CONSTRUCTION NOTES

FOR PILE-SUPPORTED LWD:
1. INSTALL BURIED LOG PILES (SECTION 9.08) TO DEPTH SHOWN. CONTRACTOR RESPONSIBLE FOR EXCAVATION, SUPPORT AND PROTECTION. PLACE LOG RULE BUT END DOWN. BURIAL AROUND BURIED LOG PILES TO EXISTING GRADES IN ACCORDANCE WITH SECTION 8.06.
2. EXCAVATE TO PLACE REDUNDANT.
3. PLACEROOTWAD LOG AND LOG POLES Flush WITH EXISTING GRADE. ROOTWAD LOGS AND LOG POLES ON LAYER ONE SHALL BE IN CONTINUOUS CONTACT WITH THE GROUND SURFACE ON THE UNDERSIDE OF THE POLE EXCEPT WHERE SHOWN AROUND THE ROOTWAD.
4. SHOES SHOWN WITH ROOTWAD PILES UPFRONT.
5. BURIAL ALL ROOTWAD LOGS AND LOG POLES TOGETHER TO THE BURIED LOG PILES PER DETAILS 1, 2, AND 4 ON PERM NOD. 10.
5.1 USE 3/8" DIA. GALVANIZED WIRE ROPES AND ASSOCIATED HARDWARE PER SECTION 9.06 FOR ALL CONNECTIONS.
6. BOLTED INTERIOR OF STRUCTURE WITH NATIVE SANDS AND GRAVELS FLUSH WITH THE TOP OF LAYER ONE. DO NOT COMPACT BACKFILL.

FOR BOULDER-SUPPORTED LWD:
1. INSTALL ROCK ANCHORS AND EYE BOLTS, ONE PER BOULDER.
2. EYE BOLTS SHALL BE SHOWN WITH EYE BOLTS SHOWN THE TOP OF THE BOULDER.
3. PLACE ROOTWAD LOG AS SHOWN.
4. DRILL A HOLE THROUGH BOTH ROOTWAD LOGS AT THEIR INTERSECTION AND CONNECT THE ROOTWAD LOGS TOGETHER USING 3/8" DIA. GALVANIZED WIRE ROPES AND ASSOCIATED HARDWARE PER SECTION 9.06 FOR ALL CONNECTIONS.
5. DRILL HOLE THROUGH ROOTWAD LOGS NEAR EYE BOLTS AND CONNECT TOGETHER USING 3/8" DIA. GALVANIZED WIRE ROPES AND ASSOCIATED HARDWARE PER SECTION 9.06 FOR ALL CONNECTIONS.
6. BACKFILL INTERIOR OF STRUCTURE WITH NATIVE SANDS AND GRAVELS FLUSH WITH THE TOP OF LAYER ONE. DO NOT COMPACT BACKFILL.

RE-VESATATION NOTE
10. CONTRACTOR SHALL COORDINATE WITH RE-VESATATION CREDNS FOR INSTALLATION OF PLANTS. PLANTS WILL BE INSTALLED BY OTHERS WITHIN THE STRUCTURE NEAR THE GRADE/MAINTENANCE LEVEL. CARE SHALL BE TAKEN NOT TO DAMAGE PLANTINGS INSTALLED PRIOR TO COMPLETION OF THE STRUCTURE.

FEATURE LWD QUANTITIES

<table>
<thead>
<tr>
<th>VERSION</th>
<th>_LAYER</th>
<th>ITEM</th>
<th>LOG DIA (IN)</th>
<th>ROOTWAD DIA (IN)</th>
<th>MIN. LOG LENGTH (FT)</th>
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<td></td>
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TABLE NOTES:
1. MATERIAL LENGTHS ARE REPORTED FOR MATERIAL PROCUREMENT PURPOSES. ALL LWD SHALL BE CUT TO FIT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
2. ROOTWAD LOG LENGTHS DO NOT INCLUDE THE LENGTH OF THE ROOTWAD MAZE.
3. ROOTWAD LOG LENGTHS ARE MEASURED AT GREATEST HEIGHT.
4. ROOTWAD LOG LENGTHS ARE MEASURED AT GREATEST WIDTH OF THE LOG.
5. BURIAL ALL ROOTWAD LOGS AND LOG POLES TOGETHER TO THE BURIED LOG PILES PER DETAILS 1, 2, AND 4 ON PERM NOD. 10.
6. BOLTED INTERIOR OF STRUCTURE WITH NATIVE SANDS AND GRAVELS FLUSH WITH THE TOP OF LAYER ONE. DO NOT COMPACT BACKFILL.

FOR CONSTRUCTION
TUCANON PROJECT AREA 15

C-11

BANK SEDIMENT RETENTION LWD DETAILS

SHEET NO 13 OF 22

ANCHOR QEA

WALKABOUT ECOLOGICAL SERVICES, INC. 10143 NE 124TH STREET SUITE 275 KENMORE, WA 98028 (425) 771-3861

DESIGNER BY: AL X
DRAW BY: AL X
DRAW DATE: 4-16-15
APPROVED BY: TD
APPROVE DATE: 4-16-15

BANK SEDIMENT RETENTION LWD TYPICAL PROFILE

BANK SEDIMENT RETENTION LWD TYPICAL SECTION

BANK SEDIMENT RETENTION LWD TYPICAL PLAN (WITH PILES)

BANK SEDIMENT RETENTION LWD TYPICAL PLAN (WITH BOULDERS)

FEATURE BOULDER QUANTITIES

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<th>LOCATION</th>
<th>ITEM</th>
<th>INTERMEDIATE DIA (FT)</th>
<th>MIN. DRY WEIGHT (LB)</th>
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<tbody>
<tr>
<td>AS SHOWN</td>
<td>BOULDER</td>
<td>3.0 (DIA 150)</td>
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CONSTRUCTION NOTES:

1. INSTALL BURIED LOG PILES (SECTION 02410) TO DEPTH SHOWN. CONTRACTOR RESPONSIBLE FOR EXCAVATION SUPPORT AND PROTECTION. PLACE LOG PILES 5FT (1.5M) APART FROM EACH OTHER. PLACE LOG PILES 12" (30CM) AWAY FROM THE EXISTING BULKHEAD.

2. ALTERNATIVELY, ROOTWAD LOGS MAY BE SECURED TO EXISTING STANDING TREES WITH A MINIMUM 12" (30CM) DIA. AS SHOWN.

3. PLACE BURIED LOGS AND LOG POLES FLUSH WITH EXISTING GRADE. ROOTWAD LOGS ON LAYER ONE (1) AND TWO (2) SHALL BE IN CONTINUOUS CONTACT WITH THE GROUND SURFACE ON THE UNDERSIDE OF THE BOLE EXCEPT WHERE SHOWN AROUND THE ROOTWAD.

4. PLACE THE DIAMOND (ROOTWAD LOG AS SHOWN) IN LAYER 3 WITH ROOTWAD LOGS (POSTBEAM).

5. SECURE ALL ROOTWAD LOG TOGETHER AND TO THE BURIED LOG PILES PER DETAILS 4.1 AND 4 ON SHEET 23.

6. IF LIVE TREES ARE USED IN PLACE OF PILE, SECURE ALL ROOTWAD LOGS TOGETHER AND TO THE LIVE TREES PER DETAIL 9 ON SHEET 22.

7. USE 1/2" DIA. SYNTHETIC MANILA ROPE AND ASSOCIATED HARDWARE PER SECTION 02410 FOR ALL CONNECTIONS.

8. SECURE BURIED WATER.

FEATURE LWM QUANTITIES

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<th>LAYER</th>
<th>ITEM</th>
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TABLE NOTES:

1. LOG LENGTHS ARE REPORTED FOR MATERIAL PROCUREMENT PURPOSES. ALL LWM SHALL BE CUT TO FIT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

2. ROOTWAD LOG LENGTHS DO NOT INCLUDE THE LENGTH OF THE ROOTWAD MASS.

3. ROOTWAD LOG DIA IS MEASURED AT BREAST HEIGHT.

4. LOG POLE DIAMETER IS MEASURED AT THE MIDPOINT ALONG THE LENGTH OF THE LOG.

5. SEE SECTION 02410 FOR DIAMETER TOLERANCES AND TAPER RATES.

FOR CONSTRUCTION

TUCANNON PROJECT AREA 15

C-12

BANK BARB LWD DETAILS
1 LOGS TO BE SECURED TO BOULDERS, TP. 15 LOCATIONS (SEE CONSTRUCTION NOTES 2 AND 3).

FLOW DIRECTION

EXCAVATE TO PLACE ROUCTWAD SO LOG IS FLUSH WITH THE BED

BOULDER SPECIFICATIONS

<table>
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<th>ITEM</th>
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<th>MIN. DRY WEIGHT (LBS)</th>
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FEATURE LOG QUANTITIES

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<th>ITEM</th>
<th>LOG DA (FT)</th>
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<tr>
<td>LOG &amp; ROUCTWAD</td>
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<td>72</td>
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<td>LOG POLE</td>
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TABLE NOTES:
1. MEASURED LENGTHS ARE REPORTED FOR MATERIAL PROCUREMENT PURPOSES. ALL LUMI SHALL BE CUT TO FIT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
2. ROOTWAD LOG LENGTHS DO NOT INCLUDE THE LENGTH OF THE ROOTWAD MASS.
3. ROOTWAD LOG DIAMETER IS MEASURED AT BREST HEIGHT.
4. LOG POLE DIAMETER IS MEASURED AT THE MID-POINT ALONG THE LENGTH OF THE LOG.
5. SEE SECTION 2B.47 FOR DIAMETER TOLERANCES AND TAPER RATES.

CONSTRUCTION NOTES:
1. EXCAVATE FOR ROOTWADS IN LAYER 1 AS SHOWN.
2. INSTALL EYE BOLTS INTO BOULDERS.
3. PLACE BOULDERS ON THE BED IN LOCATIONS SHOWN.
4. PLACE ROOTWAD IN LAYER 1 AS SHOWN WITH THE BOLE FLUSH WITH THE BED OR FLUSHLY BELOW THE BED TO PROVIDE CONTACT WITH THE GROUND SURFACE ON THE UNDERSIDE OF THE BOLE EXCEPT WHERE SHOWN AROUND THE ROOTWAD.
5. CONTINUE PLACEMENT OF OTHER LOGS LAYER 2.
6. MAKE CONNECTIONS BETWEEN LOGS AND TO THE BOULDERS IN LOCATIONS SHOWN, OR AS OTHERWISE APPROVED BY THE ENGINEER.

1. USE TWO LOG CORNER JOINT FOR CONNECTIONS BETWEEN LOGS AND ROOTWAD LOGS.
2. USE RIVET, WIRE, BOLT, OR CONCRETE TO SECURE STRUCTURE TO BOULDERS.
3. FOR ALL CONNECTIONS USE 36" DA, (2) 1" X 2" X 5" HOLLOW ROD AND 1/2" BOLTS PER SECTION 2B.47.
4. MAKE A MINIMUM OF TWO CONNECTIONS PER LUMI MEMBER.
5. DOUBLE CHECK ALL CONNECTIONS TO ENSURE NO LOOSE STRUCTURES OR STURCTURE FALLS INTO OR FROM CONSTRUCTION AREAS.
6. PREPARE SURFACES FOR SPACING BETWEEN BOULDERS, INCLUDING OTHER STRUCTURES OR AS APPROVED BY THE ENGINEER. CLEAN, BLOCK, AND SPACING BETWEEN THE BOULDERS, CONSTRUCTION PROCESSES PROVIDED.

FOR CONSTRUCTION
TUCANNON PROJECT AREA 15
CHANNEL SPANNING ROUGHNESS LWQ DETAILS

CHANNEL SPANNING ROUGHNESS LWQ TYPICAL SECTION

CHANNEL SPANNING ROUGHNESS LWQ TYPICAL PROFILE

CHANNEL SPANNING ROUGHNESS LWQ TYPICAL PLAN

OVER BANK FLOW PATH PROTECTION

1/2 CHANNEL WIDTH

LOW FLOOD PLAN

MAIN CHANNEL

1/2 CHANNEL WIDTH

LOGS EXTEND TO BANK

CONNECT LOGS TO BOULDERS, TP. 15 LOCATIONS

Boulder, TP.

CHANNEL SPANNING ROUGHNESS LWQ TYPICAL PLAN