APRON PLAN
(NON-SKEWED STRUCTURE)

SPAN (S) — T_S

C◄—

C◄—

B◄—

B◄—

AL

7/8" DIA. ANCHOR BOLTS AND BLOCKOUTS FOR WASHERS AND NUTS. FILL WITH APPROVED GROUT.

12" RUBBERIZED MEMBRANE WATERPROOFING. SEE JOINT DETAIL

LEVEL (TYP.)

1'-6" TYP.

A°

B°

WF

T_S

WL 1

WL 2

A◄—

FILL WITH CONC. FROM BOTTOM OF WING FTG. (TYP.)

APRON PLAN
(SKEWED STRUCTURE)

A_S8 A_S7 PRECAST BOX

TIE

PRECAST TOP SLAB AND HEADER.

HOLES FOR 7/8" DIA. BOLTS AND WASHERS. 1'-6" MAX. SPA. (3 BOLTS PER SIDE MIN.)

12" RUBBERIZED MEMBRANE WATERPROOFING. SEE JOINT DETAIL

BE1

BE2

1'-6" MIN.

1'-6"

WL 1

WL 2

SKEW

D◄—

D◄—

E◄

E◄

END VIEW

RISE (R)

WH

2'-0" (TYP)

$2T_b$

SECTION E-E

RISE (R)

9" MIN.

A_S9

WF

RISE(R)	A_S9 IN.²/FT	WF
4'-0"	0.19	2'-6"
6'-0"	0.24	3'-6"
8'-0"	0.31	4'-0"
10'-0"	0.34	4'-9"

SECTION D-D

A_S10 BARS

PRECAST SLAB & HEADER

6"

#3 BARS AT 9" CTRS.

A_S7 TO BE DESIGNED

A_S8 TO BE DESIGNED

CAST 7/8" DIA. BOLT IN WALL (TYP.)

#5 BARS AT 1'-0 CTRS., 2'-0" LONG (BOT. SLAB ONLY)

FIELD POUR

1'-0

JOINT DETAIL
JOINT DETAIL EXAMPLE SHOWN. PRECAST SUPPLIER TO SUBMIT JOINT DETAIL FOR ACCEPTANCE.

PROVIDE KEYWAY FULL-HEIGHT OF WALL. FILL WITH NON-SHRINK GROUT AFTER APRON UNITS ARE SET.

12" RUBBERIZED MEMBRANE WATERPROOFING

1" MAX

PRECAST WING

COMPRESSIBLE FOAM JOINT FILLER

NOTES

CONCRETE COVER ON ALL REINFORCEMENT IN THE PRECAST ELEMENTS SHALL BE 2" UNLESS SHOWN OR NOTED OTHERWISE.

STEEL REINFORCEMENT MAY BE EITHER GRADE 60 DEFORMED BARS (FY = 60,000 P.S.I.) OR WELDED DEFORMED - WIRE FABRIC OF EQUIVALENT AREA, (FY = 65,000 P.S.I.)

THE MINIMUM CONCRETE STRENGTH OF THE FIELD POURED CONCRETE SHALL BE 3,500 P.S.I.

ALTERNATE DETAILS OF EQUAL STRENGTH AND HYDRAULIC CAPACITY TO THE DETAILS SHOWN ON THIS SHEET MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

THE MINIMUM CONCRETE STRENGTH OF THE CONCRETE IN THE PRECAST APRON ELEMENTS SHALL BE 4,000 P.S.I.

THE PRECAST ELEMENTS SHALL BE PROVIDED WITH SUITABLE LIFTING DEVICES FOR HANDLING AND PLACEMENT OF THE ELEMENTS.

VERTICAL CONSTRUCTION JOINTS THRU THE WALLS AND FOOTING WILL BE ALLOWED ONLY WITH THE APPROVAL OF THE ENGINEER. DETAILS MUST BE SHOWN ON THE SHOP DRAWINGS FOR APPROVAL.

THE AREA OF REINFORCING STEEL NOT IDENTIFIED IN SECTIONS SHALL CONFORM TO THE FOLLOWING TEMPERATURE AND SHRINKAGE REQUIREMENTS:

THICKNESS	T&S REINF.
≤ 12"	#4 @ 18"
> 12" – 18"	#4 @ 12"

THE MAXIMUM BAR SIZE OF GRADE 60 DEFORMED BARS, OTHER THAN THE A_S10 BARS, SHALL BE #5.

THE 7/8" DIA. ANCHOR BOLTS SHALL BE GALVANIZED AND CONFORM TO THE REQUIREMENTS OF A.S.T.M. A575.

ALL EXPOSED CORNERS SHALL BE BEVELED 3/4" ON THE SIDES OR TOOL EDGED WITH A 1/2" MINIMUM RADIUS EDGER.

PRECAST CUT OFF WALLS MAY BE FIELD SPLICED BY EXTENDING THE REINFORCING STEEL FROM BOTH SEGMENTS TO BE SPLICED 1'-6" INTO THE SPLICE ZONE, LAPPING THE STEEL ± 1'-6" AND FIELD POURING A SECTION OF CUT OFF WALL 1'-6" LONG.

PRECAST ELEMENTS MAY BE POURED IN PLACE AT THE OPTION OF THE CONTRACTOR.

APRON SHALL BE POURED AND CURED PRIOR TO BACKFILLING WINGWALLS.

DESIGNER NOTE:

PROVIDE "BOX CULVERT APRON DATA" TABLE ON CONTRACT PLANS WHEN A PRECAST ONLY DESIGN IS PROVIDED.

	A_S10 BARS		
SPAN	SKEW		
(S)	0°-15°	16°-30°	31°-45°
6'-0"	(6) - #6	(6) - #6	(6) - #6
7'-0"	(6) - #6	(6) - #6	(6) - #7
8'-0"	(6) - #6	(6) - #7	(6) - #8
10'-0"	(6) - #7	(6) - #8	(6) - #8

BOX CULVERT APRON DATA

	R (FT)	S (FT)	T OR T_S (IN)	SKEW	ANGLE A	ANGLE B	WL 1	WL 2	AL	AH	WH	BE1	BE2
INLET													
OUTLET													

SECTION B-B

AH

FIELD POURED

6"

3" CL.

PRECAST CUTOFF WALL

1'-6"

6"

2" CL.

SECTION A-A

T OR T_b

PRECAST WING

ELEVATION OF BARREL BOTTOM SLAB (TOP)

A_S9

3" CL.

1'-0

9"

WF

SECTION C-C

1'-0

PRECAST HEADER

#3 BARS AT 1'-6"

2 - #4

CL.

6"

9" MIN.

1'-0

NAME PLATE

PRECAST WINGS, HEADERS, AND CUTOFF WALLS FOR PRECAST CONCRETE BOX CULVERT

BUREAU OF STRUCTURES

WISCONSIN DEPARTMENT OF TRANSPORTATION

APPROVED: *Laura Shadewald*

DATE: 1-21

STANDARD 36.06