GENERAL NOTES:

- 1. All materials and workmanship shall be in accordance with the requirements of the current edition of the Standard Specifications.
- 2. These Precast Reinforced Concrete Retaining Walls (Walls) have been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 9th Edition 2020 and the WSDOT Bridge Design Manual, 2023. The seismic design for the Walls has been completed using Site Adjusted Peak Ground Acceleration (As) values as shown in the Table.
- The Contractor shall be responsible for safely lifting, shipping, installing, and 3. backfilling the precast Walls.
- Precast Wall segment lengths shall be a minimum of 4 feet. 4.
- The native subgrade material shall be granular soil with a minimum internal angle 5 of friction as specified in the Design Table. Bedding material shall be in accordance with Standard Specifications 6-20.3(6)A.
- Retained soil may be comprised of in-situ soil or backfill. The retained soil within 6. the Zone of Influence shall be granular soil with a minimum Internal Angle of Friction of 34 degrees and a total unit weight within the range of 125 to 145 PCF. For backfill and drainage requirements, see Standard Plan D-4 and Contract Documents.
- 7. Precast concrete shall be Class 7000. Cast-in-place concrete shall be Class 4000.
- 8. Reinforcing steel shall conform to Standard Specification Section 9-07.2. AASHTO M31 GR 60 (ASTM A615) when used shall not be welded. Headed steel reinforcing bars shall conform to Standard Specifications Section 9-07.2(1). The Contractor may substitute deformed welded wire reinforcement (WWR) conforming to Standard Specifications Section 9-07.7 provided any equivalent bar area reduction is limited to 15% of the original area and spacing is no greater than 2/3 of the dimension provided in the Design Table. The specified minimum yield strength of the WWR shall be limited to a maximum of 75 ksi. Alternative proposed substitutions shall be submitted in accordance with Standard Specifications Section 6-20.3(1)A2.
- 9. Unless otherwise noted, concrete cover to reinforcing shall be 2 inches.
- 10. All steel plates and shapes shall be ASTM A36 or ASTM A572 GR 50. All steel plates and shapes shall be galvanized in accordance with AASHTO M111 after fabrication, unless noted otherwise. Galvanizing shall be removed at any field welded zones. All galvanizing repairs shall be in accordance with ASTM A780. Galvanizing Repair Paint shall conform to Standard Specifications Section 9-08.1(2)B.
- 11. All joints on the backfill side of the wall stem and top of footing shall be sealed with a 12-inch wide external sealing band centered about the joint and adhesively bonded to the concrete surface.
- 12. Alternative joint types between precast units, other than those detailed herein, shall not be used unless submitted for acceptance by the Engineer in a Type 2 Working Drawing.
- 13. Worker fall protection shall be provided at top of Wall in accordance with Standard Specification 6-20.3(1)F.
- 14. These plans may be used in combination with the following Standard Plans, unless otherwise specified in the contract:
 - a. L-5.10 Bridge Railing Type Chain Link Pipe Rail (worker fall protection)
 - **L-5.15 Cable Fence** (worker fall protection)
- 15. Provide surface treatment in accordance with the Contract Documents. Alternate surface treatment shall be accepted by the State Bridge and Structures Architect.





TYPICAL SECTION

- #5 CONT. WITH 2'-0" LAP SPLICES



KEY NOTES

1 bars F spaced at 6" in case of top mounted worker fall protection fence



Oct 6, 2023

PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-00

SHEET 2 OF 6 SHEETS

APPROVED FOR PUBLICATION

Mort a Daines

Oct 9, 2023

STATE DESIGN ENGINEER 7 Washington State Department of Transportation

WALL TYPE		BACK	As (g)	Kae	ф (DEG)	design Height H	DIMENSIONS						STEM REINFORCING				FOOTING REINFORCING				MIN. REQUIRED FACTORED BEARING				
							STEM FTG.		FTG. FTG.	FTG.	FTG. KEY	FTG. KEY	BAR A		BAR B		BAR C BA			RD	RI	RESISTANCE (PSF)		MATERIAL QUANTITY	
		SLOPE					THICK. T	WIDTH B	DEPTH D	TOE C	HEIGHT HK	WIDTH BK	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SERVICE	STRENGTH	EXTREME EVENT I	CONC. (CY/FT)	STEEL (LBS/FT)
TYPE 1		FLAT	0.32	0.36	30	5'-0"	10"	3'-0"	10"	1'-0''			#4	12"	#4	12"	#4	12"	#4	12"	970	1522	1018	0.221	24.4
					30	7'-0"	10"	3'-9"	10"	1'-0''	- N/A	N/A	#4	11"	#4	12"	#4	12"	#4	12"	1351	1991	1531	0.306	31.2
					30	9'-0"	10"	4'-6"	10"	1'-6"			#5	9"	#4	12"	#4	12"	#4	10"	1554	2335	1872	0.391	43.3
					30	11'-0"	10"	5'-6"	10"	1'-6"	_		#5	6"	#4	10"	#4	12"	#5	8"	1895	2771	2322	0.484	63.5
					30	13'-0"	10"	6'-6"	10"	1'-6"			#5	4"	#4	9"	#4	11"	#5	6"	2256	3273	2802	0.576	91.6
					30	15'-0"	1'-0"	7'-6"	1'-0''	1'-9"			#7	7"	#4	8"	#4	11"	#6	7"	2502	3604	3150	0.796	115.3
TYPE 2		FLAT	0.64	0.53	30	5'-0"	10"	3'-0"	10"	1'-0"	- N/A	N/A	#4	12"	#4	12"	#4	12"	#4	12"	970	1522	1537	0.221	24.4
					30	7'-0"	10"	3'-9"	10"	1'-3"			#4	10"	#4	12"	#4	12"	#4	12"	1258	1907	2341	0.306	31.7
					30	9'-0"	10"	4'-9"	10"	1'-6"			#5	9"	#4	12"	#4	12"	#5	12"	1495	2187	2890	0.399	46.0
					30	11'-0"	10"	6'-0"	10"	1'-6"			#5	5"	#4	10"	#4	12"	#6	10"	1802	2598	3485	0.499	72.1
					30	13'-0"	1'-0"	7'-3"	1'-0"	2'-0"			#7	8"	#4	9"	#5	12"	#6	8"	1928	2753	3552	0.713	98.7
					30	15'-0"	1'-2"	8'-6"	1'-0"	2'-0"		NIZA	#7	6"	#4	8"	#5	10"	#7	7"	2255	3194	4226	0.920	141.2
TYPE 3			0.32	1.11	30	5'-0"	10"	3'-0"	10"	1'-0"	N/A	N/A	#4	12"	#4	12"	#4	12"	#4	12"	934	1414	1512	0.221	24.4
	A				30	7'-0"	10"	4'-0"	10"	1'-0"	1'-6"	1'-0"	#5	10"	#4	12"	#4	12"	#4	10"	1454	2129	3098	0.314	36.0
		VADICO			30	9'-0"	10"	5'-9"	10"	1'-6"	2'-0"	1'-0"	#5	7"	#4	12"	#4	12"	#5	/" 	1658	2379	3314	0.430	56.9
	V	VARIES			30	11'-0"	1'-0"	7'-6"	1'-0"	1'-6"	3'-0"	1'-6"	#6	7"	#4	12"	#4	12"	#/	/" 0"	2128	3019	4196	0.648	90.7
	-	3			34	11'-0"	1'-0"	6'-6"	1'-0"	1'-6"	2'-6"	1'-3"	#6	/"	#4	12"	#4	10"	#6	6"	2225	3214	5658	0.611	82.9
	В				34	13'-0"	1-2"	7'-6"	1'-0"	2'-6"	3'-0"	1'-6"	#/	5"	#4	10"	#6	10"	#6	5"	2227	3220	5965	0.796	140.2
	0				34	15-0"	1-5"	9-3"	1-2"	2-6"	3'-0"	1'-6"	#8	4"	#4	9"	#6	6"	#8	5"	2648	3/84	6625	1.126	251.2
	C			0.00	38	15'-0"	1'-5"	8'-6"	1-2"	2-9	3-0"	1'-6"	#8	4"	#4	9"	#1	6"	#/	5"	2599	3/61	/836	1.093	239.4
TYPE 4	A	-		2.00	30	5'-0"	10"	3'-0"	10"	1-0"	1-6"	1-0"	#4	12"	#4	12	#4	12"	#4	12"	942	1368	2465	0.221	24.4
	B			2.00	34	7'-0"	10	5-0	10"	1-0"	2-0"	1-0"	#5	10" E"	#4	12	#4	12	C#	8" 0"	1345	1912	4072	0.345	42.4
	~	VARIES		2.00	34	9-0	1-0	7.0"	1-0	2-0	3-0	1-0	#5	5	#4	12	#5	10	#0	9	1417	2006	4000	0.520	69.0
			0.47	1.56	34	11-0"	1-2	7-0"	1'-0"	2-6"	3-0"	1-6	#5	5"	#4	12	#5	10"	#0	9"	1396	1979	4927	0.556	69.8
	D			1.23 2.00 2.00 1.70 1.48 3.51 2.80 1.90 1.50 4 1.20 3.51 2.70	34	13-0	1-3	0-0	1-4	2-9	3-0	1-0	#0	/ 5"	#4	10	#0	10	#0	0"	1090	1979	4927	0.720	01.3
	E				20	9-0	1-0	0-3	1-0	2-0	2-0	1-0	#0	5	#4	12	#0	10	#0	9	2054	2301	6054	0.725	125.0
	=	F G A B C C D E F G G			20	12'0"	1-5	7-0 9' 6"	1-2	2-0	3-0	1.6"	#1	5"	#4	12	#0	12	#7	7"	1003	2901	7195	0.947	173.4
	G				38	15-0"	1'.0"	0-0	1-4	2-9	3'.0"	1'6"	#0	5"	#4	0"	#1	10	#1	6"	2335	3300	8004	1 292	247.2
	Δ.				34	5'0"	10"	4' 0"	10"	1' 0"	2' 0"	1'0"	#3	10"	#4	12"	#0	12	#5	10"	2000	1270	2810	0.252	247.2
	B				34	7'-0"	10"	5-6"	1'-0"	1-0	3'-0"	1-6"	#5	7"	#4	12"	#4	12"	#5	7"	1293	1270	4484	0.232	48.7
	0				34	7-0	10"	5'6"	10"	1-3"	3'.0"	1-0	#0	7"	#4	12"	#4	10"	#0	6"	1200	1827	6019	0.360	40.7 61.0
					34	9'_0"	1'-0"	6'-6"	1'-0"	1'-6"	3'-0"	1'-6"	#7	7"	#4	12"	#6	12"	#6	7"	1626	2290	5276	0.537	75.1
	5				34	9-0"	1' 2"	6' 9"	1'.0"	1' 0"	3' 0"	1'6"	#8	7"	#4	10"	#0	12	#7	8"	1504	2230	6580	0.546	88.3
	F				38	11'-0"	1'-2"	7'-0"	1'-0"	2'-6"	3'-0"	1'-6"	#5	5"	#A	12"	#1 #A	10"	#1	6"	1687	2402	5694	0.630	99.4
	G				38	11'-0"	1'-2"	7'-6"	1'-2"	2'-6"	3'-0"	1'-6"	#6	6"	#4	12"	#5	10"	#6	5"	1667	2351	7066	0.749	142.2
	<u>ч</u>			2.70	30	13' 0"	1.3"	8.0"	1.4"	2-0	3'.0"	1.6"	#0	5"	#4 #A	12"	#5	10"	#0	6"	2054	2001	6294	0.743	138.3
	1	-		1.65	38	13'-0"	1'-5	8'-6"	1'-4	3'-0"	3'_0"	1-0	#2	5"	#4 #A	10"	#0	10"	#7	7"	1903	2801	7503	0.996	173.4
	.1	-		1.00	30	15-0"	1'-0	9',9"	1'-4	3'_0"	3'-0"	1-0	#0 #0	5	#4 #A	0"	#1	12"	#1	6"	2335	3300	8126	1 202	247.2
	J			1.40	50	10-0	1-3	9-9	1-0	5-0	5-0	1-0	#3	5	11'1	9	#0	12	#0	0	2000	0000	0120	1.232	241.2

LEGEND:

As - SITE ADJUSTED PEAK SEISMIC GROUND ACCELERATION COEFFICIENT

KAE - SEISMIC ACTIVE EARTH PRESSURE COEFFICIENT

φ - NATIVE SUBGRADE MINIMUM ANGLE OF INTERNAL FRICTION

NOTES:

1. Concrete and steel quantities do not include footing key.



PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-00

SHEET 3 OF 6 SHEETS

APPROVED FOR PUBLICATION Mark a Daines

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STATE DESIGN ENGINEER Washington State Department of Transportation



OPTION A:

2. SET PRECAST WALL UNITS.

OPTION B:

2. PLACE FOOTING KEY CONCRETE. CONCRETE SHALL BE PLACED IN DRY TRENCH AND CONSOLIDATED.

SUGGESTED CONSTRUCTION SEQUENCE FOR CAST-IN-PLACE FOOTING KEY

1. EXCAVATE AND RETAIN TRENCH FOR FOOTING KEY. PROVIDE STAY-IN-PLACE SHORING AS NEEDED. ENSURE TRENCH IS DRY OR DEWATERED.

3. PLACE FOOTING KEY CONCRETE VIA CLOSURE HOLES.

4. WHILE FOOTING KEY CONCRETE IS STILL WET, INSERT HEADED REINFORCING BARS INTO 3" DIA. BLOCKOUTS. GROUT BLOCKOUTS.

1. EXCAVATE AND RETAIN TRENCH FOR FOOTING KEY. PROVIDE STAY-IN-PLACE SHORING AS NEEDED. ENSURE TRENCH IS DRY OR DEWATERED.

3. SET PRECAST WALL UNITS WHILE FOOTING KEY CONCRETE IS STILL WET.

4. INSERT HEADED REINFORCEMENT BARS INTO 3" DIA. BLOCKOUTS, GROUT BLOCKOUTS. AS AN ALTERNATIVE, HEADED REINFORCEMENT BARS MAY BE POST-INSTALLED AFTER FOOTING KEY HAS SET. DRILL 1 1/4" DIAMETER HOLE HK-3" DEEP AND SET WITH EPOXY RESIN. GROUT BLOCKOUTS.



PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-00

SHEET 4 OF 6 SHEETS

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Oct 9, 2023

STATE DESIGN ENGINEER $\overline{\nabla}$ Washington State Department of Transportation



KEY NOTES

INSTALLED IN EACH WALL UNIT. MAXIMUM SPACING SHALL NOT EXCEED 12'OR AS RECOMMENDED BY GEOTECHNICAL ENGINEER. DRAINS SHALL BE 6" ABOVE FINISHED GROUND LINE AT FRONT OF WALL.

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8¼"