

STRUCTURE GENERAL NOTES

- ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION DATED 2023.
- THIS BURIED STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020). THE STRUCTURE HAS BEEN DESIGNED FOR LESS THAN 1-INCH PER 100-FOOT OF SPAN OF DIFFERENTIAL SETTLEMENT, AND 2" TOTAL SETTLEMENT.
- THE SEISMIC DESIGN OF THIS BURIED STRUCTURE HAS BEEN COMPLETED IN ACCORDANCE WITH THE AASHTO TECHNICAL MANUAL FOR DESIGN AND CONSTRUCTION OF ROAD TUNNELS - CIVIL ELEMENTS USING PEAK GROUND ACCELERATION OF 0.50g, AND 0.2 SECOND AND 1.0 SECOND SPECTRAL ACCELERATION COEFFICIENTS OF 1.10g AND 0.60g, RESPECTIVELY, FOR SITE WITH $V_{530} = 967 \text{ ft/sec}$.
- THIS BURIED STRUCTURE HAS BEEN DESIGNED FOR SCOUR IN ACCORDANCE WITH THE HYDRAULIC REPORT DATED JUNE 2024.
- THIS BURIED STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE FINAL GEOTECHNICAL REPORT DATED JANUARY 2025.
- CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000. SHOTCRETE 28-DAY COMPRESSIVE STRENGTH SHALL BE 4,000 PSI. REINFORCING STEEL YIELD STRENGTH SHALL BE 60,000 PSI, UNLESS NOTED OTHERWISE. REINFORCING STEEL EMBEDDED IN SHOTCRETE FINAL LINER SHALL BE EPOXY COATED.
- STRUCTURAL STEEL
 - STEEL SHAPES: ASTM A572 OR A992, GRADE 50 $F_y = 50 \text{ KSI}$
 - STIFFENER PLATES AT TIEBACKS: ASTM A572, GRADE 50 $F_y = 50 \text{ KSI}$
 - OTHER STIFFENER PLATES: ASTM A36, $F_y = 36 \text{ KSI}$
 - OTHER PLATES; SUCH AS BEARING PLATES: ASTM A572, GRADE 50 $F_y = 50 \text{ KSI}$
 - STEEL ANGLES: ASTM A36, $F_y = 36 \text{ KSI}$
 - STEEL PIPE SECTIONS: ASTM A53 GRADE B $F_y = 35 \text{ KSI}$
STEEL PIPE STRUTS: ASTM A252 GRADE 2 $F_y = 35 \text{ KSI}$ OR ASTM A500 GRADE B $F_y = 42 \text{ KSI}$
 - ALL BOLTS, NUTS, AND WASHERS (UNLESS NOTED OTHERWISE) SHALL BE ASTM A307, AND SHALL CONFORM TO STD. SPEC. 9-16.3(4).
 - ALL RESIN BONDED ANCHORS SHALL BE ASTM A193 GRADE B7, OR ASTM A449.
 - ALL STEEL PLATES SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M 111 AFTER FABRICATION. BOLTS AND HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M 232, OR ASTM F2329 AS APPLICABLE.
- UNLESS OTHERWISE SHOWN IN THE PLANS, CONCRETE COVER, MEASURED FROM THE FACE OF CONCRETE TO THE FACE OF ANY REINFORCING STEEL, SHALL BE 2" AT ALL LOCATIONS AND 3" AT THE BOTTOM OF BURIED STRUCTURE OR WINGWALL FOOTINGS, AND WHERE CONCRETE IS PLACED AGAINST THE GROUND.

LOAD COMBINATIONS

THE FOLLOWING COMBINATIONS HAVE BEEN INVESTIGATED AT THE LIMIT STATES SHOWN, IN ACCORDANCE WITH BDM SECTION 8.3.3-B.

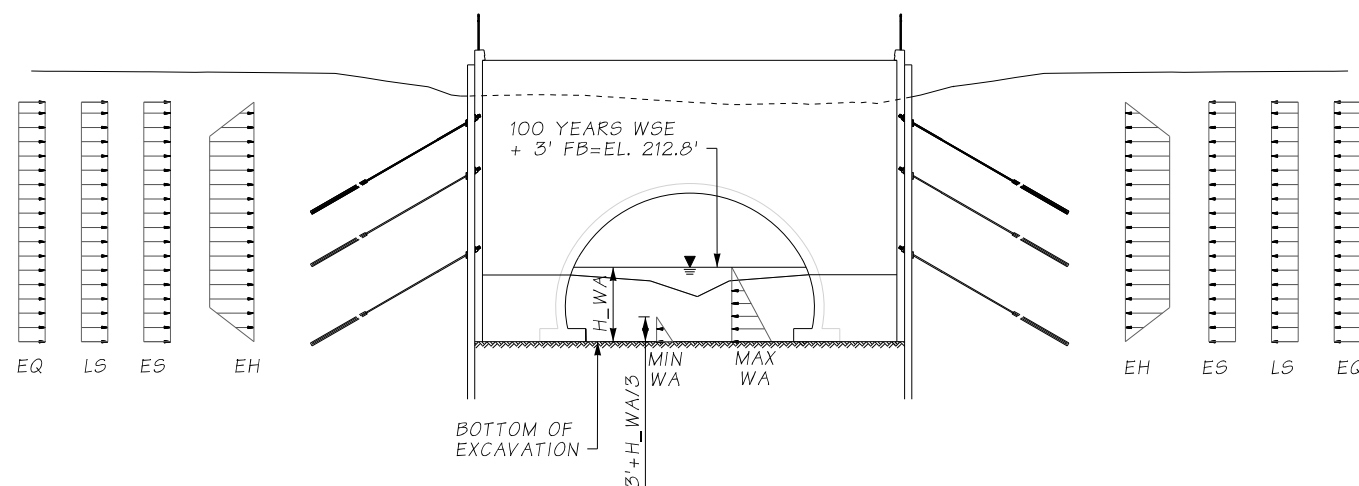
$$\begin{aligned} \text{STRENGTH I} &= \gamma \text{ DC} + \gamma \text{ DW} + \gamma \text{ EH} + \gamma \text{ EV} + \gamma \text{ ES} \\ &\quad + 1.75 \text{ LS} + 1.75 (\text{LL+IM}) + 1.00 \text{ WA} + 1.00 \text{ BY} \\ \text{SERVICE} &= 1.00 \text{ DC} + 1.00 \text{ DW} + 1.00 \text{ EH} + 1.00 \text{ EV} + 1.00 \text{ ES} + 1.00 \text{ LS} \\ &\quad + 1.00 (\text{LL+IM}) + 1.00 \text{ WA} + 1.00 \text{ BY} \\ \text{EXTREME I} &= 1.00 \text{ DC} + 1.00 \text{ DW} + 1.00 \text{ EH} + 1.00 \text{ EV} + 1.00 \text{ ES} + 1.00 \text{ LS} \\ &\quad + \gamma (\text{LL+IM}) + 1.00 \text{ WA} + 1.00 \text{ BY} + 1.00 \text{ EQ} \\ \text{EXTREME II} &= 1.00 \text{ DC} + 1.00 \text{ DW} + 1.00 \text{ EH} + 1.00 \text{ EV} + 1.00 \text{ ES} + 1.00 \text{ LS} \\ &\quad + 0.50 (\text{LL+IM}) + 1.00 \text{ WA} + 1.00 \text{ BY} + 1.00 \text{ IC} \end{aligned}$$

DC = DEAD LOAD OF STRUCTURAL COMPONENTS
 DW = DEAD LOAD OF WEARING SURFACE
 EH = HORIZONTAL EARTH PRESSURE
 ES = EARTH SURCHARGE
 EQ = EARTHQUAKE
 EV = VERTICAL EARTH PRESSURE
 LL + IM = LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE
 LS = LIVE LOAD SURCHARGE
 WA = HYDRO-STATIC PRESSURE
 BY = BUOYANCY
 IC = ICE LOAD

γ FOR DC = 1.25 MAX./0.90 MIN.
 γ FOR DW = 1.50 MAX./0.65 MIN.
 γ FOR EH & EV = 1.35 MAX./0.90 MIN.
 γ FOR ES = 1.50 MAX./0.75 MIN.
 γ = 1.20 FOR DEFORMATIONS, 0.50/1.00 FOR ALL OTHER EFFECTS
 γ = 0.50 FOR (LL+IM) IN EXTREME I

LOADING NOTES:

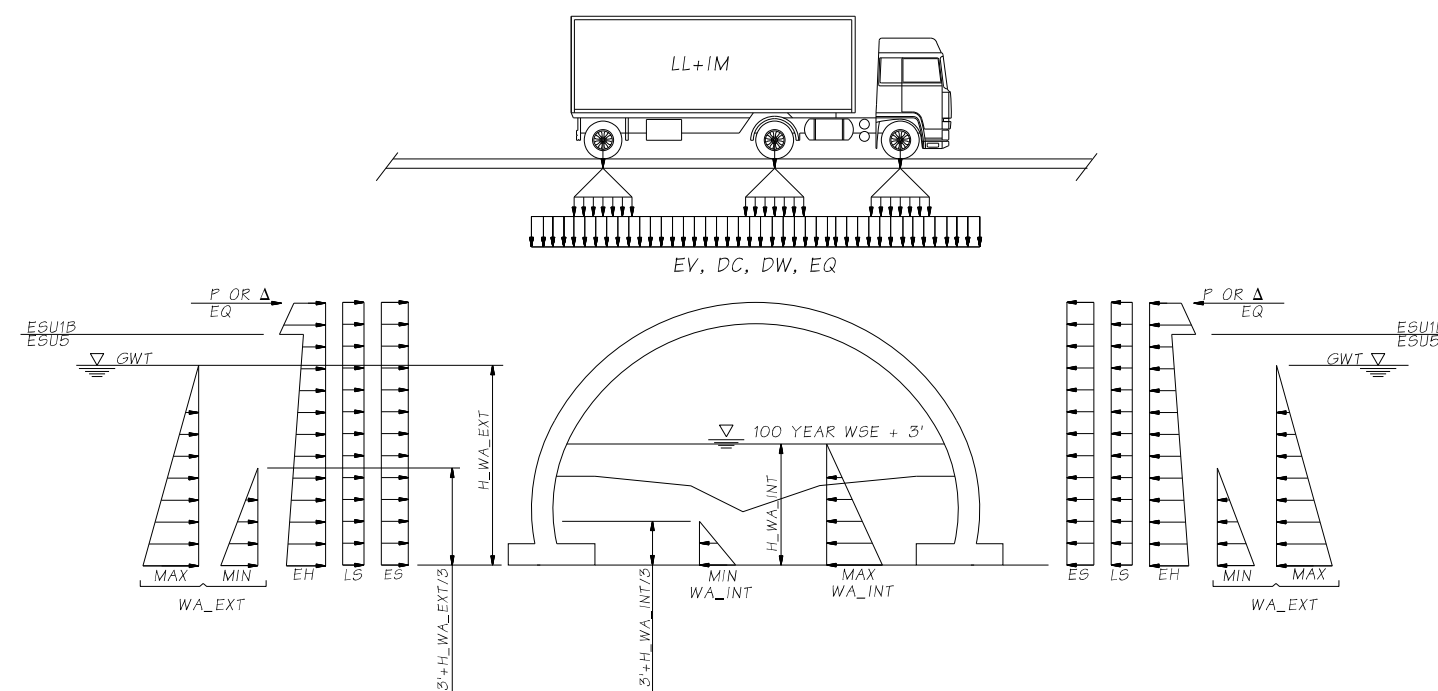
- K_0 WAS USED IN EH COMPUTATIONS FOR ALL LIMIT STATES, UNLESS OTHERWISE NOTED.
- EQ LOADING INCLUDES BOTH LATERAL RACKING DEFORMATION AND VERTICAL SEISMIC LOAD.
- EXTREME II LIMIT STATE LOAD COMBINATION RELATES TO SCOUR AND ICE DESIGN.
- LOADS AND LOAD FACTORS FOR CONSTRUCTION WERE IN ACCORDANCE WITH BDM SECTION 3.6.



WALL DESIGN LOADING DIAGRAM

NOT TO SCALE

LATERAL SUPPORT AND SOIL-STRUCTURE INTERACTION MODELED USING COMPRESSION-ONLY GROUND SPRINGS.



TUNNEL DESIGN LOADING DIAGRAM

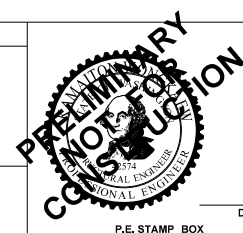
NOT TO SCALE

LATERAL SUPPORT AND SOIL-STRUCTURE INTERACTION MODELED USING COMPRESSION-ONLY GROUND SPRINGS.

RESERVED FOR
RFC
CERTIFICATION STAMP

SR FILE NO. SHEET

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DATE	24/2/2025					
PLOTTED BY	EscribanoRosilloN			JOB NUMBER		
DESIGNED BY	S SANCHEZ			22AB17		
ENTERED BY	IRIVERO	REV C - PRELIM DESIGN SUBMITTAL EAST PORTAL	2/24/25	MW		
CHECKED BY	M WONGKAEW	REV B - DESIGN PACKAGE #8	11/6/24	MW		
PROJ. ENGR.	J SLAVICEK	REV A - DESIGN PACKAGE #8	7/3/24	MW		
REGIONAL ADM.	L HODGSON	REVISION	DATE	BY	9727	XL5446



AECOM



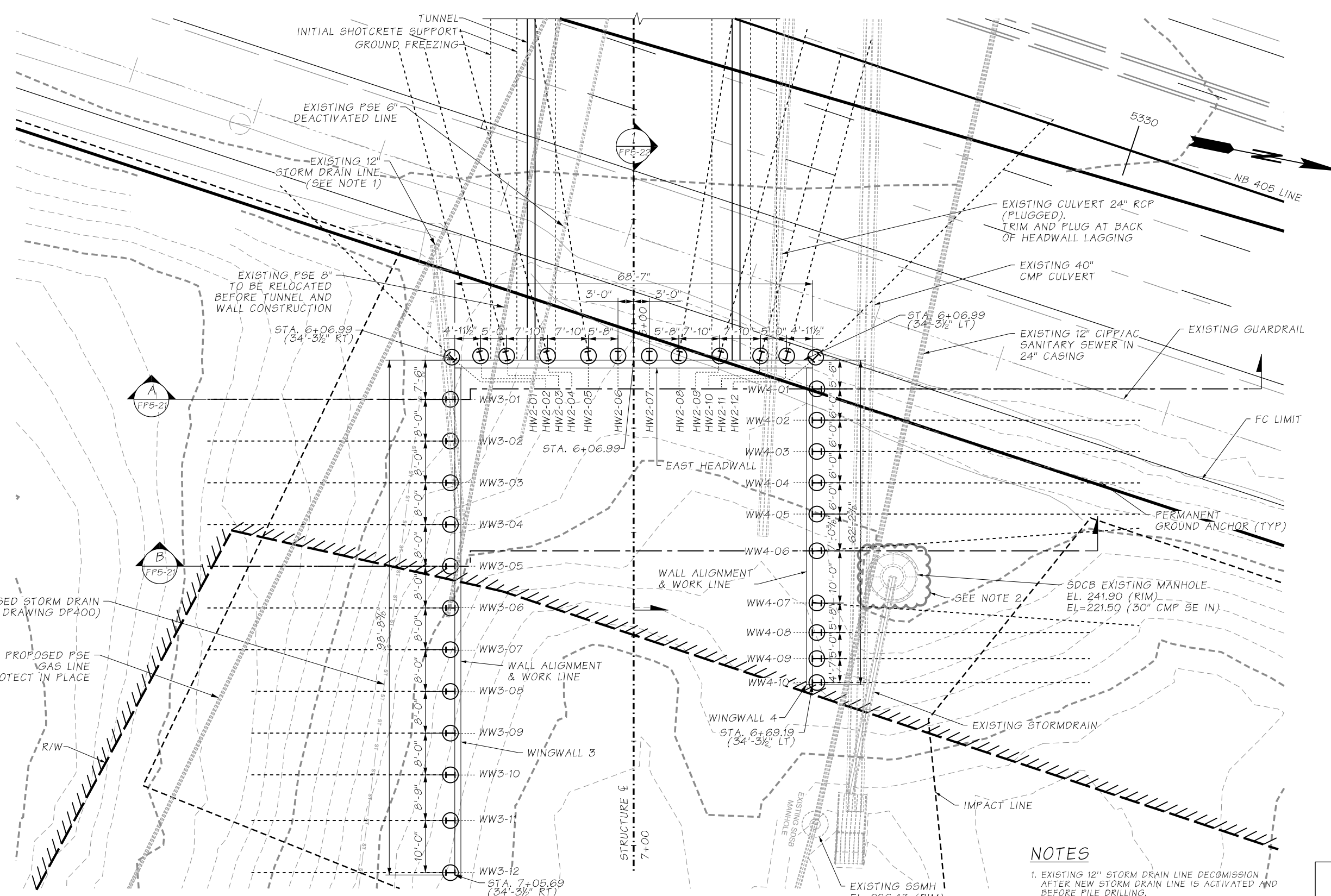
I-405
BRICKYARD TO SR527
IMPROVEMENT PROJECT

JUANITA CREEK
FISH PASSAGE STRUCTURE
GENERAL NOTES

PLAN REF NO
FP5-02
SHEET
XX
OF
SHEETS

C.S. 1757 ~ PROJ. NO. 9727 ~ NORTHWEST REGION ~ I-405 MP 21.94 ~ JUANITA CREEK AT I-405 FISH PASSAGE

C.S. 1757 ~ PROJ. NO. 9727 ~ NORTHWEST REGION ~ I-405 MP 21.94 ~ JUANITA CREEK AT I-405 FISH PASSAGE



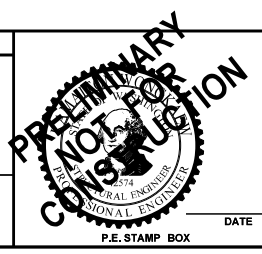
EAST PORTAL LAYOUT
SCALE 1"=20'

- NOTES**
- EXISTING 12" STORM DRAIN LINE DECOMMISSION AFTER NEW STORM DRAIN LINE IS ACTIVATED AND BEFORE PILE DRILLING.
 - UNDERGROUND SIZE AND PIPE CONNECTION FROM AND TO THIS MANHOLE ARE NOT CONFIRMED. THE CONTRACTOR SHALL BE MINDFUL OF POTENTIAL CLASHES WITH UNFORESEEN MANHOLE AND/OR DUCTS DURING ANCHORS INSTALLATION.

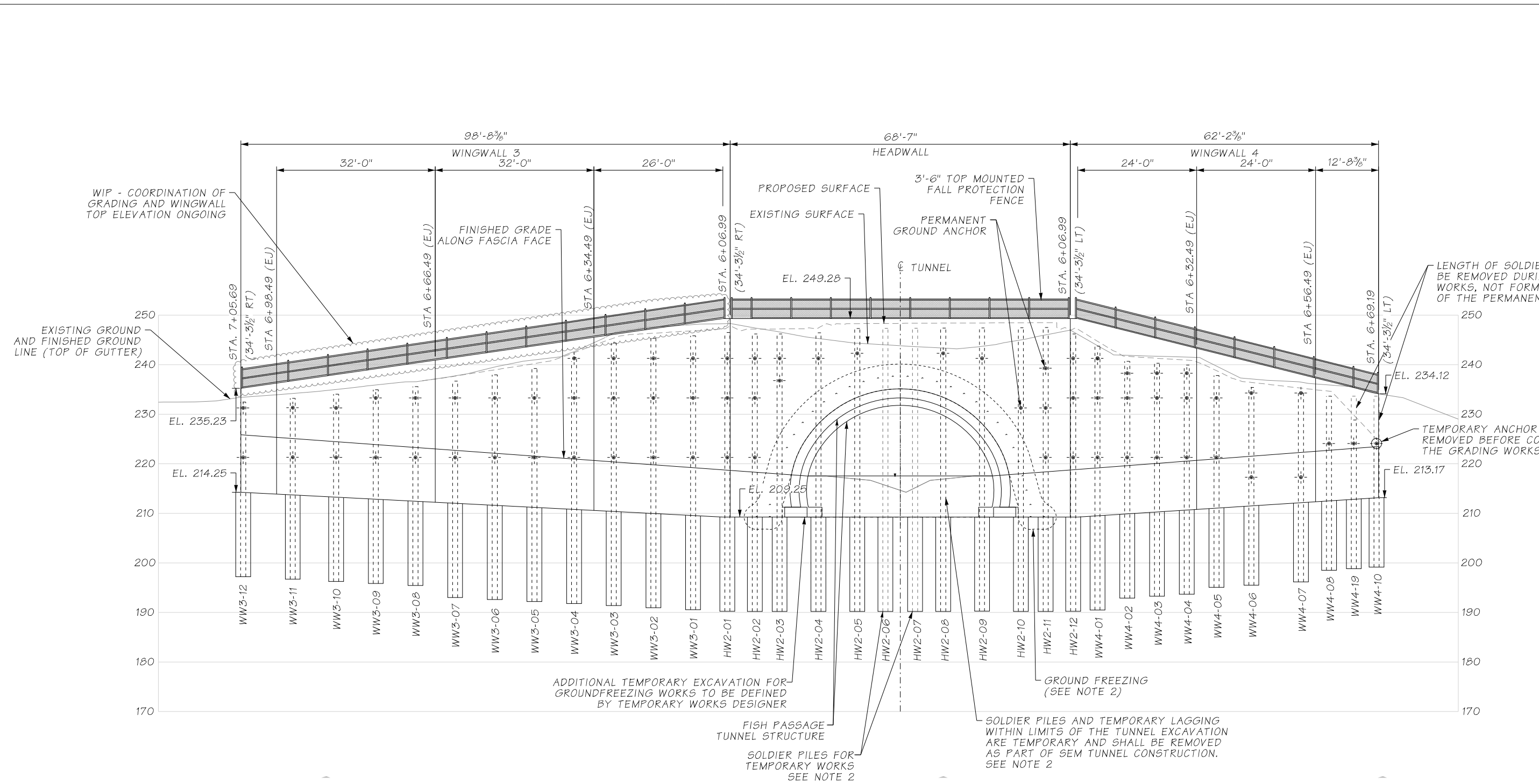
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SR FILE NO. SHEET

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DATE	21/2/2025		
PLOTTED BY	EscribanoRosilloN		
DESIGNED BY	I RIVERO		
ENTERED BY	S SANCHEZ		
CHECKED BY	M WONGKAEW		
PROJ. ENGR.	J SLAVICEK	REV A - PRELIM DESIGN SUBMITTAL	2/24/25 MW
REGIONAL ADM.	L HODGSON	REVISION	DATE BY
REGION NO.	10	STATE	WASH
FED.AID PROJ.NO.			
JOB NUMBER	22AB17		
CONTRACT NO.	9727		
LOCATION NO.	XL5446		



I-405 BRICKYARD TO SR527 IMPROVEMENT PROJECT	PLAN REF NO FP5-17
JUANITA CREEK FISH PASSAGE STRUCTURE EAST PORTAL WALL LAYOUT	SHEET XX OF SHEETS



ELEVATION - EAST PORTAL
SCALE 1"=100'

NOTES

- UNLESS OTHERWISE NOTED, THE SOLDIER PILES, TIEBACKS, WALER BEAMS AND REINFORCED CONCRETE FASCIA WALL SHOWN ON THIS SHEET REPRESENT THE PERMANENT (FINAL) CONDITION.
- REFER TO PLANS PREPARED BY BRIERLEY ASSOCIATES FOR THE SEM TUNNEL AND ADDITIONAL REQUIREMENTS FOR THE PORTAL WALL IN THE TEMPORARY CONDITIONS.
- FASCIA SHALL HAVE ARCHITECTURAL FINISH TYPE 1, NOT VISIBLE AESTHETICS. NO WALL CAP NOR ASHLAR FINISH REQUIRED. THE TUNNEL FINAL LINER SHALL EXTEND OUT TO THE EXTERIOR FACE OF THE HEADWALL AND DOES NOT REQUIRE FORMLINER FINISH.

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RFC
CERTIFICATION STAMP**

SR FILE NO. SHEET

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TIME	10:11:58			10	WASH						FP5-18
DATE	21/2/2025			JOB NUMBER							
PLOTTED BY	EscribanoRosilloN			CONTRACT NO.		LOCATION NO.			JUANITA CREEK FISH PASSAGE STRUCTURE EAST PORTAL WALL ELEVATION VIEW	SHEET	
DESIGNED BY	I RIVERO									XX	
ENTERED BY	S SANCHEZ									OF	
CHECKED BY	M WONGKAEW									SHEETS	
PROJ. ENGR.	J SLAVICEK	REV A - PRELIM DESIGN SUBMITTAL	2/24/25	MW	9727	XL5446					
REGIONAL ADM.	IL HODGSON	REVISION	DATE	BY							

C.S. 1757 ~ PROJ. NO. 9727 ~ NORTHWEST REGION ~ I-405 MP 21.94 ~ JUANITA CREEK AT I-405 FISH PASSAGE

EAST PORTAL SOLDIER PILE SCHEDULE

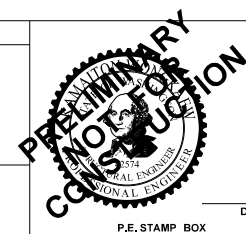
PILE NO.	STA.	OFFSET (FT)	DRILL HOLE SIZE (m)	P.G.A ARANGEMENT TYPE	SOLDIER PILE SECTION	TOP ELEVATION (FT)	(H)	(D)
HW2-01	6+06.99	34'-10½" Rt.	1.0	A	W21X101	246.50	37'-3"	19'-0"
HW2-02	6+06.99	29'-4" Rt.	1.0	HW-A	W21X101	246.19	36'-11"	19'-0"
HW2-03	6+06.99	24'-4" Rt.	1.0	HW-B	W21X101	246.21	36'-11"	19'-0"
HW2-04	6+06.99	16'-6" Rt.	1.0	HW-C	W21X101	246.43	37'-2"	19'-0"
HW2-05	6+06.99	8'-8" Rt.	1.0	HW-D	W21X101	247.28	38'-0"	19'-0"
HW2-06	6+06.99	3'-0" Rt.	1.0	-	W21X101	247.32	38'-1"	19'-0"
HW2-07	6+06.99	3'-0" Lt.	1.0	-	W21X101	247.36	38'-1"	19'-0"
HW2-08	6+06.99	8'-8" Lt.	1.0	HW-E	W21X101	247.39	38'-2"	19'-0"
HW2-09	6+06.99	16'-6" Lt.	1.0	HW-F	W21X101	247.40	38'-2"	19'-0"
HW2-10	6+06.99	24'-4" Lt.	1.0	HW-G	W21X101	247.45	38'-2"	19'-0"
HW2-11	6+06.99	29'-4" Lt.	1.0	HW-H	W21X101	247.49	38'-3"	19'-0"
HW2-12	6+06.99	34'-10½" Lt.	1.0	D	W21X101	246.20	36'-11"	19'-0"
WW3-01	6+14.49	35'-1⅜" Rt.	1.0	A	W21X101	245.83	36'-3"	19'-0"
WW3-02	6+22.49	35'-1⅜" Rt.	1.0	A	W21X101	245.33	35'-4"	19'-0"
WW3-03	6+30.49	35'-1⅜" Rt.	1.0	A	W21X101	244.37	34'-0"	19'-0"
WW3-04	6+38.49	35'-1⅜" Rt.	1.0	B	W21X101	241.41	30'-7"	19'-0"
WW3-05	6+46.49	35'-1⅜" Rt.	1.0	B	W21X101	239.21	28'-0"	19'-0"
WW3-06	6+54.49	35'-1⅜" Rt.	1.0	B	W21X101	237.95	26'-4"	19'-0"
WW3-07	6+62.49	35'-1⅜" Rt.	1.0	B	W21X101	236.68	24'-8"	19'-0"
WW3-08	6+70.49	35'-1⅜" Rt.	1.0	B	W21X101	235.58	23'-2"	17'-0"
WW3-09	6+78.49	35'-1⅜" Rt.	1.0	B	W21X101	234.93	22'-1"	17'-0"
WW3-10	6+86.49	35'-1⅜" Rt.	1.0	C	W21X101	234.04	20'-9"	17'-0"
WW3-11	6+95.24	35'-1⅜" Rt.	1.0	C	W21X101	233.20	19'-6"	17'-0"
WW3-12	7+05.24	35'-1⅜" Rt.	1.0	C	W21X101	232.45	18'-3"	17'-0"
WW4-01	6+12.49	35'-1⅜" Lt.	1.0	D	W21X101	243.73	34'-3"	19'-0"
WW4-02	6+18.49	35'-1⅜" Lt.	1.0	E	W21X101	240.68	30'-9"	17'-0"
WW4-03	6+24.49	35'-1⅜" Lt.	1.0	E	W21X101	240.29	30'-0"	17'-0"
WW4-04	6+30.49	35'-1⅜" Lt.	1.0	E	W21X101	239.92	29'-3"	17'-0"
WW4-05	6+36.49	35'-1⅜" Lt.	1.0	F	W21X101	237.79	26'-9"	16'-0"
WW4-06	6+43.53	35'-1⅜" Lt.	1.0	G	W21X101	235.41	23'-11"	16'-0"
WW4-07	6+53.53	35'-1⅜" Lt.	1.0	G	W21X101	234.28	22'-1"	16'-0"
WW4-08	6+59.19	35'-1⅜" Lt.	1.0	H	W24X104	233.65	21'-2"	14'-0"
WW4-09	6+64.19	35'-1⅜" Lt.	1.0	H	W24X104	228.83 *	16'-0"	14'-0"
WW4-10	6+68.77	35'-1⅜" Lt.	1.0	H	W24X104	224 *	10'-10"	14'-0"

* TOP ELEVATION FOR SOLDIER PILES IN THE PERMANENT WORKS. IN THE TEMPORARY WORKS CONDITION THE PILE TOP MAY BE AT A HIGHER ELEVATION (REFER TO DRAWING FP5-1B)

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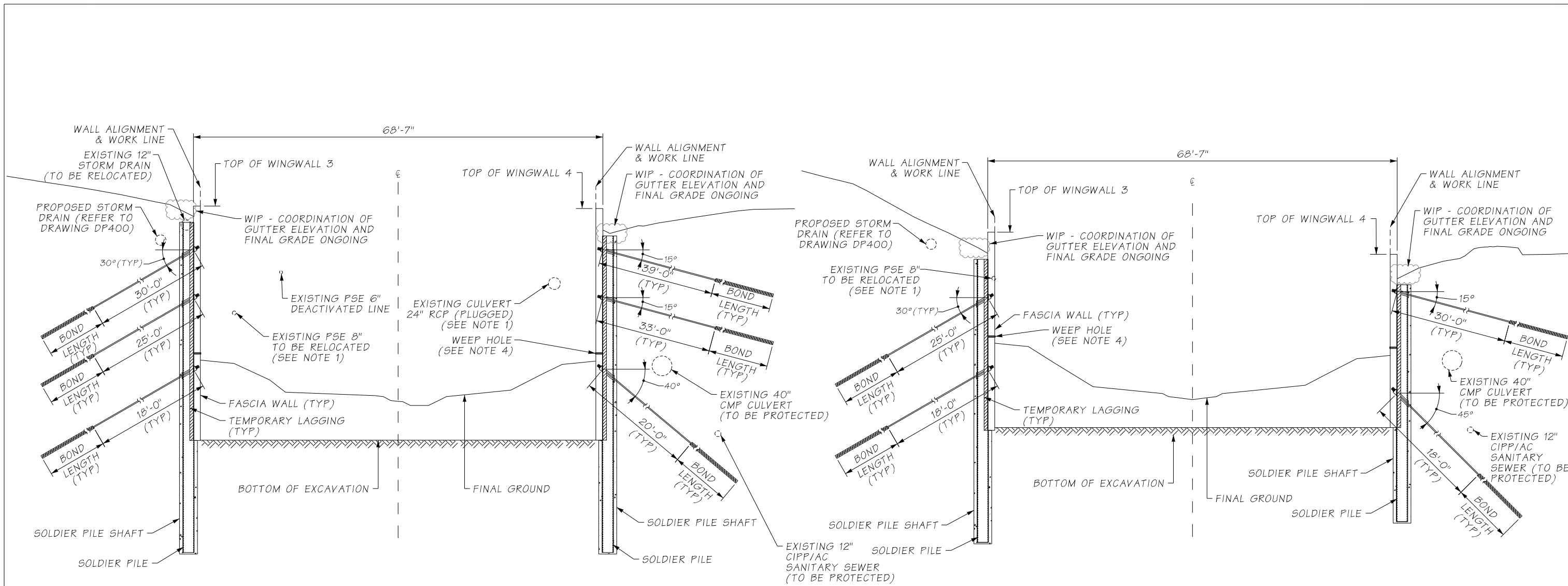
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DATE	3/17/2025			JOB NUMBER		
PLOTTED BY	WongkaewM			22AB17		
DESIGNED BY	I RIVERO			CONTRACT NO.		LOCATION NO.
ENTERED BY	S SANCHEZ					
CHECKED BY	M WONGKAEW					
PROJ. ENGR.	J SLAVICEK	REV A - PRELIM DESIGN SUBMITTAL	2/24/25	MW	9727	XL5446
REGIONAL ADM.	L HODGSON	REVISION	DATE	BY		



I-405 BRICKYARD TO SR527 IMPROVEMENT PROJECT	PLAN REF NO FP5-19
JUANITA CREEK FISH PASSAGE STRUCTURE EAST PORTAL WALL. PILE SCHEDULE	SHEET XX OF SHEETS

C.S. 1757 ~ PROJ. NO. 9727 ~ NORTHWEST REGION ~ I-405 MP 21.94 ~ JUANITA CREEK AT I-405 FISH PASSAGE



SECTION A
SCALE 1"=100'
FP5-17

SECTION B
SCALE 1"=100'
FP5-17

TIEBACK ANCHORS SCHEDULE					
TYPE	NUMBER OF ROWS	ROW ELEVATION	INCLINATION (°)	UNBONDED LENGTH (ft)	FACTORED DESIGN LOAD (kipf)
A [WINGWALL 3]	3	241.28/233.28/221.28	30/30/30	30/25/18	90/128/138
B [WINGWALL 3]	2	233.28/221.28	30/30	25/18	153/152
C [WINGWALL 3]	2	231.28/221.28	30/30	25/18	77/107
D [WINGWALL 4]	3	241.28/233.28/221.28	15/15/40	39/33/20	83/116/176
E [WINGWALL 4]	3	238.28/233.28/221.28	15/15/40	35/30/19	80/113/168
F [WINGWALL 4]	2	233.28/221.28	15/45	30/18	114/158
G [WINGWALL 4]	2	234.28/217.28	15/45	30/15	114/143
H [WINGWALL 4]	1	224.10	25	17	92

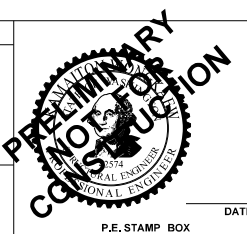
NOTES

- EXISTING UTILITIES THAT ARE ABANDONED IN PLACE AND SHALL BE DECOMMISSIONED. THOSE THAT INTERSECT WITH THE WALL SHALL BE REMOVED TO THE BACK OF THE LAGGING AND PLUGGED.
- LOCK-OFF LOAD SHALL BE 60% OF THE FACTORED DESIGN LOAD.
- CONTRACTOR SHALL DETERMINE THE ANCHOR DIAMETER AND BOND LENGTH, NOT LESS THAN 15 FEET, PER WSDOT SPECIFICATION 6-17.3.
- WEEP HOLES TO FOLLOW WSDOT DETAILS. TO BE LOCATED CENTERED BETWEEN PILES, AT 1FT ELEVATION FROM THE STREAM FINAL GRADE.

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SR FILE NO. SHEET

FILE NAME	c:\pwworking\uswaldms06730\c9727_DE_FP5_21.dgn		
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DESIGNED BY	I RIVERO		
ENTERED BY	S SANCHEZ		
CHECKED BY	M WONGKAEW		
PROJ. ENGR.	J SLAVICEK	REV A - PRELIM DESIGN SUBMITTAL	2/24/25 MW
REGIONAL ADM.	IL HODGSON	REVISION	DATE BY
REGION NO.	10	STATE	WASH
FED.AID PROJ.NO.			
JOB NUMBER	22AB17		
CONTRACT NO.	9727	LOCATION NO.	XL5446



I-405
BRICKYARD TO SR527
IMPROVEMENT PROJECT

JUANITA CREEK
FISH PASSAGE STRUCTURE
EAST PORTAL WALL. TYPICAL SECTIONS

PLAN REF NO
FP5-21

SHEET XX OF SHEETS

C.S. 1757 ~ PROJ. NO. 9727 ~ NORTHWEST REGION ~ I-405 MP 21.94 ~ JUANITA CREEK AT I-405 FISH PASSAGE

