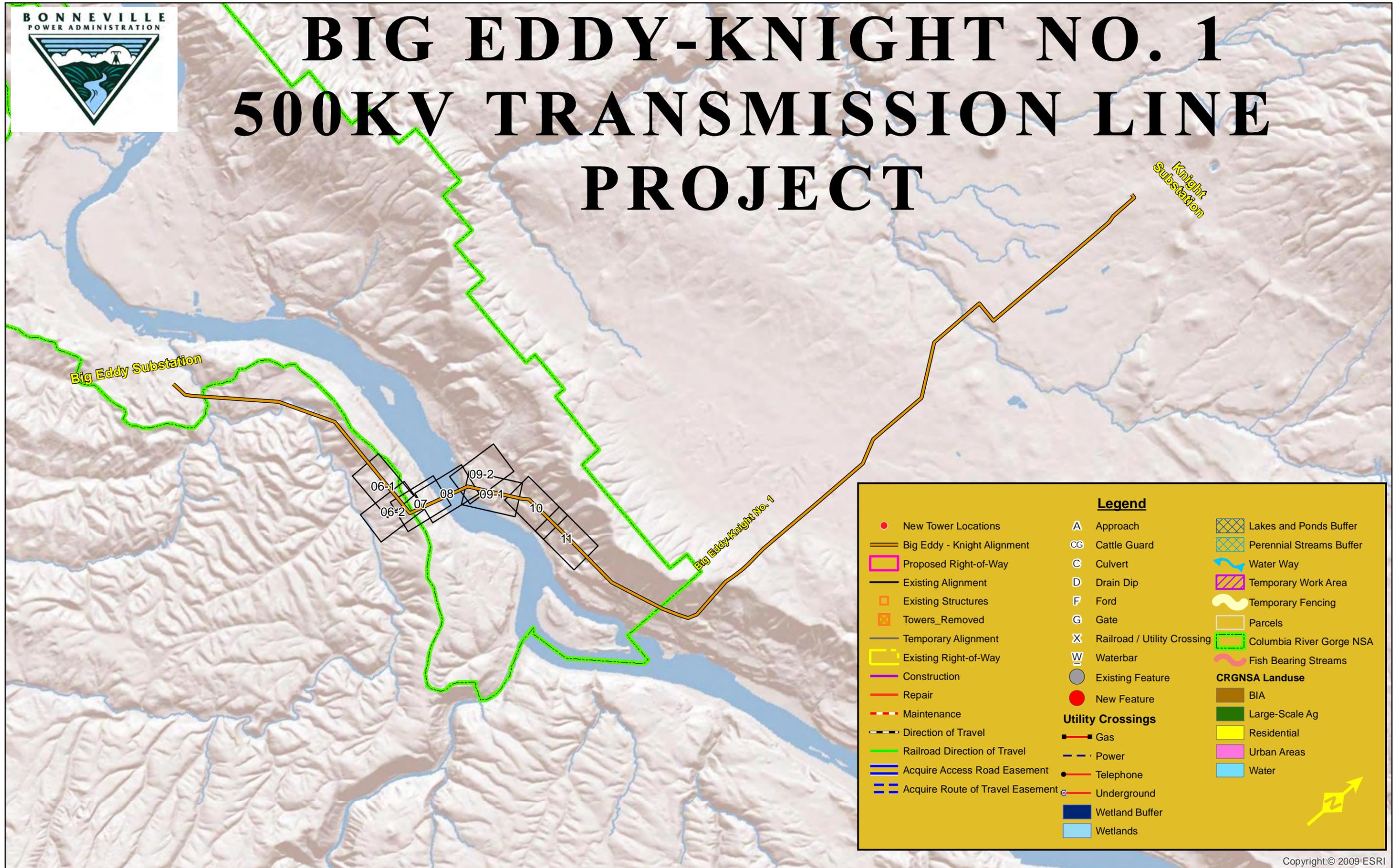


Photomap Attachment



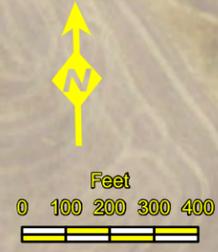
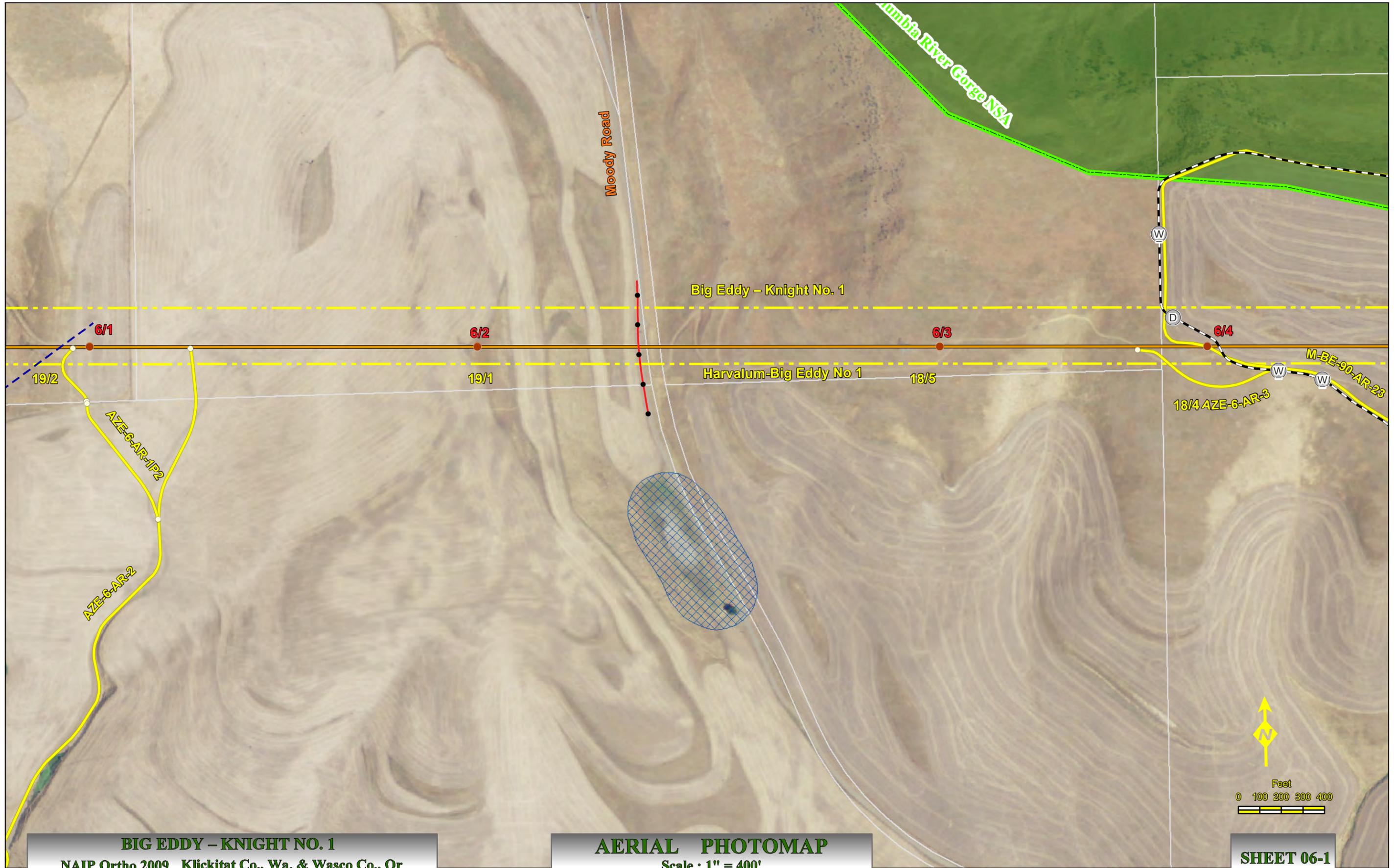
BIG EDDY-KNIGHT NO. 1 500KV TRANSMISSION LINE PROJECT



Legend

● New Tower Locations	A Approach	▨ Lakes and Ponds Buffer
— Big Eddy - Knight Alignment	CG Cattle Guard	▨ Perennial Streams Buffer
▭ Proposed Right-of-Way	C Culvert	~ Water Way
— Existing Alignment	D Drain Dip	▨ Temporary Work Area
▭ Existing Structures	F Ford	~ Temporary Fencing
▭ Towers_Removed	G Gate	▭ Parcels
— Temporary Alignment	X Railroad / Utility Crossing	▨ Columbia River Gorge NSA
▭ Existing Right-of-Way	W Waterbar	~ Fish Bearing Streams
— Construction	● Existing Feature	CRGNSA Landuse
— Repair	● New Feature	▨ BIA
— Maintenance	Utility Crossings	▨ Large-Scale Ag
— Direction of Travel	— Gas	▨ Residential
— Railroad Direction of Travel	— Power	▨ Urban Areas
▭ Acquire Access Road Easement	● Telephone	▨ Water
▭ Acquire Route of Travel Easement	— Underground	
	▨ Wetland Buffer	
	▨ Wetlands	







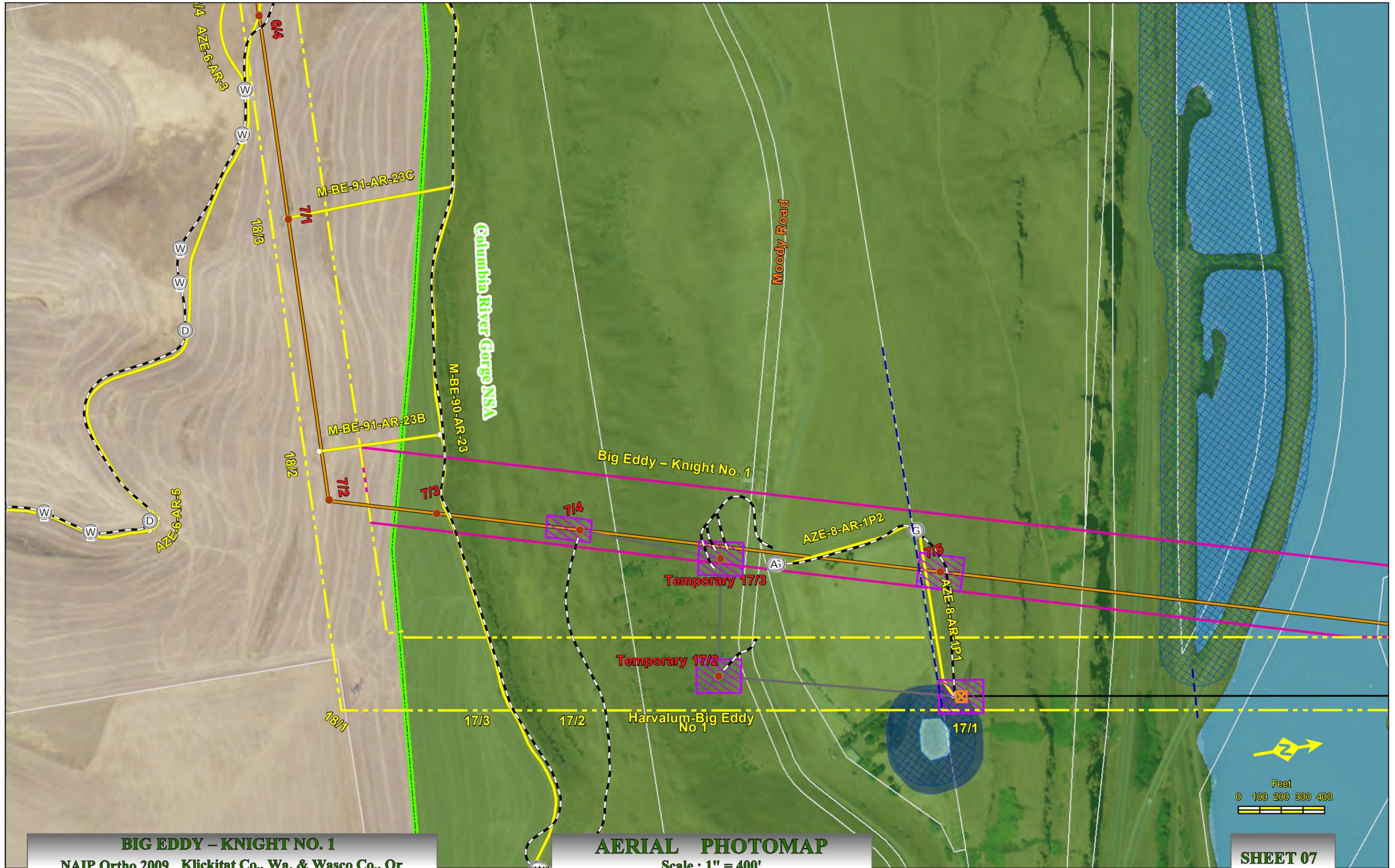
BIG EDDY – KNIGHT NO. 1
 NAIP Ortho 2009 Klickitat Co., Wa. & Wasco Co., Or

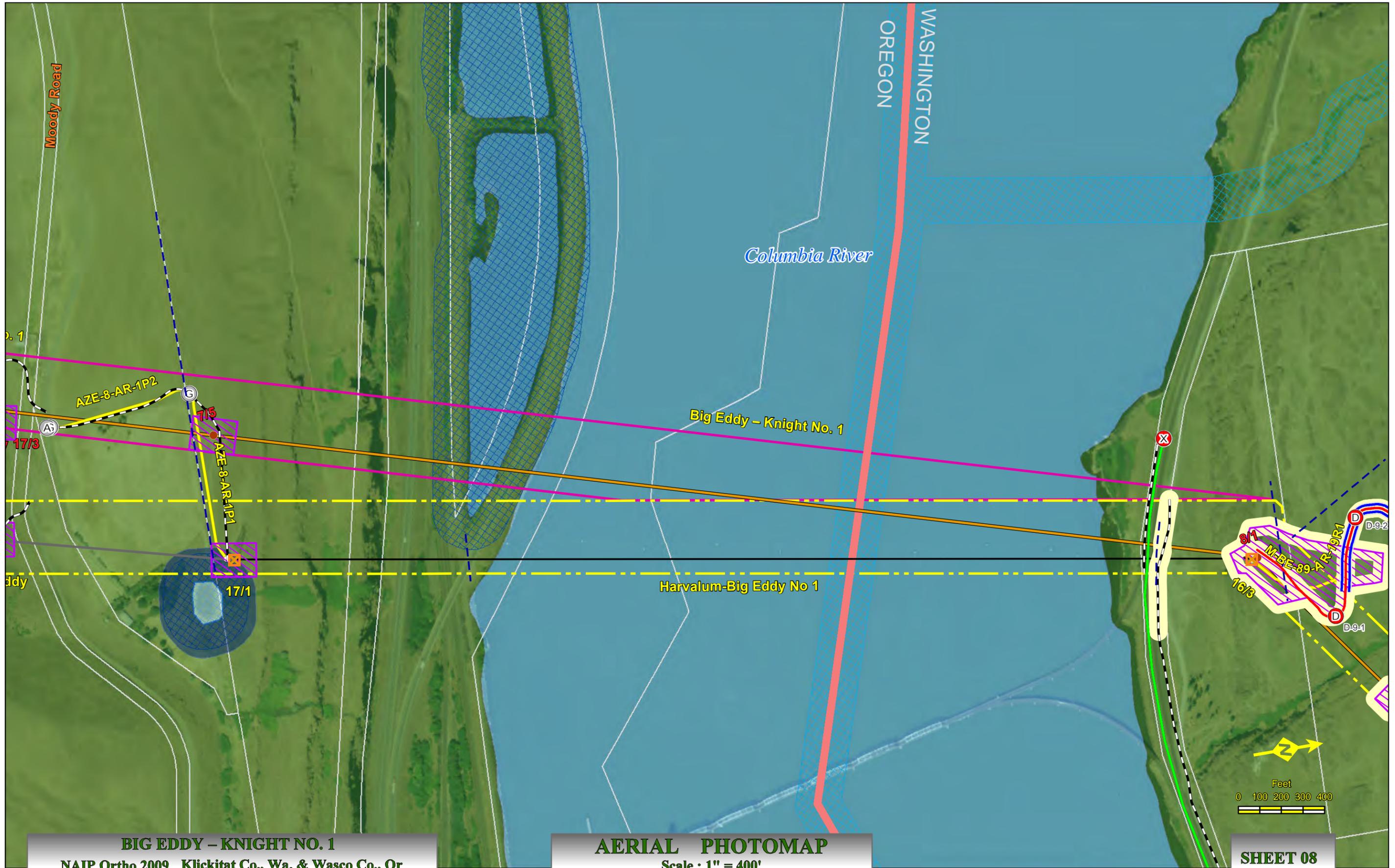
AERIAL PHOTOMAP
 Scale : 1" = 400'

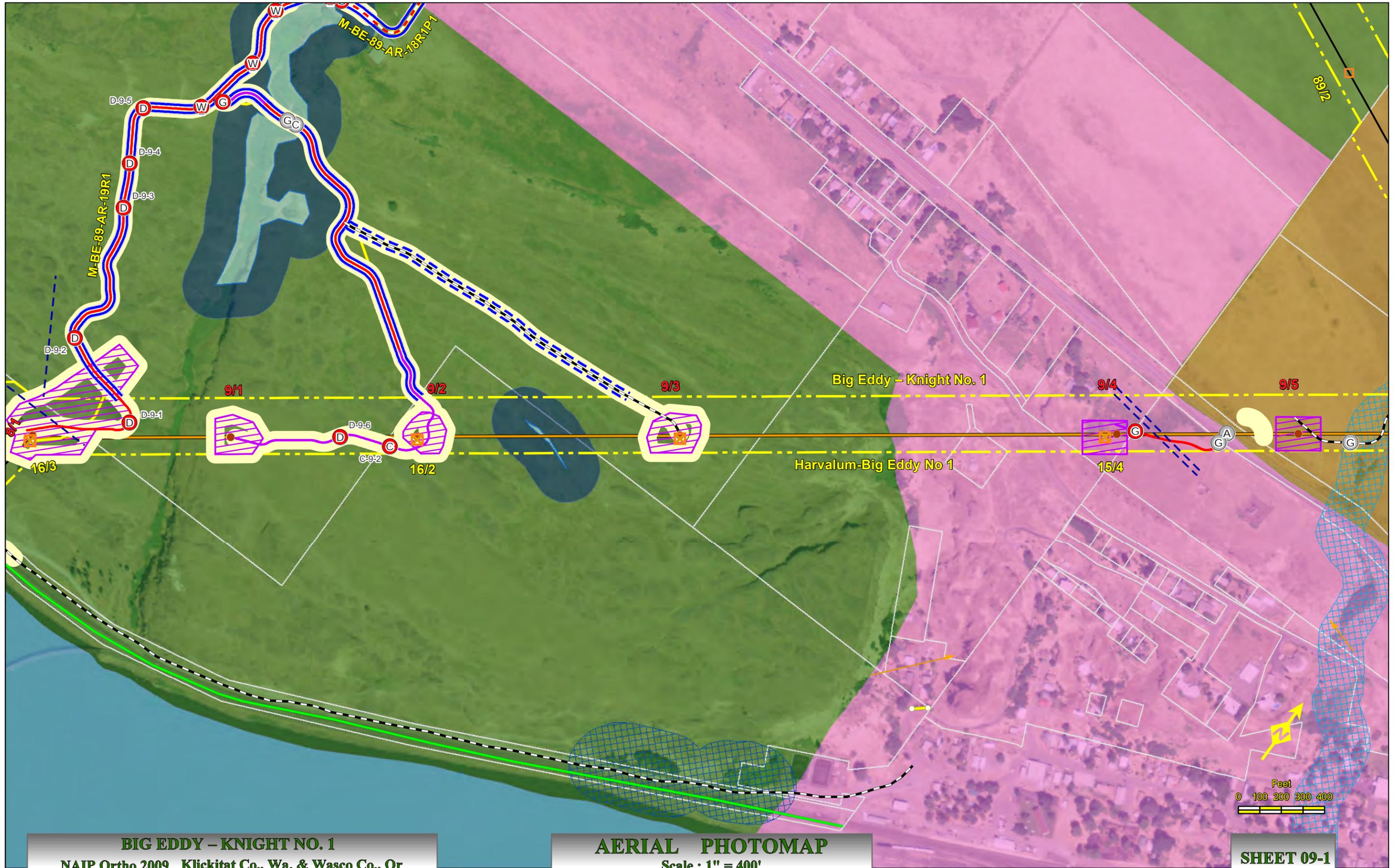
SHEET 06-2

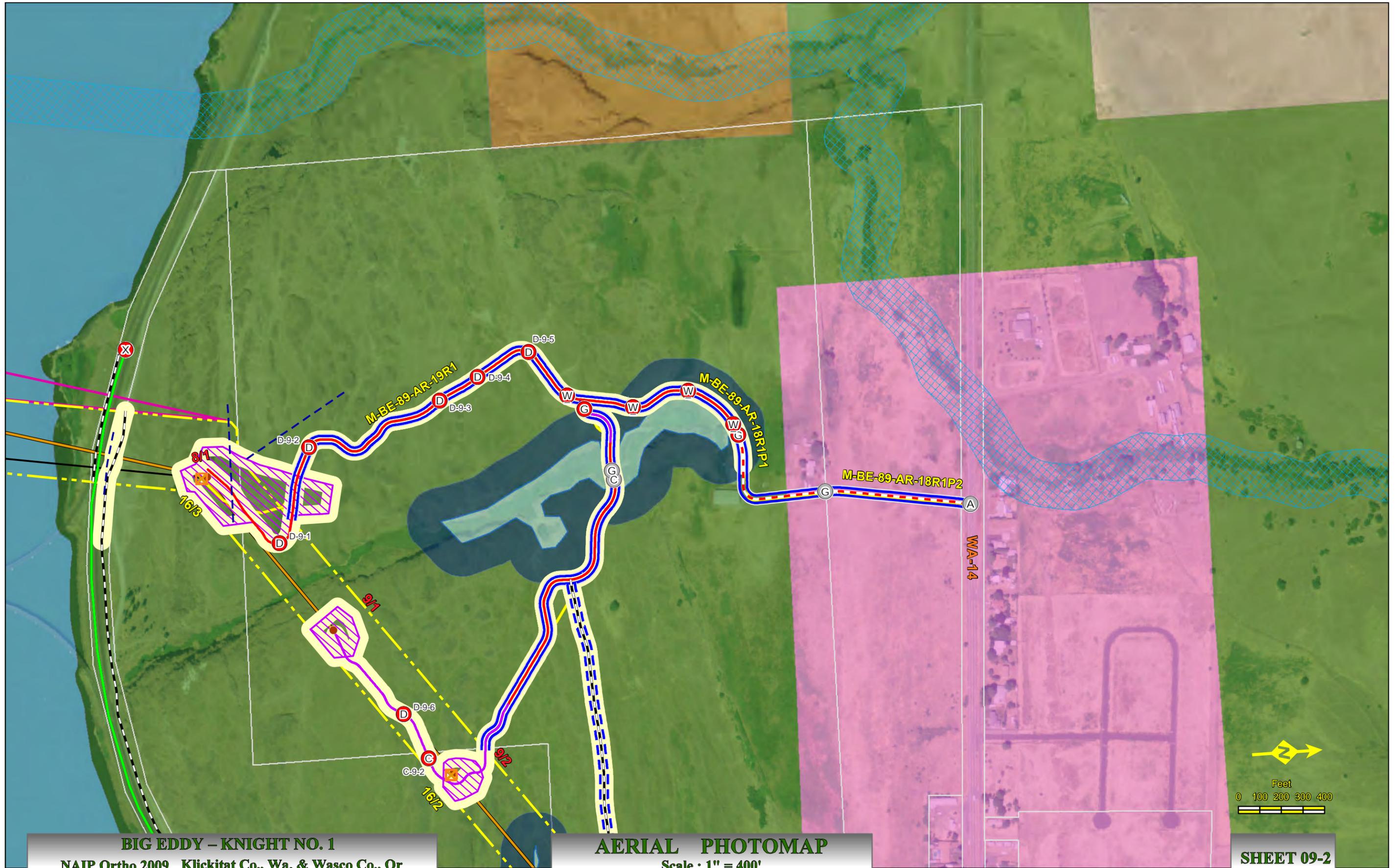
Created:3/6/2014









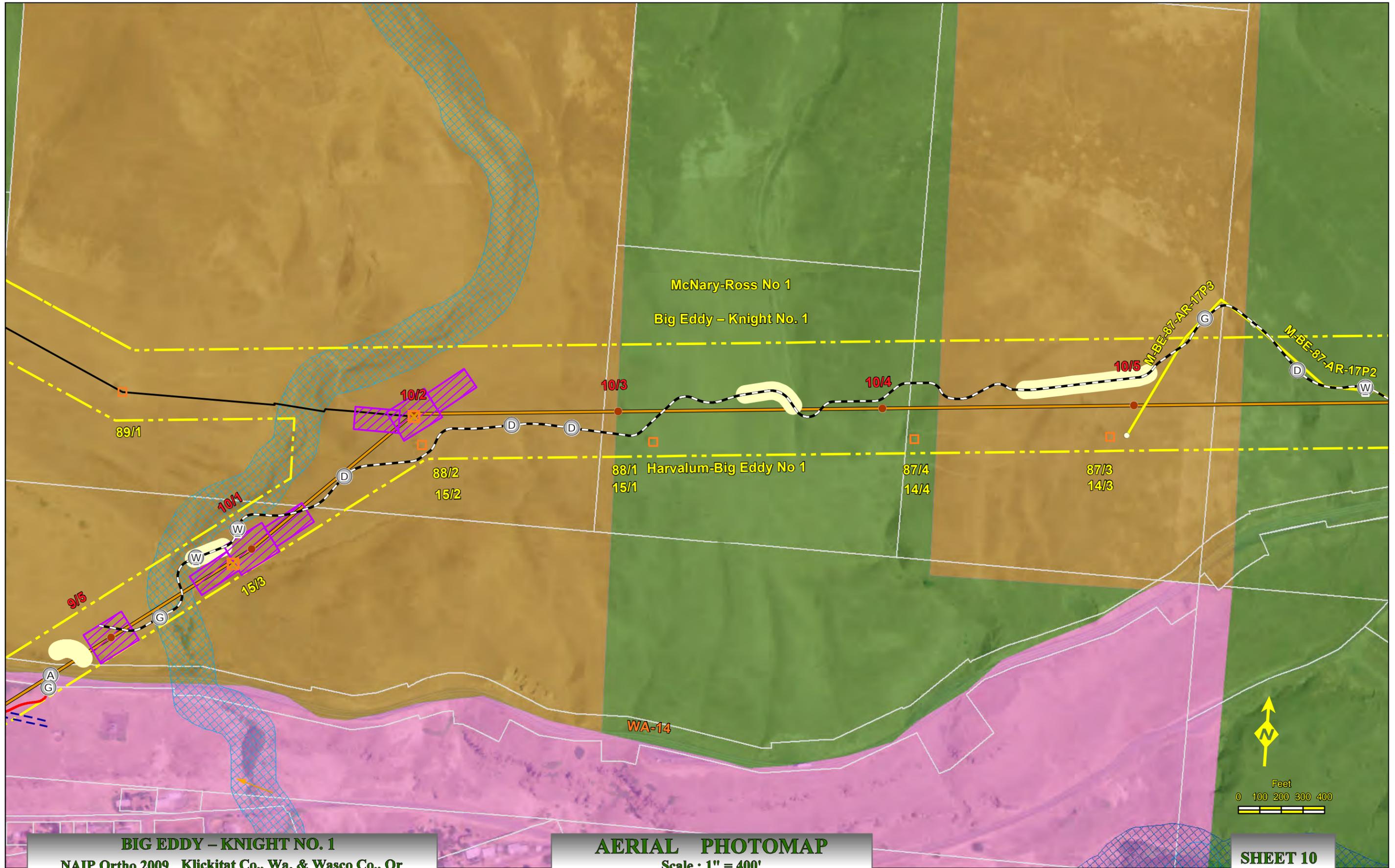


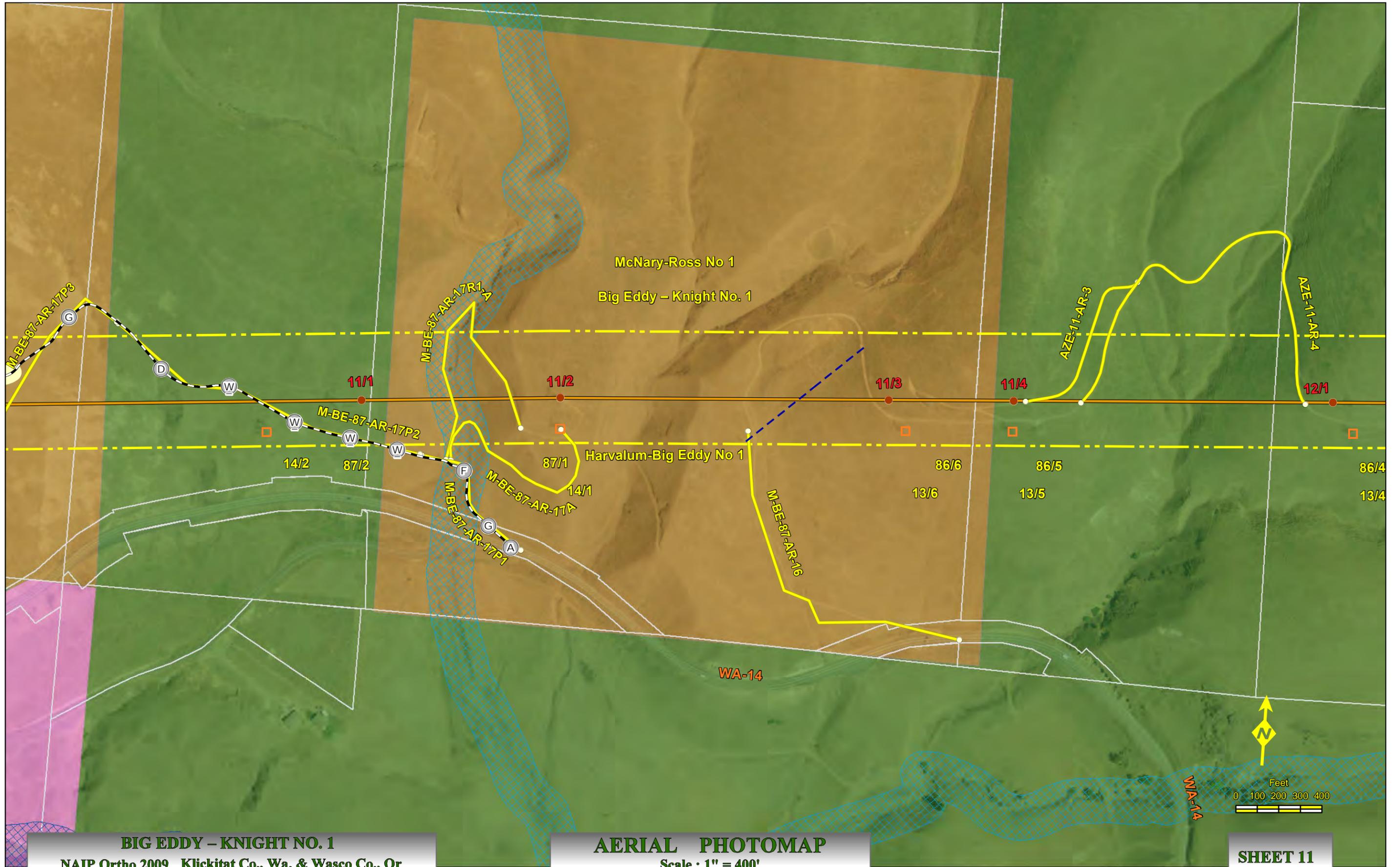
BIG EDDY - KNIGHT NO. 1
 NAIP Ortho 2009 Klickitat Co., Wa. & Wasco Co., Or

AERIAL PHOTOMAP
 Scale : 1" = 400'

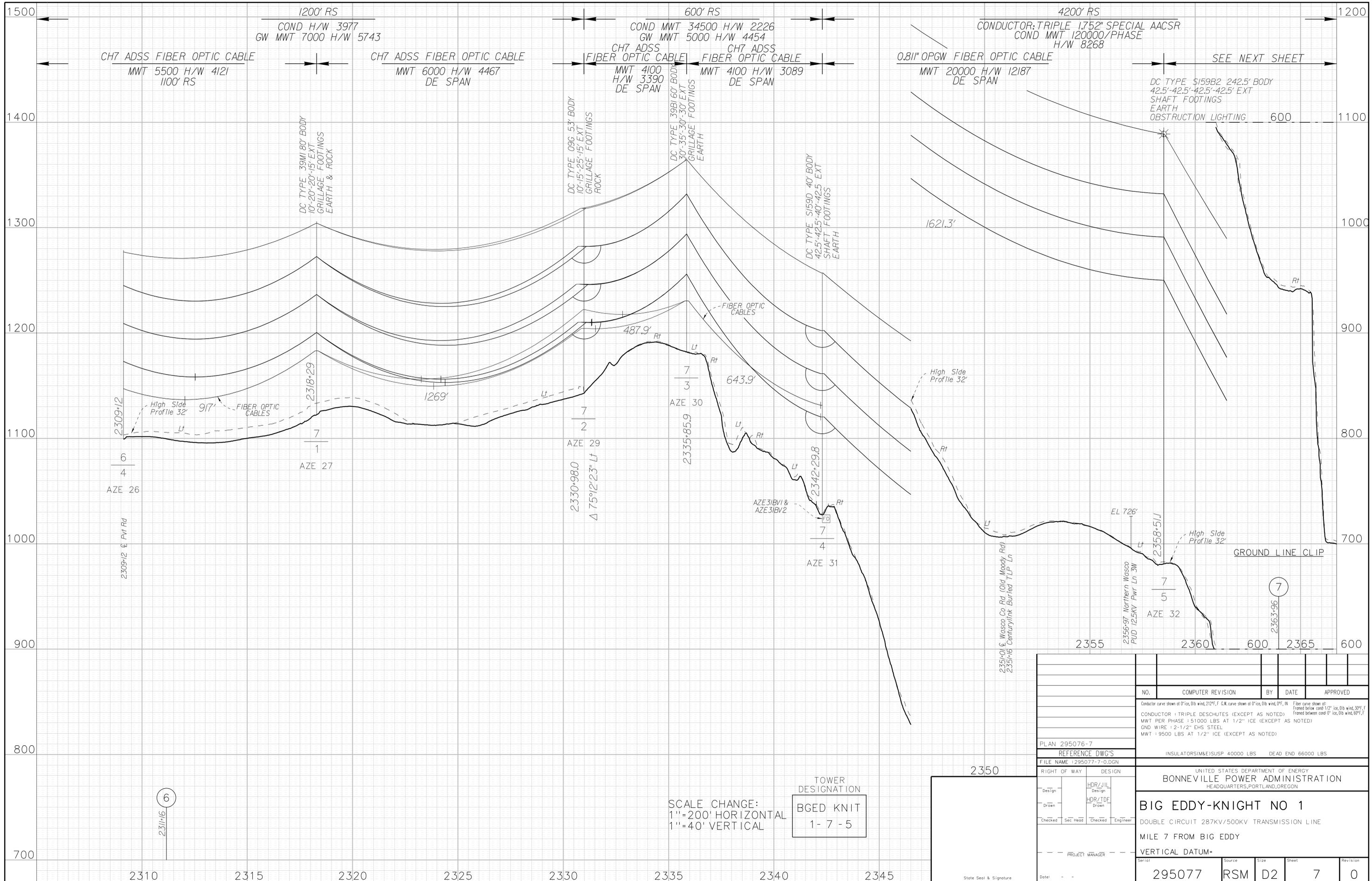
SHEET 09-2

Created:3/6/2014





Profile Attachment



TRIM LINE

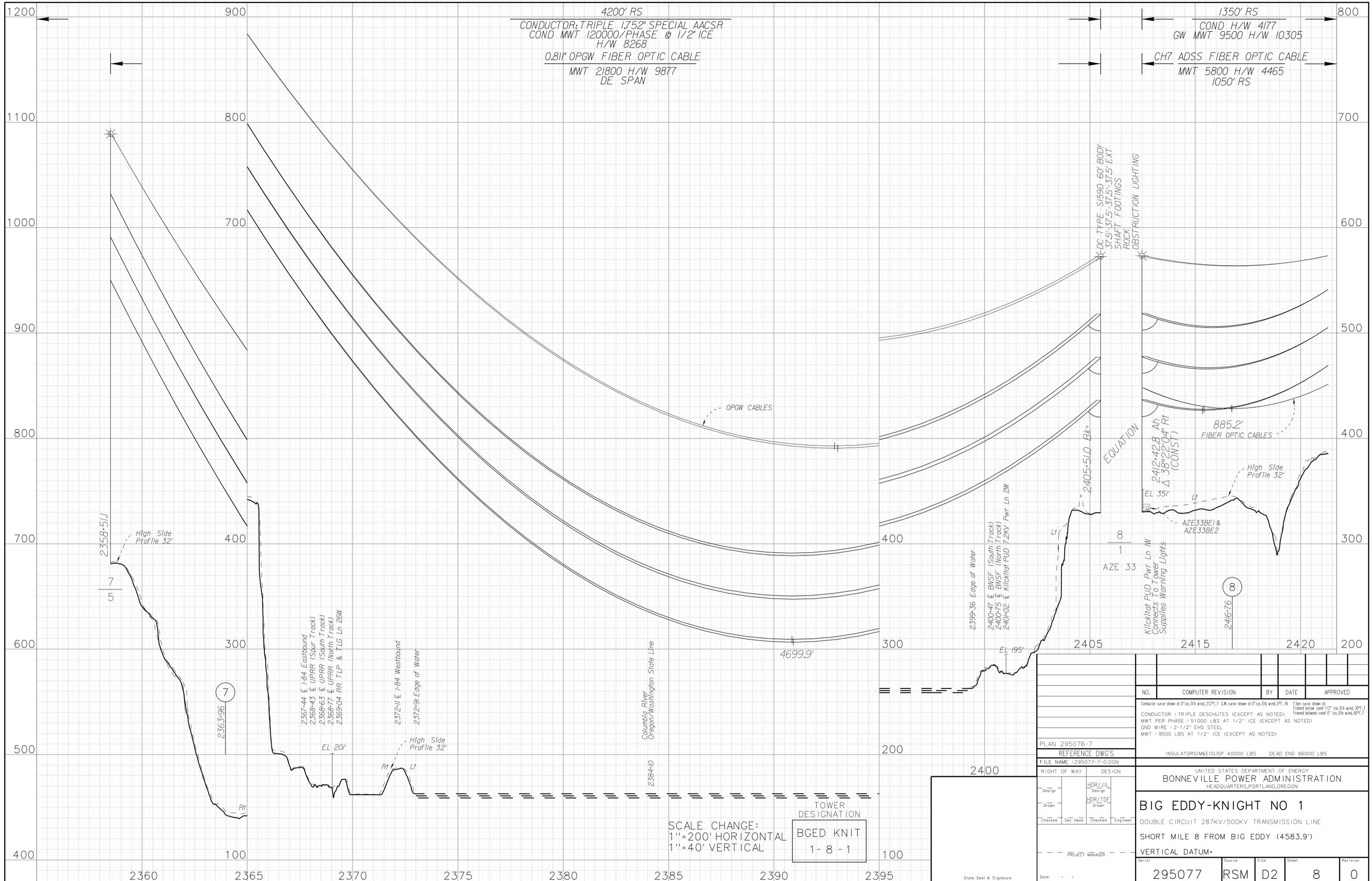
TRIM LINE

BIG EDDY-KNIGHT 1 SEG & BIG EDDY-KNIGHT 2 SEG BIG EDDY-WAUTOMA FIBER SYSTEM

SCALE CHANGE:
1" = 200' HORIZONTAL
1" = 40' VERTICAL

TOWER DESIGNATION
BGED KNIT
1-7-5

NO.		COMPUTER REVISION		BY	DATE	APPROVED
<small>Conductor curve shown of 0° ice, 0lb wind, 212°F, F & W curve shown of 0° ice, 0lb wind, 0°F, IN. Fiber curve shown of: Framed below cond-1/2" ice, 0lb wind, 30°F, F Framed between cond-0° ice, 0lb wind, 0°F, F MWT PER PHASE : 51000 LBS AT 1/2" ICE (EXCEPT AS NOTED) GND WIRE : 2-1/2" EHS STEEL MWT : 9500 LBS AT 1/2" ICE (EXCEPT AS NOTED)</small>						
PLAN 295076-7		INSULATORS(M&E)SUSP 40000 LBS DEAD END 66000 LBS				
FILE NAME : 295077-7-0.DGN						
RIGHT OF WAY	DESIGN	UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON				
Design	HDR/JIL Design	BIG EDDY-KNIGHT NO 1 DOUBLE CIRCUIT 287KV/500KV TRANSMISSION LINE MILE 7 FROM BIG EDDY VERTICAL DATUM=				
Drawn	HDR/TDF Drawn					
Checked	Sec Head	Checked	Engineer	PROJECT MANAGER		
Date: - -		Serial	Source	Size	Sheet	Revision
State Seal & Signature		295077	RSM	D2	7	0



4200' RS
 CONDUCTOR: TRIPLE 1.752" SPECIAL AACSR
 COND MWT 120000/PHASE @ 1/2" ICE
 H/W 8268
 0.811" OPGW FIBER OPTIC CABLE
 MWT 21800 H/W 9877
 DE SPAN

1350' RS
 COND H/W 4177
 GW MWT 9500 H/W 10305
 CH7 ADSS FIBER OPTIC CABLE
 MWT 5800 H/W 4465
 1050' RS

SCALE CHANGE:
 1" = 200' HORIZONTAL
 1" = 40' VERTICAL

TOWER DESIGNATION
BGED KNIT
 1 - 8 - 1

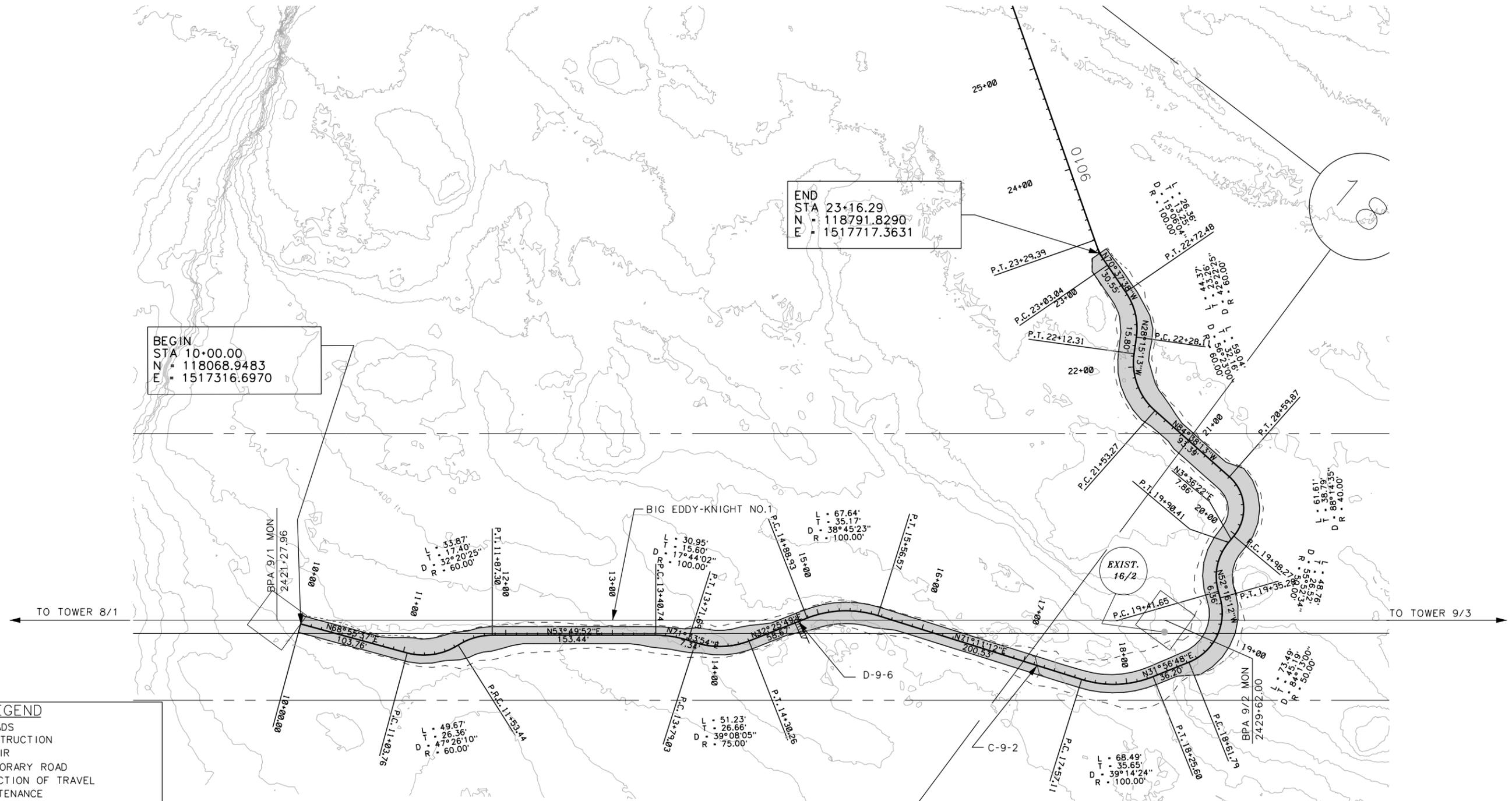
NO.	COMPUTER REVISION	BY	DATE	APPROVED
<small>Conductor curve shown at 0° ice, 0 lb wind, 212°F, F & W curve shown at 0° ice, 0 lb wind, 0°F, IN. Fiber curve shown at: Framed below cond: 1/2" ice, 0 lb wind, 30°F, F Framed between cond: 0° ice, 0 lb wind, 0°F, F</small>				
CONDUCTOR : TRIPLE DESCHUTES (EXCEPT AS NOTED) MWT PER PHASE : 51000 LBS AT 1/2" ICE (EXCEPT AS NOTED) GND WIRE : 2-1/2" EHS STEEL MWT : 9500 LBS AT 1/2" ICE (EXCEPT AS NOTED)				
INSULATORS(M&E)SUSP 40000 LBS		DEAD END 66000 LBS		
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON				
BIG EDDY-KNIGHT NO 1 DOUBLE CIRCUIT 287KV/500KV TRANSMISSION LINE SHORT MILE 8 FROM BIG EDDY (4583.9') VERTICAL DATUM=				
295077	RSM	D2	8	0

LT CKT OPER AS BIG EDDY-KNIGHT NO 1 RT CKT OPER AS MILE 16 HARVALUM-BIG EDDY NO 1 (230KV)

BIG EDDY-KNIGHT 1 SEG & BIG EDDY-KNIGHT 2 SEG BIG EDDY-WAUTOMA FIBER SYSTEM

Road Grading Plan Attachment

SEC 18 T2N R15E WM



BEGIN
 STA 10+00.00
 N = 118068.9483
 E = 1517316.6970

END
 STA 23+16.29
 N = 118791.8290
 E = 1517717.3631

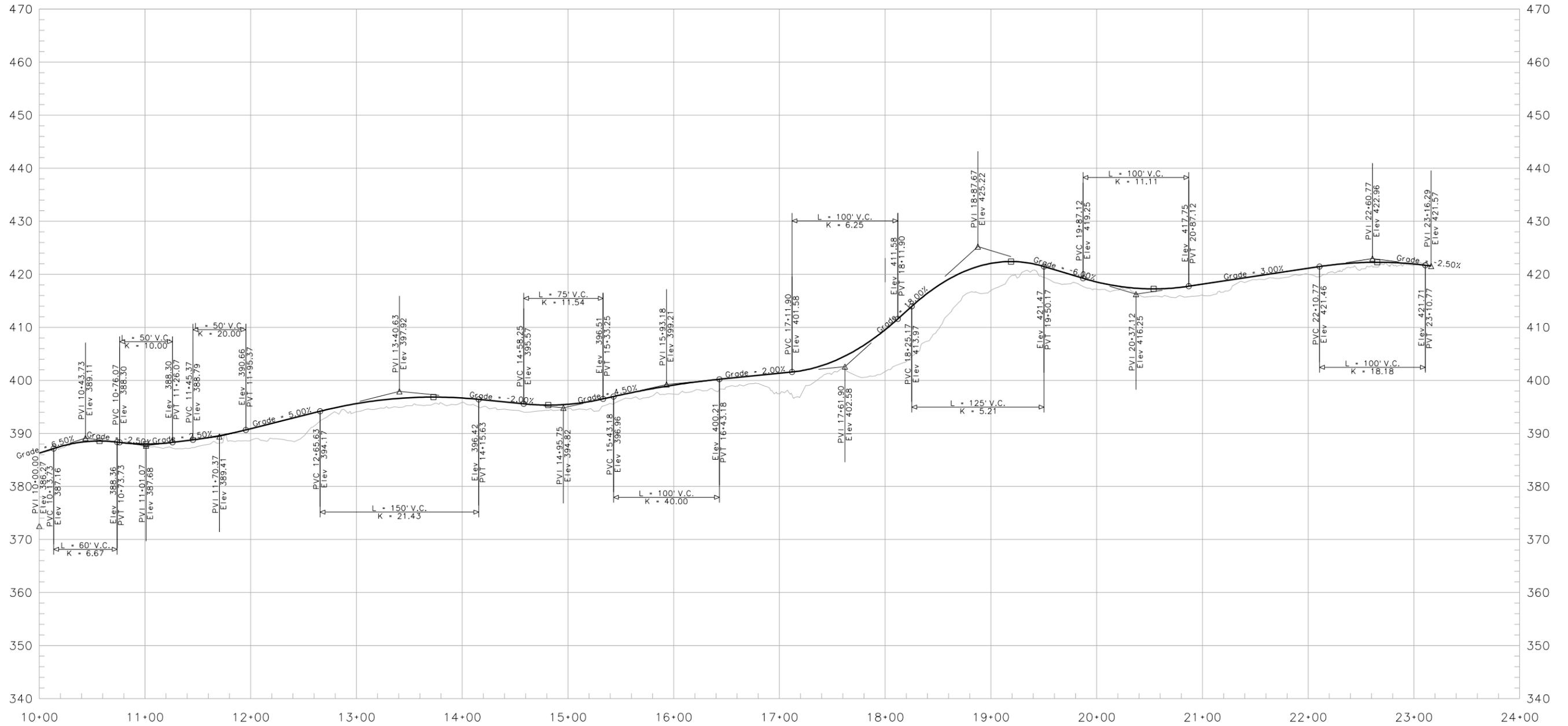
ACCESS ROAD 9010 TO
 TOWERS 9/1 - 9/2
 (SEE PLAN SHEET 9)

LEGEND

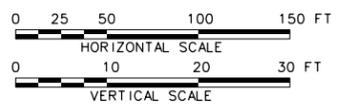
- PROPOSED ROADS
 - CONSTRUCTION
 - REPAIR
 - TEMPORARY ROAD
 - DIRECTION OF TRAVEL
 - MAINTENANCE
 - TOP OF CUT
 - TOE OF FILL
 - EXISTING ROAD
- FENCE
- CREEK
- ACCESS ROADS SURFACE
- STRUCTURE/TOWER
 - PROP.
 - EXIST.
- CULVERT
- GATE
- DRAIN DIP
- FORD
- WATER BAR
- CATTLE GUARD
- GAS
- OH PWR
- TELE
- CABLE

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	ACCESS ROAD DESIGN REVISIONS	HDR/RW	8/5/2013	
W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON						
BIG EDDY-KNIGHT NO.1 500kv TRANSMISSION LINE PROJECT LINE MILE 9 GRADING PLAN						
Design	HDR/BAH		SERIAL	390778	SOURCE	LFC
Drawn	HDR/BAH		SIZE	A	SHEET	GP1
Chkd	HDR/DEC		REVISION	0		
Sub						
Rec						
Appr						
Date	AUGUST 2013					

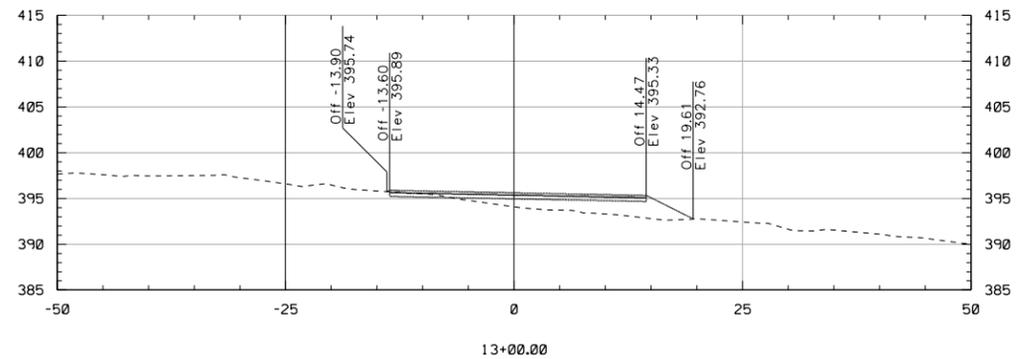
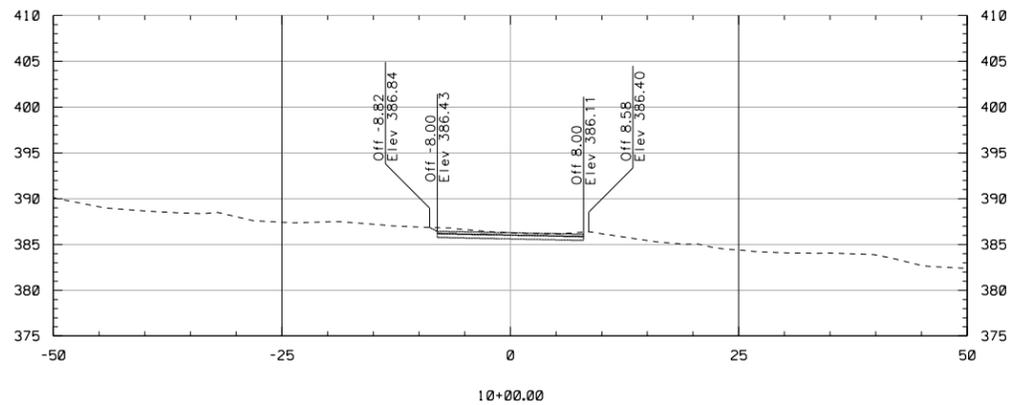
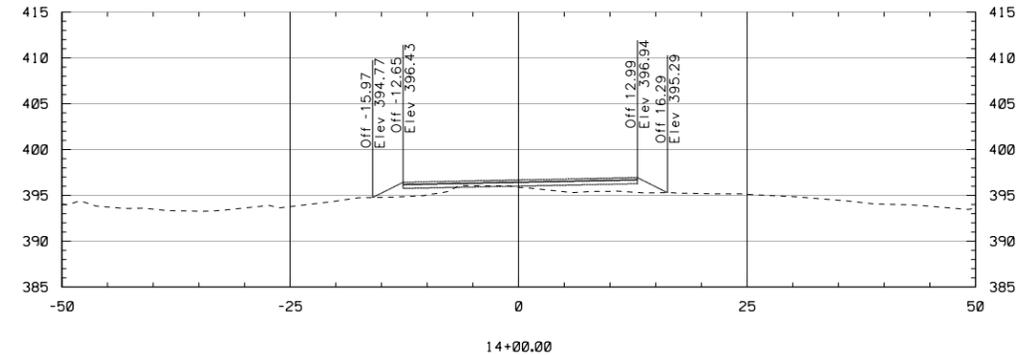
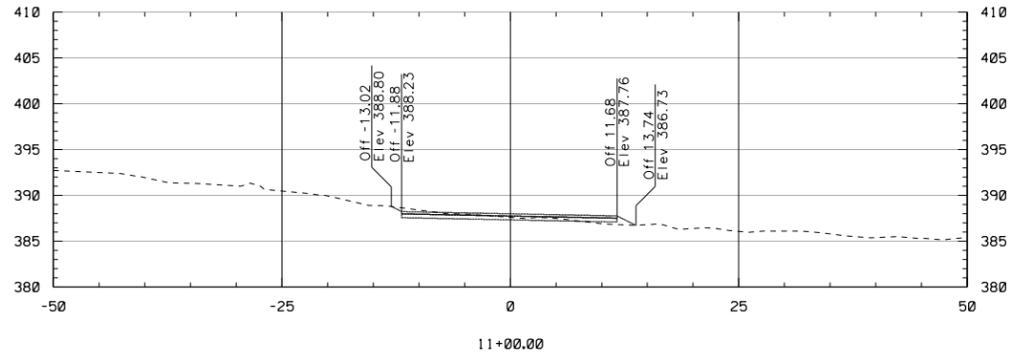
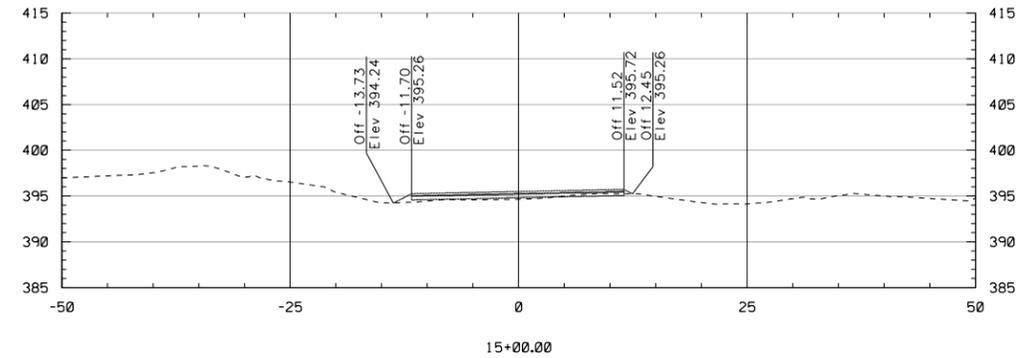
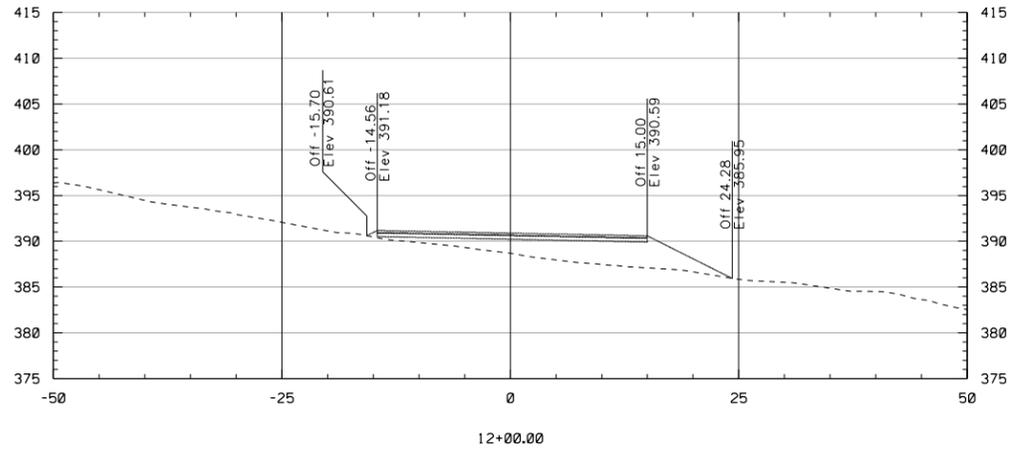


ACCESS ROAD 9010 PROFILE
(SEE SHEET GP1 FOR GRADING PLAN)



DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	ACCESS ROAD DESIGN REVISIONS	HDR/RW	8/5/2013		
	W.O.	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR/BAH						
Drawn	HDR/BAH						
Chkd	HDR/DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON							
BIG EDDY-KNIGHT NO.1 500kv TRANSMISSION LINE PROJECT LINE MILE 9 ACCESS ROAD PROFILE							
SERIAL	290778	SOURCE	LFC	SIZE	A1	SHEET	PR1
REVISION	0						

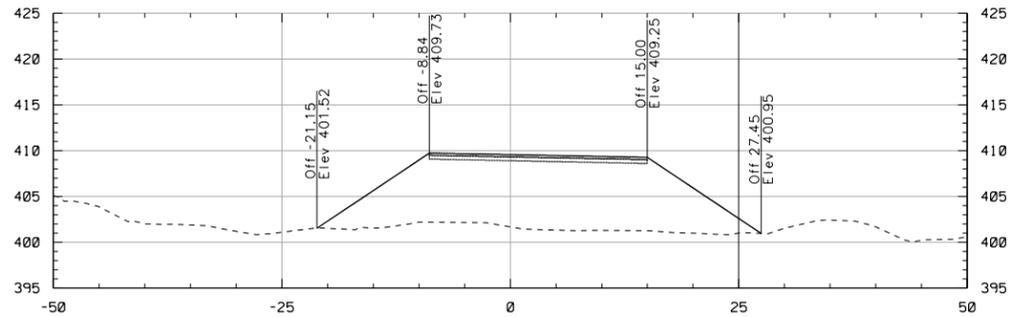


**ACCESS ROAD 9010
CROSS SECTIONS (1 OF 3)**
(SEE SHEET GP1 FOR GRADING PLAN)

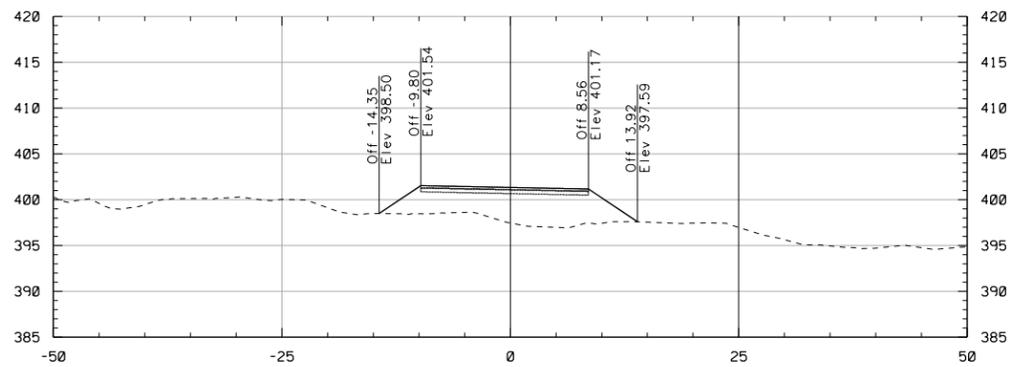


DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

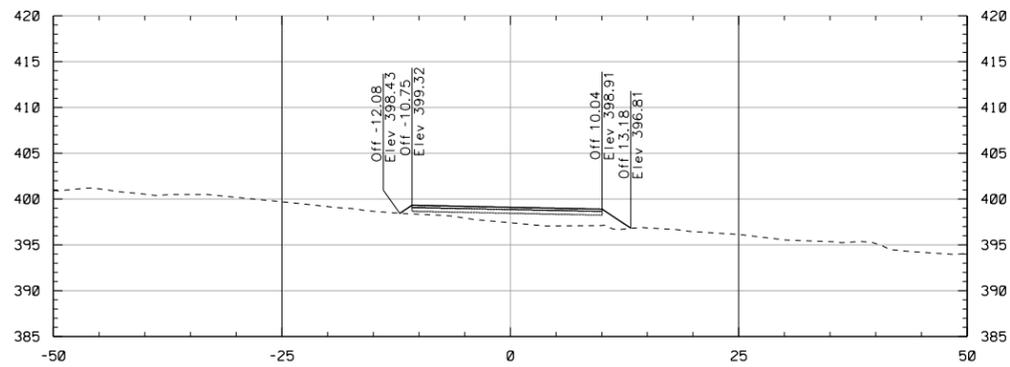
NO.	C	00232575	ACCESS ROAD DESIGN REVISIONS	HDR/RW	8/5/2013		
NO.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR/BAH						
Drawn	HDR/BAH						
Chkd	HDR/DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON							
BIG EDDY-KNIGHT NO.1 500kv TRANSMISSION LINE PROJECT LINE MILE 9 STA 10+00 TO 15+00 SECTIONS							
SERIAL	290778	SOURCE	LFC	SIZE	A1	SHEET	CS1
REVISION	0						



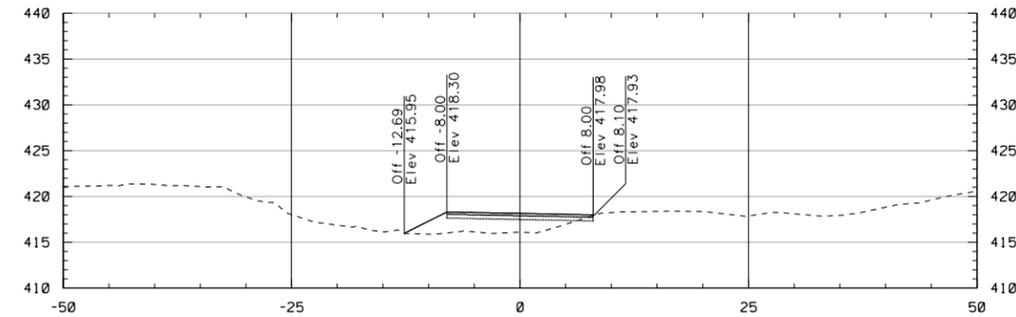
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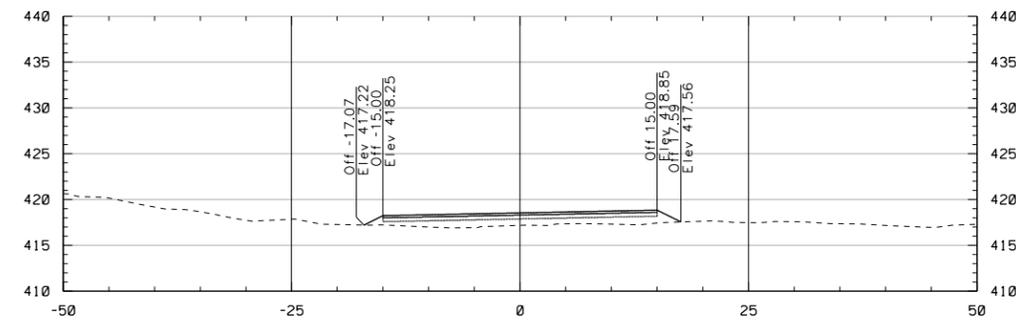
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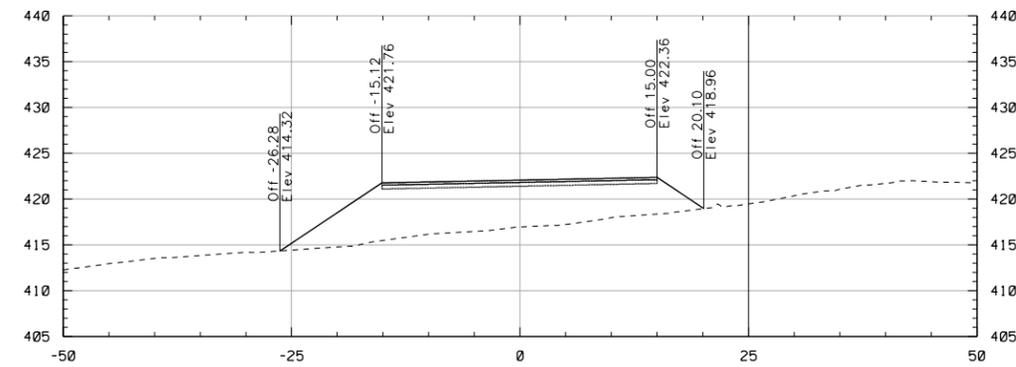
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21+00.00



20+00.00



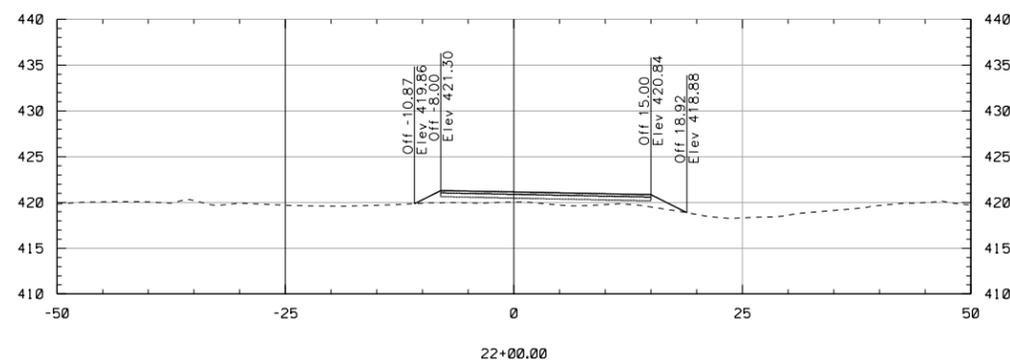
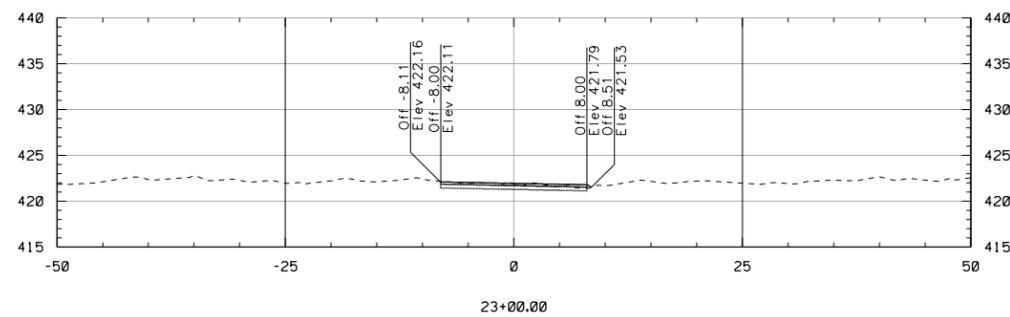
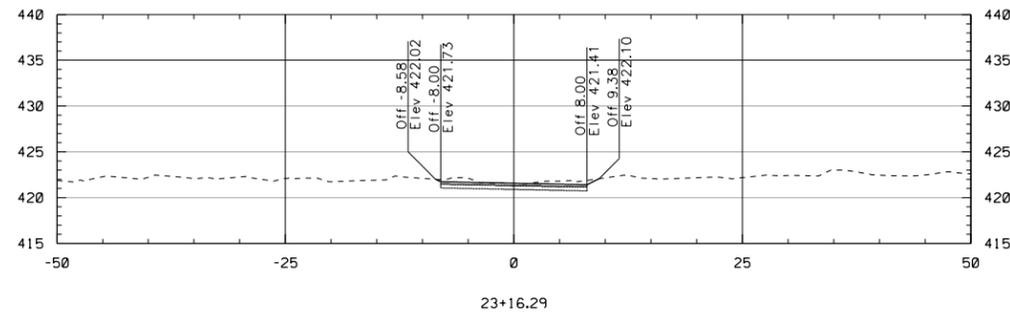
19+00.00

ACCESS ROAD 9010
CROSS SECTIONS (2 OF 3)
(SEE SHEET GP1 FOR GRADING PLAN)



DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	ACCESS ROAD DESIGN REVISIONS	HDR/RW	8/5/2013		
	W.O.	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR/BAH						
Drawn	HDR/BAH						
Chkd	HDR/DEC						
Sub							
Rec							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY-KNIGHT NO.1 500kv TRANSMISSION LINE PROJECT LINE MILE 9 STA 16+00 TO 21+00 SECTIONS							
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	CS2	0			



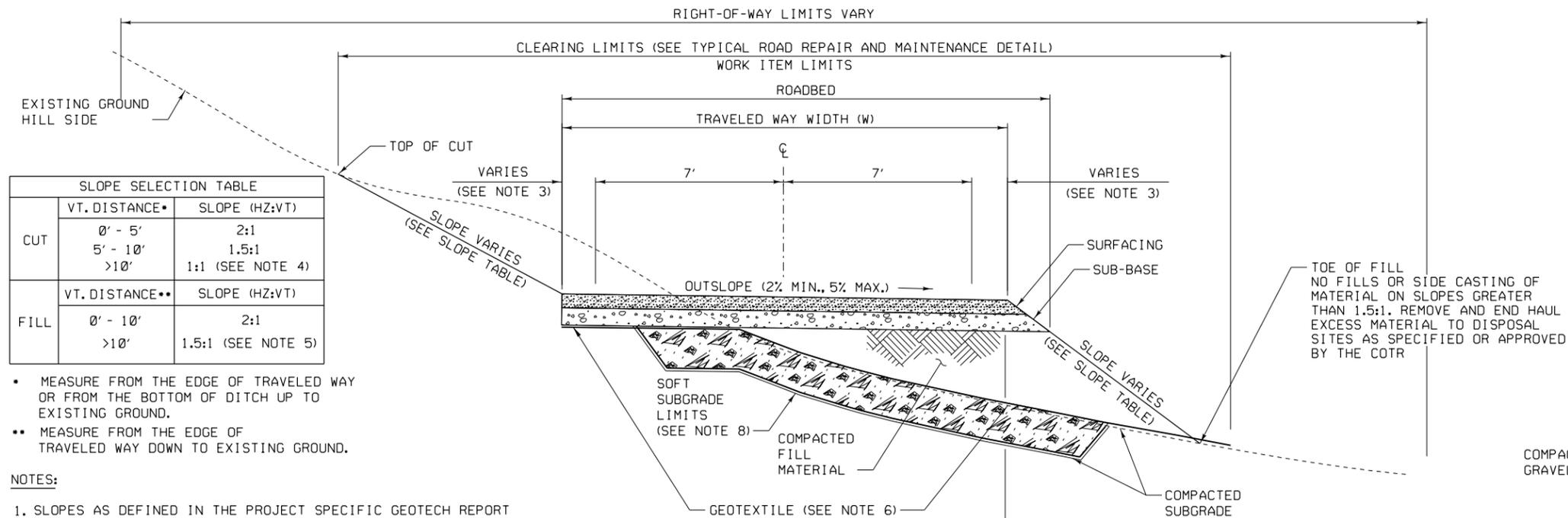
**ACCESS ROAD 9010
CROSS SECTIONS (3 OF 3)**
(SEE SHEET GP1 FOR GRADING PLAN)



DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	ACCESS ROAD DESIGN REVISIONS	HDR/RW	8/5/2013		
	*C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
* C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR/BAH						
Drawn	HDR/BAH						
Chkd	HDR/DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON							
BIG EDDY-KNIGHT NO.1 500kv TRANSMISSION LINE PROJECT LINE MILE 9 STA 22+00 TO 23+16 SECTIONS							
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	CS3	0			

Typical Road Design Attachment



SLOPE SELECTION TABLE		
	VT. DISTANCE*	SLOPE (HZ:VT)
CUT	0' - 5'	2:1
	5' - 10'	1.5:1
	>10'	1:1 (SEE NOTE 4)
	VT. DISTANCE**	SLOPE (HZ:VT)
FILL	0' - 10'	2:1
	>10'	1.5:1 (SEE NOTE 5)

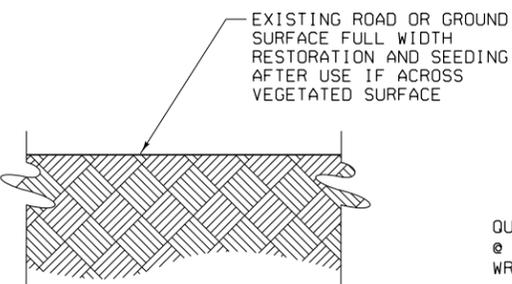
- MEASURE FROM THE EDGE OF TRAVELED WAY OR FROM THE BOTTOM OF DITCH UP TO EXISTING GROUND.
- ** MEASURE FROM THE EDGE OF TRAVELED WAY DOWN TO EXISTING GROUND.

NOTES:

- SLOPES AS DEFINED IN THE PROJECT SPECIFIC GEOTECH REPORT WILL SUPERSEDE INFORMATION CONTAINED IN THE SLOPE SELECTION TABLE ABOVE. USE OF SLOPES STEEPER THAN THOSE AS DEFINED IN THE SLOPE SELECTION TABLE ABOVE ARE SUBJECT TO APPROVAL BY A LICENSED GEOTECHNICAL ENGINEER.
- SEE SPECIFIC CROSS SECTIONS FOR ACCESS ROADS IN DETAILED AREAS, AS NOTED ON THE PLANS.
- A) UNLESS OTHERWISE NOTED CONSTRUCT ROADS WITH A MINIMUM HORIZONTAL RADIUS OF 60 FT. PROVIDE WIDENING ON INSIDE OF ALL CURVES LESS THAN 400 FT IN RADIUS. WIDENING SHALL BE EQUAL TO 400 DIVIDED BY THE RADIUS OF CURVE IN FEET.
B) SEE TYPICAL TURNOUT DETAIL FOR REQUIRED INTERVAL AND WIDTH "X" ASSOCIATED WITH TURNOUTS.
- EXCAVATED CUT SECTIONS GREATER THAN 10 FT IN DEPTH TO EXISTING GROUND SHALL BE REVIEWED BY A LICENSED GEOTECHNICAL ENGINEER FOR SLOPE STABILITY WITH APPROPRIATE CUT SLOPES DEFINED BASED ON EXCAVATED MATERIAL CHARACTERISTICS.
- FILL SECTIONS GREATER THAN 10 FT IN HEIGHT TO EXISTING GROUND SHALL BE REVIEWED BY A LICENSED GEOTECHNICAL ENGINEER FOR SLOPE STABILITY WITH APPROPRIATE FILL SLOPES BASED ON FILL MATERIAL CHARACTERISTICS.
- ALL GEOTEXTILE APPLICATIONS USED TO STABILIZE ACCESS ROADS SHALL BE 15 FT MINIMUM WIDE ROLLS WITH A MINIMUM OF 50 TONS PER STATION OF SUB-BASE ON THE GEOTEXTILE.
- DRAINAGE DITCH REQUIRED ON LOW SIDE OF ROADWAY WHEN THE ROADWAY IS IN A THROUGH CUT SECTION. IF ANY ROAD IS INSLOPED TO THE HILL SIDE BY THE CONTRACTOR A DITCH AND WATER CROSSING FEATURE WILL BE REQUIRED.
- SUBGRADE STABILIZATION LIMITS AS DEFINED IN THE ACCESS ROAD SUMMARY OR AS REQUIRED BY THE SPECIFICATIONS. APPLICATION OF SUBGRADE STABILIZATION DUE TO UNFORSEEN SUBGRADE FAILURE OR WET WEATHER CONSTRUCTION ACTIVITIES WILL REQUIRE COTR APPROVAL. SEE GEOTECH REPORT FOR FURTHER GUIDANCE REGARDING WET WEATHER CONSTRUCTION METHODS AND REQUIREMENTS. ALL TYPICAL ROAD SURFACING MATERIAL PAID UNDER SEPARATE ITEM.
- IF SOFT SUBGRADE CONDITIONS ARE FOUND AS A RESULT OF AN UNFORSEEN CONDITION THAT WILL NOT SUPPORT CONSTRUCTION ACROSS DIRECTION OF TRAVEL LOCATIONS, SEE TEMPORARY ACCESS ROAD TYPICAL DETAIL. USE OF TEMPORARY ROADS IN PLACE OF DIRECTION OF TRAVEL WILL REQUIRE GEOTECHNICAL REVIEW AND COTR APPROVAL.
- ALL TYPICAL ROAD SURFACING MATERIAL QUANTITIES SHOWN IN TONS PER STATION INCLUDE A 10% INCREASE OF MATERIAL BEYOND TRAVELED WAY WIDTH TO ACCOMMODATE FOR CURVE WIDENING AND VEHICLE TURNOUTS.

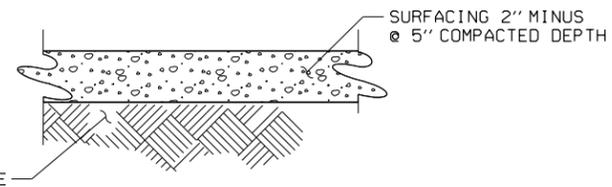
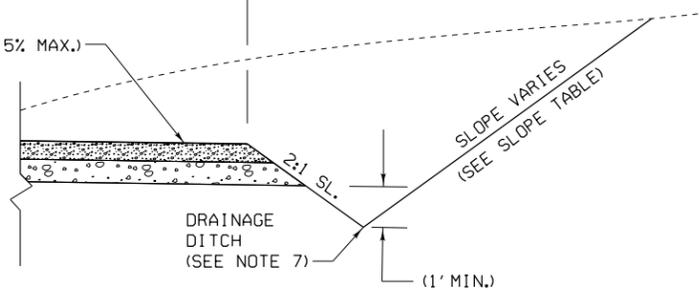
TYPICAL ROAD CROSS SECTION

NTS



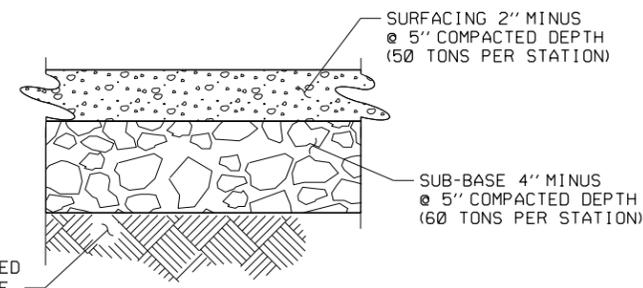
DIRECTION OF TRAVEL

(SEE NOTE 9)



ROADWAY IMPROVEMENT

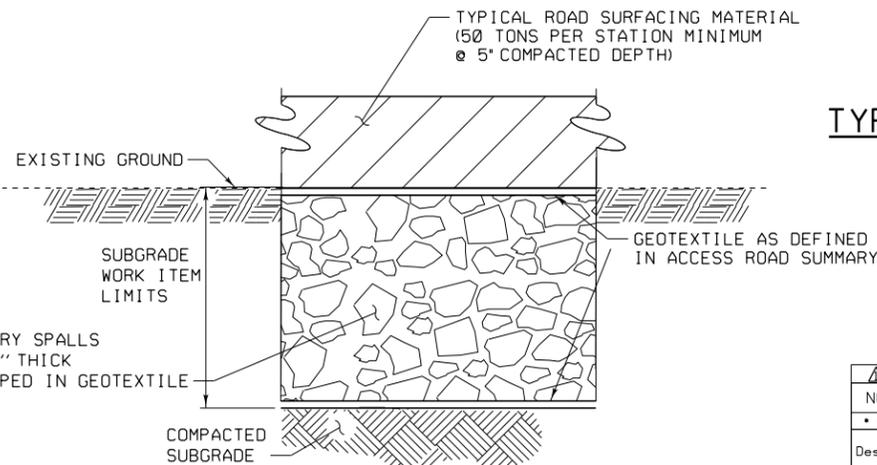
(50 TONS PER STATION)



CONSTRUCTION & RECONSTRUCTION

(110 TONS PER STATION)

TYPICAL ROAD SURFACING MATERIAL (50 TONS PER STATION MINIMUM @ 5" COMPACTED DEPTH)



SUBGRADE STABILIZATION

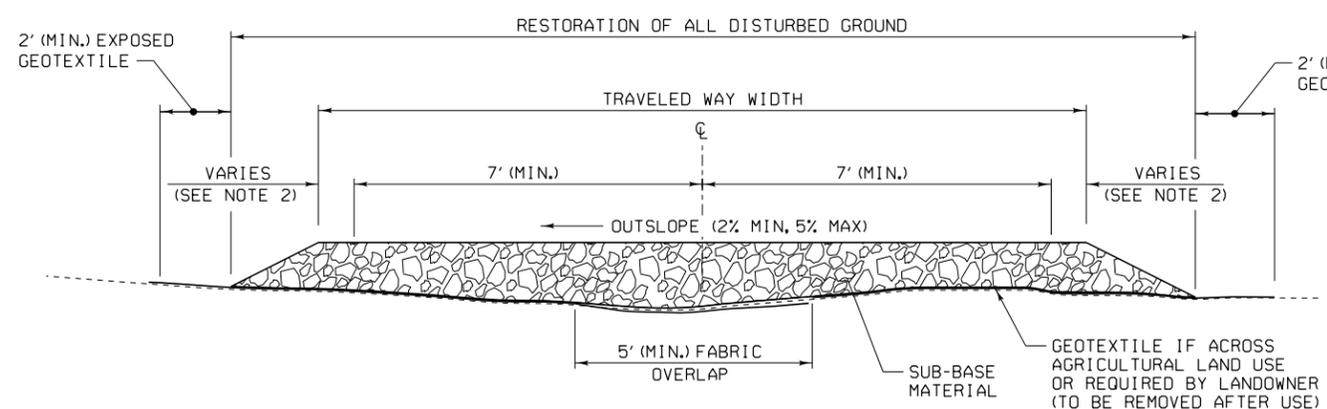
(112 TONS PER STATION)

TYPICAL ROAD SURFACING MATERIAL

NTS
FOR NEW CONSTRUCTION, RECONSTRUCTION, AND IMPROVEMENTS, AS DEFINED IN ACCESS ROAD SUMMARY

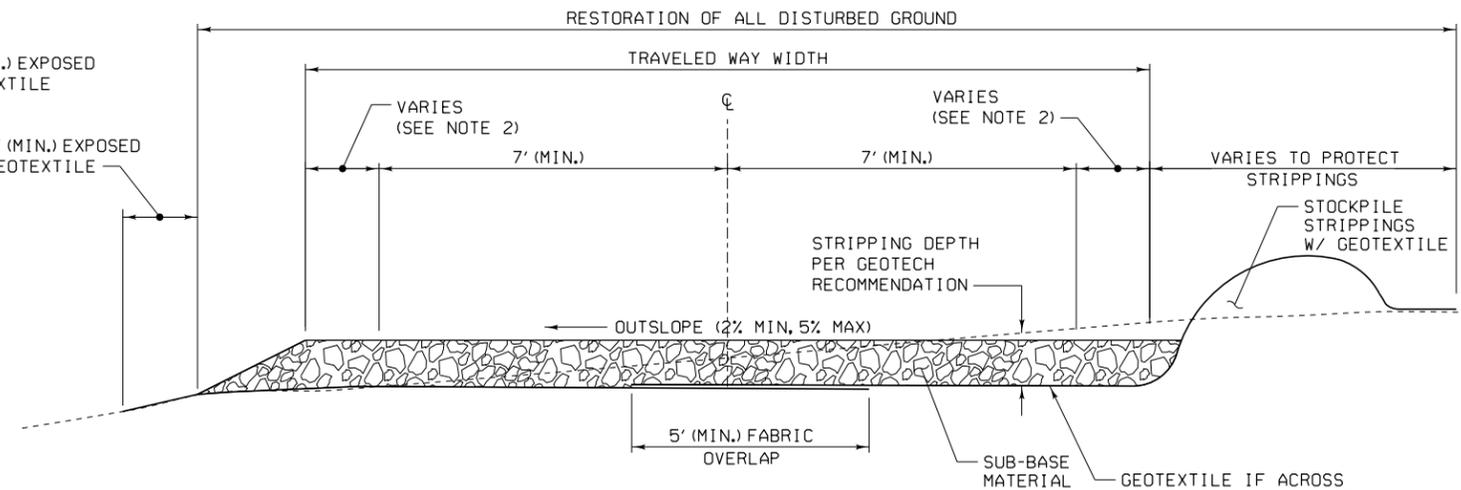
DRAWING NUMBER	SHEET	TITLE
REFERENCE DRAWINGS		

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
NO.	C	W.O.	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / L.S.J.						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
SERIAL		290778	SOURCE	LFC	SIZE	A1	SHEET
TITLE		ROAD CROSS SECTION TYPICAL DETAIL		TD1	REVISION	0	



OPTION 1A

NTS
(EXISTING GROUND CROSS SLOPES 0-5% WITHOUT STRIPPING)

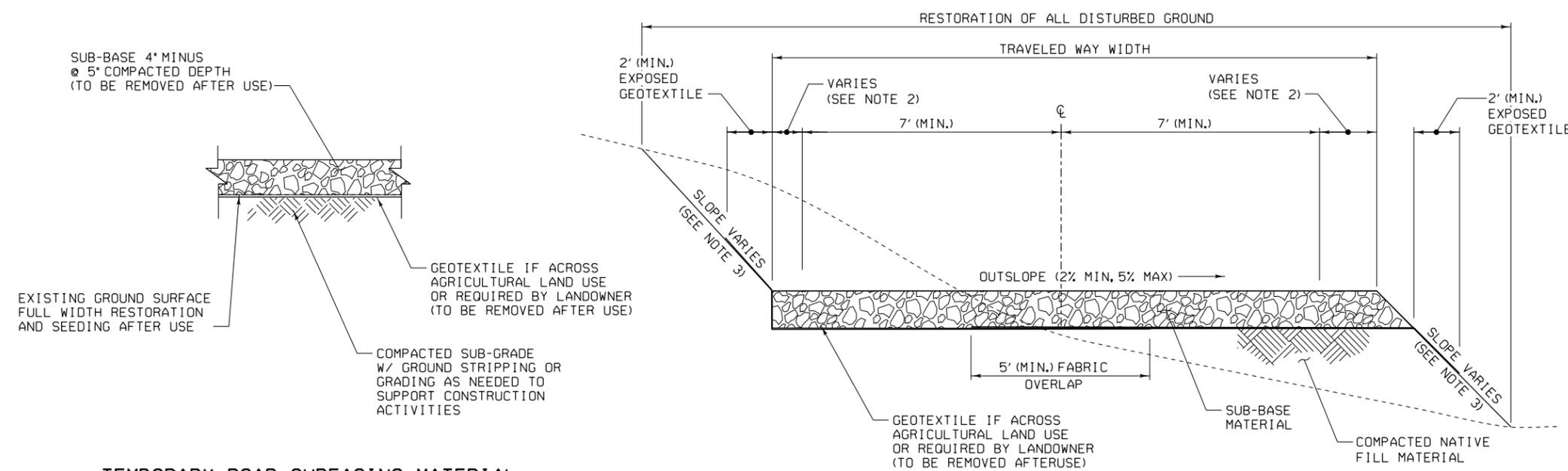


OPTION 1B

NTS
(EXISTING GROUND CROSS SLOPES 0-5% WITH STRIPPING)

NOTES:

1. USE OF TEMPORARY ROADS IN PLACE OF DIRECTION OF TRAVEL AS IDENTIFIED IN CONTRACT DOCUMENTS WILL REQUIRE GEOTECHNICAL REVIEW AND COTR APPROVAL.
2. UNLESS OTHERWISE NOTED CONSTRUCT TEMPORARY ROADS WITH THE MINIMUM HORIZONTAL CURVE RADIUS AND CURVE WIDENING NEEDED TO SUPPORT CONSTRUCTION ACTIVITIES.
3. TEMPORARY CUT AND FILL SLOPES STEEPER THAN 1.5:1 SHALL BE COORDINATED WITH A LICENSED GEOTECHNICAL ENGINEER TO IDENTIFY APPROPRIATE TEMPORARY SLOPES BASED ON MATERIAL CHARACTERISTICS.
4. USE OF GEOTEXTILE WITH TEMPORARY ROADS SHALL BE APPLIED TO STABILIZED ROAD BED WHEN A SUBGRADE WILL NOT SUPPORT THE CONSTRUCTION ACTIVITY, TEMPORARY ROADS ACROSS AGRICULTURAL LAND USES, OR IS REQUIRED BY THE PROPERTY OWNER TO MINIMIZE THE MIGRATION OF THE AGGREGATE TO THE SUBGRADE.
5. ALL GEOTEXTILE APPLICATIONS USED WITH TEMPORARY ROADS SHALL ACCOMMODATE A 5' MINIMUM OVERLAP AT INTERFACE BETWEEN ROLL WIDTHS WHEN UNDER THE ROADBED AND AN EXPOSED 2' MINIMUM WIDTH OF GEOTEXTILE BEYOND THE ROAD SUB-BASE MATERIAL. A MINIMUM OF 50 TONS PER STATION OF SUB-BASE MATERIAL SHALL BE APPLIED OVER THE GEOTEXTILE WHEN USED ON TEMPORARY ROADS.
6. ALL STRIPPINGS SHALL BE STOCKPILED ON THE UPHILL SIDE OF AND ADJACENT TO THE TEMPORARY ROAD WITH GEOTEXTILE PROTECTION OVER THE STRIPPINGS TO MINIMIZE LOSS OF MATERIAL.
7. TEMPORARY ROADS INCLUDING SUB-BASE AGGREGATE AND GEOTEXTILE SHALL BE REMOVED ONCE THE TEMPORARY ROAD IS NO LONGER NEEDED TO SUPPORT CONSTRUCTION. ALL DISTURBED AREAS WILL REQUIRE RESTORATION TO MEET OR EXCEED THE ORIGINAL CONDITION OF THE AREA PRIOR TO CONSTRUCTION. PRIOR TO APPLYING SEED MIX COORDINATE WITH THE PROPERTY OWNER TO ESTABLISH THE APPROPRIATE MIX AND IF APPROPRIATE TO SEED THE DISTURBED AREA.
8. ADDITIONAL SUBGRADE STABILIZATION MAY BE REQUIRED TO SUPPORT CONSTRUCTION TRAFFIC DUE TO UNFORESEEN WET CONDITIONS. USE OF ADDITIONAL SUBGRADE STABILIZATION TO BRIDGE SOFT SOIL CONDITIONS REQUIRES COTR APPROVAL.



OPTION 2

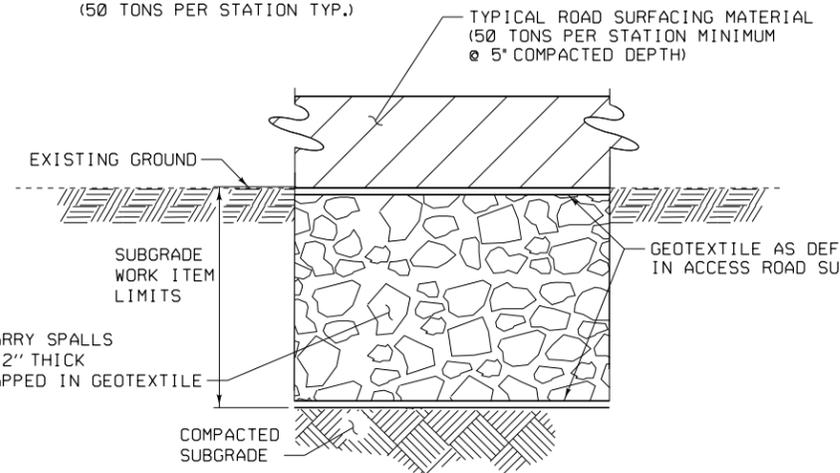
NTS
(EXISTING GROUND CROSS SLOPES > 5%)

TEMPORARY ROAD TYPICAL DETAIL

NTS

TEMPORARY ROAD SURFACING MATERIAL

NTS
(50 TONS PER STATION TYP.)

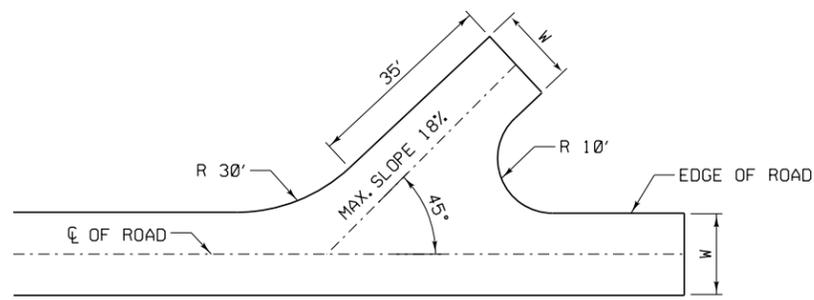


SUBGRADE STABILIZATION

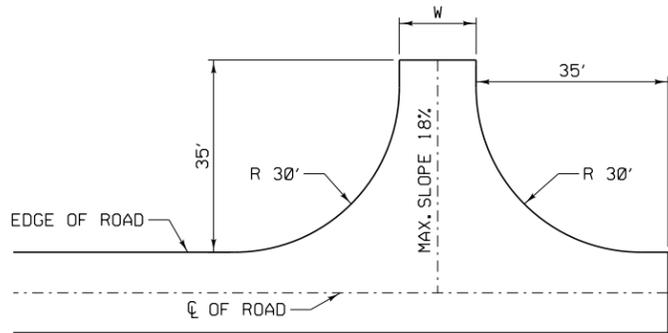
(112 TONS PER STATION)

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

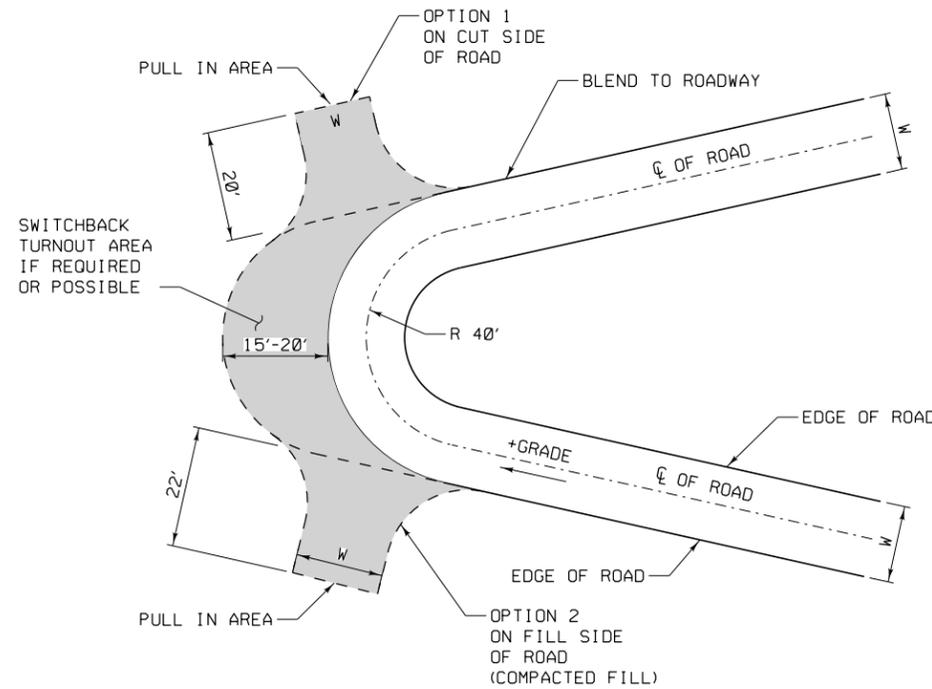
NO.	C	00232575	NEW SHEET	HDR/RW	8/5/2013		
W.O.		00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ			UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON			
Drawn	HDR / BAH			BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT TEMPORARY ROAD TYPICAL DETAIL			
Chkd	HDR / DEC			SERIAL	209778	SOURCE	LFC
Sub				SIZE	A1	SHEET	TD2
Rec				REVISION			0
Appr				Date	AUGUST 2013		



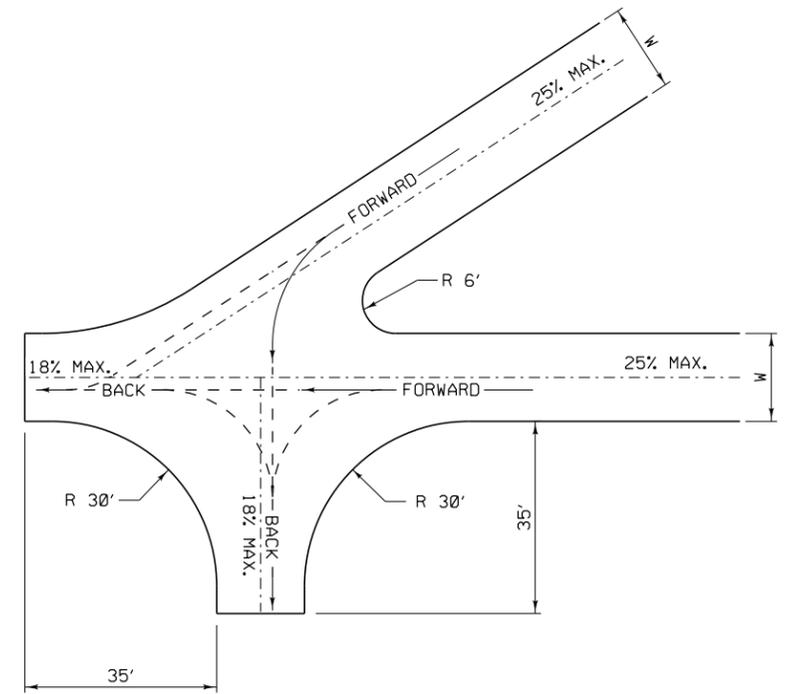
J-HOLE TURNAROUND
NTS



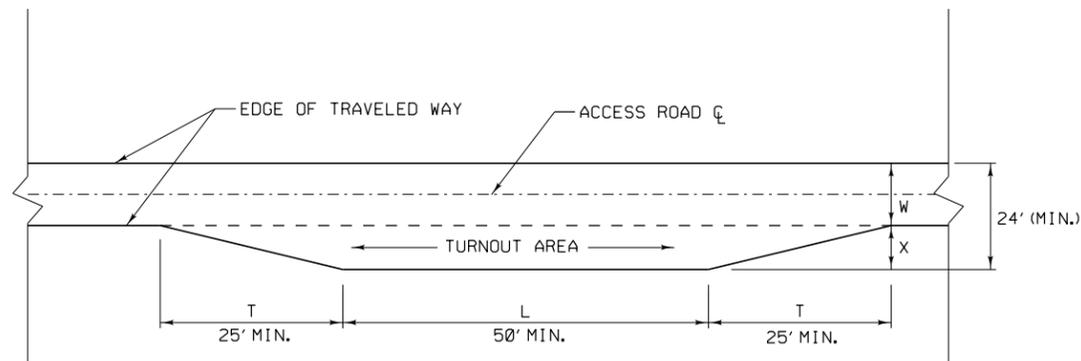
T-TURNAROUND
NTS



SWITCHBACK WITH TURNOUT
NTS



SWITCHBACK WITH T-TURNOUT
NTS



W = TRAVELED WAY WIDTH (SEE ROAD CROSS SECTION TYPICAL DETAIL)
X = TURNOUT WIDTH
L = TURNOUT LENGTH
T = TAPER LENGTH

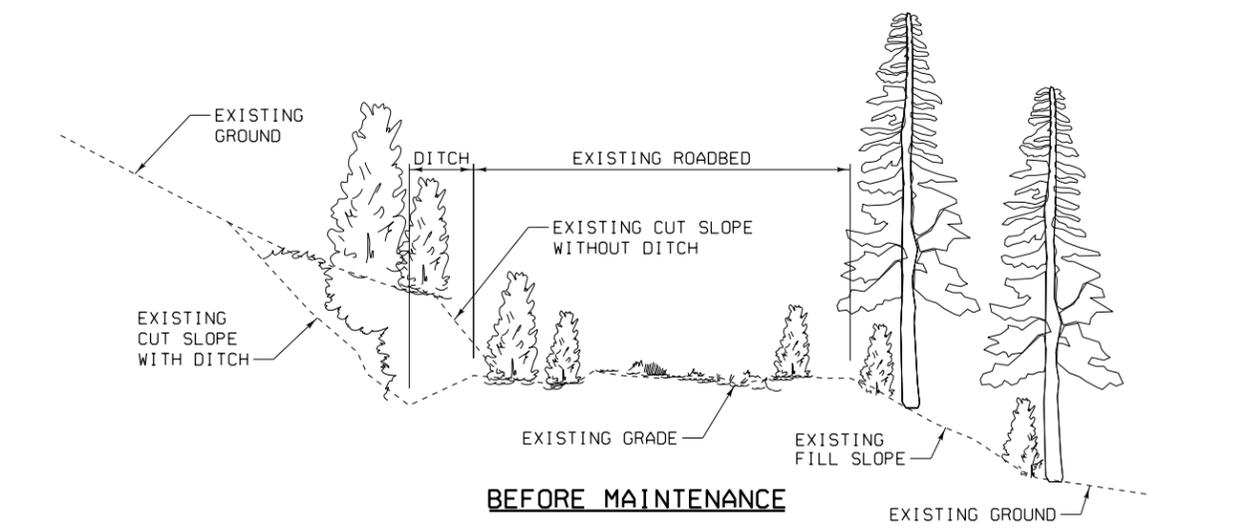
VEHICLE TURNOUT
NTS

NOTES:

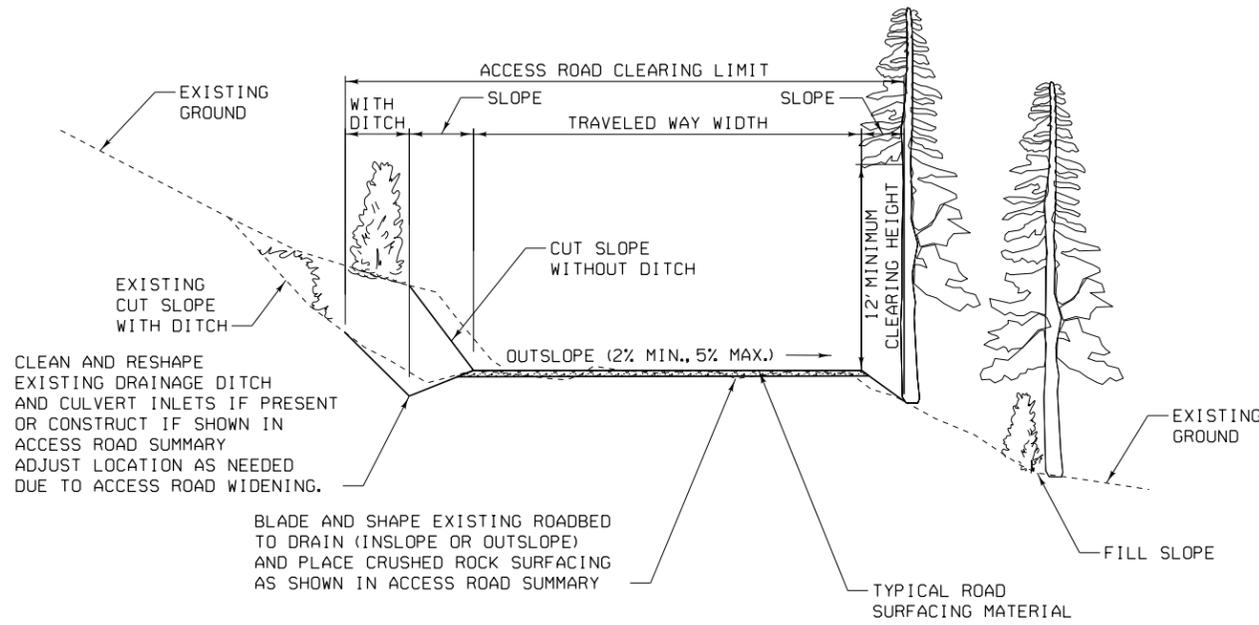
- TURNOUT AREA SURFACING TO MATCH ROAD CROSS SECTION TYPICAL DETAIL.
- PLACE VEHICLE TURNOUTS AT A MINIMUM OF 1/4 MILE INCREMENTS ALONG AN ACCESS ROAD ALIGNMENT, PER BPA STANDARDS.
- WHEN NOT PRACTICAL TO INSTALL TURNOUTS AT THE 1/4 MILE STANDARD INTERVAL AS DEFINED IN THE BPA STANDARDS, COTR APPROVALS ARE REQUIRED.
- SEE ROAD CROSS SECTION TYPICAL DETAIL FOR ACCESS ROAD TRAVELED WAY WIDTH "W" WITH TYPICAL TURNOUT WIDTH "X" BEING 24 FEET MINUS "W".

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
	*C	W.D.	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
* C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Rec							
Appr							
Date	AUGUST 2013						
SERIAL	290778	SOURCE	LFC	SIZE	A1	SHEET	TD3
REVISION							0

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS



BEFORE MAINTENANCE



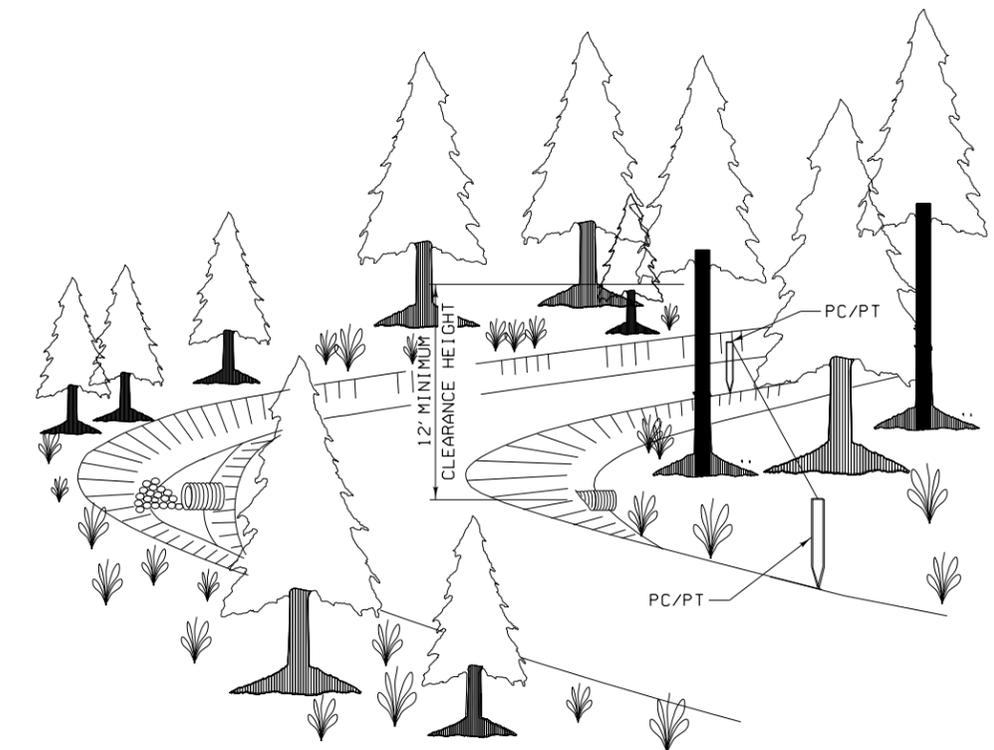
AFTER MAINTENANCE

EXISTING ROAD MAINTENANCE AND CLEARING DETAIL

NTS
APPLIES TO ROAD REPAIR AND MAINTENANCE ACTIVITIES

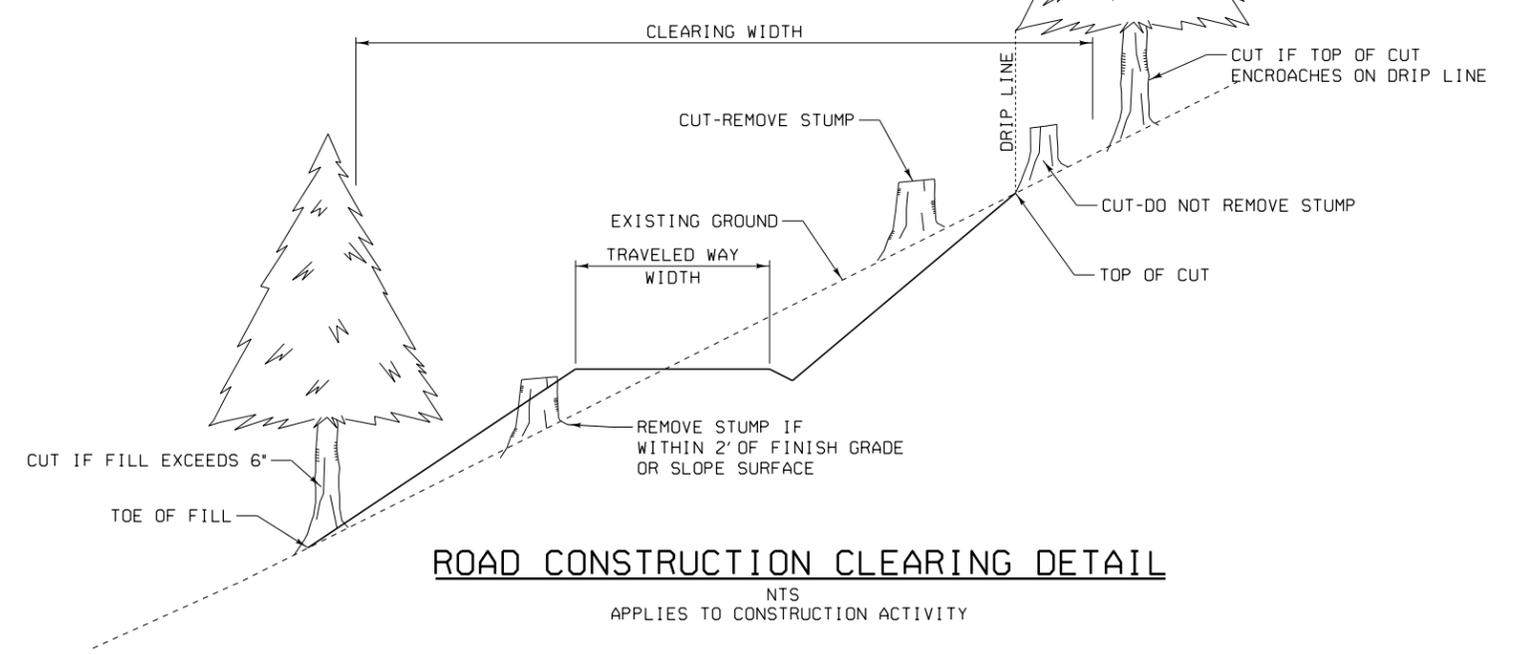
NOTES:

1. REMOVE ALL TREES AND BRUSH WITHIN CLEARING LIMITS SHOWN ON DETAIL OR AS MARKED ON THE GROUND. THE ACCESS ROAD CLEARING LIMIT IS DEFINED AS BEING FROM TOP OF CUT PLUS DRIP LINE TO TOE OF FILL AT 6" DEPTH MAX. TREES MUST BE PROPERLY MARKED AND APPROVED FOR REMOVAL PRIOR TO CUTTING.
2. THE SIGHT DISTANCE CLEARING IS IN ADDITION TO THE ACCESS ROAD CLEARING LIMIT AS DEFINED BY THE LINE OF SIGHT AT THE EDGE OF TRAVELED WAY BETWEEN THE PC & PT OF THE ACCESS ROAD CURVE OR AS MARKED ON THE GROUND. THIN CONIFER TREES WITHIN THIS AREA TO APPROXIMATELY A 12 FT TRUNK SPACING UNLESS TREES ARE MARKED DIFFERENTLY IN THE FIELD. REMOVE ALL HARDWOOD AND BRUSH WITHIN THESE LIMITS UNLESS DIRECTED OTHERWISE.
3. TRIM BRANCHES ON REMAINING CONIFERS FROM GROUND LEVEL TO A 12 FT CLEARING HEIGHT LIMIT ABOVE THE ROADBED ELEVATION OR TO A LIMIT OF 60% TREES HEIGHT, WHICHEVER IS LESS. CUT LIMBS OF VEGETATION SO AS NOT TO PROTRUDE WITHIN THE ACCESS ROAD CLEARING LIMITS.
4. BLADE AND RESHAPE EXISTING ACCESS ROAD TO SPECIFIED GRADES AND DIMENSIONS AS SHOWN IN THE ROAD CROSS SECTION TYPICAL DETAIL AND PLACE ROAD SURFACING MATERIAL DESCRIBED IN THE ACCESS ROAD SUMMARY.
5. CLEAN AND RESHAPE EXISTING DRAINAGE DITCHES INCLUDING CULVERT INLETS IF PRESENT OR CONSTRUCT FEATURES AS DESCRIBED IN THE ACCESS ROAD SUMMARY. ADJUST EXISTING DRAINAGE FEATURES AS NEEDED TO SUPPORT ACCESS ROAD WIDENING.
6. RESHAPE EXISTING WATER BARS, DRAIN DIPS, OR OTHER EXISTING DRAINAGE FEATURES TO DRAIN THE ACCESS ROAD. PLACE ROAD SURFACING MATERIAL, WATER BARS, AND DRAIN DIPS AS SHOWN IN THE ACCESS ROAD SUMMARY.
7. DIMENSIONS AS SHOWN MAY VARY TO FIT LOCAL CONDITIONS AS APPROVED BY COTR.



SIGHT DISTANCE CLEARING DETAIL

NTS
APPLIES TO CONSTRUCTION, REPAIR, AND MAINTENANCE ACTIVITIES



ROAD CONSTRUCTION CLEARING DETAIL

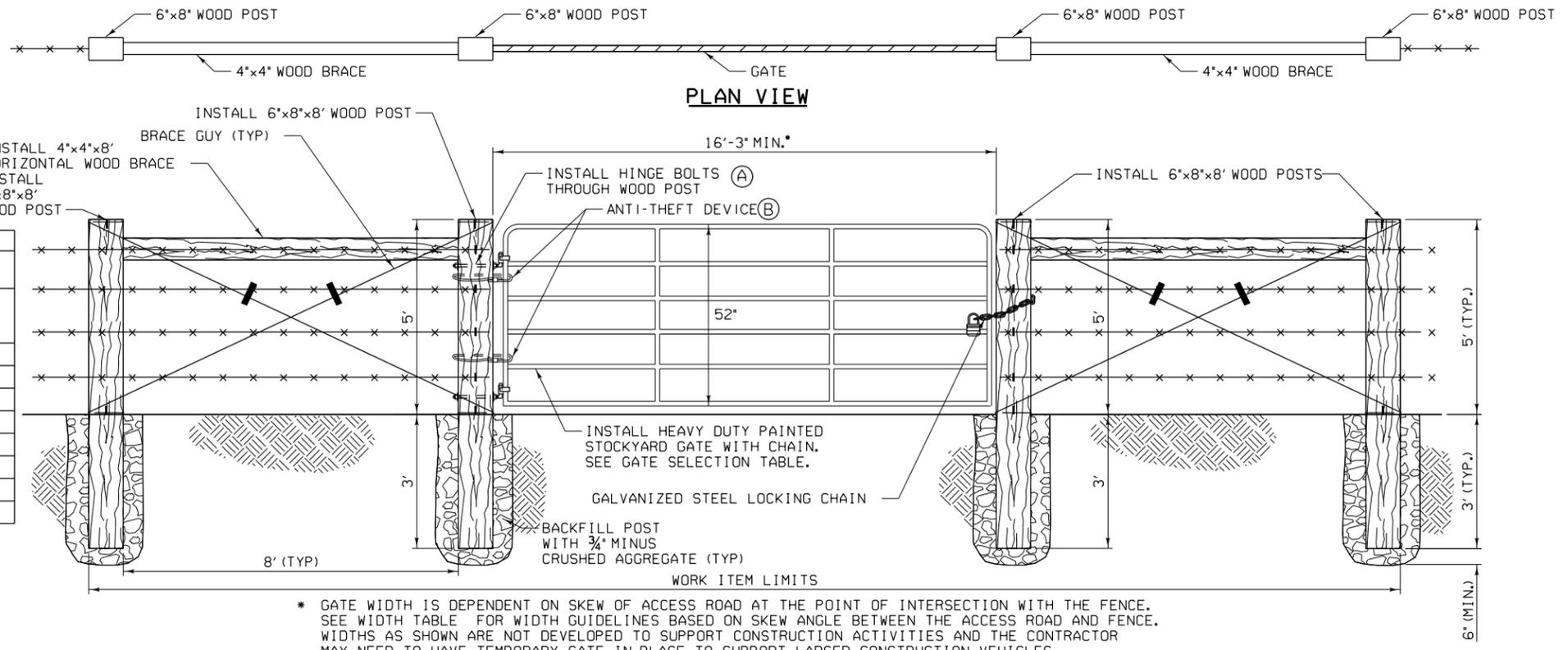
NTS
APPLIES TO CONSTRUCTION ACTIVITY

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
NO.	*C	W.D.	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
* C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
			UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON				
			BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT				
			ROAD REPAIR AND MAINTENANCE TYPICAL DETAIL				
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	TD4	0			

GATE WIDTH TABLE					
FENCE OPENING	SKEW α	# OF GATES	GATE LENGTH	GATE WEIGHT (EACH)	# OF VERTICAL BRACES (EACH)
16'-3"	0°-10°	1	16'	150 lb.	3
20'-6"	11°-38°	2	2-10'	100 lb.	1
24'-6"	39°-49°	2	2-12'	115 lb.	2
28'-6"	50°-55°	2	2-14'	140 lb.	2
32'-6"	56°-60°	2	2-16'	150 lb.	3

MATERIALS REQUIRED FOR GATES			
ITEM	QUAN. (SINGLE)	QUAN. (DOUBLE)	DESCRIPTION
1	1	2	PAINTED 16 FT. 2" DIA. TUBULAR FRAME GATE COMPLETE WITH 2 HINGE ASSEMBLY'S
2	2	4	ANTI-THEFT DEVICE (SEE DETAIL)
3	4	4	6"x8"x8' SAWN CEDAR OR PRESSURE TREATED POST
4	80 FT	80 FT	NO. 9 SMOOTH GALVANIZED WIRE (BRACE GUYS)
5	2	2	4"x4"x8' SAWN CEDAR OR PRESSURE TREATED BRACE
6	125 FT	125 FT	12½ ga GALVANIZED STEEL BARBED WIRE
7	1 LB	1 LB	COMMON NAILS 20d (GALV.)
8	1 LB	1 LB	1½" STAPLES (GALV.)
9	2 FT	2 FT	GALV. STEEL LOCKING CHAIN

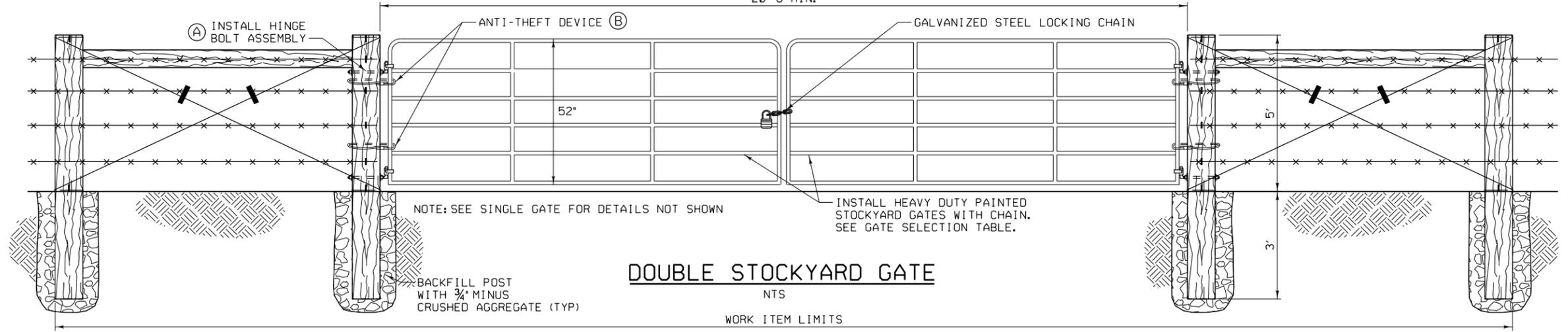
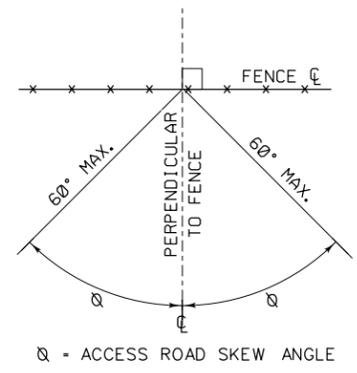


* GATE WIDTH IS DEPENDENT ON SKEW OF ACCESS ROAD AT THE POINT OF INTERSECTION WITH THE FENCE. SEE WIDTH TABLE FOR WIDTH GUIDELINES BASED ON SKEW ANGLE BETWEEN THE ACCESS ROAD AND FENCE. WIDTHS AS SHOWN ARE NOT DEVELOPED TO SUPPORT CONSTRUCTION ACTIVITIES AND THE CONTRACTOR MAY NEED TO HAVE TEMPORARY GATE IN-PLACE TO SUPPORT LARGER CONSTRUCTION VEHICLES.

SINGLE STOCKYARD GATE

NTS

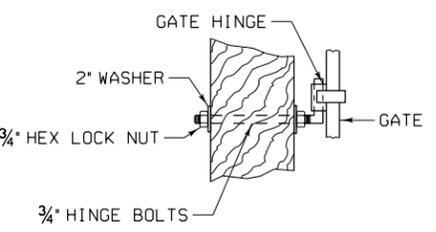
20'-6" MIN.



DOUBLE STOCKYARD GATE

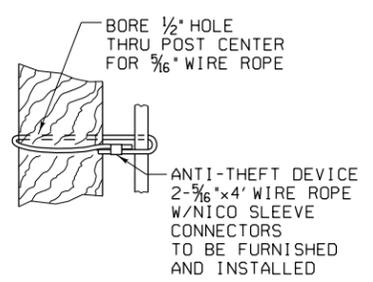
NTS

WORK ITEM LIMITS



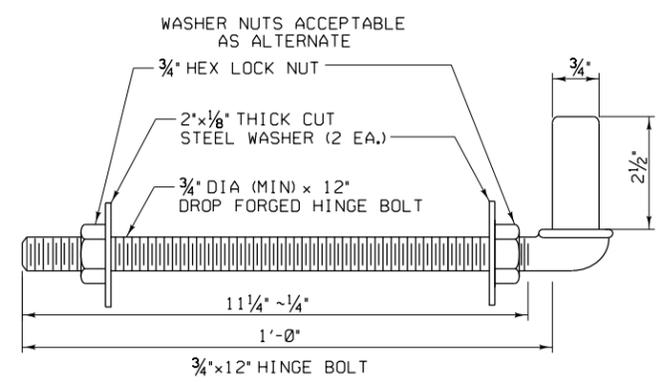
HINGE BOLT ASSEMBLY

NTS



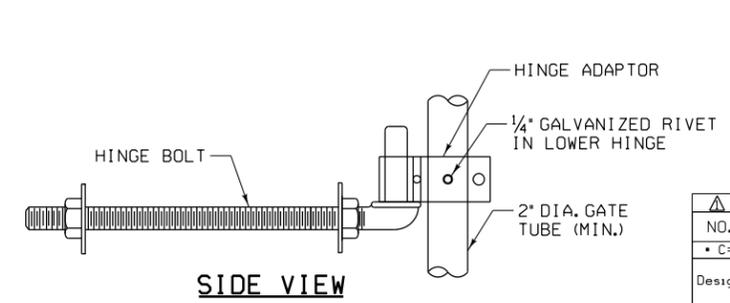
ANTI-THEFT DETAIL

NTS



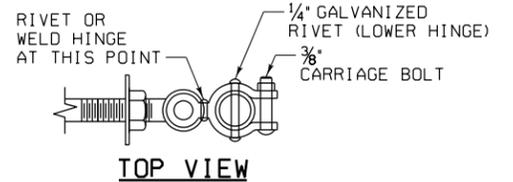
HINGE BOLT

NTS



HINGE ADAPTOR (IF NEEDED)

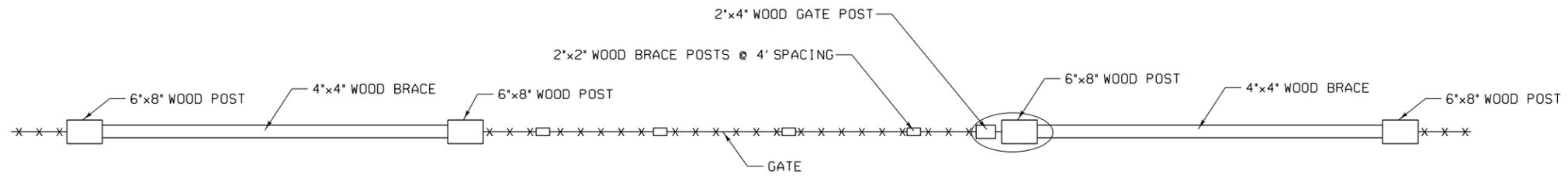
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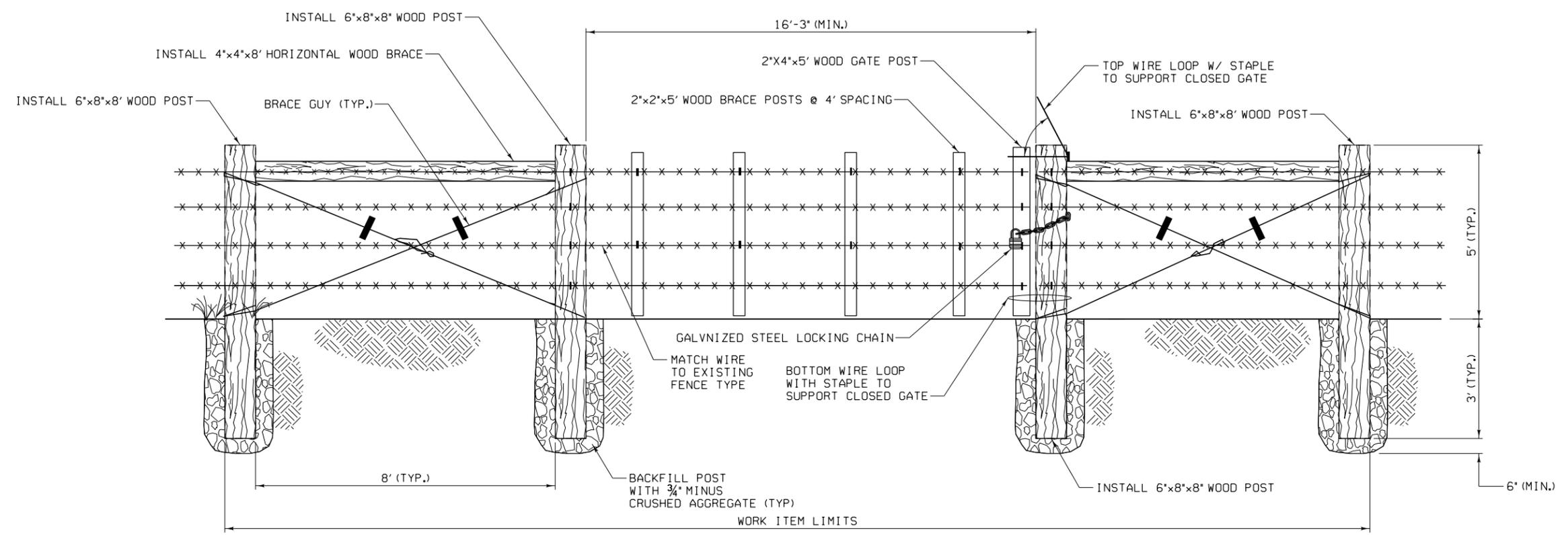
TOP VIEW

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013	
W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD						
Design	HDR / LSJ					UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT STOCKYARD GATE TYPICAL DETAIL
Drawn	HDR / BAH					
Chkd	HDR / DEC					
Sub						
Rec						
Appr						
Date	AUGUST 2013		SERIAL	290778	SOURCE	LFC
			SIZE	A1	SHEET	TD5
			REVISION			0



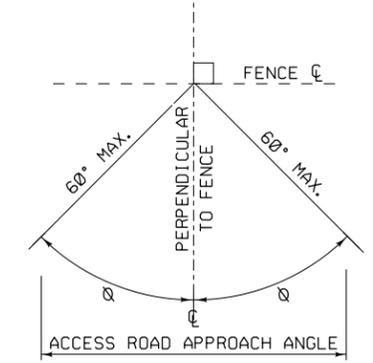
PLAN VIEW



• GATE WIDTH IS DEPENDENT ON SKEW OF ACCESS ROAD AT THE POINT OF INTERSECTION WITH THE FENCE. SEE WIDTH TABLE FOR WIDTH GUIDELINES BASED ON SKEW ANGLE BETWEEN THE ACCESS ROAD AND FENCE. WIDTHS AS SHOWN ARE NOT DEVELOPED TO SUPPORT CONSTRUCTION ACTIVITIES AND THE CONTRACTOR MAY NEED TO HAVE TEMPORARY GATE IN-PLACE TO SUPPORT LARGER CONSTRUCTION VEHICLES.

BARB WIRE GATE DETAIL

NTS

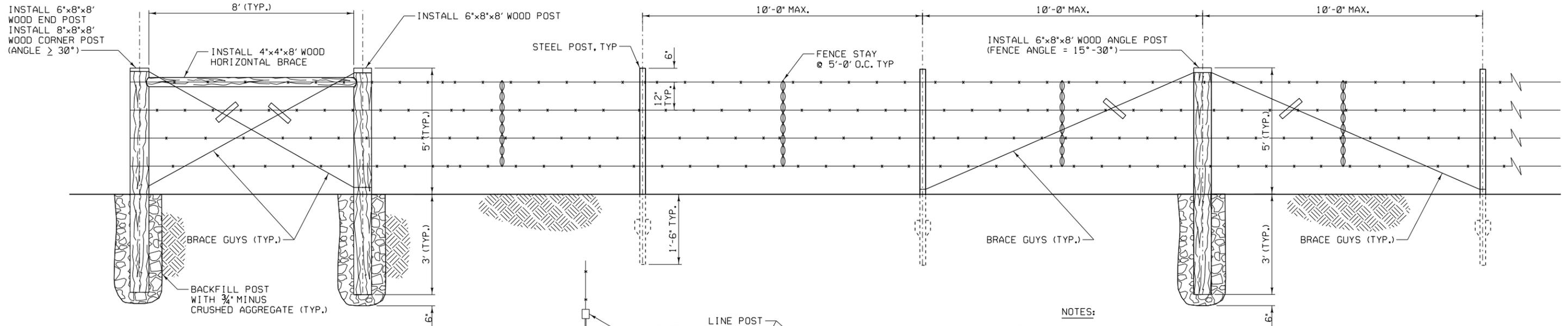


ITEM	QUANT.	MATERIALS REQUIRED FOR GATES DESCRIPTION
1	4	6"x8"x8' SAWN CEDAR OR PRESSURE TREATED POST
2	TABLE	2"x2"x5' SAWN CEDAR OR PRESSURE TREATED POST
3	2	4"x4"x8' SAWN CEDAR OR PRESSURE TREATED BRACE
4	1	4"x2"x5' SAWN CEDAR OR PRESSURE TREATED POST
5	TABLE	12 1/2 ga GALV. STEEL BARBWIRE
6	1 LB	COMMON NAILS 20d (GALV.)
7	1 LB	1 1/2" STAPLES (GALV.)
8	4 FT	GALV. STEEL LOCKING CHAIN
9	80 FT	NO. 9 SMOOTH GALVANIZED WIRE (BRACE GUYS)

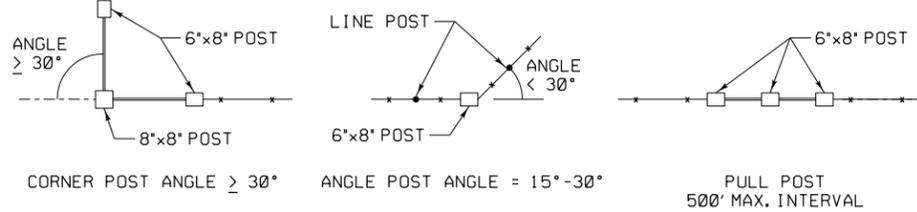
GATE WIDTH TABLE			
FENCE OPENING	SKEW	VERTICAL BRACE POST	BARBWIRE LENGTH
16'-3"	0°-10°	4	150 FT
20'-6"	11°-38°	5	165 FT
24'-6"	39°-49°	6	180 FT
24'-6"	50°-55°	6	180 FT
24'-6"	56°-60°	6	180 FT

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	NEW SHEET	HDR/RW	8/5/2013		
W.O.		00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON							
BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT BARB WIRE GATE TYPICAL DETAIL							
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	TD6	0			



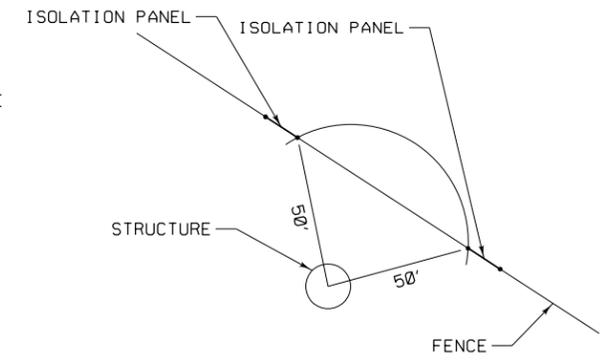
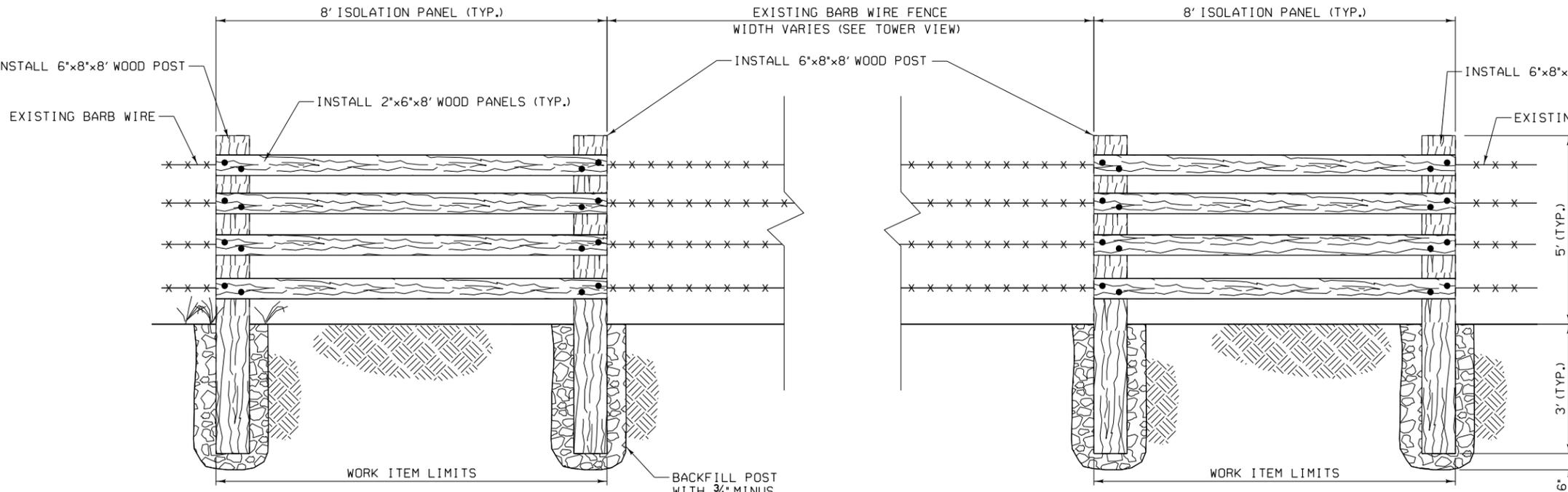
MATERIALS REQUIRED FOR SUPPORT POSTS					
ITEM	QUAN. CORNER	QUAN. END	QUAN. PULL	QUAN. ANGLE	DESCRIPTION
1	1	0	0	0	8"x8"x8' SAWN CEDAR OR PRESSURE TREATED CORNER POST
2	2	2	3	1	6"x8"x8' SAWN CEDAR OR PRESSURE TREATED POST
3	2	1	2	0	4"x4"x8' SAWN CEDAR OR PRESSURE TREATED BRACE
4	80 FT	40 FT	80 FT	50 FT	NO. 9 SMOOTH GALVANIZED WIRE (BRACE GUYS)
5	1 LB	½ LB	1 LB	0	COMMON NAILS 20d (GALV.)
6	1 LB	½ LB	1 LB	½ LB	1½" STAPLES (GALV.)



- NOTES:
- CORNER POSTS ARE INCIDENTAL TO LINEAR FOOT COSTS ASSOCIATED WITH CONSTRUCTION OF BARB WIRE FENCE.
 - EXISTING OR CONSTRUCTED BARB WIRE FENCE IN PROXIMITY TO TRANSMISSION TOWERS REQUIRE ISOLATION FENCE PANELS.
 - BARB WIRE FENCE LINE POST APPLICATIONS WITHIN SHALLOW BEDROCK REQUIRE LINE POSTS TO BE DRILLED AND GROUTED.
 - CORNER, ANGLE, PULL AND END POST ASSEMBLIES SHALL BE INSTALLED PRIOR TO STRETCHING WIRE BETWEEN LINE POSTS.
 - EXISTING AND NEW WIRE FENCES WITH WOOD LINE POSTS WITHIN THE TRANSMISSION RIGHT-OF-WAY REQUIRE METAL FENCE LINE POSTS TO BE INSTALLED AT THE ENDS OF FENCE AND AT A 200 FOOT MAXIMUM INTERVAL SPACING TO GROUND THE FENCE.

BARB WIRE FENCE TYPICAL DETAIL

NTS



STRUCTURE VIEW

- NOTES:
- INSTALL PANELS AT LIMITS OF 50' RADIUS RADIUS FROM STRUCTURE.
 - ISOLATION FENCE PANEL PAY ITEM SHALL INCLUDE 2 PANELS PER EACH INSTALLATION.

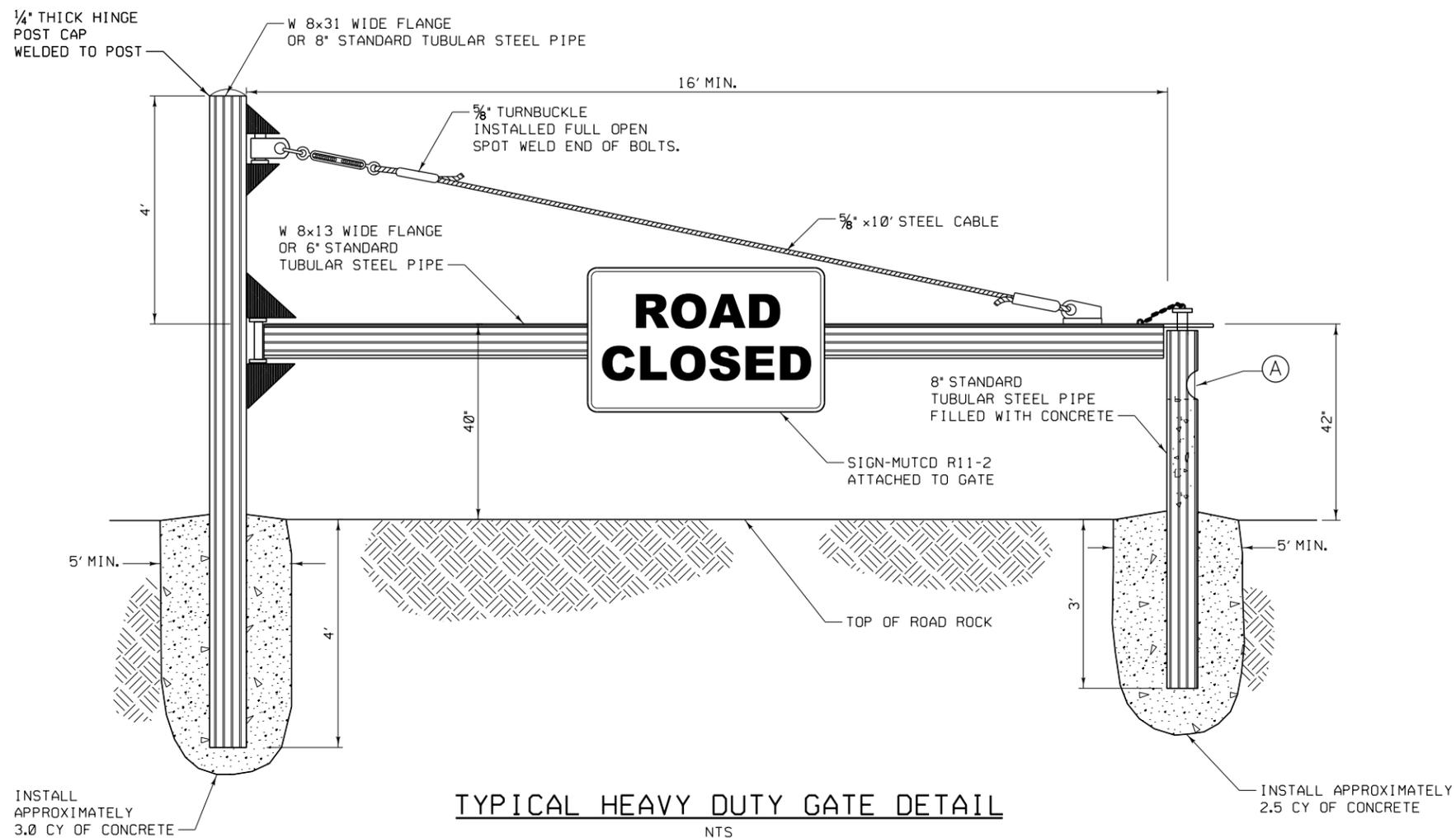
ISOLATION FENCE PANEL DETAIL

NTS

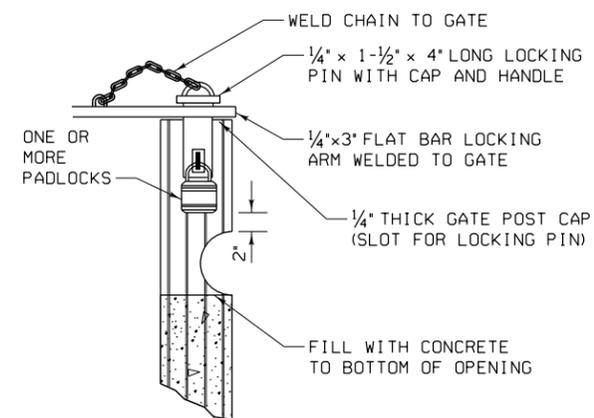
MATERIALS REQUIRED FOR PANELS		
ITEM	QUANT	DESCRIPTION
1	4	6"x6"x8' SAWN CEDAR OR PRESSURE TREATED POST
2	8	2"x6"x8' SAWN CEDAR OR PRESSURE TREATED PANELS
3	32	½"x6" LAG BOLTS (GALV.)
4	32	½" FLAT WASHERS
5	1 LB	1½" STAPLES (GALV.)

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C 00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013	
W.O.	00254606	COMPUTER REVISION ONLY	BY	DATE	APPROVED
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT BARB WIRE & ISOLATION FENCE PANEL TYPICAL DETAIL					
Design	HDR / LSJ				
Drawn	HDR / BAH				
Chkd	HDR / DEC				
Sub					
Rec					
Appr					
Date	AUGUST 2013	SERIAL	SIZE	SHEET	REVISION
		290778	LFC	A1	TD7 0



TYPICAL HEAVY DUTY GATE DETAIL
NTS



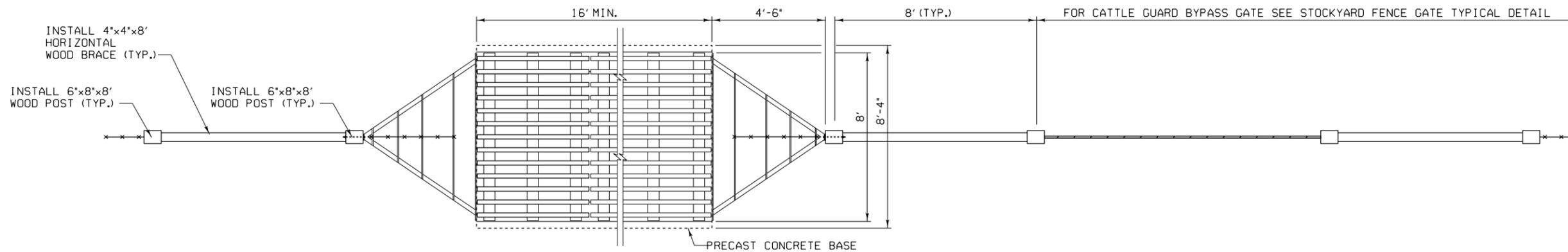
LOCK & LOCKING POST DETAIL (A)
NTS

NOTES:

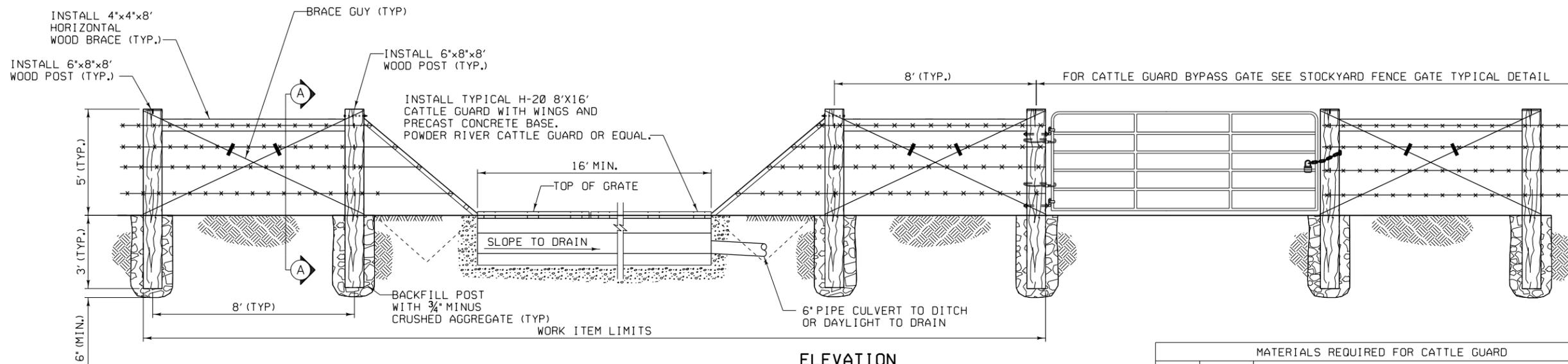
1. ALL STEEL PIPE SHALL BE ASTM A500 GRADE B. ALL OTHER STEEL SHALL BE ASTM A36.
2. ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1. ALL ELECTRODES SHALL BE E70XX.
3. STRUCTURAL STEEL FABRICATION SHALL CONFORM TO THE AISC CODE OF STANDARD PRACTICE.
4. ALL STEEL MEMBERS SHALL BE BLAST CLEANED TO SSPC-SP2 STANDARDS AND PRIMED WITH SHERWIN WILLIAMS PROCRY UNIVERSAL PRIMER (2-4 MILS) OR APPROVED EQUAL. THE GATE AND ALL APPURTENANCES SHALL BE PAINTED WITH SHERWIN WILLIAMS RUGGED BROWN (6062) OR APPROVED EQUAL. DTMACRYLIC-B66-100 SERIES (2.5-4 MILS)
5. PRIOR TO FABRICATION, THE CONTRACTOR SHALL PREPARE SHOP DRAWINGS AND WORKING DRAWINGS FOR REVIEW BY THE ENGINEER.

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
	*C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
* C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON				BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT HEAVY DUTY GATE TYPICAL DETAIL			
SERIAL	SOURCE	SIZE	SHEET	REVISION			
209778	LFC	A1	TD8	0			



TOP VIEW

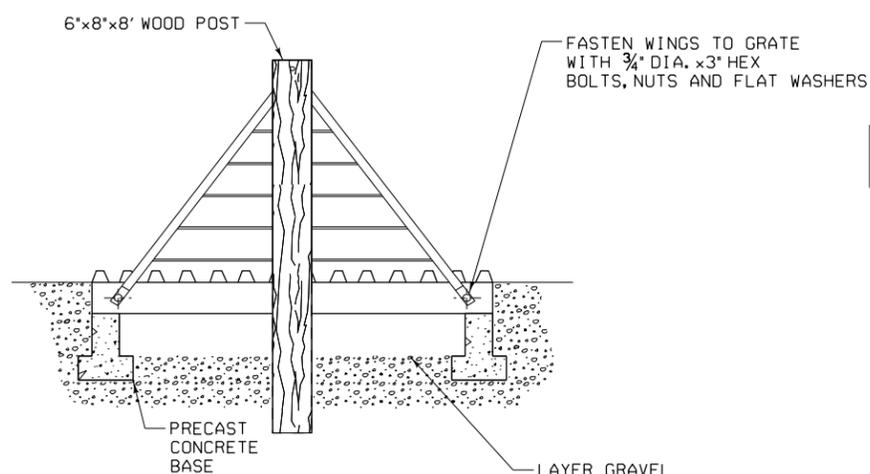


ELEVATION

TYPICAL CATTLE GUARD DETAIL

NTS

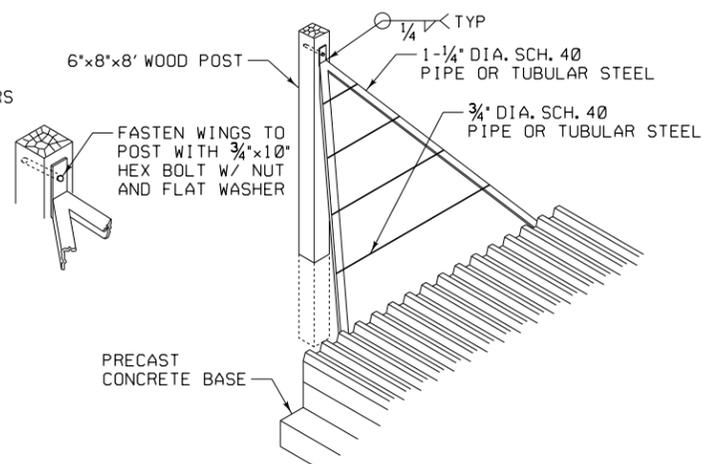
MATERIALS REQUIRED FOR CATTLE GUARD		
ITEM	QUANT	DESCRIPTION
1	1	8'x16' H-20 LOADING CATTLE GUARD GRATE
2	2	CATTLE GUARD WINGS
3	4	3/4"x3" DIA. HEX BOLTS, NUTS & FLAT WASHERS FOR ATTACHMENT OF WINGS TO GRATE
4	2	3/4"x10" DIA. HEX BOLTS, NUTS & FLAT WASHERS FOR ATTACHMENT OF WINGS TO POST
5	2	16' PRECAST CONCRETE CATTLE GUARD BASES (8000 LBS/PAIR)
6	4	6"x8"x8' SAWN CEDAR OR PRESSURE TREATED POST
7	100-120'	12 1/2 ga GALVANIZED STEEL BARBED WIRE
8	1 LB	1 1/2" STAPLES (GALV.)
9	80 FT	NO. 9 SMOOTH GALVANIZED WIRE (BRACE GUY)
10	1/2 LB	COMMON NAILS 20d (GALVANIZED)
11	2	4"x4"x8' SAWN CEDAR OR PRESSURE TREATED BRACE



SECTION A

NTS

LAYER GRAVEL APPROXIMATELY 6" DEEP BENEATH AND ON OUTSIDES OF CONCRETE BASES (TYP.)

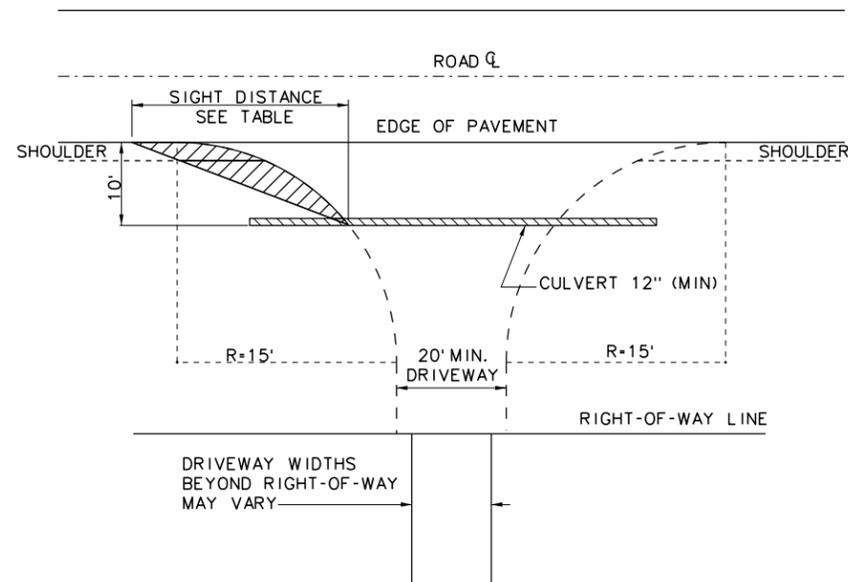


ORTHOGONAL VIEW

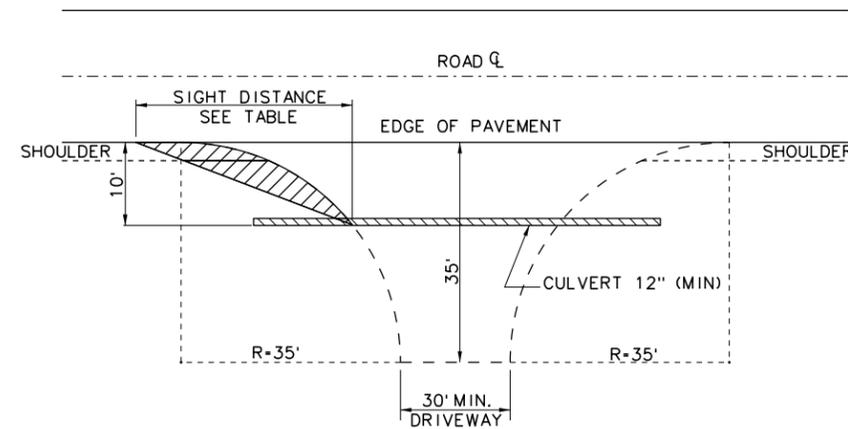
NTS

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	NEW SHEET	HDR/RW	8/5/2013		
W.O.		00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design HDR / LSJ Drawn HDR / BAH Chkd HDR / DEC Sub Rec Appr				UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT CATTLE GUARD TYPICAL DETAIL			
Date	AUGUST 2013	SERIAL	290778	SOURCE	LFC	SIZE	A1
		SHEET	TD9	REVISION	0		



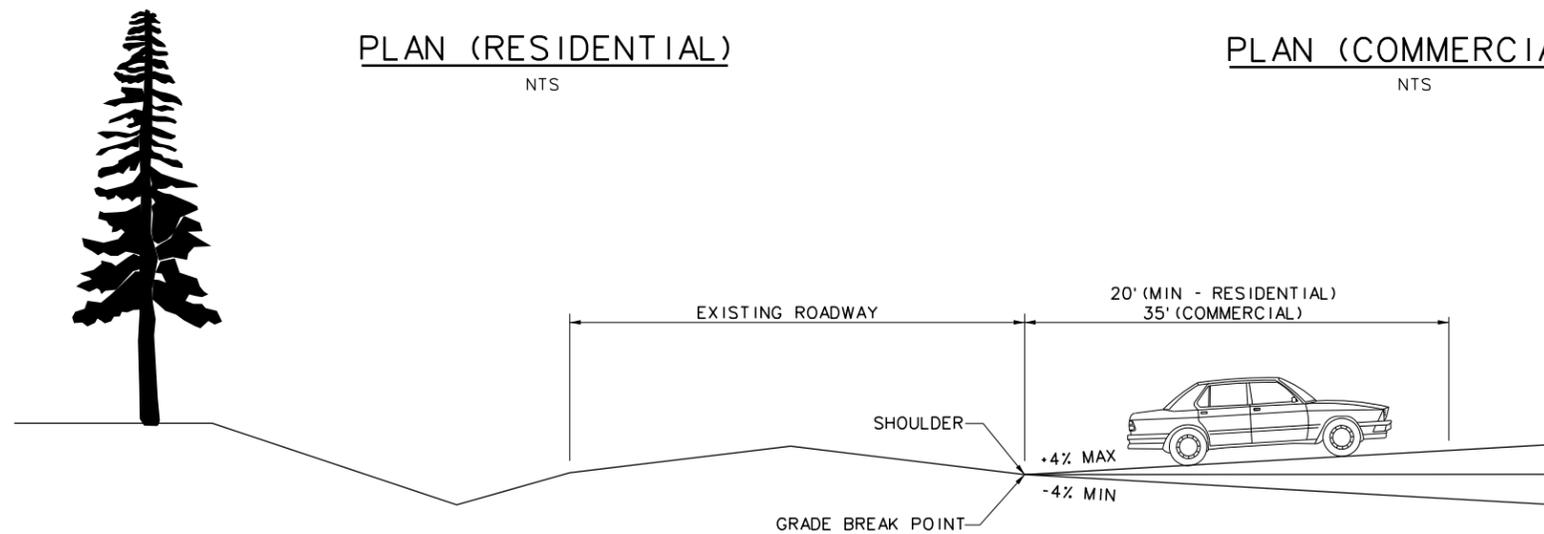
PLAN (RESIDENTIAL)
NTS



PLAN (COMMERCIAL)
NTS

Sight Distance Table (feet)

Posted Speed (mph)	20	25	30	35	40	50
Sight Distance	150	150	180	230	280	380



TYPICAL SECTION
NTS

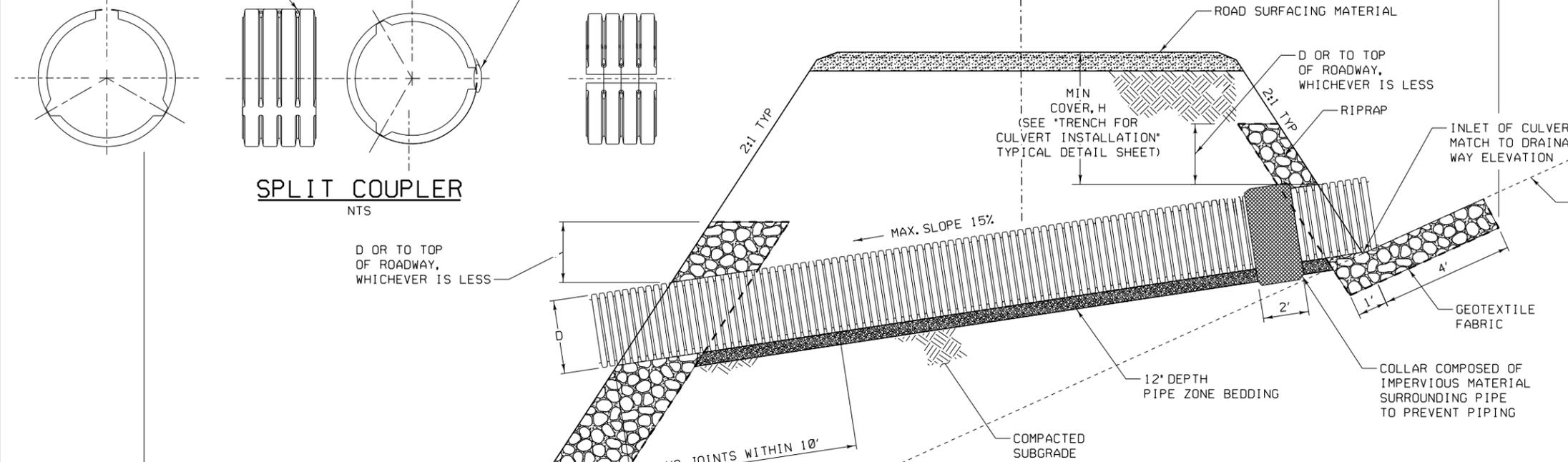
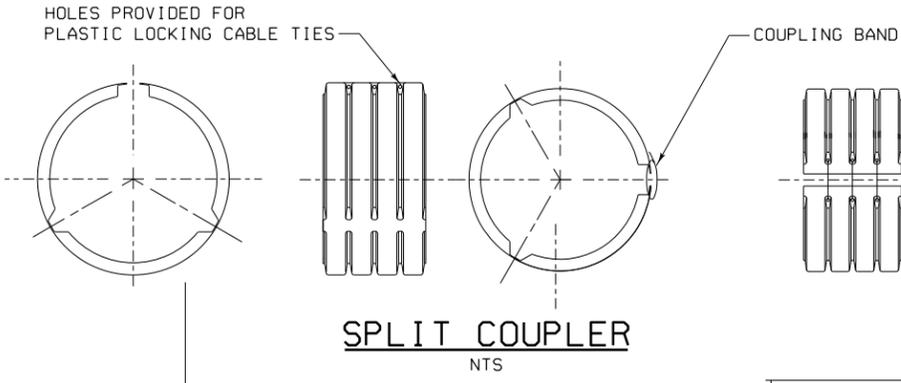
KLICKITAT COUNTY DRIVEWAY APPROACH

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

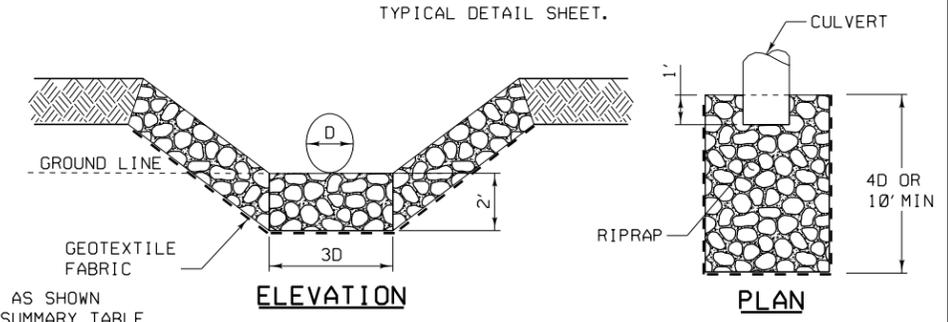
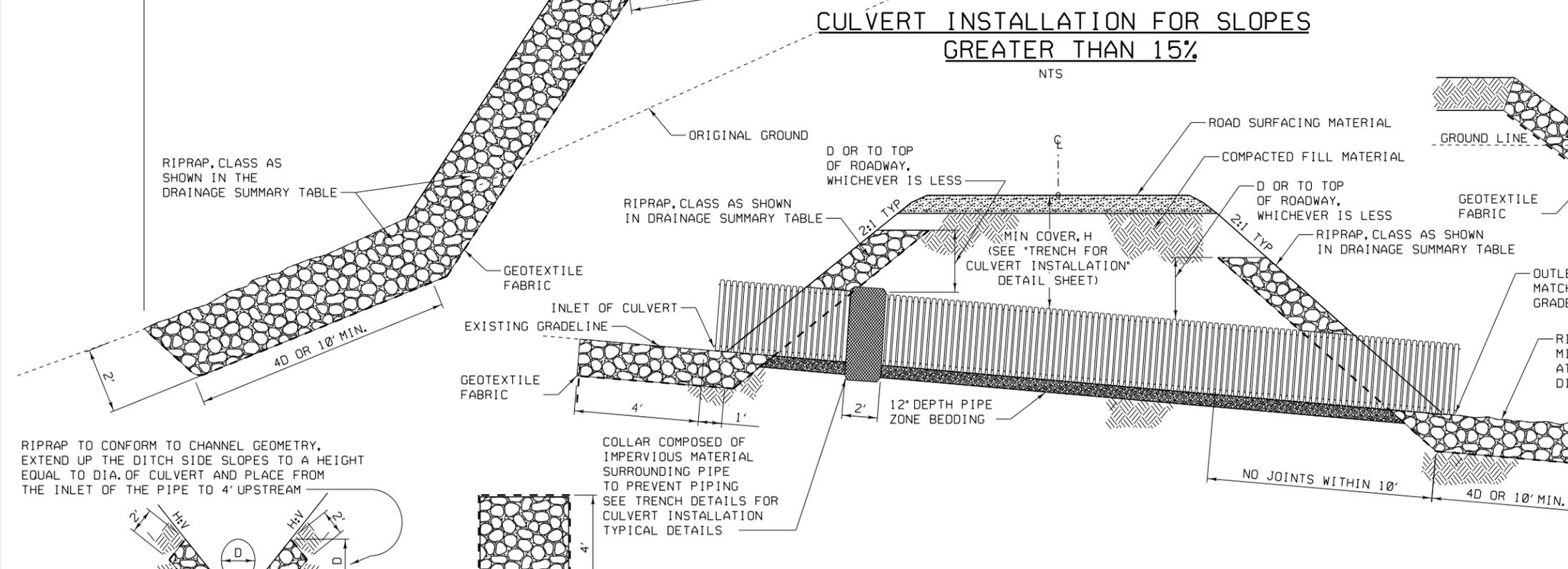
NO.	C	W.D.	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
* C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR/LSJ						
Drawn	HDR/BAH						
Chkd	HDR/DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY-KNIGHT NO.1 500kv TRANSMISSION LINE PROJECT KLICKITAT COUNTY DRIVEWAY APPROACH DETAIL							
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	TD10	0			

CULVERT INSTALL WORK ITEM LIMITS

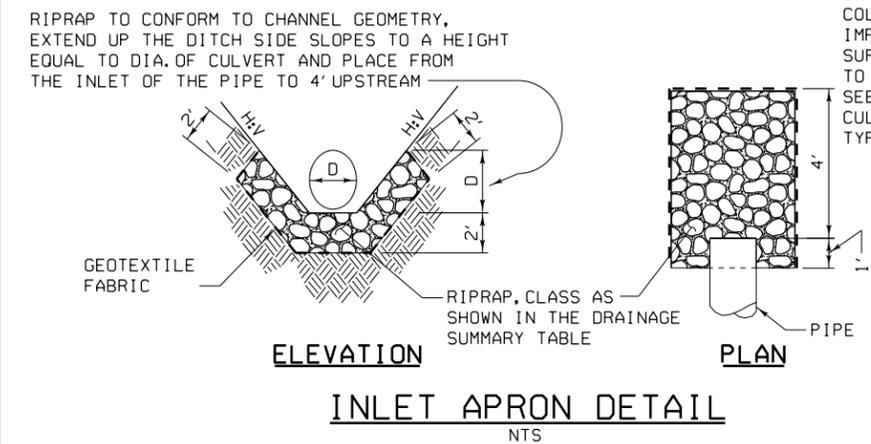
MATERIALS REQUIRED FOR CULVERT INSTALLATION	
ITEM	DESCRIPTION
1	PIPE, SIZE AS SHOWN IN THE DRAINAGE SUMMARY TABLE
2	PIPE ZONE BEDDING
3	BACKFILL
4	COLLAR
5	RIPRAP, CLASS AS SHOWN IN THE DRAINAGE SUMMARY TABLE
6	GEOTEXTILE FABRIC



- NOTES:**
1. RIPRAP AT CULVERT INLET AS REQUIRED AND SHOWN IN THE DRAINAGE SUMMARY TABLE.
 2. CULVERTS SHALL NOT BE INSTALLED AT SLOPES GREATER THAN 15%.
 3. CONTRACTOR SHALL VERIFY ALL CULVERT LENGTHS BASED ON ACCESS ROAD DESIGN SIDE SLOPES AND EXISTING CONDITIONS FOUND IN THE FIELD.
 4. SEE NOTES ON PLANS AND DRAINAGE SUMMARY TABLE FOR LOCATION AND SIZE OF CULVERT.
 5. SEE "TRENCH FOR CULVERT INSTALLATION" TYPICAL DETAIL SHEET.



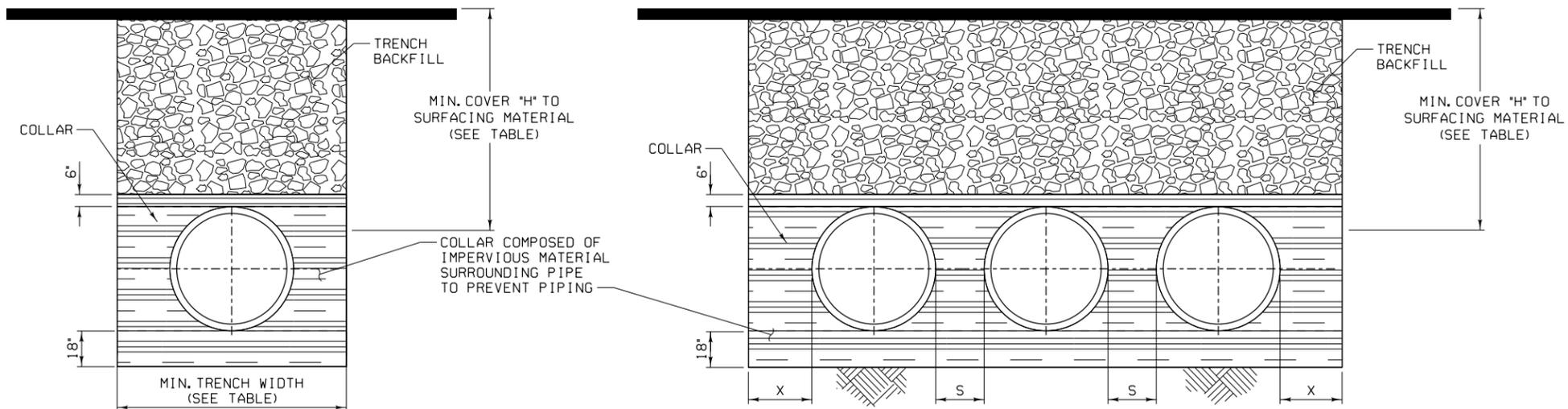
- NOTES:**
1. APRON SURFACE MUST CONFORM TO SHAPE OF EXISTING GROUND AND BE LEFT ROUGH TO REDUCE WATER VELOCITY.
 2. DITCH OUTLET APRON TO BE MIN. 10' X 6'



CULVERT INSTALLATION FOR SLOPES LESS THAN 15%
NTS

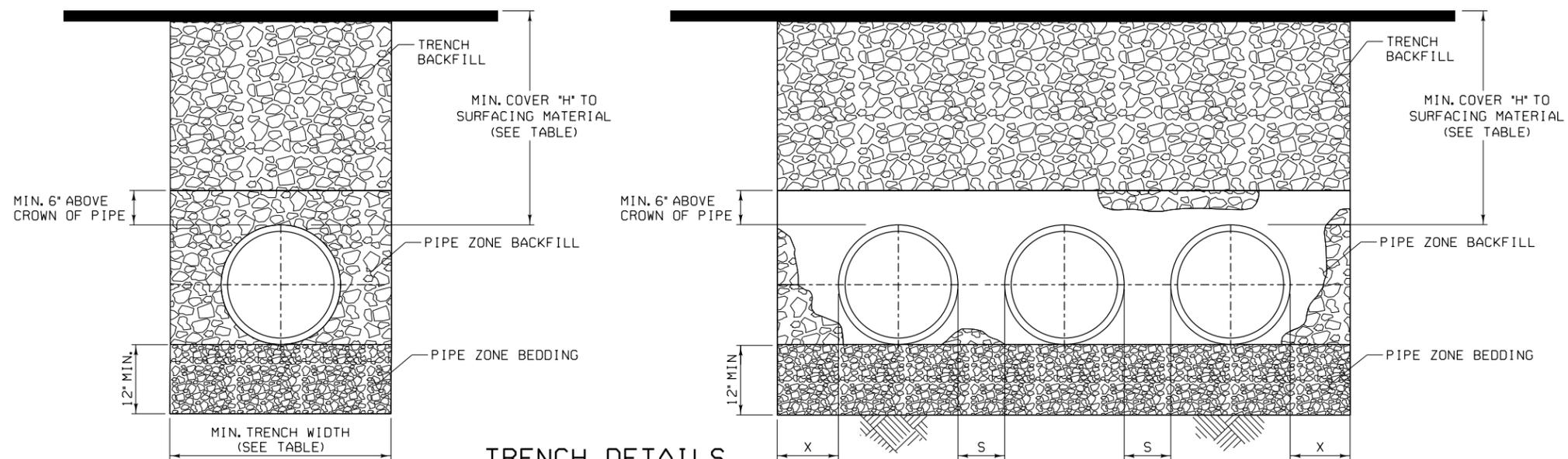
DRAWING NUMBER	SHEET	TITLE
REFERENCE DRAWINGS		

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013	
W.D.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD						
Design	HDR / LSJ					
Drawn	HDR / BAH					
Chkd	HDR / DEC					
Sub						
Rec						
Appr						
Date	AUGUST 2013					
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON			BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT CULVERT INSTALLATION TYPICAL DETAIL			
SERIAL	SOURCE	SIZE	SHEET	REVISION		
290778	LFC	A1	TD11	0		



NOTES:

1. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL.
2. WHEN CULVERT(S) ARE INSTALLED IN STREAM CHANNELS THE CULVERT(S) SHALL BE INSTALLED TO ALIGN WITH THE NATURAL STREAM BED SKEWED AND STAGGERED AS NEEDED TO THE PROPOSED ROADWAY.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE COTR AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE COTR, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. COLLAR SHALL BE 2' THICK AS NOTED IN THE CULVERT INSTALLATION TYPICAL DETAIL.
5. COLLAR SHALL BE EMBEDDED INTO NATIVE MATERIAL A MINIMUM OF 6".
6. COLLAR SHALL BE COMPOSED OF IMPERVIOUS MATERIAL TO PREVENT PIPING. IMPERVIOUS MATERIAL COULD INCLUDE: COMPACTED CLAY, CDF BACKFILL, OR READY MIX ON-SITE CONCRETE.

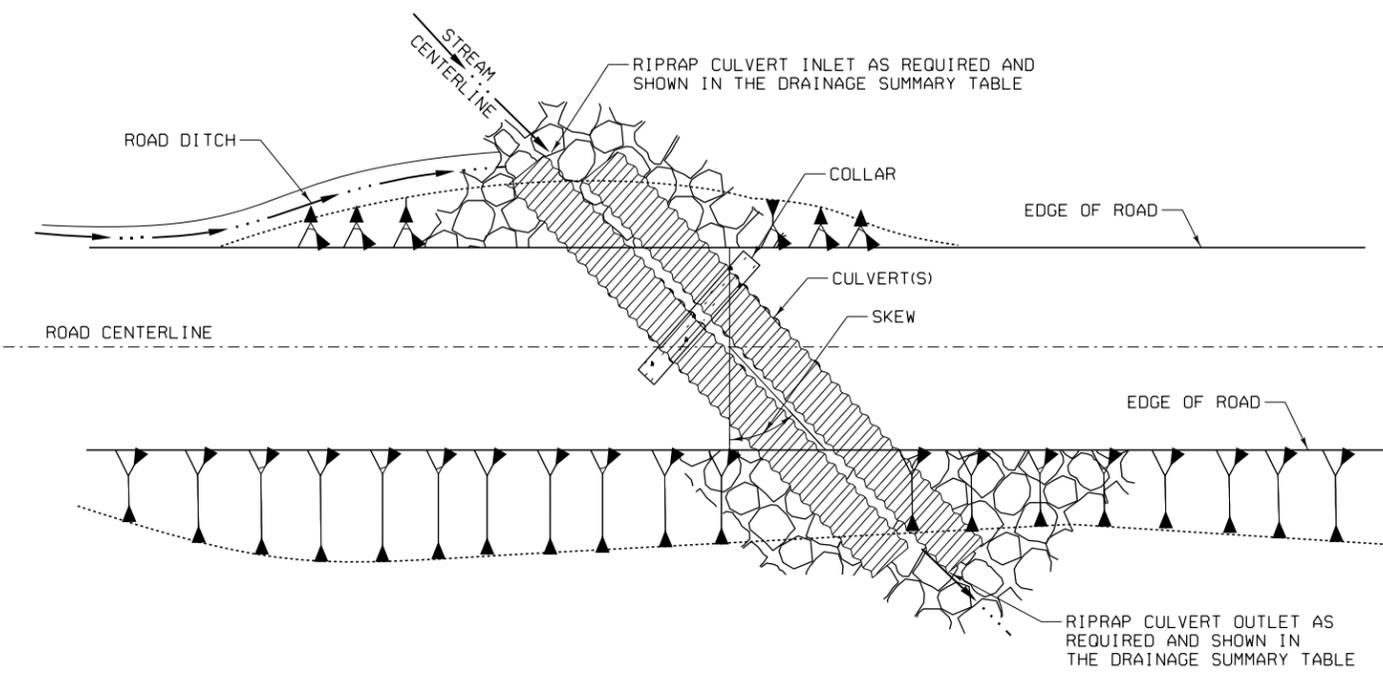


TRENCH DETAILS

NTS

RECOMMENDED MINIMUM TRENCH WIDTHS AND MINIMUM SPACING				
PIPE DIAM.	MIN. TRENCH WIDTH	MIN. "X"	MIN. "S"	MIN. COVER "H"
18"	36"	9"	12"	12"
24"	48"	10"	12"	12"
30"	56"	18"	15"	12"
36"	64"	18"	18"	12"
42"	72"	18"	21"	12"
48"	80"	18"	24"	12"
54"	88"	18"	27"	24"
60"	96"	18"	30"	24"

- MINIMUM SPACING ("S") MEASURED FROM OUTSIDE DIAMETER TO OUTSIDE DIAMETER.
- ADDITIONAL PARALLEL PIPES SHALL BE SPACED "S" DISTANCE APART WITH "X" DISTANCE FROM TRENCH SIDE WALL.

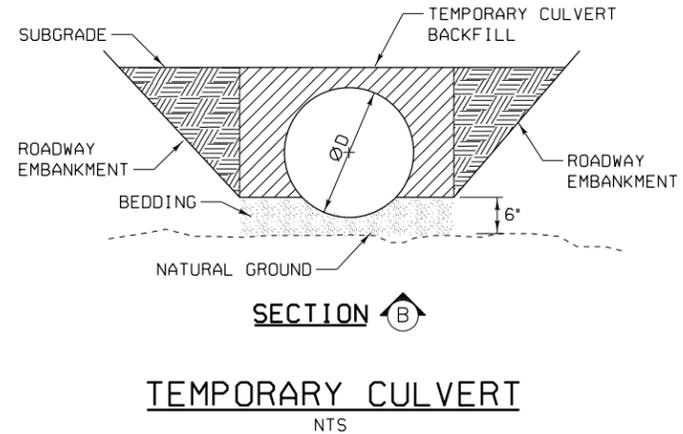
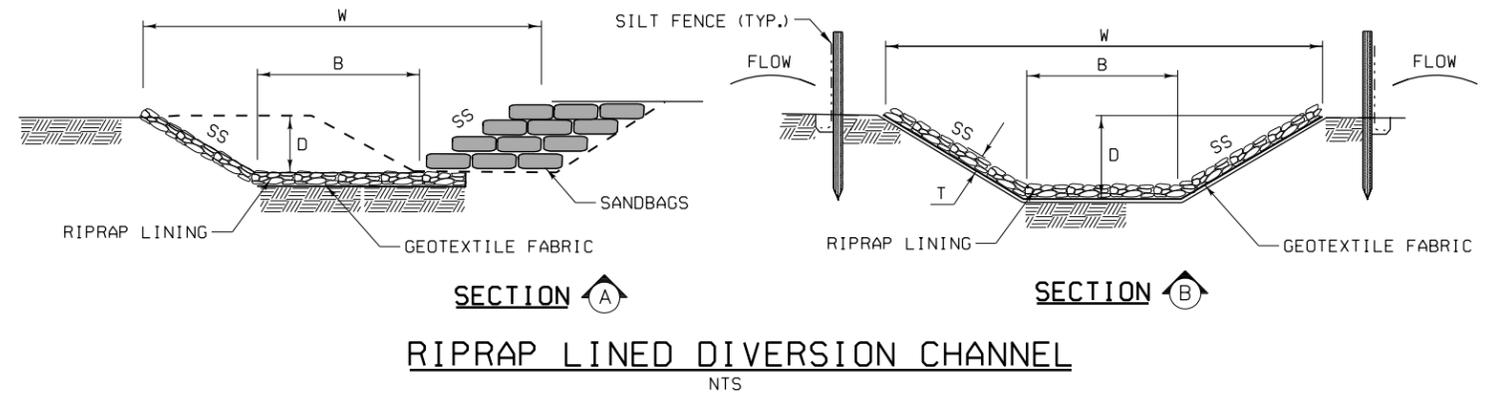
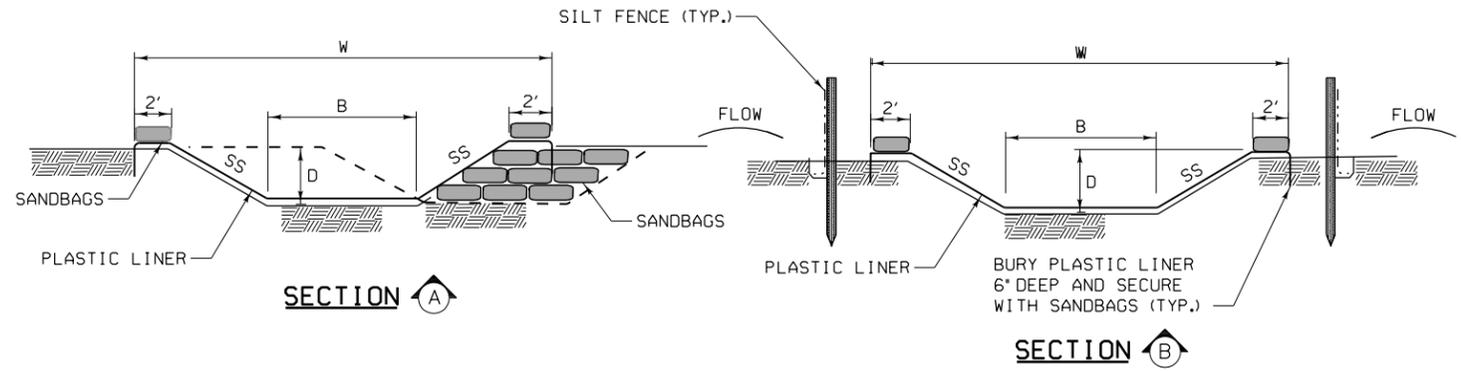
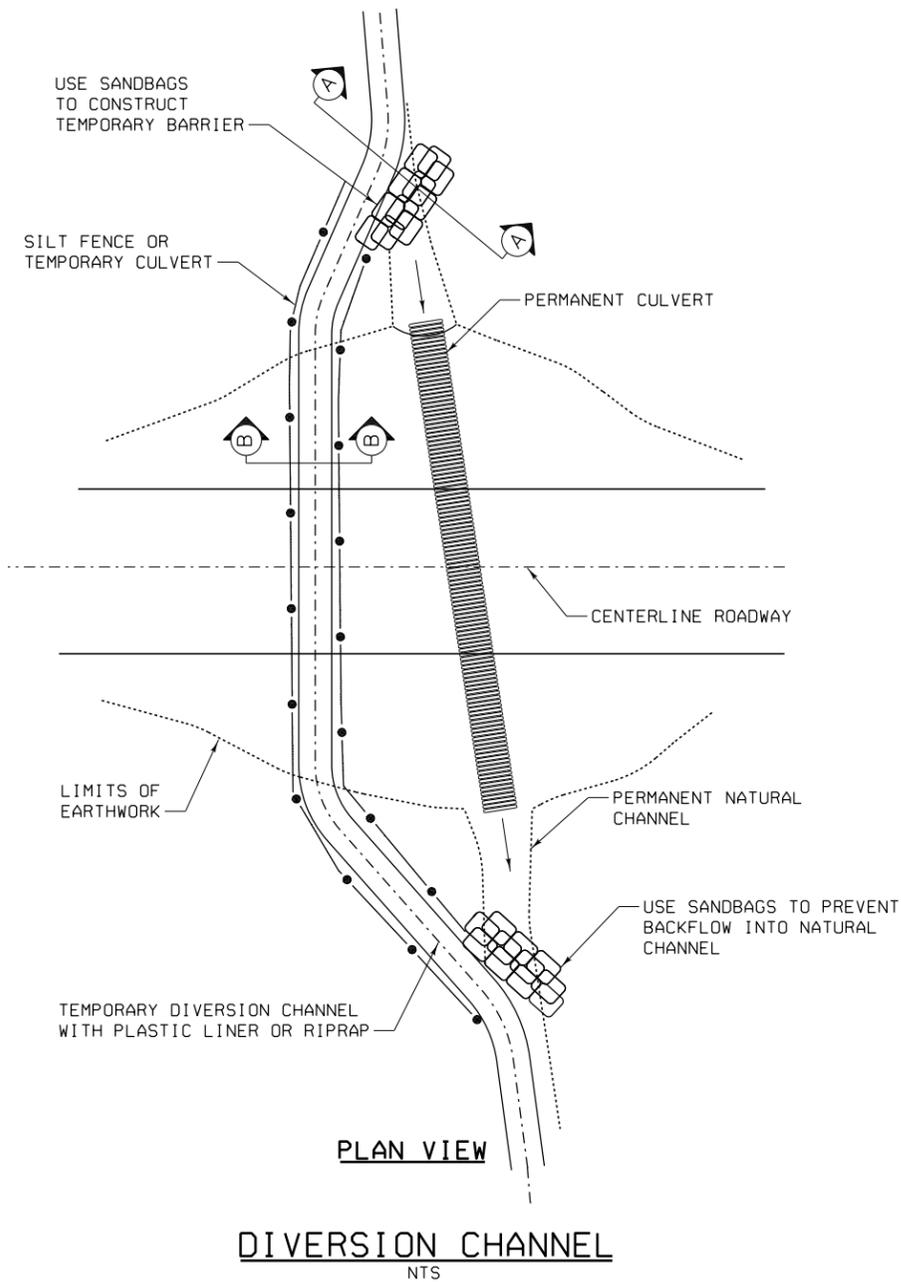


**SINGLE/DOUBLE CULVERTS INSTALL
W/ SKEW & STAGGER GUIDANCE
PLAN VIEW**

NTS

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON							
BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT							
TRENCH FOR CULVERT INSTALLATION TYPICAL DETAIL							
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	TD12	0			



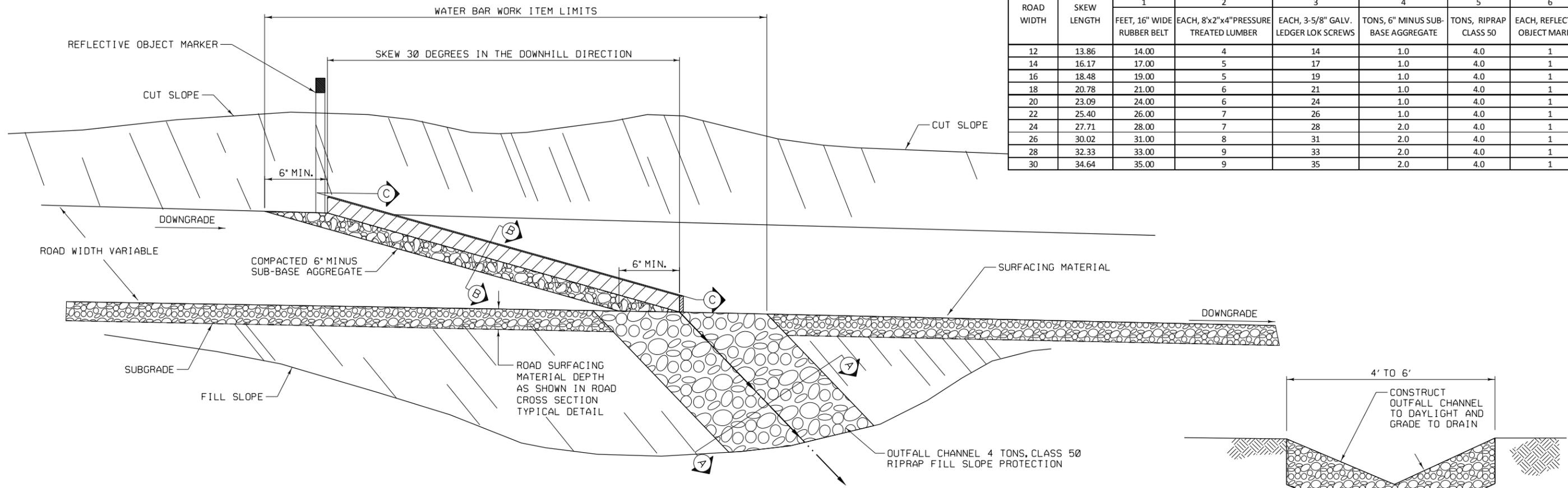
NOTES:

1. ADJUST DIMENSIONS (W, B, D, T AND SS) DURING CONSTRUCTION TO MEET THE REQUIREMENTS FOR STREAM SIZE AND FLOW.
2. USE PLASTIC LINER OR RIPRAP ALONG THE ENTIRE LENGTH AND WIDTH OF THE TEMPORARY DIVERSION CHANNEL.
3. CONSTRUCT CHANNEL AT THE MINIMUM GRADE OF 0.5%.
4. DO NOT CONSTRUCT WITH LONGITUDINAL JOINTS IF USING A PLASTIC LINER. BURY THE UPSTREAM EDGE OF THE LINER A MINIMUM OF 6" DEEP AND SECURE WITH RIPRAP OR SANDBAGS.
5. COMPACT TEMPORARY CULVERT BACKFILL USING ONE OF THE METHODS LISTED IN THE SPECIFICATIONS.
6. DIVERSION CHANNEL AND TEMPORARY CULVERT SHALL BE INCIDENTAL TO CULVERT INSTALLATION.

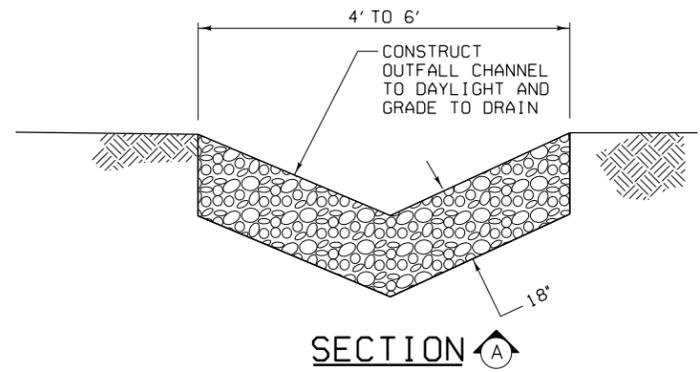
DRAWING NUMBER	SHEET	TITLE
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• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON				BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT CULVERT DIVERSION TYPICAL DETAIL			
SERIAL	290778	SOURCE	LFC	SIZE	A1	SHEET	TD13
REVISION							0

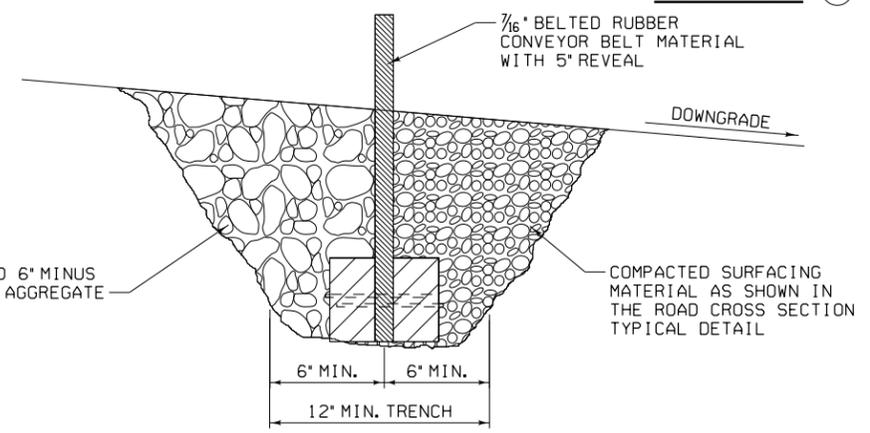
		MATERIAL TABLE BASED ON ACCESS ROAD WIDTH					
ROAD WIDTH	SKEW LENGTH	ITEM QUANTITY AND DESCRIPTION					
		1	2	3	4	5	6
		FEET, 16" WIDE RUBBER BELT	EACH, 8"x2"x4" PRESSURE TREATED LUMBER	EACH, 3-5/8" GALV. LEDGER LOK SCREWS	TONS, 6" MINUS SUB-BASE AGGREGATE	TONS, RIPRAP CLASS 50	EACH, REFLECTIVE OBJECT MARKER
12	13.86	14.00	4	14	1.0	4.0	1
14	16.17	17.00	5	17	1.0	4.0	1
16	18.48	19.00	5	19	1.0	4.0	1
18	20.78	21.00	6	21	1.0	4.0	1
20	23.09	24.00	6	24	1.0	4.0	1
22	25.40	26.00	7	26	1.0	4.0	1
24	27.71	28.00	7	28	2.0	4.0	1
26	30.02	31.00	8	31	2.0	4.0	1
28	32.33	33.00	9	33	2.0	4.0	1
30	34.64	35.00	9	35	2.0	4.0	1



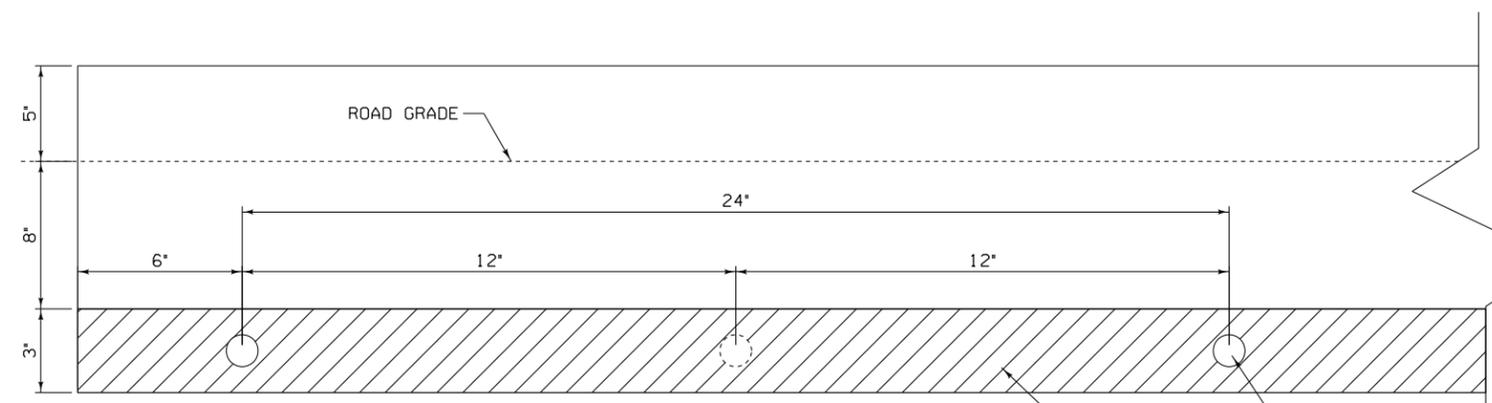
TYPICAL RUBBER WATER BAR DETAIL
NTS



SECTION A



SECTION B



SECTION C

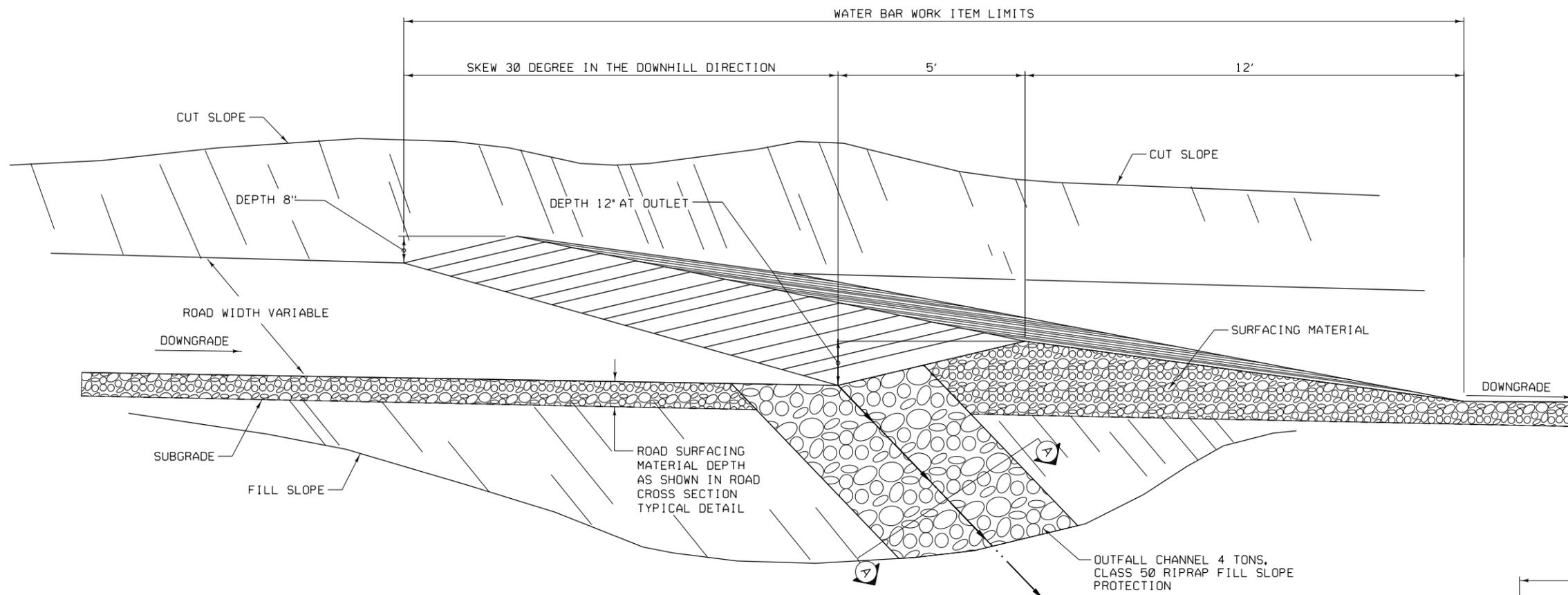
NOTES:

- BEGIN WATER BARS AT THE INTERSECTION OF THE ROADBED AND CUT SLOPES, AND RUN ACROSS THE ENTIRE WIDTH OF THE ROADBED.
- ENSURE WATER BARS HAVE A FREE FLOWING OUTLET FOR DRAINAGE.
- WHEN STAKES OR FLAGGING ARE USED TO IDENTIFY WATER BAR LOCATIONS, THEY DESIGNATE THE OUTFALL CHANNEL LOCATION OF THE WATER BAR.
- INSTALL 6" REFLECTIVE OBJECT MARKER AT THE UPSTREAM EDGE OF THE RUBBER WATERBAR WITH 24" EMBEDMENT.
- PRESSURE TREATED LUMBER SPLICES SHALL BE OVERLAPED AT A 24" MINIMUM WITH ADJACENT ATTACHED LUMBER. ALL PRESSURE TREATED LUMBER SHALL BE CLASS 2 OR BETTER WITH CONTRACTOR TO TREAT SAWN EDGES WITH APPROPRIATE LIQUID TREATMENT SOLUTION.
- 6" MINUS SUB-BASE AGGREGATE SHALL BE INCIDENTAL TO THE WATER BAR INSTALLATION.

TWO PARALLEL 2"x4" PRESSURE TREATED TIMBER REINFORCING ATTACHED WITH FASTENERS AT 12" OC STAGGERED FROM EACH SIDE FOR LENGTH OF RUBBER WATER BAR ASSEMBLY

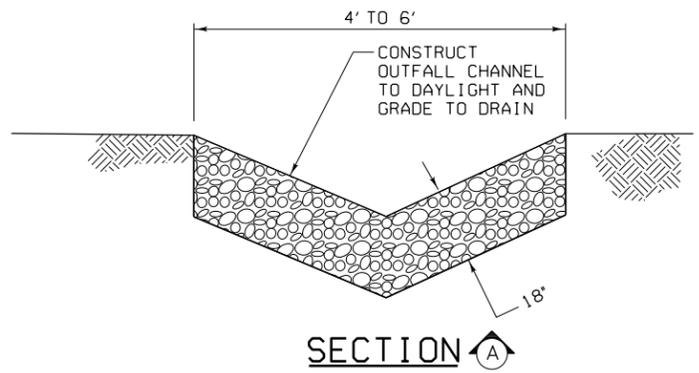
DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	NEW SHEET	HDR/RW	8/5/2013		
W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design HDR / LSJ Drawn HDR / BAH Chkd HDR / DEC Sub _____ Rec _____ Appr _____ Date AUGUST 2013				UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT RUBBER WATER BAR TYPICAL DETAIL			
SERIAL	SOURCE	SIZE	SHEET	REVISION			
290778	LFC	A1	TD14	0			



MATERIALS REQUIRED FOR WATERBAR	
ITEM	DESCRIPTION
1	SURFACING MATERIAL
2	CLASS 50 RIPRAP

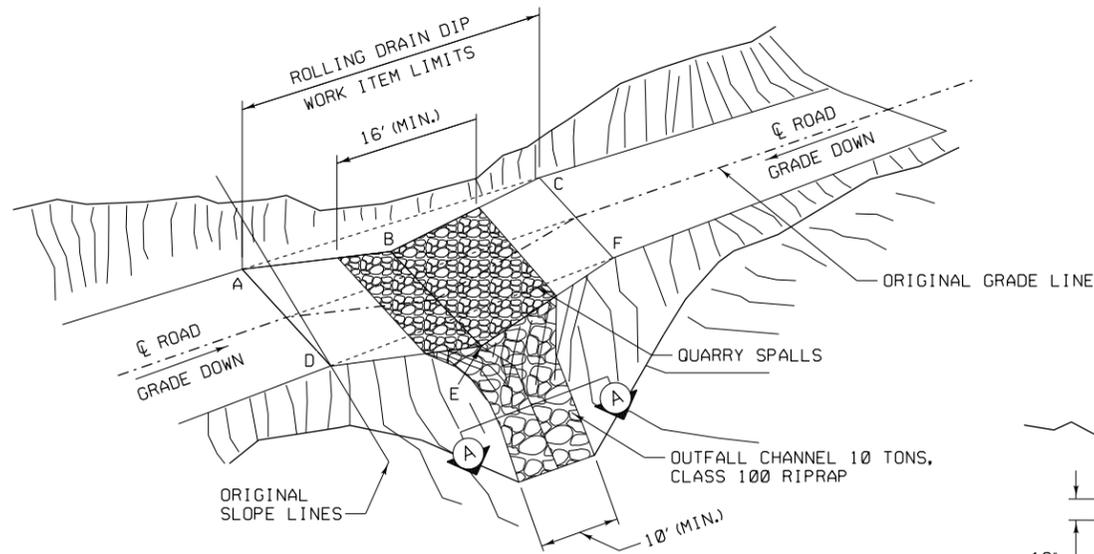
TYPICAL ROCK WATER BAR DETAIL
NTS



- NOTES:**
- BEGIN WATER BARS AT THE INTERSECTION OF THE ROADBED AND CUT SLOPES, AND RUN ACROSS THE ENTIRE WIDTH OF THE ROADBED.
 - ENSURE WATER BARS HAVE A FREE FLOWING OUTLET FOR DRAINAGE.
 - WHEN STAKES OR FLAGGING ARE USED TO IDENTIFY WATER BAR LOCATIONS, THEY DESIGNATE THE OUTFALL CHANNEL LOCATION OF THE WATER BAR.

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

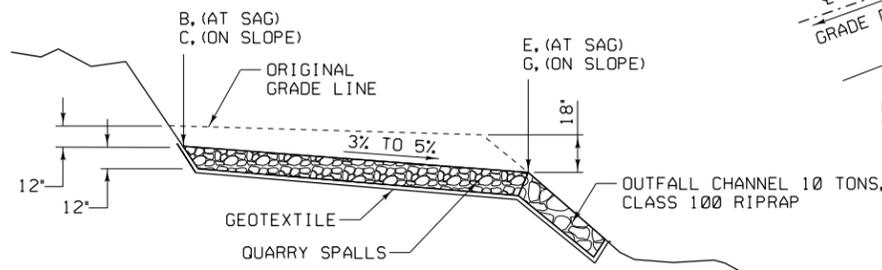
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W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
* C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON							
BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT ROCK WATER BAR TYPICAL DETAIL							
SERIAL	290778	SOURCE	LFC	SIZE	A1	SHEET	TD15
REVISION							0



PERSPECTIVE VIEW (AT SAG)

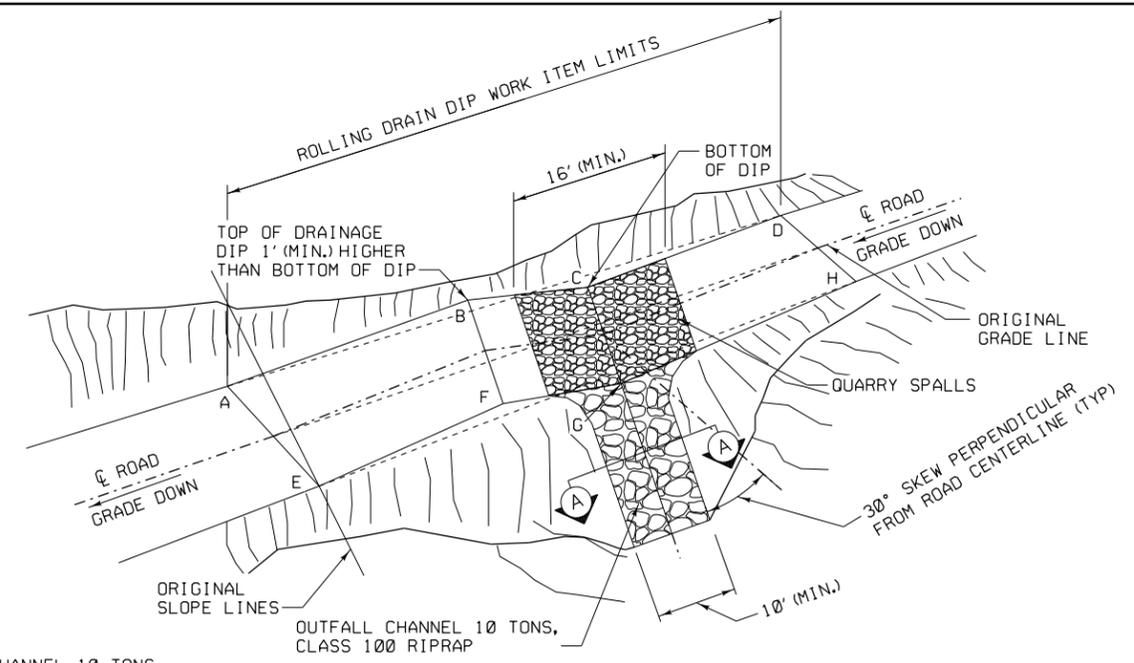
NTS

ITEM	DESCRIPTION
1	QUARRY SPALLS
2	CLASS 100 RIPRAP
3	GEOTEXTILE



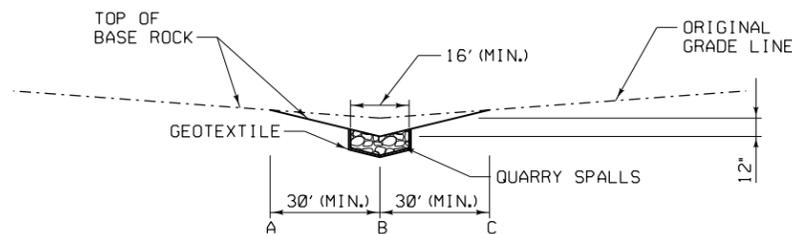
SUBGRADE TYPICAL

NTS



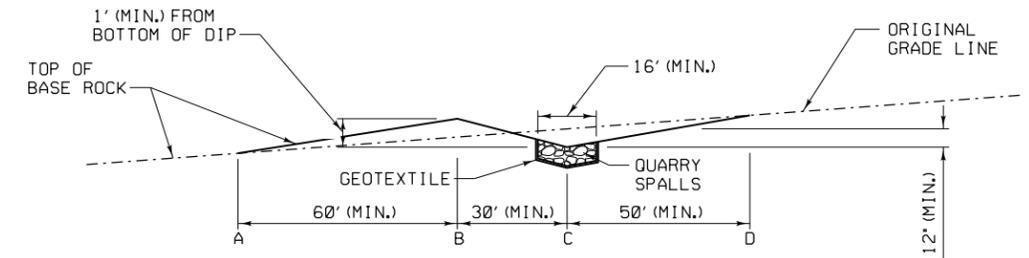
PERSPECTIVE VIEW (ON SLOPE)

NTS



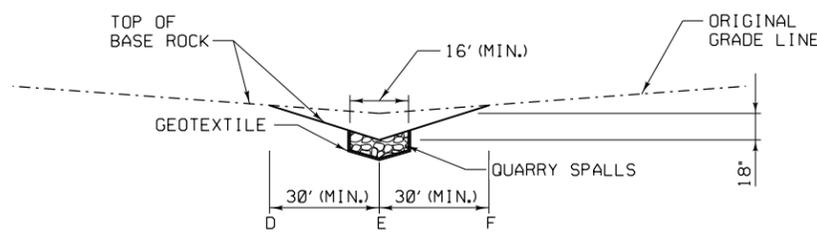
ROAD PROFILE ALONG A-B-C OF DRAIN DIP (UPHILL SIDE)

NTS



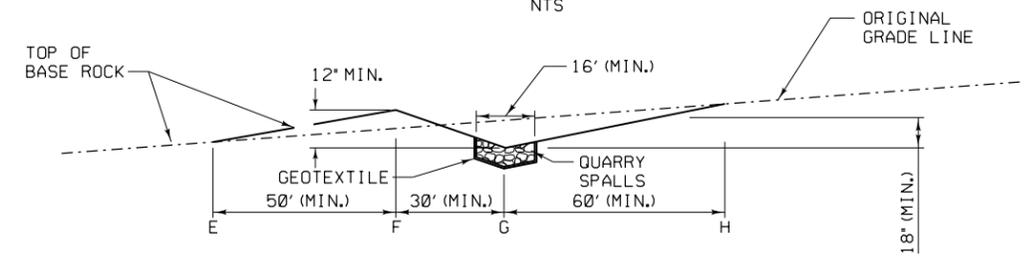
ROAD PROFILE ALONG A-B-C-D OF DRAIN DIP (UPHILL SIDE)

NTS



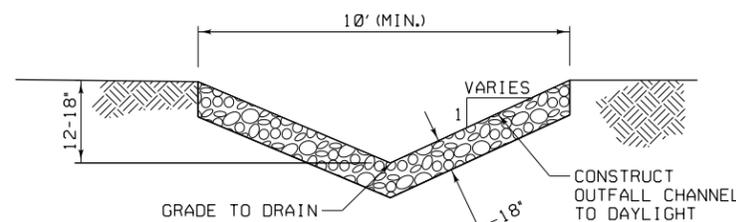
ROAD PROFILE ALONG D-E-F OF DRAIN DIP (DOWNHILL SIDE)

NTS



ROAD PROFILE ALONG E-F-G-H OF DRAIN DIP (DOWNHILL SIDE)

NTS



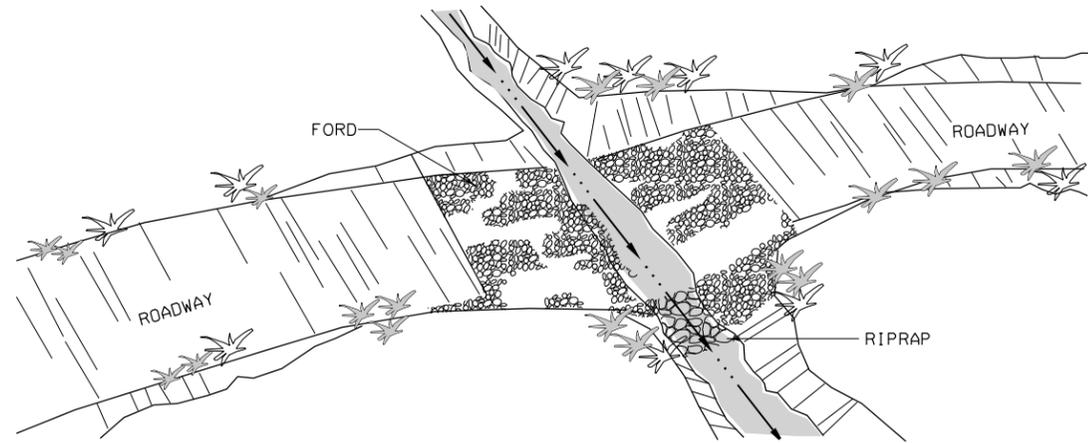
SECTION A

NOTES:

- ALL GROUND DISTURBING ACTIVITIES ASSOCIATED WITH THE ROLLING DRAIN DIP SHALL BE KEPT WITHIN THE LIMITS OF THE ROLLING DRAIN DIP. WHEN EXCAVATIONS OCCUR BELOW THE EXISTING GRADE LINE THE MATERIAL SHALL BE USED ON THE DOWN GRADE SIDE OF THE ROLLING DRAIN DIP OR USE ELSEWHERE AS FILL ON THE PROJECT.
- ROLLING DRAIN DIPS ARE OUTSLOPED UNLESS OTHERWISE NOTED.
 - WHEN OUTSLOPED THE ROLLING DRAIN DIP MUST BE DISCHARGED TO NATURAL GROUND VIA AN OUTFALL CHANNEL. SEE ROCK WATER BAR TYPICAL DETAIL.
 - WHEN INSLOPED THE ROLLING DRAIN DIP MUST BE DISCHARGED TO A SUITABLE DRAINAGE FEATURE SUCH AS A DITCH, CULVERT, OR DROP INLET.
- THE MINIMUM CROSS SLOPE AT THE CENTERLINE OF THE DRAIN DIP MUST BE GREATER THAN THE CROSS SLOPE OF THE ADJACENT ROADWAY.
- ROLLING DRAIN DIPS MAY BE SKEWED AS NEEDED TO FIT THE LOWPOINT IN A DRAW OR TO MATCH A NATURAL DRAINAGE COURSE. DRAIN DIPS CONSTRUCTED ON A SLOPE SHALL BE CONSTRUCTED AT A 30° SKEW PERPENDICULAR FROM THE ROAD CENTERLINE.
- ROLLING DRAIN DIPS ARE TYPICALLY PROPOSED AT THE FOLLOWING LOCATIONS:
 - ROADWAY SAG LOCATIONS.
 - TO CONVEY RUNOFF TO DOWN STREAM CHANNEL WHERE UPSTREAM CHANNEL IS NOT PRESENT AT THE EDGE OF ROADWAY. FOR THESE LOCATIONS, THE DRAIN DIP SHALL ALIGN WITH THE DOWNSTREAM CHANNEL.
 - TO CONVEY RUNOFF COLLECTED IN AN ADJACENT DITCH OR ALONG A TOE OF SLOPE TO CROSS THE ROADWAY WHERE A CULVERT CROSSING IS NOT FEASIBLE.
- THE QUARRY SPALL ROCK SPILL APRON SHALL BE 16' WIDE (MIN.) WITH CLASS 100 RIPRAP OUTFALL CHANNEL CONSTRUCTED TO THE TOE OF FILL.

DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
NO.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON BIG EDDY - KNIGHT NO. 1 500kv TRANSMISSION LINE PROJECT ROLLING DRAIN DIP TYPICAL DETAIL							
Design	HDR / LSJ			SERIAL	290778	SOURCE	LFC
Drawn	HDR / BAH			SIZE	A1	SHEET	TD16
Chkd	HDR / DEC			REVISION			0
Sub				Date	AUGUST 2013		
Rec							
Appr							



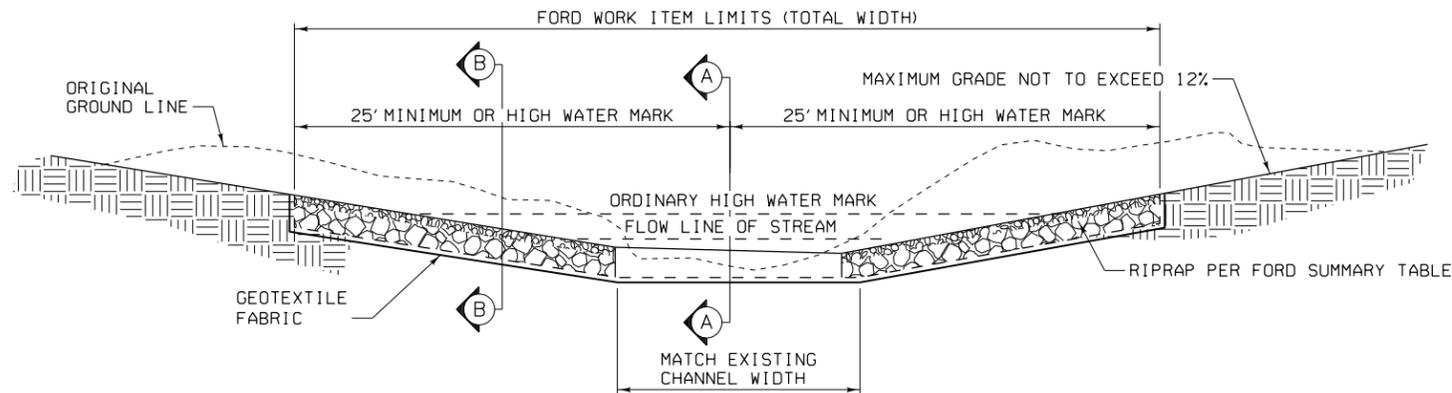
NOTES:

1. EXCAVATE APPROACHES AND FORD TO MINIMUM DEPTH BELOW FINISH GRADE EQUAL TO LARGEST RIPRAP SIZE IN SPECIFIED CLASS.
2. PLACE RIPRAP TO MINIMUM COMPACTED DEPTH OF 12" OR LARGEST RIPRAP SIZE IN SPECIFIED CLASS WHICHEVER IS GREATER.
3. PLACE 3-6" MINUS CRUSHED OR PIT RUN AGGREGATE IN FORD ONLY ENOUGH TO FILL VOIDS IN RIPRAP TO MAKE A DRIVEABLE SURFACE. 3-6" CRUSHED AGGREGATE SHALL BE INCIDENTAL TO THE FORD INSTALLATION.
4. RIPRAP (MACHINE OR HAND PLACE) DOWNSTREAM BANKS - AND OUTFALL AT FLOW LINE AS DIRECTED BY THE COTR.

FORD TYPICAL DETAIL

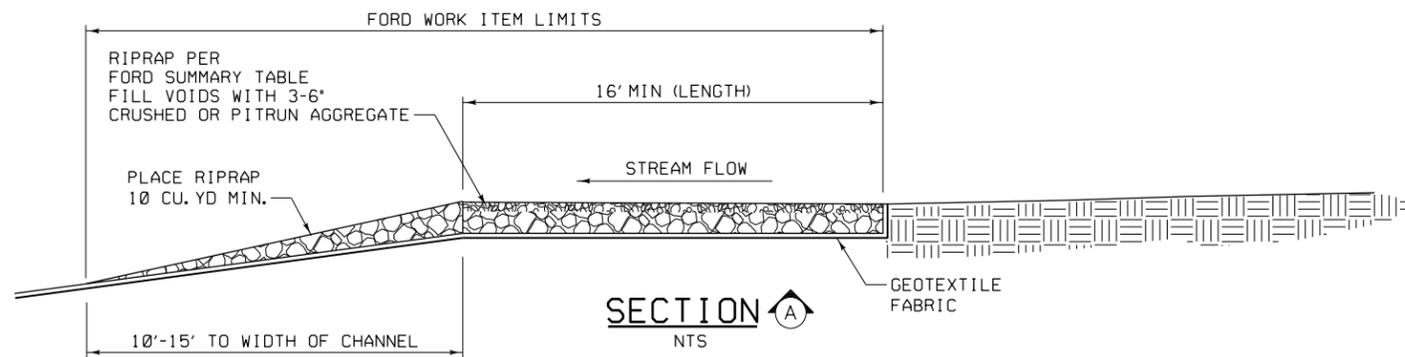
(TYP)
NTS

MATERIALS REQUIRED FOR FORD	
ITEM	DESCRIPTION
1	3'-6" CRUSHED OR PIT RUN AGGREGATE
2	RIPRAP, CLASS AS SHOWN ABOVE AND ON DRAINAGE SUMMARY TABLE
3	GEOTEXTILE



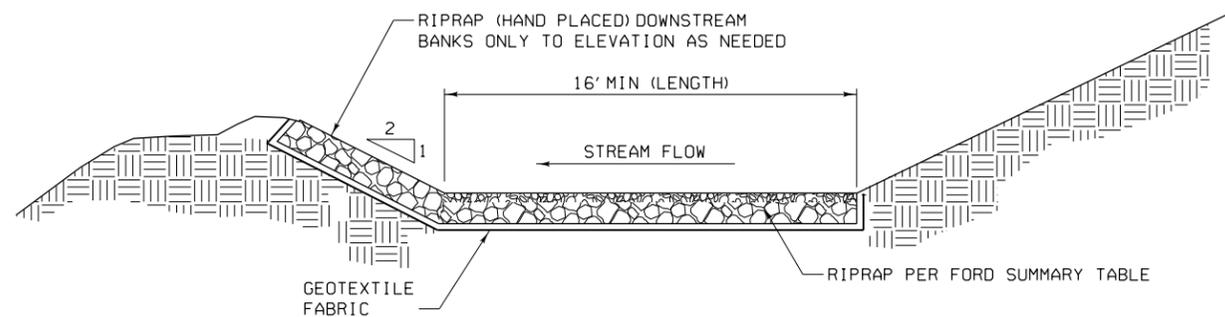
CROSS SECTION OF FORD LOOKING UPSTREAM

NTS



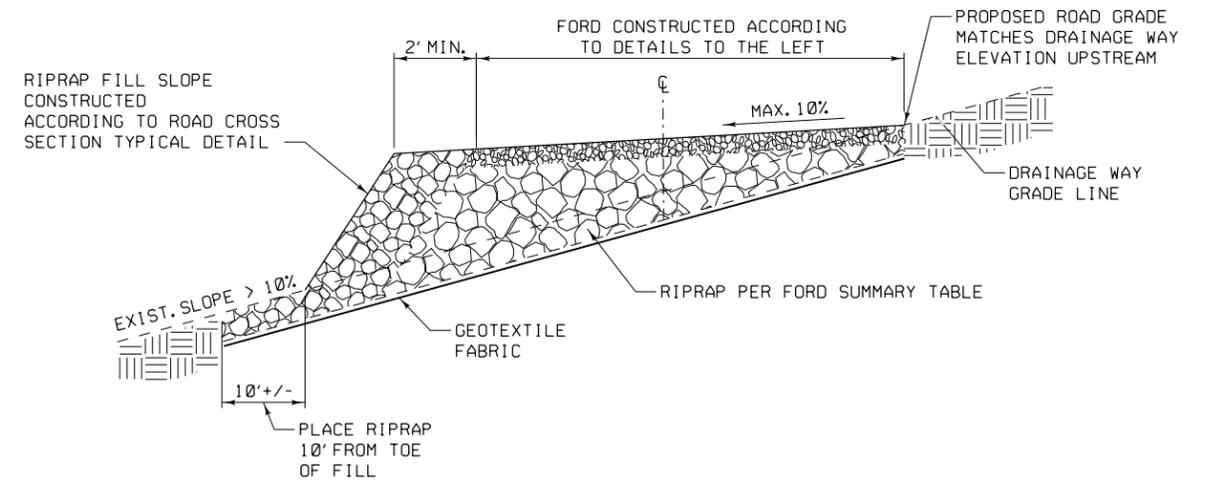
SECTION A

NTS



SECTION B

NTS



FORD CROSS SECTION ON STEEP SLOPES

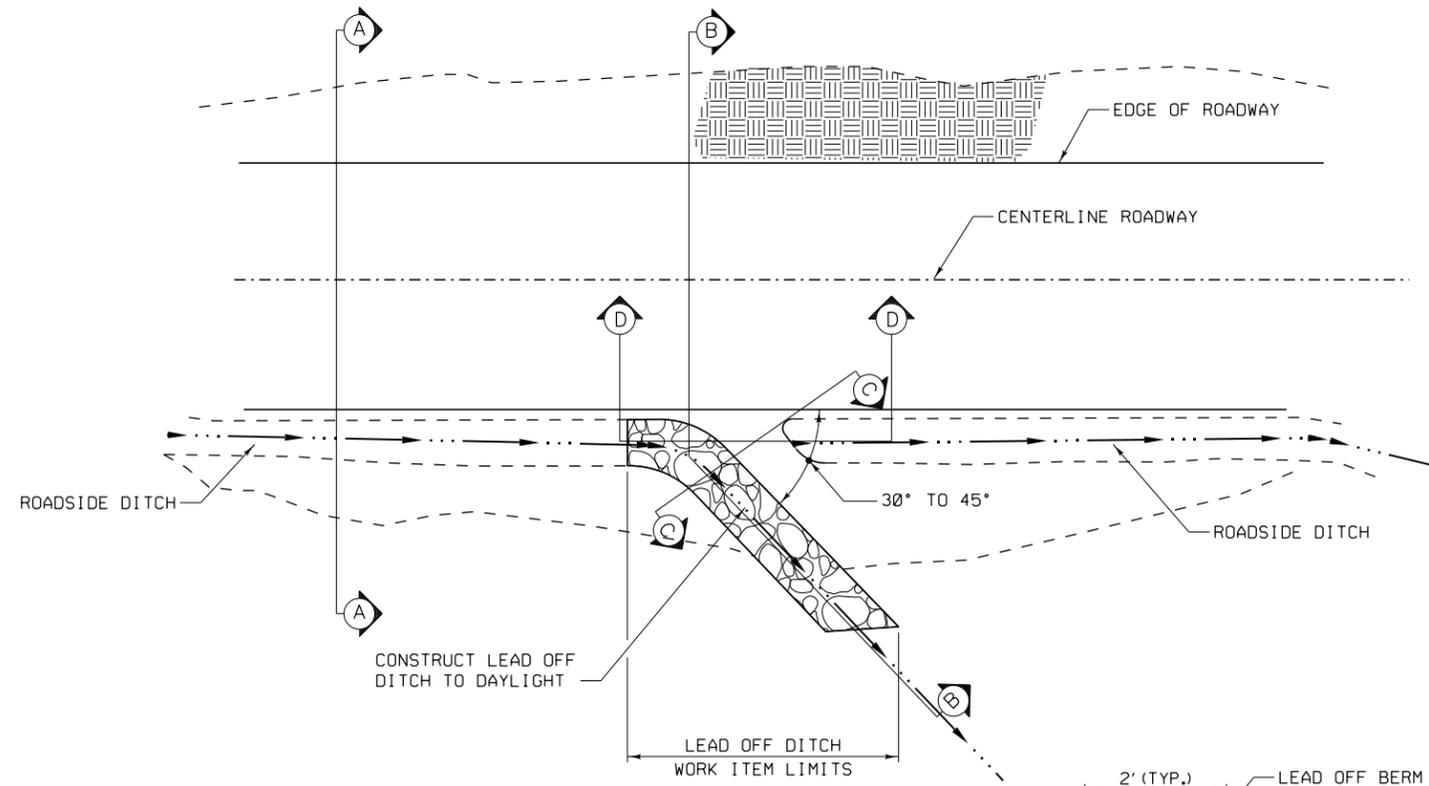
SECTION A

NTS

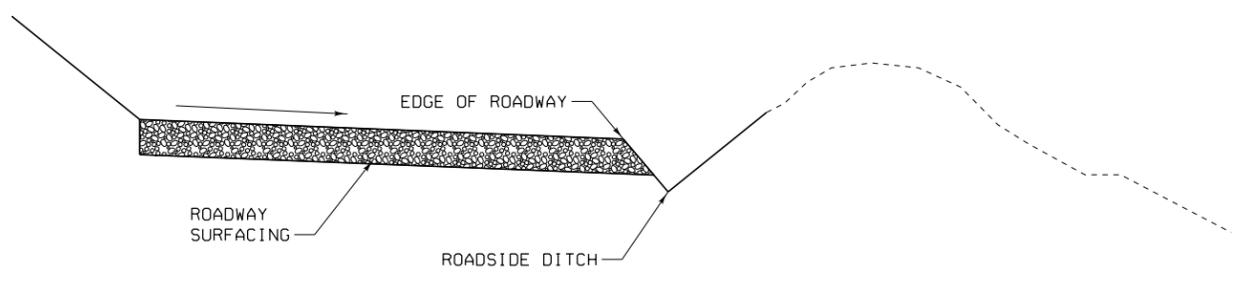
DRAWING NUMBER	SHEET	TITLE
		REFERENCE DRAWINGS

NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR/LSJ						
Drawn	HDR/BAH						
Chkd	HDR/DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
		SERIAL	SOURCE	SIZE	SHEET	REVISION	
		290778	LFC	A1	TD17	0	

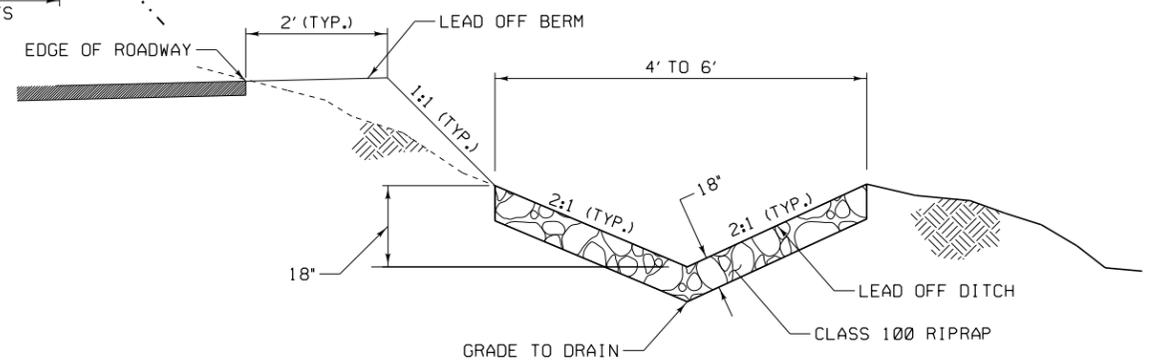
UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
 HEADQUARTERS, PORTLAND, OREGON
BIG EDDY - KNIGHT NO. 1
500kv TRANSMISSION LINE
PROJECT
FORD
TYPICAL DETAIL



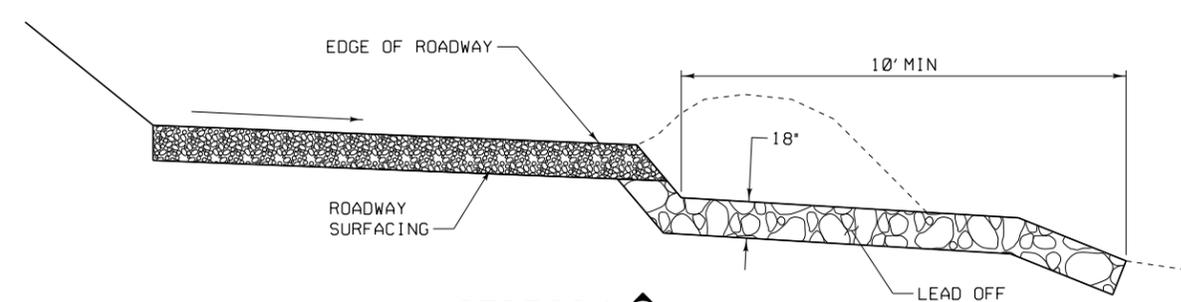
MATERIALS REQUIRED FOR LEAD OFF DITCH	
ITEM	DESCRIPTION
1	CLASS 100 RIPRAP



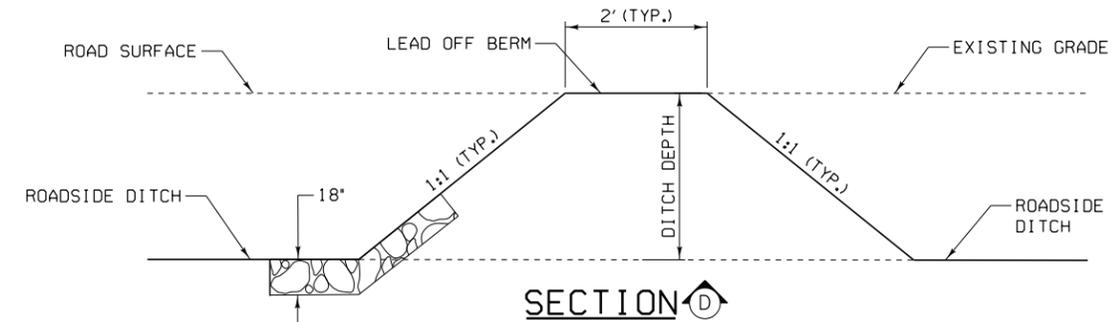
SECTION A-A



SECTION C-C



SECTION B-B



SECTION D-D
(LEAD OFF BERM)

LEAD OFF DITCH DETAIL FOR ROAD DRAINAGE

(AS NEEDED)
NTS

DRAWING NUMBER	SHEET	TITLE
REFERENCE DRAWINGS		

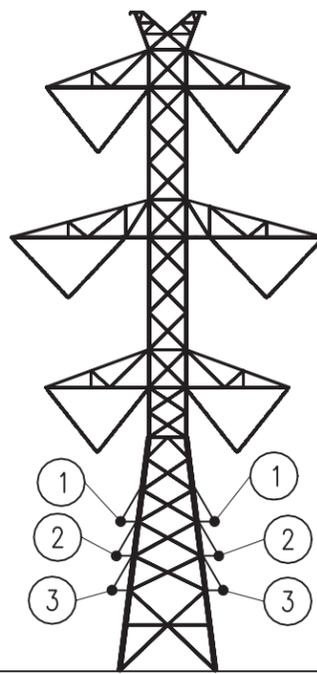
NO.	C	00232575	REVISED PER PROJECT SPECIFICATIONS	HDR/RW	8/5/2013		
W.O.	C	00232575	COMPUTER REVISION ONLY	BY	DATE	APPROVED	
• C=CONTRACT CONSTRUCTION ,FA=FORCE ACCOUNT CONSTRUCTION ,R=RECORD							
Design	HDR / LSJ						
Drawn	HDR / BAH						
Chkd	HDR / DEC						
Sub							
Rec							
Appr							
Date	AUGUST 2013						
SERIAL	290778	SOURCE	LFC	SIZE	A1	SHEET	TD18
REVISION	0						

UNITED STATES DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION
 HEADQUARTERS, PORTLAND, OREGON
BIG EDDY - KNIGHT NO. 1
500kv TRANSMISSION LINE
 PROJECT
LEAD OFF DITCH
 TYPICAL DETAIL

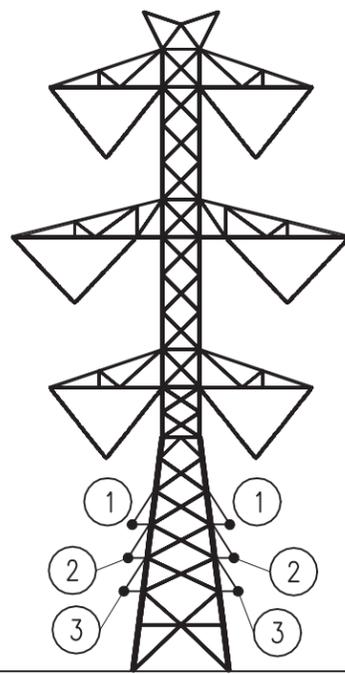
Typical Tower Design Attachment

TRIM LINE

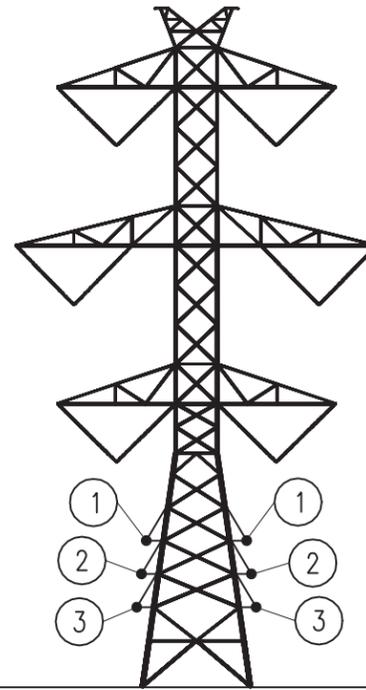
TRIM LINE



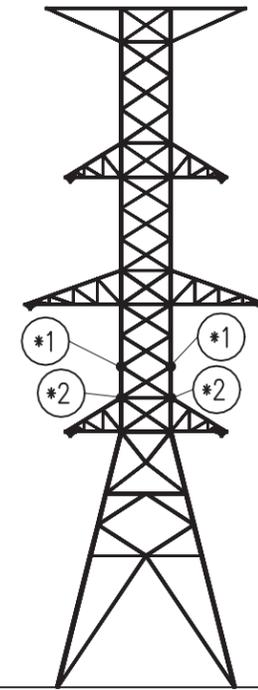
39M
0°
SEE SERIAL #265933



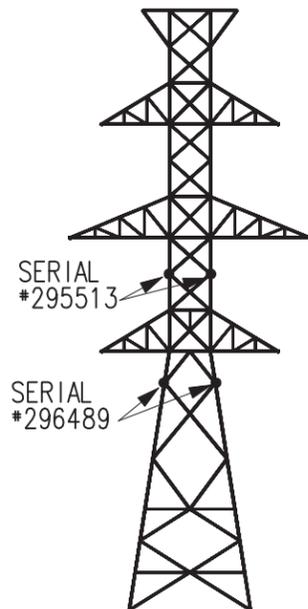
39A
0°-3°
SEE SERIAL #265935



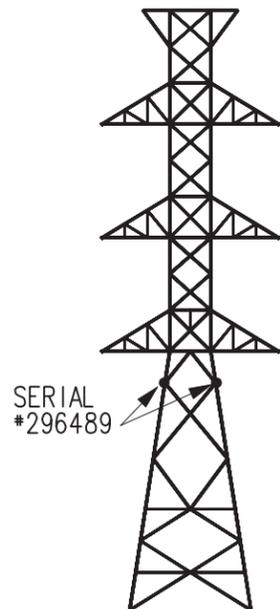
39B
0°-8°
SEE SERIAL #266822



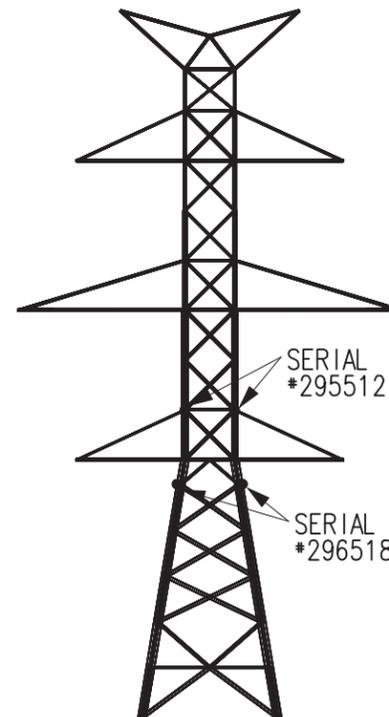
S159D
0°-60° DE
SEE SERIAL #295313



139D
0°-60° DE



139DE
0°-60° DE



09G
60°-90° DE

KEY:

- * DETAILS INCLUDED ON STRUCTURE DRAWINGS
- ** DETAILS INCLUDED ON STRUCTURE DRAWINGS; LOCATION NUMBER NOT SHOWN ON DRAWING

NOTE:

DETAILED ATTACHMENT LOCATIONS ARE ONLY THOSE USED IN BIG EDDY - KNIGHT. ADDITIONAL LOCATIONS MAY BE AVAILABLE.

TOWERS SHOWN FOR CONCEPTUAL PURPOSES ONLY, NOT FOR DESIGN. TOWERS NOT DRAWN TO SCALE.

NO.	00232575	REVISION	BY	DATE	APPROVED						
* C - CONTRACT CONSTRUCTION, FA - FORCE ACCOUNT, R - RECORD FILE NAME: 297969-2-0.DGN											
DSGN	HDR/JAG	UNITED STATES DEPARTMENT OF ENERGY BONNEVILLE POWER ADMINISTRATION HEADQUARTERS, PORTLAND, OREGON									
DRWN	HDR/JLJ	BIG EDDY-KNIGHT NO. 1 DOUBLE CIRCUIT TOWERS FIBER ATTACHMENT LOC.									
CHKD											
REVN											
CNCR											
APPR											
DATE		Serial	297969	Source	LBL	Size	A3	Sheet	2 OF 2	Rev.	0