Appendix A: 99% Design Drawings
REACH 13 PROJECT AREA
STATION 630+00 TO 655+00
Revised

1. Final alignment of access routes through vegetated corridors to be approved at time of construction.

2. Typical access route width is 13 feet. Typical access route surface type is native material with some areas of gravel. Contractor shall protect access routes from degradation during construction. Damages to access routes shall be repaired in-kind or as otherwise approved by the contracting officer.
OFF-CHANNEL AREA 13B INLET
OFF-CHANNEL AREA 13B OUTLET
BOULDER FIELD

100 CFS

MAIN CHANNEL PROFILE STA. 644+00 TO 652+00

OFF-CHANNEL PROPOSED GRADE AT MAIN CHANNEL EDGE OF WATER, (TYP.)

NOTES:
1. MATERIAL LAYOUTS DEPICTED ARE SCHEMATIC ONLY.
   AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST LOCATIONS OF MATERIALS AND FEATURES TO OPTIMIZE HABITAT.
2. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST THE GRADING LIMITS LOCALLY TO PRESERVE MATURE TREES AND SMOOTHLY BLEND TO ADJACENT GROUND.

US Army Corps of Engineers
SAN FRANCISCO DISTRICT
455 GOLDEN GATE AVE., 4TH FLOOR
SAN FRANCISCO, CA 94102-3406
SONOMA COUNTY, CALIFORNIA
DRY CREEK ECOSYSTEM RESTORATION PROJECT - PHASE I

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
SIZE:
ISSUE DATE:
SOLICITATION NO:
CONTRACT NO:
DESCRIPTION DATE:
DRAWING NO:
OF
Inter-Fluve, Inc.
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

APN: 139-110-057
APN: 139-110-054
APN: 139-120-002
APN: 139-120-002
APN: 139-110-054
APN: 139-110-057

DAVID A. CAGLE, PROJECT MANAGER
JIM D. KUSA, CENTRAL ENGINEER
GREGORY W. GAGE, JR., JUNIOR ENGINEER
OFF-CHANNEL AREA 13A OUTLET
OFF-CHANNEL AREA 13A INLET

MAIN CHANNEL PROFILE STA. 632+00 TO 639+00

NOTES:
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APN: 139-140-033
APN: 139-120-002
APN: 139-110-036
APN: 139-110-057
APN: 139-110-036
APN: 139-140-032

NOTE: Preliminary 99% Not for Construction

STATUS 99%
NOTES:
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2. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST THE GRADING LIMITS LOCALLY TO PRESERVE MATURE TREES AND SMOOTHLY BLEND TO ADJACENT GROUND.
3. INSTALL LIVE STAKES ALONG CONSTRUCTED BANKS, SEE SPECIFICATIONS.
NOTE:
GRADING CROSS SECTIONS ARE ORIENTED LOOKING DOWNSTREAM FROM LEFT TO RIGHT. THE STATIONING ORIGIN FOR EACH SECTION IS AT THE CENTERLINE ALIGNMENT.
1. Conform grading to preserve existing trees and roots. Integrate LWS with existing mature trees as approved by the Contracting Officer.
2. See specifications for fine grading and decompaction requirements.
1. Material layout depicted are schematic only. After initial staking, the contracting officer reserves the right to adjust locations of materials and features to optimize habitat.

2. After initial staking, the contracting officer reserves the right to adjust the grading limits locally to preserve mature trees and smoothly blend to adjacent ground.

3. Install live stakes along constructed banks, see specifications.
**NOTES:**

1. MATERIAL LAYOUTS DEPICTED ARE SCHEMATIC ONLY. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST LOCATIONS OF MATERIALS AND FEATURES TO OPTIMIZE HABITAT.

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NOTE:
GRADING CROSS SECTIONS ARE ORIENTED LOOKING DOWNSTREAM FROM LEFT TO RIGHT. THE STATIONING ORIGIN FOR EACH SECTION IS AT THE DRY CREEK ALIGNMENT.
OFF-CHANNEL AREA 10B2 CHANNEL GRADING PLAN

1. CONFORM GRADING TO PRESERVE EXISTING TREES AND ROOTS. INTEGRATE LWS WITH EXISTING MATURE TREES AS APPROVED BY THE CONTRACTING OFFICER.
2. SEE SPECIFICATIONS FOR FINE GRADING AND DECOMPACTION REQUIREMENTS.

TREE CLEARING SCHEDULE

<table>
<thead>
<tr>
<th>SIZE CLASS</th>
<th>NUMBER TO BE REMOVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 12-IN DBH</td>
<td>5</td>
</tr>
<tr>
<td>12-IN TO 24-IN DBH</td>
<td>32</td>
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<tr>
<td>&gt; 24-IN DBH</td>
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</tbody>
</table>

TREES TO BE CLEARED ARE ESTIMATED BASED ON SURVEY DATA AND THE LIMITS OF DISTURBANCE SHOWN. ACTUAL NUMBER OF TREES CLEARED MAY VARY AS APPROVED BY THE CONTRACTING OFFICER.

STATUS: 99%
1. MATERIAL LAYOUTS DEPICTED ARE SCHEMATIC ONLY. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST LOCATIONS OF MATERIALS AND FEATURES TO OPTIMIZE HABITAT.

2. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST THE GRADING LIMITS LOCALLY TO PRESERVE MATURE TREES AND SMOOTHLY BLEND TO ADJACENT GROUND.

3. INSTALL LIVE STAKES ALONG CONSTRUCTED BANKS, SEE SPECIFICATIONS.
Note:
Grading cross sections are oriented looking downstream from left to right. The stationing origin for each section is at the centerline alignment.
1. Conform grading to preserve existing trees and roots. Integrate LWS with existing mature trees as approved by the contracting officer.
2. See specifications for fine grading and decompaction requirements.

Tree Clearing Schedule

<table>
<thead>
<tr>
<th>Tree Size Class</th>
<th>Treated Trees Removed</th>
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</thead>
<tbody>
<tr>
<td>&lt; 12-In DBH</td>
<td>4</td>
</tr>
<tr>
<td>12-In to 24-In</td>
<td>16</td>
</tr>
<tr>
<td>&gt; 24-In DBH</td>
<td>0</td>
</tr>
</tbody>
</table>

Trees to be cleared are estimated based on survey data and the limits of disturbance shown. Actual number of trees cleared may vary as approved by the contracting officer.
1. MATERIAL LAYOUTS DEPICTED ARE SCHEMATIC ONLY. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST LOCATIONS OF MATERIALS AND FEATURES TO OPTIMIZE HABITAT.

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NOTE: GRADING CROSS-SECTIONS ARE ORIENTED LOOKING DOWNSTREAM FROM LEFT TO RIGHT. THE STATIONING ORIGIN FOR EACH SECTION IS AT THE CENTERLINE ALIGNMENT.
OFF CHANNEL AREA 10A2 CHANNEL PLAN

CONSTRUCTION/Maintenance AND MONITORING EASEMENT (TYP.)

EXISTING TREES AND ROOTS

PREPARE EXISTING TREES AND ROOTS

AREA 10A2 GRADING CROSS-SECTIONS,
SEE SHEET 36

EDGE OF WATER
(150FT
MODIFIED 110CF)

PROPOSED GRADE, (TYP.)

EXISTING GRADE, (TYP.)

SCALE IN FEET
1" = 30'

OFF CHANNEL AREA 10A2 CHANNEL PROFILE

TREE CLEARING SCHEDULE

SIZE CLASS

NUMBER TO BE REMOVED

< 12-IN DBH

7

12-IN TO 24-IN DBH

34

> 24-IN DBH

1

TREES TO BE CLEARED ARE ESTIMATED BASED ON SURVEY DATA AND THE LIMITS OF DISTURBANCE SHOWN. ACTUAL NUMBER OF TREES CLEARED MAY VARY AS APPROVED BY THE CONTRACTING OFFICER.

NOTES:

1. CONFORM GRADING TO PRESERVE EXISTING TREES AND ROOTS. INTEGRATE LWS WITH EXISTING MATURE TREES AS APPROVED BY THE CONTRACTING OFFICER.

2. SEE SPECIFICATIONS FOR FINE GRADING AND DECOMPACTION REQUIREMENTS.
1. Material layouts depicted are schematic only. After initial staking, the contracting officer reserves the right to adjust locations of materials and features to optimize habitat.

2. After initial staking, the contracting officer reserves the right to adjust the grading limits locally to preserve mature trees and smoothly blend to adjacent ground.

3. Install live stakes along constructed banks; see specifications.
NOTE:
Grading Cross Sections are oriented looking downstream from left to right. The stationing origin for each section is at the centerline alignment.
1. Conform grading to preserve existing trees and roots. Integrate LWS with existing mature trees as approved by the contracting officer.

2. See specifications for fine grading and decompaction requirements.
NOTES:

1. MATERIAL LAYOUTS DEPICTED ARE SCHEMATIC ONLY. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST LOCATIONS OF MATERIALS AND FEATURES TO OPTIMIZE HABITAT.

2. AFTER INITIAL STAKING, THE CONTRACTING OFFICER RESERVES THE RIGHT TO ADJUST THE GRAADING LIMITS LOCALLY TO PRESERVE MATURE TREES AND SMOOTHLY BLEND TO ADJACENT GROUND.

3. INSTALL LIVE STAKES ALONG CONSTRUCTED BANKS. SEE SPECIFICATIONS.
OFF-CHANNEL AREA 10A0 CHANNEL GRADING PLAN

OFF-CHANNEL AREA 10A0 CHANNEL PROFILE

NOTES:
1. CONFORM GRADING TO PRESERVE EXISTING TREES AND ROOTS. INTEGRATE LWS WITH EXISTING MATURE TREES AS APPROVED BY THE CONTRACTING OFFICER.
2. SEE SPECIFICATIONS FOR FINE GRADING AND DECOMPACTION REQUIREMENTS.
3. FILL Voids IN EXISTING ROCK TOE WITH CALTRANS CLASS II RIPRAP AS APPROVED BY THE CONTRACTING OFFICER. EXISTING TYPE 4 BANK TREATMENT INSTALLATION MAY BE REUSED TO FILL Voids IN REMAINING EXISTING RIPRAP AS APPROVED BY THE CONTRACTING OFFICER.
4. APPROXIMATELY 15 VINES TO BE REMOVED BY CONTRACTOR IN CLOSE COORDINATION WITH LANDOWNER. LANDOWNER WILL RELOCATE END POSTS AND ADJUST IRRIGATION PRIOR TO VINE REMOVAL. CONTRACTOR SHALL HAUL OFF REMOVED VINES, ABANDONED POSTS, AND OTHER VINE ROW MATERIALS WITHIN THE REMOVAL EXTENT.

STATUS: 99%

CLARITY, LEGIBILITY, ACCURACY, COMPLETENESS, AND REVISES:
- Preliminary

ISSUE DATE:
- 31 July 2020

CONTRACT NO.:
- W912P7-22-C-XXXX

SOLICITATION NO.:
- C-41

DESIGNED BY:
- Inter-Fluve, Inc.

DRAWN BY:
-

CHECKED BY:
-

SUBMITTED BY:
-}

SIZE:
- ANSI D

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DRY CREEK ECOSYSTEM RESTORATION PROJECT - PHASE I

U.S. ARMY CORPS OF ENGINEERS
SAN FRANCISCO DISTRICT
455 GOLDEN GATE AVE., 4TH FLOOR
SAN FRANCISCO, CA 94102-3406

SONOMA COUNTY, CALIFORNIA

Preliminary 99%
BURIED CUTOFF AT CREST OF RIFFLE
MIX 20% SELECT SOIL WITH RIFFLE SUBSTRATE. LENGTH INTO BANK VARIES WITH LOCATION.

10 FEET TOE OF BANK
FLOW EXTENT VARIES BY LOCATION
Rifle Slip Face Orientation and Final Detail Grading of the Transition from Riffle To Pool To Be as Approved By the Contracting Officer.

RIFFLE CREST
RIFFLE SUBSTRATE B

TYPICAL DETAILS - SIDE CHANNEL RIFFLES

MIN. RIFFLE CREST ELEVATIONS SHOWN ON PROFILE SHALL BE AT CHANNEL CENTERLINE OR AS APPROVED BY THE CONTRACTING OFFICER

MIN. RIFFLE CREST ELEVATIONS SHOWN ON PROFILE SHALL BE AT CHANNEL CENTERLINE OR AS APPROVED BY THE CONTRACTING OFFICER

RIFFLE SUBSTRATE B

RIFFLE SUBSTRATE B

TYPICAL PLAN
SIDE CHANNEL RIFFLE CONSTRUCTION

EXTENT OF CUTOFF VARIES BY LOCATION.

EXTENT VARIATION SHOWS ON PROFILE SHALL BE AT CHANNEL CENTERLINE OR AS APPROVED BY THE CONTRACTING OFFICER

MATCH FINISHED GRADE, TYP.

MATCH FINISHED GRADE, TYP.

TYPICAL SECTION
SIDE CHANNEL RIFFLE CREST

1:1 CUT LINE EXTENDED TO MEET FINISH GRADE

TYPICAL SECTION
SIDE CHANNEL RIFFLE (NON-CREST)

TYPICAL PROFILE
SIDE CHANNEL RIFFLE
NOTE:
1. FINAL LOCATION, ALIGNMENT AND CONFIGURATION OF BOULDER FIELD TO BE CONFIRMED AT TIME OF CONSTRUCTION, APPROVAL BY CONTRACTING OFFICER.

Flow

Cluster of 3 boulders
7' spacing

Random Boulder Placement

Typical detail - Access Slope Reinforcement

Place boulders on streambed and press into channel bed to stabilize as approved by the contracting officer.

Min 6" embedment

Typical Section - Boulder Field

Cluster of 3 boulders
3/4' apart

Typical Plan - Boulder Field

1 ton boulder (typ.)
Quantity varies by location

Varies, see plan

Typical Access Ramp Profile

Access ramp slope 4H:1V max

Existing ground or ramp subgrade at 4H:1V max (Note 1)

Finished ground

Existing ground where steeper than 4H:1V (Note 1)

16" compacted thickness CalTRANS quarry spalls

Conform to adjacent ground

Typical Access Ramp Section - Cut at Top of Slope

Class I RSP

2H:1V cut side slope, typ.

Existing ground

Typical Access Ramp Section - Fill at Toe of Slope

Class I RSP

2H:1V fill side slope, typ.

Existing ground

Bush

Top of slope

Bottom of slope

Length varies

Access route

Boulder Field

Cluster of 3 boulders
1' spacing

Variable placement

Variable, see plan

TYPICAL DETAIL - ACCESS SLOPE REINFORCEMENT
TYPICAL SECTION - BANK TREATMENT TYPE 1

- FES LIFT FILLED WITH MIX OF 85% SELECT FILL, 15% SELECT SOIL
- BIODEGRADABLE FABRICS AND STAKES
- HORIZONTAL LIFT OFFSET VARIES TO MATCH FINISHED GRADE SLOPE
- PLACE CUTTINGS BETWEEN LIFTS AT 1 FT O.C.
- STAGGER VERTICALLY BETWEEN LIFTS

TYPICAL SECTION - BANK TREATMENT TYPE 2

- FES LIFT FILLED WITH MIX OF 85% SELECT FILL, 15% SELECT SOIL
- BIODEGRADABLE FABRICS AND STAKES
- HORIZONTAL LIFT OFFSET VARIES TO MATCH FINISHED GRADE SLOPE
- PLACE CUTTINGS BETWEEN LIFTS AT 1 FT O.C.
- STAGGER VERTICALLY BETWEEN LIFTS

TYPICAL SECTION - BANK TREATMENT TYPE 3

- FES LIFT FILLED WITH MIX OF 85% SELECT FILL, 15% SELECT SOIL
- BIODEGRADABLE FABRICS AND STAKES
- HORIZONTAL LIFT OFFSET VARIES TO MATCH FINISHED GRADE SLOPE
- PLACE CUTTINGS BETWEEN LIFTS AT 1 FT O.C.
- STAGGER VERTICALLY BETWEEN LIFTS
1. DIG TRENCH WITH EXCAVATOR

WILLOW STAKES 6-8 FT. LONG AND 2 TO 3.5 IN DIAMETER.

NOTES:

1. INSTALL LIVE STAKES WITH CUT ENDS IN TOE OF TRENCH.
2. INSTALL 10 LIVE STAKES PER 10 LINEAR FEET OF TRENCH.
3. BACKFILL WITH NATIVE SUBSTRATE MINIMUM 3 FT. EXPOSED ABOVE FINISHED GRADE.
4. END OF STAKE TO BE A MINIMUM OF 1 FT BELOW PROPOSED LOW FLOW USE.

BACKFILL NATIVE SUBSTRATE TO FINISH GRADE.

LOG WITH ROOTWAD, 10 FT.
NORMAL SPACING ALONG STREAM.

PACK SLASH AT BACK OF CRIB FACE.

PLACE LIVE STAKES THROUGH FULL DEPTH OF SUBSTRATE CONCURRENT WITH CONSTRUCTION APPROX SPACING 5 FT. O.C. ALONG BANK, 18 IN. O.C. UP BANK.

FILTER FABRIC COMPACTED.
SELECT SOIL COMPACTED.
SELECT FILL:

BOTTOM OF CRIB ELEVATION TBD.
FINISH GRADE.
BOTTOM OF ROCK ELEVATION TBD.

FES LIFT FILLED WITH MIX OF 85% SELECT FILL, 15% SELECT SOIL.

TOP OF CRIB ELEVATION 162.5 FT.

1. INSTALL WILLOW STAKES D-04

FLOW.

MINIMUM 3 FT. EXPOSED ABOVE FINISHED GRADE.

WILLOW STAKES 6-8 FT. LONG AND 2 TO 3.5 IN DIAMETER.

NOT TO SCALE

TYPICAL DETAIL - WILLOW BAFFLE

1. DIG TRENCH WITH EXCAVATOR

2. INSTALL WILLOW STAKES

3. BACKFILL WITH NATIVE SUBSTRATE

NOTES:

1. INSTALL LIVE STAKES WITH CUT ENDS IN TOE OF TRENCH.
2. INSTALL 10 LIVE STAKES FOR 10 LINEAR FEET OF TRENCH.

TYPICAL DETAIL - BRUSH PILE

BRUSH PILE, TYP. 5-12 FT.
WIDE, 2-4 FT. HIGH AT 50 FT. O.C. AVERAGE SPACING.

4 TO 6 SMALL SNAGS. TYP. SNAGS SHALL BE 6" TO 10" IN DIAMETER. DRIVEN 4 FT. INTO THE GROUND, LEAVING 2 FEET ABOVE GROUND WITHIN BRUSH PILE.
1. Insert and drive wood stakes between the fibers of the woven coir fabric. Fibers at wood stake location shall be manually stretched to accommodate the wood stake without breaking the fabric fibers. Staking shall not be facilitated by pre-cutting of the coir fabrics.

2. Forms may be angled to create bends in the lifts as needed. Fabric shall be folded as shown. Stake the folds as shown.

3. Outer fabric ends shall be joined by lapping the upstream piece of fabric over the downstream piece as shown.

---

**General Notes on Securing Coir Fabric**

1. Insert and drive wood stakes between the fibers of the woven coir fabric. Finders at wood stake location shall be manually stretched to accommodate the wood stake without breaking the fabric fibers. Staking shall not be facilitated by pre-cutting of the coir fabrics.

2. Forms may be angled to create bends in the lifts as needed. Fabric shall be folded as shown. Stake the folds as shown.

3. Outer fabric ends shall be joined by lapping the upstream piece of fabric over the downstream piece as shown.
1. TOP AND BOTTOM LIFTS SHALL USE 13 FT. WIDE WOVEN COIR FOR THE OUTER FABRIC. MIDDLE LIFTS MAY USE 9.8 FT. WIDE WOVEN COIR FOR THE OUTER FABRIC.

2. FABRIC MAY BE CONSTRUCTED IN EITHER AN UPSTREAM OR DOWNSTREAM DIRECTION, AS LONG AS THE FABRIC IS OVERLAPPED IN THE PROPER DIRECTION.

3. EACH LIFT MAY HAVE A UNIQUE FILL COMPOSITION AND VARYING PLACEMENT OF CUTTINGS. SEE TYPICAL SECTIONS.

4. PLACE A SERIES OF THREE OR MORE FORMS ON THE GROUND SO THAT THE FORMS STRETCH TIGHTLY TOGETHER. CUTOFF THE OUTSIDE FABRIC PARALLEL TO THE LONG AXIS OF THE CHANNEL AND POSITION IT SO THAT AT LEAST 1 FT. EXTENDS TO THE POINT AT WHICH THE ABOVE LIFT WILL OVERLAP (FIG C).


6. APPLY SEED MIX TO INNER FABRIC ALONG VERTICAL EDGE OF LIFT (FIG C). PLACE SELECT SOIL ON LIFT. PLACE LIVE CUTTINGS AT 6 IN. ON CENTER.

7. APPLY SEED MIX TO TOP OF FILL FROM THE FRONT OF THE LIFT TO THE POINT AT WHICH THE ABOVE LIFT WILL OVERLAP (FIG G). FOLD THE LOOSE ENDS OF THE TWO OUTER FABRIC LAYERS BACK OVER THE COMPACTED FILL MATERIAL AND STRETCH TIGHTLY TO REMOVE WRINKLES (FIG D). SECURE WITH WOODEN STAKES AT 3 FT. ON CENTER. LEAVE A MINIMUM OF 1 FT. BETWEEN LIFTS. SHAPES THE TRENCH. SECURE FABRIC WITH WOODEN STAKES AT 3 FT. ON CENTER.


10. PLACE 3 IN. OF SELECT SOIL ON LIFT. PLACE LIVE CUTTINGS AT 6 IN. ON CENTER.


12. REPEAT STEPS 2 THROUGH 11 TO ACHIEVE FULL FES TREATMENT HEIGHT.

13. WHERE THE TOP OF THE LIFT MEETS THE GROUND SURFACE, EXCAVATE A KEY TRENCH 1-3 FT. WIDE AND 1 FT. DEEP ALONG THE EDGE OF THE OUTER FABRIC. PLACE SELECT SOIL OVER THE KEY TRENCH. SECURE THE FABRIC IN THE KEY TRENCH WITH WOODEN STAKES AT 3 FT. ON CENTER.

14. BACKFILL THE KEY TRENCH AND CONTINUE TO BACKFILL AND COMPACT TO SMOOTHLY MERGE WITH THE ADJACENT FINISHED GRADE. APPLY SEED MIX TO KEY TRENCH AREA.

**TYPICAL SEQUENCE**

**CONSTRUCTION SEQUENCE FOR FES LIFTS**

**TYPICAL ELEVATION VIEW**
LEGS MAY OVERLAP AS NEEDED. FORMS MAY BE SKEWED TO CREATE STREAM BENDS AS NEEDED.

1 FT. 3 FT. 3 FT. 3/4 INCH PLYWOOD. 1 FT. MAX.

TYPICAL ISOMETRIC DETAIL
FABRICATED CONSTRUCTION FORM FOR FES LIFTS

NOT TO SCALE (ISOMETRIC VIEW FROM REAR)

TYPICAL ISOMETRIC DETAIL
FABRICATED CONSTRUCTION FORM FOR FES LIFTS

NOT TO SCALE (ISOMETRIC VIEW FROM FRONT)

TYPICAL PLAN DETAIL
FABRICATED CONSTRUCTION FORM FOR FES LIFTS

TYPICAL SEQUENCE
BOX END AT FES LIFT TERMINATION

EDGE OF ADJACENT TREATMENT OR NATIVE GROUND

FABRIC WRAPPED LIFT

ISOMETRIC VIEW
BOX END AT FES LIFT TERMINATION

TYPICAL SEQUENCE
BOX END AT FES LIFT TERMINATION

EDGE OF EXCAVATION

EXISTING STREAMBANK OR ADJACENT TREATMENT

NOTE: INNER FABRIC SHOULD BE INSTALLED WITHIN BOTH VERTICAL FACES OF THE BOX END.

2 FT. (TYP.)
1/4 IN. CARRIAGE BOLT WITH NUT AND WASHER (TYP.)

8 FT. CONSTRUCTION FORMS

1/4 x 2 INCH STRAP STEEL (TYP.)
WELDED JOINTS (TYP.)

STREAM BANK ALIGNMENT
LEGS MAY OVERLAP AS NEEDED

FORMS MAY BE SKEWED TO CREATE STREAM BENDS AS NEEDED

45° (TYP.)

FOLD LINES (TYP.)
LIFT

STEP 1
STEP 2
STEP 3
STEP 4
STEP 5
STEP 6

1/4 IN. CARRIAGE BOLT WITH NUT AND WASHER (TYP.)

1 INCH SQUARE STEEL TUBING

1/4 x 2 INCH STRAP STEEL (TYP.)

WELDED JOINTS (TYP.)

1/4 IN. CARRIAGE BOLT WITH NUT AND WASHER (TYP.)

1 INCH SQUARE STEEL TUBING

1/4 IN. CARRIAGE BOLT WITH NUT AND WASHER (TYP.)

1 INCH SQUARE STEEL TUBING

1/4 x 2 INCH STRAP STEEL (TYP.)
STEP 1.
1. PREPARE SITE INCLUDING CLEARING AND GRUBBING THE TREATMENT LENGTH.
2. ISOLATE WORKING AREA FROM FLOW PER PERMIT AND WORKING CONDITION REQUIREMENTS.

STEP 2.
1. EXCAVATE SUBGRADE TO TOP ELEVATION FOR BOTTOM COURSE OF LOGS. SLOPE SUBGRADE EXCAVATION TOWARD THE CREEK.

STEP 3.
1. EXCAVATE AND INSTALL TOE TRENCH. BACKFILL TRENCH WITH NATIVE SUBSTRATE.
2. INSTALL LWM COURSE 1 (HEADERS) BY TRENCHING EACH LOG INTO SUBGRADE TO DESIGN DEPTH.
3. HEADER LOGS TO OVERLAP BY 5 FT.
4. ANGLE LWM AT END TERMINATIONS TO EXTEND TO THE FULL LIMITS OF BANK TREATMENT.

STEP 4.
1. INSTALL AND CONNECT LWM COURSE 2 (STRINGERS), 25% OF LWM WITH ROOTWADS SHALL EXTEND 8 FT. PAST THE NEAREST EDGE OF THE BANK INTO THE CHANNEL.
2. STRINGERS ARE TO BE STAGGERED HORIZONTALLY.
3. PACK SLASH AGAINST BANK SIDE OF CRIB FORMED BY LWM COURSES 1 AND 2.
4. ANGLE LWM AT END TERMINATIONS TO EXTEND TO THE FULL LIMITS OF BANK TREATMENT AND BLEND TO EXISTING GRADE.
5. ALTERNATELY INSTALL LIVE CUTTINGS, SELECT FILL, NONWOVEN COIR FABRIC, GRAVEL FILTER, AND BACKFILL TO TOP OF LWM COURSE.

STEP 5.
1. INSTALL AND CONNECT LWM COURSE 3 (HEADERS).
2. HEADER LOGS TO OVERLAP BY 5 FT.
3. ANGLE LWM AT END TERMINATIONS TO EXTEND TO THE FULL LIMITS OF BANK TREATMENT AND BLEND TO EXISTING GRADE.

GENERAL SHEET NOTES:
1. ORIENTATION AND CONFIGURATION OF LARGE WOOD MAY BE ADJUSTED AS APPROVED BY THE CONTRACTING OFFICER.
2. SEQUENCING PROVIDED AS GENERAL GUIDELINES FOR LWS CONSTRUCTION.
3. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57.
4. SEE SHEET 72 FOR LWS ATTACHMENT DETAILS.
5. SHADED LARGE WOOD REPRESENTS CURRENT LAYER BEING INSTALLED IN EACH STEP.
6. UNSHADED LARGE WOOD REPRESENTS PREVIOUS LAYER INSTALLED AND BACKFILLED, EXCEPT FOR SNAGS, WHICH ARE SHADED FOR REFERENCE.
BANK LWS NOTES:

1. VARY LWS ORIENTATION AND PROJECTION INTO CHANNEL TO OPTIMIZE HABITAT AS APPROVED BY THE CONTRACTING OFFICER.

2. BALLAST BOULDER CONNECTIONS SHALL BE WITHIN THE BACKFILL UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.

3. LOCATION AND ORIENITATIONS OF LOGS AND LOGS WITH ROOTWADS MAY VARY BETWEEN LAYERS FROM SITE TO SITE, TO BE CONFIRMED DURING CONSTRUCTION WITH CONTRACTING OFFICER.

4. SALVAGED WHOLE TREES INCORPORATED INTO THE LWS SHALL HAVE A DIAMETER AT BREAST HEIGHT NO MORE THAN 16-IN AND A LENGTH NO MORE THAN 40-FT. SALVAGED WHOLE TREES SHALL HAVE AN INTACT ROOTWAD UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.

GENERAL LWS NOTES:

1. SPECIFIC ORIENTATION OF LWS AND BALLAST MATERIALS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SITE CONDITIONS AND SIZE AND SHAPE OF MATERIALS DELIVERED TO THE SITE.

2. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER DURING INSTALLATION OF LWS TO CONFIRM PLACEMENT, ORIENTATION AND BALLASTING.

3. LWS SHALL BE BALLASTED TO RESIST BUOYANCY BY PARTIAL BURIAL, CONNECTION TO OTHER LWS, CONNECTION TO VERTICAL SNAGS OR BOULDERS, OR OTHER METHODS CONFIRMED BY THE CONTRACTING OFFICER.

4. EXISTING STANDING TREES MAY BE SUBSTITUTED FOR SNAGS IN SELECT LOCATIONS, TO BE CONFIRMED BY THE CONTRACTING OFFICER.

5. BALLAST BOULDERS TO BE PLACED BELOW FINISH GRADE ONLY.

6. SUBGRADE SLOPE MAY BE ADJUSTED BASED ON LOCAL SITE CONDITIONS AS APPROVED BY THE CONTRACTING OFFICER.

7. DUE TO ANTICIPATED VARIATION IN MATERIAL SIZE AND SITE CONDITIONS ENCOUNTERED, EXACT DIMENSIONS MAY VARY.
1. PREPARE SITE
2. EXCAVATE TO SUBGRADE
3. INSTALL SNAGS
4. PLACE LAYER 1 LWM
5. CONNECT LAYER 1 LWM, MINIMUM 2 CONNECTIONS PER LWM, CONNECTIONS TO VERTICAL SNAGS.
6. PLACE Boulders AS APPROVED BY CONTRACTING OFFICER.
7. CONNECT Boulders TO LAYER 1 LWM
8. BACKFILL AND COMPACT WITH SELECT FILL MATERIAL TO TOP OF LAYER 1
9. PLACE SLASH OVER STRUCTURE WITH SLASH.
1. ORIENTATION AND CONFIGURATION OF LARGE WOOD MAY BE ADJUSTED AS APPROVED BY THE CONTRACTING OFFICER.
2. SEE SHEET 70 FOR LWS ATTACHMENT AND BALLASTING DETAILS.
3. SEQUENCING PROVIDED TO REFLECT GENERAL LEVEL OF EFFORT FOR LWS CONSTRUCTION.
4. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 70.
5. SHADED LARGE WOOD REPRESENTS CURRENT LAYER BEING INSTALLED IN EACH STEP.
6. UNSHADED LARGE WOOD REPRESENTS PREVIOUS LAYER INSTALLED AND BACKFILLED, EXCEPT FOR SNAGS, WHICH ARE SHADED FOR REFERENCE.
GENERAL SHEET NOTES:
1. ORIENTATION AND CONFIGURATION OF LARGE WOOD MAY BE ADJUSTED AS APPROVED BY THE CONTRACTING OFFICER.
2. SEQUENCING PROVIDED TO REFLECT GENERAL LEVEL OF EFFORT FOR LWS CONSTRUCTION.
3. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57.
4. SEE SHEET 72 FOR LWS ATTACHMENT DETAILS.
5. SHADED LARGE WOOD REPRESENTS CURRENT LAYER BEING INSTALLED IN EACH STEP.
6. UNSHADED LARGE WOOD REPRESENTS PREVIOUS LAYER INSTALLED AND BACKFILLED, EXCEPT FOR SNAGS, WHICH ARE SHADED FOR REFERENCE.

TYPICAL CONSTRUCTION SEQUENCE - LOW BANK POOL LWS

STEP 1
1. CLEAR SITE.
2. INSTALL VERTICAL SNAGS AND BALLAST BOULDERS.
3. PLACE BALLAST BOULDERS FOR LAYER 1 LWM.
4. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 2
1. INSTALL LAYER 1 LOGS. ATTACH TO VERTICAL SNAGS. 2 CONNECTIONS (MIN) PER LOG.
2. PLACE BALLAST BOULDERS FOR LAYER 2 LWM.
3. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 3
1. INSTALL LAYER 2 LOGS. ATTACH TO PREVIOUS LOGS, VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 4
1. INSTALL LAYER 3 LOGS. ATTACH TO PREVIOUS LOGS, VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 5
1. INSTALL LAYER 4 LOGS. ATTACH TO PREVIOUS LOGS, VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 6
1. INSTALL LAYER 5 LOGS. ATTACH TO PREVIOUS LOGS, VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PACK VOIDS OF STRUCTURE WITH SLASH.

TYPICAL CONSTRUCTION SEQUENCE - HIGH BANK POOL LWS

STEP 1
1. CLEAR SITE.
2. INSTALL VERTICAL SNAGS.
3. PLACE BALLAST BOULDERS FOR LAYER 1 LWM.
4. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 2
1. INSTALL LAYER 1 LOGS. ATTACH TO VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PLACE BALLAST BOULDERS.
3. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 3
1. INSTALL LAYER 2 LOGS. ATTACH TO VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PLACE BALLAST BOULDERS.
3. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 4
1. INSTALL LAYER 3 LOGS. ATTACH TO VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PLACE BALLAST BOULDERS.
3. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 5
1. INSTALL LAYER 4 LOGS. ATTACH TO VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PLACE BALLAST BOULDERS.
3. PACK VOIDS OF STRUCTURE WITH SLASH.

STEP 6
1. INSTALL LAYER 5 LOGS. ATTACH TO VERTICAL SNAGS AND BALLAST BOULDERS. 2 CONNECTIONS (MIN).
2. PLACE BALLAST BOULDERS.
3. PLACE LOG TIGHTLY AGAINST SLOPE.
4. PACK VOIDS OF STRUCTURE WITH SLASH.
**STEP 1**
1. PREPARE SITE
2. EXCAVATE TO SUBGRADE. SLOPE SUBGRADE EXCAVATION TOWARD THE CREEK.
3. INSTALL VERTICAL SNAGS.

**STEP 2**
1. INSTALL LAYER 2 LWM.
2. INSTALL ASSOCIATED BOULDERS.
3. ATTACH LOGS TO SNAGS AND BOULDERS. 2 CONNECTIONS PER LOG.
4. BACKFILL TO TOP OF LAYER 1.

**STEP 3**
1. INSTALL LAYER 3 LWM.
2. INSTALL ASSOCIATED BOULDERS.
3. ATTACH LOGS TO LOGS, SNAGS AND BOULDERS. 2 CONNECTIONS PER LOG.
4. BACKFILL TO TOP OF LAYER 2.

**STEP 4**
1. INSTALL LAYER 4 LWM.
2. ATTACH LOGS TO LOGS, SNAGS AND BOULDERS. 2 CONNECTIONS PER LOG.
3. BACKFILL TO TOP OF LAYER 3.

**STEP 5**
1. PLACE LAYER 4 LWM.
2. ATTACH LOG TO LOGS AND SNAGS. 2 CONNECTIONS PER LOG.
3. BACKFILL WITH SELECT FILL TO TO THE FINISHED GRADE. ROOTWADS AND LOGS SHALL REMAIN EXPOSED AS SHOWN.

**STEP 6**
1. INSTALL LAYER 4 LWM.
2. INSTALL ASSOCIATED BOULDERS.
3. ATTACH LOGS TO LOGS, SNAGS AND BOULDERS. 2 CONNECTIONS PER LOG.
4. BACKFILL TO TOP OF LAYER 2.

**FINISHED CONDITION**

**GENERAL SHEET NOTES:**
1. ORIENTATION AND CONFIGURATION OF LARGE WOOD MAY BE ADJUSTED AS APPROVED BY THE CONTRACTING OFFICER.
2. SEQUENCING PROVIDED TO REFLECT GENERAL LEVEL OF EFFORT FOR LWS CONSTRUCTION.
3. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57.
4. SEE SHEET 72 FOR LWS ATTACHMENT DETAILS.
5. SHADED LARGE WOOD \( \rightarrow \) REPRESENTS CURRENT LAYER BEING INSTALLED IN EACH STEP.
6. UNSHADED LARGE WOOD \( \rightarrow \) REPRESENTS PREVIOUS LAYER INSTALLED AND BACKFILLED, EXCEPT FOR SNAGS, WHICH ARE SHADED FOR REFERENCE.
ATTACH LOGS TO VERTICAL SNAG (TYP.)

VERTICAL SNAG OR EXISTING TREE

ATTACH LOGS TO SNAG OR EXISTING TREE TO BE CONFIRMED BY CONTRACTING OFFICER.

FLOW

PACK VODIS OF LWS WITH SLASH AND ROOTWAD

LIMIT OF EXCAVATION

SLOPE SSUBGRADE EXCAVATION TOWARD THE CREEK AT 1S:1

ATTACH LOGS TO SNAGS AND OTHER LOGS

VARY HORIZONTAL ANGLE OF LARGE WOOD TO OPTIMIZE HABITAT PER CONTRACTING OFFICER

STAKEOUT REFERENCE POINT

TOP OF SUBGRADE EXCAVATION

PACK VODIS OF LWS WITH SLASH AND NO MORE THAN 1 SALVAGED WHOLE TREE (NOTE 4)

GENERAL SHEET NOTES:
1. SEE GENERAL LWS INSTALLATION NOTES ON SHEET ST.
2. SEE SHEET 72 FOR LWS ATTACHMENT AND BALLASTING DETAILS.
3. SEE SHEET 65-66 FOR SIDE CHANNEL LWS CONSTRUCTION SEQUENCE.
4. SALVAGED WHOLE TREES INCORPORATED INTO THE LWS SHALL HAVE A DIAMETER AT BREAST HEIGHT NO MORE THAN 16-IN AND A LENGTH NO MORE THAN 40-FT. SALVAGED WHOLE TREES SHALL HAVE AN INTACT ROOTWAD UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
**TYPICAL CONSTRUCTION SEQUENCE - SIDE CHANNEL LWS (RIVER RIGHT)**

**STEP 1.**
1. Prepare Site
2. Excavate to subgrade.
3. Install Snags.

**STEP 2.**
1. Install Layer 1 Logs
2. Attach Logs to Logs and Snags. 2 Connections per Log.

**STEP 3.**
1. Install Layer 2 Logs
2. Attach Logs to Logs and Snags. 2 Connections per Log.

**STEP 4.**
1. Install Layer 3 Log. Angle to be adjusted in field to optimize habitat.
2. Attach Logs to Logs and Snags. 2 Connections per Log.

**STEP 5.**
1. Backfill with select fill. Confirm backfill extent with contracting officer.

**GENERAL SHEET NOTES:**
1. Orientation and configuration of large wood may be adjusted as approved by the contracting officer.
2. Sequencing provided to reflect general level of effort for LWS construction.
3. See General LWS Installation Notes on Sheet 57.
4. See Sheet 72 for LWS attachment details.
5. Shaded large wood represents current layer being installed in each step.
6. Unshaded large wood represents previous layer installed and backfilled, except for Snags, which are shaded for reference.
**General Sheet Notes:**

1. **Orientation and Configuration of Large Wood** may be adjusted as approved by the Contracting Officer.
2. **Sequencing** provided to reflect general level of effort for LWS construction.
3. See General LWS Installation Notes on Sheet 57.
4. See Sheet 72 for LWS Attachment Details.
5. Shaded Large Wood [ ] represents current layer being installed in each step.
6. Unshaded Large Wood [ ] represents previous layer installed and backfilled, except for Snags, which are shaded for reference.

**Typical Construction Sequence - Side Channel LWS (River Left)**

**Step 1.**
1. Prepare site
2. Excavate to Subgrade Slope
3. Install Snags.

**Step 2.**
1. Install Layer 1 Logs

**Step 3.**
1. Install Layer 2 Logs
2. Attach Logs to Logs and Snags. 2 Connections Per Log.
3. Backfill Layer 1

**Step 4.**
1. Install Layer 3 Logs. Angle to be Adjusted in Field to Optimize Habitat.
2. Attach Logs to Logs and Snags. 2 Connections Per Log.

**Step 5.**
1. Backfill with Select Fill
2. Confirm Backfill Extent with Contracting Officer.

**Scale in Feet**

0
20
40
60
80
100

**Plan View**

**Typical Construction Sequence - Side Channel LWS (River Left)**
GENERAL SHEET NOTES:

1. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57.
2. SEE SHEET 72 FOR LWS ATTACHMENT AND BALLASTING DETAILS.
3. SEE SHEET 68 LWS CONSTRUCTION SEQUENCE.
4. SALVAGED WHOLE TREES INCORPORATED INTO THE LWS SHALL HAVE A DIAMETER AT BREAST HEIGHT NO MORE THAN 16-IN AND A LENGTH NO MORE THAN 40-FT. SALVAGED WHOLE TREES SHALL HAVE AN INTACT ROOTWAD UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
TYPICAL CONSTRUCTION SEQUENCE - APEX LWS

STEP 1
1. PREPARE SITE
2. EXCAVATE TO SUBGRADE
3. INSTALL SNAGS
4. PLACE LAYER 1 LWS
5. CONNECT LAYER 1 LWS, MINIMUM 2 CONNECTIONS PER LWS. CONNECTIONS INCLUDE LWS TO LWS OR LWS TO SNAG
6. CONNECT BOULDER BALLAST TO LAYER 1 LWS

STEP 2
1. PLACE LAYER 2 LWS
2. CONNECT LAYER 2 LWS, MINIMUM 2 CONNECTIONS PER LWS. CONNECTIONS INCLUDE LWS TO LWS OR LWS TO SNAG
3. PLACE BALLAST BOULDER AS APPROVED BY CONTRACTING OFFICER
4. CONNECT BOULDER BALLAST TO LAYER 2 LWS

STEP 3
1. PLACE LAYER 3 LWS
2. CONNECT LAYER 3 LWS, MINIMUM 2 CONNECTIONS PER LWS. CONNECTIONS INCLUDE LWS TO LWS OR LWS TO SNAG
3. PLACE SLASH OVER LAYER 2 LWS AS SHOWN
4. BACKFILL AND COMPACT WITH SELECT FILL MATERIAL TO TOP OF LAYER 2

STEP 4
1. PLACE LAYER 4 LWS
2. CONNECT LAYER 4 LWS, MINIMUM 2 CONNECTIONS PER LWS. CONNECTIONS INCLUDE LWS TO LWS OR LWS TO SNAG
3. PLACE SLASH OVER LAYER 4 LWS AS SHOWN

STEP 5
1. PLACE LAYER 5 LWS
2. CONNECT LAYER 5 LWS, MINIMUM 2 CONNECTIONS PER LWS. CONNECTIONS INCLUDE LWS TO LWS OR LWS TO SNAG
3. BACKFILL AND COMPACT WITH SELECT FILL MATERIAL TO TOP OF LAYER 4
4. PLACE SLASH OVER LAYER 5 LWS AS SHOWN

STEP 6
1. PLACE LAYER 6 LWS
2. CONNECT LAYER 6 LWS, MINIMUM 2 CONNECTIONS PER LWS. CONNECTIONS INCLUDE LWS TO LWS OR LWS TO SNAG
3. PLACE SLASH OVER LAYER 6 LWS AS SHOWN
4. BACKFILL AND COMPACT WITH SELECT FILL MATERIAL TO TOP OF LAYER 6

GENERAL SHEET NOTES:
1. ORIENTATION AND CONFIGURATION OF LARGE WOOD MAY BE ADJUSTED AS APPROVED BY THE CONTRACTING OFFICER.
2. SEQUENCING PROVIDED TO REFLECT GENERAL LEVEL OF EFFORT FOR LWS CONSTRUCTION.
3. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57
4. SEE SHEET 72 FOR LWS ATTACHMENT DETAILS.
5. SHADED LARGE WOOD REPRESENTS CURRENT LAYER BEING INSTALLED IN EACH STEP
6. UNSHADED LARGE WOOD REPRESENTS PREVIOUS LAYER INSTALLED AND BACKFILLED, EXCEPT FOR SNAGS, WHICH ARE SHADED FOR REFERENCE.
GENERAL SHEET NOTES:

1. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57.
2. SEE SHEET 72 FOR LWS ATTACHMENT AND BALLASTING DETAILS.
3. SEE SHEET 70 INLET LWS CONSTRUCTION SEQUENCE.
4. SALVAGED WHOLE TREES INCORPORATED INTO THE LWS SHALL HAVE A DIAMETER AT BREAST HEIGHT NO MORE THAN 16-IN AND A LENGTH NO MORE THAN 40-FT. SALVAGED WHOLE TREES SHALL HAVE AN INTACT ROOTWAD UNLESS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
TYPICAL CONSTRUCTION SEQUENCE - INLET LWS

**STEP 1.**
1. PREPARE SITE.
2. EXCAVATE TO SUBGRADE, BLOW SUBGRADE EXCAVATION TOWARDS THE INLET CHANNEL.
3. INSTALL SNAGS.
4. PLACE INLET SUBSTRATE.

**STEP 2.**
1. INSTALL LAYER 1 LOGS.
2. ATTACH LOGS TO SNAGS, MIN. 2 CONNECTIONS PER LOG.
3. BACKFILL LAYER 1.

**STEP 3.**
1. INSTALL LAYER 2 LOGS.
2. ATTACH LOGS TO LOGS AND SNAGS, MINIMUM 2 CONNECTIONS PER LOG.
3. BACKFILL LAYER 2.

**STEP 4.**
1. INSTALL LAYER 3 LOGS.
2. ATTACH LOGS TO LOGS AND SNAGS, MINIMUM 2 CONNECTIONS PER LOG.
3. BACKFILL LAYER 3.

**STEP 5.**
1. INSTALL LAYER 4 LOGS.
2. ATTACH LOGS TO LOGS AND SNAGS, MINIMUM 2 CONNECTIONS PER LOG.
3. BACKFILL LAYER 4.

**STEP 6.**
FINISHED CONDITION.

**GENERAL SHEET NOTES:**
1. ORIENTATION AND CONFIGURATION OF LARGE WOOD MAY BE ADJUSTED AS APPROVED BY THE CONTRACTING OFFICER.
2. SEQUENCING PROVIDED TO REFLECT GENERAL LEVEL OF EFFORT FOR LWS CONSTRUCTION.
3. SEE GENERAL LWS INSTALLATION NOTES ON SHEET 57.
4. SEE SHEET 72 FOR LWS ATTACHMENT DETAILS.
5. SHADED LARGE WOOD REPRESENTS CURRENT LAYER BEING INSTALLED IN EACH STEP.
6. UNSHADED LARGE WOOD REPRESENTS PREVIOUS LAYER INSTALLED AND BACKFILLED, WHICH ARE SHADED FOR REFERENCE.
### REACH 13 LWS SUMMARY OF QUANTITIES

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**Notes:**
1. Reduced snags are part of the total snag quantity (i.e., reduced snag + either snag + total snag).

**DRY SPECIFICATIONS FOR GOVERNMENT PURCHASED LOG DIMENSION REQUIREMENTS:**
- **Breast Height (APPLC. 4-FT):**
  - Character at Breast Height (DBH)
  - Taper = [Butt DIA - Tip DIA] / Tip Pointing For Driving
  - Not Included in Length
- **Log Length:**
  - Tip Pointing For Driving
  - Not Included in Length

**SNAG DIMENSIONING:**
- **Breast Height (APPLC. 4-FT):**
  - Character at Breast Height (DBH)
  - Taper = [Butt DIA - Tip DIA] / Tip Pointing For Driving
  - Not Included in Length
- **Log Length:**
  - Tip Pointing For Driving
  - Not Included in Length

**ROOTWAD:**
- **Breast Height (APPLC. 4-FT):**
  - Character at Breast Height (DBH)
  - Taper = [Butt DIA - Tip DIA] / Tip Pointing For Driving
  - Cut End

**ROOTWAD LOG DIMENSIONING:**
- **Breast Height (APPLC. 4-FT):**
  - Character at Breast Height (DBH)
  - Taper = [Butt DIA - Tip DIA] / Tip Pointing For Driving
  - Not Included in Length
- **Log Length:**
  - Tip Pointing For Driving
  - Not Included in Length

### REACH 10 LWS SUMMARY OF QUANTITIES

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**Notes:**
1. Reduced snags are part of the total snag quantity (i.e., reduced snag + either snag + total snag).
**NOTES:**

1. Threadbar shall be the same size as for log to log attachment.
2. Chain shall be sized according to threadbar diameter. See specifications.
3. Detail applies to single boulder or pair of boulders as shown. For single boulder, treat opposite end of threadbar the same as for log to log attachment.
4. If end of threadbar extends more than 3 in. beyond nut, cut off excess to no closer than 1 in. from nut.
5. Peen end of threadbar or chisel threads so nut cannot be backed off.
6. File or grind off sharp edges.

---

**LOG ATTACHMENT A**

**NOT TO SCALE**

**TYPICAL DETAIL**

**LOG TO BOULDER ATTACHMENT A**

**NOT TO SCALE**

---

**TYPICAL DETAIL**

**LOG ATTACHMENT A**

**NOT TO SCALE**

---

**NOTES:**

1. Pin log to log, log to snag, or log to tree.
2. Insert threadbar through both logs.
3. Place washers over each end of threadbar; thread a nut onto each end of threadbar and tighten until wood crushes.
4. If end of threadbar extends more than 2 in. beyond nut, cut off excess to no closer than 1 in. from the nut.
5. Peen end of threadbar or chisel threads so nut cannot be backed off.
6. File or grind off sharp edges.