



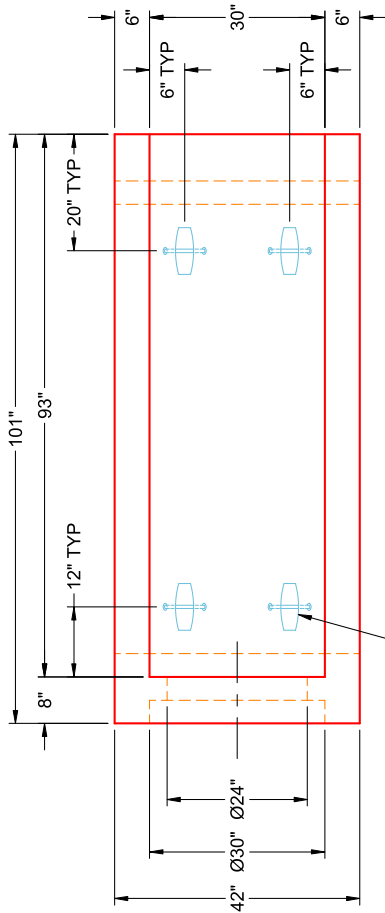
**Structure ID: HW 16 (14)**

**P1 HWTDOT3-1TU24**

**24" - HW TDOT 3:1 Type U Cross Drain Endwall F/F**

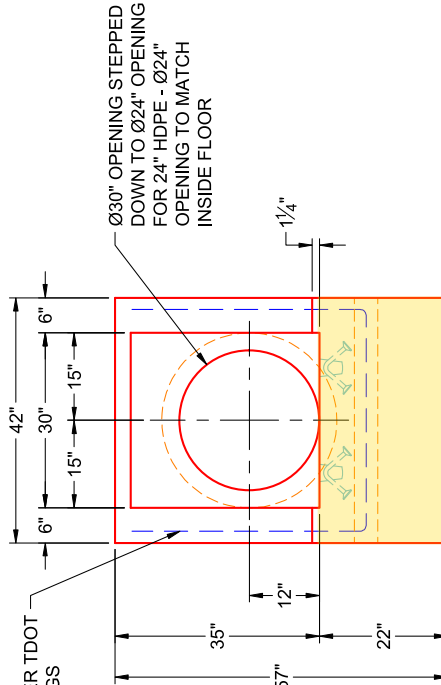
**GENERAL NOTES:**

- PER TDOT D-PE-24 SPECIFICATIONS
- CONCRETE: 4,500 PSI AT 28 DAYS
- REINFORCEMENT: PER TDOT STANDARD DRAWINGS D-PE-24A & D-PE-24B
- WEIGHT: 5,005 LBS  
 - FIRST POUR: 2,860 LBS  
 - SECOND POUR: 2,145 LBS



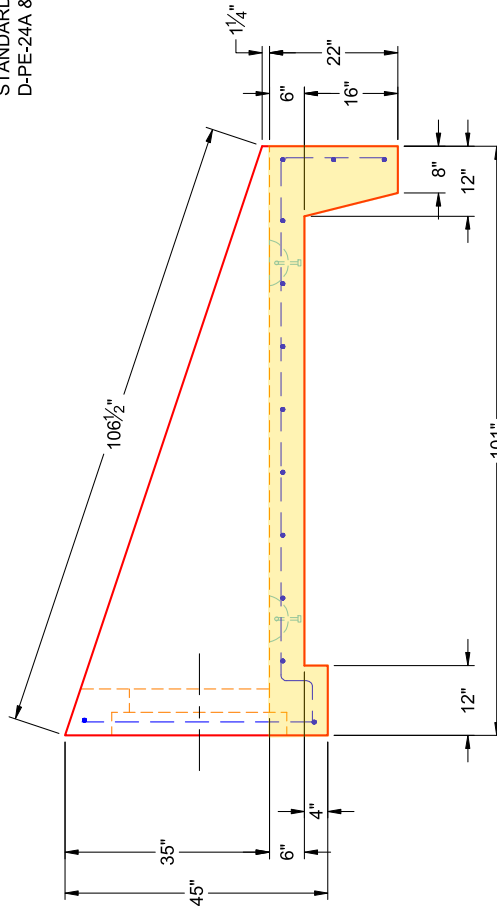
4 EA. SCA14 CONAC A-ANCHORS FOR PLANT & FIELD HANDLING

**PLAN VIEW  
(RIGHT SIDE UP)**



**VIEW B  
(RIGHT SIDE UP)**

REINFORCEMENT PER TDOT STANDARD DRAWINGS D-PE-24A & D-PE-24B



**VIEW A  
(RIGHT SIDE UP)**

PRODUCTION WORK ORDER		PRODUCT I.D.: HWTDOT3-1TU24	DESCRIPTION: 24" TDOT D-PE-24 TYPE "U" CROSS DRAIN EW 3:1
QUALITY CONTROL CHECKLIST		PRODUCT VIEW: RIGHT SIDE UP	CUSTOMER: PARKER EXCAVATING, LLC
<input type="checkbox"/> ALL DIMENSIONS CORRECT.		PLANT: BEAVER DAM, KY	PROJECT: GOVERNMENT CENTER
<input type="checkbox"/> LIFTERS INSTALLED.		WEIGHT: 5,005 LBS	STRUCTURE: HW 16 (14)
<input type="checkbox"/> OPENING CENTERED.		TOP SECTION JOINT: N/A	ORDER NO: 25-4566
<input type="checkbox"/> REINFORCING CORRECT.		BASE SECTION JOINT: N/A	PE: J.H. ROSS
<input type="checkbox"/> SURFACE QUALITY ACCEPTABLE.		QC CHECK INITIALS:	DRAWING: K. CARDWELL
<input type="checkbox"/> EDGES CHAMFERED.			SCALE: NTS
<input type="checkbox"/> ALL PATCHWORK ACCEPTABLE.			PG. 1 OF 1

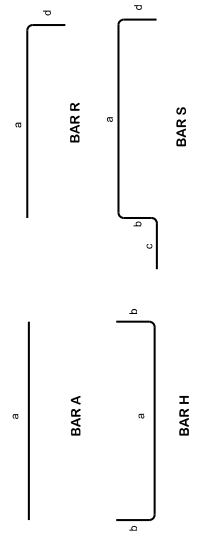




# BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE				4:1 WINGWALL SLOPE				6:1 WINGWALL SLOPE						
			a	b	c	d	REQD	NO.	LENGTH	a	b	c	d	REQD	NO.	LENGTH	
A400	TOEWALL	4	3'-2"	-	-	-	3	3'-2"	-	-	-	-	3	3'-2"	-	-	-
A431	WINGWALLS	4	7'-4"	-	-	-	2	7'-4"	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	4'-4"	-	-	-	2	4'-4"	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	7'-10"	-	-	-	2	7'-10"	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	9'-10"	-	-	-	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	5'-10"	-	-	-	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	10'-4"	-	-	-	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A701	HEADWALL	7	1'-8"	-	-	-	2	1'-8"	-	-	-	-	2	1'-8"	-	-	-
A702	HEADWALL	7	3'-2"	-	-	-	1	3'-2"	-	-	-	-	1	3'-2"	-	-	-
SERIES H430	BOTTOM SLAB & WINGWALL	4	3'-2"	-	-	-	1	43'-9"	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-6 1/2" TO 0'-6 1/2" IN INCREMENTS OF 0'-4" (7 BARS)														
H431	BOTTOM SLAB & HEADWALL	4	3'-2"	-	-	-	1	9'-7"	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-7 7/8" TO 0'-7 7/8" IN INCREMENTS OF 0'-3" (9 BARS)														
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-9 1/2" TO 0'-7 1/2" IN INCREMENTS OF 0'-2" (14 BARS)														
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-9 1/2" TO 0'-4 1/2" IN INCREMENTS OF 0'-4" (14 BARS)														
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R431	WINGWALL & HEADWALL	4	1'-4"	-	-	-	2	2'-0"	-	-	-	-	-	-	-	-	-
R441	WINGWALL & HEADWALL	4	-	-	-	-	-	1'-10"	-	-	-	-	-	-	-	-	-
R461	WINGWALL & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S430	BOTTOM SLAB & TOEWALL	4	7'-4 1/2"	0'-4 1/2"	0'-8"	1'-5"	6	9'-10"	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	9'-11 1/2"	0'-4 1/2"	0'-8"	1'-5"	5	12'-5"	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 0'-4 1/2" TO 0'-8" IN INCREMENTS OF 0'-4" (6 BARS)														

### REINFORCING STEEL LEGEND



### REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.  
STANDARD C.R. S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

**PRECAST NOTES**

**PRECAST UNITS:**

**THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:**

- ① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.
- ② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
- ③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.
- ④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SURVEY OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.
- ⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (ASHTO M70).
- ⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

CONCRETE: Fc=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.  
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



**CROSS DRAIN ENDWALL  
FOR 24" PIPE,  
BILL OF STEEL AND  
PRECAST NOTES**

11/8/2019 8:04:30 AM  
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NOT TO SCALE



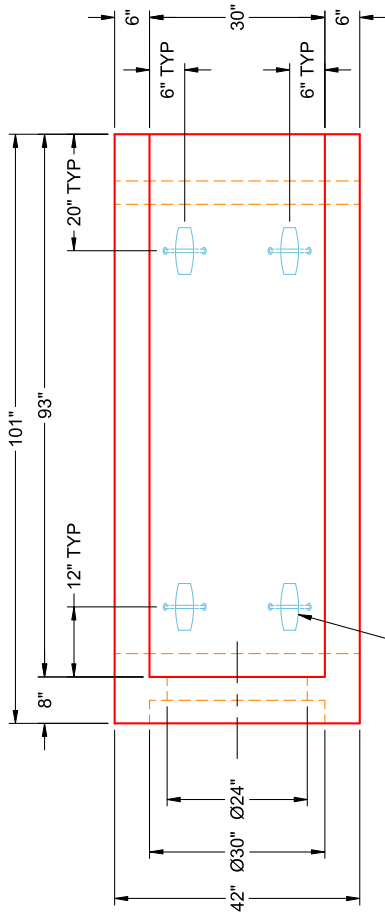
**Structure ID: HW 16 (14)**

**P1 HWTDOT3-1TU24**

**24" - HW TDOT 3:1 Type U Cross Drain Endwall F/F**

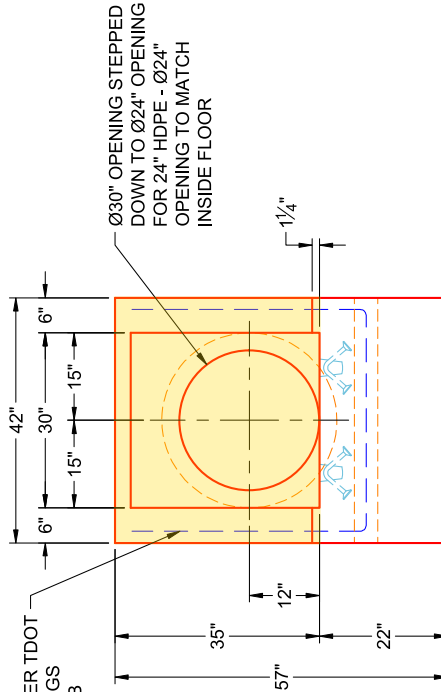
**GENERAL NOTES:**

- PER TDOT D-PE-24 SPECIFICATIONS
- CONCRETE: 4,500 PSI AT 28 DAYS
- REINFORCEMENT: PER TDOT STANDARD DRAWINGS D-PE-24A & D-PE-24B
- WEIGHT: 5,005 LBS  
 - FIRST POUR: 2,860 LBS  
 - SECOND POUR: 2,145 LBS

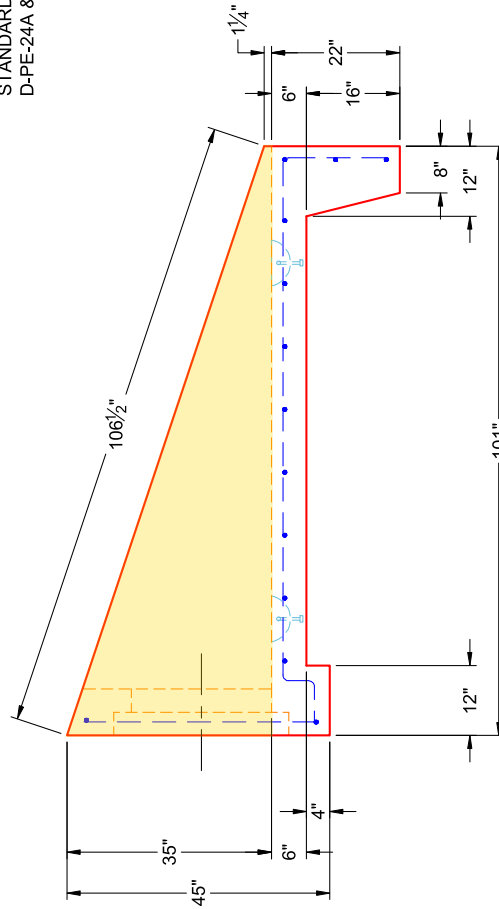


4 EA. 5CA14 CONAC A-ANCHORS FOR PLANT & FIELD HANDLING

**PLAN VIEW (RIGHT SIDE UP)**



**VIEW B (RIGHT SIDE UP)**

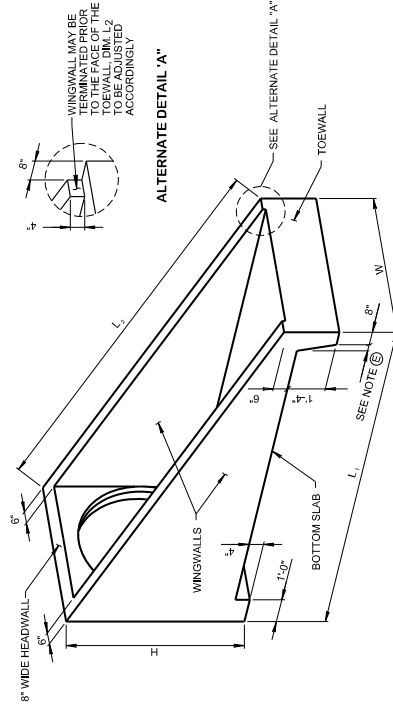


**VIEW A (RIGHT SIDE UP)**

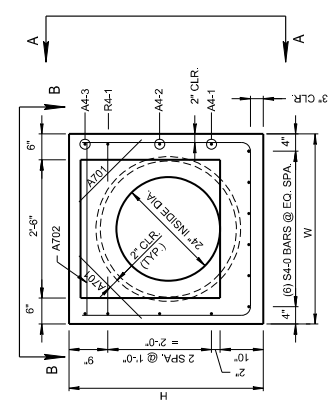
PRODUCTION WORK ORDER		PRODUCT I.D.: HWTDOT3-1TU24	DESCRIPTION: 24" TDOT D-PE-24 TYPE "U" CROSS DRAIN EW 3:1
QUALITY CONTROL CHECKLIST		PRODUCT VIEW: RIGHT SIDE UP	CUSTOMER: PARKER EXCAVATING, LLC
<input type="checkbox"/> ALL DIMENSIONS CORRECT.		PLANT: BEAVER DAM, KY	PROJECT: GOVERNMENT CENTER
<input type="checkbox"/> LIFTERS INSTALLED.		WEIGHT: 5,005 LBS	STRUCTURE: HW 16 (14)
<input type="checkbox"/> OPENING CENTERED.		TOP SECTION JOINT: N/A	ORDER NO: 25-4566
<input type="checkbox"/> REINFORCING CORRECT.		BASE SECTION JOINT: N/A	PE: J.H. ROSS
<input type="checkbox"/> SURFACE QUALITY ACCEPTABLE.		QC CHECK INITIALS:	DRAWING: K. CARDWELL
<input type="checkbox"/> EDGES CHAMFERED.			SCALE: NTS
<input type="checkbox"/> ALL PATCHWORK ACCEPTABLE.			PG. 1 OF 1
DATE: 04/03/26			



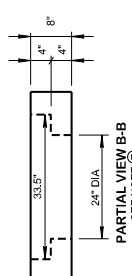
- REV 6-14-13 REVISED NOTES.
- ADDED NOTE (A) AND (I)
- REV 1-5-15 REVISED HOLE OPENING SIZE. ADDED STEPPED HOLE DETAIL.
- REV 1-31-16 REVISED GENERAL NOTE (E)
- REV 7-5-17 MODIFIED GENERAL NOTES (C) AND (I)
- REV 06-28-19 ADJUSTED A-A, B-B AND ELEVATION VIEWS. RENAMED AND REKEY SHEET.



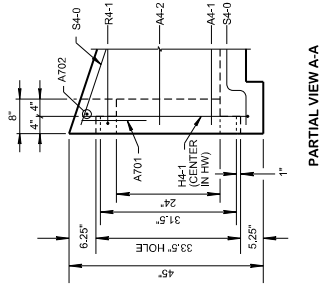
ISOMETRIC VIEW  
NOTE: 3/8\"/>



ELEVATION

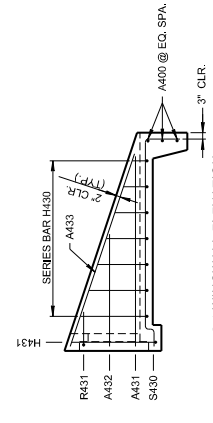


PARTIAL VIEW B-B  
SEE NOTE (I)

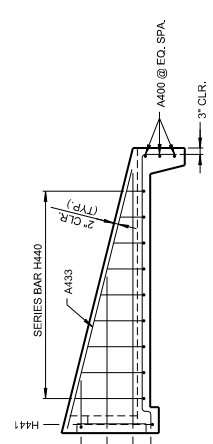


PARTIAL VIEW A-A

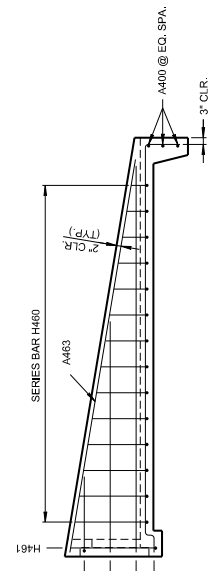
HEADWALL DETAILS  
NOTE: INSTALL BARS A701 AT 45\"/>



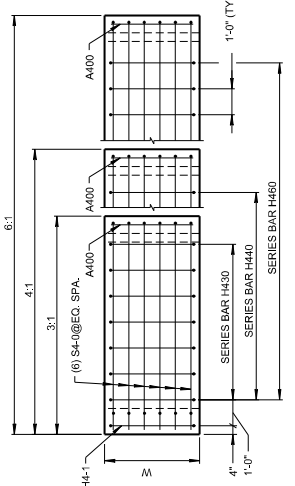
3:1 WINGWALL ELEVATION  
NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



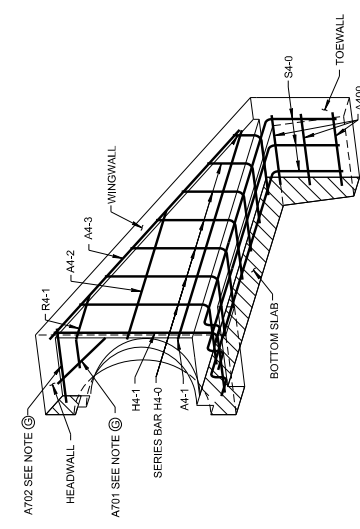
4:1 WINGWALL ELEVATION  
NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



6:1 WINGWALL ELEVATION  
NOTE: A-BARS IN HEADWALL NOT SHOWN FOR CLARITY.



BOTTOM SLAB PLAN



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

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

**DIMENSIONS AND QUANTITIES FOR ONE ENDWALL 24" PIPE**

- GENERAL NOTES**
- (A) DRAWING TO BE USED FOR ALL CAST-IN-PLACE AND ALL PRECAST CONCRETE WINGWALLS AND ENDWALLS. ALL 24" DIA. U-Pipe ENDS TO BE PLACED AT 90° SKEW TO CENTERLINE. SEE STD. DWG. D-PE-99 FOR SKEWED CONNECTION DETAIL WHEN CROSS DRAIN IS NOT SHOWN. ALL REINFORCEMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.
  - (B) SEE STD. DWG. D-PE-246 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. SEE STD. DWG. D-PE-248.
  - (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) 90° STEPS ARE SHOWN ON THE STEPPED HOLE DETAIL. HOWEVER MINOR VARIATIONS OF THE TAPER ARE ACCEPTABLE.
  - (G) OPTIONAL STEPPED HOLE OR HOLE FORMERS ARE ALLOWED PROVIDED THE AMOUNT OF COVER BETWEEN THE PIPE OPENING AND BARS 201 AND A702 IS THE SAME OR GREATER THAN SHOWN ON THIS DRAWING.
  - (H) PAYMENT WILL BE MADE UNDER:
 

611-07.57	24" ENDWALL (CROSS DRAIN)	3:1	EACH
611-07.58	24" ENDWALL (CROSS DRAIN)	4:1	EACH
611-07.59	24" ENDWALL (CROSS DRAIN)	6:1	EACH
  - (I) THE CONTRACTOR MAY BE ELECTED TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.
  - (J) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



DEPARTMENT OF TRANSPORTATION  
**TYPE "U"  
CROSS DRAIN  
ENDWALL  
FOR 24" PIPE**  
(FOR 3:1, 4:1 & 6:1 SLOPES)

D-PE-24A  
10-30-2012

NOT TO SCALE

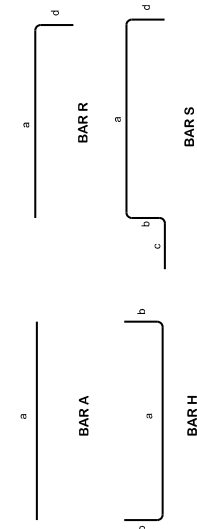
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# BILL OF STEEL

CODE NO.	LOCATION	BAR SIZE	3:1 WINGWALL SLOPE				4:1 WINGWALL SLOPE				6:1 WINGWALL SLOPE						
			a	b	c	d	REQD	NO.	LENGTH	a	b	c	d	REQD	NO.	LENGTH	
A400	TOEWALL	4	3'-2"	-	-	-	3	3'-2"	-	-	-	3	3'-2"	-	-	3	3'-2"
A431	WINGWALLS	4	7'-4"	-	-	-	2	7'-4"	-	-	-	-	-	-	-	-	-
A432	WINGWALLS	4	4'-4"	-	-	-	2	4'-4"	-	-	-	-	-	-	-	-	-
A433	WINGWALLS	4	7'-10"	-	-	-	2	7'-10"	-	-	-	-	-	-	-	-	-
A441	WINGWALLS	4	-	-	-	-	-	9'-10"	-	-	-	-	-	-	-	-	-
A442	WINGWALLS	4	-	-	-	-	-	5'-10"	-	-	-	-	-	-	-	-	-
A443	WINGWALLS	4	-	-	-	-	-	10'-4"	-	-	-	-	-	-	-	-	-
A461	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A462	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A463	WINGWALLS	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A701	HEADWALL	7	1'-8"	-	-	-	2	1'-8"	-	-	-	2	1'-8"	-	-	2	1'-8"
A702	HEADWALL	7	3'-2"	-	-	-	1	3'-2"	-	-	-	1	3'-2"	-	-	1	3'-2"
SERIES H430	BOTTOM SLAB & WINGWALL	4	3'-2"	-	-	-	1	43'-9"	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-6 1/2" TO 0'-5 1/2" IN INCREMENTS OF 0'-4" (7 BARS)														
H431	BOTTOM SLAB & HEADWALL	4	3'-2"	-	-	-	1	9'-7"	-	-	-	-	-	-	-	-	-
SERIES H440	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-7 7/8" TO 0'-7 7/8" IN INCREMENTS OF 0'-3" (9 BARS)														
H441	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	9'-7 3/8"	-	-	-	-	-	-	-	-	-
SERIES H460	BOTTOM SLAB & WINGWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 2'-9 1/2" TO 0'-7 1/2" IN INCREMENTS OF 0'-2" (14 BARS)														
H461	BOTTOM SLAB & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R431	WINGWALL & HEADWALL	4	1'-4"	-	-	-	2	2'-0"	-	-	-	-	-	-	-	-	-
R441	WINGWALL & HEADWALL	4	-	-	-	-	-	1'-10"	-	-	-	-	-	-	-	-	-
R461	WINGWALL & HEADWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S430	BOTTOM SLAB & TOEWALL	4	7'-4 1/2"	0'-4 1/2"	0'-8"	1'-5"	6	9'-10"	-	-	-	-	-	-	-	-	-
S440	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	9'-11 1/2"	0'-4 1/2"	0'-8"	1'-5"	5	12'-5"	-	-	-	-
S460	BOTTOM SLAB & TOEWALL	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			* DIMENSION "b" VARIES FROM 0'-4 1/2" TO 0'-8" IN INCREMENTS OF 0'-4 1/2" (14 BARS)														

### REINFORCING STEEL LEGEND



### REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR. STANDARD C.R. S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

### PRECAST NOTES

- PRECAST UNITS:**
- THE CONTRACTOR MAY, WITH PERMISSION FROM THE ENGINEER, SUBSTITUTE PRECAST ENDWALLS FOR CAST-IN-PLACE ENDWALLS PROVIDED THAT:**
- ① APPROPRIATE SIZING AND LOCATION OF THE LIFTING INSERTS SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION OF THE PRECAST ENDWALL.
  - ② THE CONTRACTOR TO PATCH ALL LIFTING INSERT HOLES AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
  - ③ PAYMENT FOR PRECAST ENDWALLS BASED ON THE QUANTITIES FOR CAST-IN-PLACE ENDWALLS IS ACCEPTABLE.
  - ④ PRECAST ENDWALL UNITS WHICH ARE DAMAGED DURING SURVEY OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE THE DAMAGED ENDWALL UNITS AT HIS OWN EXPENSE.
  - ⑤ PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (ASHTO M70).
  - ⑥ ADDITIONAL REINFORCING STEEL NECESSARY TO MAINTAIN THE INTEGRITY OF THE STRUCTURE DURING HANDLING AND PLACEMENT SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
- CONCRETE: Fc=4,500 POUNDS PER SQUARE INCH MINIMUM AT 28 DAYS.  
REINFORCING STEEL: ASTM A615, Fy=60,000 POUNDS PER SQUARE INCH.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



TYPE "U"  
CROSS DRAIN ENDWALL  
FOR 24" PIPE,  
BILL OF STEEL AND  
PRECAST NOTES