Calapooia River Reach 3
Restoration, Stabilization, and Conservation Projects

PROJECT PARTNERS

LOCAL LANDOWNERS LOCATED IN REACH 3 OF THE CALAPOOIA RIVER NEAR BROWNSVILLE, OREGON.

PROJECT DESCRIPTION

PROPOSED RESTORATION, STABILIZATION, AND CONSERVATION PROJECTS ARE PROPOSED FOR REACH 3 OF THE CALAPOOIA RIVER. THE CALAPOOIA WATERSHED COUNCIL IS WORKING WITH LANDOWNERS TO ENHANCE RIVER AND FLOODPLAIN HABITAT IN REACH 3.

BENCHMARK

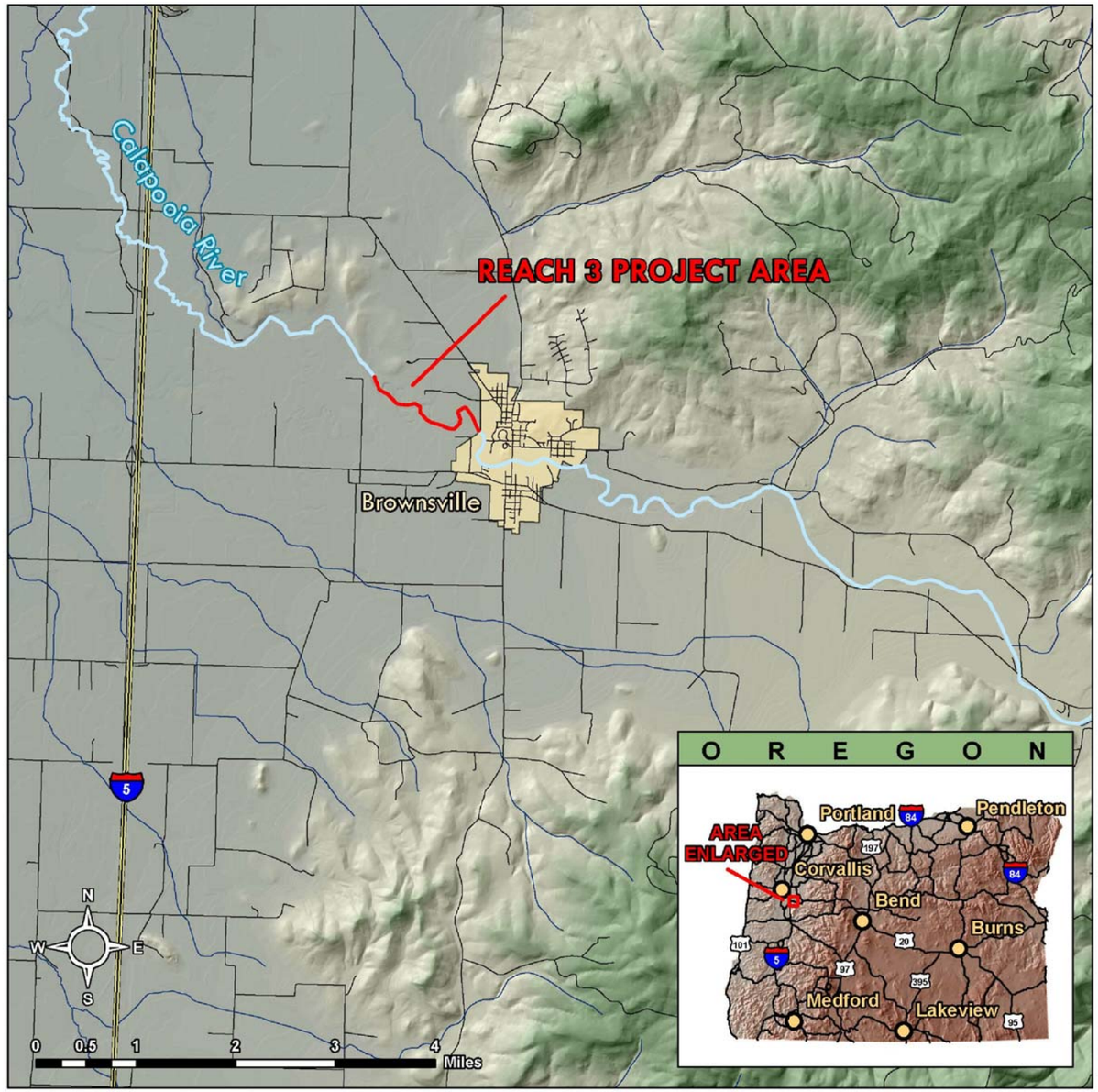
SURVEY CONTROL USED FOR THE PROJECT IS PROVIDED ON DRAWING 2.0. THE HORIZONTAL DATUM IS NAD 83, STATE PLANE COORDINATES, OREGON ZONE NORTH, AND THE VERTICAL DATUM IS NAVD 88. THE BENCHMARK COORDINATES CORRESPOND TO THE TOP CENTER OF CONTROL MARKERS LISTED ON DRAWING.

GENERAL NOTES

1. DUE TO THE INHERENT VARIABILITY AND DYNAMIC NATURE OF RIVERS, IT IS NECESSARY TO REVIEW CURRENT CONDITIONS PRIOR TO IMPLEMENTATION OF THE DESIGN DRAWINGS TO ENSURE SITE CONDITIONS MATCH CONDITIONS DEPICTED IN DRAWINGS.
2. RIVER DESIGN GROUP MAKES NO REPRESENTATION OF THE EXISTENCE OR NONEXISTENCE OF UTILITIES. CONTRACTOR IS RESPONSIBLE FOR CALLING THE OREGON UTILITY NOTIFICATION CENTER (800-332-2344) AT LEAST TWO BUSINESS DAYS PRIOR TO DIGGING.
3. EXCAVATION, TRENCHING, SHORING, AND SHIELDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK, THESE DRAWINGS ARE NOT INTENDED TO PROVIDE MEANS OR METHODS OF CONSTRUCTION.
4. PRESERVE AND PROTECT ALL VEGETATION TO THE FULLEST EXTENT POSSIBLE.
5. METHODS FOR WORK AREA ISOLATION, FISH REMOVAL, AND EROSION CONTROL SHALL BE SUBMITTED TO RIVER DESIGN GROUP FOR APPROVAL PRIOR TO COMMENCING WORK.
6. THE LANDOWNER IS RESPONSIBLE FOR PROCURING AND COMPLYING WITH ALL PERMITS AND EASEMENTS INCLUDING ALL FEDERAL, STATE, COUNTY, AND LOCAL PERMITS.
7. THESE DRAWINGS AND THE ASSOCIATED WRITTEN SPECIFICATIONS REPRESENT THE CONSTRUCTION DOCUMENTS. ANY DEVIATIONS FROM THESE DRAWINGS AND ASSOCIATED SPECIFICATIONS WITHOUT WRITTEN APPROVAL FROM RIVER DESIGN GROUP, INC. MAY RESULT IN NOT MEETING CONTRACT DOCUMENTS AND MAY RESULT IN NOT BEING ACCEPTED FOR PAYMENT.

DRAWING INDEX

CALAPOOIA RIVER REACH 3 VICINITY MAP



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Whitefish, Montana
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COVER PAGE AND NOTES
CALAPOOIA RIVER REACH 3 RESTORATION
CALAPOOIA WATERSHED COUNCIL

Fieldwork:	RB/JL
Date:	9/24/08
Design:	TB
Drawn:	RB
Checked:	SW

PROJECT NUMBER
RDG-08-067

REVISION	DATE
0	04/15/09

DRAWING NUMBER
1.0

STREAM REACH CHARACTERISTICS

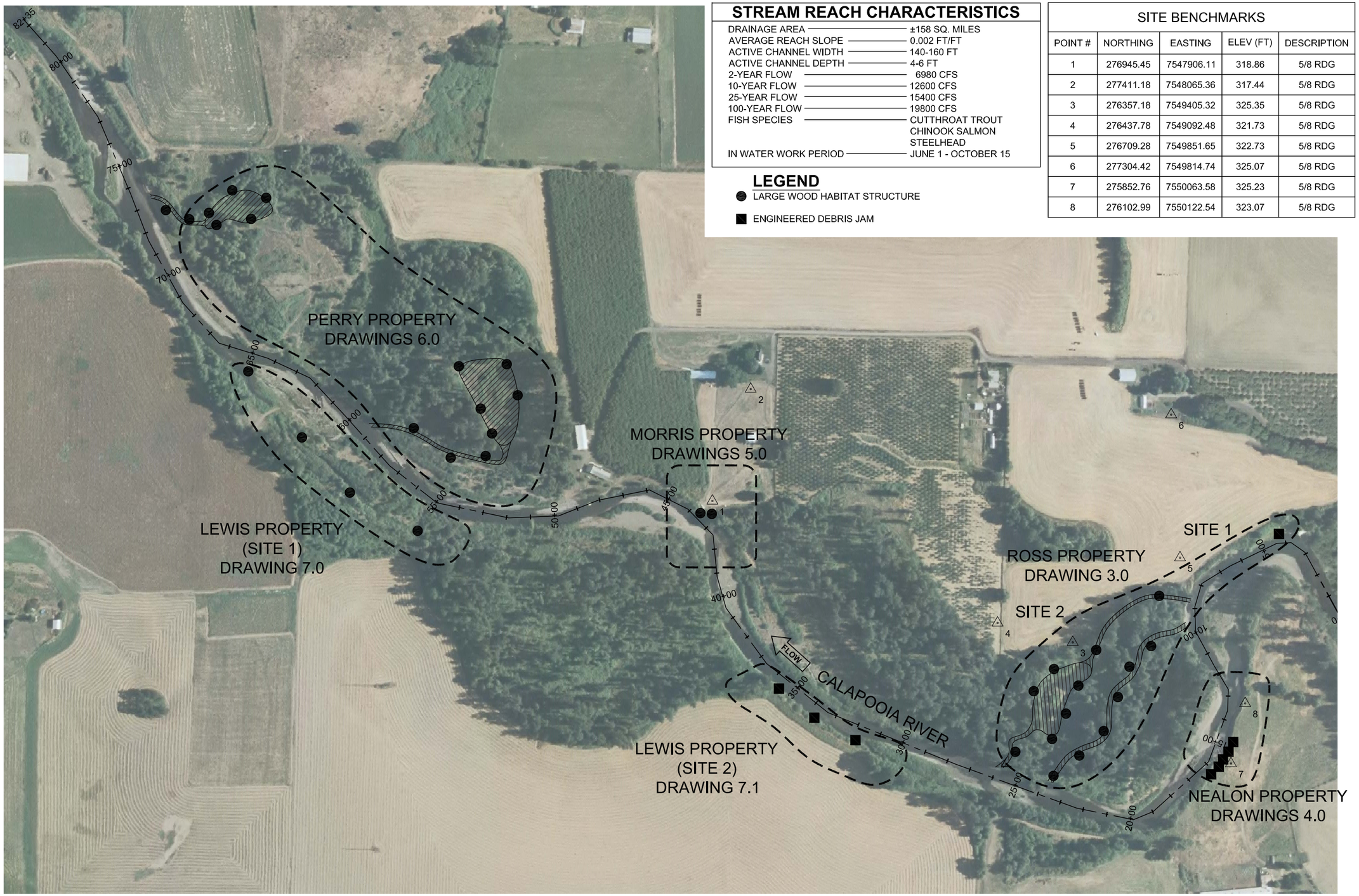
DRAINAGE AREA	±158 SQ. MILES
AVERAGE REACH SLOPE	0.002 FT/FT
ACTIVE CHANNEL WIDTH	140-160 FT
ACTIVE CHANNEL DEPTH	4-6 FT
2-YEAR FLOW	6980 CFS
10-YEAR FLOW	12600 CFS
25-YEAR FLOW	15400 CFS
100-YEAR FLOW	19800 CFS
FISH SPECIES	CUTTHROAT TROUT CHINOOK SALMON STEELHEAD
IN WATER WORK PERIOD	JUNE 1 - OCTOBER 15

LEGEND

- LARGE WOOD HABITAT STRUCTURE
- ENGINEERED DEBRIS JAM

SITE BENCHMARKS

POINT #	NORTHING	EASTING	ELEV (FT)	DESCRIPTION
1	276945.45	7547906.11	318.86	5/8 RDG
2	277411.18	7548065.36	317.44	5/8 RDG
3	276357.18	7549405.32	325.35	5/8 RDG
4	276437.78	7549092.48	321.73	5/8 RDG
5	276709.28	7549851.65	322.73	5/8 RDG
6	277304.42	7549814.74	325.07	5/8 RDG
7	275852.76	7550063.58	325.23	5/8 RDG
8	276102.99	7550122.54	323.07	5/8 RDG



1 **PROJECT LAYOUT**

1" = 400'

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PROJECT LAYOUT

CALAPOOIA RIVER REACH 3 RESTORATION

CALAPOOIA WATERSHED COUNCIL

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2.0

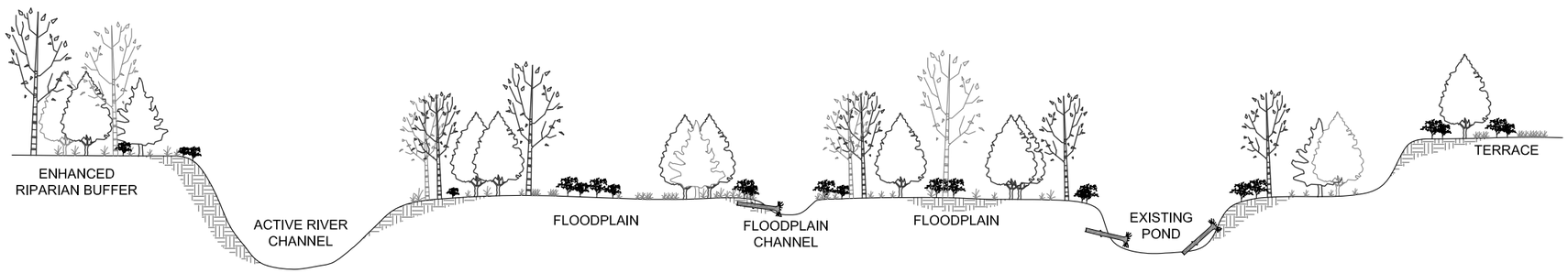
Drawing 2 of 11

NOTE:
STRUCTURE SYMBOLS ARE NOT TO SCALE.

1 PROJECT LAYOUT
1" = 200'

LEGEND

- INDIVIDUAL LARGE WOOD
- ENGINEERED DEBRIS JAM
- LARGE WOOD HABITAT STRUCTURE
- RIPARIAN/UPLAND PLANTINGS



2 SECTION
NOT TO SCALE


VIEW OF DOWNSTREAM PROPOSED FLOODPLAIN CHANNEL LOOKING DOWNVALLEY


PROPOSED PLACEMENT LOCATION OF ENGINEERED DEBRIS JAM


BERM AT PROPOSED BREACH LOCATION

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FLOODPLAIN HABITAT ENHANCEMENT

CALAPOOIA RIVER REACH 3 RESTORATION
CALAPOOIA WATERSHED COUNCIL - ROSS PROPERTY

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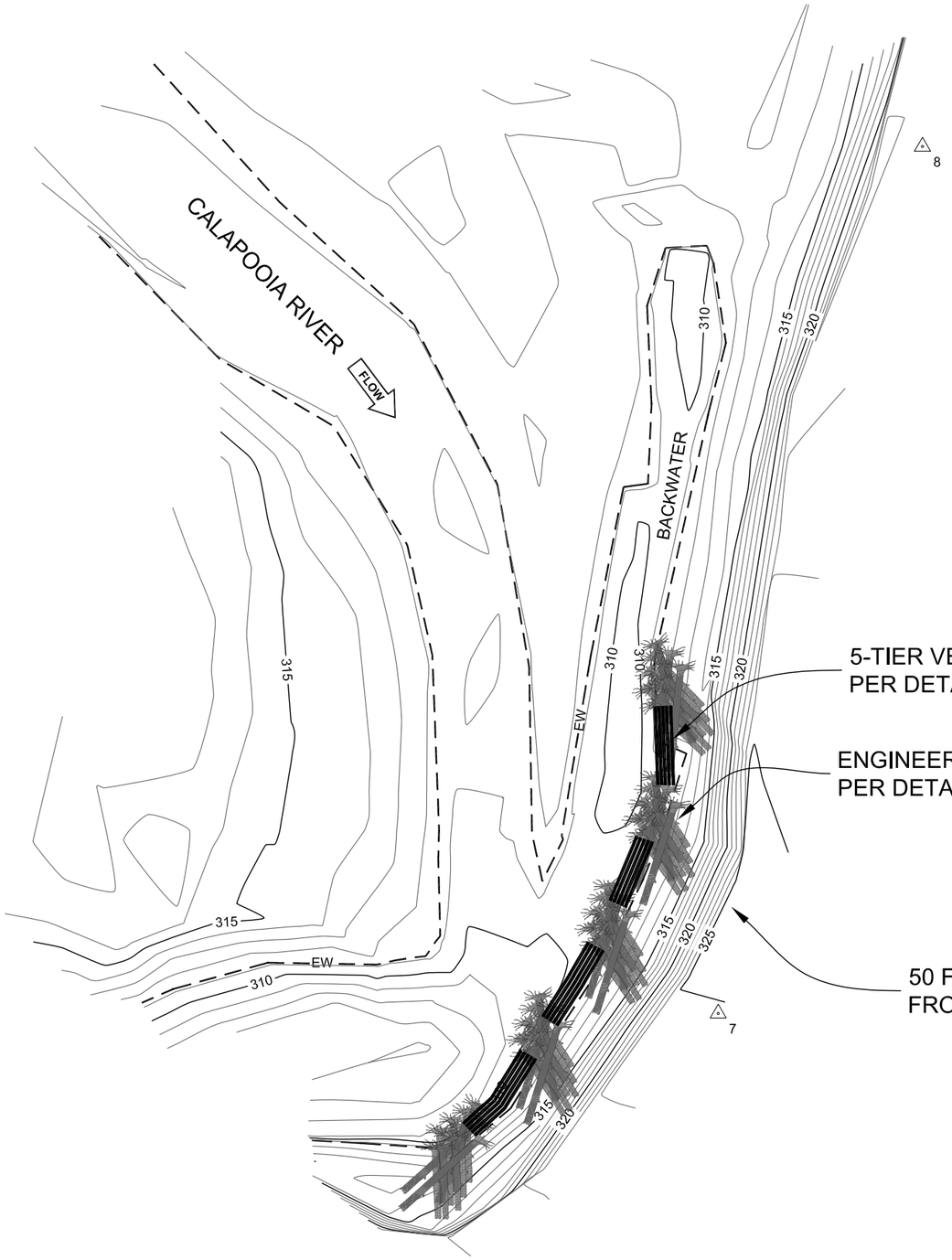
3.0

Drawing 3 of 11



SITE BENCHMARKS				
POINT #	NORTHING	EASTING	ELEV (FT)	DESCRIPTION
7	275852.76	7550063.58	325.23	5/8 RDG
8	276102.99	7550122.54	323.07	5/8 RDG

5-TIER VEGETATED SOIL LEFT (TYP.)
PER DETAIL 8.2

ENGINEERED DEBRIS JAM (TYP.)
PER DETAIL 8.0

50 FOOT RIPARIAN SETBACK
FROM TOP OF BANK

BANK FAILURE AT NEALON PROPERTY

BANK FAILURE AT NEALON PROPERTY

1 PROJECT LAYOUT
1" = 40'

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STREAMBANK STABILIZATION

CALAPOOIA RIVER REACH 3 RESTORATION
CALAPOOIA WATERSHED COUNCIL - NEALON PROPERTY

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4.0

1 **LARGE WOOD LAYOUT**

1" = 40'

PROPOSED PLACEMENT LOCATION OF LARGE WOOD HABITAT STRUCTURE 1

PROPOSED PLACEMENT LOCATION OF LARGE WOOD HABITAT STRUCTURE 2

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BACKWATER - LARGE WOOD PLACEMENT

CALAPOOIA RIVER REACH 3 RESTORATION

CALAPOOIA WATERSHED COUNCIL - MORRIS PROPERTY

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1 **PROJECT LAYOUT**

1" = 200'

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FLOODPLAIN POND AND CHANNEL ENHANCEMENT LAYOUT

CALAPOOIA RIVER REACH 3 RESTORATION

CALAPOOIA WATERSHED COUNCIL - PERRY PROPERTY

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6.0

1 **PROJECT LAYOUT**

1" = 100'

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FLOODPLAIN POND AND CHANNEL ENHANCEMENT LAYOUT

CALAPOOIA RIVER REACH 3 RESTORATION

CALAPOOIA WATERSHED COUNCIL - LEWIS PROPERTY

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1 **PROJECT LAYOUT**
1" = 100'

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STREAMBANK STABILIZATION

CALAPOOIA RIVER REACH 3 RESTORATION
CALAPOOIA WATERSHED COUNCIL - LEWIS PROPERTY

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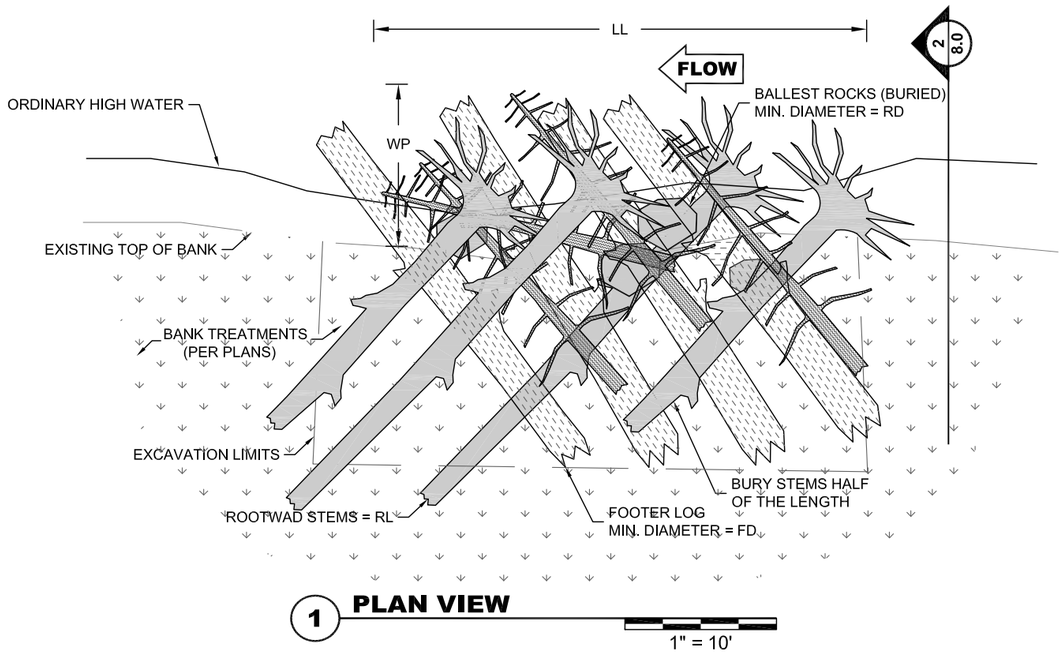


1 **PLAN VIEW**

1" = 10'

DESIGN INTENT

THE INTENT OF THE ENGINEERED DEBRIS JAM IS TO PROVIDE BANK STABILIZATION BY REDUCING NEAR-BANK STRESS AND REDIRECTING FLOW AWAY FROM THE BANK. THE STRUCTURE IS DESIGNED TO ALLOW FISH PASSAGE AT ALL FLOW LEVELS AND DISSIPATE ENERGY IN THE FORM OF A DOWNSTREAM SCOUR POOL. STRUCTURE PERFORMANCE IS DEPENDENT UPON PLACEMENT WITHIN A SEQUENCE OF OTHER BANK STABILIZATION AND GRADE CONTROL STRUCTURES.

THE STRUCTURE IS DESIGNED TO BE NATURAL IN APPEARANCE AND INCORPORATE LARGE WOOD, ROCK, BIOENGINEERING, AND VEGETATION. THE STRUCTURE IS DESIGNED TO HAVE NO ABRUPT AFFECT ON THE WATER SURFACE PROFILE AT ALL FLOW LEVELS. THE STRUCTURE EXTENDS APPROXIMATELY 5-10 FEET INTO THE CHANNEL, LEAVING 30TO 35 FEET OF THE CHANNEL WIDTH UNOBSTRUCTED FOR BEDLOAD AND DEBRIS TRANSPORT, AND RECREATIONAL PASSAGE. OVER TIME, THE STRUCTURE WILL DECOMPOSE AND/OR BECOME ABANDONED AND REPLACED BY RIPARIAN VEGETATION THAT WILL BE PLANTED IN AND AROUND THE STRUCTURE.

CONSTRUCTION NOTES

EXCAVATE TRENCH AND SET FOOTER LOGS AT SPECIFIED DEPTH. USE FOOTER LOGS WITH MINIMUM DIAMETER AND STEM LENGTH AS SPECIFIED. FOOTER LOGS SHALL NOT HAVE A ROOTFAN. IF POSSIBLE, BACKFILL UP TO TOP OF FOOTER LOGS WITH SPECIFIED ALLUVIAL BACKFILL. DOUSE BACKFILL PERIODICALLY WITH WATER TO IMPROVE COMPACTION AND MINIMIZE VOID SPACES.

SET ROOTWAD LOGS ON FOOTER LOGS. PLACE LOG STEMS SLOPING DOWNWARD INTO BANK FROM EDGE OF WATER. USE ROOTWADS WITH MINIMUM ROOTFAN DIAMETER AND STEM LENGTH AS SPECIFIED. BACKFILL WITH NATIVE MATERIAL UP TO TOP OF ROOTWAD LOGS AND PLACE BALLAST ROCKS ON TOP OF ROOTWAD LOGS AT LOCATIONS WHERE ROOTWAD LOGS INTERSECT FOOTER LOGS. DOUSE BACKFILL PERIODICALLY WITH WATER TO IMPROVE COMPACTION AND MINIMIZE VOID SPACES.

ADD ADDITIONAL TIER OF FOOTER LOGS AND ROOTWAD LOGS AS DESCRIBED ABOVE. COVER BALLAST ROCKS AND TOP OF STRUCTURE WITH VEGETATED SOIL LIFT AS SPECIFIED.

PLACE ADDITIONAL LOGS AND WOODY DEBRIS INTO TRENCH TO ACT AS DEFLECTOR LOGS AND ADDITIONAL BALLASTING. NUMBER AND SIZE OF HABITAT LOGS MAY VARY FROM STRUCTURES SHOWN.

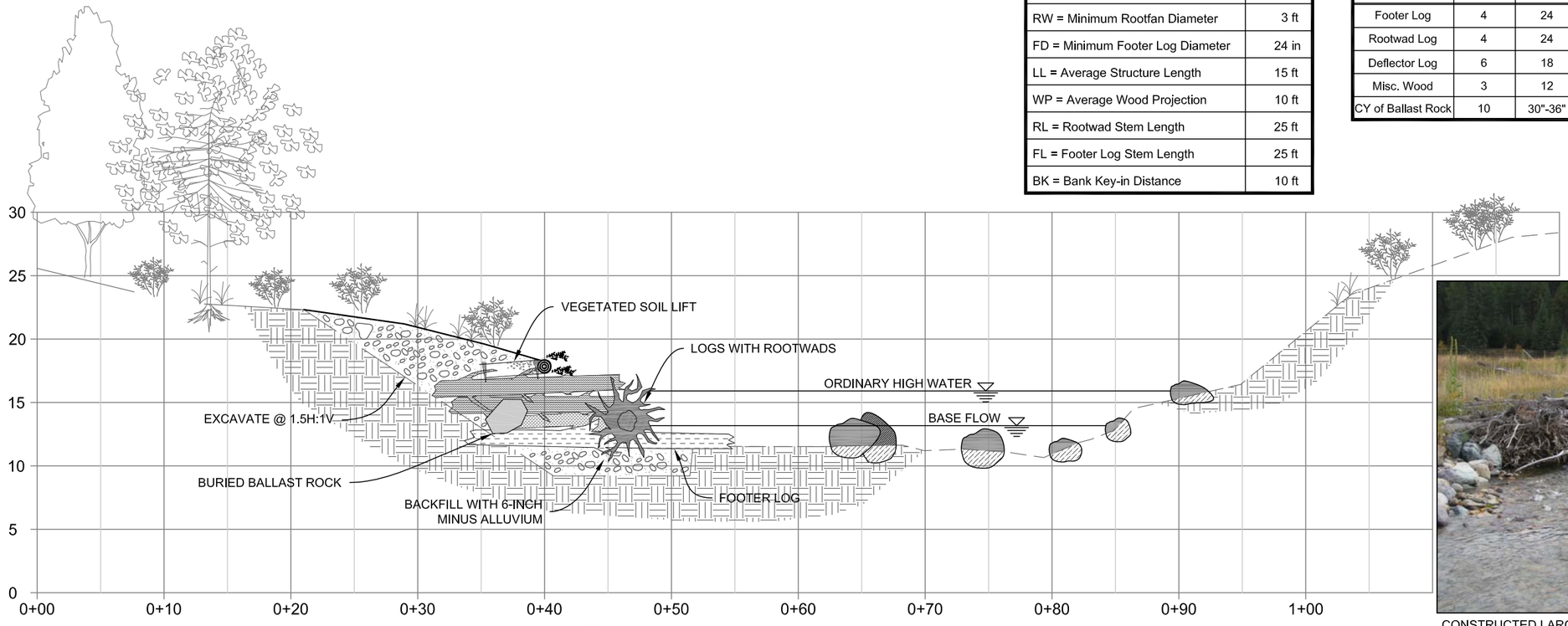
THE CONSTRUCTION MANAGER SHALL INSPECT AND APPROVE ALL FOOTER LOGS AND ROOTWAD LOGS PRIOR TO BACKFILLING. NOTIFY CONSTRUCTION MANAGER OF ANY PROPOSED CHANGES PRIOR TO IMPLEMENTATION. THE CONSTRUCTION MANAGER RESERVES THE RIGHT TO MODIFY STRUCTURE DESIGN SPECIFICATIONS DURING CONSTRUCTION IF WARRANTED DUE TO UNFORESEEN CONDITIONS.

STRUCTURE DIMENSIONS

RD = Minimum Ballast Rock Diameter	2 ft
RW = Minimum Rootfan Diameter	3 ft
FD = Minimum Footer Log Diameter	24 in
LL = Average Structure Length	15 ft
WP = Average Wood Projection	10 ft
RL = Rootwad Stem Length	25 ft
FL = Footer Log Stem Length	25 ft
BK = Bank Key-in Distance	10 ft

MATERIAL SCHEDULE (PER STRUCTURE)

Item	Quantity	Dia. (in)	Length (ft)	Rootwad (Y/N)
Footer Log	4	24	25	No
Rootwad Log	4	24	25	Yes - 3 ft Dia. Min.
Deflector Log	6	18	25	Optional - 3-4 ft
Misc. Wood	3	12	10	No
CY of Ballast Rock	10	30"-36"		



2 **STRUCTURE CROSS SECTION**

HORIZ 1" = 10'
VERT 1" = 10'

CONSTRUCTED LARGE WOOD HABITAT STRUCTURE WITH ADDITIONAL WOOD ADDED FOR HABITAT ENHANCEMENT

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ENGINEERED DEBRIS JAM

CALAPOOIA RIVER REACH 3 RESTORATION

CALAPOOIA WATERSHED COUNCIL

Fieldwork:	RB/JL
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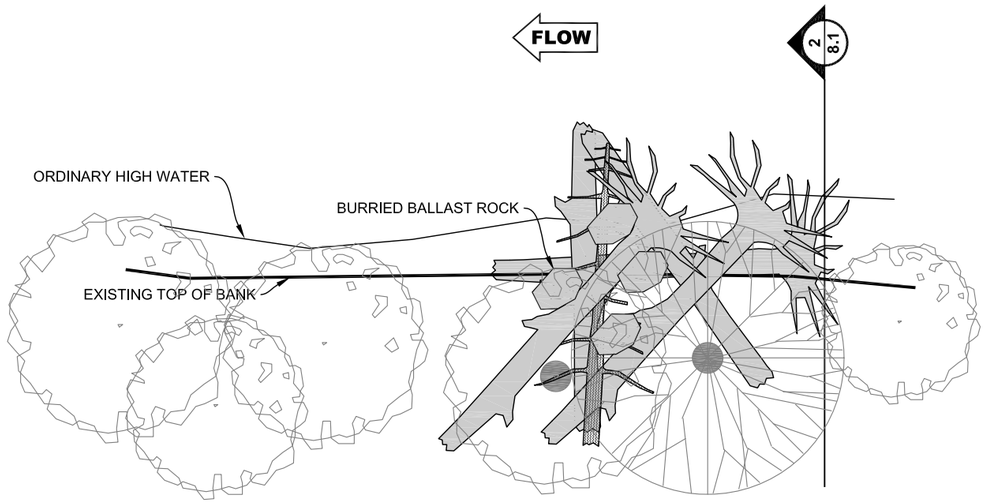
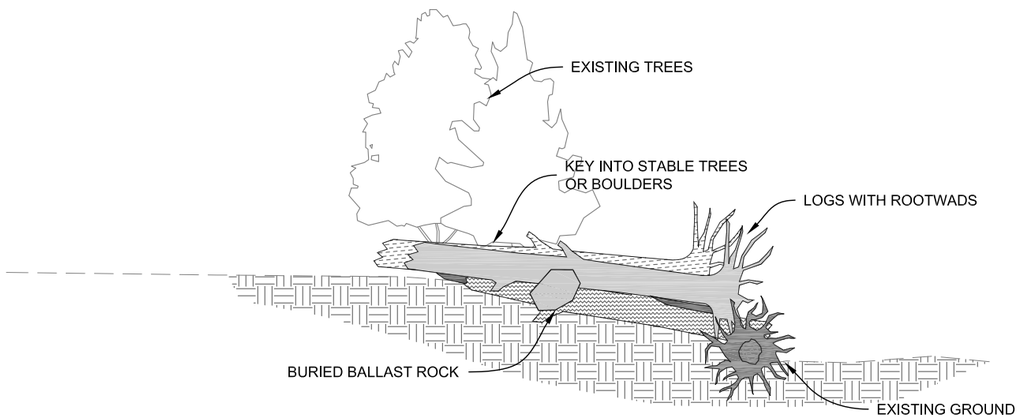


1 **PLAN VIEW**

1" = 10'



2 **STRUCTURE PROFILE**

HORIZ 1" = 10'
VERT 1" = 10'

DESIGN INTENT

THE LARGE WOOD HABITAT STRUCTURE IS INTENDED TO PROVIDE HABITAT DIVERSITY BY ENHANCING SCOUR POOLS, ACTING AS REFUGIA AREA DURING HIGH FLOW, CREATING NEAR-BANK FLOW PARTITION ZONES, AND POOL COVER.

CONSTRUCTION NOTES

LOGS FOR THE HABITAT STRUCTURES SHALL BE CEDAR, SPRUCE, PINE, OR FIR - APPROXIMATELY 15'-20' LONG AND 18" DIAMETER WITH 3' DIAMETER ROOTWADS. OTHER TYPES OF LOGS MAY BE USED IF APPROVED PRIOR TO CONSTRUCTION BY THE PROJECT ENGINEER.

LOGS SHALL BE ANCHORED TO EXISTING STABLE TREES. BALLAST ROCKS SHALL BE USED TO ANCHOR HABITAT LOGS WHEN STABLE TREES ARE NOT PRESENT OR INSUFFICIENT FOR STABILIZING STRUCTURES.

THE NUMBER OF LOGS AND ROOTWADS, THEIR ORIENTATION, AND BALLAST REQUIREMENTS FOR A PARTICULAR STRUCTURE WILL BE DETERMINED ON-SITE BY PROJECT ENGINEER BASED ON INDIVIDUAL SITE CHARACTERISTICS.

EXAMPLE LARGE WOOD HABITAT STRUCTURES

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LARGE WOOD HABITAT STRUCTURE

CALAPOOIA RIVER REACH 3 RESTORATION

CALAPOOIA WATERSHED COUNCIL

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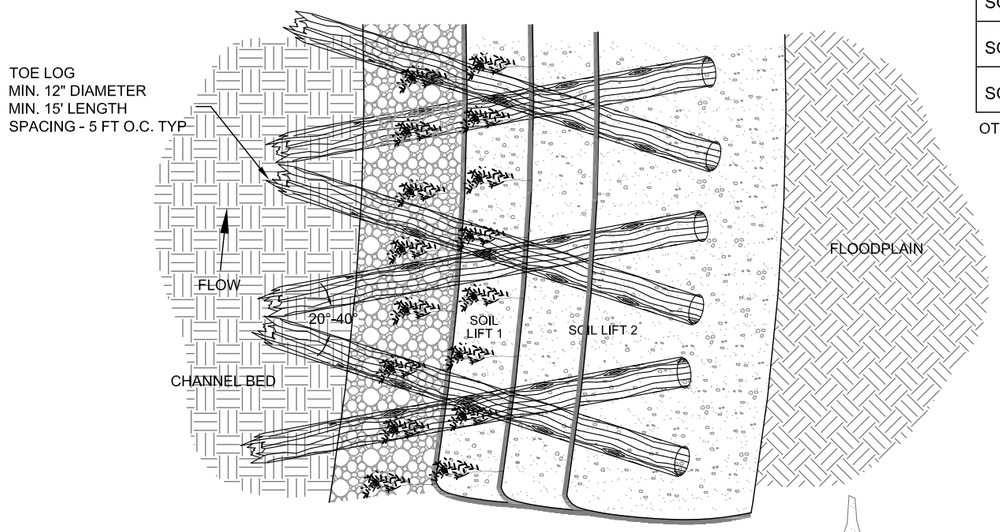
VEGETATED SOIL LIFT SCHEDULE

Callout	Height	Coir Log Designation	Outside Wrap	Inner Wrap	Stakes
SOIL LIFT 1	12"	Belton Ind . Coir Log, 12" Ø x 13 ft	Dekowe 700 Coir Mat, 4M x 50M	NAG C125n 2M x 30M	TAPERED 18" 2" x 4"
SOIL LIFT 2	12"	Belton Ind. Coir Log, 12" Ø x 13 ft	Dekowe 700 Coir Mat, 4M x 50M	NAG C125n 2M X 30M	TAPERED 18" 2" x 4"
SOIL LIFT 3	12"	Belton Ind. Coir Log, 12" Ø x 13 ft	Dekowe 700 Coir Mat, 4M x 50M	NAG C125n 2M X 30M	TAPERED 18" 2" x 4"

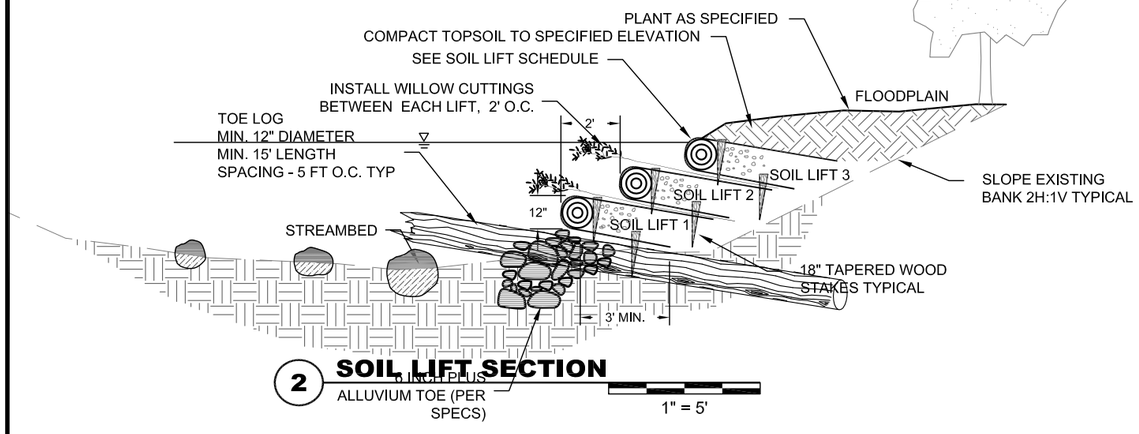
OTHER BRAND MATERIALS MAY BE SUBSTITUTED FOR SPECIFIED BRAND MATERIALS AS LONG AS SPECIFICATIONS ARE SIMILAR.



1 **TYPICAL SOIL LIFT**

1" = 5'

NUMBER OF SOIL LIFTS AND LENGTH OF TREATED BANK IS CALLED OUT ON SPECIFIC DRAWING SCHEDULE



2 **SOIL LIFT SECTION**

1" = 5'

CONSTRUCTION NOTES

TOE OF SOIL LIFT 1 SHALL BE STABILIZED USING A MIXTURE OF THE LARGEST NATURAL GRAVELS AND COBBLES FOUND IN THE STREAM, OR COARSER MATERIAL SHOULD BE IMPORTED. TOE MATERIAL MUST EXCEED THE DESIGN SHEAR STRESS. TOE SHALL BE STABILIZED DOWN TO THE MAXIMUM ANTICIPATED SCOUR DEPTH. CONSTRUCTION MANAGER SHALL VIEW AND APPROVE FOUNDATION LAYER PRIOR TO CONSTRUCTING SOIL LIFTS.

UPSTREAM AND DOWNSTREAM "TIE-IN" POINTS SHALL BE STABLE AREAS AND THE FABRIC SHALL BE STAKED TIGHTLY INTO THE STABILE AREA USING WOOD STAKES AT 2-FOOT O.C. STABLE AREAS INCLUDE LARGE WOOD OR BOULDERS TO PROTECT FABRIC TIE IN POINTS.

SLOPE ENGINEERED SOIL LIFTS APPROXIMATELY 30-DEGREES AS ILLUSTRATED ON THE SECTION DETAIL, OR ALLOW FOR A MINIMUM SETBACK OF 12-INCHES BETWEEN THE TOE FACE AND FIRST LIFT, AND 12-18" BETWEEN SUBSEQUENT LIFTS.

EMBED LIVE CUTTINGS A MINIMUM OF 5-FEET INTO SOIL LIFT, INSTALL WHILE VEGETATION IS DORMANT. MAY SUBSTITUTE CONTAINERIZED PLANTS IF PLANTED DURING THE GROWING SEASON.

THE SOIL LIFT FOUNDATION AND SUBSEQUENT LIFTS TO BE BUILT WITH A TAPERED SLOPE (45°-60°) FROM THE LIFT FACE TO THE LIFT REAR TO PROMOTE MOISTURE RETENTION AND VEGETATION GROWTH. PLACE WILLOW CUTTINGS BUTT ENDS WITHIN ONE FOOT OF BASE FLOW WATER SURFACE ELEVATION.

NOTIFY CONSTRUCTION MANAGER OF ANY PROPOSED CHANGES PRIOR TO IMPLEMENTATION. THE CONSTRUCTION MANAGER RESERVES THE RIGHT TO MODIFY STRUCTURE DESIGN SPECIFICATIONS DURING CONSTRUCTION IF WARRANTED DUE TO UNFORESEEN CONDITIONS.

INSTALL CONTAINERIZED WILLOWS AND AT LEAST 4 FOOT WILLOW CUTTINGS SELECTED FROM LOCAL SOURCES FOR OVERBANK AND RIPARIAN BUFFER. SALVAGE AND INSTALL SHRUB AND WILLOW TRANSPLANTS AS THEY ARE AVAILABLE IN CONSTRUCTED FLOODPLAIN SURFACE.

SOIL LIFT BACKFILL:

1. SOIL LIFTS SHALL CONTAIN A MIXTURE OF NATIVE GRAVELS AND SOIL FROM ON-SITE SOURCES.
2. EACH LIFT SHALL CONTAIN SOILS FOR PLANTING AND THE LIFTS SHALL BE COMPACTED USING A VIBRATORY PLATE COMPACTOR OR EQUAL TO A MINIMUM OF 90% MAXIMUM RELATIVE DENSITY.
3. WILLOW STAKES SHALL BE PLACED IN A SHALLOW LAYER OF DIRT BETWEEN EACH SOIL LIFT.
4. APPLY NATIVE SEED MIX TO INSIDE OF FRONT 2-FEET OF SOIL LIFT.
5. SOIL LIFT FABRIC TO BE DRAWN TIGHT WITH NO FOLDS, ROLLS, OR GAPS.
6. INSERT STAKES AT 18" TO 24" FROM SOIL LIFT FACE SO THAT SUBSEQUENT LIFTS COVER STAKES.
7. VEGETATE TOP OF SOIL LIFTS PER PLANTING PLANS.

EXAMPLE OF VEGETATED SOIL LIFTS FOLLOWING CONSTRUCTION (LEFT) AND DURING THE SECOND GROWING SEASON (RIGHT)

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VEGETATED SOIL LIFT

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