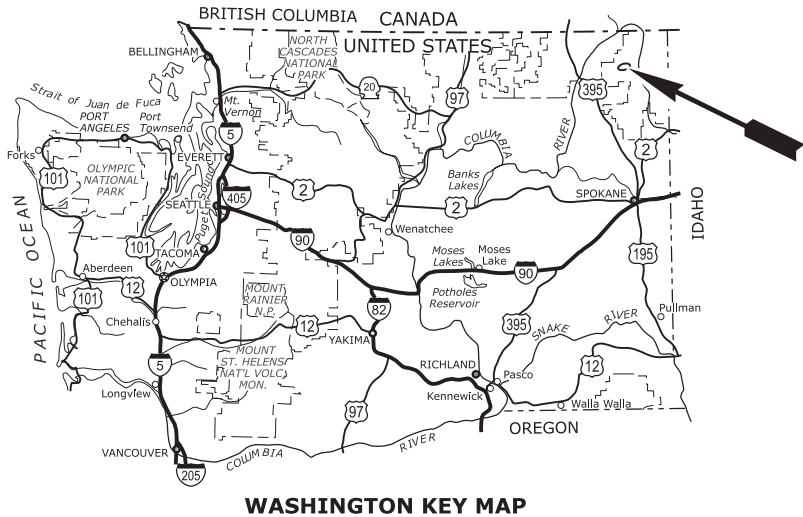


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WASHINGTON KEY MAP

U. S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

PLANS FOR PROPOSED PROJECT

WA FWS LPO MULTI(1)

LITTLE PEND OREILLE NWR CULVERT IMPROVEMENTS

LITTLE PEND OREILLE NATIONAL WILDLIFE REFUGE
STEVENS COUNTY, WASHINGTON

SCHEDULE A LENGTH 0.15 MILES

SCHEDULE B LENGTH 0.20 MILES

SCHEDULE C LENGTH 0.23 MILES

TYPE OF CONSTRUCTION:

*Culvert replacements, stream rehabilitation,
and earthwork.*

DESIGN DESIGNATION:

ADT (2020) <400
ADT (2040) <1,000
V 25 MPH
e (max) 0.08

SPECIFICATION:

*Standard Specifications for
Construction of Roads and Bridges
on Federal Highway Projects, FP-14*



PLANS PREPARED BY

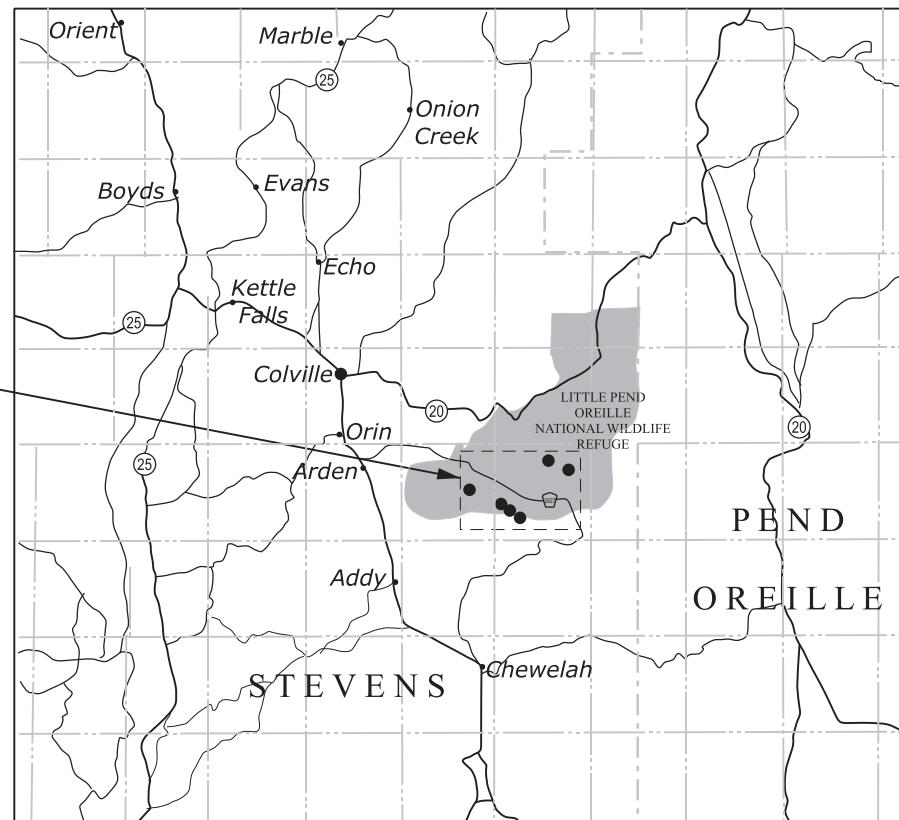
**U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION**
WESTERN FEDERAL LANDS HIGHWAY DIVISION
VANCOUVER, WASHINGTON

PROJECT MANAGER
T. YEOMAN



PROJECT LOCATION

See Sheet A.4 for Vicinity Maps



SCALE IN MILES
5 0 5 10 15 20

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	A.1

SECTION INDEX

- A. GENERAL INFORMATION
- B. SUMMARY OF QUANTITIES
- C. TYPICAL SECTIONS
- D. PLAN-PROFILE
- E. EROSION CONTROL
- F. DRAINAGE
- G. TEMPORARY TRAFFIC CONTROL
- H. PERMANENT TRAFFIC CONTROL

See Sheet A.2 for complete Sheet Index.

APPROVED:

BRENT LEE COE

Digitally signed by BRENT LEE COE
Date: 2026.07.13 16:59:40 -07'00'

Chief of Engineering,
Western Federal Lands Highway Division

DATE

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	A.2

SHEET INDEX

A. GENERAL INFORMATION

- A.1 TITLE SHEET
- A.2 SHEET INDEX
- A.3 PLAN SYMBOLS AND ABBREVIATIONS
- A.4 VICINITY MAP

B. SUMMARY OF QUANTITIES

- B.1-3 SUMMARY OF QUANTITIES

C. TYPICAL SECTIONS

- C.1 TYPICAL SECTIONS

D. PLAN-PROFILE

- D.1 SURVEY CONTROL
- D.2-3 TABULATION OF QUANTITIES
- D.4 SITE 1 PLAN AND PROFILE
- D.5 SITE 2 PLAN AND PROFILE
- D.6 SITE 3 PLAN AND PROFILE
- D.7 SITE 4 PLAN AND PROFILE
- D.8 SITE 7 PLAN AND PROFILE
- D.9 SITE 8 PLAN AND PROFILE
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E. EROSION CONTROL

- E.1 TABULATION OF QUANTITIES
- E.2-5 EROSION CONTROL PLANS
- E.6 TEMPORARY DIVERSION BERM METHOD
- E.7-9 STANDARD DETAILS
- E.10 ROLLED EROSION CONTROL PRODUCT ON SLOPES
- E.11 FIBER ROLL CHECK DAM

F. DRAINAGE

- F.1 TABULATION OF QUANTITIES
- F.2 SITE NO. 1 AOP CULVERT PLAN AND PROFILE
- F.3 SITE NO. 1 AOP CULVERT ELEVATIONS
- F.4 SITE NO. 2 AOP CULVERT PLAN AND PROFILE
- F.5 SITE NO. 2 AOP CULVERT ELEVATIONS
- F.6 SITE NO. 3 AOP CULVERT PLAN AND PROFILE
- F.7 SITE NO. 3 AOP CULVERT ELEVATIONS
- F.8 SITE NO. 4 AOP CULVERT PLAN AND PROFILE
- F.9 SITE NO. 4 AOP CULVERT ELEVATIONS
- F.10 SITE NO. 7 AOP CULVERT PLAN AND PROFILE
- F.11 SITE NO. 7 AOP CULVERT ELEVATIONS
- F.12 SITE NO. 8 AOP CULVERT PLAN AND PROFILE
- F.13 SITE NO. 8 AOP CULVERT ELEVATIONS
- F.14 SIMULATED STREAM CULVERT INTERIOR TREATMENT
- F.15 BOX CULVERT RIPRAP DETAILS
- F.16A BOX CULVERT STRUCTURE DETAILS
- F.16B BOX CULVERT STRUCTURE DETAILS
- F.17 RIPRAP REVETMENT TYPICAL SECTIONS
- F.18 OPEN BOTTOM PIPE ARCH STRUCTURAL DETAILS
- F.19 LARGE CULVERT REINFORCED CONCRETE COLLAR DETAILS
- F.20 CULVERT SEDIMENT RETENTION SILL DETAILS
- F.21 ROCK WEIR DETAIL
- F.22 LOG DEFLECTOR DETAIL
- F.23 STREAMBANK RECONSTRUCTION
- F.24 METAL PIPE CULVERT

SHEET INDEX (continued)

G. TEMPORARY TRAFFIC CONTROL

- G.1 TABULATION OF QUANTITIES
- G.2-3 TEMPORARY TRAFFIC CONTROL SIGNING
- G.4 TEMPORARY TRAFFIC CONTROL SIGN INSTALLATION WOOD POSTS

H. PERMANENT TRAFFIC CONTROL

- H.1 TABULATION OF QUANTITIES
- H.2-4 PERMANENT TRAFFIC CONTROL PLANS
- H.5 PERMANENT SIGN INSTALLATION WOOD POSTS

SHEET INDEX

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Δ	total central angle
Δc	curve central angle
$\emptyset$	diameter
θs	spiral central angle
abut.	abutment
ADT	average daily traffic
AH	ahead
appr.	approach
BK	back
b.f.	back face
BM	bench mark
BP	balance point
br.	bridge
brg.	bearing
btwn	between
cc or c. to c.	center to center
cl.	clear
CMP	corrugated metal pipe
col.	column
conc.	concrete
conn.	connection
constr. jt.	construction joint
cont.	continuous
CS	point of curve to spiral
ctrs.	centers
CUFT	cubic foot (feet)
culv.	culvert
CUYD	cubic yard(s)
D	diameter
DHV	design hourly volume
dia.	diameter
diaph.	diaphragm
dist.	distance
drwg(s).	drawing(s)
E	east
e	superelevation rate
e.f.	each face
El. 94.16	elevation in feet
elev.	elevation
emb.	embankment
EOP	edge of pavement
EQ or eq.	equation
EW	edge of water
exc.	excavation
exp. jt.	expansion joint
f.f.	front face
fin.	finish
flg.	flange
ftg.	footing
ga.	gage (gauge)
galv.	galvanized
ID	inside diameter
IE	invert elevation
jt.	joint
KSI	thousand pounds per square inch
L	length of curve
lat.	latitude
LNFT	linear foot (feet)
long.	longitudinal
LPSM	lump sum
Ls	length of spiral
lt. or LT	left
LW	low water

M.L.	main line
M.P.	mile post
matl.	material
max.	maximum
MGAL	thousand gallon
min.	minimum
mon.	monument
N	north
NC	normal crown
o.c.	on center
o. to o.	out to out
OD	outside diameter
OG	original ground
OHWM	ordinary high water mark
PC	point of curve
PCC	point of compound curve
PCS	point of curve to spiral
PI	point of intersection
pl.	plate
POC	point on curve
POS	point on spiral
POT	point on tangent
PS	point of tangent to spiral
PSF	pounds per square foot
PSI	pounds per square inch
PSC	point of spiral to curve
PST	point of spiral to tangent
PT	point of tangent
pvmt.	pavement
R	radius
R.	range
R/W	right-of-way
rdwy.	roadway
reinf.	reinforcement
reqd.	required
rt. or RT	right
rte.	route
S	south
SADT	seasonal average daily traffic
SC	point of spiral to curve
sect.	section
shldr.	shoulder
SLRY	slurry unit
spa.	spacing, spaces or spaced
SQFT	square foot
SQYD	square yard
SRS	point of spiral to reverse spiral
SS	point of spiral to spiral (no curve)
ST	point of spiral to tangent
STA, Sta.	station
std.	standard
stgr.	stringer
stiff.	stiffener
struc.	structural
STS	point of spiral to tangent spiral
T	tangent distance
T.	township
TBM	temporary bench mark
thd.	thread
TS	point of tangent to spiral
Ts	tangent distance (spiraled curve)
typ.	typical
V	design speed (velocity)
vph	vehicles per hour
VPI	vertical point of intersection
W	west

National Boundary

State Boundary

County Boundary

City Boundary

Township or Range Line

Section Line

Section Corner (Found, Projected)

$\frac{1}{4}$ Section Line

$\frac{1}{4}$ Section Corner (Found, Projected)

$\frac{1}{16}$ Section Line

$\frac{1}{16}$ Section Corner (Found, Projected)

Property Line

Parcel Number

National Park Boundary

National Forest Boundary

National Wildlife Refuge Boundary

BLM Lands Boundary

Indian Reservation Boundary

Existing Roadway (Paved, Gravel)

Railroad

Trail

Fiber Roll

Silt Fence

Sandbag

Intermittent Drainage or Small Creek

Large Creek or River

Lake, Pond or Reservoir; Marshland

Spring or Seep

Treeline; Individual Trees

Material Source; Bore Hole; Test Pit

Spot Elevation; Coordinate Grid Tick

Above Ground Tank; Underground Tank

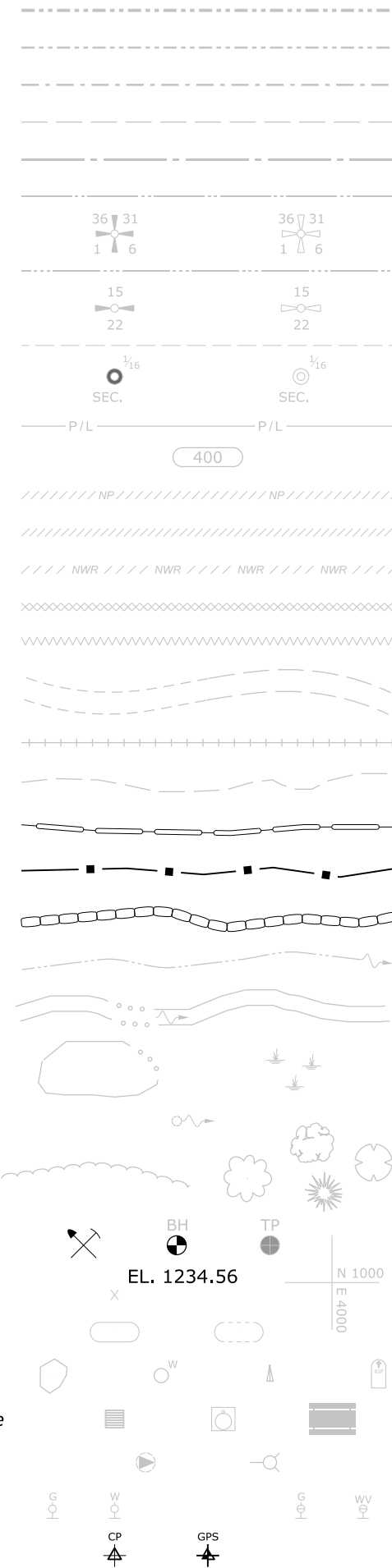
Boulder; Well; Antenna; Grave

Cooking Grate; Garbage Can; Picnic Table

Flagpole; Fire Hydrant

Gas & Water Meter; Gas & Water Valve

Control Point (Terrestrial and GPS)



North Arrow



EXISTING

PROPOSED

Slope Stake Limits

Top of Cut
Toe of Fill

Construction Limits

- no symbol -

Bottom of Ditch

Fence

Gate with Fence

Cattleguard

Guardrail

Concrete Barrier and Guard Wall

Retaining Wall

wall face

Signs (single, double post; portable)

Delineators

Pipe Culvert (arrow shows flow)

Pipe Culvert with End Section

Pipe Culvert with Headwall

Pipe Culvert with Drop Inlet

Box Culvert

Underdrain

Overhead/Above Ground Utilities

Underground Utilities

FM = force main, FO = fiber optic, G = gas, IRR = irrigation, O = oil,
P = power, SA = sanitary sewer, SD = storm drain, SS = storm sewer,
STEAM = steam, T = telephone, TV = CATV, W = water

Poles (Power, Telephone, Joint Use,
Light, Support w/Anchor)

Miscellaneous Utility Features

EM = electric meter, TP = telephone pedestal, TV = CATV pedestal,
UP = transformer or junction box, WF = water fountain

Building

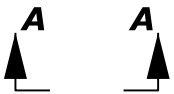
Right-of-Way Line

Permanent Easement

Construction Easement

Riprap

Section A-A



NO SCALE

NOTE:

- Other symbols used in the plans will be shown in a legend on the appropriate plan sheet.

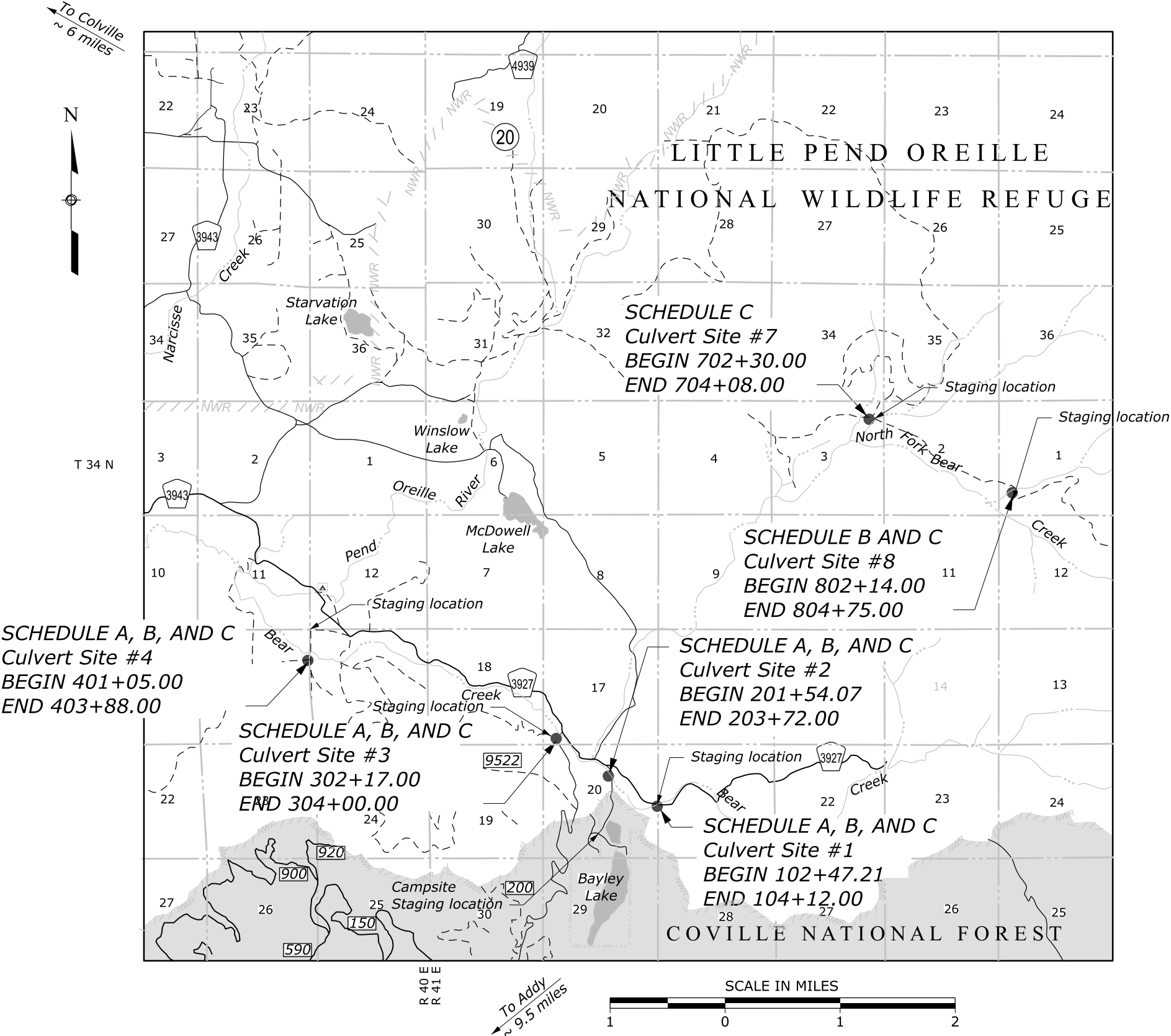
U.S. DEPARTMENT OF TRANSPORTATION, FHWA
OFFICE OF FEDERAL LANDS HIGHWAY

PLAN SYMBOLS AND ABBREVIATIONS

WFLHD DETAIL
W101-1

SPECIFICATION
FP-14

APPROVED FOR USE
6/2022



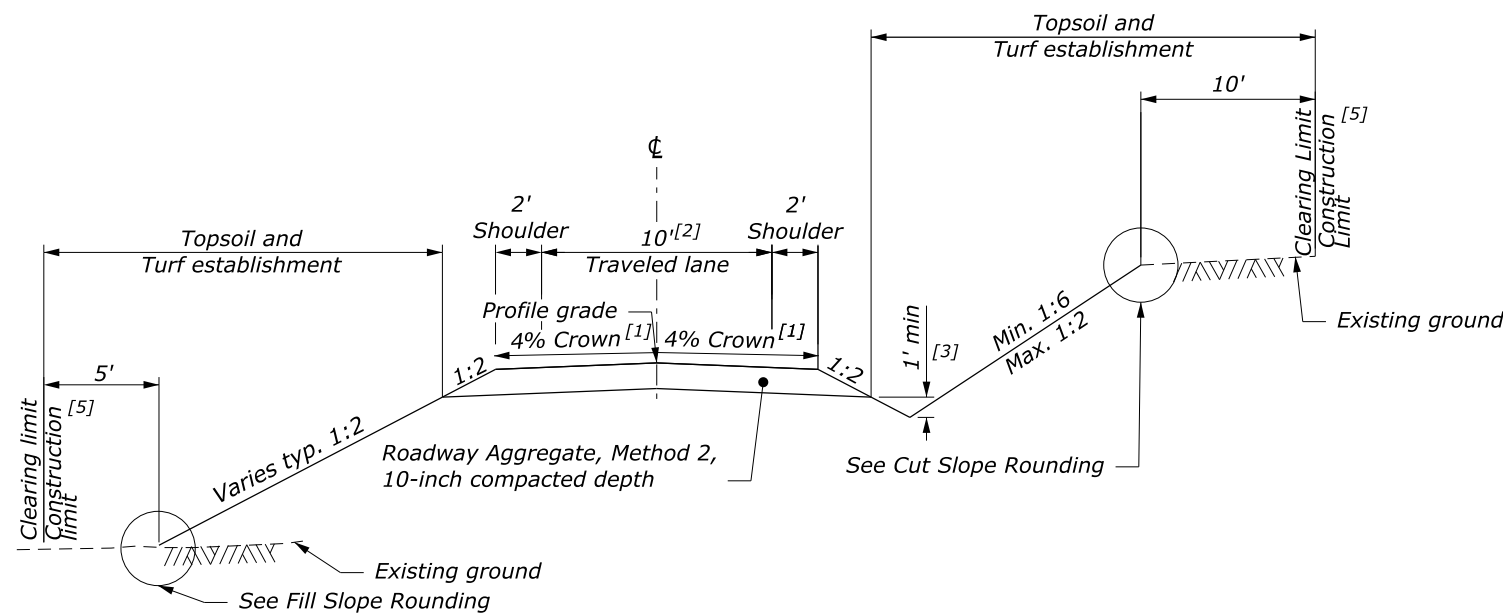
VICINITY MAP

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	B.1

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PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	B.3

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TYPICAL SECTION

Site 1

102+47.21 to 104+15.38

Site 2

201+54.07 to 203+72.00
1200+08.60 to 1200+40.00^[4]

Site 3

302+17.00 to 304+00.00

Site 4

401+05.00 to 403+88.00

Site 7

702+30.00 to 704+08.00

Site 8

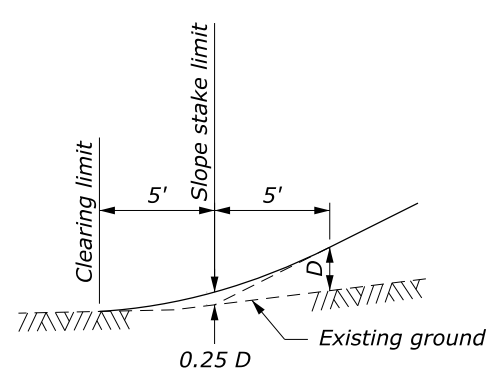
802+14.00 to 804+75.00

NOTE:

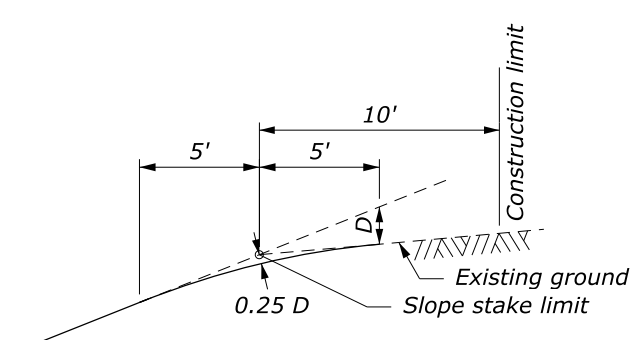
- 1. Sites 5 & 6 are not included in this contract.
- 2. When placing topsoil, used the topsoil that has been conserved from the site. Place the same depths that were removed as listed on the Earthwork Summary Table.

FOOTNOTE:

- ^[1] Cross slope varies. See physical data.
- ^[2] Traveled lane width varies. See physical data.
- ^[3] Ditch depth varies. See physical data.
- ^[4] Approach alignment and stationing. Lane width varies. See Approach Plan and Profile sheet.
- ^[5] Construction limits differs from the clearing limits over stream crossings. See Plan and Profile Sheets.



FILL SLOPE ROUNDING



CUT SLOPE ROUNDING

C:\Users\adam.davies\Documents\Projects_2026\Washington\Little Pend Oreille\PW\WA_FWS_LPO_2020(1)_sites1-4_7-8 control sheet.xlsx]Sheet 30-Apr-2026 7:55 AM

PROJECT :Little Pend Oreille
DATE OF FIELD WORK : October/November 2020
DATE OF FINAL ADJUSTMENT : November 2020

COORDINATE SYSTEM : Assumed (resembles Washington North)
VERTICAL DATUM : Assumed (initial elevations derived from OPUS NAVD88 GEOID 18)

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	D.1

PROJECT UNITS : US SURVEY FOOT

POINT NUMBER	PROJECT COORDINATES			DESCRIPTION
	NORTH	EAST	ELEVATION	
Site 1				
LPO11	537812.490	2411482.818	2419.296	5/8" IR/FHWA ALUM CAP
LPO12	537828.899	2411766.371	2422.622	5/8" IR/FHWA ALUM CAP
LPO13	537810.172	2411925.952	2420.842	5/8" IR/FHWA ALUM CAP
LPO14	537740.494	2412050.908	2422.040	5/8" IR/FHWA ALUM CAP
LPO15	537762.519	2412222.480	2437.433	5/8" IR/FHWA ALUM CAP
Site 2				
LPO21	539328.881	2409667.648	2335.892	5/8" IR W/FHWA ALUM CAP
LPO22	539217.337	2409827.081	2331.213	5/8" IR W/FHWA ALUM CAP
LPO23	539001.936	2409833.908	2327.430	5/8" IR W/FHWA ALUM CAP
LPO24	538750.986	2409816.738	2332.534	5/8" IR W/FHWA ALUM CAP
Site 3				
LPO31	540989.446	2407506.924	2270.564	5/8" IR W/FHWA ALUM CAP
LPO32	540991.247	2407397.392	2265.129	5/8" IR W/FHWA ALUM CAP
LPO33	540855.673	2407334.183	2263.681	5/8" IR W/FHWA ALUM CAP
LPO34	540696.660	2407211.233	2264.735	5/8" IR W/FHWA ALUM CAP
LPO35	540621.757	2407099.430	2268.876	5/8" IR W/FHWA ALUM CAP
Site 4				
LPO41	544450.203	2395691.166	2149.276	5/8" IR W/FHWA ALUM CAP
LPO42	544207.441	2395745.051	2139.514	5/8" IR W/FHWA ALUM CAP
LPO43	544011.699	2395742.012	2140.253	5/8" IR W/FHWA ALUM CAP
LPO44	543836.197	2395731.421	2146.419	5/8" IR W/FHWA ALUM CAP
LPO45	543792.700	2395556.186	2147.920	5/8" IR W/FHWA ALUM CAP
Site 7				
LPO71	555979.187	2420741.950	3245.113	5/8" IR W/FHWA ALUM CAP
LPO72	556007.934	2420989.019	3254.709	5/8" IR W/FHWA ALUM CAP
LPO73	555937.192	2421123.749	3258.742	5/8" IR W/FHWA ALUM CAP
LPO74	555869.296	2421248.563	3264.249	5/8" IR W/FHWA ALUM CAP
LPO75	555838.010	2421463.693	3273.203	5/8" IR W/FHWA ALUM CAP
Site 8				
LPO81	553089.924	2427715.288	3648.942	5/8" IR W/FHWA ALUM CAP
LPO82	553033.096	2427969.297	3652.994	5/8" IR W/FHWA ALUM CAP
LPO83	552862.534	2427996.303	3655.743	5/8" IR W/FHWA ALUM CAP
LPO84	552641.212	2427823.292	3675.723	5/8" IR W/FHWA ALUM CAP

SURVEY CONTROL

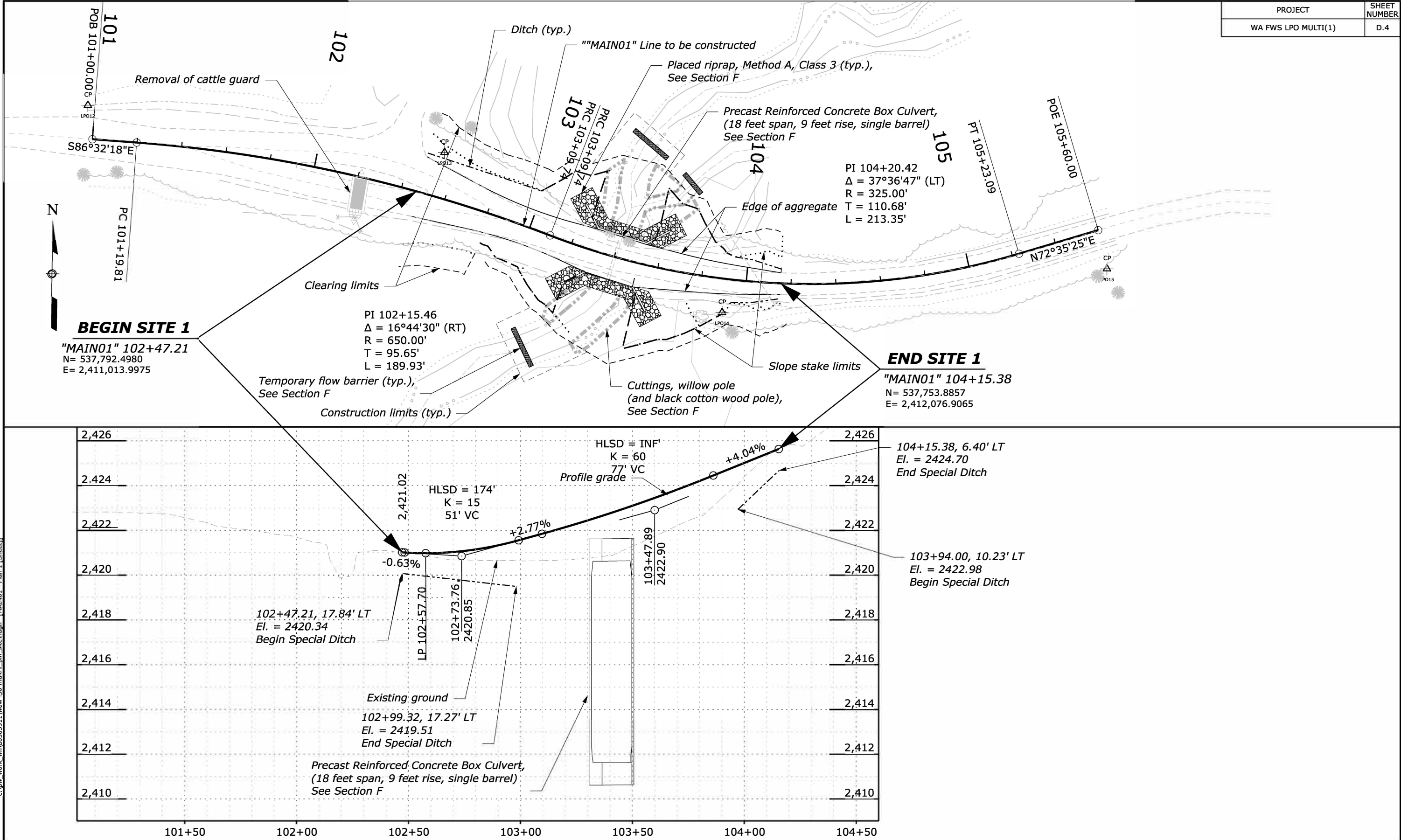
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EARTHWORK SUMMARY TABLE																						
LOCATION	RAW DATA				ASSUMPTIONS						CUT						FILL				TOTALS	
	Volumes_Cut (Total Cut volume excluding topsoil) Source: ORD, Quantities by Named Boundary	Volumes_Fill (Total Fill volume including Topsoil) Source: ORD Quantities from component quantities	Exist Topsoil (removed) (existing topsoils in cut) Source: ORD Quantities by Named Boundary	Exist Topsoil (removed and replaced) (existing topsoil in fill) Source: ORD Quantities by Named Boundary	Shrink (-) / Swell (+) Factor Bank Volume Source: Geotechnical recommendation 01/06/2026	Shrink (-) / Swell (+) Factor Haul Volume Source: Geotechnical recommendation 01/06/2026	Specific areas with unsuitable material	Assumed percent unsuitable (0%=Suitable to 100%=Unsuitable) Source: Geotechnical recommendation 01/07/2026	Unsuitable material based on Volumes_Cut and Assumed Percent Unsuitable	Assumed Topsoil Removal / Conserved Depth Source: Geotechnical recommendation 01/06/2026	Item 20401-0000 ROADWAY EXCAVATION	(+) Additional Excavation (See Note 2) for info only	(-) Topsoil Stripped from Cuts for info only	(-) Estimate of Unsuitable Material for info only	Total Unadjusted Excavation Available for Fill for info only	Total Adjusted Available for Fill (adjusted based on shrink/swell factor) for info only	Embankment for info only	(+) Additional Backfill Needed (See Note 3) for info only	(+) Topsoil stripped from embankment foundation areas for info only	Total Fill Needed for info only	Excess Available Fill (Total Adjusted Available For Fill less Total Fill Needed) for info only	Waste for info only
UNITS	CUYD	CUYD	CUYD	CUYD	%	CUYD	%	CUYD	INCH	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD	CUYD Haul
Site 1	32	166	13	85	-11%	5%	32	5%	2	6	45	1,411	13	34	1,409	1,254	81	1	85	167	1,087	1,142
Site 2	75	120	31	122	-11%	5%	75	5%	4	6	106	1,250	31	79	1,246	1,109	(2)	-	122	120	989	1,039
Site 2 Approach	25	-	3	10	-11%	5%	25	5%	1	6	28	-	3	26	(1)	(1)	(10)	-	10	-	0	0
Site 3	141	89	22	45	-15%	20%	141	25%	35	3	163	1,675	22	176	1,640	1,394	44	-	45	89	1,305	1,566
Site 4	59	163	35	142	-11%	5%	59	5%	3	6	94	1,332	35	62	1,329	1,183	21	5	142	168	1,015	1,066
Site 7	155	42	83	236	-11%	5%	155	20%	31	12	238	1,694	83	186	1,663	1,480	(194)	-	236	42	1,438	1,510
Site 8	161	270	44	181	-11%	5%	161	5%	8	6	205	1,276	44	169	1,268	1,128	89	5	181	275	853	896
SCHEDULE A TOTALS	648	538	231	821			332		45		436	5,668	104	377	5,623	4,939	134	6	404	544	4,396	4,812
SCHEDULE B TOTALS	493	808	148	585			493		53		641	6,944	148	546	6,891	6,068	223	11	585	819	5,250	5,708
SCHEDULE C TOTALS	648	850	231	821			648		84		879	8,638	231	732	8,554	7,548	29	11	821	861	6,688	7,218

TABULATION OF QUANTITIES
(SHEET 1 OF 2)

TABULATION OF PLAN AND PROFILE QUANTITIES												
ITEM	DESCRIPTION	UNIT	SITE 1	SITE 2	SITE 3	SITE 4	SITE 7	SITE 8	SCHEDULE QUANTITY			REMARKS
									A	B	C	
20101-0000	CLEARING AND GRUBBING	ACRE	0.2	0.3	0.2	0.3	0.2	0.3	1.0	1.3	1.5	
20301-0600	REMOVAL OF CATTLE GUARD	EACH	1	0	1	0	0	0	2	2	2	
30201-2000	ROADWAY AGGREGATE, METHOD 2	CUYD	100	127	156	146	127	126	529	655	782	1.97 TON/CUYD
61920-2000	REMOVE AND RESET GATE	EACH	0	1	0	0	0	0	1	1	1	
62502-0000	TURF ESTABLISHMENT	SQYD	739	1126	848	1279	982	1347	3,992	5,339	6,321	

NOTE:
1. All Site 2 quantities include the work on the approach road.

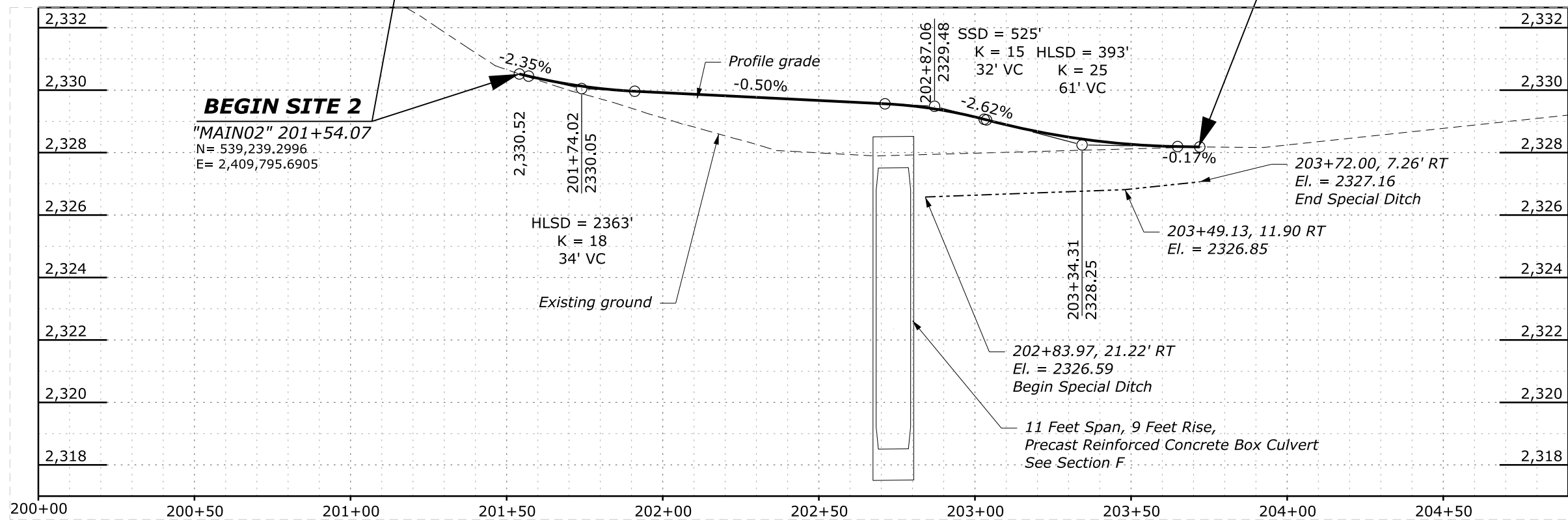
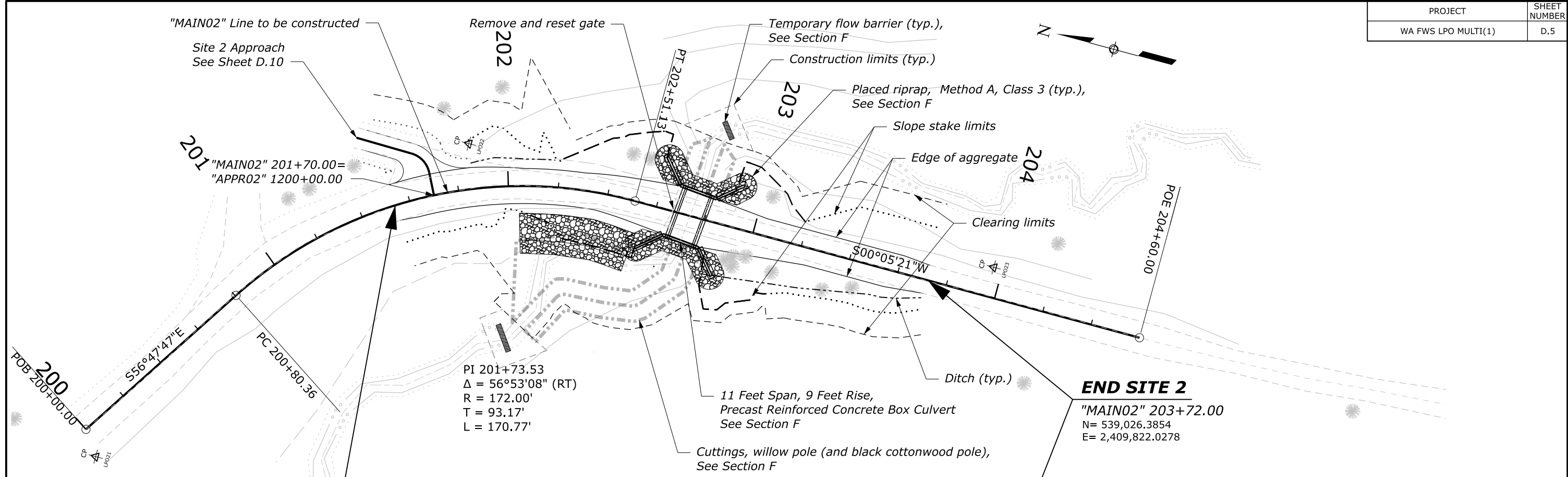


NOTE:

1. Match the existing roadway widths and cross slopes at the start and end of the site.
2. At the beginning of the alignment, construct the roadway around the existing island as directed by the CO.

SITE 1 PLAN AND PROFILE

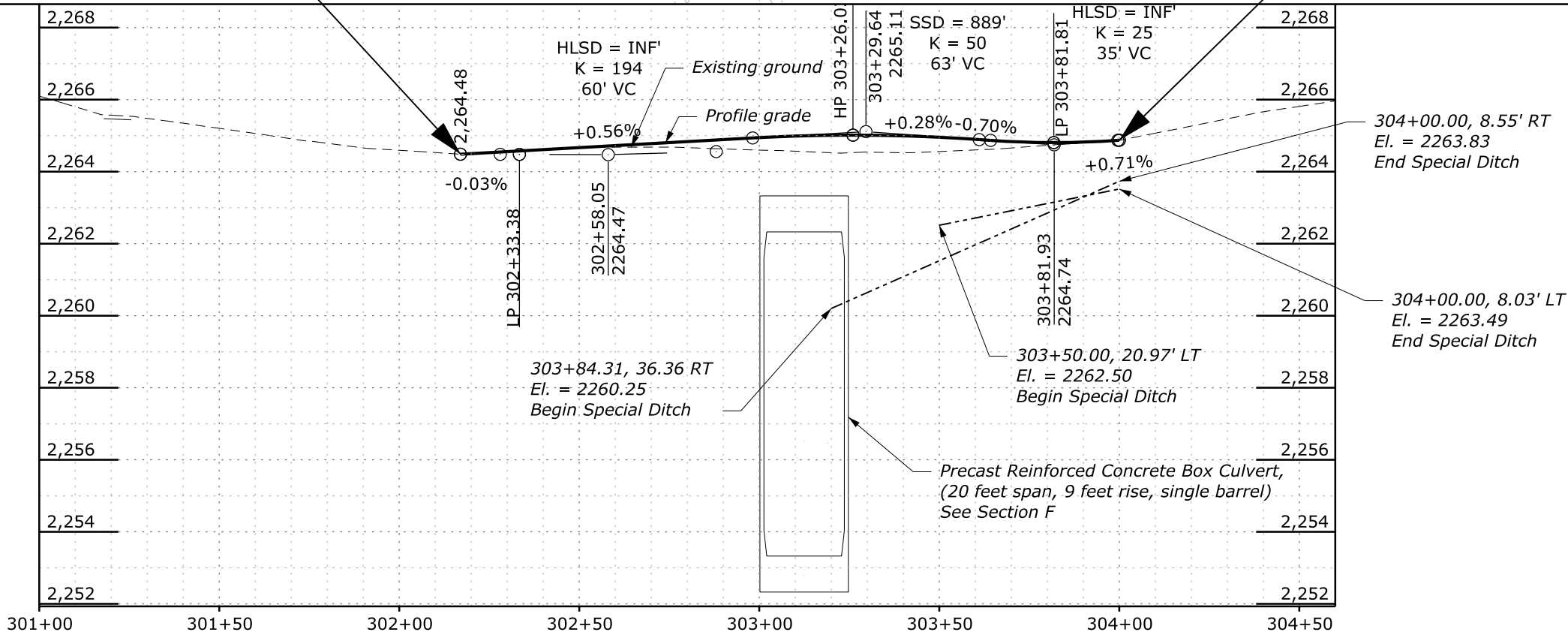
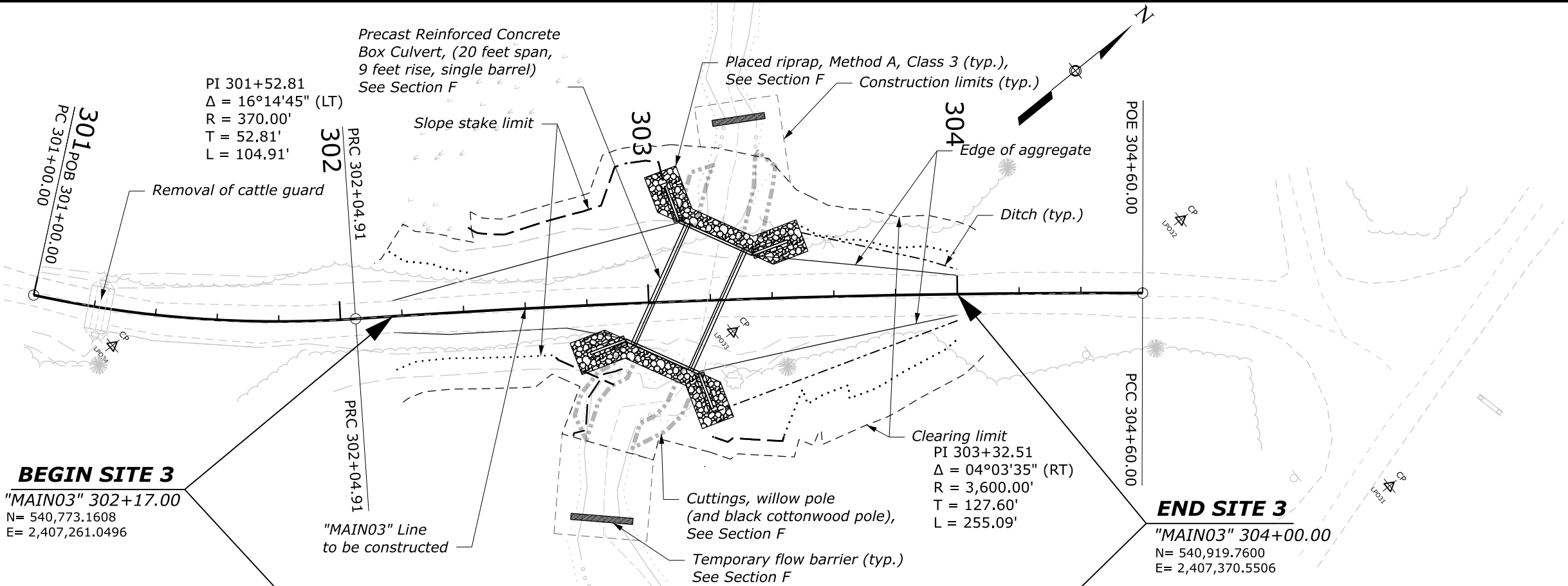
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	D.5



NOTE:

- Match the existing roadway widths and cross slopes at the start and end of the site.
- Reset gate in location as direction by CO.

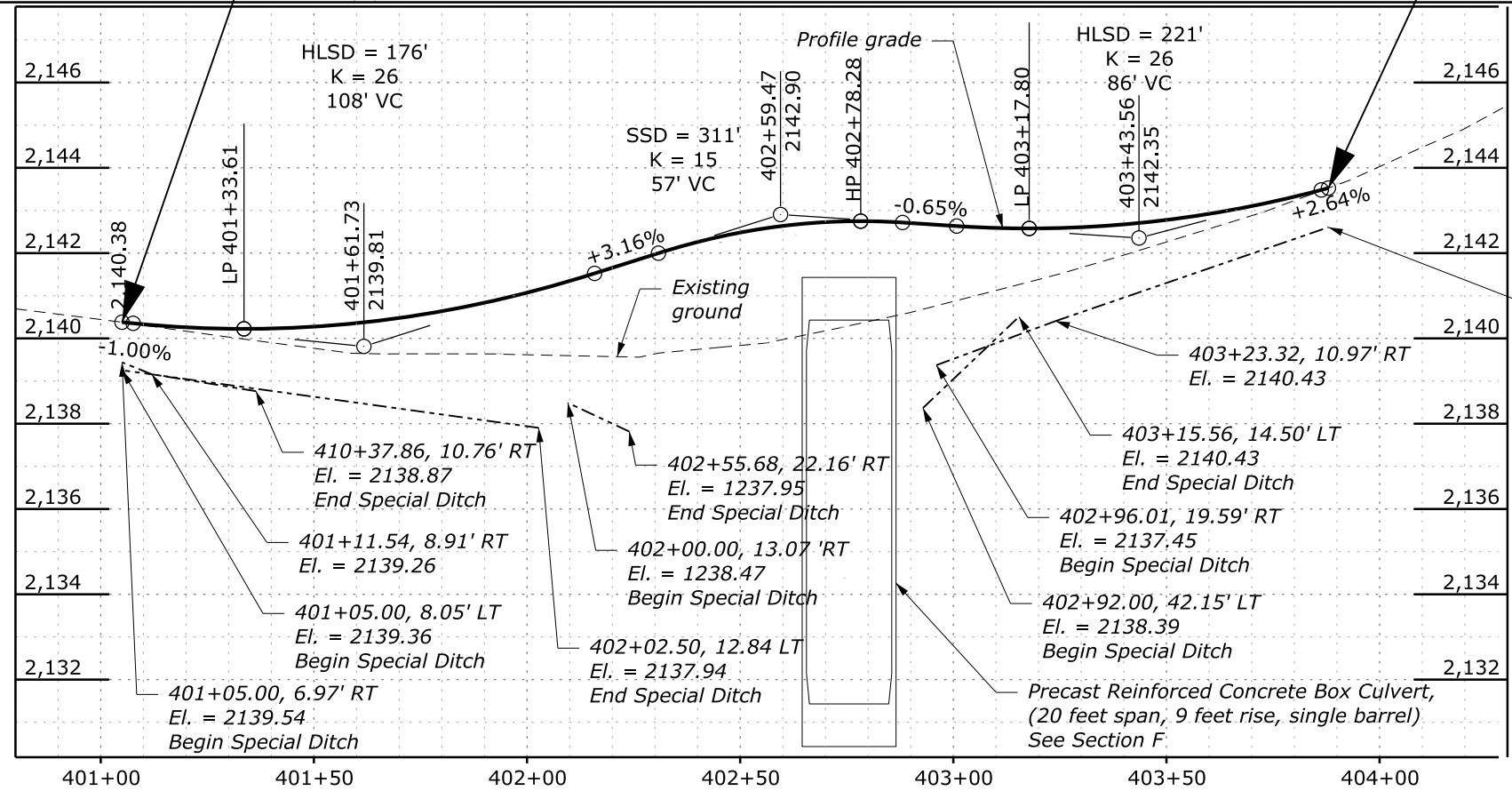
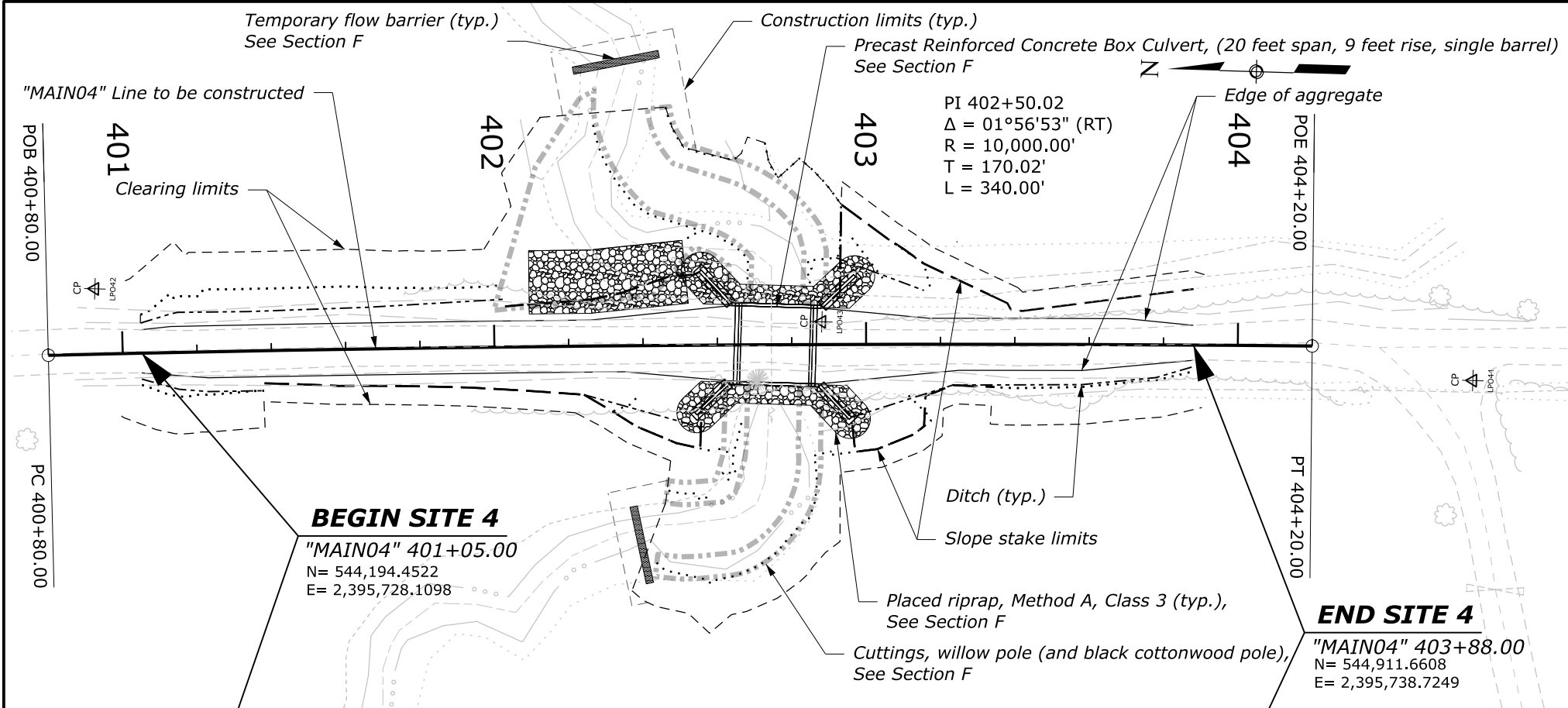
SITE 2 PLAN AND PROFILE



NOTE:
1. Match the existing roadway widths and cross slopes at the start and end of the site.

SITE 3 PLAN AND PROFILE

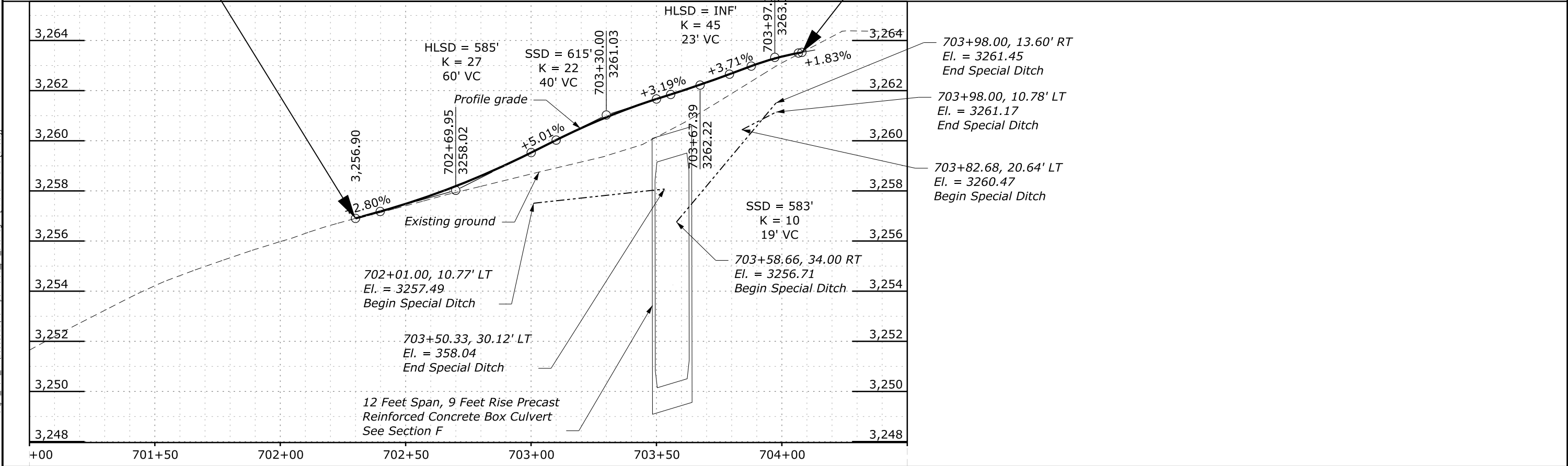
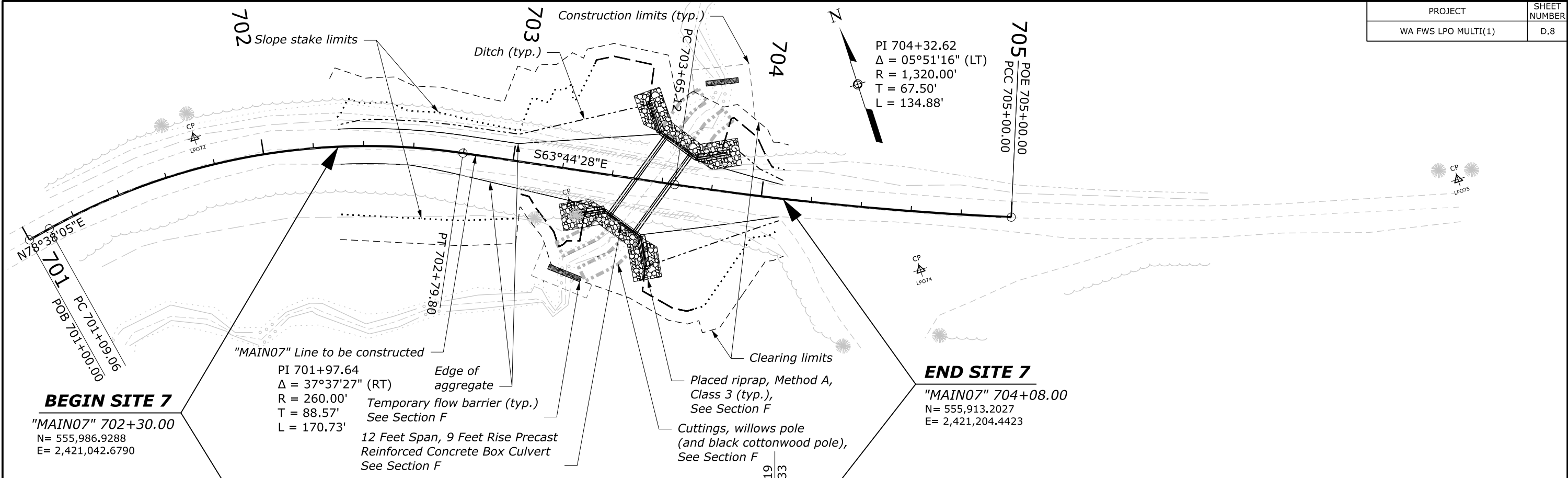
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	D.7



c:\pw_work\wfd0505911\waw-lpo-multi1_pfr_site4.dgn [MAIN04 - Plan 1 [Sheet]] 28 April 2026 4:25 PM

NOTE:
1. Match the existing roadway widths and cross slopes at the start and end of the site.

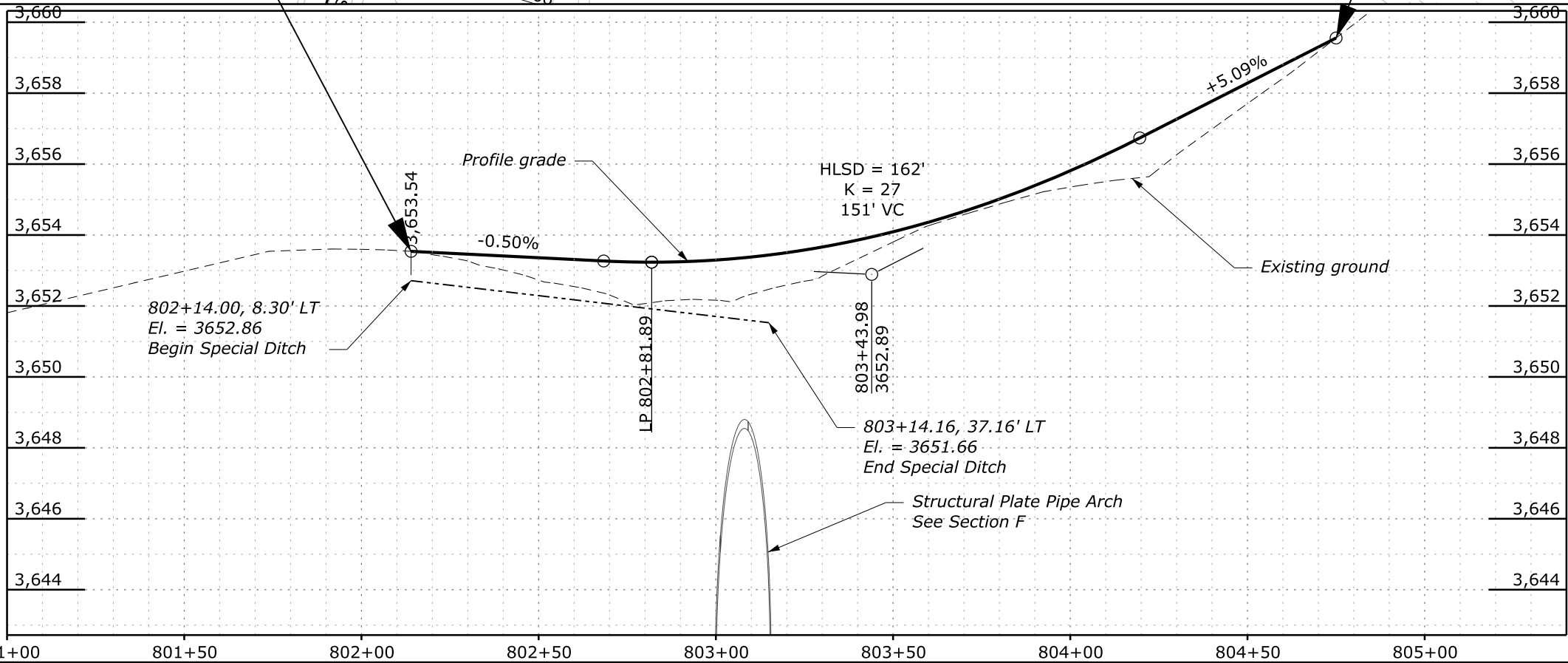
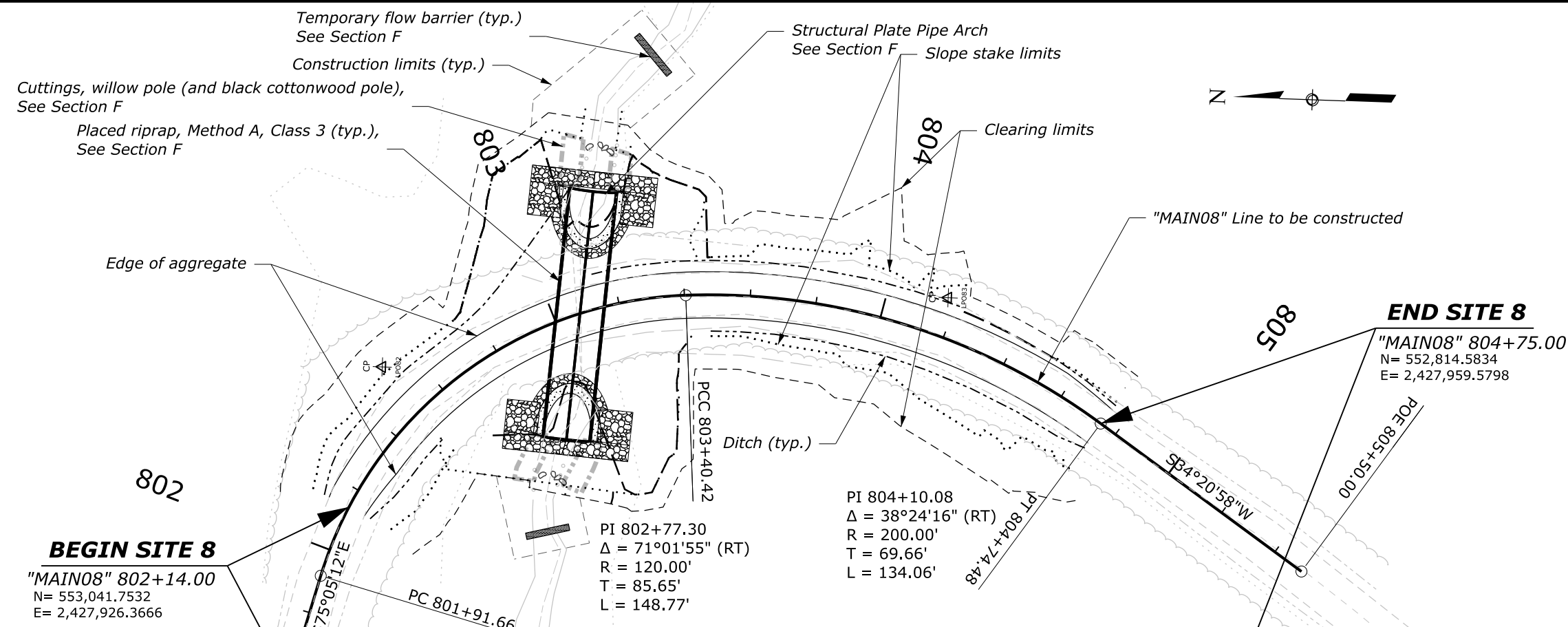
SITE 4 PLAN AND PROFILE



NOTE:
1. Match the existing roadway widths and cross slopes at the start and end of the site.

SITE 7 PLAN AND PROFILE

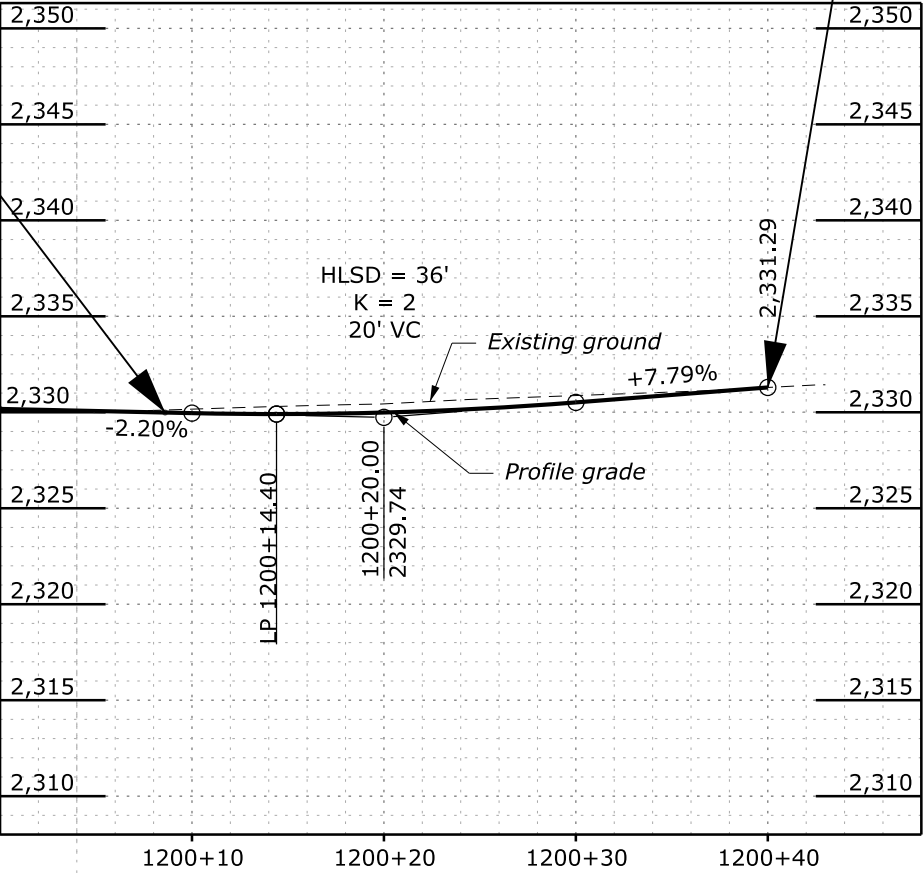
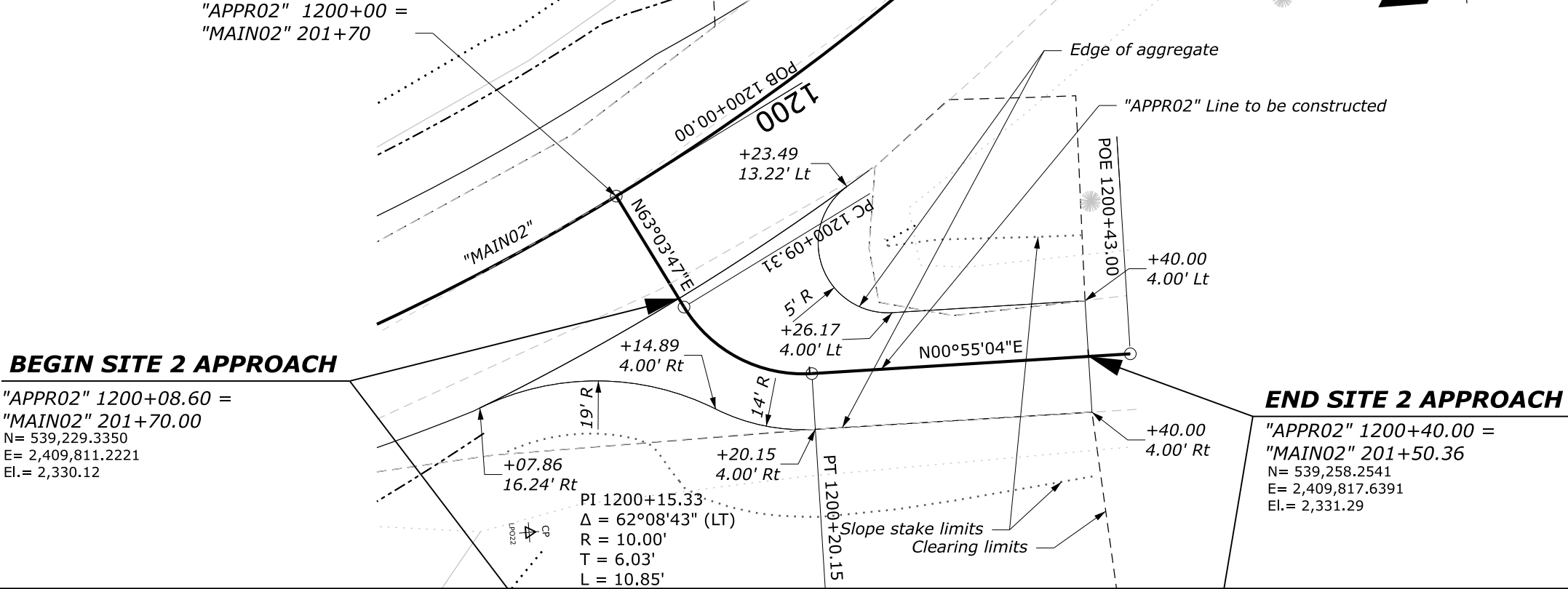
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	D.9



NOTE:
1. Match the existing roadway widths and cross slopes at the start and end of the site.

SITE 8 PLAN AND PROFILE

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	D.10

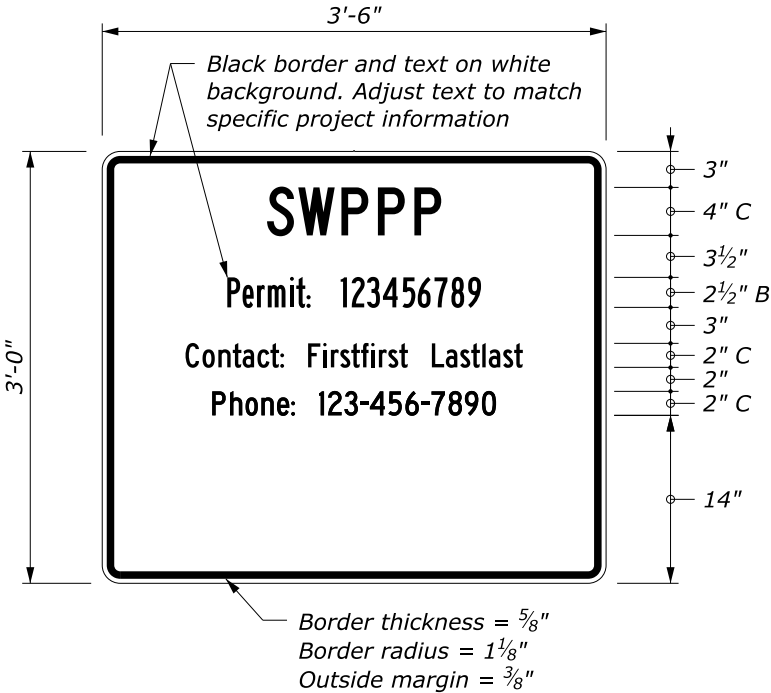


SITE 2 APPROACH PLAN AND PROFILE

c:\pw_work_wfd\0511131\waw-lpo-multi1_plt_ec.dgn [TABULATION OF QUANTITIES] 29 June 2026 2:58 PM

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.1

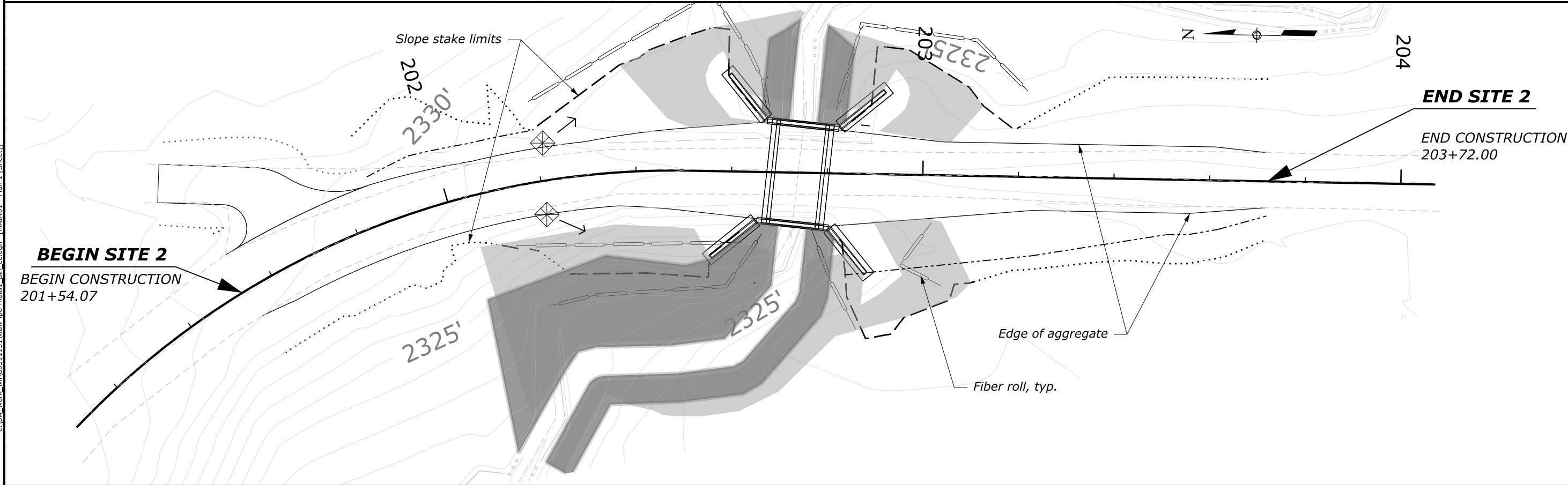
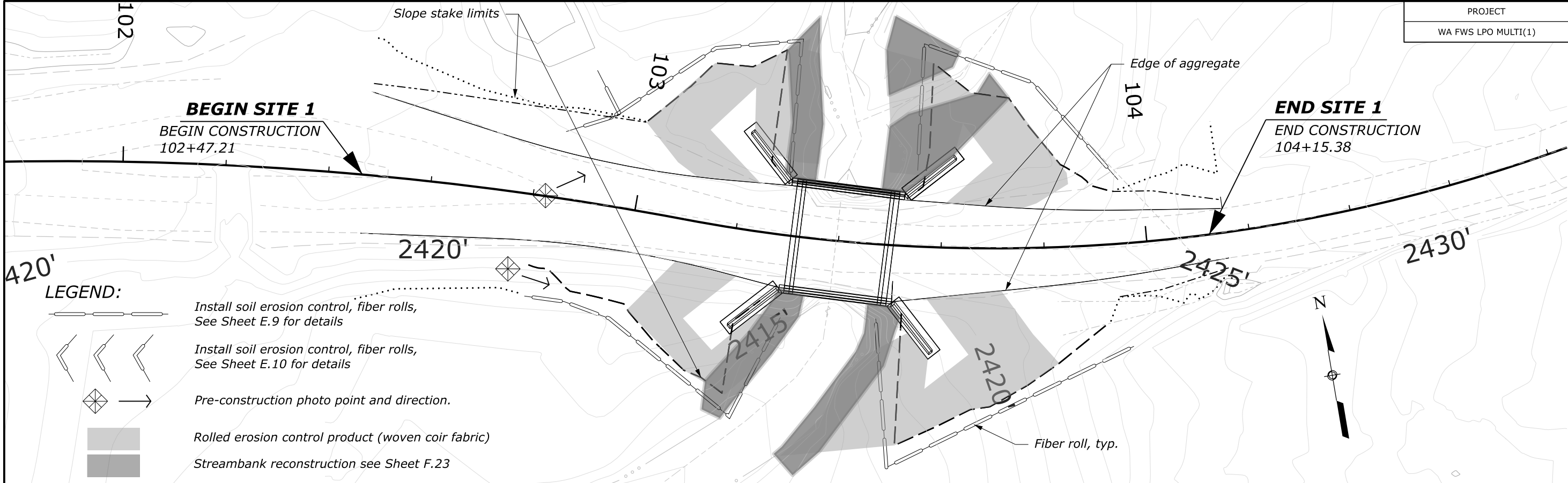
TABULATION OF SOIL EROSION AND SEDIMENT CONTROL QUANTITIES												
ITEM	DESCRIPTION	UNIT	SITE 1	SITE 2	SITE 3	SITE 4	SITE 7	SITE 8	SCHEDULE QUANTITY			REMARKS
									A	B	C	
15705-1400	SOIL EROSION CONTROL, FIBER ROLL	LNFT	313	274	193	431	240	355	1211	1566	1806	
62901-0000	ROLLED EROSION CONTROL PRODUCT (WOVEN COIR FABRIC)	SQYD	248	356	222	418	240	480	1244	1724	1964	



SWPPP Sign
Refer to Subsection 107.01A
No separate payment will be made

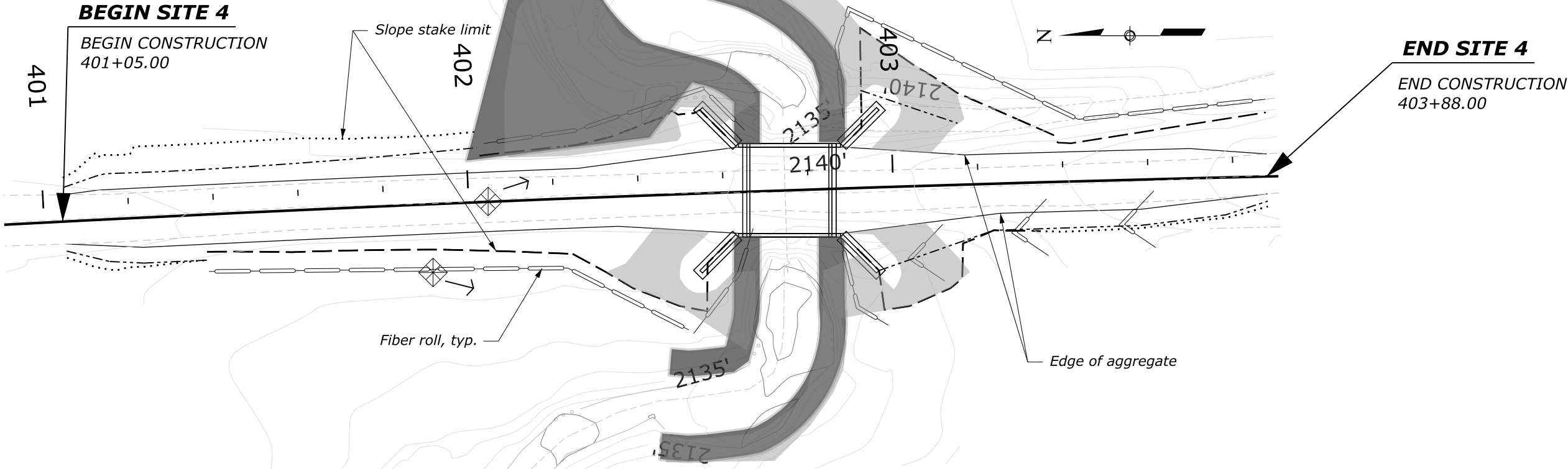
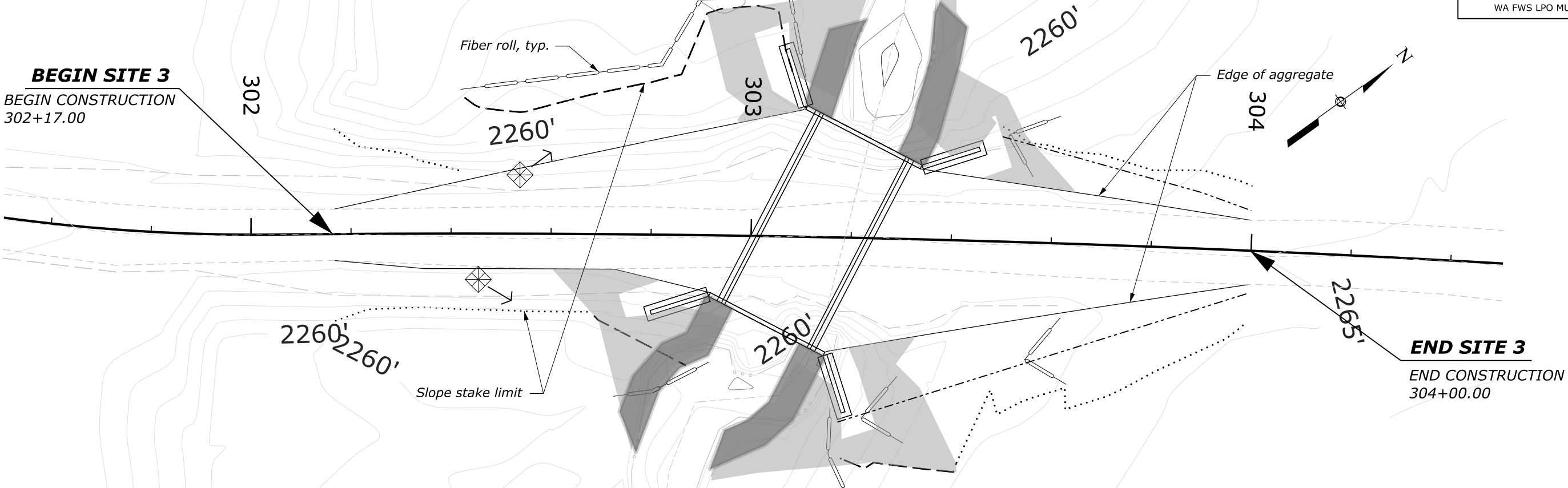
TABULATION OF QUANTITIES

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.2



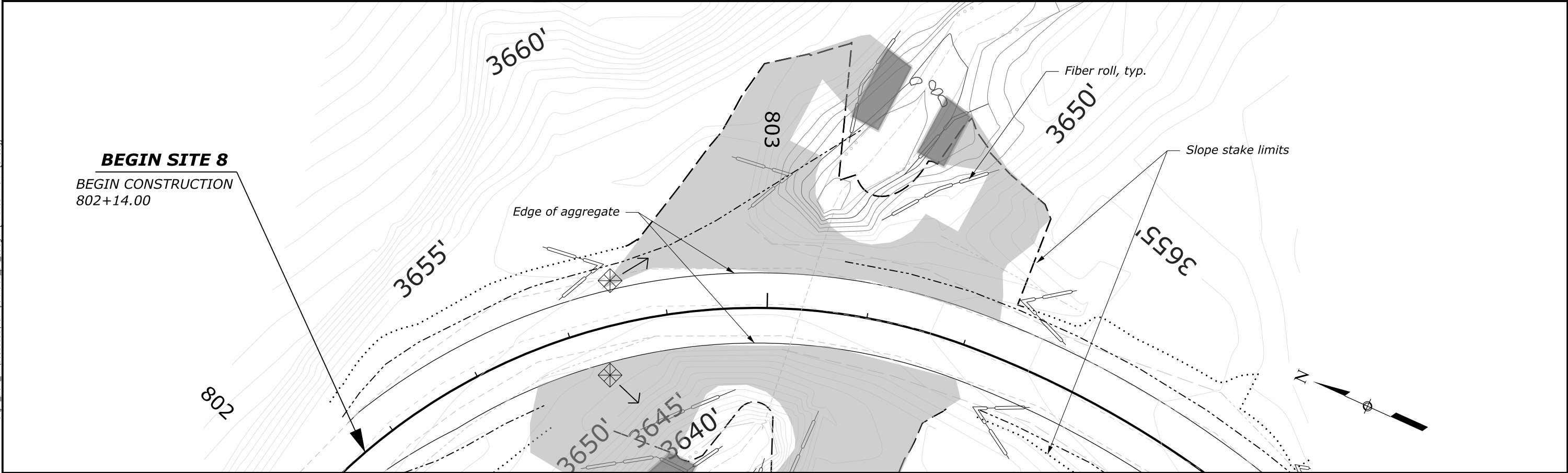
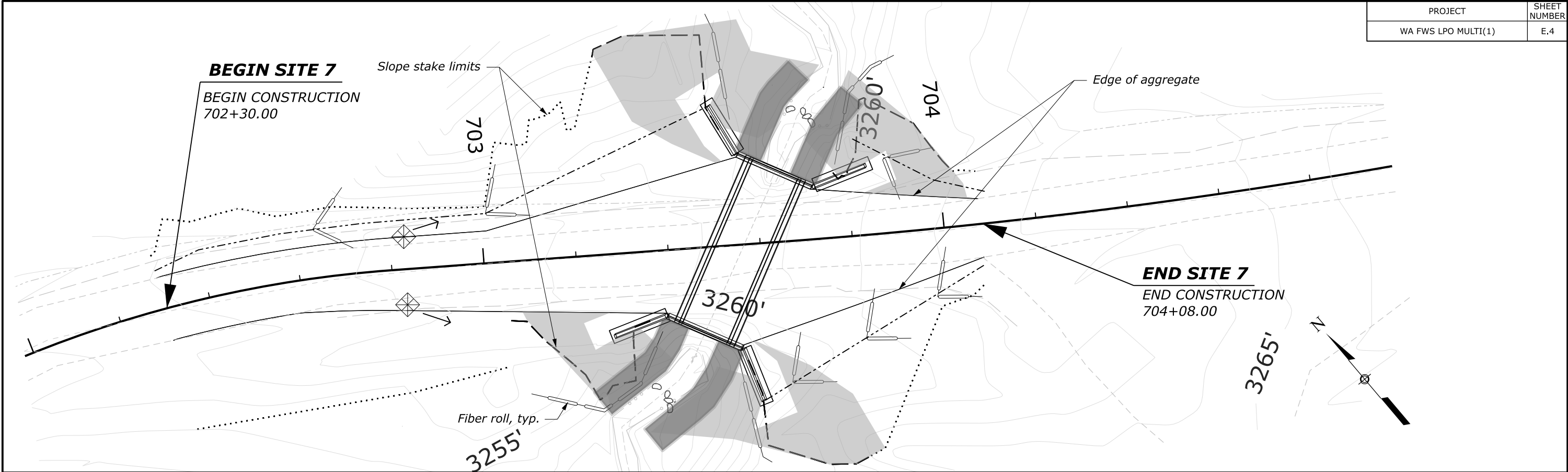
EROSION CONTROL PLANS

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.3



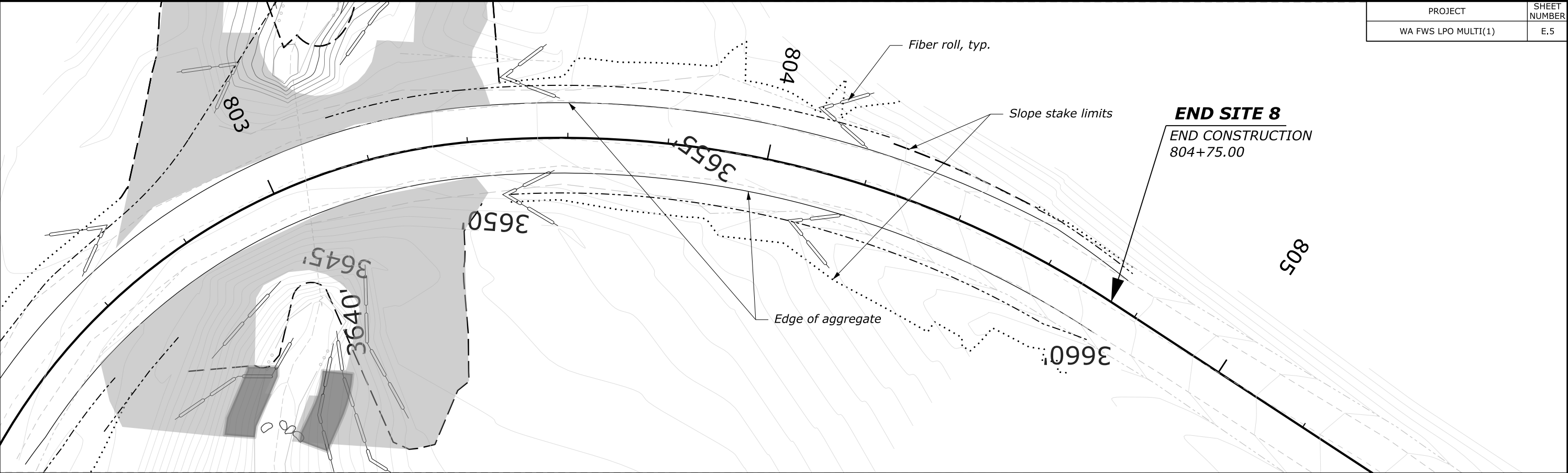
EROSION CONTROL PLANS

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.4



EROSION CONTROL PLANS

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.5



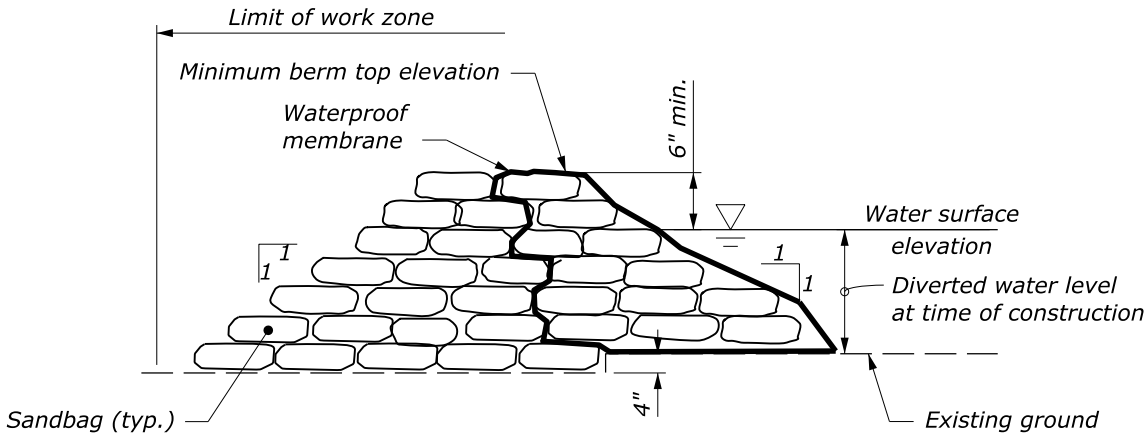
EROSION CONTROL PLANS

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PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.6

NOTE:

1. The detail is a suggested configuration for diverting a stream during construction operations. Alternate stream diversion methods may be chosen (including any approved prefabricated or portable diversion berms, dams, etc.). As a minimum, provide a temporary diversion berm with a minimum height equal to the water surface elevation with a 6-inch (min.) freeboard. Submit temporary stream diversion plans for approval prior to installation.
2. Place sandbags to form a pyramid by laying equal numbers of bottom rows as there are vertical course. Overlap the upper rows of sandbags above the joints in the lower rows.
3. While in use, inspect and maintain the temporary diversion berm daily. Repair as needed after rainfall events or as directed.

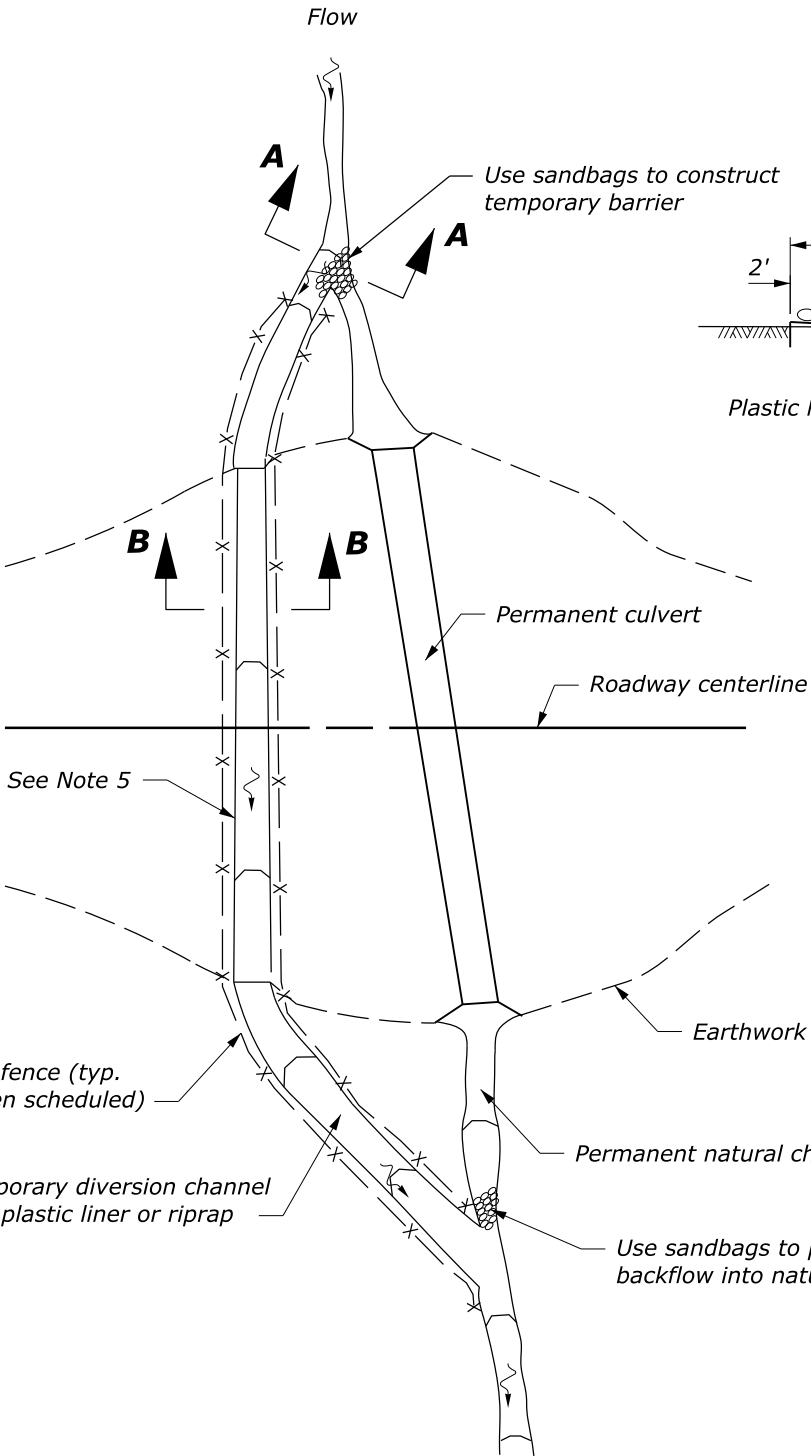


NO SCALE

TEMPORARY DIVERSION BERM
METHOD

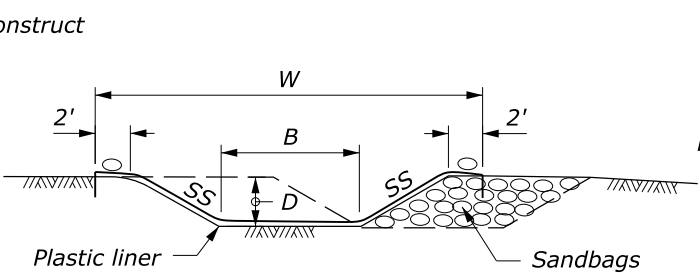
NOTE:

- 1. See Erosion Control Section for temporary culvert diameter, riprap class, channel dimensions and quantities.
- 2. Use plastic liner or riprap along the entire length and width of the temporary diversion channel.
- 3. Construct channel at a minimum grade of 0.5 percent.
- 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. When specified replace the portion of the diversion channel through the roadway embankment with temporary culvert. Compact temporary culvert backfill using one of the methods listed in Subsection 204.11(a).
- 6. Provide geotextile filter conforming to Subsection 714.01(a).

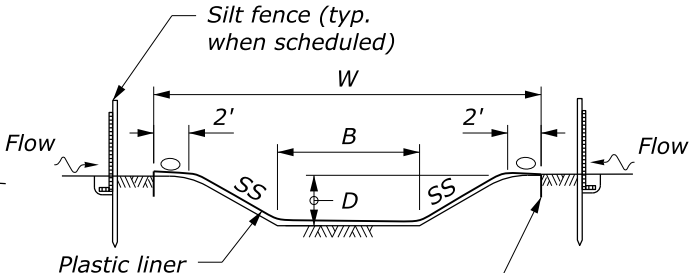


PLAN

DIVERSION CHANNEL

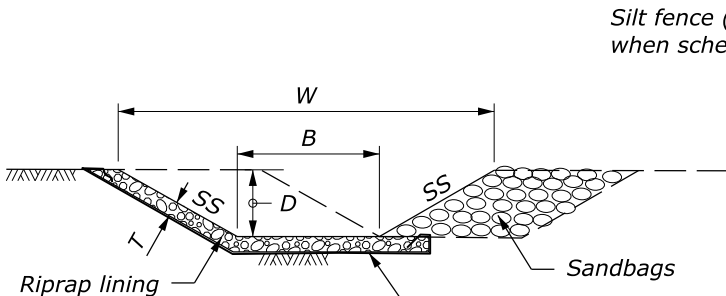


SECTION A-A

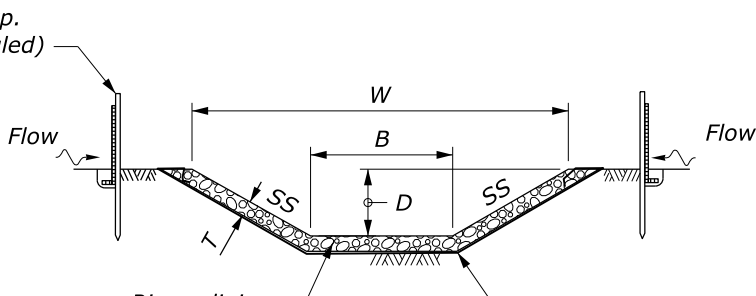


SECTION B-B

PLASTIC LINED DIVERSION CHANNEL

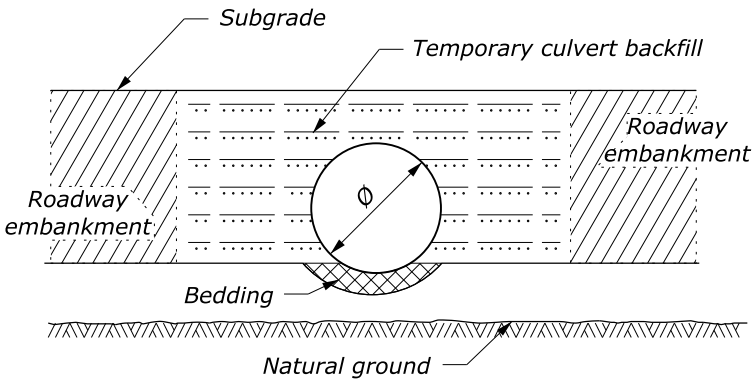


SECTION A-A



SECTION B-B

RIPRAP LINED DIVERSION CHANNEL

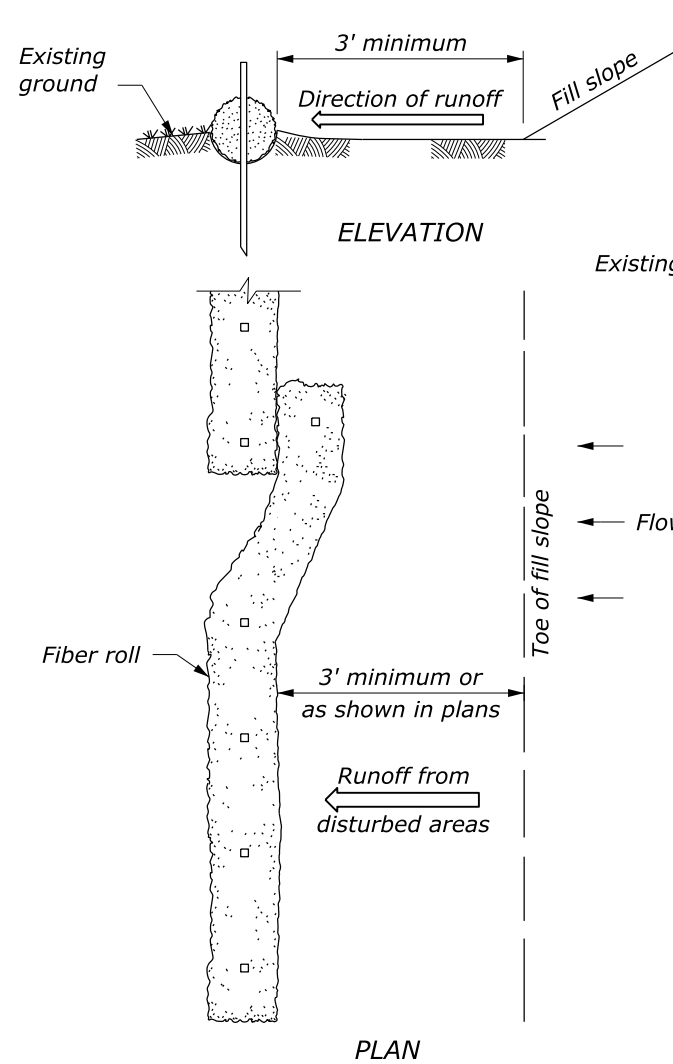


SECTION B-B

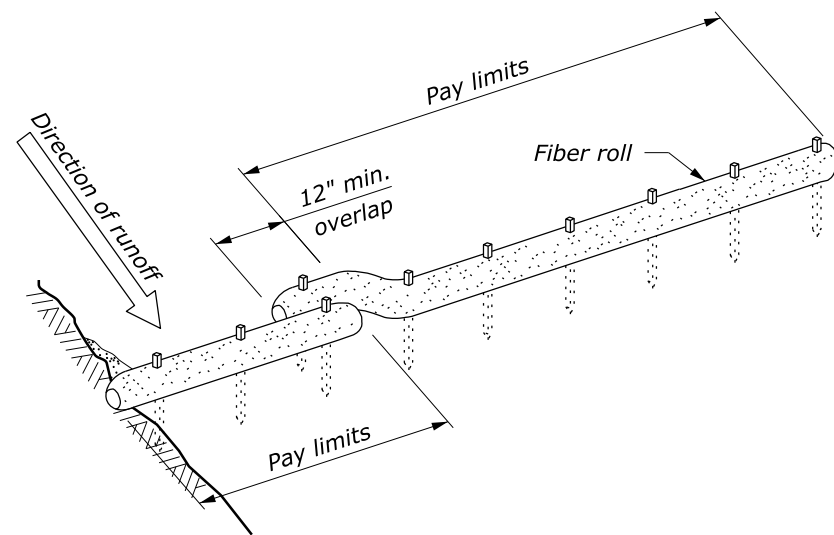
TEMPORARY CULVERT

NO SCALE

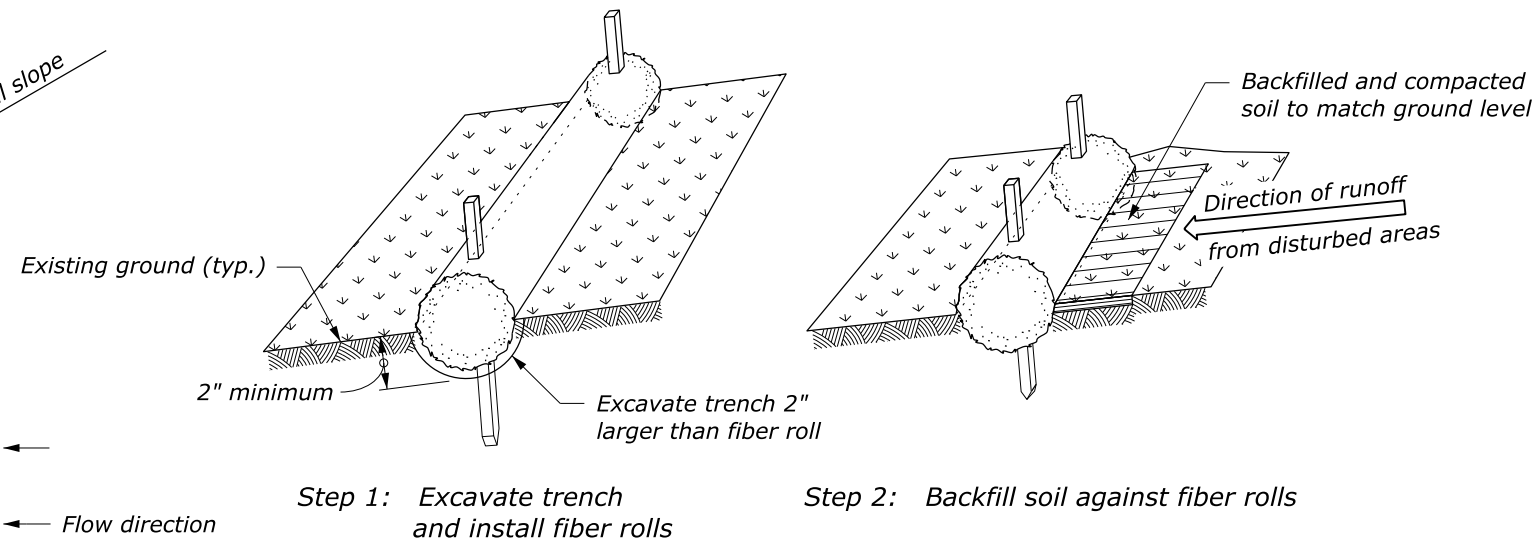
U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD 157-5
TEMPORARY DIVERSION CHANNELS	SPECIFICATION FP-14
	APPROVED FOR USE 1/2024



INSTALLATION BEYOND TOE OF SLOPE



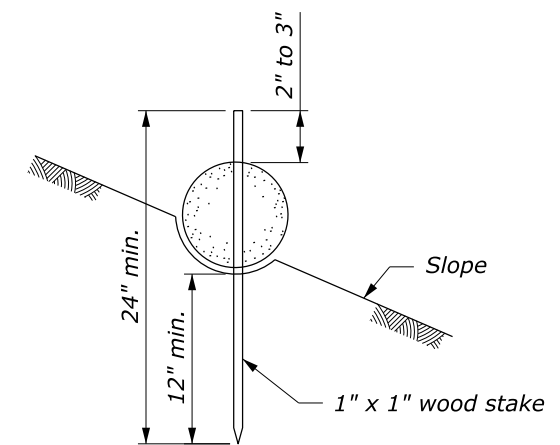
ALTERNATE FIBER ROLL JOINT DETAIL SLOPE PROTECTION INSTALLATION



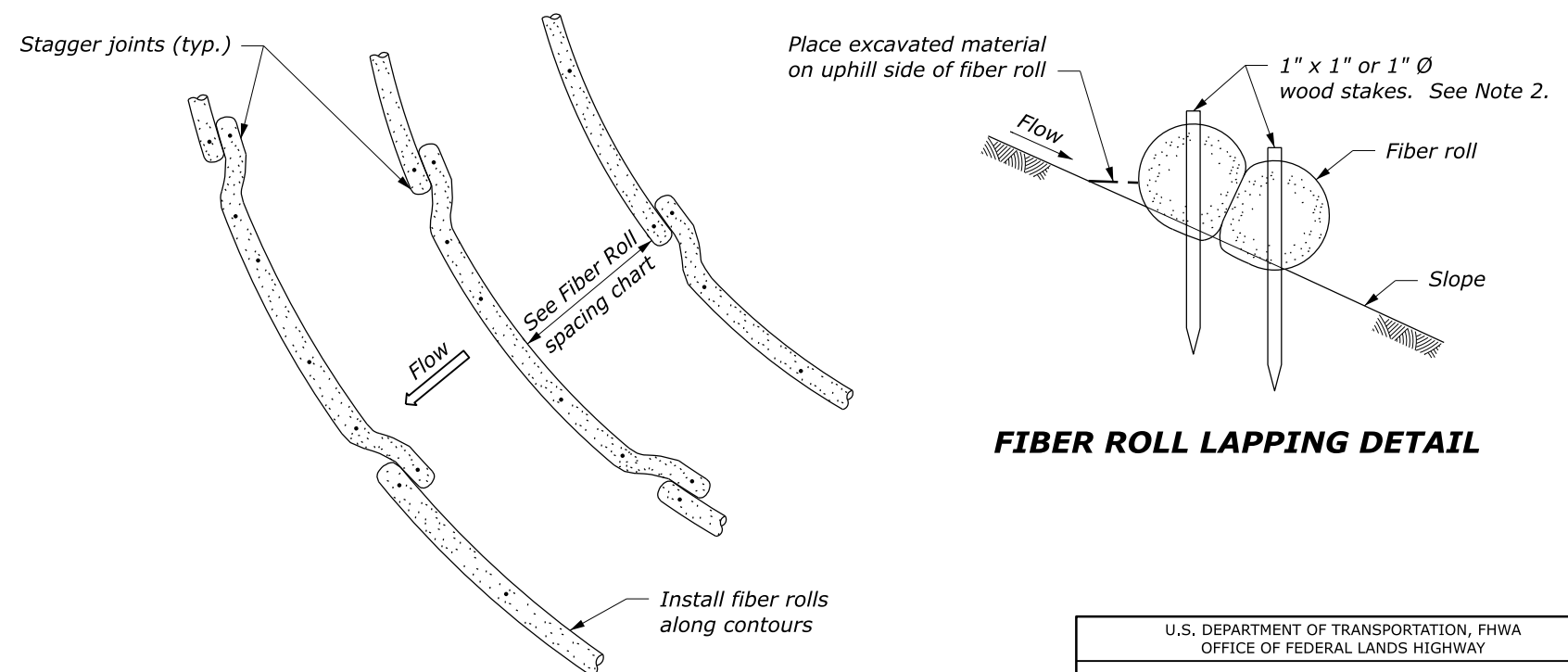
PROPERLY STAKED AND ENTRENCHED FIBER ROLL

FIBER ROLL SPACING	
Slope	Spacing (FT)
1:4 or flatter	40
1:3	30
1:2	20
1:1	10

STAKES REQUIRED	
Fiber roll length (FT)	Stakes required for each roll
25	8
20	6
12	4



FIBER ROLL STAKING DETAIL



INSTALLATION ALONG SLOPES

FIBER ROLL LAPPING DETAIL

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	WFL STANDARD W157-21
	SPECIFICATION FP-24, FP-14
	APPROVED FOR USE 7/2016

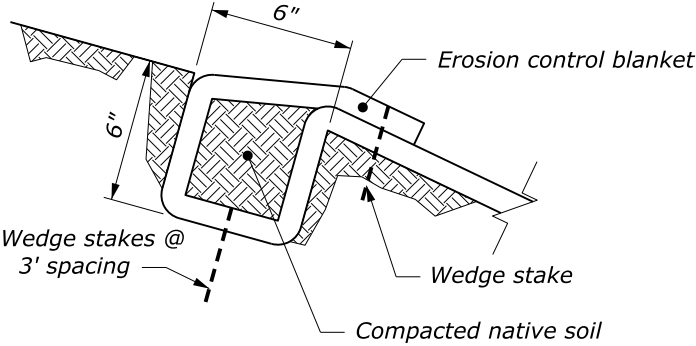
FIBER ROLL

NOTE:

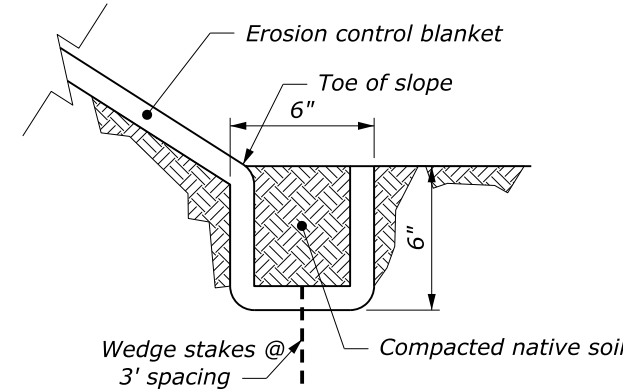
1. Drive stakes at each end and at 4-foot spacing until fiber roll is secure to slope. Live stakes may be used for permanent installations. Do not crush fiber roll while staking.
2. Overlap fiber rolls 12-inch minimum. Drive stakes at 6-inches from fiber roll end angles towards the adjacent fiber roll and space stakes at 4-foot maximum.

NOTE:

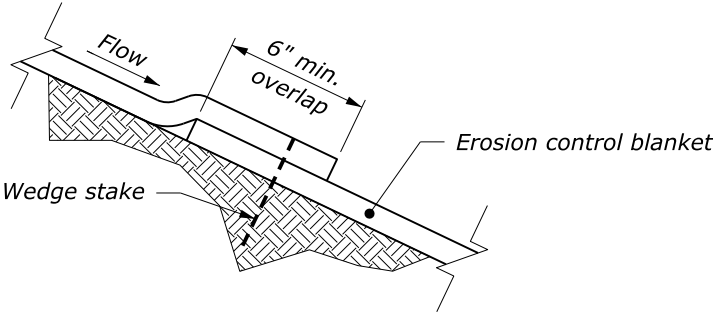
1. Overlap in the direction of the prevailing wind.



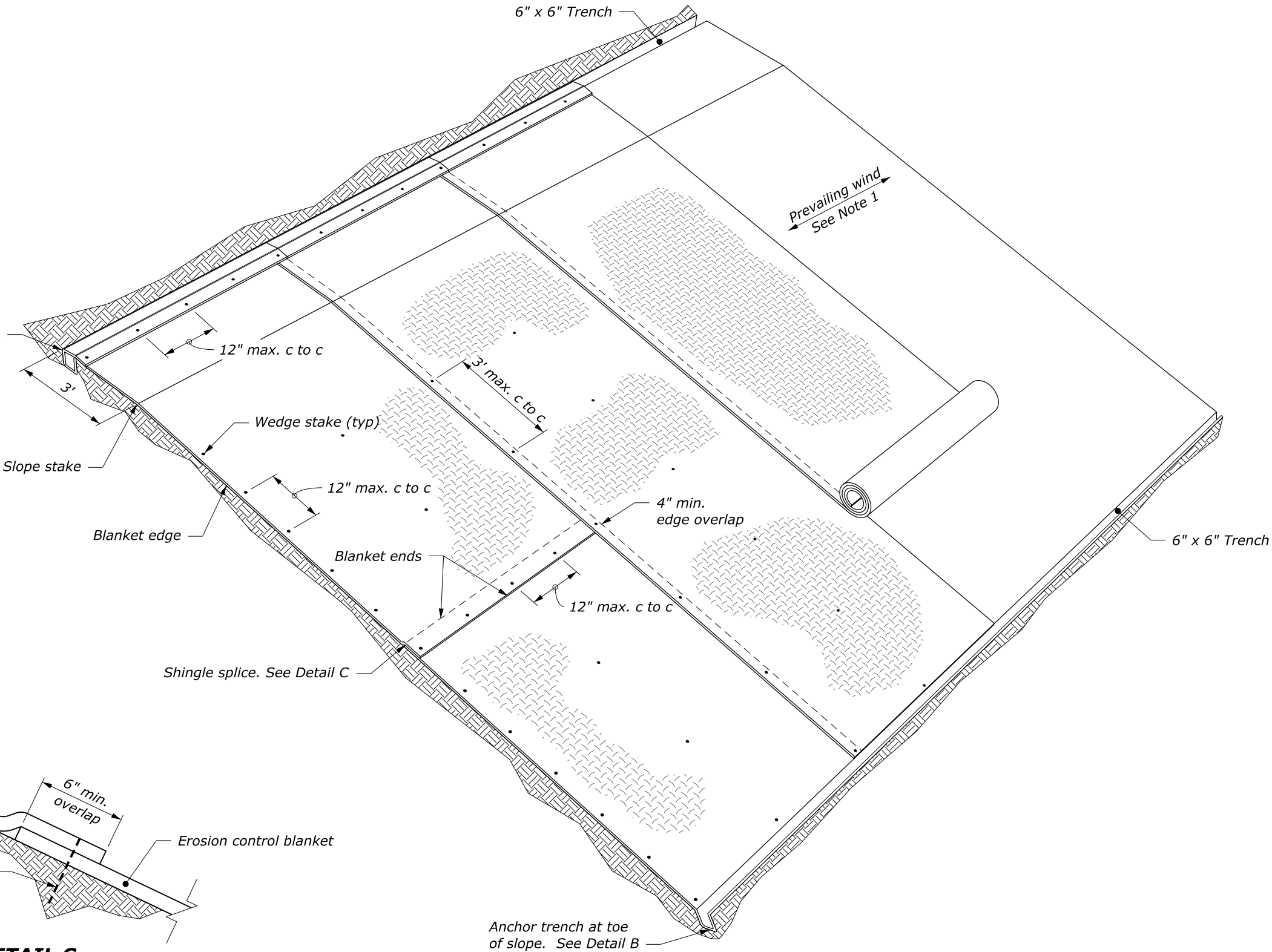
**DETAIL A
ANCHOR TRENCH
AT TOP OF SLOPE**



**DETAIL B
ANCHOR TRENCH
AT TOE OF SLOPE**



**DETAIL C
SHINGLE SPLICE**



PERSPECTIVE VIEW

NO SCALE

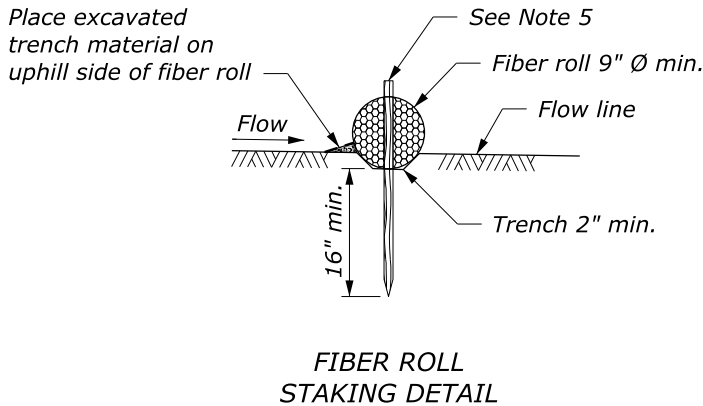
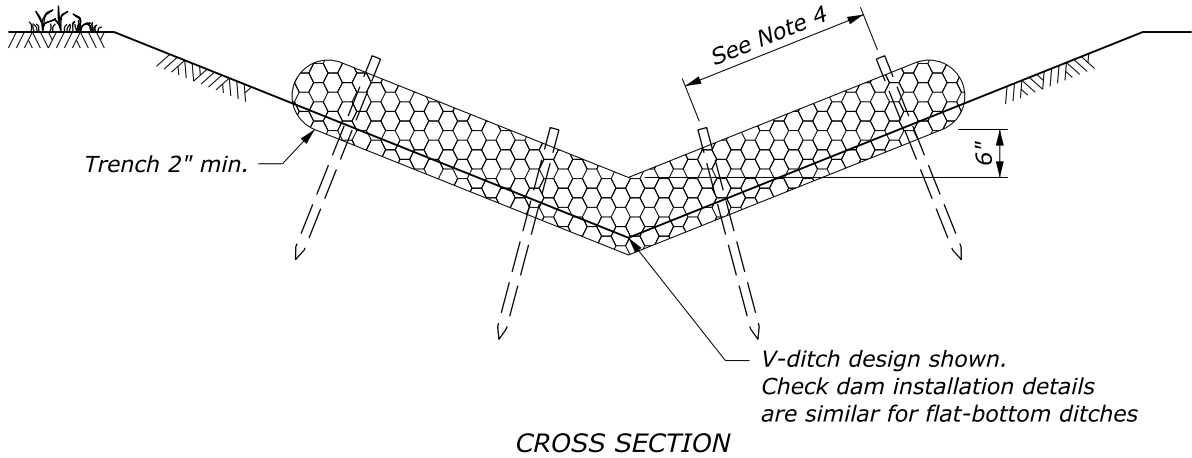
**ROLLED EROSION CONTROL PRODUCT ON
SLOPES**

c:\pw_work_w\0511131\W157-15 (3).dgn [Fiber Roll Check Dam] 12 May 2026 2:11 PM

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	E.11

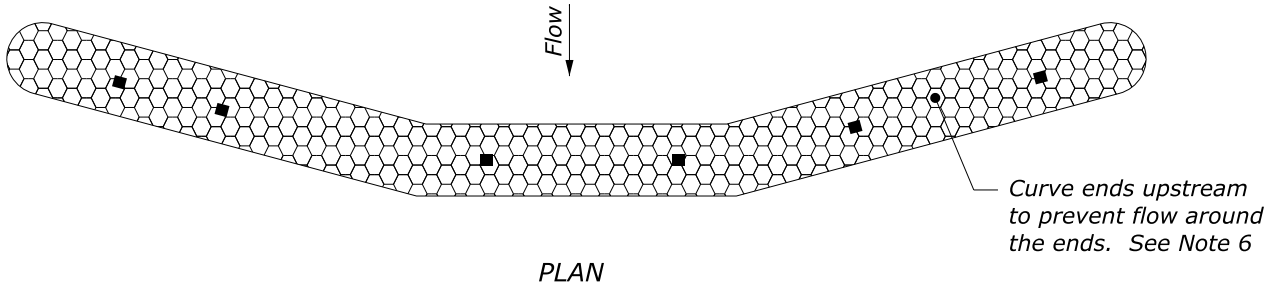
NOTE:

1. Construct check dams from fiber rolls to meet the functional requirements of the check dam device.
2. Repair all rills or gullies and properly compact prior to installation.
3. Install check dams in ditches perpendicular to the flowline.
4. Stake fiber rolls in place with 1½-inch x 1½-inch wood stakes. Drive stakes at each end of the fiber roll and at 2-foot maximum spacing.
5. Drive stakes into undisturbed soil of trench bottom. Expose stakes 2-inches minimum above top of fiber roll.
6. Provide sufficient length to prevent water from flowing around the ends of the fiber roll.
7. Adjust check dam spacing based on site-specific conditions.



FIBER ROLL CHECK DAM SPACING* (See Note 7)	
DITCH GRADE	CHECK DAM SPACING (max.) (FT)
2%	150
3%	100
4%	80
5%	60

* Spacing calculated based on 9" Ø minimum fiber roll.
Do not use fiber roll check dams on ditch grades steeper than 5%.



FIBER ROLL CHECK DAM

NO SCALE

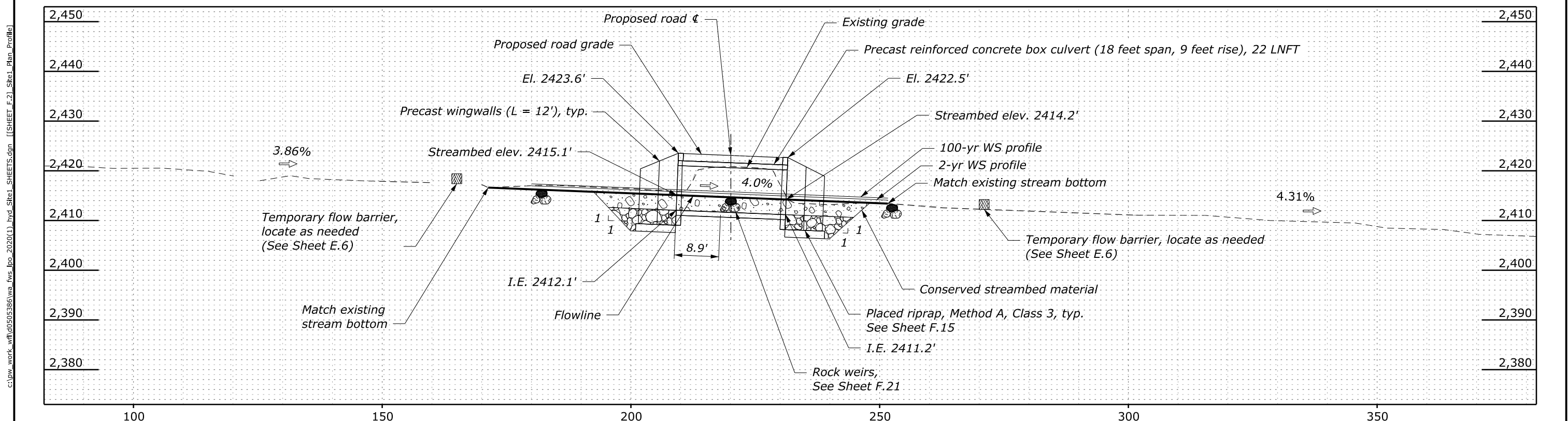
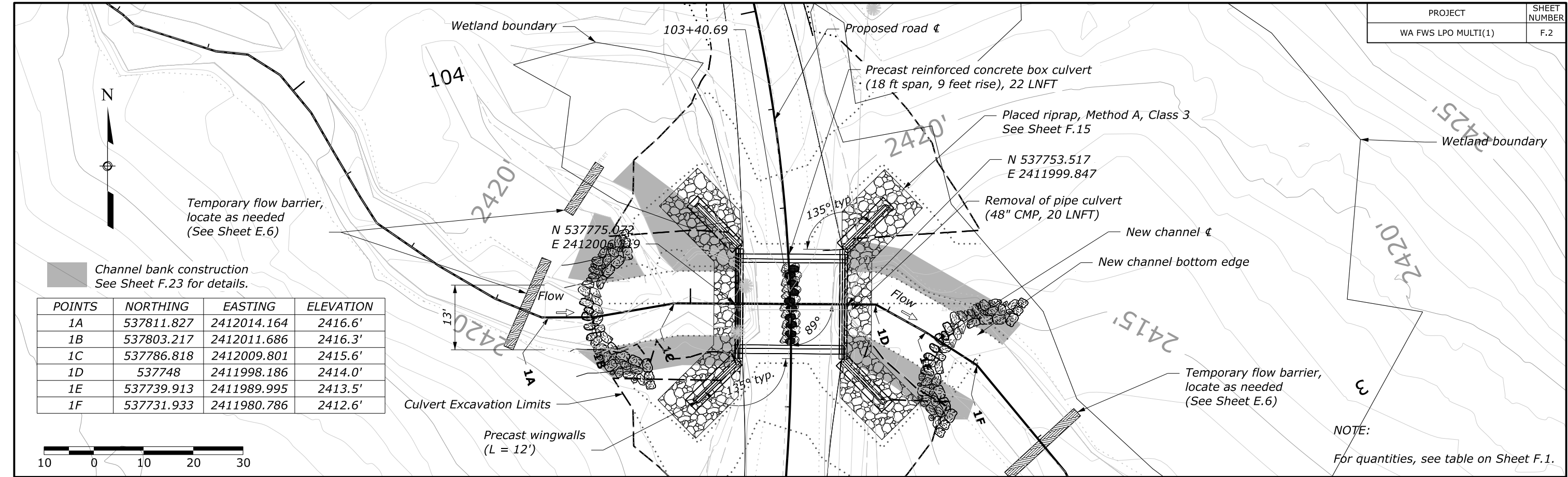
FIBER ROLL CHECK DAM

c:\pw_work_wfl\d0511132\TabulationQuantities.dgn [TABULATION OF QUANTITIES] 29 June 2026 12:22 PM

TABULATION OF DRAINAGE QUANTITIES												
ITEM	DESCRIPTION	UNIT	SITE 1	SITE 2	SITE 3	SITE 4	SITE 7	SITE 8	SCHEDULE QUANTITY			REMARKS
									A	B	C	
FIO ^[1]	SEPARATION STABILIZATION GEOTEXTILE, CLASS 1, TYPE E	SQYD	275	310	280	340	260	250	1205	1455	1715	
25101-0300	PLACED RIPRAP, METHOD A, CLASS 3	CUYD	100	195	100	190	90	90	585	675	765	
FIO ^[1]	STRUCTURAL CONCRETE, CLASS A (AE)	CUYD	35	40	50	35	45	85	160	245	290	
60220-3700	11 FEET SPAN, 9 FEET RISE PRECAST REINFORCED CONCRETE BOX CULVERT	LNFT	0	22	0	0	0	0	22	22	22	
60220-0000	PRECAST REINFORCED CONCRETE BOX CULVERT (18 FEET SPAN, 9 FEET RISE, SINGLE BARREL)	LNFT	22	0	0	0	0	0	22	22	22	
60220-0000	PRECAST REINFORCED CONCRETE BOX CULVERT (20 FEET SPAN, 9 FEET RISE SINGLE BARREL)	LNFT	0	0	43	22	0	0	65	65	65	
60220-4100	12 FEET SPAN, 9 FEET RISE PRECAST REINFORCED CONCRETE BOX CULVERT	LNFT	0	0	0	0	39	0	0	0	39	
60302-0000	STRUCTURAL PLATE PIPE ARCH	LNFT	0	0	0	0	0	76	0	76	76	
62635-3000	CUTTINGS, WILLOW POLE (AND BLACK COTTONWOOD POLE)	EACH	100	225	75	350	60	40	750	790	850	
64703-3010	MITIGATION, ROCK WEIR	EACH	3	0	0	0	5	6	3	9	14	
64703-4000	MITIGATION, LOG BARRIER	EACH	0	1	0	1	0	0	2	2	2	
64703-5000	MITIGATION, ROOT WAD	EACH	0	2	0	4	0	2	6	8	8	
64703-6000	MITIGATION, FISH PASSAGE BOULDER	EACH	4	23	9	22	5	11	58	69	74	
64704-1000	MITIGATION STREAMBED MATERIAL	CUYD	70	50	210	160	70	178	490	668	738	
64704-1500	MITIGATION STREAMBED CHANNEL REALIGNMENT	CUYD	0	115	0	110	0	0	225	225	225	

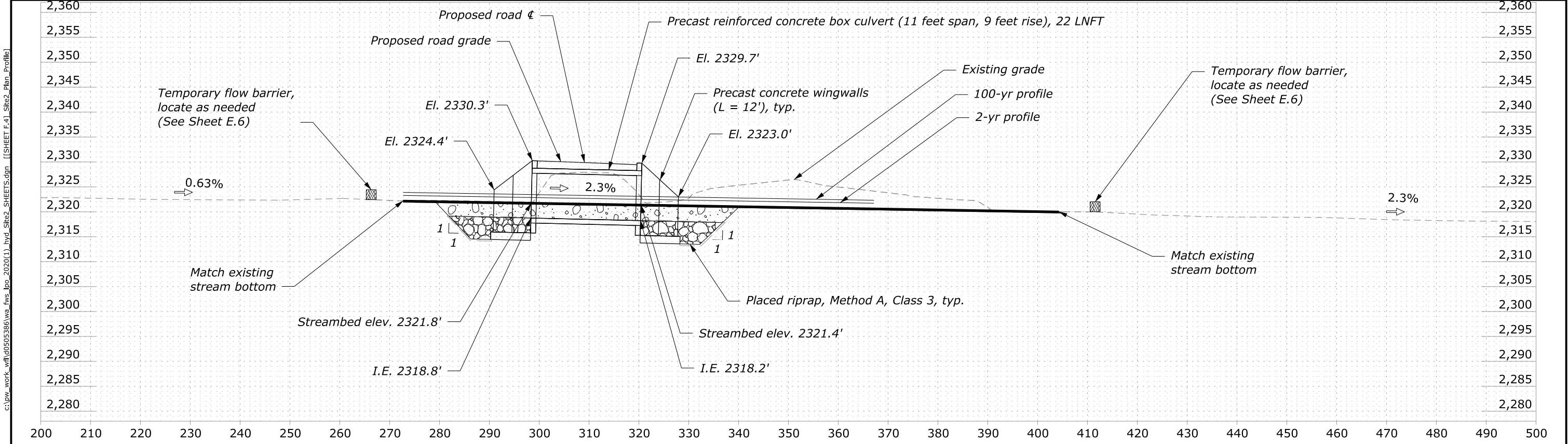
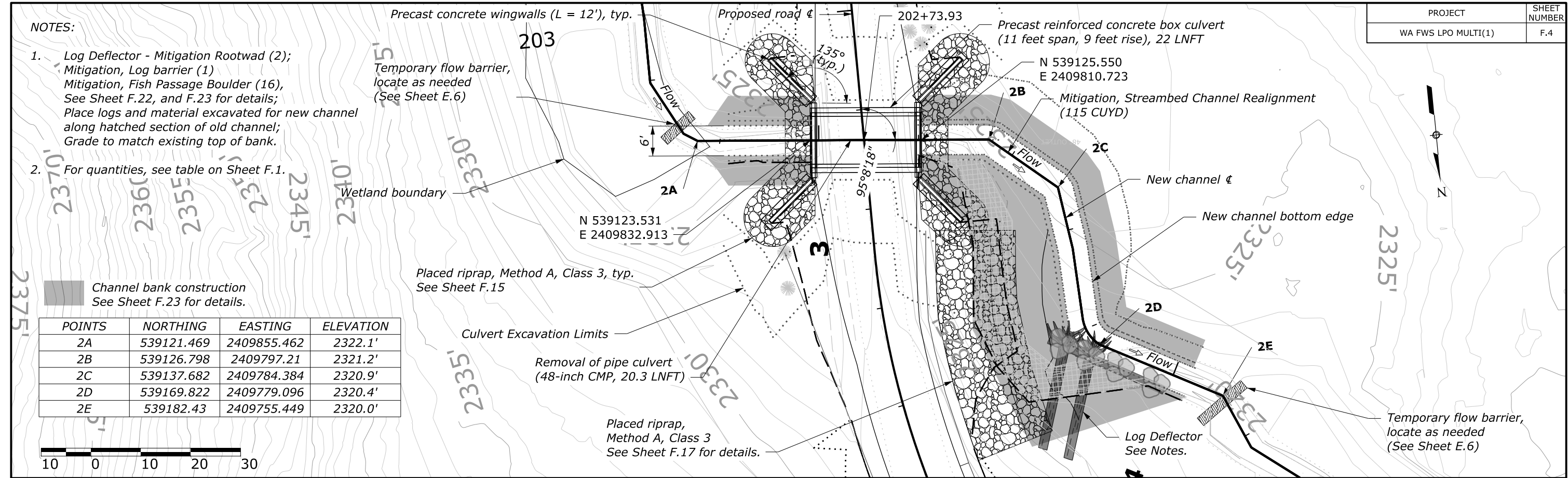
FOOTNOTE:

^[1]For information only.



HYDRAULIC INFORMATION		PIPE		INLET		OUTLET		SITE NO. 1 AOP CULVERT PLAN AND PROFILE
Q ₂ : 45.1 cfs	OHW: 0.7'	TYPE: Concrete Box Culvert	SPAN: 18'-0" RISE: 9'-0"	INV N/E/EL: 537775.072 / 2412006.319 / 2412.1'	BURIAL DEPTH: 3' - 00"	INV N/E/EL: 537753.517 / 2411999.847 / 2411.2'	BURIAL DEPTH: 3' - 00"	
Q ₁₀₀ : 129 cfs	HW ₁₀₀ : 1.1'	LENGTH: 22'-00"	WALL THICKNESS: 12"	LOWER BEVEL HEIGHT: 8"	BEVEL: 2(H): 1(V)	LOWER BEVEL HEIGHT: 8"	BEVEL: 2(H): 1(V)	
FISH SPECIES: Resident Bull Trout		PIPE SLOPE: 0.04 ft/ft	FLOWLINE SLOPE: 0.04 ft/ft	HEADWALL: Precast Concrete		HEADWALL: Precast Concrete		
INSTREAM WORK WINDOW: July 1 - Sept. 30		INFILL TYPE: Streambed Material	TYPE: Conserved					
ACTIVE CHANNEL WIDTH: 15'								

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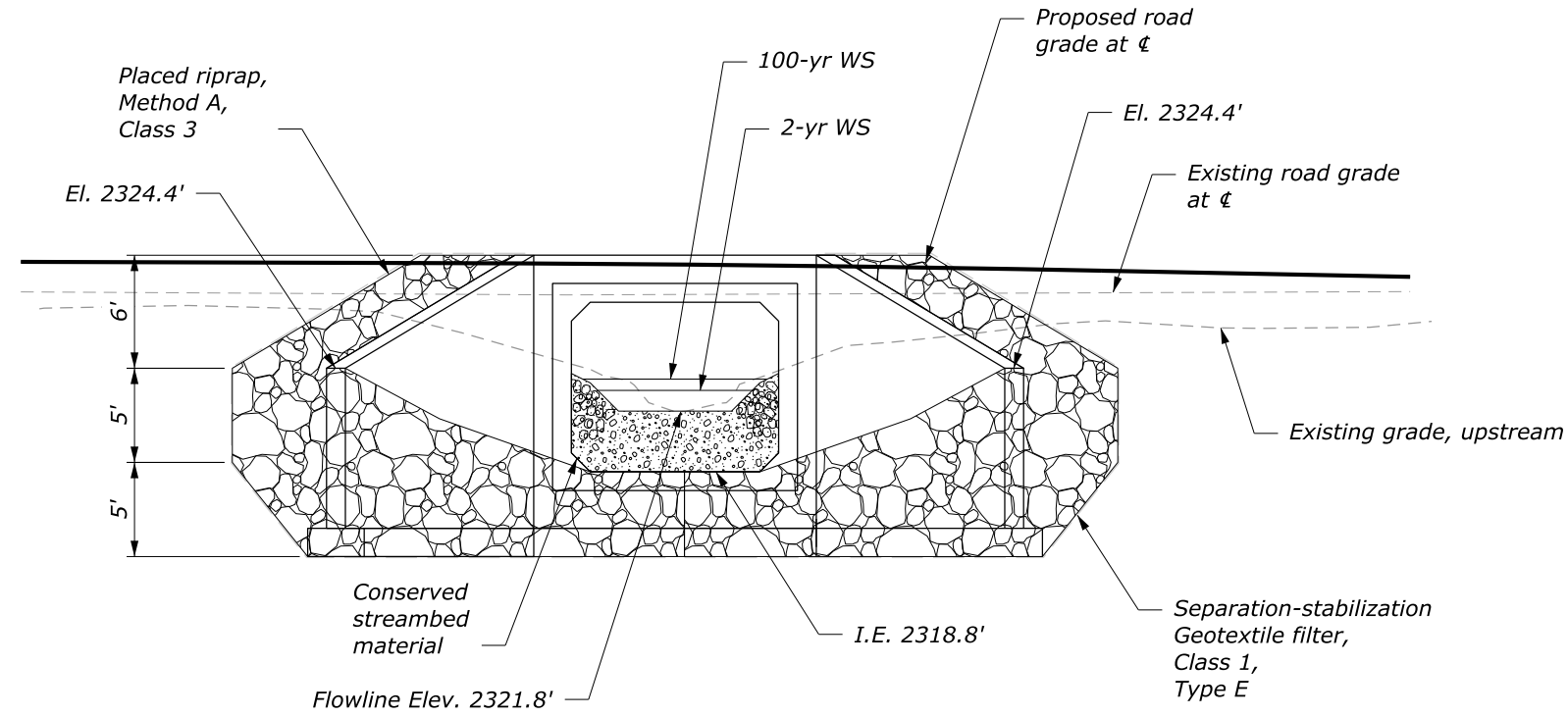


HYDRAULIC INFORMATION		PIPE		INLET		OUTLET	
Q ₂ : 49.9 cfs	OHW: 1.1'	TYPE: Concrete Box Culvert	SPAN: 11'-0" RISE: 9'-0"	INV N/E/EL: 539123.531 / 2409832.913 / 2318.8'	BURIAL DEPTH: 3' - 00"	INV N/E/EL: 539125.550 / 2409810.723 / 2318.2'	BURIAL DEPTH: 3' - 02"
Q ₁₀₀ : 153 cfs	HW ₁₀₀ : 1.7'	LENGTH: 22'-00"	WALL THICKNESS: 12"	LOWER BEVEL HEIGHT: 8"	BEVEL: 2(H): 1(V)	LOWER BEVEL HEIGHT: 8"	BEVEL: 2(H): 1(V)
FISH SPECIES: Resident Bull Trout		PIPE SLOPE: 0.023 ft/ft	FLOWLINE SLOPE: 0.023 ft/ft	HEADWALL: Precast Concrete		HEADWALL: Precast Concrete	
INSTREAM WORK WINDOW: July 1 - Sept. 30		INFILL TYPE: Streambed Material	TYPE: Conserved				
ACTIVE CHANNEL WIDTH: 9.0'							

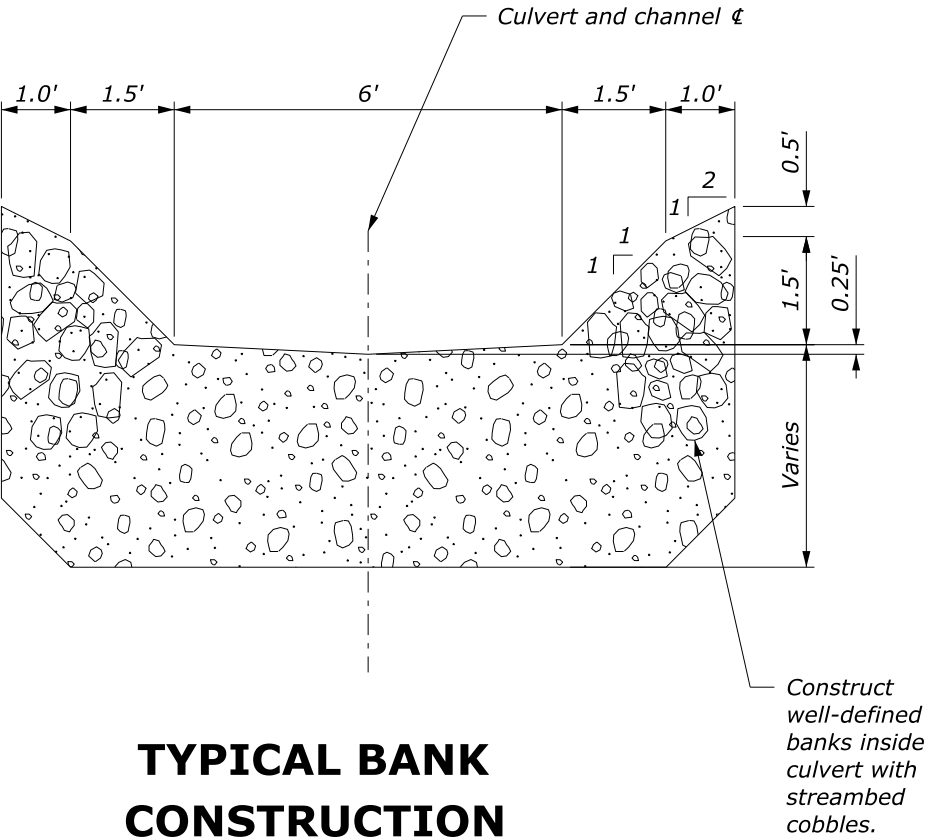
SITE NO. 2 AOP CULVERT
PLAN AND PROFILE

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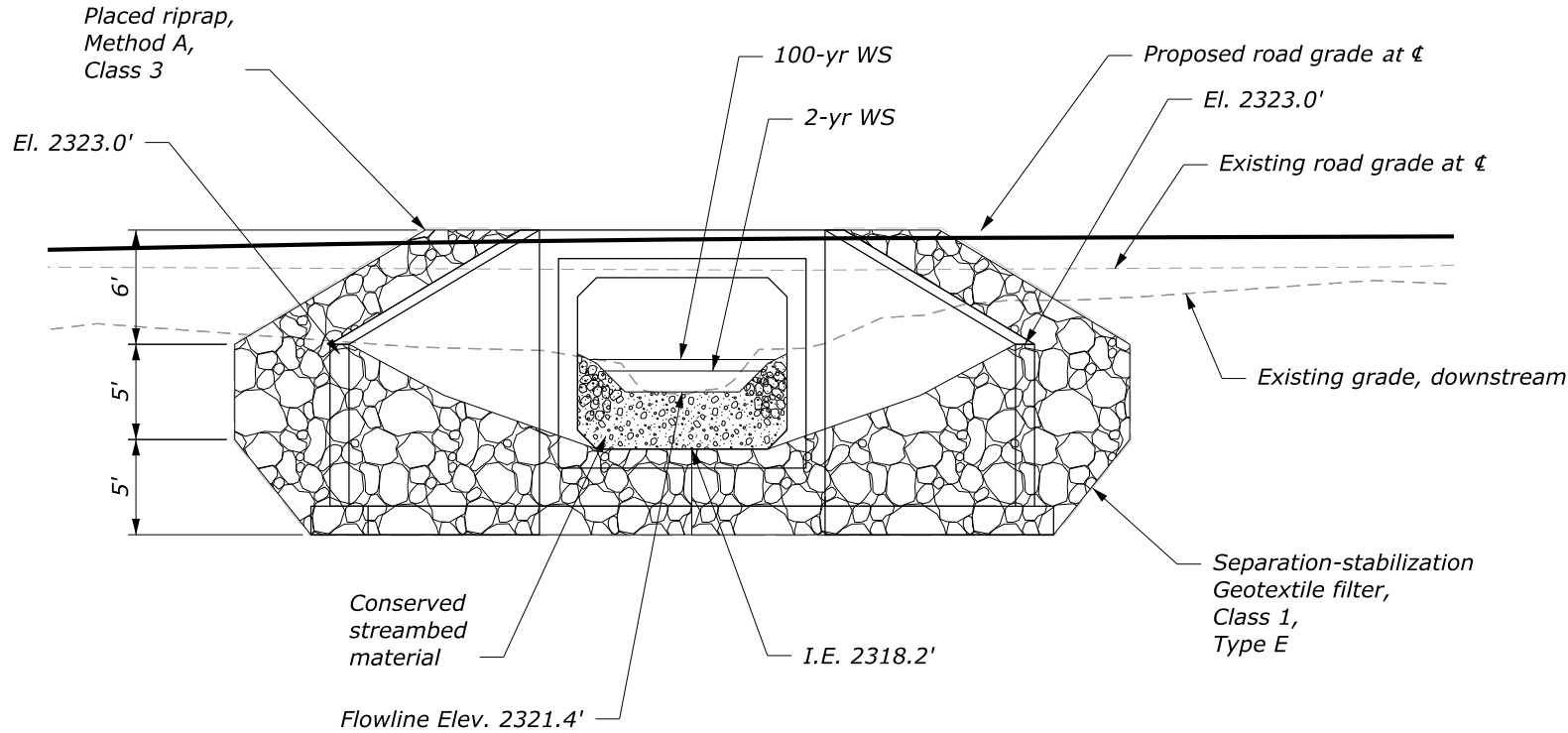
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.5



CULVERT INLET



TYPICAL BANK CONSTRUCTION

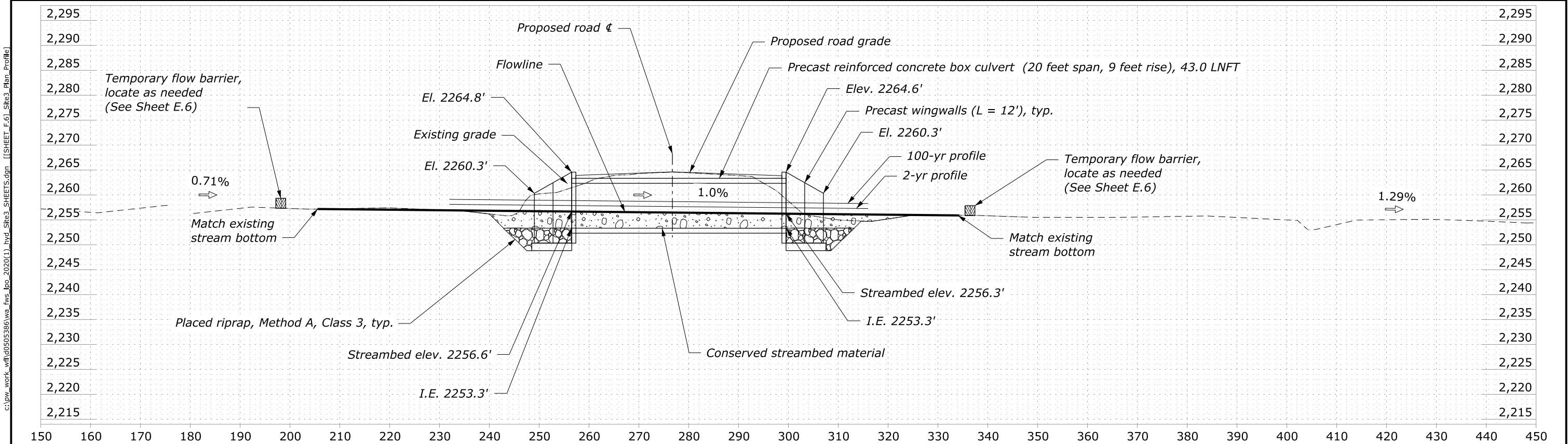
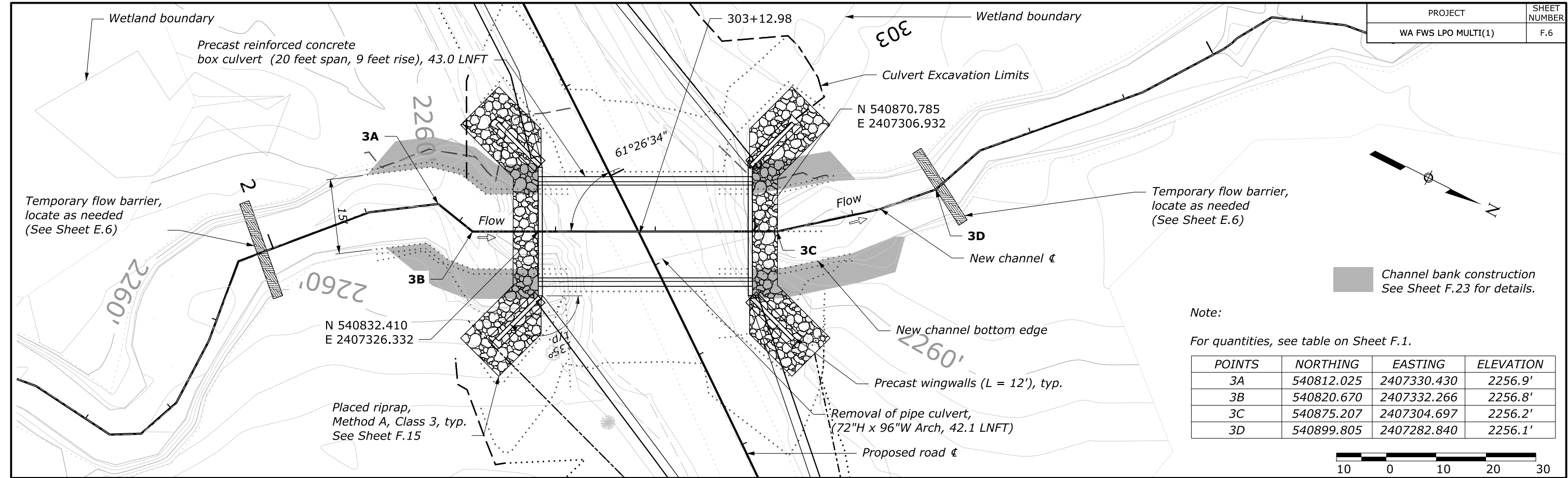


CULVERT OUTLET

- NOTE:**
1. Construct bank area, excavate or place conserved streambed material to create smooth transition to existing grade, min. new stream channel depth 18-inches. See Sheet F. 14.
 2. Place conserved streambed material over constructed bank areas.

NO SCALE

SITE NO. 2
AOP CULVERT ELEVATIONS



13 May 2026 9:32 PM

HYDRAULIC INFORMATION			
Q ₂ :	116 cfs	OHW:	1.2'
Q ₁₀₀ :	317 cfs	HW ₁₀₀ :	2.2'
FISH SPECIES:	Resident Bull Trout		
INSTREAM WORK WINDOW:	July 1 - Sept. 30		
ACTIVE CHANNEL WIDTH:	18'		

PIPE	
TYPE:	Concrete Box Culvert
SPAN:	20'-0"
RISE:	9'-0"
LENGTH:	43'-00"
WALL THICKNESS:	12"
PIPE SLOPE:	0.00 ft/ft
FLOWLINE SLOPE:	0.01 ft/ft
INFILL TYPE:	Streambed Material
TYPE:	Conserved

INLET	
540832.410 / 2407326.332 / 2253.3'	INV N/E/EL:
3' - 04"	BURIAL DEPTH:
8"	LOWER BEVEL HEIGHT:
2(H): 1(V)	BEVEL:
Precast Concrete	HEADWALL:

OUTLET	
540870.785/ 2407306.932 / 2253.3'	INV N/E/EL:
3' - 00"	BURIAL DEPTH:
8"	LOWER BEVEL HEIGHT:
2(H): 1(V)	BEVEL:
Precast Concrete	HEADWALL:

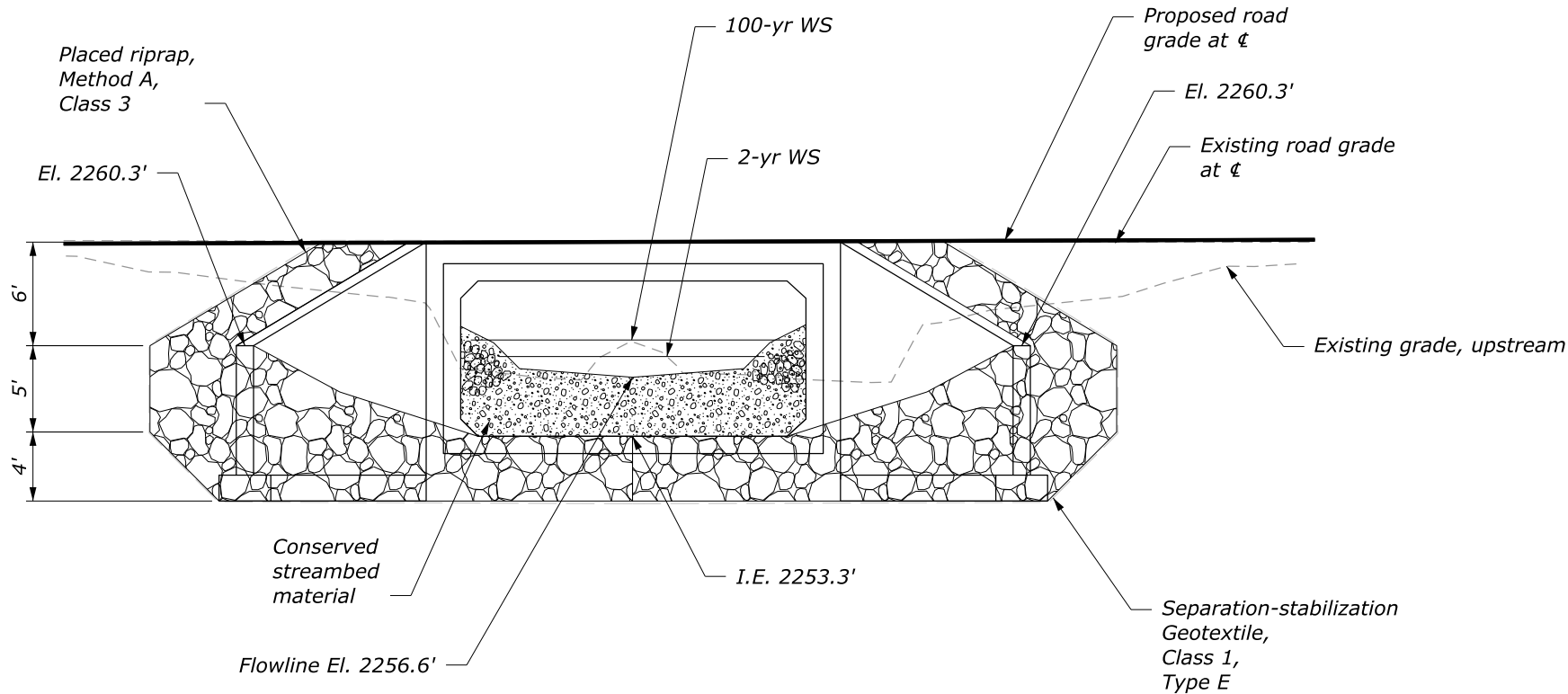
SITE NO. 3 AOP CULVERT
PLAN AND PROFILE

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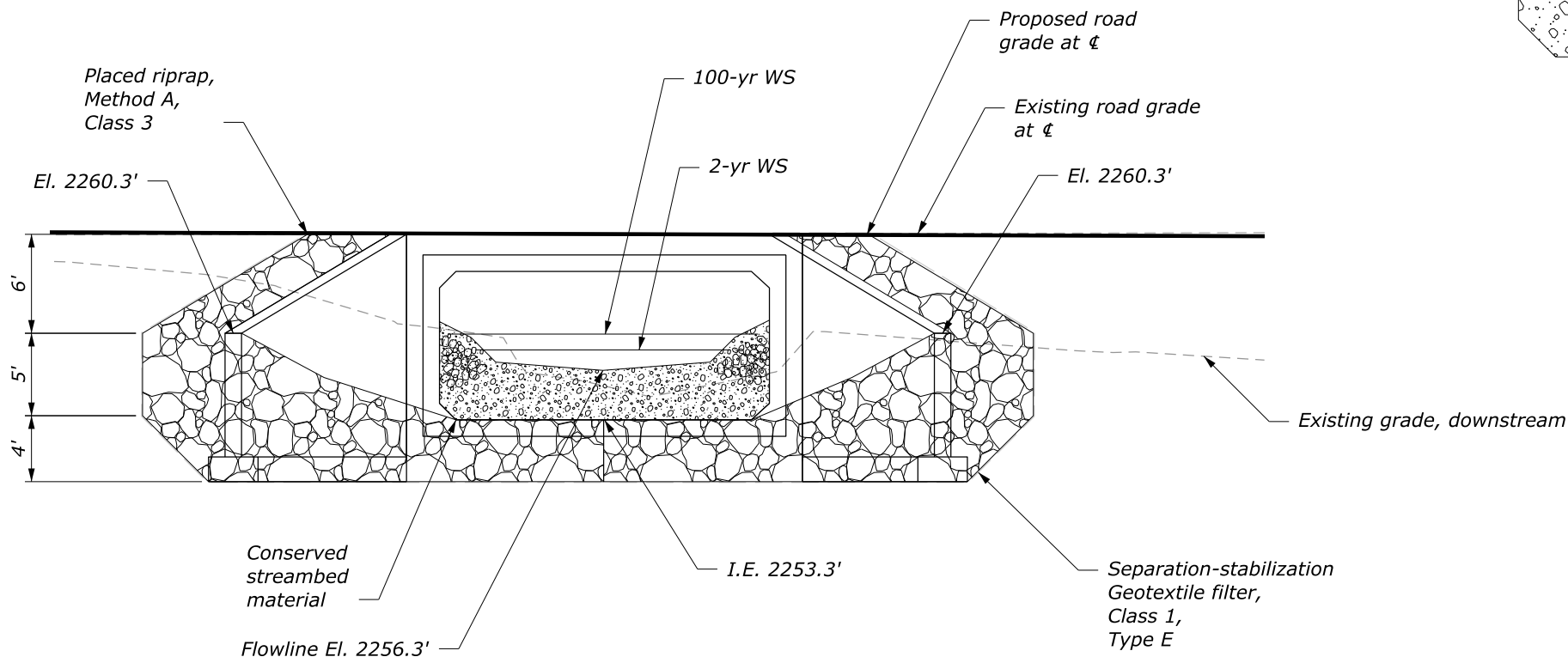
13 May 2026 9:32 PM

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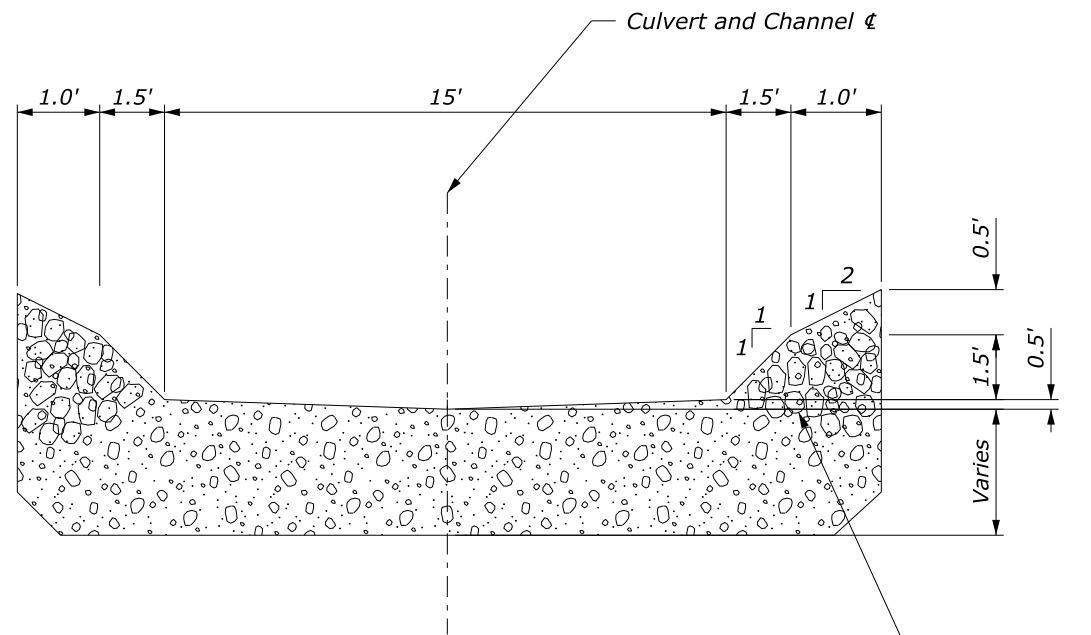
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.7



CULVERT INLET



CULVERT OUTLET



TYPICAL BANK CONSTRUCTION

- NOTE:**
- Construct bank area, excavate or place conserved streambed material to create smooth transition to existing grade, min. new stream channel depth 18-inches. See Sheet F.14.
 - Place conserved streambed material over constructed bank areas.

NO SCALE

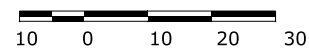
SITE NO. 3
AOP CULVERT ELEVATIONS

1. Log Deflector - Mitigation Rootwad (4);
Mitigation, Log barrier (1);
Mitigation, Fish Passage Boulders (16);
See Sheets F.22, and F.23 for details;
Place logs and material excavated for new channel
along hatched area of old channel;
Grade to match existing top of bank.

Temporary flow barrier,
locate as needed
(See Sheet E.6)

POINTS	NORTHING	EASTING	ELEVATION
4A	544066.875	2395808.797	2134.5'
4B	544066.293	2395792.036	2135.0'
4C	544056.882	2395777.174	2134.9'
4D	544031.796	2395768.578	2134.8'
4E	544024.056	2395761.019	2134.7'
4F	544024.056	2395703.748	2134.4'
4G	544027.504	2395691.136	2134.4'
4H	544034.467	2395686.013	2134.3'

Placed riprap, Method A, Class 3, typ. See Sheet F.15



Culvert Excavation limits

402

- Removal of pipe culvert, (48'H x 72"W Arch, 30.5 LNFT)

Placed riprap, Method A, Class 3
See Sheet F.17 for details.

— Temporary flow barrier, locate as needed
(See Sheet E.6)

- *New channel bottom edge*

- New channel $\mathcal{C}$

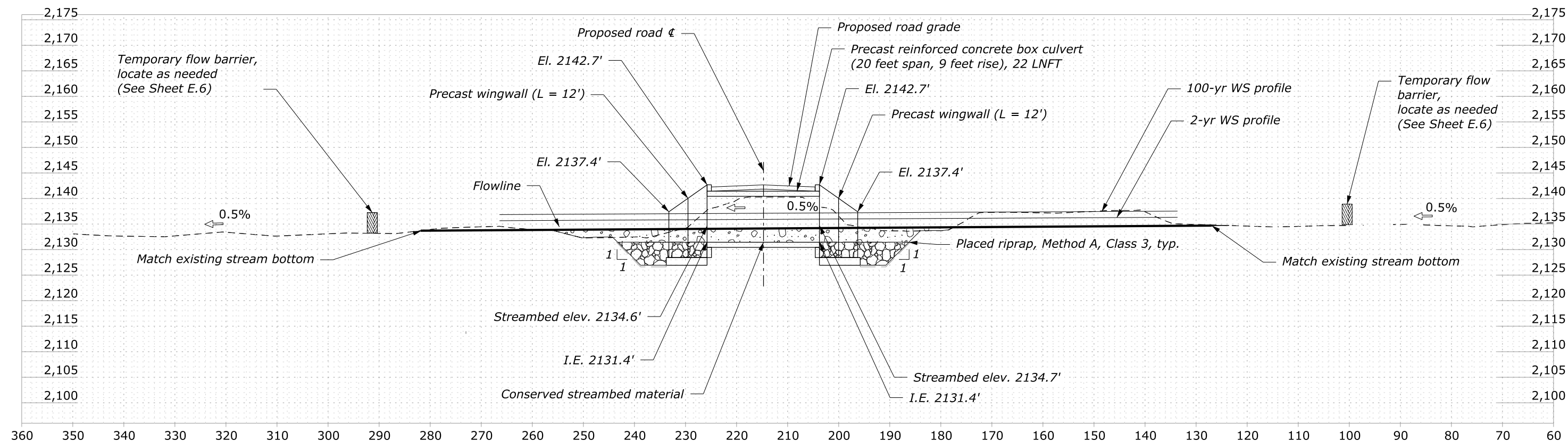
Mitigation, Streambed Channel Realignment (110 CUYD)

— N 544024.056
E 2395746.465

403

– Precast wingwall (L = 12'), typ.

– Proposed road €



Q ₂ :	126 cfs	OHW:	1.3'
Q ₁₀₀ :	357 cfs	HW ₁₀₀ :	2.5'
FISH SPECIES:	Resident Bull Trout		
INSTREAM WORK WINDOW:	July 1 - Sept. 30		
ACTIVE CHANNEL WIDTH:	18'		

TYPE:	Concrete Box Culvert	SPAN:	20'-0"	RISE:	9'-0"
LENGTH:	22'-00"	WALL THICKNESS:	12"		
PIPE SLOPE:	0.00 ft/ft	FLOWLINE SLOPE:	0.005 ft/ft		
INFILL TYPE:	Streambed Material	TYPE:	Conserved		

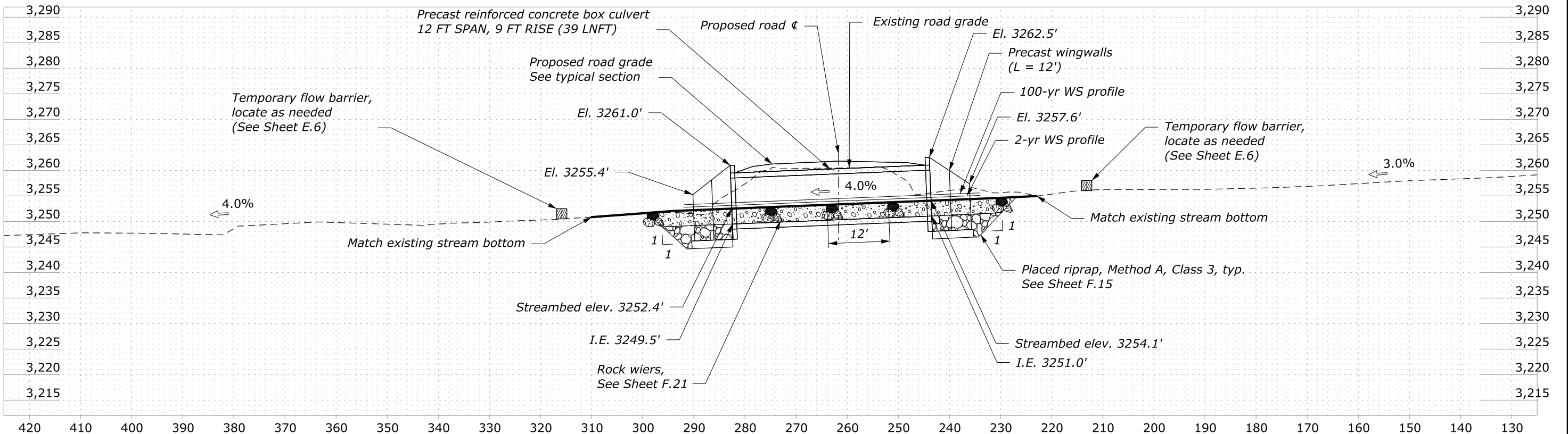
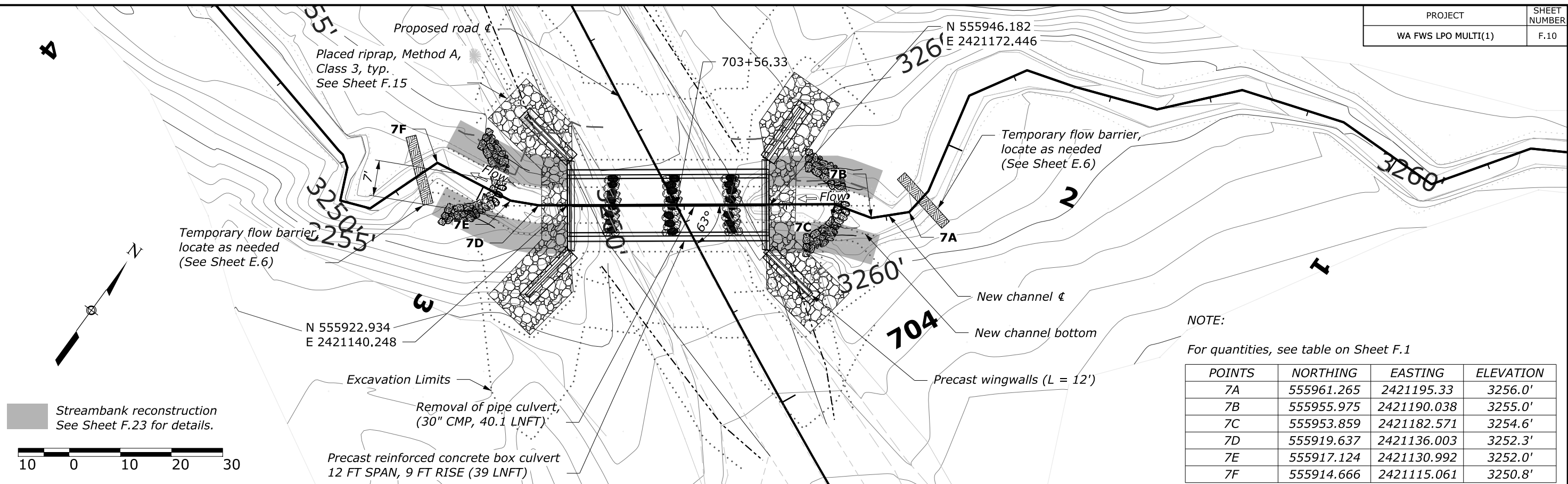
INLET 544024.056 /
2395746.465 /
INV N/E/EL: 2131.4'
BURIAL DEPTH: 3' - 03"
LOWER BEVEL HEIGHT: 8"
BEVEL: 2(H): 1(V)
HEADWALL: Precast Concrete

OUTLET 544024.056 /
2395724.465 /
INV N/E/EL: 2131.4'
BURIAL DEPTH: 3' - 01"
LOWER BEVEL HEIGHT: 8"
BEVEL: 2(H): 1(V)
HEADWALL: Precast Concrete

SITE NO. 4 AOP CULVERT PLAN AND PROFILE

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PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.10



HYDRAULIC INFORMATION

Q₂: 16.6 cfs OHW: 0.5'
Q₁₀₀: 44 cfs HW₁₀₀: 1.0'
FISH SPECIES: Resident Bull Trout
INSTREAM WORK WINDOW: July 1 - Sept. 30
ACTIVE CHANNEL WIDTH: 9'

PIPE

TYPE: Concrete Box Culvert SPAN: 12'-0" RISE: 9'-0"
LENGTH: 39'-00" WALL THICKNESS: 12"
PIPE SLOPE: 0.04 ft/ft FLOWLINE SLOPE: 0.04 ft/ft
INFILL TYPE: Streambed Material TYPE: Conserved

INLET

55546.182 / 2421172.446 / 3251.0'
INV N/E/EL:
BURIAL DEPTH: 3' - 00"
LOWER BEVEL HEIGHT: 8"
BEVEL: 2(H): 1(V)
HEADWALL: Precast Concrete

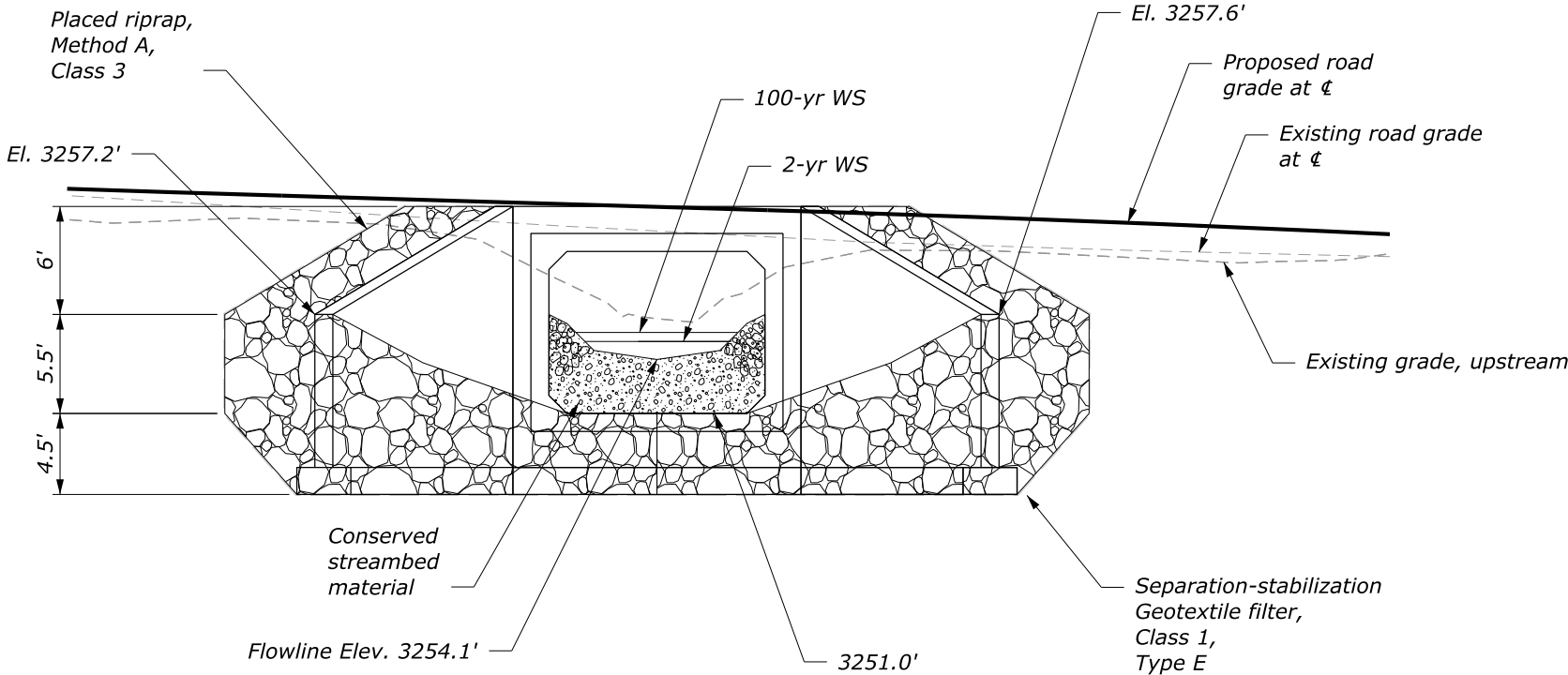
OUTLET

555922.934 / 2421140.248 / 3249.5'
INV N/E/EL:
BURIAL DEPTH: 3' - 00"
LOWER BEVEL HEIGHT: 8"
BEVEL: 2(H): 1(V)
HEADWALL: Precast Concrete

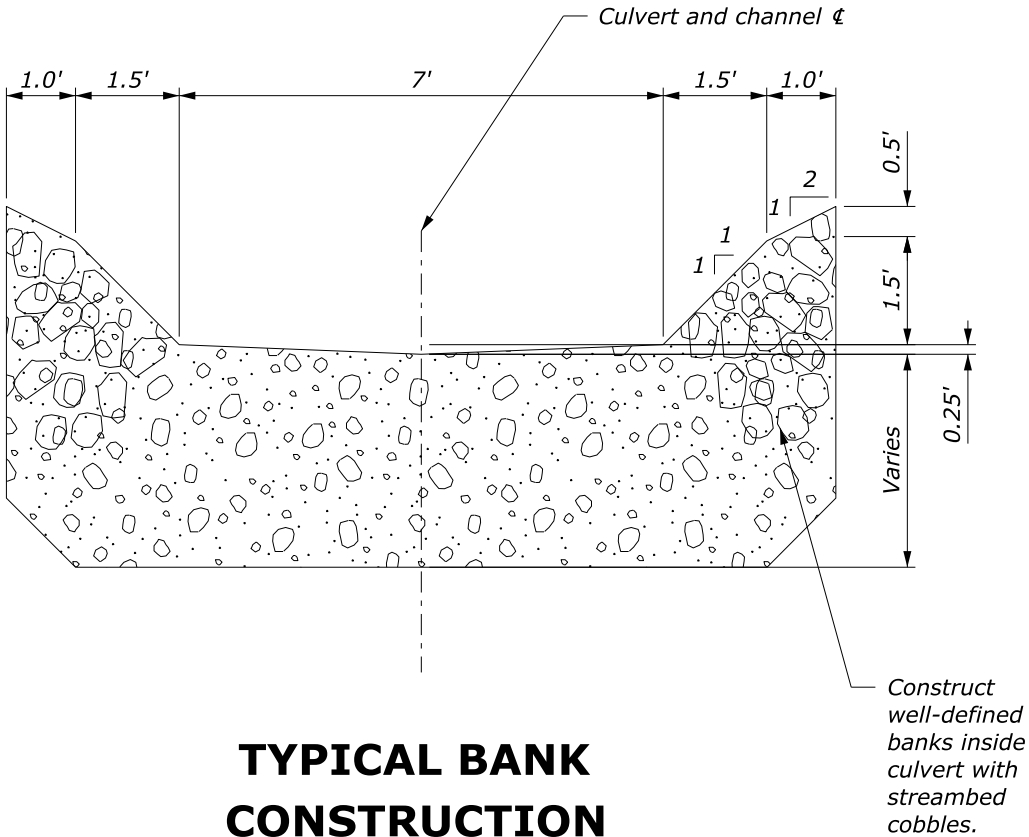
SITE NO. 7 AOP CULVERT
PLAN AND PROFILE

c:\pw_work\w\id0505386\wa_fws_lpo_2020(1)_hyd_site7_sheets.dgn [SHEET F.11 Design] 14 May 2026 9:43 AM Checked by: ??

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.11

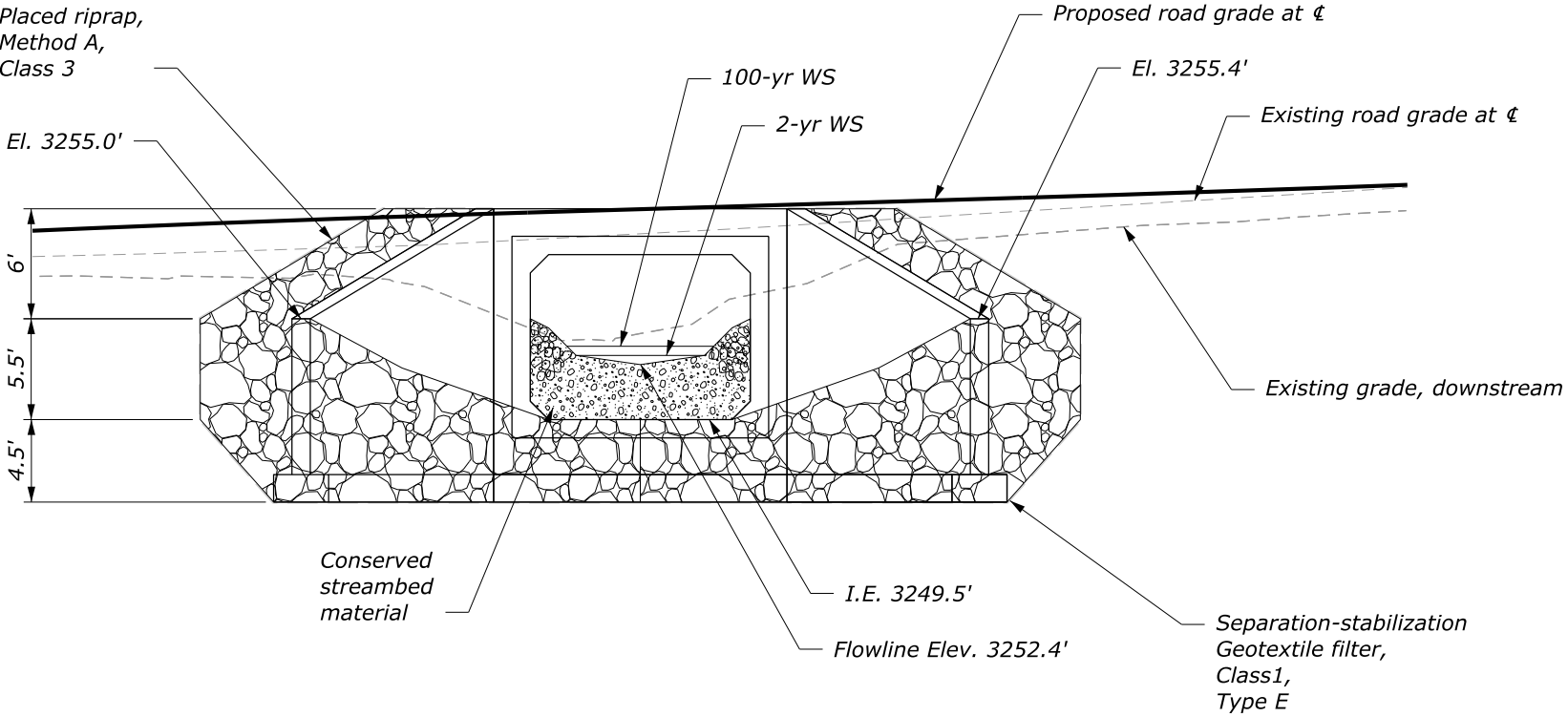


CULVERT INLET



TYPICAL BANK CONSTRUCTION

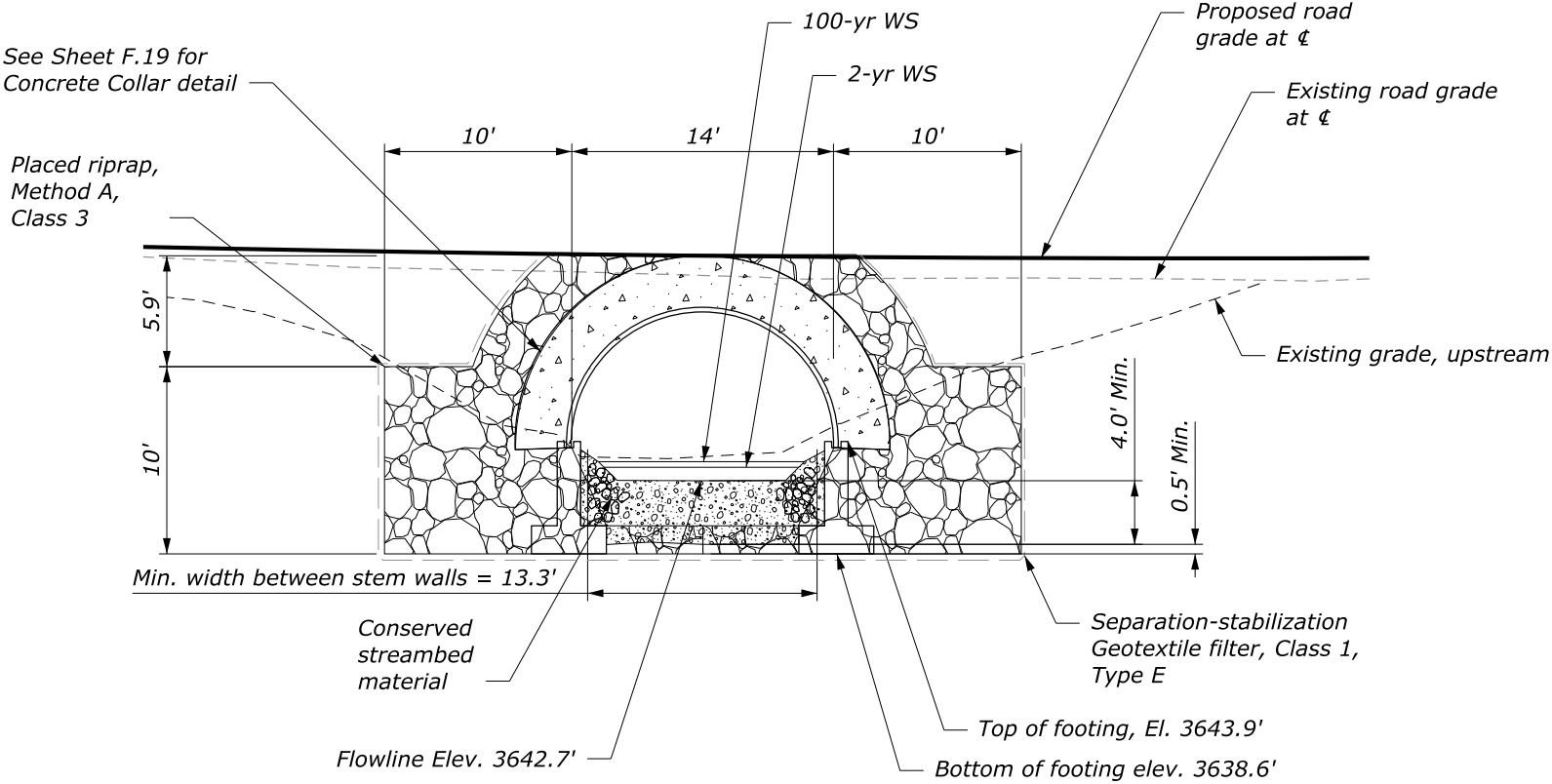
- NOTE:**
- Construct bank area, excavate or place conserved streambed material to create smooth transition to existing grade, min. new stream channel depth 18-inches. See Sheet F.14.
 - Place conserved streambed material over constructed bank areas.



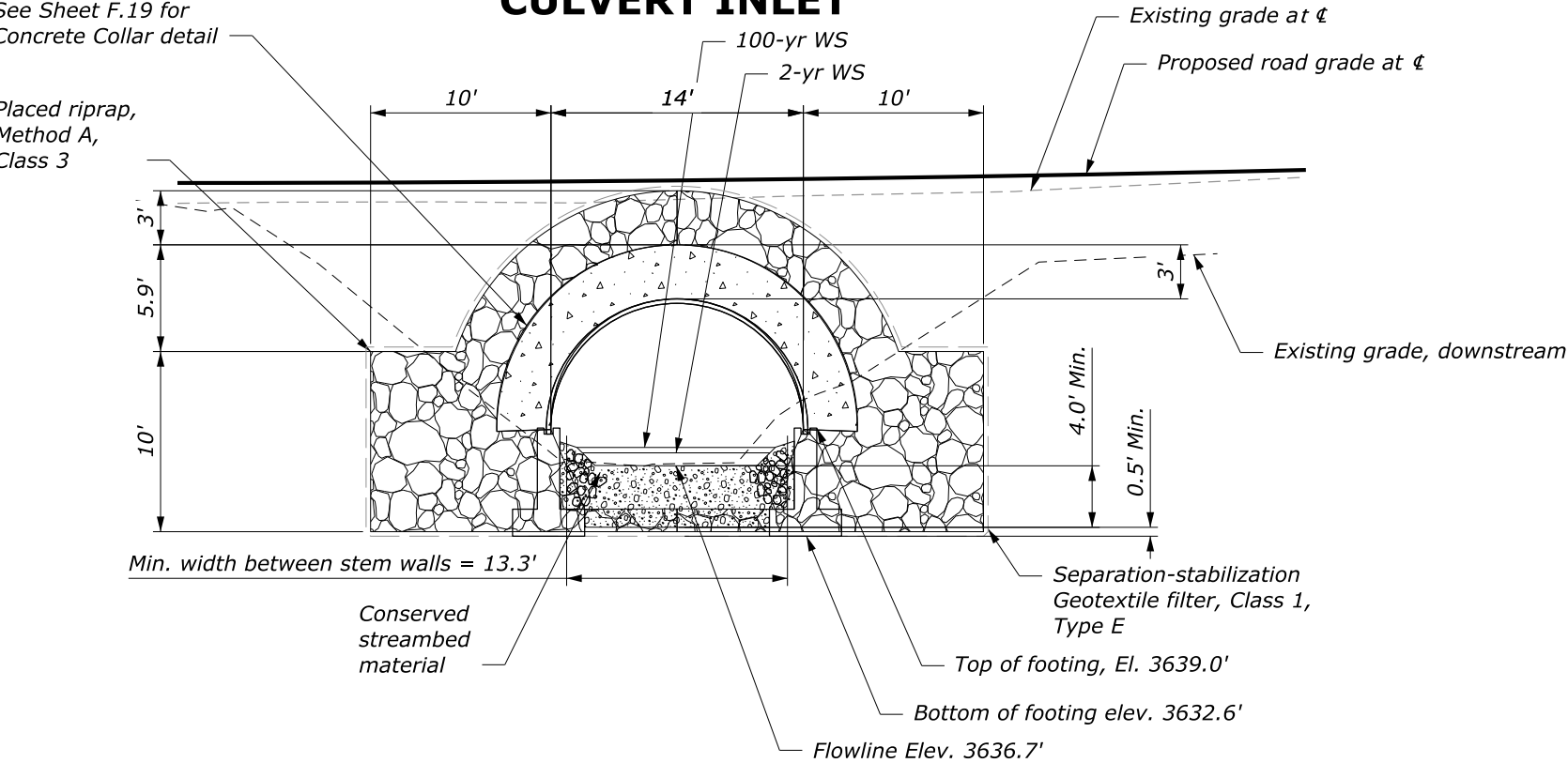
CULVERT OUTLET

NO SCALE

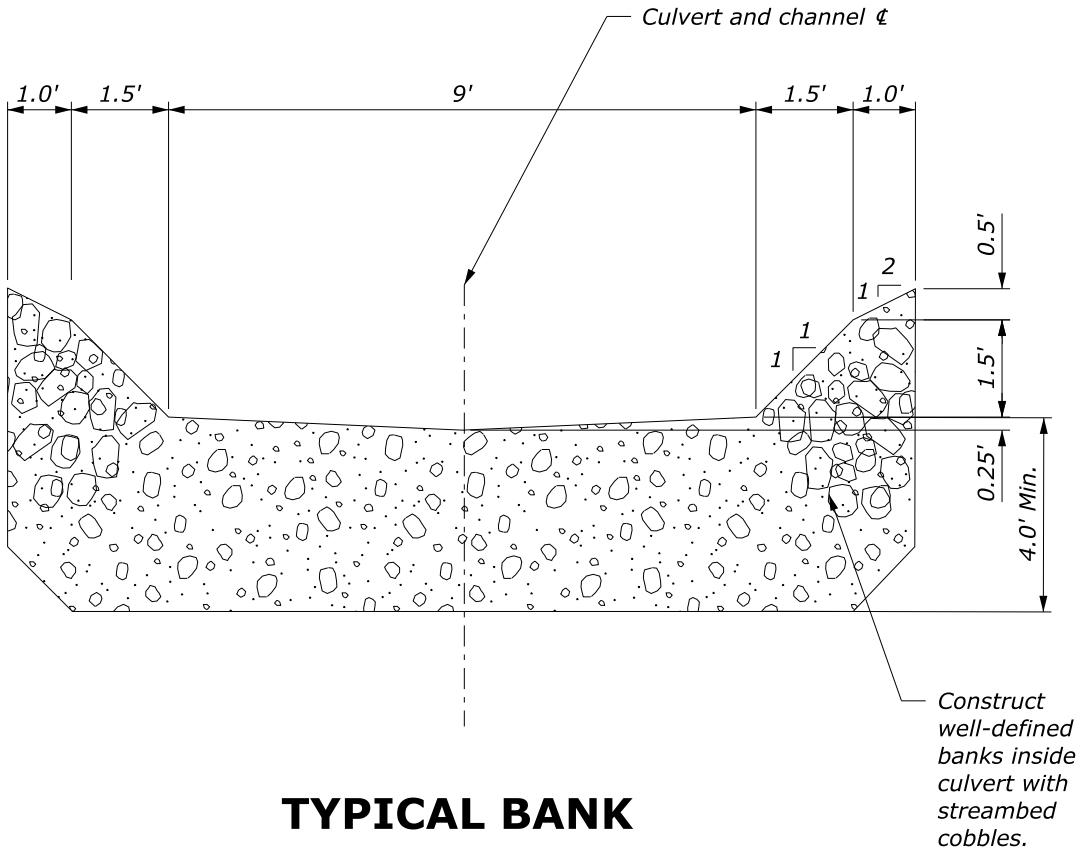
**SITE NO. 7
AOP CULVERT ELEVATIONS**



CULVERT INLET



CULVERT OUTLET



TYPICAL BANK CONSTRUCTION

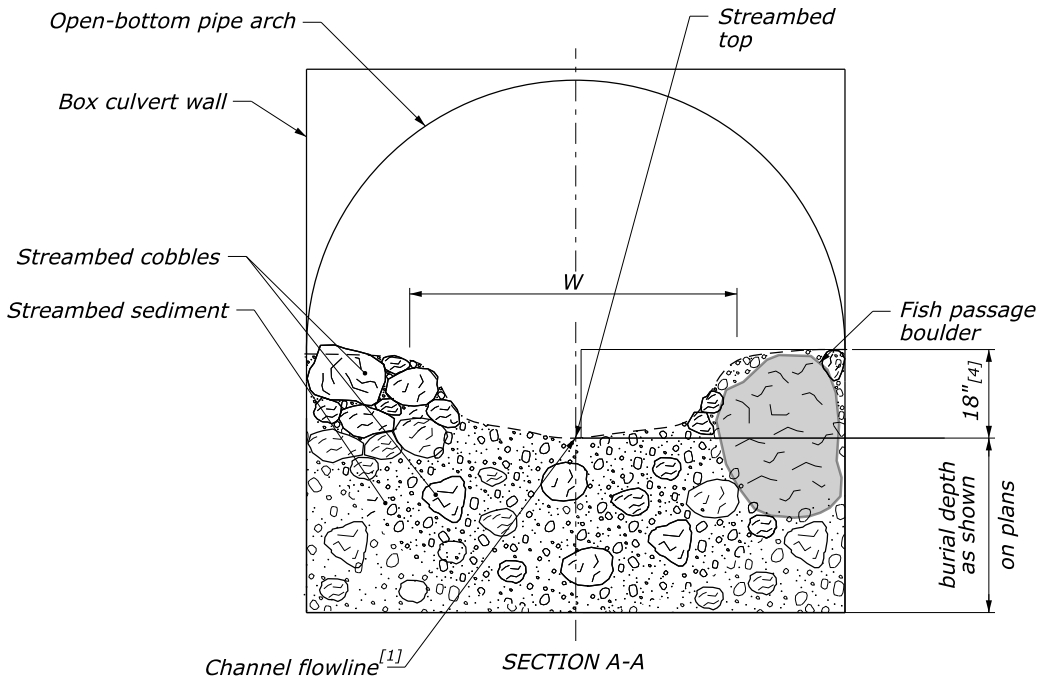
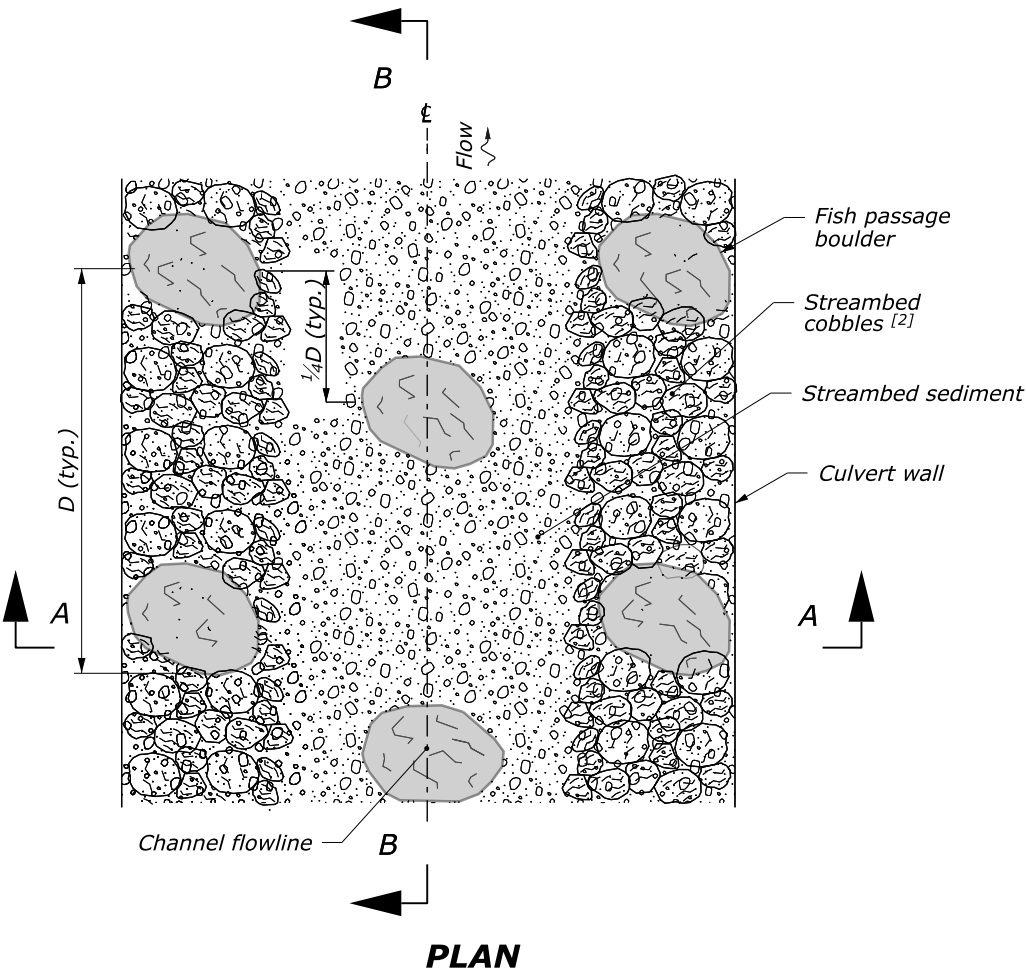
- NOTE:**
1. Construct bank area, excavate or place conserved streambed material to create smooth transition to existing grade, min. new stream channel depth 18-inches. See Sheet F.14.
 2. Place conserved streambed material over constructed bank areas.

NO SCALE

SITE NO. 8
AOP CULVERT ELEVATIONS

c:\pw\work\w\id050386\wa_fws\p0_2020\1_hyd_Site1_SHEETS.dgn [SHEET F.14] FIO SIM STREAM CULV INTERIOR 14 May 2026 4:40 PM

STREAMBED MATERIAL INFORMATIONAL QUANTITIES							
LOCATION	D (FT)	W (FT)	STREAMBED COBBLE GRADATION (IN)	STREAMBED SEDIMENT (CUYD) ^[5]	STREAMBED COBBLE (CUYD) ^[5]	FISH PASSAGE BOULDER DIAMETER (IN +/- 4)	FP BOULDER (EACH)
SITE 1	18	16	Class E	38	32	30	4
SITE 2	11	9	Class D	27	23	24	7
SITE 3	20	18	Class D	125	85	30	9
SITE 4	20	18	Class D	97	63	30	6
SITE 7	12	10	Class E	38	33	24	5
SITE 8	14	12	Class E	98	80	30	7

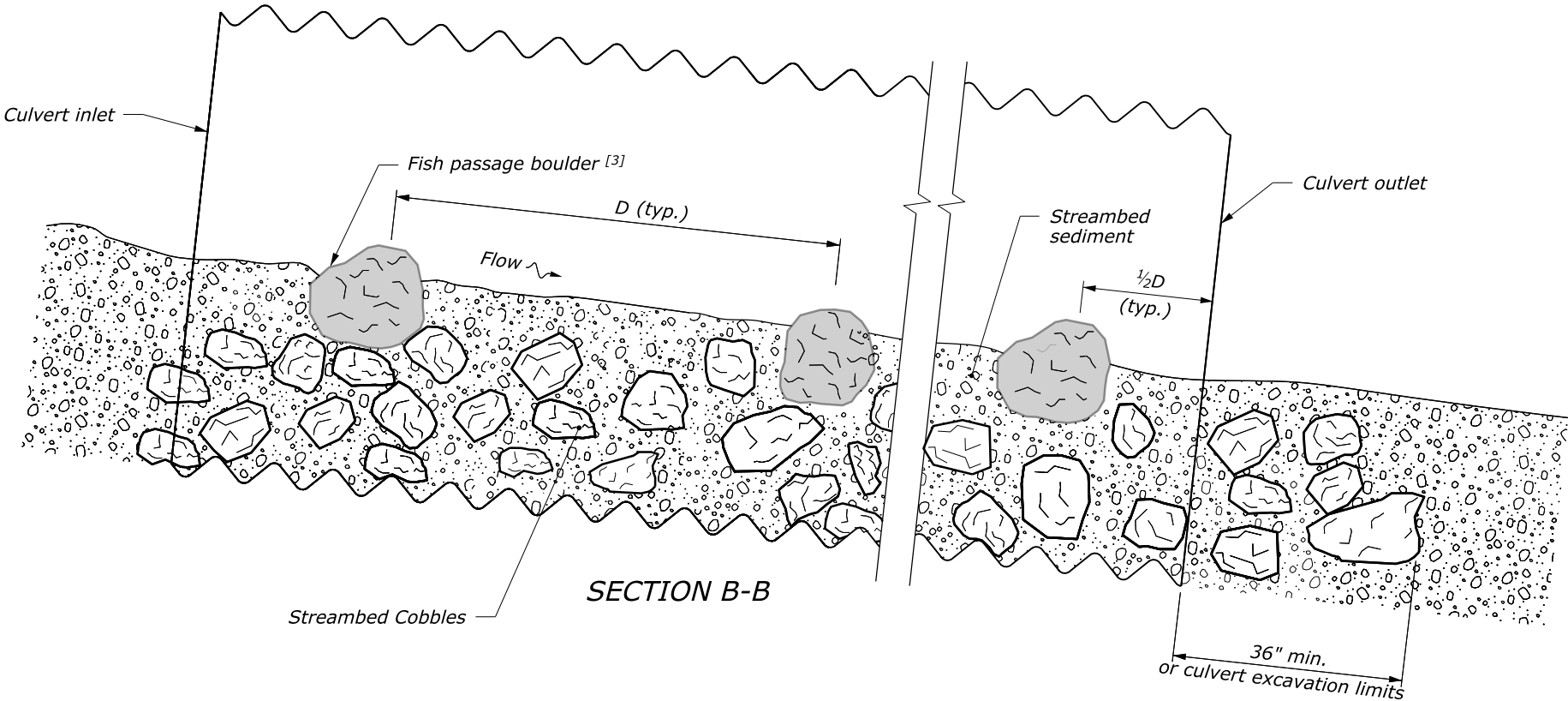


NOTE:

1. Mix streambed cobbles evenly throughout streambed sediment.
2. See special contract requirements for streambed sediment, streambed cobble gradations.
3. Stagger in-channel fish passage boulder within the culvert span.
4. Place first fish passage boulder 1 foot from culvert inlet.

FOOTNOTE:

- [1] Slope streambed aggregate towards flowline to ensure parabolic shape.
- [2] Construct well defined banks with streambed cobbles and backfill with streambed sediment to fill voids.
- [3] Embed fish passage boulders within active channel 3/4 smallest dimension.
- [4] 18-inches or as specified on plan sheet.
- [5] Quantities included in Item 64704-1000 Mitigation, Streambed Material, reflect totals for both streambed and bank construction gradation mixes. Use 90 pct streambed cobble, 10pct streambed material mix for bank construction.

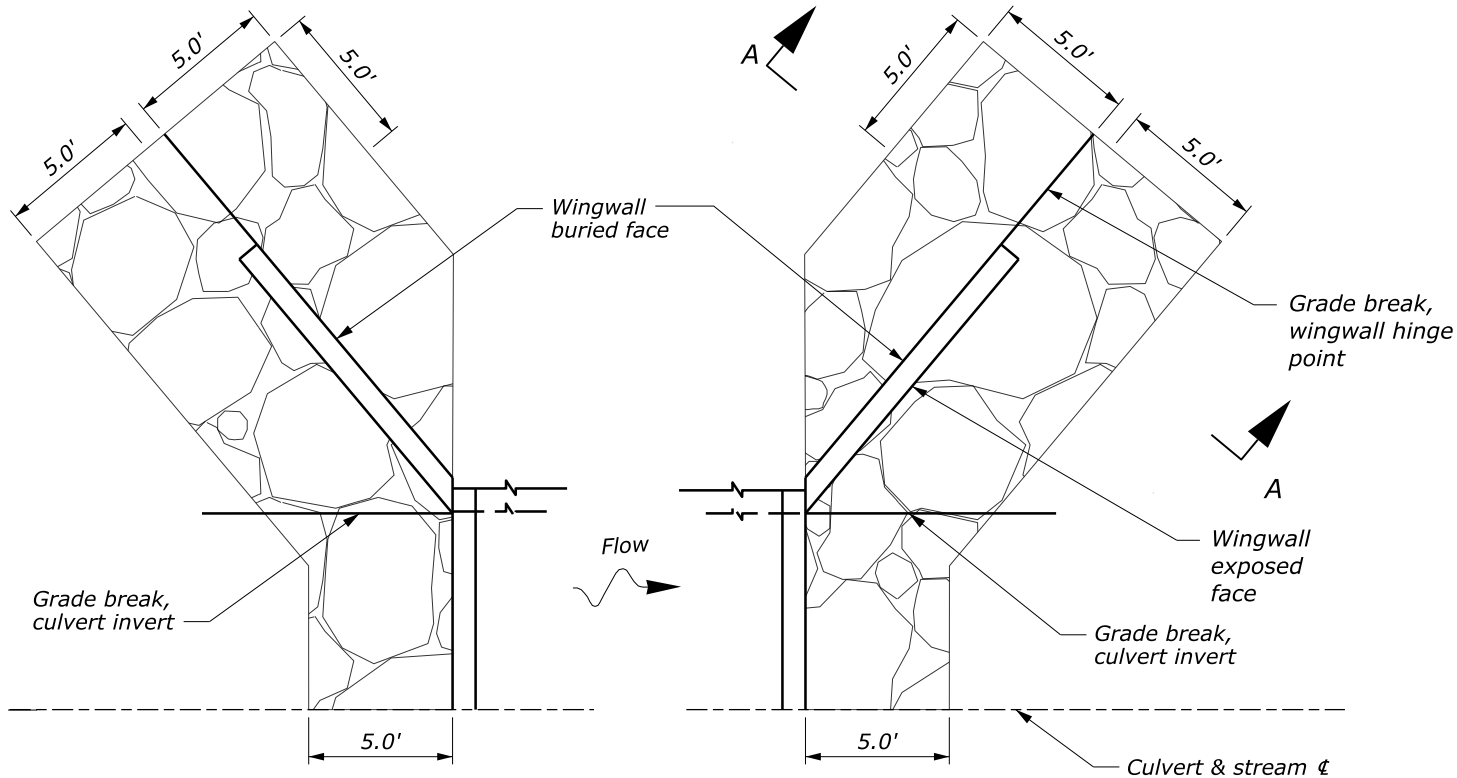


NO SCALE

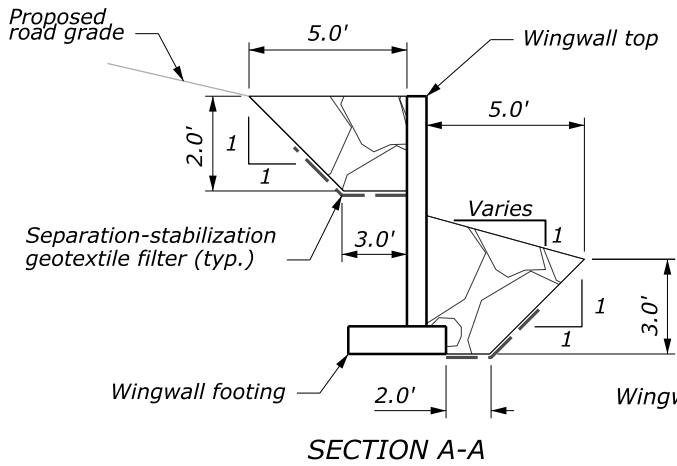
SIMULATED STREAM
CULVERT INTERIOR
TREATMENT

c:\pw_work\wfd\0505386\wa_fws\p\2020\1\hyd_Site1_SHEETS.dgn [SHEET F.15] FIO_BOX_CULVERT_RIPRAP_DETAILS 14 May 2026 11:14 AM

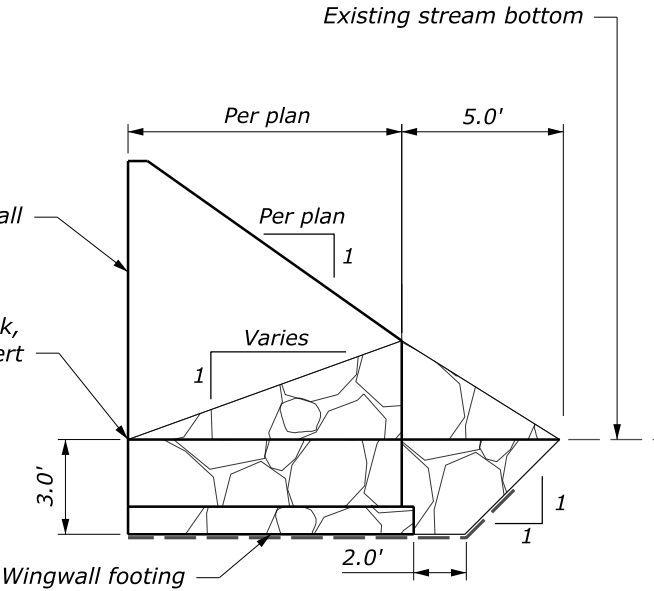
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.15



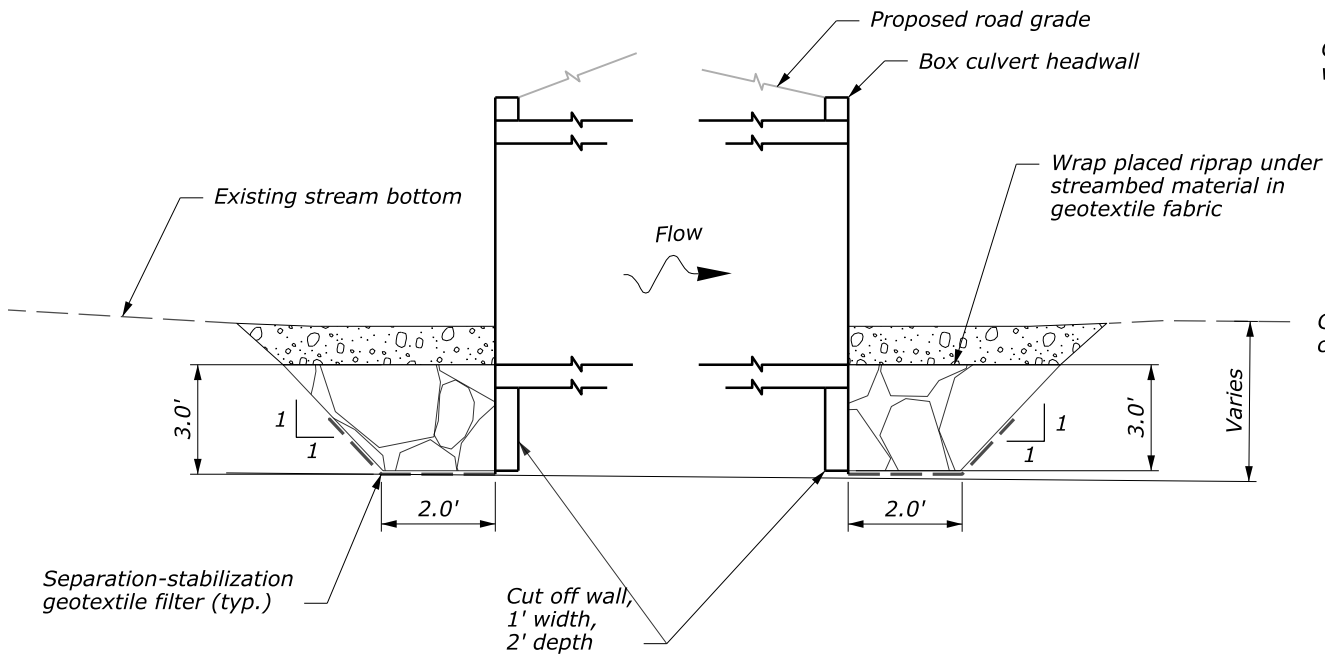
TYPICAL CULVERT INLET/OUTLET PLAN



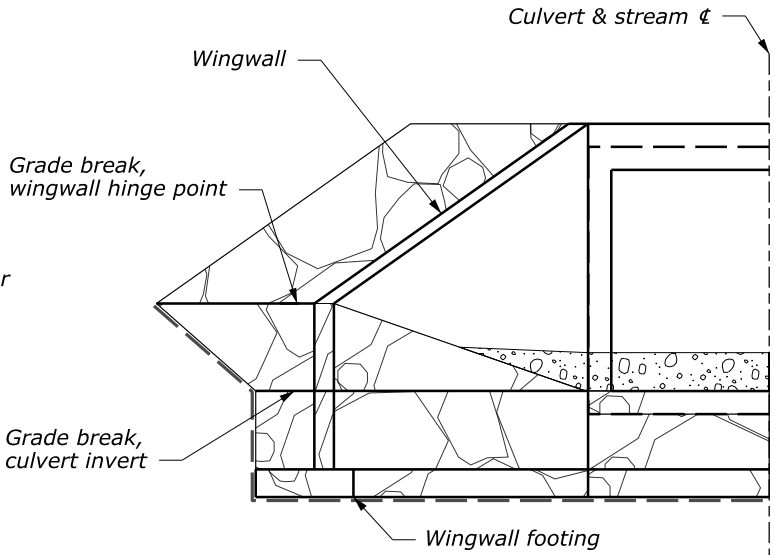
SECTION A-A



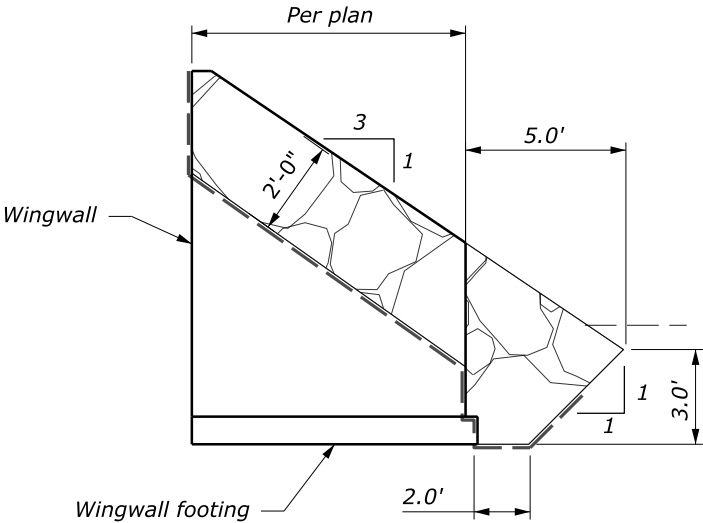
TYPICAL EXPOSED WINGWALL FACE ELEVATION



TYPICAL CULVERT INLET/OUTLET PROFILE



CULVERT INLET/OUTLET ELEVATION



TYPICAL BURIED WINGWALL FACE ELEVATION

- NOTE:
1. Place conserved streambed material over riprap as needed for transition to existing bank top and toe.
 2. Place filter $\frac{2}{3}$ to the edge of riprap.

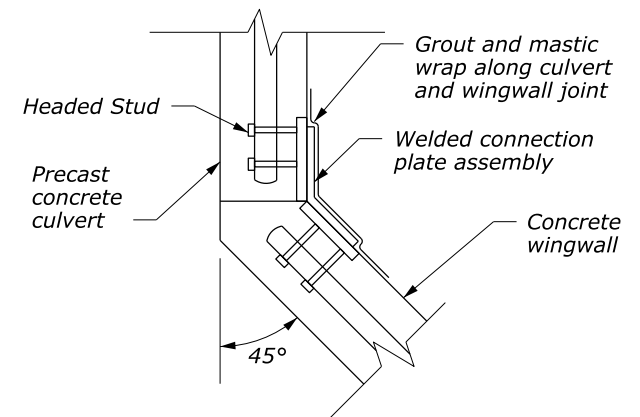
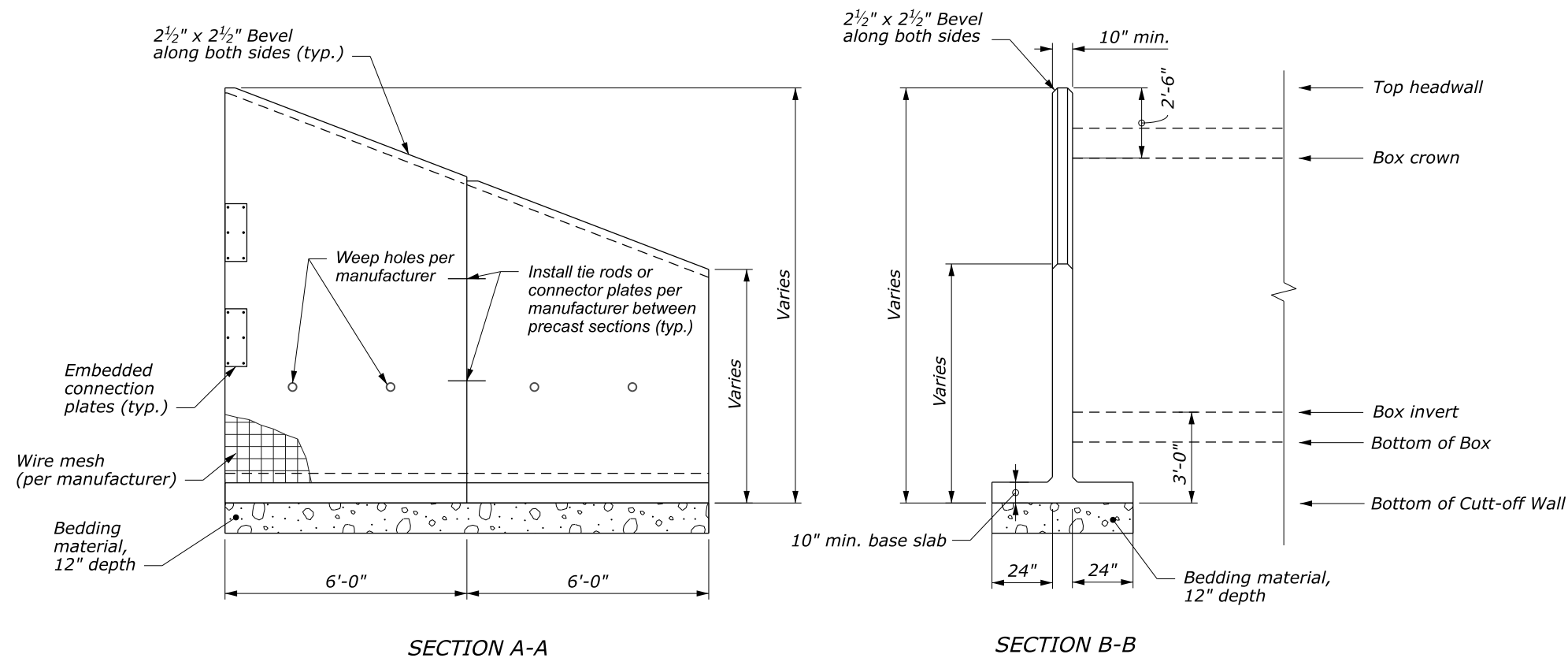
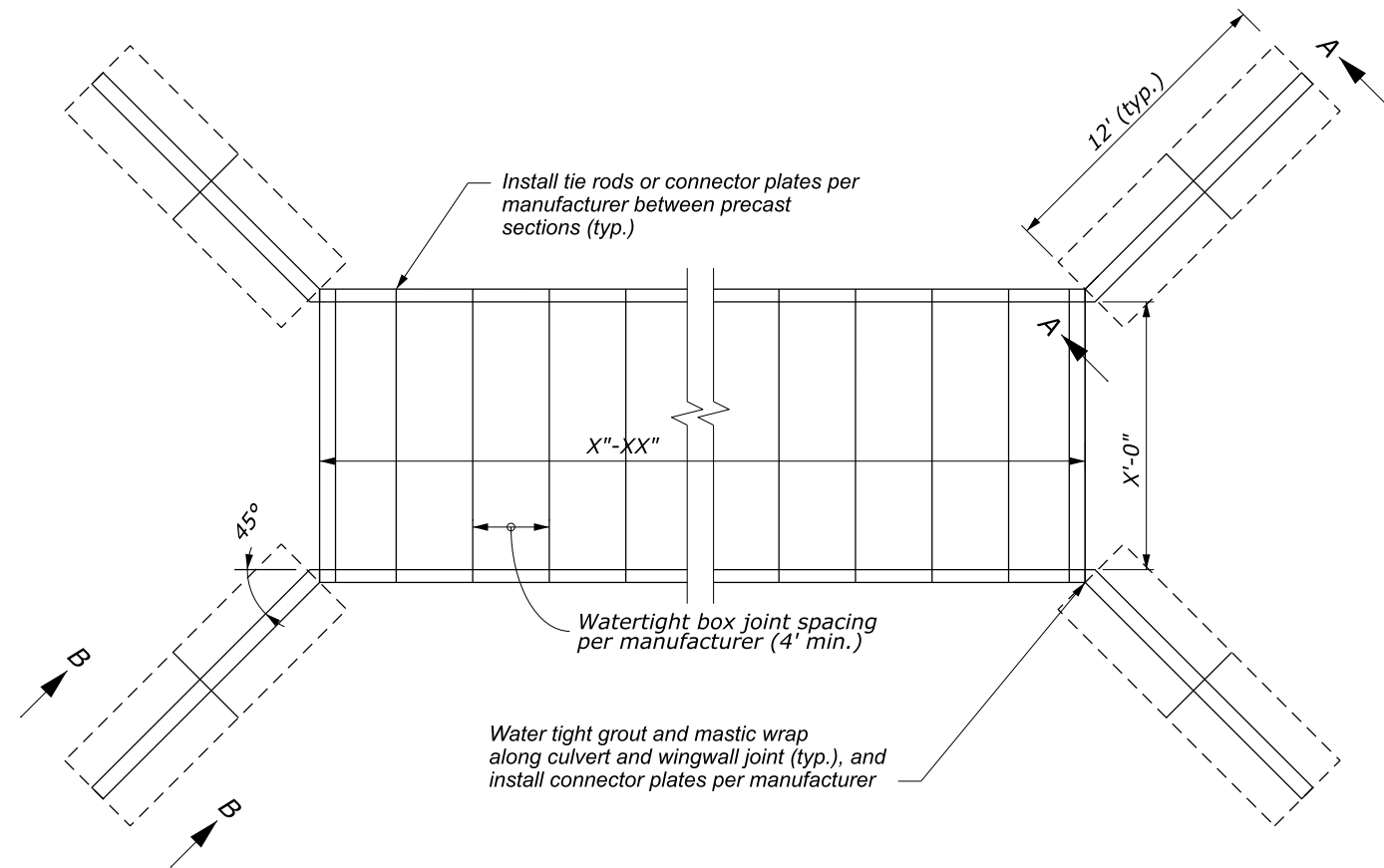
CULVERT RIPRAP QUANTITIES								
ITEM NO.	DESCRIPTION	UNIT	SITE 1	SITE 2	SITE 3	SITE 4	SITE 7	SITE 8
FIO	Separation-stabilization geotextile, Class 1, Type E	SQ YD	275	225	280	260	260	250
25101-0400	Placed Riprap, Method A, Class 3	CY	100	85	100	90	90	90

NO SCALE

BOX CULVERT
RIPRAP DETAILS

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PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.16A



**BOX CULVERT
STRUCTURE DETAILS**
SHEET 1 of 2

GENERAL NOTES:

CONSTRUCTION:
Detail is for general information only.

Federal Highway Administration Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-14 (U.S. Customary).

Provide precast concrete box culvert, headwalls, wingwalls, and cut-off walls conforming to ASTM-C1577 and to the dimensions, lines, and grades shown in the plans and provide shop drawings for review by the CO. See section 104.

DEAD LOAD:
Concrete: 150 lb per cubic foot.

LIVE LOAD:
HL-93.

CONCRETE:
All concrete shall be structural concrete, class A(AE) with minimum 28-day design compressive strength $f'_c=4500$ psi. Chamfer all exposed edges ¾-inch.

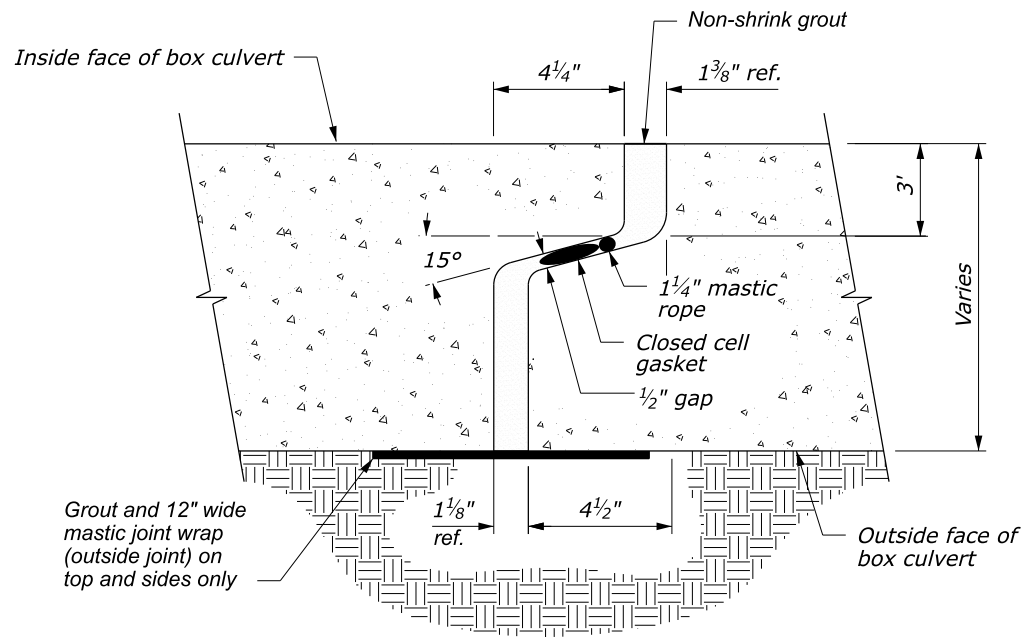
REINFORCING STEEL:
All reinforcing steel shall conform to AASHTO M31, deformed (ASTM, A615) grade 60. Minimum 3-inches concrete cover for reinforcing steel for concrete against the ground. Minimum 2-inches concrete cover to all other reinforcing steel.

SOIL:
Unit weight: 125 lbs/cu. ft.
Factored bearing resistance: 4,500 psf. Apply a resistance factor of 0.45.

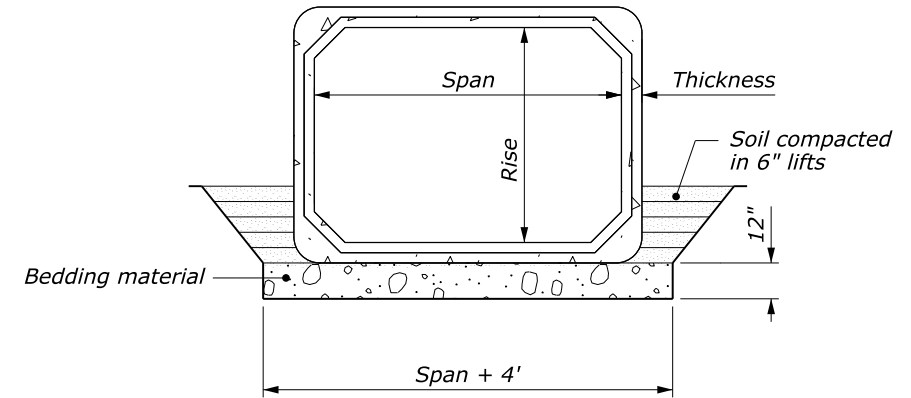
NO SCALE

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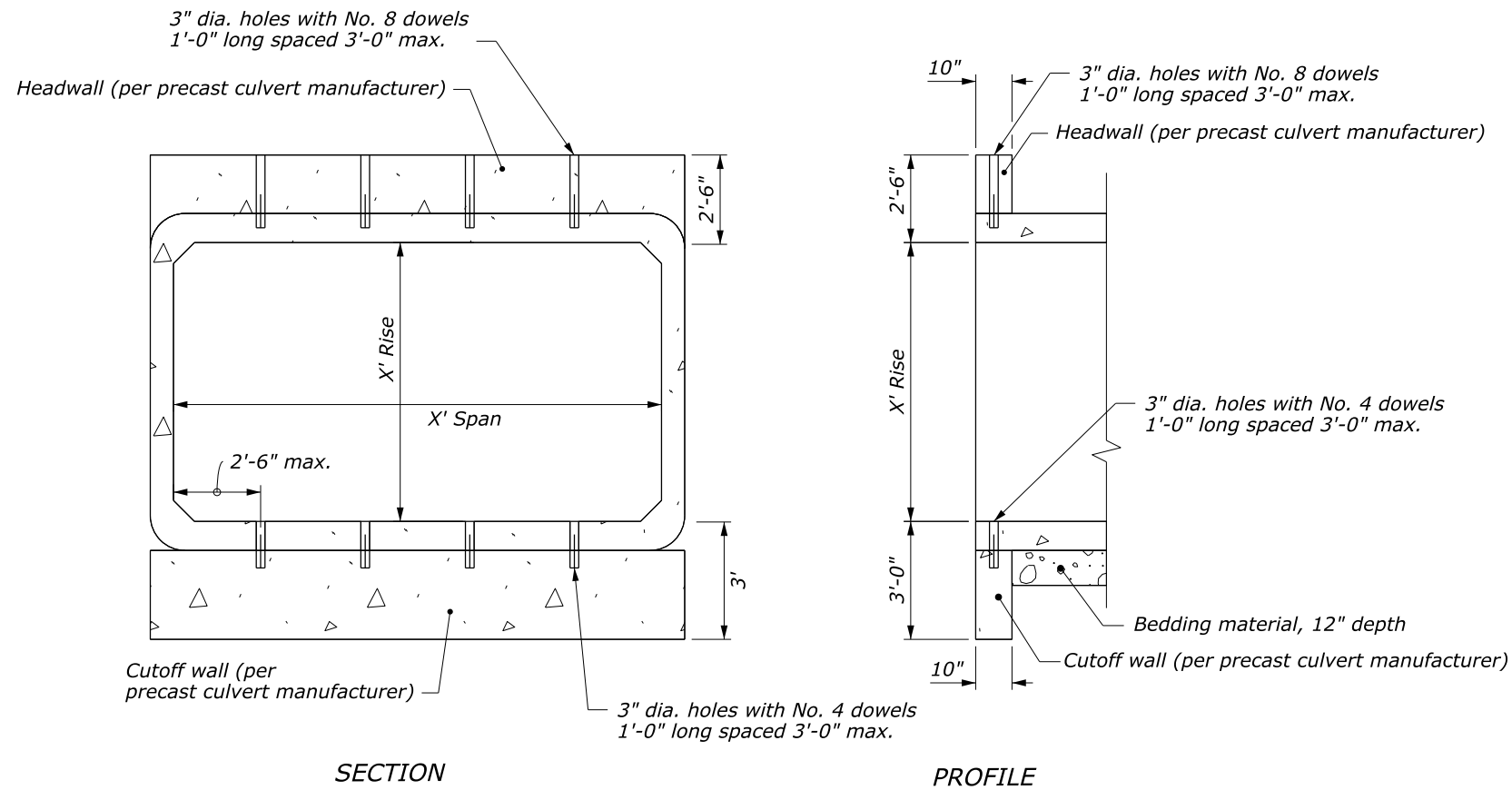
PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.16B



WATERTIGHT BOX JOINT SECTION



BOX CULVERT BEDDING DETAIL



SECTION

PROFILE

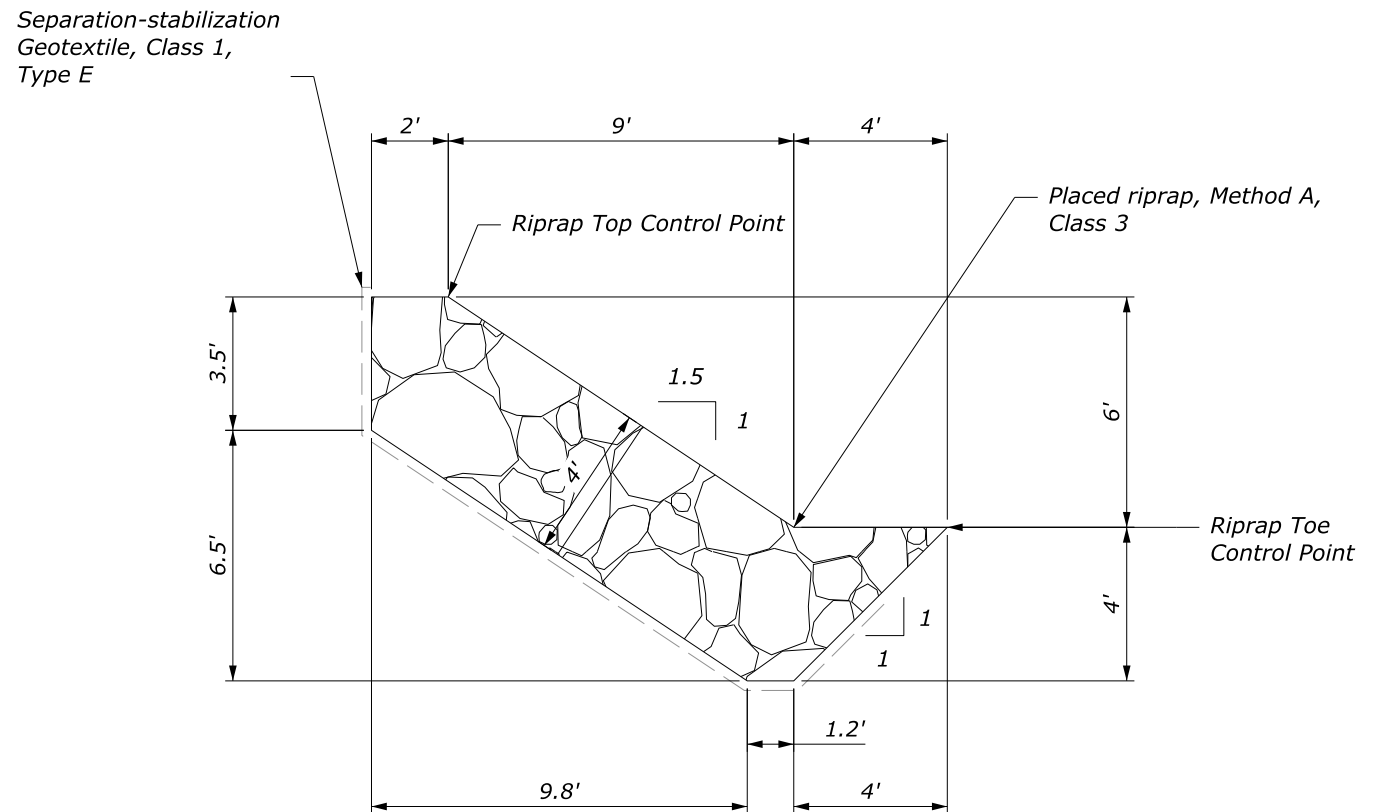
**HEADWALL AND CUTOFF WALL
DETAIL**

NOTE:

1. Fill dowel holes with polymer mortar.
2. Dowels shall be installed in accordance with the manufacturers recommendations.
3. Reinforcing for headwall and cutoff walls shall be welded wire reinforcing meeting the requirements of AASHTO LRFD Section 5. concrete cover over the reinforcing steel shall not be less than 1.5 inches or greater than 2.0-inches.

NO SCALE

**BOX CULVERT
STRUCTURE DETAILS**
SHEET 2 of 2



SITE 4 REVETMENT TYPICAL SECTION

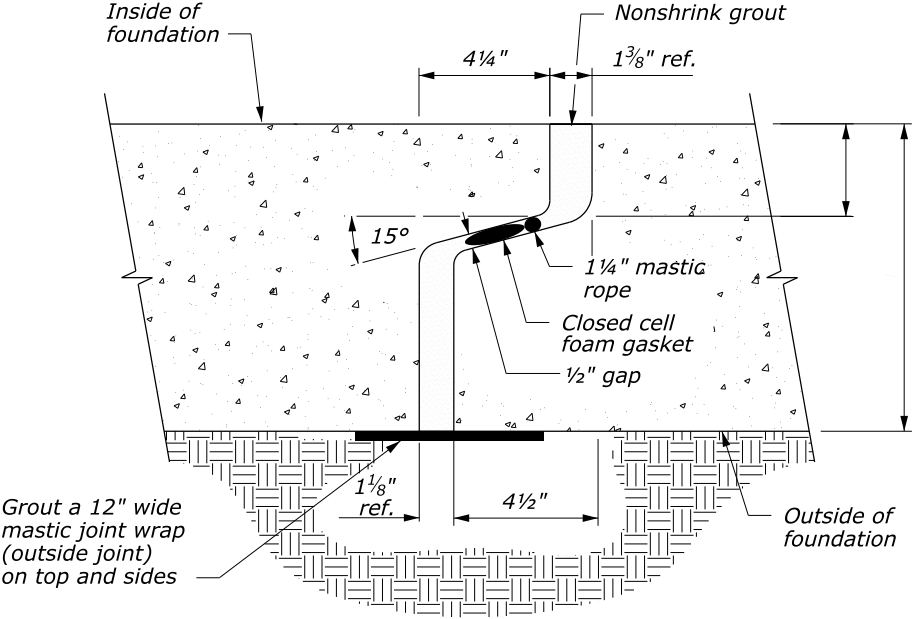
<i>SITE 4 CONTROL POINT</i>	<i>NORTHING</i>	<i>EASTING</i>	<i>ELEVATION (FT)</i>
<i>TOE 4R-A</i>	<i>544091.1462</i>	<i>2395758.7466</i>	<i>2131.14</i>
<i>TOP 4R-A</i>	<i>544090.6127</i>	<i>2395745.7576</i>	<i>2137.14</i>
<i>TOE 4R-B</i>	<i>544074.6050</i>	<i>2395759.4188</i>	<i>2131.46</i>
<i>TOP 4R-B</i>	<i>544074.0868</i>	<i>2395746.4292</i>	<i>2137.46</i>
<i>TOE 4R-C</i>	<i>544049.9819</i>	<i>2395762.7751</i>	<i>2131.97</i>
<i>TOP 4R-C</i>	<i>544048.2768</i>	<i>2395749.8874</i>	<i>2137.97</i>

1. Place conserved streambed material over riprap, as needed, for transition to existing bank top. Grade to match existing terrain.

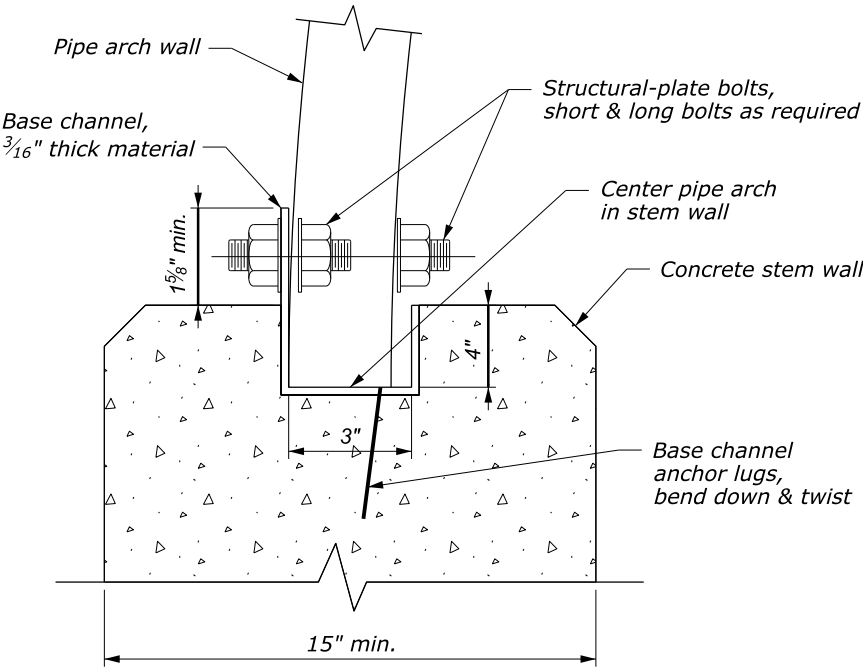
NO SCALE

14 May 2026 11:54 PM

REVTMENT RIPRAP QUANTITIES				
ITEM NO.	DESCRIPTION	UNIT	SITE 2	SITE 4
FIO	Separation-stabilization geotextile, Class 1, Type E	SQYD	80	80
25101-0400	Placed Riprap, Method A, Class 3	CUYD	110	100



WATERTIGHT FOUNDATION JOINT SECTION



BASE CHANNEL DETAIL

GENERAL NOTE:

CONSTRUCTION:
Detail is for general information only.

Federal Highway Administration Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-14 (U.S. Customary).

Field verify all dimensions and elevations.
Install tie rods or connector plates per manufacturer between precast sections.

DESIGN:
Design structural plate arch in accordance with ASTM A796, latest edition.
Design reinforced cast-in-place stem walls and footings in accordance with AASHTO LRFD Bridge Design Specifications, latest edition.

LOADING:
Dead: Concrete unit weight = 150 lb per cubic foot, Structural backfill unit weight: 125 lb per cubic foot
Live: As specified in design specifications

STEEL STRUCTURAL PLATE STRUCTURES:
Furnish structures and assembly fasteners for connecting plates conforming to AASHTO M 167 for the sizes and types specified.

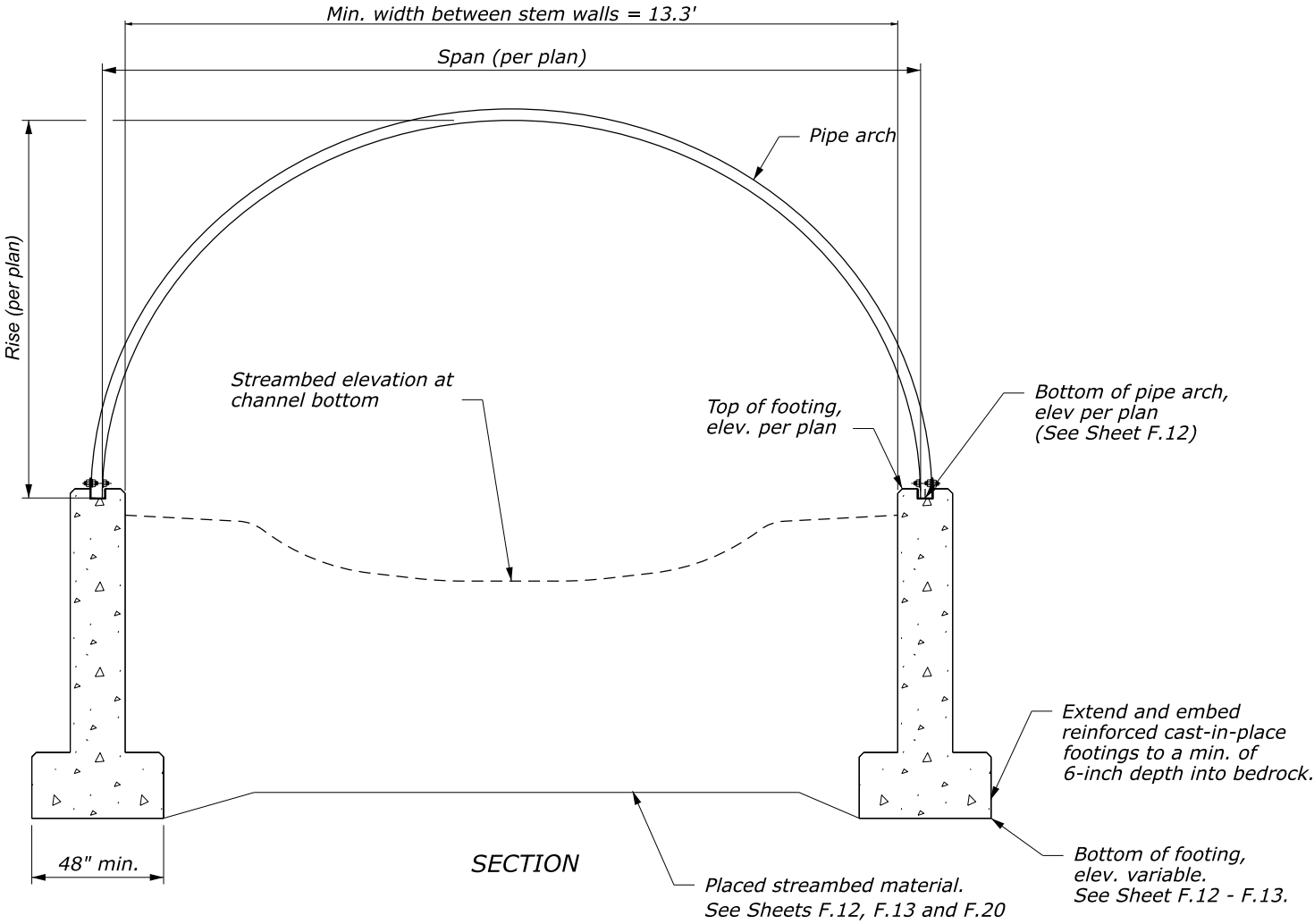
CONCRETE:
Furnish Structural Concrete Class A(AE) per section 552, with minimum 28-day compressive strength $f'_c = 4500$ psi for all concrete. Chamfer all exposed edges 3/4"-inch.

REINFORCING STEEL:
Furnish reinforcing steel bars conforming to AASHTO M31 (ASTM A615), deformed, grade 60, or welded wire reinforcing conforming to ASTM A1064, grade 65. Provide 3-inch minimum cover for concrete cast against ground, and 2-inch minimum for all other locations.

GEOTECHNICAL:
Construct base of footings at elevations provided PLAN/PROFILE sheets. Construct footings on suitable foundation material and backfill with suitable material as directed:
Foundation material: Unit weight = 125 lb per cubic foot, Effective friction angle = 34 degrees, Cohesion = 0 lb per square foot
Structural backfill: Unit weight = 125 lb per cubic foot, Effective friction angle = 34 degrees

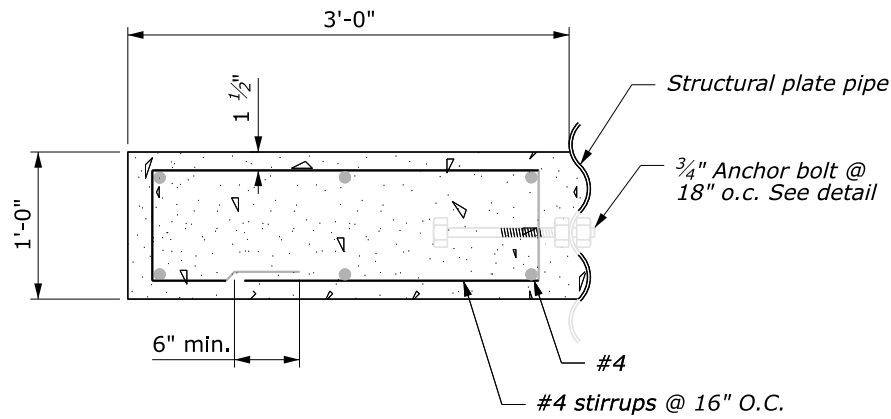
Nominal bearing resistance (based on 18 inch minimum width) = 8000 lb per square foot. Apply a resistance factor of 0.45.

For additional Geotechnical information, see Geotechnical Report GM 21-22, dated 08/08/22.

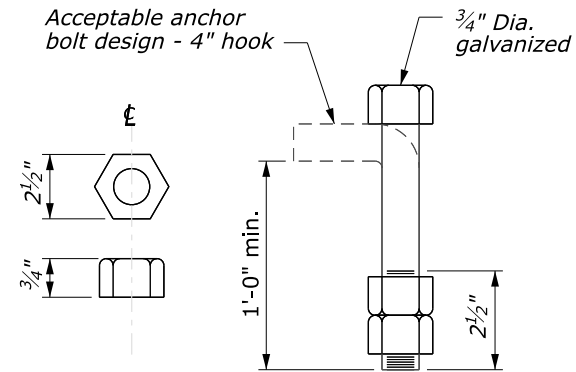


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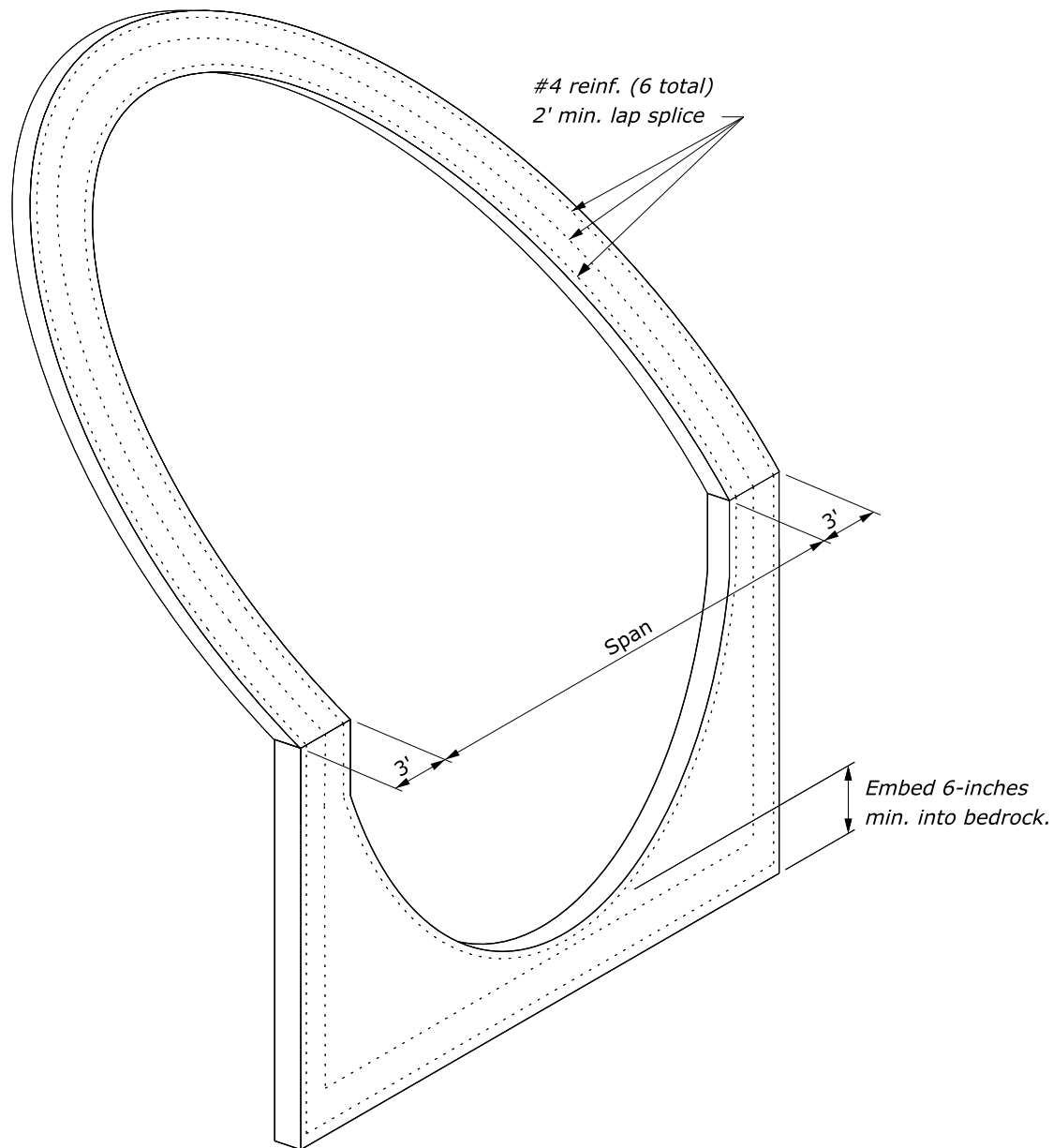
**OPEN BOTTOM PIPE ARCH
STRUCTURAL DETAILS**



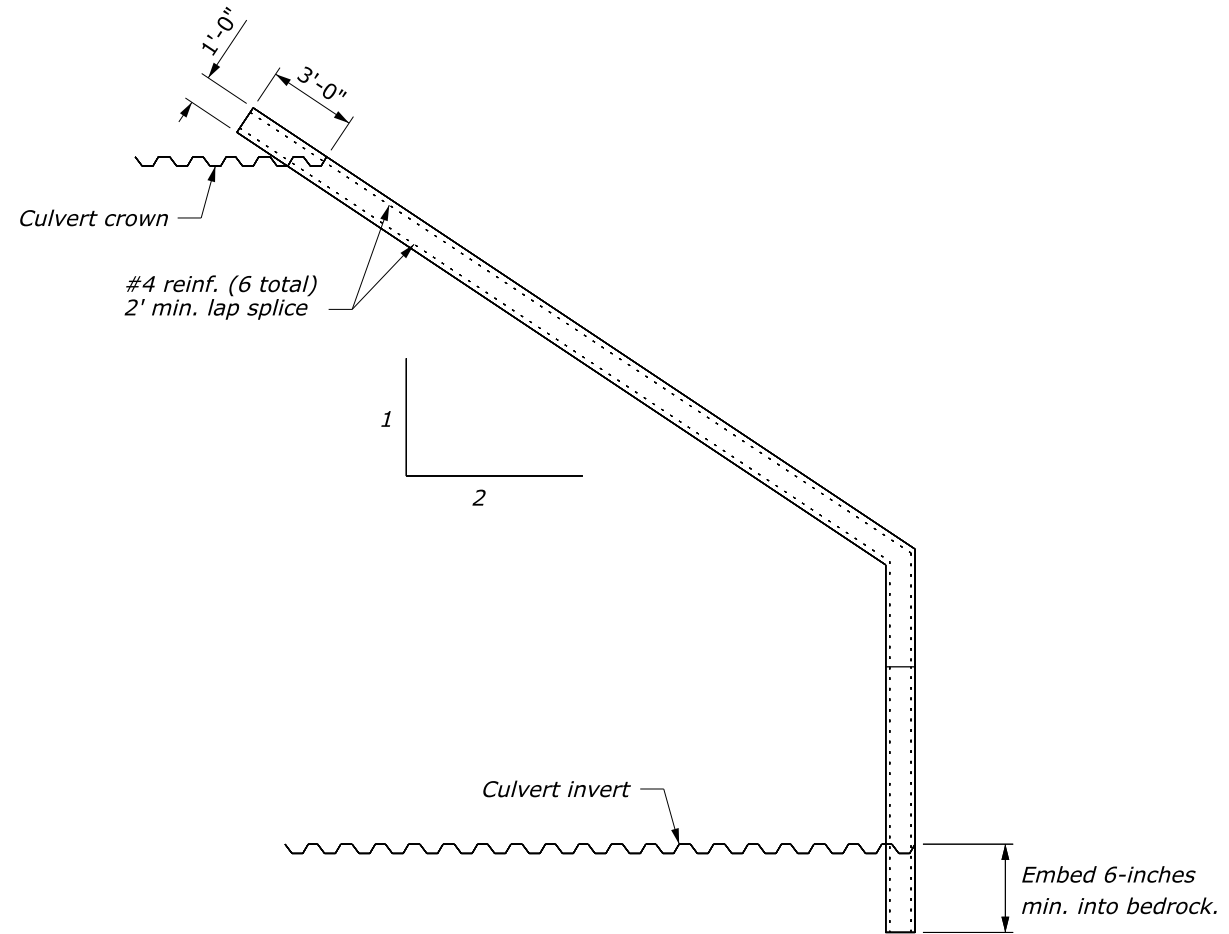
TYPICAL SECTION
THRU COLLAR



ANCHOR BOLT DETAIL



ISOMETRIC VIEW
INLET COLLAR



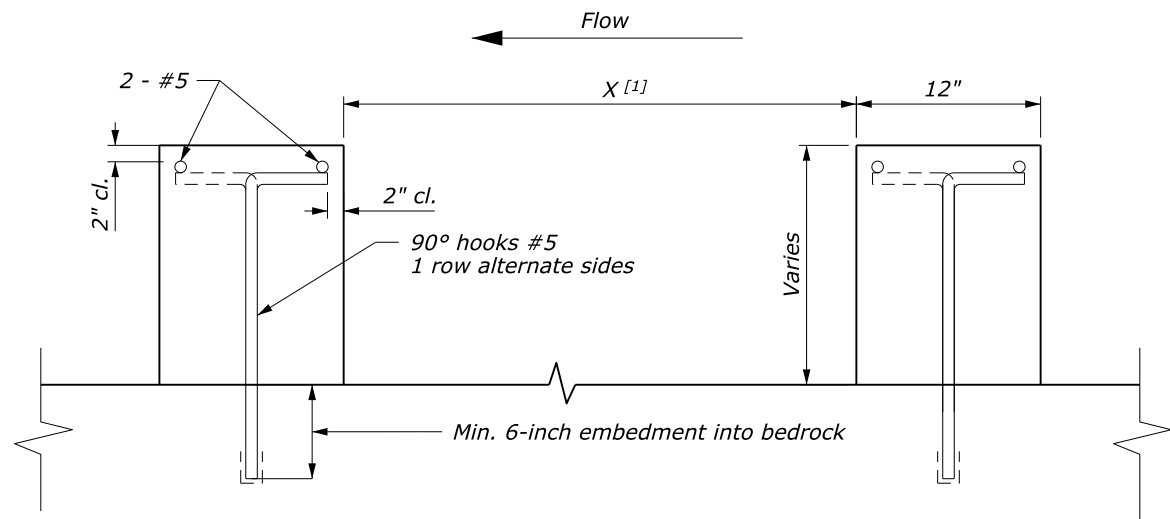
SECTION VIEW

NOTE:
See Site 8, Sheets F.12 and F13

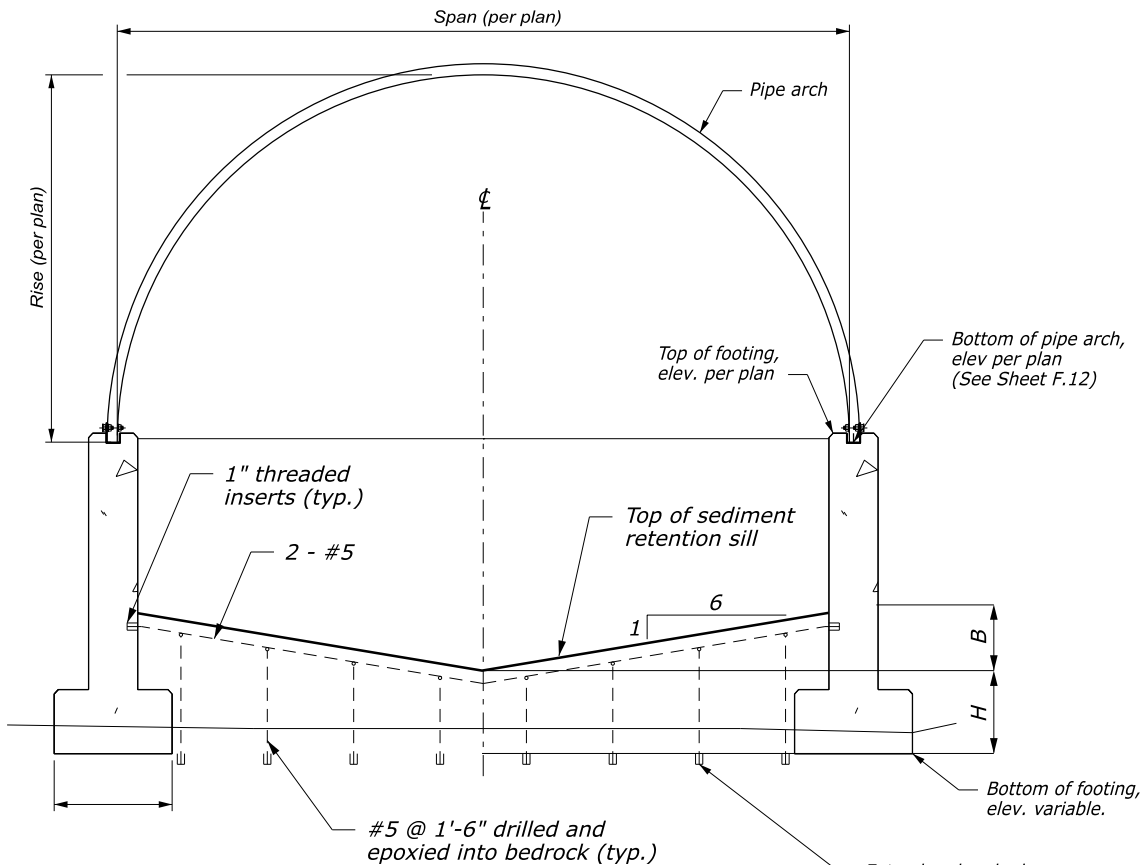
**LARGE CULVERT
REINFORCED CONCRETE
COLLAR DETAIL**

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PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.20



CONCRETE SILL
DETAIL



SEDIMENT RETENTION SILLS
OPEN BOTTOM PIPE ARCH ON BEDROCK
CROSS-SECTION

FOR INFORMATION ONLY				
SEDIMENT RETENTION SILLS (SRS)				
LOCATION	SRS Min. (NO.)	B (IN)	H (IN)	X Max. (FT)
Site 8	4	12	12	15

FOOTNOTE:

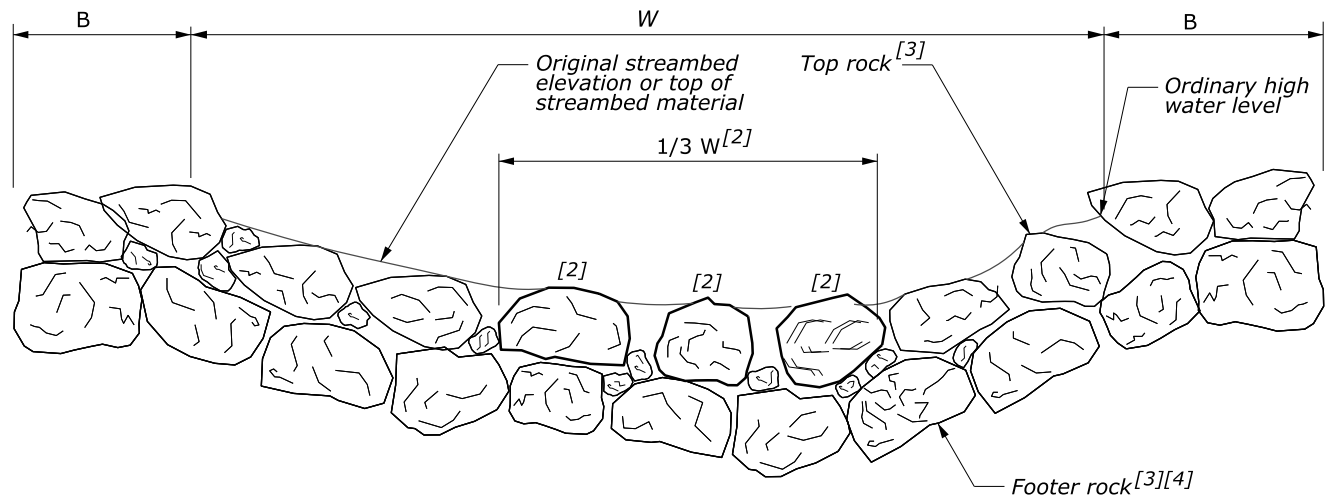
[1] X Dimension may be varied +/- 6-inches as needed for locating SRS away from seams

CULVERT
SEDIMENT RETENTION SILL
DETAILS

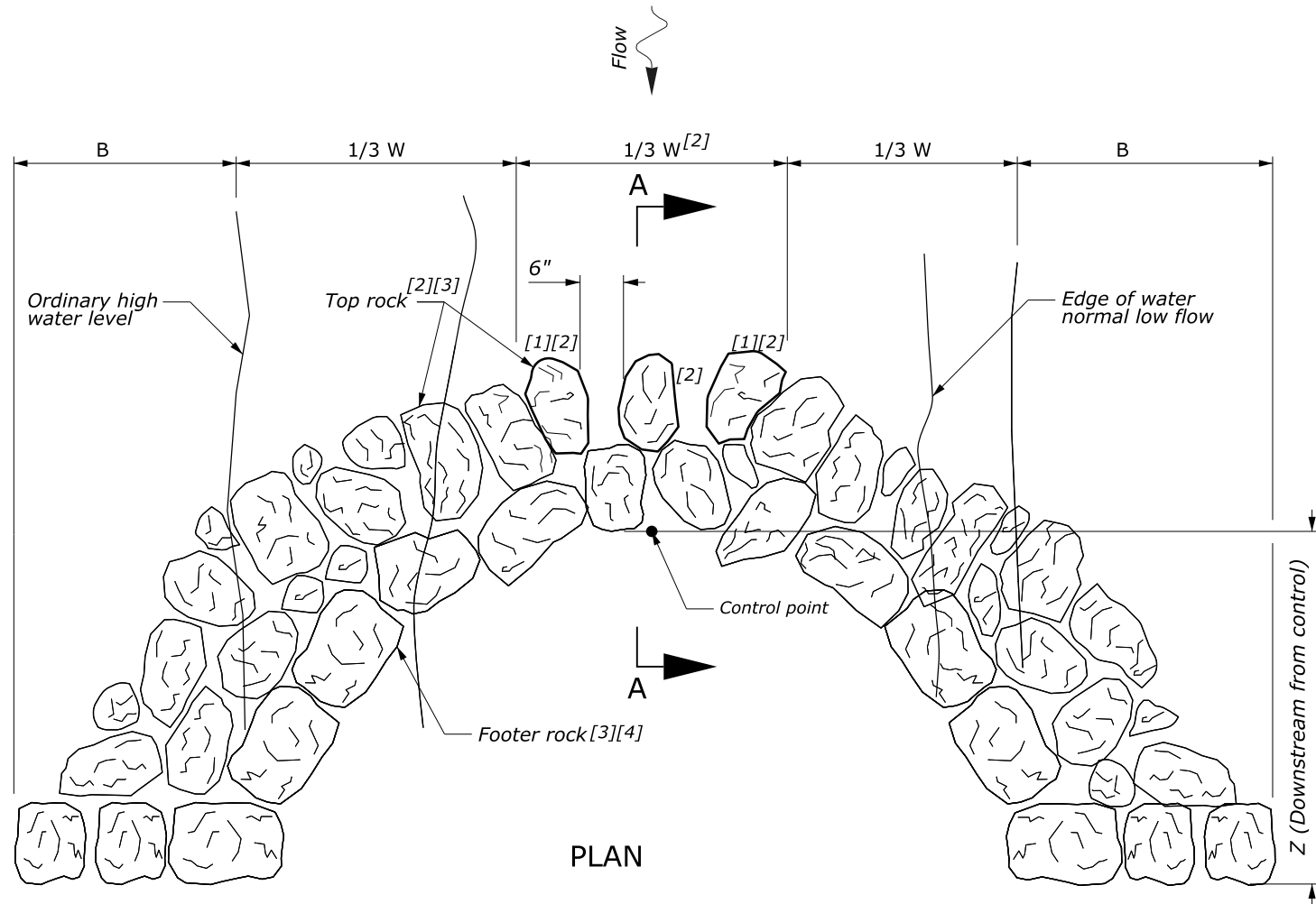
NO SCALE

c:\pw_work\w\id050386\wa_fws_lpo_2020(1)_hyd_Site8_SHEETS.dgn [SHEET F.21] Rock Weir Detail 13 May 2026 10:35 PM

PROJECT	SHEET NUMBER
WA FWS LPO MULTI(1)	F.21



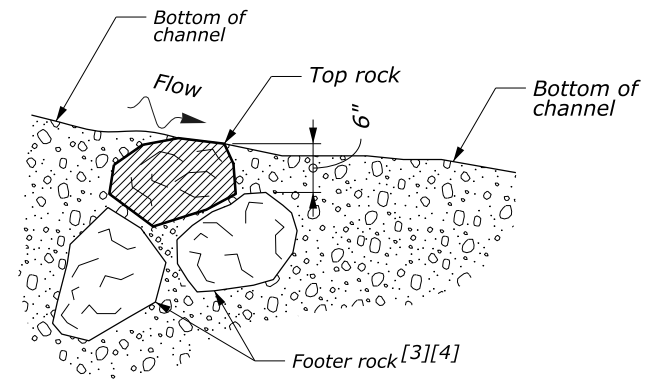
ELEVATION



PLAN

ROCK WEIR INFORMATION

LOCATION	W (ft)	B (ft)	Culvert Z (ft)	Channel Z (ft)	TOP ROCK AND FOOTER ROCK DIAMETER (in)	ROCK WEIR QUANTITY (no.)
Site 1	18	5	0	8	24±4	3
Site 7	12	4	0	6	24±4	5
Site 8	14	5.5	0 ^[5]	7	30±4	6



SECTION A-A

NOTE:

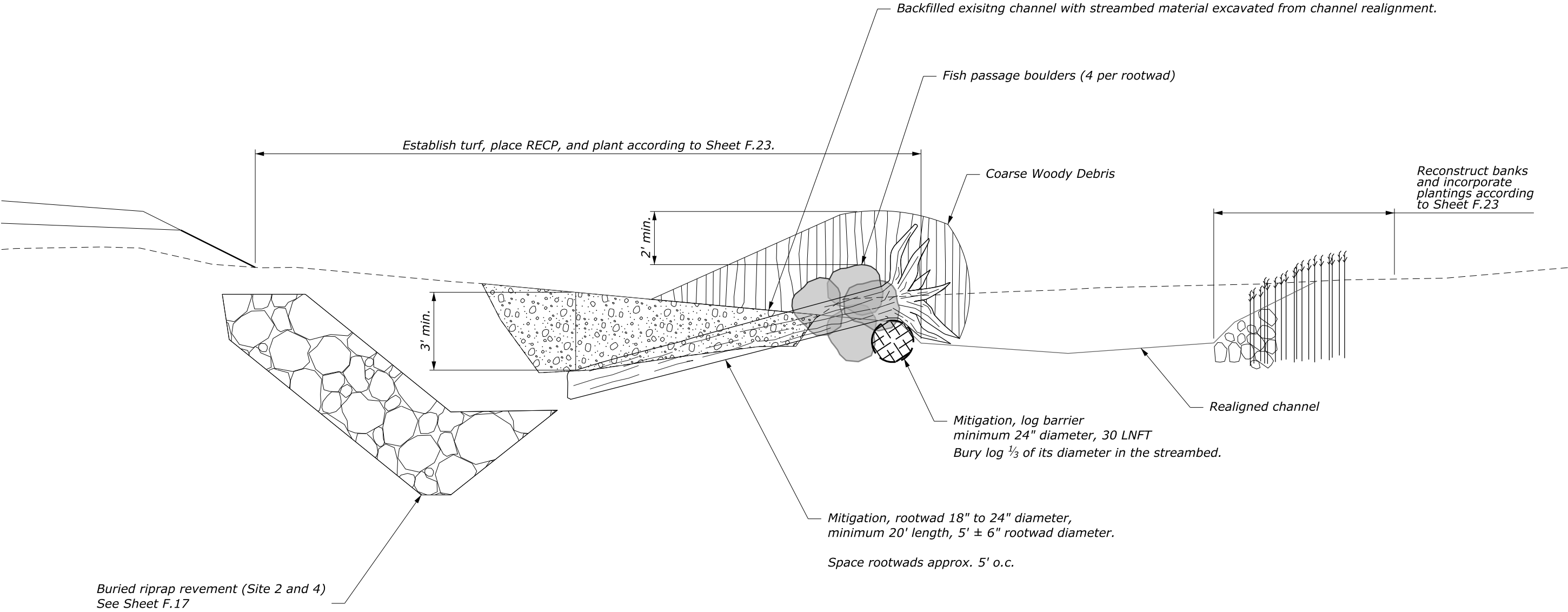
1. Dimensions not labeled are in inches.

FOOTNOTE:

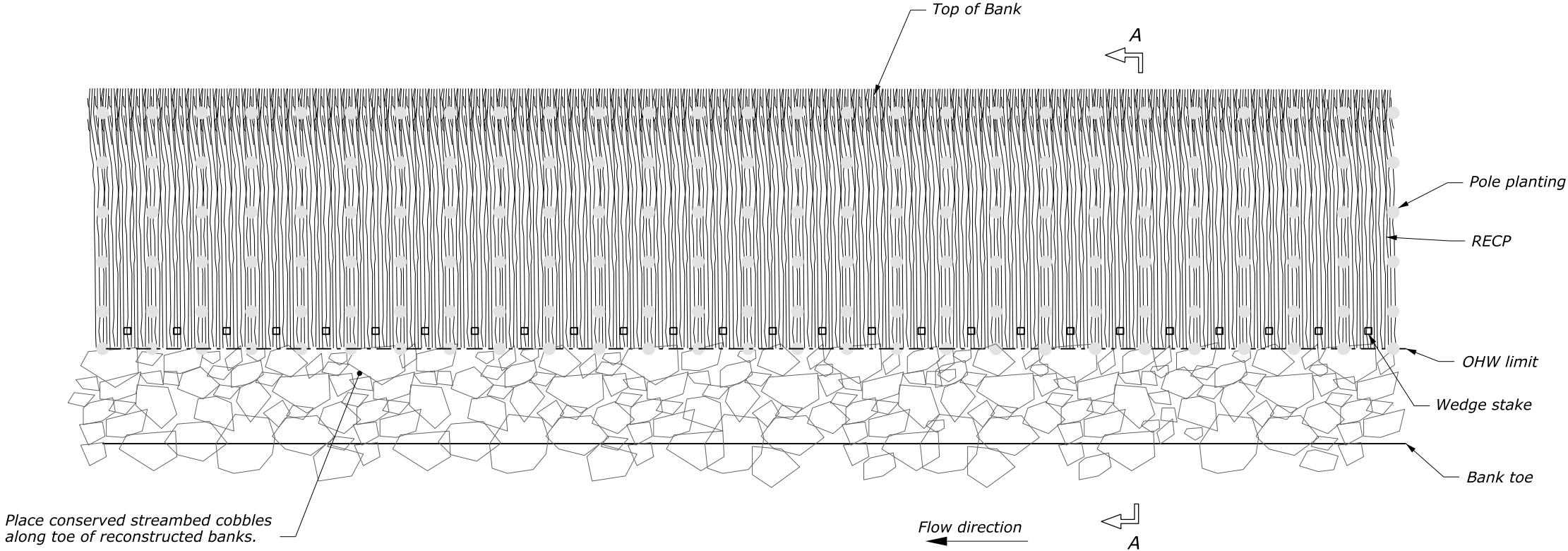
- [1] Orient top rocks to deflect water towards center of stream.
- [2] Space top rocks in center 1/3 only.
- [3] Fill voids in top rock and footer rock with specified streambed material.
- [4] Place footer rocks close together to create a tightly packed and stable foundation for the top rocks.
- [5] Align footer rocks flush against bed retention sills inside culvert.

ROCK WEIR DETAIL

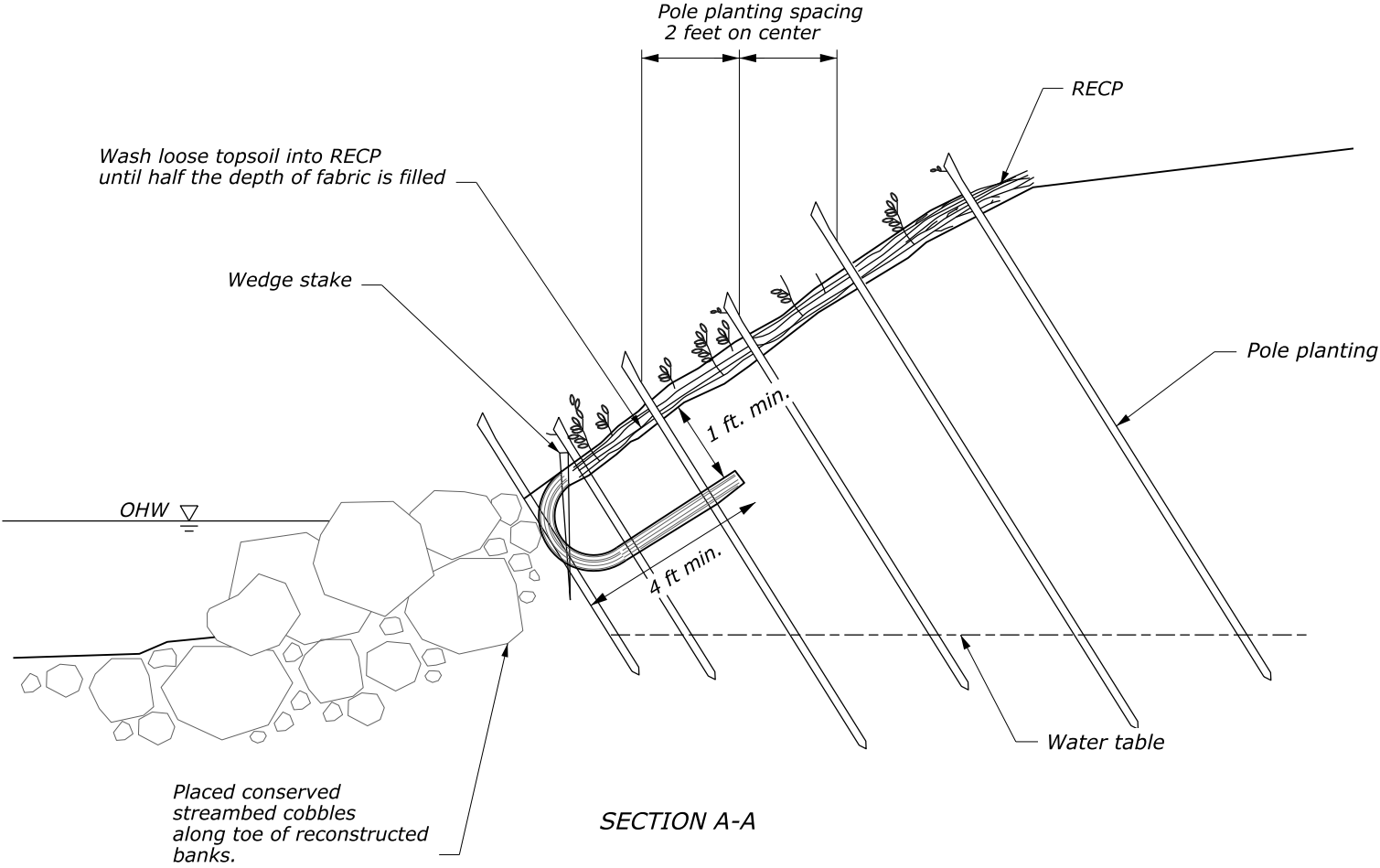
Not to scale



LOG DEFLECTOR DETAIL



PLAN



NOTES:

1. Pole plantings: Live willow or cottonwood cuttings 1 to 3 inch diameter.
2. Wedge stakes: Cut 2x4 dimension lumber diagonally to form wedge shaped stakes at 3 to 4 foot lengths. Space wedges max. 3' to secure fabric.
3. RECP: Wrap fabric behind exposed rock along active stream and encapsulate streambed material before placing along bank surface.
4. Transition ends of constructed banks to blend with natural ground/banks.

NO SCALE

STREAMBANK
RECONSTRUCTION

c:\pw_work_wfl\d051132\Std602-1 (3).dgn [Std 602-1]
12 August 2024 3:15 PM

METAL ROUND PIPE CULVERT																												
FILL HEIGHT AND METAL THICKNESS TABLE FOR HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT																												
STEEL																ALUMINUM												
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2 ² / ₃ " x 1 ¹ / ₂ " CORRUGATIONS					3" x 1" CORRUGATIONS					5" x 1" CORRUGATIONS					PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2 ² / ₃ " x 1 ¹ / ₂ " CORRUGATIONS					3" x 1" CORRUGATIONS				
		METAL THICKNESS (INCH/GAGE)																	METAL THICKNESS (INCH/GAGE)									
		0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.064/16	0.079/14	0.109/12	0.138/10	0.168/8			0.060/16	0.075/14	0.105/12	0.135/10	0.164/8					
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)																	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)									
12	12	100	100	100	100	100											12	12	100	100	100	100	100					
15	12	100	100	100	100	100											15	12	100	100	100	100	100					
18	12	100	100	100	100	100											18	12	100	100	100	100	100					
21	12	100	100	100	100	100											21	12	88	100	100	100	100					
24	12	100	100	100	100	100											24	12	77	97	100	100	100					
30	12	85	100	100	100	100											30	12	62	77	100	100	100	71	89	100	100	100
36	12	71	89	100	100	100	81	100	100	100	100						36	12	52	64	90	100	100	59	74	100	100	100
42	12	61	76	100	100	100	70	87	100	100	100						42	12	44	55	77	99	100	51	64	89	100	100
48	12	53	66	93	100	100	61	76	100	100	100	54	68	95	100	100	48	12			67	87	100	44	56	78	100	100
54	12		59	83	100	100	54	68	95	100	100	48	60	85	100	100	54	18			54	71	88	39	50	69	93	100
60	12			74	97	100	49	61	86	100	100	43	54	76	98	100	60	18				57	72	35	45	62	83	98
66	12				87	100	44	55	78	100	100	39	49	69	89	100	66	18					58	32	40	56	76	89
72	12				80	97	40	51	71	92	100	36	45	63	82	100	72	18					45	30	37	55	70	82
78	12					87	37	47	66	85	100	33	42	58	75	92	78	24							34	48	64	75
84	12					75	35	43	61	78	96	31	39	54	70	86	84	24								44	59	70
90	12						32	40	57	73	90	29	36	51	65	80	90	24								41	62	65
96	12							38	53	69	84		34	48	61	75	96	24								38	51	61
102	18							36	50	65	79		32	45	57	71	102	24									46	55
108	18								47	61	75			42	54	67	108	24									42	50
114	18								45	58	71			40	52	63	114	24										45
120	18							43	55	67			38	49	60		120	24										40
126	18								52	64					47	57												
132	18								50	61					44	54												
138	18								48	58					42	52												
144	18									56						50												

- NOTE:**
- When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
 - Fill heights exceeding 100 feet require special analysis by the CO.
 - The fill heights in the table are for helical lockseam and welded seam pipe only. Fill heights for culvert pipe with annular corrugations are more restrictive than those of helical lockseam and welded seam pipe. Obtain approval before furnishing annular corrugation pipe.
 - For flexible pavement and aggregate surface roadways, measure minimum cover from the top of the pipe culvert to the bottom of the roadway subgrade. For rigid pavements, measure minimum cover from the top of the pipe culvert to the top of the pavement. For all roadway surface types, measure maximum fill height from the top of the pipe culvert to the top of the pavement.

METAL PIPE ARCH CULVERT																												
FILL HEIGHT AND METAL THICKNESS TABLE FOR HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT																												
STEEL																ALUMINUM												
PIPE ARCH SIZE SPAN x RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2 ² / ₃ " x 1 ¹ / ₂ " CORRUGATIONS				3" x 1" CORRUGATIONS				5" x 1" CORRUGATIONS				PIPE ARCH SIZE SPAN x RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2 ² / ₃ " x 1 ¹ / ₂ " CORRUGATIONS				3" x 1" CORRUGATIONS				
				METAL THICKNESS (INCH/GAGE)																METAL THICKNESS (INCH/GAGE)								
				0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.079/14	0.109/12	0.138/10	0.168/8	0.079/14	0.109/12	0.138/10					0.168/8	0.060/16	0.075/14	0.105/12	0.135/10	0.060/16	0.075/14	0.105/12	0.135/10
				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)																								
17 x 13	15	3	12	13												17 x 13	15	3	12	13								
21 x 15	18	3	12	12												21 x 15	18	3	12	12								
24 x 18	21	3	12	13												24 x 18	21	3	12	13								
28 x 20	24	3	12	13												28 x 20	24	3	12		13							
35 x 24	30	3	12	12												35 x 24	30	3	12		12							
42 x 29	36	3.5	12	12												42 x 29	36	3.5	15			12						
49 x 33	42	4	12		12											49 x 33	42	4	15			12						
57 x 38	48	5	12			12										57 x 38	48	5	15				12					
60 x 46	54	8	15							21				21		60 x 46	54	8	15					21				
64 x 43	54	6	12			12										64 x 43	54	6	18			12						
66 x 51	60	9	15							21				21		66 x 51	60	9	18					21				
71 x 47	60	7	12				12									71 x 47	60	7	12						20			
73 x 55	66	12	18							20				20		73 x 55	66	12	18								17	
77 x 52	66	8	12					12								77 x 52	66	8	12								17	
81 x 59	72	14	18						17					17		81 x 59	72	14	18								17	
83 x 57	72	9	12					12								83 x 57	72	9	12							17		
87 x 63	78	14	18						17					17		87 x 63	78	14	18								17	
95 x 67	84	16	18						17					17		95 x 67	84	16	18								17	
103 x 71	90	16	18							17				17		103 x 71	90	16	18									17
112 x 75	96	18	21							16				16		112 x 75	96	18	21									
117 x 79	102	18	21						16					16		117 x 79	102	18	21									
128 x 83	108	18	24							16					16	128 x 83	108	18	24								16	
137 x 87	114	18	24							16					16	137 x 87	114	18	24								16	
142 x 91	120	18	24								16				16	142 x 91	120	18	24								16	

U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF FEDERAL LANDS MANAGEMENT

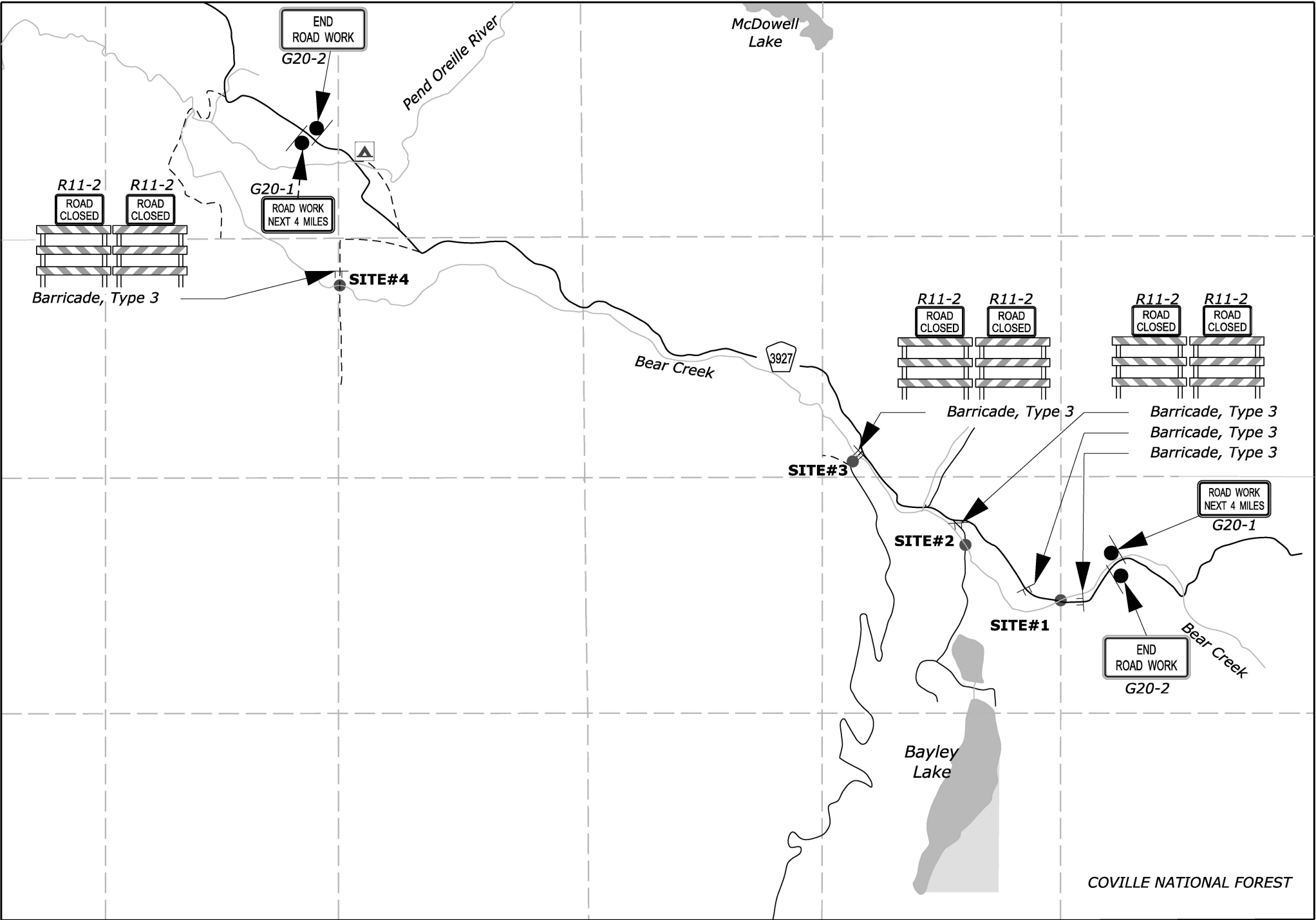
METAL PIPE CULVERT

NO SCALE

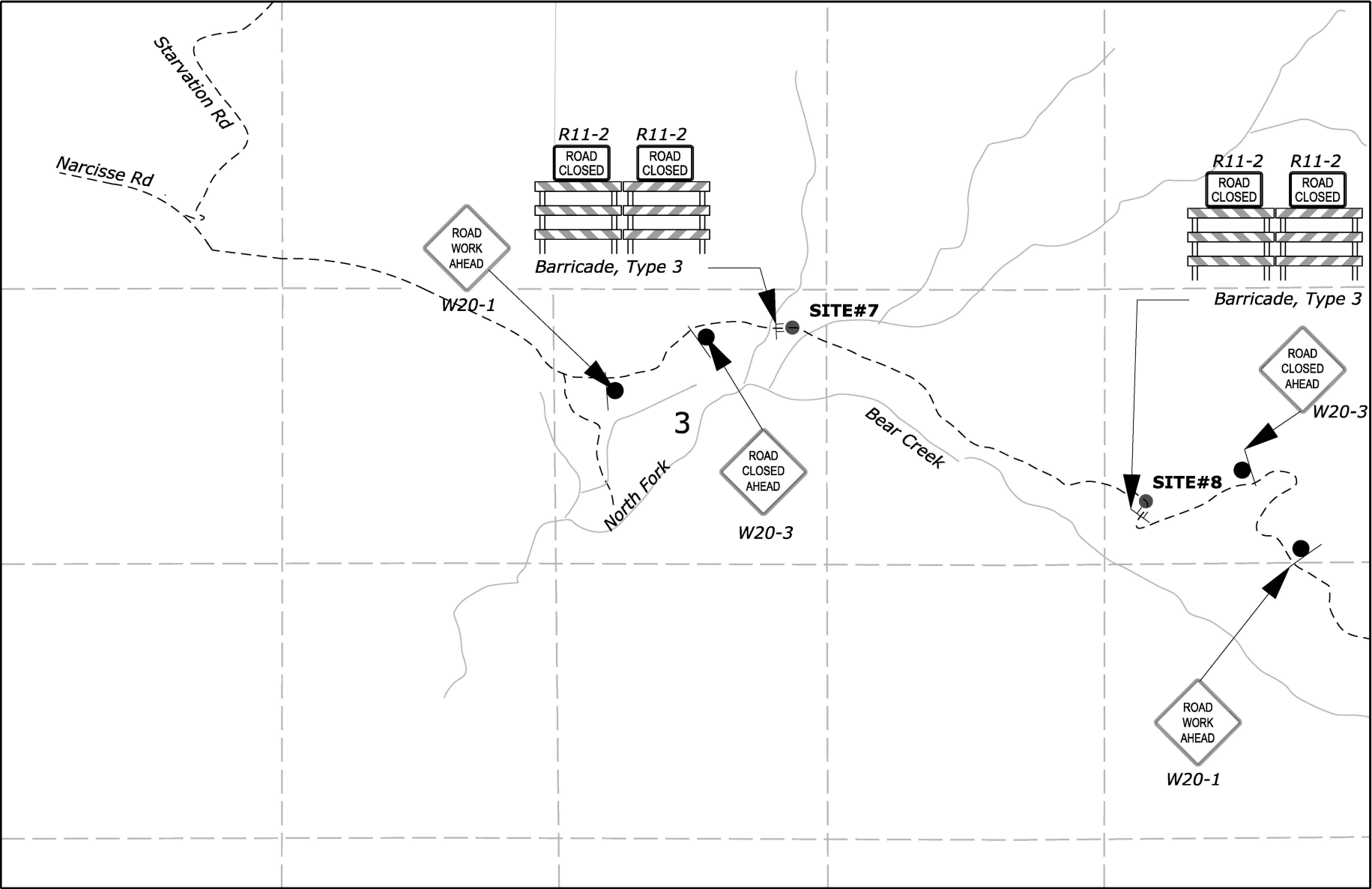
U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD 602-1
METAL PIPE CULVERT	SPECIFICATION FP-24, FP-14
	APPROVED FOR USE 8/2024

TABULATION OF TEMPORARY TRAFFIC CONTROL QUANTITIES						
ITEM	DESCRIPTION	UNIT	SCHEDULE QUANTITY			REMARKS
			A	B	C	
63502-0600	TEMPORARY TRAFFIC CONTROL, BARRICADE TYPE 3	EACH	10	14	14	
63502-3900	TEMPORARY TRAFFIC CONTROL, CONSTRUCTION SIGN	EACH	14	22	22	
63507-0700	TEMPORARY TRAFFIC CONTROL, TRAFFIC CONTROL SUPERVISOR	DAY	90	157	161	

STATE	PROJECT	SHEET NUMBER
WA	FWS LPO MULTI(1)	G.2



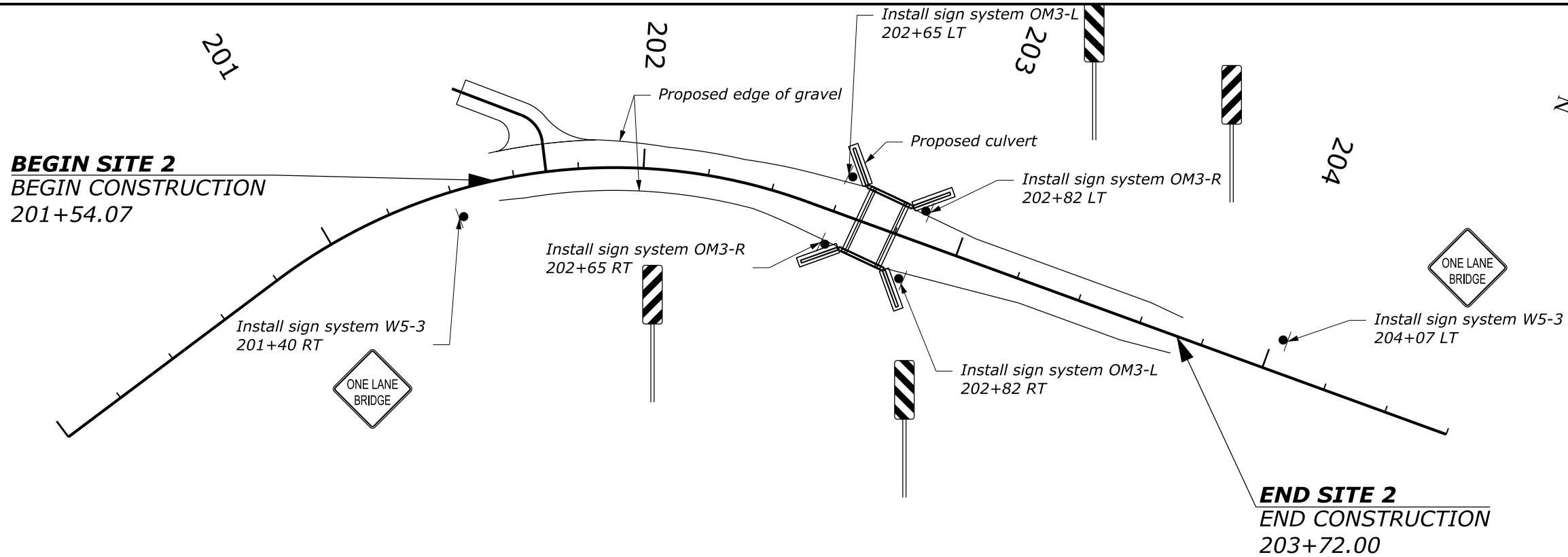
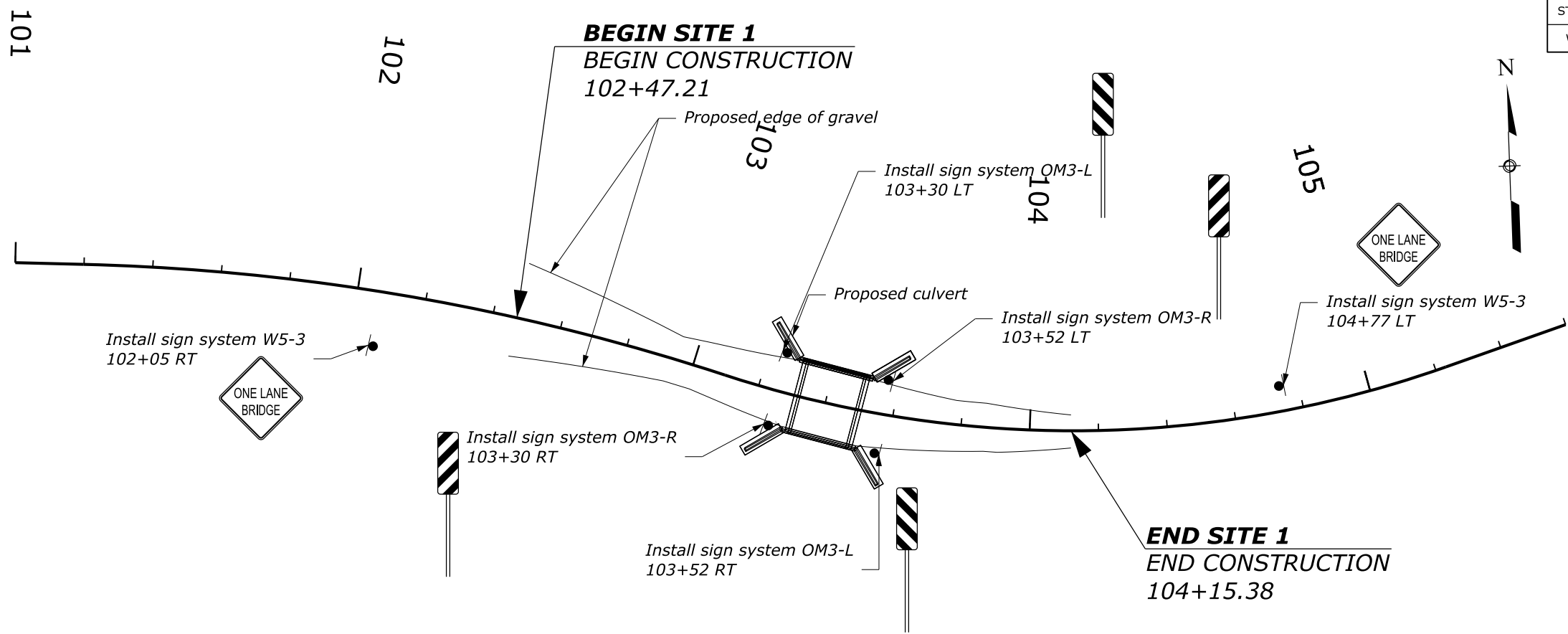
**TEMPORARY TRAFFIC CONTROL
SIGNING**



**TEMPORARY TRAFFIC CONTROL
SIGNING**

TABULATION OF PERMANENT TRAFFIC CONTROL QUANTITIES												
ITEM	DESCRIPTION	UNIT	SITE 1	SITE 2	SITE 3	SITE 4	SITE 7	SITE 8	SCHEDULE QUANTITY			REMARKS
									A	B	C	
63301-0000	SIGN SYSTEM	EACH	6	6	6	6	6	6	24	30	36	

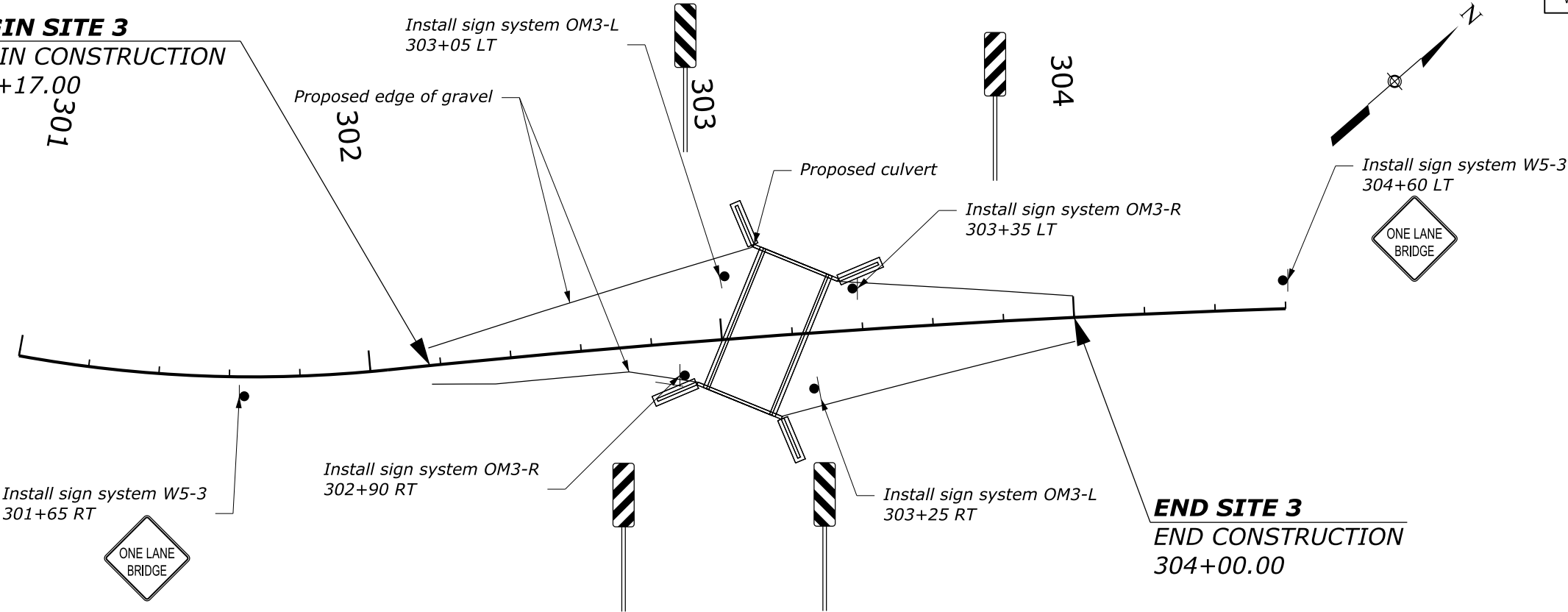
STATE	PROJECT	SHEET NUMBER
WA	FWS LPO MULTI(1)	H.2



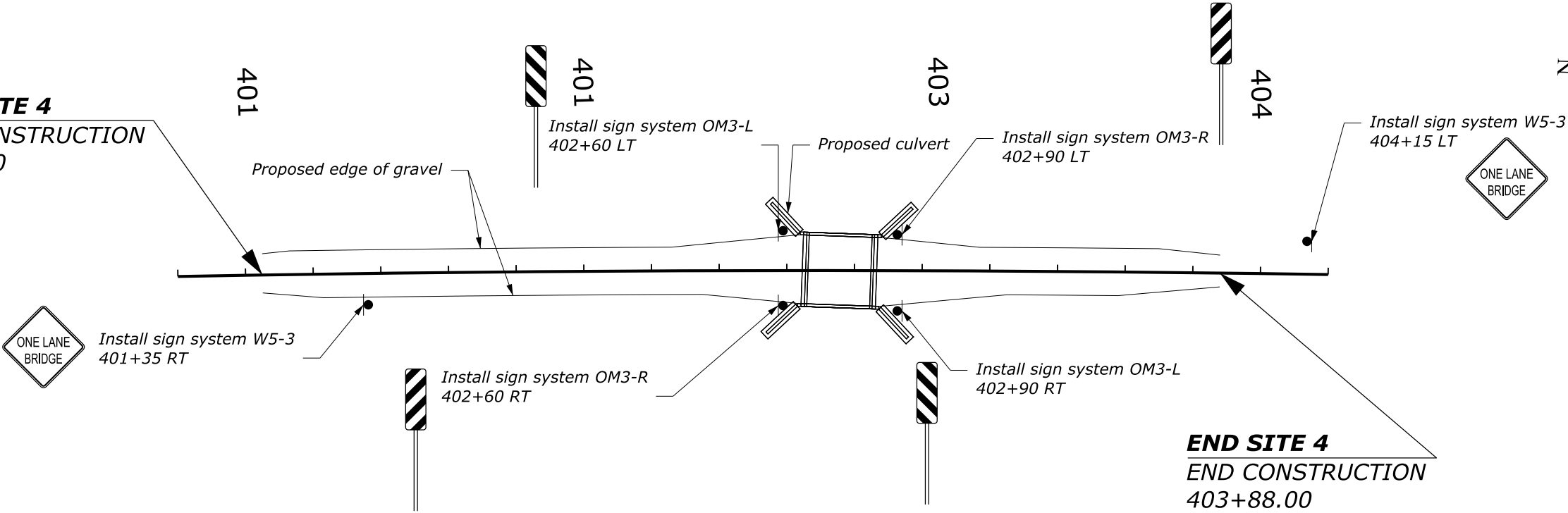
**PERMANENT TRAFFIC CONTROL
PLANS
SITES 1 & 2**

STATE	PROJECT	SHEET NUMBER
WA	FWS LPO MULTI(1)	H.3

BEGIN SITE 3
BEGIN CONSTRUCTION
302+17.00

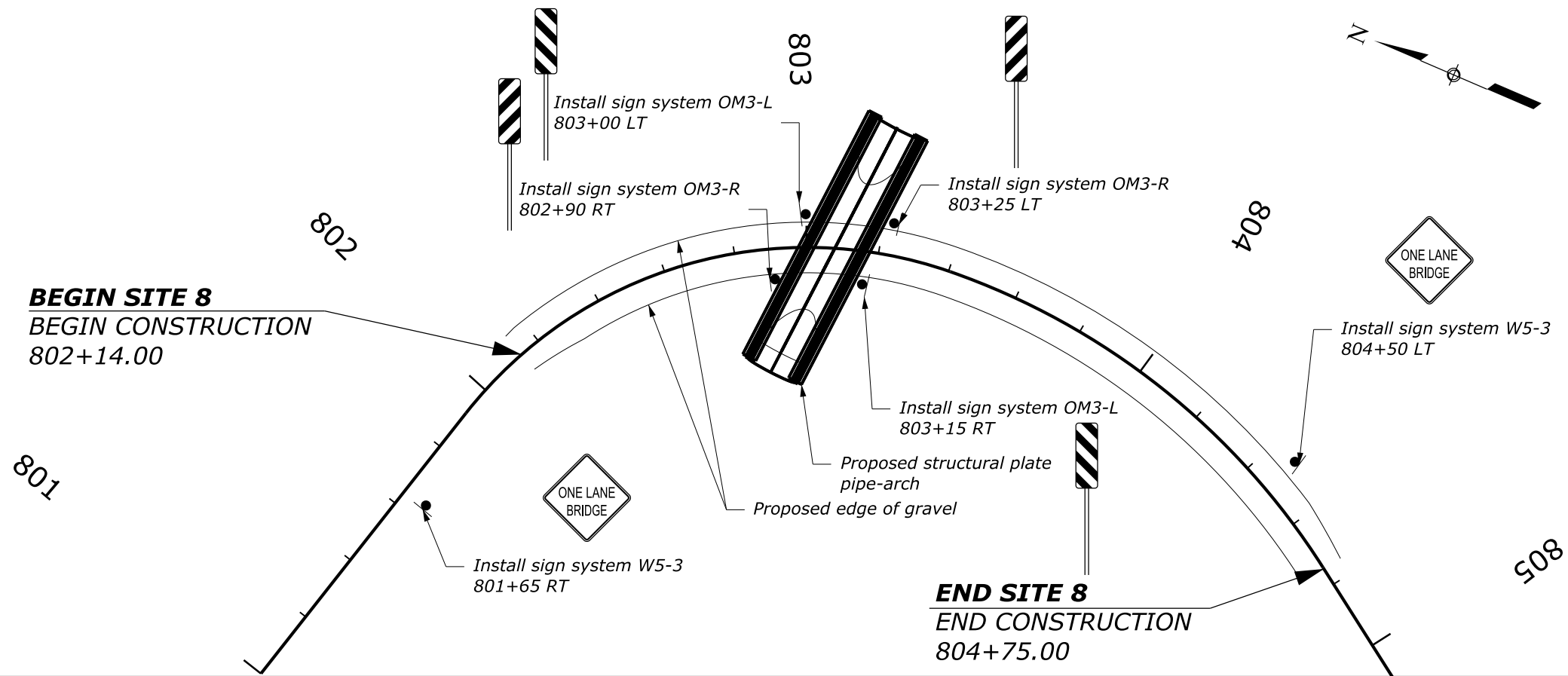
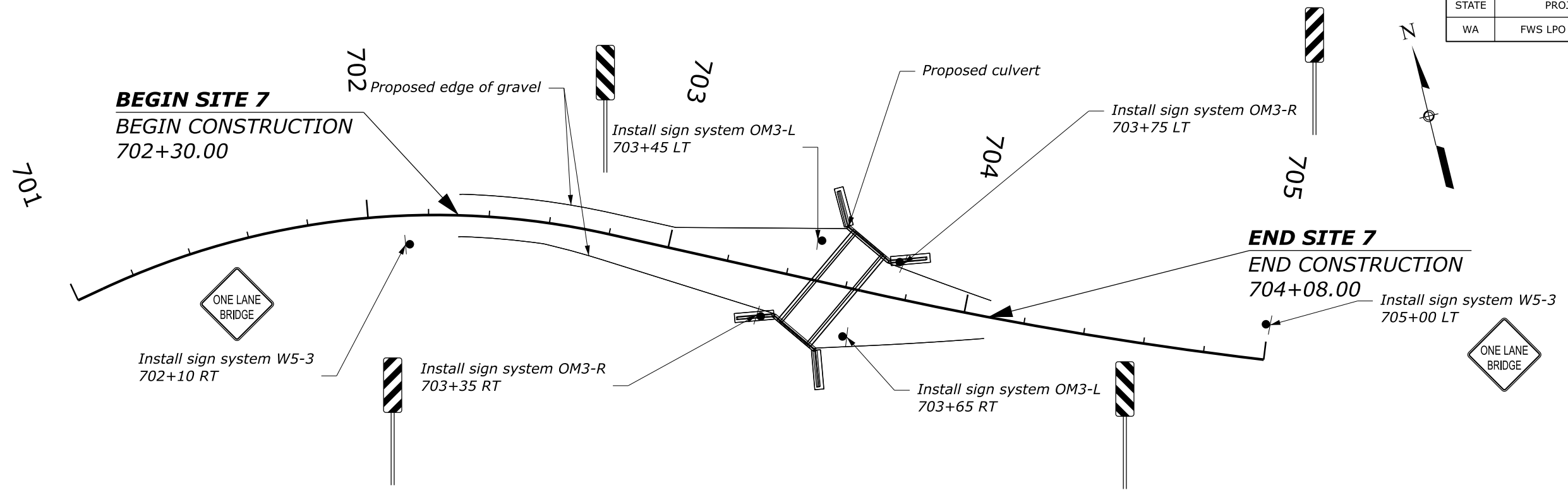


BEGIN SITE 4
BEGIN CONSTRUCTION
401+05.00

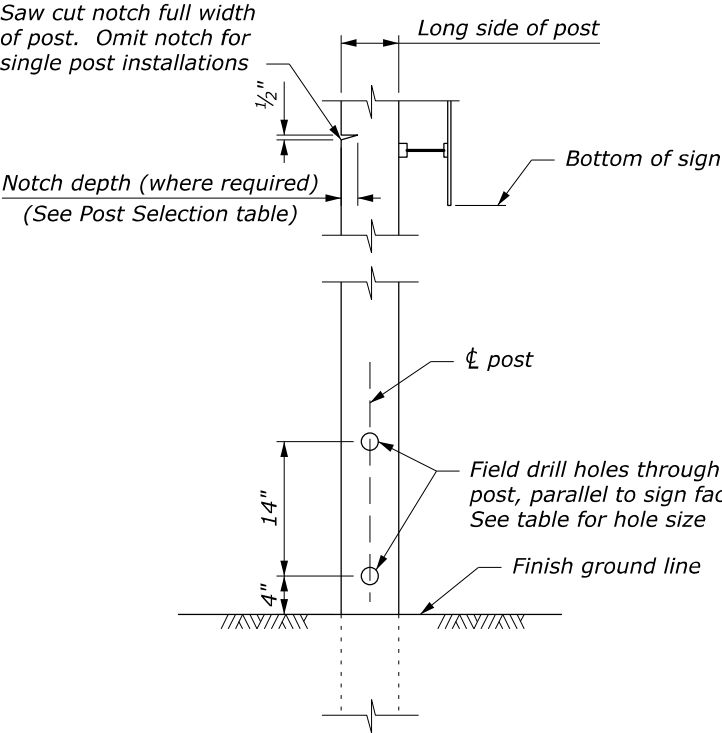


**PERMANENT TRAFFIC CONTROL
PLANS
SITES 3 & 4**

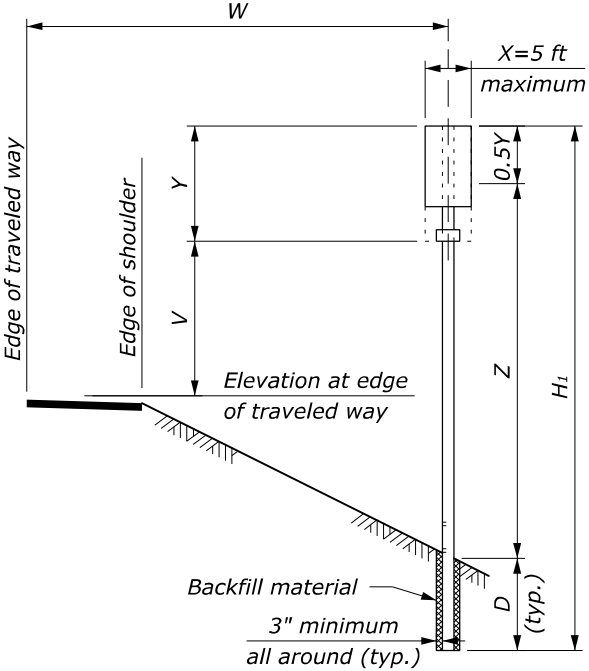
STATE	PROJECT	SHEET NUMBER
WA	FWS LPO MULTI(1)	H.4



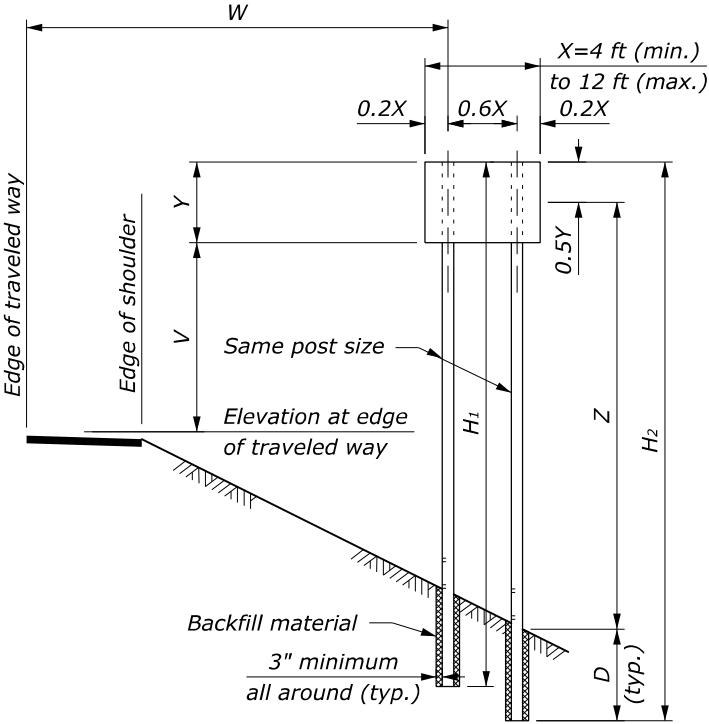
**PERMANENT TRAFFIC CONTROL
PLANS
SITES 7 & 8**



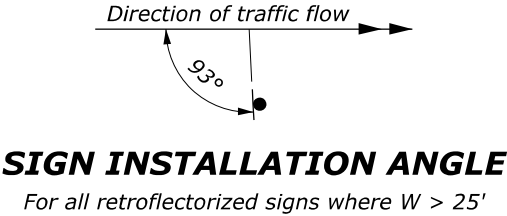
POST DETAIL



SINGLE POST SIGNS



TWO POST SIGNS

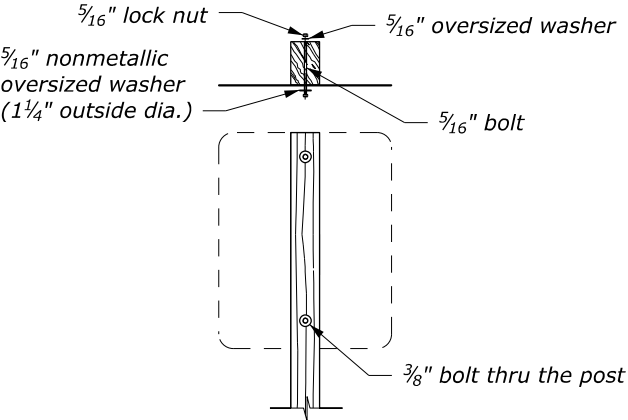


MINIMUM DISTANCE TO SIGN		
Location	Lateral Offset (W)	Mounting Height (V)
Rural Districts	6 ft	5 ft
Business or Residence Districts	2 ft from curb	7 ft

V may be reduced by 1 foot in rural districts for a secondary sign mounted below another sign.

NOTE:

- Traffic barrier protection is required for all posts larger than 6" x 8" when located within the clear zone or if the post is vulnerable to being struck when placed outside the clear zone.
- H₁ thru H₄ indicate overall post length. Select post lengths to fit field conditions.
- D is the minimum post embedment depth for average soil conditions. See Wood Post Selection Table below.
- Z is the height from ground line to mid-height of sign at the longest post.
- For the purpose of post selection X and Y are as follows:
 - Single sign, or back to back signs: X and Y are the overall dimensions of the signs.
 - Multiple sign installations: X and Y are the dimensions of a rectangle enclosing all the signs.

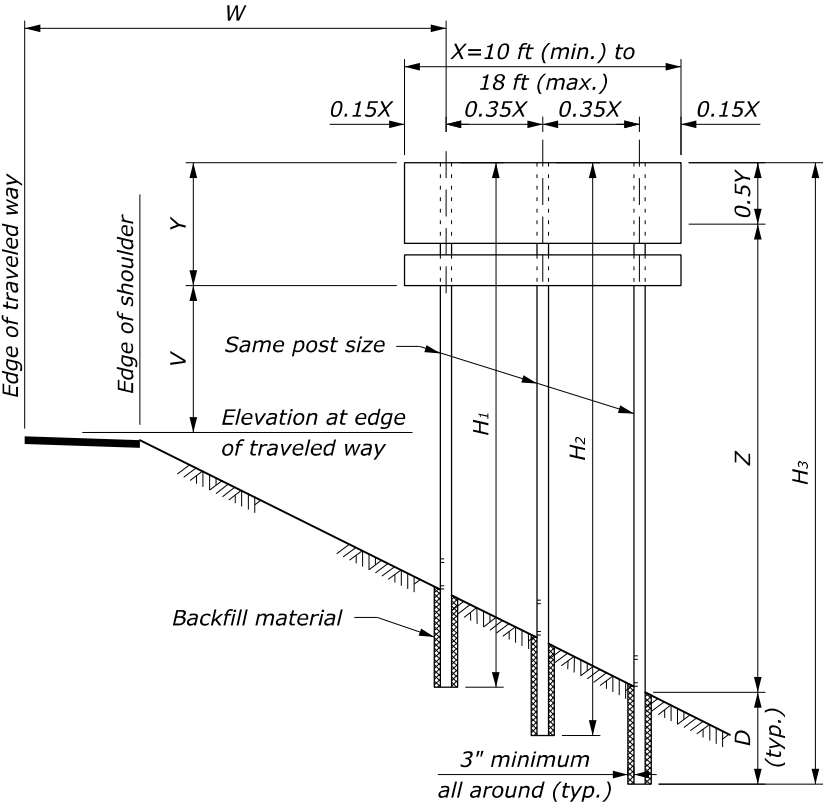


TYPICAL MOUNTING FOR SIGNS WITHOUT ANGLES

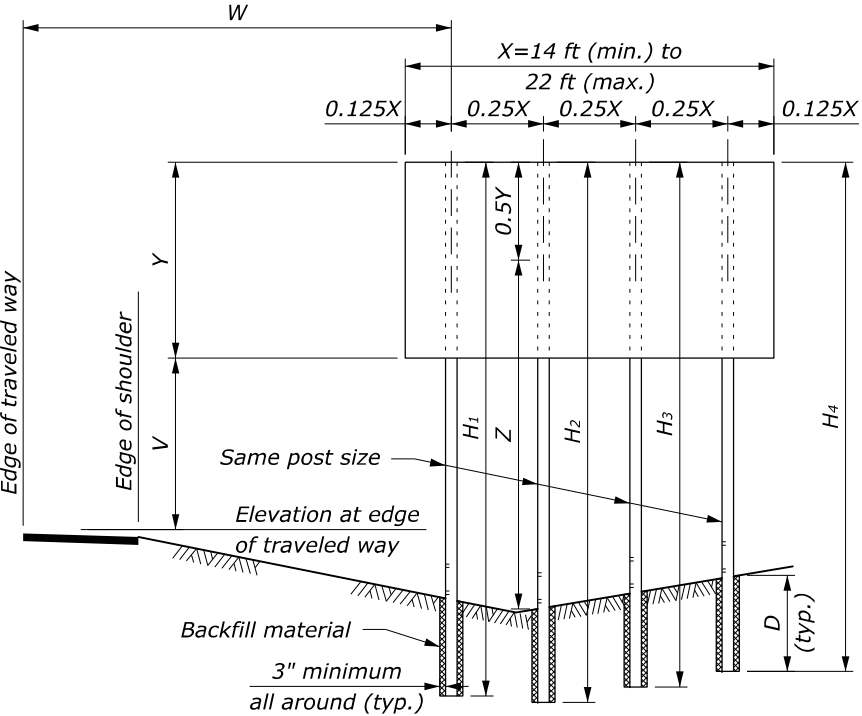
WOOD POST SELECTION TABLE						
POST SIZE (inch)	NUMBER OF POSTS				D	Notch depth and hole diameter
	1	2	3	4		
	Product of X-Y-Z in CUFT					
4 x 4	80	155	235	310	3'-0"	-
4 x 6	180	385	545	725	4'-0"	1¾"
6 x 6	235	475	710	950	4'-0"	1¾"
6 x 8	300	850	1280	1700	4'-0"	2½"
6 x 10	385	1180	1170	2360	5'-0"	-
8 x 10	575	1610	2410	3215	5'-0"	-
8 x 12	775	2310	3465	4620	6'-0"	-

Values shown are the maximum permitted. If the product of XYZ exceeds the limit for the largest post, use steel post installation.

NO SCALE



THREE POST SIGNS



FOUR POST SIGNS

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY DETAIL
**PERMANENT SIGN
INSTALLATION
WOOD POSTS**