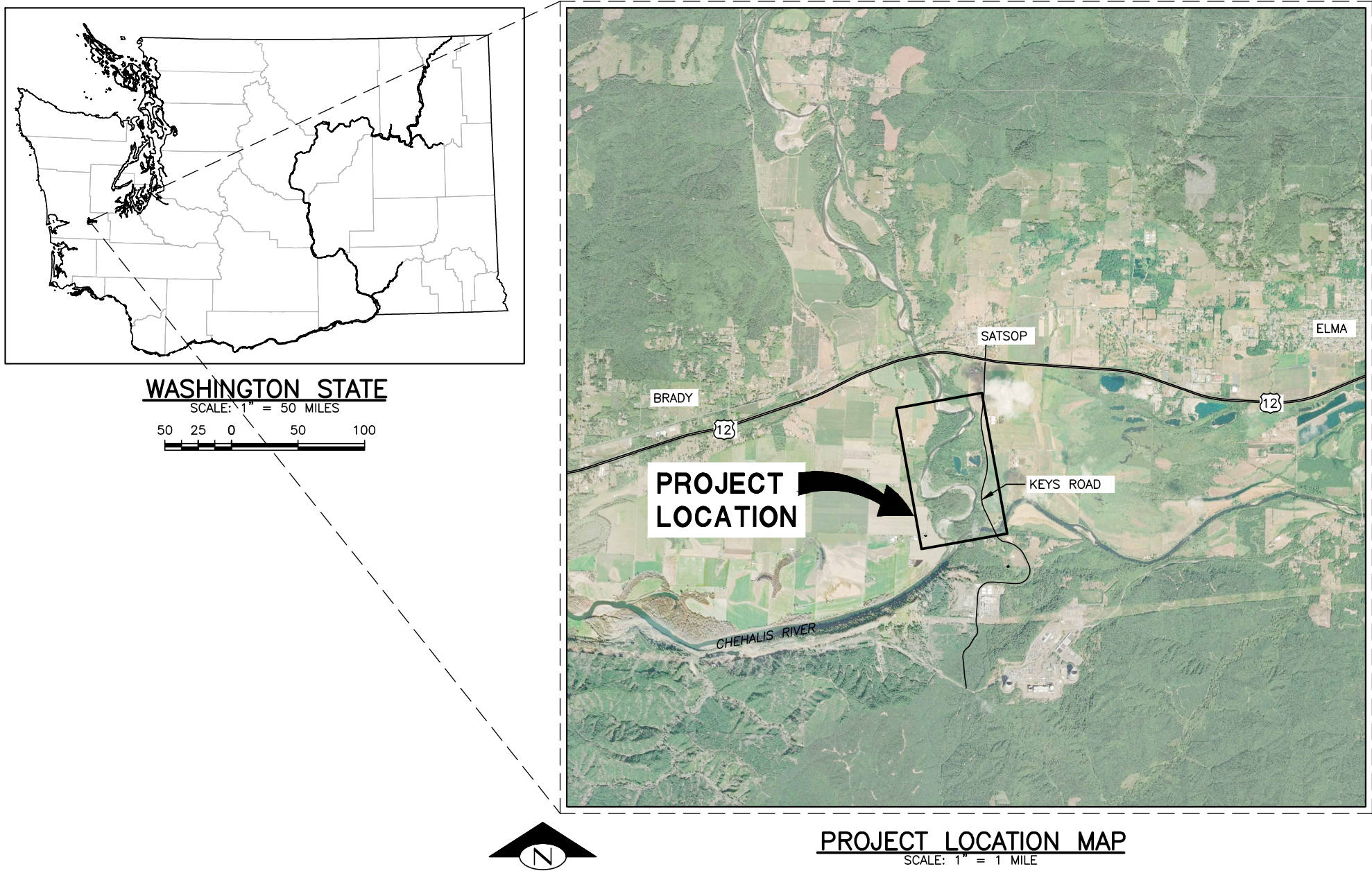


KEYS ROAD FLOOD PROTECTION

PHASE I PRELIMINARY DESIGN

GRAYS HARBOR COUNTY



SHEET LIST TABLE	
Sheet Number	Sheet Title
1	COVER SHEET
2	GENERAL NOTES
3	LEGEND
4	EXISTING CONDITIONS
5	PROPOSED CONDITIONS
6	SETBACK REVETMENT ELJ SCHEDULE
7	ACCESS AND STAGING
8	CONSTRUCTION SEQUENCING AND TESC
9	TYPE 1 APEX ELJ DETAILS
10	TYPE 2 APEX ELJ DETAILS
11	TYPE 1 DEFLECTOR ELJ DETAILS
12	FLOODPLAIN ROUGHNESS ELJ DETAILS
13	TIMBER COMPLEX PLAN
14	TYPE 1 SETBACK REVETMENT
15	TYPE 2 SETBACK REVETMENT
16	RELIEF CHANNEL PROFILE AND SECTIONS
17	CONSTRUCTION DETAILS

CONTACT INFORMATION
NATURAL SYSTEMS DESIGN, INC
1900 N NORTHLAKE WAY, SUITE 211
SEATTLE, WA 98103
(206) 834-0175
GRAYS HARBOR COUNTY
DEPARTMENT OF PUBLIC WORKS
110 WEST BROADWAY, SUITE 31
MONTESANO, WA 98563
(360) 249-4222

N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD DWGS - CURRENT\COVER SHEET.DWG Mirinda 3/26/2020 3:54:42 PM

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

NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED RLE, MS	LATITUDE 46°58'55.71"N
CHECKED RLE	LONGITUDE 123°28'56.2"W
DRAWN MS, GM	TN/SC/RG T17N/S6/R6W
CHECKED RLE	DATE 2/14/2019

KEYS ROAD FLOOD PROTECTION	COVER SHEET	1
		SHEET 1 OF 17

Mar 26, 2020 10:26 AM PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION

N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD_DWG5 - CURRENT NOTES.DWG, Miranda, 3/26/2020, 3:55:03 PM

GENERAL NOTES

1. THESE PLANS HAVE BEEN PREPARED FOR THE EXCLUSIVE USE OF GRAYS HARBOR COUNTY, 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 (WASHDOT) 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 (WASHDOT) 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 ANCHOR QEA AND WAS COLLECTED AS PART OF THE CHEHALIS BASIN LIDAR ACQUISITION AND IS REPRESENTATIVE OF 2017 CONDITIONS. THE VERTICAL DATUM IS NAVD88 GEOID12B. THE HORIZONTAL DATUM IS NAD83 (2011) WASHINGTON STATE PLANE SOUTH, US SURVEY FEET.

EROSION, SEDIMENT CONTROL AND WATER MANAGEMENT NOTES

1. 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.
2. 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.
3. 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.
4. 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.
5. IF HIGH WATER LEVEL CONDITIONS THAT CAUSE SILTATION OR EROSION ARE ENCOUNTERED DURING CONSTRUCTION, WORK SHALL STOP UNTIL THE WATER LEVEL SUBSIDES.
6. 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.
7. CONTRACTOR SHALL LIMIT MACHINERY MOVEMENT TO CONSTRUCTION AREAS DEFINED ON SITE PLAN OR IDENTIFIED AS ACCEPTABLE BY THE ENGINEER OR OWNER.
8. ALL EXTERNAL GREASE AND OIL SHALL BE PRESSURE-WASHED OFF THE EQUIPMENT PRIOR TO TRANSPORT TO THE SITE.
9. ALL EQUIPMENT OPERATING BELOW OHWM SHALL UTILIZE READILY BIODEGRADABLE VEGETABLE-BASED HYDRAULIC FLUIDS.
10. 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.
11. THE CONTRACTOR SHALL HAVE AN EMERGENCY SPILL KIT ONSITE AT ALL TIMES.
12. 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.

13. 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.

GENERAL QUANTITIES			
ITEM #	DESCRIPTION	QUANTITY	UNITS
1	EROSION/WATER POLLUTION CONTROL MEASURES	1	LS
2	ACCESS AND STAGING	1	LS
3	SITE ISOLATION	1	LS
4	TYPE 1 APEX ELJ	7	EA
5	TYPE 2 APEX ELJ	1	EA
6	TYPE 1 DEFLECTOR ELJ	9	EA
7	TYPE 1 FLOODPLAIN ROUGHNESS ELJ	7	EA
8	TIMBER COMPLEX UNIT ELJ	5	EA
9	TYPE 1 SETBACK REVETMETN ELJ	6	EA
10	TYPE 2 SETBACK REVETMETN ELJ	12	EA
11	EXCAVATION OF TEMPORARY RELIEF CHANNEL	10,000	CY
12	RACKING LOGS	5,550	EA
13	SLASH	3,740	CY

0

Ø

1

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

GRAYS HARBOR COUNTY

1854

Natural Systems Design

NAME OR INITIALS AND DATE

DESIGNED RLE, MS

CHECKED RLE

DRAWN MS, GM

CHECKED RLE

GEOGRAPHIC INFORMATION

LATITUDE 46°58'55.71"N

LONGITUDE 123°28'56.2"W

TN/SC/RG T17N/S6/R6W

DATE 2/14/2019

KEYS ROAD FLOOD PROTECTION

GENERAL NOTES

2

SHEET 2 OF 17

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION

GENERAL LEGEND

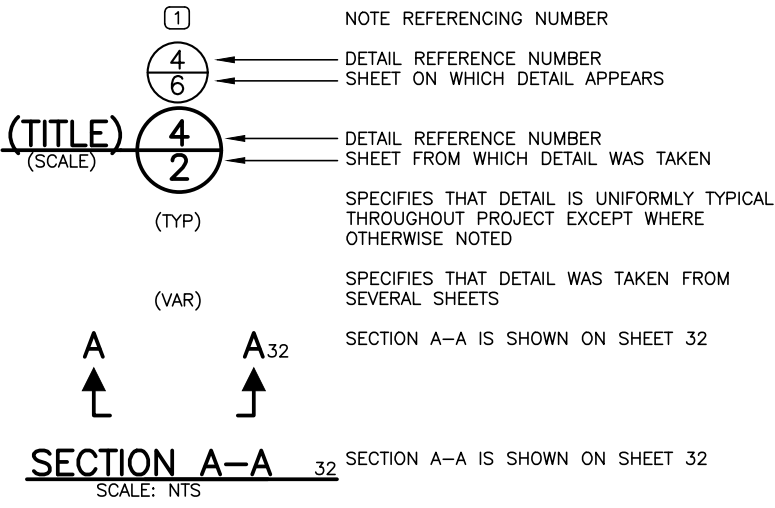
- PROPERTY LINE
- GAS LINE
- RIGHT OF WAY LINE
- EXISTING ROAD
- ACCESS ROAD
- CLEARING LIMIT
- GRADING LIMIT
- EXCAVATION LIMIT
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING FLOW
- EXISTING OHWM
- PROPOSED OHWM
- 2-YEAR FLOOD BOUNDARY
- 100-YEAR FLOOD BOUNDARY
- EXISTING WETLAND
- PROPOSED WETLAND
- EXISTING WATER
- PROPOSED WATER
- EXISTING FENCE
- CONTROL POINT LOCATION
- DEMOLITION/REMOVAL AREA

- ENGINEERED LOGJAM (ELJ)
TYPE 1 APEX
- ENGINEERED LOGJAM (ELJ)
TYPE 2 APEX
- ENGINEERED LOGJAM (ELJ)
TYPE 1 DEFLECTOR
- ENGINEERED LOGJAM (ELJ)
FLOODPLAIN ROUGHNESS
- ENGINEERED LOGJAM (ELJ)
TYPE 1 SETBACK REVETMENT
- ENGINEERED LOGJAM (ELJ)
TYPE 2 SETBACK REVETMENT
- ENGINEERED LOGJAM (ELJ)
TIMBER COMPLEX UNIT

TEMPORARY EROSION CONTROL LEGEND

- SILT BOOM
- BLOCK NETS
- SILT FENCE
- STRAW WATTLE
- DEWATERING LINE DISCHARGE
- PROPOSED STAGING AREA
- BULK BAG COFFERDAM
- TEMPORARY ACCESS ROAD
- TEMPORARY ACCESS BRIDGE
- PUMP DISCHARGE OUTLET
- DEWATERING PUMP

DETAIL AND SECTION REFERENCING



N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD DWGS - CURRENT\LEGEND.DWG Miranda_3/26/2020 3:55:38 PM

0 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, MS	LATITUDE 46°58'55.71"N
CHECKED RLE	LONGITUDE 123°28'56.2"W
DRAWN MS, GM	TN/SC/RG T17N/S6/R6W
CHECKED RLE	DATE 2/14/2019

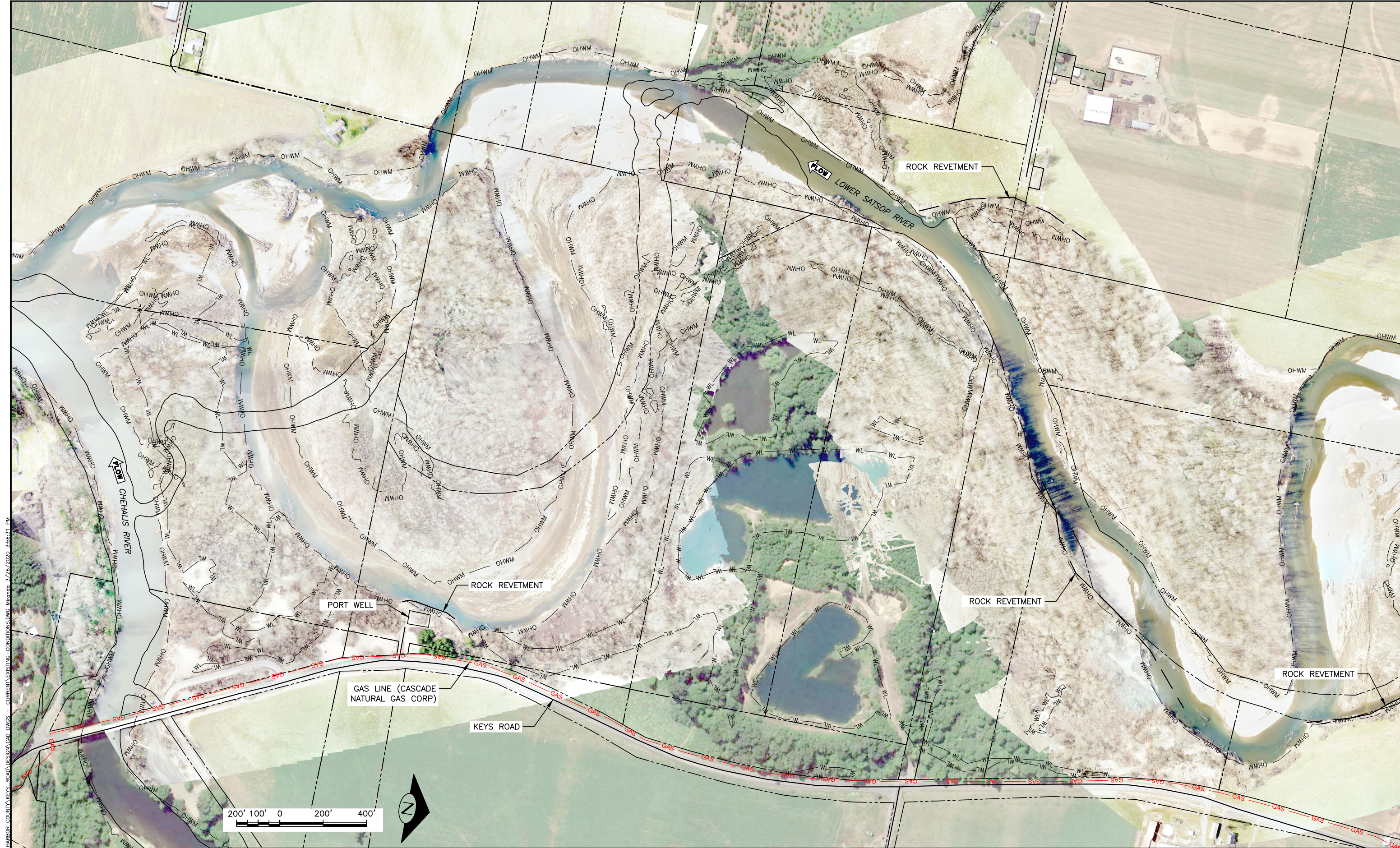
KEYS ROAD FLOOD
PROTECTION

LEGEND

3

SHEET 3 OF 17

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION



N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD.DWG - CURRENT EXISTING-CONDITIONS.DWG Miranda 3/26/2020 3:56:31 PM

0 100 200 400
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT PLOTTED TO ORIGINAL SCALE.

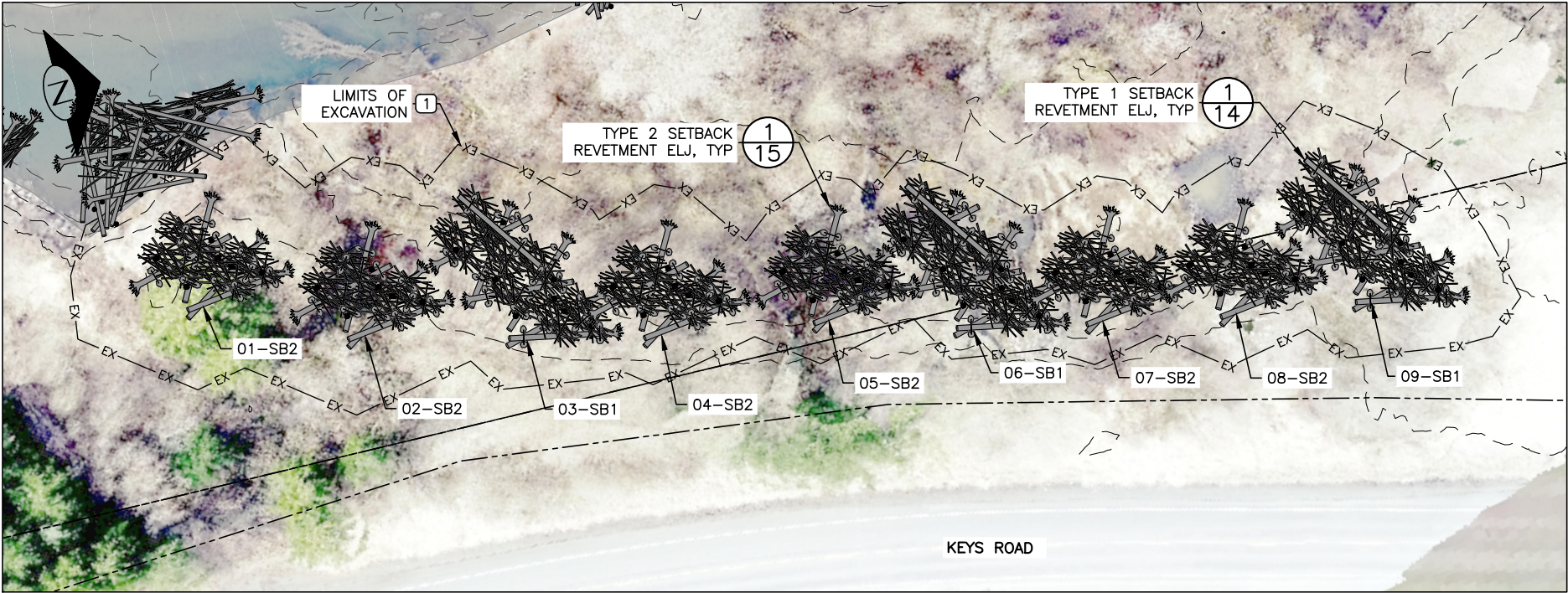


NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	RLE, MS	LATITUDE	46°58'55.71"N
CHECKED	RLE	LONGITUDE	123°28'56.2"W
DRAWN	MS, GM	TN/SC/RG	T17N/S6/R6W
CHECKED	RLE	DATE	2/14/2019

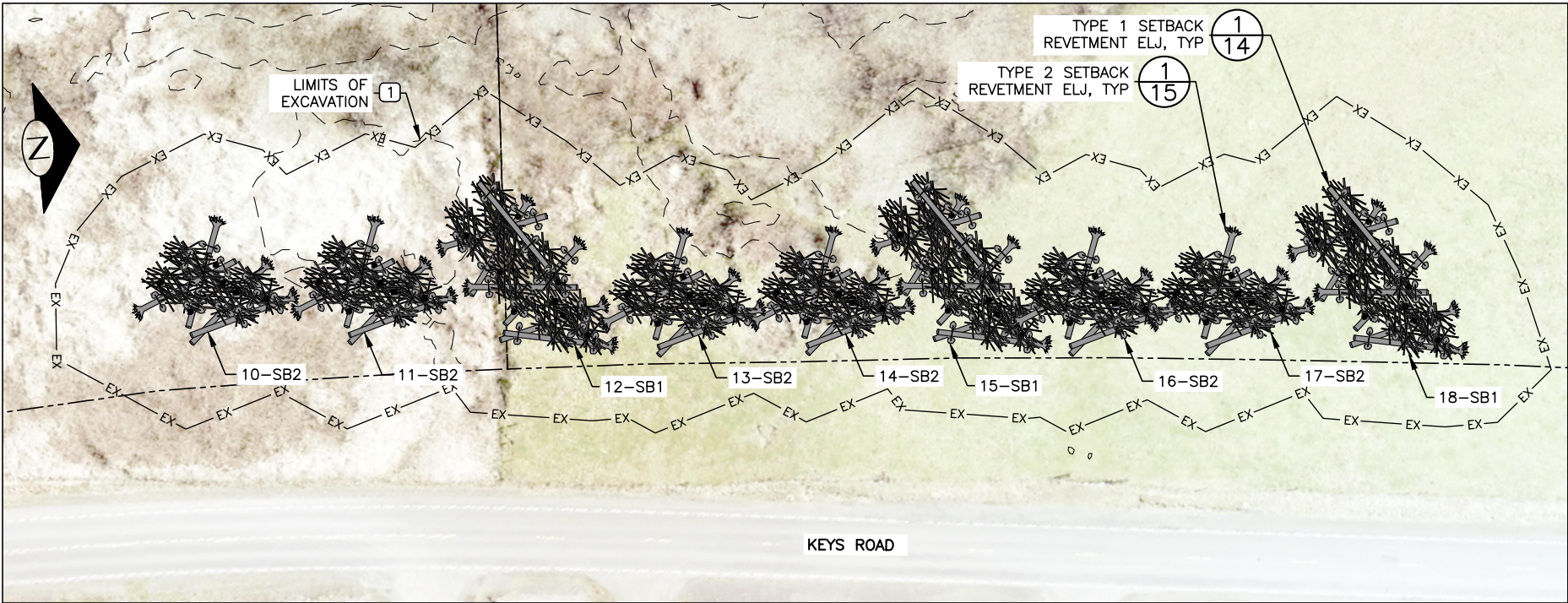
KEYS ROAD FLOOD PROTECTION

EXISTING CONDITIONS

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION



SOUTH SETBACK REVETMENT
SCALE: 1:30



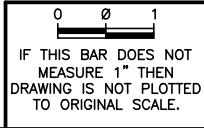
NORTH SETBACK REVETMENT
SCALE: 1:30

ELJ STRUCTURE SCHEDULE				
ELJ ID	EXISTING GRADE ELEVATION (FT)	ELJ BED ELEVATION (FT)	EXCAVATION DEPTH (FT)	EXCAVATION QTY. (CY)
01-SB2	25.9	11	15	1,805
02-SB2	26.0	12	14	1,675
03-SB1	20.0	12	8	945
04-SB2	19.2	12	7	540
05-SB2	17.9	12	6	435
06-SB1	16.1	12	4	366
07-SB2	18.0	12	6	403
08-SB2	19.9	12	8	649
09-SB1	21.3	12	9	1,273
10-SB2	34.0	16	18	2,438
11-SB2	34.0	16	18	2,381
12-SB1	32.0	16	16	2,705
13-SB2	32.0	16	16	1,950
14-SB2	30.0	16	14	1,536
15-SB1	32.0	16	16	2,713
16-SB2	32.0	16	16	1,870
17-SB2	32.0	16	16	1,945
18-SB1	32.0	16	16	3,397

NOTES:

- 1
- EXCAVATION LIMITS WERE DETERMINED FOLLOWING OSHA GUIDANCE FOR OPEN PIT WITHOUT SHORING AT 1.5:1 SIDE SLOPES.
- 2
- EXCAVATION QUANTITIES HAVE BEEN CALCULATED AS BANK CUBIC YARDS USING 2017 LIDAR TOPOGRAPHY, EXCAVATION DEPTHS SHOWN IN THE STRUCTURE SCHEDULE, AND OSHA GUIDANCE FOR 1.5:1 SIDE SLOPES.

N:\PROJECTS\KEYS ROAD\COUNTY\KEYS ROAD\DESIGN\CAD\DWGS - CURRENT\PROPOSED - CONDITIONS.DWG: Miranda, 3/16/2020, 3:59:10 PM



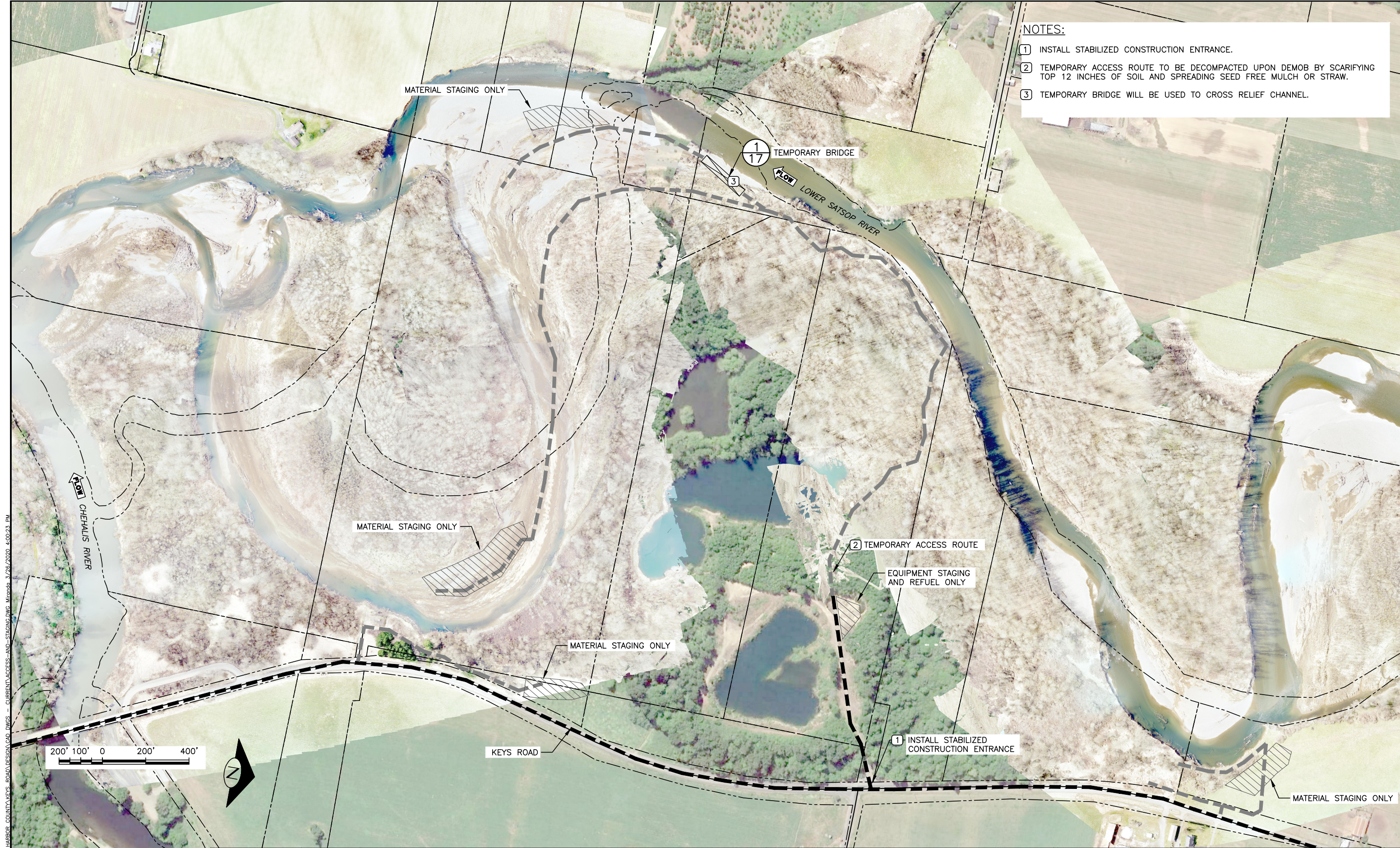
NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	RLE, MS	LATITUDE	46°58'55.71"N
CHECKED	RLE	LONGITUDE	123°28'56.2"W
DRAWN	MS, GM	TN/SC/RG	T17N/S6/R6W
CHECKED	RLE	DATE	2/14/2019

KEYS ROAD FLOOD
PROTECTION

SETBACK REVETMENT ELJ
SCHEDULE

6
SHEET 6 OF 17

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION



- NOTES:
- 1 INSTALL STABILIZED CONSTRUCTION ENTRANCE.
 - 2 TEMPORARY ACCESS ROUTE TO BE DECOMPACTED UPON DEMOB BY SCARIFYING TOP 12 INCHES OF SOIL AND SPREADING SEED FREE MULCH OR STRAW.
 - 3 TEMPORARY BRIDGE WILL BE USED TO CROSS RELIEF CHANNEL.

N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN CAD DWGS - CURRENT ACCESS AND STAGING.DWG Miranda 3/26/2020 4:00:23 PM

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION

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



NAME OR INITIALS AND DATE	
DESIGNED	RLE, MS
CHECKED	RLE
DRAWN	MS, GM
CHECKED	RLE

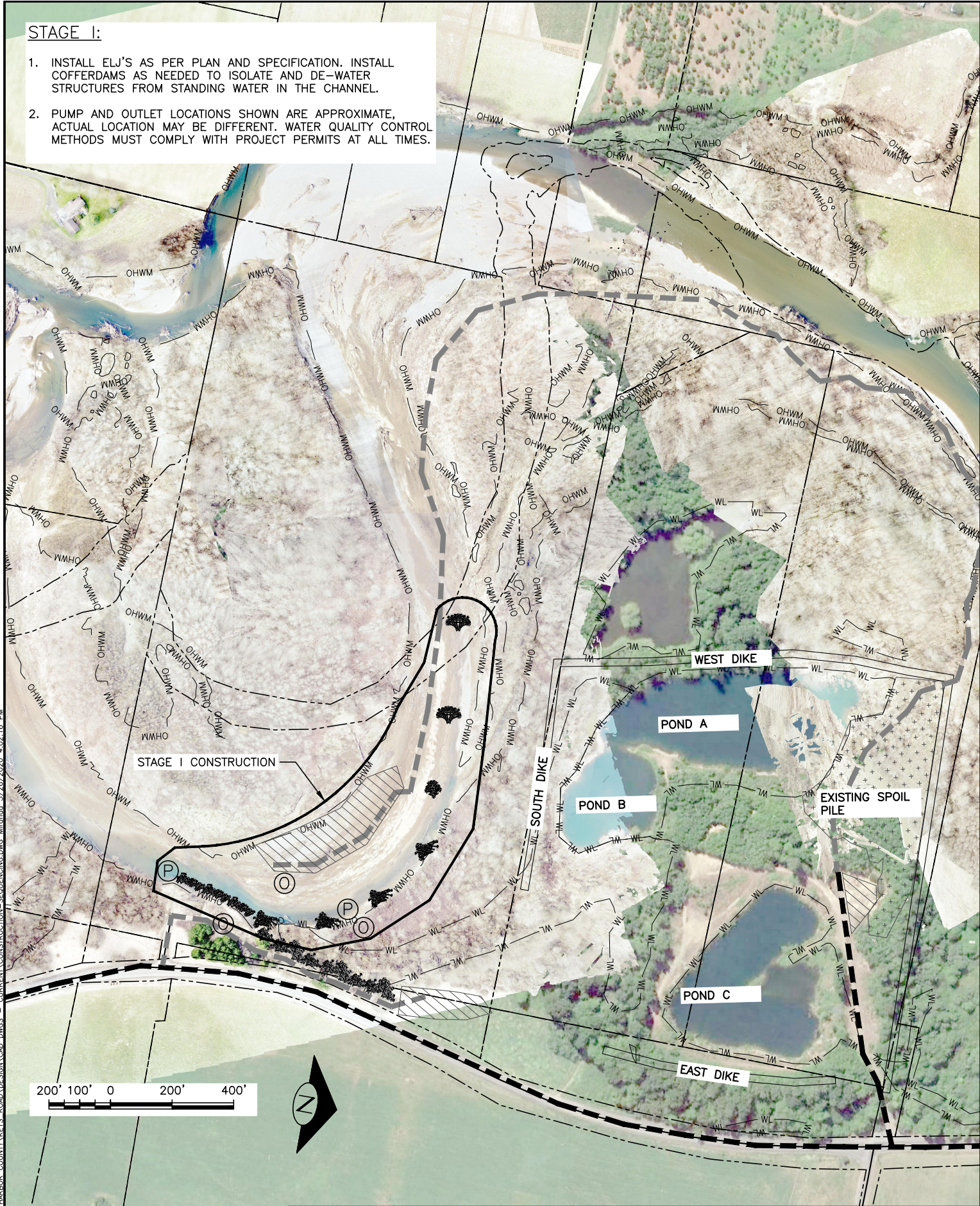
GEOGRAPHIC INFORMATION	
LATITUDE	46°58'55.71"N
LONGITUDE	123°28'56.2"W
TN/SC/RG	T17N/S6/R6W
DATE	2/14/2019

KEYS ROAD FLOOD
PROTECTION

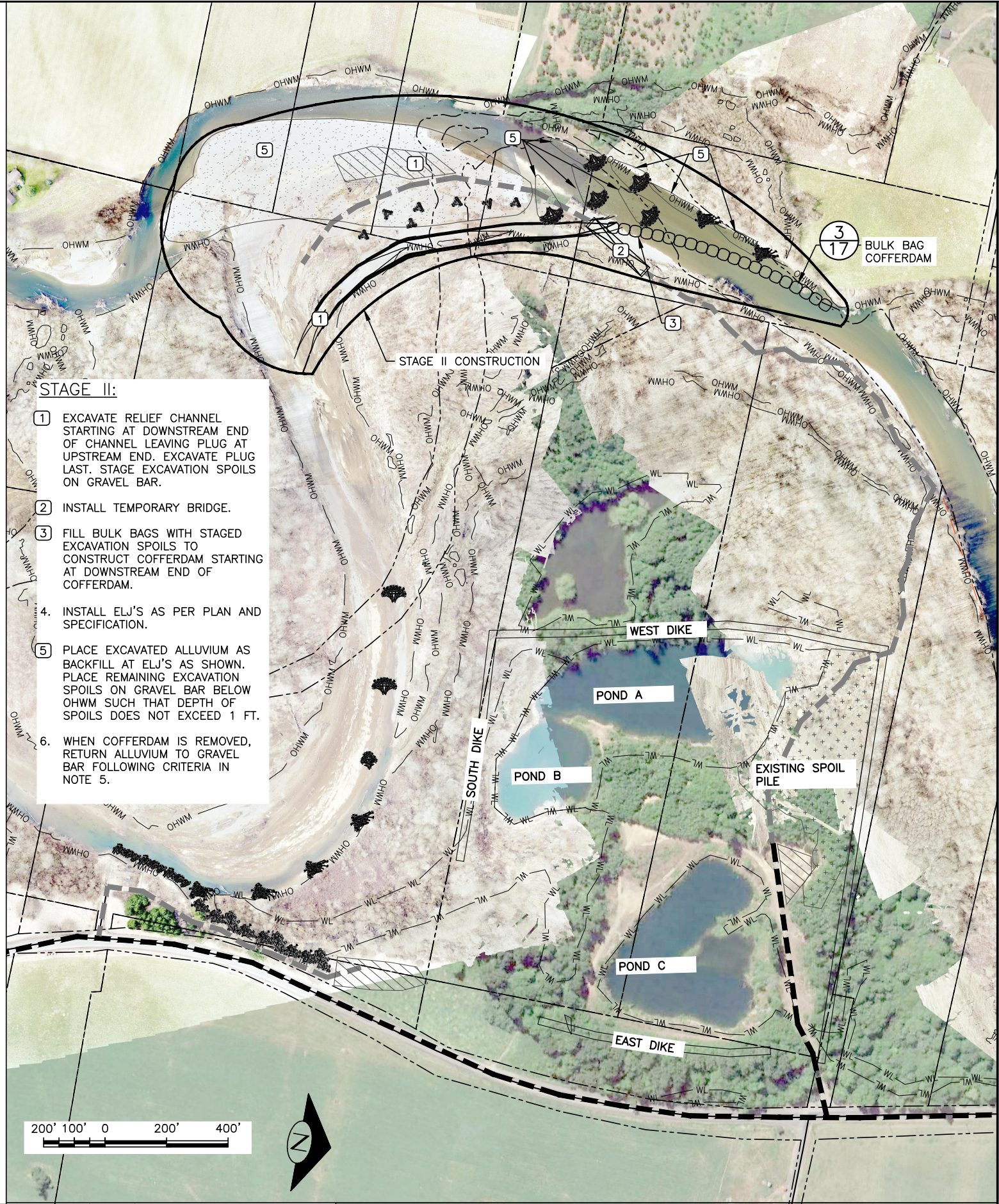
ACCESS AND STAGING

7
SHEET 7 OF 17

- STAGE I:
1. INSTALL ELJ'S AS PER PLAN AND SPECIFICATION. INSTALL COFFERDAMS AS NEEDED TO ISOLATE AND DE-WATER STRUCTURES FROM STANDING WATER IN THE CHANNEL.
 2. PUMP AND OUTLET LOCATIONS SHOWN ARE APPROXIMATE, ACTUAL LOCATION MAY BE DIFFERENT. WATER QUALITY CONTROL METHODS MUST COMPLY WITH PROJECT PERMITS AT ALL TIMES.



- STAGE II:
- 1 EXCAVATE RELIEF CHANNEL STARTING AT DOWNSTREAM END OF CHANNEL LEAVING PLUG AT UPSTREAM END. EXCAVATE PLUG LAST. STAGE EXCAVATION SPOILS ON GRAVEL BAR.
 - 2 INSTALL TEMPORARY BRIDGE.
 - 3 FILL BULK BAGS WITH STAGED EXCAVATION SPOILS TO CONSTRUCT COFFERDAM STARTING AT DOWNSTREAM END OF COFFERDAM.
 4. INSTALL ELJ'S AS PER PLAN AND SPECIFICATION.
 - 5 PLACE EXCAVATED ALLUVIUM AS BACKFILL AT ELJ'S AS SHOWN. PLACE REMAINING EXCAVATION SPOILS ON GRAVEL BAR BELOW OHWM SUCH THAT DEPTH OF SPOILS DOES NOT EXCEED 1 FT.
 6. WHEN COFFERDAM IS REMOVED, RETURN ALLUVIUM TO GRAVEL BAR FOLLOWING CRITERIA IN NOTE 5.



N:\PROJECTS\KEYS ROAD DESIGN\KEYS ROAD DESIGN.CAD.DWG - CURRENT CONSTRUCTION SEQUENCING.DWG, Miracosta, 3/28/2020, 4:02:16 PM

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



NAME OR INITIALS AND DATE	
DESIGNED	RLE, MS
CHECKED	RLE
DRAWN	MS, GM
CHECKED	RLE

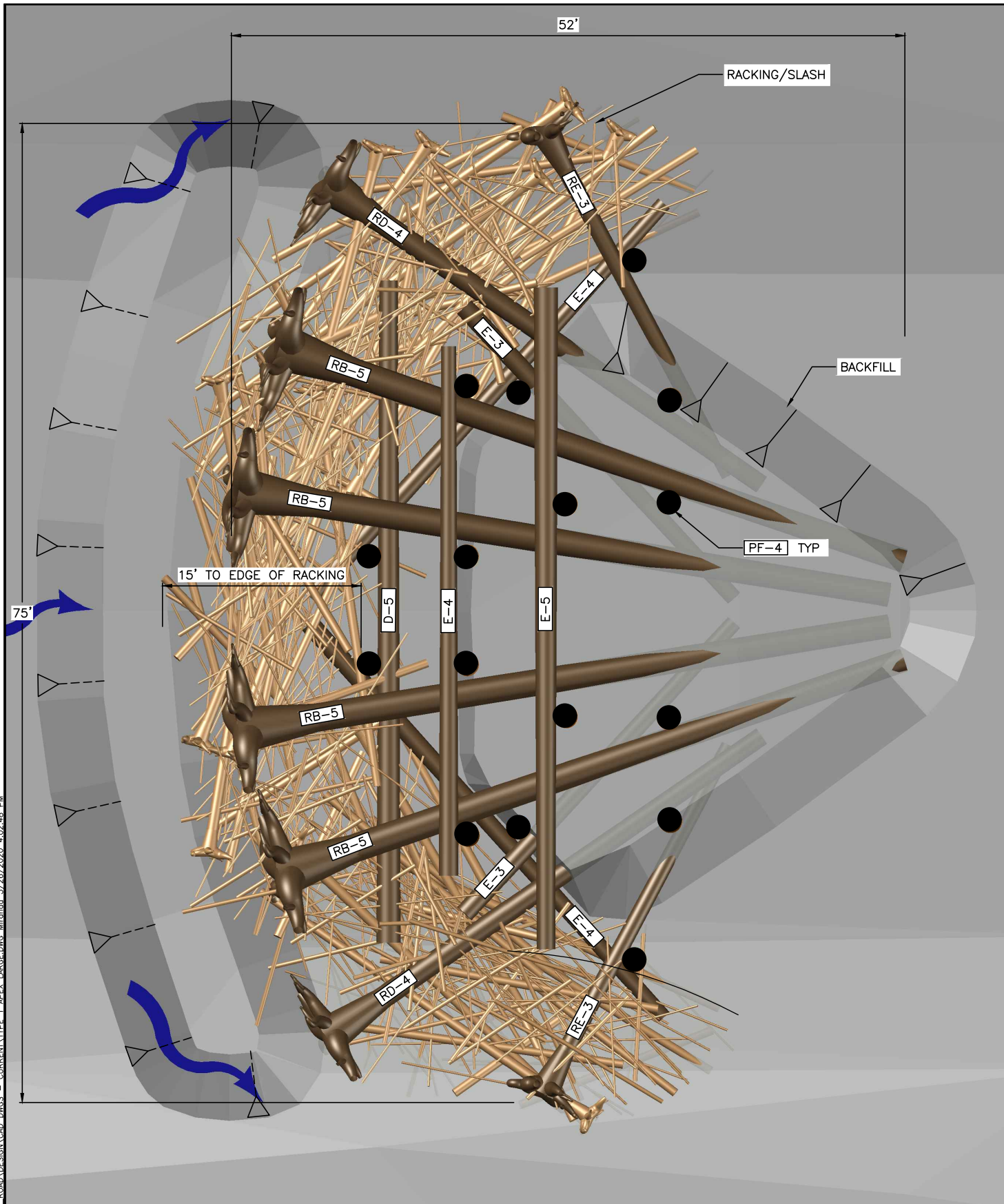
GEOGRAPHIC INFORMATION	
LATITUDE	46°58'55.71"N
LONGITUDE	123°28'56.2"W
TN/SC/RG	T17N/S6/R6W
DATE	2/14/2019

KEYS ROAD FLOOD PROTECTION

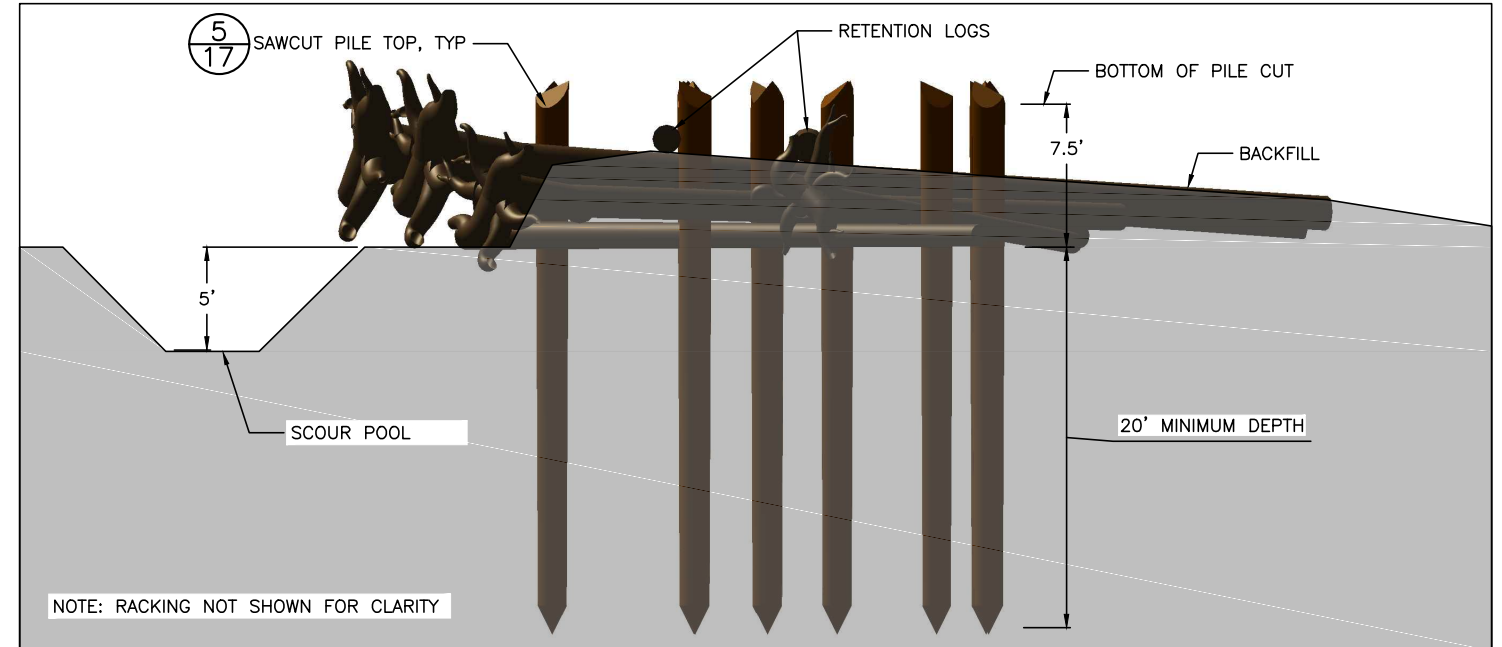
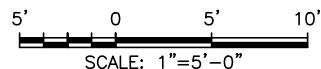
CONSTRUCTION SEQUENCING AND TESC

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION

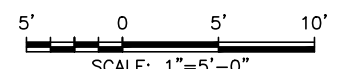
N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD DWGS - CURRENT\TYPE 1_APEX_LARGE.DWG, Miranda, 3/26/2020, 4:02:48 PM



TYPE 1 APEX ELJ PLAN
SCALE: 1" = 5'



TYPE 1 APEX ELJ PROFILE
SCALE: 1" = 5'



NOTES:

- ALL LOGS SHALL BE DOUGLAS FIR, OR WESTERN RED CEDAR.
- ALL PILES SHALL BE ROUND, UNTREATED TIMBER PILES AND SHALL BE DOUGLAS FIR. PILES SHALL BE FREE FROM DEFECTS, CRACKS, AND SPLITTING AT THE TIME OF DRIVING.
- LOGS WITH ROOTWADS SHALL HAVE A DIAMETER AS SHOWN MEASURED AT DBH, DEFINED AS 4.5 FEET ABOVE GROUND WHEN TREE WAS STANDING.
- THE CONTRACTOR SHALL PLACE LOGS AS ILLUSTRATED ON THIS SHEET UNLESS DIRECTED OTHERWISE BY THE CONTRACTING OFFICER.
- SOIL EXCAVATED DURING CONSTRUCTION SHALL BE REPLACED TO ORIGINAL GROUND FOLLOWING PLACEMENT OF ALL LOGS.
- THE LOCATIONS SHOWN IN THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- RACKING LOGS SHALL CONSIST OF TREES WITH BRANCHES HAVING A BASE DIAMETER OF 6-12 INCHES AND A LENGTH OF 20-40 FT. RACKING MATERIAL SHALL OCCUR WITH EACH LAYER TO ENSURE THAT RACKING MATERIAL EXTENDS THROUGH THE STRUCTURE AND IS PINNED BY SUBSEQUENT LAYERS. SLASH MATERIAL SHALL CONSIST OF LIMBS AND BRANCHES AND A BASE DIAMETER BETWEEN 1 AND 3 INCHES. SLASH MATERIAL SHALL BE PLACED AS DIRECTED BY THE CONTRACTING OFFICER. QUANTITY OF RACKING LOGS AND SLASH MATERIAL PER STRUCTURE ARE SHOWN IN LOG SCHEDULE. RACKING AND SLASH MATERIAL SHALL BE DOUGLAS FIR, PONDEROSA PINE, WESTERN RED CEDAR, OR WESTERN LARCH TREES.
- RETENTION LOGS TO BE INSTALLED TO HOLD RACKING MATERIAL IN PLACE AT THE DIRECTION OF THE CONTRACTING OFFICER.
- CONNECT LOGS WITH WRAPPED CHAIN CONNECTION WHERE INDICATED ON THE DRAWINGS. SEE DETAILS.
- AT LOCATIONS WHERE SITE CONDITIONS ALLOW (IN DRY OR LIMITED DEWATERING), SCOUR POOL TO BE EXCAVATED. EXCAVATED ALLUVIUM TO BE PLACED BEHIND THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER. EXTENTS AND LOCATION OF THE SCOUR POOL IS APPROXIMATE AND TO BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- EXISTING WOODY MATERIAL AT THE STRUCTURE CONSTRUCTION SITE SHALL BE MOVED OR PROTECTED FROM CONSTRUCTION ACTIVITIES AND THEN INCORPORATED INTO THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER.

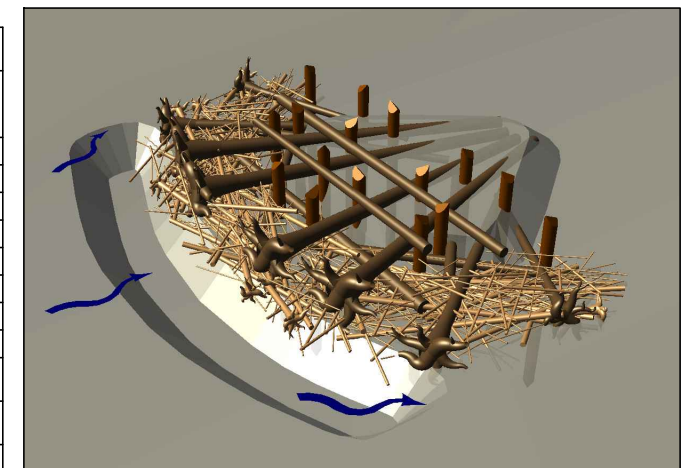
TYPE 1 APEX ELJ LOG SCHEDULE

LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
RB-5	20-24	50	Y	4	
RD-4	18-20	40	Y	2	
RE-3	14-18	30	Y	2	
D-5	18-20	50	N	1	
E-3	15-18	30	N	2	
E-4	15-18	40	N	3	
E-5	15-18	50	N	1	
PF-4 ***	16	40	N	16	
RACKING	6-12	20-40	N	150	TREES WITH BRANCHES
SLASH	1-3			50 CY	LIMBS AND BRANCHES

* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)

** TOTAL LENGTH INCLUDING ROOTWAD

*** TURNED PILES - DIA (IN) IS BUTT DIAMETER



TYPE 1 APEX ELJ PERSPECTIVE
NOT TO SCALE

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



NAME OR INITIALS AND DATE
DESIGNED RLE, MS
CHECKED RLE
DRAWN MS, GM
CHECKED RLE

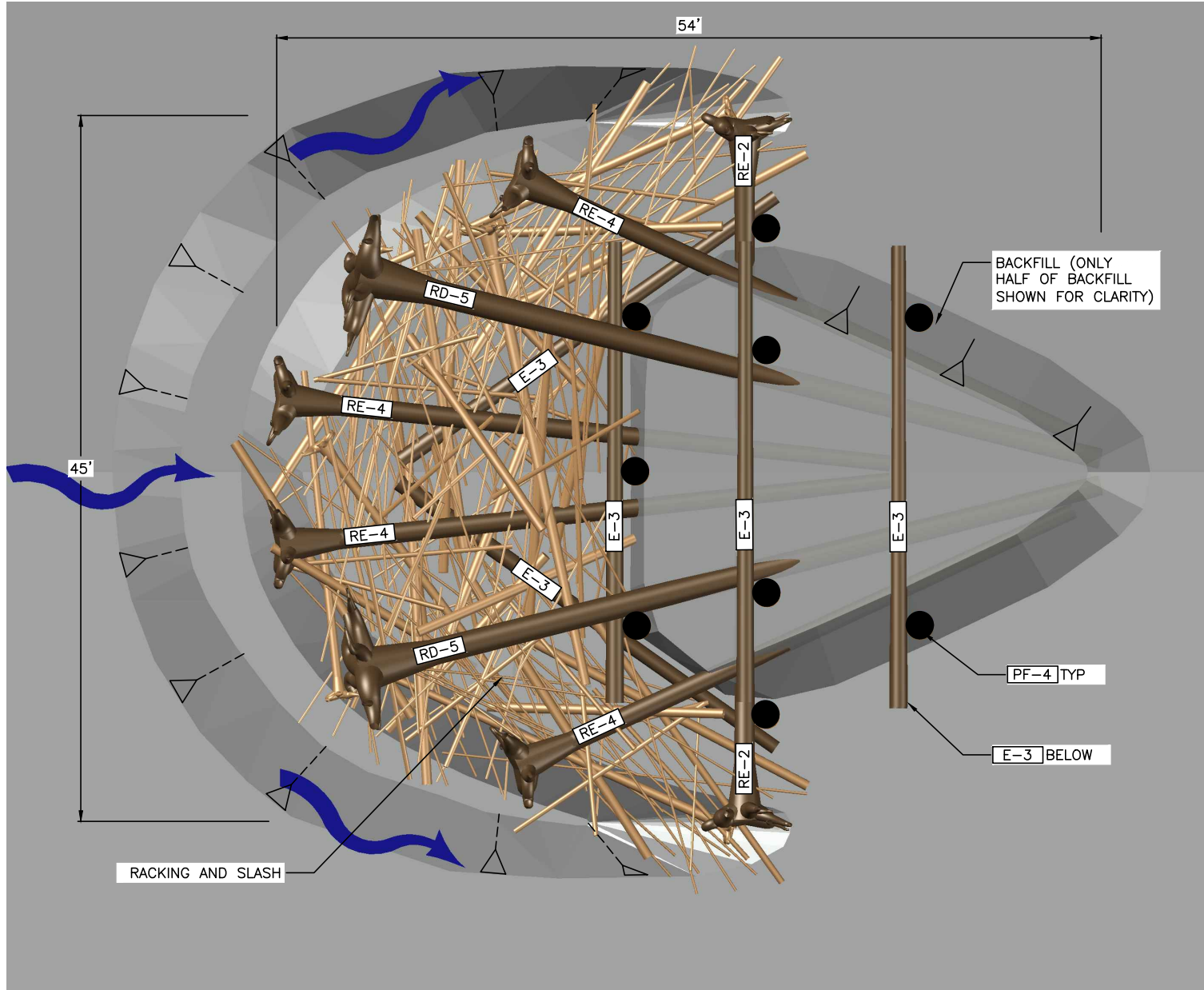
GEOGRAPHIC INFORMATION
LATITUDE 46°58'55.71"N
LONGITUDE 123°28'56.2"W
TN/SC/RG T17N/S6/R6W
DATE 2/14/2019

KEYS ROAD FLOOD PROTECTION

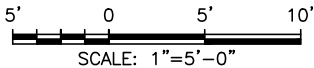
TYPE 1 APEX ELJ DETAILS

9
SHEET 9 OF 17

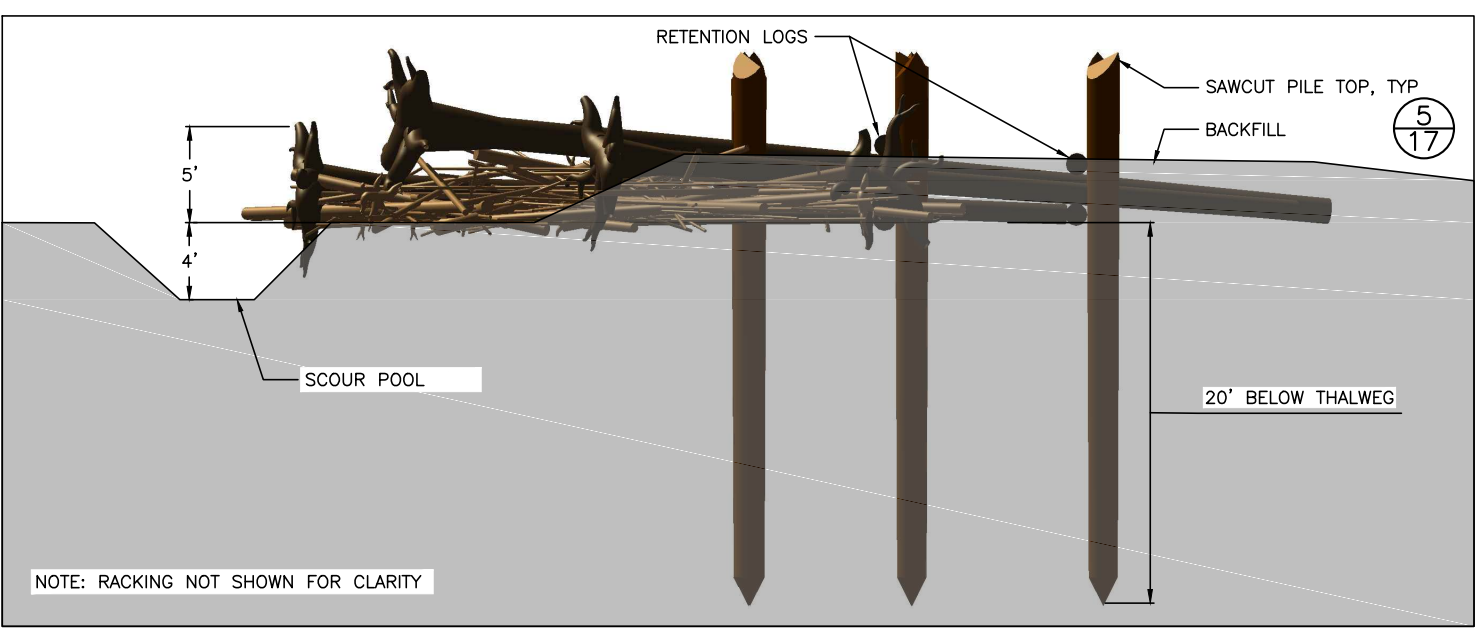
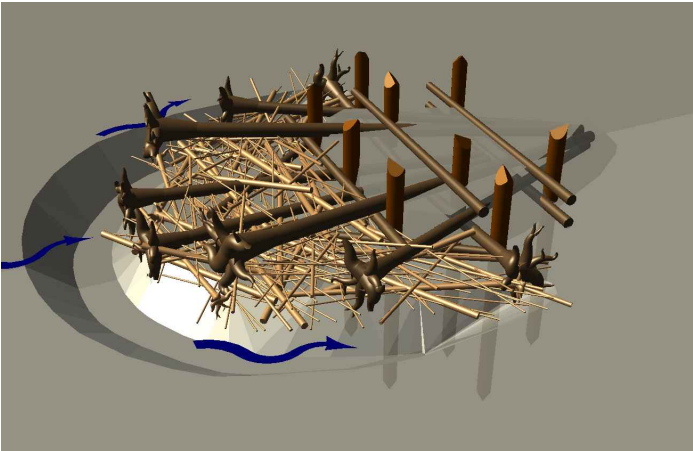
Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION



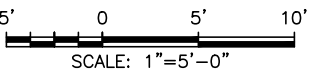
TYPE 2 APEX ELJ PLAN
SCALE: 1" = 5'



TYPE 2 APEX ELJ PERSPECTIVE
NOT TO SCALE



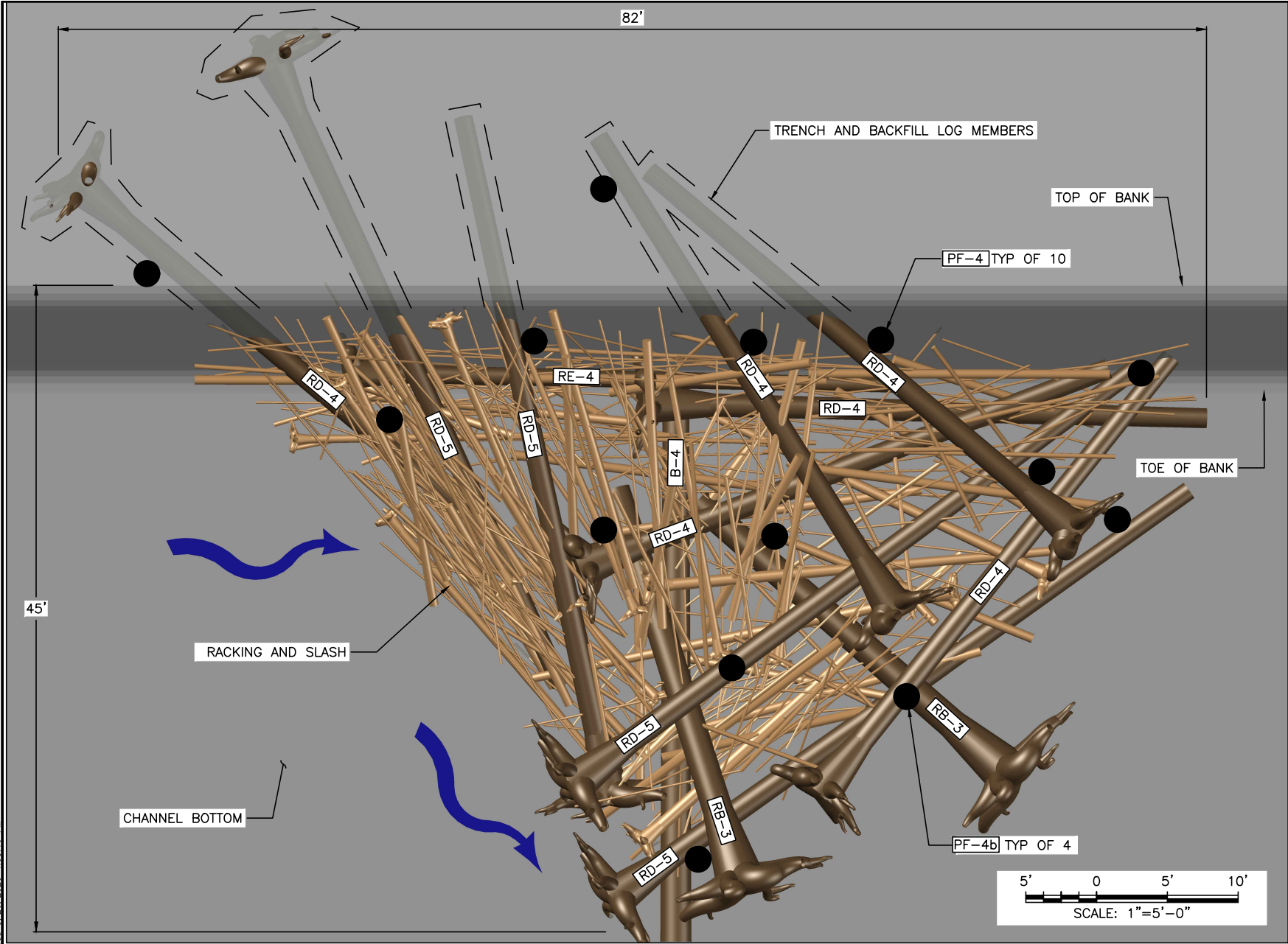
TYPE 2 APEX ELJ PROFILE
SCALE: 1" = 5'



NOTES:

- ALL LOGS SHALL BE DOUGLAS FIR OR WESTERN RED CEDAR.
- ALL PILES SHALL BE ROUND, UNTREATED TIMBER PILES AND SHALL BE DOUGLAS FIR. PILES SHALL BE FREE FROM DEFECTS, CRACKS, AND SPLITTING AT THE TIME OF DRIVING.
- LOGS WITH ROOTWADS SHALL HAVE A DIAMETER AS SHOWN MEASURED AT DBH, DEFINED AS 4.5 FEET ABOVE GROUND WHEN TREE WAS STANDING.
- THE CONTRACTOR SHALL PLACE LOGS AS ILLUSTRATED ON THIS SHEET UNLESS DIRECTED OTHERWISE BY THE CONTRACTING OFFICER.
- SOIL EXCAVATED DURING CONSTRUCTION SHALL BE REPLACED TO ORIGINAL GROUND FOLLOWING PLACEMENT OF ALL LOGS.
- THE LOCATIONS SHOWN IN THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- THE LOCATION SHOWN ON THE SHEET IS APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- RACKING LOGS SHALL CONSIST OF TREES WITH BRANCHES HAVING A BASE DIAMETER OF 6-12 INCHES AND A LENGTH OF 20-40 FT. RACKING MATERIAL SHALL OCCUR WITH EACH LAYER TO ENSURE THAT RACKING MATERIAL EXTENDS THROUGH THE STRUCTURE AND IS PINNED BY SUBSEQUENT LAYERS. SLASH MATERIAL SHALL CONSIST OF LIMBS AND BRANCHES AND A BASE DIAMETER BETWEEN 1 AND 3 INCHES. SLASH MATERIAL SHALL BE PLACED AS DIRECTED BY THE CONTRACTING OFFICER. QUANTITY OF RACKING LOGS AND SLASH MATERIAL PER STRUCTURE ARE SHOWN IN LOG SCHEDULE. RACKING AND SLASH MATERIAL SHALL BE DOUGLAS FIR, PONDEROSA PINE, WESTERN RED CEDAR, OR WESTERN LARCH TREES.
- RETENTION LOGS TO BE INSTALLED TO HOLD RACKING MATERIAL IN PLACE AT THE DIRECTION OF THE CONTRACTING OFFICER.
- CONNECT LOGS WITH WRAPPED CHAIN CONNECTION WHERE INDICATED ON THE DRAWINGS. SEE DETAILS.
- AT LOCATIONS WHERE SITE CONDITIONS ALLOW (IN DRY OR LIMITED DEWATERING), SCOUR POOL TO BE EXCAVATED. EXCAVATED ALLUVIUM TO BE PLACED BEHIND THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER. EXTENTS AND LOCATION OF THE SCOUR POOL IS APPROXIMATE AND TO BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- EXISTING WOODY MATERIAL AT THE STRUCTURE CONSTRUCTION SITE SHALL BE MOVED OR PROTECTED FROM CONSTRUCTION ACTIVITIES AND THEN INCORPORATED INTO THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER.

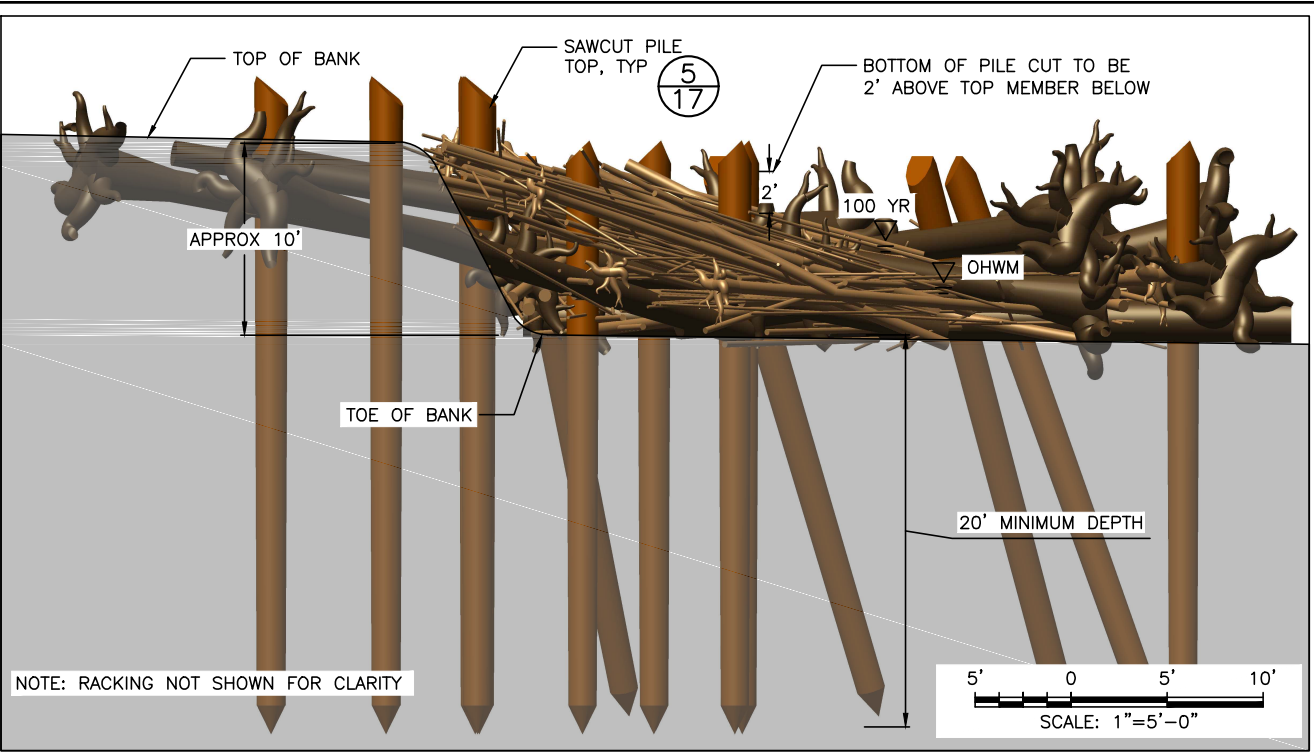
TYPE 2 APEX ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
RD-5	18-22	50	Y	2	
RE-4	14-18	40	Y	4	
RE-2	14-18	20	Y	2	
E-3	15-18	30	N	6	
PF-4 ***	16	40	N	9	
RACKING	6-12	20-40	N	100	TREES WITH BRANCHES
SLASH	1-3	-	-	30 CY	LIMBS AND BRANCHES
* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)					
** TOTAL LENGTH INCLUDING ROOTWAD					
*** TURNED PILES - DIA (IN) IS BUTT DIAMETER					



TYPE 1 DEFLECTOR ELJ PLAN
SCALE: 1" = 5'

TYPE 1 DEFLECTOR ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
RB-3	22-26	30	Y	2	
RD-5	18-22	50	Y	4	
RD-4	18-22	40	Y	6	
RE-4	14-18	40	Y	1	
B-4	22-26	40	N	1	
PF-4 ***	16	40	N	10	
PF-4b ***	16	40	N	4	INSTALL PILE AT 15 TO 20 DEGREES FROM VERTICAL
RACKING	6-12	20-40	N	120	TREES WITH BRANCHES
SLASH	1-3	-	-	40 CY	LIMBS AND BRANCHES

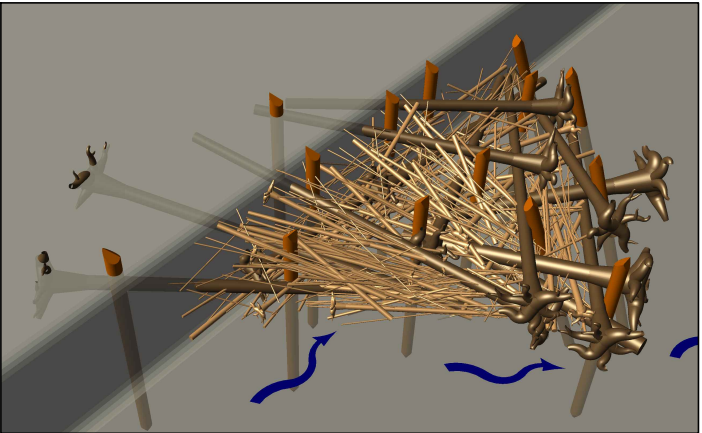
* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)
** TOTAL LENGTH INCLUDING ROOTWAD
*** TURNED PILES - DIA (IN) IS BUTT DIAMETER



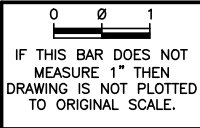
TYPE 1 DEFLECTOR ELJ PROFILE
SCALE: 1" = 5'

NOTES:

- ALL LOGS SHALL BE DOUGLAS FIR OR WESTERN RED CEDAR.
- ALL PILES SHALL BE ROUND, UNTREATED TIMBER PILES AND SHALL BE DOUGLAS FIR. PILES SHALL BE FREE FROM DEFECTS, CRACKS, AND SPLITTING AT THE TIME OF DRIVING.
- LOGS WITH ROOTWADS SHALL HAVE A DIAMETER AS SHOWN MEASURED AT DBH, DEFINED AS 4.5 FEET ABOVE GROUND WHEN TREE WAS STANDING.
- THE CONTRACTOR SHALL PLACE LOGS AS ILLUSTRATED ON THIS SHEET UNLESS DIRECTED OTHERWISE BY THE CONTRACTING OFFICER.
- SOIL EXCAVATED DURING CONSTRUCTION SHALL BE REPLACED TO ORIGINAL GROUND FOLLOWING PLACEMENT OF ALL LOGS.
- THE LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- RACKING LOGS SHALL CONSIST OF TREES WITH BRANCHES HAVING A BASE DIAMETER OF 6-12 INCHES AND A LENGTH OF 20-40 FT. RACKING MATERIAL SHALL OCCUR WITH EACH LAYER TO ENSURE THAT RACKING MATERIAL EXTENDS THROUGH THE STRUCTURE AND IS PINNED BY SUBSEQUENT LAYERS. SLASH MATERIAL SHALL CONSIST OF LIMBS AND BRANCHES AND A BASE DIAMETER BETWEEN 1 AND 3 INCHES. SLASH MATERIAL SHALL BE PLACED AS DIRECTED BY THE CONTRACTING OFFICER. QUANTITY OF RACKING LOGS AND SLASH MATERIAL PER STRUCTURE ARE SHOWN IN LOG SCHEDULE. RACKING AND SLASH MATERIAL SHALL BE DOUGLAS FIR, PONDEROSA PINE, WESTERN RED CEDAR, OR WESTERN LARCH TREES.
- RETENTION LOGS TO BE INSTALLED TO HOLD RACKING MATERIAL IN PLACE AT THE DIRECTION OF THE CONTRACTING OFFICER.
- PILES TO BE DRIVEN WITH EXCAVATOR MOUNTED VIBRATORY EQUIPMENT. PILES TO BE DRIVEN IN A BATTER (NON-VERTICAL) CONFIGURATION AS DIRECTED BY THE CONTRACTING OFFICER.
- CONNECT LOGS WITH WRAPPED CHAIN CONNECTION WHERE INDICATED ON THE DRAWINGS.
- AT LOCATIONS WHERE SITE CONDITIONS ALLOW (IN DRY OR LIMITED DEWATERING), SCOUR POOL TO BE EXCAVATED. EXCAVATED ALLUVIUM TO BE PLACED BEHIND THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER. EXTENTS AND LOCATION OF THE SCOUR POOL IS APPROXIMATE AND TO BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- EXISTING WOODY MATERIAL AT THE STRUCTURE CONSTRUCTION SITE SHALL BE MOVED OR PROTECTED FROM CONSTRUCTION ACTIVITIES AND THEN INCORPORATED INTO THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER.



TYPE 1 DEFLECTOR ELJ PERSPECTIVE
NOT TO SCALE

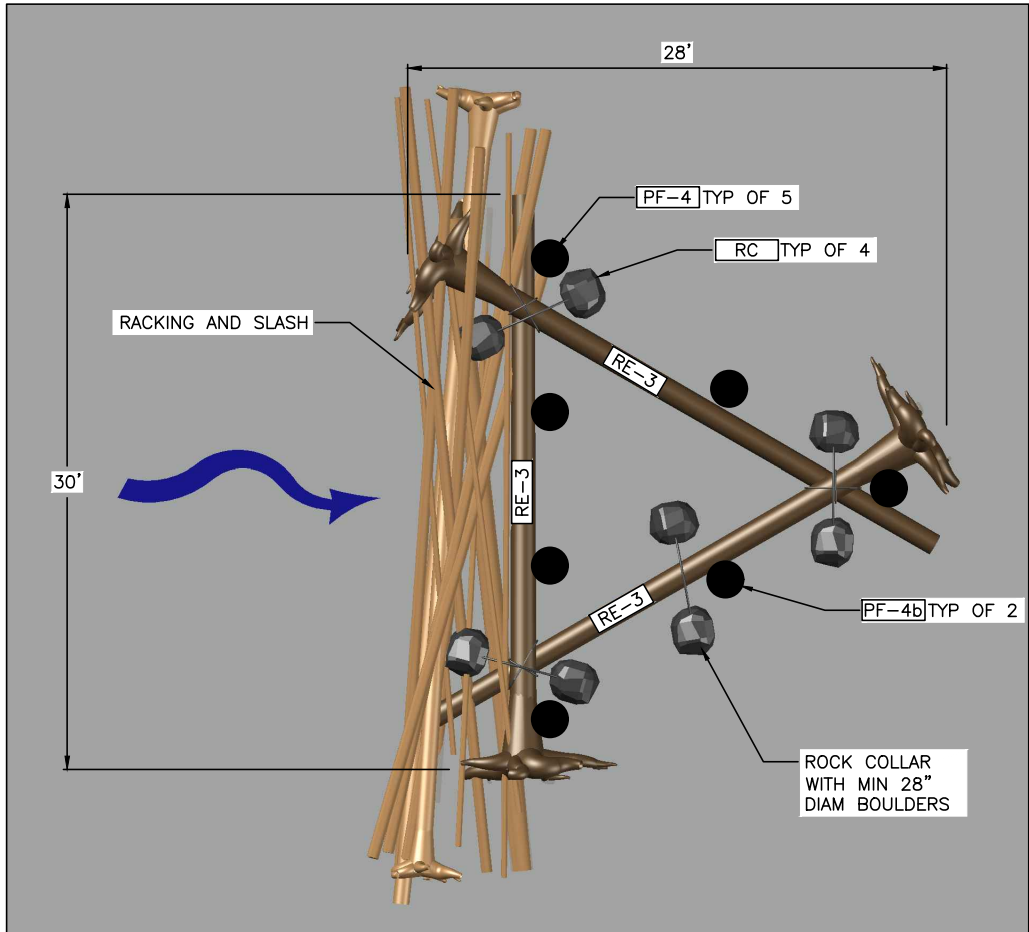


NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	RLE, MS	LATITUDE	46°58'55.71"N
CHECKED	RLE	LONGITUDE	123°28'56.2"W
DRAWN	MS, GM	TN/SC/RG	T17N/S6/R6W
CHECKED	RLE	DATE	2/14/2019

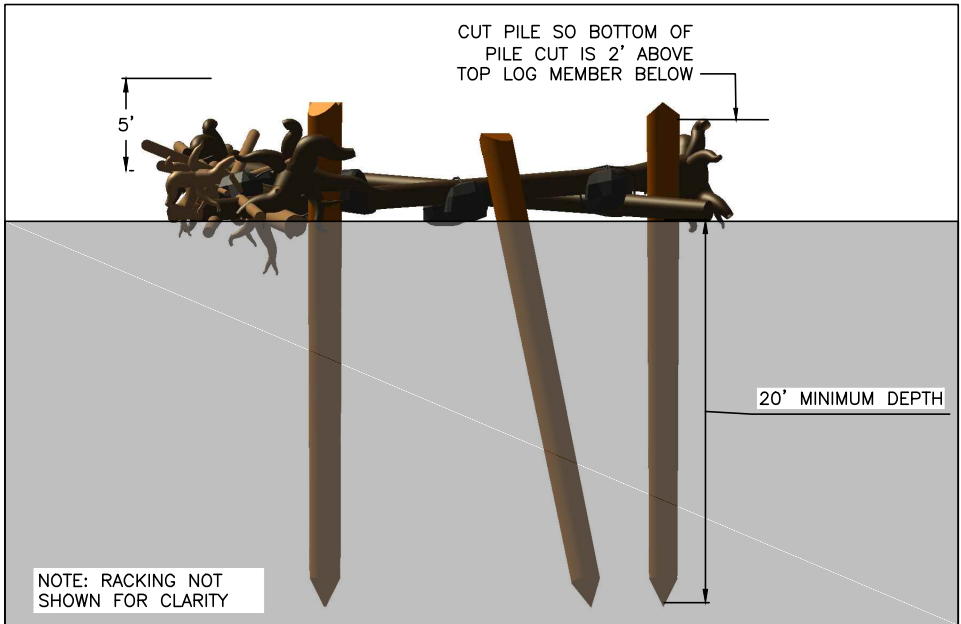
KEYS ROAD FLOOD
PROTECTION

TYPE 1 DEFLECTOR ELJ
DETAILS

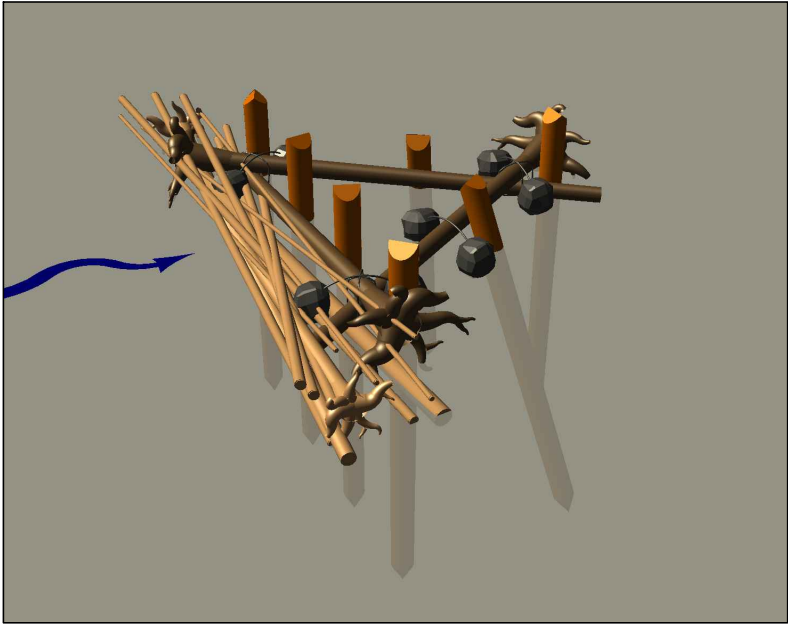
11
SHEET 11 OF 17



FLOODPLAIN ROUGHNESS PLAN
SCALE: 1" = 5'



FLOODPLAIN ROUGHNESS ELJ PROFILE
SCALE: 1" = 5'



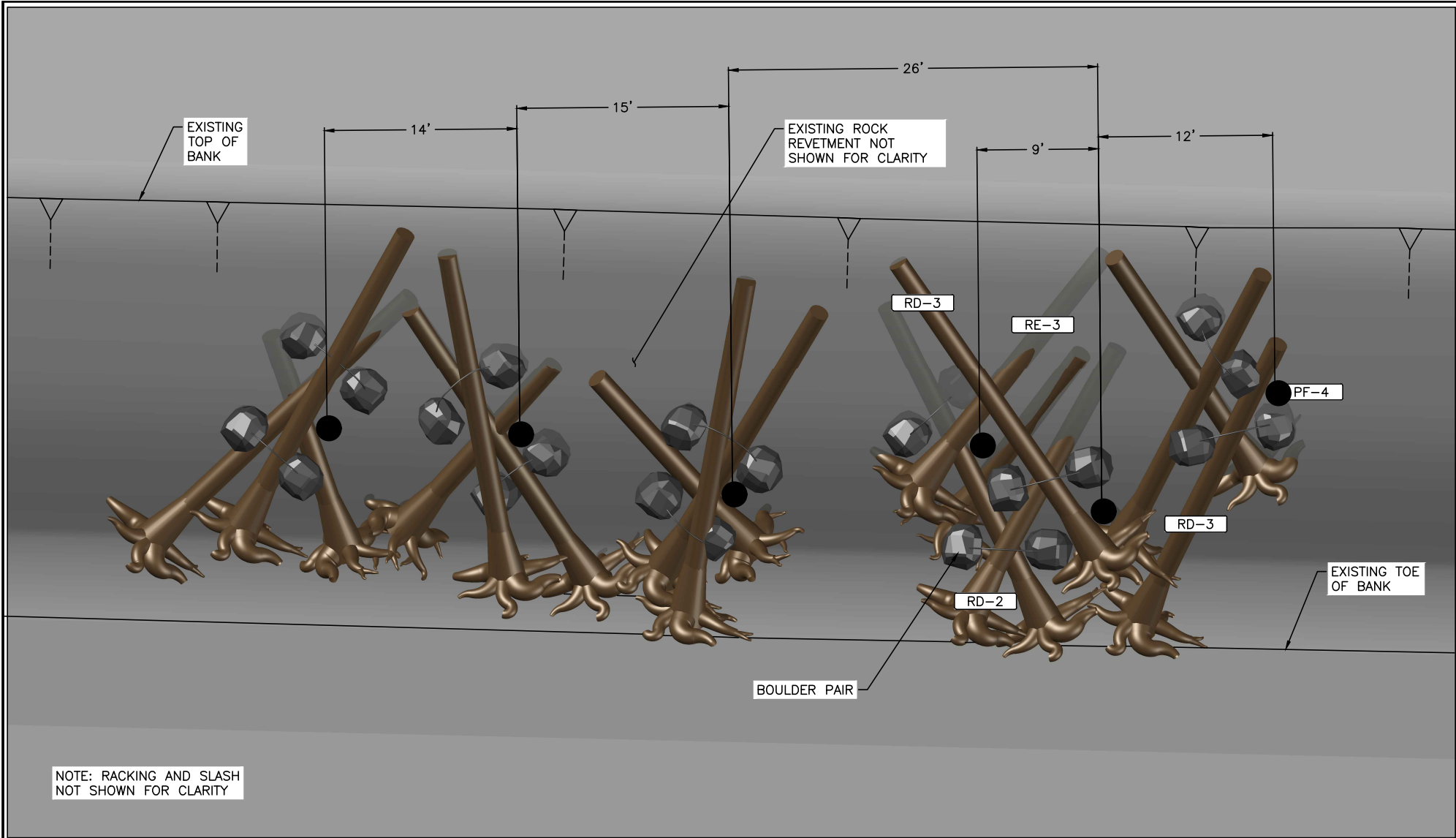
FLOODPLAIN ROUGHNESS ELJ PERSPECTIVE
NOT TO SCALE

NOTES:

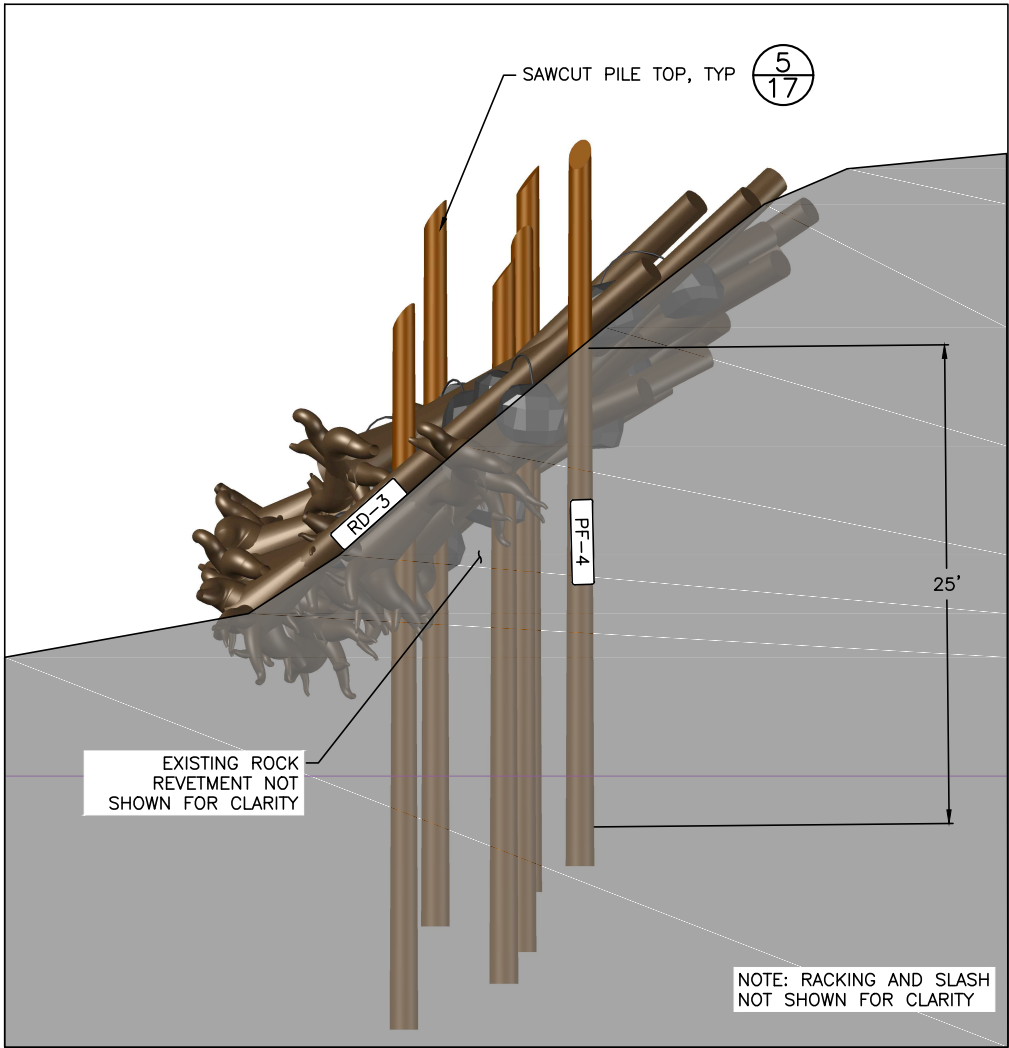
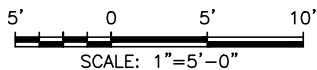
1. ALL LOGS SHALL BE DOUGLAS FIR OR WESTERN RED CEDAR.
2. ALL PILES SHALL BE ROUND, UNTREATED TIMBER PILES AND SHALL BE DOUGLAS FIR. PILES SHALL BE FREE FROM DEFECTS, CRACKS, AND SPLITTING AT THE TIME OF DRIVING.
3. LOGS WITH ROOTWADS SHALL HAVE A DIAMETER AS SHOWN MEASURED AT DBH, DEFINED AS 4.5 FEET ABOVE GROUND WHEN TREE WAS STANDING.
4. THE CONTRACTOR SHALL PLACE LOGS AS ILLUSTRATED ON THIS SHEET UNLESS DIRECTED OTHERWISE BY THE CONTRACTING OFFICER.
5. SOIL EXCAVATED DURING CONSTRUCTION SHALL BE REPLACED TO ORIGINAL GROUND FOLLOWING PLACEMENT OF ALL LOGS.
6. THE LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
7. RACKING LOGS SHALL CONSIST OF TREES WITH BRANCHES HAVING A BASE DIAMETER OF 6–12 INCHES AND A LENGTH OF 20–40 FT. RACKING MATERIAL SHALL OCCUR WITH EACH LAYER TO ENSURE THAT RACKING MATERIAL EXTENDS THROUGH THE STRUCTURE AND IS PINNED BY SUBSEQUENT LAYERS. SLASH MATERIAL SHALL CONSIST OF LIMBS AND BRANCHES AND A BASE DIAMETER BETWEEN 1 AND 3 INCHES. SLASH MATERIAL SHALL BE PLACED AS DIRECTED BY THE CONTRACTING OFFICER. QUANTITY OF RACKING LOGS AND SLASH MATERIAL PER STRUCTURE ARE SHOWN IN LOG SCHEDULE. RACKING AND SLASH MATERIAL SHALL BE DOUGLAS FIR, PONDEROSA PINE, WESTERN RED CEDAR, OR WESTERN LARCH TREES.
8. RETENTION LOGS TO BE INSTALLED TO HOLD RACKING MATERIAL IN PLACE AT THE DIRECTION OF THE CONTRACTING OFFICER.
9. PILES TO BE DRIVEN WITH EXCAVATOR MOUNTED VIBRATORY EQUIPMENT. PILES TO BE DRIVEN IN A BATTER (NON–VERTICAL) CONFIGURATION AS DIRECTED BY THE CONTRACTING OFFICER. EXISTING WOODY MATERIAL AT THE STRUCTURE CONSTRUCTION SITE SHALL BE MOVED OR PROTECTED FROM CONSTRUCTION ACTIVITIES AND THEN INCORPORATED INTO THE STRUCTURE AS DIRECTED BY THE CONTRACTING OFFICER.
10. TRIANGLE FRAME UNITS SHALL BE PINNED AT LOG INTERSECTIONS.

FLOODPLAIN ROUGHNESS ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
RF-3	14–18	30	Y	3	
PF-4 ***	16	40	N	5	
PF-4b ***	16	40	N	2	
RC	–	–	–	4	ROCK COLLAR WITH 28"DIAM BOULDERS
RACKING	6–12	20–40	Y/N	12	TREES WITH BRANCHES
SLASH	1–3	–	–	5 CY	LIMBS AND BRANCHES
* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)					
** TOTAL LENGTH INCLUDING ROOTWAD					
*** TURNED PILES – DIA (IN) IS BUTT DIAMETER					

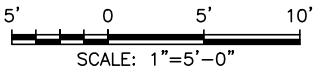
N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD DWGS - CURRENT\TIMBER COMPLEX.DWG, Miranda, 3/26/2020 4:13:47 PM



TIMBER COMPLEX UNIT PLAN
SCALE: 1"=5'



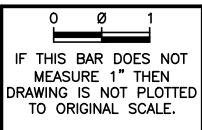
TIMBER COMPLEX PERSPECTIVE
SCALE: 1"=5'



TIMBER COMPLEX ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
RD-3	18-22	40	Y	4	
RD-2	18-22	40	Y	10	
RE-3	14-18	30	Y	3	
PF-3 ***	16	25	N	10	
RC	-	-	-	11	ROCK COLLAR WITH 28" DIAM BOULDERS
RACKING	6-12	20-40	N	160	TREES WITH BRANCHES
SLASH	N/A	N/A	N	150 CY	LIMBS AND BRANCHES
* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)					
** TOTAL LENGTH INCLUDING ROOTWAD					
*** TURNED PILES - DIA (IN) IS BUTT DIAMETER					

NOTES:

- ALL LOGS SHALL BE DOUGLAS FIR OR WESTERN RED CEDAR.
- ALL PILES SHALL BE ROUND, UNTREATED TIMBER PILES AND SHALL BE DOUGLAS FIR. PILES SHALL BE FREE FROM DEFECTS, CRACKS, AND SPLITTING AT THE TIME OF DRIVING.
- LOGS WITH ROOTWADS SHALL HAVE A DIAMETER AS SHOWN MEASURED AT DBH, DEFINED AS 4.5 FEET ABOVE GROUND WHEN TREE WAS STANDING.
- THE CONTRACTOR SHALL PLACE LOGS AS ILLUSTRATED ON THIS SHEET UNLESS DIRECTED OTHERWISE BY THE CONTRACTING OFFICER.
- SOIL EXCAVATED DURING CONSTRUCTION SHALL BE REPLACED TO ORIGINAL GROUND FOLLOWING PLACEMENT OF ALL LOGS.
- THE LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- RACKING LOGS SHALL CONSIST OF TREES WITH BRANCHES HAVING A BASE DIAMETER OF 6-12 INCHES AND A LENGTH OF 20-40 FT. RACKING MATERIAL SHALL OCCUR WITH EACH LAYER TO ENSURE THAT RACKING MATERIAL EXTENDS THROUGH THE STRUCTURE AND IS PINNED BY SUBSEQUENT LAYERS. SLASH MATERIAL SHALL CONSIST OF LIMBS AND BRANCHES AND A BASE DIAMETER BETWEEN 1 AND 3 INCHES. SLASH MATERIAL SHALL BE PLACED AS DIRECTED BY THE CONTRACTING OFFICER. QUANTITY OF RACKING LOGS AND SLASH MATERIAL PER STRUCTURE ARE SHOWN IN LOG SCHEDULE. RACKING AND SLASH MATERIAL SHALL BE DOUGLAS FIR, PONDEROSA PINE, WESTERN RED CEDAR, OR WESTERN LARCH TREES.
- RETENTION LOGS TO BE INSTALLED TO HOLD RACKING MATERIAL IN PLACE AT THE DIRECTION OF THE CONTRACTING OFFICER.
- PILES TO BE DRIVEN WITH EXCAVATOR MOUNTED VIBRATORY EQUIPMENT.
- TIMBER COMPLEX CONSTRUCTION SITE CURRENTLY HAS ROCK REVETMENT ALONG THE BANK. EXISTING ROCK MATERIAL SHALL BE MOVED SO THAT PILES MAY BE DRIVEN INTO THE BED. ROCK THAT MEETS SIZE SPECIFICATIONS SHOULD BE SALVAGED TO CONSTRUCT ROCK COLLARS.



NAME OR INITIALS AND DATE	
DESIGNED	RLE, MS
CHECKED	RLE
DRAWN	MS, GM
CHECKED	RLE

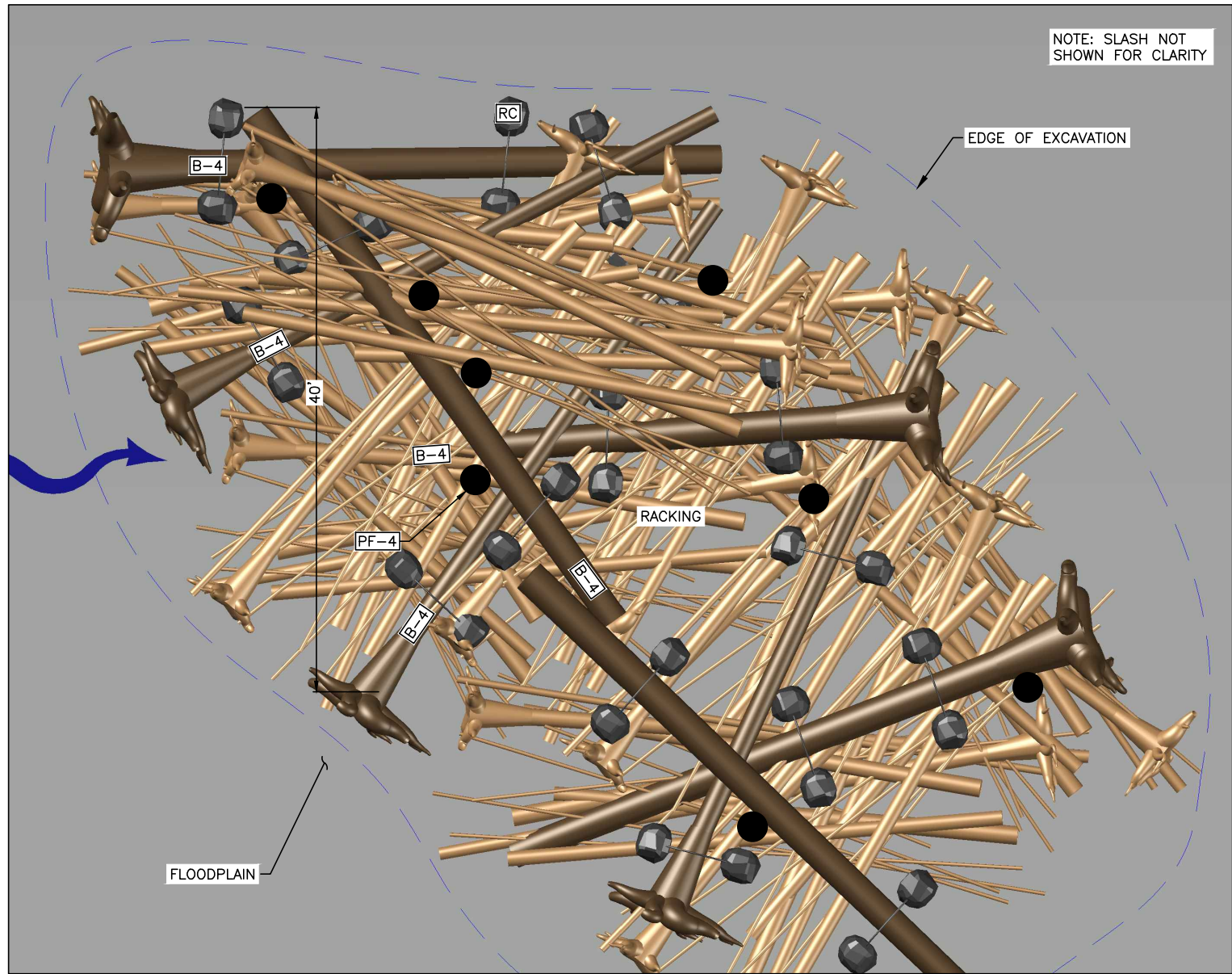
GEOGRAPHIC INFORMATION	
LATITUDE	46°58'55.71"N
LONGITUDE	123°28'56.2"W
TN/SC/RG	T17N/S6/R6W
DATE	2/14/2019

KEYS ROAD FLOOD PROTECTION

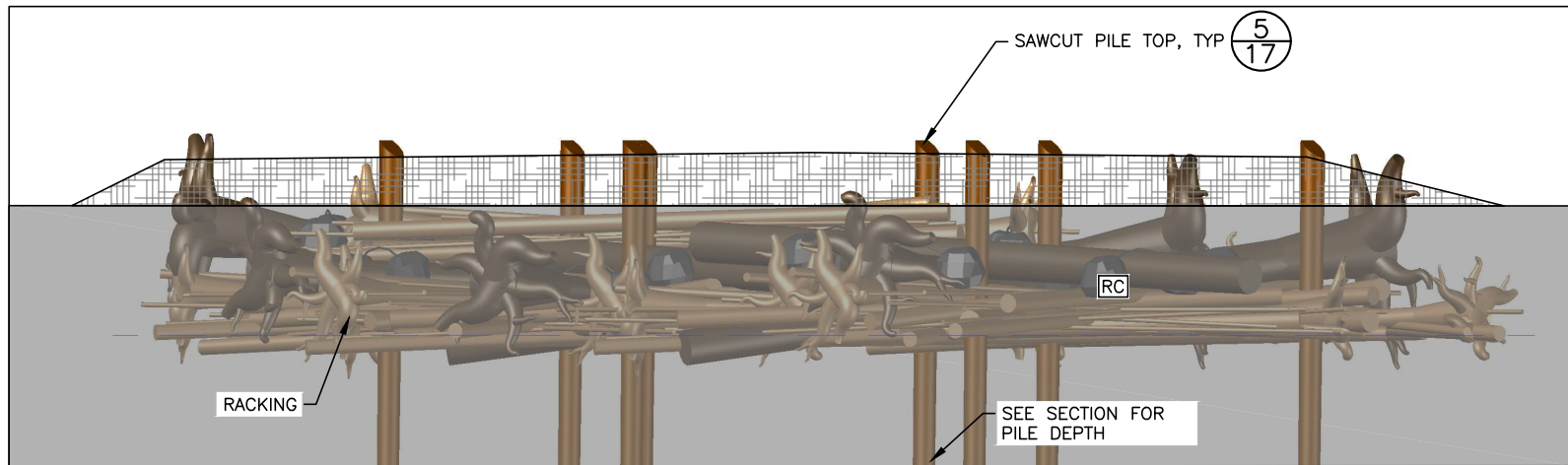
TIMBER COMPLEX

13
SHEET **13** OF **17**

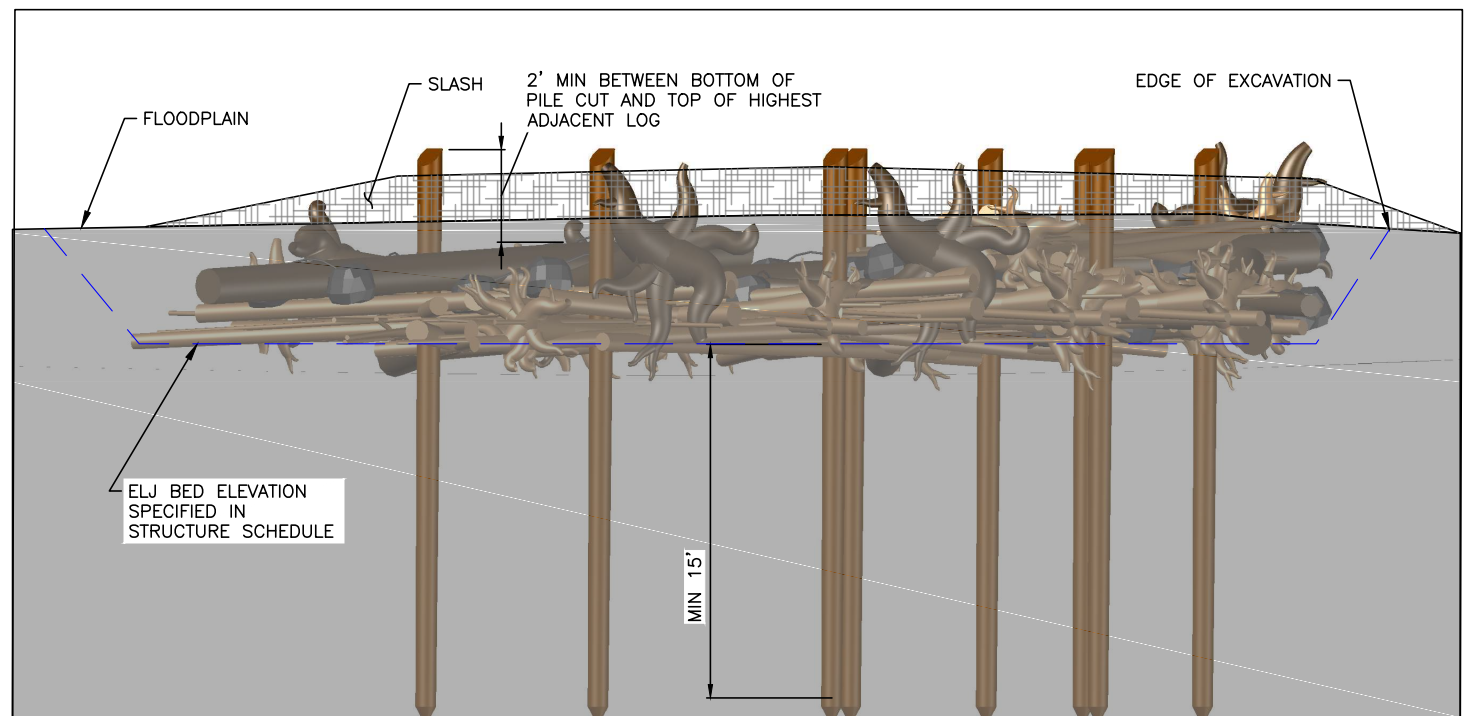
N:\PROJECTS\GRAYS HARBOR COUNTY\KEYS ROAD\DESIGN\CAD\DWGS - CURRENT\TYPE 1 SETBACK REVETMENT.DWG, Miranda, 3/26/2020, 4:14:15 PM



TYPE 1 SETBACK REVETMENT PLAN
SCALE: 1" = 5'



TYPE 1 SETBACK REVETMENT ELJ SIDE PROFILE
SCALE: 1" = 5'



TYPE 1 SETBACK REVETMENT ELJ SECTION
SCALE: NTS

NOTES:

1. EXCAVATION SPOILS SHALL BE STAGED WITHIN THE WORK AREA AND OUTSIDE FLOWING WATER. SPOILS SHALL BE STOCKPILED TO ALLOW LOG LAYER PLACEMENT AND CONSTRUCTION ACCESS.
2. BACKFILL EXTENTS VARY AND TO BE CONSTRUCTED WITH NATIVE ALLUVIUM FROM EXCAVATION SPOILS.
3. FINAL REVETMENT HEIGHT TO BE ACHIEVED AS SPECIFIED REGARDLESS OF ACTUAL LOG DIAMETERS USED OR STACKING ARRANGEMENT.
4. ALL LARGE WOOD DIMENSIONS DO NOT INCLUDE BARK THICKNESS.
5. COVER TOP OF BACKFILL AREA AND BASE OF STRUCTURES WITH LOOSE WOOD DEBRIS AND CHIPS. MIX 6 INCHES OF LOOSE WOOD INTO UPPER 2 FT ON BACKFILL
6. THE LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
6. RACKING AND SLASH PLACEMENT SHALL OCCUR ACCORDING TO LAYERING PLAN. RACKING AND SLASH QUANTITIES ARE SHOWN IN THE LOG SCHEDULE.
7. THE CONTRACTOR SHALL FIELD VERIFY WITH THE ENGINEER ALL PILE LOCATIONS, LENGTHS, WIDTHS AND ELEVATIONS PRIOR TO EXCAVATION, ASSEMBLY AND INSTALLATION OF EACH STRUCTURE.
8. LOCATIONS FOR ALL STRUCTURE PLACEMENTS WILL BE STAKED IN FIELD BY THE ENGINEER PRIOR TO START OF CONSTRUCTION AT EACH SITE.
9. EXCAVATION LIMITS SHALL BE FIELD VERIFIED BY THE ENGINEER PRIOR TO EXCAVATION COMMENCING AND PLACEMENT OF ANY LARGE WOOD.
10. WOOD PLACEMENT IN EACH REVETMENT LAYER SHALL BE FIELD VERIFIED BY ENGINEER PRIOR TO BACKFILLING.

TYPE 1 SETBACK REVETMENT ELJ LOG SCHEDULE

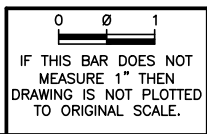
LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
B-3	22-26	30	N	5	
PC-4 ***	16	40	N	8	
RC	-	-	-	16	ROCK COLLAR WITH 36" DIAM BOULDERS
RACKING	6-12	20-40	N	160	TREES WITH BRANCHES
SLASH	N/A	N/A	N	150 CY	LIMBS AND BRANCHES

* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)

** TOTAL LENGTH INCLUDING ROOTWAD

*** TURNED PILES - DIA (IN) IS BUTT DIAMETER

TYPE 1 SETBACK REVETMENT DETAILS
SCALE: AS NOTED



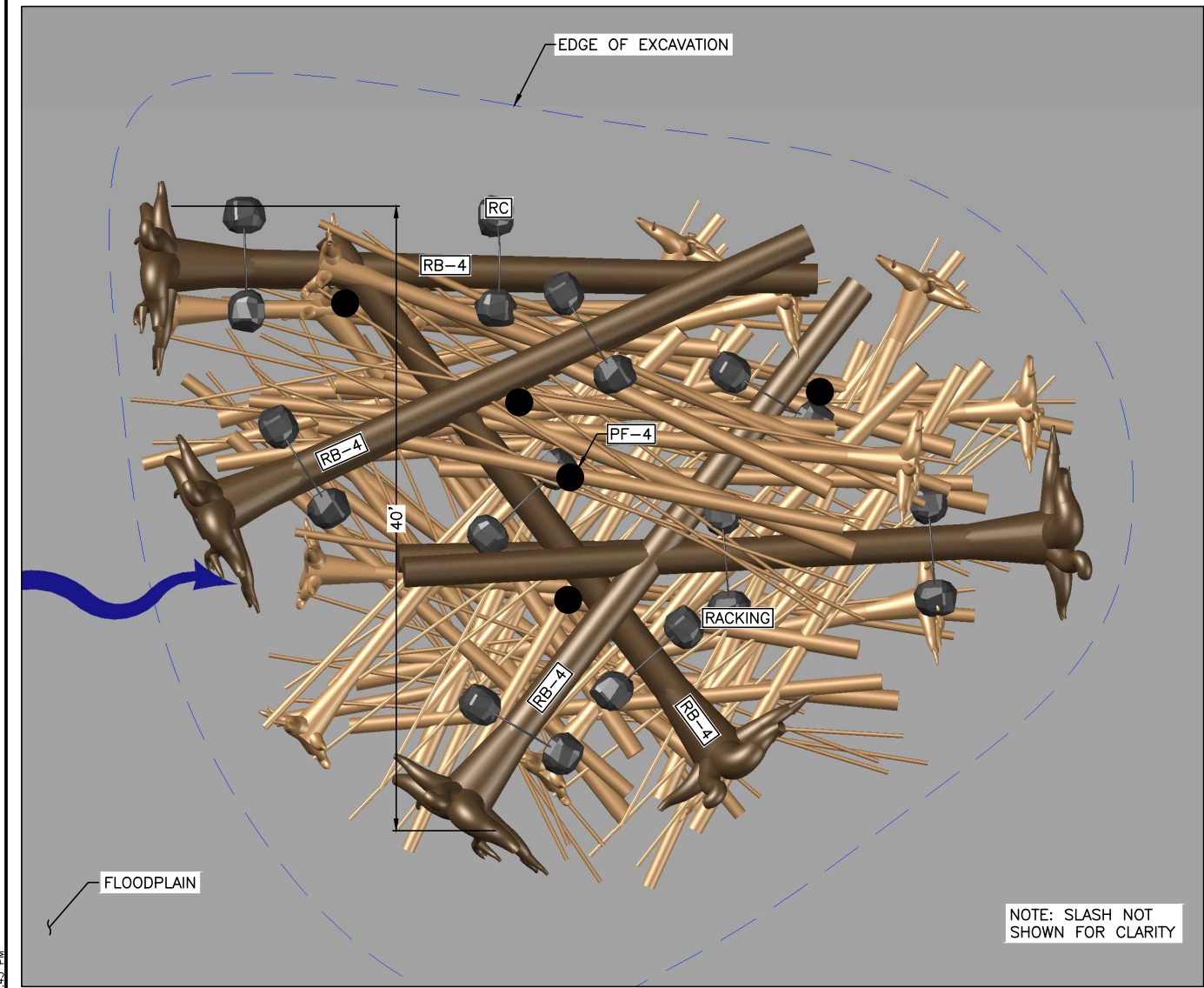
NAME OR INITIALS AND DATE	
DESIGNED	RLE, MS
CHECKED	RLE
DRAWN	MS, GM
CHECKED	RLE

GEOGRAPHIC INFORMATION	
LATITUDE	46°58'55.71"N
LONGITUDE	123°28'56.2"W
TN/SC/RG	T17N/S6/R6W
DATE	2/14/2019

KEYS ROAD FLOOD PROTECTION

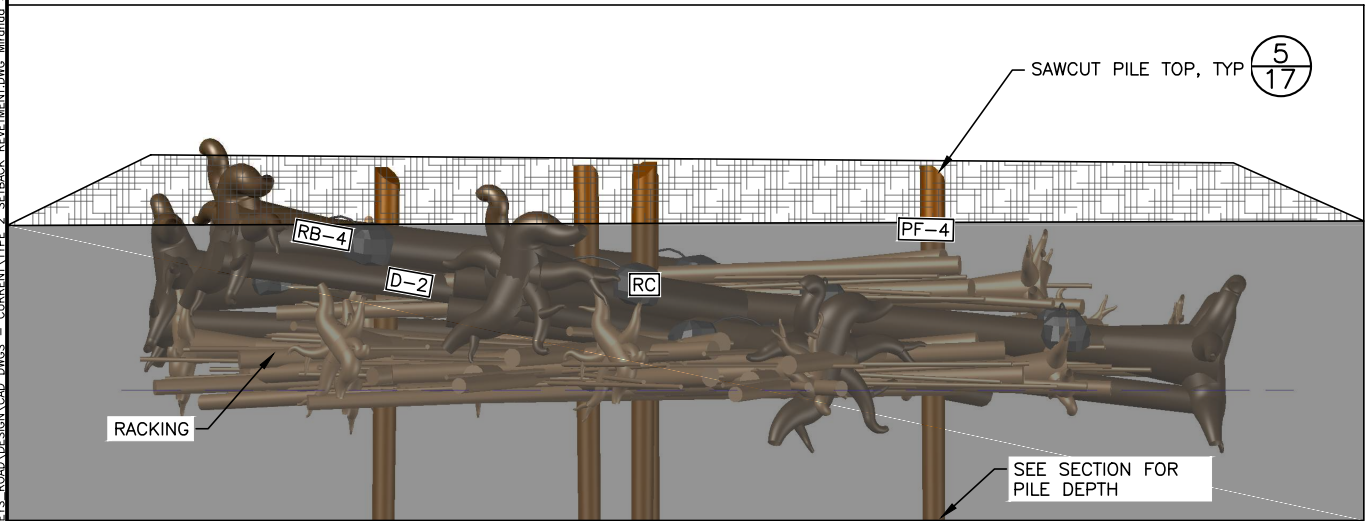
TYPE 1 SETBACK REVETMENT

N:\PROJECTS\GRAY'S HARBOR COUNTY KEYS ROAD\DESIGN CAD DWGS - CURRENT\TYPE 2 SETBACK REVETMENT.DWG, Miranda, 3/26/2020, 4:14:43 PM



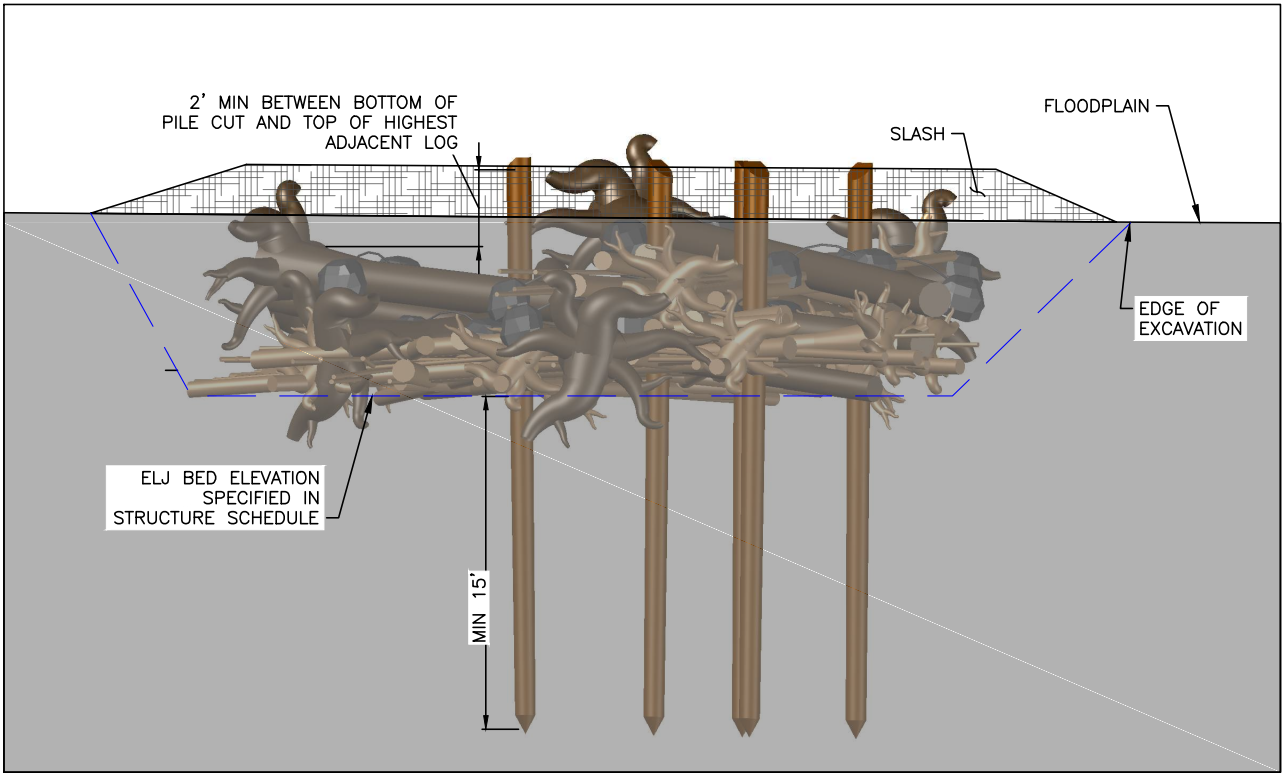
TYPE 2 SETBACK REVETMENT PLAN

SCALE: 1" = 5'



TYPE 2 SETBACK REVETMENT ELJ SIDE PROFILE

SCALE: 1" = 5'



TYPE 2 SETBACK REVETMENT ELJ SECTION

SCALE: NTS

NOTES:

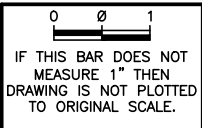
- EXCAVATION SPOILS SHALL BE STAGED WITHIN THE WORK AREA AND OUTSIDE FLOWING WATER. SPOILS SHALL BE STOCKPILED TO ALLOW LOG LAYER PLACEMENT AND CONSTRUCTION ACCESS.
- BACKFILL EXTENTS VARY AND TO BE CONSTRUCTED WITH NATIVE ALLUVIUM FROM EXCAVATION SPOILS.
- FINAL REVETMENT HEIGHT TO BE ACHIEVED AS SPECIFIED 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 WITH LOOSE WOOD DEBRIS AND CHIPS. MIX 6 INCHES OF LOOSE WOOD INTO UPPER 2 FT ON BACKFILL.
- THE LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY THE CONTRACTING OFFICER.
- RACKING AND SLASH PLACEMENT SHALL OCCUR ACCORDING TO LAYERING PLAN. RACKING AND SLASH QUANTITIES ARE SHOWN IN THE LOG SCHEDULE.
- THE CONTRACTOR SHALL FIELD VERIFY WITH THE ENGINEER ALL 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 PRIOR TO START OF CONSTRUCTION AT EACH SITE.
- EXCAVATION LIMITS SHALL BE FIELD VERIFIED BY THE ENGINEER PRIOR TO EXCAVATION COMMENCING AND PLACEMENT OF ANY LARGE WOOD.
- WOOD PLACEMENT IN EACH REVETMENT LAYER SHALL BE FIELD VERIFIED BY ENGINEER PRIOR TO BACKFILLING.

TYPE 2 SETBACK REVETMENT ELJ LOG SCHEDULE					
LOG ID	DIA* (INCHES)	LENGTH ** (FEET)	ROOTWAD (Y/N)	QUANTITY PER STRUCTURE	NOTES
[B-3]	22-26	30	N	5	
[PF-4]	16	40	N	5	
[RC]	-	-	-	10	ROCK COLLAR WITH 36" DIAM BOULDERS
RACKING	6-12	20-40	N	100	TREES WITH BRANCHES
SLASH	N/A	N/A	N	100 CY	LIMBS AND BRANCHES
* MINIMUM DIAMETER AT BREAST HEIGHT (1" PER 10' MAXIMUM TAPER)					
** TOTAL LENGTH INCLUDING ROOTWAD					
*** TURNED PILES - DIA (IN) IS BUTT DIAMETER					

TYPE 2 SETBACK REVETMENT DETAILS

SCALE: AS NOTED

1
15



NAME OR INITIALS AND DATE	
DESIGNED	RLE, MS
CHECKED	RLE
DRAWN	MS, GM
CHECKED	RLE

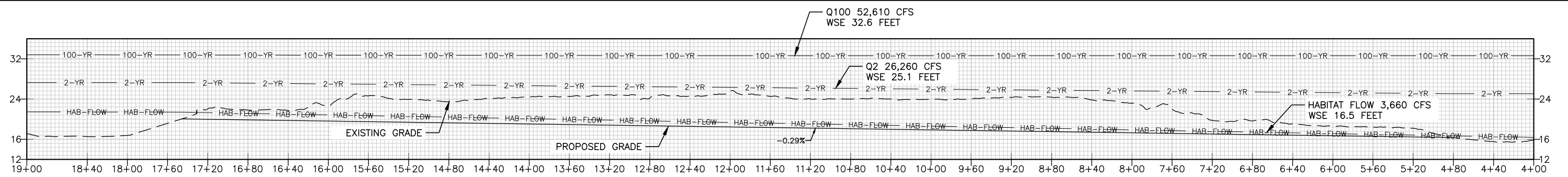
GEOGRAPHIC INFORMATION	
LATITUDE	46°58'55.71"N
LONGITUDE	123°28'56.2"W
TN/SC/RG	T17N/S6/R6W
DATE	2/14/2019

KEYS ROAD FLOOD
PROTECTION

TYPE 2 SETBACK REVETMENT

15
SHEET 15 OF 17

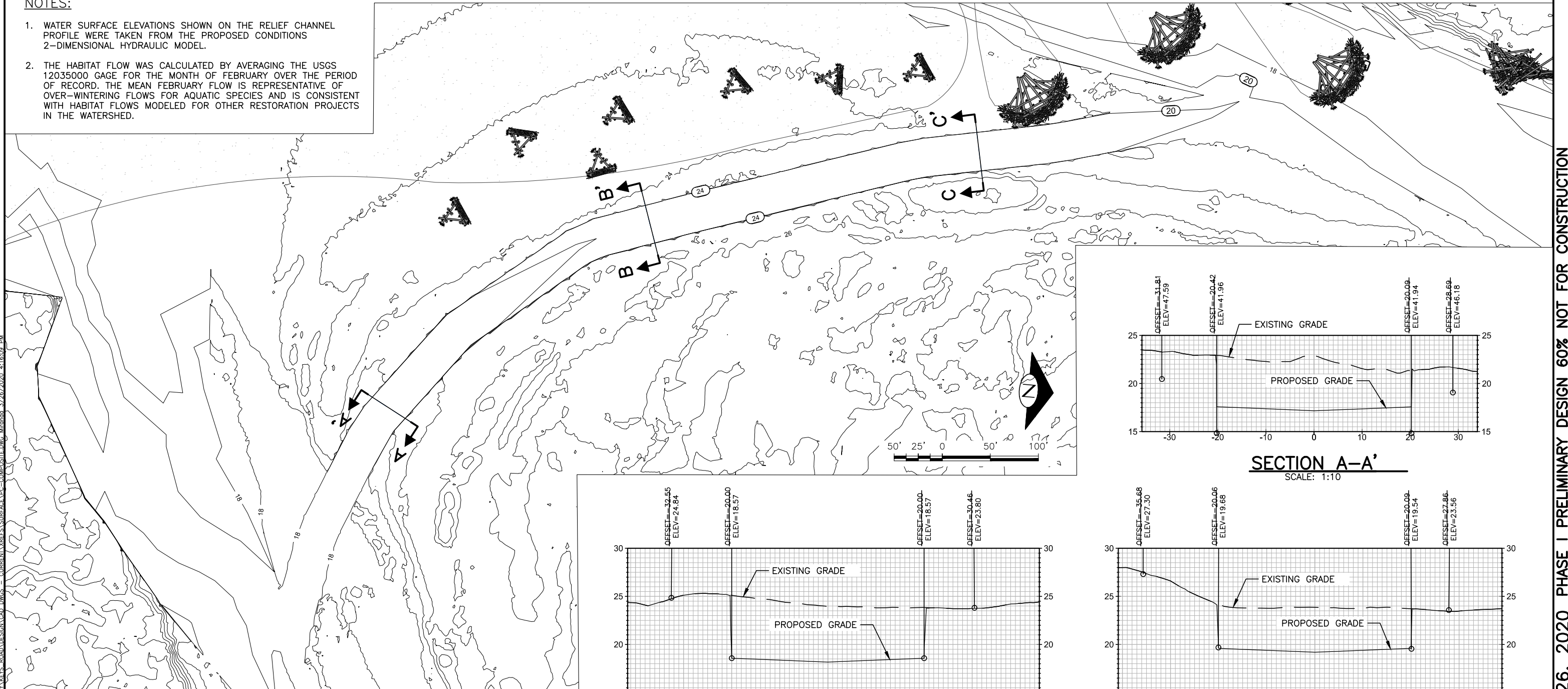
Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION



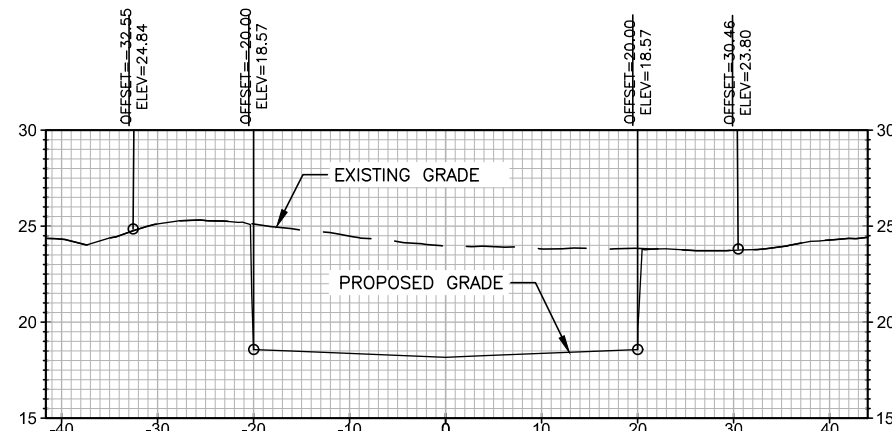
RELIEF CHANNEL PROFILE

NOTES:

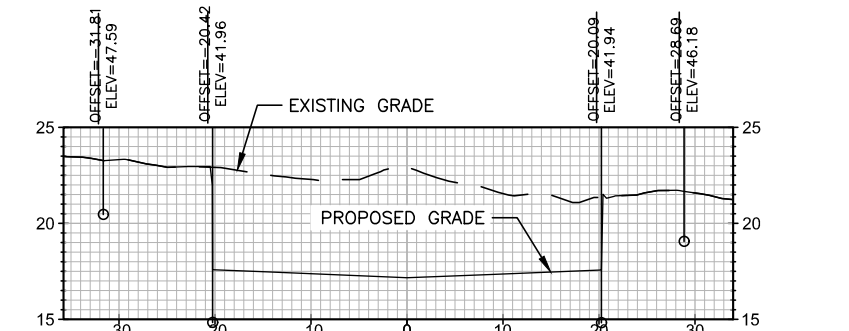
1. WATER SURFACE ELEVATIONS SHOWN ON THE RELIEF CHANNEL PROFILE WERE TAKEN FROM THE PROPOSED CONDITIONS 2-DIMENSIONAL HYDRAULIC MODEL.
2. THE HABITAT FLOW WAS CALCULATED BY AVERAGING THE USGS 12035000 GAGE FOR THE MONTH OF FEBRUARY OVER THE PERIOD OF RECORD. THE MEAN FEBRUARY FLOW IS REPRESENTATIVE OF OVER-WINTERING FLOWS FOR AQUATIC SPECIES AND IS CONSISTENT WITH HABITAT FLOWS MODELED FOR OTHER RESTORATION PROJECTS IN THE WATERSHED.



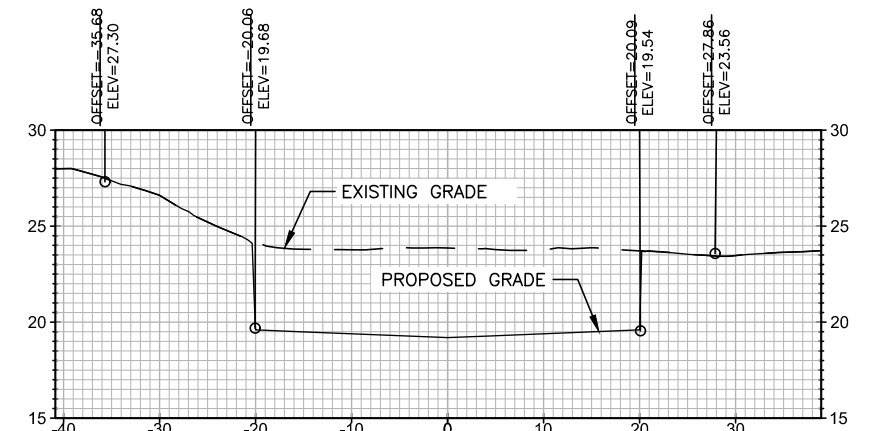
RELIEF CHANNEL PLAN VIEW



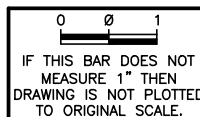
SECTION B-B'
SCALE: 1:10



SECTION A-A'
SCALE: 1:10



SECTION C-C'
SCALE: 1:10



NAME OR INITIALS AND DATE		GEOGRAPHIC INFORMATION	
DESIGNED	RLE, MS	LATITUDE	46°58'55.71"N
CHECKED	RLE	LONGITUDE	123°28'56.2"W
DRAWN	MS, GM	TN/SC/RG	T17N/S6/R6W
CHECKED	RLE	DATE	2/14/2019

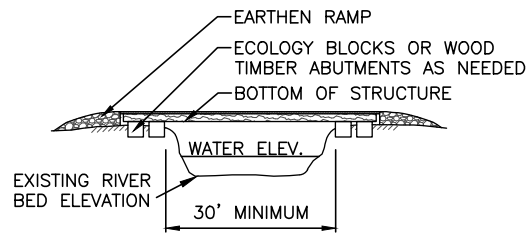
KEYS ROAD FLOOD PROTECTION

RELIEF CHANNEL PROFILE AND SECTIONS

6

SHEET 16 OF 17

Mar 26, 2020 PHASE I PRELIMINARY DESIGN 60% NOT FOR CONSTRUCTION

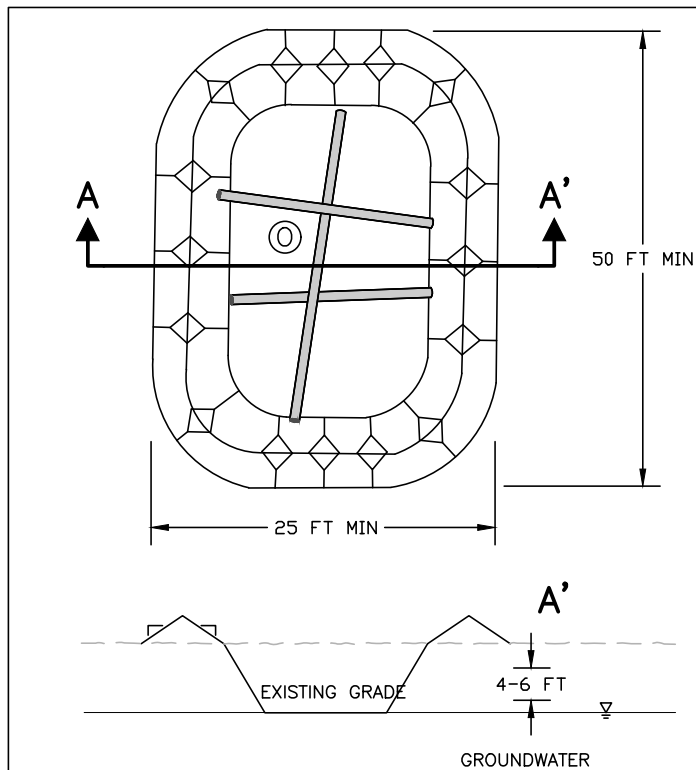


NOTES:

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 DETAILS 1 17

NOT TO SCALE



NOTES:

1. CONTAINMENT POND LOCATION TO BE DETERMINED BY CONTRACTOR.
2. POND WALLS WILL BE CONSTRUCTED FROM ONSITE NATIVE MATERIAL.
3. POND WILL BE ISOLATED FROM FLOWING WATERS.
4. CONTRACTOR SHALL MAINTAIN POND TO REDUCE RISK OF POND FAILURE.
5. FOLLOWING USE, MATERIALS SHALL BE RETURNED TO GRAVEL BAR AND SPREAD EVENLY.
6. PUMP OUTLET SECURED TO CROSS LOGS.



PUMP OUTLET CONTAINMENT POND DETAILS 2 17

SCALE: NTS

ROCK COLLAR DETAIL 6 17

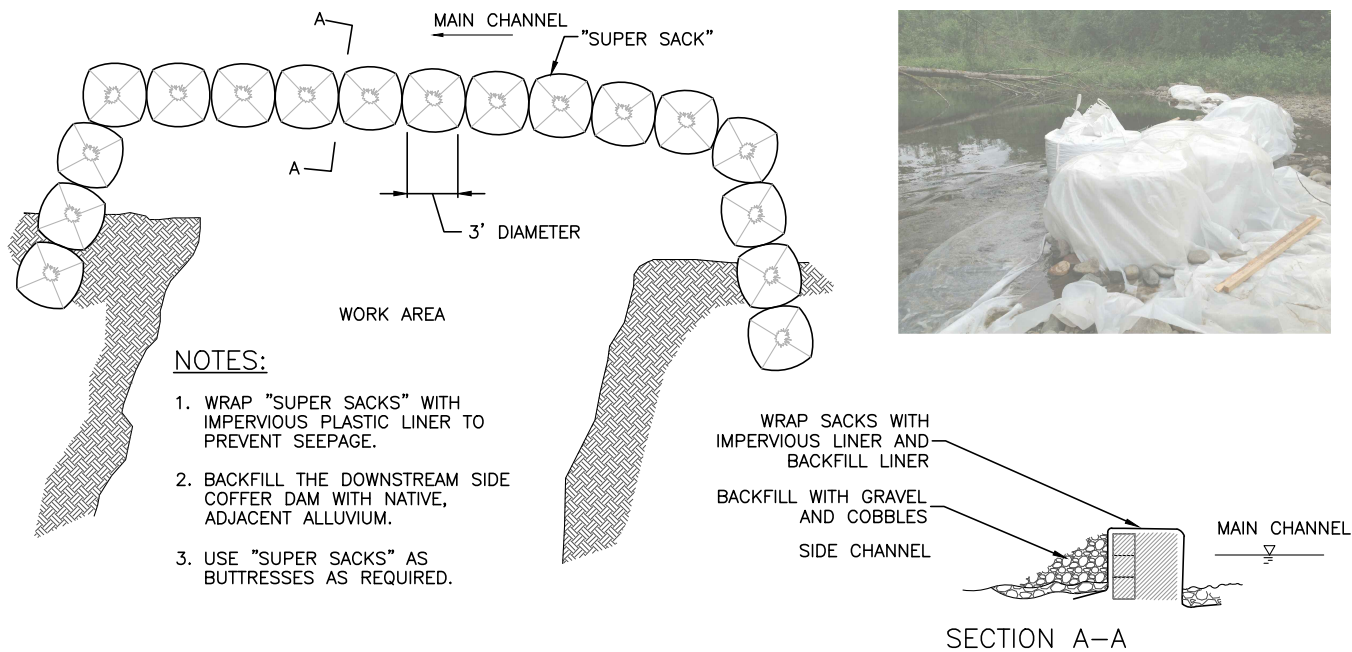
NOT TO SCALE

ℓ (FT)	TOTAL LENGTH (FT)
5	6.33
8	9.33
12	13.33
14	15.33

ℓ = EXPOSED WIRE ROPE LENGTH

NOTES:

1. SEE ELJ STRUCTURE DETAIL FOR MINIMUM AVERAGE BOULDER DIAMETER TO BE USED PER STRUCTURE TYPE.
2. FOLLOWING EPOXY CURE, EACH ROCK COLLAR SHALL BE TESTED TO ENSURE PROPER BONDING.
3. THE DRILL HOLES MUST BE THOROUGHLY CLEANED OF ALL ROCK POWDER AND DRIED. THE RESIN WILL NOT PROPERLY ADHERE TO THE ROCK IF THE HOLE IS INADEQUATELY CLEANED OR IS WET. CLEANING IS DONE BY POURING WATER INTO THE HOLE WHILE PLUNGING IT WITH A CIRCULAR NYLON BRUSH. THE HOLE IS CLEAN WHEN THE WATER PLUNGES OUT CLEAR AND FREE OF SEDIMENT. ALLOWING 24 HOURS FOR DRILL HOLES TO DRY AFTER CLEANING IS USUALLY SUFFICIENT.
4. THE CABLE MUST BE CUT CLEANLY SO THAT THE END CAN BE INSERTED INTO THE TIGHT FITTING ROCK HOLE.
5. THE CABLE SURFACE TO BE BONDED SHOULD BE FREE OF DIRT AND GREASE. HOT DIP GALVANIZED CABLE IS RECOMMENDED.
6. THE HOLE MUST BE SUFFICIENTLY FILLED WITH RESIN SO THAT WHEN THE CABLE IS INSERTED, A SMALL AMOUNT OF RESIN WILL BE DISPLACED OUT OF THE TOP OF THE HOLE. ONCE THE CABLE IS INSERTED IN THE HOLE, IT SHOULD NOT BE DISTURBED UNTIL THE RESIN HAS CURED.
7. FOLLOW RESIN MANUFACTURING RECOMMENDATIONS FOR USE.



NOTES:

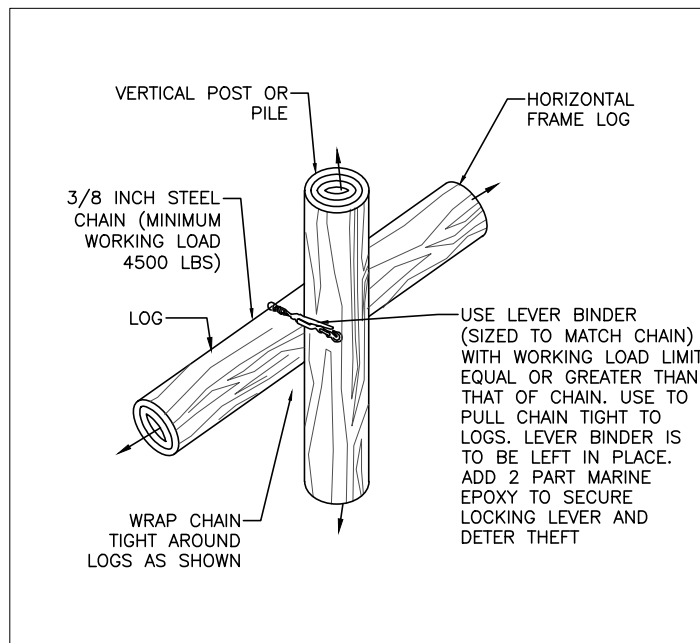
1. WRAP "SUPER SACKS" WITH IMPERVIOUS PLASTIC LINER TO PREVENT SEEPAGE.
2. BACKFILL THE DOWNSTREAM SIDE COFFER DAM WITH NATIVE, ADJACENT ALLUVIUM.
3. USE "SUPER SACKS" AS BUTTRESSES AS REQUIRED.

WRAP SACKS WITH IMPERVIOUS LINER AND BACKFILL LINER
BACKFILL WITH GRAVEL AND COBBLES

SECTION A-A

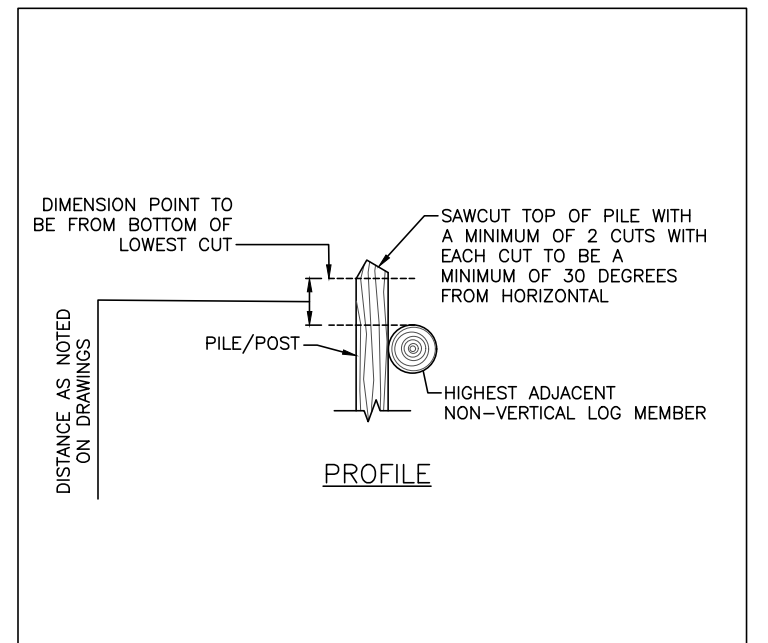
COFFERDAM DETAILS 3 17

NOT TO SCALE



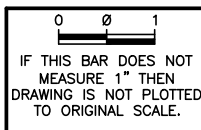
CHAIN LASHING DETAIL 4 17

NOT TO SCALE



SAWCUT POST TOP DETAIL 5 17

NOT TO SCALE



NAME OR INITIALS AND DATE	GEOGRAPHIC INFORMATION
DESIGNED RLE, MS	LATITUDE 46°58'55.71"N
CHECKED RLE	LONGITUDE 123°28'56.2"W
DRAWN MS, GM	TN/SC/RG 117N/56/R6W
CHECKED RLE	DATE 2/14/2019

KEYS ROAD FLOOD PROTECTION

CONSTRUCTION DETAILS

17

SHEET 17 OF 17