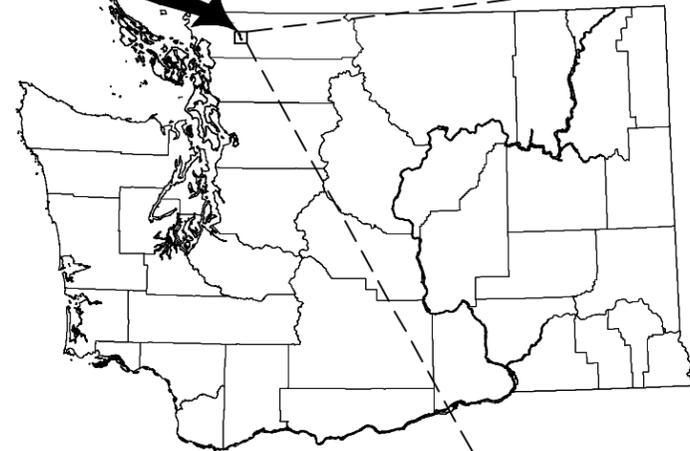
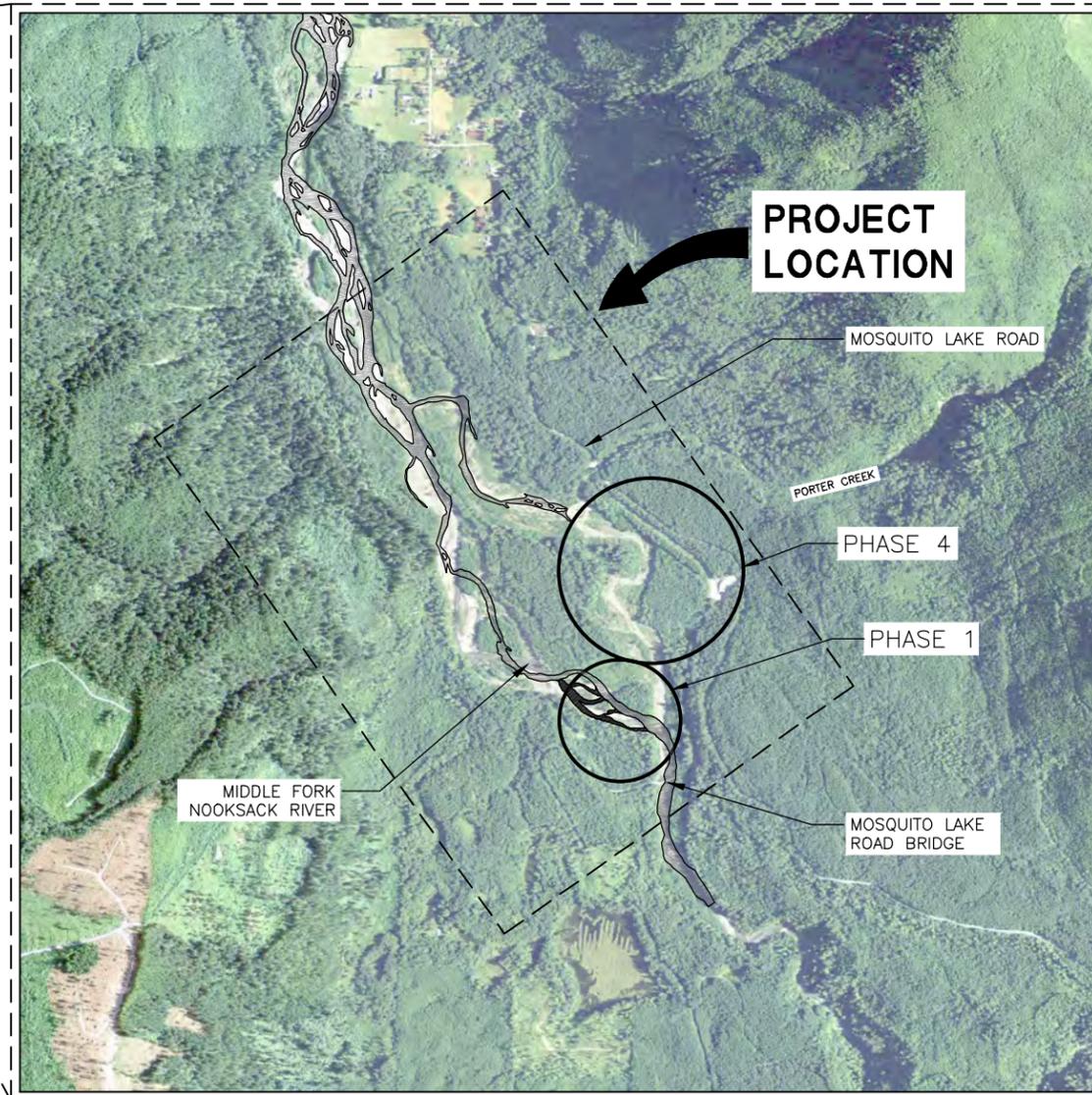


MIDDLE FORK NOOKSACK RIVER PORTER CREEK REACH RESTORATION PHASE 1 & 4

SITE



WASHINGTON STATE
SCALE: 1" = 50 MILES



VICINITY MAP
SCALE: 1" = 1000'

DRAWING LIST	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	GENERAL NOTES
3	LEGEND
4	SITE PLAN
5	PHASE 1
6	PHASE 4
7	TYPE 1 ELJ
8	TYPE 1 LAYERING PLAN 1
9	TYPE 1 ELJ LAYERING PLAN 2
10	TYPE 1 ELJ LAYERING PLAN 3 AND DETAILS
11	TYPE 2 ELJ
12	TYPE 2 ELJ LAYERING PLAN 1
13	TYPE 2 ELJ LAYERING PLAN 2
14	TYPE 2 ELJ LAYERING PLAN 3 AND DETAILS
15	TYPE 3 ELJ
16	TYPE 3 ELJ LAYERING PLAN
17	TYPE 3 ELJ LAYERING PLAN 2 AND DETAILS
18	RESTORATION DETAILS
19	TESC PLAN PHASE 1
20	TESC PLAN PHASE 4
21	TESC DETAILS

CONTACT INFORMATION

NATURAL SYSTEMS DESIGN, INC

1900 N NORTHLAKE WAY, SUITE 211
SEATTLE, WA 98103
(206) 834-0175

LUMMI NATION

2616 KWINA ROAD
BELLINGHAM, WA 98226

0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.



NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	RLE	LATITUDE	48°49'00"N
CHECKED	TA	LONGITUDE	122°08'00"W
DRAWN	GD	TN/SC/RG	T38N/S2/R5E
CHECKED	RLE	DATE	2/10/2015

PORTER CREEK REACH
RESTORATION PHASE 1 & 4

COVER SHEET

1
SHEET 1 OF 21

N:\PROJECTS\LUMMI\TRIBE\MIDDLE FORK NOOKSACK PHASE1\DESIGN\CAD DWGS - CURRENT\COVER SHEET.DWG, GARNEY, 5/1/2013, 9:26:19 AM

Apr 12, 2016 DESIGN 90%

GENERAL NOTES

1. THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE OF LUMMI NATION, HEREAFTER REFERRED TO AS "OWNER" AND "CONTRACTOR" AND THEIR AUTHORIZED AGENTS.
2. NATURAL SYSTEMS DESIGN HEREAFTER REFERRED TO AS "ENGINEER" IS RESPONSIBLE FOR THE PREPARATION OF THESE ORIGINAL PLANS AND ASSOCIATED SPECIFICATIONS; AND WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGE, OR USE, OF THESE PLANS WHICH INCLUDES ALTERATION, DELETION, OR EDITING OF THIS DOCUMENT WITHOUT EXPLICIT WRITTEN PERMISSION FROM THE ENGINEER. ANY OTHER UNAUTHORIZED USE OF THIS DOCUMENT IS PROHIBITED.
3. MINOR MODIFICATIONS ARE EXPECTED TO SUIT JOB SITE DIMENSIONS OR CONDITIONS. SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF THE WORK. THE OWNER, ENGINEER AND APPROPRIATE REGULATORY AGENCIES SHALL BE NOTIFIED OF ANY OWNER-AUTHORIZED CHANGE RESULTING IN MORE THAN A 10% DESIGN CHANGE OF PROPOSED FOOTPRINT OR THAT SIGNIFICANTLY AFFECTS THE INTENDED BENEFIT OR FUNCTION OF A PROJECT ELEMENT.
4. THE LOCATION OF ALL FEATURES SHOWN IS APPROXIMATE.
5. THE CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; AND FURTHER AGREES THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS IN ACCORDANCE WITH THE PROVISIONS OUTLINED BY THE PROJECT CONTRACT AND SPECIFICATIONS.
6. ALL IMPROVEMENTS SHALL BE ACCOMPLISHED UNDER THE APPROVAL, INSPECTION, AND TO THE SATISFACTION OF THE OWNER. IMPROVEMENT CONSTRUCTION SHALL COMPLY WITH THESE PLANS AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD PLANS FOR CONSTRUCTION OF ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, CURRENT EDITION UNLESS NOTED OTHERWISE. ALL REFERENCES TO THE "STANDARD SPECIFICATIONS" SHALL MEAN THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION OF LOCAL STREETS AND ROADS, CURRENT EDITION. CONSTRUCTION NOT SPECIFIED ON THESE PLANS SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS. THE CONTRACTOR IS OBLIGATED TO BE FAMILIAR WITH APPLICABLE SECTIONS OF THE STANDARD SPECIFICATIONS NOT DISCUSSED IN THE GENERAL NOTES. THE CONTRACT SPECIAL PROVISIONS SHALL SUPERSEDE THOSE OF THE STANDARD SPECIFICATIONS WHERE DISCREPANCIES OCCUR.
7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTOR(S) TO EXAMINE THE PROJECT SITE PRIOR TO THE OPENING OF BID PROPOSALS. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, SUCH AS THE NATURE AND LOCATION OF THE WORK; AND THE GENERAL AND LOCAL CONDITIONS, PARTICULARLY THOSE AFFECTING THE AVAILABILITY OF TRANSPORTATION, THE DISPOSAL, HANDLING, AND STORAGE OF MATERIALS; AVAILABILITY OF LABOR, WATER, ELECTRICITY, ROADS, THE UNCERTAINTIES OF WEATHER, THE CONDITIONS OF THE GROUND, SURFACE AND SUBSURFACE MATERIALS, GROUNDWATER, THE EQUIPMENT AND FACILITIES NEEDED FOR AND DURING THE PERFORMANCE OF THE WORK, AND THE COSTS THEREOF. ANY FAILURE BY THE CONTRACTOR AND SUBCONTRACTOR(S) TO ACQUAINT THEMSELVES WITH ALL THE AVAILABLE INFORMATION WILL NOT RELIEVE THE CONTRACTOR AND SUBCONTRACTOR(S) FROM RESPONSIBILITY FOR PROPERLY ESTIMATING THE DIFFICULTY AND COST OF SUCCESSFULLY PERFORMING THE WORK.
8. THE CONTRACTOR IS RESPONSIBLE FOR REVIEWING THE CONTRACT DOCUMENTS AND FOR ALL SUBMITTALS REQUIRED TO THE OWNER FOR REVIEW AND ACCEPTANCE.

PERMIT NOTES

1. EVERY REASONABLE EFFORT SHALL BE MADE TO CONDUCT THE ACTIVITIES SHOWN IN THESE PLANS, IN A MANNER THAT MINIMIZES THE ADVERSE IMPACT ON WATER QUALITY, FISH AND WILDLIFE, AND THE NATURAL ENVIRONMENT.
2. ALL WORK WILL BE IN COMPLIANCE WITH PERMIT CONDITIONS ISSUED BY PERTINENT REGULATORY AGENCIES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE COPIES OF ALL PERMITS ON THE JOB SITE, UNDERSTAND AND COMPLY WITH ALL PERMIT CONDITIONS.
3. ALL WORK THAT DISTURBS THE SUBSTRATE, BANK, OR SHORE OF A WATERS OF THE STATE THAT CONTAINS FISH LIFE SHALL BE CONDUCTED ONLY DURING THE WORK PERIOD FOR THAT WATERBODY AS ALLOWED BY RELEVANT HYDRAULIC WORK PERMITS. THOSE PORTIONS OF THE PROJECT WORK THAT OCCUR OUTSIDE OR ABOVE THE ORDINARY HIGH WATER MARK (ABOVE THE USACE JURISDICTIONAL LINE) ARE NOT SUBJECT TO THE WORK PERIODS DESCRIBED ABOVE UNLESS SPECIFIED IN THE RELEVANT PERMITS.
4. ALL ACTIVITIES THAT INVOLVE WORK ADJACENT TO, OR WITHIN THE WETTED CHANNEL SHALL, AT ALL TIMES, REMAIN CONSISTENT WITH ALL APPLICABLE WATER QUALITY STANDARDS; EFFLUENT LIMITATION; AND STANDARDS OF PERFORMANCE, PROHIBITIONS, PRETREATMENT STANDARDS, AND MANAGEMENT PRACTICES ESTABLISHED PURSUANT TO THE CLEAN WATER ACT OR PURSUANT TO APPLICABLE STATE AND LOCAL LAW.
5. IF AT ANY TIME, AS A RESULT OF PROJECT ACTIVITIES, FISH ARE OBSERVED IN DISTRESS, A FISH KILL OCCURS, OR WATER QUALITY PROBLEMS DEVELOP (INCLUDING EQUIPMENT LEAKS OR SPILLS), OPERATIONS SHALL CEASE AND THE OWNER SHALL BE NOTIFIED IMMEDIATELY.
6. IF, DURING CONSTRUCTION, ARCHAEOLOGICAL REMAINS ARE ENCOUNTERED, CONSTRUCTION IN

THE VICINITY SHALL BE HALTED, AND THE STATE OFFICE OF HISTORIC PRESERVATION AND THE OWNER SHALL BE NOTIFIED IMMEDIATELY.

SURVEY NOTES

1. UNLESS NOTED OTHERWISE ON THE PLANS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS AND OTHER SURVEY MARKERS DURING CONSTRUCTION.
2. THE CONTRACTOR SHALL MAINTAIN A SET OF PLANS ON THE JOB SHOWING "AS-CONSTRUCTED" CHANGES MADE TO DATE. UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL SUPPLY TO OWNER A SET OF PLANS, MARKED UP TO THE SATISFACTION OF THE OWNER, REFLECTING THE AS-CONSTRUCTED MODIFICATIONS.
3. ELEVATIONS SHOWN ON THE PLANS FOR PIPE INVERTS, TOPS OF BANKS, THALWEG, GRADE CONTROLS, ETC., ARE BASED UPON THE TOPOGRAPHIC INFORMATION SHOWN ON THE PLANS. THE CONTRACTOR SHALL VERIFY ALL NECESSARY SURFACE ELEVATIONS IN THE FIELD AND NOTIFY THE OWNER OF ANY DISCREPANCIES, WHICH MIGHT AFFECT PROPER OPERATION OF THE NEW FACILITIES BEFORE BREAKING GROUND AND PRIOR TO FACILITY INSTALLATION. THE OWNER SHALL BE CONTACTED IN THE EVENT ELEVATIONS ARE INCORRECT SO THAT THE PROPER ADJUSTMENTS CAN BE MADE BY ENGINEER PRIOR TO THE INSTALLATION OF THE FACILITIES, AS SET FORTH IN THE SPECIAL PROVISIONS.
4. LIDAR FOR THIS PROJECT WAS PROVIDED BY PUGET SOUND LIDAR CONSORTIUM FROM WATERSHED SCIENCES, INC. AND IS REPRESENTATIVE OF MARCH 31 - APRIL 1, 2013 CONDITIONS (FLOWS 410-700 CFS). THE VERTICAL DATUM IS NAVD 88 (FT) GEOID03. THE HORIZONTAL DATUM IS NAD 83 WASHINGTON STATE PLANE NORTH FIPS 4601, US SURVEY FT.

EROSION, SEDIMENT CONTROL AND WATER MANAGEMENT NOTES

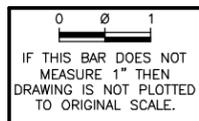
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING ALL TEMPORARY EROSION CONTROL MEASURES. THE EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND PERFORMANCE OF THE TEMPORARY EROSION CONTROL MEASURES THROUGHOUT THE DURATION OF THE PROJECT.
5. A SEDIMENT AND EROSION CONTROL PLAN WILL BE DEVELOPED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL BY OWNER AND/OR THE ENGINEER BEFORE ANY CONSTRUCTION MAY BEGIN. THE SEDIMENT AND EROSION CONTROL PLAN WILL IDENTIFY BEST MANAGEMENT PRACTICES TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, AND ADJACENT PROPERTIES IS MINIMIZED.
6. ACTIVITIES SHALL BE DESIGNED AND CONSTRUCTED TO AVOID AND MINIMIZE ADVERSE IMPACTS TO WATERS OF THE UNITED STATES TO THE MAXIMUM EXTENT PRACTICAL THROUGH THE USE OF PRACTICAL ALTERNATIVES. ALTERNATIVES THAT SHALL BE CONSIDERED INCLUDE THOSE THAT MINIMIZE THE NUMBER AND EXTENT OF IN-WATER WORK AND EQUIPMENT CROSSINGS OF WETTED CHANNELS.
7. AT NO TIME SHALL SEDIMENT-LADEN WATER BE DISCHARGED OR PUMPED DIRECTLY INTO THE SUBJECT RIVER, STREAM, OR WETLAND. WATER SHALL BE DISCHARGED IN ACCORDANCE WITH REQUIREMENTS SET FORTH IN THE PROJECT PERMITS AND / OR SPECIFICATIONS.
8. IF HIGH WATER LEVEL CONDITIONS THAT CAUSE SILTATION OR EROSION ARE ENCOUNTERED DURING CONSTRUCTION, WORK SHALL STOP UNTIL THE WATER LEVEL SUBSIDES.
9. PERMIT CONDITIONS CONTAIN SPECIFIC REQUIREMENTS FOR THE CONTROL OF EROSION AND TURBIDITY FROM PROJECT OPERATIONS. TURBIDITY WILL BE MONITORED ON A FREQUENT BASIS BY THE PROJECT MANAGEMENT AND INSPECTION STAFF ON-SITE. TURBIDITY AMOUNTS IN EXCESS OF THE PERMITTED CONCENTRATIONS AND/OR DURATIONS WILL CAUSE WORK TO BE STOPPED UNTIL IMPROVED PRACTICES ARE IN EFFECT AND THE PROBLEMS CONTROLLED. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR ANY PROJECT DELAYS THAT OCCUR BY NATURE OF THIS FAILURE TO ADEQUATELY CONTAIN SEDIMENT ON-SITE.
10. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO CONSTRUCTION AREAS DEFINED ON SITE PLAN OR IDENTIFIED AS ACCEPTABLE BY THE ENGINEER OR OWNER.
11. ALL EXTERNAL GREASE AND OIL SHALL BE PRESSURE-WASHED OFF THE EQUIPMENT PRIOR TO TRANSPORT TO THE SITE.
12. ALL EQUIPMENT OPERATING BELOW OHWM SHALL UTILIZE READILY BIODEGRADABLE VEGETABLE-BASED HYDRAULIC FLUIDS.
13. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT NO PETROLEUM PRODUCTS, HYDRAULIC FLUID, SEDIMENTS, SEDIMENT-LADEN WATER, CHEMICALS, OR ANY OTHER TOXIC OR DELETERIOUS MATERIALS ARE ALLOWED TO ENTER OR LEACH INTO THE SUBJECT RIVER, STREAM, OR WETLAND.
14. THE CONTRACTOR SHALL HAVE AN EMERGENCY SPILL KIT ONSITE AT ALL TIMES.
15. NO TREES OR WETLAND VEGETATION SHALL BE REMOVED UNLESS THEY ARE SHOWN AND NOTED TO BE REMOVED ON THE PLANS OR AS DIRECTLY SPECIFIED ON-SITE BY THE PROJECT MANAGEMENT STAFF. ALL TREES CONFLICTING WITH GRADING SHALL BE REMOVED. NO GRADING SHALL TAKE PLACE WITHIN THE DRIP LINE OF TREES NOT TO BE REMOVED UNLESS OTHERWISE APPROVED.

16. FOLLOWING CONSTRUCTION, SITE RESTORATION WILL INCLUDE ESTABLISHING LONG-TERM EROSION PROTECTION MEASURES. THESE MEASURES WILL INCLUDE PLANTINGS, EROSION CONTROL FABRIC, SEED, AND MULCH. EQUIPMENT AND EXCESS SUPPLIES WILL BE REMOVED AND THE WORK AREA WILL BE CLEANED. MAINTENANCE ACTIVITIES FOR THE NEWLY CONSTRUCTED RESTORATION PROJECTS ARE ANTICIPATED TO OCCUR PERIODICALLY.

CONSTRUCTION NOTES

1. CONTRACT DOCUMENTS REFER TO THESE PLANS.
2. CONTRACTOR SHALL FURNISH ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY TO COMPLETE ALL WORK AS INDICATED IN THE CONTRACT DOCUMENTS.
3. CONSTRUCTION HOURS SHALL BE WEEKDAYS BETWEEN 7:00 A.M. AND 6:30 P.M. UNLESS PRIOR APPROVAL IS RECEIVED FROM THE OWNER.
4. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE OWNER PRIOR TO PROCEEDING WITH THE WORK.
5. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY INDICATED OTHERWISE BY THE OWNER OR WHERE LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.
6. ALL WORK PERFORMED AND MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
7. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK USING THE BEST SKILLS AND ATTENTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THIS CONTRACT.
8. THE CONTRACTOR SHALL MAKE ALL NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, ROADWAY, DRAINAGE WAYS, PRIVATE BRIDGE, CULVERTS, AND VEGETATION UNTIL SUCH ITEMS ARE TO BE DISTURBED OR REMOVED AS INDICATED ON THE CONTRACT DOCUMENTS.
9. THE CONTRACTOR SHALL KEEP THE JOB SITE CLEAN AND HAZARD FREE. CONTRACTOR SHALL DISPOSE OF ALL DIRT, DEBRIS, AND RUBBISH FOR THE DURATION OF THE WORK. UPON COMPLETION OF WORK, CONTRACTOR SHALL REMOVE ALL MATERIAL AND EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY.
10. NOTES AND DETAILS ON THE PLANS SHALL TAKE PRECEDENCE OVER GENERAL NOTES HEREIN.
11. DIMENSIONS CALLOUTS SHALL TAKE PRECEDENCE OVER SCALES SHOWN ON THE PLANS.
12. THE PLANS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF ALL CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURES, WORKS, AND THE PUBLIC DURING CONSTRUCTION.
13. MATERIAL SHALL NOT BE STORED OUTSIDE OF IDENTIFIED STAGING AREAS. THE CONTRACTOR SHALL USE ONLY DESIGNATED SPECIFIC SITES FOR STORAGE OF EQUIPMENT AND MATERIALS AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SECURITY OF ALL EQUIPMENT AND MATERIALS.

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NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	RLE	LATITUDE	48°49'00"N
CHECKED	TA	LONGITUDE	122°08'00"W
DRAWN	GD	TN/SC/RG	T38N/S2/R5E
CHECKED	RLE	DATE	2/10/2015

**PORTER CREEK REACH
RESTORATION PHASE 1 & 4**

GENERAL NOTES

2
SHEET 2 OF 21

Apr 12, 2016 DESIGN 90%

GENERAL LEGEND

- PROPERTY LINE
- PHASE LINE
- RIGHT OF WAY LINE
- EXISTING ROAD
- CLEARING LIMIT
- GRADING LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- LOW FLOW CHANNEL
- LOW FLOW CHANNEL EXPECTED TO BE DRY DURING CONSTRUCTION
- EXISTING FLOW
- EXISTING OHWM
- PROPOSED OHWM
- MEAN HIGHER HIGH WATER
- MEAN HIGH WATER
- MEAN LOWER LOW WATER
- 2-YEAR FLOOD BOUNDARY
- 100-YEAR FLOOD BOUNDARY
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WETLAND
- PROPOSED WETLAND
- EXISTING WATER
- PROPOSED WATER
- CONTROL POINT LOCATION

- RACKING AND SLASH MATERIAL
- LARGE WOOD PIECE
- ENGINEERED LOGJAM TYPE 1, SEE SHEET 7
- ENGINEERED LOGJAM TYPE 2, SEE SHEET 11
- ENGINEERED LOGJAM TYPE 3, SEE SHEET 15
- NATIVE ALLUVIUM
- STREAMBED GRAVEL
- RIPRAP
- BOULDER CLUSTER
- STEEL CABLE
- RIVER MILE
- EXISTING WOOD ACCUMULATION

TEMPORARY EROSION CONTROL LEGEND

- SB — SB — SILT BOOM
- BN — BN — BLOCK NETS
- SF — SF — SILT FENCE
- SW — SW — STRAW WATTLE
- PROPOSED STREAM BYPASS
- PROPOSED STAGING AREA
- BULK BAG COFFERDAM
- TEMPORARY ACCESS ROAD
- PUMP OUTLET LOCATION

DETAIL AND SECTION REFERENCING

- NOTE REFERENCING NUMBER
- DETAIL REFERENCE NUMBER SHEET ON WHICH DETAIL APPEARS
- DETAIL REFERENCE NUMBER SHEET ON WHICH DETAIL APPEARS
- SPECIFIES THAT DETAIL IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED
- SPECIFIES THAT DETAIL WAS TAKEN FROM SEVERAL SHEETS
- SECTION A-A IS SHOWN ON SHEET 32
- SECTION A-A IS SHOWN ON SHEET 32
- SCALE: NTS

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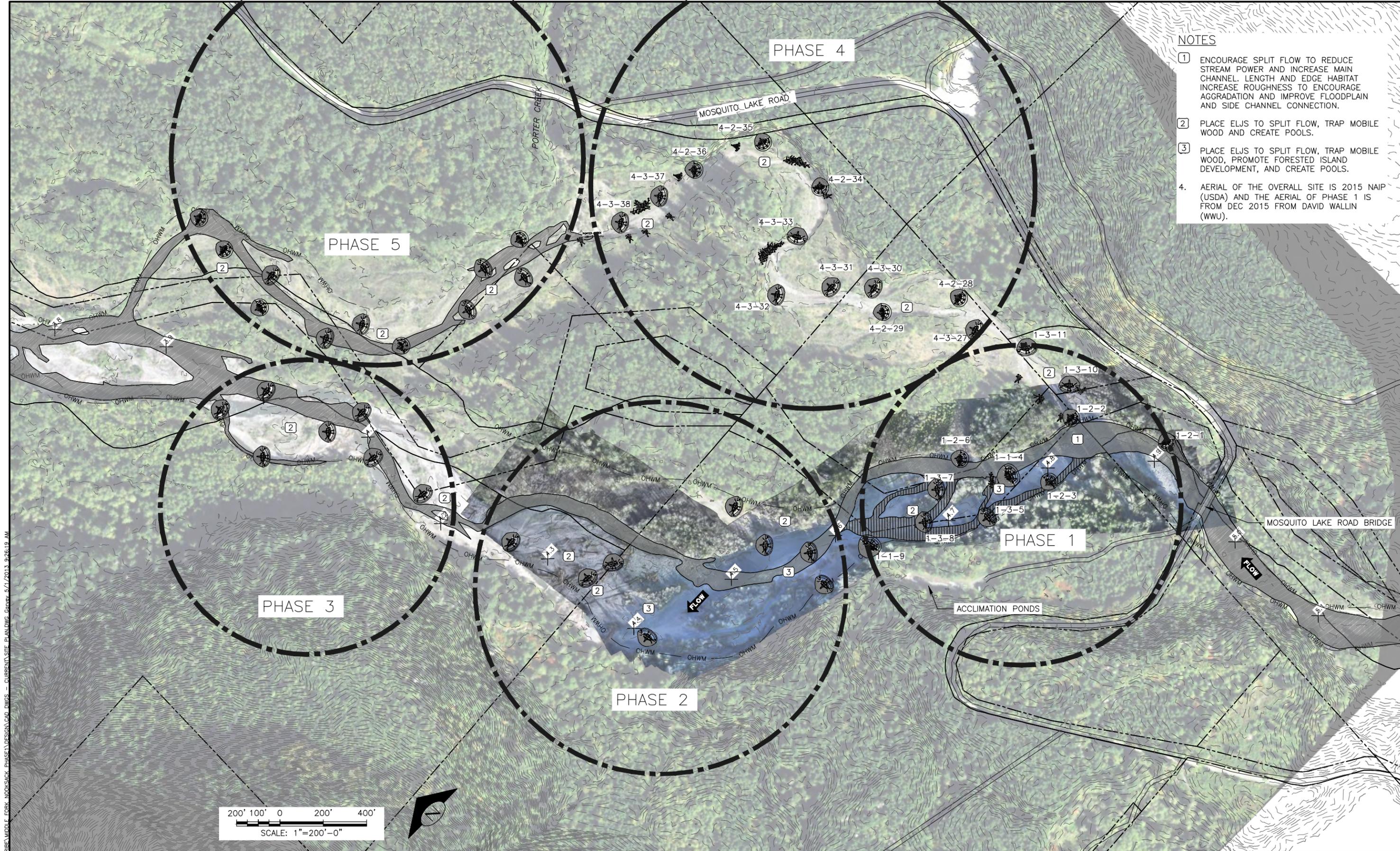
NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
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CHECKED	TA	LONGITUDE	122°08'00"W
DRAWN	GD	TN/SC/RG	T38N/S2/R5E
CHECKED	RLE	DATE	2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

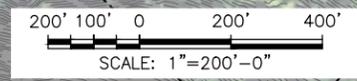
LEGEND

3
SHEET 3 OF 21

Apr 12, 2016 DESIGN 90%



- NOTES**
- 1 ENCOURAGE SPLIT FLOW TO REDUCE STREAM POWER AND INCREASE MAIN CHANNEL LENGTH AND EDGE HABITAT. INCREASE ROUGHNESS TO ENCOURAGE AGGRADATION AND IMPROVE FLOODPLAIN AND SIDE CHANNEL CONNECTION.
 - 2 PLACE ELJS TO SPLIT FLOW, TRAP MOBILE WOOD AND CREATE POOLS.
 - 3 PLACE ELJS TO SPLIT FLOW, TRAP MOBILE WOOD, PROMOTE FORESTED ISLAND DEVELOPMENT, AND CREATE POOLS.
 4. AERIAL OF THE OVERALL SITE IS 2015 NAIP (USDA) AND THE AERIAL OF PHASE 1 IS FROM DEC 2015 FROM DAVID WALLIN (WWU).



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 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.



NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
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DRAWN	GD	TN/SC/RG	T3BN/S2/R5E
CHECKED	RLE	DATE	2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

SITE PLAN

4-2-29

MATCHLINE SEE SHEET 6

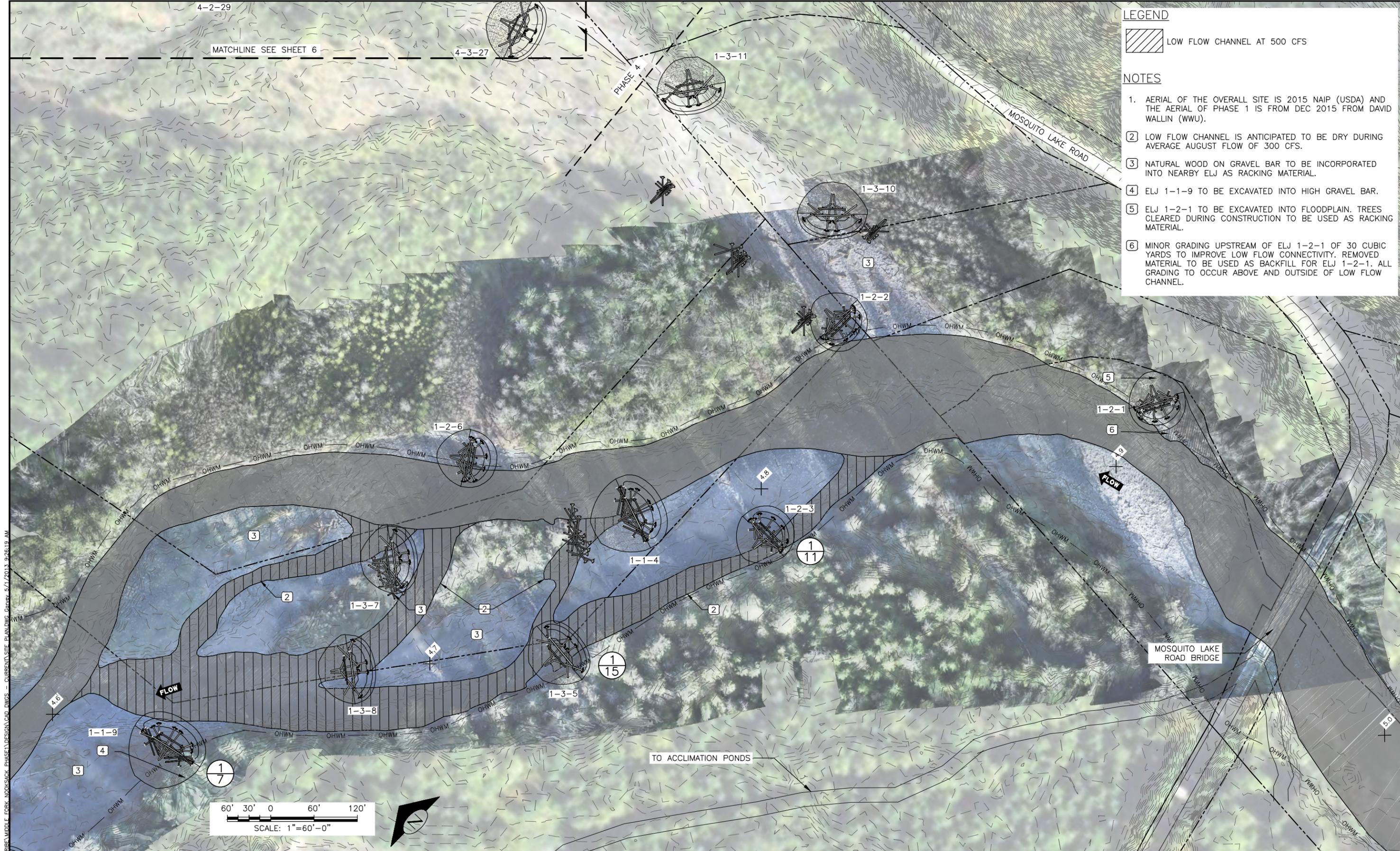
4-3-27

LEGEND

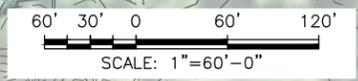
 LOW FLOW CHANNEL AT 500 CFS

NOTES

1. AERIAL OF THE OVERALL SITE IS 2015 NAIP (USDA) AND THE AERIAL OF PHASE 1 IS FROM DEC 2015 FROM DAVID WALLIN (WVU).
2. LOW FLOW CHANNEL IS ANTICIPATED TO BE DRY DURING AVERAGE AUGUST FLOW OF 300 CFS.
3. NATURAL WOOD ON GRAVEL BAR TO BE INCORPORATED INTO NEARBY ELJ AS RACKING MATERIAL.
4. ELJ 1-1-9 TO BE EXCAVATED INTO HIGH GRAVEL BAR.
5. ELJ 1-2-1 TO BE EXCAVATED INTO FLOODPLAIN. TREES CLEARED DURING CONSTRUCTION TO BE USED AS RACKING MATERIAL.
6. MINOR GRADING UPSTREAM OF ELJ 1-2-1 OF 30 CUBIC YARDS TO IMPROVE LOW FLOW CONNECTIVITY. REMOVED MATERIAL TO BE USED AS BACKFILL FOR ELJ 1-2-1. ALL GRADING TO OCCUR ABOVE AND OUTSIDE OF LOW FLOW CHANNEL.



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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.



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CHECKED: RLE	DATE: 2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

Apr 12, 2016 DESIGN 90%

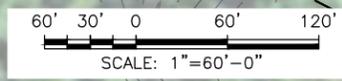
NOTES

1. EXISTING NSEA LW "ACCUMULATION" TO BE INCORPORATED INTO ELJ 4-2-34.
2. AERIAL OF THE OVERALL SITE IS 2015 NAIP (USDA).



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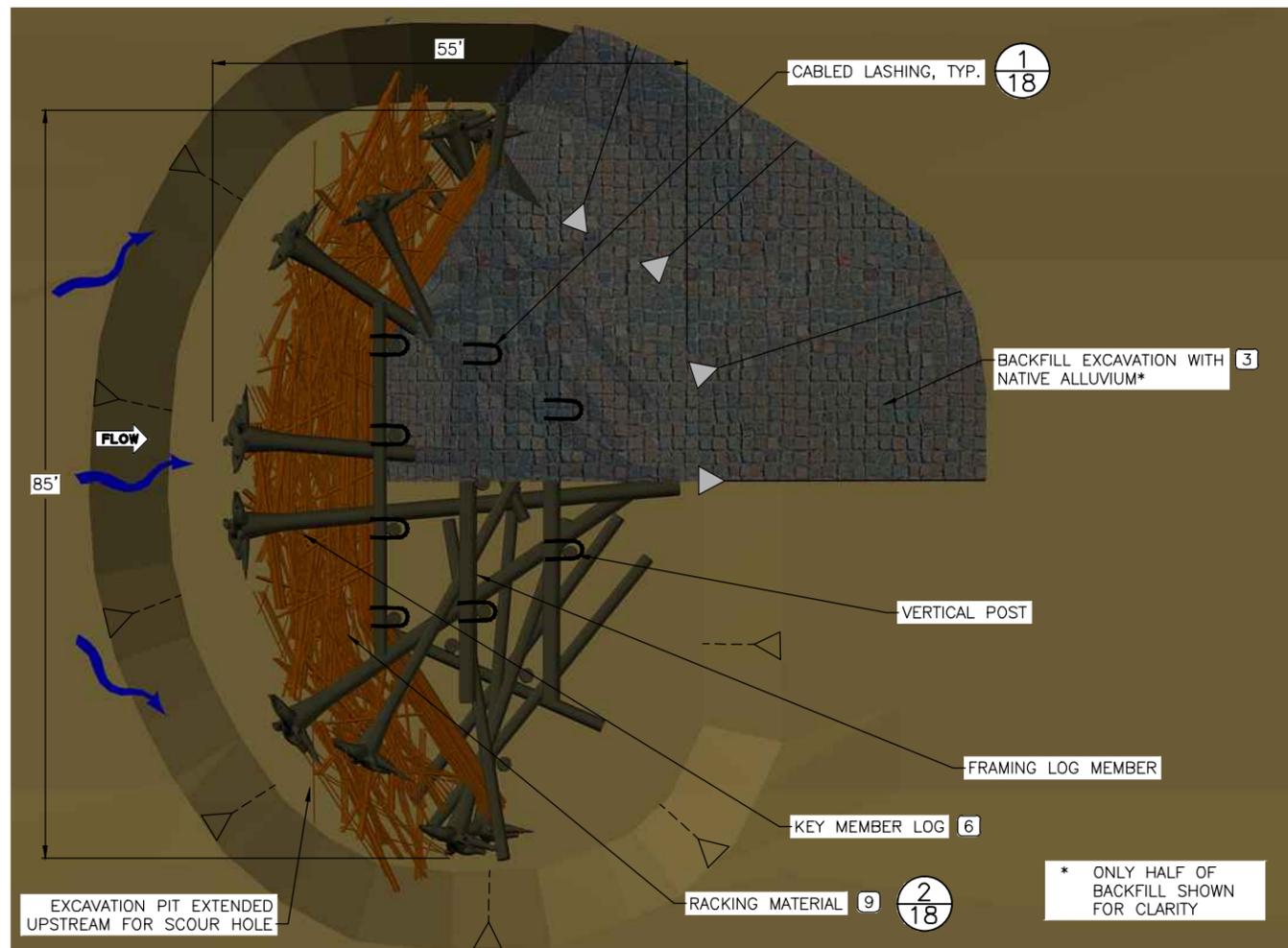


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PORTER CREEK REACH RESTORATION PHASE 1 & 4

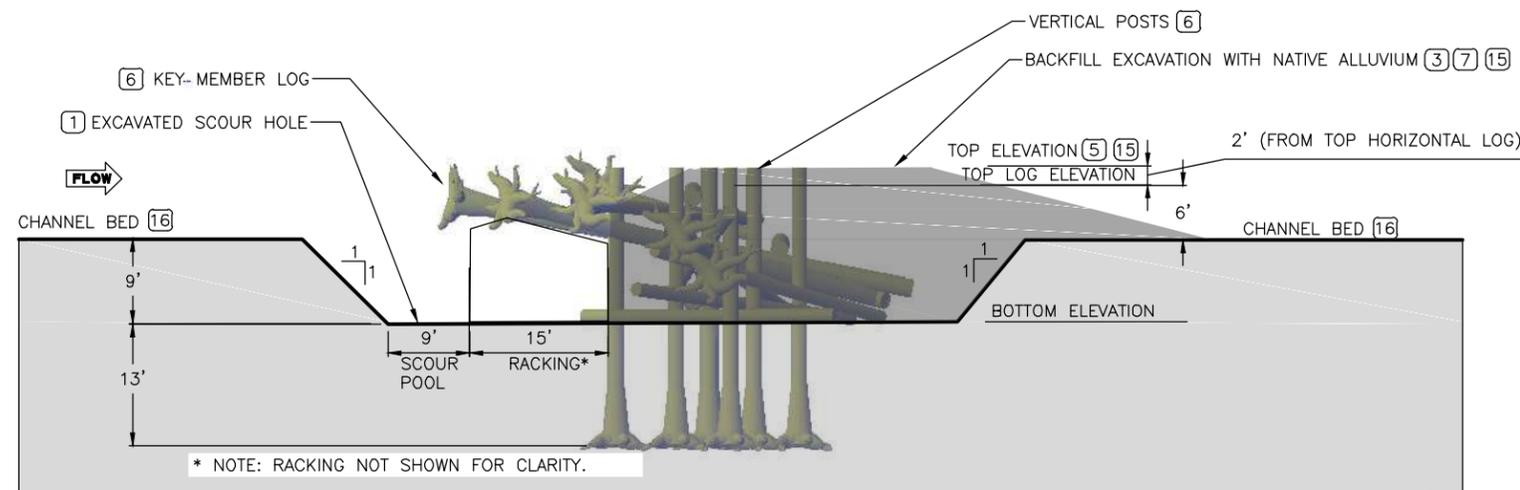
PHASE 4

6
SHEET **6** OF **21**



TYPE 1 ELJ PLAN

10' 5' 0 10' 20'
SCALE: 1"=10'-0"



TYPE 1 ELJ PROFILE

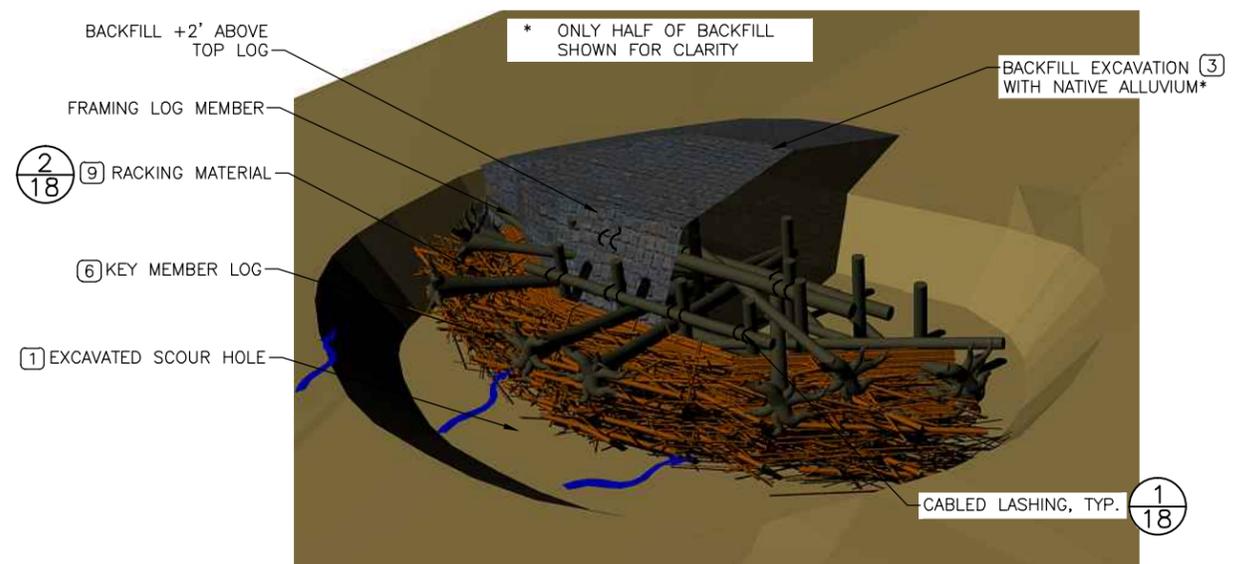
10' 5' 0 10' 20'
SCALE: 1"=10'-0"

TYPE 1 ELJ STRUCTURE SCHEDULE

STRUCTURE LABEL*	1-1-4	1-1-9
STRUCTURE WIDTH, (FT)	85	85
STRUCTURE LENGTH, (FT)	55	55
MINIMUM FRAME LOG DIAMETER, (IN)	18	18
MINIMUM KEY LOG DIAMETER, (IN)	24	24
TIMBER POST DIAMETER, (IN)	22	22
GROUND ELEVATION AT STRUCTURE, (FT-NAVD88)	516	509
CHANNEL BED ELEVATION ADJACENT TO STRUCTURE, (FT-NAVD88)	512.5	503
STRUCTURE BOTTOM ELEVATION, (FT-NAVD88)	503	496
TOP LOG ELEVATION, (FT-NAVD88)	518	511
STRUCTURE TOP ELEVATION, (FT-NAVD88)	520	513
MINIMUM POST BOTTOM ELEVATIONS, (FT-NAVD88)	490	483
AVERAGE SEPTEMBER WATER SURFACE ELEVATION (FT-NAVD 88)	513	503.5
* LABEL FORMAT, PHASE-ELJ TYPE-ELJ NUMBER		

TYPE 1 ELJ STRUCTURE NOTES

- EXCAVATE IN FRONT OF LOGJAM FOR PLACEMENT OF RACKING MATERIAL. EXCAVATION AREA SHALL NOT BE BACKFILLED WITH ALLUVIUM, BUT LEFT AS A SCOUR HOLE.
- EXCAVATION SPOILS SHALL BE STAGED ACCORDING TO THE SWPPP. SPOILS SHALL ALSO BE STOCKPILED TO ALLOW LOG LAYER PLACEMENT AND CONSTRUCTION ACCESS.
- BACKFILL EXTENTS MAY VARY AND TO BE CONSTRUCTED WITH NATIVE ALLUVIUM FROM EXCAVATION SPOILS.
- BACKFILL EACH STRUCTURE LAYER WITH NATIVE ALLUVIUM FLUSH WITH THE CURRENT LAYER PRIOR TO PLACEMENT OF THE SUBSEQUENT LAYER.
- FINAL ELJ HEIGHT TO BE ACHIEVED AS SPECIFIED REGARDLESS OF ACTUAL LOG DIAMETERS USED OR STACKING ARRANGEMENT.
- ALL LARGE WOOD DIMENSIONS DO NOT INCLUDE BARK THICKNESS.
- COVER TOP OF BACKFILL AREA AND BASE OF STRUCTURES 6-12 INCHES WITH LOOSE WOOD DEBRIS AND CHIPS. MIX INTO UPPER 2 FT ON BACKFILL.
- FRAME LOG MEMBERS PER INSTRUCTIONS ON LAYERING PLAN TO VERTICAL POSTS WITH CABLED LASHING. SEE DETAIL 1 ON SHEET 18.
- RACKING MATERIAL SHALL CONSIST OF APPROXIMATELY 155 CU. YDS PER STRUCTURE WITH 6" - 12" DIA DBH AND A MINIMUM OF 5-FOOT LENGTH. RACKING PLACEMENT SHALL OCCUR WITH EACH LAYER PLACEMENT TO ENSURE RACKING MATERIAL EXTENDS THROUGH STRUCTURE AND PINNED IN PLACE BY SUBSEQUENT LAYERS.
- THE CONTRACTOR SHALL FIELD VERIFY WITH THE OWNER REPRESENTATIVE OR ENGINEER ALL STRUCTURE LOCATIONS, PILE LOCATIONS, LENGTHS, WIDTHS AND ELEVATIONS PRIOR TO EXCAVATION, ASSEMBLY AND INSTALLATION OF EACH STRUCTURE.
- LOCATIONS FOR ALL STRUCTURE PLACEMENTS WILL BE STAKED IN FIELD BY THE ENGINEER OR OWNER REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.
- EXCAVATION LIMITS SHALL BE FIELD VERIFIED BY THE OWNER REPRESENTATIVE OR ENGINEER PRIOR TO EXCAVATION COMMENCING AND PLACEMENT OF ANY LARGE WOOD.
- LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS BY THE CONTRACTOR IN A PLACE VISIBLE FOR FIELD VERIFICATION PRIOR TO PLACEMENT WITH LEAD-FREE, BLAZE-ORANGE SURVEY MARKING PAINT.
- THE WOOD LAYER PLACEMENT IN EACH LOGJAM LAYER SHALL BE FIELD VERIFIED BY ON-SITE OWNER REPRESENTATIVE PRIOR TO BACKFILLING.
- BACKFILL NOT TO EXCEED TOP ELEVATION. EXCESS BACKFILL TO BE PLACED DOWNSTREAM OF FINISHED ELJ.
- CHANNEL BED ELEVATION IS REPRESENTATIVE OF A LOCAL AVERAGE CHANNEL BED AT RIFFLES. CHANNEL BED ELEVATION SHOULD NOT BE TAKEN IN POOLS.



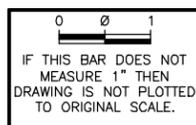
TYPE 1 ELJ PERSPECTIVE

TYPE 1 ELJ

SCALE: AS NOTED.

1/7

NA:\PROJECTS\LUMMI\REEL MIDDLE FORK\WORKSACK_PHASE1\DESIGN\CAD DWGS - CURRENT\TYPE 1 ELJ DETAILS.DWG Genrev: 5/1/2013 9:26:19 AM



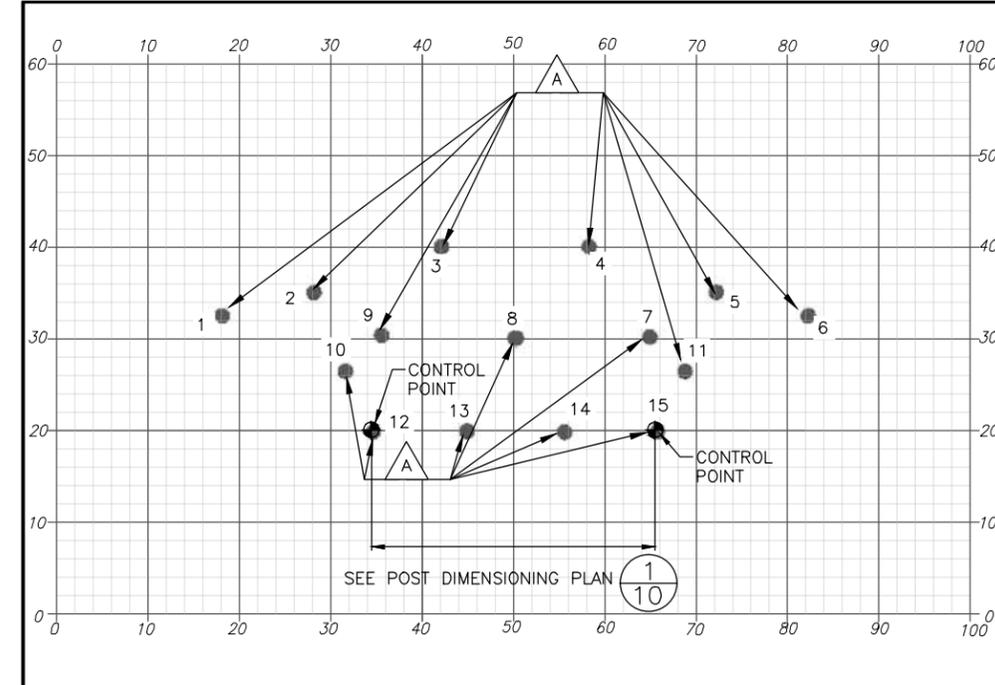
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DESIGNED	RLE	LATITUDE	48°49'00"N
CHECKED	TA	LONGITUDE	122°08'00"W
DRAWN	GD	TN/SC/RG	T38N/S2/R5E
CHECKED	RLE	DATE	2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

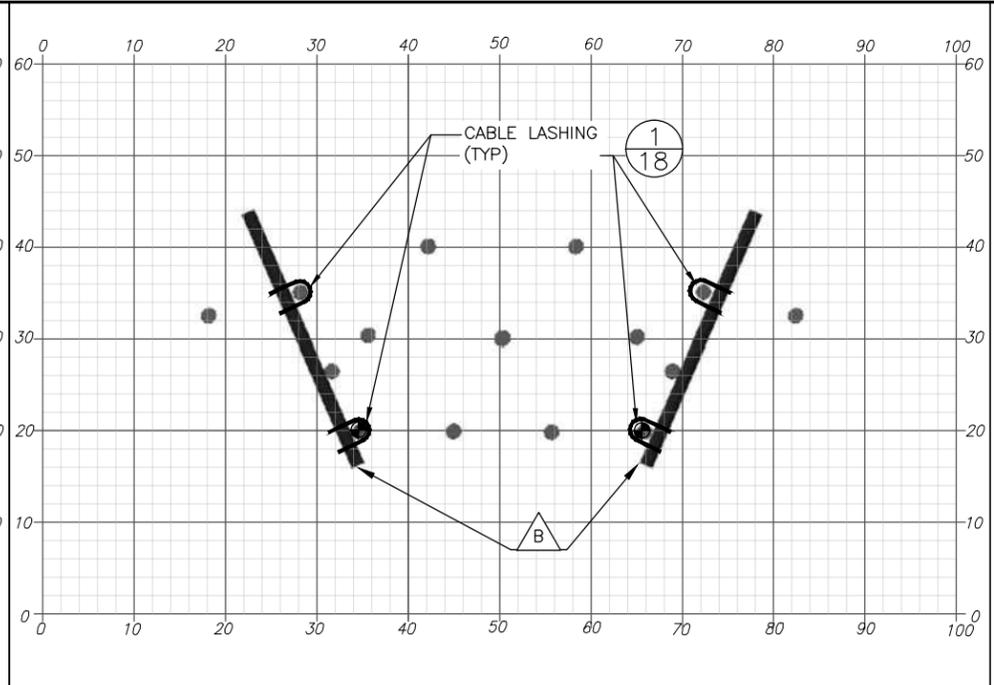
TYPE 1 ELJ

7
SHEET 7 OF 21

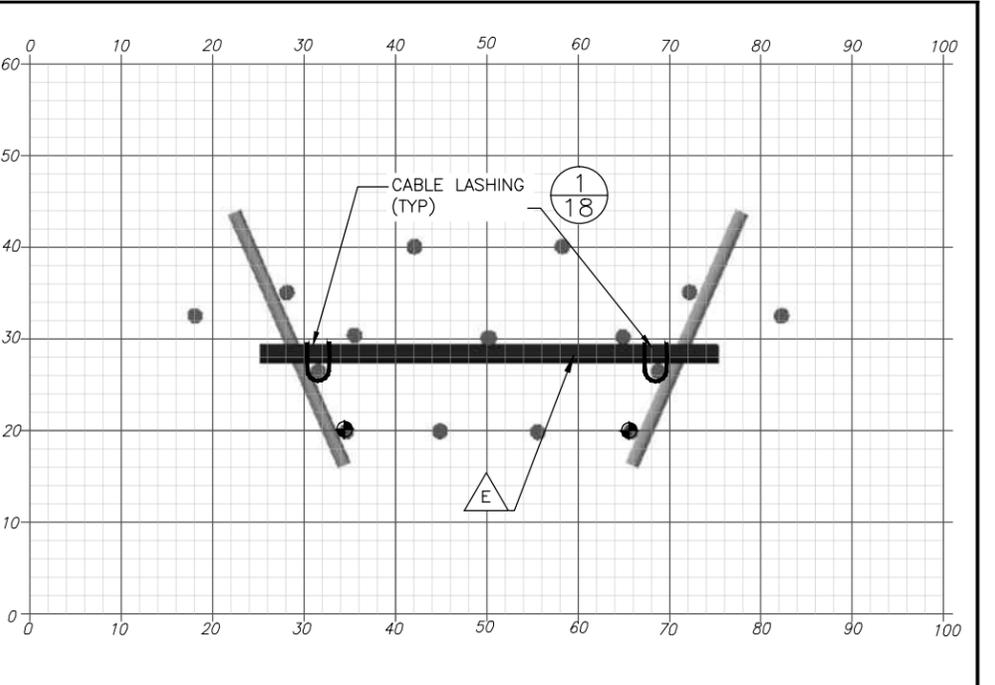
Apr 12, 2016 DESIGN 90%



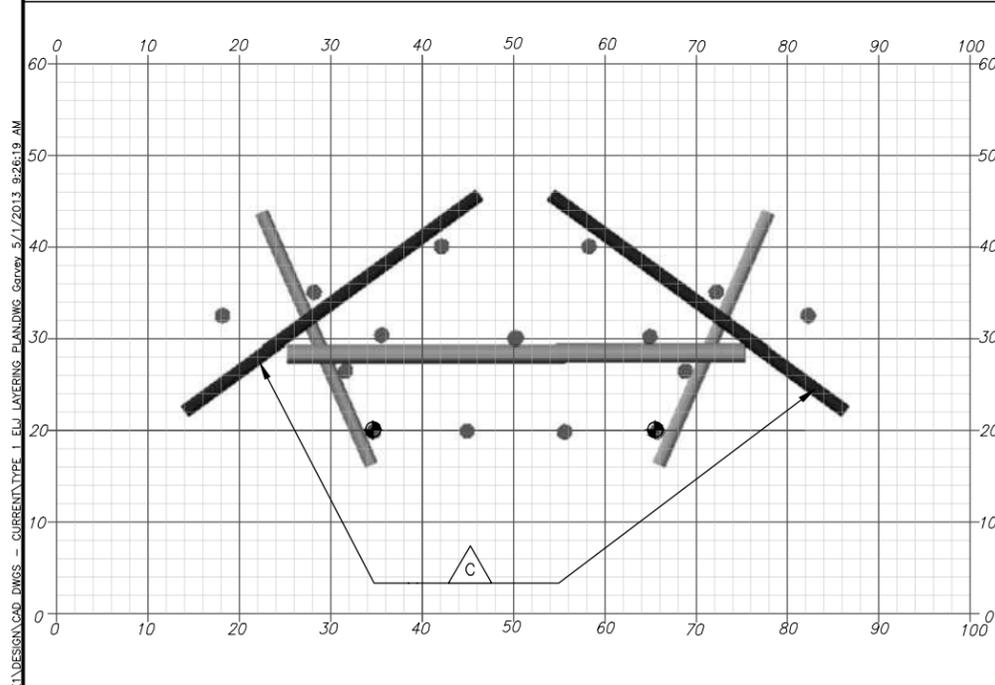
LAYER 0
EXCAVATE TO POST BOTTOM ELEVATION PLACE FIFTEEN VERTICAL LOG POSTS.



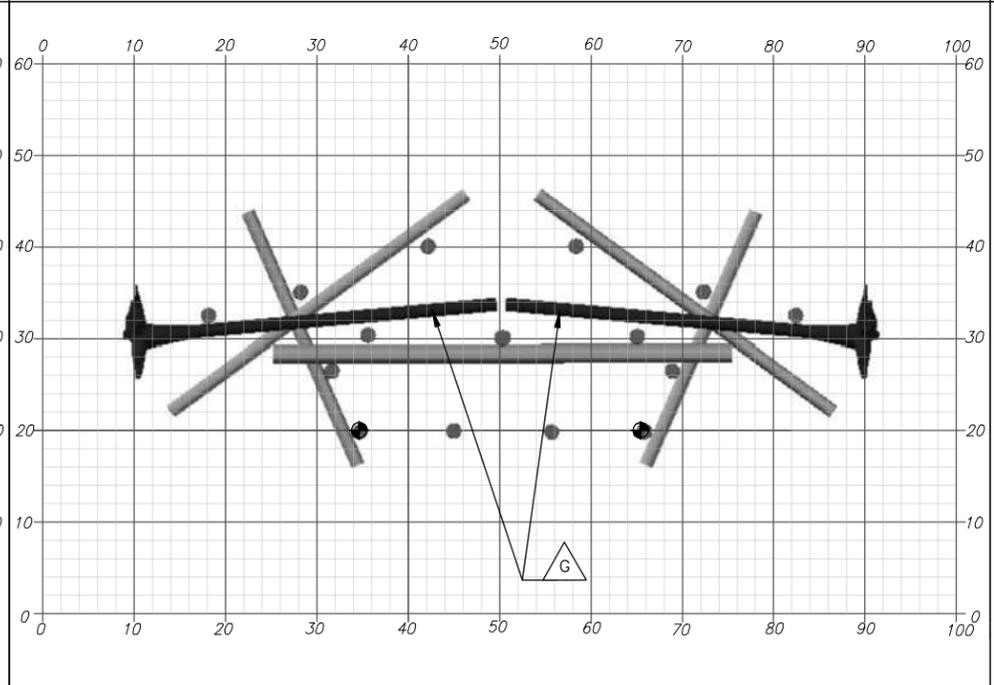
LAYER 1
PLACE TWO FRAME LOG MEMBERS. CABLE LASH TO VERTICAL POSTS WHERE SHOWN.



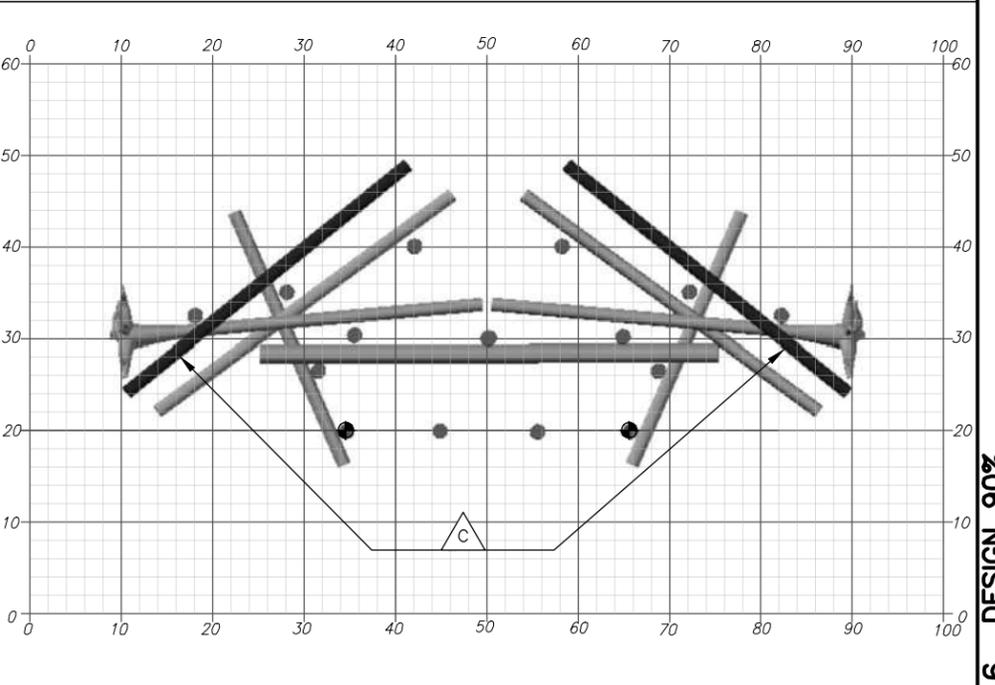
LAYER 2
PLACE ONE FRAME LOG MEMBER. CABLE LASH TO VERTICAL POSTS WHERE SHOWN.



LAYER 3
PLACE TWO FRAME LOG MEMBERS

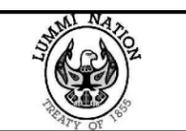
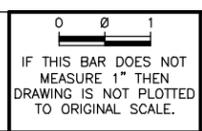


LAYER 4
PLACE TWO FRAME LOG MEMBERS



LAYER 5
PLACE TWO FRAME LOG MEMBERS

NA\PROJECTS\LUMMI\BELMIDDLE_FORK_HOOKSACK_PHASE1\DESIGN\CAD_DWG5 - CURRENT\TYPE 1_L1J_LAYERING_PLAN.DWG Correv. 5/1/2013 9:26:19 AM



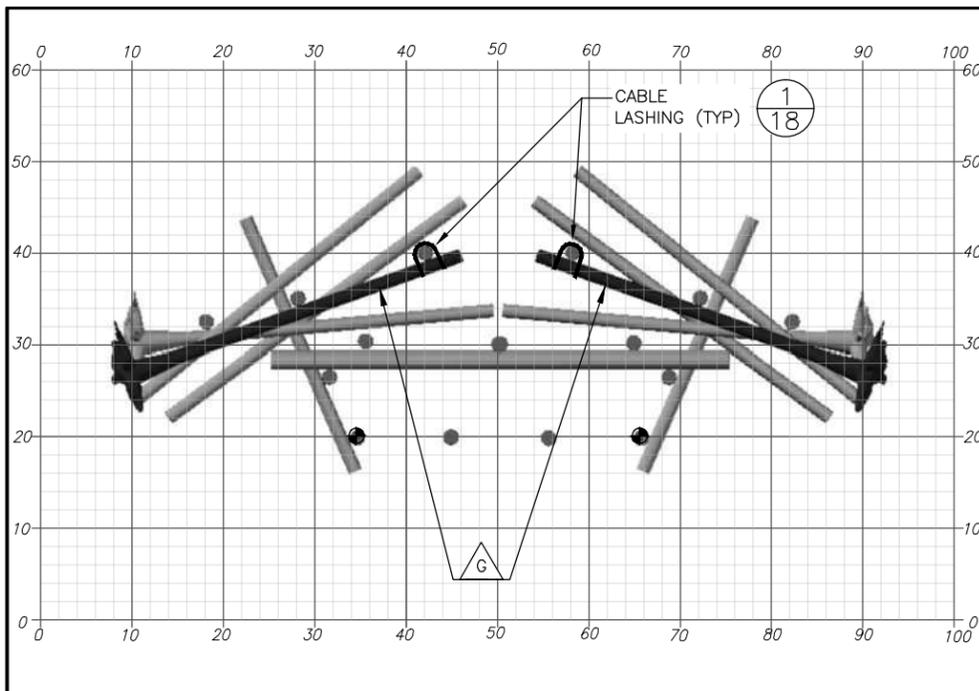
NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED: RLE	LATITUDE: 48°49'00"N
CHECKED: TA	LONGITUDE: 122°08'00"W
DRAWN: GD	TN/SC/RG: T38N/S2/R5E
CHECKED: RLE	DATE: 2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

TYPE 1 LAYERING PLAN 1

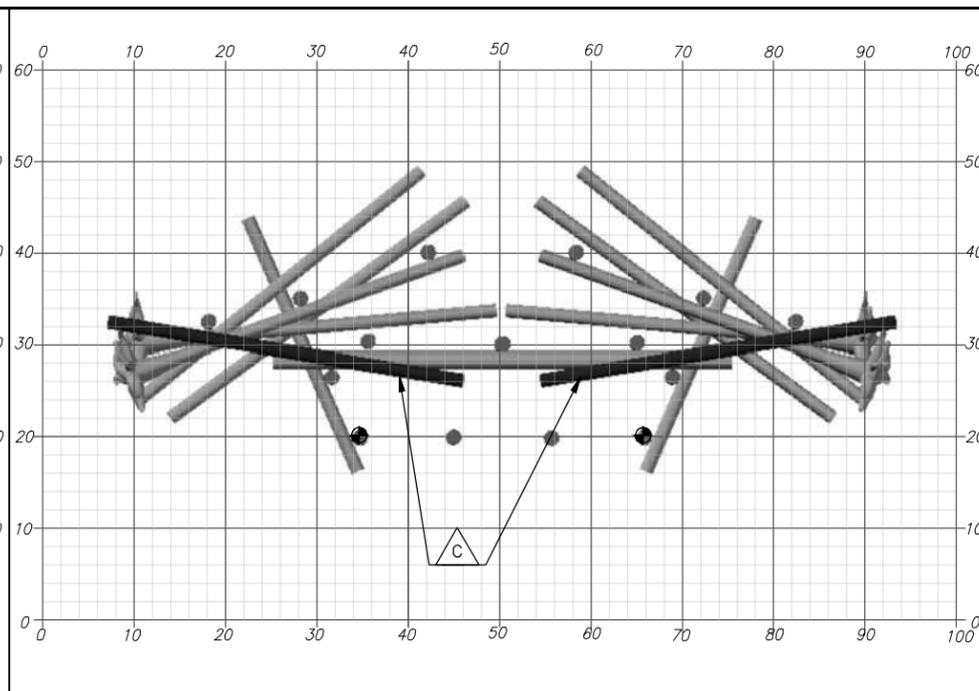
8
SHEET 8 OF 21

Apr 12, 2016 DESIGN 90%



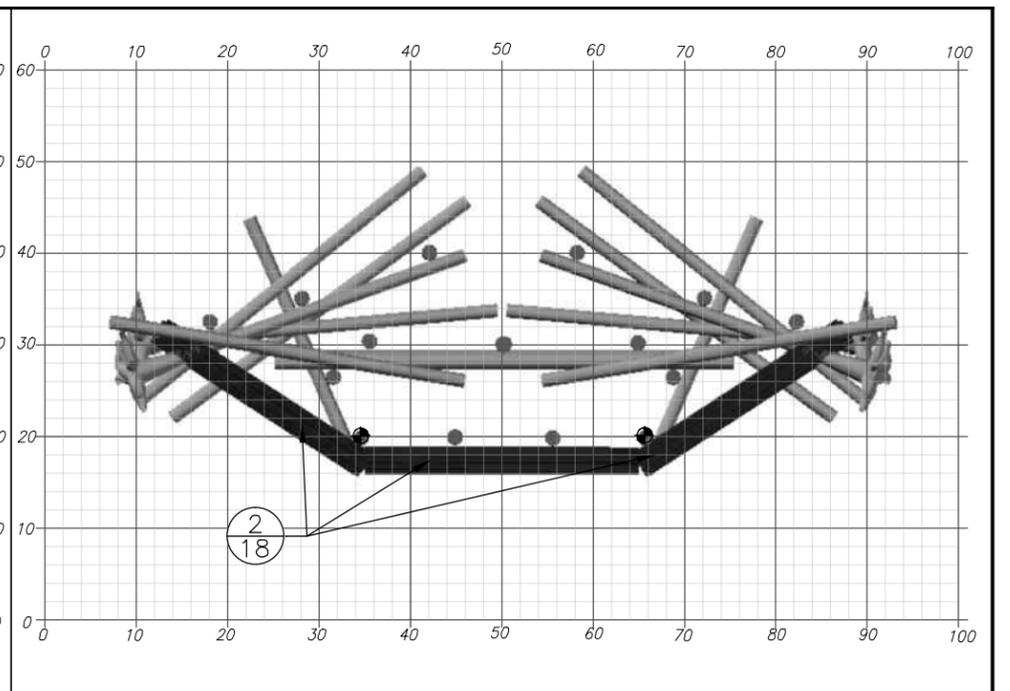
LAYER 6

PLACE TWO FRAME LOG MEMBERS. CABLE LASH TO VERTICAL POSTS WHERE SHOWN.



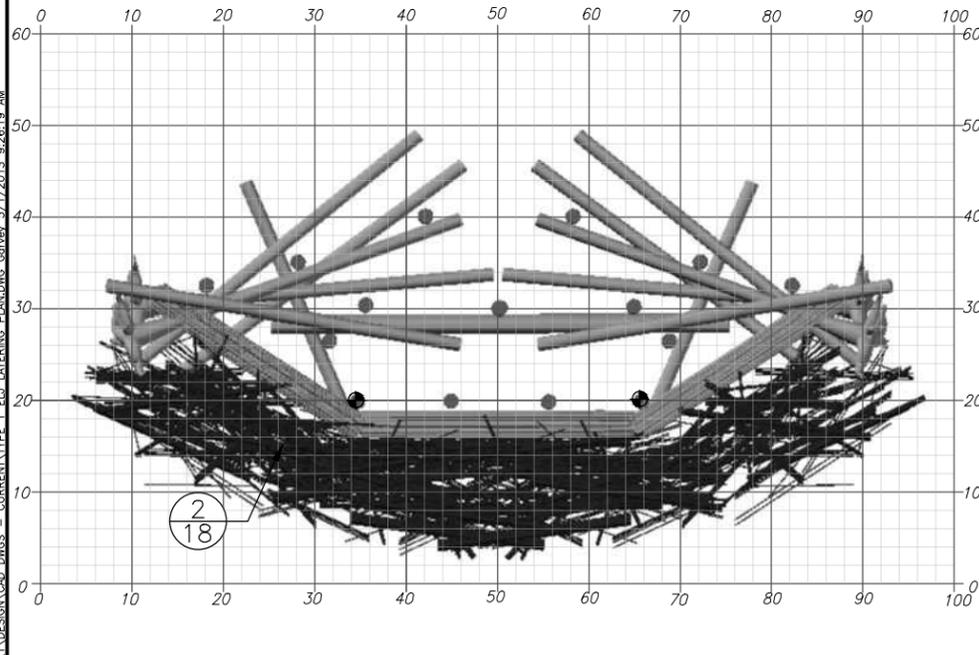
LAYER 7

PLACE TWO FRAME LOG MEMBERS



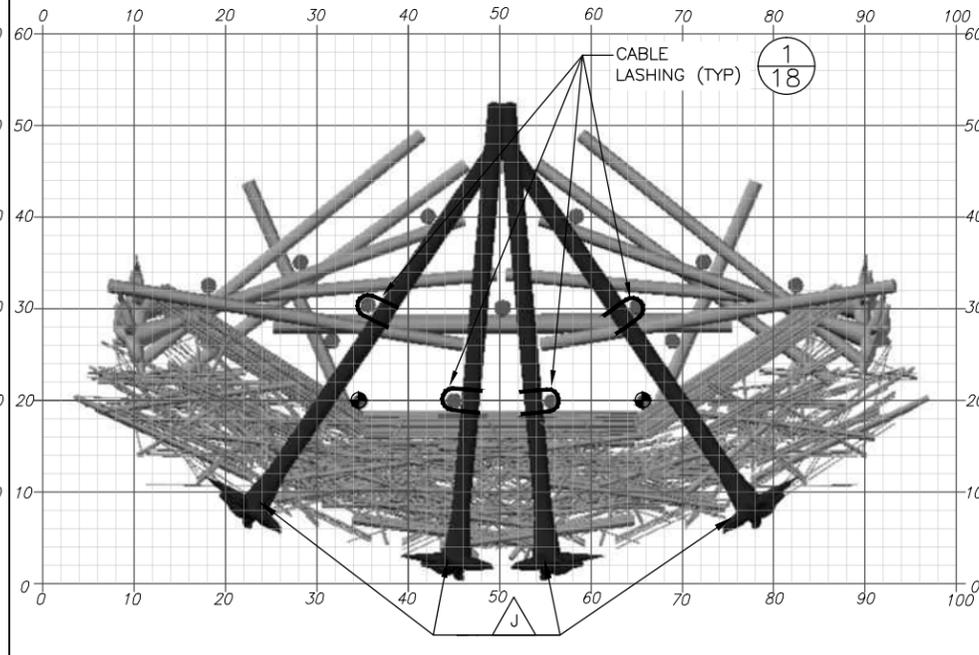
LAYER 8

PLACE RACKING MATERIAL TIGHT AND UNIFORM



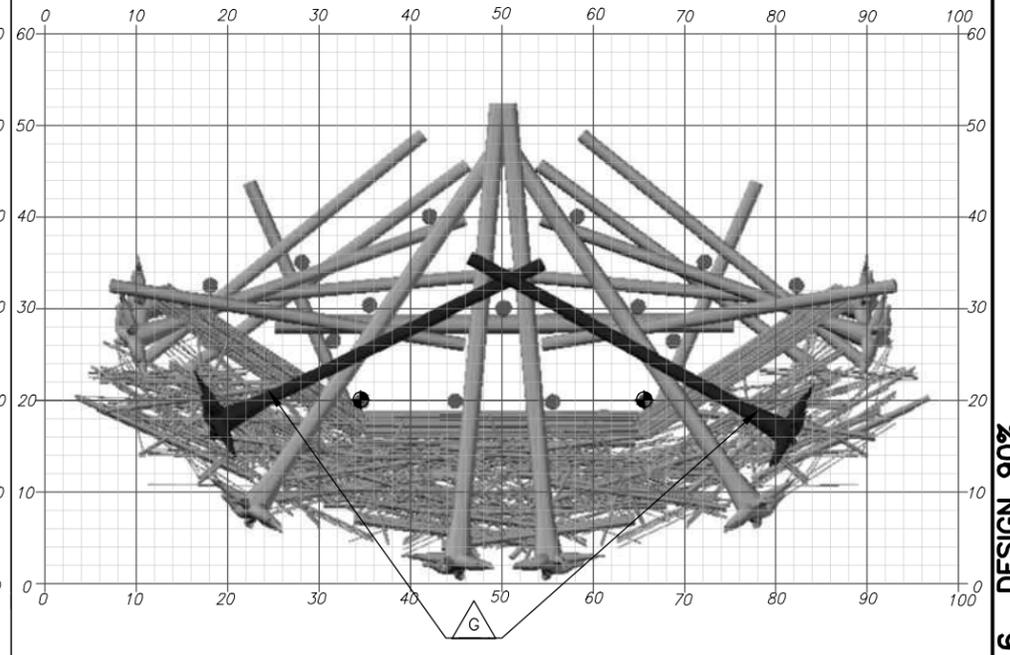
LAYER 9

PLACE RACKING MATERIAL INTERLOCKED AND RANDOMLY



LAYER 10

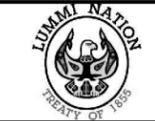
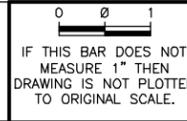
PLACE FOUR KEY LOG MEMBERS. CABLE LASH TO VERTICAL POSTS WHERE SHOWN.



LAYER 11

PLACE TWO FRAME LOG MEMBERS

NA:\PROJECTS\LUMMI\BELMIDDLE_FORK_HOOKSACK_PHASE1\DESIGN\CAD_DWG5 - CURRENT\TYPE 1_ELJ_LAYERING_PLAN.DWG_Conver_5/1/2013_9:26:19_AM

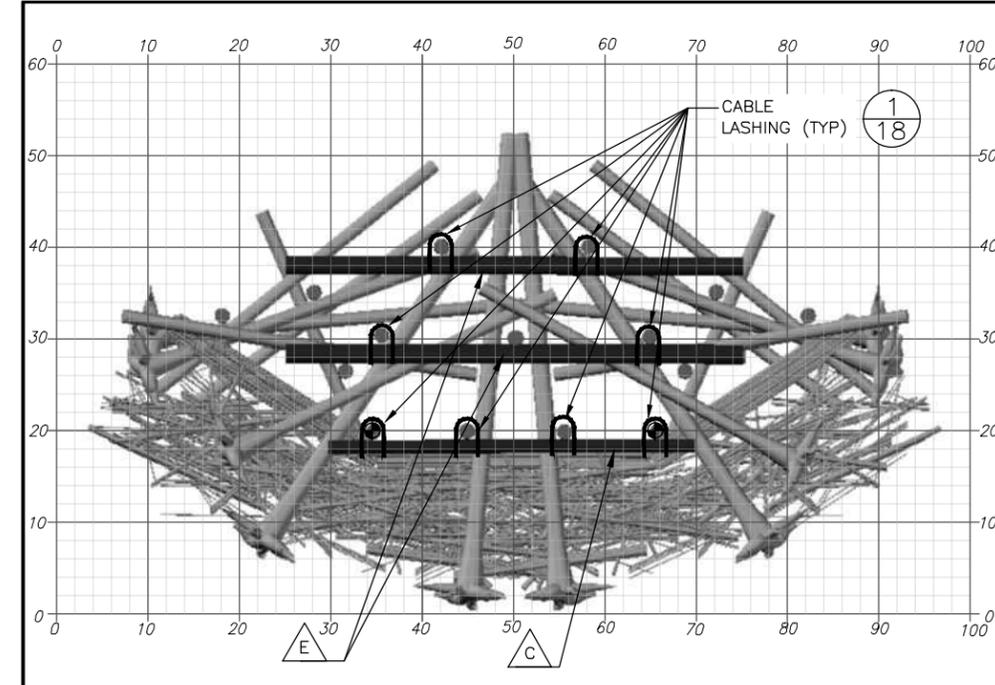


NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED: RLE	LATITUDE: 48°49'00"N
CHECKED: TA	LONGITUDE: 122°08'00"W
DRAWN: GD	TN/SC/RG: T38N/S2/R5E
CHECKED: RLE	DATE: 2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

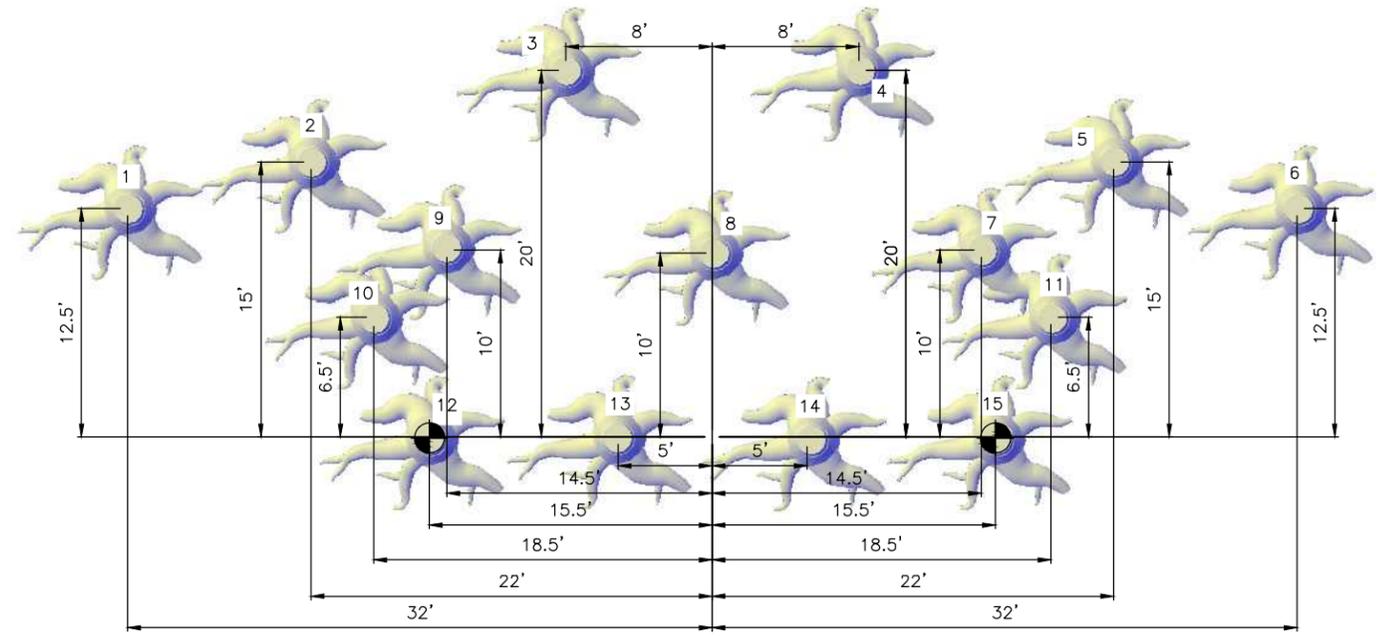
TYPE 1 ELJ LAYERING PLAN 2

Apr 12, 2016 DESIGN 90%



LAYER 12

PLACE THREE FRAME LOG MEMBERS. CABLE LASH TO VERTICAL POSTS (8 LOCATIONS).



TYPE 1 ELJ POST DIMENSIONING PLAN 1/7

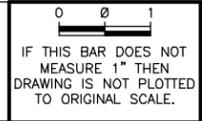
SCALE: 1"=5'

NA:\PROJECTS\LUMMI\BIBEL MIDDLE FORK HOOPSACK PHASE1\DESIGN\CAD DWGS - CURRENT\TYPE 1 ELJ LAYERING PLAN.DWG, Correv. 5/1/2013, 9:26:19 AM

TYPE 1 ELJ - LOG SCHEDULE

LOG ID	DIA* (IN)	LENGTH** (FT)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE
A	22	30	Y	15
B	18	30	N	2
C	18	40	N	7
E	24	50	N	3
G	18	40	Y	6
J	24	50	Y	4

*DIAMETER AT BREAST HEIGHT
 **TOTAL LENGTH INCLUDING ROOTWAD



NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED: <u>RLE</u>	LATITUDE: <u>48°49'00"N</u>
CHECKED: <u>TA</u>	LONGITUDE: <u>122°08'00"W</u>
DRAWN: <u>GD</u>	TN/SC/RG: <u>T38N/S2/R5E</u>
CHECKED: <u>RLE</u>	DATE: <u>2/10/2015</u>

PORTER CREEK REACH
 RESTORATION PHASE 1 & 4

TYPE 1 ELJ LAYERING PLAN
 3 AND DETAILS

10
 SHEET 10 OF 21

Apr 12, 2016 DESIGN 90%

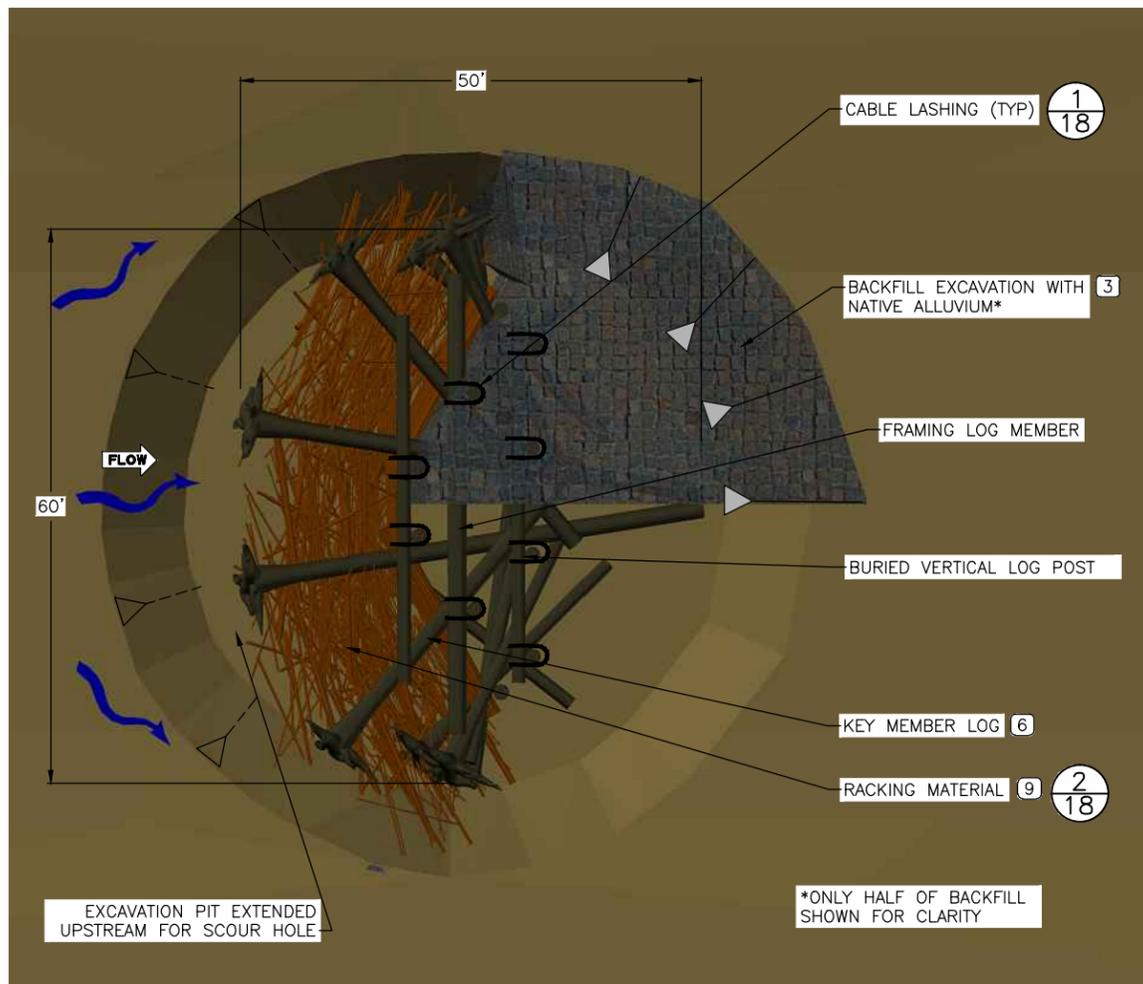
TYPE 2 ELJ STRUCTURE SCHEDULE

STRUCTURE LABEL*	1-2-1	1-2-2	1-2-3	1-2-6	4-2-28	4-2-29	4-2-34	4-2-35	4-2-36
STRUCTURE WIDTH, (ft)	60	60	60	60	60	60	60	60	60
STRUCTURE LENGTH, (ft)	50	50	50	50	50	50	50	50	50
MINIMUM FRAME LOG DIAMETER, (in)	18	18	18	18	18	18	18	18	18
MINIMUM KEY LOG DIAMETER, (in)	24	24	24	24	24	24	24	24	24
TIMBER POST DIAMETER, (in)	22	22	22	22	22	22	22	22	22
GROUND ELEVATION AT STRUCTURE, (ft-NAVD88)	526.5	521.5	515	514.5	513.5	507.5	496.5	495	488.5
CHANNEL BED ELEVATION ADJACENT TO STRUCTURE, (ft-NAVD88)	521.5	516	514.5	512	509	507	495	491	487
STRUCTURE BOTTOM ELEVATION, (ft-NAVD88)	514.5	509.5	506.5	504	501	499	487	483	479
TOP LOG ELEVATION, (ft-NAVD88)	528.5	523.5	520.5	518	515	513	501	497	493
STRUCTURE TOP ELEVATION, (ft-NAVD88)	530.5	525.5	522.5	520	517	515	503	499	495
MINIMUM POST BOTTOM ELEVATIONS, (ft-NAVD88)	500.5	495.5	492.5	490	487	485	473	469	465
AVERAGE SEPTEMBER WATER SURFACE ELEVATION (ft-NAVD 88)	522	516.5	515	512.5	**	**	**	**	**

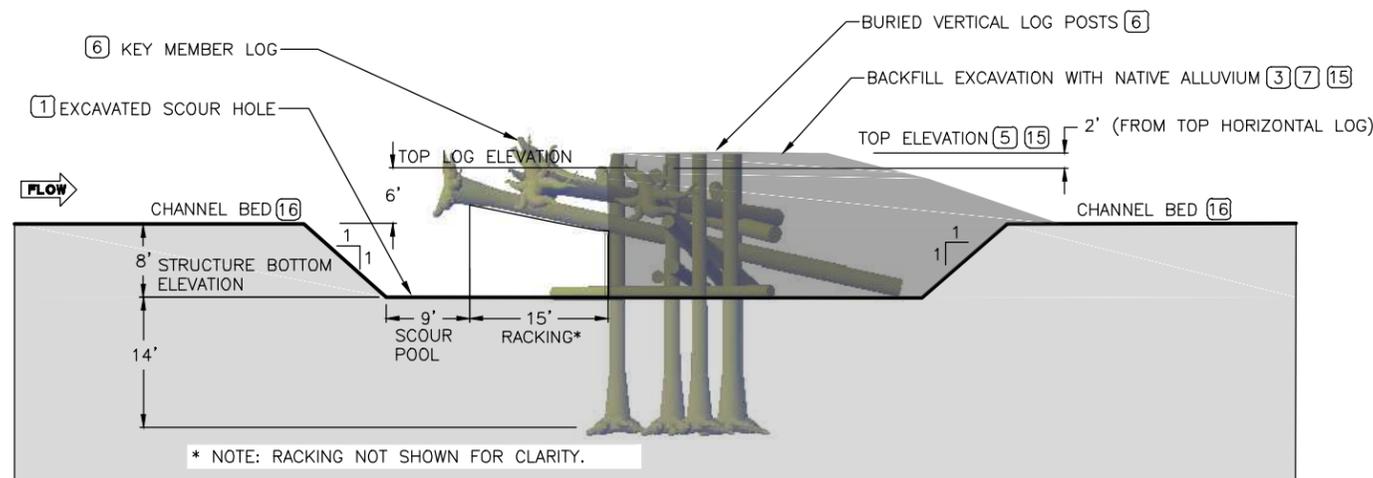
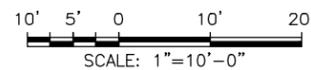
* LABEL FORMAT, PHASE-ELJ TYPE-ELJ NUMBER

TYPE 2 ELJ STRUCTURE NOTES

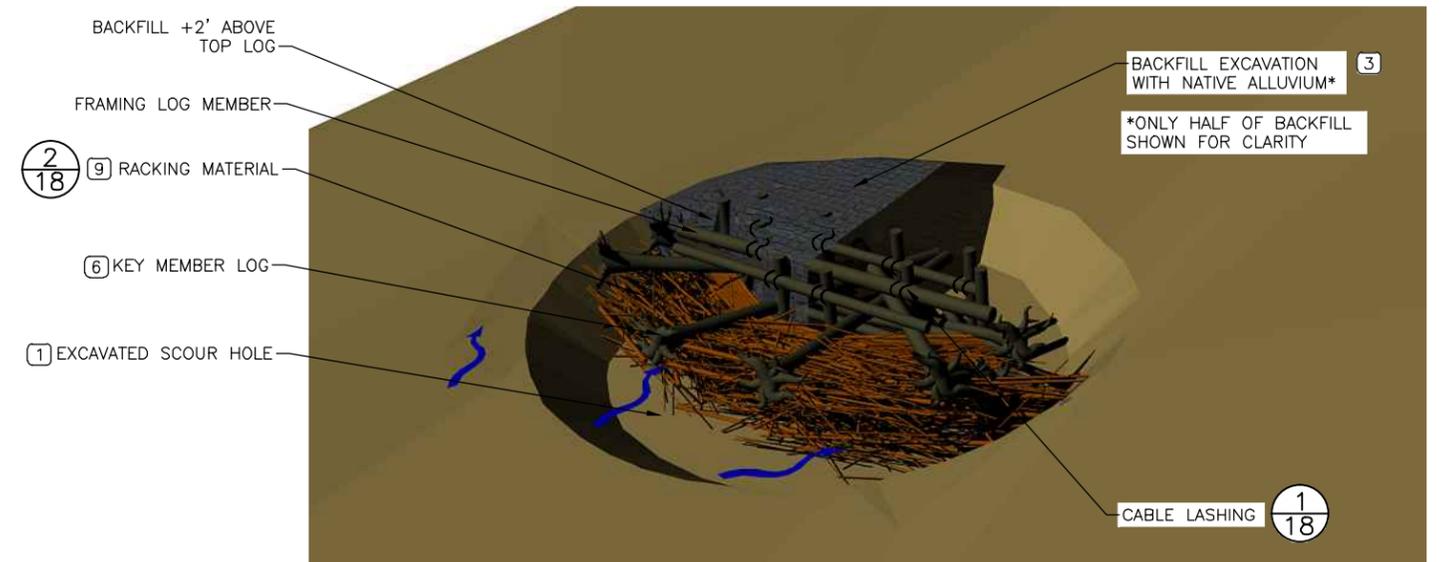
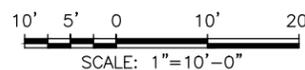
- (1) EXCAVATE IN FRONT OF LOGJAM FOR PLACEMENT OF RACKING MATERIAL. EXCAVATION AREA SHALL NOT BE BACKFILLED WITH ALLUVIUM, BUT LEFT AS A SCOUR HOLE.
2. EXCAVATION SPOILS SHALL BE STAGED ACCORDING TO THE SWPPP. SPOILS SHALL ALSO BE STOCKPILED TO ALLOW LOG LAYER PLACEMENT AND CONSTRUCTION ACCESS.
- (3) BACKFILL EXTENTS MAY VARY AND TO BE CONSTRUCTED WITH NATIVE ALLUVIUM FROM EXCAVATION SPOILS.
4. BACKFILL EACH STRUCTURE LAYER WITH NATIVE ALLUVIUM FLUSH WITH THE CURRENT LAYER PRIOR TO PLACEMENT OF THE SUBSEQUENT LAYER.
- (5) FINAL ELJ HEIGHT TO BE ACHIEVED AS SPECIFIED REGARDLESS OF ACTUAL LOG DIAMETERS USED OR STACKING ARRANGEMENT.
- (6) ALL LARGE WOOD DIMENSIONS DO NOT INCLUDE BARK THICKNESS.
- (7) COVER TOP OF BACKFILL AREA AND BASE OF STRUCTURES 6-12 INCHES WITH LOOSE WOOD DEBRIS AND CHIPS. MIX INTO UPPER 2 FT ON BACKFILL.
8. FRAME LOG MEMBERS PER INSTRUCTIONS ON LAYERING PLAN TO VERTICAL POSTS WITH CABLE LASHING. SEE DETAIL 1 ON SHEET 18.
- (9) RACKING MATERIAL SHALL CONSIST OF APPROXIMATELY 90 CU. YDS PER STRUCTURE WITH 6" - 12" DIA DBH AND A MINIMUM OF 5-FOOT LENGTH. RACKING PLACEMENT SHALL OCCUR WITH EACH LAYER PLACEMENT TO ENSURE RACKING MATERIAL EXTENDS THROUGH STRUCTURE AND PINNED IN PLACE BY SUBSEQUENT LAYERS.
10. THE CONTRACTOR SHALL FIELD VERIFY WITH THE OWNER REPRESENTATIVE OR ENGINEER ALL STRUCTURE LOCATIONS, PILE LOCATIONS, LENGTHS, WIDTHS AND ELEVATIONS PRIOR TO EXCAVATION, ASSEMBLY AND INSTALLATION OF EACH STRUCTURE.
11. LOCATIONS FOR ALL STRUCTURE PLACEMENTS WILL BE STAKED IN FIELD BY THE ENGINEER OR OWNER REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.
12. EXCAVATION LIMITS SHALL BE FIELD VERIFIED BY THE OWNER REPRESENTATIVE OR ENGINEER PRIOR TO EXCAVATION COMMENCING AND PLACEMENT OF ANY LARGE WOOD.
13. LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS BY THE CONTRACTOR IN A PLACE VISIBLE FOR FIELD VERIFICATION PRIOR TO PLACEMENT WITH LEAD-FREE, BLAZE-ORANGE SURVEY MARKING PAINT.
14. THE WOOD LAYER PLACEMENT IN EACH LOGJAM LAYER SHALL BE FIELD VERIFIED BY ON-SITE OWNER REPRESENTATIVE PRIOR TO BACKFILLING.
- (15) BACKFILL NOT TO EXCEED TOP ELEVATION. EXCESS BACKFILL TO BE PLACED DOWNSTREAM OF FINISHED ELJ.
- (16) CHANNEL BED ELEVATION IS REPRESENTATIVE OF A LOCAL AVERAGE CHANNEL BED AT RIFFLES. CHANNEL BED ELEVATION SHOULD NOT BE TAKEN IN POOLS.



TYPE 2 ELJ PLAN



TYPE 2 ELJ PROFILE



TYPE 2 ELJ PERSPECTIVE

TYPE 2 ELJ
SCALE: AS NOTED.

11

0 10 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.



NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED: RLE	LATITUDE: 48°49'00"N
CHECKED: TA	LONGITUDE: 122°08'00"W
DRAWN: GD	TN/SC/RG: T38N/S2/R5E
CHECKED: RLE	DATE: 2/10/2015

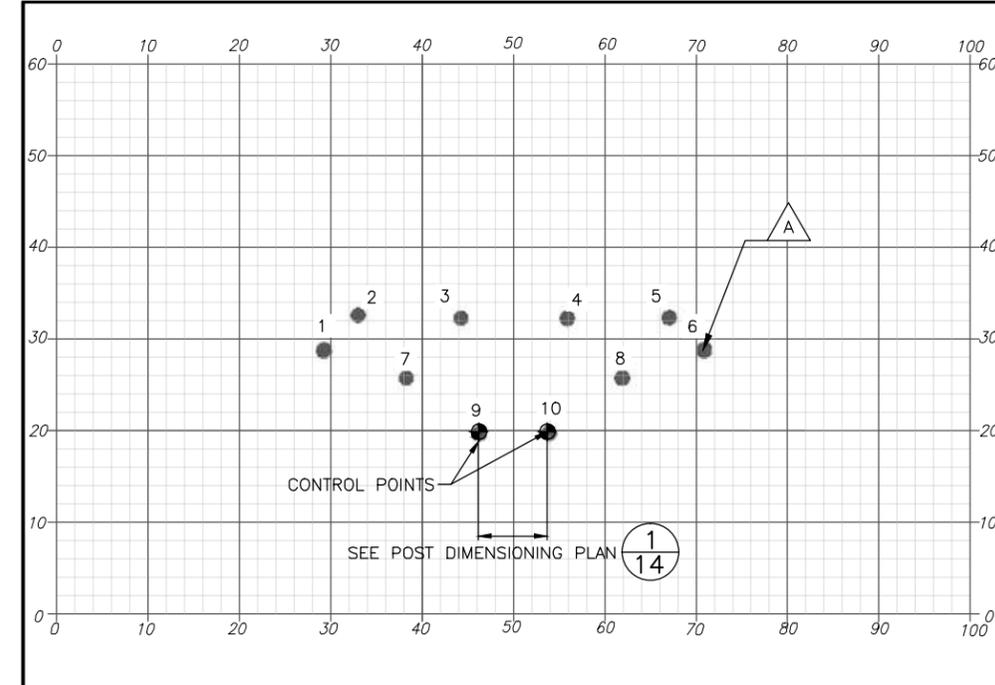
PORTER CREEK REACH RESTORATION PHASE 1 & 4

TYPE 2 ELJ

11
SHEET 11 OF 21

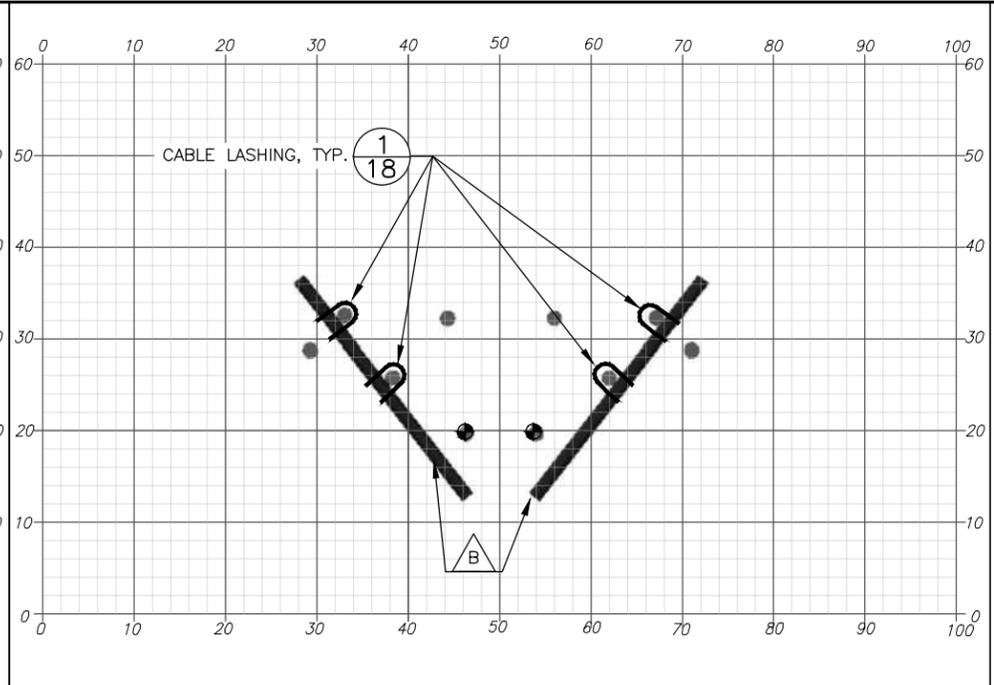
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Apr 12, 2016 DESIGN 90%



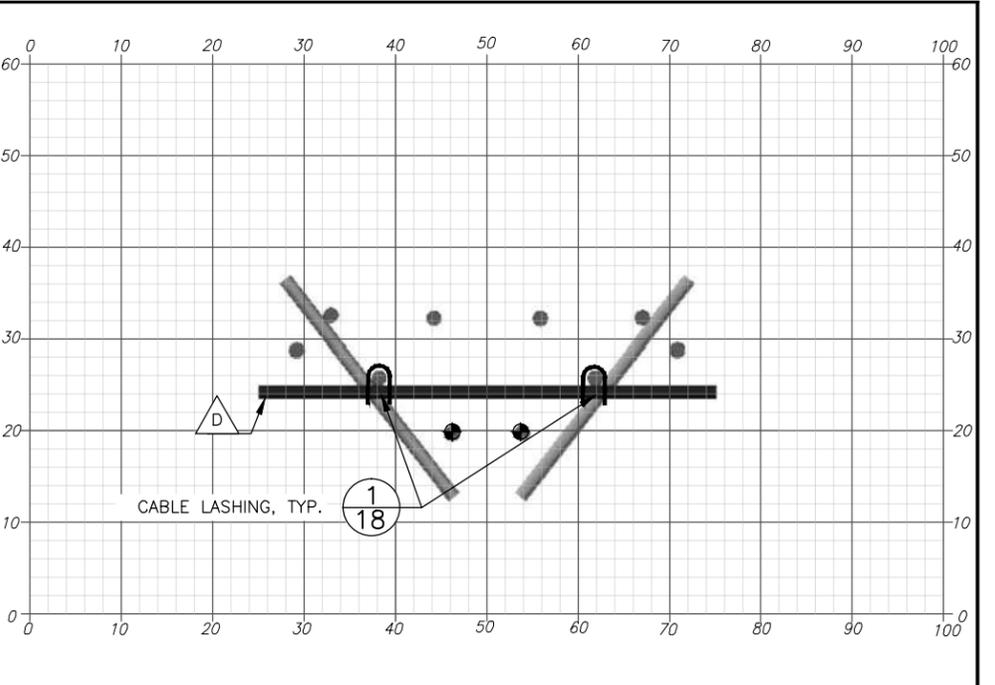
LAYER 0

EXCAVATE TO POST BOTTOM ELEVATION, PLACE 10 VERTICAL LOG POSTS.



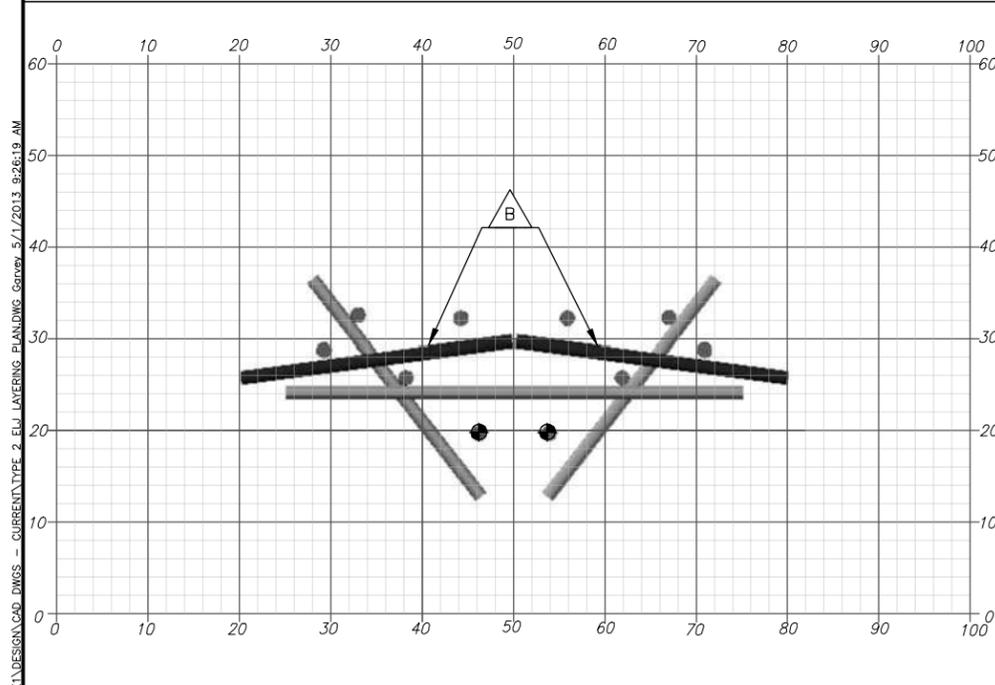
LAYER 1

PLACE 2 FRAME LOG MEMBERS. CABLE LASH TO VERTICAL POSTS WHERE SHOWN.



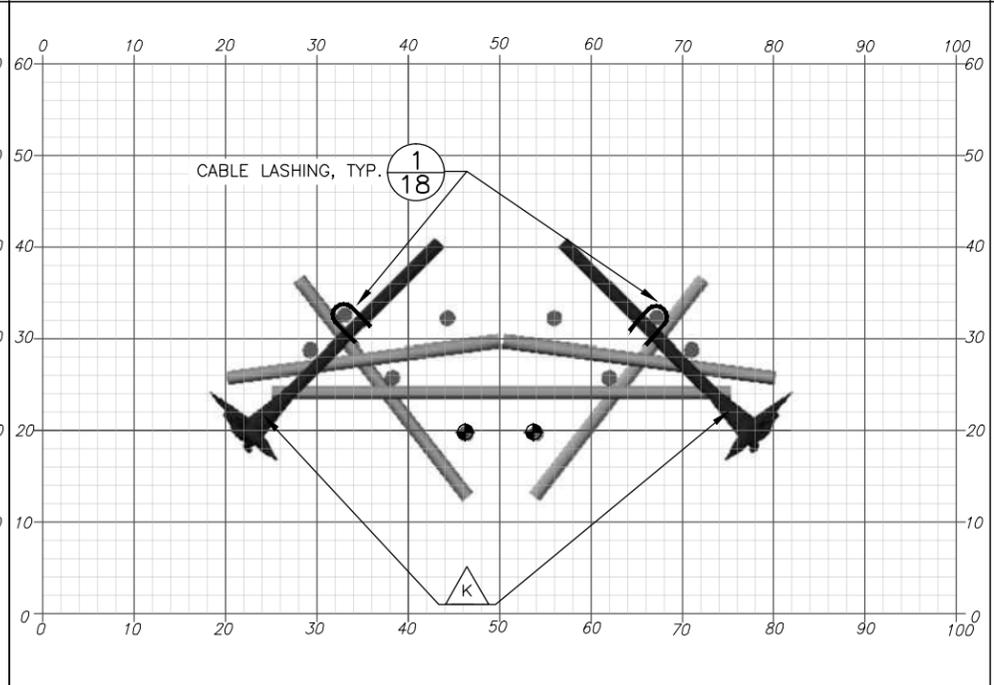
LAYER 2

PLACE 1 FRAME LOG MEMBER AND CABLE LASH TO VERTICAL POST AT 2 LOCATIONS



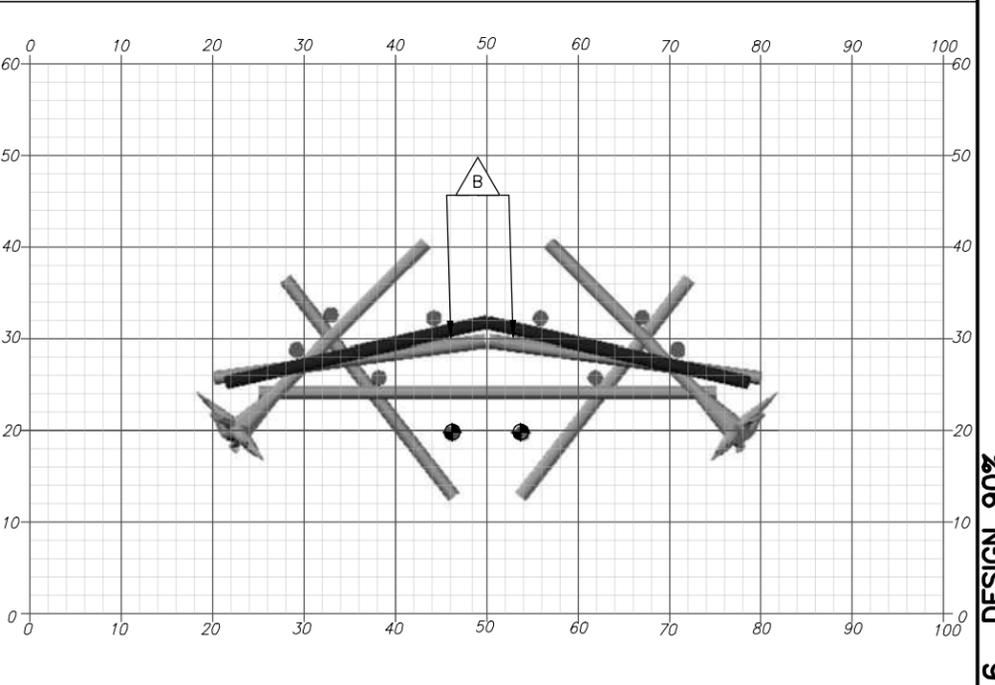
LAYER 3

PLACE 2 FRAME LOG MEMBERS



LAYER 4

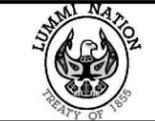
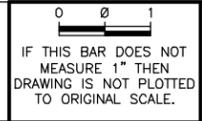
PLACE 2 FRAME LOG MEMBERS. CABLE LASH TO POSTS WHERE SHOWN.



LAYER 5

PLACE 2 FRAME LOG MEMBERS

NA:\PROJECTS\LUMMI\BEL MIDDLE FORK HOOPSACK PHASE1\DESIGN\CAD DWGS - CURRENT\TYPE 2_ELJ_LAYERING_PLAN.DWG, Correv: 5/1/2013 9:26:19 AM



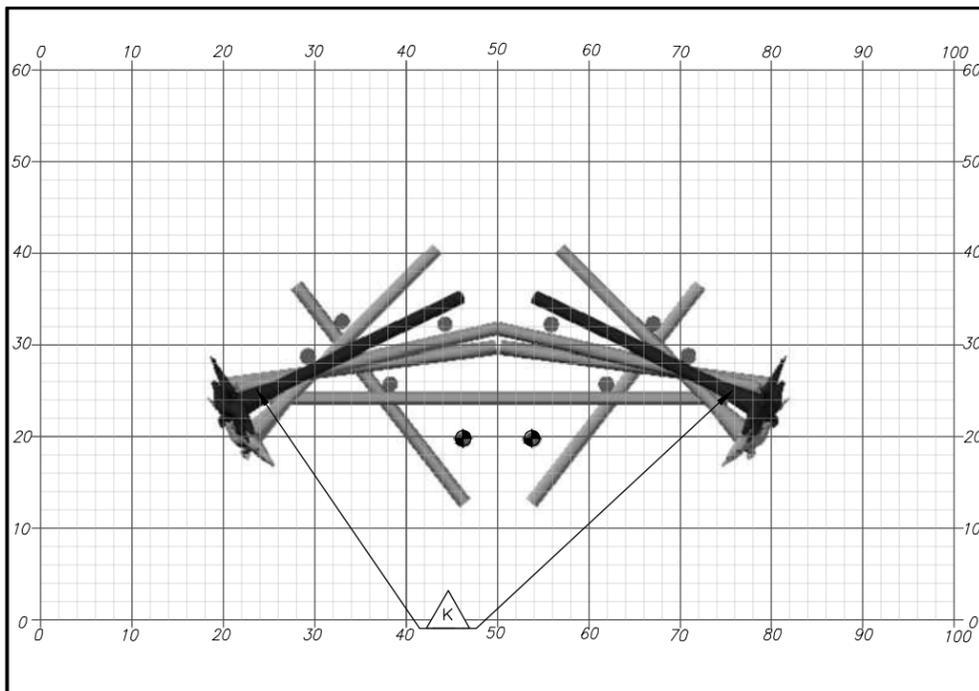
NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED: RLE	LATITUDE: 48°49'00"N
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PORTER CREEK REACH RESTORATION PHASE 1 & 4

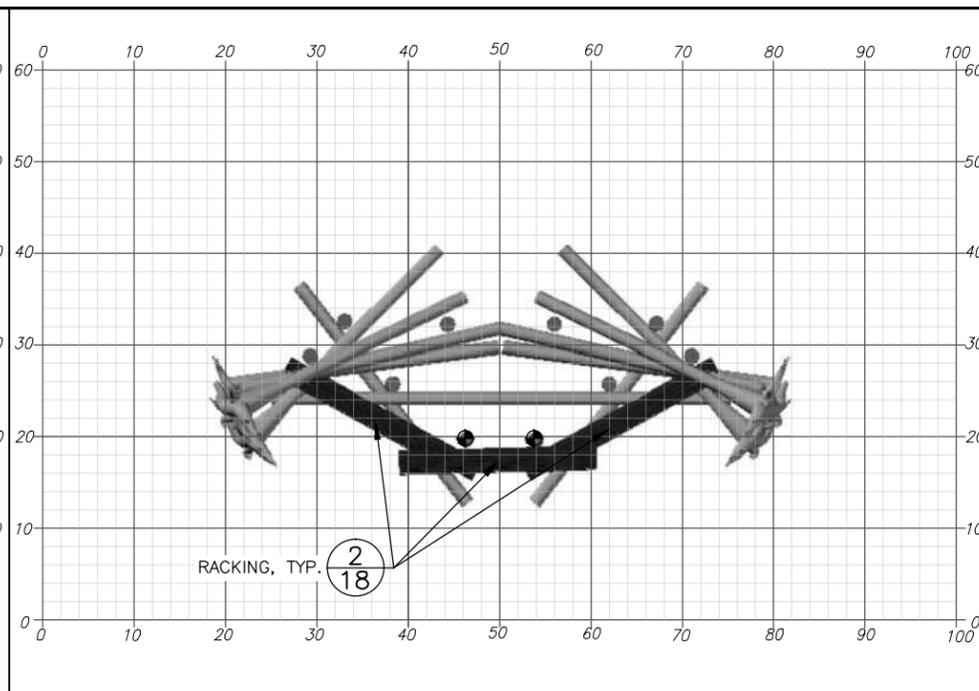
TYPE 2 ELJ LAYERING PLAN 1

12 SHEET 12 OF 21

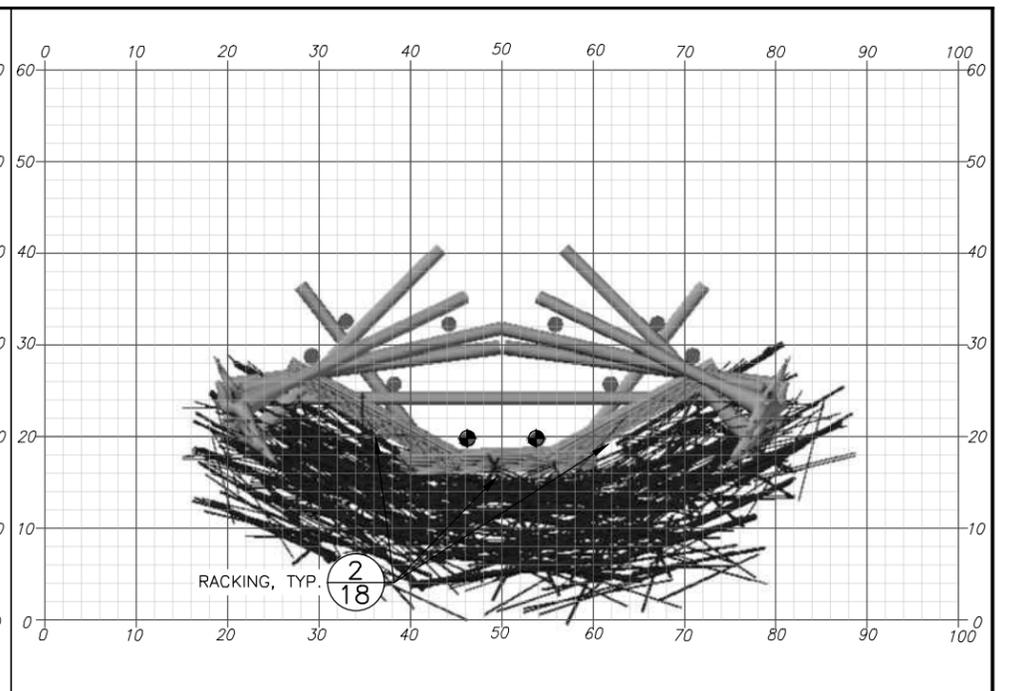
Apr 12, 2016 DESIGN 90%



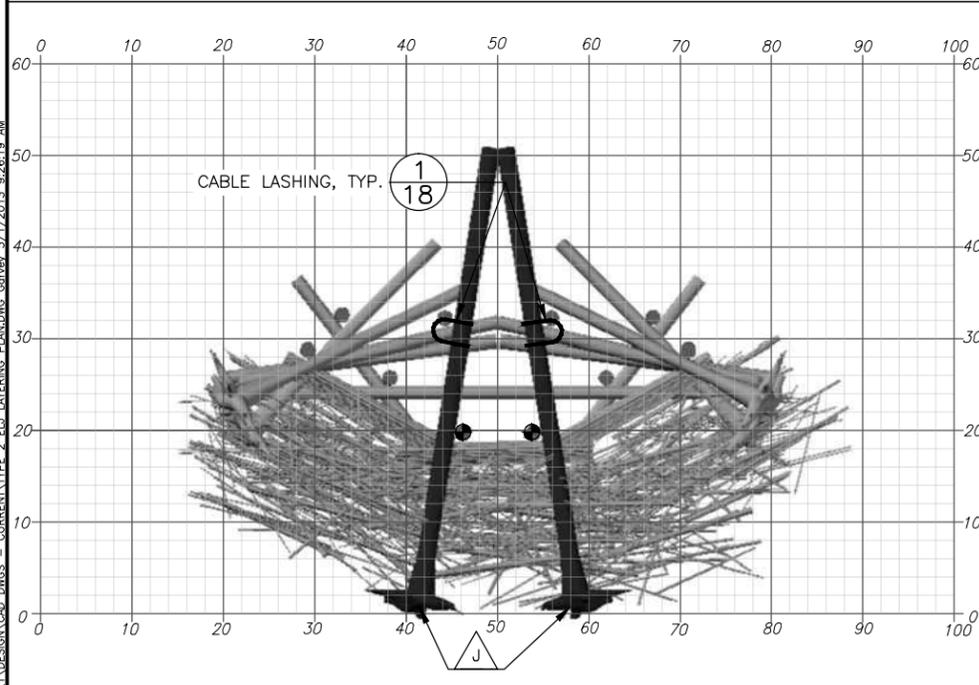
LAYER 6
PLACE 2 FRAME LOG MEMBERS



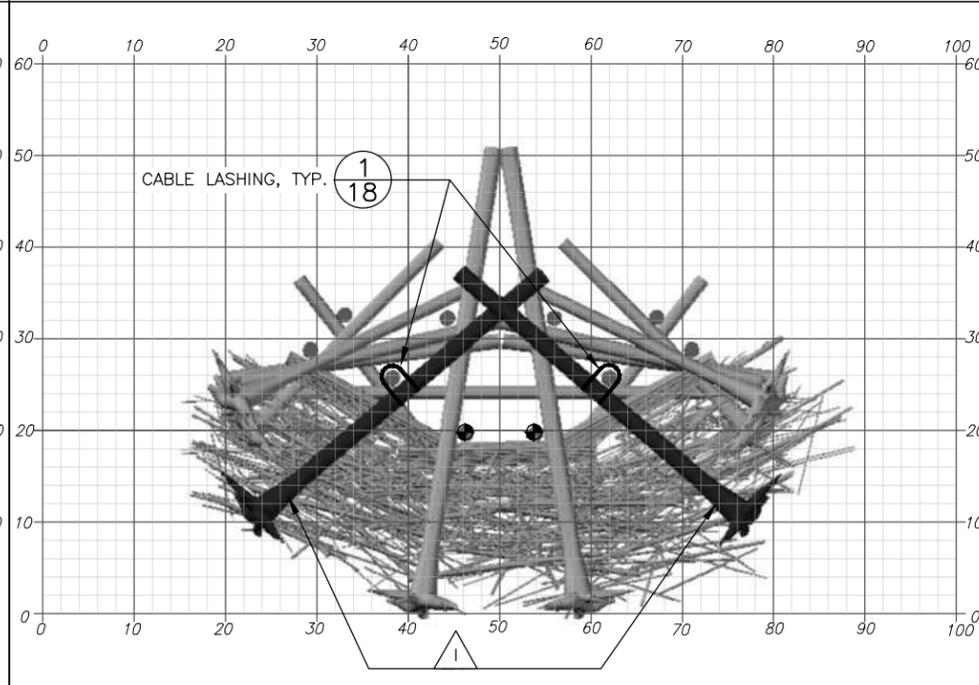
LAYER 7
PLACE RACKING MATERIAL TIGHT AND UNIFORM



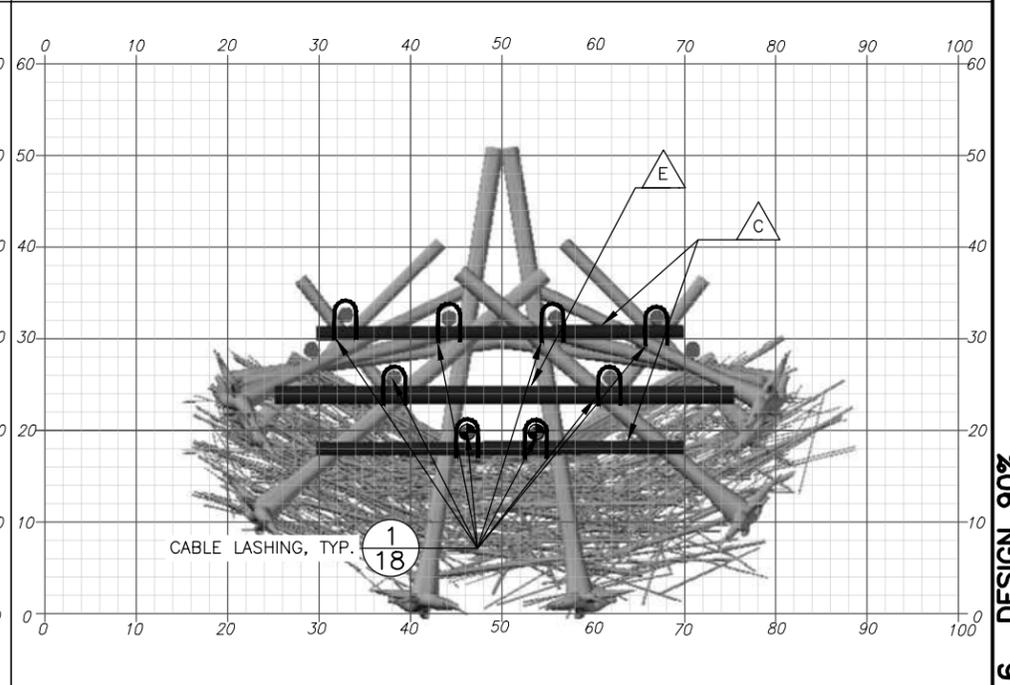
LAYER 8
PLACE RACKING MATERIAL INTERLOCKED AND RANDOMLY



LAYER 9
PLACE TWO KEY LOG MEMBERS. CABLE LASH TO POSTS WHERE SHOWN.

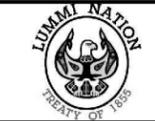
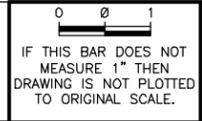


LAYER 10
PLACE TWO KEY LOG MEMBERS. CABLE LASH TO POSTS WHERE SHOWN.



LAYER 11
PLACE FRAME LOG MEMBERS AND CABLE LASH TO VERTICAL LOG POSTS

NA:\PROJECTS\LUMMI\ELJ\MIDDLE FORK HOOPSACK PHASE1\DESIGN\CAD DWGS - CURRENT\TYPE 2_ELJ_LAYERING_PLAN.DWG, Correv. 5/1/2013, 9:26:19 AM



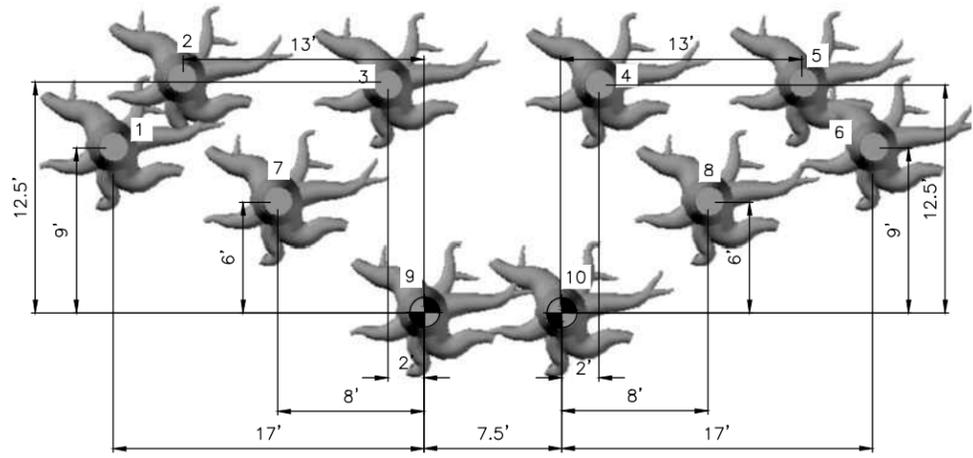
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CHECKED: TA	LONGITUDE: 122°08'00"W
DRAWN: GD	TN/SC/RG: T38N/S2/R5E
CHECKED: RLE	DATE: 2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

TYPE 2 ELJ LAYERING PLAN 2

13
SHEET 13 OF 21

Apr 12, 2016 DESIGN 90%



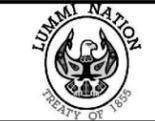
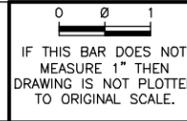
TYPE 2 ELJ POST DIMENSIONING PLAN 1
12
SCALE: 1"=5'

TYPE 2 ELJ – LOG SCHEDULE				
LOG ID	DIA* (IN)	LENGTH** (FT)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE
A	22	30	Y	10
B	18	30	N	6
C	18	40	N	2
D	18	50	N	1
E	24	50	N	1
I	24	40	Y	2
J	24	50	Y	2
K	18	30	Y	4

*DIAMETER AT BREAST HEIGHT
**TOTAL LENGTH INCLUDING ROOTWAD

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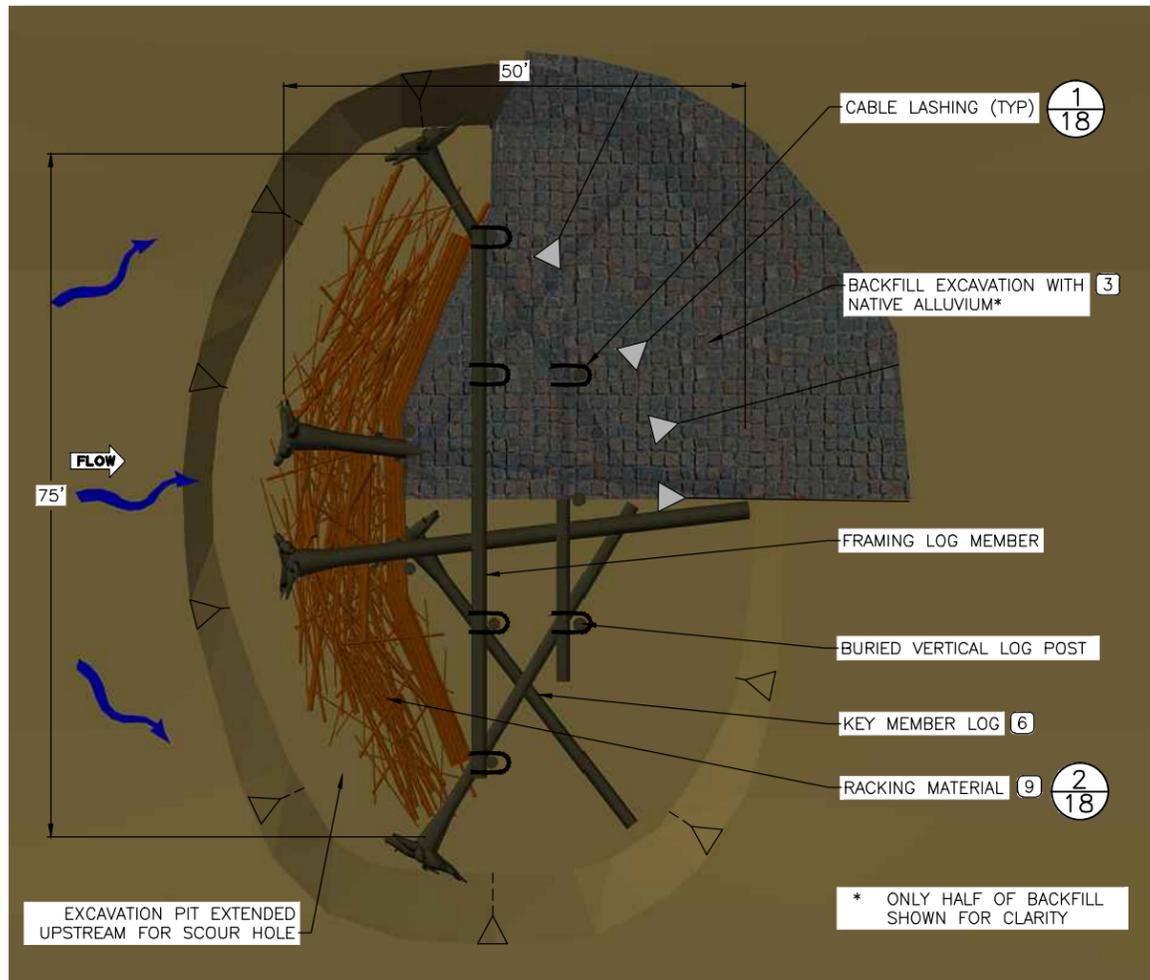


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CHECKED: TA	LONGITUDE: 122°08'00"W
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CHECKED: RLE	DATE: 2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

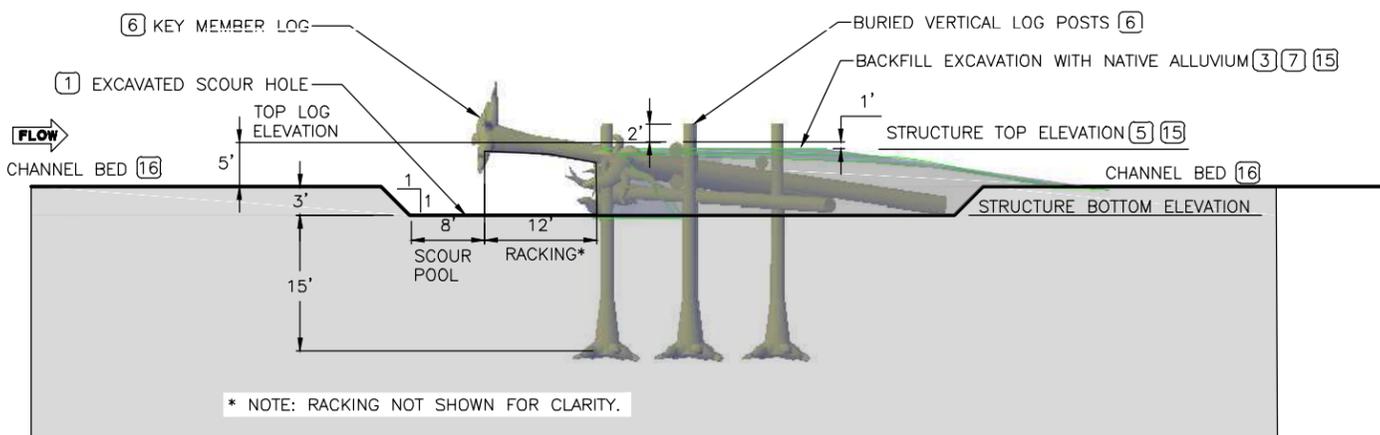
TYPE 2 ELJ LAYERING PLAN 3 AND DETAILS

14
SHEET 14 OF 21



TYPE 3 ELJ PLAN

10' 5' 0 10' 20'
SCALE: 1"=10'-0"



TYPE 3 ELJ PROFILE

10' 5' 0 10' 20'
SCALE: 1"=10'-0"

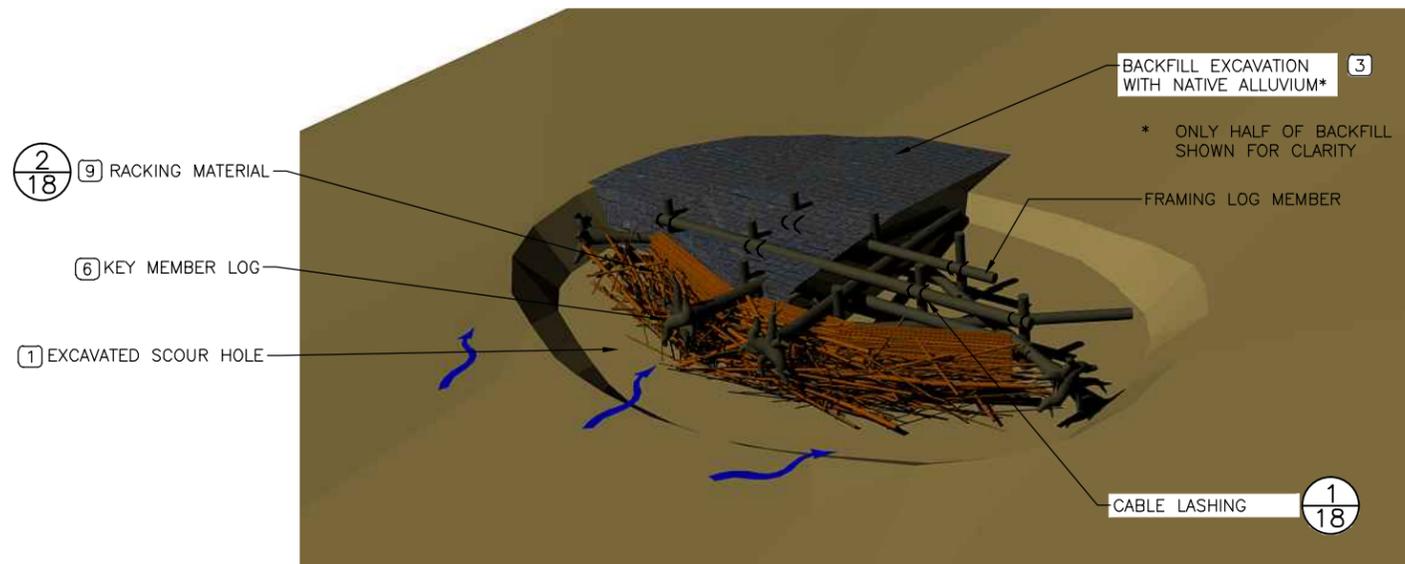
TYPE 3 ELJ
SCALE: AS NOTED.

TYPE 3 ELJ STRUCTURE SCHEDULE

STRUCTURE LABEL*	1-3-5	1-3-7	1-3-8	1-3-10	1-3-11	4-3-27	4-3-30	4-3-31	4-3-32	4-3-33	4-3-37	4-3-38
STRUCTURE WIDTH, (ft)	75	75	75	75	75	75	75	75	75	75	75	75
STRUCTURE LENGTH, (ft)	50	50	50	50	50	50	50	50	50	50	50	50
MINIMUM FRAME LOG DIAMETER, (in)	18	18	18	18	18	18	18	18	18	18	18	18
MINIMUM KEY LOG DIAMETER, (in)	24	24	24	24	24	24	24	24	24	24	24	24
TIMBER POST DIAMETER, (in)	18	18	18	18	18	18	18	18	18	18	18	18
GROUND ELEVATION AT STRUCTURE, (ft-NAVD88)	510.5	511.5	507	517	513.5	514.5	507.5	506.5	503	498.5	489	486.5
CHANNEL BED ELEVATION ADJACENT TO STRUCTURE, (ft-NAVD88)	510.5	511	506	517	513.5	512.5	505	503	502.5	498.5	487	485.5
STRUCTURE BOTTOM ELEVATION, (ft-NAVD88)	507.5	508	504	514	510.5	509.5	502	500.5	499.5	495.5	483	482.5
TOP LOG ELEVATION, (ft-NAVD88)	515.5	516	512	522	518.5	517.5	510	508.5	507.5	503.5	491	490.5
STRUCTURE TOP ELEVATION, (ft-NAVD88)	514.5	515	511	521	517.5	516.5	509	507.5	506.5	502.5	490	489.5
MINIMUM POST BOTTOM ELEVATIONS, (ft-NAVD88)	492.5	493	489	499	495.5	494.5	487	485.5	484.5	480.5	468	467.5
AVERAGE SEPTEMBER WATER SURFACE ELEVATION (ft-NAVD 88)	511	511.5	506.5	**	**	**	**	**	**	**	**	**

TYPE 3 ELJ STRUCTURE NOTES

- EXCAVATE IN FRONT OF LOGJAM FOR PLACEMENT OF RACKING MATERIAL. EXCAVATION AREA SHALL NOT BE BACKFILLED WITH ALLUVIUM, BUT LEFT AS A SCOUR HOLE.
- EXCAVATION SPOILS SHALL BE STAGED ACCORDING TO THE SWPPP. SPOILS SHALL ALSO BE STOCKPILED TO ALLOW LOG LAYER PLACEMENT AND CONSTRUCTION ACCESS.
- BACKFILL EXTENTS MAY VARY AND TO BE CONSTRUCTED WITH NATIVE ALLUVIUM FROM EXCAVATION SPOILS.
- BACKFILL EACH STRUCTURE LAYER WITH NATIVE ALLUVIUM FLUSH WITH THE CURRENT LAYER PRIOR TO PLACEMENT OF THE SUBSEQUENT LAYER.
- FINAL ELJ HEIGHT TO BE ACHIEVED AS SPECIFIED REGARDLESS OF ACTUAL LOG DIAMETERS USED OR STACKING ARRANGEMENT.
- ALL LARGE WOOD DIMENSIONS DO NOT INCLUDE BARK THICKNESS.
- COVER TOP OF BACKFILL AREA AND BASE OF STRUCTURES 6-12 INCHES WITH LOOSE WOOD DEBRIS AND CHIPS. MIX INTO UPPER 2 FT ON BACKFILL
- FRAME LOG MEMBERS PER INSTRUCTIONS ON LAYERING PLAN TO VERTICAL PILES WITH CABLE LASHING. SEE DETAIL 1 ON SHEET 18.
- RACKING MATERIAL SHALL CONSIST OF APPROXIMATELY 100 CU. YDS PER STRUCTURE WITH 6" - 12" DIA DBH AND A MINIMUM OF 5- FEET LENGTH. RACKING PLACEMENT SHALL OCCUR WITH EACH LAYER PLACEMENT TO ENSURE RACKING MATERIAL EXTENDS THROUGH STRUCTURE AND PINNED IN PLACE BY SUBSEQUENT LAYERS.
- THE CONTRACTOR SHALL FIELD VERIFY WITH THE OWNER REPRESENTATIVE OR ENGINEER ALL STRUCTURE LOCATIONS, PILE LOCATIONS, LENGTHS, WIDTHS AND ELEVATIONS PRIOR TO EXCAVATION, ASSEMBLY AND INSTALLATION OF EACH STRUCTURE.
- LOCATIONS FOR ALL STRUCTURE PLACEMENTS WILL BE STAKED IN FIELD BY THE ENGINEER OR OWNER REPRESENTATIVE PRIOR TO START OF CONSTRUCTION.
- EXCAVATION LIMITS SHALL BE FIELD VERIFIED BY THE OWNER REPRESENTATIVE OR ENGINEER PRIOR TO EXCAVATION COMMENCING AND PLACEMENT OF ANY LARGE WOOD.
- LOG TYPE IDENTIFICATION SHALL BE PAINTED ON ALL LOGS BY THE CONTRACTOR IN A PLACE VISIBLE FOR FIELD VERIFICATION PRIOR TO PLACEMENT WITH LEAD-FREE, BLAZE-ORANGE SURVEY MARKING PAINT.
- THE WOOD LAYER PLACEMENT IN EACH LOGJAM LAYER SHALL BE FIELD VERIFIED BY ON-SITE OWNER REPRESENTATIVE PRIOR TO BACKFILLING.
- BACKFILL NOT TO EXCEED TOP ELEVATION. EXCESS BACKFILL TO BE PLACED DOWNSTREAM OF FINISHED ELJ.
- CHANNEL BED ELEVATION IS REPRESENTATIVE OF A LOCAL AVERAGE CHANNEL BED AT RIFFLES. CHANNEL BED ELEVATION SHOULD NOT BE TAKEN IN POOLS.



TYPE 3 ELJ PERSPECTIVE

1/15

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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.



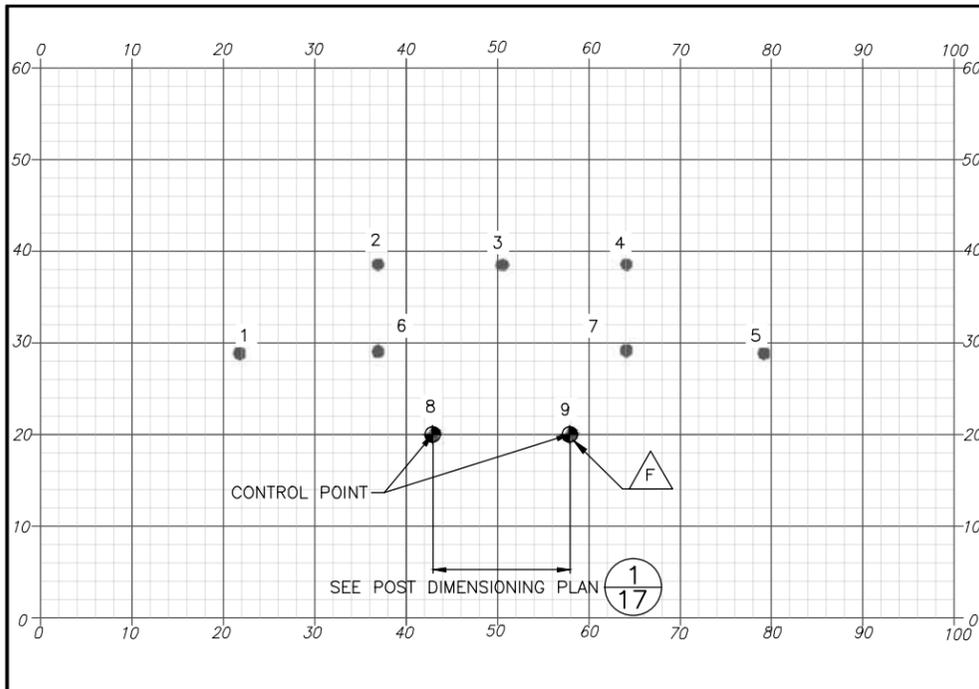
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DRAWN	GD	TN/SC/RG	T38N/S2/R5E
CHECKED	RLE	DATE	2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

TYPE 3 ELJ

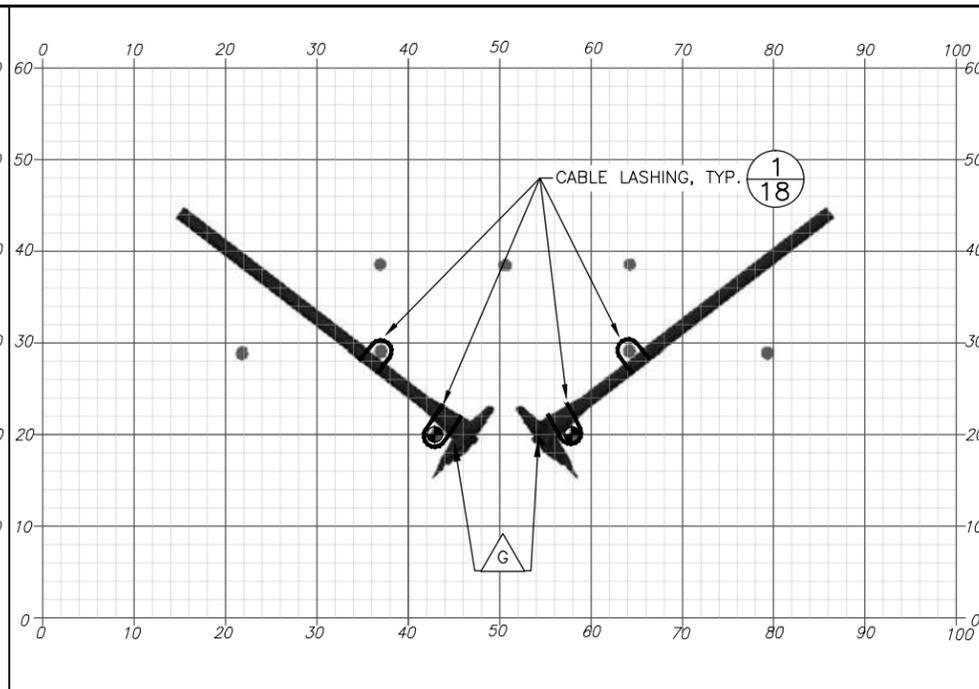
15
SHEET 15 OF 21

Apr 12, 2016 DESIGN 90%



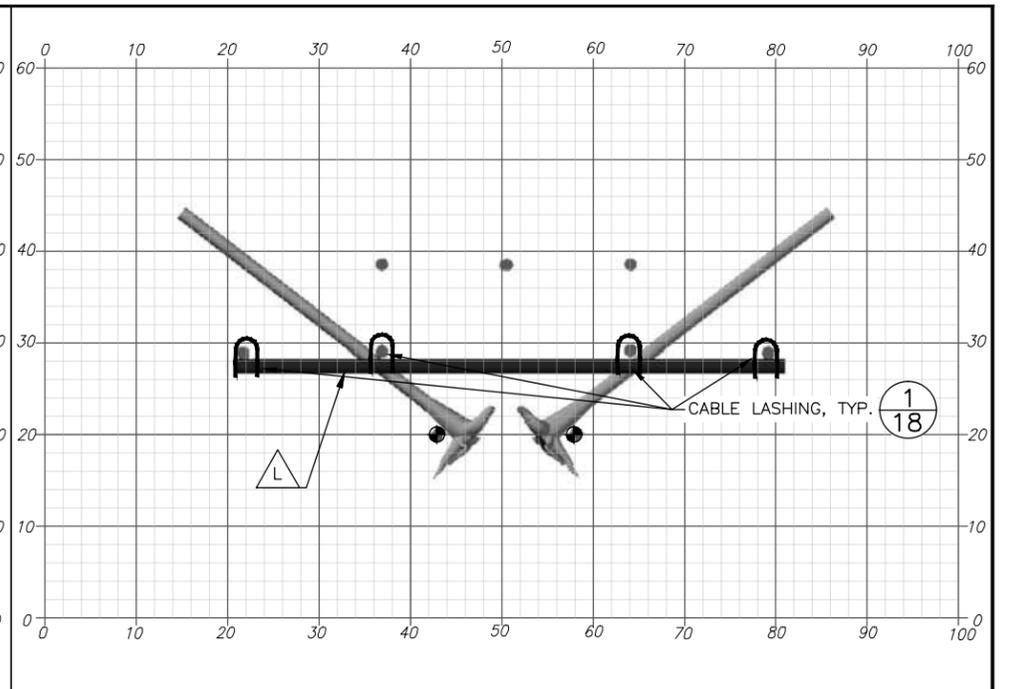
LAYER 0

EXCAVATE TO POST BOTTOM ELEVATION, PLACE 9 VERTICAL LOG POSTS.



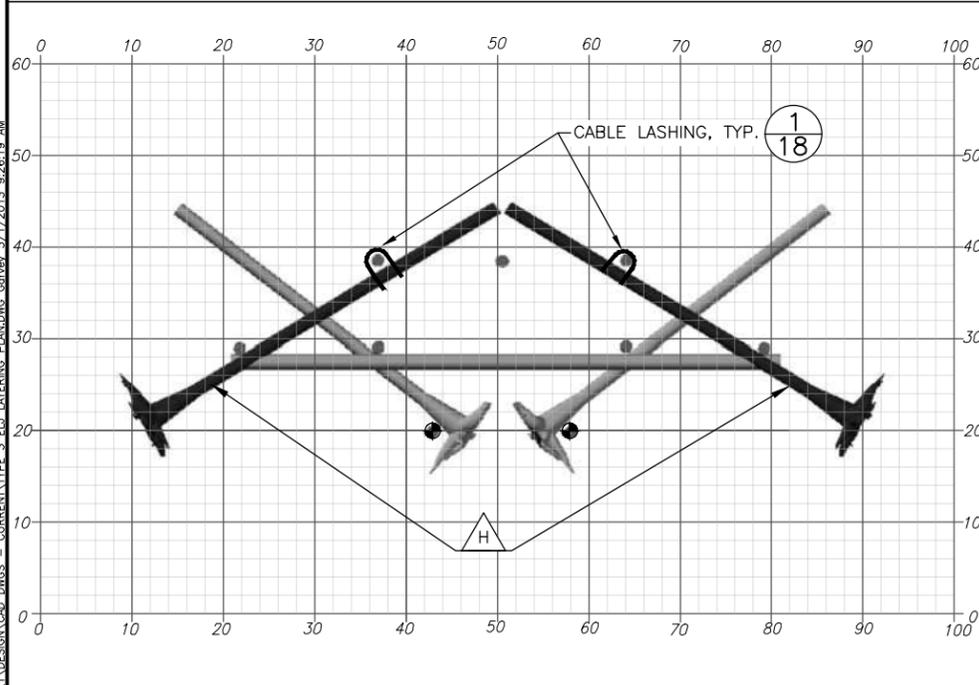
LAYER 1

PLACE TWO FRAME LOG MEMBERS. CABLE LASH TO VERTICAL POSTS.



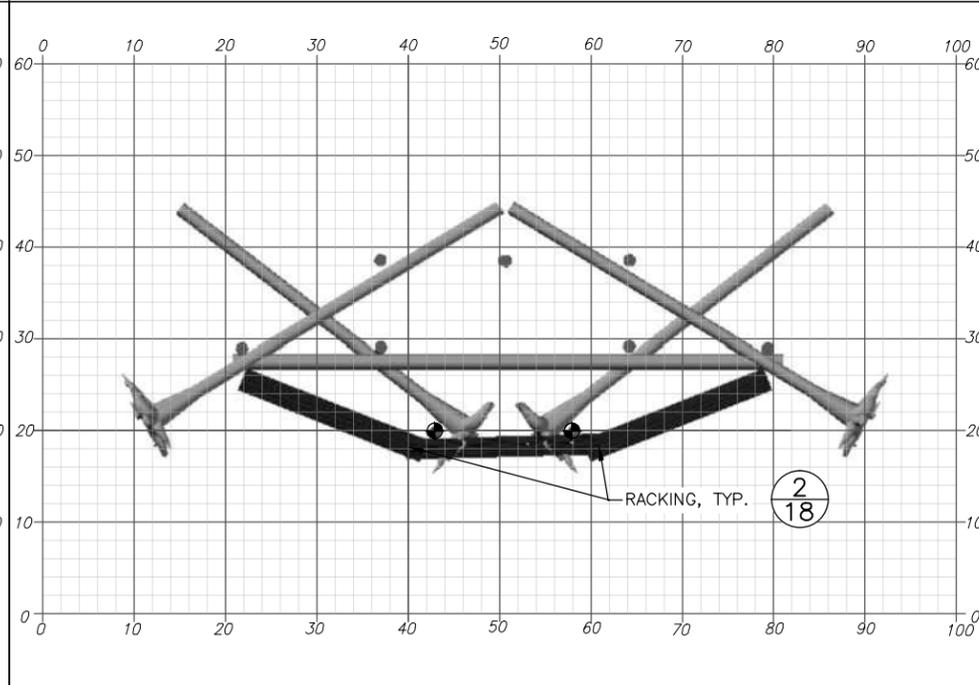
LAYER 2

PLACE ONE FRAME LOG MEMBER AND CABLE LASH TO VERTICAL POSTS



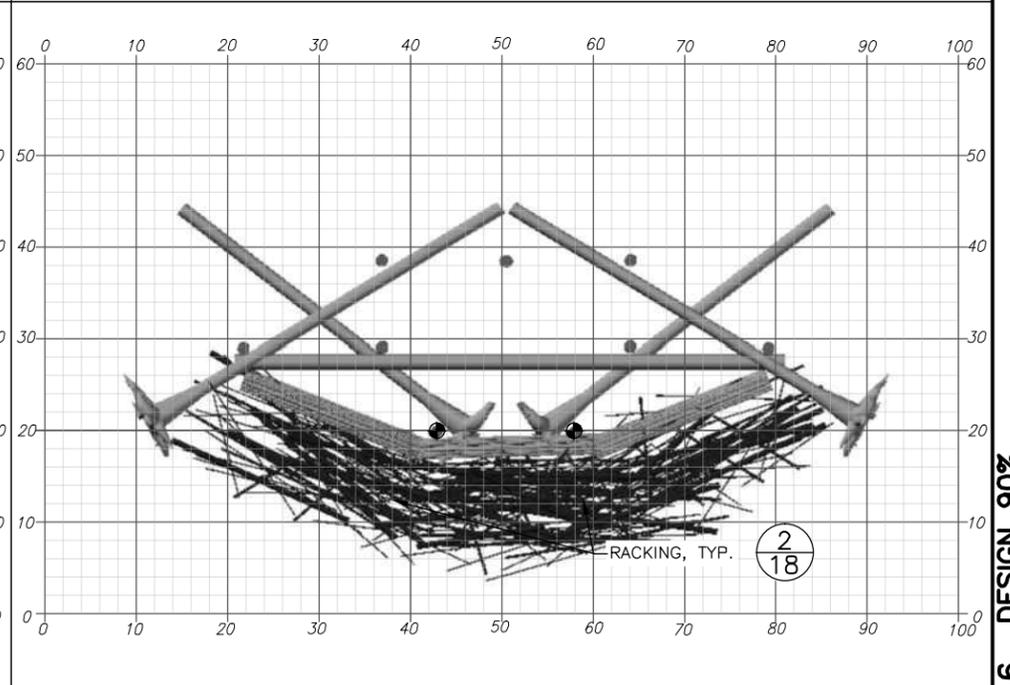
LAYER 3

PLACE TWO FRAME LOG MEMBERS. CABLE LASH TO VERTICAL POSTS.



LAYER 4

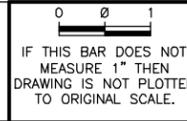
PLACE RACKING MATERIAL INTERLOCKED AND TIGHT



LAYER 5

PLACE RACKING MATERIAL INTERLOCKED AND RANDOMLY

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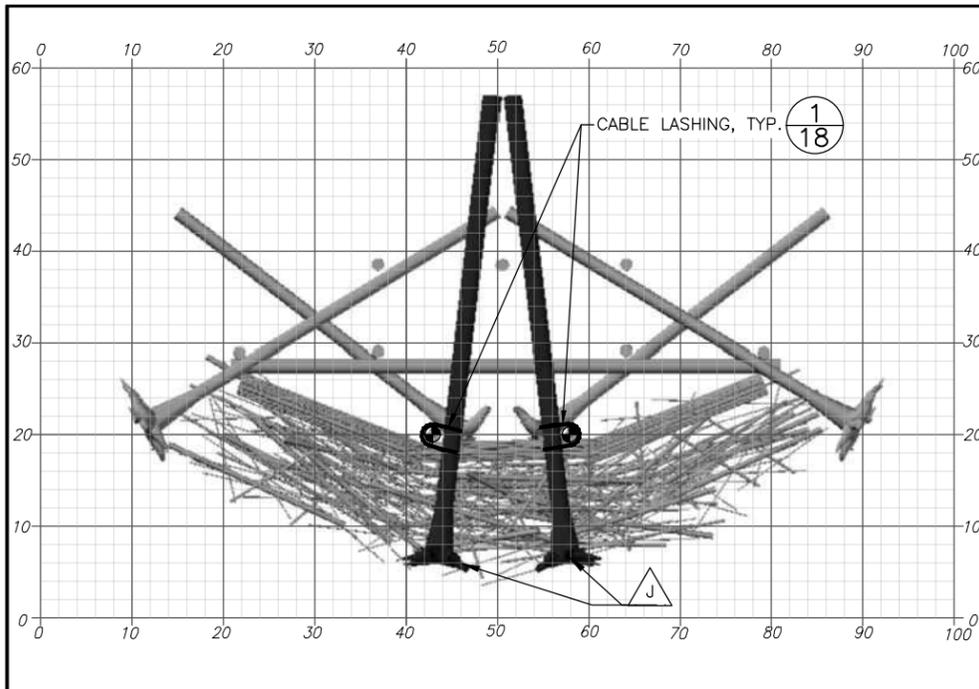
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PORTER CREEK REACH RESTORATION PHASE 1 & 4

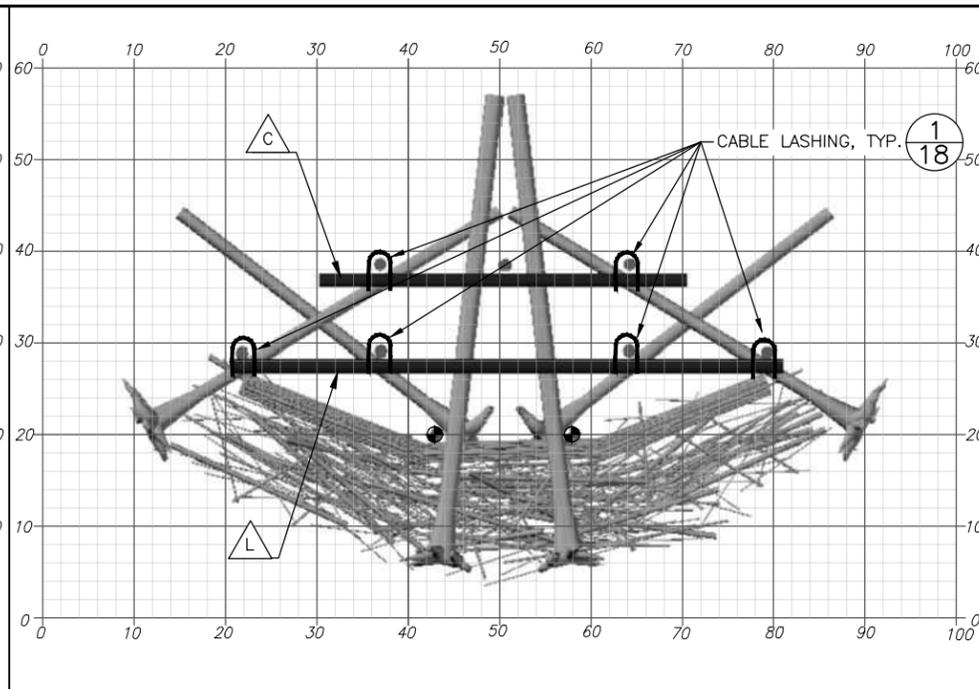
TYPE 3 ELJ LAYERING PLAN

16
SHEET **16** OF **21**

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LAYER 6
PLACE TWO FRAME LOG MEMBERS

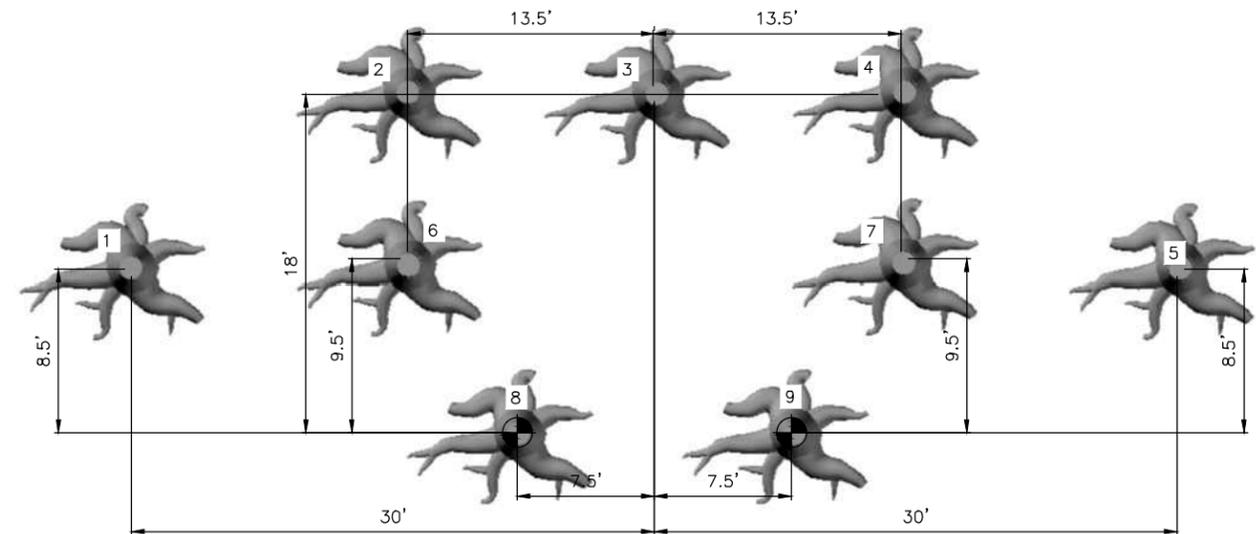


LAYER 7
PLACE TWO FRAME LOG MEMBERS AND CABLE LASH TO VERTICAL POSTS

TYPE 3 ELJ - LOG SCHEDULE

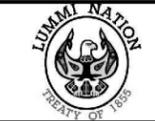
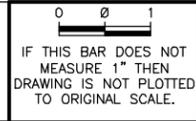
LOG ID	DIA* (IN)	LENGTH** (FT)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE
△C	18	40	N	1
△F	18	25	Y	9
△G	18	40	Y	2
△H	18	45	Y	2
△J	24	50	Y	2
△L	20	60	N	2

*DIAMETER AT BREAST HEIGHT
**TOTAL LENGTH INCLUDING ROOTWAD



TYPE 3 ELJ POST DIMENSION PLAN 1/16
SCALE: 1" = 5'

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NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
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CHECKED: TA	LONGITUDE: 122°08'00"W
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CHECKED: RLE	DATE: 2/10/2015

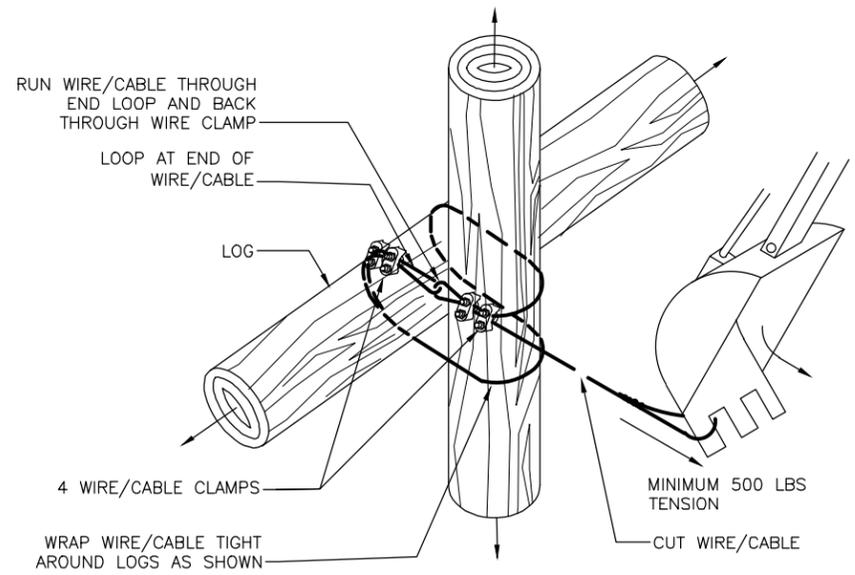
PORTER CREEK REACH RESTORATION PHASE 1 & 4

TYPE 3 ELJ LAYERING PLAN 2 AND DETAILS

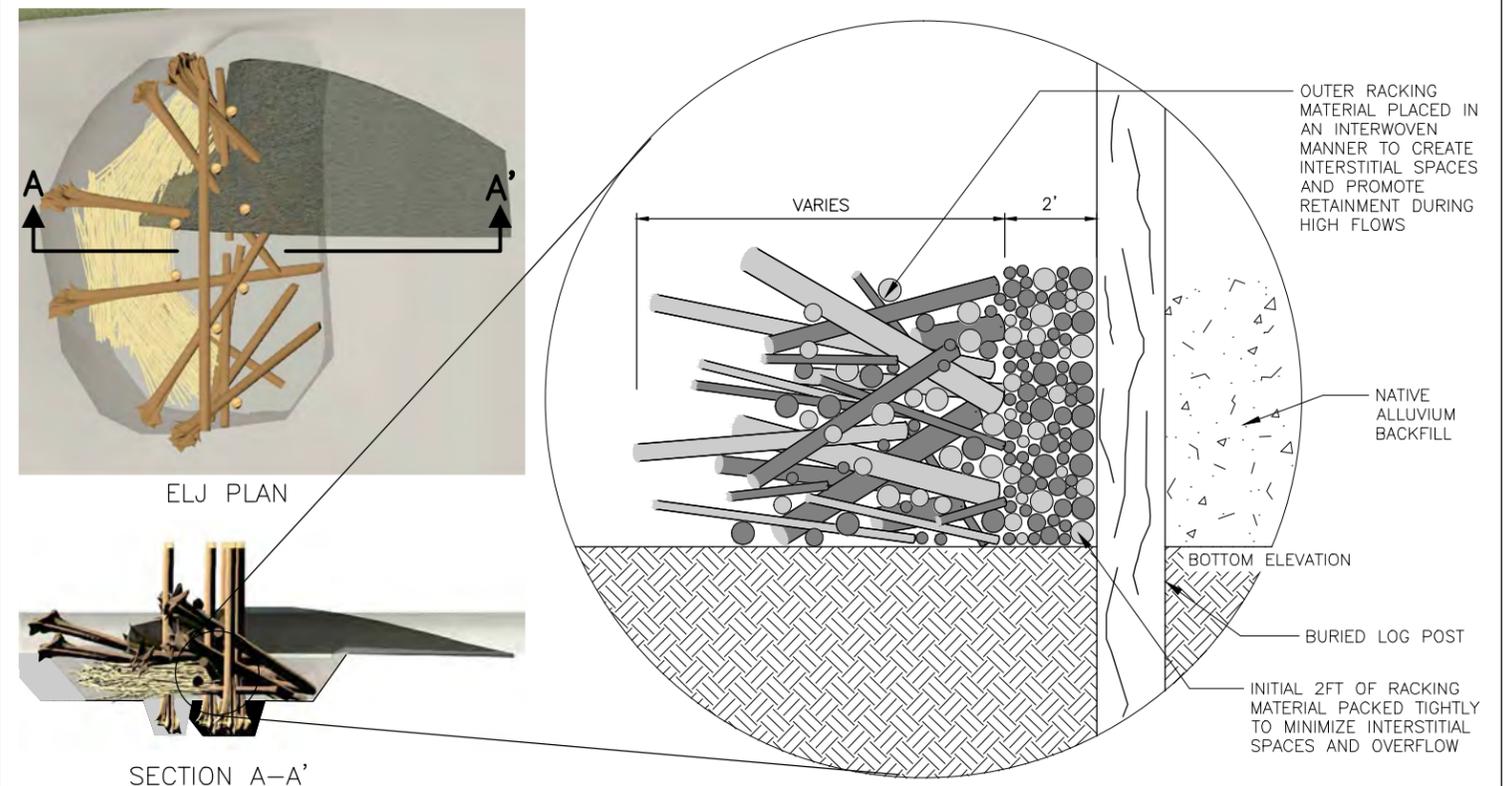
17
SHEET 17 OF 21

Apr 12, 2016 DESIGN 90%

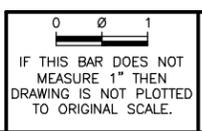
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CABLE LASHING 1
NTS 18



RACKING MATERIAL DETAIL 2
NTS 18



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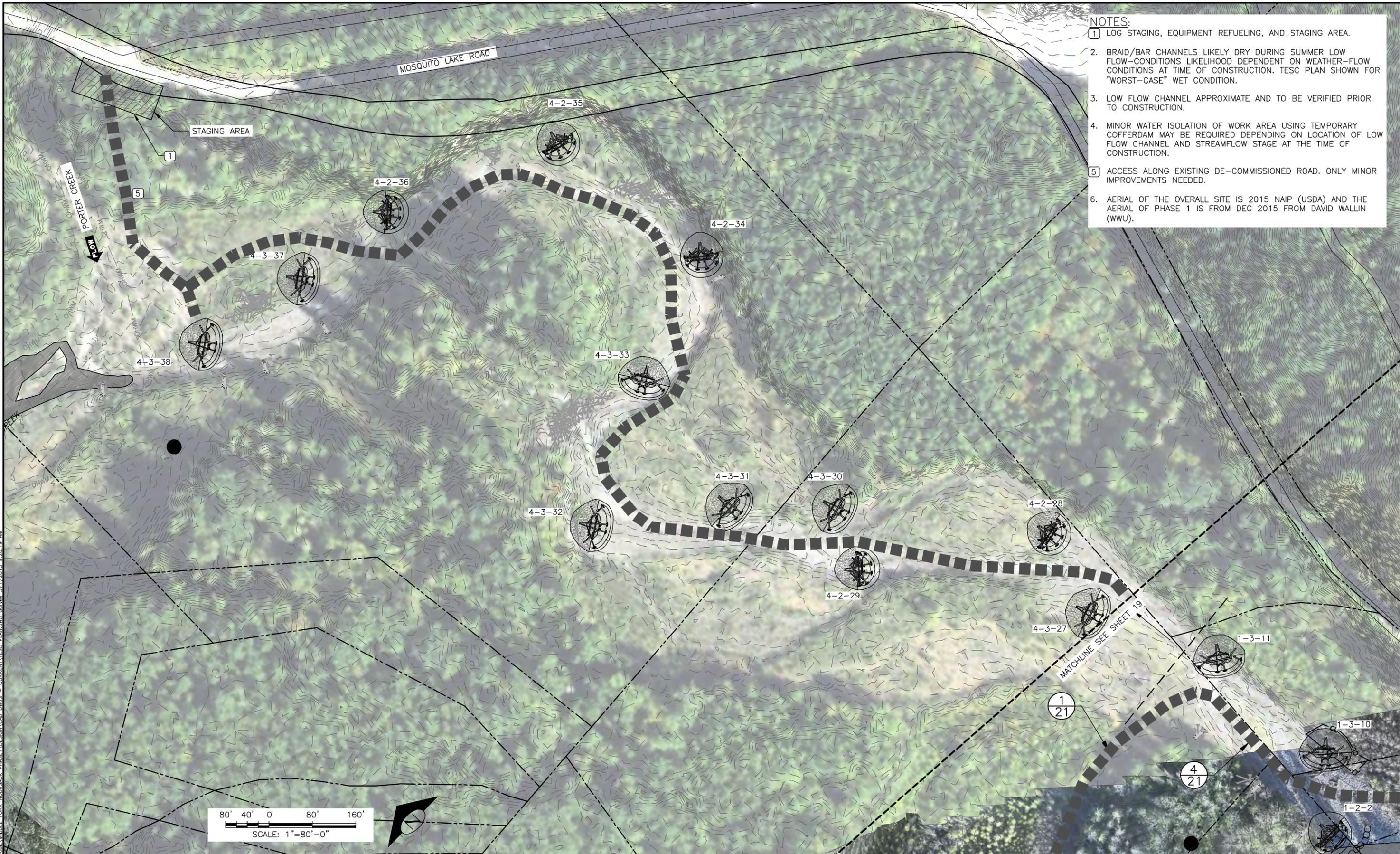
PORTER CREEK REACH
 RESTORATION PHASE 1 & 4

RESTORATION DETAILS

18
 SHEET 18 OF 21

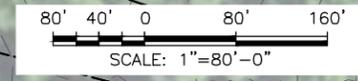
Apr 12, 2016 DESIGN 90%

- NOTES:**
- LOG STAGING, EQUIPMENT REFUELING, AND STAGING AREA.
 - BRAID/BAR CHANNELS LIKELY DRY DURING SUMMER LOW FLOW—CONDITIONS LIKELIHOOD DEPENDENT ON WEATHER—FLOW CONDITIONS AT TIME OF CONSTRUCTION. TESC PLAN SHOWN FOR "WORST-CASE" WET CONDITION.
 - LOW FLOW CHANNEL APPROXIMATE AND TO BE VERIFIED PRIOR TO CONSTRUCTION.
 - MINOR WATER ISOLATION OF WORK AREA USING TEMPORARY COFFERDAM MAY BE REQUIRED DEPENDING ON LOCATION OF LOW FLOW CHANNEL AND STREAMFLOW STAGE AT THE TIME OF CONSTRUCTION.
 - ACCESS ALONG EXISTING DE-COMMISSIONED ROAD. ONLY MINOR IMPROVEMENTS NEEDED.
 - AERIAL OF THE OVERALL SITE IS 2015 NAIP (USDA) AND THE AERIAL OF PHASE 1 IS FROM DEC 2015 FROM DAVID WALLIN (WWU).



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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.

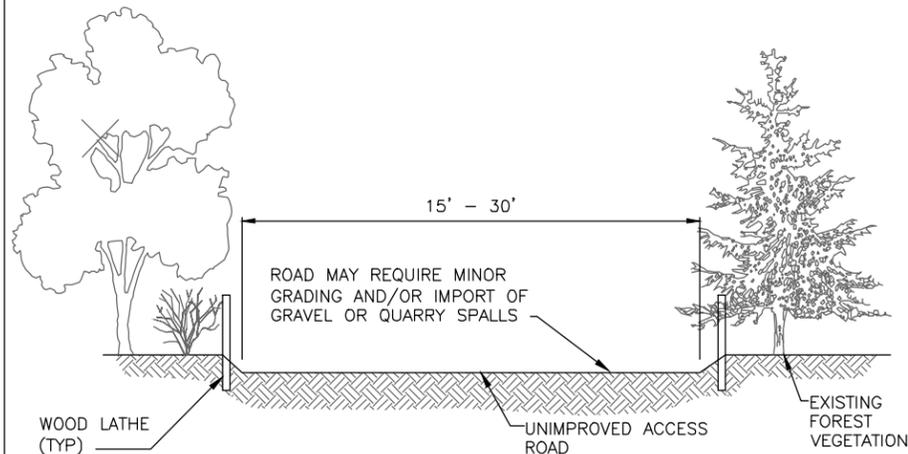


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DRAWN	GD	TN/SC/RG	T38N/S2/R5E
CHECKED	RLE	DATE	2/10/2015

PORTER CREEK REACH RESTORATION PHASE 1 & 4

TESC PLAN PHASE 4

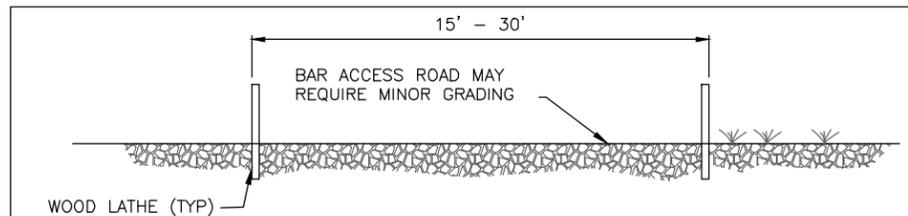
20
SHEET **20 OF 21**



NOTES FOR TEMPORARY CLEARED ACCESS

1. CLEARED ACCESS TO BE ROUTED TO MINIMIZE VEGETATION DISTURBANCE AND FOREST CLEARING.
2. CONTRACTOR SHALL MARK CLEARING LIMITS WITH FLAGGING. CLEARING LIMITS TO BE APPROVED BY ENGINEER PRIOR TO ANY CLEARING ACTIVITIES.
3. ANY TREES GREATER THAN 18" Ø SHALL BE REMOVED W/ ROOTWADS INTACT AND STOCKPILED FOR USE IN LOGJAM CONSTRUCTION.
4. TREES AND SHRUBS WITH 6"-18" Ø SHALL BE STOCKPILED FOR USE AS RACKING MATERIAL IN LOGJAM CONSTRUCTION.
5. REMAINDER OF VEGETATION AND ORGANIC SOIL SHALL BE GRUBBED, STOCKPILED AND BROADCASTED ON ROAD ALIGNMENT FOLLOWING TERMINATION OF WORK.
6. ACCESS SHALL BE MAINTAINED BY MINOR GRADING AND IMPORTATION OF WOOD CHIPS, GRAVEL AND/OR QUARRY SPALLS.
7. CLEARED ACCESS SHALL BE SCARIFIED AND DECONSTRUCTED TO PREVENT FUTURE ACCESS AT THE TERMINATION OF WORK.
8. REVEGETATION ROAD ALIGNMENT FOLLOWING CONSTRUCTION WILL BE PERFORMED BY CONTRACTOR.
9. ALL GRAVEL OR QUARRY SPALLS PLACED SHALL BE UNDERLAIN WITH A GEOTEXTILE AND REMOVED AT TERMINATION OF WORK IF UTILIZED.

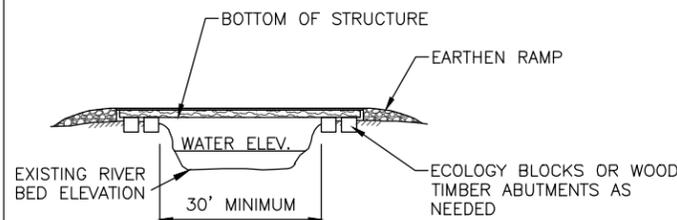
TEMPORARY CLEARED ACCESS 1
SCALE: NTS



NOTES FOR TEMPORARY BAR ACCESS

1. BAR ACCESS TO BE ROUTED TO MINIMIZE VEGETATION DISTURBANCE.
2. CONTRACTOR SHALL STAKE EDGES OF PROPOSED BAR ACCESS FOR APPROVAL BY ENGINEER.
3. EQUIPMENT SHALL OPERATE ONLY WITHIN STAKED BAR ACCESS ALIGNMENT OR OTHER DEFINED PROJECT AREAS.
4. BAR ACCESS SHALL BE SCARIFIED AT TERMINATION OF WORK.

TEMPORARY BAR ACCESS 4
SCALE: NTS



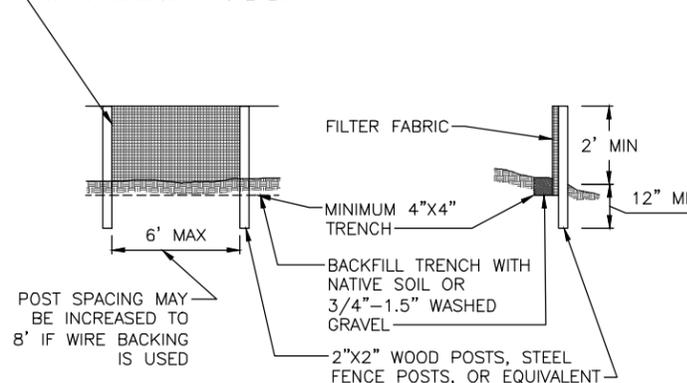
NOTES:

1. CONTRACTOR TO DESIGN TEMPORARY BRIDGE.
2. BRIDGE SHALL BE LOCATED SUCH THAT ONLY ONE SPAN IS USED TO ELIMINATE IMPACTS TO SUBSTRATE OF CHANNEL.
3. END OF BRIDGE SHALL BEAR ON HIGH BANKS WITH SUFFICIENT BEARING CAPACITY TO PREVENT SLOUGHING OR COLLAPSE OF SIDE CHANNEL BANKS.
4. CONCRETE ECOLOGY BLOCKS OR WOOD ABUTMENTS MAY BE USED TO SUPPORT ENDS OF TEMPORARY BRIDGE AS NEEDED.
5. BRIDGES MAY BE CONSTRUCTED FROM LOGS, RAIL CAR BEDS OR APPROVED EQUAL AND DECKED WITH STEEL SHEET, WOOD LAGGING OR APPROVED EQUAL.



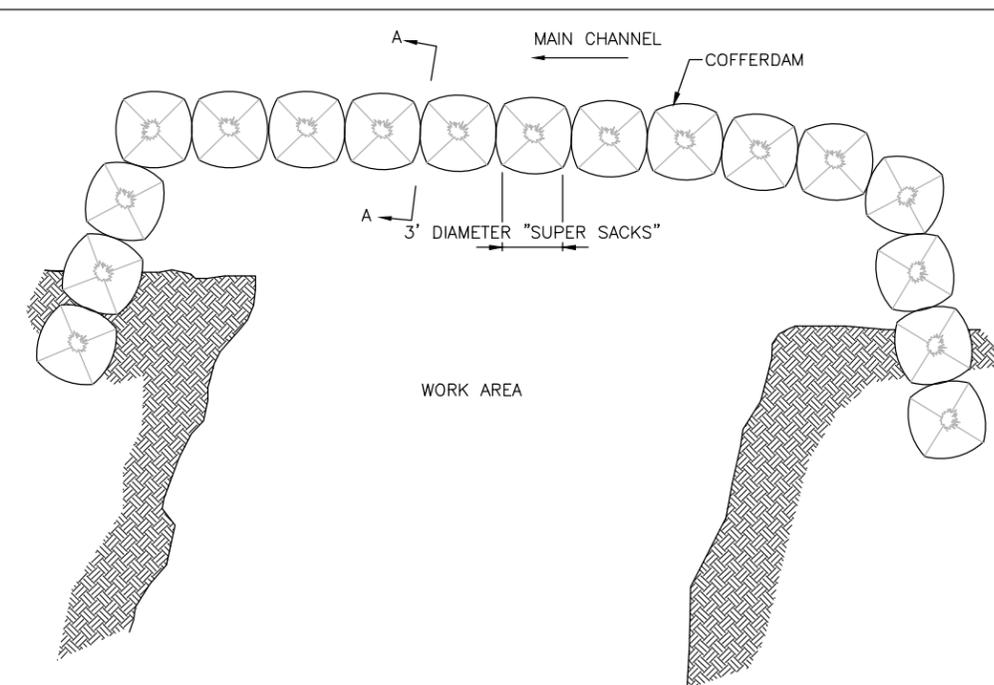
TEMPORARY BRIDGE 2
SCALE: NTS

JOINTS IN FILTER FABRIC SHALL BE SPLICED AT POSTS. USE STAPLES, WIRE RINGS OR EQUIVALENT TO ATTACH FABRIC TO POSTS WITH A MINIMUM 4" OVERLAP



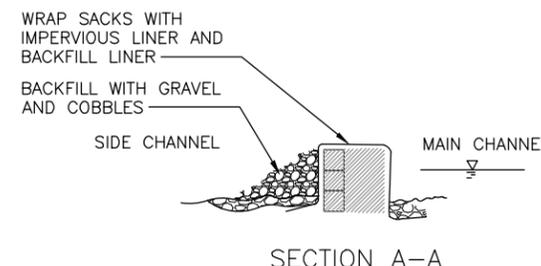
REFERENCE; WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON (FIGURE 4-19)

TEMPORARY SILT FENCE 3
SCALE: NTS

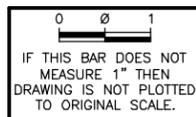


NOTES:

1. WRAP "SUPER SACKS WITH IMPERVIOUS PLASTIC LINER TO PREVENT SEEPAGE.
2. BACKFILL THE DOWNSTREAM SIDE COFFER DAM WITH NATIVE, ADJACENT ALLUVIUM.
3. USE "SUPER SACKS" AS BUTTRESSES AS REQUIRED.



COFFERDAM 5
SCALE: NTS



NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
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PORTER CREEK REACH RESTORATION PHASE 1 & 4

TESC DETAILS

21
SHEET **21** OF **21**

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