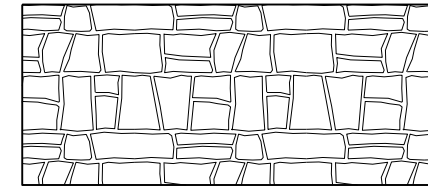
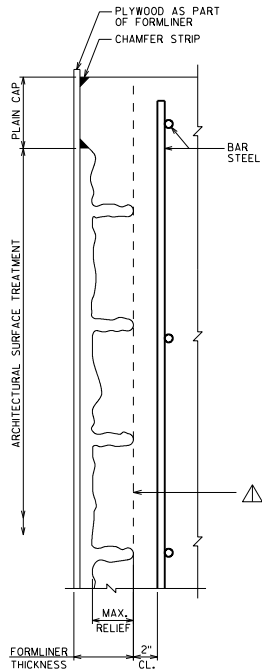


BROKEN RIB
 FORMLINER THICKNESS = $3" \pm 1/2"$
 WIDTH = $2" \pm 1/2"$
 MAX. RELIEF = $2" \pm 1/2"$

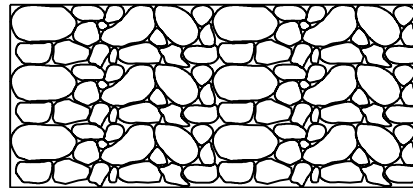


RUSTIC ASHLAR
 FORMLINER THICKNESS = $3"$
 SIZE = $8"$ TO $32"$
 MAX. RELIEF = $2"$

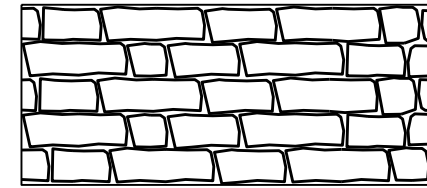


SECTION THRU FORMLINER

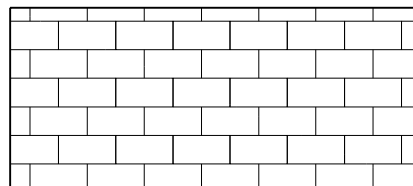
▲ STRUCTURAL CONCRETE CAN ONLY BE ASSUMED TO THIS LINE. PROVIDE ADDITIONAL STRUCTURE SIZE AS NECESSARY TO MAINTAIN MINIMUM FULL STRUCTURAL CONCRETE DIMENSIONS AS INDICATED ON THE STANDARDS.



FIELD STONE - RANDOM
 FORMLINER THICKNESS = $3 1/2"$
 SIZES BETWEEN $6"$ & $24"$
 MAX. RELIEF = $2 1/2"$



RECTANGULAR CUT STONE
 FORMLINER THICKNESS = $4"$ TO $5 1/2"$
 COURSE HEIGHT = $\pm 2"$
 MAX. RELIEF = $3"$ TO $4 1/2"$



RECTANGULAR BRICK
 FORMLINER THICKNESS = $2"$
 SIZE = VARIES
 MAX. RELIEF = $1"$

RETAINING WALL NOTES

FORMLINER COURSING ON RETAINING WALLS SHALL BE LEVEL

ABUTMENT NOTES

FORMLINER COURSING ON ABUTMENTS AND WINGS SHALL BE LEVEL.

THE FORMLINER COURSING ON THE WINGS SHALL BE VERTICALLY ALIGNED WITH THE FORMLINER COURSING ON THE FRONT OF THE ABUTMENT.

THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS.

PIER NOTES

FORMLINER COURSING ON PIERS SHALL BE LEVEL.

THE FORMLINER COURSING ON ALL FACES OF EACH COLUMN SHALL BE VERTICALLY ALIGNED.

SPACE ADJACENT PORTIONS OF FORMLINER ON SLOPED FACE SO THAT COURSING IS ALIGNED VERTICALLY WITH COURSING ON VERTICAL FACE.

THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS

PARAPET NOTES

FORMLINER COURSING ON PARAPETS SHALL BE PARALLEL TO TOP OF PARAPET.

FORMLINER DETAILS

STATE OF WISCONSIN
 DEPARTMENT OF TRANSPORTATION
 STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

DATE:
 1-11

DESIGNER NOTES

THIS TYPE OF WING SHOULD BE USED WHEN POSSIBLE IN LIEU OF WINGS PARALLEL TO THE ROADWAY. DO NOT USE FOR STREAM CROSSINGS WHERE HIGH WATER MAY BE A PROBLEM.

- *USE 2 1/2:1 FOR THE UNSTABLE CLAYS WHICH ARE SOMETIMES ENCOUNTERED IN NORTHWEST WISC. (SUPERIOR AREA)
- ① WHEN TIMBER RAILING IS USED AS PER STANDARD 30.24, AND THE SKEW IS > 0°, THIS CONSTRUCTION JOINT SHALL BE MANDATORY. THE WING CONCRETE SHALL BE PLACED ABOVE CONSTR. JT. AFTER THE TIMBER END POSTS ARE IN PLACE.

ALL WING BARS SHALL BE EPOXY COATED.

LRFD DESIGN LOADS (WINGS)

LIVE LOAD = 1'-0" SURCHARGE

LOAD FACTORS:

$\gamma_{DC} = 1.25$

$\gamma_{SW} = 1.50$

$\gamma_{S} = 1.75$

EXPOSURE CLASS 2, $\gamma_{F} = 0.75$

HORIZ. EARTH LOAD BASED ON: 35 P.C.F. EQUIV. FLUID UNIT

WEIGHT OF SOIL

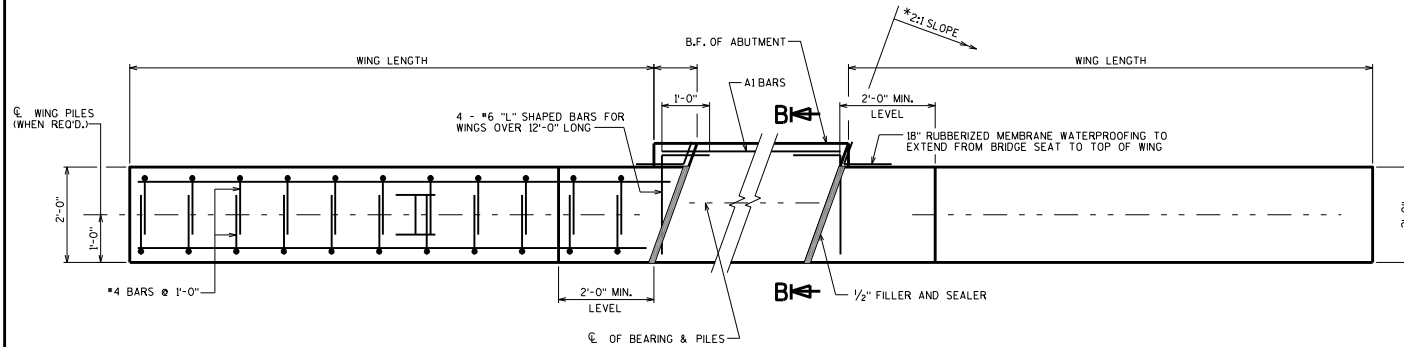
$F_y = 60,000$ P.S.I.

$F_c = 3,500$ P.S.I.

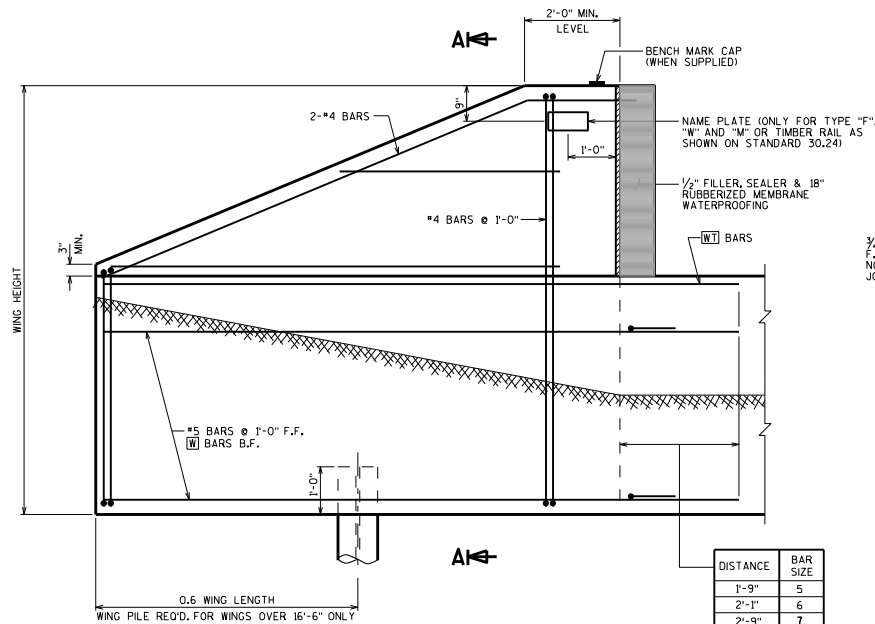
TABLE A

WING LENGTH	WING HEIGHT				BARS
	8'-6"	10'-0"	11'-6"	13'-0"	
5'-9"	5-#9's	5-#5's	6-#5's		W
	2-#5's	2-#5's	2-#5's		WT
10'-0"	4-#6's	4-#6's	5-#6's		A1
		5-#6's	5-#7's		W
12'-0"		2-#7's	2-#7's	2-#8's	WT
		5-#6's	6-#6's	6-#7's	A1
15'-0"		5-#8's	6-#8's	5-#9's	W
		2-#8's	2-#8's	2-#9's	WT
20'-0"		5-#8's	6-#8's	7-#8's	A1
			8-#8's	8-#9's	W
		2-#8's	2-#9's		WT
		7-#9's	8-#9's		A1

▲ WING PILE REQUIRED

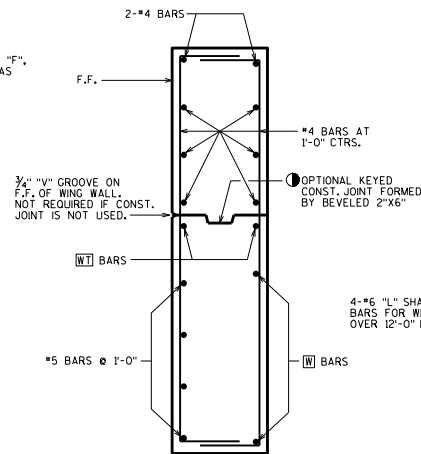


PLAN FOR TYPE A1 ABUTMENT

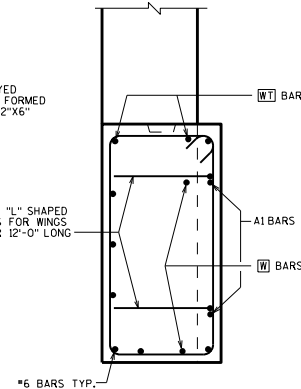


WING ELEVATION
(A1 ABUTMENT)

DISTANCE	BAR SIZE
1'-9"	5
2'-1"	6
2'-9"	7
3'-8"	8
4'-7"	9



SECTION A-A



SECTION B-B

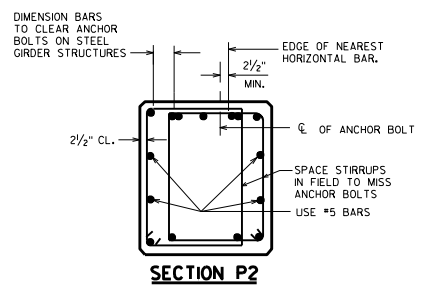
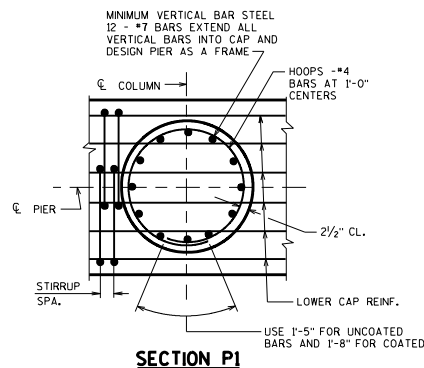
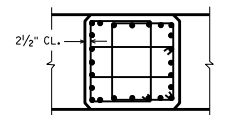
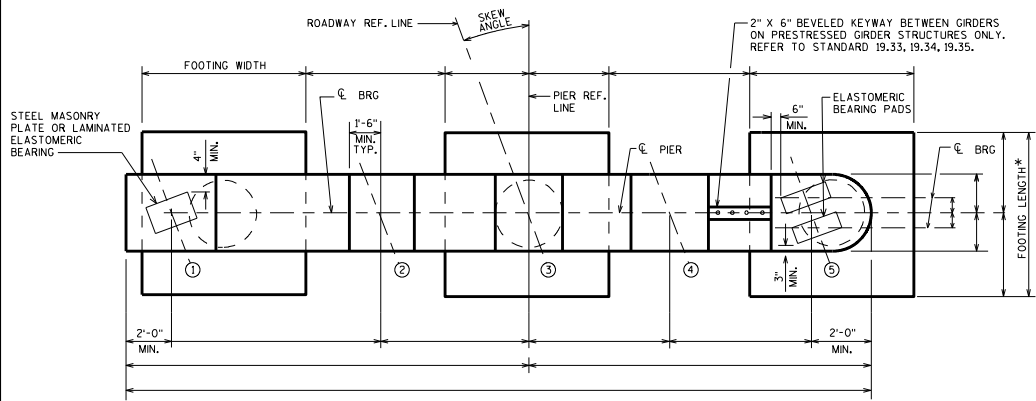
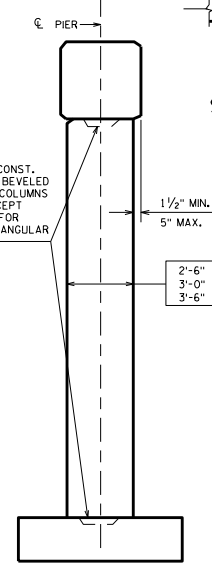
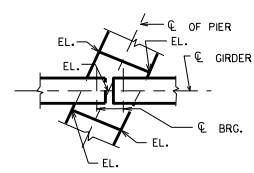
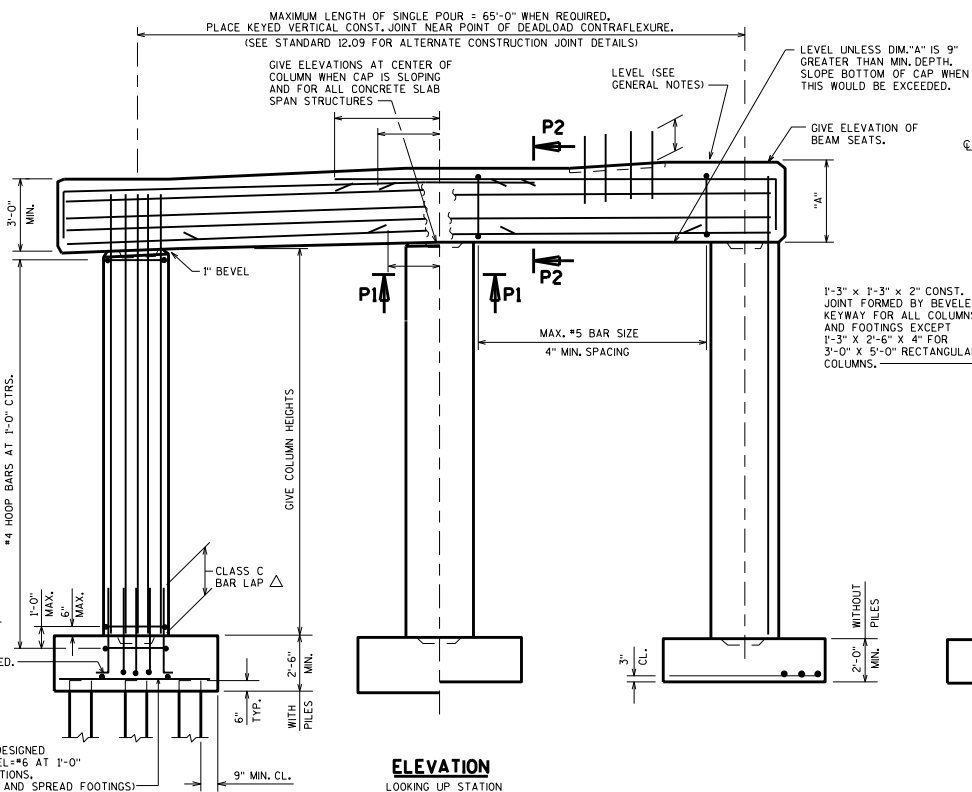
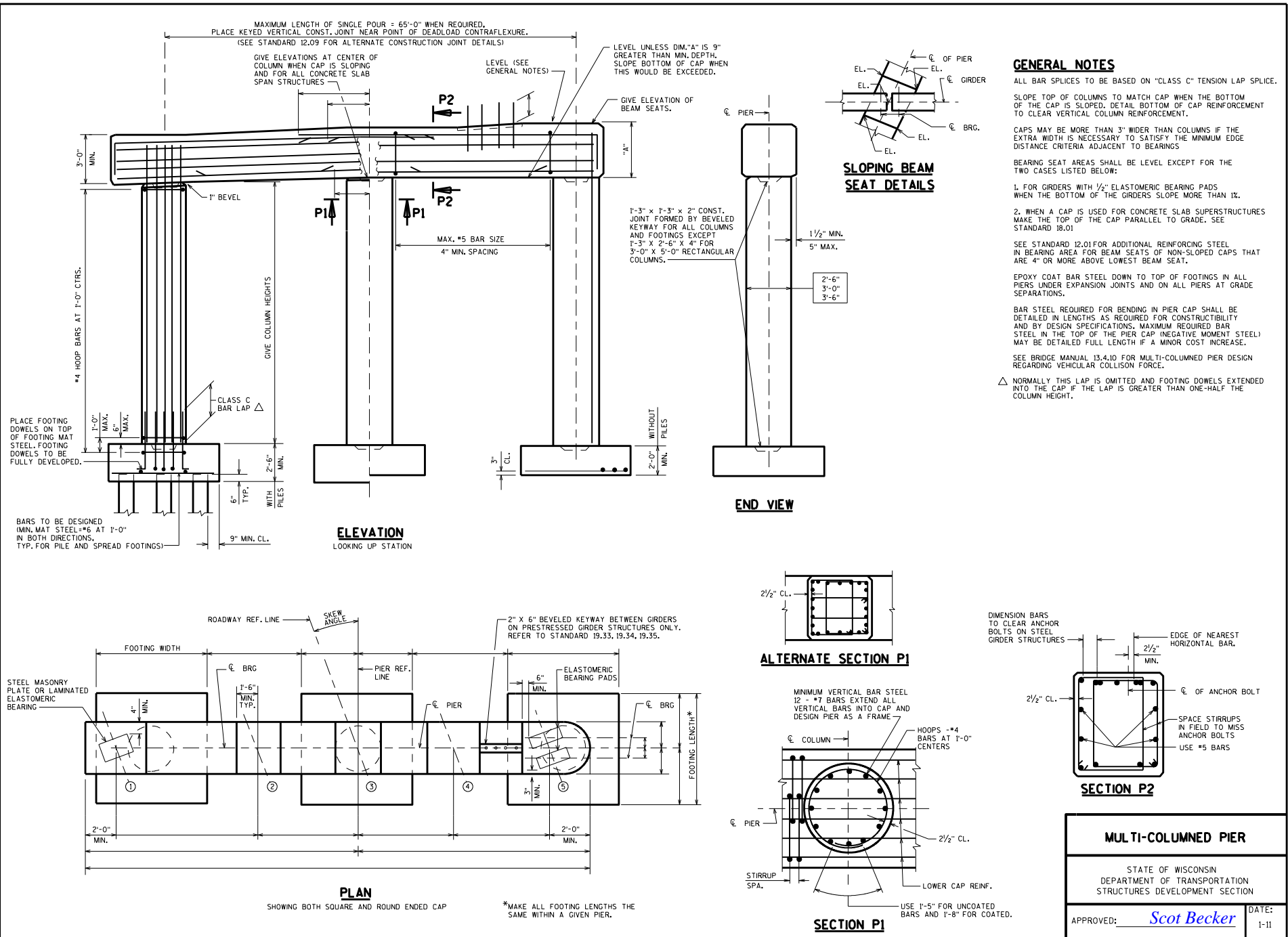
SEE STD. 12.01 & 12.02 FOR NOTES & DETAILS

DETAILS FOR WINGS PARALLEL TO A1 ABUTMENT CENTERLINE

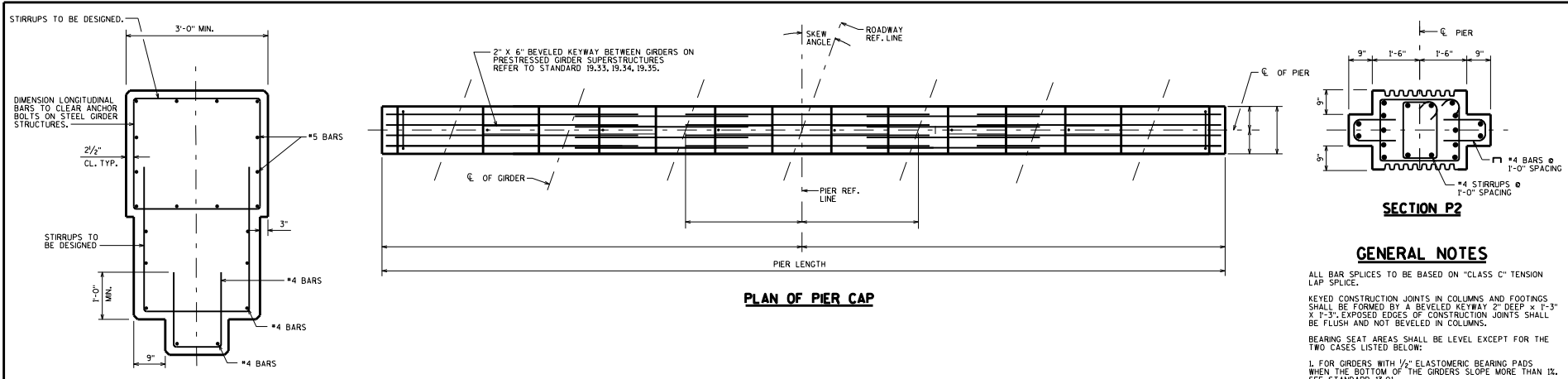
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

DATE:
1-11

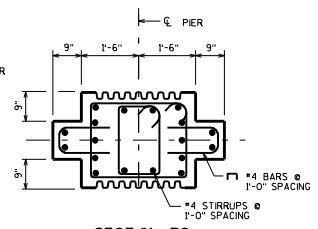


MULTI-COLUMNED PIER	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11



PLAN OF PIER CAP

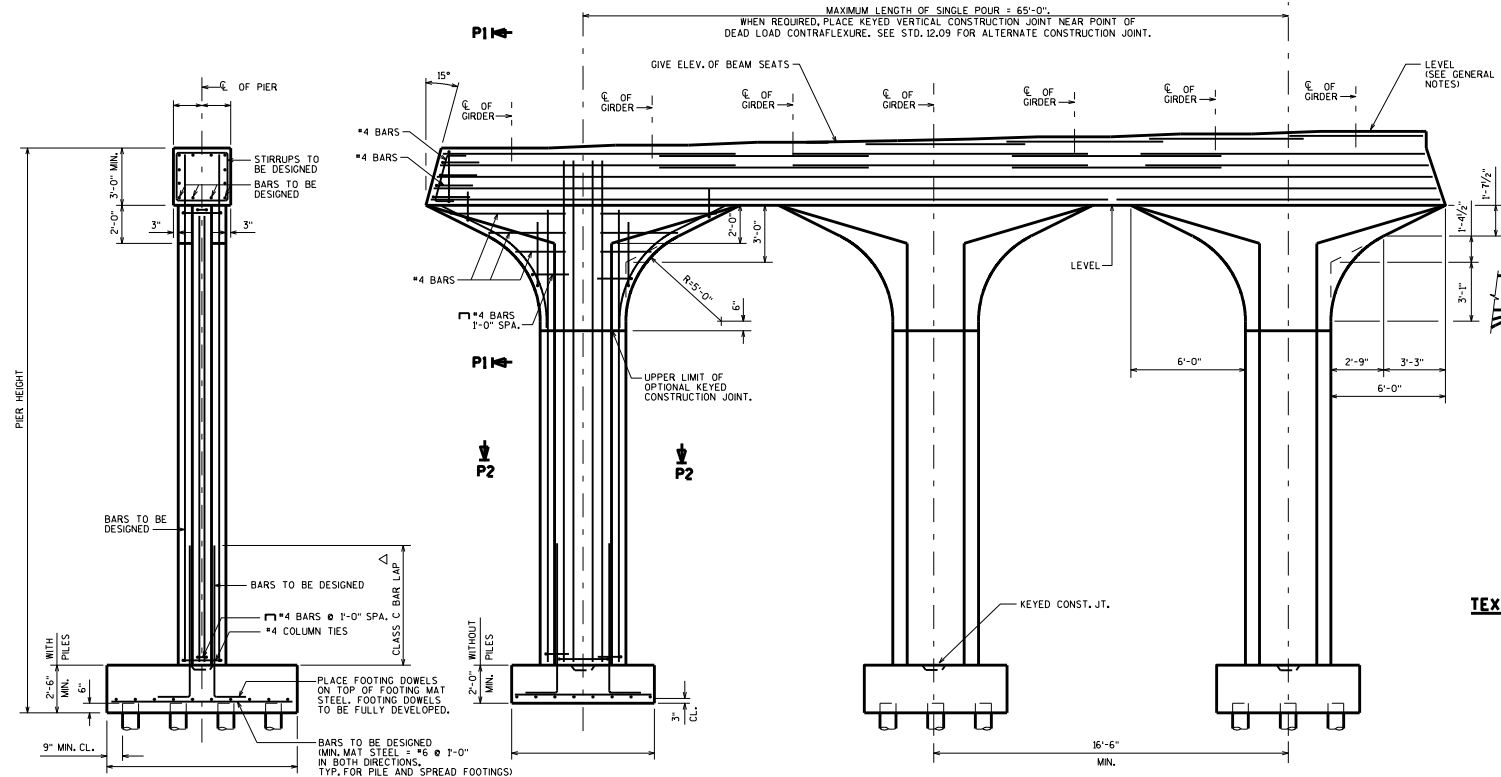
SECTION P1



SECTION P2

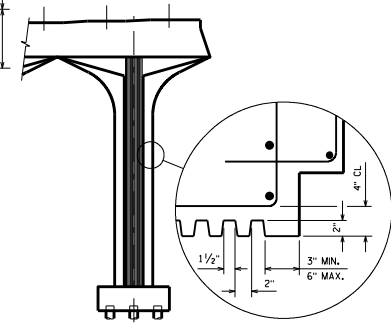
GENERAL NOTES

- ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE.
- KEYED CONSTRUCTION JOINTS IN COLUMNS AND FOOTINGS SHALL BE FORMED BY A BEVELED KEYWAY 2" DEEP X 1'-3" X 1'-3" EXPOSED EDGES OF CONSTRUCTION JOINTS SHALL BE FLUSH AND NOT BEVELED IN COLUMNS.
- BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:
 - FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.
 - FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.
- SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.
- EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.
- BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.
- SEE STANDARD 13.01 FOR MINIMUM OFFSETS FROM BEARINGS TO SIDES OF CAP AND TO ADJACENT BEARING SEAT STEPS.
- FOR CASES WITH CRASH WALLS, DEFER TO NON-AESTHETIC TYPE MULTI-COLUMNED PIERS.
- SEE BRIDGE MANUAL 13.4.10 FOR MULTI-COLUMNED PIER DESIGN REGARDING VEHICULAR COLLISION FORCE.
- △ NORMALLY THIS LAP IS OMITTED AND FOOTING DOWELS EXTENDED INTO THE CAP IF THE LAP IS GREATER THAN ONE-HALF THE COLUMN HEIGHT.



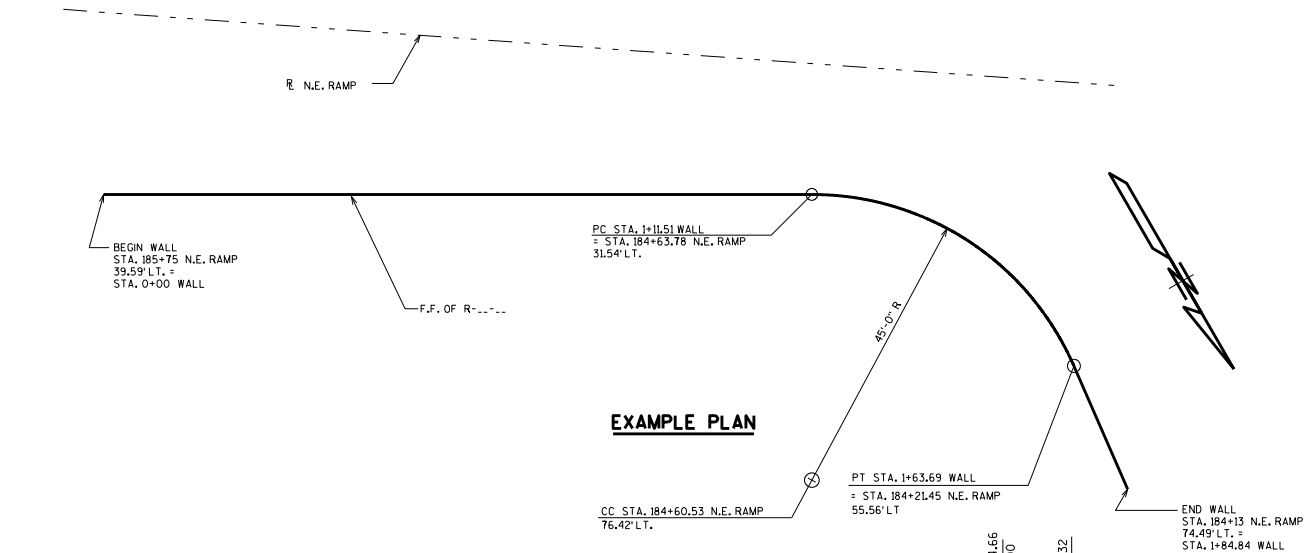
ELEVATION
LOOKING UP STATION

END VIEW

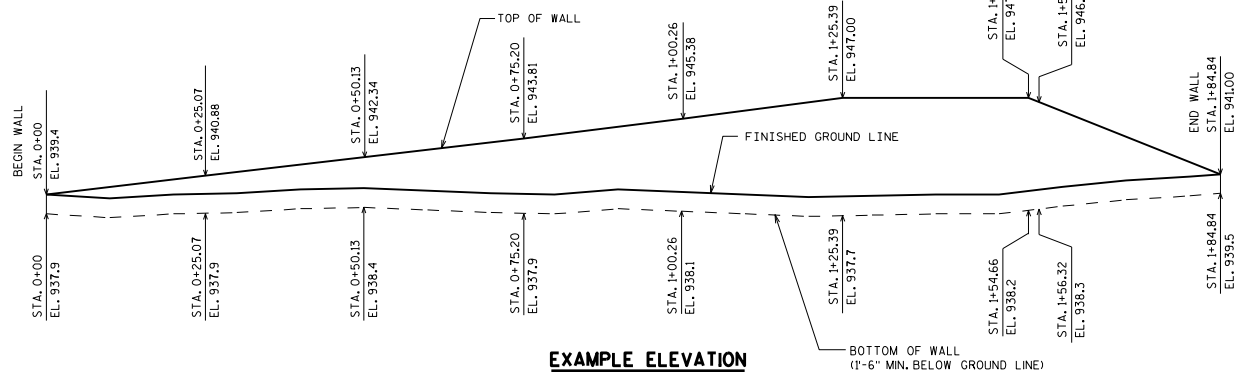


TEXTURING LIMITATIONS OF PIER COLUMN (EACH FACE)

MULTI-COLUMNED PIER TYPE 2	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11



EXAMPLE PLAN



EXAMPLE ELEVATION
(LOOKING @ F.F. OF WALL)

GEOMETRY TABLE

STATION	OFFSET TO F.F. WALL	COORDINATES	ELEV. A	ELEV. B

SOIL PARAMETERS

STRATUM LOCATIONS & SOIL DESCRIPTIONS	UNIT WEIGHT (pcf)	FRICTION ANGLE (DEGREES)	COHESION (psf)
EL. - EL. (SOIL TYPE)			
EL. - EL. (SOIL TYPE)			
EL. & BELOW (SOIL TYPE)			
RETAINED SOIL EL. - EL. *			

* DESIGN WALL FOR THESE VALUES

WALL EXTERNAL STABILITY EVALUATION

DIMENSIONS	
WALL HEIGHT (FEET)	
EXPOSED WALL HEIGHT (FEET)	
MINIMUM LENGTH OF REINFORCEMENT/WALL WIDTH (FEET)	
WALL STATION	
BORING USED	
CAPACITY TO DEMAND RATIO (CDR)	
SLIDING (CDR>1.0)	
ECCENTRICITY (CDR>1.0)	
BEARING (CDR>1.0)	
GLOBAL STABILITY (CDR>1.0)	

DESIGN DATA

THE CONTRACTOR SHALL PROVIDE COMPLETE DESIGN, PLANS, DETAILS, SPECIFICATIONS, AND SHOP DRAWINGS FOR THE RETAINING WALLS IN ACCORDANCE WITH THE SPECIAL PROVISIONS. THE RETAINING WALL MANUFACTURER SHALL PROVIDE TECHNICAL ASSISTANCE TO THE CONTRACTOR DURING CONSTRUCTION. THE COST OF FURNISHING THESE ITEMS SHALL BE INCLUDED IN THE BID ITEM "INSERT WALL SYSTEM OR SYSTEMS".

PLANS, ELEVATIONS AND DETAILS SHOWN ON THESE DRAWINGS ARE INTENDED TO INDICATE WALL LOCATIONS, LENGTHS, HEIGHTS, AND DETAILS COMMON TO THE WALL SYSTEM SELECTED. THE CONTRACTOR SHALL VERIFY THAT THE WALL SYSTEM SELECTED WILL CONFORM TO THE REQUIRED ALIGNMENTS AND DETAILS.

THE RETAINING WALL IS TO BE DESIGNED USING THE ELEVATIONS GIVEN ON THIS SHEET.

DESIGN FOR RETAINING WALL TO PROVIDE FOR FINISHED GRADE SLOPED BEHIND WALL AS SHOWN.

SEE SPECIAL PROVISIONS FOR AESTHETIC TREATMENT TO WALL.

DESIGN RETAINING WALL FOR A LIVE LOAD SURCHARGE OF (INSERT VALUE).

THE MAXIMUM VALUE OF THE ANGLE OF INTERNAL FRICTION OF THE WALL BACKFILL MATERIAL IN THE REINFORCED ZONE SHALL BE ASSUMED TO BE 30° WITHOUT CERTIFIED TEST VALUES.

ALLOWABLE WALL SYSTEMS

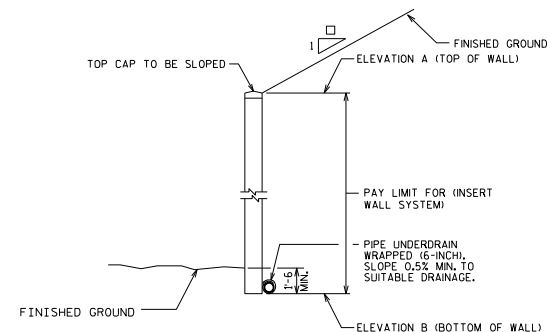
- 1.
- 2.

TOTAL ESTIMATED QUANTITIES

(INSERT WALL SYSTEM) S.F.

GENERAL NOTES

DRAWINGS SHALL NOT BE SCALED.



TYP. CROSS SECT. OF RETAINING WALL

LIST OF DRAWINGS

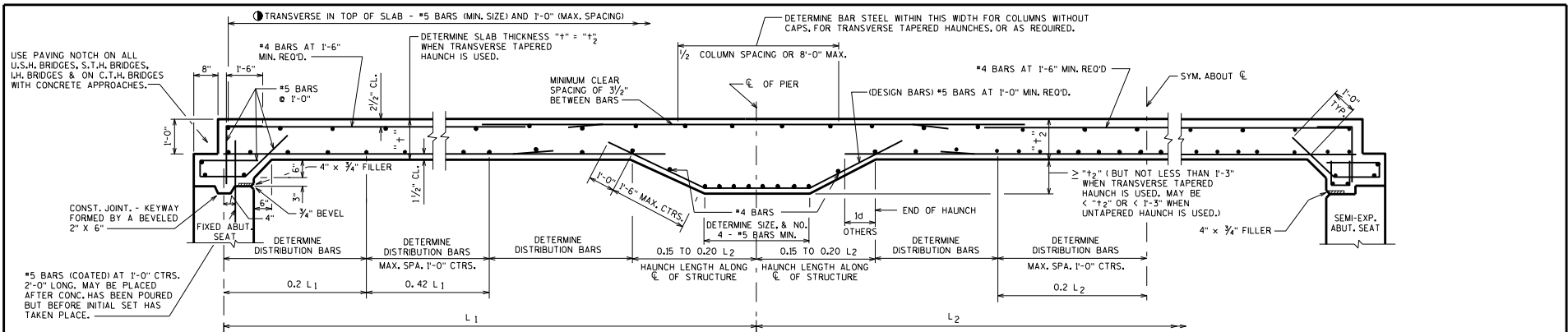
1. INSERT WALL SYSTEM
2. SUBSURFACE EXPLORATION

LRFD PROPRIETARY RETAINING WALLS (GENERAL PLAN)

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: *Scot Becker*

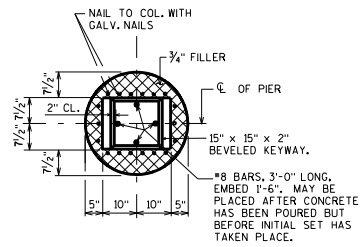
DATE:
1-11



LONGITUDINAL SECTION

GENERAL NOTES

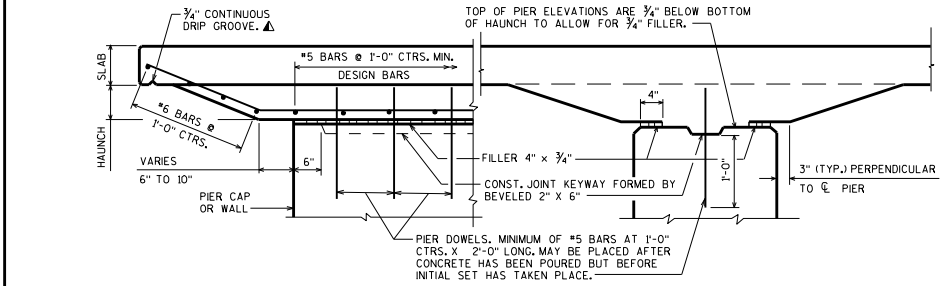
- TOP TRANSVERSE BARS IN SLAB SHALL BE SUPPORTED BY INDIVIDUAL BAR CHAIRS AT APPROXIMATELY 3'-0" CENTERS EACH WAY. BOTTOM LONGITUDINAL BARS SHALL BE SUPPORTED BY CONTINUOUS BAR CHAIRS AT APPROXIMATELY 4'-0" CENTERS.
- ALL SLAB THICKNESS DIMENSIONS ARE MINIMUM. ANY TOLERANCES NECESSARY TO CORRECT CONSTRUCTION DISCREPANCIES ARE TO BE PLUS (+).
- PARAPETS, SIDEWALKS AND MEDIANS PLACED ON TOP OF THE SLAB SHALL BE POURED AFTER FALSEWORK HAS BEEN RELEASED, EXCEPT FOR STAGED CONSTRUCTION.
- CAMBER SPANS AS SHOWN TO PROVIDE FOR DEAD LOAD DEFLECTION AND FUTURE CREEP. CAMBER DOES NOT INCLUDE ALLOWANCE FOR FORM SETTLEMENT.
- ▲ 3/4" CONTINUOUS DRIP GROOVE TO END 2'-0" AWAY FROM FACE OF ABUTMENT.



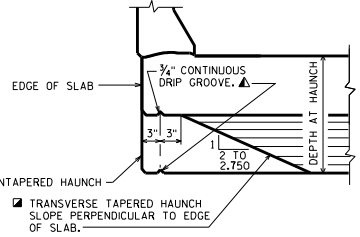
COLUMN W/O CAP TYPE PIER DETAIL AT TOP OF COLUMN

DESIGNER NOTES

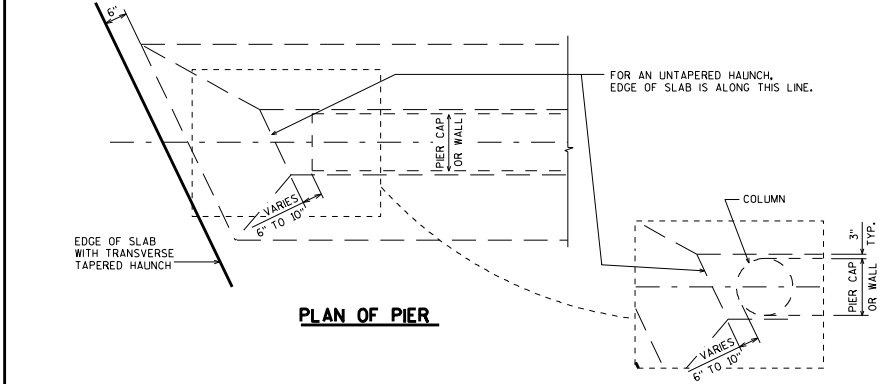
- THE MAXIMUM ALLOWABLE SKEW ANGLE OF STRUCTURE SHALL BE 30°.
- ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE.
- USE OPTIONAL LONGITUDINAL JOINTS WHEN OVERALL SLAB WIDTH IS OVER 52'-0". SEE STANDARD 18.02 FOR DETAIL.
- FOR BRIDGES LOCATED IN REMOTE AREAS USE OPTIONAL TRANSVERSE JOINT WHEN POUR EXCEEDS 400 C.Y. PLACE KEYED JOINT NEAR POINT OF DEAD LOAD INFLECTION.
- ALL TRANSVERSE BAR STEEL REINFORCEMENT SHALL BE PLACED ON THE SKEW.
- FLOOR DRAINS ARE TO BE OMITTED FROM SLAB STRUCTURES WHERE POSSIBLE. IF FLOOR DRAINS ARE REQUIRED, PLACE ONLY AT THE 2/10 AND 8/10 PTS. BEND MAIN REBARS PAST DRAINS - DO NOT CUT.
- PIER CAP OR WALL TYPE PIERS SHALL BE USED ON MOST STRUCTURES. "COLUMN WITHOUT CAP" TYPE PIERS MAY BE USED WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.
- ON THE PLANS, PROVIDE CAMBER VALUES AT THE TENTH POINTS OF ALL SPANS. ALSO PROVIDE TOP OF SLAB ELEVATIONS AT THE CENTERLINE (AND/OR CROWN) AND OUTSIDE EDGES OF SLAB AT TENTH POINTS.
- ▣ TRANSVERSE TAPERED HAUNCH SLOPE PERPENDICULAR TO EDGE OF SLAB.
- ▣ TRANSVERSE TAPERED HAUNCHES MAY BE USED TO ELIMINATE A COLUMN (PROVIDED A MINIMUM OF 3 COLUMNS ARE USED, OR FOR AESTHETICS).



PIER CAP OR WALL TYPE PIER SHOWING TRANSVERSE TAPERED HAUNCH



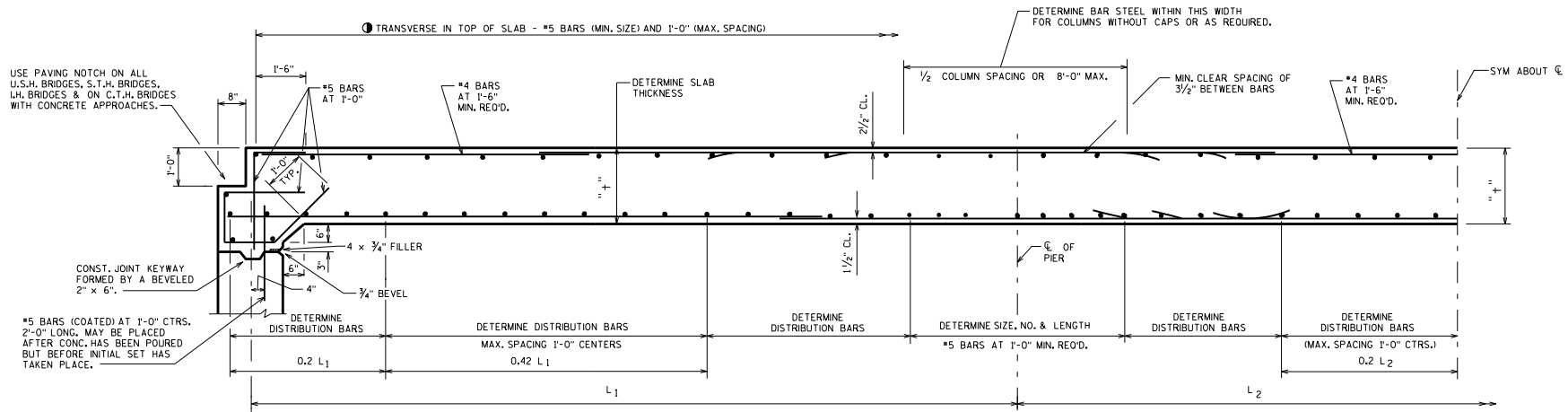
TAPERED/UNTAPERED HAUNCH CROSS SECTION



PLAN OF PIER

TOP TRANSVERSE REINF. FOR RAILINGS/PARAPETS		
SLOPED FACE PARAPETS LF/HF/5IF	MAIN BARS RUN FROM EDGE TO EDGE OF SLAB	SHORT BARS PLACED BETWEEN MAIN BARS AT EDGE OF SLAB
SLAB THICK. ≥ 15"	(#5 @ 1'-0")	(#5 @ 1'-0") 4'-9" LONG NO HOOK REQ'D. AT END
13" ≤ SLAB THICK. < 15"	(#5 @ 10")	(#5 @ 10") 4'-9" LONG STD. HOOK REQ'D. AT END
STEEL RAILINGS TYPE "M"/"W"	▣ TOP TRANSVERSE REINF. SPECIFIED IN "LONGIT. SECTION" IS ADEQUATE	

CONTINUOUS HAUNCHED SLAB	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11

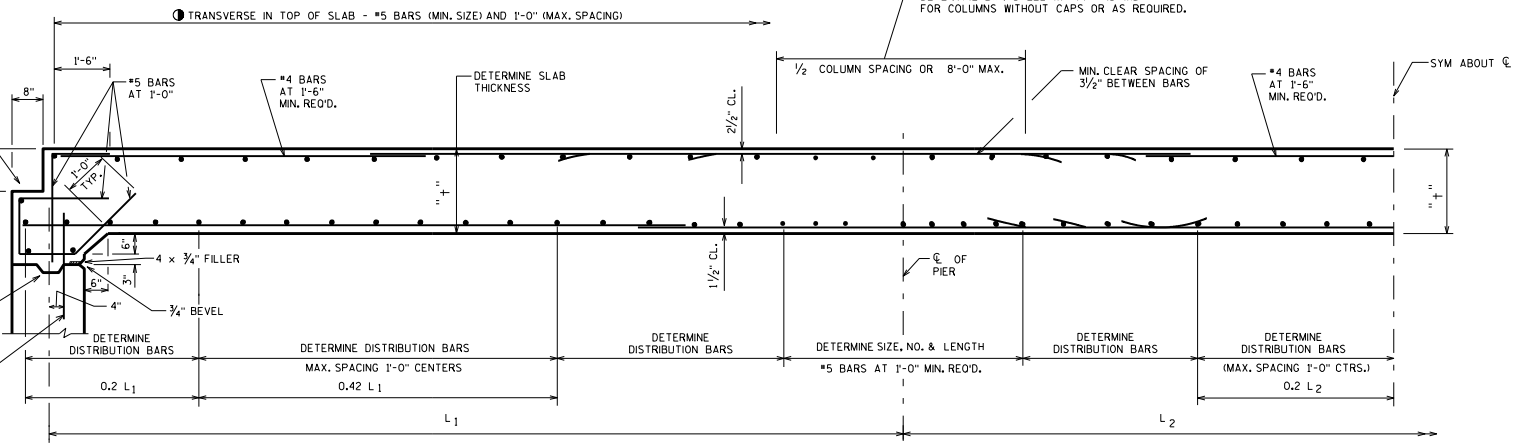


HALF LONGITUDINAL SECTION

USE PAVING NOTCH ON ALL U.S.H. BRIDGES, S.T.H. BRIDGES, I.H. BRIDGES & ON C.T.H. BRIDGES WITH CONCRETE APPROACHES.

CONST. JOINT KEYWAY FORMED BY A BEVELLED 2" x 6".

#5 BARS (COATED) AT 1'-0" CTRS. 2'-0" LONG. MAY BE PLACED AFTER CONC. HAS BEEN POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE.



DETERMINE BAR STEEL WITHIN THIS WIDTH FOR COLUMNS WITHOUT CAPS OR AS REQUIRED.

MIN. CLEAR SPACING OF 3/2" BETWEEN BARS

#4 BARS AT 1'-6" MIN. REO'D.

SYM ABOUT C/L

TRANSVERSE IN TOP OF SLAB - #5 BARS (MIN. SIZE) AND 1'-0" (MAX. SPACING)

#4 BARS AT 1'-6" MIN. REO'D.

DETERMINE SLAB THICKNESS

1/2 COLUMN SPACING OR 8'-0" MAX.

2/2" CL.

1/2" CL.

C/L OF PIER

DETERMINE DISTRIBUTION BARS

DETERMINE DISTRIBUTION BARS

DETERMINE DISTRIBUTION BARS

DETERMINE SIZE, NO. & LENGTH

DETERMINE DISTRIBUTION BARS

DETERMINE DISTRIBUTION BARS

0.2 L1

MAX. SPACING 1'-0" CENTERS

L1

#5 BARS AT 1'-0" MIN. REO'D.

L2

(MAX. SPACING 1'-0" CTRS.)

0.2 L2

GENERAL NOTES

TOP TRANSVERSE BARS IN SLAB SHALL BE SUPPORTED BY INDIVIDUAL BAR CHAIRS AT APPROXIMATELY 3'-0" CENTERS EACH WAY. BOTTOM LONGITUDINAL BARS SHALL BE SUPPORTED BY CONTINUOUS BAR CHAIRS AT APPROXIMATELY 4'-0" CENTERS.

ALL SLAB THICKNESS DIMENSIONS ARE MINIMUM. ANY TOLERANCES NECESSARY TO CORRECT CONSTRUCTION DISCREPANCIES ARE TO BE PLUS (+).

PARAPETS, SIDEWALKS AND MEDIANS PLACED ON TOP OF THE SLAB SHALL BE POURED AFTER FALSEWORK HAS BEEN RELEASED, EXCEPT FOR STAGED CONSTRUCTION.

CAMBER SPANS AS SHOWN TO PROVIDE FOR DEAD LOAD DEFLECTION AND FUTURE CREEP. CAMBER DOES NOT INCLUDE ALLOWANCE FOR FORM SETTLEMENT.

△ 3/4" CONTINUOUS DRIP GROOVE TO END 2'-0" AWAY FROM FACE OF ABUTMENT.

DESIGNER NOTES

THE MAXIMUM ALLOWABLE SKEW ANGLE OF STRUCTURE SHALL BE 30°.

ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE.

USE OPTIONAL LONGITUDINAL JOINTS WHEN OVERALL SLAB WIDTH IS OVER 52'-0".

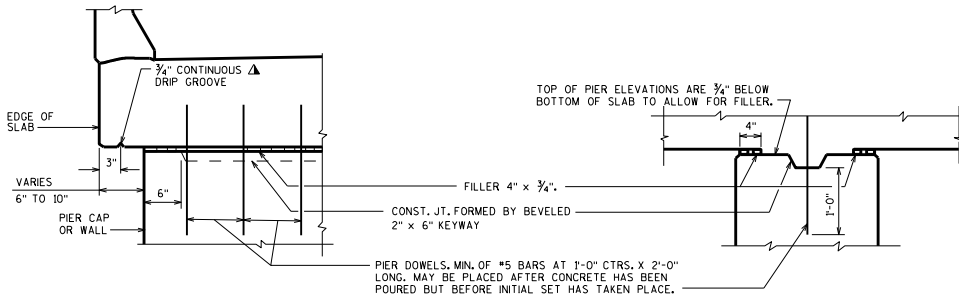
FOR BRIDGES LOCATED IN REMOTE AREAS USE OPTIONAL TRANSVERSE JOINT WHEN POUR EXCEEDS 400 C.Y. PLACE KEYED JOINT NEAR POINT OF DEAD LOAD INFLECTION.

ALL TRANSVERSE BAR STEEL REINFORCEMENT SHALL BE PLACED ON THE SKEW.

FLOOR DRAINS ARE TO BE OMITTED FROM SLAB STRUCTURES WHERE POSSIBLE. IF FLOOR DRAINS ARE REQUIRED, PLACE ONLY AT THE 2/10 AND 8/10 PTS. BEND MAIN REBARS PAST DRAINS - DO NOT CUT.

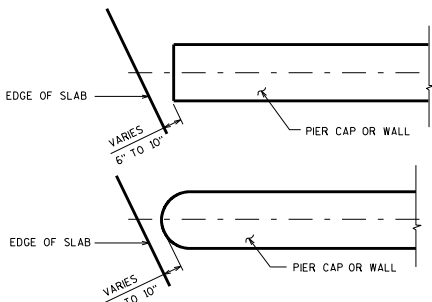
PIER CAP OR WALL TYPE PIERS SHALL BE USED ON MOST STRUCTURES. "COLUMN WITHOUT CAP" TYPE PIERS (SEE STD. 18.01) MAY BE USED WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

ON THE PLANS, PROVIDE CAMBER VALUES AT THE TENTH POINTS OF ALL SPANS, ALSO PROVIDE TOP OF SLAB ELEVATIONS AT THE CENTERLINE (AND/OR CROWN) AND OUTSIDE EDGES OF SLAB AT TENTH POINTS.



PIER CAP OR WALL TYPE PIER

SEE STD. 18.01 FOR COLUMN W/O CAP PIER DETAIL.



PLAN OF PIER

OPTIONAL LONGITUDINAL CONSTRUCTION JOINT

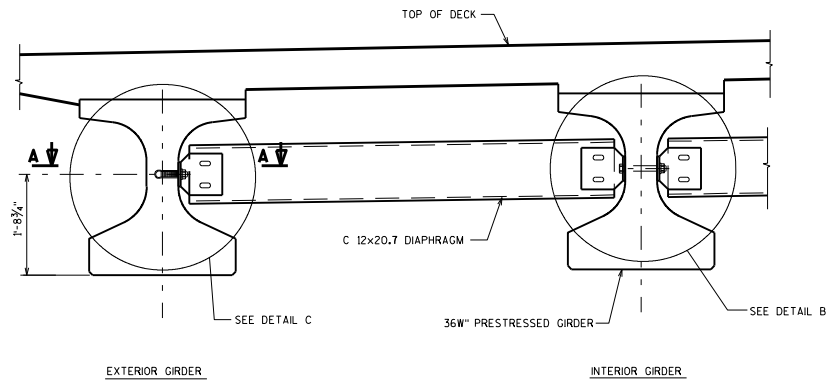
TOP TRANSVERSE REINF. FOR RAILINGS/PARAPETS		
SLOPED FACE PARAPETS LF/HF/5IF	MAIN BARS RUN FROM EDGE TO EDGE OF SLAB	SHORT BARS PLACED BETWEEN MAIN BARS AT EDGE OF SLAB
SLAB THICK. ≥ 15"	(#5 @ 1'-0")	(#5 @ 1'-0") 4'-9" LONG NO HOOK REO'D. AT END
13" ≤ SLAB THICK. < 15"	(#5 @ 10")	(#5 @ 10") 4'-9" LONG STD. HOOK REO'D. AT END
STEEL RAILINGS TYPE "M"/W"	TOP TRANSVERSE REINF. SPECIFIED IN "LONGIT. SECTION" IS ADEQUATE	

CONTINUOUS FLAT SLAB

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: *Scot Becker*

DATE:
1-11



PART TRANSVERSE SECTION AT DIAPHRAGM

NOTES

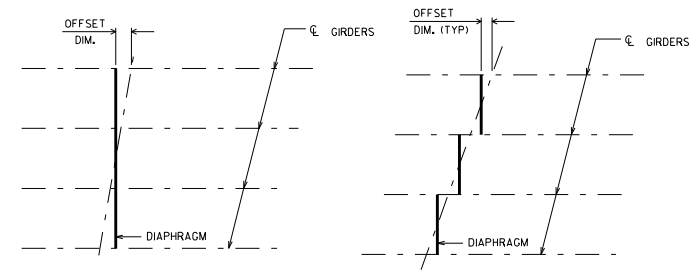
ALL DIAPHRAGM MATERIAL NOT EMBEDDED IN THE CONCRETE GIRDER SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "STEEL DIAPHRAGMS B-1", EACH.

EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.

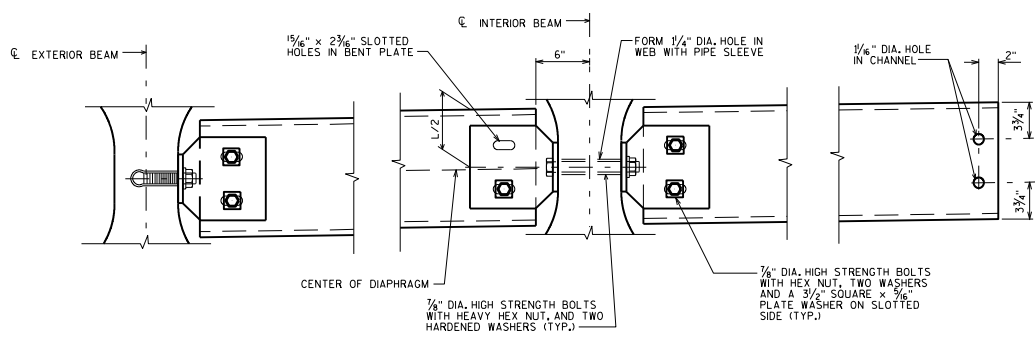
ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36. ALL BOLTS, NUTS AND WASHERS SHALL BE ASTM A325 TYPE 1.

ALL DIAPHRAGM STRUCTURAL STEEL SHOWN SHALL BE HOT-DIPPED GALVANIZED. ALL BOLTS, NUTS AND WASHERS SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C. GALVANIZED NUTS SHALL BE TAPPED OVERSIZE IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A563 AND SHALL MEET THE REQUIREMENTS OF SUPPLEMENTARY REQUIREMENT S1 OF ASTM A563, LUBRICANT AND TEST FOR COATED NUTS.

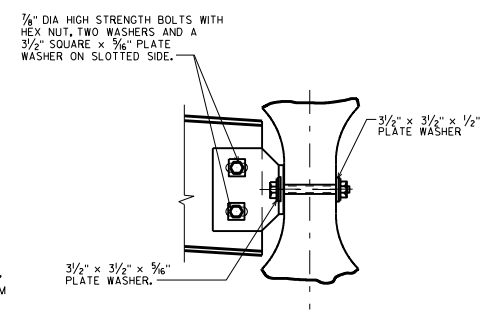
FOR SPANS EQUAL TO OR LESS THAN 80'-0", PLACE ONE DIAPHRAGM AT MID-LENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS.



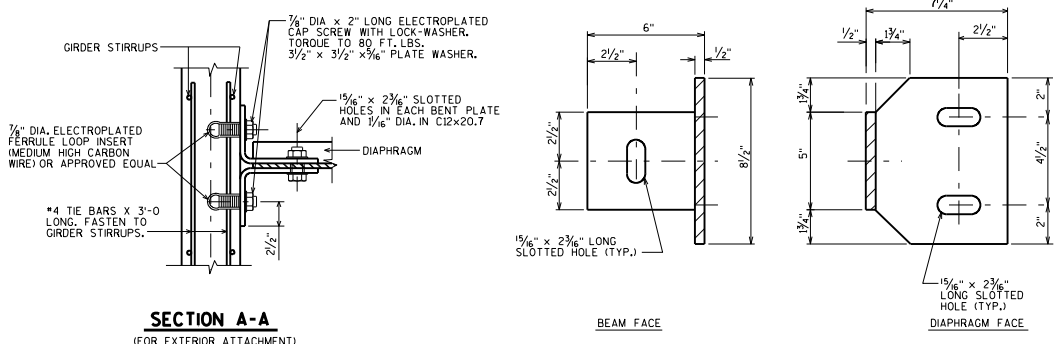
PLAN FOR SKEW ANGLES ≤ 10° **PLAN FOR SKEW ANGLES > 10°**



DETAIL C **DETAIL B**

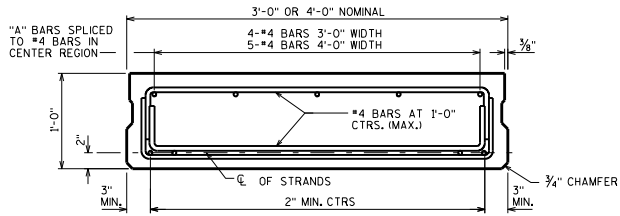


SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°

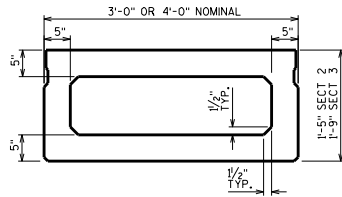


SECTION A-A
(FOR EXTERIOR ATTACHMENT)

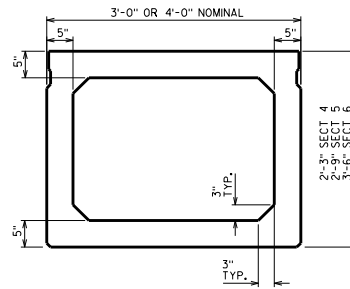
INTERM. STEEL DIAPHS. FOR 36W" PRESTRESSED GIRDERS	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11



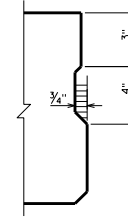
SECTION 1



SECTIONS 2 & 3

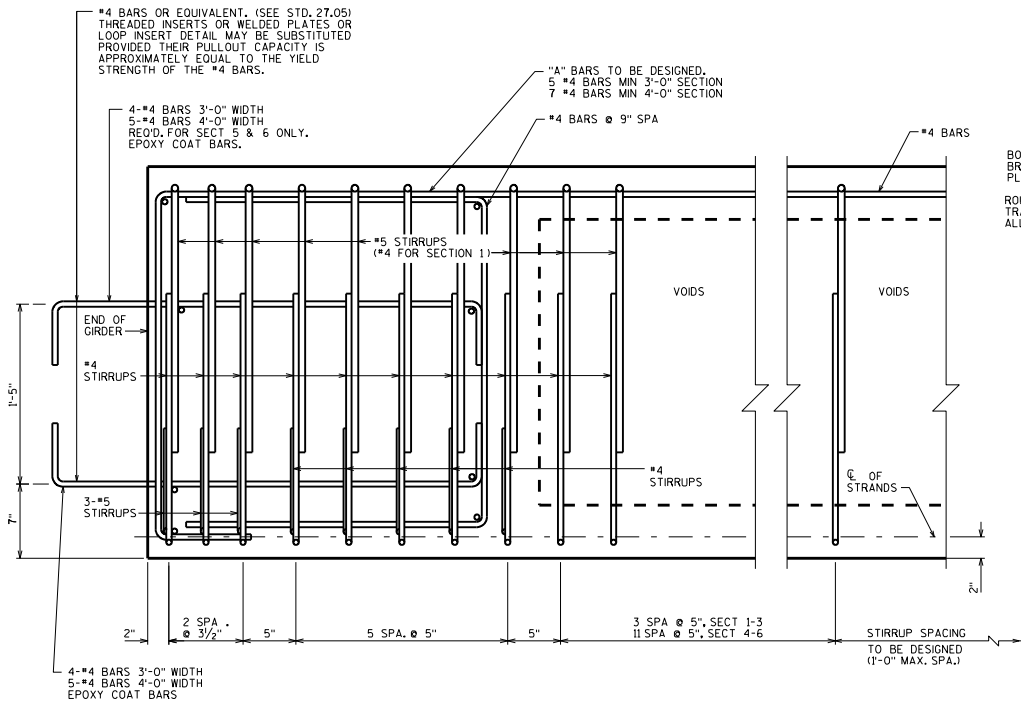


SECTIONS 4 THRU 6



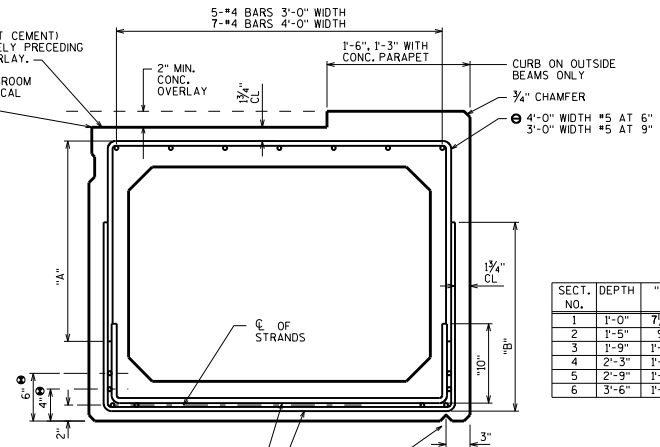
SHEAR KEY

OMIT SHEAR KEY ON EXTERIOR FACE OF EXTERIOR GIRDERS.



PART GIRDER ELEVATION
(TRANSVERSE BARS NOT LABELED ARE #4 BARS.)

BONDING COAT (NEAT CEMENT) BRUSH ON IMMEDIATELY PRECEDING PLACEMENT OF OVERLAY.
ROUGH FLOAT AND BROOM TRANSVERSELY (TYPICAL ALL BEAMS).



#4 AND #5 BARS AT ENDS OF BEAM. SEE ELEVATION FOR SPACING.
#4 BARS AT 1'-0" MAX. CTRS.
3/4" CONTINUOUS "V" DRIP GROOVE OR EQUIVALENT REQ'D. ON OUT-SIDE OF FASCIA BEAM, OPTIONAL ON INTERIOR BEAMS, END 2'-0" FROM SUPPORTS.

CROSS SECTION

SHOW SPACING FOR THESE STRANDS ONLY IF REQUIRED BY DESIGN.

SECT. NO.	DEPTH	"A"	"B"
1	1'-0"	7 1/2"	7 1/2"
2	1'-5"	9"	1'-0"
3	1'-9"	1'-0"	1'-4"
4	2'-3"	1'-3"	1'-10"
5	2'-9"	1'-3"	2'-4"
6	3'-6"	1'-3"	3'-1"

NOTES

FOUR WAY SLING MUST BE USED TO ENGAGE ALL 4 LIFTING DEVICES ON BOTH ENDS OF UNITS.

STRANDS SHALL BE FLUSH WITH END OF UNIT.

VOIDS SHALL BE VENTED AND DRAINED BY CASTING (2)-1" # TUBES AT EACH END OF VOID SEGMENT. LOCATE TUBES AT BOTTOM EDGES OF THE CORNER FILLETS.

SLOPE BEAM SEATS TO MATCH ROADWAY CROWN.

SLOPE BEAM SEATS PARALLEL TO GRADE LINE IF GRADE AT BRG. > 1%. PLACE ELEVATIONS ON PLANS TO MEET THESE REQUIREMENTS.

POST-TENSIONING OF THE TRANSVERSE TENDONS SHALL NOT BEGIN UNTIL THE GROUT BETWEEN THE PRECAST BEAMS HAS BEEN ALLOWED TO CURE FOR 48 HOURS.

BAR STEEL REINFORCEMENT SHALL BE GRADE 60 (FY=60 KSI).

PRESTRESSING STEEL ULTIMATE STRENGTH = 270 KSI.

PRESTRESSED CONCRETE STRENGTH AT 28 DAYS = 5.0 KSI.

THE CONCRETE MIX FOR THE PRESTRESSED SLABS AND BOX GIRDERS SHALL CONFORM TO SECTION 503.2.2 OF THE STANDARD SPECIFICATIONS.

THE CEMENT AND FINE AGGREGATE FOR THE GROUT BETWEEN THE POST-TENSIONING BEAMS SHALL BE PROPORTIONED BY WEIGHT AS INDICATED IN THE SPECIAL PROVISIONS.

THE MAXIMUM ALLOWABLE SKEW ANGLE OF THE STRUCTURE SHALL BE 30°.

ABUTMENT BACKWALLS AND CONCRETE OVERLAY SHALL NOT BE POURED UNTIL AFTER THE POST-TENSIONING HAS BEEN COMPLETED.

SEAL WASHER SHALL BE SPONGE NEOPRENE GASKET 2 1/2" MIN. THICK. STRESS POCKETS SHALL BE FILLED WITH CHLORIDE FREE NON-SHRINK GROUT AFTER POST-TENSIONING (REFER TO SPECIAL PROVISION FOR NON-SHRINK GROUT SPECIFICATIONS.)

TRANSITION BETWEEN CHANGING SLOPES OF POST-TENSIONING DUCTS SHALL BE PROVIDED BY EITHER A CIRCULAR OR PARABOLIC CURVE WITH A MINIMUM LENGTH OF 3'-0".

POST-TENSIONING DUCTS SHALL BE PRESSURE GROUTED FROM ONE GROUT PIPE UNTIL ALL ENTRAPPED AIR IS EXPELLED AND GROUT BEGINS TO FLOW FROM THE OPEN GROUT PIPE. THE OPEN GROUT PIPE SHALL BE CLOSED AND A PRESSURE OF 50 PSI MAINTAINED FOR 15 SECONDS. THE GROUT COMPOSITION SHALL BE IN ACCORDANCE WITH THE CONTRACT SPECIAL PROVISIONS.

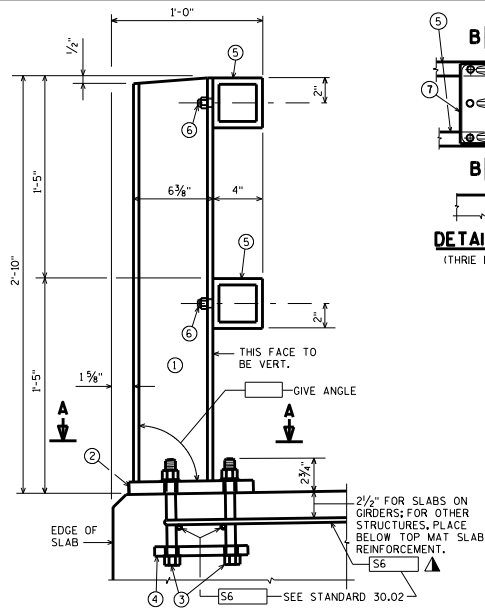
SPACING SHOWN FOR TOP STIRRUPS ARE MAXIMUMS. THE CONTRACTOR MAY ELECT (AT NO ADJUSTMENT IN BID PRICE) TO REDUCE THE SPACING OF THESE BARS OR TO ADD ADDITIONAL REINFORCEMENT TO FACILITATE TYING OF THE REINFORCEMENT.

PRESTRESSED SLAB AND BOX GIRDER SECTIONS

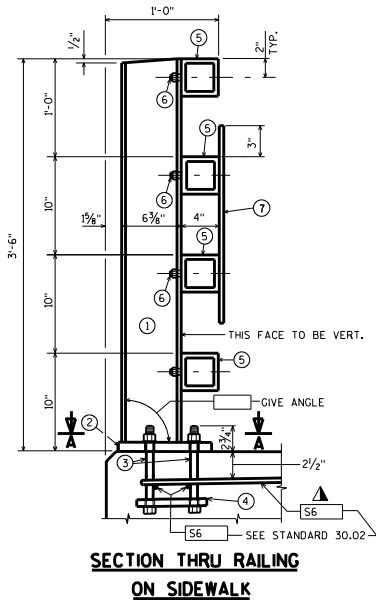
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: *Scot Becker*

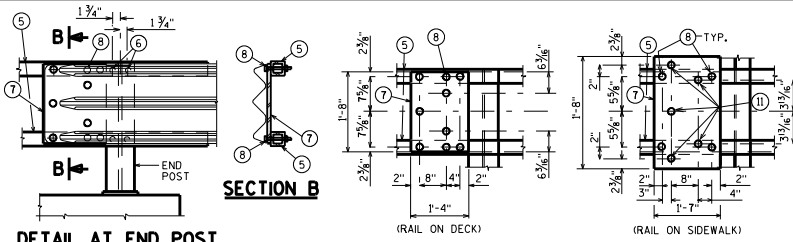
DATE:
1-11



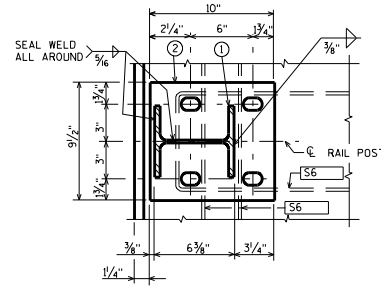
SECTION THRU RAILING ON DECK



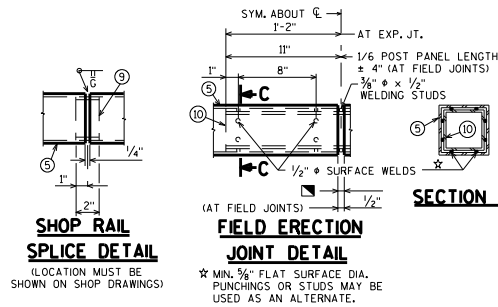
SECTION THRU RAILING ON SIDEWALK



DETAIL AT END POST (THREE BEAM RAIL ATTACHMENT)

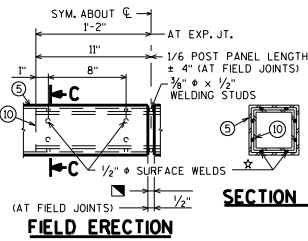


SECTION A



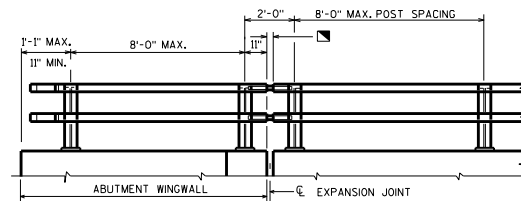
SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)

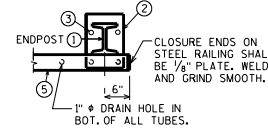


FIELD ERECTION JOINT DETAIL

★ MIN. 3/8" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.

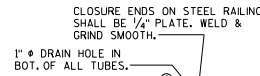


PART ELEVATION OF RAILING



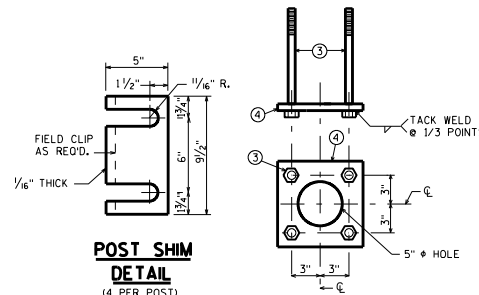
DETAIL FOR END POSTS WITH THREE BEAM RAIL ATTACHMENT

(END POST MAY BE LOCATED ON SUPERSTRUCTURE OR WINGWALLS)

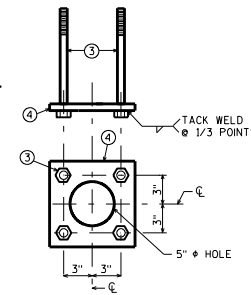


DETAIL FOR END POSTS WITHOUT THREE BEAM RAIL ATTACHMENT

(END POST MAY BE LOCATED ON SUPERSTRUCTURE OR WINGWALLS)



POST SHIM DETAIL (4 PER POST)



ANCHORAGE DETAIL

LEGEND

- ① W6 x 25 WITH 1 1/2" DIA. HOLES ON EACH SIDE OF POST FOR STUD NO. 6. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY OR SIDEWALK, AS APPLICABLE. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- ② PLATE 1" x 9 1/2" x 10" WITH 1/8" x 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN.
- ③ A325 - 3/8" DIA. HEX BOLTS (GALVANIZED) WITH A325 NUT & WASHER. 14" LONG AT END POSTS AND AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS > 15". USE 8" LONG AT ALL OTHER LOCATIONS. 4 REOD. PER 3". THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING.
- ④ 1/4" x 8" x 8" FLAT BAR WITH 1 5/16" DIA. HOLES FOR ANCHOR BOLTS NO. 3
- ⑤ TS 4 x 4 x 0.25 STRUCTURAL TUBING, CONFORMING TO ASTM DESIGNATION A501 OR A500 GRADE B. ATTACH TO NO. 1 WITH STUDS NO. 6.
- ⑥ 5/8" DIA. x 1 1/2" LONG SHOP WELDED STUDS WITH HEX NUT AND 2" WASHERS (2 REOD. AT EACH RAIL TO POST LOCATION.)
- ⑦ PLATE 3/8" x 1'-4" (1'-7" ON SDWK.) x 1'-8". BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THREE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5.
- ⑧ 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5 FOR 3/4" DIA. A325 BOLTS W/HEX NUTS AND WASHERS.
- ⑨ SQUARE SLEEVE FABRICATED FROM 1/2" PLATE. PROVIDE "SLIDING FIT" WITH A MINIMUM OUT TO OUT DIMENSION OF 3 1/32".
- ⑩ TS 3 x 3 x 0.25 x (2'-4" AT EXPANSION JOINTS) & (1'-10" AT FIELD JOINTS) LONG. PROVIDE 1/2" DIA. SURFACE WELDS ON ALL SIDES AS SHOWN. GRIND WELDS TO FIT FREE INTO LD. OF NO. 5. PROVIDE 3/8" x 1/2" WELDING STUDS ON TOP AND BOTTOM SURFACES AT CENTERLINE.
- ⑪ 3/8" DIA. x 1 1/2" LONG THREADED SHOP WELDED STUDS. (REOD. FOR SDWK. RAIL ONLY.)

GENERAL NOTES

BID ITEM SHALL BE "RAILING TUBULAR TYPE F B--", WHICH INCLUDES ALL ITEMS SHOWN.

RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE 3 OR 4 POSTS.

POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.

FOR RAILING NOT TO BE PAINTED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 4 SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. II NEAR WHITE BLAST CLEANING BY SSPC SPECIFICATIONS.

FOR RAILING TO BE PAINTED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 3 & 4, SHALL BE PAINTED WITH A THREE-COAT ZINC RICH EPOXY SYSTEM. PRIOR TO PAINTING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. II NEAR WHITE BLAST CLEANING BY SSPC SPECIFICATIONS.

ALL MATERIALS USED IN FABRICATION SHALL BE MADE FROM MATERIALS CONFORMING TO ASTM A709 GRADE 36 UNLESS NOTED OTHERWISE.

FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REOD. FOR ALIGNMENT.

PLACE FIRST BOTTOM LONGITUDINAL BAR CLEAR OF DRIP GROOVE.

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

FOR 2'-10" RAILING ON DECK:
RAILING WEIGHT = 37 LB/LF (BASED ON 8'-0" POST SPACING.)

▲ ROWY, OPENING OR 2/32" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR 'A' ABUTMENTS.

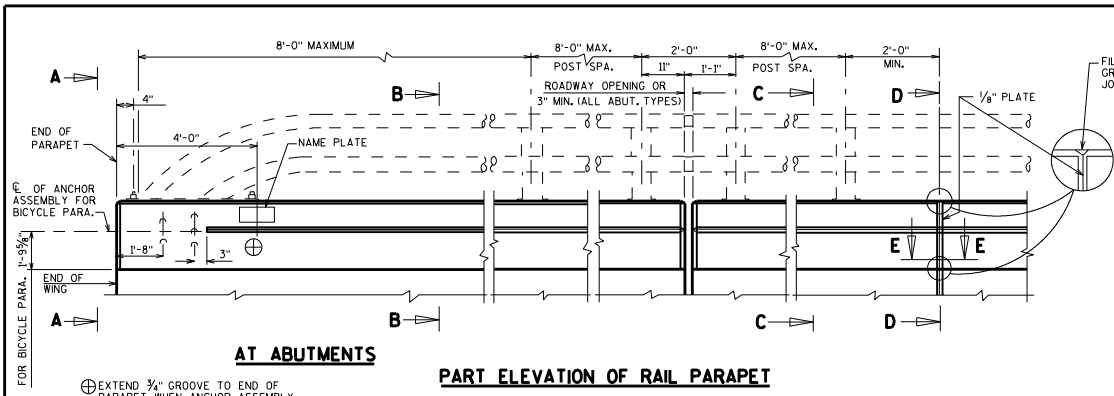
▲ TIE TO TOP MAT OF STEEL.

TUBULAR STEEL RAILING TYPE 'F'

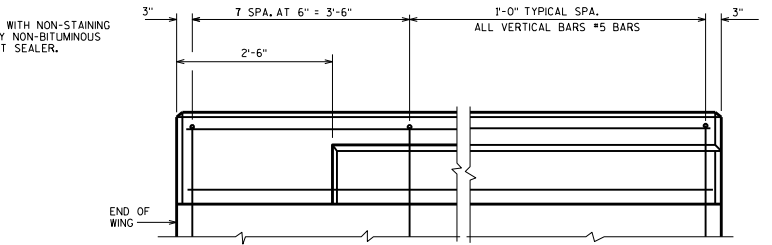
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: *Scot Becker*

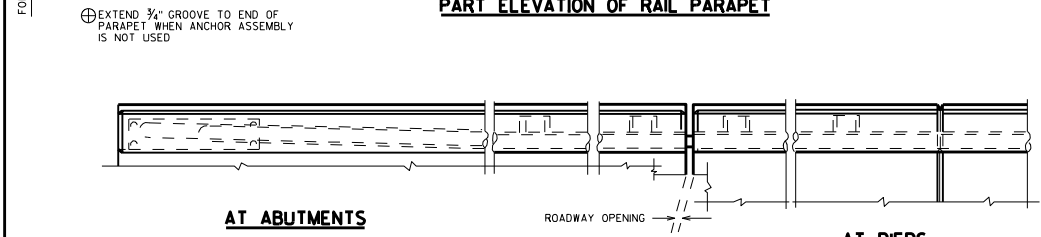
DATE:
1-11



AT ABUTMENTS
PART ELEVATION OF RAIL PARAPET



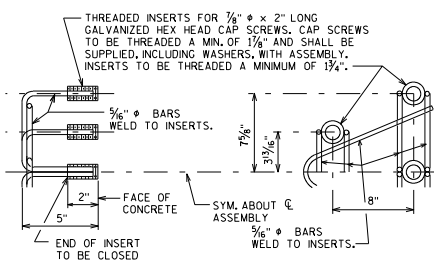
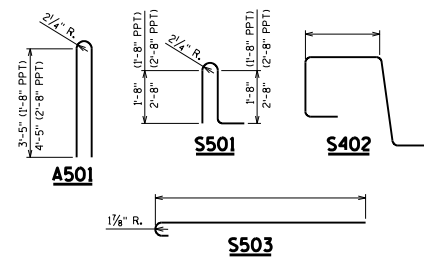
VIEW SHOWING OUTSIDE FACE OF PARAPET & REINF.



AT ABUTMENTS
PART PLAN OF RAIL PARAPET

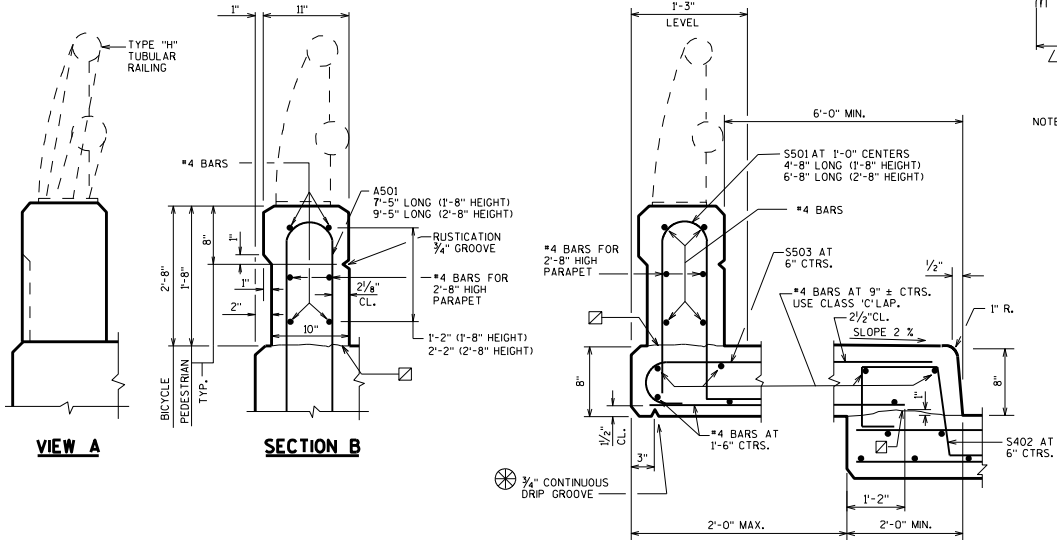
BILL OF BARS

BAR MARK	COAT	NO. REQ'D.	LENGTH		BENT	BAR SERIES	LOCATION
			1'-8" PPT HT	2'-8" PPT HT			
S501	X		4-8	6-8	X		PARAPET VERT.
S402	X					X	SIDEWALK VERT.
S503	X					X	SIDEWALK TRANSV.
A501	X		7-5	9-5	X		PARAPET VERT.



DETAIL OF ANCHOR ASSEMBLY

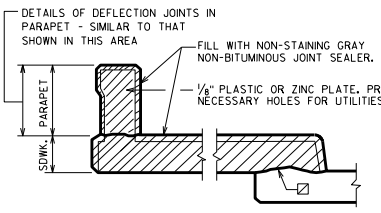
NOTE: HEX. HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 CLASS C.
ASSEMBLY BID ITEM SHALL BE "ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD", EACH.



VIEW A

SECTION B

AT SIDEWALK
SECTION C



SECTION D

SHOWING DEFLECTION JOINT IN PARAPET OR SIDEWALK USING THE FOLLOWING CRITERIA:
1. GIRDER STRUCTURES AND SLAB STRUCTURES WITH A SIDEWALK SHOULD HAVE A DEFLECTION JOINT IN THE SIDEWALK AND PARAPET OVER THE PIER.
IF THERE IS A LIGHT STANDARD AT THE PIER, PLACE A DEFLECTION JOINT APPROX. 4'-0" EACH SIDE OF PIER, WITH NONE DIRECTLY OVER THE PIER.
2. GIRDER STRUCTURES AND SLAB STRUCTURES WITHOUT SIDEWALKS SHOULD HAVE NO DEFLECTION JOINTS IN THE PARAPETS.

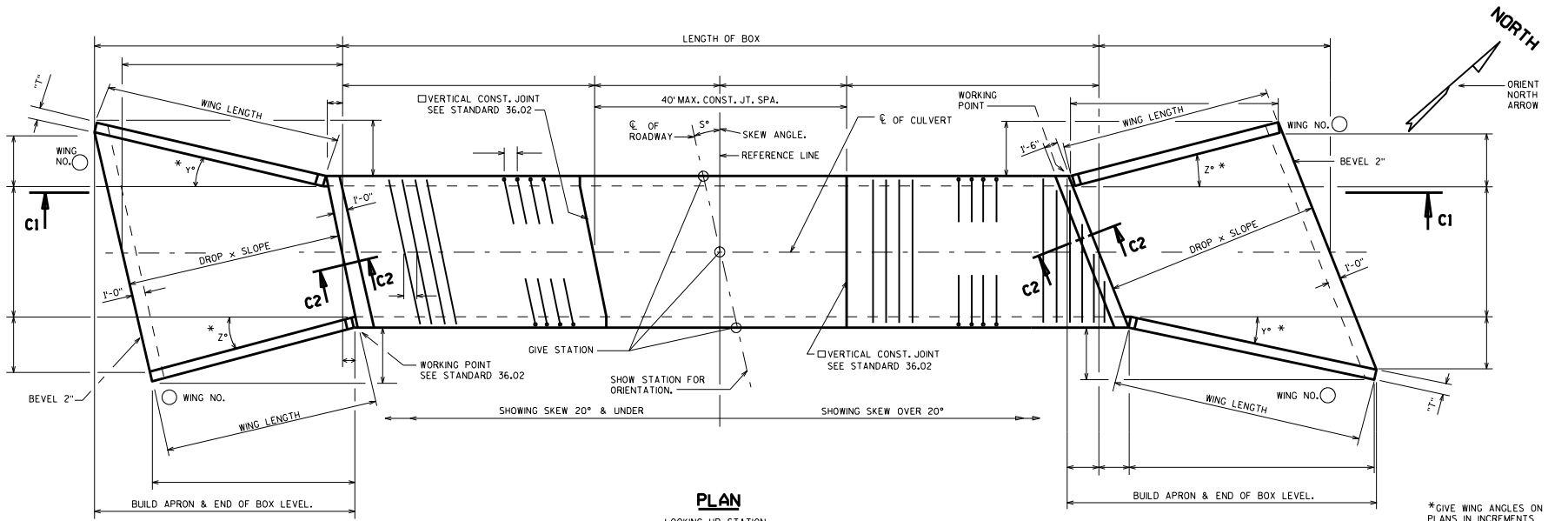
SECTION E

	1'-8" PARAPET	2'-8" PARAPET
AREA	1.44 SF	2.27 SF
WEIGHT	216 LB/FT	340 LB/FT

VERTICAL FACE PARAPET 'A'

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

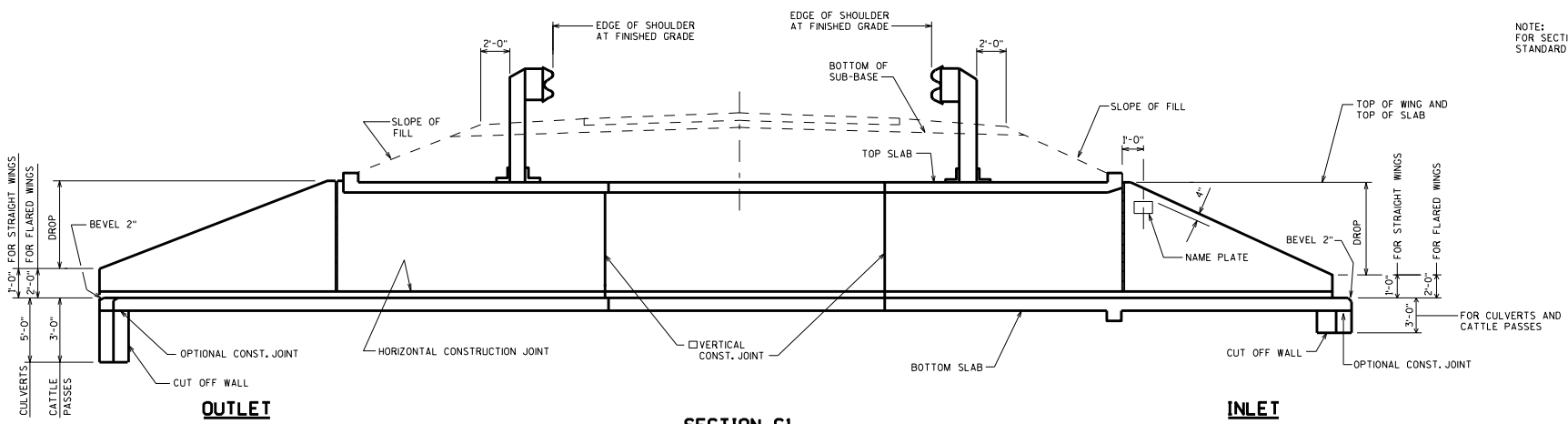
APPROVED: *Scot Becker* DATE: 1-11



PLAN
LOOKING UP STATION

*GIVE WING ANGLES ON PLANS IN INCREMENTS OF 5°. SEE BRIDGE MANUAL.

NOTE:
FOR SECTION C2 SEE STANDARD 36.03



SECTION C1

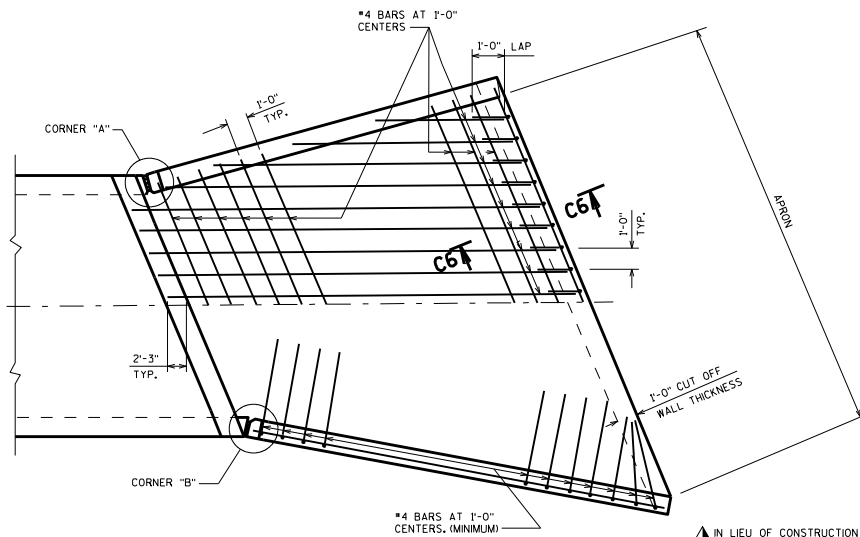
□ 18" MIN. WIDTH RUBBERIZED MEMBRANE WATERPROOFING UP WALLS & ACROSS TOP SLAB

DESIGN DATA

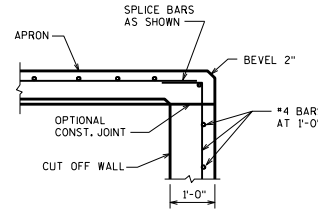
LIVE LOAD: HL-93
 **EARTH LOAD: DESIGNED FOR ULTIMATE DESIGN STRESSES:
 CONCRETE MASONRY ————— $f'_c = 3.5$ K.S.I.
 BAR STEEL REINFORCEMENT ————— $f_y = 60$ K.S.I.

**FIGURE TO BE TO THE NEAREST 0.5 FEET ON FILLS UNDER 4 FEET AND TO THE NEAREST FOOT ON FILLS OVER 4 FEET

BOX CULVERT LAYOUT	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11



APRON DETAIL



SECTION C6

"H" (FT.)	"L" (FT.)
≤ 5'-0"	3'-8"
> 5'-0" - 7'-0"	5'-2"
> 7'-0" - 8'-0"	6'-1"
> 8'-0" - 9'-0"	6'-9"
> 9'-0" - 10'-0"	7'-4"
> 10'-0" - 11'-0"	7'-8"
> 11'-0" - 12'-0"	8'-0"
> 12'-0" - 13'-0"	8'-4"
> 13'-0" - 14'-0"	8'-6"

"H" IS MAX. WING WALL HEIGHT

▲ IN LIEU OF CONSTRUCTION JOINTS IN THE BOTTOM SLAB, THE CONTRACTOR MAY USE 2" DEEP SAW CUTS WITHIN 12 HOURS AFTER POURING.

NOTES

BAR STEEL REINFORCEMENT SHALL BE EMBEDDED 2" CLEAR UNLESS OTHERWISE SHOWN OR NOTED.

ALL BAR STEEL FOR CAST-IN-PLACE CONCRETE BOX CULVERTS SHALL BE UNCOATED, EXCEPT WHEN THERE IS NO FILL OVER THE CULVERT. EPOXY COATED BARS SHALL BE USED FOR THE TOP AND BOTTOM BARS IN THE TOP SLAB.

THE UPPER LIMITS OF EXCAVATION FOR STRUCTURES CULVERTS C-... SHALL BE THE EXISTING GROUND LINE.

WHEN STRUCTURE BACKFILL IS REQUIRED: ALL SPACES EXCAVATED AND NOT OCCUPIED BY THE NEW STRUCTURE SHALL BE BACKFILLED WITH STRUCTURE BACKFILL TO THE ELEVATION AND SECTION EXISTING PRIOR TO EXCAVATION WITHIN THE LENGTH OF THE BOX.

THE CONCRETE IN THE CUT OFF WALL MAY BE PLACED UNDERWATER IF THE EXCAVATION CANNOT BE DEWATERED.

THE ALTERNATE CUT OFF WALL MAY BE USED IN LIEU OF THE CAST-IN-PLACE CONCRETE CUT OFF WALLS. PAYMENT SHALL BE BASED ON CONCRETE CUT OFF WALLS.

LOCATE NAME PLATE ON NEAREST RIGHT WING TRAVELING UP STATION, FACE NAME PLATE UP STATION.

HARDWARE FOR POST ANCHORS SHALL BE PAID FOR AS "STRUCTURAL STEEL CARBON".

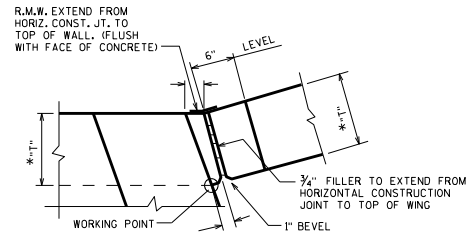
FOR "B" DESIGNATED CONCRETE BOX CULVERTS HAVING THEIR TOP SURFACE AT GRADE, HAND HELD FINISHING MACHINES MAY BE USED. NOTE THIS ON PLANS WHEN APPLICABLE.

THE CONTRACTOR MAY FURNISH A PRECAST CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE BOX CULVERT WITH THE ACCEPTANCE OF THE SHOP DRAWINGS BY THE STRUCTURES DESIGN SECTION. THE PRECAST CONCRETE BOX CULVERT SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 36 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL. PAYMENT FOR THE PRECAST CULVERT SHALL BE BASED ON THE QUANTITIES AND PRICES BID FOR THE ITEMS LISTED IN THE "TOTAL ESTIMATED QUANTITIES".

MAX. VALUE FOR "W_H" = 13'-0"

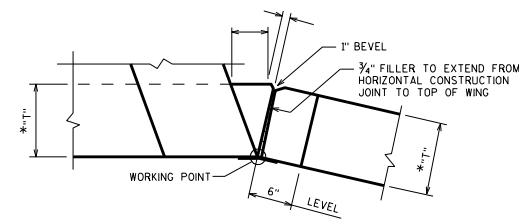
THE AREA OF REINFORCING STEEL NOT IDENTIFIED IN SECTIONS SHALL CONFORM TO THE FOLLOWING TEMPERATURE AND SHRINKAGE REQUIREMENTS:

THICKNESS	T&S REINF.
≤ 12"	*4 @ 18"
> 12" - 18"	*4 @ 12"

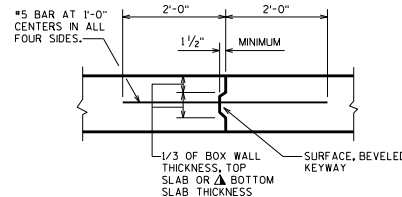


CORNER "A"

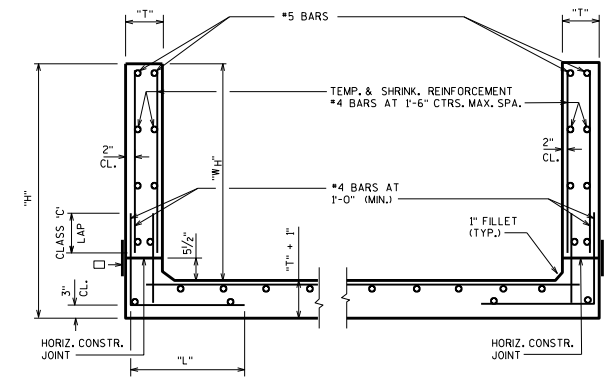
* DIMENSION "T" TO BE DETERMINED FROM BARREL DESIGN



CORNER "B"

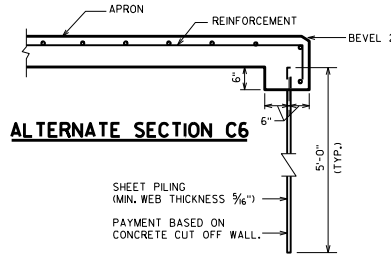


VERTICAL CONSTRUCTION JOINT



SECTION THRU WINGWALLS

□ 18" MIN. WIDTH RUBBERIZED MEMBRANE WATERPROOFING ALONG HORIZ. CONST. JT. IN WING.

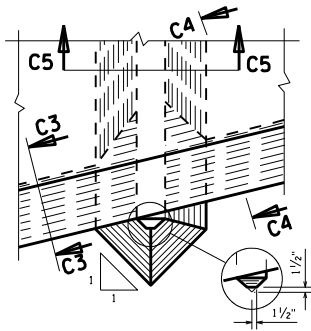


ALTERNATE SECTION C6

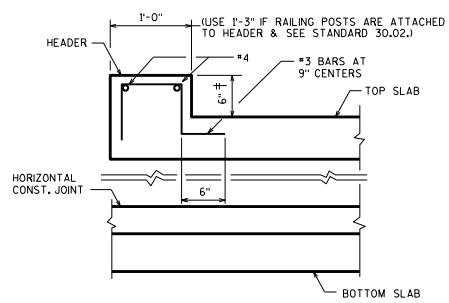
SHEET PILING (MIN. WEB THICKNESS 3/16")
PAYMENT BASED ON CONCRETE CUT OFF WALL.

ALTERNATE CUTOFF WALL

BOX CULVERT APRON DETAILS	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11

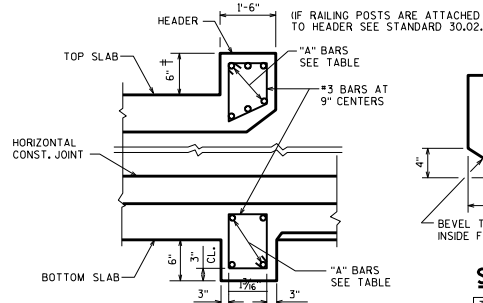


PLAN



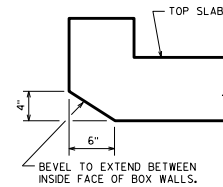
SECTION C2 FOR SKEW OF 20° AND UNDER

OUTLET HEADERS SHOWN



SECT C2 FOR SKEW OVER 20°

† IF RAILING POSTS ARE ATTACHED TO HEADER THIS DIMENSION MAY BE INCREASED IF NECESSARY TO KEEP RAILING PARALLEL TO ROADWAY. INCREASE WING HEIGHT IF NECESSARY.

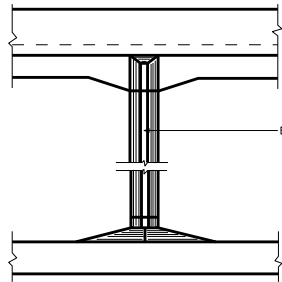


SECTION C3

TYPICAL ALL INLETS

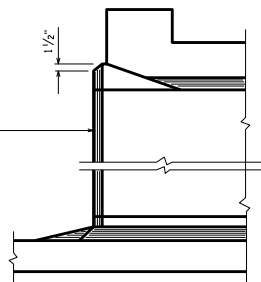
* HEADER LENGTH	"A" BARS
TO 11'-0"	6 - #7
OVER 11'-0" - 14'-0"	6 - #8
OVER 14'-0" - 17'-0"	6 - #9
OVER 17'-0" - 20'-0"	6 - #10

* HEADER LENGTH EQUALS THE DISTANCE BETWEEN C. OF WALLS IN ONE CELL MEASURED ALONG THE SKEW.

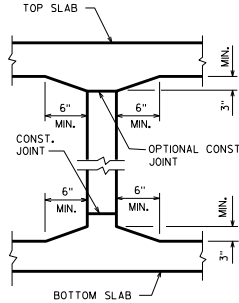


ELEVATION

INLET NOSE CENTERWALL DETAILS



SECTION C4

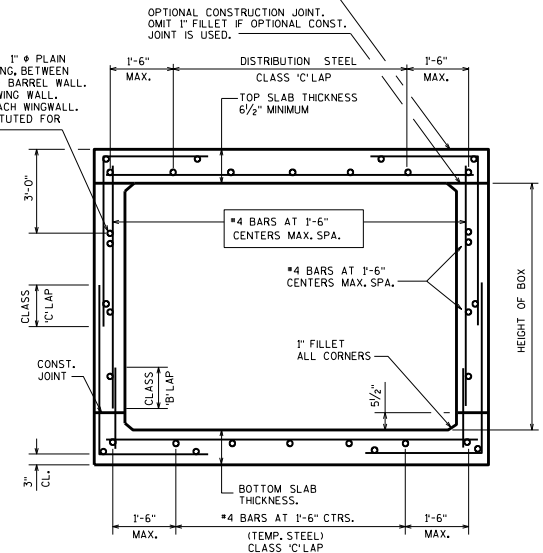


SECTION C5

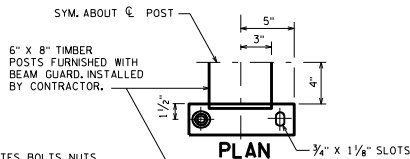
NOTE:

FOR MULTI-CELL CULVERTS IN THE TOP OF TOP SLAB, USE #4 BARS AT 1'-0" IN THE LONGITUDINAL DIRECTION AND A MIN. OF #4 BARS AT 1'-6" IN THE TRANSVERSE DIRECTION WHEN THE TOP SLAB IS AN INTEGRAL PART OF WEARING SURFACE.

FOR "HEIGHT OF BOX" > 6'-0", PLACE 1" ϕ PLAIN (SMOOTH) ROUND DOWEL BAR, 2'-6" LONG, BETWEEN BARREL AND WINGS, EMBED 1'-3" INTO BARREL WALL. USE DEBONDER ON EXTENSION INTO WING WALL. BEND AS REQUIRED. ONE BAR FOR EACH WINGWALL. ASTM A36 MATERIAL MAY BE SUBSTITUTED FOR AASHTO M31.

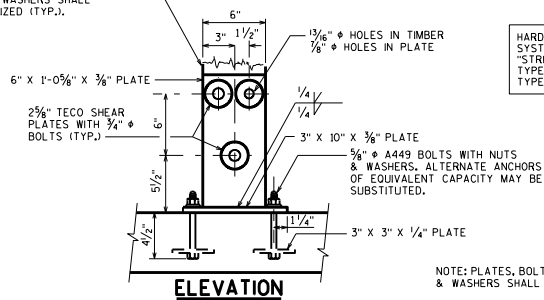


SECTION THRU BOX



PLAN

NOTE: PLATES, BOLTS, NUTS, ANGLES, & WASHERS SHALL BE GALVANIZED (TYP.).

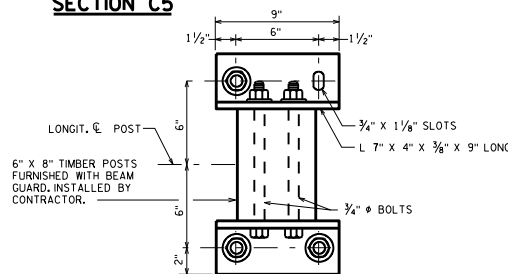


ELEVATION

NOTE: PLATES, BOLTS, NUTS, ANGLES, & WASHERS SHALL BE GALVANIZED. (TYP.)

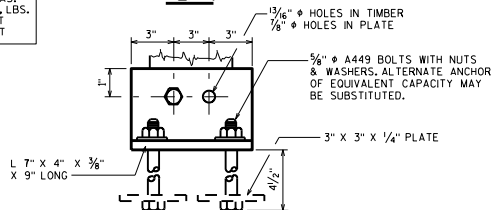
TIMBER GUARD RAIL POST ANCHORS TYPE 1

USE FOR POSTS EMBEDDED 2'-0" OR LESS.



PLAN

HARDWARE FOR POST ANCHOR SYSTEM SHALL BE PAID FOR AS: "STRUCTURAL STEEL CARBON", LBS. TYPE 1 ---- 35 LBS. PER POST TYPE 2 ---- 30 LBS. PER POST

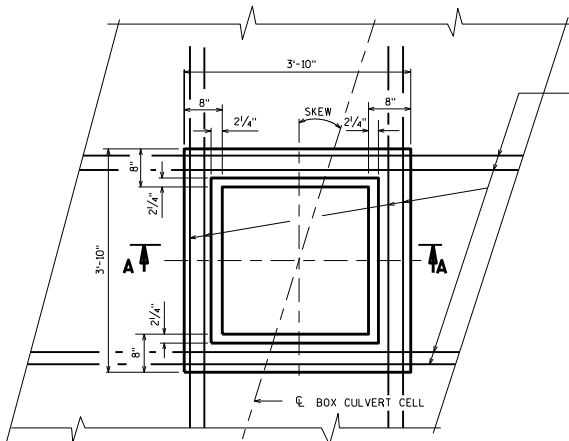


ELEVATION

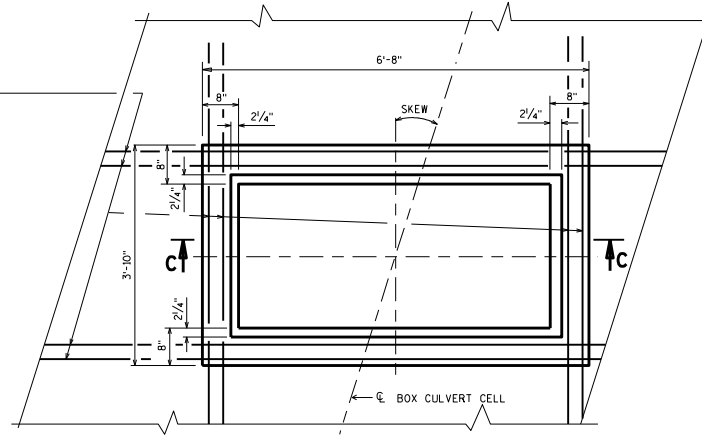
TIMBER GUARD RAIL POST ANCHORS, TYPE 2

USE FOR POSTS EMBEDDED OVER 2'-0" BUT LESS THAN 4'-0" ANCHORS NOT RECD FOR POSTS EMBEDDED 4'-0" OR MORE

BOX CULVERT DETAILS	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11



INLET TYPE 8



INLET TYPE 9

MEDIAN INLET PLAN

(INLET COVER NOT SHOWN)

GENERAL NOTES

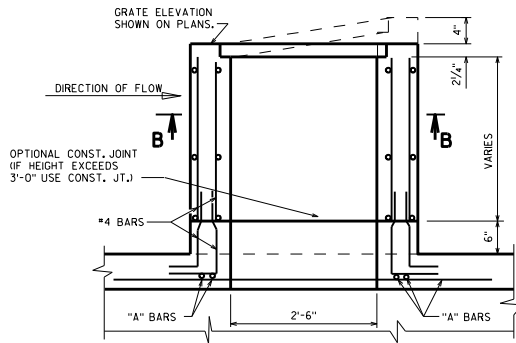
FIELD CUT BAR STEEL REINFORCEMENT IN TOP SLAB TO CLEAR THE OPENING PROVIDED FOR MEDIAN INLET.
ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. MAXIMUM ADJUSTMENT SHALL BE 8".

DESIGN NOTES

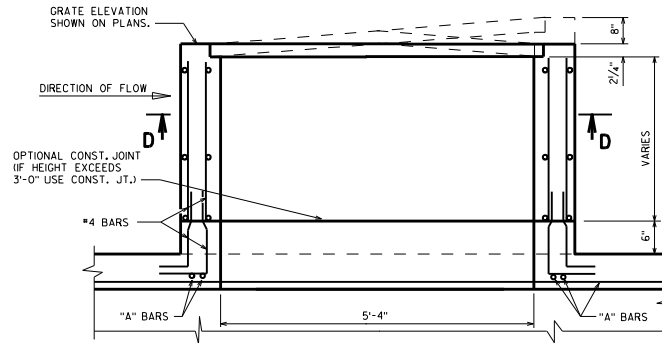
SIZE AND LENGTH OF "A" BARS TO BE DETERMINED BY THE DESIGNER.

STEEL SHOWN IS ADEQUATE TO DEPTHS UP TO 15'-6" FOR INLET TYPE 8 AND 44'-0" FOR INLET TYPE 9. ASSUMING A COEFFICIENT OF LATERAL EARTH PRESSURE OF 0.5 AND A UNIT WEIGHT OF SOIL OF 0.120 KCF.

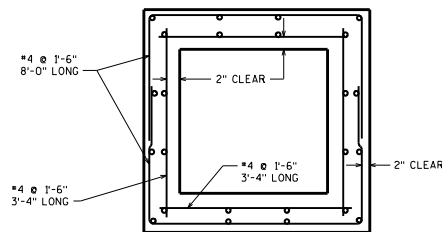
VERTICAL STEEL ADEQUATE FOR DEPTH UP TO 25'-0" ASSUMING WIND LOAD OF 50*/SQ.FT..



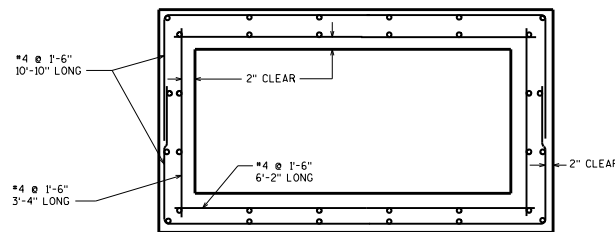
SECTION A-A



SECTION C-C



SECTION B-B



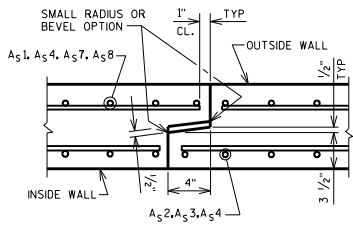
SECTION D-D

BOX CULVERT MANHOLE FOR INLET TYPE 8 & 9

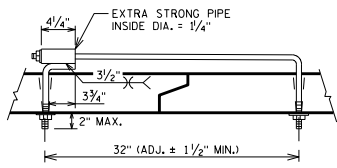
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: *Scot Becker*

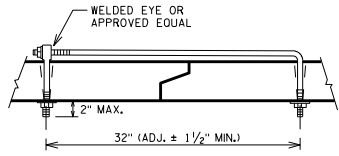
DATE:
1-11



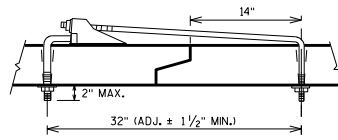
JOINT DETAIL



WELDED PIPE TIE



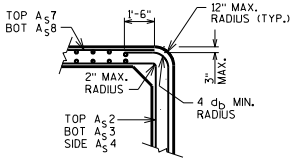
EYE BOLT TIE



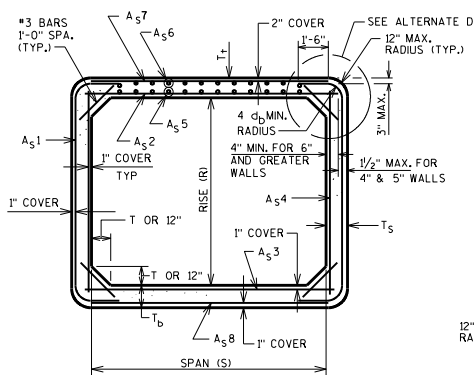
CANOPY TIE

NOTES:
EITHER EYE BOLT TIES, WELDED PIPE TIES, OR CANOPY TIES MAY BE USED.
THREADS MAY BE CUT OR ROLLED. TIE NUTS SHALL BE TIGHTENED AS DIRECTED
BY THE ENGINEER. (2 TIES REQ'D. PER JOINT.) (TIES TO BE GALVANIZED.)

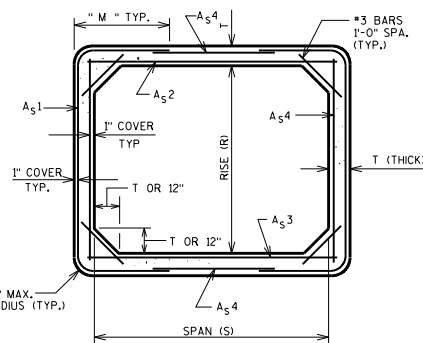
JOINT TIES



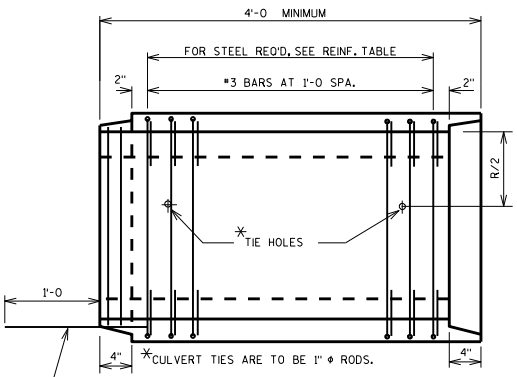
ALTERNATE DETAIL OPTION



SECTION THRU BARREL
FOR LESS THAN 2 FEET OF COVER



SECTION THRU BARREL
FOR 2'-0" OR MORE OF COVER



LONGITUDINAL SECTION

NOTES

DETAILS FOR MATERIALS, FABRICATION, CONSTRUCTION AND DESIGN OF PRECAST BOX CULVERTS NOT SHOWN OR STATED ON THIS DRAWING SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM SPECIFICATION, C1577; ASHTO LRFD BRIDGE DESIGN SPECIFICATIONS; WISCONSIN DOT BRIDGE MANUAL; WISCONSIN DOT STANDARD SPECIFICATIONS & APPLICABLE SPECIAL PROVISIONS, EXCEPT THAT THE CONCRETE MIXTURE SHALL CONTAIN NOT LESS THAN 565 LBS. OF CEMENTITIOUS MATERIALS PER CUBIC YARD.

THE DESIGN OF PRECAST BOX CULVERTS WITH ALL FILL HEIGHTS SHALL BE AS STATED IN ASTM C1577.

ALL PRECAST BOX SECTIONS SHALL BE PLACED ON A BEDDING OF "STRUCTURE BACKFILL" OF 6" MINIMUM DEPTH.

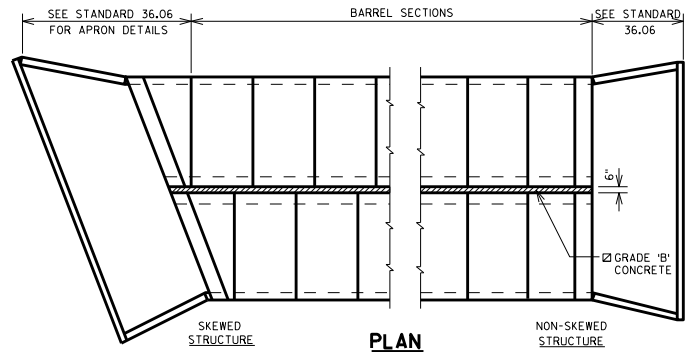
THE COVER OF CONCRETE OVER THE REINFORCEMENT SHALL BE 1 INCH OR 2 INCHES AS SHOWN WITH AN ALLOWABLE VARIATION OF -3/8" TO +1/2" INCH.

THE SPACING CTR. TO CTR. OF THE CIRCUMFERENTIAL WIRES SHALL NOT BE LESS THAN 2 INCHES NOR MORE THAN 4 INCHES. THE SPACING CTR. TO CTR. OF THE LONGIT. WIRES SHALL NOT BE MORE THAN 8 INCHES.

NOT MORE THAN FOUR (4) HOLES MAY BE CAST, DRILLED OR OTHERWISE NEATLY MADE IN THE SHELL OF EACH PIECE OF BOX SECTION FOR HANDLING. THE HOLES SHALL BE TAPERED UNLESS DRILLED. HOLES SHALL BE FILLED WITH PORTLAND CEMENT MORTAR EXCEPT TAPERED HOLES MAY BE FILLED WITH CONCRETE PLUGS SECURED WITH PORTLAND CEMENT MORTAR OR OTHER APPROVED ADHESIVE.

THE JOINT ON THE BOTTOM OF THE CULVERT & THE SIDES OF THE CULVERT FROM THE BOTTOM TO A POINT 1'-0" FROM THE CEILING SHALL BE SEALED WITH A PREFORMED MASTIC. PREFORMED MASTIC MUST CONFORM TO ASHTO MATERIALS SPEC. M198, TYPE B. A 2'-0" STRIP OF GEOTEXTILE FABRIC SHALL BE PLACED OVER THE JOINTS ON THE TOP AND ON THE SIDES OF THE CULVERT. THE GEOTEXTILE FABRIC SHALL COMPLY WITH REQUIREMENTS OF STANDARD SPECIFICATION 645.2.4, SCHEDULE A. (FABRIC NOT REQUIRED OVER INSIDE WALL JOINTS OF MULTICELL INSTALLATION.)

WHEN TWO OR MORE BARRELS ARE UTILIZED IN PARALLEL FOR MULTICELL INSTALLATIONS THE CLEAR SPACING BETWEEN BARRELS SHALL BE 6 INCHES AND THE SPACE BETWEEN ADJACENT BARRELS FROM TOP OF BEDDING TO TOP OF TOP SLAB SHALL BE FILLED WITH GRADE "B" CONCRETE.



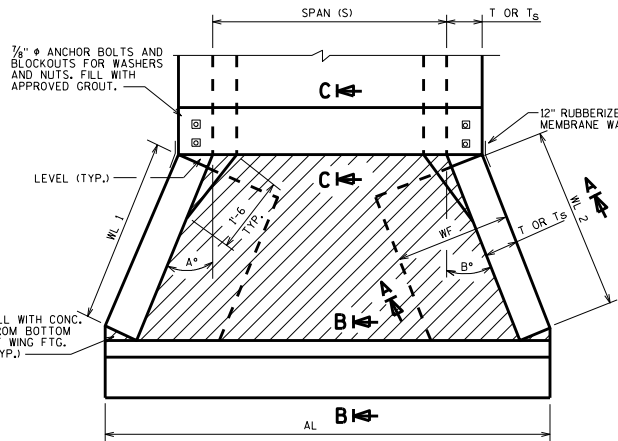
MULTICELL INSTALLATION

DIMENSIONS				EARTH COVER (FT.)											
S (FT.)	R(FT.)	T OR T _s , T _b , T _t (IN.)		AREA/FT.		LENGTH		M		AREA/FT.		LENGTH		M	
				A _s 1											
				A _s 2											
				A _s 3											
				A _s 4											
				A _s 5											
				A _s 6											
				A _s 7											
				A _s 8											
TOTAL BARREL OR PANEL LENGTH															

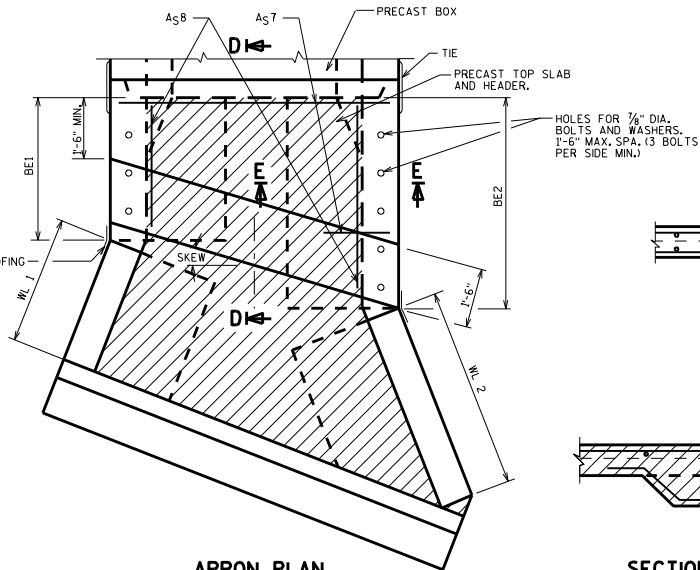
PRECAST CONCRETE BOX CULVERT BARREL DETAILS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

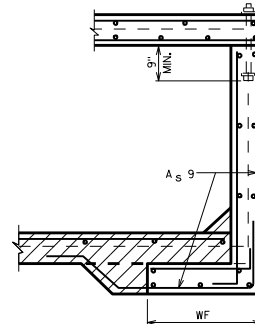
APPROVED: *Scot Becker* DATE: 1-11



APRON PLAN
(NON-SKEWED STRUCTURE)



APRON PLAN
(SKEWED STRUCTURE)



SECTION E

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

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

12" RUBBERIZED MEMBRANE WATERPROOFING

LEVEL (TYP.)

RL 1

A°

1'-6" MIN.

TYP.

WF

B°

T OR Ts

2

AL

B1

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

WF

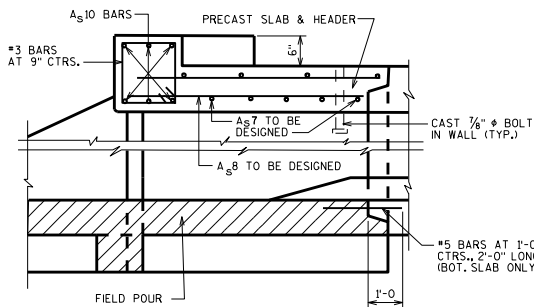
WF

WF

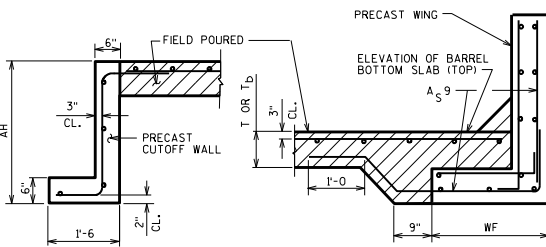
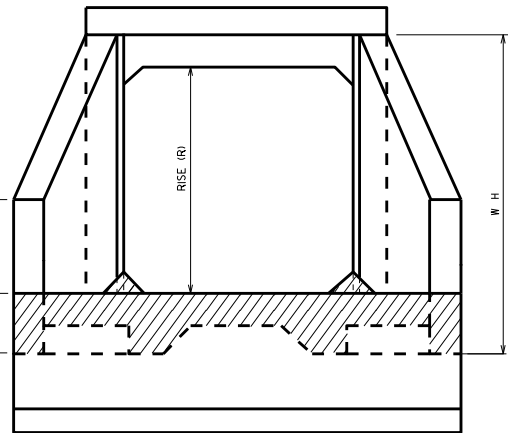
2'-0" (TYP.)

2 T OR 2Tb

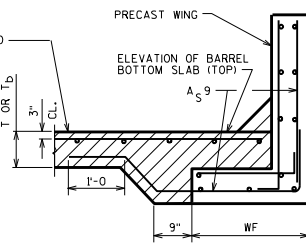
END VIEW



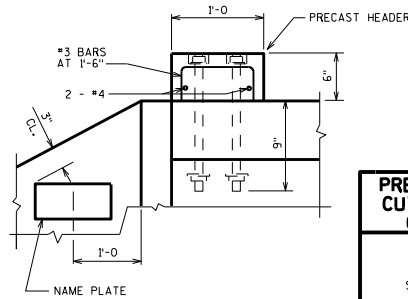
SECTION D



SECTION B



SECTION A



SECTION C

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

SPAN (S)	A ₅ 10 BARS		
	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

RISE (R)	A ₅ 9 IN. ² /FT	WF
4'-0"	.19	2'-6"
6'-0"	.24	3'-6"
8'-0"	.31	4'-0"
10'-0"	.34	4'-9"

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

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

DATE: 1-11

GENERAL 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 ULTIMATE COMPRESSIVE 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 ULTIMATE COMPRESSIVE STRENGTH OF THE CONCRETE IN THE PRECAST 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 A₅ 10 BARS, SHALL BE #5.

THE 7/8" ϕ 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 NOTES FOR PRECAST CONCRETE STRUCTURE

BID ITEM SHALL BE "THREE-SIDED PRECAST CONCRETE STRUCTURE".

PRECAST BRIDGES WILL BE LIMITED TO SPANS NOT TO EXCEED 42'-0".

SECURE WISDOT BOS AND GEOTECHNICAL (SOILS) ENGINEER'S APPROVAL BEFORE INCORPORATING PRECAST BRIDGES IN ANY PROJECT.

CHECK FOUNDATION PRESSURE, SCOUR AND SETTLEMENT TO ENSURE THAT NO FOUNDATION FAILURE OCCURS. PREFERABLY, PROVIDE FOOTING ON NON-YIELDING FOUNDATION MATERIAL. HOWEVER, ALLOWABLE DIFFERENTIAL SETTLEMENT FOR FOOTING ON SOIL SUPPORTING THE STRUCTURE = 0.002 FT. PER FT. (MAX.) OF THE SPAN. DESIGN STRUCTURE COMPONENTS TO RESIST FORCES CAUSED BY THIS DIFFERENTIAL SETTLEMENT. ADEQUATELY REINFORCE THE ENTIRE FOOTING AS REQUIRED BY THE DESIGN.

WHEN BEAM GUARD POSTS ARE TO BE EMBEDDED IN FILL ABOVE THE PRECAST ARCH UNIT, PROVIDE A DEPTH OF FILL, MEASURED FROM TOP OF ARCH CROWN TO TOP OF ROADWAY, AT LEAST EQUAL TO THE MINIMUM EMBEDMENT DEPTH SHOWN ON S.D.D. 14 B 15-6 PLUS 6".

FOR SHORTER SPAN CULVERTS, WHERE BEAM GUARD CROSSES THE LENGTH OF THE STRUCTURE, CONSIDERATION SHALL BE GIVEN TO THE DETAILS SHOWN ON S.D.D. 14 B 25-1 PROVIDED ALL REQUIREMENTS ON THIS STANDARD CAN BE MET.

WHEN A CONCRETE BARRIER (SINGLE SLOPE) CROSSES THE LENGTH OF THE STRUCTURE, THE FILL DEPTH MUST BE ADEQUATE TO ACCOMMODATE THE REQUIRED FOOTING DEPTH, SEE S.D.D. 14 B 32-1 AND S.D.D. 14 B 34-1 FOR CONCRETE BARRIER DETAILS.

PROVIDE A SUITABLE DRAINAGE PIPE ALONG THE CULVERT AND WINGWALLS TO RELEASE HYDROSTATIC PRESSURE. WHERE SIGNIFICANT SEEPAGE OR RELATIVELY RAPID ACCUMULATION OF WATER IS ANTICIPATED BEHIND THE WALL, INCORPORATE PIPE UNDERDRAIN WRAPPED AS SPECIFIED, INTO THE BACKFILL STRUCTURE, BEHIND THE WALL TO IMPROVE DRAINAGE CONDITIONS. DIRECT SEEPAGE FROM DRAINAGE PIPE TO WEEP HOLES ALONG THE EXTERIOR FACE OF THE WALL OR TO THE STORM WATER CONVEYANCES.

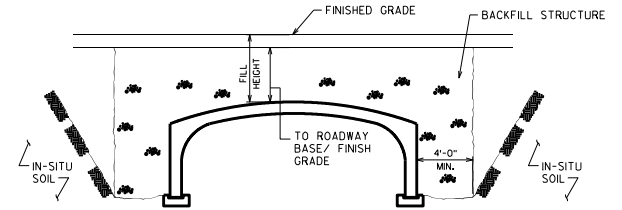
PLACE FOOTINGS BELOW SCOUR AND FROST DEPTHS. PLACE BOTTOM OF FOOTING AT A MINIMUM DEPTH EQUAL TO PREVAILING FROST DEPTH OR SCOUR DEPTH BUT NOT LESS THAN 4'-0" BELOW GROUND ELEVATION UNLESS CONSTRUCTED ON ROCK FOUNDATION OR OTHERWISE INDICATED.

PROVIDE DUCTILE JOINT SYSTEM BETWEEN VERTICAL LEG OF THE PRECAST SEGMENT AND FOOTER AS INDICATED ON THE STANDARD DETAIL DRAWINGS.

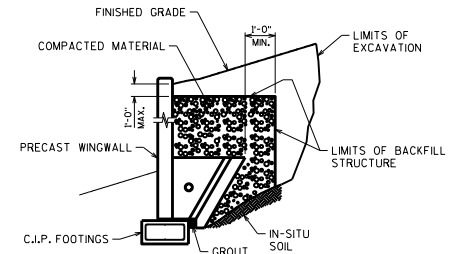
BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.

LRFD DESIGN LOADS

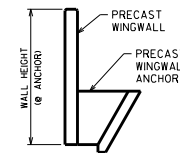
LIVE LOAD: HL-93
 HORIZONTAL EARTH PRESSURE: UNIT WEIGHT = 125 PCF
 VERTICAL EARTH PRESSURE: UNIT WEIGHT = 120 PCF



BACKFILL REQUIREMENTS



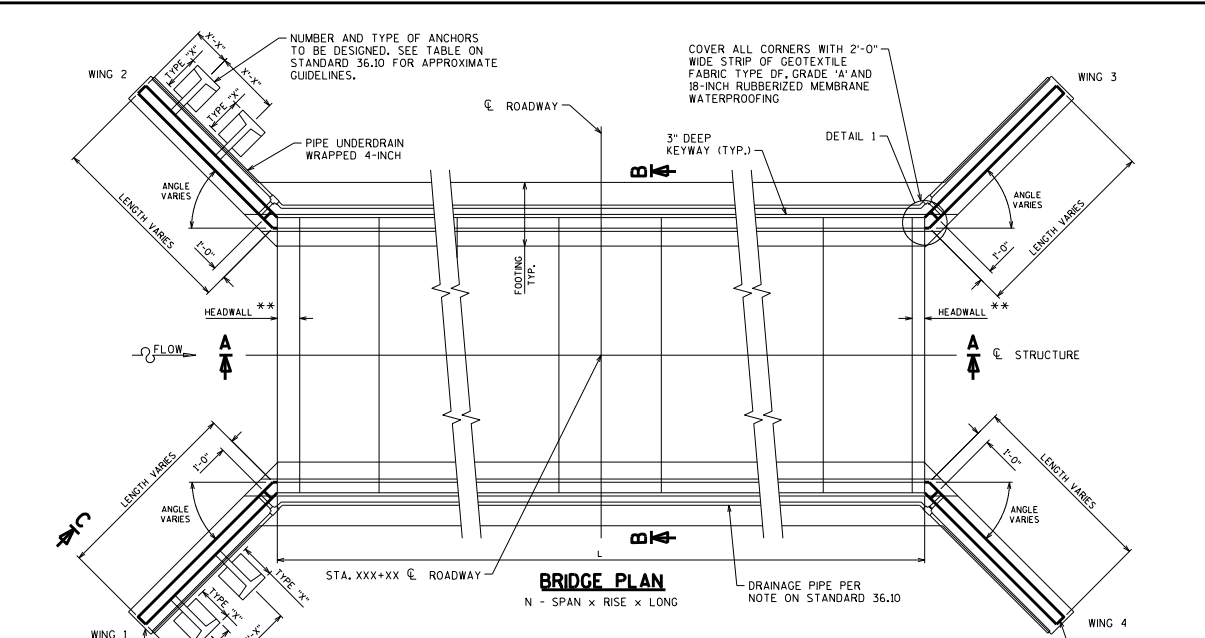
WALL BACKFILL REQUIREMENTS



APPROXIMATE/GUIDELINE NUMBER OF ANCHORS PER WALL	
LENGTH OF WALL	NO. ANCHORS
L = 14'-0"	2
L = 20'-0"	3
L = 24'-0"	4
24'-0" < L	MULTIPLE-PIECE WINGWALL*

*NOTE: ADJACENT SEGMENTS SHALL BE ATTACHED TO EACH OTHER TO KEEP FRONT FACES IN ALIGNMENT. PLACE A FILLER AT THESE JOINTS WITH A MEMBRANE ALONG THE JOINT AT THE BACK FACE.

PRECAST THREE-SIDED BOX CULVERT DESIGN NOTES	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION	
APPROVED: <i>Scot Becker</i>	DATE: 1-11



GENERAL NOTES:

MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH WISCONSIN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND THE CONTRACT SPECIAL PROVISIONS.

DESIGN SPECIFICATION: DESIGN STRUCTURE BY CURRENT EDITION AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY WISDOT BRIDGE MANUAL.

USE GRADE A CONCRETE IN FOOTING AND WINGWALLS. $f_c = 4 \text{ KSI (MIN.)}$

PROVIDE CONCRETE COVER ON REINFORCING BARS AS NOTED HEREIN.

CHAMFER EXPOSED CONCRETE EDGES $\frac{3}{4}'' \times \frac{3}{4}''$ EXCEPT AS NOTED.

PROVIDE DEFORMED REINFORCEMENT STEEL MEETING THE REQUIREMENTS OF ASTM DESIGNATION 615, OR 617, GRADE 60 AS SET FORTH IN THE STANDARD SPECIFICATIONS.

IF A CAST-IN-PLACE OPTION IS SHOWN AND SPECIFICATIONS ALLOW FOR A PRECAST SUBSTITUTION, PRECAST STRUCTURE SYSTEM (INCLUDING WINGWALLS AND HEADWALLS) AND FOOTERS WILL BE DESIGNED BY CONTRACTORS.

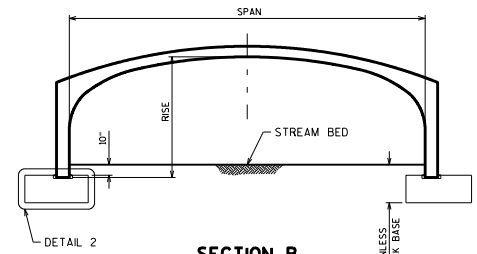
AT ANY TIME DURING PLACEMENT OF THE BACKFILL, DO NOT PERMIT A DIFFERENCE IN FILL ELEVATION ON THE SIDES OF THE CULVERT BARREL IN EXCESS OF 2'-0". DURING COMPACTION OF THE BACKFILL, DO NOT ALLOW THE WHEELS OF ROLLERS TO COME CLOSER THAN 1'-0" TO THE FACE OF THE OF THE STRUCTURE.

DESIGNER NOTES:

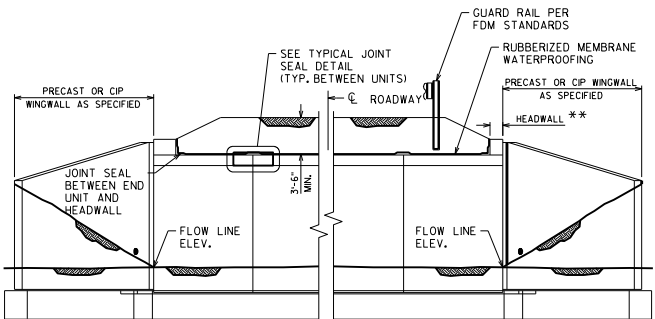
ALL BAR SPLICES TO BE "CLASS C" TENSION LAP SPLICES.

PRECAST CONCRETE CULVERT UNITS PLUS (N-D) JOINTS $\phi \frac{1}{4}''$ TO $\frac{1}{2}''$ PER JOINT = L

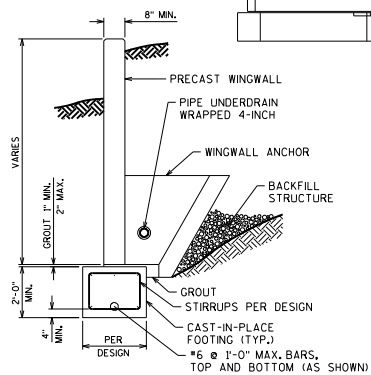
** SEE STANDARD 36.13 AND STANDARD 36.14 FOR HEADWALL DETAILS AND FEASIBILITY GUIDELINES



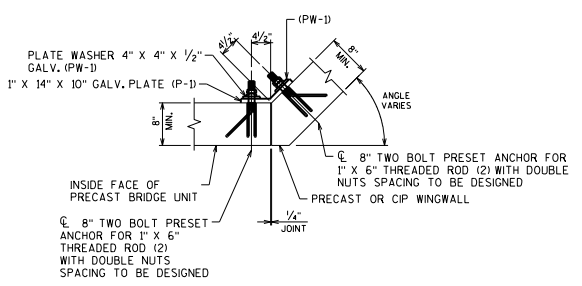
SECTION B



SECTION A



SECTION C



DETAIL 1

NOTE: CONNECTION PLATES (P-1) MUST BE POSITIONED WITH SMALL DIAMETER HOLES TOWARD PRECAST BRIDGE UNIT

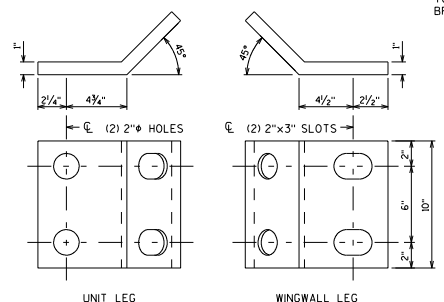
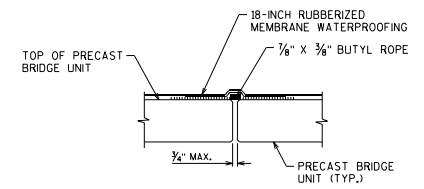


PLATE P-1

NOTE: PLATE LENGTH AND THICKNESS SHALL BE INCREASED AS REQUIRED BY DESIGN.



TYPICAL JOINT SEAL DETAIL

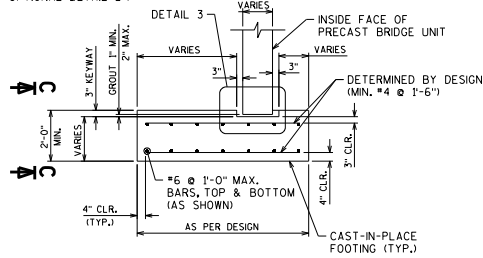
PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS

STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION STRUCTURES DEVELOPMENT SECTION

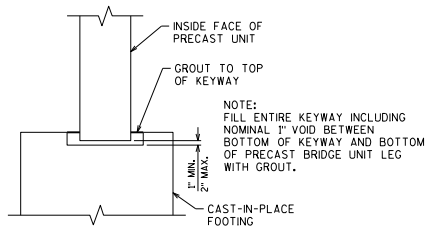
APPROVED: *Scot Becker*

DATE: 1-11

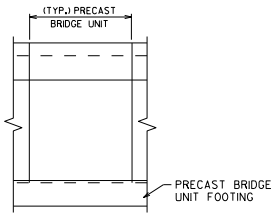
SPREAD FOOTING SHOWN, OTHER FOUNDATION TYPES POSSIBLE. (FOR PEDESTAL WALL, PILE AND BASE SLAB FOUNDATIONS, "SEE OPTIONAL DETAIL 2")



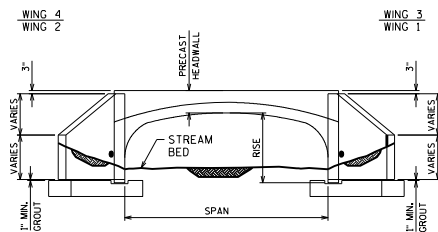
DETAIL 2



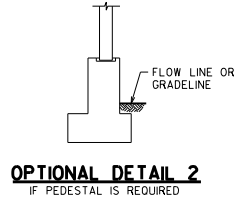
DETAIL 3



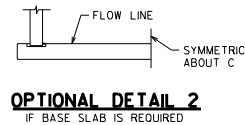
SECTION C



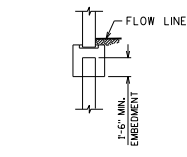
TYPICAL END ELEVATION



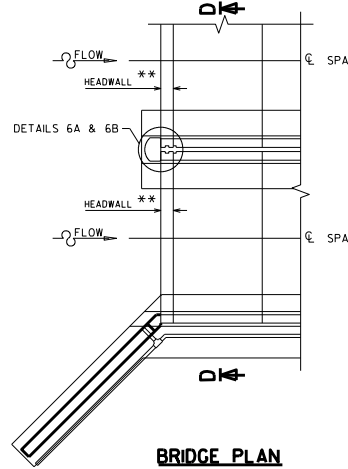
OPTIONAL DETAIL 2
IF PEDESTAL IS REQUIRED



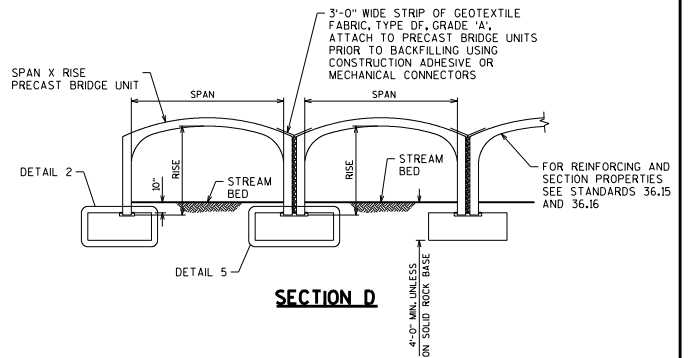
OPTIONAL DETAIL 2
IF BASE SLAB IS REQUIRED



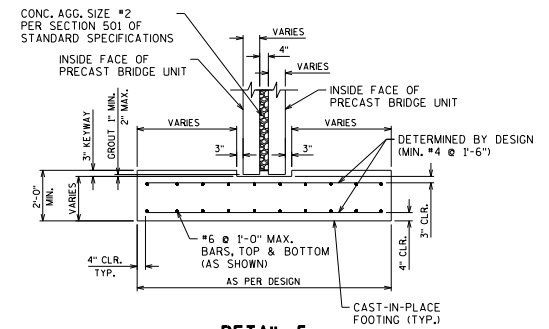
OPTIONAL DETAIL 2
IF PILES ARE REQUIRED



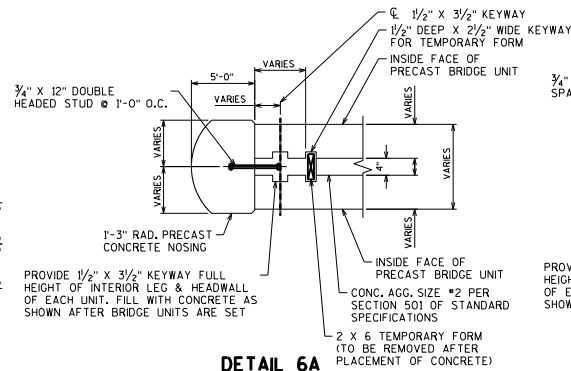
BRIDGE PLAN



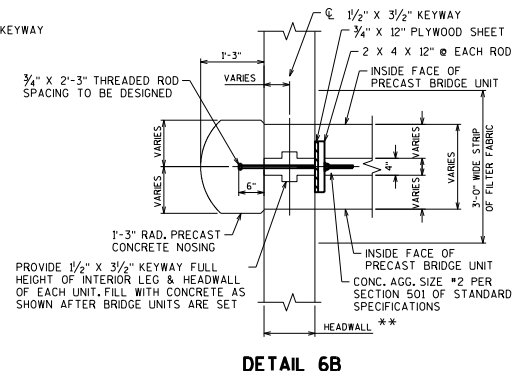
SECTION D



DETAIL 5



DETAIL 6A



DETAIL 6B

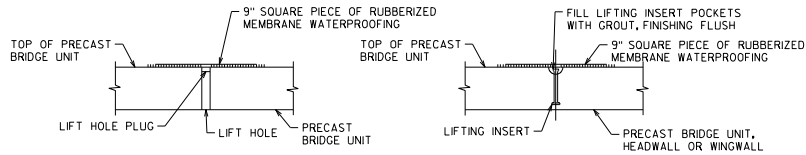
NOTES:
**SEE STANDARDS 36.13 AND 36.14 FOR HEADWALL DETAILS AND FEASIBILITY GUIDELINES

PRECAST THREE-SIDED BOX CULVERT DETAILS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

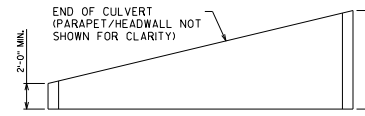
DATE:
1-11



LIFTING HOLES

LIFTING INSERTS

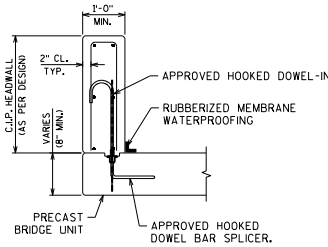
TYPICAL LIFT POINT SEALING DETAIL



SKEWEED UNITS

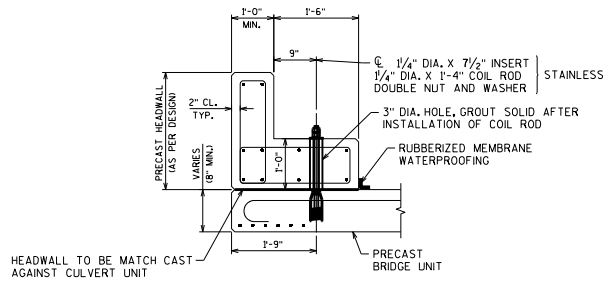
TYPICAL SKEW LIMITS PLAN VIEW - NOT TO SCALE

7'-9" MAX. FOR SPANS ≤ 24'-0"
5'-9" MAX. FOR SPANS 28'-0" - 42'-0"



CAST-IN-PLACE HEADWALL DETAIL

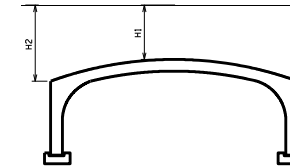
NOT TO SCALE



PRECAST HEADWALL DETAIL WITH COLLAR

NOT TO SCALE

	H1	H2
UNIT SPAN	MAX. HEIGHT @ CROWN TO 1/2 HEADWALL (NO LIVE LOAD SURCHARGE)	MAX. APPROXIMATE HEIGHT @ EDGE OF SPAN
14'-0"	8'-0"	9'-6 3/4"
20'-0" - 28'-0"	7'-0"	10'-0"
36'-0"	6'-0"	10'-6"
42'-0"	4'-0"	10'-0"



LRFD COLLAR/HEADWALL DESIGN NOTES:

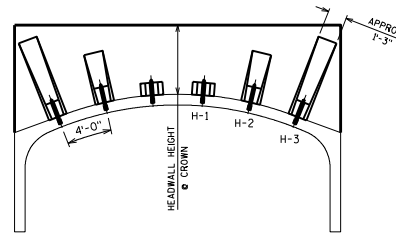
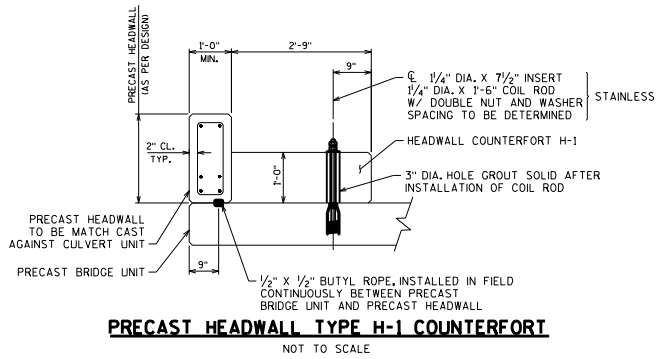
- HEADWALL DETAILS SHOWN HERE HAVE ONLY BEEN DESIGNED FOR THE FOLLOWING 2 LOAD CASES:
 - 1) EARTH PRESSURE ONLY
 - 2) EARTH PRESSURE + LIVE LOAD SURCHARGE
 THESE DETAILS ARE NOT TO BE USED WHERE A VEHICLE LOAD CAN BE TRANSMITTED THROUGH A BARRIER TO THE HEADWALL.
- 1'-0" HEADWALL THICKNESS
- 1'-0" COLLAR THICKNESS
- SOIL BEHIND HEADWALL IS AT SAME ELEVATION AS TOP OF HEADWALL
- ADDITIONAL HW HEIGHT MAY BE ACHIEVED WITH ADDITIONAL STEEL REINFORCEMENT OR THICKENED COLLAR
- FOR DETACHED HEADWALL DESIGNS ONLY

PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

DATE:
1-11



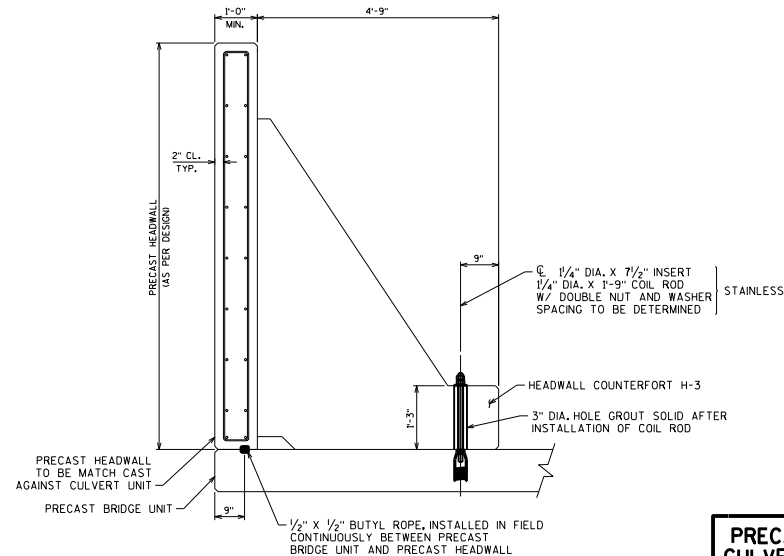
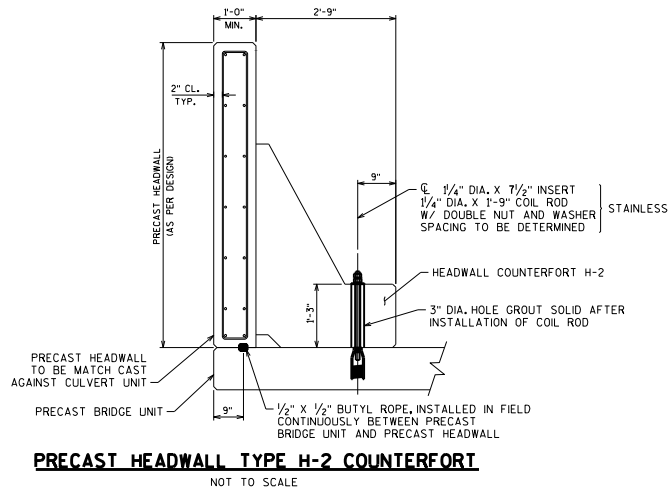
SAMPLE ELEVATION

NOTE:
THE ACTUAL NUMBER AND TYPE OF PRECAST HEADWALL COUNTERFORTS IS TO BE DESIGNED, HOWEVER, USE THE FOLLOWING CHART AS A GENERAL GUIDE TO FEASIBILITY OF COUNTERFORT USE.

SPAN	COUNTERFORT	MAX HEADWALL HEIGHT @ COUNTERFORT LOCATION	
		NO SURCHARGE	W/ 2'-0" SURCHARGE
14'-0" SPAN	H-1	7'-0"	5'-0"
	H-2	7'-0"	5'-0"
	H-3	8'-0"	6'-0"
20'-0" - 42'-0" SPANS	H-1	8'-0"	6'-0"
	H-2	10'-0"	7'-0"
	H-3	10'-0"	8'-0"

LRFD HEADWALL COUNTERFORTS

- HEADWALL DETAILS SHOWN HERE HAVE ONLY BEEN DESIGNED FOR THE FOLLOWING 2 LOAD CASES:
 - 1) EARTH PRESSURE ONLY
 - 2) EARTH PRESSURE + LIVE LOAD SURCHARGE
 THESE DETAILS ARE NOT TO BE USED WHERE A VEHICLE LOAD CAN BE TRANSMITTED THROUGH A BARRIER TO THE HEADWALL.
- ASSUMED 4'-0" SPACING OF COUNTERFORTS
- 1'-0" HEADWALL THICKNESS MIN.
- SOIL BEHIND HEADWALL IS AT SAME ELEVATION AS TOP OF HEADWALL
- ADDITIONAL HEADWALL HEIGHT MAY BE ACHIEVED WITH CLOSER COUNTERFORT SPACING
- FOR DETACHED HEADWALL DESIGNS ONLY

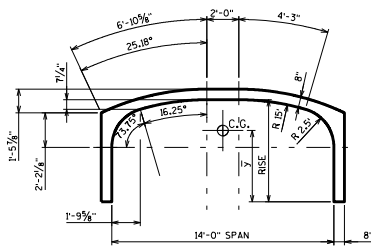


PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

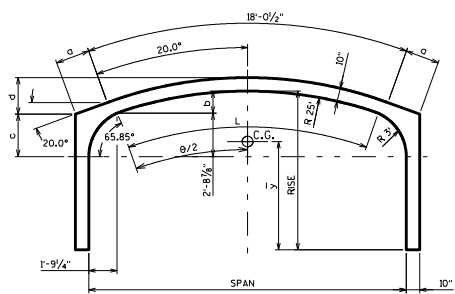
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

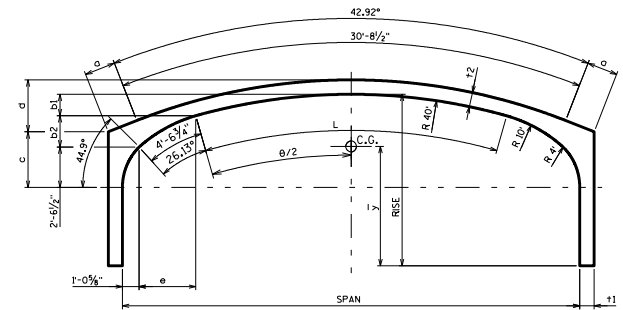
DATE:
1-11



14'-0" SPAN



20'-0" TO 24'-0" SPANS



28'-0" TO 42'-0" SPANS

RISE FT	CENTER OF GRAVITY \bar{y} FT					
	SPAN - FT					
	14	20	24	28	36	42
4	3.2					
5	3.9	3.8				
6	4.6	4.6	4.6			
7	5.2	5.3	5.3	5.3		
8	5.8	6.0	6.0	6.0	5.8	
9	6.5	6.6	6.6	6.7	6.5	
10	7.1	7.3	7.3	7.4	7.2	6.9
11				8.0	7.9	7.7
12					8.6	8.4
13					9.3	9.1

RISE FT	AREA OF CONCRETE SECTION SQ. FT					
	SPAN - FT					
	14	20	24	28	36	42
4	15.2					
5	16.5	24.8				
6	17.8	26.5	29.1			
7	19.2	28.2	30.8	39.9		
8	20.5	29.9	32.5	41.9	54.1	
9	21.8	31.5	34.2	43.9	56.4	
10	23.0	33.2	35.8	45.9	58.7	64.7
11				47.9	61.1	67.0
12					63.4	69.4
13					65.7	71.7

	GEOMETRIC PROPERTIES (FT.) (NOT SHOWN ON DRAWING)				
	SPAN - FT				
	20	24	28	36	42
θ	38.43°	48.29°	25.30°	37.93°	47.86°
L	16.77	21.07	17.66	26.48	33.41
a	2.13	4.25	0.00	4.48	4.48
b	1.39	2.19			
b1			0.97	2.17	3.50
b2			1.96	2.40	2.75
c	2.68	2.75	3.76	3.91	4.31
d	2.29	3.01	2.84	4.48	5.66
e			4.07	3.83	3.63
t1			1.00	1.17	1.17
t2			0.83	1.00	1.00

(REFER TO STANDARDS 36.16 FOR REINFORCING DETAILS)

COVER ft	ARCH UNIT PRIMARY REINFORCING (MINIMUM)																	
	14'-0" SPAN 4'-0" TO 10'-0" RISE			20'-0" SPAN 5'-0" TO 10'-0" RISE			24'-0" SPAN 6'-0" TO 10'-0" RISE			28'-0" SPAN 7'-0" TO 11'-0" RISE			36'-0" SPAN 8'-0" TO 13'-0" RISE			42'-0" SPAN 10'-0" TO 13'-0" RISE		
	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REO'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REO'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REO'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REO'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REO'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REO'D. PSI
3	0.66	0.48	5000	0.90	0.78	5000	0.72	0.84	5000	0.96	1.08	5000	1.50	1.68	6000	1.44	1.44	6000
6	0.66	0.48	5000	0.72	0.78	5000	0.72	1.08	5000	0.96	1.32	5000	1.50	1.92	6000	1.44	1.44	6000 ⊕
9	0.66	0.48	5000	0.72	0.90	5000	0.72	1.44	5000	0.96	1.68	5000 ⊕	1.50	2.40	6000	1.44	1.92	6000 ⊕
12	0.66	0.60	5000	0.72	1.08	5000	0.72	1.80	6000 ⊕	0.96	1.80	6000 ⊕	1.50	3.00	6000 ⊕	1.44	2.16	6000 ⊕

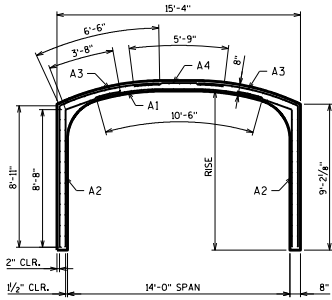
- ⊕ SHEAR REINFORCEMENT REQUIRED
- ⊕ SHEAR REINFORCEMENT REQUIRED FOR 6'-0" & 7'-0" RISE
- ⊕ SHEAR REINFORCEMENT REQUIRED FOR 8'-0" & 9'-0" RISE
- ⊕ SHEAR REINFORCEMENT REQUIRED FOR 10'-0" & 11'-0" RISE
- ⊕ MINIMUM PRECAST UNIT WIDTH = 3'-11 1/4"

NOTE:
THESE STEEL AREAS ARE SHOWN FOR COVER OF 12'-0" OR LESS.

**PRECAST THREE-SIDED BOX
CULVERT CROSS SECTIONS**

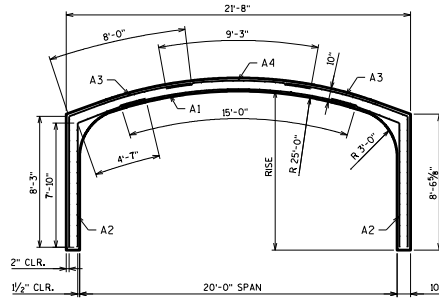
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker DATE: 1-11



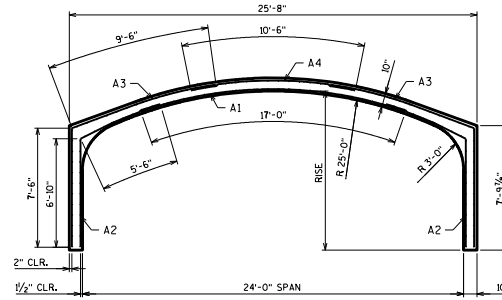
14'-0" SPAN

RISE = 10'-0" **SEE NOTE



20'-0" SPAN

RISE = 10'-0" **SEE NOTE



24'-0" SPAN

RISE = 10'-0" **SEE NOTE

NOTES:

** SEE ARCH UNIT PRIMARY REINFORCING CHART ON STANDARD 36.15 FOR MORE INFORMATION.

ALL REINFORCING DIMENSIONS SHOWN ARE FOR 10'-0" RISE. A2 AND A3 STEEL LENGTHS SHALL BE REVISED ACCORDINGLY FOR RISES OTHER THAN 10'-0".

THESE STEEL AREAS, STEEL LENGTHS AND ARCH THICKNESS ARE SHOWN FOR COVER OF 12'-0" OR LESS.

THREE-SIDED PRECAST CONCRETE STRUCTURES SHALL BE DESIGNED FOR COVER GREATER THAN 12'-0", AND CAN BE DESIGNED FOR UP TO THE LIMITS OF COVER SHOWN IN THE TABLE BELOW.

THE COVER OF CONCRETE OVER THE OUTSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 2 INCHES MINIMUM.

THE COVER OF CONCRETE OVER THE INSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 1/2 INCHES MINIMUM.

THE CLEAR DISTANCE OF THE END CIRCUMFERENTIAL WIRES SHALL NOT BE LESS THAN 1" NOR MORE THAN 2" FROM THE ENDS OF EACH SECTION.

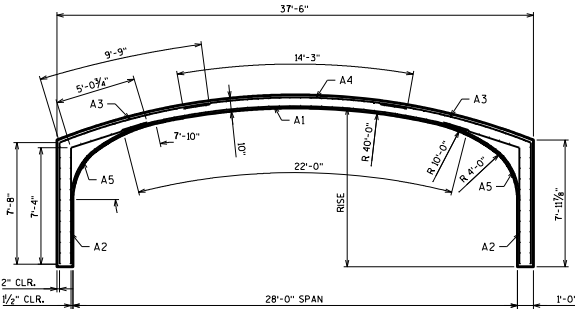
AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A497 MAY BE SUBSTITUTED FOR THE REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT CHIEF, (608) 266-5161

MINIMUM COVER FOR WILDED WIRE FABRIC: 1-INCH

DESIGN DATA:

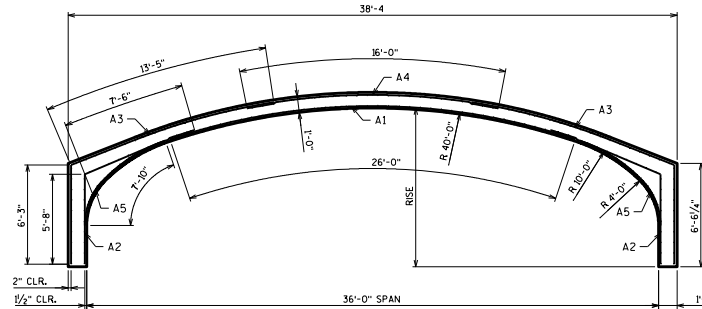
f'c = 5000 PSI MINIMUM FOR CONCRETE
 fy = 60,000 PSIFOR STEEL REINFORCING BARS
 fy = 65,000 PSIFOR WELDED WIRE FABRIC (IN FLAT SHEET)

SPAN FT	APPROX. MAX. COVER
14'	50'
20' - 24'	30'
28' - 36'	20'
42'	15'



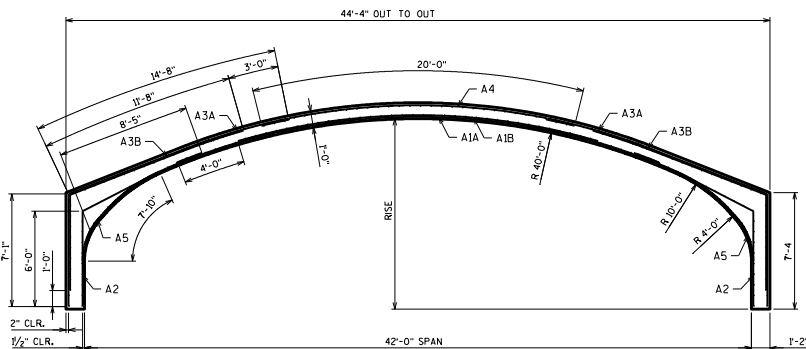
28'-0" SPAN

RISE = 10'-0"



36'-0" SPAN

RISE = 10'-0"



42'-0" SPAN

RISE = 12'-0"

ARCH UNIT LONGITUDINAL REINFORCEMENT (MINIMUM)								
14'-0" SPAN			20'-0" SPAN			24'-0" SPAN		
CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT	CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT	CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT
A1 = **	0.13	10'-6"	A1 = **	0.13	15'-0"	A1 = **	0.13	17'-0"
A2 = 0.24	0.13	12'-3"	A2 = 0.24	0.13	12'-5"	A2 = 0.24	0.13	12'-4"
A3 = **	0.13	15'-4"	A3 = **	0.13	16'-3"	A3 = **	0.13	17'-0"
A4 = 0.24	0.13	5'-9"	A4 = 0.24	0.13	9'-3"	A4 = 0.24	0.13	10'-6"

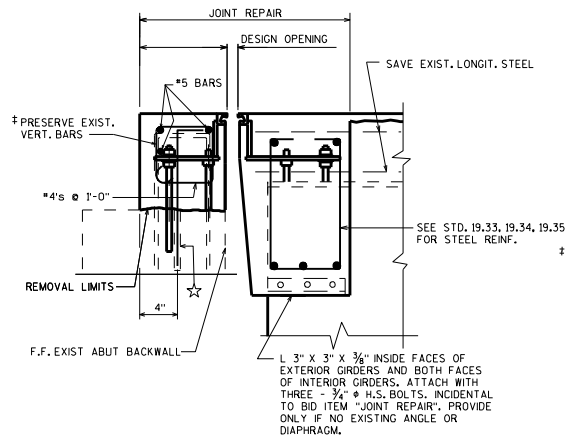
28'-0" SPAN			36'-0" SPAN			42'-0" SPAN		
CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT	CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT	CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT
A1A = **	0.13	22'-0"	A1A = **	0.13	26'-0"	A1A = **	0.13	31'-0"
A1B = **	NOT REQ'D	16'-0"	A1B = **	NOT REQ'D	18'-0"	A1B = **	NOT REQ'D	23'-0"
A2 = 0.36	0.13	12'-6"	A2 = 0.36	0.13	13'-2"	A2 = 0.48	0.13	14'-4"
A3A = **	0.13	17'-6"	A3A = **	0.13	19'-8"	A3A = **	0.13	21'-9"
A3B = **	NOT REQ'D	13'-6"	A3B = **	NOT REQ'D	15'-8"	A3B = **	NOT REQ'D	17'-9"
A4 = 0.36	0.13	14'-3"	A4 = 0.36	0.13	16'-0"	A4 = 0.48	0.13	20'-0"
A5 = 0.24	0.13	7'-10"	A5 = 0.24	0.13	7'-10"	A5 = 0.24	0.13	7'-10"

PRECAST THREE-SIDED BOX CULVERT REINFORCEMENT

STATE OF WISCONSIN
 DEPARTMENT OF TRANSPORTATION
 STRUCTURES DEVELOPMENT SECTION

APPROVED: *Scot Becker*

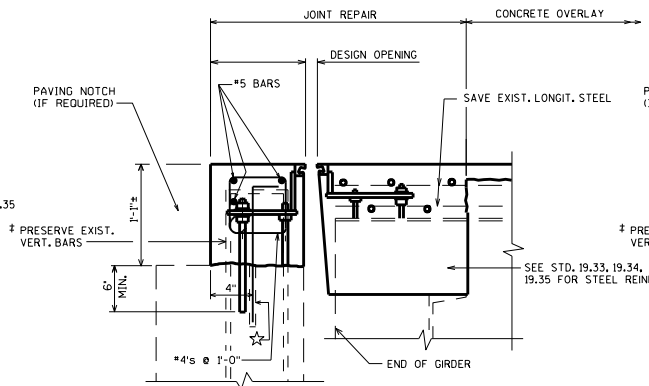
DATE: 1-11



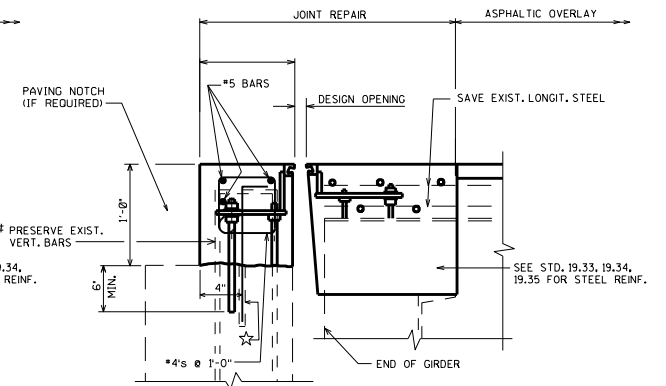
**SECTION THRU JOINT
STEEL GIRDER WITHOUT END DIAPHRAGM**

‡ EXISTING BARS ARE LIKELY TO BE CORRODED AND/OR DAMAGED DURING CONCRETE REMOVAL. PRESERVE AND INCORPORATE AS MUCH REBAR AS PRACTICAL. SUPPLEMENT WITH THE BARS INDICATED BY ☆.

☆ MASONRY ANCHORS TYPE L NO. 5 BARS HAVING A MINIMUM PULLOUT CAPACITY OF 19 KIPS. EMBED 1'-3" INTO EXISTING CONCRETE. EPOXY ANCHORED. SPACE AT 1'-0". TURN 10" LEG AS NECESSARY TO FIT.



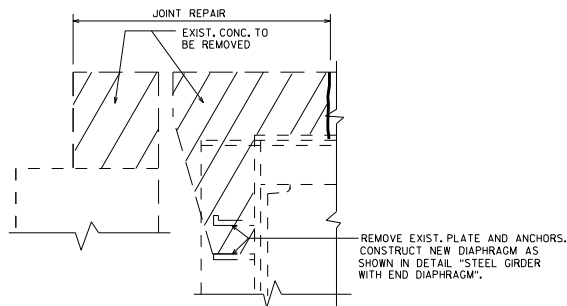
**SECTION THRU PROPOSED JOINT
STEEL GIRDER WITH END DIAPHRAGM
CONCRETE OVERLAY**



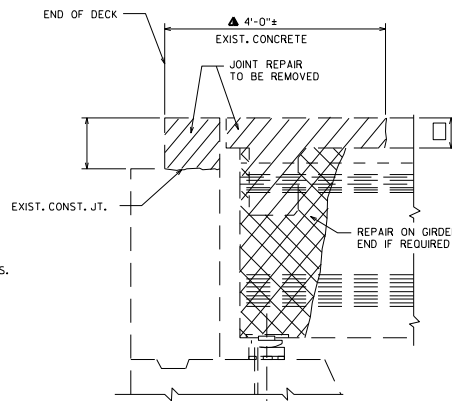
**SECTION THRU PROPOSED JOINT
STEEL GIRDER WITH END DIAPHRAGM
ASPHALTIC OVERLAY**

TOTAL ESTIMATED QUANTITIES

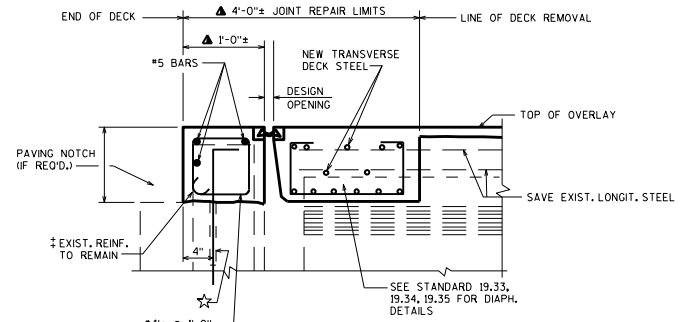
BID ITEMS	UNIT
JOINT REPAIR	SY
EXPANSION DEVICE B-1	1LS
BAR STEEL REINFORCEMENT HS COATED BRIDGES	LB



**JOINT REPAIR-REMOVAL
STEEL GIRDER**



**JOINT REPAIR-REMOVAL
SECTION THRU JOINT-PRESTRESSED GIRDER**



▲ DIMENSIONS GIVEN ARE NORMAL TO C. OF SUBSTRUCTURE UNIT. UTILIZE EXISTING REINFORCEMENT

SEE STANDARD 28.01 FOR SUPPORTS USED WITH STRIP SEAL - STEEL EXTRUSIONS.

**STRIP SEALS & DIAPH.
DETAILS FOR OVERLAYS**

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DEVELOPMENT SECTION

APPROVED: Scot Becker

DATE:
1-11