from adjacent terrain, direct rainfall, and seepage and groundwater discharge in coffered areas. The ENGINEER will provide a typical on-site water management detail in the project plans for reference; however, it is wholly the responsibility of the CONTRACTOR to design, submit for approval, and implement a comprehensive and site-specific CW Plan. The CW Plan shall include a detailed Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors. The Plan shall include a specific and detailed plan for returning on-site waters to the Active Channel which includes settling, pumping, and filtration methods and locations. The final accepted CW Plan shall provide a reliable means to conform to allowable construction discharge turbidity regulations and shall include methods and schedules for turbidity monitoring if required by project permits.

2.04.05 Look Ahead Construction Schedule

The CONTRACTOR shall submit construction Look Ahead Schedules 7 days prior to the start of any given stage of construction as well as bi-weekly during active construction. Schedules should include the following:

- **a.** All forecasted tasks associated with in-channel and upland construction, mobilization, staging and access, and materials acquisition and delivery
- **b.** Completed construction tasks
- **c.** Report submittals
- **d.** Progress and management meetings
- **e.** Permit timeframes and deadlines
- **f.** Inspections

2.04.06 Rock Sourcing Plan

The CONTRACTOR shall submit

2.04.07 Stormwater Pollution Prevention Plan (SWPPP)

Meet or Exceed APWA 2025 Standard Specification 01 78 45 or as modified herein.

1 GENERAL

1.1 Section includes

A. Requirements for controlling erosion and capturing sediment laden runoff from leaving the construction site and areas under the Contractor's control.

B. Requirements for installing, inspecting, maintaining, and removing temporary erosion and sediment control measures.

1.2 Related sections

A. APWA Section 01 57 00 Temporary Controls

B. APWA Section 31 25 00 Erosion and Sedimentation Control

C. APWA Section 31 05 19 Geotextiles

1.3 Submittals

A. A Storm Water Pollution Prevention Plan (SWPPP) for the project shall be submitted at least two weeks prior to beginning construction.

B. The Notice of Intent (NOI) form for storm water discharges associated with construction activity to the Division of Water Quality at the Utah Department of Environmental Quality (DEQ).

C. Close-out the Storm Water General Permit for Construction Activities by submitting a Notice of Termination (NOT) form to the Division of Water Quality.

2 PRODUCTS

2.1 Materials

A. Temporary Materials: Contractor's choice.

B. Riprap: Rock, APWA Section 31 37 00.

C. Blankets: Uniform open weave jute, wood fiber or biodegradable.

D. Geotextiles: Project specification 31 05 20S and APWA Section 31 05 19

E. Topsoil and Fertilizer: APWA Sections 31 05 13 and 32 92 00

3 EXECUTION

3.1 Preparation

A. Do not begin any earth-disturbing activities until the SWPPP has been approved and the NOI form has been completed online and submitted to the Division of Water Quality.

B. Comply with requirements of Storm Water General Permit for Construction Activities.

C. Follow the Storm Water Pollution Prevention Plan (SWPPP) for the project.

D. Do not start earth-disturbing activities until BMPs along the project perimeter and those protecting environmentally sensitive areas are installed.

E. Maintain a copy of the prepared SWPPP on the project site at all times.

F. Use the most restrictive requirement if a conflict occurs between erosion and sediment control specifications and federal, state, or local agency laws, rules, or regulations.

G. Remove foreign materials, roots, rocks, debris.

H. Grade to eliminate rough spots, ponding areas.

I. Grade soil to drain perimeter water away from protected areas.

J. Temporary Controls: APWA Section 01 57 00 as applicable.

3.2 Installation

A. Construct BMPs such as check dams, silt fence, and other sediment and erosion control devices to reduce erosion and sedimentation.

B. Install stabilization measures as soon as practical on newly disturbed areas.

3.3 Inspection

A. Perform weekly inspections of all disturbed areas during construction. Inspect the site within 24 hours of a storm event greater than ½ inch of precipitation. Conduct inspections at least once per month when construction activities are temporarily or seasonally shut down. Apply corrective measures as required.

B. Complete the Division of Water Quality inspection form during each inspection. Keep copies of all inspection reports with the prepared SWPPP on the project site.

3.4 Maintenance

A. Maintain erosion control and sediment control devices until all disturbed areas are stabilized.

B. Remove erosion control and sediment control devices upon completion of construction.

2.04.07 Pneumatic Gate System Submittals

Final design of the pneumatic gate system shall be included in the bid price including:

1) Shop drawings of all proposed components.
2) Materials list with specifications.
3) Structural drawings revisions including concrete block-outs and modifications.
4) Control house modifications.
5) Electrical power supply.
6) Final field inspection and testing.
7) Final field wiring drawings as-built.
8) Final as-built Mechanical System Manual.
9) Airline trenches and Manhole shop drawings.

2.05 SITE INTEGRITY

Meet or Exceed APWA 2025 Standard Specification 01 31 13 or as modified herein.

The CONTRACTOR is required to document the condition of Utilities, Adjacent Streets and Sidewalks, Recreation Area Facilities, Construction Access Areas on the banks, Wetlands, Mature Vegetation and the

general area with pictures and video recordings, submitted to ENGINEER electronically prior to any construction phase and after each phase of construction is completed. The pictures and video recording shall document the surface integrity of the structures with clear and recognizable reference features or established and repeatable reference markers in the field of view. The CONTRACTOR is responsible for rehabilitating, repairing or replacing, to better than pre-construction conditions, any damage to the structures, roads, and vegetation directly or indirectly related to construction activities.

2.06 UTILITIES

Meet or Exceed APWA 2025 Standard Specification 01 31 13 or as modified herein.

CONTRACTOR shall field-locate and mark all utilities within or adjacent to Project Limits. Any utility locations marked on plans are approximate and actual field location of any utility is wholly the responsibility of the CONTRACTOR. Overhead powerlines shall be marked at ground level with warning signs where they cross haul routes. CONTRACTOR shall protect in-place all utilities. Known Utility contacts include, but are not limited to:

2.06.01 Bluestakes of Utah

www.bluestakes.org
800-662-4111
801-208-2100

2.06.02 Ogden Engineering Division

www.ogdencity.com/268/Engineering
801-629-8271

2.07 TEMPORARY FACILITIES

CONTRACTOR shall provide all temporary facilities required for performing the work. Temporary construction facilities and utility connections are solely the CONTRACTOR's responsibility based on his selected method of operation and schedule. CONTRACTOR is responsible for providing a clean and safe environment for all workers on the job site. CONTRACTOR is responsible for providing sanitary facilities. CONTRACTOR shall follow Occupational Safety and Health Administration (OSHA) regulations. CONTRACTOR is responsible for providing all electrical, water and other temporary utility needs. CONTRACTOR shall keep the Project Limits in a neat and orderly manner. CONTRACTOR is responsible for removing temporary facilities and controls after completion of all Work.

2.07.01 Staging Areas

Preliminary Staging Areas are shown on the Plans. Final staging and access are to be pre-approved in writing by the OWNER. All construction staging, stockpiling of materials, equipment storage, equipment fueling and maintenance, and other, shall take place in designated areas with adequate barriers to protect the public from entry. Staging areas shall have a designated office or contact information posted for public inquires. Staging areas shall provide employees all necessary facilities, legal postings, and safety protocol. Staging area shall include trash and recycling disposal containers and temporary restroom facilities maintained and serviced as necessary. The CONTRACTOR is responsible for maintaining a clean and organized staging area and restoring all disturbed areas equal to pre-project conditions.

2.07.02 Disposal Areas

Construction activities are anticipated to produce clean fill materials, as well as some other waste materials. All excess materials produced by construction activities shall be properly disposed. Prior to construction activities CONTRACTOR shall report any materials disposal locations to the OWNER. All disposal locations, and means and methods of disposal, shall be in accordance with any applicable regulations and permits, and it is solely the responsibility of the CONTRACTOR to acquire any applicable permits. It is wholly the responsibility of the CONTRACTOR to notify the OWNER of potentially contaminated materials, request for testing, and ensure proper disposal. The cost of testing and disposal will be reimbursed at a unit basis based on direct costs.

2.07.02 Dewatering Areas

Dewatering areas shall have adequate BMPs in place to stockpile material prior to disposal. All soaked waste materials shall be dewatered prior to exporting outside of the Project Limits. Dewatering shall be sufficient that no leakage is evident from any hauling equipment. The dewatering area shall be adequate to evaporate water or overflow shall be passed through filter fabric wrapped ECLs, or equivalent, and routed to the Weber River without erosion or turbidity.

Dewatering areas may also be configured to include a Washout Area for concrete pours. Pours shall not be conducted during or before an anticipated storm event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes shall be discharged off site, or temporarily into a washout area designated in an unvegetated upland location and completely isolated from stormwater and drainage. All concrete residues shall be hauled off-site and properly disposed. Returning water from dewatering areas to surface flow routes may require a dewatering permit from the UDEQ and is wholly the responsibility of the CONTRACTOR.

2.07.03 Equipment Fueling, Greasing, and Maintenance Areas

Any and all fueling and greasing of equipment shall be in designated upland locations, with adequate BMP's to contain any potential spill. All major equipment/vehicle maintenance shall be performed off-site. Fuel tank may be kept on-site in the staging area with drip pans underneath the fueling area. All equipment fluids generated from maintenance activities shall be disposed of into designated drums stored on spill pallets in accordance with hazardous waste management practices. Drip pans shall be placed under all equipment receiving minor or routine maintenance. All equipment shall be inspected daily for leaks and proper function. Leaking or otherwise improperly functioning equipment shall not be used in any capacity for construction activities. Any equipment found to be leaking upon inspection shall be immediately taken out of service for maintenance.

a) A Spill Cleanup Plan is wholly the responsibility of the CONTRACTOR and shall be posted and available at all times on site for all work areas prior to any construction activities and shall include coordination with local emergency response agencies.

b) A release of any chemical, oil, petroleum product, sewage, etc., which may enter waters of the State of Utah (which include surface water, ground water and dry gullies or storm sewers leading to surface water) shall be reported to the Ogden City Representative, National Response Center (NRC) (800-424-8802) in accordance with the requirements of 40 CFR 117, 40 CFR 110, and 40 CFR 302 and the Division of Water Quality (DWQ) (801-538-6146) or the 24 hour DWQ answering service at 801-536-

4123 as soon as he or she has knowledge of the discharge as required under the Clean Water Act and the Oil Pollution Act.

c) Any incident spills that do not threaten water resources shall be reported to: Utah State Emergency Response Commission (members include UDEQ, DERR, Utah Department of Public Safety, and the Division of Emergency Services & Homeland Security), at Toll-Free 24-hour Environmental Emergency Spill Reporting Line 1-801-538-4123, http://www.environmentalresponse.utah.gov. Furthermore, contact must be made immediately, reporting any spill incident, with the Weber-Morgan Health Department, the OWNER and ENGINEER. The CONTRACTOR shall submit within 14 calendar days of knowledge of the release a written description of: the release (including the type and estimate of the amount of material released), the date that such release occurred, the circumstances leading to the release, the measures taken and/or planned to be taken to clean up the release, and steps to be taken to minimize the chance of future occurrences.

2.07.04 Hauling Routes

The import and export of materials from the project limits shall occur at designated locations on defined haul routes. Haul routes shall be approved by the OWNER prior to commencement of the work. Haul routes should be designed to reduce impacts on existing valued vegetation and trees, including limiting any activities within the drip line of existing large cottonwood trees. The access routes to construction sites shall be maintained by the CONTRACTOR with standard maintenance activities, including minimizing and mitigating for equipment Track Out. Haul routes shall be graded and maintained to drain and not pool water. Haul routes shall have wheel washing locations and tracking pads at the junction of paved surfaces. All damage to paved surfaces due to construction activities are the responsibility of the CONTRACTOR to repair to pre-construction conditions or better. Haul routes shall also be flagged by the CONTRACTOR within the Project Limits and random access of equipment shall be prevented. Adequate dust suppression, such as watering of haul routes, shall be maintained at all times. Loads shall be covered while hauling where necessary. Haul routes shall be repaired, ripped and contoured to not pool water and seeded at the completion of the work, to pre project conditions as determined by OWNER.

2.07.05 Channel Access Areas

CONTRACTOR shall be responsible for establishing and maintaining channel access sites for equipment and workers within Project Limits defined on plans and for rehabilitating access sites once construction is complete. Channel access ramps will be graded per plan in order to protect flood walls and other bank structures from equipment damage. Gravel berms shall be installed at the top of the access ramp and other areas to eliminate sheet flow or drainage onto the exposed or disturbed Riverbanks. A silt barrier shall be erected along the toe of any and all out-of-channel open cuts to eliminate the migration of material outside of the limits of work. Straw Bales or wattles shall be used at the toe of the ramp when the access is not in use to prevent the migration of material into the River.

2.08 CONSTRUCTION STAKING

Meet or Exceed APWA 2025 Standard Specification 01 71 34 or as modified herein.

2.08.01 Control Points General

The ENGINEER shall provide adequate horizontal and vertical control points for the CONTRACTOR to establish the lines and grades shown on the plans. Grade elevations and construction staking shall be wholly the responsibility of the CONTRACTOR.

The ENGINEER will provide a proposed XML compatible digital surface model and river alignment to the CONTRACTOR. The CONTRACTOR shall have the means to load and survey the alignments and surface into a field survey controller, for use in staking out the project layout, checking tolerances, and as-builts of any location in the project area. Surveyor shall be available for ENGINEER inspection at 48 hours notice to provide measurements in the field at ENGINEER'S request. Prior to each days construction grading activities and at the completion of every day, CONTRACTORs site localized survey/stake-out equipment shall be control validated as accurate to within allowable tolerances and recorded daily.

2.08.02 Control Establishment

Established control points shall be provided with special colored flagging and it shall be the responsibility of the CONTRACTOR to protect those control points. In the event they are lost, due to any cause, the CONTRACTOR shall re-establish adequate and permanent control markers on the local survey datums.

2.08.03 Survey Control Monument Coordinates

Table 2.1 Survey Control Monuments (Feet)

CONTROL POINTS	NORTHING	EASTING	ELEVATION	DESCRIPTIONS
CP1	3607005.77	1505907.368	4290.516	CP1 Mag Nail
CP2	3607143.629	1505533.978	4288.974	Yellow Survey Cap
CP3	3607244.976	1506197.388	4289.896	CP3 Mag Nail
USGS Monument (To be relocated)	3606840.700	1506388.020	4294.880	USGS Stream Gage

2.08.04 Survey Coordinate System and Datum

Coordinate System: Utah State Plane, NAD83 datum, Central Zone, US foot, (UT83-CF)
Vertical Datum: NAVD88

2.08.05 As-built Survey

Coordinate System: Utah State Plane, NAD83 datum, Central Zone, US foot, (UT83-CF)
Vertical Datum: NAVD88. Provide asbuilt survey and adjustments in autocad compatible format adequate to verify quantities and conditions of final work product.

2.09 SITE GRADING

CONTRACTOR shall establish and identify required lines, levels, contours and datum. Grade Site to match all lines, elevations and grades shown on the Project Drawings. CONTRACTOR is required to accomplish all site grading through the use of GPS Control. The ENGINEER will provide a proposed XML compatible digital surface model and alignments to the CONTRACTOR. The CONTRACTOR shall have the means to load the alignments and surface into handheld and/or machine mounted field survey controllers to establish proposed elevations and grades. ENGINEER will be present during critical construction activities to inspect grading against the proposed project elevations, alignments and grades.

2.10 SPECIAL GUARANTEE TERMS

Meet or exceed 2025 APWA Standard Specification 00 72 00 and 32 01 90

2.10.01 Protect in Place Trees and Shrubs

a) CONTRACTOR guarantees that care, caution and best management techniques are implemented to maximize the survivability of native mature trees not specifically designated for removal. An initial walk through the project area shall be done to identify best access/hauling routes and to avoid large trees.

b) All Protect in Place vegetation shall have 100% success rate, showing vigor and general health, for one year after PIP measures are conducted.

c) Post-construction monitoring may recommend additional pruning, irrigation, or fertilizer to restore health to the marked tree. The CONTRACTOR is responsible for all measures to restore the health of vegetation for one year after construction disturbances around protect-in-palace vegetation.

d) If negligence results in potential mortality of trees, as determined by the ENGINEER, the CONTRACTOR shall replace all damaged trees with new native trees to reclaim an equivalent canopy cover at CONTRACTOR's sole expense.

2.10.02 Seeding

a) Prior to final acceptance seeded areas shall be reviewed during the inspection period by the ENGINEER for bare soils caused by surface or wind erosion. Bare areas caused by surface or gully erosion, blown away mulch, etc. shall be regraded, seeded, mulched and have mulch tackifier (or erosion control fabric) applied as necessary.

b) Areas where seed has not germinated after one growing season shall be evaluated by the ENGINEER. Areas that have not germinated shall have seed, mulch and mulch tackifier or (erosion control fabric) reapplied at CONTRACTORS expense.

c) Weed infestations shall be treated in accordance with the specifications, as directed by the project ENGINEER, and shall be considered incidental to the work. Weed control shall be treated for the 12-month warranty period.

d) Native seed areas shall have a minimum of 85 percent coverage, with weed control, prior to final acceptance. Any seed areas having poor germination (less than 85 percent coverage) shall be re-seeded at no additional cost to the project.

2.10.03 Live Stake Planting

a) Replace all poles and stakes that do not sprout after 45 days if possible or wait until the following dormant season to harvest and replant.

b) Periodic inspection repair and maintenance shall be required during the first two years or until vegetation is established to a 70% success rate.

2.10.04 Structures/Channel work

a. All constructed in-channel and bank features shall be functioning in accordance with the Plans and Specifications for one year after installation. The CONTRACTOR is responsible for the repair or replacement of in-channel and bank features to proper functioning conditions. CONTRACTOR is responsible for all incidentals such as permit authorizations, BMPs, channel access and any incidental damage caused by repair.

b. Settlement in backfill, fill, or in structures and paving built over backfill or fill, which may occur within one-year warranty period, shall be corrected at no cost to the OWNER. Restore any structures damaged by settlement to their original condition at no cost to the Owner.

c. All damage caused to the Pathways as a result of improper construction is wholly the responsibility of the CONTRACTOR. The CONTRACTOR shall replace all pathways that are dilapidated as a result from improper installation or construction activities.

2.11 ACCEPTABLE AS BUILT ELEVATION VARIATIONS

Average Elevations across each Cross-Section shall be exact according to Plans. With natural building materials variances are expected and shall be allowed for average locations of individual particles. The following As-Built Variances are allowed.

Table 2.2 Acceptable As-Built Variances for Average Locations of Individual Particles

Description	Variance Elevation (feet)	Variance Horizontal (feet)
Top and Bottom of Cast in Place Structure	+0.05;-0.05	+/-0.1 channel alignment
Landscape and Stockpiles	+2.0;- 2.0	+/-5.0 stockpile extents
Finished Grade - Drop Structure Boulder Inverts	+0.25;-0.25	+/-1.0 channel alignment
Finished Grade - Channel Bed and Banks	+0.25;-0.25	+/-0.5
Finished Grade - Channel Overbanks	+0.5;-0.5	+/-1.0 channel alignment
Planting Pocket and Overview	+0.5;-0.5	+/-1.0 channel alignment

**See Table 5.1, 5.2 and 5.3 for gradation information*

END OF SECTION

SECTION 3 BEST MANAGEMENT PRACTICES

Meet or Exceed APWA 2025 Standard Specification 01 57 00 & 31 05 19 & 31 23 16 & 31 25 00 or as modified herein.

3.01 GENERAL

The Work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for installation, maintenance and inspection of all on shore and in-channel BMPs. Within the Project Limits all disturbed surfaces shall utilize best management practices such as Turbidity Curtains, Silt Fences, Construction Sequencing, Care of Water, etc.; to minimize potential environmental damage, turbid conditions, locations of ponding, sediment loading in any flow path, dust, noise, light, etc. Adequate numbers, locations and properly functioning BMPs and erosion control are wholly the responsibility of the CONTRACTOR. CONTRACTOR is responsible for maintaining all BMPs during construction activities, and for the removal post-construction activities and/or adequate stabilization periods. All construction activities shall be performed in accordance with; guidelines set out in the project plans and specifications, specifications in applicable permits, and any local, state, and federal regulations. CONTRACTOR shall inspect all BMPs daily. The OWNER or ENGINEER may stop work in any area due to improperly installed, inadequate, or non-functioning BMP's based on OWNER's or ENGINEER's sole discretion. CONTRACTOR is responsible for coordinating and participating in any inspections of BMPs by appropriate regulatory authorities.

3.02 CONSTRUCTION SEQUENCING

Construction sequencing is an essential BMP to minimize impacts to the Weber River; this sequence attempts to minimize potential impacts from non-point source pollution by implementing Best Management Practices prior to commencing work. Prior to starting construction, the CONTRACTOR shall notify the ENGINEER and the OWNER of the date the CONTRACTOR intends to start construction with a written notice delivered a minimum 7 days in advance. Additionally, Look-Ahead schedules shall be submitted every 14 days during active construction periods.

The Weber River flow rate can change rapidly, and it is the responsibility of the CONTRACTOR to be informed of river flow forecast and historical information to manage construction activities accordingly. The CONTRACTOR should be ready at all times to remove equipment from the channel and floodplain and modify cofferdams and diversions quickly to accommodate flood flows and protect the public, the environment, city infrastructure, and equipment from damage or loss. The CONTRACTOR should anticipate periodic delays in work due to increased flow in the Weber River. These delays should be factored into the cost of the project. A table of statistically estimated river flows is included in Section 7.01 of the specifications for the CONTRACTOR use. Additionally, a table of approximate Water Surface Elevations (WSEL) associated with the river flows and in relation to the Coffer Diversion locations presented in the project plans is provided in Hydrology Section 12.01 of the specifications.

The construction sequencing of the critical construction processes are defined by the ENGINEER and CONTRACTOR shall follow the sequence or as amended by ENGINEER. It is the responsibility of the CONTRACTOR to develop a sequencing plan for the construction of the in-stream structures and verify plan with ENGINEER.

3.02.01 Initial Site Setup

1. Submit all required plan documentation and construction schedules.
2. Notify OWNER, and ENGINEER of start date with at least 7 days' notice.

3. Obtain Ogden City approval of Traffic Control Plans for roads, paths and river.
4. Document with referenced photographs and video the project vicinity, structures, haul road and vegetation and submit to ENGINEER.
5. Establish and post construction site safety protocol.
6. Locate, in field, all Structures and Utilities.
7. Place Barriers, Post Signs, Install Safety Fencing and Isolate Project Site.
8. Protect in place structures, roads, utilities, boulders, trees and other in accordance with submitted plans.
9. Locate and flag Project Limits.
10. Locate and Protect in Place Survey Control.
11. Install temporary erosion control measures.
12. Locate and isolate construction staging and stockpile areas.
13. Install oil booms across wet channel downstream of work area; replace used oil booms per manufacturer's specifications.
14. Locate area for storage of spare oil booms and designate oiling and petroleum handling areas with appropriate and adequate BMPs outside of the riparian zone.
15. Establish and post protocol for potential oil spill cleanup and emergency response.
16. Verify all construction equipment and materials are clean and inspect equipment for leaks, improper function and invasive species.

3.02.02 Staging

1. Locate construction haul routes, stockpile, and staging areas and place silt fence or other BMP down gradient.
2. Install and maintain temporary portable toilet and waste receptables.
3. Identify and mark out the location for a job trailer, concrete wash out area, stockpile area, dewatering area, and fueling area as needed and with proper BMPs in place.
4. Place adequate barriers to prevent public entry of staging area and existing trails.
5. Post contact information for public inquires and emergencies.
6. Implement approved Traffic Control Plan.
7. Install BMPs

i. Control erosion and concentrated runoff
ii. Maintain and facilitate any and all existing Drainage Channels
iii. Identify and install any other BMPs as necessary

8. Install wheel wash and equipment tracking at staging area with drainage and BMPs.
9. Install oil/fueling area with spill kit stored on site.
10. Protect in Place Mature Vegetation, Wetlands and other Natural Resources
11. Grade Access and Staging Areas to drain in the direction of placed BMPs.
12. Grade dewatering area and install overflow drain with filtration.
13. Located stormwater drain(s) and install gravel wattle to surround drain(s).
14. Maintain, add and repair BMP structures as necessary throughout project

3.02.03 River Corridor Construction

1. General

a. Maintain, add and repair BMP structures as necessary throughout project.
b. Submit to Engineer list of equipment using certified bio-degradable fluids.
c. Clean, repair and maintain to leak free condition any equipment accessing the riparian corridor.
d. Disinfect any equipment accessing any wet channel.
e. Protect in Place all trees adjacent to designated excavation areas.
f. Follow all necessary requirements set forth by permitting.

2. Installation of Channel Access Areas:

a. Locate areas for equipment to access the channel with berm at top of bank.
b. Install Oil Booms across channel downstream of channel access locations
c. Prepare channel access.
d. Install silt fence at toe of bank access cuts.
e. Install straw bales or wattles at toe of channel access ramp.

3. Construction of In-stream Structures:
    a. Monitor river levels and weather patterns for potential runoff spikes.
    b. Plan daily work. Each day's work shall be completed prior to advancing to subsequent work. No in-channel excavations or stockpiles shall be unattended for any period.
    c. Install and maintain Oil Booms downstream of work area if working in the wet channel.
    d. Install erosion and sediment controls bmp's and temporary construction access points.
    e. Perform demolition work and rough grading of east bank above ordinary high water (OHW) line.
    f. Install coffer dams, turbidity curtain, oil booms and dewatering system for STAGE 1 (upper grade control feature Fish passage channel).
    g. Construct STAGE 1 of in-channel construction and bank improvements as shown in plans.
    h. Relocate coffer dams, dewatering system and other in-channel bmp's for STAGE 2 (upper grade control feature – Surf wave Channel).
    i. Construct STAGE 2 of in-channel construction and bank improvements as shown on plans.
    j. Relocate coffer dams, dewatering system and other in-channel bmp's for STAGE 3 work. (west bank access, bank toe restoration and river left side of downstream structure)
    k. Construct STAGE 3 of in-channel construction, access/bank improvements as shown on plans.
    l. Relocate coffer dams, dewatering system and other in-channel bmp's for STAGE 4 work. (river right bank tie in and river right side of downstream structure)
    m. Construct STAGE 4 of in-channel construction and bank tie in as shown on plans
    n. Remove coffer dams and dewatering system.
    o. Construct downstream engineered riffle and downstream west bank improvements (river left) as shown in plans. Work may be performed in the wet and flowing channel.
    p. Remove temporary river access points and in-channel bmp's river.
    q. Construct bank and riverside improvements as shown in plans.
    r. Install erosion control matting and seeding.
    s. Remove staging areas and other temporary bmp's.

3.03 CHANNEL ACCESS

Berms shall be installed at the top of the access ramp and other areas to eliminate sheet flow or drainage onto the exposed or disturbed banks. A silt barrier shall be erected along the toe of any and all out-of-channel open cuts to eliminate the migration of material outside of the limits of work. Straw Bales and/or wattles shall be used at the toe of the ramp when the access is not in use to prevent the migration of material into the body of water.

3.04 EQUIPMENT OPERATING IN WET CHANNELS

Meet or Exceed APWA 2025 Standard Plan No. 125 or as modified herein.

Equipment shall be allowed to operate in the wet channels. Equipment operating in or adjacent to any wet channels shall be free of any fluid leaks and in excellent operating condition. Biodegradable hydraulic fluids shall be utilized for any equipment operating in the flowing river channel. CONTRACTOR shall submit a list of equipment operating with certified biodegradable hydraulic fluids to the ENGINEER prior to use of the equipment in the flowing channel. No equipment shall be left unattended at any time in any wet channel or below the Ordinary High-Water Line. Any and all fueling and oiling of equipment shall be in a designated upland location, with adequate BMPs to contain any potential spill. Equipment storage shall occur in a designated upland location or in the Staging Area.

Mobilization within the channel shall be sequenced for minimal disturbance. The CONTRACTOR shall time the excavation and placing of materials in order to minimize equipment driving on the channel bed. All in-stream structures shall be constructed in sections sized to minimize open excavation area. Each day's work shall be completed prior to commencing new work and no excavations of the bank or streambed shall be left open to flow. Equipment shall access designated ramps closest to work and sequence work to minimize driving on the stream bed.

All equipment shall be cleaned prior to being on-site to minimize potential for spreading of invasive species. Equipment shall be power-sprayed and free of weeds, soil and untreated water. If any equipment being used for the Project has been previously working in another stream, river, lake, pond or wetland, one of the following disinfection practices is necessary prior to construction to prevent the spread of whirling disease, New Zealand mud snails, zebra mussels, didymosphenia, and other aquatic hitchhikers. These practices are also necessary after project completion, prior to the equipment being used in another stream, river, lake, pond, or wetland, for the same purpose:

Offsite, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) and spray/soak equipment in a 1:15 solution of Sparquat institutional cleaner and water. Keep equipment moist for at least 10 minutes; or

Offsite, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) and spray/soak equipment with water greater than 140 degrees Fahrenheit for at least 10 minutes.

The excavators and backhoes may need to be cleaned on site to remove excess native sediments stuck to the track or hoes. Sediments that are removed with a shovel shall be placed in designated clean fill material storage areas. Sediments removed with clean water shall be washed into the dewatering area. All dewatering areas shall have erosion control logs, or equivalent, staked at flow lines before discharge into city curb gutters.

3.05 IN-CHANNEL CONSTRUCTION

The CONTRACTOR shall time in-channel and open bank excavation work to be completed prior to **DECEMBER 1st, 2026**. The CONTRACTOR shall coordinate with the Division of Wildlife Resources on time extensions and install other necessary BMPs required to minimize turbidity transported downstream. The CONTRACTOR shall be responsible to plan accordingly and monitor the weather forecast to anticipate for storm events. No work shall be partially completed that would be subjected to high flow, approximately greater than 500 cfs. Table 3.1 below provides the approximate existing Water Surface Elevations for anticipated flows at the location of the Project where work will involve the Weber channel and banks.

Water Surface Elevations (WSEL) are based on limited survey and two-dimensional hydraulic modeling. Actual WSELs in the field may vary from those listed herein. Approximate WSELs are provided herein solely for the information of the CONTRACTOR.

Water Surface Elevations may be affected to an unknown degree with temporary flow obstructions of equipment, coffers, temporary alluvium placement or other construction activities. The CONTRACTOR is wholly responsible for monitoring and controlling WSELs during construction and any associated erosion, flooding, structure integrity or environmental damage.

Base flows are typically between 50-150 cfs during the construction period (50% Exceedance), however storm flow events exceeding the 150cfs maximum may occur. Real-time Streamflow gage information is available for the Weber River at the project site and should be used to monitor and predict river flow rates during construction.

https://waterdata.usgs.gov/nwis/inventory/?site_no=10137000&agency_cd=USGS

The CONTRACTOR is wholly responsible for monitoring storm events, snow accumulation, and temperature to anticipate for high flow events.

Table 3.1 Existing Water Surface Elevations

Flowrate (cfs)	WSE Upstream of Existing Dam (ft El NAVD-88)
50	4281.07
150	4281.44
227	4281.51
450	4282.1
1000	4282.90
1500	4283.50

3.06 OIL BOOM

An adequate number of oil booms, PS-8W-S12G, manufactured by SPC (http://www.sorbentproducts.com), or equivalent, shall be placed in a designated stockpile location onsite, visible and unobstructed at all times. Any spills shall be contained and cleaned by the CONTRACTOR. Oil booms shall be installed at the downstream end of the Project Limits, and at all times when equipment is working in or adjacent to flowing waters. Velocities of the Weber River likely require Oil Booms to be installed in backwaters during channel diversions. All Booms shall be replaced as needed, approximately weekly, with new Oil Booms.

3.07 PERMEABLE TURBIDITY BARRIER

River bank excavations open to the flow shall have Permeable (Non-Woven, Medium Weight Geotextile) Turbidity Curtains isolating all bank excavations from the Weber River (See Drawing Detail). Silt master Turbidity Curtain Type II by Parker Systems, www.parkersystemsinc.com, or equivalent.

3.08 TEMPORARY DIVERSION STRUCTURES

Control of the River stage and associated erosion during construction is wholly the responsibility of the CONTRACTOR. Installation of in-channel Concrete Ramps will require Temporary Coffer Dam structures; however, boulders and grading of clean native alluvium may be performed in the wet channel. The CONTRACTOR is responsible for installing and maintaining all temporary flow diversion structures and coffer dams. It is the responsibility of the CONTRACTOR to design and implement any isolation and dewatering measures. The project plans provide an alternative means, methods, and materials for coffer dam construction for CONTRACTOR's reference. However, the CONTRACTOR shall be wholly responsible for designing, implementing and maintaining the final in-channel work isolation plan.

In addition to controlling the variable stage of the river, seepage and ground water will likely require additional control methods such as pumping, sand bagging, impermeable membranes and jersey barriers. The CONTRACTOR shall be wholly responsible for the selection of suitable method(s), and for design, installation, and operation of the diversion and Care Of Water required during the performance of the work under these specifications. The CONTRACTOR is required to design and install adequate diversion and Care Of Water facilities in a timely fashion in accordance with his/her schedule of construction and the requirements of these specifications. All means, methods, and materials used for work area isolation and for the care of on-site waters shall be included in the Care of Water (COW) Plan submitted by the CONTRACTOR.

Areas disturbed for diversion practices shall be restored and stabilized to pre project conditions. Failure of the CONTRACTOR to become adequately familiar with and address the existing structures, access and river conditions which impact the work may result in unnecessary construction delays and associated increased efforts for which the CONTRACTOR shall be solely responsible.

Pumping and returning of coffered water may require a dewatering permit from the UDEQ and is wholly the responsibility of the CONTRACTOR. The CONTRACTOR shall be responsible for monitoring the

turbidity within the Weber River and notifying the Utah Department of Wildlife Resources (DWR) of potential impacts to water quality.

3.09 FILTERING OF PUMPED WATER

Pumping of groundwater or surface water may occur during construction. Any pumped water being returned to the main flow of the river, without sufficient detention, shall first be processed through a filter. The filter may be a GEOTUBE by US Fabrics or equivalent. Flows exiting the detention or filter systems shall be controlled to prevent erosion and shall be observed and cared for the entire course to the river. Dewatering permits may be required. It is the responsibility of the CONTRACTOR to obtain construction permits.

3.10 STRAW BALES

Meet or Exceed APWA 2025 Standard Plan No. 121 or as modified herein.

Bales shall be certified "Weed-Free" and not hay bales. Bales shall be secured with wood or metal stakes driven 2 feet into ground. 4 inches of 3 inch minus washed gravel shall be placed on the up-gradient toe of the bales. Bales can be removed when vegetation is in place.

3.11 STRAW WATTLES

Straw Wattles (Wattles) shall be certified "Weed-Free" and in sound new condition. Temporary Wattles are to be removed within one year of installation. Any non-temporary Wattles shall be fully biodegradable and have Burlap or Jute fabric netting. Wattles shall be installed in an approximately 2" – 3" deep rounded trench. Spoils from the excavated trench should be deposited and "Knifed In" on the up-hill side of the Wattle to direct flow into the Wattle and prevent under-cutting. Ends should overlap by 1'. Wattles shall be staked at approximately 4' o.c. and at every end with 1" width 16" long wood stakes.

3.12 SILT FENCE

Meet or Exceed APWA 2025 Standard Plan No. 122 or as modified herein.

Silt Fences shall be placed to contain construction activities on land. Silt Fence shall be constructed with 6oz. non-woven Geotextile or equivalent, with a 6 inch by 6 inch anchor trench up-grade (i.e. uphill) of the fence line and fence posts in 6 ft centers. The anchor trench shall be backfilled to existing grade with native material sufficiently tamped or compacted to prevent flow from migrating under the silt fence.

3.13 EROSION CONTROL LOGS

The CONTRACTOR may choose to place Erosion Control logs at drainage exits for Staging Area, Stormwater Inlets, Dewatering Activities, and Channel Access Roads in place of Straw Bales. Erosion Control Logs of 8 inches in diameter and staked every 1 foot on center.

3.14 STORM INLETS

Meet or Exceed APWA 2025 Standard Plan No. 124.1 – 124.3 or as modified herein.

All storm water inlets shall have 6" gravel or bark filled wattles, or an equivalent BMP that is adequate to

prevent sediment or containment loading.

3.15 OVERLAND FLOW

Meet or Exceed APWA 2025 Standard Plan No. 123 or as modified herein.

All bank excavations shall have adequate BMP's to prevent overland flow from eroding the disturbed soils.

3.16 REMOVAL OF BMPs

Any non-erosion control BMPs (including trash bins, material storage areas, and sanitary toilets) shall be removed immediately after construction activities are complete at the staging area. All Erosion and Sediment Control measures are to remain in place until the establishment of vegetation. All non-biodegradable BMPs are the property of the Contractor. Any non- biodegradable BMPs shall be removed after vegetation has established at least 85% cover (approximately 1 year).

3.17 RIPARIAN PROTECTION

Any and all riparian areas and riparian vegetation outside of the limits of excavation shall be Protected In Place. No construction supplies, fuels nor oils shall be stored in riparian areas, no vehicles nor heavy equipment shall be allowed into riparian areas other than the designated channel access sites. No discharge of any materials shall be allowed into any riparian areas. Riparian areas shall be traversed only by foot and leak free hoses may cross riparian vegetation. Any incidentally disturbed riparian areas shall be restored to better than pre-construction conditions.

3.18 ENVIRONMENTAL PROTECTION

The construction site shall be maintained to minimize dust, noise, erosion, and water ponding. Any and all fuel operated equipment near or within drainage areas, wetlands, riparian areas or open water areas shall be leak-free and in excellent operational condition. The CONTRACTOR is wholly responsible for any environmental damage directly or indirectly related to storage of supplies and equipment, equipment operation, any fluid spills or any other construction activities.

3.19 BARRIERS

The CONTRACTOR shall furnish, install and maintain suitable barriers, as required to prevent public entry, and to protect the work, facilities, trees and wetland areas from any associated construction activities. Remove temporary barriers at the completion of work.

3.20 DISTURBED AREA SEEDING

After all other construction activities are completed; all disturbed areas are to be rehabilitated to pre-construction conditions. Clean the site of trash and debris and remove all construction measures, equipment and supplies. Permanent riparian plantings and seeding shall be installed immediately after the final design grades are achieved, but no later than 14 days after construction activities have permanently ceased at the disturbed area.

3.21 PROJECT SITE REHABILITATION

CONTRACTOR shall seed and plant in the early spring to take advantage of the cool weather and moist conditions. The CONTRACTOR may need to provide temporary water for adequate establishment of all

seeding and container plantings. The CONTRACTOR may need to use a water truck to periodically water and establish plants for site restoration.

3.22 CULTURAL RESOURCES

The project area has been disturbed by bank construction, diversion and irrigation systems, trail and railroad alignments, multiple utilities, and is within the main channel of the Weber River. No cultural resources are anticipated to be impacted by the project. If potential cultural resources in the project area are discovered during construction and cannot be avoided, CONTRACTOR shall suspend construction activities in that area until the properties can be evaluated for listing in the National Register of Historic Places in consultation with Utah State Historical Preservation Office. The CONTRACTOR shall notify the ENGINEER and OWNER immediately if potential cultural resources are discovered during construction.

END OF SECTION

SECTION 4

* This section is intentionally left blank.

SECTION 5 IN-CHANNEL AND BANK CONSTRUCTION

5.01 CONSTRUCTION OF IN-CHANNEL BOULDER MATRIX STRUCTURES

All Boulder Structures constructed In-Channel or below the Ordinary High-Water Line (OHWL) shall be constructed with Footer Rocks and Keying Techniques (See Drawing Details). Construction of Boulder Structures shall include rotation, placement and adjustment of each individual rock to minimize void spaces and maximize interlocking of boulders. The ENGINEER shall identify each imported boulder that may affect surface flow and observe the placement of marked boulder.

Boulder Structures shall be constructed by placing individual boulders in designed cross-sections of the channel. Each cross-section has specific elevations and alignments for the placement of rock as shown on the Project Drawings. Each structure shall include footer boulders placed at least to the depth shown on Project Drawings. Stacked boulders shall have a minimum 0.5:1 horizontal to vertical slope with the footer offset in the downstream direction when buried and footer offset in all directions when exposed.

Each individual boulder shall be set with the “B” axis in the direction of flow when exposed or the “A” or “B” axis when the boulder is interlocked between other boulders (See Drawing Details). See table 5.1 for gradation details.

5.02 CONSTRUCTION OF BOULDER TERRACING STRUCTURES

Boulder Terracing shall be constructed by placing individual boulders in designed sections of the bank. Each boulder shall include selection, rotation, placement and adjustment of each individual rock to minimize void spaces and maximize interlocking of boulders. Each section has specific elevations and

alignments for the placement of rock as well as spot elevations as shown on the Project Drawings. Each Surface Boulder shall include footer boulders placed at least to depth shown on Project Drawings and placed on 8oz Filter Fabric. Filter Fabric shall not be torn or ripped and preventative measures such as 6 inches of native alluvium bedding material shall be used. See table 5.1 for boulder gradation details.

5.03 FILTER FABRIC SPECIFICATION

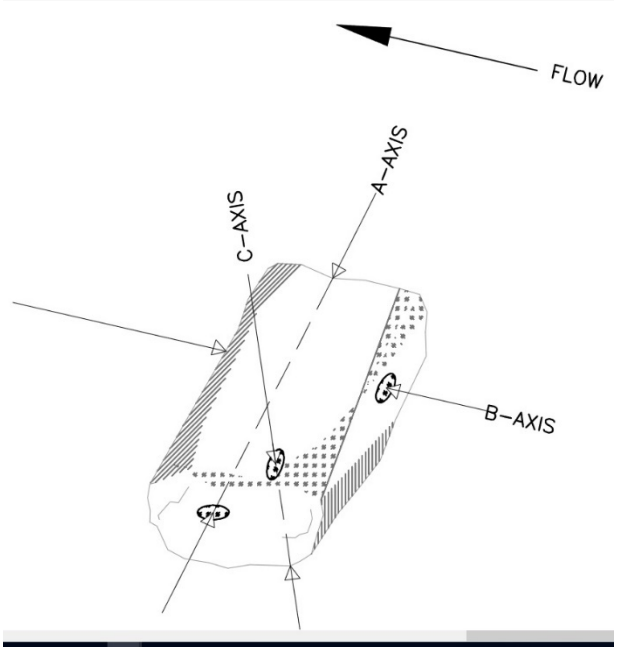
An undamaged Filter Fabric with Geo-Composite shall underlay all Exposed earthen embankment materials. Filter Fabric shall be placed to eliminate migration of fines through the boulder structures and allow water to drain from structure. A composite that provides drainage, Hydrodrain 300 by, or approved equivalent shall be used at a minimum of 4 feet width on 10 feet center (approximately 40% of total Filter Fabric coverage). An acceptable non-woven 8oz Filter Fabric, Mirafi 180N or equivalent, may be used for the bank coverage not overlaid by drainage. Filter Fabric shall be placed to have intimate contact with undisturbed bank material. Washed Gravel bedding may be used to protect Filter Fabric from damage during boulder placement.

5.04 IMPORTED BOULDERS SPECIFICATION

Imported Boulders may be quarried or excavated and generally smooth in shape with the largest rock faces being approximately flat. Boulders shall be of a consistent material for the entire project and shall be a color that is aesthetically neutral with the native landscape. Boulder gradations shall conform to Table 5.1 by number, and measurement of the intermediate axis ("B"-Axis). The minor axis (shortest dimension or "C"-Axis) shall not be less than indicated in Table 5.1.

Table 5.1 B-Axis Rock Gradations (Inches)

Percent of Stones	Indicator	24 inch	30 inch	36 inch	48 inch	72 inch
< 10%	Greater	36	42	48	60	84
> 75%	Between	32&18	36&24	42&30	54&36	78&60
0%	Less	15	24	21	28	48
C-Axis	Greater	12	16	18	24	36



Imported Boulders shall consist of hard, dense durable stone, resistant to weathering. Surface stones must have an aesthetic neutral color. Stone shall be suitable for incidental human contact. CONTRACTOR shall submit source information and samples to ENGINEER. The ENGINEER shall approve or reject Boulder material. Granitic and Basaltic boulders subjected to weathering such as glacial or alluvial flows will be preferred.

The Engineer may require Contractor to furnish laboratory results if, in the Engineer's opinion, the material is marginal or unacceptable. At the request of the Engineer, the Contractor shall furnish laboratory test results indicating that the material meet the requirements including those for abrasion resistance and soundness as indicated below:

- **a.** Boulders shall have a minimum specific gravity of 2.65.
- **b.** Abrasion resistance by Los Angeles Machine; Test Method ASTM C535; Specification Requirement: 15% loss, maximum.
- **c.** Soundness by use of Sodium/Magnesium Sulfate, Test Method ASTM D5240-04 Standard Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate; Specification Requirement: 5% loss, maximum.
- **d.** Soundness by Freezing and Thawing, Test Method ASTM D5312-04 Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions; Specification Requirement: 5% loss, maximum.

5.05 COBBLE/GRAVEL ALLUVIUM MATERIAL

Bank Run Alluvium shall be well-graded and consist of clean, hard, durable, weathered material, S.G. > 2.50. Material may be excavated directly from an alluvial or glacial deposit and selectively sorted. Required gradations are presented in table 5.2.
Materials shall meet the following specification requirements:

- **a.** Minimum specific gravity of 2.50.

b. Abrasion resistance by Los Angeles Machine; Test Method ASTM C535; Specification Requirement: 28% loss, maximum.

c. Soundness by use of Sodium/Magnesium Sulfate, Test Method ASTM D5240-04 Standard Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate; Specification Requirement: 10% loss, maximum.

d. Soundness by Freezing and Thawing, Test Method ASTM D5312-04 Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions; Specification Requirement: 10% loss, maximum.

Table 5.2 Gradations for well graded Bank Run Alluvium

Weight	Indicator	24 inch minus (Cobble/Boulder)	12 inch minus (Gravel/Cobble)	3 inch minus
100%	Passing	24”	12”	3” (Gravel)
70%-95%	Passing	15”	8”	2”
60%-80%	Passing	8”	5”	-
40%-70%	Passing	5”	2.5”	1”
30%-50%	Passing	2.5”	1”	1/2”
20%-40%	Passing	1”	3/4”	1/4"
10%-30%	Passing	3/4”	1/2"	No. 4
0%-20%	Passing	1/2"	1/4"	No. 20
0%-5%	Passing	No. 4	No. 20	No. 200
5%-30%	Retained	15”	8”	2”
20%-40%	Retained	8”	6”	-
30%-60%	Retained	5”	2.5”	1”
50%-70%	Retained	2.5”	1”	½”
60%-80%	Retained	1”	¾”	¼”-
70%-90%	Retained	¾”	½”	No. 4
80%-100%	Retained	½”	¼”	No. 20
95%-100%	Retained	No.4	No.20	No. 200
	D_{85}	18”	8”	2.5”
	D_{50}	3”-6”	2”-3”	½”-1”
	D_{30}	¼”-3”	¼”-2”	¼”-1/2”

Bank Run Alluvium Material 24 inch minus gradation

5.06 RIPRAP MATERIAL

Riprap Material shall consist of clean, hard, durable, well graded material, S.G. > 2.50. Coarse Alluvium may be screened or crushed material. Unless specified in drawings, gradation shall match the 24 inch minus defined in table 5.3. Materials shall meet the following specification requirements:

- **a.** Minimum specific gravity of 2.55.
- **b.** Abrasion resistance by Los Angeles Machine; Test Method ASTM C535; Specification Requirement: 28% loss, maximum.
- **c.** Soundness by use of Sodium/Magnesium Sulfate, Test Method ASTM D5240-04 Standard Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate; Specification Requirement: 10% loss, maximum.

d. Soundness by Freezing and Thawing, Test Method ASTM D5312-04 Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions; Specification Requirement: 10% loss, maximum.

Table 5.3 Riprap Material Gradations (inches)

Weight	Indicator	24”	18”
100%	Passing	36”	24”
35%-65%	Passing	24”	18”
10%-30%	Passing	6”	5”
0%-5%	Passing	1”	3/4”

24 inch riprap gradation example

5.06.01 Riprap Placement

Riprap should be placed from the bottom working toward the top of the slope so that rolling and/or segregation does not occur. Riprap should be placed to the required thickness in one lift. Riprap may be placed from either land-based or water-based operations and can be placed under water or in the dry. Special-purpose equipment such as clamshells, orange-peel grapples, or hydraulic excavators (often equipped with a "thumb") should be used to place riprap.

Riprap Placement on Geotextiles: Riprap should be placed over the geotextile by methods that do not stretch, tear, puncture, or reposition the fabric. Equipment should be operated to minimize the drop

height of the stone without the equipment contacting and damaging the geotextile. Generally, this will be about 1 foot of drop from the bucket to the placement surface (ASTM Standard D 6825). When the preferred equipment cannot be utilized, a bedding layer of coarse granular material on top of the geotextile can serve as a cushion to protect the geotextile. Material comprising the bedding layer must be more permeable than the geotextile to prevent uplift pressures from developing.

Riprap Placement Under Water: Riprap placed in water requires close observation and increased quality control to ensure a continuous well-graded uniform rock layer of the required thickness (ASTM Standard D6825). A systematic process for placing and continuous monitoring to verify the quantity and layer thickness is important.

5.07 CRUSHER FINES SCREENINGS

Crusher Fines Screenings shall consist of clean, hard, durable particles or fragments of 3/8 inch minus select brown crushed granite or basalt. Fines shall be evenly mixed throughout the aggregate.

a. When produced from gravel, fifty percent (50%) by weight, of the material retained on a Number four (4) sieve shall have one fractured face.
b. The portion retained on the Number four (4) sieve shall have a maximum percentage of wear of fifty (50) at five hundred (500) revolutions as determined by AASHTO T96-77.
c. The portion passing a Number forty (40) sieve shall have a maximum liquid limit of twenty-five (25) and a maximum plasticity index of seven (7), as determined by AASHTO T89-81, respectively.
d. The crushed aggregate screenings shall be free from clay lumps, vegetative matter, and deleterious material.

Grading requirements are as follows:

1. Percentage of Weight Passing a Square Mesh Sieve
2. AASHTO T11-82 and T27-82

Sieve Designation	Percent Passing	Sieve Designation	Percent Passing
3/8 inch	100	No. 30	40 - 50
No. 4	95 - 100	No. 50	25 - 35
No. 8	75 - 80	No. 100	20 - 25
No. 16	55 - 65	No. 200	5 - 15

5.08 SLABSTONE STEPS

CONTRACTOR shall level, fit and stack individual slabs to maximize aesthetic value of finished wall face, seating surfaces and steps. Slabs shall be stacked with a minimum of 12” of intimate contact between successive slabs for terracing.

Figure 4.3. Slabstone terracing example

5.09 SLABSTONE SPECIFICATION

Slabstone shall consist of hard, dense durable stone, resistant to weathering. CONTRACTOR shall submit source information and samples to ENGINEER prior to delivery. Material may be approved by the ENGINEER if, by visual inspection, the material is determined to be suitable, sound and durable. The ENGINEER may require CONTRACTOR to furnish laboratory results if, in the ENGINEER'S opinion, the material is marginal or unacceptable. At the request of the ENGINEER, the CONTRACTOR shall furnish laboratory test results indicating that the material meets the requirements including those for abrasion resistance and soundness.

---Minimum specific gravity of 2.40.

---Abrasion resistance by Los Angeles Machine; Test Method ASTM C535; Specification Requirement: 30% loss, maximum.

--Soundness by use of Sodium/Magnesium Sulfate, Test Method ASTM D5240-04 Standard Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate; Specification Requirement: 10% loss, maximum.

--Soundness by Freezing and Thawing, Test Method ASTM D5312-04 Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions; Specification Requirement: 10% loss, maximum.

Surface stones must have an aesthetic, neutral color unless otherwise specified in drawings. Stone shall be suitable for incidental human contact. Steps shall be constructed of natural stone slabs with dimensions per Table 5.1. Stones shall be generally flat and slab like.

Figure 4.4. Slabstone representative image

Table 5.1. Slabstone Material Dimensions and Variances (inches)

Face	Indicator	Min	Max	Avg	Variance %
Thickness	Between	8	16	8	20
Length	Between	48	192	96	100

5.10 FILTER FABRIC SPECIFICATION

An undamaged non-woven geotextile Filter Fabric shall overlay any exposed earthen embankment materials to be faced with more coarse materials. Filter Fabric shall be placed to eliminate migration of fines through the boulder structures and allow water to drain from structure. An acceptable non-woven 8oz filter fabric, Mirafi 180N or equivalent, may be used for the ramp subgrade and the boulder and slabstone embankments. Filter Fabric shall be placed to have intimate contact compacted subgrade material. Washed Gravel bedding or native alluvium may be used to protect Filter Fabric from damage during Geoweb panel placement. An acceptable non-woven 8oz Filter Fabric, Mirafi 180N or equivalent, may be used for the bank coverage overlain by boulder. Filter Fabric shall be placed to have intimate contact with intact bank material. Washed Gravel bedding may be used to protect Filter Fabric from damage during boulder placement.

Figure 4.5. Filter fabric installation example

5.11 DRAINAGE MAT

Drainage mat shall be Hydrotech USA's **Hydrodrain 1000** or approved equivalent. CONTRACTOR shall submit material specification for the chosen drainage to ENGINEER for approval. It shall be installed at 100 coverage beneath the slabstone steps as shown in the plans. Install per manufacturers recommendations.

5.12 PERFORMANCE CRITERIA OF WHITEWATER AND ENGINEERED RIFFLE STRUCTURES

a. For post-project conditions, the water surface elevations above and between the hydraulic structures are critical to the success of the project.
b. The ENGINEER will verify performance of the structures by measuring water surface elevations through the project reach.
c. Adjustments to the structures' configurations may be required if the performance criteria is outside of the acceptable tolerance. These adjustments will primary consist of realigning/reconfiguring Gates operations and boulders along the crest of each structure.
d. These adjustments will be made at no additional cost to the OWNER or ENGINEER.

END OF SECTION

SECTION 6 CONSTRUCTION OF CONCRETE STRUCTURES

6.01 GENERAL

The following specifications, standards and codes shall govern the construction of any and all concrete structures, where applicable, with modifications as specified on structural drawings.

6.02 PNEUMATIC GATE SYSTEM

Section 01100, which is not a Standard Specification, is included in this Project by Special Provision. The Pneumatic Gate System (System) is specified herein as required performance of the system. The System shall be Obermeyer Hydro, Inc or an approved equivalent.

Description

The Pneumatic Gate System (System) is comprised of 4 major sub systems.

1) **Control System**
2) **Control Building**
3) **Pneumatic Gate System**
4) **Air Supply System**

01100.01 Control System Description: The control system shall be configured to control water level above each set of gates along the two drops. Three (3) pressure transducers shall be mounted in stilling wells located in each of the three pools, one located in the tail water below the Lower drop (**PT-TW3 in Pool 3**), one located in the pool between the two drops (**PT-W2 in Pool 2**), and one located above the Upper drop (**PT-W1 in Pool 1**). Input from these transducers shall be used to control the flow of air into and exhausted from the flow control bladders in accordance with table 1. At least two (2) master programs with at least four (4) sub routines, are required. Master programs can be seasonal programs (high and low flows) and would include target elevations for the upstream and pool water levels during those seasons. The sub-routines would be for up to 4 different flow ranges. Master program and sub-routine would be read two times a day. Gates would be continuously adjusted under a sub-routine to limit significant fluctuations in water surfaces.

Each airline shall be connected to a pressure transducer providing pressure information for each air supply line. Provide surveyed project elevation datum accurate to 0.01’ all pressure transducers and inclinometers. Provide Benchmark bronze monument in left abutment top of wall. This information is an indication of the position of the gate and can trigger an alarm if pressure cannot be maintained without adding more air, which may indicate a leak in the air supply line.

The control system includes:

a) **Control**
b) **Air Control Cabinet and Human Machine Interface (HMI)**
c) **Internet connectivity and LAN.**
d) **Telemetry and Conduit**
e) **Web Camera**

Controls: Pressure Transducer Industrial Submersible Pressure Transducer, 700 Series by Pressure Systems Inc., titanium wetted materials or approved equivalent. Affixed in stilling wells per drawings.

a. Static Accuracy +or- 0.05 % FSO BFSL
b. Pressure Range: 0-120 inches of water.
c. Self-sealing submersible “Kevlar Strength” polyurethane jacketed cable with polyethylene vent tube, 90 kilogram pull strength, 22 AWG conductors.

PLC shall be a Square D, M340 PLC, or approved equal with remote I/O based on Ethernet/IP.

d. Control system components shall be non-proprietary and readily available.
e. Provide internet connectivity

- Perform control system programming and testing to assure proper operation.
- Provide control system documentation in accordance with ISA Standards.

Internet connectivity provide 100 mb speed or greater.

a. Static I.P. address and gateway shall be provided to the Control Building by Owner.
b. Provide ethernet secure login to PLC (non-critical infrastructure) with Multi Factor Authentication over internet and remote viewing and operation of gates and water levels.
c. Provide secured remote access (WiFi or Bluetooth) Local Area Network (LAN) to the control system reliably operated within 300 feet of the control house in dense forest.
d. Provide a LAN portable HMI or laptop with software and programing to control system remotely within 300 feet.

Telemetry and Conduit.

To be used for routing telemetry lines from Control Building to junction box use HDPE Pipe of suitable diameter to pull all lines with 20lbs force. Material shall be PE 3408/PE100 high-density polyethylene meeting cell classification 345564 and 345566 per ASTM D3350; and shall be listed in PPI (Plastics Pipe Institute TR-4 with standard grade HDB ratings of 1600 psi at 73°F, and 1000 psi at 140° F. The material shall also be listed in the same PPI document as a PE100. Materials shall be stabilized against ultraviolet deterioration and shall be suitable for unprotected outdoor storage for at least four (4) years. The pipe shall be DR 11 wall thickness, and shall be manufactured and tested in accordance with the latest addition of ASTM D 2513.

For routing telemetry from Control Building to Stilling Well use galvanized steel schedule 40

pipe with threaded fittings.

Bury all telemetry conduit minimum 18 inches sub grade. Prune roots per specifications . Survey as-built of telemetry top of conduits.

Web Camera (2):
Provide foundation mount and conduit. City to provide pole. Install pole. City to install telemetry and camera.

(a) Control Gates and Pressure Transducers: The position of the gates may be controlled by the other transducers in accordance with Table 1.

- Automatic control will proceed in the following steps:
    - Read date and time and determine master program (Low, medium, high flow - read tail water if less than 4280.6 then set pool 2 to 4280.6 elevation and set pool 1 to 4282 elevation. If greater than 4282.2 then keep pool 2 above 4282.2 elevation and keep pool 1 below 4285.3 elevation)
    - Continuous reading of tail water elevation from the PT-TW3 pressure transducer and calculate River Flow Rate. The flow rate will determine which program sub-routine needs to run.
    - Based on flow rate, the W2-1,2 and 4 gates as well as W3-1 and 2 gates will be raised or lowered, by a specified length of time, at the head of upper drop.
    - Based on flow rate sub-routine, the W4 gates will be adjusted until the Pool water surface elevation minimum is reached at PT-W2.
    - Read W 1-1, 2 and 3 steel gates and adjust whitewater hydraulics per sub-routine.

TABLE 1	
GATE NUMBER	CONTROLING PRESSURE TRANSDUCER
W1-1	PT-W1&2
W1-2	PT-W1&2
W1-3	PT-W1&2
W2-1	PT-W1&2
W2-2	PT-W1&2
W2-3	PT-W1&2
W2-4	PT-W1&2
W3-1	PT-W1&2
W3-2	PT-W1&2
W4-1	PT-W2&3
W4-2	PT-W2&3
W4-3	PT-W2&3
W4-4	PT-W2&3
W4-5	PT-W2&3
W4-6	PT-W2&3

01100.12 Control Building - The control building structure shall be a fire-resistive construction, reinforced concrete, welded steel or masonry construction to meet drawing requirements of plan. The structure must comply with all local, state and federal codes and requirements for enclosed spaces.

Control Building Includes:

a. Building and Foundation
b. Power Supply and Protection
c. Enclosed Space Access

(a) Building: 10.5 X 20 Schweitzer & Utility | CXT Precast Concrete Buildings or equivalent to be provided by Owner to stockpile area onsite. Provide foundation per manufacturers specifications. Install per manufacturers specifications.

(b) Pull box: furnish and install locking concrete flatwall pull box 3'X5'X4' or similar to transition airlines and telemetry sweeps from control building to trench as necessary.

(c) **Power** - The Control Building shall have a three phase (IR R7.5I-115 10HP- 480/230 - volt) power supply. The compressor building shall have a 120 volt power supply for other equipment. Fused disconnects are required outside the building where all power to the building can be secured and locked out. All electrical components must be approved by the City prior to installation. The structural drawings revisions submittal shall show penetrations, seals and anchors for all equipment including and support under compressor operating conditions.
Provide electrical trench and wiring from W Stockman Way; approximately 650 feet. Install per City and Electrical Company codes and requirements. Provide survey of buried lines. Provide **meter mounted on building. Provide 200 Amp electrical panel mounted inside of building.**

(d) **Access** - Utility Building shall have at least one locking double door or rolling with intrusion alarm. Equipment must be dimensioned and positioned to allow for access and removal of all equipment in the building, including lifting equipment.

(e) **Lighting** - Provide adequate lighting with average 30 foot candle illumination being provided; Furnish fluorescent lighting with heavy gauge, all steel housing and positive locking stainless-steel framed and gasketed enclosure. Additional localized lighting may serve instruments, control panels, gauges and other devices routinely used to control station operation. Convenience outlets may be provided for use by maintenance personnel. Emergency lighting with battery backup must also be provided.

(f) **Environmental Systems:**

- Heating and cooling shall be provided to prevent damage to equipment by condensation and to provide comfort for operating personnel. Air conditioning shall be provided to prevent damage to instruments and controls from high humidity. Temperature shall be maintained in the range of 55 to 85 degrees F.
- Positive ventilation shall be provided per confined space requirements. The fans shall be mounted so as to exhaust air as near the building roof as practical. The fan's capacity shall provide adequate volume to produce one (1) air change every three (3) minutes. The ventilation system shall have its own breaker and shall start with a signal generated when the door opens.

- **Direct exhaust heat from compressor to outside through building penetration and seal exhaust outlet.**

(g) Lightening Arrestor - These shall be motor savers adequately sized to the compressor motors.

(h) Electric Wiring - Electric wiring, equipment, piping and valves must be properly labeled and identified (wire numbers according to related schematic drawings.)

(i) Corrosion Protection:

- All steel structures above ordinary high water line shall be sandblasted after welding is complete and the prime coating operation shall take place immediately after surface preparation. The prime coat shall be durable, chemical resistant, and shall be followed by two (2) applications of finishing enamel. Follow coating manufacturer's recommendations. Submit complete coating spec to the Engineer for approval. The manufacturer shall provide packaged magnesium anodes for cathodic protection. The anodes shall be buried equally spaced around the station and be connected by heavy copper wire.
- All corrosion protection devices shall follow NACE guidelines.
- The homage of each anode ground bed shall not exceed 30 ohms each, with current flow limited to that required for cathodic protection.

The control building will be installed according to the manufacturer's recommendations. All equipment and hardware contained within the building will be installed per manufacturer's recommendation and as shown on plans.

(a) Layout –

- Prior to placement of building, a properly prepared sub-base shall be provided.
- Sub-base consists of 3/4" minus crushed rock (road base material) compacted to 95% of optimum density in accordance with the ASTM D 1557.
- Finished surface of sub-base shall be flat and leveled, with a maximum deviation of -1/2", +0" From a true horizontal plane.
- The site shall be graded to extend sub-base to frost depth (3 feet in Ogden). Verify native Subgrade shall have a bearing capacity of at least 1500 PSF. Sub-base shall extend 2 feet outside the building's perimeter.
- Roadway access for maintenance vehicles shall be provided.
- Equipment layouts must provide vertical and horizontal clearances and access openings for maintenance and repair operations.
- Main aisles shall be 4 feet minimum clear width.
- Clearance around all electric panels and equipment shall meet the requirements of the national electric code.
- Floors shall slope to floor drains and a drainage sump which shall be equipped with a sump pump, or drain pipe (2.5 inch Sch 40 pvc) at least - 0.5% to daylight .

(b) Final Grade and Landscaping:

- Fill so that finished grade elevation drains away from slab elevation (above XXX) at 1%.
- Landscaping vegetation shall not interfere with entrance, and egress of the compressor building, including lifting equipment.

01100.13 Pneumatic gate system: shall be manufactured by Obermeyer Hydro Inc, or approved equal.
Pneumatic Gate System includes:

a. Steel Gates and Abutment Plates
b. Air Bladders and connections
c. Anchor Bolts

(a) Steel Gates – All steel structures and attachments below ordinary high water line shall be stainless steel of highest grade suitable for the long-term corrosion resistance in the river environment. Each gate panel shall be individually actuated and act as a movable, rigid barrier to the flow of water. The gate panels attach along the upstream edge of a hinge flap molded in with the air bladder. The gate and bladder system are anchored to the gate slab with the main anchor bolts. Drawings specify lowest gate elevation and highest gate elevation. Tolerance for open gate elevation is +.01' to -.04'. Gate manufacturer shall specify final gate slab elevation or block out dimensions. Tolerance for closed gate elevation is +0.20 to -0.01'.

(b) Air Bladders - Each air bladder or rubber rock shall be individually actuated and act as a movable, rigid barrier to the flow of water. The air bladder and hinge flap rest on top and on the front of the Gate slab and are held in place by Clamp Bars that mount to the front of the slab. When inflated the Air Bladder imparts upward and upstream force on steel gate panels which impound water. For "rubber rocks" the bladder itself impounds water. Follow manufacturer's instruction when installing gates and bladders.

(c) Air Bladder Connection - the air system is connected to the underside of the Air Bladders by a threaded fitting and ½" flexible rubber air hose (submit product information) which stores beneath the bladder in a concrete block out.

(d) Abutment Plates Heated abutment plates not required.

(e) Anchor Bolts shall be fully antiseeze to prevent galling during installation

(f) All Abutment Seals, and all main anchor assembly, and all bumpers shall be generally flush and contiguous with no significant hooks, ledges or entrapments that may catch debris, leashes or body parts.

Pneumatic gate system: shall be manufactured by Obermeyer Hydro Inc, or approved equal.
Air Supply System includes:

a. Air Compressor and Vacuum Assist
b. Low Pressure Air Lines
c. High Pressure Lines

d. Valves and Mechanical Controls

(g) Air Compressor – Air compressor shall be capable of filling the air bladders of all 25 connections in 30 minutes or less. Ingersoll Rand IR R7.5I-115 10HP Air Compressor with integrated Air Dryer & tank or approved equal. Total Package Input Power at rated capacity and full operation pressure is equal to 10.72 kW. Submit complete technical specifications including, installation and testing procedure, maintenance schedule and procedure, and spare parts list.

- Air Dryer: Integrated with the Air Compressor - submit product specifications and maintenance instructions.
- Air Filters shall be installed to remove contaminants. Submit product and maintenance information. Both general purpose- 1 micron- and HE filter-.01 micron filters shall be provided.
- Compressor heat exhaust shall be routed to outside of building.

(h) Vacuum Assist: Provide vacuum assist to help evacuate at least half of rubber rock bladders in 60 minutes or less when required.

01100.13 Low Pressure Air Lines: HDPE Pipe Material shall be PE 3408/PE100 high-density polyethylene meeting cell classification 345564 and 345566 per ASTM D3350; and shall be listed in PPI (Plastics Pipe Institute TR-4 with standard grade HDB ratings of 1600 psi at 73°F, and 1000 psi at 140° F. The material shall also be listed in the same PPI document as a PE100. Materials shall be stabilized against ultraviolet deterioration and shall be suitable for unprotected outdoor storage for at least four (4) years. The pipe shall be DR 9 wall thickness, and shall be manufactured and tested in accordance with the latest addition of ASTM D 2513. Air supply lines to each gate will be 1” diameter, and purge lines will be ½” in diameter. Low pressure air lines shall be continuous between junction boxes with no fittings. Metal tag label each air line with gate connection designation inside of each junction boxe.

01100.14 Low Pressure HDPE fittings: shall be manufactured in accordance with ASTM D 2513. The same manufacturer shall supply pipe, and butt, socket, and saddle heat fusion fittings. Fittings shall only be installed within Junction Boxes or at gate connections. Seal redundant lines at each end.

01100.15 Ball Valves: To be used for condensate purge valves and isolation valves: Full port brass ball valves 600 WOG/150 WSP manual with locking lever, threaded connections Mueller series 282 or approve equal.

Junction Boxes shall be furnished and installed, suitable for manhole access.

01100.17 High Pressure Pipe: Material shall be schedule 10S 304 or 316 stainless steel. Filler material shall be 308 or as specified by The Welding Procedure Specification (WPS). Submit the WPS to the Engineer for approval. Welding shall be conducted in accordance with AWS D1.6/D1.6M-Structural Welding Code, Stainless Steel. Welders shall be qualified in conformance with code requirements and the WPS. Contractor shall provide qualified field and laboratory personnel to perform all required quality control field and laboratory testing.

01100.42 Low Pressure Air Piping: Protect against shear and bending loads in accordance with ASTM D 2774. Connections shall be protected where an underground branch or service pipe is joined to branch fitting and where pipes enter or exit casings or walls or slabs. The area surrounding the connection shall be embedded in properly placed compacted embedment material in combination with a protective pipe sleeve or other mechanical support to protect the pipe against shear and bending loads. Utilize Fernco flexible sleeve seals or equal for vault and slab penetrations, install per manufacturers recommendations.

01100.43 Trenching, Bedding and Backfill: HDPE Pipe shall be installed in accordance with CFR 49, Part 192, subpart G, applicable codes and regulations and ASTM D 2774. Minimum depth of burial is 18” of cover. Pipe shall be laid on grade and on a stable foundation. Unstable trench bottom soils shall be removed and a 6-inch minimum foundation of compacted bedding material shall be installed to pipe bottom grade. A trench cut in rock or stony bottom shall be excavated to 6” below pipe bottom grade, and brought back to grade with compacted bedding.

01100.41 Fitting and joints:

(a) Transition fittings: HDPE pipe may be joined to other material by full restrained mechanical couplings including mechanical OD compression couplings only at locations

specified in drawings. Submit product material to the Engineer for approval. Follow instructions of the joining device manufacturer. All transitions shall be fully accessible from the surface.

(b) Heat Fusion Joining. Butt and saddle fusion joints in polyethylene piping shall be made using procedures that have been qualified and approved by the Operator in accordance with Title 49, Code of Federal Regulations (CFR) and Part 192. In accordance with CFR 49, Part 192, Section 192.285, the Operator shall ensure that all persons making fusion joints have been qualified to make joints in accordance with the Operator's Approved Qualified Fusion Procedures. The Operator shall maintain records of qualified personnel and shall certify that qualification training was received not more than 12 months before commencing construction. The Contractor shall ensure that all persons making heat fusion joints are qualified in accordance with this section.

VALVES AND MECHANICAL CONTROLS:

Automated Mechanical Control

Furnish and install automated mechanical control system that can function without electricity. This patented Obermeyer system will automatically hold or lower the gate in proportion to upstream flow elevations, should the PLC become compromised. The automated mechanical system utilizes a bubbler in the upstream pool to sense water elevation (Max 4285.25). Back pressure on the bubbler operates a three way valve that will take the air supply equipment off line and automatically lower the gates in response to high upstream water surface elevation conditions. The bubbler utilizes air from the air compressor receiver tank to operate. If the receiver is depleted during an extended power outage, the bubbler will continue to operate using air bled from the gate system air bladders.

Manual Control

Supply valves capable of operated manually using quarter turn inflate (if the compressor has power) and deflate valves located in the mechanical control cabinet. These valves are mechanical and require no electricity to operate. The weight of the steel gates, with or without the hydrostatic pressure, will compress the air bladders and evacuate air through the manually opened valves.

A. *Supply* normally closed solenoid valves on all control systems. Loss of electrical power will not lead to uncontrolled gate opening as the pressure established in the system prior to power loss can be held.
B. Supply pilot operated solenoid valves for inflating and deflating the gate. Air for operating the valves is stored in a dedicated receiver tank. Using pilot operated valves minimizes electrical solenoid size and maximizes UPS operating time.
C. Supply all control systems with pressure relief valves. The pressure relief valve is typically set 10% above operating pressure and protects the gate system from over pressurization.
D. Supply isolating adjacent air bladders from each other via check valves if on same air circuit. In most instances, the check valves are located on shore and a separate pipe is run to each individual air bladder. The individual pipes merge upstream of the check valves into a common inflate and deflate pipe. This system allows all air bladders in the same operating zone to operate in unison while affectively isolating each individual

air bladder from the rest of the zone. If one air bladder is ever compromised, the other air bladders cannot deflate through the damaged air bladder or pipe.

Maintenance

01100.60 Pneumatic Air Line Testing

- Fusion Quality. The Contractor shall ensure the field set-up and operation of fusion equipment, and the fusion procedure used by the Contractor's fusion operator while on site. Upon request by Owner, the Contractor shall verify field fusion quality by making and testing a trial fusion. The trial fusion shall be allowed to cool completely; then test straps shall be cut out and bent strap tested in accordance with ASTM D2657. If the bent strap test of the trial fusion fails at the joint, the field fusions represented by the trial fusion shall be rejected. The Contractor at his expense shall make all necessary corrections to equipment, set up, operation and fusion procedure, and shall re-make the rejected fusions.
- Leak Testing shall be performed in accordance with CFR 49, Part 192, Sections 192.509, 192.511 or 192.513 as applicable, and in accordance with manufacturer's recommendations.
- The Contractor shall take all precautions to eliminate hazards to persons near lines being tested. Pipes being tested shall be supervised at all times. Submit test procedures and results to the Engineer.

01100.61 Pneumatic System Acceptance testing: shall be done in the presence of the ENGINEER and OWNER's representative.

(a) Conduct bladder and air line leakage testing per manufacturer's instructions prior to pouring gate slabs. Fix any leaks. Replace or repair any pipes, bladders, valves, and connections that leak.

(b) Operation and hydraulic testing:

- **Gate Operation** After system is completed test each gate by operating it from highest to lowest position. Check to make sure the lowest elevation and highest elevation for each gate matches the specified elevation within tolerances. Make any and all adjustments required to achieve the required tolerances.
- **Time to Fill and Exhaust:** Check the time it takes to raise all gates from the lowest position and to lower all gates from the highest position. It shall take no longer than 45 minutes to raise or and 60 minutes to lower all gates.
- **Hydraulic Testing**: Under manual control raise all gates at the upper drop (W2-1-4 and W3-1-2; shut off flow to the fish passage channel, and raise all the W4-1-6 gates on the downstream drop, maximizing flow through the whitewater channel and pool elevation. Position all W1 gates as directed by the ENGINEER until desired whitewater effects can be observed. Make adjustments as needed to accomplish desired effects.
- **Automatic Operations Testing:** Switch to automatic control and check the water level in each of the whitewater pools. If water level fails to stabilize at the desired level, make any necessary hardware of software adjustments until automatic

operations are successful. Run program over an extended period of time to see if operation is stable.

- **Remote Operation testing:** Test both manual and automatic operation with remote operating device. Check remote operations using Wi-Fi device and also over the internet. If remote access fails any of the operating functions, make necessary hardware and software adjustments.

Other

WARRANTY – Company warrants title to the product(s) and also warrants the product(s) on date of delivery to Purchaser to be of the kind and quality described herein, merchantable, and free of defects in workmanship and material. **THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THOSE EXPRESSELY STATED IN THIS CONTRACT.**

If within two years from the date of initial operation, but not more than two years and six months from the date of shipment by Company of any item of the product(s), Purchaser discovers that such item was not as warranted and promptly notifies Company in writing thereof, Company shall remedy such non-conformance by, at Company's option, adjustment or repair or replacement of the item or any affected part of the product(s). Purchaser shall assume all responsibility and expense for removal, reinstallation, and freight in connection with the foregoing remedies. The same obligations and conditions shall extend to replacement parts furnished by Company there under. Company shall have the right of disposal of parts replaced by it. The Company shall not be liable for any repairs, replacements, or adjustments to the Product(s) or any cost of labor performed by the Purchaser or others without the Company's prior written approval.

The Purchaser shall not operate the Product(s) which is considered to be defective, without first notifying the Company in writing of its intention to do so. Any such use of the Product(s) will be at the Purchaser's sole risk and liability unless Company gives Purchaser approval to operate the Product(s). Such approval will not be unreasonably withheld.

The effects of corrosion, erosion, and normal wear-and-tear are specifically excluded from the Company's warranty.

Company's liability to Purchaser relating to the product(s) whether in contract or in tort arising out of warranties, representations, instructions, installations, or defects from any cause, shall be limited exclusively to correcting the product(s) and under the conditions aforesaid.

Any separately listed item of the product(s) that is not manufactured by the Company shall be covered only by the express warranty of the manufacturer thereof.

Contractor grants to OWNER a worldwide, non-exclusive, transferable, royalty-free, perpetual license to use, reproduce, distribute, modify, exercise, practice, perform, and exploit any assets subject to Contractor's works, patents, copyrights, or other intellectual property rights, to the extent that such license is necessary for OWNER to enjoy all rights associated with ownership of the Works.

Patent and Licenses – No separate measurement will be made for work performed under this Section.

6.03 CONCRETE

6.03.01 Concrete Section Includes

a) Concrete Products
b) Concrete References
c) Concrete Submittals
d) Concrete Execution
e) Concrete Filed Quality Control
f) Defective Concrete
g) Concrete Reinforcement

6.03.02 Concrete Products

a) Structural Concrete
    i) As noted in the General Structural Notes, as shown on Drawings
        (1) M4500-STD: Standard exterior concrete mix for all out-of-river concrete including slabs, walls, and foundations.
        (2) M4500-SYN: Standard exterior structural concrete mix with secondary synthetic fiber reinforcement for all in-river concrete including structural walls, slabs, and foundations.
b) Controlled Low Strength Material (Controlled Density Fill)
    i) Lean concrete mix for use under foundations and slabs on grade shall meet the following design criteria:
        (1) M-CDF: A mixture of cement, fine sand, coarse aggregate, fly ash and admixtures formulated to be flowable and self-consolidating with a net 28-day compressive strength of 200 to 300 psi
c) Flexible Waterstop
    i) Waterstop noted as flexible or PVC on the drawings shall be compounded from polyvinyl chloride (PVC) and shall have the following properties:
        (1) Minimum Ultimate Elongation: 250 Percent
        (2) Minimum Tensile Strength: 2,000 psi
        (3) Brittle Temperature: -23 Degrees Fahrenheit
        (4) Shor Durometer Type “A” Hardness: 80, Approximately
        (5) Specific Gravity: 1.3 Approximately
    ii) Waterstop shall be uniform in dimensions, homogeneous and free from porosity. Minimum thickness shall be one-quarter (1/4) inch and minimum width of six (6) inches unless otherwise shown on Drawings. Waterstop shall be ribbed center bulb type.
    iii) Corrugated type waterstops are not acceptable.
d) For all products not listed see General Structural Notes in Drawings

6.03.03 Concrete References

a) ACI 302 – Guide for Concrete floor and Slab Construction
b) ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
c) ACI 305R – Hot Weather Concreting
d) ACI 306R – Cold Weather Concreting
e) ACI 308 – Standard Practice for Curing Concrete
f) ACI 318 – Building Code Requirements for Reinforced Concrete
g) ACI 350R – Environmental Engineering Concrete Structures
h) American National Standards Institute (ANSI)/ASTM International (ASTM) D994 – Performed Expansion Joint Filler for Concrete (Bituminous Type)

i) ANSI/ASTM D1190- Concrete Joint Sealer, Hot-Poured Elastic Type
j) ANSI/ASTM D1751 – Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
k) ANSI/ASTM D1752 – Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
l) ASTM C31 – Making and curing concrete test specimens in the field
m) ASTM C33 – Concrete Aggregates
n) ASTM C39- Compressive Strength of Cylindrical Concrete Specimens
o) ASTM C94 – Ready-Mixed Concrete
p) ASTM C150 – Portland Cement
q) ASTM C260 – Air Entraining Admixtures for Concrete
r) ASTM C494 – Chemicals Admixtures for Concrete
s) ASTM C1260 – Standard Test Method of Potential Reactivity of Aggregates (Mortar-Bar Method)
t) ASTM C618 – Fly Ash and Raw or Calcinated Natural pozzolan for Use as Mineral Admixture in Portland Cement Concrete.

ASTM C1567 – Standard Test Method of determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and aggregate (Accelerated Mortar-Bar Method).

6.03.04 Concrete Submittals

a) For list of required submittals see Structural General Notes in drawings
b) Product Data: Provide data on joint devices, attachment accessories, and admixtures and aggregate and cement.
c) Samples: Submit two-inch long samples of contraction joint and control joint.
d) Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.
e) Submit mix design and certification of compliance for all admixtures and curing compounds
f) Mitigation for aggregate Akali-Silica Reaction (ASR)
    i) For aggregate source with non-reactive material: Submit verification that selected source of aggregate is not susceptible to alkali-silica-reaction (ASR) within the proposed concrete mix designs for this project. Aggregate shall be classified R0 (Non-reactive).
    ii) For aggregate source with moderately reactive materials; aggregates classified R1: Submit verification that the proposed mix design, with the specific aggregate source selected, has been designed through the addition of appropriate amounts of Fly Ash or other accepted additives to mitigate ASR. Provide test results proving effectiveness of mix design per ASTM C1567.
    iii) For aggregate source with highly or very-highly reactive materials; aggregates classified R2 or R3: Mix designs with moderately or highly reactive materials shall not be permitted for use on this project.

6.03.05 Concrete Execution

a) Examination
    i) All reinforcement shall be inspected by Engineer prior to pouring concrete
    ii) Verify site conditions under specified provisions
    iii) Verify requirements for concrete cover over reinforcement
    iv) Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

b) Preparation
   i) Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instruction.
c) Placing Concrete
   i) Place concrete in accordance with ACI 318 and ACI 350
   ii) Notify Engineer a minimum of 24 hours prior to commencement of operations
   iii) Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement
   iv) Install joint fillers, primers and sealant in accordance with the manufacturer's instructions
   v) Separate slabs on grade from vertical surfaces with ½-inch thick joint filler.
   vi) Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.
   vii) Install joint devices in accordance with manufacturer's instructions.
   viii) Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
   ix) Install joint covers in one piece, longest practical length, when adjacent construction activity is complete.
   x) Apply sealants in joint devices in accordance with manufacturer's recommendations.
   xi) Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
   xii) Place concrete continuously between predetermined control and construction joints.
   xiii) Do not interrupt successive placement; do not permit cold joints to occur.
d) Curing & Protection
   i) Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
      (1) Placing of concrete during hot weather shall be limited by the temperature of the concrete at the time of placing. Mixed concrete which has a temperature of 90 ºF or higher, shall not be placed.
      (2) Insulating blankets shall be used if concrete is placed when ambient air temperature is below 40ºF. If the ambient temperature drops below 40ºF the temperature of the concrete shall be monitored using an electronic sensing device placed between the concrete surface and insulating blankets. If the temperature at the surface of the concrete cannot be maintained above 40ºF, then enclosures with artificial heat sources shall be installed. If insulating blankets or heated enclosures are utilized to keep the concrete surface above 40ºF, the minimum curing period of the concrete shall be 120 hours from the time the concrete is placed; insulating blankets or heated enclosures shall remain in place for the duration of the minimum curing period. At the end of the curing period the protection shall remain in place until it can be removed without permitting the concrete temperature to fall more than 50º in a 24 hour period.
   ii) Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete (Minimum curing period). The minimum curing period shall be 120 hours from the time the concrete is placed or until the concrete has reached a compressive strength of 80% of the required field compressive strength.

6.03.06 Concrete Field Quality Control

a) Field review and testing will be performed in accordance with ACI 301
b) All concrete repair or restoration shall comply with the provisions of 6.02.07 Defective Concrete

c) Provide free access to Work and cooperate with appointed firm
d) Submit proposed mix design of each class of concrete to Engineer and testing firm for review prior to commencement of Work
e) Tests of cement and aggregates may be performed to ensure conformance with specified requirements
f) One additional test cylinder may be taken during cold weather concreting, curing on job site under same conditions as concrete it represents
g) Additional test cylinders shall be taken where 15%-20% of fly-ash is incorporated into the concrete mix to allow for a 56-day break.

6.02.07 Defective Concrete

a) Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
b) During the progress of the work, if the laboratory-cured values shown for each concrete design strength and quality as determined by compression cylinders fail to attain the requirements specified, suspend all concrete work. Concrete that has been placed in the work and does not meet the specified requirements will be reviewed by the Engineer and the Contractor. Any field testing such as core drilling required to verify in-place concrete strengths after compression tests fail to meet requirements shall be at the Contractor's expense. The Contractor shall, at his own expense, correct or remove the defective work in a manner approved by the Engineer.
c) The following criteria shall be followed in defining cracks by minimum measured crack width; using feeler gauges or other approved means:
d) Cracks with maximum widths less than 0.015 inches (1/64") shall be considered hair-line cracks and shall be repaired or sealed as directed by the Project Engineer.
e) Cracks equal to or greater than 0.015 inches (1/64") and less than or equal to .095 inches (3/32") in width at any point shall be considered medium cracks with mandatory repair by injection required.
f) Any cracks equal to or greater than 0.095 inches (3/32") in width at any point shall be considered large cracks with mandatory repair by injection or as directed by the Project Engineer.
g) Repair or replacement of defective concrete will be determined by the Engineer.
h) Repair defects in formed concrete surfaces within 24 hours of removing forms.
i) Replace defective concrete within 48 hours.
j) Do not patch, fill, touch up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.
k) Cut out and remove defective area.
l) Cut edges square to avoid feathering.
m) Comply with ACI 301, Chapter 9.
n) Perform repair work so as not to interfere with curing of adjacent concrete.
o) Adequately cure repair work.

6.03.08 Concrete Reinforcement

a) Refer to Structural General Notes in Drawings

b) Reinforcing Steel: ASTM A615, 60 kilopounds per square inch (ksi) yield grade; deformed billet steel bars (#3 bars may be grade 40 ksi), unfinished, free of dirt, oil, grease, loose scale or other substances that might reduce development of the bond strength.

c) Submittals:
   i) Shop Drawings:
      (1) Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric bending and cutting schedules, and supporting and spacing devices, if dissimilar from Drawings.
      (2) Indicate dimensions, materials, bracings, and arrangement of joints and ties.
   ii) Submit plan for placement of all concrete walls four weeks prior to placement.
   iii) Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
   iv) Indicate locations of all construction joints prior to concrete placement
d) Embedment Anchors
   i) Simpson SET-3G epoxy system or Hilti, HVA epoxy embedment anchors. Refer to notes for Adhesive Anchors

6.04 STRUCTURAL STEEL

a) Refer to Structural General Notes in Drawings
b) References
   i) American Institute of Steel Construction:
      (1) AISC Code of Standard Practice for Steel Buildings and Bridges.
      (2) AISC Load and Resistance Factor Design (LFRD) Specification for Structural Steel Buildings.
      (3) AISC Load and Resistance Factor Design Specification for Single-Angle Members.
      (4) AISC Specification for Allowable Stress Design of Single-Angle Members.
      (5) AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
   ii) ASTM International:
      (1) ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
      (2) ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
      (3) ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
      (4) ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
      (5) ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
      (6) ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
      (7) ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
      (8) ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
      (9) ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
      (10) ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
      (11) ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
      (12) ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.

(13) ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
(14) ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
(15) ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
(16) ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point to 4-in. (100-mm) Thick.
(17) ASTM A618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
(18) ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
(19) ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
(20) ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
(21) ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
(22) ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
(23) ASTM E94 - Standard Guide for Radiographic Examination.
(24) ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
(25) ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
(26) ASTM E709 - Standard Guide for Magnetic Particle Examination.
(27) ASTM F436 - Standard Specification for Hardened Steel Washers.
(28) ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
(29) ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
(30) ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

iii) American Welding Society:
(1) AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
(2) AWS D1.1 - Structural Welding Code - Steel.
iv) Research Council on Structural Connections:
(1) RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
v) SSPC: The Society for Protective Coatings:
(1) SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
(2) SSPC SP 3 - Power Tool Cleaning.
(3) SSPC SP 6 - Commercial Blast Cleaning.
(4) SSPC SP 10 - Near-White Blast Cleaning.

c) Qualifications
i) Fabricator: Company specializing in performing Work of this section with minimum 2 years documented experience.
ii) Erector: Company specializing in performing Work of this section with minimum 2 years documented experience with the following current AISC Certification:

(1) Certified Steel Erector (CSE).
(2) Advanced Certified Steel Erector (ACSE).

iii) Shop Painter: Company specializing in performing Work of this section with minimum 2 years documented experience with the following current AISC Certification:
(1) Sophisticated Paint Endorsement - Enclosed (P1).
(2) Sophisticated Paint Endorsement - Covered (P2).
(3) Sophisticated Paint Endorsement - Outside (P3).

iv) Welders and Welding Procedures: AWS D.1 qualified within previous 12 months.

d) Structural Steel
i) Channels and Angles: ASTM A36/A36M
ii) Structural Plates and Bars: ASTM A36/A36M
iii) Anchor rods: ASTM F1554; Grade 36
(1) Shape: Hooked or Headed
(2) Plate Washers: ASTM A36/A36M
iv) Threaded Rods: ASTM A36/A36M
v) All steel to be Stainless (A304 or A316 as needed) or Hot-dipped Galvanized

e) Welding Materials
i) Welding Materials: AWS D1.1; Type required for materials being welded

f) Fabrication
i) Continuously seal joined members by continuous welds. Grind exposed welds smooth
ii) Fabricate connections for bolt, nut, and washer connectors.

g) Finish
i) Prepare structural component surfaces in accordance with SSPC SP 3.
ii) Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, or high strength bolted.
iii) Galvanizing for Structural Steel Members: ASTM A123/A123M; galvanize after fabrication.
iv) Galvanizing for Fasteners, Connectors, and Anchors:
(1) Hot-Dipped Galvanizing: ASTM A153/A153M.
(2) Mechanical Galvanizing: ASTM B695; Class 50 minimum.

6.05 GROUT FOR GROUTED BOULDERS

The work shall consist of furnishing, transporting, and placing concrete grout, including filter, bedding or geotextile materials where specified, in the construction of grouted rock riprap sections as shown on the construction drawings.

a. **Placing Boulders -** The rock shall be placed on the surfaces and to the depths specified in such a manner as to avoid displacement of underlying materials. The rock shall be placed to produce a uniform surface in which the tops of the individual rocks match the neat lines shown on the drawings within the appropriate tolerances given in table 2.2. Double decking flat rocks to bring the surface up to the required grade will not be permitted.

b. **Grout Mix** - The Contractor shall be responsible for proportioning the mix. The cement content shall be 6 bags per cubic yard (564 lbs. per cu yd.); the fine aggregate to combined fine and coarse aggregate ratio shall be greater than 0.45 but less than 0.53. Water content shall not exceed 6 gallons of water per bag of concrete.

   Fly ash may be used as a partial substitution for Portland cement in an amount not greater than 20 percent (based on absolute volume) of cement in the concrete mix.

   Grout shall attain a compressive strength of 3000 pounds per square inch at 28 days. At least 10 days prior to placement of grout, the Contractor shall submit a certification of the mix design for approval. Submit mix design and 28 day test results for review by the engineer.

c. **Air Content and Consistency -** Air entrainment may be used and shall not exceed 7 percent at time of placement. The consistency of the grout mixture shall be such that it will penetrate the rock to the minimum depth of 24 inches.

d. **Conveying and Placing -** The grout mix shall not be placed until the rock riprap has been inspected and approved by the engineer for the placement of grout. Rock to be grouted shall be kept moist for a minimum of 2 hours before grouting.

The rock riprap shall be flushed with water before placing the grout to remove the fines from the rock surfaces. The rock shall be kept moist before the grouting and without placing in standing or flowing water. Grout placed on inverts or other nearly level areas may be placed in one operation. On slopes, the grout shall be placed in two nearly equal applications consisting of successive lateral strips about 10 feet in width starting at the toe of the slope and progressing upward. The grout shall be delivered to the place of final deposit by approved methods and discharged directly on the surface of the rock. A metal or wood splash plate is used to prevent displacement of the rock directly under the grout discharge. The flow of grout shall be directed with brooms, spades, or baffles to prevent grout from flowing excessively along the same path and to assure that all intermittent spaces are filled. Sufficient barring shall be conducted to loosen tight pockets of rock and otherwise aid in the penetration of grout to ensure the grout fully penetrates the total thickness of the rock blanket. All brooming on slopes shall be uphill. After the grout has stiffened, the entire surface shall be rebroomed to eliminate runs and to fill voids caused by sloughing. For sloped ramps the surface finish, following the completion of grout installation, shall consist of two inches of the rock extended above the level of grout. The exposed rock will not have a plastered appearance. The work shall consist of furnishing, transporting, and placing rock and concrete grout, including filter, bedding or geotextile materials where specified, in the construction of grouted rock riprap sections as shown on the construction drawings.

Hold grout minimum 3 inches below top of boulders. Boulders extending above final surface elevation of grout shall be cleaned of all grout residues. Clean appearance of final boulder surface is required.

After completion of any strip or panel, no individual(s) or equipment shall be permitted on the grouted surface for 24 hours. The grouted surface shall be protected from injurious action by the sun, rain, flowing water, mechanical injury, or other potential damaging activity.

e. **Curing and Protection** - The completed finished surface shall be prevented from drying for a minimum curing period of 7 days following placement. Exposed surfaces shall be

maintained in a moist condition continuously for the 7-day curing period or until curing compound has been applied as specified in this section.

The grouted rock may be coated with an approved curing compound as an alternative method to maintaining continuous moisture condition during the curing period. The compound shall be applied per manufacturers recommendation/direction and shall form a continuous adherent membrane over the entire surface. Curing compound shall not be applied to surfaces requiring bond to subsequently placed grout and/or concrete. If the membrane is damaged during the curing period, the damaged area shall be reapplied at the rate of application specified for the original treatment.

Grout mix shall not be placed when the daily minimum temperature is less than 40 degrees Fahrenheit unless cold weather concrete measures are taken. Submit cold weather concreting plan to engineer for review prior to work commencing.

f. **Inspecting and Testing Fresh Grout -** The grout material shall be checked and tested throughout the grouting operation. Sampling of fresh grout shall be conducted in conformance with ASTM C 172. The volume of each batch will be determined by methods prescribed in ASTM C 138. At a minimum samples will be taken daily or whenever there is a change in the mix or if the engineer deems there is a change in the mix attributes.

6.06 SHEET PILE

6.06.01 Products

a) General

A. CONTRACTOR shall provide information from the manufacturer that indicates the sheet piling meets or exceeds the SPECIFICATIONS listed in this section.

B. All steel sheet piling shall be new and unsliced material throughout, unless otherwise reviewed and accepted by ENGINEER. Splice locations, if necessary, shall be reviewed and accepted by ENGINEER prior to installation.

C. Steel sheet piles and special fabricated shapes shall be of a design that ensures continuous interlock throughout the entire length when in place.

b) Materials

A. Steel sheet piling, Nucor Hot-Rolled Steel Sheet Pile NZ 14 or equivalent (https://www.nucorskyline.com/globalnav/products/steel-sheet-piling/z-piles), shall be installed by the CONTRACTOR to the grades and lines described in the project plans and specifications.

B. Steel sheet piling shall have a minimum section modulus 0.54 in^3 to 2.23 in3(Ft. Wall).

Section Type	Thickness	Weight	Weight	Sec. Mod.	Moment of Inertia	Coating Area

	Nominal	Lb/Square Ft.	Lb/Lineal Ft.	$Inch^3$(Ft.Wall)	$Inch^4$(Ft.Wall) Per Ft. of Wall	Sq.Ft/LF
NZ 14	0.375	21.77	55	25.65	171.7	6.10

C. Steel sheet piling shall meet the requirements of ASTM A328, (Grade 50).

D. Steel corners, tees, wyes, and crosses shall meet the requirements of ASTM A328.

E. Steel sheet piles required for the PROJECT shall be the type and weight shown on the DRAWINGS.

   a. Additional length beyond those indicated on the DRAWINGS may be required to provide for trimming of tops of sheet piling.

F. The interlocks between steel sheet pile sections shall be configured such that the average width of the annular space between all contact points of the interlocks shall be a maximum of one-eighth (1/8) inch, as determined by ENGINEER.

G. Steel sheet piles and interlocks shall not have excessive kinks, camber or twist that would prevent the pile from reasonably free sliding to grade.

H. All fabricated connections shall be made with the use of angles or bent plates, as necessary, and shall be adequately welded or connected with high strength bolts as accepted by ENGINEER.

I. Handling Holes:

   a. If handling holes are provided, they shall be two (2) standard two and nine sixteenth (2-9/16) inch diameter handling holes located six (6) inches from one end.

   b. The holes shall be plugged by welding a piece of steel over the hole prior to installing any riprap, backfill or drop structure cap.

   c. The plated hole shall be watertight.

c) Storage and Handling

A. Do not subject piles to damage by impact bending stresses in transporting to and storing piles onsite.

B. Store and handle piles such that corrosion damage does not occur.

6.06.02 Execution

a) Examination

A. Do not begin sheet pile installation until the earthwork in the area where the piles are to be driven has been completed to the extent that the grade elevation is at no more than

twelve (12) inches above or below the top of the piling elevation as indicated on the DRAWINGS.

b) Preparation

A. Any fill along the alignment of the sheet pile must be in place to sub-grade elevations and compacted prior to driving the sheet pile.

B. Fill material (except riprap, boulders, bedding and grout) is not to be placed around the sheet pile after the sheet pile is in place.

c) Installation

A. General:
   a. All welding or gas cutting shall be in accordance with the current standards of the American Welding Society.

   b. Virtual Refusal:
      i. Steel sheet piling shall be driven to the depths shown on the DRAWINGS or to virtual refusal.
      ii. Virtual refusal is defined as ten (10) blows per inch with an approved pile hammer.

   c. A pile hammer shall be used to determine virtual refusal.

   d. The hammer shall be operating at the manufacturer's recommended stroke and speed when virtual refusal is measured.

B. Sheet Piling Driving:

   a. Steel sheet piling shall be assembled before driving and then driven as a continuous wall, progressively in stages to keep the piles aligned correctly and minimize the danger of breaking the interlock between the sheets.
   b. Steel sheet piling shall be driven to form a tight bulkhead.

   c. A driving head shall be used and any piling which is damaged in driving or which has broken interlocks between sections shall be pulled and replaced at CONTRACTOR's expense.

   d. The piling shall be driven within the following tolerances:
      i. Alignment:
         1. Sheet pile shall be driven to form a relatively straight line between the termini points shown on the DRAWINGS.
         2. Horizontal deviation of any point from a straight line connecting the two ends of the wall section shall be a maximum of six (6) inches.
      ii. Plumbness: Each individual sheet pile section shall be driven vertical, within a horizontal tolerance of two percent (2%) of any vertical length measured along the pile.
      iii. Elevation:
         1. Tops of sheet pile sections shall be within a tolerance of one (1)

inch from plan elevations.

2. CONTRACTOR shall not be paid for excess sheet pile trimmed off the end of the pile to meet final grade.

C. CONTRACTOR shall brace and/or provide soil grading as necessary during construction operations in order to provide lateral stability for the sheet pile wall. The sheet pile wall has been designed for the soil grades of the final configuration denoted on the DRAWINGS only. Other temporary configurations during the construction period shall not be allowed.

D. Care shall be taken during driving to keep from causing deformations of the top of the piles, splitting of section, or breaking of the interlock between sections. Care shall also be taken during driving to prevent and correct any tendency of steel sheet piles to twist or get out of plumb.

E. Steel Z piling shall be driven with the ball-end leading. Proper care and planning shall be used to allow for this construction procedure in both immediate and possible future walls.

F. Alternate Z piles shall be reversed end for end for proper interlocking in the “normal” position. Piles shall also be aligned properly to maintain a “normal” driving width.

G. For sheet piles driven into the native soils, pre-drilled soils, or excavated soils a vibratory driver may be used as long as the required depth is obtained.

H. For sheet piles being driven into bedrock, an approved hammer utilizing a minimum hammer energy of 19,000 foot-pounds per square inch of steel section shall be used to obtain the required depth or virtual refusal. The hammer shall be clearly marked so that it can be identified at the job site.

I. Steel sheet pile that is full length as shown on the DRAWINGS and is required to be driven below the specified cutoff elevation shall be spliced with additional steel sheet piling with a full penetration butt weld.

6.07 STRUCTURAL BACKFILL

6.07.01 General

a) The drawing shows typical installation. Refer to construction drawings for locations and elevations of backfill areas.

b)Materials used for Structural Fill/Backfill shall be as noted in the Geotechnical Report and Structural General Notes, Foundations Section in the Drawings and as noted in the Soil Backfill Detail

END OF SECTION

SECTION 7 STREAMBANK WORK

7.01 STREAMBANK WORK GENERAL

Erosion and Sediment Control (ESC) and Care of Water (COW) practices, as part of BMP's, may be required for streambank construction activities.

7.02 STREAMBANK WORK CONSTRUCTION METHODS

7.02.01 Erosion Control Blankets

Disturbed banks shall be rehabilitated with Erosion Control Blankets. After final elevations have been graded and seed applied, excavate a trench parallel to the channel and up the slope of the bank. A 6 in. by 6in. trench should run along the length and width of the ECB installation. Staple the ECB along bottom of trench and backfill with compacted soil. Overlap the ECB a minimum of 24 inches at the top and bottom, and a minimum of 12 inches along adjacent ECBs. The ECB shall be stapled every 1 ft on center. The CONTRACTOR shall follow the specifications provided by the manufacturer of the ECB.

7.02.02 Restored Bank Compaction

Meet or Exceed APWA 2025 Standard Specification 31 23 26 or as modified herein.

Restored bank shall be constructed using material excavated on-site. The restored bank subgrade shall be compacted to 95% Standard Proctor Density using a vibratory compactor, sheepsfoot roller or equivalent. The subgrade material shall be moistened to obtain optimum moisture for compaction. After final subgrades have been established and compacted, place topsoil to a minimum of 12 inches depth and plant/seed as specified on the Drawing Plans.

7.03 STREAMBANK WORKMATERIALS

7.03.01 Erosion Control Blankets

a. Install Erosion Control Blankets (ECB) over topsoil and specified seed mix on slopes as shown on Project Drawings.
b. Erosion Control Blankets shall be all natural 100% biodegradable blanket of 100% coconut fiber with a functional longevity of up to 18 months. Tensile strength shall be 222 lbs/sqft (ASTM 6818), a thickness of 0.28" and mass of 8.83oz/sqyd and withstand a sheer stress of 2.35lbs/sqft and a velocity of 10 ft/sec such as Tensar, Rollmax BioNet C700BN or approved equivalent.
c. Store all coir fabric elevated off the ground and ensure that it is adequately covered to protect the material from damage. Protect fabric from sharp objects that may damage the material. Materials damaged during transport, storage or placement shall be replaced at the CONTRACTOR expense. The ENGINEER shall inspect and approve all materials prior to installation.

7.03.02 ECB Staples

a. ECB Staples to secure the ECB shall be 11 gauge staples. A minimum of 10in. long by 2 in. crown staples are to be used to secure the blanket to the ground surface, and at all locations where ECB is cut for planting.

7.03.03 Wood Stake Materials

a. Wood Stakes shall be tapered with dimensions of 18 in by 1in by 2 in. Wood Stakes shall be natural wood that is not treated with preservatives.

END OF SECTION

SECTION 8 VEGETATION PROTECTION, PRUNING OPERATIONS, AND DEBRIS REMOVAL

Meet or Exceed APWA 2025 Standard Specification 32 01 90, 32 01 91 and 32 01 93 or as modified herein.

8.01 GENERAL VEGETATION PROTECTION

The preservation of existing mature riparian vegetation is an essential component of the work and a measure of the successful completion thereof. Healthy root mass is essential to the stability of the banks and channel of the Weber River. The CONTRACTOR is responsible for the survivability of mature vegetation. Any vegetation lost or damaged due to construction activities shall be replaced by the CONTRACTOR at no expense to the OWNER, within the 1-year warranty period.

8.02 VEGETATION ROOT CUTTING

The Work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for all tree root cutting necessary for excavation purposes with the goal of minimizing the impact to the existing environment. Excavation shall be limited to areas as shown on the Plans and described in these specifications.

8.02.01 Excavation Work Near Trees and Shrubs

Excavation work near trees and shrubs shall be outside of the drip line. Prune tree to allow for adequate viewing of base of tree and prevent damage. Roots exposed during excavation shall be cleanly cut.

8.02.02 Hand Excavations Under the Drip Line

Under the drip line, or at a minimum of 10 feet from the base of a Protect In Place Tree, all necessary excavating activities shall be done by hand to expose the roots.

a. Expose all roots greater than 1'' and preserve.
b. If it is necessary to achieve grades, the roots may be cleanly cut, and shall not be ripped or torn.

8.02.03 Treatment of Cut and Exposed Roots

Backfill all cut and exposed roots the same day of root cutting, or cover with wood chips, mulch and water until backfilling is accomplished.

8.02.04 Root Care

Roots can be up to 2-3 times the diameter of the drip line.
The CONTRACTOR shall take as much care as possible to preserve roots.

a. All roots that are necessary to remove for excavation activities shall be cleanly cut.
b. The CONTACTOR shall apply all root cuts with approved root stimulator.

8.02.05 Areas of Cut Near Marked Trees

a. If necessary, any cut slope areas shall be held away from marked trees with a boulder retaining wall with a discontinuous footing.
b. No soils shall be compacted under the drip line without ENGINEER approval.

8.02.06 Pruning of trees and shrubs

Pruning shall follow Utah Shade Tree Pruning Standards as well as the American National Standards for tree care operations. Class II, medium pruning, is generally for lifting the lower bottom branches of trees for under clearance. All Class II pruning cuts shall be less than 12 feet above the ground. Pruned limbs shall be less than 1 inch in diameter. Class II Pruning is intended to clear obstructions for equipment access and excavation areas.

8.02.07 Medium Pruning

Shall consist of the removal of dead, dying, diseased, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch up to one inch in diameter may remain within the main leaf area where it is not practical to remove it. The following specifications shall apply:

- **a.** All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts shall be made at all times.
- **b.** It is necessary to precut branches too heavy to handle to prevent splitting or peeling the bark. Where necessary to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.
- **c.** On trees known to be diseased, tools are to be disinfected with methyl alcohol at 70% (denatured wood alcohol diluted appropriately with water) or Clorox solution after each cut and between trees where there is known to be a danger of transmitting the disease on tools.
- **d.** Old injuries are to be inspected. Those not closing properly and where the callus growth is not already completely established and show signs of extensive rot shall be reported to the Owner.
- **e.** All girdling roots visible to the eye are to be reported to a supervisor and/or the Owner.

The presence of any structural weakness, disease conditions, decayed trunk or branches, split crotches or branches should be reported in writing to a supervisor and/or the Owner, and corrective measures recommended.

8.02.08 Class IV Pruning and Debris Removal

Excavation of the fill material to establish design grade will require the removal of trees and shrubs and associated debris. Class IV pruning may be required for equipment access and to protect adjacent vegetation and utilities. Class IV pruning shall follow Utah Shade Tree Pruning Standards as well as the American National Standards for tree care operations. Class IV pruning typically requires a lift and chainsaw work to remove the upper limbs to prepare the tree for removal and stumping.

a. Appropriate safety procedures shall be implemented at all times during Class IV pruning operations.
b. Debris shall be stored in the Staging Area with adequate BMPs until hauled off-site.

END OF SECTION

SECTION 9 SEEDING

Meet or Exceed APWA 2025 Standard Specification 32 01 90, 32 91 13, 32 91 19, 32 93 13, 32 93 43 and 32 98 00 or as modified herein.

9.01 SEEDING

All soil areas within the Project Limits, disturbed by construction activities, shall be seeded with the Upland Stabilization Seed mix. All Slope Stabilization areas shall have Riparian Seed mix. All mixes shall be Certified Seed that is weed free and native strands of Pure Live Seed (PLS). Table 9.1 provides the seed type and rate for Upland Mix Species (Zone A) and Table 9.2 provides the seed type and rate for Riparian Emergent Mix Species (Zone B).

1. Soil Preparation: Where topsoil is specified place stored topsoil to a minimum of 6 inches in depth up to 12 inches as suited. Soil shall be graded and raked to a depth of 0.25' to 0.5' to create a seed bed. Soils must be moist prior to seed application. Sprinkle areas to be seeded with water, using fine spray to avoid washing or erosion of soil.
2. Seed Application: Within 48 hours of soil placement, broadcast seed at the specified rate and lightly rake into soil, then tamp soil to ensure seed to soil contact. Do not apply seeds when weather is too windy, hot or drying, or other adverse conditions exist

3. Apply hydro-mulch to all seeded areas.

Table 9.1 Upland Mix Application (Zone A)

Upland Mix Application		
Common Name	**Scientific Name**	**pls/acre***
Sand dropseed	*Sporobolus cryptandrus*	1%
Blanket flower	*Gaillardia aristata*	6.4%
Rocky Mountain beeplant	*Cleome serrulata*	19.2%
Scarlet globemallow	*Sphaeralcea coccinea*	3.2%
Alkali sacaton	*Sporobolus airoides*	3.2%
Great Basin wildrye	*Leymus cinereus*	25.5%
Western wheatgrass	*Pascopyrum smithii*	25.5%
Sandberg bluegrass	*Poa secunda ssp. Sandbergii*	6.4%
Inland saltgrass	*Distichlis spicata*	3.2%
Lewis blue flax	*Linum lewisii*	6.4%
*Broadcast Application=60 lbs/acre		100%

Table 9.2 Riparian Mix Application (Zone B)

Emergent Riparian Mix Application		
Common Name	**Scientific Name**	**pls/acre***
Inland saltgrass	*Distichlis spicata*	25%
Creeping spikebrush	*Eleocharis palustris*	25%
Spike muhly	*Muhlenbergia wrightii*	25%
Nuttal's alkaligrass	*Puccinellia nuttalliana*	25%
*Broadcast Application=15 lbs/acre		100%

9.04 TRANSPLANTING ON-SITE VEGETATION

Vegetation to be disturbed by excavation activities should be transplanted when feasible. Vegetation suitable for transplants should be healthy native species. Prune shrub or tree to approximately 6 feet in height. Cleanly cut all broken and damaged limbs. Herbaceous clusters are also suitable for transplants. Excavate a hole that is larger, but not deeper, than the transplant rootball. Scoop the entire root mass of the transplant with the bucket of a trackhoe, keeping intact the rootball and soils. Immediately place transplant in the excavated hole and hand backfill lightly compacting the soil. Water transplant as necessary to ensure survival.

END OF SECTION

SECTION 10 TOPSOIL

10.01 TOPSOIL PRESERVATION

Topsoil stripped from the immediate construction area shall be stockpiled in an area designated in the SWPPP. The stockpiles shall be in areas that shall not interfere with construction phases and at least 15 feet away from areas of concentrated flows or pavement. The slopes of the stockpile shall be roughened by equipment tracking and shall not exceed 2:1 horizontal to vertical. A silt fence or other adequate erosion control shall be installed around the perimeter of each stockpile.

Current conditions of the Project Area are compacted soil and fill material with concrete and litter. Topsoil excavated on areas disturbed for construction shall be removed up to 18'' and stored in the Staging Area until after construction. Once construction is complete, remove stockpile and place topsoil onto disturbed areas for revegetation.

10.02 TOPSOIL MATERAILS

Meet or Exceed APWA Standard Specifications 31 05 13 or as modified herein.

Soil material may be approved by the ENGINEER if, by visual inspection, the soil is determined to be high quality. The ENGINEER may require CONTRACTOR to furnish laboratory results if, in the ENGINEER'S opinion, the material is marginal or unacceptable. At the request of the ENGINEER, the CONTRACTOR shall furnish laboratory test results indicating that the material meets the requirements including those for composition and pH as indicated below: Material that does not conform to the specification requirements and is placed in the work area shall be removed and replaced at the CONTRACTOR'S expense.

10.03 IMPORTED TOPSOIL APPLICATION

The Project requires the import of topsoil. The Contractor shall provide a Certificate of Compliance to the Engineer to verify the organic matter content, pH, electrical conductivity and cation exchange capacity of the humate product in all imported soils. Topsoil shall be placed on all compacted soil and fill areas.

a. Topsoil shall be applied a minimum of 6 inches depth on all disturbed areas within the riparian corridor.
b. Topsoil shall be applied to all planting wells (tree and shrubs) at least the depth and 2 times the width of the root ball.
c. Topsoil shall be applied to all wetland areas at a minimum of 6-10" inches in depth.
d. Topsoil shall not be placed when the ground or Topsoil is frozen, excessively wet, or otherwise in a condition detrimental to uniform spreading operations, proper grading and seedbed preparation.
e. Following the spreading operation, the Topsoil surface shall be left reasonably smooth and without surface irregularities that could contribute to concentrated waterflow downslope.

10.04 SALVAGED AND STORED TOPSOIL

The CONTRACTOR shall store topsoil that consists of plant propagules (roots, rhizomes, seed) from locations that have been cleared and grubbed. Salvaged Topsoil shall be properly stockpiled and protected in locations indicated on the SWPPP. To the best extent possible, salvaged Topsoil shall be free and clear of cobbles and or gravel exceeding 2 inches in size. Strip and remove off site all weed infested soils to a min. depth of 3" prior to salvaging topsoil. Salvaged Topsoil shall comply with the following requirements:

10.04.01 Percent Organic Matter

Contain no less than 2 percent nor more than 13 percent organic matter, as determined by the test for organic matter in accordance with ASTM D2974.

10.04.02 Percent Clay

Contain no less than 12 percent or more than 40 percent clay, as determined in accordance with ASTM D422.

10.04.03 Percent Sand

Sand content shall not exceed 55 percent, as determined in accordance with ASTM D422.

10.04.04 pH

The pH shall not be lower than 5.0 or higher than 8.0. The pH shall be determined with an acceptable pH meter on that portion of the sample passing the No. 10 sieve, in accordance with the "Suggested Methods of Tests for Hydrogen Ion Concentration (pH) of Soils," included in the ASTM Procedures for Testing Soils issued December 1964.

10.05 IMPORTED TOPSOIL

Imported topsoil shall be a natural sandy loam that is invasive and noxious weed free and cheatgrass free. Imported Topsoil shall be properly stored and protected, and shall be free of roots, hard clay and stones which shall not pass through a 1-inch square opening. It shall be a loamy mixture having at least 90 percent passing No. 10 sieve. Below lists the soil properties:

10.05.01 Percent Organic Matter

Contain no less than 2 percent nor more than 13 percent organic matter, as determined by the test for organic matter in accordance with ASTM D2974.

10.05.02 Percent Clay

Contain no less than 12 percent or more than 25 percent clay, as determined in accordance with ASTM D422.

10.05.03 Percent Sand

Sand content shall not exceed 55 percent, as determined in accordance with ASTM D422.

10.05.04 pH

The pH shall not be lower than 5.0 or higher than 8.0. The pH shall be determined with an acceptable pH meter on that portion of the sample passing the No. 10 sieve, in accordance with the "Suggested Methods of Tests for Hydrogen Ion Concentration (pH) of Soils," included in the ASTM Procedures for Testing Soils issued December 1964.

10.05.05 Mechanical Criteria

Topsoil shall meet the following mechanical criteria: 100 percent shall pass the 1-inch screen; 97-100 percent shall pass the 1.5-inch screen; and 40-60 percent shall pass the No. 100 mesh sieve.

10.05.06 Vegetative Content

Topsoil shall be free of clods, gravel, and other inert material. It shall be free of thistle, reed canary grass, creeping foxtail, noxious vegetation and seed. Should such regenerative material be present in the soil, the Contractor shall remove, at his expense and in a manner satisfactory to the Owner's Representative, all such growth, both surface and root, which may appear in the imported Topsoil within 1 year following acceptance of the work.

SECTION 11 INVASIVE SPECIES CONTROL

11.01 GENERAL INVASIVE VEGETATION SPECIES CONTROL

Meet or exceed APWA Standard Specifications 31 31 19

All equipment entering the site shall be clean of mud, debris, organic matter or other material that may contain weed seeds (Invasive species and noxious weed seeds shall be removed from the staging area, ingress and egress, and all areas disturbed by construction activities prior to mobilization into the site.). Equipment cleaning shall adhere to section 3.04

END OF SECTION

SECTION 12 HYDROLOGY

12.01 EXISTING PROJECT SITE HYDROLOGY

The Weber River Gage at Ogden, Utah is located immediately upstream and in close proximity to the project site and can be used to forecast flows during construction. **The Gage will be impacted by construction activities and may be inaccurate due to construction**. Hydrologic information for the project is based on 4 years of record for the USGS 10137000 Weber River at Ogden, Utah, which can be accessed online at:

https://waterdata.usgs.gov/nwis/inventory/?site_no=10137000&agency_cd=USGS

Real time data may be seasonal and is provisional, subject to change. Statistical Analysis of historical data is not a guarantee for the flow rates during construction and are provided herein solely for the information of the CONTRACTOR. Maintenance of the River Flows, diversions, erosion, COW, environmental protection, BMPs and River stages during the construction period are wholly the responsibility of the CONTRACTOR.

Exceedance probabilities for mean daily flows on the Weber River at Ogden, UT are shown below in Table 1.

Table 1 Percent of record that average daily flows were exceeded on the Weber River downstream of the Project Area (cfs)

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
1-Jan	152	57	75	90	241	350
2-Jan	151	42	69	93	278	331
3-Jan	147	39	61	90	285	330
4-Jan	146	47	66	92	267	320
5-Jan	155	50	67	102	263	340
6-Jan	164	55	77	98	276	325
7-Jan	160	58	72	96	283	312
8-Jan	157	56	65	106	252	325
9-Jan	165	57	83	129	249	324
10-Jan	175	53	81	140	297	370
11-Jan	183	56	81	146	300	404
12-Jan	172	60	82	129	297	330
13-Jan	162	52	82	118	256	329
14-Jan	170	46	80	146	265	346
15-Jan	179	52	72	137	314	375
16-Jan	247	53	73	112	325	884
17-Jan	198	61	80	125	328	496
18-Jan	184	58	72	116	326	433
19-Jan	202	54	75	103	324	572
20-Jan	182	53	81	102	318	453
21-Jan	177	61	86	110	308	398

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
22-Jan	172	60	83	106	294	384
23-Jan	182	70	79	152	323	364
24-Jan	184	72	78	124	319	361
25-Jan	187	65	78	113	321	391
26-Jan	184	66	76	109	309	386
27-Jan	196	66	81	123	340	408
28-Jan	183	65	77	95	326	380
29-Jan	179	67	75	110	309	365
30-Jan	182	67	73	118	329	369
31-Jan	180	61	75	103	328	380
1-Feb	174	60	78	107	322	369
2-Feb	175	63	79	107	305	365
3-Feb	180	73	85	119	290	365
4-Feb	181	69	81	136	274	362
5-Feb	188	69	76	161	276	371
6-Feb	189	68	81	169	278	365
7-Feb	237	66	97	199	338	606
8-Feb	263	65	87	216	326	785
9-Feb	294	67	83	189	329	1030
10-Feb	309	64	85	185	310	1160
11-Feb	312	65	79	199	308	1180
12-Feb	280	71	87	213	313	875
13-Feb	256	71	108	223	306	672
14-Feb	241	70	90	223	319	557
15-Feb	237	69	85	263	311	499
16-Feb	245	73	95	271	346	466
17-Feb	244	76	106	263	355	453
18-Feb	242	74	90	279	361	447
19-Feb	275	72	81	265	363	711
20-Feb	265	71	82	257	380	607
21-Feb	322	68	81	245	443	933
22-Feb	303	65	82	234	404	865
23-Feb	294	65	77	240	412	759
24-Feb	304	68	84	242	450	813
25-Feb	331	68	79	242	497	908
26-Feb	294	68	83	259	498	661
27-Feb	269	70	82	257	438	604
28-Feb	261	67	83	250	401	603
	321		141	261	562	
1-Mar	275	65	76	263	326	734
2-Mar	286	65	79	257	320	823
3-Mar	289	75	86	253	340	819
4-Mar	290	76	105	243	366	829
5-Mar	303	70	90	233	386	890

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
6-Mar	315	73	112	234	394	916
7-Mar	327	74	107	246	452	888
8-Mar	360	75	102	303	477	945
9-Mar	375	77	132	318	458	1010
10-Mar	408	75	135	348	534	1070
11-Mar	399	75	179	349	463	1100
12-Mar	388	80	168	295	457	1110
13-Mar	394	76	166	321	469	1120
14-Mar	397	93	169	301	459	1140
15-Mar	408	82	203	303	521	1130
16-Mar	421	114	168	286	579	1240
17-Mar	418	117	164	293	518	1280
18-Mar	415	112	158	281	494	1290
19-Mar	425	117	142	280	491	1370
20-Mar	431	134	165	299	491	1310
21-Mar	433	120	157	335	562	1220
22-Mar	487	116	159	326	737	1330
23-Mar	602	114	170	419	711	1880
24-Mar	597	106	187	491	713	1670
25-Mar	585	141	205	476	789	1430
26-Mar	565	115	230	485	853	1230
27-Mar	544	102	224	462	834	1200
28-Mar	523	108	210	512	673	1170
29-Mar	515	123	234	509	785	1080
30-Mar	513	143	248	526	631	1090
31-Mar	512	126	200	479	709	1150
1-Apr	525	118	200	452	802	1150
2-Apr	539	125	224	431	921	1180
3-Apr	557	134	203	399	945	1180
4-Apr	551	121	203	388	897	1240
5-Apr	558	103	204	384	889	1370
6-Apr	617	115	203	397	1010	1470
7-Apr	627	140	255	386	955	1660
8-Apr	680	139	278	373	1020	1880
9-Apr	671	143	291	335	1190	1700
10-Apr	645	133	283	364	1130	1580
11-Apr	626	145	274	418	966	1500
12-Apr	648	136	260	443	1090	1530
13-Apr	647	125	259	421	1170	1580
14-Apr	699	161	291	445	1290	1750
15-Apr	783	215	316	445	1420	1770
16-Apr	825	183	293	417	1460	2060
17-Apr	784	188	324	489	1440	1670
18-Apr	841	181	305	474	1560	2000

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
19-Apr	873	166	299	497	1630	2120
20-Apr	888	125	286	451	1630	2200
21-Apr	894	107	288	462	1630	2230
22-Apr	918	119	264	556	1680	2280
23-Apr	910	89	284	707	1530	2240
24-Apr	931	41	266	657	1560	2400
25-Apr	929	44	274	565	1610	2590
26-Apr	941	96	240	492	1460	2860
27-Apr	978	69	223	525	1500	3070
28-Apr	941	74	270	515	1350	2850
29-Apr	943	60	308	490	1280	2950
30-Apr	940	66	274	453	1230	3140
1-May	942	121	221	491	1220	3090
2-May	921	112	230	521	1290	3000
3-May	950	87	229	516	1170	3130
4-May	995	66	285	453	1120	3430
5-May	1080	46	269	410	1240	3870
6-May	1150	43	298	561	1470	4020
7-May	1230	52	310	712	1690	4100
8-May	1190	62	242	713	1530	3920
9-May	1090	68	198	628	1340	3610
10-May	1030	76	156	578	1380	3380
11-May	960	87	166	508	1430	3120
12-May	978	56	236	434	1500	3260
13-May	929	46	183	414	1200	3180
14-May	866	48	139	346	1250	3050
15-May	814	65	141	302	1280	2810
16-May	824	73	122	262	1350	2810
17-May	865	36	131	286	1600	2830
18-May	821	23	146	268	1460	2680
19-May	838	26	122	341	1370	2530
20-May	909	24	102	562	1470	2600
21-May	958	46	111	583	1940	2630
22-May	921	79	149	755	1560	2620
23-May	875	27	152	773	1300	2590
24-May	868	16	117	741	1430	2500
25-May	837	34	84	594	1260	2430
26-May	816	24	99	543	1400	2370
27-May	794	14	107	458	1370	2290
28-May	772	16	123	390	1240	2240
29-May	809	15	151	356	1440	2230
30-May	832	28	137	520	1680	2320
31-May	776	57	163	349	1590	2280
1-Jun	755	56	103	287	1550	2130

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
2-Jun	726	38	111	276	1280	1970
3-Jun	683	43	78	258	1300	1720
4-Jun	647	42	77	246	1030	1820
5-Jun	630	22	87	242	989	1910
6-Jun	606	22	89	225	930	1900
7-Jun	616	45	83	385	947	1910
8-Jun	569	15	71	296	985	1890
9-Jun	532	12	111	162	1100	1840
10-Jun	532	15	103	153	1140	1830
11-Jun	545	21	93	161	1120	1910
12-Jun	543	13	75	172	1020	1850
13-Jun	543	28	86	189	1270	1660
14-Jun	547	46	82	232	1160	1580
15-Jun	523	36	75	181	819	1630
16-Jun	523	35	96	190	849	1620
17-Jun	479	41	105	323	914	1230
18-Jun	444	57	84	267	849	1050
19-Jun	390	38	101	213	760	897
20-Jun	343	33	90	216	619	797
21-Jun	347	49	77	203	596	878
22-Jun	328	44	88	190	513	883
23-Jun	287	37	57	177	461	832
24-Jun	240	37	75	107	410	674
25-Jun	249	42	65	136	295	861
26-Jun	254	43	62	90	215	1060
27-Jun	229	40	53	102	193	927
28-Jun	198	45	51	96	195	724
29-Jun	173	31	42	103	240	512
30-Jun	172	32	40	127	245	481
1-Jul	155	36	53	117	201	418
2-Jul	139	43	58	122	182	354
3-Jul	129	47	61	122	172	273
4-Jul	113	31	55	93	154	248
5-Jul	104	41	52	89	135	221
6-Jul	89	44	51	73	84	199
7-Jul	90	45	53	71	109	207
8-Jul	85	39	57	71	102	185
9-Jul	87	35	55	71	116	166
10-Jul	88	30	54	65	140	165
11-Jul	95	47	65	80	122	174
12-Jul	91	50	53	68	123	165
13-Jul	83	43	53	69	131	154
14-Jul	84	36	46	72	110	179
15-Jul	86	43	50	71	107	170

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
16-Jul	83	36	46	64	128	157
17-Jul	91	34	49	92	136	185
18-Jul	83	30	44	76	119	169
19-Jul	85	26	47	80	104	163
20-Jul	81	25	48	79	115	140
21-Jul	79	29	51	75	105	138
22-Jul	74	32	43	65	98	138
23-Jul	82	34	40	71	131	152
24-Jul	87	26	38	92	119	163
25-Jul	88	34	45	90	128	167
26-Jul	86	35	40	71	130	195
27-Jul	86	35	45	65	112	197
28-Jul	89	33	52	69	122	183
29-Jul	85	26	52	72	124	153
30-Jul	86	24	57	78	115	156
31-Jul	86	31	47	68	133	172
1-Aug	90	33	45	70	158	180
2-Aug	82	26	42	65	112	174
3-Aug	92	26	51	93	116	172
4-Aug	107	32	46	99	127	264
5-Aug	102	28	47	69	122	275
6-Aug	91	32	42	73	101	225
7-Aug	93	33	44	65	116	255
8-Aug	81	24	43	59	116	181
9-Aug	79	25	34	71	116	168
10-Aug	78	23	34	64	97	189
11-Aug	73	26	35	66	103	165
12-Aug	67	28	32	48	100	141
13-Aug	64	24	30	51	90	132
14-Aug	56	21	29	45	90	114
15-Aug	55	17	26	47	93	112
16-Aug	60	26	29	47	105	115
17-Aug	62	26	30	45	86	137
18-Aug	63	19	30	46	85	137
19-Aug	82	24	30	54	110	217
20-Aug	82	25	30	79	96	189
21-Aug	82	18	36	85	93	184
22-Aug	79	24	40	81	101	150
23-Aug	86	25	39	71	112	200
24-Aug	76	25	33	50	132	158
25-Aug	71	25	36	56	109	141
26-Aug	70	22	34	64	94	127
27-Aug	63	19	29	60	90	110
28-Aug	65	20	33	77	86	105

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
29-Aug	62	25	33	62	82	106
30-Aug	63	18	29	64	93	113
31-Aug	69	22	29	72	105	130
1-Sep	73	24	29	64	122	150
2-Sep	77	23	34	54	113	157
3-Sep	75	23	31	79	107	160
4-Sep	76	20	29	55	101	197
5-Sep	75	18	24	52	107	193
6-Sep	74	22	35	49	110	162
7-Sep	75	20	32	70	93	166
8-Sep	76	16	26	54	102	200
9-Sep	79	15	26	55	112	224
10-Sep	83	15	30	49	122	251
11-Sep	96	15	39	65	125	280
12-Sep	98	16	40	57	134	260
13-Sep	90	16	23	73	104	253
14-Sep	100	16	20	75	116	288
15-Sep	104	16	26	68	141	306
16-Sep	92	12	25	64	132	246
17-Sep	82	19	27	56	133	191
18-Sep	73	17	24	54	133	153
19-Sep	65	16	21	57	106	135
20-Sep	66	14	20	45	126	175
21-Sep	77	13	20	56	154	198
22-Sep	90	14	21	65	151	208
23-Sep	97	13	27	77	146	261
24-Sep	95	12	28	62	121	283
25-Sep	82	18	28	52	120	214
26-Sep	74	19	28	55	120	173
27-Sep	71	13	21	46	121	148
28-Sep	67	9.9	16	43	127	154
29-Sep	69	9.1	22	53	104	168
30-Sep	66	12	23	46	110	153
1-Oct	77	11	23	56	138	175
2-Oct	76	11	18	64	142	175
3-Oct	76	11	18	61	144	159
4-Oct	91	8.1	19	91	151	200
5-Oct	87	12	18	80	144	199
6-Oct	78	14	26	76	114	172
7-Oct	83	13	32	90	115	168
8-Oct	92	13	31	107	120	205
9-Oct	111	13	29	112	151	267
10-Oct	98	12	29	90	126	241
11-Oct	85	12	26	61	119	224

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
12-Oct	89	17	26	92	128	221
13-Oct	93	14	33	111	120	232
14-Oct	107	12	33	110	155	258
15-Oct	118	10	35	106	198	255
16-Oct	120	23	47	94	203	270
17-Oct	100	14	38	92	149	243
18-Oct	92	12	28	95	118	233
19-Oct	103	13	43	97	117	280
20-Oct	97	25	59	94	102	244
21-Oct	100	37	69	88	104	241
22-Oct	103	46	75	88	111	238
23-Oct	107	63	83	90	111	239
24-Oct	113	69	86	95	116	243
25-Oct	117	85	89	96	117	244
26-Oct	124	76	81	98	135	276
27-Oct	122	77	90	102	130	252
28-Oct	126	76	96	105	138	259
29-Oct	119	72	81	99	135	242
30-Oct	117	67	79	95	141	231
31-Oct	116	67	79	96	131	230
1-Nov	118	75	84	103	130	225
2-Nov	121	73	84	101	133	245
3-Nov	123	68	77	96	128	284
4-Nov	121	62	72	93	145	268
5-Nov	120	58	70	90	169	255
6-Nov	122	58	72	86	197	251
7-Nov	128	56	74	86	216	266
8-Nov	130	58	72	90	218	269
9-Nov	130	59	71	89	220	272
10-Nov	135	62	72	93	222	280
11-Nov	140	68	75	90	223	309
12-Nov	150	70	74	85	222	363
13-Nov	147	65	79	88	212	360
14-Nov	151	61	79	103	225	352
15-Nov	149	60	74	102	216	381
16-Nov	154	65	77	101	237	363
17-Nov	162	70	72	111	248	365
18-Nov	143	68	74	101	186	360
19-Nov	138	66	77	90	178	347
20-Nov	134	57	76	90	165	353
21-Nov	144	63	79	111	164	370
22-Nov	139	63	80	108	155	356
23-Nov	138	69	78	107	153	335
24-Nov	142	67	86	109	163	333

		Percent Exceedance of Daily Flows on Weber River at Ogden, Ut				
Date	Mean	90%	75%	50%	25%	10%
25-Nov	139	66	83	101	165	344
26-Nov	134	68	75	97	164	334
27-Nov	132	65	74	94	163	330
28-Nov	132	70	77	89	158	322
29-Nov	132	67	81	96	161	312
30-Nov	131	62	80	88	178	308
1-Dec	155	58	74	98	213	419
2-Dec	152	58	76	85	210	425
3-Dec	153	63	74	90	212	430
4-Dec	153	61	66	100	211	436
5-Dec	159	59	75	96	241	438
6-Dec	160	65	71	93	264	434
7-Dec	164	60	69	91	296	432
8-Dec	166	58	68	99	324	425
9-Dec	167	62	79	92	314	425
10-Dec	176	62	85	101	303	425
11-Dec	172	60	80	103	304	375
12-Dec	180	62	79	130	308	375
13-Dec	179	57	83	121	306	377
14-Dec	180	53	81	120	306	377
15-Dec	172	63	88	113	300	375
16-Dec	200	62	80	107	344	488
17-Dec	185	67	79	105	341	381
18-Dec	170	57	77	105	316	375
19-Dec	162	57	72	105	295	375
20-Dec	157	59	65	108	286	375
21-Dec	156	61	67	106	280	355
22-Dec	157	59	72	97	289	357
23-Dec	202	61	76	98	322	571
24-Dec	261	60	78	104	288	994
25-Dec	231	65	86	103	308	770
26-Dec	201	63	88	105	302	575
27-Dec	181	66	85	98	299	462
28-Dec	170	58	76	92	299	407
29-Dec	161	51	65	90	307	372
30-Dec	162	61	73	91	298	374
31-Dec	157	59	72	89	271	374

12.02 TEMPORARY DIVERSION WATER SURFACE ELEVATIONS

Calculated Water Surface Elevations (WSEL) are based on limited survey and two-dimensional hydraulic modeling. Actual WSELs in the field may vary from those listed herein. Approximate WSELs are provided herein solely for the information of the CONTRACTOR.

WSELs will be affected by temporary flow obstructions of equipment, coffers, temporary alluvium placement or other construction activities. The WSELs provided in Table 2, 3, 4 and 5 are estimated given the coffer dam obstruction in the river at the location proposed in the plans. This coffer dam scheme assumes four separate setups.

The Stage 1 COW Plan would block off the river on the right side of the channel, at the crest of the existing dam, for a distance of approximately 40 feet. The work would focus on the river right bank boulder and abutment wall, concrete demo and pouring of new slab, as well as the fish passage side of the new upper structure. The access to the isolated work area would occur through an access bridge (37ft Span, see Table 2 below)). The upstream coffer dam would need to be set at a minimum elevation of 4282.5 feet to contain flows up to 450cfs. A separate downstream coffer dam will simultaneously need to be constructed to prevent backwatering from below at an assumed minimum elevation of 4280 feet (450cfs Backwater WSE behind coffer dam).

The Stage 2 configuration would block off the river on the left side of the channel, at the lower crest of the existing dam, for a distance of approximately 70 feet. The work would focus on the river left bank boulder and abutment wall, existing dam concrete demo and casting and pouring of new Surf Wave slab and walls, OHI Pneumatic gate system would be installed for this side of the channel during this phase. The upstream coffer dam would need to be set at a minimum elevation of 4283.5 feet to contain flows up to 450cfs. A separate downstream coffer dam will simultaneously need to be constructed to prevent backwatering from below at an assumed minimum elevation of 4280 feet (450cfs Backwater WSE behind coffer dam).

Once the upper drop is built and concrete cured, the Stage 3 configuration would block off the river, on the left side of the channel, 100 feet downstream of the upper drop, for a width of approximately 60 feet. The work would focus on the river left bank slab stone steps and boulder toe restoration, concrete access ramp, pool grading and work associated with the river left side of the Downstream drop (boulder placement, concrete work and OHI pneumatic gate system installation). The upstream coffer dam would need to be set at a minimum elevation of 4283.0 feet to contain flows up to 450cfs. A separate downstream coffer dam will simultaneously need to be constructed to prevent backwatering from below at an assumed minimum elevation of 4280 feet (450cfs Backwater WSE behind coffer dam).

The Stage 4 configuration would block off the river on the right side of the channel, approximately 100 feet downstream of the upper drop, for a width of approximately 60 feet. The work would focus on the downstream grade control structure and river right boulder wing and tie ins. The access to the isolated work area would occur through an access bridge (37ft Span, see Table 2 below) The upstream coffer dam would need to be set at a minimum elevation of 4282.0 feet to contain flows up to 450cfs. A separate downstream coffer dam will simultaneously need to be constructed to prevent backwatering from below at an assumed minimum elevation of 4280 feet (450cfs Backwater WSE behind coffer dam).

The monthly flows used to model and estimate these WSELs are within the range of flows observed at the project site during the anticipated construction season, as described in Table 1. These WSELs are estimates and only valid for the aforementioned Coffer Dam Alignment and Elevation. They should not be considered for other Coffer Dam Alignments or orientations. The CONTRACTOR is wholly responsible for monitoring and controlling WSELs during construction and any associated erosion, flooding, structure integrity or environmental damage.

Table 2 Approximate WSEL for the Proposed Stage 1 COW Plan (Per Project Plan Sheets CW01) Access Bridge span of 37ft @450cfs

Stage 1 COW Plan - Recreational Channel Stationing			
Flow Rate	Upstream Existing Dam WSEL (ft)	US Coffer Dam WSEL (ft)	DS Coffer Dam WSEL (ft)
50	4281.07	4280.62	4278.07
150	4281.44	4281.31	4278.51
227	4281.51	4281.66	4279.69
450	4282.1	4282.40	4279.80

Table 3 Approximate WSEL for the Proposed Stage 2 COW Plan (Per Project Plan Sheets CW02)

Stage 2 COW Plan - Recreational Channel Stationing			
Flow Rate	Upstream Existing Dam WSEL (ft)	US Coffer Dam WSEL (ft)	DS Coffer Dam WSEL (ft)
50	4281.07	4281.19	4278.33
150	4281.44	4281.97	4278.81
227	4281.51	4282.40	4279.04
450	4282.1	4283.43	4279.87

Table 4 Approximate WSEL for the Proposed Stage 3 COW Plan (Per Project Plan Sheets CW03)

Stage 3 COW Plan - Recreational Channel Stationing			
Flow Rate	Existing WSEL (ft) @ COW3 US Coffer dam Location	US Coffer Dam WSEL (ft)	DS Coffer Dam WSEL (ft)
50	4277.76	4279.93	4277.17
150	4278.85	4281.23	4277.85
227	4279.95	4281.76	4278.21
450	4279.95	4282.68	4279.70

Table 5 Approximate WSEL for the Proposed Stage 4 COW Plan (Per Project Plan Sheets CW04) – Access Bridge span of 37ft @450cfs

Stage 4 COW Plan - Recreational Channel Stationing			
Flow Rate	Existing WSEL (ft) @ COW4 US Coffer dam Location	US Coffer Dam WSEL (ft)	DS Coffer Dam WSEL (ft)
50	4277.76	4278.64	4277.15
150	4278.85	4279.32	4277.92
227	4279.95	4279.72	4278.32
450	4279.95	4280.67	4279.64

END OF SECTION

SECTION 13 MODIFICATIONS TO TIME OF COMPLETION

13.01 CONSTRUCTION WINDOW

Anticipated Construction window is 180 calendar days from January 1st, 2026 through November 30th, 2026 with a contract suspension period during spring runoff months (March-May). All removal of large trees should occur before the bird migratory nesting season starts in March.

If IN-STREAM construction is anticipated to take place outside of these dates, CONTRACTOR shall notify OWNER in writing. ON-SHORE construction may take place outside of these dates with OWNER approval. OWNER shall be notified of any work anticipated outside of these dates.

No construction activities shall be performed on soil during periods when the soil is too wet to adequately support construction equipment as measured by ruts greater than 4 inches deep.

The date of beginning and the time for completion of the work are essential conditions of the Contract Documents and the work embraced shall be commenced on a date specified in the Notice to Proceed. The Contractor will proceed with the work at such rate of progress to ensure full completion within the Contract time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the Contract time for the completion of the work described herein is a reasonable time, taking into consideration the climatic and other factors prevailing in the locality of the work. Every effort shall be made by the Contractor to complete the project within the "Contract Time" shown in the bid, quote or proposal. The "Contract Time" anticipates "Normal" weather and climate conditions in and around the vicinity of the Project site during the times of year that the construction will be carried out. Freezing conditions are likely to be regularly encountered during the construction window.

Frazil ice is a winter occurrence throughout much of Utah. Ice can pile up significantly on many in-channel obstructions. CONTRACTOR is wholly responsible for maintaining conditions that prevent buildup of ice during construction and for delays associated with ice.

SECTION 14 DEFINITIONS

B-Axis - The intermediate (and overturning) axis on a boulder.

Best Management Practices (BMPs) - Water and Soil Care Measures designed to prevent sediment soil erosion, minimize turbidity and protect wetlands.

Care of Water (COW) - Any and all measures implemented to predict the native flow of a watershed and to manage, divert and control that flow in order to access and perform the work and simultaneously minimize impacts on the environment, property and infrastructure.

Coffer Dam - Structure used to isolate an area for dewatering.

Ordinary High-Water Line (OHWL) - Approximate Water Surface Elevation at the 1 ½ year Flood.

Obermeyer Hydro Inc (OHI)

In-Channel Work - All construction work occurring below the ordinary high-water line or one and a half year flood or in a wet channel.

Invert - The cross-section that controls water flow.

On-Shore Work - All construction work occurring above the ordinary high-water line or one and a half year flood.

Protect-In-Place - Protection of Structures or Vegetation by not disturbing them with adjacent construction activities.

Thalweg - Lowest elevation of the river channel in cross section perpendicular to the direction of the main current flow.

Toe - Point where a ground slope meets a low point and flattens out. Most commonly in rivers it refers to the point where the bank slope meets the channel bottom slope.

River Right - The right side of the channel when looking downstream.

River Left - The left side of the channel when looking downstream.

Riparian Vegetation - Vegetation which is rooted in the water table of the adjacent river which includes the drip line of all mature trees that are protected in place.

Water Surface Elevation - Elevation on the project datum, of the surface of water at a specified location.
Waters of the United States - Any waters that are relatively permanent, meaning they contain water at least seasonally; and Wetlands that directly abut relatively permanent waters

PART IV

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APPENDIX A Project Drawings

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
WEBER RIVER - OGDEN, UT
October 2025

BID SET

SHEET INDEX

CONTACTS

Mr. Phil Suiter
Ogden City Corporation - Engineering
Ogden City
(801) 629-8971

Mr. Francois Escorihuela
Lead Design Engineer
RiverRestoration.org, LLC.
(970) 947-9568

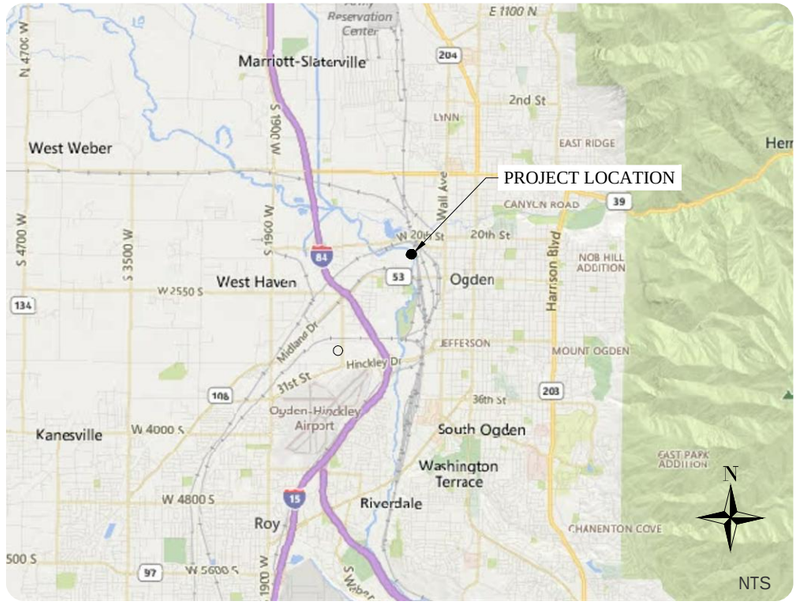
Mr. Jason Carey, P.E.
Project Manager
RiverRestoration.org, LLC.
(970) 947-9568

NOTE

Utilities shown on plans are approximate. Contractor wholly responsible for field locating & protecting in place utilities

LOCATION MAP

VICINITY MAP



BID SET

PROFESSIONAL ENGINEER STAMP

JASON CAREY 10/26/2025

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
COVER SHEET

No.	REVISION/UPDATE	Date
1	REVISION	12/2/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
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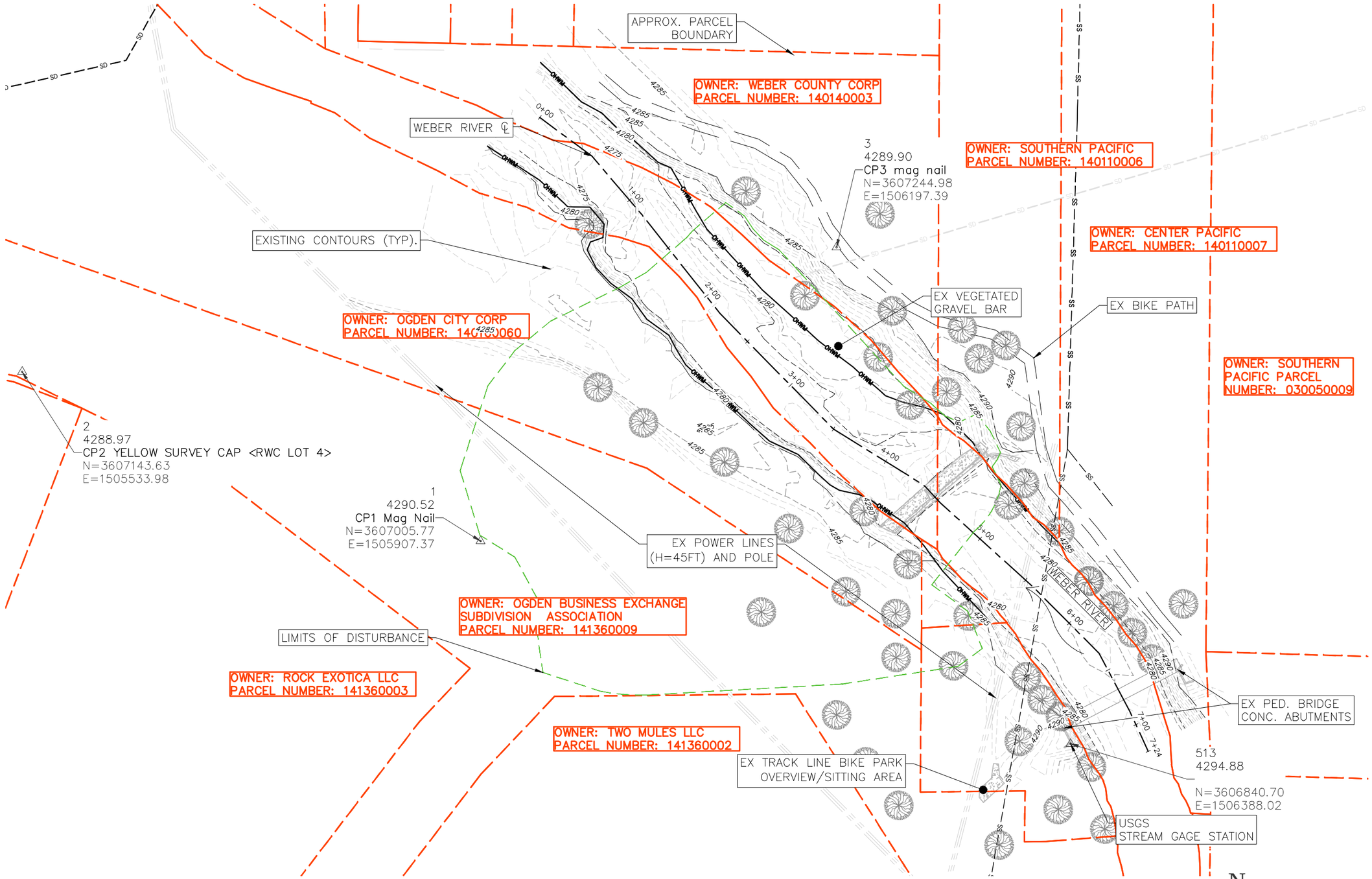
Date: OCTOBER 2025	
Scale: NTS	



SURVEY NOTES:

1. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
2. HORIZONTAL COORDINATE SYSTEM: UTAH STATE PLANE, NORTH AMERICAN DATUM 1983 (NAD83), NORTH ZONE, US FOOT

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
BASE MAP & HORIZONTAL CONTROL PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

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www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
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Date: OCTOBER 2025	
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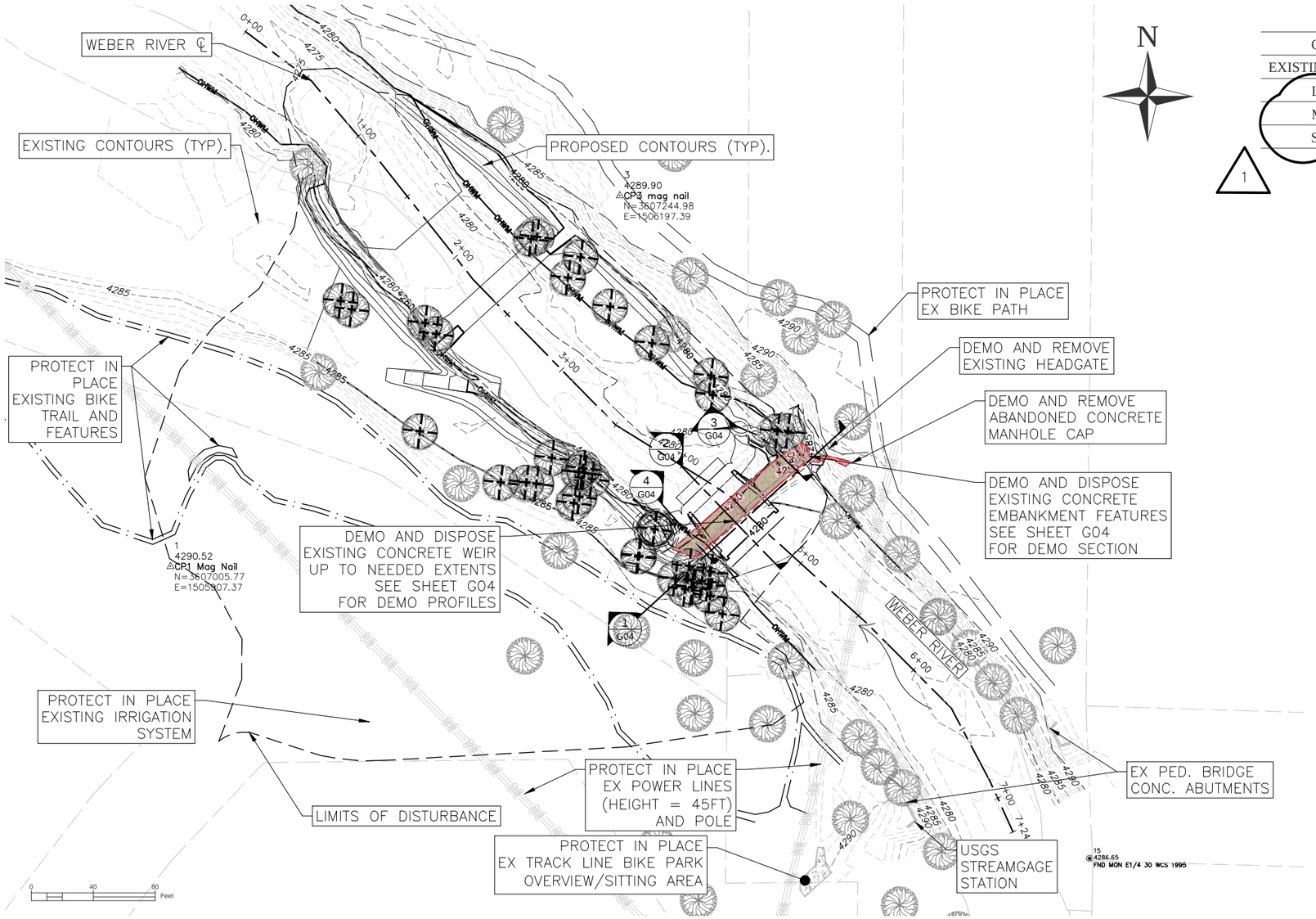

N

DEMO ITEMS

GENERAL EXCAVATION & STOCKPILING (PROJECT TOTAL)	3980	CY
EXISTING CONCRETE DEMOLITION AND HAUL OFF AND DISPOSAL	186	CY
LARGE TREE (24”-32” DIA.)	1	EA
MEDIUM TREES (12”-23.9” DIA.)	8	EA
SMALL TREES (6”-11.9” DIA.)	30	EA

1

4 / G03 EXISTING ABANDONED CONCRETE MANHOLE CAP & ABANDONED HEADGATE

5 / G03 EXISTING CONCRETE WEIR AND RIVER LEFT BANK VIEW

1 / G03 EXISTING CONCRETE WEIR

2 / G03 EXISTING CONCRETE WEIR & RIVER RIGHT EMBANKMENT

3 / G03 RIVER RIGHT CONCRETE EMBANKMENT (DETAIL)

TO BE REMOVED

TO PROTECT IN PLACE

REMOVE AND DISPOSE EXISTING TREE

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
DEMOLITION & PROTECT IN PLACE PLAN

No.	REVISION/UPDATE	Date
1	DEMO TREE UPDATES	11/21/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

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PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

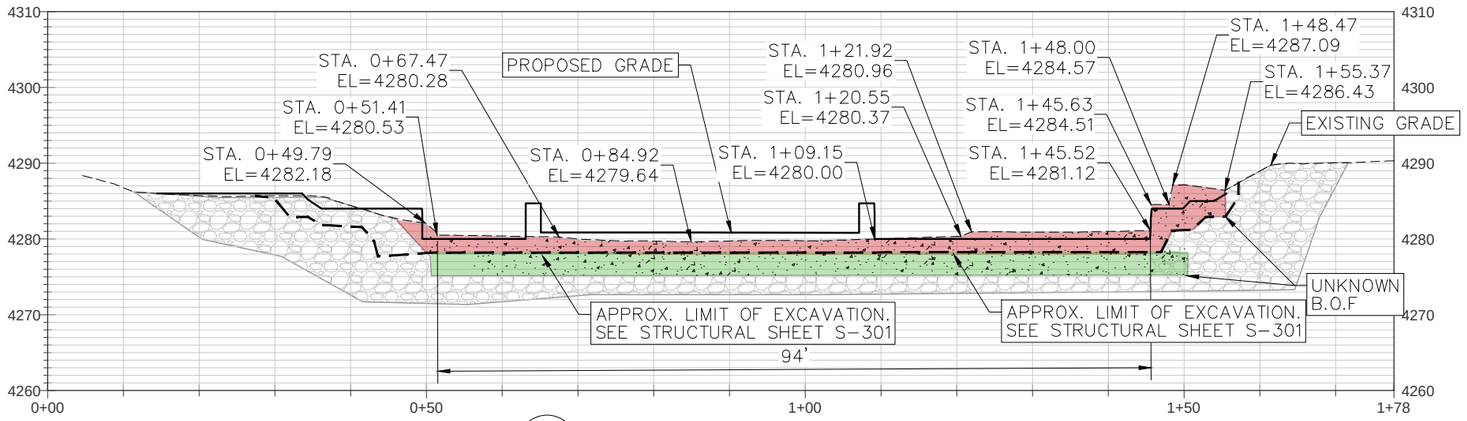
Ogden Business Exchange Surf Wave

Project 45072

Date OCTOBER 2025

Scale 1" = 40' (FULL SIZE)

Sheet G03



1 / G04 EXISTING WEIR / SURF WAVE DROP CREST SECTION

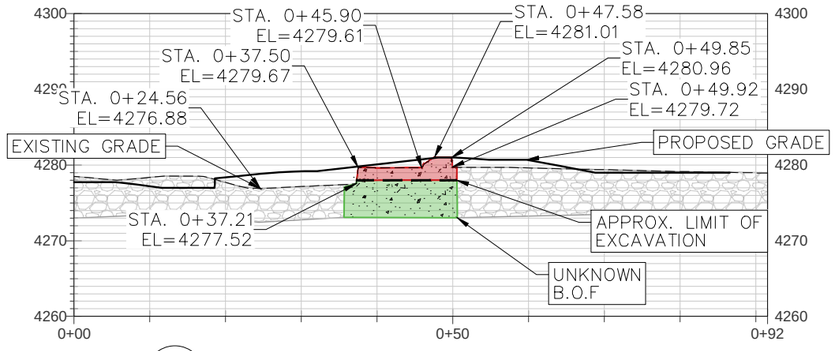
TO BE REMOVED

TO PROTECT IN PLACE

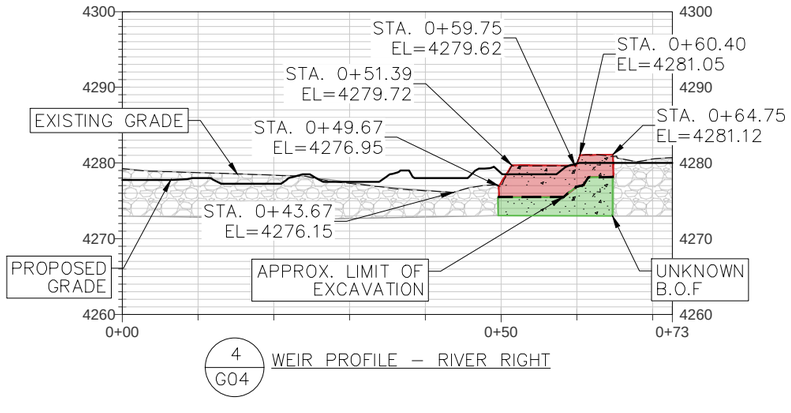
NOTE:

ASSUMED TYPICAL EXCAVATION RELATIVE TO PROPOSED GRADE, UNLESS OTHERWISE NOTED, :

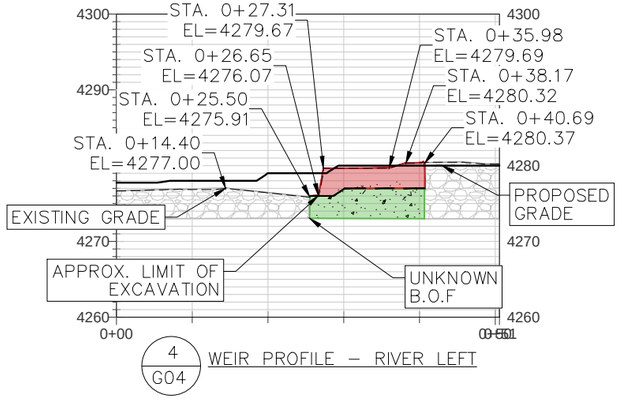
- -2' FOR CONCRETE
- -3' FOR BOULDER PLACEMENT
- FOUNDATION OF RIVER RIGHT ABUTMENT WALL TO SEAT ON EXISTING CONCRETE IF SUITABLE



1 / G04 EXISTING WEIR / SURF WAVE DROP ℄ PROFILE



4 / G04 WEIR PROFILE – RIVER RIGHT



4 / G04 WEIR PROFILE – RIVER LEFT

0 10 20 Feet

BID SET

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
07/24/2025
STATE OF UTAH

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
DEMOLITION & PROTECT
SECTION AND PROFILES

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

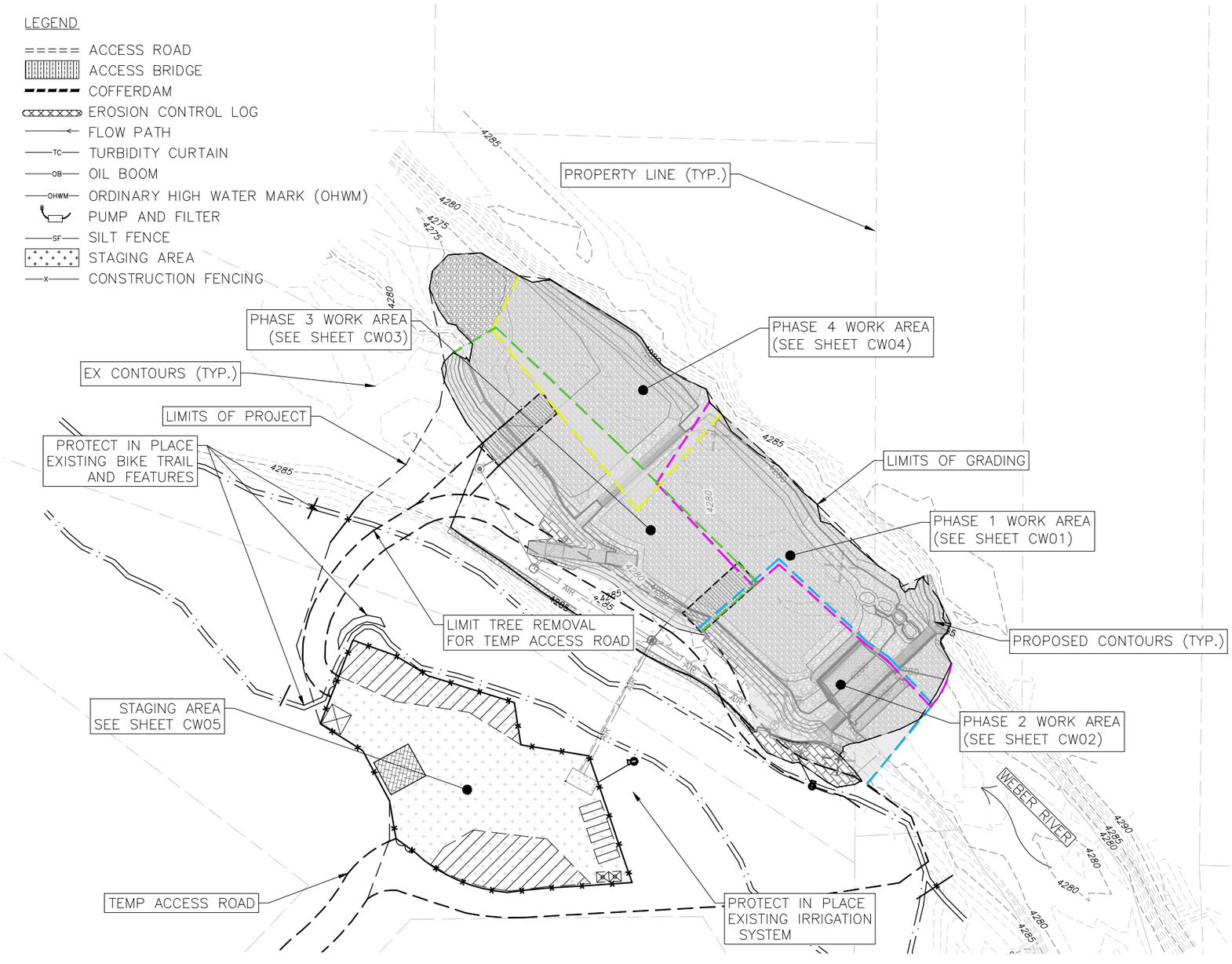
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	G04
Date: OCTOBER 2025	
Scale: 1" = 10' (FULL SIZE)	

LEGEND

- ACCESS ROAD
- ACCESS BRIDGE
- COFFERDAM
- EROSION CONTROL LOG
- FLOW PATH
- TC — TURBIDITY CURTAIN
- OB — OIL BOOM
- OHWM — ORDINARY HIGH WATER MARK (OHWM)
- PUMP AND FILTER
- SF — SILT FENCE
- STAGING AREA
- X — CONSTRUCTION FENCING



EROSION CONTROL AND CARE OF WATER NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS AND BEST MANAGEMENT PRACTICES (BMP'S).
2. CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPMENT OF STAGING AREAS, ACCESS, AND CARE OF WATER DURING CONSTRUCTION.
3. IF ISOLATION FROM THE FLOWING RIVER IS DESIRED DURING CONSTRUCTION, CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION OF ISOLATION PLAN.
4. CONTRACTOR IS RESPONSIBLE FOR DEMOBILIZATION OF EQUIPMENT TO AVOID DESTABILIZATION OF EQUIPMENT AND PARTIALLY CONSTRUCTED FEATURES. SEE SPECIFICATIONS FOR REQUIREMENTS AND DETAILS.
5. UTILITY LOCATIONS SHOWN IN PLANS ARE APPROXIMATE, CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY LOCATES INCLUDING UTILITIES NOT SHOWN IN PLANS.
6. MINIMIZE TREE CUTTING IN MATURE FOREST WITHIN DISTURBANCE AREA. ANY TREES OUTSIDE THE ITEM NUMBER IN COST OPINION WILL NEED TO BE APPROVED BEFORE CUTTING

CARE OF WATER SEQUENCE:

COW PHASE 1 (CW01):

1.1 SALVAGE AND REMOVE ABANDONED CONCRETE MANHOLE CAP;

1.2 SALVAGE AND REMOVE EXISTING HEADGATE;

1.3 DEMO AND DISPOSE EX. CONCRETE EMBANKMENT FEATURES;

1.4 DEMO AND DISPOSE RIVER RIGHT SIDE OF EXISTING CONCRETE WEIR;

1.5 REBUILD BANK;

1.6 GRAVEL BAR EXCAVATION, AND POOL GRADING;

1.7 BOULDER PLACEMENT FOR RIVER RIGHT BANK TIE IN AND FISH PASSAGE CHANNEL;

1.8 POUR CREST CONCRETE SLAB AND INSTALL OHI GATE SYSTEM;

COW PHASE 2 (CW02):

2.1 DEMO AND DISPOSE RIVER LEFT SIDE OF EX CONCRETE WEIR;

2.2 BUILD BANK AND RIVER LEFT WING;

2.3 POUR CREST CONCRETE SLAB AND INSTALL OHI GATE SYSTEM;

2.4 CAST AND POUR CONCRETE SLAB AND WALLS FOR SURF WAVE FEATURE; INSTALL OHI GATE SYSTEM;

2.6 SCOUR PAD, POOL AND RIVER LEFT UPSTREAM BANK IMPROVEMENTS (LAID BACK STEPS AND VIEWING PLATFORM).

COW PHASE 3 (CW03):

3.1 LEFT BANK AND BANK TOE RESTORATION;

3.2 ACCESS RAMP;

3.3 POOL GRADING;

3.4 DOWNSTREAM GRADE CONTROL STRUCTURE (G.C.S), CONCRETE AND BOULDER PLACEMENT;

3.5 INSTALL OHI GATE SYSTEM;

COW PHASE 4 (CW04):

4.1 DOWNSTREAM G.C.S & RIVER RIGHT BOULDER WING;

4.2 BANK TIE IN AND GRADING.

ALL OTHER WORK, AS PER RIFFLE GRADE BELOW G.C.S, IN WET WITH DOWNSTREAM OIL BOOM AND TURBIDITY CURTAIN IN PLACE AT ALL TIMES.

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

CARE OF WATER OVERVIEW AND NOTES

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
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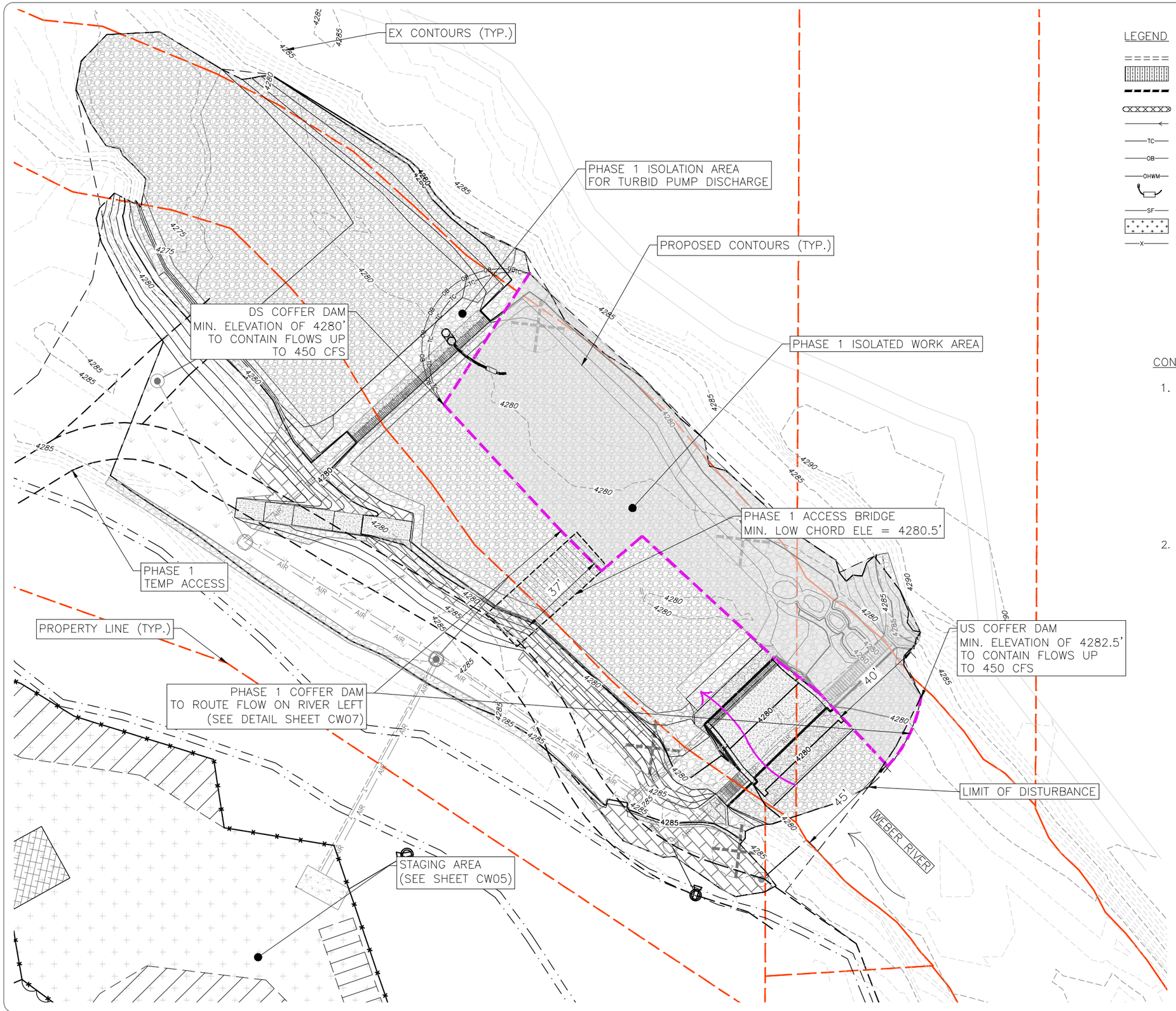
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW00
Date: OCTOBER 2025	
Scale: 1" = 40' (FULL SIZE)	



LEGEND

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- ACCESS BRIDGE
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- TC — TURBIDITY CURTAIN
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- X — CONSTRUCTION FENCING

CONSTRUCTION NOTES:

1. SEE SHEET CW00 AND TECHNICAL SPECIFICATIONS, SECTIONS 2 AND 3 FOR A DETAILED DESCRIPTION OF CONTRACTOR REQUIREMENTS CONCERNING EROSION CONTROL (NPDES) AND CARE OF WATER (USACE 404, UDWQ 401); & SECTION 12 FOR EXISTING PROJECT SITE HYDROLOGY AND TEMPORARY DIVERSION WATER SURFACE ELEVATIONS.
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BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CARE OF WATER PHASE 1

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

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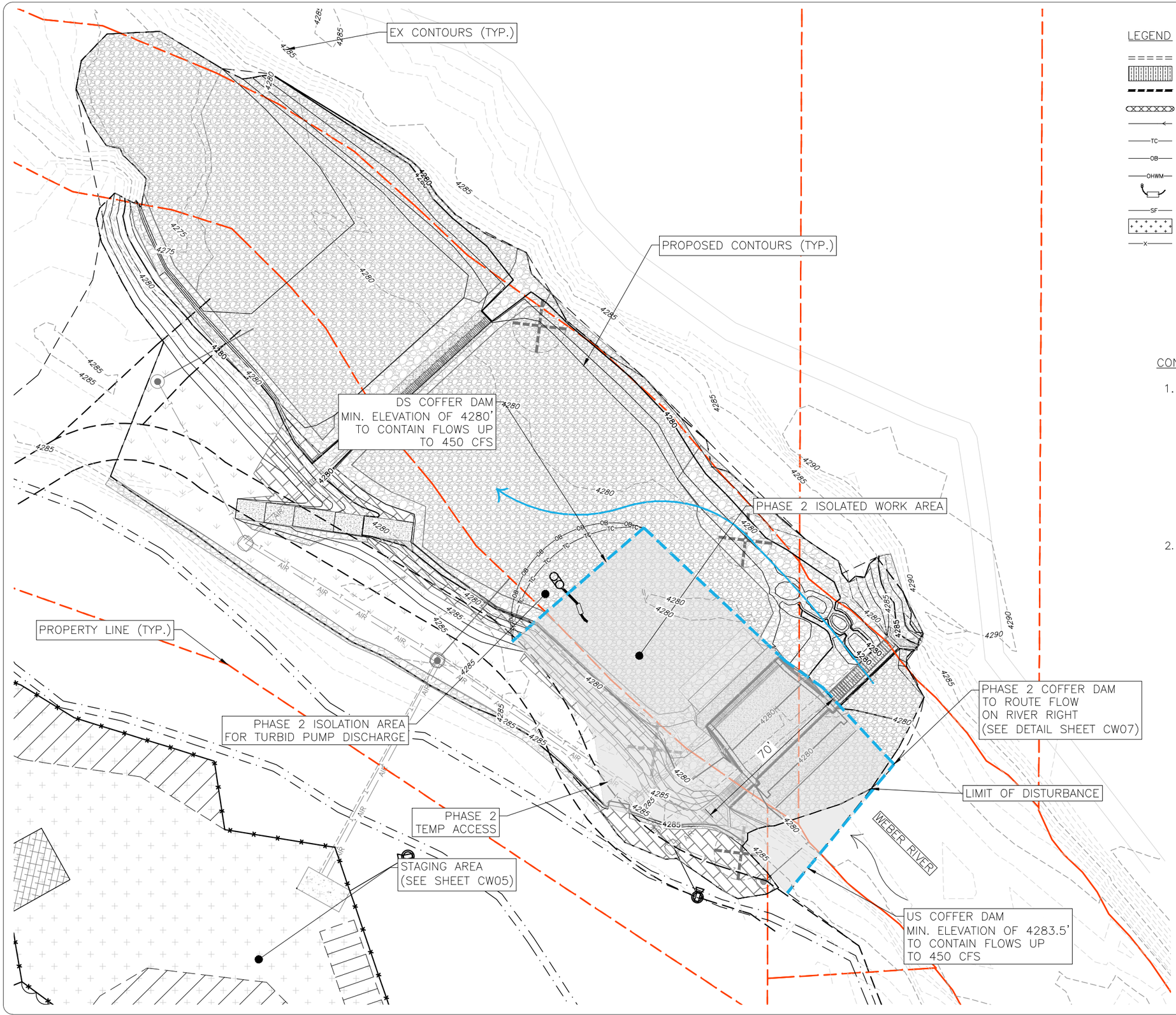
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW01
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	



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BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CARE OF WATER PHASE 2

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

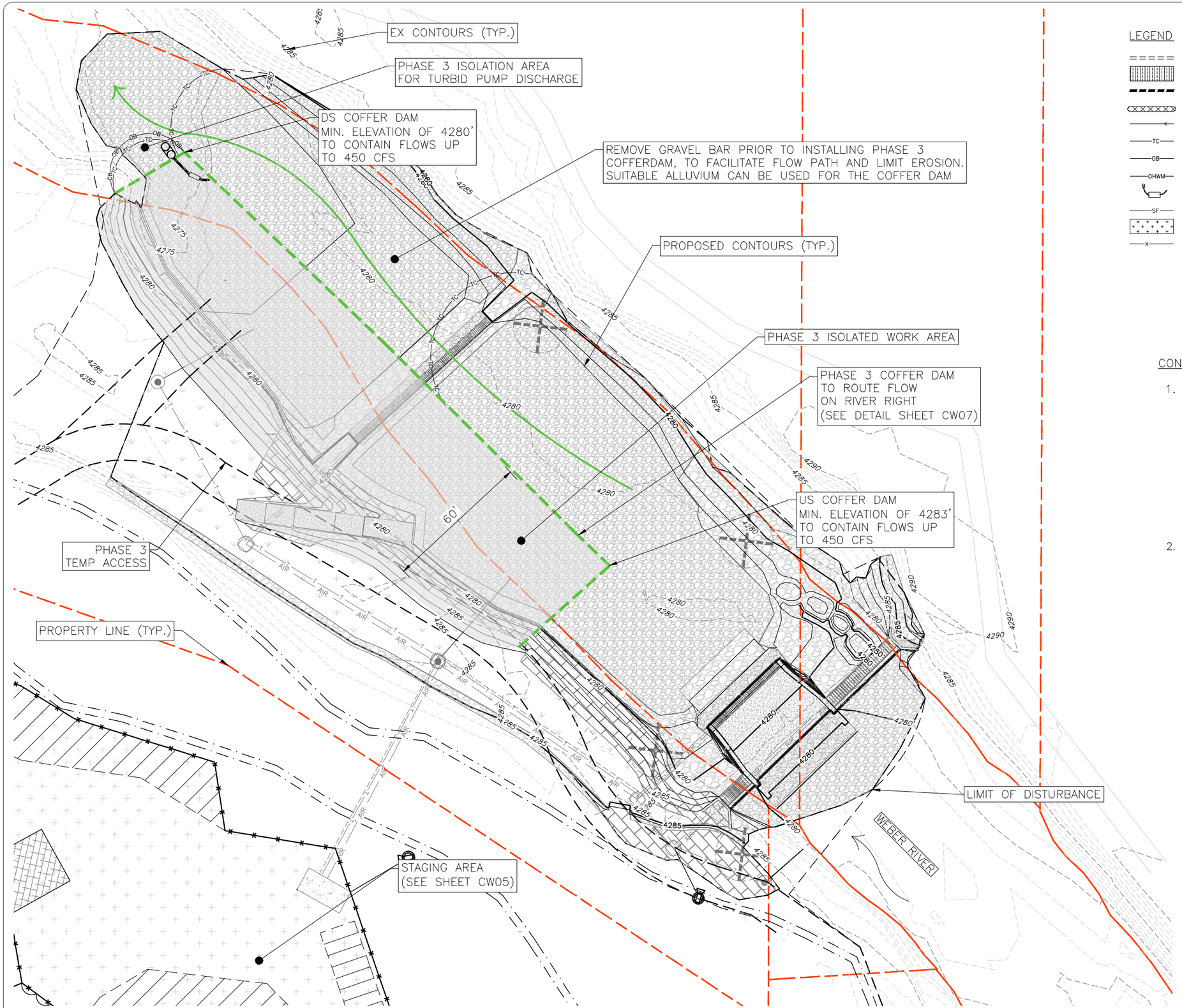
RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW02
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	



LEGEND

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N

0 20 40 Feet

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CARE OF WATER PHASE 3

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

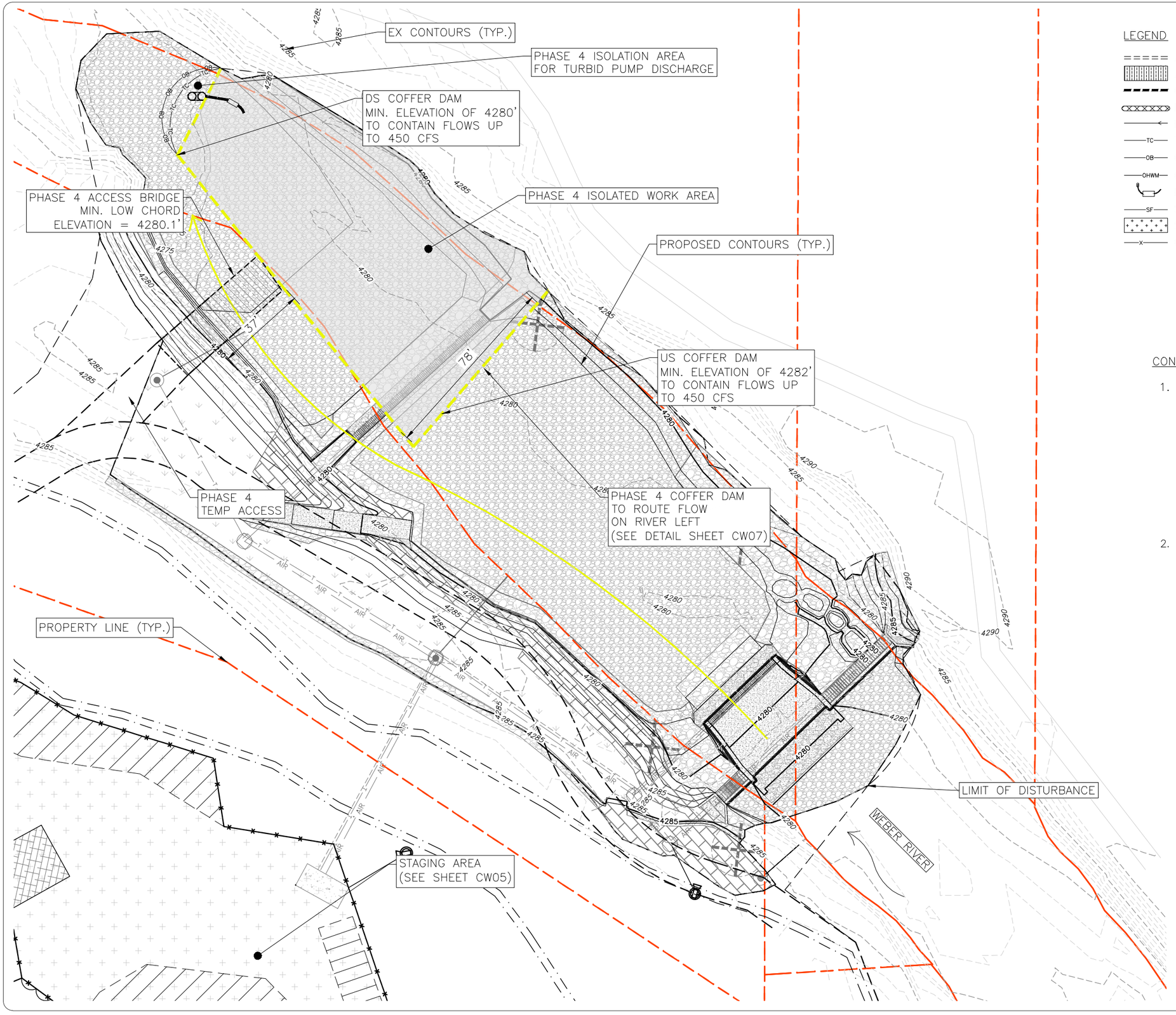
RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW03
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	



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BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CARE OF WATER PHASE 4

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
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PROJECT NAME AND ADDRESS

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Project	Sheet
45072	CW04
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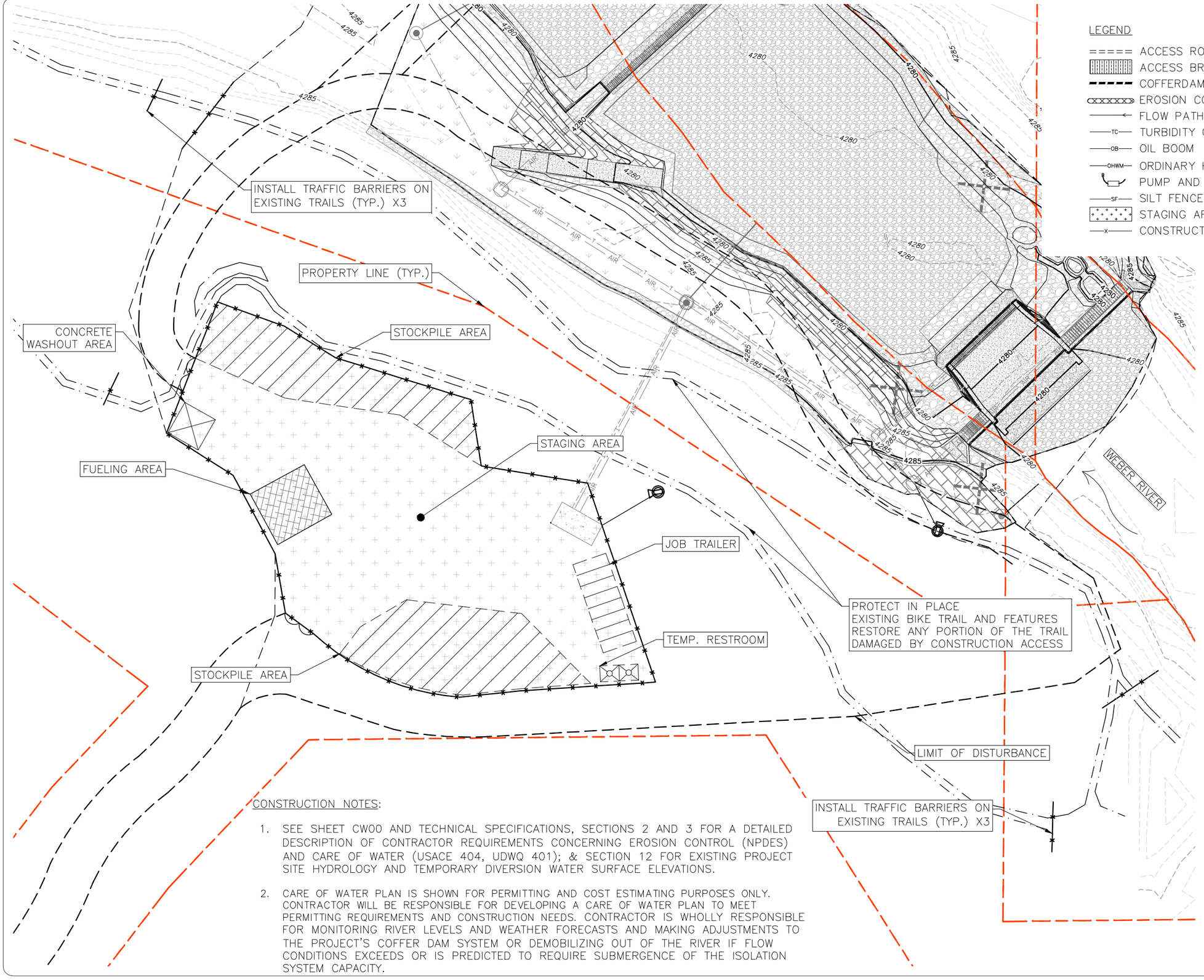

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2. CARE OF WATER PLAN IS SHOWN FOR PERMITTING AND COST ESTIMATING PURPOSES ONLY. CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING A CARE OF WATER PLAN TO MEET PERMITTING REQUIREMENTS AND CONSTRUCTION NEEDS. CONTRACTOR IS WHOLLY RESPONSIBLE FOR MONITORING RIVER LEVELS AND WEATHER FORECASTS AND MAKING ADJUSTMENTS TO THE PROJECT'S COFFER DAM SYSTEM OR DEMOBILIZING OUT OF THE RIVER IF FLOW CONDITIONS EXCEEDS OR IS PREDICTED TO REQUIRE SUBMERGENCE OF THE ISOLATION SYSTEM CAPACITY.

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CARE OF WATER STAGING AREA

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

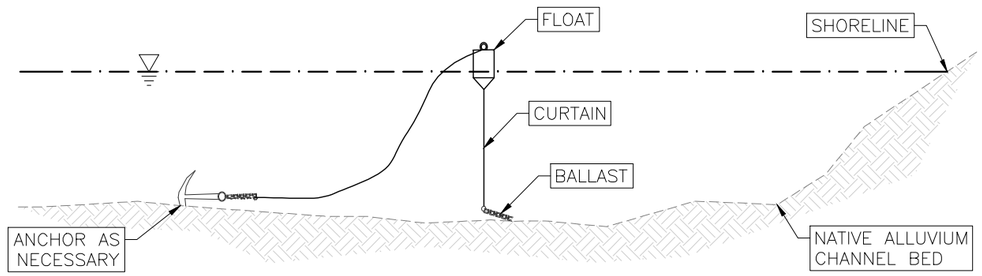
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

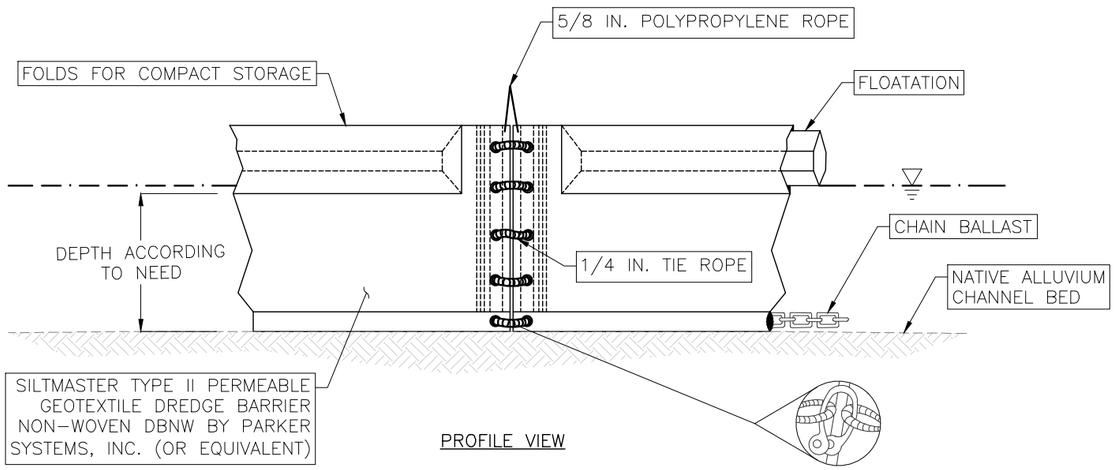
Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW05
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	

ORIENTATION WHEN INSTALLED

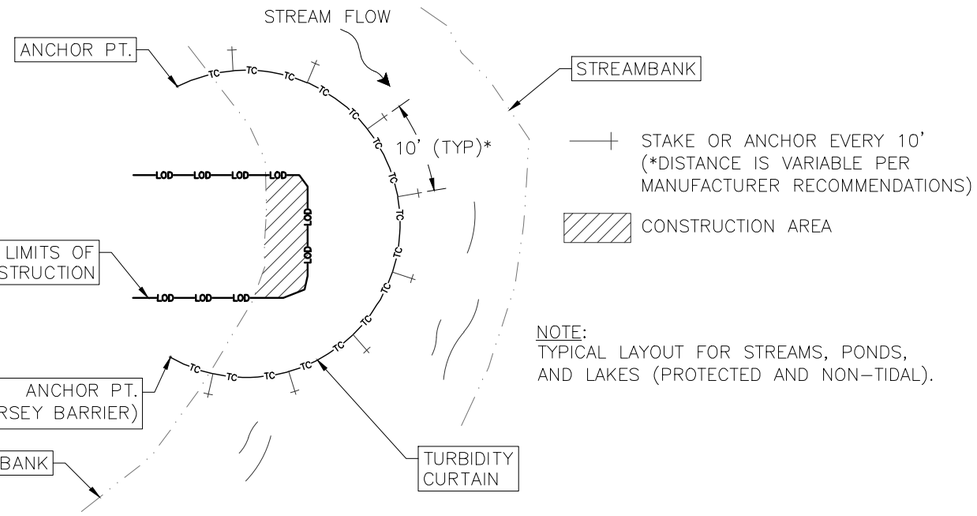


SECTION VIEW



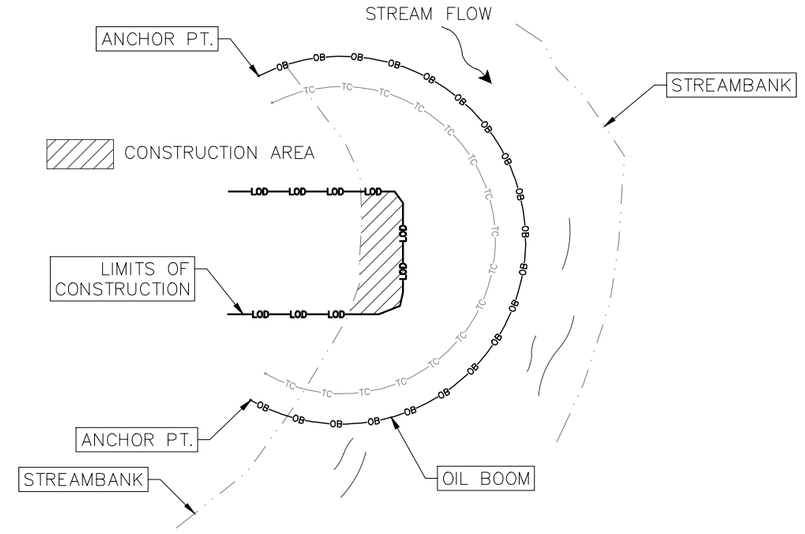
PROFILE VIEW

(BLOW-UP OF SHACKLE CONNECTION)



NOTE:
TYPICAL LAYOUT FOR STREAMS, PONDS, AND LAKES (PROTECTED AND NON-TIDAL).

1 CW06 TURBIDITY CURTAIN (TYP)
PLAN VIEW – NTS



NOTE:
TYPICAL LAYOUT FOR STREAMS AND RIVERS. OIL BOOM TO BE PLACED BEHIND TURBIDITY CURTAIN AND DOWNSTREAM OF ANY EQUIPMENT WORKING IN THE WET.

2 CW06 OIL BOOM (TYP)
PLAN VIEW – NTS

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

CARE OF WATER DETAILS 1 OF 2

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

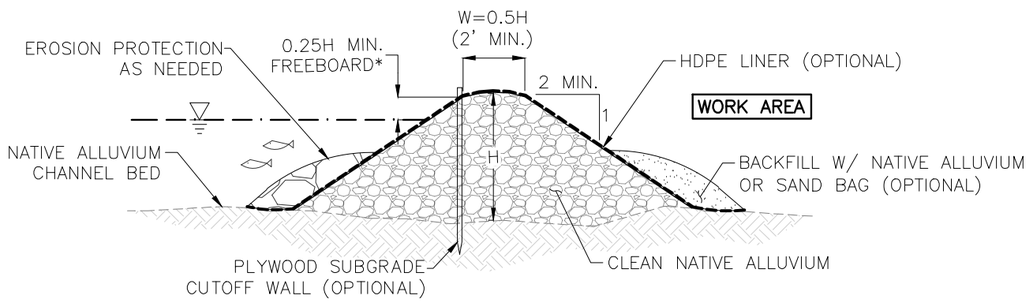
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW06
Date: OCTOBER 2025	
Scale: NTS	

NOTE:
HMAX=8.0'
WMIN=0.5H; MIN FREEBOARD*=0.25H; MAX DEPTH=6'

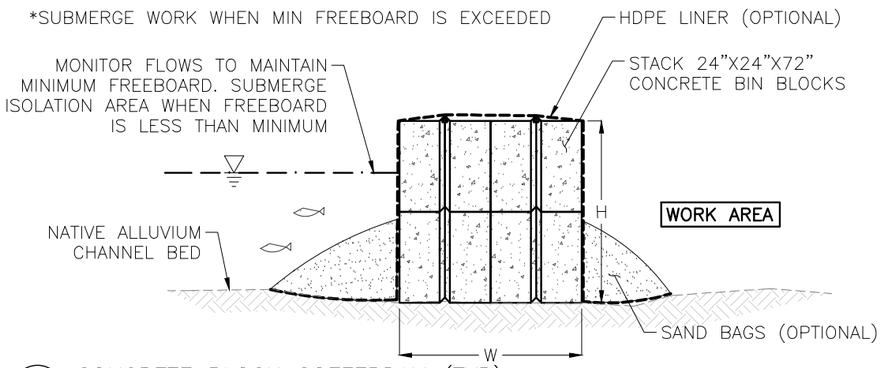
*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED



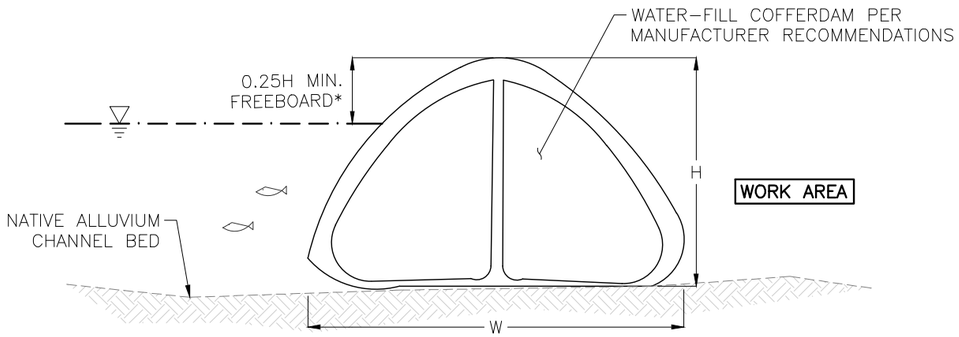
1 CW07 ALLUVIUM COFFERDAM (TYP)
SECTION VIEW – NTS

NOTE:
H MAX=8.0'
MAX H=W; MIN FREEBOARD*=0.25H; MAX DEPTH=0.75H

*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED



2 CW07 CONCRETE BLOCK COFFERDAM (TYP)
SECTION VIEW – NTS



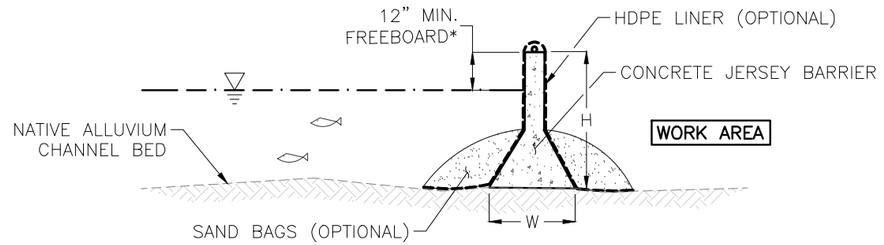
3 CW07 WATER-FILLED COFFERDAM (TYP)
SECTION VIEW – NTS

NOTE:
H MAX = PER MANUFACTURERS RECOMMENDATIONS.
W MIN = PER MANUFACTURERS RECOMMENDATIONS.

*SUBMERGE WORK WHEN MINIMUM FREEBOARD IS EXCEEDED

NOTE:
H MAX=34" (TYP. JERSEY BARRIER HEIGHT)
W MIN=23" (TYP. JERSEY BARRIER BASE WIDTH)
MIN FREEBOARD*=12"
MAX DEPTH=0.75H

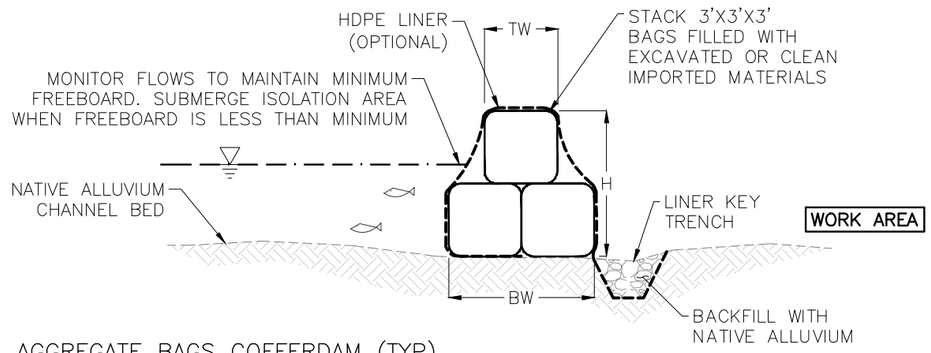
*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED



4 CW07 JERSEY BARRIER COFFERDAM (TYP)
SECTION VIEW – NTS

NOTE:
H MAX = 8.0'
BW MIN = H
MIN FREEBOARD* = 0.25H
MAX DEPTH = 0.75H
TW = H/2

*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED



5 CW07 AGGREGATE BAGS COFFERDAM (TYP)
SECTION VIEW – NTS

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

CARE OF WATER DETAILS 2 OF 2

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

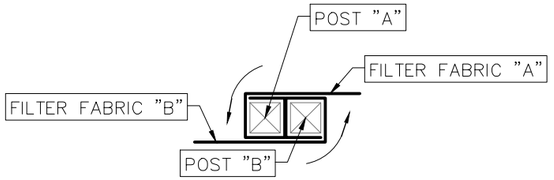
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW07
Date: OCTOBER 2025	
Scale: NTS	

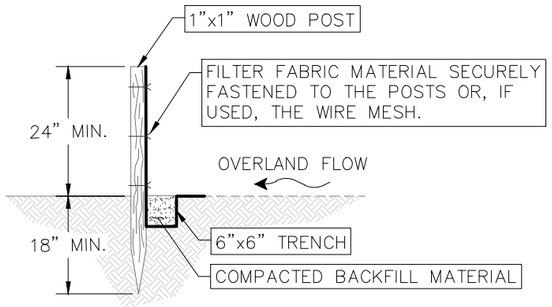


JOINING SECTION DETAIL (PLAN VIEW)

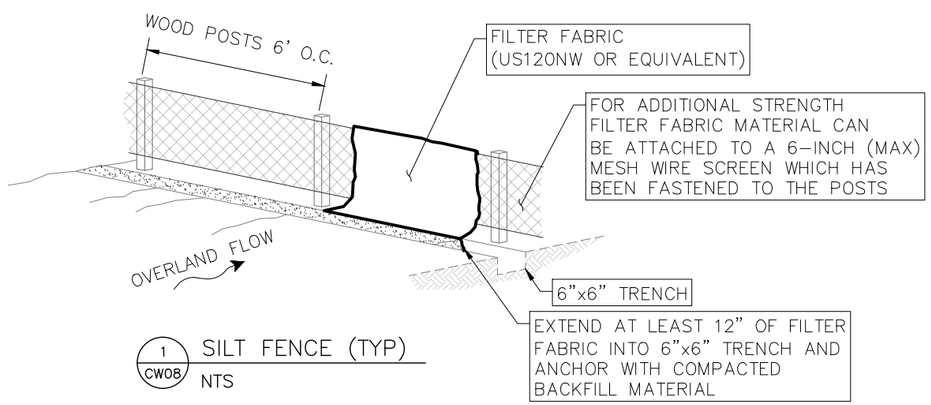
SILT FENCE JOINING NOTES:

1. WRAP APPROXIMATELY 6" OF FILTER FABRIC OF EACH END AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH HEAVY DUTY WIRE STAPLES AT LEAST 1" LONG.
2. POST SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.

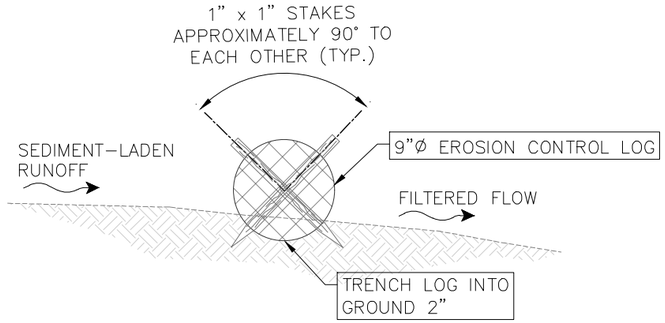
END SECTION DETAIL (PLAN VIEW)



SECTION VIEW



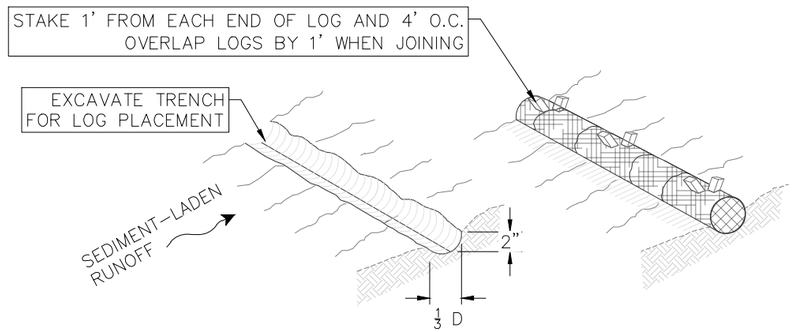
1 / CW08 SILT FENCE (TYP)
NTS



SECTION VIEW

EROSION CONTROL LOG INSTALLATION NOTES:

1. EXCAVATE TRENCH 2".
2. PLACE AND STAKE EROSION CONTROL LOG.
3. PLACE SPOILS UP-SLOPE FROM LOG, KNIFE-IN AND COMPACT.



2 / CW08 EROSION CONTROL LOG INSTALLATION (TYP)
NTS

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

EROSION CONTROL DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

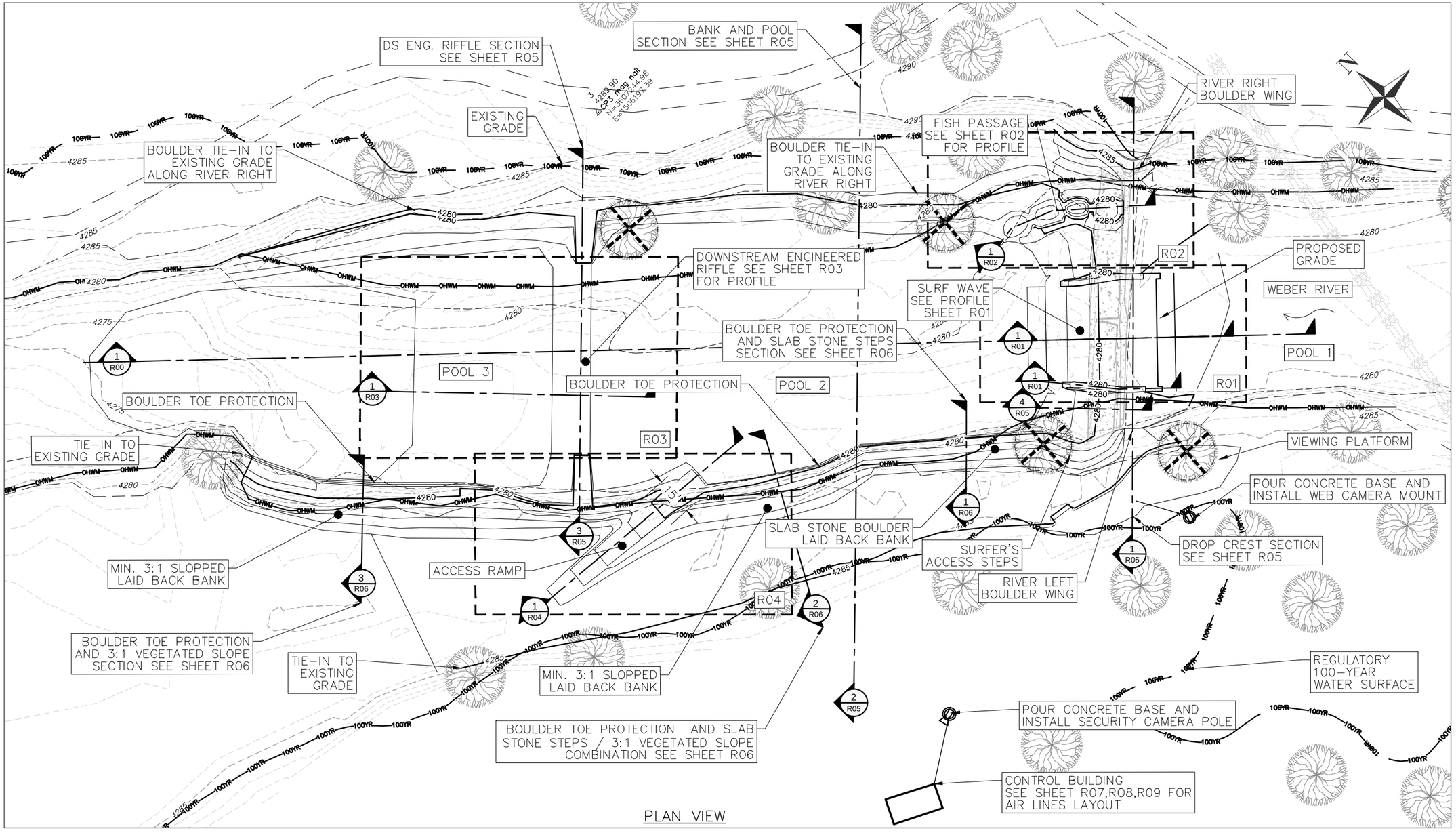
PROJECT NAME AND ADDRESS

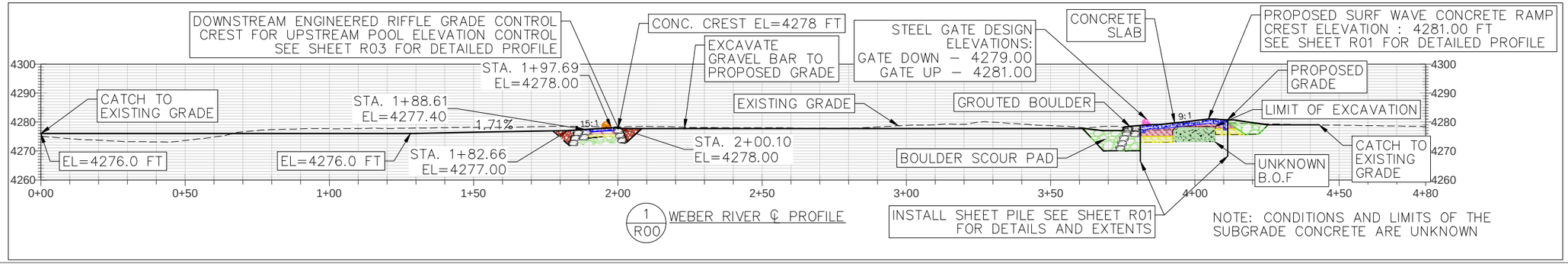
Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
45072	CW08
Date: OCTOBER 2025	
Scale: NTS	

BID SET





BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

PLAN VIEW, PROFILE AND INDEX

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

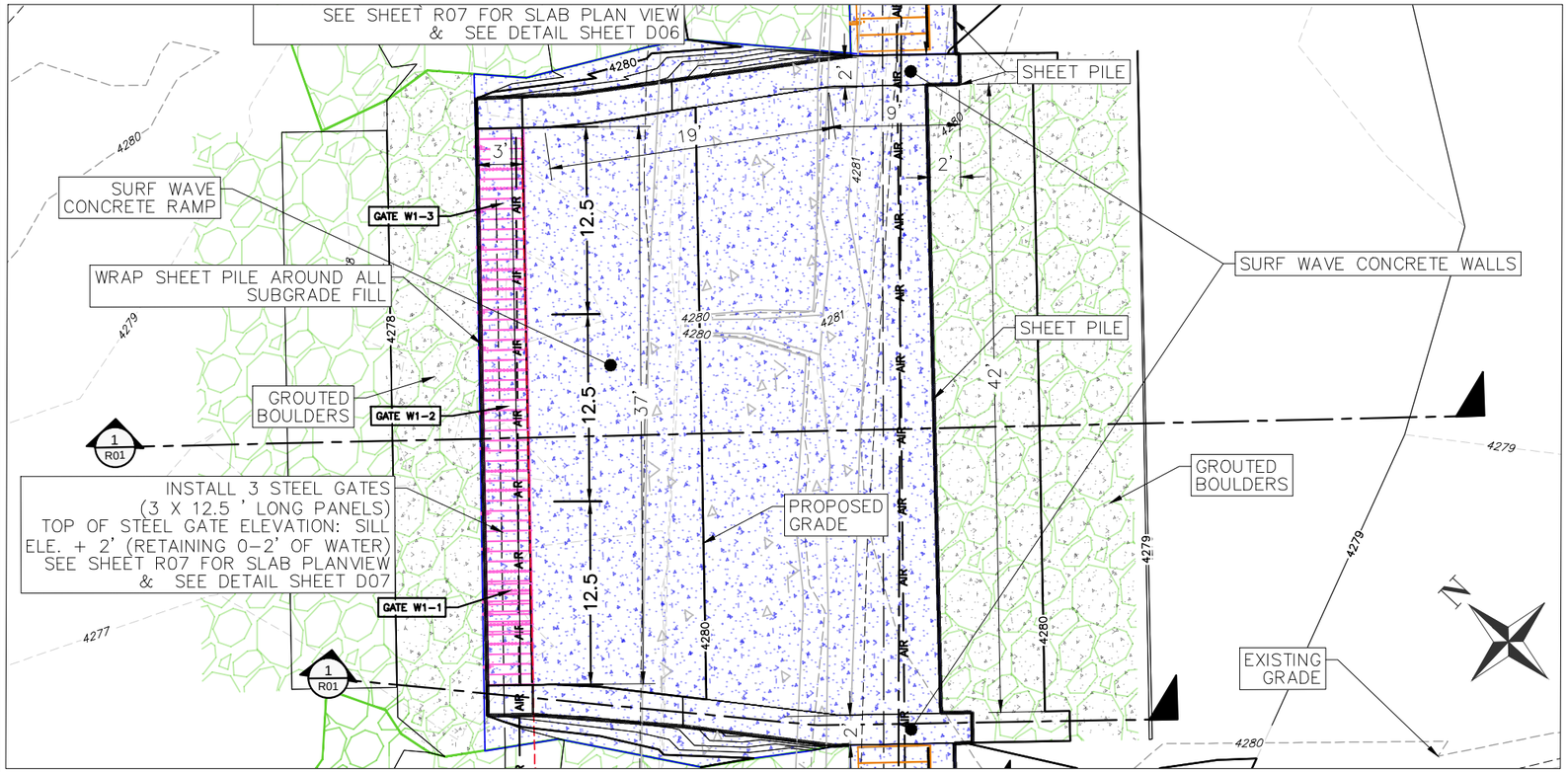
RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
45072	R00
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	



LEGEND:

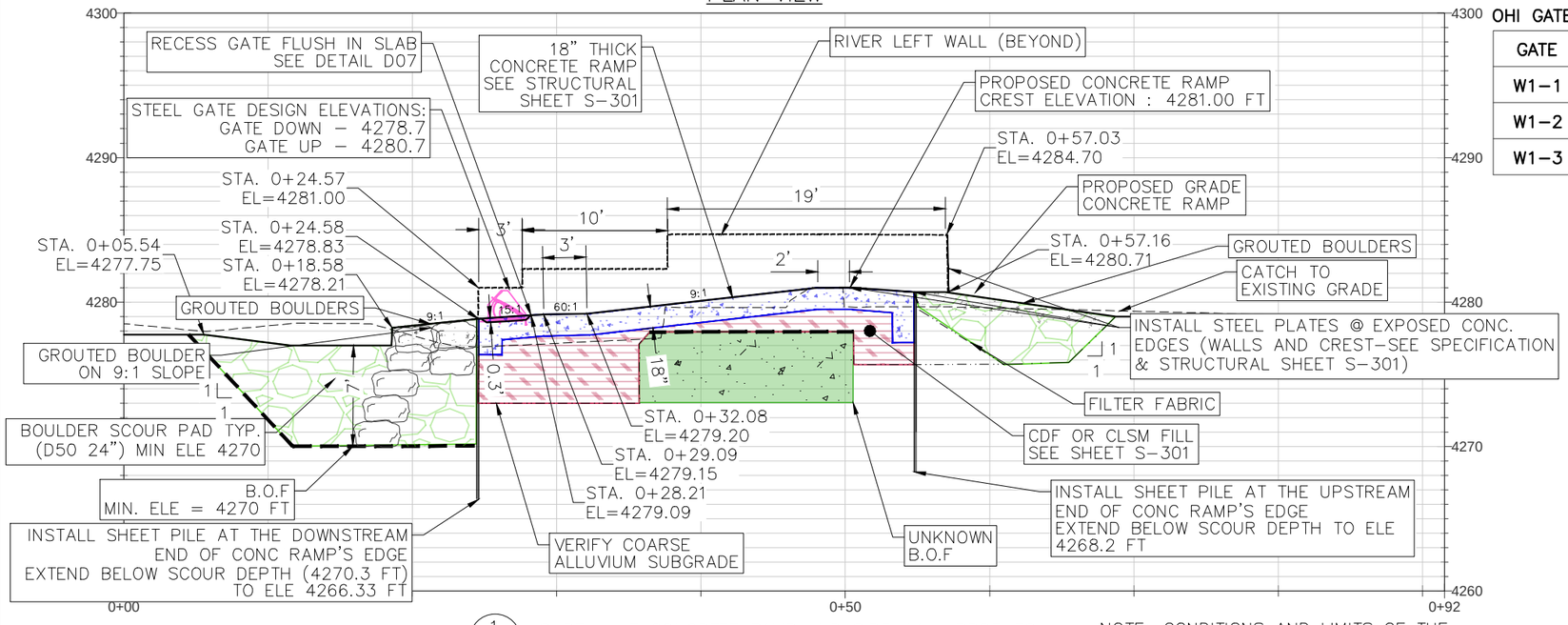
- CONCRETE
- BOULDERS
- ALLUVIAL SUBSTRATE
- TO PROTECT IN PLACE
- CDF OR CLSM FILL
- FILTER FABRIC
- SHEET PILE
- TOPSOIL
- GROUT
- SLABSTONE STEPS

OBERMEYER HYDRO INC. (OHI) RUBBER ROCK

OHI STEEL GATES

NOTES:
1. BOULDERS, OTHERWISE SPECIFIED, SHALL CONSIST OF MIN. 36" B-AXIS. SELECT BOULDERS

PLAN VIEW



1/R01 SURF WAVE CONCRETE RAMP AND SIDE WALL PROFILES

NOTE: CONDITIONS AND LIMITS OF THE SUBGRADE CONCRETE ARE UNKNOWN

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W1-1	4278.7	4280.7	2.0
W1-2	4278.7	4280.7	2.0
W1-3	4278.7	4280.7	2.0

0 5 10 Feet

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
PLAN VIEW AND PROFILE SURF WAVE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

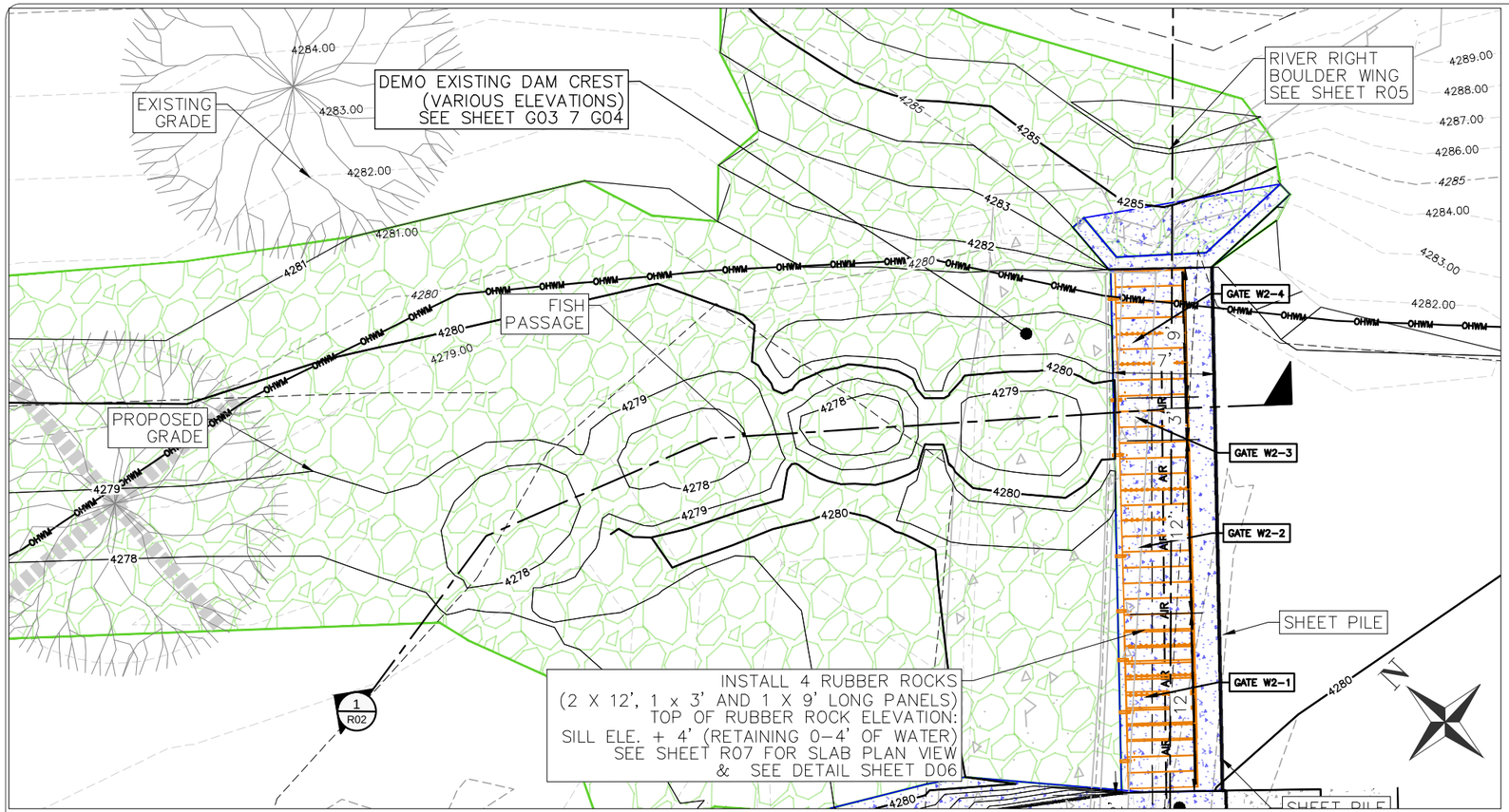
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

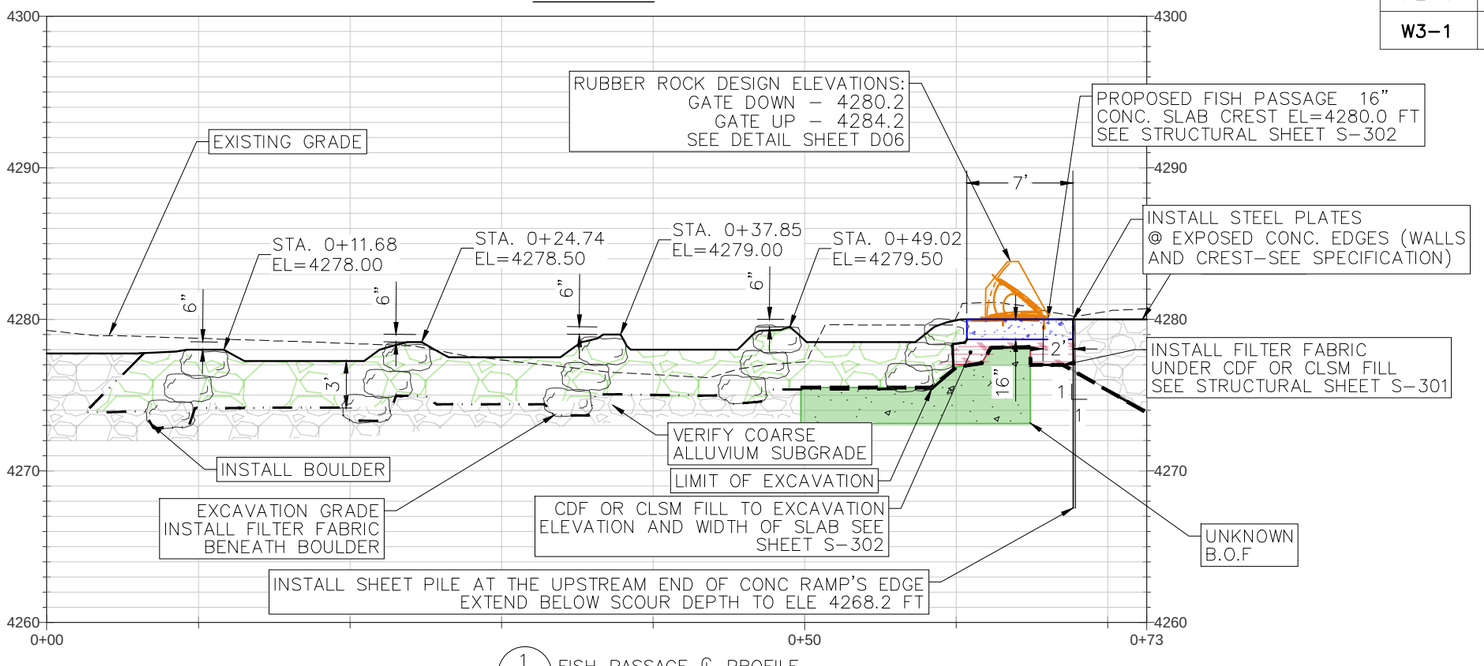
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R01
Date: OCTOBER 2025	
Scale: 1" = 5' (FULL SIZE)	



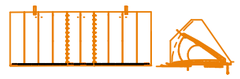
PLAN VIEW



1 / R02 FISH PASSAGE ℄ PROFILE

LEGEND:

- CONCRETE
- BOULDERS
- ALLUVIAL SUBSTRATE
- TO PROTECT IN PLACE
- FILTER FABRIC
- CDF OR CLSM FILL
- SHEET PILE
- TOPSOIL
- GROUT
- SLABSTONE STEP



OBERMEYER HYDRO INC.
(OHI) RUBBER ROCK

NOTES:
1. BOULDERS SHALL CONSIST OF MIN. 36" B-AXIS. SELECT BOULDERS

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W2-1	4280.2	4284.2	4.0
W2-2	4280.2	4284.2	4.0
W2-3	4280.2	4284.2	4.0
W2-4	4280.2	4284.2	4.0
W3-1	4280.2	4284.2	4.0

BID SET

0 5 10 Feet

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
STATE OF UTAH

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
PLAN VIEW AND PROFILE
FISH PASSAGE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

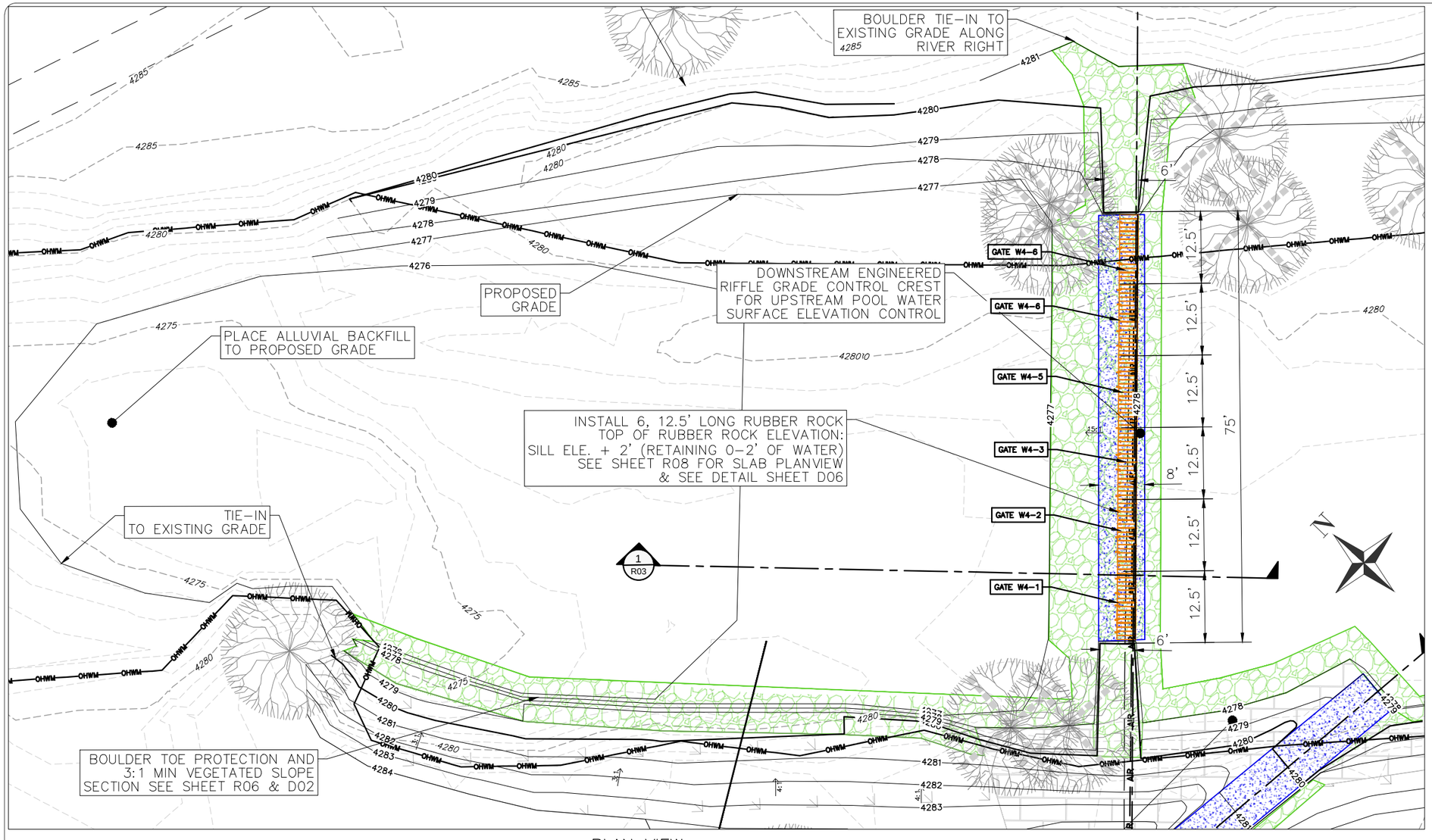
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

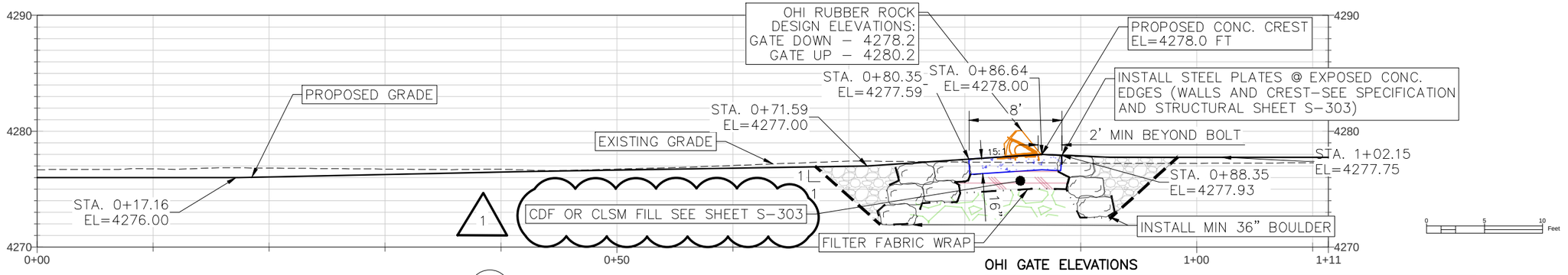
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R02
Date: OCTOBER 2025	
Scale: 1" = 5' (FULL SIZE)	



PLAN VIEW



1/R03 DOWNSTREAM ENGINEERED RIFFLE GRADE CONTROL PROFILE

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W4–1–6	4278.2	4280.2	2.0

LEGEND:

- CONCRETE
- BOULDERS
- ALLUVIAL SUBSTRATE
- TOPSOIL
- GROUT
- SLABSTONE STEPS
- CDF OR CLSM FILL
- FILTER FABRIC

OBERMEYER HYDRO INC.
(OHI) RUBBER ROCK

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
PLAN VIEW AND PROFILE
ENGINEERED RIFFLE GRADE CONTROL

No.	REVISION/UPDATE	Date
1	CDF OR CLSM FILL TO REPLACE COMPACTED STRUCTURAL FILL	11/21/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

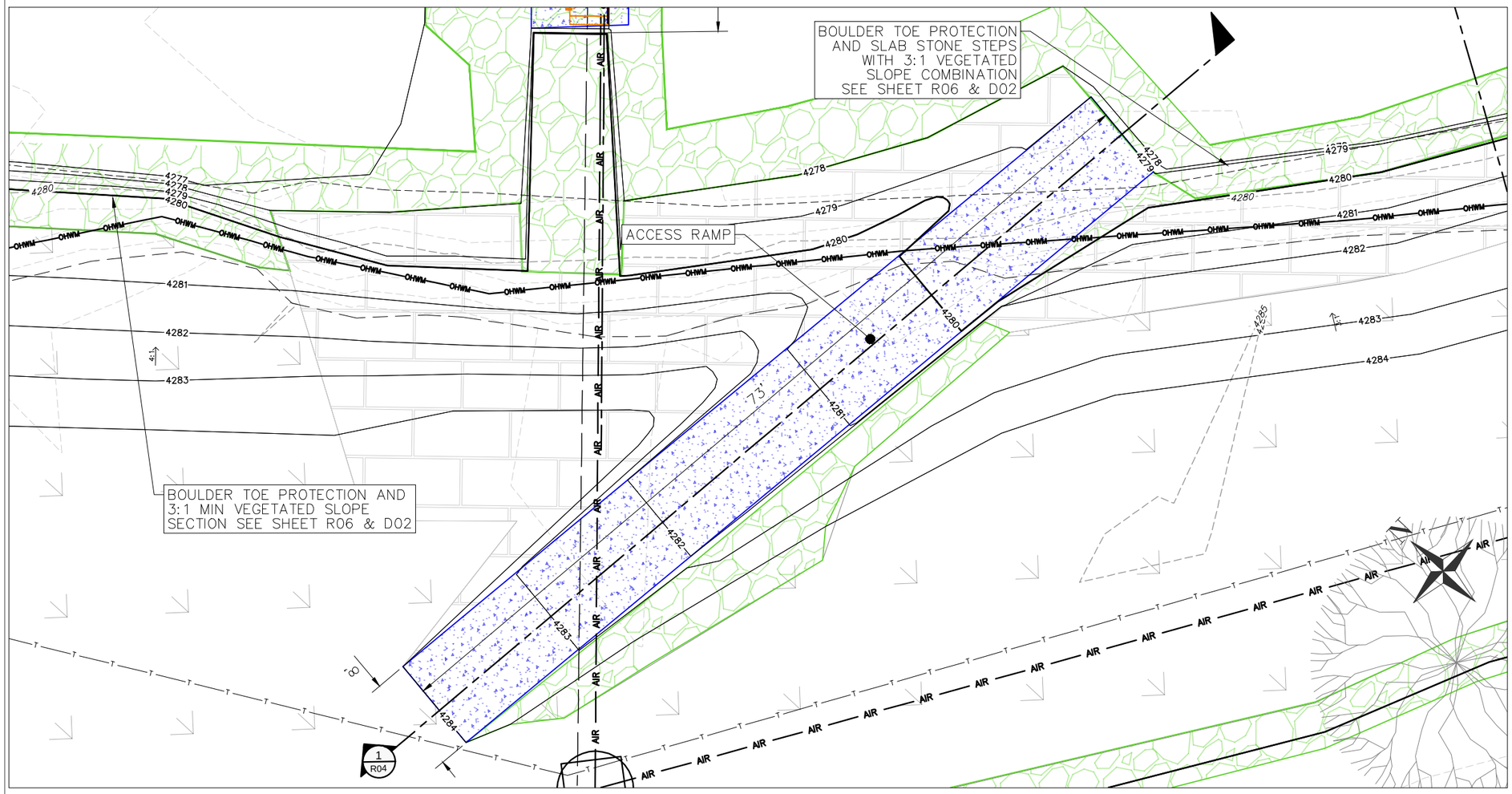
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

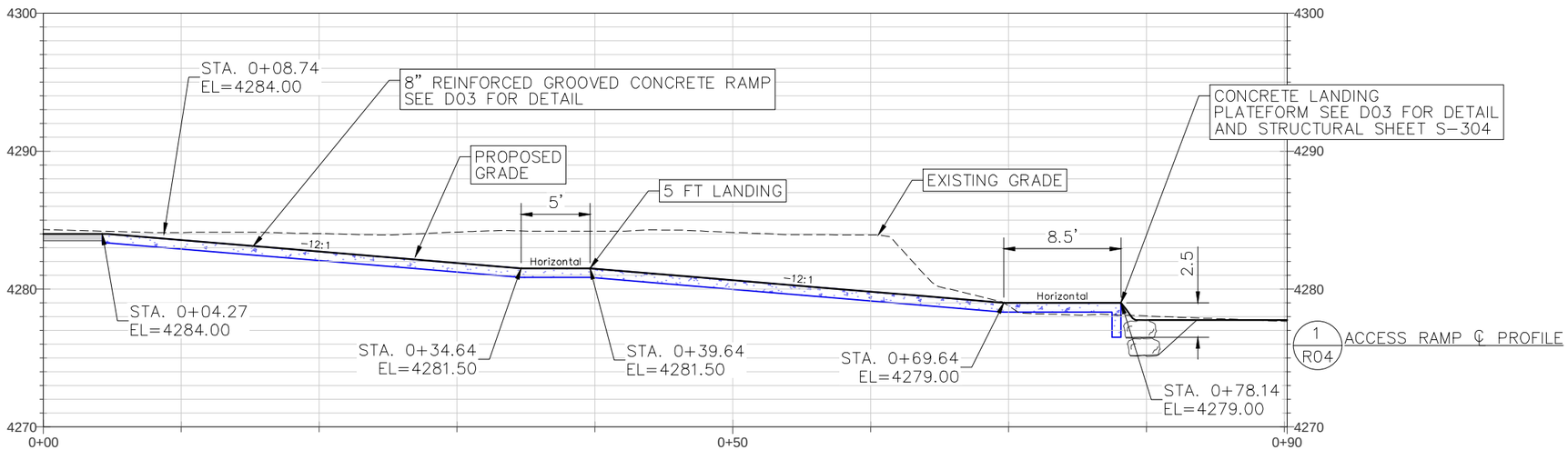
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R03
Date: NOVEMBER 2025	
Scale: 1" = 10' (PLAN VIEW) 1" = 5' (PROFILE)	



PLAN VIEW



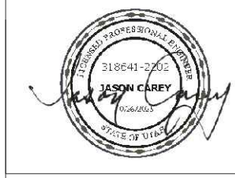
LEGEND:

- CONCRETE
- BOULDERS
- ALLUVIAL SUBSTRATE
- TOPSOIL
- GROUT
- SLABSTONE STEPS
- FILTER FABRIC

0 5 10 Feet

BID SET

PROFESSIONAL ENGINEER STAMP



OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT PLAN VIEW AND PROFILE ACCESS RAMP

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

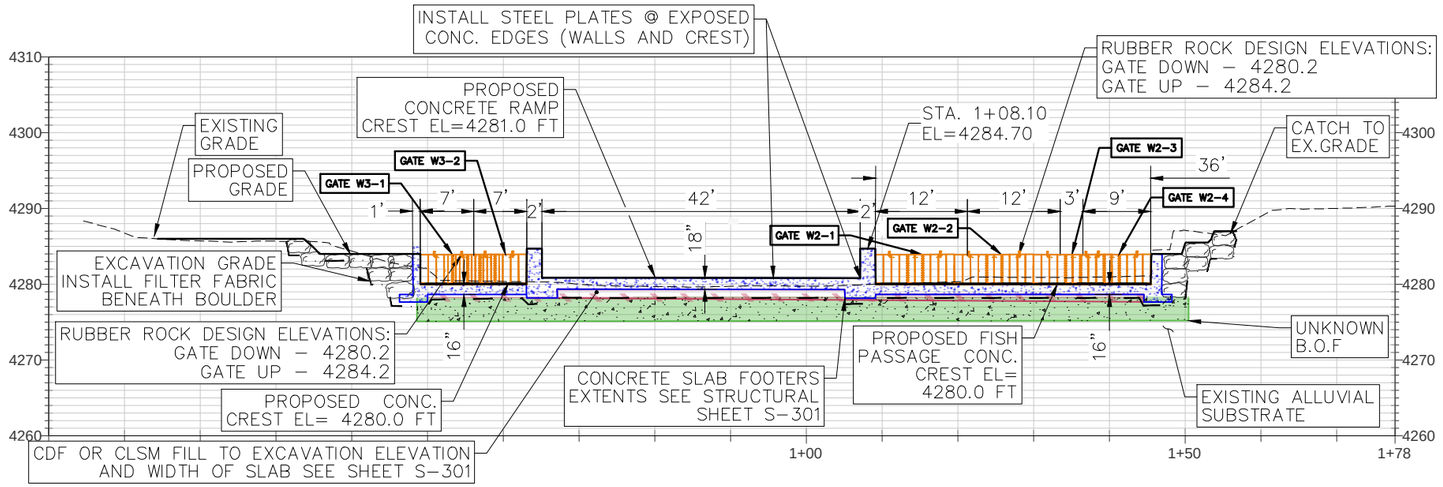
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R04
Date: OCTOBER 2025	
Scale: 1" = 5' (FULL SIZE)	



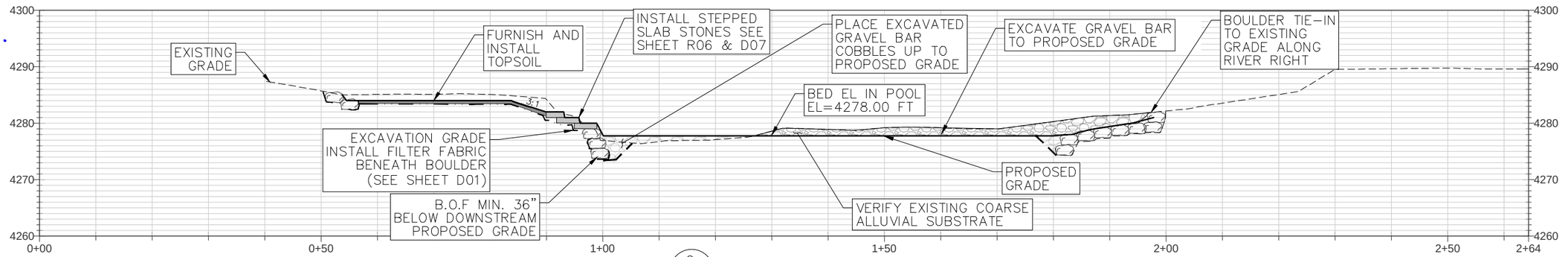
1 / R05 SURF WAVE DROP CREST SECTION

LEGEND:

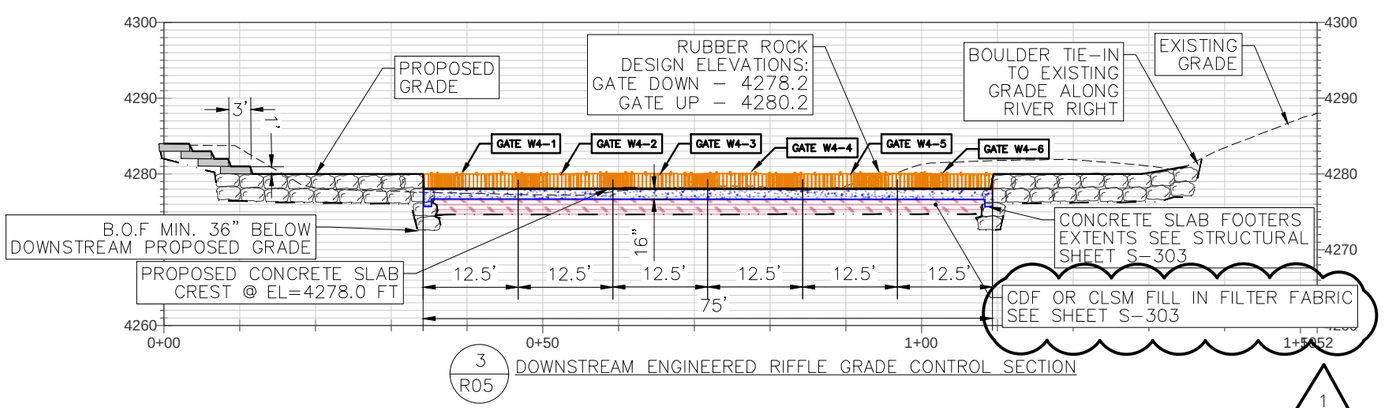
- CONCRETE
- BOULDERS/SLABSTONE
- ALLUVIAL SUBSTRATE
- TOPSOIL
- FILTER FABRIC
- OBERMEYER HYDRO INC. (OHI) RUBBER ROCK
- BOULDERS TO PROTECT IN PLACE
- CDF OR CLSM FILL
- SHEET PILE

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W2–1	4280.20	4284.20	4.0
W2–2	4280.20	4284.20	4.0
W2–3	4280.20	4284.20	4.0
W2–4	4280.20	4284.20	4.0
W3–1	4280.20	4284.20	4.0
W3–2	4280.20	4284.20	4.0

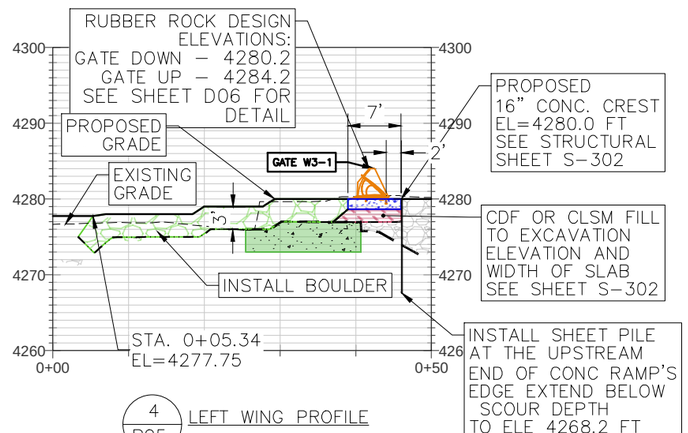


2 / R05 POOL SECTION



3 / R05 DOWNSTREAM ENGINEERED RIFFLE GRADE CONTROL SECTION

1



4 / R05 LEFT WING PROFILE

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W4–1–6	4278.20	4280.20	2.0

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT PROFILE AND SECTIONS

No.	REVISION/UPDATE	Date
1	CDF OR CLSM FILL TO REPLACE COMPACTED STRUCTURAL FILL	11/21/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

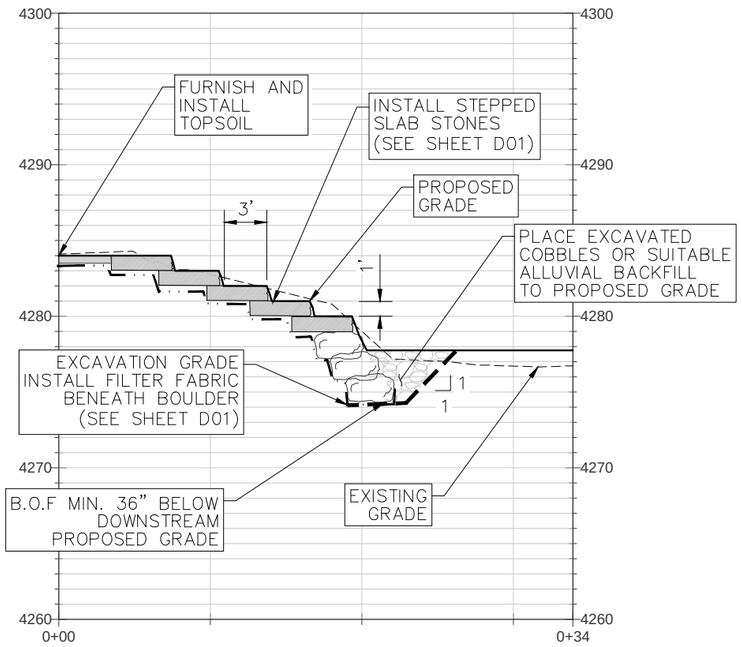
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

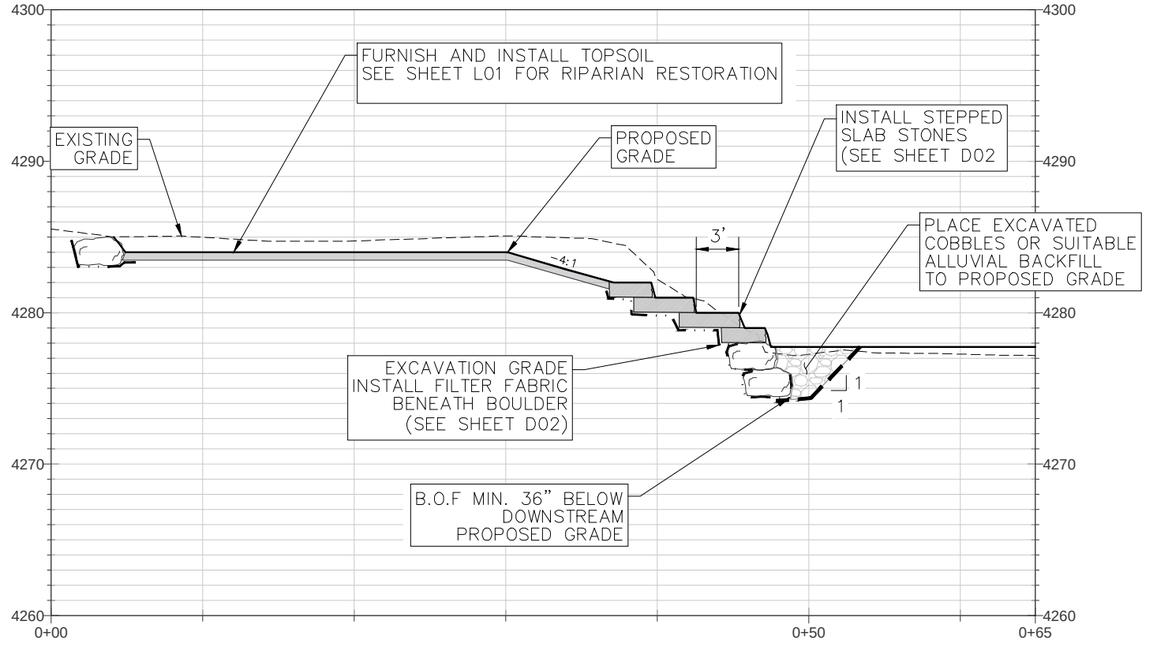
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

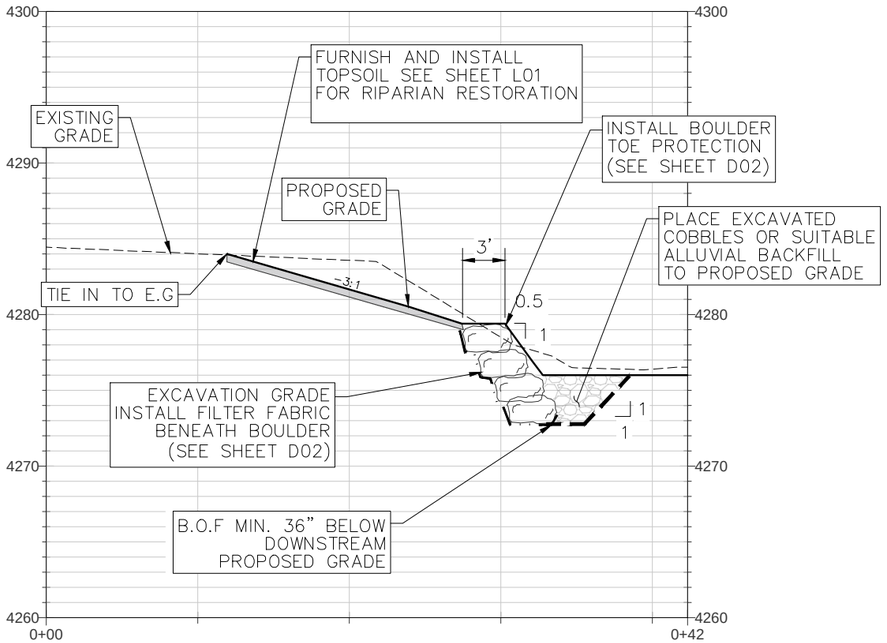
Project	Sheet
45072	R05
Date: NOVEMBER 2025	
Scale: 1" = 10' (FULL SIZE)	



1 / R06 BOULDER TOE PROTECTION/ SLAB STONE BANK TERRACING SECTION



2 / R06 BOULDER TOE PROTECTION WITH SLAB STONE STEPS AND 3:1 MIN. VEGETATED SLOPE SECTION



3 / R06 BOULDER TOE PROTECTION AND 3:1 VEGETATED SLOPE SECTION

BOULDERS/SLABSTONE

FILTER FABRIC

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
BANK RESTORATION TYPICAL SECTIONS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R06
Date: OCTOBER 2025	
Scale: 1" = 5' (FULL SIZE)	

BID SET

LEGEND:

- OBERMEYER HYDRO INC. (OHI) RUBBER ROCK
- OHI STEEL GATES
- AIR LINE
- PURGE LINE
- TELEMETRY LINE
- MANHOLE FOR PURGE VALVE
- LEVEL SENSOR IN STILLING WELL
- CONCRETE
- BOULDERS
- ALLUVIAL SUBSTRATE
- INCLINOMETER TELEMETRY LINE
- TOPSOIL
- GROUT
- SLABSTONE STEPS

INSTALL STEEL GATES
TOP OF STEEL GATE ELEVATION: SILL ELE. + 2' (RETAINING 0-2' OF WATER)
SEE SHEET R08 AND DETAIL SHEET D05 & D07

W2-4

INSTALL RUBBER ROCK
TOP OF GATE ELEVATION: SILL ELE. + 4' (RETAINING 0-4' OF WATER)
SEE SHEET R08 AND DETAIL SHEET D05 & D06

W4-6

INSTALL RUBBER ROCK
TOP OF GATE ELEVATION: SILL ELE. + 2' (RETAINING 0-2' OF WATER)
SEE SHEET R09 AND DETAIL SHEET D05 & D06

POOL 1

POOL 2

POOL 3

WEBER RIVER

W1-3

CONDUIT TO INCLINOMETERS
(3) 1" CONDUIT 300 FT TOTAL

INSTALL RUBBER ROCK
TOP OF GATE ELEVATION: SILL ELE. + 4' (RETAINING 0-4' OF WATER)
SEE SHEET R08 AND DETAIL SHEET D05 & D06

(3) 1" HDPE AIR LINES + SPARE

ROUTE TELEMETRY FROM JUNCTION BOX TO STILLING WELL USING GALVANIZED STEEL SCHEDULE 40 PIPE WITH THREADED FITTINGS
SEE DETAIL SHEET D04

PROVIDE BENCHMARK
BRONZE MONUMENT IN LEFT ABUTMENT TOP OF WALL
SEE DETAIL SHEET D08

(6) 1" HDPE AIR LINES + SPARE

ROUTE LOW PRESSURE AIR LINES USING HDPE PIPE

MH4

MH2

MH3

PT-W1 LEVEL SENSOR IN STILLING WELL X3 (TYP.)
WITHIN MANHOLE BOX BASE
SEE DETAIL SHEET D04

R08

PG ELE= 4286'
B.O.F. ELE = 4278.5'

1-1/2" CONDUIT TO LEVEL TRANSDUCER APPROX 270 FT TO CONTROL BUILDING

R09

MH1

1-1/2" CONDUIT TO LEVEL TRANSDUCER APPROX. 263 FT TO CONTROL BUILDING

PT-TW3 LEVEL SENSOR IN STILLING WELL X3 (TYP.)
WITHIN MANHOLE BOX BASE
SEE DETAIL SHEET D04

MH6

PG ELE= 4284'
B.O.F. ELE = 4276.5'

MH5

PG ELE= 4284'
B.O.F. ELE = 4276.5'

PG ELE= 4284' B.O.F. ELE = 4276.5'

POUR CONCRETE BASE AND FURNISH & INSTALL WEB CAMERA POLE SEE DETAIL SHEET D09

(6) 1" HDPE AIR LINES + SPARE

2" PVC CONDUIT SCHEDULE 40
24" BURIAL, SEE DETAIL D09

PT-W2 LEVEL SENSOR IN STILLING WELL X3 (TYP.)
WITHIN MANHOLE BOX BASE

TYPE C PRECAST MANHOLE (MH) X6 (TYP.) WITH BASE SLAB TO SUPPORT MANHOLE AGAINST BUOYANT FORCES FOR OHI GATES PURGE VALVES
SEE DETAIL SHEET D04 AND S-502

INCLINOMETERS TELEMETRY LINES
(3) 3" CONDUIT 300 FT TOTAL

(15) 1" HDPE AIR LINES + SPARE IN 9" CONDUIT
APPROX. HOME RUN DISTANCES FROM CONTROL BUILDING:
341 FT TO W2-4
277 FT TO W1-3
332 FT TO W4-6

1-1/2" CONDUIT TO LEVEL TRANSDUCER APPROX. 100 FT TO CONTROL BUILDING

ROUTE AIR LINES FROM CONTROL BUILDING TO JUNCTION BOX USING HDPE PIPE
SEE DETAIL SHEET D13

POUR CONCRETE BASE AND FURNISH & INSTAL SECURITY CAMERA POLE
SEE DETAIL SHEET D09

2" PVC CONDUIT SCHEDULE 40
24" BURIAL, SEE DETAIL D09

DIG UTILITY TRENCH FROM STOCKMAN WAY BOX TO CONTROL BUILDING APPROX. 640FT
SEE SHEET D12 FOR TRENCH DETAILS

OHI CONTROL BUILDING (CB; 10X20FT)
FLOOR ELE =4291.5 FT
100 YEAR WSE = 4285.6 FT
SEE DETAIL SHEETS D10-D12

0 20 40 Feet

AIR LILNE NOTES:

1. AIR LINE ROUTING IS SCHEMATIC ONLY TO SHOW APPROXIMATE LOCATION AND CONNECTIVITY.
2. MINIMIZE THE NUMBER OF PIPE JOINTS. ALL NON ACCESSIBLE PIPE JOINTS SHALL BE FUSION WELDED.
3. PROVIDE CONCRETE BLOCK-OUT AT BLADDER CONNECTION POINTS PER MANUFACTURERS DRAWINGS.
4. SLAB DIMENSIONS VARY, SEE SHEETS R08-R09.
5. STILLING WELL SHOULD BE LOCATED AS SHOWN ON PLANS, APPROXIMATELY 1-1/2 FT. OFF THE BOTTOM OF CHANNEL.
6. BACKFILL ABOVE PIPE BEDDING SHALL BE MINUS 6" INCH ALLUVIUM FOR A MINIMUM OF 18" ABOVE BEDDING. .
7. SPARE AIR LINE IN SLAB ONLY. ROUTED CONTINUOUSLY THROUGH ALL BLOCK-OUTS - SEAL ENDS.

BID SET

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
06/26/25
STATE OF UTAH

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
RUBBER & STEEL GATES, AIRLINE LAYOUT PLAN

No.	REVISION/UPDATE	Date
1	CONTROL BUILDING AND AIRLINES UPDATES	11/21/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

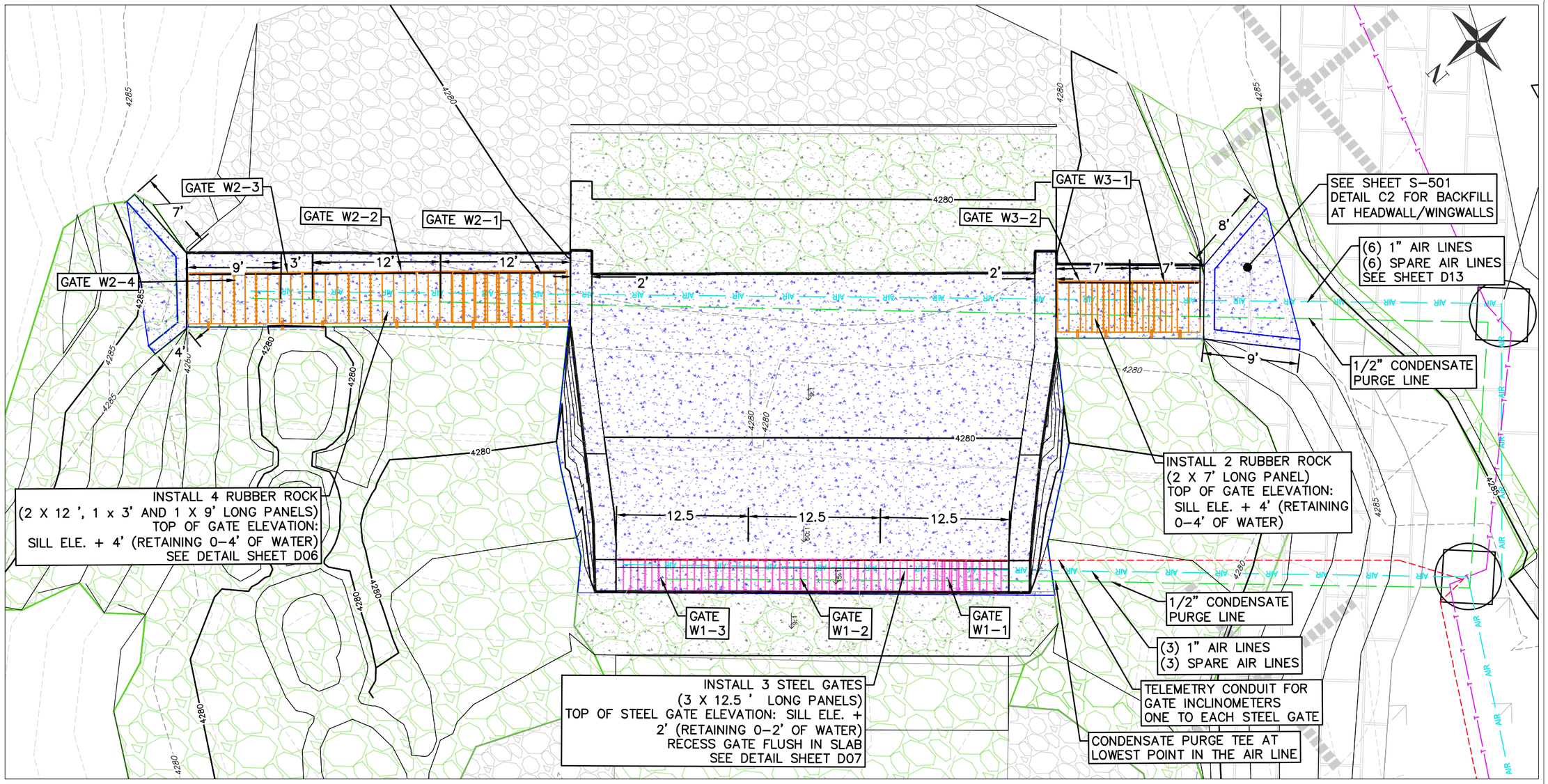
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R07
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	



AIR LINE
PURGE LINE
TELEMETRY LINE
MANHOLE FOR PURGE VALVE
LEVEL SENSOR IN STILLING WELL
INCLINOMETER TELEMETRY LINE

CONCRETE
BOULDERS
ALLUVIAL SUBSTRATE

TOPSOIL
GROUT
SLABSTONE STEPS

OBERMEYER HYDRO INC. (OHI) RUBBER ROCK

OHI STEEL GATES

MAXIMUM WATER PRESSURE DIFFERENTIAL IN FEET OF WATER

WHITEWATER COURSE FLOW	UPSTREAM W.S.E	DOWNSTREAM W.S.E.	HEAD PRESSURE
150 CFS	4282.0	4278.7	3.3
1500 CFS	4285.3	4282.2	3.2

100 YEAR WATER PRESSURE DIFFERENTIAL IN FEET OF WATER

WHITEWATER COURSE FLOW	UPSTREAM W.S.E	DOWNSTREAM W.S.E.	HEAD PRESSURE
6205 CFS	4286.91	4285.64	1.27

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W1-1	4278.7	4280.7	2.0
W1-2	4278.7	4280.7	2.0
W1-3	4278.7	4280.7	2.0
W2-1	4280.2	4284.2	4.0
W2-2	4280.2	4284.2	4.0
W2-3	4280.2	4284.2	4.0
W2-4	4280.2	4284.2	4.0
W3-1	4280.2	4284.2	4.0
W3-2	4280.2	4284.2	4.0

BID SET

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
07/28/2025
STATE OF UTAH

OGDEN BUSINESS EXCHANGE
SURF WAVE PROJECT
RUBBER & STEEL GATE
SURF WAVE PLAN VIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

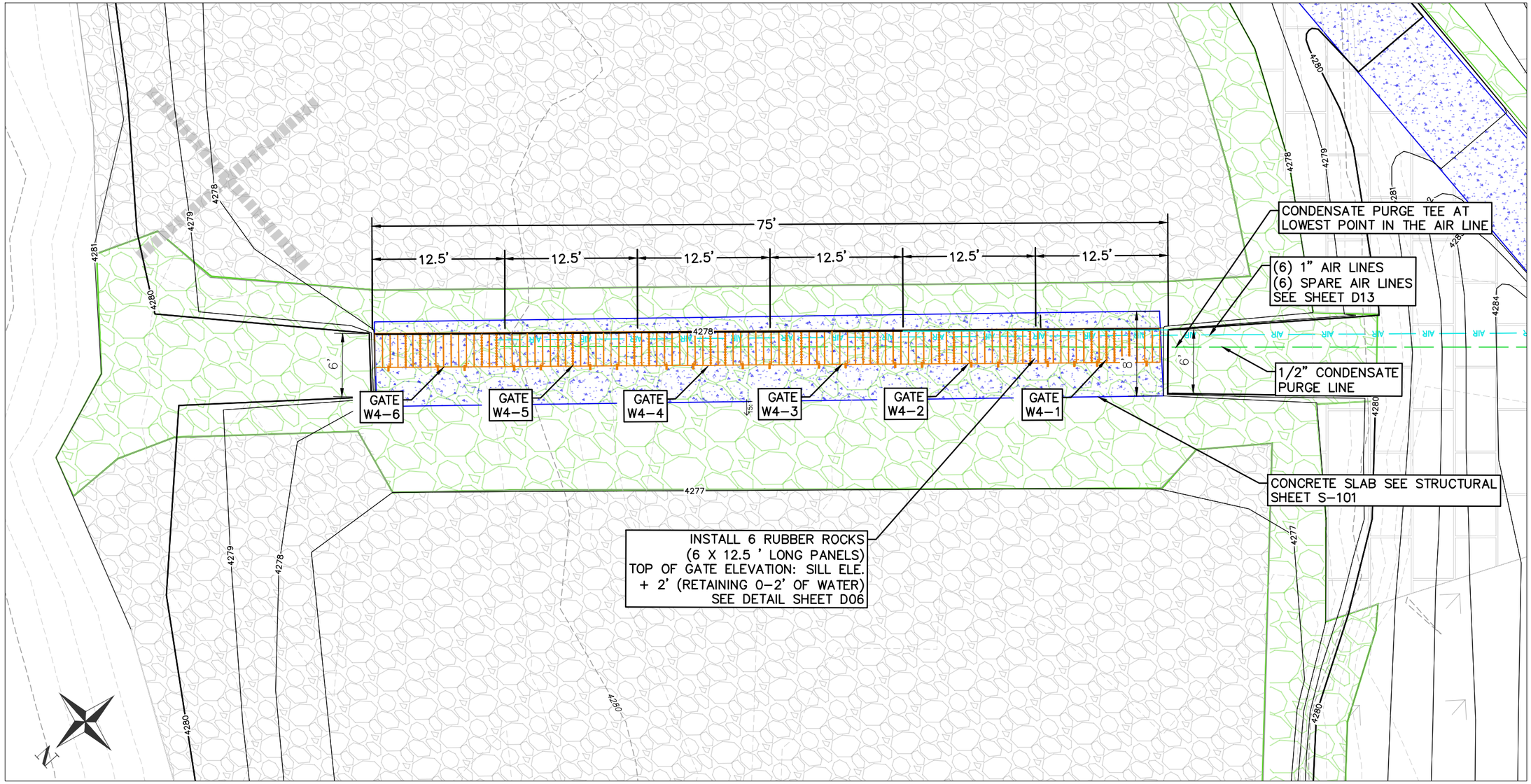
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R08
Date: OCTOBER 2025	
Scale: 1" = 5' (FULL SIZE)	



AIR LINE
PURGE LINE
TELEMETRY LINE
MANHOLE FOR PURGE VALVE
LEVEL SENSOR IN STILLING WELL

CONCRETE
BOULDERS
ALLUVIAL SUBSTRATE

TOPSOIL
GROUT
SLABSTONE STE

OBERMEYER HYDRO INC.
(OHI) RUBBER ROCK

WHITEWATER COURSE FLOW	UPSTREAM W.S.E	DOWNSTREAM W.S.E.	HEAD PRESSURE
150 CFS (all gates up for tailwater control)	4280.6	4278.0	2.70

OHI GATE ELEVATIONS

GATE	GATE DOWN ELEVATION	GATE UP ELEVATION	Δ
W4-1	4278.2	4280.2	2.0
W4-2	4278.2	4280.2	2.0
W4-3	4278.2	4280.2	2.0
W4-4	4278.2	4280.2	2.0
W4-5	4278.2	4280.2	2.0
W4-6	4278.2	4280.2	2.0

BID SET

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
STATE OF UTAH

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT RUBBER & STEEL GATE ENGINEERED RIFFLE PLAN VIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	R09
Date: OCTOBER 2025	
Scale: 1" = 5' (FULL SIZE)	

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO APPLICABLE LOCAL, COUNTY AND/OR STATE CODES, REGULATIONS AND RULES.
2. ALL WORK SHALL BE PERFORMED BY A UTAH LICENSED CONTRACTOR.
3. CONTRACTOR SHALL OBTAIN, COORDINATE, AND PAY FOR ANY AND ALL PERMITS AND AGENCY INSPECTIONS AS REQUIRED.
4. CONTRACTOR SHALL CARRY ALL WORKER' COMPENSATION, PUBLIC LIABILITY, PROPERTY DAMAGE INSURANCE AS REQUIRED BY ALL APPLICABLE CODES AND REGULATIONS AND BY THE OWNER'S REPRESENTATIVE.
5. PROPERTY LINES SHOWN ARE APPROXIMATE, BASED ON PLATTED INFORMATION, CONTRACTOR TO PROTECT INDIVIDUAL PROPERTY PINS FOUND IN FIELD.
6. CONTRACTOR TO FIELD VERIFY ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION. CALL FOR UTILITY LOCATES.
7. ALL SURFACE DRAINAGE SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION PERIOD.
8. CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH APPLICABLE WATER QUALITY & CONTROL REGULATIONS.
9. CONTRACTOR TO BE RESPONSIBLE FOR ALL TRAFFIC CONTROL FOR THE UTILITY CONSTRUCTION.

SITE PREPARATION NOTES

1. CONSTRUCTION FENCING TO BE PUT UP ALONG LIMITS OF WORK TO PREVENT TRAMPLING BY PEDESTRIANS. ALL CONSTRUCTION FENCE SHALL BE GREEN PLASTIC AND SUPPORTED AT ADEQUATE INTERVALS TO BE STRAIGHT AND FULL HEIGHT.
2. CONTRACTOR SHALL NOT DISTURB INTERSECTING WALKS, STAIRS, OR HANDRAILS. IF AFFECTED, CONTRACTOR IS RESPONSIBLE FOR REPAIRING TO ORIGINAL CONDITION.
3. DUE TO SITE ACCESS RESTRICTIONS, USE ALL ACCESS/STAGING AND PARKING INDICATED ON PLANS.

SEEDING ZONE A

Upland Mix Application		
Common Name	**Scientific Name**	**pls/acre***
Sand dropseed	*Sporobolus cryptandrus*	1%
Blanket flower	*Gaillardia aristata*	6.4%
Rocky Mountain beeplant	*Cleome serrulata*	19.2%
Scarlet globemallow	*Sphaeralcea coccinea*	3.2%
Alkali sacaton	*Sporobolus airoides*	3.2%
Great Basin wildrye	*Leymus cinereus*	25.5%
Western wheatgrass	*Pascopyrum smithii*	25.5%
Sandberg bluegrass	*Poa secunda ssp. Sandbergii*	6.4%
Inland saltgrass	*Distichlis spicata*	3.2%
Lewis blue flax	*Linum lewisii*	6.4%
*Broadcast Application=60 lbs/acre		100%

SEEDING ZONE B

Emergent Riparian Mix Application		
Common Name	**Scientific Name**	**pls/acre***
Inland saltgrass	*Distichlis spicata*	25%
Creeping spikebrush	*Eleocharis palustris*	25%
Spike muhly	*Muhlenbergia wrightii*	25%
Nuttal's alkaligrass	*Puccinellia nuttalliana*	25%
*Broadcast Application=15 lbs/acre		100%

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT SEEDING NOTES

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

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Engineering Division
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Ogden, UT 84401

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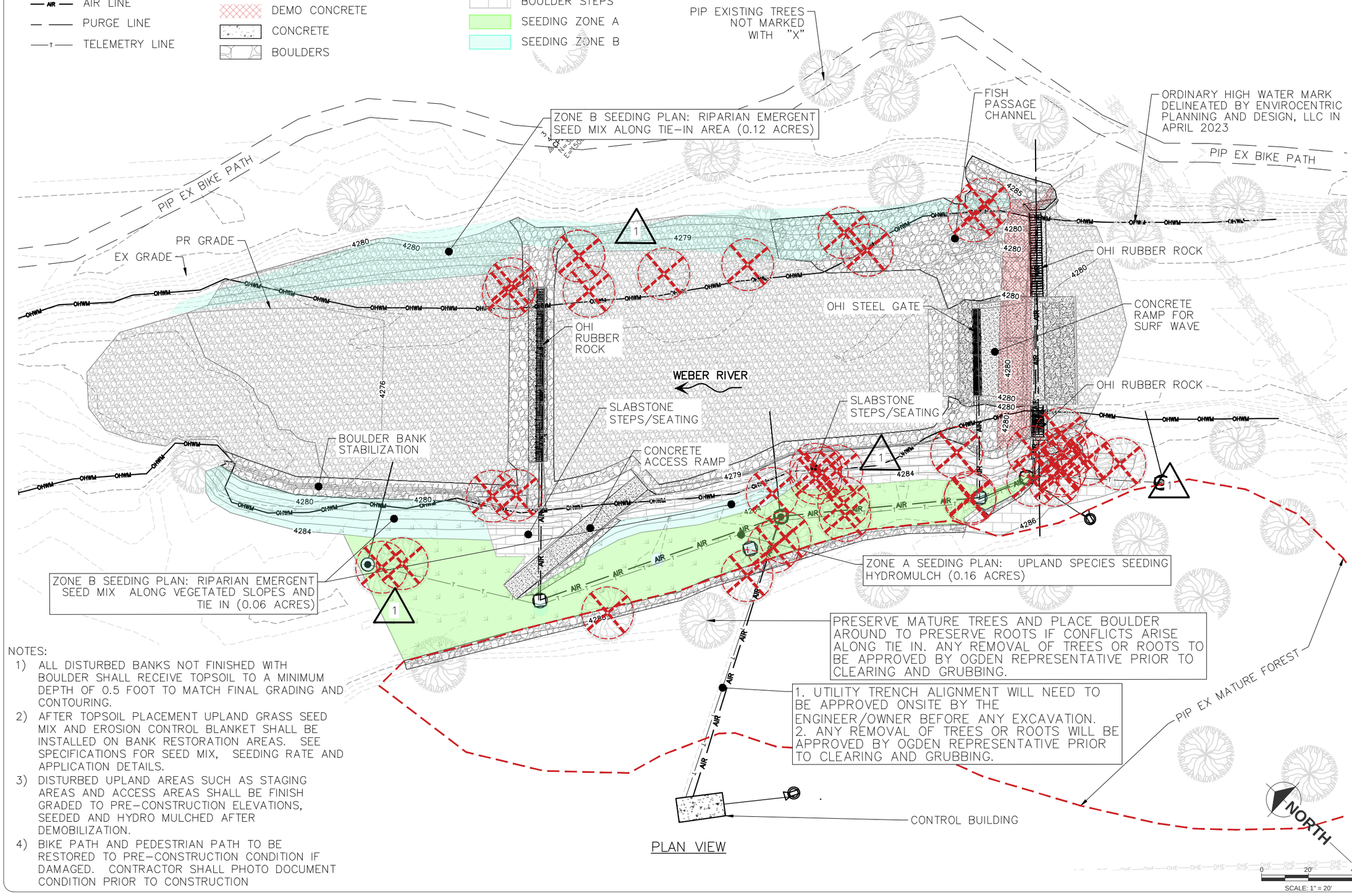
Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project: 45072
Date: OCTOBER 2025
Scale: 1" = 20' (FULL SIZE)
Sheet: L00

FEATURES LEGEND:

OHI = OBERMEYER HYDRO INC.

- OHI RUBBER ROCK
- OHI STEEL GATES
- AIR LINE
- PURGE LINE
- TELEMETRY LINE
- MANHOLE FOR PURGE VALVE
- LEVEL SENSOR IN STILLING WELL
- REMOVE TREE
- DEMO CONCRETE
- CONCRETE
- BOULDERS
- GROUTED BOULDERS
- ALLUVIAL SUBSTRATE
- TOPSOIL AND SEED
- BOULDER STEPS
- SEEDING ZONE A
- SEEDING ZONE B



PLAN VIEW

NOTES:

1) ALL DISTURBED BANKS NOT FINISHED WITH BOULDER SHALL RECEIVE TOPSOIL TO A MINIMUM DEPTH OF 0.5 FOOT TO MATCH FINAL GRADING AND CONTOURING.
2) AFTER TOPSOIL PLACEMENT UPLAND GRASS SEED MIX AND EROSION CONTROL BLANKET SHALL BE INSTALLED ON BANK RESTORATION AREAS. SEE SPECIFICATIONS FOR SEED MIX, SEEDING RATE AND APPLICATION DETAILS.
3) DISTURBED UPLAND AREAS SUCH AS STAGING AREAS AND ACCESS AREAS SHALL BE FINISH GRADED TO PRE-CONSTRUCTION ELEVATIONS, SEEDED AND HYDRO MULCHED AFTER DEMOBILIZATION.
4) BIKE PATH AND PEDESTRIAN PATH TO BE RESTORED TO PRE-CONSTRUCTION CONDITION IF DAMAGED. CONTRACTOR SHALL PHOTO DOCUMENT CONDITION PRIOR TO CONSTRUCTION

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT SEEDING PLAN

No.	REVISION/UPDATE	Date
1	DEMO TREE UPDATES	11/21/25

CLIENT NAME AND ADDRESS

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Engineering Division
2549 Washington Blvd
Ogden, UT 84401

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PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	L01
Date: NOVEMBER 2025	
Scale: 1" = 20' (FULL SIZE)	

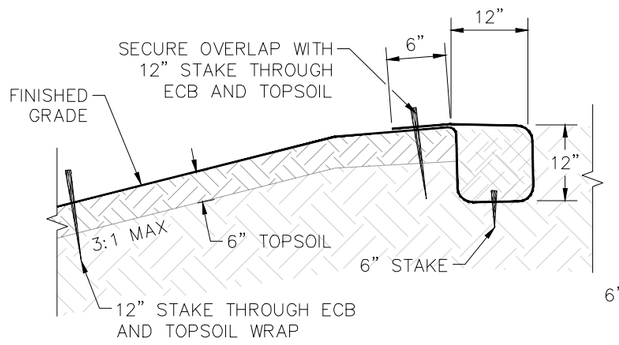


FIGURE A: SECURE ECB AT TOP OF BANK – NTS

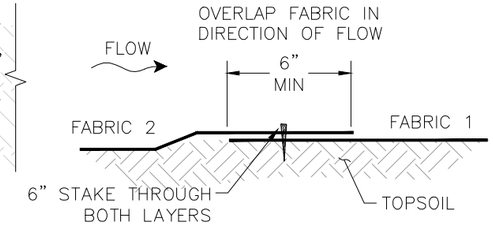


FIGURE B: CROSS SECTION VIEW OF OVERLAP – NTS

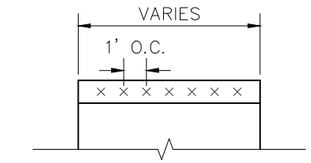


FIGURE C: TOB STAKE SPACING PLAN VIEW – NTS

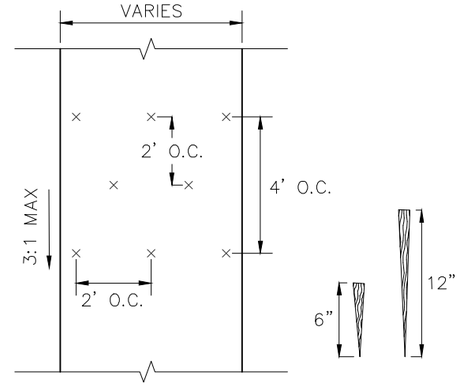


FIGURE D: STAKE SPACING PLAN VIEW – NTS

ECB INSTALLATION NOTES:

1. CONTRACTOR SHALL USE ALL NATURAL 100% BIODEGRADABLE COIR NORTH AMERICAN GREEN C700BN EROSION CONTROL BLANKETS (ECBs) OR APPROVED EQUIVALENT. STAKES SHALL ALSO BE 100% BIODEGRADABLE. SEE SPECIFICATIONS AND MANUFACTURER'S INSTALLATION GUIDELINES FOR ADDITIONAL INFORMATION.
2. PREPARE SOIL BEFORE INSTALLATION. GROUND SURFACE MUST BE FREE OF DEBRIS, ROCKS, CLAY CLODS AND RAKED SMOOTH SUFFICIENT TO ALLOW INTIMATE CONTACT OF THE ECB WITH THE SOIL OVER THE ENTIRETY OF INSTALLATION.
3. STARTING AT THE TOE, KEY–IN 18" OF ECB BEHIND BOULDER TOE .
4. IN THE FOLLOWING ORDER, APPLY TOPSOIL, SEED MIX, THEN WRAP ECB FROM THE TOE TOWARDS THE TOP OF BANK. ECB MUST BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH. SECURE IN PLACE PER STAKING PLAN (FIGURE D).
5. EXCAVATE A 12" WIDE BY 12" DEEP TRENCH AT THE TOP. THE TRENCH SHALL RUN ALONG THE LENGTH OF THE INSTALLATION. STAKE ECB ALONG BOTTOM OF TRENCH, FILL WITH COMPACTED SOIL, OVERLAP ECB TOWARDS TOE OF SLOPE, AND SECURE WITH 6" STAKES EVERY 1.0' (FIGURES A&C).
6. EDGES OF PARALLEL ECBs MUST BE STAKED WITH AN APPROXIMATE 6" SHIPLAP IN DIRECTION OF FLOW (FIGURE B). UPSTREAM ROLL MUST BE ON TOP OF DOWNSTREAM ROLL. IF NEEDED, CONSECUTIVE ECBs SPLICED DOWNSLOPE MUST BE OVERLAPPED END–OVER–END (SHINGLED) WITH AN APPROXIMATE 3" OVERLAP.

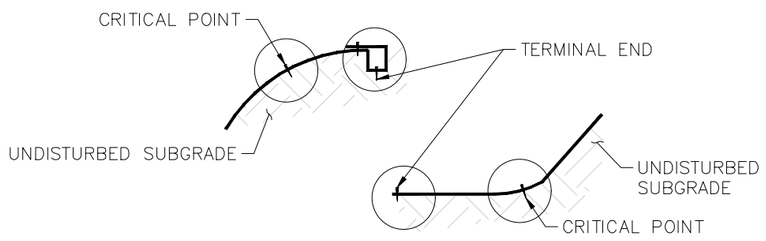
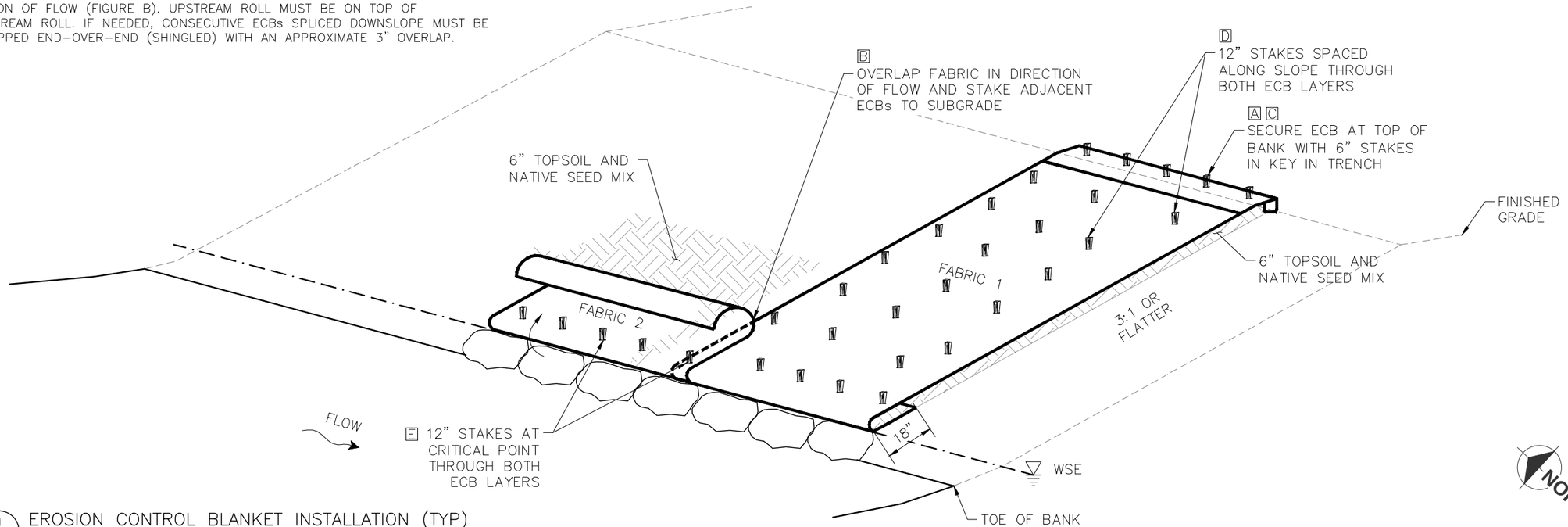


FIGURE E: CRITICAL POINT SECURING – NTS



1 / L02 EROSION CONTROL BLANKET INSTALLATION (TYP)
NTS

NORTH
0 20' 40'
SCALE: 1" = 20'

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

EROSION CONTROL BLANKET INSTALLATION

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
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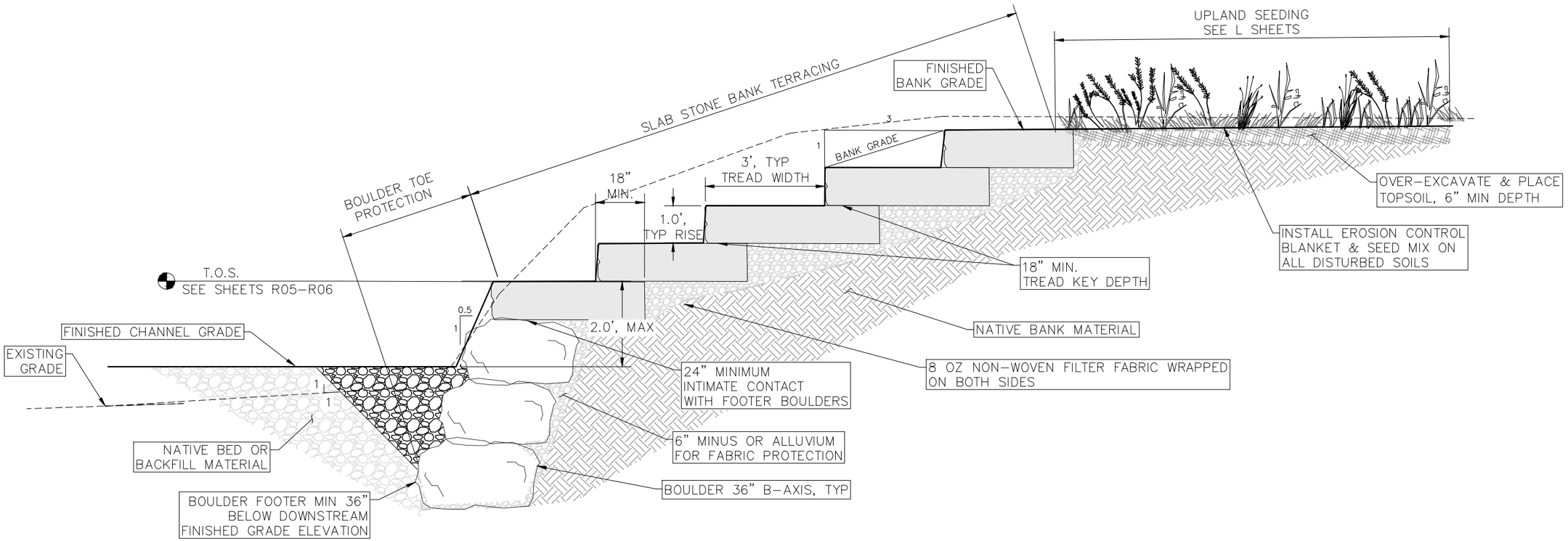
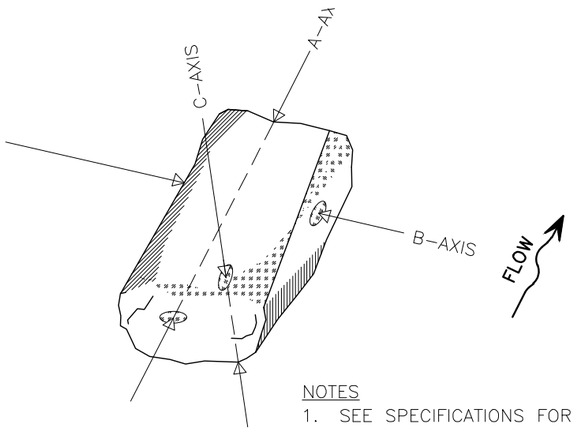
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	L02
Date: OCTOBER 2025	
Scale: 1" = 20' (FULL SIZE)	



1 / D01 BOULDER TOE PROTECTION WITH SLAB STONE BANK TERRACING, TYP.
NTS



NOTES
1. SEE SPECIFICATIONS FOR BOULDER GRADATION.

2 / D01 BOULDER AXIAL PLACEMENT (TYP)
NTS

SLAB STONE NOTES
1. CONTRACTOR SHALL LEVEL, FIT, AND STACK INDIVIDUAL SLABS TO MAXIMIZE AESTHETIC VALUE OF FINISHED STEPS AND TERRACING. REFER TO TECHNICAL SPECIFICATIONS FOR MATERIAL AND CONSTRUCTION REQUIREMENTS.

BOULDER NOTES:
1. CONSTRUCTION OF BOULDER BANK SHALL INCLUDE SELECTION, ROTATION, PLACEMENT, AND ADJUSTMENT OF EACH INDIVIDUAL BOULDER TO MINIMIZE VOID SPACE AND MAXIMIZE INTIMATE CONTACT BETWEEN BOULDERS.
2. SEE SPECIFICATIONS FOR ACCEPTABLE AS-BUILT VARIANCES ON ELEVATIONS OF BOULDER AND ALLUVIAL BACKFILL.
3. HORIZONTAL CONTROL INFORMATION, INCLUDING COORDINATES OF ALIGNMENTS AND CROSS SECTIONS WILL BE PROVIDED ELECTRONICALLY.

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
BOULDER TOE - SLAB STONE BANK TERRACING DETAIL

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

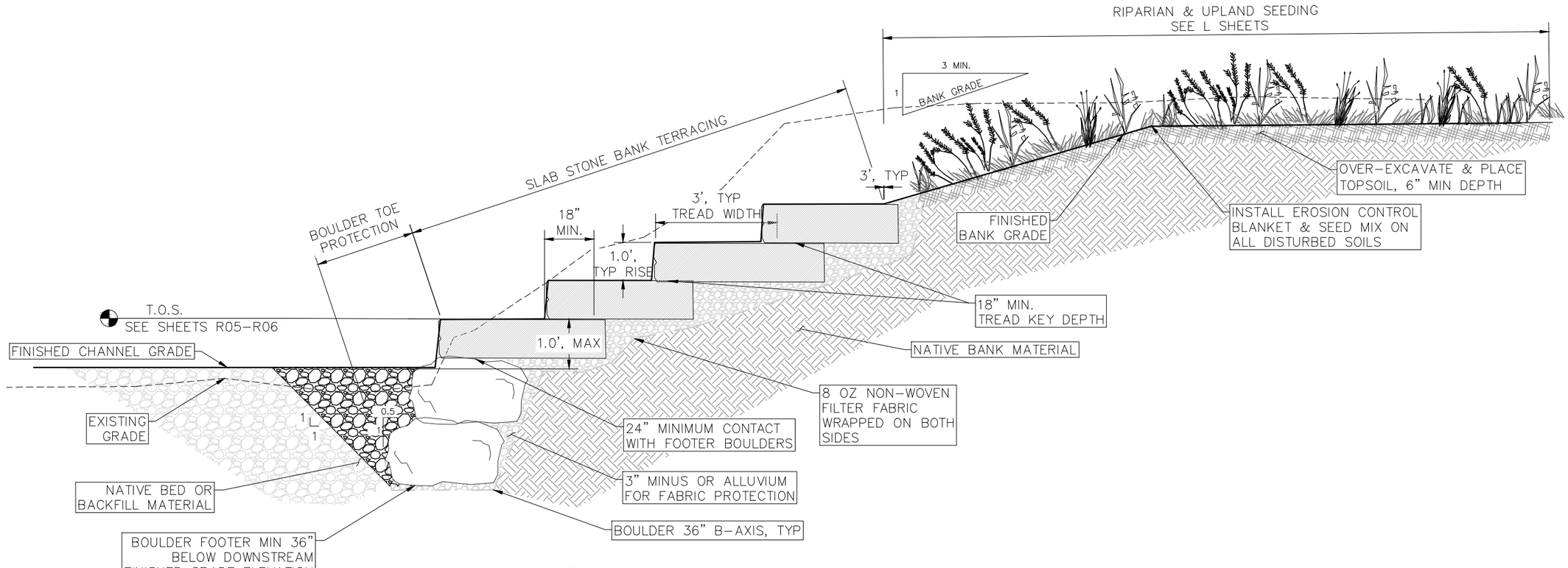
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

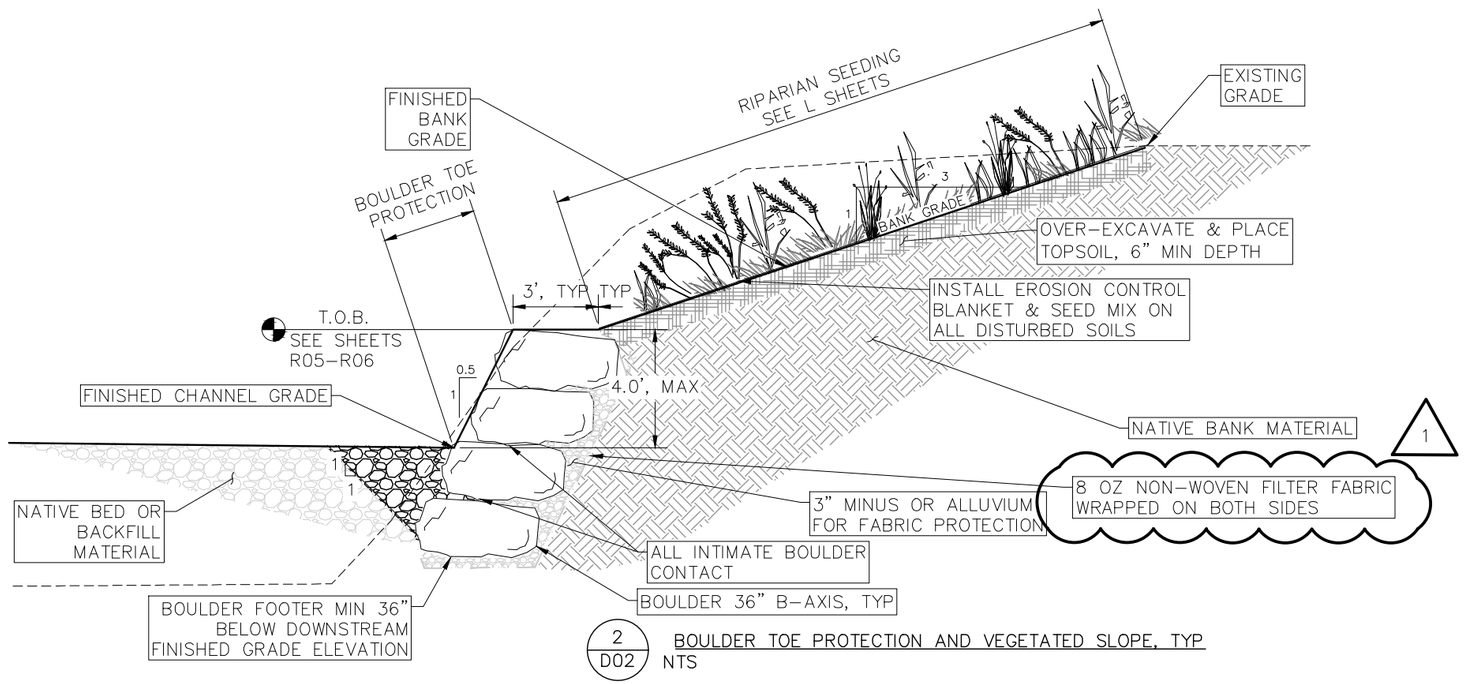
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D01
Date: OCTOBER 2025	
Scale: NTS	



1 / D02 BOULDER TOE PROTECTION WITH SLAB STONE STEPS TERRACING AND 3:1 MIN. VEGETATED SLOPE, TYP NTS



2 / D02 BOULDER TOE PROTECTION AND VEGETATED SLOPE, TYP NTS

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
BOULDER TOE PROTECTION / SLAB STONE BANK TERRACING 3:1 VEGETATED SLOPE DETAIL

No.	REVISION/UPDATE	Date
1	CALL OUT UPDATE ON 2 D02	11/21/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

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Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
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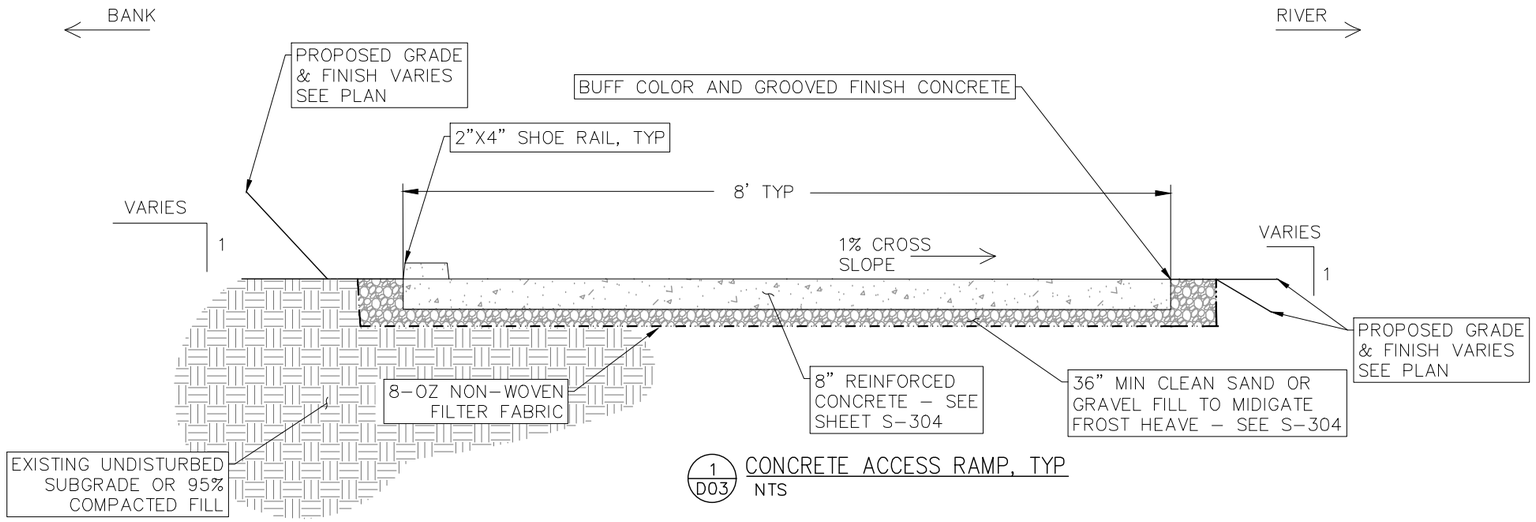
Date: NOVEMBER 2025	
Scale: NTS	



1/D03 CONCRETE ACCESS RAMP, TYP
NTS

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CONCRETE ACCESS RAMP DETAIL

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
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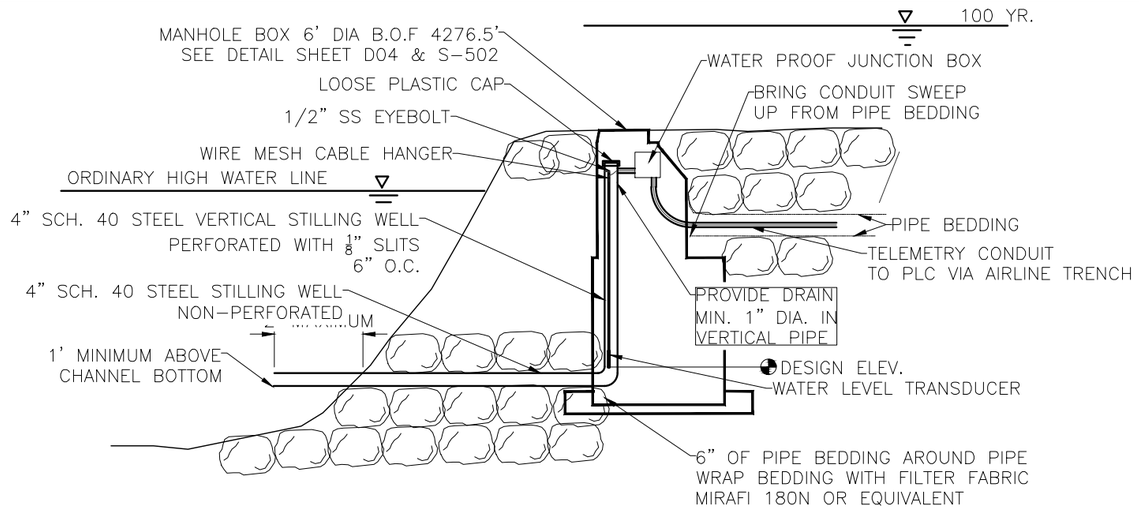
PROJECT NAME AND ADDRESS

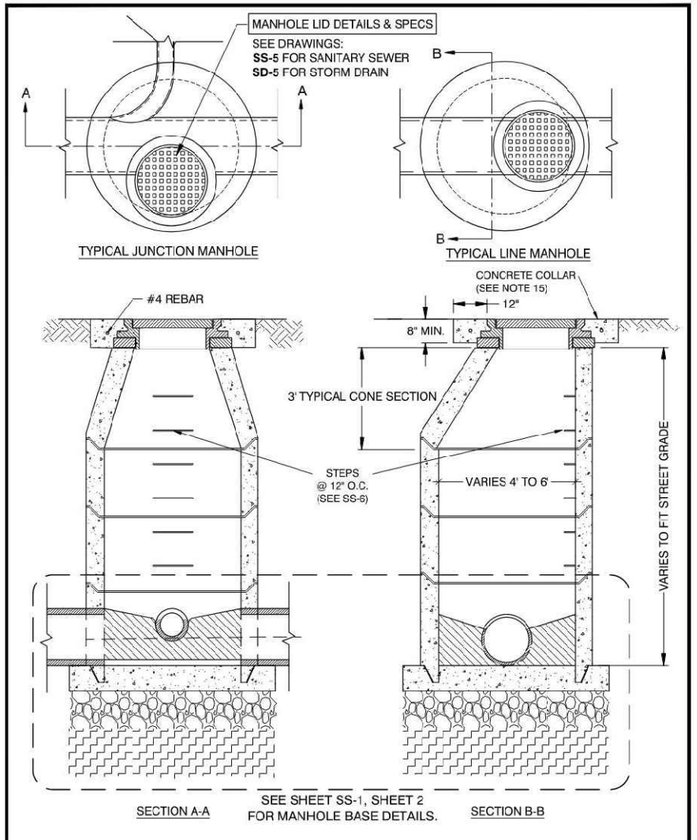
Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
45072	D03
Date: OCTOBER 2025	
Scale: NTS	

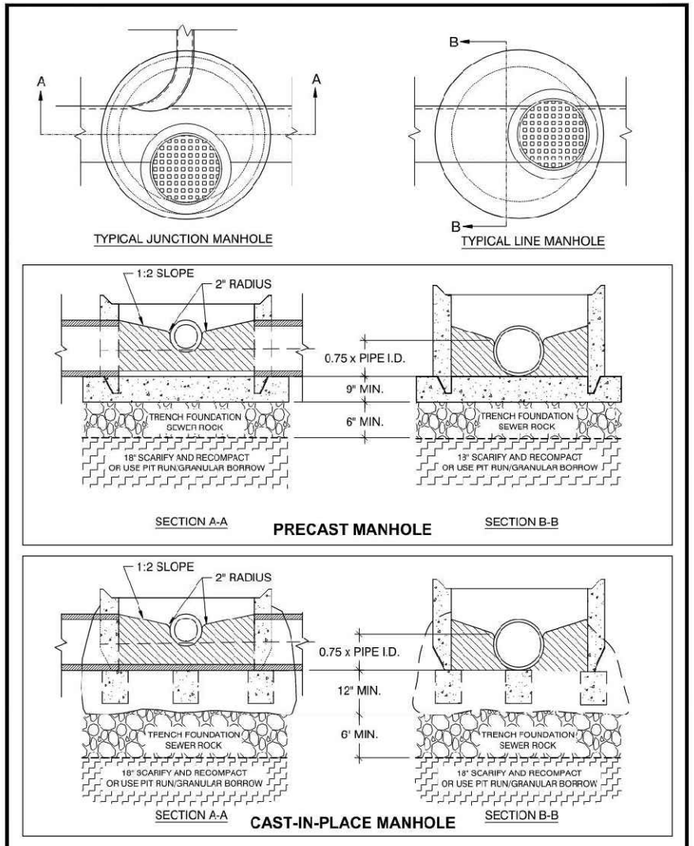


1 / D04 TYPICAL WATER LEVEL TRANSDUCER INSTALLATION DETAIL
NTS (PROVIDE SHOP DRAWINGS)



OGDEN CITY ENGINEERING - STANDARD DRAWINGS

Ogden UTAH Still Untamed	TYPICAL SEWER MANHOLE JUSTIN ANDERSON, CITY ENGINEER	SS-1 SHEET 1 OF 4



OGDEN CITY ENGINEERING - STANDARD DRAWINGS

Ogden UTAH Still Untamed	SEWER MANHOLE BASE DETAILS JUSTIN ANDERSON, CITY ENGINEER	SS-1 SHEET 2 OF 4

NOTES:

1. BACKFILL: PROVIDE AND PLACE PER APWA SECTION 31 23 23.
   1.1. COMPACT PER APWA SECTION 31 23 26 TO A DENSITY OF 95 PERCENT OR GREATER. MAXIMUM LIFT THICKNESS BEFORE COMPACTION IS 8" WHEN USING RIDING AND 6" WHEN USING HAND COMPACTION EQUIPMENT.
   1.2. SEWER ROCK SHALL BE PER APWA SECTION 31 05 13.
2. CONCRETE CLASS 4000 PER APWA SECTION 03 30 04. PLACE CONCRETE PER APWA 03 30 10.
3. MANHOLE SIZE
   3.1. 4' DIAMETER FOR SEWER PIPES UNDER 12" IN DIAMETER AND NOT SUBJECT TO ANY CONDITIONS LISTED FOR THE 5' MANHOLE.
   3.2. 5' DIAMETER FOR THE FOLLOWING:
      3.2.1. DEFLECTION ANGLE IS GREATER THAN OR EQUAL TO 45°
      3.2.2. WHEN THE MANHOLE HAS THREE OR MORE LINES
      3.2.3. FOR SEWERS WITH A PIPE DIAMETER OF 12" OR GREATER
      3.2.4. WHEN THE COVER IS GREATER THAN 14'.
4. SEE SS-5 FOR MANHOLE LID SPECIFICATIONS.
5. OUTLET PIPE TO BE A MINIMUM OF 1" BELOW INLET PIPE FLOW LINES EXCEPT AS NOTED BELOW IN FIG. 1 (BELOW).
6. STEEL FRAMES: USE ASTM A 36 STEEL.
7. LOW PROFILE LIDS WILL NOT BE ALLOWED IN ANY OGDEN CITY RIGHT OF WAY.
8. REINFORCEMENT: USE ASTM A 615, GRADE 60. REFER TO APWA 03 20 00.
   8.1. CAST IN PLACE REBAR SCHEDULE MUST BE STAMPED BY A STRUCTURAL ENGINEER.
9. COATINGS: EXCEPT MACHINED SURFACES, COAT ALL METAL WITH ASPHALTUM PAINT.
10. GROUT ALL PIPE OPENINGS WITH 2:1 SAND/CEMENT MORTAR.
11. PLACE FLEXIBLE GASKET-TYPE SEALANT IN ALL MANHOLE JOINTS. SEAL MUST MEET THE REQUIREMENTS OF SS-S-00210 (210A), AASHTO M-198, AND ASTM C990.
12. PRECAST REINFORCED CONCRETE WALLS MUST BE 5" THICK.
13. CAST-IN-PLACE CONCRETE WALLS MUST BE A MINIMUM OF 8" THICK.
14. CONTRACTOR SHALL CONTACT SEWER DEPARTMENT PRIOR TO ENTRANCE INTO MANHOLE
    14.1. ENTRANCE INTO MANHOLE SHALL BE PER OSHA STANDARDS
15. **MINIMUM PIPE SLOPE:** REFER TO **TABLE 1 - MINIMUM SEWER MAIN PIPE SLOPE**, OF THE OGDEN CITY ENGINEERING STANDARDS FOR MINIMUM SEWER MAIN PIPE SLOPE.

NORMAL DROPS (IN FEET) STRAIGHT THROUGH MANHOLES AT INVERTS FOR MINIMUM GRADES OF GREATER EXCEPT AS NOTED BELOW

OUTLET SIZE \ INLET SIZE	8"	10"	12"	15"	18"
8"	0.10	---	---	---	---
10"	0.17	0.10	---	---	---
12"	0.33	0.17	0.10	---	---
15"	0.58	0.42	0.25	CL	---
18"	0.80	0.71	0.63	0.50	CL

FIGURE 1

CL INDICATES THE DROP THOUGH THE MANHOLE SHALL BE THE EXISTING FLOWLINE BASED ON THE PIPE SLOPE

OGDEN CITY ENGINEERING - STANDARD DRAWINGS

Ogden UTAH Still Untamed	SEWER MANHOLE JUSTIN ANDERSON, CITY ENGINEER	SS-1 SHEET 3 OF 4

2 / D04 MANHOLE (TELEMETRY – AIRLINES – TYP.)
SEE SHEET S-502 FOR PRECAST MANHOLE FOOTING DETAIL

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT OBERMEYER HYDRO INC DETAIL

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT

Ogden Business Exchange Surf Wave

Project	Sheet
45072	D04
Date: OCTOBER 2025	
Scale: NTS	

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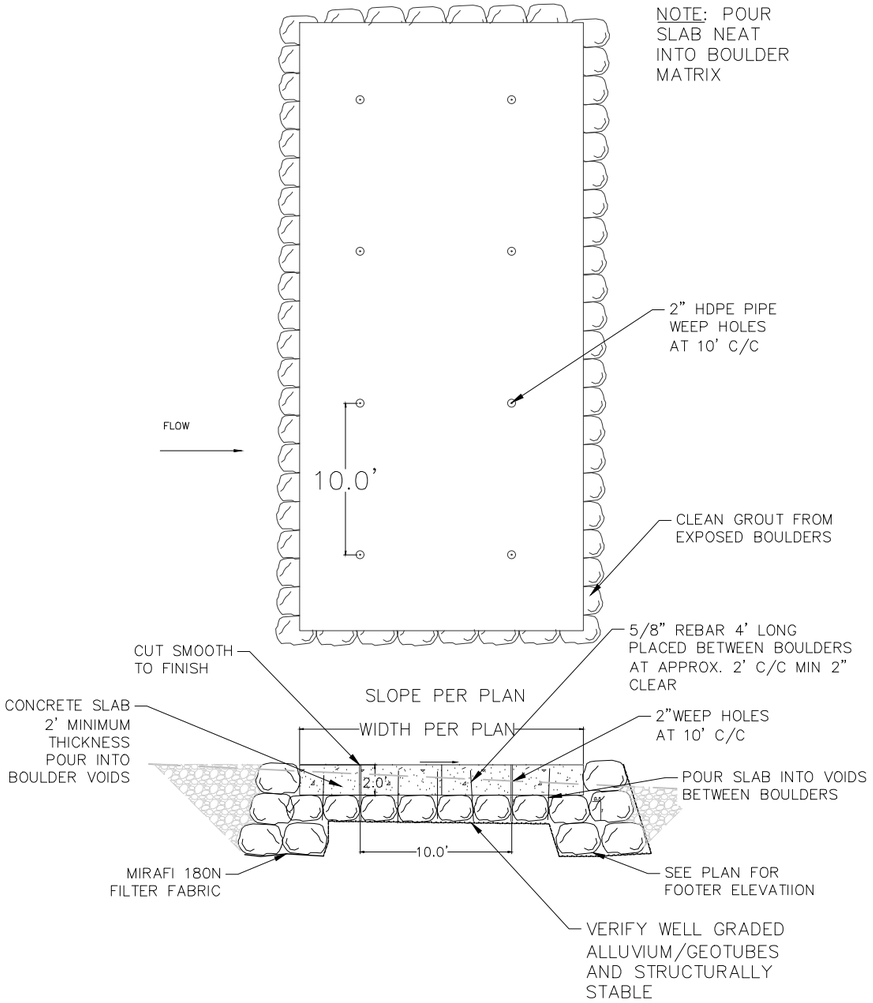
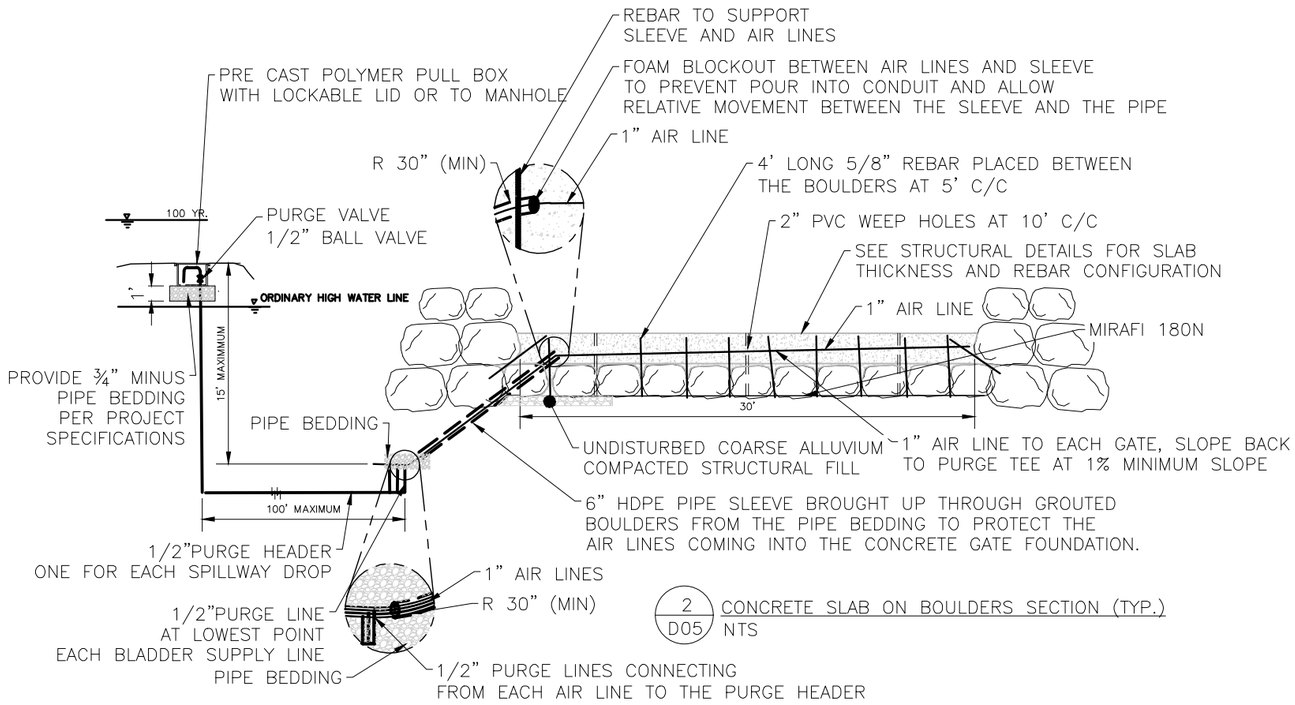


1/D05 CONCRETE SLAB ON BOULDERS (TYP.)
NTS



2/D05 CONCRETE SLAB ON BOULDERS SECTION (TYP.)
NTS

NOTES:

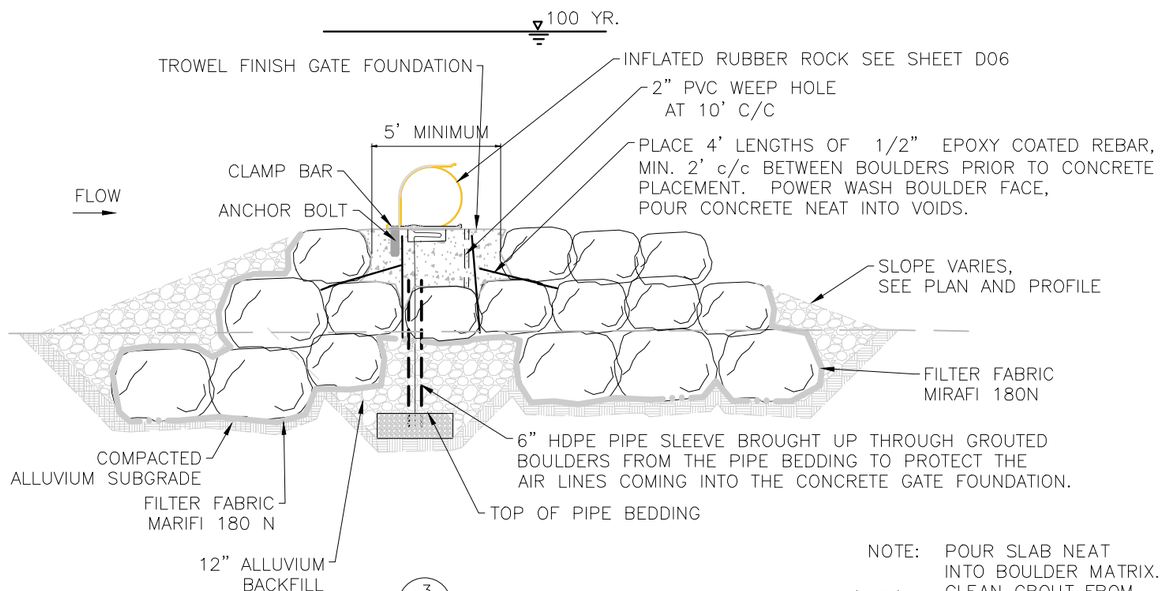
1. CONCRETE UNDER GATE SYSTEM, GRIND HIGH SPOTS FLUSH AND FILL VOIDS. SURFACE SHOULD BE FREE FROM ANY SHARP SURFACES AND SHOULD BE LEVEL WITHIN 1/4".

2. ALL DIMENSIONS TO WITHIN ±1/8" OF TRUE POSITION UNLESS OTHERWISE DIMENSIONED OR NOTED ON PART DRAWING.

3. ANCHOR BOLTS TO BE PERPENDICULAR TO WITHIN ±1/8" OVER LENGTH OF ANCHOR BOLTS AS COMPARED TO THE HORIZONTAL CONCRETE CLAMPING SURFACE.

4. CONTRACTOR RESPONSIBLE FOR ALL CONCRETE CUTTING, GROUTING, GROUT, AIR PIPE, AIR PIPE FITTINGS/WELDING, VALVING, ELECTRICAL CONDUIT, CONDUIT FITTINGS, ASSOCIATED TOOLS, REBAR, ANCHORING AND SURFACE EPOXY, AND ANYTHING ELSE PERTAINING TO COMPONENTS NOT SUPPLIED BY OBERMEYER HYDRO, INC. OR OUTLINED IN THE OBERMEYER BILL OF MATERIAL.

5. ALL DIMENSIONS IN FEET UNLESS OTHERWISE NOTED.



3/D05 CONCRETE SLAB ON BOULDERS PROFILE (TYP.)
NTS

NOTE: POUR SLAB NEAT INTO BOULDER MATRIX. CLEAN GROUT FROM EXPOSED BOULDERS.

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
OBERMEYER HYDRO INC
DETAIL

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

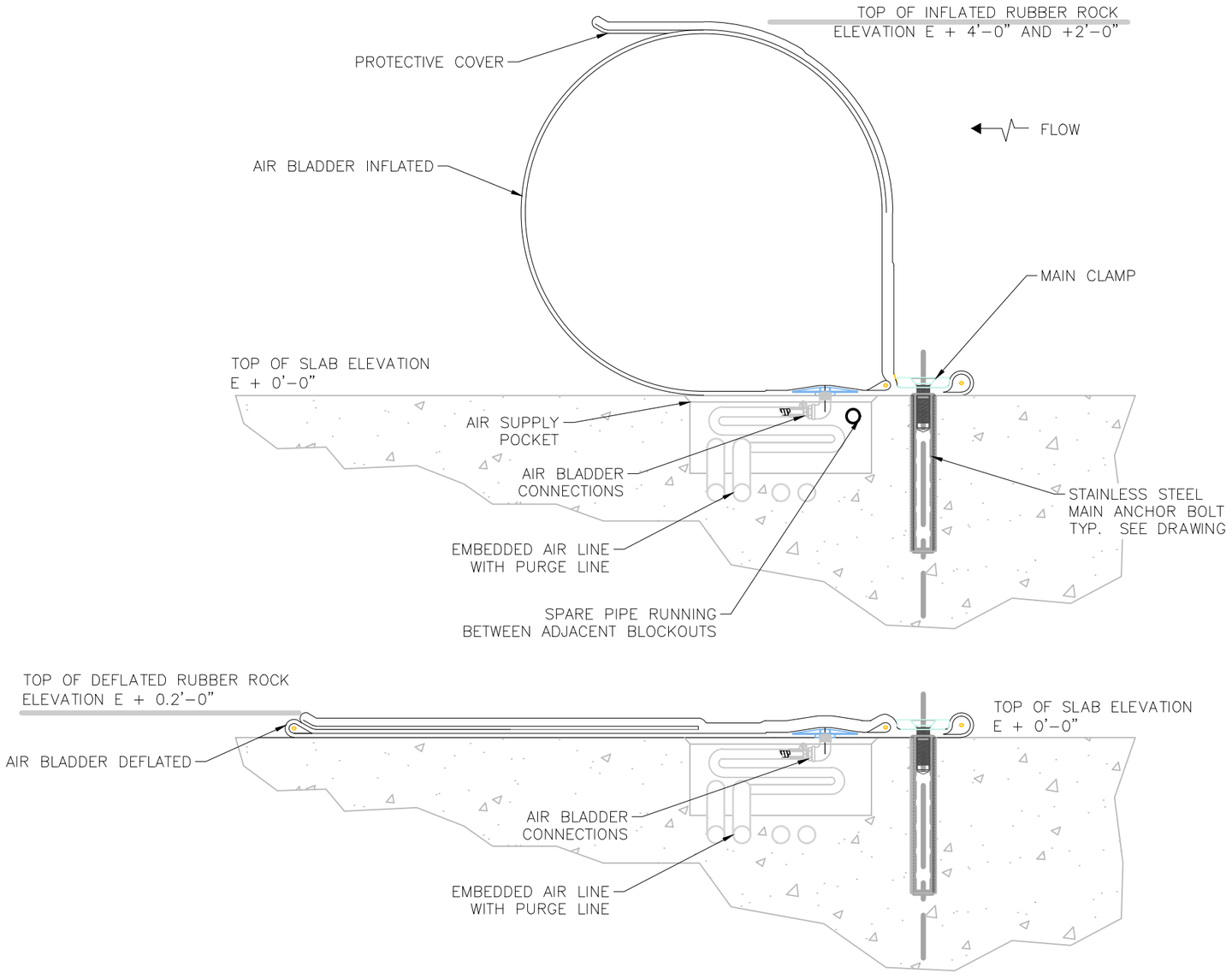
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D05
Date: OCTOBER 2025	
Scale: NTS	



1/D06 OHI RUBBER ROCK DETAIL – SECTION ELEVATION 2–4 FT HIGH
(NTS – NOT FOR CONSTRUCTION PROVIDE SHOP DRAWINGS)

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
OBERMEYER HYDRO INC
RUBBER ROCK DETAIL

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

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RiverRestoration
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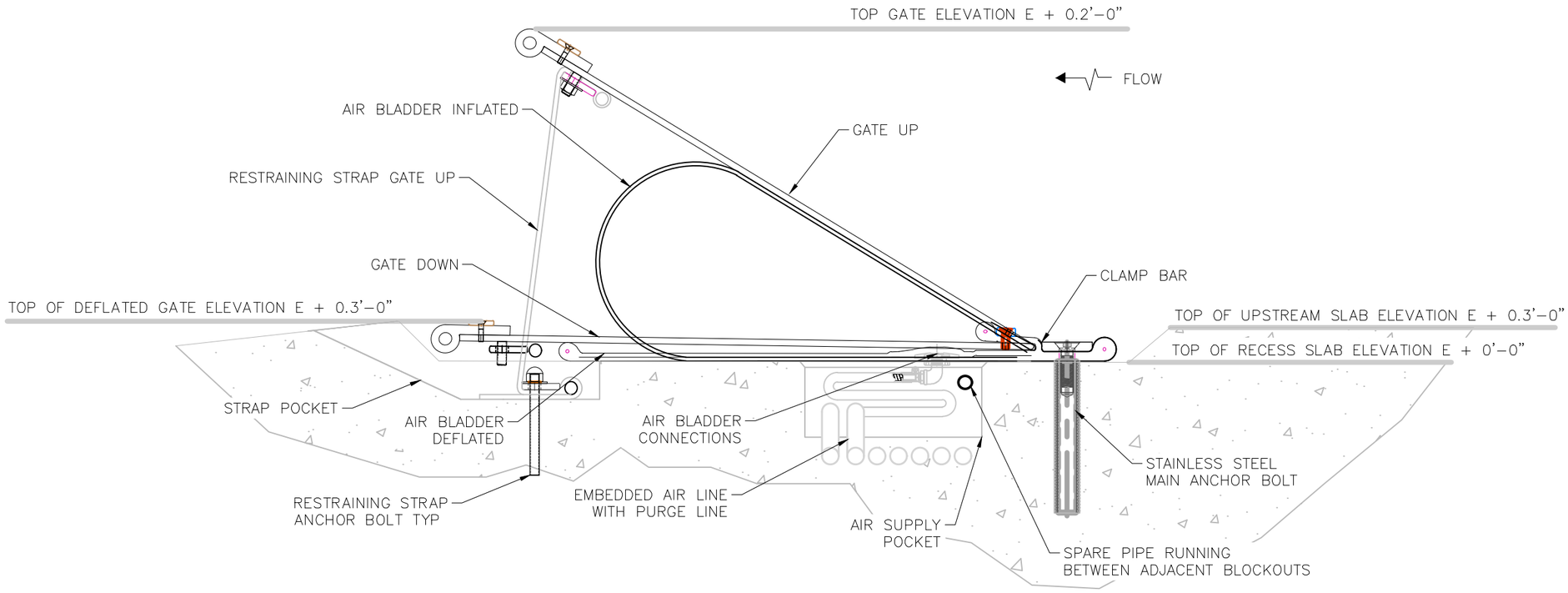
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D06
Date: OCTOBER 2025	
Scale: NTS	



1 / D07 OHI STEEL GATE DETAIL – SECTION ELEVATION 2.0 FT HIGH
(NTS – NOT FOR CONSTRUCTION PROVIDE SHOP DRAWINGS)

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
OBERMEYER HYDRO INC
STEEL GATE DETAIL

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D07
Date: OCTOBER 2025	
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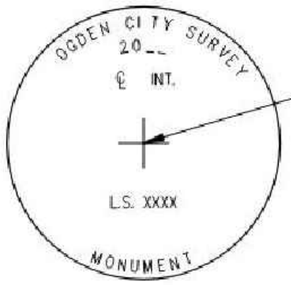
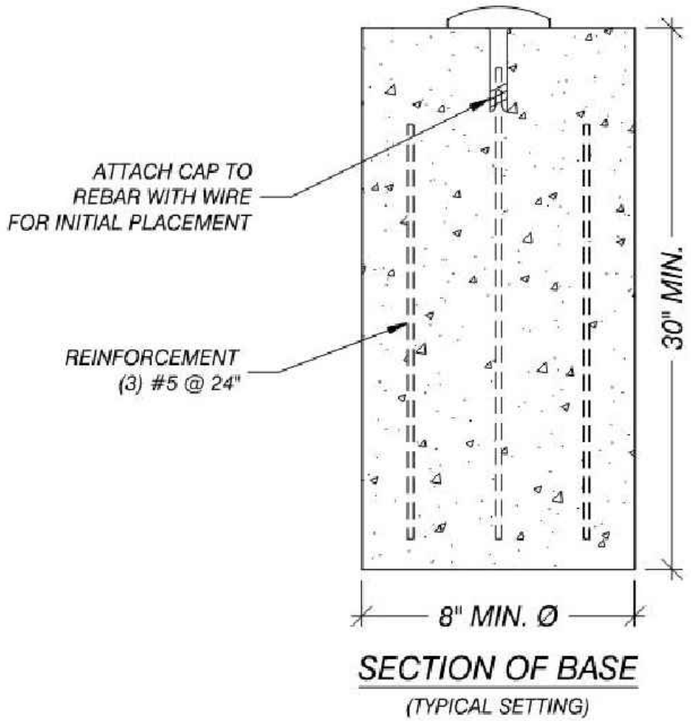


CAP PLAN

CAP CAN BE PURCHASED FROM ENGINEERS OFFICE

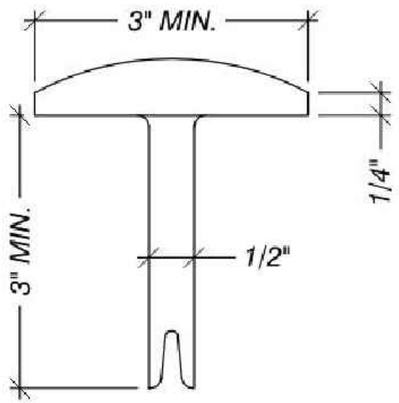
ABBREVIATIONS:

INT - INTERSECTION
ML INT - MONUMENT LINE INTERSECTION
P.C. - POINT OF CURVATURE
P.C.C. - POINT OF COMPOUND CURVATURE
P.I. - POINT OF INTERSECTION
P.O.C. - POINT ON CURVE
P.O.T. - POINT ON TANGENT
P.R.C. - POINT OF REVERSE CURVE
P.T. - POINT OF TANGENCY
S.C. - SECTION CORNER
W.C. - WITNESS CORNER



SECTION OF BASE

(TYPICAL SETTING)



CAP SECTION

NOTES:

1. DATE:SHOW MONTH, DAY, AND YEAR WHEN CAP WAS MARKED.
2. LICENCE:SHOW LICENCE NUMBER OF LAND SURVEYOR WHO MARKED THE CAP.
3. CONCRETE:CLASS 4000 PER APWA SECTION 03 30 04.
4. REINFORCEMENT:ASTM A 615, GRADE 60, DEFORMED STEEL REBAR.

BID SET

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
07/16/2025
STATE OF UTAH

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT

OGDEN CITY DETAILS - SURVEY MONUMENT

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
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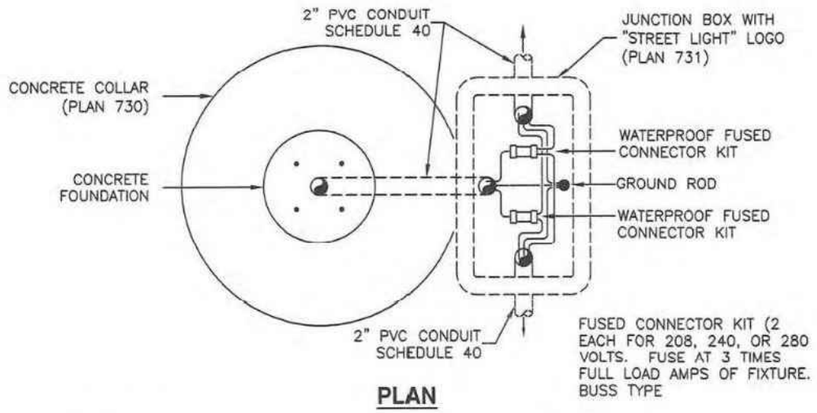
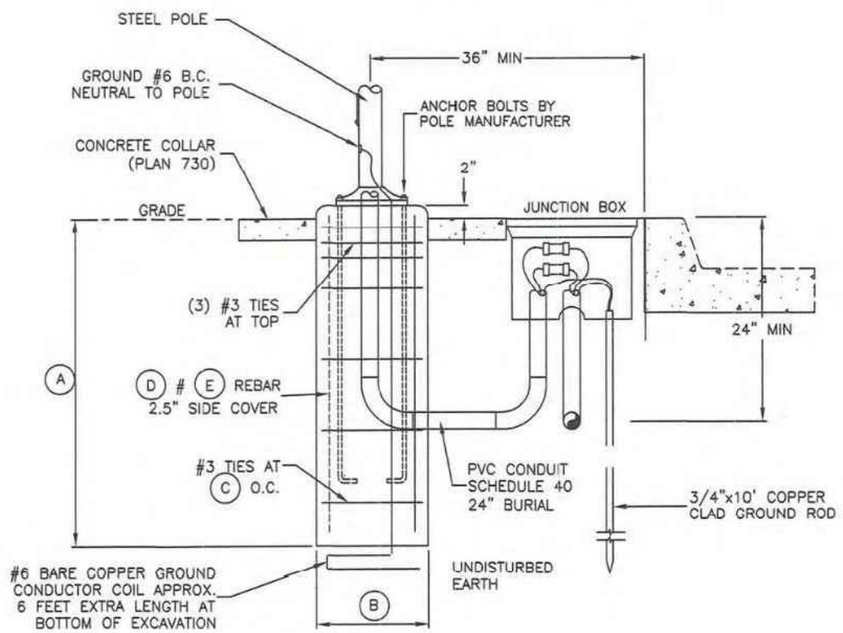
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D08
Date: OCTOBER 2025	
Scale: NTS	



PLAN



POLE LENGTH	DEPTH (A)	DIAMETER (B)	REBAR (C)	VIRTUAL (D)	REBAR (E)
10'–15'	4'–0"	18"	1 1/4"	8.6"	14
16'–25'	6'–0"	24"	1"	8.6"	14
26'–50'	9'–0"	30"	1"	6.6"	12

ELEVATION

APWA Utah Chapter

Concrete base for street light pole

Plan
743
January 2011

Concrete base for street light pole

1. GENERAL

A. Match longitudinal grades of foundation cap with top of existing curb.
B. Establish grade from which foundation elevation is measured.
   1) Existing Curb and No Sidewalk: Grade is 1/4-inch per foot sloped upward from the top of the back of curb.
   2) Existing Curb and Sidewalk: Straight grade from top back of curb to near edge of sidewalk.
   3) Inside of Existing Median. Straight grade between top of back of one curb to top of back of other curb.
C. When foundation cap is located in an area to be paved, the cap is to be placed below grade with bolts extending above top of cap to accommodate paving surface.

2. PRODUCTS

A. Reinforcement: Galvanized or epoxy coated, deformed, 60 ksi yield grade steel, ASTM A615.
B. Anchor Bolt: Galvanized steel with galvanized washer and nut, APWA Section 05 05 23.
C. Concrete: Class 4000, APWA Section 03 30 04.

3. EXECUTION

A. Keyhole to verify pole placement and protect utilities, APWA Section 31 23 16.
B. Excavation. Use vacuum extraction or excavate by hand if utilities are in the site vicinity.
C. Formwork: Use a circular form for the top 18-inches of foundation. If ground water is encountered, excavate additional depth and install sewer rock. Pump out water and provide a circular form for full length of foundation.
D. Before Concrete Placement:
   1) Do not weld reinforcing steel, anchor bolts, or galvanized steel conduit.
   2) Place all conduits in same trench.
   3) Use a template to hold anchor bolts in the proper positions and to the proper heights until concrete is placed and sets.
   4) Protect conduits from plugging by sealing conduit ends before concrete placement.
E. Concrete Placement: APWA Section 03 30 10. Provide 1/2-inch radius edges. Cure concrete for 7 days before erecting pole.

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
OGDEN CITY DETAILS - CONCRETE BASE FOR CAMERA POLE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

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Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D09
Date: OCTOBER 2025	
Scale: *NTS*	

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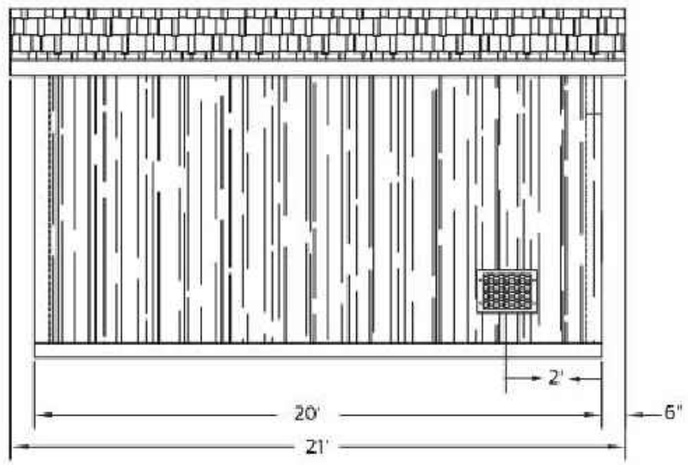
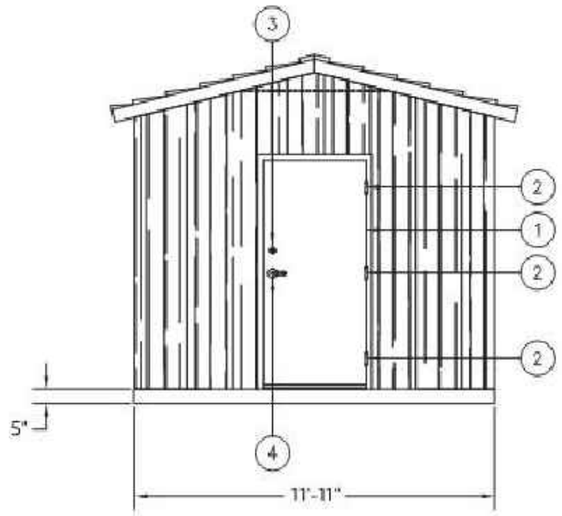


LH SIDE ELEVATION



FRONT ELEVATION

DESIGN CRITERIA:

GENERAL NOTES APPLY TO ALL PANELS
UNLESS SPECIFICALLY NOTED OTHERWISE

1997 UBC

LOADS:
- WIND: 120 MPH EXP D
- SEISMIC: ZONE 4
- SNOW: 250 PSF ROOF LOAD
- FLOOR LIVE LOAD: 400 PSF

MATERIALS:

CONCRETE: F'ci = 2500 PSI
F'C = 5000 PSI

STEEL:
- REBAR=ASTM A615 GRADE 60
- WELDING NOT ALLOWED
- MIN LAP SPLICE IS 40 DIAMETERS
- ALL MESH IS 4x4xW8xW8
- MIN. MESH LAP IS TWO SQUARES
- MESH IS TO BE CENTERED IN PANEL
- PLATES & BARS=ASTM A36 Fy=36 KSI

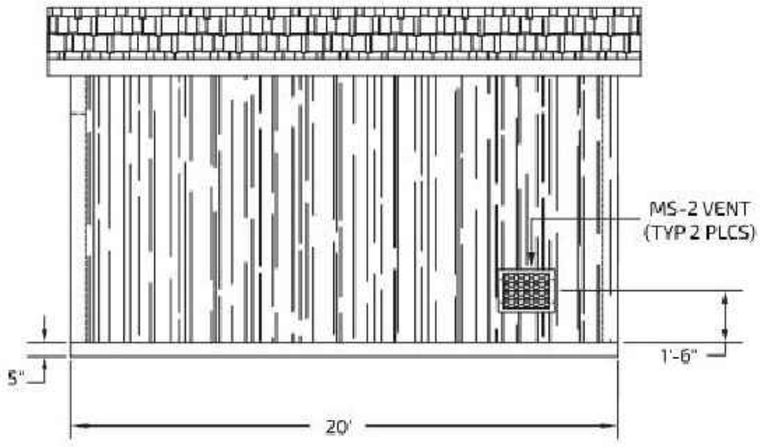
PANEL THICKNESS:
- FLOOR = 5"
- WALLS = 4"
- ROOF = 4 1/2"

COLOR: SEE MI

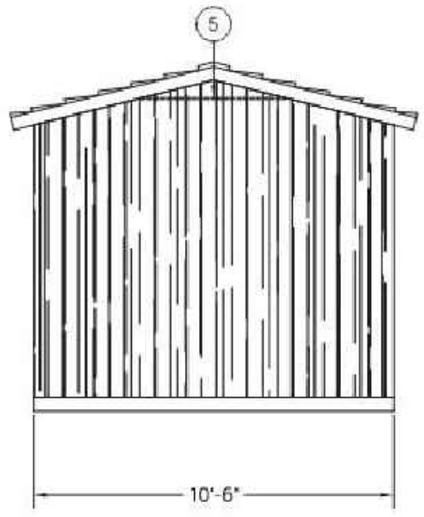
TEXTURE: WALLS - BARNWOOD
ROOF - CEDAR SHAKE

BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
1	1	3068 DOOR ASSEMBLY
		PREP FOR DEAD BOLT
		OPENS OUT
		AUTOMATIC DOOR BTM
		3" THRESHOLD
2	3	SPRING HINGE 4.5 x 4.5
3	1	SCHALAGE DEAD BOLT LOCK
4	1	CLASS ROOM LEVER
5	3	FLAT BAR 1/2" x 5HR x 4'-2"
		APPROXIMATE WEIGHT



RH SIDE ELEVATION



REAR ELEVATION

CASTING TOLERANCES:

OVERALL LENGTH OR WIDTH
- 10 FT OR UNDER = ± 1/8"
- 10 TO 20 FT = +1/8", -3/16"
- 20 TO 40 FT = ±1/4"

TOTAL THICKNESS = +1/8, ±1/4

VARIATION FROM SQUARE = ±1/8 PER 6 FT OF DIAGONAL

LOCAL SMOOTHNESS = 1/4" IN 10 FT

SWEEP = ±1/4"

POSITION OF TENDONS = ±1/4"

POSITION OF BLOCKOUTS = ±1/4"

SIZE OF BLOCKOUTS = ±1/4"

POSITION OF EMBEDS = ±1/4"

TIPPING AND FLUSHNESS OF PLATES = +0, -1/4

BOWING = LENGTH/360

END SQUARENESS = ±1/8"

CXT

Precast Products

PROJECT TITLE

10.5' x 20' SCHWEITZER
CXT STANDARD BUILDING

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CXT Incorporated

REV.	DESCRIPTION	APPROVAL	DATE
SCALE	1/4"=1'-0"	DATE	06-05-06
DRAWN	D.BRESSLER	FILE NO.	PD-SW01
CHECKED		PLOT	48

BUILDING ELEVATIONS

DWG NO.	SHEET	REV.
10.520-01		

BID SET

PROFESSIONAL ENGINEER STAMP

318641-2202
JASON CAREY
STATE OF UTAH

OGDEN BUSINESS EXCHANGE
SURF WAVE PROJECT
CXT Precast Products
10.5' x 20' CONTROL BUILDING

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

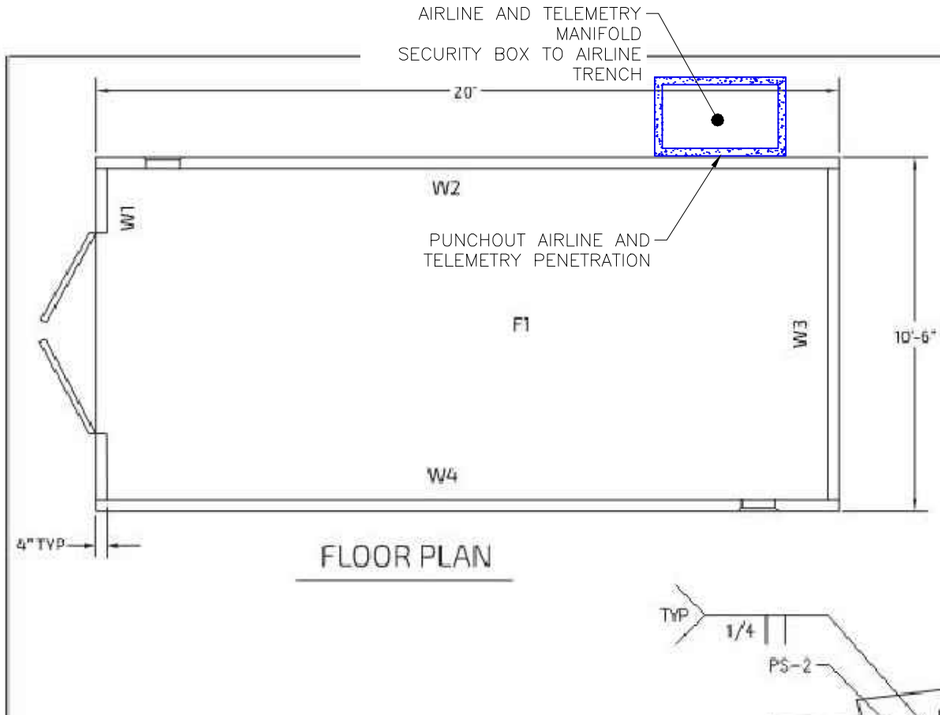
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

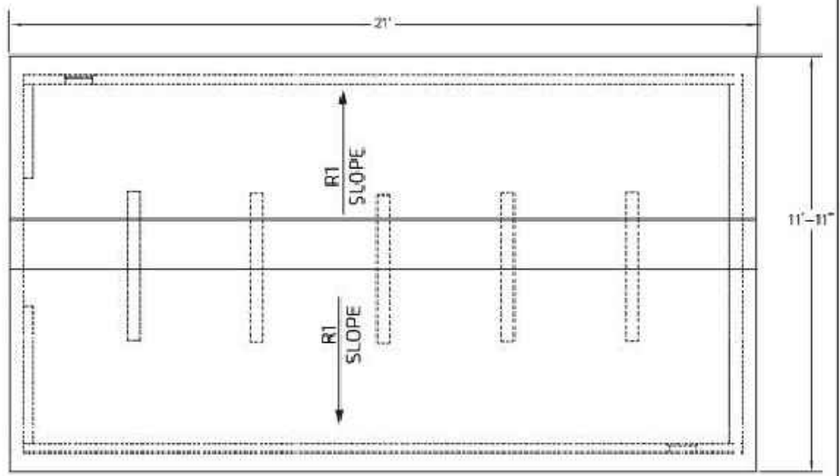
PROJECT NAME AND ADDRESS

Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

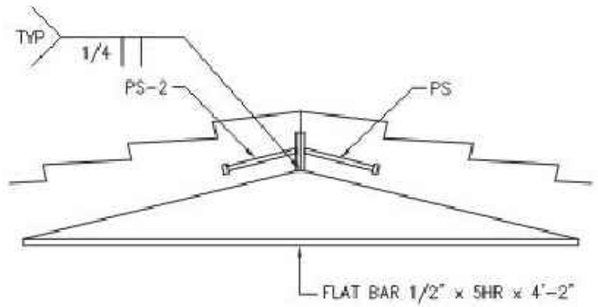
Project	Sheet
45072	D10
Date: OCTOBER 2025	
Scale: NTS	



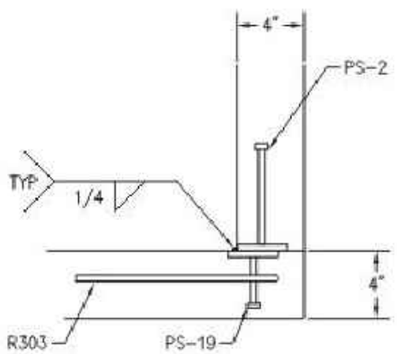
FLOOR PLAN



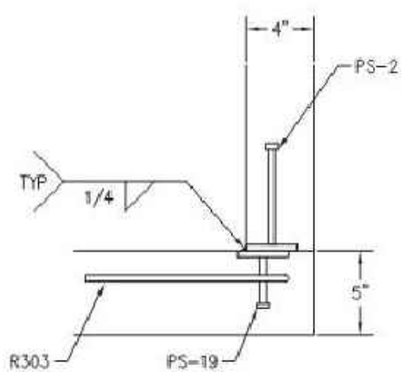
ROOF PLAN



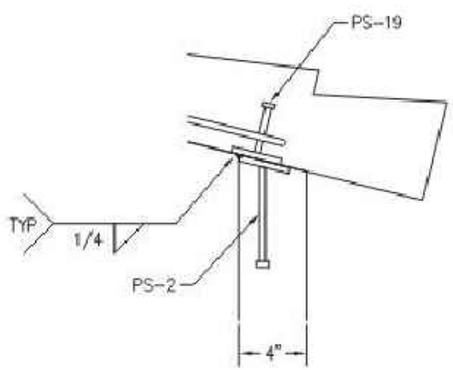
RIDGE CONNECTION



WALL TO WALL CONNECTION



WALL TO FLOOR CONNECTION



WALL TO ROOF CONNECTION

CXT®
Precast Products

PROJECT TITLE
10.5' x 20' SCHWEITZER
CXT STANDARD BUILDING

NOTICE

REV.	DESCRIPTION	APPROVAL	DATE
SCALE	1/4"=1'-0"	DATE	06-05-06
DRAWN	D.BRESSLER	FILE NO.	PD-SW02
CHECKED		PLOT	48

PLAN VIEW

DWG NO.	SHEET	REV.
10.520-02		

BID SET

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OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CXT Precast Products
10.5' x 20' CONTROL BUILDING

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45072	D11
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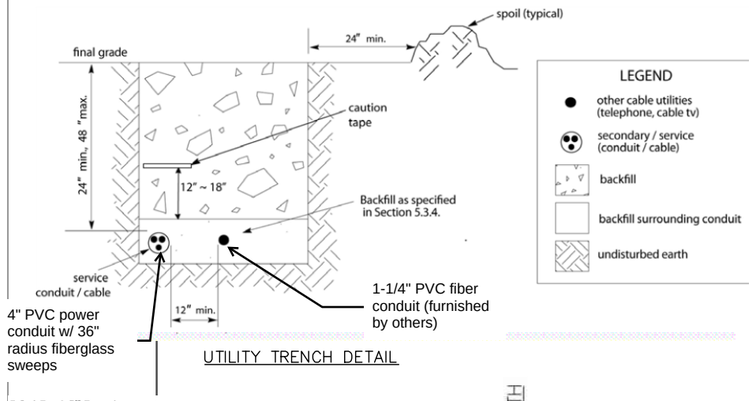
FOR REFERENCE ONLY



UTILITY TRENCH DETAIL

LEGEND

- other cable utilities (telephone, cable tv)
- secondary / service (conduit / cable)
- backfill
- backfill surrounding conduit
- undisturbed earth

5.3.4 Backfill Requirements

The following list of requirements applies to all installations requiring backfill:

1. The customer shall provide trench backfill and site restoration.
2. All backfill shall be free of materials that may damage the conduit system. Backfill within 4 inches of the conduit shall be select (capable of passing through a 3/4-inch sieve).
3. Extra caution should be taken when refilling trenches.
4. The Power Company may not energize conductors until the customer completes the backfill to Power Company satisfaction.

The cost to repair a conduit is the responsibility of the customer.

NOTE:

THE "FOUNDATION" FOR THIS STRUCTURE IS ESSENTIALLY THE COMBINATION OF THE COMPACTED SUB-BASE MATERIAL AND THE BUILDING'S REINFORCED SLAB. THE COMBINATION OF THE COMPACTED SUB-BASE MATERIAL AND THE BUILDING'S REINFORCED SLAB NEED TO BE AT LEAST 12" THICK AND THE COMPACTED SUB-BASE MATERIAL SHALL EXTEND BELOW THE LOCAL FROST DEPTH.

THIS FACTORY ASSEMBLED BUILDING, AS CONSTRUCTED, PROVIDES A RIGID BOX TYPE STRUCTURAL SYSTEM. VERTICAL LOADS ARE TRANSFERRED PRIMARILY THROUGH BEARING WALLS TO THE STRUCTURAL SLAB FLOOR OF THE BUILDING. THE VERTICAL LOADS ARE THEN DISTRIBUTED THROUGH THE REINFORCED CONCRETE FLOOR TO THE PREPARED GRANULAR, NON-FROST SUSCEPTIBLE (NFS) SUB-BASE WHICH DISTRIBUTES THE VERTICAL LOADS IN RELATIVELY UNIFORM FASHION TO THE NATIVE SUB-GRADE. AS WITH MOST CONSTRUCTION, THIS DOES REQUIRE THE NATIVE SUB-GRADE TO BE STRIPPED OF VEGETATION AND TOP SOIL PRIOR TO PLACEMENT OF THE PREPARED GRANULAR SUB-BASE. DUE TO THE INHERENT STIFFNESS OF THE BUILDING, IT WILL REMAIN SAFE AND STRUCTURALLY SOUND IN THE UNLIKELY EVENT OF FREEZING ACTION BELOW THE BUILDING REGARDLESS OF ANTICIPATED NATURAL FREEZE/ THAW CYCLES.

LATERAL LOADS ARE TRANSFERRED TO THE GROUND THROUGH FRICTIONAL RESISTANCE WITHOUT SLIDING OR SHIFTING BETWEEN THE BUILDING FLOOR SLAB AND THE PREPARED SOIL AND GRAVEL SUB-BASE ON WHICH THE BUILDING RESTS. SEISMIC ANALYSES ARE BASED ON LOADS DETERMINED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE USING PARAMETERS, WHICH MEET OR EXCEED THE CODE PRESCRIBED REQUIREMENTS FOR THIS INSTALLATION.

THIS BUILDING AS DESIGNED, RESTING ON A PROPERLY PREPARED GRANULAR SUB-BASE WILL BE SAFE AND STRUCTURALLY SOUND FOR VERTICAL AND LATERAL LOADS AS DISCUSSED ABOVE. A FULL DEPTH FOUNDATION WALL AT THE BUILDING PERIMETER AND AN ANCHORAGE SYSTEM, TYPICAL FOR OTHER TYPES OF BUILDING CONSTRUCTION, ARE NOT REQUIRED FOR THIS BUILDING.

PRIOR TO PLACEMENT OF BUILDING A PROPERLY PREPARED SUB-BASE SHALL BE PROVIDED. SUB-BASE SHALL EXTEND TO FROST DEPTH(36" BELOW GRADE) AND CONSIST OF 3/4" MINUS CRUSHED ROCK (ROAD BASE MATERIAL) COMPACTED TO 95% OF OPTIMUM DENSITY IN ACCORDANCE WITH ASTM D 1557. FINISHED SURFACE OF SUB-BASE SHALL BE FLAT AND LEVEL, WITH A MAXIMUM DEVIATION OF -1/2", +0" FROM A TRUE HORIZONTAL PLANE. (FOUNDATION PREP NOT BY CXT).

CXT

6707 E. Flamingo Ave, Bldg 300, Nampa, ID 83687
901 N. Highway 77 Hillsboro, TX 76645
362 Waverly Road Williamstown, WV 26187

PROJECT TITLE
XXXX
BUILDING NUMBER XXXX

REV.	DESCRIPTION	APPROVAL	DATE
SCALE	1/4"=1'-0"	DATE	-
DRAWN	M. TOLMAN	FILE NO.	-
CHECKED	N. PENNER	PLOT	48

FOUNDATION DETAIL

DWG NO.	SHEET	REV.
-	- / 24	0

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
CXT Precast Products
10.5' x 20' CONTROL BUILDING

No.	REVISION/UPDATE	Date

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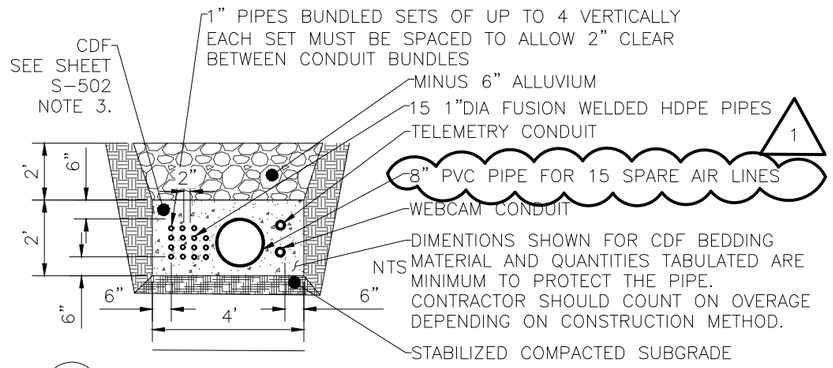
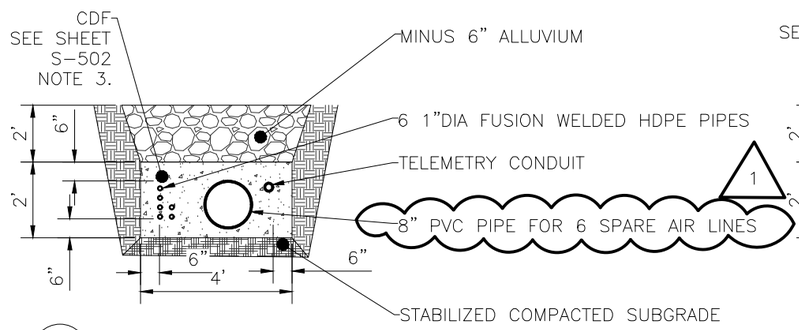
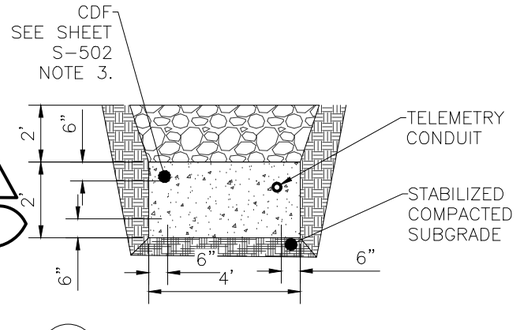
Project	Sheet
45072	D12
Date: OCTOBER 2025	
Scale: NTS	



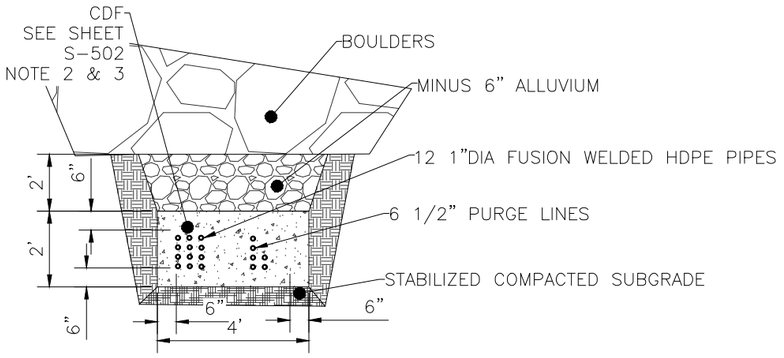
1 / D13 AIR LINE BEDDING DETAIL (CB TO MH1)



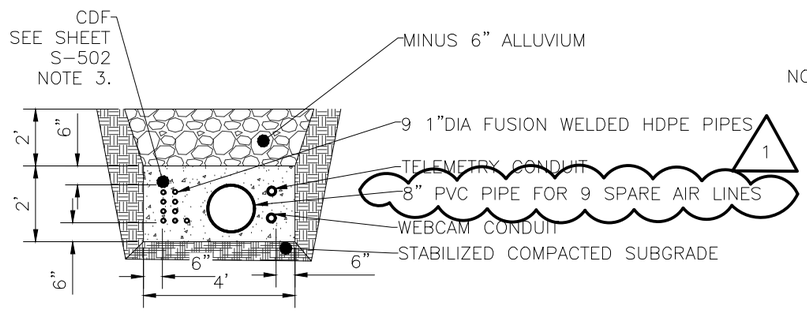
2 / D13 AIR LINE BEDDING DETAIL (MH1 TO MH5)
NTS



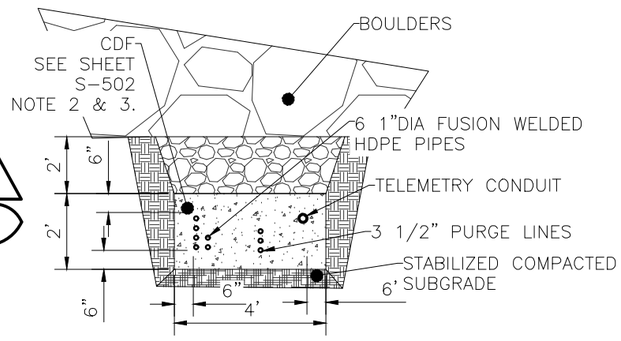
3 / D13 AIR LINE BEDDING DETAIL (MH5 TO MH6)
NTS



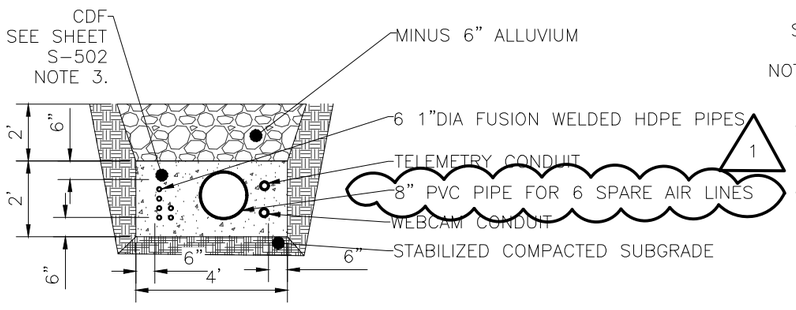
4 / D13 AIR LINE BEDDING DETAIL (MH5 TO W4 GATES)
NTS – SEE DETAIL A1 SHEET S-502 NOTE 2 FOR REINFORCED CONCRETE CONDUIT ENCASEMENT WHEN PLACED UNDER CONCRETE STRUCTURES



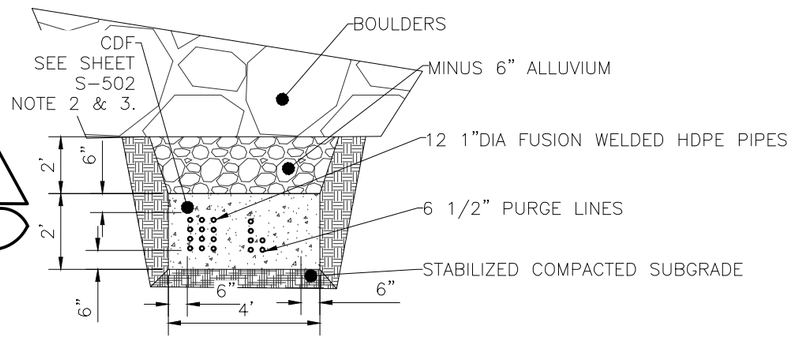
5 / D13 AIR LINE BEDDING DETAIL (MH1 TO MH2)
NTS



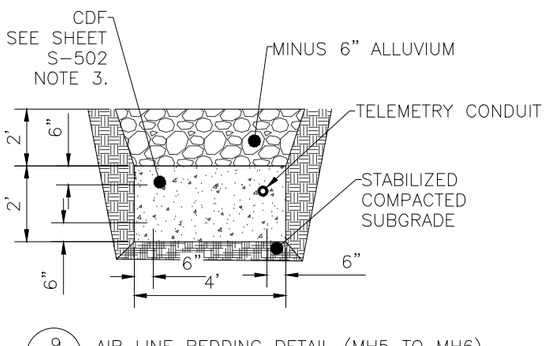
6 / D13 AIR LINE BEDDING DETAIL (MH2 TO W1 GATES)
NTS – SEE DETAIL A1 S-502 NOTE 2 FOR REINFORCED CONCRETE CONDUIT ENCASEMENT WHEN PLACED UNDER CONCRETE STRUCTURES



7 / D13 AIR LINE BEDDING DETAIL (MH2 TO MH3)
NTS



8 / D13 AIR LINE BEDDING DETAIL (MH5 TO W2–W3 GATES)
NTS – SEE DETAIL A1 SHEET S-502 NOTE 2 FOR REINFORCED CONCRETE CONDUIT ENCASEMENT WHEN PLACED UNDER CONCRETE STRUCTURES



9 / D13 AIR LINE BEDDING DETAIL (MH5 TO MH6)
NTS

NOTE:
- THE USE OF STRUCTURAL CONCRETE WITH REINFORCEMENT IS REQUIRED FOR ALL CONDUIT ENCASEMENT PASSING UNDER CONCRETE STRUCTURES. SEE STRUCTURAL DETAILS.
- USE CDF FOR ALL OTHER TRENCH LOCATIONS.
- JUNCTION AT MANHOLE,
- CAP AND SWEEP REDUNDANT LINES IN MANHOLE AND AT BLOCK-OUT
- SPACING BETWEEN AIRLINES = 1" PIPES BUNDLED SETS OF UP TO 4 VERTICALLY SPACED AT 2" O.C HORIZONTAL

BID SET

PROFESSIONAL ENGINEER STAMP

OGDEN BUSINESS EXCHANGE SURF WAVE PROJECT
AIR LINE BEDDING DETAIL

No.	REVISION/UPDATE	Date
1	8" PVC PIPE UPDATE	11/21/25

CLIENT NAME AND ADDRESS

Ogden City Corporation
Engineering Division
2549 Washington Blvd
Ogden, UT 84401

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
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www.RiverRestoration.org

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Weber River
Ogden, UT
Ogden Business Exchange Surf Wave

Project	Sheet
45072	D13
Date: NOVEMBER 2025	
Scale: NTS	

GENERAL REQUIREMENTS

A. THESE GENERAL STRUCTURAL NOTES AND SPECIFICATIONS SUPPLEMENT THE PROJECT WRITTEN TECHNICAL SPECIFICATIONS (WHERE APPLICABLE) AND THE PROJECT STRUCTURAL DRAWINGS.
B. THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION BRACING, TEMPORARY SHORING, AND OTHER SITE SAFETY CONTROLS REQUIRED DURING CONSTRUCTION IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS, TO ENSURE THE STABILITY AND SAFETY OF ALL CONSTRUCTION UNTIL IT IS COMPLETED AND SELF-SUPPORTING.
C. THE CONTRACTOR IS RESPONSIBLE FOR ALL WATER, BOTH ABOVE AND BELOW GROUND, RUNOFF AND OTHER ENVIRONMENTAL CONTROLS REQUIRED DURING CONSTRUCTION TO ENSURE THE SITE IS MAINTAINED IN COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.
D. DETAILS ON THESE PLANS ARE INTENDED TO DEPICT THE GENERAL CONSTRUCTION DETAILS AND METHODS FOR THIS STRUCTURE. CONNECTION DETAILS AND CONDITIONS NOT SPECIFICALLY SHOWN THAT ARE SIMILAR IN NATURE TO THOSE THAT ARE SPECIFIED SHALL BE ASSUMED ONE AND THE SAME. IF QUESTIONS REGARDING THE APPLICATION OF DETAILS ARE ENCOUNTERED, NOTIFY THE ENGINEER FOR CLARIFICATION OR INSTRUCTION.
E. PRIOR TO IMPLEMENTING ANY CHANGES TO THESE PLANS, THE ENGINEER SHALL BE NOTIFIED IN WRITING FOR THEIR WRITTEN APPROVAL. CHANGES IMPLEMENTED WITHOUT THE ENGINEERS WRITTEN APPROVAL SHALL RELIEVE THE ENGINEER OF ANY CLAIM OR LIABILITY RESULTING FROM THAT PORTION OF THE STRUCTURE CHANGED OR AFFECTED BY THE CHANGE.

CONTRACTOR RESPONSIBILITY FOR COORDINATION

A. IT IS THE CONTRACTOR'S PRIME RESPONSIBILITY TO COORDINATE THE WORK SHOWN ON ALL OF THE PROJECT DRAWINGS, GENERAL, SPECIAL AND TECHNICAL SPECIFICATIONS.
B. THE CONTRACTOR IS RESPONSIBLE TO VERIFY ALL EXISTING CONSTRUCTION MATERIAL TYPES DIMENSIONS, ELEVATIONS AND CONDITIONS.
C. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE DIMENSIONS AMONG ALL DRAWINGS AND IN THE FIELD PRIOR TO PROCEEDING WITH ANY WORK OR FABRICATION, ANY DISCREPANCY SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER.
D. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CAREFULLY STUDY AND COORDINATE THE CONSTRUCTION REQUIREMENTS SHOWN ON BOTH THE CIVIL AND THE STRUCTURAL DRAWINGS. WHEN CONFLICTS OR DISCREPANCIES ARE FOUND BETWEEN THESE PLAN SETS AND/OR WITHIN THESE DRAWINGS, THE CONTRACTOR SHALL REPORT THEM IMMEDIATELY TO THE PROJECT ENGINEER FOR DIRECTION AND/OR CLARIFICATION.
E. ANY CONSTRUCTION WORK DONE BY THE CONTRACTOR BEFORE OBTAINING SUCH CLARIFICATION FROM THE PROJECT ENGINEER SHALL BE AT THE CONTRACTOR'S OWN RISK AND COST. FURTHERMORE, ANY WORK REQUIRED TO CORRECT, REPLACE AND/OR RESTORE THE WORK AS DIRECTED BY THE ENGINEER SHALL BE AT THE CONTRACTOR'S OWN RISK AND COST.

CODES

A. INTERNATIONAL BUILDING CODE, IBC 2021 EDITION.
B. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ASCE 7-16.
C. AMERICAN CONCRETE INSTITUTE, ACI 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE; CURRENT EDITION.
D. AMERICAN CONCRETE INSTITUTE, ACI 350, CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES; CURRENT EDITION.
E. AMERICAN CONCRETE INSTITUTE, ACI 301, SPECIFICATIONS FOR STRUCTURAL CONCRETE.
F. AMERICAN INSTITUTE OF STEEL CONSTRUCTION, AISC 15TH EDITION, STEEL CONSTRUCTION MANUAL.
G. AMERICAN WELDING SOCIETY, AWS D1.1 CURRENT EDITION, STRUCTURAL WELDING CODE.

SUBMITTALS

A. SUBMIT PRODUCT OR MATERIAL INFORMATION TO THE ENGINEER FOR REVIEW FOR THE FOLLOWING ITEMS:
  i CONCRETE MIX DESIGNS AND ADMIXTURES.
  ii NON-SHRINK GROUT.
  iii EXPANSION BOLTS.
  iv ADHESIVE ANCHORS.

SHOP DRAWINGS

A. SUBMIT SHOP DRAWINGS TO THE ARCHITECT/ENGINEER FOR REVIEW PRIOR TO FABRICATION OF THE FOLLOWING ITEMS:
  i REINFORCING STEEL FOR ALL CONCRETE.
  ii STEEL ANGLES & BENT PLATES W/ WELDED STUDS.
  iii CONCRETE BLOCKOUTS.

DESIGN CRITERIA

A. OCCUPANCY OR USE; IBC TABLE 1607.1: RECREATION
  i RISK CATEGORY; ASCE-7 TABLE 1.5-2: II
B. LIVE LOADS:
  i FLOOR LIVE LOAD:
    (a) GENERAL LOADING: 100 PSF
    (b) GATE LOADS: PER OHI
C. SNOW LOADS:
  (a) N/A
D. DEAD LOADS:
  i GATE & SLAB SELF-WEIGHT
E. WIND:
  i BASIC WIND SPEED, V=103 MPH
  ii SITE WIND EXPOSURE: C
F. EARTHQUAKE:
  i SEISMIC IMPORTANCE FACTOR, Ie: 1.00
  ii MAPPED SPECTRAL RESPONSE ACCELERATION:
    (a) SHORT PERIOD, Ss: 1.356
    (b) 1-SECOND, S1: 0.492
  iii SOIL SITE CLASS: D (DEFAULT)
  iv DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS:
    (a) SHORT PERIOD, Sds: 1.085
    (b) 1-SECOND, Sd1: 0.560
  v SEISMIC DESIGN CATEGORY: D
F. SOIL DESIGN PARAMETERS (NINYO & MOORE, 800429001 R, JAN. 10, 2025):
  i NET ALLOWABLE SOIL BEARING PRESSURES; Qn = 1200 PSF (SPREAD FOOTINGS)
    Qn = 1800 PSF (MAT FND'S)
  ii NATIVE SOIL UNIT WEIGHT, Ws = 120 PCF (ASSUMED)
  iii GROUND WATER (GW) ELEVATION
    (a) NORMAL = ± 4294.00
  iv EQUIVALENT DRAINED FLUID PRESSURES (ABOVE GW)
    (a) ACTIVE; Ka = 36 PCF
    (b) AT REST; Kr = 54 PCF
    (c) PASSIVE; Kp = 330 PCF
  v COEFICIENT OF FRICTION, SOIL TO CONCRETE; F = 0.38
  vi MODULUS OF SUBGRADE REACTION; Km = 100 PCI
  vii FROST DEPTH; Df = 2'-6"

FOUNDATIONS

A. ALL FOOTINGS TO BE PLACED ON FIRM UNDISTURBED COURSE ALLUVIAL SOIL (DEFINED IN GEOTECHNICAL REPORT), INORGANIC MATERIAL. PROOF ROLL SUB-GRADE PRIOR TO PLACING CONCRETE WHERE THE MATERIAL HAS BEEN DISTURBED BY THE EXCAVATING EQUIPMENT.
B. ALL PIERS AND FOOTINGS OUTSIDE OR AT THE PERIMETER OF THE STRUCTURE, OR IN OTHER UNHEATED AREAS SHALL BE SET TO A DEPTH OF AT LEAST 30-IN. BELOW FINISH GRADE, UNLESS OTHER WISE NOTED ON THE PLANS.
C. ALLOWABLE BEARING PRESSURE FOR ALL SPREAD FOOTINGS QA = 1,200 PSF & MAT FOUNDATIONS QA = 1,800 PSF.
D. LOCAL AREAS OF SOFT AND/OR UNACCEPTABLE MATERIAL ENCOUNTERED AT BOTTOM OF FOOTING ELEVATIONS INDICATED ON THE PLANS MUST BE OVER-EXCAVATED AND BROUGHT UP TO DESIGN GRADE WITH COMPACTED STRUCTURAL FILL OR LEAN CONCRETE FILL.
E. ALL STRUCTURAL FILL AND/OR BACKFILL SHALL BE GRANULAR, FREE DRAINING, MATERIAL; UNIFIED SOILS CLASSIFICATION GW, GP, GM, OR SW; MAXIMUM AGGREGATE SIZE OF 3-IN. AND NO MORE THAN 7% PASSING A NUMBER 200 SIEVE. MATERIAL SHALL BE PLACED IN LIFTS NO GREATER THAN 6-IN. IN DEPTH AND COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED PER ASTM D1557 AND WRAPPED IN 4 OZ. NON-WOVEN FILTER FABRIC.
F. DESIGN FOR THE MITIGATION OF SUBSURFACE WATER FLOW AND/OR PERCHED WATER TABLES SHALL BE THE RESPONSIBILITY OF OTHERS.
G. AS INDICATED ON THE PLANS ALL EXCAVATED AREAS UNDERNEATH CONCRETE STRUCTURES/SLABS SHALL BE BACKFILLED WITH CONTROLLED DENSITY FILL (CDF) OTHERWISE CALLED CONTROLLED LOW STRENGTH MATERIAL (CLSM). CDF SHALL BE A MIXTURE OF CEMENT, FINE AND COARSE AGGREGATE, FLY ASH AND ADMIXTURES FORMULATED TO BE FLOWABLE AND SELF-CONSOLIDATING WITH A NET 28 DAY COMPRESSIVE STRENGTH OF 200 TO 300 PSI. POUR IN MAXIMUM LIFTS OF 5 FT WITH 24-HR CURING PERIOD BETWEEN EACH LIFT PER GEOTECHNICAL REPORT.
H. THE ENGINEER SHALL BE NOTIFIED IN WRITING IF ANY GROUND WATER, CLAY TYPE SOILS, DEBRIS OR UNCONSOLIDATED MATERIALS ARE ENCOUNTERED DURING EXCAVATIONS FOR FOUNDATIONS.
I. DO NOT BACKFILL BASEMENT WALLS UNTIL SUPPORTING FLOORS ARE IN PLACE AND COMPLETE.
J. REFER TO THE FINAL PROJECT GEOTECHNICAL REPORT BY NINYO & MOORE DATED JAN. 10, 2025.

STRUCTURAL MATERIALS

A. STRUCTURAL BOLTS: HIGH STRENGTH BOLTS SHALL BE ASTM F3125 GRADE A325. NUTS FOR HIGH STRENGTH BOLTS SHALL CONFORM TO ASTM A563, GRADE DH, HEAVY HEX.
B. ANCHOR RODS: ANCHOR RODS (BOLTS SET INTO CONCRETE) SHALL BE ASTM F1554, FY=55 KSI. NUTS FOR ANCHOR RODS SHALL CONFORM TO ASTM A563, GRADE A, HEAVY HEX.
C. THREADED STEEL RODS: THREADED STEEL RODS SHALL CONFORM TO ASTM A36, FY=36 KSI. NUTS FOR THREADED RODS SHALL CONFORM TO ASTM A563, GRADE A, HEAVY HEX.
D. WASHERS: ALL WASHERS SHALL CONFORM TO ASTM F436.
E. BOLT PLACEMENT: ALL BOLTS SHALL BE ON MEMBER STANDARD GAGE LINES EXCEPT AS NOTED OTHERWISE.
F. STAINLESS STEEL:
  i ALL STEEL NOTED AS STAINLESS INCLUDING SHAPES, PLATES, BARS, PIPE, TUBING, FASTENERS, ANCHOR RODS AND ASSOCIATED MISCELLANEOUS STEEL ITEMS SHALL BE STAINLESS STEEL, GRADE 304 OR 316; UNLESS SPECIFICALLY NOTED OTHERWISE.
  ii STRUCTURAL SHAPES, PLATES & BARS: ASTM A276 WITH FY = 30 KSI.
  iii STRUCTURAL STEEL TUBING: ROUND, SQUARE OR RECTANGULAR STRUCTURAL STEEL TUBING SHALL BE ASTM A269 WITH FY = 35 KSI.
  iv STRUCTURAL BOLTS: ASTM A593 GRADE G OR H, MINIMUM FY = 65 KSI.
  v NUTS: ASTM A594 GRADE C OR D, HEAVY HEX NUTS.
  vi WASHERS: STAINLESS STEEL GRADE 304 OR 316, MINIMUM FY = 30 KSI.
  vii ANCHOR RODS (SET IN CONCRETE): ASTM A593 GRADE 304, MIN. FY = 30 KSI.
  viii THREADED BRACING RODS: ASTM A193 GRADE B8, MINIMUM FY=65 KSI
  ix PIPE: ASTM A312, MINIMUM FY = 30 KSI.
  x ROUND OR SQUARE TUBING: TUBING SHALL CONFORM TO ASTM A269, MINIMUM FY = 35 KSI.
G. PROJECT CONCRETE MIX TYPES: CONCRETE SHALL BE PROPORTIONED AND FURNISHED FOR THE VARIOUS PROJECT USES AS INDICATED ON THE PLANS AND AS FOLLOWS:
  i M3000-UTL: CONCRETE SURROUNDING UTILITY CONDUIT PASSING UNDER CONCRETE STRUCTURES: FC = 3,000 PSI, ABSOLUTE WATER-CEMENT RATIO BY WEIGHT = 0.5, AIR CONTENT = 6% (+/- 1.5%), MAX AGGREGATE SIZE = 0.5".
  ii M4500-STD: STANDARD EXTERIOR CONCRETE MIX FOR ALL OUT-OF-RIVER CONCRETE INCLUDING SLABS, WALLS, AND FOUNDATIONS: FC = 4,500 PSI, ABSOLUTE WATER-CEMENT RATIO BY WEIGHT = 0.45, AIR CONTENT = 6% (+/- 1.5%).
  iii M4500-SYN: STANDARD EXTERIOR STRUCTURAL CONCRETE MIX WITH SECONDARY SYNTHETIC FIBER REINFORCEMENT. FOR ALL IN-RIVER CONCRETE INCLUDING STRUCTURAL WALLS, SLABS, AND FOUNDATIONS: FC = 4,500 PSI, ABSOLUTE WATER-CEMENT RATIO BY WEIGHT = 0.45, AIR CONTENT = 6% (+/- 1.5%)
  iv M-SLURRY: SLURRY CONCRETE FOR HORIZONTAL CONSTRUCTION JOINTS IN WALLS. A FLOWABLE MIX CONSISTING OF SAND, 3/8-INCH MAXIMUM AGGREGATE, WATER AND A MINIMUM 1,150 POUNDS OF CEMENT PER CUBIC YARD.
  v M-CDF: MIX FOR CONTROLLED DENSITY FILL (CDF) OR CONTROLLED LOW STRENGTH MATERIAL (CLSM). CDF SHALL BE A MIXTURE OF CEMENT, FINE AND COARSE AGGREGATE, FLY ASH AND ADMIXTURES FORMULATED TO BE FLOWABLE AND SELF-CONSOLIDATING WITH A NET 28 DAY COMPRESSIVE STRENGTH OF 200 TO 300 PSI.
H. CONCRETE MIX COMPONENTS.
  i A WATER-REDUCING ADMIXTURE CONFORMING TO ASTM C494, USED IN STRICT CONFORMANCE WITH THE MANUFACTURERS INSTRUCTIONS, SHALL BE INCORPORATED IN ALL CONCRETE MIX DESIGNS.
  ii FOR ALL WATER-RETAINING CONCRETE STRUCTURAL WALLS AND SLABS, A HIGH-RANGE WATER-REDUCING (HRWR) ADMIXTURE CONFORMING TO ASTM C494, TYPE F OR G, SHALL BE USED. THE TOTAL SLUMP SHALL BE LESS THAN 10-IN.
  iii HIGHER WATER-CEMENT RATIOS THAN SHOWN ABOVE MAY BE USED IF SUBSTANTIATED IN ACCORDANCE WITH ACI 318.
  iv FLY-ASH CONFORMING TO ASTM C618 TYPE F OR C, MAY REPLACE UP TO 20% OF THE CEMENT CONTENT, PROVIDED THAT THE MIX STRENGTH IS SUBSTANTIATED BY TEST DATA.
    (a) WHERE 15% - 20% OF FLY-ASH IS INCORPORATED, ADDITIONAL TEST CYLINDERS SHALL BE TAKEN FOR A 56 DAY BREAK TEST.
  v CEMENT: ASTM C150 TYPE II/ASTM C595 TYPE IL(10)(MS)
  vi CEMENT: ASTM C845 TYPE K FOR SHRINKAGE COMPENSATING MIXES.
  vii WATER: CLEAN & POTABLE.
  viii AIR ENTRAINING AGENT: ASTM C260. EXCEPT WHERE NOTED NON-AIR ENTRAINED.
  ix AGGREGATE: 0.75-INCH MAXIMUM AGGREGATE PER ASTM C33. UNLESS NOTED OTHERWISE.
    (b) EXPOSURE CLASS W2 APPLIES, THEREFORE, CONCRETE SUPPLIER TO PROVIDE EVALUATION THAT AGGREGATES USED IN MIX ARE NON-REACTIVE TO ALKALI-SILICA NOR ALKALI-CARBONATE ACCORDING TO ASTM C1778.
  x MIX PROPORTIONING: ACI 211.1 AND 350R.
I. CONCRETE ACCESSORIES:
  i REINFORCING STEEL: REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60; #3 BARS MAY BE GRADE 40.
  ii REINFORCING STEEL TO BE WELDED: ALL REINFORCING STEEL TO BE WELDED SHALL CONFORM TO ASTM A706 GRADE 60, LOW-ALLOY, DEFORMED REINFORCING STEEL.
  iii WELDED WIRE FABRIC: ASTM A185 OR A497.
  iv WIRE: PLAIN WIRE SHALL CONFORM TO ASTM A 82. DEFORMED WIRE SHALL CONFORM TO ASTM A496.
  v JOINTING MATERIALS: IN ACCORDANCE WITH ACI 350, ALL JOINTING MATERIALS INCLUDING WATER-STOPS, EXPANSION JOINTS AND SEALANTS SHALL BE RESISTANT TO CHEMICAL ATTACK FOR THE DESIGN LIFE OF THE FACILITY. SEALANTS SHALL CONFORM TO ASTM C920 AND FEDERAL SPECIFICATION TT-S-00227E AND PVC WATER-STOP SHALL CONFORM TO ASTM D570, ASTM D746, ASTM D1149 AND CRD-C572.
  vi SYNTHETIC FIBER REINFORCEMENT. WHERE CALLED FOR IN THE MIX DESIGN, THE CONCRETE SHALL CONTAIN SECONDARY SYNTHETIC FIBER REINFORCEMENT AS FOLLOWS:
    (a) STANDARD: ASTM C1116
    (b) MANUFACTURERS: PROPES CONCRETE SYSTEMS CORP.
    (c) TYPE: FIBERMESH 300
    (d) APPLICATION RATE: 1.5 POUNDS PER CUBIC YARD
    (e) EXECUTION: ADD SYNTHETIC REINFORCEMENT IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS.
J. NON-SHRINK GROUT: ALL NON-SHRINK GROUT NOTED ON THE PLANS SHALL BE NON-SHRINK, NON-METALLIC GROUT WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 7,000 PSI.
K. EXPANSION BOLTS: BOLTS NOTED ON THE PLANS AS EXPANSION BOLTS SHALL BE HILTI KWIK BOLT 3, STUD ANCHORS; SIZE AND EMBEDMENT AS NOTED ON THE DRAWINGS, INSTALLED PER THE MANUFACTURERS RECOMMENDATIONS; OR AN APPROVED EQUAL.
L. SHEAR CONNECTOR/STUDS: SHEAR CONNECTOR/STUDS SHALL BE NELSON HEADED ANCHORS WITH FLUXED ENDS OR APPROVED CONFORMING TO AWS D1.1, TYPE B HEADED STUDS MADE FROM ASTM A108 GRADE 1010-1020 LOW-CARBON STEEL. SHEAR CONNECTOR/STUDS SHALL BE AUTOMATICALLY END-WELDED WITH THE MANUFACTURERS STANDARD EQUIPMENT IN ACCORDANCE WITH THEIR RECOMMENDATIONS.
M. HEADED ANCHOR/STUDS: HEADED ANCHOR/STUDS SHALL BE NELSON HEADED ANCHORS WITH FLUXED ENDS OR APPROVED CONFORMING TO AWS D1.1, TYPE A HEADED STUDS MADE FROM ASTM A108 GRADE 1010-1020 LOW-CARBON STEEL. SHEAR CONNECTOR/STUDS SHALL BE AUTOMATICALLY END-WELDED WITH THE MANUFACTURERS STANDARD EQUIPMENT IN ACCORDANCE WITH THEIR RECOMMENDATIONS.
N. DEFORMED BAR ANCHORS (DBA): DEFORMED BAR ANCHORS SHALL MEET THE REQUIREMENTS OF AWS D1.1, DEFORMED BAR ANCHORS, MADE FORM ASTM A496 MATERIAL WITH A MINIMUM YIELD STRENGTH OF FY=70 KSI. DEFORMED BAR ANCHORS SHALL BE AUTOMATICALLY END-WELDED WITH THE MANUFACTURER'S STANDARD EQUIPMENT IN ACCORDANCE WITH THEIR RECOMMENDATIONS.

SPECIAL INSPECTIONS

1. SPECIAL INSPECTIONS PER IBC CHAPTER 17 ARE REQUIRED FOR THE FOLLOWING ITEMS:
"C" INDICATES CONTINUOUS, "P" INDICATES PERIODIC.

		FREQUENCY
A.	SOILS. BY GEOTECHNICAL ENGINEER.	
i	SITE PREPARATION:	P
ii	FILL MATERIAL VERIFICATION:	C
iii	FILL PLACEMENT AND COMPACTION:	C
iv	LIFT THICKNESS:	C
B.	CONCRETE.	
i	REINFORCEMENT PLACEMENT:	P
ii	REINFORCING WELDING:	REFER TO STEEL WELDING REQUIREMENTS.
iii	PLACEMENT OF CAST-IN-PLACE ANCHORS:	P
iv	VERIFICATION OF USE OF REQUIRED MIX:	P
v	CONCRETE PLACEMENT:	C
vi	VERIFICATION OF IN-SITU CONCRETE PRIOR TO REMOVAL OF FORMS AND SHORES FROM ELEVATED BEAMS AND SLABS:	P
C.	POST INSTALLED CONCRETE ANCHORS.	
i	INSTALLATION:	C

D. ALL SPECIAL INSPECTIONS SHALL BE PERFORMED BY ICC CERTIFIED INSPECTORS.
E. FOR ADHESIVE ANCHOR INSPECTION REQUIREMENTS REFER TO THE IBC.
F. SHRINKAGE COMPENSATING OR REDUCING CONCRETE MIXES:
  i TO DOCUMENT AND VERIFY SHRINKAGE CHARACTERISTICS OF SHRINKAGE COMPENSATING OR REDUCED CONCRETE MIX DESIGNS, PROVIDE (3) RECORD SHRINKAGE TESTS FOR EACH SUCH MIX. TEST EACH SAMPLE PER ASTM C157.

CONCRETE FINISHING

A. FORMED CONCRETE SURFACES. AFTER REMOVAL OF FORMS, GIVE EACH FORMED SURFACE ONE OR MORE OF THE FOLLOWING FINISHES IN CONFORMANCE WITH ACI 301 FINISHING FORMED SURFACES.
  i CONCRETE STRUCTURES:
    (a) CONCRETE FOOTINGS AND FOUNDATIONS NOT EXPOSED TO VIEW. PROVIDE AN AS-CAST FINISH.
    (b) FOUNDATION WALL AND OTHER SURFACES BELOW GRADE AND NOT EXPOSED TO VIEW. PROVIDE A SURFACE FINISH TYPE SF-1.0.
    (c) EXTERIOR AND TOP SURFACES EXPOSED TO VIEW TO 6-INCHES BELOW GRADE. PROVIDE A SURFACE FINISH TYPE SF-2.0.
  ii LIQUID RETAINING OR RIVER FACING CONCRETE STRUCTURES:
    (a) SURFACES FROM TOP OF WALL TO FLOOR SLAB, EXTERIOR AND TOP SURFACES EXPOSED TO VIEW TO 6-INCHES BELOW GRADE. PROVIDE A GROUT-CLEANED FINISH. PRESSURE-WASH ALL CONCRETE SURFACES TO RECEIVE A GROUT-CLEANED FINISH WITH HIGH-PRESSURE WATER PRIOR TO GROUTING. (ALTERNATE, PROVIDE A SURFACE FINISH TYPE SF-3.0.)
    (b) SURFACES BELOW GRADE AND NOT EXPOSED TO VIEW. PROVIDE A SURFACE FINISH TYPE SF-2.0.
B. UNFORMED CONCRETE SURFACES. UNFORMED CONCRETE SURFACES INCLUDING THE TOP SURFACE OF ALL CONCRETE SLAB ON GRADE SLABS SHALL BE FINISHED IN ACCORDANCE WITH ACI 301 AND ACI 302.
  (a) FOR THE TOP SURFACES OF WALLS, PROVIDE A SCRATCHED FINISH.
  (b) ALL IN-RIVER SLABS SHALL RECEIVE A TROWELED FINISH.
  (c) PROVIDE A NONSLIP BROOM FINISH FOR OUT-OF-RIVER SLAB SURFACES AND WHERE INDICATED ON THE PLANS.
C. SAWED CONTRACTION JOINTS. CONFORM TO ACI 301.

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PROFESSIONAL ENGINEER
No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

GENERAL STRUCTURAL NOTES

FILE : 57-23-033_S-001X
JUB PROJ. # : 57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-001

Plot Date:10/16/2025 5:17 PM Plotted By: Emiliano Morales
Date Created:7/2/2025 \\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEETS\57-23-033_S-001X.DWG

ADHESIVE ANCHORS

A. MATERIALS
- i THE ADHESIVE ANCHOR SYSTEM USED FOR POST-INSTALLED ANCHORAGE TO CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF THE MOST RECENTLY PUBLISHED ACI 355.4, QUALIFICATION OF POST-INSTALLED ADHESIVE ANCHORS IN CONCRETE AND COMMENTARY. THE ANCHOR SYSTEM SHALL BE ONE OF THE FOLLOWING:
  - (i) SIMPSON SET-3G
  - (ii) HILTI HIT-HY 200-R V3
  - (iii) APPROVED EQUAL MEETING ACI 355.4 AND THE FOLLOWING MINIMUM STRESS VALUES.
    1. CRACKED CONCRETE BOND STRESS, Tcr=760 PSI FOR 0.75-INCH DIAMETER THREADED ROD ANCHOR.
    2. UNCRACKED CONCRETE BOND STRESS, Tuncr=1,710 PSI FOR 0.75-INCH DIAMETER THREADED ROD ANCHOR.
- ii ANCHOR ROD TYPE AND MATERIAL SHALL BE AS SPECIFIED.
- iii NUTS, WASHERS, AND OTHER HARDWARE USED WITH AN ALL-THREADED BAR ADHESIVE ANCHOR SYSTEM SHALL HAVE A MATERIAL OR AN ALLOY DESIGNATION THAT MATCHES THE ALL-THREAD MATERIAL OR ALLOY. GALVANIZED ASSEMBLIES SHALL BE HOT-DIPPED IN ACCORDANCE WITH ASTM A153 CLASS C.

B. GENERAL INSTALLATION GUIDELINES.
- i CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI AT THE TIME OF ADHESIVE ANCHOR INSTALLATION.
- ii CONCRETE TEMPERATURE AT THE TIME OF ADHESIVE ANCHOR INSTALLATION SHALL BE AT LEAST 50-DEGREES F.
- iii EMBEDMENT DEPTH AND ANCHOR PROJECTION FROM THE CONCRETE SURFACE SHALL BE AS SHOWN ON THE DRAWINGS OR DETAILS OR AS NECESSARY FOR THE PARTICULAR ANCHOR OR GROUP OF ANCHORS BEING INSTALLED.

C. INSTALLATION TECHNIQUES.
- i ADHESIVE ANCHORS SHALL BE INSTALLED BY QUALIFIED PERSONNEL TRAINED TO INSTALL ADHESIVE ANCHORS IN ACCORDANCE WITH THE SPECIFICATIONS. POST INSTALLED ADHESIVE ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS (MPII).
- ii INSTALLATION OF ADHESIVE ANCHORS HORIZONTALLY OR UPWARDLY INCLINED SHALL BE PERFORMED BY PERSONNEL CERTIFIED BY THE ACI/CRSI ADHESIVE ANCHOR INSTALLER CERTIFICATION PROGRAM. THE INSTALLER'S QUALIFICATIONS SHALL BE SUBMITTED AND APPROVED BY THE LICENSED DESIGN PROFESSIONAL.
- iii ANCHORS SHALL BE INSTALLED IN HOLES DRILED WITH A ROTARY IMPACT HAMMER DRILL OR ROCK DRILL.
- iv ANCHOR HOLES SHALL BE THOROUGHLY CLEANED PRIOR TO ADHESIVE INJECTION, AS REQURIED BY MPII.
- v ANCHORS TO BE INSTALLED IN ADHESIVE SHALL BE CLEAN, OIL-FREE AND FREE OF LOOSE RUST, PAINT OR OTHER COATING.

D. FIELD QUALITY CONTROL.
- i ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS SHALL BE CONTINUOUSLY INSPECTED DURING INSTALLATION BY AN INSPECTOR SPECIFICALLY APPROVED FOR THE PURPOSE BY THE BUILDING OFFICIAL.
- ii ADHESIVE ANCHORS SHALL BE PROOF TESTED AS FOLLOWS:
  - (a) A MINIMUM OF 10 PERCENT OF THE HORIZONTALLY OR UPWARDLY INCLINED INSTALLED ADHESIVE ANCHORS SHALL BE PROOF TESTED IN TENSION BY AN INDEPENDENT TESTING LABORITORY.
  - (b) TENSION TESTING SHALL BE PERFORMED IN ACCORDANCE WITH ASTM E488
  - (c) THE ADHESIVE ANCHORS SHALL BE TENSION PROOF TESTED TO THE FOLLOWING LOADS:
  - (i) 0.75-INCH DIAMETER ANCHOR WITH 9-INCH EMBEDMENT, Pt=50 KIPS.
  - (ii) 1.00-INCH DIAMTER ANCHOR WITH 12-INCH EMBEDMENT, Pt=75 KIPS
- iii ANCHORS SHALL HAVE NO VISIBLE INDICATIONS OF DISPLACEMENT OR DAMAGE DURING OR AFTER PROOF LOAD APPLICATION, CONCRETE CRACKING IN THE VICINITY OF THE ANCHOR AFTER LOADING SHALL BE CONSIDERED A FAILURE.
- iv IF MORE THAN 15 PERCENT OF THE TESTED ADHESIVE ANCHORS FAIL TO ACHIEVE THE SPECIFEID PROOF LOAD WITHIN THE LIMITS DEFINED ON THESE DRAWINGS, 100 PERCENT OF THE SAME DIAMETER AND TYPE AS THE FAILED ANCHOR SHALL BE PROOF TESTED, UNLESS OTHERWISE DIRECTED BY THE LICENSED DESIGN PROFESSIONAL.

FORMWORK

A. FORMS SHALL RESULT IN A FINAL STRUCTURE THAT CONFORMS TO SHAPES, LINES, AND DIMENSIONS OF THE MEMBERS AS REQUIRED BY THE DESIGN DRAWINGS AND SPECIFICATIONS.
- i DESIGN OF FORMWORK SHALL BE IN ACCORDANCE WITH ACI 318/350.
- ii FORMWORK SHALL BE IN ACCORDANCE WITH ACI 347, GUIDE TO FORMWORK FOR CONCRETE.

B. SPECIAL FORMWORK DESIGN. FORMWORK AS LISTED IN THIS SECTION SHALL BE DESIGNED PER ACI 347 BY A PROFESSIONAL STRUCTURAL ENGINEER CURRENTLY REGISTERED IN THE STATE OF *UTAH*. DESIGN CALCULATIONS AND FORMWORK PLANS AND DETAILS, SEALED AND SIGNED BY THE FORMWORK ENGINEER OF RECORD SHALL BE SUBMITTED UNDER THE DEFERRED SUBMITTAL SECTION OF THE PROJECT SPECIFICATIONS. SUBMIT SPECIAL FORMWORK DESIGNS FOR THE FOLLOWING ITEMS:

C. TOLERANCES FOR FINISHED CONCRETE SURFACES SHALL MEET THE FOLLOWING REQUIREMENTS, CLASS OF SURFACE IS PER ACI 347:
- i FOOTINGS: CLASS C
- ii FOUNDATION WALLS: CLASS B
- iii ABOVE GRADE CONCRETE NOT VISIBLE TO SIGHT: CLASS B
- iv ABOVE-GRADE CONCRETE VISIBLE TO SIGHT: CLASS A

D. REMOVAL OF FORMS.
- i CONCRETE FORMS SHALL NOT BE REMOVED UNTIL THE RETAINED CONCRETE HAS REACHED THE FOLLOWING MINIMUM PERCENTAGE OF THE REQUIRED 28 DAY COMPRESSIVE STRENGTH:
  - (a) FOOTINGS AND BASE SLABS ON GRADE: 50% OF F'C.
  - (b) FOUNDATION WALLS AND COLUMNS: 67% OF F'C.
  - (c) ELEVATED STRUCTURAL SLABS, BEAMS AND JOISTS: 95% F'C.
- ii WHERE CONCRETE CYLINDER TESTS ARE NOT AVAILABLE FOR STRENGTH VERIFICATION THE FOLLOWING GUIDE MAY BE USED WHEN PERMITTED BY THE PROJECT ENGINEER:
  - (a) FOOTINGS AND BASE SLABS ON GRADE: 12 HOURS.
  - (b) FOUNDATION WALLS AND COLUMNS: 24 HOURS.
  - (c) ELEVATED STRUCTURAL SLABS, BEAMS AND JOISTS:
    - SPANS UNDER 10-FEET: 4 DAYS
    - SPANS BETWEEN 10-FEET AND 15-FEET.: 7 DAYS.
    - SPANS BETWEEN 15-FEET AND 20-FEET: 10 DAYS
    - SPANS GREATER THAN 20-FEET: BY CYLINDER STRENGTH VERIFICATION ONLY.

E. EMBEDMENTS IN CONCRETE.
- i CONDUITS, PIPES, AND SLEEVES OF ANY MATERIAL NOT HARMFUL TO CONCRETE AND WITHIN LIMITATIONS OF ACI 318/350 SHALL BE PERMITTED TO BE EMBEDDED IN CONCRETE WITH APPROVAL OF THE PROJECT ENGINEER, PROVIDED THEY ARE NOT CONSIDERED TO REPLACE STRUCTURALLY THE DISPLACED CONCRETE, EXCEPT AS PROVIDED IN ACI 350.
- ii CONDUITS AND PIPES OF ALUMINUM SHALL NOT BE EMBEDDED IN STRUCTURAL CONCRETE UNLESS EFFECTIVELY COATED OR COVERED TO PREVENT ALUMINUM-CONCRETE REACTION OR ELECTROLYTIC ACTION BETWEEN ALUMINUM AND STEEL.

F. CONSTRUCTION JOINTS.
- i CONSTRUCTION JOINTS SHALL ONLY BE PLACED WHERE INDICATED ON THE PROJECT DRAWINGS OR AS APPROVED BY THE PROJECT ENGINEER.
- ii CONSTRUCTION JOINTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ACI 318/350.

CONCRETE QUALITY AND DETAILS

A. GENERAL. CONCRETE SHALL BE PROPORTIONED TO PROVIDE AN AVERAGE COMPRESSIVE STRENGTH, FC, AS PRESCRIBED IN ACI 318/350 AND SHALL SATISFY THE DURABILITY CRITERIA OF ACI 318/350.

B. CONCRETE PROPORTIONS.
- i CONCRETE MIX PROPORTIONING SHALL BE IN ACCORDANCE WITH ACI 211.1; STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL-DENSITY AND HIGH-DENSITY CONCRETE.
- ii CONCRETE MIX PROPORTIONING FOR LIGHTWEIGHT CONCRETE SHALL BE IN ACCORDANCE WITH ACI 211.2; STANDARD PRACTICE FOR SELECTING PROPORTIONS FOR LIGHTWEIGHT CONCRETE.

C. CONCRETE MIX VERIFICATION: CONCRETE MIX DESIGNS SHALL BE VERIFIED BY STANDARD 28-DAY CYLINDER TESTS PER ASTM C39.

D. EVALUATION AND ACCEPTANCE OF CONCRETE. CONCRETE SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318/350.

E. MIXING & PLACING CONCRETE. CONCRETE SHALL BE PREPARED, MIXED, PLACED AND CONSOLIDATED IN ACCORDANCE WITH ACI 318/350 AND AS FOLLOWS:
- i ACI 304; GUIDE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE.
- ii ACI 309; GUIDE FOR CONSOLIDATION OF CONCRETE.

F. MINIMUM TIME BETWEEN ADJACENT PLACEMENTS:
- i NON-LIQUID RETAINING STRUCTURES:
  - (a) CONSTRUCTION JOINTS: FIVE (5) DAYS WET CURE, OR SEVEN (7) DAYS DRY CURE.
  - (b) CONTROL JOINTS: TWO (2) DAYS.
  - (c) EXPANSION JOINTS: ONE (1) DAY.
- ii FLOOR SLABS:
  - (a) CONSTRUCTION JOINTS: SEVEN (7) DAYS WET CURE, OR TEN (10) DAYS DRY CURE.
  - (b) CONTROL JOINTS: FOUR (4) DAYS.
  - (c) EXPANSION JOINTS: ONE (1) DAY.
- iii LIQUID RETAINING STRUCTURES:
  - (a) CONSTRUCTION JOINTS: TEN (10) DAYS WET CURE, OR FOURTEEN (14) DAYS DRY CURE.
  - (b) CONTROL JOINTS: SIX (6) DAYS.

G. HORIZONTAL JOINTS IN REINFORCED CONCRETE WALLS:
- i PROVIDE A LAYER OF SLURRY CONCRETE IN THE BOTTOM OF ALL HORIZONTAL WALL JOINTS, 1-INCH MINIMUM TO 2-INCH MAXIMUM THICKNESS. THOROUGHLY VIBRATE TO MIX CONCRETE & SLURRY TOGETHER.

H. HORIZONTAL CONSTRUCTION JOINTS CONTAINING WATER-STOP.
- i UNLESS OTHERWISE SPECIFICALLY DIRECTED, IN ALL HORIZONTAL CONSTRUCTION JOINTS IN NEW CONCRETE CONSTRUCTION CONTAINING WATER-STOPS, PROVIDE AN INITIAL LAYER OF SLURRY MIX TO AID IN CONSOLIDATION OF FRESHLY PLACED CONCRETE AT THE JOINT INTERFACE.
- ii SLURRY MIX SHALL BE A MIXTURE OF 3/8-INCH MAXIMUM AGGREGATE, SAND, CEMENT AND WATER.
- iii PLACE SLURRY MIX 2-INCH MINIMUM TO 4-INCH MAXIMUM IN THICKNESS.
- iv PLACE WITH BUCKETS OR OTHER MEANS PERMITTING VISUAL VERIFICATION THAT ONLY ENOUGH SLURRY MIX IS DEPOSITED IN THE VICINITY OF THE CONCRETE POUR TO MEET THE THICKNESS REQUIREMENTS.
- v PLACE CONCRETE OVER SLURRY MIX WHILE SLURRY MIX IS STILL FLOWABLE.
- vi LIMIT INITIAL CONCRETE PLACEMENT ON TOP OF SLURRY MIX TO 12-INCHES IN THICKNESS. THOROUGHLY VIBRATE AND CONSOLIDATE CONCRETE AND SLURRY MIX TOGETHER.
- vii CONCRETE CURING. CONCRETE SHALL BE MAINTAINED ABOVE 50-DEGREES F AND IN A MOIST CONDITION FOR AT LEAST 7 DAYS AFTER PLACEMENT, EXCEPT WHEN CURED IN ACCORDANCE WITH ACI 308 GUIDE TO EXTERNAL CURING OF CONCRETE.

I. COLD WEATHER REQUIREMENTS. ADEQUATE EQUIPMENT SHALL BE PROVIDED FOR HEATING CONCRETE MATERIALS AND PROTECTING CONCRETE DURING FREEZING OR NEAR-FREEZING WEATHER. THE RECOMMENDED PROCEDURES LISTED IN ACI 306; COLD WEATHER CONCRETING SHALL BE FOLLOWED.
- i COLD WEATHER IS DEFINED AS A PERIOD WHEN, FOR MORE THAN 3 CONSECUTIVE DAYS, THE FOLLOWING CONDITIONS EXIST:
  - (a) THE AVERAGE DAILY AIR TEMPERATURE IS LESS THAN 40-DEGREES F AND
  - (b) THE AIR TEMPERATURE IS NOT GREATER THAN 50-DEGREES F FOR MORE THAN ONE-HALF OF ANY 24-HOUR PERIOD.

J. HOT WEATHER REQUIREMENTS. DURING HOT WEATHER, PROPER ATTENTION SHALL BE GIVEN TO INGREDIENTS, PRODUCTION METHODS, HANDLING, PLACING, PROTECTION, AND CURING TO PREVENT EXCESSIVE CONCRETE TEMPERATURES OR WATER EVAPORATION THAT COULD IMPAIR REQUIRED STRENGTH OR SERVICEABILITY OF THE MEMBER OR STRUCTURE. THE RECOMMENDED PROCEDURES LISTED IN ACI 305; HOT WEATHER CONCRETING SHALL BE FOLLOWED.
- i HOT WEATHER IS ANY COMBINATION OF THE FOLLOWING CONDITIONS THAT TENDS TO IMPAIR THE QUALITY OF FRESHLY MIXED OR HARDENED CONCRETE BY ACCELERATING THE RATE OF MOISTURE LOSS AND RATE OF CEMENT HYDRATION, OR OTHERWISE CAUSING DETRIMENTAL RESULTS:
  - (a) HIGH AMBIENT TEMPERATURE.
  - (b) HIGH CONCRETE TEMPERATURE.
  - (c) LOW RELATIVE HUMIDITY.
  - (d) WIND SPEED.
  - (e) SOLAR RADIATION.

K. ALL IN RIVER CONCRETE SHALL BE WET CURRED ACCORDING TO ACI 301 AND ACI 308. THE PREFERRED METHOD TO KEEPING THE CONCRETE SURFACE MOIST IS WET BURLAP OR A MOISTURE-RETAINING COVER.

CONCRETE FLOORS AND SLABS

A. CONCRETE FLOORS AND SLABS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ACI 302, CONCRETE FLOOR AND SLAB CONSTRUCTION. PROVIDE THE FOLLOWING CLASS CONCRETE FLOOR SLABS UNLESS OTHERWISE NOTED ON THE DRAWINGS:
- i INTERIOR OFFICES, LABORATORY SPACES AND OTHER AREAS RECEIVING ONLY LIGHT FOOT TRAFFIC: CLASS 1 OR 2 FLOOR DEPENDING ON FINAL FLOOR COVERING.
- ii INTERIOR GARAGE, INDUSTRIAL OR WORK AREAS SUBJECT TO EQUIPMENT OR TRAFFIC LOADS: CLASS 6 FLOOR WITH A SPECIAL METALLIC OF MINERAL AGGREGATE SURFACE HARDENER.
- iii EXTERIOR STRUCTURAL FLOOR SLABS SUBJECT TO FOOT AND MAINTENANCE TRAFFIC LOADS: CLASS 4 OR 5 FLOOR. PROVIDE A NONSLIP FINISH TO ALL WALKING SURFACES.

B. PLACING, CONSOLIDATING, AND FINISHING. FOLLOW THE RECOMMENDATIONS GIVEN IN ACI 302.

WATER-RETAINING CONCRETE STRUCTURES

A. CONCRETE TANKS, VAULTS, WELLS AND OTHER STRUCTURES INTENDED TO RETAIN AND HOLD WATER OR OTHER LIQUIDS SHALL BE WATER-TIGHT STRUCTURES. THE WATER-RESISTING WALLS AND FLOOR SLABS SHALL BE OF MONOLITHIC CONCRETE CONSTRUCTION WITH WATER-TIGHT JOINTS, CONSTRUCTED AS INDICATED ON THE PLANS OR AS DIRECTED BY THE PROJECT ENGINEER. WATER-RESISTING WALLS AND FLOORS SHALL BE UNIFORM IN FINISHED CONSTRUCTION FREE OF SPALLS, POCKETS, BLEMISHES AND OR CRACKS THAT MAY WEEP OR LEAK.

B. CRACKS FOUND IN WATER-RESISTING WALLS, FLOORS AND/OR FOUNDATION SLABS THAT MAY WEEP OR LEAK SHALL BE REPAIRED AND/OR SEALED PER THE PROJECT SPECIFICATIONS, NOTES OR AS APPROVED BY THE PROJECT ENGINEER.

DETAILS OF REINFORCEMENT

A. PLACEMENT OF ALL REINFORCING STEEL WITHIN CONCRETE STRUCTURES SHALL BE IN CONFORMANCE WITH ACI 318/350.

B. REINFORCING STEEL HOOKS, BENDS, TIES, SPLICES AND OTHER REINFORCEMENT DETAILS SHALL BE IN ACCORDANCE WITH ACI 315, GUIDE TO PRESENTING REINFORCING STEEL DESIGN DETAILS.

C. SPACING LIMITS FOR REINFORCEMENT SHALL BE IN CONFORMANCE WITH ACI 318/350.

D. CONCRETE PROTECTION FOR REINFORCEMENT. UNLESS NOTED ELSEWHERE ON THE DRAWINGS, ALL REINFORCING STEEL SHALL HAVE THE FOLLOWING CONCRETE COVER:
- i FOR NON-LIQUID CONTAINING OR OUT-OF-RIVER CONCRETE STRUCTURES; PER ACI 318:
  - (a) CONCRETE CAST AGAINST EARTH: 3.00 INCH
  - (b) CONCRETE EXPOSED TO EARTH OR WEATHER:
    - NO. 5 OR SMALLER BARS: 1.50-INCH
    - NO. 6 OR LARGER BARS: 2.00-INCH
  - (c) CONCRETE NOT EXPOSED TO EARTH OR WEATHER:
    - NO. 11 OR SMALLER BARS: 0.75-INCH
    - NO. 14 OR LARGER BARS: 1.50-INCH
  - (d) BEAMS AND COLUMNS:
    - PRIMARY REINFORCEMENT, TIES, STIRRUPS, OR SPIRALS: 1.50-INCH
- ii FOR LIQUID CONTAINING OR IN-RIVER CONCRETE STRUCTURES; PER ACI 350:
  - (a) CONCRETE CAST AGAINST EARTH: 3.00 INCH
  - (b) CONCRETE EXPOSED TO EARTH, LIQUID OR WEATHER:
    - SLABS AND JOINTS: 3.00-INCH
    - WALLS: 3.00-INCH
  - (c) BEAMS AND COLUMNS:
    - TIES, STIRRUPS, OR SPIRALS: 3.00-INCH
    - PRIMARY REINFORCEMENT: 3.00-INCH
  - (d) FOOTINGS AND BASE SLABS:
    - FORMED SURFACES: 3.00-INCH
    - TOP OF FOOTINGS AND BASE SLABS: 3.00-INCH

E. CONCRETE BLOCKS OR PLASTIC-COATED BAR CHAIRS SHALL BE PROVIDED FOR SUPPORT OF ALL SLAB REINFORCING STEEL, SUFFICIENT IN NUMBER TO PREVENT SETTLEMENT OR SAGGING, BUT IN NO CASE SHALL SUCH SUPPORT BE CONTINUOUS. METAL CLIPS OR SUPPORTS SHALL NOT BE PLACED IN CONTACT WITH THE FORMS OR THE SUB-GRADE.

F. DOWELS AND ANCHOR BOLTS SHALL BE WIRED OR OTHERWISE HELD IN CORRECT POSITION PRIOR TO PLACING CONCRETE. CARE SHALL BE TAKEN TO ENSURE THAT DOWELS AND ANCHOR BOLTS REMAIN PLUM AFTER CONCRETE IS POURED AND VIBRATED. IN NO CASE SHALL DOWELS OR ANCHOR BOLTS BE STABBED INTO FRESHLY POURED CONCRETE!

G. PROVIDE DOWELS IN FOOTINGS AND AT CONSTRUCTION JOINTS TO MATCH VERTICAL REINFORCING BAR SIZE AND SPACING, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

H. COORDINATE PLACEMENT OF DOWELS INTO MASONRY OR BRICK WALLS WITH THE MASONRY SHOP DRAWINGS.

I. WHERE DRILLED IN ANCHORS ARE TO BE POST-INSTALLED INTO CONCRETE SURFACES TAKE CARE TO LOCATE REINFORCING STEEL SO THAT IT WILL NOT INTERFERE WITH THE DRILLING OPERATIONS. MOVE BARS PLUS OR MINUS 1 TO 2 INCHES IN ORDER TO AVOID DRILLING CONFLICTS.

J. ALL BAR BENDS, HOOKS, SPLICES AND OTHER REINFORCING STEEL DETAILS SHALL CONFORM TO THE REQUIREMENTS OF ACI 315.

K. UNLESS OTHERWISE NOTED ON THE PLANS ALL BARS SHALL BE SPLICED WITH A MINIMUM CLASS B LAP SPLICE; LAP SPLICES OF DEFORMED BARS AND DEFORMED WIRE IN COMPRESSION ZONES MAY BE CLASS A SPLICES.

L. AT ALL CORNERS AND WALL INTERSECTIONS PROVIDE BENT BARS TO MATCH THE HORIZONTAL REINFORCING STEEL AND IN ACCORDANCE WITH THE TYPICAL CORNER REINFORCING DETAILS.

M. CHAMFER ALL EXPOSED CORNERS AND FILLET ENTRANT ANGLES 3/4" UNLESS OTHERWISE NOTED ON THE DRAWINGS.

N. WATERSTOP. ALL CONTROL AND CONSTRUCTION JOINTS IN LIQUID-RETAINING STRUCTURES SHALL BE DOWELED, KEYED AND PROVIDED WITH CONTINUOUS WATERSTOP, PER THE TYPICAL DETAILS, TECHNICAL SPECIFICATIONS OR AS DIRECTED BY THE PROJECT ENGINEER.

O. AT SLAB AND WALL OPENINGS PROVIDE A MINIMUM OF (4) #5 BARS: OVER, UNDER AND AT EITHER SIDE OF THE OPENINGS. EXTEND THESE BARS A MINIMUM OF 24" PAST THE OPENING EDGE. PROVIDE (1) MATT OF (4) #5 BARS FOR WALLS OR SLABS WITH SINGLE-LAYER REINFORCING AND (2) MATTS OF (4) #5 BARS FOR DOUBLE-LAYER REINFORCING WALLS OR SLABS. PROVIDE #4, 4'-0" LONG DIAGONAL BARS AT EACH RE-ENTRANT CORNER IN SLABS; (1) BAR FOR SLABS WITH SINGLE LAYER REINFORCING AND (2) BARS FOR SLABS WITH DOUBLE LAYER REINFORCING.

J-U-B ENGINEERS, INC.
J-U-B ENGINEERS, INC.
1047 South 100 West
Suite 180
Logan, UT 84321
Phone: 435.713.9514
www.jub.com

BID SET

PROFESSIONAL ENGINEER
No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

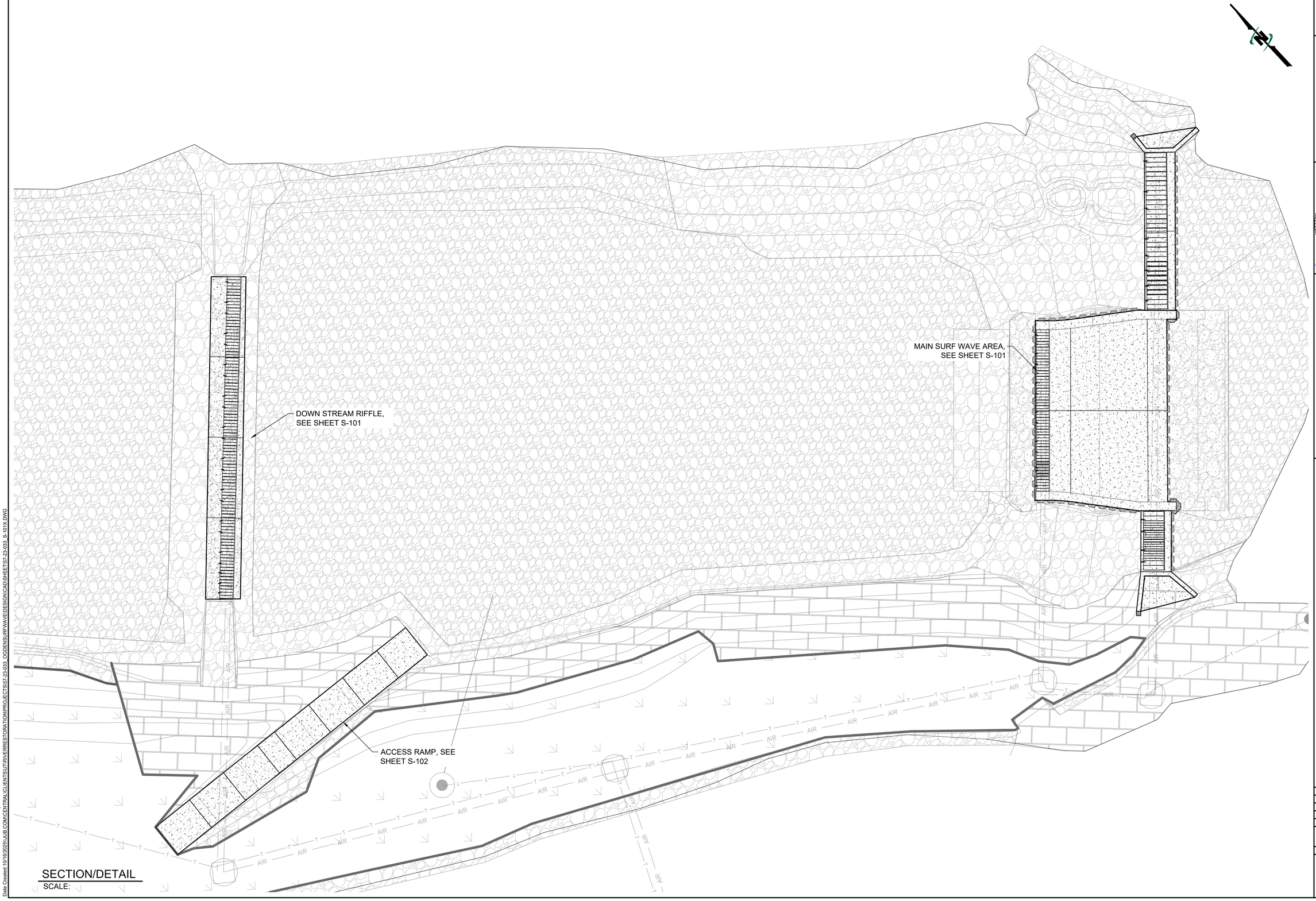
OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

GENERAL STRUCTURAL NOTES

FILE : 57-23-033_S-001X
JUB PROJ. # : 57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-002

Plot Date:10/16/2025 5:17 PM Plotted By: Emiliano Morales
Date Created:7/2/2025 \\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-001X.DWG



SECTION/DETAIL

SCALE:

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Logan, UT 84321
Phone: 435.713.9514
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No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

OVERALL PLAN

FILE :	57-23-033 S-101X
JUB PROJ. # :	57-23-033
DRAWN BY:	EM
DESIGN BY:	KJH
CHECKED BY:	JCH

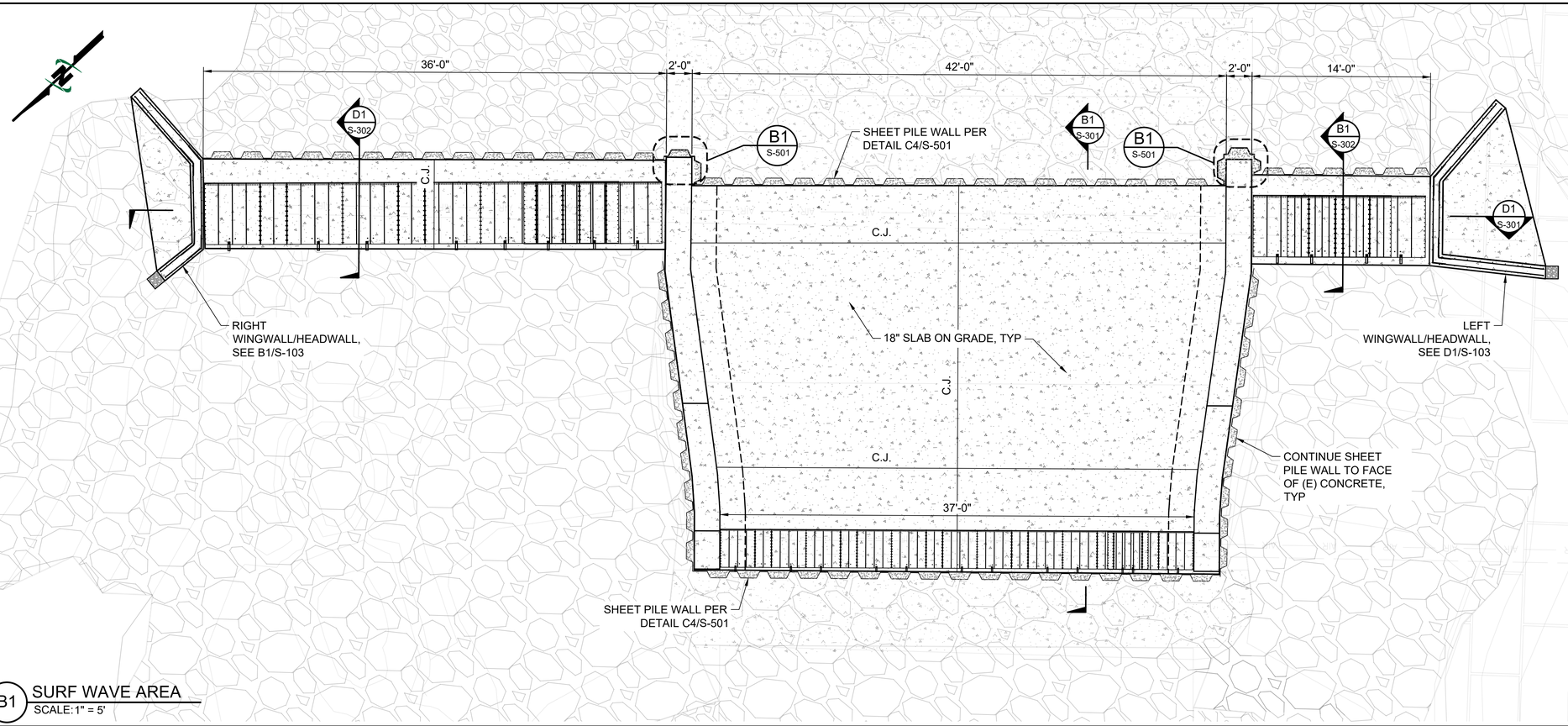
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY

LAST UPDATED: 10/16/2025

SHEET NUMBER:

S-100

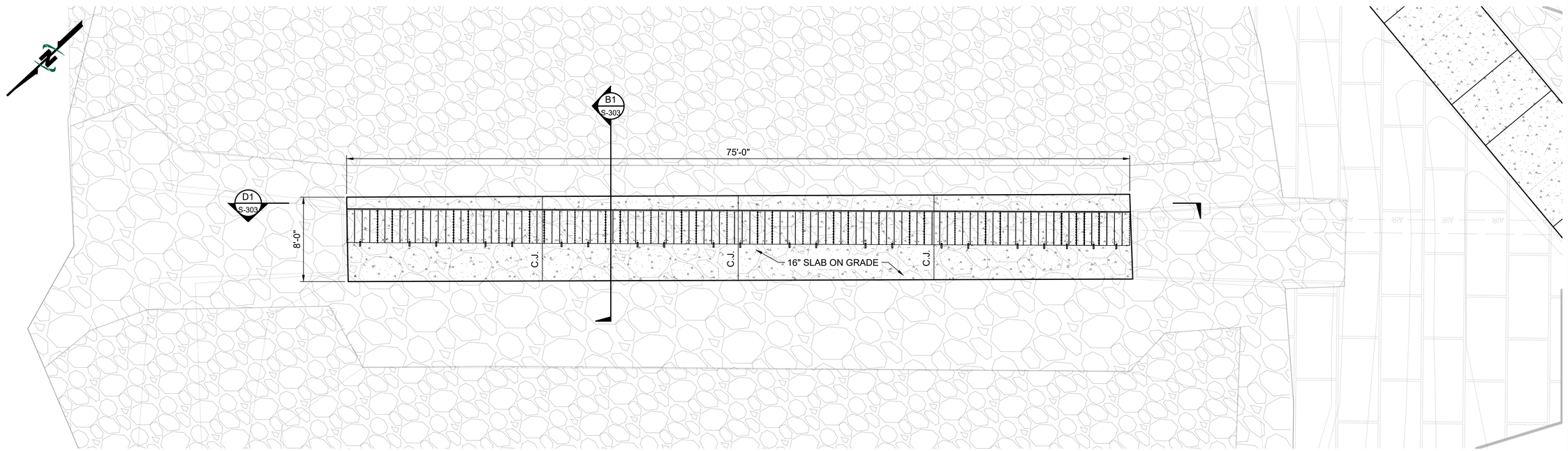
Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEETS\57-23-033_S-101X.DWG



B1 SURF WAVE AREA
SCALE: 1" = 5'

SHEET NOTES

1. C.J. = CONTROL JOINT OR OPTIONAL CONSTRUCTION JOINT. SEE DETAIL A3/S-901.
2. WHERE APPLICABLE CONCRETE TURNDOWNS SHALL BE POURED USING THE SHEET PILE WALL AS PART OF THE FORMING. REINFORCEMENT SHALL BE PLACED CONTINUOUS WITH 3" MIN CLR BETWEEN THE INNER PILE FACE AND THE BAR.
3. SURF RAMP JOINTS ARE TO LINE UP WITH CHANGE IN SLOPE OF MAIN SURF RAMP PERPENDICULAR TO RIVER FLOW AND CENTERED IN SLAB PARALLEL TO RIVER FLOW.
4. ALL OTHER JOINTS TO BE CENTERED OR EVENLY SPACED AS SHOWN.
5. ALL GATE ANCHORS HAVE BEEN DESIGNED BY AND ARE TO BE SPECIFIED BY THE MANUFACTURER/SUPPLIER.



D1 DOWNSTREAM RIFFLE AREA
SCALE: 1" = 5'

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10/17/2025

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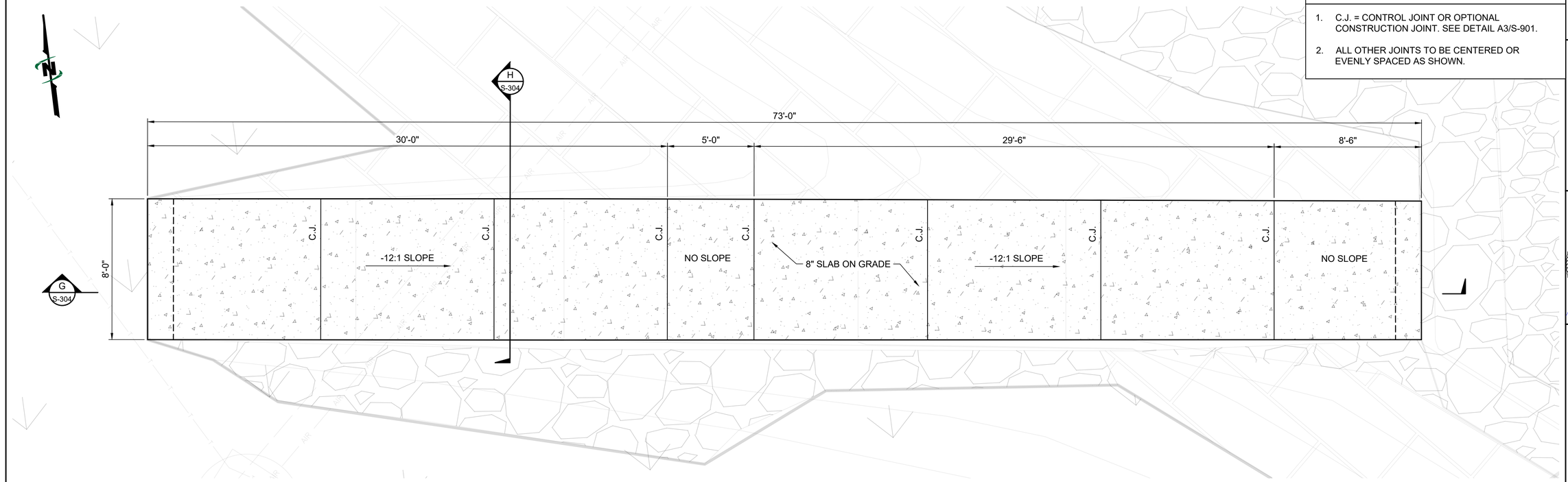
OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

SURF WAVE AREA AND RIFFLE

FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-101

Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UTAH\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG



B1 ACCESS RAMP
SCALE: 1" = 3'

SHEET NOTES

1. C.J. = CONTROL JOINT OR OPTIONAL CONSTRUCTION JOINT. SEE DETAIL A3/S-901.
2. ALL OTHER JOINTS TO BE CENTERED OR EVENLY SPACED AS SHOWN.

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STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

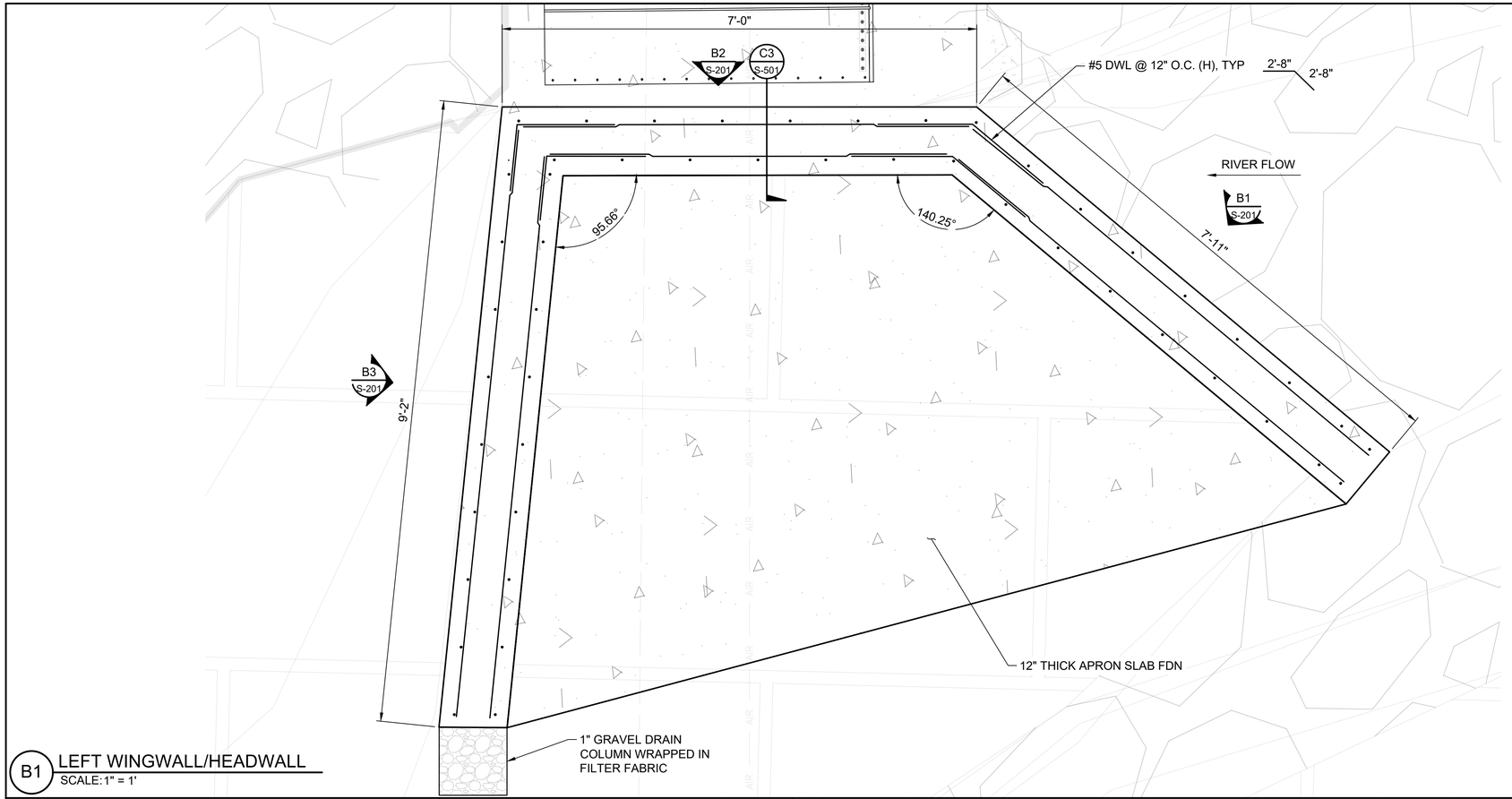
OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

ACCESS RAMP

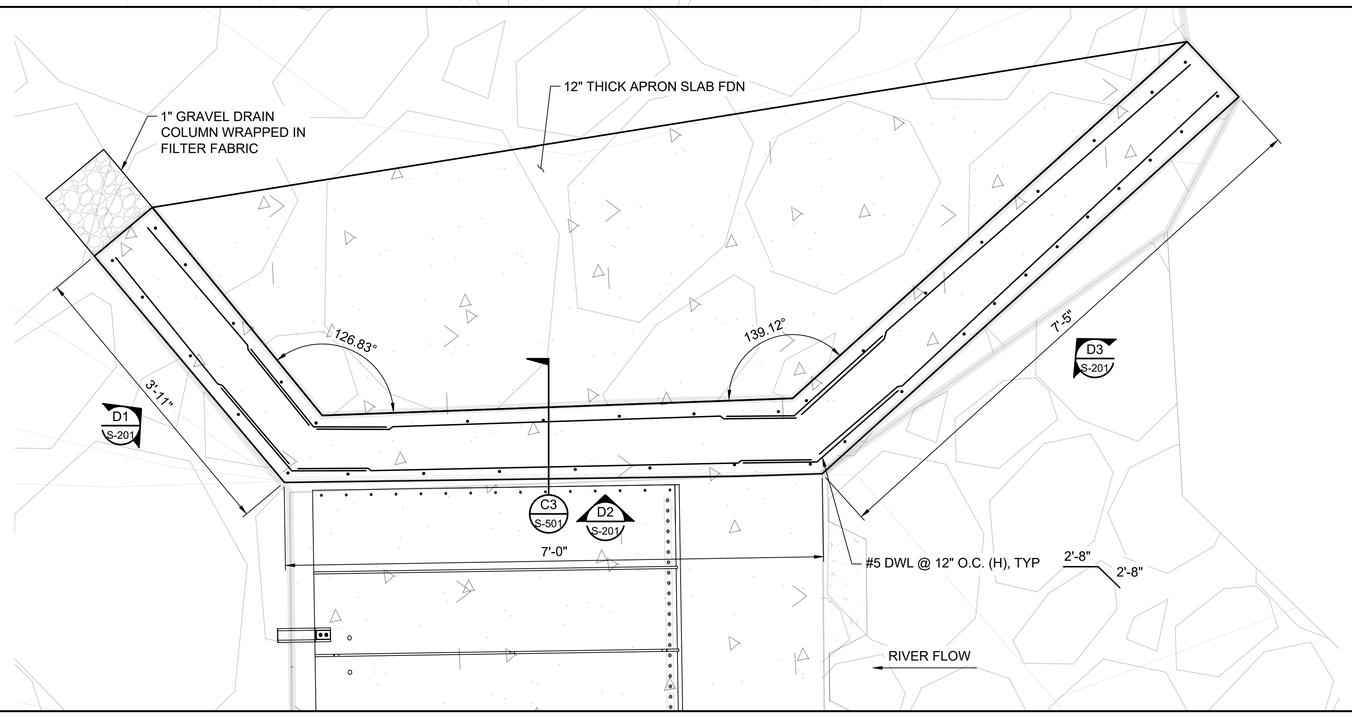
FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-102

Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG



B1 LEFT WINGWALL/HEADWALL
SCALE: 1" = 1'



D1 RIGHT WINGWALL/HEADWALL
SCALE: 1" = 1'

SHEET NOTES:

1. CONTRACTOR TO COORDINATE & VERIFY ALL DIMENSIONS & ELEVATIONS WITH CIVIL SHEETS.
2. SEE SHEETS S-001 - S-002 FOR GENERAL STRUCTURAL NOTES REQUIREMENTS.
3. ENSURE SPECIFIED SLAB THICKNESS IS MAINTAINED AS THE MINIMUM.

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OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

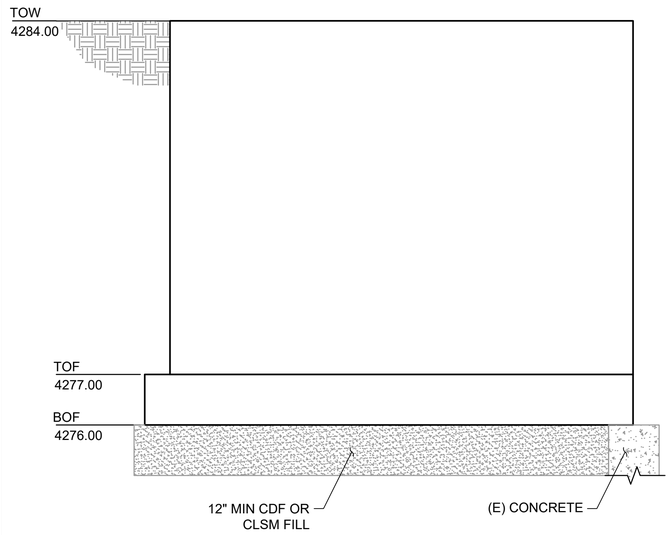
WINGWALL & HEADWALL PLANS

FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-103

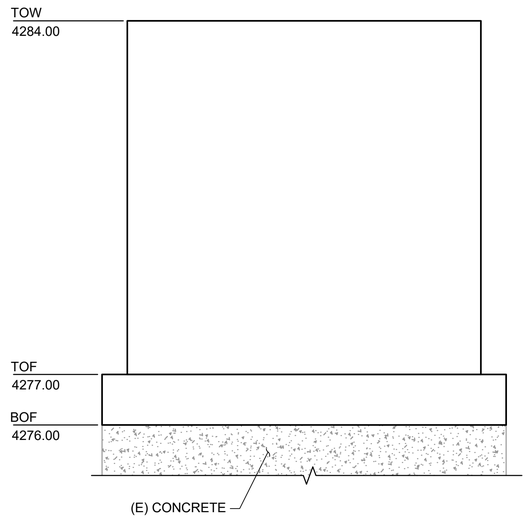
Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\UB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG

NOTE:
PRIOR TO FORMING NEW CONCRETE FOUNDATION, EXISTING CONCRETE SHALL BE ROUGHENED TO 1/4" DEPTH FOR BETTER BONDING OF NEW AND EXISTING CONCRETE.



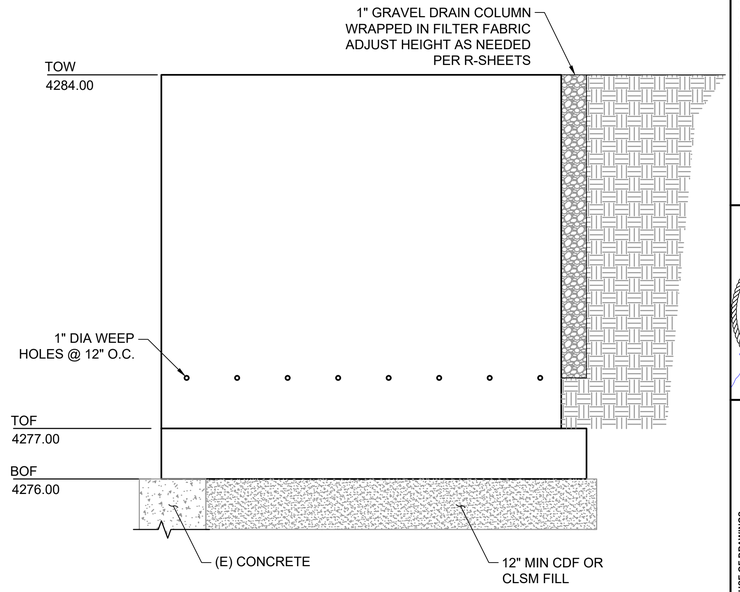
B1 RIVER LEFT UPSTREAM WINGWALL
SCALE: 1 1/2" = 1'-0"

NOTE:
PRIOR TO FORMING NEW CONCRETE FOUNDATION, EXISTING CONCRETE SHALL BE ROUGHENED TO 1/4" DEPTH FOR BETTER BONDING OF NEW AND EXISTING CONCRETE.

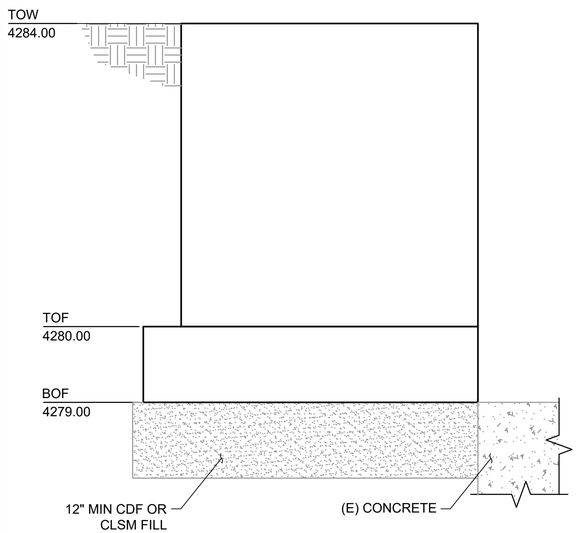


B2 RIVER LEFT HEADWALL
SCALE: 1 1/2" = 1'-0"

NOTE:
PRIOR TO FORMING NEW CONCRETE FOUNDATION, EXISTING CONCRETE SHALL BE ROUGHENED TO 1/4" DEPTH FOR BETTER BONDING OF NEW AND EXISTING CONCRETE.

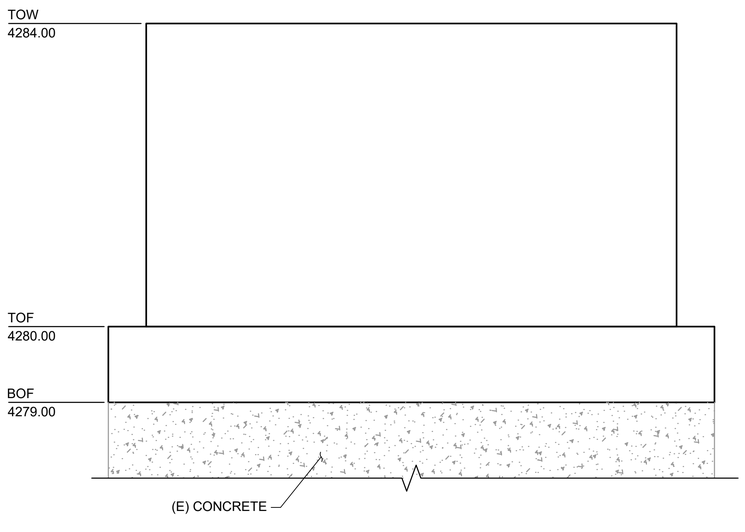


B3 RIVER LEFT DOWNSTREAM WINGWALL
SCALE: 1 1/2" = 1'-0"



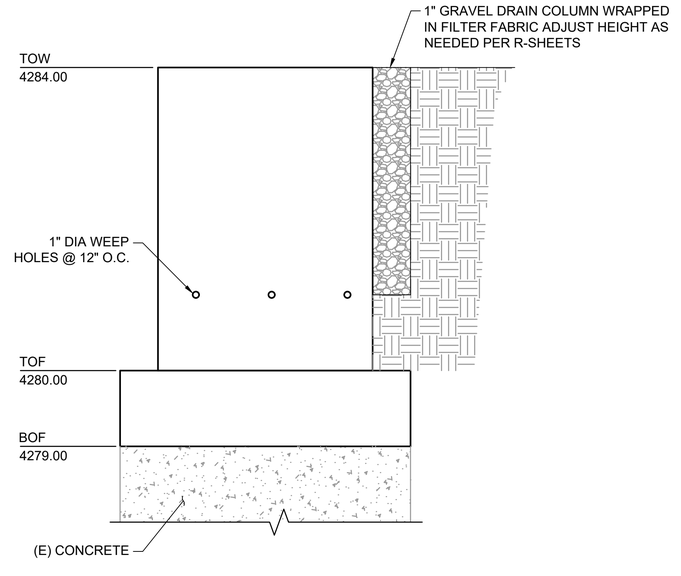
D1 RIVER RIGHT UPSTREAM WINGWALL
SCALE: 1" = 1'

NOTE:
PRIOR TO FORMING NEW CONCRETE FOUNDATION, EXISTING CONCRETE SHALL BE ROUGHENED TO 1/4" DEPTH FOR BETTER BONDING OF NEW AND EXISTING CONCRETE.



D2 RIVER RIGHT HEADWALL
SCALE: 1" = 1'

NOTE:
PRIOR TO FORMING NEW CONCRETE FOUNDATION, EXISTING CONCRETE SHALL BE ROUGHENED TO 1/4" DEPTH FOR BETTER BONDING OF NEW AND EXISTING CONCRETE.



D3 RIVER RIGHT DOWNSTREAM WINGWALL
SCALE: 1" = 1'

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JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

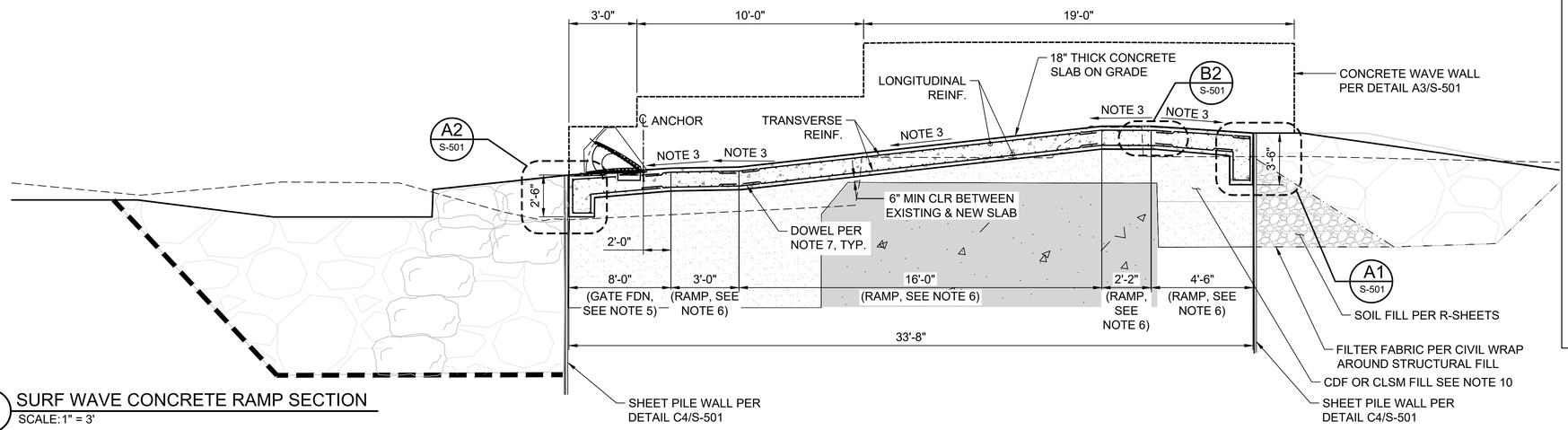
OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

HEADWALL & WINGWALL ELEVATIONS

FILE : 57-23-033 S-101X
JUB PROJ. # : 57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-201

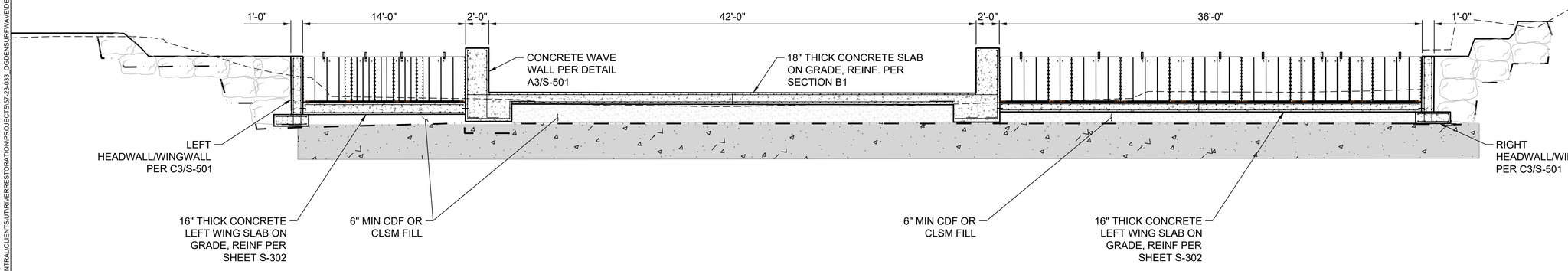
Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEETS\57-23-033_S-101X.DWG



B1 SURF WAVE CONCRETE RAMP SECTION
SCALE: 1" = 3'

SHEET NOTES:

1. CONTRACTOR TO COORDINATE & VERIFY ALL DIMENSIONS & ELEVATIONS WITH CIVIL SHEETS.
2. SEE SHEETS S-001 - S-002 FOR GENERAL STRUCTURAL NOTES REQUIREMENTS.
3. SEE RIVER RESTORATION SHEET R01 FOR SLOPE REQUIREMENTS. ENSURE SPECIFIED SLAB THICKNESS IS MAINTAINED AS THE MINIMUM.
4. GATE SHOWN IN B1 IS OHI 2FT STEEL GATE, AND GATE(S) SHOWN IN D1 IS OHI 4FT RUBBER ROCK GATE INSTALL PER MFR RECOMMENDATIONS
5. GATE FOUNDATION REINFORCEMENT:
   a. LONGITUDINAL BARS: #6 @ 8" O.C., TOP & BOTTOM
   a. TRANSVERSE BARS: #6 @ 6" O.C., TOP & BOTTOM
6. RAMP REINFORCEMENT:
   a. LONGITUDINAL BARS: #6 @ 6" O.C., TOP & BOTTOM
   b. TRANSVERSE BARS: #6 @ 6" O.C., TOP & BOTTOM
7. DOWELS SHALL BE USED WHERE CONCRETE SLOPE CHANGES. ENSURE ALL DOWELS ARE LAPPED WITH CONTINUOUS REINFORCEMENT PER DETAIL A1/S-901.
8. ALL IN-RIVER CONCRETE STRUCTURES SHALL HAVE 3" CLEAR COVER FOR ADDITIONAL WEAR PROTECTION FOR THE TOP REINFORCEMENT MAT.
9. PRIOR TO FORMING NEW CONCRETE FOUNDATION, EXISTING CONCRETE SHALL BE ROUGHENED TO 1/4" DEPTH FOR BETTER BONDING OF NEW AND EXISTING CONCRETE.
10. APPLY FILL OVER & AROUND EXISTING CONCRETE STRUCTURE AND IN AREA BETWEEN SHEET PILE WALLS. EXTEND TO EXCAVATION DEPTH AS RQR'D BY DEMO PLAN.
11. SHEET PILE WALL TO FRAME IN END OF TURNDOWN.



D1 SURF WAVE DROP CREST SECTION
SCALE: 1' = 5'

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STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
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OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

STRUCTURAL SECTIONS

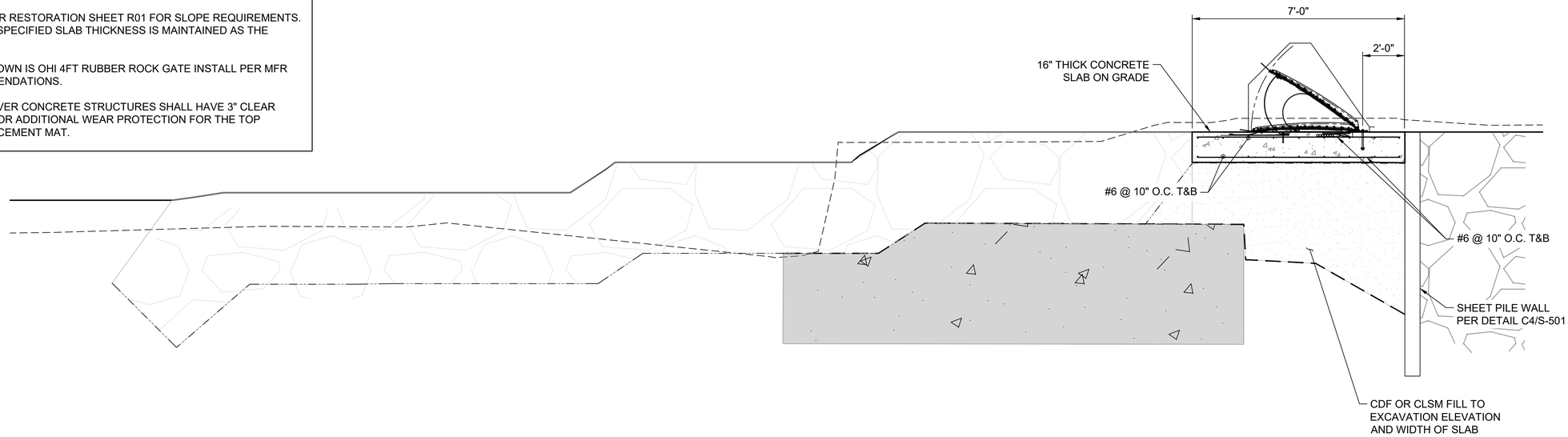
FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-301

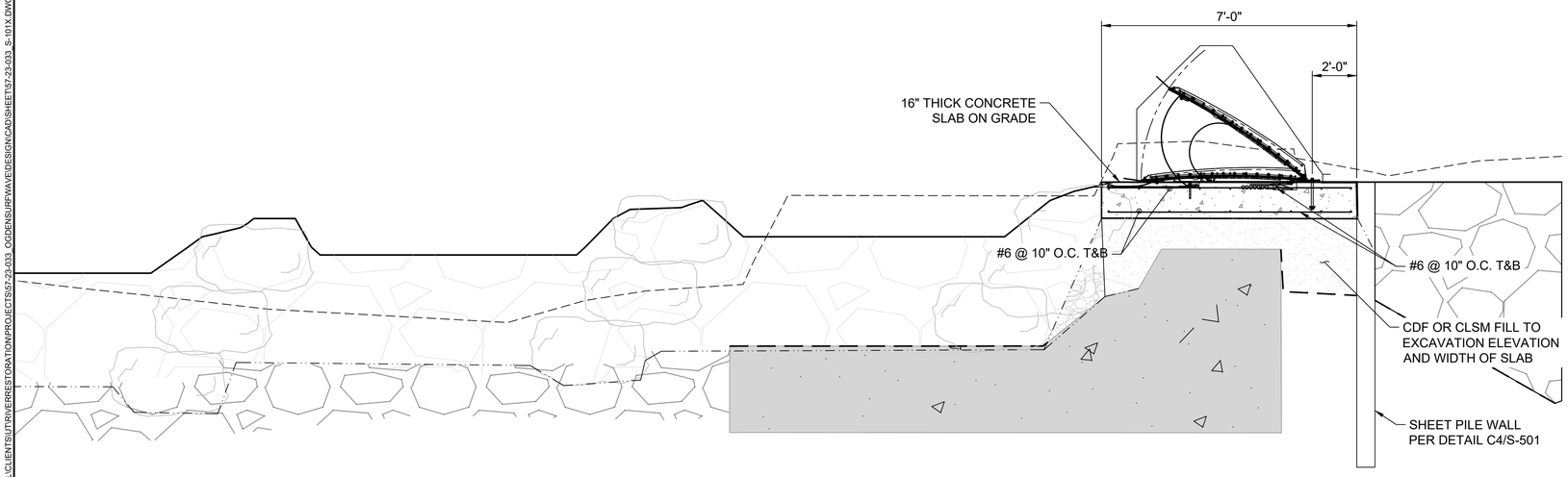
Plot Date:10/16/2025 5:18 PM, Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG

SHEET NOTES:

1. CONTRACTOR TO COORDINATE & VERIFY ALL DIMENSIONS & ELEVATIONS WITH CIVIL SHEETS.
2. SEE SHEETS S-001 - S-002 FOR GENERAL STRUCTURAL NOTES REQUIREMENTS.
3. SEE RIVER RESTORATION SHEET R01 FOR SLOPE REQUIREMENTS. ENSURE SPECIFIED SLAB THICKNESS IS MAINTAINED AS THE MINIMUM.
4. GATE SHOWN IS OHI 4FT RUBBER ROCK GATE INSTALL PER MFR RECOMMENDATIONS.
8. ALL IN-RIVER CONCRETE STRUCTURES SHALL HAVE 3" CLEAR COVER FOR ADDITIONAL WEAR PROTECTION FOR THE TOP REINFORCEMENT MAT.



B1 LEFT WING SECTION
SCALE: 1" = 2'



D1 RIGHT WING SECTION
SCALE: 1" = 2'

J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.
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Suite 180
Logan, UT 84321
Phone: 435.713.9514
www.jub.com

BID SET

PROFESSIONAL ENGINEER
No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
REVISION				

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

STRUCTURAL SECTIONS

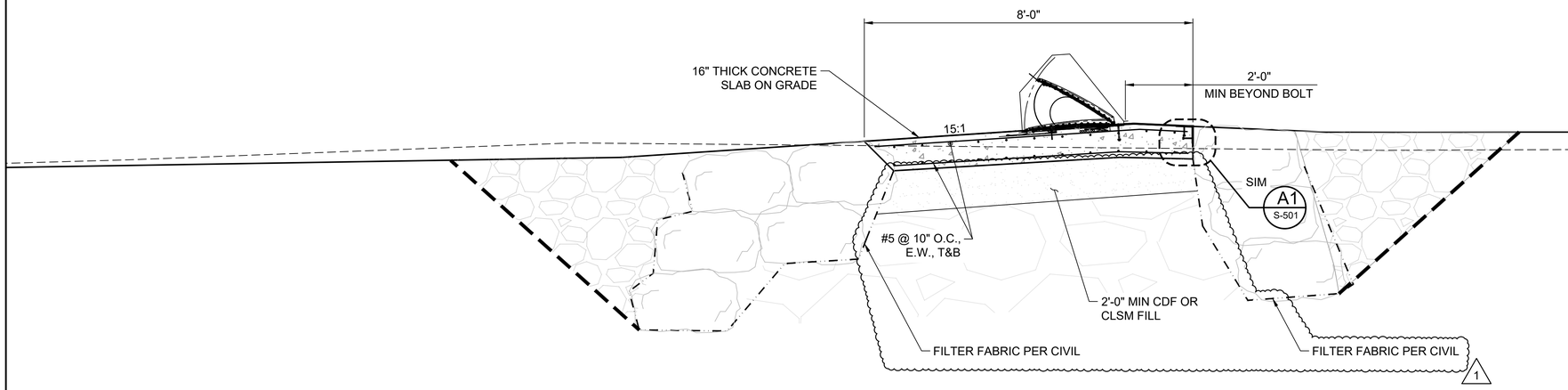
FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-302

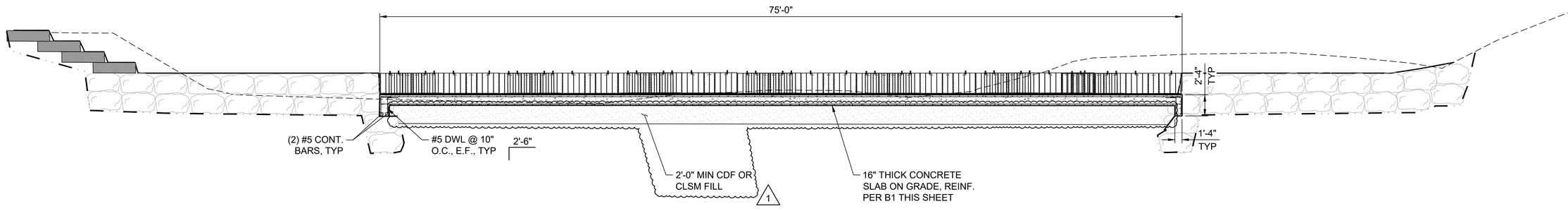
Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG

SHEET NOTES:

1. CONTRACTOR TO COORDINATE & VERIFY ALL DIMENSIONS & ELEVATIONS WITH CIVIL SHEETS.
2. SEE SHEETS S-001 - S-002 FOR GENERAL STRUCTURAL NOTES REQUIREMENTS.
3. SEE RIVER RESTORATION SHEET R03 FOR SLOPE REQUIREMENTS. ENSURE SPECIFIED SLAB THICKNESS IS MAINTAINED AS THE MINIMUM.
4. GATE SHOWN IS OHI 4FT RUBBER ROCK GATE INSTALL PER MFR RECOMMENDATIONS.
8. ALL IN-RIVER CONCRETE STRUCTURES SHALL HAVE 3" CLEAR COVER FOR ADDITIONAL WEAR PROTECTION FOR THE TOP REINFORCEMENT MAT.



B1 DOWNSTREAM RIFFLE SECTION
SCALE: 1" = 2'



D1 DOWNSTREAM RIFFLE SECTION
SCALE: 1" = 5'

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J-U-B ENGINEERS, INC.
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Suite 180
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PROFESSIONAL ENGINEER
No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
12/01/2025

NO.	REVISION	BY	DATE
1	FOUNDATION FILL UPDATE	EM / KJH	12/1/25

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

STRUCTURAL SECTIONS

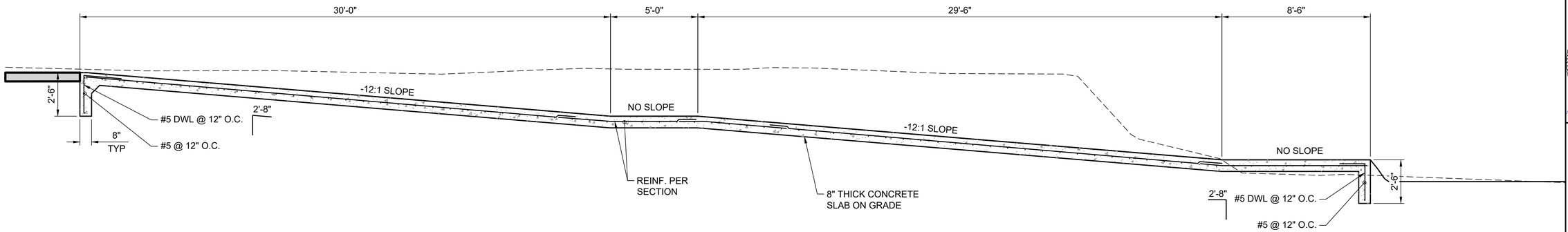
FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 12/1/2025

SHEET NUMBER:
S-303

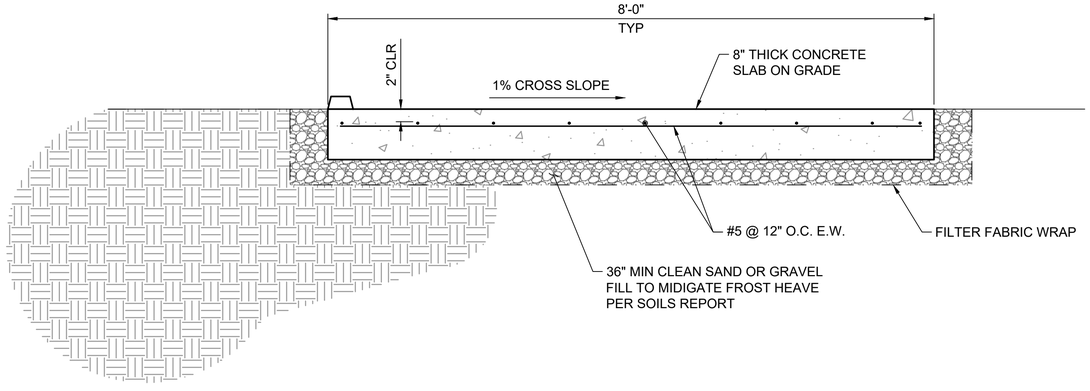
Plot Date:12/1/2025 1:35 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG

SHEET NOTES:

1. CONTRACTOR TO COORDINATE & VERIFY ALL DIMENSIONS & ELEVATIONS WITH CIVIL SHEETS.
2. SEE SHEETS S-001 - S-002 FOR GENERAL STRUCTURAL NOTES REQUIREMENTS.
3. ENSURE SPECIFIED SLAB THICKNESS IS MAINTAINED AS THE MINIMUM.



G ACCESS RAMP SECTION
SCALE: 1" = 3'



H ACCESS RAMP SECTION
SCALE: 1" = 1'

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NO.	DESCRIPTION	BY	APR.	DATE
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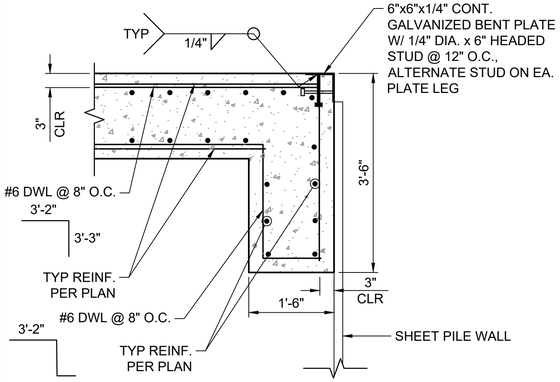
OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

STRUCTURAL SECTIONS

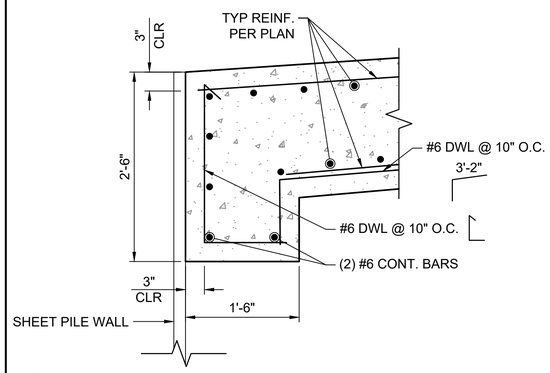
FILE : 57-23-033_S-101X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-304

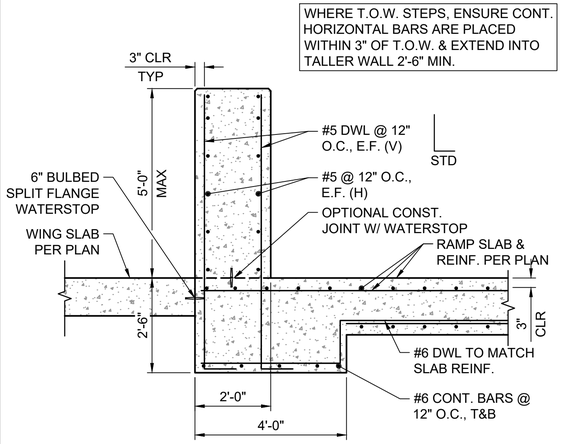
Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-101X.DWG



A1 UPSTREAM SURF RAMP TURNDOWN
SCALE:NTS



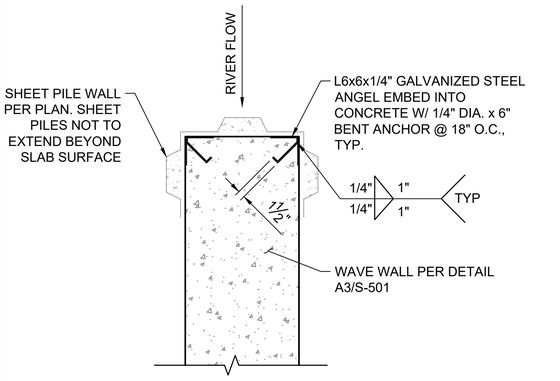
A2 DOWNSTREAM SURF RAMP TURNDOWN
SCALE:NTS



A3 WAVE WALL DETAIL
SCALE:NTS

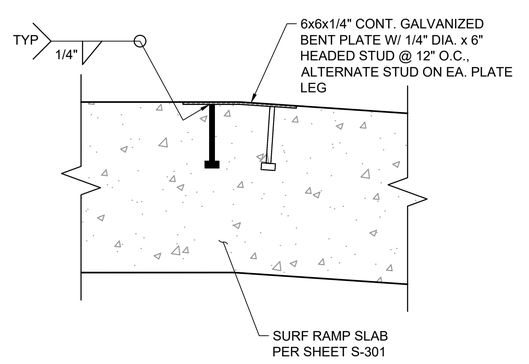
SECTION A

NOTE:
REINFORCEMENT NOT SHOWN FOR CLARITY.

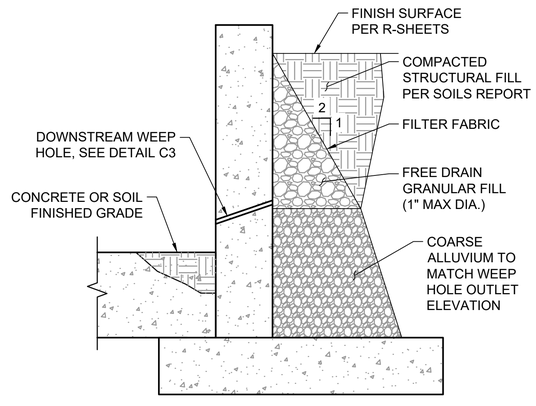


B1 UPSTREAM WAVE WALL CORNER PROTECTION DTL
SCALE:NTS

NOTE:
REINFORCEMENT NOT SHOWN FOR CLARITY.

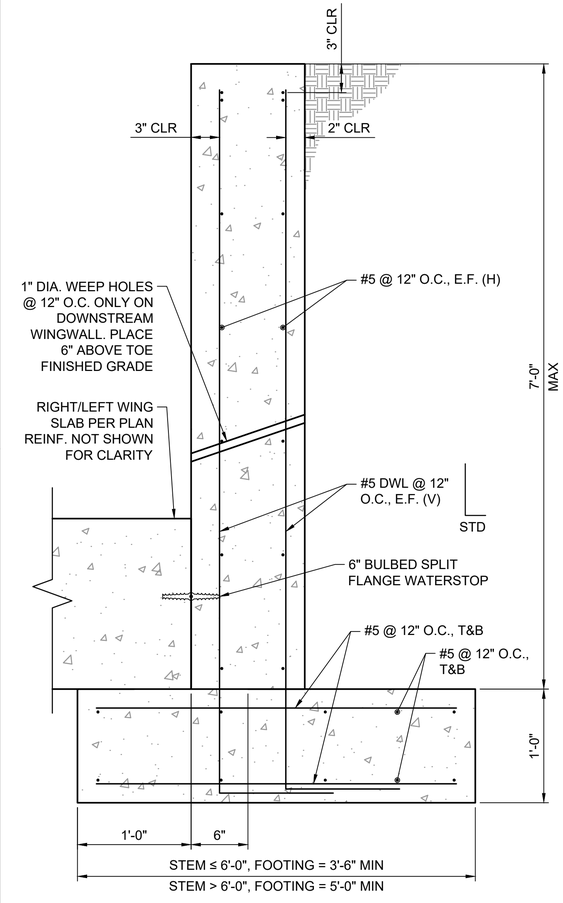


B2 UPSTREAM CREST CORNER PROTECTION DTL
SCALE:NTS

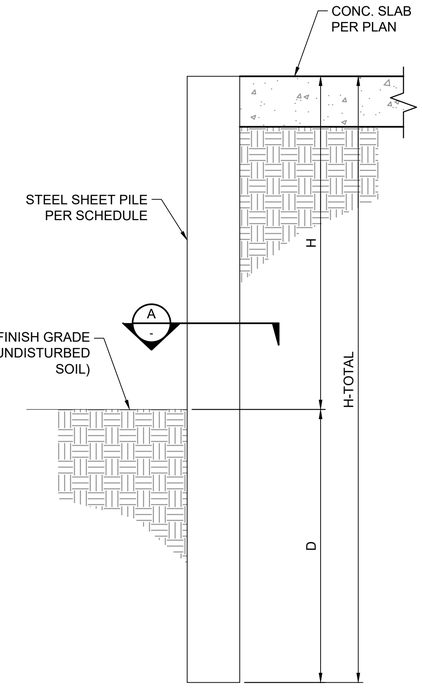


C2 SOIL BACKFILL AT HEADWALL/WINGWALLS
SCALE:NTS

NOTE:
SOIL FILL OVER TOE SHALL BE 1'-6" MIN WHERE CONCRETE SLAB IS NOT PRESENT.



C3 HEADWALL/WINGWALL DETAIL
SCALE:NTS



SHEET PILE SCHEDULE				
H	D	H-TOTAL	SECTION MODULOUS (IN^3)	SHEET PILE DESIGNATION
5'-0"	7'-10"	12'-10"	0.54	*NZ 14
8'-0"	12'-6"	20'-6"	2.23	*NZ 14

*NUCOR HOT ROLLED STEEL SHEET PILE OR APPROVED EQUAL.

NOTES:
1. SHEET PILE SPECIFICATION & DESIGN ARE DEPENDANT ON DIMENSION "H".
2. DIMENSION "H" IS A MAXIMUM VALUE. WHERE CONDITIONS ARE GREATER THAN WHAT IS PROVIDED IN THE SCHEDULE, CONTRACTOR SHALL CONTACT ENGINEER FOR UPDATED DESIGN OF NEEDED SHEET PILE.

C4 SHEET PILE WALL DETAIL
SCALE:NTS

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J-U-B ENGINEERS, INC.
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Suite 180
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No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

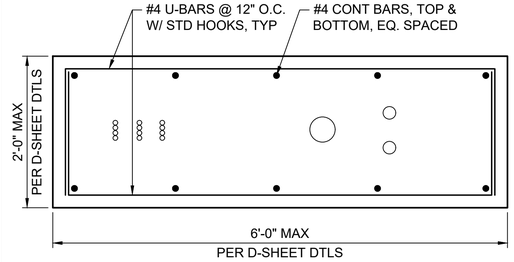
STRUCTURAL DETAILS

FILE : 57-23-033_S-901X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-501

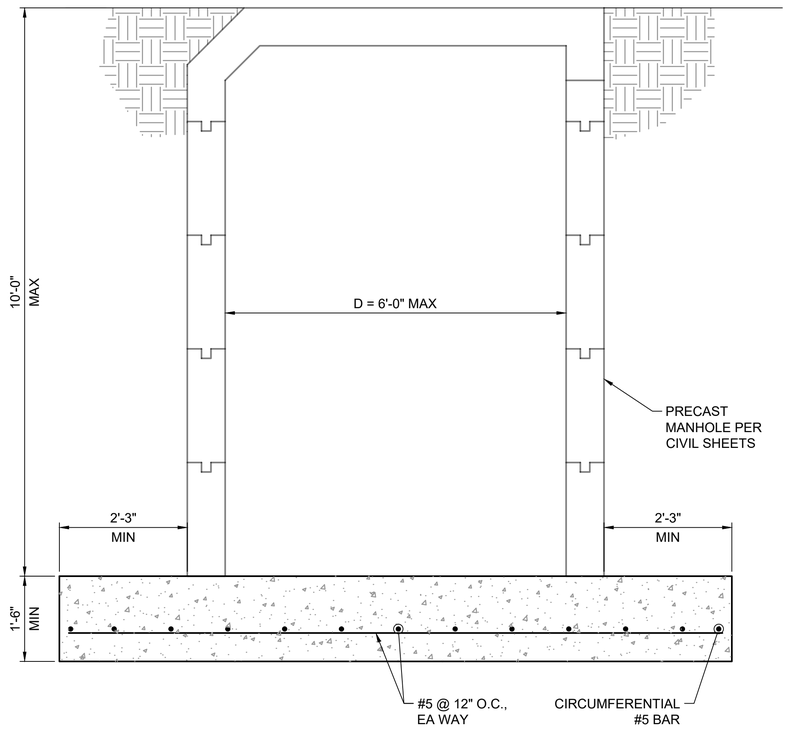
Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERREST\ORATION\PROJECTS\57-23-033_OGDEN\SURF\WAVE\DESIGN\CAD\SHEET\57-23-033_S-901X.DWG

NOTES:
1. LAYOUT OF CONDUIT IS REPRESENTATIVE. REFER TO D-SHEETS FOR ACTUAL LAYOUTS.
2. M-3000-UTL MIX SHALL BE USED WHEN PLACED UNDER CONCRETE STRUCTURES AND SHALL CONTAIN REINFORCEMENT AS DETAILED.
3. M-CDF WITH MAXIMUM COARSE AGGREGATE OF 0.5" SHALL BE USED IN ALL OTHER LOCATIONS. NO REINFORCEMENT REQUIRED.
4. 1" DIA. CONDUIT MAY BE BUNDLED IN STRAIGHT ROWS OF UP TO 4 CONDUITS. EACH SET MUST BE SPACED TO ALLOW FOR 2" CLEAR BETWEEN CONDUIT BUNDLES.



A1 CONDUIT ENCASEMENT DETAIL
SCALE:NTS

NOTE:
USE DESIGNED BASE SLAB TO SUPPORT MANHOLE AGAINST BOUYANT FORCES.



A2 PRECAST MANHOLE FOOTING DETAIL
SCALE:NTS

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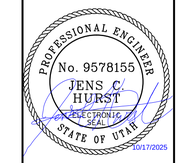


NO.	DESCRIPTION	BY	APR.	DATE
REVISION				

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

STRUCTURAL DETAILS

FILE : 57-23-033_S-901X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

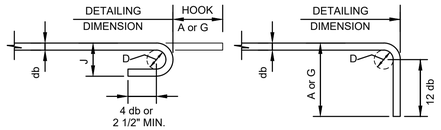
SHEET NUMBER:
S-502

Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVE\DESIGN\CAD\SHEET\57-23-033_S-901X.DWG

TYPICAL LAP SPLICE LENGTHS IN INCHES, PER ACI 318									
BAR SIZE	LAP CLASS	f'c=3,000 psi		f'c=4,000 psi		f'c=4,500 psi		f'c=5,000 psi	
		CAT.1	CAT.2	CAT.1	CAT.2	CAT.1	CAT.2	CAT.1	CAT.2
#3	A	16	25	14	21	14	20	13	19
	B	21	32	19	28	18	27	17	25
#4	A	22	33	19	28	18	27	17	25
	B	28	43	25	37	24	35	22	33
#5	A	27	41	24	36	23	34	21	32
	B	36	53	31	46	30	44	28	41
#6	A	33	49	28	43	27	41	25	38
	B	43	64	37	55	36	53	33	50
#7	A	48	72	42	62	40	59	37	56
	B	62	93	54	81	51	77	48	72
#8	A	55	82	47	71	45	68	42	64
	B	71	106	61	92	58	88	55	83
#9	A	62	92	53	80	51	76	48	72
	B	80	120	69	104	66	99	62	93

NOTES:
1. FOR GRADE 60 REINFORCING STEEL BARS.
2. ALL LAP SPLICES SHALL BE CLASS B, UNLESS NOTED OTHERWISE.
3. CATEGORY 1: CLEAR COVER >= db & CLR. SPACING >= db, AND STIRRUPS OR TIES THROUGHOUT Ld ARE PROVIDED. CATEGORY 1: CLEAR COVER >= db & CLR. SPACING >= 2db. CATEGORY 2: CLEAR COVER < db OR CLR. SPACING < 2db.
4. FOR TOP BARS MULTIPLY LAP LENGTH LISTED BY 1.30 TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12" OF CONCRETE CAST BELOW THE BARS.

A1 TYP REBAR LAP SPLICE SCHEDULE
SCALE:NTS

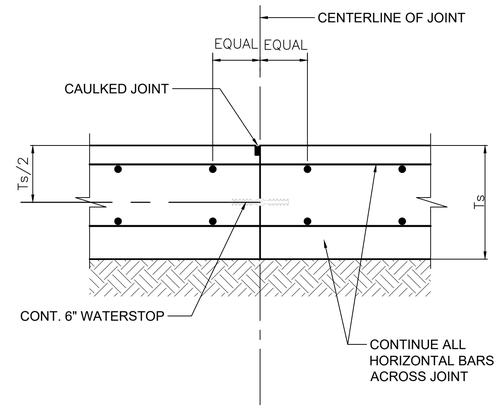


180° HOOKS 90° HOOKS

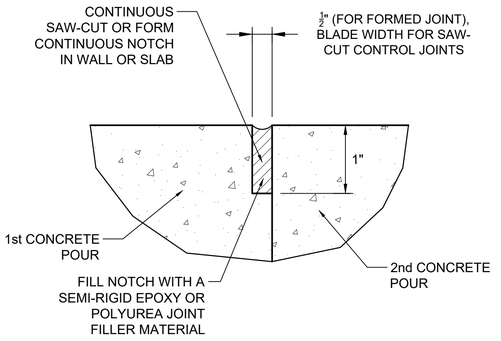
BAR SIZE	D	180° HOOKS		90° HOOKS
		A or G	J	A or G
#3	2 1/4"	5"	3"	6"
#4	3"	6"	4"	8"
#5	3 3/4"	7"	5"	10"
#6	4 1/2"	8"	6"	1'-0"
#7	5 1/4"	10"	7"	1'-2"
#8	6"	11"	8"	1'-4"

NOTES: db = NOMINAL BAR DIAMETER.
D = FINISHED INSIDE BEND DIAMETER.
MINIMUM D = 6 db FOR #3 TO #8 BARS
MINIMUM D = 8 db FOR #9 TO #11 BARS
MINIMUM D = 10 db FOR #14 AND #18 BARS
TYPICAL MINIMUM END HOOKS, ALL GRADES OF STEEL.

A2 TYPICAL REBAR HOOKS
SCALE:NTS

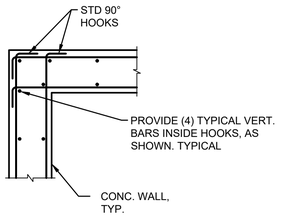


A3 TYP SLAB ON GRADE CONTROL/CONSTRUCTION JOINT
SCALE:NTS



NOTE:
REFER TO OTHER TYPICAL DETAIL FOR SLAB/WALL REINFORCING REQUIREMENTS. PROVIDE METZGER/McQUIRE MM-80 SEMI-RIGID EPOXY JOINT FILLER OR REZI-WELD FLEX, SEMI-RIGID EPOXY JOINT FILLER

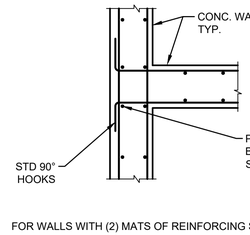
A4 TYPICAL SEALED NOTCH
SCALE:NTS



FOR WALLS WITH (2) MATS OF REINFORCING STEEL

NOTES:
1. CORNER AND INTERSECTION BARS TO MATCH SIZE & SPACING OF HORIZ. BARS.
2. REFER TO OTHER SECTIONS & DETAILS FOR REQUIRED BAR SIZE AND SPACING.
3. NOT ALL VERTICAL BARS ARE SHOWN FOR CLARITY, REFER TO OTHER DETAILS.
4. TYPICAL DETAIL FOR WATER OR NON-WATER RETAINING CONCRETE WALLS.
5. LOCATIONS OF HORIZONTAL BAR LAP SPLICES IN WATER-RETAINING WALLS SHALL BE STAGGERED PER OTHER TYPICAL DETAILS

B1 TYPICAL CONCRETE WALL CORNER
SCALE:NTS



FOR WALLS WITH (2) MATS OF REINFORCING STEEL

NOTES:
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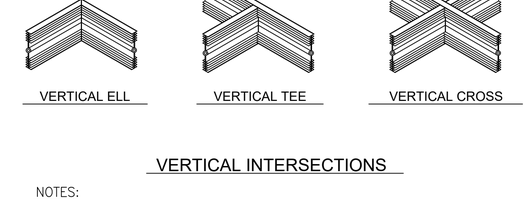
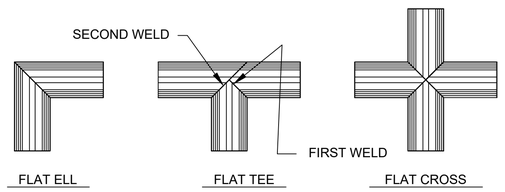
4. TYPICAL DETAIL FOR WATER OR NON-WATER RETAINING CONCRETE WALLS.
5. LOCATIONS OF HORIZONTAL BAR LAP SPLICES IN WATER-RETAINING WALLS SHALL BE STAGGERED PER OTHER TYPICAL DETAILS

B2 TYPICAL CONCRETE WALL INTERSECTION
SCALE:NTS



VERTICAL INTERSECTIONS

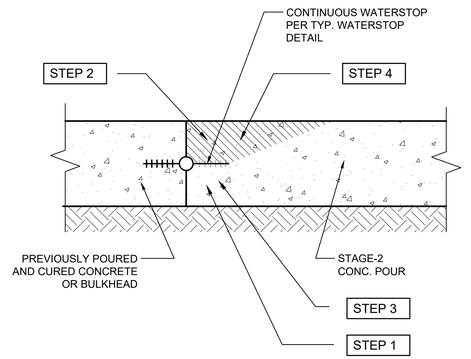
NOTES:
1. PROVIDE FACTORY MADE WATERSTOP FABRICATIONS FOR ALL VERTICAL INTERSECTIONS & CORNERS.
2. INSTALL AND SEAL FABRICATIONS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
3. FABRICATIONS SHALL BE MADE FROM THE SAME MATERIAL AS THE WATERSTOP CONNECTED.



HORIZONTAL (FLAT) INTERSECTIONS

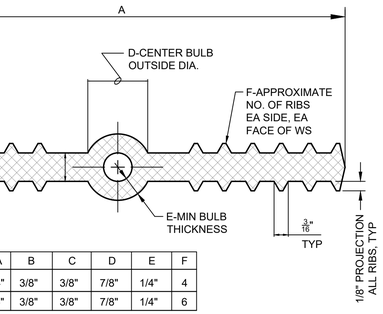
NOTES:
1. PROVIDE TEFLON COATED THERMOSTATICALLY CONTROLLED WATERSTOP SPLICING IRONS FOR ALL FIELD BUTT SPLICES.
2. FIELD BUTT SPLICES SHALL BE FULLY HEAT FUSED FOLLOWING THE MANUFACTURER'S RECOMMENDATIONS
3. LAPPING OF WATERSTOP, USE OF ADHESIVES, OR SOLVENTS SHALL NOT BE ALLOWED

C3 TYPICAL WELDED WATERSTOP INTERSECTIONS
SCALE:NTS



STEP 1	PLACE CONCRETE BELOW WATERSTOP FIRST. REMOVE ALL AIR VOIDS BY VIBRATING THOROUGHLY.
STEP 2	TO CONFIRM THERE ARE NO AIR VOIDS, LIFT WATERSTOP. A CONTINUOUS IMPRESSION OF THE WATERSTOP, INCLUDING EDGE OF BULB, SHOULD BE VISIBLE IN THE FRESH CONCRETE. CONTINUE THIS PROCEDURE ALONG THE ENTIRE POURED JOINT, END TO END. IF A CONTINUOUS IMPRESSION IS CONFIRMED, PROCEED WITH STEP 4. IF A VOID LARGER THAN 1/4 INCH IN DIAMETER IS PRESENT ANYWHERE IN THE WATERSTOP IMPRESSION, PROCEED WITH STEP 3.
STEP 3	IF A VOID LARGER THAN 1/4 INCH IN DIAMETER IS PRESENT IN THE WATERSTOP IMPRESSION, ADDITIONAL CONCRETE SHALL BE PLACED UNDER THE WATERSTOP, VIBRATED, AND STEP 2 REPEATED.
STEP 4	FINISH PLACING CONCRETE ABOVE THE WATERSTOP TO TOP OF SLAB.

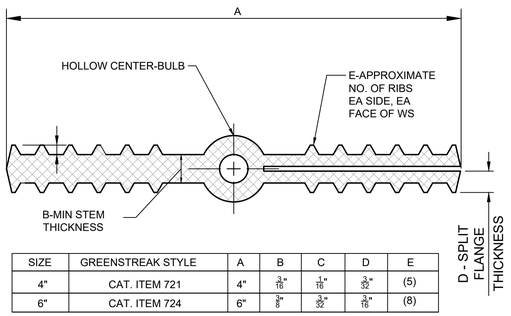
C4 TYPICAL SLAB WATERSTOP INSTALLATION
SCALE:NTS



SIZE	A	B	C	D	E	F
4"x3/8"	4"	3/8"	3/8"	7/8"	1/4"	4
6"x3/8"	6"	3/8"	3/8"	7/8"	1/4"	6

NOTES:
1. WATER-STOP SHALL BE PVC AND SHALL CONFORM TO ASTM D570, ASTM D746, ASTM D1149 AND CRD-C572.
2. WHEN AVAILABLE PROVIDE PRE-FABRICATED INTERSECTION SECTIONS AT ALL WATERSTOP INTERSECTIONS.

C1 TYPICAL WATERSTOP TYPE
SCALE:NTS



SIZE	GREENSTREAK STYLE	A	B	C	D	E
4"	CAT. ITEM 721	4"	3/16"	1/16"	3/32"	(5)
6"	CAT. ITEM 724	6"	3/8"	3/32"	3/16"	(8)

NOTES:
1. WATER-STOP SHALL BE PVC AND SHALL CONFORM TO ASTM D570, ASTM D746, ASTM D1149 AND CRD-C572.
2. WHEN AVAILABLE PROVIDE PRE-FABRICATED INTERSECTION SECTIONS AT ALL WATERSTOP INTERSECTIONS.

C2 TYPICAL SPLIT WATERSTOP TYPE
SCALE:NTS

J-U-B ENGINEERS, INC.
J-U-B ENGINEERS, INC.
1047 South 100 West
Suite 180
Logan, UT 84321
Phone: 435.713.9514
www.jub.com

BID SET

PROFESSIONAL ENGINEER
No. 9578155
JENS C. HURST
ELECTRONIC SEAL
STATE OF UTAH
10/17/2025

NO.	DESCRIPTION	BY	APR.	DATE
	REVISION			

OGDEN BUSINESS EXCHANGE SURF WAVE
OGDEN CITY

TYPICAL STRUCTURAL DETAILS

FILE : 57-23-033_S-901X
JUB PROJ. # :57-23-033
DRAWN BY: EM
DESIGN BY: KJH
CHECKED BY: JCH
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 10/16/2025

SHEET NUMBER:
S-901

Plot Date:10/16/2025 5:18 PM Plotted By: Emiliano Morales
Date Created:10/16/2025\\JUB.COM\CENTRAL\CLIENTS\UT\RIVERRESTORATION\PROJECTS\57-23-033_OGDENSURFWAVEDESIGN\CAD\SHEET\57-23-033_S-901X.DWG

APPENDIX B Geotechnical Report

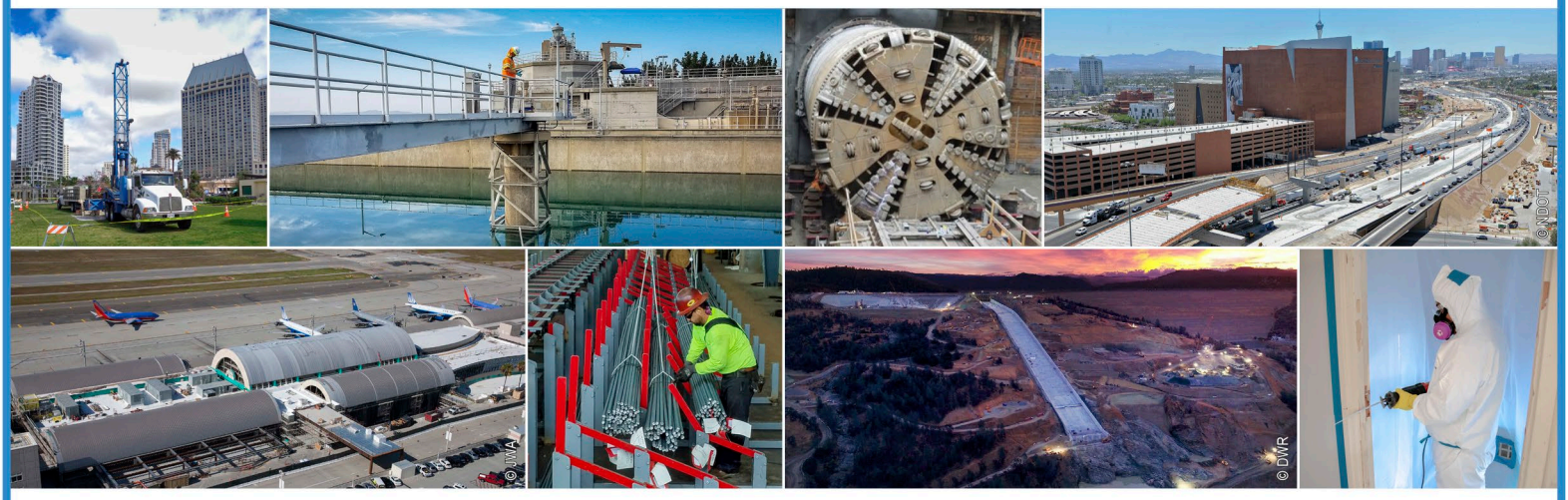
Geotechnical Evaluation

Ogden Business Exchange Wave
Near Stockman Way and Exchange Road
Ogden, Utah

River Restoration

PO Box 248 | Carbondale, Colorado 81623

January 10, 2025 | Project No. 800429001



Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

35+ YEARS

Geotechnical Evaluation
Ogden Business Exchange Wave
Near Stockman Way and Exchange Road
Ogden, Utah

Mr. Quinn Donnelly, PE
River Restoration
PO Box 248 | Carbondale, Colorado 81623

January 10, 2025 | Project No. 800429001

Robert E. Gambrell, PE
Senior Engineer

REG/BLO/kgg

PROFESSIONAL ENGINEER
No. 11256609
ROBERT E. GAMBRELL
Exp. 3/31/25
STATE OF UTAH
1/10/25

Brad L. Olsen, PE
Principal Engineer

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APPENDICES

1 INTRODUCTION

In accordance with your request, Ninyo & Moore has performed a geotechnical evaluation for the Ogden Business Exchange Wave project to be constructed along the Weber River near Stockman Way and Exchange Road in Ogden, Utah. The approximate location of the site is indicated on Figure 1. The purposes of our geotechnical study were to evaluate subsurface soil conditions at the project site and to provide design and construction recommendations regarding geotechnical aspects of the project. This report presents the findings of our subsurface exploration, results of laboratory testing, conclusions regarding subsurface conditions at the project site, and geotechnical recommendations for design and construction of this project.

2 SCOPE OF SERVICES

The scope of our services included the following:

- Review of pertinent background information, including in-house geotechnical data, aerial photographs, and published regional and local geologic maps and soils data.
- Coordination and mobilization for subsurface exploration. Mark-out of existing utilities was conducted through Blue Stakes of Utah.
- Excavating, logging, and sampling of two exploratory test pits to depths up to approximately 10 feet. The purpose of the test pits was to evaluate the subsurface soil and groundwater conditions, including obtaining soil samples for laboratory testing.
- Performance of laboratory tests to evaluate the geotechnical characteristics of the subsurface soils, including gradation, Atterberg limits (plasticity), and chemical (corrosivity) considerations, including pH, electrical resistivity, water-soluble sulfate content, water-soluble chloride content, and total dissolved solids (solubility).
- Compilation and analysis of the field and laboratory data.
- Preparation of this report presenting our findings, conclusions, and recommendations.

3 PROJECT DESCRIPTION

The project will include design and construction of a new standing whitewater surf wave, which will be located in the Weber River at approximately 41.2277 degrees north latitude and -111.9878 degrees west longitude. The wave will be created by an inflatable apparatus supported on a shallow foundation extending perpendicular across the Weber River. A second structure will be constructed just downriver from the standing wave to slow the flow of water and to create a pool below the standing wave. In addition, a paved access path will extend from the top of the south bank, diagonal to the river, to the approximate location of the proposed second structure downstream of the standing wave. It is anticipated the project will also include additional in-channel and bank improvements in and along the Weber River, such as concrete flatwork, low-height retaining walls, and various utilities. The standing wave will be constructed approximately ¼-mile downstream of the existing Ogden Kayak Park. The proposed project is anticipated to

have a total project alignment length of approximately 340 feet. The alignment currently includes a portion of a historic concrete grade-control structure that extends across the river in the approximate location of the proposed standing wave. The existing grade-control structure may be incorporated into the structure that will create the standing wave. The project site is shown on Figure 2.

4 GENERAL SITE CONDITIONS

At the time of our field activities, the project site was generally undeveloped on the south side of the river and primarily covered in native plants, vegetation and trees. On the north side of the river, the bank was built-up with boulders, apparent fill soils, remnant of previous structures, and a paved walking path. The two-tiered foundation associated with the existing historic concrete grade-control structure extends perpendicular across the Weber River. The Weber River generally flows to the northwest with approximately 2 to 4 feet of water. The site is located in the western portion of Ogden, Utah, to the east of Interstate 15. Adjacent properties include commercial businesses with parking areas to the south and southwest, and a railroad to the north and east. The topography at the site slopes gently down to the northwest with a total relief of approximately 5 feet. Indications of underground utilities were not observed, but may be present at or near the site.

5 GEOLOGY

Based on our field observations, subsurface exploration, and review of referenced geologic and soils data, the project site is underlain primarily by Quaternary-age alluvial soil deposits (native soil) consisting sand, silt, clay, and gravel deposits. Ninyo & Moore's findings regarding the geologic setting, potential geologic hazards, ground motions, and liquefaction potential at the project site are provided in the following sections.

5.1 Geologic Setting

The project site is located in the Wasatch Front Region along the western base of the Wasatch Range. The Wasatch Front is located on the eastern edge of the Great Basin, which is made up of many naturally formed structural basins resulting from block faulting, which is a fundamental characteristic of the Basin and Range physiographic province.

The Wasatch Front Region extends in a north-south direction and generally drains toward the west through rivers and washes. The referenced geologic map titled *Interim geologic map of the Ogden 30' x 60' quadrangle, Box Elder, Cache, Davis, Morgan, Rich, and Summit Counties, Utah, and Uinta County, Wyoming* (Coogan, J.C., and King, J.K., 2016) indicates that the project area

is underlain primarily by Quaternary-age alluvial deposits that are composed of moderately sorted, unconsolidated sand, silt, clay and gravel that locally includes organic overbank and oxbow lake deposits. These sediments were emplaced during the Holocene, where lower levels of the Great Salt Lake induced downcutting by the Weber River, leading to the accumulation of alluvium along recent and currently active floodplains.

The project site was also within the bounds of the ancestral Lake Bonneville, a glacial lake associated with the last Ice Age, during the late Pleistocene. Deposits associated with this environment include alluvial fan sediments where the Weber River entered the lake, coarser-grained materials in shallow water, and finer-grained materials in deep water.

5.2 Potential Geologic Hazards

Ninyo & Moore's geotechnical study included an evaluation of the possible presence of geologic hazards, such as faults and ground fissures, in the site area. This evaluation included visual observation of the site for indications of adverse geologic features and review of published geologic and soils maps and literature, and other data listed in the references section of this report.

Based on our review of referenced data, no faults traverse the project site. Surficial disturbance associated with active faulting was not observed at the site during our field evaluation. Review of referenced geologic data indicates that the nearest active fault (i.e., a fault that has experienced ground surface rupture within the past 10,000 years) to the site is the Weber segment of the Wasatch Fault Zone. Table 1 lists the principal, known active faults that may affect the project site along with approximate fault-to-site distances and anticipated maximum moment magnitudes (M_{max}). The approximate fault-to-site distances, M_{max} values, and activity levels were obtained using the referenced USGS web-based programs (USGS, 2014; USGS, 2025).

Table 1 – Principal Active Faults in Vicinity of Project Site

Fault Name (Activity Level)	Approximate Distance From Project Site to Fault (miles)	Maximum Moment Magnitude (M_{max})
Wasatch Fault Zone, Weber Segment (Active)	3.2	7.1
Wasatch Fault Zone, Bingham City Segment (Active)	7.6	7.0
Great Salt Lake Fault Zone, Fremont Island Segment (Active)	21.0	6.8

Review of the referenced geologic data does not indicate the presence of ground fissures at the project site and no ground fissures were observed during our field activities. Additionally, our

review indicates that the site is not located in a *Surface Fault Rupture Hazard Special Study Zone* (UGS, 2008b).

5.3 Ground Motions

Using the American Society of Civil Engineers (ASCE) Hazard Tool (https://ascehazardtool.org), estimated maximum considered earthquake spectral response accelerations for short (0.2 second) and long (1.0 second) periods were obtained for the project site, which is located at approximately 41.2278 degrees north latitude and -111.9880 degrees west longitude. Based on the results of our field exploration, ASCE Standard 7-16 (ASCE, 2016), and a review of available geologic information, Seismic Site Class D – Default is appropriate for the project site. The parameters presented in the following table are characteristic of the site for design purposes.

Table 2 – Seismic Design Criteria

Site Coefficients and Spectral Response Acceleration Parameters	Values
Site Class	D – Default
Site Coefficient at 0.2-second Period, F_a	1.2
Site Coefficient at 1.0-second Period, F_v	1.708
Mapped Spectral Response Acceleration at 0.2-second Period, S_S	1.356g
Mapped Spectral Response Acceleration at 1.0-second Period, S_1	0.492g
Spectral Response Acceleration at 0.2-second Period Adjusted for Site Class, S_{MS}	1.628g
Spectral Response Acceleration at 1.0-second Period Adjusted for Site Class, S_{M1}	0.840g
Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	1.085g
Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	0.560g
Site Amplification Factor, F_{PGA}	1.2
Peak Ground Acceleration, PGA	0.612g
Modified Peak Ground Acceleration, PGA_M	0.734g

5.4 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated soils lose shear strength under short-term (dynamic) loading conditions. Ground shaking of sufficient duration results in the loss of grain-to-grain contact in potentially liquefiable soils due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for a short period of time.

To be potentially liquefiable, a soil is typically cohesionless with a grain-size distribution generally consisting of sand and silt. It is generally loose to medium dense and has relatively high moisture content, which is typical near or below groundwater level. The potential for liquefaction decreases with increasing clay and gravel content, but increases as the ground acceleration and duration of

shaking increase. Potentially liquefiable soils need to be subjected to sufficient magnitude and duration of ground shaking for liquefaction to occur.

An in-depth evaluation of the potential for liquefaction at the site was outside the scope of this geotechnical evaluation. Review of the referenced geologic data indicates that the project site is mapped in a zone with a high liquefaction potential. However, based on the nature of the proposed construction, liquefaction is not a design concern.

6 FIELD EXPLORATION AND SUBSURFACE CONDITIONS

Ninyo & Moore's subsurface exploration at the project site was performed on November 11, 2024. This exploration consisted of excavating, logging, and sampling of two exploratory test pits (TP-1 and TP-2). The test pits were excavated with a track-mounted CAT 311F L excavator. The test pits were excavated to depths up to approximately 10 feet. The purpose of the test pits was to evaluate subsurface conditions at the project site and to collect soil samples for laboratory testing. The elevations of the test pits, based on Mean Sea Level (MSL), were estimated from Google Earth (Google Earth Website, 2025) data. Accordingly, the ground elevations that are recorded on the test pit logs in Appendix A should be considered approximate. The approximate locations of the test pits are shown on Figure 2.

Laboratory tests were performed on representative soil samples collected from the test pits to evaluate the gradation, Atterberg limits (plasticity), and chemical (corrosivity) considerations, including pH, electrical resistivity, water-soluble sulfate content, water-soluble chloride content, and total dissolved solids (solubility). The laboratory test results and descriptions of testing procedures utilized are presented in Appendix B and Appendix C.

6.1 Subsurface Soil Encountered

Generalized descriptions of the subsurface soils encountered in the exploratory test pits are provided in the following sections.

6.1.1 Native Soil

The encountered native soils consisted primarily of loose to dense, well-graded gravel with silt and sand; and loose, well-graded sand with silt and varying amounts of gravel and cobbles. The encountered native soils were generally moist to wet. Test Pits TP-1 and TP-2 were terminated at depths of 8.5 and 10 feet, respectively, due to collapsing sidewalls and unstable excavation conditions.

6.2 Groundwater

Groundwater was encountered in our test pits at depths of approximately 7 and 9.5 feet at the time of excavation. Groundwater levels are influenced by seasonal factors, variations in ground surface topography, precipitation, irrigation practices, soil/rock types, groundwater pumping, and other factors and are subject to fluctuations. Evaluation of factors associated with groundwater fluctuations was beyond the scope of this study.

6.3 Laboratory Testing

Laboratory tests were performed on representative samples of soil obtained from the exploratory test pits. Results of these tests are summarized in the following table and presented in Appendix B and Appendix C.

Table 3 – Summary of Laboratory Test Results

Test Type	Test Results	Remarks
Atterberg Limits		
Liquid Limit	NP	
Plastic Limit	NP	
Plasticity Index	NP	Non-plastic.
pH	7.4	--
Electrical Resistivity	31 Ohm-m	Moderate corrosion potential to normal grade steel.
Water-Soluble Sulfate	34 mg/kg (ppm)	Sulfate Exposure Class S0 – Low corrosion potential to concrete.
Water-Soluble Chloride	36 mg/kg (ppm)	Low corrosion potential to normal grade steel.
Total Dissolved Solids (Solubility)	2,690 mg/kg (ppm)	Low solubility potential.

The laboratory tests performed for this evaluation were performed in accordance with the current applicable ASTM standards.

7 FINDINGS AND CONCLUSIONS

Based on the findings of this study, it is our opinion that there are no known geotechnical or geologic conditions that would preclude construction of the proposed project, provided the recommendations presented herein are implemented and appropriate construction practices are followed. Geotechnical design and construction considerations for the proposed project include the following:

- **Structural Fill and Backfill:** The findings of our study indicate that the soils encountered in our exploratory test pits generally should be suitable for use as structural fill and backfill

material for the project. The excavated on-site soils may be used as structural fill and backfill provided they comply with the recommendations presented in Section 8.1.3.

- **Over-sized Material:** Cobbles and boulders were occasionally encountered within our test pits. Accordingly, rock excavation techniques, including rock chipping, should be anticipated. Additionally, any on site soils to be reused as structural fill will likely need to be screened to remove over-sized materials.
- **Subgrade Support:** Structure foundations and other project improvements should be supported on medium dense to very dense native granular soils, on stiff to hard native fine-grained soils, or on properly placed and compacted structural fill (reworked soils or import soils). Structural fill should extend to competent native soils, as described above.
- **Groundwater:** Groundwater was encountered in our exploratory test pits at depths of approximately 7.0 and 9.5 feet. Groundwater will be encountered during excavation operations. Dewatering and subgrade stabilization should be anticipated.
- **Subgrade Stabilization:** Relatively moist to wet conditions will be encountered during excavation and earthwork operations. Therefore, potentially unstable and pumping subgrade conditions should be anticipated in excavation bottoms. In addition, contractors for this project should anticipate that construction dewatering will be needed for the project to aid in stabilizing trench walls and trench bottoms, and to aid in placement and compaction of fills. Unstable and pumping subgrade conditions should be expected during earthwork operations.
- **Seismic Parameters:** In accordance with the referenced ASCE 7-16 (ASCE, 2016) standard, the seismic parameters provided in Table 2 are characteristic of the site and should be considered, where appropriate, in design of the proposed structures.
- **Liquefaction:** The project site is mapped in a zone with a high liquefaction potential. However, based on the proposed construction, liquefaction is not a design concern.
- **Geologic Hazards:** Review of published geologic data and our field observations do not indicate the presence of adverse on-site geologic hazards, such as faults and ground fissures, which may affect proposed site development.
- **Corrosion Potential:** Chemical test results indicate that the tested soils have a low to moderate corrosion potential to metal and a low corrosion potential to concrete.
- **Underground Utilities:** Indications of underground utilities were not observed at the site during our field activities. Existing utilities at the site may be present and should be located and marked prior to earthwork operations, and should be removed from proposed structure and other site improvement areas or abandoned in-place.

8 RECOMMENDATIONS

The following sections provide geotechnical recommendations for design and construction of proposed project improvements.

8.1 Earthwork

The following subsections provide recommendations for earthwork, including site grading, subgrade stabilization, structural fill and backfill, import soil, excavations and dewatering, and temporary excavations and shoring.

8.1.1 Site Grading

Prior to grading, areas of proposed structures and improvements should be cleared of any surface obstructions, structures, foundations, pavement, debris, concrete, topsoil, vegetation, undocumented fill (if encountered), and other deleterious material. Previous developments have occurred at this site. As a result, remnants of existing foundations are anticipated Considering the historic past-uses of the site, there may be additional buried concrete remnants, areas of deeper fills, or other unobserved features present below the ground surface. If encountered, these materials should be removed and replaced with properly compacted structural fill. Additional recommendations specific to the site conditions encountered may be provided at the time of construction. The project budget should include additional cost associated with the removal and replacement of additional fill material.

If encountered, existing fill materials should be considered undocumented/non-engineered and unsuitable for support of structures and improvements in the present condition. The term undocumented fill refers to fill placed without engineering control and documentation. Such materials generated from clearing operations should be removed and disposed of in non-structural areas or at a legal landfill. Fill soils may be left in place where documentation can be provided showing that the soils were engineered. Findings of our study indicate that the soils encountered in our exploratory test pits generally should be suitable for use as structural fill and backfill material for the project. Soils excavated in areas of proposed project improvements may be re-used as structural fill and backfill provided they conform to recommendations provided in Section 8.1.3.

After the removals described above have been made, the exposed native soils should be scarified to approximately 6 inches, moisture-conditioned to approximately optimum moisture content, and compacted to 95 percent or more relative compaction, as evaluated by ASTM International (ASTM) Standard D1557. The project's geotechnical consultant should observe excavation bottoms and areas to receive fill at the time of grading to assess the suitability of the exposed material and to evaluate if removals down to more competent soils are needed.

Surface preparations should extend 5 feet or more beyond the exterior edges of planned structure foundations and 2 feet or more beyond planned exterior concrete flatwork, pavement areas, and retaining/screen walls, where practicable.

Based on the density/consistency of the existing native soils at the site, some shrinkage should be anticipated when these soils are excavated, processed, and compacted. For

planning purposes, an estimated shrinkage factor of approximately 20 percent may be used for on-site soils encountered in the upper 5 feet.

It is anticipated that the existing grade-control structure may be incorporated into the structure that will create the standing wave. Placement of new foundations, slabs, pavement, and/or exterior flatwork on the existing foundation in the river will result in additional loading to the existing foundation, which could result in additional compression of the subgrade materials or movement of the existing foundation. Therefore, if the existing foundation is left in place in the current state, it would provide a risk to the owner of settlement and/or distress of those elements supported on the existing foundation, as well as elements downstream of the existing foundation. This risk cannot be eliminated without removal and replacement of the existing foundation. It should be noted that the risks described above do not take into account potential environmental concerns relating to the existing foundation.

The exposed subgrade materials should be medium dense to very dense and unyielding prior to fill placement. Proof-rolling of subgrade should be performed following the remedial grading and prior to fill placement. The extent of and depths of removal should be evaluated by our representative during the excavation work based on observation of the soils exposed. Additional excavations may be recommended at the time of construction to remove debris (if encountered) within the fill.

The geotechnical consultant should be retained to observe the remedial excavations, and the elevations of the excavation bottoms should be surveyed by the project civil engineer.

Cobbles and boulders were observed on the ground surface at the project site and encountered in our test pits. Accordingly, rock excavation techniques, including rock chipping, should be anticipated. Additionally, any on-site soils to be reused as structural fill will likely need to be screened to remove over-sized materials, including cobbles and boulders.

8.1.2 Subgrade Stabilization

As previously indicated, moist to wet surficial soils and relatively shallow groundwater levels were noted at the site during our field activities. Due to these moist to wet subgrade conditions, pumping subgrade should be anticipated during excavation and earthwork operations. Subgrade stabilization will be needed where pumping subgrade conditions are encountered. Pumping conditions may occur where excavations extend near to or below groundwater levels and where moisture content of in-situ soils is relatively high.

Stabilization methods should be provided by the grading contractor, as needed, and may include the use of a geogrid, such as Tensar TX160, or a woven geotextile fabric, such as Mirafi 600X, placed on unstable subgrade and overlain by 12 inches of crushed rock (Untreated Base Course). Pushing oversized angular rock, up to approximately 6 inches in nominal diameter, into exposed unstable subgrade soils may also be an appropriate stabilization alternative. The volume of rock needed will vary based on factors including the moisture content of the native soil, soil type, depth to groundwater, and total affected area. Placement of angular rock should continue until the area exhibits a relatively non-yielding behavior as observed or tested by the geotechnical consultant.

If conditions are observed that indicate additional stabilization efforts may be needed (e.g., excavations extending below groundwater), a combination of over-excavation, rock fill, and geogrid placement should be considered. Dewatering and use of relatively light or tracked earthwork equipment may also be needed. The geotechnical consultant/engineer during construction should evaluate proposed subgrade stabilization methods prior to their implementation.

8.1.3 Structural Fill and Backfill

The following sections include recommendations regarding soil suitability, placement, and compaction of structural fill and backfill.

8.1.3.1 Soil Suitability

Based on the findings of our subsurface evaluation and laboratory test results, the soils encountered during our exploration below the upper organic-rich soils should generally be suitable for use as structural fill and backfill material. The excavated on-site soils may be used as structural fill and backfill provided they comply with the recommendations presented in this section.

Structural fill and backfill soil should not contain organic matter, debris, other deleterious matter, or rocks or hard chunks larger than approximately 6 inches in nominal diameter. These soils should have a low solubility potential of 1.0 percent or less, as evaluated by SM2540C at an extraction ratio of 1:5 (soil to water) and corrected for dilution, and a very low to low expansion potential/plasticity index (Expansion Index, EI, less than 50, as evaluated by ASTM D4829; or Plasticity Index, PI, less than 15, as evaluated by ASTM D4318).

8.1.3.2 Placement and Compaction

Soils used as structural fill and backfill should be moisture-conditioned to approximately optimum moisture content and placed and compacted in uniform horizontal lifts to a relative compaction of 95 percent, as evaluated by the ASTM D1557. The optimal lift thickness of fill will depend on the type of soil and compaction equipment used, but should generally not exceed approximately 8 inches in loose thickness. Placement and compaction of structural fill should be performed in accordance with applicable building codes.

Structural fill should extend to competent native soils, consisting of medium dense to very dense granular soils or stiff to hard fine-grained soils.

Earthwork operations should be observed and compaction of structural fill and backfill materials should be tested by the project's geotechnical consultant. Typically, one field test should be performed per lift for each approximately 2,500 square feet of fill placement in structural areas. Additional field tests may also be performed in structural and non-structural areas at the discretion of the geotechnical consultant.

Due to the relatively shallow groundwater, use of controlled low-strength material (CLSM) should be considered in lieu of compacted fill for areas with low tolerances for surface settlements, for excavations that extend below the groundwater table, or in areas with difficult access for compaction equipment. CLSM should be placed in lifts of 5 feet or less with a 24-hour or more curing period between each lift.

8.1.4 Import Soil

Import soil should consist of coarse-grained material (50 percent or more retained on the No. 200 sieve). Import soil should have a low solubility potential of 1.0 percent or less, as evaluated by SM2540C at an extraction ratio of 1:5 (soil to water) and corrected for dilution, a low sulfate content (less than 0.1 percent), and a very low to low expansion potential/plasticity index (Expansion Index, EI, less than 50, as evaluated by ASTM D4829; or Plasticity Index, PI, less than 15, as evaluated by ASTM D4318). Import soil should not contain organic matter, debris, other deleterious matter, or rocks or hard chunks larger than approximately 4 inches in nominal diameter. We further recommend that proposed import material be evaluated by the project's geotechnical consultant at the borrow source for its suitability prior to being imported to the project site. Import soil should be moisture-conditioned, placed, and compacted in accordance with the recommendations set forth in the previous section.

8.1.5 Excavations and Dewatering

Excavations will encounter loose and/or wet conditions. Accordingly, dewatering techniques will be needed. The design, construction, and implementation of construction dewatering are the responsibility of the contractor, and should be performed by a qualified expert. Upon request, Ninyo & Moore can perform in-place hydro-geologic testing and/or full-scale pump testing at this site to further evaluate these parameters. Dewatering should be performed with care so as not to cause harmful settlement of nearby foundations, utilities, pavements, or other improvements. Discharge of water from the excavations to storm water collection systems will require a construction dewatering permit. Groundwater characterization will be needed as part of the permit application.

Where encountered, drying or over-excavation of any wet or saturated soils is recommended. If the subgrade becomes disturbed, it should be compacted or removed and replaced before placing additional backfill material. Groundwater should be anticipated in utility trenches, elevator pits, or other excavations. Structures and improvements should be properly waterproofed and designed to resist buoyancy forces due to shallow groundwater. Groundwater levels will fluctuate due to seasonal variations associated with precipitation, irrigation, groundwater withdrawal or injection, and other factors.

8.1.6 Temporary Excavations and Shoring

Temporary slope configurations should be consistent with the requirements provided in the referenced Occupational Safety and Health Administration (OSHA) regulations (OSHA, 2024) document. Temporary slope surfaces should be kept moist to retard raveling and sloughing. Water should not be allowed to flow over the top of excavations in an uncontrolled manner. Stockpiled material and/or equipment should be kept back from the top of excavations a distance equivalent to the depth of the excavation or more. Workers should be protected from falling debris, sloughing, and raveling in accordance with OSHA regulations (OSHA, 2024). Temporary excavations should be observed by the project's geotechnical consultant so that appropriate additional recommendations may be provided based on the actual field conditions. Temporary excavations are time sensitive and failures are possible.

Shoring systems should be designed for the contractor by a professional engineer registered in the State of Utah. In addition to lateral earth pressures, shoring design should include surcharge loads exerted by adjacent existing roadways, structure foundations, construction equipment, construction traffic, material stockpiles, etc. located within a 1:1 (H:V) plane extending upward from the toe of the excavation. Shoring design should discuss the anticipated top deflection of the shoring components. Depending on the anticipated top

deflection of the shoring components, settlement of buildings, buried utility lines, exterior flatwork, and other improvements located within close proximity (approximately 10 feet or more) of the temporary shoring should be considered.

8.2 Utility Installation

The contractor should take particular care to achieve and maintain adequate compaction of the backfill soils around manholes, valve risers, and other vertical pipeline elements where settlements are commonly observed. Use of controlled low strength material (CLSM) or a similar material should be considered in lieu of compacted soil backfill in areas with low tolerances for surface settlement. This may also reduce permeability of the utility trench backfill.

Pipe bedding materials, placement, and compaction should meet the specifications of the pipe manufacturer and applicable municipal standards. Materials proposed for use as pipe bedding should be tested for suitability prior to use.

Special care should be exercised to avoid damaging the pipe or other structures during the compaction of the backfill. In addition, the underside (or haunches) of the buried pipe should be supported on bedding material that is compacted as described above. This may need to be performed with placement by hand or small-scale compaction equipment.

Surface drainage should be designed to divert surface water away from utility trenches. Where topography, site constraints, or other factors limit or preclude adequate surface drainage, granular bedding materials should be surrounded by a non-woven geotextile fabric (e.g., TenCate Mirafi® 140N or equivalent) to reduce the migration of fines into bedding material, which can result in severe, isolated settlements.

Development of site grading plans should consider subsurface transfer of water in utility trench backfill and the pipe bedding materials. Sandy pipe bedding materials can function as efficient conduits that convey natural and applied waters in the subsurface. Cut-off walls in utility trenches or other water-stopping measures should be implemented to reduce the rates and volumes of water transmitted along utility alignments and toward buildings, pavements, and other structures where excessive wetting of the underlying soils will be damaging. Incorporation of water cut-offs and/or outlet mechanisms for saturated bedding materials into development plans could be beneficial to the project. These measures also will reduce the risk of settlement due to loss of fine-grained backfill soils into the bedding material.

8.3 Structure Foundations

We anticipate the structures will be supported on conventional spread foundations or mat foundations. The allowable bearing capacities, which were developed considering a factor of safety of 2.5, may be increased by one-third for short duration loads, such as wind or seismic. Additionally, shallow foundations should have an embedment depth of 30 inches or more below adjacent finished grade (for frost protection), and a width of 12 inches or more. Foundations in the river should be evaluated for scour and embedded appropriately. Seismic parameters for design of structures at the site are provided in Table 2 in Section 5.3.

Foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in design of the structures.

8.3.1 Conventional Spread Footings

Lightly loaded structures may be supported by conventional spread foundations utilizing a net allowable bearing capacity of 1,200 pounds per square foot (psf). Spread footings should be founded on medium dense to very dense native granular soils, on stiff to hard native fine-grained soils, or on properly placed and compacted structural fill (reworked soils or import soils). Structural fill should extend to competent native soils, as described above.

From a geotechnical standpoint, we recommend that footings be reinforced with two No. 4 or larger reinforcing bars, one placed near the top and one near the bottom of the footings. Additional reinforcement may be recommended by the structural engineer. Lateral resistance for footings is presented in Section 8.5.

8.3.2 Mat Foundations

Mat foundations should be established on at least 6 inches of Untreated Base Course placed on exposed native subgrade soils scarified and re-compacted to at least 95 percent as evaluated by ASTM D1557, or on adequately placed and compacted structural fill (reworked soils or import soils). Structural fill should extend to competent native soils. Mat foundations established as recommended above may be designed for a net allowable bearing capacity of 1,800 psf.

Bending of the mat foundation from imposed foundation loads and resulting stresses within the mat foundation should be estimated using the subgrade modulus. The recommended vertical modulus of subgrade reaction, kv1, for use in design of a flexible mat foundation is

100 pounds per cubic inch (pci) applicable for a 12-inch-square loaded area. For actual mat foundation sizes, the subgrade modulus should be reduced using the following formula:

$$Kv = Kv1(B+1)/2B \quad \text{(Equation 1)}$$

Where, for a uniformly loaded mat:

Kv = vertical modulus of subgrade reaction for actual mat foundation width

Kv1 = vertical modulus of subgrade reaction for 1-foot-square loaded area in pci

B = mat foundation width in feet

For point loads on the mat, the vertical modulus of subgrade reaction need not be reduced using the formula above for the entire width of the mat or slab but rather some equivalent width which is related to the flexural stiffness of the mat relative to the underlying soil subgrade stiffness and may be estimated using the following formula:

$$B' = 14T \quad \text{(Equation 2)}$$

Where:

B' = equivalent foundation width in feet to be used in Equation 1 for B

T = thickness of mat in feet

8.4 Settlement

Based on our evaluation of spread footing bearing capacity, we anticipate that static settlement of foundations will be on the order of 1 inch or less. We estimate static footing differential settlement of about ½-inch over a horizontal span of about 40 feet.

8.5 Lateral Earth Pressures

Lateral earth pressures may be estimated using the values provided below. These values are based on our observation of the on-site soils, considered no groundwater, and assume that the ground surface is horizontal for a distance of 10 feet, or three times the height generating the passive pressure, whichever is more. These values also assume that retaining walls will have a height of approximately 6 feet or less.

For passive resistance to lateral loads, we recommend a passive lateral earth pressure of 330 psf per foot of depth up to a value of 1,500 psf. We recommend that the upper 12 inches of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance. The passive lateral earth pressure may be increased by one-third when considering loads of short duration such as wind or seismic forces. For active and at-rest lateral earth pressures, we

recommend equivalent fluid pressures of 36 pcf and 54 pcf, respectively. In addition, for seismic active lateral earth pressures, an additional equivalent fluid pressure of 17 pcf should be added to the static active equivalent fluid pressure provided herein.

For frictional resistance to lateral loads, we recommend that a coefficient of friction of 0.57 be used between soil/soil contacts. A coefficient of friction of 0.38 may be used between soil and concrete contacts. Passive and frictional resistances may be used in combination, provided the passive resistance does not exceed one-half of the total allowable resistance.

Measures should be taken so that hydrostatic pressure does not build up behind retaining walls. Drainage measures should include free-draining granular backfill material and perforated drain pipes, or weep holes lined with polyvinyl chloride (PVC) pipe. Drain pipes should outlet away from structures and retaining walls should be waterproofed in accordance with the recommendations of a qualified civil engineer.

8.6 Exterior Concrete Flatwork

Ground-supported concrete flatwork may be subject to soil-related movements resulting from frost heave/settlement. Thus, where these types of elements abut rigid building foundations or isolated/suspended structures, differential movements should be anticipated. We recommend that flexible joints be provided in this situation to allow for differential movement.

Exterior concrete flatwork, such as walkways, should be founded on 6 inches of Untreated Base Course overlying medium dense to very dense native granular soils, stiff to hard native fine-grained soils, or properly placed and compacted structural fill (reworked soils or import soils). Structural fill should extend to competent native soils, as described above. Untreated Base Course should be compacted to 95 percent or more relative compaction, as evaluated by ASTM D1557.

To reduce the potential for shrinkage cracks, the flatwork should be constructed with control joints spaced approximately 5 feet apart for walkways and approximately 10 feet on-center each way for larger slabs. Crack control joint spacing should be in accordance with recommendations of a qualified structural engineer. Reduced joint spacing may be recommended by the structural engineer.

Formation of shrinkage cracks in concrete slabs, and other cracks due to minor soil movement, may be further reduced by utilizing steel reinforcement, such as welded wire mesh. However, due to the inherent difficulty in positioning welded wire mesh in the middle of concrete flatwork, other crack control methods should be considered, such as placement in the concrete of No. 3 steel

reinforcing bars at approximately 24 inches on-center each way. Reinforcement of the flatwork should be placed at approximately mid-height in the concrete utilizing “chairs.”

Exterior concrete flatwork, curbs, and gutters should be constructed in accordance with the recommendations of the project’s civil or structural engineer and governing agency requirements. Recommendations regarding concrete utilized in construction of proposed improvements are provided in Section 8.9.

8.7 Construction in Cold or Wet Weather

During construction, the site should be graded such that surface water can drain readily away from the structure and improvement areas. It is important to avoid ponding of water in or near excavations. Water that accumulates in excavations should be promptly pumped out or otherwise removed and these areas should be allowed to dry out before resuming construction. Berms, ditches, and similar means may be used to decrease stormwater entering the work area and to efficiently convey it to appropriate outlets off site.

Earthwork activities undertaken during the cold weather season may be difficult and should be done by an experienced contractor. Fill should not be placed on top of frozen soils. The frozen soils should be removed prior to placement of new engineered fill or other construction material. Frozen soil should not be used as structural fill or backfill. The frozen soil may be reused (provided it meets the selection criteria) once it has thawed completely. In addition, compaction of the soils may be more difficult due to the viscosity change in water at lower temperatures.

If construction proceeds during cold weather, foundations, slabs, or other concrete elements should not be placed on frozen subgrade soil. Frozen soil should either be removed from beneath concrete elements, or thawed and re-compacted. To limit the potential for soil freezing, the time between excavation and construction should be minimized. Blankets, straw, soil cover, or heating may be used to decrease the potential of soil freezing.

8.8 Frost Heave

Site soils are susceptible to frost heave if allowed to become saturated and exposed to freezing temperatures and repeated freeze/thaw cycling. The formation of ice in the underlying soils can result in 2 or more inches of heave of pavements, flatwork, and other hardscaping in sustained cold weather. A portion of this movement may be recovered when the soils thaw, but due to loss of soil density, some degree of displacement will remain. Frost heave of hardscaping could also result in areas of fine-grained subgrade soils.

In areas where hardscape movements are a design concern, replacement of the subgrade soils with 3 or more feet of clean, coarse sand or gravel, or supporting the element on foundations similar to the building, or spanning over a void should be considered. Detailed recommendations in this regard can be provided upon request.

8.9 Concrete and Corrosion Considerations

The corrosion potential of on-site soils to concrete and metal was evaluated in the laboratory using representative samples obtained from the exploratory test pits. Results of these tests are presented in Appendix C. Recommendations regarding concrete to be utilized in construction of proposed improvements and for metal in contact with on-site soils are provided in the following sections.

8.9.1 Concrete

Chemical tests performed on selected samples of on-site soils indicated a sulfate content of 34 mg/kg (ppm). Based on review of the referenced International Building Code (ICC, 2018) and American Concrete Institute manual (ACI, 2019), the tested soils are considered to have a sulfate exposure class of S0. Additionally, concrete in contact with on-site soil is anticipated to have a freeze/thaw exposure class of F2. Accordingly, we recommend that concrete in contact with on-site soils, along with subsurface walls up to 12 inches above finished grade have a design compressive strength of 4,500 psi or more, a water-cement ratio of 0.45 percent or less by weight, contain Type II cement, and contain 5.5 to 7.5 percent air-entrainment, as specified by ACI 318-19 (ACI, 2019). It is recommended that reinforcing bars in cast-against-grade concrete be covered by approximately 3 inches or more of concrete. Concrete should be placed with an approximate 4-inch slump and good densification procedures should be used during placement to reduce the potential for honeycombing. Concrete samples should be obtained, as indicated by ACI manual Section 318 (ACI, 2019), and the slump should be tested at the site by the project's geotechnical consultant. Structural concrete should be placed in accordance with American Concrete Institute (ACI, 2019) and project specifications.

8.9.2 Metal in Contact with On-Site Soils

Chemical tests performed on selected samples of on-site soils indicated low to moderate corrosion potential to normal grade steel. Accordingly, Ninyo & Moore recommends that corrosion reduction methods be implemented for this project for metal in contact with soil. These corrosion reduction methods may include utilization of protective coatings, pipe sleeving, and/or appropriate cathodic protection as recommended by a qualified corrosion

engineer. Where permitted by jurisdictional building codes, the use of plastic pipes for buried utilities should also be considered.

8.10 Observation and Testing

The geotechnical consultant should perform appropriate observation and testing services during fill placement, grading, and construction operations. These services should include observation of removal of soft, loose, undocumented fill, or otherwise unsuitable soils, evaluation of subgrade conditions where soil removals are performed, and performance of observation and testing services during placement and compaction of structural fill and backfill soils. The geotechnical consultant should also perform observation and testing services during placement of concrete, mortar, grout, asphalt concrete, and steel reinforcement.

The recommendations provided in this report are based on the assumption that Ninyo & Moore will provide geotechnical observation, testing, and inspection services during grading and construction. In the event that it is decided not to utilize the services of Ninyo & Moore during construction, we request that the selected consultant provide the client with a letter (with a copy sent to Ninyo & Moore) indicating that they fully understand Ninyo & Moore's recommendations, and that they are in full agreement with the design parameters and recommendations contained in this report.

8.11 Plan Review

The recommendations presented in this report are based on preliminary design information for the proposed project, as provided to Ninyo & Moore, and on the findings of our geotechnical evaluation. When finished, project plans and specifications should be reviewed by the geotechnical consultant prior to submitting the plans and specifications for bid. Additional field exploration and laboratory testing may be needed upon review of the project design plans.

8.12 Pre-Construction Meeting

We recommend that a pre-construction meeting be held. The owner or the owner's representative, the architect, the civil engineer, the contractor, and the geotechnical consultant should be in attendance to discuss the plans and the project.

9 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty,

expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request. The conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. Changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

10 REFERENCES

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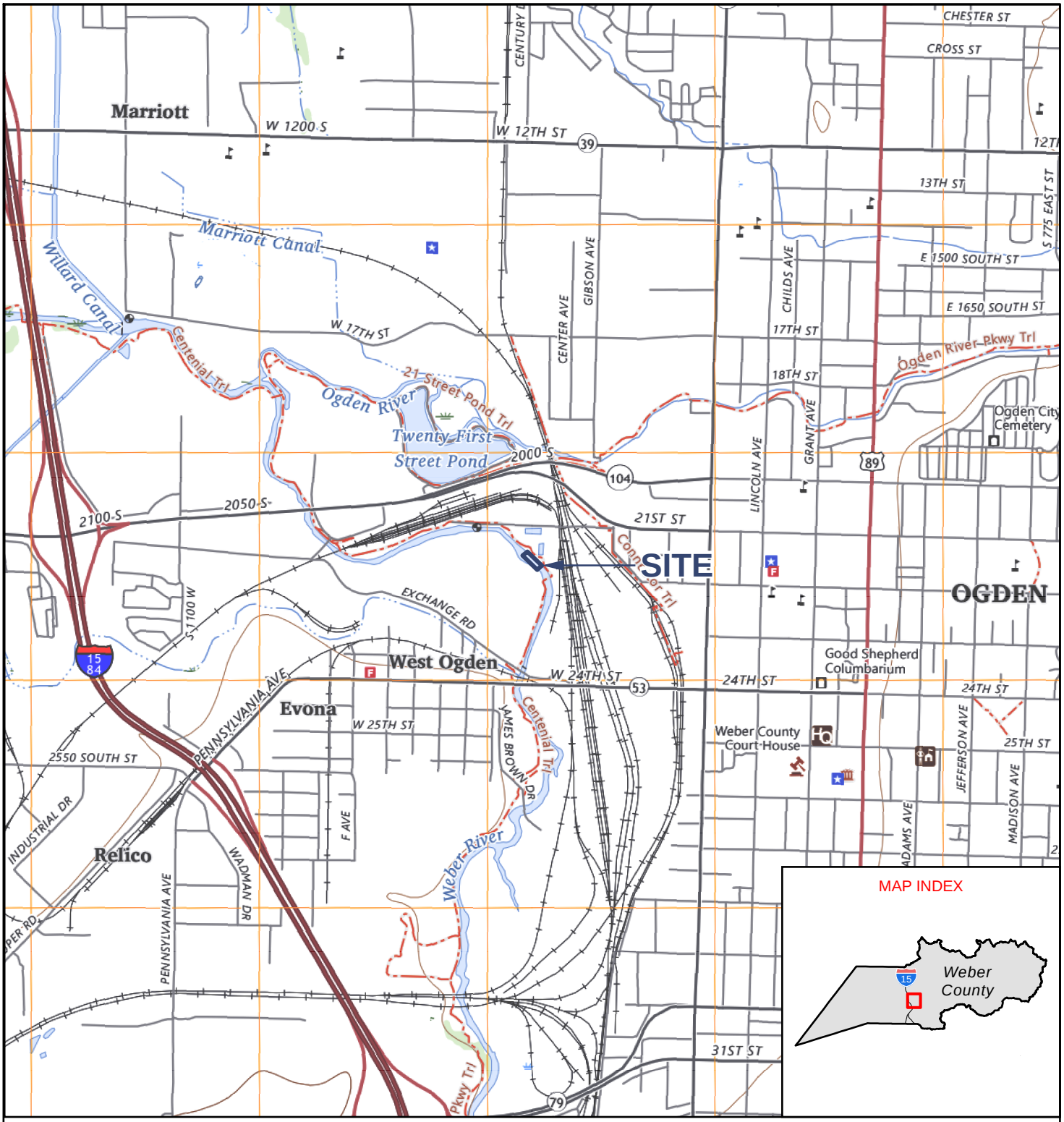
FIGURES



P800429001.aprx 1/7/2025 JDL

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: USGS, 2025

N

FEET

0 2,000 4,000

FIGURE 1

SITE LOCATION

OGDEN BUSINESS EXCHANGE WAVE
NEAR STOCKMAN WAY AND EXCHANGE ROAD
OGDEN, UTAH

800429001 | 1/25

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

LEGEND

TP-2 (TD=10.0) TEST PIT
TD=TOTAL DEPTH IN FEET

SITE BOUNDARY

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: GOOGLE EARTH, 2025

N

FEET
0 100 200

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FIGURE 2

EXPLORATION LOCATIONS

OGDEN BUSINESS EXCHANGE WAVE
NEAR STOCKMAN WAY AND EXCHANGE ROAD
OGDEN, UTAH

800429001 | 1/25

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APPENDIX A

Test Pit Logs

APPENDIX A

TEST PIT LOGS

Field Procedure for the Collection of Disturbed Soil Samples
Disturbed soil samples were obtained in the field using the following methods.

Bulk Soil Samples
Bulk samples of representative earth materials were obtained from the exploratory test pits. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler
Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1-3/8 inches. In general accordance with ASTM D1586, the sampler was driven into the ground with a 140-pound hammer free-falling from a height of 30 inches and the number of blows recorded on the test pit logs as an index to the relative resistance of the materials sampled. Soil samples were observed and removed from the sampler, bagged, sealed, and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples
Relatively undisturbed soil samples were obtained in the field using a modified split barrel drive sampler. The sampler, with an external diameter of 3.0 inches, was lined with 1-inch-long, thin, brass rings with an inside diameter of 2.4 inches. In general accordance with ASTM D3550, the sampler was driven into the ground with a 140-pound hammer free-falling from a height of 30 inches and the number of blows recorded on the test pit logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

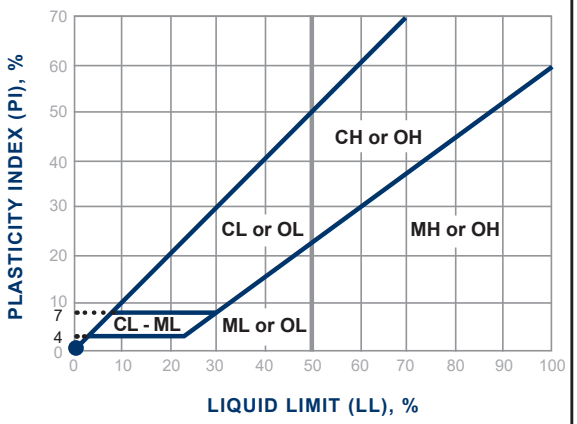
Soil Classification Chart Per ASTM D 2488

Primary Divisions			Secondary Divisions	
			Group Symbol	Group Name
COARSE-GRAINED SOILS more than 50% retained on No. 4 sieve	**GRAVEL** more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	**SILT and CLAY** liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

Consistency - Fine-Grained Soil

Consis-tency	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

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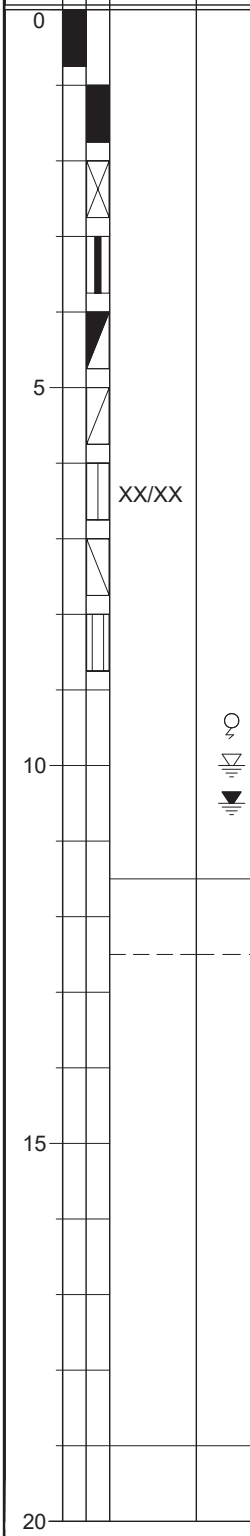
USCS METHOD OF SOIL CLASSIFICATION

BORING LOG EXPLANATION SHEET



Bulk sample.

Modified split-barrel drive sampler.

No recovery with modified split-barrel drive sampler.

Sample retained by others.

Standard Penetration Test (SPT).

No recovery with a SPT.

Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.

No recovery with Shelby tube sampler.

Continuous Push Sample.

Seepage.

Groundwater encountered during drilling.

Groundwater measured after drilling.

SM

MAJOR MATERIAL TYPE (SOIL):

Solid line denotes unit change.

CL

Dashed line denotes material change.

Attitudes: Strike/Dip
b: Bedding
c: Contact
j: Joint
f: Fracture
F: Fault
cs: Clay Seam
s: Shear
bss: Basal Slide Surface
sf: Shear Fracture
sz: Shear Zone
sbs: Shear Bedding Surface

The total depth line is a solid line that is drawn at the bottom of the boring.

DATE DRILLED 11/11/24 TEST PIT NO. TP-1

GROUND ELEVATION 4,301' ± (MSL) SHEET 1 OF 1

METHOD OF EXCAVATION CAT 311F L Excavator

DRIVE WEIGHT _____ DROP _____

SAMPLED BY EAS LOGGED BY EAS REVIEWED BY REG/EDE

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0			4.5			SW-SM	NATIVE SOIL: Brown, moist, loose, well-graded SAND with silt; organics throughout.
						GW-GM	Light brown, moist, loose, well-graded GRAVEL with silt and sand.
5							Dense; occasional cobbles.
							With cobbles.
			▽				Wet.
10							Total Depth = 8.5 feet. Groundwater was encountered at a depth of approximately 7.0 feet during excavation. Backfilled on 11/11/24. Notes: Groundwater may rise to a level higher than that measured in test pit due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 11/11/24 TEST PIT NO. TP-2

GROUND ELEVATION 4,300' ± (MSL) SHEET 1 OF 1

METHOD OF EXCAVATION CAT 311F L Excavator

DRIVE WEIGHT _____ DROP _____

SAMPLED BY EAS LOGGED BY EAS REVIEWED BY REG/EDE

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SW-SM	NATIVE SOIL: Dark brown, moist, loose, well-graded SAND with silt. Brown; organics throughout.
5			2.5			GW-GM	Light brown, moist, medium dense, well-graded GRAVEL with silt and sand; occasional cobbles. With cobbles.
10			▽				Wet; occasional boulders. Total Depth = 10.0 feet. Groundwater was encountered at a depth of approximately 9.5 feet during excavation. Backfilled on 11/11/24. Notes: Groundwater may rise to a level higher than that measured in test pit due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

APPENDIX B

Laboratory Test Results

APPENDIX B

LABORATORY TEST RESULTS

Classification

Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D2488. Soil classifications are indicated on the logs of the exploratory test pits in Appendix A.

Gradation Analysis

Gradation analysis tests were performed on selected representative soil samples in general accordance with ASTM D7928, C117, and C136. These test results were utilized in evaluating the soil classifications in accordance with the USCS. The grain-size distribution curves are shown on Figure B-1 and Figure B-2.

Atterberg Limits

Tests were performed on selected representative soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D4318. These test results were utilized to evaluate soil classification in accordance with the USCS. The test results and classifications are shown on Figure B-3.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY

Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	USCS
●	TP-1	0.0-1.2	NP	NP	NP	0.08	0.16	0.31	4.0	1.1	9.5	SW-SM

Material Percent by Weight		
Gravel	Sand	Fines
11.8	78.7	9.5

Soil Type
Well-graded SAND with silt

Moisture Content
4.5%

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D7928, C136, and C117

"NP" INDICATES NON-PLASTIC

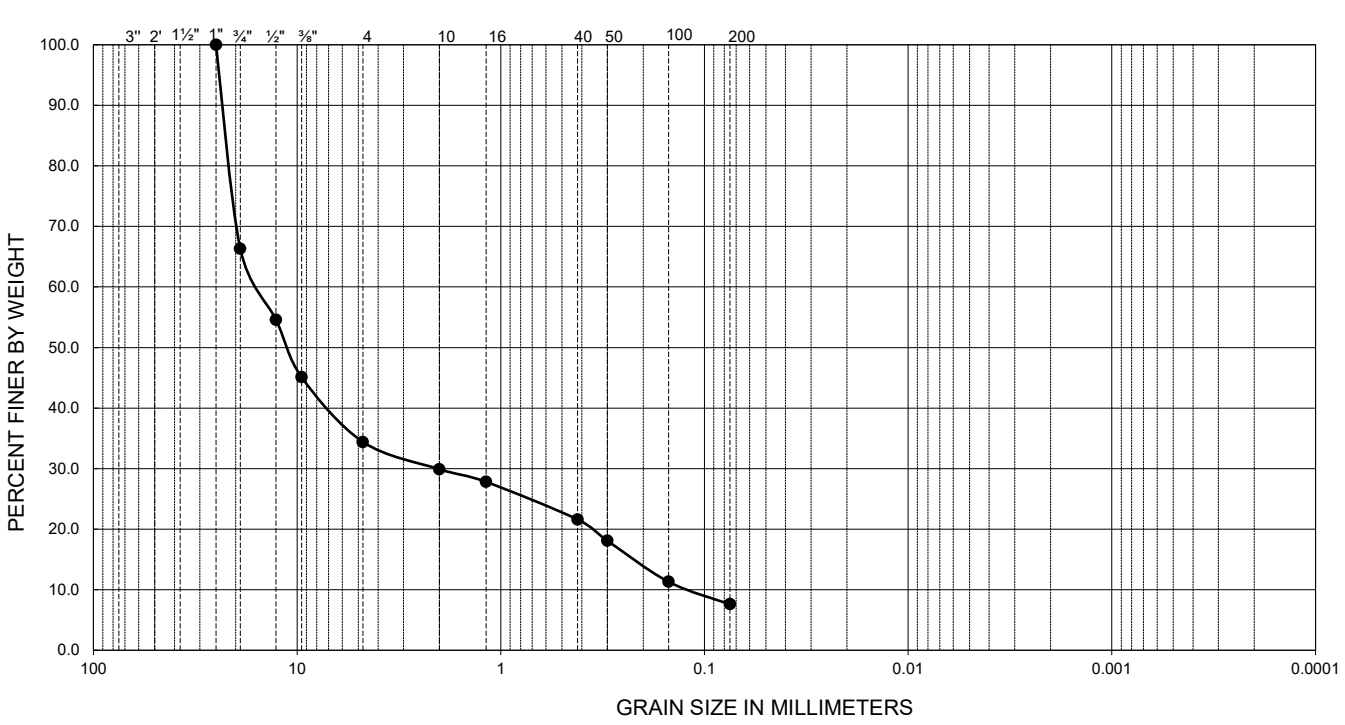
FIGURE B-1

GRADATION TEST RESULTS

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

OGDEN BUSINESS EXCHANGE WAVE
NEAR STOCKMAN WAY AND EXCHANGE ROAD, OGDEN, UTAH

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	USCS
●	TP-2	4.0-5.0	NP	NP	NP	0.12	2.04	15.30	130.1	2.3	7.6	GW-GM

Material Percent by Weight			Soil Type
Gravel	Sand	Fines	Well-graded GRAVEL with silt and sand
65.6	26.8	7.6	
			Moisture Content
			2.5%

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D7928, C136, and C117

"NP" INDICATES NON-PLASTIC

FIGURE B-2

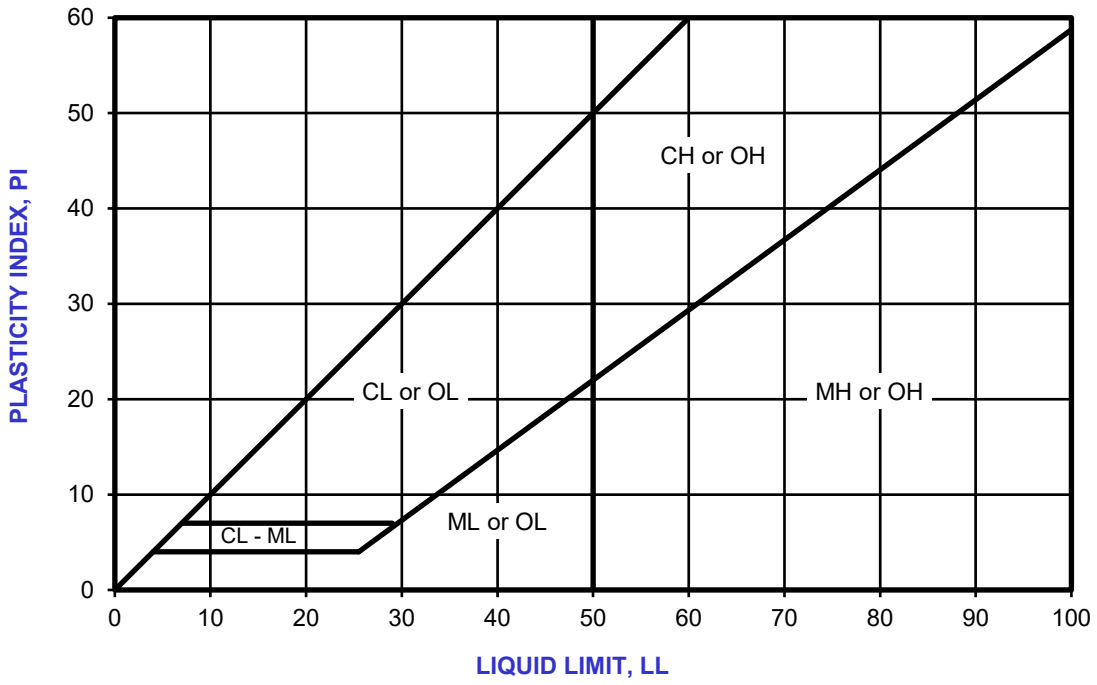
GRADATION TEST RESULTS

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

OGDEN BUSINESS EXCHANGE WAVE
NEAR STOCKMAN WAY AND EXCHANGE ROAD, OGDEN, UTAH

SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
	TP-1	0.0-1.2	NP	NP	NP	ML	SW-SM
	TP-2	4.0-5.0	NP	NP	NP	ML	GW-GM

NP - INDICATES NON-PLASTIC



PERFORMED IN GENERAL ACCORDANCE WITH D4318

FIGURE B-3

ATTERBERG LIMITS TEST RESULTS

OGDEN BUSINESS EXCHANGE WAVE
NEAR STOCKMAN WAY AND EXCHANGE ROAD, UTAH

800429001 | 1/25

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

APPENDIX C

Chemical Test Results

APPENDIX C

CHEMICAL TEST RESULTS

The results of the chemical tests are provided in this appendix.

Chemtech-Ford Laboratories
Serving the Intermountain West Since 1953

9632 South 500 West
Sandy, UT 84070
O:(801) 262-7299 F: (866) 792-0093
www.ChemtechFord.com

Certificate of Analysis

Ninyo and Moore
Edgar Salinas
871 Robinson Drive
North Salt Lake, UT 84054

PO#: **800429001**
Receipt: **12/5/24 16:04 @ 22.7** °C
Date Reported: 12/18/2024
Project Name: **800429001**

Sample ID: **TP-2 @ 0.0-1.0**

Matrix: **Solid**
Lab ID: **24L0557-01**
Date Sampled: **11/11/24 8:30**
Sampled By: **Edgar Salinas**

	Result	Units	Minimum Reporting Limit	Method	Preparation Date/Time	Analysis Date/Time	Flag(s)
Inorganic							
Chloride, Soluble (IC)	36	mg/kg dry	10	EPA 300.0	12/6/24	12/10/24	
pH	7.4	pH Units	0.1	EPA 9045D	12/6/24 13:53	12/6/24 18:00	
Resistivity	31.0	ohm m	1.0	SSSA 10-3.3	12/6/24	12/6/24	
Sulfate, Soluble (IC)	34	mg/kg dry	10	EPA 300.0	12/10/24	12/10/24	
Total Dissolved Solids, Soluble	2690	mg/kg dry	500	SM 2540 C	12/6/24	12/6/24	
Total Solids	96.7	%	0.1	CTF8000	12/6/24	12/6/24	SPH

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Sandy, UT 84070
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www.ChemtechFord.com

Certificate of Analysis

Ninyo and Moore
Edgar Salinas
871 Robinson Drive
North Salt Lake, UT 84054

PO#: **800429001**
Receipt: **12/5/24 16:04 @ 22.7** °C
Date Reported: 12/18/2024
Project Name: **800429001**

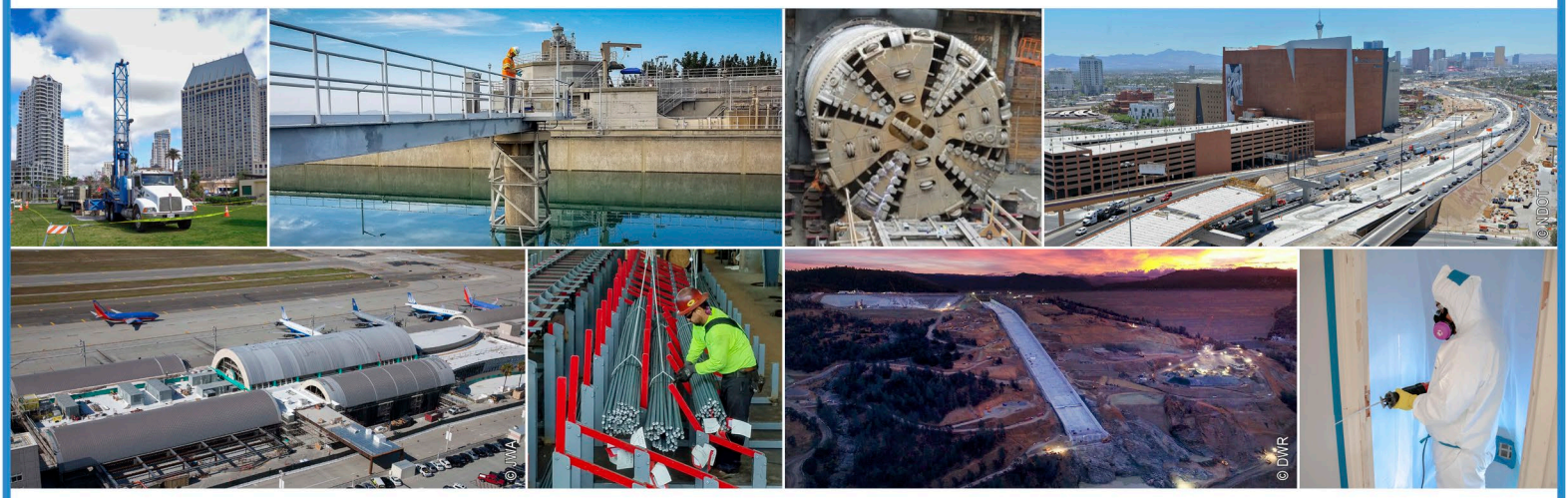
Report Footnotes

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit (MRL).
1 mg/L = one milligram per liter or 1 mg/kg = one milligram per kilogram = 1 part per million.
1 ug/L = one microgram per liter or 1 ug/kg = one microgram per kilogram = 1 part per billion.
1 ng/L = one nanogram per liter or 1 ng/kg = one nanogram per kilogram = 1 part per trillion.
On calculated parameters, there may be a slight difference between summing the rounded values shown on the report vs the unrounded values used in the calculation.

Flag Descriptions

SPH = Sample submitted past method specified holding time.



871 Robinson Drive, North Salt Lake, UT 84054 | p. 801.973.2500

ARIZONA | CALIFORNIA | COLORADO | NEVADA | TEXAS | UTAH

ninyoandmoore.com

Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

APPENDIX C Union Pacific Agreement

CONTRACTOR'S RIGHT OF ENTRY AGREEMENT
WITH UNION PACIFIC FOR PROJECT 0803248

IMPORTANT CORRESPONDANCE EMAIL FOR SCHEDULING

Project: 0803248

To the Contractor:

Before Union Pacific Railroad Company can permit you to perform work on its right of way, it will be necessary to return an original of the enclosed Contractor Right of Entry Agreement as follows:

1. Fill in the complete legal name of the contractor in the space provided on Page 1 of the Contractor's Right of Entry Agreement.

2. Fill in the name of the contractor in the space provided in the signature block at the end of the Contractor's Right of Entry Agreement. If the contractor is a corporation, the person signing on its behalf must be an elected corporate officer.

3. Please execute on your behalf and return the document via EMAIL.

4. Payment, **with Project No. 0803248 referenced,** to the Union Pacific Railroad Company in the amount of **One Thousand Dollars ($1,000.00)**. If you require formal billing, you may consider this letter as a formal bill. In compliance with the Internal Revenue Service's new policy regarding their Form 1099, I certify that 946001323is the Railroad Company's correct Federal Taxpayer Identification Number and that UNION PACIFIC RAILROAD COMPANY is doing business as a corporation.

Send ACH payments to:

Name: Bank of America, Dallas, TX
Account = 3752021457
Routing = 1110-0001-2
Reference = Project Number **0803248**

Send Check to:

Union Pacific Railroad Company
12567 Collection Center Drive
Chicago, IL 60693
Reference = Project Number **0803248**

UP does not currently offer a credit card option.

After approval of the Contractor Right of Entry Agreement, one fully-executed counterpart of the Agreement will be returned to you via email. In no event should you begin work until you have received your counterpart of the fully-executed Agreement.

Sincerely,

Kris Jones
Manager II Real Estate - Contracts

DRAINCRE.DOC 920301
Form Approved, AVP-Law

Project No. 0803248

Rev 081806

CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

THIS AGREEMENT is made and entered into as of the _____ day of _____, 20 ___, by and between UNION PACIFIC RAILROAD COMPANY, a Delaware corporation, ("Railroad") and _____, a _____ corporation ("Contractor"), to be addressed at _____.

RECITALS:

The Contractor has been hired by the **OGDEN CITY CORPORATION** for the construction of a drainage facility (the "work"), with all or a portion of such work to be performed on property of Railroad at Mile Post 993.0, on the Evanston Subdivision at or near Ogden, Weber County, Utah pursuant to a Drainage and Waterway Agreement between Railroad andOGDEN CITY CORPORATION with an effective date of August 28, 2025 at such location as shown on the print marked **Exhibit A** attached hereto and hereby made a part hereof.

Railroad is willing to permit Contractor to perform the work described above at the location describe above subject to the terms and conditions contained in this Agreement.

AGREEMENT:

NOW, THEREFORE, it is mutually agreed by and between the Railroad and Contractor, as follows:

Article I. DEFINITION OF CONTRACTOR.

For purposes of this Agreement, all references in this Agreement to the Contractor shall include Contractor's contractors, subcontractors, officers, agents and employees, and others acting under its or their authority.

Article II. RIGHT GRANTED; PURPOSE.

Railroad hereby grants to Contractor the right, during the term hereinafter stated and upon and subject to each and all of the terms, provisions and conditions herein contained, to enter upon and have ingress to and egress from the property described in the Recitals for the purpose of performing any work described in the Recitals above. The right herein granted to Contractor is limited to those portions of Railroad's property specifically described herein, or as designated by the Railroad Representative named in Article IV.

Article III. TERMS AND CONDITIONS CONTAINED IN EXHIBITS B, C AND D.

The terms and conditions contained in **Exhibit B, C** and **D**, attached hereto, are hereby made a part of this Agreement.

Article IV. **ALL EXPENSES TO BE BORNE BY CONTRACTOR; RAILROAD REPRESENTATIVE.**

A. Contractor shall bear any and all costs and expenses associated with any work performed by Contractor, or any costs or expenses incurred by Railroad relating to this Agreement.

B. Contractor shall coordinate all of its work with the following Railroad representative or his or her duly authorized representative (the "Railroad Representative"):

http://www.up.com/flagging	**Curtis Hill** **Manager I Signal Maintenance** **Phone: 801-626-8207** **Email: clhill2@up.com**

C. Contractor, at its own expense, shall adequately police and supervise all work to be performed by Contractor and shall ensure that such work is performed in a safe manner as set forth in Section 7 of **Exhibit B**. The responsibility of Contractor for safe conduct and adequate policing and supervision of Contractor's work shall not be lessened or otherwise affected by Railroad's approval of plans and specifications involving the work, or by Railroad's collaboration in performance of any work, or by the presence at the work site of a Railroad Representative, or by compliance by Contractor with any requests or recommendations made by Railroad Representative.

Article V. **TERM; TERMINATION.**

A. The grant of right herein made to Contractor shall commence on the date of this Agreement and continue until August 28, 2026, unless sooner terminated as herein provided, or at such time as Contractor has completed its work on Railroad's property, whichever is earlier. Contractor agrees to notify the Railroad Representative in writing when it has completed its work on Railroad's property.

B. This Agreement may be terminated by either party on ten (10) days written notice to the other party.

Article VI. **CERTIFICATE OF INSURANCE.**

A. Before commencing any work, Contractor will provide Railroad with the insurance binders, policies, certificates and/or endorsements set forth in **Exhibit C** of this Agreement.

B. All insurance correspondence, binders, policies, certificates and/or endorsements shall be sent to:

Project No. 0803248
Union Pacific Railroad Company
1400 Douglas Street STOP 1690
Omaha, Nebraska 68179-1690

Article VII. **CHOICE OF FORUM.**

Litigation arising out of or connected with this Agreement may be instituted and maintained in the courts of the States of Nebraska and Utah only, and the parties consent to jurisdiction over their person and over the subject matter of any such litigation, in those courts, and consent to service of process issued by such courts.

Article VIII. DISMISSAL OF CONTRACTOR's EMPLOYEE.

At the request of Railroad, Contractor shall remove from Railroad's property any employee of Contractor who fails to conform to the instructions of the Railroad Representative in connection with the work on Railroad's property, and any right of Contractor shall be suspended until such removal has occurred. Contractor shall indemnify Railroad against any claims arising from the removal of any such employee from Railroad's property.

Article IX. ADMINISTRATIVE FEE.

Upon the execution and delivery of this Agreement, Contractor shall pay to Railroad One Thousand Dollars ($1,000.00) as reimbursement for clerical, administrative and handling expenses in connection with the processing of this Agreement.

Article X. CROSSINGS.

No additional vehicular crossings (including temporary haul roads) or pedestrian crossings over Railroad's trackage shall be installed or used by Contractor without the prior written permission of Railroad.

Article XI. EXPLOSIVES.

Explosives or other highly flammable substances shall not be stored on Railroad's property without the prior written approval of Railroad.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date first herein written.

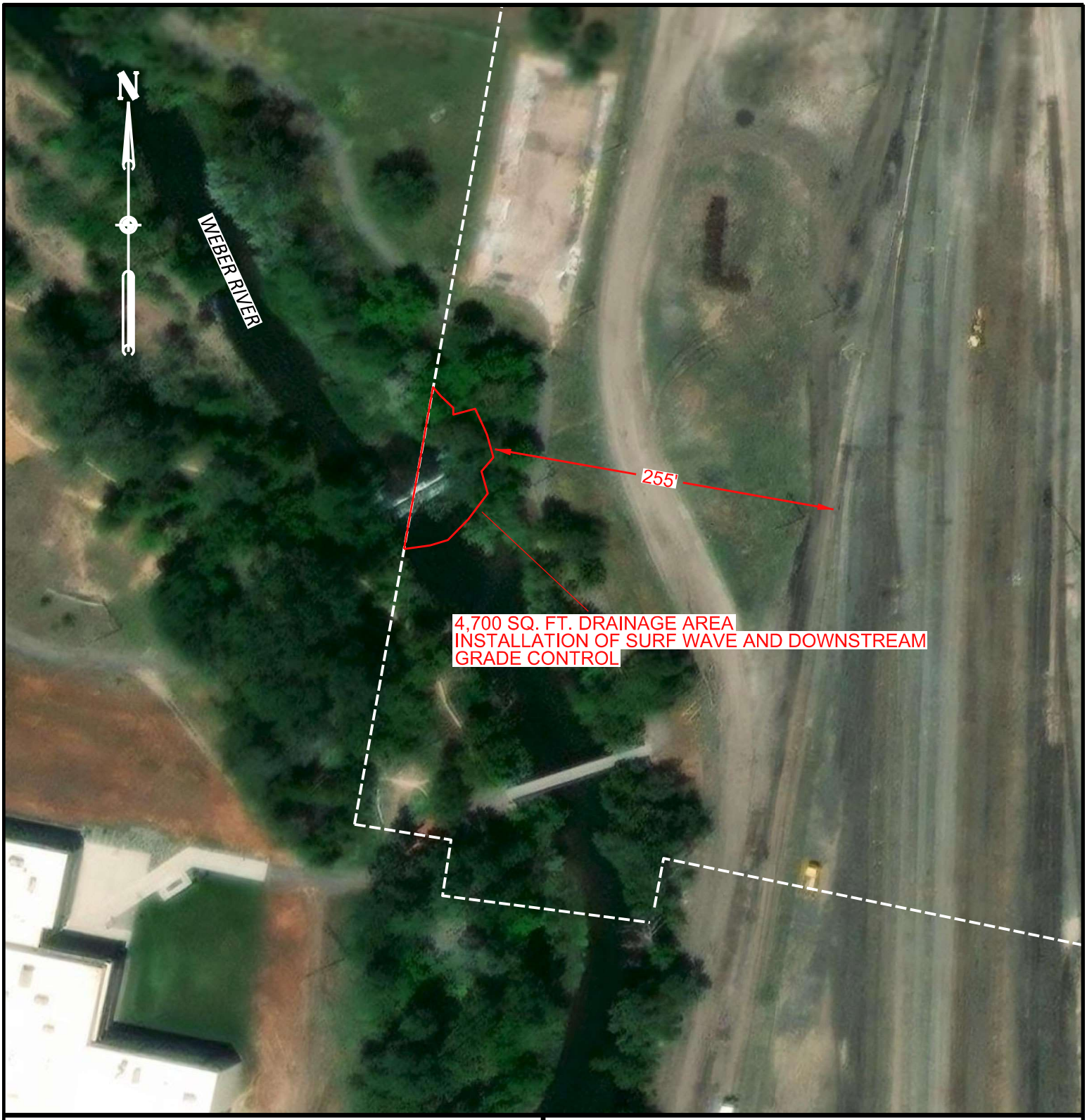
UNION PACIFIC RAILROAD COMPANY

_____
(Contractor Name)

By_____
Kris Jones
Manager II Real Estate - Contracts

By_____

Name:_____
Title:_____
Telephone:_____
Email:_____



LEGEND:

DRAINAGE AREA .....

UPRRCO. R/W OUTLINED .....

CADD FILENAME	0803248
SCAN FILENAME	X

NOTE: BEFORE YOU BEGIN ANY WORK, SEE AGREEMENT FOR FIBER OPTIC PROVISIONS.

EXHIBIT "A"

UNION PACIFIC RAILROAD COMPANY

OGDEN , WEBER COUNTY, UT

EVANSTON SUB M.P. 993

MAP UCRY/V-1/1
SCALE: 1" = 100'

OFFICE OF REAL ESTATE
OMAHA, NEBRASKA DATE: 8/5/2025

JBC FILE: 0803248

Form Approved, AVP-Law
07/25/06

EXHIBIT B
CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

Section 1. NOTICE OF COMMENCEMENT OF WORK - FLAGGING.

A. Contractor agrees to notify the Railroad Representative at least ten (10) working days in advance of Contractor commencing its work and at least ten (10) working days in advance of proposed performance of any work by Contractor in which any person or equipment will be within twenty-five (25) feet of any track, or will be near enough to any track that any equipment extension (such as, but not limited to, a crane boom) will reach to within twenty-five (25) feet of any track. No work of any kind shall be performed, and no person, equipment, machinery, tool(s), material(s), vehicle(s), or thing(s) shall be located, operated, placed, or stored within twenty-five (25) feet of any of Railroad's track(s) at any time, for any reason, unless and until a Railroad flagman is provided to watch for trains. Upon receipt of such ten (10)-day notice, the Railroad Representative will determine and inform Contractor whether a flagman need be present and whether Contractor needs to implement any special protective or safety measures. If flagging or other special protective or safety measures are performed by Railroad, Railroad will bill Contractor for such expenses incurred by Railroad, unless Railroad and a federal, state or local governmental entity have agreed that Railroad is to bill such expenses to the federal, state or local governmental entity. If Railroad will be sending the bills to Contractor, Contractor shall pay such bills within thirty (30) days of Contractor's receipt of billing. If Railroad performs any flagging, or other special protective or safety measures are performed by Railroad, Contractor agrees that Contractor is not relieved of any of its responsibilities or liabilities set forth in this Agreement.

B. The rate of pay per hour for each flagman will be the prevailing hourly rate in effect for an eight-hour day for the class of flagmen used during regularly assigned hours and overtime in accordance with Labor Agreements and Schedules in effect at the time the work is performed. In addition to the cost of such labor, a composite charge for vacation, holiday, health and welfare, supplemental sickness, Railroad Retirement and unemployment compensation, supplemental pension, Employees Liability and Property Damage and Administration will be included, computed on actual payroll. The composite charge will be the prevailing composite charge in effect at the time the work is performed. One and one-half times the current hourly rate is paid for overtime, Saturdays and Sundays, and two and one-half times current hourly rate for holidays. Wage rates are subject to change, at any time, by law or by agreement between Railroad and its employees, and may be retroactive as a result of negotiations or a ruling of an authorized governmental agency. Additional charges on labor are also subject to change. If the wage rate or additional charges are changed, Contractor (or the governmental entity, as applicable) shall pay on the basis of the new rates and charges.

C. Reimbursement to Railroad will be required covering the full eight-hour day during which any flagman is furnished, unless the flagman can be assigned to other Railroad work during a portion of such day, in which event reimbursement will not be required for the portion of the day during which the flagman is engaged in other Railroad work. Reimbursement will also be required for any day not actually worked by the flagman following the flagman's assignment to work on the project for which Railroad is required to pay the flagman and which could not reasonably be avoided by Railroad by assignment of such flagman to other work , even though Contractor may not be working during such time. When it becomes necessary for Railroad to bulletin and assign an employee to a flagging position in compliance with union collective bargaining agreements, Contractor must provide Railroad a minimum of five (5) days notice prior to the cessation of the need for a flagman. If five (5) days notice of cessation is not given, Contractor will still be required to pay flagging charges for the five (5) day notice period required by union agreement to

be given to the employee, even though flagging is not required for that period. An additional ten (10) days notice must then be given to Railroad if flagging services are needed again after such five day cessation notice has been given to Railroad.

Section 2. LIMITATION AND SUBORDINATION OF RIGHTS GRANTED

A. The foregoing grant of right is subject and subordinate to the prior and continuing right and obligation of the Railroad to use and maintain its entire property including the right and power of Railroad to construct, maintain, repair, renew, use, operate, change, modify or relocate railroad tracks, roadways, signal, communication, fiber optics, or other wirelines, pipelines and other facilities upon, along or across any or all parts of its property, all or any of which may be freely done at any time or times by Railroad without liability to Contractor or to any other party for compensation or damages.

B. The foregoing grant is also subject to all outstanding superior rights (including those in favor of licensees and lessees of Railroad's property, and others) and the right of Railroad to renew and extend the same, and is made without covenant of title or for quiet enjoyment.

Section 3. NO INTERFERENCE WITH OPERATIONS OF RAILROAD AND ITS TENANTS.

A. Contractor shall conduct its operations so as not to interfere with the continuous and uninterrupted use and operation of the railroad tracks and property of Railroad, including without limitation, the operations of Railroad's lessees, licensees or others, unless specifically authorized in advance by the Railroad Representative. Nothing shall be done or permitted to be done by Contractor at any time that would in any manner impair the safety of such operations. When not in use, Contractor's machinery and materials shall be kept at least fifty (50) feet from the centerline of Railroad's nearest track, and there shall be no vehicular crossings of Railroads tracks except at existing open public crossings.

B. Operations of Railroad and work performed by Railroad personnel and delays in the work to be performed by Contractor caused by such railroad operations and work are expected by Contractor, and Contractor agrees that Railroad shall have no liability to Contractor, or any other person or entity for any such delays. The Contractor shall coordinate its activities with those of Railroad and third parties so as to avoid interference with railroad operations. The safe operation of Railroad train movements and other activities by Railroad takes precedence over any work to be performed by Contractor.

Section 4. LIENS.

Contractor shall pay in full all persons who perform labor or provide materials for the work to be performed by Contractor. Contractor shall not create, permit or suffer any mechanic's or materialmen's liens of any kind or nature to be created or enforced against any property of Railroad for any such work performed. Contractor shall indemnify and hold harmless Railroad from and against any and all liens, claims, demands, costs or expenses of whatsoever nature in any way connected with or growing out of such work done, labor performed, or materials furnished. If Contractor fails to promptly cause any lien to be released of record, Railroad may, at its election, discharge the lien or claim of lien at Contractor's expense.

Section 5. PROTECTION OF FIBER OPTIC CABLE SYSTEMS.

A. Fiber optic cable systems may be buried on Railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. Contractor shall complete the required form at up.com/CBUD to determine if fiber optic cable is buried anywhere on Railroad Property to be used by Contractor. If it is, Contractor will telephone the telecommunications company(ies) involved, make

arrangements for a cable locator and, if applicable, for relocation or other protection of the fiber optic cable. Contractor shall not commence any work until all such protection or relocation (if applicable) has been accomplished.

B. In addition to other indemnity provisions in this Agreement, Contractor shall indemnify, defend and hold Railroad harmless from and against all costs, liability and expense whatsoever (including, without limitation, attorneys' fees, court costs and expenses) arising out of any act or omission of Contractor, its agents and/or employees, that causes or contributes to (1) any damage to or destruction of any telecommunications system on Railroad's property, and/or (2) any injury to or death of any person employed by or on behalf of any telecommunications company, and/or its contractor, agents and/or employees, on Railroad's property. Contractor shall not have or seek recourse against Railroad for any claim or cause of action for alleged loss of profits or revenue or loss of service or other consequential damage to a telecommunication company using Railroad's property or a customer or user of services of the fiber optic cable on Railroad's property.

Section 6. PERMITS - COMPLIANCE WITH LAWS.

In the prosecution of the work covered by this Agreement, Contractor shall secure any and all necessary permits and shall comply with all applicable federal, state and local laws, regulations and enactments affecting the work including, without limitation, all applicable Federal Railroad Administration regulations.

Section 7. SAFETY.

A. Safety of personnel, property, rail operations and the public is of paramount importance in the prosecution of the work performed by Contractor. Contractor shall be responsible for initiating, maintaining and supervising all safety, operations and programs in connection with the work. Contractor shall at a minimum comply with Railroad's safety standards listed in **Exhibit D**, hereto attached, to ensure uniformity with the safety standards followed by Railroad's own forces. As a part of Contractor's safety responsibilities, Contractor shall notify Railroad if Contractor determines that any of Railroad's safety standards are contrary to good safety practices. Contractor shall furnish copies of **Exhibit D** to each of its employees before they enter the job site.

B. Without limitation of the provisions of paragraph A above, Contractor shall keep the job site free from safety and health hazards and ensure that its employees are competent and adequately trained in all safety and health aspects of the job.

C. Contractor shall have proper first aid supplies available on the job site so that prompt first aid services may be provided to any person injured on the job site. Contractor shall promptly notify Railroad of any U.S. Occupational Safety and Health Administration reportable injuries. Contractor shall have a nondelegable duty to control its employees while they are on the job site or any other property of Railroad, and to be certain they do not use, be under the influence of, or have in their possession any alcoholic beverage, drug or other substance that may inhibit the safe performance of any work.

D. If and when requested by Railroad, Contractor shall deliver to Railroad a copy of Contractor's safety plan for conducting the work (the "Safety Plan"). Railroad shall have the right, but not the obligation, to require Contractor to correct any deficiencies in the Safety Plan. The terms of this Agreement shall control if there are any inconsistencies between this Agreement and the Safety Plan.

Section 8. INDEMNITY.

A. To the extent not prohibited by applicable statute, Contractor shall indemnify, defend and hold harmless Railroad, its affiliates, and its and their officers, agents and employees ("Indemnified Parties") from and against any and all loss, damage, injury, liability, claim, demand, cost or expense (including, without limitation, attorney's, consultant's and expert's fees, and court costs), fine or penalty (collectively, "Loss") incurred by any person (including, without limitation, any Indemnified Party, Contractor, or any employee of Contractor or of any Indemnified Party) arising out of or in any manner connected with (i) any work performed by Contractor, or (ii) any act or omission of Contractor, its officers, agents or employees, or (iii) any breach of this agreement by Contractor.

B. The right to indemnity under this Section 8 shall accrue upon occurrence of the event giving rise to the Loss, and shall apply regardless of any negligence or strict liability of any Indemnified Party, except where the Loss is caused by the sole active negligence of an Indemnified Party as established by the final judgment of a court of competent jurisdiction. The sole active negligence of any Indemnified Party shall not bar the recovery of any other Indemnified Party.

C. Contractor expressly and specifically assumes potential liability under this Section 8 for claims or actions brought by Contractor's own employees. Contractor waives any immunity it may have under worker's compensation or industrial insurance acts to indemnify Railroad under this Section 8. Contractor acknowledges that this waiver was mutually negotiated by the parties hereto.

D. No court or jury findings in any employee's suit pursuant to any worker's compensation act or the Federal Employers' Liability Act against a party to this Agreement may be relied upon or used by Contractor in any attempt to assert liability against Railroad.

E. The provisions of this Section 8 shall survive the completion of any work performed by Contractor or the termination or expiration of this Agreement. In no event shall this Section 8 or any other provision of this Agreement be deemed to limit any liability Contractor may have to any Indemnified Party by statute or under common law.

Section 9. RESTORATION OF PROPERTY.

In the event Railroad authorizes Contractor to take down any fence of Railroad or in any manner move or disturb any of the other property of Railroad in connection with the work to be performed by Contractor, then in that event Contractor shall, as soon as possible and at Contractor's sole expense, restore such fence and other property to the same condition as the same were in before such fence was taken down or such other property was moved or disturbed. Contractor shall remove all of Contractor's tools, equipment, rubbish and other materials from Railroad's property promptly upon completion of the work, restoring Railroad's property to the same state and condition as when Contractor entered thereon.

Section 10. WAIVER OF DEFAULT.

Waiver by Railroad of any breach or default of any condition, covenant or agreement herein contained to be kept, observed and performed by Contractor shall in no way impair the right of Railroad to avail itself of any remedy for any subsequent breach or default.

Section 11. MODIFICATION - ENTIRE AGREEMENT.

No modification of this Agreement shall be effective unless made in writing and signed by Contractor and Railroad. This Agreement and the exhibits attached hereto and made a part hereof constitute

the entire understanding between Contractor and Railroad and cancel and supersede any prior negotiations, understandings or agreements, whether written or oral, with respect to the work to be performed by Contractor.

Section 12. ASSIGNMENT - SUBCONTRACTING.

Contractor shall not assign or subcontract this Agreement, or any interest therein, without the written consent of the Railroad. Contractor shall be responsible for the acts and omissions of all subcontractors, and shall require all subcontractors to maintain the insurance coverage required to be maintained by Contractor as provided in this Agreement, and to indemnify Contractor and Railroad to the same extent as Railroad is indemnified by Contractor under this Agreement.

Form Approved, AVP-Law
09/01/2018

EXHIBIT C

Union Pacific Railroad Company
Insurance Provisions For
Contractor's Right of Entry Agreement

Contractor shall, at its sole cost and expense, procure and maintain during the course of the Project and until all Project work on Railroad's property has been completed and the Contractor has removed all equipment and materials from the Railroad's property and has cleaned and restored Railroad's property to Railroad's satisfaction, the following insurance coverage:

A. Commercial General Liability insurance. Commercial general liability (CGL) with a limit of not less than $2,000,000 each occurrence and an aggregate limit of not less than $4,000,000. CGL insurance must be written on ISO occurrence form CG 00 01 12 04 (or a substitute form providing equivalent coverage).

The policy must also contain the following endorsement, which must be stated on the certificate of insurance:

- Contractual Liability Railroads ISO form CG 24 17 10 01 (or a substitute form providing equivalent coverage) showing "Union Pacific Railroad Company Property" as the Designated Job Site.

B. Business Automobile Coverage insurance. Business auto coverage written on ISO form CA 00 01 (or a substitute form providing equivalent liability coverage) with a combined single limit of not less $2,000,000 for each accident.

The policy must contain the following endorsements, which must be stated on the certificate of insurance:

- Coverage For Certain Operations In Connection With Railroads ISO form CA 20 70 10 01 (or substitute form providing equivalent coverage) showing "Union Pacific Property" as the Designated Job Site.
- Motor Carrier Act Endorsement – Hazardous materials clean up (MCS-90) if required by law.

C. Workers Compensation and Employers Liability insurance. Coverage must include but not be limited to:

- Contractor's statutory liability under the workers' compensation laws of the state(s) affected by this Agreement.
- Employers' Liability (Part B) with limits of at least $500,000 each accident, $500,000 disease policy limit $500,000 each employee.

If Contractor is self-insured, evidence of state approval and excel workers compensation coverage must be provided. Coverage must include liability arising out of the U.S. Longshoremen's and Harbor Workers' Act, the Jones Act, and the Outer Continental Shelf Land Act, if applicable.

The policy must contain the following endorsement, which must be stated on the certificate of insurance:

- Alternate Employer endorsement ISO form WC 00 03 01 A (or a substitute form providing equivalent coverage) showing Railroad in the schedule as the alternate employer (or a substitute form providing equivalent coverage).

D. Railroad Protective Liability insurance. Contractor must maintain Railroad Protective Liability insurance written on ISO occurrence form CG 00 35 12 04 (or a substitute form providing equivalent coverage) on behalf of Railroad as named insured, with a limit of not less than $2,000,000 per occurrence and an aggregate of $6,000,000. A binder stating the policy is in place must be submitted to Railroad before the work may be commenced and until the original policy is forwarded to Railroad.

E. Umbrella or Excess insurance. If Contractor utilizes umbrella or excess policies, these policies must "follow form" and afford no less coverage than the primary policy.

F. Pollution Liability insurance. Pollution Liability coverage must be included when the scope of the work as defined in the Agreement includes installation, temporary storage, or disposal of any "hazardous" material that is injurious in or upon land, the atmosphere, or any watercourses; or may cause bodily injury at any time.

Pollution liability coverage must be written on ISO form Pollution Liability Coverage Form Designated Sites CG 00 39 12 04 (or a substitute form providing equivalent liability coverage), with limits of at least $5,000,000 per occurrence and an aggregate limit of $10,000,000.

If the scope of work as defined in this Agreement includes the disposal of any hazardous or non-hazardous materials from the job site, Contractor must furnish to Railroad evidence of pollution legal liability insurance maintained by the disposal site operator for losses arising form the insured facility accepting the materials, with coverage in minimum amounts of $1,000,000 per loss, and an annual aggregate of $2,000,000.

Other Requirements

G. All policy(ies) required above (except worker's compensation and employers liability) must include Railroad as "Additional Insured" using ISO Additional Insured Endorsements CG 20 26, and CA 20 48 (or substitute forms providing equivalent coverage). The coverage provided to Railroad as additional insured shall, to the extent provided under ISO Additional Insured Endorsement CG 20 26, and CA 20 48 provide coverage for Railroad's negligence whether sole or partial, active or passive, and shall not be limited by Contractor's liability under the indemnity provisions of this Agreement.

H. Punitive damages exclusion, if any, must be deleted (and the deletion indicated on the certificate of insurance), unless the law governing this Agreement prohibits all punitive damages that might arise under this Agreement.

I. Contractor waives all rights of recovery, and its insurers also waive all rights of subrogation of damages against Railroad and its agents, officers, directors and employees. This waiver must be stated on the certificate of insurance.

J. Prior to commencing the work, Contractor shall furnish Railroad with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements in this Agreement.

K. All insurance policies must be written by a reputable insurance company acceptable to Railroad or with a current Best's Insurance Guide Rating of A- and Class VII or better, and authorized to do business in the state(s) in which the work is to be performed.

L. The fact that insurance is obtained by Contractor or by Railroad on behalf of Contractor will not be deemed to release or diminish the liability of Contractor, including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by Railroad from Contractor or any third party will not be limited by the amount of the required insurance coverage.

Form Approved, AVP-Law
07/25/06

EXHIBIT D
TO
CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

MINIMUM SAFETY REQUIREMENTS

The term "employees" as used herein refer to all employees of Contractor as well as all employees of any subcontractor or agent of Contractor.

I. Clothing

A. All employees of Contractor will be suitably dressed to perform their duties safely and in a manner that will not interfere with their vision, hearing, or free use of their hands or feet.

Specifically, Contractor's employees must wear:

(i) Waist-length shirts with sleeves.
(ii) Trousers that cover the entire leg. If flare-legged trousers are worn, the trouser bottoms must be tied to prevent catching.
(iii) Footwear that covers their ankles and has a defined heel. Employees working on bridges are required to wear safety-toed footwear that conforms to the American National Standards Institute (ANSI) and FRA footwear requirements.

Employees must not wear loose or ragged clothing, neckties, finger rings, or other loose jewelry while operating or working on machinery.

II. Personal Protective Equipment

Contractor shall require its employees to wear personal protective equipment as specified by Railroad rules, regulations, or recommended or requested by the Railroad Representative.

(i) Hard hat that meets the American National Standard (ANSI) Z89.1 – latest revision. Hard hats should be affixed with Contractor's company logo or name.
(ii) Eye protection that meets American National Standard (ANSI) for occupational and educational eye and face protection, Z87.1 – latest revision. Additional eye protection must be provided to meet specific job situations such as welding, grinding, etc.
(iii) Hearing protection, which affords enough attenuation to give protection from noise levels that will be occurring on the job site. Hearing protection, in the form of plugs or muffs, must be worn when employees are within:

100 feet of a locomotive or roadway/work equipment
15 feet of power operated tools
150 feet of jet blowers or pile drivers
150 feet of retarders in use (when within 10 feet, employees must wear dual ear protection – plugs and muffs)
(iv) Other types of personal protective equipment, such as respirators, fall protection equipment, and face shields, must be worn as recommended or requested by the Railroad Representative.

III. On Track Safety

Contractor is responsible for compliance with the Federal Railroad Administration's Roadway Worker Protection regulations – 49CFR214, Subpart C and Railroad's On-Track Safety rules. Under 49CFR214, Subpart C, railroad contractors are responsible for the training of their employees on such regulations. In addition to the instructions contained in Roadway Worker Protection regulations, all employees must:

(i) Maintain a distance of twenty-five (25) feet to any track unless the Railroad Representative is present to authorize movements.
(ii) Wear an orange, reflectorized workwear approved by the Railroad Representative.
(iii) Participate in a job briefing that will specify the type of On-Track Safety for the type of work being performed. Contractor must take special note of limits of track authority, which tracks may or may not be fouled, and clearing the track. Contractor will also receive special instructions relating to the work zone around machines and minimum distances between machines while working or traveling.

IV. Equipment

A. It is the responsibility of Contractor to ensure that all equipment is in a safe condition to operate. If, in the opinion of the Railroad Representative, any of Contractor's equipment is unsafe for use, Contractor shall remove such equipment from Railroad's property. In addition, Contractor must ensure that the operators of all equipment are properly trained and competent in the safe operation of the equipment. In addition, operators must be:

Familiar and comply with Railroad's rules on lockout/tagout of equipment.
Trained in and comply with the applicable operating rules if operating any hy-rail equipment on-track.
Trained in and comply with the applicable air brake rules if operating any equipment that moves rail cars or any other railbound equipment.

B. All self-propelled equipment must be equipped with a first-aid kit, fire extinguisher, and audible back-up warning device.

C. Unless otherwise authorized by the Railroad Representative, all equipment must be parked a minimum of twenty-five (25) feet from any track. Before leaving any equipment unattended, the operator must stop the engine and properly secure the equipment against movement.

D. Cranes must be equipped with three orange cones that will be used to mark the working area of the crane and the minimum clearances to overhead powerlines.

V. General Safety Requirements

A. Contractor shall ensure that all waste is properly disposed of in accordance with applicable federal and state regulations.

B. Contractor shall ensure that all employees participate in and comply with a job briefing conducted by the Railroad Representative, if applicable. During this briefing, the Railroad Representative will specify safe work procedures, (including On-Track Safety) and the potential hazards of the job. If any employee has any questions or concerns about the work,

the employee must voice them during the job briefing. Additional job briefings will be conducted during the work as conditions, work procedures, or personnel change.

C. All track work performed by Contractor meets the minimum safety requirements established by the Federal Railroad Administration's Track Safety Standards 49CFR213.

D. All employees comply with the following safety procedures when working around any railroad track:

(i) Always be on the alert for moving equipment. Employees must always expect movement on any track, at any time, in either direction.
(ii) Do not step or walk on the top of the rail, frog, switches, guard rails, or other track components.
(iii) In passing around the ends of standing cars, engines, roadway machines or work equipment, leave at least 20 feet between yourself and the end of the equipment. Do not go between pieces of equipment of the opening is less than one car length (50 feet).
(iv) Avoid walking or standing on a track unless so authorized by the employee in charge.
(v) Before stepping over or crossing tracks, look in both directions first.
(vi) Do not sit on, lie under, or cross between cars except as required in the performance of your duties and only when track and equipment have been protected against movement.

E. All employees must comply with all federal and state regulations concerning workplace safety.

Francois Escorihuela

From: Kris Jones <ksjones@up.com>
Sent: Tuesday, October 7, 2025 4:28 PM
To: Suiter, Phil
Cc: Francois Escorihuela
Subject: RE: [External] 0803248 - Drainage Agreement - Ogden, Weber, UT
Attachments: 0803248 Drainage Agreement (08-28-2025).pdf

Good afternoon,

INCLUDE THIS EMAIL WHEN PROVIDING EXECUTED AGREEMENT TO LICENSEE OR CONTRACTORS.
THIS IS IMPORTANT INFORMATION ABOUT SCHEDULING THE WORK.

Attached is your original copy of our Agreement, fully executed on behalf of the Railroad Company. When you or your representative enters the Railroad Company's property, a copy of this fully executed document must be available at the site to be shown on request to any Railroad employee or official.

In accordance with the terms of the Agreement, you are required to notify a Railroad approved flagger provided at the link below, complete a locate ticket on the UPRR Telecommunications ("Call Before You Dig") website at the link below and also make notification to the Manager of Signal Maintenance for locating of UPRR signal infrastructure at least 10 days in advance of the date you plan on entering the right of way. **YOU SHOULD NOT CONTACT THE MANAGER OF SIGNAL MAINTENANCE BELOW FOR ANY FLAGGING SERVICES.**

Third Party Flagging Link: www.up.com/real_estate/third-party-flagging/index.htm

MANAGER OF SIGNAL MAINTENANCE: Curtis Hill
Manager I Signal Maintenance
Phone: 801-626-8207
Email: clhill2@up.com

Call Before You Dig: www.up.com/aboutup/community/telecom/groups/index.htm

As an additional note, the top of the casing must be a minimum of two feet below any existing fiber optic cable. Any open excavation required within five feet of the fiber optic cable must be dug by hand.

Should you have any questions or concerns, feel free to reach out to me.

Thank you,

Kris Jones
(She/her/hers)
Manager II Real Estate – Contracts

Washington, Oregon, Iowa,
Missouri, Arkansas, Tennessee, Minnesota,
California (Counties: Del Norte, Siskiyou,
Modoc, Lassen, Shasta, Trinity, Humboldt, Mendocino,
Tehama, Glenn, Butte, Plumas Sonoma, Lake, Colusa,
Yuba, Sierra, Nevada, Placer, Sutter, Yolo,
Napa, Marin, San Francisco, Santa Clara, Solano.

Attached is an original of an agreement covering your use of the Railroad Company's right of way. UPRR is now accepting digital signatures and scans of signed agreements. Reply to this email with your partially executed document attached if you do not want to mail hard copies.

If mailing the agreement, please print one copy, execute, and return to 1400 Douglas Street, Omaha, NE 68179-1690 Attn: Kris Jones, Manager II Real Estate - Contracts.

Send ACH payments to:

- Name: Bank of America, Dallas, TX
- Account = 3752021457
- Routing = 1110-0001-2
- Reference = Invoice Number (if applicable) or Project/Folder Number

Send Check to:

Union Pacific Railroad Company
P.O. Box 7412567
Chicago, IL 60674-2568

- Reference = Invoice Number (if applicable) or Project/Folder Number
- **PARTIALLY EXECUTED AGREEMENTS SENT TO CHICAGO WILL NOT BE PROCESSED**

UP does not currently offer a credit card option.

Thank you,

Kris Jones
(She/her/hers)
Manager II Real Estate – Contracts

Washington, Oregon, Idaho, Utah, Iowa, Missouri, Arkansas, Tennessee, Minnesota, Northern California (Counties: Del Norte, Siskiyou, Modoc, Lassen, Shasta, Trinity, Humboldt, Mendocino, Tehama, Glenn, Butte, Plumas) Washington, Oregon, Idaho, Utah, Iowa, Missouri, Arkansas, Tennessee, Minnesota, California (Counties: Del Norte, Siskiyou, Modoc, Lassen, Shasta, Trinity, Humboldt, Mendocino, Tehama, Glenn, Butte, Plumas) Sonoma, Lake, Colusa, Yuba, Sierra, Nevada, Placer, Sutter, Yolo, Napa, Marin, Contra Costa, Sacramento, El Dorado, San Francisco, San Mateo, Santa Clara, Alameda, Solano.

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