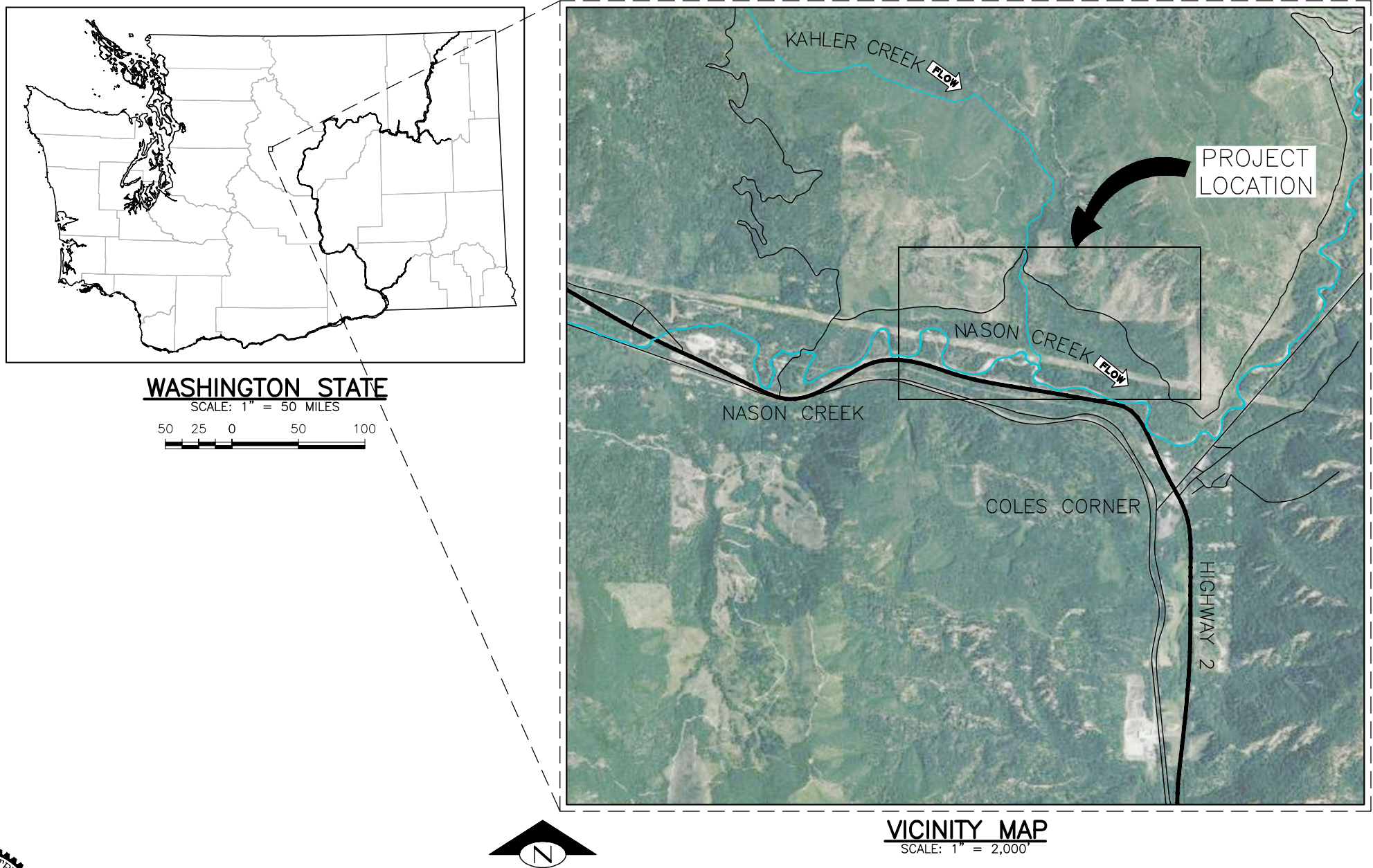


KAHLER CREEK

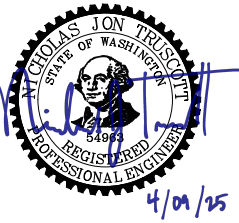
ALLUVIAL WATER STORAGE PROJECT

CHELAN COUNTY NATURAL RESOURCE DEPARTMENT



DRAWING LIST	
Sheet Number	Sheet Title
1	COVER SHEET
2	GENERAL NOTES AND LEGEND
3	SITE OVERVIEW AND ACCESS PLAN
4	SITE 1 PLAN
5	SITE 2 PLAN
6	MACHINE-CONSTRUCTED ELJ DETAILS
7	MACHINE-CONSTRUCTED ELJ LAYERING PLAN
8	HAND-CONSTRUCTED ELJ DETAILS
9	HAND-CONSTRUCTED ELJ LAYERING PLAN
10	CONSTRUCTION DETAILS
11	WATER MANAGEMENT
12	SITE STABILIZATION

CONTACT INFORMATION
NATURAL SYSTEMS DESIGN, INC
1900 N NORTHLAKE WAY, SUITE 211
SEATTLE, WA 98103
(206) 834-0175
CHELAN COUNTY NATURAL RESOURCE DEPARTMENT
411 WASHINGTON STREET, SUITE 201
WENATCHEE, WA 98801
(509) 667-6533



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



Natural Systems Design
+ Coastal Geologic Services

NAME OR INITIALS AND DATE	
DESIGNED	NT
CHECKED	JS
DRAWN	LZ
CHECKED	NT

GEOGRAPHIC INFORMATION	
LATITUDE	47°46'20.4"N
LONGITUDE	120°45'30.7"W
TN/SC/RG	T26N/S08/R17E
DATE	----

KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT

COVER SHEET

1
SHEET 1 OF 12

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Apr 09, 2025 FINAL DESIGN

GENERAL NOTES

1.

THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE OF CHELAN COUNTY NATURAL RESOURCE DEPARTMENT (CCNRD), HEREAFTER REFERRED TO AS "CONTRACTING AGENCY" AND THEIR AUTHORIZED AGENTS. THE CONTRACTING AGENCY WILL DESIGNATE A REPRESENTATIVE, HEREAFTER REFERRED TO AS "CONTRACTING OFFICER" TO REPRESENT CCNRD, TO INTERACT WITH THE CONTRACTOR, AND TO ADMINISTER THE CONSTRUCTION CONTRACT.
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. 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 CONTRACTING AGENCY, ENGINEER AND APPROPRIATE REGULATORY AGENCIES SHALL BE NOTIFIED OF ANY CONTRACTING AGENCY-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 CONTRACTING AGENCY. IMPROVEMENT CONSTRUCTION SHALL COMPLY WITH THESE PLANS AND THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD PLANS, CURRENT EDITION UNLESS NOTED OTHERWISE. ALL REFERENCES TO THE "STANDARD SPECIFICATIONS" SHALL MEAN THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, 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 CONTRACTING AGENCY 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 SHALL 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, AND TO 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 CONTRACTING AGENCY 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 CONTRACTING AGENCY 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 THE CONTRACTING AGENCY, A SET OF PLANS MARKED UP TO THE SATISFACTION OF THE CONTRACTING AGENCY, 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 CONTRACTING AGENCY 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 THE ENGINEER PRIOR TO THE INSTALLATION OF THE FACILITIES, AS SET FORTH IN THE SPECIAL PROVISIONS.
4.

EXISTING CONDITIONS SURFACE FOR THIS PROJECT CONSISTS OF LIDAR DATA COLLECTED BY QUANTUM SPATIAL IN 2015 AND 2018. THE VERTICAL DATUM IS NAVD88 (FT). THE HORIZONTAL DATUM IS WASHINGTON STATE PLANE NORTH, NAD83 (FT). ALL DISTANCES AND ELEVATIONS SHOWN ARE U.S. SURVEY FEET.

CONSTRUCTION NOTES

1.

CONTRACT DOCUMENTS REFER TO ALL DOCUMENTS INCLUDED IN THE BID PACKAGE, INCLUDING 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 CONTRACTING AGENCY.
4.

ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE CONTRACTING AGENCY 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 CONTRACTING AGENCY 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.

DIMENSION CALLOUTS SHALL TAKE PRECEDENCE OVER SCALES SHOWN ON THE PLANS.
12.

THE PLANS REPRESENT THE REQUIRED WORK. 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.

GENERAL LEGEND

- PROPERTY LINE
- =====

EXISTING ROAD
- - - - -5- - - - -

EXISTING MAJOR CONTOUR
- - - - -1- - - - -

EXISTING MINOR CONTOUR
- >->->-

EXISTING FLOW
- OHWM

EXISTING OHWM
- OH OH

OVERHEAD POWER LINE
- VB VB

VEGETATIVE BUFFER
- CLEAR

CLEARING LIMIT
- CONTROL POINT LOCATION
- REGULATORY FLOODWAY
- EXISTING ROAD
- PROPOSED STAGING AREA
- TEMPORARY ACCESS ROAD

- EXISTING NATURAL WOOD ACCUMULATION
- MACHINE-CONSTRUCTED LOGJAM (ELJ) (MC_NUMBER)
- HAND-CONSTRUCTED ELJ (HC_ NUMBER)

DETAIL AND SECTION REFERENCING

- 1

NOTE REFERENCING NUMBER
- 4
6

DETAIL REFERENCE NUMBER SHEET ON WHICH DETAIL APPEARS
- (TITLE)
(SCALE)

4
2

DETAIL REFERENCE NUMBER SHEET FROM WHICH DETAIL WAS TAKEN
- (TYP.)

SPECIFIES THAT DETAIL IS UNIFORMLY TYPICAL THROUGHOUT PROJECT EXCEPT WHERE OTHERWISE NOTED
- A

A32

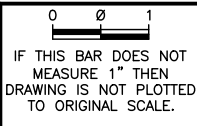
SECTION A-A IS SHOWN ON SHEET 32

SECTION A-A 32
SCALE: NTS

SECTION A-A IS SHOWN ON SHEET 32

SUMMARY OF QUANTITIES

ITEM #	ITEM DESCRIPTION	QTY	UNIT
1	MOBILIZATION	1	LS
2	TEMPORARY ACESS AND STAGING	1	LS
3	ELJ - MACHINE-CONSTRUCTED	3	EA
4	ELJ - HAND-CONSTRUCTED	9	EA
5	SITE ISOLATION AND DEWATERING	1	LS
6	EROSION CONTROL AND WATER POLLUTION PREVENTION	1	LS
7	WOOD PROCUREMENT AND HARVEST	1	LS
8	SEEDING AND MULCHING	4.2	AC



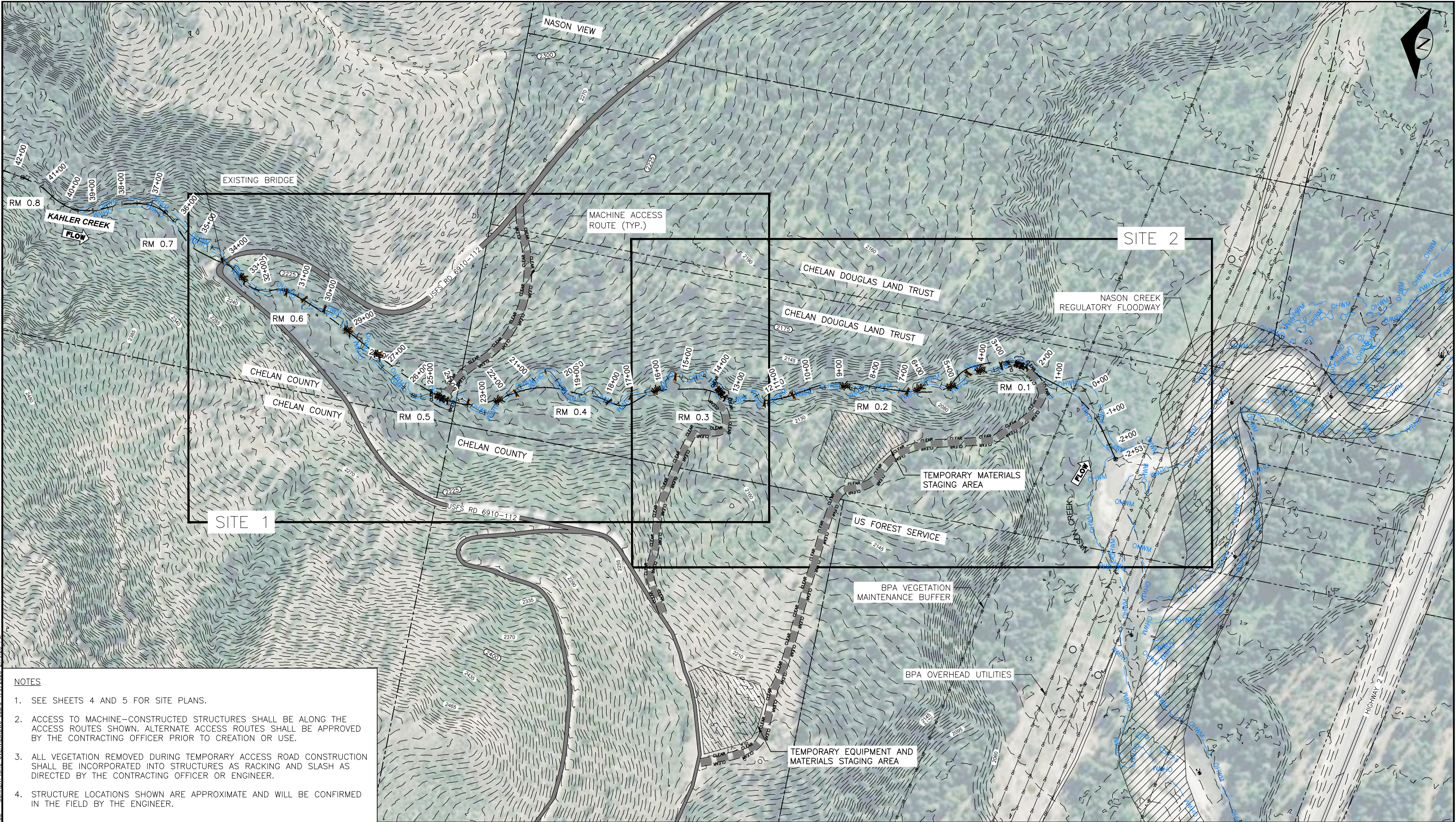
Natural Systems Design
+ Coastal Geologic Services

NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	NT	LATITUDE	47°46'20.4"N
CHECKED	JS	LONGITUDE	120°45'30.7"W
DRAWN	LZ	TN/SC/RG	T26N/S08/R17E
CHECKED	NT	DATE	----

KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT

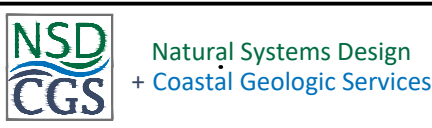
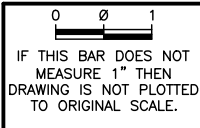
GENERAL NOTES AND LEGEND

2
SHEET 2 OF 12



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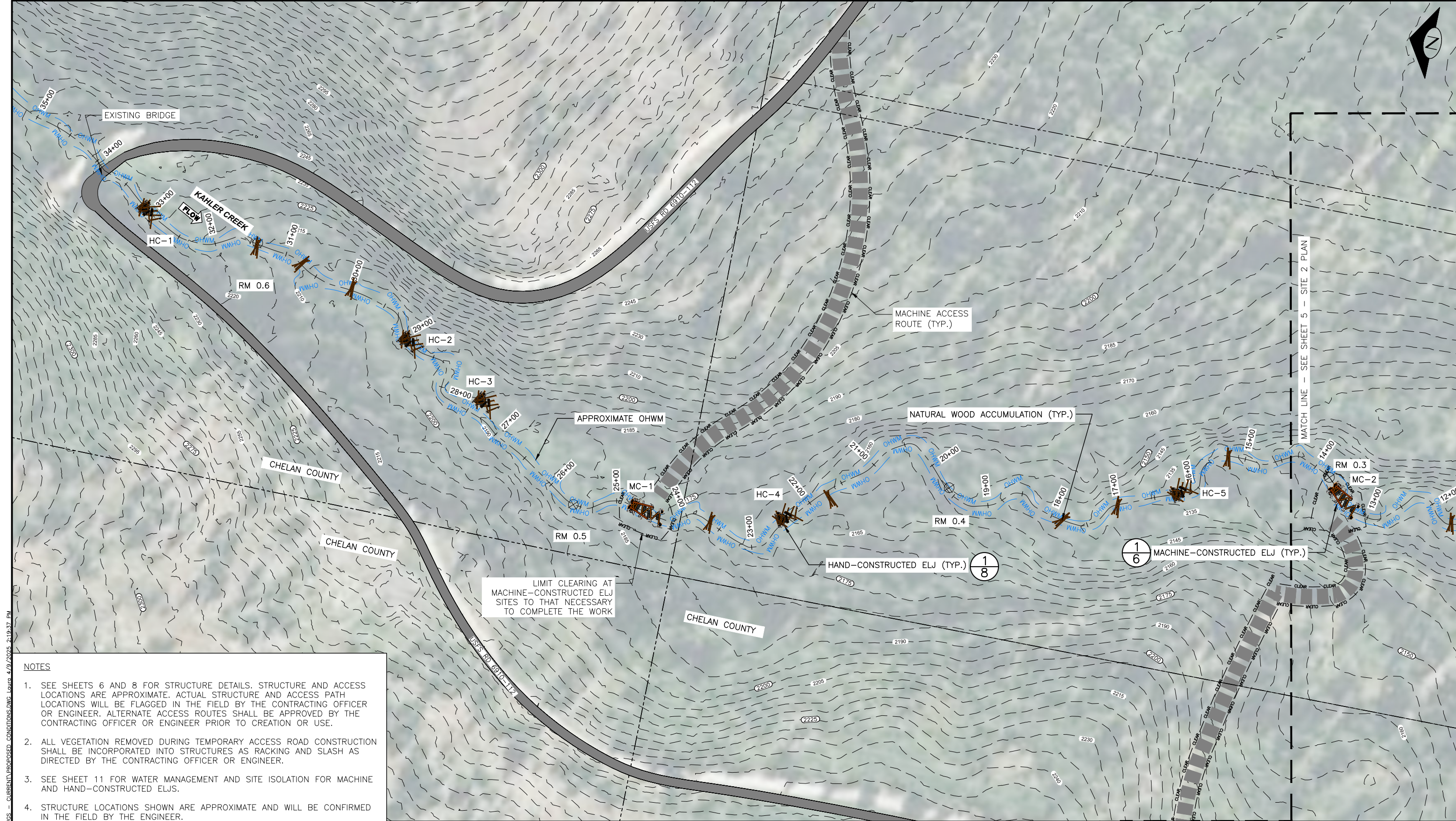
- NOTES
1. SEE SHEETS 4 AND 5 FOR SITE PLANS.
 2. ACCESS TO MACHINE-CONSTRUCTED STRUCTURES SHALL BE ALONG THE ACCESS ROUTES SHOWN. ALTERNATE ACCESS ROUTES SHALL BE APPROVED BY THE CONTRACTING OFFICER PRIOR TO CREATION OR USE.
 3. ALL VEGETATION REMOVED DURING TEMPORARY ACCESS ROAD CONSTRUCTION SHALL BE INCORPORATED INTO STRUCTURES AS RACKING AND SLASH AS DIRECTED BY THE CONTRACTING OFFICER OR ENGINEER.
 4. STRUCTURE LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE CONFIRMED IN THE FIELD BY THE ENGINEER.



NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	NT	LATITUDE	47°46'20.4"N
CHECKED	JS	LONGITUDE	120°45'30.7"W
DRAWN	LZ	TN/SC/RG	T26N/S08/R17E
CHECKED	NT	DATE	----

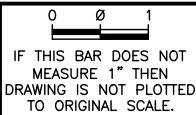
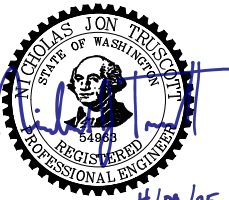
KAHLER CREEK ALLUVIAL WATER STORAGE PROJECT

SITE OVERVIEW AND ACCESS PLAN



NOTES

1. SEE SHEETS 6 AND 8 FOR STRUCTURE DETAILS. STRUCTURE AND ACCESS LOCATIONS ARE APPROXIMATE. ACTUAL STRUCTURE AND ACCESS PATH LOCATIONS WILL BE FLAGGED IN THE FIELD BY THE CONTRACTING OFFICER OR ENGINEER. ALTERNATE ACCESS ROUTES SHALL BE APPROVED BY THE CONTRACTING OFFICER OR ENGINEER PRIOR TO CREATION OR USE.
2. ALL VEGETATION REMOVED DURING TEMPORARY ACCESS ROAD CONSTRUCTION SHALL BE INCORPORATED INTO STRUCTURES AS RACKING AND SLASH AS DIRECTED BY THE CONTRACTING OFFICER OR ENGINEER.
3. SEE SHEET 11 FOR WATER MANAGEMENT AND SITE ISOLATION FOR MACHINE AND HAND-CONSTRUCTED ELJS.
4. STRUCTURE LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE CONFIRMED IN THE FIELD BY THE ENGINEER.

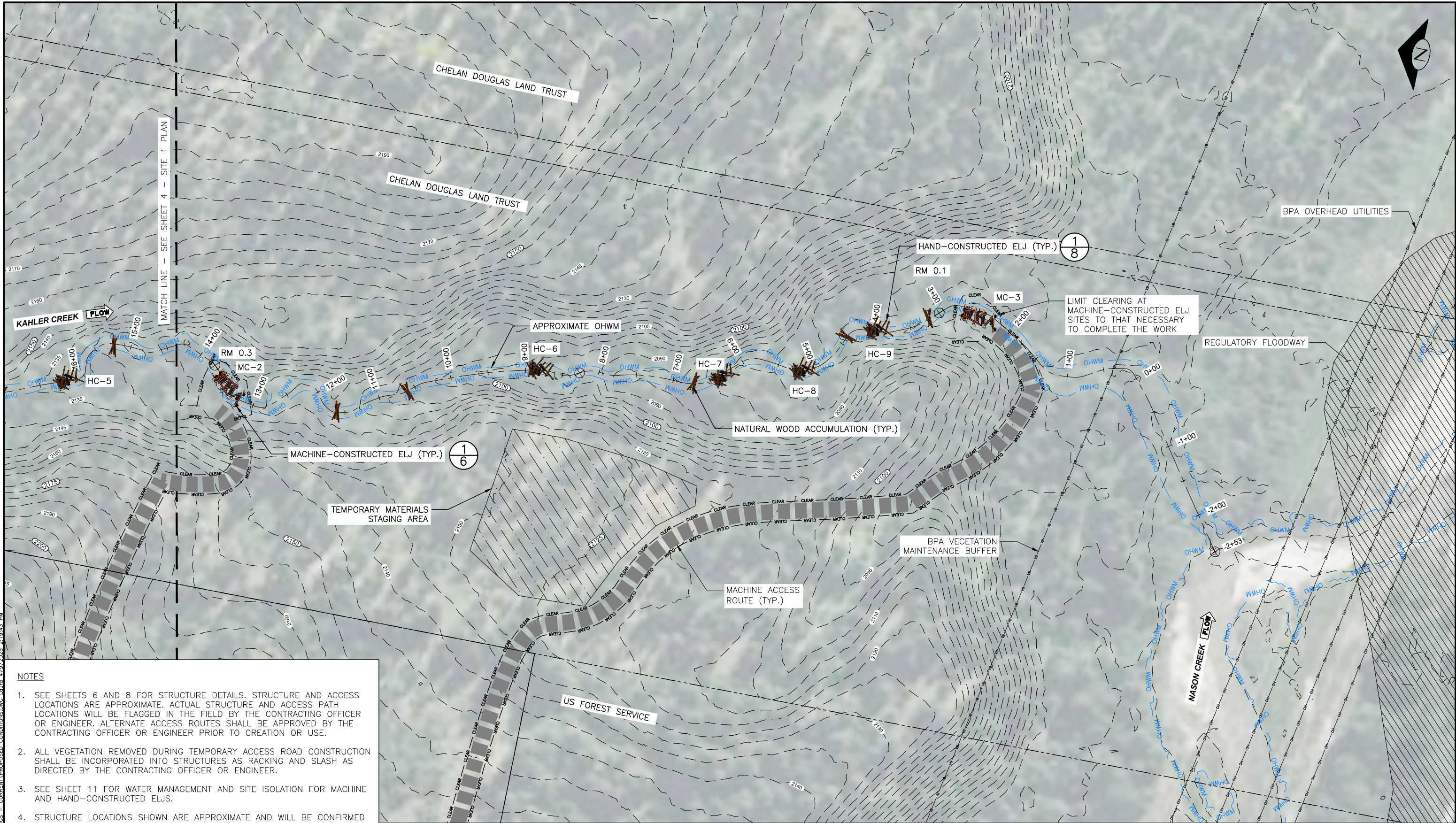


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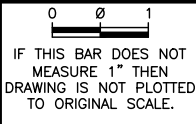
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DESIGNED	NT	LATITUDE	47°46'20.4"N
CHECKED	JS	LONGITUDE	120°45'30.7"W
DRAWN	LZ	TN/SC/RG	T26N/S08/R17E
CHECKED	NT	DATE	----

**KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT**

SITE 1 PLAN



- NOTES
1. SEE SHEETS 6 AND 8 FOR STRUCTURE DETAILS. STRUCTURE AND ACCESS LOCATIONS ARE APPROXIMATE. ACTUAL STRUCTURE AND ACCESS PATH LOCATIONS WILL BE FLAGGED IN THE FIELD BY THE CONTRACTING OFFICER OR ENGINEER. ALTERNATE ACCESS ROUTES SHALL BE APPROVED BY THE CONTRACTING OFFICER OR ENGINEER PRIOR TO CREATION OR USE.
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 4. STRUCTURE LOCATIONS SHOWN ARE APPROXIMATE AND WILL BE CONFIRMED IN THE FIELD BY THE ENGINEER.



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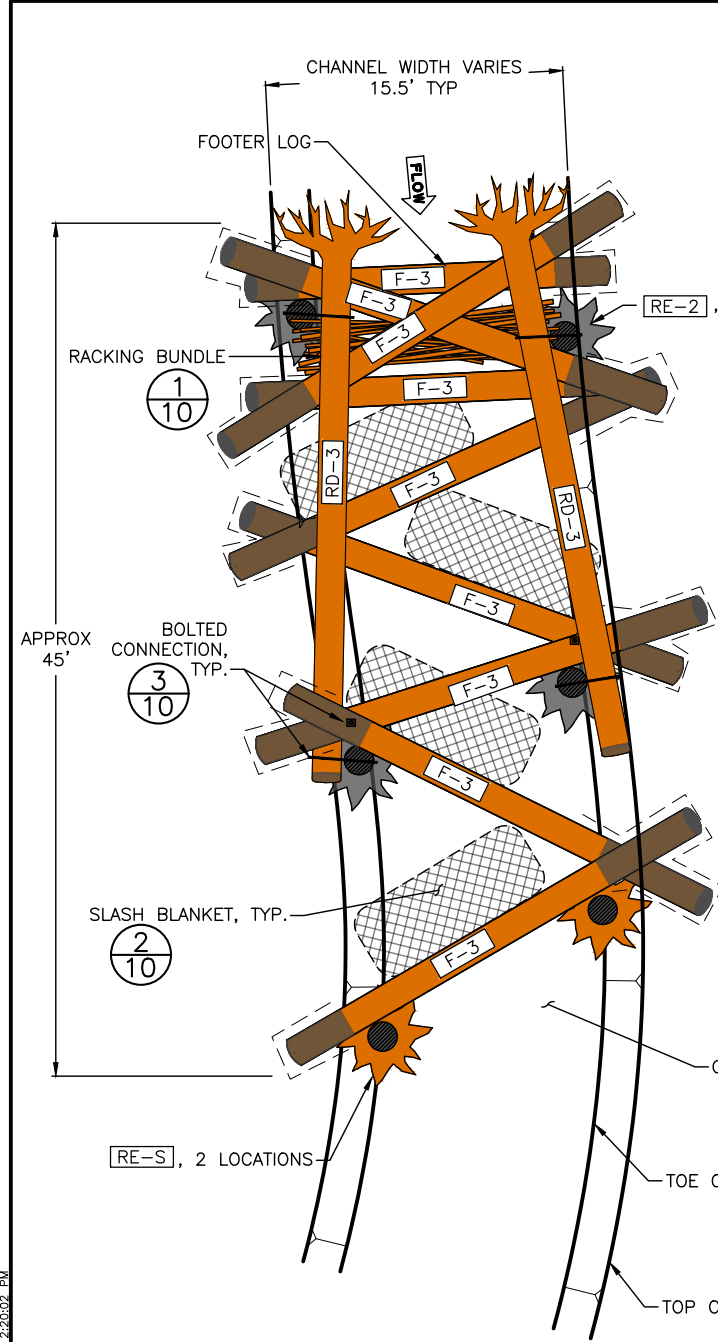
NAME OR INITIALS AND DATE	
DESIGNED	NT
CHECKED	JS
DRAWN	LZ
CHECKED	NT

GEOGRAPHIC INFORMATION	
LATITUDE	47°46'20.4"N
LONGITUDE	120°45'30.7"W
TN/SC/RG	T26N/S08/R17E
DATE	----

KAHLER CREEK ALLUVIAL WATER STORAGE PROJECT

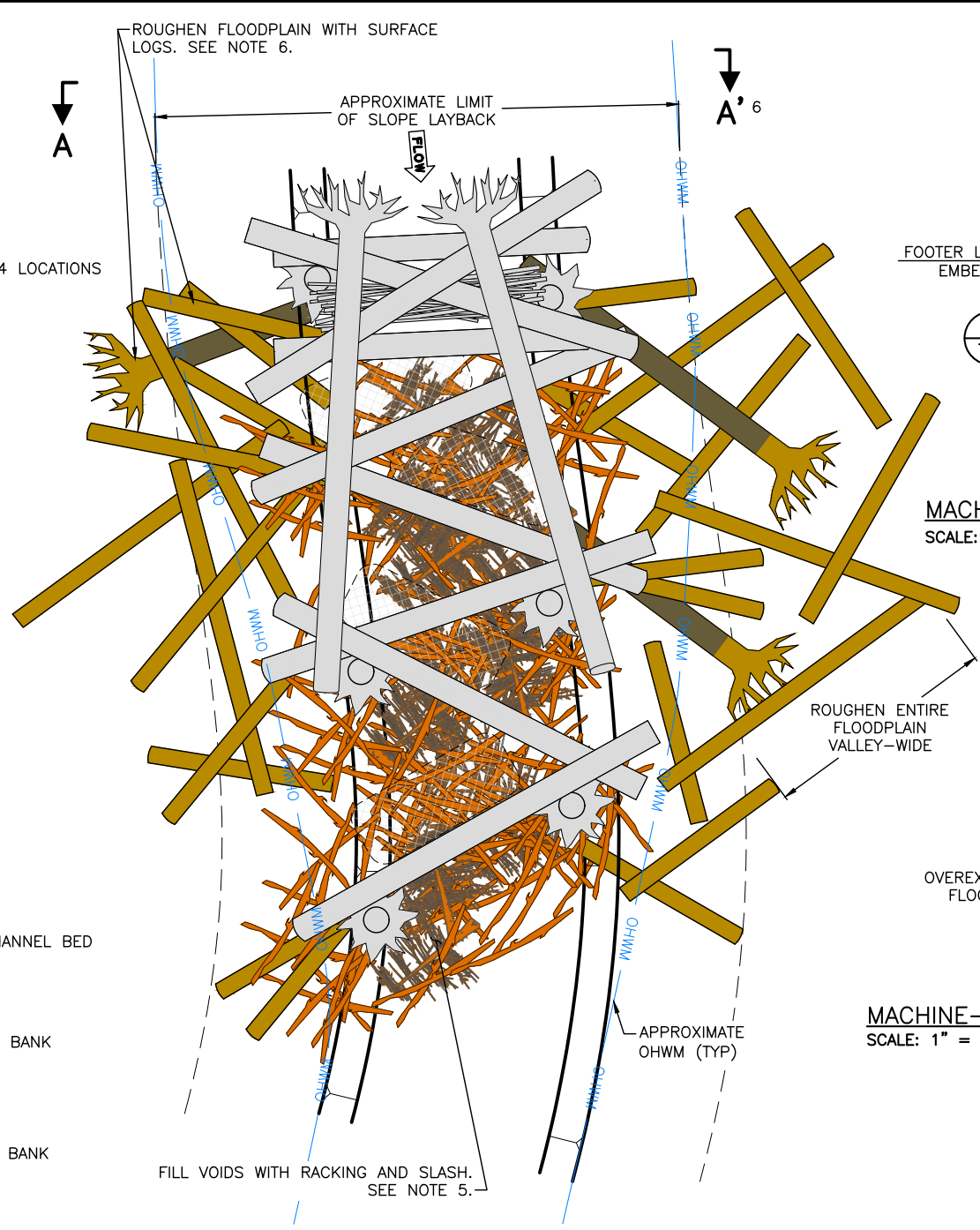
SITE 2 PLAN

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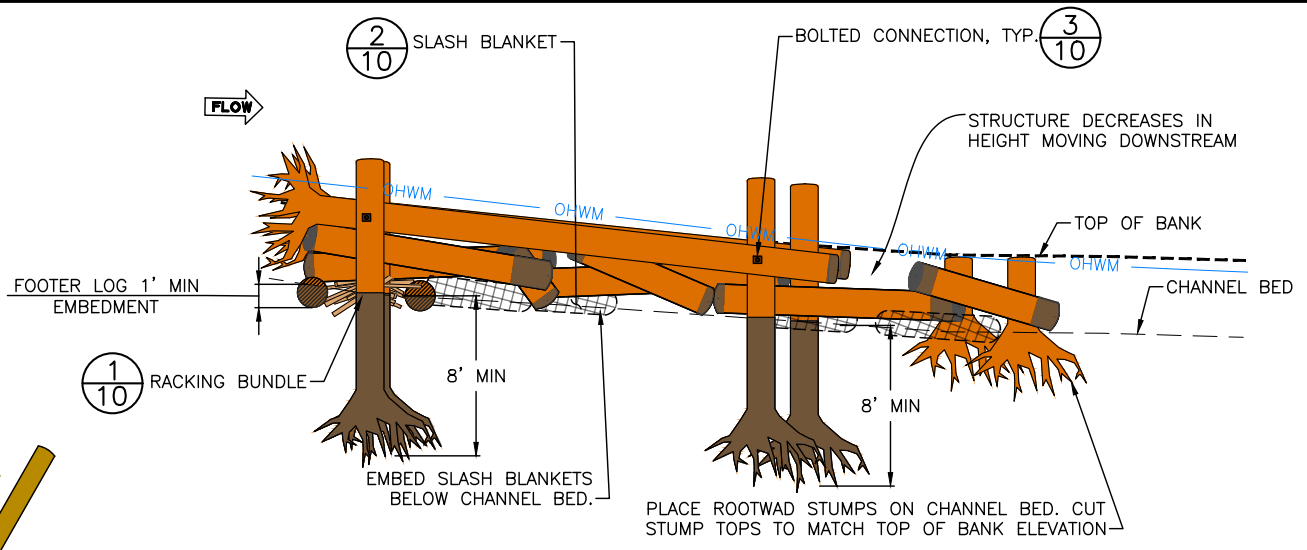
KEY MEMBER LAYOUT

MACHINE-CONSTRUCTED ELJ - LAYOUT PLAN VIEWS
SCALE: 1" = 5'

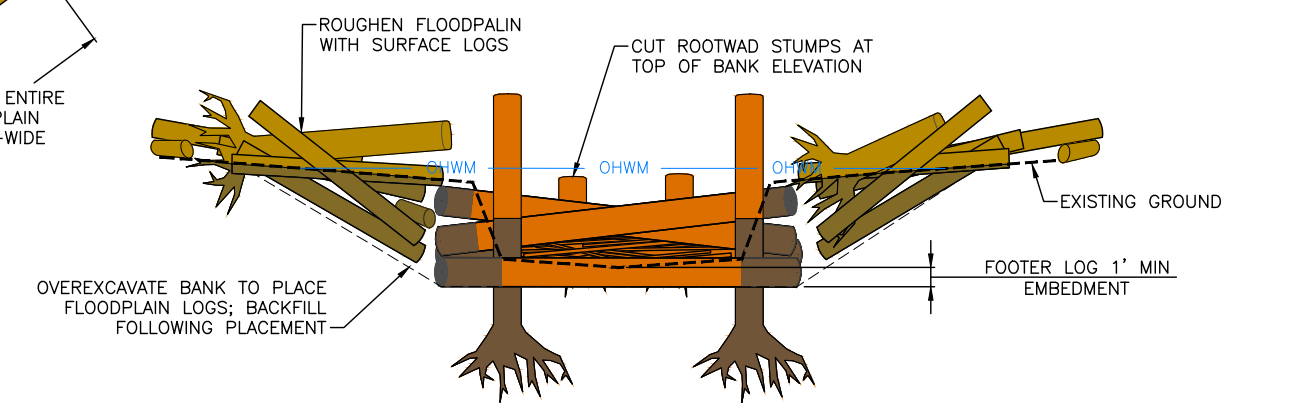


FLOODPLAIN WOOD AND CHANNEL INFILL LAYOUT

MACHINE-CONSTRUCTED ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
RE-2	18	20	Y	4	
RE-S	18	4	Y	2	
RD-3	20	30	Y	2	
F-3	16	30	N	9	
FLOODPLAIN LOG	18	10-30	Y/N	20 MIN.	TREAT FULL VALLEY WIDTH
RACKING BUNDLE	24-36	30	N	1	
RACKING	4-10	15-30	Y/N	60	TREES WITH BRANCHES ACCEPTABLE
SLASH	1-3	N/A	N	25 CY	LIMBS AND BRANCHES
BOLTED CONNECTION	1	VARIES	N/A	6	LENGTH DEPENDENT ON LOG DIAMETER
*MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)					
** TOTAL LENGTH INCLUDING ROOTWAD					



MACHINE-CONSTRUCTED ELJ - ELEVATION VIEW
SCALE: 1" = 5'

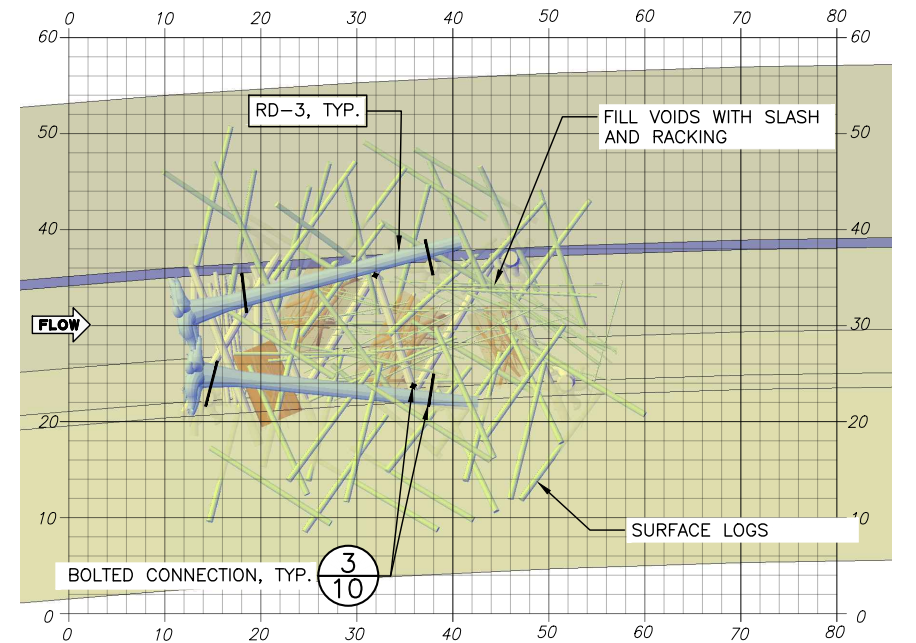
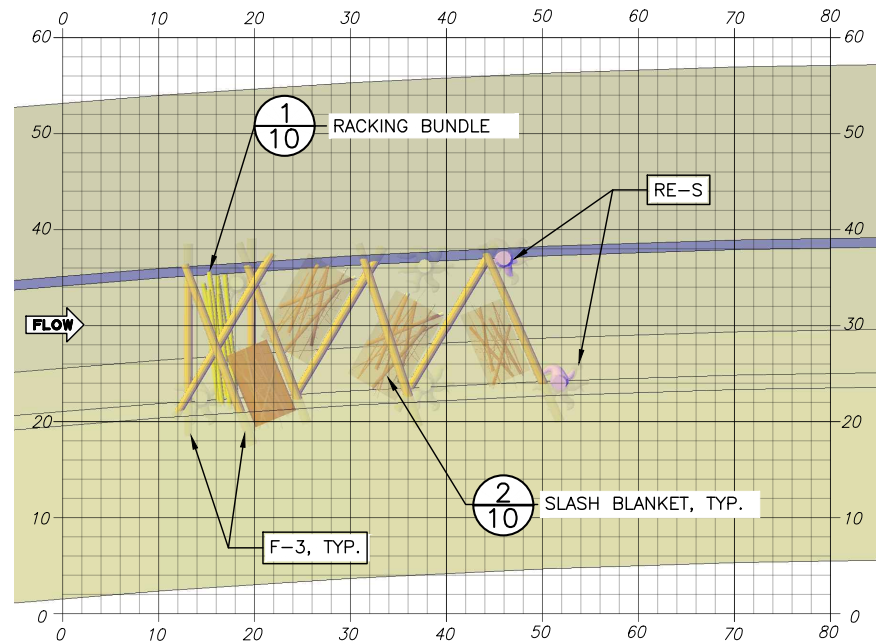
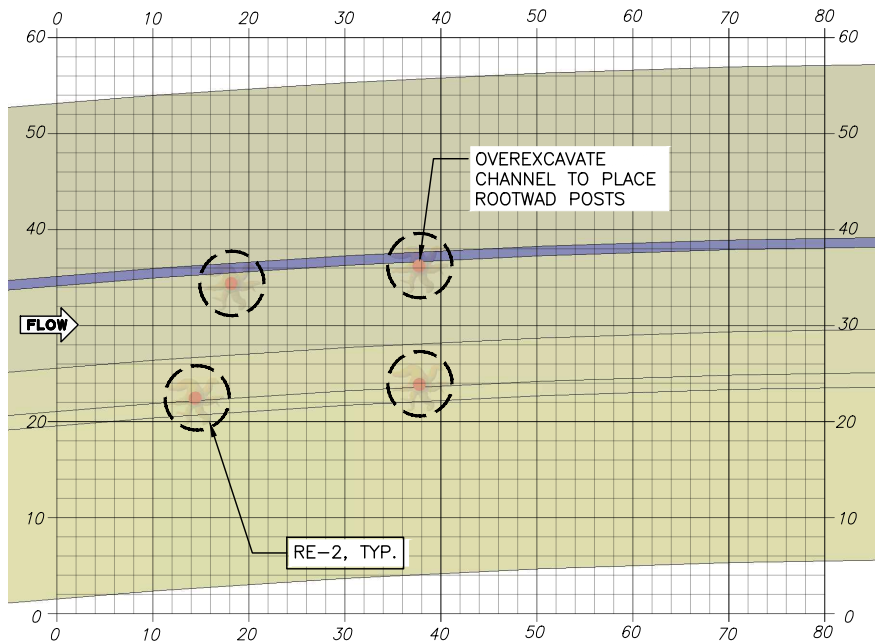


MACHINE-CONSTRUCTED ELJ SECTION A-A'
SCALE: 1" = 5'

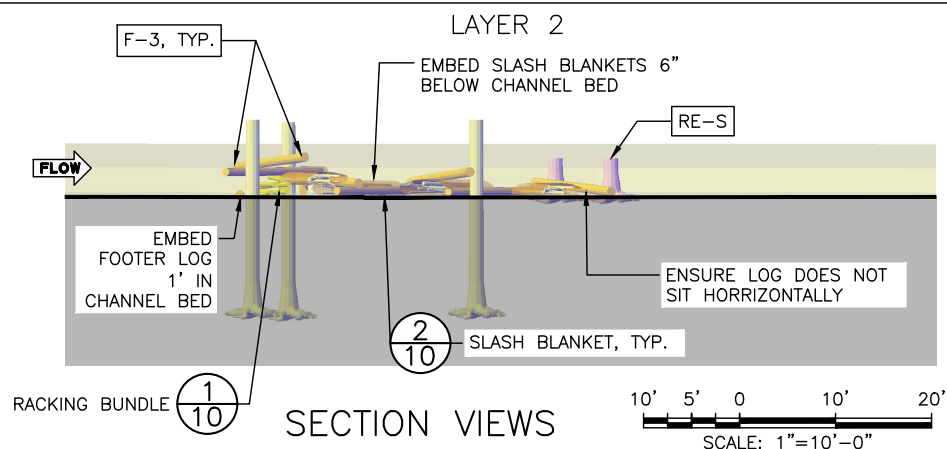
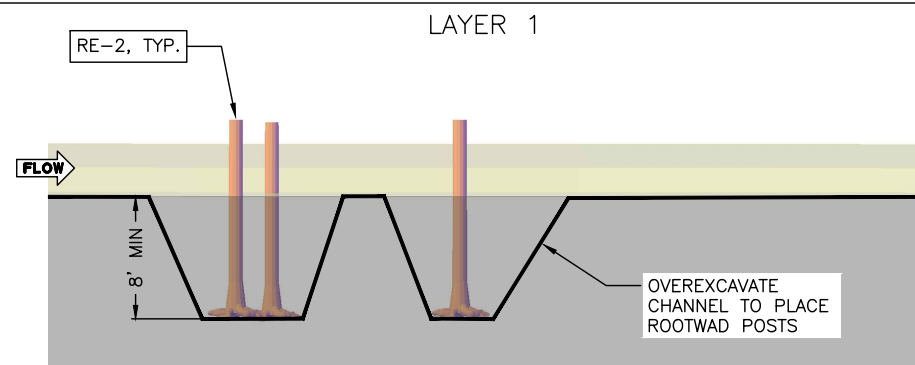
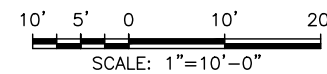
GENERAL NOTES

1. ACTUAL LOG PLACEMENT AND LAYERING WILL VARY TO SUIT FIELD CONDITIONS, AS DIRECTED BY THE ENGINEER OR CONTRACTING OFFICER.
2. OVEREXCAVATE CHANNEL TO PLACE ROOTWAD POSTS AND ROOTWAD STUMPS.
3. CUT FOOTER LOGS IN PLACE SNUG TO CHANNEL TOES. EMBED WITHIN BANK APPROXIMATELY 3' AT BOTH ENDS. EMBED VERTICALLY APPROXIMATELY 1' BELOW EXISTING THALWEG.
4. RACKING BUNDLES SHALL BE PLACED SNUG AGAINST FOOTER LOGS AND POSTS TO PROTECT FROM SCOUR. CUT SNUG TO CHANNEL TOES.
5. VOIDS THROUGHOUT STRUCTURE SHALL BE PACKED WITH LOOSE DEBRIS, RACKING MATERIAL, AND SLASH.
6. ROUGHEN FLOODPLAIN ADJACENT TO STRUCTURE BY PLACING LOGS. LAYBACK SLOPE TO TO EMBED LOGS ADJACENT TO STRUCTURE AS SHOWN IN SECTION A-A'. LOGS SHALL BE PLACED FROM TOP OF BANK TO VALLEY WALLS.
7. LOG LENGTHS SHALL VARY AND BE CUT IN PLACE TO FIT CHANNEL DIMENSIONS AS DIRECTED BY THE CONTRACTING OFFICER OR ENGINEER. CUT ENDS SHALL BE INCORPORATED INTO STRUCTURE OR USED AS DIRECTED BY CONTRACTING OFFICER OR ENGINEER.
8. HARVEST OR SALVAGE OF ON-SITE WOODY DEBRIS WILL BE DIRECTED BY THE CONTRACTING OFFICER. ANY VEGETATION CLEARED DURING ACCESS SHALL BE INCORPORATED INTO THE STRUCTURE OR PRESERVED FOR OTHER WORK.
9. CONTRACTOR SHALL WORK CLOSELY WITH THE ENGINEER OR CONTRACTING OFFICER TO ENSURE LOG PLACEMENT IS AS INTENDED; DOWNSTREAM LOG SHALL BE ANGLED VERTICALLY AND SHALL NOT SIT HORIZONTALLY.

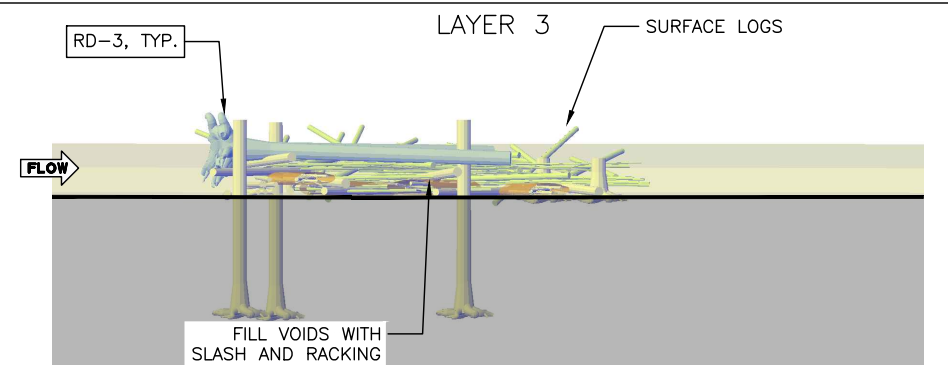
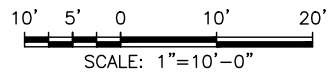
MACHINE-CONSTRUCTED ELJ
1/6



PLAN VIEWS



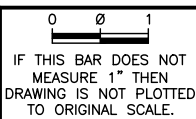
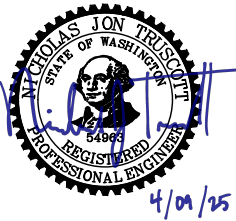
SECTION VIEWS



- OVEREXCAVATE CHANNEL TO PLACE FOUR (4) RE-2 ROOTWAD POSTS 8' MINIMUM BELOW CHANNEL BED.

- BACKFILL ROOTWAD POSTS.
- EMBED ONE (1) FRONT FOOTER LOG (F-3) 1' IN CHANNEL BED AND CHANNEL TOES.
- ADD RACKING BUNDLE TO BE SNUG AGAINST FRONT FOOTER LOG AND RE-2 ROOTWAD POSTS.
- PLACE AND EMBED FOUR (4) SLASH BLANKETS 6" BELOW CHANNEL BED.
- PLACE EIGHT (8) F-3 LOGS AND EMBED 1' WITHIN BANK AT BOTH ENDS.
- PLACE TWO (2) RE-S ROOTWAD STUMPS ON CHANNEL BED, CUT STUMP TOPS TO MATCH TOP OF BANK ELEVATION.

- PLACE TWO (2) RD-3 ROOTWADS TO BE SNUG AGAINST RE-2 POSTS.
- ADD BOLTED CONNECTIONS BETWEEN RD-3 AND RE-2, AND RD-3 AND F-3 AS SHOWN.
- ADD RACKING, SLASH, AND LOOSE DEBRIS TO FILL VOIDS ABOVE AND BELOW PREVIOUSLY PLACED LOGS.
- EXCAVATE BANK TO PLACE HALF OF SURFACE LOGS, BACKFILL FOLLOWING PLACEMENT.
- ADD SURFACE LOGS AND ROOTWADS FROM TOP OF BANK TO VALLEY WALLS TO ROUGHEN ENTIRE FLOODPLAIN.



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DRAWN	LZ
CHECKED	NT

GEOGRAPHIC INFORMATION	
LATITUDE	47°46'20.4"N
LONGITUDE	120°45'30.7"W
TN/SC/RG	T26N/S08/R17E
DATE	----

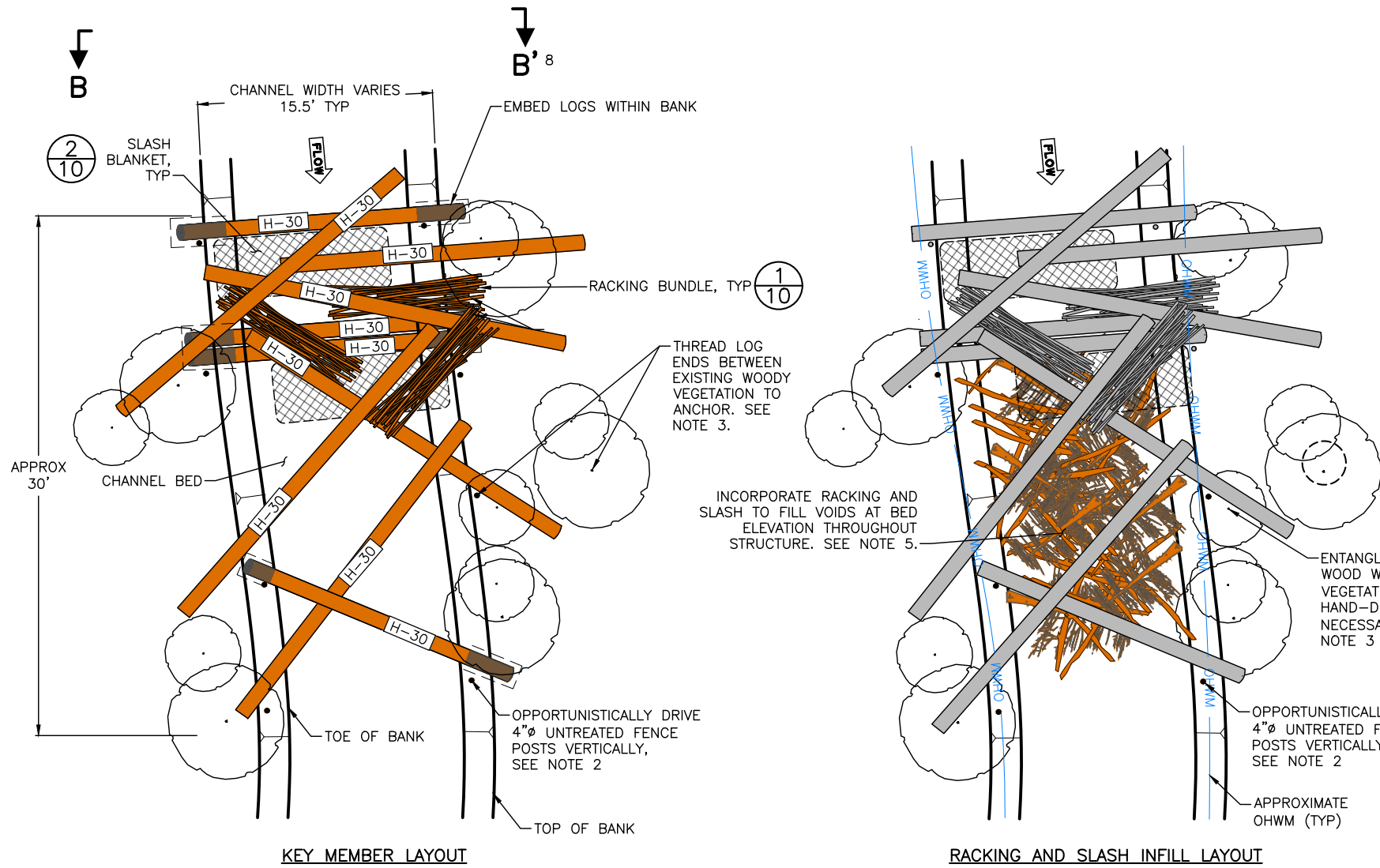
KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT

MACHINE-CONSTRUCTED ELJ
LAYERING PLAN

7
SHEET 7 OF 12

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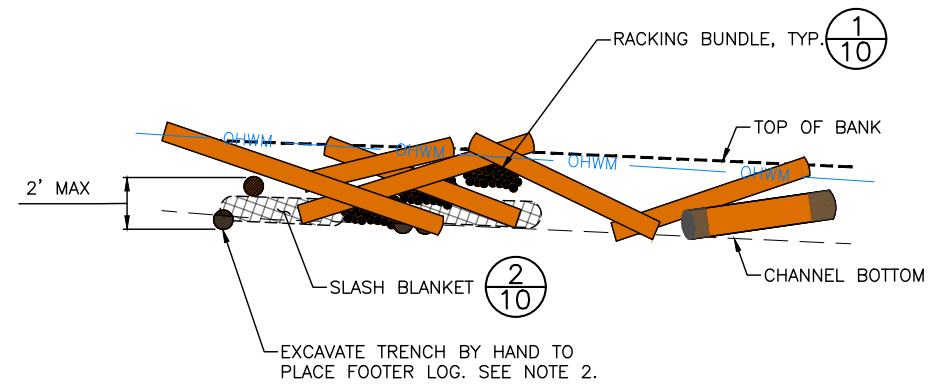


HAND-CONSTRUCTED ELJ - LAYOUT PLAN VIEWS

SCALE: 1" = 5'

GENERAL NOTES

1. ACTUAL LOG PLACEMENT AND LAYERING WILL VARY TO SUIT FIELD CONDITIONS, AS DIRECTED BY THE ENGINEER OR CONTRACTING OFFICER.
2. EXCAVATE BY HAND TO EMBED LOG ENDS APPROXIMATELY 3' IN BANK AT BOTH ENDS. OPPORTUNISTICALLY DRIVE 4"Ø UNTREATED FENCE POSTS VERTICALLY AS SOIL CONDITIONS ALLOW TO INCREASE LATERAL STABILITY OF STRUCTURE. CONTRACTOR SHALL INSTALL UP TO 6 PER STRUCTURE.
3. THREAD LOG ENDS THROUGH EXISTING WOODY FLOODPLAIN VEGETATION AS SHOWN. IF SUITABLE WOODY VEGETATION IS NOT PRESENT, LOGS MAY BE SECURED BY 4"Ø PILE DRIVEN VERTICALLY AS DIRECTED BY THE ENGINEER OR CONTRACTING OFFICER. CARE SHALL BE TAKEN TO AVOID DAMAGE OF EXISTING VEGETATION.
4. RACKING BUNDLES SHALL BE PLACED SNUG AGAINST ADJACENT LOGS AND BANKS TO PROTECT FROM SCOUR. CUT SNUG TO CHANNEL TOES.
5. VOIDS THROUGHOUT STRUCTURE SHALL BE PACKED WITH LOOSE DEBRIS AND SLASH.
6. LOG LENGTHS SHALL VARY AND BE CUT IN PLACE TO FIT CHANNEL DIMENSIONS AS DIRECTED BY THE CONTRACTING OFFICER OR ENGINEER. CUT ENDS SHALL BE INCORPORATED INTO STRUCTURE OR USED AS DIRECTED BY CONTRACTING OFFICER OR ENGINEER.
7. ALL LOGS FOR HAND-CONSTRUCTED ELJS SHALL BE EXISTING TREES AND LOGS THAT HAVE FALLEN OR BEEN HARVESTED ON-SITE.
8. HARVEST OR SALVAGE OF ON-SITE WOODY DEBRIS WILL BE DIRECTED BY THE CONTRACTING OFFICER.

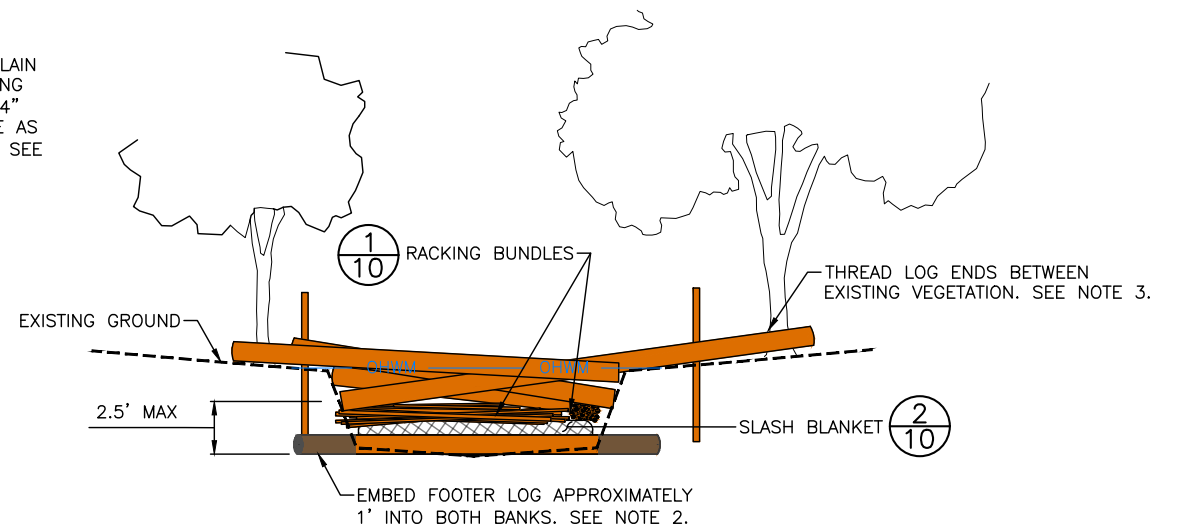


HAND-CONSTRUCTED ELJ - ELEVATION VIEW

SCALE: 1" = 5'

NOTE

1. RACKING AND SLASH INFILL NOT SHOWN FOR CLARITY.



HAND-CONSTRUCTED ELJ SECTION B-B'

SCALE: 1" = 5'

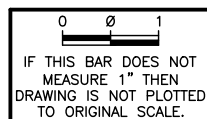
NOTE

1. RACKING AND SLASH INFILL NOT SHOWN FOR CLARITY.

HAND-CONSTRUCTED ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH** (FET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
H-30	12	30	N	10	
RACKING BUNDLE	24-36	30	N	3	
RACKING	4-10	15-30	Y/N	30	TREES WITH BRANCHES ACCEPTABLE
SLASH	1-3	N/A	N	25 CY	LIMBS AND BRANCHES
*MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)					
** TOTAL LENGTH INCLUDING ROOTWAD					

HAND-CONSTRUCTED ELJ

SCALE: 1"=5'



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CHECKED NT

GEOGRAPHIC INFORMATION
LATITUDE 47°46'20.4"N
LONGITUDE 120°45'30.7"W
TN/SC/RG T26N/S08/R17E
DATE

KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT

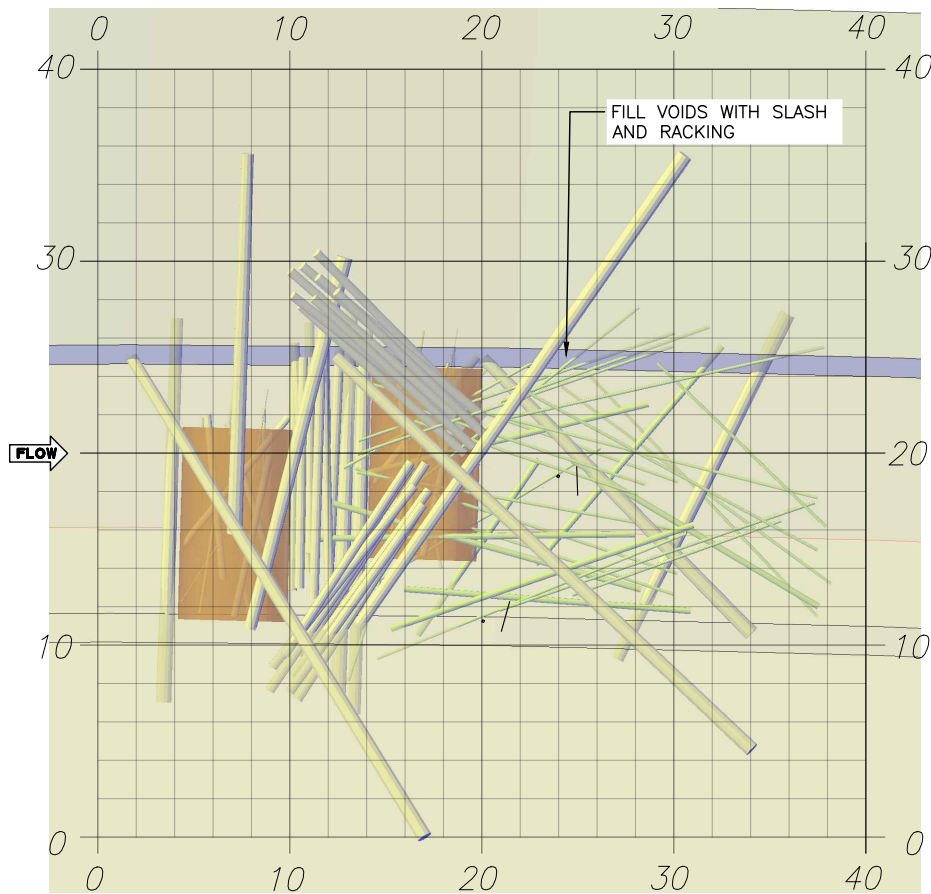
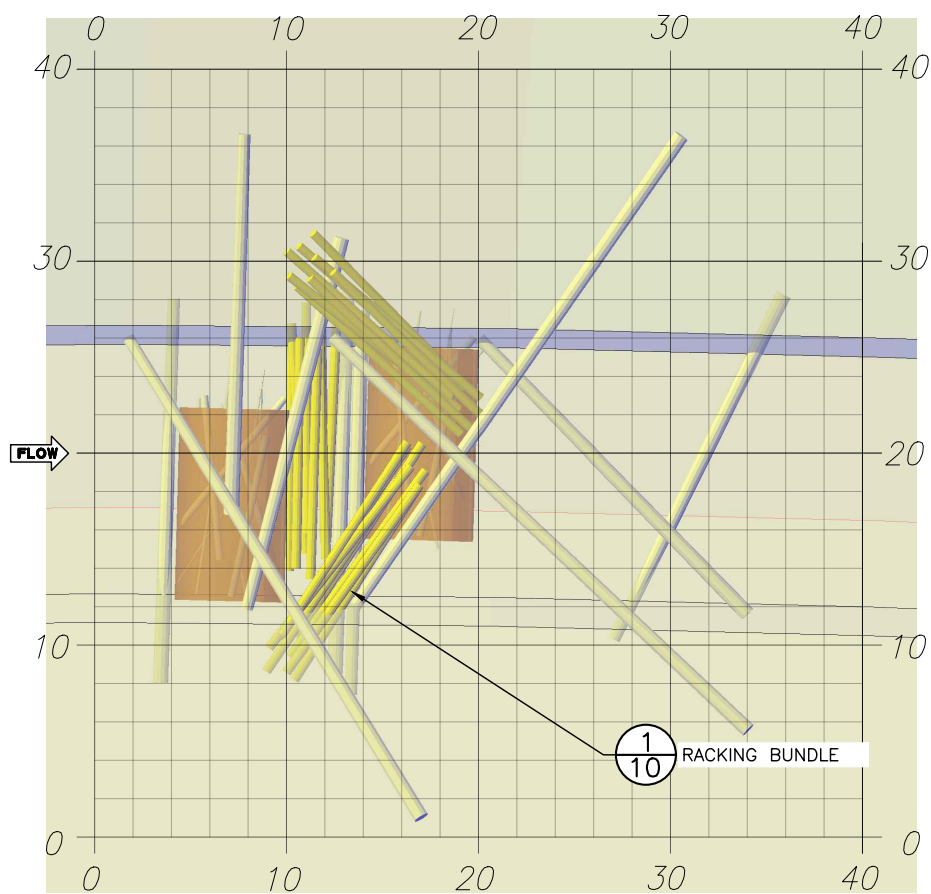
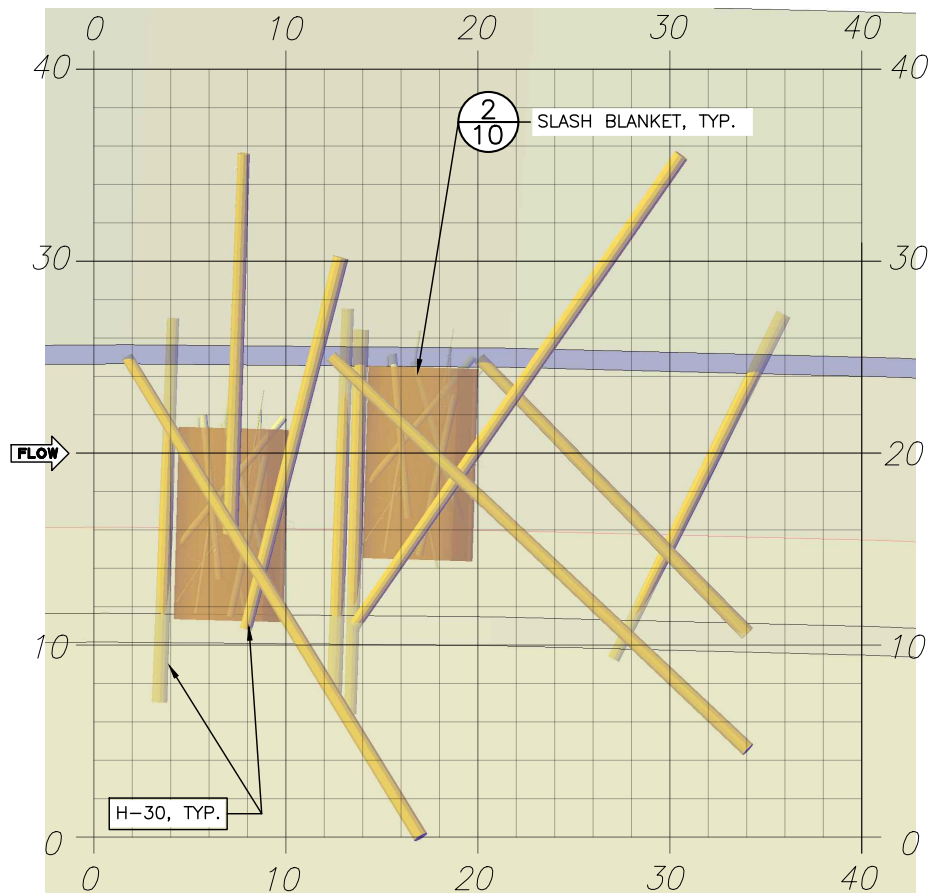
HAND-CONSTRUCTED ELJ
DETAILS

8

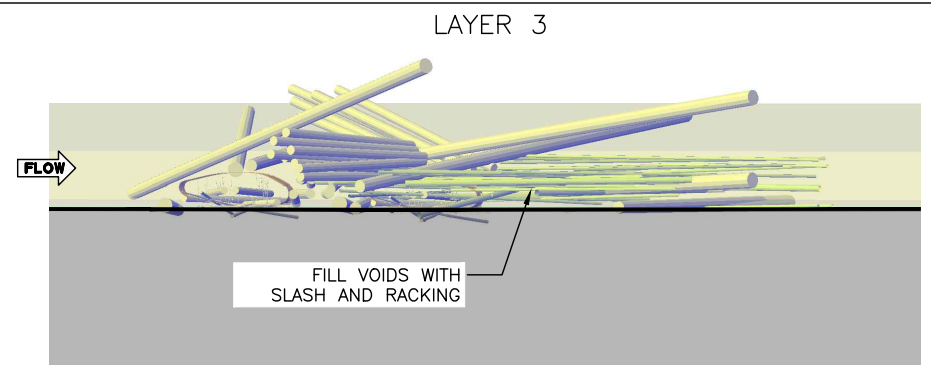
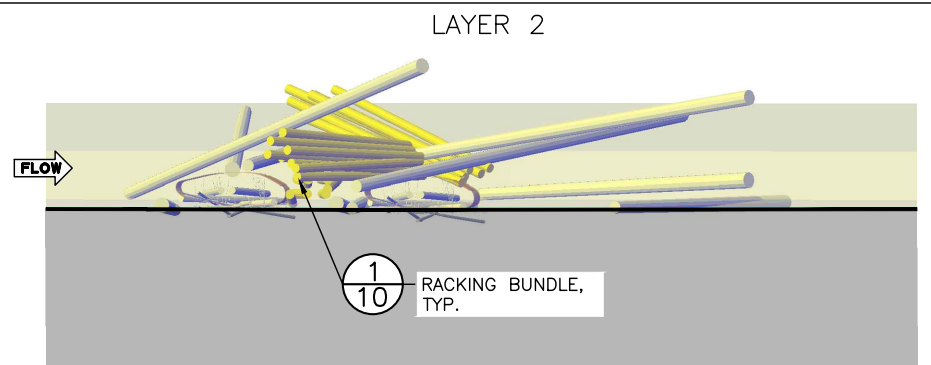
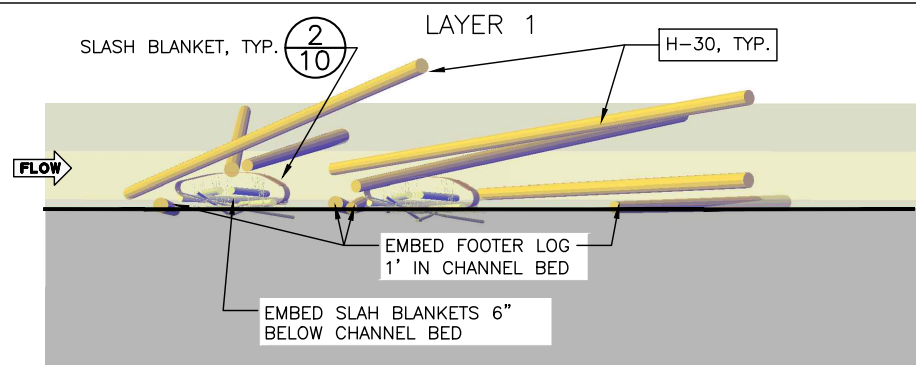
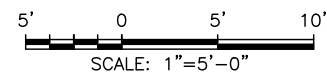
SHEET 8 OF 12

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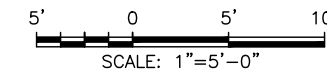
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PLAN VIEWS



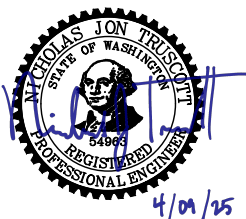
SECTION VIEWS



1. EMBED FOUR (4) FOOTER LOGS (H-30) 1' IN CHANNEL BANKS AS SHOWN.
2. PLACE TWO (2) SLASH BLANKETS ON CHANNEL BED.
3. THREAD SIX (6) H-30 LOG ENDS BETWEEN EXISTING WOODY VEGETATION AS AVAILABLE TO ANCHOR.

1. PLACE RACKING BUNDLES SNUGLY AGAINST ADJACENT LOGS AND BANKS.

1. ADD RACKING, SLASH, AND LOOSE DEBRIS TO FILL VOIDS ABOVE AND BELOW PREVIOUSLY PLACED LOGS.



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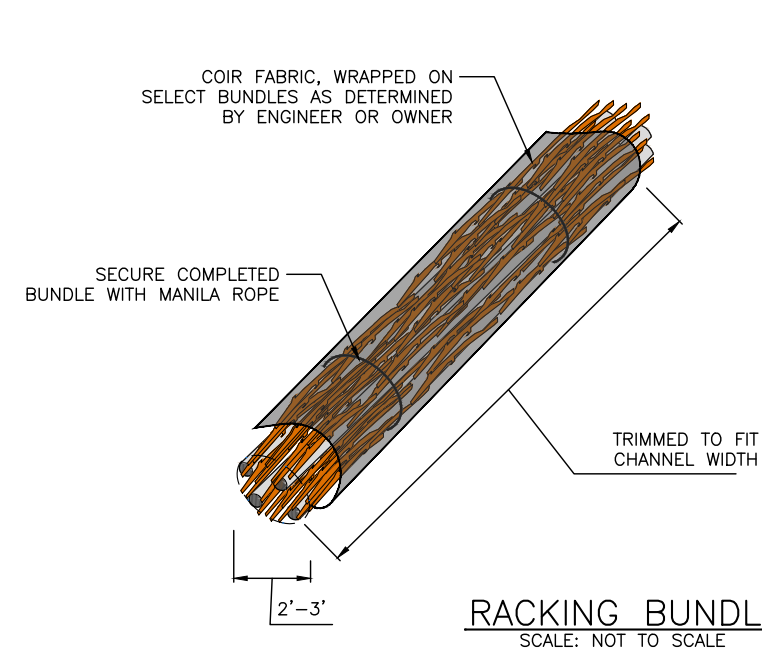
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CHECKED NT	DATE

KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT

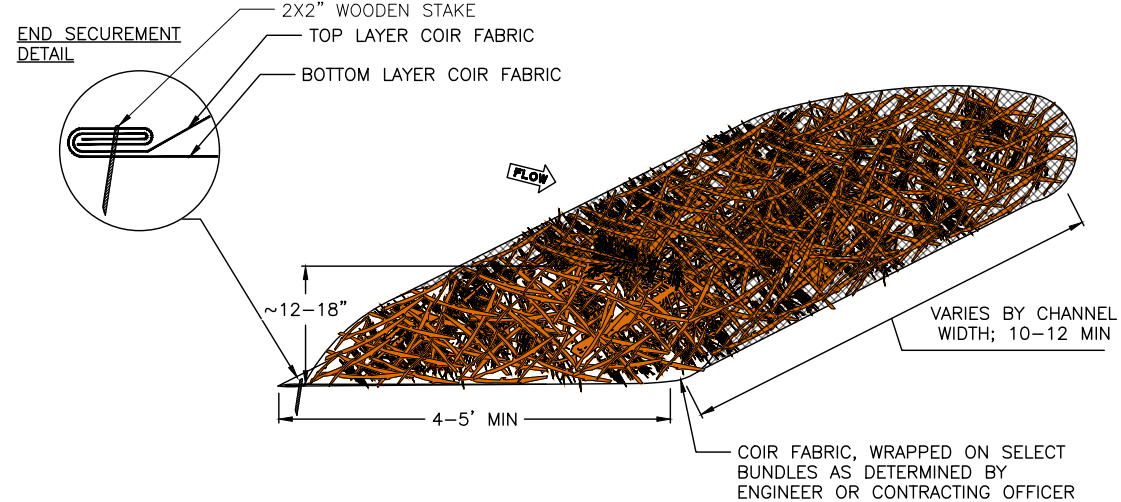
HAND-CONSTRUCTED ELJ
LAYERING PLAN

9
SHEET 9 OF 12

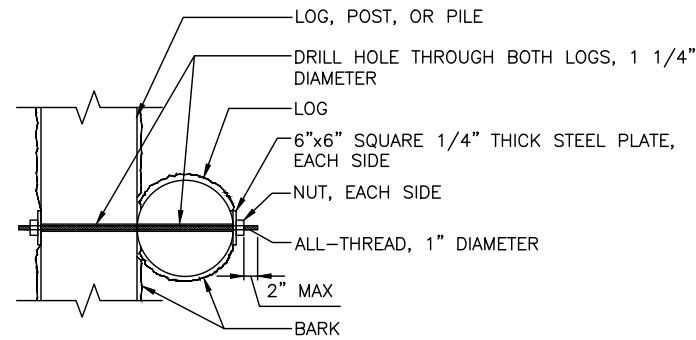
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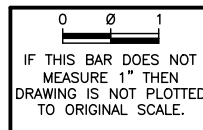
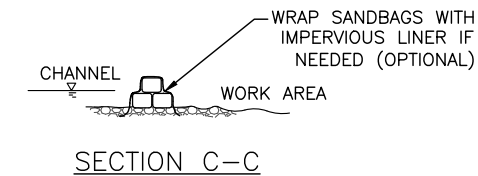
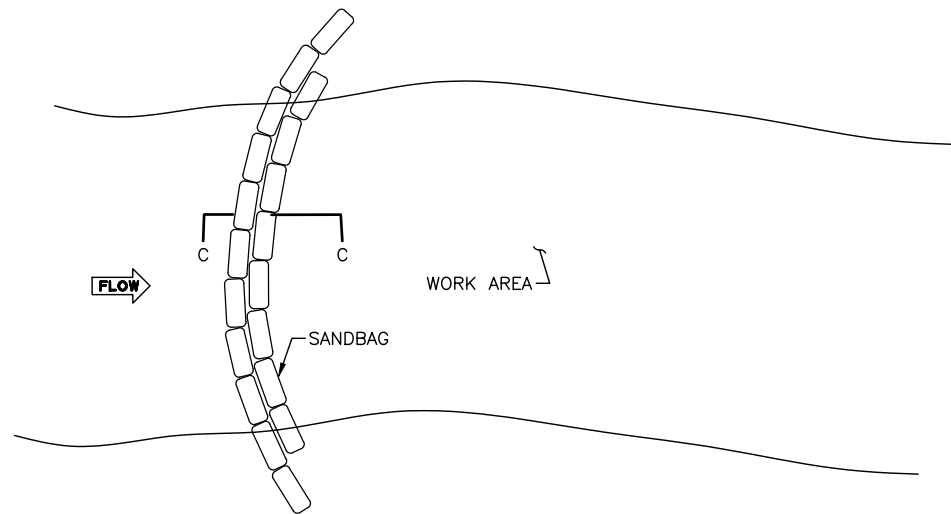
- RACKING BUNDLE NOTES**
1. SECURE BUNDLES ON BOTH ENDS WITH 3 WRAPS WITH 0.5" DIAMETER MANILA ROPE SECURED WITH A SQUARE KNOT WITH 6" TAILS.
 2. BUNDLES SHALL CONSIST OF SAPLING TREES AND BRANCHES HAVING VARYING DIAMETERS OF 0.5-3 INCHES AND A LENGTH OF 6-12 FEET.
 3. BUNDLES SHALL CONTAIN LEAVES, TWIGS, DUFF, AND LOCAL DEBRIS TO FILL VOIDS AS FEASIBLE AND CREATE A LOW-PERMEABILITY BUNDLE
 4. CERTAIN BUNDLES TO WRAPPED IN COIR FABRIC TO FURTHER REDUCE PERMEABILITY



- SLASH BLANKET NOTES**
1. LAY A LAYER OF COIR FABRIC ACROSS THE CHANNEL BED, PARALLEL TO THE DIRECTION OF FLOW.
 2. LAYER SLASH OVER THE UPSTREAM HALF OF THE FABRIC, LEAVING A 3' LONG TAIL AT THE UPSTREAM END FOR SECURING THE BUNDLE.
 3. WRAP THE REMAINING FABRIC OVER THE TOP OF THE LAYERED SLASH AND PULL TAUT.
 4. SECURE THE ENDS OF THE BUNDLE AS SHOWN, WITH A MINIMUM OF TWO FOLDS OF THE DOUBLE LAYERED COIR FABRIC. SECURE THE FOLDED END TO THE CHANNEL BED WITH WOODEN STAKES EVERY 24" MAX.



- BOLTED CONNECTION NOTES:**
1. REMOVE BARK AT CONNECTION POINTS.
 2. DRILL HOLE THROUGH CENTER OF LOGS.
 3. TIGHTEN SUFFICIENTLY TO ELIMINATE GAP BETWEEN LOGS BUT NOT CRUSH BOLES. PEEN THREADS OR TACK WELD NUT TO ALL-THREAD FOLLOWING TIGHTENING.
 4. ALL-THREAD TO BE ASTM TYPE A 307, GRADE A. LENGTH VARIES BY CONNECTION.
 5. MULTIPLE LOG CONNECTIONS AT SAME JOINT WILL USE SINGLE PIECE OF ALL-THREAD TO MINIMIZE HOLES IN POSTS.



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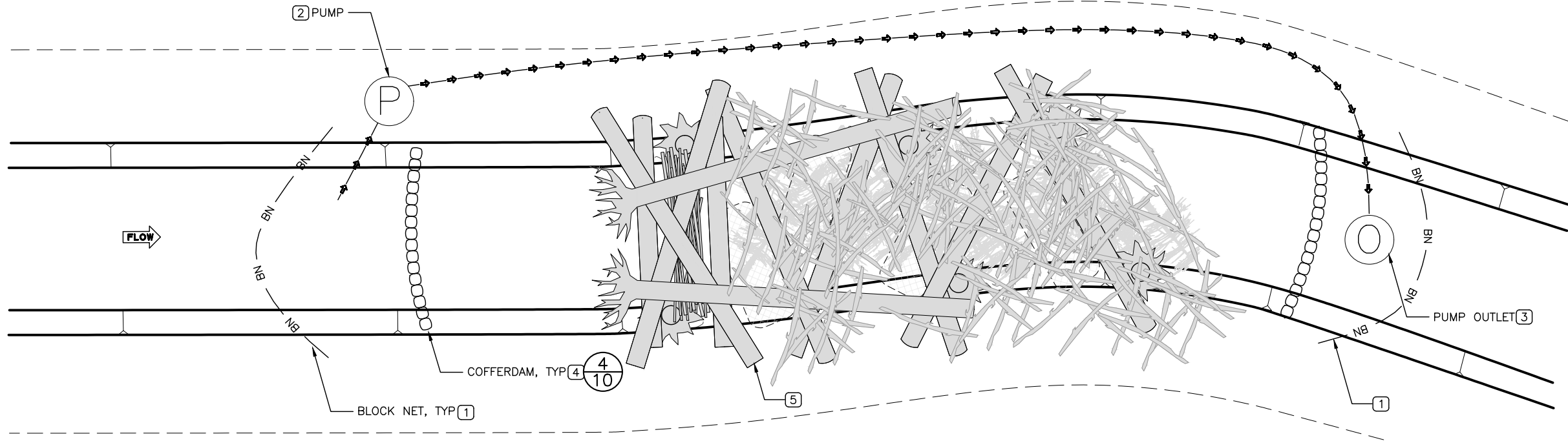
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KAHLER CREEK ALLUVIAL
WATER STORAGE PROJECT

CONSTRUCTION DETAILS

10
SHEET 10 OF 12

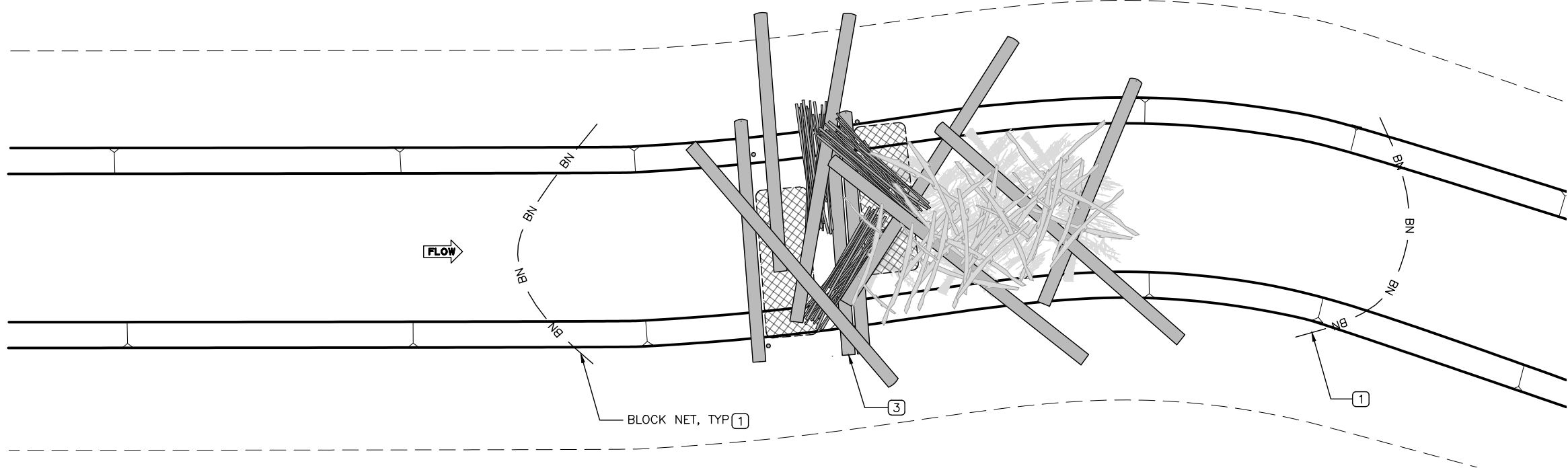
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MACHINE-CONSTRUCTED WATER MANAGEMENT
SCALE: 1" = 5'

MACHINE-CONSTRUCTED WATER MANAGEMENT NOTES:

1. CONTRACTING OFFICER TO INSTALL BLOCKNETS UPSTREAM AND DOWNSTREAM OF WORK AREA PRIOR TO ANY WORK BELOW ORDINARY HIGH WATER MARK. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER ON LOCATIONS OF BLOCK NETS.
2. FOLLOWING FISH AND AQUATIC SPECIES REMOVAL FROM WITHIN THE ISOLATED AREA, CONTRACTOR SHALL BEGIN BYPASSING FLOW AROUND ISOLATED WORK AREA. ALTERNATE MEANS OF BYPASSING FLOW MAY BE APPROVED, SEE SPECIFICATIONS FOR ADDITIONAL DETAILS.
3. IF A PUMPED BYPASS IS USED, THE CONTRACTOR SHALL PROVIDE A MEANS OF ENERGY DISPERSION AT THE DISCHARGE POINT OF THE PUMPED SYSTEM TO PREVENT SCOUR. PUMP INTAKES SHALL BE SCREENED AS REQUIRED IN PROJECT PERMITS AND SPECIFICATIONS.
4. INSTALL COFFERDAMS UPSTREAM AND DOWNSTREAM OF THE WORK AREA TO BLOCK FLOWING WATER FROM ENTERING THE ISOLATED WORK AREA.
5. COMPLETE ELJ ASSEMBLY.
6. MONITOR TURBIDITY AT ALL TIMES DURING WORK BELOW THE ORDINARY HIGH WATER MARK. STOP WORK WHEN DIRECTED BY THE CONTRACTING OFFICER AND IMPLEMENT CORRECTIVE MEASURES AS NECESSARY BEFORE RESUMING WORK.
7. REMOVE ALL WATER MANAGEMENT MEASURES FOLLOWING ACCEPTANCE OF ELJ COMPLETION; REWATER THE CHANNEL SLOWLY.



HAND-CONSTRUCTED SITE ISOLATION
SCALE: 1" = 5'

HAND-CONSTRUCTED SITE ISOLATION NOTES:

1. CONTRACTING OFFICER TO INSTALL BLOCKNETS UPSTREAM AND DOWNSTREAM OF WORK AREA PRIOR TO ANY WORK BELOW ORDINARY HIGH WATER MARK. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER ON LOCATIONS OF BLOCK NETS.
2. FOLLOWING FISH AND AQUATIC SPECIES REMOVAL FROM WITHIN THE ISOLATED AREA, CONTRACTOR MAY BEGIN ASSEMBLY OF HAND-CONSTRUCTED ELJs WITHOUT DEWATERING THE ISOLATED WORK AREA.
3. COMPLETE ELJ ASSEMBLY.
4. MONITOR TURBIDITY AT ALL TIMES DURING WORK BELOW THE ORDINARY HIGH WATER MARK. STOP WORK WHEN DIRECTED BY THE CONTRACTING OFFICER AND IMPLEMENT CORRECTIVE MEASURES AS NECESSARY BEFORE RESUMING WORK.
5. REMOVE ALL WATER MANAGEMENT MEASURES FOLLOWING ACCEPTANCE OF ELJ COMPLETION; REWATER THE CHANNEL SLOWLY.



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DATE

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WATER STORAGE PROJECT

WATER MANAGEMENT

11
SHEET 11 OF 12

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SEEDING SCHEDULE		
SPECIES	COMMON NAME	LBS PLS/ACRE
ACHILLEA MILLEFOLIUM	WESTERN YARROW	0.5
ACHNATHERUM HYMENOIDES	INDIAN RICEGRASS	6
AGROPYRON SPICATUM	BLUEBUNCH WHEATGRASS	6
BROMUS CARINATUS	MOUNTAIN BROME	0.5
ELYMUS GLAUCUS	WILD RYE	0.5
FESTUCA IDAHOENSIS	IDAHO FESCUE	3
LINUM LEWISII	PRAIRIE FLAX	0.25
LOMATIUM DISSECTUM	DESERT PARSLEY	1
LOMATIUM NUDICAULE	BARESTEM BISCUITROOT	1
LUPINUS SERICEUS	SILKY LUPINE	0.25
TRITICUM AESTIVUM X SECALE CEREALE	STERILE TRITICALE	20
POA SECUNDA	SANDBERG BLUEGRASS	6

- NOTES
- TOTAL SEEDING AREA IS 4.2 ACRES.
 - SEEDING AREAS SHOWN ON THIS SHEET ARE THE EXPECTED LIMITS OF DISTURBANCE RESULTING FROM PROJECT WORK. ALL DISTURBED AREAS SHALL BE SEEDDED ACCORDING TO THE SCHEDULE AND RATES SHOWN ON THIS SHEET AS APPROVED BY THE CONTRACTING OFFICER.
 - FOLLOWING APPLICATION OF SEED, CERTIFIED WEED-FREE STRAW MULCH SHALL BE APPLIED AT A RATE OF 2,000 LBS PER ACRE.



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WATER STORAGE PROJECT

SITE STABILIZATION

12
SHEET 12 OF 12