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 (A_s) values as shown in the Table.

3. The Contractor shall be responsible for safely lifting, shipping, installing, and backfilling the precast Walls.

4. Precast Wall segment lengths shall be a minimum of 4 feet.

5. The native subgrade material shall be granular soil with a minimum internal angle of friction as specified in the Design Table. The applicability of employing these Standard Plans shall be geotechnically evaluated in accordance with the **BDM Section 8.1.4.A.2**. Bedding material shall be in accordance with **Standard Specifications Section 6-20.3(6)A**.

6. Retained soil may be comprised of in-situ soil or backfill. The retained soil within 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 Specifications 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.

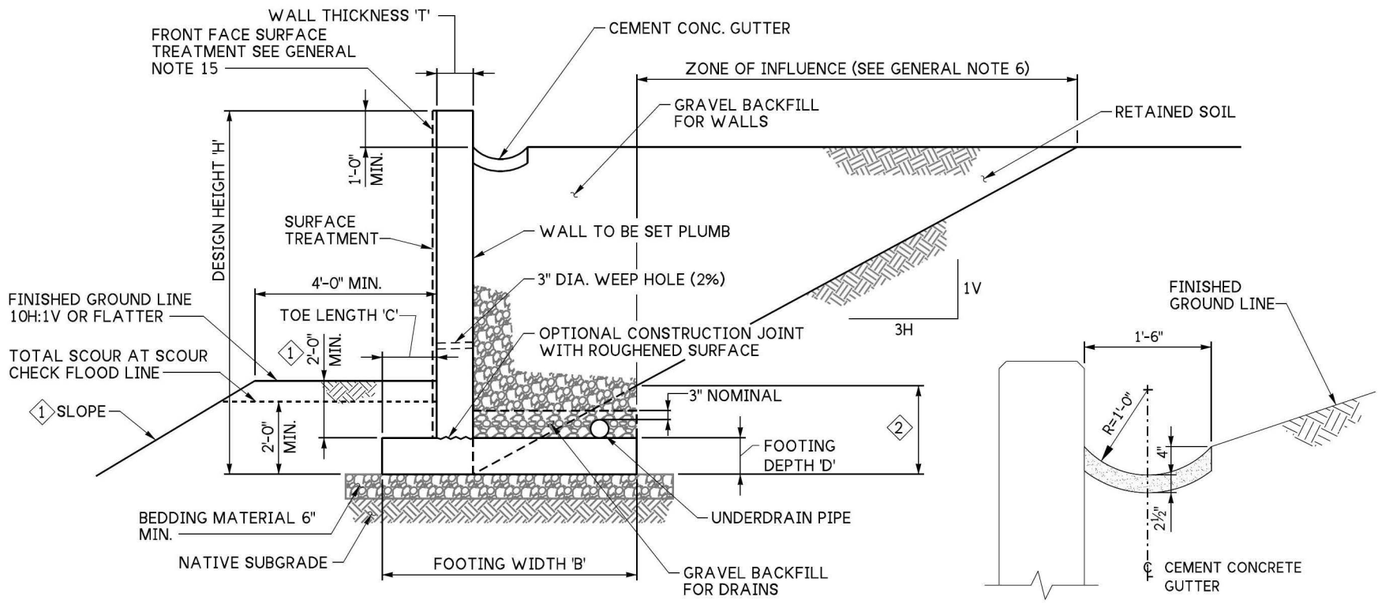
12. Alternative joint types between precast units, other than those detailed herein, shall not be used unless submitted for acceptance by the Engineer in a Type 2 Working Drawing.

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)
    b. **L-5.15 Cable Fence** (worker fall protection)

15. Provide surface treatment in accordance with the Contract Documents. Alternate surface treatment(s) requires approval by the State Bridge and Structures Architect.



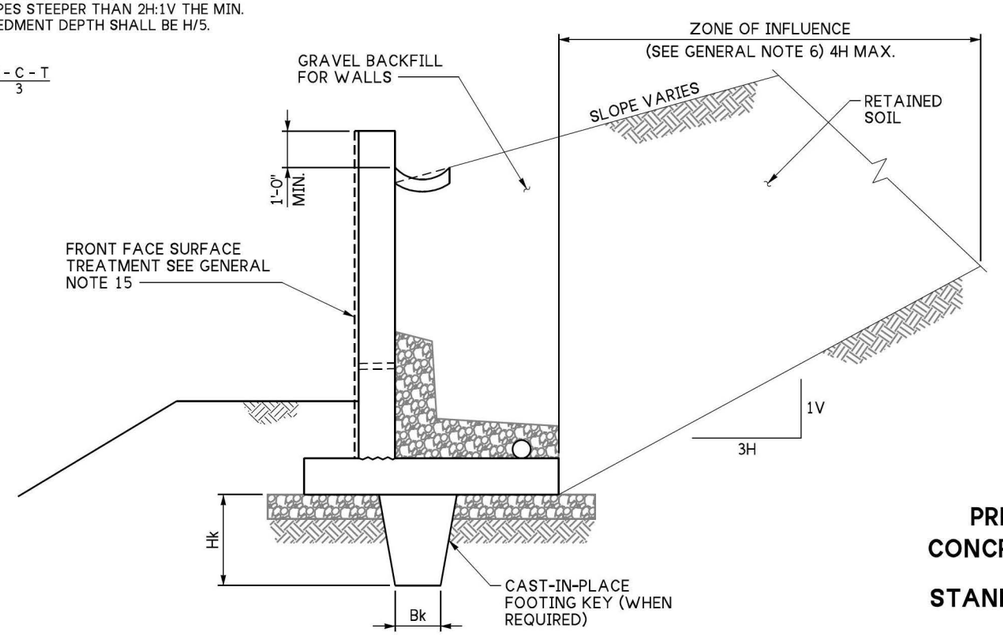
TYPICAL SECTION
FLAT BACKSLOPE

CEMENT CONCRETE GUTTER DETAIL

KEY NOTES

1 FOR WALL HEIGHTS, H > 10'-0" WITH SLOPES STEEPER THAN 2H:1V THE MIN. EMBEDMENT DEPTH SHALL BE H/5.

2 $\frac{B - C - T}{3}$



TYPICAL SECTION
SLOPING BACKSLOPE
(FOR DETAILS NOT SHOWN SEE TYPICAL SECTION FLAT BACKSLOPE)

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Aug 23, 2026

PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-01

SHEET 1 OF 6 SHEETS

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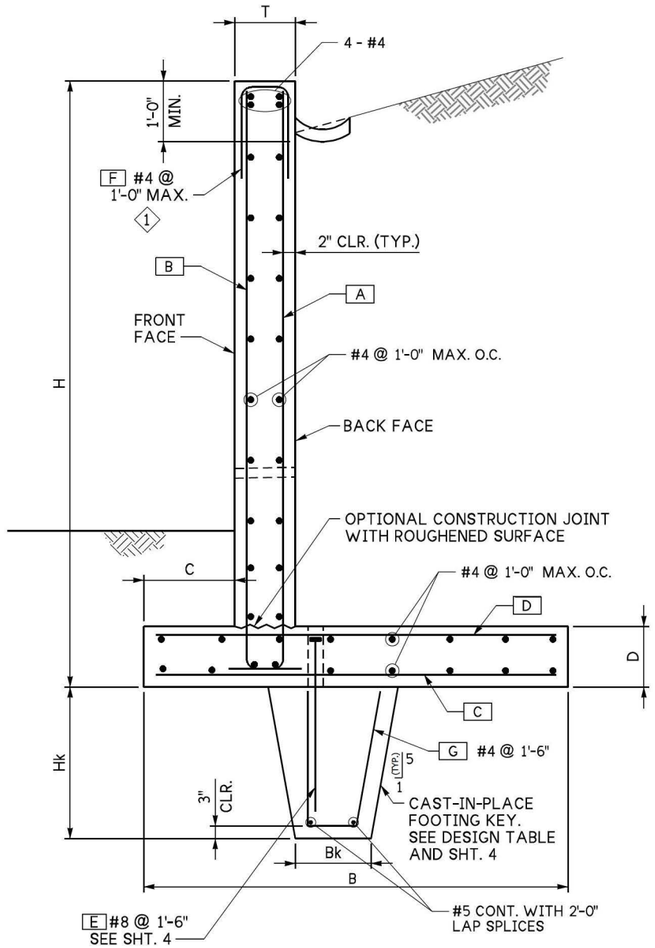
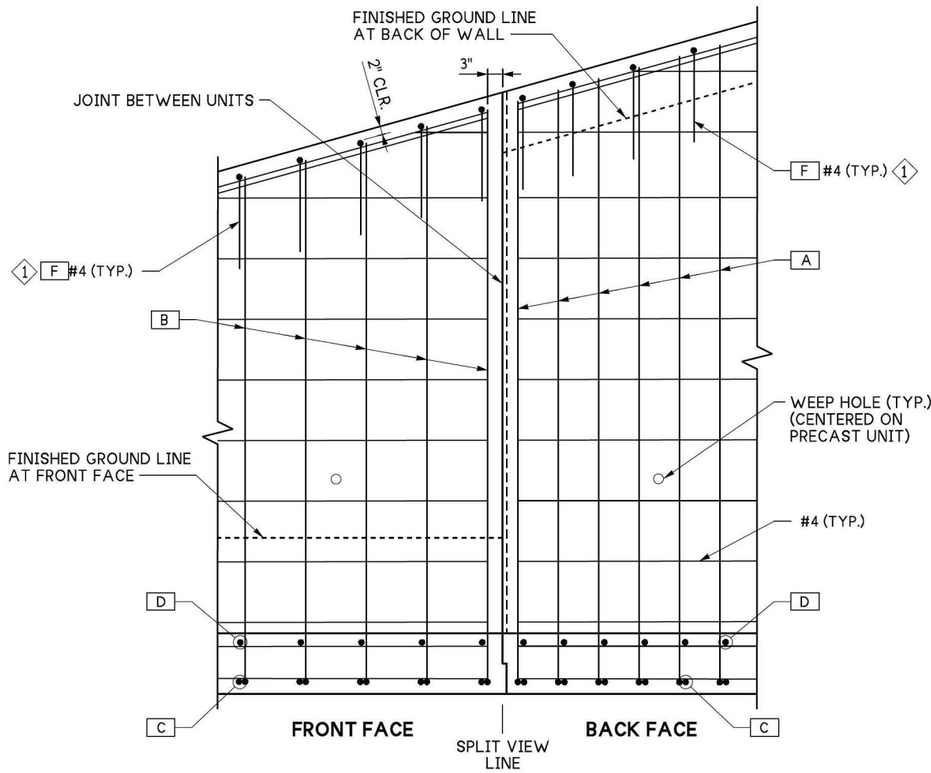
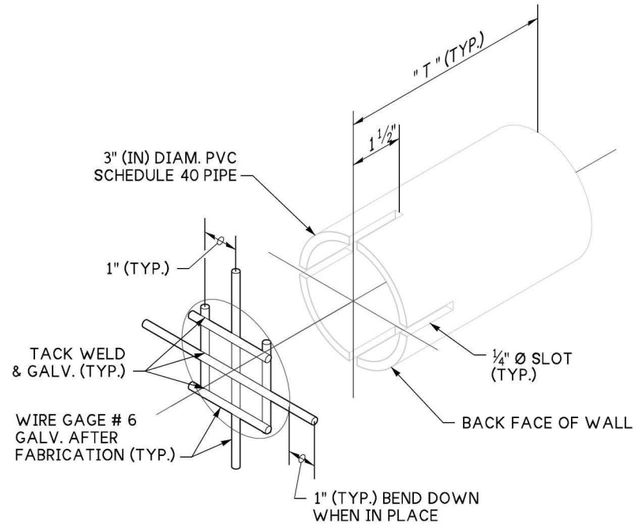


TYPICAL SECTION



SPLIT ELEVATION VIEW

FOOTING KEY NOT SHOWN FOR CLARITY. SEE SHEET 4 FOR DETAILS



WEEP HOLE ASSEMBLY

KEY NOTES

1 BAR F SHALL BE SPACED AT 6" WHEN TOP MOUNTED WORKER FALL PROTECTION FENCE IS EMPLOYED

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PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-01

SHEET 2 OF 6 SHEETS

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DESIGN TABLE

WALL TYPE		BACK SLOPE	A_s (g)	K_{AE}	ϕ (DEG)	DESIGN HEIGHT H	DIMENSIONS						STEM REINFORCING				FOOTING REINFORCING				MIN. REQUIRED FACTORED BEARING RESISTANCE (PSF)			EFFECTIVE FOOTING WIDTH			MATERIAL QUANTITY	
							STEM THICK. T	FTG. WIDTH B	FTG. DEPTH D	FTG. TOE C	FTG. KEY HEIGHT HK	FTG. KEY WIDTH BK	BAR A		BAR B		BAR C		BAR D										
													SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SIZE	SPA.	SERVICE	STRENGTH	EXTREME EVENT I	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"	N/A	N/A	#4	12"	#4	12"	#4	12"	#4	12"	970	1522	1018	2.49'	1.46'	2.10'	0.221	27.7
					30	7'-0"	10"	3'-9"	10"	1'-0"			#4	11"	#4	12"	#4	12"	#4	12"	1351	1991	1531	3.10'	2.93'	2.46'	0.306	35.8
					30	9'-0"	10"	4'-6"	10"	1'-6"			#5	9"	#4	12"	#4	12"	#4	10"	1554	2335	1872	3.74'	2.39'	2.89'	0.391	49.3
					30	11'-0"	10"	5'-6"	10"	1'-6"			#5	6"	#4	10"	#4	12"	#5	8"	1895	2771	2322	4.69'	4.46'	3.59'	0.484	72.3
					30	13'-0"	10"	6'-6"	10"	1'-6"			#5	4"	#4	9"	#4	11"	#5	6"	2256	3273	2802	5.58'	5.35'	4.25'	0.576	103.2
					30	15'-0"	1'-0"	7'-6"	1'-0"	1'-9"			#7	7"	#4	8"	#4	11"	#6	7"	2502	3604	3150	6.55'	6.29'	4.99'	0.796	130.4
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	2.49'	1.46'	1.34'	0.221	27.7
					30	7'-0"	10"	3'-9"	10"	1'-3"			#4	10"	#4	12"	#4	12"	#4	12"	1258	1907	2341	3.13'	1.95'	1.47'	0.306	36.4
					30	9'-0"	10"	4'-9"	10"	1'-6"			#5	9"	#4	12"	#4	12"	#5	12"	1495	2187	2890	4.15'	3.95'	1.91'	0.399	52.1
					30	11'-0"	10"	6'-0"	10"	1'-6"			#5	5"	#4	10"	#4	12"	#6	10"	1802	2598	3485	5.44'	5.25'	2.53'	0.499	80.9
					30	13'-0"	1'-0"	7'-3"	1'-0"	2'-0"			#7	8"	#4	9"	#5	12"	#6	8"	1928	2753	3552	6.88'	6.67'	3.41'	0.713	110.3
					30	15'-0"	1'-2"	8'-6"	1'-0"	2'-0"			#7	6"	#4	8"	#5	10"	#7	7"	2255	3194	4226	8.11'	7.90'	3.99'	0.920	156.2
TYPE 3	A	VARIES	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	2.32'	1.51'	1.59'	0.221	27.7
					30	7'-0"	10"	4'-0"	10"	1'-0"	1'-6"	1'-0"	#5	10"	#4	12"	#4	12"	#4	10"	1456	2132	3089	3.10'	2.91'	1.68'	0.314	40.7
					30	9'-0"	10"	5'-9"	10"	1'-6"	2'-0"	1'-0"	#5	7"	#4	12"	#4	12"	#5	7"	1640	2360	3345	4.90'	4.69'	2.81'	0.430	62.9
					30	11'-0"	1'-0"	7'-6"	1'-0"	1'-6"	3'-0"	1'-6"	#6	7"	#4	12"	#4	12"	#7	7"	2115	3003	4202	6.48'	6.26'	3.83'	0.648	98.0
	B				34	11'-0"	1'-0"	6'-6"	1'-0"	1'-6"	2'-6"	1'-3"	#6	7"	#4	12"	#4	10"	#6	6"	2208	3194	5675	5.18'	4.91'	2.42'	0.611	90.2
					34	13'-0"	1'-2"	7'-6"	1'-0"	2'-6"	3'-0"	1'-6"	#7	5"	#4	10"	#6	10"	#6	5"	2221	3214	6035	6.30'	5.95'	2.86'	0.796	150.6
					34	15'-0"	1'-5"	9'-3"	1'-2"	2'-6"	3'-0"	1'-6"	#8	4"	#4	9"	#6	6"	#8	5"	2633	3765	6626	7.91'	7.55'	3.86'	1.126	264.5
	C				38	15'-0"	1'-5"	8'-6"	1'-2"	2'-9"	3'-0"	1'-6"	#8	4"	#4	9"	#7	6"	#7	5"	2593	3756	7920	7.01'	6.61'	2.87'	1.093	252.7
TYPE 4	A	VARIES	0.47	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	2463	2.55'	2.39'	1.28'	0.221	27.7
	B			2.00	34	7'-0"	10"	5'-0"	10"	1'-0"	2'-0"	1'-0"	#5	10"	#4	12"	#4	12"	#5	8"	1345	1912	4068	4.37'	4.22'	1.97'	0.345	47.1
				2.00	34	9'-0"	1'-0"	6'-3"	1'-0"	2'-0"	3'-0"	1'-6"	#5	5"	#4	12"	#5	10"	#6	9"	1439	2031	4715	5.93'	5.73'	2.60'	0.528	75.8
	C			1.56	34	11'-0"	1'-2"	7'-0"	1'-0"	2'-6"	3'-0"	1'-6"	#7	7"	#4	12"	#5	7"	#6	7"	1687	2402	5540	6.47'	6.19'	2.68'	0.691	108.7
	D			1.25	34	13'-0"	1'-3"	8'-0"	1'-2"	2'-9"	3'-0"	1'-6"	#8	7"	#4	10"	#6	10"	#6	6"	2052	2936	6049	7.13'	6.80'	3.10'	0.894	146.3
	E			2.00	38	9'-0"	1'-0"	6'-3"	1'-0"	2'-0"	2'-0"	1'-0"	#5	5"	#4	12"	#5	10"	#6	9"	1396	1979	4922	5.84'	5.63'	2.41'	0.528	75.8
				2.00	38	11'-0"	1'-3"	7'-6"	1'-2"	2'-6"	3'-0"	1'-6"	#7	6"	#4	12"	#5	8"	#7	8"	1667	2351	6521	7.13'	6.88'	2.71'	0.779	119.8
	F			1.70	38	13'-0"	1'-6"	8'-6"	1'-4"	2'-9"	3'-0"	1'-6"	#8	5"	#4	10"	#7	10"	#7	7"	2000	2828	7723	7.87'	7.57'	2.90'	1.068	183.9
	G			1.48	38	15'-0"	1'-9"	9'-9"	1'-6"	3'-0"	3'-0"	1'-6"	#9	5"	#4	9"	#8	12"	#8	6"	2335	3300	8004	8.93'	8.59'	3.55'	1.417	260.7
TYPE 5	A	VARIES	0.64	3.51	34	5'-0"	10"	4'-0"	10"	1'-0"	2'-0"	1'-0"	#4	10"	#4	12"	#4	12"	#5	10"	904	1270	2810	3.74'	3.64'	1.90'	0.252	33.2
	B			2.80	34	7'-0"	10"	5'-6"	1'-0"	1'-3"	3'-0"	1'-6"	#5	7"	#4	12"	#4	12"	#5	7"	1293	1810	4484	5.16'	5.04'	2.28'	0.389	53.4
	C			1.90	34	9'-0"	1'-0"	6'-6"	1'-0"	1'-6"	3'-0"	1'-6"	#6	7"	#4	12"	#4	10"	#6	6"	1626	2290	5276	5.93'	5.76'	2.52'	0.537	81.1
	D			1.50	34	11'-0"	1'-2"	7'-0"	1'-0"	2'-6"	3'-0"	1'-6"	#7	7"	#4	12"	#5	7"	#6	7"	1687	2402	5694	6.47'	6.19'	2.57'	0.691	108.7
	E			1.20	34	13'-0"	1'-3"	8'-0"	1'-4"	2'-9"	3'-0"	1'-6"	#8	7"	#4	10"	#6	9"	#6	7"	2054	2937	6294	7.13'	6.80'	2.93'	0.935	144.5
	F			3.51	38	7'-0"	10"	5'-6"	10"	1'-3"	3'-0"	1'-6"	#5	5"	#4	12"	#4	10"	#6	6"	1290	1809	5923	5.17'	5.04'	1.92'	0.360	65.7
	G			2.70	38	9'-0"	1'-2"	6'-9"	1'-0"	1'-9"	3'-0"	1'-6"	#6	6"	#4	12"	#5	10"	#6	5"	1504	2105	6580	6.43'	6.26'	2.36'	0.596	94.4
	H			2.00	38	11'-0"	1'-3"	7'-6"	1'-2"	2'-6"	3'-0"	1'-6"	#8	5"	#4	12"	#6	10"	#6	6"	1667	2351	7066	7.13'	6.88'	2.50'	0.779	149.6
	I			1.65	38	13'-0"	1'-6"	8'-6"	1'-4"	3'-0"	3'-0"	1'-6"	#8	5"	#4	10"	#7	10"	#7	7"	1903	2691	7503	8.00'	7.69'	2.87'	1.068	183.9
	J			1.40	38	15'-0"	1'-9"	9'-9"	1'-6"	3'-0"	3'-0"	1'-6"	#9	5"	#4	9"	#7	10"	#7	5"	2335	3300	8126	8.93'	8.59'	3.42'	1.417	254.6

Aug 23, 2026

LEGEND:

A_s - SITE ADJUSTED PEAK SEISMIC GROUND ACCELERATION COEFFICIENT

K_{AE} - 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

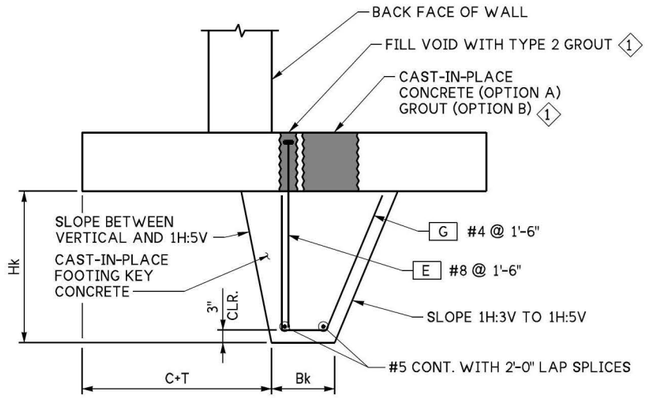
STANDARD PLAN D20.10-01

APPROVED FOR PUBLICATION

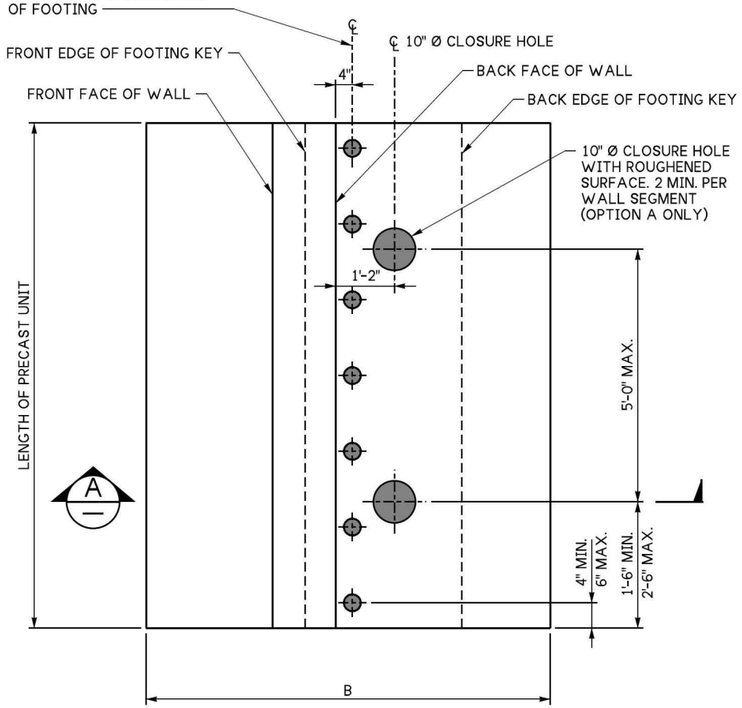
Mark A Baires Aug 24, 2026

STATE DESIGN ENGINEER

Washington State Department of Transportation



SECTION (A)
FOOTING KEY



PLAN
PRECAST WALL UNIT WITH FOOTING KEY

SUGGESTED CONSTRUCTION SEQUENCE FOR CAST-IN-PLACE FOOTING KEY

OPTION A:

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

OPTION B:

1. EXCAVATE AND RETAIN TRENCH FOR FOOTING KEY. PROVIDE STAY-IN-PLACE SHORING AS NEEDED. ENSURE TRENCH IS DRY OR DEWATERED.
2. PLACE FOOTING KEY CONCRETE. CONCRETE SHALL BE PLACED IN DRY TRENCH AND CONSOLIDATED.
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 1¼" DIAMETER HOLE Hk-3" DEEP AND SET WITH EPOXY RESIN. GROUT BLOCKOUTS.

KEY NOTES

1 THE CONTRACTOR SHALL PLACE THE GROUT BEFORE PLACING THE BACKFILL AGAINST THE STRUCTURE. GROUT SHALL CONFORM TO **STANDARD SPEC. 9-20.3(2)** AND SHALL ACHIEVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI BEFORE BACKFILL PLACEMENT.

Aug 23, 2026

PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-01

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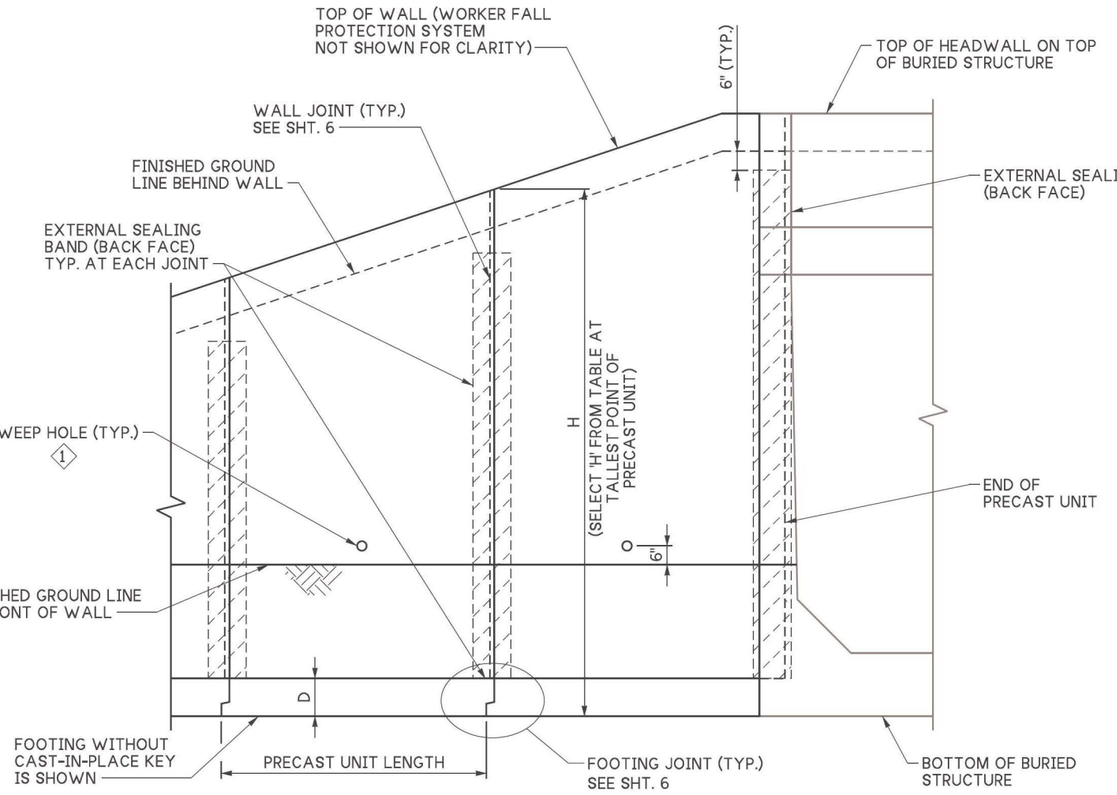
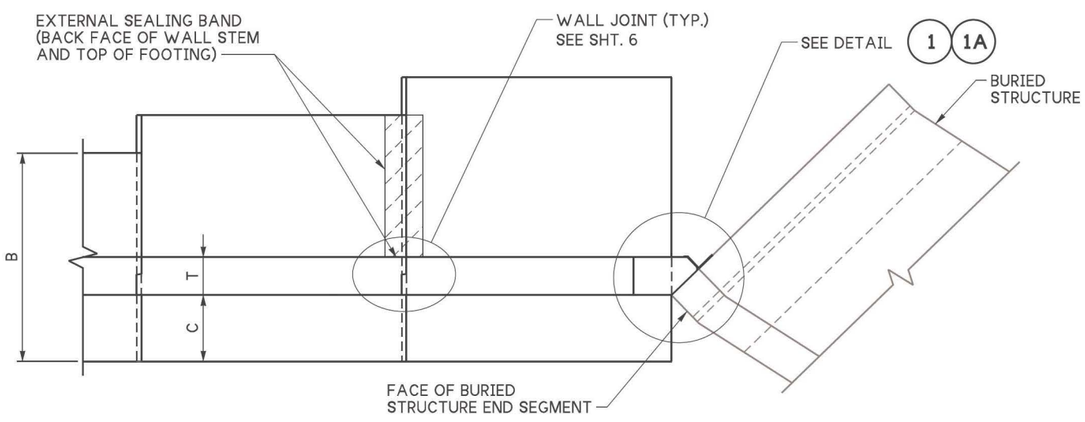
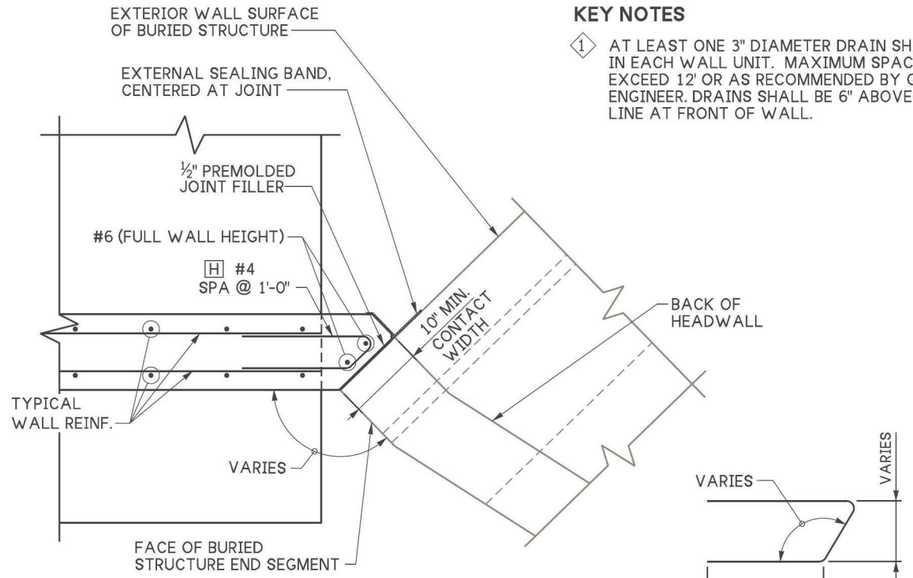


DEVELOPED ELEVATION



PLAN

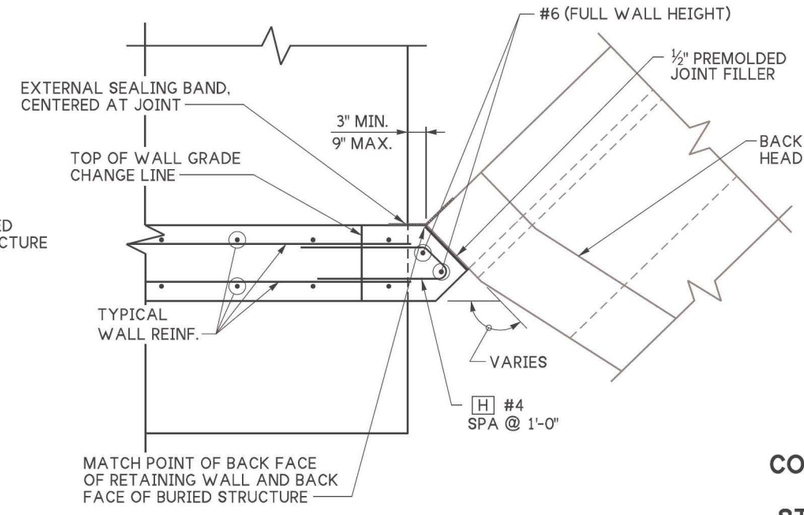


DETAIL (1)

JOINT OF WALL WHEN USED WITH A BURIED STRUCTURE

KEY NOTES

1. AT LEAST ONE 3" DIAMETER DRAIN SHALL BE 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.



DETAIL (1A)

ALTERNATE JOINT OF WALL WHEN USED WITH A BURIED STRUCTURE

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Aug 23, 2026

PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-01

SHEET 5 OF 6 SHEETS

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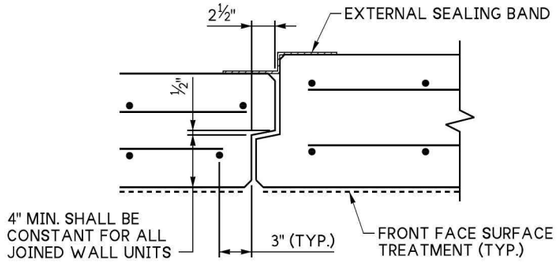
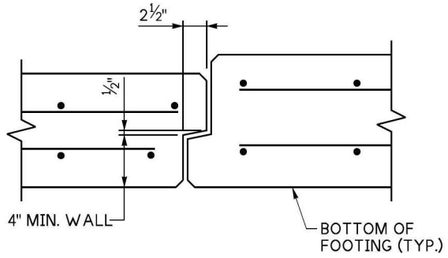
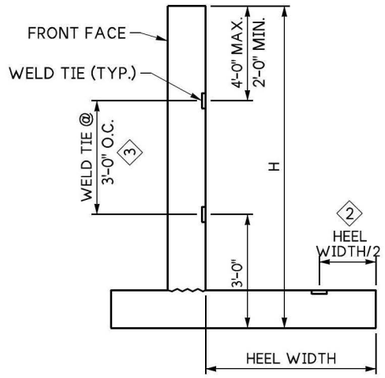


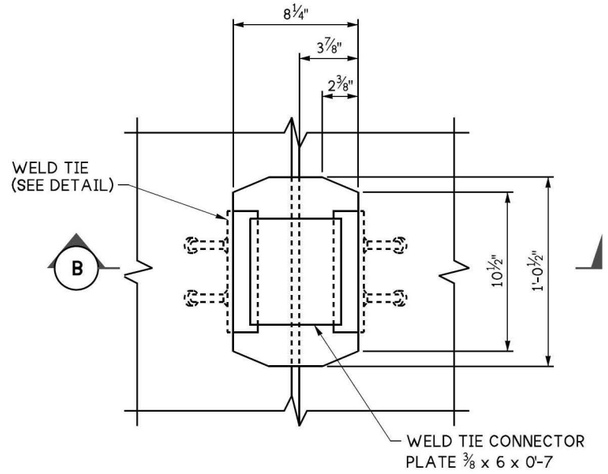
WALL JOINT TYPE 1



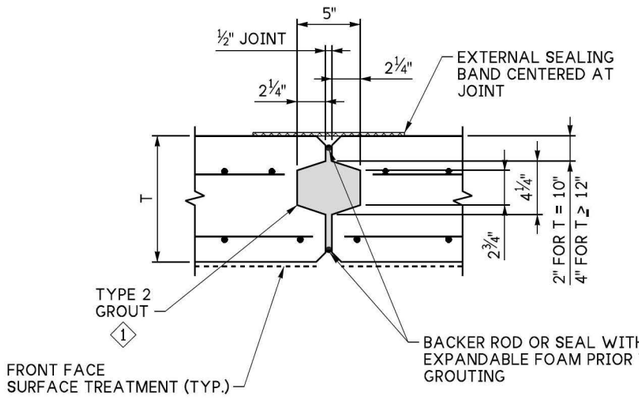
FOOTING JOINT TYPE 1



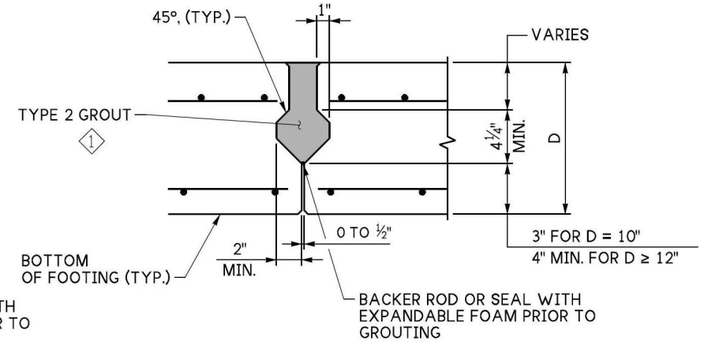
TYPICAL SECTION WELD TIE PLACEMENT



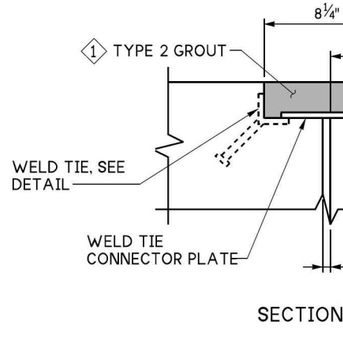
JOINT TYPE WELD TIE



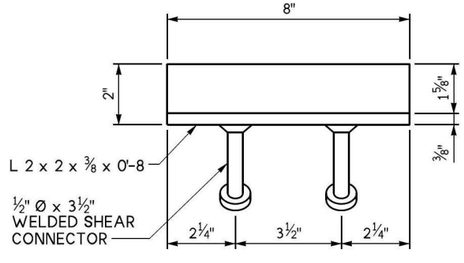
WALL JOINT TYPE 3 ⑤



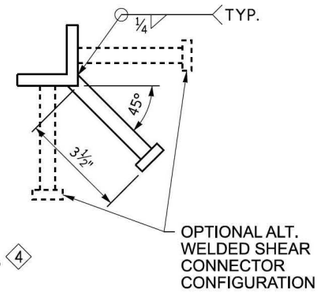
FOOTING JOINT TYPE 3 ⑤



SECTION (B)



WELD TIE DETAIL ④



NOTES

1. Wall and footing joints selected shall be shown in the Shop Drawings.
2. The same joint type shall be used for each retaining wall location. The joint type shall not be interchanged within the precast units or retaining wall location.

KEY NOTES

① THE CONTRACTOR SHALL PLACE THE GROUT BEFORE PLACING THE BACKFILL AGAINST THE STRUCTURE. GROUT SHALL CONFORM TO **STANDARD SPEC. 9-20.3(2)** AND SHALL ACHIEVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI BEFORE BACKFILL PLACEMENT.

② PROVIDE ONE WELD TIE IN THE FOOTING FOR EACH PRECAST UNIT LENGTH.

③ FOR H ≤ 6'-0" PROVIDE ONE WELD TIE.

④ WELD TIES AND ANGLES MAY BE INSTALLED UNCOATED AND COATED WITH ZINC RICH PRIMER AFTER INSTALLATION AND WELDING.

⑤ MANUFACTURER VARIATIONS OR NOMINAL ADJUSTMENTS TO THE DETAILED JOINT GEOMETRICS SHALL BE SHOWN IN THE SHOP DRAWINGS.

GEOFFREY D. SWETT
STATE OF WASHINGTON
32820
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

Aug 23, 2026

PRECAST REINFORCED CONCRETE RETAINING WALL

STANDARD PLAN D-20.10-01

SHEET 6 OF 6 SHEETS

APPROVED FOR PUBLICATION

Mark A Swires — Aug 24, 2026

STATE DESIGN ENGINEER

Washington State Department of Transportation