



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
DESIGN DIVISION**

NASHVILLE, TENNESSEE 37243-0348

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

INSTRUCTIONAL BULLETIN NO. 13-18

Regarding Revised Standard Drawings

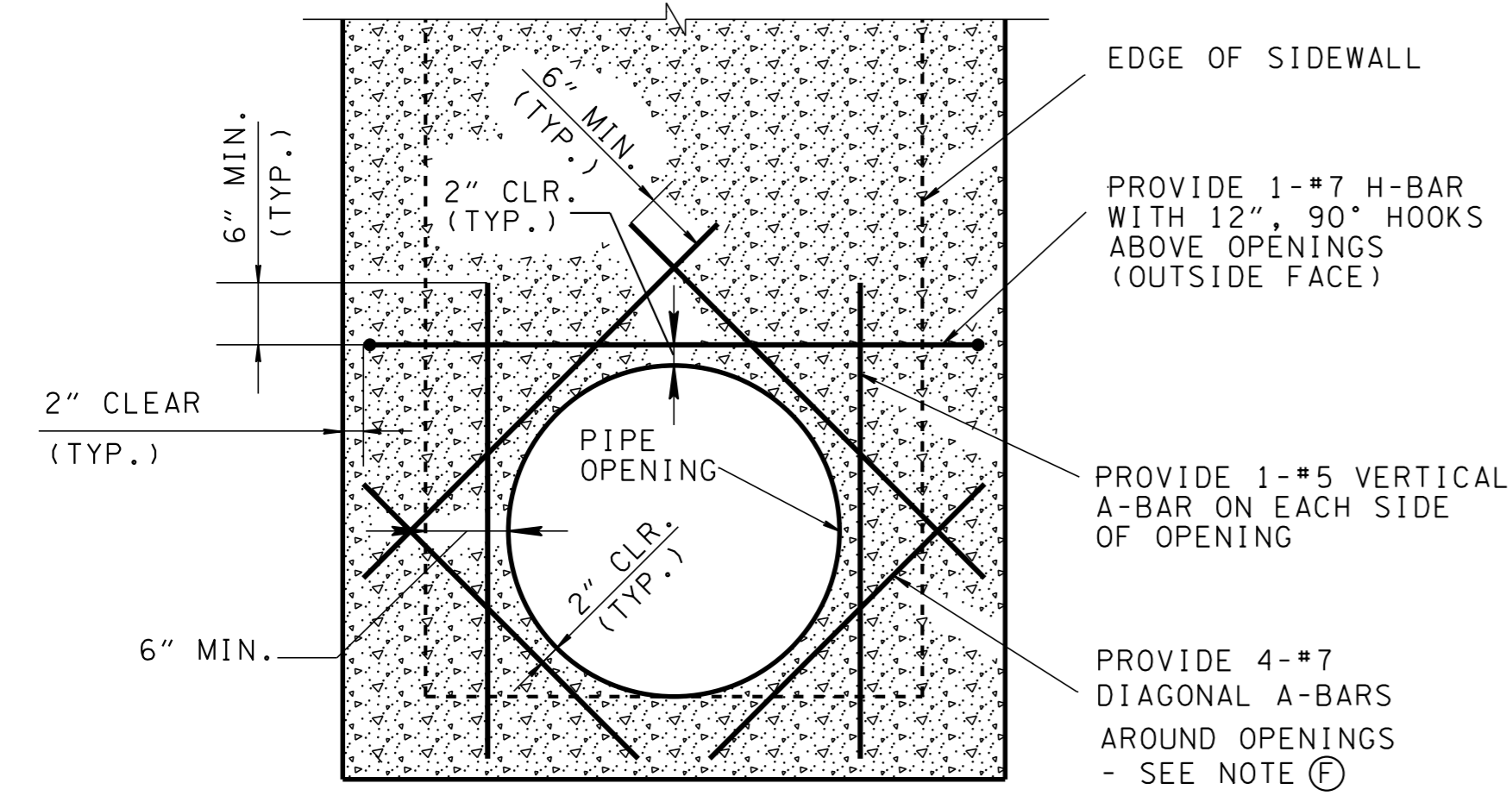
Effective for the December Letting (September 25 turn-in), the following Standard Drawings are revised and Section V of the Design Guidelines is revised for this update.

<u>DRAWING NUMBER</u>	<u>CURRENT REVISION DATE</u>	<u>DESCRIPTION</u>
D-CB-99	6/7/2013	MISCELLANEOUS DETAILS FOR RECTANGULAR STRUCTURES
D-CB-99RA	8/5/2013	BILL OF STEEL FOR ROUND CATCH BASINS
D-PE-15A	6/14/2013	15" CONCRETE ENDWALL CROSS DRAIN
D-PE-18A	6/14/2013	18" CONCRETE ENDWALL CROSS DRAIN
D-PE-24A	6/14/2013	24" CONCRETE ENDWALL CROSS DRAIN
D-PE-30A	6/14/2013	30" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-36A	6/14/2013	36" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-42A	6/14/2013	42" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-PE-48A	6/14/2013	42" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
D-SEW-1A	6/14/2013	SIDE DRAIN CONCRETE ENDWALL WITH STEEL PIPE GRATE
D-SEW-12D	6/14/2013	CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE

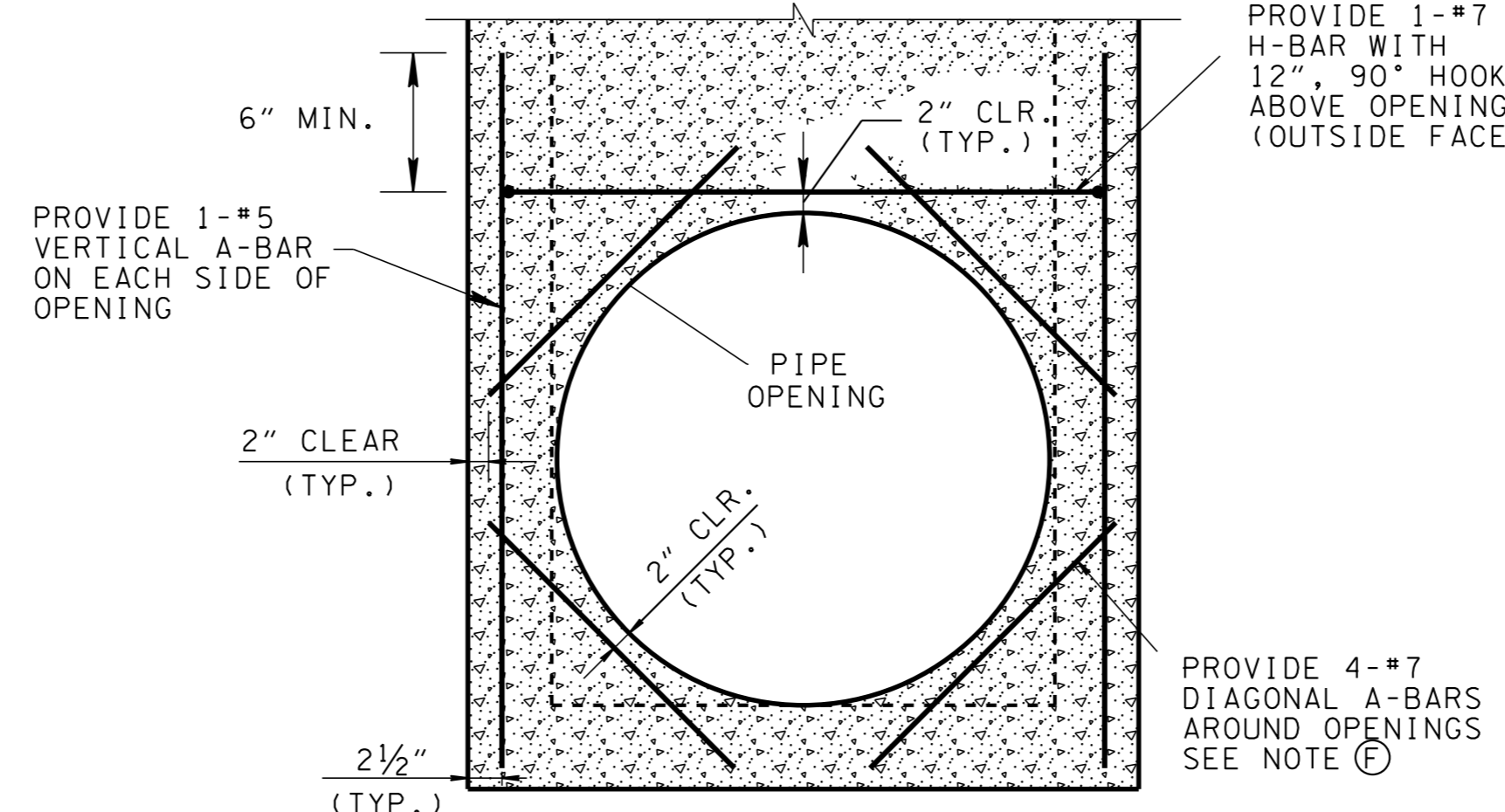
A copy of the revised standard drawings are attached.


Carolyn Stonecipher, PE
Civil Engineering Director
Roadway Design Division

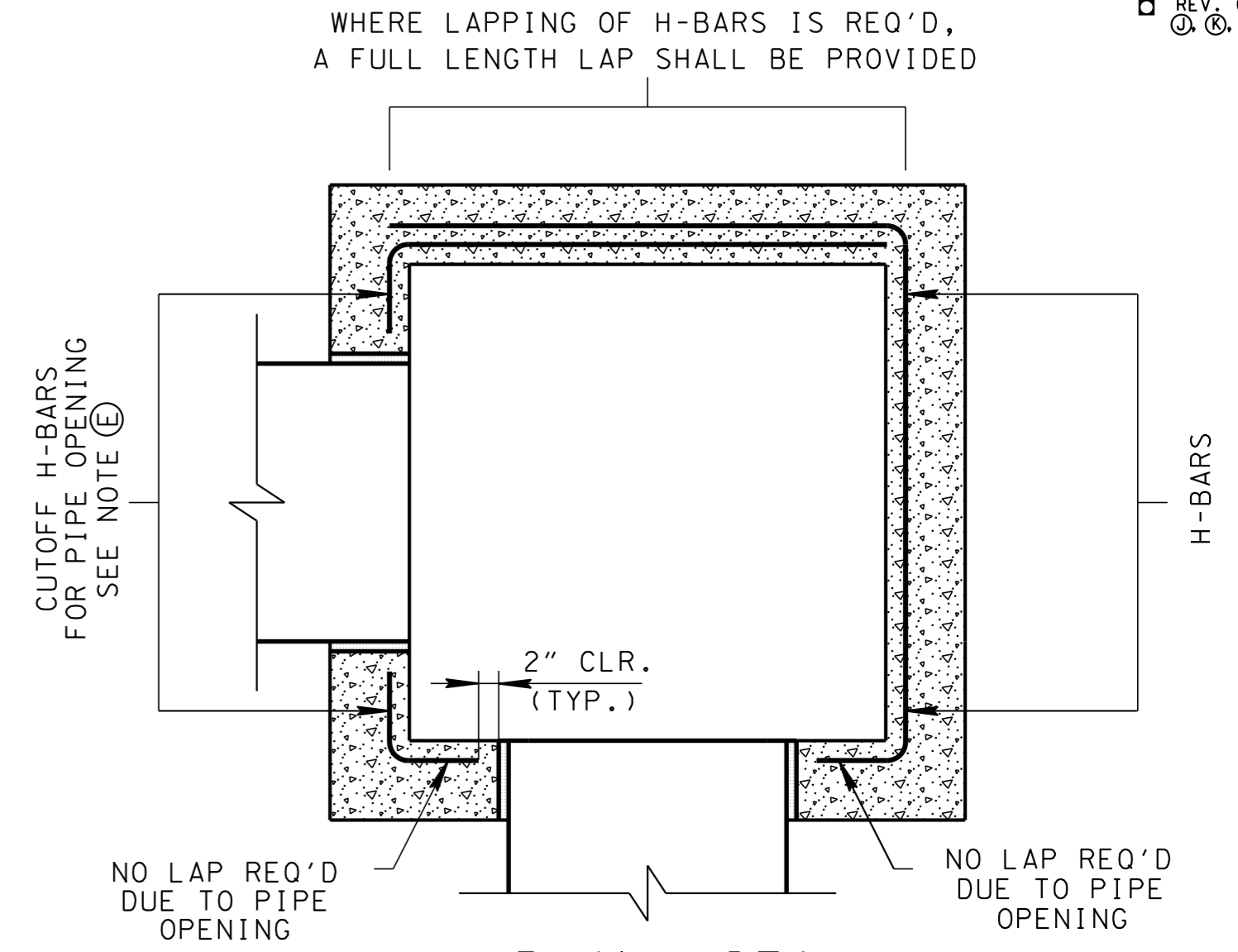
CAS:ARH:MWC
9/12/13



ELEVATION VIEW
(EDGE OF PIPE OPENING IS GREATER THAN OR EQUAL TO 6" FROM SIDE WALL)

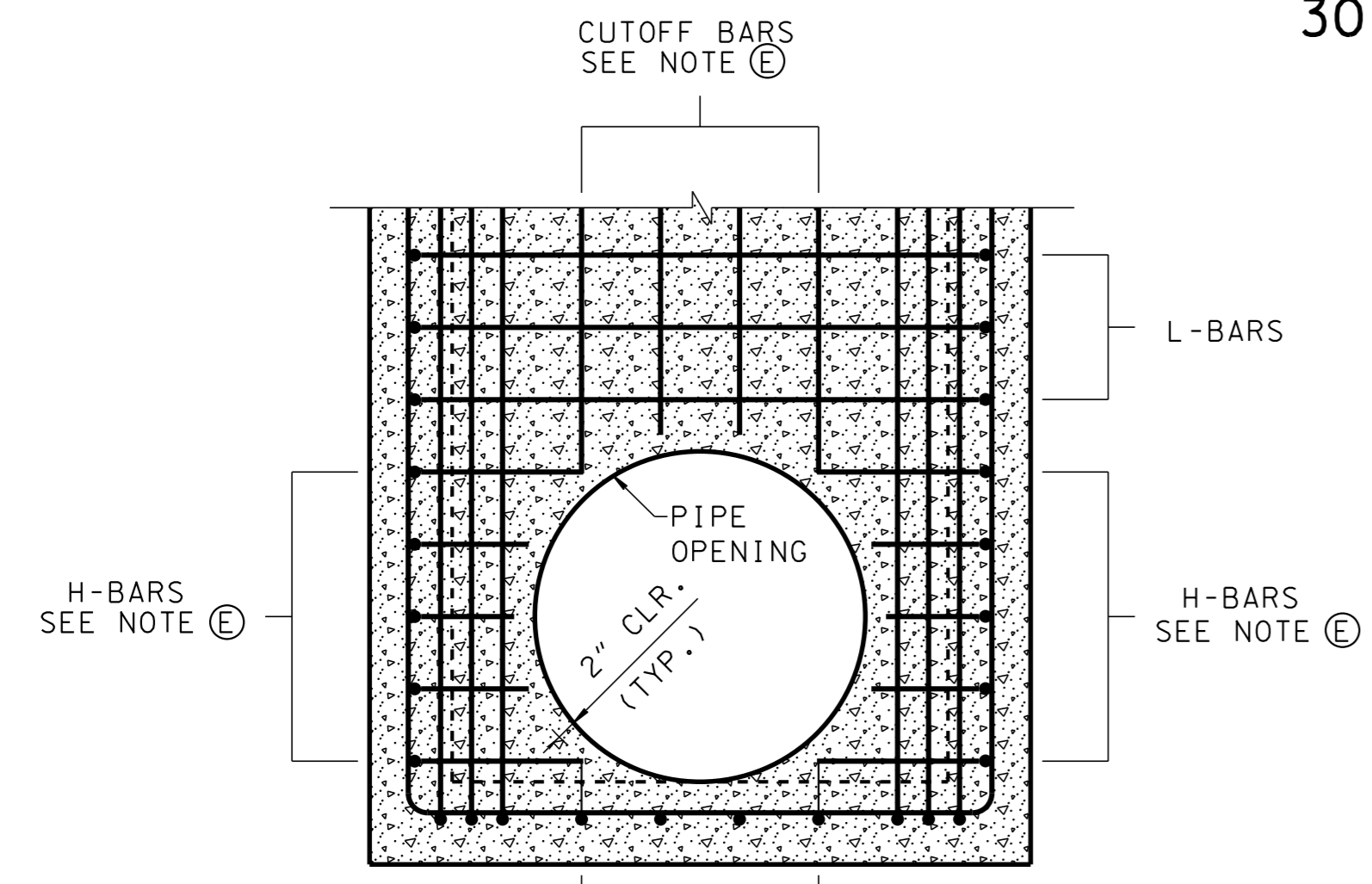


ELEVATION VIEW
(EDGE OF PIPE OPENING IS LESS THAN TO 6" FROM SIDE WALL)

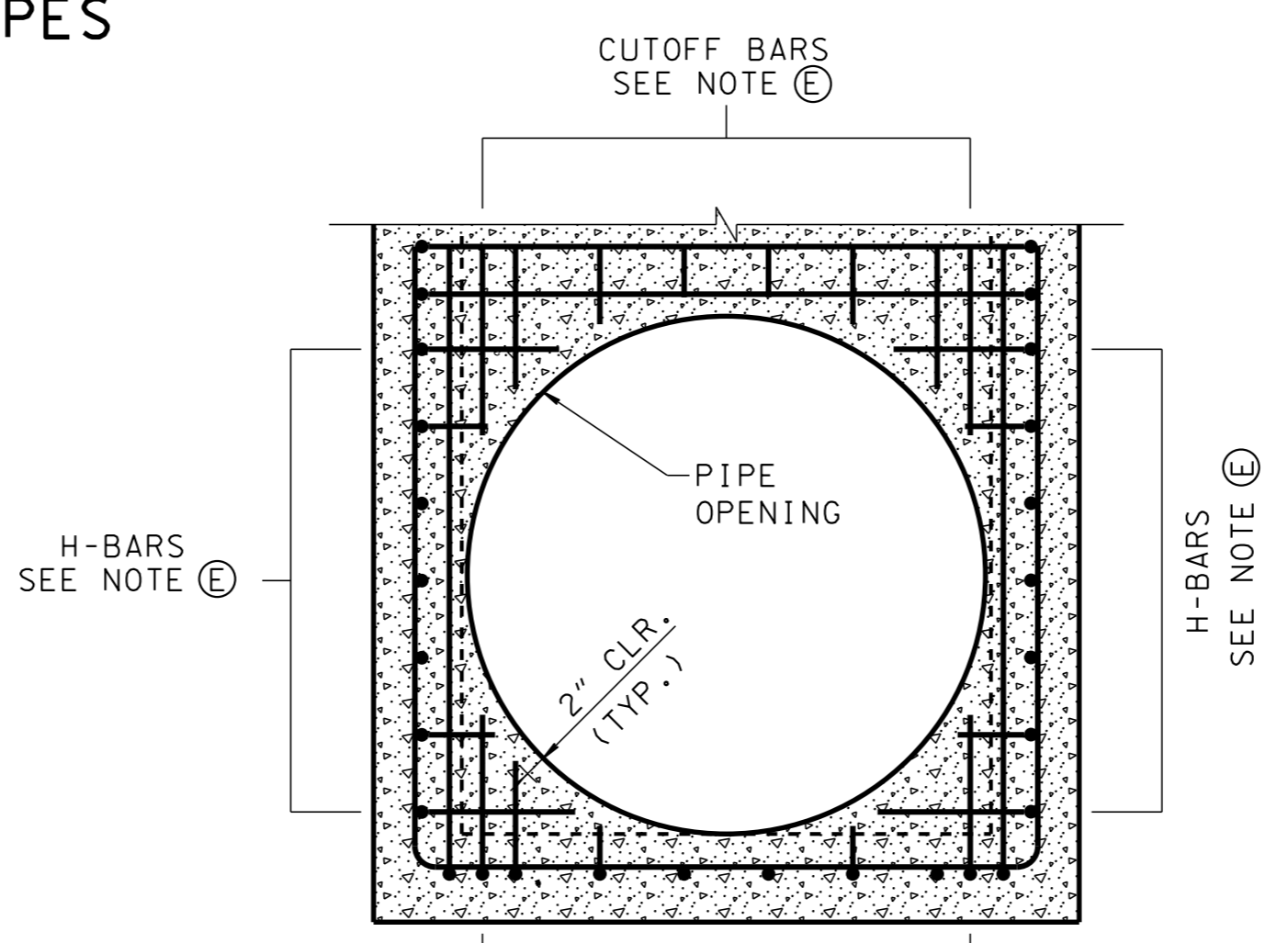


PLAN VIEW
WHERE LAPPING OF H-BARS IS REQ'D, A FULL LENGTH LAP SHALL BE PROVIDED.
NO LAP REQ'D DUE TO PIPE OPENING
NO LAP REQ'D DUE TO PIPE OPENING
SEE NOTE (C)
DEPICTING ADJACENT PIPE OPENINGS AND OVERLAPPING H-BARS (VERTICAL REINFORCING NOT SHOWN FOR CLARITY)

ADDITIONAL REINFORCING REQUIRED FOR 30" OR LARGER PIPES



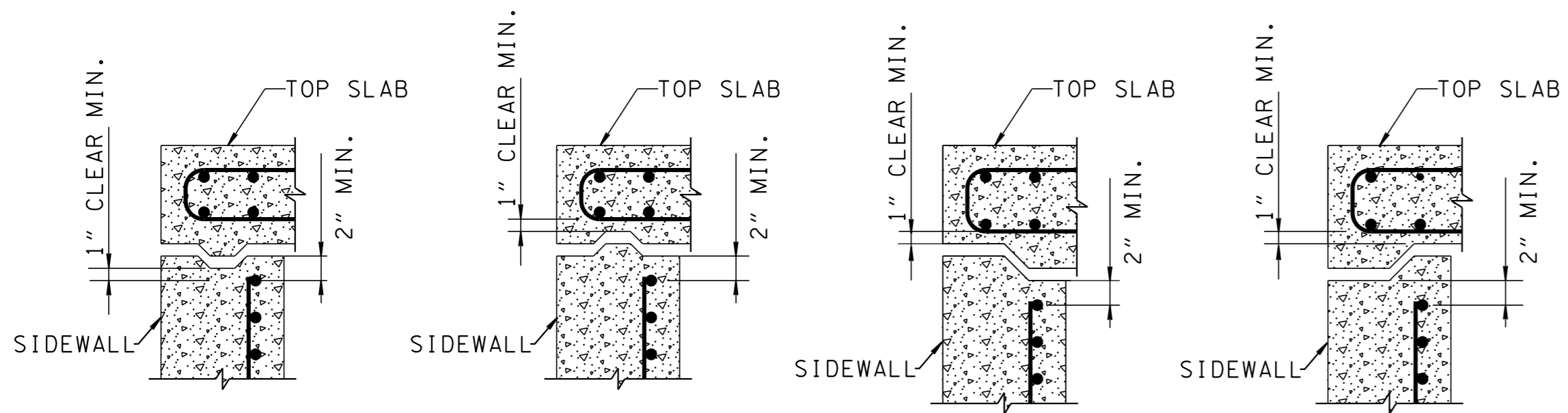
ELEVATION VIEW
(EDGE OF PIPE OPENING IS GREATER THAN OR EQUAL TO 6" FROM SIDE WALL)



ELEVATION VIEW
(EDGE OF PIPE OPENING IS LESS THAN 6" FROM SIDE WALL)

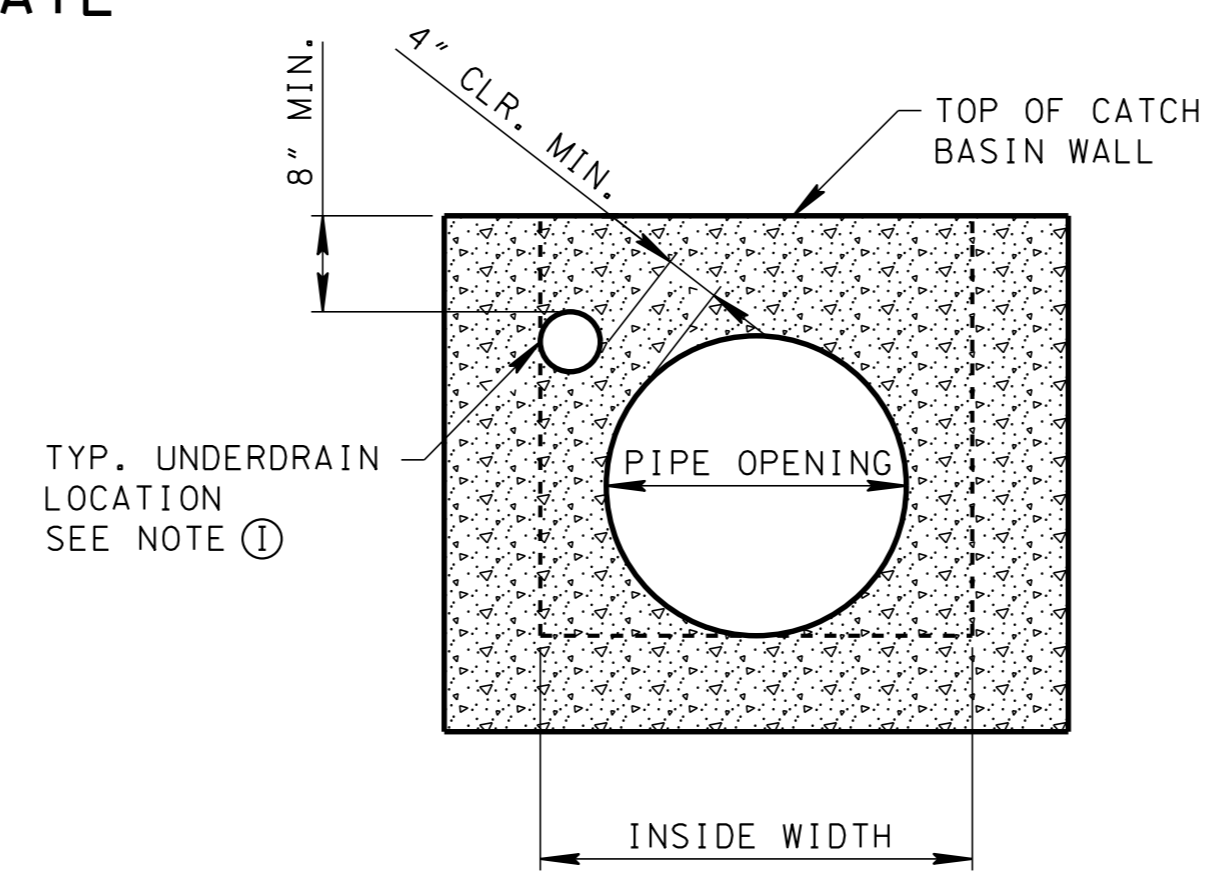
- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL NONCIRCULAR CAST-IN-PLACE AND ALL NONCIRCULAR PRECAST CATCH BASINS, MANHOLES, JUNCTION BOXES AND SPRING DRAINS.
 - (B) PLACE ALL REINFORCING STEEL AS DETAILED ON APPLICABLE STANDARD DRAWINGS. TO ACCOMMODATE A PIPE OPENING, THE REQUIRED REINFORCING SCHEMES SHALL BE MODIFIED BY CUTTING OR TRIMMING THE AFFECTED REINFORCING STEEL AS DETAILED ON THIS STANDARD DRAWING.
 - (C) HORIZONTAL H-BARS AS DETAILED ON THE STANDARD DRAWINGS ASSUME PIPE OPENINGS AS SHOWN ON THE APPLICABLE STANDARD DRAWING. IN THESE CASES, THE LEGS OF THE H-BARS SHALL BE TERMINATED TO ACCOMMODATE PIPE OPENINGS AND THERE WILL BE NO LAPPING OF H-BARS. IN THE CASE SHOWN ON THIS SHEET, WITH PIPE OPENINGS IN ADJACENT CATCH BASIN WALLS, A FULL LENGTH LAP SHALL BE REQUIRED IN THE SOLID WALL. IF PIPE OPENINGS ARE IN OPPOSITE WALLS BUT ROTATED 90° FROM WHAT IS DEPICTED ON THE STANDARD DRAWING (I.E. FOR A CROSS-DRAIN) THE CONTRACTOR HAS THE OPTION TO MODIFY THE H-BARS IN A SIMILAR FASHION SO AS TO ELIMINATE LAPS.
 - (D) L-BARS SHALL BE PLACED AS DETAILED ON THE APPLICABLE STANDARD DRAWING AND SHALL NOT BE MODIFIED.
 - (E) IF MODIFICATION TO STEEL REINFORCEMENT FOR A PIPE OPENING RESULTS IN ONE LEG OF AN H-BAR LESS THAN 6 INCHES LONG, THE LEG MAY BE OMITTED. IF MODIFICATION TO STEEL REINFORCEMENT FOR A PIPE OPENING RESULTS IN AN A-BAR LESS THAN 6 INCHES LONG, THEN THE A-BAR MAY BE OMITTED ENTIRELY.
 - (F) ADDITIONAL REINFORCING STEEL SHALL BE PROVIDED AROUND PIPE OPENINGS AS DETAILED ON THIS SHEET. PROVIDE DIAGONAL BARS WHEN PIPE OPENING IS FOR A 30 INCH OR LARGER PIPE.
 - (G) TIE ADDITIONAL REINFORCEMENT TO THE EXISTING INSIDE FACE REINFORCEMENT.
 - (H) THE PREFERRED LOCATION OF UNDERDRAIN CONNECTIONS, WHEN REQUIRED, IS IN A WALL WITH NO PIPE OPENING. UNDERDRAIN CONNECTIONS SHALL BE LOCATED AT LEAST 8 INCHES FROM THE TOP OF THE CATCH BASIN WALL. IF PLACEMENT IN A WALL WITH A PIPE OPENING IS NECESSARY, THE OUTSIDE EDGE OF THE UNDERDRAIN SHALL BE LOCATED A MINIMUM OF 4 INCHES FROM THE OUTSIDE EDGE OF THE PIPE OPENING.
 - (I) UNDERDRAIN HOLE SHOULD BE PLACED BETWEEN THE REINFORCING BARS. DURING THE PLACEMENT OF THE UNDERDRAIN HOLE, EVERY EFFORT SHALL BE MADE TO AVOID CUTTING REINFORCEMENT.
 - (J) VARIATIONS OF BAR LOCATION DUE TO REQUIRED SPLICES IS ACCEPTABLE UP TO A DISTANCE EQUAL TO THE BAR DIAMETER.
 - (K) MANUFACTURING TOLERANCES WILL BE AS SHOWN ON STANDARD OPERATING PROCEDURE (SOP) 5-3.
 - (L) A SINGLE L-BAR OF THE SAME DIAMETER MAY BE SUBSTITUTED FOR TWO OVERLAPPING H-BARS.

BAR TERMINATION TO ACCOMMODATE PIPE OPENINGS

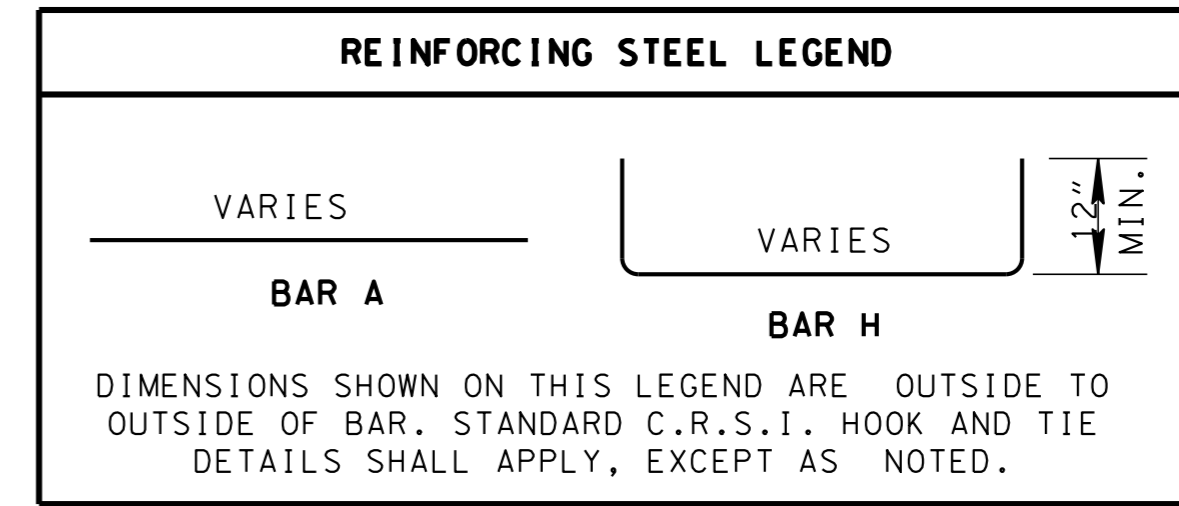


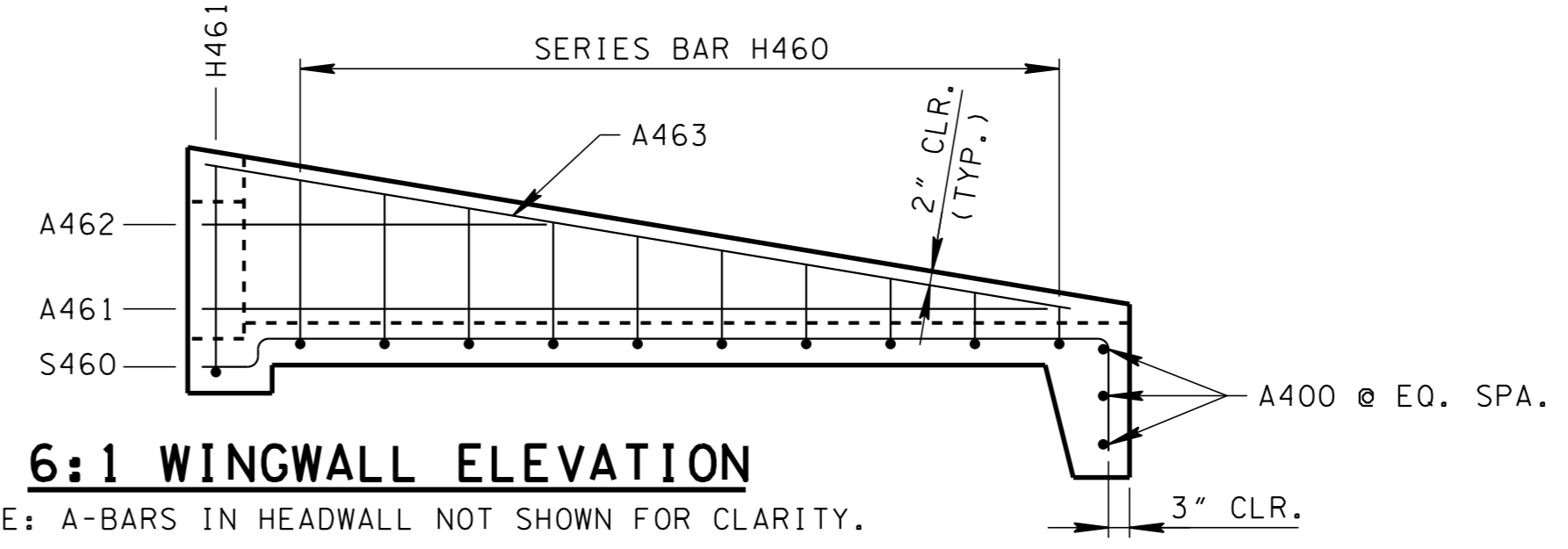
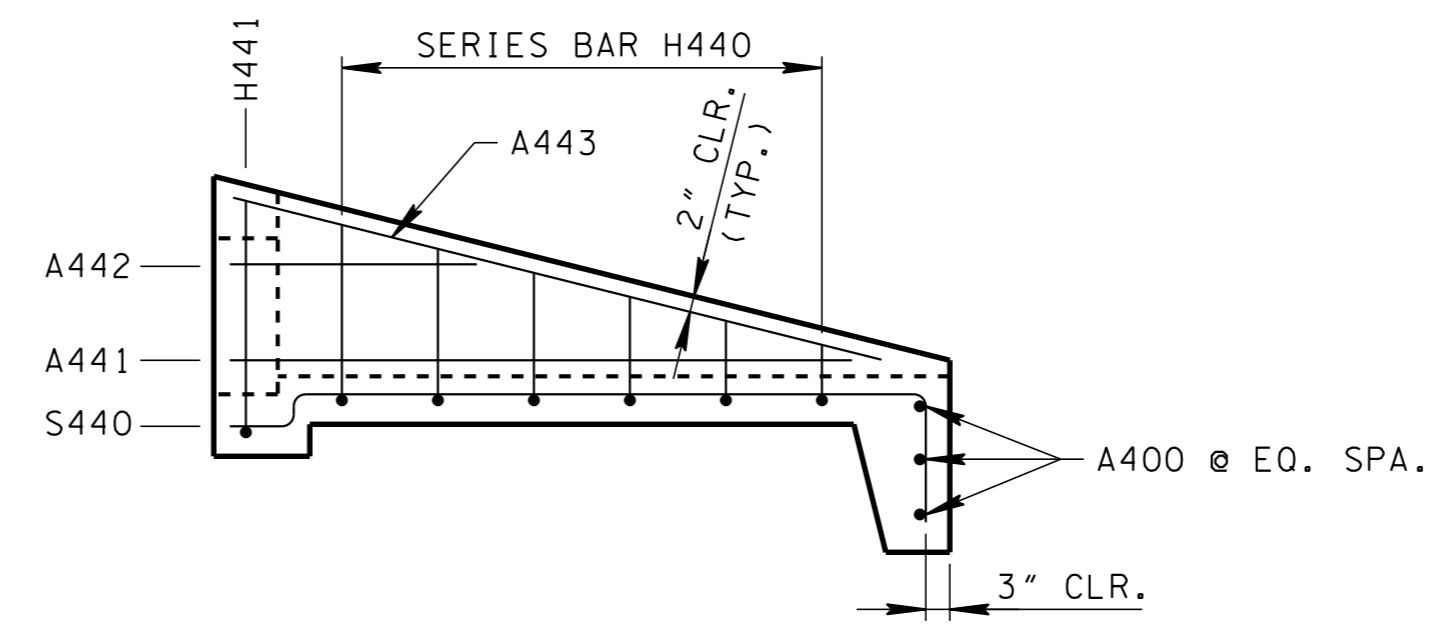
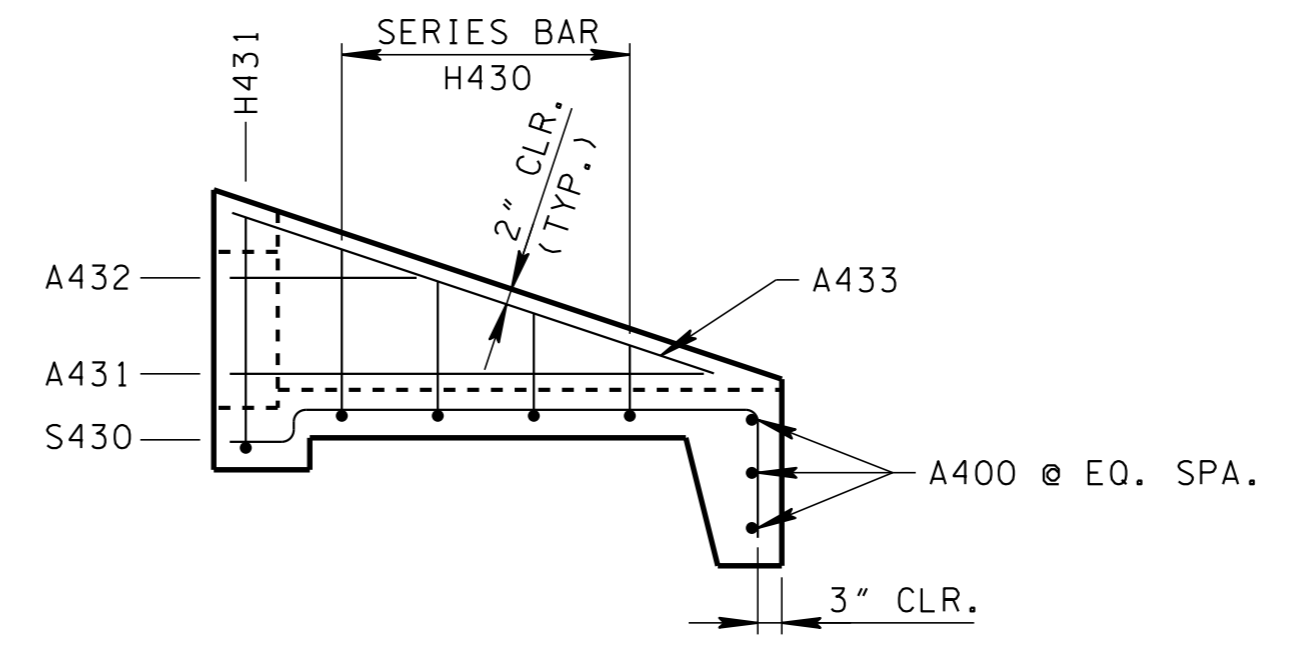
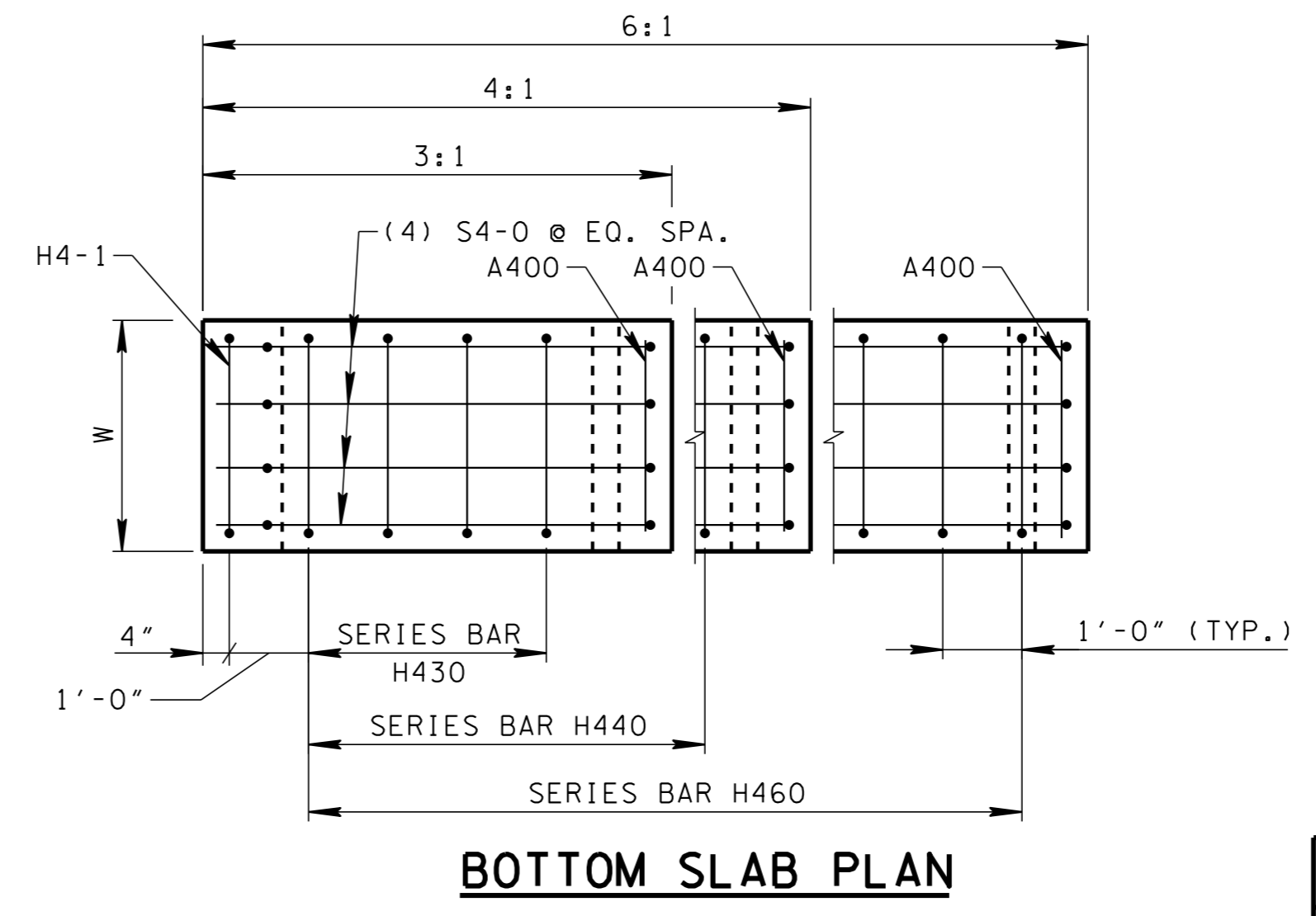
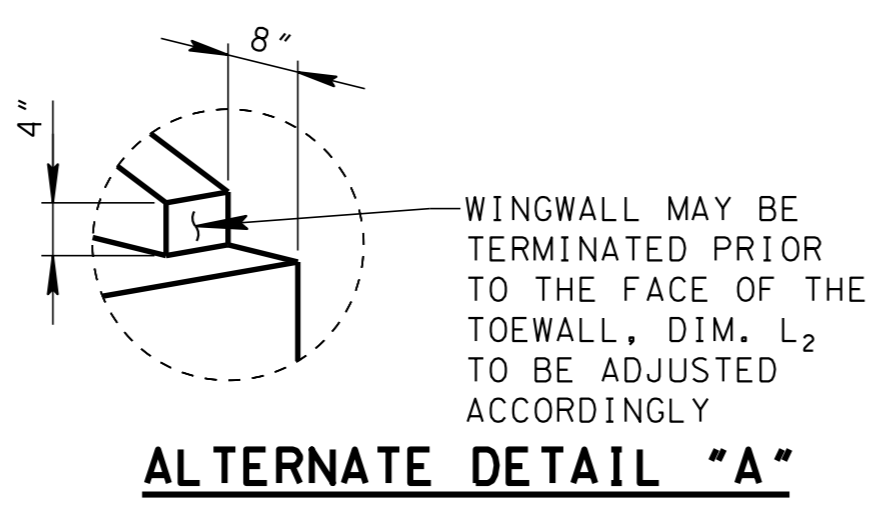
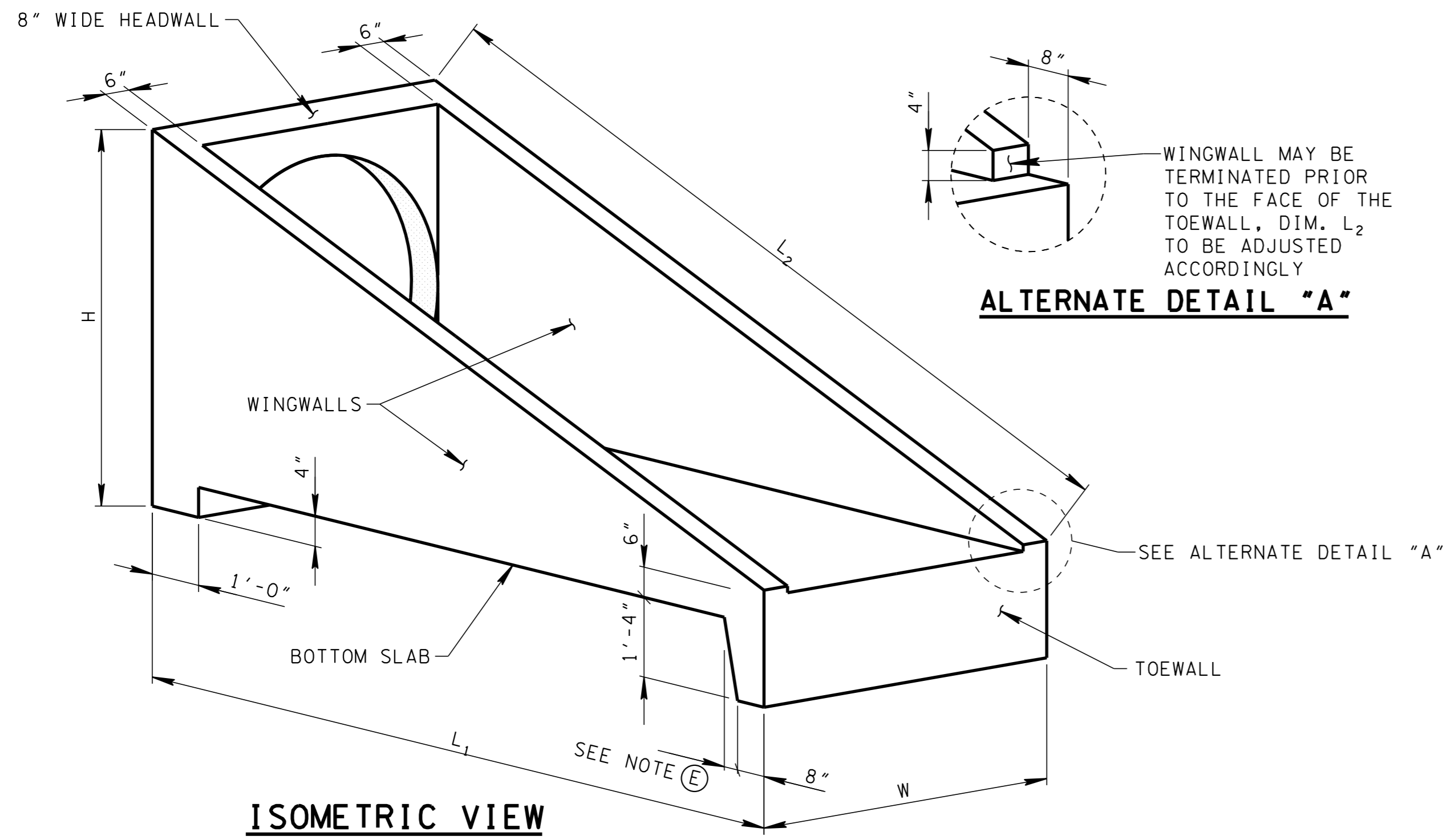
NOTE: WHEN ALTERNATE DETAIL IS PROVIDED, MINIMUM CLEAR DIMENSIONS AND INTERIOR SLAB THICKNESS SHOWN ON STANDARDS SHALL BE MAINTAINED.

ALTERNATE JOINT DETAILS



TYPICAL UNDERDRAIN CONNECTION DETAIL
SEE NOTE (H)



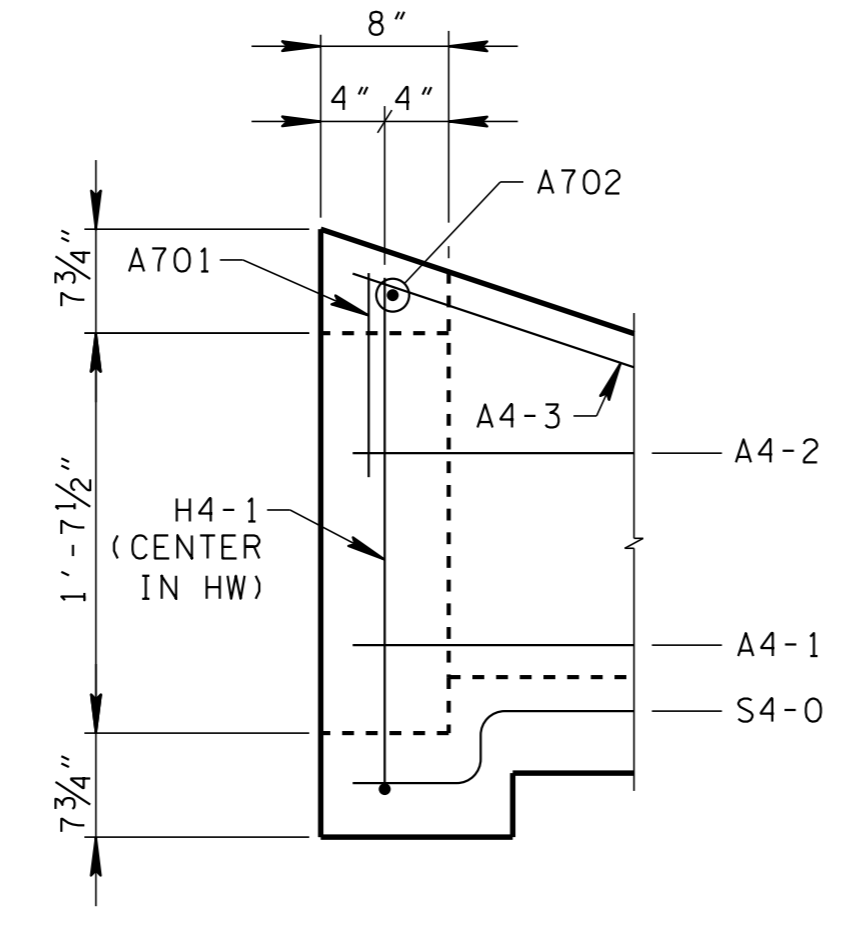
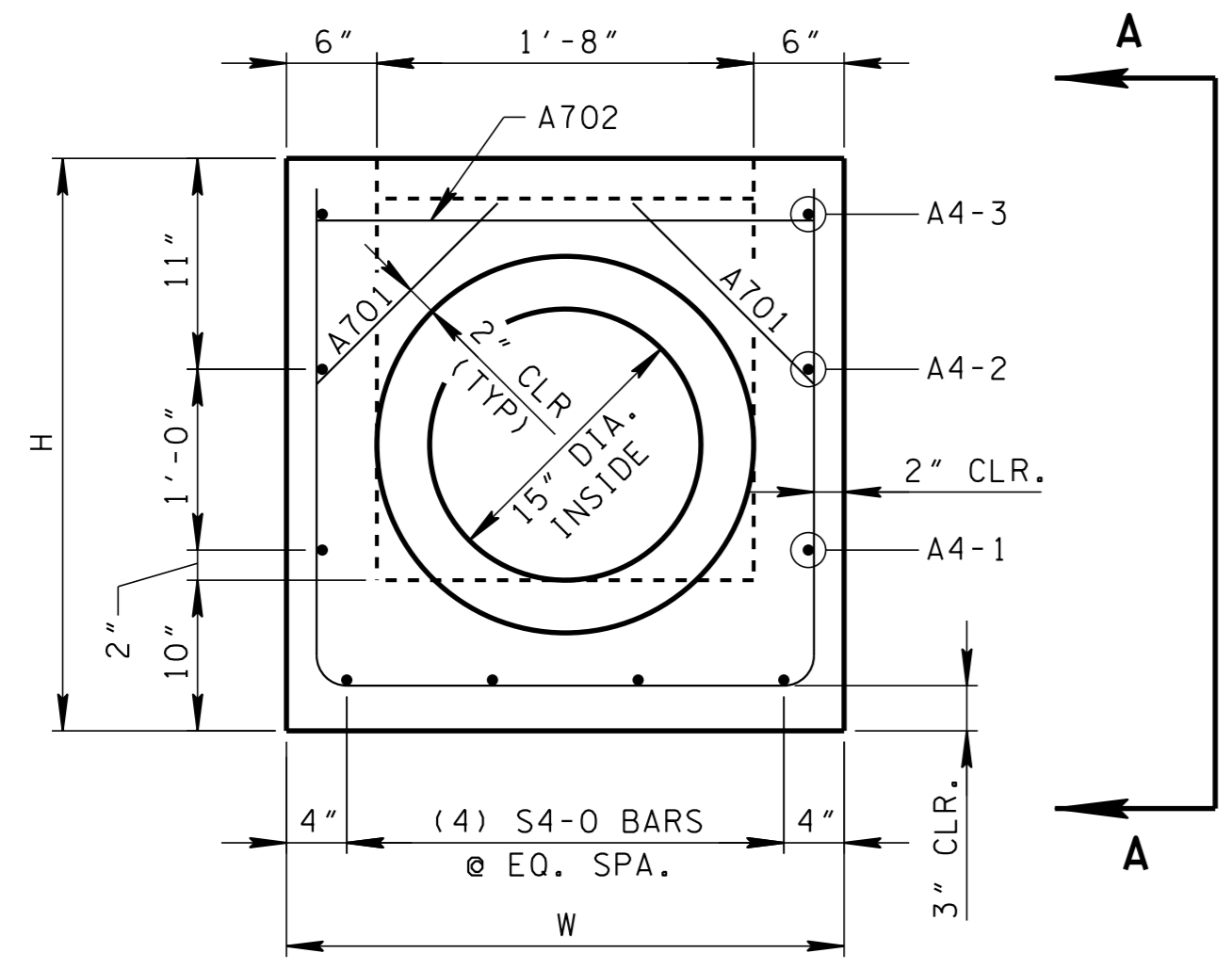


- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 15" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
 - (B) SEE STD. DWG. D-PE-15B FOR BILL OF STEEL & PRECAST NOTES.
 - (C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.
 - (D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.
 - (E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.
 - (F) OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.
 - (G) PAYMENT WILL BE MADE UNDER:

611-07.51	15IN ENDWALL (CROSS DRAIN) 3:1	EACH
611-07.52	15IN ENDWALL (CROSS DRAIN) 4:1	EACH
611-07.53	15IN ENDWALL (CROSS DRAIN) 6:1	EACH
 - (H) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.
 - (I) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

ISOMETRIC VIEW

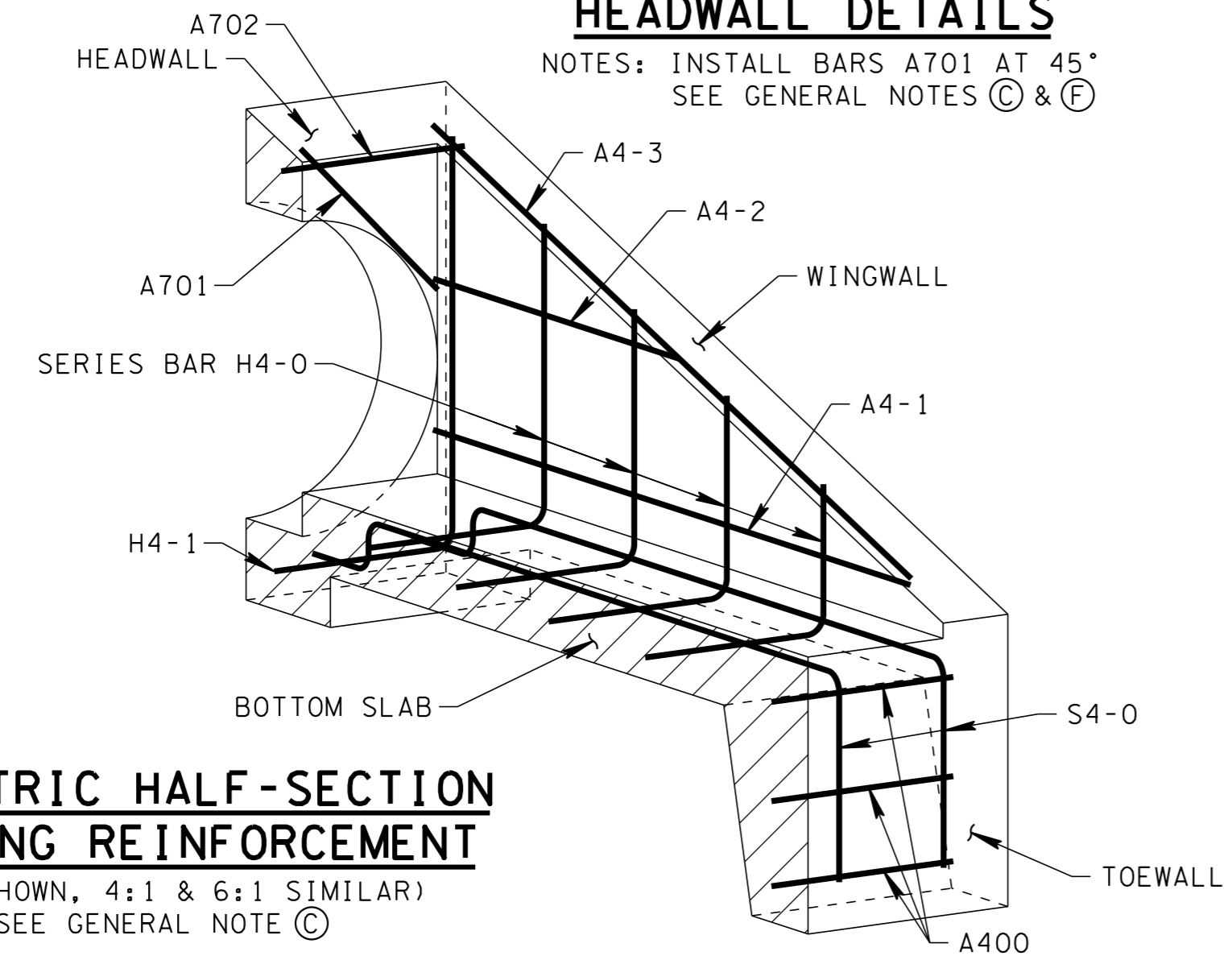
NOTE: 3/4" CHAMFER REQUIRED ON ALL EXPOSED EDGES



PARTIAL VIEW A-A

HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
SEE GENERAL NOTES (C) & (F)



ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

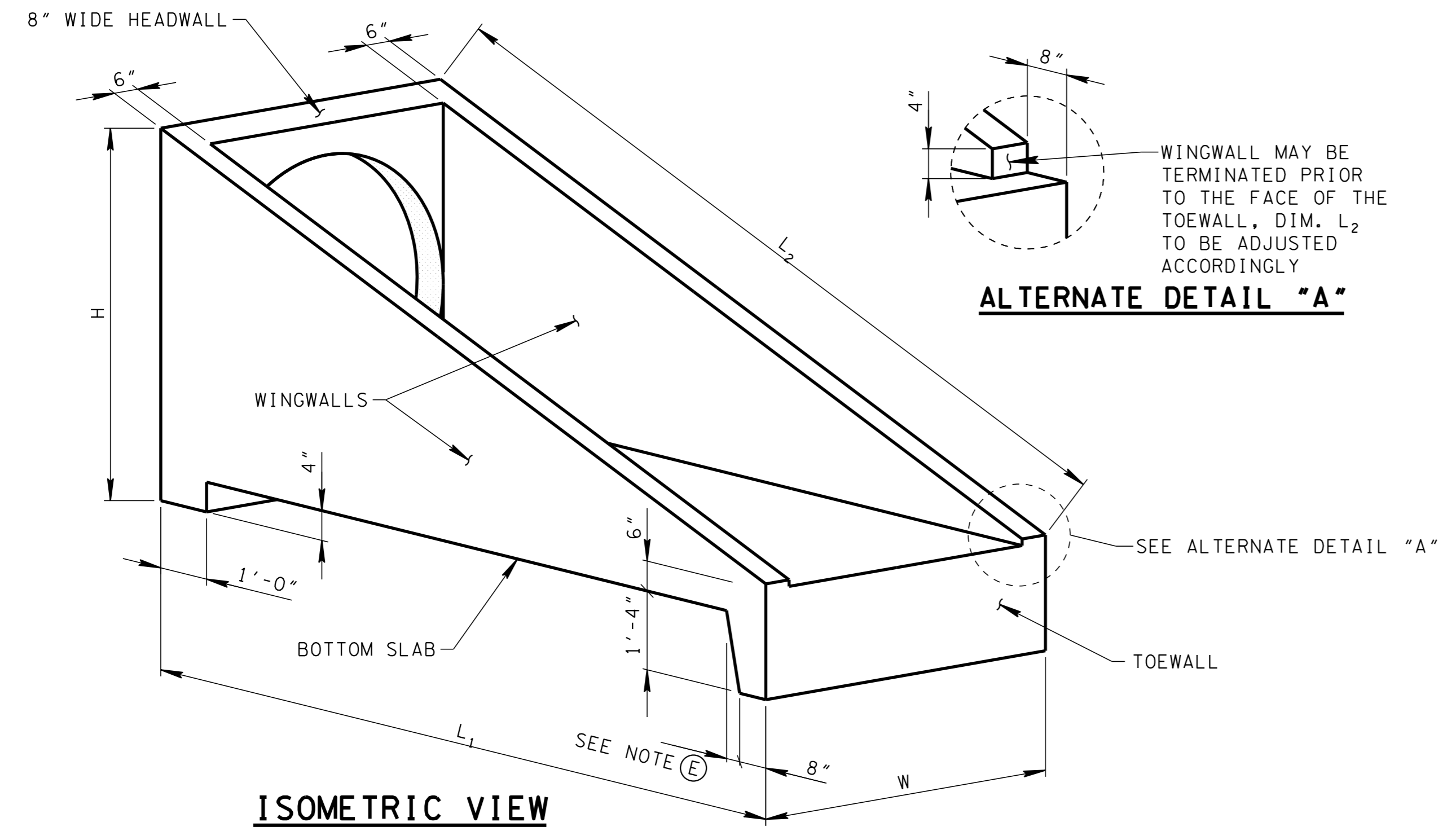
(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE (C)

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 15" PIPE						
SLOPE	CONCRETE ENDWALL DIMENSIONS				ESTIMATED QUANTITIES	
	H	L ₁	L ₂	W	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.
3:1		6' - 0"	6' - 3 7/8"	2' - 8"	0.72	68
4:1	2' - 11"	8' - 0"	8' - 3"		0.89	85
6:1		11' - 2"	11' - 3 7/8"		1.21	117

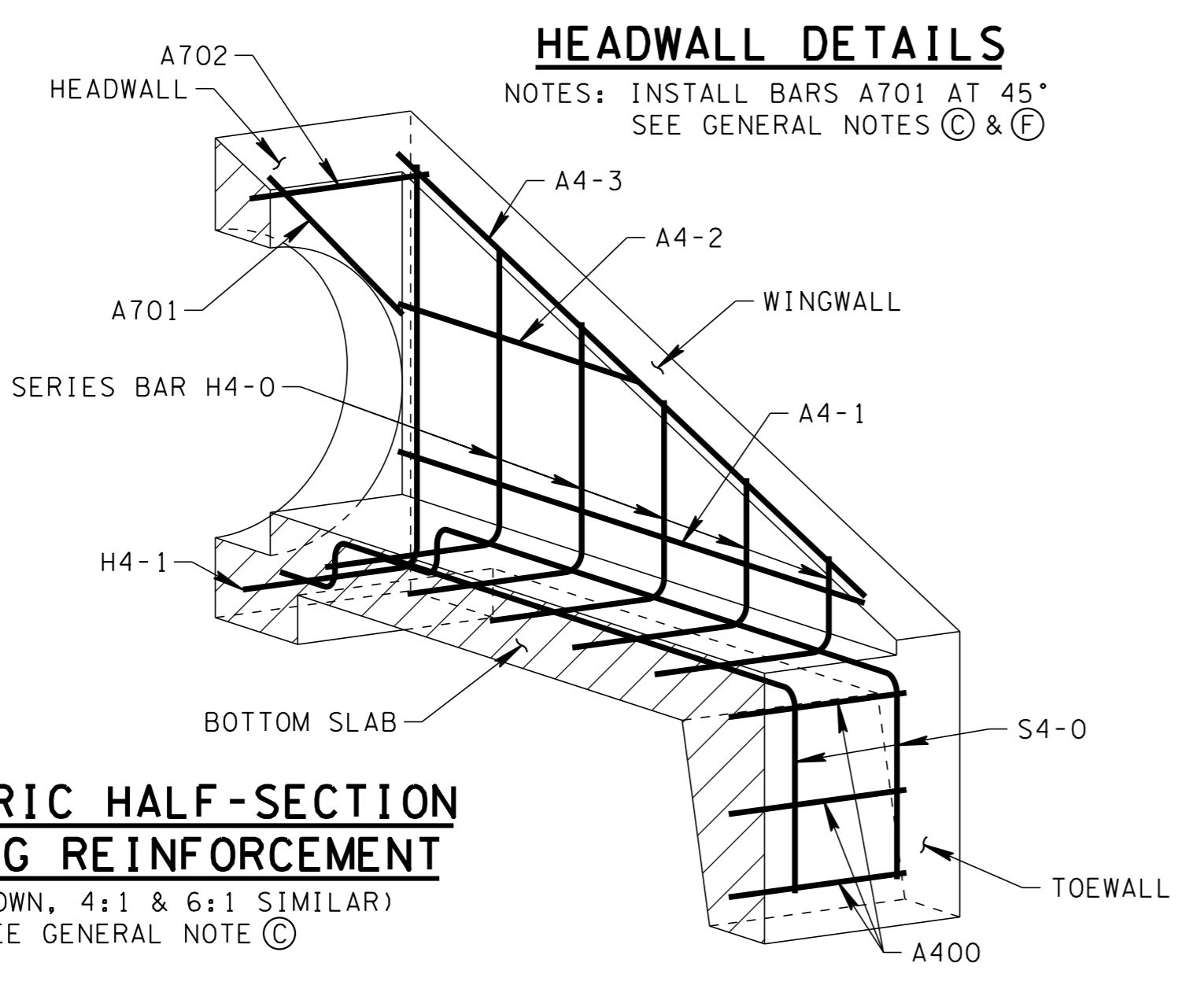
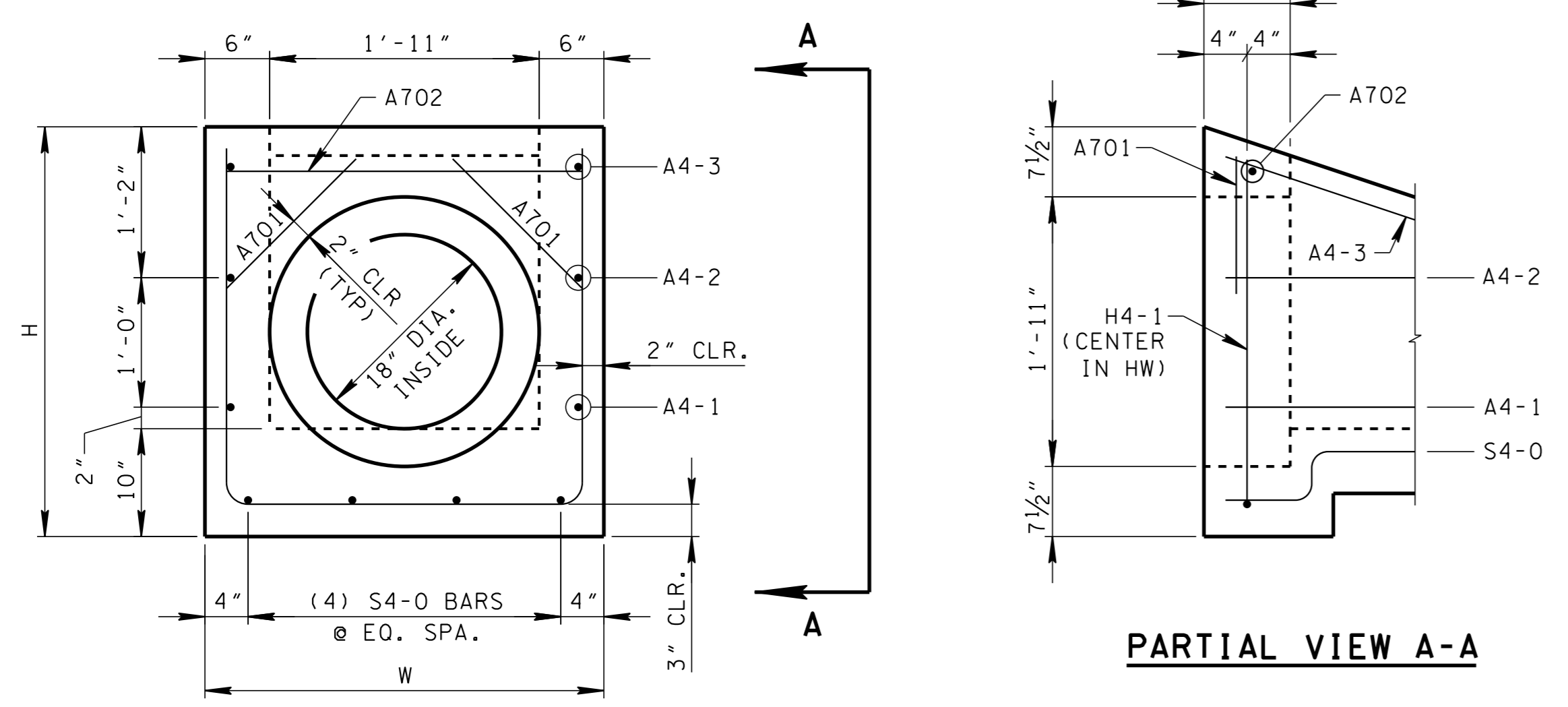
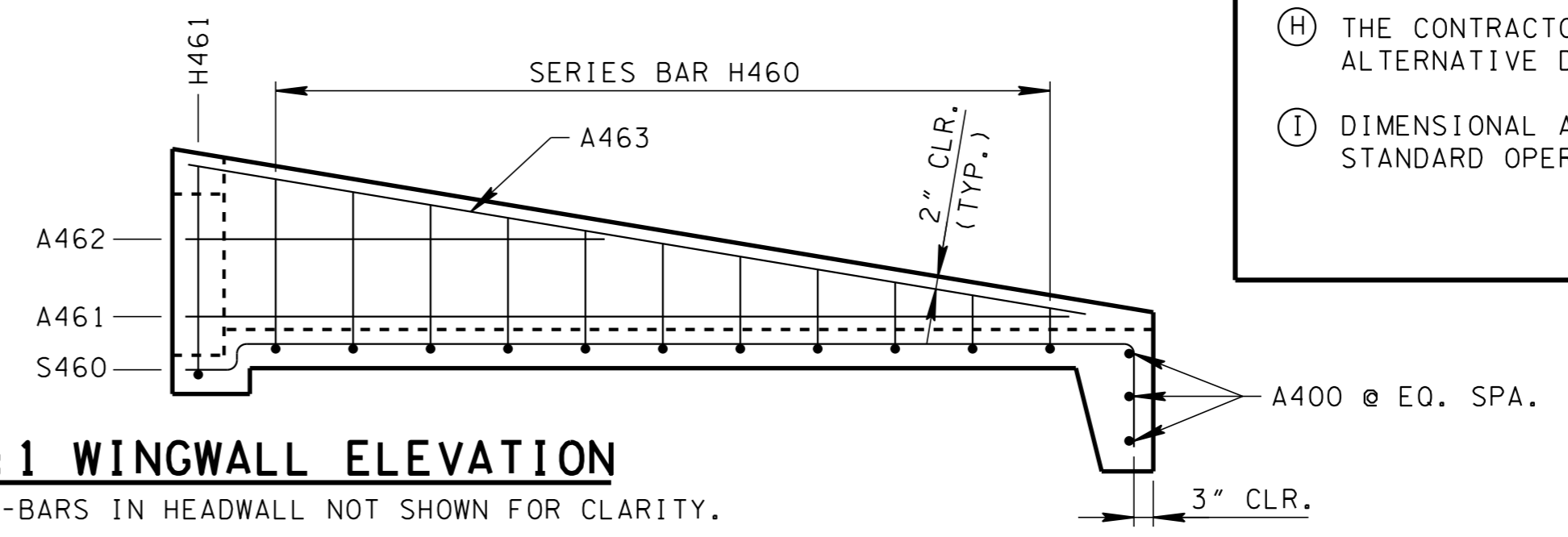
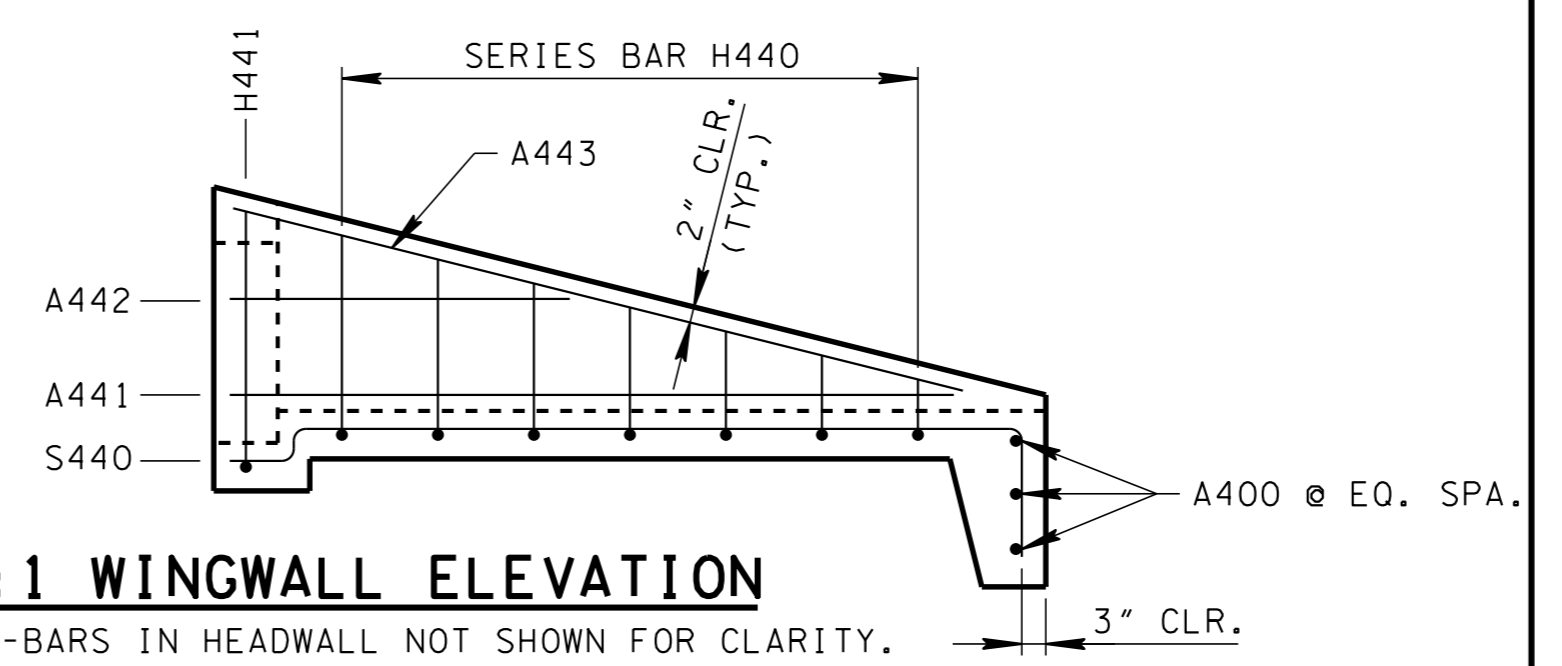
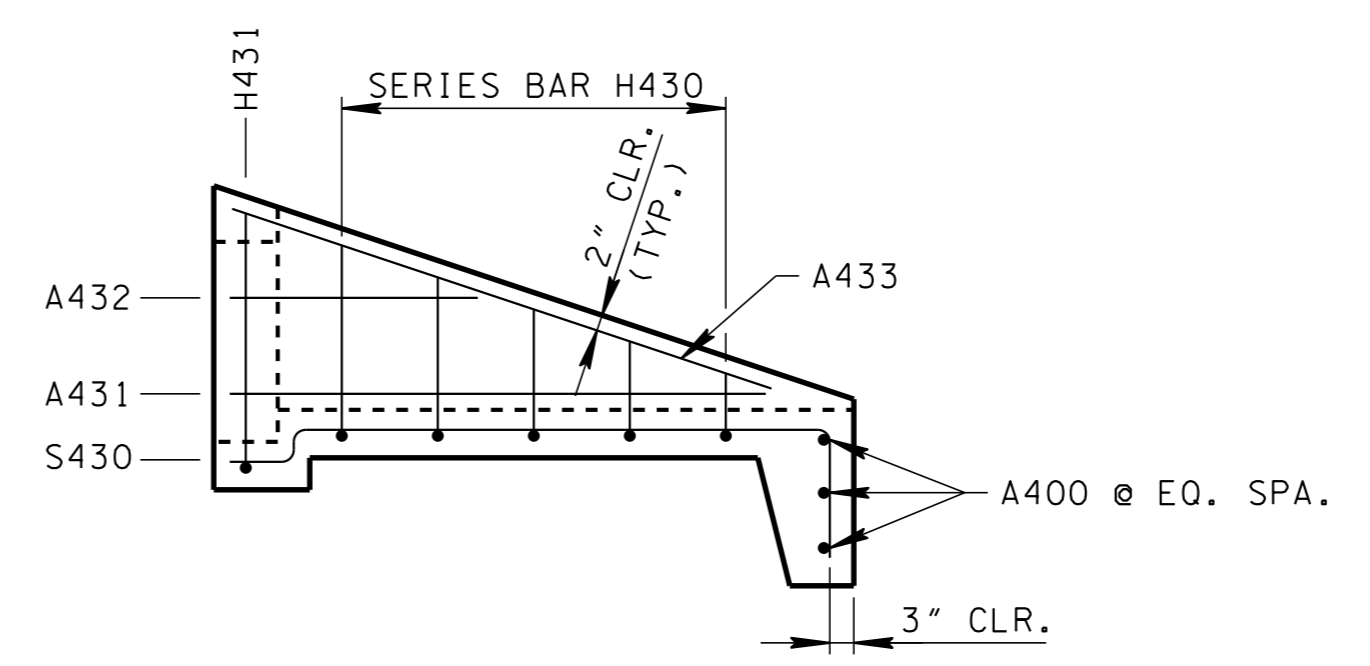
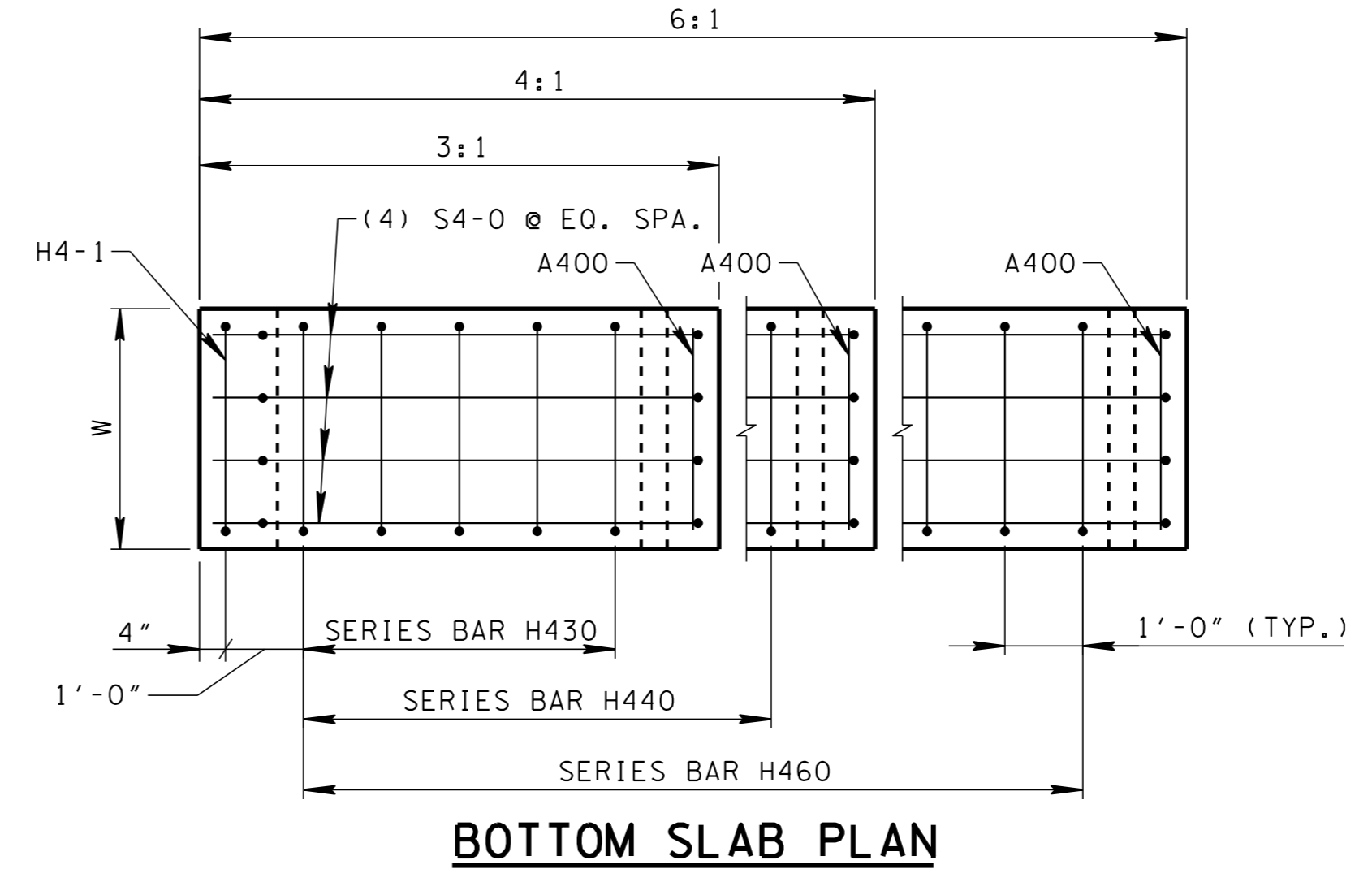
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

15" CONCRETE ENDWALL CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)



ALTERNATE DETAIL "A"



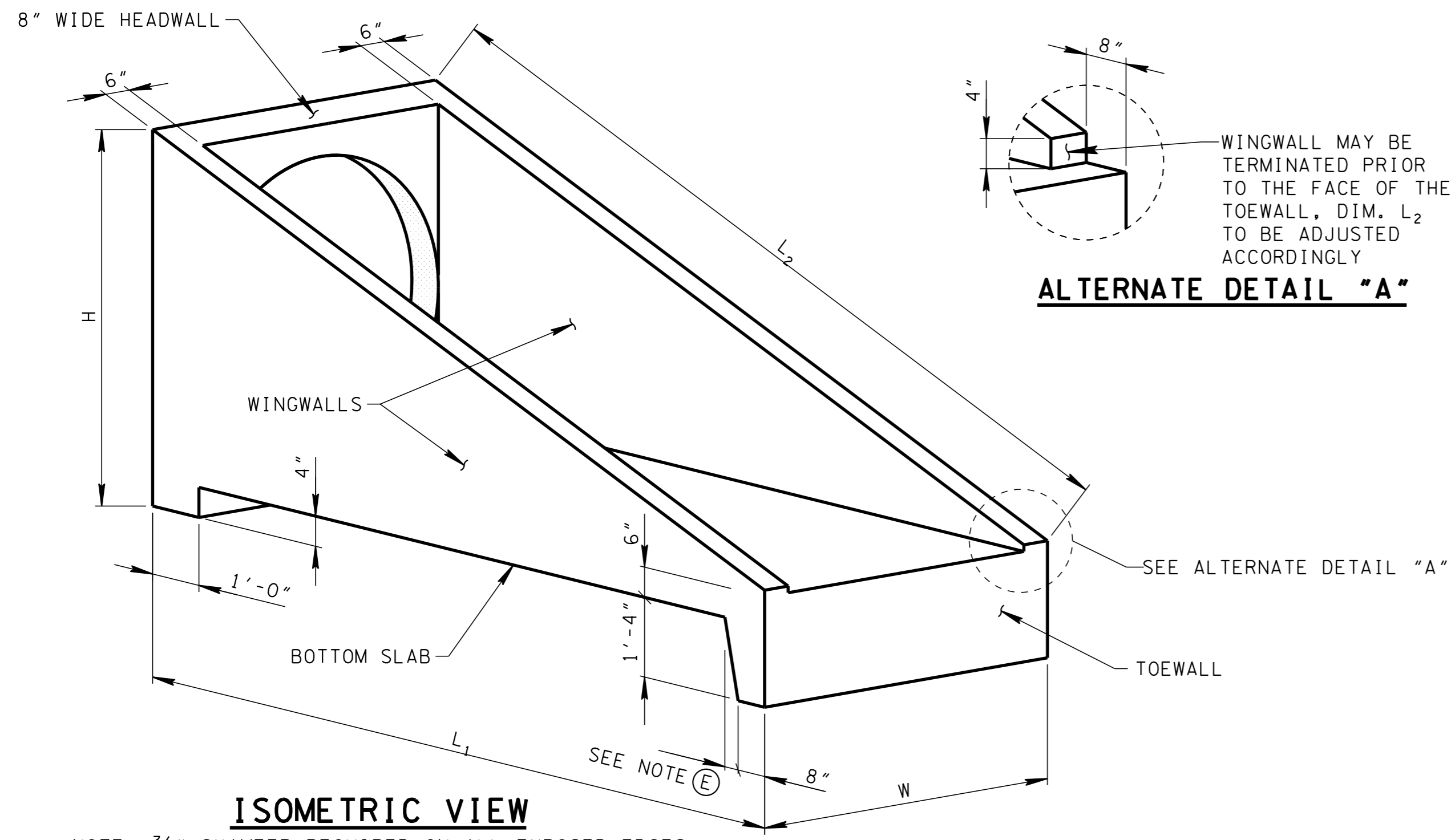
HEADWALL DETAILS

- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 18" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
 - (B) SEE STD. DWG. D-PE-18B FOR BILL OF STEEL & PRECAST NOTES.
 - (C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.
 - (D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.
 - (E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.
 - (F) OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.
 - (G) PAYMENT WILL BE MADE UNDER:

611-07.54	18IN ENDWALL (CROSS DRAIN) 3:1	EACH
611-07.55	18IN ENDWALL (CROSS DRAIN) 4:1	EACH
611-07.56	18IN ENDWALL (CROSS DRAIN) 6:1	EACH
 - (H) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.
 - (I) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

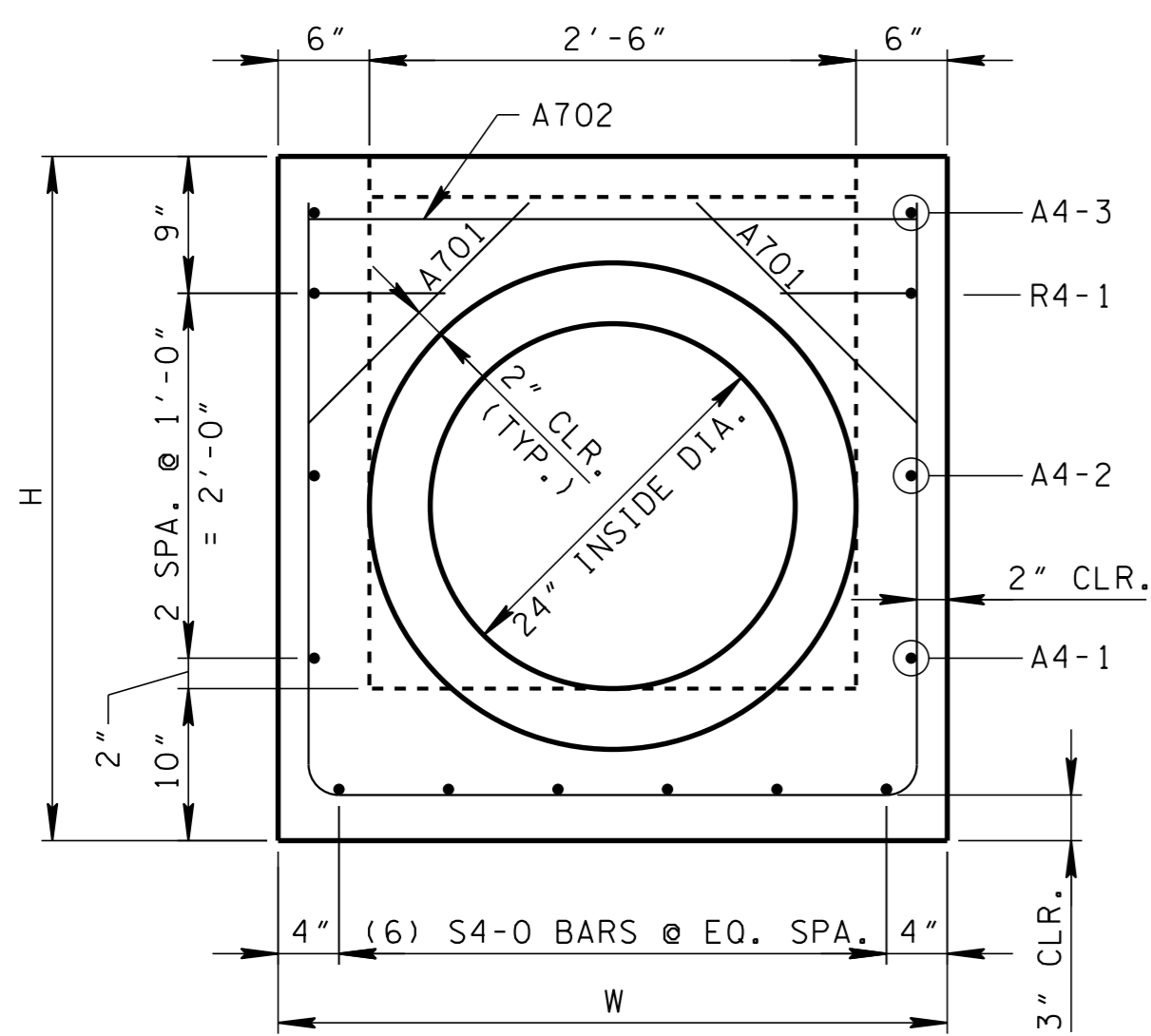
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 18" PIPE						
SLOPE	CONCRETE ENDWALL DIMENSIONS				ESTIMATED QUANTITIES	
	H	L ₁	L ₂	W	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.
3:1		6' - 8"	7' - 0 3/8"		0.87	79
4:1	3' - 2"	8' - 8"	8' - 11 1/4"	2' - 11"	1.08	98
6:1		12' - 8"	12' - 10 1/8"		1.49	137

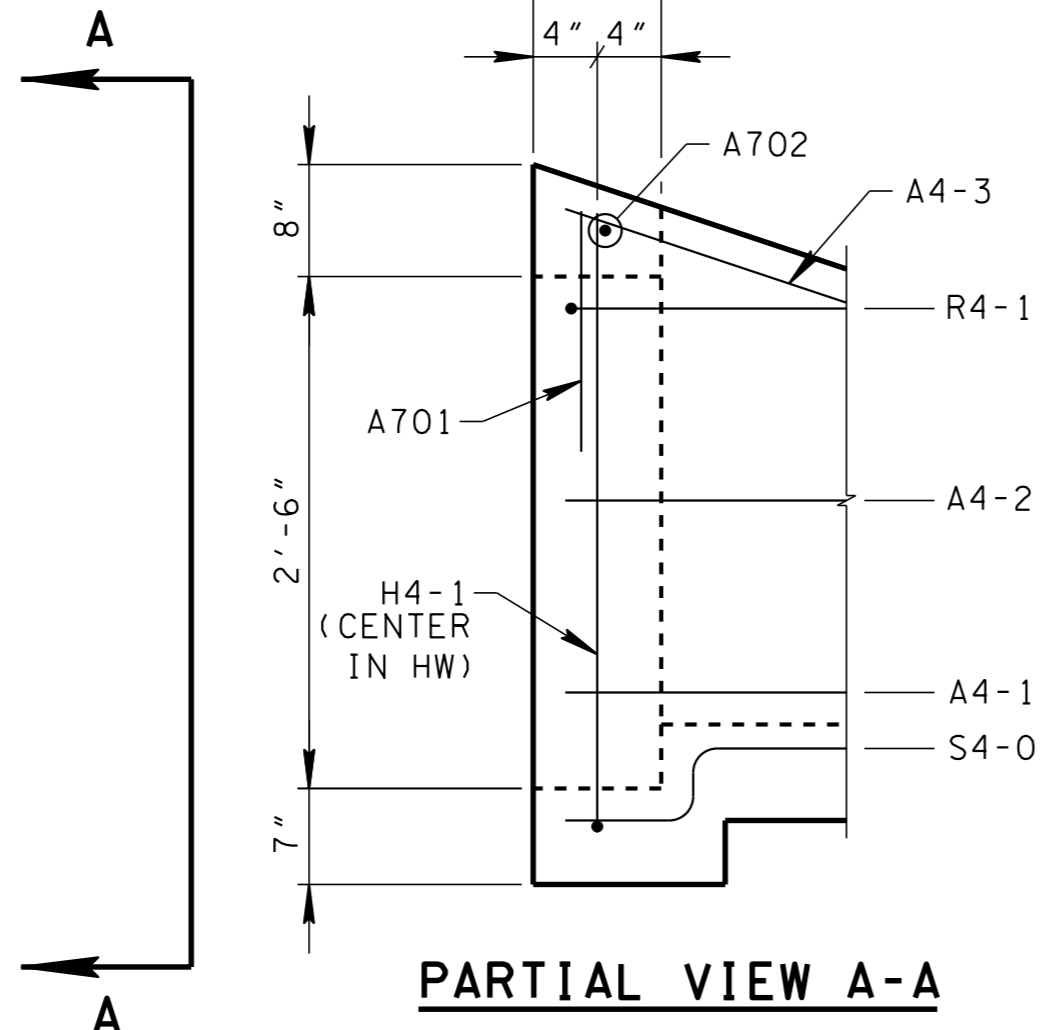


ISOMETRIC VIEW

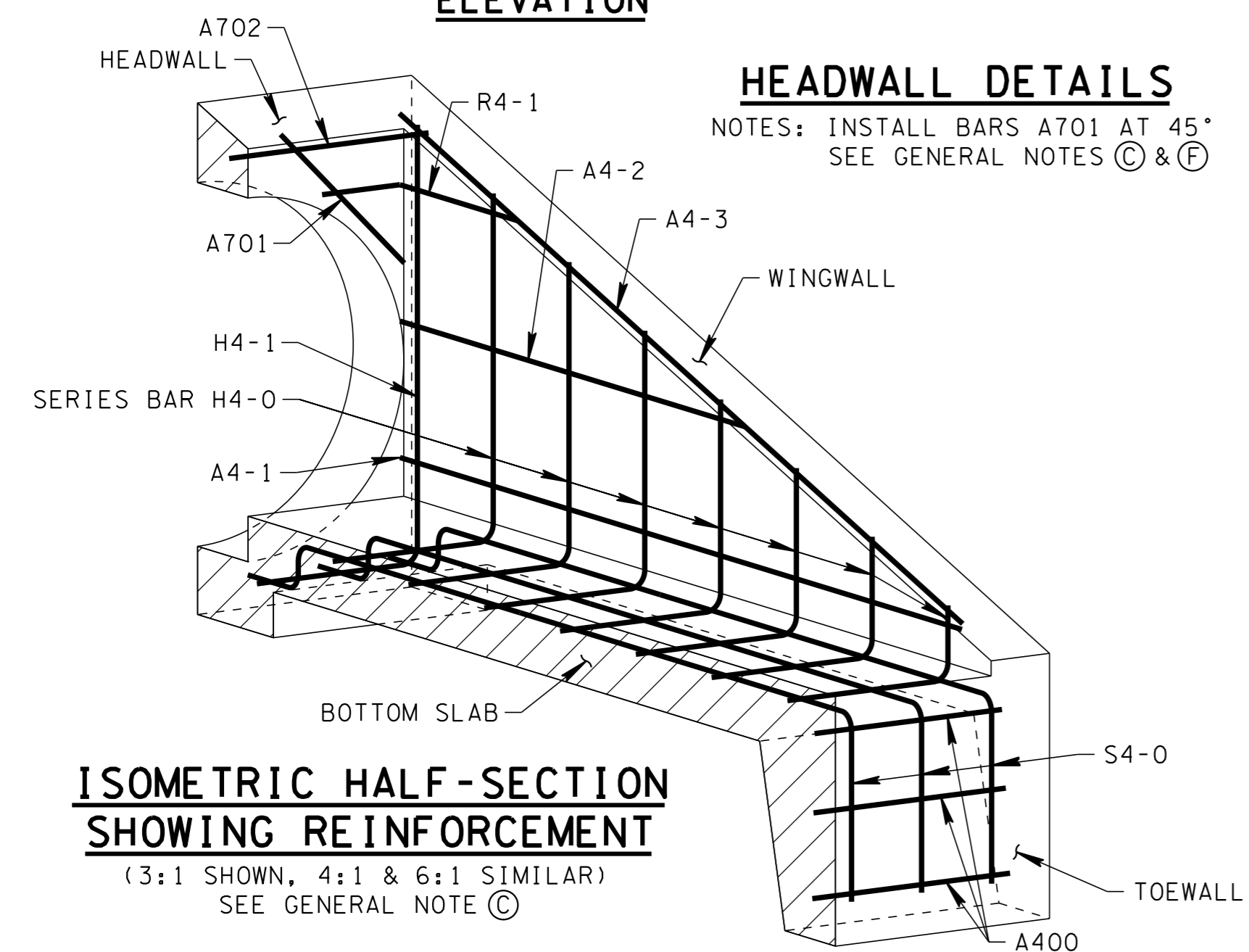
NOTE: 3/4" CHAMFER REQUIRED ON ALL EXPOSED EDGES



ELEVATION

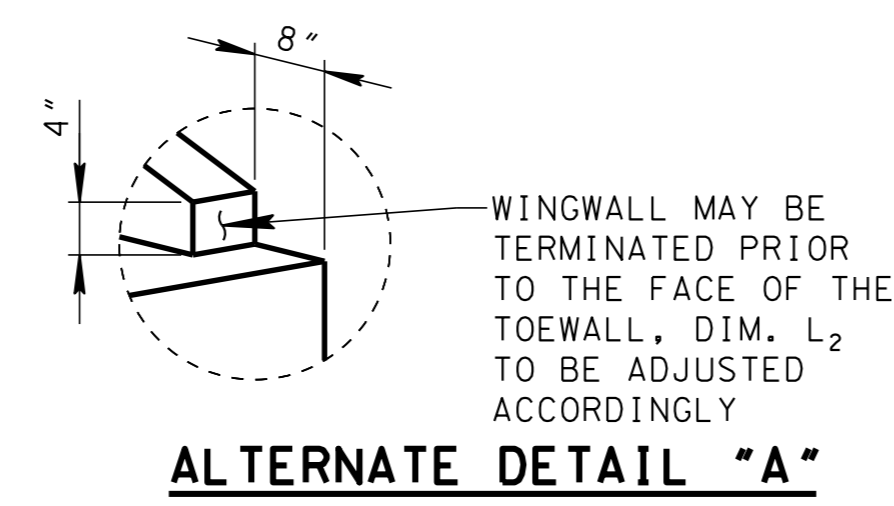


PARTIAL VIEW A-A

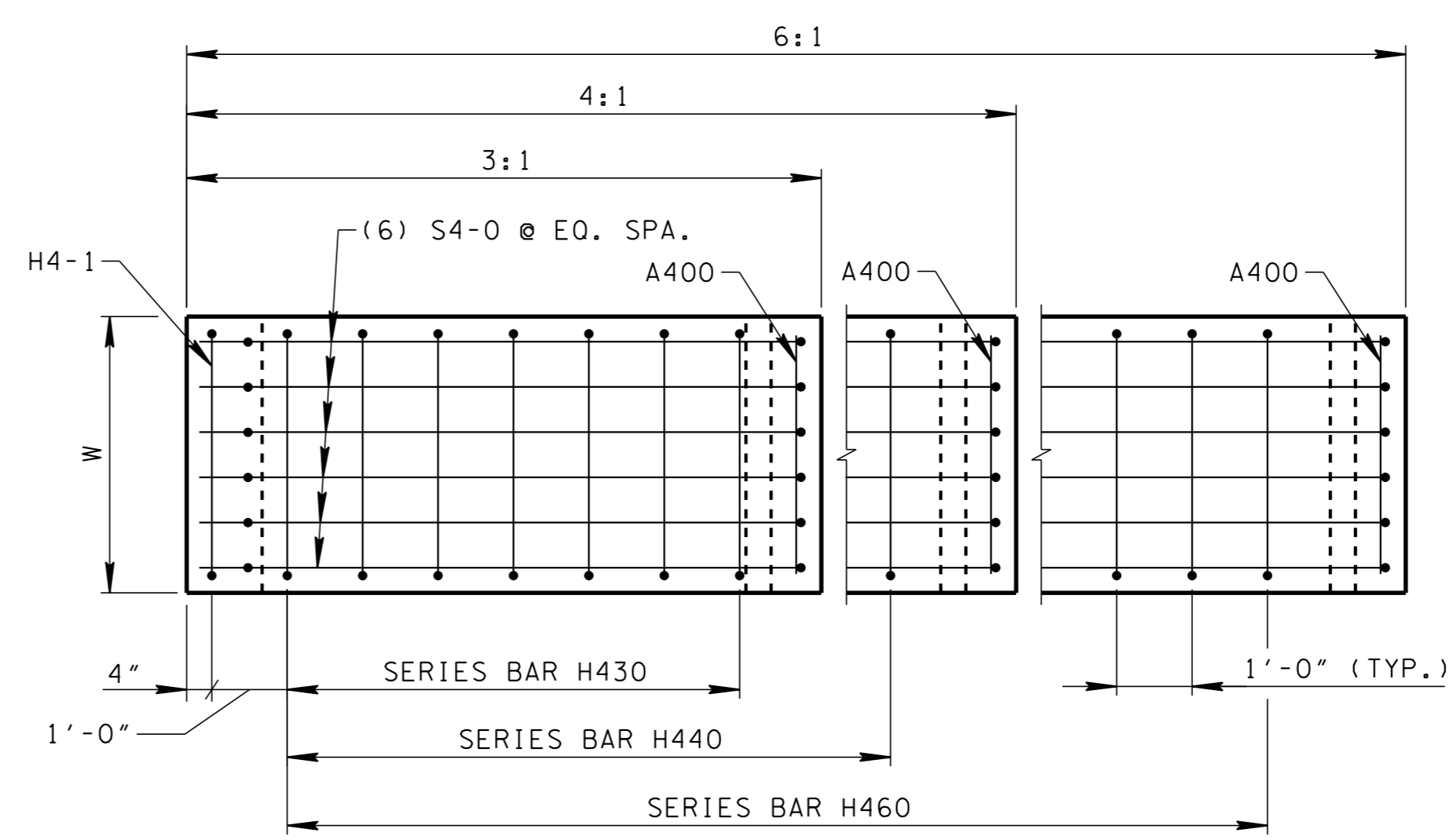


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

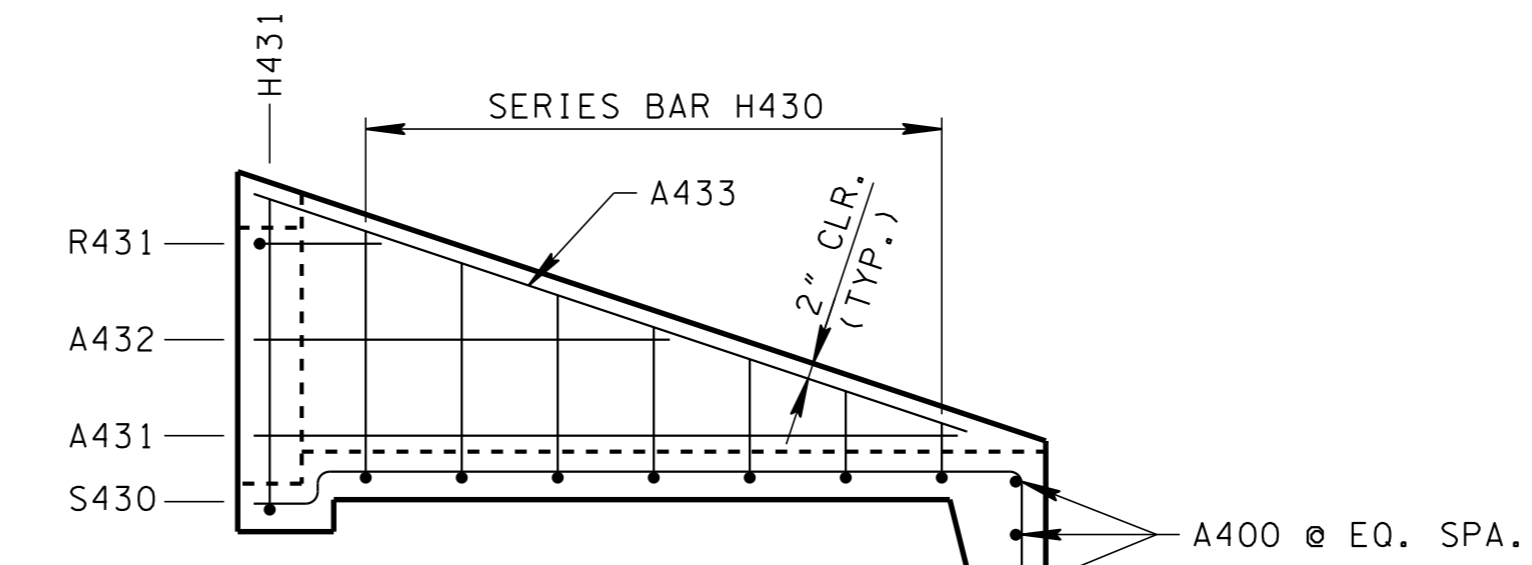
(3:1 SHOWN, 4:1 & 6:1 SIMILAR) SEE GENERAL NOTE C



ALTERNATE DETAIL "A"

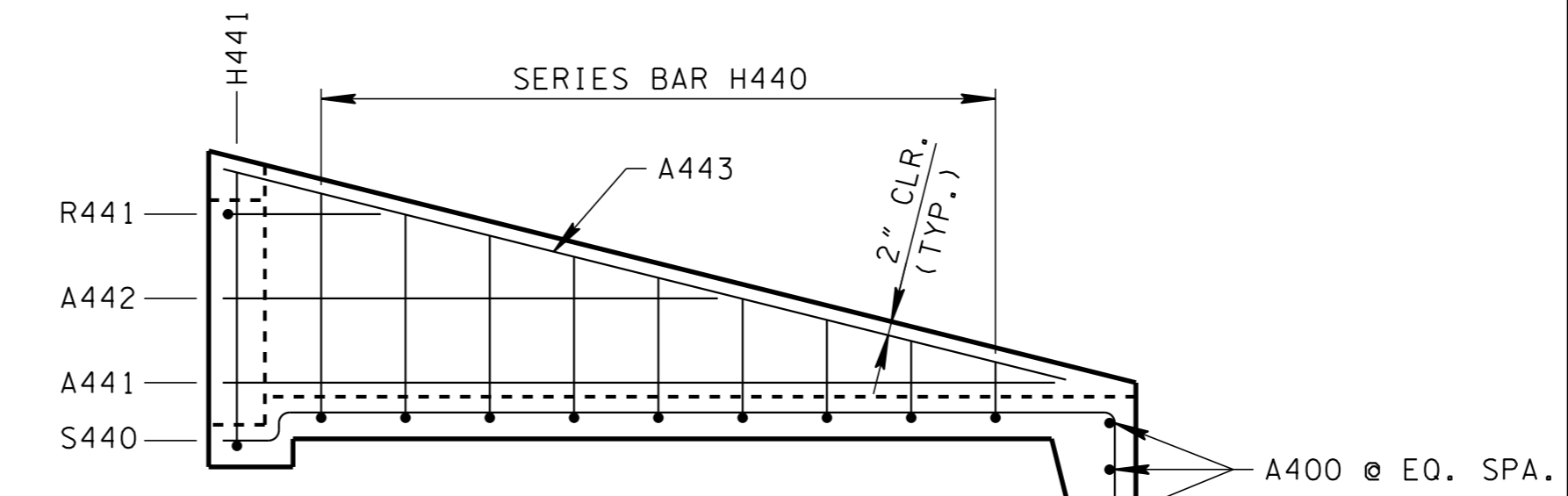


BOTTOM SLAB PLAN



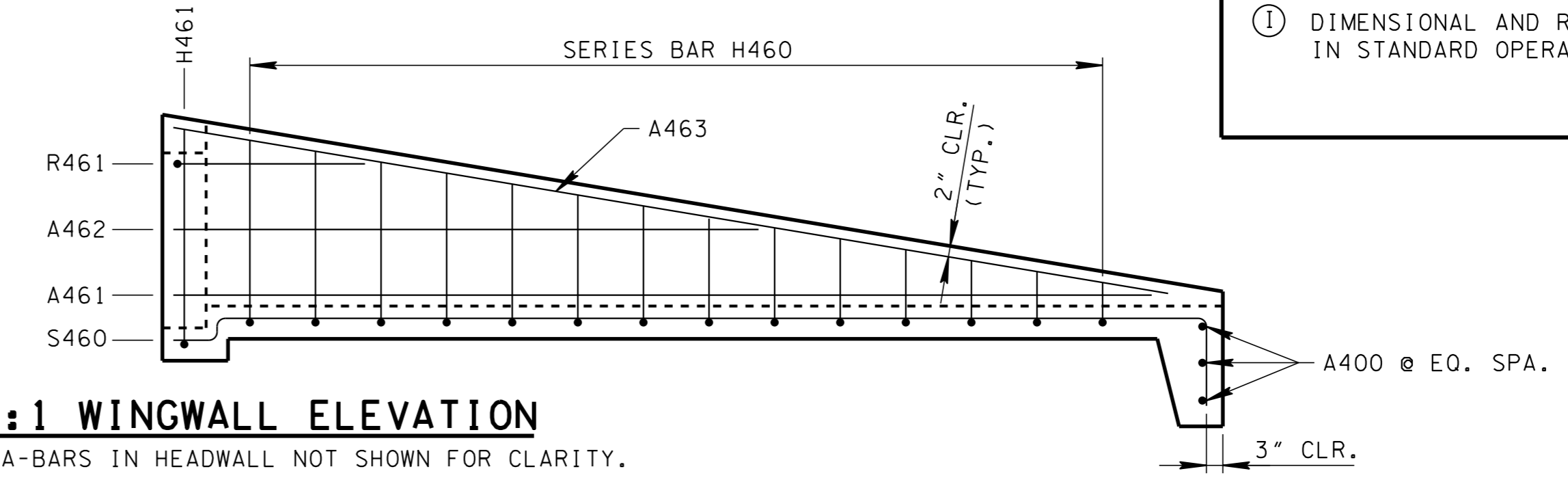
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 24" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
 - (B) SEE STD. DWG. D-PE-24B FOR BILL OF STEEL & PRECAST NOTES.
 - (C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.
 - (D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.
 - (E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.
 - (F) OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.
 - (G) PAYMENT WILL BE MADE UNDER:

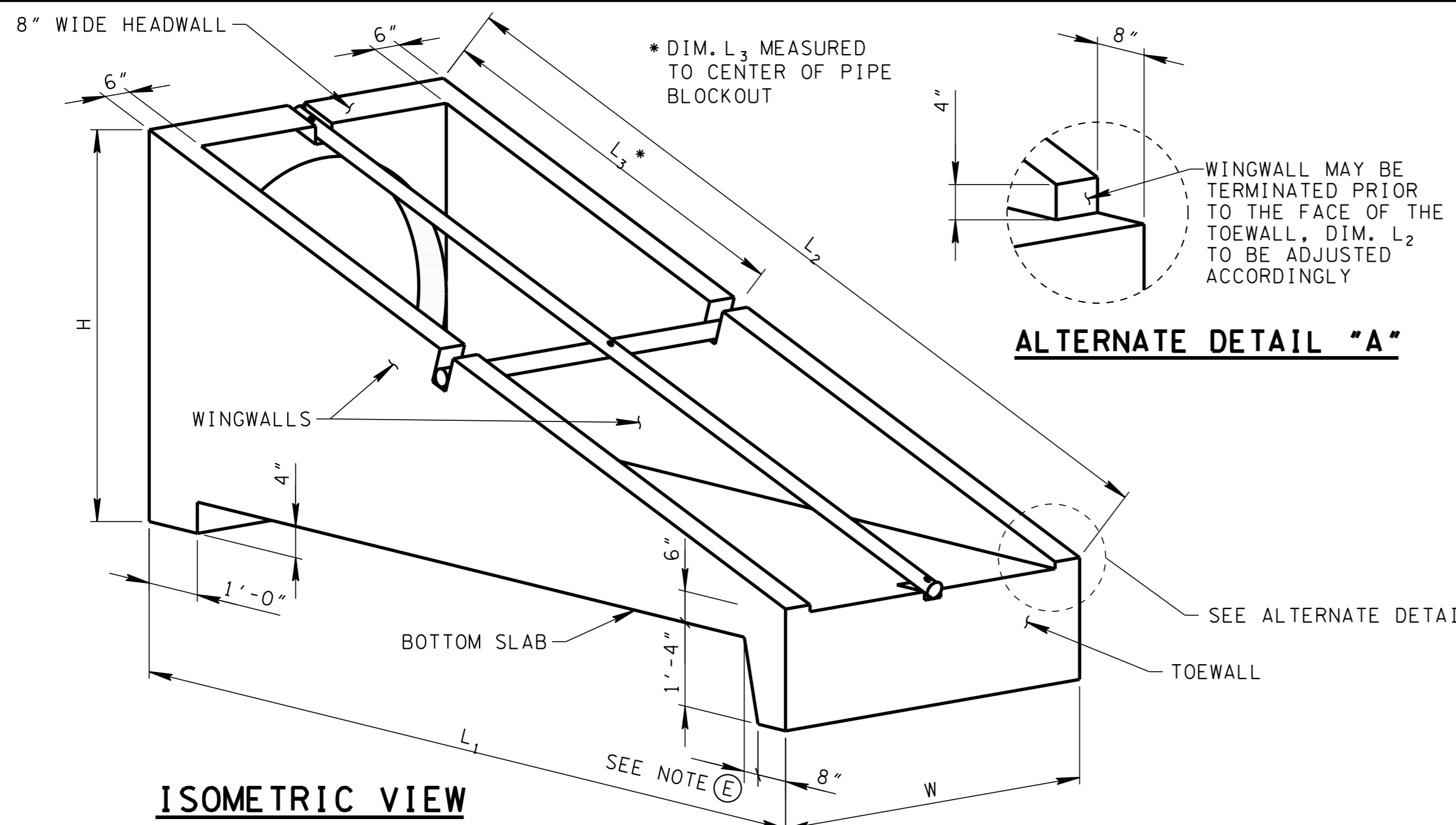
611-07.57	24IN ENDWALL (CROSS DRAIN) 3:1	EACH
611-07.58	24IN ENDWALL (CROSS DRAIN) 4:1	EACH
611-07.59	24IN ENDWALL (CROSS DRAIN) 6:1	EACH
 - (H) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATE DESIGN.
 - (I) DIMENSIONAL AND REINFORCEMENT TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATION PROCEDURE (SOP) 5-3.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 24" PIPE						
SLOPE	CONCRETE ENDWALL DIMENSIONS				ESTIMATED QUANTITIES	
	H	L ₁	L ₂	W	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.
3:1	3' - 9"	8' - 5"	8' - 10 1/2"	3' - 6"	1.28	124
4:1		11' - 0"	11' - 4"		1.61	153
6:1		16' - 2"	16' - 4 5/8"		2.26	215

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

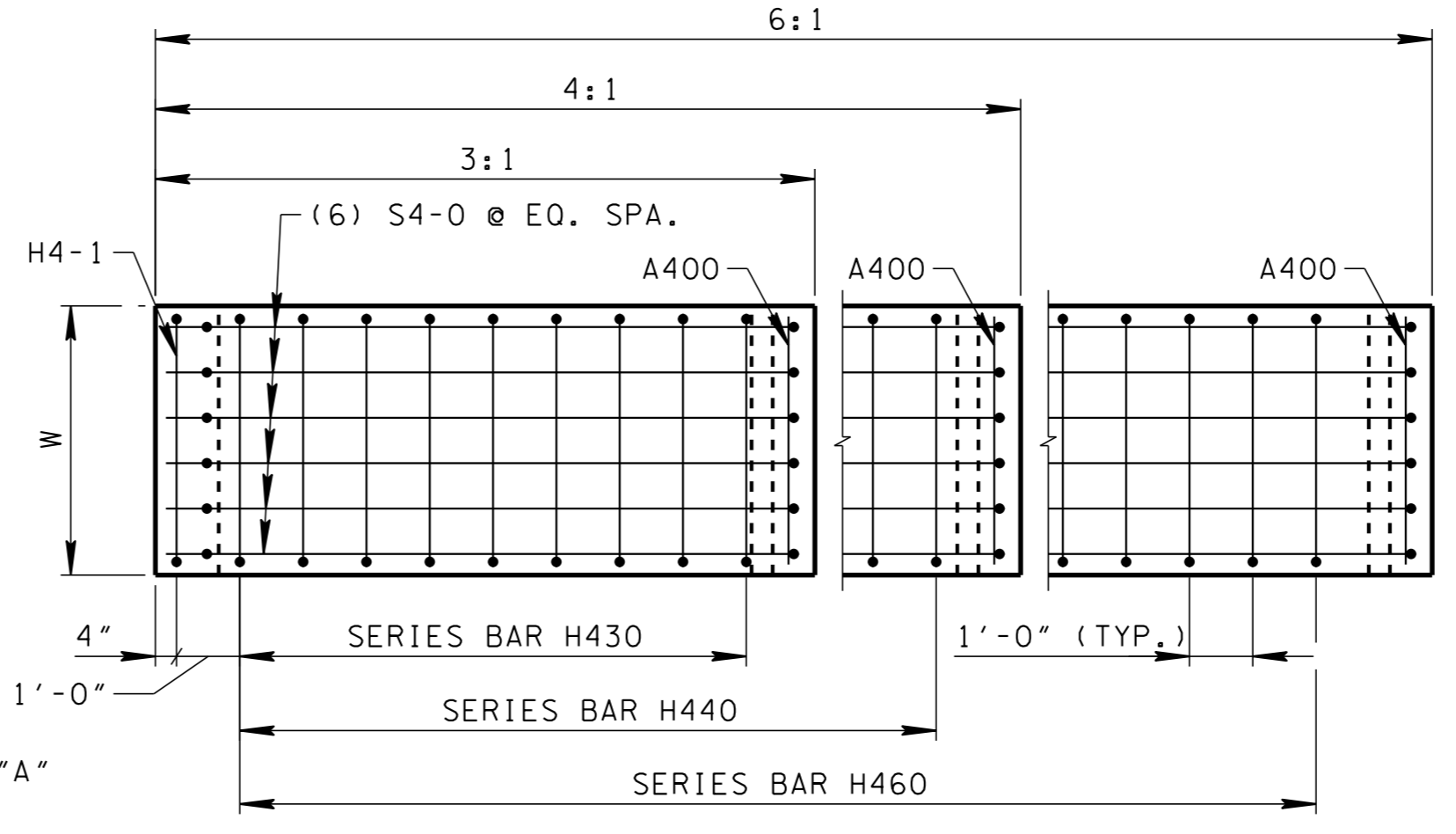
24" CONCRETE ENDWALL CROSS DRAIN
(FOR 3:1, 4:1 & 6:1 SLOPES)



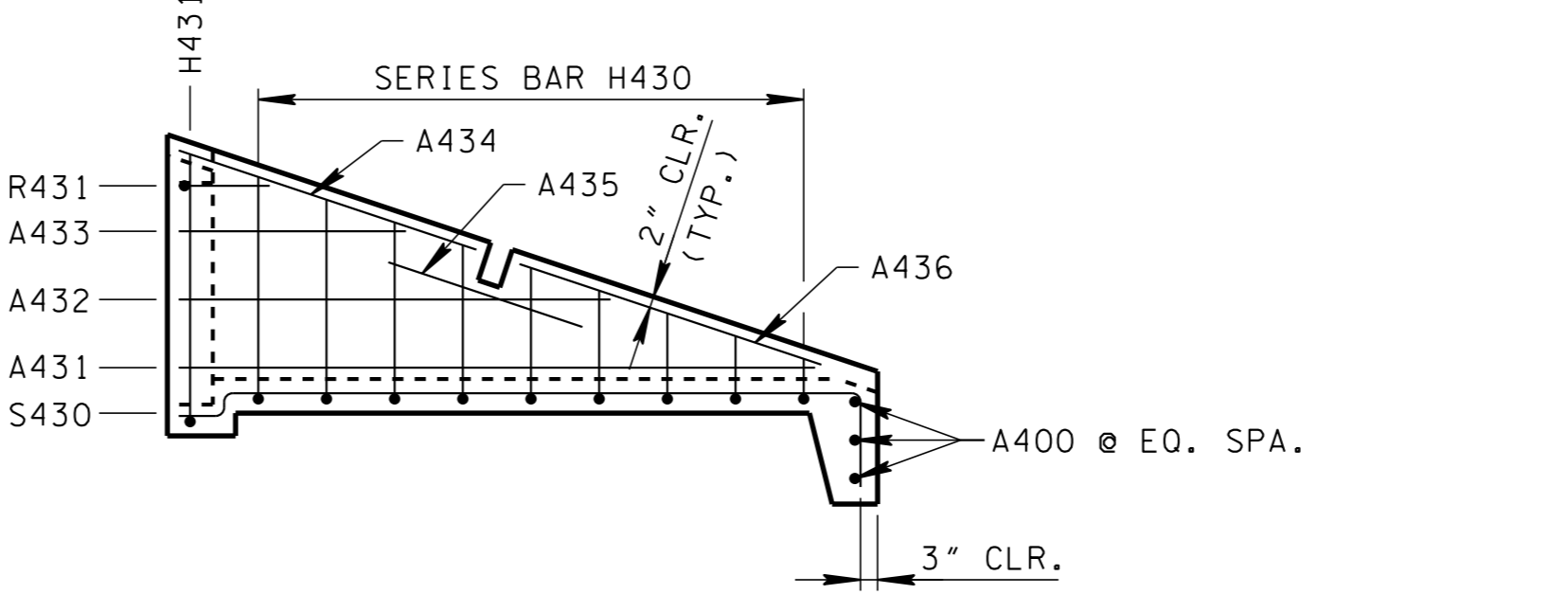
ISOMETRIC VIEW

NOTES: SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
 3/4\"/>

ALTERNATE DETAIL "A"

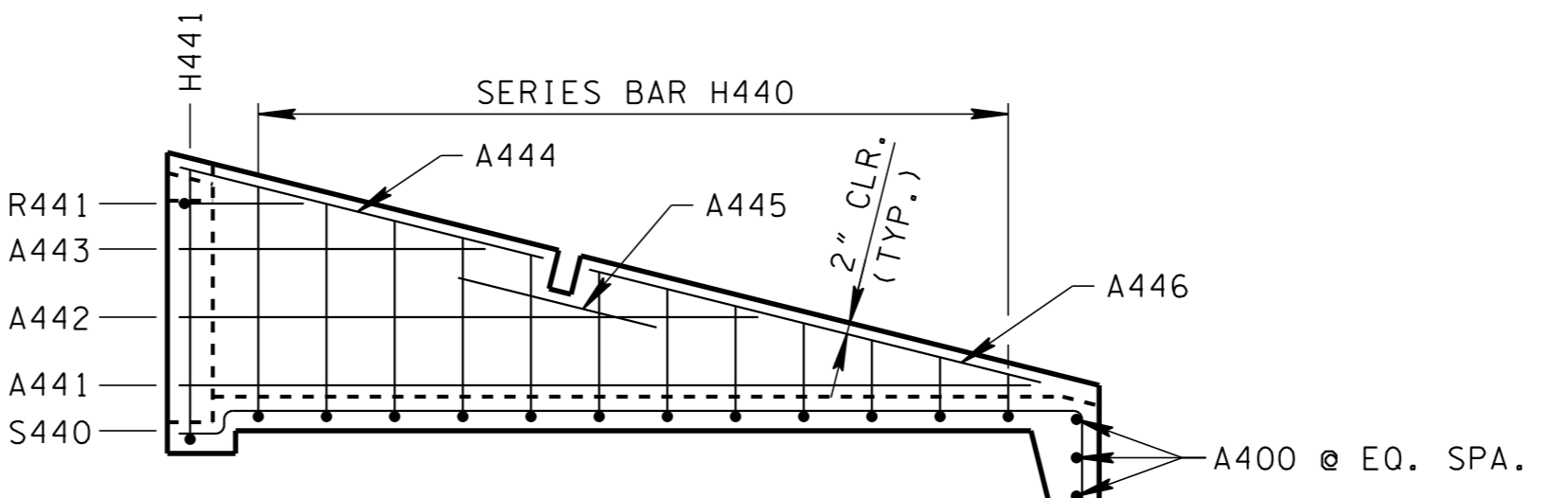


BOTTOM SLAB PLAN



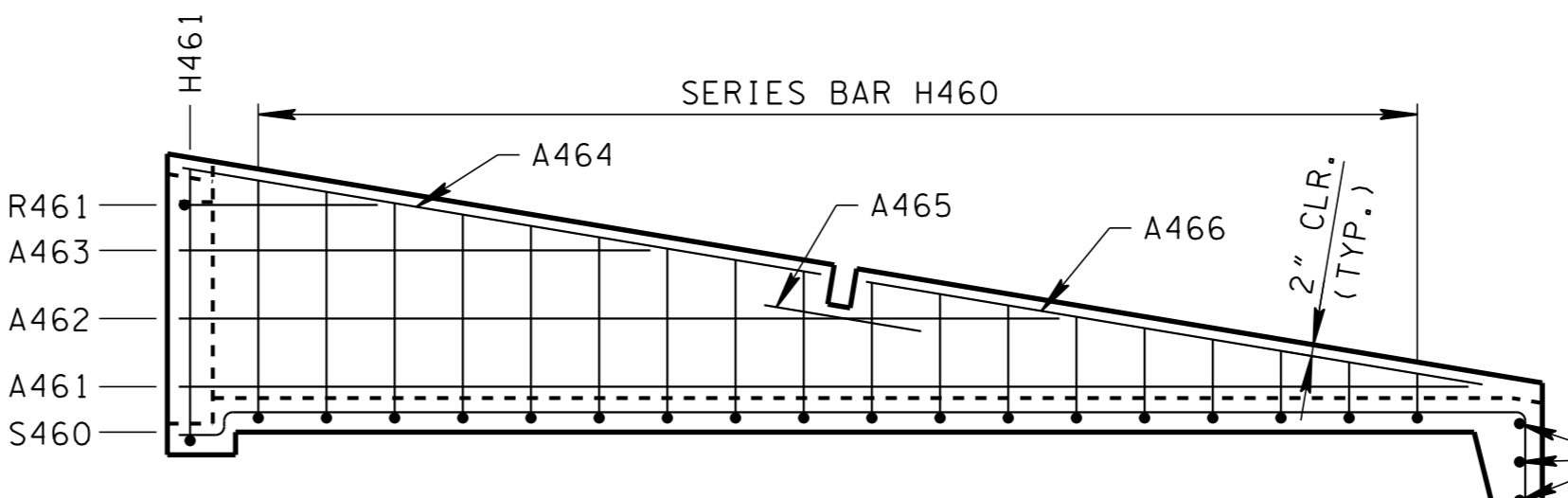
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

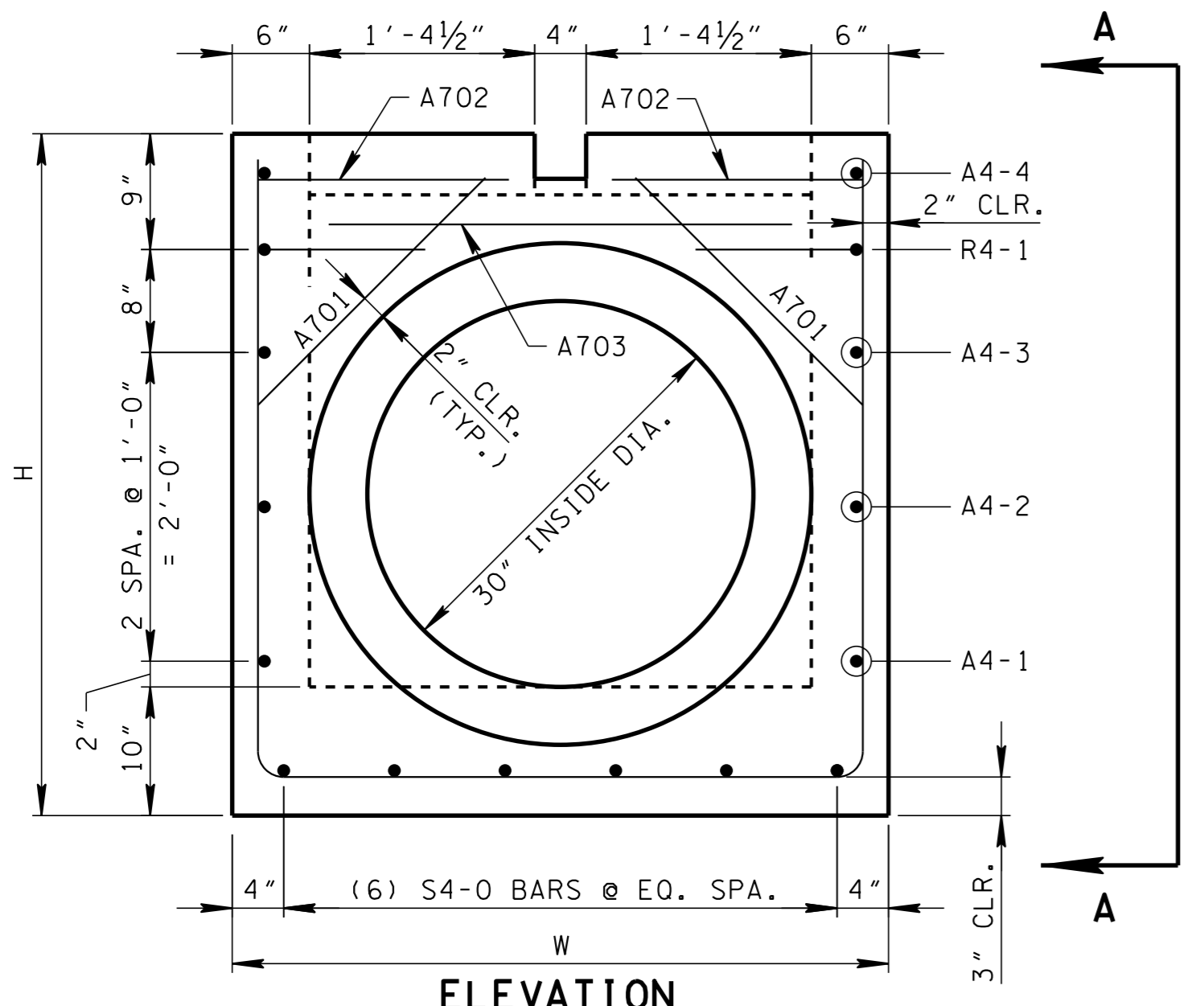


6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 30" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
 - (B) SEE STD. DWG. D-PE-30B FOR BILL OF STEEL & PRECAST NOTES.
 - (C) "--" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.
 - (D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.
 - (E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.
 - (F) OPTIONAL STEPPED HOLE IS ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS A701 AND A703 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.
 - (G) PAYMENT WILL BE MADE UNDER:

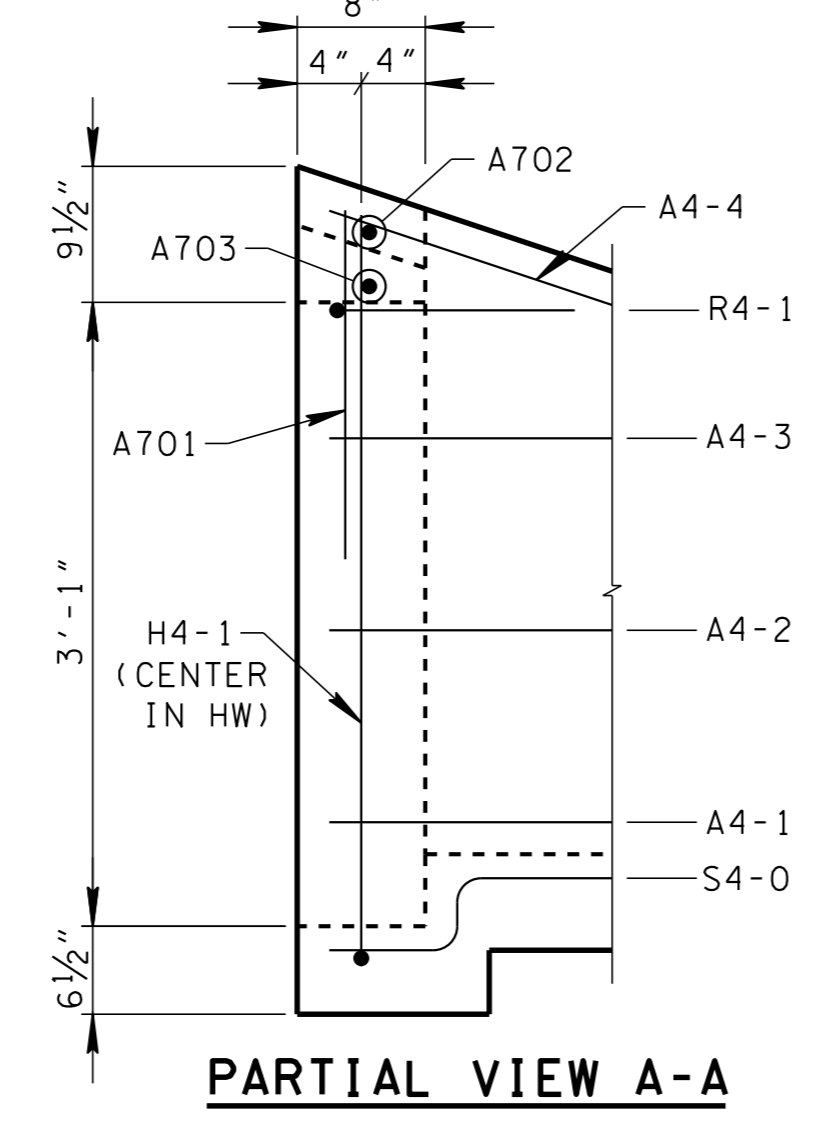
611-07.60	30IN ENDWALL (CROSS DRAIN) 3:1	EACH
611-07.61	30IN ENDWALL (CROSS DRAIN) 4:1	EACH
611-07.62	30IN ENDWALL (CROSS DRAIN) 6:1	EACH
 - (H) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.
 - (I) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.



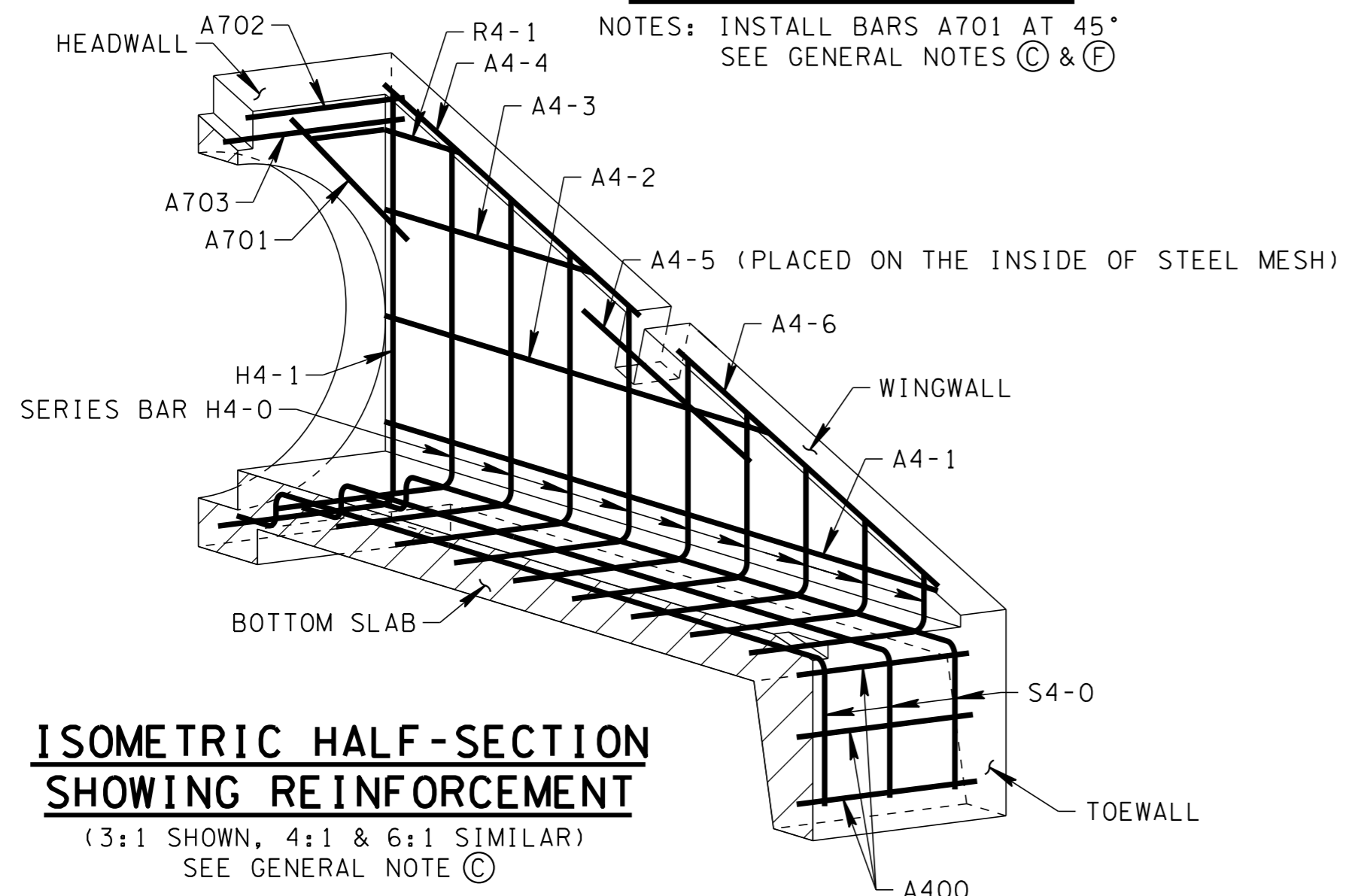
ELEVATION

HEADWALL DETAILS

NOTES: INSTALL BARS A701 AT 45°
 SEE GENERAL NOTES (C) & (E)



PARTIAL VIEW A-A

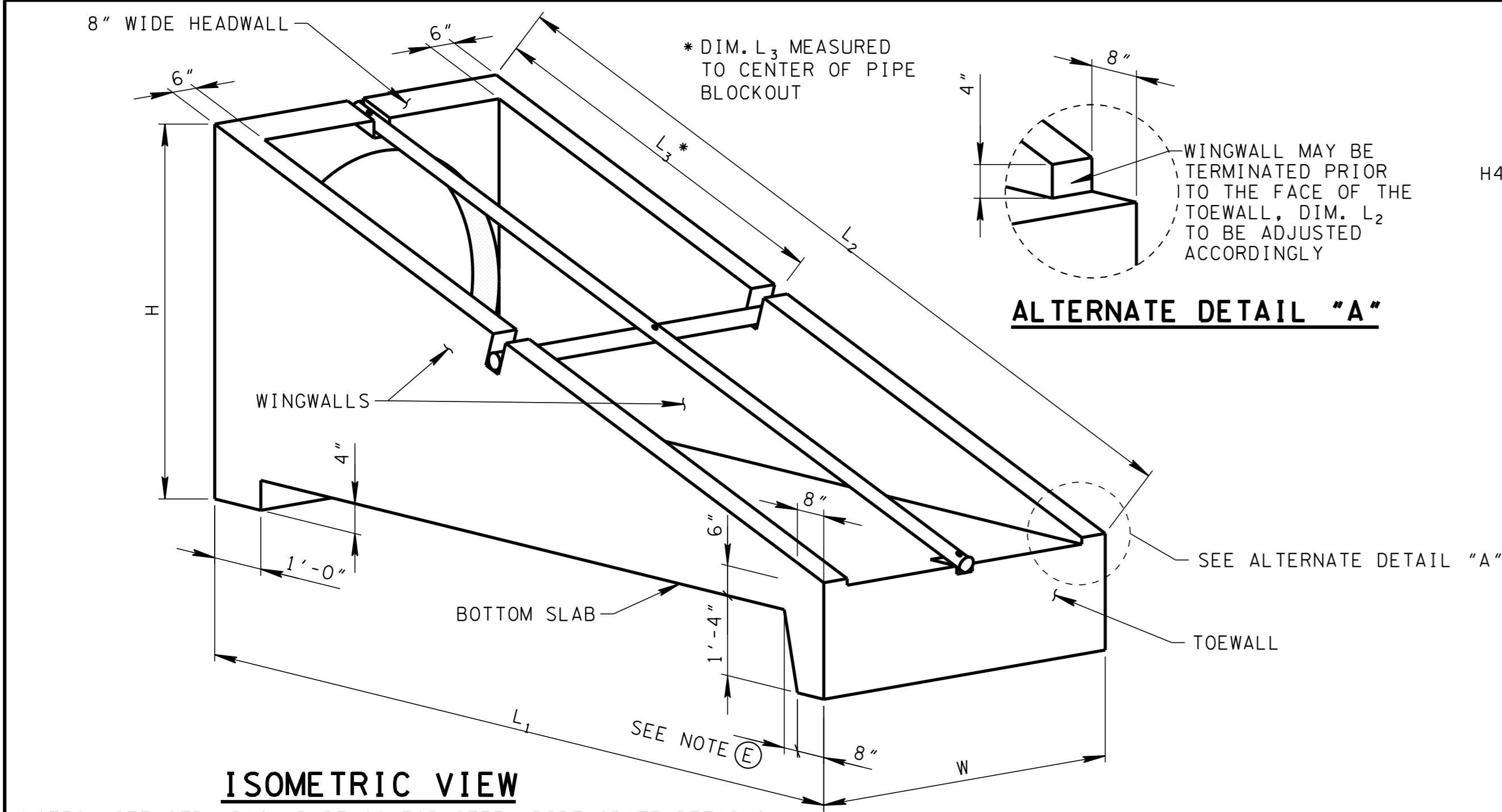


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT
 (3:1 SHOWN, 4:1 & 6:1 SIMILAR)
 SEE GENERAL NOTE (C)

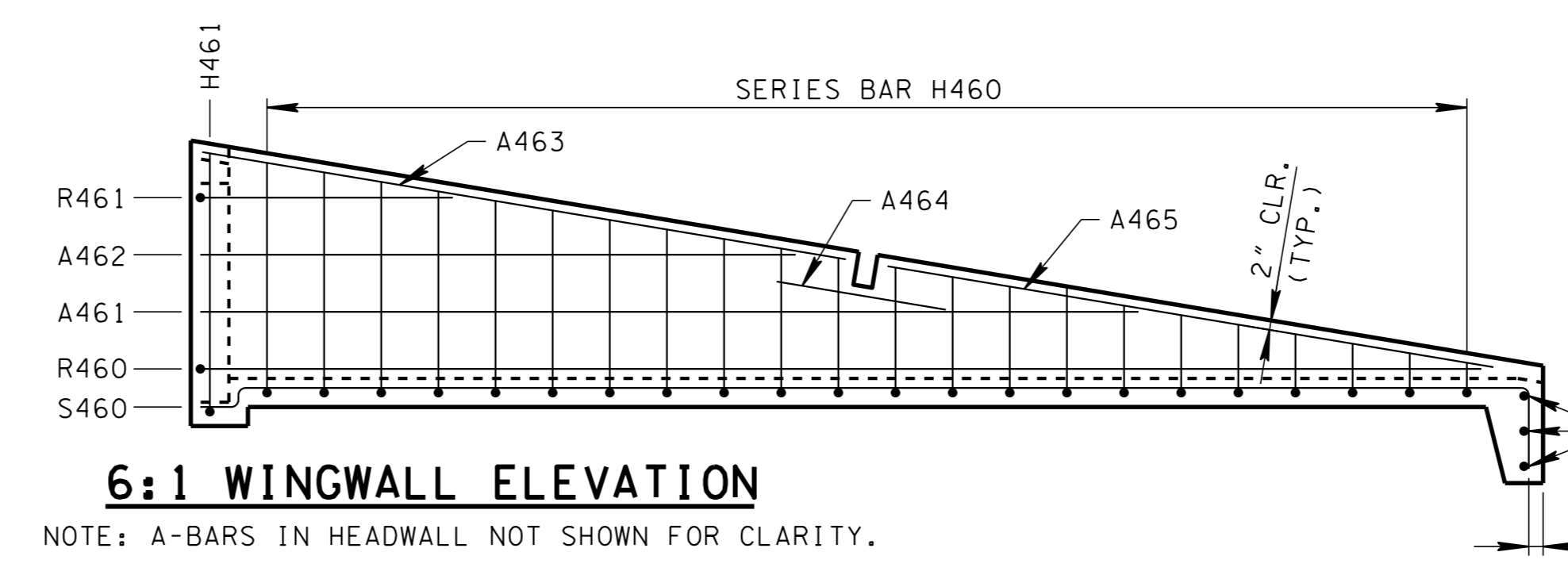
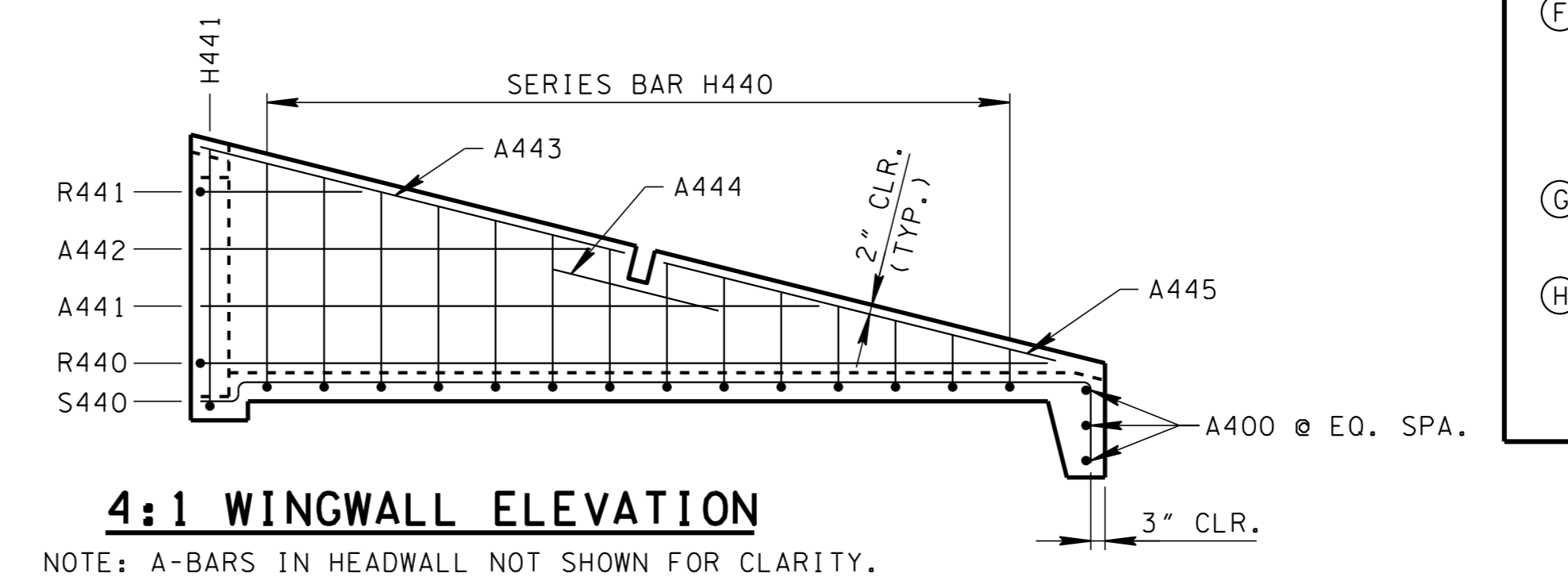
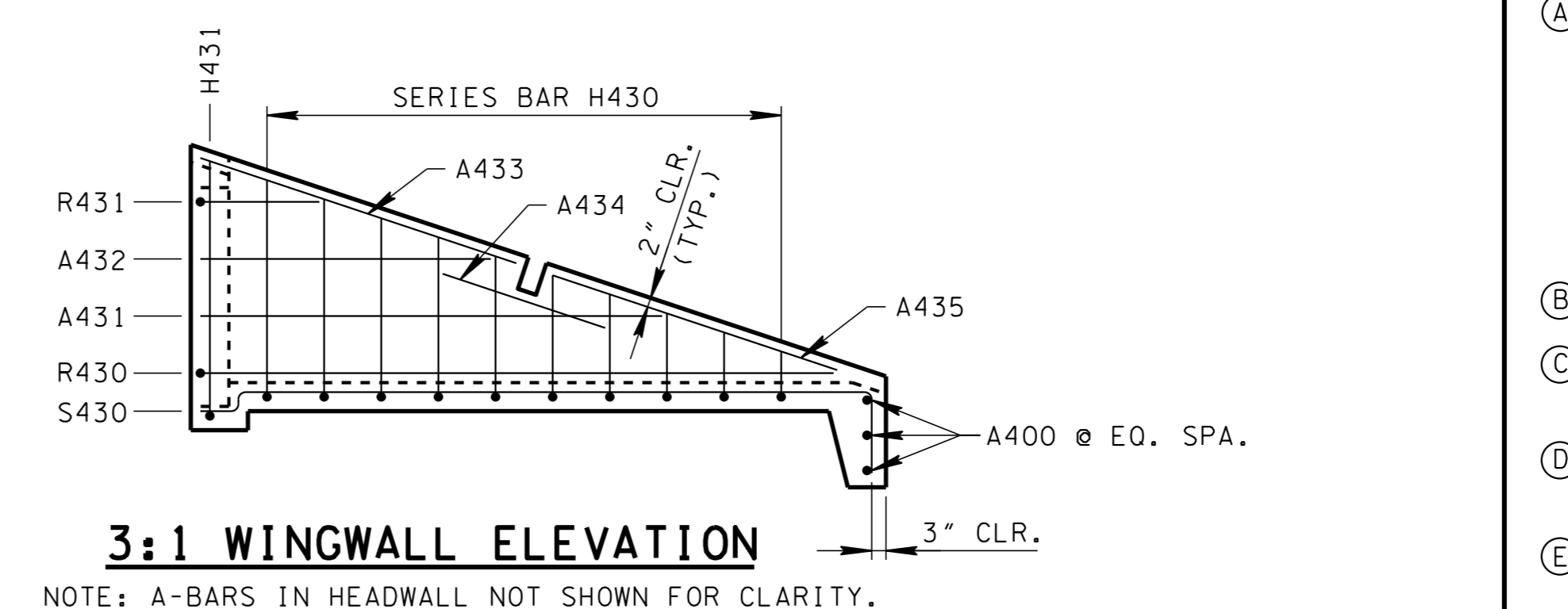
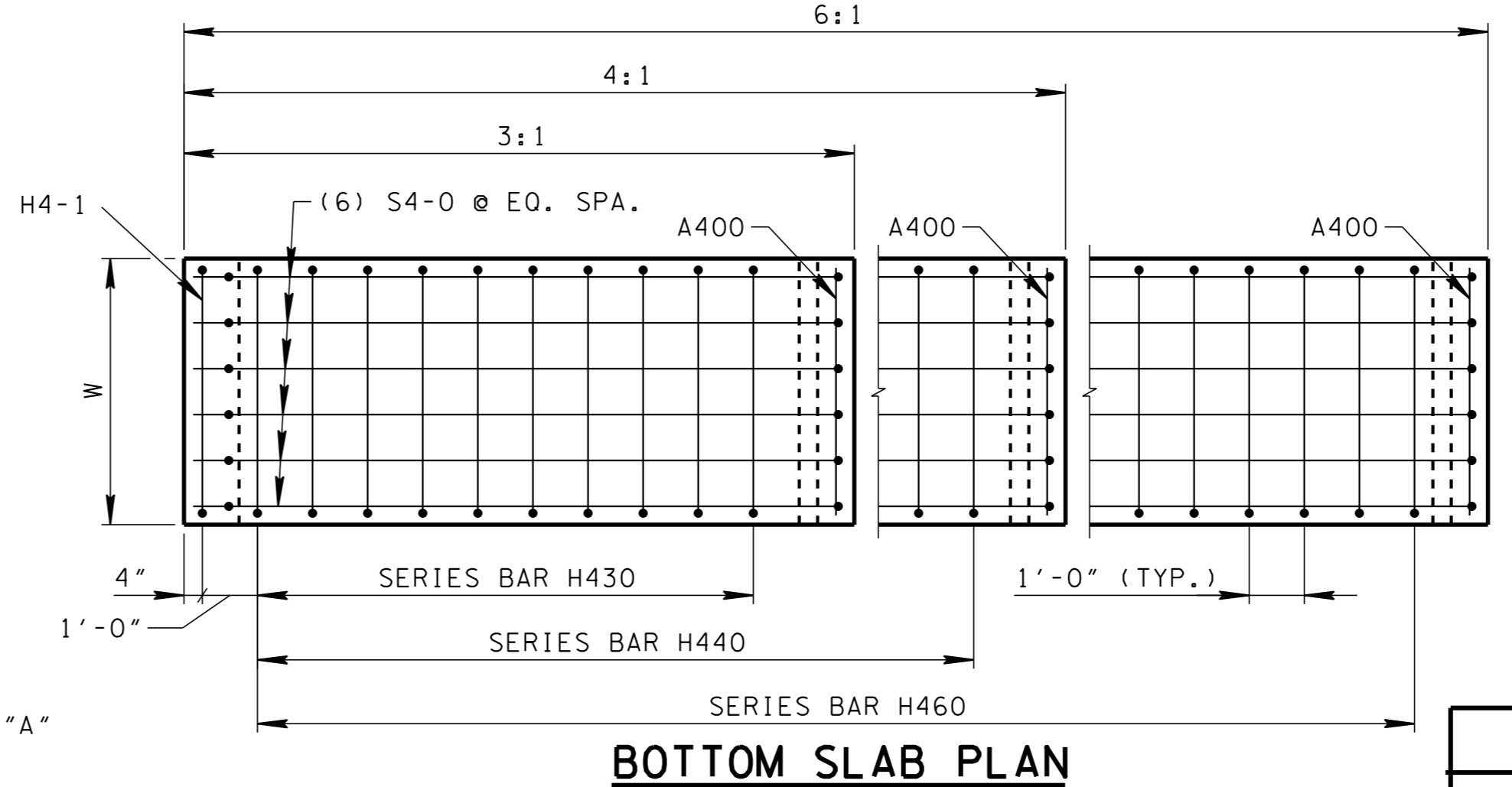
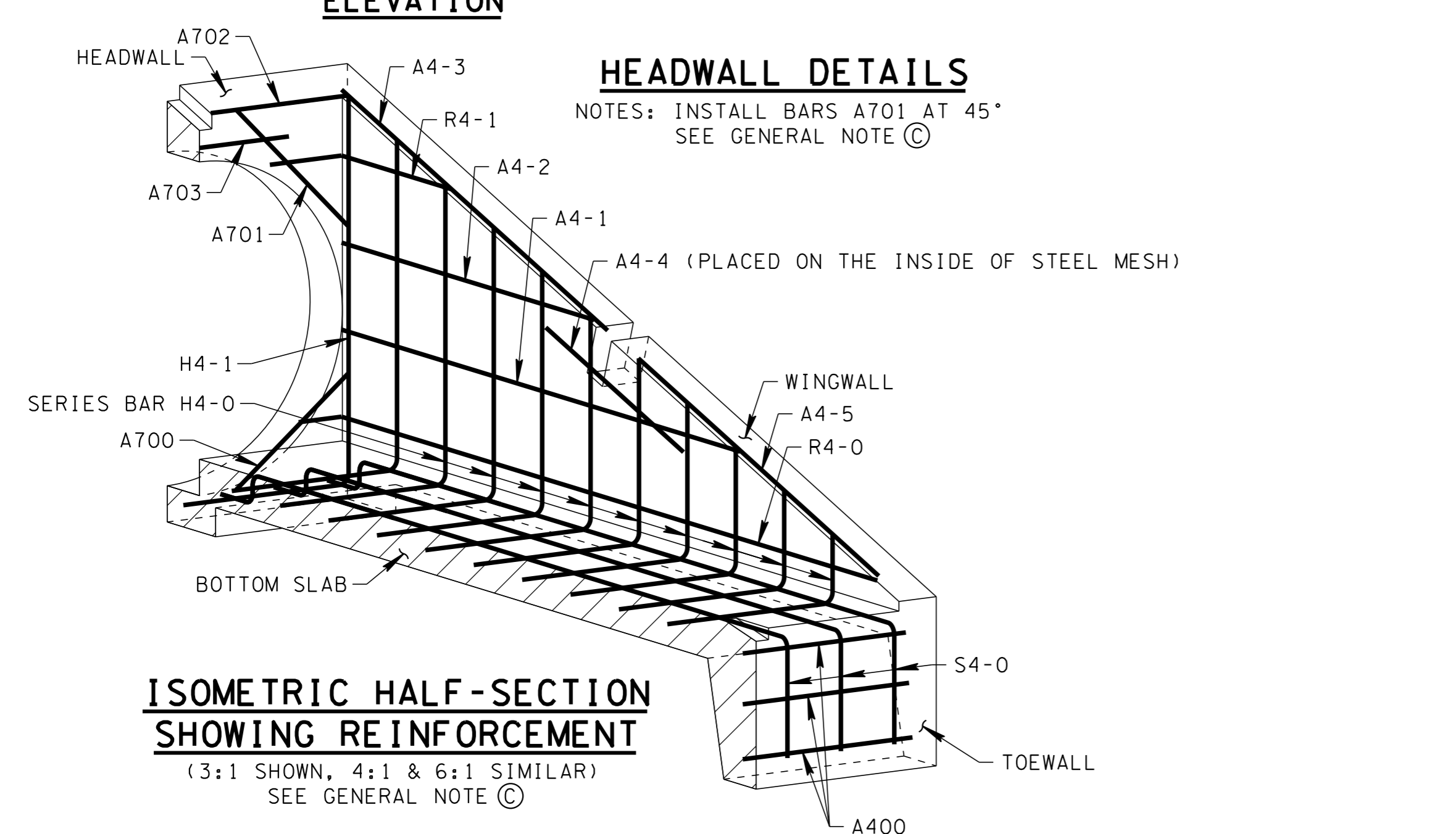
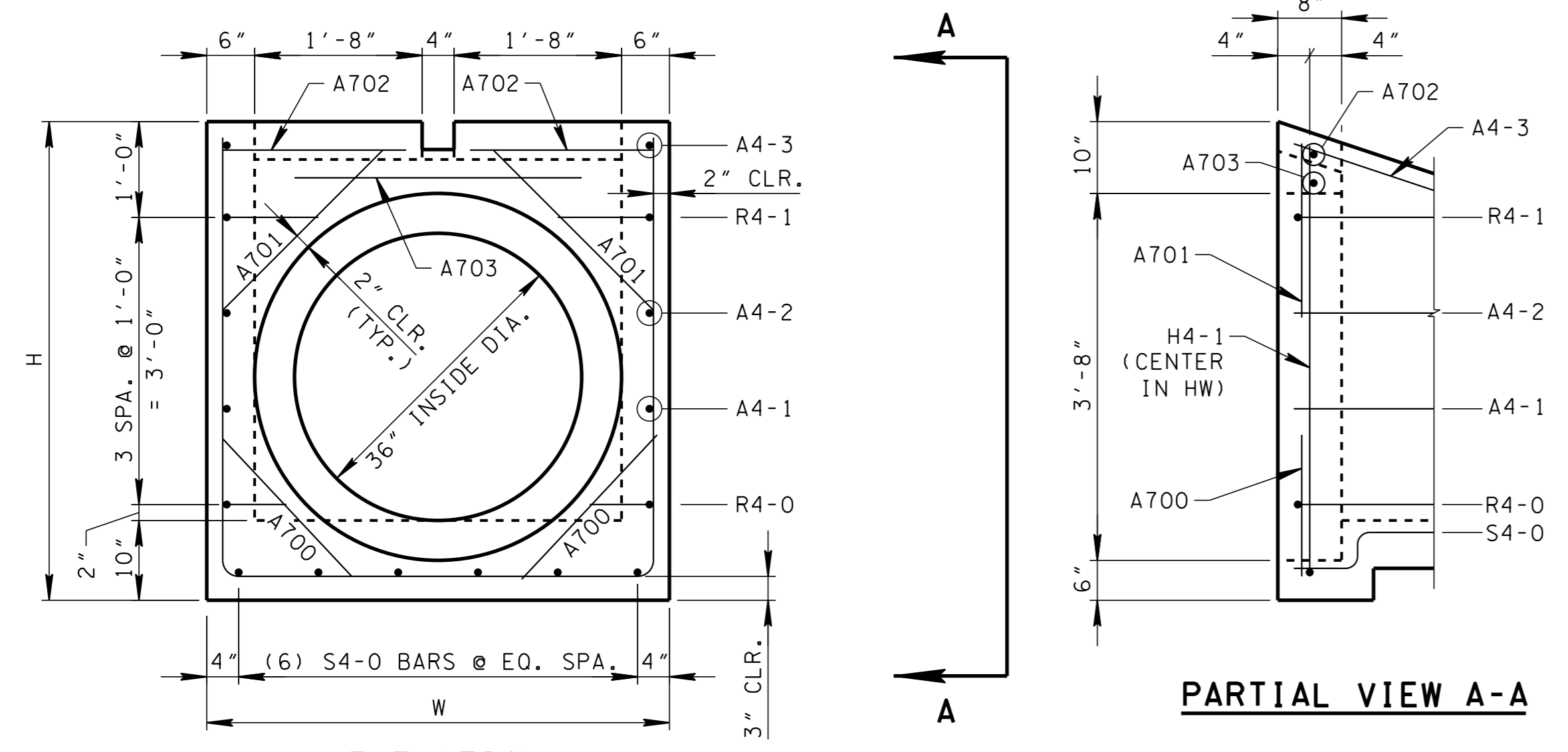
DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 30" PIPE										
SLOPE	CONCRETE ENDWALL DIMENSIONS					STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L ₁	L ₂	L ₃	W	LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	4' - 5"	10' - 5"	10' - 11 3/4"	5' - 2"	4' - 1"	10' - 10 3/8"	4' - 1"	1.84	174	114
4:1	4' - 5"	13' - 8"	14' - 1"	6' - 1"	4' - 1"	14' - 0 7/8"	4' - 1"	2.32	216	137
6:1	4' - 5"	20' - 2"	20' - 5 3/8"	10' - 1"	4' - 1"	20' - 4 3/4"	4' - 1"	3.29	303	186

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.



NOTES: SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS 3/4" CHAMFER REQUIRED ON ALL EXPOSED EDGES



GENERAL NOTES

(A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 36" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

(B) SEE STD. DWG. D-PE-36B FOR BILL OF STEEL & PRECAST NOTES.

(C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.

(D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.

(E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.

(F) PAYMENT WILL BE MADE UNDER:

611-07.63	36IN ENDWALL (CROSS DRAIN)	EACH
611-07.64	36IN ENDWALL (CROSS DRAIN)	EACH
611-07.65	36IN ENDWALL (CROSS DRAIN)	EACH

(G) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.

(H) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 36" PIPE

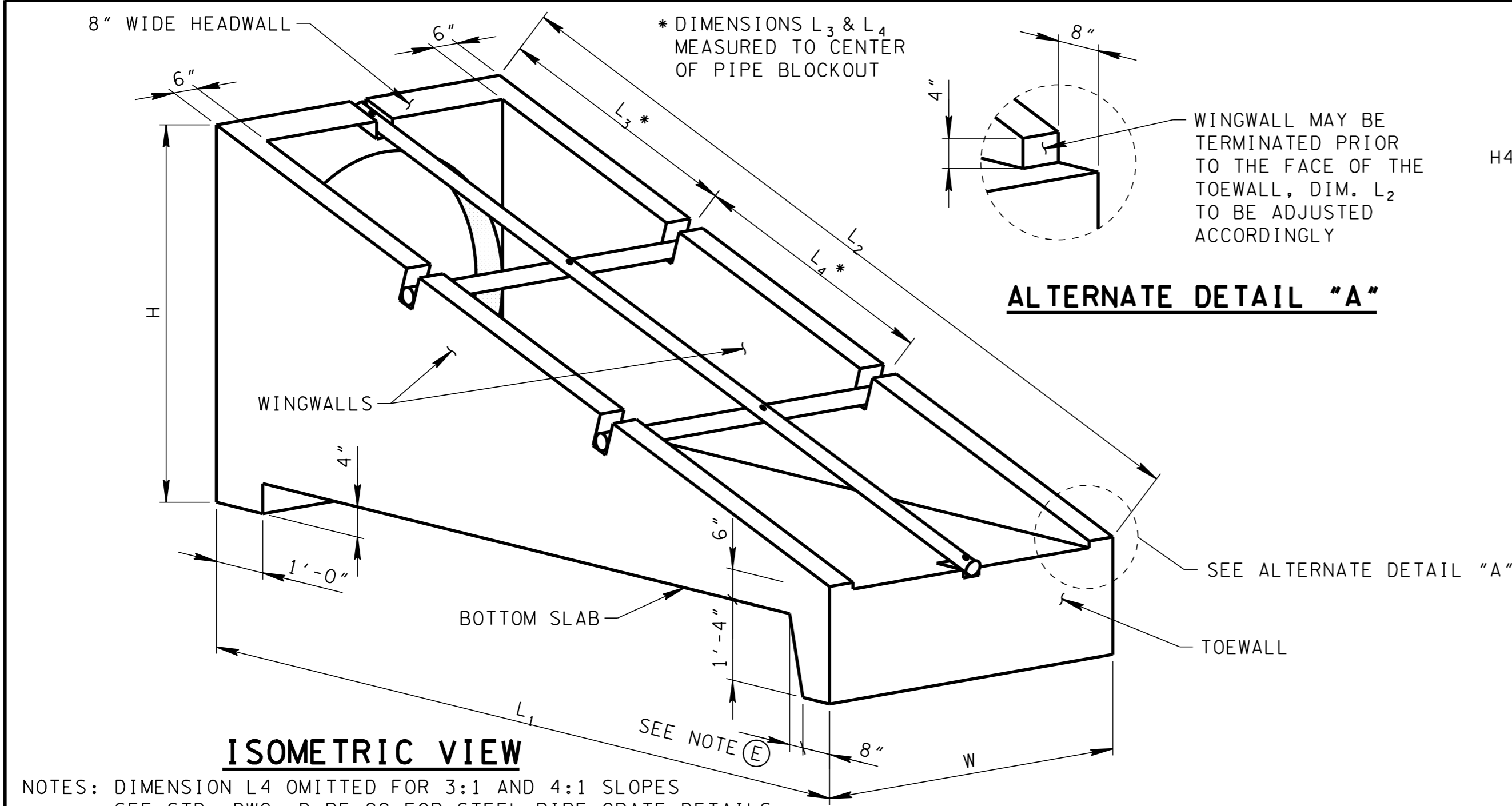
SLOPE	CONCRETE ENDWALL DIMENSIONS					STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L ₁	L ₂	L ₃	W	LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1		12'-2"	12'-9 7/8"	6'-4 3/4"		12'-8 3/4"		2.43	219	132
4:1	5'-0"	16'-0"	16'-5 7/8"	8'-2 1/2"	4'-8"	16'-5"	4'-8"	3.08	276	160
6:1		23'-8"	23'-11 7/8"	12'-0 1/4"		23'-11 7/8"		4.39	388	217

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

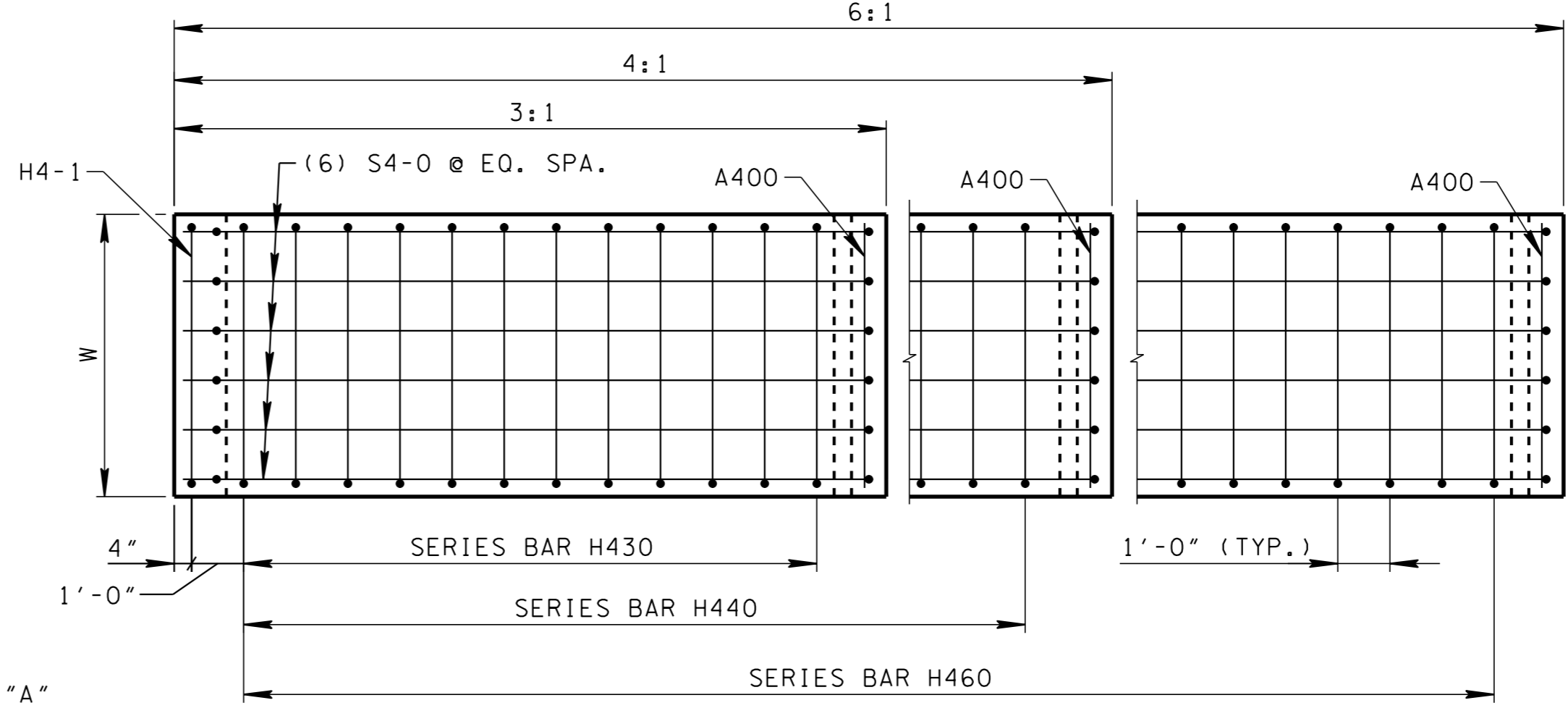
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

36" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE (FOR 3:1, 4:1 & 6:1 SLOPES)

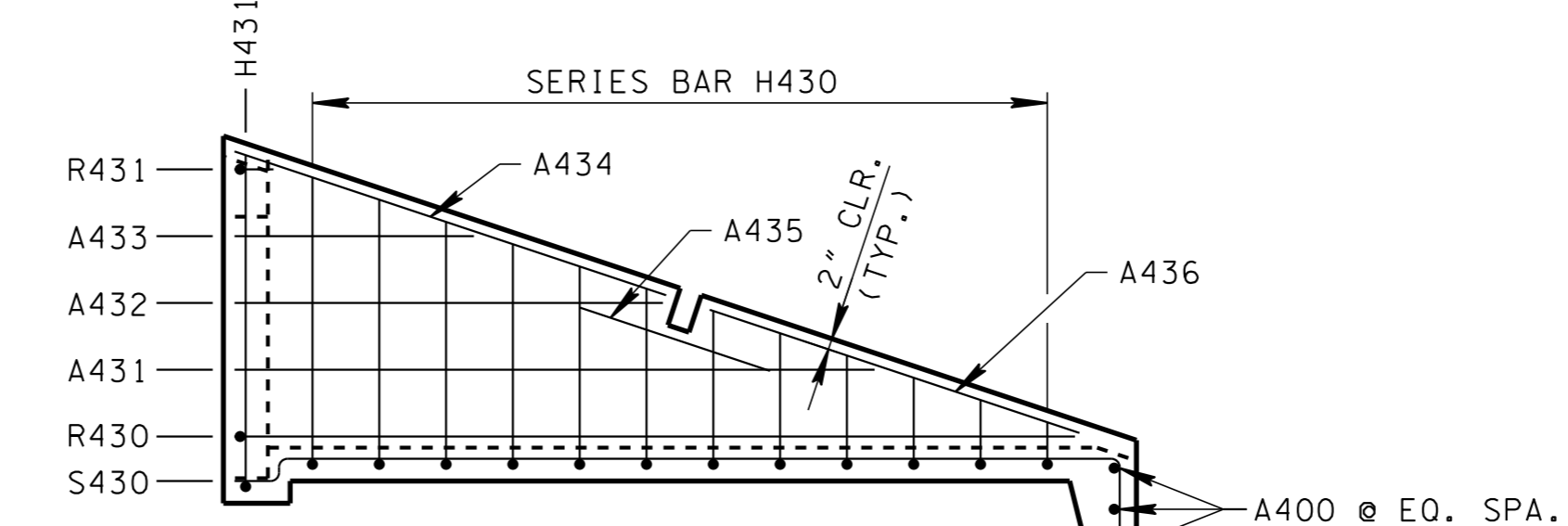


NOTES: DIMENSION L4 OMITTED FOR 3:1 AND 4:1 SLOPES
SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
3/4\"/>

ALTERNATE DETAIL "A"

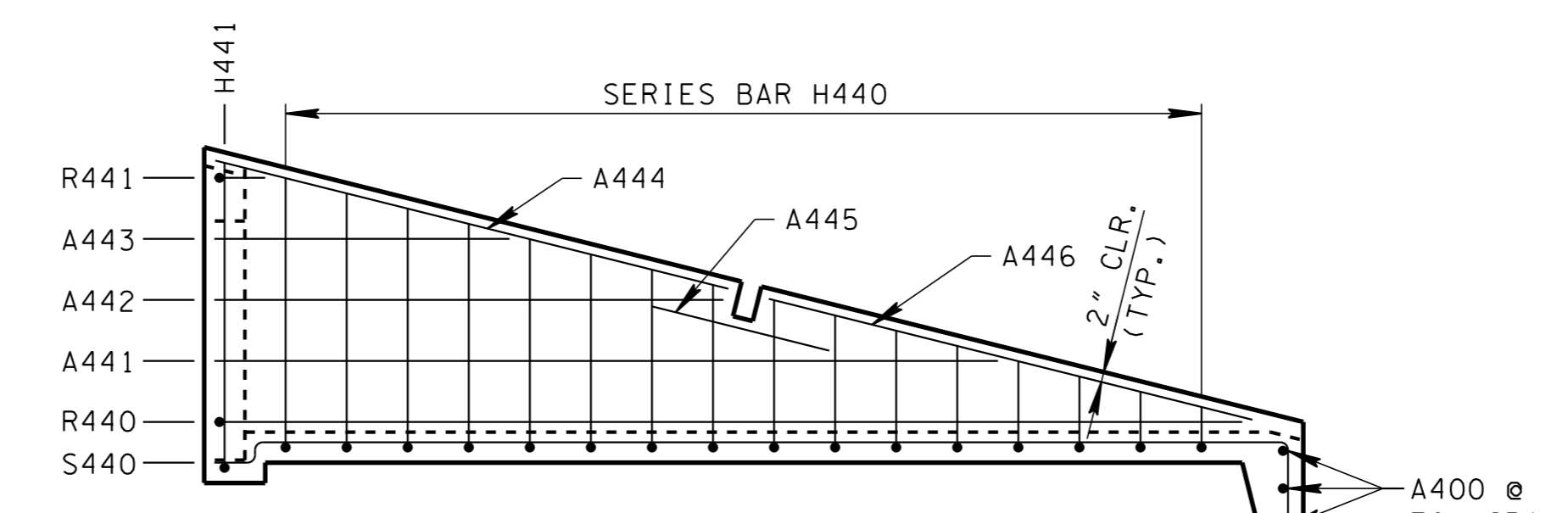


BOTTOM SLAB PLAN



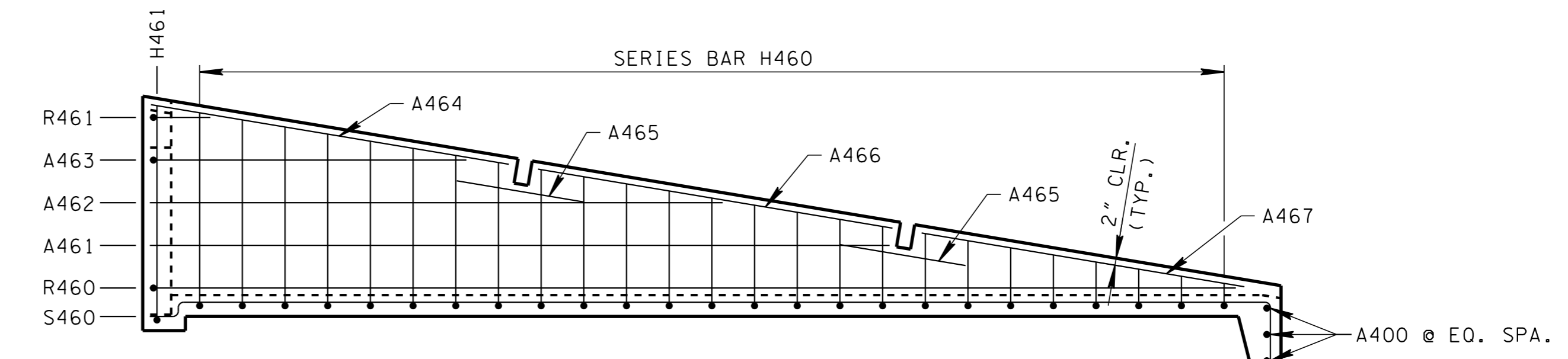
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

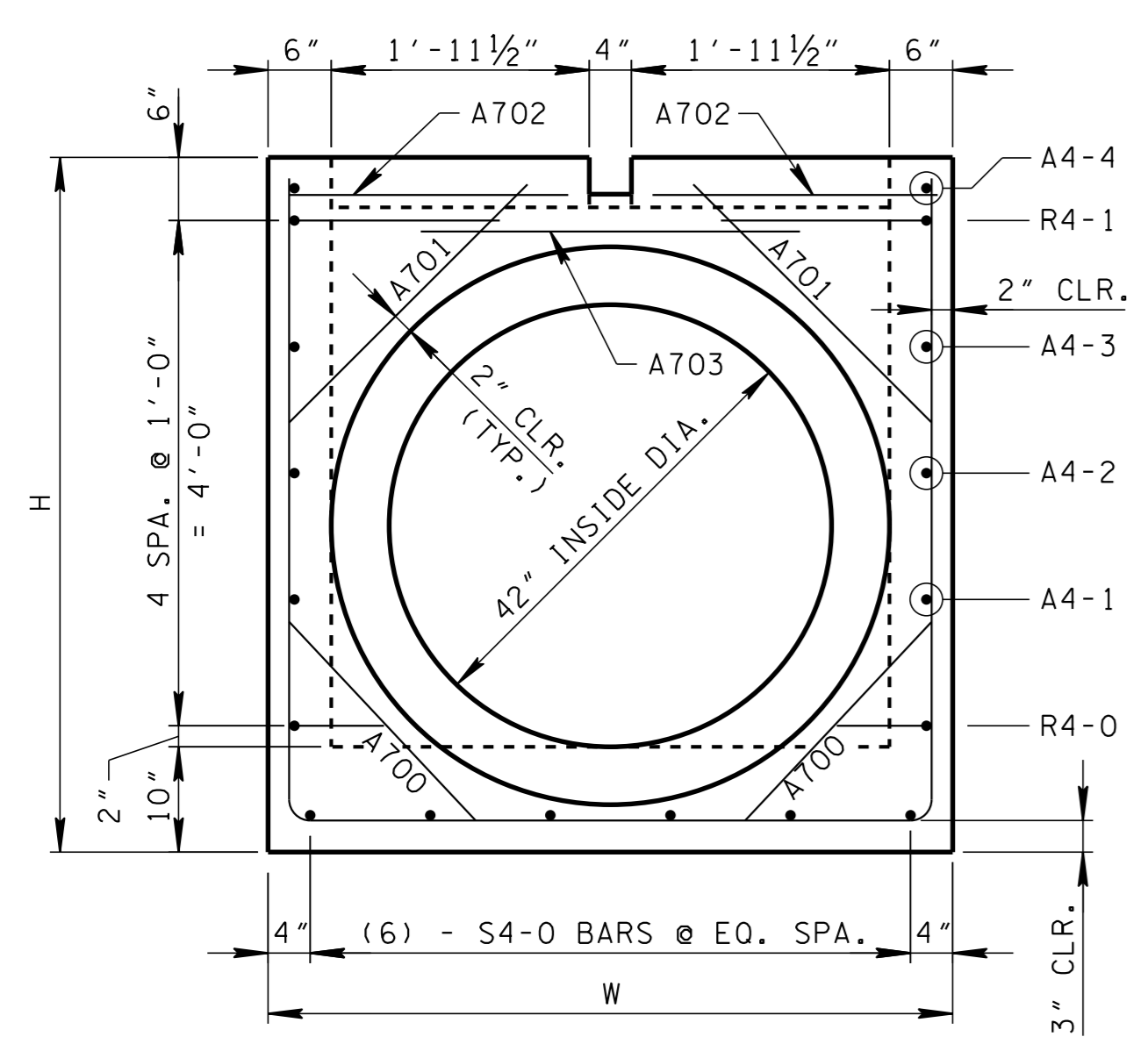


6:1 WINGWALL ELEVATION

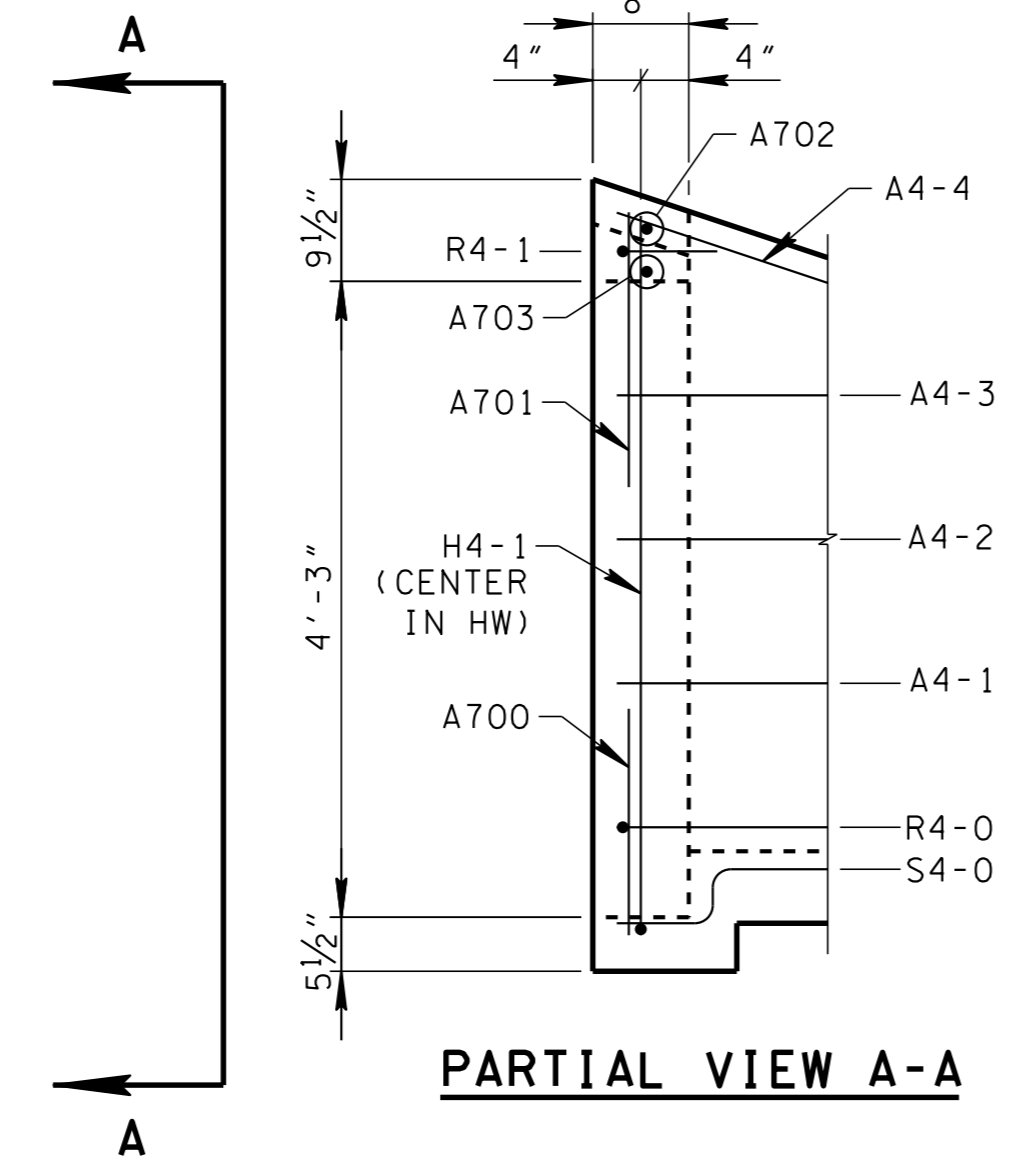
NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 42" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
 - (B) SEE STD. DWG. D-PE-42B FOR BILL OF STEEL & PRECAST NOTES.
 - (C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.
 - (D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.
 - (E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.
 - (F) PAYMENT WILL BE MADE UNDER:

611-07.66	42IN ENDWALL (CROSS DRAIN) 3:1	EACH
611-07.67	42IN ENDWALL (CROSS DRAIN) 4:1	EACH
611-07.68	42IN ENDWALL (CROSS DRAIN) 6:1	EACH
 - (G) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.
 - (H) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.



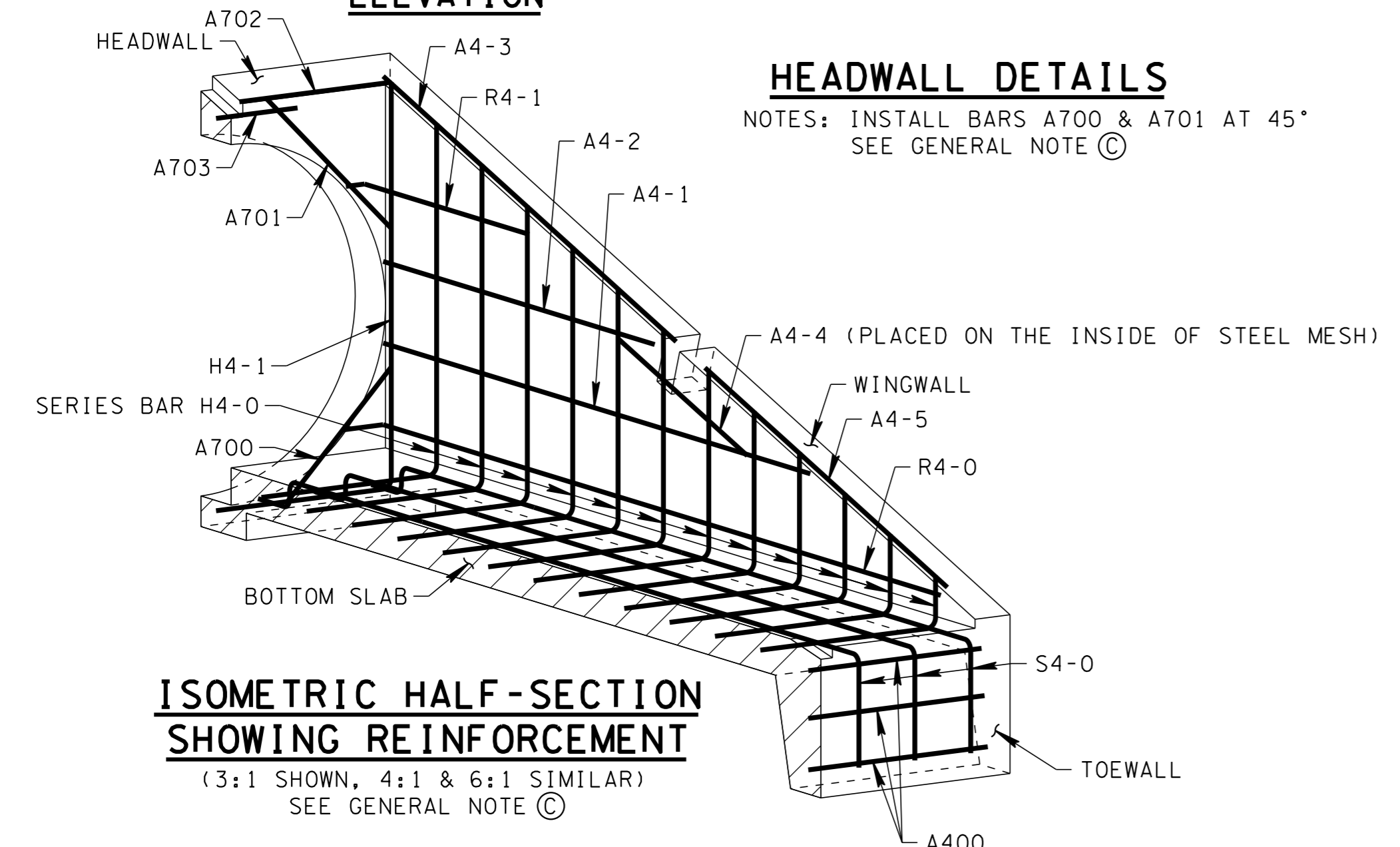
ELEVATION



PARTIAL VIEW A-A

HEADWALL DETAILS

NOTES: INSTALL BARS A700 & A701 AT 45°
SEE GENERAL NOTE (C)



ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE (C)

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 42" PIPE											
SLOPE	CONCRETE ENDWALL DIMENSIONS					W	STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L ₁	L ₂	L ₃	L ₄		LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	5'-6"	13'-8"	14'-4 1/2"	7'-4 1/2"	-	5'-3"	14'-3 3/4"	1 @ 5'-3"	3.03	261	148
4:1	5'-6"	18'-0"	18'-6 3/8"	9'-2 7/8"	-	5'-3"	18'-5 3/4"	1 @ 5'-3"	3.85	327	180
6:1	5'-6"	26'-8"	27'-0 3/8"	9'-1"	9'-1"	5'-3"	26'-11 7/8"	2 @ 5'-3"	5.50	464	284

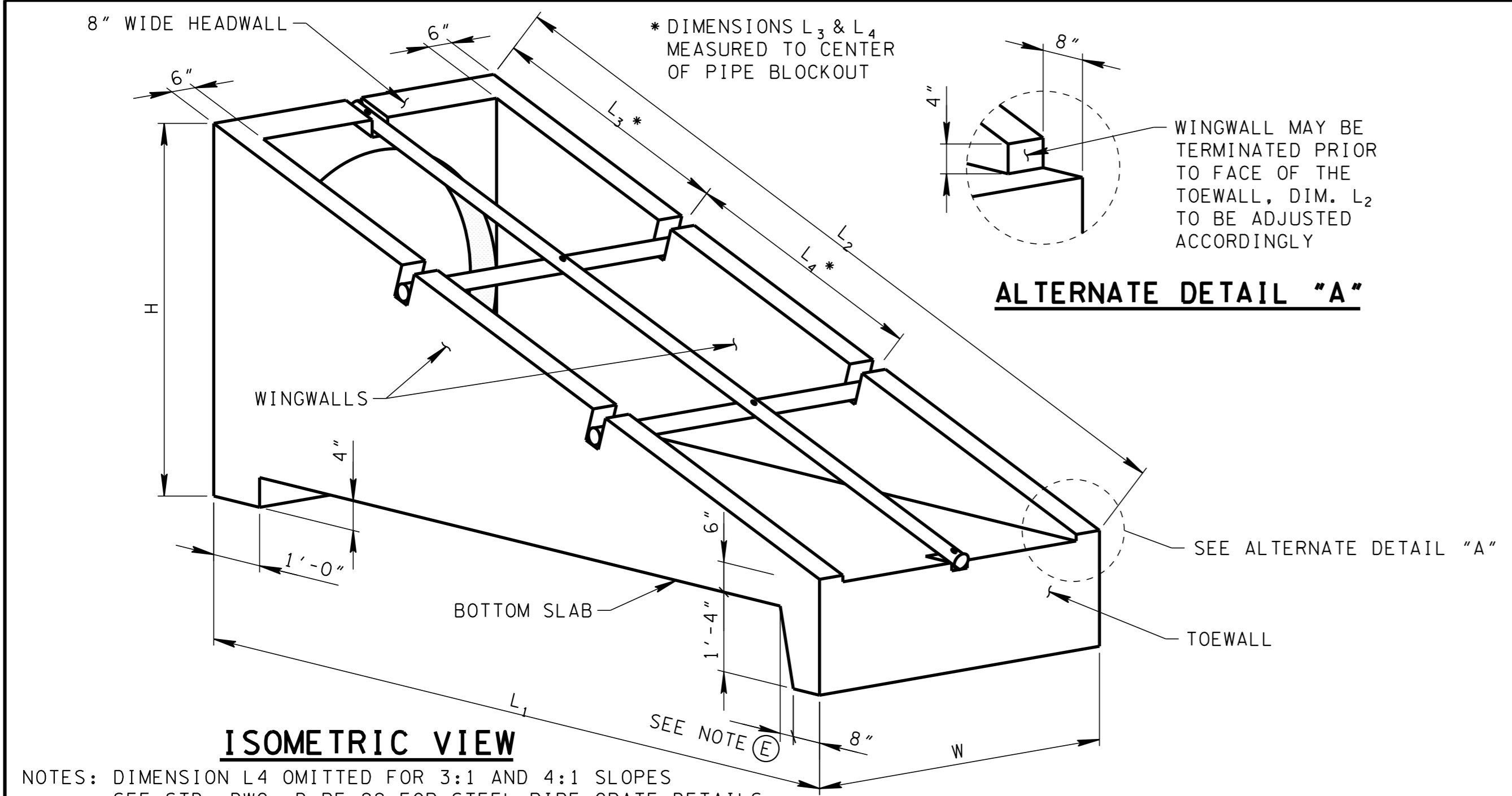
NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

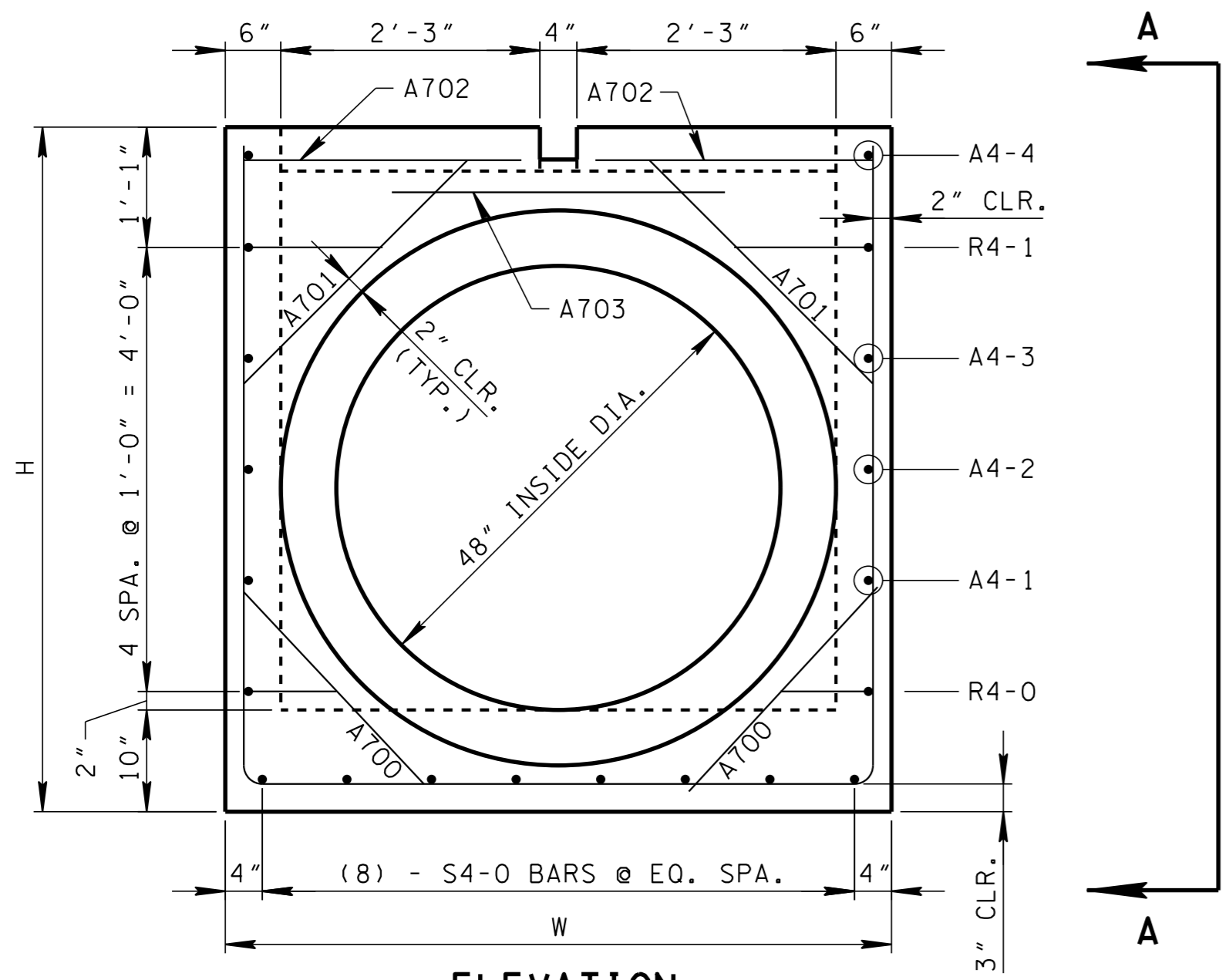
42" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)

NOT TO SCALE



ISOMETRIC VIEW

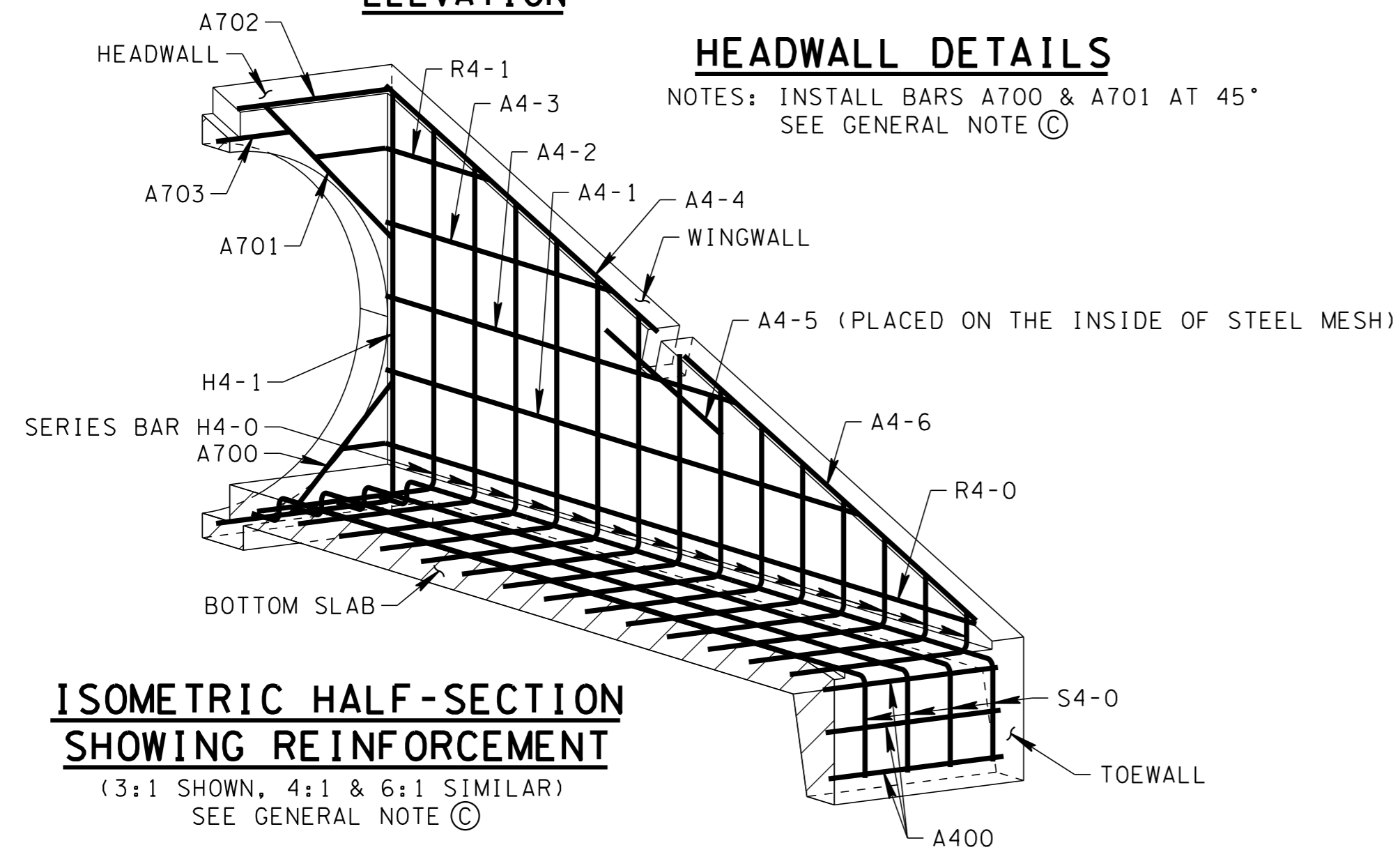
NOTES: DIMENSION L4 OMITTED FOR 3:1 AND 4:1 SLOPES
SEE STD. DWG. D-PE-99 FOR STEEL PIPE GRATE DETAILS
3/4" CHAMFER REQUIRED ON ALL EXPOSED EDGES



ELEVATION

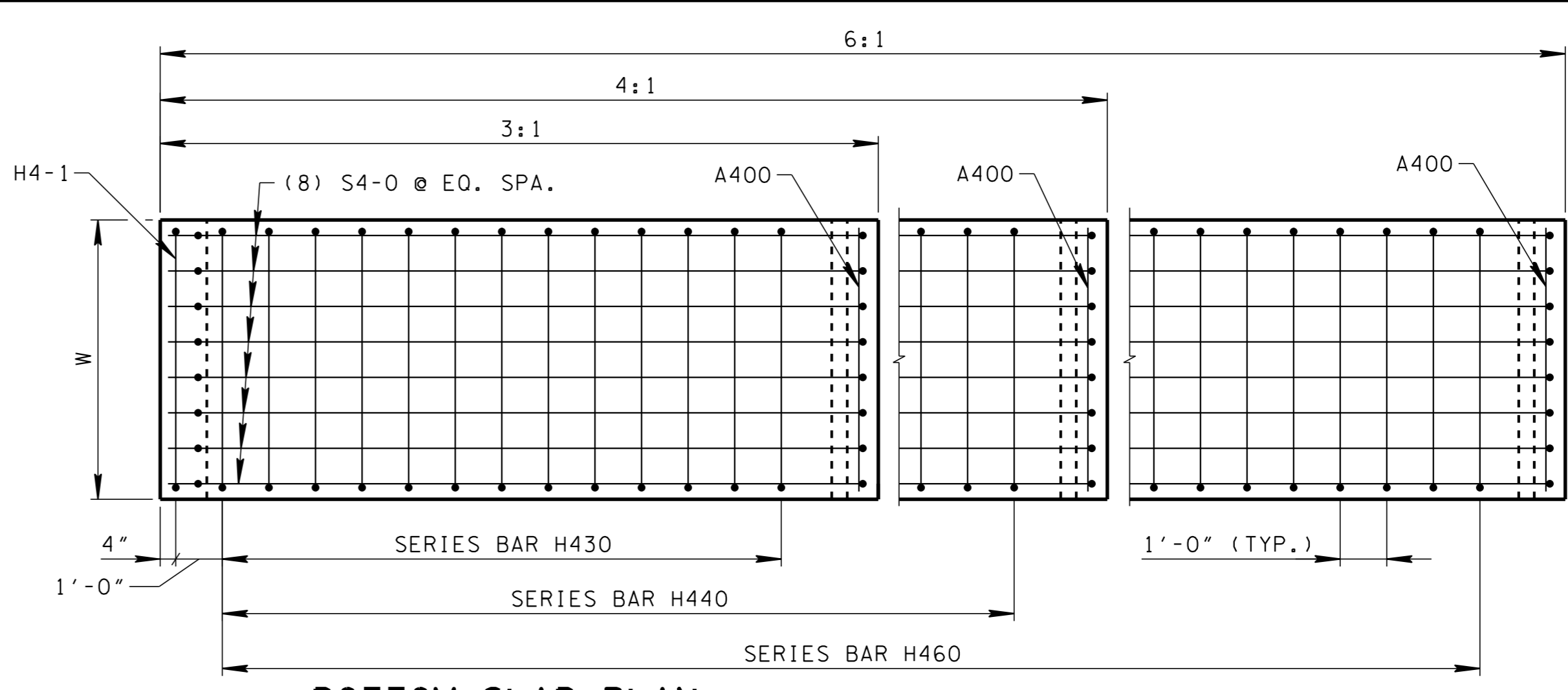
HEADWALL DETAILS

NOTES: INSTALL BARS A700 & A701 AT 45°
SEE GENERAL NOTE C

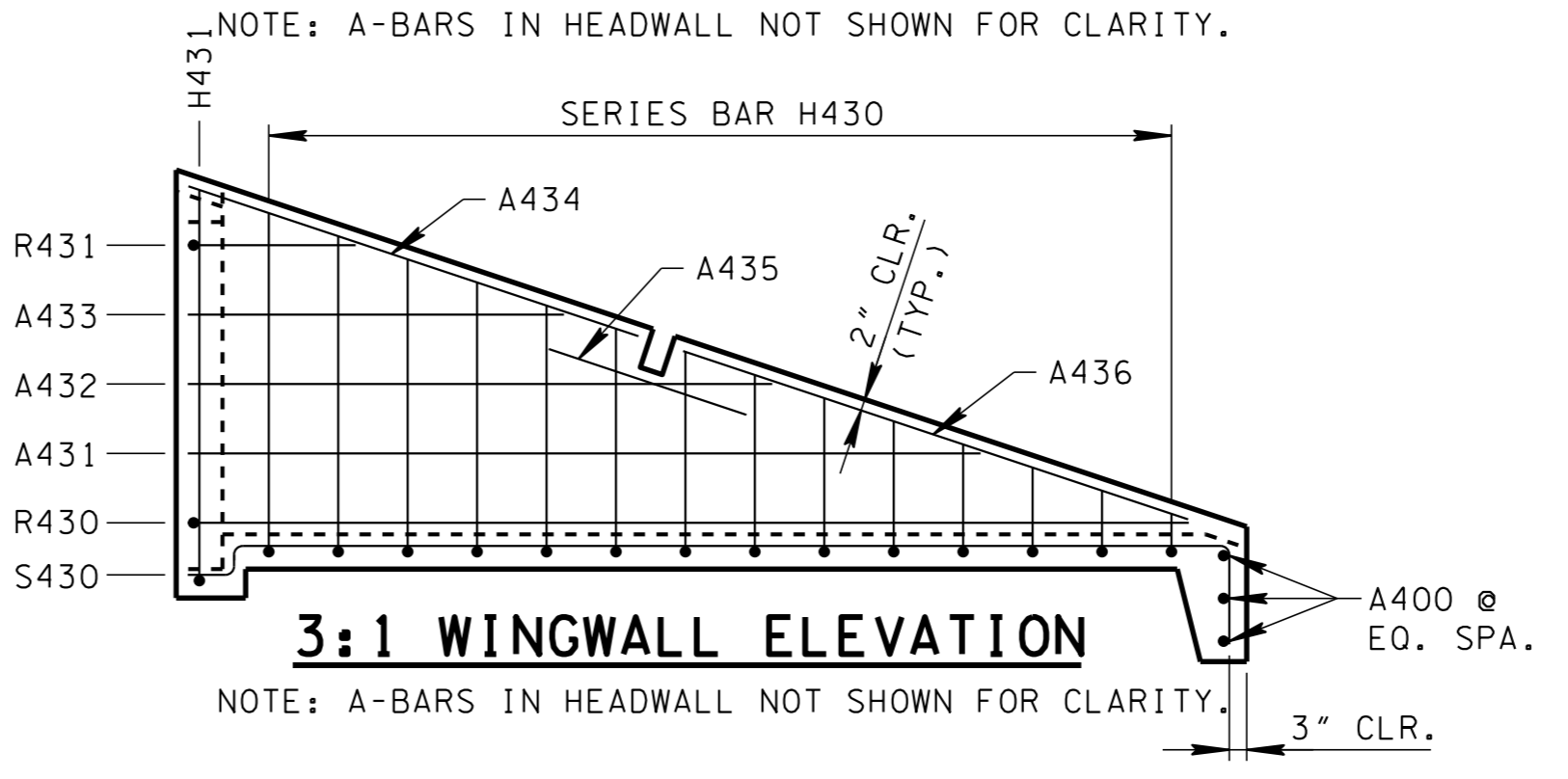


ISOMETRIC HALF-SECTION SHOWING REINFORCEMENT

(3:1 SHOWN, 4:1 & 6:1 SIMILAR)
SEE GENERAL NOTE C

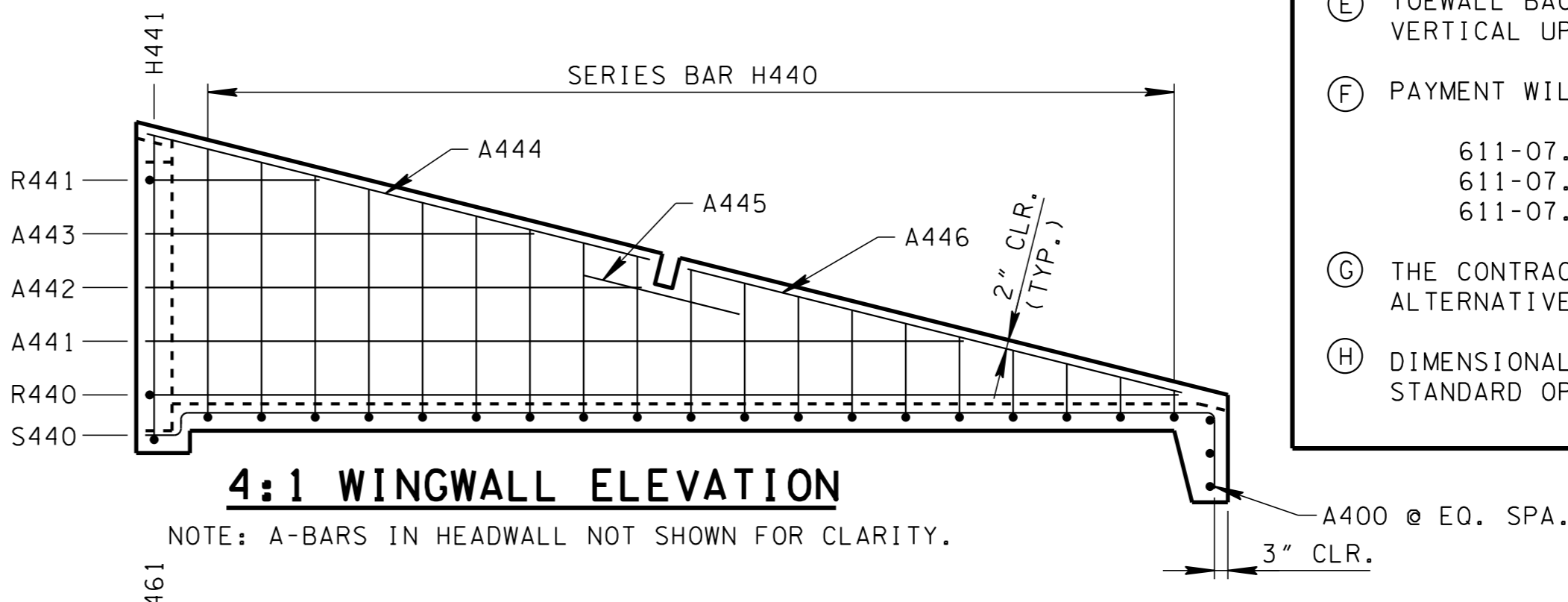


BOTTOM SLAB PLAN



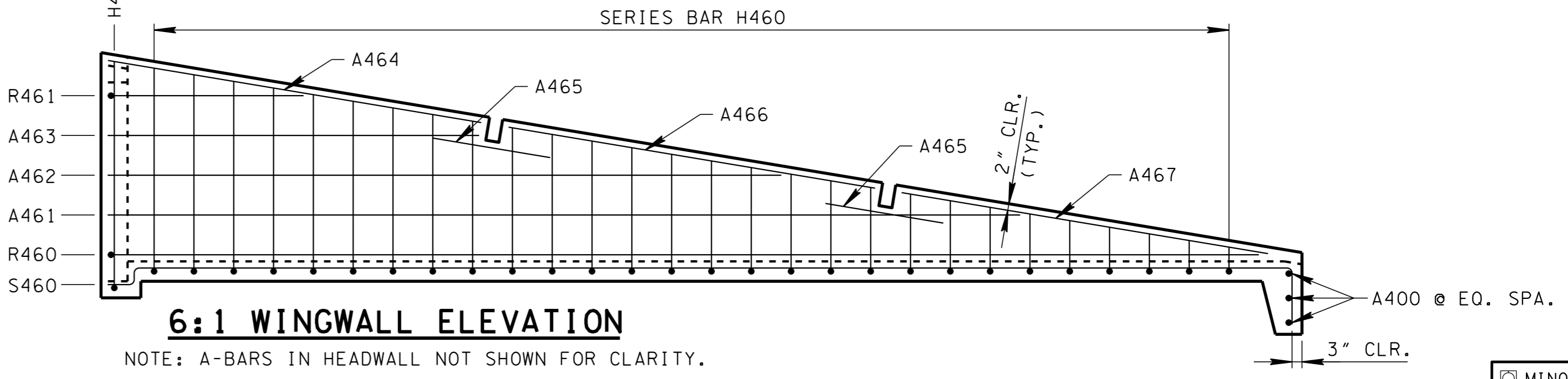
3:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



4:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION

NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.

GENERAL NOTES

- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST 48" CONCRETE ENDWALLS (TYPE "U") FOR CROSS DRAINS ONLY. "U" ENDWALL TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT PERPENDICULAR TO CENTERLINE. CAST-IN-PLACE CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
- (B) SEE STD. DWG. D-PE-48B FOR BILL OF STEEL & PRECAST NOTES.
- (C) "-" IN BAR DESIGNATION REPRESENTS 3, 4 OR 6 FOR 3:1, 4:1 OR 6:1 SLOPES, RESPECTIVELY.
- (D) SPLICING OF REINFORCEMENT IS ACCEPTABLE PROVIDED THAT A MINIMUM 21" SPLICE LENGTH IS USED.
- (E) TOEWALL BACK SLOPE MAY BE CONSTRUCTED VARIABLE FROM VERTICAL UP TO 15°.
- (F) PAYMENT WILL BE MADE UNDER:

611-07.69	48IN ENDWALL (CROSS DRAIN) 3:1	EACH
611-07.70	48IN ENDWALL (CROSS DRAIN) 4:1	EACH
611-07.71	48IN ENDWALL (CROSS DRAIN) 6:1	EACH
- (G) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN
- (H) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

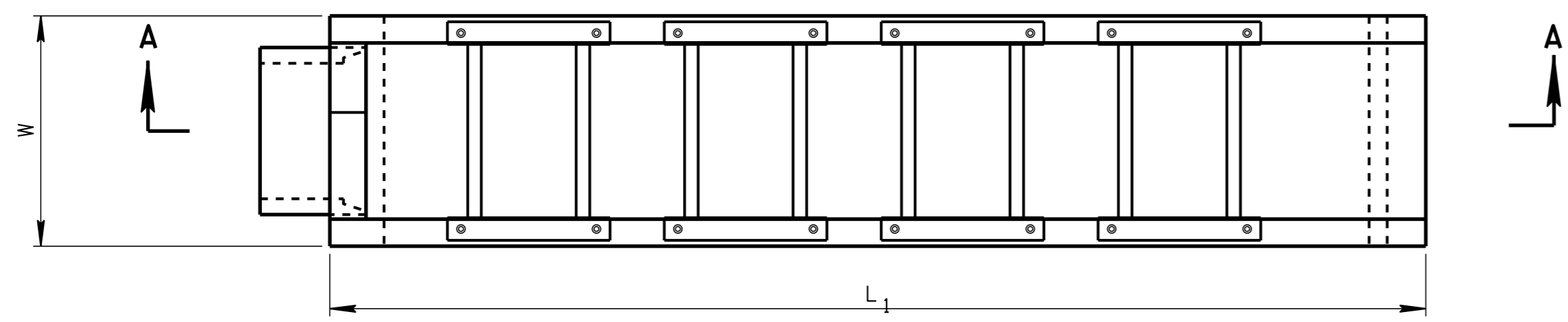
DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 48" PIPE											
SLOPE	CONCRETE ENDWALL DIMENSIONS					W	STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES		
	H	L ₁	L ₂	L ₃	L ₄		LG	WG	CLASS "A" CONC. CU. YD.	STEEL BAR REINF. LB.	STRUCTURAL STEEL LB.
3:1	6' - 1"	15' - 5"	16' - 3"	7' - 4 7/8"	-	5' - 10"	16' - 1 7/8"	1 @ 5' - 10"	3.79	333	167
4:1		20' - 4"	20' - 11 1/2"	10' - 3 3/4"	-		20' - 10 3/8"	1 @ 5' - 10"	4.83	420	203
6:1		30' - 2"	30' - 7"	10' - 0 3/4"	10' - 0 1/8"		30' - 6 3/8"	2 @ 5' - 10"	6.92	597	320

NOTE: SEE STD. DWG. D-PE-99 FOR STRUCTURAL STEEL PIPE DIMENSIONS LG & WG.

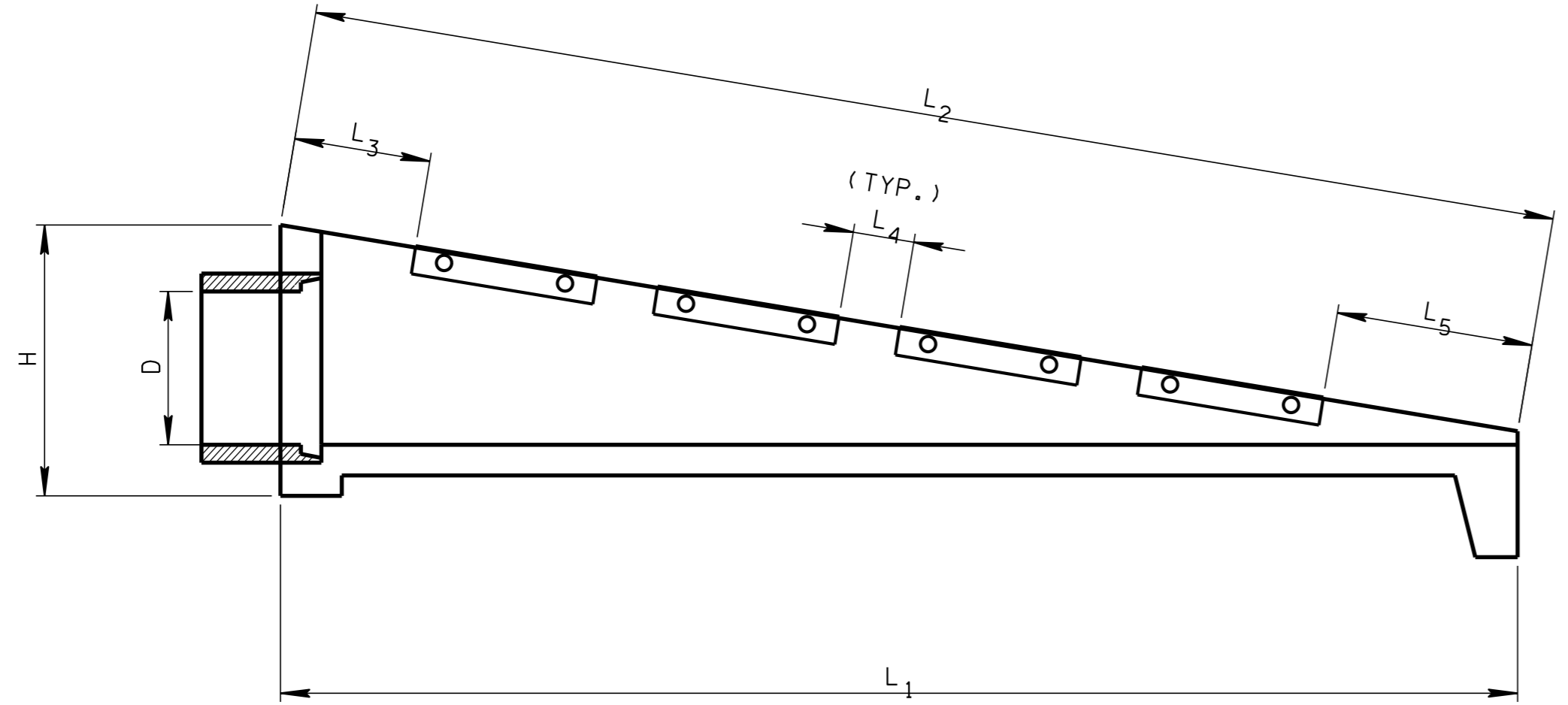
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

48" CONCRETE ENDWALL CROSS DRAIN WITH STEEL PIPE GRATE
(FOR 3:1, 4:1 & 6:1 SLOPES)



PLAN



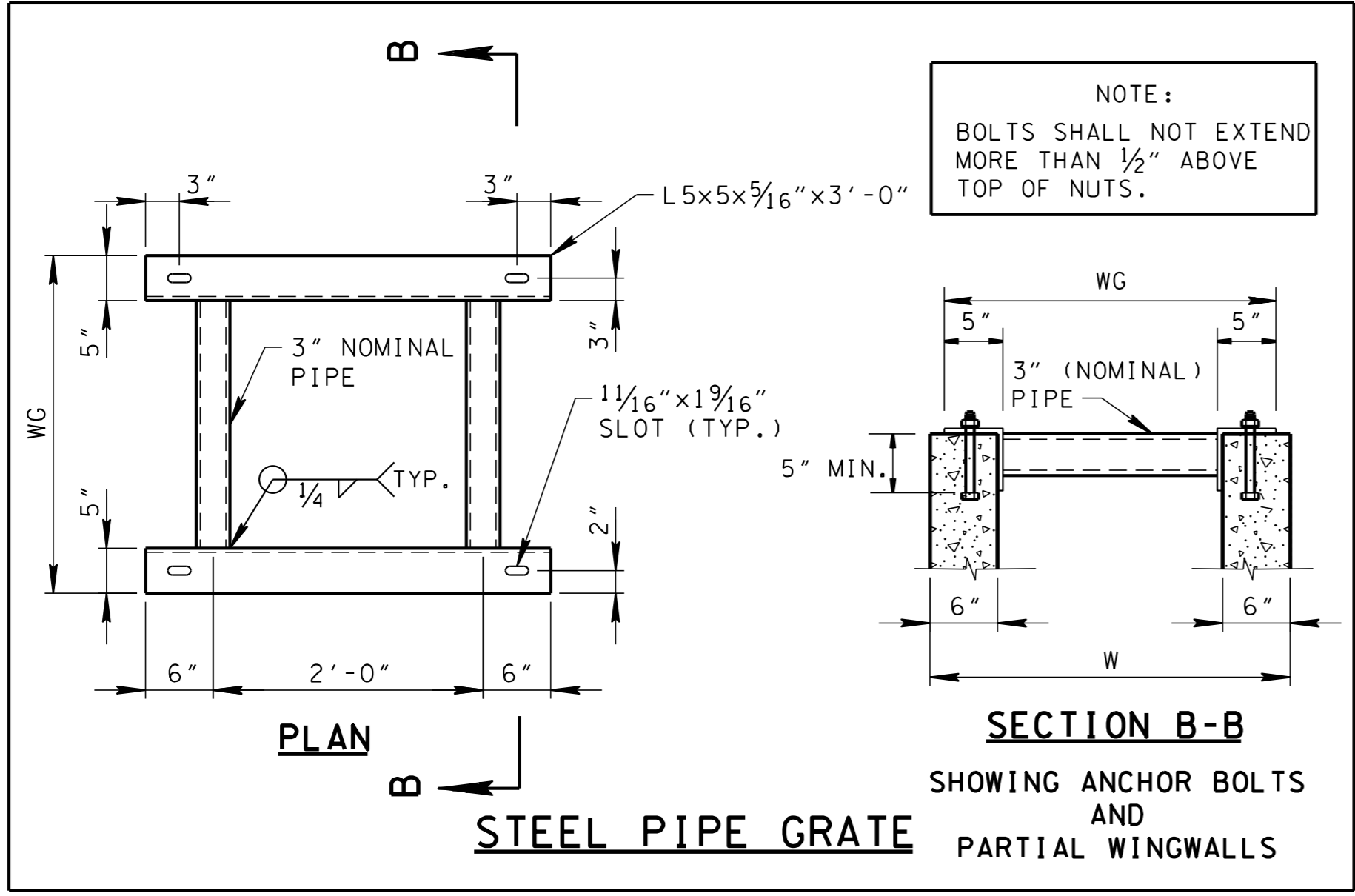
SECTION A-A

GENERAL NOTES

- (A) DRAWING TO BE USED FOR ALL 15" THRU 48" SIDE DRAIN CONCRETE ENDWALLS. FOR ENDWALL CONSTRUCTION DIMENSIONS AND QUANTITIES, EXCEPT STEEL PIPE GRATES, SEE THE FOLLOWING STANDARD DRAWINGS:
 - 15" ENDWALL - SEE D-PE-15A & D-PE-15B WITH 6:1 WINGWALL SLOPE
 - 18" ENDWALL - SEE D-PE-18A & D-PE-18B WITH 6:1 WINGWALL SLOPE
 - 24" ENDWALL - SEE D-PE-24A & D-PE-24B WITH 6:1 WINGWALL SLOPE
 - 30" ENDWALL - SEE D-PE-30A & D-PE-30B WITH 6:1 WINGWALL SLOPE
 - 36" ENDWALL - SEE D-PE-36A & D-PE-36B WITH 6:1 WINGWALL SLOPE
 - 42" ENDWALL - SEE D-PE-42A & D-PE-42B WITH 6:1 WINGWALL SLOPE
 - 48" ENDWALL - SEE D-PE-48A & D-PE-48B WITH 6:1 WINGWALL SLOPE
- NOTE: 30" THRU 48" SIDE DRAIN CONCRETE ENDWALL REQUIRES STEEL PIPE GRATES SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL OMIT THE CONCRETE BLOCKOUTS AS SHOWN ON THE ABOVE DRAWINGS AND SUBSTITUTE THE FOLLOWING REINFORCING BARS:
 - 30" ENDWALL - SUBSTITUTE A465 & A466 BY EXTENDING A464 TO 19'-5"
 - 36" ENDWALL - SUBSTITUTE A464 & A465 BY EXTENDING A463 TO 23'-0"
 - 42" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 26'-0"
 - 48" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 29'-7"
- (B) THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
 - ① ANGLES: ASTM A36
 - ② STEEL PIPE: ASTM A53, TYPE E, GRADE B, STANDARD WEIGHT (SW) FOR 15" THRU 24" DIAMETER PIPE CULVERT. ASTM A53, TYPE E, GRADE B, DOUBLE EXTRA STRONG WEIGHT (XXS) - FOR 30" THRU 48" DIAMETER PIPE CULVERT.
 - ③ WELDING: AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
 - ④ THE GRATE SHALL BE PAINTED BLACK, FEDERAL SPECIFICATION TT-E-489J, AFTER FABRICATION.
- (C) THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
 - ① BOLTS, NUTS AND WASHERS: ASTM F1554 GRADE 36
 - ② GALVANIZING: ASTM A153
- (D) THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.
- (E) PAYMENT WILL BE MADE UNDER:

ITEM NUMBER 611-07.30	15IN ENDWALL (SIDE DRAIN)	EACH
ITEM NUMBER 611-07.31	18IN ENDWALL (SIDE DRAIN)	EACH
ITEM NUMBER 611-07.32	24IN ENDWALL (SIDE DRAIN)	EACH
ITEM NUMBER 611-07.33	30IN ENDWALL (SIDE DRAIN)	EACH
ITEM NUMBER 611-07.34	36IN ENDWALL (SIDE DRAIN)	EACH
ITEM NUMBER 611-07.35	42IN ENDWALL (SIDE DRAIN)	EACH
ITEM NUMBER 611-07.36	48IN ENDWALL (SIDE DRAIN)	EACH
- (F) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN
- (G) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

- REV. 7-10-12: REVISED ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES NOTE.
- REV. 1-10-13: CHANGED REQUIREMENT FOR GRATE ON ALL ENDWALLS.
- REV. 6-14-13: REVISED NOTE E, ADDED NOTES F AND G



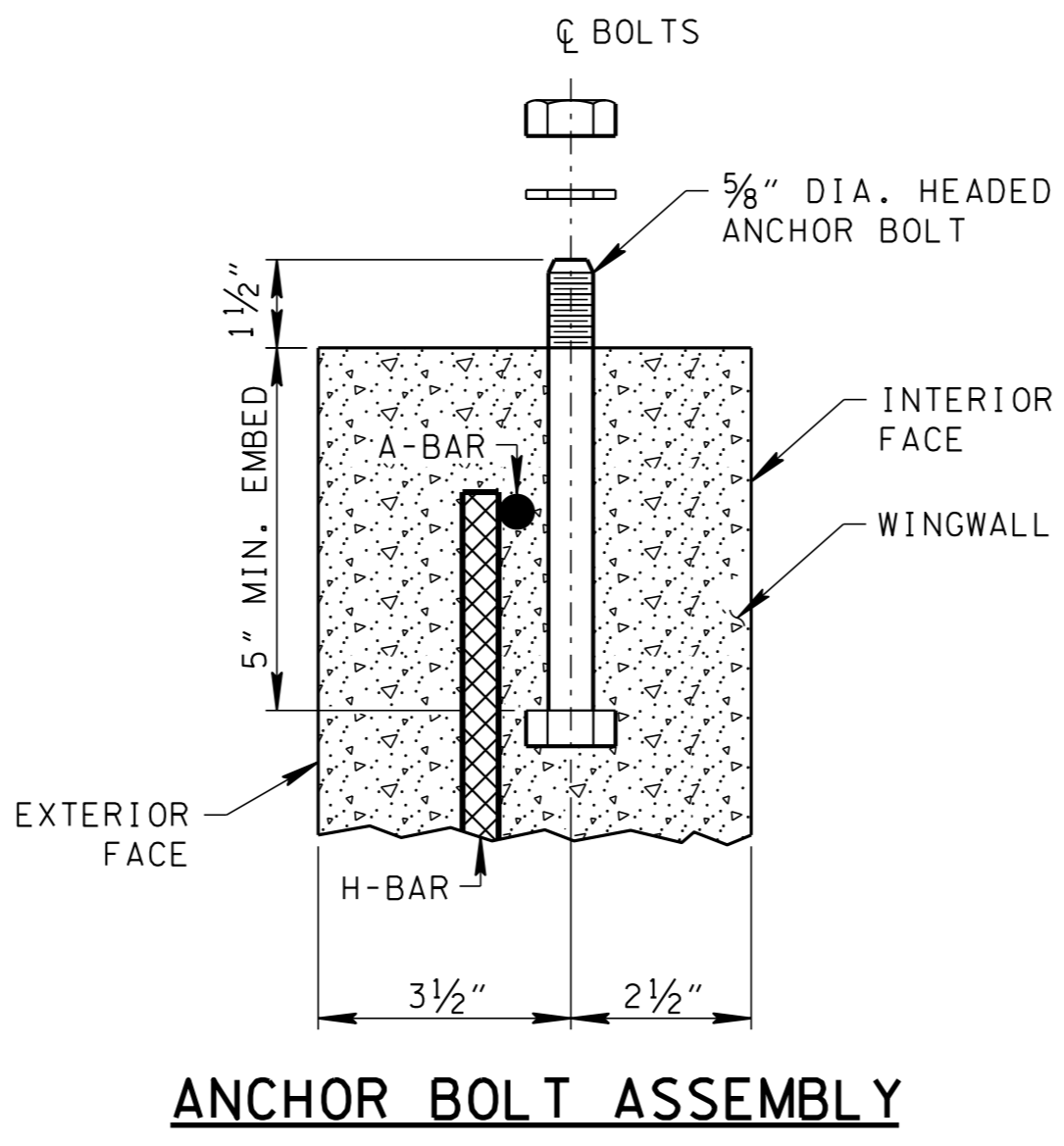
PLAN

SECTION B-B

STEEL PIPE GRATE

SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS

NOTE: BOLTS SHALL NOT EXTEND MORE THAN 1/2" ABOVE TOP OF NUTS.



ANCHOR BOLT ASSEMBLY

ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

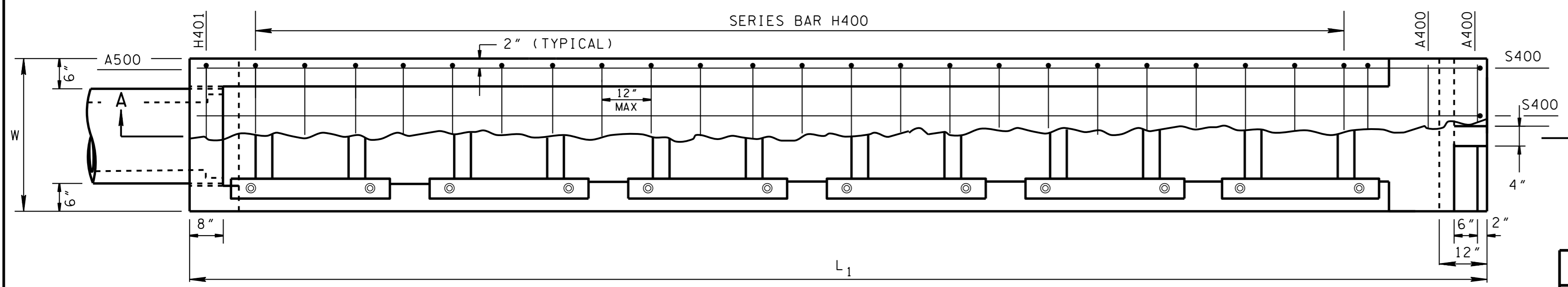
CERTIFICATION: DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR 5/8" DIAMETER ANCHORS IS 10,000 POUNDS.

SIDE DRAIN DIA. (D)	DIMENSIONS AND QUANTITIES FOR ONE ENDWALL									
	CONCRETE ENDWALL DIMENSIONS				GRATE PLACEMENT DIMENSIONS			STRUCTURAL STEEL GRATE DIMENSIONS AND QUANTITY		STRUCT. STEEL LB.
	H	W	L1	L2	L3	L4	L5	WG	NO. REQ'D.	
15"	SEE STD. DWG. D-PE-15A				1'-9 1/8"	1'-0"	2'-6"	2'-5"	2	172
18"	SEE STD. DWG. D-PE-18A				1'-2 1/8"	0'-9"	1'-2"	2'-8"	3	269
24"	SEE STD. DWG. D-PE-24A				2'-2"	1'-0"	3'-2 5/8"	3'-3"	3	296
30"	SEE STD. DWG. D-PE-30A				2'-2"	1'-0"	3'-3 3/8"	3'-10"	4	694
36"	SEE STD. DWG. D-PE-36A				2'-2"	1'-0"	2'-9 1/8"	4'-5"	5	975
42"	SEE STD. DWG. D-PE-42A				2'-2"	1'-0"	1'-10 3/8"	5'-0"	6	1,294
48"	SEE STD. DWG. D-PE-48A				2'-2"	1'-0"	1'-5"	5'-7"	7	1,669

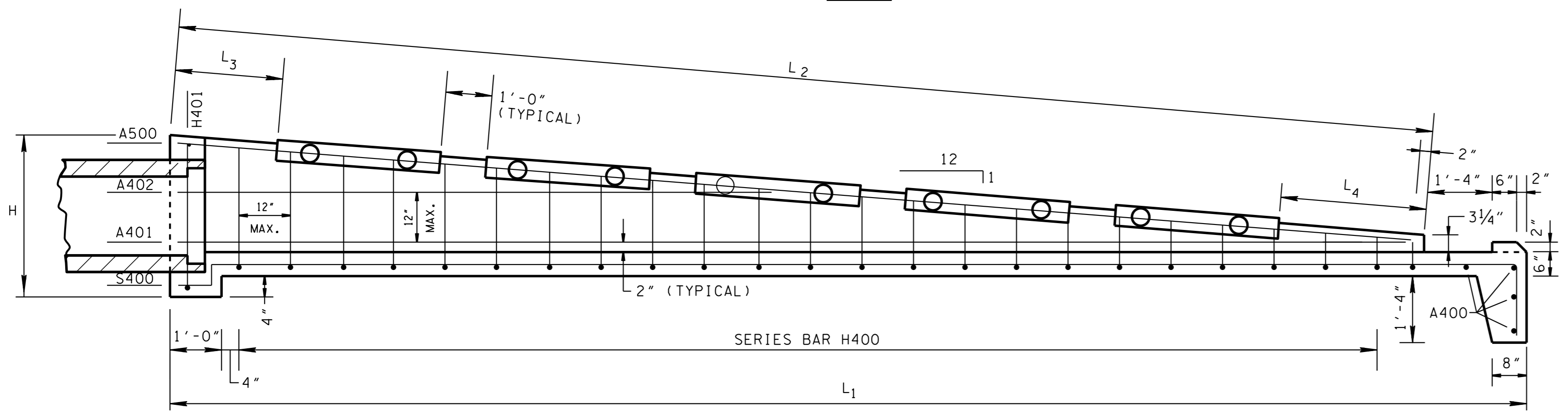
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

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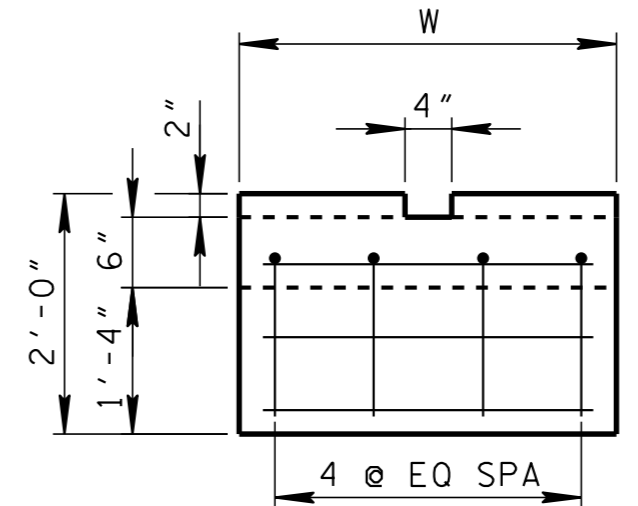
SIDE DRAIN CONCRETE ENDWALL WITH STEEL PIPE GRATE FOR 15" THRU 48" PIPES - 6:1 SLOPE



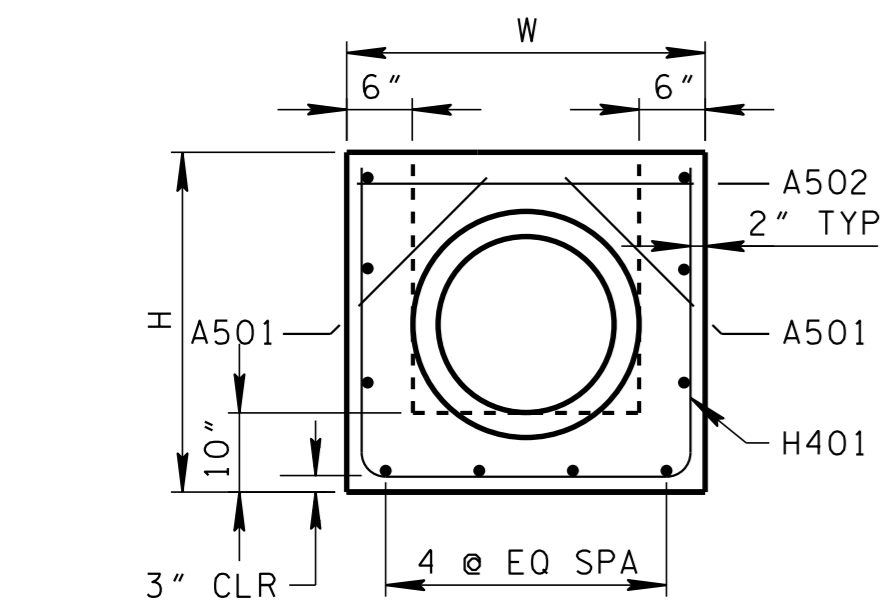
PLAN



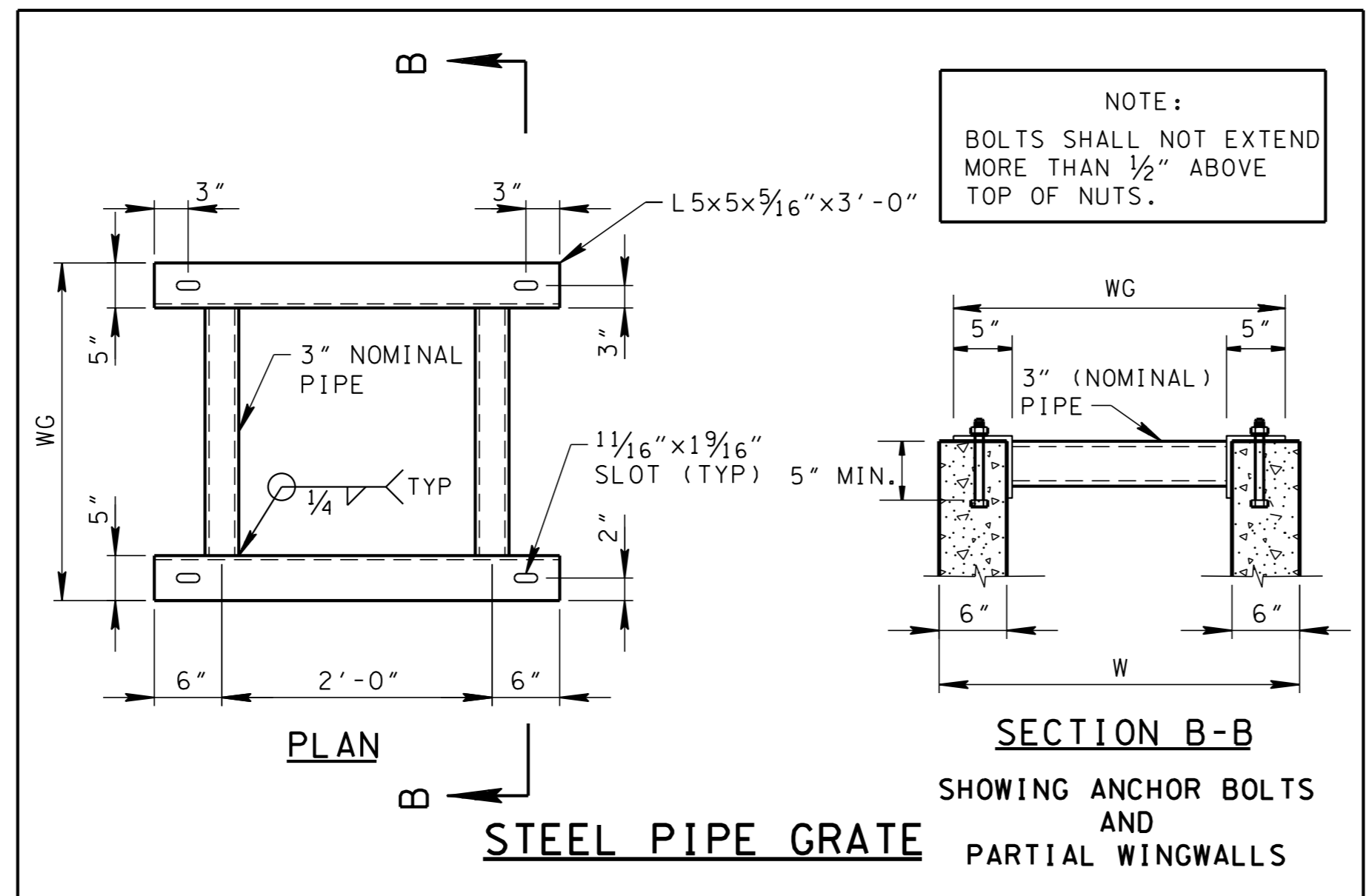
SECTION A-A



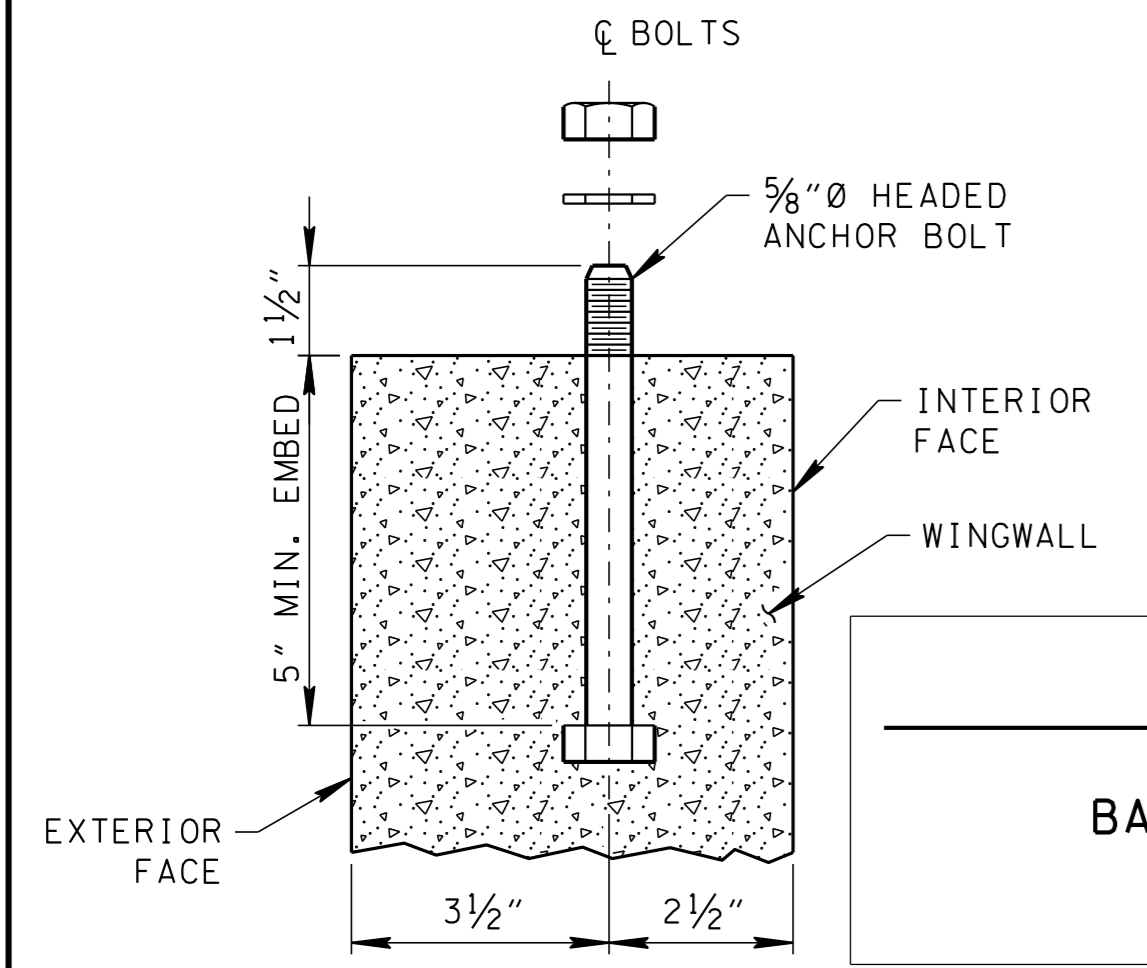
TOEWALL ELEVATION



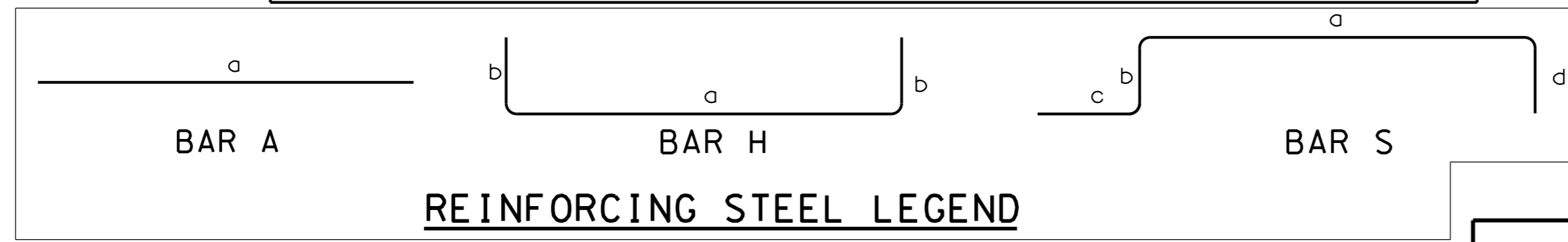
HEADWALL ELEVATION



SECTION B-B
SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS



ANCHOR BOLT ASSEMBLY



REINFORCING STEEL LEGEND

REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

- GENERAL NOTES**
- CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
 - THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
 - (A) ANGLES ASTM A36
 - (B) STEEL PIPE ASTM A53, TYPE E, GRADE B, STANDARD WEIGHT (SW)
 - (C) WELDING AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
 - (D) THE GRATE SHALL BE PAINTED BLACK, FEDERAL SPECIFICATION TT-E-489J, AFTER FABRICATION.
 - THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
 - (A) BOLTS, NUTS AND WASHERS ASTM F1554 GRADE 36
 - (B) GALVANIZING ASTM A153
 - THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR PIPE ENDWALL.
 - PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M170).
 - PAYMENT WILL BE MADE UNDER:
 - 611-07.72 15IN ENDWALL (MEDIAN DRAIN)
 - 611-07.73 18IN ENDWALL (MEDIAN DRAIN)
 - THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN
 - DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

BILL OF STEEL

ITEM	DESCRIPTION	NO.	15" PIPE				18" PIPE							
			BENDING DIMENSIONS				REQ'D.	LENGTH	BENDING DIMENSIONS				REQ'D.	LENGTH
			a	b	c	d			a	b	c	d		
A400	TOEWALL	4	2'-6"	---	---	---	2	2'-6"	---	---	---	4	2'-9"	
A401	WINGWALLS	4	19'-1"	---	---	---	2	19'-1"	10'-0 1/2"	---	---	2	10'-0 1/2"	
A402	WINGWALLS	4	7'-1"	---	---	---	2	7'-1"	22'-0"	---	---	2	22'-0"	
A500	WINGWALLS	5	20'-9"	---	---	---	2	20'-9"	23'-8"	---	---	2	23'-8"	
A501	HEADWALL	5	1'-7 1/4"	---	---	---	2	1'-7 1/4"	1'-8 5/8"	---	---	2	1'-8 5/8"	
A502	HEADWALL	5	2'-6"	---	---	---	1	2'-6"	2'-9"	---	---	1	2'-9"	
H400	BOTTOM SLAB AND WINGWALL	4	2'-6"	*	---	---	1	97'-11"	2'-9"	*	---	1	102'-11"	
H401	BOTTOM SLAB AND HEADWALL	4	2'-6"	2'-4 7/8"	---	---	1	7'-3 3/4"	2'-9"	2'-7 7/8"	---	1	8'-0 3/4"	
S400	BOTTOM SLAB AND TOEWALL	4	21'-11"	0'-4 1/2"	0'-8"	1'-4"	4	24'-3 1/2"	24'-10"	0'-4 1/2"	0'-8"	4	27'-2 1/2"	

*DIMENSION "b" VARIES FROM 1'-11 1/8" TO 0'-4 7/8" IN INCREMENTS OF 0'-1" (20 BARS)

*DIMENSION "b" VARIES FROM 2'-2 7/8" TO 0'-4 7/8" IN INCREMENTS OF 0'-1" (23 BARS)

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL

PIPE CULV. DIA.	CONCRETE ENDWALL DIMENSIONS						STRUCTURAL STEEL GRATE DIMENSION AND QUANTITY		ESTIMATED QUANTITIES		
	H	L1	L2	L3	L4	W	WG	NO. REQ'D	CLASS "A" CONCRETE CU. YD.	STEEL BAR REINF. LB.	STRUCT. STEEL LB.
15"	2'-10 1/4"	23'-0"	21'-0 7/8"	1'-10"	1'-10"	2'-10"	2'-7"	4	2.32	224	354
18"	3'-1 1/4"	25'-11"	24'-0"	0'-10"	0'-10"	3'-1"	2'-10"	5	2.84	253	461

ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

CERTIFICATION: DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR 3/4" DIAMETER ANCHORS IS 10,000 POUNDS.

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CONCRETE ENDWALL TYPE "SD" WITH STEEL PIPE GRATE FOR 15" & 18" PIPES 12:1 SLOPE

NOT TO SCALE

D-SEW-12D

REV. 7-28-84: CHANGED MATERIAL SPECIFICATIONS FOR STRUCTURAL STEEL PIPES AND PAINT SPECIFICATIONS.

REV. 3-20-86: CHANGED FEDERAL PAINT SPECIFICATION.

REV. 7-29-92: REDREW, RENAMED AND REORGANIZED SHEET. CHANGED SHEET NUMBER FROM D-PE-12 TO D-SEW-12D. CHANGED ENDWALL FROM TYPE "U" TO TYPE "SD". UPDATED SPECIFICATIONS IN THE GENERAL NOTES. CORRECTED DIMENSIONS AND ESTIMATED QUANTITIES IN THE DIMENSION AND QUANTITY BLOCK. CORRECTED DIMENSIONS IN BILL OF STEEL.

REV. 10-26-95: IN GENERAL NOTE (2) CHANGED MINIMUM WALL THICKNESS FROM 0.25" TO 0.216".

REV. 1-19-97: CHANGED WEIGHT OF STRUCTURAL STEEL GRATES.

REV. 5-27-99: CHANGED PAINT SPECIFICATION TO TT-E-489J.

REV. 4-15-00: MODIFIED TOE WALL AND CLASS "A" CONCRETE QUANTITIES.

REV. 5-27-01: CHANGED DESCRIPTION FOR ITEM NO. 611-07.03.

REV. 6-1-09: ADDED GENERAL NOTE (6).

REV. 7-19-10: DELETED GENERAL NOTE (6).

REV. 3-1-12: REVISED REINFORCING STEEL, BILL OF STEEL, REINFORCING STEEL LEGEND, STEEL GRATE, ANCHOR BOLT DETAIL, ESTIMATED QUANTITIES FOR CLASS "A" CONCRETE, STEEL BAR REINF. & STRUCTURAL STEEL. REVISED GENERAL NOTES AND NOTE FOR ALTERNATE DRILLED IN ANCHORS.

REV. 6-14-13: REVISED GENERAL NOTE (6). ADDED NOTES (7) AND (8).