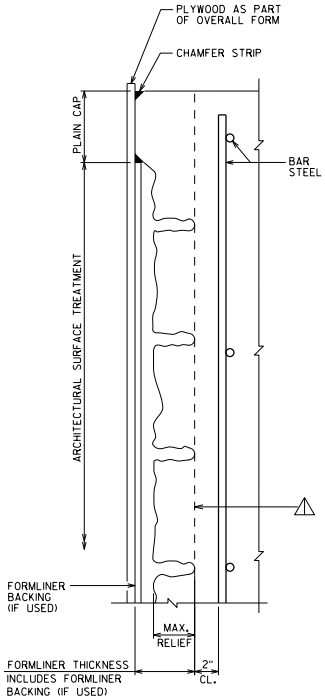
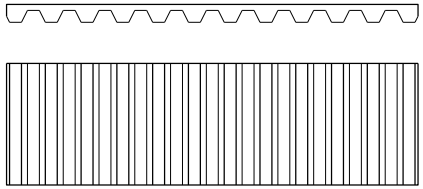


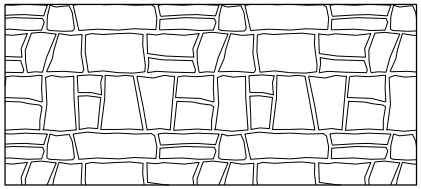
SECTION THRU FORMLINER

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



BROKEN RIB

FORMLINER THICKNESS = 3" ± ½"
WIDTH = 2" ± ½"
MAX. RELIEF = 2" ± ½"

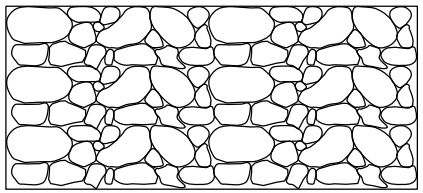


RUSTIC ASHLAR

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

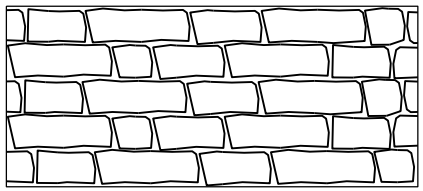
WARNING

FORMLINER SHOWN ON THIS STANDARD IS A NON-PARTICIPATING ITEM (CSS).



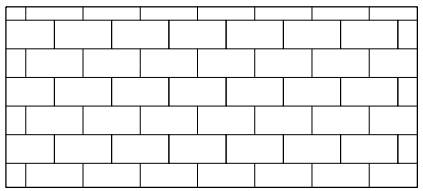
FIELD STONE - RANDOM

FORMLINER THICKNESS = 3½"
SIZES BETWEEN 6" & 24"
MAX. RELIEF = 2½"



RECTANGULAR CUT STONE

FORMLINER THICKNESS = 4" TO 5½"
COURSE HEIGHT = ± 2"
MAX. RELIEF = 3" TO 4½"



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.

WRAPAROUND/MATCH FORMLINER PATTERN AT CORNERS.

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.

WRAPAROUND/MATCH FORMLINER PATTERN AT CORNERS.

PARAPET NOTES

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

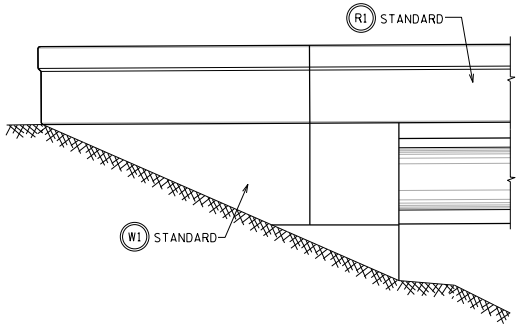
FORMLINER DETAILS

BUREAU OF STRUCTURES

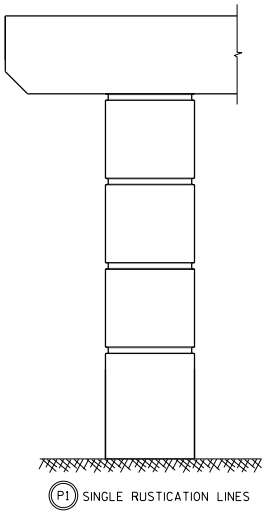
APPROVED: Bill Oliva

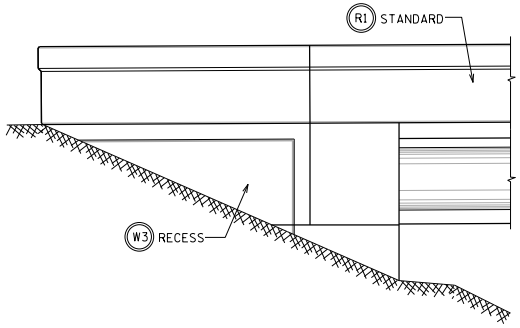
DATE: 7-16

STANDARD 4.01

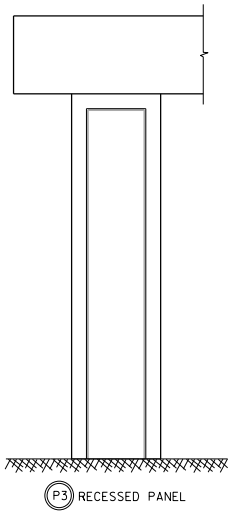


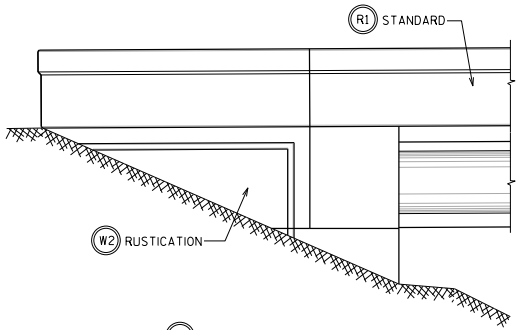
TYPE I



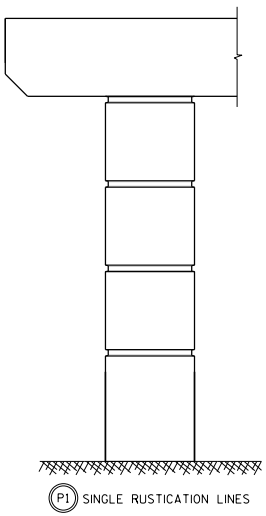


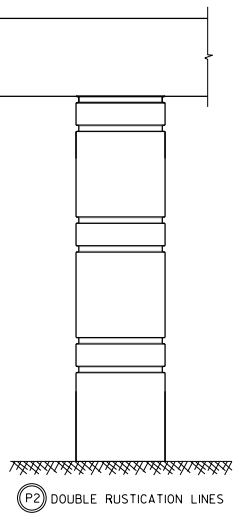
TYPE III





TYPE II





DESIGNER NOTES

THE THREE TYPES SHOWN ARE PREFERRED AESTHETIC CONCEPTS FOR WISDOT PROJECTS. WHEN USED WITHOUT STAINING, COSTS ARE INCIDENTAL TO "CONCRETE MASONRY BRIDGES" AND NOT SUBJECT TO CSS FUNDING.

ONLY THE CHOICE OF PARAPET, WING AND PIER DETAILS SHOWN FOR A GIVEN TYPE SHOULD BE USED FOR THAT TYPE.

WINGS PARALLEL TO CENTERLINE OF ABUTMENT (ELEPHANT EAR) ARE TO BE PLAIN (TYPE I).

SEE STANDARDS 4.04 AND 4.05 FOR ADDITIONAL DETAILS.

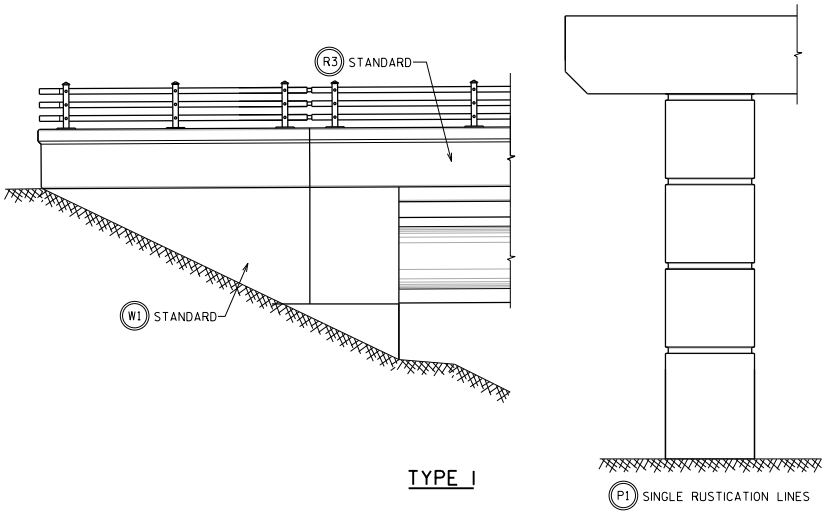
SEE BRIDGE MANUAL SECTION 4.9 FOR LOCATION OF USE AND RENDERINGS.

AESTHETIC CONCEPTS WITHOUT PEDESTRIAN ACCOMMODATIONS

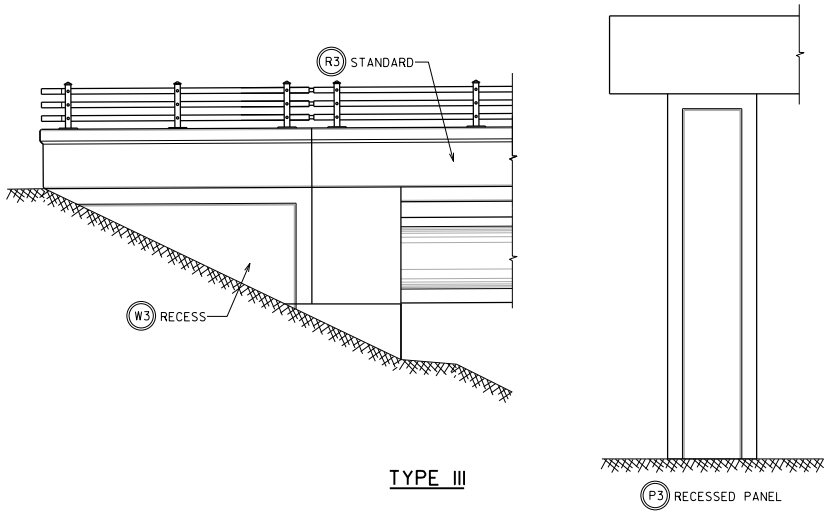
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

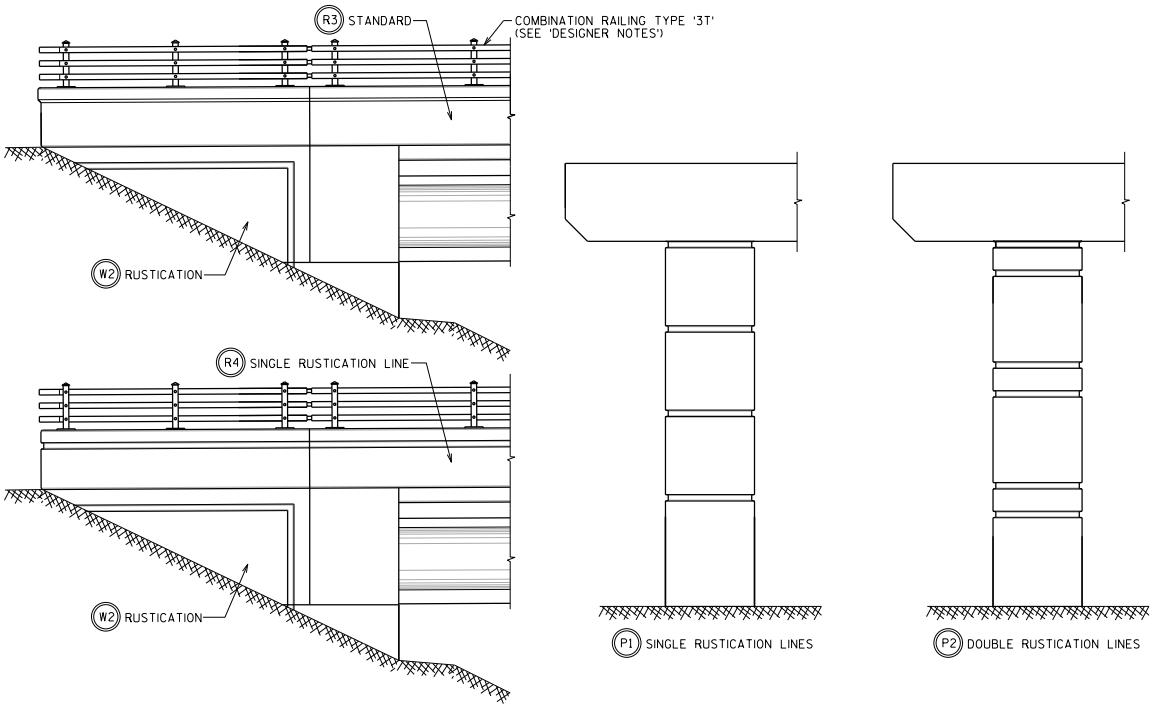
DATE: 7-15



TYPE I



TYPE III



TYPE II

DESIGNER NOTES

THE THREE TYPES SHOWN ARE PREFERRED AESTHETIC CONCEPTS FOR WISDOT PROJECTS. WHEN USED WITHOUT STAINING, COSTS ARE INCIDENTAL TO "CONCRETE MASONRY BRIDGES" AND NOT SUBJECT TO CSS FUNDING.

ONLY THE CHOICE OF PARAPET, WING AND PIER DETAILS SHOWN FOR A GIVEN TYPE SHOULD BE USED FOR THAT TYPE.

WINGS PARALLEL TO CENTERLINE OF ABUTMENT (ELEPHANT EAR) ARE TO BE PLAIN (TYPE I).

IN LIEU OF THE 'COMBINATION RAILING TYPE '3T" SHOWN, CHAIN LINK FENCING MAY BE USED. SEE STANDARD 4.04 FOR DETAILS.

SEE STANDARDS 4.04 AND 4.05 FOR ADDITIONAL DETAILS.

SEE BRIDGE MANUAL SECTION 4.9 FOR LOCATION OF USE AND RENDERINGS.

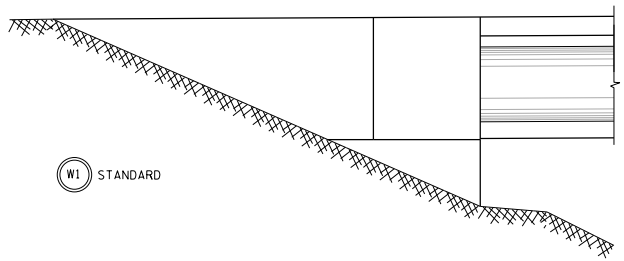
AESTHETIC CONCEPTS WITH PEDESTRIAN ACCOMMODATIONS

BUREAU OF STRUCTURES

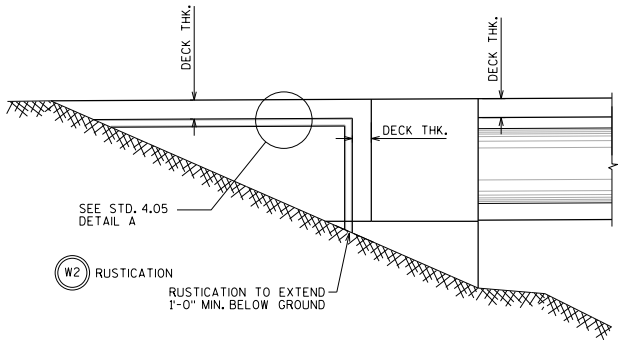
APPROVED: Bill Oliva

DATE: 7-15

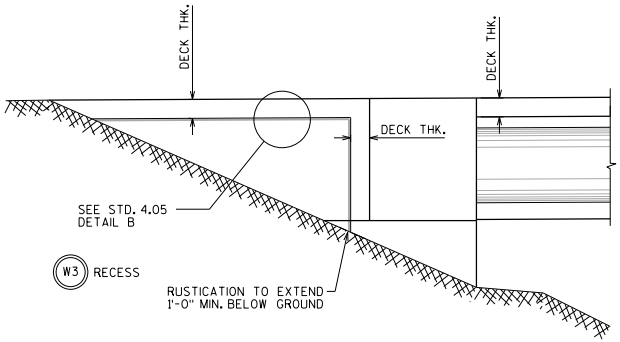
STANDARD 4.03



W1 STANDARD

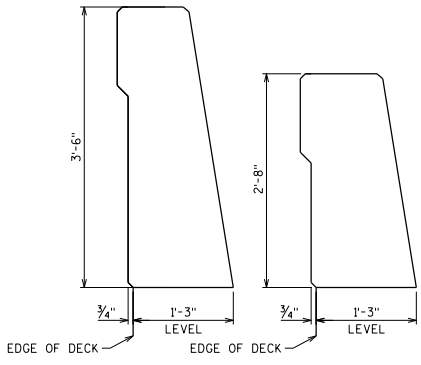


W2 RUSTICATION



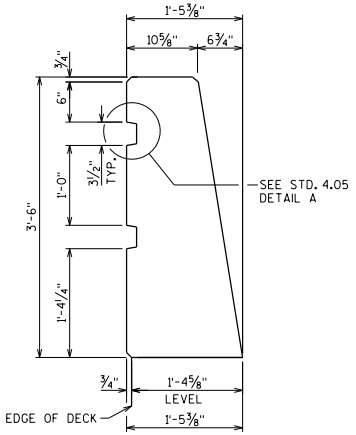
W3 RECESS

WING OPTIONS

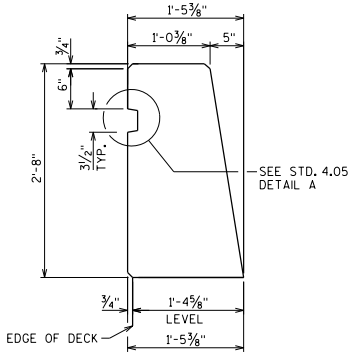


R1 STANDARD

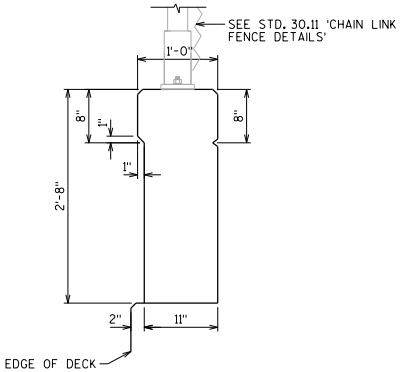
SEE STD. 30.32 'SINGLE SLOPE PARAPET 42SS' OR STD. 30.30 'SINGLE SLOPE PARAPET 32SS' FOR DETAILS



R2 DOUBLE RUSTICATION LINES
MODIFIED 'SINGLE SLOPE PARAPET 42SS'
(AREA = 4.01 SF, WEIGHT = 602 LB/FT.)

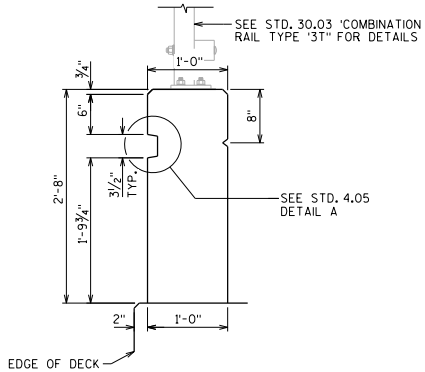


R2 SINGLE RUSTICATION LINES
MODIFIED 'SINGLE SLOPE PARAPET 32SS'
(AREA = 3.25 SF, WEIGHT = 488 LB/FT.)



R3 STANDARD

SEE STD. 30.07 'VERTICAL FACE PARAPET 'A' FOR DETAILS



R4 SINGLE RUSTICATION LINES

MODIFIED 'VERTICAL FACE PARAPET 'A'
(AREA = 2.63 SF, WEIGHT = 395 LB/FT.)

SEE STD. 30.07 'VERTICAL FACE PARAPET 'A' FOR DETAILS

PARAPET OPTIONS

DESIGNER NOTES

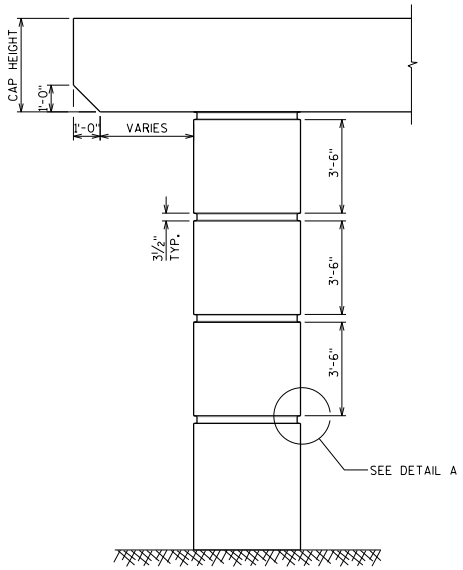
WINGS PARALLEL TO CENTERLINE OF ABUTMENT (ELEPHANT EAR)ARE TO BE PLAIN (TYPE I).

WING & PARAPET AESTHETIC DETAILS

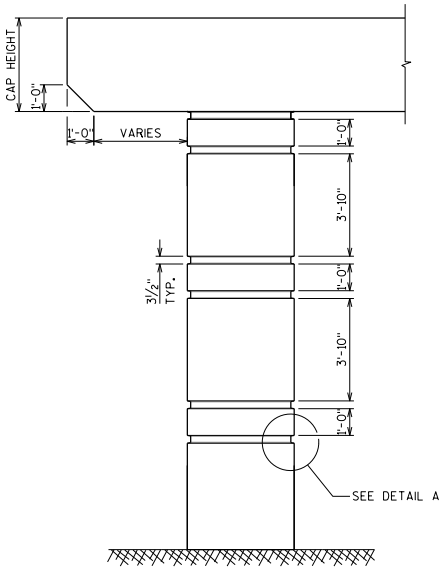
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

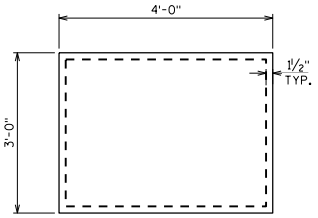
DATE: 1-19



P1 SINGLE RUSTICATION LINES

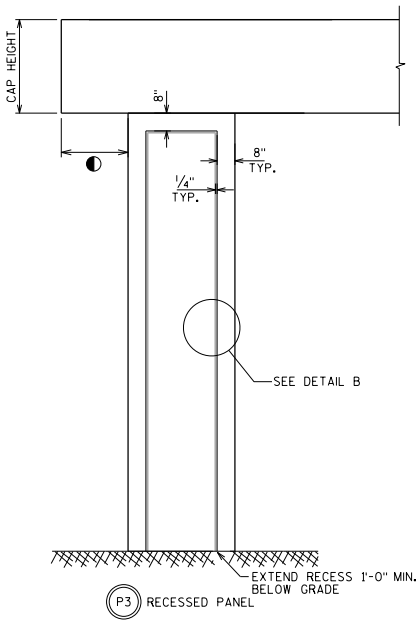


P2 DOUBLE RUSTICATION LINES



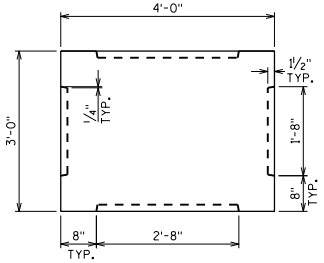
SECTION THRU COLUMN

SINGLE RUSTICATION LINES AND DOUBLE RUSTICATION LINES



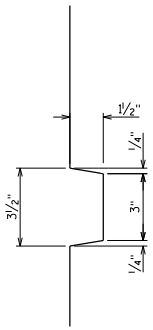
P3 RECESSED PANEL

◐ DIM. = APPROXIMATELY ¾ CAP HEIGHT

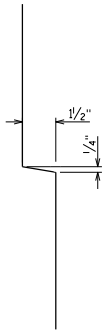


SECTION THRU COLUMN

RECESSED PANEL



DETAIL A



DETAIL B

MULTI-COLUMNED PIER AESTHETIC DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-15

STANDARD 4.05

NOTES

DRAWINGS SHALL NOT BE SCALED.

ALL GRS ABUTMENT STATIONING AND OFFSETS ARE GIVEN AT THE FRONT FACE OF THE 'ALIGNMENT KEYBLOCK', SEE SECTIONS A-A AND B-B ON STANDARD 7.02 FOR LOCATION OF THE 'ALIGNMENT KEYBLOCK'.

FACTORED BEARING RESISTANCE OF XX PSF AT BOTTOM OF REINFORCED SOIL FOUNDATION.

◐ MAXIMUM ALLOWABLE WALL BATTER IS 8 VERTICAL TO 1 HORIZONTAL OR 7.1 DEGREES.

PROTECT MODULAR BLOCK DURING PLACEMENT OF HEAVY RIPRAP.

SEE SECTIONS A-A AND B-B AND 'GRS ABUTMENT INFORMATION' TABLE ON STANDARD 7.02 FOR REQUIRED LENGTHS OF GEOTEXTILE REINFORCEMENT.

◪ PROVIDE CORNER BLOCKS AND/OR DETAILS COMPATIBLE WITH THE SELECTED MODULAR BLOCK SYSTEM. ROUNDED CORNERS ARE ALLOWABLE.

TEMPORARY FALSEWORK NOT TO BE SUPPORTED ON THE GRS ABUTMENT UNLESS APPROVED BY THE BUREAU OF STRUCTURES DEVELOPMENT SECTION.

DESIGNER NOTES

THE USE OF GRS ABUTMENTS IS SUBJECT TO PRIOR APPROVAL BY THE BUREAU OF STRUCTURES.

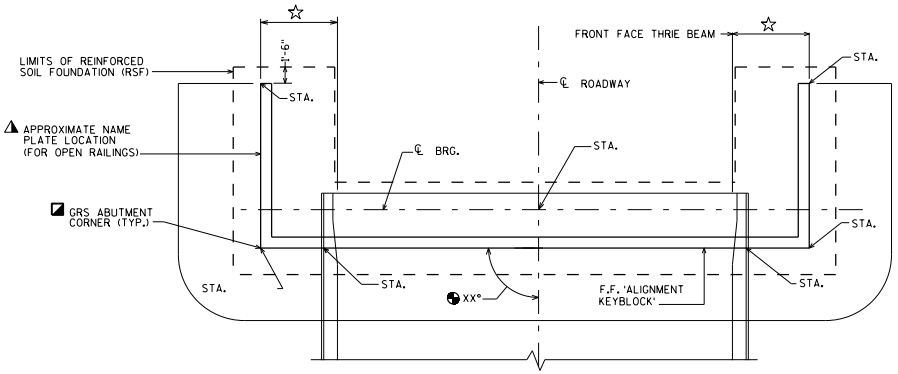
☆ PROVIDE AN ADEQUATE WORKING WIDTH FOR GUARDRAIL DEFLECTION PER FDM REQUIREMENTS. MINIMUM WIDTH SHALL BE 6'-6" FROM FRONT FACE OF THRIE BEAM TO FRONT FACE OF WALL.

◔ MAXIMUM SKEW ANGLE IS 15°.

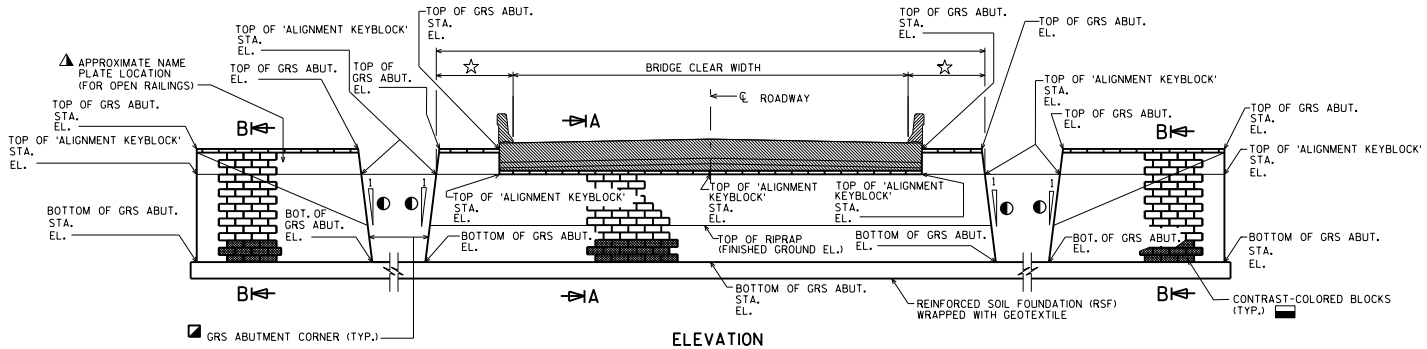
▬ THE TOP OF THE CONTRAST-COLORED BLOCKS SHALL BE 2-3 BLOCK COURSES BELOW THE TOP OF RIPRAP ELEVATION.

⚠ NAME PLATE TO BE LOCATED ON THE OUTSIDE OF THE FIRST RIGHT GRS ABUTMENT WHEN TRAVELING UPSTATION (FOR OPEN RAILINGS).

THE MINIMUM REQUIRED TENSILE STRENGTH OF THE GEOSYNTHETIC REINFORCEMENT SHALL BE SHOWN WITHIN THE SPECIAL PROVISION, 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'.



PLAN



ELEVATION
(SHOWING FRONT FACE OF GRS ABUTMENT)

SECTIONS A-A AND B-B ARE SHOWN ON STANDARD 7.02

TABLE OF GRS ABUTMENT STATIONS AND ELEVATIONS

GRS ABUT. STA.	ROADWAY ALIGN. STA.	ROADWAY STATION OFFSET (FT)	OFFSET DIR.	GRS ABUT. HT. (FT)	BOT. GRS ABUT. EL.	FINISHED GROUND EL.	TOP GRS ABUT. EL.

NOTE: STATIONS AND OFFSETS GIVEN AT FRONT FACE OF 'ALIGNMENT KEYBLOCK' AND AT ELEVATION XX.XX. THESE STATIONS AND OFFSETS SHALL BE HELD REGARDLESS OF ACTUAL MODULAR BLOCK SIZE OR GRS ABUTMENT BATTER.

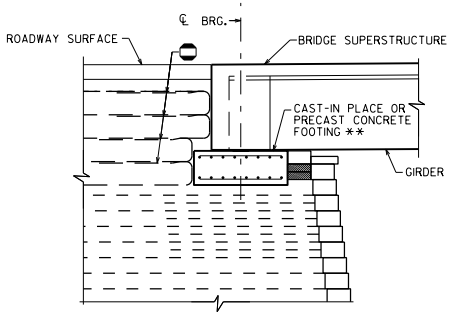
GRS ABUTMENT GENERAL PLAN

BUREAU OF STRUCTURES

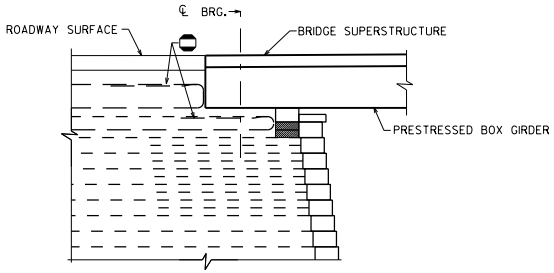
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 7.01



SECTION THRU ABUTMENT FOR GIRDERS



SECTION THRU ABUTMENT FOR PRESTRESSED BOX GIRDERS

NOTES

FRONT FACE OF 'ALIGNMENT KEYBLOCK' LOCATION TO BE HELD REGARDLESS OF ACTUAL MODULAR BLOCK SIZE OR GRS ABUTMENT BATTER.

4'-0" WRAP (TYP.)

INDICATES GEOSYNTHETIC REINFORCEMENT LAYER NUMBER. FOR LENGTHS, SEE 'GRS ABUTMENT INFORMATION' TABLE. SPACING OF GEOSYNTHETIC REINFORCEMENT LAYERS TO BE DESIGNED.

FULL HEIGHT BLOCK IS TYPICAL IN FRONT OF BEARING SEAT BUT A HALF HEIGHT BLOCK AND A SPECIAL EXPANDED POLYSTYRENE THICKNESS MAY BE REQUIRED IN SOME APPLICATIONS.

LIMITS OF GRS BACKFILL TO BE PAID FOR UNDER THE BID ITEM 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'

DESIGNER NOTES

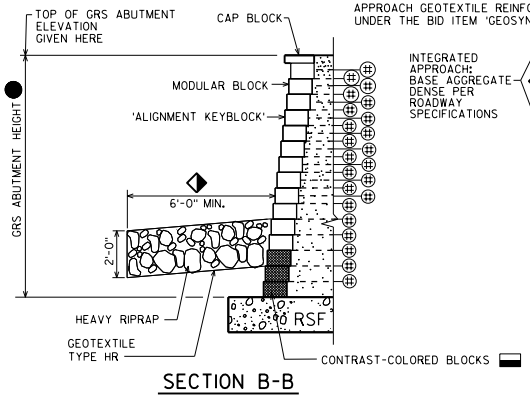
THE TOP OF THE CONTRAST-COLORED BLOCKS SHALL BE 2-3 BLOCK COURSES BELOW THE TOP OF RIPRAP ELEVATION.

DIMENSION TO BE DESIGNED

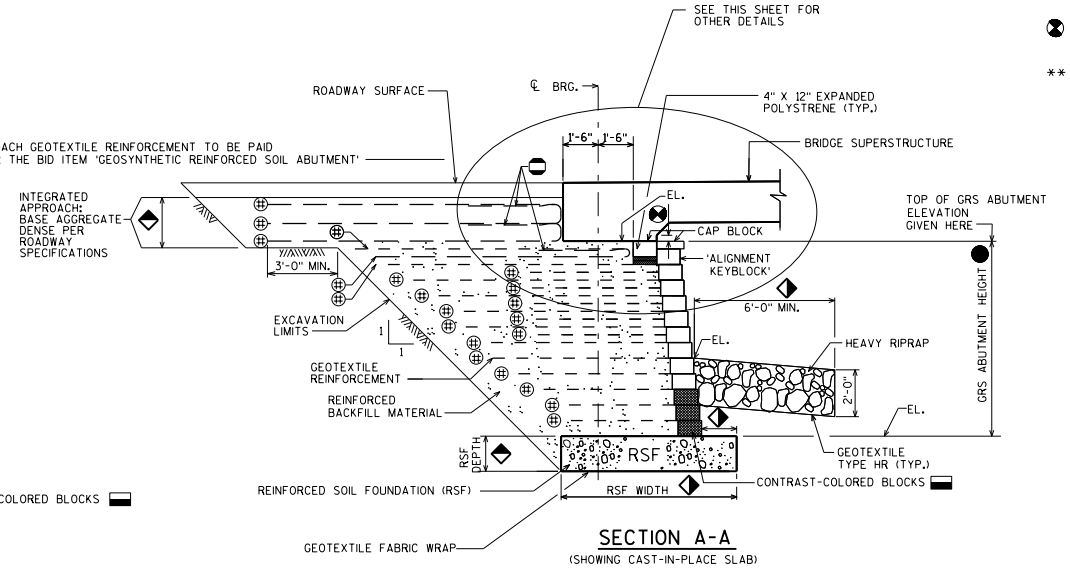
THE MINIMUM REQUIRED TENSILE STRENGTH OF THE GEOSYNTHETIC REINFORCEMENT SHALL BE SHOWN WITHIN THE SPECIAL PROVISION, 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'.

MINIMUM CLEAR SPACE SHALL BE 3" OR 2% OF GRS ABUTMENT HEIGHT, WHICHEVER IS GREATER. MINIMUM CLEAR SPACE SHALL BE SHOWN ON THE PLANS.

** CONCRETE SPREAD FOOTING TO BE DETERMINED PER DESIGN.



SECTION B-B



SECTION A-A
(SHOWING CAST-IN-PLACE SLAB)

SECTIONS A-A AND B-B ARE DETAILED ON STANDARD 7.01

GRS ABUTMENT INFORMATION

LAYER NUMBER	MINIMUM LENGTH* OF GEOTEXTILE (FT.)	EL. ±

*LENGTH MEASURED FROM FRONT FACE OF MODULAR BLOCK TO END OF GEOTEXTILE, (DOES NOT INCLUDE WRAPPED GEOTEXTILE WHERE APPLICABLE).

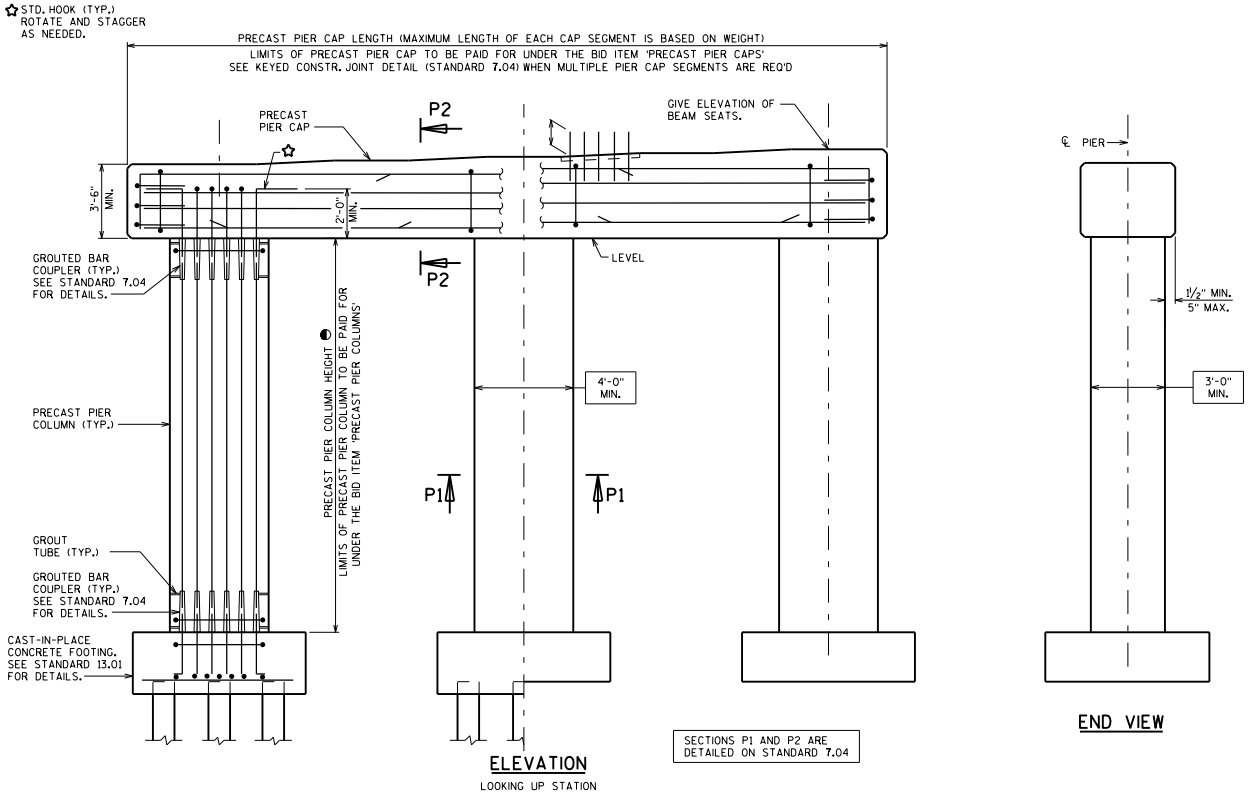
GRS ABUTMENT DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 7.02



NOTES

PROVIDE A SUITABLE LIFTING DEVICE FOR THE PRECAST CAP AND COLUMN UNIT(S).

CAST-IN-PLACE ALTERNATIVE IS NOT ALLOWED.

STIRRUPS AT THE GROUTED COUPLERS ARE SIZED BASED ON A XX" OUTER DIAMETER COUPLER SLEEVE. ADJUST STIRRUP DIMENSIONS AS REQUIRED IF THE ACTUAL COUPLER SLEEVE DIAMETER DIFFERS.

◓ MANUFACTURER TO DETERMINE THE PRECAST PIER COLUMN LENGTHS ASSUMING ½" STEEL SHIMS AT THE TOP AND BOTTOM OF THE COLUMN.

BID ITEM "PRECAST PIER COLUMNS" PAID PER PLAN VALUE AS BOTTOM OF PIER CAP ELEVATION MINUS TOP OF FOOTING ELEVATION.

DESIGNER NOTES

PIERS SHALL BE SUPPORTED BY A MINIMUM OF 3 COLUMNS. WHEN MULTIPLE PIER CAPS ARE USED EACH SEGMENT SHALL BE SUPPORT BY A MINIMUM OF 2 COLUMNS.

THE FOLLOWING SPECIAL PROVISIONS SHALL BE USED:
- GROUTED BAR COUPLERS (505.1000.S)
- PRECAST PIER COLUMNS (SPV.0090.XXX)
- PRECAST PIER CAPS (SPV.0090.XXX)

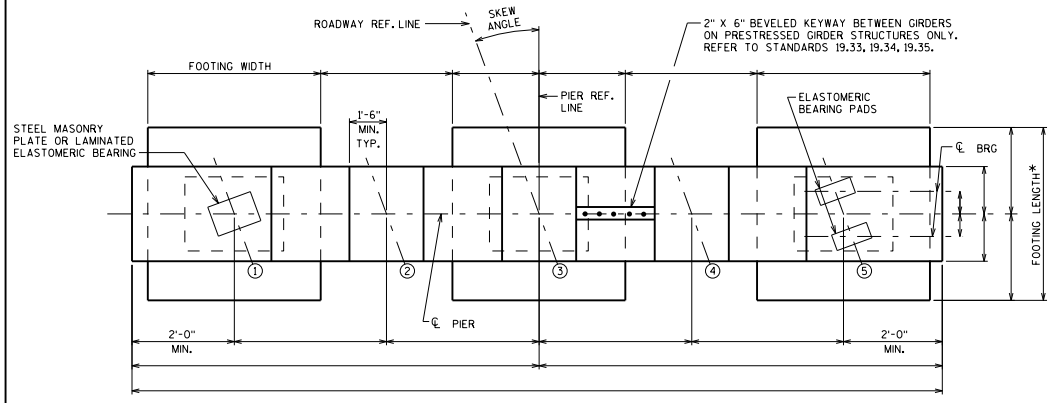
THE MAXIMUM WEIGHT OF EACH PRECAST ELEMENT SHALL BE 90 KIP.

GROUTED COUPLER SLEEVES MAY BE OVERSIZED TO ALLOW FOR ADDITIONAL LATERAL TOLERANCE IN THE FIELD. STANDARD WISDOT PRACTICE IS TO OVERSIZE COUPLER SLEEVES BY 1 BAR SIZE. ADJUST SHEAR STIRRUPS AS NECESSARY TO ACCOUNT FOR LARGER DIAMETER COUPLER SLEEVES.

VERIFY SEVERAL MANUFACTURER'S COUPLER SLEEVE DIMENSIONS PRIOR TO DESIGN. ASSUME THE MAXIMUM DIAMETER OF COUPLER SLEEVE FOR COLUMN REINFORCEMENT DESIGN.

SEE STANDARDS 13.01 AND 13.07 FOR ADDITIONAL PIER NOTES AND DETAILS.

DETAILS AS SHOWN ON THIS STANDARD ARE INTENDED FOR REQUIRED PRECAST PIERS DESIGNED TO MEET PROJECT SPECIFIC REQUIREMENTS. SEE 7.1.4.1.2 IN THE BRIDGE MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE.



PLAN

*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER

MATERIAL PROPERTIES:

CONCRETE MASONRY	f'c = 3,500 P.S.I.
BAR REINFORCEMENT, GRADE 60	fy = 60,000 P.S.I.

PRECAST PIER CAP AND COLUMNS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

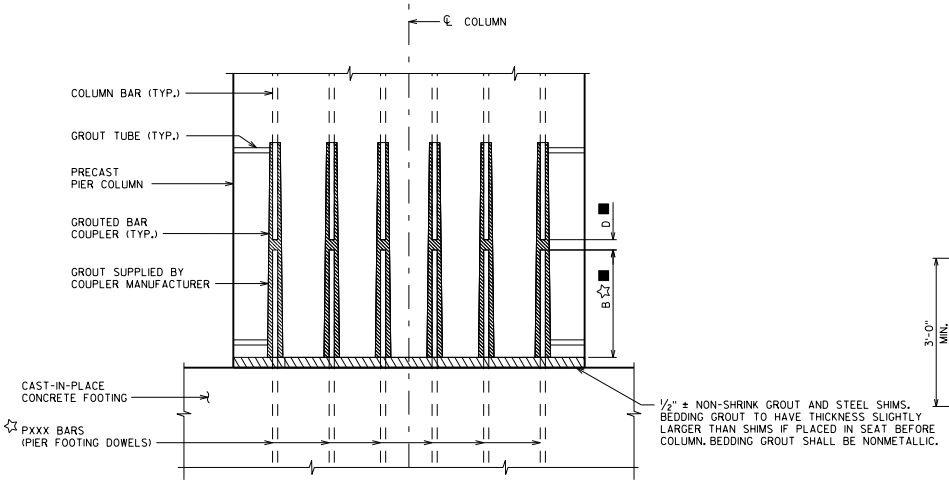
STANDARD 7.03

BILL OF BARS

TOTAL COATED: XX LBS

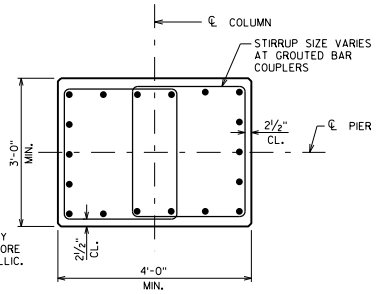
BAR MARK	NO. REQ'D.	LENGTH	COAT	BENT	LOCATION

NOTE: THIS BILL OF BARS IS SHOWN FOR INFORMATION ONLY. PAYMENT FOR REINFORCEMENT IN PRECAST COLUMNS AND PRECAST CAP IS INLCUDED IN THE BID ITEMS 'PRECAST PIER COLUMNS' AND 'PRECAST PIER CAPS'.



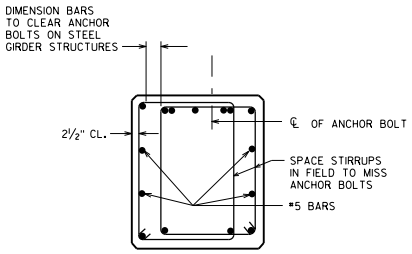
GROUTED BAR COUPLER DETAILS

(PIER COLUMN/FOOTING CONNECTION SHOWN. PIER CAP/COLUMN CONNECTION SIMILAR)



SECTION P1

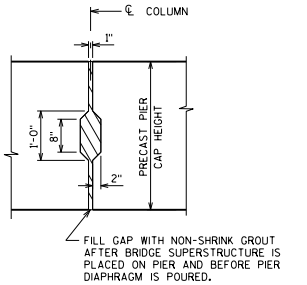
(PRECAST PIER COLUMN REINF. TO BE DESIGNED BY DESIGN ENGINEER)



SECTION P2

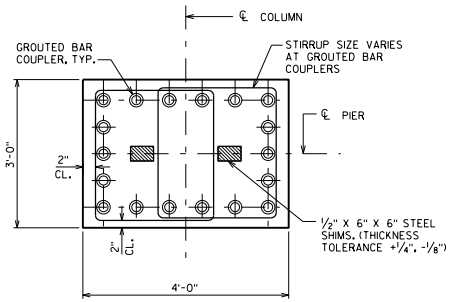
(PRECAST PIER CAP REINF. TO BE DESIGNED BY DESIGN ENGINEER)

SECTIONS P1 AND P2 ARE CUT ON STANDARD 7.03



KEYED CONSTR. JOINT ELEVATION DETAIL

(FOR PRECAST PIER CAPS WITH MULTIPLE SEGMENTS)



GROUTED COUPLER PLAN AT TOP AND BOTTOM OF COLUMN

GROUTED SPLICE COUPLER CONNECTION SEQUENCE

FOLLOW THE WRITTEN INSTALLATION PROCEDURES OF THE COUPLER MANUFACTURER. THE FOLLOWING ARE GENERAL PROCEDURES THAT APPLY TO MOST COUPLER MANUFACTURERS:

1. IT IS RECOMMENDED THAT THE ELEMENT WITH THE REINFORCEMENT BARS EXTENDING OUT BE FABRICATED WITH EXTRA BAR LENGTHS.
2. SURVEY LOCATION AND ELEVATION OF LOWER ELEMENT.
3. DETERMINE THE REQUIRED REINFORCING BAR EXTENSION LENGTHS AND THE REQUIRED SHIM HEIGHTS BASED ON THE SURVEY.
4. CUT THE BAR EXTENSIONS TO THE REQUIRED LENGTH BASED ON THE SURVEY AND THE COUPLER MANUFACTURER'S RECOMMENDATIONS. FOR COATED BARS, THE ENDS OF THE BARS SHALL BE RE-COATED.
5. PLACE BEDDING GROUT ON TOP OF LOWER ELEMENT. THE USE OF EXTRA GROUT THAT IS ALLOWED TO FLOW OUT DURING ELEMENT PLACEMENT IS RECOMMENDED. IN LIEU OF PRE-PLACEMENT OF BEDDING GROUT, THE BEDDING GROUT CAN BE FLOWED INTO PLACE AFTER ELEMENT ERECTION BUT PRIOR TO GROUTING OF COUPLERS.
6. ERECT UPPER ELEMENT TO WITHIN THE SPECIFIED ERECTION TOLERANCES INDICATED IN THE SPECIAL PROVISIONS. PREVENT BEDDING GROUT FROM FLOWING INTO COUPLER.
7. MAINTAIN INTEGRITY OF GROUT BED DURING SETTING OPERATION. REPAIR GROUT THAT IS DISPLACED OR GAPS THAT DEVELOP IN THE GROUT JOINT USING HAND TOOLS.
8. BRACE THE UPPER ELEMENT.
9. INSTALL GROUT IN COUPLERS FOLLOWING THE MANUFACTURER'S WRITTEN PROCEDURES. IF THE COUPLER IS BELOW THE JOINT, COUPLER GROUT CAN BE INSTALLED PRIOR TO APPLICATION OF BEDDING GROUT.
10. ERECTION OF SUBSEQUENT ELEMENTS ABOVE A CONNECTION SHALL NOT COMMENCE UNTIL THE CONNECTION HAS ACHIEVED ADEQUATE STRENGTH AS DETERMINED THROUGH STRENGTH TESTING OF THE GROUT. THE TIMING OF SUBSEQUENT CONSTRUCTION STEPS SHOULD BE SPECIFIED IN BRIDGE ASSEMBLY PLAN.

GROUTED COUPLER NOTES

USE MATCHING TEMPLATES FOR THE LOCATION OF REINFORCEMENT AND GROUTED COUPLER PLACEMENT WITHIN THE ELEMENTS TO CONTROL CRITICAL DIMENSIONS AND ORIENTATION IN ALL DIRECTIONS.

■ CONSULT MANUFACTURER OF THE GROUTED COUPLER FOR PROPER DIMENSIONS "B" AND "D" AND FOR TOLERANCE OF THESE DIMENSIONS. FIELD CUT FOOTING AND CAP DOWELS AS REQUIRED.

BEFORE EXECUTING GROUTED COUPLER ASSEMBLIES, ALWAYS SEEK INSTALLATION RECOMMENDATIONS FROM THE MANUFACTURER OF THE GROUTED COUPLER USED.

CONTRACTOR TO PROVIDE ADEQUATE BRACING OF COLUMNS UNTIL GROUTED COUPLER CONNECTIONS HAVE ACHIEVED ADEQUATE STRENGTH.

ALL GROUTED COUPLERS SHALL BE EPOXY COATED.

ADJUST SHIM STACK HEIGHT TO CONTROL ERECTION ELEVATIONS.

☆ SUPPLY REINFORCING BARS ACCORDING TO GROUTED COUPLER REQUIREMENTS FOR EMBEDMENT. BARS MAY BE FIELD CUT IF NEEDED.

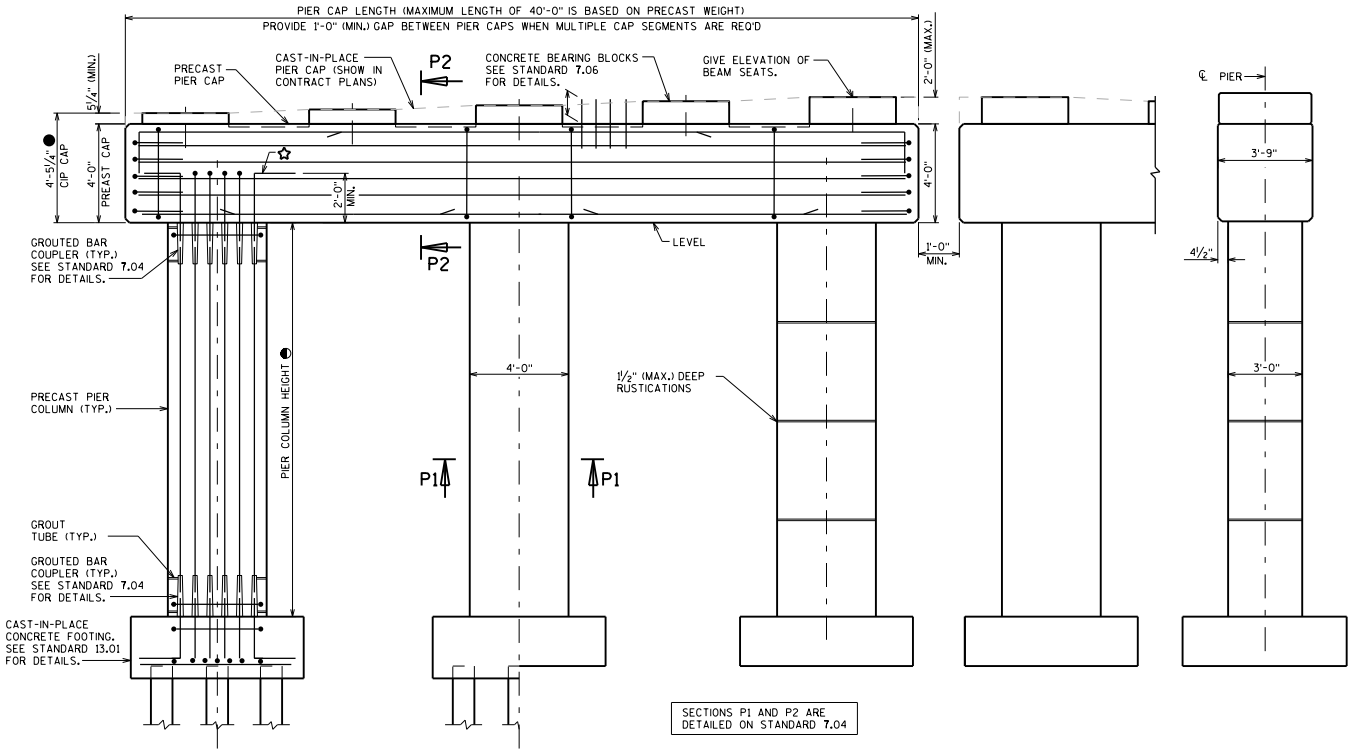
PRECASTER SHALL PROVIDE PORTS IN THE PRECAST ELEMENTS TO ALLOW THE COUPLERS TO BE GROUTED AFTER THE PRECAST ELEMENTS HAVE BEEN ERECTED.

PRECAST PIER CAP AND COLUMN DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-14



CONTRACTOR NOTES

THE CONTRACTOR SHALL FOLLOW THIS STANDARD WHEN PRECAST PIERS ARE USED IN LIEU OF THE CAST-IN-PLACE PIER. THE USE OF OPTIONAL PRECAST PIER DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE OR WITH APPROVAL BY THE BUREAU OF STRUCTURES.

PROVIDE A SUITABLE LIFTING DEVICE FOR THE PRECAST CAP, COLUMN AND BEARING BLOCK UNIT(S).

STIRRUPS AT THE GROUTED COUPLERS ARE SIZED BASED ON A XX" OUTER DIAMETER COUPLER SLEEVE. ADJUST STIRRUP DIMENSIONS AS REQUIRED IF THE ACTUAL COUPLER SLEEVE DIAMETER DIFFERS.

◓ MANUFACTURER TO DETERMINE THE PRECAST PIER COLUMN LENGTHS ASSUMING ½" STEEL SHIMS AT THE TOP AND BOTTOM OF THE COLUMN.

GROUTED COUPLER SLEEVES MAY BE OVERSIZED TO ALLOW FOR ADDITIONAL LATERAL TOLERANCE IN THE FIELD. STANDARD WISDOT PRACTICE IS TO OVERSIZE COUPLER SLEEVES BY 1 BAR SIZE. ADJUST SHEAR STIRRUPS AS NECESSARY TO ACCOUNT FOR LARGER DIAMETER COUPLER SLEEVES.

ALL PRECAST ELEMENTS AND DIAPHRAGM ITEMS PAID PER C.I.P BID ITEMS. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR THE PRECAST PIER OPTION.

THE FOLLOWING SPECIAL PROVISIONS SHALL BE USED:

GROUTED BAR COUPLERS (505.1000.S)
PRECAST PIER COLUMNS (SPV.0090.XXX)
PRECAST PIER CAPS (SPV.0090.XXX)

THE FOLLOWING ADDITIONAL STANDARDS SHALL BE USED:

STANDARD 7.04 - PRECAST PIER CAP AND COLUMN DETAILS
STANDARD 7.06 - PRECAST BEARING BLOCKS DETAILS

THE CONTRACTOR MAY USE PRECAST SEGMENTS AT THEIR DISCRETION (E.G. PRECAST CAP ONLY) WITH APPROVAL BY THE BUREAU OF STRUCTURES. SEE STANDARD 7.07 FOR CAST-IN-PLACE BEARING BLOCK DETAILS AND ADDITIONAL NOTES.

DESIGNER NOTES

INCLUDE THE FOLLOWING NOTE ON AT LEAST ONE PIER SHEET FOR EACH PIER:

THE CONTRACTOR MAY FURNISH A PRECAST CONCRETE PIER (INSERT ALLOWABLE PRECAST ELEMENTS) IN LIEU OF THE CAST-IN-PLACE PIER WITH THE ACCEPTANCE OF THE SHOP DRAWINGS BY THE STRUCTURES DESIGN SECTION. THE PRECAST CONCRETE PIER SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 7 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL AND SPECIAL PROVISIONS RELATED TO PRECAST ELEMENTS WITH THE EXCEPTION OF METHOD OF PAYMENT. PAYMENT FOR THE PRECAST PIER SHALL BE BASED ON THE QUANTITIES AND PRICES BID FOR THE ITEMS LISTED IN THE "TOTAL ESTIMATED QUANTITIES" FOR THE CAST-IN-PLACE PIER.

ALLOWABLE PRECAST ELEMENTS INCLUDE COLUMNS, CAPS, AND BEARING BLOCKS THAT HAVE BEEN DETERMINED TO BE INTERCHANGEABLE BETWEEN C.I.P. AND PRECAST OPTIONS. WHEN A PIER CAP HAS BEEN DETERMINED NON-INTERCHANGEABLE "COLUMNS ONLY" MAY BE USED.

PROVIDE CAST-IN-PLACE DETAILS ONLY. PRECAST PIER REFERENCES ARE FOR DESIGNER INFORMATIONAL PURPOSES ONLY AND SHALL NOT BE PLACED ON THE PLANS. PRECAST PIER CONFIGURATION SHALL BE INTERCHANGEABLE BETWEEN C.I.P. AND PRECAST OPTIONS.

ONLY THE PIER CAP LENGTH AND COLUMN LENGTHS SHALL BE MODIFIED. ALL NOTED DIMENSIONS SHALL BE FOLLOWED.

PIERS SHALL BE SUPPORTED BY A MINIMUM OF 3 COLUMNS. WHEN MULTIPLE PIER CAPS ARE USED, EACH SEGMENT SHALL BE SUPPORTED BY A MINIMUM OF 2 COLUMNS.

PROVIDE A CONCRETE DIAPHRAGM BETWEEN PIER CAP SEGMENTS.

MULTIPLE PIER CAP SEGMENTS MAY BE SET AT DIFFERENT ELEVATIONS TO ACCOMMODATE BEARING ELEVATIONS BEYOND CONCRETE BEARING BLOCK LIMITS.

THE MAXIMUM WEIGHT OF EACH PRECAST ELEMENT SHALL BE 90 KIP.

SEE STANDARDS 7.03, 7.04, 7.06, 13.01 AND 13.07 FOR ADDITIONAL PIER NOTES AND DETAILS.

SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

LEGEND

☆ STD. HOOK (TYP.) ROTATE AND STAGGER AS NEEDED.

● DIMENSION IS FROM BOTTOM OF PIER CAP TO LOW BEAM SEAT.

MATERIAL PROPERTIES:

CONCRETE MASONRY	f'c = 3,500 P.S.I.
BAR REINFORCEMENT, GRADE 60	fy = 60,000 P.S.I.

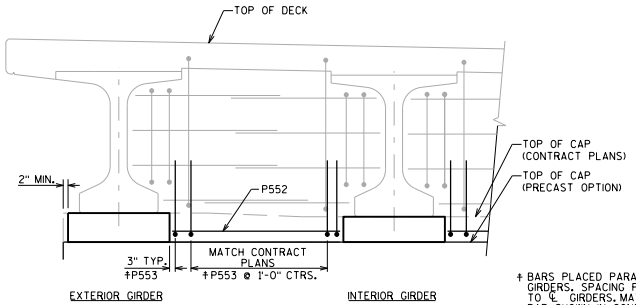
PRECAST PIER (OPTIONAL) CAP AND COLUMNS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

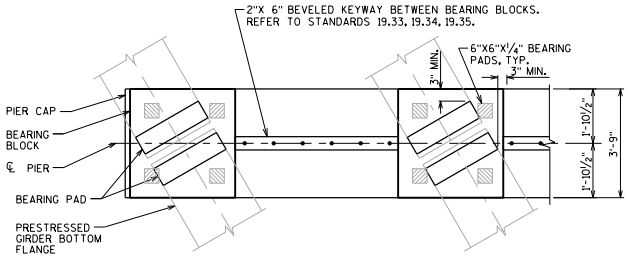
DATE: 1-19

STANDARD 7.05

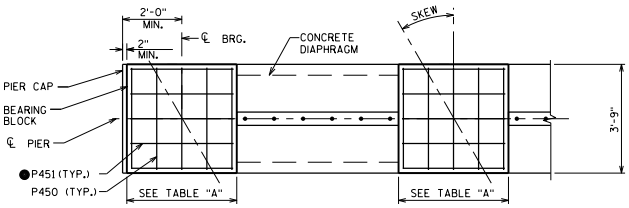


PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER

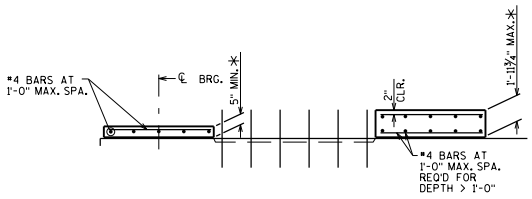
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



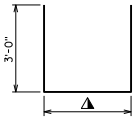
ELEVATION

BILL OF BARS

TOTAL COATED: XX LBS

BAR MARK	NO. REQ'D.	LENGTH	COAT	BENT	LOCATION
P450		3'-5"	X		TOP & BOTT. TRANS.
P451		●	X		TOP & BOTT. LONG.
P552		-'-"	X		PIER DIAPHRAGM - BOTH FACES HORIZ. - BTWN GIRDERS
P553		-'-"	X	X	PIER DIAPHRAGM - VERT. - BTWN GIRDERS

NOTE: THIS BILL OF BARS IS SHOWN FOR INFORMATION ONLY. PRECAST PIER SHOP DRAWINGS SHALL INCLUDE BILL OF BARS FOR DIAPHRAGM REINFORCEMENT. PAYMENT FOR ALL ITEMS ASSOCIATED WITH THE OPTIONAL PRECAST PIERS SHALL BE INCLUDED IN THE CAST-IN-PLACE CONCRETE BID ITEMS.



P553

△ MATCH SIMILAR DIAPHRAGM REIN. AS SHOWN IN CONTRACT PLANS.

TABLE "A"

SKEW ANGLE	BEARING BLOCK WIDTH (MIN.)	LONG. BAR LENGTH ●
0° TO 15°	3'-3"	2'-11"
15° TO 20°	3'-6"	3'-2"
> 20°	3'-9"	3'-5"

DESIGNER NOTE

SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

CONTRACTOR NOTES

THE CONTRACTOR SHALL FOLLOW THIS STANDARD WHEN PRECAST PIERS ARE USED IN LIEU OF THE CAST-IN-PLACE PIER.

THE CONTRACTOR MAY USE CAST-IN-PLACE BEARING BLOCKS IN LIEU OF PRECAST BEARING BLOCK DETAILS. THE CONTRACTOR IS RESPONSIBLE FOR THE ADDITIONAL WEIGHT, WHICH MAY CAUSE PIER CAP SEGMENTS TO BE IN EXCESS OF 90 KIPS.

SEE STANDARD 7.07 FOR CAST-IN-PLACE BEARING BLOCK DETAILS AND ADDITIONAL NOTES.

PRECAST CONCRETE DETAIL NOTES

PRECAST BEARING BLOCK DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE FOR PRECAST PIERS.

✳ PRECAST HEIGHT = VARIES (5" MIN. TO 1'-11¾" MAX.). MANUFACTURER TO DETERMINE THE PRECAST BEARING BLOCK HEIGHT ASSUMING 1/4" GROUT AT THE BOTTOM OF THE BEARING BLOCK.

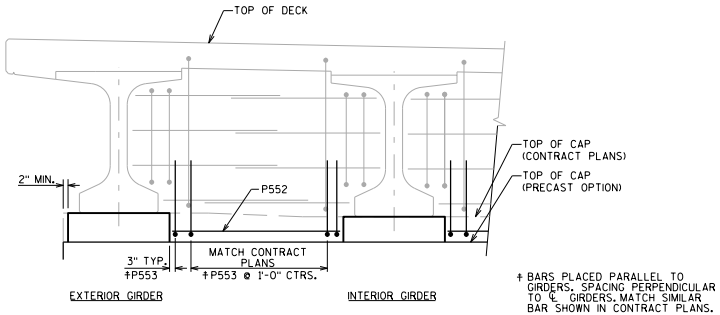
GROUT 1/4" BENEATH PRECAST ELEMENT.

PRECAST BEARING BLOCK DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

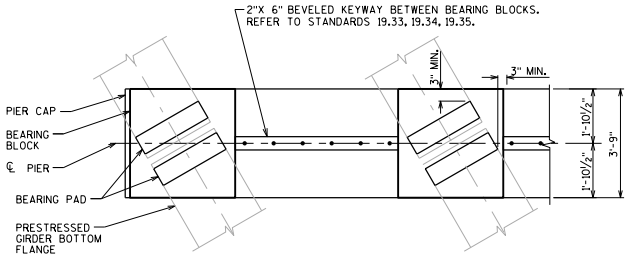
APPROVED: Bill Oliva

DATE: 1-18

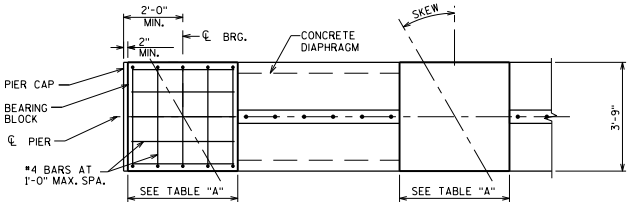


PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER

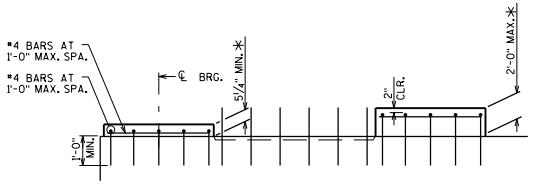
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



ELEVATION

DESIGNER NOTE

SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

CONTRACTOR NOTES

THE CONTRACTOR SHALL FOLLOW THIS STANDARD WHEN PRECAST PIERS ARE USED AND WHEN CAST-IN-PLACE BEARING BLOCKS ARE USED IN LIEU OF PRECAST BEARING BLOCKS.

SEE STANDARD 7.06 FOR ADDITIONAL NOTES AND DETAILS.

CAST-IN-PLACE CONCRETE DETAIL NOTES

CAST-IN-PLACE BEARING BLOCK DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE FOR PRECAST PIERS.

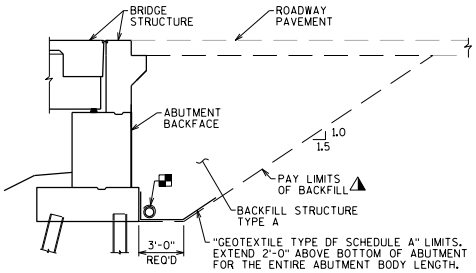
✳ CAST-IN-PLACE HEIGHT = VARIES (5¼" MIN. TO 2'-0" MAX.). CONTRACTOR TO DETERMINE THE CAST-IN-PLACE BEARING BLOCK HEIGHTS.

CAST-IN-PLACE BEARING BLOCK DETAILS

BUREAU OF STRUCTURES

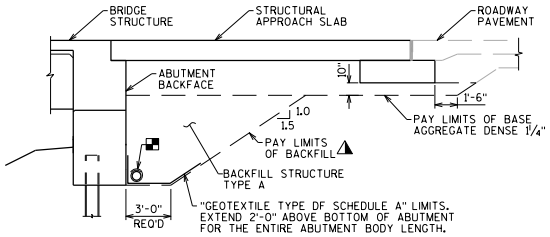
APPROVED: Bill Oliva

DATE: 1-18



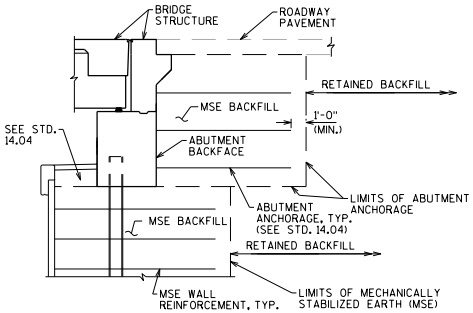
TYPICAL SECTION THRU ABUTMENT

(A3 ABUTMENT WITHOUT STRUCTURAL APPROACH)

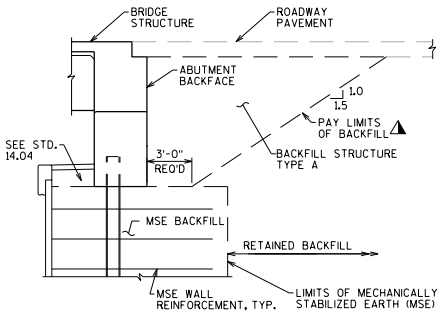


TYPICAL SECTION THRU ABUTMENT

(A1 ABUTMENT WITH STRUCTURAL APPROACH)



TYPICAL SECTION THRU ABUTMENT AT MSE WALL WITH ABUTMENT ANCHORAGE



TYPICAL SECTION THRU ABUTMENT AT MSE WALL

NOTES

THE UPPER LIMITS OF "EXCAVATION FOR STRUCTURES BRIDGES B-_-_" SHALL BE THE EXISTING GROUNDLINE.

THE BACKFILL QUANTITIES ARE BASED ON THE PAY LIMITS SHOWN ON THE PLANS AND MAY NOT REFLECT ACTUAL PLACED QUANTITIES. "BACKFILL STRUCTURE TYPE A" REQUIRED DIRECTLY BEHIND ABUTMENTS AND ABUTMENT WINGS FOR 3 FEET. BACKFILL PLACED BEYOND PAY LIMITS OR EXCEEDING PLAN QUANTITIES SHALL BE INCIDENTAL TO EXCAVATION FOR STRUCTURES.

EXCAVATION BELOW THE ABUTMENT AND ABUTMENT BEDDING MATERIALS REQUIRES ENGINEER APPROVAL. GEOTEXTILE SHALL BE SET AT THE BOTTOM OF EXCAVATION AND EXTEND 2'-0" ABOVE BOTTOM OF ABUTMENT. (NOTE INTENDED FOR PILE SUPPORTED ABUTMENTS. SEE DESIGNER NOTES FOR MORE INFORMATION)

DESIGNER NOTES

⚠ THE DESIGN ENGINEER SHOULD PROVIDE ALL NECESSARY BACKFILL PAY LIMITS AND NOTES IN ORDER TO DETERMINE QUANTITIES. FOR ABUTMENTS, PROVIDE AN ABUTMENT BACKFILL DIAGRAM AS SHOWN ON THIS SHEET. SEE BRIDGE MANUAL SECTIONS 6.4.2 AND 9.10 FOR ADDITIONAL INFORMATION.

SUBSURFACE DRAINAGE DETAILS AND NOTES SHOULD DIRECT DRAINAGE AROUND THE ABUTMENT RATHER THAN BELOW THE ABUTMENT. DRAINAGE UNDER THE ABUTMENT MAY CAUSE SLOPE PAVING DAMAGE OR FAILURE. GEOTEXTILE SHALL EXTEND THE ENTIRE LENGTH OF THE ABUTMENT BODY.

FOR ABUTMENTS WITH MSE BACKFILL BELOW THE REQUIRED "BACKFILL STRUCTURE TYPE A" WIDTH, PIPE UNDERDRAIN AND GEOTEXTILE ARE NOT REQUIRED BEHIND ABUTMENTS. PIPE UNDERDRAIN IS REQUIRED AT THE BOTTOM OF THE MSE WALL.

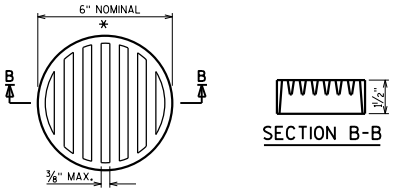
SEE STANDARD 9.02 FOR RETAINING WALL AND BOX CULVERT DETAILS.

SEE STANDARD 9.03 FOR WING FILL SECTIONS AT WING TIPS.

LEGEND

⚠ BACKFILL PAY LIMITS. BACKFILL BEYOND BACKFILL PAY LIMITS SHALL BE INCIDENTAL TO EXCAVATION FOR STRUCTURES. LIMITS OF EXCAVATION SHALL BE DETERMINED BY THE CONTRACTOR.

▪ PIPE UNDERDRAIN WRAPPED (6-INCH). SLOPE 0.5% MIN. TO SUITABLE DRAINAGE. ATTACH RODENT SHIELD AT ENDS OF PIPE UNDERDRAIN. (SHOW DETAIL ON PLANS)

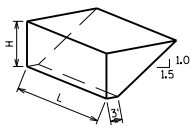


RODENT SHIELD DETAIL

* DIMENSIONS ARE APPROXIMATE. THE GRATE IS SIZED TO FIT INTO A PIPE COUPLING. ORIENT SO SLOTS ARE VERTICAL.

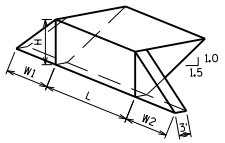
THE RODENT SHIELD, PIPE COUPLING AND SCREWS SHALL BE CONSIDERED INCIDENTAL TO THE BID ITEM "PIPE UNDERDRAIN WRAPPED 6-INCH".

THE RODENT SHIELD SHALL BE A PVC GRATE SIMILAR TO THIS DETAIL. THE GRATE IS COMMERCIALLY AVAILABLE AS A FLOOR STRAINER. A PIPE COUPLING IS REQUIRED FOR THE ATTACHMENT OF THIS SHIELD TO THE EXPOSED END OF THE PIPE UNDERDRAIN. THE SHIELD SHALL BE FASTENED TO THE PIPE COUPLING WITH TWO OR MORE NO. 10 X 1-INCH STAINLESS STEEL SHEET METAL SCREWS.



ABUTMENT BACKFILL DIAGRAM FOR WINGS PARALLEL TO ROADWAY

L = OUT TO OUT OF ABUTMENT, INCLUDING WINGS (FT)
H = AVERAGE ABUTMENT FILL HEIGHT (FT)
EF = EXPANSION FACTOR (1.20 FOR CY BID ITEMS AND 1.00 FOR TON BID ITEMS)
V_{CF} = (L)(3.0')(H) + (L)(0.5)(1.5H)(H)
V_{CY} = V_{CF} (EF)/27
V_{TON} = V_{CY} (2.0)



ABUTMENT BACKFILL DIAGRAM FOR WINGS PARALLEL TO ABUTMENT

L = OUT TO OUT OF ABUTMENT BODY (FT)
H = AVERAGE ABUTMENT FILL HEIGHT (FT)
W1 = WING 1 LENGTH (FT)
W2 = WING 2 LENGTH (FT)
EF = EXPANSION FACTOR (1.20 FOR CY BID ITEMS AND 1.00 FOR TON BID ITEMS)
V_{CF} = (L)(3.0')(H) + (L)(0.5)(1.5H)(H) + (3.0')(0.5)(W1+W2)(H)
V_{CY} = V_{CF} (EF)/27
V_{TON} = V_{CY} (2.0)

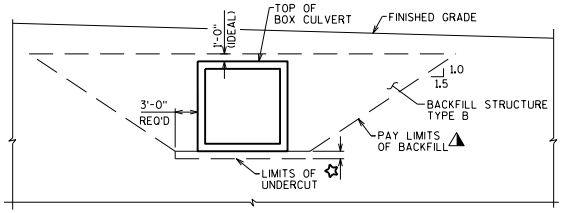
STRUCTURE BACKFILL LIMITS AND NOTES 1

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 9.01



TYPICAL SECTION
THRU BOX CULVERT

☆CULVERT UNDERCUT AND BEDDING BACKFILL TO BE DETERMINED BY GEOTECHNICAL ENGINEER.
(CHOOSE APPLICABLE NOTE, MODIFY AS NEEDED)

NOTE AND DIMENSION NOT REQUIRED. (UNDERCUT NOT REQUIRED PER GEOTECHNICAL ENGINEER OR WHEN CONSTRUCTED ON FILLS)

UNDER CUT X'-X". EXCAVATION FOR UNDER CUT TO BE INCLUDED IN EXCAVATION FOR STRUCTURES. BACKFILL WITH "BACKFILL STRUTURE TYPE B".

UNDER CUT X'-X". EXCAVATION FOR UNDER CUT TO BE INCLUDED IN EXCAVATION FOR STRUCTURES. PLACE "GEOTEXTILE TYPE C" AND BACKFILL WITH "BREAKER RUN".

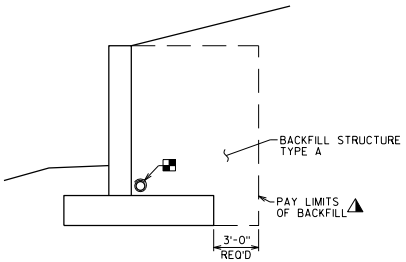
IN LIEU OF USING BREAKER RUN FOR THE BOX CONSTRUCTION PLATFORM, THE CONTRACTOR MAY ELECT TO SUBSTITUTE #1 OR #2 CONCRETE COARSE AGGREGATE, SELECT CRUSHED MATERIAL OR OTHER GRANULAR MATERIAL AS APPROVED BY THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR BASE STABILITY WITH ANY SUBSTITUTED MATERIAL. THE REGION GEOTECHNICAL ENGINEER MAY BE CONTACTED TO DETERMINE IF "OTHER GRANULAR MATERIAL" IS ACCEPTABLE.

NOTES (BOX CULVERTS)

THE UPPER LIMITS OF "EXCAVATION FOR STRUCTURES CULVERTS C-.-.-" SHALL BE THE EXISTING GROUNDLINE.

THE BACKFILL QUANTITIES ARE BASED ON THE PAY LIMITS SHOWN ON THE PLANS AND MAY NOT REFLECT ACTUAL PLACED QUANTITIES. "BACKFILL STRUCTURE TYPE B" REQUIRED ON THE BOX CULVERT SIDES AND BEHIND APRON WINGS FOR 3 FEET. BACKFILL PLACED BEYOND PAY LIMITS OR EXCEEDING PLAN QUANTITIES SHALL BE INCIDENTAL TO EXCAVATION FOR STRUCTURES.

ALL PRECAST BOX SECTIONS SHALL BE PLACED ON A BEDDING OF "BACKFILL STRUCTURE TYPE B" OF 6" MINIMUM DEPTH. (NOTE APPLICABLE WHEN PRECAST NOTE IS SHOWN ON THE PLANS)



TYPICAL SECTION
THRU RETAINING WALL

NOTES (RETAINING WALLS)

THE UPPER LIMITS OF "EXCAVATION FOR STRUCTURES RETAINING WALLS R-.-.-" SHALL BE THE EXISTING GROUNDLINE.

THE BACKFILL QUANTITIES ARE BASED ON THE PAY LIMITS SHOWN ON THE PLANS AND MAY NOT REFLECT ACTUAL PLACED QUANTITIES. "BACKFILL STRUCTURE TYPE A" REQUIRED FOR THE ENTIRE WALL LENGTH. BACKFILL PLACED BEYOND PAY LIMITS OR EXCEEDING PLAN QUANTITIES SHALL BE INCIDENTAL TO EXCAVATION FOR STRUCTURES.

DESIGNER NOTES

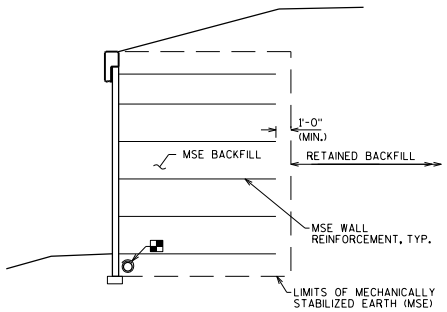
⚠ THE DESIGN ENGINEER SHOULD PROVIDE ALL NECESSARY BACKFILL PAY LIMITS AND NOTES IN ORDER TO DETERMINE QUANTITIES. SEE BRIDGE MANUAL SECTIONS 6.4.2 AND 9.10 FOR ADDITIONAL INFORMATION.

FOR CULVERTS, THE ABOVE NOTE REGARDING POTENTIAL SUBSTITUTION OF BREAKER RUN SHOULD ONLY BE INCLUDED ON THE PLANS IF ALLOWED BY THE REGION GEOTECHNICAL ENGINEER.

LEGEND

⚠ BACKFILL PAY LIMITS. BACKFILL BEYOND BACKFILL PAY LIMITS SHALL BE INCIDENTAL TO EXCAVATION FOR STRUCTURES. LIMITS OF EXCAVATION SHALL BE DETERMINED BY THE CONTRACTOR.

▪ PIPE UNDERDRAIN WRAPPED (6-INCH). SLOPE 0.5% MIN. TO SUITABLE DRAINAGE. ATTACH RODENT SHIELD AT ENDS OF PIPE UNDERDRAIN. (SHOW DETAIL ON PLANS)



TYPICAL SECTION
THRU MSE RETAINING WALL

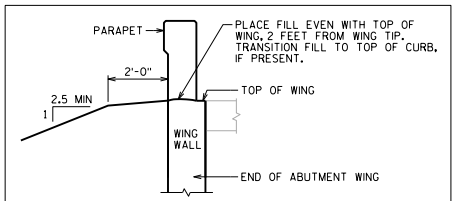
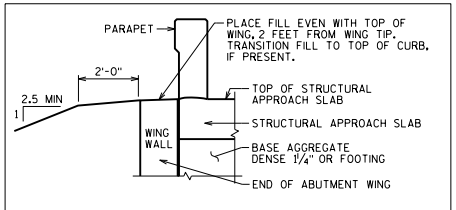
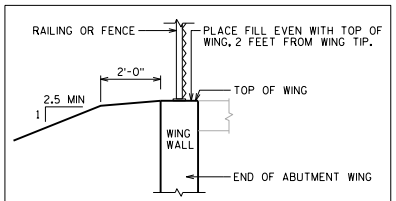
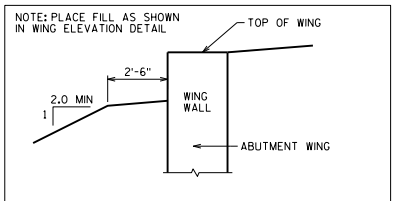
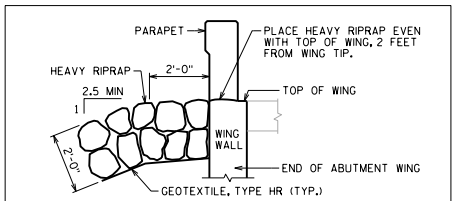
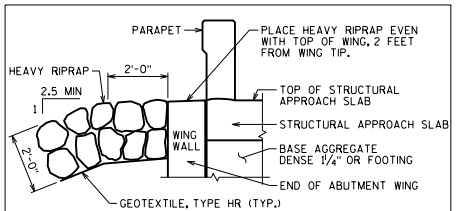
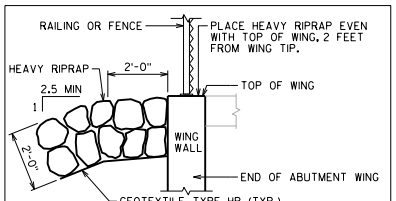
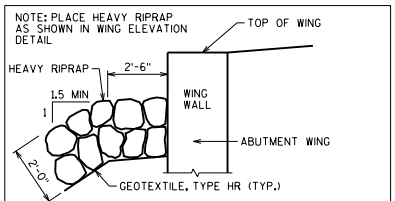
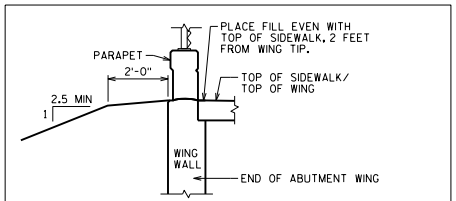
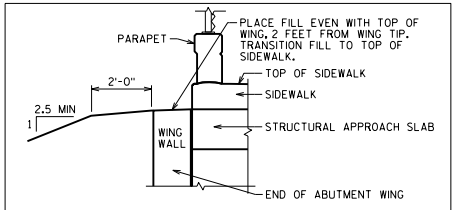
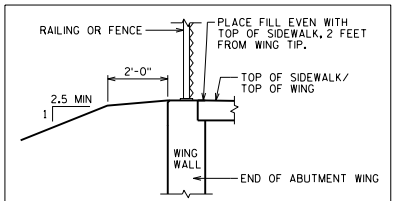
STRUCTURE BACKFILL
LIMITS AND NOTES 2

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 9.02

	WINGS PARALLEL TO ROADWAY			WINGS PARALLEL TO ABUTMENT
	STANDARD WING	WITH STRUCTURAL APPROACH SLAB	WITH RAILING OR FENCE ONLY	STANDARD WING
STANDARD FILL	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING
RIP RAP	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING
STANDARD FILL WITH SIDEWALK	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING TIPS	 TYPICAL FILL SECTION AT WING TIPS	

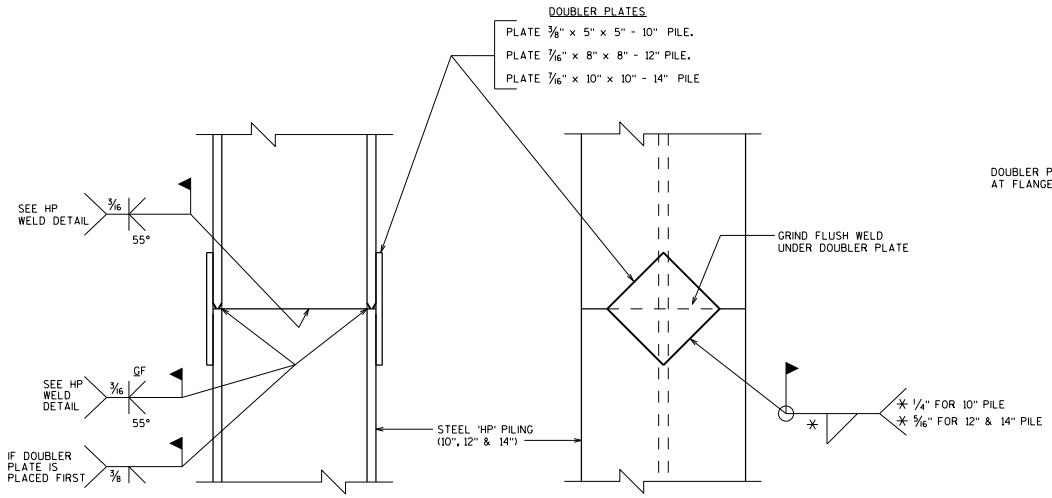
WING FILL SECTIONS AT WING TIPS

BUREAU OF STRUCTURES

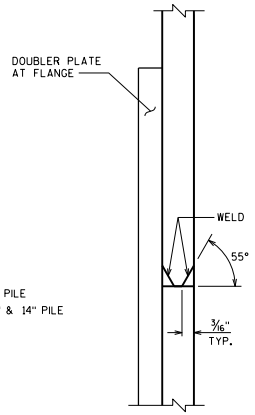
APPROVED: Bill Oliva

DATE: 1-18

STANDARD 9.03



STEEL 'HP' SHAPES



HP WELD DETAIL

FLANGE SHOWN, WEB SIMILAR

DESIGNER NOTES

FULL DESIGN LOADING CAN BE USED IF PREBORED HOLE IS LARGE ENOUGH TO AVOID PILE HANGUPS AND ALLOW FILLING WITH SAND.

SEE WISDOT POLICY ITEM IN BRIDGE MANUAL 11.3.1.12.3 FOR GUIDANCE ON "HP" PILES.

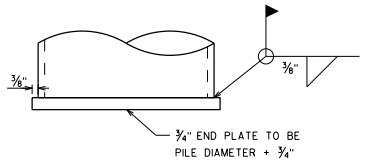
SEE BRIDGE MANUAL SECTION 11.3.1.17.7 FOR PILE RESISTANCE VALUES.

IF LESS THAN THE MAXIMUM AXIAL RESISTANCE IS REQUIRED BY DESIGN, STATE ONLY THE REQUIRED CORRESPONDING DRIVING RESISTANCE ON THE PLANS. CONSULT WITH THE GEOTECHNICAL ENGINEER REGARDING POSSIBLE ESTIMATED PILE LENGTH ADJUSTMENT.

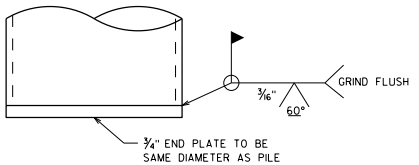
NOTES

CAST-IN-PLACE PILE SHELL MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION.

IF APPLICABLE, PLACE THE FOLLOWING NOTE ON THE PLANS:
PILES PLACED IN PREBORED HOLES CORED INTO ROCK DO NOT REQUIRE DRIVING.

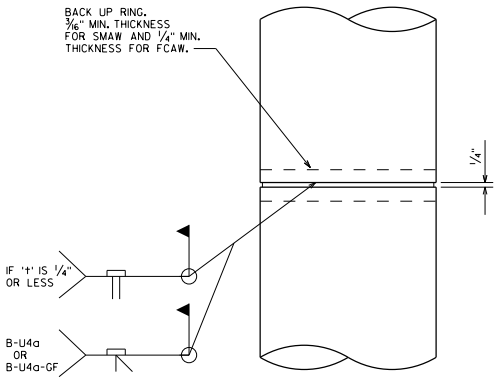


END PLATE DETAIL FOR CIP PILING

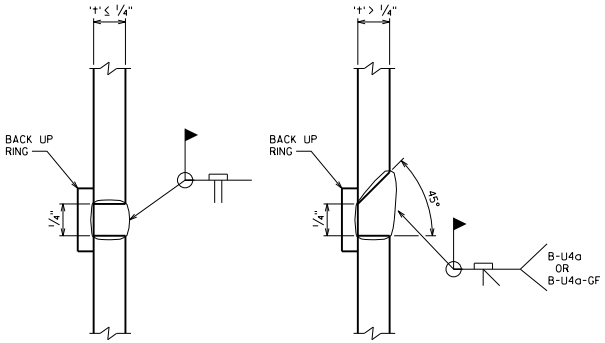


END PLATE DETAIL FOR CIP PILING IN ARTESIAN CONDITIONS

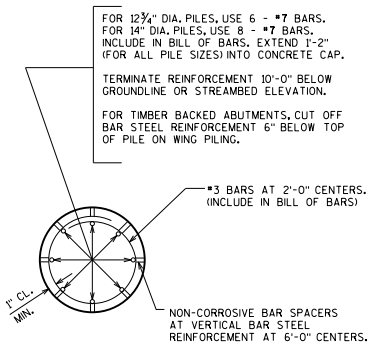
(ONLY USE FOR ARTESIAN CONDITIONS)

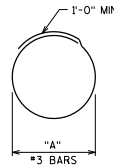


CAST-IN-PLACE 'PIPE PILE'



CIP PILE WELD DETAIL





TABLE

PILE DIA.	DIM "A"	LENGTH
12¾"	9¾"	3'-7"
14"	11"	3'-11"

SECTION THRU CONCRETE CAST-IN-PLACE PILING USED WHEN PILES ARE EXPOSED

(OPEN PILE BENTS OR TIMBER BACKED ABUTMENTS)

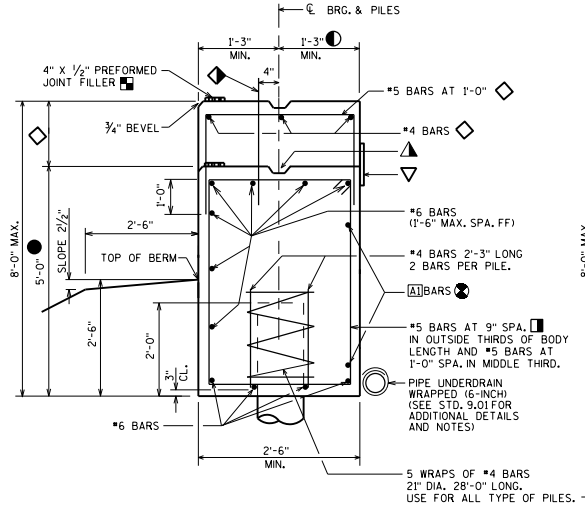
PILE DETAILS

BUREAU OF STRUCTURES

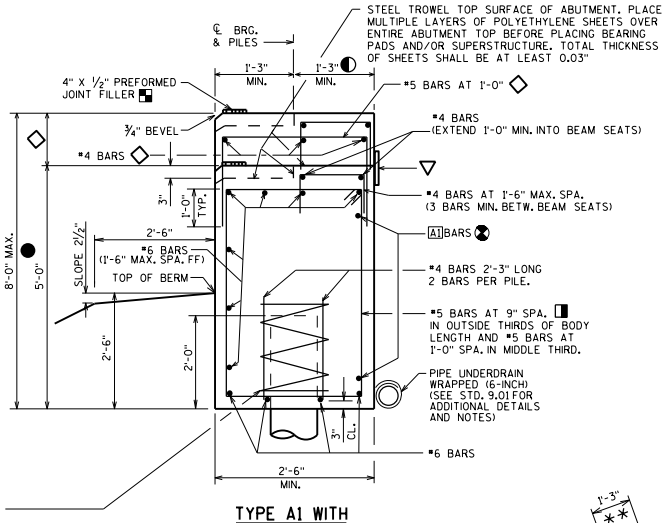
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 11.01



TYPE A1 WITH FIXED SEAT



TYPE A1 WITH SEMI-EXPANSION SEAT

DESIGNER NOTES

LAP LENGTHS FOR HORIZONTAL BARS SHALL BE BASED ON A "CLASS C" TOP TENSION LAP SPLICE.

WING BARS AND DOWEL BARS SHALL BE EPOXY COATED.

PILING SPACING IN ABUTMENT BODY SHALL BE 8'-0" MAX. FOR ALL TYPES OF PILING. THE MAX. PILE SPACING FROM THE END OF THE ABUT. BODY TO THE FIRST PILE SHALL BE THE MINIMUM OF ONE-HALF PILE SPACE OR 2'-6".

TOTAL LENGTH OF A1 BARS SHALL BE ≥ TO WING LENGTH.

CONCRETE POURED UNDER WATER WILL BE ALLOWED AND SHALL BE DONE IN ACCORDANCE WITH SECTION 502.3.5.3 STANDARD SPECIFICATIONS.

THE SEMI-EXPANSION SEAT SHALL BE USED WHEN REQUIRED AS STATED IN CHAPTER 12, FIGURE 12.7-1 OF THE BRIDGE MANUAL OR WHENEVER A WING PILE IS REQUIRED.

THE FIXED SEAT CANNOT BE USED WHEN A WING PILE IS REQUIRED (SEE STD. 12.02 FOR CRITERIA).

WHEN THE BOTTOM OF GIRDER SLOPES MORE THAN 1%, SLOPE THE BEAM SEAT BASED ON ADDING THESE TWO VALUES:
- LONGITUDINAL GRADE OF GIRDER (PERCENT)
- CAMBER EFFECT = 4(RC)/L X 100 (PERCENT), WHERE:
  RC = RESIDUAL CAMBER (INCHES)
  L = GIRDER LENGTH (INCHES)

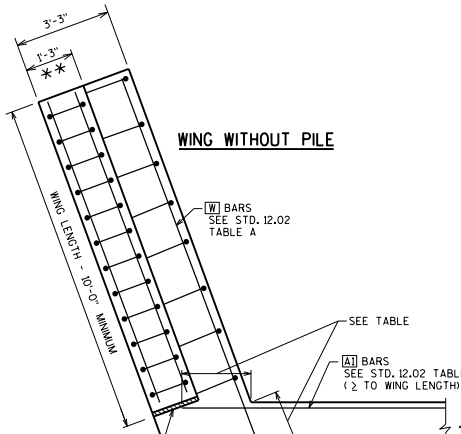
(SEE STANDARD 13.01 FOR SLOPED SEAT DETAILS)

ABUTMENT DETAILED WITHOUT STRUCTURAL APPROACH SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH DETAILS.

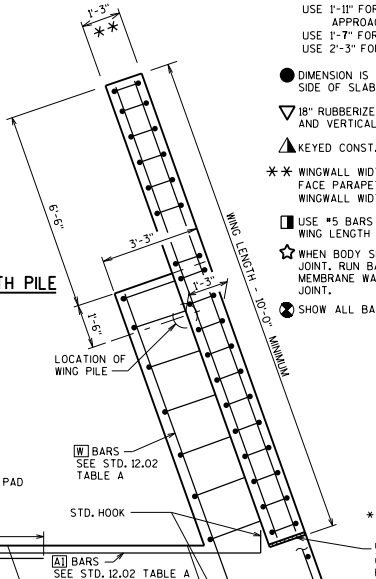
USE 3/4" THICK FILLER FOR SLAB STRUCTURES.

LEGEND

- *5 BARS (COATED) AT 1'-0" (2'-0" LONG). THESE BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE.
- WHEN THIS DIMENSION ≥ 4" THIS ADDITIONAL REINFORCEMENT SHALL BE ADDED. MAX. SPA. OF HORIZ. *4 BARS = 1'-0".
- USE 1'-3" FOR SLAB SPANS AND FOR GIRDER SPANS WITH NO PAVING NOTCH.
  USE 1'-6" FOR GIRDER SPANS WITH NO PAVING NOTCH, BUT WHERE 36W", 45W", 54", 54W", 70", 72W" OR 82W" GIRDERS ARE USED, AND SKEW > 25°.
  USE 1'-3" FOR SLAB SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
  USE 1'-11" FOR GIRDER SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
  USE 1'-7" FOR SLAB SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
  USE 2'-3" FOR GIRDER SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
- DIMENSION IS FROM BOTTOM OF ABUTMENT TO LOW BEAM SEAT OR LOW SIDE OF SLAB TYPE SUPERSTRUCTURE.
- 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.
- KEYED CONST. JOINT FORMED BY BEVELED 2" x 6".
- ** WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX", OR SINGLE SLOPE PARAPET "S6SS" IS USED. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
- USE *5 BARS AT 6" SPA. IN OUTSIDE THIRDS OF BODY LENGTH WHEN THE WING LENGTH > 20'-0" AND WING HEIGHT > 10'-0".
- WHEN BODY SECTION IS > 50'-0"± LONG PROVIDE VERTICAL CONSTRUCTION JOINT. RUN BAR STEEL THRU JOINT AND SEAL JOINT WITH 18" RUBBERIZED MEMBRANE WATERPROOFING. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.
- SHOW ALL BARS FOR CLARITY.



WING WITHOUT PILE

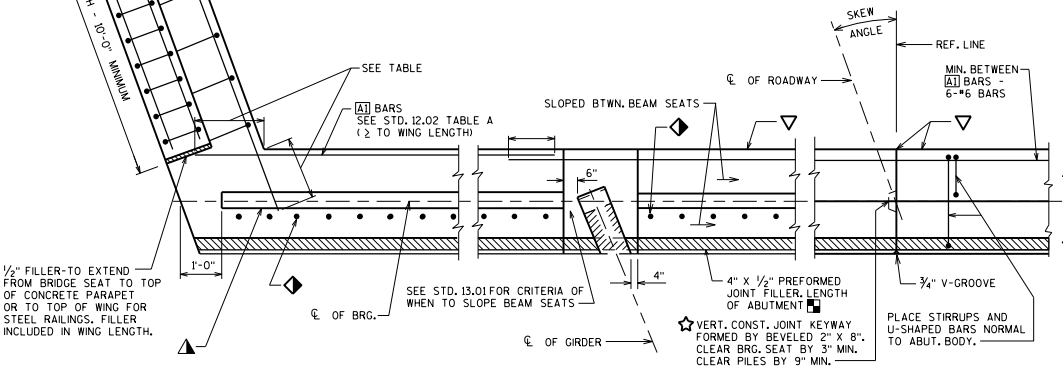


WING WITH PILE

TABLE

BAR SIZE	DISTANCE*
*5	1'-9"
*6	2'-1"
*7	2'-9"
*8	3'-8"
*9	4'-7"
*10	5'-10"

* OR EQUIVALENT STD. HOOK
USE STRAIGHT BARS WHEN POSSIBLE



SLAB SPAN WITH FIXED SEAT | GIRDER SPAN WITH FIXED SEAT | SLAB SPAN WITH SEMI-EXPANSION SEAT | GIRDER SPAN WITH SEMI-EXPANSION SEAT

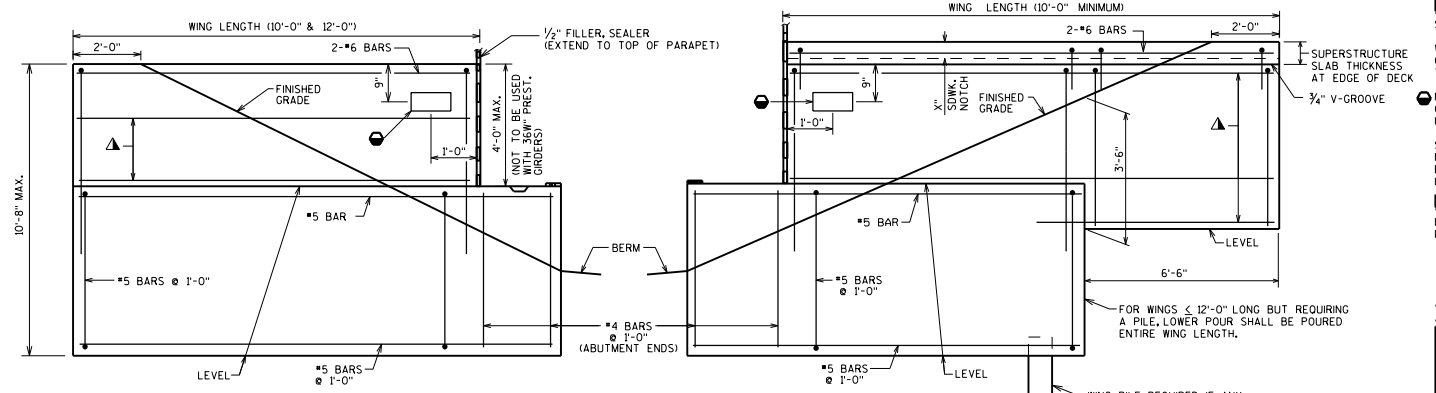
ABUTMENT TYPE A1 (INTEGRAL ABUTMENT)

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

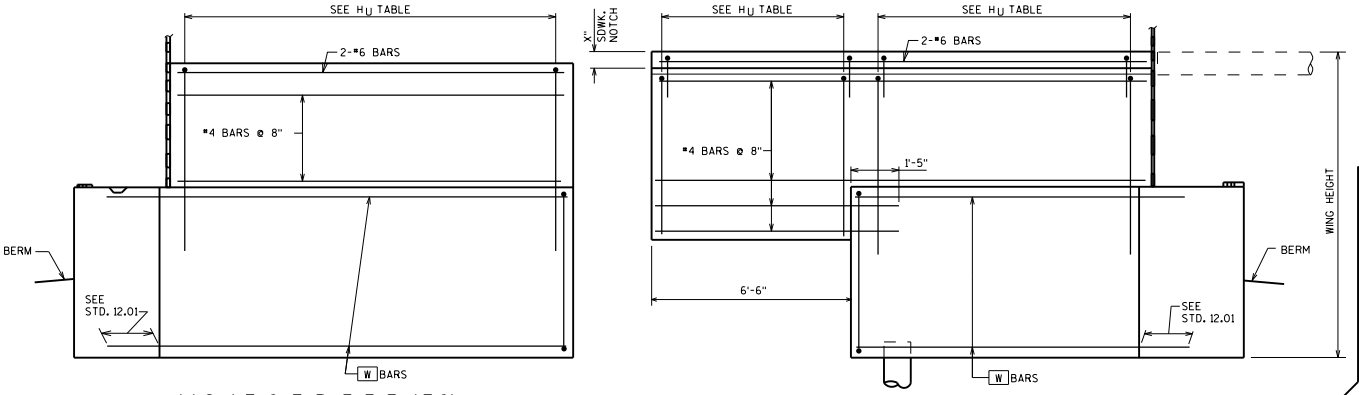
DATE: 1-19

STANDARD 12.01



WING WITHOUT PILE ELEVATION
(FRONT FACE)

WING WITH PILE ELEVATION
(FRONT FACE)



WING WITHOUT PILE ELEVATION
(BACK FACE)

WING WITH PILE ELEVATION
(BACK FACE)

DESIGNER NOTES

SEE STD. 12.01 FOR ADDITIONAL DESIGNER NOTES.

WING WITH PILE & WING WITHOUT PILE CAN BE USED FOR EITHER SIDEWALK OR SLOPED FACE PARAPETS. THE TYPE OF WING TO USE IS BASED ONLY ON THE WING HEIGHT AND WING LENGTH LIMITATIONS SHOWN.

NAME PLATE (ONLY FOR TYPE "F", "W" AND "M" OR TIMBER RAIL AS SHOWN ON STANDARD 30.24), LOCATE NAME PLATE ON FIRST RIGHT WING TRAVELING UP STATION.

SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF ½" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD ⅛" BELOW SURFACE OF CONCRETE). EXTEND SEALER 3" BELOW GUTTER LINE AT INSIDE FACE.

LRFD DESIGN LOADS

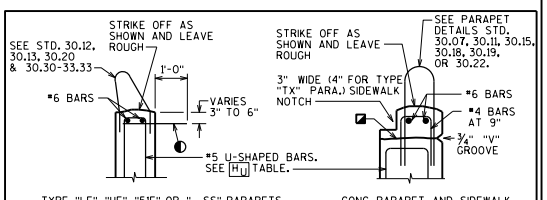
LIVE LOAD = 2'-0" SURCHARGE
LOAD FACTORS:
γ_{pDC} = 1.25
γ_{pEH} = 1.50
γ_{pEV} = 1.35
γ_{LS} = 1.75

EXPOSURE CLASS 2, γ_E = 0.75
fy = 60,000 P.S.I.
f'c = 3,500 P.S.I.
HORIZ. EARTH LOAD BASED ON:
35 P.C.F. EQUIV. FLUID UNIT WEIGHT OF SOIL

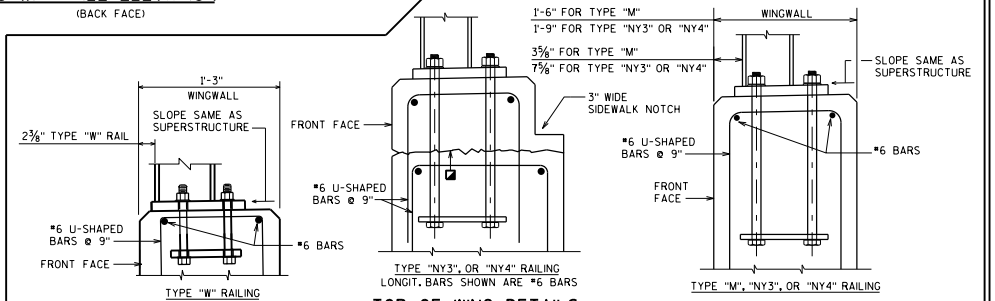
TABLE A

WING LENGTH	WING HEIGHT				
	8'-6"	10'-0"	11'-6"	13'-0"	BARS
10'-0"	*6-#6's	*6-#6's	6-#5's		W
	*7-#8's	*7-#8's	6-#5's		A1
12'-0"	*6-#6's	*7-#6's	7-#5's	7-#6's	W
	*7-#8's	*7-#8's	6-#7's	7-#7's	A1
16'-0"	7-#6's	8-#6's	7-#7's	8-#7's	W
	5-#8's	6-#8's	7-#8's	8-#8's	A1
20'-0"	7-#7's	7-#8's	8-#8's	8-#9's	W
	6-#9's	7-#9's	7-#10's	8-#10's	A1
24'-0"	8-#8's	9-#8's	9-#9's	9-#10's	W
	7-#9's	8-#9's	8-#10's	9-#10's	A1

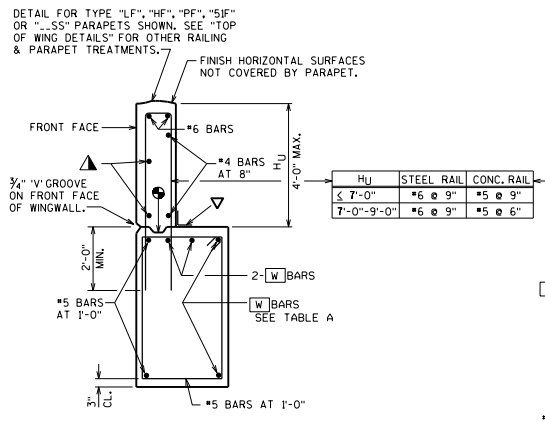
* WING WITHOUT PILE VALUES SHOWN. USE 10'-0" WING HEIGHT VALUES FOR WING HEIGHTS UP TO 10'-8". (FOR WING WITH PILE THAT HAS WING LENGTH IN THIS REGION, USE VALUES FOR 11'-6" WING HEIGHT)



◐ #4 DOWELS (COATED) 2'-0" LONG AT 1'-0" ALONG ENTIRE WING LENGTH. PLACE IN WING ADJACENT TO SURFACE DRAIN APRON ONLY.

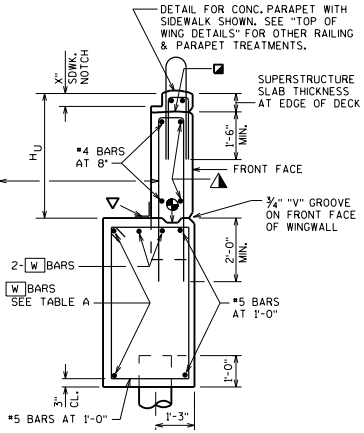


TOP OF WING DETAILS
(TYP. FOR A3 ABUTMENT WINGS ALSO)



H_U	STEEL RAIL	CONC. RAIL
≤ 7'-0"	#6 @ 9"	#5 @ 9"
7'-0"-9'-0"	#6 @ 9"	#5 @ 6"

WING WITHOUT PILE SECTION



WING WITH PILE SECTION

◪ CONSTRUCTION JOINT, LEAVE ROUGH. REQUIRED FOR PRESTRESSED CONCRETE SUPERSTRUCTURES. OPTIONAL FOR OTHERS. POUR CONCRETE ABOVE THIS JOINT AFTER DECK IS IN PLACE. IF JOINT IS USED, UTILIZE RUBBERIZED MEMBRANE WATERPROOFING (COST INCIDENTAL TO BID ITEM "CONCRETE MASONRY BRIDGES").

▽ 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.

◭ USE #4 BARS @ 1'-6" FOR WINGWALL WIDTH = 1'-3" USE #4 BARS @ 1'-4" FOR WINGWALL WIDTH = 1'-6".

◒ OPTIONAL CONST. JOINT FORMED BY BEVELED 2" x 6" KEYWAY WITH MEMBRANE ON BACKFACE.

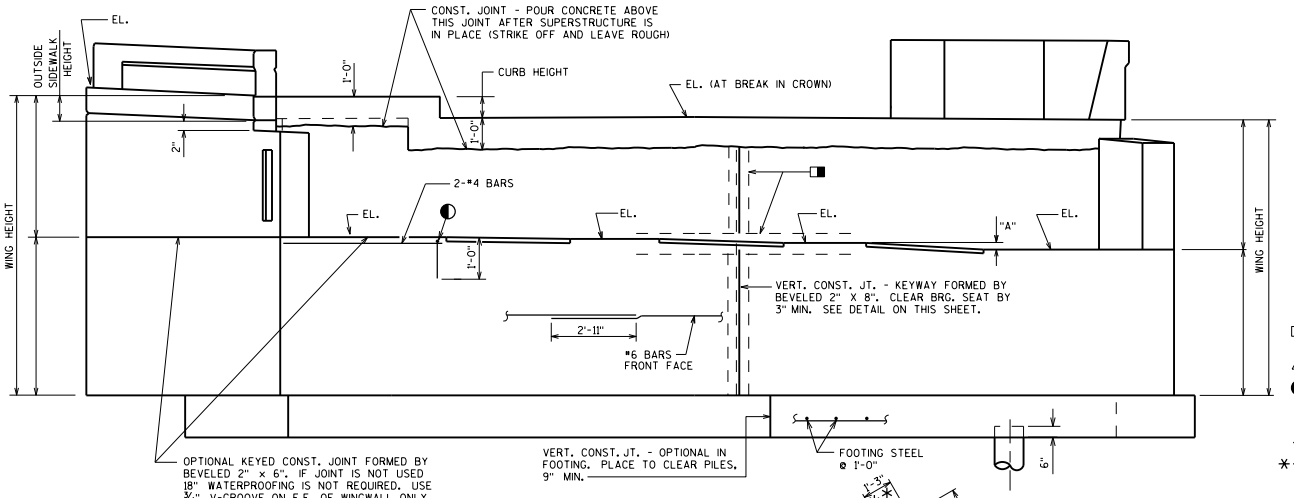
ABUTMENT TYPE A1

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 12.02



FRONT ELEVATION

DESIGNER NOTES

LAP LENGTHS FOR HORIZONTAL BARS SHALL BE BASED ON A "CLASS C" TOP TENSION LAP SPLICE.

BARS IN WINGS, ABUTMENT BACKWALL, AND PAVING BLOCK SHALL BE EPOXY COATED.

PILING SPACING IN ABUTMENT FOOTING SHALL BE 8'-0" MAXIMUM.

PILE REACTION EQUATIONS ARE FOR PRELIMINARY PILE LAYOUT PURPOSES ONLY.

TOTAL LENGTH OF A3 BARS SHALL BE ≥ TO WING LENGTH.

WHEN BODY SECTION IS MORE THAN 50'-0"± LONG, PROVIDE VERTICAL CONSTRUCTION JOINT, RUN BAR STEEL THRU JOINT, SEAL JOINT WITH 18" RUBBERIZED MEMBRANE WATERPROOFING. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.

IN "FRONT ELEVATION" VIEW, GIVE ELEVATION OF ALL BEARING AREAS AND ELEVATION AT BOTTOM OF PARAPETS AT EACH END OF WINGS. ALL ELEVATIONS ARE TAKEN AT FRONT FACE OF BACKWALL.

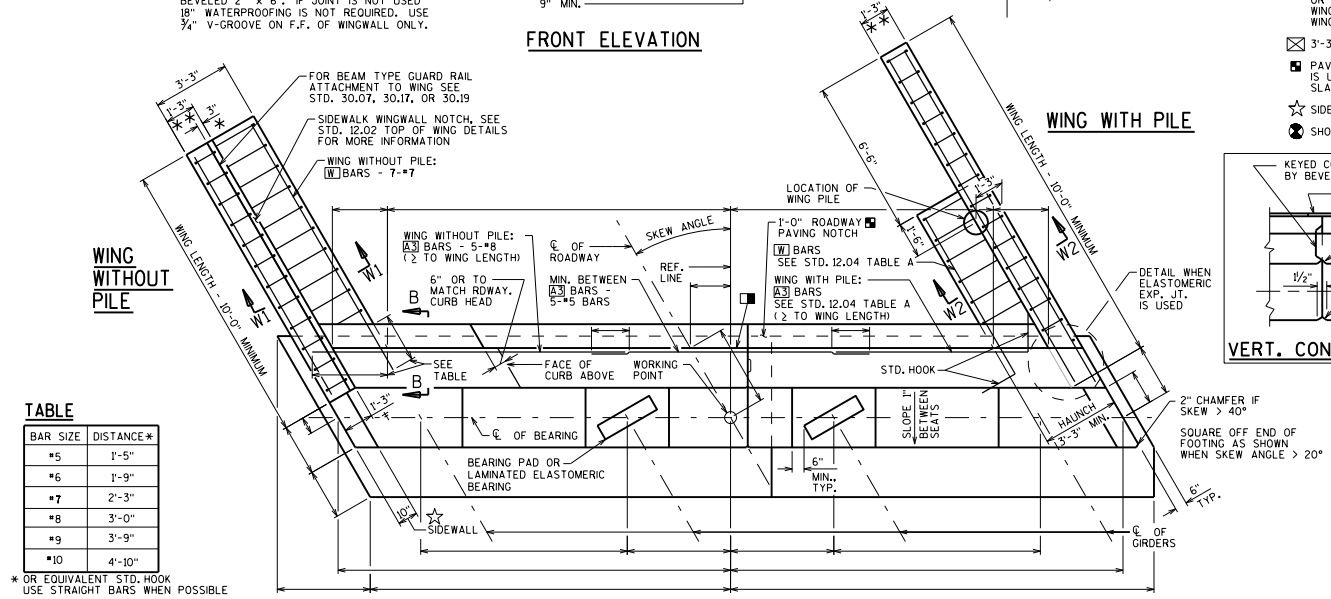
PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

ABUTMENT DETAILED WITHOUT STRUCTURAL APPROACH SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH DETAILS.

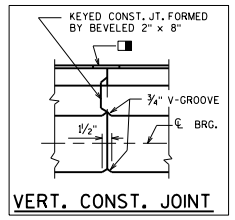
SEE STANDARDS 12.01 AND 13.01 FOR SLOPED BEAM SEAT CRITERIA AND DETAILS.

LEGEND

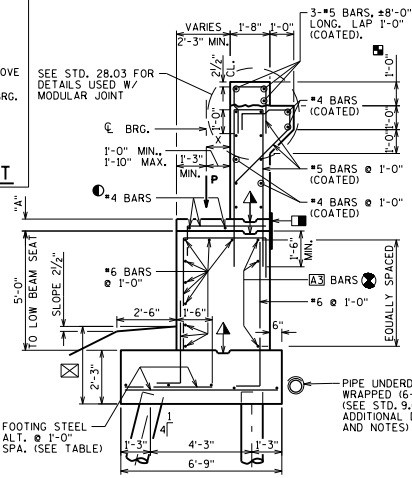
- 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZ. AND VERT. JOINTS ON BACKFACE ABOVE FOOTING.
- KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".
- #4 AT 9" BEAM SEAT. SPACE AT 1'-0" BETWEEN SEATS. THIS STEEL IS REQUIRED ONLY IF DIMENSION "A" EXCEEDS 4".
- † 1'-5" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- ∗ 4" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- ∗∗ WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX", OR SINGLE SLOPE PARAPET "56SS" IS USED. "56SS" SHOULD NOT BE USED ON A SIDEWALK. WINGWALL WIDTHE SHALL BE 1'-4" WHEN PARAPET 'A' ON A RAISED SIDEWALK IS USED. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
- 3'-3" (SLOPE PAVING), 4'-6" (HEAVY RIPRAP)
- PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD 12.12) FOR STRUCTURAL APPROACH SLAB ON THE ABUTMENT SHEET.
- SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SHOW ALL BARS FOR CLARITY.



WING WITH SIDEWALK — PLAN — WING WITH SLOPED FACE PARAPET



VERT. CONST. JOINT



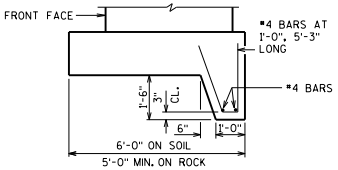
SECTION THRU BODY

ALL FOOTING BARS NOT IDENTIFIED ARE #5 BARS

TABLE

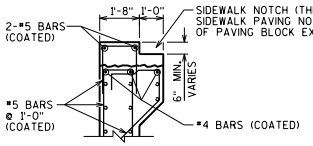
BAR SIZE	DISTANCE∗
#5	1'-5"
#6	1'-9"
#7	2'-3"
#8	3'-0"
#9	3'-9"
#10	4'-10"

∗ OR EQUIVALENT STD. HOOK USE STRAIGHT BARS WHEN POSSIBLE



KEY DETAIL

FOR SILL ABUTMENT WITHOUT PILING PLACED ON SOIL



SECTION B-B

PILE REACTIONS PER FOOT IN KIPS
FRONT ROW = $P\,[(0.22+X/4.25)] + [(h+2.25)^3/310] + 4.6$
BACK ROW = $P\,[(0.78-X/4.25)] - [(h+2.25)^3/705] + 16.8$

NOTES:

h = WING HEIGHT (FT.)

$P = \gamma_{DC}(P_{DC}) + \gamma_{DW}(P_{DW}) + \gamma_{LL}(LL)$ (K/FT.)

FRONT ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH γ_{EH} = 1.50, AND SUPERSTRUCTURE REACTIONS "P". BACK ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH γ_{EH} MIN. = 0.90, AND "P".

PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS

P K/FT.	FOOTING STEEL SIZE
20	#6
40	#7
62	#8
75	#9

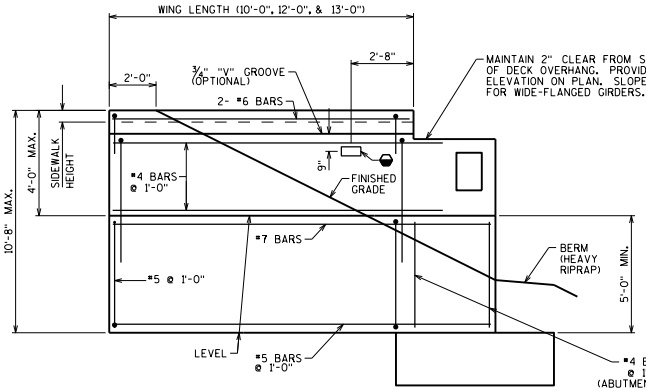
ABUTMENT TYPE A3

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

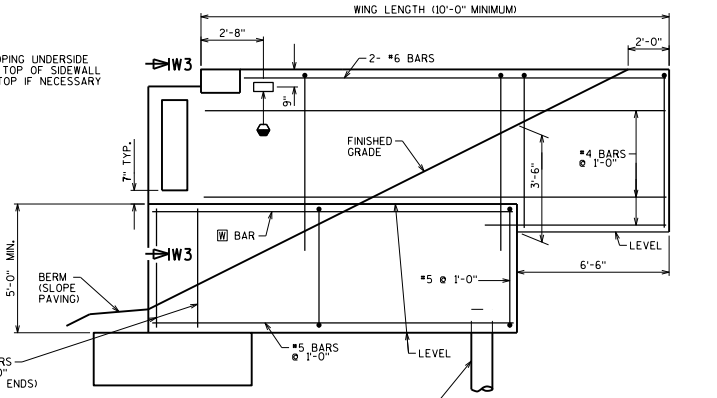
DATE: 1-19

STANDARD 12.03



WING WITHOUT PILE ELEVATION

(FRONT FACE)



WING WITH PILE ELEVATION

(FRONT FACE)

WING PILE REQUIRED IF ANY OF THESE CRITERIA ARE MET:
- WING LENGTH > 13'-0"
- OVERALL HEIGHT > 10'-8"
- H_U > 4'-0" ± OR 36W" PRESTRESSED GIRDER

DESIGNER NOTES

SEE STD. 12.03 FOR ADDITIONAL DESIGER NOTES.

WING WITH PILE & WING WITHOUT PILE CAN BE USED FOR EITHER SIDEWALK OR SLOPED FACE PARAPETS. THE TYPE OF WING TO USE IS BASED ONLY ON THE WING HEIGHT AND WING LENGTH LIMITATIONS SHOWN.

NAME PLATE (ONLY FOR TYPE "F", "W", AND "M" OR TIMBER RAIL AS SHOWN ON STANDARD 30.24). LOCATE NAME PLATE ON FIRST RIGHT WING TRAVELING UP STATION.

FOR MODULAR EXPANSION JOINTS WITH CONCRETE DIAPHRAGMS RUNNING TO EDGE OF DECK: IF SIDEWALL IS USED, FORM SIDEWALL 2" BELOW CONCRETE DIAPHRAGM.

CONSTRUCTION JOINT. LEAVE ROUGH. REQUIRED FOR PRESTRESSED CONCRETE SUPERSTRUCTURES, OPTIONAL FOR OTHERS. POUR CONCRETE ABOVE THIS JOINT AFTER DECK IS IN PLACE.

OPTIONAL CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6" KEYWAY WITH MEMBRANE ON BACKFACE.

18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.

* ABUTMENT DETAILED WITHOUT STRUCTURAL APPROACH SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH DETAILS.

LRFD DESIGN LOADS

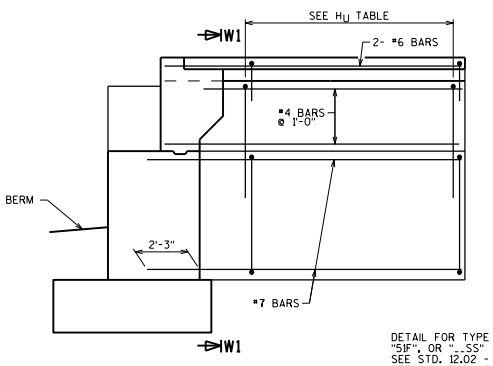
LIVE LOAD = 2'-0" SURCHARGE
LOAD FACTORS:
- γ_{DC} = 1.25
- γ_{DW} = 1.50
- γ_{EH} = 1.50
- γ_{EH} MIN. = 0.90
- γ_{EV} = 1.35
- γ_{LL} = 1.75

EXPOSURE CLASS 2, χ_E = 0.75
f_y = 60,000 P.S.I.
$f'c$ = 3,500 P.S.I
HORIZONTAL EARTH LOAD BASED ON:
35 P.C.F. EQUIVALENT FLUID UNIT WEIGHT OF SOIL

TABLE A

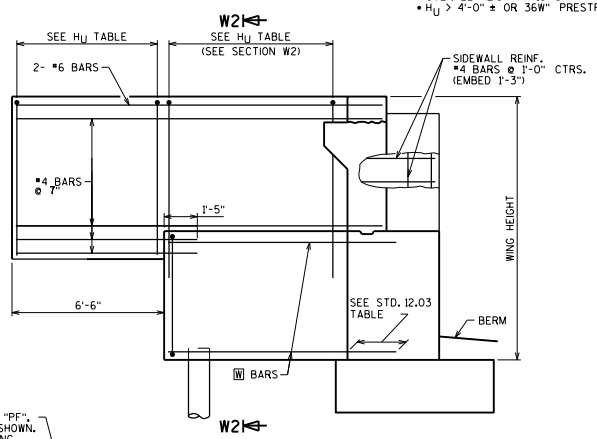
WING 2 LENGTH	WING 2 HEIGHT				
	10'-0"	11'-6"	13'-0"	14'-6"	BARS
12'-0"		6-#6's			W
		7-#5's			A3
16'-0"	8-#6's	7-#7's	8-#7's		W
	7-#6's	5-#8's	7-#7's		A3
20'-0"	8-#7's	9-#7's	9-#8's	10-#8's	W
	5-#9's	6-#9's	7-#9's	8-#9's	A3
24'-0"	9-#8's	10-#8's	10-#9's	8-#10's +	W
	9-#8's	9-#9's	9-#10's	10-#10's	A3
26'-0"	9-#9's	10-#9's	9-#9's +	10-#9's +	W
	7-#10's	9-#10's ++	9-#10's ++	10-#10's ++	A3

+ USE 4'-6" FOR LOWER WING POUR WIDTH
++ USE 3'-3" MIN. FOR BEARING SEAT WIDTH



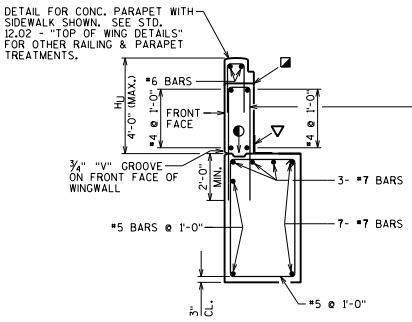
WING WITHOUT PILE ELEVATION

(BACK FACE)



WING WITH PILE ELEVATION

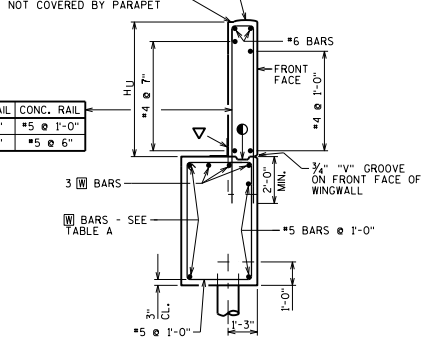
(BACK FACE)



SECTION W1

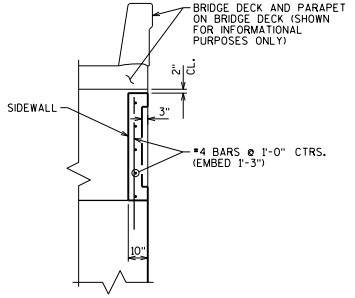
(WING WITHOUT PILE)

H_U	STEEL RAIL	CONC. RAIL
≤ 7'-0"	#6 @ 9"	#5 @ 1'-0"
7'-0" - 9'-6"	#6 @ 9"	#5 @ 6"



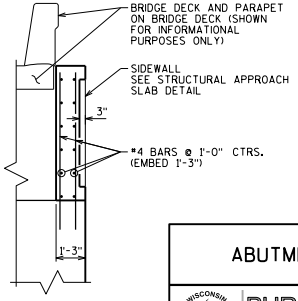
SECTION W2

(WING WITH PILE)



SECTION W3

(WITHOUT STRUCTURAL APPROACH SLAB)



SECTION W3

(WITH STRUCTURAL APPROACH SLAB)

ABUTMENT TYPE A3

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 12.04

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 ELEVATION IS ABOVE THE BOTTOM OF ABUTMENT.

*USE 2½:1 FOR THE UNSTABLE CLAYS WHICH ARE SOMETIMES ENCOUNTERED IN NORTHWEST WISC. (SUPERIOR AREA)

◑ 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.

⊠ SHOW ALL LONGITUDINAL BARS FOR CLARITY.

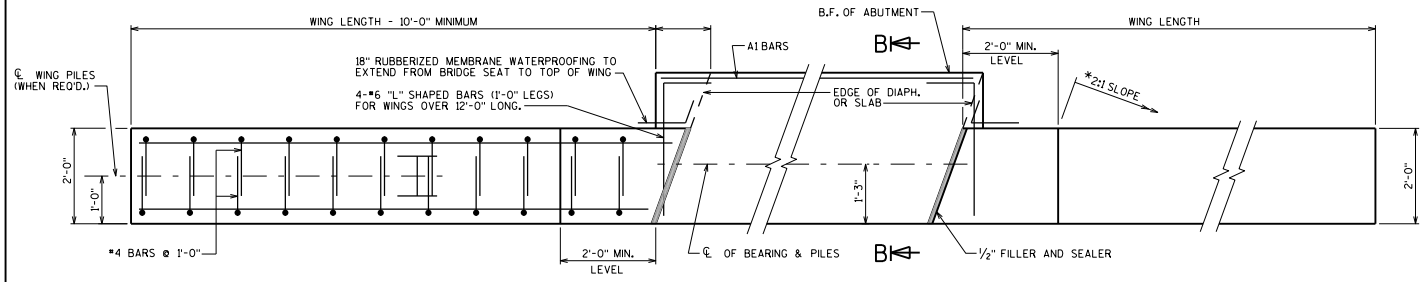
LRFD DESIGN LOADS (WINGS)

LIVE LOAD = 1'-0" SURCHARGE
LOAD FACTORS:
γ_{DDC} = 1.25
γ_{DEH} = 1.50
γ_{LS} = 1.75
EXPOSURE CLASS 2, γ_E = 0.75
HORIZ. EARTH LOAD BASED ON: 35 P.C.F. EQUIV. FLUID UNIT WEIGHT OF SOIL
FY = 60,000 P.S.I.
F'C = 3,500 P.S.I.

TABLE A

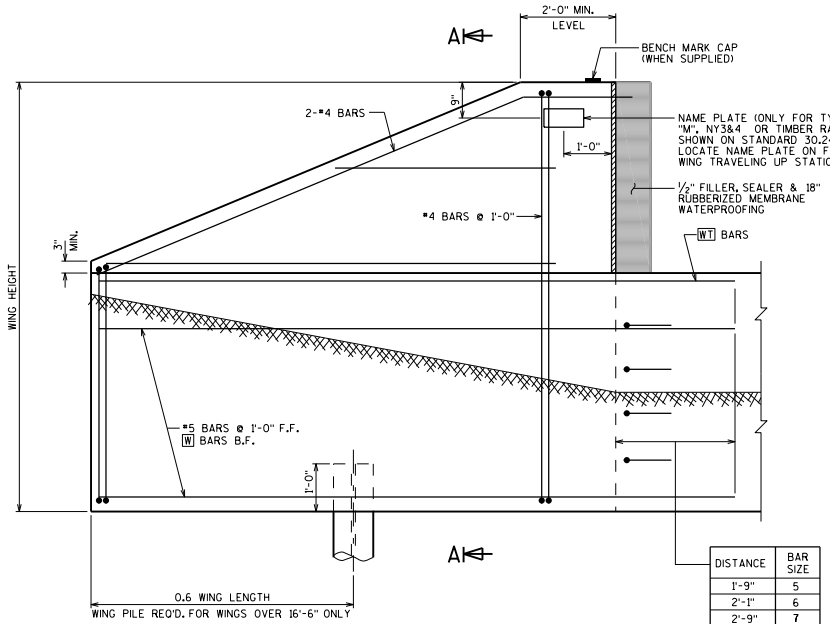
WING LENGTH	WING HEIGHT				BARS
	8'-6"	10'-0"	11'-6"	13'-0"	
10'-0"	5-#5's	5-#5's	6-#5's		W
	2-#5's	2-#5's	2-#5's		WT
	4-#6's	4-#6's	5-#6's		A1
12'-0"		5-#6's	5-#7's	6-#7's	W
		2-#7's	2-#7's	2-#8's	WT
		5-#6's	6-#6's	6-#7's	A1
16'-0"		5-#8's	6-#8's	5-#9's	W
		2-#8's	2-#8's	2-#9's	WT
		5-#8's	6-#8's	7-#8's	A1
20'-0" ◭			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

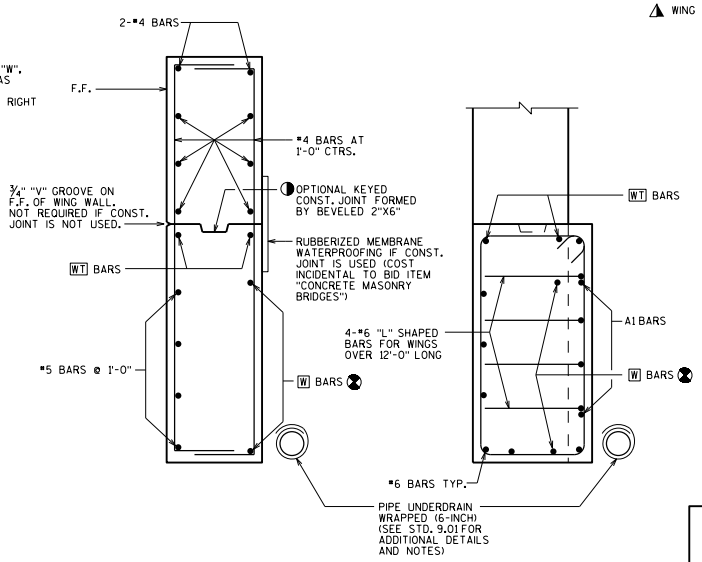
(SEE STD. 12.01 FOR ABUTMENT BODY DETAILS)



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

WING ELEVATION

(A1 ABUTMENT)



SECTION A-A

SECTION B-B

SEE STD. 12.01 & 12.02 FOR NOTES & DETAILS

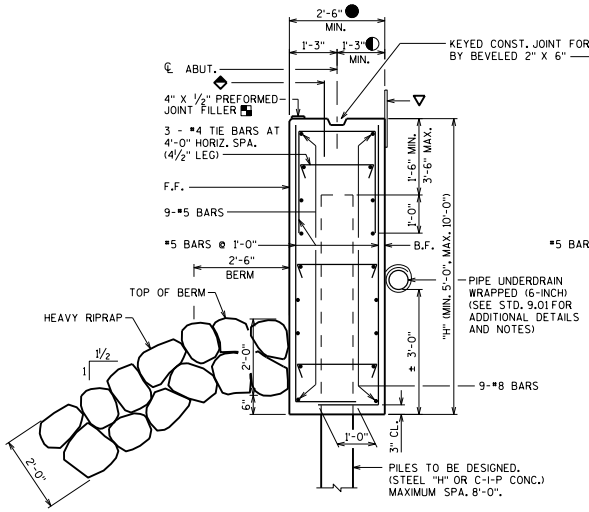
DETAILS FOR WINGS PARALLEL TO A1 ABUTMENT CENTERLINE

BUREAU OF STRUCTURES

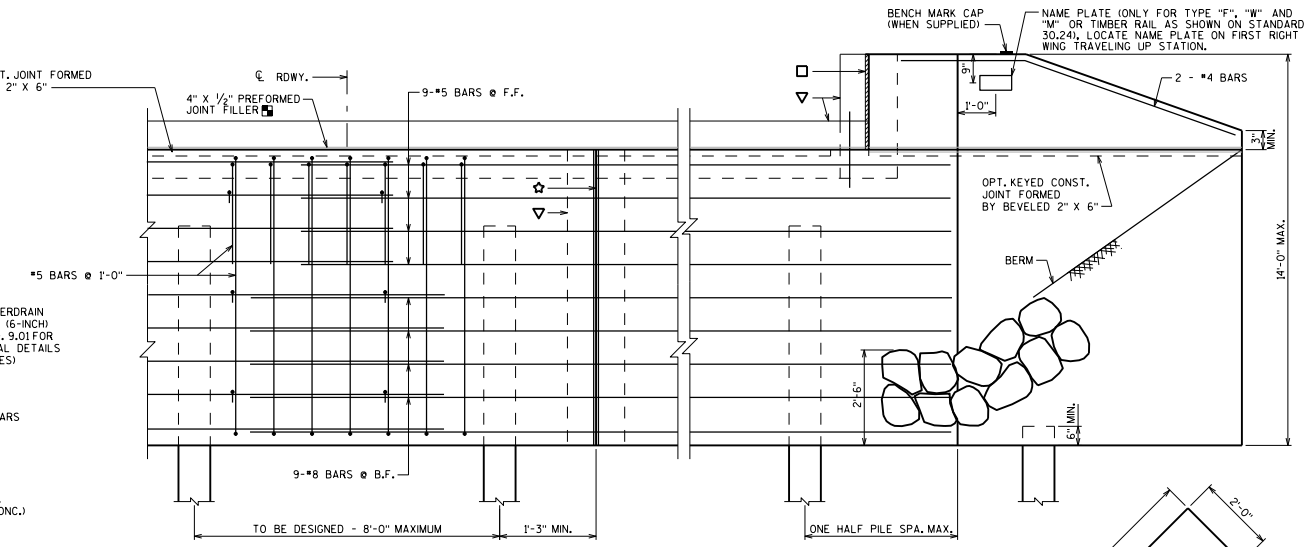
APPROVED: Bill Oliva

DATE: 7-17

STANDARD 12.07

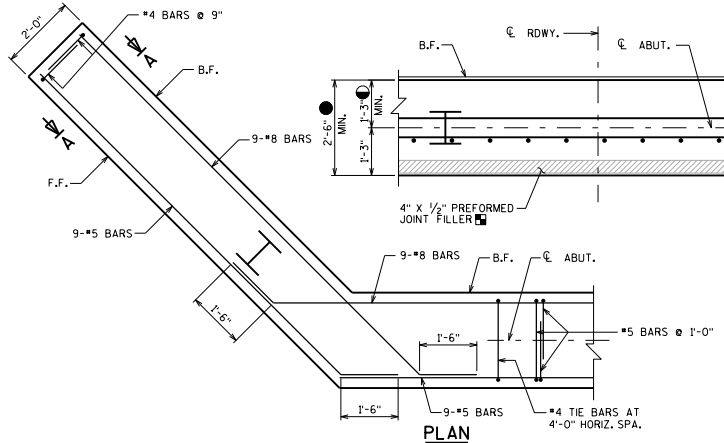


TYP. SECTION THRU ABUTMENT BODY



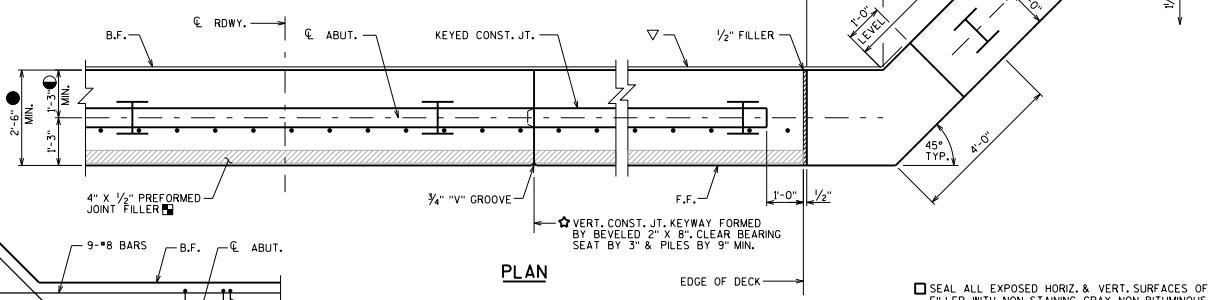
ELEVATION

SECTION A-A



PLAN

SHOWING BAR STEEL REINFORCEMENT



PLAN

DESIGNER NOTES

FOR SLAB AND PRESTRESSED GIRDER SPANS L < 200'-0" & FOR STEEL GIRDER SPANS L < 150'-0" WHERE L = LENGTH OF CONTINUOUS SUPERSTRUCTURE BETWEEN ABUTMENTS.

WHEN GIRDERS WITH SEMIEXPANSION SEAT OR FIXED SEAT, OR SLAB SPAN WITH SEMIEXPANSION SEAT ARE USED, MAKE BEAM SEATS SIMILAR TO THAT SHOWN ON STANDARD 12.01.

WING BARS AND DOWEL BARS SHALL BE EPOXY COATED.

☆ WHEN BODY SECTION IS > ± 50'-0" LONG, PROVIDE VERT. CONST. JOINT. RUN BAR STEEL THRU JOINT. BEVEL EXPOSED EDGES ¾" AND SEAL JOINT. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.

◐ USE 1'-3" FOR SLAB SPANS AND FOR GIRDER SPANS WITH NO PAVING NOTCH.
USE 1'-6" FOR GIRDER SPANS WITH NO PAVING NOTCH, BUT WHERE 36W", 45W", 54", 54W", 70", 72W" OR 82W" GIRDERS ARE USED, AND SKEW > 25°.
USE 1'-3" FOR SLAB SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
USE 1'-11" FOR GIRDER SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
USE 1'-7" FOR SLAB SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
USE 2'-3" FOR GIRDER SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)

LAP LENGTH FOR HORIZONTAL BARS SHALL BE BASED ON A "CLASS C" TOP TENSION LAP SPLICE.

□ SEAL ALL EXPOSED HORIZ. & VERT. SURFACES OF ½" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD ⅛" BELOW SURFACE OF CONC.)

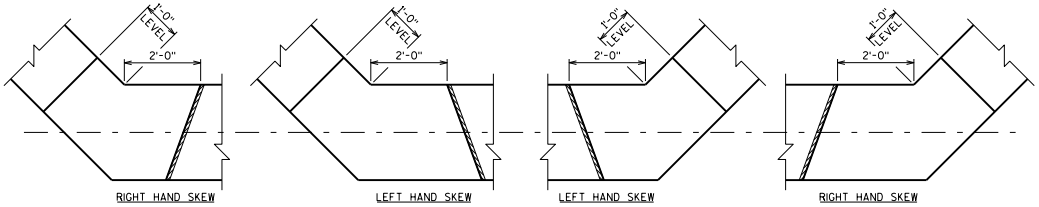
DO NOT PLACE FILL ABOVE 3'-0" FROM BOTTOM OF ABUTMENT UNTIL SUPERSTRUCTURE IS IN PLACE.

▽ 18" RUBBERIZED MEMBRANE WATERPROOFING.

● WHEN ABUTMENT WIDTH > 2'-10" FIXED POINT OF WING ROTATION SHALL BE ON F.F. OF ABUTMENT (0° SKEW ONLY).

◆ THESE BARS MAY BE PLACED AFTER CONCRETE IS POURED, BUT BEFORE INITIAL SET HAS TAKEN PLACE. SEE STD. 12.01 & 27.05

▪ USE 3/4" THICK FILLER FOR SLAB STRUCTURES.



WING DETAIL FOR SKEWED STRUCTURES

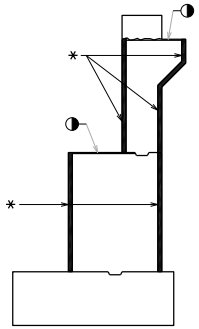
ABUTMENT A5 (INTEGRAL, PILE ENCASED ABUTMENT)

BUREAU OF STRUCTURES

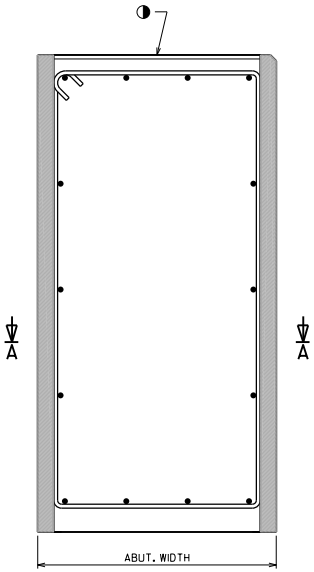
APPROVED: Bill Oliva

DATE: 1-19

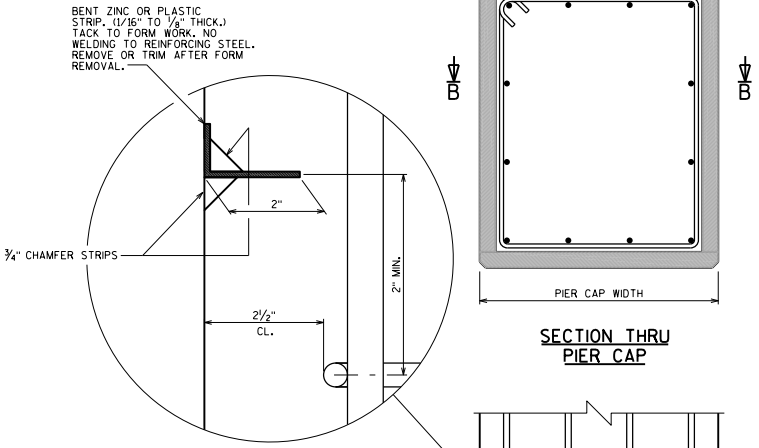
STANDARD 12.08



A3 ABUTMENT



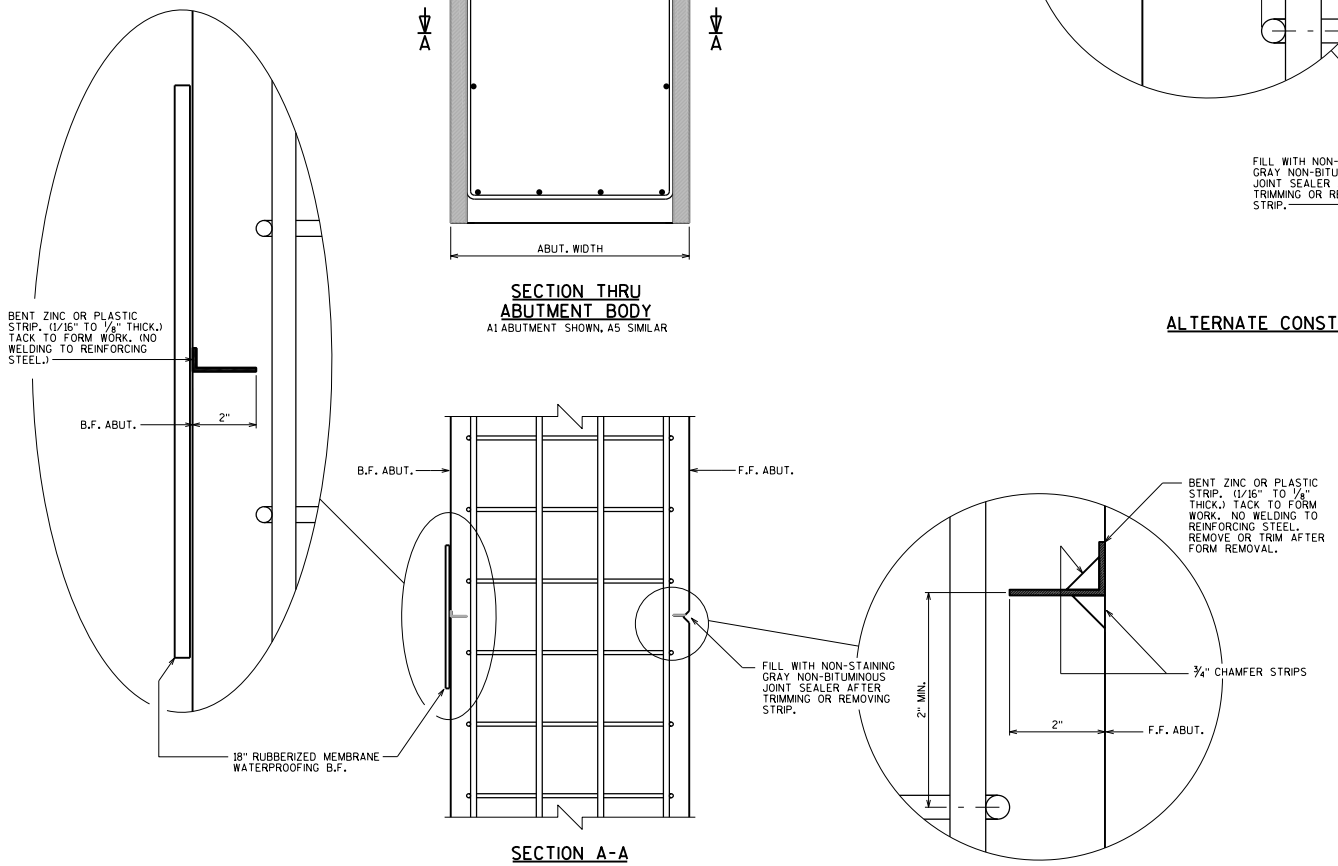
SECTION THRU
ABUTMENT BODY
A1 ABUTMENT SHOWN, A5 SIMILAR



SECTION THRU
PIER CAP

SECTION B-B

ALTERNATE CONSTRUCTION JOINT AT PIER CAP



SECTION A-A

ALTERNATE CONSTRUCTION JOINT AT ABUTMENT

NOTES

PARTIAL ZINC OR PLASTIC BULKHEAD MAY BE USED AS ALTERNATE CONSTRUCTION JOINT, WITH THE PERMISSION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.

VERTICAL CONSTRUCTION JOINT KEYWAY IS NOT REQUIRED WHEN USING ALTERNATE CONSTRUCTION JOINT.

CARE IS TO BE USED IN CASTING CONCRETE AROUND BULKHEAD TO PREVENT DISLOCATION OR MISALIGNMENT OF THE BULKHEAD.

SAW CUTTING JOINT IS NOT ALLOWED.

◑ USE A JOINT TOOL TO CONSTRUCT A CONTRACTION JOINT APPROXIMATELY 1/2" DEEP.

* BENT ZINC OR PLASTIC STRIP.

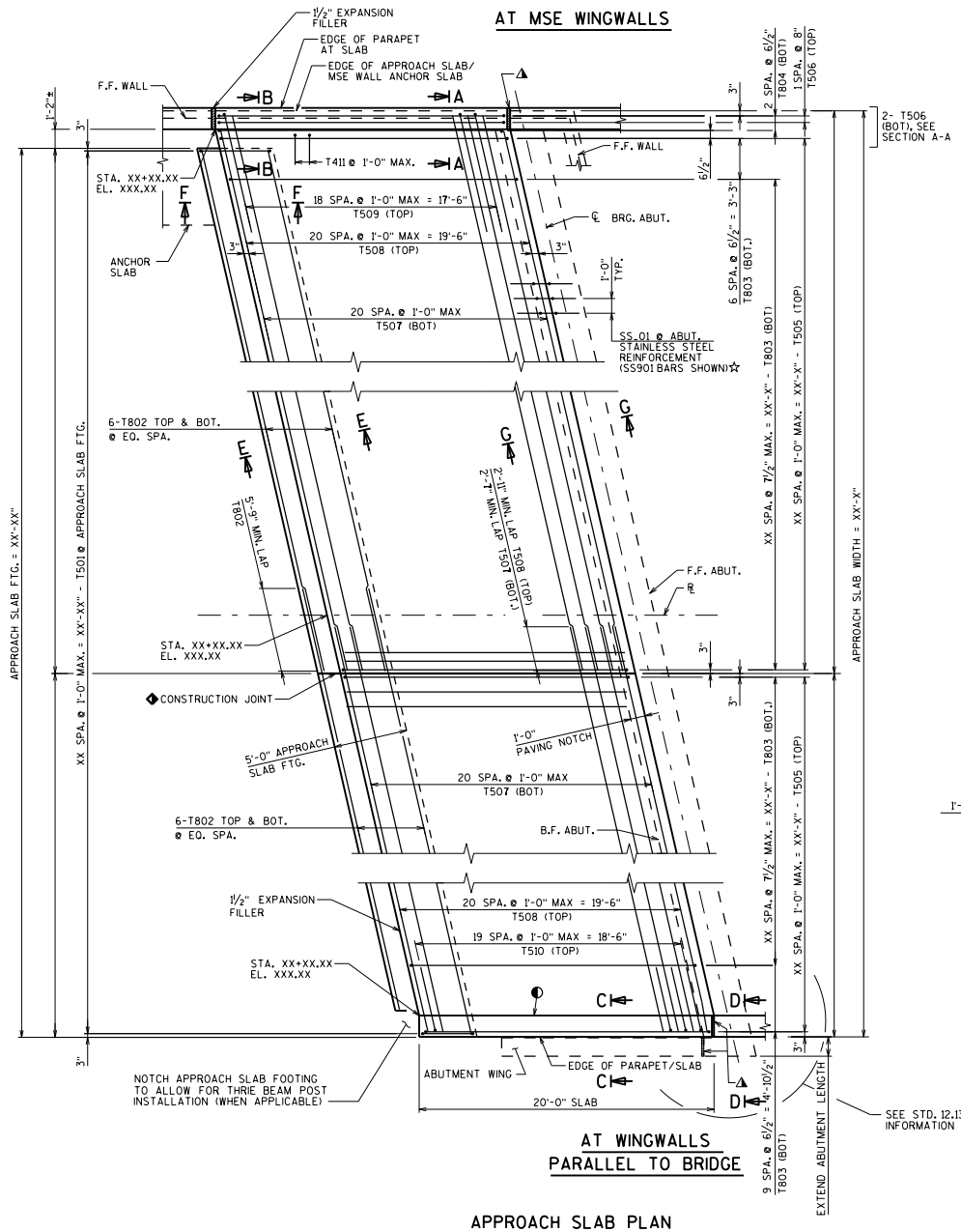
ALTERNATE
CONSTRUCTION JOINT

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 12.09



APPROACH SLAB PLAN

INSTALLATION (WHEN APPLICABLE)
(A1 ABUT. SHOWN - A3 ABUT. SIMILAR)

DESIGNER NOTES

STRUCTURAL APPROACH SLABS SHALL BE USED ON ALL I.H. BRIDGES AND U.S.H. BRIDGES. STRUCTURAL APPROACH SLABS ARE RECOMMENDED FOR BRIDGES CARRYING TRAFFIC VOLUMES GREATER THAN 3500 AADT (FUTURE DESIGN YEAR). OTHER LOCATIONS CAN BE CONSIDERED WITH THE APPROVAL OF THE CHIEF STRUCTURAL DESIGN ENGINEER. SEE BRIDGE MANUAL SECTION 12.11 FOR ADDITIONAL GUIDANCE.

STRUCTURAL APPROACH SLABS TO BE PART OF THE BRIDGE PLAN. BID ITEMS ARE CONCRETE MASONRY BRIDGES, BAR STEEL REINFORCEMENT HS COATED STRUCTURES, ETC. POLYETHYLENE SHEETS SHALL BE INCIDENTAL TO CONCRETE MASONRY BRIDGES.

QUANTITIES FOR APPROACH SLABS SHALL BE SHOWN IN A SEPARATE COLUMN WITHIN THE TOTAL ESTIMATED QUANTITIES TABLE IN THE FINAL PLANS.

◆ CONSTRUCTION JOINT REQUIRED WHEN WIDTH OF SUPERSTRUCTURE EXCEEDS 90'. RUN REINFORCEMENT THROUGH THE JOINT.

LONGITUDINAL APPROACH SLAB REINFORCEMENT SHALL BE PLACED PARALLEL TO THE APPROACH (I.E., NOT NORMAL TO THE ℄ ABUTMENT WITH SKEWED STRUCTURES).

STRUCTURE APPROACH SLABS TO BE DETAILED TO MATCH THE BRIDGE DECK (I.E., PROTECTIVE SURFACE TREATMENT, STAINLESS STEEL REINFORCEMENT, LONGITUDINAL GROOVING, ETC.). WHERE HIGH PERFORMANCE CONCRETE IS USED AT THE BRIDGE DECK, HPC SHALL BE USED FOR THE APPROACH SLAB ONLY (I.E., HPC IS NOT REQUIRED FOR APPROACH SLAB FOOTING).

☆ THE BID ITEM FOR SS901 AND SS601 BARS SHALL BE STANDARD SPECIAL PROVISION "BAR STEEL REINFORCEMENT HS STAINLESS STRUCTURES".

DESIGNER TO COORDINATE LOCATION OF SURFACE DRAINS, INLETS, AND/OR FLUMES WITH ROADWAY DESIGNER AND THE FDM.

SEE STANDARD 9.01 FOR BACKFILL AND BASE AGGREGATE DENSE 1-1/4 INCH DETAILS.

SHOW "DESIGN DATA" INFORMATION ON FIRST SHEET OF PLANS

DESIGN DATA

CONCRETE STRENGTH (STRUCTURAL APPROACH SLAB AND FOOTING), f'c:	4,000 P.S.I.
BAR STEEL REINFORCEMENT, GRADE 60, fy:	60,000 P.S.I.
ALLOWABLE SOIL BEARING PRESSURE:	2,000 P.S.F.

LEGEND

◭ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF ½" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD ⅛" BELOW SURFACE OF CONCRETE).

◐ SEE PARAPET STANDARD DETAILS FOR LOCATION OF NAME PLATE AND BENCH MARK WITH RESPECT TO THE END OF PARAPET.

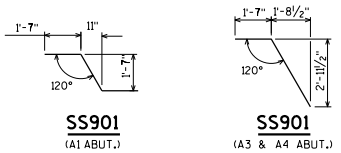
BILL OF BARS

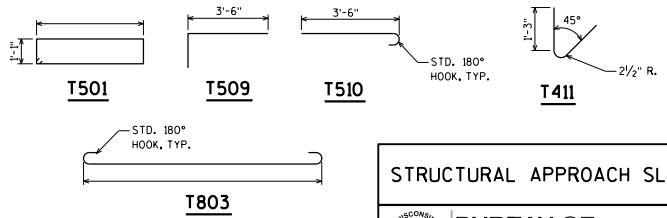
NOTE: THE FIRST OR FIRST TWO DIGITS OF THE BAR MARK SIGNIFIES THE BAR SIZE.

BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	BAR SERIES	LOCATION
SS901			5'-0"	X		CONC. ABUT. DIAPH. TO APPROACH SLAB
SS901			5'-0"	X		CONC. BACKWALL TO APPROACH SLAB
SS601			3'-0"			STRUCTURE SLAB TO APPROACH SLAB

STAINLESS STEEL (A1 ABUT. - GIRDER SPAN)
STAINLESS STEEL (A3 & A4 ABUT.)
STAINLESS STEEL (A1 ABUT. - SLAB SPAN)

BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	BAR SERIES	LOCATION
T501	X			X		APPROACH SLAB FTG. - STIRRUP
T802	X					APPROACH SLAB FTG. - TRANS.
T803	X			X		APPROACH SLAB - LONG. - BOT.
T804	X					APPROACH SLAB - LONG. - BOT. - WALL
T505	X					APPROACH SLAB - LONG - TOP.
T506	X					APPROACH SLAB - LONG. - WALL
T507	X					APPROACH SLAB - TRANS. - BOT.
T508	X					APPROACH SLAB - TRANS - TOP.
T509	X		4'-10"	X		APPROACH SLAB - TRANS. - TOP - WALL
T510	X		4'-1"	X		APPROACH SLAB - TRANS. - TOP - WING
T411	X		3'-0"	X		APPROACH SLAB - TRANS. - WALL





SECTIONS A-A THRU G-G ARE SHOWN ON STANDARD 12.11 & 12.12

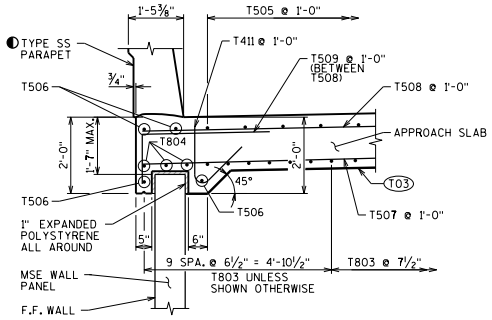
STRUCTURAL APPROACH SLAB

BUREAU OF STRUCTURES

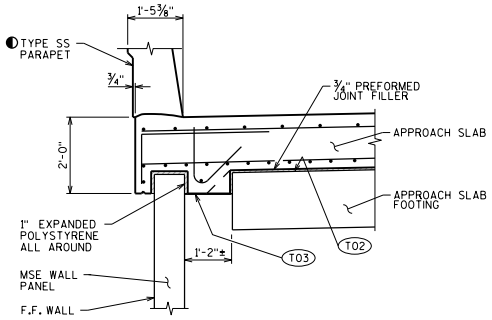
APPROVED: *Bill Oliva*

DATE: 1-19

STANDARD 12.10



SECTION A-A
(AT MSE WINGWALLS)



SECTION B-B
(AT MSE WINGWALLS)

LEGEND

(T02) STEEL TROWEL TOP SURFACE OF FOOTING AND PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF FOOTING.

(T03) PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF SUBGRADE BENEATH SLAB.

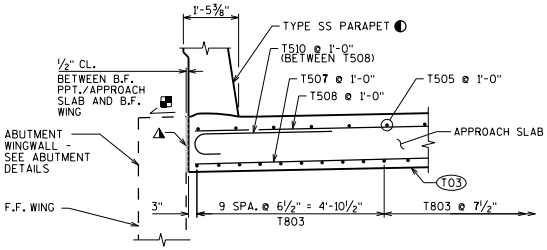
△ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF ½" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD ⅛" BELOW SURFACE OF CONCRETE).

◐ SEE PARAPET STANDARD DETAILS FOR REINFORCEMENT, LOCATION OF NAME PLATE AND BENCH MARK WITH RESPECT TO THE END OF PARAPET, ETC.

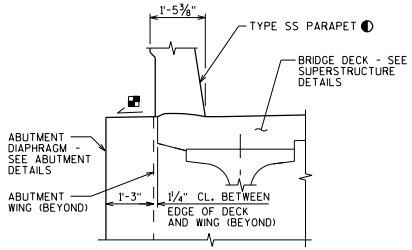
▨ CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH. FOR DECK POUR MATCH BRIDGE X-SLOPE.

▪ SLOPE TO DRAIN

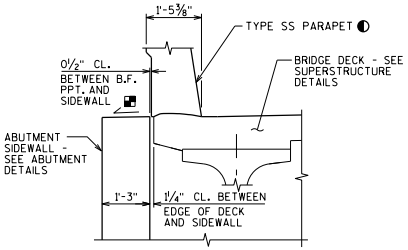
✳ SECTION REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARD 12.10 FOR DIFFERENT APPLICATION.



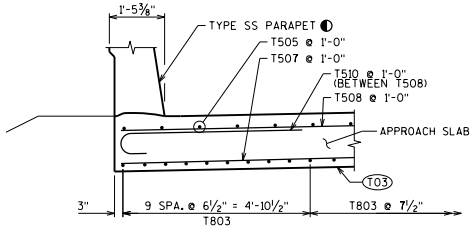
SECTION C-C
(AT WINGWALLS PARALLEL TO BRIDGE)



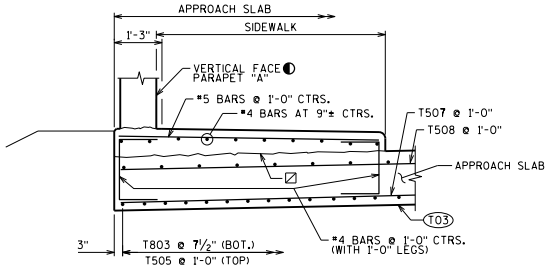
SECTION D-D
(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT.)



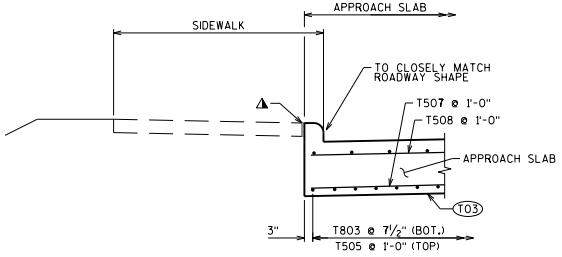
SECTION D-D ✳
(AT WINGWALLS PARALLEL TO BRIDGE - A3 ABUT.)



SECTION C-C ✳
(AT WINGWALLS PARALLEL TO ABUT.)



SECTION C-C ✳
(AT WINGWALLS PARALLEL TO ABUT.)



SECTION C-C ✳
(AT WINGWALLS PARALLEL TO ABUT.)

SECTIONS A-A THRU G-G ARE FROM STANDARD 12.10

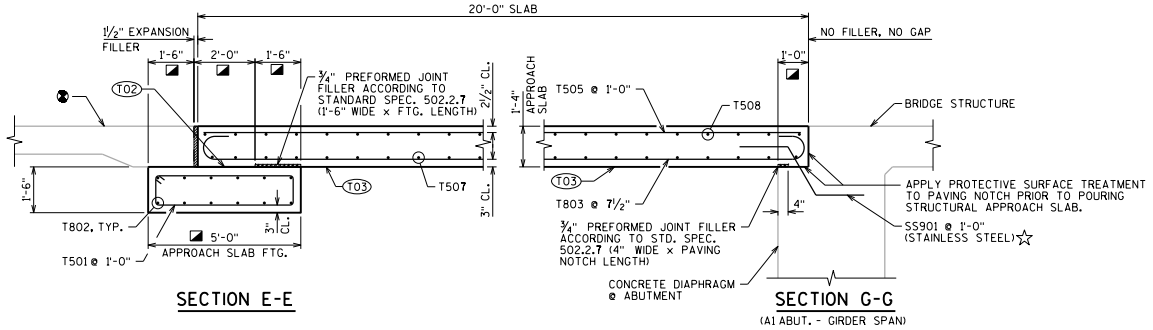
STRUCTURAL APPROACH SLAB DETAILS 1

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 12.11



SECTION E-E

SECTION G-G

(A1 ABUT. - GIRDER SPAN)

SECTION THRU APPROACH SLAB

LEGEND

(T02) STEEL TROWEL TOP SURFACE OF FOOTING AND PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF FOOTING.

(T03) PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF SUBGRADE BENEATH SLAB.

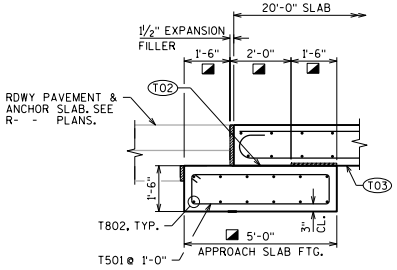
◪ MEASURED NORMAL TO ABUTMENT

FOLLOW FDM 14-10-15 REQUIREMENTS FOR ROADWAY APPROACH PAVEMENT.

✳ SECTION REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARD 12.10 FOR DIFFERENT APPLICATION.

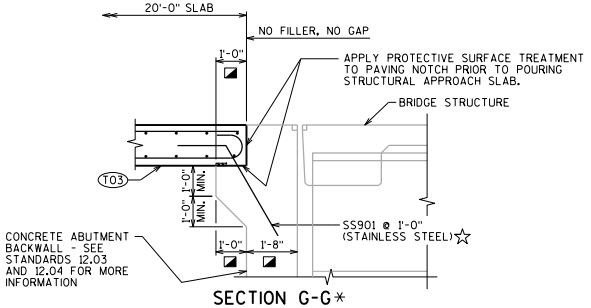
☆ THE BID ITEM FOR SS901 AND SS601 BARS SHALL BE STANDARD SPECIAL PROVISION "BAR STEEL REINFORCEMENT HS STAINLESS STRUCTURES".

▽ R501 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL AND ABUT. STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.



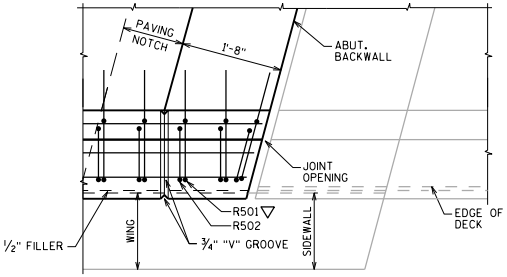
SECTION F-F

(AT MSE WINGWALLS WITH ANCHOR SLAB)



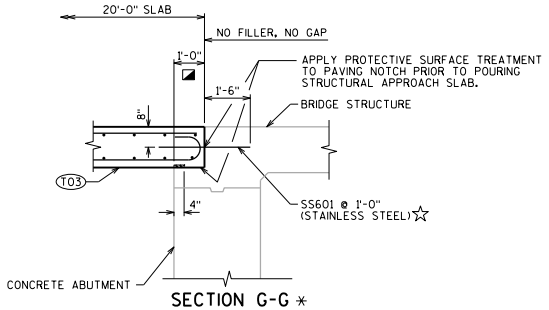
SECTION G-G ✳

(A3 ABUT.)



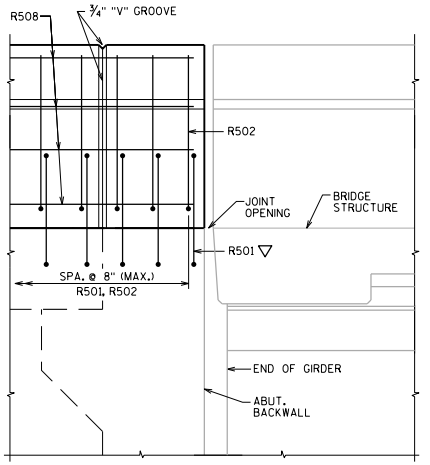
PLAN

(PARAPET ON STRUCTURAL APPROACH SLAB AT A3 ABUT.)



SECTION G-G ✳

(A1 ABUT. - SLAB SPAN)



OUTSIDE ELEVATION

(PARAPET ON STRUCTURAL APPROACH SLAB AT A3 ABUT.)
(WING NOT SHOWN FOR CLARITY)

DESIGNER NOTES

SEE CHAPTER 30 FOR PARAPETS ON STRUCTURAL APPROACH SLAB DETAILS.

SECTIONS A-A THRU G-G ARE FROM STANDARD 12.10

STRUCTURAL APPROACH SLAB DETAILS 2

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

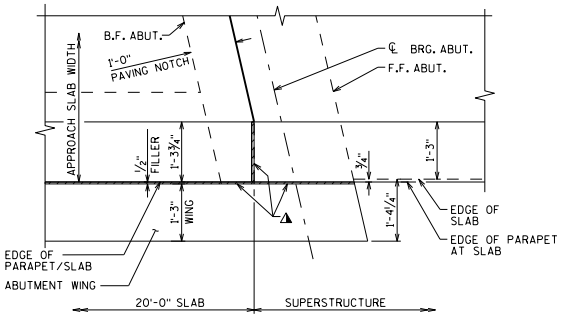
DATE: 1-19

STANDARD 12.12

LEGEND

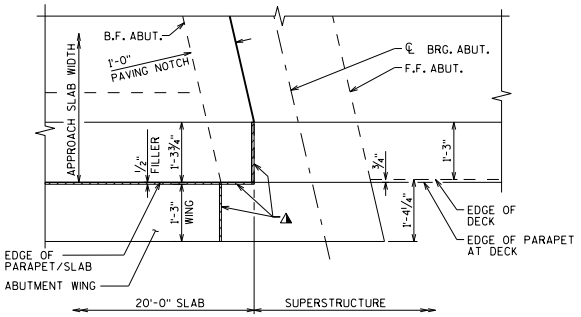
▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF ½" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD ⅛" BELOW SURFACE OF CONCRETE).

✳ PARTIAL PLAN REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARD 12.10 FOR DIFFERENT APPLICATION.



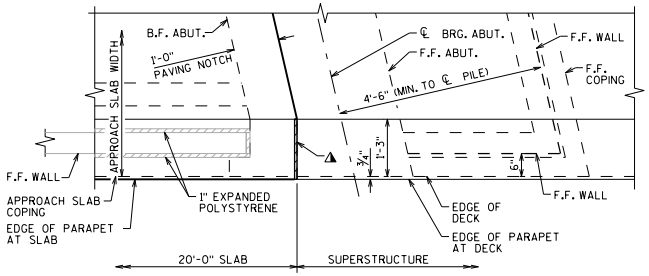
APPROACH SLAB PARTIAL PLAN

(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT. - SLAB SPAN)



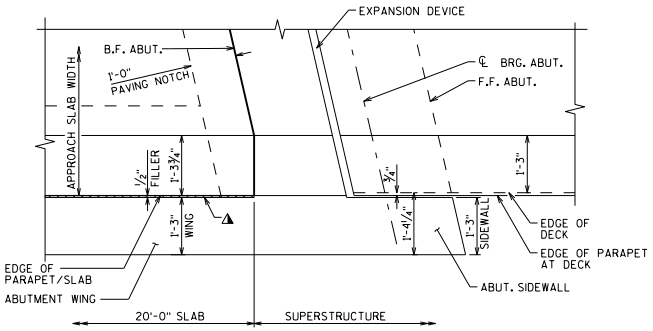
APPROACH SLAB PARTIAL PLAN

(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT. - GIRDER SPAN)



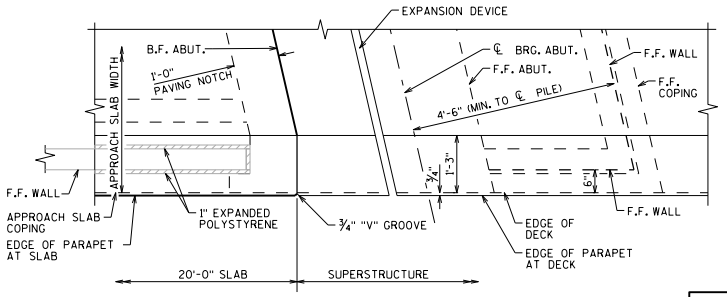
APPROACH SLAB PARTIAL PLAN ✳

(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT. AT MSE WINGWALLS - GIRDER SPAN)



APPROACH SLAB PARTIAL PLAN ✳

(AT WINGWALLS PARALLEL TO BRIDGE - A3 ABUT. - GIRDER SPAN)



APPROACH SLAB PARTIAL PLAN ✳

(AT WINGWALLS PARALLEL TO BRIDGE - A3 ABUT. AT MSE WINGWALLS - GIRDER SPAN)

PARTIAL PLANS SHOWN HERE ARE FROM STANDARD 12.10

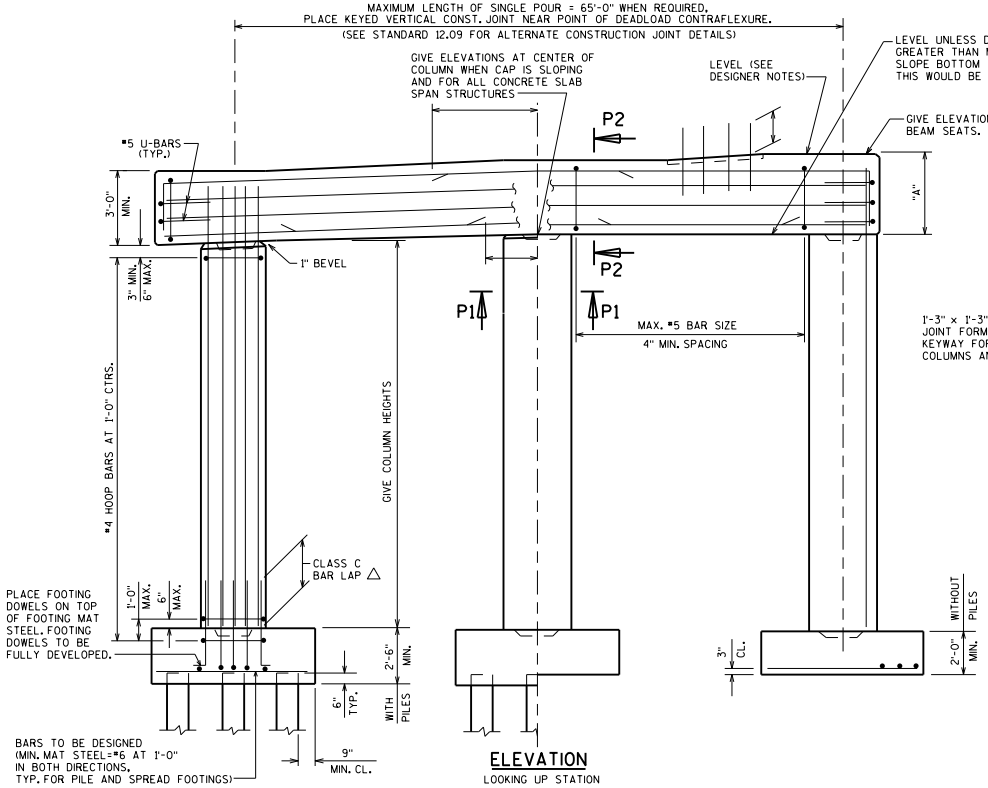
STRUCTURAL APPROACH SLAB DETAILS 3

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

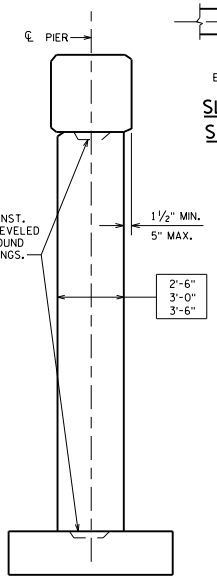
DATE: 7-18

STANDARD 12.13

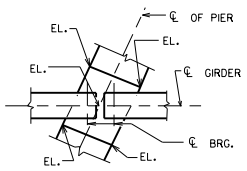


ELEVATION

LOOKING UP STATION



END VIEW



SLOPING BEAM SEAT DETAILS

DESIGNER NOTES

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

SLOPE TOP OF COLUMNS TO MATCH CAP WHEN THE BOTTOM OF THE CAP IS SLOPED. DETAIL BOTTOM OF CAP REINFORCEMENT TO CLEAR VERTICAL COLUMN REINFORCEMENT.

CAPS MAY BE MORE THAN 3" WIDER THAN COLUMNS IF THE EXTRA WIDTH IS NECESSARY TO SATISFY THE MINIMUM EDGE DISTANCE CRITERIA ADJACENT TO BEARINGS.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDERS WITH ½" ELASTOMERIC BEARING PADS AND THE GIRDER BOTTOM SLOPES MORE THAN 1%. ADD THESE TWO VALUES TO DETERMINE THE GIRDER SLOPE:
   - LONGITUDINAL GRADE OF GIRDER (PERCENT)
   - CAMBER EFFECT = 4(RC)/L X 100 (PERCENT), WHERE:
     RC = RESIDUAL CAMBER (INCHES)
     L = GIRDER LENGTH (INCHES)

2. WHEN A CAP IS USED FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

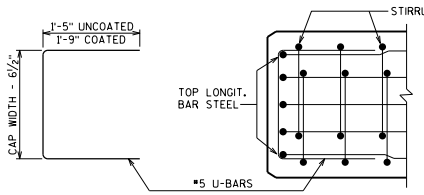
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.

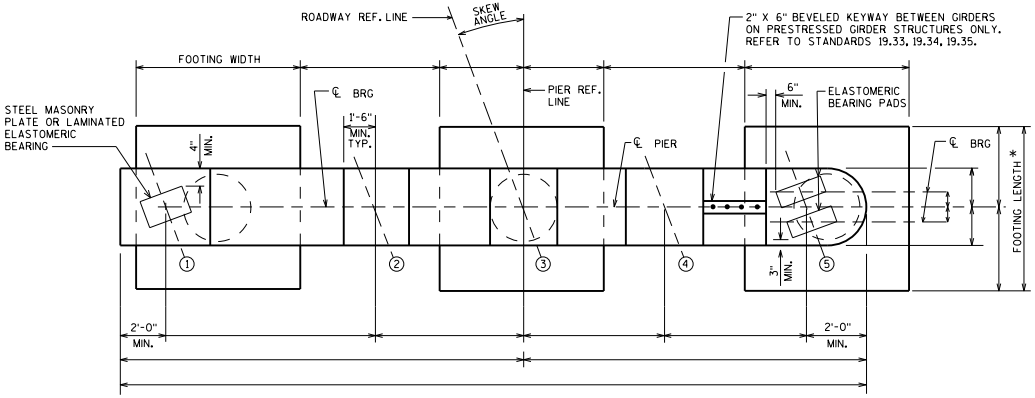
BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.

SEE BRIDGE MANUAL 13.4.10 FOR MULTI-COLUMNED PIER DESIGN REGARDING VEHICULAR COLLISON FORCE. THE PIER OPTIONS REPRESENTED ON THIS STANDARD DO NOT MEET THE REQUIREMENTS OF AASHTO LRFD 3.6.5. FOR 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.



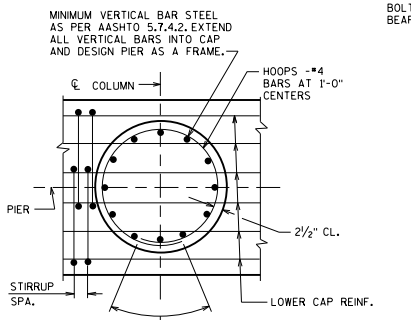
PLAN VIEW SHOWING END OF CAP REINF.



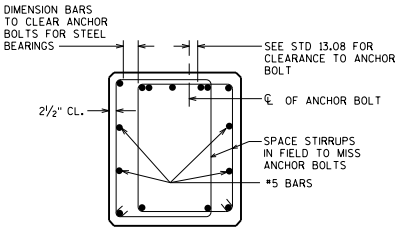
PLAN

SHOWING BOTH SQUARE AND ROUND ENDED CAP

*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER.



SECTION P1



SECTION P2

MULTI-COLUMNED PIER

BUREAU OF STRUCTURES

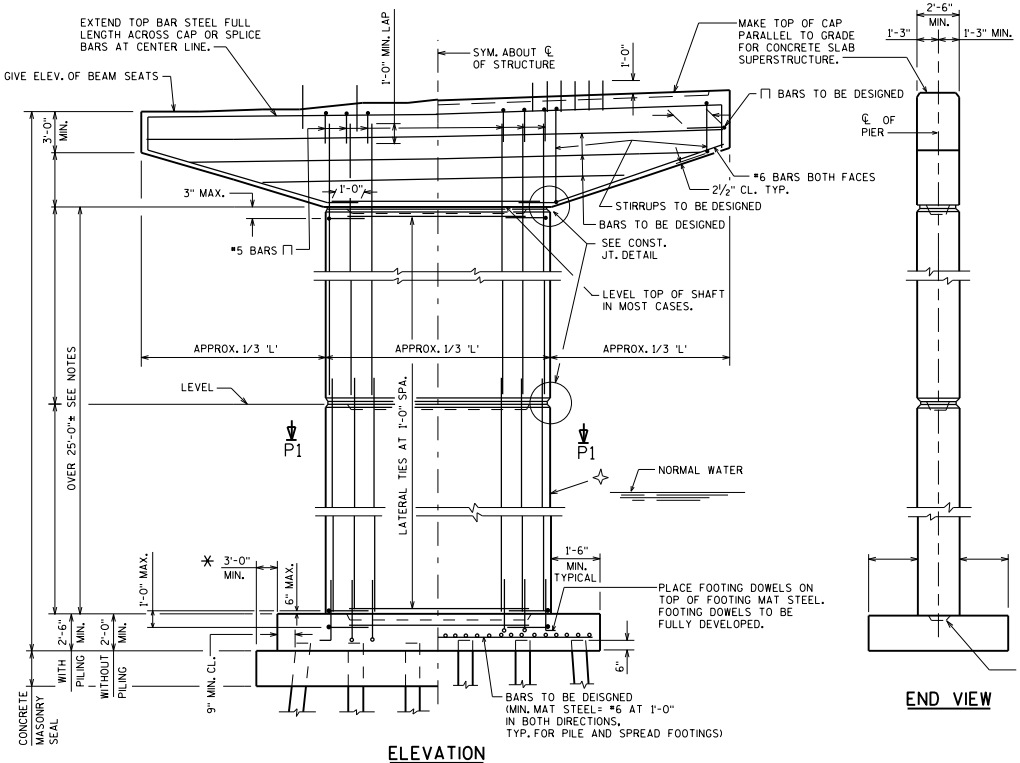
APPROVED: Bill Oliva

DATE: 1-18

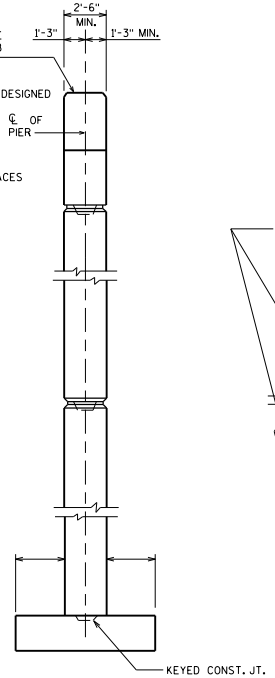
STANDARD 13.01

GIRDER STRUCTURES

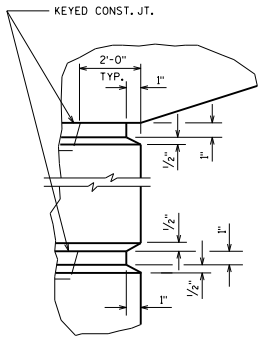
CONCRETE SLAB STRUCTURES



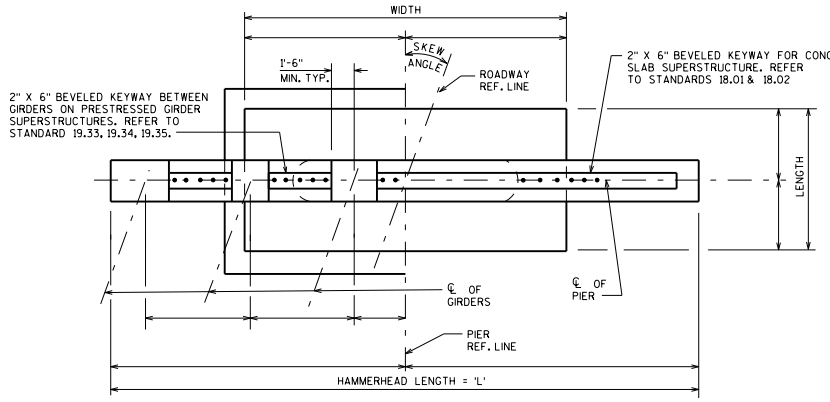
ELEVATION
LOOKING UP STATION



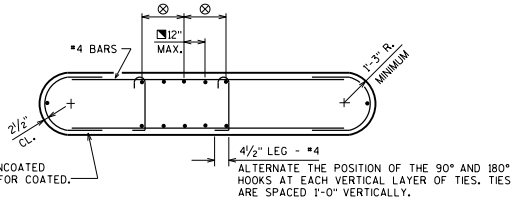
END VIEW



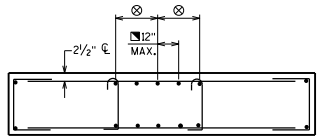
CONST. JT. DETAIL



PLAN



SECTION P1



ALTERNATE SECTION P1

DESIGNER NOTES

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

OPTIONAL KEYED CONSTRUCTION JOINTS IN SHAFT, IF PROVIDED, SHALL BE PLACED APPROXIMATELY 2'-0" ABOVE NORMAL WATER ELEVATION. OPTIONAL KEYED CONSTRUCTION JOINTS IN SHAFT SHOULD BE PROVIDED SO THAT THE MAXIMUM HEIGHT OF POUR NEED NOT EXCEED 25'-0"±. DETAIL BAR SPLICES AT OPTIONAL JOINTS IF THE BAR PROJECTION WOULD BE GREATER THAN 20'-0"±. RUSTICATIONS SHOWN IN "CONST. JT. DETAIL" MAY BE OMITTED AT THE OPTION OF THE DESIGNER.

KEYED CONSTRUCTION JOINTS SHALL BE FORMED BY BEVELED KEYWAY 4" DEEP X 1/3 THICKNESS OF SHAFT X 4'-0" LESS THAN LENGTH OF SHAFT.

✧ A STANDARD SHAFT TAPER OF 10% MAY BE USED AT THE OPTION OF THE DESIGNER. (LATERAL DIRECTION ONLY)

SHAFT MAY BE TAPERED IN ONE OR TWO DIRECTIONS WHEN REQUIRED FOR STRUCTURAL REASONS.

A NON-STANDARD SHAFT CROSS-SECTION, SHAPE, OR TAPER, NOT REQUIRED FOR STRUCTURAL REASONS, MAY BE USED ONLY WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDERS WITH ½" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.

2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4 INCHES OR MORE ABOVE THE LOWEST BEAM SEAT.

◹ THIS MAXIMUM VERT. BAR SPACING APPLIES ONLY WHEN THE VERTICAL REINFORCEMENT IS 1% OR MORE OF THE GROSS CONCRETE AREA.

SEE STANDARD 13.01 FOR MINIMUM OFFSETS FROM BEARINGS TO SIDES OF CAP AND TO ADJACENT BEARING SEAT STEPS.

EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.

✳ INCREASE THIS DIMENSION IF NECESSARY TO PREVENT BATTERED PILES FROM DRIVING INTO SHEET PILING. ALSO INCREASE DIMENSION TO FACILITATE OVERHEAD SHEETING CLEARANCE IF THE TOP OF PIER IS BEYOND NORMAL SEAL SIZE AND NO CONSTRUCTION JOINT IS PROVIDED IN THE SHAFT/CAP REGION (E.G. TAPERED WALL PIERS OR SHORTER HAMMERHEADS WITH RADIUS TRANSITION FROM SHAFT TO CAP).

⊗ MAXIMUM SPACING BETWEEN UNRESTRAINED VERTICAL BAR AND RESTRAINED (TIED ACROSS MEMBER) VERTICAL BAR IS 24 INCHES.

PLAN NOTES

THE BAR SPLICES AT THE OPTIONAL KEYED CONSTRUCTION JOINTS MAY BE ELIMINATED WHETHER OR NOT THE JOINT IS UTILIZED. PAYMENT WILL BE FOR THE ACTUAL BARS INSTALLED.

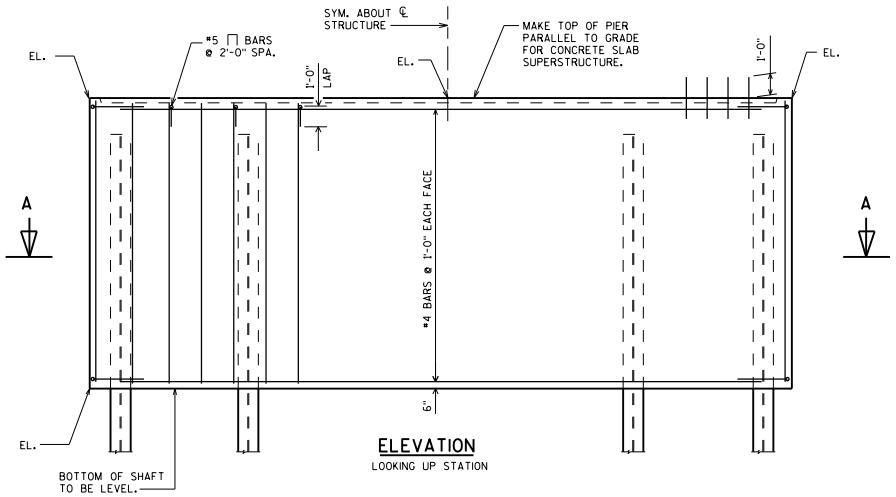
HAMMERHEAD PIER

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

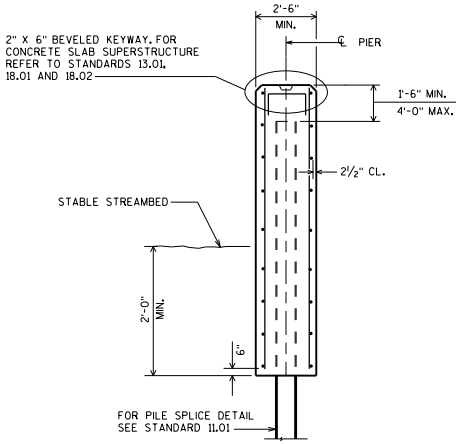
DATE: 1-15

STANDARD 13.02



ELEVATION

LOOKING UP STATION



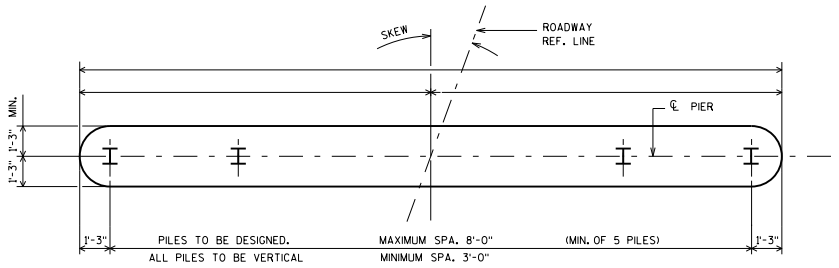
END VIEW

DESIGNER NOTES

SEE BRIDGE MANUAL SECTION 13.11.5 FOR GUIDANCE ON COFFERDAMS.

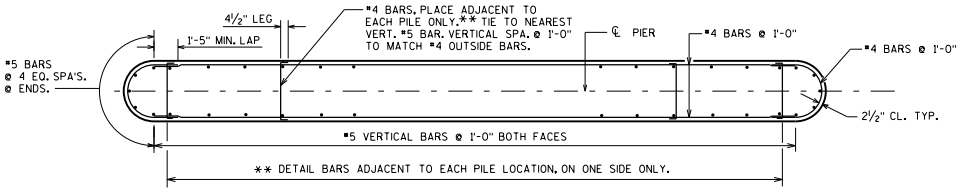
CONSTRUCTION JOINTS ARE NOT REQUIRED, REGARDLESS OF LENGTH OF PILE ENCASED PIER.

SEE STANDARD 13.01 FOR ADDITIONAL, APPLICABLE DESIGNER NOTES

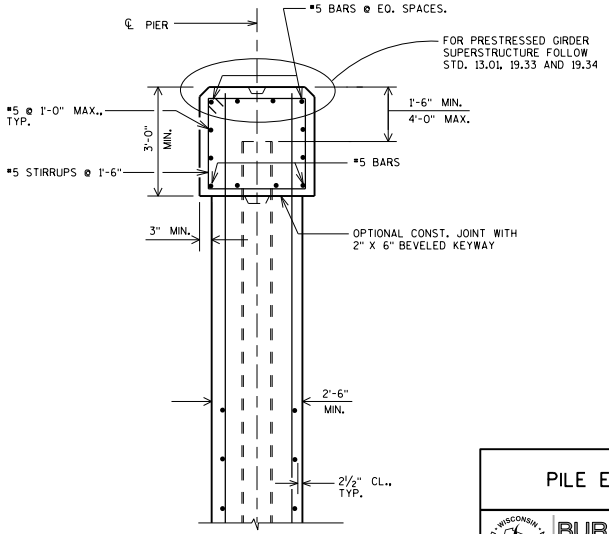


PLAN

STEEL PILING SHOWN. CAST IN PLACE CONC. PILING LAYOUT SIMILAR.



SECTION A



CAP TYPE DETAIL

USE WHEN ECONOMICAL FOR GIRDERS ON LARGE SKEWS

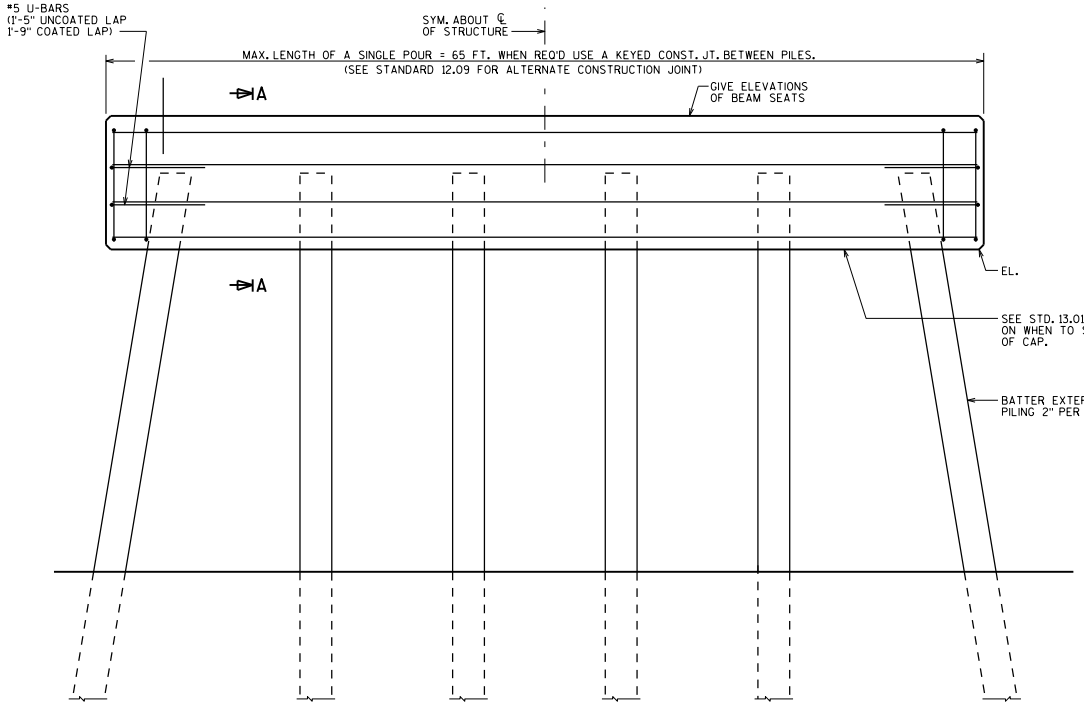
PILE ENCASED PIER

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

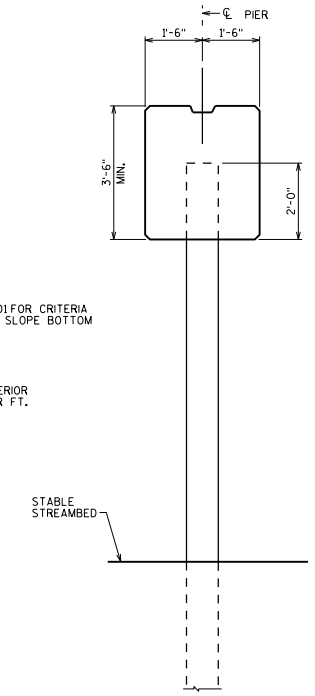
DATE: 1-19

STANDARD 13.03



ELEVATION

LOOKING UP STATION



END VIEW

NOTES

PILES SHALL BE PAINTED IN ACCORDANCE WITH SECTION 550.3.11.3 OF THE STANDARD SPECIFICATIONS.

DESIGNER NOTES

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

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDERS WITH ½" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.

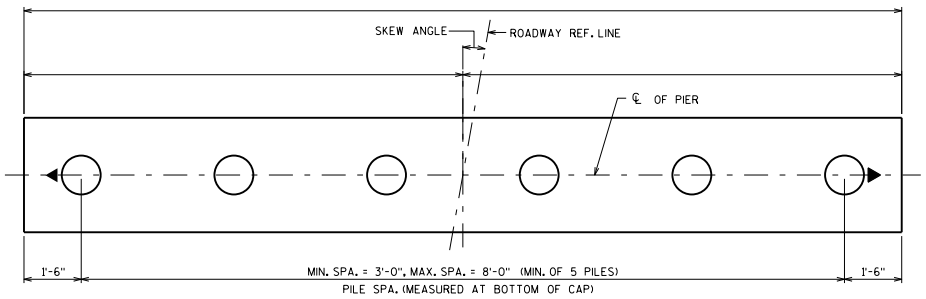
2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

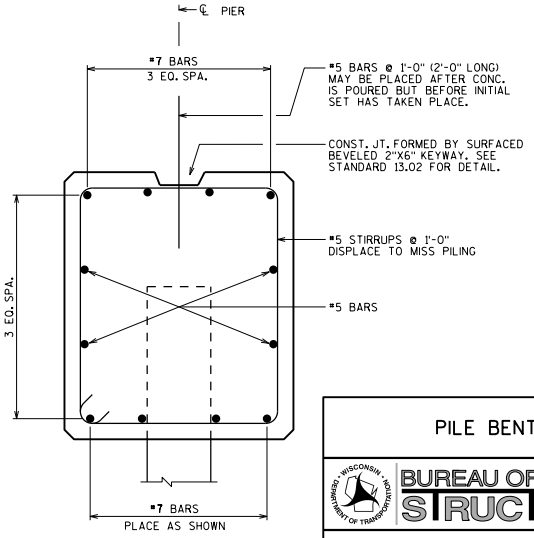
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

PILES SHALL BE 12¾" OR 14" DIAMETER CAST-IN-PLACE WITH MINIMUM WALL THICKNESS OF ⅜".

H-PILE USE REQUIRES PRIOR APPROVAL DURING DESIGN OF THE STRUCTURES DEVELOPMENT CHIEF, (608) 266-0075.



PLAN



SECTION A-A

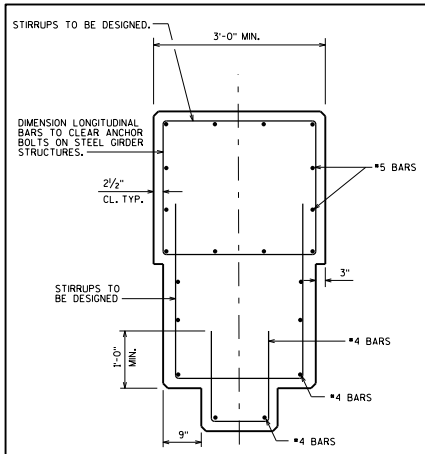
PILE BENT

BUREAU OF STRUCTURES

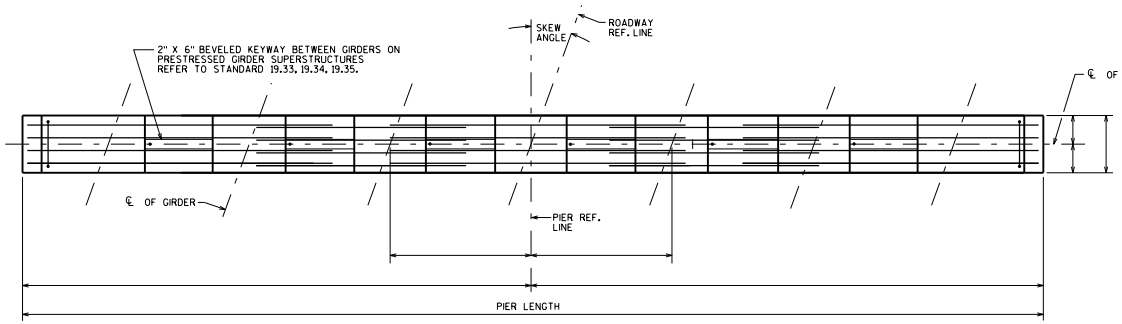
APPROVED: Bill Oliva

DATE: 1-19

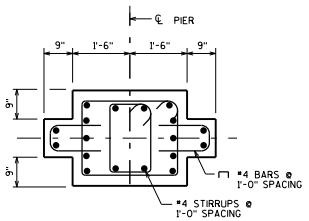
STANDARD 13.04



SECTION P1



PLAN OF PIER CAP



SECTION P2

DESIGNER NOTES

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

OPTIONAL KEYED CONSTRUCTION JOINTS IN COLUMNS (IF USED) AND REQUIRED KEYED JOINTS FOR 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:

1. FOR GIRDERS WITH ½" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.

2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

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.

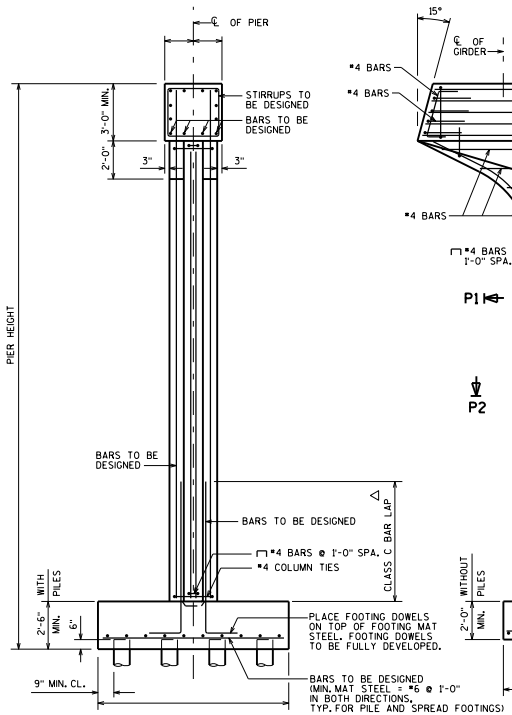
BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.

SEE STANDARD 13.01 FOR MINIMUM OFFSETS FROM BEARINGS TO SIDES OF CAP AND TO ADJACENT BEARING SEAT STEPS.

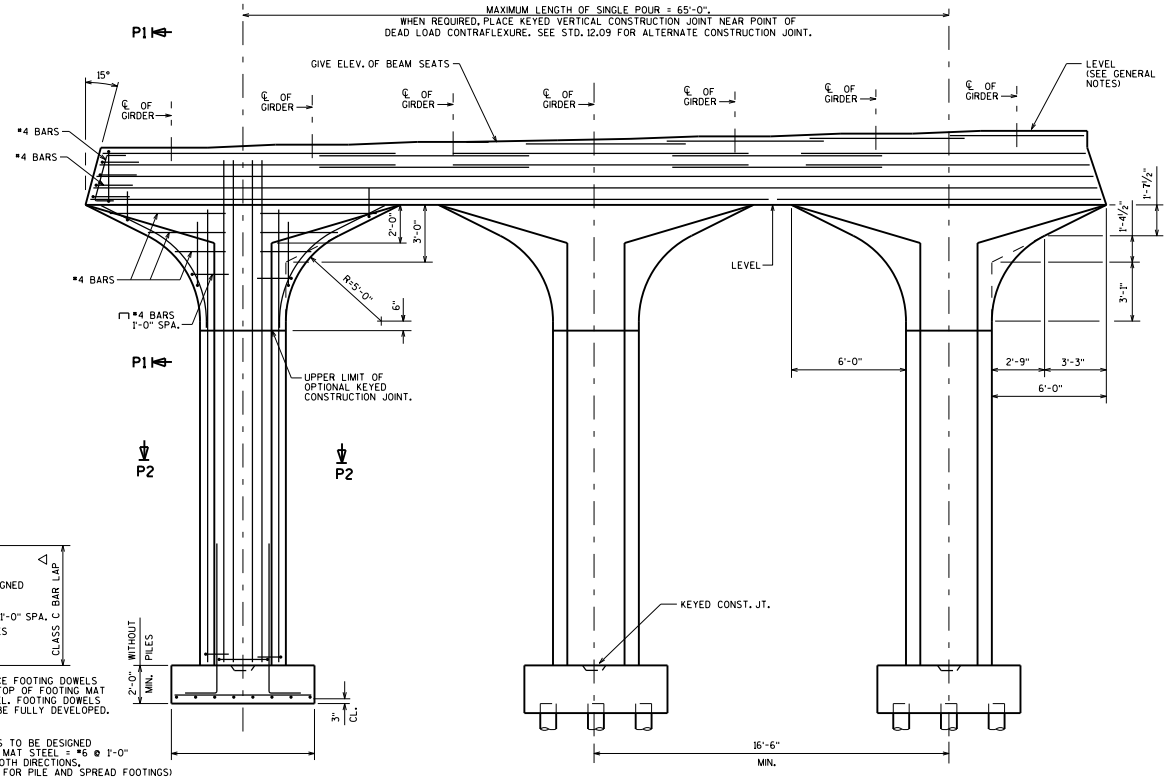
FOR CASES WITH CRASH WALLS, DEFER TO NON-AESTHETIC TYPE MULTI-COLUMNED PIERS.

SEE BRIDGE MANUAL 13.4.10 FOR MULTI-COLUMNED PIER DESIGN REGARDING VEHICULAR COLLISON FORCE.

△ NORMALLY THIS LAP IS OMITTED AND FOOTING DOWELS EXTENDED INTO THE CAP IF THE LAP IS GREATER THAN ONE-HALF THE COLUMN HEIGHT.



END VIEW



ELEVATION
LOOKING UP STATION

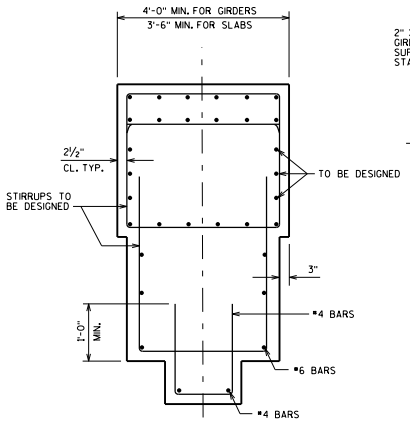
MULTI-COLUMNED PIER TYPE 2

BUREAU OF STRUCTURES

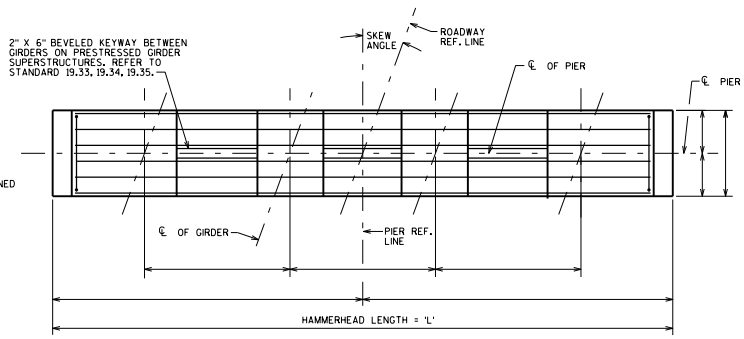
APPROVED: Bill Oliva

DATE: 7-16

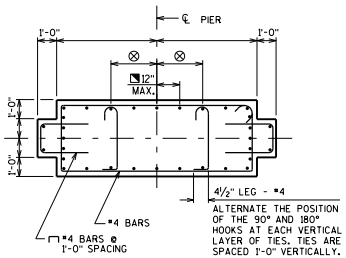
STANDARD 13.05



SECTION P1



PLAN OF PIER CAP



SECTION P2

NOTES

THE BAR SPLICES AT THE OPTIONAL KEYED CONSTRUCTION JOINTS MAY BE ELIMINATED WHETHER OR NOT THE JOINT IS UTILIZED. PAYMENT WILL BE FOR THE ACTUAL BARS INSTALLED.

DESIGNER NOTES (CON'T)

◥ THIS MAXIMUM VERT. BAR SPACING APPLIES ONLY WHEN THE VERTICAL REINFORCEMENT IS 1% OR MORE OF THE GROSS CONCRETE AREA.

⊗ MAXIMUM SPACING BETWEEN UNRESTRAINED VERTICAL BAR AND RESTRAINED (TIED ACROSS MEMBER) VERTICAL BAR IS 24 INCHES

DESIGNER NOTES

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

OPTIONAL KEYED CONSTRUCTION JOINTS IN SHAFT, IF PROVIDED, SHALL BE PLACED APPROXIMATELY 2'-0" ABOVE NORMAL WATER ELEVATION. OPTIONAL KEYED CONSTRUCTION JOINTS IN SHAFT SHOULD BE PROVIDED SO THAT THE MAXIMUM HEIGHT OF POUR NEED NOT EXCEED 25'-0"±. DETAIL BAR SPLICES AT OPTIONAL JOINTS IF THE BAR PROJECTION WOULD BE GREATER THAN 20'-0"±.

KEYED CONSTRUCTION JOINTS SHALL BE FORMED BY BEVELED KEYWAY 4" DEEP X 1/3 THICKNESS OF SHAFT X 4'-0" LESS THAN LENGTH OF SHAFT. EXPOSED EDGES OF CONSTRUCTION JOINT SHALL BE FLUSH AND NOT BEVELED.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDER WITH ½" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.

2. WHEN A CAP IS USED FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

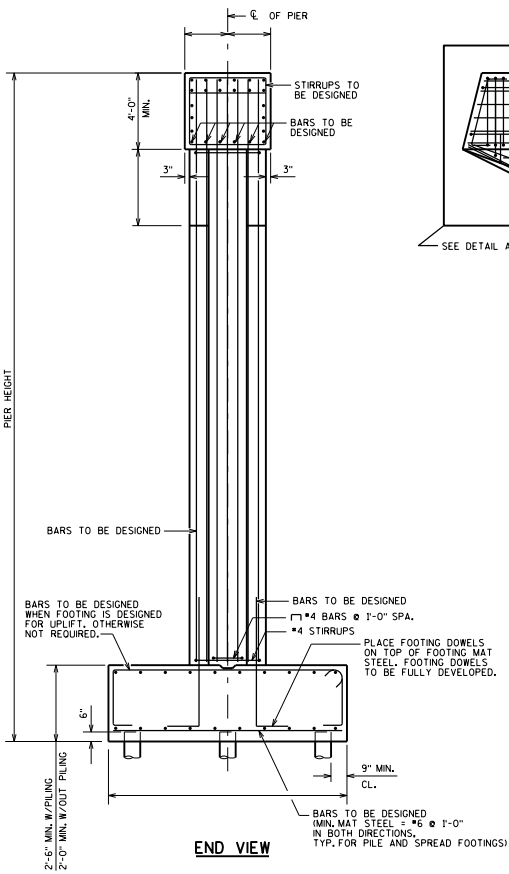
BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

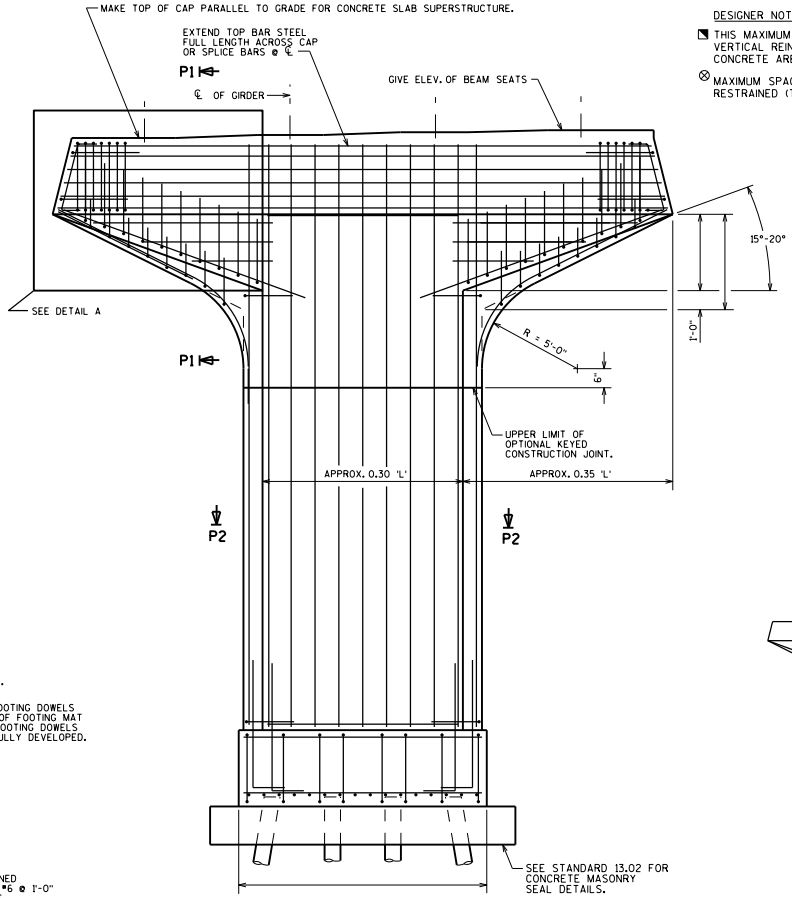
FOR "HAMMERHEAD LENGTH" GREATER THAN 45'-0", CONSIDER A TWO SHAFT PIER FRAME RESEMBLING TWO HAMMERHEAD PIERS PLACED SIDE BY SIDE.

SEE STANDARD 13.01 FOR MINIMUM OFFSETS FROM BEARINGS TO SIDES OF CAP AND TO ADJACENT BEARING SEAT STEPS.

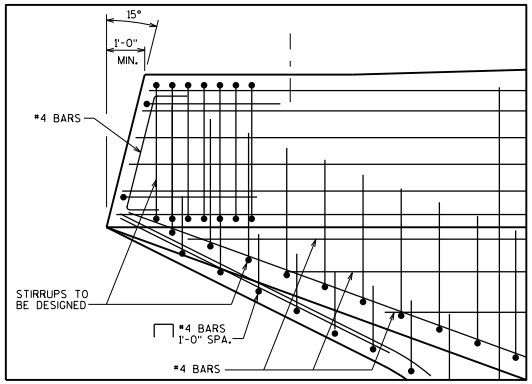
EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.



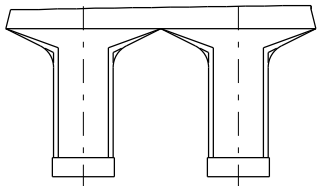
END VIEW



ELEVATION
LOOKING UP STATION



DETAIL A



TWO SHAFT PIER

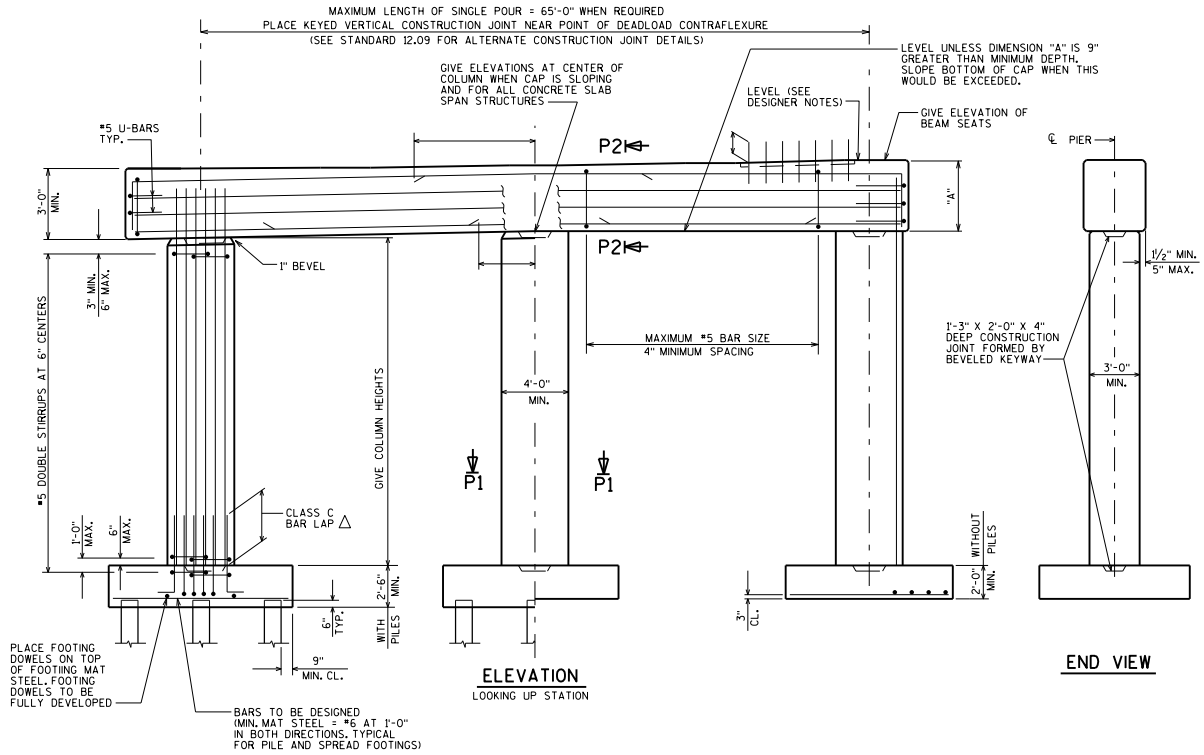
HAMMERHEAD PIER - TYPE 2

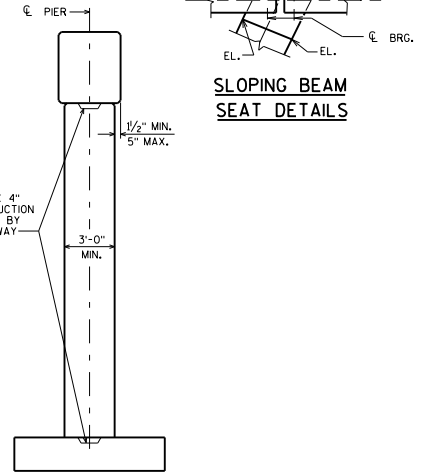
BUREAU OF STRUCTURES

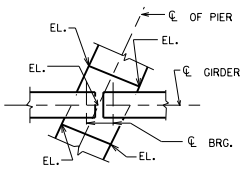
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 13.06







SLOPING BEAM SEAT DETAILS

DESIGNER NOTES

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

SLOPE TOP OF COLUMNS TO MATCH CAP WHEN THE BOTTOM OF THE CAP IS SLOPED. DETAIL BOTTOM OF CAP REINFORCEMENT TO CLEAR VERTICAL COLUMN REINFORCEMENT.

CAPS MAY BE MORE THAN 3" WIDER THAN COLUMNS IF THE EXTRA WIDTH IS NECESSARY TO SATISFY THE MINIMUM EDGE DISTANCE CRITERIA ADJACENT TO BEARINGS

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDERS WITH ½" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.

2. WHEN A CAP IS USED FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

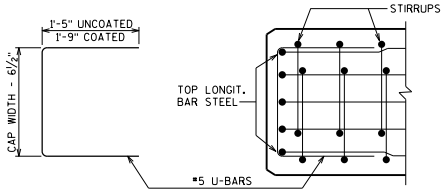
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.

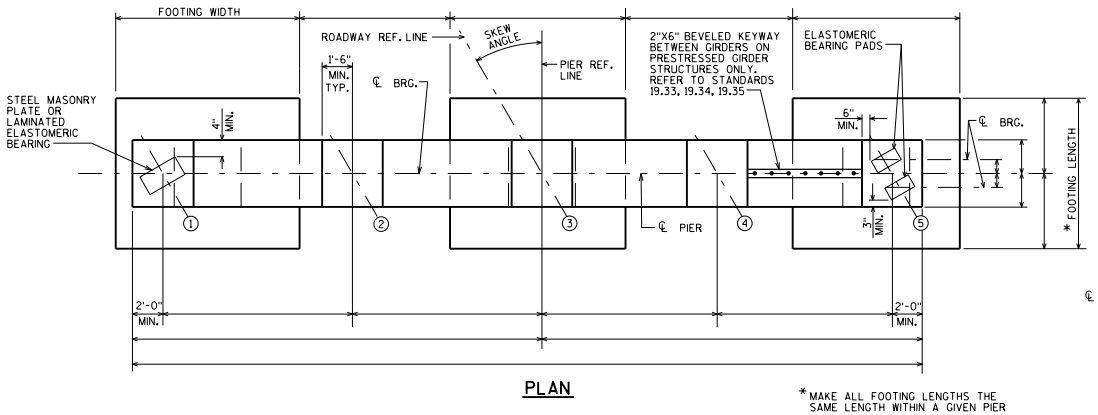
BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.

SEE BRIDGE MANUAL 13.4.10 FOR MULTI-COLUMNED PIER DESIGN REGARDING VEHICULAR COLLISON FORCE. THE PIER AS DETAILED ON THIS STANDARD IS ADEQUATE TO RESIST THE REQUIREMENTS OF AASHTO LRFD 3.6.5 FOR VEHICULAR COLLISION FORCE PROVIDED THAT RUSTICATIONS DO NOT EXEED 1½ INCH.

△ NORMALLY THIS LAP IS OMITTED AND FOOTING DOWELS EXTENDED INTO THE CAP IF THE LAP IS GREATER THAN ONE-HALF THE COLUMN HEIGHT.

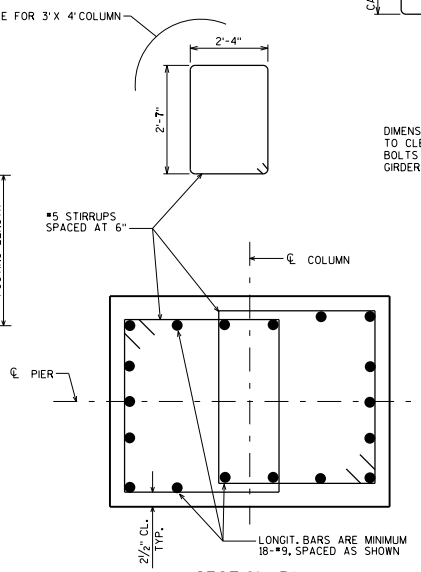


PLAN VIEW SHOWING END OF CAP REINF.

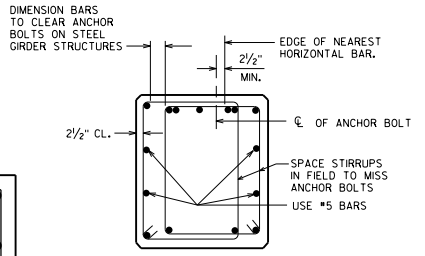


PLAN

*MAKE ALL FOOTING LENGTHS THE SAME LENGTH WITHIN A GIVEN PIER



SECTION P1



SECTION P2

MULTI-COLUMNED PIER WITH RECTANGULAR COLUMNS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-14

STANDARD 13.07

DESIGNER NOTES

PROVIDE 4" MIN. CLEAR BETWEEN ANCHOR BOLTS AND REINFORCEMENT.

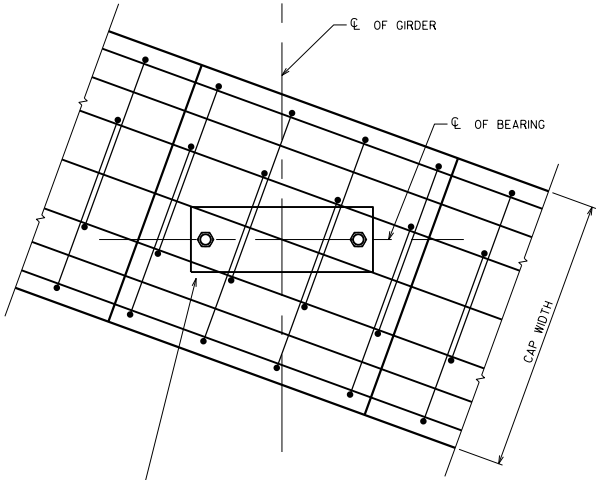
FOR PIER CAPS UP TO 3'-6" WIDE, PROVIDE AT LEAST ONE 5" MIN. CLEARANCE BETWEEN REINFORCING BARS FOR CONCRETE PLACEMENT BY TREMIE AND FOR VIBRATION. FOR CAPS GREATER THAN 3'-6" WIDE, PROVIDE AT LEAST TWO SUCH GAPS.

SHOW ANCHORS LOCATIONS ON PIER CAP SHEETS.

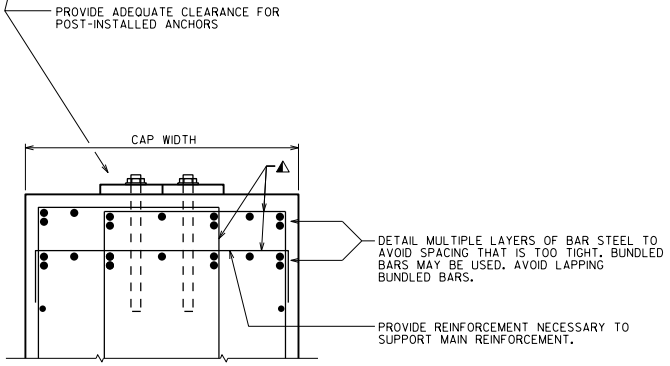
ABUTMENT REINFORCEMENT LAYOUT SIMILAR TO PIER CAP REINFORCEMENT DETAILING.

NOTE

⚠ DISPLACE TRANSVERSE STIRRUP BARS AS NEEDED TO PROVIDE 4" MIN. CLEAR BETWEEN ANCHOR BOLTS AND REINFORCEMENT.



PLAN



SECTION THRU PIER CAP

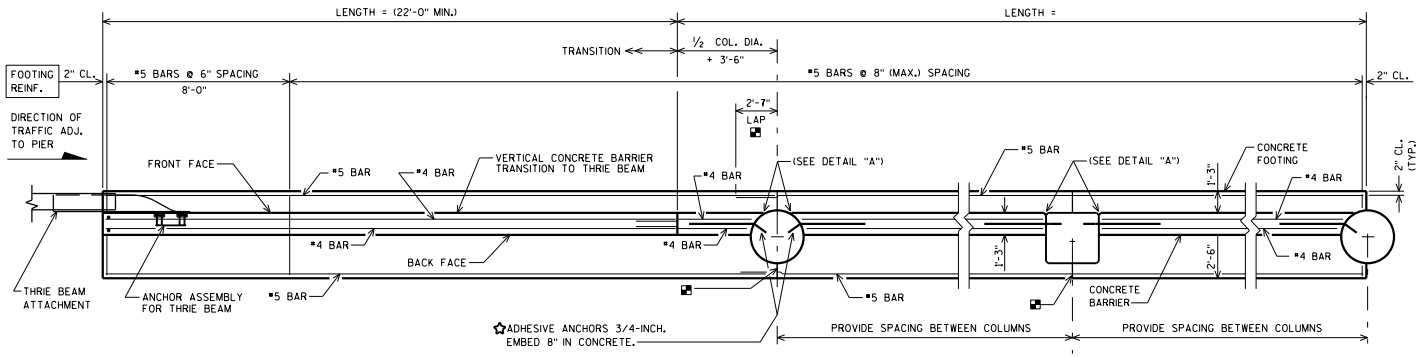
PIER CAP REINFORCEMENT DETAILING

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-17

STANDARD 13.08



■ OPTIONAL CONSTRUCTION JOINTS IN FOOTINGS PLACED ALONG ℄ OF COLUMN. IF USED, LAP LONGITUDINAL REINFORCEMENT 2'-7" IN ADJACENT POUR.

PLAN

DETAILS FOR CIRCULAR AND RECTANGULAR COLUMNS

NOTES

DETAILS OF CONSTRUCTION MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATION AND THE APPLICABLE SPECIAL PROVISIONS.

BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE CONSTRUCTION. NO JOINTS SHALL BE ALLOWED IN THE BARRIER. CONSTRUCTION JOINTS WILL ONLY BE ALLOWED IN THE FOOTING AT LOCATIONS SHOWN IN THE "PLAN VIEW".

DO NOT CUT OR DRILL INTO EXISTING COLUMN BAR STEEL.

ALL REINFORCEMENT SHALL BE EPOXY-COATED.

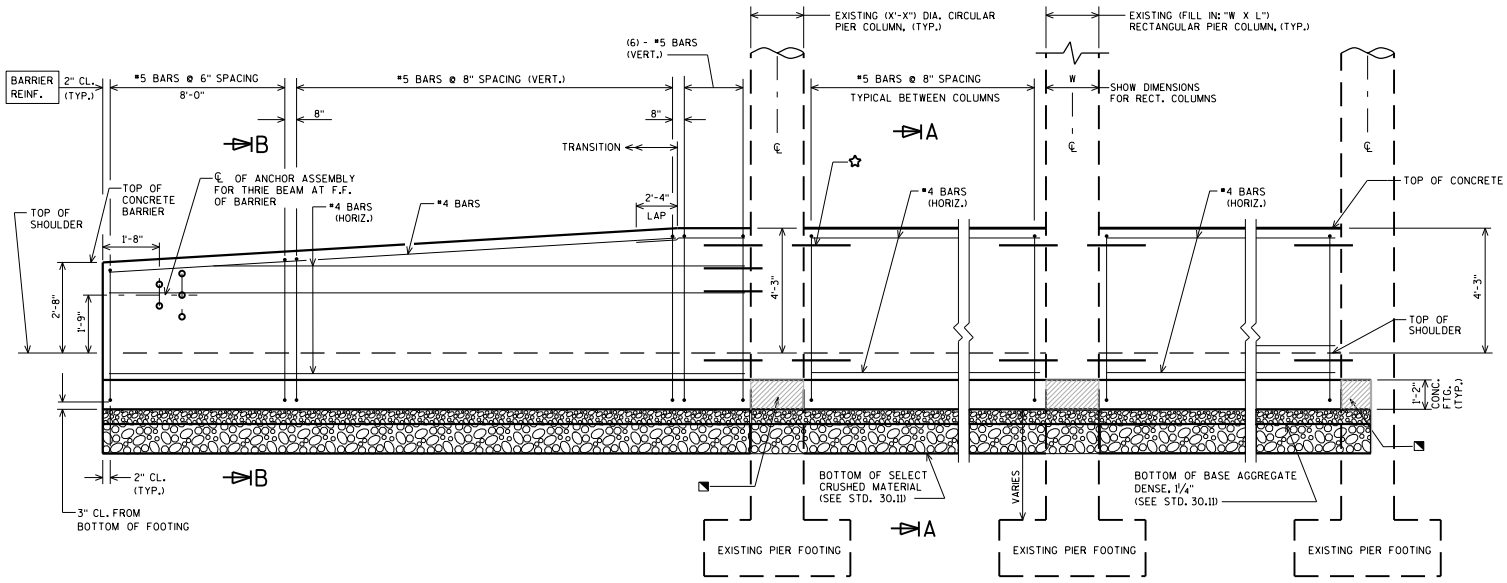
USE 2-INCH MINIMUM BAR CLEARANCE, EXCEPT AT FOOTINGS PROVIDE 3-INCH BAR CLEARANCE FROM BOTTOM OF FOOTING TO BOTTOM TRANSVERSE REINFORCEMENT.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PROVIDE 3/4-INCH BEVEL OR 1-INCH RADIUS ON BARRIER EDGES, TOP AND ENDS.

SEE STANDARD 13.11 FOR ADDITIONAL DETAILS.

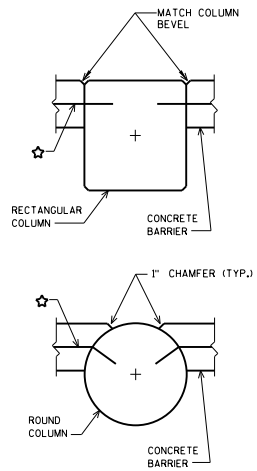
SEE STANDARD 13.11 FOR DESIGNER NOTES.



ELEVATION

LOOKING AT B.F. OF BARRIER

NOTE: 51 - INCH BARRIER REFERS TO THE DISTANCE FROM THE TOP OF THE SHOULDER TO THE TOP OF THE BARRIER.



DETAIL A

F.F. OF BARRIER IS FLUSH WITH FACE OF COLUMN

ULTIMATE DESIGN STRESSES:

CONCRETE MASONRY ——— f'c = 4,000 P.S.I.
HIGH-STRENGTH BAR STEEL REINFORCEMENT, GRADE 60 ——— fy = 60,000 P.S.I.

◥ PLACE ½" FILLER BETWEEN COLUMN AND CONCRETE FOOTING (TYP.)

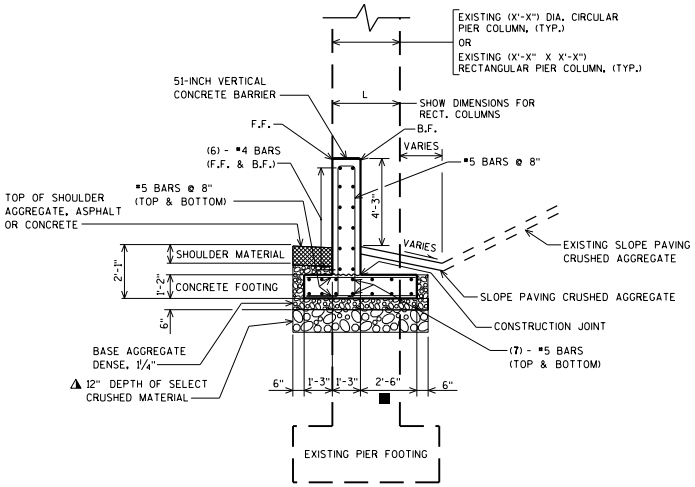
51-INCH CONCRETE INTEGRAL BARRIER

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

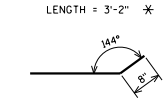
DATE: 7-16

STANDARD 13.10



SECTION A-A

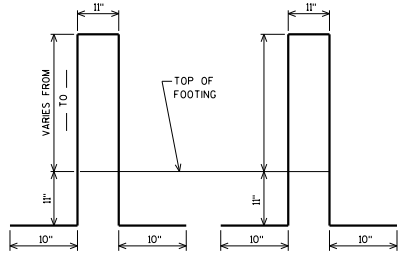
BETWEEN COLUMNS



#6 BAR

USED WITH CIRCULAR COLUMNS (ADHESIVE ANCHOR)

✳ FOR RECTANGULAR COLUMN USE STRAIGHT BARS OF THIS LENGTH



#5 BAR

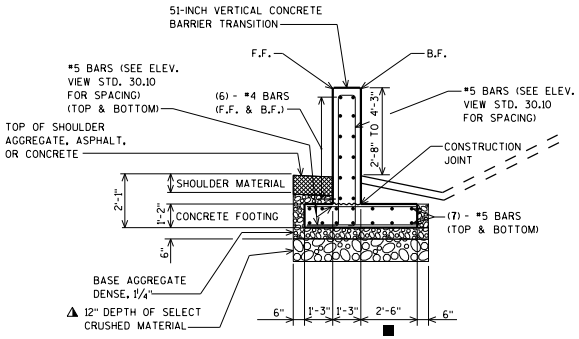
BARRIER REINF. IN TRANSITION REGION

#5 BAR

BARRIER REINF. BETWEEN COLUMNS

BAR BENDING DIAGRAMS

BAR DIMENSIONS ARE OUT TO OUT OF BAR



SECTION B-B

TRANSITION REGION

DESIGNER NOTES

THE DETAILS SHOWN ON STANDARDS 13.10 AND 13.11 ARE FOR VEHICLE PROTECTION AND ARE USED WITH EXISTING STRUCTURES.

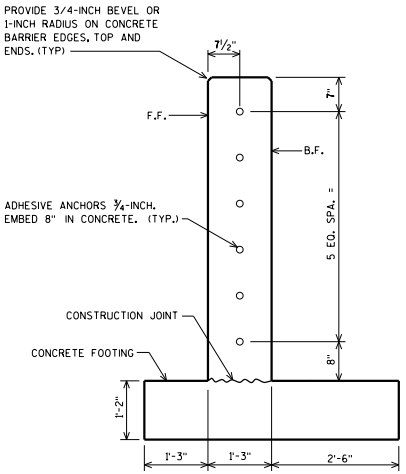
CONSIDER PROVIDING AN ADDITIONAL TRANSITION SECTION ADJACENT TO THE OTHER EXTERIOR PIER COLUMN FOR THE FOLLOWING CONDITIONS:

- TWO-LANE ROAD IS ADJACENT TO BARRIER AND THERE IS A CONCERN FOR TRAFFIC TO CROSS-OVER.
- FUTURE TRAFFIC CONTROL NEEDS MAY CAUSE THE DIRECTION OF TRAFFIC ADJACENT TO BARRIER TO BE REVERSED.
- HAZARDS MAY EXIST IN THIS REGION THAT REQUIRE SHIELDING.

CONTACT THE REGIONAL OFFICE FOR VERIFICATION OF ANY OF THESE CONDITIONS.

THESE DETAILS MEET CRITERIA FOR TEST LEVELS TL-3/TL-4.

FOR VEHICLE PROTECTION, SEE FDM 11-35-1 TO DETERMINE WHEN BEAM GUARD OR CONCRETE BARRIER SHOULD BE PLACED BETWEEN THE TRAFFIC AND THE PIER, OR WHEN AN INTEGRAL BARRIER SHOULD BE USED.



ADHESIVE ANCHOR LAYOUT

⚠ 12" SELECT CRUSHED MATERIAL MAY BE ELIMINATED IF IT IS DETERMINED BY THE ENGINEER THAT THE EXISTING MATERIAL IS COMPACTED, GRANULAR MATERIAL.

■ FOR COLUMNS WITH "DIA." OR "L" GREATER THAN 3'-0", INCREASE THIS VALUE SO THAT B.F. OF FOOTING EXTENDS 9" BEYOND B.F. OF COLUMN.

F.F. = FRONT FACE
B.F. = BACK FACE

51-INCH VERTICAL CONCRETE BARRIER AND TRANSITION

SEE STANDARD 13.10 FOR ADDITIONAL DETAILS

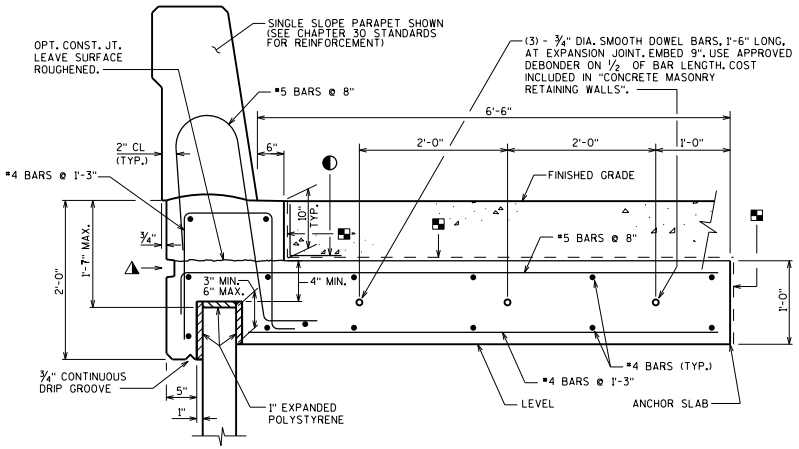
INTEGRAL BARRIER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 13.11



CAST-IN-PLACE CONCRETE TRAFFIC BARRIER DETAIL FOR PRECAST WALL PANELS

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPET AND ANCHOR SLAB BETWEEN EXPANSION JOINTS MAY BE USED. RUN BAR REINFORCEMENT THRU THE JOINT. SEE STANDARDS 30.07, 30.12, 30.13 & 30.30-30.32 FOR MINIMUM LAP LENGTHS IN PARAPET BARS. DEFINE CONSTRUCTION JOINT WITH A ¾" "V" GROOVE.

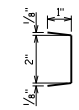
LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".

ALL BAR STEEL SHALL BE EPOXY COATED.

CONCRETE QUANTITY BASED ON 3" PANEL EMBEDMENT.

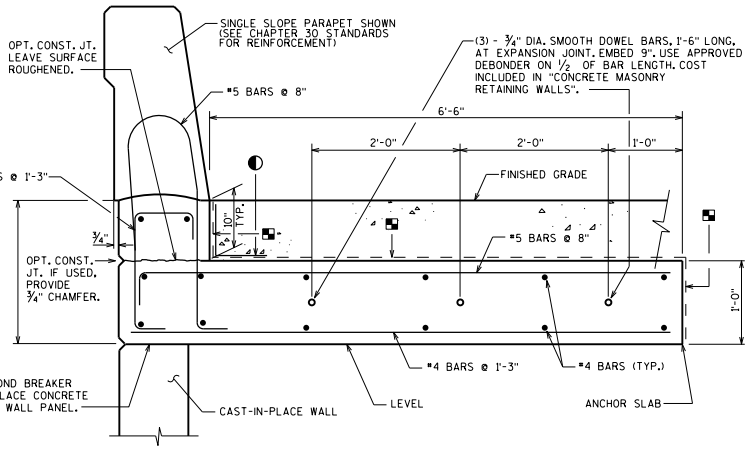
■ 18" RUBBERIZED MEMBRANE WATERPROOFING TO BE PLACED ON THESE SURFACES AT EACH JOINT.

◐ IF THE OPT. CONST. JOINT IS USED, PLACE 18" MEMBRANE WATERPROOFING ALONG THE ENTIRE LONGITUDINAL JOINT. THE MEMBRANE WATERPROOFING SEALING THE OPTIONAL CONST. JOINT IS INCIDENTAL TO THE CONRETE MASONRY BID ITEM.



RUSTICATION DETAIL

⚠ PROVIDE RUSTICATION IF OPT. CONST. JOINT IS USED.

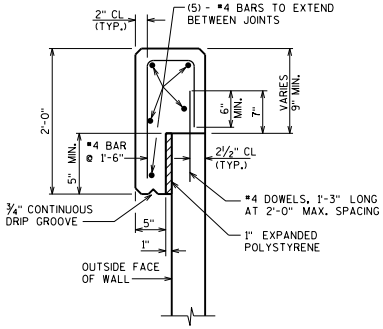


CAST-IN-PLACE CONCRETE TRAFFIC BARRIER DETAIL FOR CAST-IN-PLACE WALL PANELS

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPET AND ANCHOR SLAB BETWEEN EXPANSION JOINTS MAY BE USED. RUN BAR REINFORCEMENT THRU THE JOINT. SEE STANDARDS 30.07, 30.12, 30.13 & 30.30-30.32 FOR MINIMUM LAP LENGTHS IN PARAPET BARS. DEFINE CONSTRUCTION JOINT WITH A ¾" "V" GROOVE.

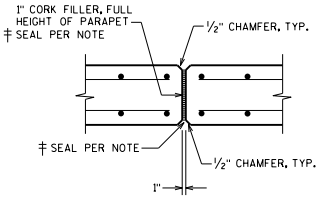
LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".

ALL BAR STEEL SHALL BE EPOXY COATED.

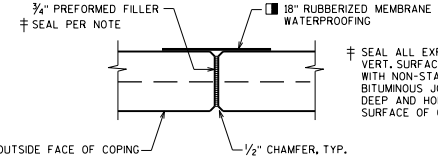


CAST-IN-PLACE CONCRETE COPING DETAIL

NOTE: CONCRETE COPING REINFORCING STEEL SHALL BE DESIGNED AT LOCATIONS WHERE RAILING, FENCING, OR ANY OTHER ATTACHMENTS ARE MADE.



⊛ TRAFFIC BARRIER EXPANSION JOINT DETAIL

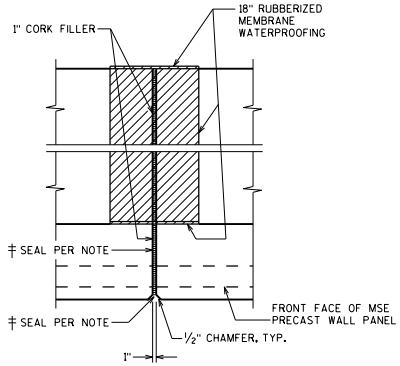


‡ SEAL ALL EXPOSED HORIZ. & VERT. SURFACES OF FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD ⅛" BELOW SURFACE OF CONC.)

COPING EXPANSION JOINT

DO NOT RUN BAR STEEL THRU JOINT. MAX. SPACING OF JOINT = 50'

■ MEMBRANE WATERPROOFING TO EXTEND FROM TOP OF COPING TO 6" BELOW TOP OF PANELS.



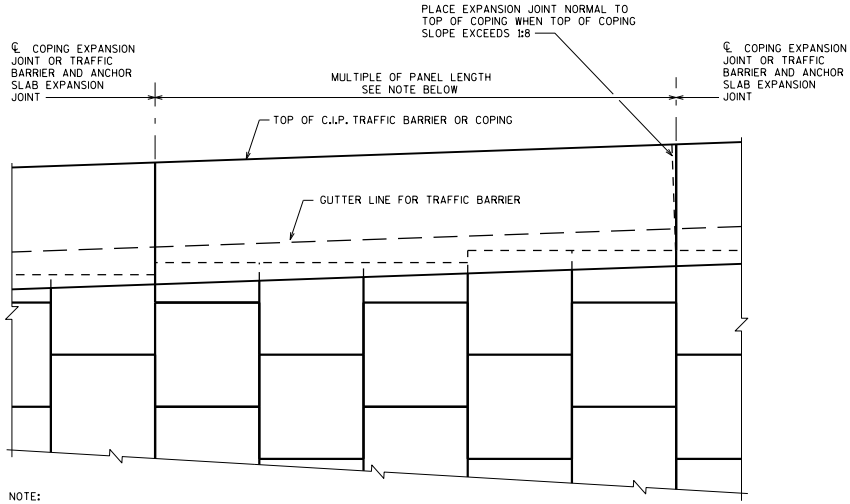
⊛ ANCHOR SLAB EXPANSION JOINT DETAIL

⊛ EXPANSION JOINTS TO BE SPACED AT A MINIMUM OF 20' AND A MAXIMUM OF 30'. LOCATE EXPANSION JOINTS OVER WALL JOINTS. DO NOT RUN BAR STEEL THRU JOINT, EXCEPT FOR DOWEL BARS. JOINT TO EXTEND FULL DEPTH OF PARAPET AND ANCHOR SLAB.

PROVIDE THE NUMBER OF BARS AND OVERALL LENGTH FOR QUANTITY PURPOSES, ONLY. DO NOT DETAIL SPECIFIC BAR LENGTHS BETWEEN EXPANSION JOINTS AS THESE LENGTHS ARE BASED ON UNKNOWN MSE PANEL LENGTH AND CONFIGURATION.

COPING CONTRACTION JOINT

DO NOT RUN BAR STEEL THRU JOINT. MAX. SPACING OF JOINT = 12'



NOTE:
ALL JOINTS SHALL BE LOCATED AS SHOWN ON WALL ELEVATIONS AND MUST COINCIDE WITH PANEL JOINT ON FRONT FACE.

C.I.P. TRAFFIC BARRIER OR COPING PARTIAL ELEVATION

DESIGNER NOTES

MODIFIED ANCHOR SLAB DETAILS SHALL SATISFY AASHTO LRFD STRENGTH AND STABILITY REQUIREMENTS.

PROVIDE CONCRETE, REINFORCEMENT, AND RUBBERIZED MEMBRANE WATERPROOFING QUANTITIES FOR TRAFFIC BARRIERS. PROVIDE BILL OF BARS.

FOR STANDARD COPING, AS SHOWN ON THIS SHEET, SHOW BAR SIZE AND BAR SPACING, ONLY. DO NOT PROVIDE BILL OF BARS. CONCRETE, REINFORCEMENT, AND RUBBERIZED MEMBRANE WATERPROOFING ARE INCLUDED IN BID ITEM FOR THE MSE WALL.

MSE RETAINING WALL DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

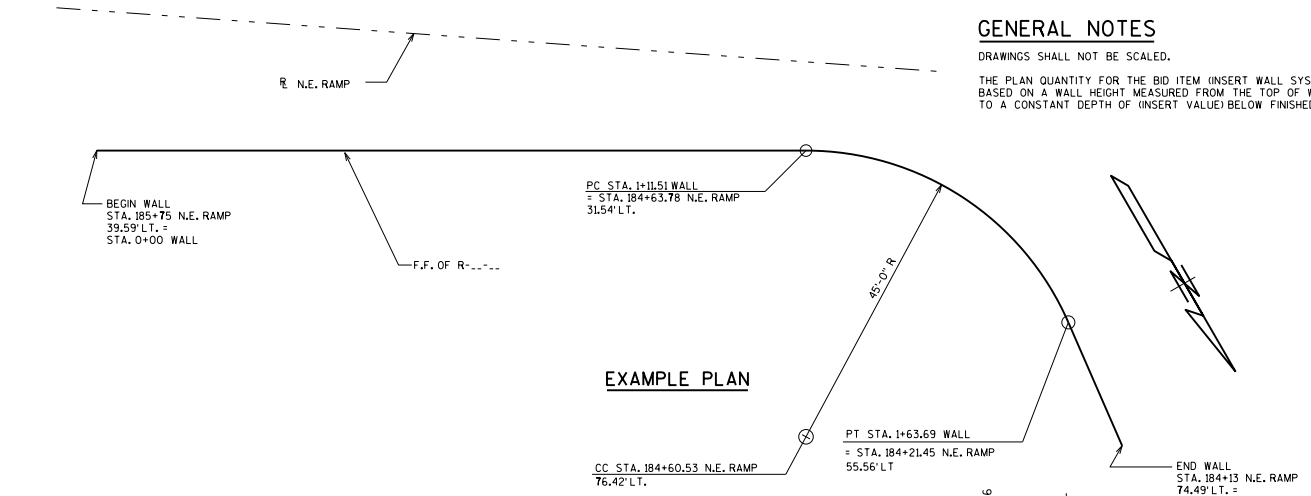
DATE: 1-17

STANDARD 14.02

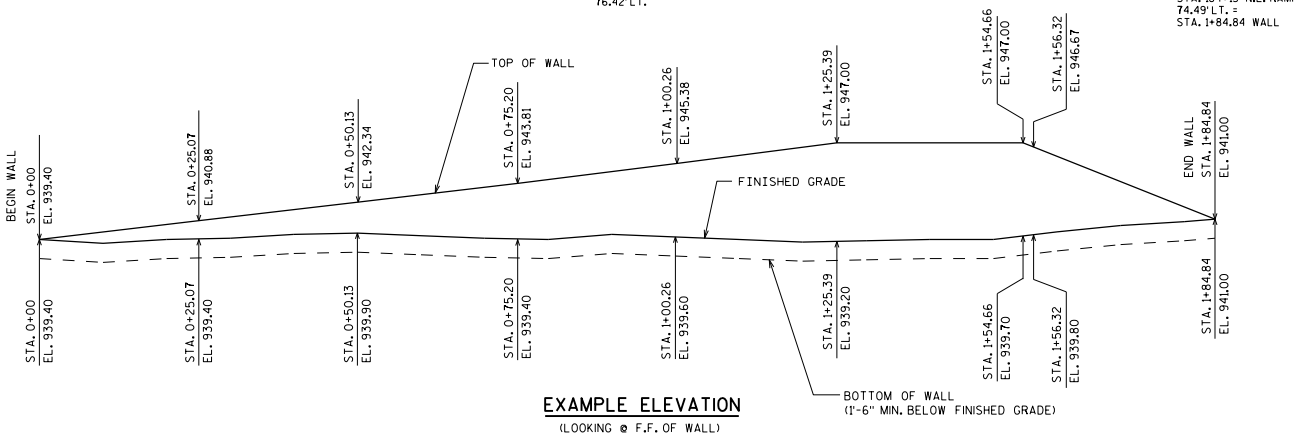
GENERAL NOTES

DRAWINGS SHALL NOT BE SCALED.

THE PLAN QUANTITY FOR THE BID ITEM (INSERT WALL SYSTEM) IS BASED ON A WALL HEIGHT MEASURED FROM THE TOP OF WALL TO A CONSTANT DEPTH OF (INSERT VALUE) BELOW FINISHED GRADE.



EXAMPLE PLAN



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

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.

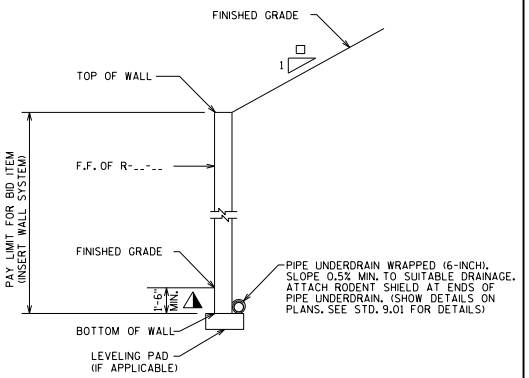
DESIGN RETAINING WALL FOR A LIVE LOAD SURCHARGE OF (INSERT VALUE).

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.

DESIGNER NOTES

- ■ THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED UPON THE MINIMUM DESCRIBED IN THE WALL SYSTEM SPECIAL PROVISIONS OR EXTERNAL AND OVERALL STABILITY AT THE DESIGNATED LOCATIONS. THESE DESIGNATED LOCATIONS REPRESENT TYPICAL AND CRITICAL WALL LOCATIONS, BUT SHALL NOT BE CONSIDERED ALL INCLUSIVE. THE CONTRACTOR DESIGN LENGTHS SHALL MEET OR EXCEED THE MINIMUM VALUES REPRESENTED IN THE TABLE AT THESE DESIGNATED LOCATIONS.
- ☆ THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED ON OVERALL STABILITY PERFORMED BY THE WALL DESIGNER. COMPOUND STABILITY IS THE CONTRACTORS RESPONIBILITY.
- ◭ MINIMUM EMBEDMENT BASED ON SITE SPECIFIC PARAMETERS (1'-6" MINIMUM FOR ALL WALLS ON LEVEL GROUND). FIELD EMEBEDMENTS SHALL MEET OR EXCEED THE MINIMUM EMEMBEDMENT. FIELD EMBEDMENTS BELOW MINIMUM EMBEDMENT SHALL NOT BE INCLUDED IN THE PAY LIMITS.
- ⊠ STRATUM LOCATIONS & SOIL DESCRIPTIONS AT EACH BORING LOCATION.

NOMINAL MSE PANEL DIMENSIONS ARE 5-FOOT HIGH AND 5-10 FOOT WIDE. THE WALL DESIGNER SHALL PROVIDE DETAILS BASED ON NOMINAL PANEL DIMENSIONS AND CONFIGURATION. DETAILS SHALL BE ABLE TO ACCOMMODATE VARIOUS PANEL DIMENSIONS. THE CONTRACTOR AND WALL SUPPLIER SHALL COORDINATE DETAILS BASED ON THE ACTUAL PANEL DIMENSIONS.



TYP. CROSS SECT. OF RETAINING WALL

GEOMETRY TABLE

WALL STATION	ROADWAY STATION	OFFSET TO F.F. WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.

WALL EXTERNAL & OVERALL STABILITY EVALUATION

DIMENSIONS	EVALUATED LOCATIONS		
WALL HEIGHT (FEET)			
EXPOSED WALL HEIGHT (FEET)			
MINIMUM LENGTH OF REINFORCEMENT (FEET) ■			
WALL STATION			
BORING USED			
CAPACITY TO DEMAND RATIO (CDR)			
SLIDING (CDR>1.0)			
ECCENTRICITY (CDR>1.0)			
OVERALL STABILITY (CDR>1.0) ☆			
BEARING RESISTANCE (CDR>1.0)			
FACTORED BEARING RESISTANCE (PSF)			

SOIL PARAMETERS

STRATUM LOCATIONS & SOIL DESCRIPTIONS	TOTAL UNIT WEIGHT (PCF)	FRICTION ANGLE (DEGREES)	COHESION (PCF)
GRANULAR BACKFILL (REINFORCING ZONE OR BACKFILL)			
(INSERT SOIL TYPE) RETAINED SOIL *			
(INSERT SOIL TYPE) FILL ⊠ EL._____ - EL. _____			
(INSERT SOIL TYPE) ⊠ EL._____ - EL. _____			
(INSERT SOIL TYPE) ⊠ EL._____ - EL. _____			

* DESIGN WALL FOR THESE VALUES

LIST OF DRAWINGS

1. (INSERT WALL SYSTEM)
2. SUBSURFACE EXPLORATION

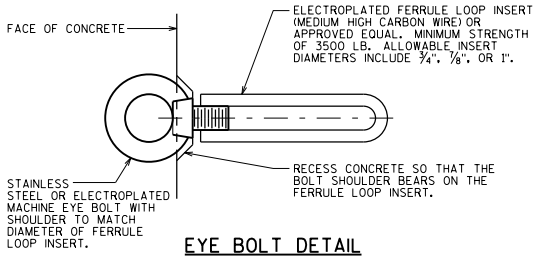
LRFD PROPRIETARY RETAINING WALLS (GENERAL PLAN)

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

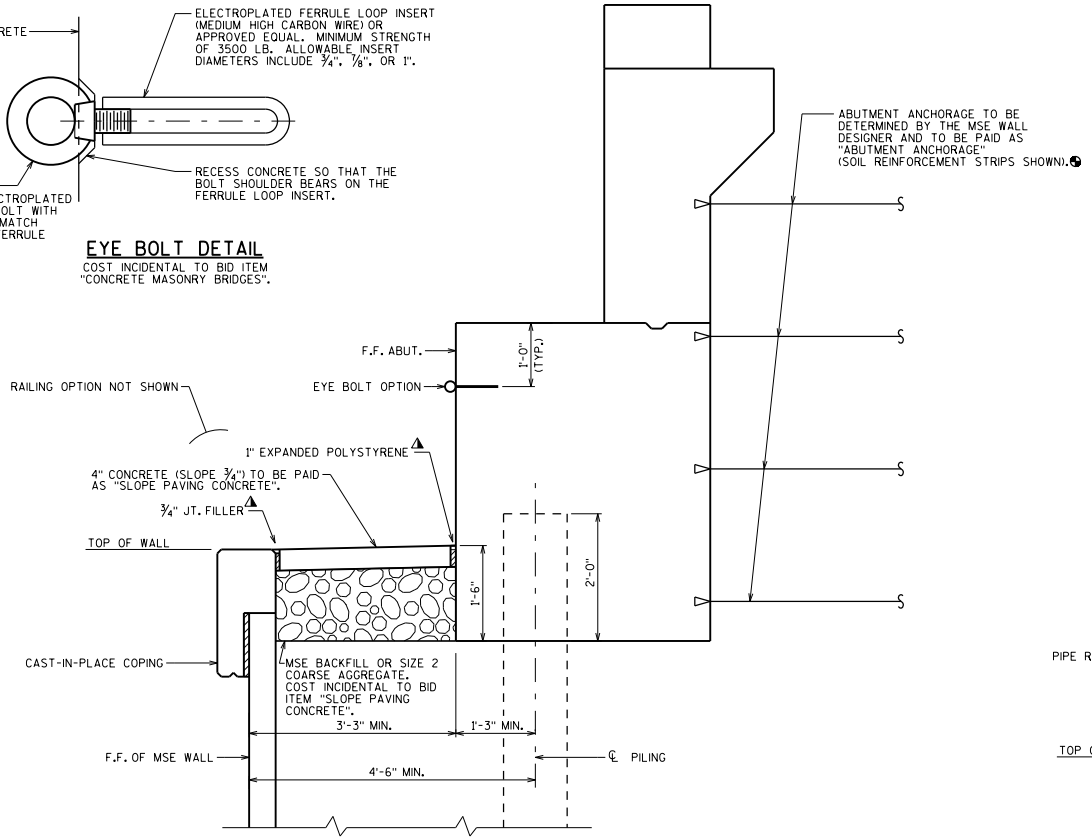
DATE: 1-19

STANDARD 14.03



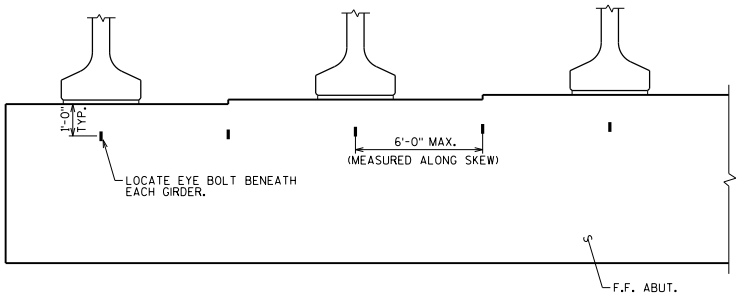
EYE BOLT DETAIL

COST INCIDENTAL TO BID ITEM "CONCRETE MASONRY BRIDGES".



CROSS SECTION THRU ABUTMENT AT MSE WALL

EXPANSION ABUT. SHOWN. SEE STANDARDS 12.01 & 12.02 FOR APPLICABLE BODY REINFORCEMENT AND STANDARDS 12.03 & 12.04 FOR BACKWALL AND WING REINFORCEMENT.



PARTIAL ELEVATION OF F.F. ABUTMENT SHOWING EYE BOLT FALL PROTECTION OPTION

RETAINING WALL NOT SHOWN

DESIGNER NOTES

DUE TO MAINTENANCE CONCERNS, MSE WALLS SHALL NOT BE USED FOR THE SINGULAR PURPOSE OF REDUCING SPAN LENGTH. IF THE GRADE LINE CANNOT BE RAISED, THEN MSE WALLS MAY BE USED TO MAINTAIN THE SUPERSTRUCTURE DEPTH. OTHER CIRCUMSTANCES MAY ALSO JUSTIFY THE USE OF MSE WALLS AT ABUTMENTS.

FALL PROTECTION SHALL BE PROVIDED. THE OPTION PROVIDED SHOULD BE BASED ON THE PREFERENCE OF THE BRIDGE MAINTENANCE AND REGION PROJECT STAFF.

IF PIPE RAILING IS USED, SEE STD. 30.26 FOR APPLICABLE NOTES. (NOTE: STD. 30.26 IS STILL UNDER DEVELOPMENT)

"SLOPE PAVING CONCRETE" ITEMS TO BE SHOWN AS PART OF BRIDGE PLAN.

BID ITEM SHALL BE "ABUTMENT ANCHORAGE" (UNDER DEVELOPMENT).

NOTES

◔ UNFACTORED SUPERSTRUCTURE LATERAL LOADS TRANSFERRED TO THE ABUTMENT ARE TAKEN TO BE KIPS PER FOOT OF ABUTMENT LENGTH. THE VALUES ARE TO BE USED FOR THE LRFD DESIGN OF THE ABUTMENT ANCHORAGE BY THE MSE MANUFACTURER (MSE SYSTEM, DEAD MAN ANCHOR, OTHER). THE FOLLOWING AASHTO LINE LOADS SHALL BE NOTED ON PLAN:

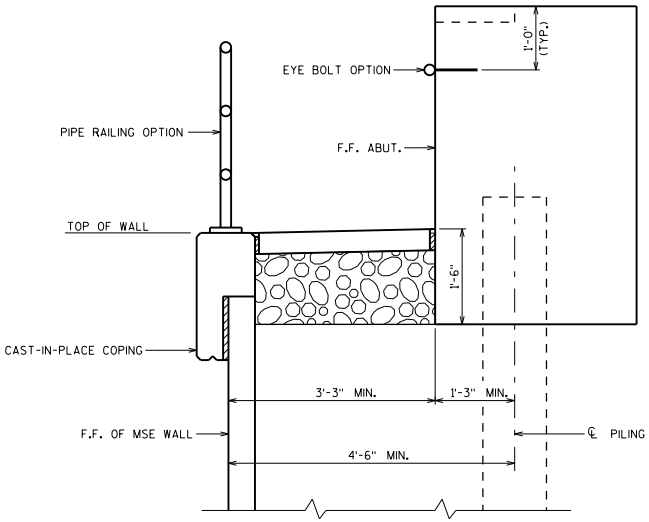
BR = ___ KLF WS = ___ KLF
TU = ___ KLF WL = ___ KLF

FOR SEMI-EXPANSION OR FIXED TYPE A1 ABUTMENTS:

THE DESIGN OF THE WALL IN FRONT OF THE ABUTMENT SHALL INCLUDE THE HORIZONTAL EARTH LOADS AND 240 PSF LIVE LOAD SURCHARGE ACTING ON THE BACK OF THE ABUTMENT BELOW THE BEAM SEATS.

⚠ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF FILLER AND EXPANDED POLYSTYRENE WITH NON-STAINING, GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD 1/8" BELOW SURFACE OF CONCRETE).

EXPANSION ABUTMENTS TO BE BACKFILLED TO A MINIMUM OF THE BEAM SEAT ELEVATION PRIOR TO PLACING GIRDERS.



CROSS SECTION THRU ABUTMENT AT MSE WALL SHOWING BOTH EYE BOLT AND RAILING FALL PROTECTION OPTIONS

TYPE A1 SEMI-EXPANSION ABUTMENT SHOWN

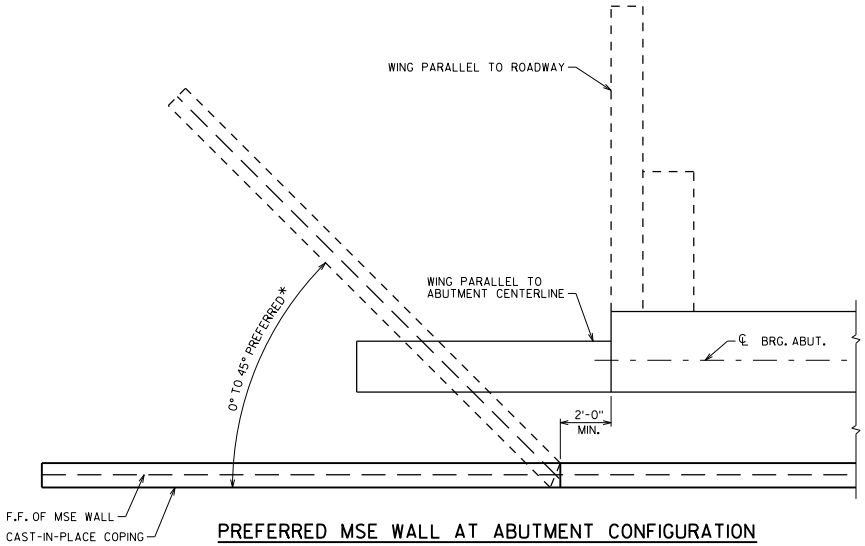
MSE WALL AT ABUTMENT

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

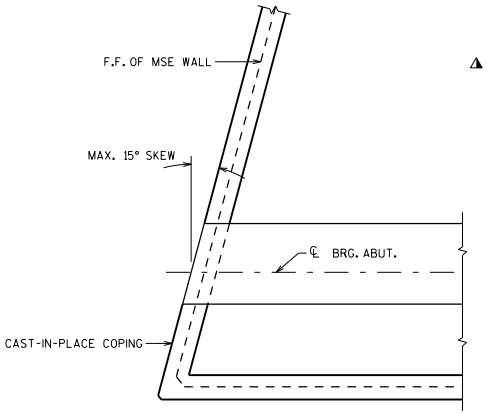
DATE: 1-18

STANDARD 14.04



PREFERRED MSE WALL AT ABUTMENT CONFIGURATION

* 0° WALL ANGLE REQUIRED FOR WING PARALLEL TO ABUTMENT CENTERLINE



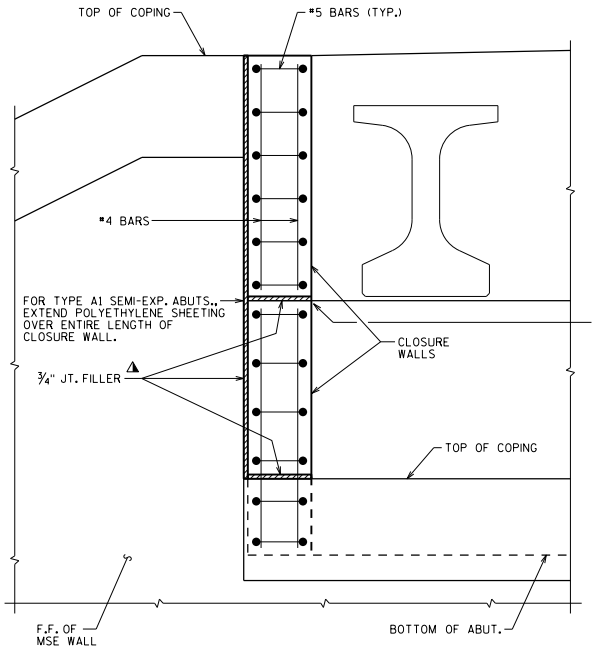
ALTERNATE MSE WALL AT ABUTMENT WITH WRAPPED MSE WALL

DESIGNER NOTES

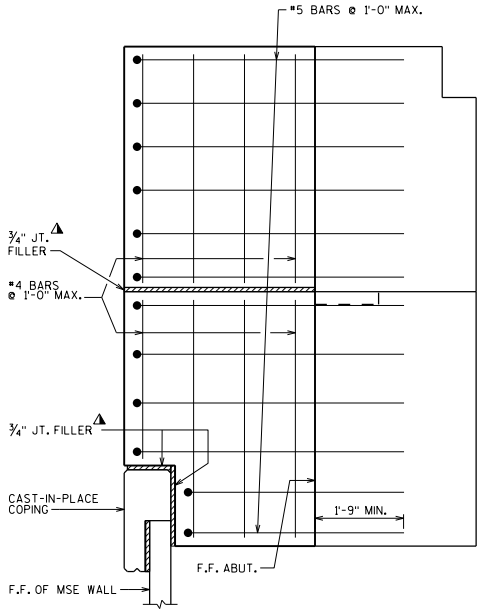
THE "PREFERRED MSE WALL AT ABUTMENT CONFIGURATION" IS THE DESIRED OPTION AS IT SEPARATES THE MSE WALL FROM THE ABUTMENT, MINIMIZING COMPLICATED DETAILS AND POTENTIAL SETTLEMENT ISSUES. THIS ADVICE IS MORE RELEVANT AS SKEW INCREASES.

NOTES

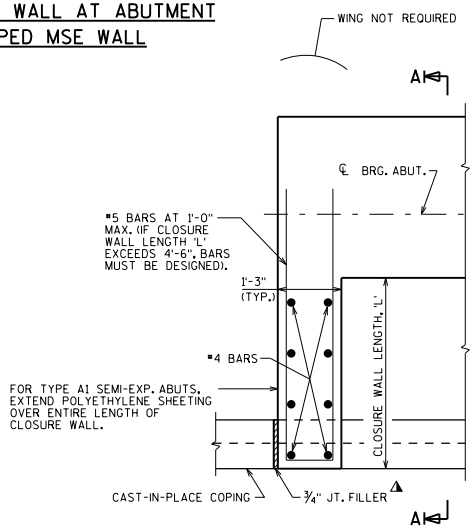
△ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF FILLER WITH NON-STAINING GRAY, NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD 1/8" BELOW SURFACE OF CONCRETE).



FRONT ELEVATION OF ALTERNATE MSE WALL AT ABUTMENT WITH CLOSURE WALL



SECTION A-A



PLAN VIEW OF ALTERNATE MSE WALL AT ABUTMENT WITH CLOSURE WALL

ABUT. TYPE A1 SHOWN. EXPANSION ABUT. WOULD REQUIRE CLOSURE WALL GOING TO BACKWALL WITH BENT BARS TO ACHIEVE DEVELOPMENT.

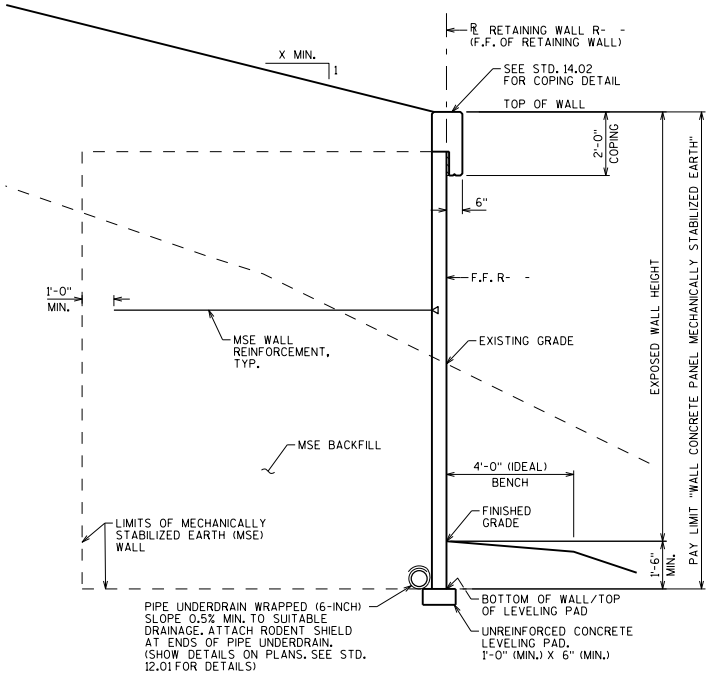
MSE WALL AT ABUTMENT LAYOUT DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

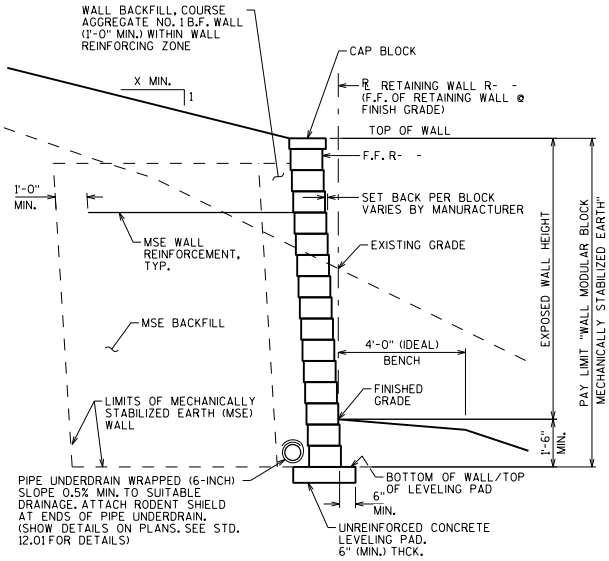
DATE: 7-17

STANDARD 14.05



TYPICAL SECTION

(MSE WALL WITH CONCRETE PANEL FACING)



TYPICAL SECTION

(MSE WALL WITH MODULAR BLOCK FACING)

DESIGNER NOTE

SEE STANDARD 14.02 FOR ADDITIONAL INFORMATION

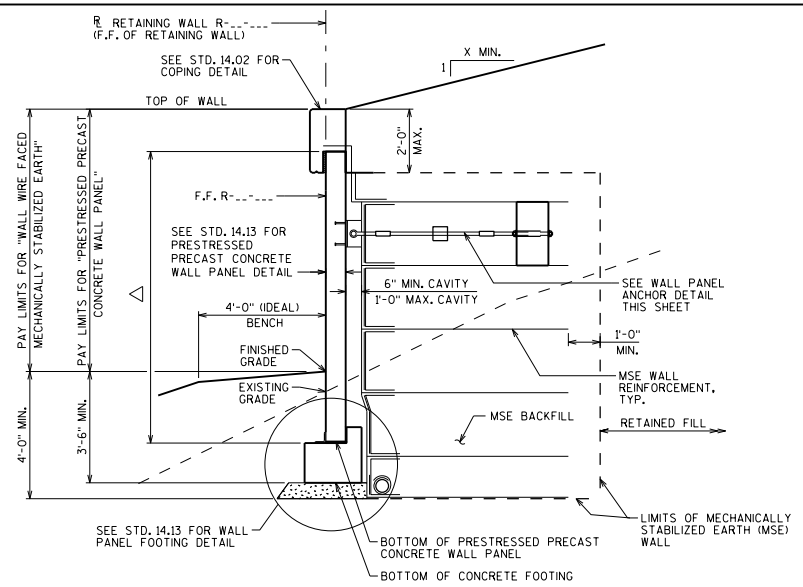
MSE WALL PANEL
AND BLOCK FACING

BUREAU OF STRUCTURES

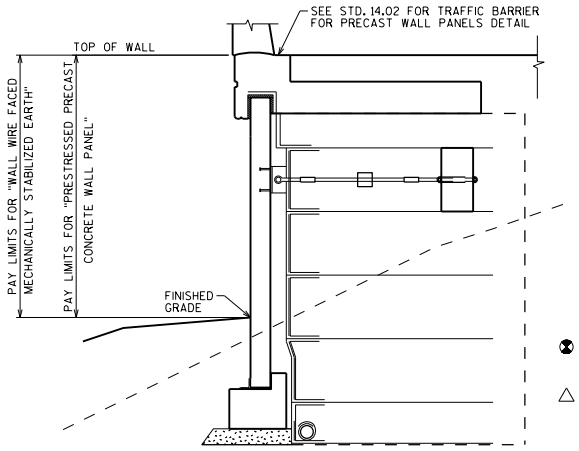
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 14.11



TYPICAL WALL SECTION WITH CAST-IN-PLACE CONCRETE COPING



TYPICAL WALL SECTION WITH CAST-IN-PLACE CONCRETE TRAFFIC BARRIER

SEE TYPICAL WALL SECTION WITH CAST-IN-PLACE CONCRETE COPING DETAIL FOR ADDITIONAL INFORMATION

MATERIAL PROPERTIES

CONCRETE MASONRY RETAINING WALLS ◓	f'c = 3,500 PSI
PRESTRESSED PRECAST CONCRETE WALL PANEL	f'c = 5,000 PSI
BAR STEEL REINFORCEMENT GRADE 60	fy = 60,000 PSI
STRUCTURAL CARBON STEEL - ASTM A36	fy = 36,000 PSI

NOTES

CLEVIS, CLEVIS PIN, COUPLER, MULTIDIRECTIONAL CONNECTOR, AND TURNBUCKLE TO BE CORROSION RESISTANT AND DEVELOP 125% OF THE ULTIMATE STRENGTH OF THE 1¼" DIAMETER ROD.

ST6X25, ROD, CONNECTING HARDWARE, AND DEADMAN ANCHOR INCLUDING ALL ASSOCIATED REINFORCEMENT ARE INCLUDED IN THE BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL".

FORCES APPLIED TO THE DEADMAN ANCHOR MUST BE ACCOUNTED FOR IN THE DESIGN OF MSE REINFORCEMENT WHEN SATISIFYING FORCE AND MOMENT EQUILIBRIUM.

DESIGNER NOTES

⊗ SHOW BAR SIZE AND SPACING ONLY, DO NOT PROVIDE BILL OF BARS. BAR STEEL REINFORCEMENT AND CONCRETE INCLUDED IN BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL".

△ WALL PANEL HEIGHT IS DEFINED AS THE LENGTH FROM THE TOP OF THE WALL PANEL TO THE TOP OF THE CONCRETE FOOTING. THE MAXIMUM ALLOWABLE WALL PANEL HEIGHT IS 30'.

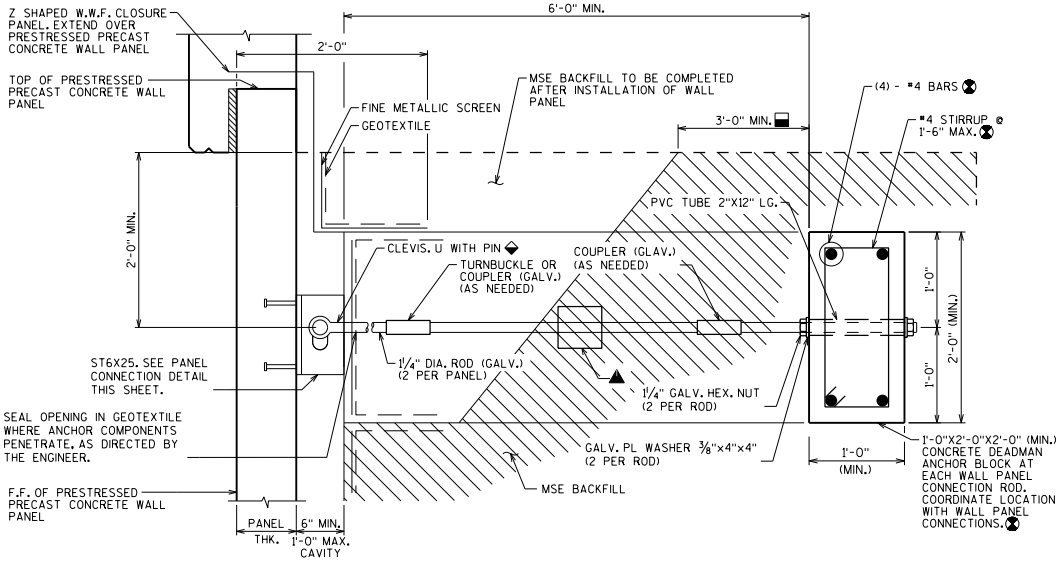
LEGEND

⬓ CONTRACTOR TO DESIGN LENGTH TO PROVIDE REQUIRED HORIZONTAL CAPACITY OF ANCHOR ASSEMBLY. MINIMUM OF 3'-0" OF COMPACTED FILL IN FRONT OF DEADMAN ANCHOR PRIOR TO WALL PANEL ERECTION. 1¼" ROD TO BE 2'-0" MIN. BELOW TOP OF REINFORCED SOIL ZONE.

◆ CLEVIS TO BE INSTALLED TOWARDS THE TOP OF THE SLOTTED HOLE, TO ALLOW FOR SETTLEMENT OF THE WIRE FACED MSE WALL.

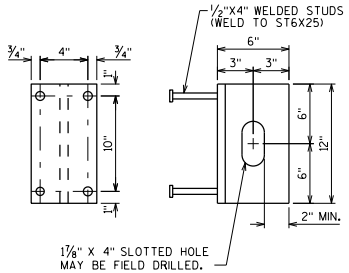
▲ OPTIONAL MULTIDIRECTIONAL CONNECTOR MAY BE USED TO FACILITATE ALIGNMENT AT THE CONNECTION.

◓ INCLUDES CONCRETE FOR COPING, FOOTING, AND DEADMAN ANCHOR.



WALL PANEL ANCHOR DETAIL

CAST-IN-PLACE CONCRETE COPING SHOWN
CAST-IN-PLACE CONCRETE TRAFFIC BARRIER SIMILAR



PANEL CONNECTION DETAIL

AS AN ALTERNATIVE, ½" (GALV.) ADHESIVE ANCHORS MAY BE USED TO AVOID AN OBSTRUCTION. ALTERNATIVE SHALL BE LIMITED TO ONE PANEL CONNECTION PER PANEL.

ST6X25 MAY BE WELDED TO ¾" THICK PLATE WITH (4)-½"X4" STUDS ANCHORED IN PRECAST CONCRETE PANEL. RESTORE ZINC COATING AROUND ANY WELDED AREAS. SUBMIT DETAILS FOR APPROVAL BY THE ENGINEER.

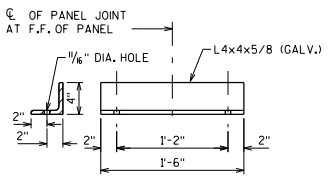
MSE WALL WIRE FACING 1

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

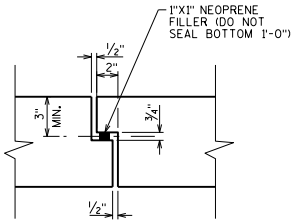
DATE: 1-19

STANDARD 14.12

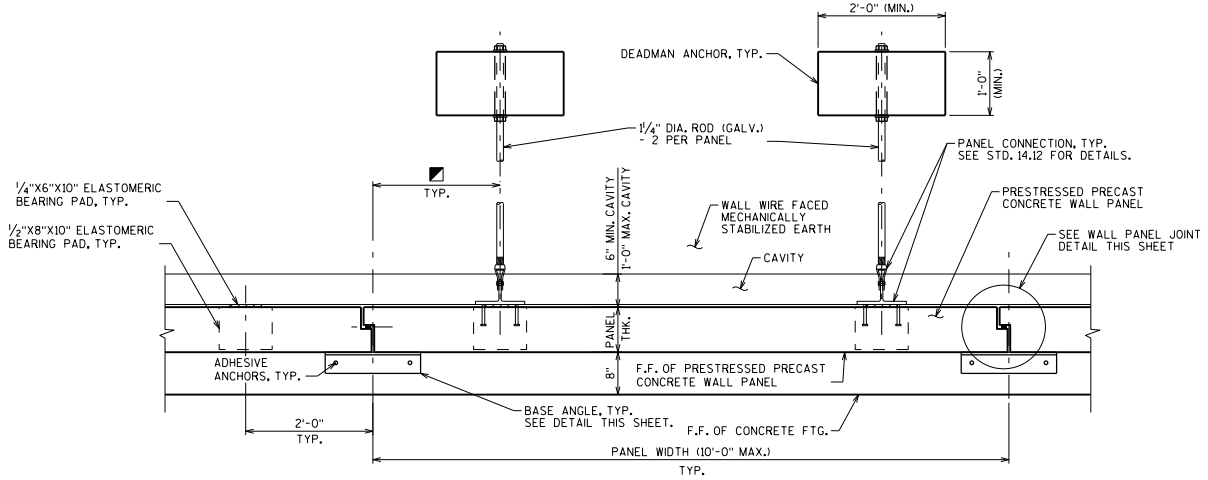


BASE ANGLE DETAIL

CENTERED ON PANEL JOINT OR AT EACH FOOTING END OR STEP ELEVATION.

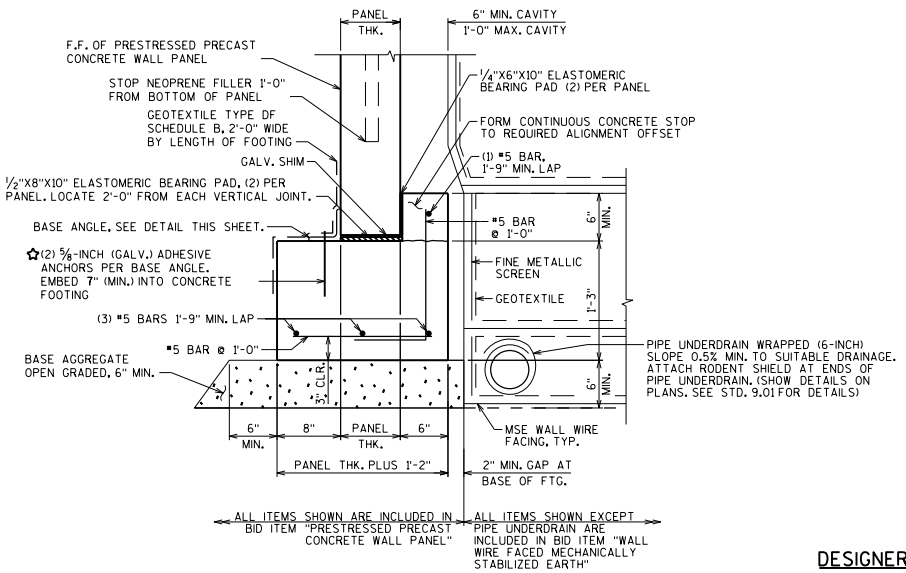


WALL PANEL JOINT DETAIL



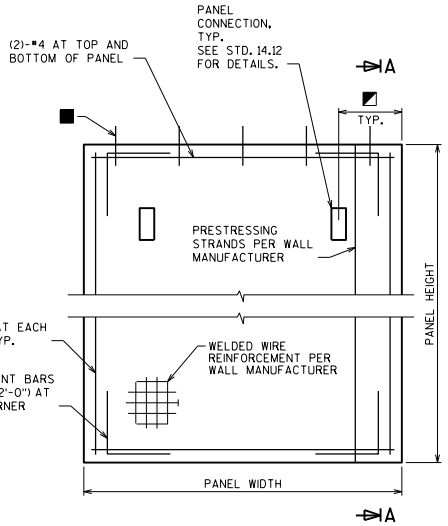
TYPICAL WALL PANEL CONNECTION - PLAN VIEW

ALL ITEMS SHOWN ARE INCLUDED IN BID ITEM "PRESTRESED PRECAST CONCRETE WALL PANEL".



WALL PANEL FOOTING DETAIL

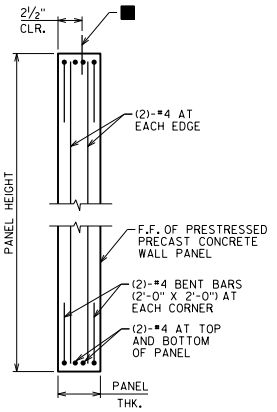
☆ ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.



ELEVATION PRESTRESSED PRECAST CONCRETE WALL PANEL

DO NOT PROVIDE BILL OF BARS. BAR STEEL REINF. AND CONCRETE ARE INCLUDED IN BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL.

PRECAST PANELS 6 FEET OR LESS IN HEIGHT DO NOT REQUIRE PRESTRESSING STRANDS.



SECTION A-A

PRESTRESSING STRANDS NOT SHOWN FOR CLARITY.

DESIGNER NOTE

■ DOWELS REQUIRED FOR CAST-IN-PLACE CONCRETE COPING ONLY. IF CAST-IN-PLACE CONCRETE COPING PROPOSED, INCLUDE THE FOLLOWING NOTE:

#4 DOWELS, 1'-3" LONG AT 2'-0" MAX. SPACING ALTERNATE ANCHORAGE: 1/2" DIA. ELECTROPLATED FERRULE LOOP INSERT (MEDIUM HIGH CARBON WIRE) OR APPROVED EQUAL.

LEGEND

◩ USE 2'-0" ON 10'-0" PANELS
USE 1'-0" ON PANELS LESS THAN 10'-0".

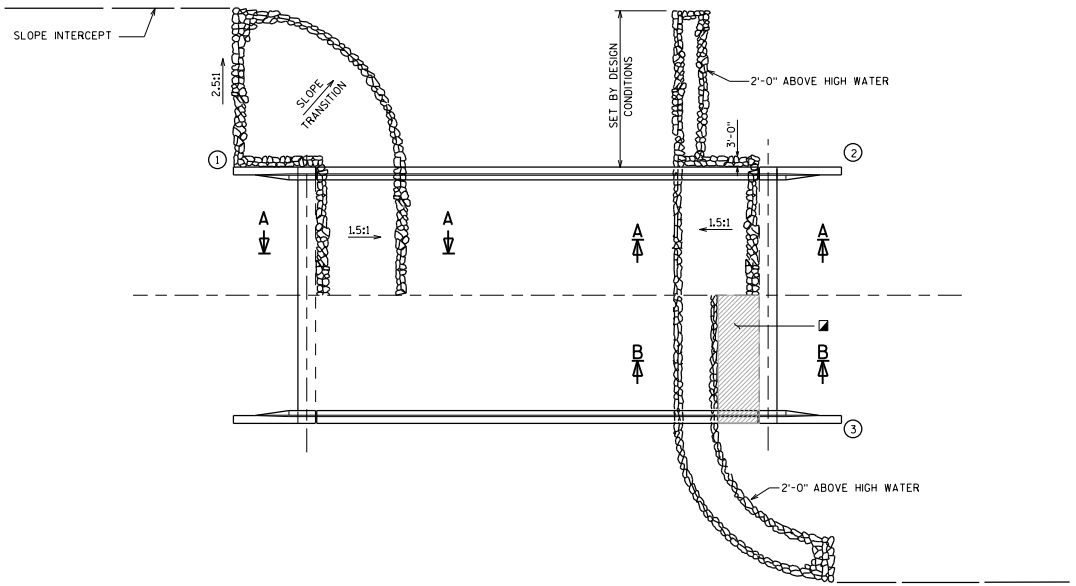
MSE WALL WIRE FACING 2

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 14.13



ALTERNATE (1)

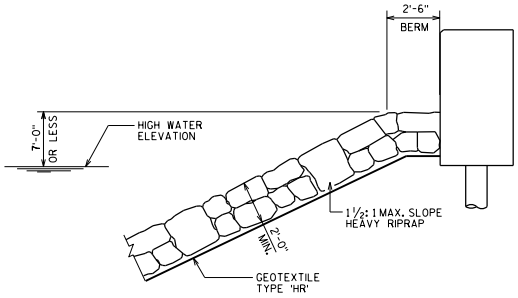
NORMAL CONDITION FOR EMBANKMENT FILLS

ALTERNATE (2)

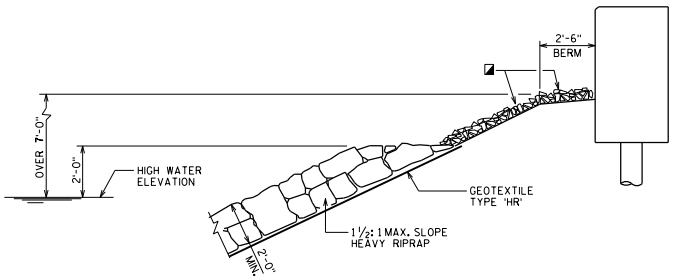
USE WHERE BERM ELEVATION IS LESS THAN 7'-0" ABOVE HIGH WATER

ALTERNATE (3)

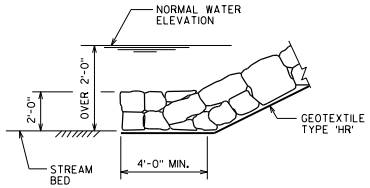
USE WHERE BERM ELEVATION IS OVER 7'-0" ABOVE HIGH WATER



SECTION A-A

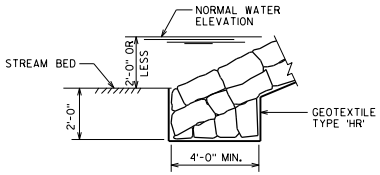


SECTION B-B



TOE DETAIL

NORMAL WATER ELEVATION > 2'-0" ABOVE STREAM BED



TOE DETAIL

NORMAL WATER ELEVATION ≤ 2'-0" ABOVE STREAM BED

◪ HEAVY RIPRAP OR OTHER SLOPE PROTECTION. IF HEAVY RIPRAP IS USED, PLACE GEOTEXTILE TYPE 'HR' BELOW IT.

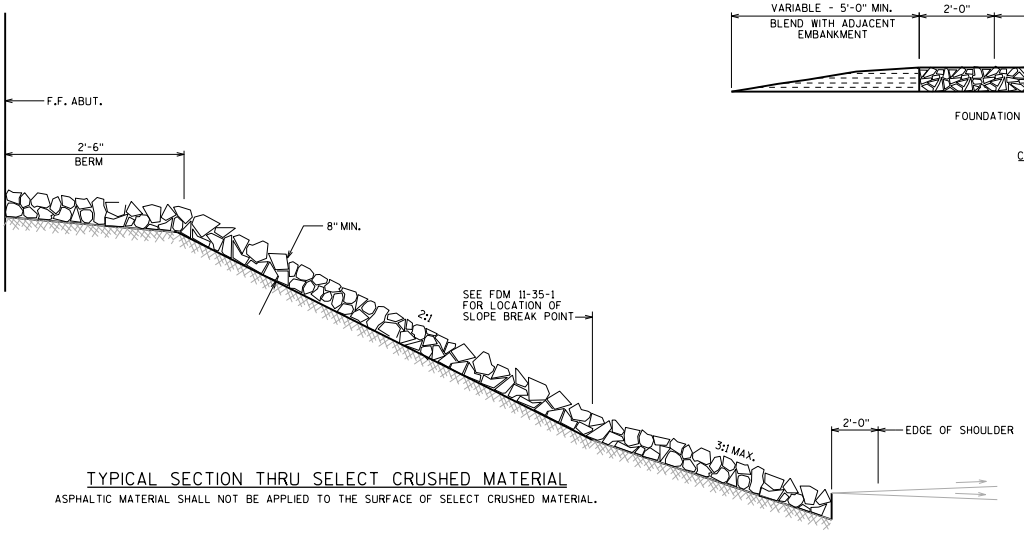
PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

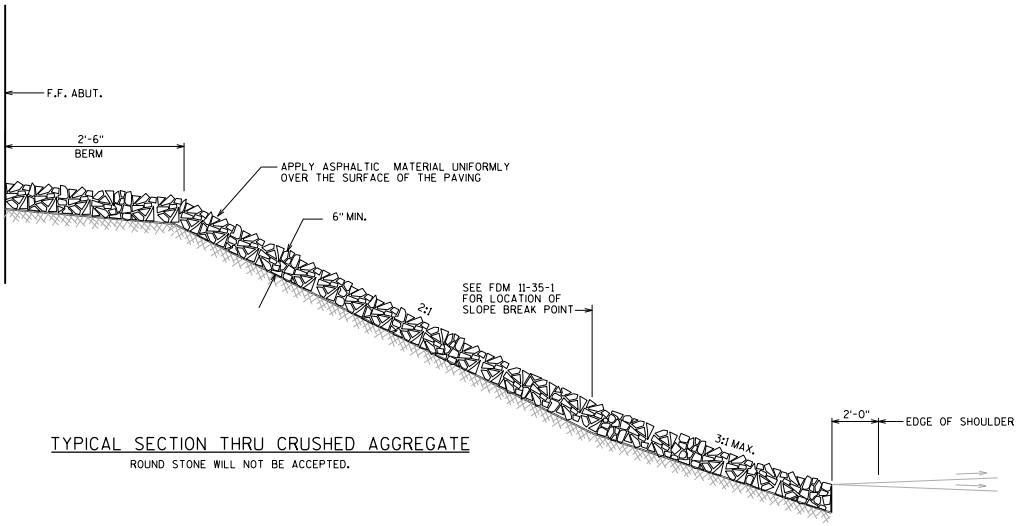
DATE: 1-19

STANDARD 15.01



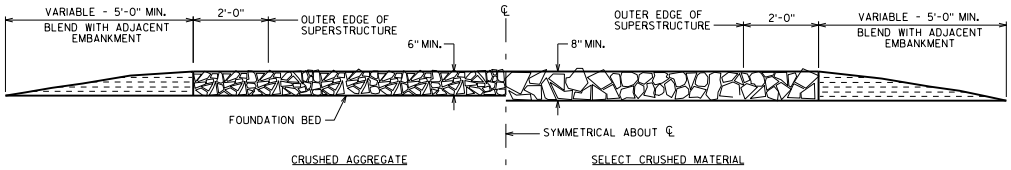
TYPICAL SECTION THRU SELECT CRUSHED MATERIAL

ASPHALTIC MATERIAL SHALL NOT BE APPLIED TO THE SURFACE OF SELECT CRUSHED MATERIAL.

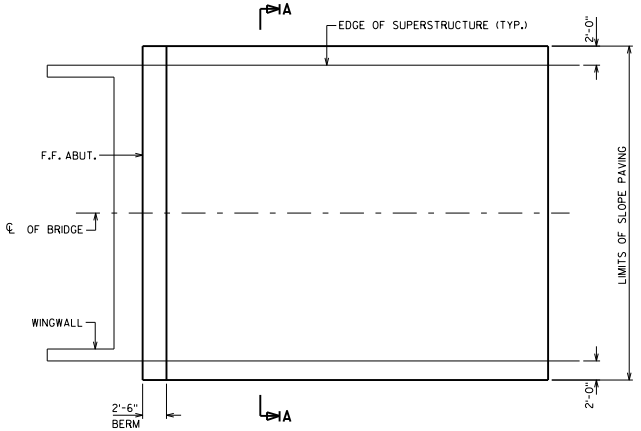


TYPICAL SECTION THRU CRUSHED AGGREGATE

ROUND STONE WILL NOT BE ACCEPTED.



SECTION A-A



PLAN

NOTES

BID ITEM SHALL BE "SLOPE PAVING CRUSHED AGGREGATE" (OR "SLOPE PAVING SELECT CRUSHED MATERIAL")

WOOD FORMS MAY BE LEFT IN PLACE WHEN OF A QUALITY ACCEPTABLE TO THE ENGINEER.

DESIGNER NOTE

PREFERRED SECTION SHOWN. FOR ALTERNATE SECTION SEE FDM 11-35-1.

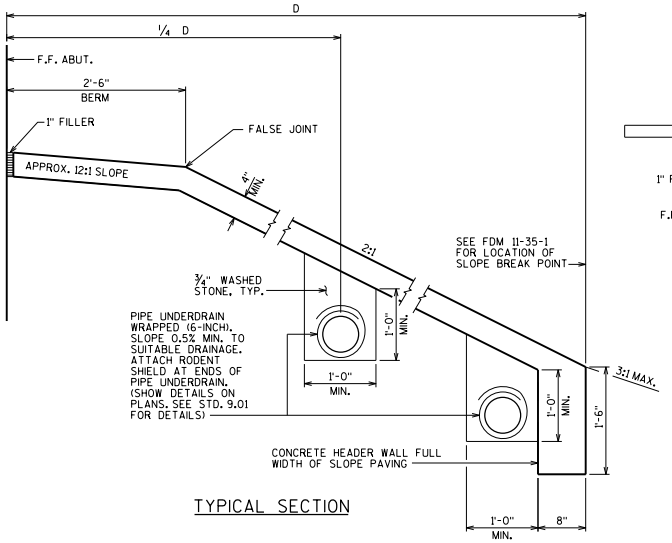
SLOPE PAVING - STRUCTURES (CRUSHED AGGREGATE & SELECT CRUSHED MATERIAL)

BUREAU OF STRUCTURES

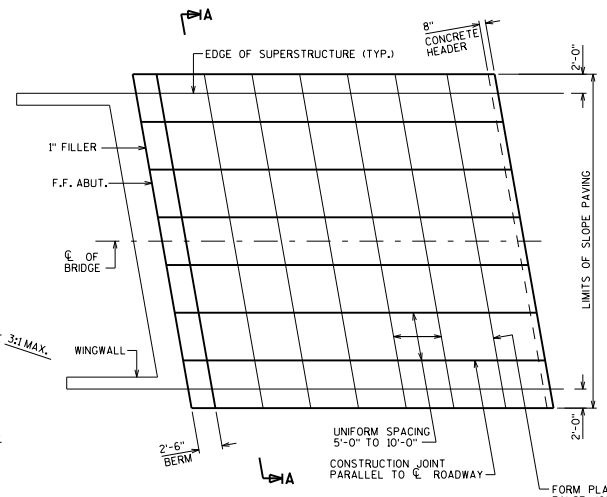
APPROVED: Bill Oliva

DATE: 7-18

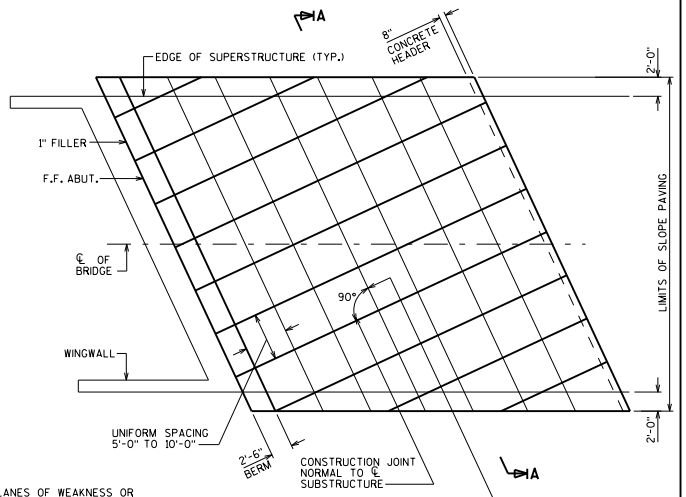
STANDARD 15.02



TYPICAL SECTION



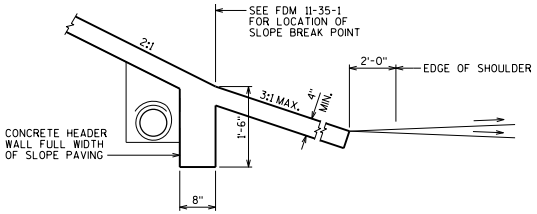
0° - 15° SKEW



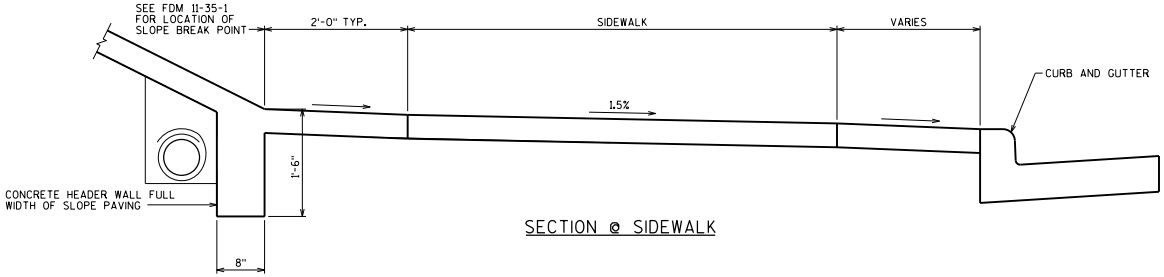
> 15° SKEW

FORM PLANES OF WEAKNESS OR FALSE JOINTS IN THE CONCRETE BY SCORING THE FINISHED SURFACE AT LEAST 1/2" DEEP WITH A JOINT TOOL.

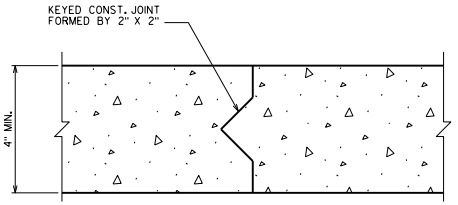
PLAN
(TYPICAL SECTION SHOWN)



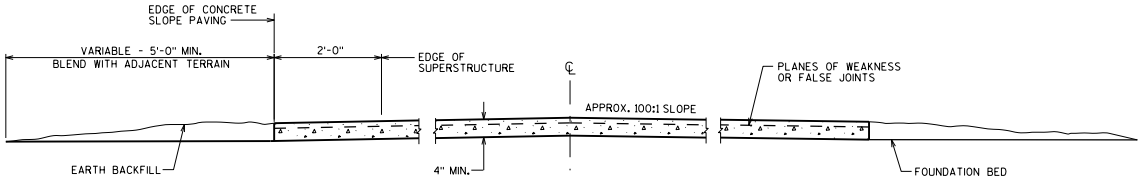
ALT. SECTION @ SHOULDER
(RURAL ROADWAY)



SECTION @ SIDEWALK



CONSTRUCTION JOINT DETAIL



SECTION A-A

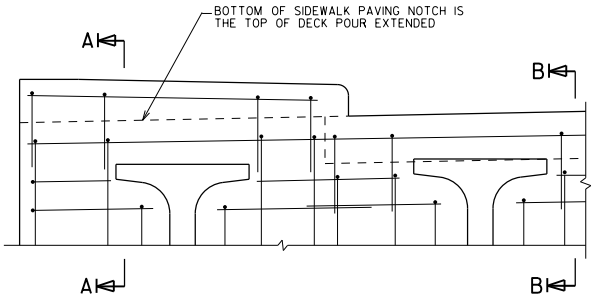
NOTE
BID ITEM SHALL BE "SLOPE PAVING CONCRETE"

SLOPE PAVING - STRUCTURES (CONCRETE CAST-IN-PLACE)

BUREAU OF STRUCTURES

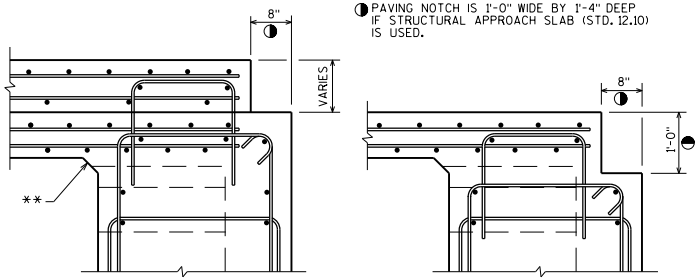
APPROVED: _____ DATE: 7-18

STANDARD 15.03



PART TRANSVERSE SECTION AT ABUTMENT TYPE A1 DIAPHRAGM WITH A RAISED SIDEWALK

(HORIZ. BARS SHOWN ARE THE FF BARS. DECK REINFORCEMENT NOT SHOWN FOR CLARITY.)

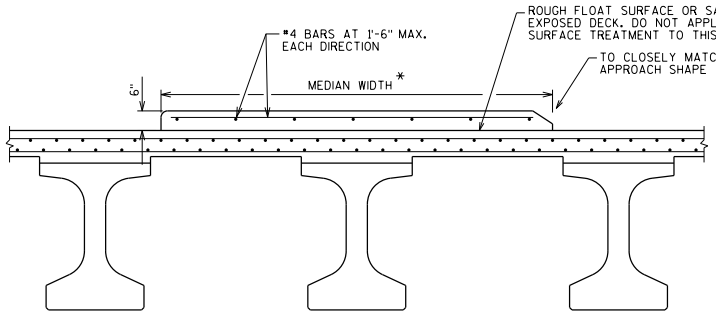


SECTION A-A

SECTION B-B

** 3" X 3" BEVEL ENDS AT EDGE OF BRIDGE DECK

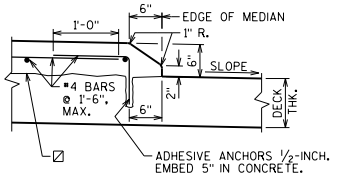
- SEE STANDARDS 19.33, 19.34, 19.35 FOR REINFORCEMENT DETAILS
- DETAILS SHOWN ARE FOR GIRDER STRUCTURES. SIMILAR REINFORCEMENT FOR SLAB STRUCTURES SHALL BE USED WITH A REMINDER THAT THE TRANSVERSE AND LONGITUDINAL REINFORCMENT LAYERS ARE REVERSED.



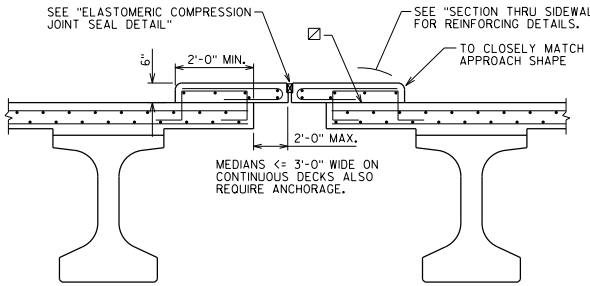
CROSS SECTION THRU UNANCHORED MEDIAN

*(ANCHORAGE TO DECK NOT REQUIRED FOR WIDTHS > 3'-0", EXCEPT ALL MEDIAN SECTIONS ON TOP OF PAVING BLOCK MUST BE ANCHORED)

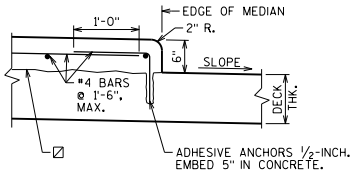
NOTE: CLEAN ALL LOOSE MATERIAL ON THE DECK AT THE MEDIAN LOCATION PRIOR TO MEDIAN PLACEMENT USING HIGH PRESSURE WATER OR AIR, ENSURING ALL FREE-STANDING WATER IS REMOVED PRIOR TO MEDIAN PLACEMENT. NEAT CEMENT IS REQUIRED AS PER 509.3.9.2 OF THE STANDARD SPECIFICATIONS UNLESS THE MEDIAN IS POURED WITHIN 45 DAYS OF COMPLETING THE DECK POUR.



ANCHORED MEDIAN CURB DETAIL

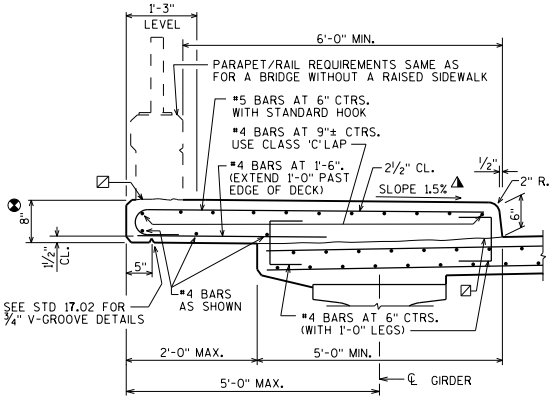


CROSS SECTION THRU MEDIAN WITH A JOINT

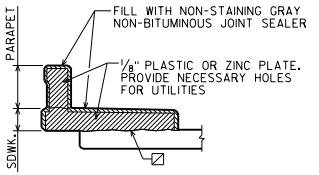


ANCHORED MEDIAN CURB DETAIL

☑ CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH. FOR DECK POUR, MATCH BRIDGE X-SLOPE.



SECTION THRU SIDEWALK



DEFLECTION JOINT DETAIL

SHOW DEFLECTION JOINT IN PARAPET OR SIDEWALK USING THE FOLLOWING CRITERIA:

1. GIRDER STRUCTURES AND SLAB STRUCTURES WITH A RAISED SIDEWALK SHOULD HAVE A DEFLECTION JOINT IN THE SIDEWALK AND PARAPET OVER THE PIER. FOR SKEWS GREATER THAN 20°, DETAIL THE JOINT NORMAL TO THE SIDEWALK AND PARAPET WITH THE JOINT APPROX. CENTERED OVER ℄ PIER.
2. GIRDER STRUCTURES AND SLAB STRUCTURES WITHOUT SIDEWALKS SHOULD HAVE NO DEFLECTION JOINTS IN THE PARAPETS.

NOTES

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF ⅛" ZINC OR PLASTIC PLATE CUT AS SHOWN IN THE "DEFLECTION JOINT DETAIL". IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH AN APPROVED LIQUID BOND BREAKER AND PLATE SEPARATORS MAY BE OMITTED.

☑ CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH. FOR DECK POUR, MATCH BRIDGE X-SLOPE.

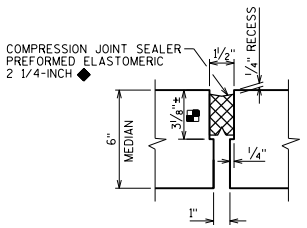
◓ 8" MIN. SIDEWALK THICKNESS ALSO REQ'D AT EDGE OF DECK/SLAB.

▲ ±0.5% CONSTRUCTION TOLERANCE IN SIDEWALK CROSS SLOPE. THE SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

DESIGNER NOTES

FOR EXTREME SIDEWALK WIDTHS AND/OR SUPERELEVATIONS THE DECK MAY BE LEVEL BENEATH THE SIDEWALK (MAINTAIN CONSTANT DECK THICKNESS) TO REDUCE EXCESSIVE SIDEWALK THICKNESS.

SEE STD. 24.11 FOR DECK JOINT DETAIL FOR LONGITUDINAL AND TRANSVERSE JOINTS.



ELASTOMERIC COMPRESSION SEAL DETAIL

▪ VARIES BASED ON JOINT MANUFACTURER

◆ MANUFACTURER SHALL LABEL TOP OF SEAL

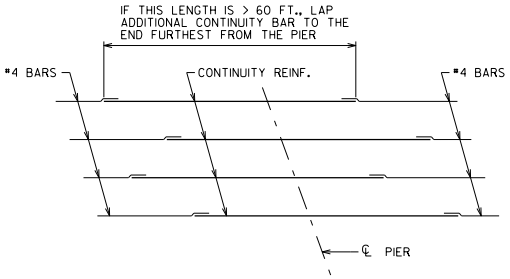
MEDIAN AND RAISED SIDEWALK DETAILS

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

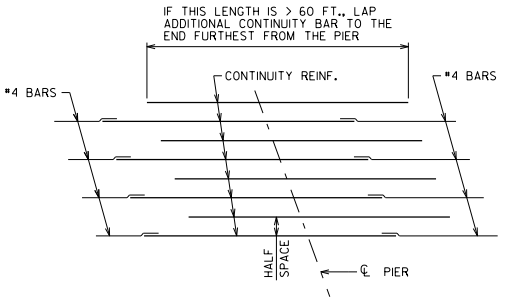
DATE: 7-16

STANDARD 17.01



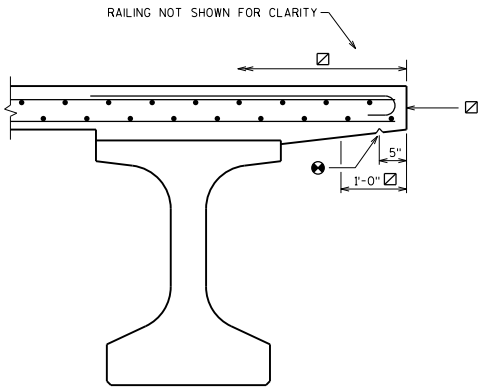
PLAN VIEW OF DECK CONTINUITY REINFORCEMENT FOR PRESTRESSED GIRDER BRIDGES

(SHOWING TYPICAL BAR SPACING FROM CHAPTER 17 TABLES)



PLAN VIEW OF DECK CONTINUITY REINFORCEMENT FOR PRESTRESSED GIRDER BRIDGES SHOWING HALF-SPACES

(SHOWING TYPICAL BAR SPACING FROM CHAPTER 17 TABLES + HALF-SPACE)



CROSS SECTION THRU EDGE OF DECK

(SHOWING DRIP GROOVE FOR ALL PARAPET AND RAILINGS, AND PROTECTIVE SURFACE TREATMENT FOR OPEN RAILINGS. FOR PARAPETS, PROTECTIVE SURFACE TREATMENT IS ONLY APPLIED GUTTERLINE TO GUTTERLINE)

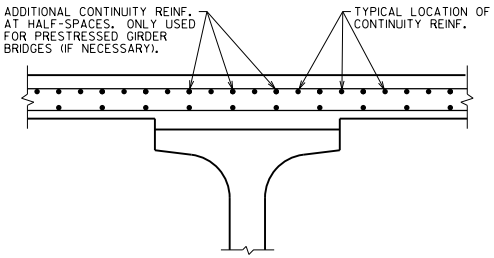
LONGITUDINAL CONSTRUCTION JOINT DETAIL

SEE STD. 24.11 FOR GIRDER SUPERSTRUCTURES
SEE STD. 18.02 FOR SLAB SUPERSTRUCTURES

DESIGNER NOTES

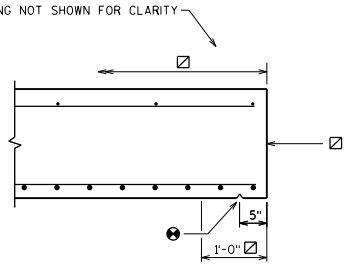
DETAIL REQUIRED WHEN WIDTH OF DECK EXCEEDS 90 FEET FOR GIRDER SUPERSTRUCTURES AND 52 FEET FOR SLAB SUPERSTRUCTURES. DETAIL SHOULD BE USED FOR STAGED CONSTRUCTION AND FOR OTHER COLD JOINT APPLICATIONS WITHIN THE DECK. OPTIONAL (CONTRACTOR) JOINTS ARE TO BE APPROVED BY THE ENGINEER.

JOINTS SHOULD BE PLACED AT LEAST 6 INCHES FROM THE EDGE OF THE TOP FLANGE OF THE GIRDER AND PREFERABLY LOCATED BENEATH THE MEDIAN OR PARAPET. AVOID PLACING NEAR WHEEL PATHS (PLACE AT LANE LINES OR IN THE MIDDLE OF THE LANE).



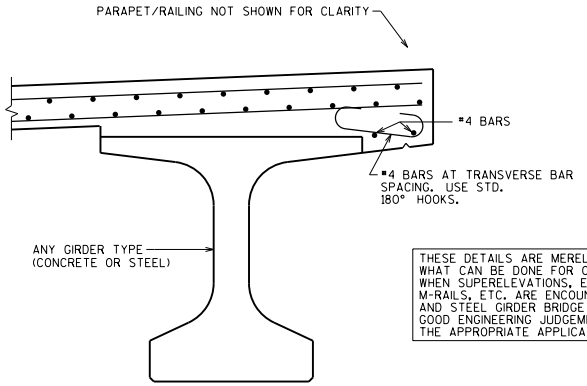
CROSS SECTION THRU DECK

(SHOWING TOP LONGIT. REINF. LOCATION RELATIVE TO BOTTOM LONGIT. REINF.)



CROSS SECTION THRU EDGE OF SLAB

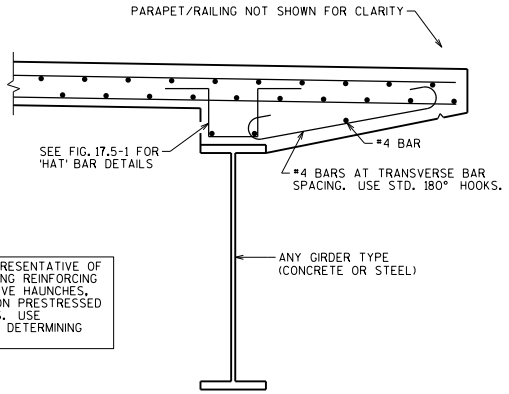
(SHOWING DRIP GROOVE FOR ALL PARAPET AND RAILINGS, AND PROTECTIVE SURFACE TREATMENT FOR OPEN RAILINGS. FOR PARAPETS, PROTECTIVE SURFACE TREATMENT IS ONLY APPLIED GUTTERLINE TO GUTTERLINE)



CROSS SECTION THRU EDGE OF DECK

(SHOWING ADDITIONAL OVERHANG REINFORCEMENT)

THESE DETAILS ARE MERELY REPRESENTATIVE OF WHAT CAN BE DONE FOR OVERHANG REINFORCING WHEN SUPERELEVATIONS, EXCESSIVE HAUNCHES, M-RAILS, ETC. ARE ENCOUNTED ON PRESTRESSED AND STEEL GIRDER BRIDGE DECKS. USE GOOD ENGINEERING JUDGEMENT IN DETERMINING THE APPROPRIATE APPLICATION.



CROSS SECTION THRU EDGE OF DECK

(SHOWING ADDITIONAL OVERHANG REINFORCEMENT)

DESIGNER NOTES

(E) ¾" V-GROOVE. TERMINATE 2'-0" FROM FRONT FACE OF ABUTMENT BODY FOR FOR ABUTMENTS WITH EXPANSION JOINTS.

¾" V-GROOVE. EXTEND V-GROOVE TO 6" FROM FRONT FACE OF ABUTMENT DIAPHRAGM FOR TYPE A1 FIXED AND SEMI-EXPANSION ABUTMENTS.

V-GROOVES ARE REQUIRED.

NOTES

(E) ¾" V-GROOVE REQ'D. EXTEND TO 2'-0" FROM F.F. OF ABUT. BODY

¾" V-GROOVE REQ'D. EXTEND TO 6" FROM F.F. OF ABUT. DIAPH.

☑ FOR OPEN RAILINGS, COAT WITH "PROTECTIVE SURFACE TREATMENT" AS PER THE STANDARD SPECIFICATIONS. PROTECTIVE SURFACE TREATMENT TO BE APPLIED TO THE TOP AND EXTERIOR EXPOSED FACE OF WINGS, AND THE END 1'-0" OF THE FRONT FACE OF ABUTMENT.

☑ COAT WITH "PROTECTIVE SURFACE TREATMENT" AS PER THE STANDARD SPECIFICATIONS.

USE "PIGMENTED SURFACE SEALER" FOR INSIDE & TOP FACES OF PARAPETS.

DECK AND SLAB DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17

STANDARD 17.02

DESIGNER NOTES

EDGE OF DECK FLASHING IS FOR OPEN RAIL BRIDGES AND MAY BE USED FOR REHABILITATION OR NEW CONSTRUCTION. CONTACT THE REGION BRIDGE MAINTENANCE ENGINEER FOR THE DECISION ON WHETHER OR NOT TO USE THE FLASHING ON NEW BRIDGES.

DETAIL 1 OR DETAIL 2, OR A COMBINATION OF THE TWO, MAY BE USED FOR REHABILITATION.

THE DESIGN ENGINEER SHALL PROVIDE CONCRETE SURFACE REPAIR DETAILS AS NEEDED. CONCEPTUAL DETAILS ARE SHOWN ON THIS STANDARD.

NOTES

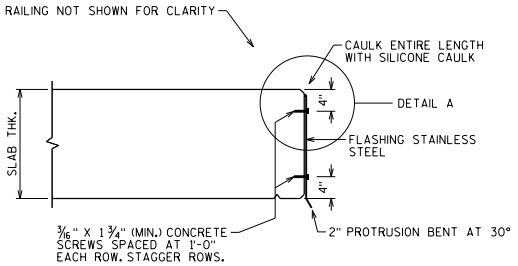
THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK AND 3/16" CONCRETE SCREWS.

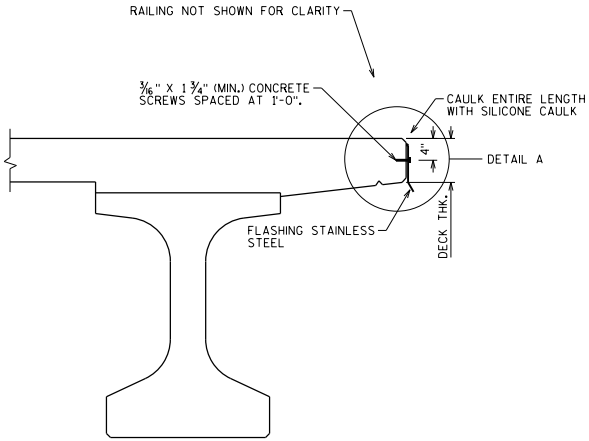
FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE TREATMENT APPLICATION.

CONCRETE SCREWS SHALL BE 410 STAINLESS STEEL.

EXTEND FLASHING TO B.F. OF ABUTMENT DIAPHRAGM.

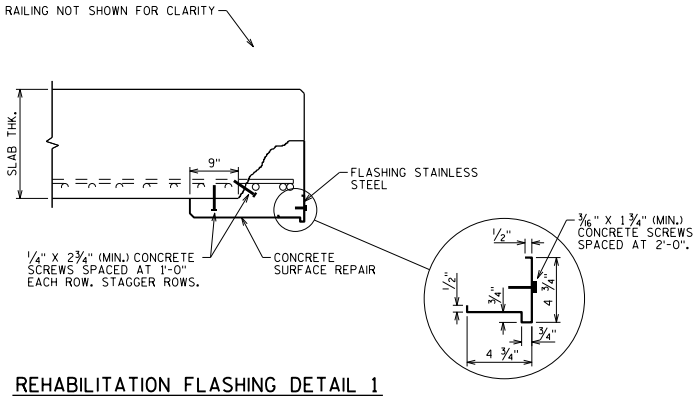
TOP OF FLASHING TO BEGIN APPROX. 1-INCH BELOW TOP OF DECK/SLAB SURFACE.





FLASHING DETAIL FOR NEW BRIDGES WITH OPEN RAILING

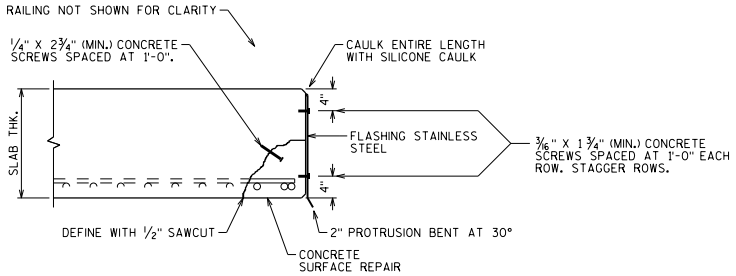
THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK, 3/16" CONCRETE SCREWS AND CLEANING THE EDGE OF THE DECK PRIOR TO ATTACHMENT OF THE FLASHING.



REHABILITATION FLASHING DETAIL 1

DETAIL 1 NOT TO BE USED IF CLEARANCE IS AN ISSUE OR IF DEBRIS IS A CONCERN.

THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING AND CONCRETE SCREWS, INCLUDING THE 1/4" SCREWS USED TO SECURE THE CONCRETE SURFACE REPAIR.



REHABILITATION FLASHING DETAIL 2

THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK, 3/16" AND 1/4" CONCRETE SCREWS, AND CLEANING THE EDGE OF THE DECK PRIOR TO ATTACHMENT OF THE FLASHING.

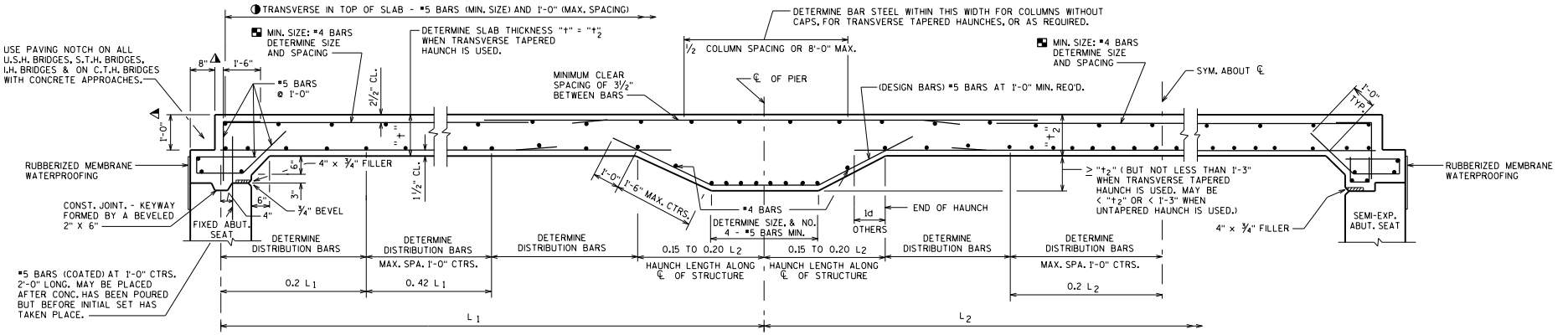
EDGE OF DECK FLASHING

BUREAU OF STRUCTURES

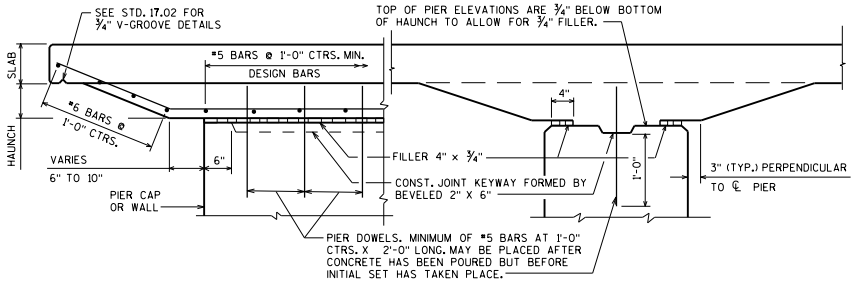
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 17.03

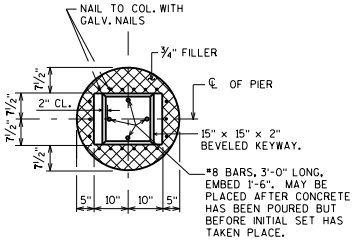


LONGITUDINAL SECTION

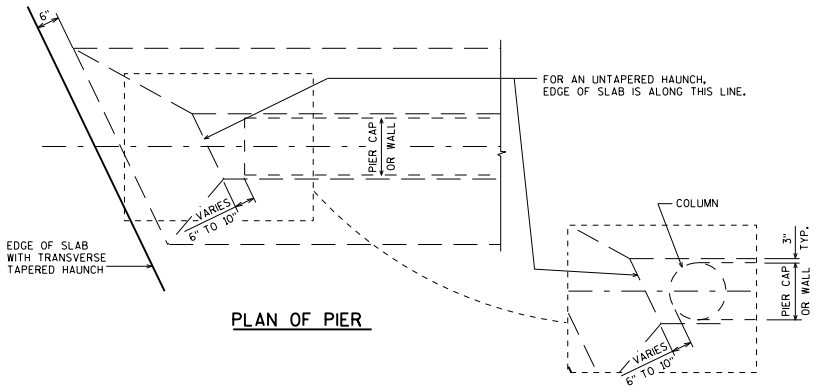


PIER CAP OR WALL TYPE PIER

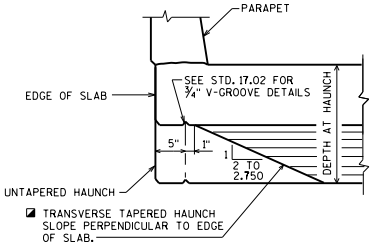
SHOWING TRANSVERSE TAPERED HAUNCH



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



PLAN OF PIER



TAPERED/UNTAPERED HAUNCH CROSS SECTION

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.

PRIOR TO RELEASING SLAB FALSEWORK, TAKE TOP OF SLAB ELEVATIONS AT THE ℄ OF ABUTMENTS, THE ℄ OF PIERS AND AT 5/10 PTS. TO VERIFY CAMBER. TAKE ELEVATIONS ALONG GUTTER LINES AND CROWN OR ℄.

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 HAUNCHES MAY BE USED TO ELIMINATE A COLUMN (PROVIDED A MINIMUM OF 3 COLUMNS ARE USED), OR FOR AESTHETICS.

◬ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

◩ REINFORCEMENT IN SLAB MUST MEET TEMPERATURE AND SHRINKAGE REQUIREMENTS.

TOP TRANSVERSE REINF. FOR RAILINGS/PARAPETS		
SINGLE SLOPE OR SLOPED FACE PARAPETS	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") 5'-0" LONG NO HOOK REQ'D. AT END
13" ≤ SLAB THICK. < 15"	(#5 @ 10")	(#5 @ 10") 5'-0" LONG STD. HOOK REQ'D. AT END
STEEL RAILINGS TYPE "NY"/"M"/"W"	◑ TOP TRANSVERSE REINF. SPECIFIED IN "LONGIT. SECTION" IS ADEQUATE	

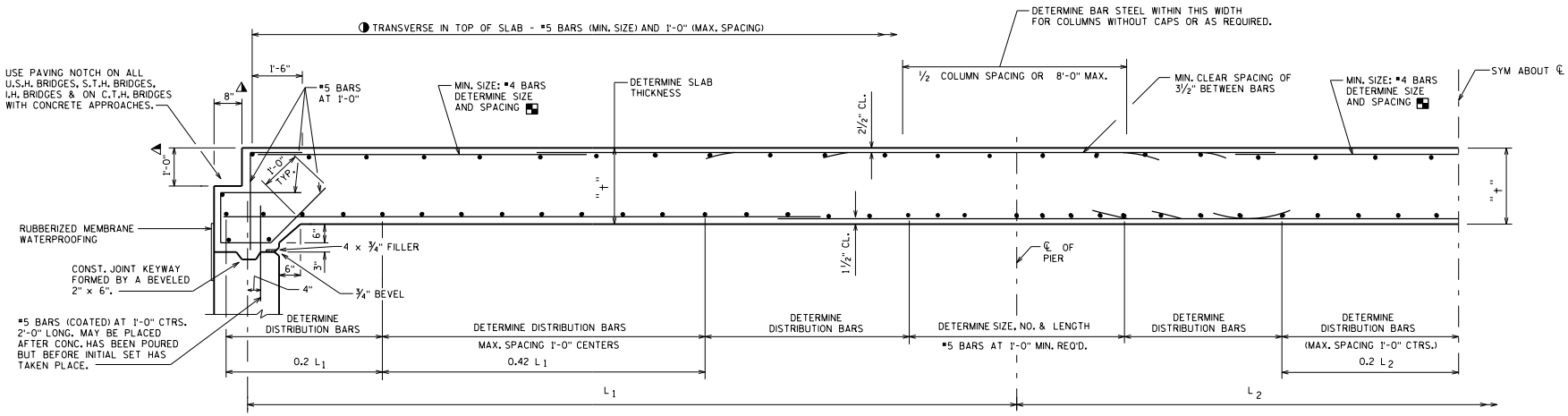
CONTINUOUS HAUNCHED SLAB

BUREAU OF STRUCTURES

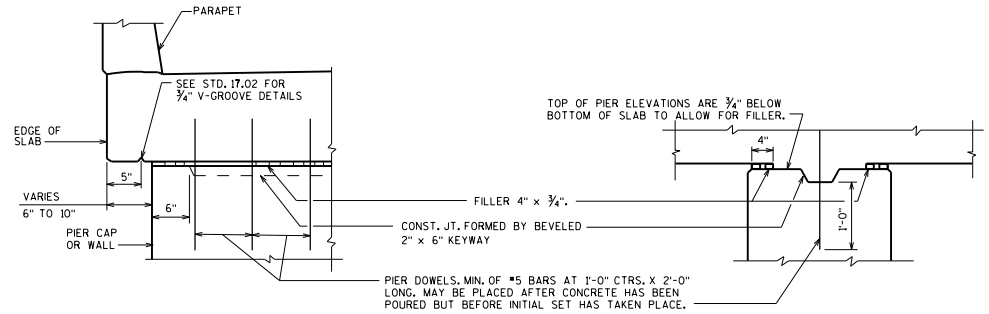
APPROVED: Bill Oliva

DATE: 1-15

STANDARD 18.01

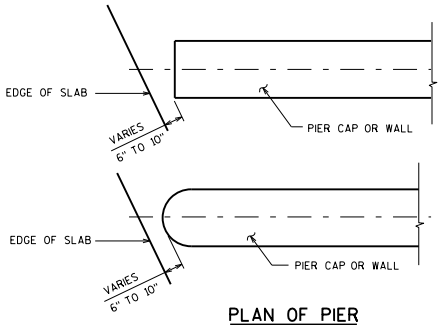


HALF LONGITUDINAL SECTION

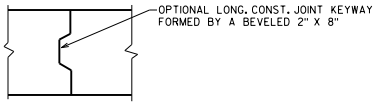


PIER CAP OR WALL TYPE PIER

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



PLAN OF PIER



OPTIONAL LONGITUDINAL CONSTRUCTION JOINT

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.

PRIOR TO RELEASING SLAB FALSEWORK, TAKE TOP OF SLAB ELEVATIONS AT THE ℄ OF ABUTMENTS, THE ℄ OF PIERS AND AT 5/10 PTS. TO VERIFY CAMBER. TAKE ELEVATIONS ALONG GUTTER LINES AND CROWN OR ℄.

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.

⚠ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

◪ REINFORCEMENT IN SLAB MUST MEET TEMPERATURE AND SHRINKAGE REQUIREMENTS.

TOP TRANSVERSE REINF. FOR RAILINGS/PARAPETS		
SINGLE SLOPE OR SLOPED FACE PARAPETS	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") 5'-0" LONG NO HOOK REQ'D. AT END
13" ≤ SLAB THICK. < 15"	(#5 @ 10")	(#5 @ 10") 5'-0" LONG STD. HOOK REQ'D. AT END
STEEL RAILINGS TYPE "NY"/"M"/"W"	◑ TOP TRANSVERSE REINF. SPECIFIED IN "LONGIT. SECTION" IS ADEQUATE	

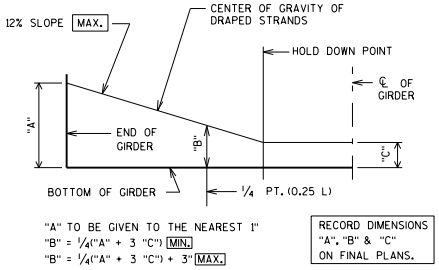
CONTINUOUS FLAT SLAB

BUREAU OF STRUCTURES

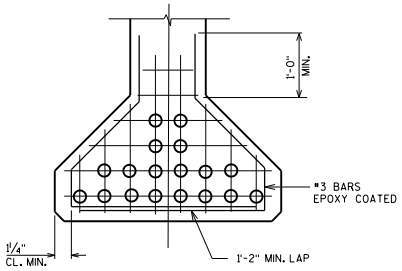
APPROVED: *Bill Oliva*

DATE: 7-17

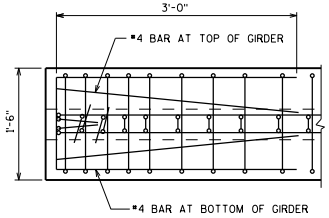
STANDARD 18.02



LOCATION OF DRAPED STRANDS



DETAIL A



PLAN VIEW

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 2" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS. SEE SECTION 503.3.3 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON ACCEPTANCE OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE (DIA.)-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 28-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE ONLY 0.5" DIA. STRAND FOR THE DRAPED PATTERN. THE MAX. NUMBER OF DRAPED 0.5" DIA. STRANDS IS 8. USE 0.6" DIA. FOR THE STRAIGHT PATTERN, UNLESS ONLY 0.5" DIA. WORK FOR KEEPING STRESSES AT ACCEPTABLE LEVELS.

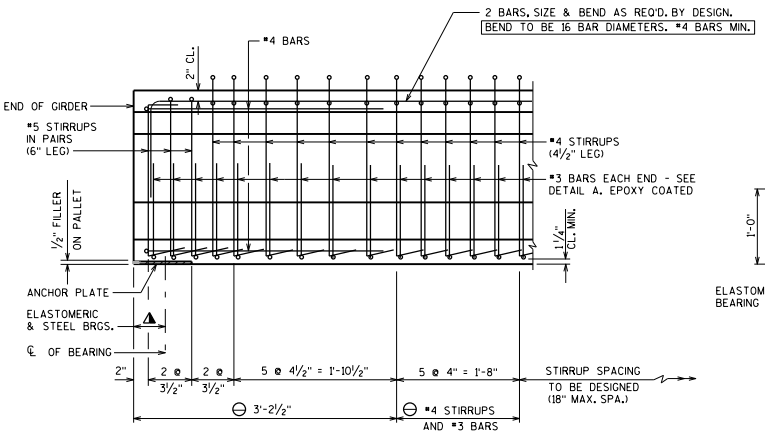
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.02 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

⚠ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

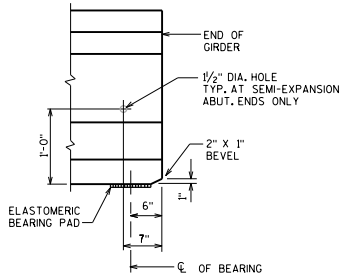
⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.

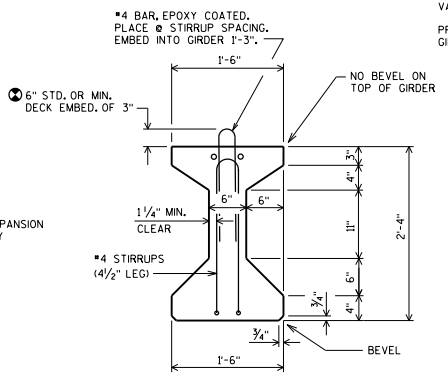


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER

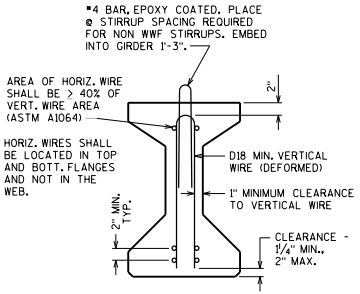


SUPPORT WITH ½" ELASTOMERIC BRG. PAD



SECTION THRU GIRDER

STRANDS NOT SHOWN



SECTION THRU GIRDER

SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)

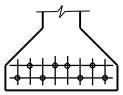
28" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

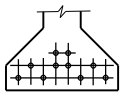
APPROVED: Bill Oliva

DATE: 7-18

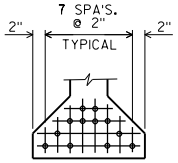
STANDARD 19.01



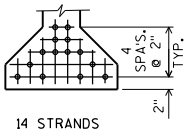
8 STRANDS



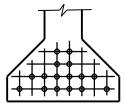
10 STRANDS



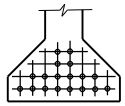
12 STRANDS



14 STRANDS



*16 STRANDS

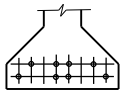


*18 STRANDS

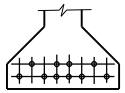
* MAY REQUIRE DEBONDING AT ENDS, WHICH IS TO BE AVOIDED.

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS

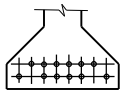
(0.5" DIA. STRANDS MAY ALSO BE USED)



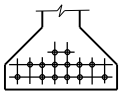
8 STRANDS



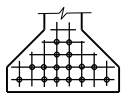
10 STRANDS



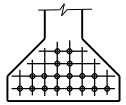
12 STRANDS



14 STRANDS



16 STRANDS



18 STRANDS

ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS

28" GIRDER

A = 312 SQ. IN.

r^2 = 91.95 IN.^{2}

y_T = 14.58 IN.

y_B = -13.42 IN.

I = 28,687 IN.^{4}

S_T = 1,968 IN.^{3}

S_B = -2,138 IN.^{3}

WT. = 325 #/FT.

PRE-TENSION

f_s' = 270,000 P.S.I

f_s = 0.75 x 270,000 = 202,500 P.S.I
for low relaxation strands

Pi PER 0.5" DIA. STRAND = 0.1531 X 202,500 = 31.00 KIPS

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

$$\frac{y_B}{r^2} = \frac{-13.42}{91.95} = -0.1459 \text{ IN./IN.}^2$$

$$f_B(\text{init.}) = \frac{A_s f_s}{A}\left(1+\frac{e_s y_B}{r^2}\right)$$

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_s (inches)	$P(\text{init.})=A_s f_s$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)			
8	-10.40	352	2.841
10	-9.80	439	3.419
12	-8.73	527	3.841
14	-7.97	615	4.264
*16	-9.4	703	5.345
*18	-9.6	791	6.087
STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)			
8	-10.4	248	2.001
10	-10.6	310	2.531
12	-10.4	372	3.002
14	-10.0	434	3.421
16	-9.4	496	3.771
18	-9.6	558	4.294

DESIGNER NOTES

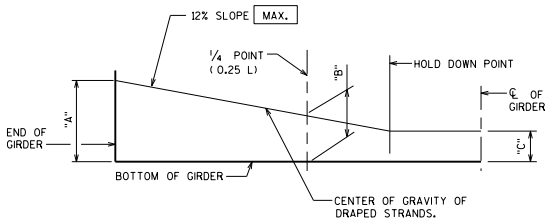
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

28" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

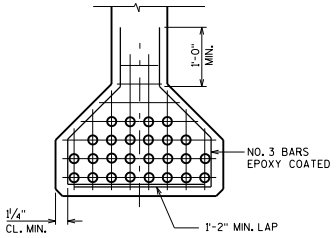
DATE: 7-17



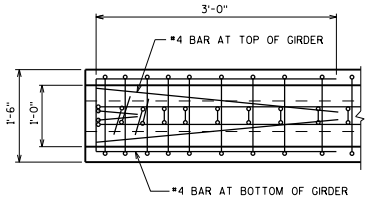
"A" TO BE GIVEN TO THE NEAREST 1"
"B" = ¼("A" + 3 "C") MIN.
"B" = ¼("A" + 3 "C") + 3" MAX.

RECORD DIMENSIONS "A", "B" & "C" ON FINAL PLANS.

LOCATION OF DRAPED STRANDS



DETAIL A



PLAN VIEW

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 2" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS. SEE SECTION 503.3.3 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON ACCEPTANCE OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE (DIA.)-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 36-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE ONLY 0.5" DIA. STRAND FOR THE DRAPED PATTERN. THE MAX. NUMBER OF DRAPED 0.5" DIA. STRANDS IS 8. USE 0.6" DIA. FOR THE STRAIGHT PATTERN, UNLESS ONLY 0.5" DIA. WORK FOR KEEPING STRESSES AT ACCEPTABLE LEVELS.

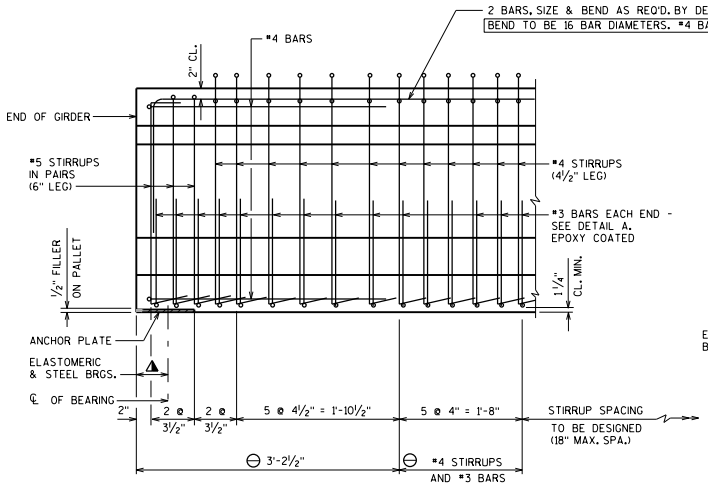
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.04 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

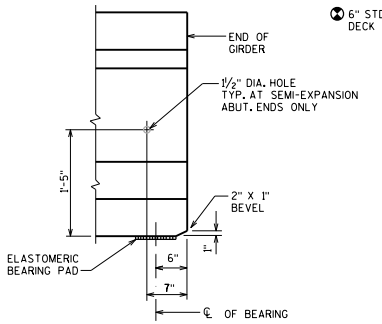
⊖ DETAIL TYPICAL AT EACH END

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.

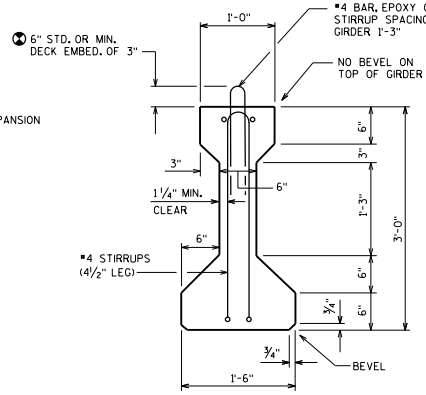


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.



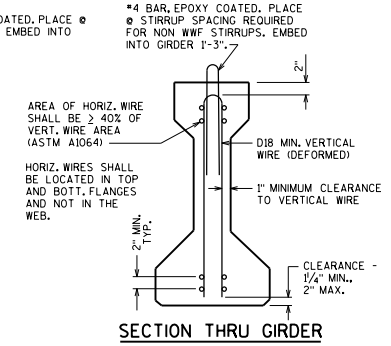
SUPPORT WITH ½" ELASTOMERIC BRG. PAD

SIDE VIEW OF GIRDER



SECTION THRU GIRDER

STRANDS NOT SHOWN



SECTION THRU GIRDER

SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)

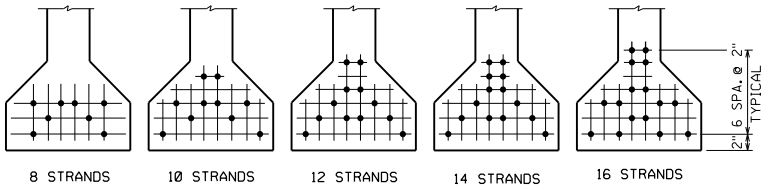
36" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

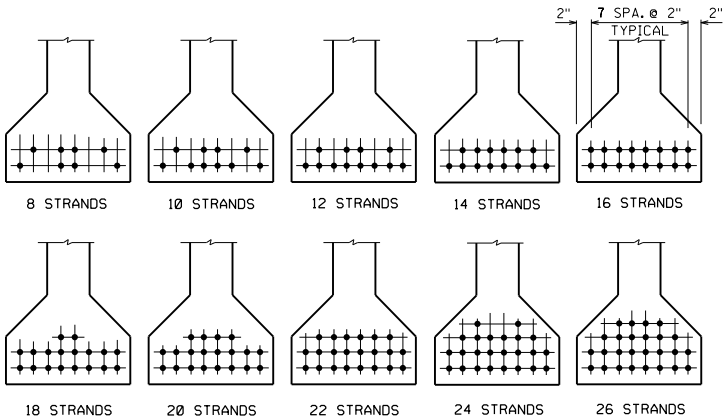
DATE: 7-18

STANDARD 19.03



STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS

(0.5" DIA. STRANDS MAY ALSO BE USED)



ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS

36" GIRDER

A = 369 SQ. IN.

r^2 = 138.15 IN.^{2}

y_T = 20.17 IN.

y_B = -15.83 IN.

I = 50,979 IN.^{4}

S_T = 2,527 IN.^{3}

S_B = -3,220 IN.^{3}

WT. = 384 #/FT.

PRE-TENSION

f'_S = 270,000 P.S.I

f_S = 0.75 X 270,000 = 202,500 P.S.I
for low relaxation strands

Pi PER 0.5" DIA. STRAND = 0.1531 X 202,500 = 31.00 KIPS

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

$$\frac{y_B}{r^2} = \frac{-15.83}{138.15} = -0.1146 \text{ IN./IN.}^2$$

$$f_B(\text{init.}) = \frac{A_S f_S}{A}\left(1+\frac{e_S y_B}{r^2}\right)$$

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_S (inches)	$P(\text{init.}) = A_S f_S$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)			
8	-11.33	352	2.192
10	-10.23	439	2.584
12	-9.83	527	3.036
14	-9.26	615	3.435
16	-9.08	703	3.887
STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)			
8	-12.83	248	1.660
10	-13.03	310	2.094
12	-13.16	372	2.528
14	-12.97	434	2.924
16	-12.83	496	3.320
18	-12.50	558	3.678
20	-12.23	620	4.034
22	-12.01	682	4.392
24	-11.66	744	4.710
26	-11.37	806	5.030

DESIGNER NOTES

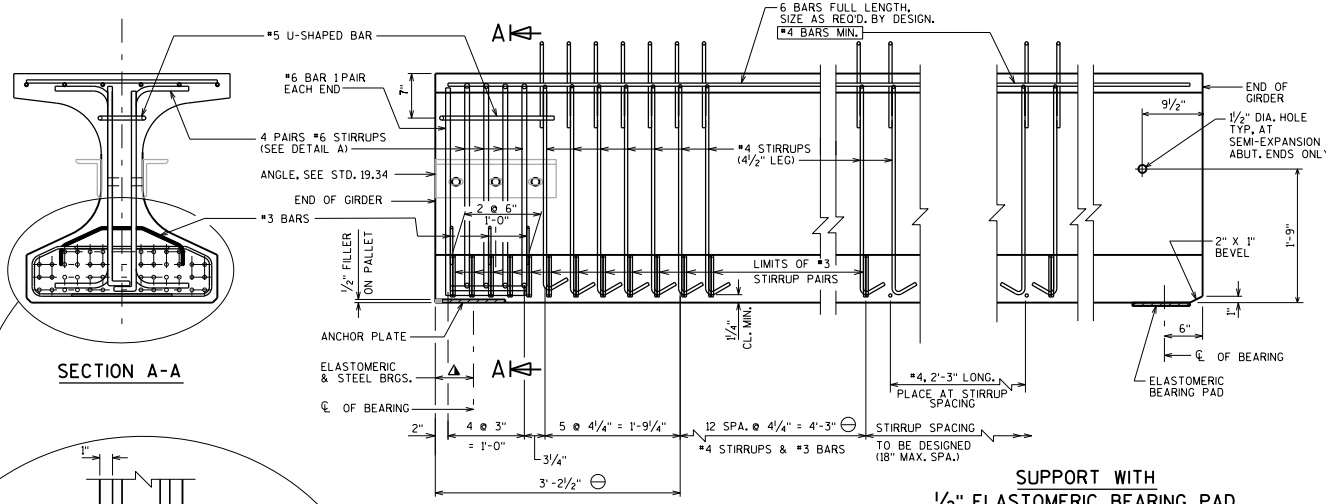
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

36" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

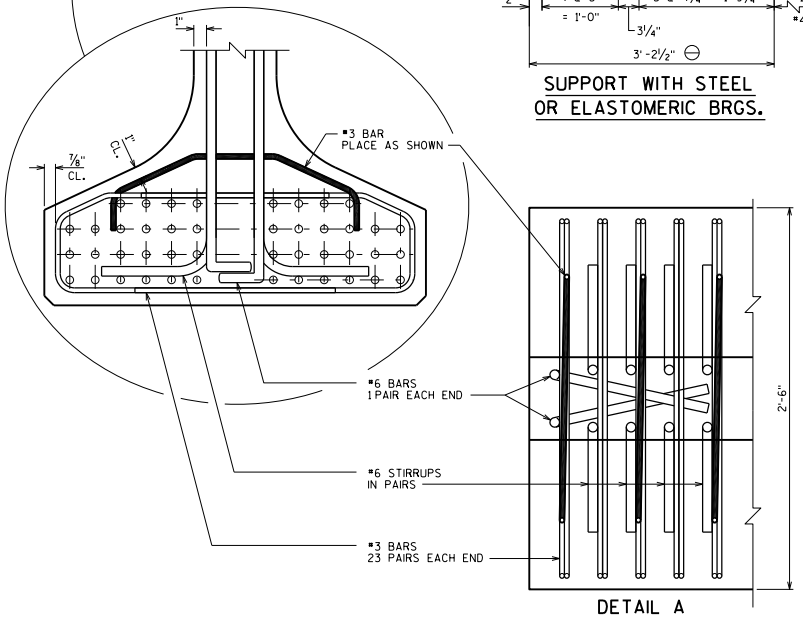
DATE: 7-17



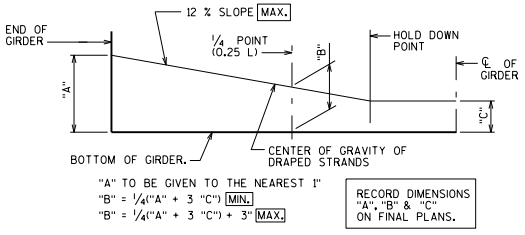
SECTION A-A

SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

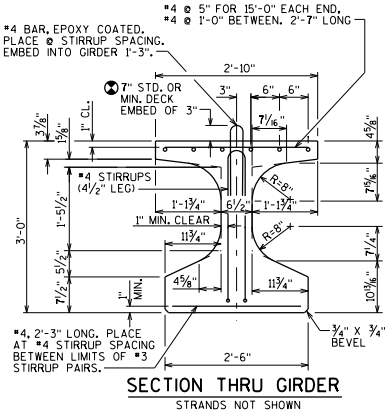
SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD



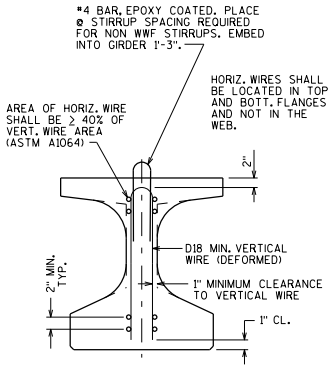
DETAIL A
BOTTOM FLANGE



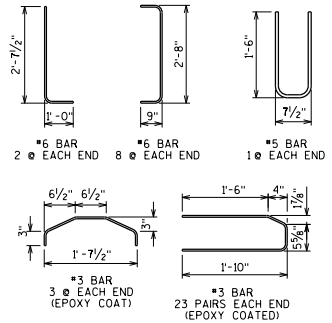
LOCATION OF DRAPED STRANDS



SECTION THRU GIRDER
STRANDS NOT SHOWN



SECTION THRU GIRDER
SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)



NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 8" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 8" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS. SEE SECTION 503.3.3 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 36W-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.

REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.12 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±3/4" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.

36W" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.11

36W" GIRDER

A = 632 SQ. IN.

r^2 = 158.20 IN.^{2}

y_T = 19.37 IN.

y_B = -16.63 IN.

I = 99,980 IN.^{4}

S_T = 5,162 IN.^{3}

S_B = -6,012 IN.^{3}

WT. = 658 #/FT.

PRE-TENSION

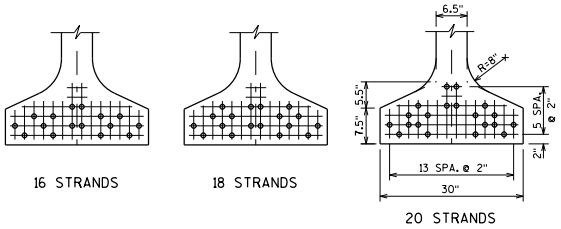
f'_s = 270,000 P.S.I.

f_s = 0.75 X 270,000 = 202,500 P.S.I.
for low relaxation strands

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

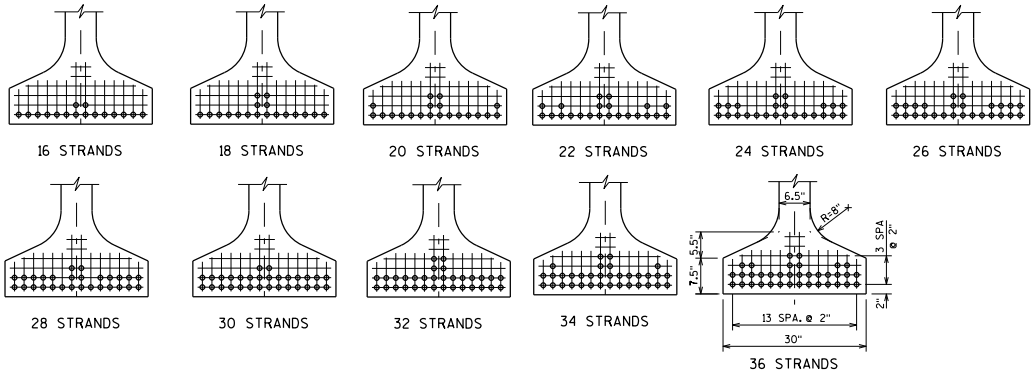
$$\frac{y_B}{r^2} = \frac{-16.63}{158.20} = -0.10512 \text{ in/in}^2$$

$$f_B(\text{init.}) = \frac{A_s f_s}{A}\left(1 + \frac{e_s y_B}{r^2}\right)$$



16 STRANDS 18 STRANDS 20 STRANDS

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS



16 STRANDS 18 STRANDS 20 STRANDS 22 STRANDS 24 STRANDS 26 STRANDS

28 STRANDS 30 STRANDS 32 STRANDS 34 STRANDS 36 STRANDS

ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_s (inches)	P(init.)=$A_s f_s$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-12.13	703	2.531
18	-11.74	791	2.796
20	-11.03	879	3.003
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-14.38	703	2.794
18	-13.96	791	3.088
20	-13.83	879	3.413
22	-13.72	967	3.737
24	-13.63	1055	4.061
26	-13.55	1143	4.385
28	-13.49	1230	4.706
30	-13.43	1318	5.030
32	-13.13	1406	5.295
34	-12.98	1494	5.589
36	-12.85	1582	5.885

DESIGNER NOTES

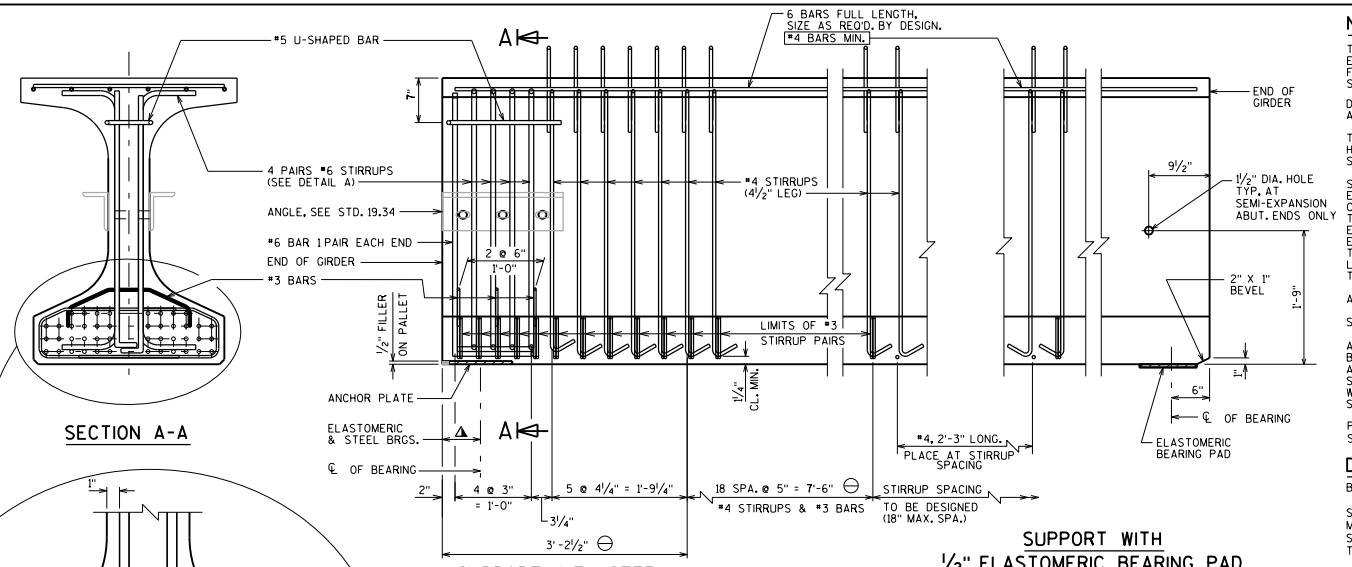
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

36W" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

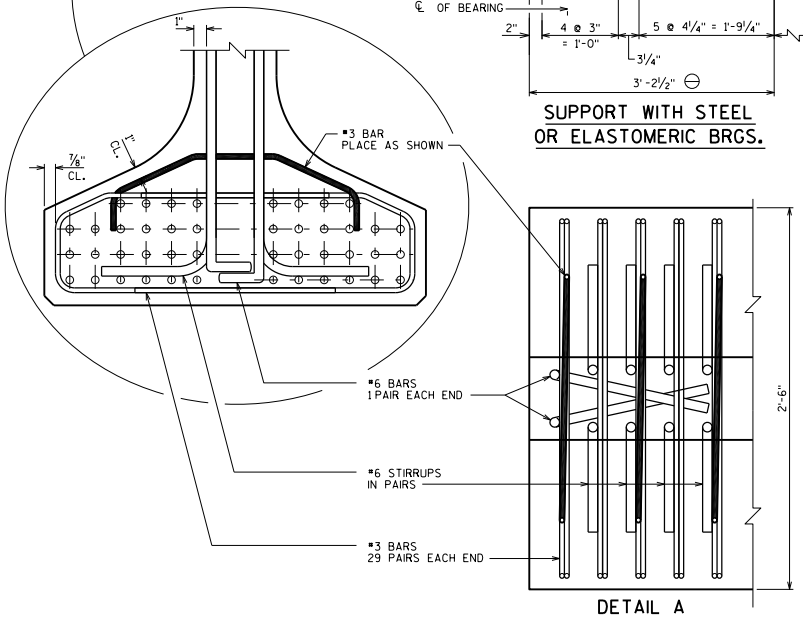
DATE: 7-17



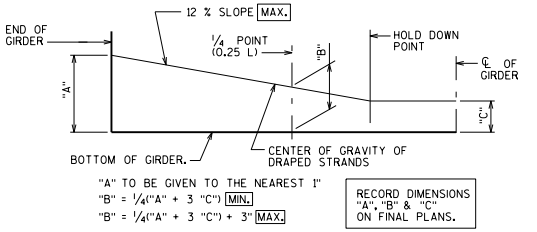
SECTION A-A

SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SUPPORT WITH ½" ELASTOMERIC BEARING PAD



DETAIL A
BOTTOM FLANGE



LOCATION OF DRAPED STRANDS

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 8" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 8" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS. SEE SECTION 503.3.3 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 45W-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.

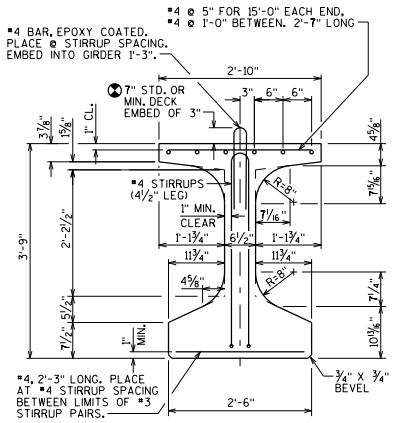
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.14 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1, USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

△ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

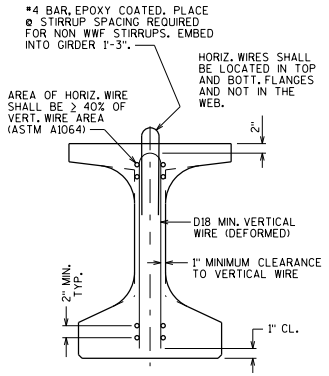
⊖ DETAIL TYPICAL AT EACH END

Ⓓ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

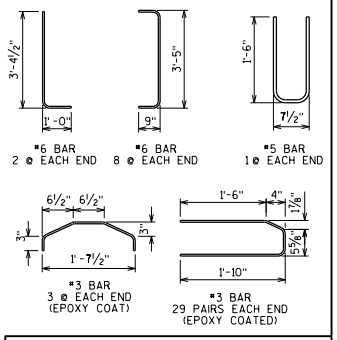
PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.



SECTION THRU GIRDER
STRANDS NOT SHOWN



SECTION THRU GIRDER
SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)



45W" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.13

45W" GIRDER

A = 692 SQ. IN.

r^2 = 258.70 IN.^{2}

y_T = 24.26 IN.

y_B = -20.74 IN.

I = 178,971 IN.^{4}

S_T = 7,377 IN.^{3}

S_B = -8,629 IN.^{3}

WT. = 721 #/FT.

PRE-TENSION

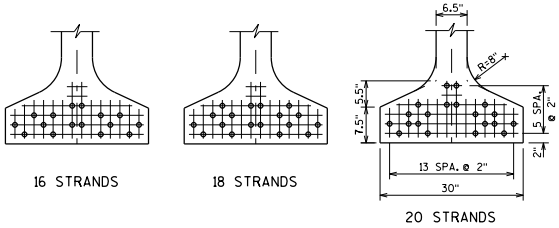
f'_s = 270,000 P.S.I.

f_s = 0.75 X 270,000 = 202,500 P.S.I.
for low relaxation strands

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

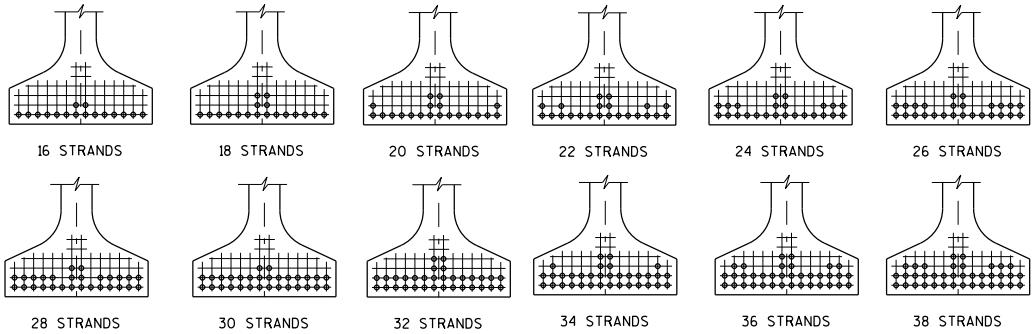
$$\frac{y_B}{r^2} = \frac{-20.74}{258.70} = -0.08017 \text{ in/in}^2$$

$$f_B(\text{init.}) = \frac{A_s f_s}{A}\left(1 + \frac{e_s y_B}{r^2}\right)$$



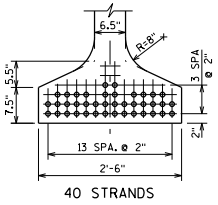
16 STRANDS 18 STRANDS 20 STRANDS

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS



16 STRANDS 18 STRANDS 20 STRANDS 22 STRANDS 24 STRANDS 26 STRANDS

28 STRANDS 30 STRANDS 32 STRANDS 34 STRANDS 36 STRANDS 38 STRANDS



40 STRANDS

ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_s (inches)	P(init.)=$A_s f_s$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-16.24	703	2.339
18	-15.85	791	2.596
20	-15.14	879	2.812
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-18.49	703	2.521
18	-18.07	791	2.799
20	-17.94	879	3.097
22	-17.83	967	3.394
24	-17.74	1055	3.693
26	-17.66	1143	3.991
28	-17.60	1230	4.285
30	-17.54	1318	4.583
32	-17.24	1406	4.840
34	-17.09	1494	5.117
36	-16.96	1582	5.395
38	-16.85	1670	5.674
40	-16.74	1758	5.950

DESIGNER NOTES

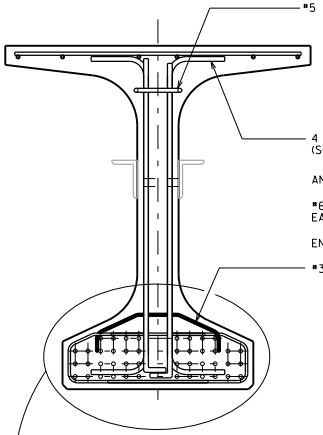
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

45W" PRESTRESSED GIRDER DESIGN DATA

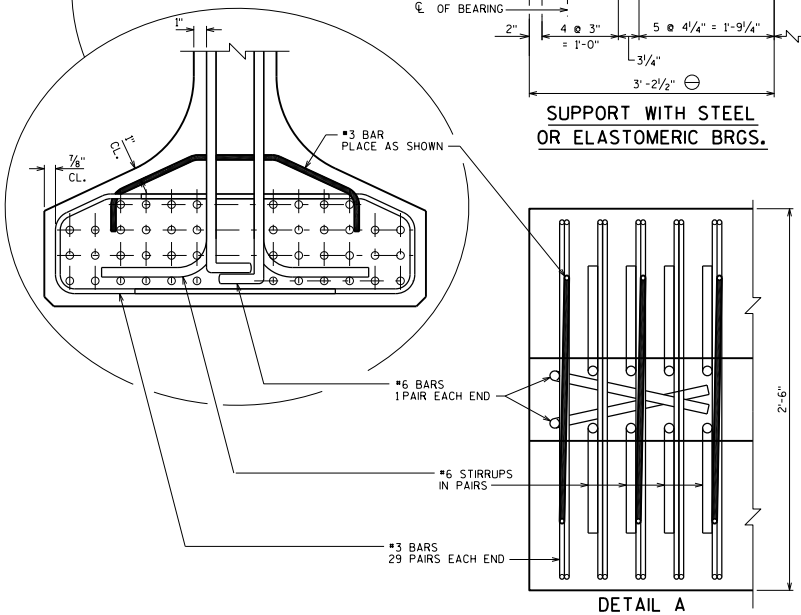
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17



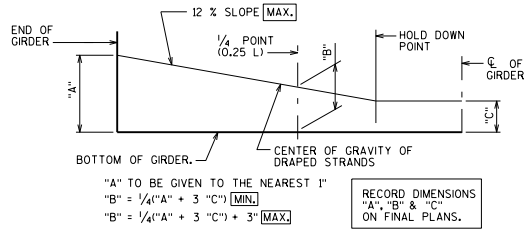
SECTION A-A



SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SUPPORT WITH ½" ELASTOMERIC BEARING PAD

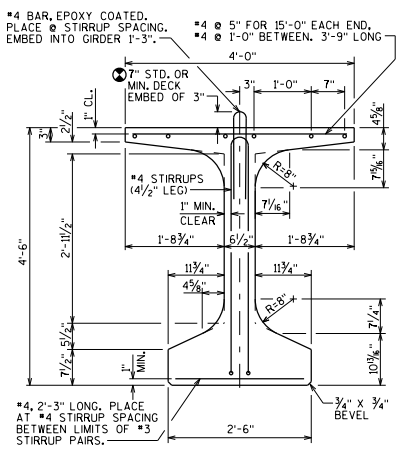
DETAIL A
BOTTOM FLANGE



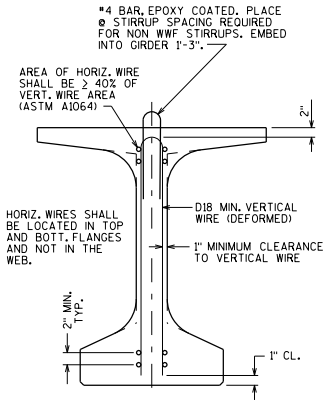
"A" TO BE GIVEN TO THE NEAREST 1"
"B" = ¼("A" + 3 "C") MIN.
"B" = ¼("A" + 3 "C") + 3" MAX.

RECORD DIMENSIONS "A", "B" & "C" ON FINAL PLANS.

LOCATION OF DRAPED STRANDS



SECTION THRU GIRDER
STRANDS NOT SHOWN



SECTION THRU GIRDER
SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS
ASTM A1064 (FY = 70 KSI)

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 15" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 15" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS. SEE SECTION 503.3.3 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 54W-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.

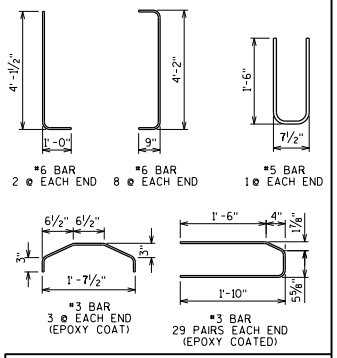
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.16 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.



54W" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.15

54W" GIRDER

A = 798 SQ. IN.

r^2 = 402.41 IN.^{2}

y_T = 27.70 IN.

y_B = -26.30 IN.

I = 321,049 IN.^{4}

S_T = 11,592 IN.^{3}

S_B = -12,205 IN.^{3}

WT. = 831 #/FT.

PRE-TENSION

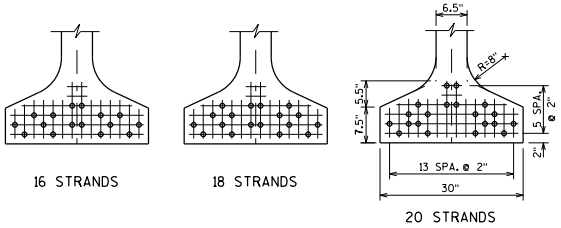
f'_s = 270,000 P.S.I.

f_s = 0.75 X 270,000 = 202,500 P.S.I.
for low relaxation strands

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

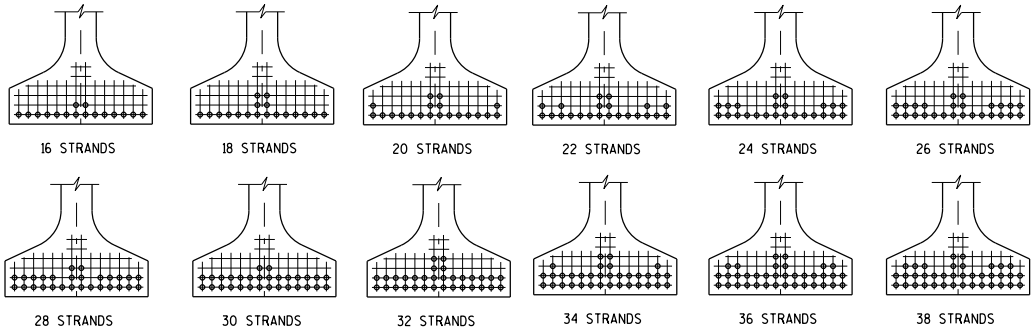
$$\frac{y_B}{r^2} = \frac{-26.30}{402.41} = -0.06536 \text{ in/in}^2$$

$$f_B(\text{init.}) = \frac{A_s f_s}{A}\left(1 + \frac{e_s y_B}{r^2}\right)$$



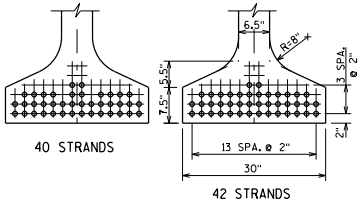
16 STRANDS 18 STRANDS 20 STRANDS

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS



16 STRANDS 18 STRANDS 20 STRANDS 22 STRANDS 24 STRANDS 26 STRANDS

28 STRANDS 30 STRANDS 32 STRANDS 34 STRANDS 36 STRANDS 38 STRANDS



40 STRANDS 42 STRANDS

ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_s (inches)	P(init.)=$A_s f_s$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-21.80	703	2.136
18	-21.41	791	2.378
20	-20.70	879	2.592
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-24.05	703	2.266
18	-23.63	791	2.522
20	-23.50	879	2.793
22	-23.39	967	3.065
24	-23.30	1055	3.336
26	-23.22	1143	3.607
28	-23.16	1230	3.875
30	-23.10	1318	4.146
32	-22.80	1406	4.387
34	-22.65	1494	4.643
36	-22.52	1582	4.901
38	-22.41	1670	5.159
40	-22.30	1758	5.413
42	-22.20	1846	5.670

DESIGNER NOTES

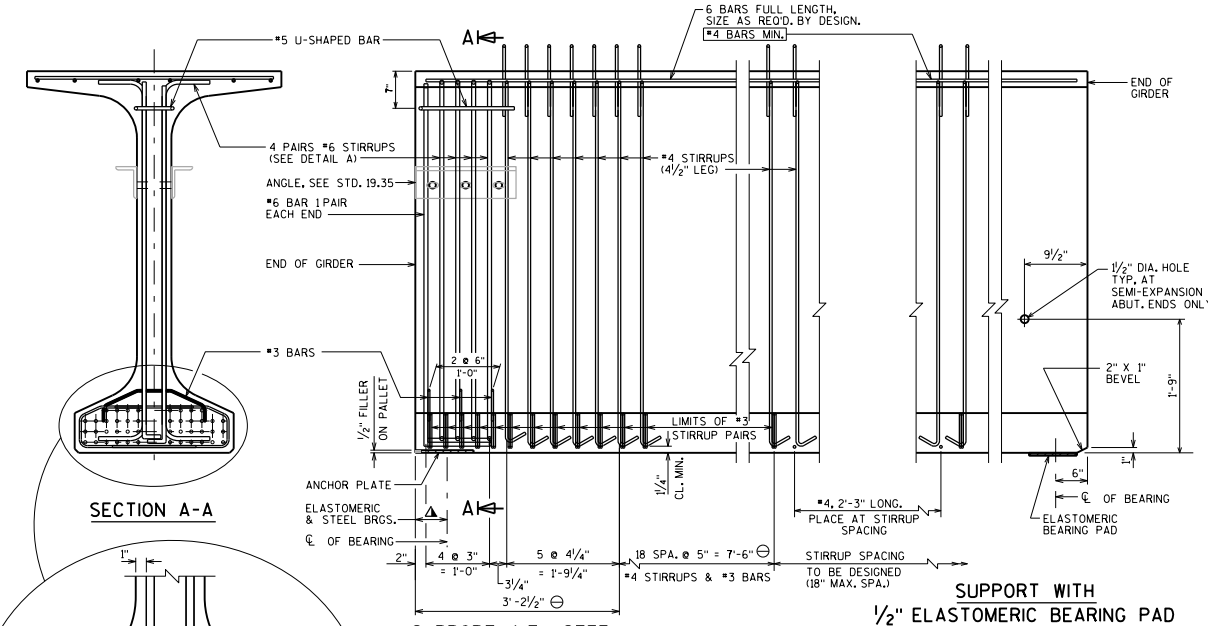
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

54W" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

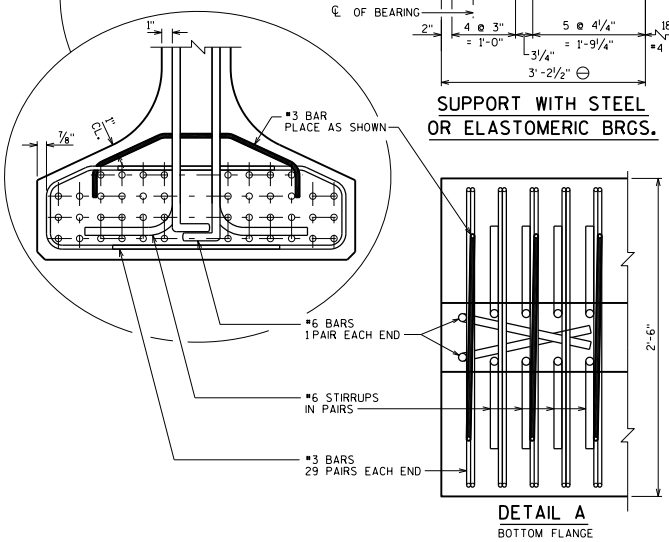
DATE: 7-17



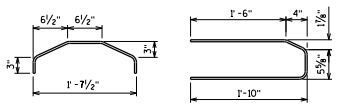
SECTION A-A

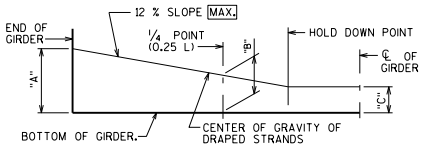
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SUPPORT WITH ½" ELASTOMERIC BEARING PAD



DETAIL A
BOTTOM FLANGE

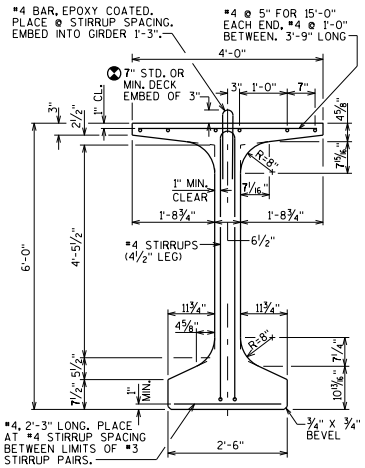




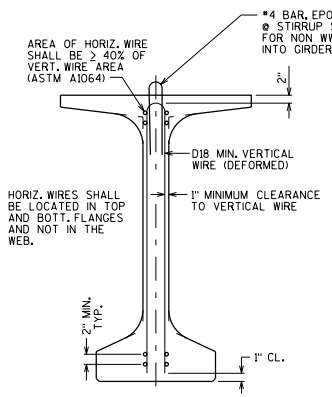
"A" TO BE GIVEN TO THE NEAREST 1"
"B" = ¼("A" + 3 "C") MIN.
"B" = ¼("A" + 3 "C") + 3" MAX.

RECORD DIMENSIONS "A", "B" & "C" ON FINAL PLANS.

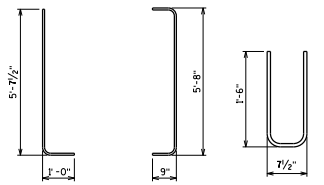
LOCATION OF DRAPED STRANDS



SECTION THRU GIRDER
STRANDS NOT SHOWN



SECTION THRU GIRDER
SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS
ASTM A1064 (FY = 70 KSI)



NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 15" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 15" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR *4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

THIS NOTE APPLIES TO LONG SPANS AS DEFINED IN THE NOTES FOR THE 72W GIRDER, TABLE 19.3-2 OF THE BRIDGE MANUAL: FOR STORAGE, HANDLING, AND TRANSPORTING, THIS GIRDER IS REINFORCED TO ALLOW A MAXIMUM OVERHANG FROM THE LIFTING LOCATION OR POINT OF SUPPORT OF UP TO 1/10 THE GIRDER LENGTH. THE CONTRACTOR IS RESPONSIBLE FOR LATERAL STABILITY OF THE GIRDER UNTIL THE DECK IS CURED. (IF NOTE DOESN'T APPLY, REFERENCE SECT. 503.3.3 OF STD. SPEC. FOR GUIDANCE)

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 72W-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.

REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.18 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRE PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.

72W" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.17

72W" GIRDER

A = 915 SQ. IN.

r^2 = 717.5 IN.^{2}

y_T = 37.13 IN.

y_B = -34.87 IN.

I = 656,426 IN.^{4}

S_T = 17,680 IN.^{3}

S_B = -18,825 IN.^{3}

WT. = 953 #/FT.

PRE-TENSION

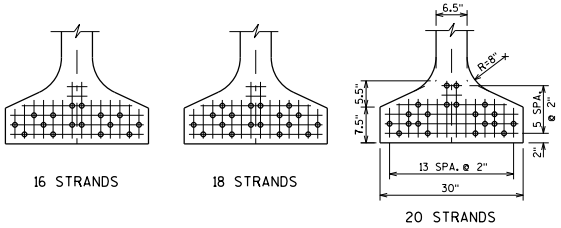
f'_s = 270,000 P.S.I.

f_s = 0.75 X 270,000 = 202,500 P.S.I.
for low relaxation strands

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

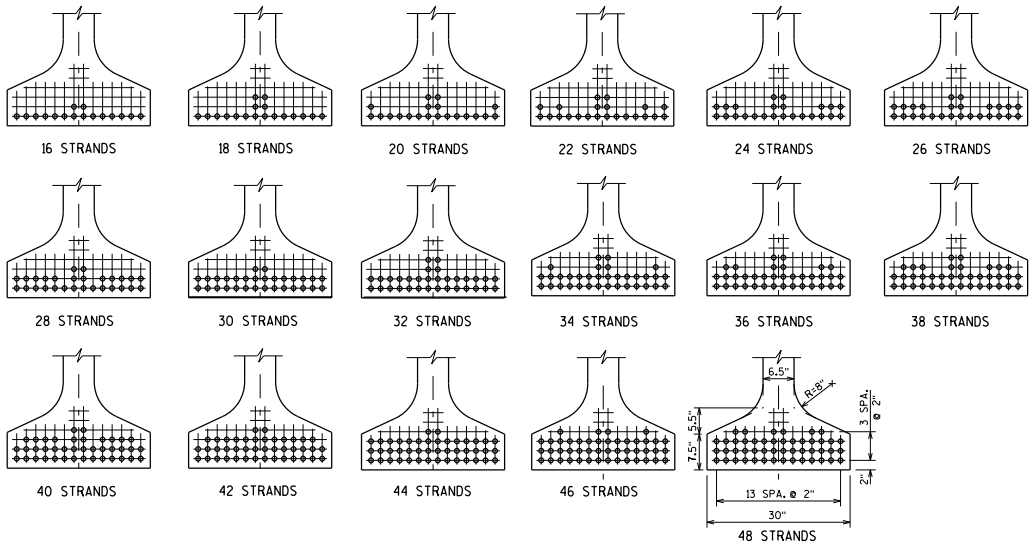
$$\frac{y_B}{r^2} = \frac{-34.87}{717.50} = -0.0486 \text{ in/in}^2$$

$$f_B(\text{init.}) = \frac{A_s f_s}{A}\left(1 + \frac{e_s y_B}{r^2}\right)$$



16 STRANDS 18 STRANDS 20 STRANDS

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS



ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_s (inches)	P(init.)=$A_s f_s$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-30.37	703	1.902
18	-29.98	791	2.124
20	-29.27	879	2.328
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-32.62	703	1.986
18	-32.20	791	2.217
20	-32.07	879	2.458
22	-31.96	967	2.698
24	-31.87	1055	2.939
26	-31.79	1143	3.179
28	-31.73	1230	3.417
30	-31.67	1318	3.657
32	-31.37	1406	3.880
34	-31.22	1494	4.110
36	-31.09	1582	4.341
38	-30.98	1670	4.574
40	-30.87	1758	4.803
42	-30.77	1846	5.034
44	-30.69	1933	5.265
46	-30.52	2021	5.484
48	-30.37	2109	5.707

DESIGNER NOTES

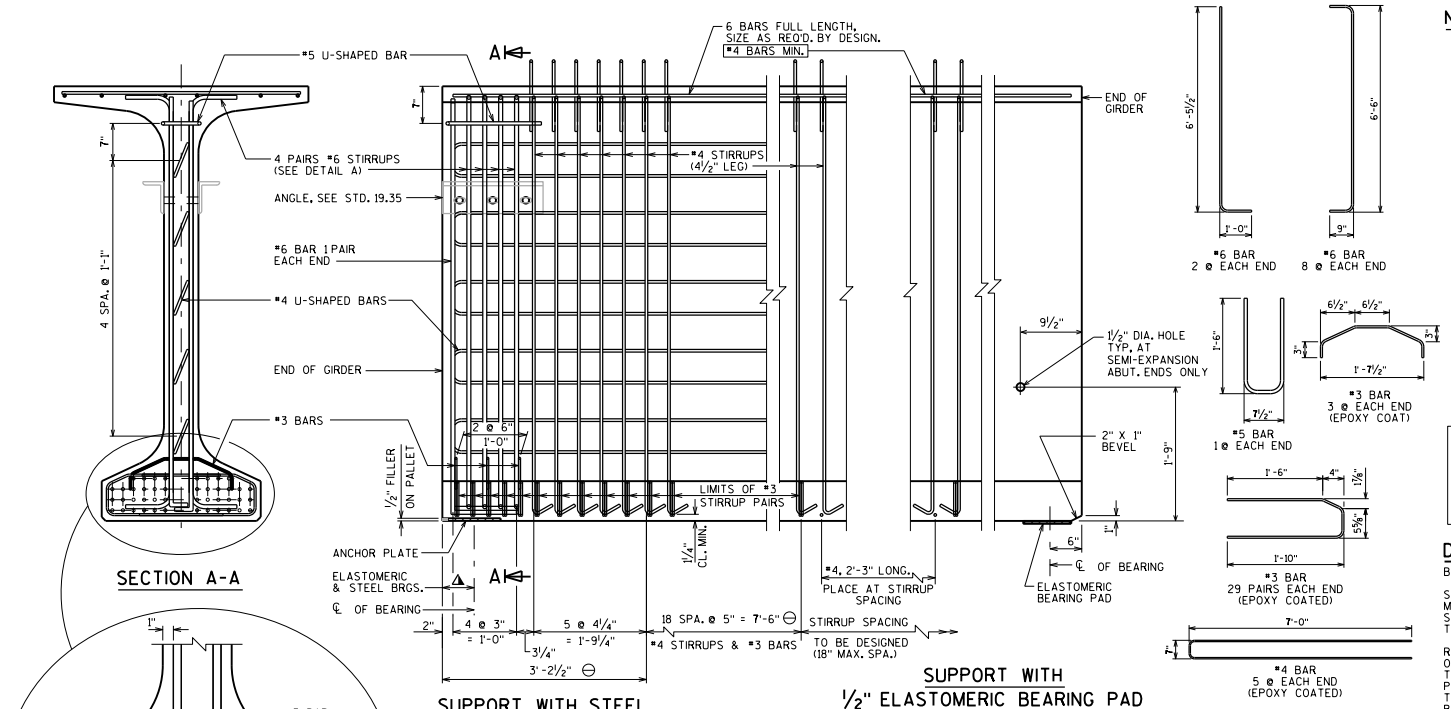
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

72W" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17



NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 15" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 15" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR *4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY MAY SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

PRESTRESSING STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

THIS NOTE APPLIES TO LONG SPANS AS DEFINED IN THE NOTES FOR THE 82W" GIRDER, TABLE 19.3-2 OF THE BRIDGE MANUAL: FOR STORAGE, HANDLING, AND TRANSPORTING, THIS GIRDER IS REINFORCED TO ALLOW A MAXIMUM OVERHANG FROM THE LIFTING LOCATION OR POINT OF SUPPORT OF UP TO 1/10 THE GIRDER LENGTH. THE CONTRACTOR IS RESPONSIBLE FOR LATERAL STABILITY OF THE GIRDER UNTIL THE DECK IS CURED. (IF NOTE DOESN'T APPLY, REFERENCE SECT. 503.3.3 OF STD. SPEC. FOR GUIDANCE)

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 82W-INCH".

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI, USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.

REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.20 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

⧗ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.

THERE IS CURRENTLY A MORATORIUM ON THE USE OF 82W" PRESTRESSED GIRDERS.

82W" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.19

82W" GIRDER

A = 980 SQ. IN.

r^2 = 924.1 IN.^{2}

y_T = 42.32 IN.

y_B = -39.68 IN.

I = 905,453 IN.^{4}

S_T = 21,396 IN.^{3}

S_B = -22,819 IN.^{3}

WT. = 1021 #/FT.

PRE-TENSION

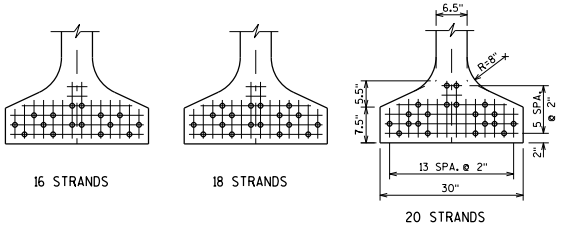
f'_s = 270,000 P.S.I.

f_s = 0.75 X 270,000 = 202,500 P.S.I.
for low relaxation strands

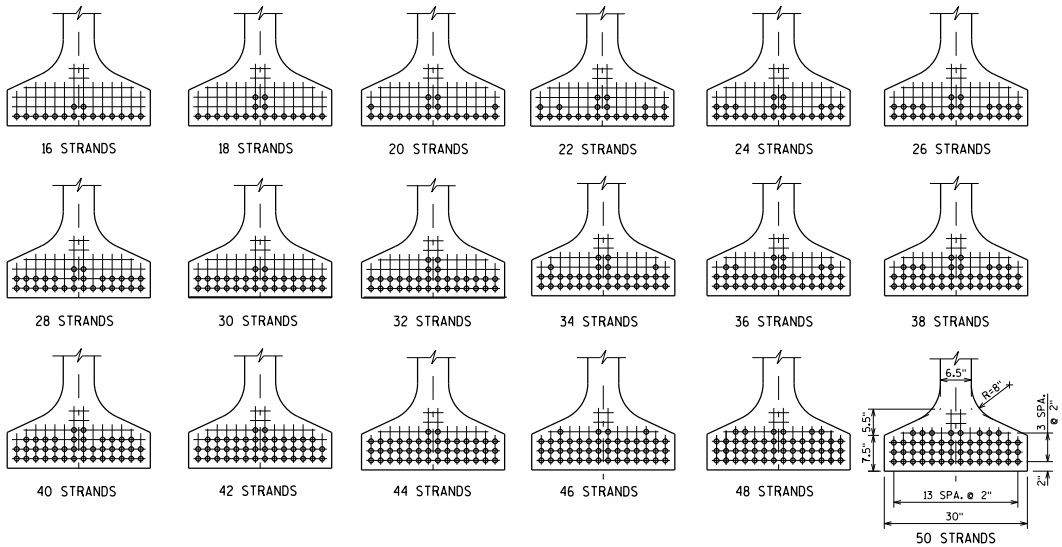
Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

$$\frac{y_B}{r^2} = \frac{-39.68}{924.10} = -0.04294 \text{ in/in}^2$$

$$f_B(\text{init.}) = \frac{A_s f_s}{A}\left(1 + \frac{e_s y_B}{r^2}\right)$$



STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS



ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

(COMPRESSION IS POSITIVE)

NO. STRANDS	e_s (inches)	P(init.)=$A_s f_s$ (KIPS)	f_B (init.) (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-35.18	703	1.801
18	-34.79	791	2.013
20	-34.08	879	2.209
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-37.43	703	1.870
18	-37.01	791	2.090
20	-36.88	879	2.318
22	-36.77	967	2.545
24	-36.68	1055	2.772
26	-36.60	1143	3.000
28	-36.54	1230	3.224
30	-36.48	1318	3.451
32	-36.18	1406	3.664
34	-36.03	1494	3.883
36	-35.90	1582	4.104
38	-35.79	1670	4.323
40	-35.68	1758	4.542
42	-35.58	1846	4.762
44	-35.50	1933	4.978
46	-35.33	2021	5.191
48	-35.18	2109	5.404
50	-35.04	2197	5.616

DESIGNER NOTES

ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

THERE IS CURRENTLY A MORATORIUM ON THE USE OF 82W" PRESTRESSED GIRDERS.

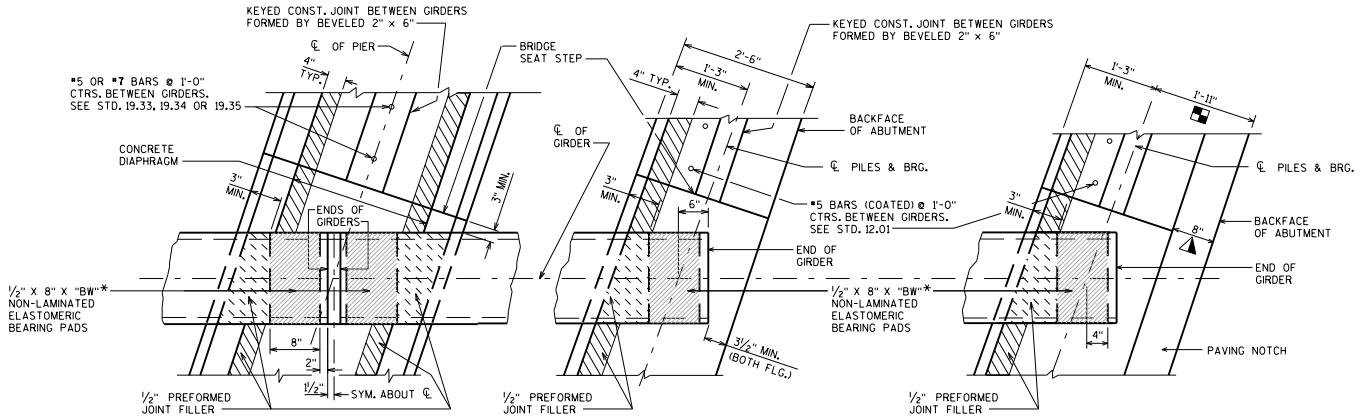
82W" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17

STANDARD 19.20



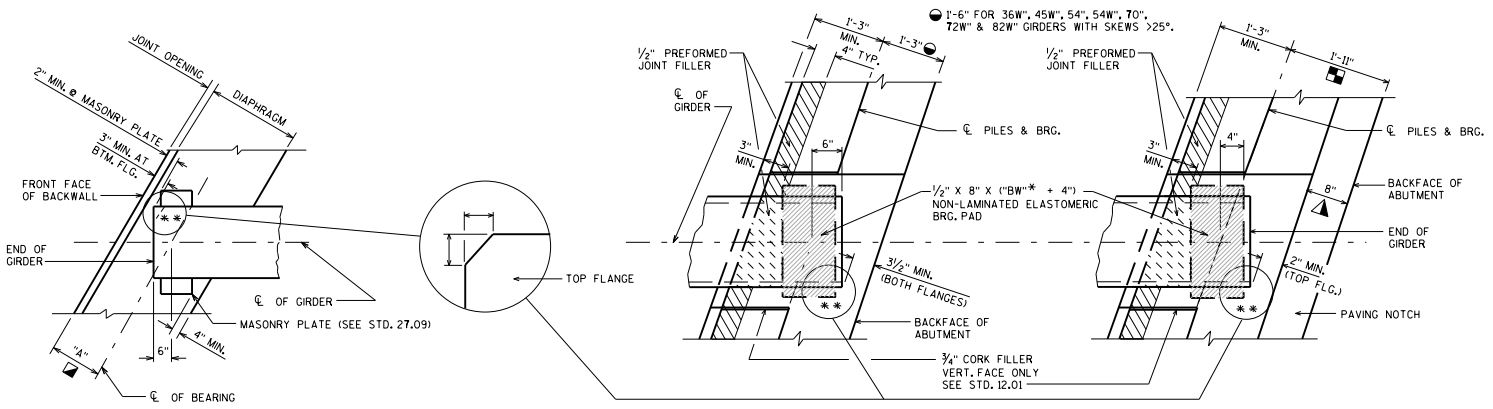
AT PIER

AT ABUTMENT

ABUTMENT: TYPE "A1 FIXED" AND "A5" W/O PAVING NOTCH

AT ABUTMENT

ABUTMENT: TYPE "A1 FIXED" AND "A5" WITH PAVING NOTCH.



PLAN AT ABUTMENT

ABUTMENT: TYPE "A3" SEE TABLE FOR MIN. "A" VALUES REQ'D. TO MEET MIN. CLEARANCE CRITERIA ABOVE.

** FORM-OUT CORNER OF TOP FLANGE ON 36W", 45W", 54W", 70", 72W" & 82W" PRESTRESSED GIRDERS TO MEET MIN. CLEARANCE REQ'D.

AT ABUTMENT

ABUTMENT: TYPE "A1 SEMI-EXP." W/O PAVING NOTCH

AT ABUTMENT

ABUTMENT: TYPE "A1 SEMI-EXP." WITH PAVING NOTCH.

MIN. "A" DIMENSION IN INCHES FOR A3 ABUTMENTS WITH STEEL BEARINGS AS SHOWN ON STD. 27.09.

◪ "A" DIMENSION BASED ON BOTTOM FLANGE CLEARANCE IS CALCULATED USING 6" OFFSET FROM ℄ BRG. TO END OF GIRDER AND 3" MIN. OFFSET BETWEEN FLANGE AND BACKWALL TO ACCOMMODATE EXPANSION. IF CONDITIONS REQUIRE OFFSETS OTHER THAN THESE, THE "A" DIMENSION MUST BE CALCULATED.
"A" DIMENSION BASED ON MASONRY PLATE CLEARANCE IS CALCULATED ASSUMING A 10" LONG PLATE. IF LONGER PLATE IS REQUIRED, RECALCULATE "A".

SKEW ANGLE °	GIRDER DEPTHS									
	28"	36"	36W"	45"	45W"	54"	54W"	70"	72W"	82W"
0-5	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"
> 5-15	12"	12"	13"	12"	13"	12.5"	13"	13"	13"	13"
> 15-25	12.5"	12.5"	15"	13"	15"	14"	15"	15"	15"	15"
> 25-35	(14")	(14")	(17.5")	(15")	(17.5")	(16.5")	(17.5")	16.5"	(17.5")	(17.5")
> 35-45	(15.5")	(15.5")	(20")	(17")	(20")	(18.5")	(20")	(18.5")	(20")	(20")
> 45-55	(17")	(17")	(21.5")	(18.5")	(21.5")	(20")	(21.5")	(20")	(21.5")	(21.5")

VALUES IN PARENTHESIS ARE CONTROLLED BY 2" CLR. CRITERIA AT EDGE OF MASONRY PLATE. VALUES MAY BE ADJUSTED IF MASONRY PLATE IS CLIPPED PER STANDARD 27.02.

■ USE 2'-3" WITH A STRUCTURAL APPROACH SLAB (STD. 12.10)

◭ PAVING NOTCH IS 1'-0" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

PRESTRESSED GIRDER FLANGE WIDTH TABLE										
GIRDER DEPTH	28"	36"	36W"	45"	45W"	54"	54W"	70"	72W"	82W"
TOP FLANGE WIDTH	18"	12"	34"	16"	34"	20"	48"	30"	48"	48"
BOTTOM FLANGE WIDTH "BW"*	18"	18"	30"	22"	30"	26"	30"	26"	30"	30"

DESIGNER NOTES

STANDARD DETAIL DRAWINGS FOR THE 45", 54" AND 70" CAN BE FOUND IN CHAPTER 40, BRIDGE REHABILITATION. THESE GIRDERS HAVE BEEN REPLACED WITH THE 45W", 54W" AND 72W" RESPECTIVELY AND ARE NO LONGER USED ON NEW CONSTRUCTION PROJECTS.

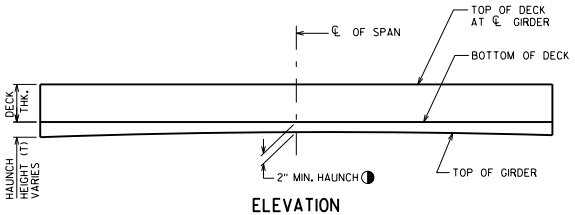
BEARING PAD DETAILS FOR PRESTRESSED CONCRETE GIRDERS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

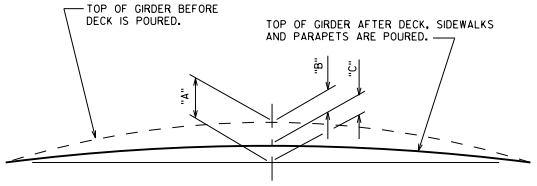
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.31



ELEVATION



CAMBER & DEFLECTION DIAGRAM

* "A" = PRESTRESS CAMBER

* "B" = DEAD LOAD DEFLECTION

* "C" = RESIDUAL CAMBER

* ROUND OFF TO NEAREST 1/8"

DESIGNER NOTES

◑ PRESENT PRACTICE IS TO USE A MINIMUM "HAUNCH HEIGHT" (AT EDGE OF GIRDER FLANGE) OF 2" FOR DESIGN CALCULATIONS.

THE MINIMUM HAUNCH (AT EDGE OF GIRDER FLANGE) ALLOWED IN CONSTRUCTION IS 1¼".

USE THE CALCULATED THEORETICAL AVERAGE "HAUNCH HEIGHT" AT CENTERLINE OF FLANGE FOR COMPUTING THE HAUNCH CONCRETE QUANTITY.

USE TOP OF DECK ELEVATIONS AND CALCULATED "HAUNCH HEIGHT" AT CENTERLINE OF GIRDER FOR COMPUTING BEAM SEAT ELEVATIONS AT SUBSTRUCTURES.

"INTERMEDIATE CONCRETE DIAPHRAGMS" SHALL BE USED ONLY WHEN THE USE OF STEEL DIAPHRAGMS IS NOT FEASIBLE BECAUSE OF UTILITIES OR FOR OTHER SPECIAL SITUATIONS. ONLY ONE TYPE OF INTERMEDIATE DIAPHRAGM SHALL BE SHOWN ON THE PLANS. THE USE OF BOTH INTERMEDIATE CONCRETE & STEEL DIAPHRAGMS ON THE SAME BRIDGE IS NOT ALLOWED.

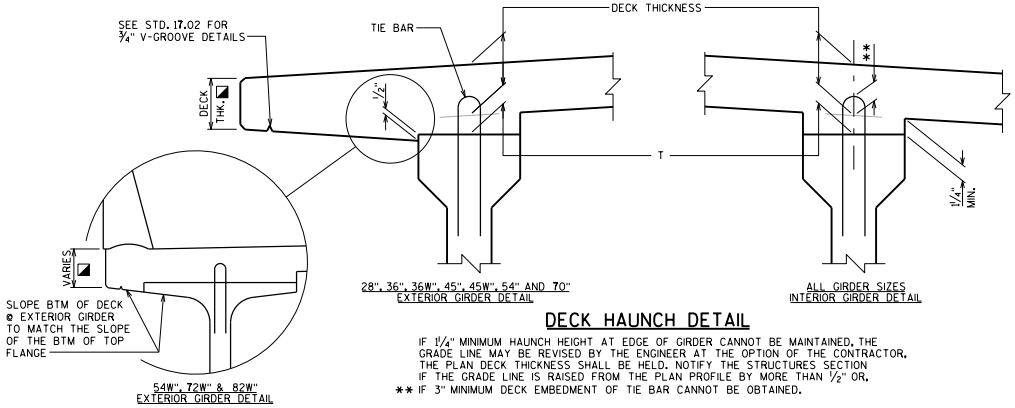
FOR SKEWS ≤ 10°, PLACE INTERMEDIATE DIAPHRAGMS IN A STRAIGHT LINE. REFER TO STANDARD 19.36. PROVIDE OFFSET FOR SKEWS > 10°.

PIER PILASTERS ARE TYPICALLY NOT USED, BUT MAY BE USED AS PART OF THE BRIDGE AESTHETIC PACKAGE ON 28", 36", 45", 54" AND 70" PRESTRESSED GIRDERS. PILASTERS ARE NOT USED ON 36W", 45W", 54W", 72W" OR 82W".

◥ 10 1/2" MIN. FOR TYPE "M" RAILINGS
11" MIN. FOR TYPE "NY3/NY4" RAILINGS

DIAPHRAGM SPACING: FOR SPANS ≤ 80'-0" PLACE ONE DIAPHRAGM AT MID-LENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS OF THE GIRDER LENGTH.

NOTE ON PLAN THAT DIAPHRAGM SPACING IS FROM THE GIRDER END.



DECK HAUNCH DETAIL

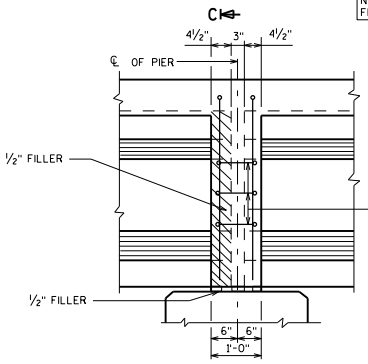
IF 1¼" MINIMUM HAUNCH HEIGHT AT EDGE OF GIRDER CANNOT BE MAINTAINED, THE GRADE LINE MAY BE REVISED BY THE ENGINEER AT THE OPTION OF THE CONTRACTOR, THE PLAN DECK THICKNESS SHALL BE HELD. NOTIFY THE STRUCTURES SECTION IF THE GRADE LINE IS RAISED FROM THE PLAN PROFILE BY MORE THAN ½" OR,

** IF 3" MINIMUM DECK EMBEDMENT OF TIE BAR CANNOT BE OBTAINED.

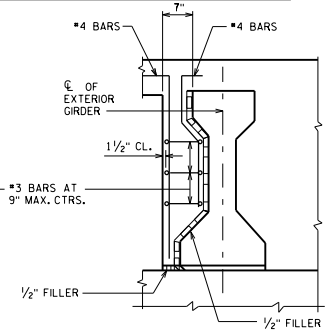
TO DETERMINE 'T', ELEV. OF TOP OF GIR'S. AT ℄ OF SUBSTRUCTURE UNITS & AT 1/10 POINTS OF EACH SPAN SHALL BE TAKEN. THEN FOLLOW THIS PROCESS:

TOP OF DECK ELEV. AT FINAL GRADE
\- TOP OF GIRDER ELEVATION
\+ DEAD LOAD DEFLECTION
\- DECK THICKNESS
= HAUNCH HEIGHT 'T'

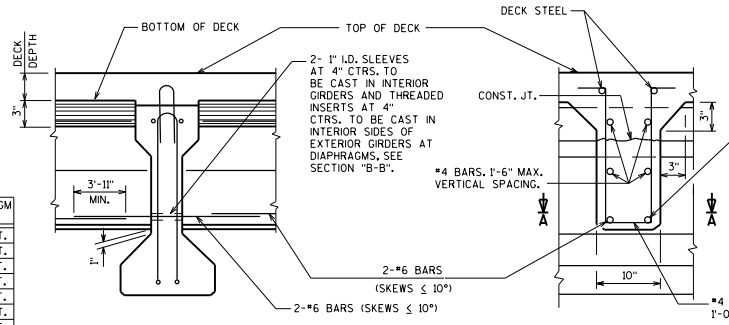
NOTE: AN AVERAGE HAUNCH ('T') OF WAS USED IN THE QUANTITY "CONCRETE MASONRY BRIDGES".



PILASTER DETAIL AT PIERS



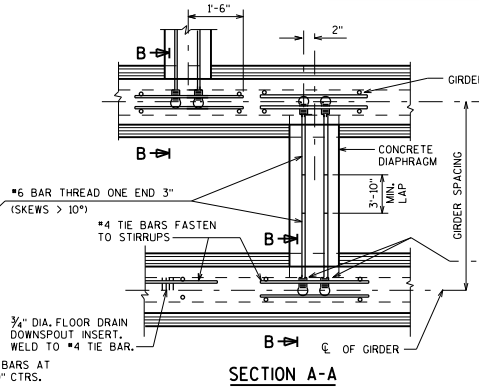
SECTION C-C



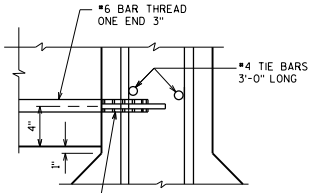
GIRDER DEPTH	DIAPHRAGM WEIGHT
28"	207#/FT.
36"	270#/FT.
36W"	259#/FT.
45"	338#/FT.
45W"	353#/FT.
54"	405#/FT.
54W"	446#/FT.
70"	634#/FT.
72W"	634#/FT.
82W"	738#/FT.

ELEVATION OF DIAPHRAGM

SECTION THRU DIAPHRAGM



SECTION A-A
SKEW ANGLES > 10°



SECTION B-B

INTERMEDIATE CONCRETE DIAPHRAGM DETAILS

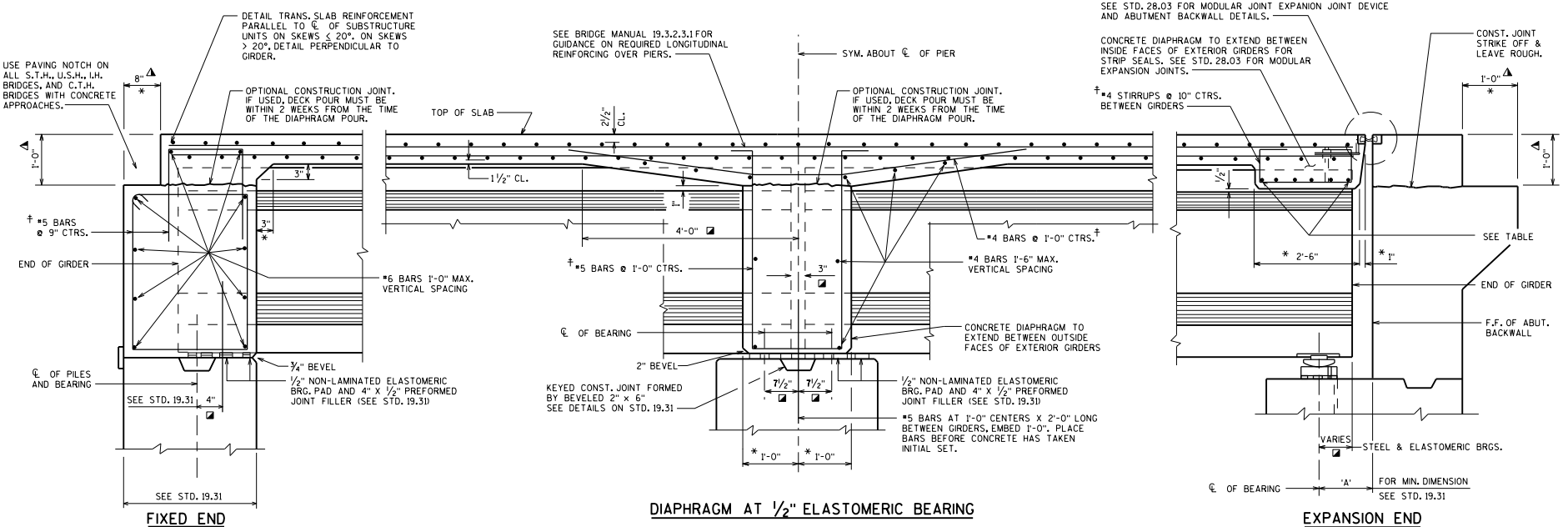
PRESTRESSED GIRDER DETAILS

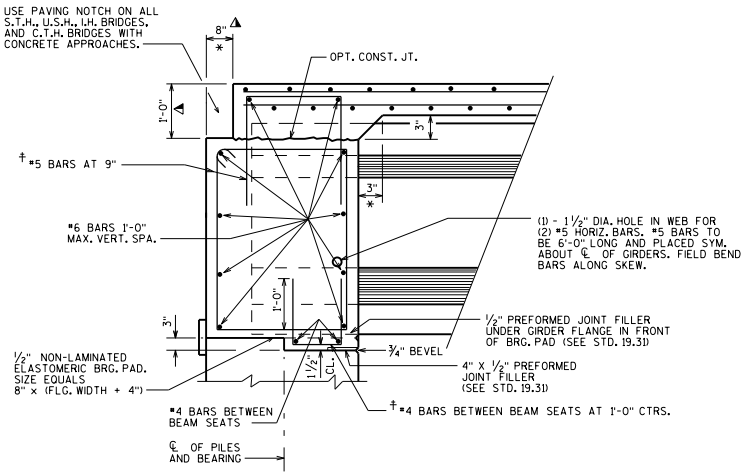
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

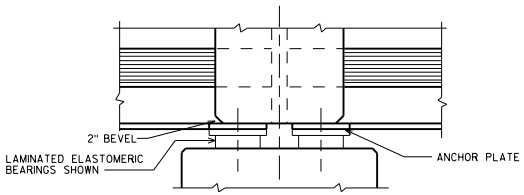
STANDARD 19.32





EXPANSION END DIAPHRAGM STEEL

DIAPHRAGM LENGTH (ALONG SKEW) BETWEEN GIRDERS (℄ TO ℄ OF GRDS.)	NO. OF BARS & BAR SIZE	
	28"	36"
≤ 8'-4"	6 - #6	6 - #6
> 8'-4" ≤ 11'-4"	6 - #8	6 - #7
> 11'-4" ≤ 14'-9"		6 - #8



DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS
SECTION THRU DIAPHRAGM AT PIER

FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY ½" ABOVE BEARING KEEPER BARS

DESIGNER NOTES

LAP LENGTHS FOR ALL BARS SHALL BE BASED ON A "CLASS C" TENSION LAP SPLICE, EXCEPT HORIZONTAL DIAPHRAGM BARS, IF SPLICED, CAN UTILIZE A "CLASS A" TENSION LAP SPLICE.

LEGEND

◪ DIMENSION IS TAKEN PARALLEL TO ℄ GIRDER.

* DIMENSION IS TAKEN NORMAL TO ℄ SUBSTRUCTURE UNITS.

⚠ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTUAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD. 12.12) FOR STRUCTURAL APPROACH SLAB ON THE SECTION THRU ABUT. OR ABUT. DIAPH.

† BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ℄ GIRDERS.

SEE STANDARD 19.34 FOR 36W" & 45W" PRESTESSED GIRDERS SLAB AND SUPERSTRUCTURE DETAILS

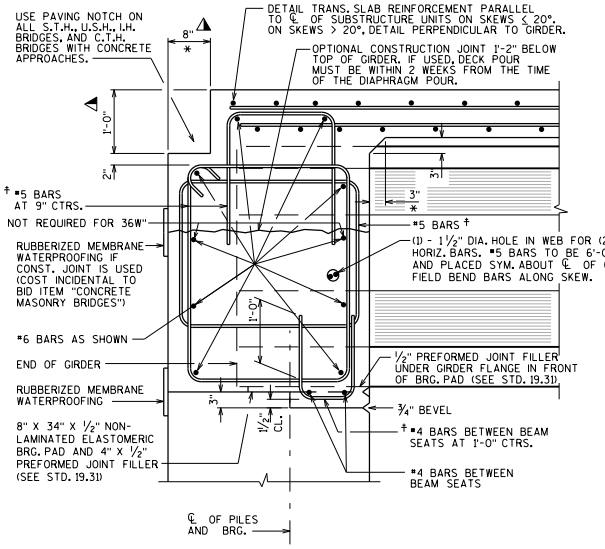
SEE STANDARD 19.35 FOR 54W", 72W" & 82W" PRESTRESSED GIRDERS SLAB & SUPERSTRUCTURE DETAILS.

28" & 36" PRESTRESSED GIRDERS SLAB & SUPERSTRUCTURE DETAILS

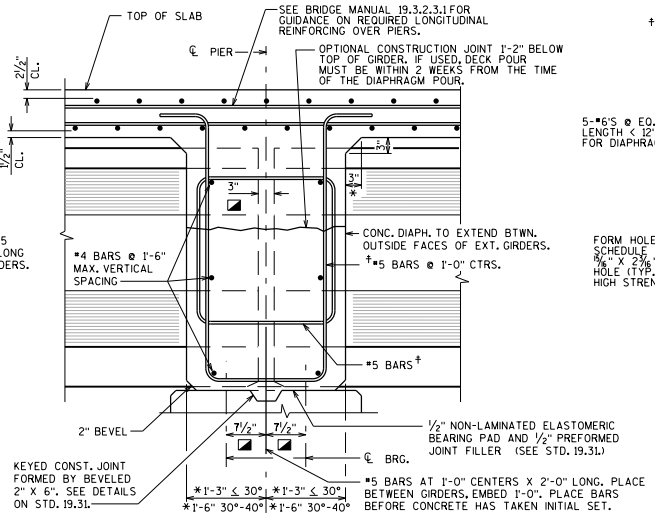
WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

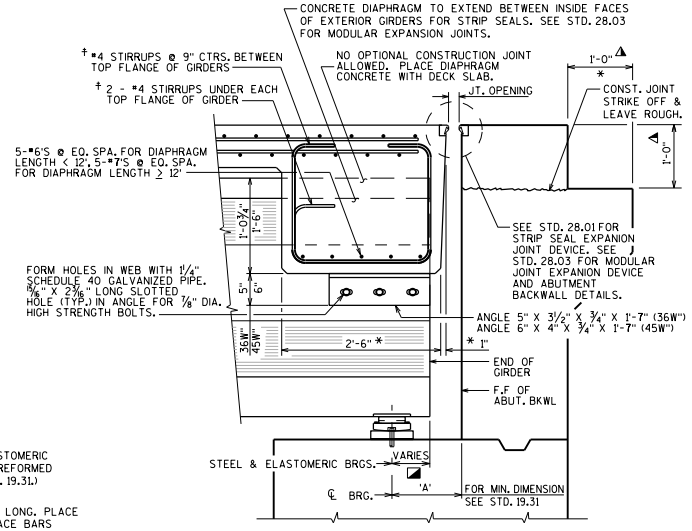
DATE: 1-19



PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



DIAPHRAGM AT ½" ELASTOMERIC BEARING

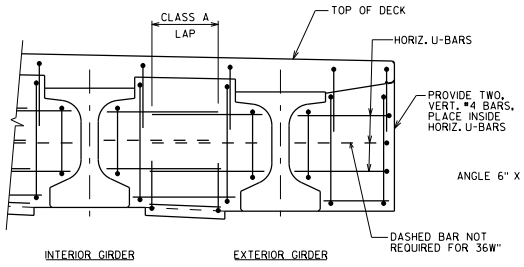


EXPANSION END

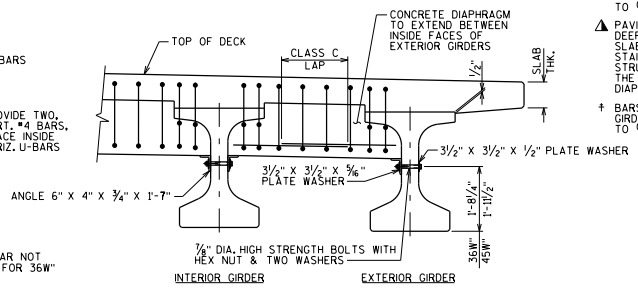
0° SKEW SHOWN (NON 0° SKEW SHOWN IN TOP VIEW)

LEGEND

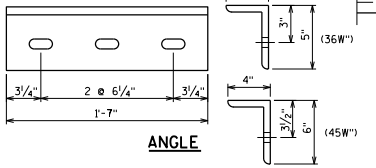
- ◪ DIMENSION IS TAKEN PARALLEL TO ℄ GIRDER.
- * DIMENSION IS TAKEN NORMAL TO ℄ SUBSTRUCTURE UNITS.
- ◭ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD. 12.12) FOR STRUCTURAL APPROACH SLAB ON THE SECTION THRU ABUT. OR ABUT. DIAPH.
- † BARS PLACED PARALLEL TO GIRDERS, SPACING PERPENDICULAR TO ℄ GIRDERS.



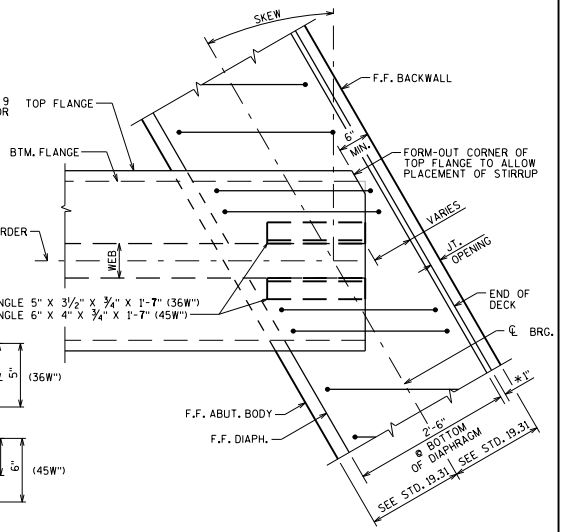
PART TRANSVERSE SECTION AT DIAPHRAGM SEMI EXPANSION END



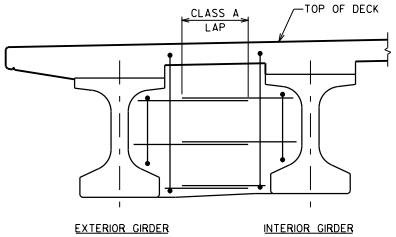
PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END



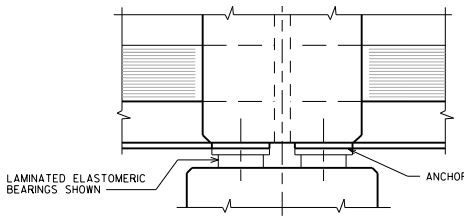
ANGLE



TOP VIEW OF DIAPHRAGM (EXPANSION END)



PART TRANSVERSE SECTION AT DIAPHRAGM PIER



DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY ½" ABOVE BEARING KEEPER BARS

NOTES

ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "CONCRETE MASONRY BRIDGES".

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS ¼ TURN. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

DESIGNER NOTE

LAP LENGTHS FOR DIAPHRAGM REINFORCEMENT SHALL BE BASED ON A CLASS "C" TENSION LAP SPLICE, UNLESS OTHERWISE NOTED.

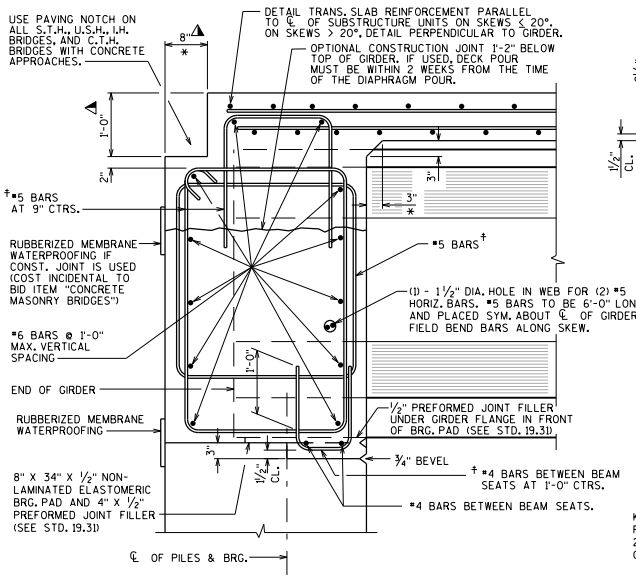
PRESTRESSED 36W" & 45W" GIRDER SLAB & SUPERSTRUCTURE DETAILS

BUREAU OF STRUCTURES

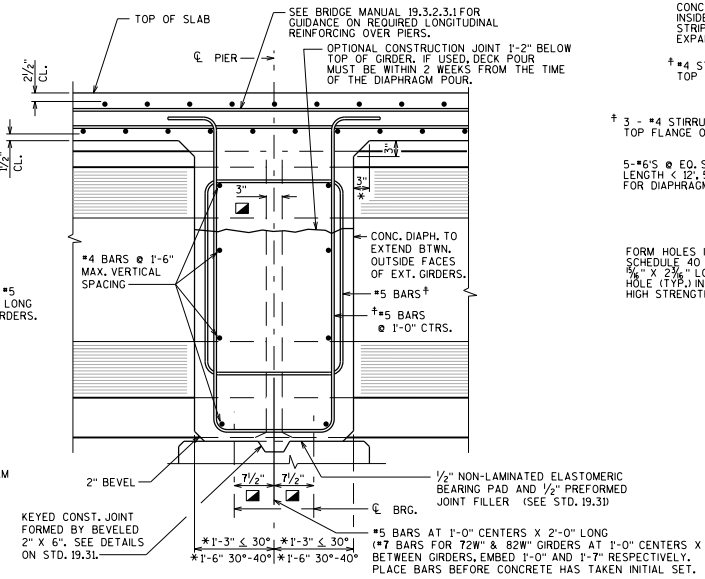
APPROVED: Bill Oliva

DATE: 1-19

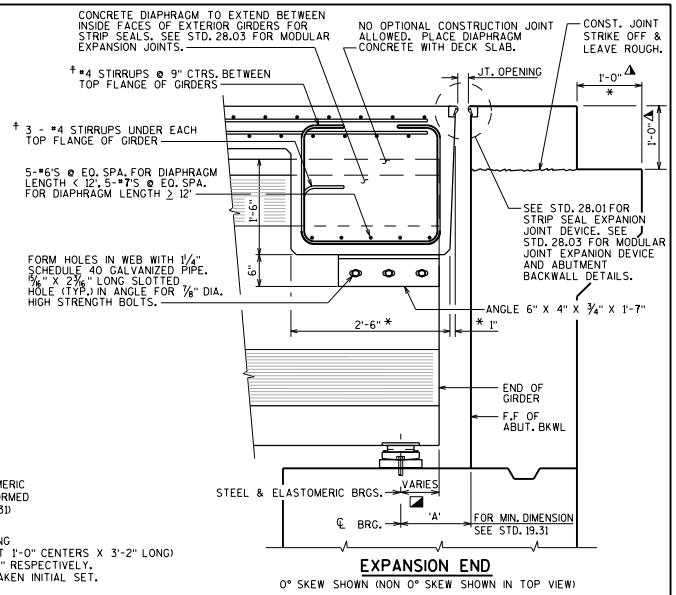
STANDARD 19.34



PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



DIAPHRAGM AT ½" ELASTOMERIC BEARING

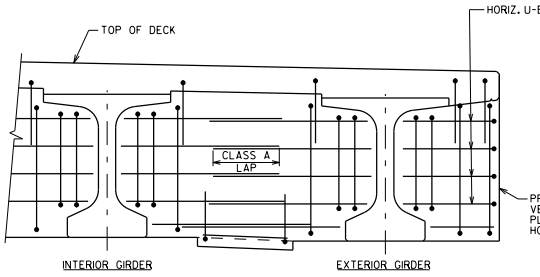


EXPANSION END

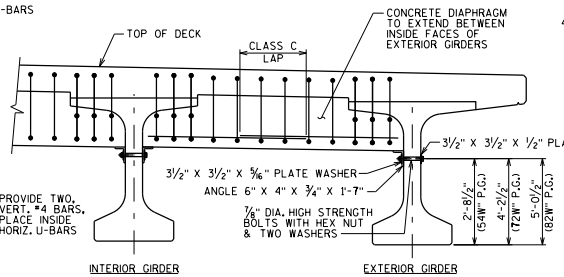
0° SKEW SHOWN (NON 0° SKEW SHOWN IN TOP VIEW)

LEGEND

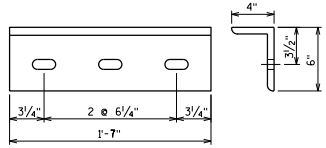
- DIMENSION IS TAKEN PARALLEL TO ℄ GIRDER.
- * DIMENSION IS TAKEN NORMAL TO ℄ SUBSTRUCTURE UNITS.
- ▲ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD. 12.12) FOR STRUCTURAL APPROACH SLAB ON THE SECTION THRU ABUT. OR ABUT. DIAPH.
- ‡ BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ℄ GIRDERS.



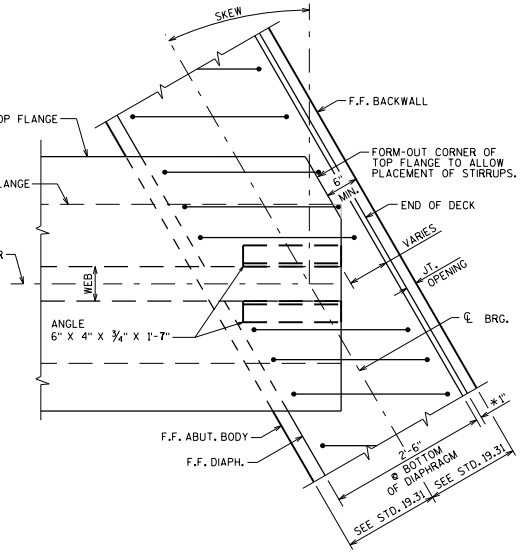
PART TRANSVERSE SECTION AT DIAPHRAGM SEMI EXPANSION END



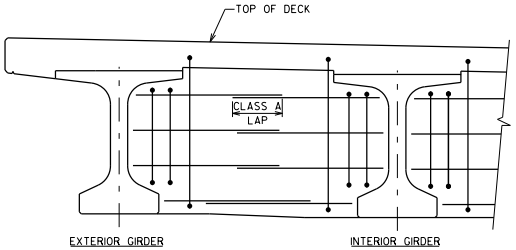
PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END



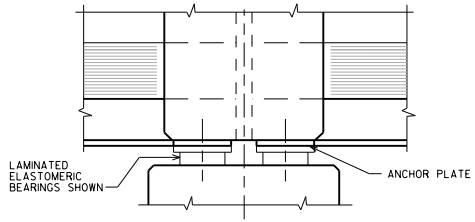
ANGLE



TOP VIEW OF DIAPHRAGM (EXPANSION END)



PART TRANSVERSE SECTION AT DIAPHRAGM PIER



DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY ½" ABOVE BEARING KEEPER BARS

NOTES

ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "CONCRETE MASONRY BRIDGES".

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS ¼ TURN. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

DESIGNER NOTES

LAP LENGTHS FOR DIAPHRAGM REINFORCEMENT SHALL BE BASED ON A CLASS "C" TENSION LAP SPLICE, UNLESS OTHERWISE NOTED.

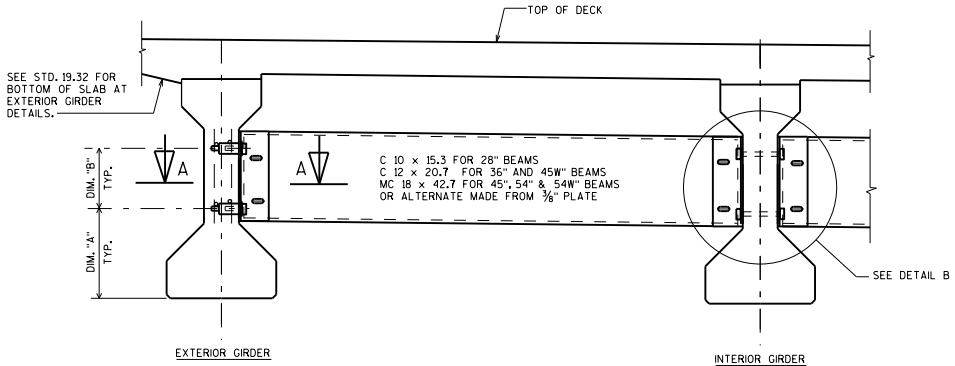
PRESTRESSED 54W", 72W" & 82W" GIRDER SLAB & SUPERSTRUCTURE DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION — BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

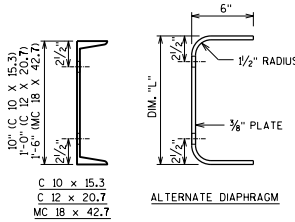
STANDARD 19.35



PART TRANSVERSE SECTION AT DIAPHRAGM

TABLE

GIRDER HEIGHT	DIM. "A"	DIM. "B"	DIM. "L"	✳ DIM. "X"
28"	1'-0⅞"	5⅞"	9½"	2¼"
36"	1'-2⅞"	9⅞"	1'-1½"	3¼"
45"	1'-5⅜"	1'-1⅞"	1'-5½"	2¼"
45W"	1'-9⅛"	8⅞"	1'-0½"	2¾"
54"	1'-7⅞"	1'-5⅞"	1'-9½"	4¼"
54W"	1'-9⅛"	1'-5⅞"	1'-9½"	4¼"



SECTION THRU DIAPHRAGM

NOTES

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

EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.

ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.

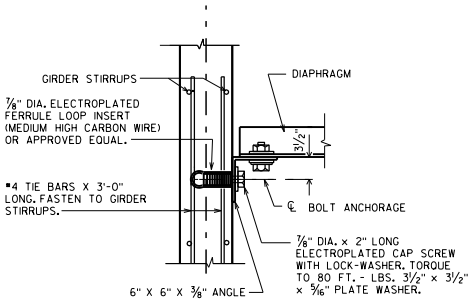
ALL DIAPHRAGM MATERIAL INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

STEEL DIAPHRAGM TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS ¼ TURN, UNLESS NOTED OTHERWISE. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

DESIGNER NOTES

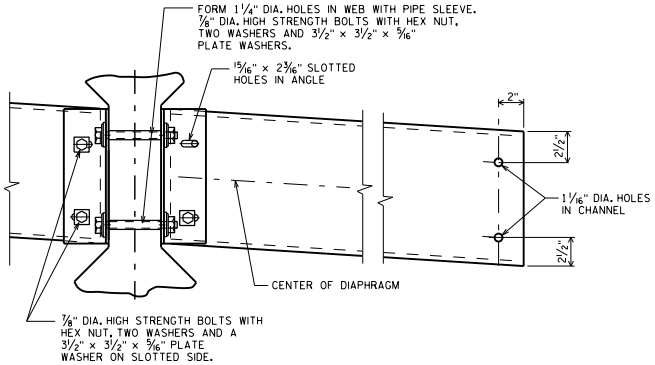
FOR SPANS EQUAL TO OR LESS THAN 80'-0", PLACE ONE DIAPHRAGM AT MID-LENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS.

ON THE PLANS, SHOW LOCATION OF INSERTS/HOLES FOR DIAPHRAGM TO WEB CONNECTION, NOT ONLY FROM THE BOTTOM OF THE GIRDER (DIM "A" AND "B"), BUT ALSO FROM THE ENDS OF EACH GIRDER.



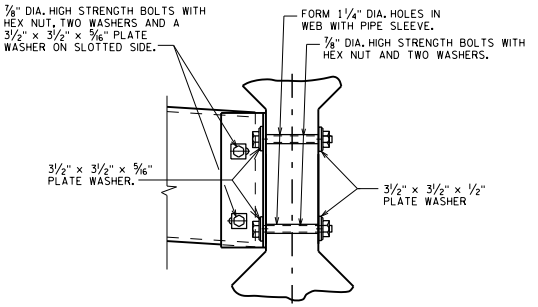
SECT. A-A

(FOR EXTERIOR ATTACHMENT)

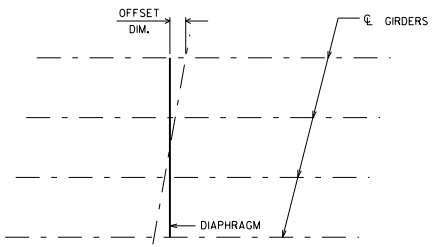


DETAIL B

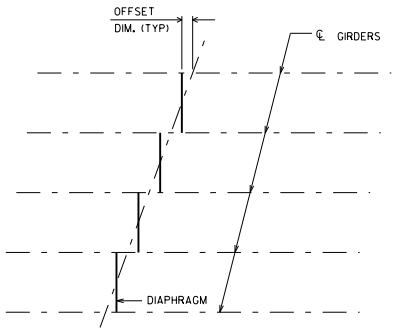
(FOR CONTINUOUS LINE OF DIAPHRAGMS)



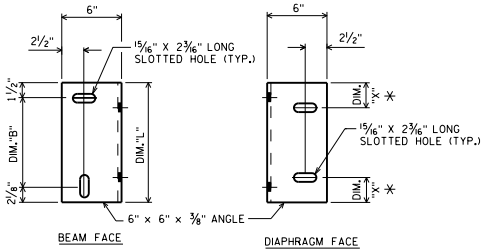
SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°



PLAN FOR SKEW ANGLES ≤ 10°



PLAN FOR SKEW ANGLES > 10°



DIAPHRAGM SUPPORT

✳2½" FOR ALTERNATE PLATE DIAPHRAGM

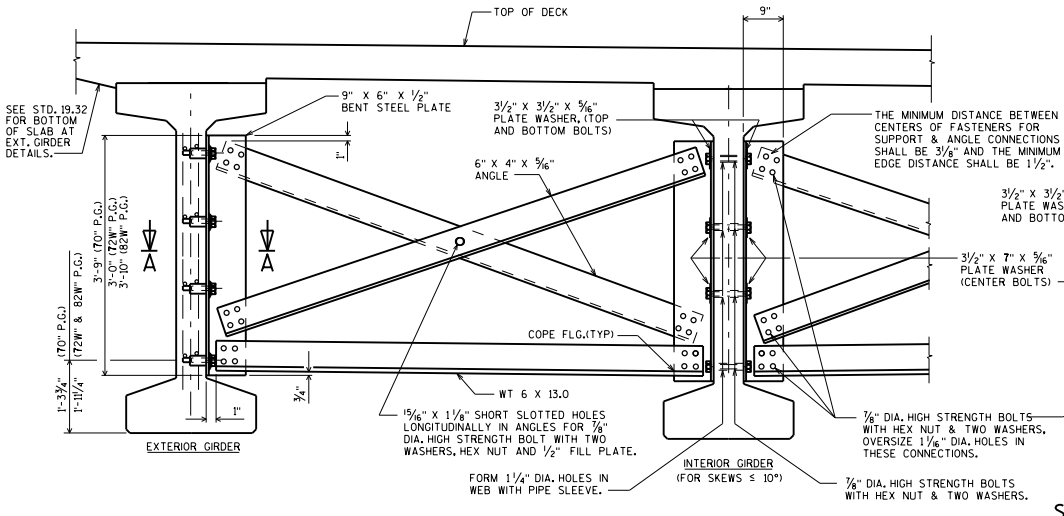
INTERM. STEEL DIAPHS. FOR 28", 36", 45", 45W" 54" & 54W" PRESTRESSED GIRDERS

BUREAU OF STRUCTURES

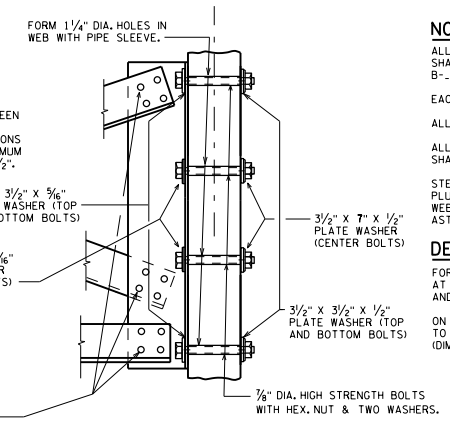
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 19.36



PART TRANSVERSE SECTION AT DIAPHRAGM



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

NOTES

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

EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.

ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.

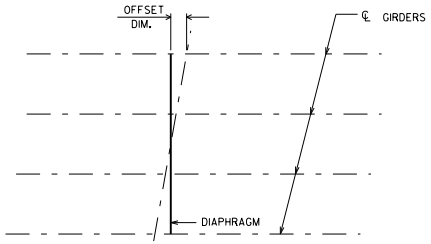
ALL DIAPHRAGM MATERIAL INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

STEEL DIAPHRAGM TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS 1/4 TURN, UNLESS NOTED OTHERWISE. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

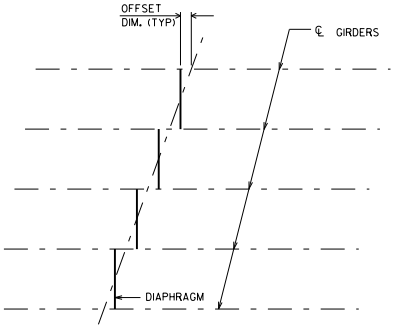
DESIGNER NOTES

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.

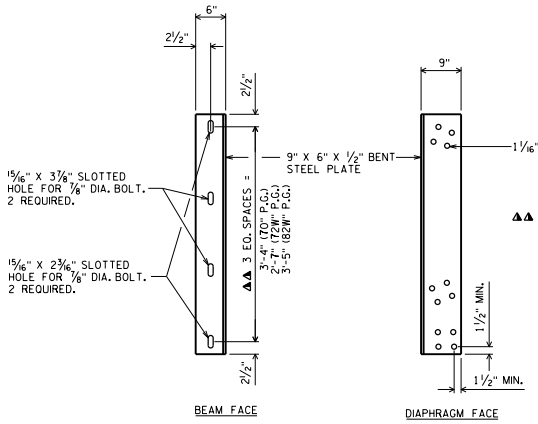
ON THE PLANS, SHOW LOCATION OF INSERTS/HOLES FOR DIAPHRAGM TO WEB CONNECTION, NOT ONLY FROM THE BOTTOM OF THE GIRDER (DIM "A" AND "B"), BUT ALSO FROM THE ENDS OF EACH GIRDER.



PLAN FOR SKEW ANGLES ≤ 10°

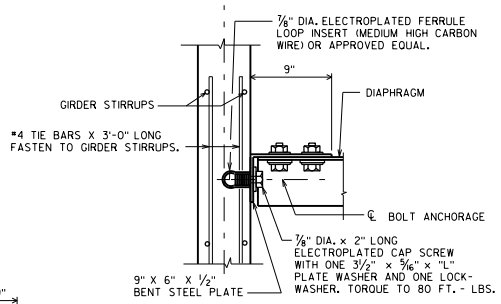


PLAN FOR SKEW ANGLES > 10°



▲▲ BOLT HOLES SHALL BE SPACED SO AS TO MISS PRESTRESSED STRANDS IN CONCRETE BEAMS.

DIAPHRAGM SUPPORT



SECT. A-A
(FOR EXTERIOR ATTACHMENT)

"L" = 3 1/2" ; TOP & BOTTOM BOLTS
"L" = 7" ; CENTER BOLTS

INTERMEDIATE STEEL DIAPHRAGMS FOR 70", 72W" & 82W" PRESTRESSED GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17

STANDARD 19.37

NOTES

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

EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.

ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.

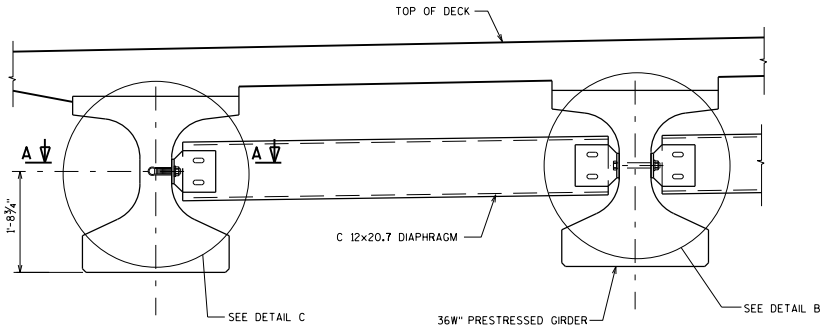
ALL DIAPHRAGM MATERIAL INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

STEEL DIAPHRAGM TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS 1/4 TURN, UNLESS NOTED OTHERWISE. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FORASTM A325 OR ASTM A449.

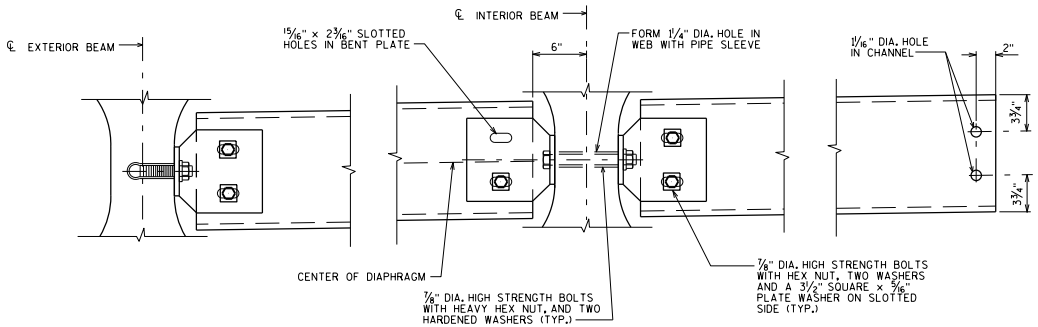
DESIGNER NOTES

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.

ON THE PLANS, SHOW LOCATION OF INSERTS/HOLES FOR DIAPHRAGM TO WEB CONNECTION, NOT ONLY FROM THE BOTTOM OF THE GIRDER (DIM "A" AND "B"), BUT ALSO FROM THE ENDS OF EACH GIRDER.

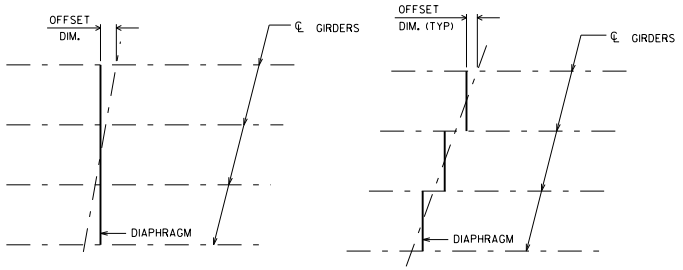


PART TRANSVERSE SECTION AT DIAPHRAGM



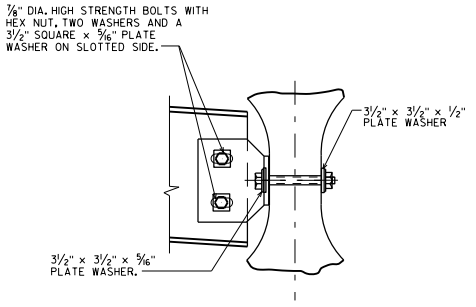
DETAIL C

DETAIL B

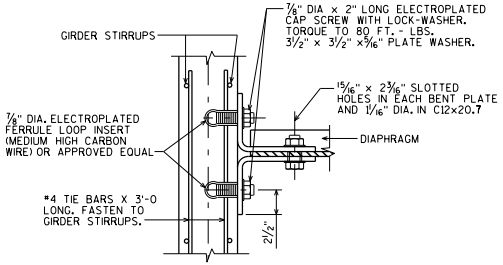


PLAN FOR SKEW ANGLES ≤ 10°

PLAN FOR SKEW ANGLES > 10°

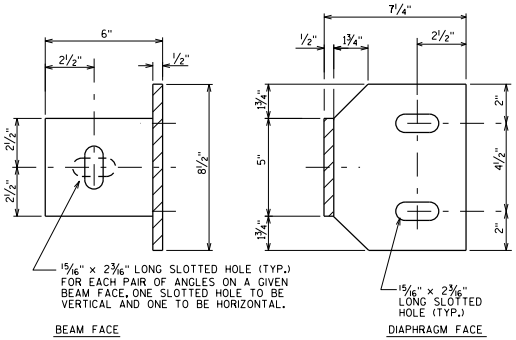


SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°



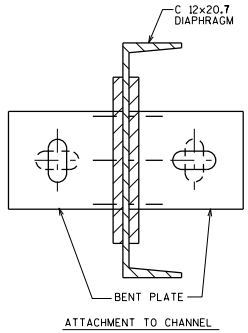
SECTION A-A

(FOR EXTERIOR ATTACHMENT)



BEAM FACE

DIAPHRAGM FACE



ATTACHMENT TO CHANNEL

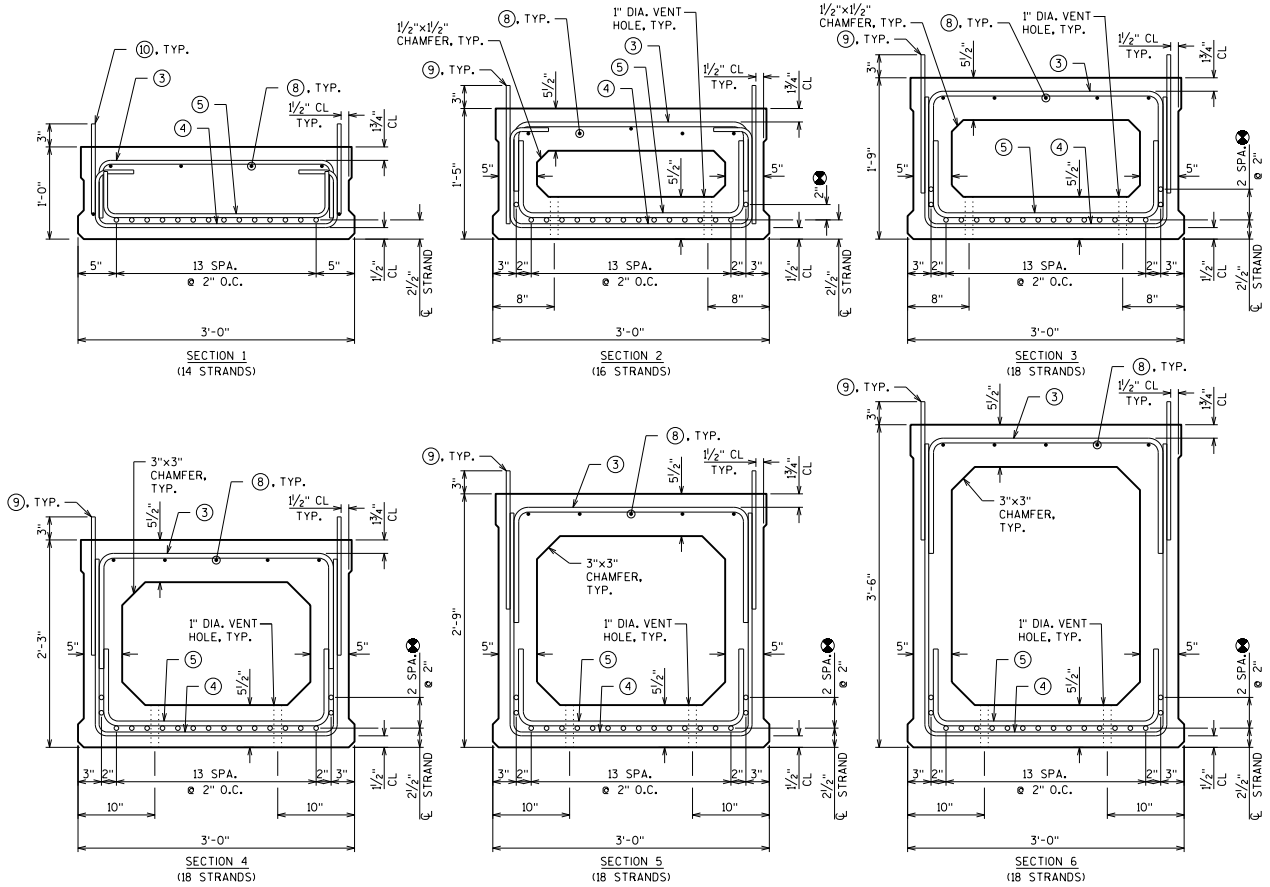
INTERM. STEEL DIAPHS. FOR 36W" PRESTRESSED GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

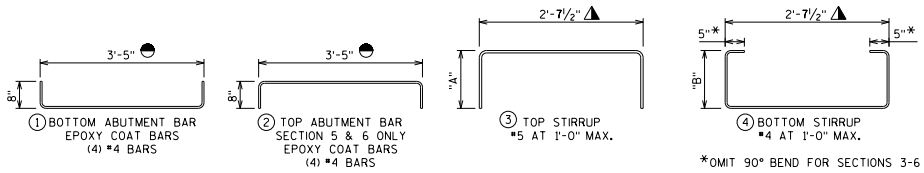
STANDARD 19.38



3'-0" SECTIONS

REBAR DIMENSION

SECT. DEPTH	SECT. NO.	"A"	"B"	"C"
1'-0"	1	7½"	7½"	6"
1'-5"	2	9"	1'-1"	10"
1'-9"	3	1'-3"	1'-5"	1'-2"
2'-3"	4	1'-3"	1'-11"	1'-8"
2'-9"	5	1'-3"	2'-5"	2'-2"
3'-6"	6	1'-3"	3'-2"	2'-11"



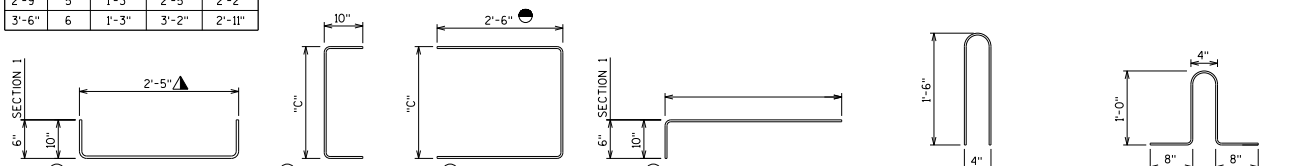
① BOTTOM ABUTMENT BAR EPOXY COAT BARS (4) #4 BARS

② TOP ABUTMENT BAR SECTION 5 & 6 ONLY EPOXY COAT BARS (4) #4 BARS

③ TOP STIRRUP #5 AT 1'-0" MAX.

④ BOTTOM STIRRUP #4 AT 1'-0" MAX.

*OMIT 90° BEND FOR SECTIONS 3-6



⑤ END BLOCK BOTTOM STIRRUP #4 AND #5 BARS SEE ELEVATION FOR SPACING

⑥ DUCT STIRRUP #4 AT 9" MAX. (5) EACH GIRDER END (10) EACH GIRDER DUCT

⑦ DUCT STIRRUP #4 AT 9" MAX. (5) EACH GIRDER END

⑧ LONGITUDINAL BAR (4) #4 BARS MIN. FOR SECTION 1 (5) #4 BARS MIN. FOR SECTIONS 2-6

⑨ SHEAR CONNECTOR TIE ONE LEG OF BAR TO ③ EPOXY COAT BARS #4 AT 2'-0" MAX. (FOR SECTIONS 2-6) ◩

⑩ SHEAR CONNECTOR TIE ONE LEG OF BAR TO ③ EPOXY COAT BARS #4 AT 2'-0" MAX. (FOR SECTION 1) ◩

NOTES

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

AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO THE BOTTOM OF THE GIRDERS AND THE EXTERIOR FACE OF EXTERIOR GIRDERS. DO NOT APPLY CONCRETE SEALER OR EPOXY TO THE SHEAR KEY OR THE TOP OF GIRDERS.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR CONCRETE ABUTMENTS, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GRS ABUTMENTS, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS, AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

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

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

POST-TENSIONING OF THE TRANSVERSE TENDONS SHALL NOT BEGIN UNTIL THE GROUT BETWEEN THE PRECAST BOX GIRDERS HAS BEEN ALLOWED TO CURE FOR 48 HOURS AND GROUT HAS REACHED A COMPRESSIVE STRENGTH OF 3,000 PSI.

SEAL WASHER SHALL BE SPONGE NEOPRENE GASKET 3¼" MIN. THICK. STRESS POCKETS SHALL BE FILLED WITH CHLORIDE FREE NON-SHRINK GROUT AFTER POST-TENSIONING.

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".

DESIGNER NOTES

USE OF PRESTRESSED BOX GIRDERS IS SUBJECT TO PRIOR-APPROVAL BY THE BUREAU OF STRUCTURES. SEE 19.3.2.3.2 IN THE BRIDGE MANUAL FOR ADDITIONAL GUIDANCE.

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

BEAM SEATS SHALL BE SLOPED ALONG THE SUBSTRUCTURE UNITS TO ACCOUNT FOR THE CROSS SLOPE OR SUPERELEVATION ON THE DECK.

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

STRANDS TO BE DESIGNED. MAXIMUM NUMBER OF STRANDS AND STRAND ARRANGEMENTS ARE SHOWN. STRANDS NOT TO BE DRAPED.

MULTI-SPAN STRUCTURES REQUIRE ANCHOR DOWELS AT THE PIERS, WHICH MAY REDUCE THE MAXIMUM NUMBER OF STRANDS AVAILABLE BY 2. (CURRENTLY NOT USED)

CONTACT THE BUREAU OF STRUCTURES FOR THE MOST CURRENT PRESTRESSED BOX GIRDER SPECIAL PROVISION.

SEE STANDARD 19.51 FOR SHEAR KEY RECESS DETAIL.

MATERIAL PROPERTIES

CONCRETE MASONRY BRIDGES	f'c = 4,000 PSI
BAR STEEL REINFORCEMENT, GRADE 60	fy = 60,000 PSI
PRESTRESSED BOX GIRDERS, CONCRETE MASONRY	f'c = 5,000 PSI
STRANDS - 0.5" OR 0.6" DIA. ULTIMATE TENSILE STRENGTH	fy = 270,000 PSI

PRE-TENSION

f'_s = 270,000 P.S.I

f_s = 0.75 x 270,000 = 202,500 P.S.I
for low relaxation strands

Pi PER 0.5" DIA. STRAND = 0.1531 X 202,500 = 31.00 KIPS

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

LEGEND

◓ DIMENSION GIVEN FOR A POST-TENSIONING DUCT 1'-10" FROM END OF PRESTRESSED BOX GIRDER.

◭ DIMENSION GIVEN FOR STIRRUPS PERPENDICULAR TO THE PRESTRESSED BOX GIRDER LENGTH. ADJUST THE DIMENSION FOR STIRRUPS AT SKEWED PRESTRESSED BOX GIRDER ENDS.

⊠ SHOW SPACING FOR THESE STRANDS ONLY IF REQUIRED BY DESIGN.

◩ SUBSTITUTE ⑪ BAR ON EXTERIOR EDGE OF EXTERIOR GIRDERS. SEE STANDARD 19.56.

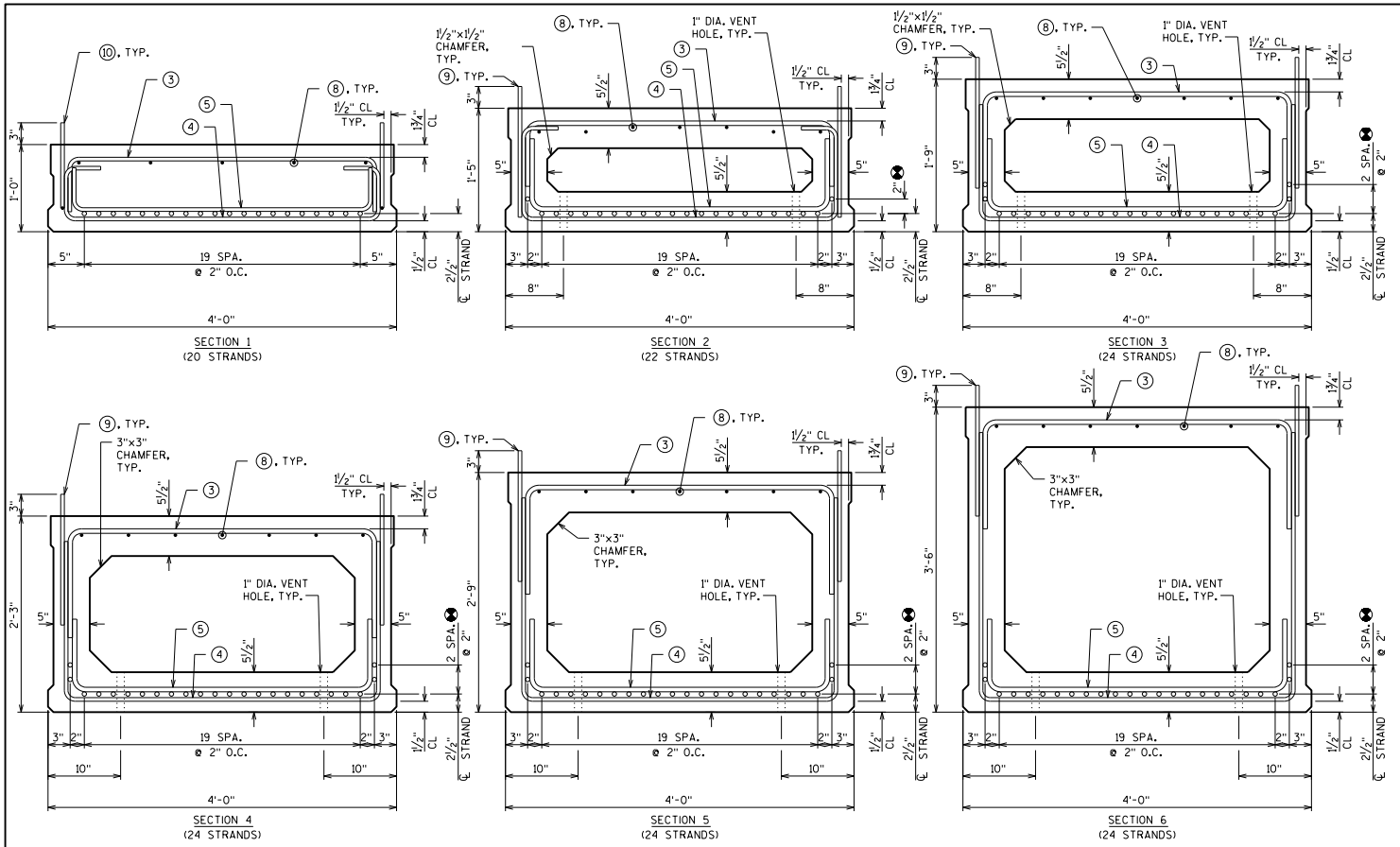
3'-0" PRESTRESSED BOX GIRDER SECTIONS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

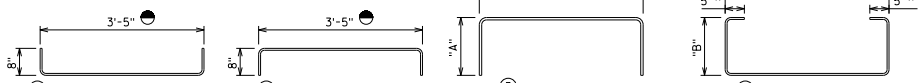
STANDARD 19.50



4'-0" SECTIONS

REBAR DIMENSION

SECT. DEPTH	SECT. NO.	"A"	"B"	"C"
1'-0"	1	7½"	7½"	6"
1'-5"	2	9"	1'-1"	10"
1'-9"	3	1'-3"	1'-5"	1'-2"
2'-3"	4	1'-3"	1'-11"	1'-8"
2'-9"	5	1'-3"	2'-5"	2'-2"
3'-6"	6	1'-3"	3'-2"	2'-11"

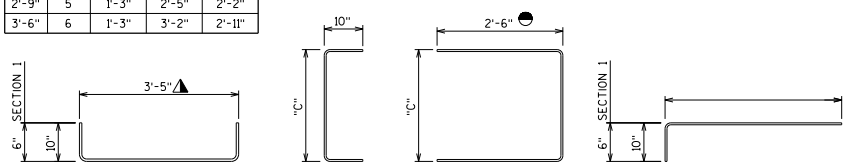


① BOTTOM ABUTMENT BAR
EPOXY COAT BARS
(5) #4 BARS

② TOP ABUTMENT BAR
SECTION 5 & 6 ONLY
EPOXY COAT BARS
(5) #4 BARS

③ TOP STIRRUP
#5 AT 1'-0" MAX.

④ BOTTOM STIRRUP
#4 AT 1'-0" MAX.



⑤ END BLOCK BOTTOM STIRRUP
#4 AND #5 BARS
SEE ELEVATION FOR SPACING

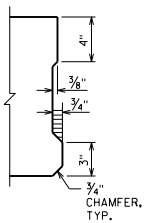
⑥ DUCT STIRRUP
#4 AT 9" MAX.
(6) EACH GIRDER END
(12) EACH GIRDER DUCT

⑦ DUCT STIRRUP
#4 AT 9" MAX.
(6) EACH GIRDER END

⑧ LONGITUDINAL BAR
(5) #4 BARS MIN. FOR SECTION 1
(7) #4 BARS MIN. FOR SECTIONS 2-6

⑨ SHEAR CONNECTOR
TIE ONE LEG OF BAR TO ③
EPOXY COAT BARS
#4 AT 2'-0" MAX.
(FOR SECTIONS 2-6)

⑩ SHEAR CONNECTOR
TIE ONE LEG OF BAR TO ③
EPOXY COAT BARS
#4 AT 2'-0" MAX.
(FOR SECTION 1)



SHEAR KEY RECESS DETAIL

OMIT SHEAR KEY ON
EXTERIOR FACE OF
EXTERIOR GIRDERS.

DESIGNER NOTE

SEE STANDARD 19.50 FOR NOTES, DESIGNER NOTES, MATERIAL PROPERTIES.

LEGEND

- DIMENSION GIVEN FOR A POST-TENSIONING DUCT 1'-10" FROM END OF PRESTRESSED BOX GIRDER.
- DIMENSION GIVEN FOR STIRRUPS PERPENDICULAR TO THE PRESTRESSED BOX GIRDER LENGTH. ADJUST THE DIMENSION FOR STIRRUPS AT SKEWED PRESTRESSED BOX GIRDER ENDS.
- SHOW SPACING FOR THESE STRANDS ONLY IF REQUIRED BY DESIGN.
- SUBSTITUTE ⑪ BAR ON EXTERIOR EDGE OF EXTERIOR GIRDERS. SEE STANDARD 19.56.

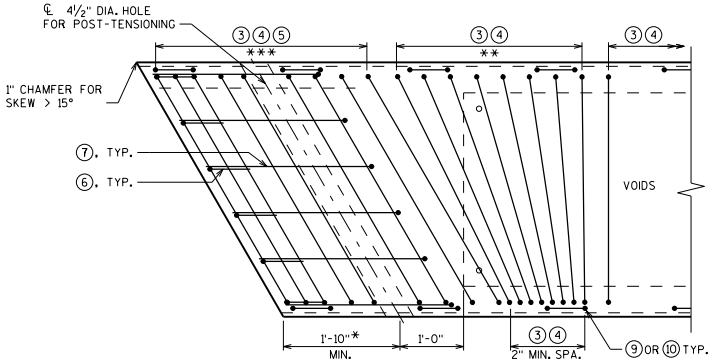
4'-0" PRESTRESSED BOX GIRDER SECTIONS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

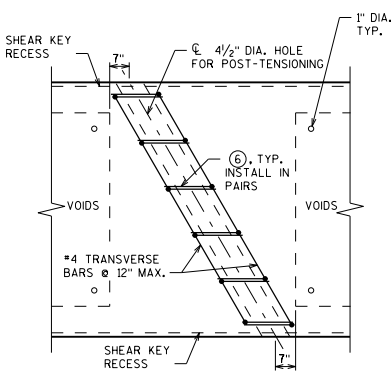
DATE: 1-18

STANDARD 19.51

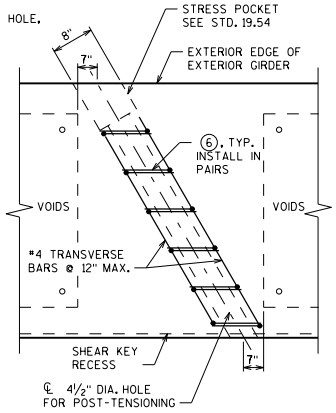


PART GIRDER PLAN WITH SKEW

①, ② & #4 TRANSVERSE BARS NOT SHOWN FOR CLARITY



INTERIOR GIRDER DUCT PLAN



EXTERIOR GIRDER DUCT PLAN

LEGEND

☆ BARS NOT REQUIRED WHEN USED ON GRS ABUTMENTS.

◆ BARS PLACED PARALLEL TO GIRDERS. SPACING IS PERPENDICULAR TO THE ℄ OF THE GIRDERS.

* WHEN WINGS ARE PARALLEL TO ABUTMENT ℄, USE DIMENSIONS TO ALLOW FOR EASE OF POST-TENSIONING OPERATION.

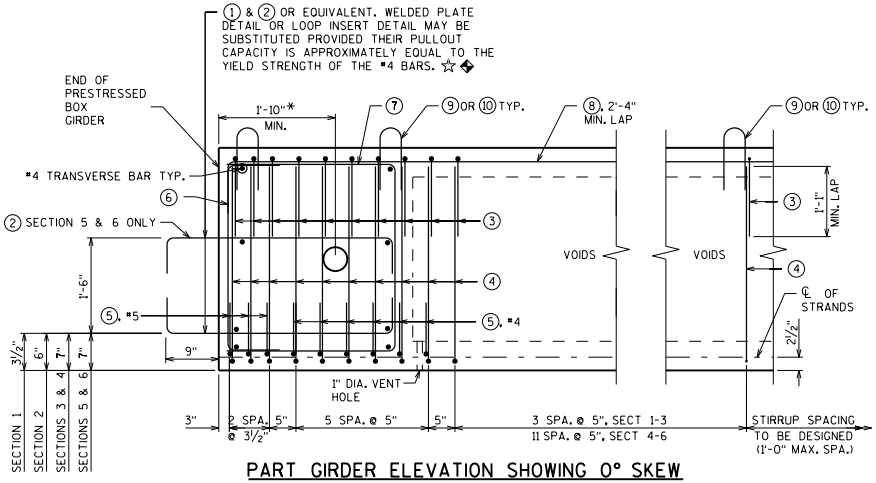
** PLACE AT 5" MAX. SPACING UNTIL PERPENDICULAR TO THE ℄ OF THE GIRDER.

*** PLACE ALONG SKEW FROM END OF PRESTRESSED BOX GIRDER UNTIL ALL END BLOCK BOTTOM STIRRUP BARS, ⑤, ARE PLACED.

DESIGNER NOTES

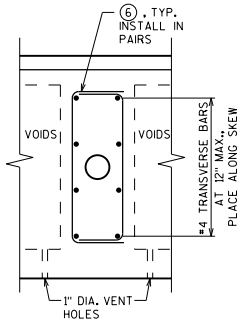
FOR BAR BEND DETAILS, SEE STANDARD 19.50 AND STANDARD 19.51

FOR SKEWED STRUCTURES CAST END OF PRESTRESSED BOX GIRDER ALONG SKEW.

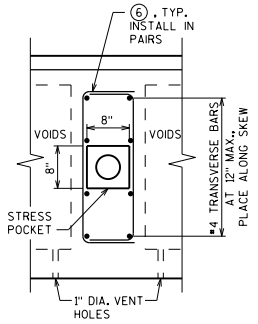


PART GIRDER ELEVATION SHOWING 0° SKEW

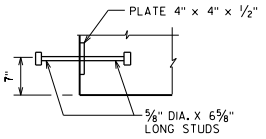
PLACE #4 TRANSVERSE BARS AS SHOWN ALONG SKEW



INTERIOR GIRDER DUCT ELEVATION

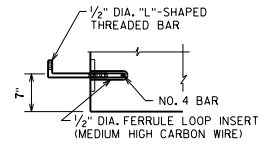


EXTERIOR GIRDER DUCT ELEVATION



WELDED PLATE DETAIL

(EQUIVALENT TO ONE #4 BAR)



LOOP INSERT DETAIL

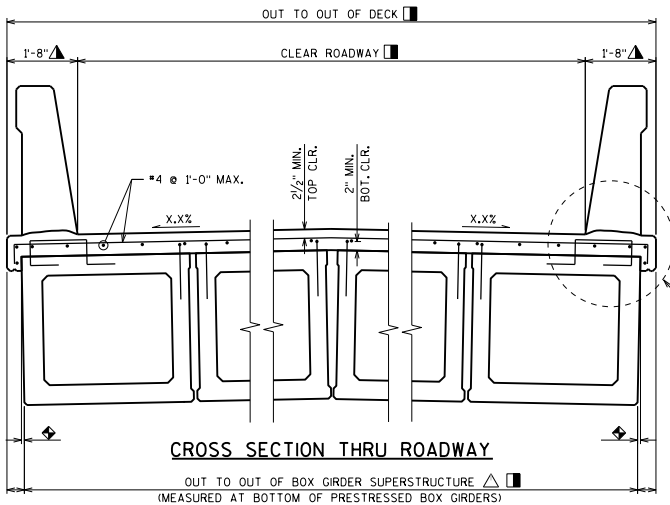
PRESTRESSED BOX GIRDER DETAILS 1

BUREAU OF STRUCTURES

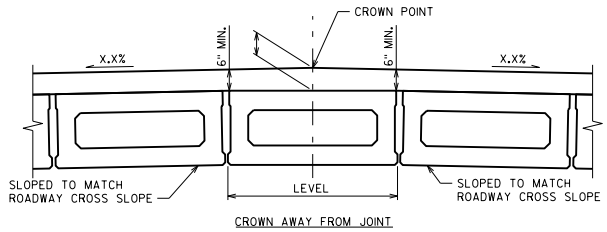
APPROVED: Bill Oliva

DATE: 1-17

STANDARD 19.52



CROSS SECTION THRU ROADWAY

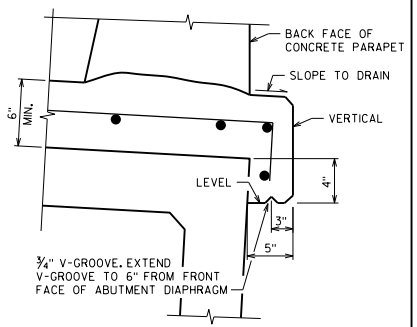


CROWN DETAIL AT LOCATION OF MIN. DECK THICKNESS

NUMBER OF SECTIONS

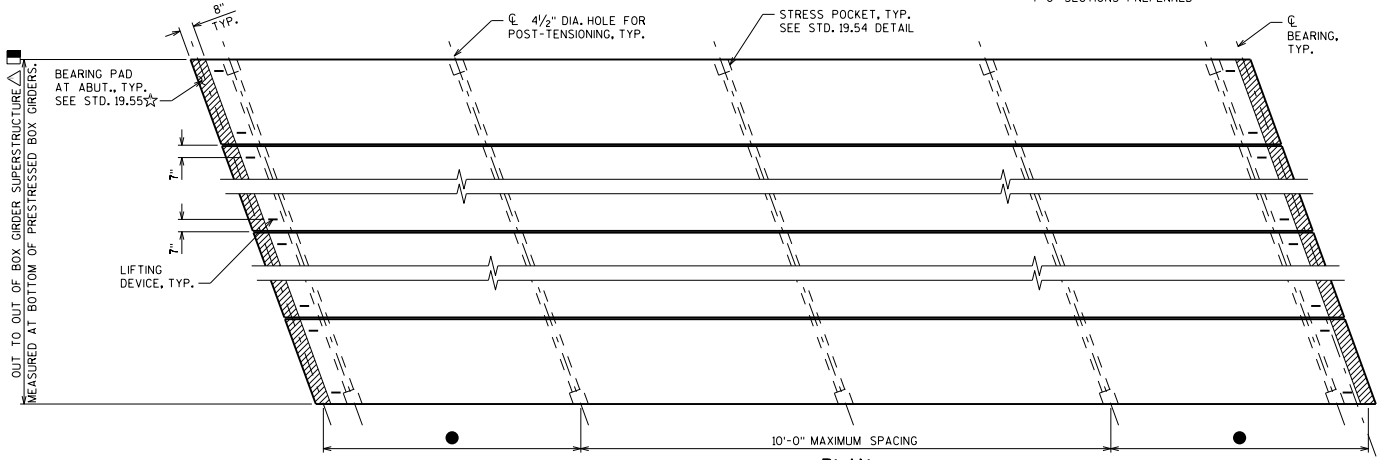
CLEAR ROADWAY	3'-0" SECTION	4'-0"* SECTION
26'-0"	10	7
30'-0"	11	8
36'-0"	13	10
40'-0"	14	11
44'-0"	16	12

* 4'-0" SECTIONS PREFERRED

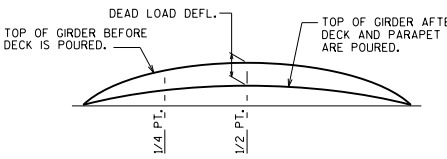


DECK OVERHANG DETAIL

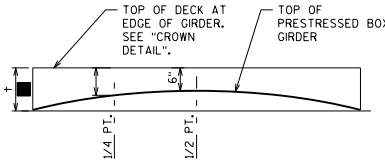
SEE STANDARD 19.56 FOR ADDITIONAL DETAILS



PLAN



DEAD LOAD DEFLECTION DIAGRAM



DECK THICKNESS DIAGRAM

DESIGNER NOTES

△ ACCOUNT FOR NUMBER OF PRESTRESSED BOX GIRDERS, NUMBER OF JOINTS (AT 1" NORMAL TO ℄ GIRDER), AND ROADWAY CROSS SLOPE.

◆ DIMENSION IS HORIZONTAL DISTANCE FROM TOP OF PRESTRESSED BOX GIRDER TO BOTTOM OF PRESTRESSED BOX GIRDER.

DECK THICKNESS DETERMINATION PROCEDURE IS BASED ON TANGENT PROFILE GRADE LINE. STRUCTURES WITH VERTICAL CURVE PROFILE GRADE LINES MAY REQUIRE ADDITIONAL INVESTIGATION.

NOTES

NOTE: AN AVERAGE DECK THICKNESS OF _____ WAS USED IN THE QUANTITY "CONCRETE MASONRY BRIDGES".

VARIATIONS TO THE GRADE LINE OVER ¼" MUST BE SUBMITTED BY THE FIELD ENGINEER TO THE STRUCTURES DESIGN SECTION FOR REVIEW.

LEGEND

☆ BEARING PAD NOT REQUIRED FOR GRS ABUTMENTS.

● ¼ SPAN FOR SPANS UP TO 80'-0".
⅕ SPAN FOR SPANS OVER 80'-0".

◨ DIMENSION ASSUMES 1" JOINT WIDTH. JOINT WIDTH DIMENSIONS MAY VARY DUE TO ±¼" JOINT TOLERANCES.

◭ MAY BE REDUCED TO 1'-7" TO MAINTAIN ROADWAY CLEAR WIDTH.

■ TO DETERMINE DECK THICKNESS AT GIRDER ENDS FOLLOW THIS PROCESS:

6" MIN. DECK SLAB THICKNESS
\+ FIELD MEASURED GIRDER CAMBER (AT MID SPAN)
\- DEADLOAD DEFLECTION (AT MIDSPAN)
= DECK THICKNESS, †

NOTE: PLAN DECK THICKNESS BASED ON THEORETICAL INITIAL CAMBER VALUE. ¼ PT. MAY BE INTERPOLATED. USE FIELD MEASURED GIRDER CAMBER FOR ACTUAL DECK THICKNESS. THE ¼ PT. IS INTERPOLATED BETWEEN DECK THICKNESS AT THE END OF DECK AND MIDSPAN.

** THE THEORETICAL INITIAL CAMBER VALUE AT THE TIME OF STRAND RELEASE AT MIDSPAN MULTIPLIED BY A FACTOR OF 1.4 TO ACCOUNT FOR CAMBER GROWTH FROM THE TIME OF STRAND RELEASE TO JOBSITE PLACEMENT.

SPAN	CAMBER (IN.) **
1	

THESE VALUES ARE NOT TO BE USED IN DETERMINING '†', USE FIELD MEASURED GIRDER CAMBER.

THESE VALUES ARE FOR INFORMATIONAL PURPOSES ONLY.

GIRDER DATA

SPAN	GIRDER	GIRDER LENGTH "L"	DEAD LOAD DEFL. (IN.) ¼ PT.	DEAD LOAD DEFL. (IN.) ½ PT.	CONC. STRGTH. f'c (PSI)	DIA. OF STRAND (IN.)	UNDRAPED PATTERN TOTAL NO. OF STRANDS	UNDRAPED PATTERN TOTAL INITIAL PRESTRESS FORCE (KIPS)	f'ci (PSI) *
1									

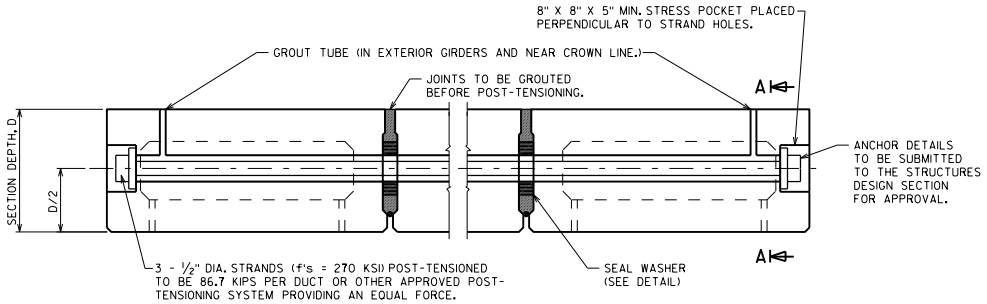
* MINIMUM CYLINDER STRENGTH OF CONCRETE @ TIME OF TRANSFER OF PRESTRESS FORCE.

PRESTRESSED BOX GIRDER DETAILS 2

BUREAU OF STRUCTURES

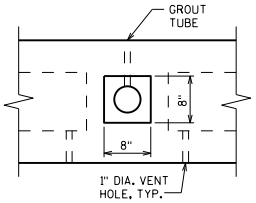
APPROVED: Bill Oliva

DATE: 7-18

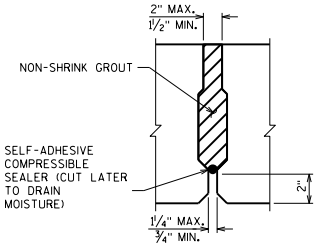


POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM

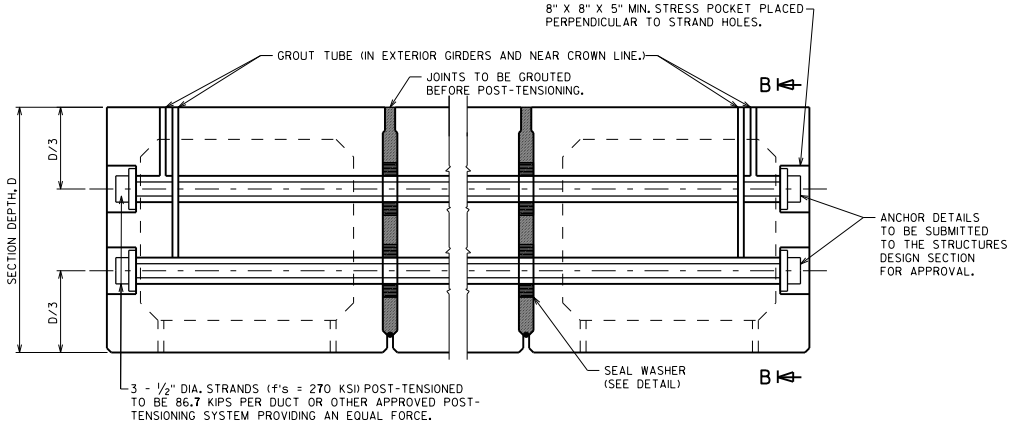
(SECTIONS 1 THROUGH 4)



SECTION A-A

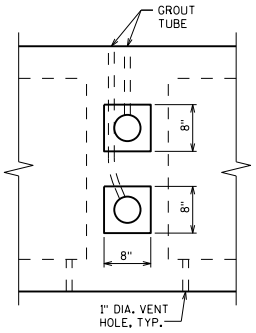


SHEAR KEY DETAIL

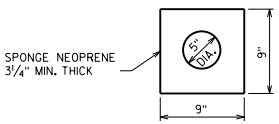


POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM

(SECTIONS 5 AND 6)

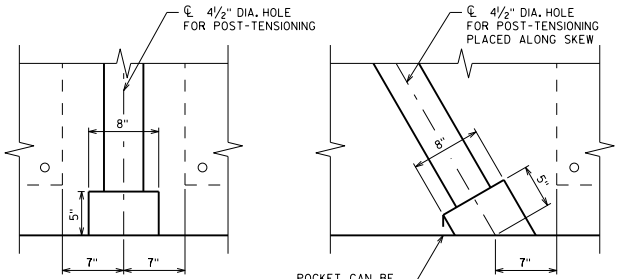


SECTION B-B



SEAL WASHER

(MAY ALSO BE ROUND)



STRESS POCKET DETAIL

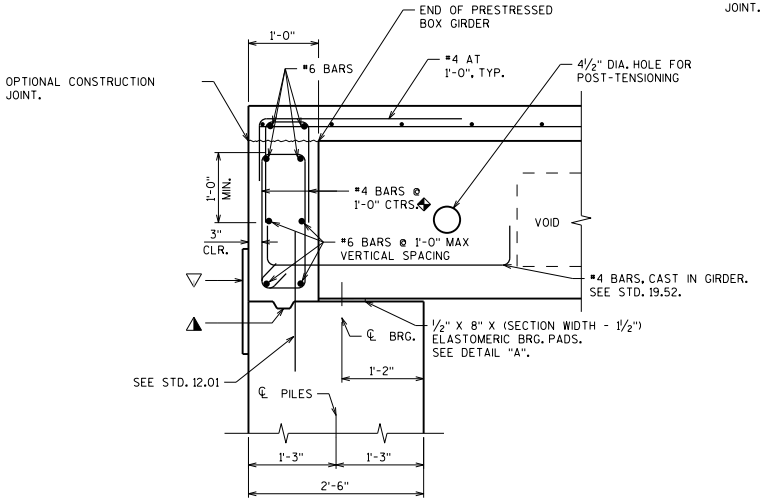
PRESTRESSED BOX GIRDER DETAILS 3

BUREAU OF STRUCTURES

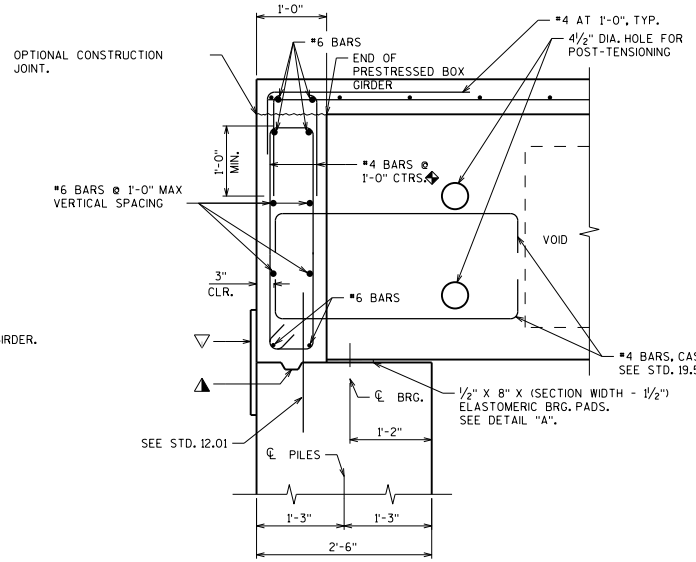
APPROVED: Bill Oliva

DATE: 1-18

STANDARD 19.54



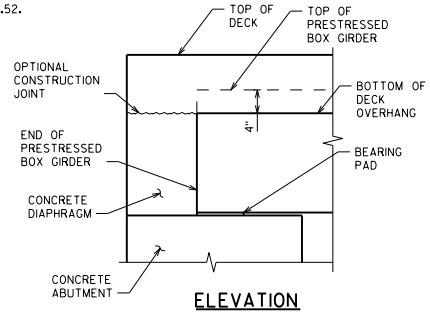
NO PAVING NOTCH - SECTIONS 1 THROUGH 4



NO PAVING NOTCH - SECTIONS 5 AND 6

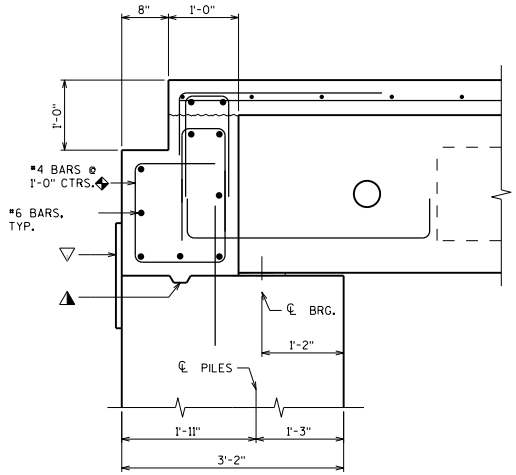
LEGEND

- ▽ 1'-6" RUBBERIZED MEMBRANE WATERPROOFING
- ◭ KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".
- ◆ BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ℄ GIRDERS.



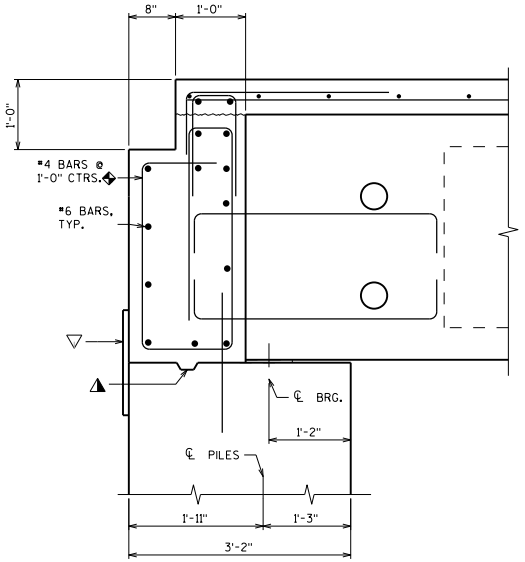
ELEVATION

(SHOWING DECK OVERHANG TERMINATION AT CONCRETE ABUTMENT)



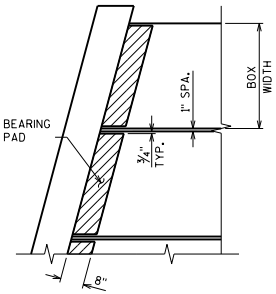
WITH PAVING NOTCH - SECTIONS 1 THROUGH 4

SEE NO PAVING NOTCH - SECTIONS 1 THROUGH 4 DETAIL FOR ADDITIONAL INFORMATION



WITH PAVING NOTCH - SECTIONS 5 AND 6

SEE NO PAVING NOTCH - SECTIONS 5 AND 6 DETAIL FOR ADDITIONAL INFORMATION



DETAIL "A"

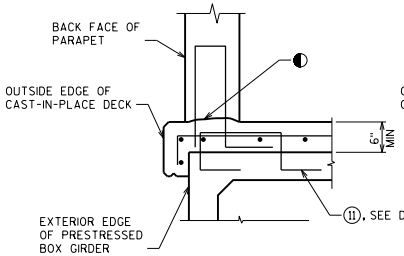
PRESTRESSED BOX GIRDER DETAILS 4

BUREAU OF STRUCTURES

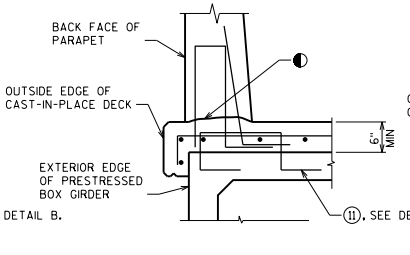
APPROVED: Bill Oliva

DATE: 1-16

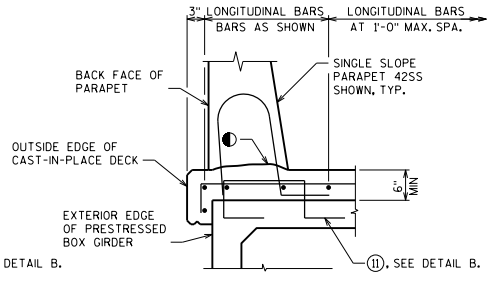
STANDARD 19.55



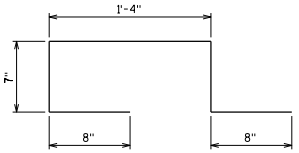
SECTION A-A



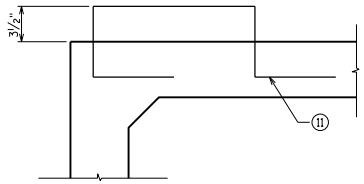
SECTION B-B



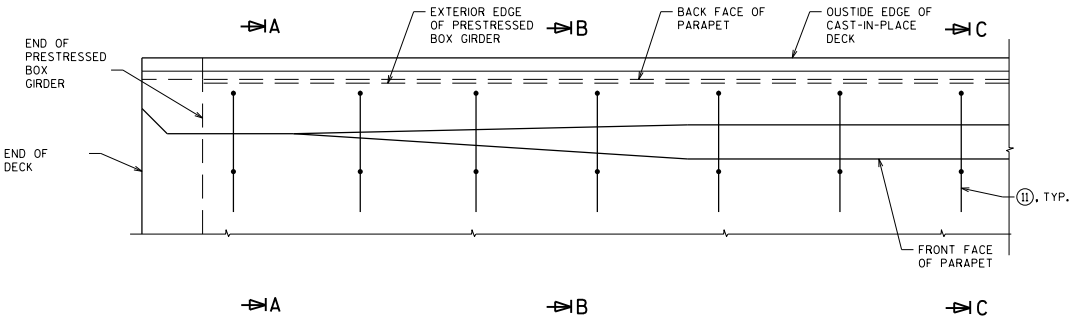
SECTION C-C



⑪ EXTERIOR EDGE SHEAR CONNECTOR
#4 AT 2'-0" MAX.
EPOXY COAT BARS

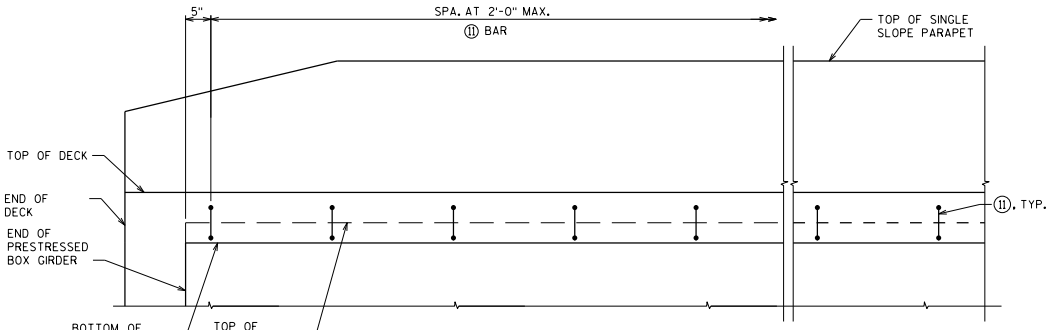


DETAIL B



PLAN

SHOWING REINFORCEMENT CAST INTO PRESTRESSED BOX GIRDER
PARAPET AND DECK ARE SHOWN FOR CLARITY



OUTSIDE ELEVATION

SHOWING REINFORCEMENT CAST INTO PRESTRESSED BOX GIRDER
PARAPET AND DECK ARE SHOWN FOR CLARITY

LEGEND

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

NOTE

BAR ⑪ TO BE PAID AS PART OF BID ITEM "PRESTRESSED BOX GIRDER TYPE XX-INCH".

DESIGNER NOTES

SEE CHAPTER 30 STANDARDS FOR SINGLE SLOPE PARAPET DETAILS.

DETAILS SHOWN ARE APPLICABLE FOR CONCRETE ABUTMENTS. DETAILS TO BE MODIFIED FOR GRS ABUTMENTS.

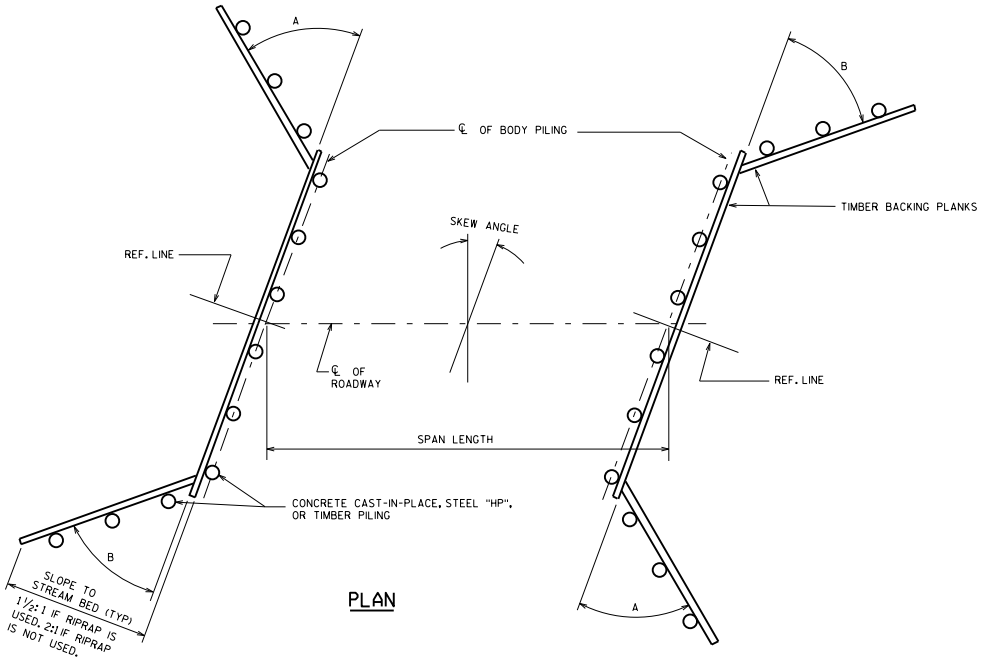
PRESTRESSED BOX GIRDER DETAILS 5

BUREAU OF STRUCTURES

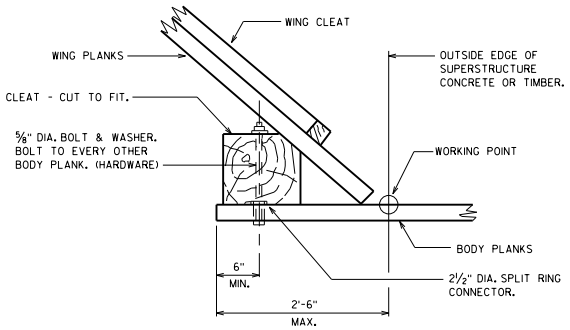
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 19.56



PLAN



CORNER DETAIL

NOTES

ALL TIMBER CONNECTORS AND HARDWARE EXCEPT THOSE OF MALLEABLE IRON SHALL BE GALVANIZED.

TREAT ALL LUMBER AND TIMBER WITH ONE OF THE PRESERVATIVES RECOMMENDED IN THE STANDARD SPECIFICATIONS.

TIE RODS SHALL BE COATED WITH THE COAL TAR OR BITUMASTIC COMPOUND USED FOR COVERING WING PILE ENDS.

REFER TO AASHTO LRFD SPECIFICATIONS FOR LUMBER AND TIMBER DESIGN REQUIREMENTS.

THE BODY BACKING PLANKS SHALL BE CONTINUOUS OVER 4 PILES (3 PANELS). PLANK SPLICES, IF REQUIRED SHALL BE AT THE CENTERLINE OF PILING AND ADJACENT SPLICES SHALL BE STAGGERED.

ALL TIE RODS, TURNBUCKLES, NUTS AND WASHERS SHALL BE PAID FOR AS "STRUCTURAL STEEL CARBON".

TIMBER CONNECTORS AND HARDWARE SHALL BE INCLUDED IN THE COST FOR "TREATED LUMBER AND TIMBER".

ALTERNATE DETAILS MAY BE SUBMITTED USING EITHER GALVANIZED STEEL BRIDGE PLANK OR PRECAST CONCRETE PLANK IN LIEU OF TIMBER BACKED ABUTMENT PLANKING, SUBJECT TO APPROVAL BY THE ENGINEER.

SKEW ANGLE	"H" HEIGHT FROM STREAM BED OR BERM TO GRADE	WING ANGLE "A"	WING ANGLE "B"
0° TO 15° INCL.	H ≤ 10'-0"	45°	45°
0° TO 15° INCL.	* H > 10'-0"	50°	50°
15° TO 20° INCL.	H ≤ 10'-0"	55°	30°
15° TO 20° INCL.	* H > 10'-0"	50°	50°
OVER 20°	H ≤ 10'-0"	65°	25°
OVER 20°	● H > 10'-0"	65°	25°

* USE TIE RODS ON WING PILING

● USE TIE RODS WITH A DEADMAN ON WING PILING.

SECTION	MOMENT CAPACITY (INCH - KIPS/FT.)
10 GAGE (6' x 2') GRADE A * ARMCO	22.9 (f_b = 18 K.S.I.)
7 GAGE (6' x 2') GRADE A * ARMCO	30.0 (f_b = 18 K.S.I.)

*ASTM A446

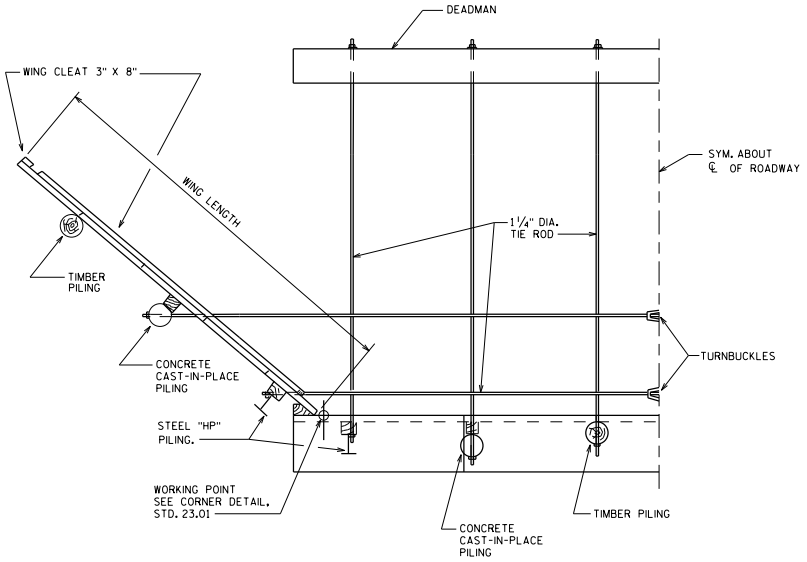
TIMBER ABUTMENTS GENERAL

BUREAU OF STRUCTURES

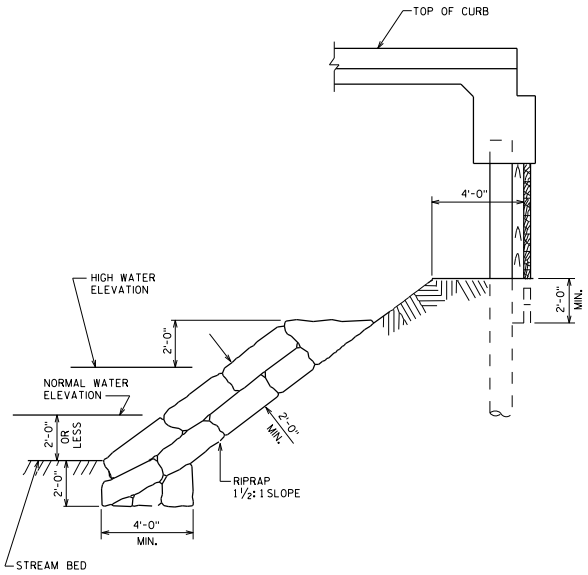
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 23.01

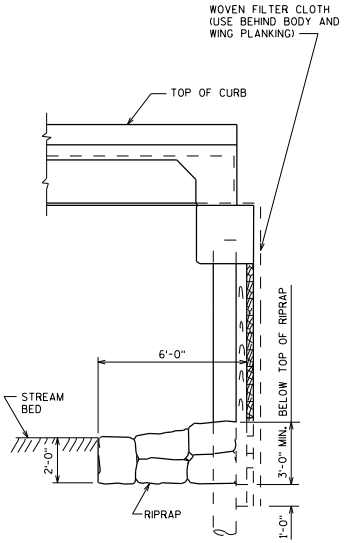


HALF PLAN

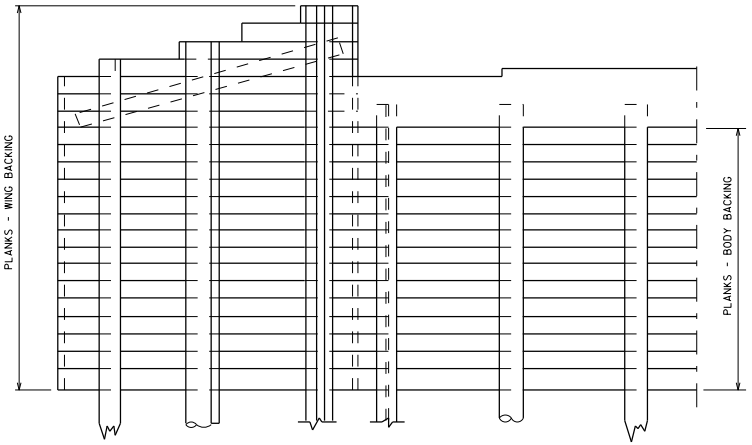


LONGITUDINAL SECTION WITH BERM

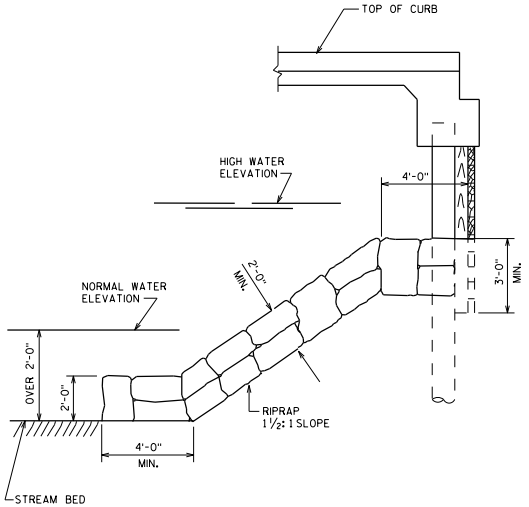
SHOWING TOE OF RIPRAP WHEN WATER IS 2'-0" OR LESS IN DEPTH.



LONGITUDINAL SECTION WITHOUT BERM



HALF ELEVATION



LONGITUDINAL SECTION WITH BERM

SHOWING TOE OF RIPRAP WHEN WATER IS OVER 2'-0" IN DEPTH.

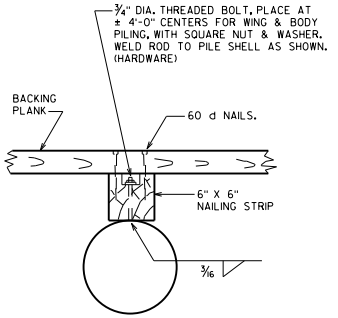
TIMBER ABUTMENT

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

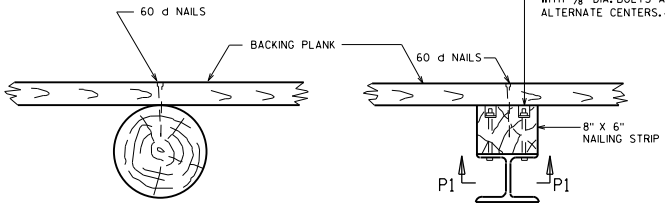
DATE: 7-16

STANDARD 23.02



CONCRETE CAST-IN-PLACE PILING

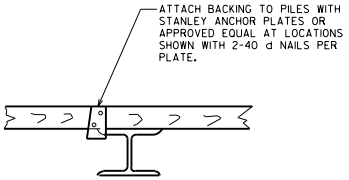
REFER TO STANDARD 11.01 FOR SECTION THRU REINFORCED CAST-IN-PLACE PILING WHEN PILES ARE EXPOSED.



TIMBER PILING

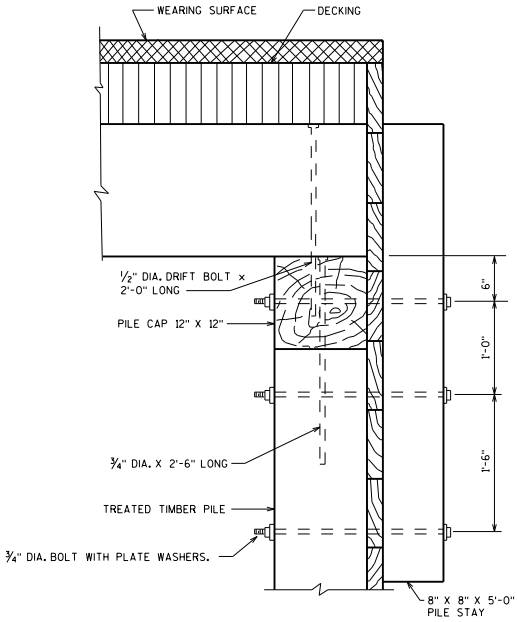
STEEL "HP" PILING

SECTION P1

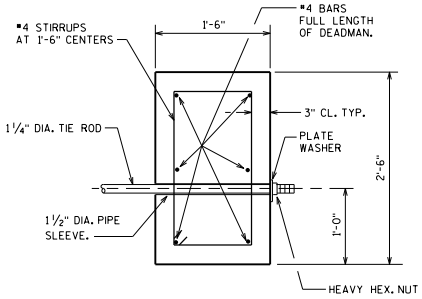


STEEL "HP" PILING
(ALTERNATE ATTACHMENT)

BODY & WING PLANK CONNECTION DETAILS



PILE CAP DETAIL
(TIMBER GIRDER)



SECTION THRU DEADMAN

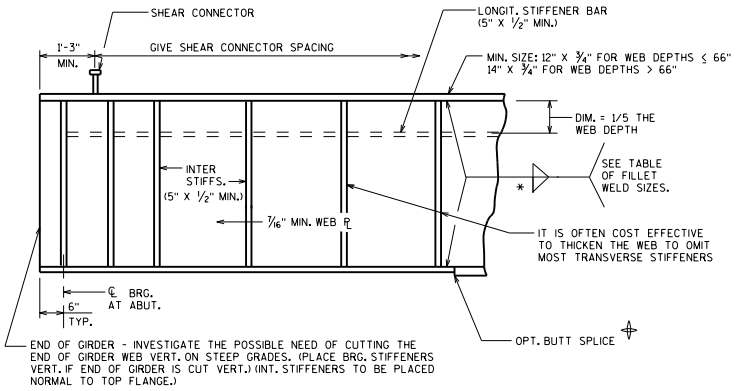
TIMBER ABUTMENT DETAILS

BUREAU OF STRUCTURES

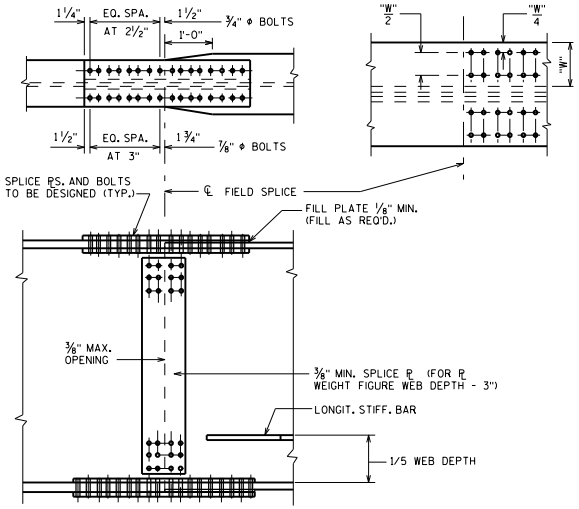
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 23.03



PART GIRDER ELEVATION



FIELD SPLICE DETAILS

NOTES

OPTIONAL WELDED SHOP SPLICES MAY BE USED FOR ALL FLANGE AND WEB PLATES OVER 60'-0" LONG. IF USED, THE LOCATION OF THE SPLICE SHALL BE SHOWN ON SHOP DRAWINGS AND WILL BE SUBJECT TO THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

⏚ OPTIONAL FLANGE BUTT SPLICE. A FLANGE PLATE OF THE LARGER SIZE MAY BE FURNISHED FULL LENGTH, BUT PAY WEIGHT SHALL BE BASED ON SECTIONS AS DETAILED. IF A PERMANENT HOLD DOWN DEVICE IS USED AT THE ABUTMENT, THEN THE BUTT SPLICE SHALL NOT BE OPTIONAL.

PRIOR TO STEEL BLAST, ALL FLAME CUT EDGES OF PLATE THAT ARE TO BE PAINTED SHALL BE GROUND OR PLANED TO REMOVE THE HARDENED SURFACE CAUSE BY THE FLAME, AND CORNERS CHAMFERED 1/16" MINIMUM.

DESIGNER NOTES

BASE BEAM SEAT ELEVATIONS AT ABUTMENT ON THICKER FLANGE AND DETAIL SHIM PLATES TO ACCOMMODATED THINNER FLANGE.

AT EXTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON INTERIOR FACE OF GIRDER. PLACE LONGITUDINAL STIFFENERS ON THE OUTSIDE FACE.

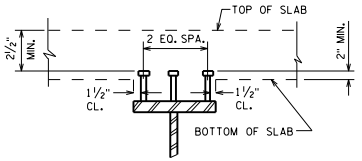
AT INTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON ONE SIDE OF GIRDER AND LONGITUDINAL STIFFENERS ON THE OPPOSITE SIDE OF GIRDER. KEEP INTERMEDIATE STIFFENERS ON ONE SIDE WHEN LONGITUDINAL STIFFENERS ARE NOT REQUIRED.

AVOID USE OF LONGITUDINAL STIFFENERS IF PRACTICAL BY THICKENING WEB. WHERE LONGITUDINAL STIFFENERS ARE USED, RUN THEM CONTINUOUS WITHOUT BREAKS AT CONNECTION STIFFENERS.

AT EXTERIOR GIRDER PLACE INTERMEDIATE STIFFENERS ALONG ENTIRE LENGTH OF GIRDER AT A MAX. SPACING EQUAL TO 1.5 X THE DEPTH OF WEB. SPACE EQUALLY BETWEEN DIAPHRAGM CONNECTION STIFFENER. THIS REQUIREMENT IS NECESSARY TO SUPPORT THE FALSEWORK FOR THE SLAB OVERHANG AND MAY BE DISREGARDED IF THE SLAB OVERHANG, MEASURED FROM ℄ WEB, IS 1'-6" OR LESS OR ANY OF THE FOLLOWING CRITERIA ARE SATISFIED:
...WEB THICKNESS > 5/8" AND WEB DEPTH < 48"
...WEB THICKNESS > 11/16" AND WEB DEPTH < 60"
...WEB THICKNESS > 3/4" AND WEB DEPTH < 66"

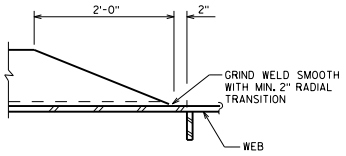
SEE STANDARD 40.07 FOR CONNECTING ANY NEW STIFFENERS TO EXISTING GIRDERS.

NOTE: USE THREE FIELD WELDED 7/8" DIA. X 5" LONG ⊖ STUDS EQUALLY SPACED WITH A MIN. OF 1 1/2" CL. FROM THE FLANGE EDGE. STUDS SHALL NOT BE PLACED OVER FIELD SPLICE PLATES.

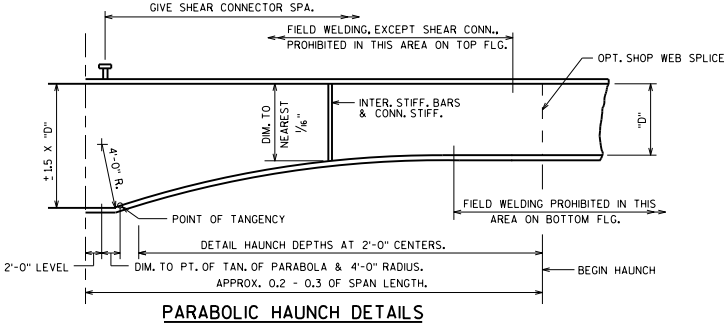


⊖ USE DIFFERENT LENGTH STUDS IF 2 1/2" MIN. CLEARANCE OR 2" EXTENSION CRITERIA IS VIOLATED.

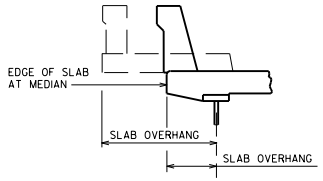
SHEAR CONN. DETAILS



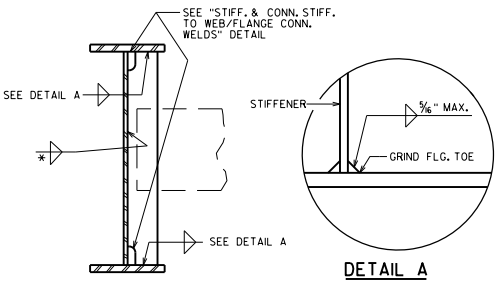
LONGIT. STIFF. TERMINATION



PARABOLIC HAUNCH DETAILS

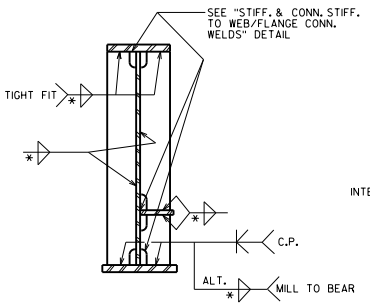


SLAB OVERHANG DEFINITION

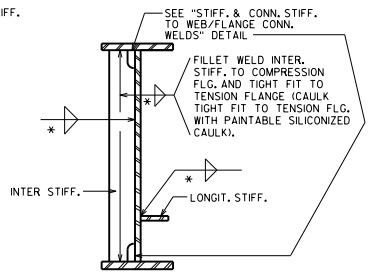


CONNECTION STIFF. DETAILS

DETAIL A
CONNECTION STIFFENER DETAIL @ TENSION FLANGE



BRG. STIFF. DETAILS TYP. AT ABUT. & PIER



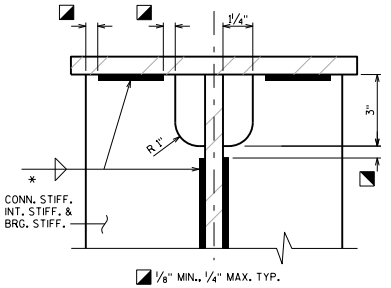
INTERMEDIATE & LONGITUDINAL STIFF. DETAILS
(ALL GIRDERS)

* TABLE OF FILLET WELD SIZES

MATERIAL THICKNESS OF THICKER PART JOINED.	+ MIN. SIZE OF FILLET WELD
TO 1/2" INCLUSIVE	3/16"
OVER 1/2" TO 3/4"	1/4"
OVER 3/4" TO 1 1/2"	△ 5/16"
OVER 1 1/2"	△ 3/8"

+ EXCEPT THAT THE WELD SIZE SHALL NOT EXCEED THE THICKNESS OF THE THINNER PART JOINED.

△ MIN. PASS SIZE IS 5/16"



STIFF. & CONN. STIFF. TO WEB/FLANGE CONN. WELDS

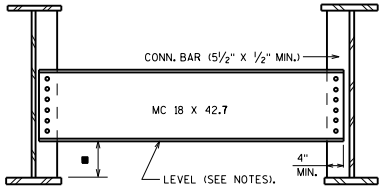
PLATE GIRDER DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

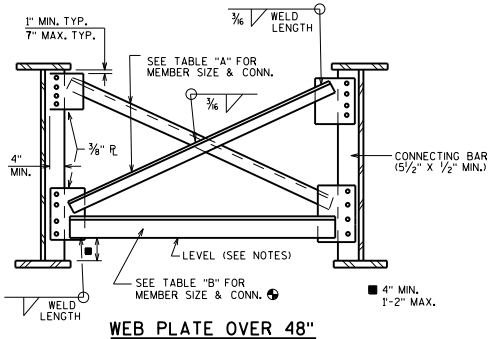
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 24.02



WEB PLATE ≤ 48"
TYP. IN SPAN & AT PIER



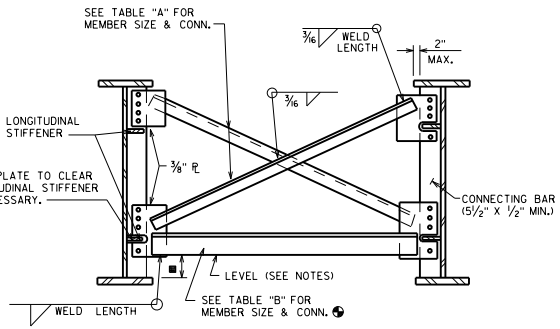
WEB PLATE OVER 48"
TYP. IN SPAN & AT PIER

TABLE "A"

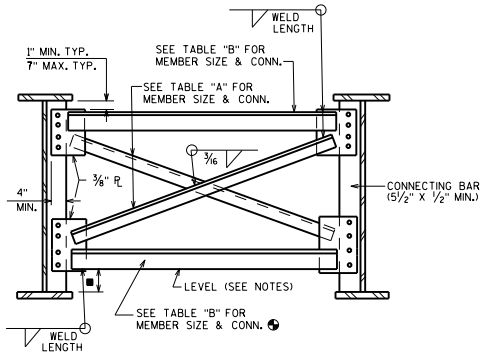
SIZE	MAX. LENGTH OF MEMBER	WELD LENGTH	NO. OF ¾" ø BOLTS	WEIGHT PER FT.
L 3½ X 3½ X 5/16	21'-6"	9"	4	7.2#
L 4 X 4 X 5/16	25'-0"	11"	4	8.2#
L 5 X 5 X 5/16	31'-0"	14"	5	10.3#

TABLE "B"

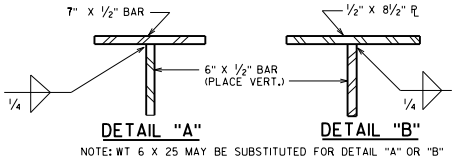
SIZE	MAX. LENGTH OF MEMBER	WELD SIZE	WELD LENGTH	NO. OF ¾" ø BOLTS	WEIGHT PER FT.
L 5 X 5 X 5/16	11'-6"	¼"	11"	4	10.3#
L 6 X 6 X ⅜	13'-6"	5/16"	13"	6	14.9#
½" T SECTION SEE DETAIL "A"	17'-6"	5/16"	14"	7	16.6#
½" T SECTION SEE DETAIL "B"	22'-0"	⅜"	13"	7	18.5#



WEB PLATE OVER 48" WITH LONGITUDINAL STIFFENERS
TYP. IN SPAN & AT PIER



TYP. CURVED GIRDER DIAPHRAGM
ALSO USE TOP HORIZONTAL MEMBER AT DIAPHRAGMS ADJACENT TO KINK POINTS OF KINKED GIRDERS



NOTE: WT 6 X 25 MAY BE SUBSTITUTED FOR DETAIL "A" OR "B"

NOTES

ALL BOLTED CONNECTIONS SHALL BE FRICTION TYPE USING ¾" ø HIGH STRENGTH ASTM A325 BOLTS WITH DOUBLE WASHERS.

DIAPHRAGMS OR LOWER CROSS FRAME MEMBERS ARE SLOPED WHEN DIFFERENCE IN ADJACENT BOTTOM FLANGE ELEVATIONS EXCEEDS 6". HOLD 8" FROM TOP OF ADJACENT FLANGES TO BOTTOM OF DIAPHRAGMS OR LOWER CROSS FRAME WHEN THESE MEMBERS ARE SLOPED.

DIAPHRAGMS OR LOWER CROSS FRAME MEMBERS THAT ARE LEVEL SHALL BE PLACED 4" ABOVE THE TOP OF THE HIGHER BOTTOM FLANGE OF ADJACENT GIRDERS.

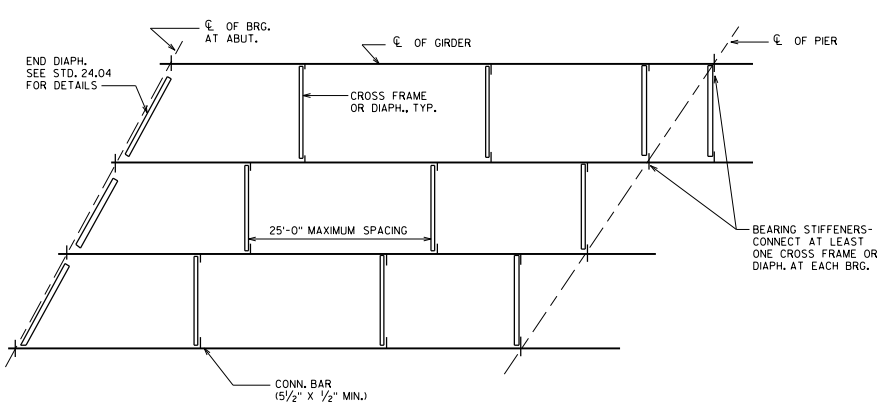
HOLES IN CROSS FRAME CONNECTIONS MAY BE OVERSIZED ø 15/16" DIA. IN 1 PLY.

DESIGNER NOTES

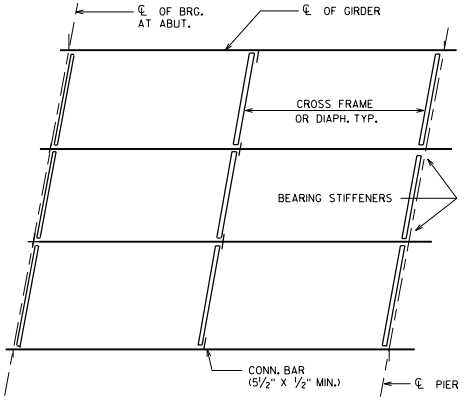
SEE STD. 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.

FOR SPANS OVER 200', THE CROSS FRAMES AT THE PIERS SHALL BE DESIGNED TO RESIST THE LATERAL LOADS THAT ARE TRANSFERRED TO THE PIERS.

◐ HORIZONTAL CROSSFRAME MEMBER TO HAVE HORIZONTAL LEG TOP (AS SHOWN) WHEN NO LOWER LATERALS ARE USED. WHEN LOWER LATERALS ARE USED THE HORIZONTAL LEG SHALL BE ON THE BOTTOM, THIS IS TO ALLOW FRAMING INTO THE LOWER LATERAL GUSSET. CURRENT PRACTICE IS TO AVOID THE USE OF LOWER LATERALS, HOWEVER.



FRAMING PLAN FOR SKEW > 15°



FRAMING PLAN FOR SKEW ≤ 15°

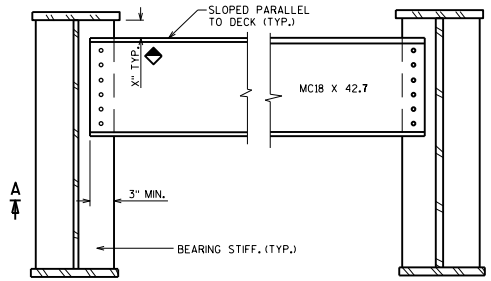
PLATE GIRDER DIAPHRAGMS AND CROSS FRAMES

BUREAU OF STRUCTURES

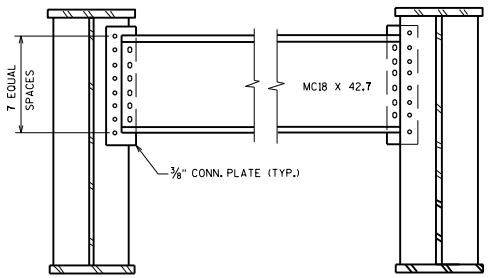
APPROVED: Bill Oliva

DATE: 7-15

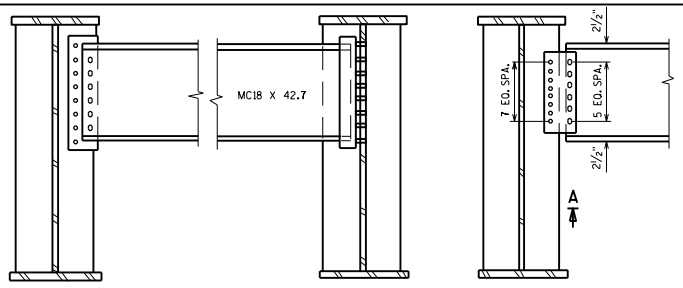
STANDARD 24.03



SKEWS 0° - 15°



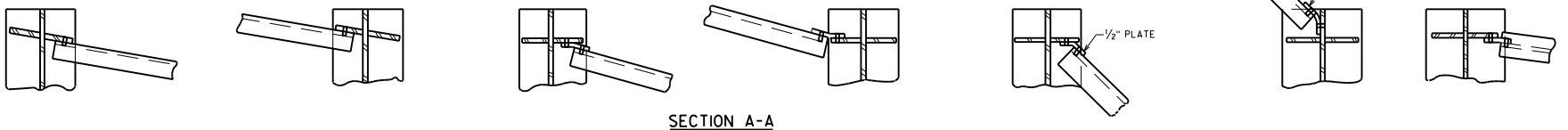
SKEWS > 15° ≤ 30°



SKEW > 30°

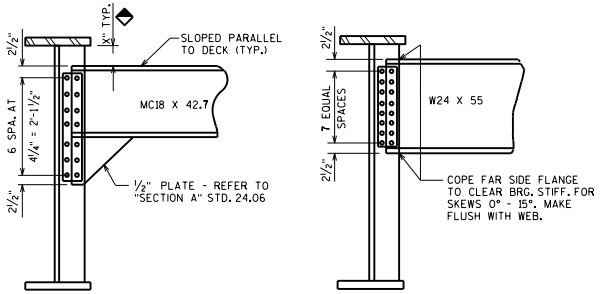
W24 X 55 TYPICAL CONN.

USE W24x55 IN PLACE OF MC18x42.7 WHEN LENGTH OF DIAPHRAGM EXCEEDS 13'-6" BUT < 22'-0". (SKEW > 15° ≤ 30° SHOWN.)



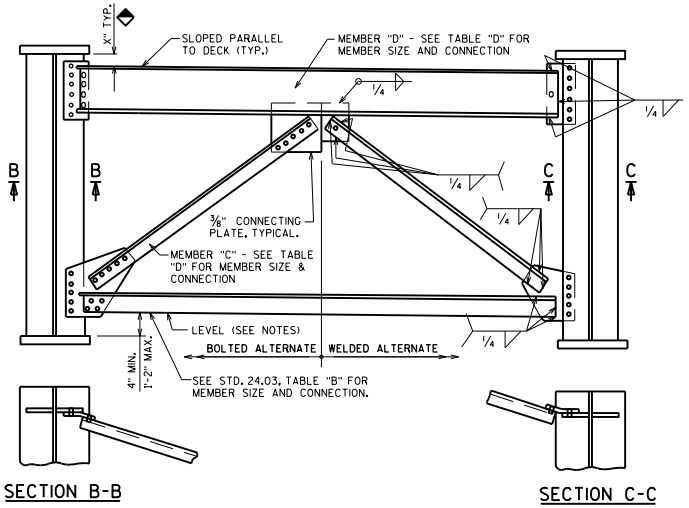
SECTION A-A

END DIAPHRAGM CONNECTIONS - WEB DEPTHS ≤ 48"



TYPICAL CONNECTION FOR MC18 X 42.7 AND W24 X 55. USE MC18 X 42.7 WHEN DIAPHRAGM LENGTH IS ≤ 13'-6". USE W24 X 55 FOR LENGTHS > 13'-6" < 22'-0". (SKEW > 15° ≤ 30° SHOWN)

END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 48" ≤ 60"



SECTION B-B

SECTION C-C

END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 60"

SKEWS > 15° ≤ 30° SHOWN

NOTES

ALL BOLTED CONNECTIONS SHALL BE FRICTION TYPE USING ¾" DIA. HIGH STRENGTH ASTM A325 BOLTS WITH DOUBLE WASHERS.

LOWER CROSS FRAME MEMBERS ARE SLOPED WHEN DIFFERENCE IN ADJACENT BOTTOM FLANGE ELEVATIONS EXCEEDS 6". HOLD 8" FROM TOP OF ADJACENT FLANGES TO BOTTOM OF DIAPHRAGMS OR LOWER CROSS FRAME WHEN THESE MEMBERS ARE SLOPED.

LOWER CROSS FRAME MEMBERS THAT ARE LEVEL SHALL BE PLACED 4" ABOVE THE TOP OF THE HIGHER BOTTOM FLANGE OF ADJACENT GIRDERS.

DESIGNER NOTES

SEE STANDARD 24.02 FOR BEARING STIFFENER COPE & WELD DETAILS.

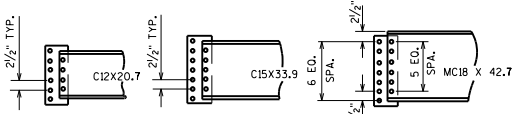
FOR WEB DEPTHS GREATER THAN 60", THE NUMBER OF BOLTS REQUIRED BETWEEN BEARING STIFFENERS AND LOWER CONNECTING PLATES EQUALS THE NUMBER OF BOLTS REQUIRED IN MEMBER "C" OR THE NUMBER REQUIRED IN THE LOWER HORIZONTAL MEMBER, WHICHEVER IS GREATER.

◆ 3" MINIMUM. USE 3" UNLESS INCREASED TO ACCOMMADATE LARGE EXPANSION DEVICES.

TABLE "D"

MEMBER "C" MAXIMUM LENGTH	WEB DEPTH 5'-0" - 6'-6"			WEB DEPTH 6'-6" - 7'-6"			WEB DEPTH 7'-6" - 8'-9"			MEMBER "D" SIZE	MEMBER "D" CONN. NO. OF ¾" DIA. BOLTS	
	MEMBER "C" SIZE	NO. OF ¾" DIA. BOLTS	LENGTH OF ¼" WELD	MEMBER "C" SIZE	NO. OF ¾" DIA. BOLTS	LENGTH OF ¼" WELD	MEMBER "C" SIZE	NO. OF ¾" DIA. BOLTS	LENGTH OF ¼" WELD		CONN. PLATE TO BRG. STIFF.	MEMBER "D"
11'-6"	4 X 4 X 5/16	5	13	4 X 4 X 5/16	5	12	4 X 4 X 5/16	5	11	C12 X 20.7	6 @ 2½"	4 @ 2½"
13'-6"	5 X 5 X 5/16	6	17	5 X 5 X 5/16	6	16	5 X 5 X 5/16	6	15	C12 X 20.7	6 @ 2½"	4 @ 2½"
17'-6"	6 X 6 X 5/16	8	20	5 X 5 X 5/16	7	18	5 X 5 X 5/16	6	16	C15 X 33.9	7 @ 2½"	5 @ 2½"
22'-0"	6 X 6 X 5/16	9	23	6 X 6 X 5/16	8	21	6 X 6 X 5/16	7	19	MC18 X 42.7	7 @ 2½"	6 @ 2½"

NOTE: ALL MEMBER "C" SIZES REPRESENT ANGLES.



MEMBER "D" END CONNECTIONS

OMIT END CONNECTING PLATE FOR SKEWS 0° - 15°

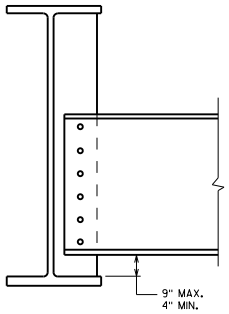
END DIAPHRAGMS

BUREAU OF STRUCTURES

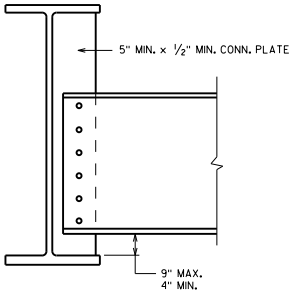
APPROVED: Bill Oliva

DATE: 1-18

STANDARD 24.04



36" W. GIRDER



33" W. GIRDER

INTERMEDIATE DIAPHRAGM SIZES

ALL INTERMEDIATE CONNECTIONS	
GIRDER DEPTH	INTERMEDIATE DIAPHRAGMS
36"	MC18 X 42.7
33"	MC18 X 42.7
30"	C15 X 33.9
27"	C15 X 33.9
24"	C12 X 20.7
21"	C10 X 15.3
18"	C8 X 11.5

NOTES

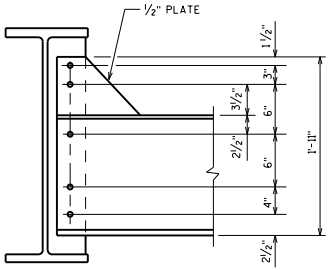
DIAPHRAGMS SHALL BE HORIZONTAL EXCEPT WHEN THE DIFFERENCE IN ADJACENT GIRDER ELEVATIONS IS OF A MAGNITUDE THAT NECESSITATES SLOPING THE DIAPHRAGMS.

WHEN DIAPHRAGMS ARE SLOPED, PLACE CENTER OF DIAPHRAGM AT MID-DEPTH OF GIRDER.

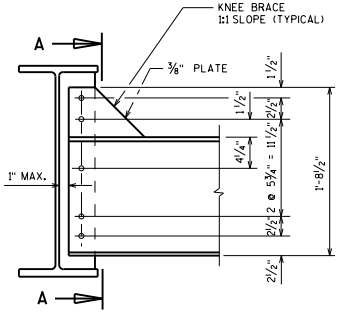
ALL BOLTED CONNECTIONS SHALL BE MADE WITH ¾" ø HIGH STRENGTH ASTM A325 BOLTS.

DESIGNER NOTES

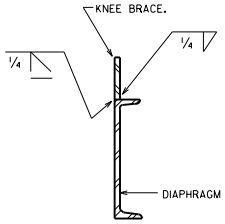
SEE STANDARD 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.



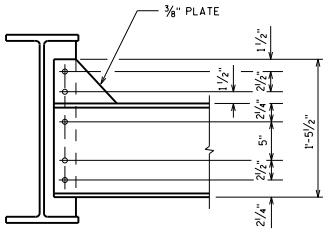
30" W. GIRDER



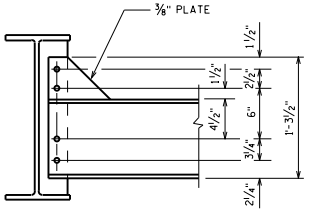
27" W. GIRDER



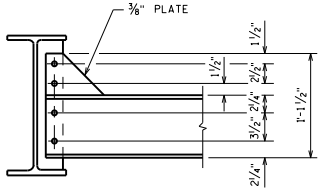
SECTION A



24" W. GIRDER



21" W. GIRDER



18" W. GIRDER

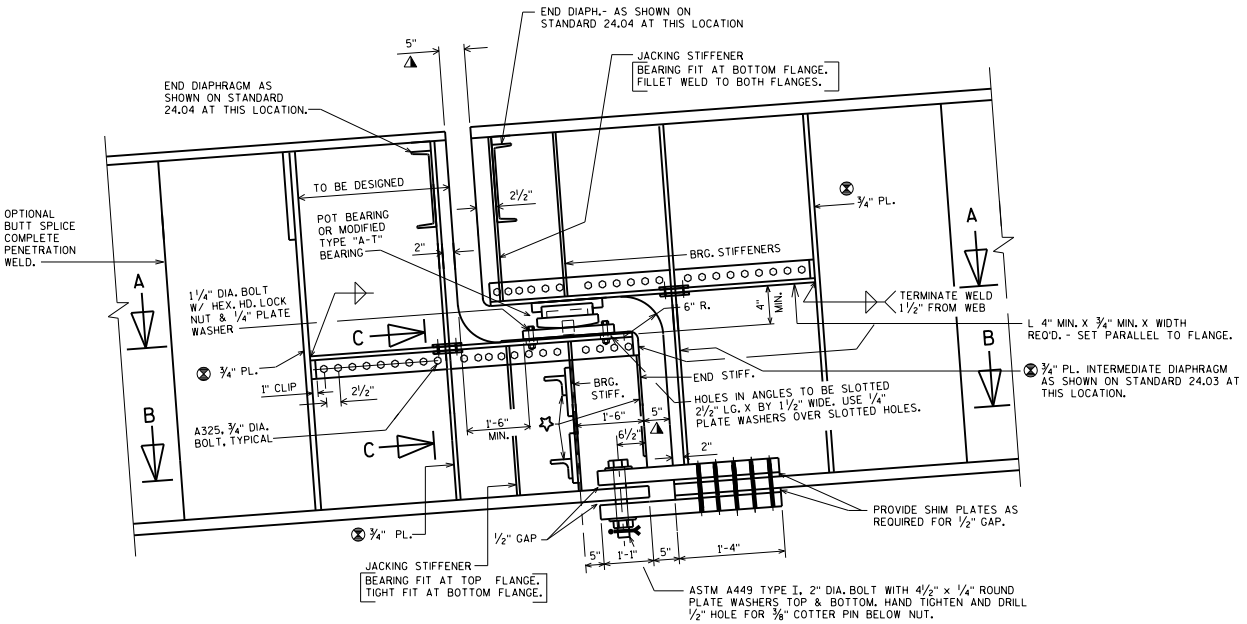
ROLLED GIRDER DIAPHRAGMS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-15

STANDARD 24.06



ELEVATION

NOTES

⊗ FOR WELDING DETAILS SEE "CONNECTION STIFFENER DETAILS" ON STANDARD 24.02 MINIMUM PLATE SIZE SHOWN. DESIGN ACTUAL SIZE REQUIRED.

STIFFENERS AND BEARING PLATES ARE ALL PERPENDICULAR TO FLANGES. ANGLES ARE PARALLEL TO FLANGES.

DESIGNER NOTES

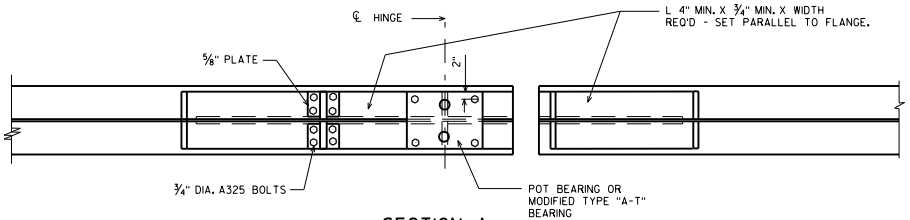
SIZE AND LENGTH OF ANGLES, NUMBER OF BOLTS THRU ANGLES, THICKNESS OF WEB PLATE, AND SIZE OF BEARING STIFFENERS AND JACKING STIFFENERS SHALL BE DETERMINED FROM AN ANALYSIS USING THE VERTICAL AND HORIZONTAL FORCES ACTING AT THE HINGE.

⚠ THE 5" OPENING BETWEEN GIRDER WEB AND FLANGE PLATES IS FOR FABRICATION ACTUAL OPENING IS BASED ON EXPANSION LENGTH AND TEMPERATURE.

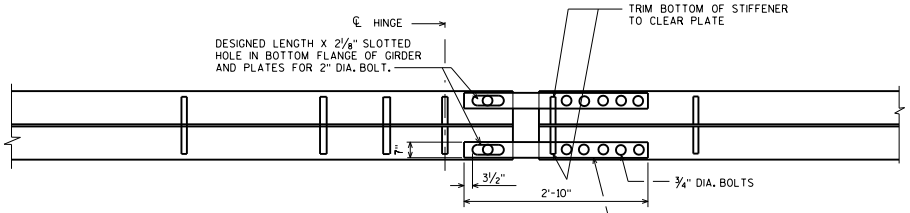
SLOTTED HOLES OF 6" IN THE FLANGES AND CONNECTING BARS WILL ACCOMMODATE A TOTAL TEMPERATURE MOVEMENT OF 8" (± 4" FROM 45° F). THE DESIGNER MAY NEED TO INCREASE OR DECREASE THE LENGTH OF THE SLOT TO MEET SPECIFIC JOB REQUIREMENTS.

✡ CROSS FRAME UNDER BRG. AND END STIFFENER IS ONLY REQ'D. IF TOTAL WEB HEIGHT EXCEEDS 8'-0".

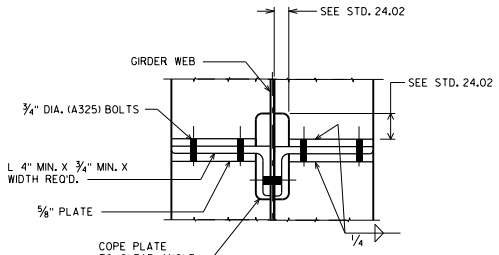
SEE BRIDGE MANUAL, SECTION 24.1 FOR CRITERIA FOR LOCATING HINGE JOINTS.



SECTION A



SECTION B



SECTION C

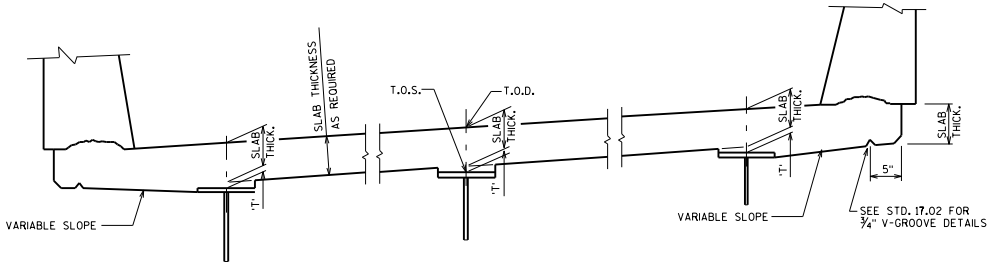
EXPANSION HINGE JOINT DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 24.08



SECTION THRU SLAB

DESIGNER NOTES

HAUNCH HEIGHTS WILL NORMALLY BE MADE 2" AT EDGE OF GIRDER, AT ABUTMENTS, HINGES, AND FIELD SPLICES.

HAUNCH DEPTH VARIATIONS NEED NOT BE SHOWN ON THE PLANS.

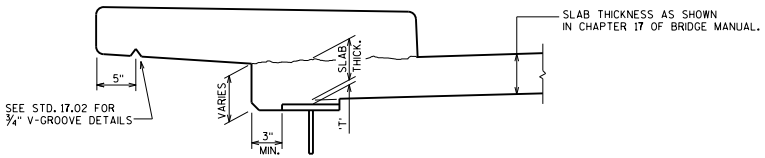
IF HAUNCH VARIATIONS EXCEED ¾", THE GIRDER SHALL BE CAMBERED TO REDUCE THE VARIATIONS IN HAUNCH THICKNESS.

NOTES

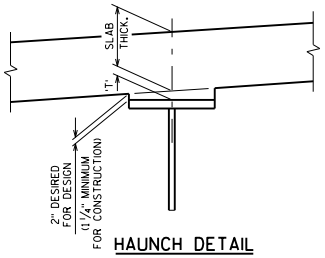
'T' = HAUNCH HEIGHT AT CENTERLINE OF GIRDER.

TO DETERMINE 'T': AFTER ALL STRUCTURAL STEEL HAS BEEN ERECTED, ELEVATIONS OF THE TOP FLANGES SHALL BE TAKEN AT CENTERLINE OF BEARINGS AND AT 0.1 POINTS.

TOP OF DECK ELEVATION AT FINAL GRADE
- TOP OF STEEL ELEVATION AFTER STEEL ERECTION
+ CONC. ONLY DEFLECTION; DOWNWARD DEFLECTION IS ADDED, UPWARD DEFLECTION IS SUBTRACTED
- SLAB THICKNESS
= 'T' VALUE FOR SETTING HAUNCH



TREATMENT OF EXTERIOR GIRDER AT SIDEWALK OVERHANG

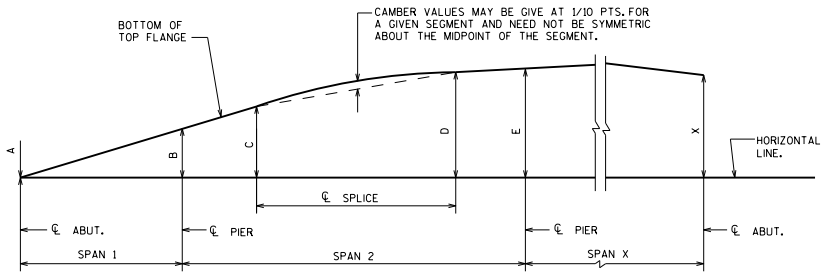


HAUNCH DETAIL

ELEVATIONS AT TOP OF DECK (T.O.D.) & TOP OF STEEL (T.O.S.)

		W. ABUT.	0.1 SPAN	0.2 SPAN	0.3 SPAN	℄ PIER	℄ SPLICE		℄ ABUT.
GIRDER 1	T.O.D.	861.17	861.13	861.08	861.04	860.99			860.69
	T.O.S.	860.48				860.35	860.35		860.00
GIRDER 2	T.O.D.	860.62	860.58	860.53	860.49	860.45			860.16
	T.O.S.	859.93				859.80	859.80		859.59
GIRDER X	T.O.D.								
	T.O.S.								

THESE ELEVATIONS ARE TO TOP OF STEEL (SPLICE AND COVER PLATE THICKNESS, IF APPLICABLE, ARE ACCOUNTED FOR) AND THEY ARE FOR THE MATERIAL AS ERECTED. THE ELEVATION OF THE TOP STEEL AT THE FIELD SPLICE POINTS SHALL BE CHECKED, AND CORRECTED, IF POSSIBLE, AFTER ERECTION AND BEFORE PERMANENTLY BOLTING THE DIAPHRAGMS IN PLACE.



BLOCKING DIAGRAM

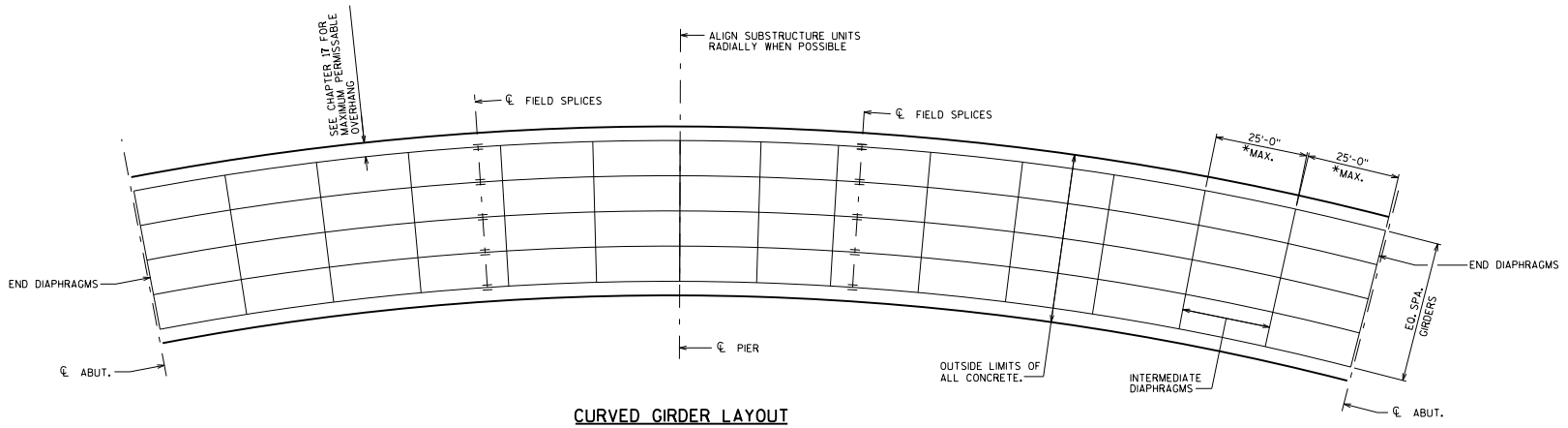
BLOCKING & SLAB HAUNCH DETAILS

BUREAU OF STRUCTURES

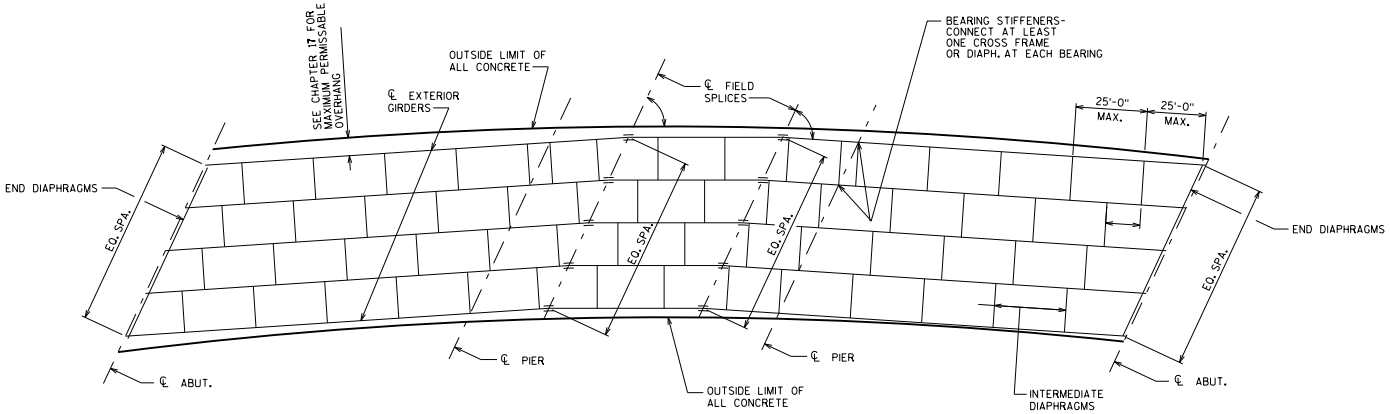
APPROVED: Bill Oliva

DATE: 1-12

STANDARD 24.09



CURVED GIRDER LAYOUT



KINKED GIRDER LAYOUT

GENERAL NOTES

SKETCHES AND NOTES APPLY TO ANY NUMBER OF SPANS.

NUMBER AND SIZE OF GIRDERS AND LOCATION OF FIELD SPLICES TO BE DETERMINED BY DESIGN.

FOR HORIZONTAL CURVES WITH A RADIUS OF LESS THAN 1400 FT., THE GIRDERS SHALL BE FABRICATED ALONG THE CURVE. FOR A RADIUS GREATER THAN 1400 FT., CONSIDERATION SHALL BE GIVEN TO KINKING GIRDERS AT FIELD SPLICE LOCATIONS.

FOR KINKED GIRDER LAYOUT:
HOLD ℄ OF SUBSTRUCTURE UNITS AND ℄ OF SPLICES PARALLEL TO EACH OTHER WHEN POSSIBLE.

GIRDERS ARE TO BE HELD PARALLEL TO EACH OTHER BETWEEN FIELD SPLICES.

FOR CURVED GIRDER LAYOUT:
PLACE SUBSTRUCTURE UNITS ON RADIAL LINES WHEN POSSIBLE.

*TIGHTER SPACING MAY BE REQ'D. FOR MORE SEVERE CURVATURES

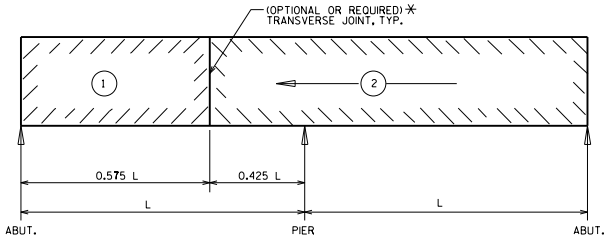
GIRDER LAYOUT ON CURVE

BUREAU OF STRUCTURES

APPROVED: Scot Becker

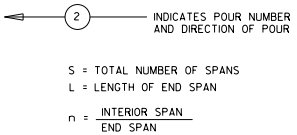
DATE: 7-10

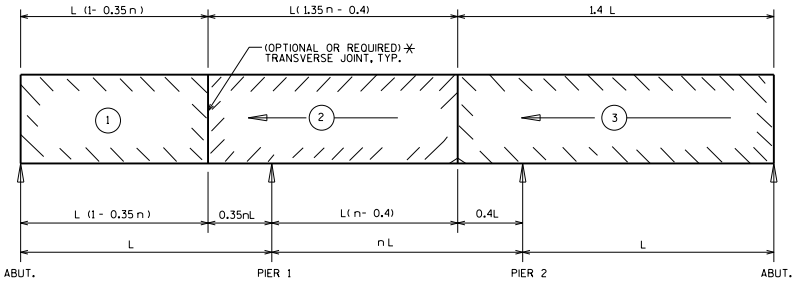
STANDARD 24.10



IDEAL DECK POUR SEQUENCE

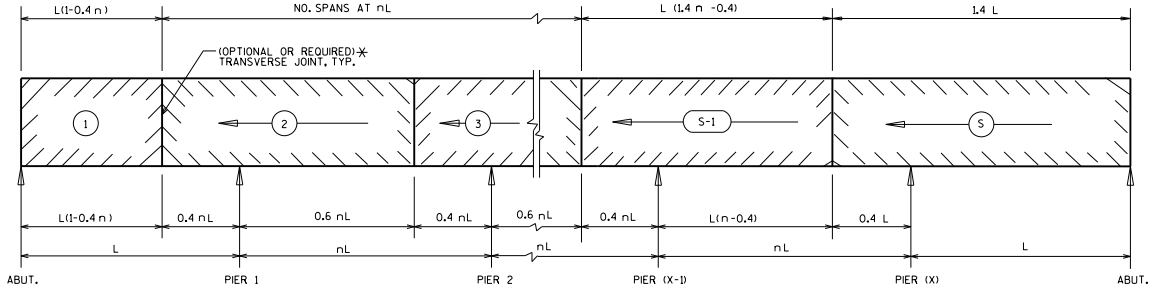
(CONTINOUS STEEL GIRDER - 2 SPANS SHOWN)





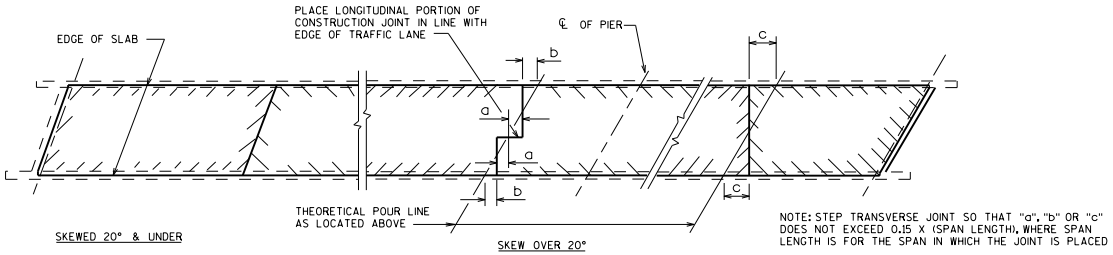
IDEAL DECK POUR SEQUENCE

(CONTINOUS STEEL GIRDER - 3 SPANS SHOWN)



IDEAL DECK POUR SEQUENCE

(CONTINOUS STEEL GIRDER - ANY NUMBER OF SPANS SHOWN)



PLAN VIEW - SHOWING PLACEMENT OF TRANSVERSE CONSTRUCTION JOINTS

NOTES

THE RATE OF PLACING CONCRETE SHALL EQUAL OR EXCEED ½ SPAN LENGTH PER HOUR BUT NEED NOT EXCEED 100 CU. YDS. PER HOUR. (REQUIRED ONLY FOR CONTINUOUS STEEL GIRDERS.)

IF OPTIONAL JOINTS ARE PROVIDED, TWO OR MORE SEQUENTIAL POURS MAY BE COMBINED AND PLACED IN ONE CONTINUOUS OPERATION. TWO OR MORE ALTERNATE DECK POURS (E.G. 1 & 3) MAY BE PLACED ON THE SAME DAY.

THE NEXT DECK POUR CAN BE MADE NO LESS THAN 72 HOURS AFTER THE PREVIOUS POUR.

THE CONTRACTOR MAY SUBMIT AN ALTERNATE POURING SEQUENCE SUBJECT TO THE APPROVAL OF THE STRUCTURES DESIGN SECTION.
(NOTE: APPLICABLE WHEN OPTIONAL TRANSVERSE CONTRUCTION JOINTS ARE SHOWN)

THE CONTRACTOR SHALL POUR THE ENTIRE DECK PER THE DECK POUR SEQUENCE IF REQUIRED TRANSVERSE CONSTRUCTION JOINTS ARE SHOWN ON THE PLANS. THE CONTRACTOR MAY SUBMIT AN ALTERNATE POURING SEQUENCE SUBJECT TO THE APPROVAL OF THE STRUCTURES DESIGN SECTION.
(NOTE: REQUIRED WHEN REQUIRED TRANSVERSE CONTRUCTION JOINTS ARE SHOWN)

DESIGNER NOTES

✳ THE DESIGNER SHALL DETERMINE IF TRANSVERSE JOINTS ARE OPTIONAL OR REQUIRED.

OPTIONAL TRANSVERSE CONSTRUCTION JOINTS SHALL BE DETAILED ON THE PLANS TO LIMIT THE VOLUME OF POUR TO < 600 CU. YDS. IN URBAN AREAS AND < 300 CU. YDS. IN OTHER AREAS. GENERALLY FOR STEEL GIRDER SUPERSTRUCTURES LOCATE THE TRANSVERSE JOINTS AT THE 0.6 POINT (CONCRETE IN 60% OF SPAN) AND FOR PRESTRESS GIRDER SUPERSTRUCTURES LOCATE JOINTS NEAR THE 0.75 POINT. (CONCRETE IN 75% OF SPAN) CONSIDER CUT-OFF POINTS OF CONTINUITY REINFORCING STEEL WHEN LOCATING JOINTS FOR PRESTRESS GIRDER SUPERSTRUCTURES. LOCATION OF JOINTS IN STEEL GIRDER SUPERSTRUCTURES MAY VARY IF DEFLECTIONS ARE INFLUENCED BY IN SPAN HINGES OR UNUSUAL SPAN LENGTH RATIOS. CHECK WITH THE STRUCTURES DEVELOPMENT SECTION FOR ADDITIONAL INFORMATION.

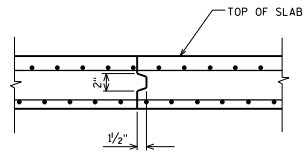
REQUIRED TRANSVERSE CONSTRUCTION JOINTS SHALL BE DETAILED ON THE PLANS ONLY WHEN REQUIRED BY DESIGN. SEQUENTAIL STAGES ARE DISCUSSED IN SECTION 24.12.2. ALL PLACEMENT REQUIREMENTS SHALL BE NOTED ON THE PLANS.

DETAIL TRANSVERSE CONSTRUCTION JOINTS 5'-0" FROM ℄ OF IN SPAN HINGES. (ONE ON EACH SIDE OF HINGE) THE CONCRETE BETWEEN THESE JOINTS SHOULD BE THE LAST POUR PLACED.

WHEN THE WIDTH OF SLAB IS GREATER THAN 90 FEET, A LONGITUDINAL CONSTRUCTION JOINT SHALL BE DETAILED. LOCATE LONGITUDINAL CONSTRUCTION JOINT ALONG EDGE OF LANE LINE AND AT LEAST 6 INCHES FROM EDGE OF TOP FLANGE OF GIRDER.

FOR GRADES OVER 3% THE PREFERRED DIRECTION OF POUR IS UPHILL.

AN ALTERNATE POURING SEQUENCE IS TO POUR THE DL POSITIVE MOMENT AREAS AND THEN THE DL NEGATIVE MOMENT AREAS. THE SEQUENCE MAY BE STARTED ANYWHERE ON THE BRIDGE.



SECTION THRU TRANSVERSE OR LONGITUDINAL JOINT

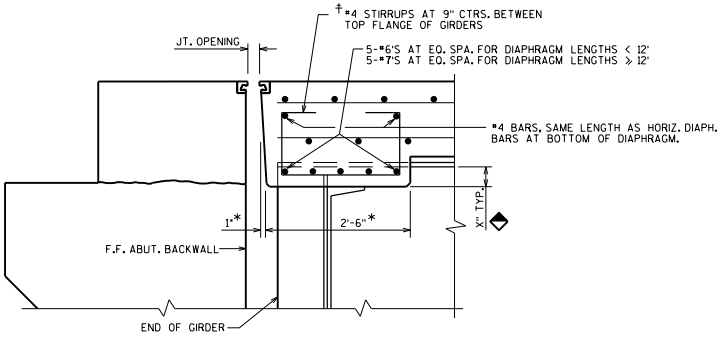
SLAB POURING SEQUENCE

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

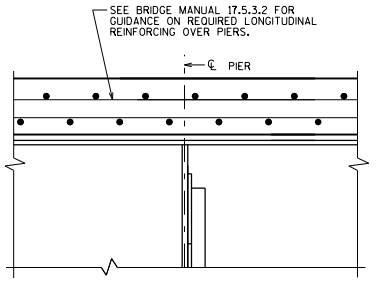
DATE: 7-17

STANDARD 24.11

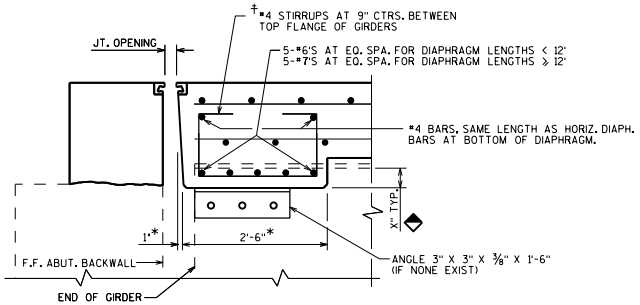


SECTION THRU EXPANSION END

DIAPHRAGM TO EXTEND TO GIRDER WEB
(SEE PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END FOR TYPICAL EXTENTS)

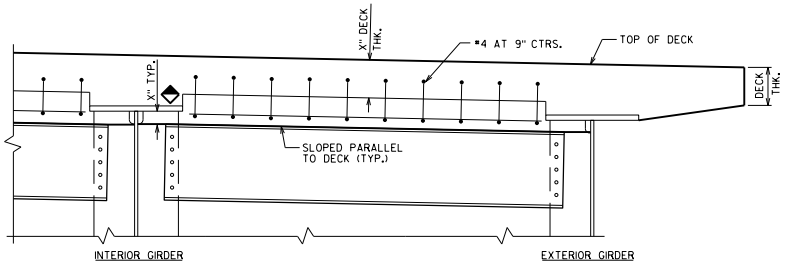


SECTION AT PIER



SECTION THRU EXPANSION END OF NEW DECK SHOWING EXISTING STEEL GIRDER WITHOUT EXISTING STEEL DIAPHRAGM

(SEE STD. 40.04 FOR ADDITIONAL DETAILS)



PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END

NOTES

FOR REHABILITATION PROJECTS:

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36. BOLTS ARE ¾" DIA. ALL BOLTS, NUTS AND WASHERS SHALL BE ASTM A325 TYPE 1.

ALL SUPPORT ANGLES 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 OVERSIZED 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.

ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "CONCRETE MASONRY BRIDGES".

ALL REPLACEMENT PAVING BLOCK DIMENSIONS SHALL MATCH EXISTING PLAN DIMENSIONS UNLESS DESIGNER DETERMINES OTHERWISE.

DESIGNER NOTE

◆ 3" MINIMUM. USE 3" UNLESS INCREASED TO ACCOMMODATE LARGE EXPANSION DEVICES.

LEGEND

† BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ℄ GIRDERS.

* DIMENSION IS TAKEN NORMAL TO ℄ ABUTMENT

STEEL GIRDER SLAB & SUPERSTRUCTURE DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 24.12

LENGTH OF PLATE "C"	TOTAL LOAD KIPS	PLATE C			PLATE D			HEIGHT FEET
		X	Y	Z	X	Y	Z	
10"	215	5"	2 3/8"	10"	8"	1 3/4"	1'-7"	0.354
12"	260	5"	2 3/8"	1'-0"	9"	1 3/4"	1'-9"	0.354
	280	5"	2 3/8"	1'-0"	10"	2 3/8"	1'-9"	0.406
14"	280	5"	1 5/16"	1'-2"	9"	1 3/4"	1'-11"	0.318
	335	5"	2 3/8"	1'-2"	11"	2 3/8"	1'-11"	0.406
	385	5"	2 3/8"	1'-2"	1'-1"	2 7/8"	1'-11"	0.448
	410	5"	2 3/8"	1'-2"	1'-3"	2 7/8"	2'-0"	0.448
16"	275	5"	1 5/16"	1'-4"	8"	1 3/4"	2'-1"	0.318
	330	5"	1 5/16"	1'-4"	10"	2 3/8"	2'-1"	0.370
	390	5"	2 3/8"	1'-4"	1'-0"	2 3/8"	2'-1"	0.406
	465	5"	2 3/8"	1'-4"	1'-2"	2 7/8"	2'-2"	0.448
	490	5"	2 3/8"	1'-4"	1'-4"	3 3/8"	2'-2"	0.490
18"	325	5"	1 5/16"	1'-6"	9"	1 3/4"	2'-3"	0.318
	390	5"	1 5/16"	1'-6"	11"	2 3/8"	2'-3"	0.370
	465	5"	2 3/8"	1'-6"	1'-1"	2 7/8"	2'-4"	0.448
	495	5"	2 3/8"	1'-6"	1'-2"	2 7/8"	2'-4"	0.448
	560	5"	2 3/8"	1'-6"	1'-4"	3 3/8"	2'-4"	0.490
20"	350	5"	1 5/16"	1'-8"	9"	1 3/4"	2'-5"	0.318
	380	5"	1 5/16"	1'-8"	10"	2 3/8"	2'-5"	0.370
	460	5"	2 3/8"	1'-8"	1'-0"	2 3/8"	2'-6"	0.406
	530	5"	2 3/8"	1'-8"	1'-2"	2 7/8"	2'-6"	0.448
	600	5"	2 3/8"	1'-8"	1'-4"	3 3/8"	2'-6"	0.490
	640	5"	2 3/8"	1'-8"	1'-6"	3 7/8"	2'-6"	0.531
22"	405	5"	1 5/16"	1'-10"	10"	2 3/8"	2'-7"	0.370
	490	5"	1 5/16"	1'-10"	1'-0"	2 3/8"	2'-8"	0.370
	565	5"	2 3/8"	1'-10"	1'-2"	2 7/8"	2'-8"	0.448
	635	5"	2 3/8"	1'-10"	1'-4"	3 3/8"	2'-8"	0.490
	705	5"	2 3/8"	1'-10"	1'-6"	3 7/8"	2'-8"	0.531
	720	5"	2 3/8"	1'-10"	1'-8"	3 7/8"	2'-8"	0.531

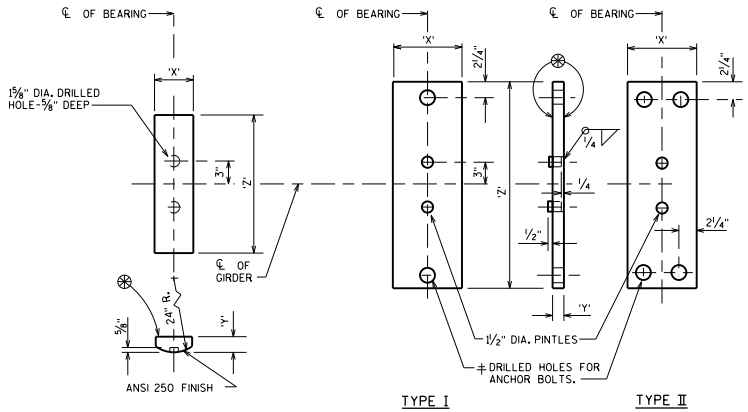
ANCHOR BOLT NOTES

FOR SPAN LENGTHS UP TO 100'-0":
USE A TYPE I MASONRY PLATE "D" WITH
(2) - 1 1/4" DIA. x 1'-5" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS FROM 100'-0" UP TO 150'-0":
USE A TYPE I MASONRY PLATE "D" WITH
(2) - 1 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

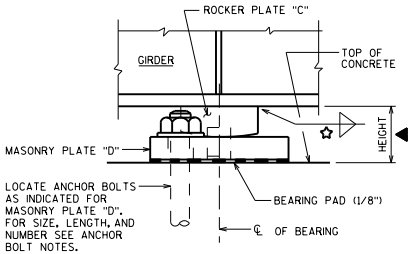
FOR SPAN LENGTHS GREATER THAN 150'-0":
USE A TYPE II MASONRY PLATE "D" WITH
(4) - 1 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.

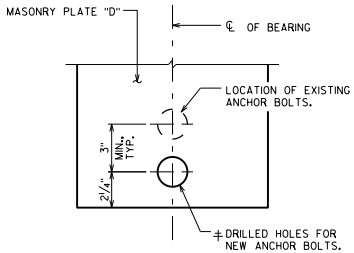


ROCKER PLATE "C"

MASONRY PLATE "D"



FIXED BEARING ASSEMBLY
(SEE "DESIGNER NOTES" FOR BEARING REPLACEMENTS)



MASONRY PLATE "D"
BEARING REPLACEMENTS

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT ℄ OF GIRDER AND ℄ OF BEARING.

IN LIEU OF USING SHIM PLATES, FABRICATOR MAY INCREASE THICKNESS OF MASONRY PLATE "D" BY THE SHIM PLATE THICKNESS.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

ALL FINISHED SURFACES SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS.

ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. PROJECT ANCHOR BOLTS, MASONRY PLATE "D" THICKNESS + 2 1/4", ABOVE TOP OF CONCRETE.

ALL MATERIAL IN BEARINGS, INCLUDING SHIM PLATES, BUT EXCLUDING PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

STEEL PINTLES SHALL CONFORM TO ASTM A449 OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ALL MATERIAL IN TYPE "A" BEARINGS, INCLUDING SHIM PLATES AND BEARING PADS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES FIXED B-_-_", EACH.

CHAMFER TOP OF PINTLES 1/8". DRILL HOLES FOR ALL PINTLES IN MASONRY PLATE "D" FOR A DRIVING FIT.

PROVIDE 1/8" THICK BEARING PAD THE SAME SIZE AS MASONRY PLATE "D" FOR EACH BEARING.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 36, OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C.

ROCKER PLATE "C" SHALL BE SHOP PAINTED WITH A WELDABLE PRIMER.

MASONRY PLATE "D" SHALL BE GALVANIZED.

PLACE SHIM PLATES BETWEEN BEARING PAD AND MASONRY PLATE "D". PLATES SHALL HAVE 'X' AND 'Z' DIMENSIONS THAT MATCH MASONRY PLATE "D".

‡ DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 3/8" LARGER THAN ANCHOR BOLT.

❋ FINISH THESE SURFACES TO ANSI 250 IF 'Y' DIMENSION IS GREATER THAN 2".

DESIGNER NOTES

HEIGHT OF BEARINGS GIVEN IN TABLE INCLUDES 1/8" BEARING PAD.

DETAIL SHIM PLATES AS DESCRIBED IN NOTES ON STANDARD 24.02.

REFER TO THE DETAILS BELOW FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 3% AND ALSO CLEARANCE REQUIREMENTS.

✩ FOR WELD SIZE, REFER TO STANDARD 24.02

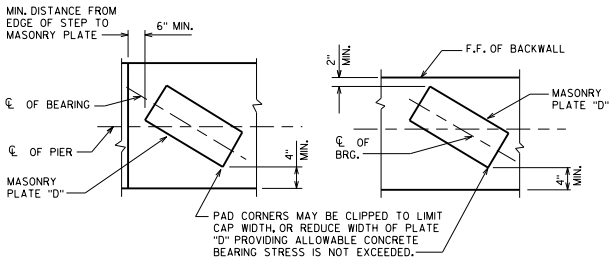
▲ ADJUST HEIGHT IF BEVELED ROCKER PLATE "C" IS USED.

FOR BEARING REPLACEMENTS, DESIGNER SHALL UTILIZE A WIDER BEARING THAN THE EXISTING GIRDER BOTTOM FLANGE WIDTH TO ALLOW FOR FIELD WELDING OF THE EDGE OF THE BOTTOM FLANGE TO THE TOP OF PLATE "C". SEE STANDARD 40.08 FOR DETAILS.

CALCULATE THE REACTION AT THE BEARINGS DUE TO "TOTAL LOADS". USE THE AASHTO LRFD SERVICE I LOAD COMBINATION. CONSIDER ONLY DEAD LOAD (DC + DW) AND HL-93 LIVE LOADS (LL), INCLUDING A 33% DYNAMIC LOAD ALLOWANCE (IM).

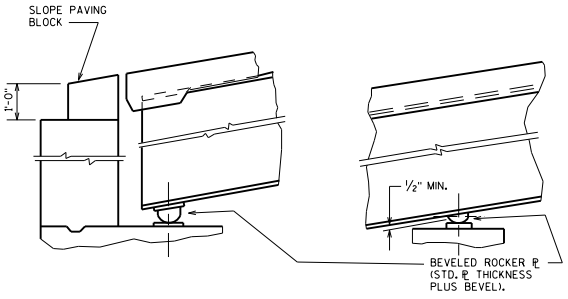
THE VALUES IN THE TABLES ARE THE BEARING CAPACITIES FOR "TOTAL LOAD" (DC + DW + (LL + IM)).

SELECT A BEARING THAT HAS A CAPACITY GREATER THAN OR EQUAL TO THE CALCULATED REACTION FOR "TOTAL LOADS".



AT SKEWED PIER AT SKEWED ABUTMENTS

CLEARANCE DIAGRAM



AT EXPANSION BRG. AT FIXED BRG.

BEVELED ROCKERS WITH GRADES GREATER THAN 3%

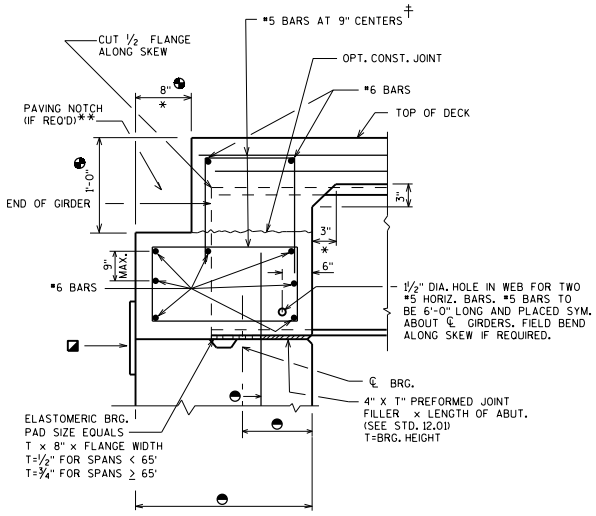
FIXED BEARING DETAILS TYPE 'A' - STEEL GIRDERS

BUREAU OF STRUCTURES

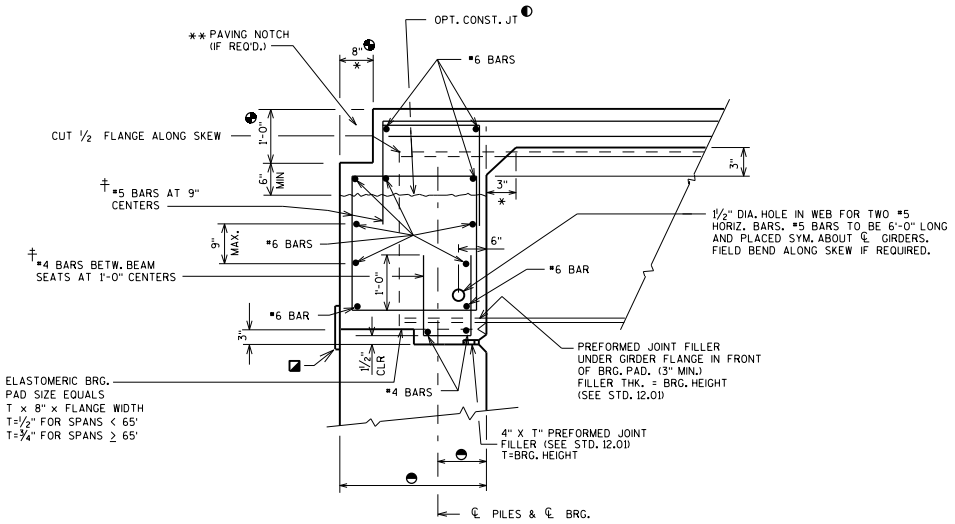
APPROVED: Bill Oliva

DATE: 1-19

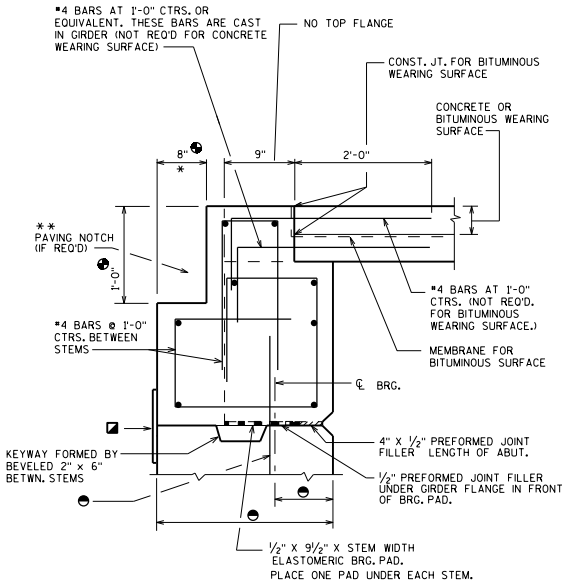
STANDARD 27.02



STEEL GIRDER WITH FIXED SEAT



STEEL GIRDER WITH SEMI-EXPANSION SEAT



PRECAST DOUBLE TEE OR MULTI-STEM SECTION

NOTES

FOR SKEWED STRUCTURES CAST END OF PRECAST TEE ALONG SKEW.

* DIMENSION IS TAKEN NORMAL TO ℄ SUBSTRUCTURE UNITS.

◪ 1'-6" RUBBERIZED MEMBRANE WATERPROOFING

‡ BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ℄ GIRDERS.

DESIGNER NOTES

SEE STANDARD 19.55 FOR PRESTRESSED BOX GIRDER BEARING DETAILS.

◐ THE USE OF THIS OPT. CONST. JOINT IS NOT RECOMMENDED FOR SKEWS OVER 15° WHEN LARGE DEADLOAD END ROTATION IS ANTICIPATED.

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

◔ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

◓ SEE STD. 12.01

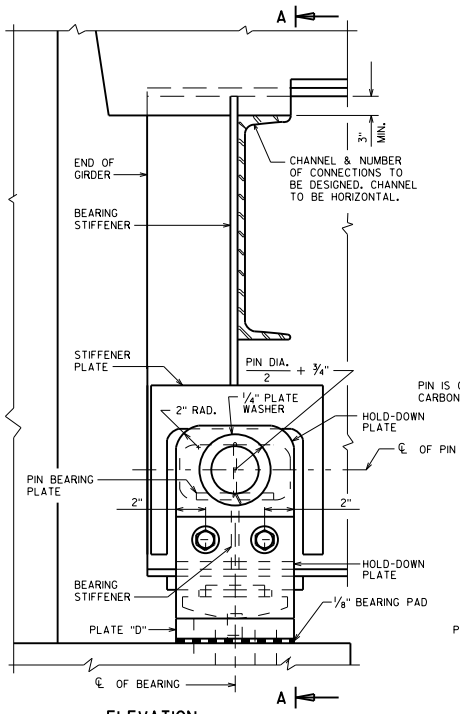
BRG. DETAILS FOR STEEL GDRS. AND PRECAST UNITS ON A1 ABUTMENTS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

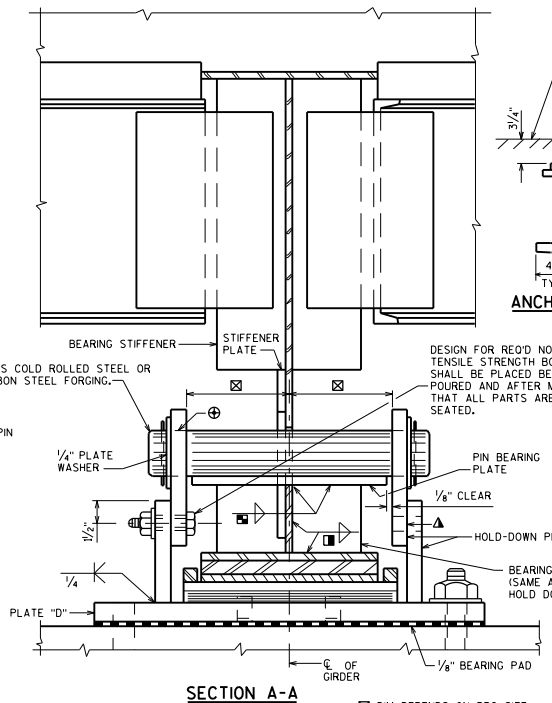
APPROVED: *Bill Oliva*

DATE: 7-18

STANDARD 27.05



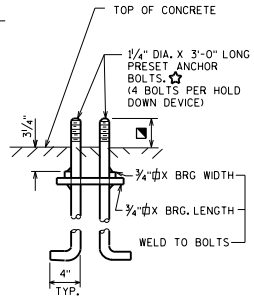
ELEVATION



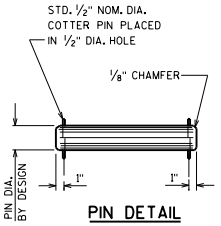
SECTION A-A

PERMANENT HOLD DOWN DEVICE

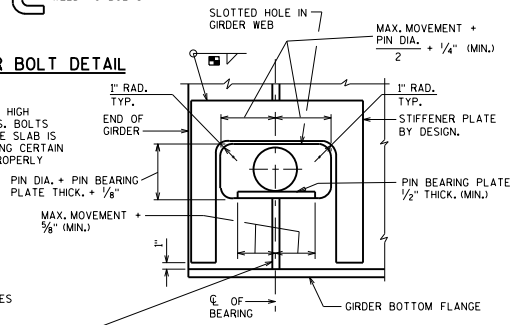
⊠ DIM. DEPENDS ON BRG. SIZE.



ANCHOR BOLT DETAIL



PIN DETAIL



GIRDER DETAIL

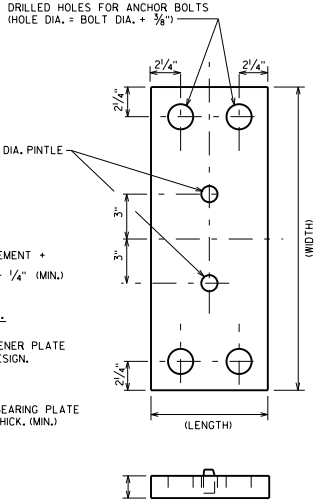


PLATE "D"

WHEN REQUIRED, HOLD DOWN DEVICES SHALL BE PLACED SYMMETRICALLY ABOUT LONGITUDINAL ℄ OF FRAMING PLAN. MAXIMUM SPACING OF HOLD DOWNS SHALL BE AT ALTERNATE GIRDERS. HOLD DOWN DEVICE TO BE DESIGNED FOR MINIMUM UPLIFT CAPACITY OF 20 KIPS.

NOTES (PERMANENT HOLD DOWN DEVICE)

ALL STRUCTURAL STEEL PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS

ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. CHAMFER TOP OF ANCHOR BOLTS PRIOR TO THREADING.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C.

THE MATERIAL FOR THE HOLD-DOWN PLATES SHALL CONFORM TO ASTM A709 GRADE 50W.

ALL MATERIAL WELDED TO THE GIRDERS, WHICH INCLUDES BEARING STIFFENERS, STIFFENER PLATE, AND PIN BEARING PLATE, SHALL MATCH THE STEEL REQUIREMENTS OF THE WEB AT THAT LOCATION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 36 OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ALL MATERIAL IN HOLD DOWN DEVICES, WHICH INCLUDES HOLD-DOWN PLATES, HIGH TENSILE STRENGTH BOLTS, PINS AND ANCHOR BOLTS, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B-_-_".

ALL MATERIAL WELDED TO THE GIRDERS, WHICH INCLUDES BEARING STIFFENERS, STIFFENER PLATE, AND PIN BEARING PLATE, SHALL BE INCLUDED IN THE BID ITEM USED FOR THE STEEL GIRDER QUANTITIES.

☆ FOR REPLACEMENT BEARINGS, ANCHOR BOLTS SHALL BE 1 1/4" DIAMETER X 3'-0" LONG AND FULLY THREADED ADHESIVE ANCHORS. ANCHOR BOLTS SHALL BE PAID FOR AS "ADHESIVE ANCHORS 1 1/2-INCH". EMBED IN CONCRETE AS DETAILED.

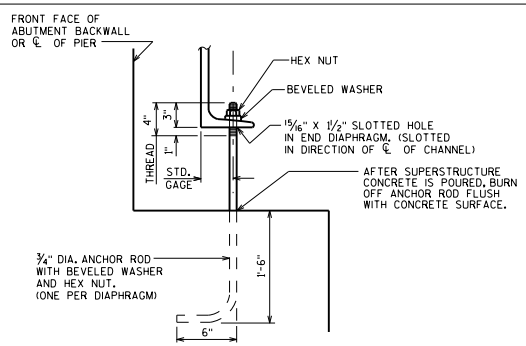
◮ SHOP DRILL HOLES IN HOLD-DOWN PLATE ATTACHED TO PLATE "D". FIELD DRILL HOLES IN UPPER HOLD-DOWN PLATE AFTER ALIGNING IN THE FIELD.

◪ SEE STANDARD 24.02 FOR TABLE OF FILLET WELD SIZES.

◨ SEE STANDARD 24.02 FOR WELD DETAILS SHOWING BEARING STIFFENER CONNECTION TO WEB AND FLANGE.

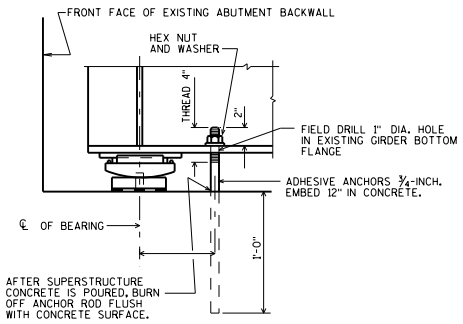
◹ PROJECT ANCHOR BOLTS, PLATE "D" THICKNESS + 2 1/4", ABOVE TOP OF CONCRETE.

⊕ HOLES FOR PIN IN HOLD-DOWN PLATES AND PLATE WASHERS SHALL BE AS STATED IN STANDARD SPECIFICATION 506.3.17.



ELEVATION - NEW CONSTRUCTION

TEMPORARY HOLD DOWN DEVICES SHALL BE PLACED AT THAT END OF ALL CONTINUOUS STEEL GIRDER UNITS WHERE THE SLAB POUR TERMINATES, EXCEPT WHERE PERMANENT HOLD DOWN DEVICES ARE PLACED AT THIS LOCATION. LOCATE 1'-6" (NORMAL) OFF ℄ OF GIRDER. TO BE PAID FOR AS "STRUCTURAL CARBON STEEL".



ELEVATION - DECK REPLACEMENT

PLACE ONE ANCHOR ROD PER GIRDER AT ABUTMENT WHERE SLAB POUR TERMINATES. LOCATE 4" (NORMAL) OFF ℄ OF GIRDER. ANCHOR ROD, NUT, WASHER, AND DRILLED HOLE IN GIRDER FLANGE SHALL BE PAID FOR AS "ADHESIVE ANCHORS 3/4-INCH".

TEMPORARY HOLD DOWN DEVICE

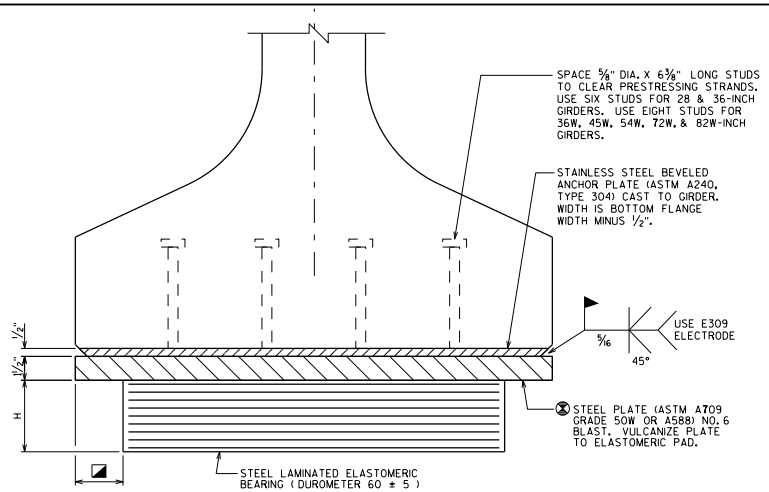
HOLD DOWN DEVICES

BUREAU OF STRUCTURES

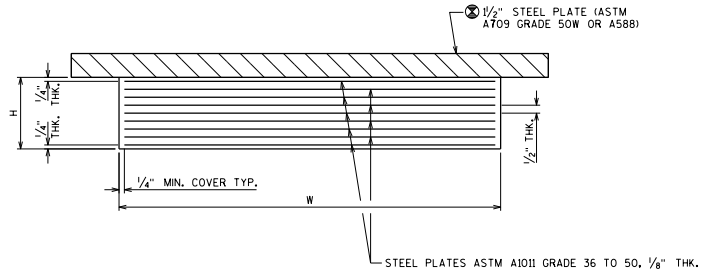
APPROVED: Bill Oliva

DATE: 7-16

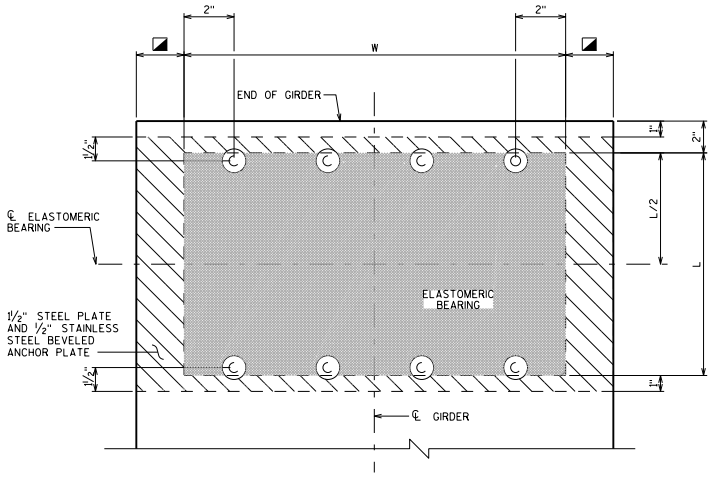
STANDARD 27.06



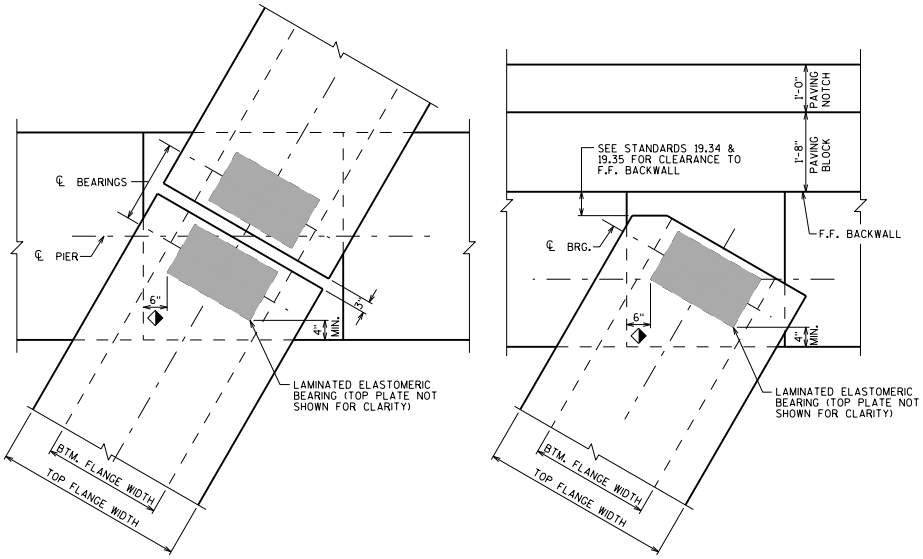
END VIEW



SECTION THRU ELASTOMERIC BEARING



PLAN VIEW



AT SKEWED PIER

AT SKEWED ABUTMENTS

DETAIL SHOWN IS FOR A CONTINUOUS DECK AT AN EXPANSION PIER. IF PIER CAP WIDTH BECOMES EXCESSIVE, CONSIDER USING STEEL BEARINGS.

CLEARANCE DIAGRAM

DESIGNER NOTES

SEE CHAPTER 40 STANDARDS FOR USE OF ELASTOMERIC BEARINGS ON NEW AND REHABILITATED STEEL GIRDER BRIDGES.

FOR ALL NEW BRIDGES, THE STEEL TOP PLATE SHALL HAVE A MINIMUM THICKNESS OF 1½".

FOR BEARINGS USED IN BEARING REPLACEMENT PROJECTS, THE STEEL TOP PLATE THICKNESS MAY BE REDUCED (TO A MINIMUM OF ¾") TO MATCH THE OVERALL EXISTING BEARING HEIGHT. WHEN THE THICKNESS IS REDUCED, THE FOLLOWING NOTE SHALL BE LOCATED ON THE PLANS:

"WELDING PROCEDURES SHALL BE ESTABLISHED BY THE CONTRACTOR TO RESTRICT THE MAXIMUM TEMPERATURE REACHED BY SURFACES IN CONTACT WITH ELASTOMER TO 200°F (93°C). TEMPERATURES SHALL BE CONTROLLED BY TEMPERATURE INDICATING WAX PENCILS OR OTHER SUITABLE MEANS APPROVED BY THE ENGINEER."

DO NOT INCLUDE PRESTRESSED GIRDER SHRINKAGE WHEN DESIGNING BEARINGS FOR BRIDGE REHABILITATION PROJECTS.

◪ 3" FOR 36W", 45W", 54W", 72W" & 82W"
1" FOR 28" & 36"

◈ MIN. DISTANCE FROM EDGE OF PIER/ABUTMENT. STEP TO LAMINATED ELASTOMERIC BEARING.

⊗ TAPER THE TOP PLATE IF THE GIRDER ANGLE RELATIVE TO HORIZONTAL IS GREATER THAN 0.01 RADIANS OR IF THIS ANGLE MULTIPLIED BY THE TOP PLATE LENGTH IS 1/8" OR MORE. TO DETERMINE THIS ANGLE, ADD THESE TWO VALUES:
- LONGITUDINAL GRADE OF GIRDER
- CAMBER EFFECT = 4(RC)/L, WHERE:
  RC = RESIDUAL CAMBER (INCHES)
  L = GIRDER LENGTH (INCHES)

NOTES

BEARINGS SHALL NOT BE PLACED AT A TEMPERATURE GREATER THAN 85° F.

ALL MATERIAL USED FOR BEARINGS SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING PADS ELASTOMERIC LAMINATED", EACH.

ALL STRUCTURAL STEEL PLATES SHALL BE FLAT ROLLED WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

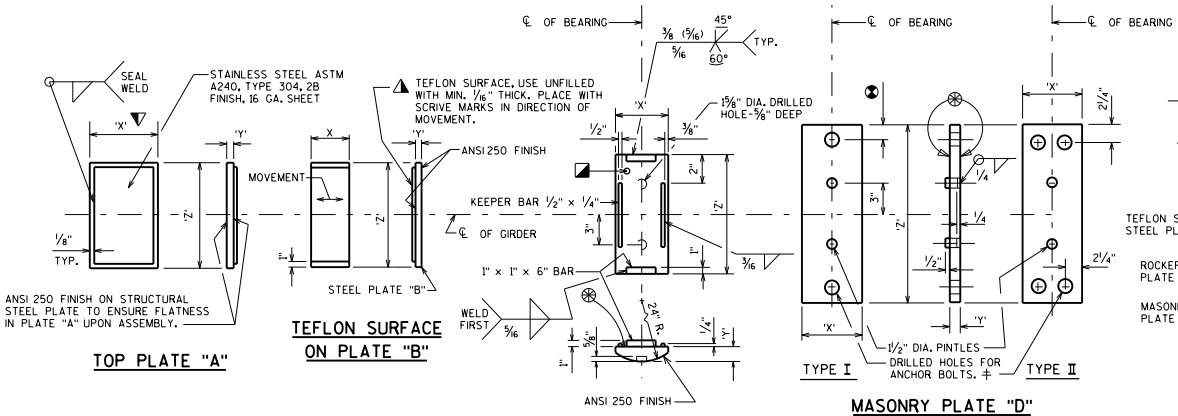
ELASTOMERIC BEARINGS FOR PRESTRESSED CONCRETE GIRDERS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 27.07



10" BEARING

TOTAL LOAD (KIPS)	PLATE A			PLATE B			PLATE C			PLATE D			HEIGHT FEET
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
100	9"	5/8"	10"	5"	1/2"	10"	7"	1 7/16"	1'-0 1/4"	8"	1 1/2"	1'-8"	0.360
180	1'-1"	5/8"	10"	9"	1/2"	10"	11"	2 3/8"	1'-0 1/4"	8"	1 1/2"	1'-8"	0.438
260	1'-5"	5/8"	10"	1'-1"	1/2"	10"	1'-3"	3 3/8"	1'-0 1/4"	11"	2"	1'-8"	0.604

12" BEARING

TOTAL LOAD (KIPS)	PLATE A			PLATE B			PLATE C			PLATE D			HEIGHT FEET
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
125	9"	5/8"	1'-0"	5"	1/2"	1'-0"	7"	1 7/16"	1'-2 1/4"	8"	1 1/2"	1'-10"	0.360
175	11"	5/8"	1'-0"	7"	1/2"	1'-0"	9"	1 15/16"	1'-2 1/4"	8"	1 1/2"	1'-10"	0.401
275	1'-3"	5/8"	1'-0"	11"	1/2"	1'-0"	1'-1"	2 7/8"	1'-2 1/4"	11"	2"	1'-10"	0.521

14" BEARING

TOTAL LOAD (KIPS)	PLATE A			PLATE B			PLATE C			PLATE D			HEIGHT FEET
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
210	11"	5/8"	1'-2"	7"	1/2"	1'-2"	9"	1 5/8"	1'-4 1/4"	8"	1 1/2"	2'-0"	0.401
375	1'-5"	5/8"	1'-2"	1'-1"	1/2"	1'-2"	1'-3"	3 7/8"	1'-4 1/4"	1'-2"	2 7/8"	2'-0"	0.677
500	1'-9"	5/8"	1'-2"	1'-5"	1/2"	1'-2"	1'-7"	4 7/8"	1'-4 1/4"	1'-5"	3 3/8"	2'-1"	0.802

16" BEARING

TOTAL LOAD (KIPS)	PLATE A			PLATE B			PLATE C			PLATE D			HEIGHT FEET
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
245	11"	5/8"	1'-4"	7"	1/2"	1'-4"	9"	1 5/8"	1'-6 1/4"	8"	1 1/2"	2'-2"	0.401
370	1'-3"	5/8"	1'-4"	11"	1/2"	1'-4"	1'-1"	2 7/8"	1'-6 1/4"	1'-0"	2 3/8"	2'-3"	0.552
525	1'-7"	5/8"	1'-4"	1'-3"	1/2"	1'-4"	1'-5"	3 7/8"	1'-6 1/4"	1'-4"	3 3/8"	2'-3"	0.719
575	1'-9"	5/8"	1'-4"	1'-5"	1/2"	1'-4"	1'-7"	4 7/8"	1'-6 1/4"	1'-6"	3 7/8"	2'-3"	0.844

18" BEARING

TOTAL LOAD (KIPS)	PLATE A			PLATE B			PLATE C			PLATE D			HEIGHT FEET
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
280	11"	5/8"	1'-6"	7"	1/2"	1'-6"	9"	1 5/8"	1'-8 1/4"	9"	2"	2'-4"	0.443
360	1'-1"	5/8"	1'-6"	9"	1/2"	1'-6"	11"	2 3/8"	1'-8 1/4"	11"	2"	2'-4"	0.479
600	1'-7"	5/8"	1'-6"	1'-3"	1/2"	1'-6"	1'-5"	3 7/8"	1'-8 1/4"	1'-5"	3 3/8"	2'-5"	0.719
650	1'-11"	5/8"	1'-6"	1'-7"	1/2"	1'-6"	1'-9"	4 7/8"	1'-8 1/4"	1'-10"	3 7/8"	2'-5"	0.844

20" BEARING

TOTAL LOAD (KIPS)	PLATE A			PLATE B			PLATE C			PLATE D			HEIGHT FEET
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
225	9"	5/8"	1'-8"	5"	1/2"	1'-8"	7"	1 7/16"	1'-10 1/4"	8"	1 1/2"	2'-6"	0.360
315	11"	5/8"	1'-8"	7"	1/2"	1'-8"	9"	1 15/16"	1'-10 1/4"	9"	2"	2'-6"	0.443
495	1'-3"	5/8"	1'-8"	11"	1/2"	1'-8"	1'-1"	2 7/8"	1'-10 1/4"	1'-1"	2 7/8"	2'-7"	0.594
675	1'-7"	5/8"	1'-8"	1'-3"	1/2"	1'-8"	1'-5"	3 7/8"	1'-10 1/4"	1'-6"	3 7/8"	2'-7"	0.760
705	1'-11"	5/8"	1'-8"	1'-7"	1/2"	1'-8"	1'-9"	4 7/8"	1'-10 1/4"	1'-11"	3 7/8"	2'-7"	0.844

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT ℄ OF GIRDER AND ℄ OF BEARING.

⊛ FINISH THESE SURFACES TO ANSI 250 IF 'Y' DIMENSION IS GREATER THAN 2".

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C.

ROCKER PLATE "C" AND MASONRY PLATE "D" SHALL BE GALVANIZED. TOP PLATE "A" AND STEEL PLATE "B" SHALL BE SHOP PAINTED. USE A WELDABLE PRIMER ON TOP PLATE "A". DO NOT PAINT STAINLESS STEEL OR TEFLON SURFACES.

ALL MATERIAL IN BEARINGS, INCLUDING SHIM PLATES, BUT EXCLUDING STAINLESS STEEL SHEET, TEFLON SURFACE, PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

IN LIEU OF USING SHIM PLATES, FABRICATOR MAY INCREASE THICKNESS OF TOP PLATE "A" OR MASONRY PLATE "D" BY THE SHIM PLATE THICKNESS.

⊛ DIMENSION IS 2" WHEN 1 1/4" DIA. ANCHOR BOLTS ARE USED AND 2 1/4" WHEN 1 1/2" DIA. ANCHOR BOLTS ARE USED.

ALL MATERIAL IN TYPE "A-T" BEARINGS, INCLUDING SHIM PLATES AND BEARING PADS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B-__-__", EACH.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

ALL FINISHED SURFACES SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

PROVIDE 1/8" THICK BEARING PAD THE SAME SIZE AS MASONRY PLATE "D" FOR EACH BEARING.

ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. PROJECT ANCHOR BOLTS, MASONRY PLATE "D" THICKNESS + 2 1/4", ABOVE TOP OF CONCRETE.

CHAMFER TOP OF PINTLES 1/8". DRILL HOLES FOR ALL PINTLES IN MASONRY PLATE "D" FOR A DRIVING FIT.

STEEL PINTLES SHALL CONFORM TO ASTM A449 OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 36, OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

PLACE SHIM PLATES BETWEEN BEARING PAD AND MASONRY PLATE "D". PLATES SHALL HAVE 'X' AND 'Z' DIMENSIONS THAT MATCH MASONRY PLATE "D".

◪ PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.

◭ BOND STEEL PLATE "B" AND TEFLON WITH ADHESIVE MATERIAL MEETING THE REQUIREMENTS FOUND IN THE STANDARD SPECIFICATION.

‡ DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 3/8" LARGER THAN ANCHOR BOLT.

AT INSTALLATION, ENSURE STAINLESS STEEL SLIDING FACE OF THE UPPER ELEMENT AND THE TFE SLIDING FACE OF THE LOWER ELEMENT HAVE THE SURFACE FINISH SPECIFIED AND ARE CLEAN AND FREE OF ALL DUST, MOISTURE, OR ANY OTHER FOREIGN MATTER.

DESIGNER NOTES

HEIGHT OF BEARINGS GIVEN IN TABLES INCLUDES 1/8" BEARING PAD, 16 GAGE STAINLESS STEEL SHEET AND 1/16" TEFLON SURFACE.

DETAIL SHIM PLATES AS DESCRIBED IN NOTES ON STANDARD 24.02.

SEE STANDARD 27.02 FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 3% AND ALSO CLEARANCE REQUIREMENTS.

AT ABUTMENTS, WHEN THE 'X' DIMENSION OF PLATE "A" EXCEEDS 11", INCREASE STANDARD DISTANCE FROM ℄ OF BEARING TO END OF GIRDER.

☆ FOR WELD SIZE, REFER TO STANDARD 24.02.

▲ ADJUST HEIGHT IF BEVELED ROCKER PLATE "C" IS USED.

FOR BEARING REPLACEMENTS, DESIGNER SHALL UTILIZE A WIDER BEARING THAN THE EXISTING GIRDER BOTTOM FLANGE WIDTH TO ALLOW FOR FIELD WELDING OF THE EDGE OF THE BOTTOM FLANGE TO THE TOP OF PLATE "C". SEE STANDARD 40.08 FOR DETAILS.

FOR BEARING REPLACEMENTS, SEE STD. 27.02 FOR MINIMUM ANCHOR BOLT CLEARANCE INFORMATION.

▽ DIMENSION 'X' SHOWN FOR TOP PLATE 'A' IS A MINIMUM. PROVIDE ADEQUATE LENGTH TO ENSURE PLATE 'B' IS ALWAYS COVERED FOR ALL EXPECTED MOVEMENTS. SEE STD. 27.10 FOR ADDITIONAL GUIDANCE.

CALCULATE THE REACTIONS AT THE BEARINGS DUE TO "TOTAL LOADS" AND ALSO "DEAD LOADS" ONLY. USE THE AASHTO LRFD SERVICE I LOAD COMBINATION. CONSIDER ONLY DEAD LOAD (DC + DW) AND HL-93 LIVE LOADS (LL), INCLUDING A 33% DYNAMIC LOAD ALLOWANCE (IM).

THE VALUES IN THE TABLES ARE THE BEARING CAPACITIES FOR "TOTAL LOAD" (DC + DW + (LL + IM)). TAKE 60% OF THE VALUES IN THE TABLES TO DETERMINE THE BEARING CAPACITIES FOR "DEAD LOAD" ONLY (DC + DW).

SELECT A BEARING THAT HAS A "TOTAL LOAD" CAPACITY GREATER THAN OR EQUAL TO THE CALCULATED "TOTAL LOAD" REACTION AND ALSO A "DEAD LOAD" CAPACITY GREATER THAN OR EQUAL TO THE CALCULATED "DEAD LOAD" REACTION.

ANCHOR BOLT NOTES

FOR SPAN LENGTHS UP TO 100'-0":
USE A TYPE I MASONRY PLATE "D" WITH (2) - 1 1/4" DIA. x 1'-5" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS FROM 100'-0" UP TO 150'-0":
USE A TYPE I MASONRY PLATE "D" WITH (2) - 1 1/2" DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS GREATER THAN 150'-0":
USE A TYPE II MASONRY PLATE "D" WITH (4) - 1 1/2" DIA. X 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.

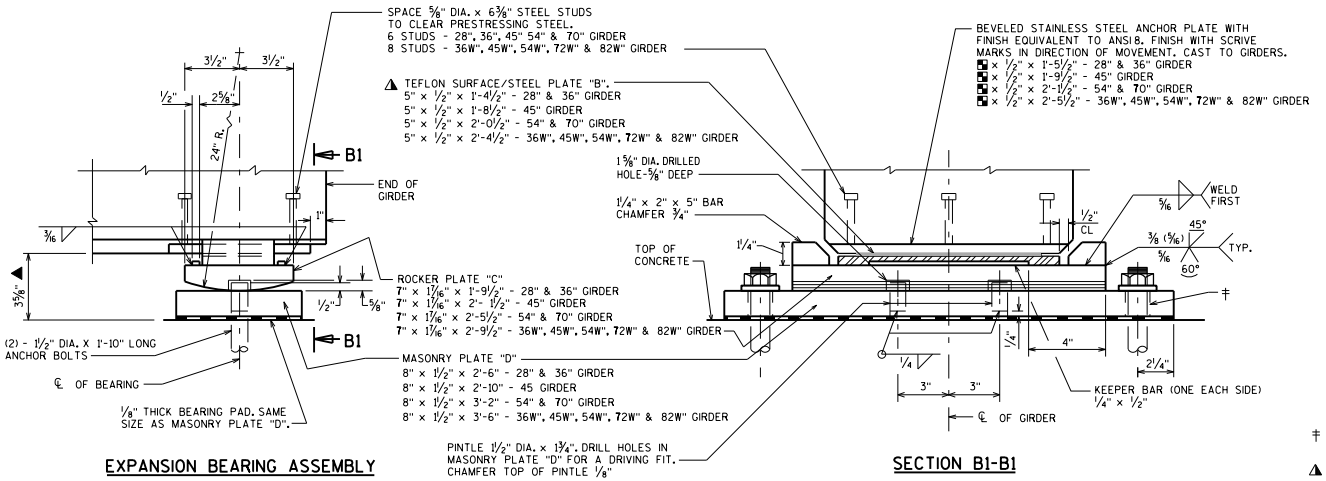
STAINLESS STEEL - TFE EXPANSION BEARING DETAILS TYPE 'A-T'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 27.08



BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT ℄ OF GIRDER AND ℄ OF BEARING.

ALL MATERIAL IN BEARINGS, BUT EXCLUDING STAINLESS STEEL PLATE, TEFLON SURFACE, PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

STAINLESS STEEL PLATE SHALL CONFORM TO ASTM A240, TYPE 304.

STEEL PINTLES SHALL CONFORM TO ASTM A449 OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 36, OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

ALL FINISHED SURFACES SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS.

ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. PROJECT ANCHOR BOLTS, MASONRY PLATE "D" THICKNESS + 2 1/4", ABOVE TOP OF CONCRETE.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

MASONRY PLATE "D", ROCKER PLATE "C", ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS "C". STEEL PLATE "B" SHALL BE SHOP PAINTED. DO NOT PAINT TEFLON SURFACE.

ALL MATERIAL IN "STEEL BEARINGS FOR PRESTRESSED CONCRETE GIRDERS", INCLUDING BEARING PADS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B-_-_", EACH.

‡ DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 3/8" LARGER THAN ANCHOR BOLT.

▲ TEFLON SURFACE, USE UNFILLED WITH MINIMUM 1/16" THICKNESS. PLACE WITH SCRIVE MARKS IN DIRECTION OF MOVEMENT. BOND STEEL PLATE "B" AND TEFLON WITH ADHESIVE MATERIAL MEETING THE REQUIREMENTS FOUND IN THE STANDARD SPECIFICATION.

◪ PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.

AT INSTALLATION, ENSURE STAINLESS STEEL SLIDING FACE OF THE UPPER ELEMENT AND THE TFE SLIDING FACE OF THE LOWER ELEMENT HAVE THE SURFACE FINISH SPECIFIED AND ARE CLEAN AND FREE OF ALL DUST, MOISTURE, AND ANY OTHER FOREIGN MATTER.

DESIGNER NOTES

IF ALL BEARINGS AT A GIVEN SUBSTRUCTURE UNIT ARE FIXED, UTILIZE 1/2" THICK ELASTOMERIC BEARING PADS AND FULL-DEPTH CONCRETE DIAPHRAGMS.

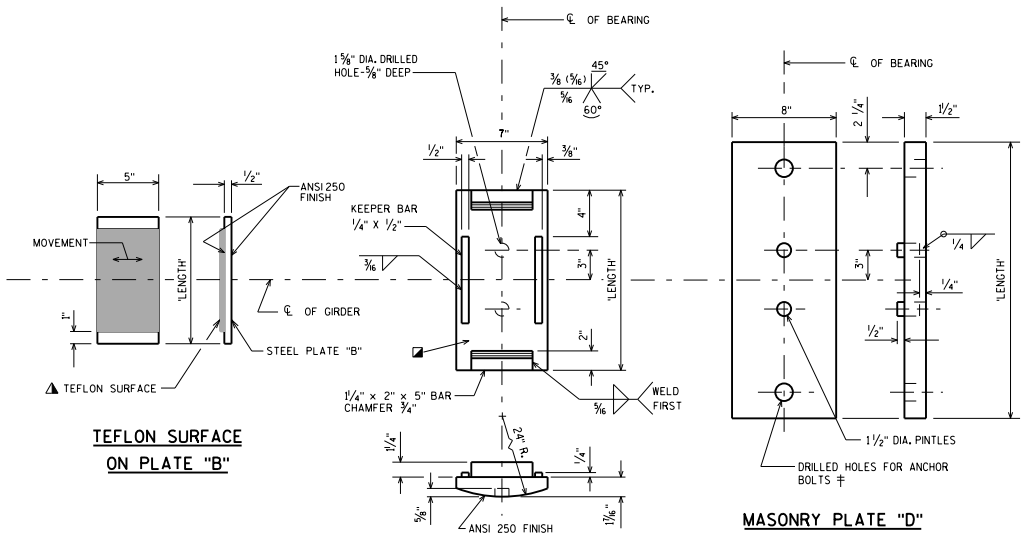
FOR EXPANSION BEARINGS, USE LAMINATED ELASTOMERIC BEARINGS WHENEVER POSSIBLE.

SEE STANDARD 27.02 AND 19.31 FOR CLEARANCE REQUIREMENTS AND STANDARD 27.02 FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 3%.

HEIGHT OF BEARING SHOWN IN "EXPANSION BEARING ASSEMBLY" INCLUDES 1/8" BEARING PAD AND 1/16" TEFLON SURFACE.

▲ ADJUST HEIGHT IF BEVELED ROCKER PLATE "C" IS USED.

◪ ANCHOR PLATE LENGTH TO BE DESIGNED. MINIMUM LENGTH IS 10". SEE STD. 27.10 FOR ADDITIONAL GUIDANCE.



CALCULATE THE REACTIONS AT THE BEARINGS DUE TO "TOTAL LOADS" AND ALSO "DEAD LOADS" ONLY. USE THE AASHTO LRFD SERVICE I LOAD COMBINATION AND CHECK TO SEE IF THE REACTIONS EXCEED THE BEARING CAPACITES IN THE TABLE BELOW. CONSIDER ONLY DEAD LOAD (DC + DW) AND HL-93 LIVE LOADS (LL), INCLUDING A 33% DYNAMIC LOAD ALLOWANCE (IM).

IF EITHER REACTION EXCEEDS ITS CORRESPONDING BEARING CAPACITY, THE BEARING DETAILS AS SHOWN ON THIS STANDARD MUST BE MODIFIED TO INCREASE THE BEARING CAPACITY. IF BEARING DETAILS ARE CHANGED AND ANY PLATE HAS A THICKNESS GREATER THAN 2", THEN PROVIDE AN ANSI 250 FINISH TO TOP AND BOTTOM SURFACE OF THESE PLATES.

	GIRDER SIZE	28" & 36"	45°	54" & 70"	36W", 45W", 54W", 72W" & 82W"
BEARING CAPACITY (KIPS)	TOTAL LOAD (DC+DW+(LL+IM))	180	230	280	330
	DEAD LOAD (DC + DW)	110	140	170	200

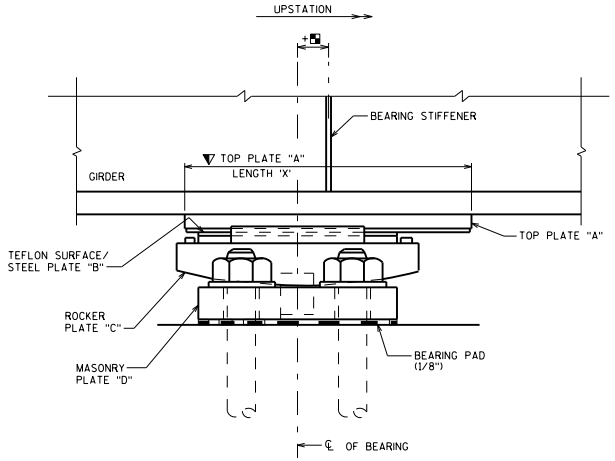
STEEL BEARINGS FOR PRESTRESSED CONCRETE GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

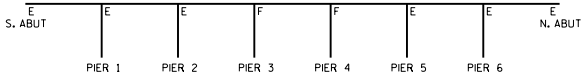
STANDARD 27.09



EXPANSION BEARING ASSEMBLY

FOR STEEL GIRDER

(SHOW ON PLANS)



BELOW SHOWS AN EXAMPLE BEARING OFFSET TABLE BASED ON THE SAMPLE BRIDGE SHOWN ABOVE. SUCH A TABLE SHOULD BE PROVIDED FOR STEEL GIRDER BRIDGES. THE OFFSET TABLE MAY BE OMITTED AT THE DISCRETION OF THE DESIGN ENGINEER IF THE VALUES ARE NEGLIGIBLE.
(THE BRIDGE SCHEMATIC SHOULD NOT BE SHOWN ON THE PLANS)

°F	S. ABUT	PIER 1	PIER 2	PIER 5	PIER 6	N. ABUT
30	0.7	0.5	0.3	-0.3	-0.5	-0.7
45	0	0	0	0	0	0
60	-0.7	-0.5	-0.3	0.3	0.5	0.7
75	-1.6	-1.1	-0.7	0.7	1.1	1.6
90	-2.4	-1.7	-1.0	1.0	1.7	2.4

BEARING OFFSET TABLE

ALL DIMENSIONS IN INCHES
AMBIENT TEMPERATURE DURING GIRDER INSTALLATION

NOTES

FOR STEEL GIRDER BEARINGS:
USE TEMPERATURE SETTING TABLE, RATHER THAN CENTERING BEARINGS BENEATH BEARING STIFFENERS FOR ALL TEMPERATURES.

FOR PRESTRESSED GIRDER BEARINGS:
PLACE BEARINGS AS SHOWN ON THE SUBSTRUCTURE PLAN, PROVIDING ADJUSTMENT FOR SUBSTRUCTURE LOCATION DISCREPANCIES. PLACE EACH GIRDER CENTERED BETWEEN ITS GIVEN BEARINGS.

DESIGNER NOTES

THIS STANDARD SHOULD ONLY BE USED FOR STEEL BEARINGS.

▼ TOP PLATE "A" FOR STEEL GIRDER BEARINGS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT AND CONSTRUCTION TOLERANCE. (USE GREATER OF VALUE FROM PROCEDURE BELOW OR SIZE FROM STANDARD 27.08).

PROCEDURE FOR SIZING TOP PLATE "A":

½ TEFLON PLATE "B" LENGTH 'X'
+ THERMAL MOVEMENT (USE 60-(-30)=90 DEGREES)
+ 1" CONSTRUCTION TOLERANCE
= ½ TOP PLATE "A" LENGTH (DOUBLE THIS FOR PLATE "A" LENGTH)

▲ ANCHOR PLATES IN PRESTRESSED GIRDERS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT, GIRDER SHRINKAGE AND CONSTRUCTION TOLERANCE.

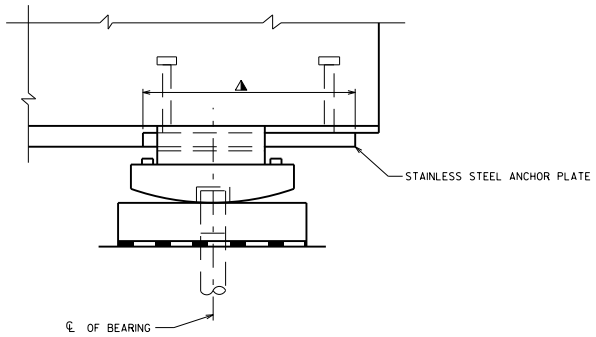
PROCEDURE FOR SIZING ANCHOR PLATE:

2½ INCHES = ½ TEFLON PLATE LENGTH
+ THERMAL MOVEMENT (USE 60-5=55 DEGREES)
+ SHRINKAGE = 0.0003'/'
+ 1" CONSTRUCTION TOLERANCE
= ½ ANCHOR PLATE LENGTH (DOUBLE THIS FOR ANCHOR PLATE LENGTH)

ACCORDING TO AASHTO, THE LOAD FACTOR FOR TU IS 1.20 FOR DEFORMATIONS. THE PROCEDURE OUTLINED ABOVE SHOULD BE USED WITH A LOAD FACTOR OF 1.0, WITH THE 1" CONSTRUCTION TOLERANCE BEING USED IN LIEU OF THE HIGHER LOAD FACTOR.

THE 90 DEGREE TEMPERATURE RANGE FOR STEEL BEARINGS, BASED ON A 60 DEGREE SETTING TEMPERATURE, IS SLIGHTLY CONSERVATIVE IF THE BEARING OFFSET TABLE IS UTILIZED, SINCE AT 45 DEGREES THE OFFSET WOULD BE ZERO.

SHOWING OFFSET DUE TO EXPANSION

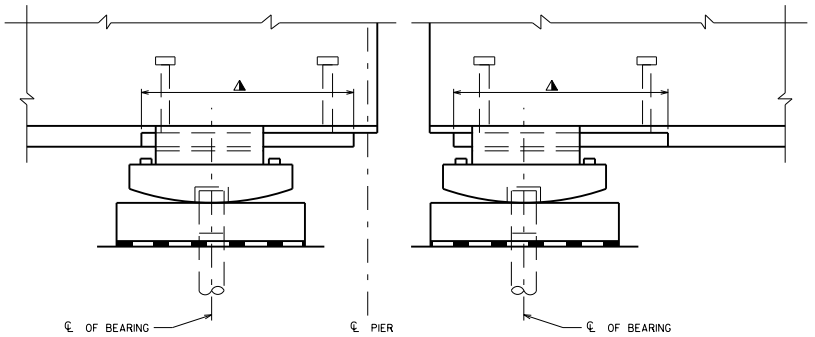


EXPANSION BEARING AT ABUTMENT

PRESTRESSED CONCRETE GIRDER

FOR DESIGNER INFORMATION, ONLY
(DO NOT PUT ON THE PLANS)

SHOWING OFFSET DUE TO EXPANSION OR CONTRACTION



EXPANSION BEARINGS AT PIER

PRESTRESSED GIRDER (CONC. DIAPHS. NOT SHOWN FOR CLARITY)

FOR DESIGNER INFORMATION, ONLY
(DO NOT PUT ON THE PLANS)

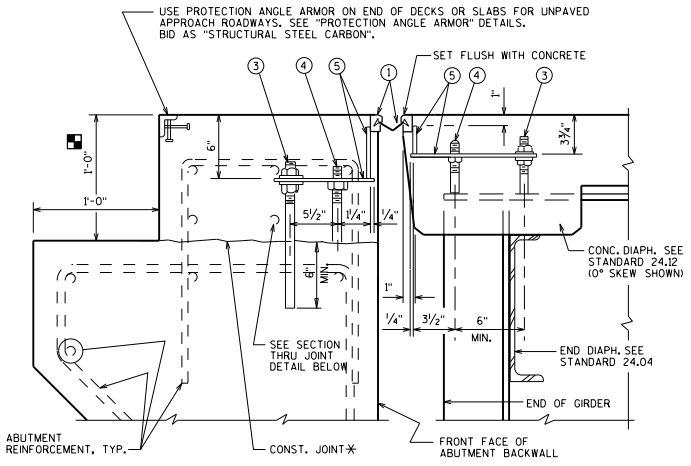
STEEL EXPANSION BEARING DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

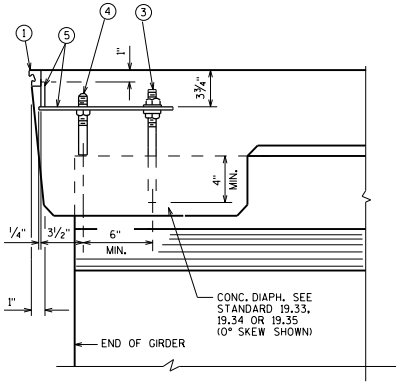
DATE: 1-17

STANDARD 27.10



TYPICAL SECTION THRU JOINT AT STEEL GIRDER

NORMAL TO ℄ SUBSTRUCTURE

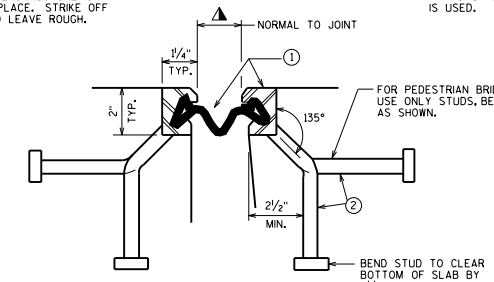


PART SECTION THRU JOINT AT PRESTRESSED GIRDERS

NORMAL TO ℄ SUBSTRUCTURE

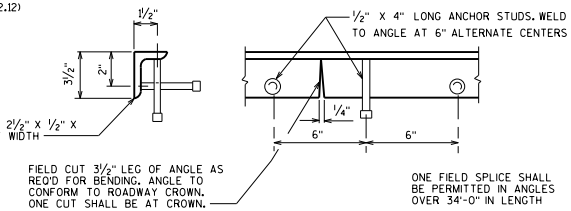
✳ POUR CONC. ABOVE THIS JOINT AFTER SUPERSTRUCTURE IS IN PLACE. STRIKE OFF AND LEAVE ROUGH.

◨ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.12) IS USED.



SECTION THRU JOINT

EXTERIOR GIRDER TO EDGE OF DECK, AND AT PARAPETS, MEDIANS AND SIDEWALKS



PROTECTION ANGLE ARMOR

SANDBLAST PROTECTION ANGLE AFTER FABRICATION PER NOTES. AFTER BLAST CLEANING, THE PROTECTION ANGLE SHALL BE HOT DIPPED GALVANIZED.

LEGEND

◭ (1) NEOPRENE STRIP SEAL (-INCH) AND STEEL EXTRUSIONS. SET JOINT OPENING AT 1¾" WHEN EXPANSION LENGTH ≤ 230'-0". WHEN EXPANSION LENGTH > 230'-0", PREPARE A TEMPERATURE TABLE SHOWING JOINT OPENINGS FROM 5°F TO 85°F IN 10°F INCREMENTS. ACCOUNT FOR PRESTRESSED GIRDER SHRINKAGE DUE TO CREEP WHEN DETERMINING THIS TABLE. JOINT OPENINGS GIVEN NORMAL TO JOINT. ◨

(2) STUDS ⅝" DIA. X 6⅜" LONG AT 6" ALTERNATE CENTERS. WELD TO EXTRUSIONS AND BEND AS SHOWN AFTER WELDING.

(2A) ½" THICK ANCHOR PLATE WITH ⅝" DIA. ROD (OR ALTERNATE STRIP SEAL ANCHOR). WELD ROD TO ANCHOR PLATE, WELD ANCHOR PLATE TO NO. 1 AT 1'-6" CENTERS BETWEEN GIRDERS.

(3) ¾" DIA. THREADED ROD WITH 2 NUTS AND PLATE WASHERS. FOR PRESTRESSED GIRDERS, GROUT THREADED ROD INTO FIELD DRILLED HOLES ON ℄ OF GIRDER. FOR STEEL GIRDERS, WELD THREADED ROD TO TOP FLANGE OR ATTACH BY BOLTING THRU FLANGE. ON ABUTMENT SIDE, GROUT THREADED ROD INTO FIELD DRILLED HOLES IN ABUTMENT BACKWALL AS SHOWN.

(4) ¾" DIA. THREADED ROD WITH NUT. TACK WELD NUT TO NO. 5.

(5) FABRICATE SUPPORT FROM 3" X ½" BAR AS SHOWN OR EQUIVALENT. ONE PER GIRDER PER SIDE. SHOP OR FIELD WELD TO NO. 1. IF FIELD WELDED, COVER WELDED AREAS WITH EPOXY-COATING MATERIAL. PROVIDE 1½" DIA. HOLE FOR NO. 3 AND 1" DIA. HOLE FOR NO. 4.

REFER TO STANDARD 28.02 & 28.07

(6) GALVANIZED PLATE ⅜" X 10" X (2'-2" LONG FOR SKEWS TO 45° AND 3'-0" LONG FOR SKEWS > 45°) WITH HOLES FOR NO. 7, FOR SINGLE SLOPE PARAPET. FOR SLOPED FACE PARAPET, SEE STANDARD 28.07.

(7) ¾" DIA. X 1½" STAINLESS STEEL SOCKET FLAT HEAD SCREWS WITH ANTI-SEIZE LUBRICANT. PLACE IN COUNTERSUNK HOLE. RECESS 1/16" BELOW PLATE SURFACE.

(8) ¾" DIA. X 4" GALVANIZED HEX HEAD BOLT. BEND 45°.

(9) ¾" DIA. X 2¼" GALVANIZED THREADED COUPLING.

(10) SIDEWALK COVER PLATE ⅜" X (2'-0" WIDE FOR SKEWS TO 45° AND 3'-0" WIDE FOR SKEWS > 45°) X LIMITS SHOWN. BEND DOWN FACE OF SIDEWALK WITH HOLES FOR NO. 7. GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.

(11) 1" X 5" SLOTTED COUNTERSUNK HOLE FOR NO. 7. PLACE SLOT PARALLEL TO DIRECTION OF MOVEMENT.

NOTES

ONE FIELD SPLICE PERMITTED IN STEEL EXTRUSIONS, UNLESS MORE ARE REQUIRED FOR STAGED CONSTRUCTION, HANDLING OR GALVANIZING REQUIREMENTS. IF USED, DETAILS SHALL BE SUBMITTED FOR APPROVAL. NO SPLICING PERMITTED IN NEOPRENE STRIP SEAL.

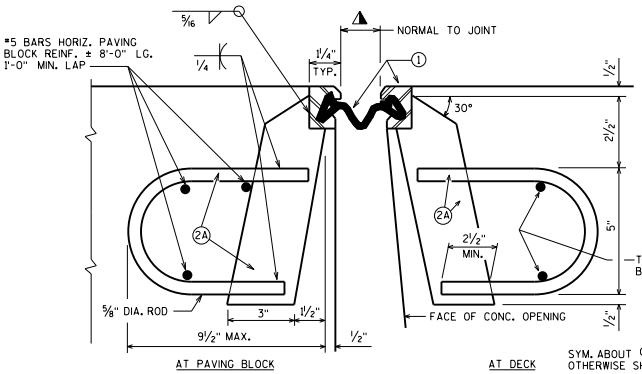
AFTER FABRICATION, BUT BEFORE SHIPMENT, STRAIGHTEN STEEL EXTRUSIONS SUCH THAT THEY SHALL BE FREE FROM WARP, TWIST AND SWEEP.

FABRICATOR SHALL PROVIDE MEANS OF KEEPING GALVANIZED EXTRUSIONS CLEAN AND SMOOTH DURING SHIPMENT AND PRIOR TO APPLYING LUBRICANT ADHESIVE FOR NEOPRENE GLAND INSTALLATION.

SANDBLAST PLATES, SUPPORTS AND EXTRUSIONS AFTER FABRICATION IN ACCORDANCE WITH SSPC SP. #6 "COMMERCIAL BLAST CLEANING". AFTER BLAST CLEANING, THE PLATES, SUPPORTS AND EXTRUSIONS SHALL BE HOT DIPPED GALVANIZED. SLIP-RESISTANT SURFACE IS APPLIED TO SIDEWALK COVER PLATES BY THE MANUFACTURER AND THEN HOT DIPPED GALVANIZED TO THEIR RECOMMENDATIONS TO MAINTAIN THE INTEGRITY OF THIS SURFACE.

ANCHOR SYSTEM NO. 8 AND NO. 9 SHALL CONFORM TO ASTM A307 AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C AND D.

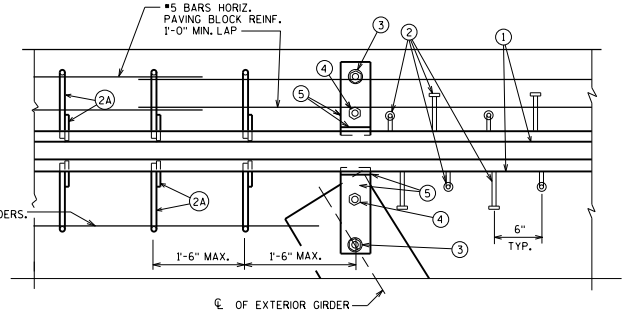
STRIP SEAL EXPANSION JOINT ASSEMBLY, INCLUDING ANCHOR STUDS AND HARDWARE WILL BE PAID FOR AT THE LUMP SUM PRICE BID FOR "EXPANSION DEVICE B-_-_".



SECTION THRU JOINT

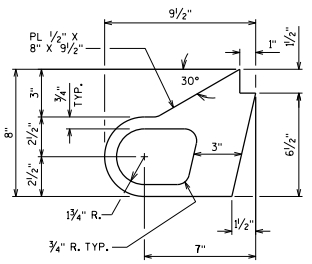
ROADWAY TRAFFIC AREA BETWEEN EXTERIOR GIRDERS.

◨ IF TEMPERATURE TABLE IS SHOWN, PLACE FOLLOWING NOTE ADJACENT TO TABLE: "A SMALL JOINT OPENING DUE TO A HIGH TEMPERATURE AT TIME OF CONSTRUCTION MAY REQUIRE NEOPRENE STRIP SEAL INSTALLATION INTO STEEL EXTRUSIONS PRIOR TO SETTING THE EXPANSION JOINT."



SYM. ABOUT ℄ JOINT UNLESS OTHERWISE SHOWN OR NOTED

PART PLAN



ALTERNATE STRIP SEAL ANCHOR

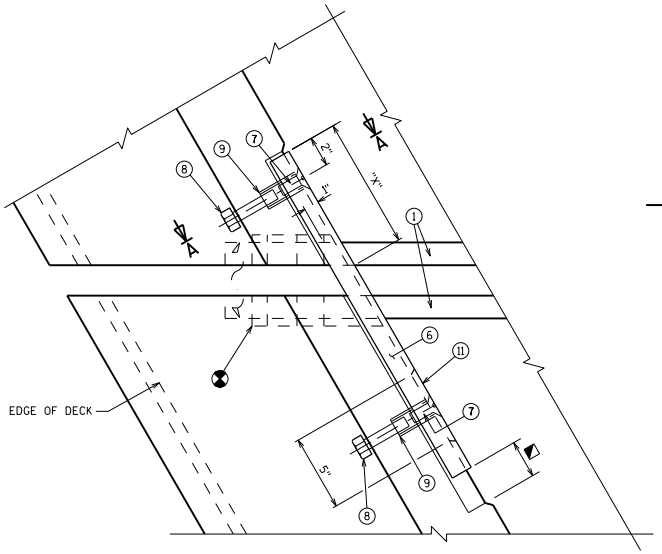
STRIP SEAL EXPANSION JOINT DETAILS

BUREAU OF STRUCTURES

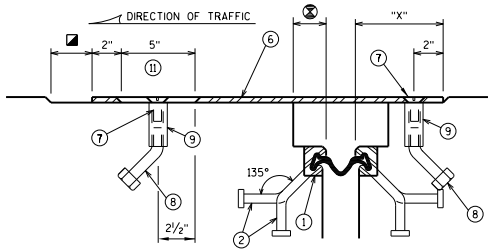
APPROVED: Bill Oliva

DATE: 7-17

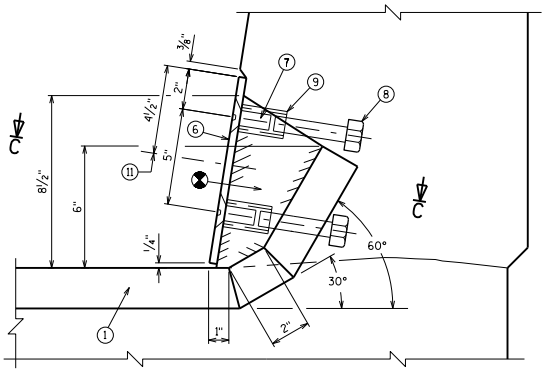
STANDARD 28.01



PLAN AT PARAPET
SINGLE SLOPE PARAPET

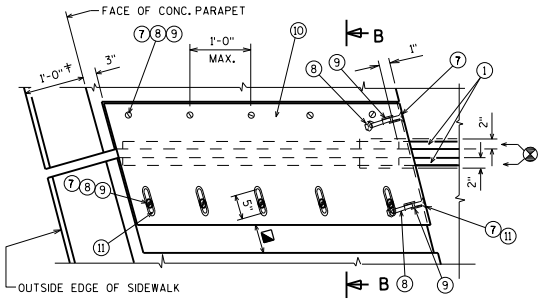


SECTION C-C



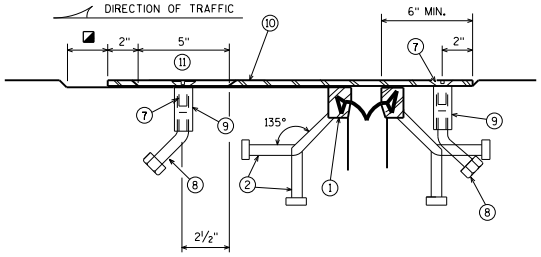
SECTION A-A
SINGLE SLOPE PARAPET

"X" - VALUES IN INCHES	USE "X" = 6½" FOR 0° SKEW												
SKEW	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°
RHF	6½	6½	6½	6½	6½	6½	6½	6½	6½	7	7	7½	8
LHF	7	7½	8	8½	9	9½	10½	11	11½	13	13½	14½	15½

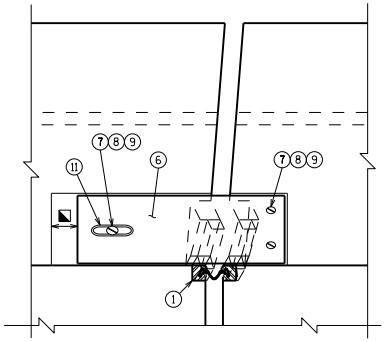


PLAN AT SIDEWALK

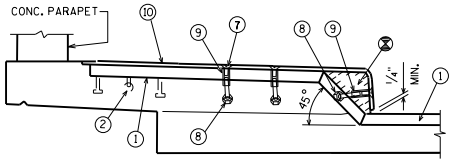
* 1'-2" WHEN "VERTICAL FACE PARAPET TYPE 'TX' IS USED



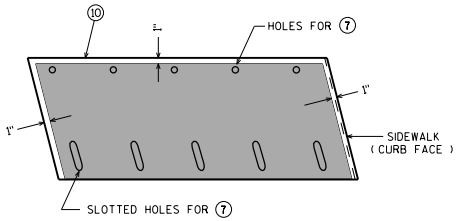
SECTION B-B



VIEW OF PARAPET PLATES FROM ROADWAY
SINGLE SLOPE PARAPET



SECTION AT SIDEWALK



PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE

PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE).

APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

⊗ BLOCK OUT CONCRETE 2" EACH SIDE OF JOINT OPENING

◪ JOINT OPENING DIM. ALONG SKEW PLUS ½"

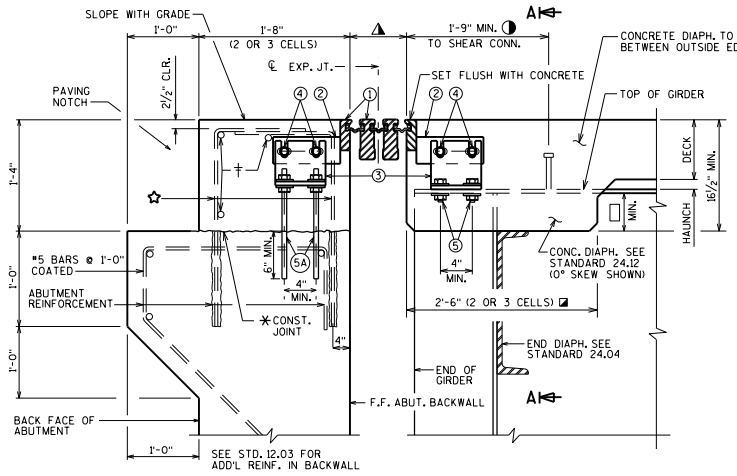
STRIP SEAL COVER PLATES
SINGLE SLOPE PARA./SDWK.

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

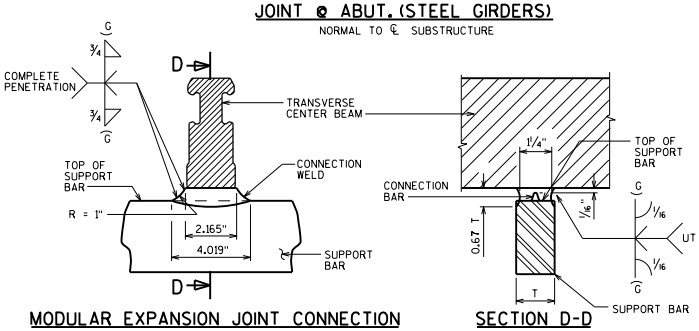
DATE: 1-13

STANDARD 28.02



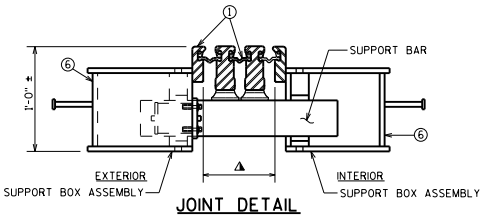
JOINT @ ABUT. (STEEL GIRDERS)

NORMAL TO ℄ SUBSTRUCTURE



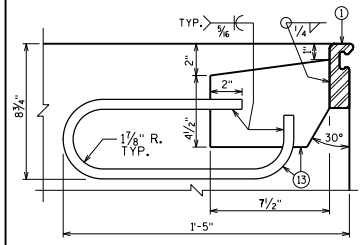
MODULAR EXPANSION JOINT CONNECTION DETAIL AND WELD SPECIFICATION

SECTION D-D



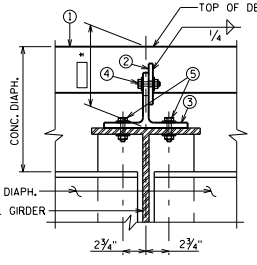
JOINT DETAIL

AT SUPPORT BAR & SUPPORT BOX ASSEMBLY

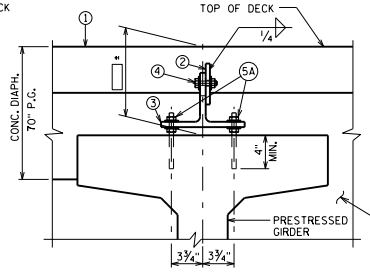


ANCHORAGE DETAIL

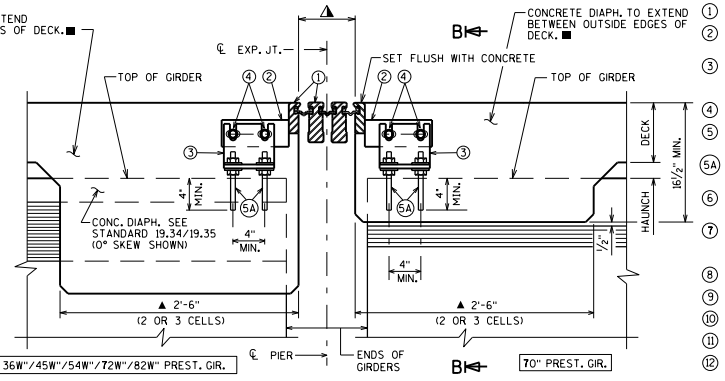
PLACE ADJACENT TO SUPPORT BOXES IN PAVING BLOCK @ ABUT. & IN DECK @ CONC. DIAPH.



SECTION A-A

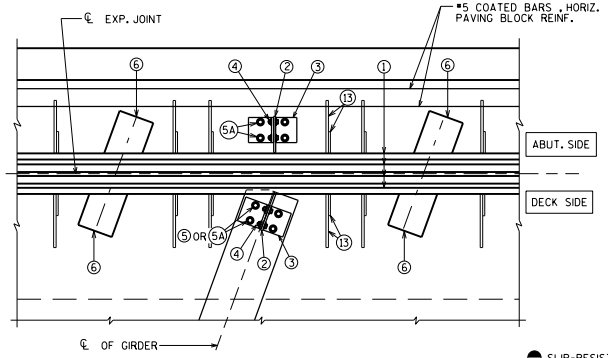


SECTION B-B



JOINT @ PIER (PRESTRESSED GIRDERS)

NORMAL TO ℄ SUBSTRUCTURE



PART PLAN

NOTE:
MODULAR EXPANSION DEVICE DESIGN AND DETAILS ARE SPECIFIC TO THE MANUFACTURER SELECTED FROM THOSE LISTED IN THE SPECIAL PROVISIONS.

▲ SUPPORT BOXES ARE SHOWN FOR GENERAL INFORMATION AND LOCATION MAY VARY ACCORDING TO FABRICATOR DESIGN. SPACE SUPPORT BOXES TO MISS GIRDER TOP FLANGES WHEN POSSIBLE, BUT NOT TO EXCEED MAXIMUM SPACING PER SPECIAL PROVISIONS.

◓ SLIP-RESISTANT SURFACE IS APPLIED TO SIDEWALK COVER PLATES BY THE MANUFACTURER AND THEN HOT DIPPED GALVANIZED TO THEIR RECOMMENDATIONS TO MAINTAIN THE INTEGRITY OF THIS SURFACE.

LEGEND

1. MODULAR EXPANSION JOINT DEVICE, ▭ CELLS.
2. ½" PLATE, ONE PER GIRDER MIN. PROVIDE 2 - 1" X 2" MIN. SLOTTED HOLES PLACED HORIZONTALLY FOR NO. 4.
3. WT 6 X 29 (OR EQUIVALENT BUILT UP T-SECTION). ONE PER GIRDER. PROVIDE 2- 1" X 3" MIN. SLOTTED HOLES PLACED VERTICALLY IN WEB OF WT FOR BOLTS NO. 4.
4. ¾" DIA. HIGH STRENGTH BOLTS WITH NUTS & WASHERS. (A325 GALV.)
5. ¾" DIA. HIGH STRENGTH BOLTS WITH NUTS & WASHERS. FIELD DRILL HOLES IN GIRDER TOP FLANGE. (A325 GALV.)
5A. ¾" DIA. THREADED ROD WITH 2 NUTS & WASHERS. GROUT THREADED ROD INTO FIELD DRILLED HOLES (GALV.).
6. SUPPORT BOX ASSEMBLY FOR SUPPORT BAR (SPA. PER MANUFACTURER). FABRICATE BOX FROM ½" PLATES.
7. ⅜" BULKHEAD PLATE. WELD TO NO. 1, NO. 8 AND NO. 14. WHEN CONDUIT IS PRESENT IN PARAPET OR SIDEWALK, ACCOMMODATE FOR BY PROVIDING OPENING IN NO. 7.
8. INSIDE PLATE. FABRICATE FROM ⅜" PLATE.
9. OUTSIDE PLATE. FABRICATE FROM ⅝" PLATE.
10. ⅞" SQUARE BAR. WELD TO NO. 8 AS SHOWN.
11. ¾" DIA. X 4" LONG STUDS. WELD TO NO. 7, 8, & 14 AS SHOWN.
12. ¾" DIA. X 2" STAINLESS STEEL FLAT CTSK, SLOTTED HEAD CAP SCREWS W/ ANTI-SEIZE LUBRICANT. RECESS 1/16" BELOW PL. SURFACE.
13. ½" PLATE WITH ⅝" DIA. LOOP ANCHOR FABRICATED AS SHOWN. SPACED AT MANUFACTURER'S SPEC.
14. INSIDE PLATE. FABRICATE FROM ⅝" PLATE
15. ADIPRENE BUTTON. SEE DETAIL. SET IN OUTSIDE PLATE.

■ AT LOCATION WHERE EXT. GIR. IS ADJACENT TO A RAISED SIDEWALK (STD.30.07), CONC. DIAPH. DOES NOT EXTEND OUT TO EDGE OF DECK, BUT IS TERMINATED AT INSIDE FACE OF EXT. GIR.

‡ "5 COATED BARS, ± 8'-0" LONG, 1'-0" MIN. LAP. CUT IN FIELD TO CLEAR JOINT SUPPORT SYSTEM AS REQ'D.

* POUR CONC. ABOVE THIS JOINT AFTER SUPERSTRUCTURE CONC. IS IN PLACE. STRIKE OFF & LEAVE ROUGH.

◑ DIMENSION IS PARALLEL TO ℄ GIRDER.

△ MANUFACTURER'S RECOMMENDED JOINT OPENING BASED ON THE TEMPERATURE ON THE DAY OF PLACEMENT PER TEMPERATURE TABLE. THE MODULAR EXPANSION DEVICE SHALL HAVE THE NUMBER OF CELLS AS INDICATED IN ①.

✿ (2) COATED L-SHAPED ADHESIVE ANCHORS ⅝-INCH. EMBED 12" IN CONCRETE. SPACE AT 1'-0". PLACE ADHESIVE ANCHORS AFTER MODULAR JOINT IS IN POSITION.

◪ TOP FLANGE WIDTH WITHIN LIMITS OF CONC. DIAPH. SHALL BE ≤ 20" FOR SKEWS ≤ 30°

▲ FOR PRESTRESSED GIRDERS, PLACE THE FOLLOWING NOTE ON PLANS: "JOINT MANUFACTURER SHALL INFORM AND PROVIDE NECESSARY DETAILS TO THE PRESTRESSED GIRDER FABRICATOR, WHEN FORM-OUT OF THE TOP FLANGE IS REQ'D. TO ALLOW PLACEMENT OF SUPPORT BOX ASSEMBLY."

TEMP. TABLE

TEMPERATURE TABLE FOR SETTING JOINT OPENINGS TO BE DETERMINED BY JOINT MANUFACTURER WITH THE FOLLOWING DESIGN DATA:

1. ▭ IN. OF MOVEMENT PER 10° F
2. MEDIAN TEMPERATURE OF 45° F
3. TEMP. RANGE IN TABLE FROM (5°F) TO (85°F) FOR PRESTRESSED CONCRETE GIRDERS AND FROM (-5)°F) TO (+95°F) FOR STEEL GIRDERS.
4. ADJUST INITIAL JOINT OPENINGS BY A REDUCTION OF ▭ IN., WHICH ACCOUNTS FOR SHRINKAGE (CREEP) OF THE SUPERSTRUCTURE OVER TIME, TO PRODUCE FINAL JOINT OPENINGS FOR TABLE.

A TABLE OF JOINT OPENINGS BASED ON ABOVE DATA SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

INCLUDE ITEM 4. FOR PRESTRESSED GIRDER STRUCTURES ONLY. SEE CHAPT. 28 IN BRIDGE DESIGN MANUAL FOR ADJUSTMENT FACTOR.

NOTES

ONE FIELD SPLICE PERMITTED IN STEEL EXTRUSIONS. DETAILS SHALL BE SUBMITTED FOR APPROVAL. NO SPLICING PERMITTED IN NEOPRENE GLAND.

AFTER FABRICATION, BUT BEFORE SHIPMENT, STRAIGHTEN STEEL EXTRUSIONS SUCH THAT THEY SHALL BE FREE FROM WARP, TWIST & SWEEP.

NO EXPANSION JOINT PROTRUSIONS PERMITTED ABOVE ROADWAY SURFACE, ON PARAPET ROADWAY FACE OR ABOVE SIDEWALK SURFACE (FOR RAISED SIDEWALK).

THE EXPANSION JOINT SEALS SHALL BE PLACED, BONDED & SEALED AS RECOMMENDED BY THE MANUFACTURER. FORM WORK SHALL BE PLACED BETWEEN THE SUPPORT BOXES TO PREVENT CONCRETE INTRUSION INTO THE SUPPORT BOX. A TECHNICAL REPRESENTATIVE OF THE MANUFACTURER SHALL BE PRESENT DURING INSTALLATION, PRIOR TO SETTING THE JOINT ASSEMBLY INTO POSITION, THE PROJECT ENGINEER SHALL DETERMINE THE PROPER JOINT OPENING.

EXPANSION JOINT EXTRUSIONS SHALL BE FABRICATED TO CONFORM TO ROADWAY CROWN & GRADE. FABRICATOR SHALL PROVIDE MEANS OF KEEPING GALVANIZED EXTRUSIONS CLEAN & SMOOTH DURING SHIPMENT AND PRIOR TO APPLYING LUBRICANT ADHESIVE FOR NEOPRENE GLAND INSTALLATION.

SANDBLAST BARS, PLATES, WT-SECTION, ANCHORAGE LOOP, & EXTRUSIONS AFTER FABRICATION IN ACCORDANCE WITH SSPC SP. "6 "COMMERCIAL BLAST CLEANING". AFTER BLAST CLEANING, THIS ASSEMBLY SHALL BE HOT DIPPED GALVANIZED. ◓

COST OF FURNISHING & PLACING OF THE EXPANSION JOINTS COMPLETE WITH PARAPET PLATES & SIDEWALK PLATES SHALL BE PAID FOR UNDER THE PRICE BID FOR "EXPANSION DEVICE MODULAR B- - ".

BAR STEEL REINF. IN DECK AND CONC. DIAPHRAGM SHALL BE RESPACED AS NECESSARY TO ALLOW PLACEMENT OF JOINT ASSEMBLY. TOP TRANSVERSE BARS, ADJACENT TO MOD. JT., TO BE CUT AND PLACED BETWEEN JT. SUPPORT SYSTEM.

STANDARD COVERS:
- SKEWS ≤ 30°
- 2 OR 3 CELL MODULAR EXPANSION JOINTS
- STEEL GIRDER BRIDGES
- PRESTRESSED GIRDER BRIDGES (70", 36W", 45W", 54W", 72W" AND 82W" SECTION)

MODULAR EXPANSION JOINT DETAILS

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-18

STANDARD 28.03

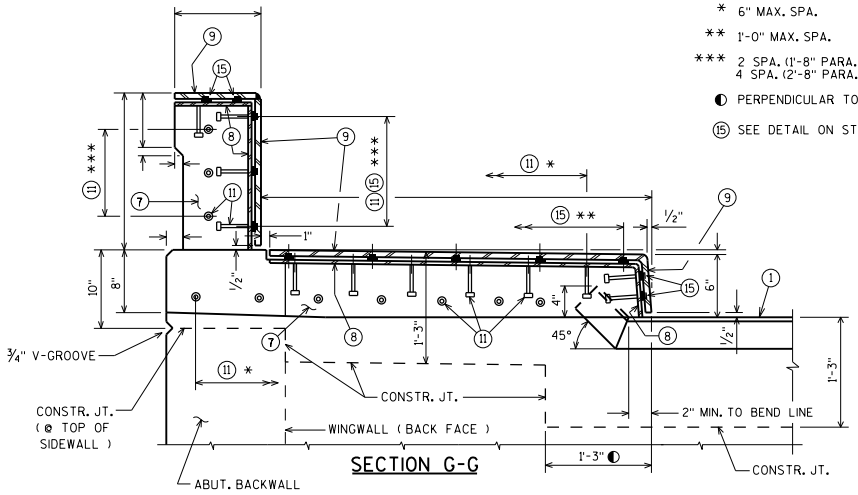
* 6" MAX. SPA.

** 1'-0" MAX. SPA.

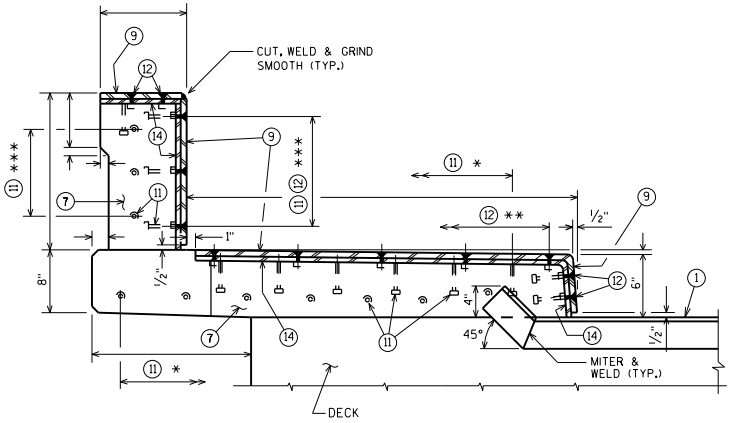
*** 2 SPA. (1'-8" PARA. HEIGHT)
4 SPA. (2'-8" PARA. HEIGHT)

◐ PERPENDICULAR TO FACE OF CURB

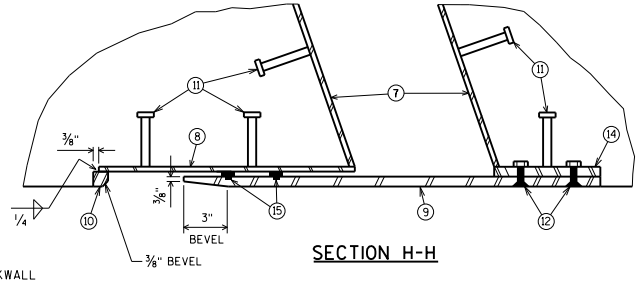
⑮ SEE DETAIL ON STANDARD 28.05



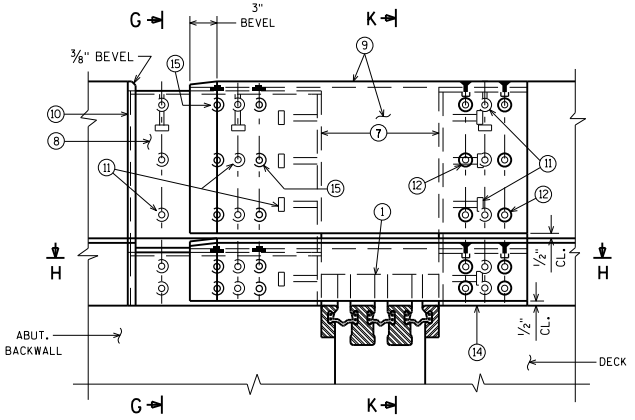
SECTION G-G



SECTION K-K

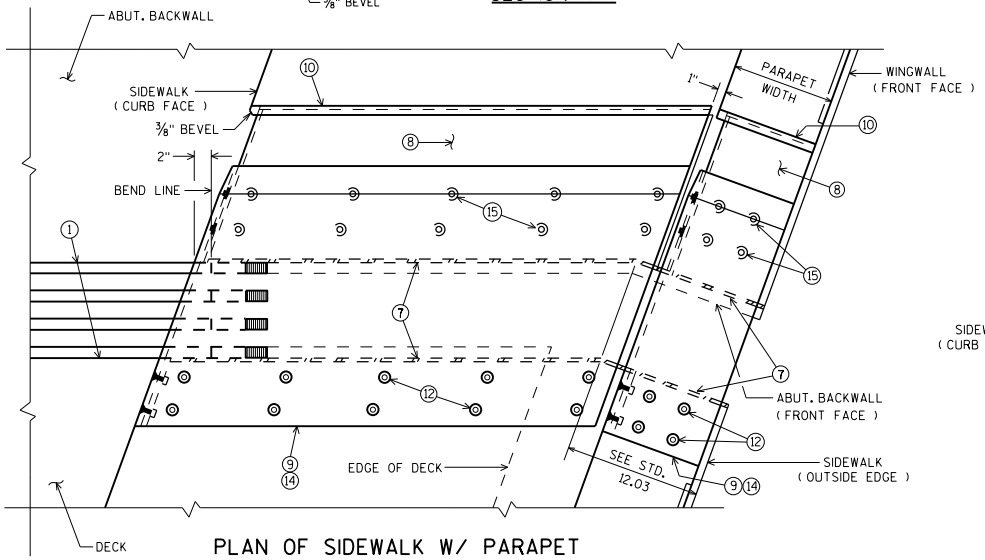


SECTION H-H

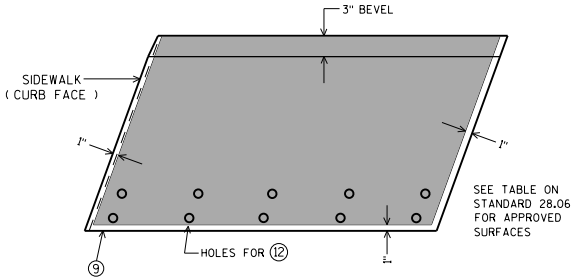


ELEVATION OF SIDEWALK W/ PARAPET

DIRECTION OF TRAFFIC
DETERMINES THE ORIENTATION OF PLATES ⑨ & ⑩



PLAN OF SIDEWALK W/ PARAPET



SEE TABLE ON STANDARD 28.06 FOR APPROVED SURFACES

PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE ◥

◥ PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE). GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.

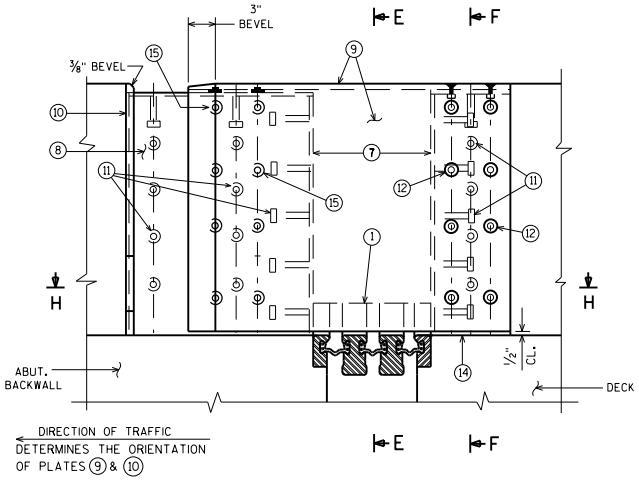
COVER PLATES FOR SIDEWALK W/ CONC. PARA.

BUREAU OF STRUCTURES

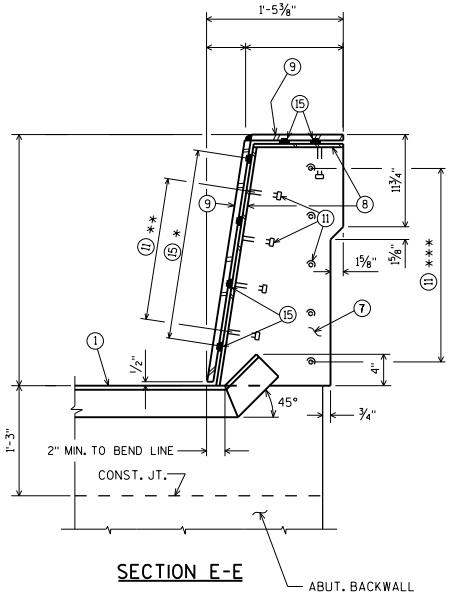
APPROVED: Scot Becker

DATE: 7-11

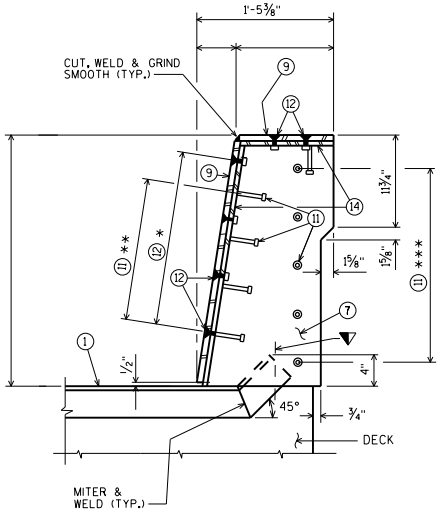
STANDARD 28.04



ELEVATION OF SINGLE SLOPE PARAPET

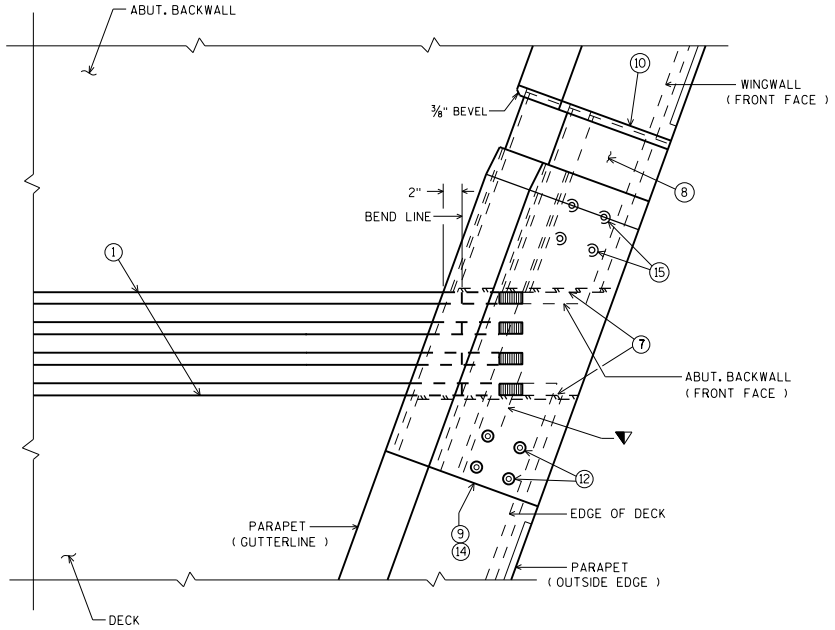


SECTION E-E

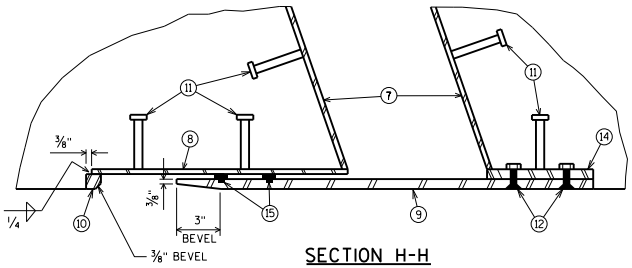


SECTION F-F

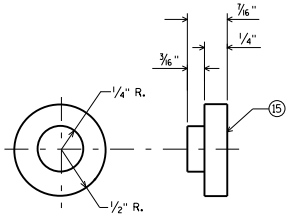
CROSS SECTION SHOWN FOR 32", 36", AND 42" SINGLE SLOPE PARAPET.
DETAILS FOR 56" PARAPET ARE SIMILAR.



PLAN OF SINGLE SLOPE PARAPET



SECTION H-H



ADIPRENE BUTTON DETAIL

* 3 EQ. SPA. (32")
4 EQ. SPA. (36")
5 EQ. SPA. (42")
7 EQ. SPA. (56")

** 3 SPA. (32")
4 SPA. (36")
5 SPA. (42")
7 EQ. SPA. (56")

*** 4 SPA. (32")
5 SPA. (36")
6 SPA. (42")
8 SPA. (56")

▽ FOR STRUCTURES WITH SKEWS, ADD NOTE TO PLANS : "MITER EXTRUSION ENDS AS REQ'D TO PROVIDE CLEARANCE"

COVER PLATES FOR SINGLE SLOPE PARAPET

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

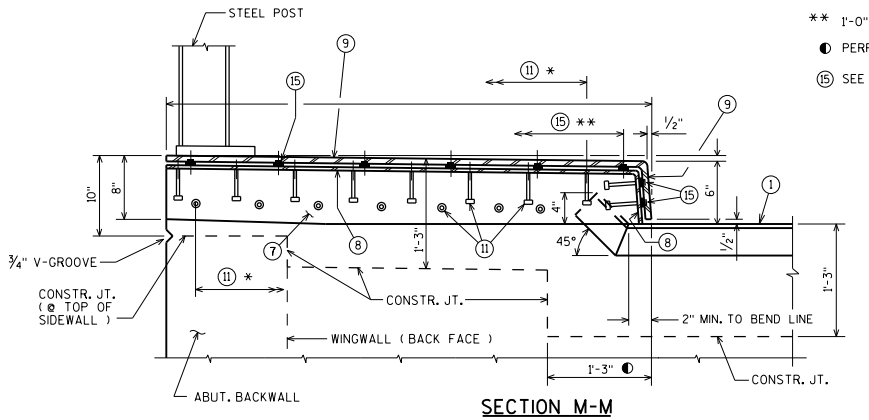
STANDARD 28.05

* 6" MAX. SPA.

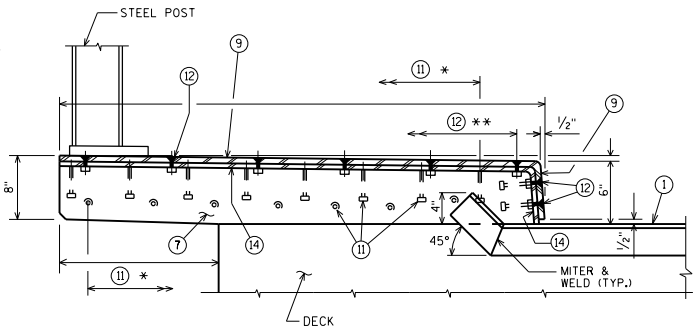
** 1'-0" MAX. SPA.

◐ PERPENDICULAR TO FACE OF CURB

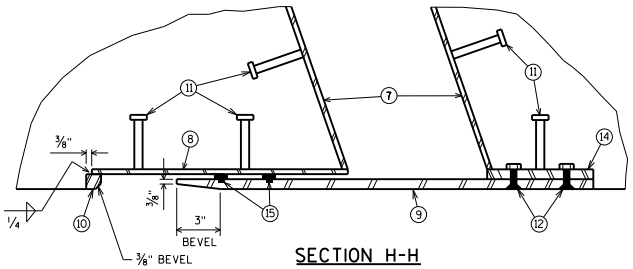
⑮ SEE DETAIL ON STANDARD 28.05



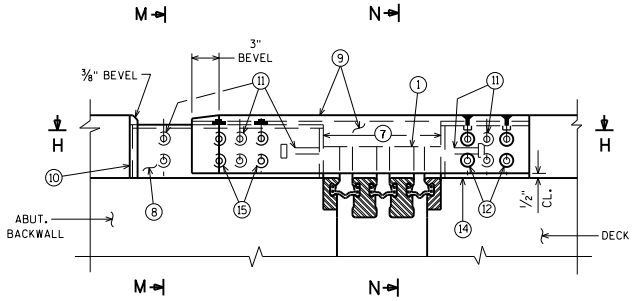
SECTION M-M



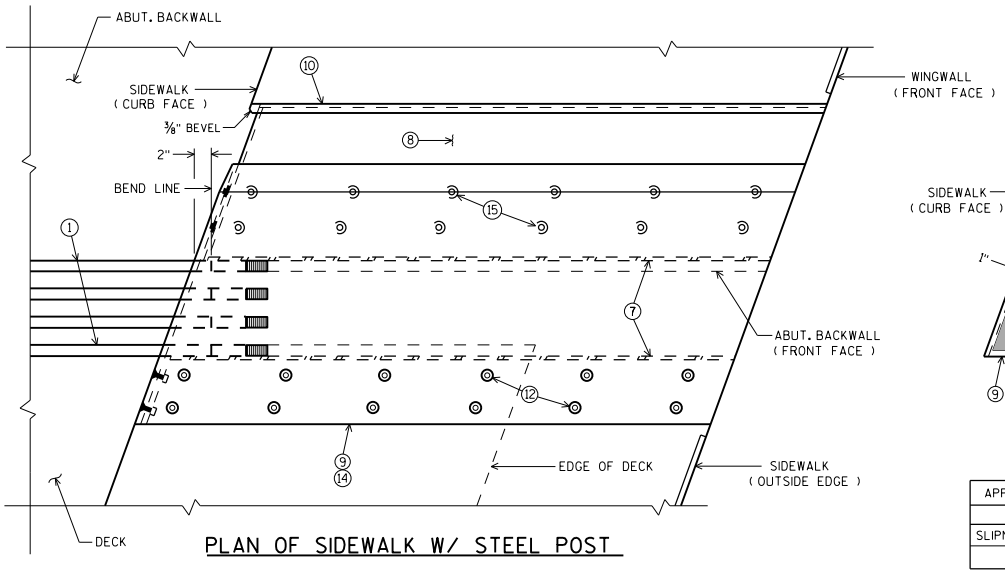
SECTION N-N



SECTION H-H

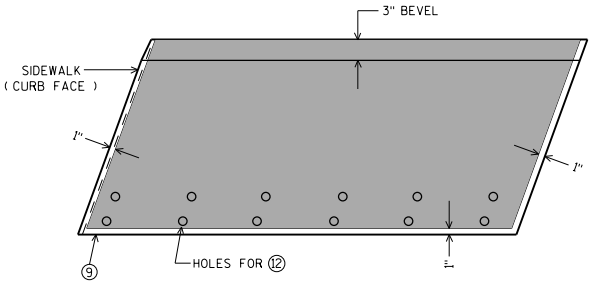


ELEVATION OF SIDEWALK W/ STEEL POST



PLAN OF SIDEWALK W/ STEEL POST

DIRECTION OF TRAFFIC
DETERMINES THE ORIENTATION OF PLATES ⑨ & ⑩



PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE ◥

◥ PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE). GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.

APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

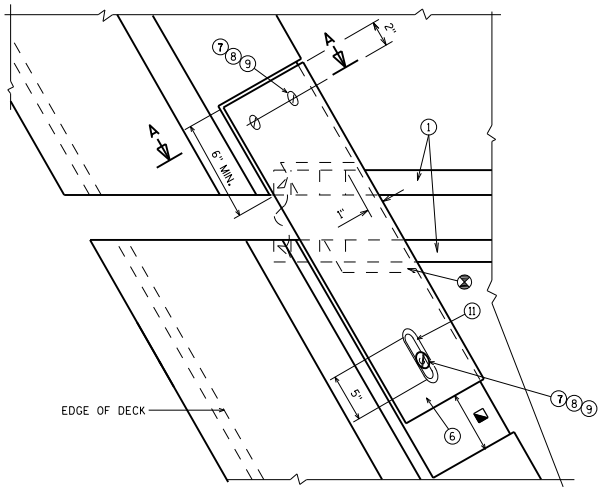
COVER PLATES FOR SIDEWALK W/ STEEL RAIL

BUREAU OF STRUCTURES

APPROVED: Scot Becker

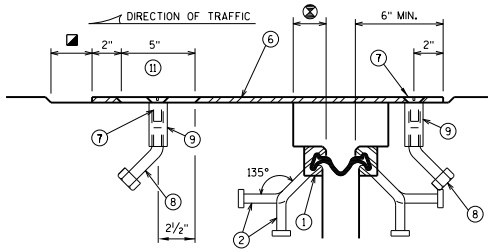
DATE: 7-11

STANDARD 28.06

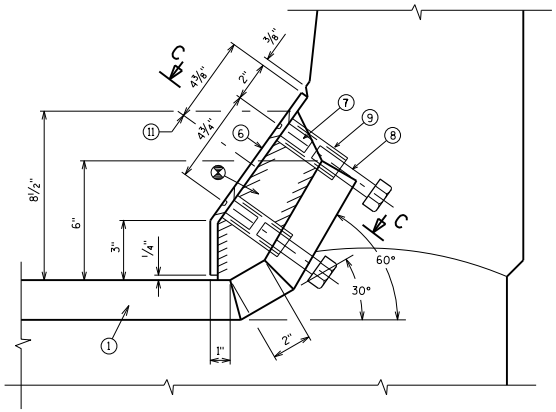


PLAN AT PARAPET

SLOPED FACE PARAPET



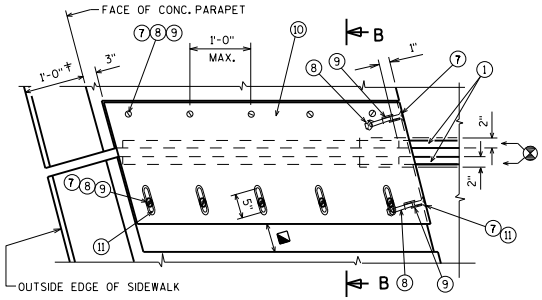
SECTION C-C



SECTION A-A

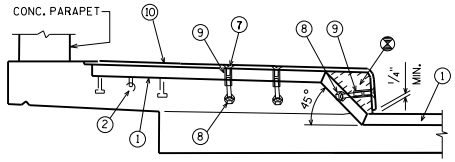
SLOPED FACE PARAPET

⑥ GALVANIZED PLATE ⅜" × 10½" × (2'-2" LONG FOR SKEWS TO 45° AND 3'-0" LONG FOR SKEWS ≥ 45°) WITH HOLES FOR NO. 7. BEND AS SHOWN.

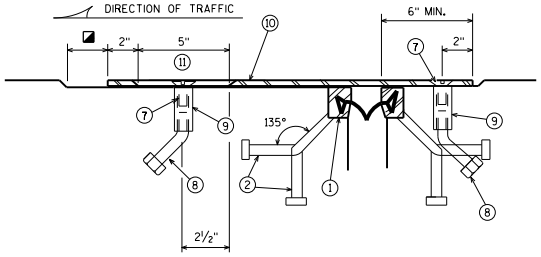


PLAN AT SIDEWALK

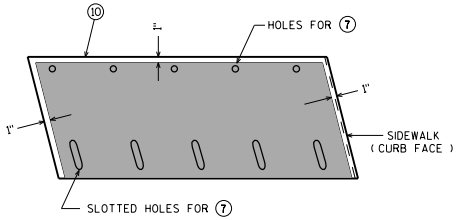
* 1'-2" WHEN "VERTICAL FACE PARAPET TYPE 'TX' IS USED



SECTION AT SIDEWALK



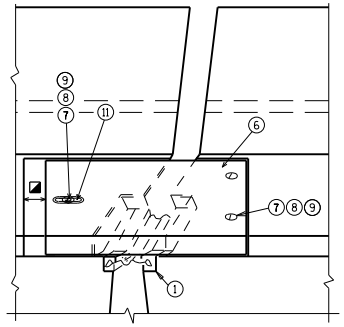
SECTION B-B



PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE

PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE).

APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170



VIEW OF PARAPET PLATES FROM ROADWAY

SLOPED FACE PARAPET

⊗ BLOCK OUT CONCRETE 2" EACH SIDE OF JOINT OPENING

◪ JOINT OPENING DIM. ALONG SKEW PLUS ½"

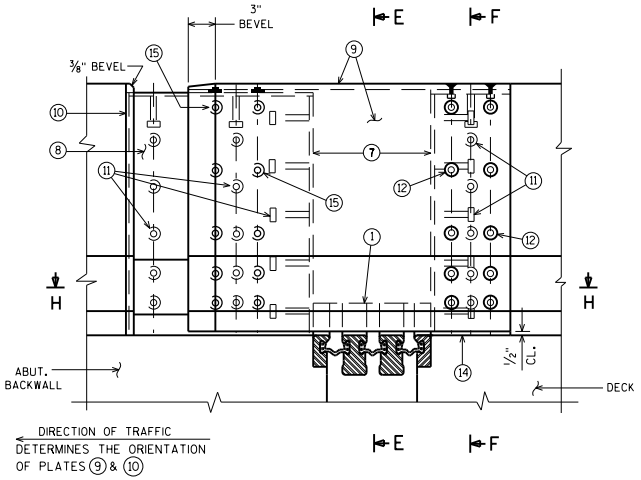
STRIP SEAL COVER PLATES
SLOPED FACE PARA./SDWK.

BUREAU OF STRUCTURES

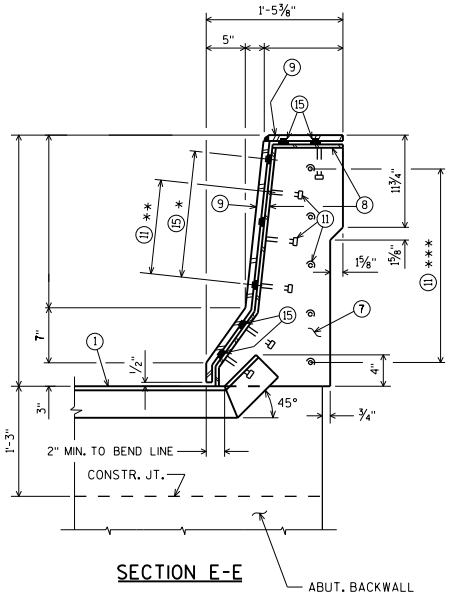
APPROVED: Bill Oliva

DATE: 7-13

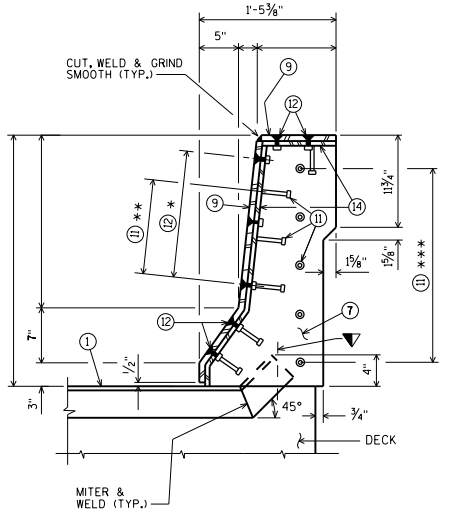
STANDARD 28.07



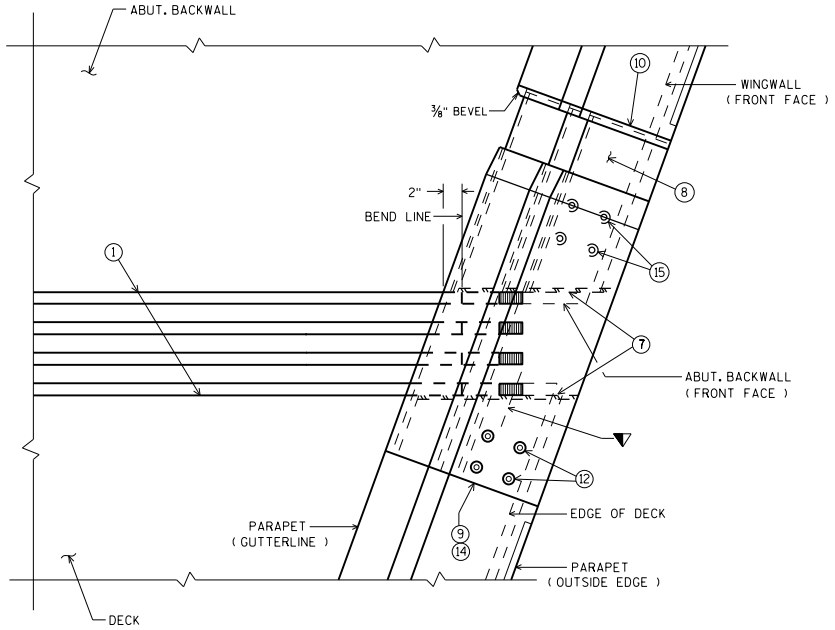
ELEVATION OF PARAPET LF/HF



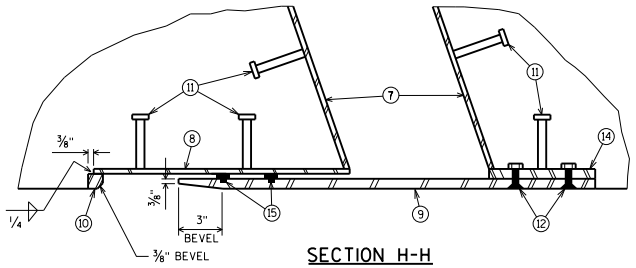
SECTION E-E



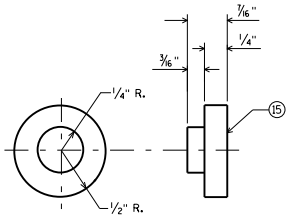
SECTION F-F



PLAN OF LF/HF



SECTION H-H



ADIPRENE BUTTON DETAIL

* 2 EQ. SPA. (LF)
4 EQ. SPA. (HF)

** 2 SPA. (LF)
4 SPA. (HF)

*** 4 SPA. (LF)
6 SPA. (HF)

▼ FOR STRUCTURES WITH SKEWS ADD NOTE TO PLANS : "MITER EXTRUSION ENDS AS REQ'D TO PROVIDE CLEARANCE"

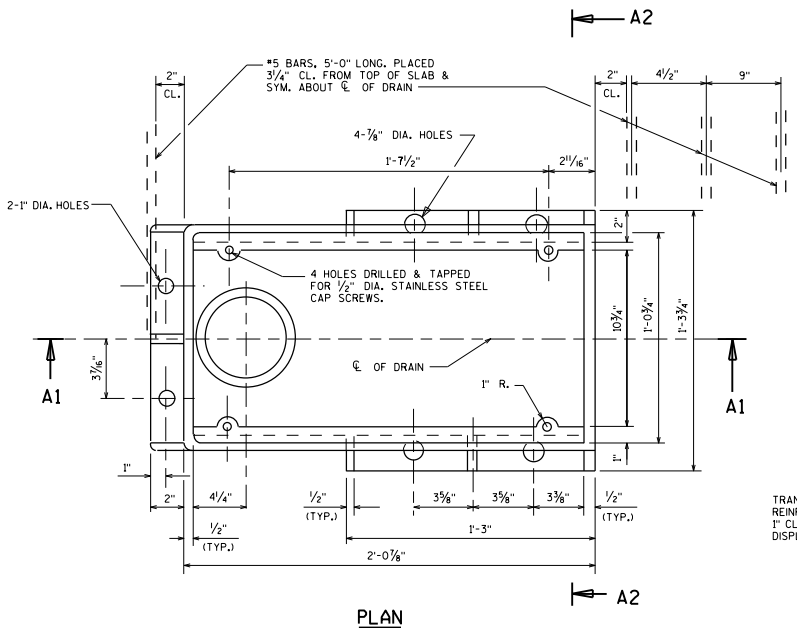
COVER PLATES FOR PARAPET 'LF/HF'

BUREAU OF STRUCTURES

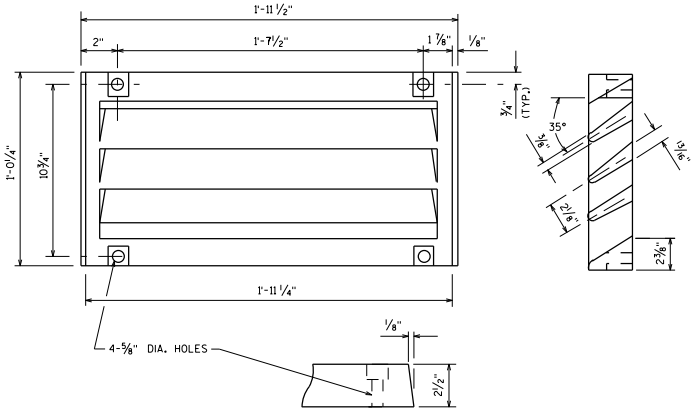
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 28.08



PLAN



GRATE CASTING DETAIL

ATTACH GRATE TO FRAME FOR SHIPMENT

TRANS. AND LONGIT. SLAB BAR REINF. TO BE CUT A MAX. OF 1" CL. FROM DRAIN FRAME. DISPLACE BARS WHERE POSSIBLE.

NOTES

ALL MATERIAL FOR TYPE "GC" CASTING, EXCLUDING GRATE HOLD DOWN SCREWS, SHALL BE GRAY IRON CONFORMING TO ASTM A48, CLASS 30. (APPROXIMATE WEIGHT = 225#)

MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A36.

THE CONTRACTOR MAY PROPOSE AN ALTERNATE TYPE OF BRACKET. THE PROPOSED ALTERNATE DETAILS SHALL BE SUBMITTED AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

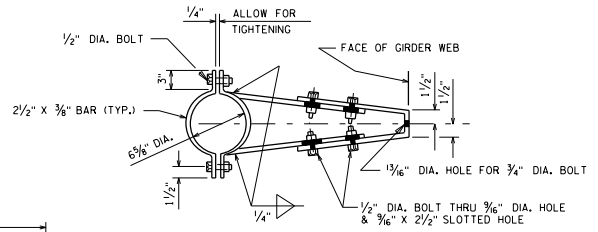
◪ FLANGED 6" DIA. DOWNSPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.

DESIGNER NOTES

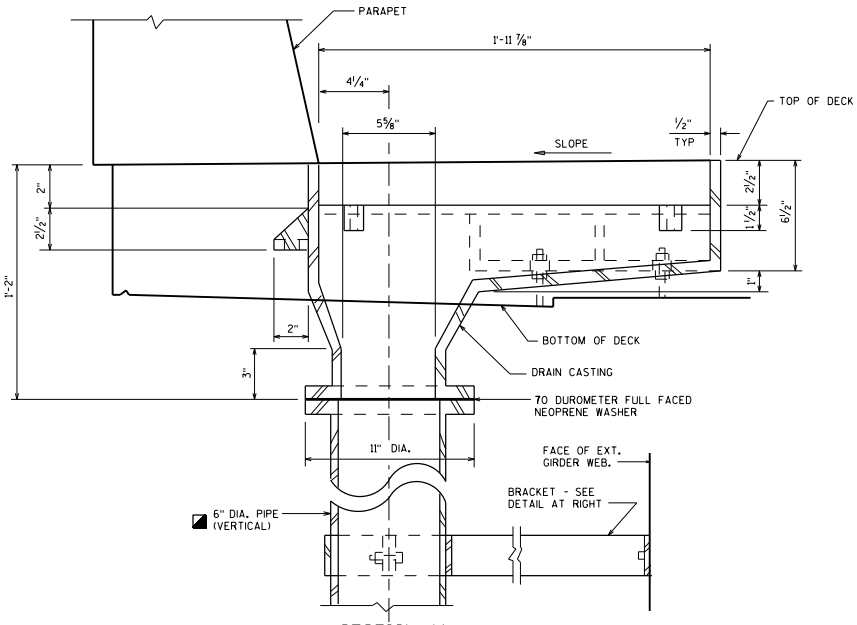
ALL MATERIAL FOR FLOOR DRAINS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "FLOOR DRAINS TYPE GC".

ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 6-INCH".

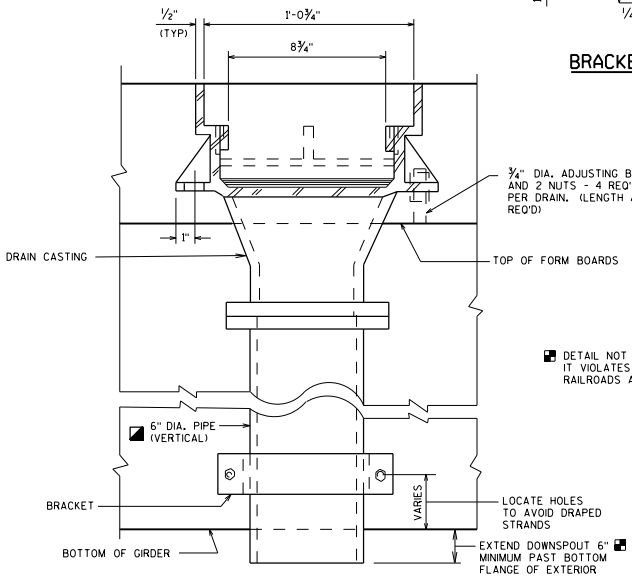
ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.



BRACKET DETAIL



SECTION A1



SECTION A2

◪ DETAIL NOT TO BE USED OVER RAILROADS BECAUSE IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT RAILROADS AND HARBORS SECTION FOR GUIDANCE.

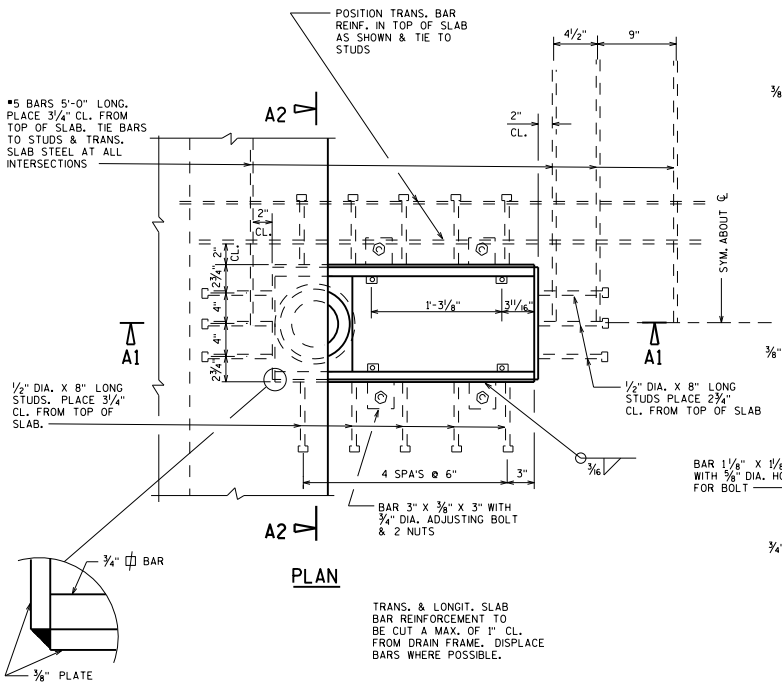
FLOOR DRAIN TYPE 'GC'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

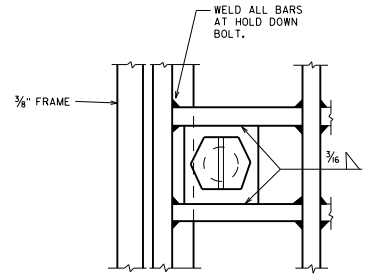
DATE: 1-17

STANDARD 29.01

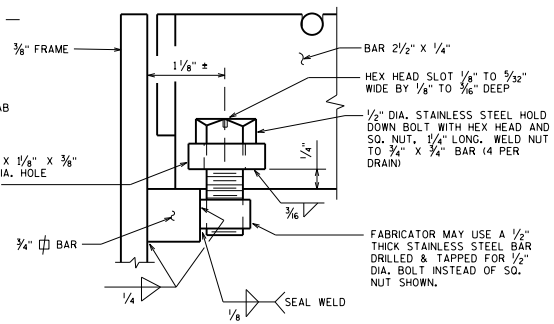


PLAN

TRANS. & LONGIT. SLAB BAR REINFORCEMENT TO BE CUT A MAX. OF 1" CL. FROM DRAIN FRAME. DISPLACE BARS WHERE POSSIBLE.



PART PLAN



SECTION AT HOLD DOWN BOLT

NOTES

ALL DRAIN MATERIAL INCLUDING GRATE, EXCLUDING PIPE & GRATE HOLD DOWN BOLTS, SHALL BE ASTM A36 STEEL.

MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A36.

THE CONTRACTOR MAY PROPOSE AN ALTERNATE TYPE OF BRACKET. THE PROPOSED ALTERNATE DETAILS SHALL BE SUBMITTED AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

ALL STEEL SHALL BE GALVANIZED. WELDS SHALL BE MADE WITH LOW HYDROGEN ELECTRODES.

SEAL WELD INSIDE OF DRAIN.

PRIOR TO GALVANIZING A NO. 6 BLAST CLEANING IS REQ'D.

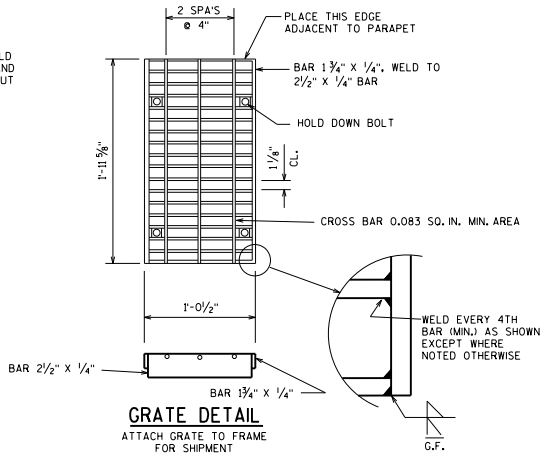
◪ FLANGED 6" DIA. DOWNSPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.

DESIGNER NOTES

ALL MATERIAL FOR FLOOR DRAINS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "FLOOR DRAINS TYPE H".

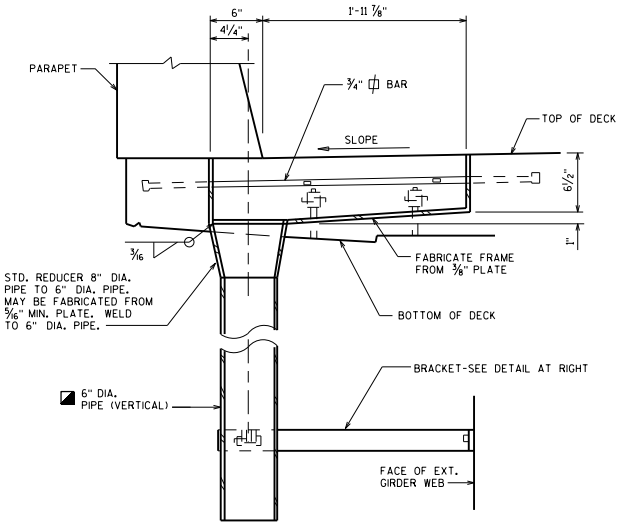
ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 6-INCH".

ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.

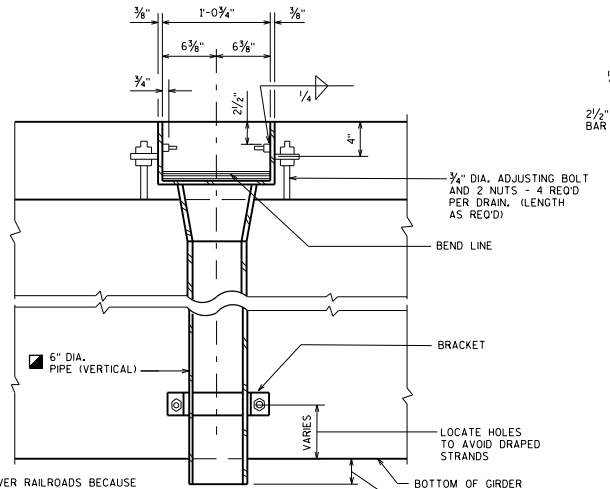


GRATE DETAIL

ATTACH GRATE TO FRAME FOR SHIPMENT

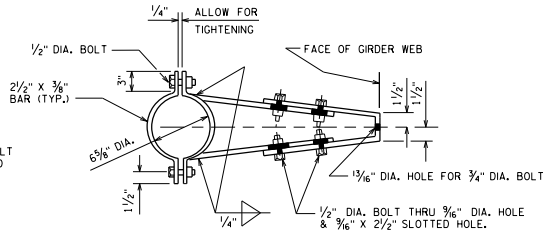


SECTION A1



◪ DETAIL NOT TO BE USED OVER RAILROADS BECAUSE IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT RAILROADS AND HARBORS SECTION FOR GUIDANCE.

SECTION A2



BRACKET DETAIL

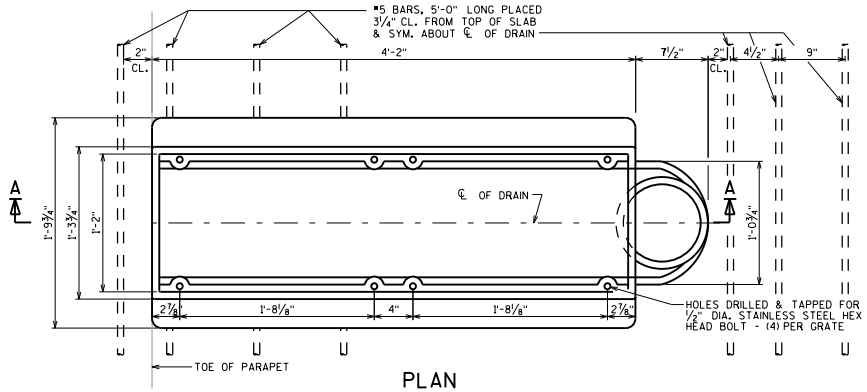
FLOOR DRAIN TYPE 'H'

BUREAU OF STRUCTURES

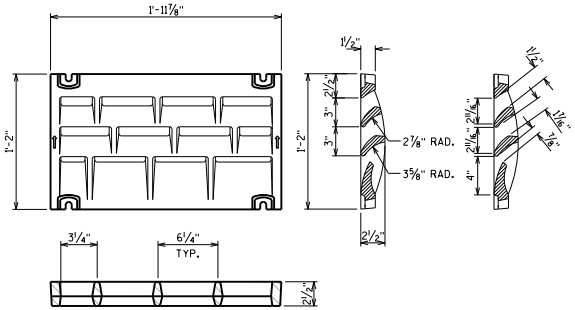
APPROVED: Bill Oliva

DATE: 7-18

STANDARD 29.02



PLAN



GRATE CASTING DETAILS

ATTACH GRATES TO FRAME FOR SHIPMENT

NOTES

ALL MATERIAL FOR TYPE "WF" CASTING AND 8" DIA. CONNECTION PIPE, EXCLUDING GRATE HOLD DOWN SCREWS, SHALL BE GRAY IRON CONFORMING TO ASTM A48, CLASS 30.

MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A36.

THE CONTRACTOR MAY PROPOSE AN ALTERNATE TYPE OF BRACKET. THE PROPOSED ALTERNATE DETAILS SHALL BE SUBMITTED AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

◪ 8" DIA. DOWNSPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP).

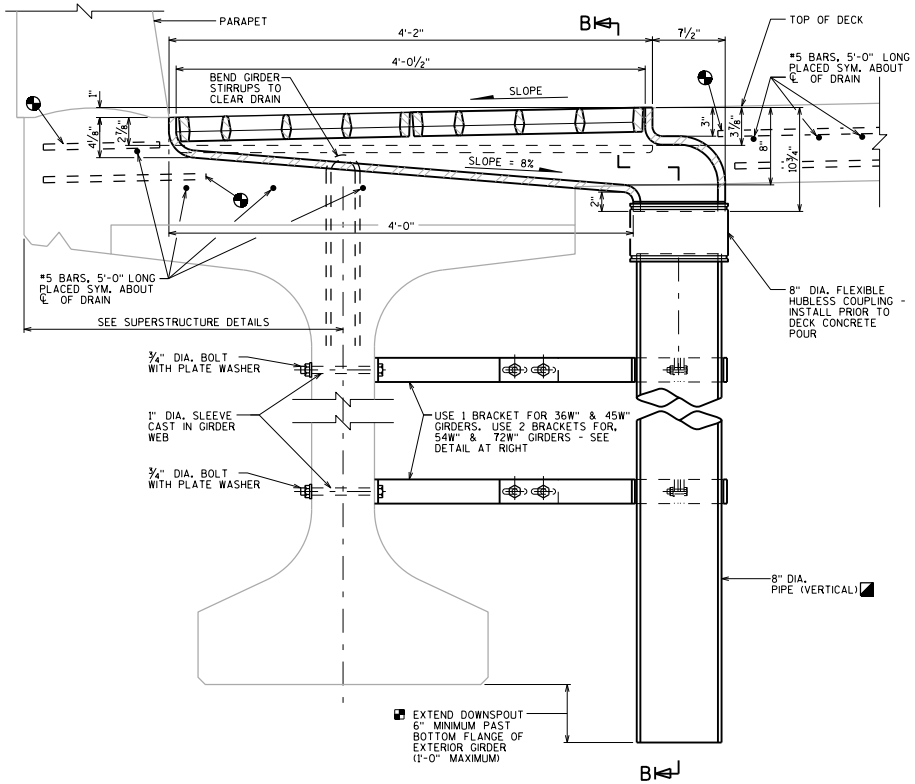
⊕ TRANSVERSE & LONGITUDINAL SLAB BAR REINFORCEMENT TO BE CUT A MAXIMUM OF 1" CLEAR FROM DRAIN FRAME. DISPLACE BARS WHERE POSSIBLE.

DESIGNER NOTES

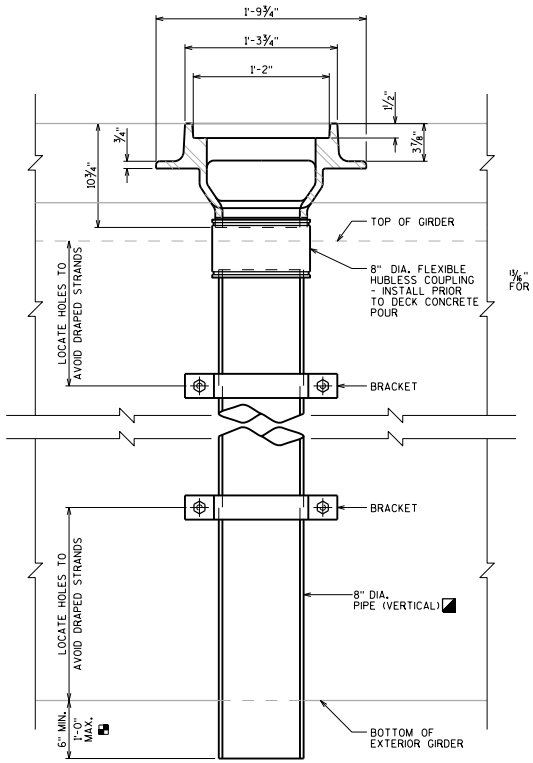
ALL MATERIAL FOR FLOOR DRAINS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "FLOOR DRAINS TYPE WF".

ALL MATERIAL FOR DOWNSPOUTS, CONNECTORS, AND BRACKETS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 8-INCH".

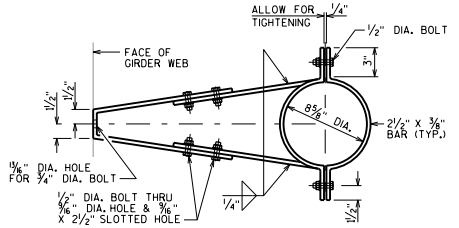
ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.



SECTION A-A



SECTION B-B



BRACKET DETAIL

◪ DETAIL NOT TO BE USED OVER RAILROADS BECAUSE IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT RAILROADS AND HARBORS SECTION FOR GUIDANCE.

FLOOR DRAIN TYPE 'WF'

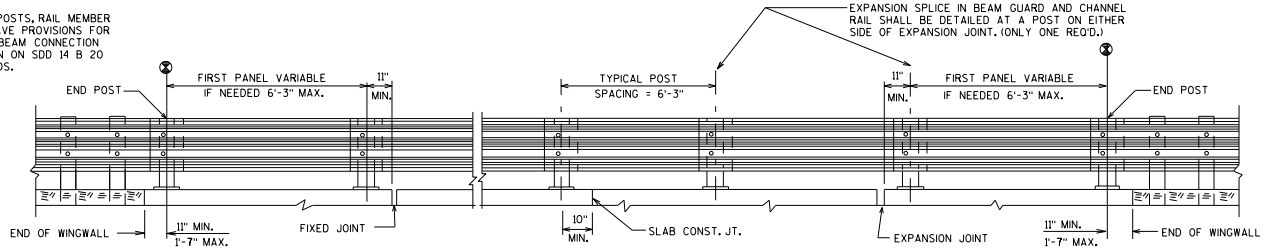
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

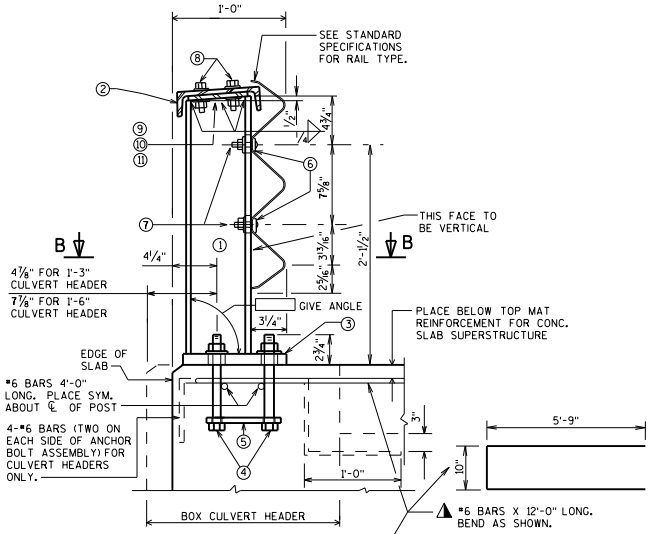
DATE: 1-17

STANDARD 29.03

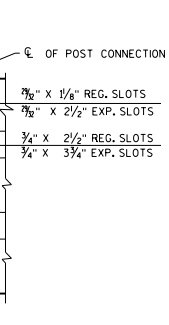
AT END POSTS, RAIL MEMBER SHALL HAVE PROVISIONS FOR A THRIE BEAM CONNECTION AS SHOWN ON SDD 14 B 20 STANDARDS.



ELEVATION OF RAILING

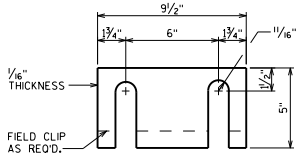


SECTION THRU RAILING



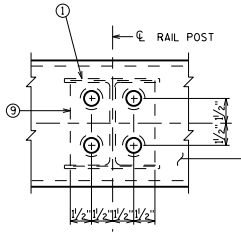
RAIL MEMBER SPLICE

⅝" DIA. BUTTON HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS.

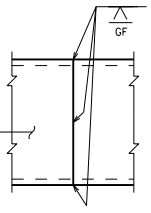


POST SHIM DETAIL

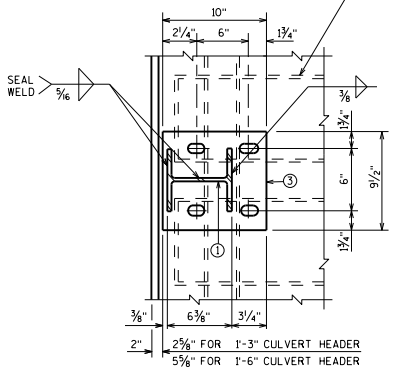
4 PER POST



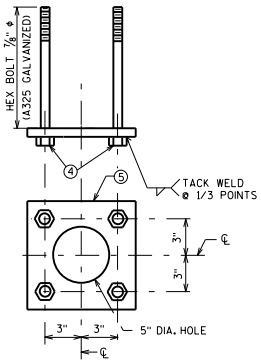
BASIC POST CONNECTION



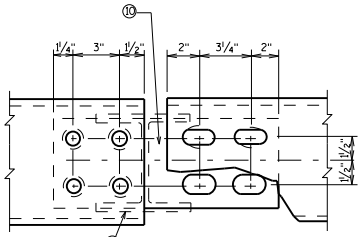
OPTIONAL SHOP SPLICE



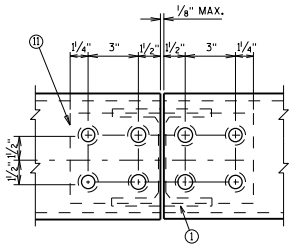
SECTION B-B



ANCHORAGE DETAIL



EXPANSION SPLICE



TYPICAL SPLICE

CHANNEL MEMBER DETAILS

SHIM PLATES 6" X 1/16" X 6" MAY BE USED BETWEEN TOP OF POST AND CHANNEL MEMBER TO ACHIEVE VERT. ALIGNMENT.

LEGEND

① W6×25 WITH 2 - ¾" × 2½" VERT. SLOTS IN FLG. (SLOT ON OTHER SIDE OF WEB IS OPTIONAL) FOR NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POSTS VERTICAL AND NORMAL TO GRADE LINE.

② C8×11.5 WITH 13/16" DIA. HOLES FOR NO. 8.

③ BASE PLATE 1" X 9½" × 10" WITH 1⅛" × 1½" SLOTTED HOLES FOR ANCHOR BOLTS NO. 4. WELD TO NO. 1 AS SHOWN.

④ A325 - ⅞" HEX BOLTS (GALVANIZED) WITH A325 NUT AND 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 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 3. CHAMFER TOP OF BOLTS BEFORE THREADING.

⑤ ¼" × 8" × 8" FLAT BAR WITH 15/16" DIA. HOLES FOR ANCHOR BOLTS NO. 4.

⑥ 1¾" × 3" MOUNTING BOLT WASHER (GALVANIZED).

⑦ ⅝" DIA. BUTTON HEAD POST MOUNTING BOLT WITH ROUND WASHER AND NUT.

⑧ ⅝" DIA. × 2" HEX BOLTS WITH NUT AND TWO WASHERS EACH.

⑨ PLATE ½" × 5¾" × 6" AT BASIC POST CONNECTION. 1¼" DIA. HOLES IN PLATE. 13/16" DIA. HOLES IN CHANNEL.

⑩ PLATE ½" × 5¾" × 1'-2½". 1¼" DIA. HOLES IN PLATE. 13/16" DIA. HOLES IN CHANNEL. EXPANSION SLOTS ON JOINT SIDE OF POST, 1 1/16" × 2¼" IN PLATE, 13/16" X 2¼" IN CHANNEL. (AT EXPANSION SPLICE.)

⑪ PLATE ½" × 5¾" × 11½". 1¼" DIA. HOLES IN PLATE, 13/16" DIA. HOLES IN CHANNEL. (AT TYPICAL SPLICE.)

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE W B-_-_" WHICH INCLUDES ALL ITEMS SHOWN.

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 CUTS.

ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 5 SHALL BE GALVANIZED AFTER FABRICATION.

PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS AND CHANNELS SHALL BE GIVEN A NO. 6 COMMERCIAL BLAST CLEANING BY SSPC SPECS.

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

FILL BOLT SLOT OPENINGS IN POST SHIMS & PLATE NO. 3 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

SEE STANDARD SPECIFICATIONS FOR RAIL TYPE.

CHANNEL MEMBER SHALL BE ATTACHED CONTINUOUSLY TO A MINIMUM OF FOUR POSTS AND A MAXIMUM OF EIGHT (EXCEPT AT ABUTMENTS).

AT EXPANSION SLOTS IN RAIL AND CHANNEL MEMBERS, TIGHTEN BOLTS, BACK OFF ONE HALF TURN AND BURR THREADS. RAIL MEMBERS SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC AND THE UPPER RAIL SHALL LAP THE LOWER RAIL.

STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REQ'D. FOR ALIGNMENT.

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

▲ TIE TO TOP MAT OF STEEL. PUT THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE. NOT REQ'D. FOR BOX CULVERT HEADERS.

⊠ PAY LIMITS FOR TYPE "W" STEEL RAILING.

WEIGHT = 45 LB/FT

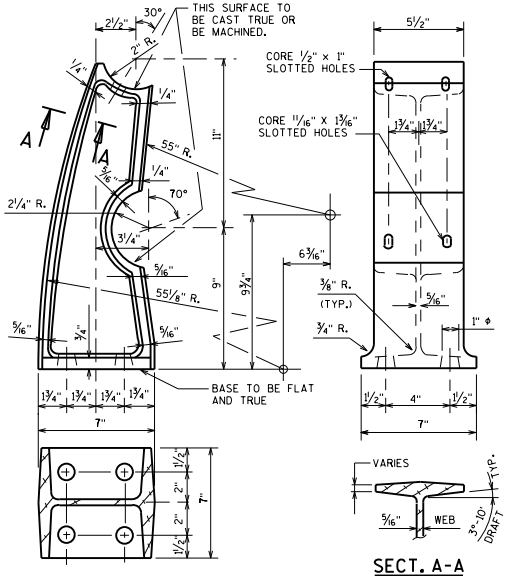
STEEL RAILING TYPE 'W'

BUREAU OF STRUCTURES

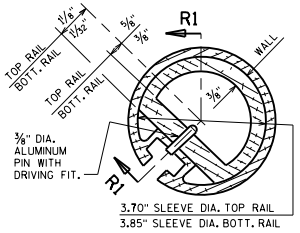
APPROVED: Bill Oliva

DATE: 1-16

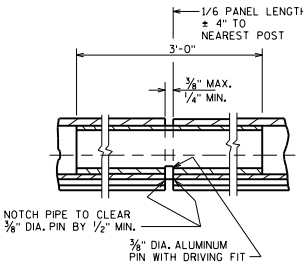
STANDARD 30.02



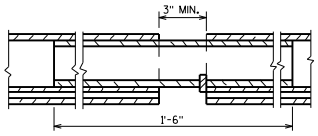
ALUMINUM POST CASTING



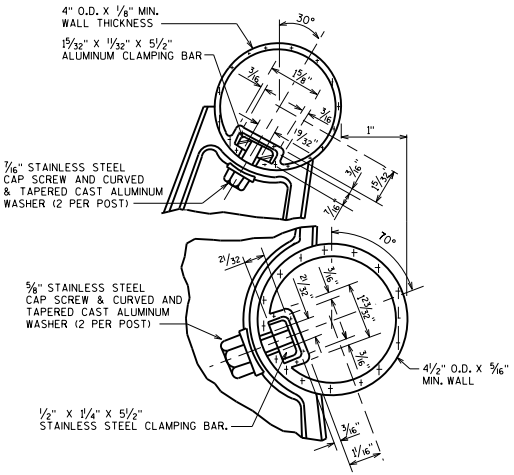
RAIL SPLICE DETAIL



SECTION R1

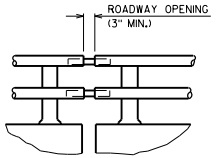


SLEEVE DETAIL AT ABUTMENT



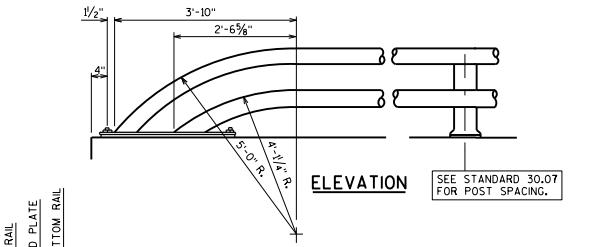
DETAIL OF ATTACHMENT TO POST

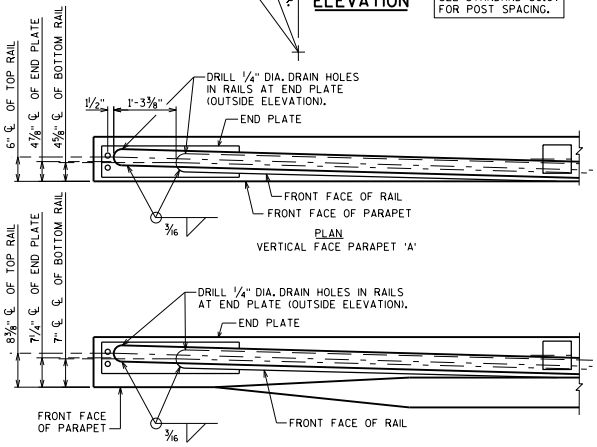
NOTES: MAX. REDUCTION IN DIAMETER OF BENT SECTION SHALL BE 3%.
WALL THICKNESS OF TUBING SHOWN ABOVE SHALL BE MIN. NOMINAL AVERAGE WALL THICKNESS.
MAX. REDUCTION IN SLOT WIDTH IN BENT TUBING SHALL BE 3/16".



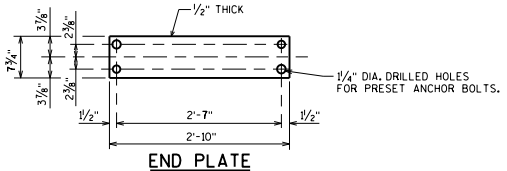
DETAIL AT RAIL OPENINGS

ALL SLEEVE DETAILS SAME AS "RAIL SPLICE DETAIL" UNLESS SHOWN OTHERWISE

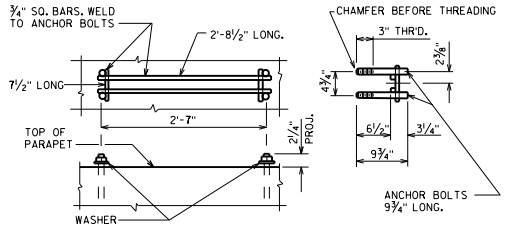




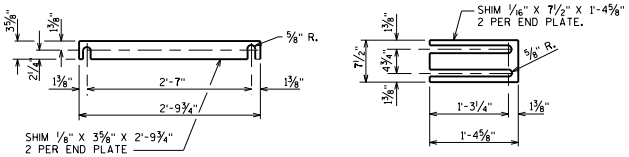
DETAIL OF RAIL BEND AT ABUTMENTS



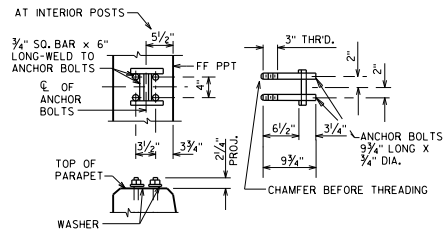
END PLATE



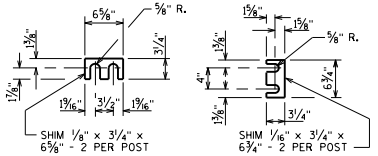
ANCHOR BOLTS AT END PLATE



END PLATE SHIM DETAILS



ANCHOR BOLTS AT POSTS



POST SHIM DETAILS

NOTES

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

SHIMS SHALL CONFORM TO SAME MATERIAL AS POSTS.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE STAINLESS STEEL.

RAILINGS SHALL BE FABRICATED IN 2 AND 3 PANEL LENGTHS.

RAILING POSTS SHALL BE SET NORMAL TO GRADE LINE.

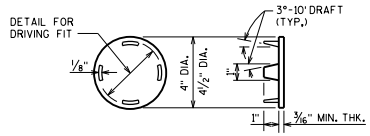
ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG CENTERLINE OF THE POST BASE.

SHIMS SHALL BE USED UNDER POSTS AND END PLATES WHERE REQ'D. FOR ALIGNMENT.

FILL ALL EXPOSED OPENINGS BETWEEN SHIMS AND POST ANCHOR BOLT HOLES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

RAILS SHALL BE BUILT STRAIGHT AND SPRUNG INTO PLACE FOR STRUCTURES CURVED UP TO 3°. FOR STRUCTURES CURVED GREATER THAN 3°, RAILS SHALL BE CURVED TO FIT.

RAILING WEIGHT = 20 LB/FT



RAIL CLOSURE CAP DETAIL

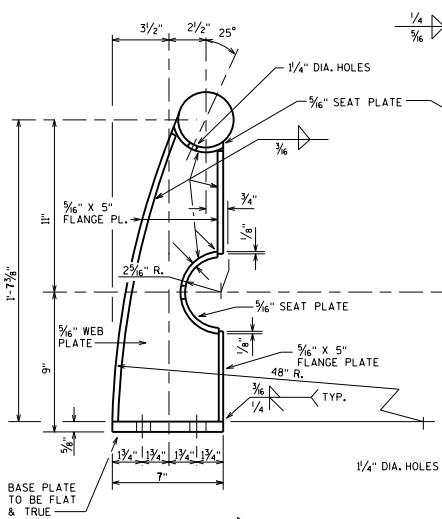
TUBULAR RAILING
TYPE 'H' (ALUM.)

BUREAU OF STRUCTURES

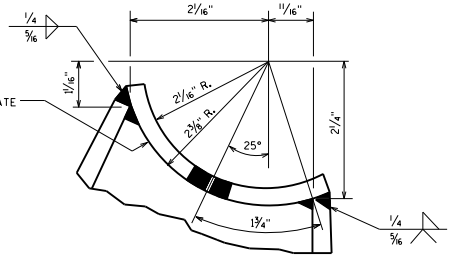
APPROVED: *Bill Oliva*

DATE: 7-18

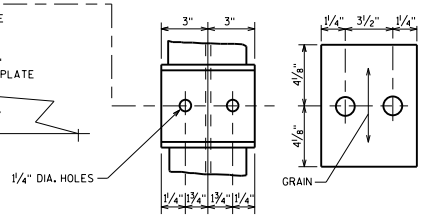
STANDARD 30.04



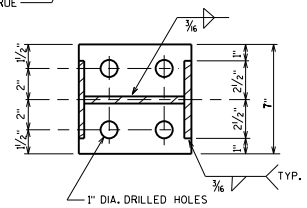
STEEL POST DETAILS



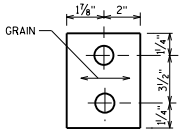
TOP RAIL SEAT PLATE



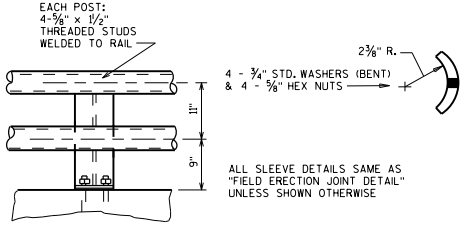
LAYOUT OF BOTTOM RAIL SEAT PL.



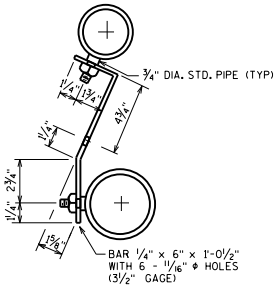
STEEL POST DETAILS



LAYOUT OF TOP RAIL SEAT PL.

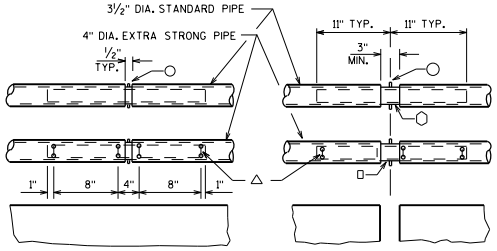


RAIL TO POST CONN.



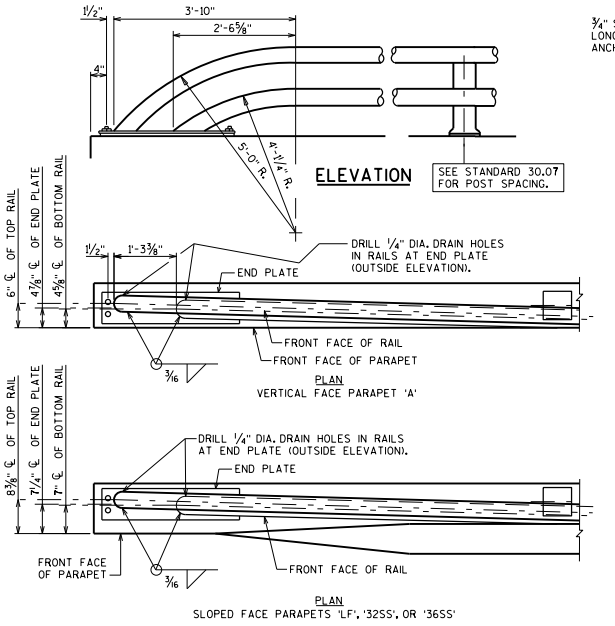
SHIPPING BAR

END SECTION ONLY

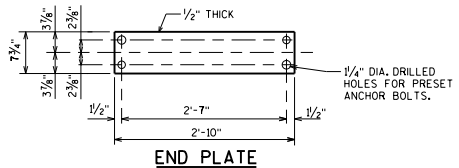


FIELD ERECTION JOINT DETAIL

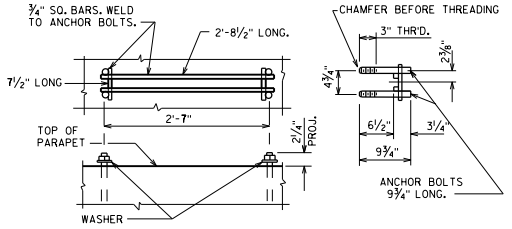
DETAIL AT RAIL OPENING



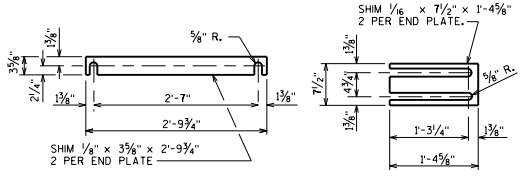
DETAIL OF RAIL BEND AT ABUTMENTS



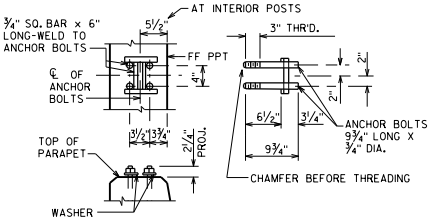
END PLATE



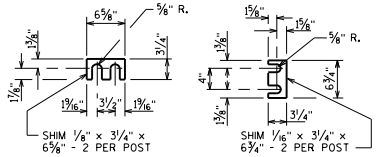
ANCHOR BOLTS AT END PLATE



END PLATE SHIM DETAILS



ANCHOR BOLTS AT POSTS



POST SHIM DETAILS

NOTES

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

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM A307. IF A307 IS USED ELECTRO-GALVANIZE NUTS, WASHERS & TOP 3½" OF ANCHOR BOLTS.

CLOSURE ENDS ON STEEL RAILING SHALL BE ¼" PLATE. WELD AND GRIND SMOOTH.

RAILINGS SHALL BE FABRICATED IN 2 AND 3 PANEL LENGTHS.

RAILING POSTS SHALL BE SET NORMAL TO GRADE LINE.

ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG CENTERLINE OF THE POST BASE.

SHIMS SHALL BE USED UNDER POSTS AND END PLATES WHERE REQ'D. FOR ALIGNMENT.

FILL ALL EXPOSED OPENINGS BETWEEN SHIMS AND POST ANCHOR BOLT HOLES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

RAILS, POSTS & SHIMS SHALL BE MADE FROM MATERIALS CONFORMING TO ASTM DESIGNATION A709, GRADE 36.

ALL MATERIALS, EXCEPT ANCHORAGES, SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.

RAILS SHALL BE BUILT STRAIGHT AND SPRUNG INTO PLACE FOR STRUCTURES CURVED UP TO 3°. FOR STRUCTURES CURVED GREATER THAN 3°, RAILS SHALL BE CURVED TO FIT.

RAILING WEIGHT = 30 LB/FT

LEGEND

- ○ 5/16" x 3/8" WELDED STUDS
- ⬡ 3" DIA. STD. PIPE x 1'-10" LONG
- □ 3" DIA. EXTRA STRONG PIPE x 1'-10" LONG
- △ ½" DIA. WELD BEADS AT 1/3 PTS. ON PIPE 11" CIRCUMF. GRIND BEADS SO THAT SLEEVE FITS FREELY IN THE I.D. OF 4" DIA. EXTRA STRONG PIPE.

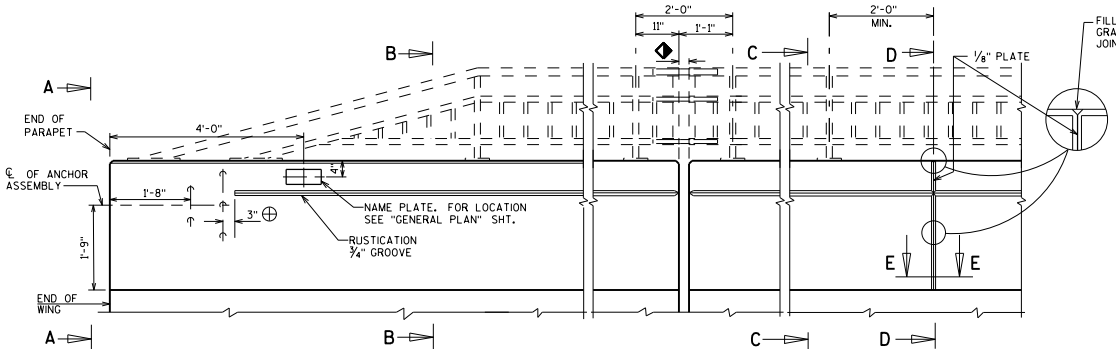
TUBULAR RAILING TYPE 'H' (STEEL)

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

STANDARD 30.05



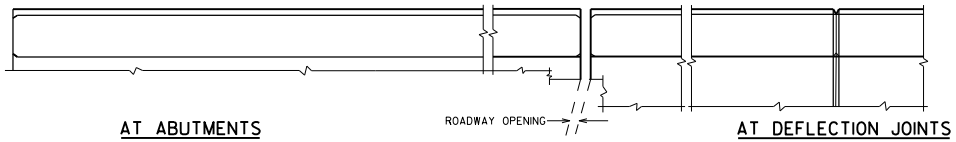
AT ABUTMENTS

AT DEFLECTION JOINTS

⊕ EXTEND 3/4" GROOVE TO END OF PARAPET WHEN ANCHOR ASSEMBLY IS NOT USED

ELEVATION OF PARAPET

◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR A1 ABUTMENTS

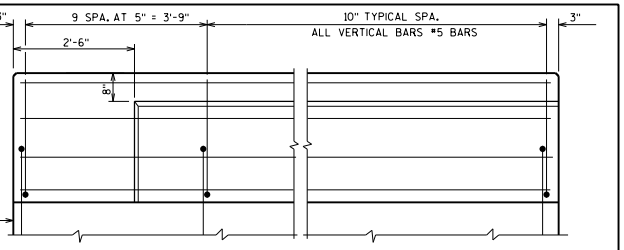


AT ABUTMENTS

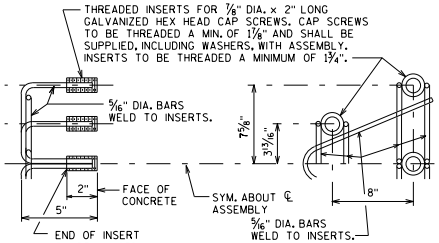
AT DEFLECTION JOINTS

PLAN OF PARAPET

(RAILING NOT SHOWN FOR CLARITY)



VIEW SHOWING OUTSIDE FACE OF PARAPET & REINF.



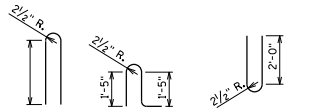
DETAIL OF ANCHOR ASSEMBLY

NOTE: HEX. HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 CLASS C.

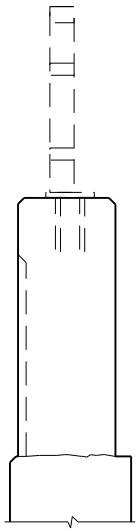
ASSEMBLY BID ITEM SHALL BE "ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD", EACH.

BILL OF BARS

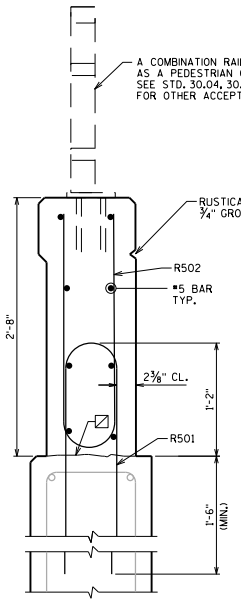
BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	BAR SERIES	LOCATION
R501	X			X		PARAPET VERT.
R502	X		4'-9"	X		PARAPET VERT.
S501	X		4'-4"	X		PARAPET VERT.
S502	X		4'-9"	X		PARAPET VERT.



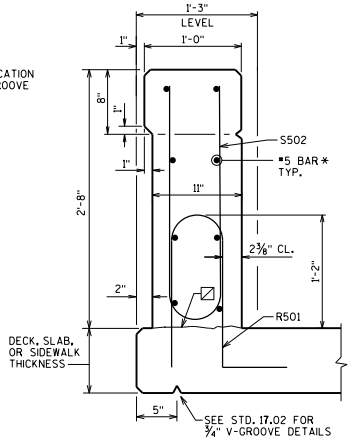
R501 S501 R502/S502



VIEW A

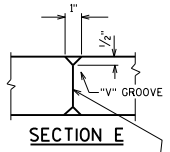


SECTION B

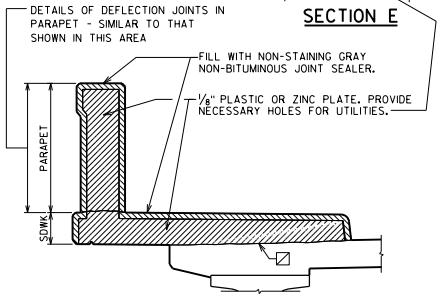


SECTION C

(PARAPET ON DECK, SLAB, OR SIDEWALK)
(RAILING NOT SHOWN FOR CLARITY)



SECTION E



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.

NOTE

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF 1/8" ZINC OR PLASTIC PLATE CUT AS SHOWN IN SECTION "D" BY SHADED AREA. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH AN APPROVED LIQUID BOND BREAKER AND PLATE SEPARATORS MAY BE OMITTED.

LEGEND

☒ HORIZ. CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH.

* OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT, LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 3/4" - 'V' GROOVE.

DESIGNER NOTE

A A501 BAR MAY BE USED IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

	PARAPET
AREA	2.50 SF
WEIGHT	375 LB/FT

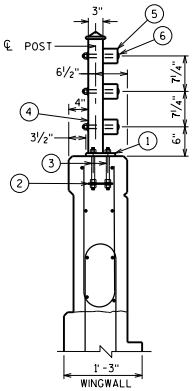
VERTICAL FACE PARAPET 'A'

BUREAU OF STRUCTURES

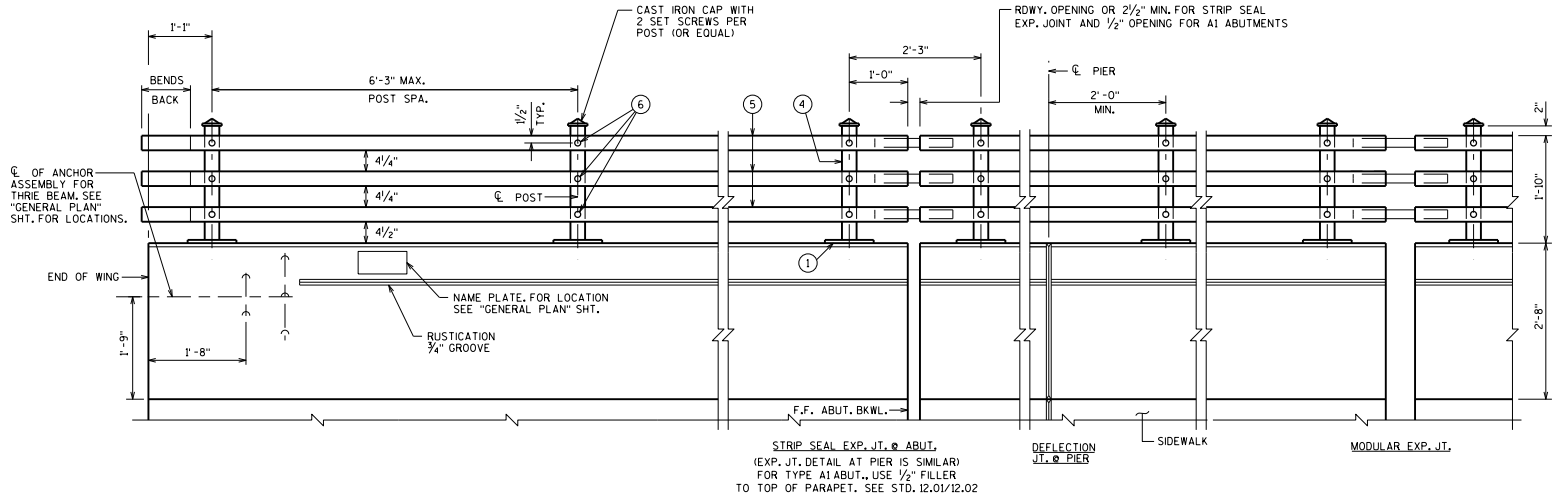
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 30.07

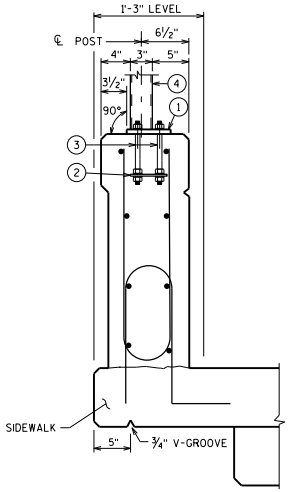


END VIEW



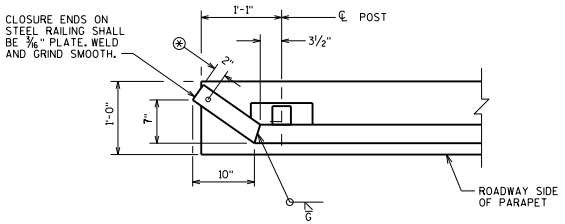
INSIDE ELEVATION

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A ¾" "V"-GROOVE.



SECTION THRU PARAPET ON BRIDGE

* ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD.



END POST DETAIL

* ¾" DIA. DRAIN HOLE IN BOTTOM OF ALL TUBES.

DESIGNER NOTES

SEE STANDARD 30.09 FOR ADDITIONAL RAILING DETAILS

SEE STANDARD 30.07 FOR:
- DEFLECTION JOINT DETAILS AND NOTES
- BEAM GUARD ANCHOR ASSEMBLY DETAILS
- SIDEWALK REINFORCEMENT AND DETAILS
- PARAPET REINFORCING BAR SIZE AND SPACING

STEEL RAILING WEIGHT = 25 LB/FT
BASED ON 6'-3" POST SPA.

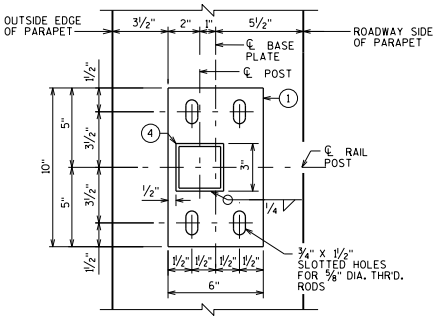
COMBINATION RAILING TYPE '3T'

BUREAU OF STRUCTURES

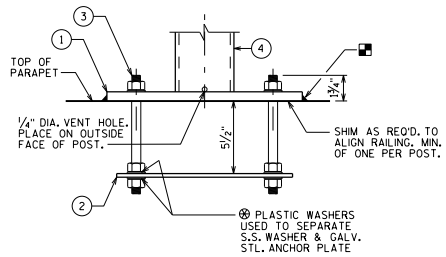
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 30.08



TYPICAL RAIL POST BASE PLATE



ANCHORAGE FOR RAIL POSTS

✪NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

LEGEND

(1) BASE PLATE ⅝" X 6" X 10" WITH ¾" X 1½" SLOTTED HOLES FOR THR'D RODS NO. 3. WELD TO NO. 4 AS SHOWN. SLOTS PARALLEL TO LONG SIDE OF PLATE.

(2) ¼" X 5" X 9" ANCHOR PLATE (GALVANIZED) WITH 11/16" DIA. HOLES FOR THR'D. RODS NO. 3.

(3) ⅝" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ✪

(4) STRUCTURAL TUBING 3" X 3" X 3/16" POSTS, PLACE VERTICAL. WELD TO NO. 1, AND USE 1" DIA. HOLES (FRONT AND BACK) FOR BOLT NO. 6.

(5) STRUCTURAL TUBING 3" X 3" X 3/16" RAILS, WITH 11/16" DIA. HOLES (FRONT AND BACK) FOR BOLT NO. 6. BOLT TO NO. 4.

(6) ⅝" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/16" X 1½" X 1½" WASHER, AND LOCK WASHER.

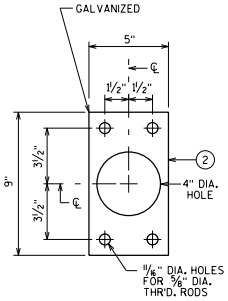
(9) RECTANGULAR SLEEVE FABRICATED FROM 3/16" PLATES. PROVIDE "SLIDING FIT".

(10) RECTANGULAR SLEEVE FABRICATED FROM 3/16" PLATES. (1'-4" ⊠ FIELD ERECTION JTS.) (1'-4" ⊠ STRIP SEAL EXP. JTS.)

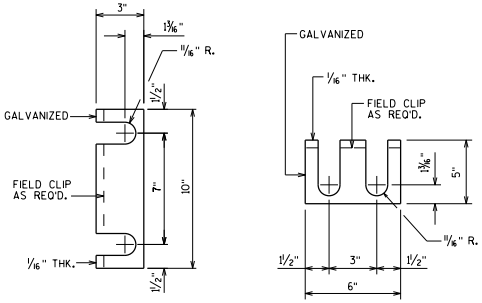
(11) SLEEVE FABRICATED FROM STRUCTURAL TUBING 2½" X 2½" X 3/16" X '- " LONG. SLOTTED HOLES IN TOP AND BOTTOM.

(12) ½" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCKWASHER.

✪ ALTERNATIVE ANCHORAGE: 4 EQUIVALENT STAINLESS STEEL CONCRETE ADHESIVE ANCHORS ⅝-INCH, EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.



ANCHOR PLATE



RAIL POST SHIM DETAIL

(2 SETS PER POST)

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE 3T B-_-_", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.

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.

ENDS OF STRUCTURAL TUBING SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.

ALL PLATES, AND RECTANGULAR SLEEVES SHALL CONFORM TO ASTM A709 GRADE 36. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B.

ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET NORMAL TO GRADE.

CUT BOTTOM OF POST TO MAKE POST VERTICAL IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTION.

STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATE NO. 1, WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

◪ CAULK AROUND PERIMETER OF BASE PLATES, NO. 1, AND FILL BOLT SLOT OPENINGS IN SHIMS AND BASE PLATES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

ALL JOINTS IN CONCRETE PARAPET ARE TO BE VERTICAL.

ALL MATERIAL (EXCEPT NO. 3 & 12) SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, THE STEEL RAILING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.

VENT HOLES SHALL BE DRILLED IN POST AND RAIL MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.

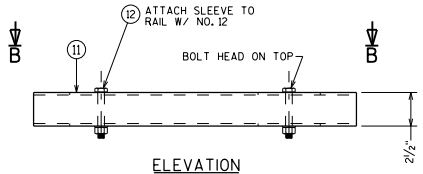
RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE 3 OR 4 POSTS.

WHEN PAINTING REQ'D: (ADD)

PAINT OVER GALVANIZING (EXCEPT NO. 2) WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. ☐, ☐ (FILL IN COLOR NAME).

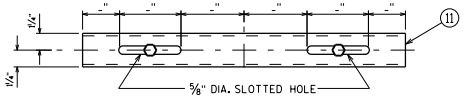
INSIDE OF TUBES TO BE PAINTED AT ALL FIELD ERECTION AND EXPANSION JOINTS.

TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.



ELEVATION

(USE FOR EACH RAIL MEMBER)

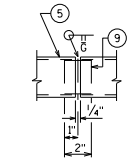


SECTION B-B

SLEEVE DETAIL

(AT MODULAR EXP. JT.)

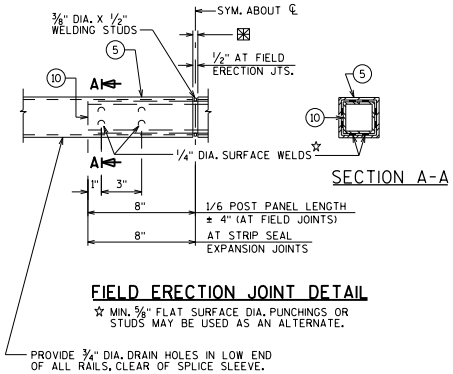
NOTE: CONSTRUCT BOTTOM RAIL AND SLEEVE CONNECTION FIRST, THEN MIDDLE RAIL, AND THEN TOP RAIL, TO ALLOW EASE IN PLACEMENT OF BOLT NO. 12.



SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)

◪ RDWY. OPENING OR 2½" MIN. FOR STRIP SEAL EXP. JOINT AND ½" OPENING FOR A1 ABUTMENTS



FIELD ERECTION JOINT DETAIL

☆ MIN. ⅝" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.

PROVIDE ¾" DIA. DRAIN HOLES IN LOW END OF ALL RAILS, CLEAR OF SPLICE SLEEVE.

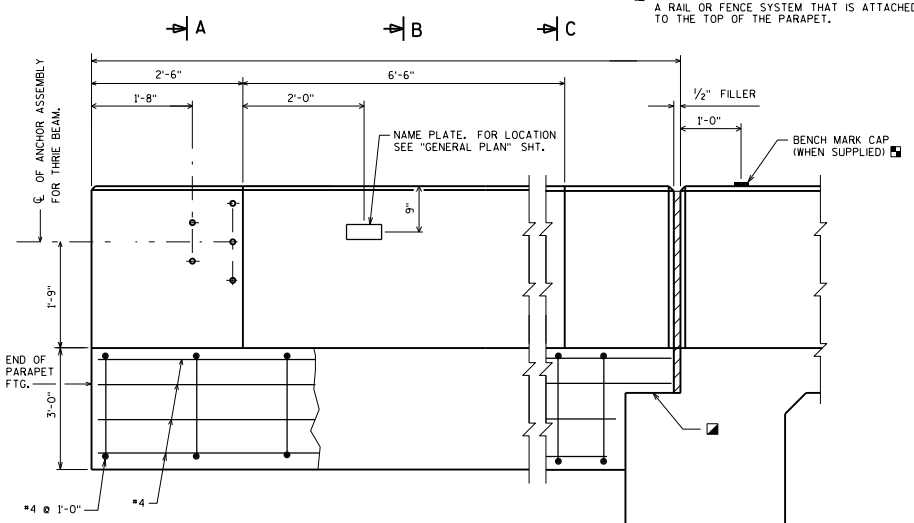
COMBINATION RAILING TYPE '3T' DETAILS

BUREAU OF STRUCTURES

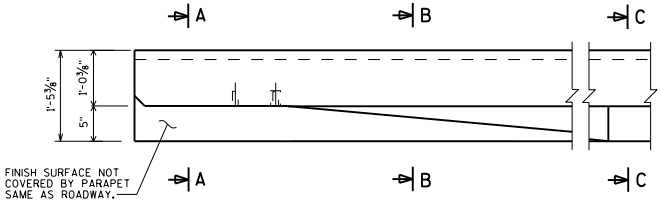
APPROVED: Bill Oliva

DATE: 1-19

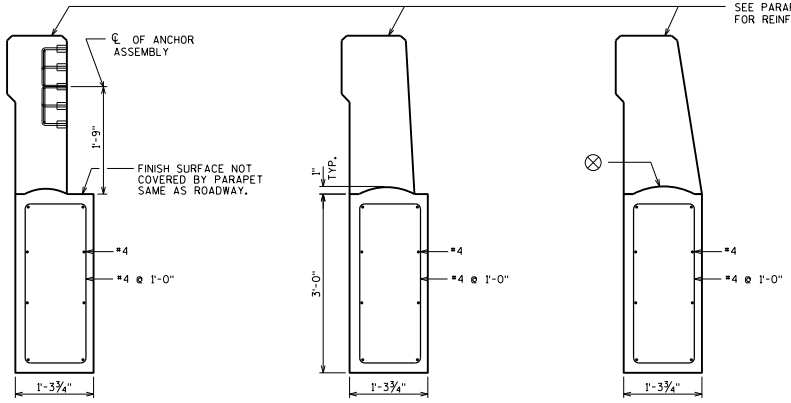
STANDARD 30.09



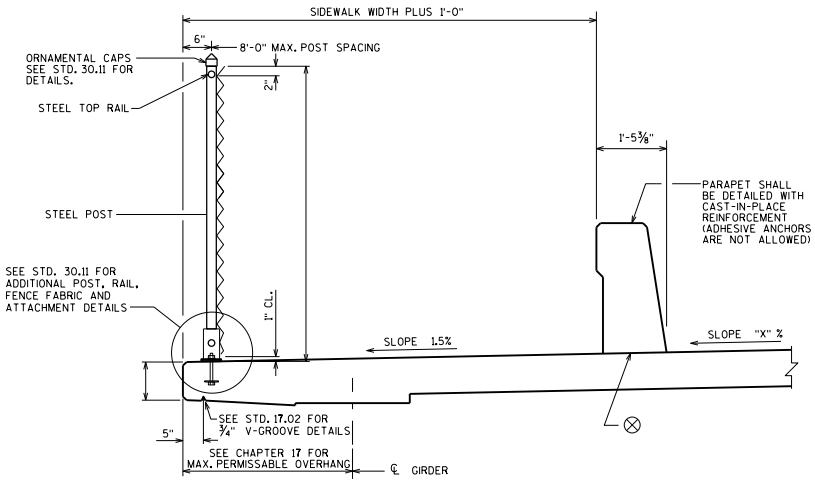
INSIDE ELEVATION



PLAN



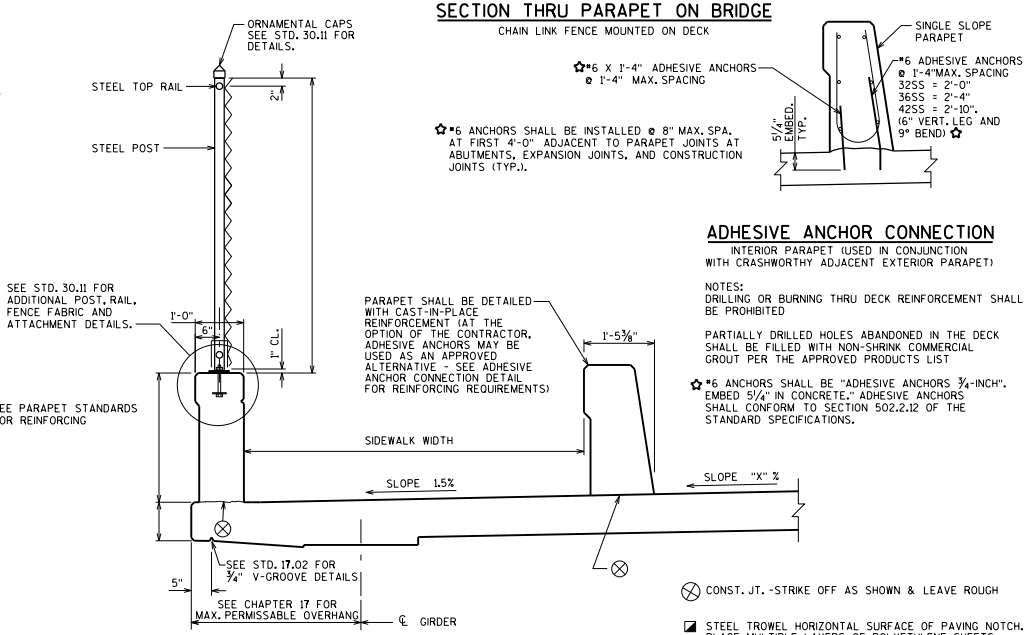
SECTION A SECTION B SECTION C



SECTION THRU PARAPET ON BRIDGE

CHAIN LINK FENCE MOUNTED ON DECK

✿#6 ANCHORS SHALL BE INSTALLED @ 8" MAX. SPA. AT FIRST 4'-0" ADJACENT TO PARAPET JOINTS AT ABUTMENTS, EXPANSION JOINTS, AND CONSTRUCTION JOINTS (TYP.).



SECTION THRU PARAPET ON BRIDGE

CHAIN LINK FENCE MOUNTED ON PARAPET

ADHESIVE ANCHOR CONNECTION

INTERIOR PARAPET (USED IN CONJUNCTION WITH CRASHWORTHY ADJACENT EXTERIOR PARAPET)

NOTES:
DRILLING OR BURNING THRU DECK REINFORCEMENT SHALL BE PROHIBITED

PARTIALLY DRILLED HOLES ABANDONED IN THE DECK SHALL BE FILLED WITH NON-SHRINK COMMERCIAL GROUT PER THE APPROVED PRODUCTS LIST

✿#6 ANCHORS SHALL BE "ADHESIVE ANCHORS ¾-INCH". EMBED 5¼" IN CONCRETE." ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

⊗ CONST. JT. -STRIKE OFF AS SHOWN & LEAVE ROUGH

◪ STEEL TROWEL HORIZONTAL SURFACE OF PAVING NOTCH. PLACE MULTIPLE LAYERS OF POLYETHLENE SHEETS BETWEEN PARAPET FOOTING AND HORIZONTAL SURFACE OF PAVING NOTCH. TOTAL THICKNESS OF SHEETS SHALL BE AT LEAST 0.03".

DESIGNER NOTES

'32SS' PARAPET SHOWN IN THIS STANDARD. FOR DETAILS, INCLUDING REINFORCING, SEE STANDARD 30.30. SEE STANDARDS 30.31, 30.32, AND 30.33 FOR SIMILAR DETAILS USED WITH OTHER PARAPET TYPES.

ALL PARAPET FOOTING BARS SHALL BE EPOXY COATED.

DO NOT SHOW THE ADHESIVE ANCHOR CONNECTION DETAIL ON THE PLAN. THE CONTRACTOR MAY REQUEST THIS DETAIL IF DESIRED.

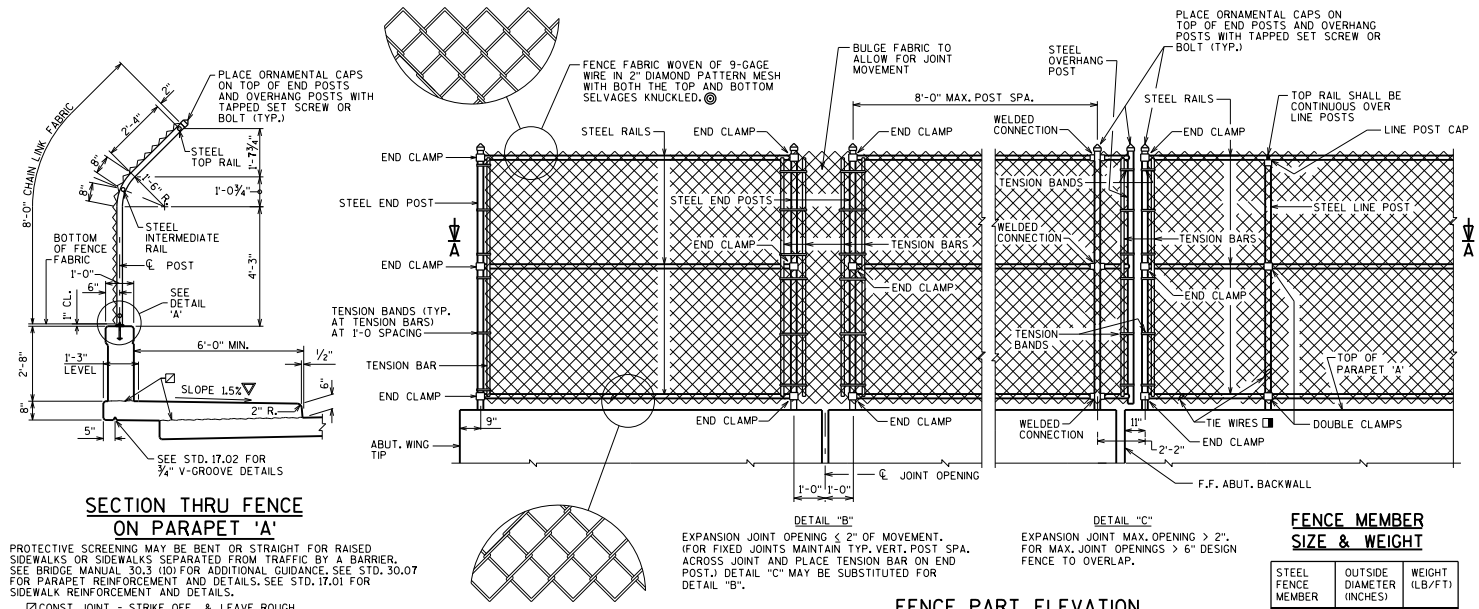
PARAPET FOOTING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 30.10



SECTION THRU FENCE ON PARAPET 'A'

PROTECTIVE SCREENING MAY BE BENT OR STRAIGHT FOR RAISED SIDEWALKS OR SIDEWALKS SEPARATED FROM TRAFFIC BY A BARRIER. SEE BRIDGE MANUAL 30.3 (10) FOR ADDITIONAL GUIDANCE. SEE STD. 30.07 FOR PARAPET REINFORCEMENT AND DETAILS. SEE STD. 17.01 FOR SIDEWALK REINFORCEMENT AND DETAILS.

☑CONST. JOINT - STRIKE OFF & LEAVE ROUGH

▽ ±0.5% CONSTRUCTION TOLERANCE IN SIDEWALK CROSS SLOPE. THE SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

DETAIL "B"

EXPANSION JOINT OPENING ≤ 2" OF MOVEMENT. (FOR FIXED JOINTS MAINTAIN TYP. VERT. POST SPA. ACROSS JOINT AND PLACE TENSION BAR ON END POST.) DETAIL "C" MAY BE SUBSTITUTED FOR DETAIL "B".

DETAIL "C"

EXPANSION JOINT MAX. OPENING > 2". FOR MAX. JOINT OPENINGS > 6" DESIGN FENCE TO OVERLAP.

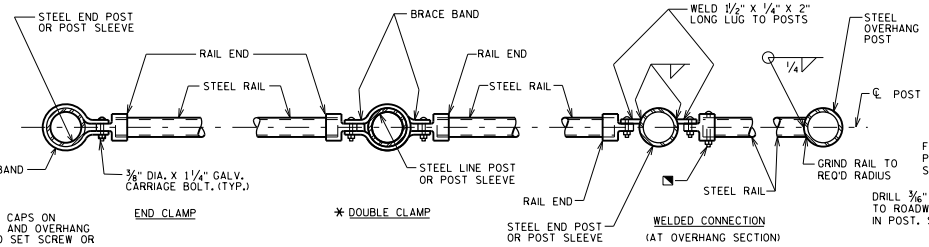
FENCE PART ELEVATION

(OUTSIDE VIEW OF PARAPET 'A')

FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
RAILS	1.660	2.27
END POST	2.875	5.80
OVERHANG POST	2.875	5.80
LINE POST	2.375	3.65
POST SLEEVE	4.000	9.12

WEIGHT OF CHAIN LINK FENCE: (BASED ON 8 FT. POST SPACING)
6 FT. HIGH FENCE = 18 LB / FT
8 FT. HIGH FENCE = 21 LB / FT



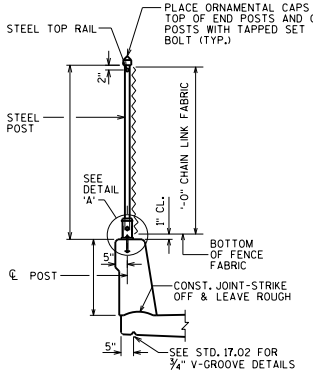
END CLAMP

✱ DOUBLE CLAMP

WELDED CONNECTION (AT OVERHANG SECTION)

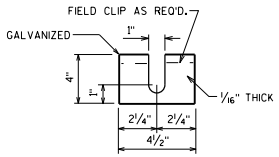
SECTION A-A

NOTE: PLACE ALL BOLT HEADS ON SIDE OF FENCE ADJACENT TO PEDESTRIANS



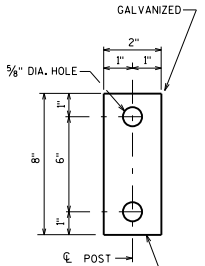
SECTION THRU FENCE ON SINGLE SLOPE PARAPET

FOR TRAFFIC BARRIER APPLICATION, USE VERTICAL POST (NO BEND)



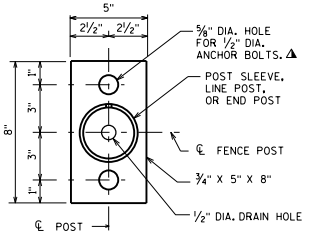
POST SHIM DETAILS

SHIMS REQUIRED ONLY WHEN END POSTS AND LINE POSTS ARE WELDED TO BASE PLATES. PROVIDE 4 SHIMS PER POST. USE WHERE REQUIRED FOR ALIGNMENT.

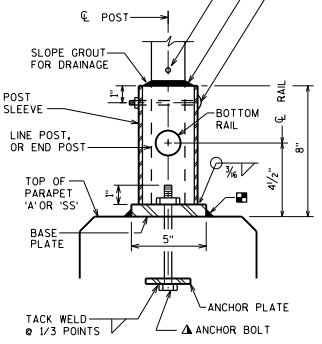


ANCHOR PLATE

✪NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



BASE PLATE



DETAIL 'A'

UNIT SHALL BE GALVANIZED AFTER FABRICATION

NOTE: IN LIEU OF USING THE POST SLEEVE, THE FENCE POST MAY BE WELDED TO THE BASE PLATE.

NOTES

POSTS ARE TO BE SET VERTICAL.

METALLIC-COATED FENCE SYSTEM:
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT THE FENCE FABRIC WHICH MAY BE ALUMINUM- COATED STEEL OR GALVANIZED STEEL.

FABRIC SHALL CONFORM TO ASTM A491 OR A392, CLASS 2. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626.

THE BID ITEM SHALL BE "FENCE CHAIN LINK _- FT."

POLYMER-COATED FENCE SYSTEM:
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL WITH A COLORED POLYMER-COATING ON THE OUTSIDE.

FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626. SEE THE "BRIDGE SPECIAL PROVISIONS" FOR ADDITIONAL DETAILS.

THE COLOR OF POLYMER-COATING FOR THIS STRUCTURE SHALL BE (SPECIFY: DARK GREEN, BROWN OR BLACK) IN ACCORDANCE WITH ASTM F934.

THE BID ITEM SHALL BE "FENCE CHAIN LINK POLYMER - COATED _- FT. B-_-_"

COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.

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.

BASE PLATES, ANCHOR PLATES AND SHIMS SHALL BE ASTM A709, GRADE 36.

ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG THE C/L OF THE POST.

◪ CAULK AROUND PERIMETER OF BASE PLATE AND FILL PORTION OF SLOTTED HOLE AROUND ANCHOR BOLT IN SHIM WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

✱ ALTERNATE TO DOUBLE CLAMP: USE LINE RAIL CLAMP (BOULEVARD) OR 180° BRACE BAND, WHICH MAY BE USED WHEN THE POSTS ARE EITHER BOLTED TO THE POST SLEEVES OR DIRECTLY WELDED TO THE BASE PLATE.

◭ ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM 307. IF 307 IS USED, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.✪

✪ ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS ⅝-INCH. EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

◨ ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH TIE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".

◹ BOLT RAIL TO RAIL END TO SECURE OVERHANG SECTION. ALTERNATE IS TO WELD RAIL DIRECTLY TO END POST.

MINIMUM LENGTH OF TOP RAIL BETWEEN SPLICES SHALL BE 20'-0". LOCATE SPLICES NEAR ¼ POINT OF POST SPACING.

DESIGNER NOTES

THE CHAIN LINK FENCE SYSTEM SELECTED FOR THE STRUCTURE SHALL BE A "METALLIC-COATED FENCE SYSTEM" OR A "POLYMER-COATED FENCE SYSTEM".

◎ A 1" MESH MAY BE USED ON PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE 11-35-1 FOR PROTECTIVE SCREENING.

PEDESTRIAN RAILING MAY BE USED ON WINGWALL PARAPETS IF CHAIN LINK FENCE DOES NOT CONTINUE BEYOND BRIDGE.

HANDRAILS SHALL BE USED ALONG BRIDGE SIDEWALKS WHERE THE SLOPE OF THE SIDEWALK IS GREATER THAN 5%. TOP OF HANDRAIL GRIPPING SURFACES SHALL BE MOUNTED BETWEEN 30" & 34" ABOVE SIDEWALK SURFACE. USE 30" NEAR SCHOOL ZONES. IF FEASIBLE, HANDRAILS SHALL BE PROVIDED ALONG BOTH SIDES OF SIDEWALK. FOR HANDRAIL DETAILS SEE STANDARD 37.02.

THE DESIGN ENGINEER SHALL DESIGN THE SUPERSTRUCTURE TO ACCOUNT FOR THE MAXIMUM 2% SIDEWALK CROSS SLOPE.

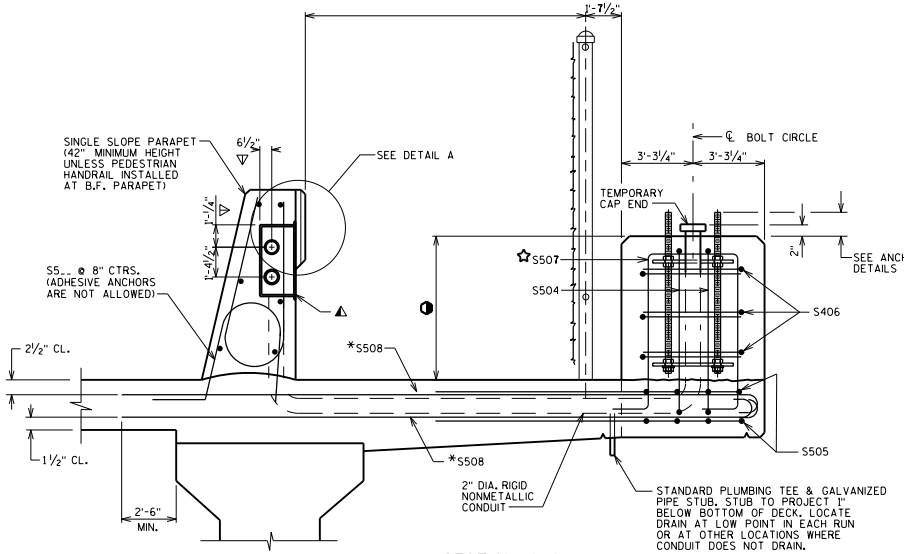
CHAIN LINK FENCE DETAILS

BUREAU OF STRUCTURES

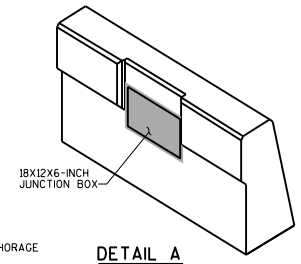
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 30.11

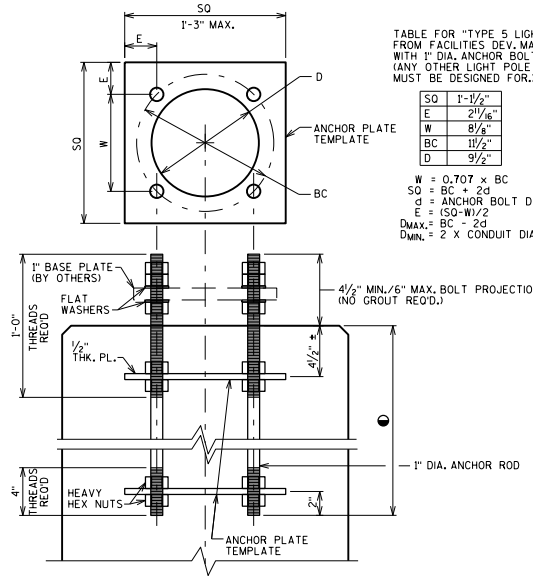


SECTION A-A



DETAIL A

SHOWING B.F. OF PARAPET WITH BLOCK OUT FOR JUNCTION BOX.

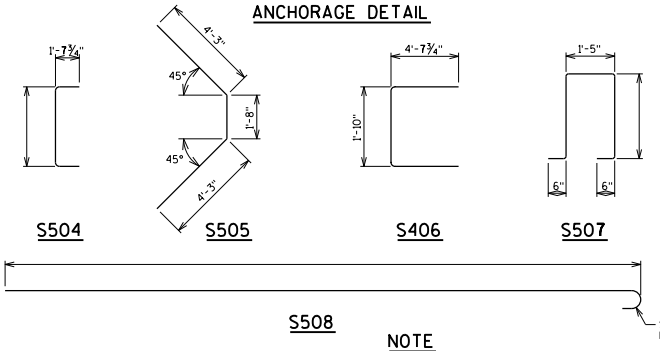


ANCHORAGE DETAIL

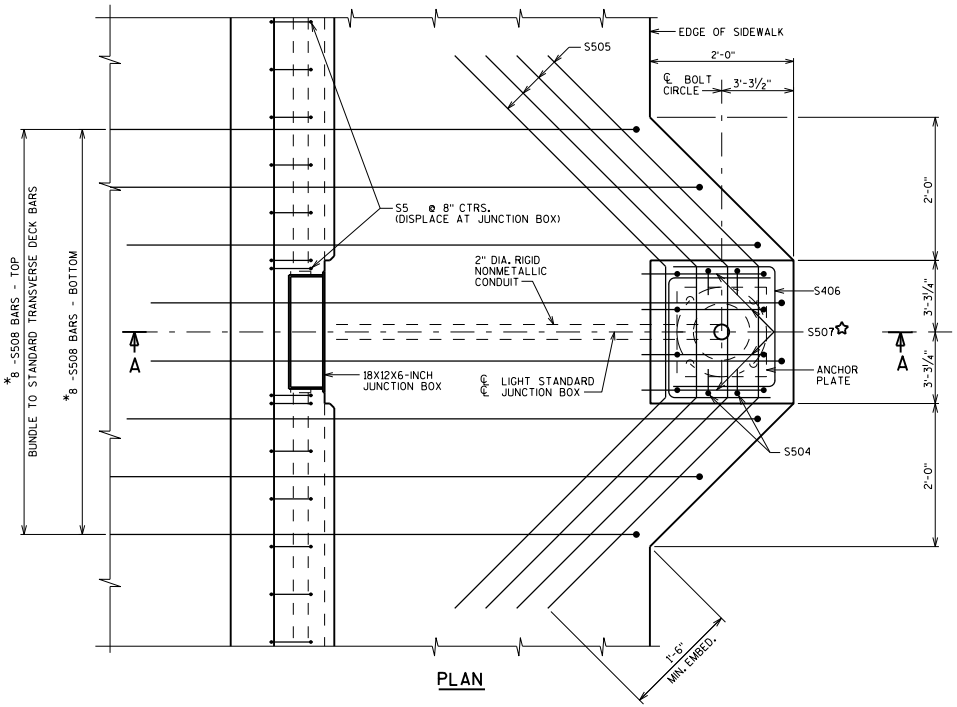
TABLE FOR "TYPE 5 LIGHT POLE" FROM FACILITIES DEV. MANUAL WITH 1" DIA. ANCHOR BOLTS. (ANY OTHER LIGHT POLE TYPE MUST BE DESIGNED FOR.)

SQ	1'-1½"
E	2 11/16"
W	8⅛"
BC	11½"
D	9½"

W = 0.707 x BC
SQ = BC + 2d
d = ANCHOR BOLT DIA.
E = (SQ-W)/2
$D_{MAX.}$ = BC - 2d
$D_{MIN.}$ = 2 X CONDUIT DIA. + 1"



S508



PLAN

● STAND-ALONE PEDESTAL
- 1" DIA. ANCHOR BOLTS = 2'-0"
- < 1" DIA. ANCHOR BOLTS = 1'-3"

◐ STAND-ALONE PEDESTAL
- 1" DIA. ANCHOR BOLTS = 1'-11"
- < 1" DIA. ANCHOR BOLTS = 1'-2"

PARAPET BLISTER
- SEE STANDARD 30.21

◭ CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE.

▽ LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.

☆ TIE IN PLACE AFTER ANCHOR BOLT ASSEMBLY LOCATED.

* THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK.

BILL OF BARS

BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	LOCATION
S504	X			X	LIGHT STD., VERT.
S505	X		10-2	X	LIGHT STD., HORIZ. IN DECK
S406	X		4-6	X	LIGHT STD., HORIZ.
S507	X			X	LIGHT STD., VERT.
S508	X			X	LIGHT STD., TRANSV. IN DECK

NOTE

BID ITEM SHALL BE "ANCHOR ASSEMBLIES LIGHT POLES ON STRUCTURES", EACH

DESIGNER NOTES

ANCHORAGE DETAIL FOR "TYPE 5 LIGHT POLE". ANCHORAGE FOR OTHER LIGHT POLE TYPES MUST BE DESIGNED.

SEE STD. 30.11 FOR FENCE DETAILS.

SEE STD. 30.21 FOR
- ADDITIONAL NOTES
- END OF BRIDGE DETAILS

THIS STANDARD IS NOT INTENDED TO BE USE WITH TRANSFORMER BASES.

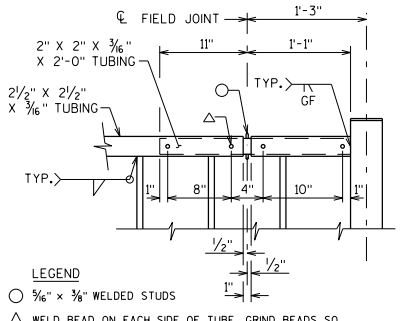
THIS STANDARD ACCOMMODATES A MAXIMUM 15" DIA. BOLT HOLE CIRCLE AND A MAXIMUM 15" X 15" SQUARE ANCHOR PLATE WITH (4) - 1" DIA. ANCHOR BOLTS. THIS STANDARD IS BASED ON A 8" MIN. DECK THICKNESS.

LIGHTING DETAIL

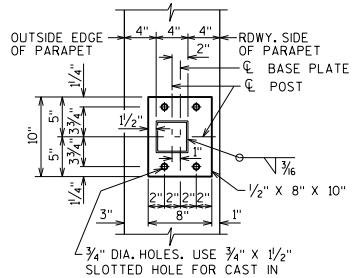
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

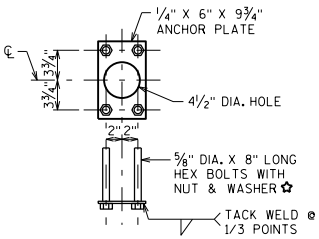
DATE: 1-18



RAILING EXPANSION JOINT DETAIL



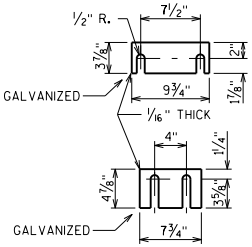
BASE PLATE



ANCHORAGE DETAIL

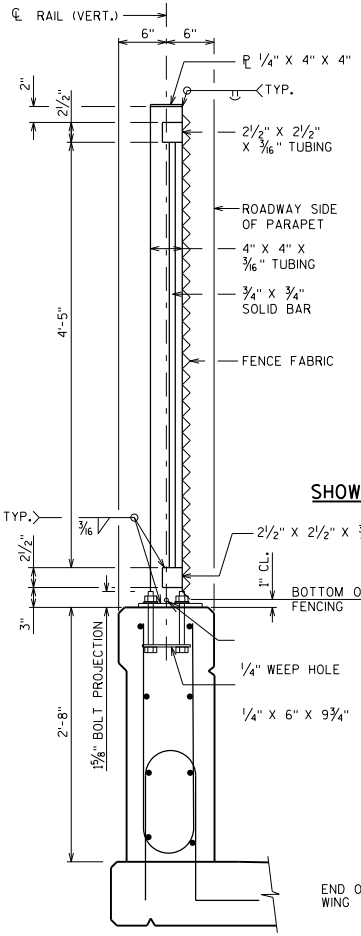
✿ ALTERNATIVE ANCHORAGE: ADHESIVE ANCHORS ⅝-INCH. EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



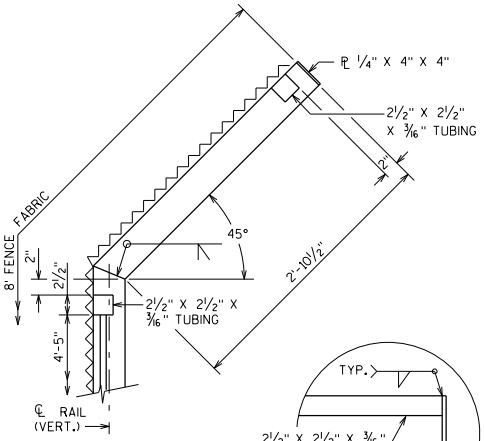
SHIM PLATE DETAILS

TWO SHIMS OF EACH SIZE REQUIRED PER POST

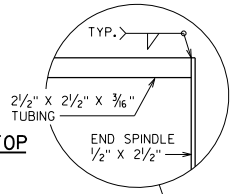


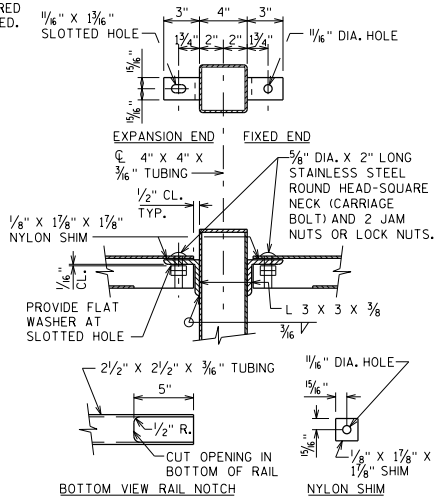
SECTION THRU RAILING

(SEE STD. 30.07 FOR PARAPET REINFORCEMENT AND DETAILS)

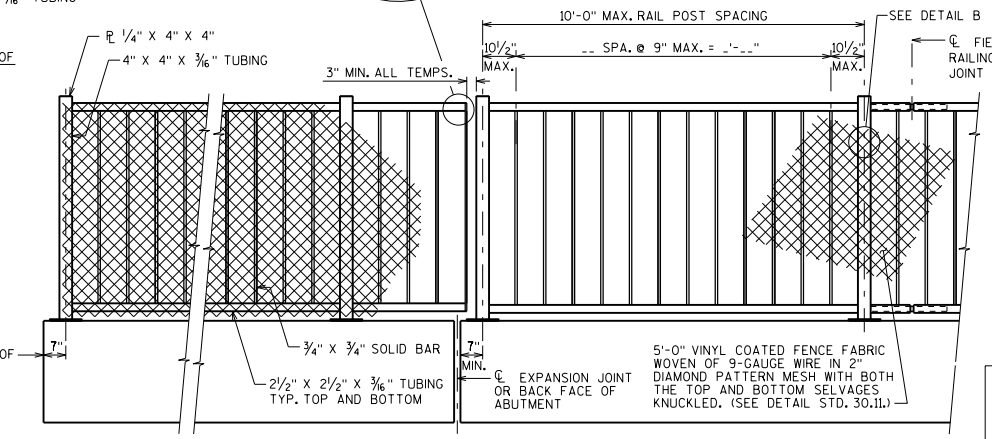


SECTION THRU FENCE SHOWING DETAILS FOR BENT TOP





TOP RAIL CONNECTION FOR FENCE W/ BENT TOP



INSIDE ELEVATION OF RAILING

WEIGHT = 35 LB/FT (W/O BENT SECTION @ TOP)
WEIGHT = 45 LB/FT (W/ BENT SECTION @ TOP)

NOTES

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.

STRUCTURAL TUBING SHALL CONFORM TO ASTM A500, GRADE B. PLATES, ANGLES, BARS AND SHIMS SHALL CONFORM TO ASTM A709, GRADE 36. FENCE FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B.

ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET POSTS NORMAL TO GRADE.

ALL POST SPACINGS ARE TAKEN HORIZONTAL ALONG CENTERLINE OF RAILING AT BASE OF POST.

STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATES WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

CAULK AROUND PERIMETER OF BASE PLATES AND FILL PORTION OF SLOTTED HOLES AROUND ANCHOR BOLTS WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

CUT BOTTOM OF POST TO MAKE VERTICAL IN TRANSVERSE DIRECTION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM 307. IF 307 IS USED, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.✿

THE BID ITEM SHALL BE "RAILING TUBULAR SCREENING B-_-_" WHICH SHALL INCLUDE ALL ITEMS SHOWN.

RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE NOT MORE THAN 3 POSTS.

VENT HOLES SHALL BE DRILLED IN MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.

ALL RAILING MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING THE STEEL RAILING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS. PAINT OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. ☐, ☐ (FILL IN COLOR NAME). FENCE FABRIC AND TIES TO BE VINYL-COATED. COLOR SHALL BE (SPECIFY: DARK GREEN, BROWN OR BLACK) IN ACCORDANCE WITH ASTM F934.

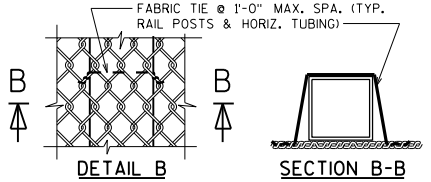
THE END OF THE FABRIC SHALL BE ATTACHED TO THE POST BY MEANS OF A TENSION BAR THREADED THROUGH THE END LOOPS OF THE FABRIC AND SECURED TO THE POST WITH CLAMPS & BOLT. THE FABRIC SHALL BE STRETCHED TO REMOVE ALL SLACK.

DESIGNER NOTES

TUBULAR SCREENING MAY BE USED ON STRUCTURES WITH A 45 M.P.H. DESIGN SPEED OR LESS, OR WHEN THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A PARAPET.

THIS RAILING MAY BE MOUNTED DIRECTLY TO A BRIDGE SIDEWALK OR RETAINING WALL PROVIDED THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A TRAFFIC BARRIER. USE 6" CLEAR SPACING BETWEEN VERTICAL MEMBERS IF CHAIN LINK FENCE IS NOT USED.

FENCE HEIGHT, CURVED OR STRAIGHT, MESH SIZE, COATING AND COLOR SHOULD BE COORDINATED WITH THE REGION. SEE BRIDGE MANUAL 30.3 (8) FOR ADDITIONAL GUIDANCE.



DETAIL B

SECTION B-B

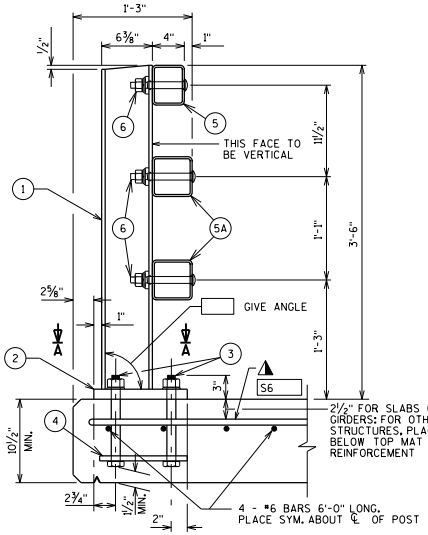
TUBULAR STEEL RAILING SCREENING

BUREAU OF STRUCTURES

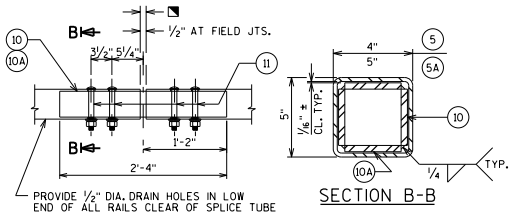
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 30.15

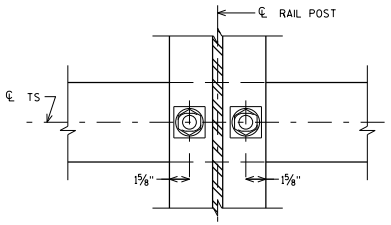


SECTION THRU RAILING ON DECK

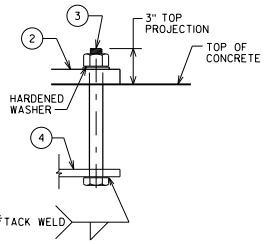


FIELD ERECTION JOINT DETAIL

SECTION B-B

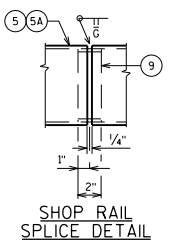


SECTION THRU POST WEB



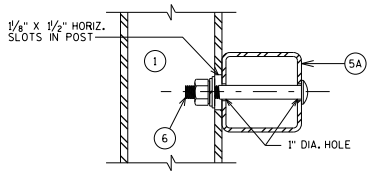
ANCHOR BOLTS

*FOR ANCHOR BOLTS IN WINGS, TACK WELD MAY BE USED IN FIELD AFTER ANCHOR PLATE IS IN POSITION IF REQ'D. FOR CONSTRUCTIBILITY.



SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



SECTION THRU RAIL

NOTE: CONNECTIONS AT LOWER RAILS SHOWN. CONNECTIONS AT TOP RAIL SIMILAR.

TYPICAL RAIL TO POST CONNECTIONS

LEGEND

(1) W6 x 25 WITH 1⅛" X 1½" HORIZONTAL SLOTS ON EACH SIDE OF POST FOR BOLT NO. 6. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.

(2) PLATE 1'-¼" x 11¾" x 1'-8" WITH 1⅝" X 1⅝" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE

(3) ASTM A449 - 1⅛" DIA. ANCHOR BOLTS WITH NUT AND HARDENED WASHER (ALL GALVANIZED). 5 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 1'-9" LONG IN ABUTMENT WINGS. AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS > 16" USE 1'-3" LONG. USE 10¾" LONG AT ALL OTHER LOCATIONS. (AN EQUIVALENT THREADED ROD WITH NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQ'D. FOR CONSTRUCTIBILITY.)

(4) ⅝" X 11" X 1'-8" ANCHOR PLATE (GALVANIZED) WITH 1⅜" DIA. HOLES FOR ANCHOR BOLTS NO. 3

(5) TS 5 x 4 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.

(5A) TS 5 x 5 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.

(6) ⅞" DIA. A325 SLOTTED ROUND HEAD BOLT WITH NUT, 3/16" X 1⅝" X 1⅝" WASHER, AND LOCK WASHER (2 REQ'D. AT EACH RAIL TO POST LOCATION.)

(7) ½" THK. BACK-UP PLATE WITH 2 - ⅞" X 1½" THREADED SHOP WELDED STUDS (NO. 12). BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THRIE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.

(8) 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5A FOR ⅞" DIA. A325 BOLTS WITH HEX NUTS AND WASHERS. 6 HOLES IN TUBES AND PLATE NO. 7.

(9) SPLICE SLEEVE FABRICATED FROM ¼" PLATE. PROVIDE "SLIDING FIT".

(10) ⅜" X 3⅝" X 2'-4" PLATE. 2 PER RAIL. USED IN NO. 5 & 5A.

(10A) ⅜" X 2⅝" X 2'-4" PLATE USED IN NO. 5, ⅜" X 3⅝" X 2'-4" PLATE USED IN NO. 5A. 2 PER RAIL.

(11) ⅞" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER. USE 15/16" X 1¼" LONGIT. SLOTTED HOLES AT FIELD JOINTS AND 15/16" X 2¼" MIN. LONGIT. SLOTTED HOLES AT EXP. JOINTS IN PLATE NO. 10A.

(12) ⅞" DIA. X 1½" LONG THREADED SHOP WELDED STUDS (2 REQ'D).

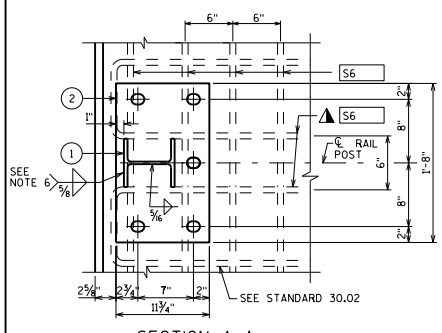
(13) ⅜" X 8" X 1'-6" PLATE. BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THRIE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.

(14) ⅞" DIA. X 2" LONG A325 HEX BOLT WITH NUT AND WASHER (5 REQ'D.).

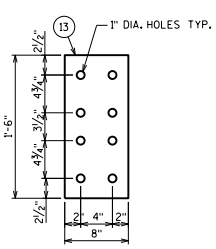
(15) 1" DIA. HOLES IN TUBES NO. 5A FOR ⅞" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER (4 REQ'D.). 4 HOLES IN TUBES.

NOTES

1. BID ITEM SHALL BE "RAILING TUBULAR TYPE M B-_-_" WHICH INCLUDES ALL ITEMS SHOWN.
2. RAIL POST AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. HOLLOW RAILING STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED FY = 50 KSI. ANCHOR PLATES, AND SPLICE TUBE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.
3. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL ⅛ TURN.
4. RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE. RAILS SHALL BE SPLICED IN A PANEL OVER EXPANSION JOINTS.
5. ENDS OF TUBE SECTIONS SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.
6. WELD IS THE SAME ON BOTH FLANGES. FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING.
7. FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 AND CAULK AROUND PERIMETER OF PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REQ'D. FOR ALIGNMENT.
8. 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.
9. ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.
10. WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. ☐ . ☐ (FILL IN COLOR NAME).
11. SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

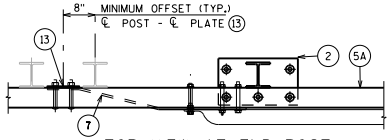


SECTION A-A



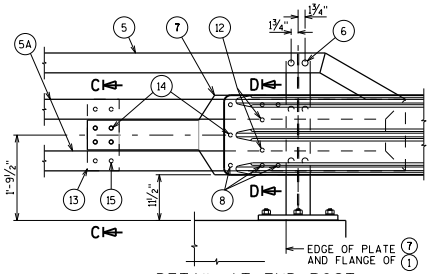
ANCHOR PLATE

AT BEAM GUARD ATTACHMENT



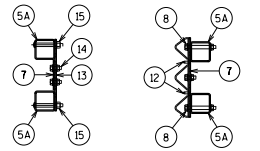
TOP VIEW AT END POST

(THRIE BEAM RAIL ATTACHMENT)



DETAIL AT END POST

(THRIE BEAM RAIL ATTACHMENT)

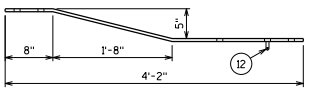


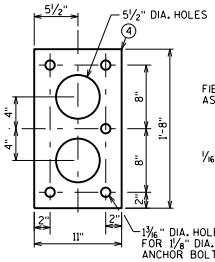
SECTION C-C

SECTION D-D

▲ TIE TO TOP MAT OF STEEL.

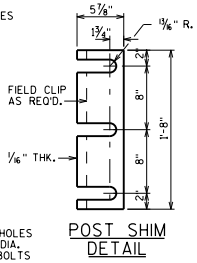
◥ RDWY. OPENING OR 2½" MIN. FOR STRIP SEAL EXP. JOINT & ½" OPENING FOR A1 ABUTMENT.



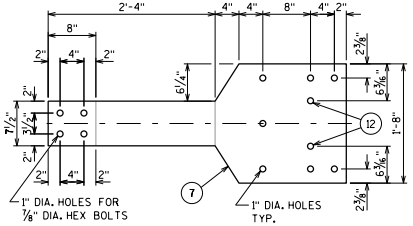


ANCHOR PLATE

AT RAIL TO DECK CONNECTION

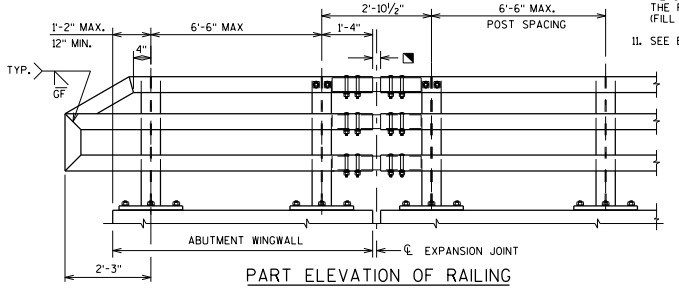


POST SHIM DETAIL



BACK-UP PLATE DETAIL

AT BEAM GUARD ATTACHMENT



PART ELEVATION OF RAILING

RAILING WEIGHT = 75 LB/FT (BASED ON 6'-6" POST SPACING.)

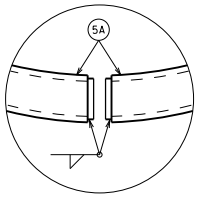
TUBULAR STEEL RAILING TYPE 'M'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

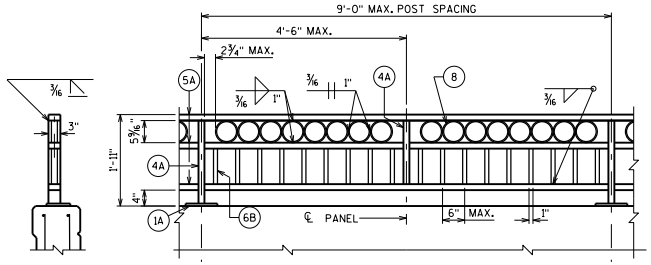
DATE: 1-19

STANDARD 30.16

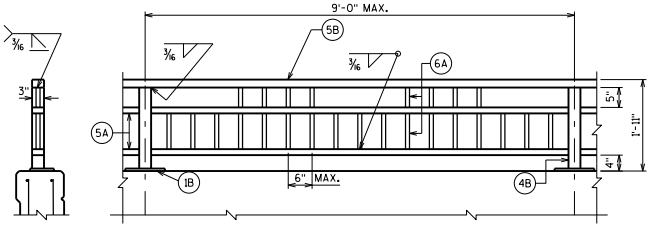


DETAIL A

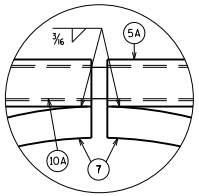
SEAL ENDS ON CURVED STRUCTURAL TUBING WITH 1/4" PLATE. WELD AND GRIND SMOOTH.



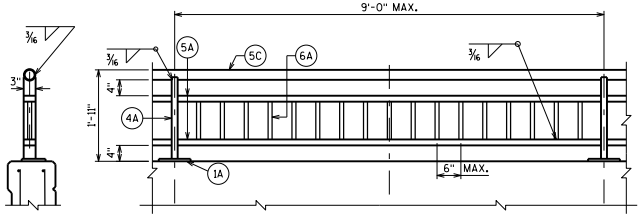
TYPE C1



TYPE C4

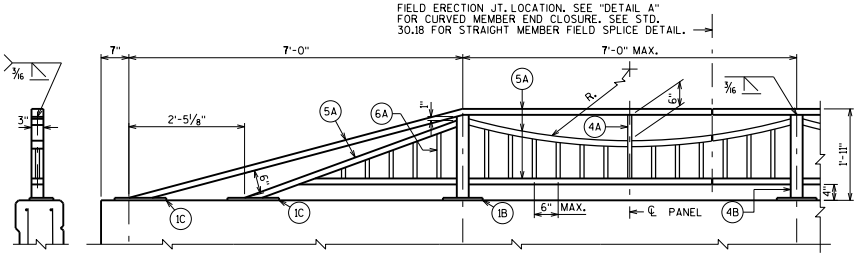


DETAIL B



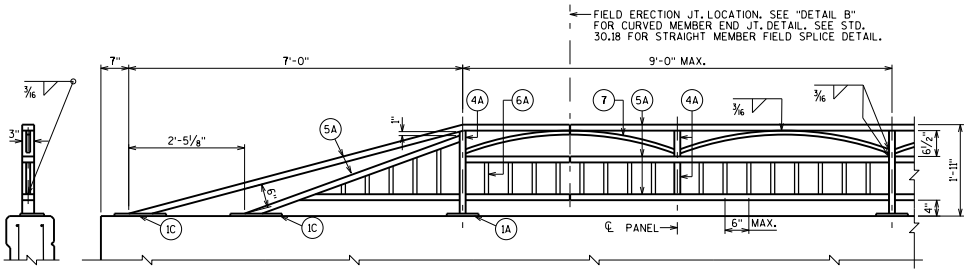
TYPE C2

FIELD ERECTION JT. LOCATION. SEE "DETAIL A" FOR CURVED MEMBER END CLOSURE. SEE STD. 30.18 FOR STRAIGHT MEMBER FIELD SPLICE DETAIL.

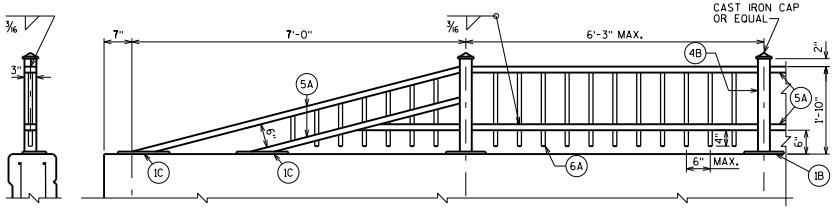


TYPE C5

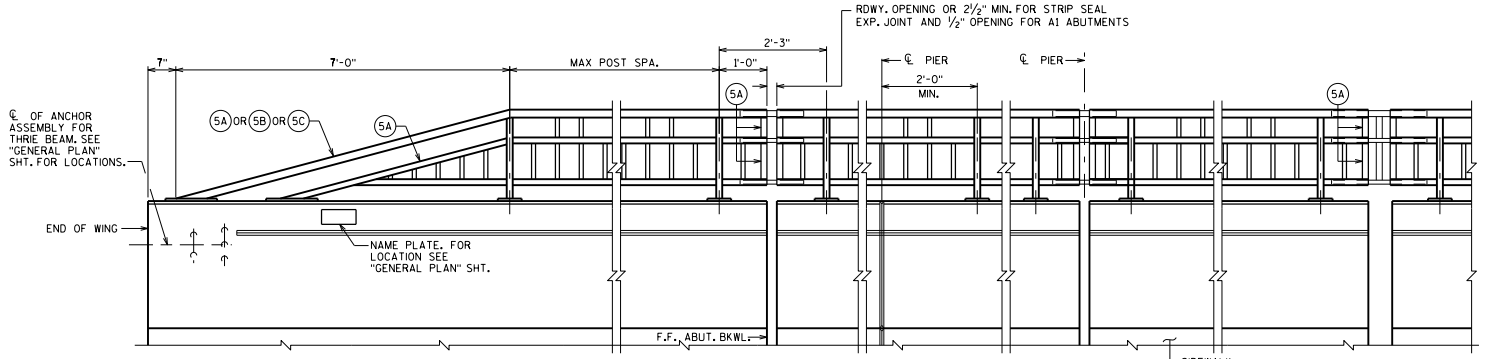
FIELD ERECTION JT. LOCATION. SEE "DETAIL B" FOR CURVED MEMBER END JT. DETAIL. SEE STD. 30.18 FOR STRAIGHT MEMBER FIELD SPLICE DETAIL.



TYPE C3



TYPE C6



INSIDE ELEVATION

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5". MIN. JOINT SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A ¾" "V"-GROOVE.

RAILING WEIGHT = 22 LB/FT

DESIGNER NOTES

COMBINATION RAILINGS TYPE C1-C6 MAY ALSO BE USED AS A PEDESTRIAN RAIL MOUNTED DIRECTLY TO A BRIDGE SIDEWALK OR RETAINING WALL BY INCREASING THE RAILING HEIGHT TO A MINIMUM OF 3'-6" AND A MAXIMUM OF 4'-6" AND USING A MINIMUM POST SIZE OF 3"X3"X3/16". WHEN USED ON A BRIDGE, A TRAFFIC BARRIER IS REQUIRED BETWEEN THE ROADWAY AND THE SIDEWALK. FOR THIS PEDESTRIAN RAILING, BID ITEM SHALL BE "RAILING STEEL PEDESTRIAN TYPE C(1-6) B-____-____". THE CLEAR SPACE BETWEEN THE TOP TWO RAILS MAY BE INCREASED TO A 6" MAXIMUM EXCEPT FOR "TYPE C1" RAILING.

A MINIMUM 12'-0" WING LENGTH IS RECOMMENDED TO ACCOMODATE THE RAIL END TRANSITION AND PROVIDE A POST SPACING ON THE WING THAT WILL MAINTAIN THE RAIL AESTHETICS.

SEE STANDARD 30.18 FOR ADDITIONAL RAILING DETAILS.

SEE STANDARD 30.07 FOR:
- DEFLECTION JOINT DETAILS AND NOTES
- BEAM GUARD ANCHOR ASSEMBLY DETAILS
- PARAPET REINFORCING BAR SIZE AND SPACING

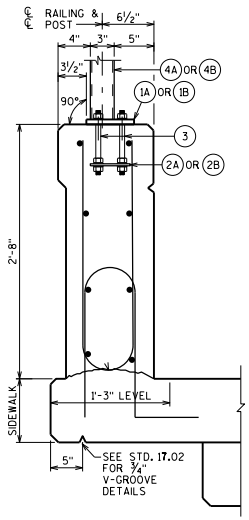
COMBINATION RAILING TYPES 'C1 - C6'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

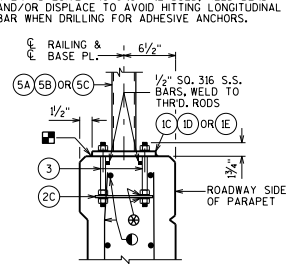
STANDARD 30.17



SECTION THRU PARAPET ON BRIDGE

✱ ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD (WHEN REQ'D.).

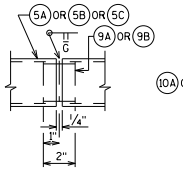
◐ WHEN ADHESIVE ANCHORS ARE USED, FIELD BEND AND/OR DISPLACE TO AVOID HITTING LONGITUDINAL BAR WHEN DRILLING FOR ADHESIVE ANCHORS.



ANCHORAGE FOR END RAIL

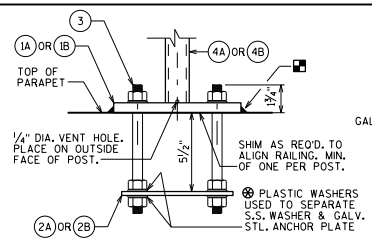
NOTE: USE 8" THR'D. ROD AT PLATE 1D WHEN ADJ. TO BEAM GUARD ANCHOR ASSEMBLY

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



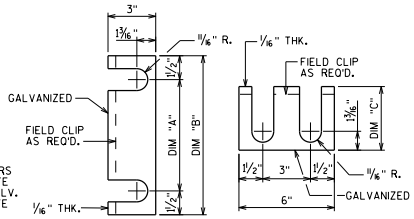
SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



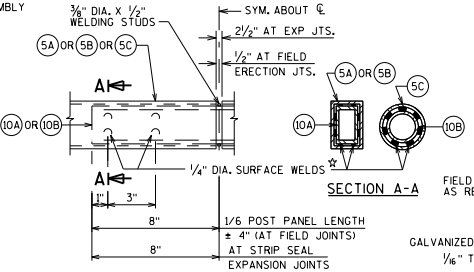
ANCHORAGE FOR RAIL POSTS

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



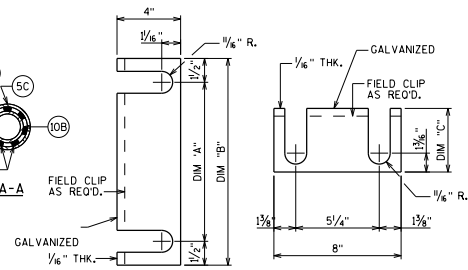
RAIL POST SHIM DETAIL

6" X 8" BASE PLATE (1A) DIM "A" = 5", DIM "B" = 8", DIM "C" = 4"
6" X 10" BASE PLATE (1B) DIM "A" = 7", DIM "B" = 10", DIM "C" = 5"
(2 SETS PER POST)



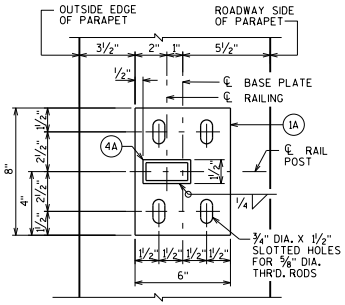
FIELD ERECTION JOINT DETAIL

☆ MIN. ⅝" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.



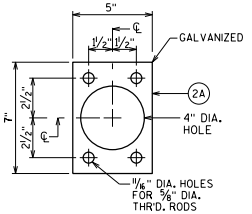
END RAIL SHIM DETAIL

8" X 1'-1" BASE PLATE (1C) DIM "A" = 10", DIM "B" = 1'-1", DIM "C" = 6½"
8" X 1'-6" BASE PLATE (1D) DIM "A" = 1'-3", DIM "B" = 1'-6", DIM "C" = 9"
8" X 1'-3" BASE PLATE (1E) DIM "A" = 1'-0", DIM "B" = 1'-3", DIM "C" = 7½"
(2 SETS PER POST)



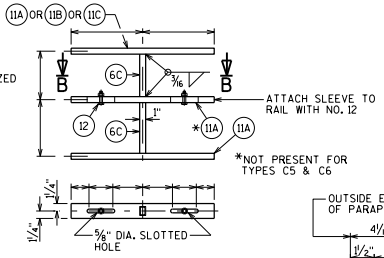
TYPICAL RAIL POST BASE PLATE

FOR 3" X 1½" X ⅜" POSTS (4A)



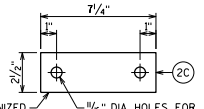
ANCHOR PLATE

FOR 3" X 1½" X ⅜" POSTS (4A)



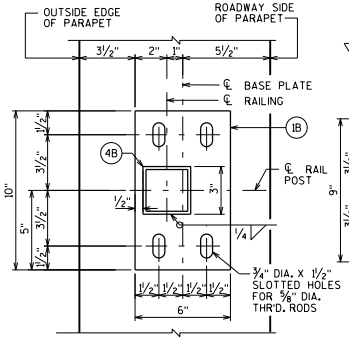
SECTION B-B

MODULAR JOINT SLEEVE DETAIL



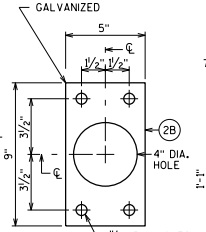
END RAIL ANCHOR PLATE

FOR END RAIL BASE PLATES (1C)(1D)(1E)
2 REQ'D. PER END RAIL BASE PLATE



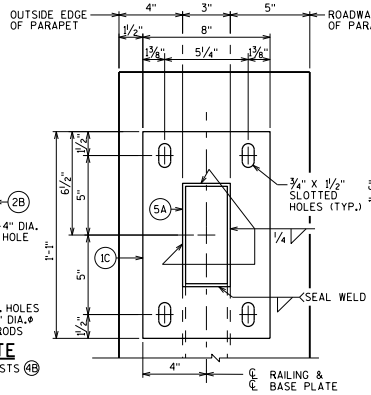
TYPICAL RAIL POST BASE PLATE

FOR 3" X 3" X ⅜" POSTS (4B)



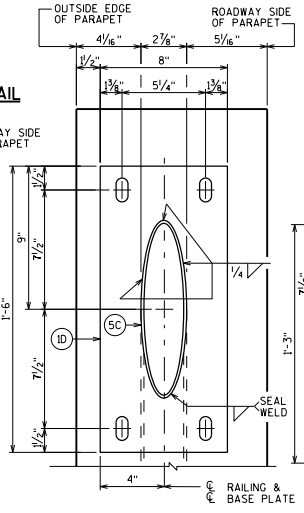
ANCHOR PLATE

FOR 3" X 3" X ⅜" POSTS (4B)



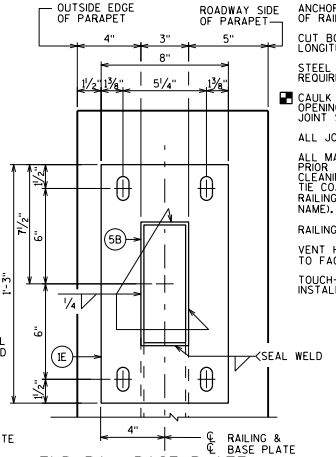
END RAIL BASE PLATE

FOR 3" X 1½" X ⅜" RAIL (5A)



END RAIL BASE PLATE

FOR 2½" DIA. STANDARD PIPE RAIL (5C)



END RAIL BASE PLATE

FOR 3" X 2" X ⅜" RAIL (5B)

LEGEND

(1A) PLATE ⅝" X 6" X 8" WITH ¾" X 1½" SLOTTED HOLES.
(1B) PLATE ⅝" X 6" X 10" WITH ¾" X 1½" SLOTTED HOLES
(1C) PLATE ⅝" X 8" X 1'-1" WITH ¾" X 1½" SLOTTED HOLES.
(1D) PLATE ⅝" X 8" X 1'-6" WITH ¾" X 1½" SLOTTED HOLES
(1E) PLATE ⅝" X 8" X 1'-3" WITH ¾" X 1½" SLOTTED HOLES
(2A) ¼" X 5" X 7" ANCHOR PLATE WITH 11/16" DIA. HOLES FOR THR'D. RODS NO. 3.
(2B) ¼" X 5" X 9" ANCHOR PLATE WITH 11/16" DIA. HOLES FOR THR'D. RODS NO. 3.
(2C) ¼" X 2½" X 7¼" ANCHOR PLATE WITH 11/16" DIA. HOLES FOR THR'D. RODS NO. 3.
(3) ⅝" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS ⅝-INCH. EMBED 7" IN CONCRETE FOR RAIL POSTS. EMBED 5" IN CONCRETE FOR END RAILS. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.
(4A) STRUCTURAL TUBING 3" X 1½" X 3/16". PLACE VERTICAL. WELD TO NO. 1 & 5.
(4B) STRUCTURAL TUBING 3" X 3" X 3/16". PLACE VERTICAL. WELD TO NO. 1 & 5.
(5A) STRUCTURAL TUBING 3" X 1½" X 3/16" RAILS. WELD TO NO. 1 & NO. 4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
(5B) STRUCTURAL TUBING 3" X 2" X 3/16" RAILS. WELD TO NO. 1 & NO. 4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
(5C) STRUCTURAL TUBING 2½" DIA. (STANDARD SIZE) (2.875" O.D.). WELD TO NO. 1 & 4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
(6A) BAR 1" X 1" PICKETS. WELD TO NO. 5. (SPACE AT 6" MAX. ℄ TO ℄ SPACING). PLACE VERTICAL.
(6B) BAR 1" X 1½" PICKETS. WELD TO NO. 5. (SPACE AT 6" MAX. ℄ TO ℄ SPACING). PLACE VERTICAL.
(6C) BAR 1" X 1½" PICKETS. WELD TO NO. 11. PLACE VERTICAL.
(7) BAR 1" X 1" . BEND TO REQUIRED RADIUS. WELD TO NO. 4 & 5.
(8) STRUCTURAL TUBING 5" DIA. (STANDARD SIZE) (5.563" O.D.) 1½" LONG SLICES. WELD TO NO. 5A.
(9A) RECTANGULAR SLEEVE FABRICATED FROM ⅜" PLATES. PROVIDE "SLIDING FIT".
(9B) CIRCULAR SLEEVE FABRICATED FROM STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.)
(10A) RECTANGULAR SLEEVE FABRICATED FROM ⅜" PLATES. (1'-4" ✱ FIELD ERECTION JTS.) (1'-4" ✱ STRIP SEAL EXP. JTS.)
(10B) CIRCULAR SLEEVE FABRICATED FROM STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.) (1'-4" ✱ FIELD ERECTION JTS.) (1'-4" ✱ STRIP SEAL EXP. JTS.)
(11A) BAR 2½" X 1" X '- ".
(11B) BAR 2½" X 1½" X '- ".
(11C) STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.) X '- ".
(12) ½" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCKWASHER.

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE C(1-6) B-_-_", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.

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 CUTS.

ALL PLATES, BARS, AND RECTANGULAR SLEEVES SHALL CONFORM TO ASTM A709 GRADE 36. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B.

ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET NORMAL TO GRADE.

CUT BOTTOM OF POST TO MAKE POST VERTICAL IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTION.

STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATES WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

◪ CAULK AROUND PERIMETER OF BASE PLATES, NO. 1, AND FILL BOLT SLOT OPENINGS IN SHIMS AND BASE PLATES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

ALL JOINTS AND RECESSES IN CONCRETE PARAPET ARE TO BE VERTICAL.

ALL MATERIAL (EXCEPT NO. 3 & 12) SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, THE STEEL RAILING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS. PAINT OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. ☐, ☐ (FILL IN COLOR NAME).

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

VENT HOLES SHALL BE DRILLED IN POST AND RAIL MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.

TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.

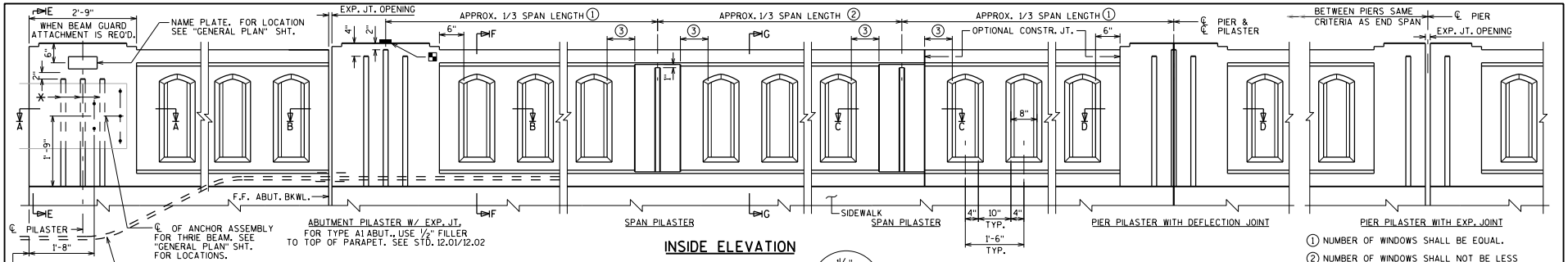
COMBINATION RAILING DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

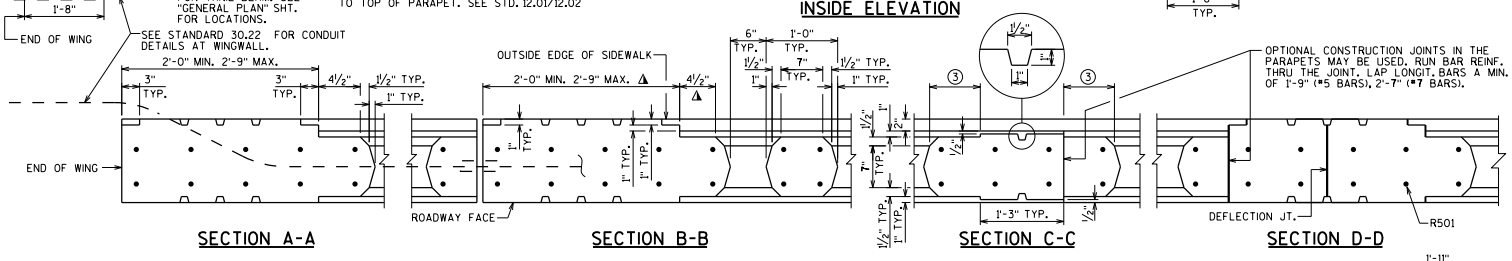
APPROVED: Bill Oliva

DATE: 1-19

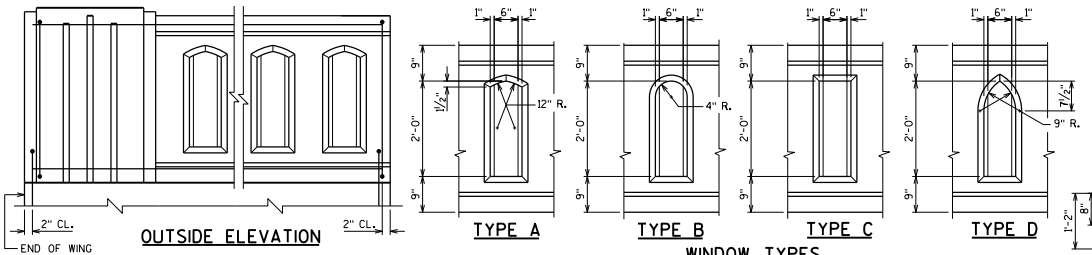
STANDARD 30.18



INSIDE ELEVATION



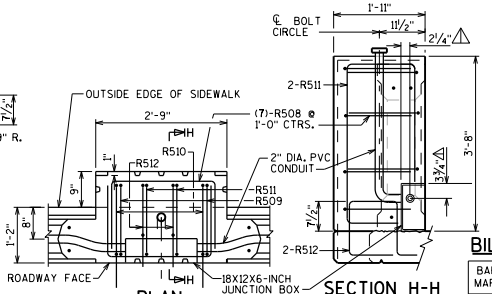
SECTION A-A | SECTION B-B | SECTION C-C | SECTION D-D



OUTSIDE ELEVATION

TYPE A | TYPE B | TYPE C | TYPE D

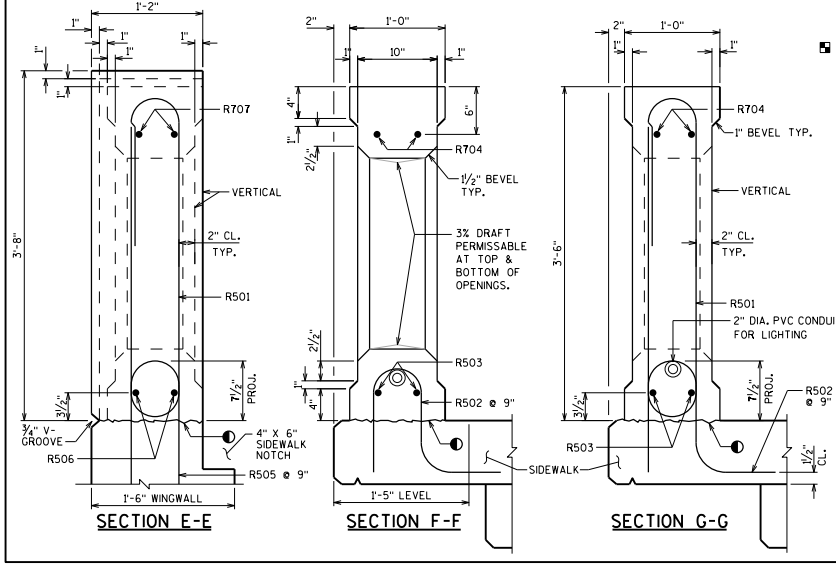
WINDOW TYPES



PLAN

SECTION H-H
CUT (1)-R503 BAR AT JUNCTION BOX

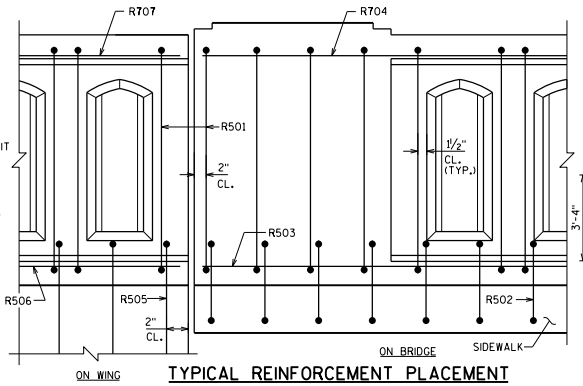
LIGHT STANDARD
SEE STANDARD 30.14 FOR ANCHORAGE DETAILS.
SEE STANDARD 30.21 AND 30.22 FOR CONDUIT DETAILS AND NOTES



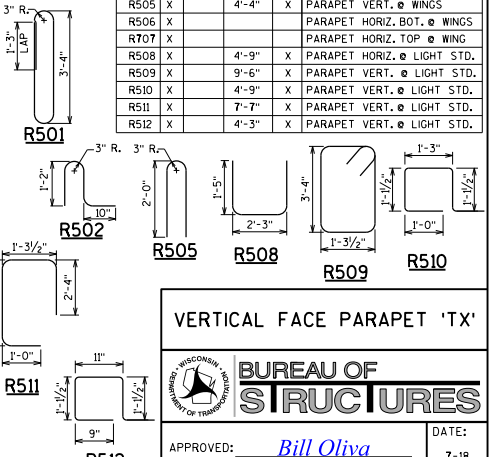
SECTION E-E | SECTION F-F | SECTION G-G

BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

WEIGHT = 350 LB/FT (EXCLUDING PILASTERS.)



TYPICAL REINFORCEMENT PLACEMENT



BILL OF BARS

BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	LOCATION
R501	X		8'-6"	X	PARAPET VERT.
R502	X		3'-4"	X	PARAPET VERT.
R503	X				PARAPET HORIZ. BOT.
R704	X				PARAPET HORIZ. TOP
R505	X		4'-4"	X	PARAPET VERT. @ WINGS
R506	X				PARAPET HORIZ. BOT. @ WINGS
R707	X				PARAPET HORIZ. TOP @ WING
R508	X		4'-9"	X	PARAPET HORIZ. @ LIGHT STD.
R509	X		9'-6"	X	PARAPET VERT. @ LIGHT STD.
R510	X		4'-9"	X	PARAPET VERT. @ LIGHT STD.
R511	X		7'-7"	X	PARAPET VERT. @ LIGHT STD.
R512	X		4'-3"	X	PARAPET VERT. @ LIGHT STD.

NOTES

① NUMBER OF WINDOWS SHALL BE EQUAL.

② NUMBER OF WINDOWS SHALL NOT BE LESS THAN THE AMOUNT IN ①. SPAN PILASTERS MAY BE SPACED AT 1/5 POINTS IN LONG SPANS.

③ DIMENSION SHALL BE THE SAME FOR ALL POSTS ADJACENT TO SPAN PILASTERS IN A SPAN. DIMENSION MAY VARY FROM SPAN TO SPAN. MIN. = 3", MAX. = 7½"

NOTES

BID ITEM SHALL BE "PARAPET CONCRETE TYPE 'TX'", WHICH SHALL INCLUDE ALL ITEMS SHOWN.

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF ⅛" ZINC OR PLASTIC PLATE CUT AS SHOWN ON STANDARD 30.07. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH BITUMINOUS PAINT AND PLATE SEPARATORS MAY BE OMITTED.

SEE STD. 30.07 FOR
- DEFLECTION JOINT DETAILS
- ANCHOR ASSEMBLY DETAILS
- SIDEWALK REINFORCEMENT AND DETAILS

⚠ LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.

◮ VALUE APPLIES TO PIER PILASTER ALSO.

◐ CONST. JOINT - STRIKE OFF AS SHOWN AND LEAVE ROUGH.

✳ WHEN BEAM GUARD ATTACHMENT IS NOT REQ'D, BUT NAME PLATE IS PRESENT, USE RUSTICATIONS AS SHOWN. (AT ENDS W/O NAME PLATE AND BEAM GUARD ATTACHMENT USE RUSTICATION DETAILS AS SHOWN FOR ABUTMENT PILASTER.

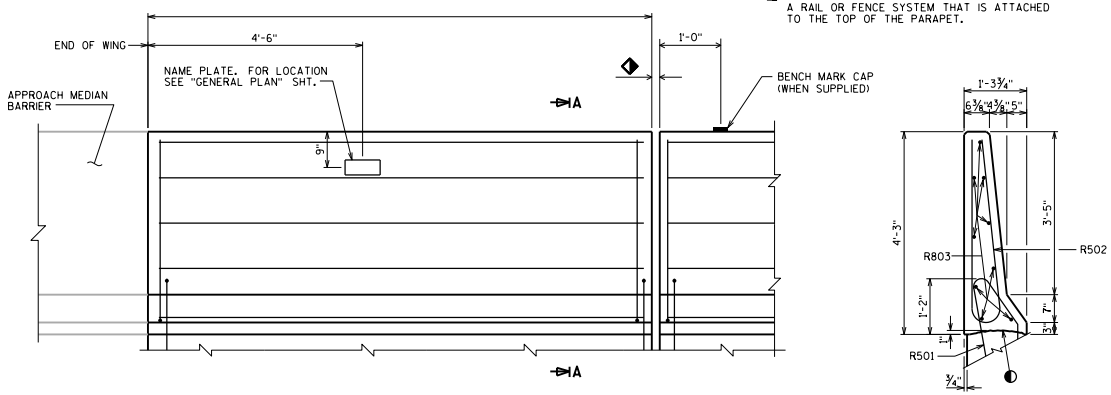
VERTICAL FACE PARAPET 'TX'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

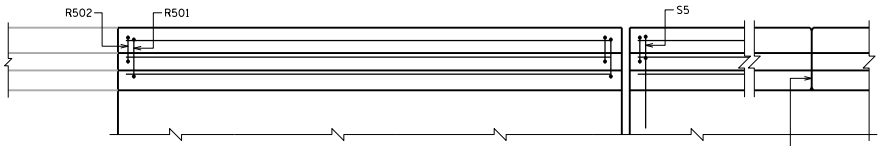
STANDARD 30.19



INSIDE ELEVATION

◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

SECTION A



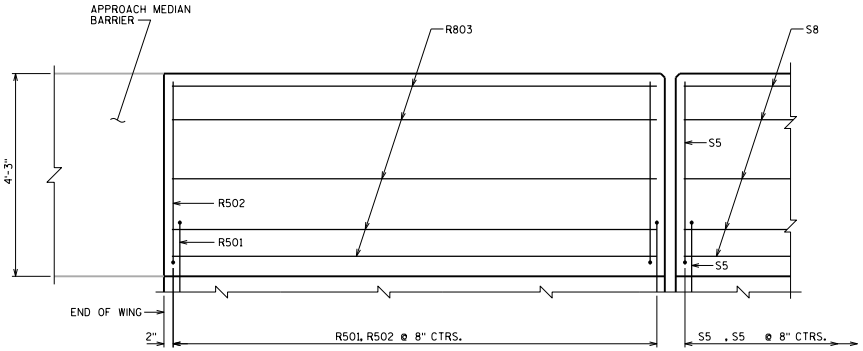
PLAN

EXPANSION JOINT @ ABUT.

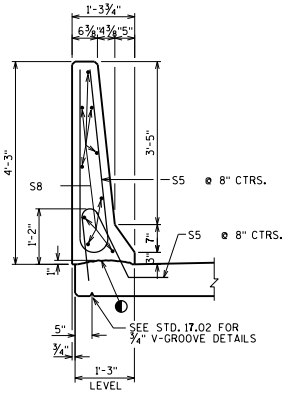
0° SKEW SHOWN. MATCH EXP. JT. OPENING.

FOR TYPE A1 ABUT., USE ½" FILLER TO TOP OF PARAPET. SEE STD. 12.01.

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 3'-5". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.



OUTSIDE ELEVATION

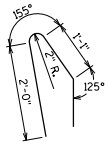


SECTION THRU PARAPET ON BRIDGE

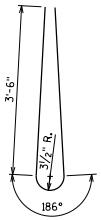
BILL OF BARS

FOR ABUTMENT PARAPETS

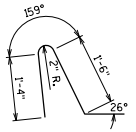
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4'-6"	X	PARAPET VERT.
R502	X			7'-11"	X	PARAPET VERT.
R803	X					PARAPET HORIZ.
S5	X			4'-2"	X	PARAPET VERT.
S5	X			7'-11"	X	PARAPET VERT.
S8	X					PARAPET HORIZ.



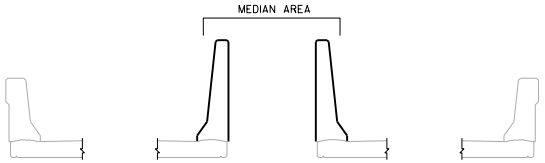
R501



R502/S5



S5



SLOPED FACE PARAPET "51F" MAY BE USED IN MEDIAN AREA OF ADJACENT STRUCTURES WHEN HIGHWAY MEDIAN APPROACH CONCRETE BARRIER IS 51" HIGH

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

A R501 BAR MAY BE USED IN LIEU OF A TYPICAL S5.. BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

AREA = 3.41 FT.²
WEIGHT = 512 LBS./FT.

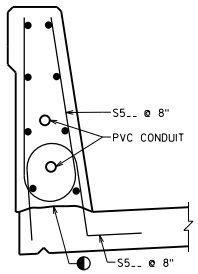
SLOPED FACE PARAPET '51F'

BUREAU OF STRUCTURES

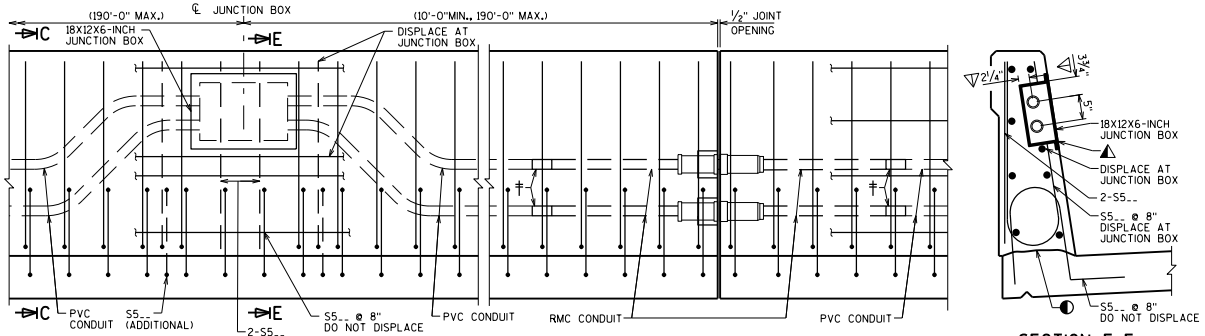
APPROVED: Bill Oliva

DATE: 7-14

STANDARD 30.20



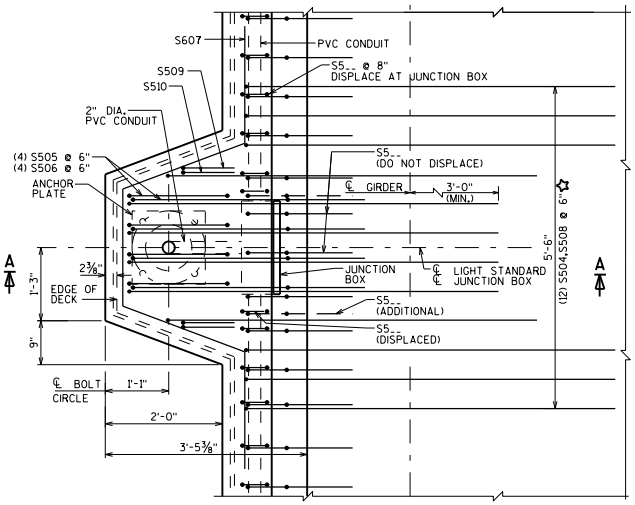
SECTION C-C



INSIDE ELEVATION AT JUNCTION BOX AT SEMI-EXP. JOINT

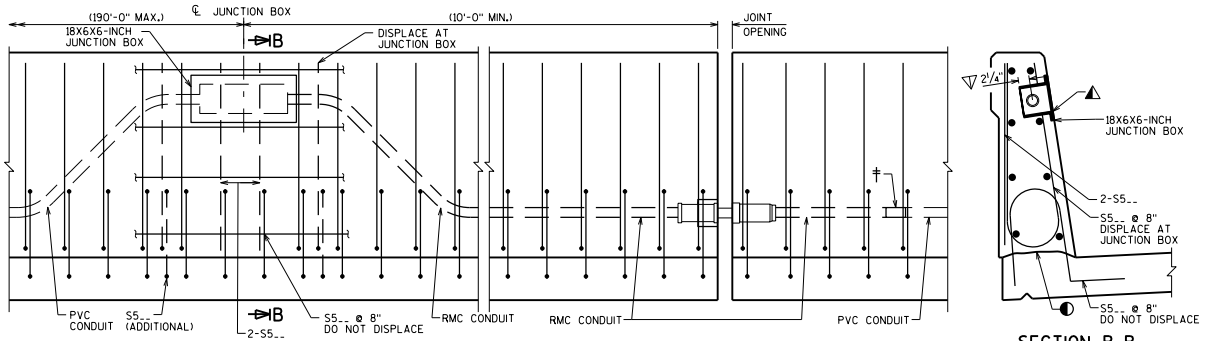
(DECK STEEL NOT SHOWN FOR CLARITY)

SECTION E-E



PLAN AT LIGHT STANDARD

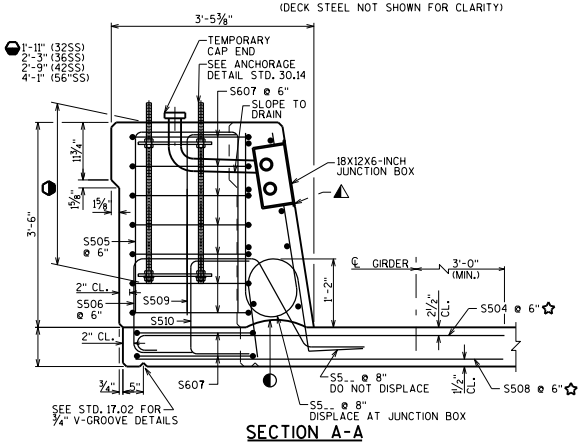
(DECK STEEL NOT SHOWN FOR CLARITY)



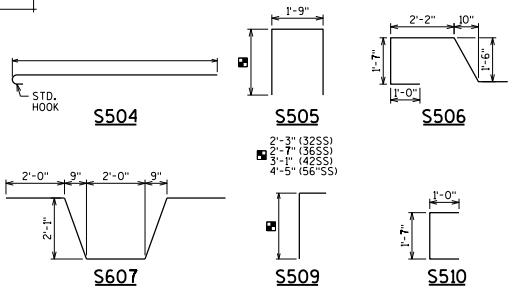
INSIDE ELEVATION AT JUNCTION BOX AT EXP. JOINT

(DECK STEEL NOT SHOWN FOR CLARITY)

SECTION B-B



SECTION A-A



DESIGNER NOTES

THIS STANDARD ACCOMMODATES ELECTRICAL SERVICE TO LIGHTS STANDARDS MOUNTED ON STRUCTURES. ADDITIONAL REQUIREMENTS MAY BE REQUIRED FOR OTHER SYSTEMS. SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.

POSSIBLE BID ITEMS:
"JUNCTION BOXES 18X12X6-INCH", EACH
"JUNCTION BOXES 18X6X6-INCH", EACH
"CONDUIT RIGID NONMETALLIC SCHEDULE 40 2-INCH"
"CONDUIT RIGID METALLIC 2-INCH"
"ANCHOR ASSEMBLIES LIGHT POLES ON STRUCTURE"

SEE STD. 30.14 FOR ANCHORAGE DETAIL AND LIMITATIONS.

SEE STD. 30.22 FOR CONDUIT DETAILS AND NOTES.

THIS STANDARD ACCOMMODATES A MAXIMUM 15" DIA. BOLT HOLE CIRCLE AND A MAXIMUM 15" X 15" SQUARE ANCHOR PLATE WITH (4) - 1" DIA. ANCHOR BOLTS. THIS STANDARD IS BASED ON A 8" MIN. DECK THICKNESS AND A MAXIMUM OVERHANG OF 3'-7" FROM ℄ GIRDER TO EDGE OF DECK.

✩ THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK. FOR CONC. SLAB STRUCTURES, REPLACE S504 & S508 BARS W/ S404 BARS @ 6" SPA. (W/O HOOK @ ENDS, 5'-6" LONG).

CONDUIT REQUIREMENTS:
- USE (1) - 2" DIA. CONDUIT TO PROVIDE ELECTRICAL SERVICE TO LIGHTS MOUNTED ON TOP OF THE PARAPET.
- USE (2) - 2" DIA. CONDUITS IF AN ADDITIONAL ELECTRICAL SERVICE IS REQUIRED.

JUNCTION BOX REQUIREMENTS:
- USE A JUNCTION BOX TO KEEP A CONTINUOUS RUN OF CONDUIT (PULL LENGTH) TO A MAXIMUM OF 190 FT.
  - USE A 18" X 6" X 6" JUNCTION BOX WHEN (1) - 2" DIA. CONDUIT IS USED.
  - USE A 18" X 12" X 6" JUNCTION BOX WHEN (2) - 2" DIA. CONDUITS ARE USED.
- USE A 18" X 12" X 6" JUNCTION BOX AT EACH LIGHT STANDARD (CENTERED ON LIGHT ℄).
- USE A JUNCTION BOX AT EACH EXPANSION JOINT. LOCATE 10'-0" MINIMUM FROM EACH EXPANSION JOINT. (NOT REQUIRED AT SEMI-EXP. OR FIXED JOINTS)

BILL OF BARS

BAR MARK	COAT	NO. REQ'D.	LENGTH 32SS	36SS	42SS	56SS	BENT	LOCATION
S504	X						X	LIGHT STD. - TRANS. - DECK - TOP
S505	X		6-0	6-8	7-8	10-0	X	LIGHT STD. - VERT. - PARAPET
S506	X		7-0	7-0	7-0	7-0	X	LIGHT STD. - VERT - PARAPET
S607	X		10-0	10-0	10-0	10-0	X	LIGHT STD. - HORIZ. - PARAPET
S508	X							LIGHT STD. - TRANS. - DECK - BOT.
S509	X		3-2	3-6	4-0	5-4	X	LIGHT STD. - VERT. - PARAPET
S510	X		3-4	3-4	3-4	3-4	X	LIGHT STD. - VERT. - PARAPET

LEGEND

◐ CONSTRUCTION JOINT, STRIKE OFF AS SHOWN.

◭ CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE.

▽ LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.

† NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED)

PVC = POLYVINYL CHLORIDE (RIGID NONMETALLIC) CONDUIT

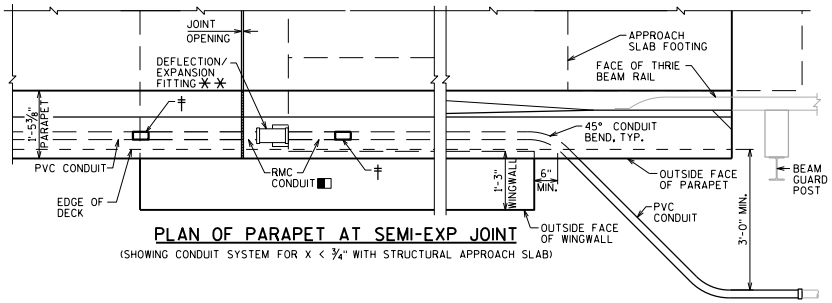
RMC = RIGID METALLIC CONDUIT

LIGHT STANDARD AND JUNCTION BOX FOR PARAPETS

BUREAU OF STRUCTURES

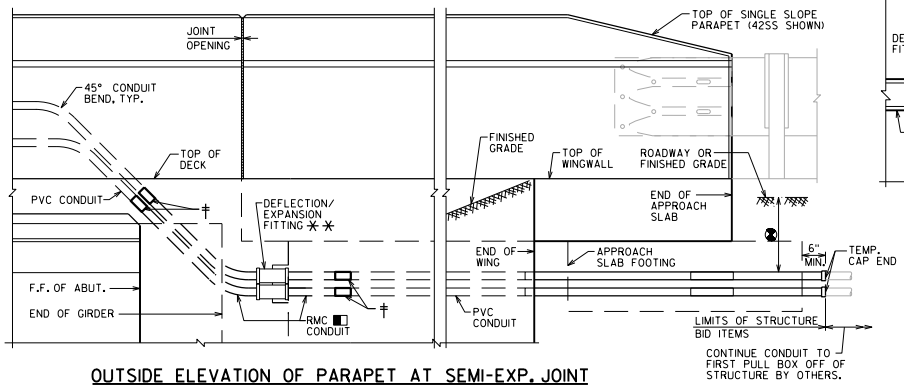
APPROVED: Bill Oliva

DATE: 7-18



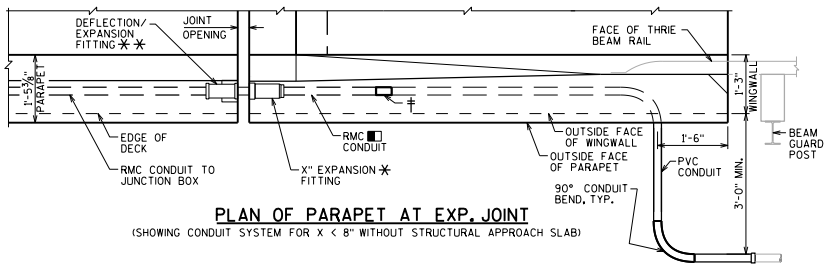
PLAN OF PARAPET AT SEMI-EXP JOINT

(SHOWING CONDUIT SYSTEM FOR X < ¾" WITH STRUCTURAL APPROACH SLAB)



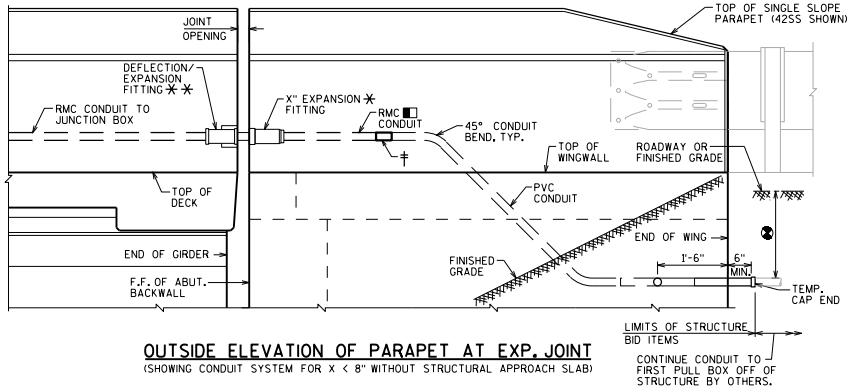
OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP. JOINT

(SHOWING CONDUIT SYSTEM FOR X < ¾" WITH STRUCTURAL APPROACH SLAB)



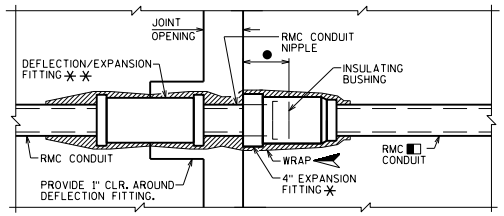
PLAN OF PARAPET AT EXP. JOINT

(SHOWING CONDUIT SYSTEM FOR X < 8" WITHOUT STRUCTURAL APPROACH SLAB)



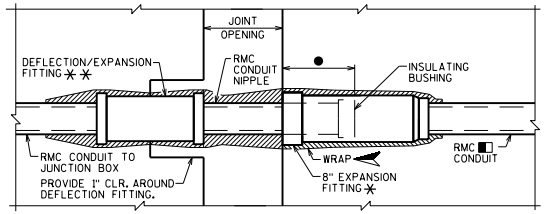
OUTSIDE ELEVATION OF PARAPET AT EXP. JOINT

(SHOWING CONDUIT SYSTEM FOR X < 8" WITHOUT STRUCTURAL APPROACH SLAB)



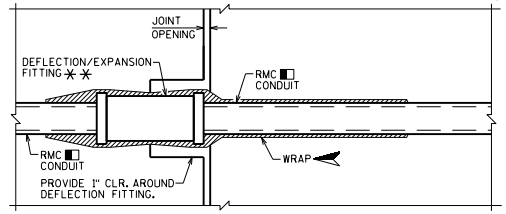
DEFLECTION/EXPANSION AND 4" EXPANSION FITTING

THIS DETAIL ACCOMMODATES A MAXIMUM OF 4" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. BOND JUMPER NOT SHOWN FOR CLARITY



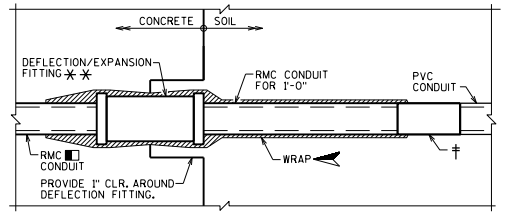
DEFLECTION/EXPANSION AND 8" EXPANSION FITTING

THIS DETAIL ACCOMMODATES A MAXIMUM OF 8" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. BOND JUMPER NOT SHOWN FOR CLARITY



DEFLECTION/EXPANSION FITTING

THIS DETAIL ACCOMMODATES A MAXIMUM OF ¾" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. BOND JUMPER NOT SHOWN FOR CLARITY (CONCRETE TO CONCRETE FITTING)



DEFLECTION/EXPANSION FITTING

THIS DETAIL ACCOMMODATES A MAXIMUM OF ¾" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. BOND JUMPER NOT SHOWN FOR CLARITY (CONCRETE TO SOIL FITTING)

NOTES

CONDUIT SHALL BE EMBEDDED 2" CLEAR.

USE 2" DIA. RIGID NONMETALLIC CONDUIT (PVC) UNLESS NOTED OTHERWISE.

CONDUIT FITTINGS, CONDUIT BENDS, AND ADAPTER FITTINGS INCIDENTAL TO CONDUIT WORK.

CONDUIT BENDS SHALL CONFORM TO THE NATIONAL ELECTRIC CODE.

✳ 2'-0" MIN. CONDUIT COVER UNDER ROADWAYS, 1'-6" OTHERWISE. CONDUIT COVER SHOULD NOT EXCEED 3'-0".

PROVIDE JUNCTION BOXES FROM THE APPROVED PRODUCTS LIST.

DESIGNER NOTES

THIS STANDARD ACCOMMODATES A MAXIMUM 8" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.

PLANS SHALL SPECIFY SIZE, TYPE, AND LOCATION FOR CONDUIT, JUNCTION BOXES, AND FITTINGS. SEE TABLE BELOW FOR CONDUIT FITTING RECOMMENDATIONS.

LEGEND

■ USE 2" DIA. RIGID METALLIC (RMC) CONDUIT AT FITTINGS. PROVIDE RMC FOR 3'-0" MIN. ON EACH SIDE OF JOINT OPENINGS UNLESS NOTED OTHERWISE.

† NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED)

◢ SPONGE RUBBER WRAP TO BE AASHTO M153, TYPE 1 OR EQUIVALENT - ¼" MINIMUM THICKNESS. PROVIDE WRAP FOR THE ENTIRE LENGTH OF THE FITTING OR AS SHOWN. SPONGE RUBBER WRAP INCIDENTAL TO "CONDUIT RIGID METALLIC 2-INCH".

● POSITION MOVABLE END OF CONDUIT INSIDE EXPANSION FITTING, SUCH THAT IT WILL HAVE THE SAME ALLOWANCE FOR MOVEMENT (EXPANSION/CONTRACTION) AS THE EXPANSION DEVICE SET IN PLACE IN THE DECK BELOW IT. TAKE CARE TO INSTALL EXPANSION FITTING AND CONDUIT EXACTLY PARALLEL TO BRIDGE MOVEMENT.

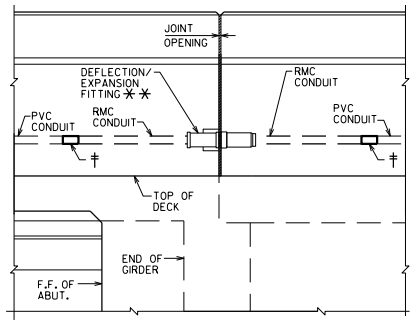
✳ EXPANSION FITTING REQUIREMENTS (IF USED):
- 4" TOTAL CONDUIT MOVEMENT WITH BONDING JUMPER
- 8" TOTAL CONDUIT MOVEMENT WITH BONDING JUMPER

✳✳ DEFLECTION/EXPANSION FITTING REQUIREMENTS (IF USED):
- UP TO 3/4" CONDUIT CONTRACTION OR EXPANSION AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION WITH BONDING JUMPER

CONDUIT FITTING RECOMMENDATIONS TABLE:

LOCATION	JOINT TYPE	REQUIREMENT		FITTING TYPE
BRIDGE	FIXED	NONE		NONE - RUN PVC CONDUIT THRU JOINT
	SEMI-EXP.	X < ¾"		DEFL./EXP. FITTING
		¾" ≤ X < 4"	S < 30°	4" EXP. FITTING
			S ≥ 30°	DEFL./EXP. AND 4" EXP. FITTING
	EXPANSION	X < 4"		DEFL./EXP. AND 4" EXP. FITTING
		4" ≤ X < 8"		DEFL./EXP. AND 8" EXP. FITTING
		X ≥ 8"		CONSIDER FLEXIBLE METAL CONDUIT SYSTEM (NOT SHOWN)
WALL	CONTRACTION	NONE		NONE - RUN PVC CONDUIT THRU JOINT
	EXPANSION	L < 90 FEET		DEFL./EXP. FITTING

X = TOTAL ANTICIPATED LONGITUDINAL JOINT MOVEMENT
L = DISTANCE BETWEEN EXPANSION JOINTS
S = SKEW



OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP JOINT

(SHOWING CONDUIT SYSTEM FOR X ≥ ¾" WITHOUT STRUCTURAL APPROACH SLAB)

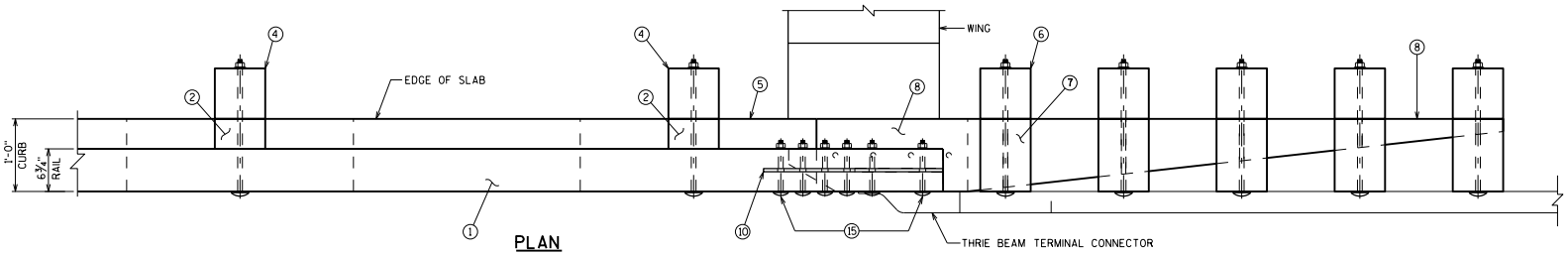
CONDUIT DETAILS AND NOTES

BUREAU OF STRUCTURES

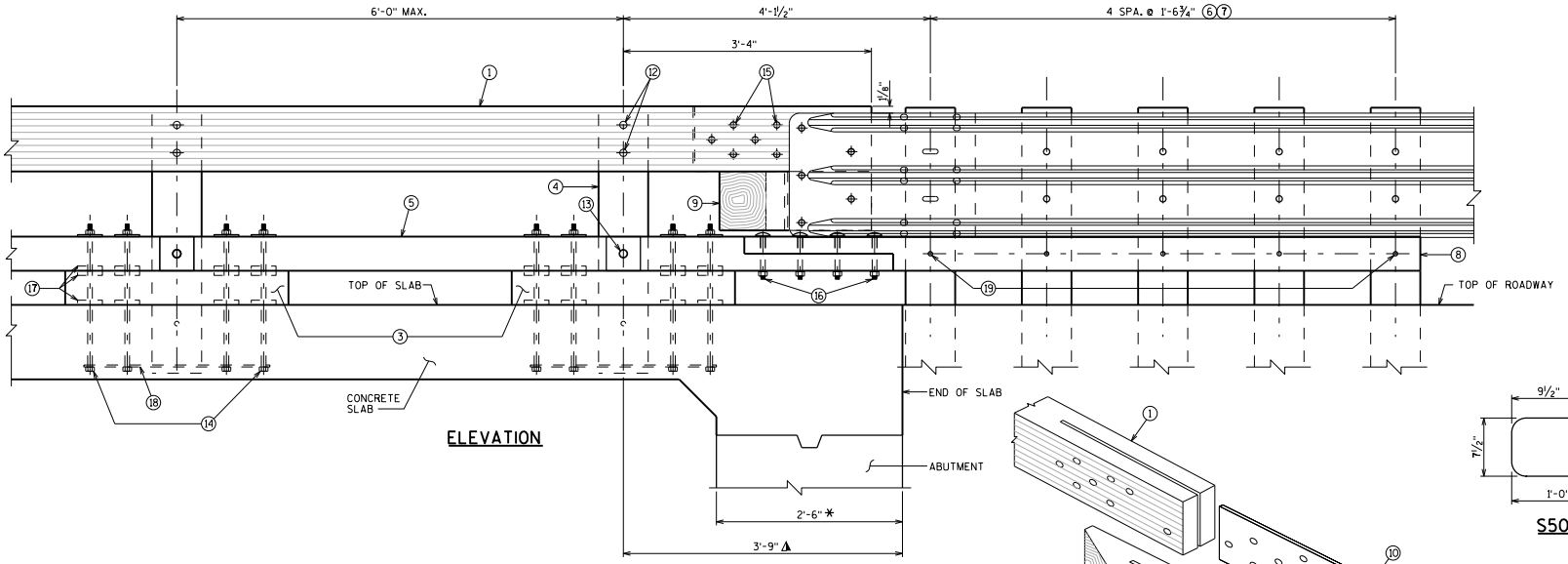
APPROVED: *Bill Oliva*

DATE: 7-17

STANDARD 30.22

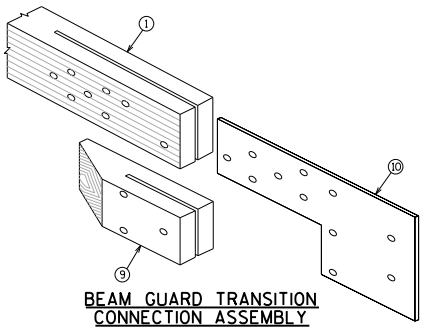


PLAN

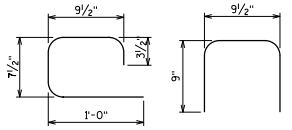


ELEVATION

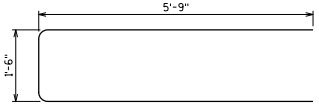
✱ DIMENSION IS TAKEN NORMAL TO ℄ SUBSTRUCTURE.
◮ DIMENSION IS TAKEN ALONG EDGE OF SLAB.



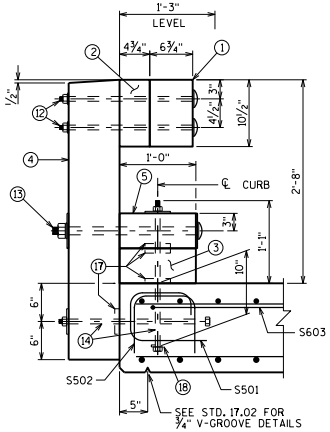
BEAM GUARD TRANSITION CONNECTION ASSEMBLY



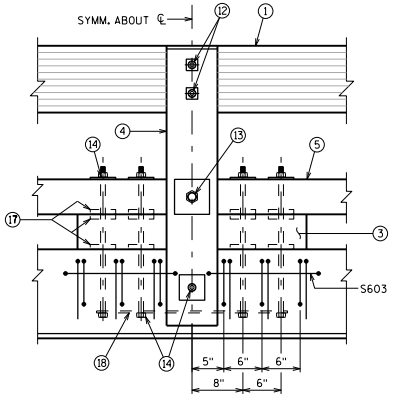
S501 S502



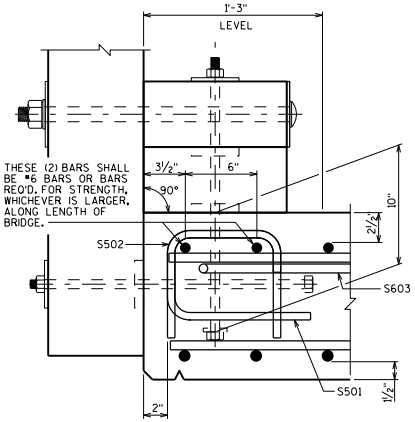
S603



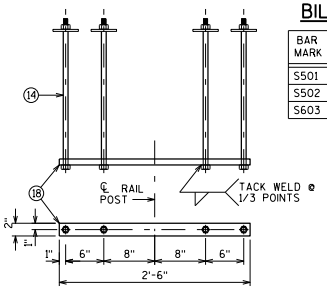
SECTION THRU RAIL
ALSO SEE "EDGE OF SLAB DETAILS"



BACK ELEVATION



EDGE OF SLAB DETAILS



ANCHORAGE DETAIL

BILL OF BARS

NOTE: THE FIRST DIGIT OF THE BAR MARK SIGNIFIES THE BAR SIZE.

BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	LOCATION
S501	X		2-4	X	RAIL POST VERTICAL
S502	X		2-1	X	RAIL POST VERTICAL
S603	X		12-9	X	RAIL POST HORIZONTAL

SEE STANDARD 30.25 FOR RAILING DETAILS

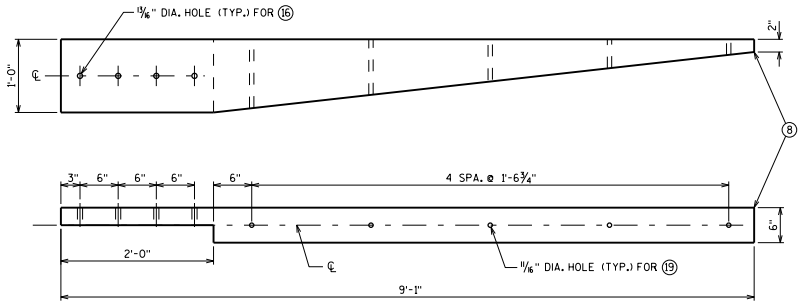
TIMBER RAILING ATTACHED TO CONCRETE SLAB

BUREAU OF STRUCTURES

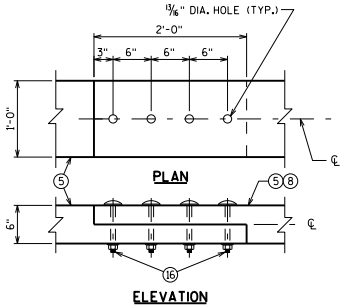
APPROVED: Scot Becker

DATE: 7-11

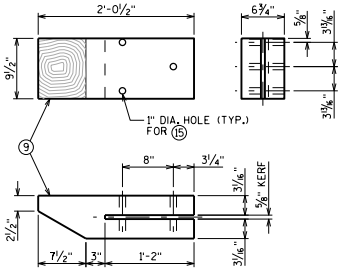
STANDARD 30.24



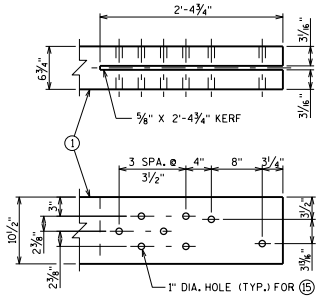
CURB TRANSITION



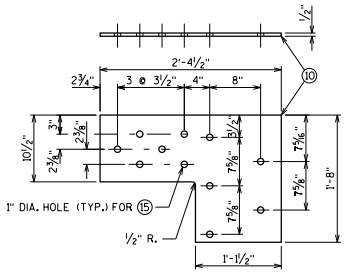
CURB SPLICE DETAIL



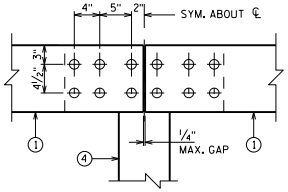
TRANSITION BLOCK



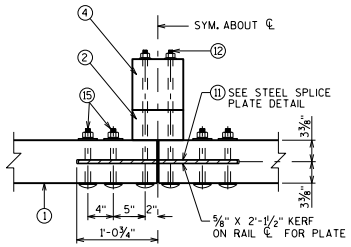
TRANSITION GLULAM RAIL BORING DETAIL



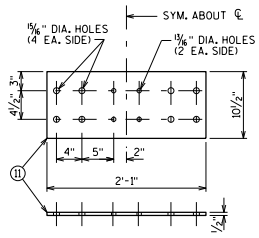
STEEL TRANSITION PLATE



ELEVATION



PLAN VIEW



STEEL SPLICE PLATE

RAIL SPLICE DETAILS

LEGEND

1. GLULAM RAIL 6¾" X 10½"
2. RAIL SPACER BLOCK 8" X 4¾" X 10½"
3. SCUPPER BLOCK 6" X 12" X 3'-0"
4. RAIL POST @ STRUCTURE 8" X 8" X 3'-8"
5. CURB 6" X 12"
6. RAIL POST @ BEAM GUARD 8" X 8"
7. RAIL SPACER BLOCK @ BEAM GUARD 8" X 11½" X 1'-10½"
8. CURB TRANSITION @ BEAM GUARD
9. TRANSITION BLOCK @ BEAM GUARD
10. STEEL TRANSITION PLATE, ASTM A36.
11. STEEL SPLICE PLATE, ASTM A36.
12. ¾" DIA. X 1'-10" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT. (2 REQ'D. @ EACH RAIL TO POST CONNECTION, 4 REQ'D. @ EACH RAIL SPLICE).
13. 1¼" DIA. X 1'-10" LONG ASTM A325, DOME-HEAD BOLT W/ 2 - 5½" X 5½" X ¼" PLATE WASHERS, W/ 1⅜" DIA. HOLE. (1 REQ'D. @ EACH CURB TO POST CONNECTION.)
14. ¾" DIA. x 1'-11" LONG ASTM A325 BOLT. 1 - 4" X 4" X 5/16" PLATE WASHER REQ'D. AT CURB TO SLAB CONNECTION. 1 - 4" X 4" X 5/16" PLATE WASHER REQ'D. AT POST TO SLAB CONNECTION.
15. ⅝" DIA. X 9" LONG ASTM A307, GRADE 2, DOME HEAD BOLT AT RAIL SPLICE DETAIL AND AT BEAM GUARD ATTACHMENT.
16. ¾" DIA. X 8" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT (4 REQ'D. @ EACH CURB SPLICE DETAIL.)
17. 4" DIA. SHEAR PLATE (8 REQ'D. @ EACH CURB TO SCUPPER CONNECTION, 4 REQ'D. @ EACH SCUPPER TO SLAB CONNECTION AND 1 REQ'D. @ EACH POST TO SLAB CONNECTION). MALLEABLE IRON MEETING REQUIREMENTS OF ASTM A47, GRADE 32510.
18. 2" X 2'-6" X 5/16" ANCHOR PLATE WITH 4 - 13/16" DIA. HOLES FOR ANCHOR BOLTS NO. 14 (CURB TO SLAB CONNECTION).
19. ⅝" DIA. ASTM A325 DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT. (1 REQ'D. @ EACH THRIE BEAM POST TO CURB TRANSITION CONNECTION.)

NOTES

1. BID ITEM SHALL BE "TREATED LUMBER AND TIMBER" WHICH INCLUDES ALL ITEMS SHOWN EXCEPT ITEMS NO 6, 7 AND THRIE BEAM TERMINAL CONNECTOR..
2. DIMENSIONS GIVEN FOR GLUED-LAMINATED (GLULAM) TIMBER RAILS ARE ACTUAL DIMENSIONS.
3. DIMENSIONS FOR WOOD POSTS, CURBS AND SCUPPERS ARE GIVEN AS NOMINAL DIMENSIONS. ACTUAL DIMENSIONS MAY BE A MAXIMUM OF ½ INCH LESS THAN THE STATED NOMINAL DIMENSIONS. DIMENSION FOR SPACER BLOCK DEPTH ARE ACTUAL DIMENSIONS.
4. CURB AND RAIL SPLICES SHALL BE LOCATED SO THAT CURB AND RAIL MEMBERS ARE CONTINUOUS OVER NOT LESS THAN TWO POSTS. CURB SPLICES SHALL BE LOCATED A MINIMUM OF 1.5 POST SPACINGS AWAY FROM RAIL SPLICES. IT IS RECOMMENDED THAT GLULAM RAILS BE CONTINUOUS OVER THE LENGTH OF THE BRIDGE.
5. SAWN LUMBER AND GLULAM SHALL COMPLY WITH THE REQUIREMENTS OF AASHTO M168 AND SHALL BE PRESSURE TREATED WITH WOOD PRESERVATIVES IN ACCORDANCE WITH AASHTO M133 AND STANDARD SPECIFICATIONS.
6. BRIDGE RAIL SHALL BE HORIZONTALLY LAMINATED GLULAM, VISUALLY GRADED WESTERN SPECIES COMBINATION NO. 2, OR VISUALLY GRADED SOUTHERN PINE COMBINATION NO. 48. OTHER SPECIES AND GRADES OF GLULAM MAY BE USED, PROVIDED THE MINIMUM TABULATED VALUES ARE NOT LESS THAN THE FOLLOWING:

   $F_{b_{yy}}$ = 1,800 LB/IN² E = 1,800,000 LB/IN²
7. POSTS, CURBS, SCUPPERS, TRANSITION BLOCKS AND SPACER BLOCKS MAY BE SAWN LUMBER OR GLULAM. WHEN SAWN LUMBER IS USED, MATERIAL SHALL BE VISUALLY GRADED NO. 1 SOUTHERN PINE OR VISUALLY GRADED NO 1 DOUGLAS FIR-LARCH. GLULAM AND OTHER SPECIES AND GRADES OF SAWN LUMBER MAY BE USED, PROVIDED THE MINIMUM TABULATED VALUES ARE NO LESS THAN THE FOLLOWING:

   F_b = 1,350 LB/IN² E = 1,500,000 LB/IN²
8. ALL STEEL COMPONENTS AND FASTENERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 OR M232.
9. TO THE EXTENT POSSIBLE, ALL WOOD SHALL BE CUT, DRILLED, AND COMPLETELY FABRICATED PRIOR TO PRESSURE TREATMENT WITH PRESERVATIVES. WHEN FIELD FABRICATION OF WOOD IS REQUIRED OR IF WOOD IS DAMAGED, ALL CUTS, BORE HOLES, AND DAMAGE SHALL BE IMMEDIATELY TREATED WITH WOOD PRESERVATIVE IN ACCORDANCE WITH AASHTO M133 AND STANDARD SPECIFICATIONS.
10. UNLESS NOTED, MALLEABLE IRON WASHERS SHALL BE PROVIDED UNDER BOLT HEADS AND UNDER NUTS THAT ARE IN CONTACT WITH WOOD. WHEN THE SIZE AND STRENGTH OF THE HEAD ARE SUFFICIENT TO DEVELOP CONNECTION STRENGTH WITHOUT WOOD CRUSHING, WASHERS MAY BE OMITTED UNDER HEADS OF DOME-HEAD TIMBER BOLTS.
11. TOPS OF RAIL POSTS AND TOP OF THE RAIL SPLICE PLATE KERF SHALL BE SEALED WITH ROOFING CEMENT OR OTHERWISE PROTECTED FROM DIRECT EXPOSURE TO WEATHER.
12. DESTROY THREADS ON ALL BOLTS WITH A CENTER PUNCH AFTER TIGHTENING NUT. EXPOSED BOLT PROJECTION OVER 1" SHALL BE CUT OFF. REPAIR END OF BOLT BY PAINTING WITH ZINC RICH PRIMER.
13. WHEN PLACING OVERLAY (FWS) ON TOP OF EXISTING SLAB, THE THICKNESS OF THE OVERLAY MUST BE TAPERED NEAR THE VICINITY OF THE RAILING TO MAINTAIN THE REQ'D. (CRASH TESTED) DISTANCE FROM TOP OF SLAB TO TOP OF RAIL TO 32 INCHES.
14. THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 2 (TL-2).

BILL OF TREATED LUMBER

ITEM	NO. REQ'D.	SIZE	LENGTH	MBM
GLULAM RAIL		6¾" X 10½		
RAIL SPACER BLOCK		8" X 4¾"	10½"	
SCUPPER BLOCK		6" X 12"	3'-0"	
RAIL POST		8" X 8"		
CURB		6" X 12"		
CURB TRANSITION				
TRANSITION BLOCK				
TOTAL MBM				

THESE RAILING DETAILS MAY BE USED WITH CONCRETE SLAB SUPERSTRUCTURES (SLAB DEPTH > 14") THAT HAVE A1 ABUTMENTS WITH WINGS PARALLEL TO ℄ OF ABUTMENT OR HAVE A5 ABUTMENTS.

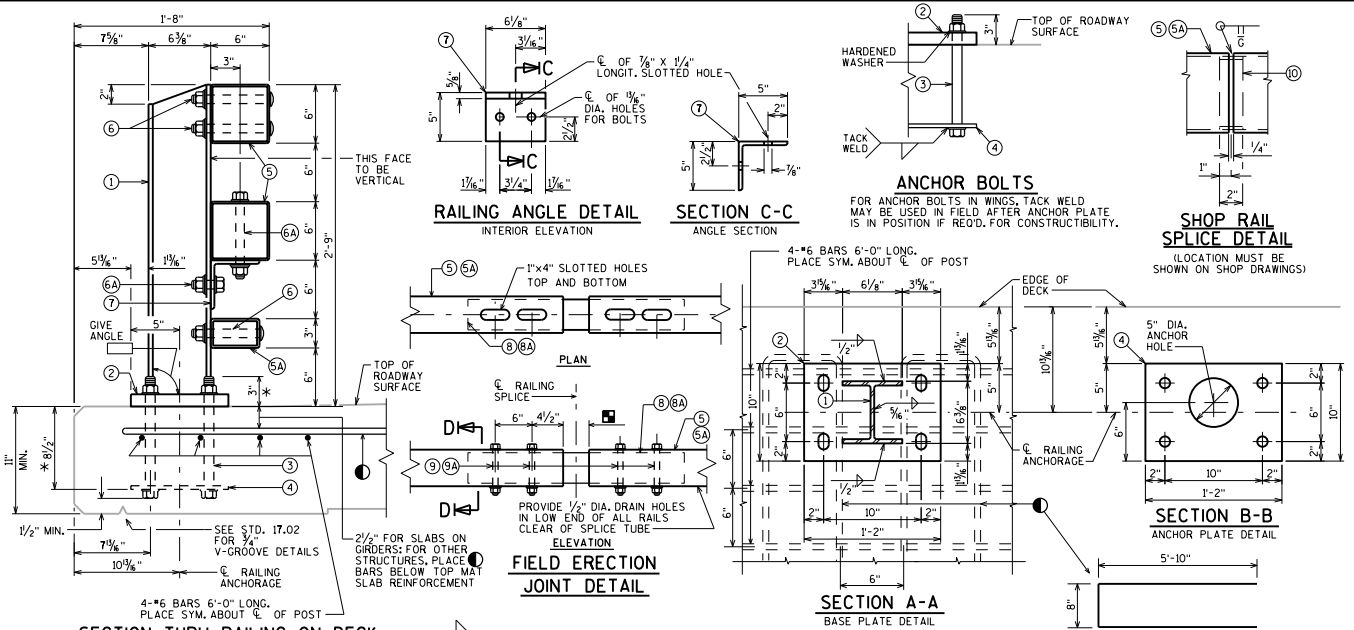
TIMBER RAILING ATTACHED TO CONCRETE SLAB DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION — BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 30.25



SECTION THRU RAILING ON DECK

* NORMAL TO BASE PLATE

RAILING ANGLE DETAIL

INTERIOR ELEVATION

SECTION C-C

ANGLE SECTION

ANCHOR BOLTS

FOR ANCHOR BOLTS IN WINGS, TACK WELD MAY BE USED IN FIELD AFTER ANCHOR PLATE IS IN POSITION IF REQ'D. FOR CONSTRUCTIBILITY.

SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)

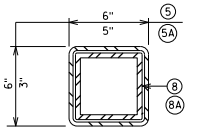
FIELD ERECTION JOINT DETAIL

SECTION A-A

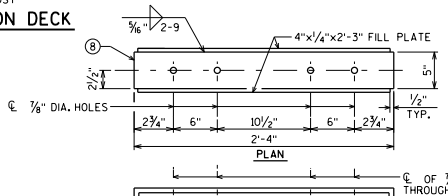
BASE PLATE DETAIL

SECTION B-B

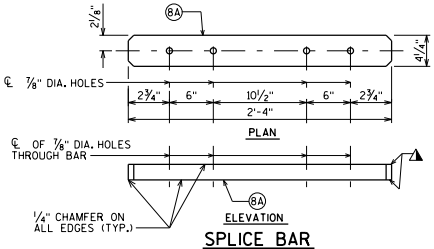
ANCHOR PLATE DETAIL



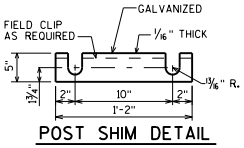
SECTION D-D



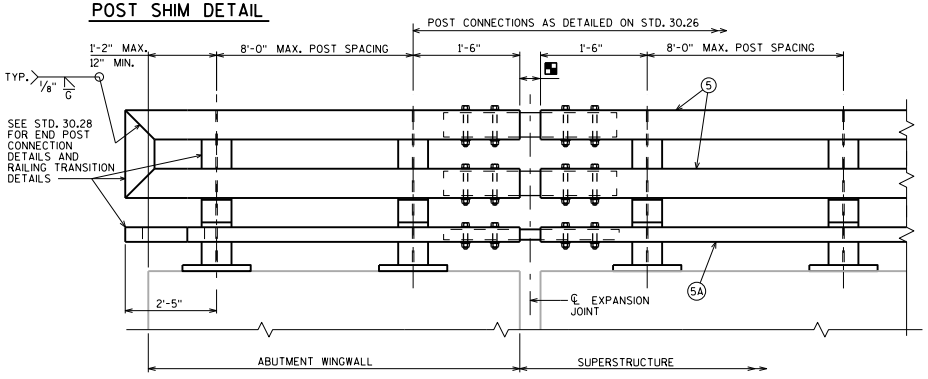
SPLICE TUBE



SPLICE BAR

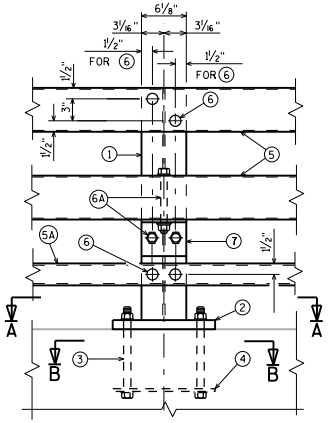


POST SHIM DETAIL



PART ELEVATION OF RAILING

INTERIOR ELEVATION



PART ELEVATION OF RAILING AT POST

INTERIOR ELEVATION

LEGEND

① W6 X 25 WITH 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT NO. 5. USE 1" DIA. HOLES FOR BOLT NO. 6 AT NO. 5A AND FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.

② PLATE 1¼" X 10" X 1'-2" WITH 1⅛" X 1⅞" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.

③ ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 11½" LONG BOLT FOR CONCRETE DECKS. ON CONCRETE SLAB SUPERSTRUCTURES, USE 1'-3" LONG BOLT FOR SLAB THICKNESS > 16" AND 11½" LONG FOR THICKNESS ≤ 16". USE 1'-9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTABILITY.)

④ ⅜" X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1⅛" DIA. HOLES FOR ANCHOR BOLTS NO. 3.

⑤ TS 6 X 6 X ⅜" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & ⅞" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).

⑤A TS 5 X 3 X ¼" STRUCTURAL TUBING. USE 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.

⑥ ⅞" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, ⅜" X 1¾" X 1¾" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).

⑥A ¾" DIA. A325 BOLT WITH HEX NUT & SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE & 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH ⅜" X 1¾" X 1¾" WASHER).

⑦ L 5 X 5 X ⅝" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.

⑧ TS 5 X 5 X ⅝" X 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.

⑧A 4¼" X 2⅛" X 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.

⑨ ¾" DIA. A325 FULLY THREADED BOLTS, 7½" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5.

⑨A ¾" DIA. A325 FULLY THREADED BOLTS, 4½" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5A.

⑩ SPLICE SLEEVE FABRICATED FROM ¼" PLATE. PROVIDE "SLIDING FIT".

▪ ROADWAY OPENING OR 2½" MIN. FOR STRIP SEAL EXP. JOINT & ½" OPENING FOR A1 ABUTMENT. ½" AT FIXED JOINTS. SPLICES ARE REQUIRED IN ANY RAILING SPAN BETWEEN POSTS THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT.

▲ PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE RAILS, SPLICE TUBES AND FILL PLATES.

◐ #6 BARS X 12'-0" LONG. BEND AS SHOWN. TIE TO TOP MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE NY3 B-_-_". WHICH INCLUDES ALL ITEMS SHOWN.

RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE.

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.

ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS, ANGLES, SPLICE TUBES, SPLICE BARS AND STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.

WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. [ ] . [ ] (FILL IN COLOR NAME).

RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED f_y =50 KSI. ANCHOR PLATES & SHIMS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.

THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL ⅛ TURN.

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

STEEL SHIMS SHALL BE PROVIDED & USED UNDER PLATE NO. 2 WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

RAILING WEIGHT = 60 LB/LF (BASED ON 8'-0" POST SPACING)

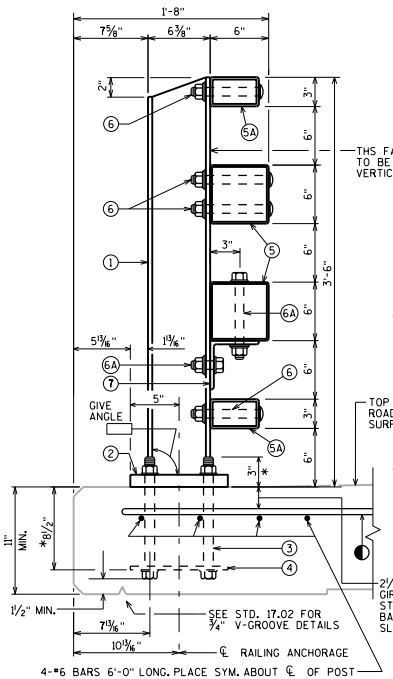
TUBULAR STEEL RAILING TYPE NY3

BUREAU OF STRUCTURES

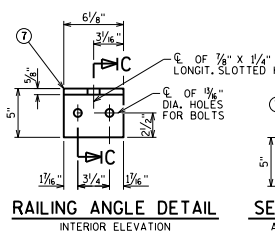
APPROVED: *Bill Oliva*

DATE: 1-19

STANDARD 30.26

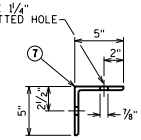


SECTION THRU RAILING ON DECK



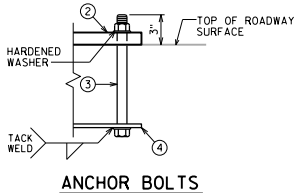
RAILING ANGLE DETAIL

INTERIOR ELEVATION



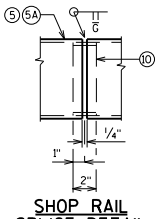
SECTION C-C

ANGLE SECTION



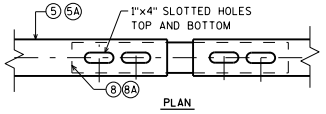
ANCHOR BOLTS

FOR ANCHOR BOLTS IN WINGS, TACK WELD MAY BE USED IN FIELD AFTER ANCHOR PLATE IS IN POSITION IF REQ'D. FOR CONSTRUCTIBILITY.

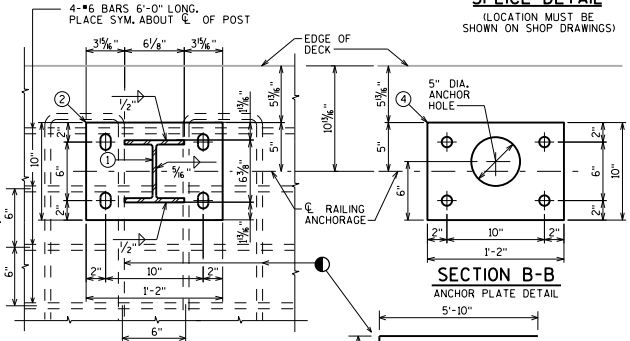


SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



FIELD ERECTION JOINT DETAIL

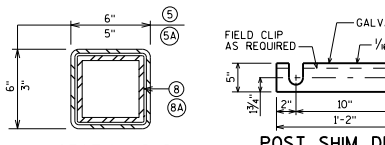


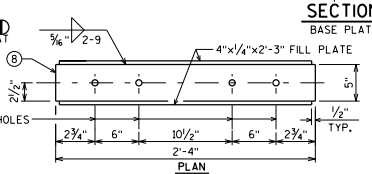
SECTION A-A

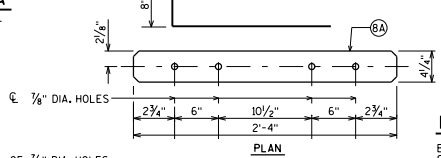
BASE PLATE DETAIL

SECTION B-B

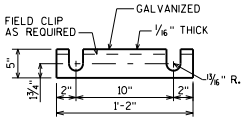
ANCHOR PLATE DETAIL



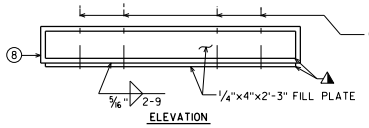




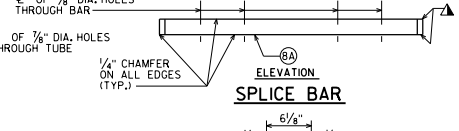
SECTION D-D



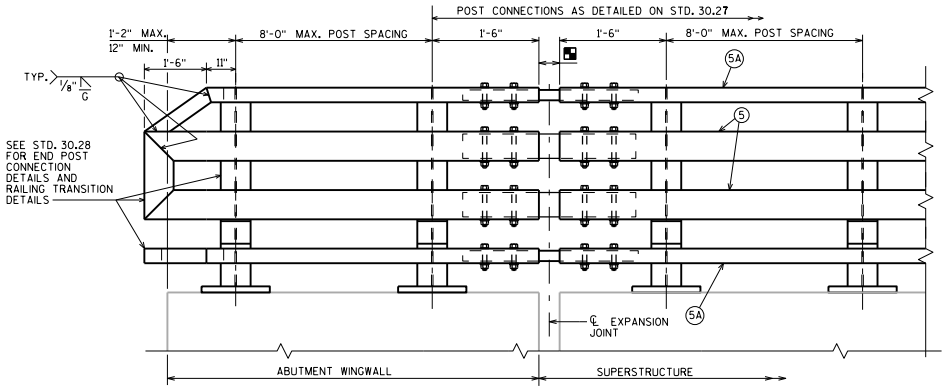
POST SHIM DETAIL



SPLICE TUBE

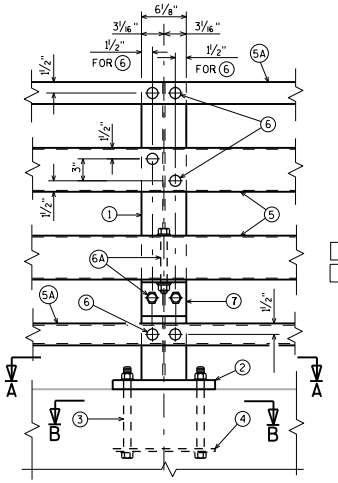


SPLICE BAR



PART ELEVATION OF RAILING

INTERIOR ELEVATION



PART ELEVATION OF RAILING AT POST

INTERIOR ELEVATION

LEGEND

① W6 X 25 WITH 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT TOP TWO RAILS. USE 1" DIA. HOLES FOR BOLT NO. 6 AT BOTTOM NO. 5A & FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.

② PLATE 1¼" X 10" X 1'-2" WITH 1⅛" X 1⅜" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.

③ ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 11½" LONG BOLT FOR CONCRETE DECKS. ON CONCRETE SLAB SUPERSTRUCTURES, USE 1'-3" LONG BOLT FOR SLAB THICKNESS > 16" AND 11½" LONG FOR THICKNESS ≤ 16". USE 1'-9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTABILITY.)

④ ⅜" X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1⅛" DIA. HOLES FOR ANCHOR BOLTS NO. 3.

⑤ TS 6 X 6 X ⅜" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & ⅞" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).

⑤A TS 5 X 3 X ¼" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK). USE 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.

⑥ ⅞" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 5/16" X 1¾" X 1¾" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).

⑥A ¾" DIA. A325 BOLT WITH HEX NUT AND SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE AND 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH 5/16" X 1¾" X 1¾" WASHER).

⑦ L 5 X 5 X ⅝" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.

⑧ TS 5 X 5 X 5/16" X 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.

⑧A 4¼" X 2⅛" X 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.

⑨ ¾" DIA. A325 FULLY THREADED BOLTS, 7½" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5.

⑨A ¾" DIA. A325 FULLY THREADED BOLTS, 4½" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5A.

⑩ SPLICE SLEEVE FABRICATED FROM ¼" PLATE. PROVIDE "SLIDING FIT".

■ ROADWAY OPENING OR 2½" MIN. FOR STRIP SEAL EXP. JOINT & ½" OPENING FOR A1 ABUTMENT. ½" AT FIXED JOINTS. SPLICES ARE REQUIRED IN ANY RAILING SPAN BETWEEN POSTS THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT.

▲ PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE RAILS, SPLICE TUBES AND FILL PLATES.

◐ #6 BARS X 12'-0" LONG. BEND AS SHOWN. TIE TO TOP MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE NY4 B-_-_", WHICH INCLUDES ALL ITEMS SHOWN.

RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE.

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.

ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS, ANGLES, SPLICE TUBES, SPLICE BARS AND STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.

WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. [ ] , [ ] (FILL IN COLOR NAME).

RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED f_y =50 KSI. ANCHOR PLATES & SHIMS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.

THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL ⅛ TURN.

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

STEEL SHIMS SHALL BE PROVIDED & USED UNDER PLATE NO. 2 WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

RAILING WEIGHT = 75 LB/LF (BASED ON 8'-0" POST SPACING)

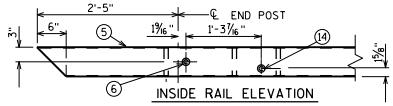
TUBULAR STEEL RAILING TYPE NY4

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

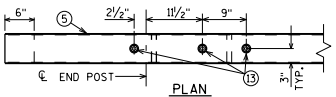
APPROVED: *Bill Oliva*

DATE: 1-19

STANDARD 30.27

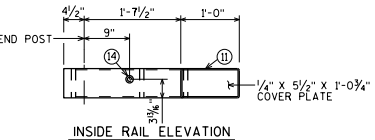


INSIDE RAIL ELEVATION

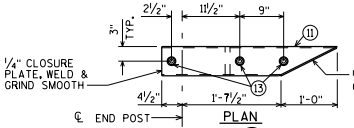


PLAN

TOP RAIL ⑤ DETAILS

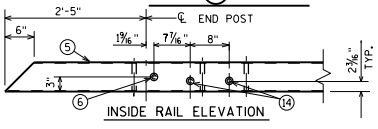


INSIDE RAIL ELEVATION

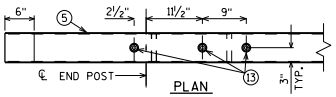


PLAN

TUBE ⑪ DETAILS

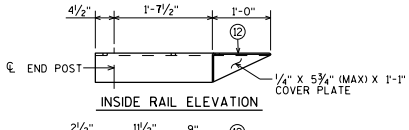


INSIDE RAIL ELEVATION

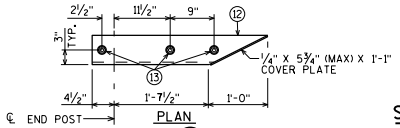


PLAN

BOTTOM RAIL ⑤ DETAILS

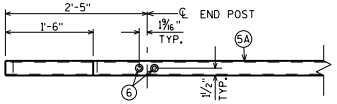


INSIDE RAIL ELEVATION

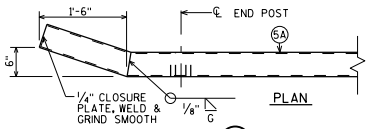


PLAN

ANGLE ⑫ DETAILS

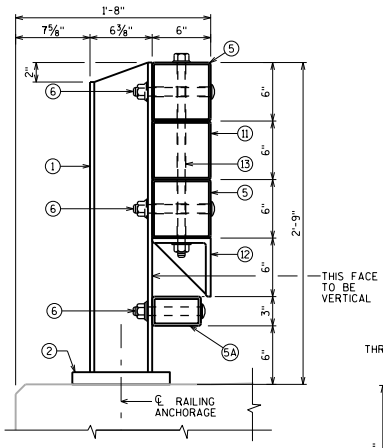


INSIDE RAIL ELEVATION

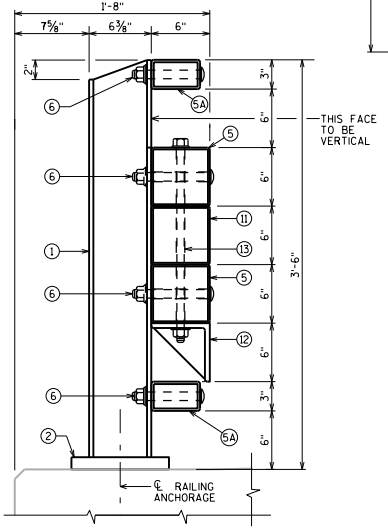


PLAN

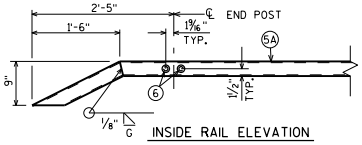
BOTTOM RAIL 5A DETAILS



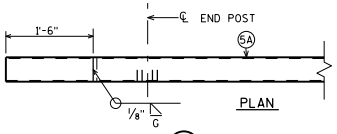
SECTION THRU NY3 RAILING END POST



SECTION THRU NY4 RAILING END POST

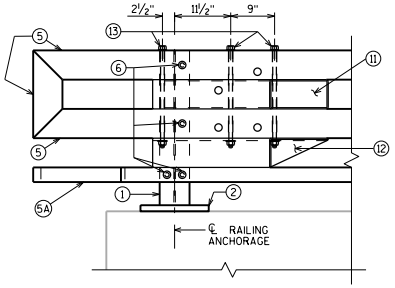


INSIDE RAIL ELEVATION



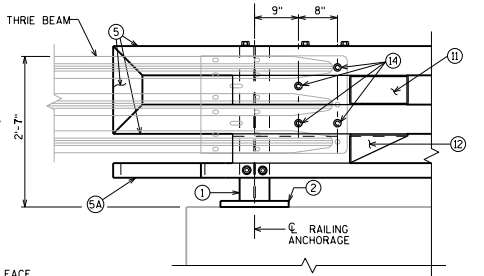
PLAN

TOP RAIL 5A DETAILS



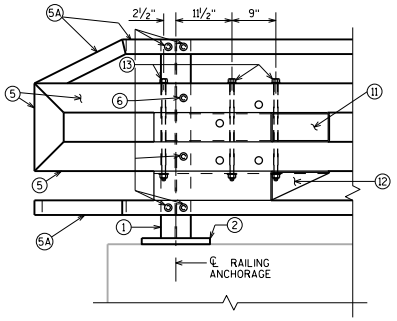
ELEVATION DETAIL AT NY3 END POST

INTERIOR ELEVATION



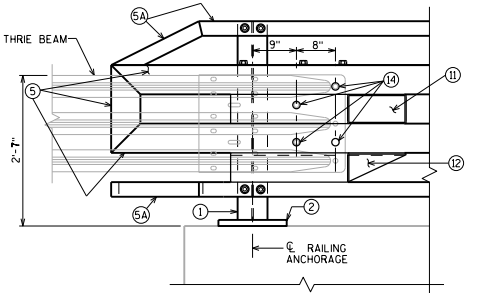
ELEVATION OF DETAIL AT NY3 END POST

THRIE BEAM RAIL ATTACHMENT



ELEVATION DETAIL AT NY4 END POST

INTERIOR ELEVATION



ELEVATION OF DETAIL AT NY4 END POST

THRIE BEAM RAIL ATTACHMENT

LEGEND

① W6 X 25 WITH 1¼" X 1⅜" HORIZONTAL SLOTTED HOLES ON SIDE OF POST FOR BOLT NO. 6 AT NO. 5 (AND TOP RAIL FOR NY4). USE 1" DIA. HOLE FOR BOLT NO. 6 AT NO. 5A BOTTOM RAIL. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.

② PLATE 1¼" X 10" X 1'-2". SEE STANDARDS 30.26 AND 30.27 FOR MORE INFORMATION.

⑤ TS 6 X 6 X ⅜" STRUCTURAL TUBING. USE ⅞" DIA. HOLES IN TOP AND BOTTOM OF RAILS FOR BOLT NO. 13 AS SHOWN IN PLAN DETAILS. USE 1" DIA. HOLES IN FRONT AND BACK OF RAILS FOR BOLTS NO. 6 & NO. 14 AS SHOWN IN ELEVATION DETAILS.

⑤A TS 5 X 3 X ½" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL FOR NY4 (FRONT & BACK). USE 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.

⑥ ⅞" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, ⅜" X 1¾" X 1¾" WASHER, AND SPRING LOCK WASHER (1 REQUIRED AT RAIL NO. 5 TO POST NO. 1 CONNECTION LOCATIONS SHOWN. 2 REQUIRED AT RAIL NO. 5A TO POST NO. 1 CONNECTION LOCATIONS SHOWN).

⑪ TS 6 X 6 X ⅜" STRUCTURAL TUBING. USE 1" DIA. HOLES IN FRONT AND BACK FOR BOLT NO. 14 & ⅞" DIA. HOLES IN TOP & BOTTOM FOR BOLT NO. 13.

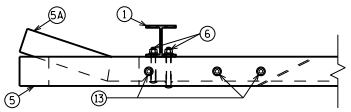
⑫ L 6 X 6 X ½" STRUCTURAL ANGLE. USE ⅞" DIA. HOLES IN TOP FLANGE FOR BOLT NO. 13.

⑬ ¾" DIA. A325 FULLY THREADED BOLTS, 2 WASHERS AND A HEAVY HEX NUT, ON EACH BOLT. NUT TO BE FINGER TIGHT. 3 BOLTS AT EACH END POST.

⑭ ⅞" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT AND ⅜" X 2" X 2" WASHER FOR CONNECTION OF THRIE BEAM (4 REQUIRED)

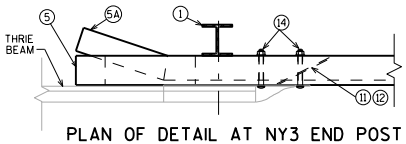
NOTES

STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED f_y=50 KSI. STRUCTURAL ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50.



PLAN OF DETAIL AT NY3 END POST

NY4 SIMILAR



PLAN OF DETAIL AT NY3 END POST

THRIE BEAM RAIL ATTACHMENT
NY4 SIMILAR

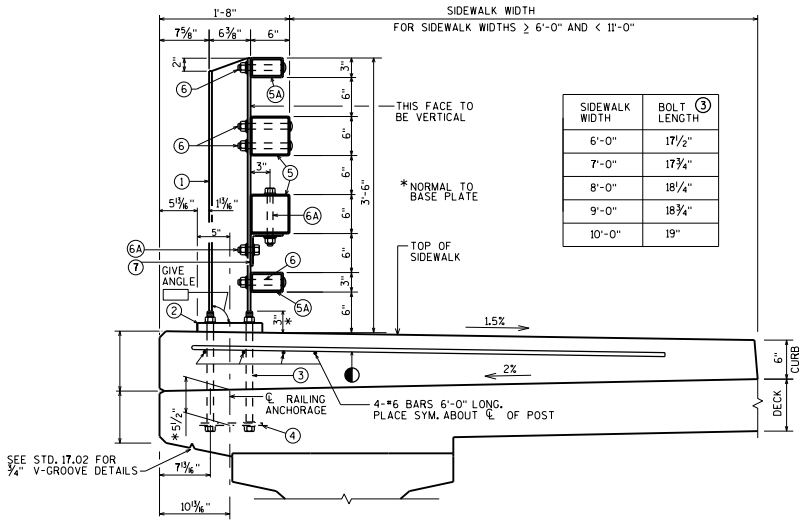
END POST DETAILS FOR TUBULAR STEEL RAILING TYPE NY3 & NY4

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

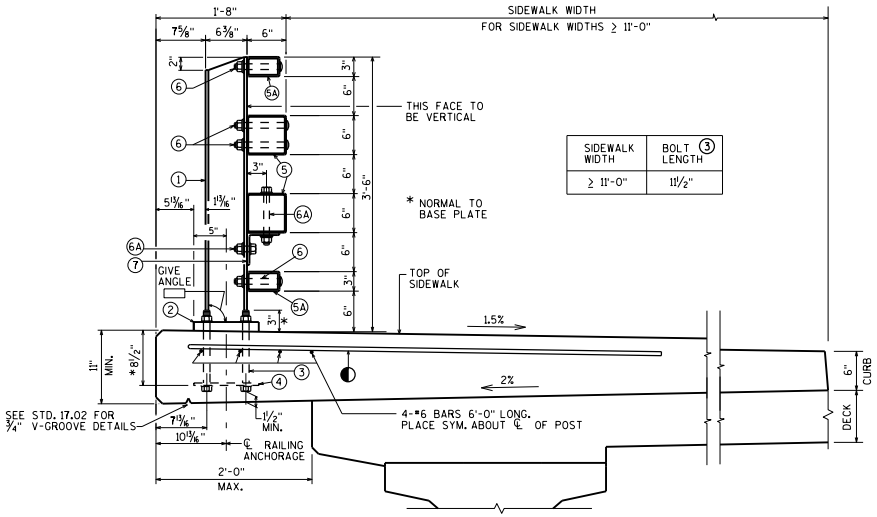
DATE: 1-15

STANDARD 30.28



SIDEWALK WIDTH	BOLT ③ LENGTH
6'-0"	17½"
7'-0"	17¾"
8'-0"	18¼"
9'-0"	18¾"
10'-0"	19"

SECTION THRU RAILING ON SIDEWALK



SIDEWALK WIDTH	BOLT ③ LENGTH
≥ 11'-0"	11½"

SECTION THRU RAILING ON SIDEWALK

LEGEND

① W6 X 25 WITH 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT TOP TWO RAILS. USE 1" DIA. HOLES FOR BOLT NO. 6 AT BOTTOM NO. 5A & FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.

② PLATE 1¼" X 10" X 1'-2" WITH 1⅛" X 1⅜" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.

③ ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 11½" LONG BOLT FOR CONCRETE SIDEWALKS ≥ 11'-0" WIDE AND SEE TABLE TO THE LEFT FOR CONCRETE SIDEWALKS ≥ 6'-0" AND < 11'-0" WIDE FOR PROPER BOLT LENGTHS. USE 1'-9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTABILITY.)

④ ⅜" X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1⅛" DIA. HOLES FOR ANCHOR BOLTS NO. 3.

⑤ TS 6 X 6 X ⅜" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & ⅞" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).

⑤A TS 5 X 3 X ¼" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK). USE 1⅛" X 1⅜" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.

⑥ ⅞" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, ⅜" X 1¾" X 1¾" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).

⑥A ¾" DIA. A325 BOLT WITH HEX NUT AND SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE AND 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH ⅜" X 1¾" X 1¾" WASHER).

⑦ L 5 X 5 X ⅝" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.

◐ #6 BARS X 12'-0" LONG. BEND AS SHOWN. TIE TO TOP MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

FOR ALL TUBULAR STEEL RAILING TYPE NY4 DETAILS SEE STD. 30.27.

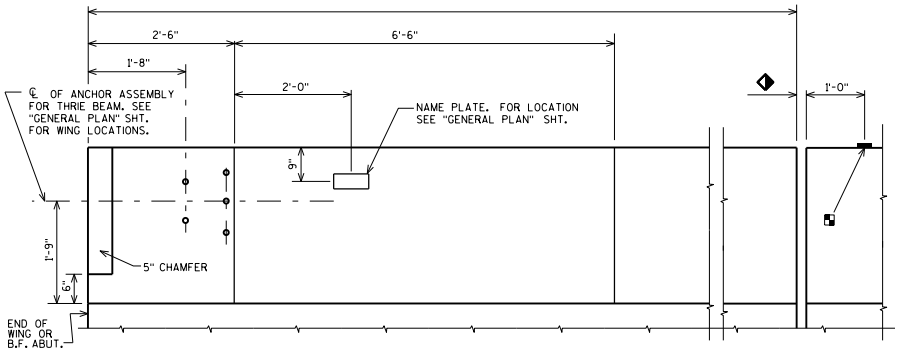
SIDEWALK DETAILS FOR TUBULAR STEEL RAILING TYPE NY4

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 30.29

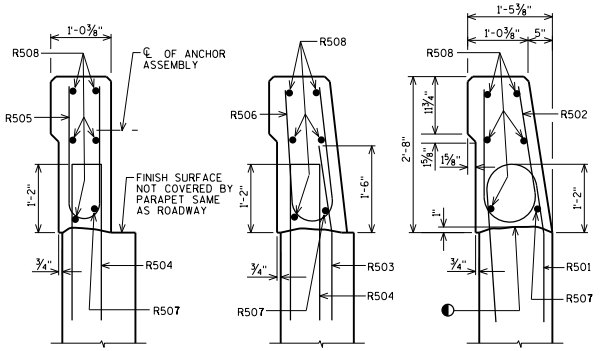


INSIDE ELEVATION

◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

■ BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

NOTE: FOR SECTIONS A, B & C ONLY THE PARAPET TERMINATING ON A WING IS SHOWN. TERMINATION ON A DECK IS SIMILAR.

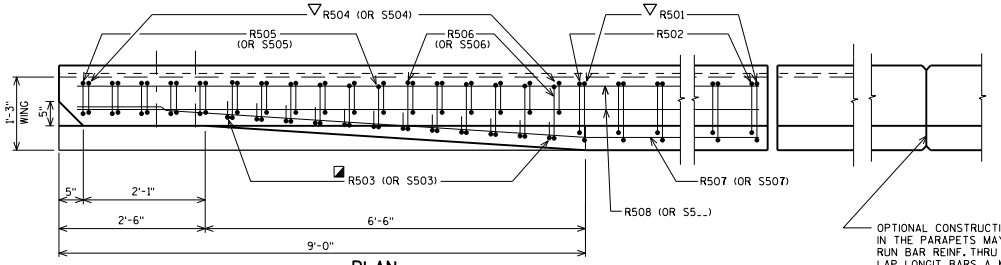


SECTION A SECTION B SECTION C

BILL OF BARS

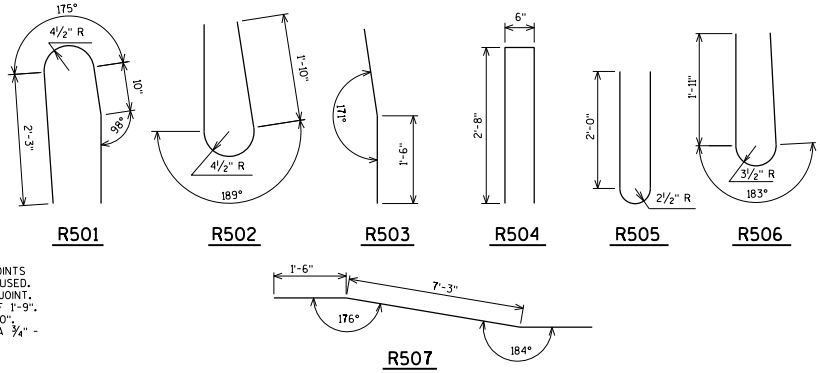
FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			5-10	X	PARAPET-VERT.
R502	X			5-0	X	PARAPET-VERT.
R503	X			3-0	X	PARAPET-VERT.
R504	X			5-7	X	PARAPET-VERT.
R505	X			4-9	X	PARAPET-VERT.
R506	X			4-10	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.
S501	X			4-5	X	PARAPET-VERT.
S503	X			2-9	X	PARAPET-VERT.
S504	X			4-4	X	PARAPET-VERT.



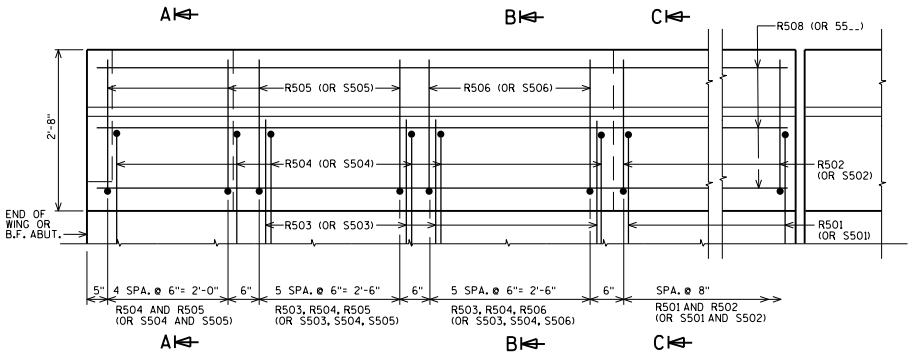
PLAN

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.

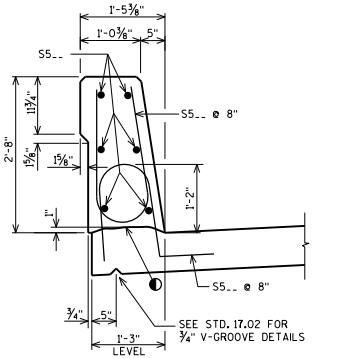


R501 R502 R503 R504 R505 R506

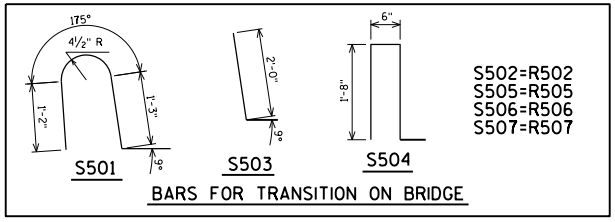
R507



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



S501 S503 S504

BARS FOR TRANSITION ON BRIDGE

AREA = 3.09 SF
WEIGHT = 464 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◪ R503 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R503 OR S503 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

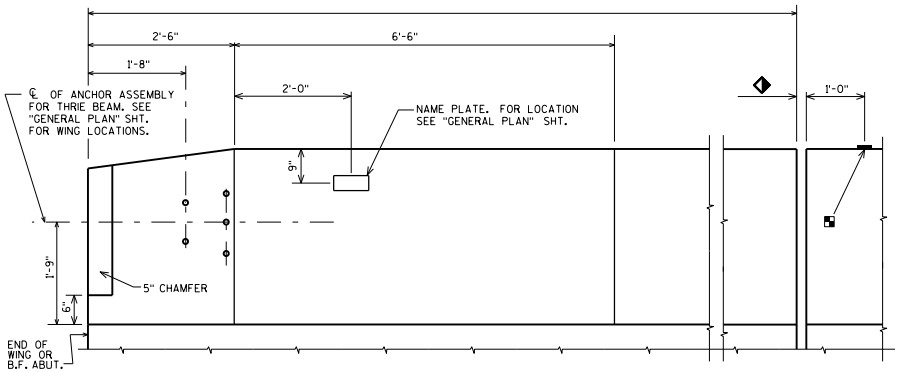
SINGLE SLOPE PARAPET 32SS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 30.30

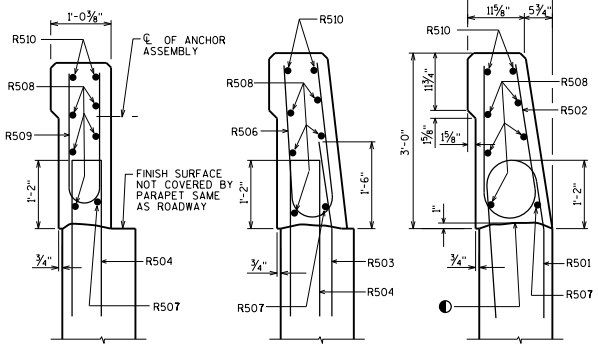


INSIDE ELEVATION

◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

■ BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

NOTE: FOR SECTIONS A, B & C ONLY THE PARAPET TERMINATING ON A WING IS SHOWN. TERMINATION ON A DECK IS SIMILAR.

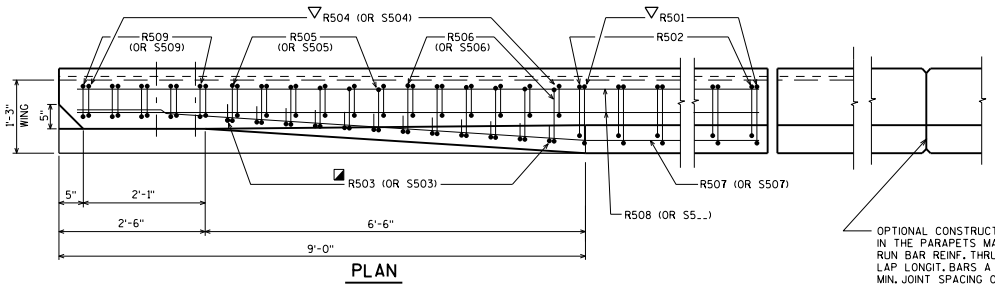


SECTION A SECTION B SECTION C

BILL OF BARS

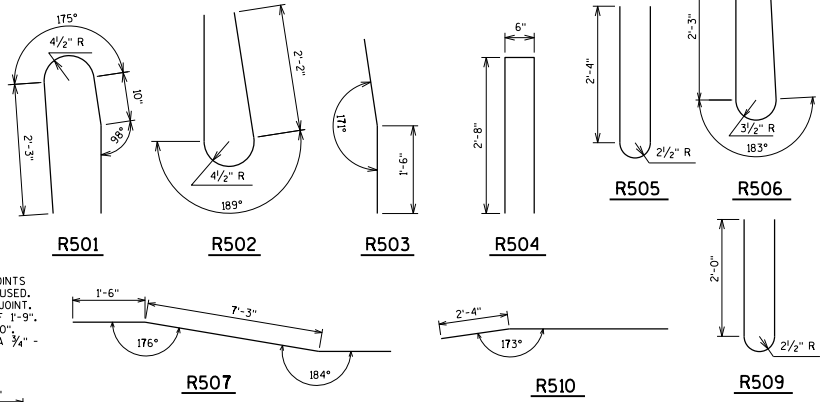
FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			5-10	X	PARAPET-VERT.
R502	X			5-8	X	PARAPET-VERT.
R503	X			3-0	X	PARAPET-VERT.
R504	X			5-7	X	PARAPET-VERT.
R505	X			5-5	X	PARAPET-VERT.
R506	X			5-6	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.
R509	X			4-9	X	PARAPET-VERT.
R510	X				X	PARAPET-HORIZ.
S501	X			4-5	X	PARAPET-VERT.
S503	X			2-9	X	PARAPET-VERT.
S504	X			4-4	X	PARAPET-VERT.

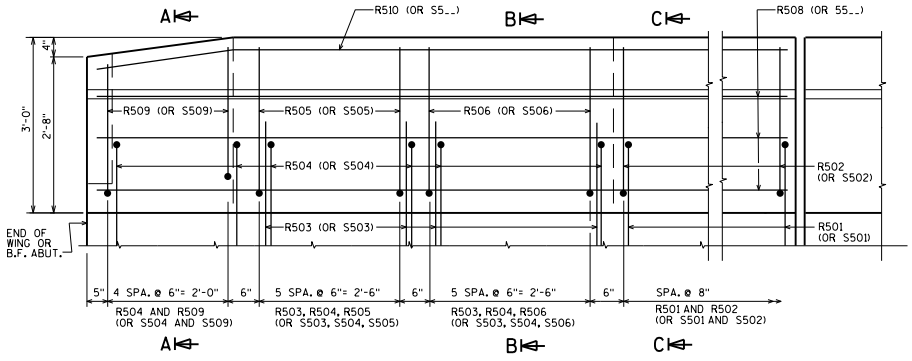


PLAN

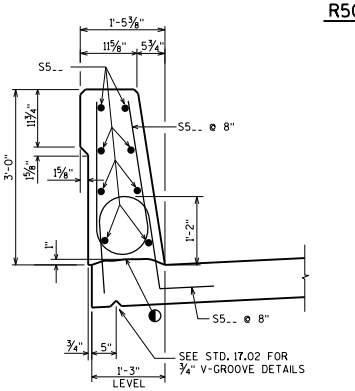
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.



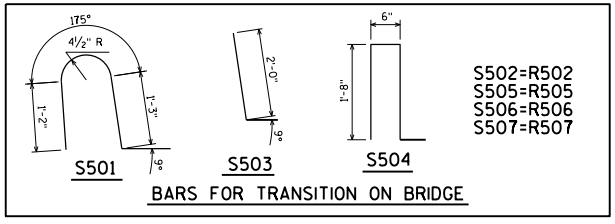
R501 R502 R503 R504 R505 R506 R507 R510 R509



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

AREA = 3.36 SF
WEIGHT = 504 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◪ R503 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R503 OR S503 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

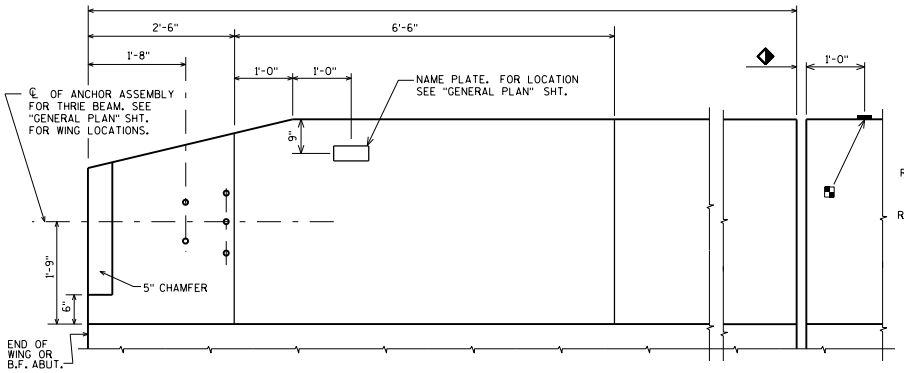
SINGLE SLOPE PARAPET 36SS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

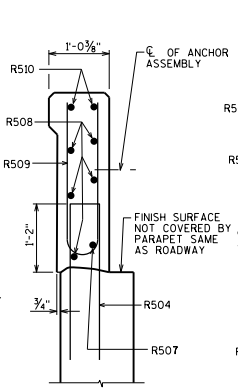
STANDARD 30.31



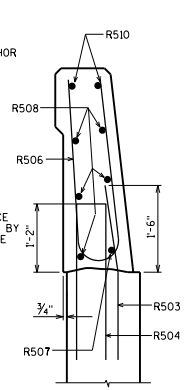
INSIDE ELEVATION

◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

■ BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

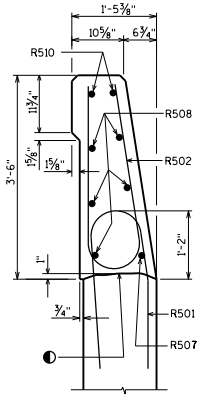


SECTION A



SECTION B

NOTE: FOR SECTIONS A, B & C ONLY THE PARAPET TERMINATING ON A WING IS SHOWN. TERMINATION ON A DECK IS SIMILAR.



SECTION C

BILL OF BARS

FOR ABUTMENT PARAPETS

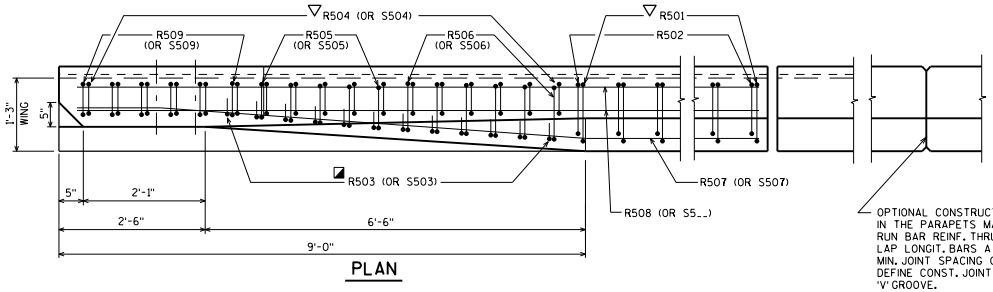
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	BAR SERIES	LOCATION
R501	X			5-10	X		PARAPET-VERT.
R502	X			6-8	X		PARAPET-VERT.
R503	X			3-0	X		PARAPET-VERT.
R504	X			5-7	X		PARAPET-VERT.
R505	X			6-5	X		PARAPET-VERT.
R506	X			6-6	X		PARAPET-VERT.
R507	X				X		PARAPET-HORIZ.
R508	X						PARAPET-HORIZ.
R509	X			5-5	X	▲	PARAPET-VERT.
R510	X				X		PARAPET-HORIZ.
S501	X			4-5	X		PARAPET-VERT.
S503	X			2-9	X		PARAPET-VERT.
S504	X			4-4	X		PARAPET-VERT.

▲ LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.

BAR SERIES TABLE

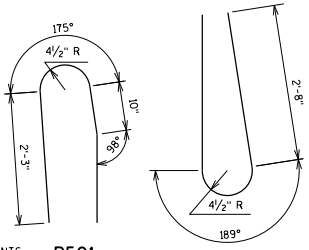
MARK	NO. REQD.	LENGTH
R509	4 SERIES OF 6	4'-9" TO 6'-1"

BUNDLE AND TAG EACH SERIES SEPARATELY.

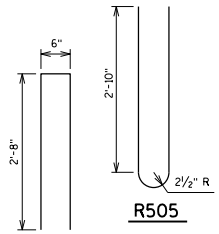


PLAN

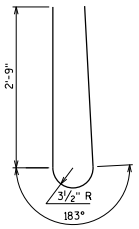
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.



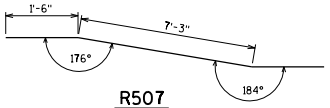
R501 R502 R503



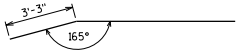
R504 R505



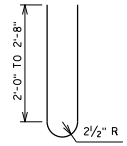
R506



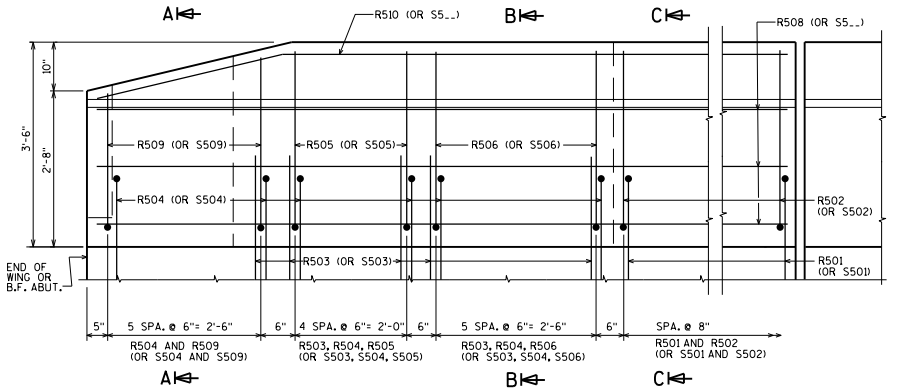
R507



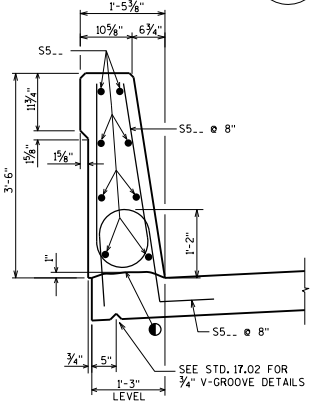
R510



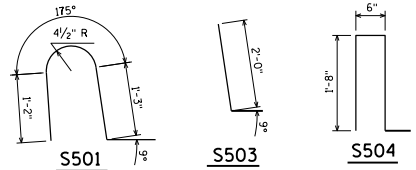
R509



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

AREA = 3.75 SF
WEIGHT = 563 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◪ R503 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R503 OR S503 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

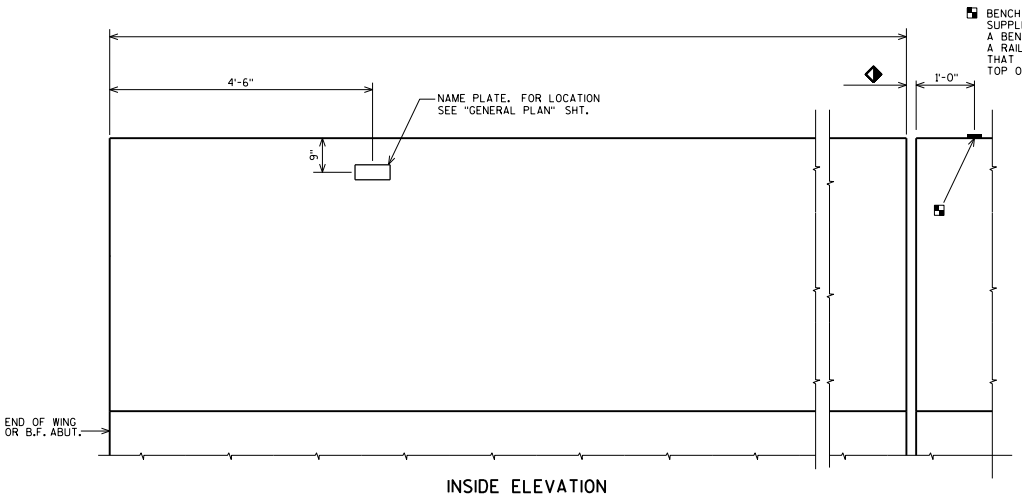
SINGLE SLOPE PARAPET 42SS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

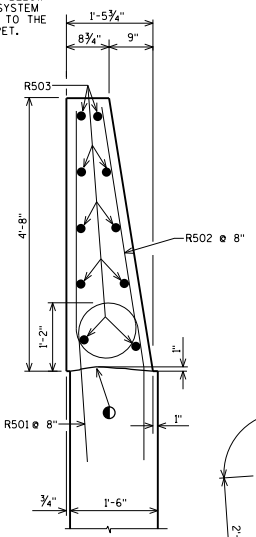
STANDARD 30.32



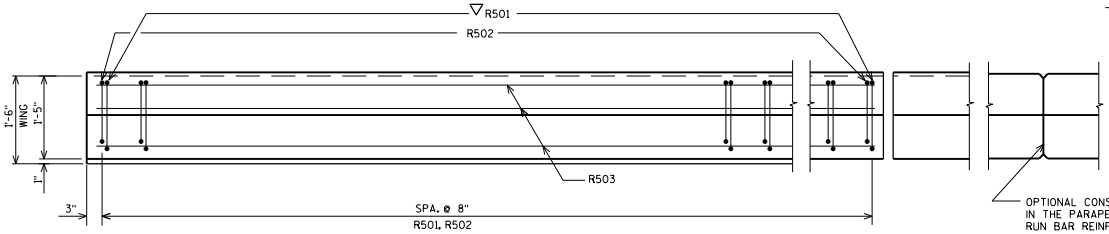
INSIDE ELEVATION

◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

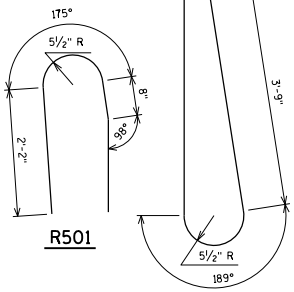


SECTION A



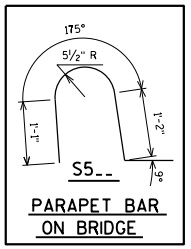
PLAN

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.



R501

R502



PARAPET BAR ON BRIDGE

BILL OF BARS

FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			5-11	X	PARAPET-VERT.
R502	X			9-1	X	PARAPET-VERT.
R503	X					PARAPET HORIZ.
S5__	X			4-6	X	PARAPET-VERT.

DESIGNER NOTES

THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE S56' SINGLE SLOPE CONCRETE ROADWAY BARRIER ADJOINS THE END OF THE '56SS' PARAPET.

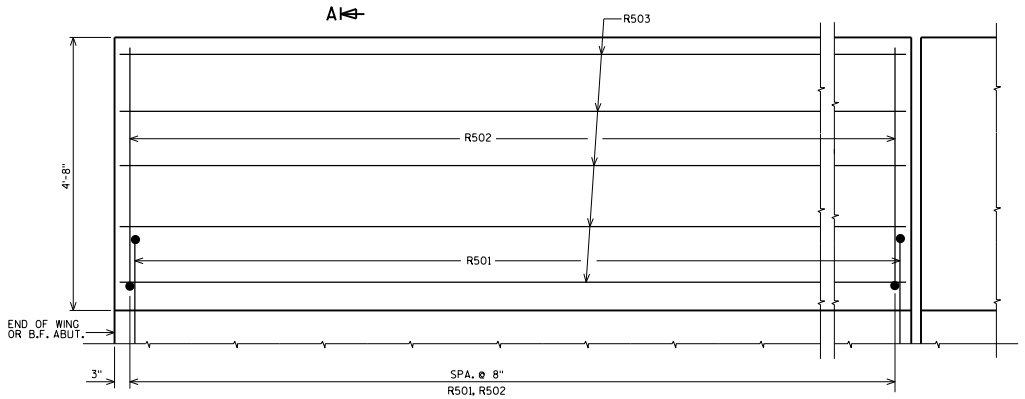
USE A 1'-6" WING WIDTH FOR WINGS PARALLEL TO THE ROADWAY.

AREA = 5.16 SF
WEIGHT = 774 LB/FT

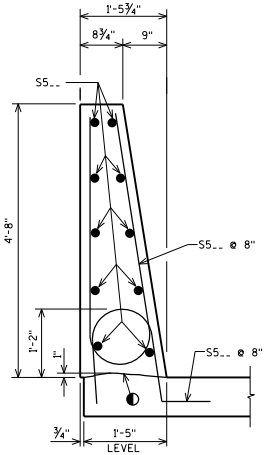
◐ CONST. JOINT - STRIKE OFF AS SHOWN.

▽ R501 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S5__ BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE

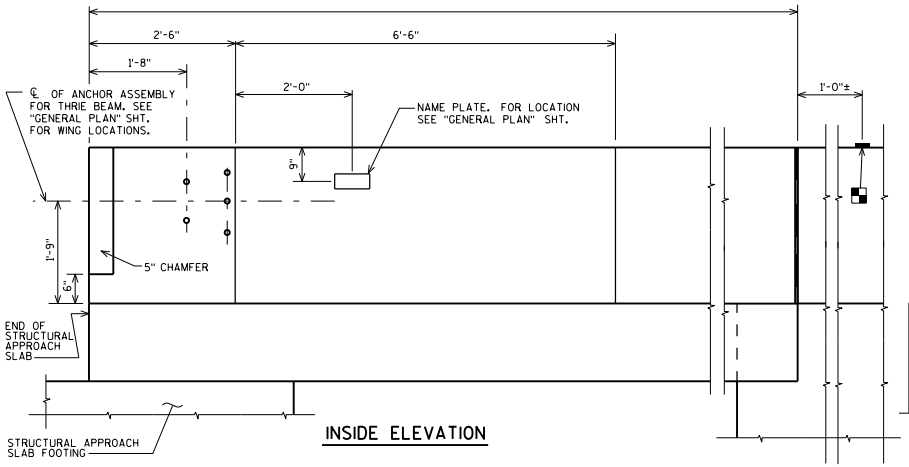
SINGLE SLOPE PARAPET 56SS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

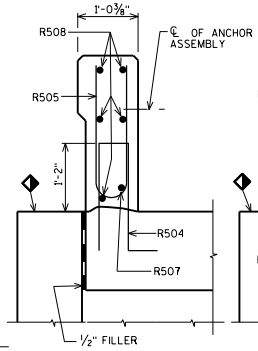
DATE: 7-14

STANDARD 30.33

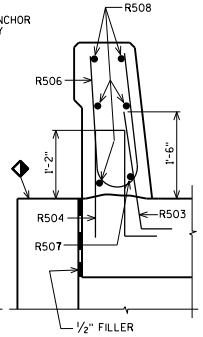


INSIDE ELEVATION

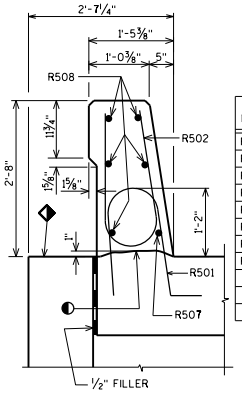
BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



SECTION A



SECTION B

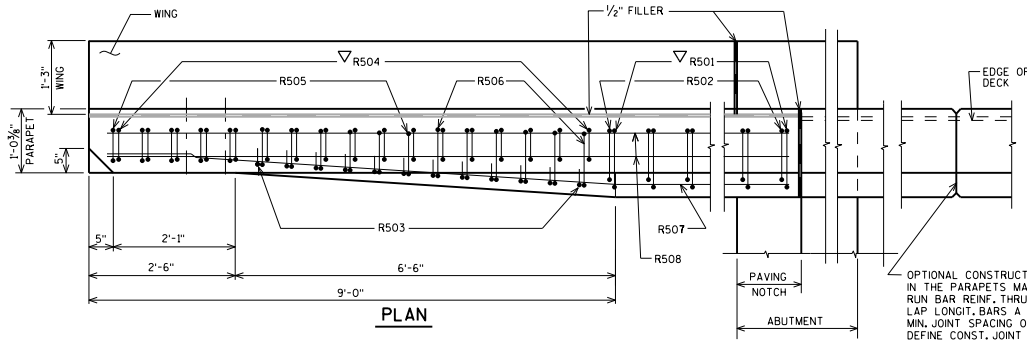


SECTION C

BILL OF BARS

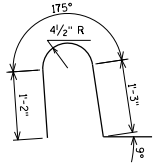
FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4-5	X	PARAPET-VERT.
R502	X			5-0	X	PARAPET-VERT.
R503	X			2-9	X	PARAPET-VERT.
R504	X			4-4	X	PARAPET-VERT.
R505	X			4-9	X	PARAPET-VERT.
R506	X			4-10	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.

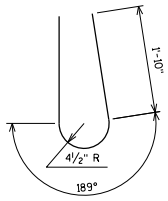


PLAN

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.

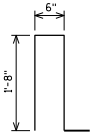


R501

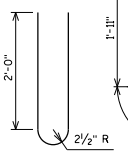


R502

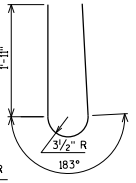
R503



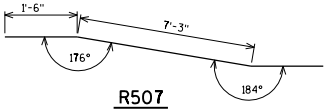
R504



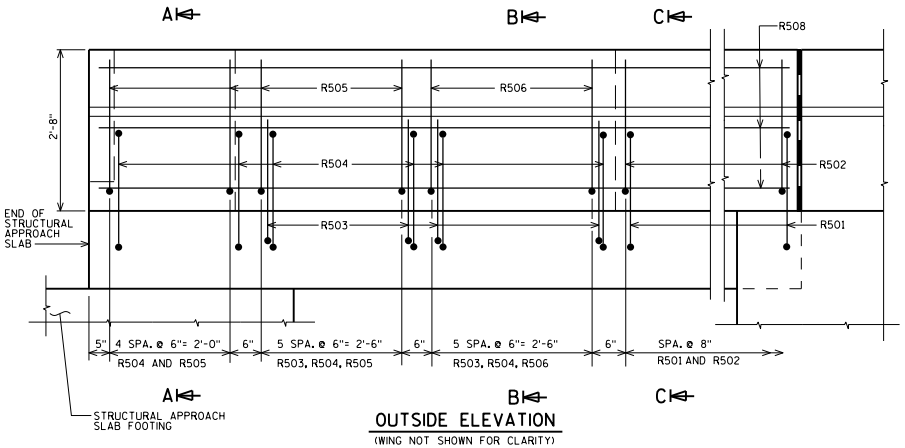
R505



R506



R507



OUTSIDE ELEVATION
(WING NOT SHOWN FOR CLARITY)

DESIGNER NOTES

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.30 FOR DETAILS OF 32SS PARAPET ON BRIDGE.

AREA = 3.09 SF
WEIGHT = 464 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◆ SLOPE FOR DRAINAGE

▽ R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

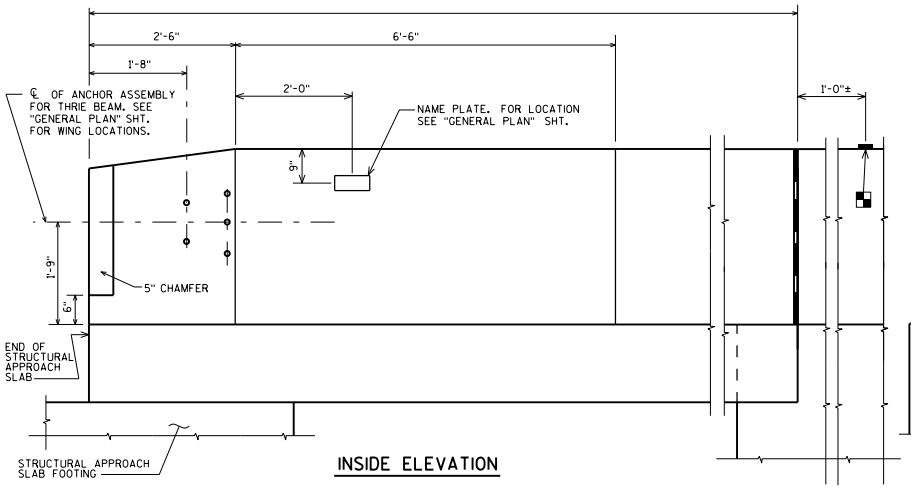
SINGLE SLOPE PARAPET 32SS WITH STRUCTURAL APPROACH SLAB

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

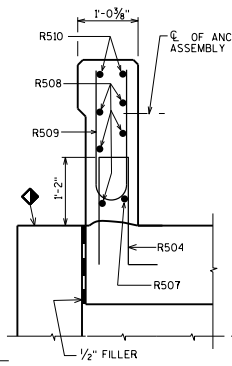
DATE: 1-18

STANDARD 30.34

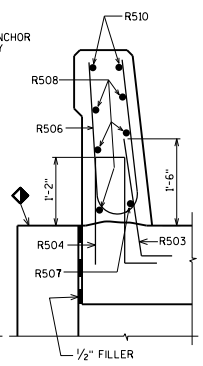


INSIDE ELEVATION

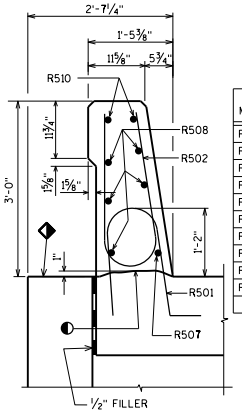
BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



SECTION A



SECTION B

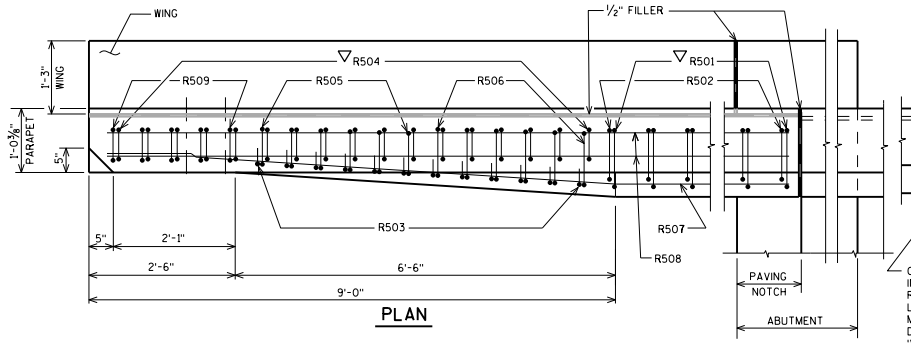


SECTION C

BILL OF BARS

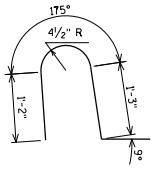
FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4-5	X	PARAPET-VERT.
R502	X			5-8	X	PARAPET-VERT.
R503	X			2-9	X	PARAPET-VERT.
R504	X			4-4	X	PARAPET-VERT.
R505	X			5-5	X	PARAPET-VERT.
R506	X			5-6	X	PARAPET-VERT.
R507	X				X	PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.
R509	X			4-9	X	PARAPET-VERT.
R510	X				X	PARAPET-HORIZ.

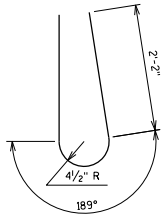


PLAN

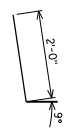
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.



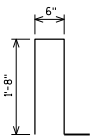
R501



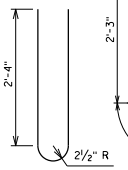
R502



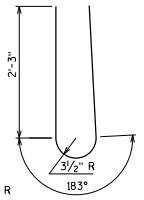
R503



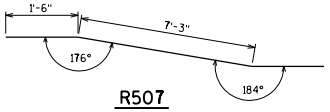
R504



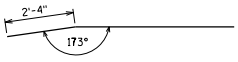
R505



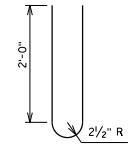
R506



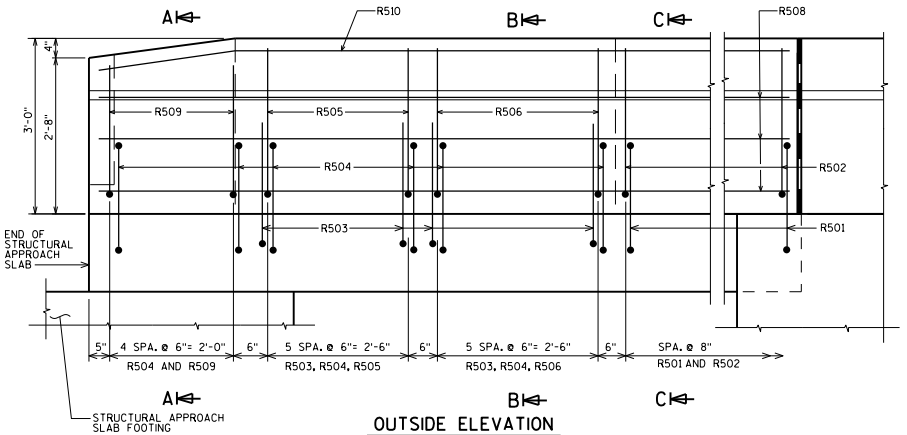
R507



R510



R509



OUTSIDE ELEVATION
(WING NOT SHOWN FOR CLARITY)

DESIGNER NOTES

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.31 FOR DETAILS OF 36SS PARAPET ON BRIDGE.

AREA = 3.36 SF
WEIGHT = 504 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◆ SLOPE FOR DRAINAGE

▽ R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

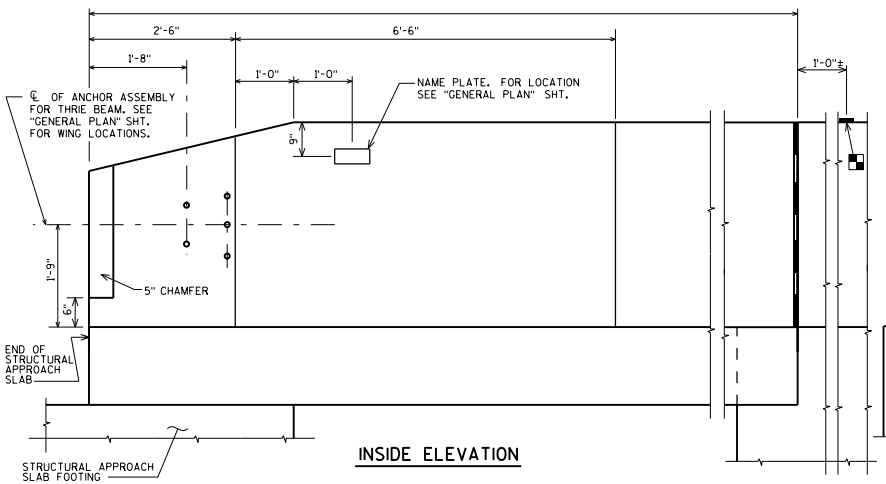
SINGLE SLOPE PARAPET 36SS WITH STRUCTURAL APPROACH SLAB

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

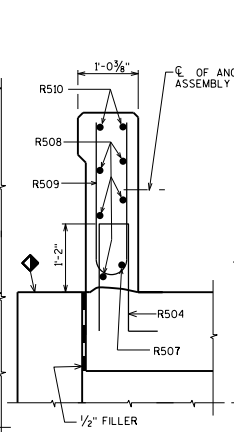
DATE: 1-18

STANDARD 30.35

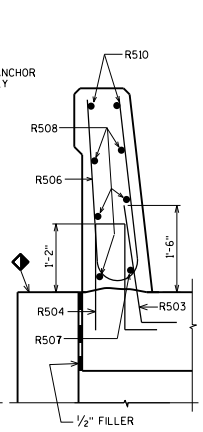


INSIDE ELEVATION

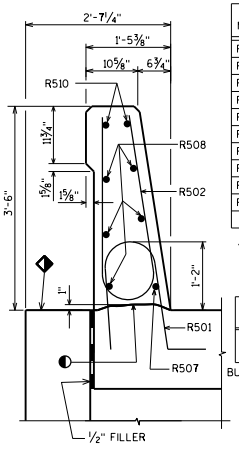
BENCH MARK CAP (WHEN SUPPLIED). AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.



SECTION A



SECTION B



SECTION C

BILL OF BARS

FOR STRUCTURAL APPROACH SLAB PARAPETS

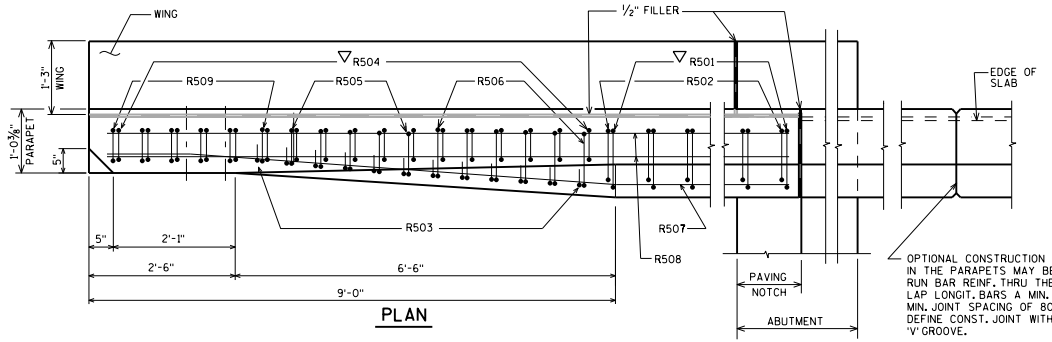
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	BAR SERIES	LOCATION
R501	X			4-5	X		PARAPET-VERT.
R502	X			6-8	X		PARAPET-VERT.
R503	X			2-9	X		PARAPET-VERT.
R504	X			4-4	X		PARAPET-VERT.
R505	X			6-5	X		PARAPET-VERT.
R506	X			6-6	X		PARAPET-VERT.
R507	X				X		PARAPET-HORIZ.
R508	X						PARAPET-HORIZ.
R509	X			5-5	X	⚠	PARAPET-VERT.
R510	X				X		PARAPET-HORIZ.

⚠ LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.

BAR SERIES TABLE

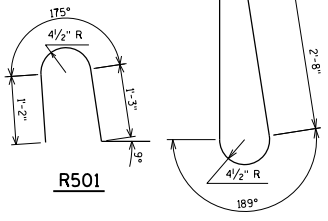
MARK	NO. REQD.	LENGTH
R509	4 SERIES OF 6	4'-9" TO 6'-1"

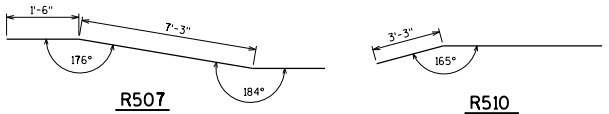
BUNDLE AND TAG EACH SERIES SEPARATELY.

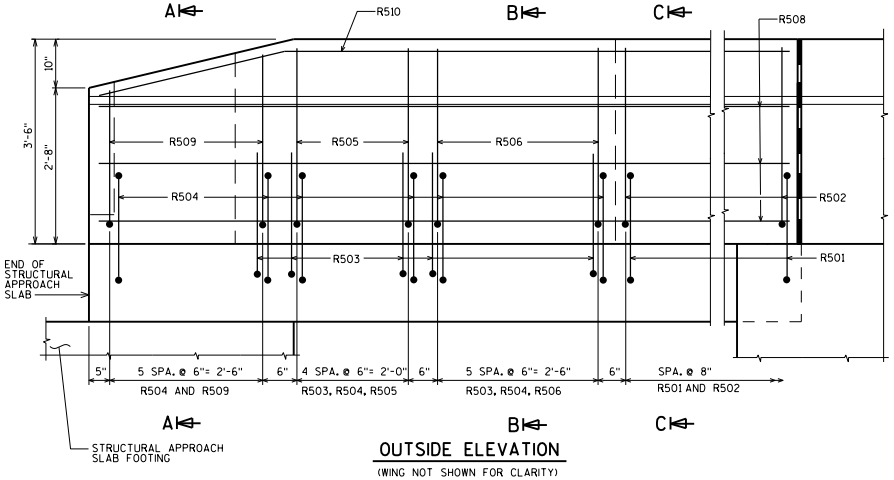


PLAN

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.







OUTSIDE ELEVATION

(WING NOT SHOWN FOR CLARITY)

DESIGNER NOTES

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.32 FOR DETAILS OF 42SS PARAPET ON BRIDGE.

AREA = 3.75 SF
WEIGHT = 563 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◆ SLOPE FOR DRAINAGE

▽ R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

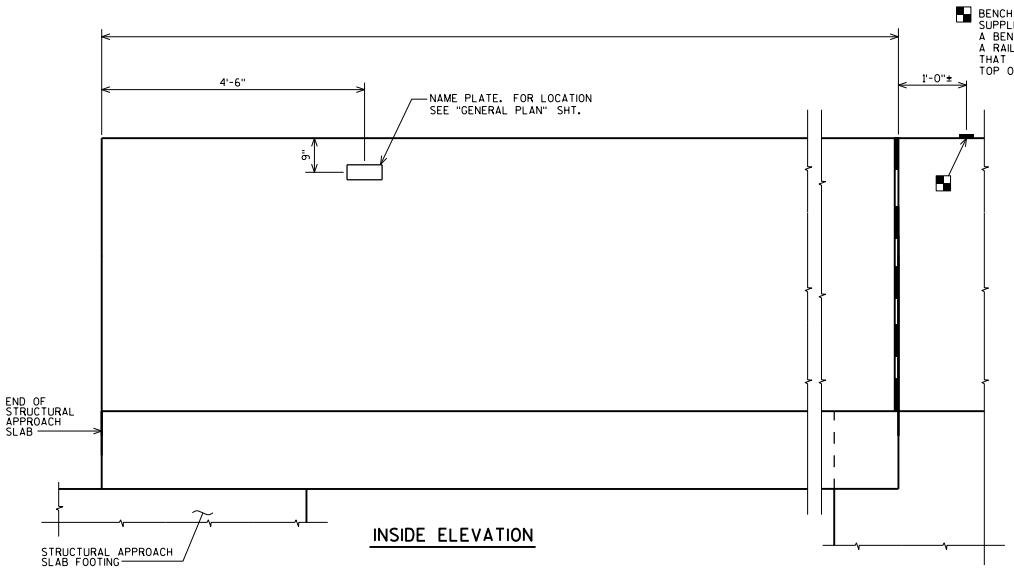
SINGLE SLOPE PARAPET 42SS WITH STRUCTURAL APPROACH SLAB

BUREAU OF STRUCTURES

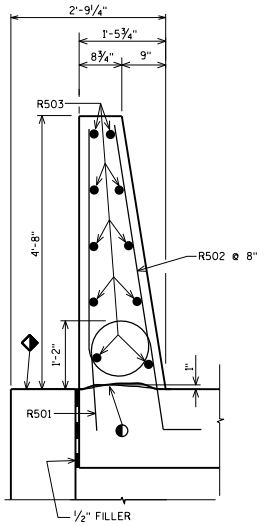
APPROVED: *Bill Oliva*

DATE: 1-18

STANDARD 30.36



INSIDE ELEVATION

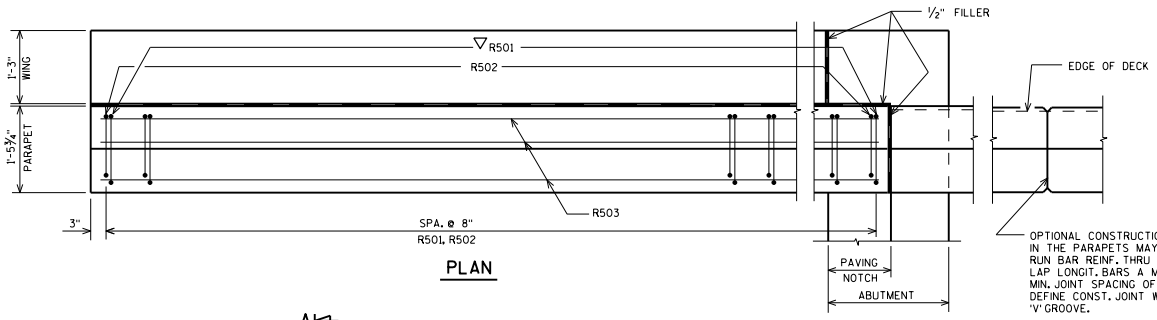


SECTION A

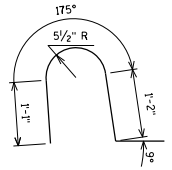
BILL OF BARS

FOR STRUCTURAL APPROACH SLAB PARAPETS

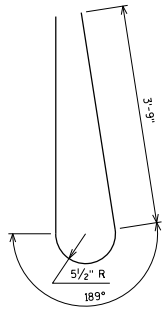
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4-6	X	PARAPET-VERT.
R502	X			9-1	X	PARAPET-VERT.
R503	X					PARAPET HORIZ.



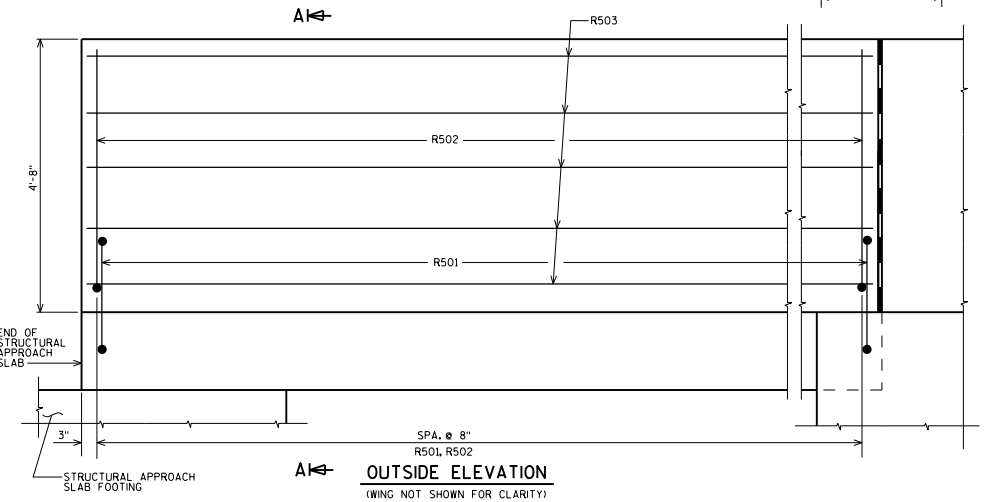
PLAN



R501



R502



OUTSIDE ELEVATION

(WING NOT SHOWN FOR CLARITY)

DESIGNER NOTES

THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE S56' SINGLE SLOPE CONCRETE ROADWAY BARRIER ADJOINS THE END OF THE '56SS' PARAPET.

SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS.

SEE STANDARD 30.33 FOR DETAILS OF 56SS PARAPET ON BRIDGE.

AREA = 5.16 SF
WEIGHT = 774 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

▽ R501 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

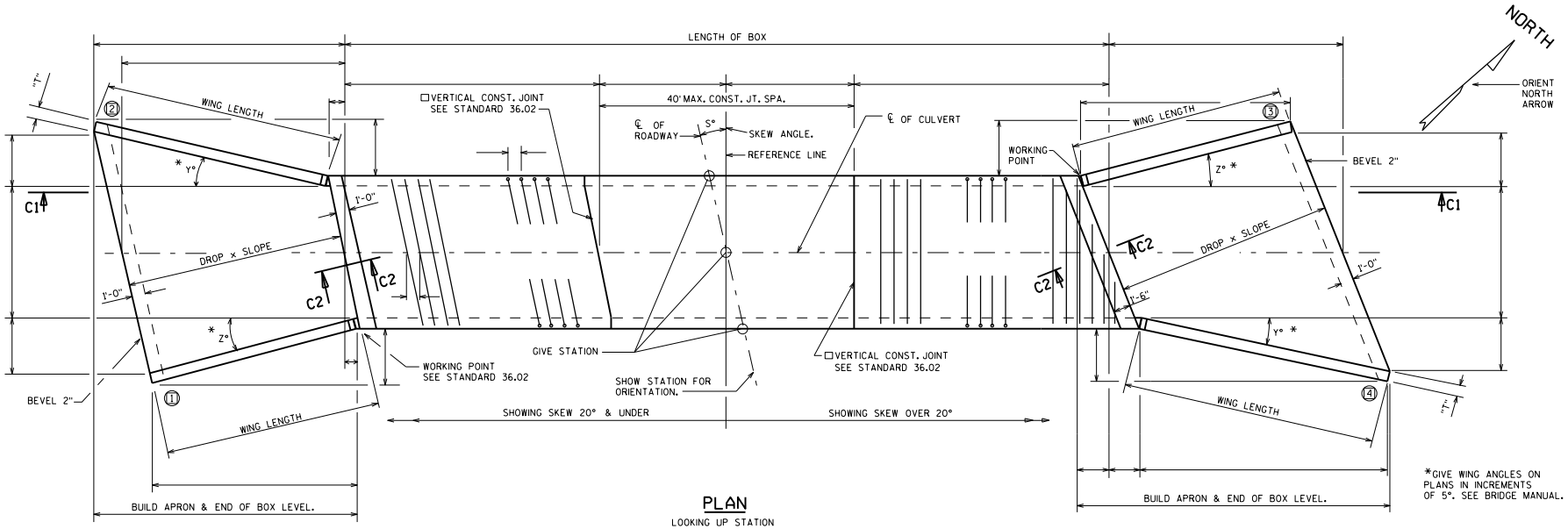
◆ SLOPE FOR DRAINAGE

SINGLE SLOPE PARAPET 56SS WITH STRUCTURAL APPROACH SLAB

BUREAU OF STRUCTURES

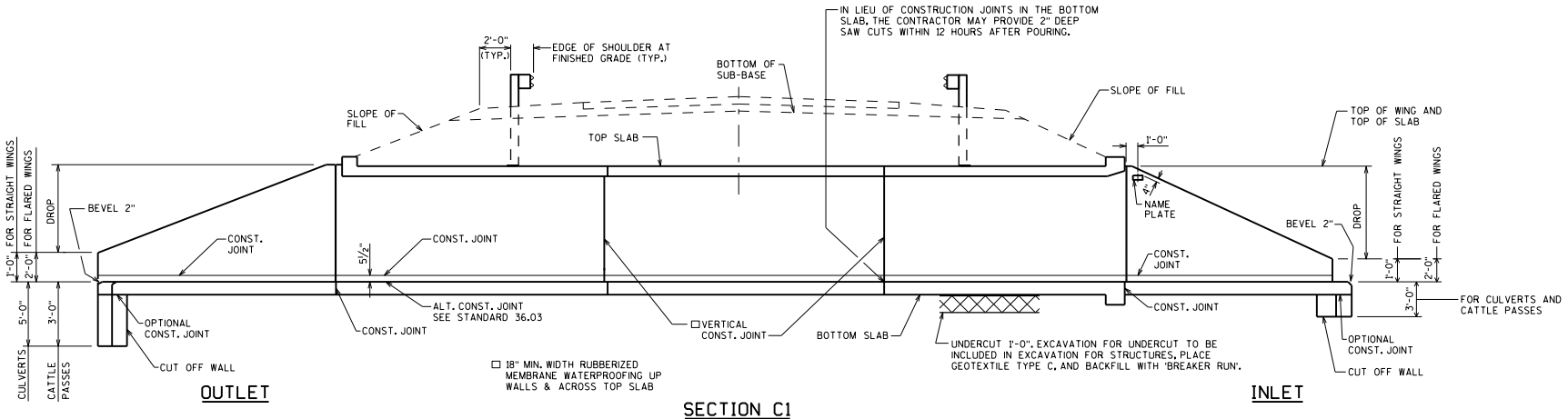
APPROVED: Bill Oliva

DATE: 1-18



PLAN

LOOKING UP STATION



SECTION C1

LEGEND

⬡ INDICATES WING NUMBER

DESIGN DATA

LIVE LOAD:

DESIGN LOADING: HL-93
INVENTORY RATING FACTOR: RF=1.05
OPERATING RATING FACTOR: RF=1.35
WISCONSIN STANDARD PERMIT VEHICLE (WIS.-SPV): 255 (KIPS)

** EARTH LOAD: DESIGNED FOR FILL HEIGHT RANGE OF ___ TO ___ FEET

MATERIAL PROPERTIES:

CONCRETE MASONRY ——— f'c = 3.5 K.S.I.
BAR STEEL REINFORCEMENT ——— fy = 60.0 K.S.I.

DESIGNER NOTES

TYPICAL UNDERCUT SHOWN. SEE STANDARD 9.01 FOR ALTERNATIVES AND ADDITIONAL NOTES.

FOR SECTION C2 AND CONST. JOINT DETAILS SEE STANDARD 36.03

** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS.
HEIGHT TO BE TO THE NEAREST 0.5 FEET ON FILLS UNDER 4 FEET AND TO THE NEAREST FOOT ON FILLS OVER 4 FEET.

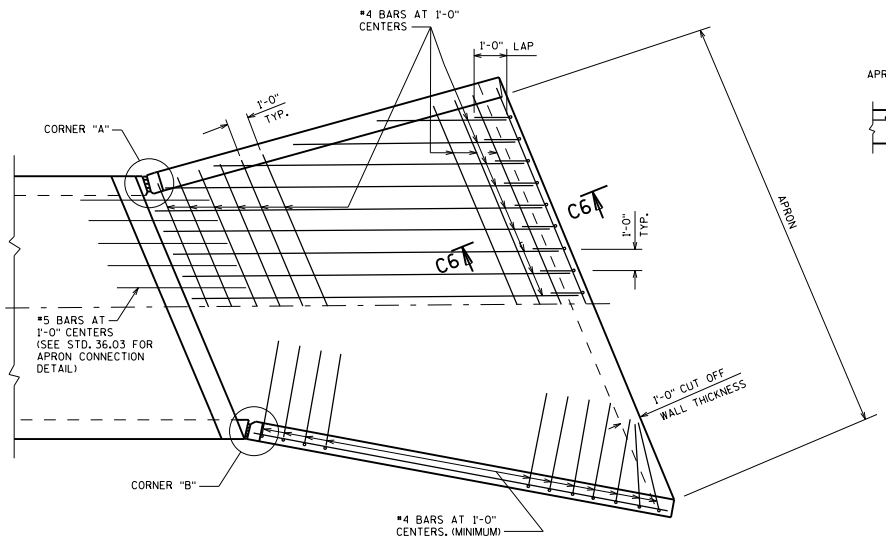
BOX CULVERT LAYOUT

BUREAU OF STRUCTURES

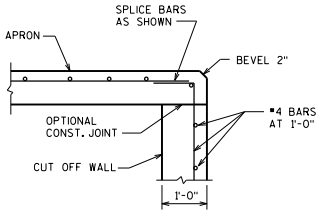
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 36.01



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

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"

NOTES

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

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.

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".

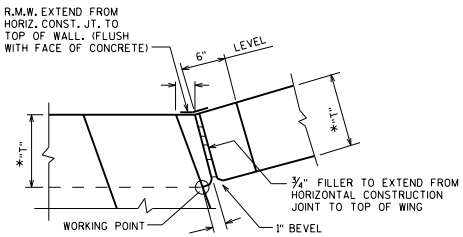
DESIGNER NOTES

SEE STANDARD 9.01 FOR ADDITIONAL NOTES.

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.

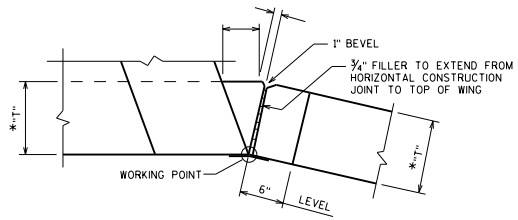
BAR STEEL FOR CAST-IN-PLACE CONCRETE APRONS SHALL BE UNCOATED AND BAR STEEL FOR WINGWALL DOWELS AND ALL WINGWALL BARS SHALL BE EPOXY COATED.

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.

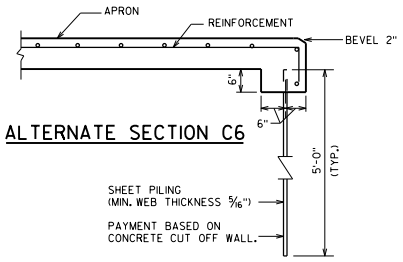


CORNER "A"

* DIMENSION "T" TO BE DETERMINED FROM BARREL DESIGN

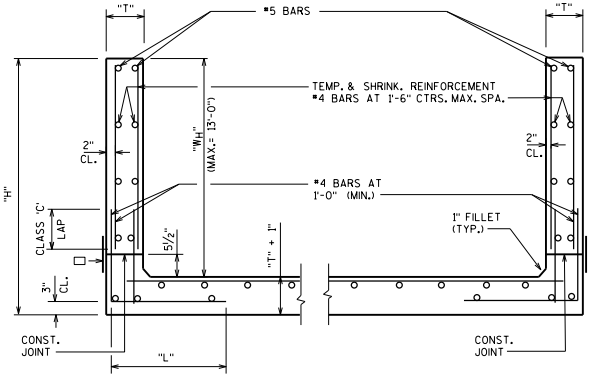


CORNER "B"



ALTERNATE SECTION C6

ALTERNATE CUTOFF WALL



SECTION THRU WINGWALLS

☐ 18" MIN. WIDTH RUBBERIZED MEMBRANE WATERPROOFING ALONG HORIZ. CONSTR. JT. IN WING.

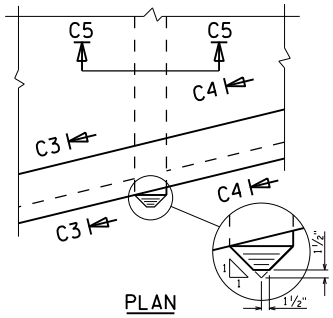
BOX CULVERT APRON DETAILS

BUREAU OF STRUCTURES

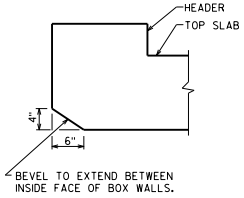
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 36.02

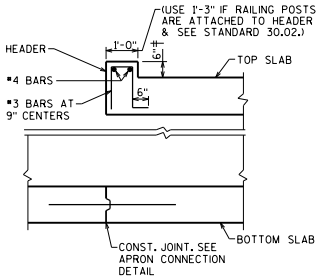


PLAN



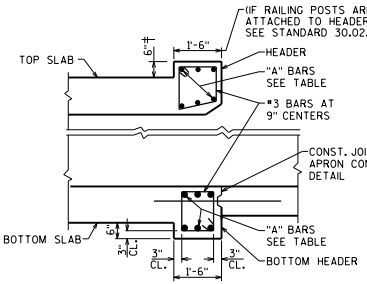
SECTION C3

TYPICAL ALL INLETS



SECTION C2

(OUTLET HEADERS SHOWN FOR SKEW OF 20° AND UNDER)



SECTION C2

(INLET HEADERS SHOWN 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.

* 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 ℄ OF WALLS IN ONE CELL MEASURED ALONG THE SKEW.

DESIGNER NOTES

SEE BRIDGE MANUAL SECTION 36.2 FOR ADDITIONAL REQUIREMENTS FOR PEDESTRIAN UNDERPASSES AND CATTLEPASSES.

⊠ DETAIL NOT ALLOWED WHEN HAUNCHES ARE REQ'D OR FOR PEDESTRIAN UNDERPASSES. OMIT 1" FILLET IF ALTERNATIVE CONSTRUCTION JOINT IS USED.

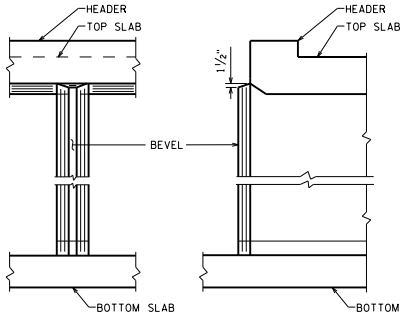
◆ † = 1'-0" MIN. FOR PEDESTRIAN UNDERPASSES AND SLABS WITH DEPTH OF FILLS < 2'-0"

☆ † = 6½" MIN. OTHERWISE

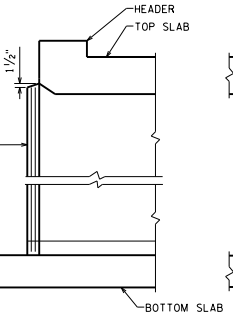
TOP BARS FOR TOP SLAB:
- FOR † < 10" WITH DEPTH OF FILLS ≥ 2'-0": BARS NOT REQUIRED
- FOR † ≥ 10": #4 AT 1'-6" MAX. EACH DIRECTION
- FOR PEDESTRIAN UNDERPASSES: #4 AT 1'-6" MAX. EACH DIRECTION
- FOR SLABS WITH DEPTH OF FILLS < 2'-0": #4 AT 1'-0" MAX. EACH DIRECTION USE CLASS 'C' LAPS

▲ USE "SHEET MEMBRANE WATERPROOFING FOR TOP SLAB C-_-_" (516.0610.S) FOR PEDESTRIAN UNDERPASSES. INCLUDE THE FOLLOWING NOTE:

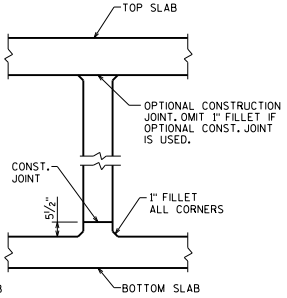
SHEET MEMBRANE WATERPROOFING REQUIRED UP WALLS & ACROSS TOP SLAB FOR ENTIRE CULVERT LENGTH. EXTEND 6" MIN. BELOW THE TOP OF BOTTOM SLAB.



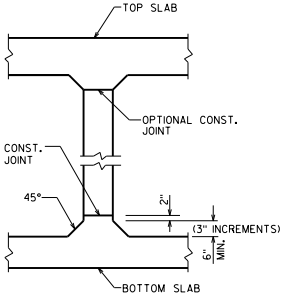
ELEVATION



SECTION C4



SECTION C5

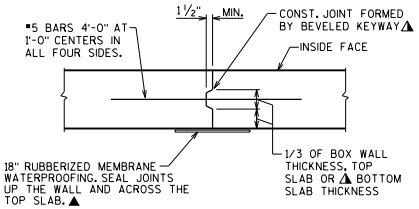


HAUNCH DETAIL

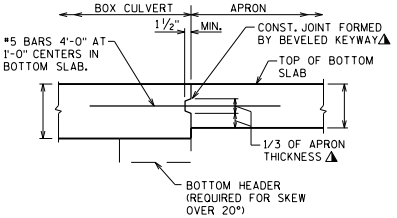
(PROVIDE HAUNCH DETAIL ONLY WHEN REQUIRED AS PER DESIGN)

INLET NOSE CENTERWALL DETAILS

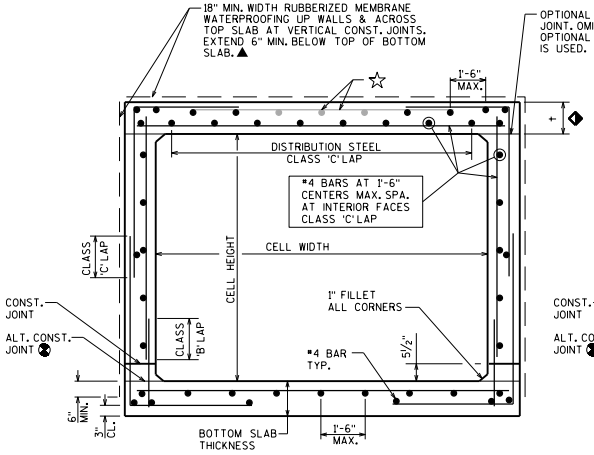
TYPICAL ALL INLETS



VERTICAL CONSTRUCTION JOINT



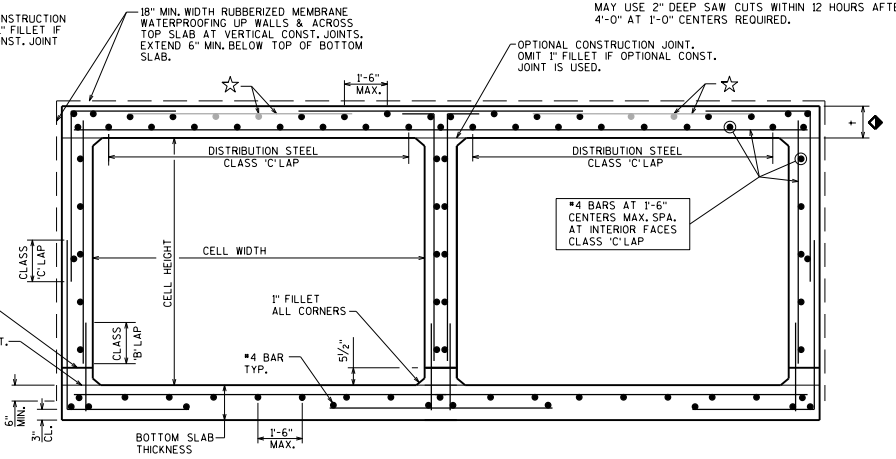
APRON CONNECTION DETAIL



SECTION THRU BOX

SINGLE CELL BOX

▲ IN LIEU OF CONSTRUCTION JOINTS IN THE BOTTOM SLAB, THE CONTRACTOR MAY USE 2" DEEP SAW CUTS WITHIN 12 HOURS AFTER POURING. #5 BARS 4'-0" AT 1'-0" CENTERS REQUIRED.



SECTION THRU BOX

TWIN CELL BOX

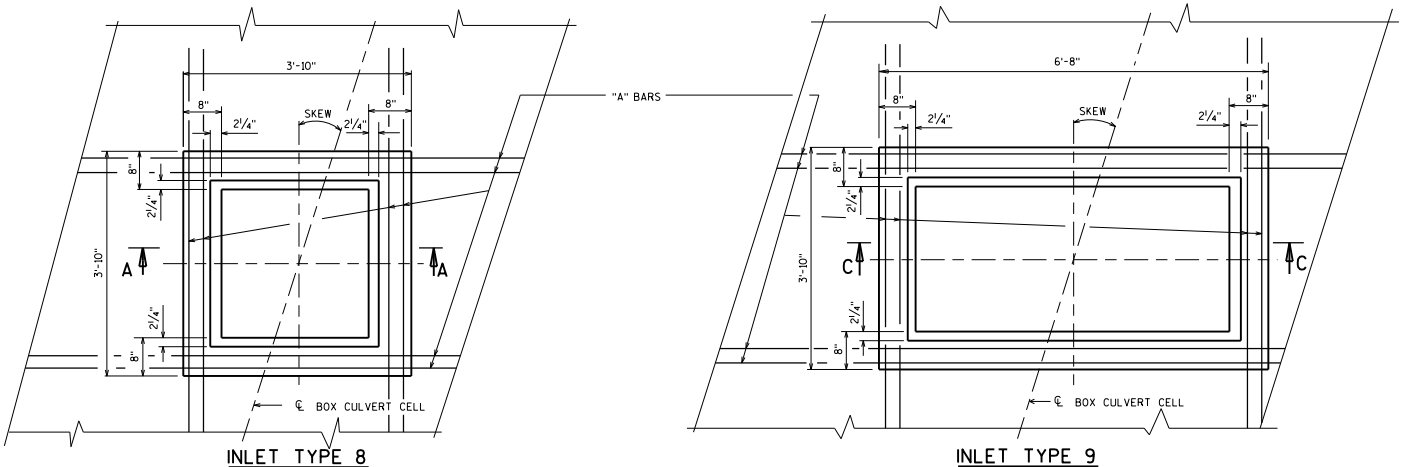
BOX CULVERT DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 36.03



INLET TYPE 8

INLET TYPE 9

MEDIAN INLET PLAN

(INLET COVER NOT SHOWN)

NOTES

FIELD CUT BAR STEEL REINFORCEMENT IN TOP SLAB TO CLEAR THE OPENING PROVIDED FOR MEDIAN INLET.

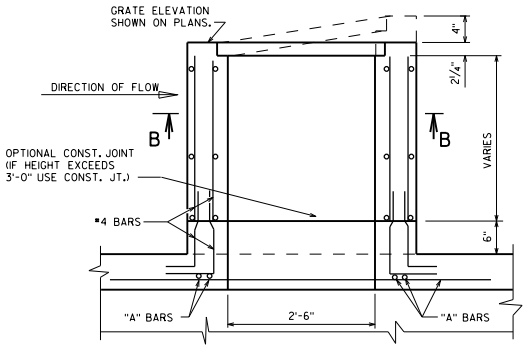
ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. MAXIMUM ADJUSTMENT SHALL BE 8".

DESIGN NOTES

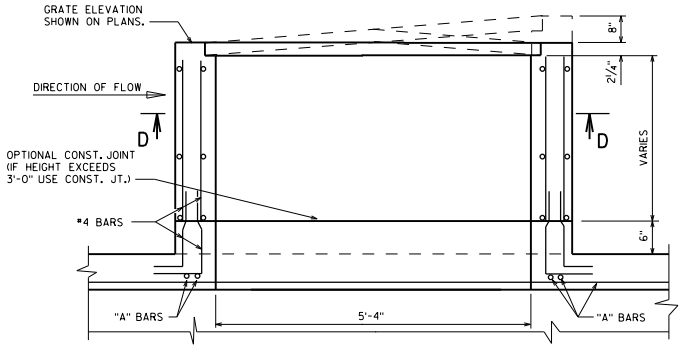
SIZE AND LENGTH OF "A" BARS TO BE DETERMINED BY THE DESIGNER.

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

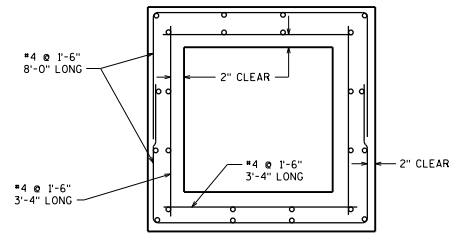
VERTICAL STEEL ADEQUATE FOR DEPTH UP TO 25'-0" ASSUMING WIND LOAD OF 50#/SQ. FT..



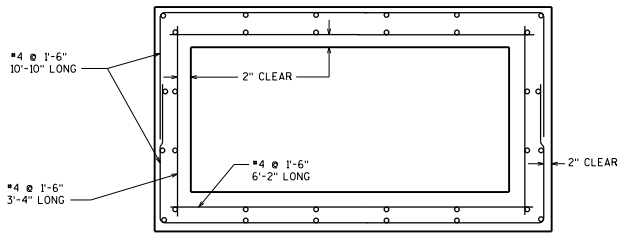
SECTION A-A



SECTION C-C



SECTION B-B



SECTION D-D

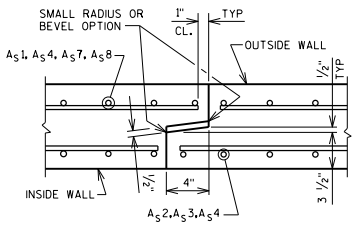
BOX CULVERT MANHOLE FOR INLET TYPE 8 & 9

BUREAU OF STRUCTURES

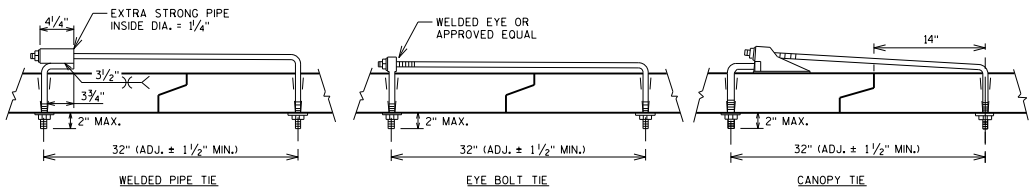
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 36.04

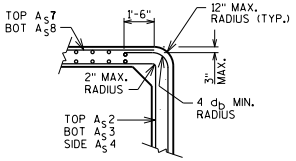


JOINT DETAIL

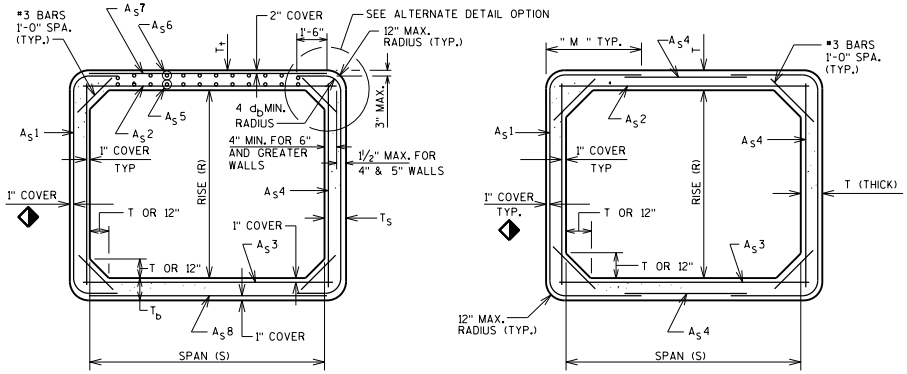


JOINT TIES

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.)



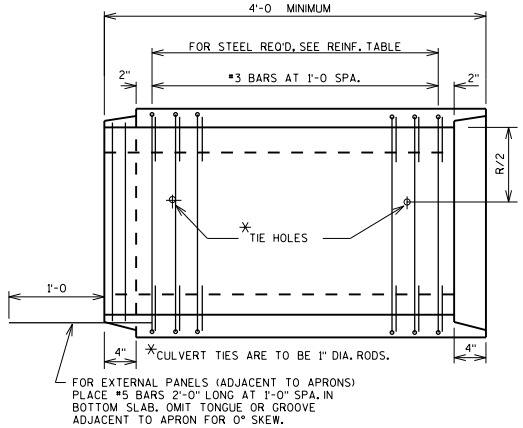
ALTERNATE DETAIL OPTION



SECTION THRU BARREL
FOR LESS THAN 2 FEET OF COVER

◆ 1" OR 3 x WIRE DIAMETER, WHICHEVER IS GREATER

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; AASHTO 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.

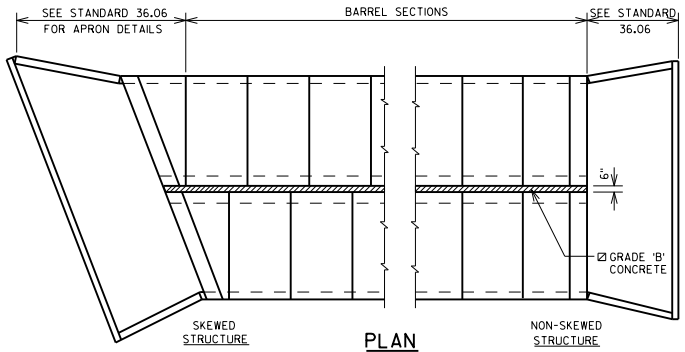
THE COVER OF CONCRETE OVER THE REINFORCEMENT SHALL BE 1 INCH OR 2 INCHES AS SHOWN WITH AN ALLOWABLE VARIATION OF -3/8" TO +½ INCH.

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 AASHTO MATERIALS SPEC. M198, TYPE B. A 2'-0" STRIP OF GEOTEXTILE TYPE DF SCHEDULE A SHALL BE PLACED OVER THE JOINTS ON THE TOP AND ON THE SIDES OF THE CULVERT. THE GEOTEXTILE SHALL CONFORM TO SECTION 645.2.2.4 OF THE STANDARD SPECIFICTION. (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.



PLAN

MULTICELL INSTALLATION

BOX CULVERT DATA

DIMENSIONS: S (FT.), R (FT.), T OR T_S, T_b, T_t (IN.) / REINFORCEMENT	EARTH COVER (FT.) AREA/FT.	LENGTH	M	AREA/FT.	LENGTH	M	AREA/FT.	LENGTH	M
A_S1									
A_S2									
A_S3									
A_S4									
A_S5									
A_S6									
A_S7									
A_S8									
TOTAL BARREL OR PANEL LENGTH									

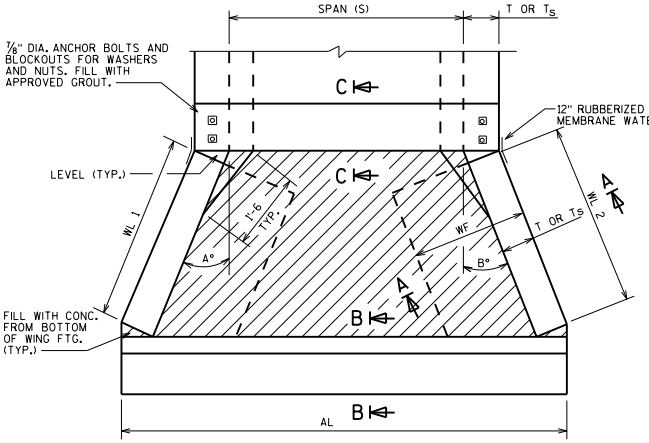
PRECAST CONCRETE BOX CULVERT BARREL DETAILS

BUREAU OF STRUCTURES

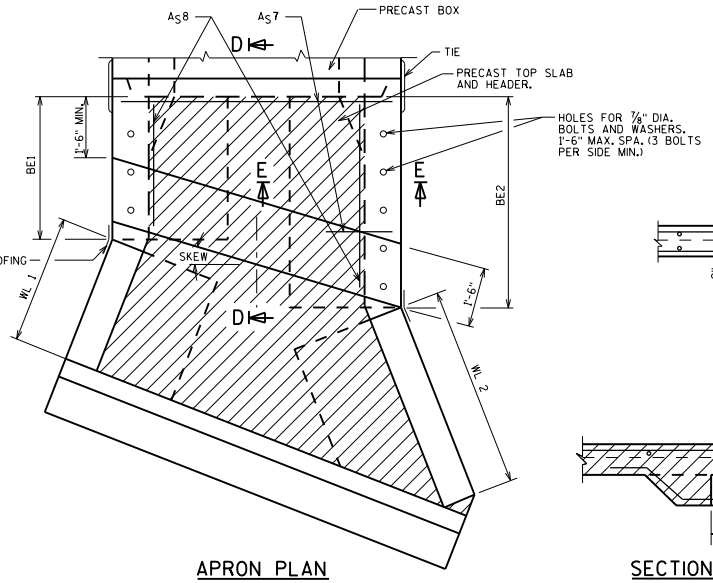
APPROVED: Bill Oliva

DATE: 7-18

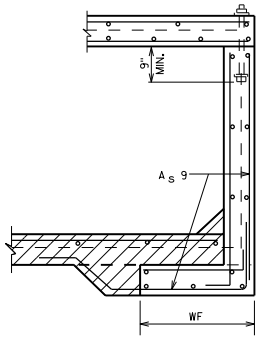
STANDARD 36.05



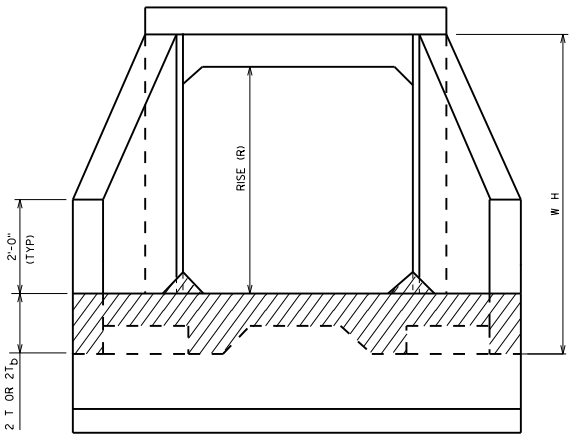
APRON PLAN
(NON-SKEWED STRUCTURE)



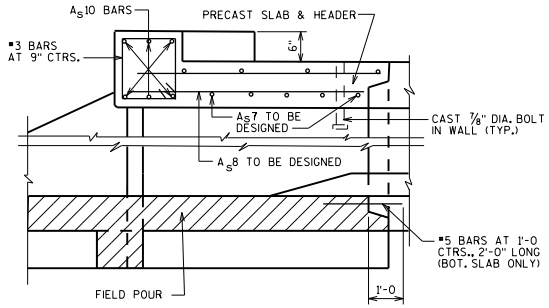
APRON PLAN
(SKEWED STRUCTURE)



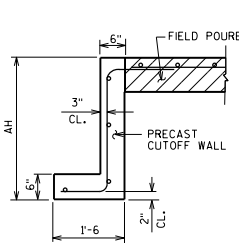
SECTION E



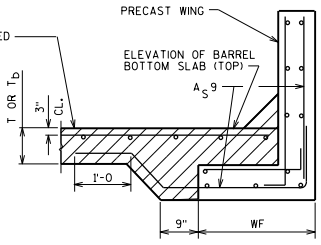
END VIEW



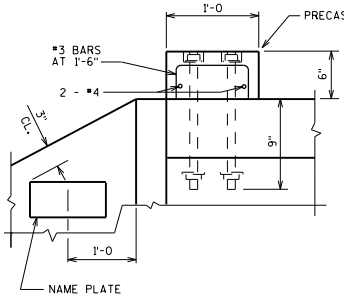
SECTION D



SECTION B



SECTION A



SECTION C

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 A 10 BARS, SHALL BE #5.

THE ⅞" DIA. ANCHOR BOLTS SHALL BE GALVANIZED AND CONFORM TO THE REQUIREMENTS OF A.S.T.M. A575.

ALL EXPOSED CORNERS SHALL BE BEVELED ¾" ON THE SIDES OR TOOL EDGED WITH A ½" 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.

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

SPAN (S)	A_S 10 BARS SKEW 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_S9 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

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

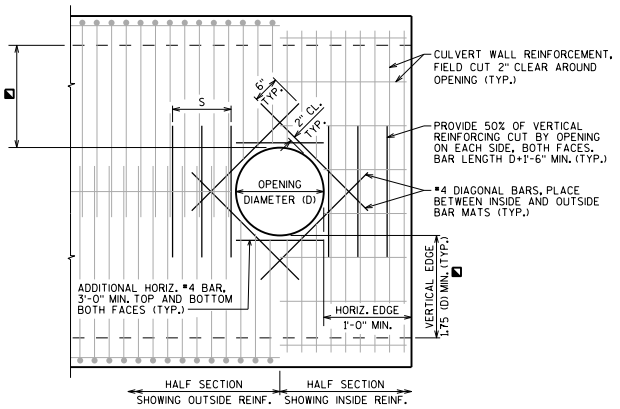
STANDARD 36.06

NOTES

ALL BAR STEEL REINFORCEMENT SHALL BE CUT 2" CLEAR AROUND OPENING.

DESIGNER NOTES

DETAILS SHOWN ARE FOR CAST-IN-PLACE CULVERTS. PRECAST CULVERT DETAILS TO BE SIMILAR.



ELEVATION

WHEN D ≤ 1'-6" S = 1'-6"
WHEN D > 1'-6" S = 1'-6" MIN, D MAX

PIPE OPENING IN CULVERT WALL

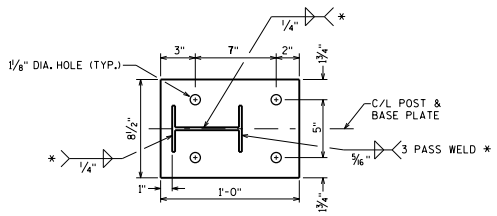
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-13

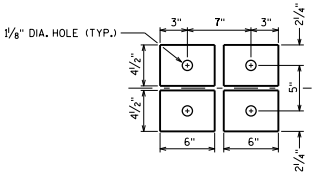
STANDARD 36.07

* WELDING IS TO BE COMPLETED USING THE GAS-METAL ARC WELDING (GMAW) PROCESS WITH ER70S-3 WELDING WIRE AND ARGON-OXYGEN OR CO_2 COVER GAS.



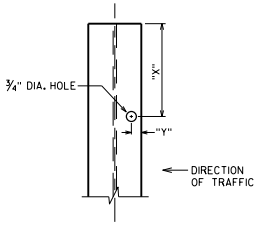
SECTION A-A

POST & BASE PLATE



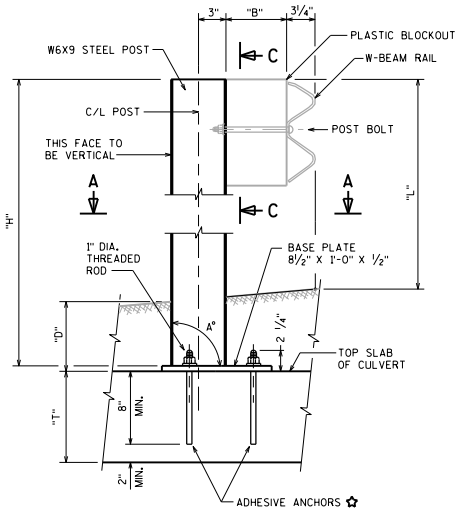
SECTION B-B

(4)-BOTTOM PLATES



SECTION C-C

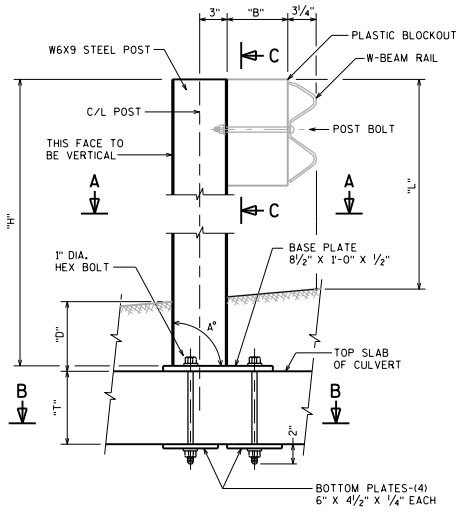
HOLE IN POST FLANGE ON APPROACHING TRAFFIC SIDE



ELEVATION

GUARDRAIL POST ANCHORS TYPE 1

USE FOR THICKNESS "T" OF 10 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (f'_c) OF 4,000 PSI



ELEVATION

GUARDRAIL POST ANCHORS TYPE 2

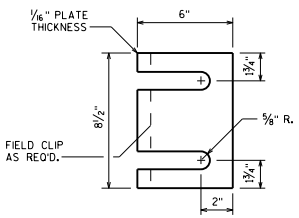
USE FOR THICKNESS "T" OF 8 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (f'_c) OF 3,500 PSI

GUARDRAIL POST ANCHORAGE SYSTEM

CRITERIA:

USE FOR POSTS WITH "D" EMBEDMENT LESS THAN OR EQUAL TO 4'-0" AND GREATER THAN OR EQUAL TO 9". NOT REQ'D FOR POSTS WITH "D" EMBEDMENT MORE THAN 4'-0". NOT ALLOWED FOR POSTS WITH "D" EMBEDMENT LESS THAN 9".

	"L"	"B"	"X"	"Y"
CLASS "A" GUARDRAIL	2'-4⅝"	8"	7"	13/16"
MGS GUARDRAIL	2'-7⅞"	12"	7⅛"	¾"



STEEL SHIM DETAIL

4 PER POST

NOTES

DETAILS SHOWN FOR POSTS, PLATES, ANCHORAGE SYSTEM AND INSTALLATION, BLOCKS, AND GUARD RAIL ARE NOT PART OF THE STRUCTURE CONTRACT, BUT ARE BID PER THE ROADWAY DESIGN PLANS.

POST BASE PLATES (AND BOTTOM PLATES IF USED) 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 CUTS.

CUT BOTTOM OF POST SO THAT POST WILL BE VERTICAL WHEN POST ASSEMBLY IS PLACED ON TOP OF THE CULVERT. ALONG THE ROADWAY THE POST WILL BE NORMAL TO GRADE LINE. HEX BOLTS AND THREADED RODS ARE TO BE PLACED PERPENDICULAR TO THE BASE PLATE.

POST, BASE PLATE (AND BOTTOM PLATE IF USED), AND SHIMS SHALL BE GALVANIZED AFTER FABRICATION.

PRIOR TO GALVANIZING, ALL STEEL POSTS AND PLATES SHALL BE GIVEN A NO. 6 COMMERCIAL BLAST CLEANING BY SSPC SPECS.

ALL MATERIAL USED IN POSTS AND PLATES SHALL BE MADE FROM MATERIAL CONFORMING TO ASTM DESIGNATION A709 GRADE 50 OR 50S.

HEX BOLTS, THREADED RODS, HEX NUTS AND WASHERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1554 GRADE 36, AND SHALL BE GALVANIZED. RODS ARE TO BE FULLY THREADED AND BOLTS TO BE THREADED 3". CHAMFER TOP OF BOLTS AND RODS BEFORE THREADING.

✿ ADHESIVE ANCHORS 1-INCH, EMBED IN CONCRETE AS DETAILED. CHARACTERISTIC BOND STRENGTH SHALL MEET OR EXCEED 1305 PSI FOR UNCRACKED CONCRETE.

STEEL SHIMS MAY BE USED BETWEEN PLATES AND SLAB WHERE REQUIRED FOR ALIGNMENT.

DESIGNER NOTES

CHECK CRITERIA TO SEE IF POST ANCHORAGE SYSTEM IS REQUIRED BASED ON FILL HEIGHT "D" AT POSTS. IF REQUIRED, THEN SELECT WHICH TYPE OF ANCHORAGE (TYPE 1 OR TYPE 2) SHOULD BE USED.

CONTACT THE ROADWAY DESIGN SECTION TO VERIFY IF CLASS 'A' OR 'MGS' GUARDRAIL SYSTEM WILL BE USED.

POST SPACING IS 3'-1½" PER FDM SDD 14 B 51-1. SEE FDM SDD 14 B 51-1 FOR MINIMUM CLEARANES FROM EDGES OR OBSTRUCTIONS TO ANCHORAGE SYSTEM. FOR TYPE 2 ANCHORAGE, MAKE SURE BOTTOM PLATE IS NOT PLACED AT THE SLOPED HAUNCH BETWEEN THE WALL AND TOP SLAB. SHIFT LOCATION OF POSTS (LONGITUDINALLY ALONG C/L OF POSTS) IF REQUIRED TO MEET SPACING AND CLEARANCE REQUIREMENTS.

SHOW DETAILS AND PERTINENT NOTES FOUND ON THIS STANDARD ON THE STRUCTURE PLANS FOR THE CHOSEN ANCHOR TYPE.

SHOW LOCATION OF POSTS AND SPACING ALONG C/L OF POST IN PLAN VIEW OF STRUCTURE PLANS. LABEL EACH POST (P1, P2, ETC.). SHOW A TABLE PROVIDING THE ESTIMATED LENGTH "H" OF EACH POST, AND THE ANGLE A° BETWEEN BASE PLATE AND POST.

IN THE TOP SLAB PROVIDE A MINIMUM OF #4 BARS AT 1'-0" IN EACH DIRECTION WHEN TYPE 1 OR TYPE 2 DETAILS ARE USED.

THIS RAILING AND ANCHORAGE SYSTEM MEET NCHRP 350 EVALUATION CRITERIA FOR TEST LEVEL 3 (TL-3).

GUARDRAIL POST ANCHORAGE SYSTEM

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 36.08

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 43-3 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.

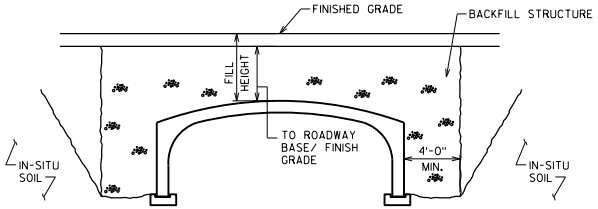
PLACE FOOTINGS BELOW SCOUR AND FROST DEPTHS. PLACE BOTTOM OF FOOTING AT A MINIMUM DEPTH EQUAL TO PREVAILING FROST DEPTH OR SCOUR DEPTH BUT NOT LESS THAN 4'-0" BELOW GROUND ELEVATION UNLESS CONSTRUCTED ON ROCK FOUNDATION OR OTHERWISE INDICATED.

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

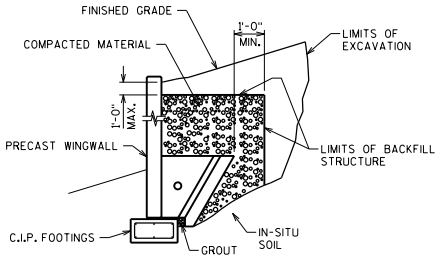
BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.

LRFD DESIGN LOADS

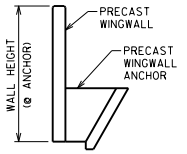
LIVE LOAD: HL-93
HORIZONTAL EARTH PRESSURE: UNIT WEIGHT = 125 PCF
VERTICAL EARTH PRESSURE: UNIT WEIGHT = 120 PCF



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.

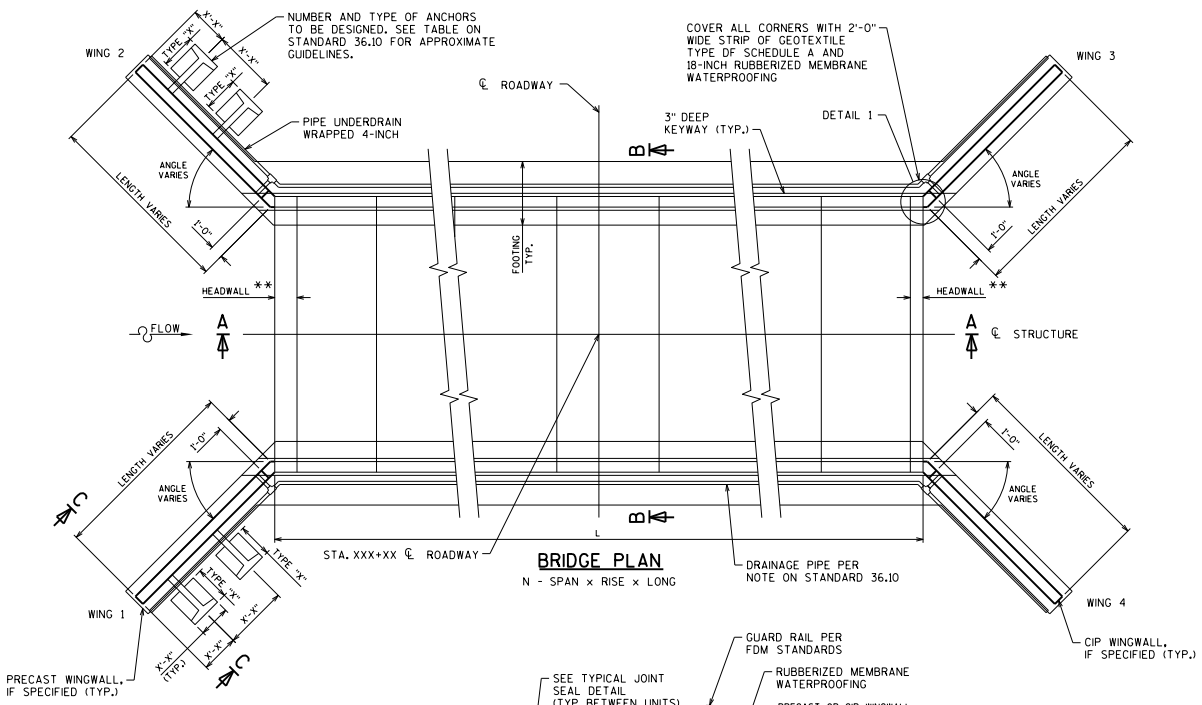
PRECAST THREE-SIDED BOX CULVERT DESIGN NOTES

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 36.10



BRIDGE PLAN

N - SPAN x RISE x LONG

GENERAL NOTES:

MATERIALS AND WORKMANSHIP SHALL BE IN ACCORANDANCE 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 KSI (MIN.)

PROVIDE CONCRETE COVER ON REINFORCING BARS AS NOTED HEREIN.

CHAMFER EXPOSED CONCRETE EDGES ¾" x ¾" 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.

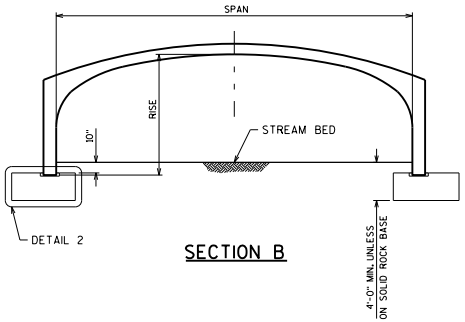
AT ANY TIME DURING PLACEMENT OF THE BACKFILL, DO NOT PERMIT A DIFFERENCE IN FILL ELEVATION ON THE SIDES OF THE CULVERT BARREL IN EXCESS OF 2'-0". DURING COMPACTION OF THE BACKFILL, DO NOT ALLOW THE WHEELS OF ROLLERS TO COME CLOSER THAN 1'-0" TO THE FACE OF THE OF THE STRUCTURE.

DESIGNER NOTES:

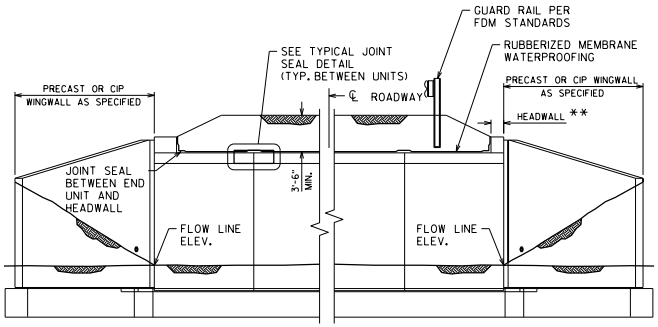
ALL BAR SPLICES TO BE "CLASS C" TENSION LAP SPLICES.

PRECAST CONCRETE CULVERT UNITS
PLUS (N-1) JOINTS @ ¼" TO ½" PER JOINT = L

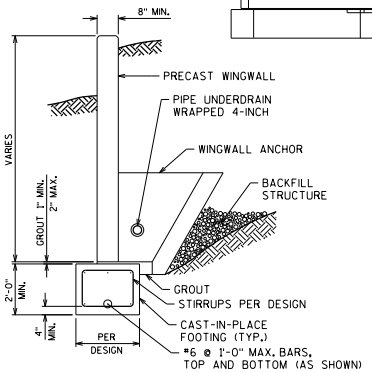
** SEE STANDARD 36.13 AND STANDARD 36.14 FOR HEADWALL DETAILS AND FEASIBILITY GUIDELINES



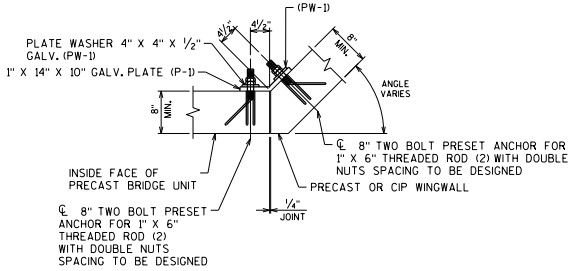
SECTION B



SECTION A

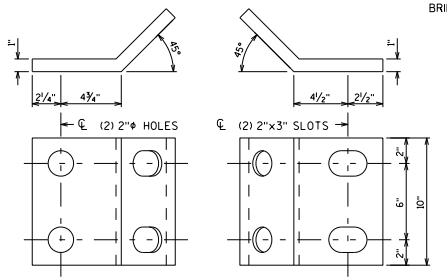


SECTION C



DETAIL 1

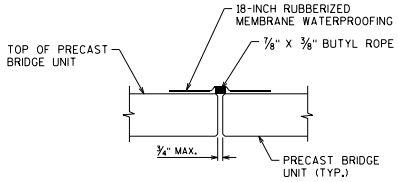
NOTE: CONNECTION PLATES (P-1) MUST BE POSITIONED WITH SMALL DIAMETER HOLES TOWARD PRECAST BRIDGE UNIT



UNIT LEG WINGWALL LEG

PLATE P-1

PLATE, 1" X 14" X 10"
NOTE: PLATE LENGTH AND THICKNESS SHALL BE INCREASED AS REQUIRED BY DESIGN.



TYPICAL JOINT SEAL DETAIL

PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS

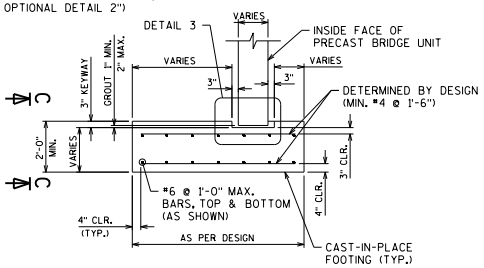
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

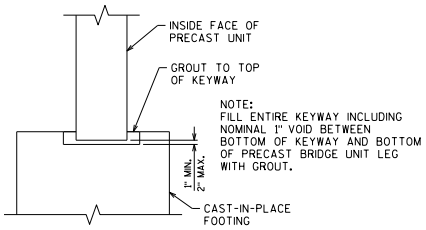
DATE: 7-18

STANDARD 36.11

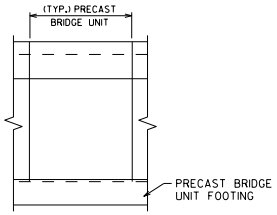
SPREAD FOOTING SHOWN. OTHER FOUNDATION TYPES POSSIBLE. (FOR PEDESTAL WALL, PILE AND BASE SLAB FOUNDATIONS, "SEE OPTIONAL DETAIL 2")



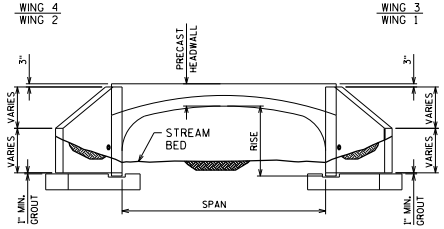
DETAIL 2



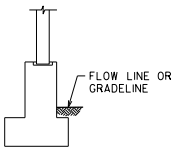
DETAIL 3



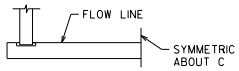
SECTION C



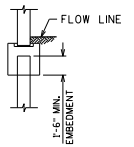
TYPICAL END ELEVATION



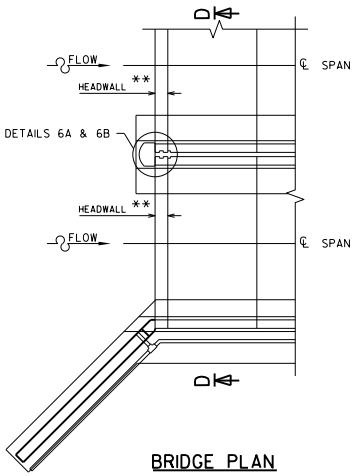
OPTIONAL DETAIL 2
IF PEDESTAL IS REQUIRED



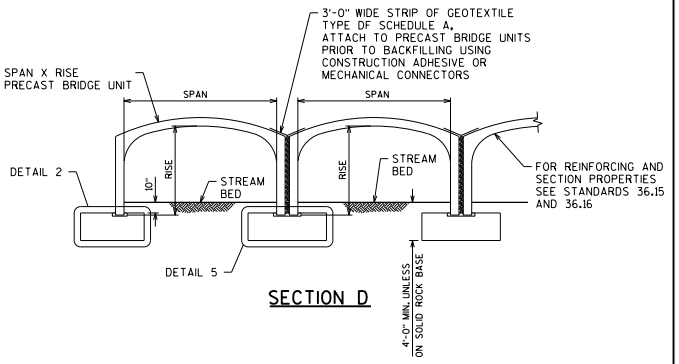
OPTIONAL DETAIL 2
IF BASE SLAB IS REQUIRED



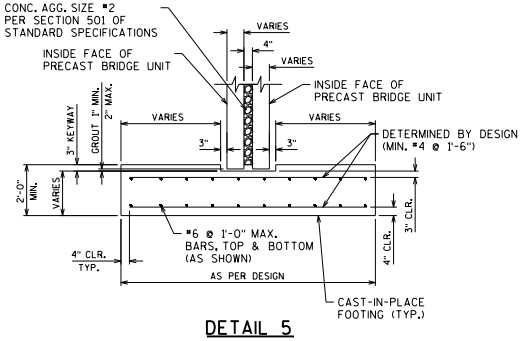
OPTIONAL DETAIL 2
IF PILES ARE REQUIRED



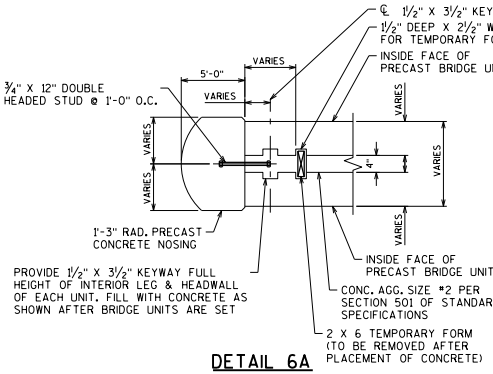
BRIDGE PLAN



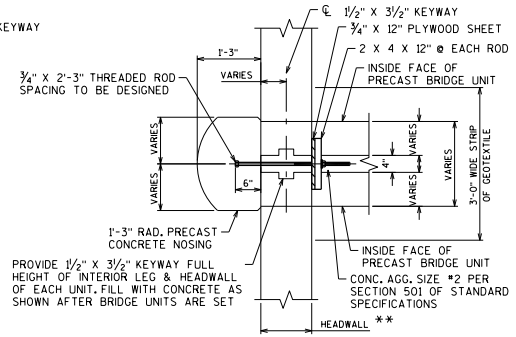
SECTION D



DETAIL 5



DETAIL 6A



DETAIL 6B

NOTES:

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

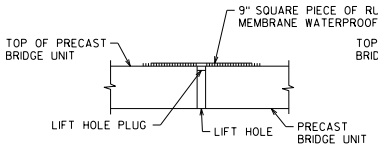
PRECAST THREE-SIDED BOX CULVERT DETAILS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

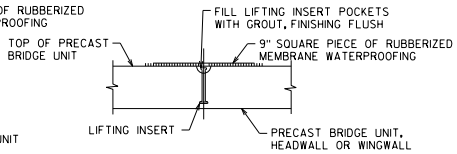
APPROVED: Scot Becker

DATE: 7-18

STANDARD 36.12

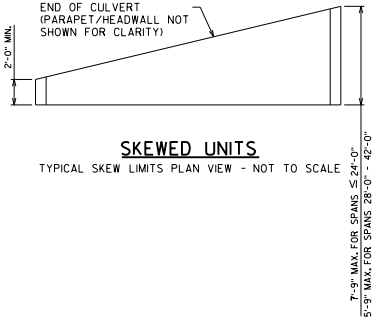


LIFTING HOLES



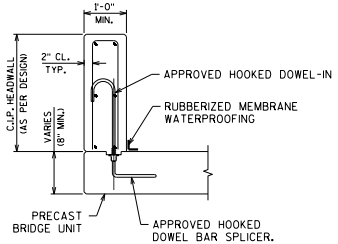
LIFTING INSERTS

TYPICAL LIFT POINT SEALING DETAIL



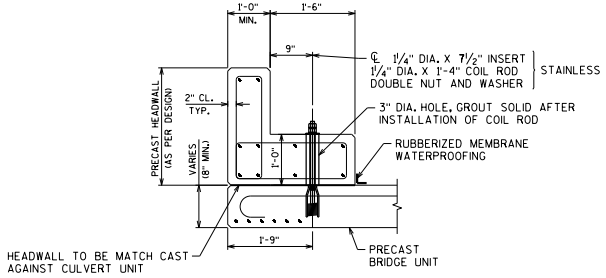
SKEWED UNITS

TYPICAL SKEW LIMITS PLAN VIEW - NOT TO SCALE



CAST-IN-PLACE HEADWALL DETAIL

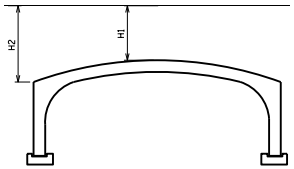
NOT TO SCALE



PRECAST HEADWALL DETAIL WITH COLLAR

NOT TO SCALE

	H1	H2
UNIT SPAN	MAX. HEIGHT @ CROWN TO T/HEADWALL (NO LIVE LOAD SURCHARGE)	MAX. APPROXIMATE HEIGHT @ EDGE OF SPAN
14'-0"	8'-0"	9'-6¾"
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

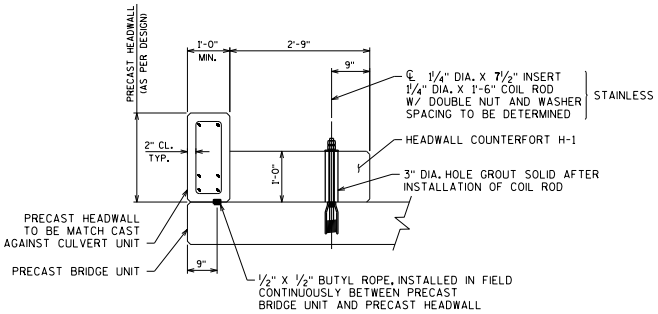
PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

BUREAU OF STRUCTURES

APPROVED: Scot Becker

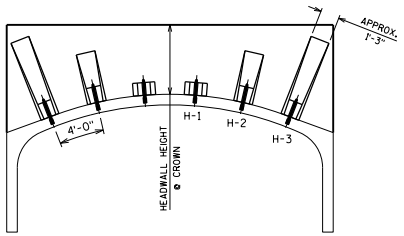
DATE: 1-11

STANDARD 36.13



PRECAST HEADWALL TYPE H-1 COUNTERFORT

NOT TO SCALE



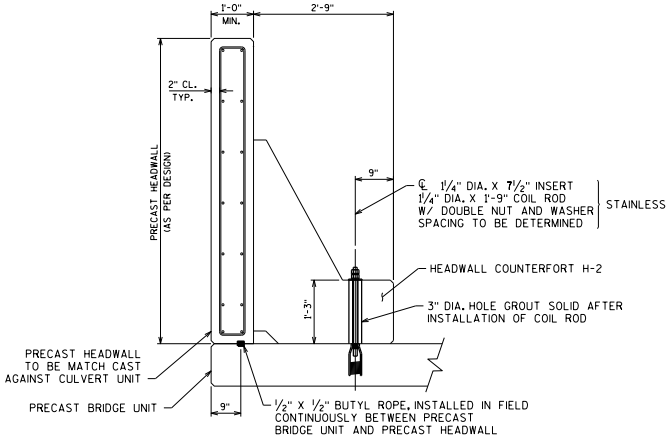
SAMPLE ELEVATION

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.

	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"

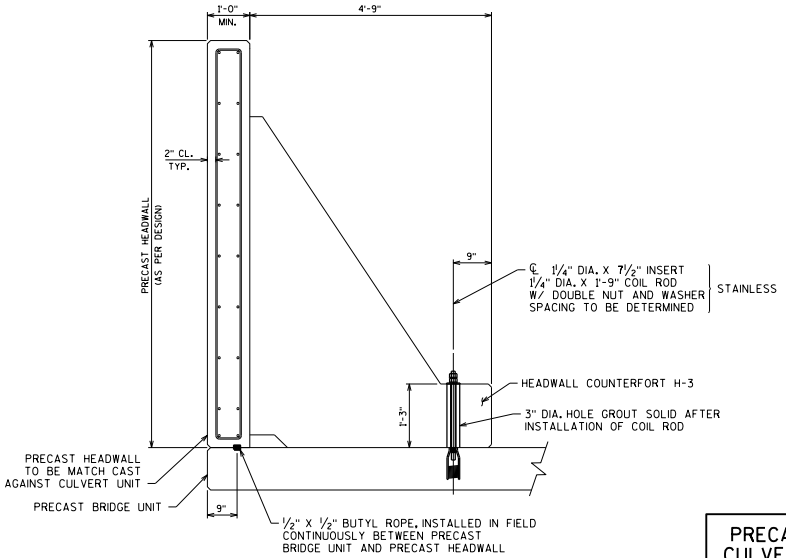
LRFD HEADWALL COUNTERFORTS

- 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 HEADWALL TYPE H-2 COUNTERFORT

NOT TO SCALE



PRECAST HEADWALL TYPE H-3 COUNTERFORT

NOT TO SCALE

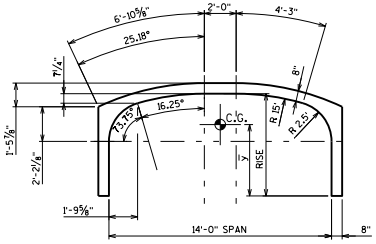
PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

BUREAU OF STRUCTURES

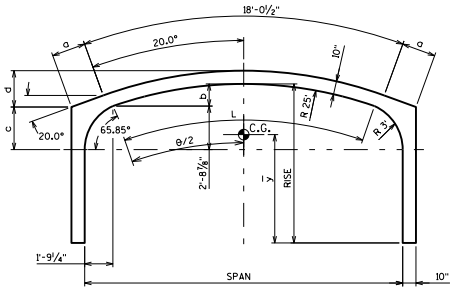
APPROVED: Scot Becker

DATE: 1-11

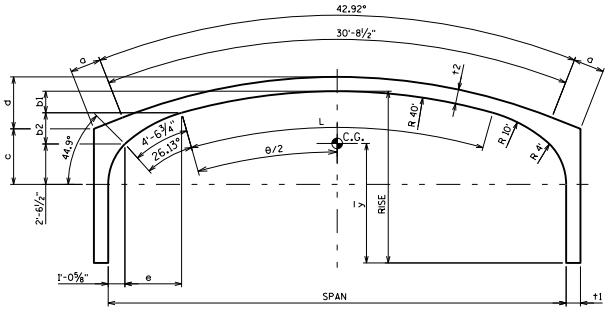
STANDARD 36.14



14'-0" SPAN



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



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

CENTER OF GRAVITY Ȳ FT						
RISE 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

AREA OF CONCRETE SECTION SQ. FT						
RISE 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)

ARCH UNIT PRIMARY REINFORCING (MINIMUM)																		
COVER ft	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 REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'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 ④
9	0.66	0.48	5000	0.72	0.90	5000	0.72	1.44	5000	0.96	1.68	5000 ①	1.50	2.40	6000	1.44	1.92	6000 ①
12	0.66	0.60	5000	0.72	1.08	5000	0.72	1.80	6000 ①	0.96	1.80	6000 ①	1.50	3.00	6000 ①	1.44	2.16	6000 ①

①SHEAR REINFORCEMENT REQUIRED
②SHEAR REINFORCEMENT REQUIRED FOR 6'-0" & 7'-0" RISE
③SHEAR REINFORCEMENT REQUIRED FOR 8'-0" & 9'-0" RISE
④SHEAR REINFORCEMENT REQUIRED FOR 10'-0" & 11'-0" RISE
⑤MINIMUM PRECAST UNIT WIDTH = 3'-11¾"

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

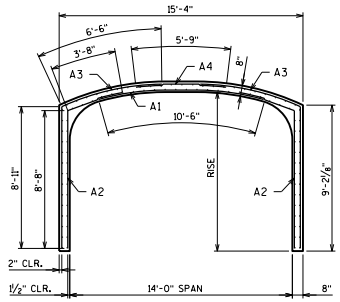
PRECAST THREE-SIDED BOX CULVERT CROSS SECTIONS

BUREAU OF STRUCTURES

APPROVED: Scot Becker

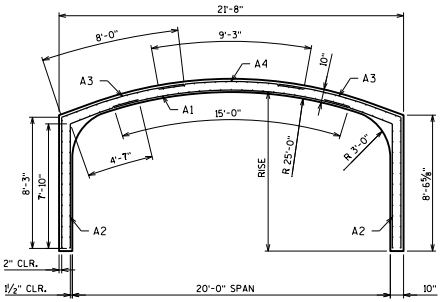
DATE: 1-11

STANDARD 36.15



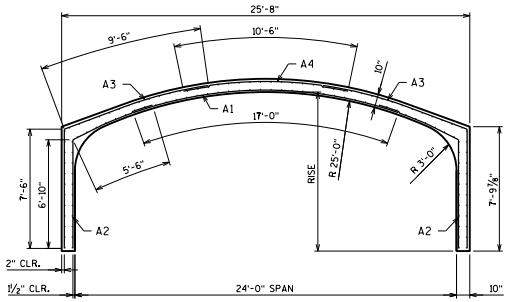
14'-0" SPAN

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.

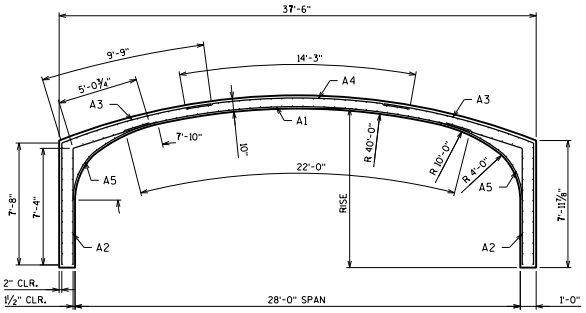
THE COVER OF CONCRETE OVER THE INSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 1½ INCHES MINIMUM.

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 SECTION.

MINIMUM COVER FOR WILDED WIRE FABRIC: 1-INCH

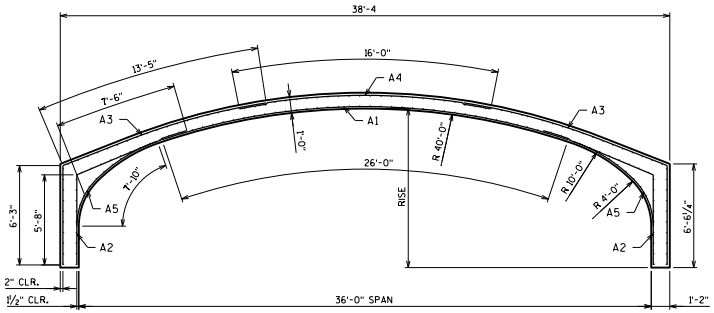
DESIGN DATA:

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



28'-0" SPAN

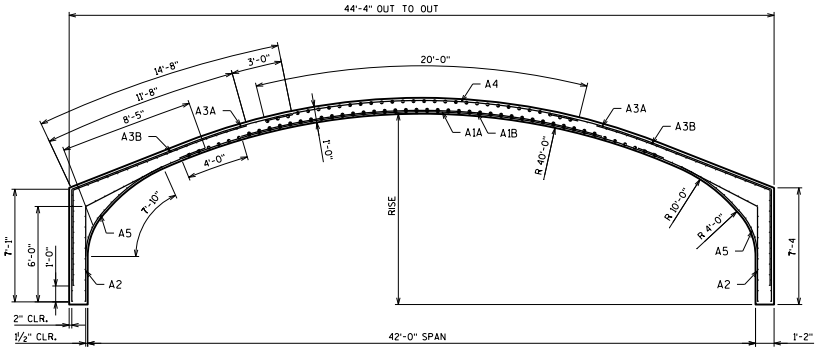
RISE = 10'-0"



36'-0" SPAN

RISE = 10'-0"

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



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"

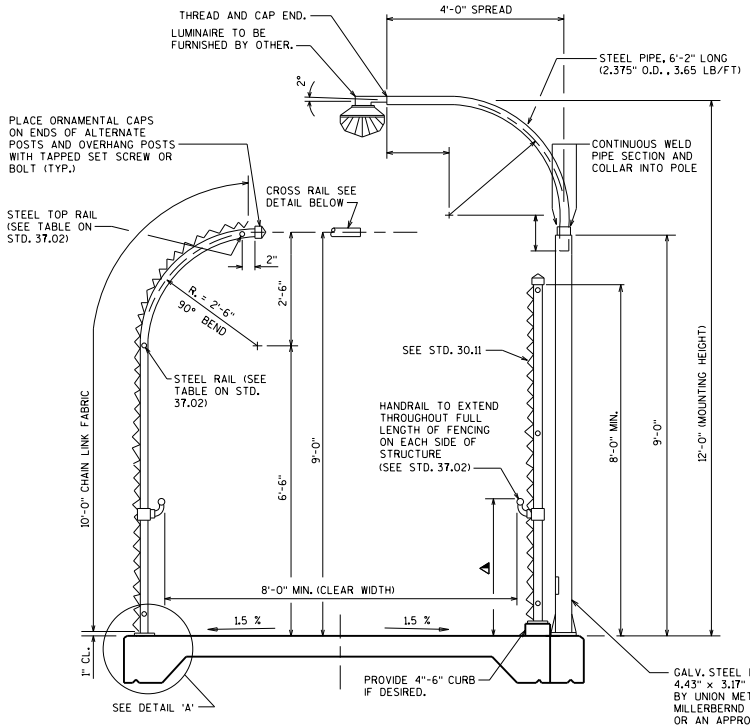
PRECAST THREE-SIDED BOX CULVERT REINFORCEMENT

BUREAU OF STRUCTURES

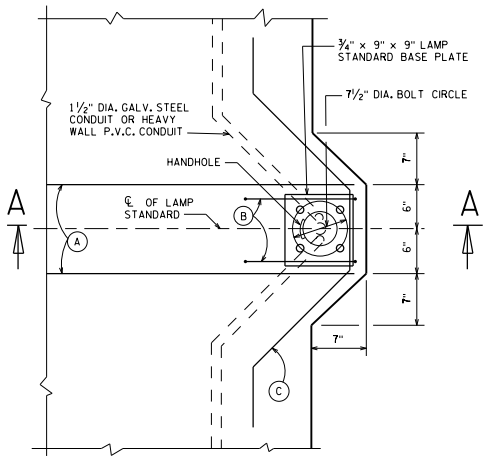
APPROVED: *Bill Oliva*

DATE: 7-14

STANDARD 36.16



SECTION THRU PEDESTRIAN STRUCTURE



PLAN AT LAMP STANDARD

BAR STEEL REINFORCEMENT AT EACH LAMP STANDARD.

- (A) 4 - #5 BARS 4'-6" LONG
- (B) 2 - #4 BARS 4'-3" LONG
- (C) 2 - #4 BARS 5'-9" LONG

NOTES

STEEL RAILS, POSTS, HANDRAILS AND SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40).

ALL POSTS, INCLUDING LIGHT POLES, SHALL BE SET VERTICAL. SPACE ALL POSTS OF 9'-0" HIGH FENCE OPPOSITE EACH OTHER TO PERMIT SQUARE PLACEMENT OF CROSS RAILS.

MAXIMUM SPACING FOR CROSS RAILS SHALL BE AT ALTERNATE POSTS. ALL END POSTS SHALL HAVE CROSS RAILS.

HANDRAILS SHALL BE CONTINUOUS EXCEPT AT EXPANSION JOINTS WHERE ENDS SHALL BE CAPPED.

WASHERS, HEX NUTS AND ANCHOR BOLTS FOR LIGHT POLES SHALL BE GALVANIZED AND SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "STRUCTURAL STEEL CARBON".

GALVANIZED STEEL SHIMS OF 1/8" THICKNESS SHALL BE USED UNDER LAMP STANDARD BASE PLATE WHERE REQUIRED FOR ALIGNMENT. CAULK AROUND PERIMETER OF THIS PLATE AND FILL PORTION OF SLOTTED HOLE AROUND ANCHOR BOLT IN SHIM WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

FOR GALVANIZED CONDUIT PROVIDE GROUNDING LUG IN HAND-HOLE. GROUND WIRE FROM LUG TO CONDUIT SHALL BE NUMBER 6 AWG BARE OR WEATHER-PROOF COPPER, SINGLE CONDUCTOR.

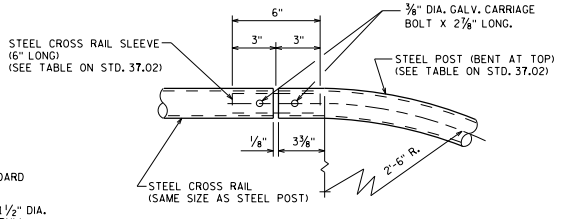
SEE STANDARD 30.11 FOR ADDITIONAL "NOTES".

DESIGNER NOTES

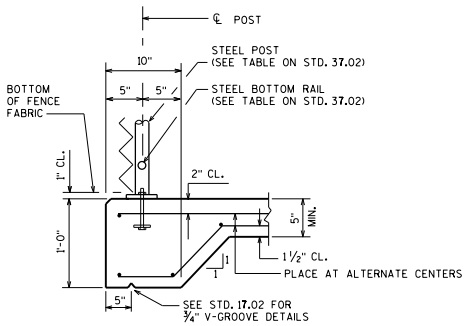
⚠ TOP OF HANDRAIL GRIPPING SURFACES SHALL BE MOUNTED BETWEEN 30" AND 34" ABOVE WALKING SURFACE. USE 30" NEAR SCHOOL ZONES.

FENCE HEIGHT, CURVED OR STRAIGHT, MESH SIZE, COATING AND COLOR SHOULD BE COORDINATED WITH THE REGION AND ALL OTHER APPLICABLE AGENCIES. SEE BRIDGE MANUAL SECTION 30.3 FOR ADDITIONAL GUIDANCE.

SEE STANDARD 30.11 FOR ADDITIONAL "DESIGNER NOTES".

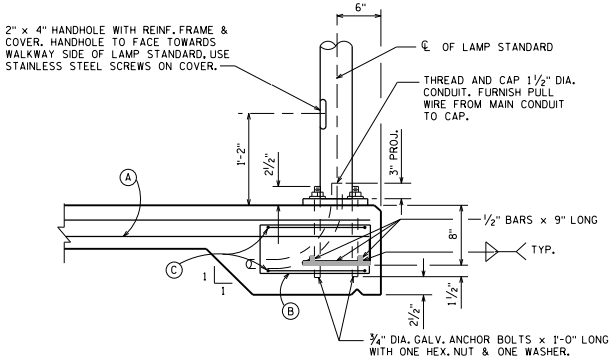


DETAIL OF CROSS RAIL AT TOP



DETAIL 'A'

SEE STANDARD 30.11 FOR BASE PLATE, ANCHOR PLATE, SHIM, POST SLEEVE AND ANCHORAGE DETAILS. SEE THIS STANDARD ALSO FOR FENCE FABRIC REQUIREMENTS.



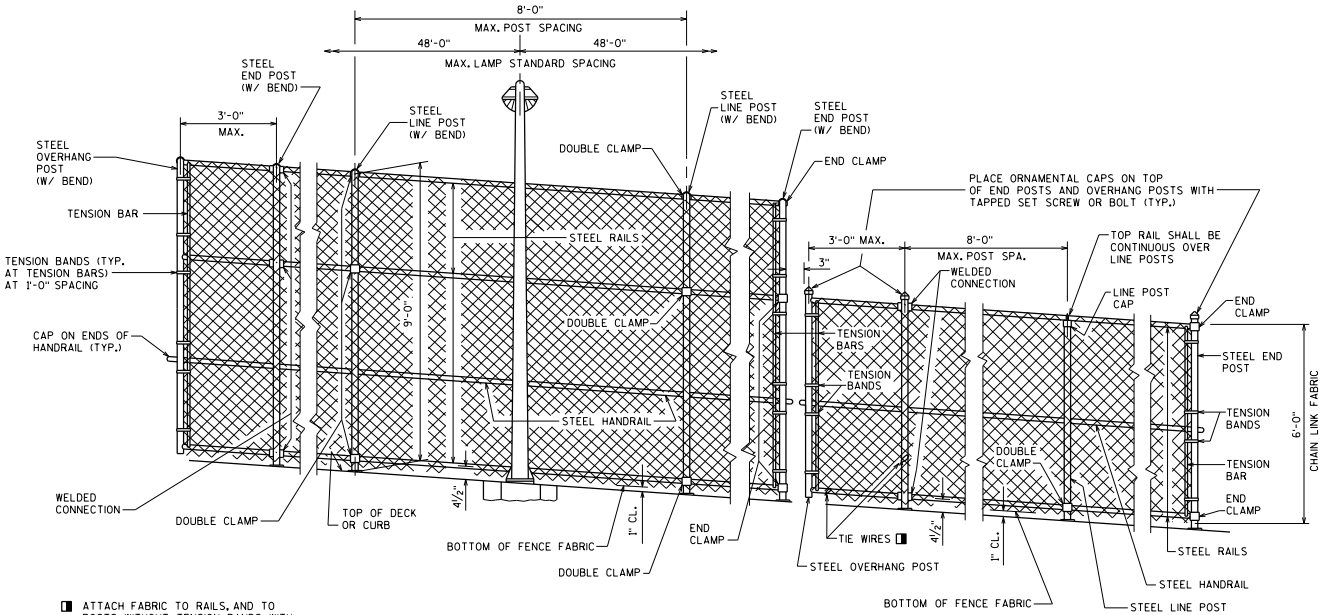
SECTION A-A

PEDESTRIAN OVERPASS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-15

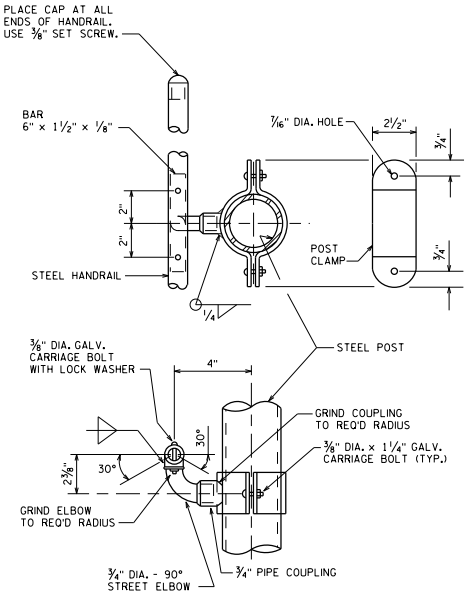


ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH TIE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".

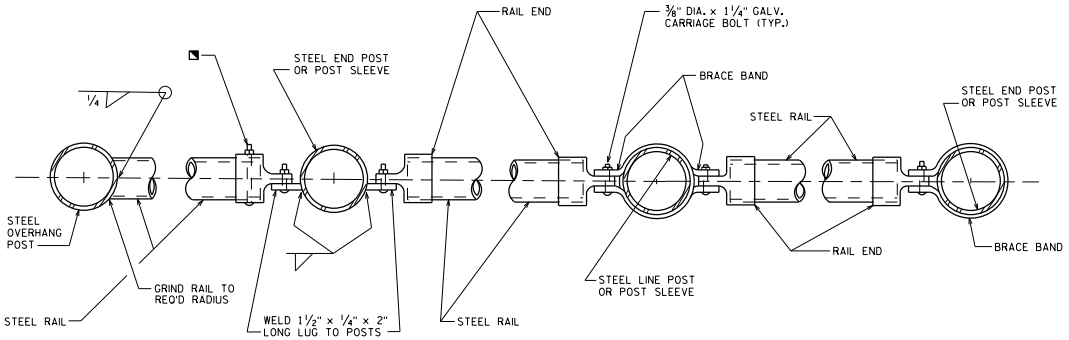
AT LAMP STANDARD

AT EXPANSION JOINT

ELEVATION OF FENCE



HANDRAIL DETAILS



WELDED CONNECTION
(AT OVERHANG SECTION)

* DOUBLE CLAMP

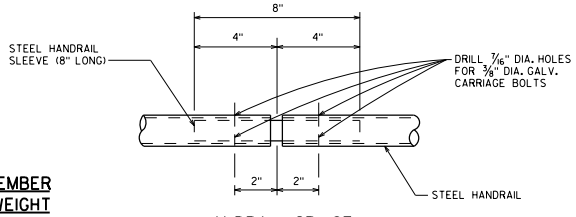
END CLAMP

BOLT RAIL TO RAIL END TO SECURE OVERHANG SECTION. ALTERNATE IS TO WELD RAIL DIRECTLY TO END POST.

PLAN OF RAILING

NOTE: PLACE ALL BOLT HEADS ON SIDE OF FENCE ADJACENT TO PEDESTRIANS

* ALTERNATE TO DOUBLE CLAMP: USE LINE RAIL CLAMP (BOULEVARD) OR 180° BRACE BAND, WHICH MAY BE USED WHEN THE POSTS ARE EITHER BOLTED TO THE POST SLEEVES OR DIRECTLY WELDED TO THE BASE PLATE. (AS SHOWN ON STANDARD 30.11)



HANDRAIL SPLICE

FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
RAILS	1.660	2.27
END POST	2.375	3.65
OVERHANG POST	2.375	3.65
LINE POST	2.375	3.65
HANDRAIL	1.660	2.27
CROSS RAIL SLEEVE	1.900	2.72
HANDRAIL SLEEVE	1.315	1.68
POST SLEEVE	4.000	9.12

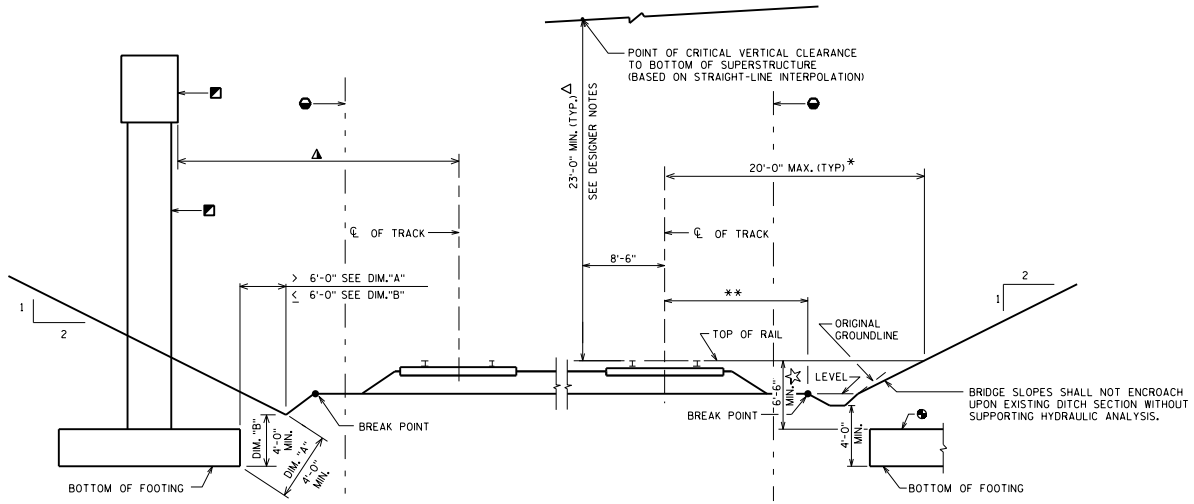
PEDESTRIAN OVERPASS DETAILS

BUREAU OF STRUCTURES

APPROVED: Scot Becker

DATE: 7-10

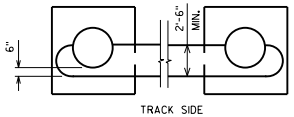
STANDARD 37.02



RAILROAD IN FILL

RAILROAD CROSS SECTIONS

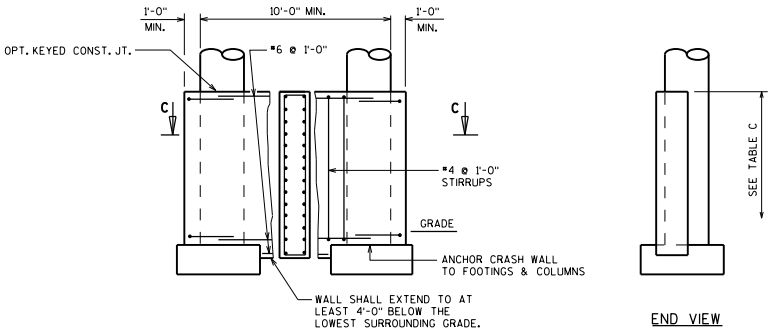
RAILROAD IN CUT



SECTION C-C
TRACK ON ONE SIDE OF COLUMNS

	PIER LOCATION	HEIGHT OF CRASH WALL ABOVE TOP OF RAIL
GENERAL AREMA REQUIREMENT	PIERS ≤ 12'-0" FROM ℄ TRACK	12'-0"
	PIERS 12'-0" TO 25'-0"	6'-0"
CP RAIL REQUIREMENT	PIERS < 15'-0" FROM ℄ TRACK	12'-0"
	PIERS ≥ 15'-0" TO 25'-0"	8'-0"

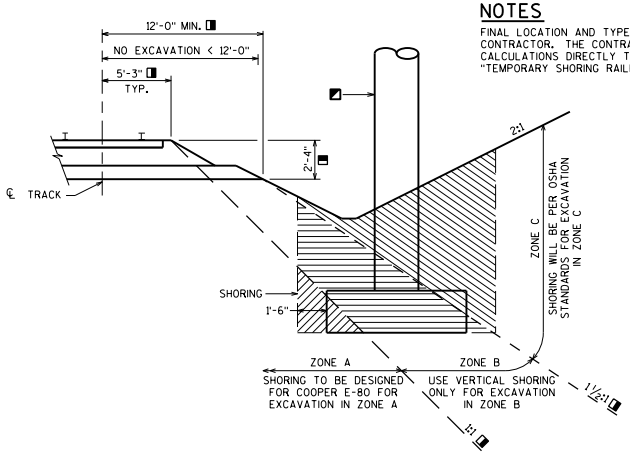
TABLE C



ELEVATION

END VIEW

CRASH WALL DETAILS



LIMITS BEFORE SHORING REQUIRED

DESIGNER NOTES

DIMENSIONS SHOWN APPLY TO CUT OR FILL SITUATIONS.

DECK DRAINS OR DOWN SPOUTS SHALL NOT DISCHARGE ONTO RAILROAD TRACK BED.

SINGLE SLOPE PARAPET SHALL BE USED. PEDESTRIAN RAILING WILL ONLY BE PROVIDED IF THERE IS A SIDEWALK. SEE CHAPTER 38 OF THE BRIDGE MANUAL.

△ VERTICAL CLEARANCE MUST BE AT LEAST 23'-0" AFTER CONSTRUCTION. USE A STRAIGHT-LINE INTERPOLATION BETWEEN TOP OF BEARINGS TO DETERMINE THE CLEARANCE, PROVIDED THAT POSITIVE CAMBER IS REALIZED. LL DEFLECTION NEED NOT BE CONSIDERED WITH THE STRAIGHT-LINE APPROACH. DESIGN FOR (APPROX.) 23'-2" TO AVOID GOING BELOW THE MINIMUM DURING CONSTRUCTION. MAXIMUM ALLOWABLE VERTICAL CLEARANCE OF 23'-3½" IS ALLOWED BY FHWA. VERTICAL CLEARANCE LESS THAN 23'-0" MAY BE PROVIDED IN SOME SITUATIONS WITH APPROVAL OF THE OFFICE OF THE COMMISSIONER OF RAILROADS. CONSULT WITH CENTRAL OFFICE RAILROAD UNIT.

** VARIABLE DISTANCE WHICH IS FOUND FROM FIELD SURVEY.

* SITE SPECIFIC JUSTIFICATION REQUIRED FOR GREATER DISTANCES. LATERAL CLEARANCES SHALL BE ESTABLISHED BASED ON SITE SPECIFIC CONDITIONS AND ECONOMICAL STRUCTURE DESIGN; CONSULT WITH CENTRAL OFFICE RAILROAD UNIT. SEE 23 CODE OF FEDERAL REGULATIONS PT 646, SUBPT. B APPENDIX.

◭ FOR OFFSETS UP TO, AND INCLUDING 25'-0", A CRASH WALL OR HAMMERHEAD PIER DESIGNED TO AREMA STANDARDS (30 SQ. FT. MIN. X-SECT) IS REQUIRED. CP RAIL REQUIRES CRASH WALLS BE DESIGNED TO RESIST A 600 KIP EXTREME EVENT FORCE APPLIED 6 FEET ABOVE THE GROUND. THE CRASH WALLS SHOWN ON THIS STANDARD ARE NOT DESIGNED TO ACCOUNT FOR THIS LOAD.

◭ ACCOMODATION FOR ADDITIONAL TRACKS REQUIRES DEPARTMENT APPROVAL. CONFER WITH STATEWIDE RAILROAD STRUCTURE AND TRACK ENGINEER IN CENTRAL OFFICE RAILROADS AND HARBORS SECTION AT (608) 266-0233.

◭ HORIZONTAL CLEARANCES LESS THAN 18'-0" SHOULD BE REVIEWED WITH THE STATEWIDE RAILROAD AND TRACK ENGINEER IN THE CENTRAL OFFICE RAILROADS AND HARBORS SECTION. 18'-0" CLEARANCE IS MEASURED TO THE NEAREST ENCROACHING ELEMENT (PIER CAPS, MSE WALL COPING, ETC.)

TEMPORARY CONSTRUCTION CLEARANCES ARE 21'-0" VERTICAL (21'-6" FOR BNSF AND UP RAILROADS) AND 12'-0" HORIZONTAL (15'-0" FOR BNSF AND UP RAILROADS) FROM CENTERLINE OF TRACK TO FALSEWORK. UNLESS INSTRUCTED OTHERWISE, A CONSTRUCTION CLEARANCE DETAIL SHOULD NOT BE INCLUDED IN THE PLANS AS CONSTRUCTION CLEARANCES ARE STATED IN SECTION 107.17.1 OF THE STANDARD SPECIFICATIONS.

DESIGNER SHALL SHOW HORIZONTAL LOCATION OF SHORING NEEDED IN PLAN VIEW. INCLUDE BID ITEM "TEMPORARY SHORING RAILROAD" WHEN SHORING ENCROACHES ZONE A OR B.

☆ 6'-6" MIN. NOT REQ'D IF BEDROCK IS PRESENT.

THIS STANDARD IS TO MEET WISDOT REQUIREMENTS ONLY. THE DESIGN ENGINEER SHALL CONTACT THE RAILROAD FOR THEIR REQUIREMENTS.

◨ BNSF AND UP RAILROADS HAVE GREATER REQUIREMENTS THAN SHOWN. CONFER WITH STATEWIDE RAILROAD STRUCTURE AND TRACK ENGINEER IN CENTRAL OFFICE RAILROADS AND HARBORS SECTION. DESIGNER SHOULD CONSIDER FIELD TOLERANCES AND CONTINGENCIES WHEN SHOWING SHORING REQUIREMENTS. REFER TO "GUIDELINES FOR TEMPORARY SHORING" PUBLICATION BY UP AND BNSF FOR ADDITIONAL INFORMATION.

◓ BNSF AND UP RAILROAD REQUIRE A DEPTH OF FOOTING 6'-0" MIN. FROM BASE OF RAIL TO TOP OF FOOTING. IN LOCATIONS WHERE BEDROCK IS PRESENT, COORDINATE FOOTING DEPTHS WITH RAILROAD PROJECT COORDINATION ENGINEER.

◒ LIMITS OF RAILROAD RIGHT-OF-WAY. LOCATIONS SHOWN ARE FOR REFERENCE ONLY AND NEED NOT BE DIMENSIONED.

◩ AESTHETICS SHALL NOT BE EMPLOYED ALONG RAILROAD TRACKS.

NOTES

FINAL LOCATION AND TYPE OF SHORING SYSTEM TO BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT ALL DESIGN DRAWINGS AND CALCULATIONS DIRECTLY TO THE RAILROAD. SHORING COVERED BY BID ITEM "TEMPORARY SHORING RAILROAD".

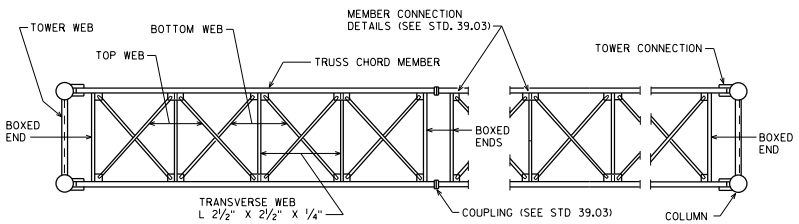
HIGHWAY OVER RAILROAD DESIGN REQUIREMENTS

BUREAU OF STRUCTURES

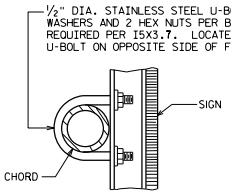
APPROVED: Bill Oliva

DATE: 7-17

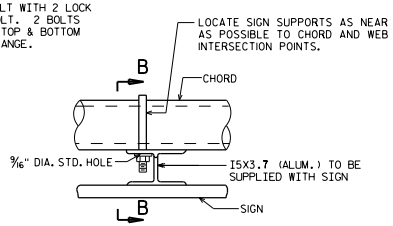
STANDARD 38.01



PLAN

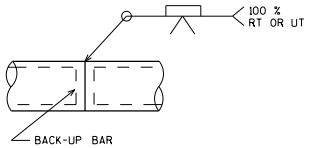


SECTION B-B

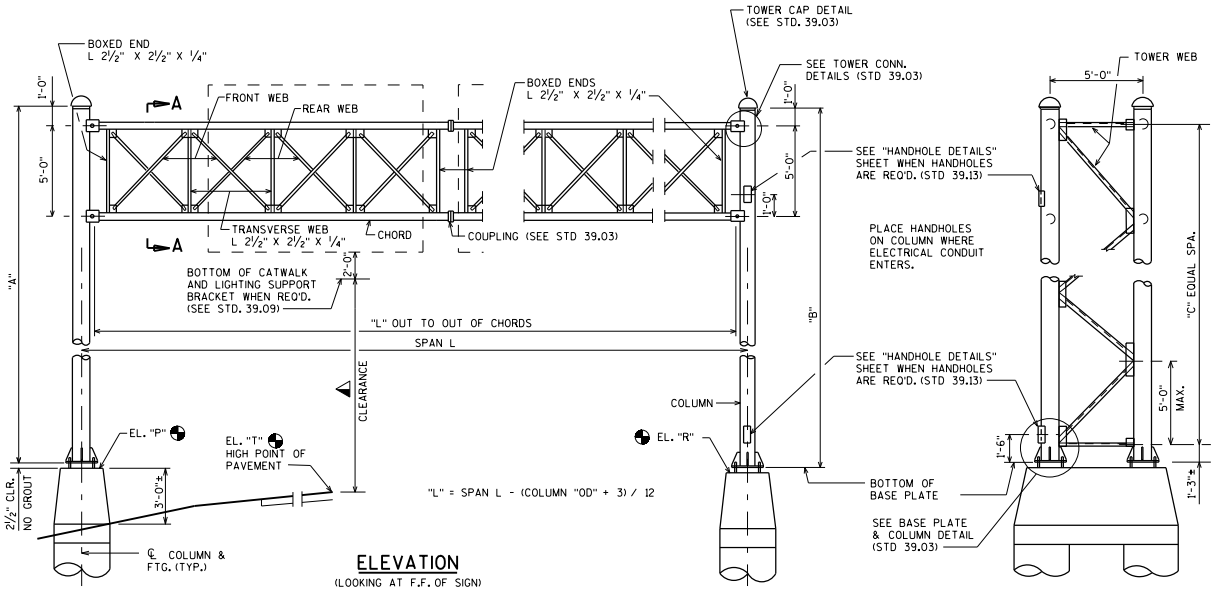


TYPICAL SIGN CONNECTION

USE FOR TYPE I AND II SIGNS ONLY



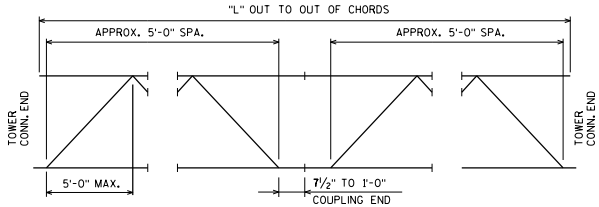
CHORD SPLICE



ELEVATION

(LOOKING AT F.F. OF SIGN)

END VIEW



TRUSS ARRANGEMENT

FABRICATOR MAY MAKE TRUSSES ANY LENGTH KEEPING A SECTION A MINIMUM OF 20'-0" & A MULTPLE OF 5'-0". CHORD FIELD SPLICES SHALL BE MADE WITH COUPLINGS. CHORD SHOP SPLICE SHALL BE THE WELDED SPLICE SHOWN ABOVE.

NOTES

DRAWINGS SHALL NOT BE SCALED.

STEEL COLUMN AND CHORD PIPES SHALL BE API SPEC. 5L GRADE X42 Fy = 42,000 PSI**

PLATES, BARS & STRUCTURAL ANGLES SHALL BE ASTM A709 GRADE 36 Fy = 36,000 PSI

STEEL ANCHOR RODS SHALL MEET THE REQUIREMENTS OF ASTM F1554 GRADE 55, ASTM A563A HEAVY HEX NUTS, AND ASTM F436 WASHERS.

UNLESS DETAILED OTHERWISE IN THE PLANS, ALL H.S. BOLTED CONNECTIONS SHALL BE MADE WITH ¾" DIA. A325 GALVANIZED BOLTS. FIELD CONNECTIONS SHALL BE INSTALLED WITH DTI WASHERS.

ALL STRUCTURAL STEEL MEMBERS, PLATES, ANCHOR RODS, H.S. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

WELDED CONNECTIONS CAN BE USED IN LIEU OF BOLTED CONNECTIONS, IF A TRUSS UNIT CAN BE GALVANIZED IN ONE PIECE.

WELD TEST AS PER AWS D1.1.

EXACT LOCATION OF SIGN BRIDGE SHALL BE DETERMINED BY THE REGION TRAFFIC ENGINEER.

SEE SIGN PLATE NO. A4-6 OF THE SIGN PLATE MANUAL FOR INSTRUCTION ON CENTERING SIGN VERTICALLY ON TRUSS.

** SEE WisDOT BRIDGE MANUAL SECTION 39.3 FOR ACCEPTABLE ALTERNATE MATERIAL.

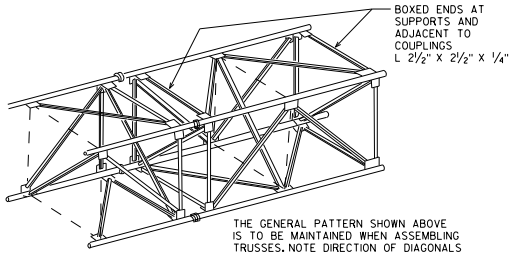
℄ ELEVATIONS TO BE SHOWN ON "GENERAL LAYOUT" SHEET.

⚠ 20'-0" MIN. FOR OSOW HIGH CLEARANCE ROUTE, 18'-3" MIN. FOR ALL OTHERS.

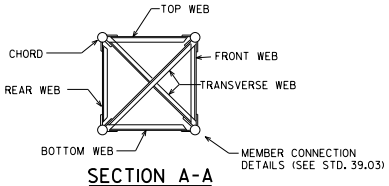
DESIGN DATA

DEAD LOAD - 3 PSF OF SIGN, WT. OF SUPPORTING STRUCTURE, CATWALK, LIGHTS AND RAILINGS.
ICE LOAD - 3 PSF TO 1 FACE OF SIGN & AROUND SURFACE OF MEMBERS.
WIND PRESSURE - 90 MPH (3-SECOND GUST SPEED) TO SIGN AREA & EXPOSED MEMBERS.
FATIGUE GROUP LOAD IS APPLIED PER SECTION 39.4.2 OF THE WISDOT BRIDGE MANUAL.

DESIGNED ACCORDING TO THE 6TH EDITION OF AASHTO "STANDARD SPECIFICTIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS."



TYPICAL TRUSS SECTION



SECTION A-A

STANDARDS 39.03, 39.09, AND 39.13 DETAILS ARE USED WITH THIS STANDARD TO DETAIL A "4-CHORD GAVANIZED STEEL SIGN BRIDGE" FOR TYPE I AND II SIGNS ONLY.

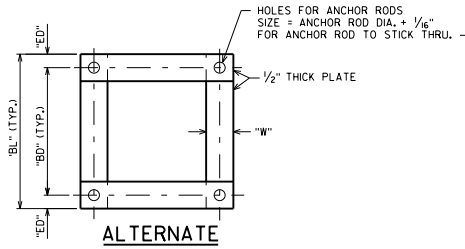
4-CHORD GALVANIZED STEEL SIGN BRIDGE

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

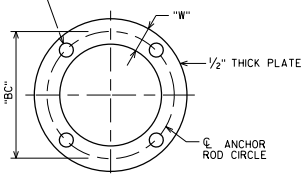
STANDARD 39.02



ALTERNATE

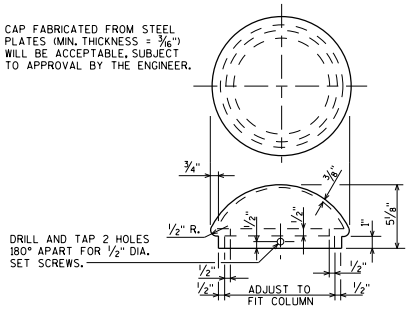
ANCHOR PLATE/TOP TEMPLATE

PLAN VIEW

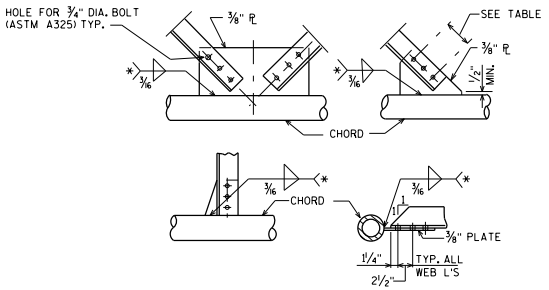


ANCHOR PLATE/TOP TEMPLATE

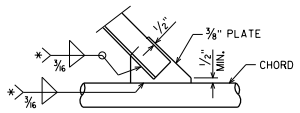
PLAN VIEW



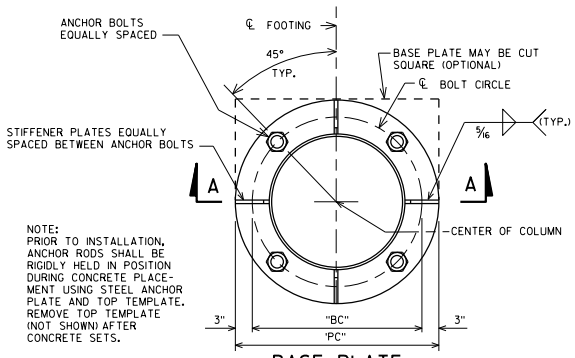
TOWER CAP DETAIL



TYPICAL TRUSS CONNECTION DETAILS

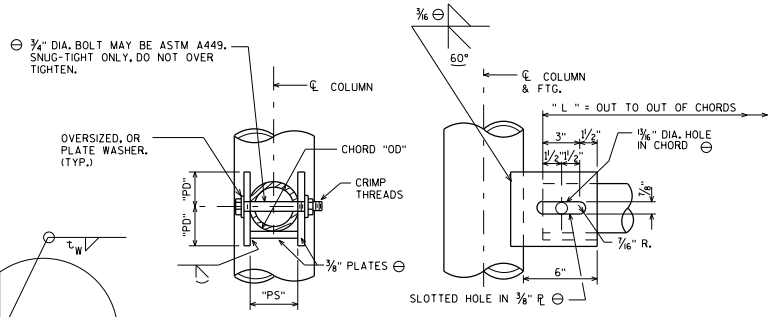


TYPICAL WELDED ALTERNATE



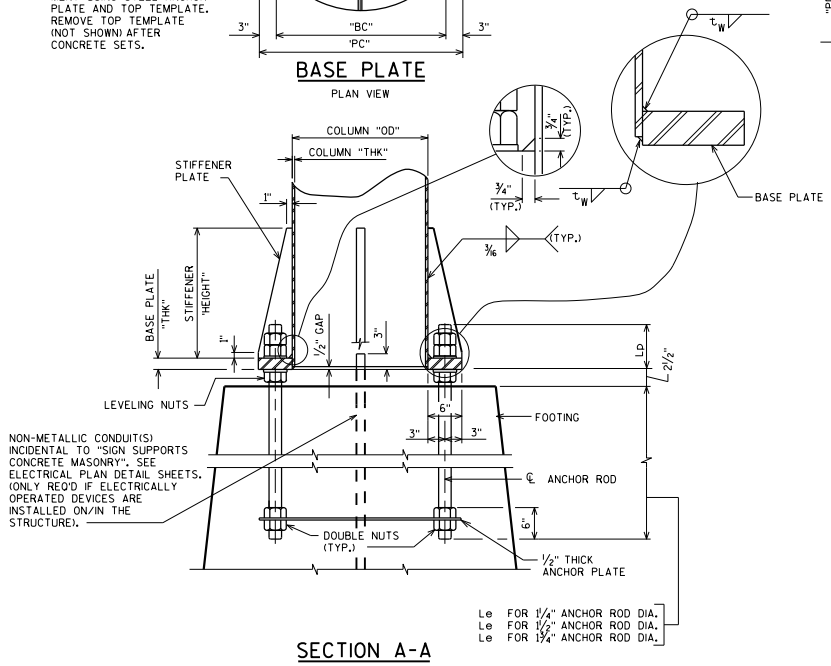
BASE PLATE

PLAN VIEW

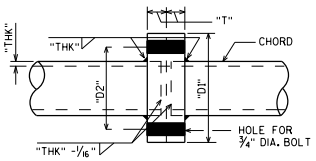


TOWER CONNECTION DETAIL

⊖ BOLT, PLATE & HOLE DETAILS SHOWN ARE MIN.



SECTION A-A



COUPLING DETAIL

CONTRACTOR SHALL PROVIDE #16 GA. GALVANIZED STEEL SHIMS, AS REQUIRED TO PROVIDE FOR CAMBER

DESIGN DATA

WEB MEMBERS & BOXED ENDS

ANGLE SIZE	*WELD LENGTH	NO. OF BOLTS
● 2 1/2"×2 1/2"×1/4"	11"	3
3"×3"×3/16"	10"	3
3"×3"×1/4"	13"	4
3"×3"×5/16"	16 1/2"	5
3"×3"×3/8"	19 1/2"	6
4"×4"×1/4"	18"	5
4"×4"×5/16"	22"	6
4"×4"×3/8"	26"	8
4"×4"×7/16"	30"	9
4"×4"×1/2"	34"	10

● ONLY USED FOR BOXED ENDS AND TRANSVERSE WEBS.

OTHER DATA

"BC" = COLUMN "OD" + 6"
"PC" = COLUMN "OD" + 1'-0"
"W" = 2 × (ANCHOR ROD DIA.)
"BD" = "BC" × COS(45°)
"ED" = "W"/2
"BL" = "BD" + "W"
"PD" = (CHORD "OD")/2 + 3/4"
"PS" = CHORD "OD" + 3/16"

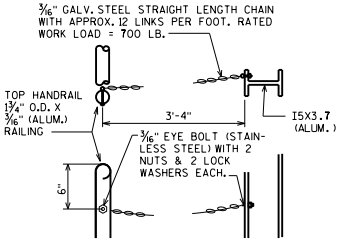
4-CHORD SIGN BRIDGE DETAILS

BUREAU OF STRUCTURES

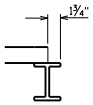
APPROVED: Bill Oliva

DATE: 1-17

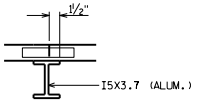
STANDARD 39.03



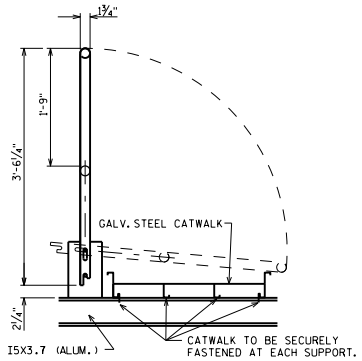
SAFETY CHAIN DETAIL



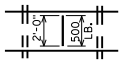
CATWALK TERMINATION DETAIL



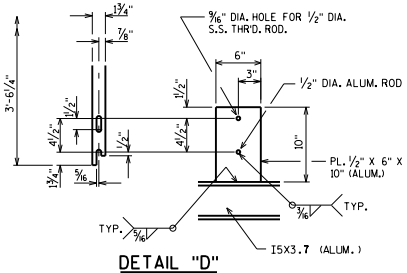
CATWALK SPLICE LOCATION DETAIL



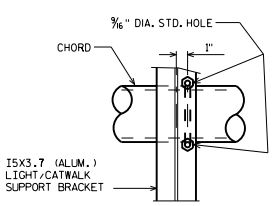
RAIL POST DETAIL



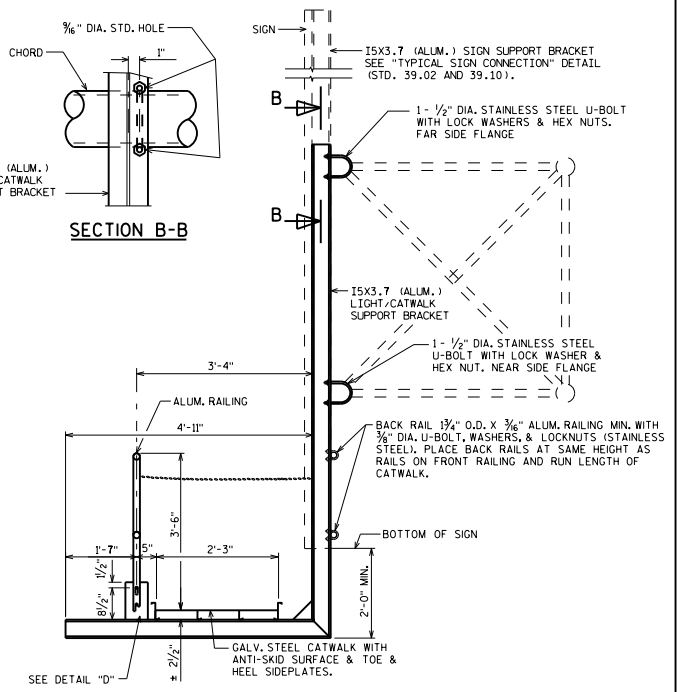
NOTE:
CATWALK SHALL MEET AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS" 6TH EDITION. (500 LB. DISTRIBUTED OVER 2'-0" TRANSVERSELY WITH THE BASIC ALLOWABLE UNIT STRESS INCREASED 25%). MAX. SPAN IS 8'-0". CATWALK SHALL ALSO MEET THE MOST RECENT ISSUE OF OSHA STD'S FOR WALKING-WORKING SURFACES.



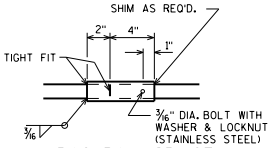
DETAIL "D"



SECTION B-B

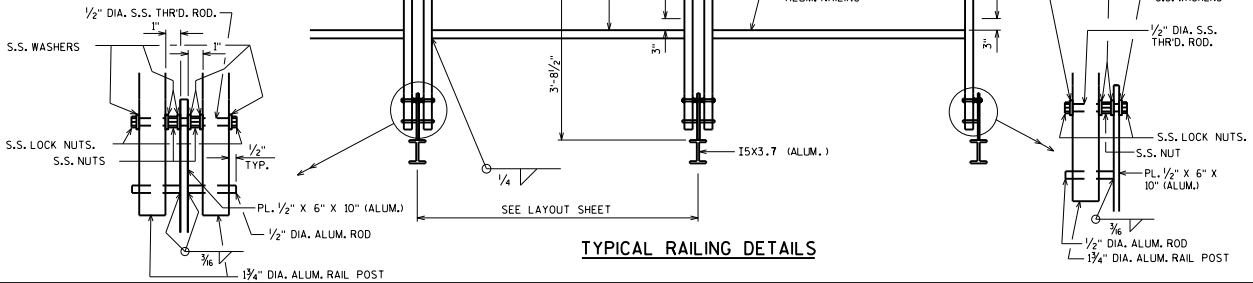


SECTION THRU WALKWAY

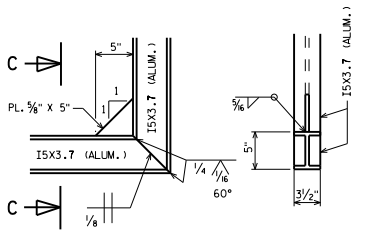


BACKRAIL SPLICE

ONE SPLICE ALLOWED FOR LENGTHS OVER 30'-0"



TYPICAL RAILING DETAILS



BRACKET DETAIL

SECTION C-C

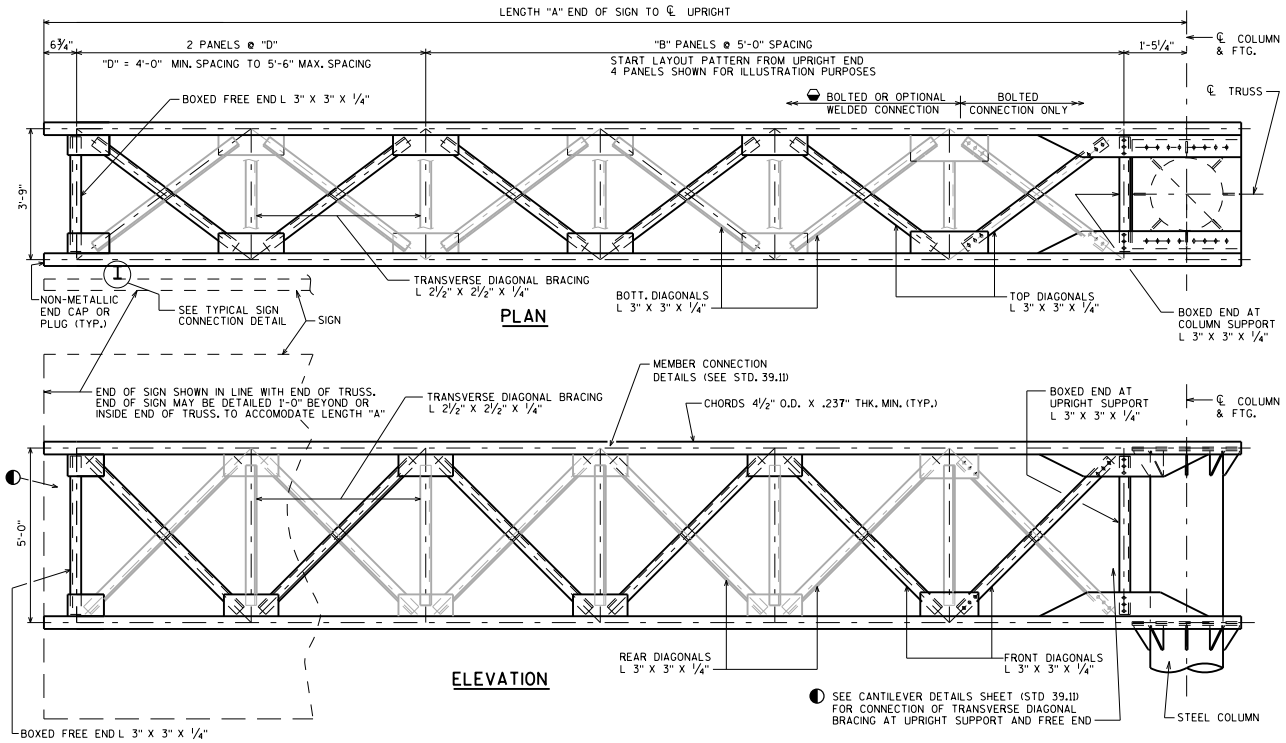
SIGN BRIDGE CATWALK FOR TYPE I AND II SIGNS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 39.09



NOTES

DRAWINGS SHALL NOT BE SCALED.

STEEL COLUMN AND CHORD PIPES SHALL BE API SPEC. 5L GRADE X42, PSL-2, Fy = 42,000 PSI **

PLATES, BARS & STRUCTURAL ANGLES SHALL BE ASTM A709 GRADE 36, Fy = 36,000 PSI

STEEL ANCHOR RODS SHALL MEET THE REQUIREMENTS OF ASTM F1554 GRADE 55, ASTM A563A HEAVY HEX NUTS, AND ASTM F436 WASHERS.

UNLESS DETAILED OTHERWISE IN THE PLANS, ALL H.S. BOLTED CONNECTIONS SHALL BE MADE WITH ¾" DIA. A325 GALVANIZED BOLTS. FIELD CONNECTIONS SHALL BE INSTALLED WITH DTI WASHERS.

ALL STRUCTURAL STEEL MEMBERS, PLATES, ANCHOR RODS, H.S. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

WELD TEST AS PER AWS D1.1.

EXACT LOCATION OF SIGN BRIDGE SHALL BE DETERMINED BY THE REGION TRAFFIC ENGINEER.

PREFABRICATE CAMBER INTO THE HORIZONTAL SUPPORT PROVIDING AN AMOUNT "Y" AT END OF TRUSS SHOWN IN "CAMBER DIAGRAM". DO NOT RAKE VERTICAL UPRIGHT BY ADJUSTMENT OF LEVELING NUTS.

SEE SIGN PLATE NO. A4-6 OF THE SIGN PLATE MANUAL FOR INSTRUCTION ON CENTERING SIGN VERTICALLY ON TRUSS.

** AN ALTERNATE MATERIAL MAY BE SUBSTITUTED, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION. SEE SECTION 39.3 IN THE BRIDGE MANUAL FOR ACCEPTABLE MATERIAL.

◒ WELDED CONNECTIONS MAY BE USED IF UNIT CAN BE GALVANIZED IN ONE PIECE.

◓ ELEVATIONS TO BE SHOWN ON "GENERAL LAYOUT" SHEET.

◭ 20'-0" MIN. FOR OSOW HIGH CLEARANCE ROUTE, 18'-3" MIN. FOR ALL OTHERS.

DESIGN DATA

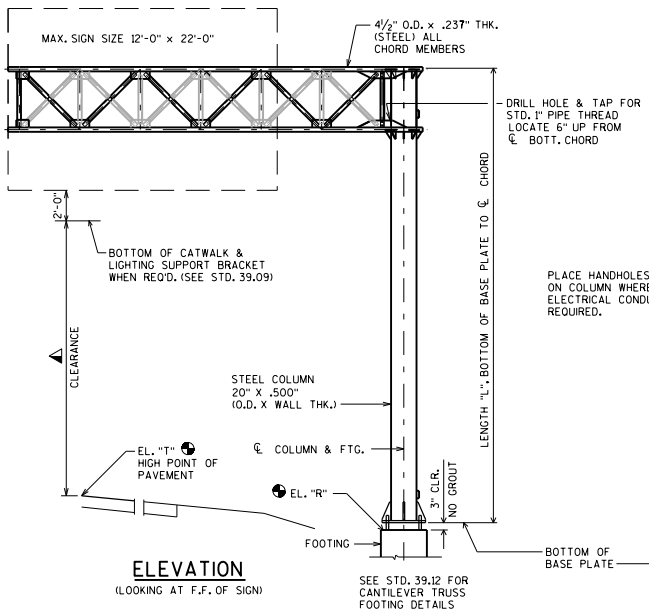
DEAD LOAD - 3 PSF OF SIGN, WT. OF SUPPORTING STRUCTURE, CATWALK, LIGHTS AND RAILINGS.
ICE LOAD - 3 PSF TO 1 FACE OF SIGN & AROUND SURFACE OF MEMBERS.
WIND PRESSURE - 90 MPH (3-SECOND GUST SPEED) TO SIGN AREA & EXPOSED MEMBERS.
FATIGUE CATEGORY I WITHOUT GALLOPING WIND EFFECTS.

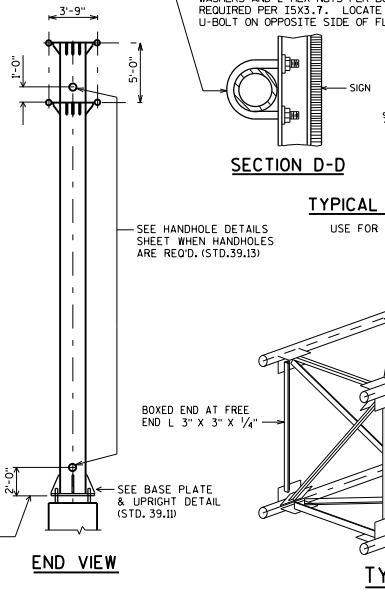
DESIGNED ACCORDING TO THE 4TH EDITION AND INTERIM REVISIONS OF AASHTO "STANDARD SPECIFICTIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS."

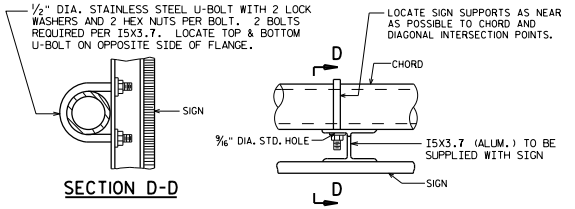
DESIGNER NOTES

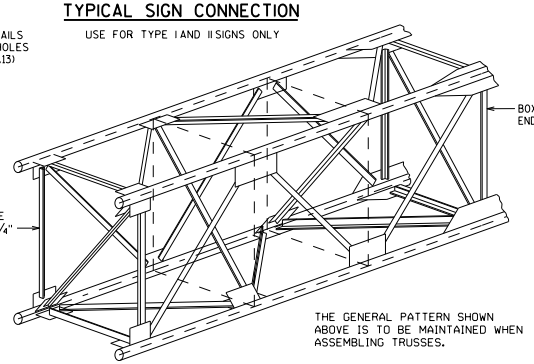
CAMBER VALUES "Y" (IN.) "A" / "L"	32	30	28	26	24
30	4⅛	3½	2⅞	2⅜	1⅞
28	3⅞	3¼	2¾	2¼	1¾
26	3⅝	3	2½	2⅛	1¾
24	3⅜	2⅞	2⅜	2	1⅝
22	3⅛	2⅝	2¼	1⅞	1½

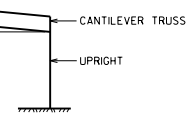
"A" & "L" IN FT.
INTERPOLATE FOR VALUES NOT SHOWN
TABLES REFLECT CATWALK LOADING . FOR CAMBER VALUES WITHOUT CATWALK LOADING, MULTIPLY TABLE VALUES ABOVE AS FOLLOWS: MULTIPLY 'Y' BY .72











STANDARDS 39.9, 39.11, 39.12 AND 39.13 DETAILS ARE USED WITH THIS STANDARD TO DETAIL A "GALVANIZED STEEL CANTILEVER SIGN TRUSS" FOR TYPE I AND II SIGNS ONLY.

GALVANIZED STEEL CANTILEVER SIGN TRUSS

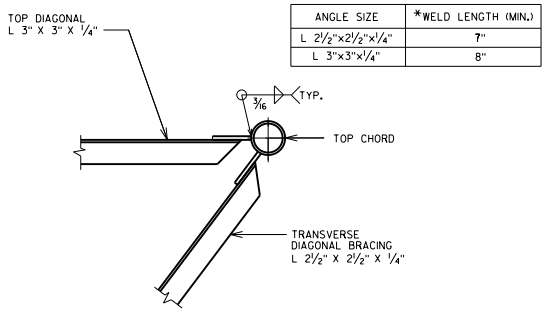
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

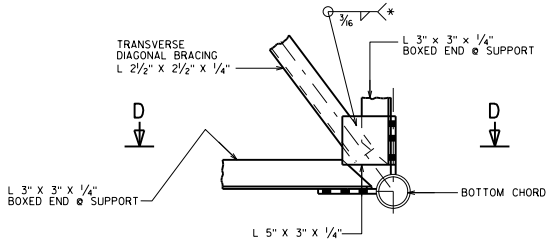
DATE: 7-18

STANDARD 39.10

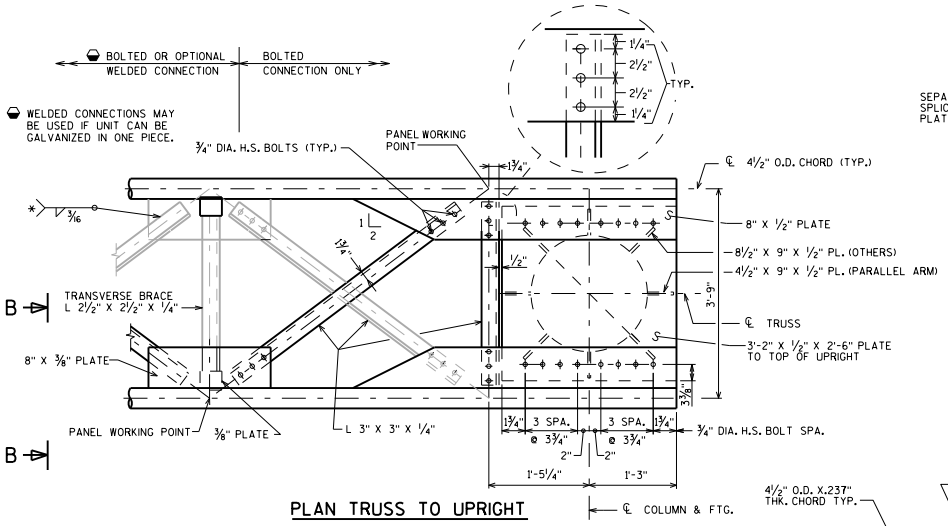
ANGLE SIZE	*WELD LENGTH (MIN.)
L 2½"x2½"x¼"	7"
L 3"x3"x¼"	8"



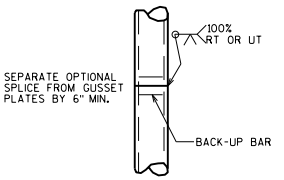
SECTION B-B



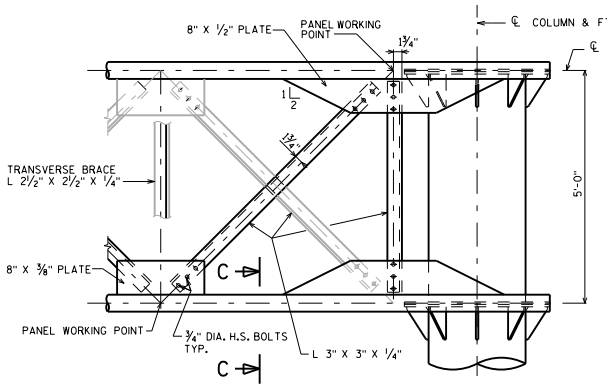
SECTION C-C



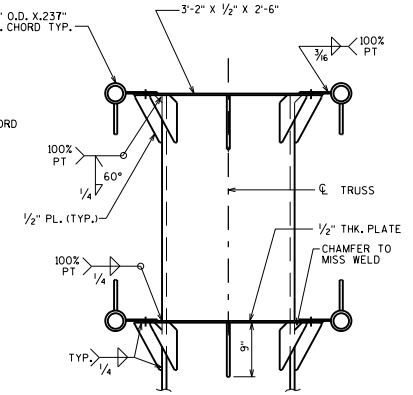
PLAN TRUSS TO UPRIGHT



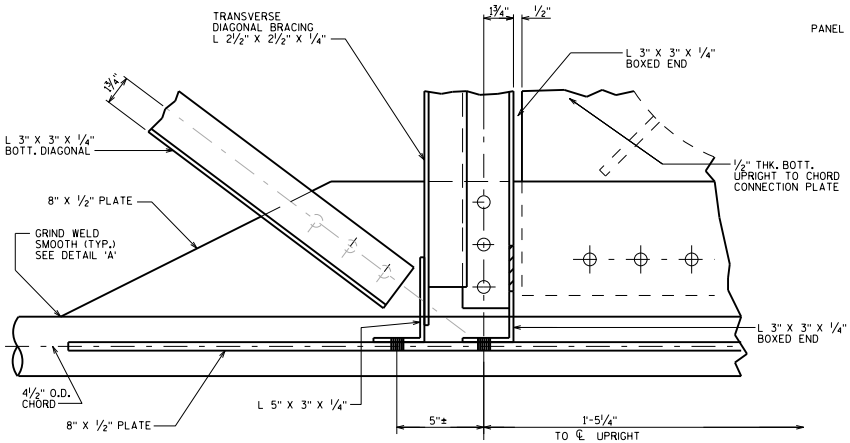
OPTIONAL COLUMN OR CHORD SPLICE DETAIL



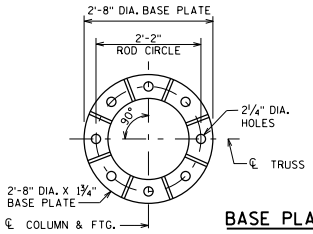
ELEVATION TRUSS TO UPRIGHT



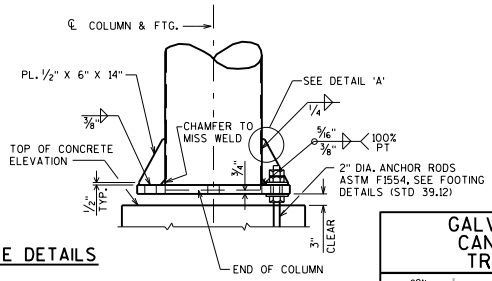
END VIEW
TRUSS TO UPRIGHT

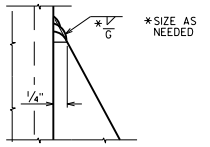


SECTION D-D
(LOOKING DOWN @ BOTT. HORIZ. PLANE @ FRONT CHORD)



BASE PLATE DETAILS





DETAIL 'A'

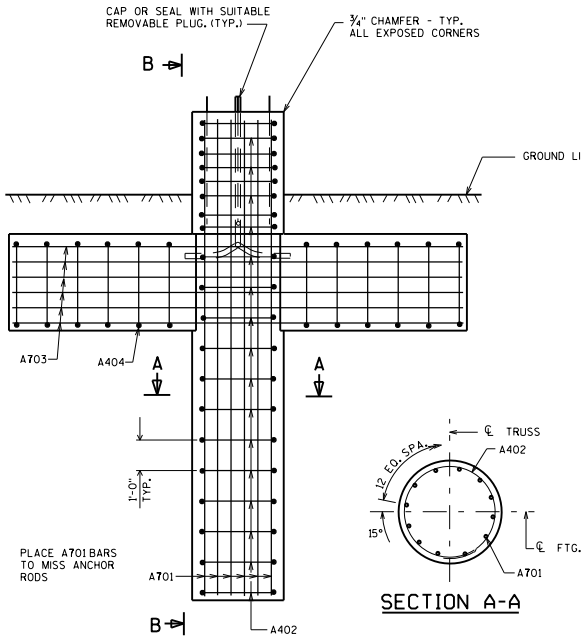
GALVANIZED STEEL CANTILEVER SIGN TRUSS DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

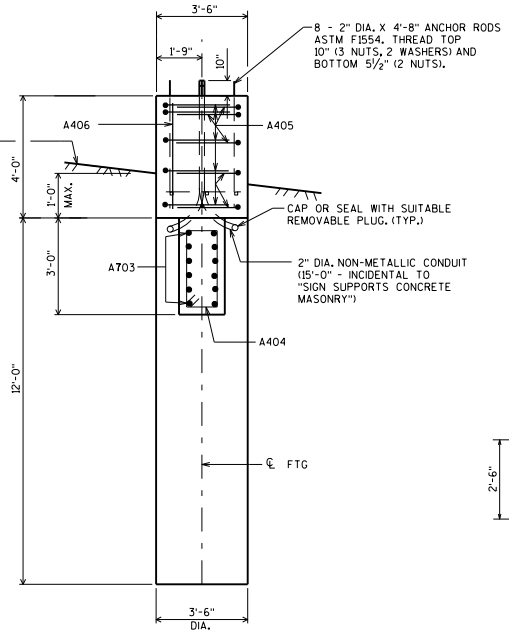
DATE: 1-17

STANDARD 39.11



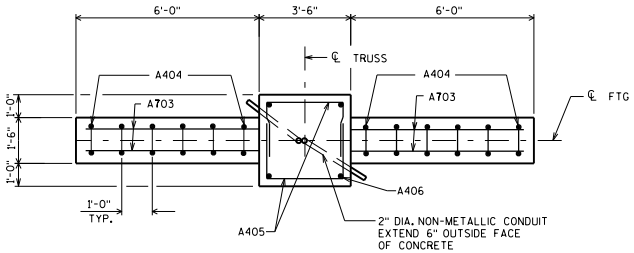
ELEVATION

SECTION A-A



SECTION B-B

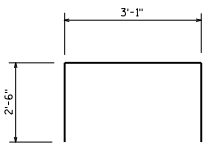
(SHOWING WING AND CAP STEEL ONLY)



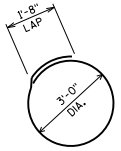
PLAN

BILL OF BARS

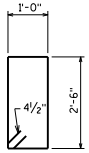
BAR MARK	COAT	NO. REQ'D	LENGTH	BENT	CUT. DIAG.	BUN-DLE	LOCATION
A701	X	12	15'-6"				FOOTING - COLUMN/TOP
A402	X	16	11'-2"	X			FOOTING - COLUMN/TOP
A703	X	12	15'-0"				FOOTING - WINGS
A404	X	12	7'-6"	X			FOOTING - WINGS
A405	X	10	7'-11"	X			FOOTING - TOP
A406	X	4	3'-6"				FOOTING - TOP - COLUMNS



A405



A402



A404 (STIRRUP)

NOTES

DRAWINGS SHALL NOT BE SCALED.

THE FIRST OR FIRST TWO DIGITS OF THE BAR MARK SIGNIFIES THE BAR SIZE.

BAR STEEL REINFORCEMENT SHALL BE EMBEDDED 3" CLEAR UNLESS DETAILED OTHERWISE.

BENDING DIMENSIONS ARE OUT TO OUT OF BAR.

CENTER ANCHOR ROD ASSEMBLY TO MISS BAR STEEL REINFORCEMENT AND MAKE SURE IT IS PLUMB. MAINTAIN ANCHOR ROD PROJECTION ABOVE FOOTING AS DETAILED ON PLAN. ANCHOR ROD ASSEMBLY SHALL BE RIGIDLY SECURE IN POSITION DURING AND AFTER CONCRETE PLACEMENT. DO NOT WELD THE ANCHOR ROD.

ULTIMATE DESIGN STRESSES

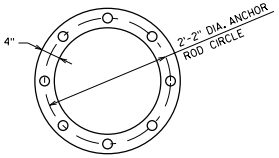
CONCRETE MASONRY — f'c=3,500 PSI
BAR STEEL REINFORCEMENT, GRADE 60 — fy=60,000 PSI
ANCHOR BOLTS ASTM F1554 — fy=55,000 PSI

FOUNDATION DATA

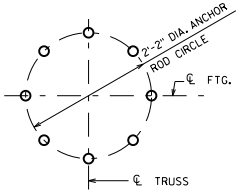
ALLOWABLE SOIL BEARING PRESSURE = 2T/SF

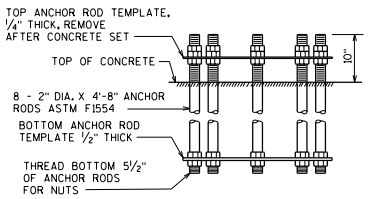
TOTAL ESTIMATED QUANTITIES (1 FTG.)

SIGN SUPPORTS CONCRETE MASONRY — 8 CY
SIGN SUPPORTS STEEL REINFORCEMENT HS — 990 LB



TOP VIEW OF TOP & BOTTOM TEMPLATES





ANCHOR ROD DETAILS

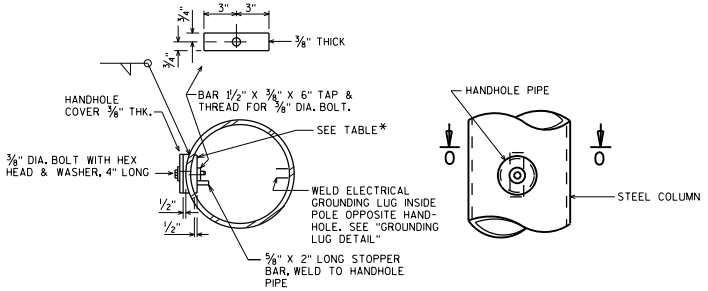
CANTILEVER TRUSS FOOTING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 39.12



SECTION 0-0

HANDHOLE DETAILS

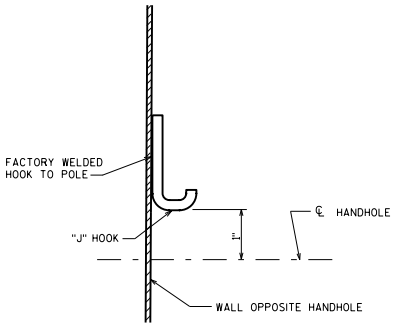
HANDHOLE NOTES

HANDHOLES SHALL BE LOCATED IN ONE COLUMN OF THE SIGN BRIDGE STRUCTURE IF ELECTRICALLY OPERATED DEVICES ARE INSTALLED ON/IN THE STRUCTURE. COLUMNS WITH HANDHOLES SHALL BE NEAR THE ELECTRICAL SERVICE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF THE ELECTRICAL SERVICE ENTRANCE WITH THE REGION TRAFFIC SECTION PRIOR TO FABRICATION OF THE SIGN BRIDGE COLUMNS AND MEMBERS. CONDUIT (AS REQ'D.) SHALL BE LOCATED, PLACED AND SIZED AS SHOWN ON THE ELECTRICAL PLAN DETAIL SHEETS.

UNLESS NOTED OTHERWISE, ALL HANDHOLE ELEMENTS TO BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

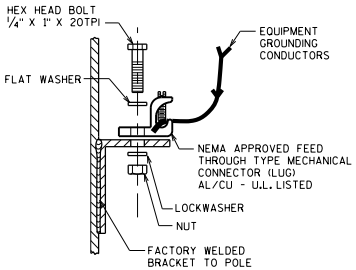
*

COLUMN SIZE O.D. X THK.	HANDHOLE PIPE O.D. X MIN. THK.
UP TO AND INCLUDING 16" X 0.375"	5.562" X 0.500"
GREATER THAN 16" X 0.375" TO AND INCLUDING 24" X 0.562"	6.625" X 0.562"



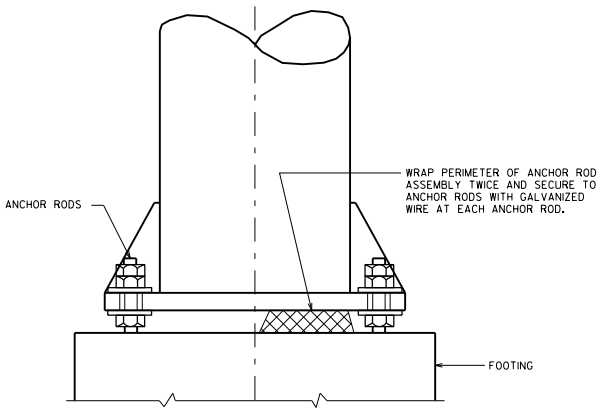
TYPICAL "J" HOOK LOCATION

THE "J" HOOK SHALL BE FACTORY WELDED TO THE INSIDE OF ALL COLUMNS CONTAINING ELECTRICAL WIRING. THE "J" HOOK SHALL BE ATTACHED ABOVE THE CENTERLINE OF THE UPPER HANDHOLE AND MOUNTED DIRECTLY OPPOSITE THE HANDHOLE AS SHOWN IN THE DRAWING.



GROUNDING LUG DETAIL

NUT, BOLT AND WASHERS SHALL BE STAINLESS STEEL



RODENT SCREEN

(ONLY REQ'D. WHEN ELECTRICAL DEVICES ARE INSTALLED)

HANDHOLE DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

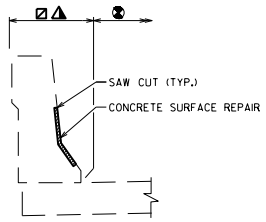
DATE: 7-18

STANDARD 39.13

"CLEANING PARAPETS" LIMITS

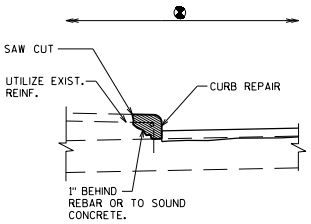
"PIGMENTED SURFACE SEALER" LIMITS

"PROTECTIVE SURFACE TREATMENT" LIMITS



PARAPET REPAIR DETAIL

502.3200	PROTECTIVE SURFACE TREATMENT	SY
502.3210	PIGMENTED SURFACE SEALER	SY
509.1500	CONCRETE SURFACE REPAIR	SF
509.9050.S	CLEANING PARAPETS	LF



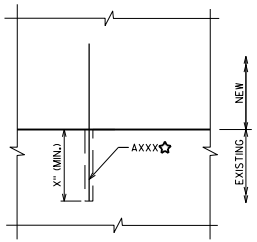
CURB REPAIR DETAIL

502.3200	PROTECTIVE SURFACE TREATMENT	SY
509.1200	CURB REPAIR	LF

DESIGNER NOTES

DETAILS MAY BE SHOWN ON PLANS IF NECESSARY FOR CLARITY.

INCLUDE APPLICABLE CONCRETE MASONRY BID ITEM TO FILL REPAIRS.



NOTE

ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS. (PROVIDE NOTE WHEN THE ADHESIVE ANCHOR BID ITEM IS NOT USED, BUT ARE ALLOWED AS AN ALTERNATIVE ANCHORAGE)

✪ (CHOOSE ONE OF THE FOLLOWING AND PLACE ON PLAN)

ADHESIVE ANCHORS X/X-INCH.
EMBED X" IN CONCRETE.

ADHESIVE ANCHORS X/X-INCH.
EMBED XX" IN CONCRETE.
ANCHORS SHALL BE APPROVED FOR USE IN CRACKED CONCRETE.

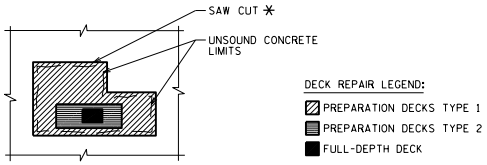
ANCHOR DETAIL (EXAMPLE)

502.41__	ADHESIVE ANCHORS _-INCH	EACH
502.42__	ADHESIVE ANCHORS NO. _BAR	EACH
505.0605	BAR STEEL REINFORCEMENT HS COATED STRUCTURES	LB

DESIGNER NOTES

THE DESIGN ENGINEER SHALL PROVIDE ANCHOR DETAILS AS NEEDED. PLANS SHALL INCLUDE ANCHOR "NOTES" WHEN ADHESIVE ANCHORS ARE USED.

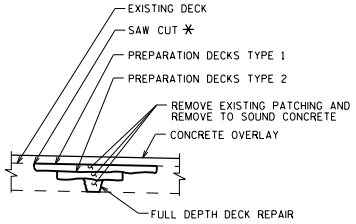
ANCHOR DETAIL EXAMPLE APPLICABLE FOR ADHESIVE ANCHORS LOCATED IN UNCRACKED CONCRETE. SEE CHAPTER 40.16 FOR ADDITIONAL GUIDANCE.



DECK REPAIR DETAIL - PLAN

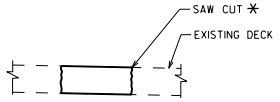
FOR DESIGNER INFORMATION ONLY
(DO NOT PLACE ON PLANS)

509.0301	PREPARATION DECKS TYPE 1	SY
509.0302	PREPARATION DECKS TYPE 2	SY
✳509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF
509.2000	FULL-DEPTH DECK REPAIR	SY
▲509.2500	CONCRETE MASONRY OVERLAY DECKS	CY



DECK REPAIR DETAIL - SECTION

FOR DESIGNER INFORMATION ONLY
(DO NOT PLACE ON PLANS)



FULL-DEPTH DECK REPAIR DETAIL

FOR DESIGNER INFORMATION ONLY
(DO NOT PLACE ON PLANS)

✳509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF
509.2000	FULL-DEPTH DECK REPAIR	SY
▲509.2500	CONCRETE MASONRY OVERLAY DECKS	CY

DESIGNER NOTES

DETAILS APPLICABLE TO ALL OVERLAY METHODS AND DECK REPAIRS WITHOUT OVERLAYS.

✳ "SAWING PAVEMENT DECK PREPARATION AREAS" NOT REQUIRED FOR CONCRETE OVERLAYS.

▲ USE "CONCRETE MASONRY DECK REPAIR" (509.2100.S) FOR DECK REPAIRS UNDER POLYMER, ASPHALTIC, OR POLYMER MOD. ASPHALTIC OVERLAYS. USE "CONCRETE MASONRY DECK REPAIR" FOR DECK REPAIRS WITHOUT OVERLAYS.

RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

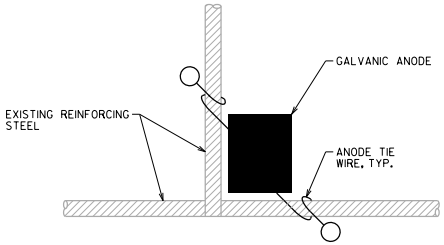
CONCRETE REPAIR DETAILS

BUREAU OF STRUCTURES

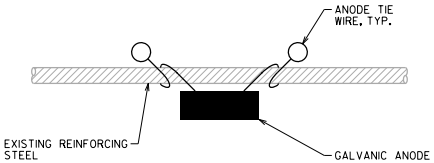
APPROVED: Bill Oliva

DATE: 1-18

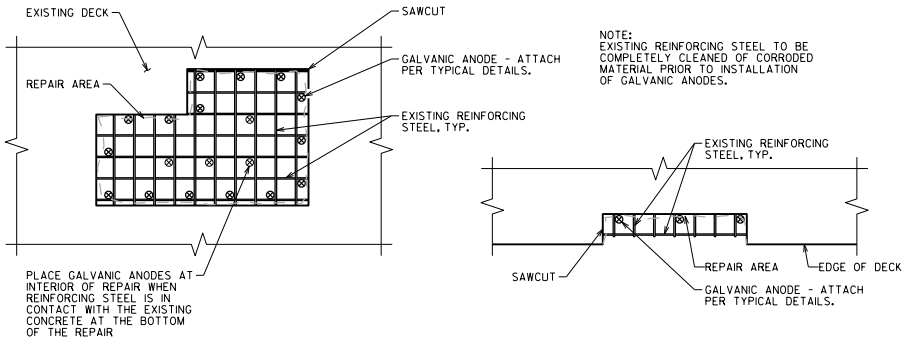
STANDARD 40.01



TYPICAL INSTALLATION AT BAR STEEL INTERSECTION



TYPICAL INSTALLATION FOR BAR STEEL



PART. PLAN TYPICAL REPAIR DETAIL

509.1500	CONCRETE SURFACE REPAIR	SF
SPV.0060	EMBEDDED GALVANIC ANODES	EACH

NOTES

SEE SPECIAL PROVISION "EMBEDDED GALVANIC ANODES" FOR DESCRIPTION, MATERIALS, CONSTRUCTION, MEASUREMENT, AND PAYMENT INFORMATION.

ANODES NEAREST TO EDGE OF REPAIR TO BE WITHIN 6" OF EDGE.

AFTER PLACEMENT, GALVANIC ANODES SHOULD MAINTAIN A MINIMUM TOP COVER OF 1½" AND A MINIMUM BOTTOM COVER OF ¾".

DESIGNER NOTES

CATHODIC PROTECTION SHALL BE USED ONLY AT THE REQUEST OF THE REGIONAL BRIDGE MAINTENANCE ENGINEER.

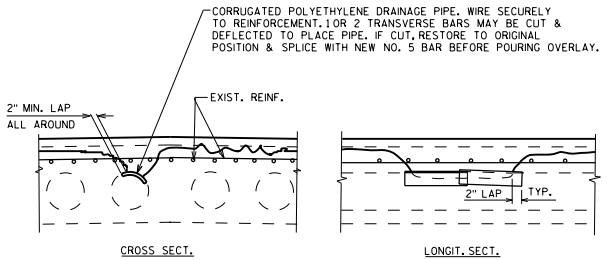
INCLUDE APPLICABLE CONCRETE MASONRY BID ITEM TO FILL REPAIRS.

CATHODIC PROTECTION

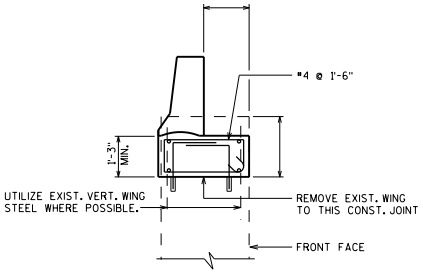
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

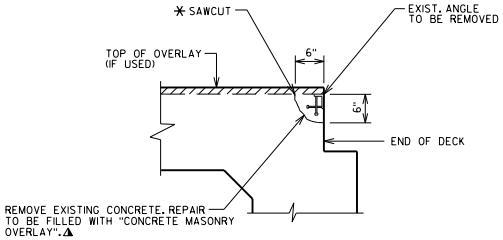
DATE: 1-15



RUPTURED VOID REPAIR



SECTION THRU PARAPET ON WING



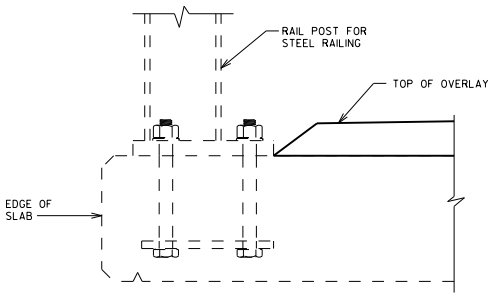
SECTION AT END OF SLAB

509.0301	PREPARATION DECKS TYPE 1	SY
509.0302	PREPARATION DECKS TYPE 2	SY
✳509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF
509.2000	FULL-DEPTH DECK REPAIR	SY
⚠509.2500	CONCRETE MASONRY OVERLAY DECKS	CY

DESIGNER NOTES

✳ "SAWING PAVEMENT DECK PREPARATION AREAS" NOT REQUIRED FOR CONCRETE OVERLAYS.

⚠ USE "CONCRETE MASONRY DECK REPAIR" (SPV.0035) FOR DECK REPAIRS UNDER POLYMER, ASPHALTIC, OR POLYMER MOD. ASPHALTIC OVERLAYS. USE "CONCRETE MASONRY DECK REPAIR" FOR DECK REPAIRS WITHOUT OVERLAYS.



SECTION THRU RAILING

ATTACHING PARAPETS OR RAILINGS TO BRIDGE DECKS WITH EPOXY ANCHORS IS NOT ALLOWED BY FHWA.

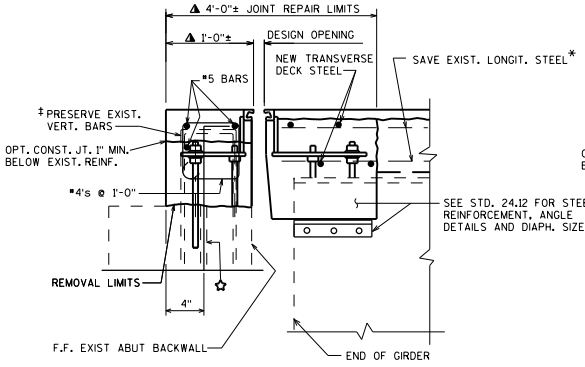
OVERLAY DETAILS

BUREAU OF STRUCTURES

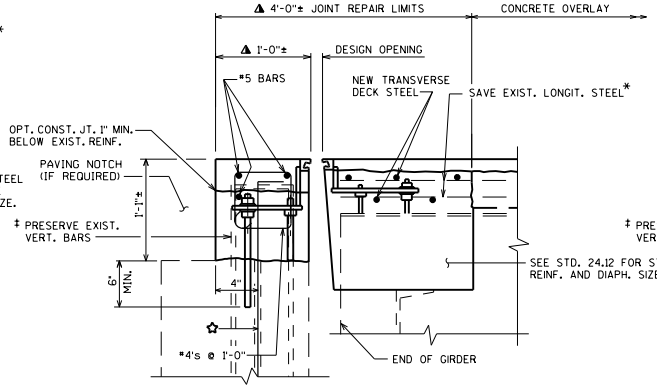
APPROVED: Bill Oliva

DATE: 1-18

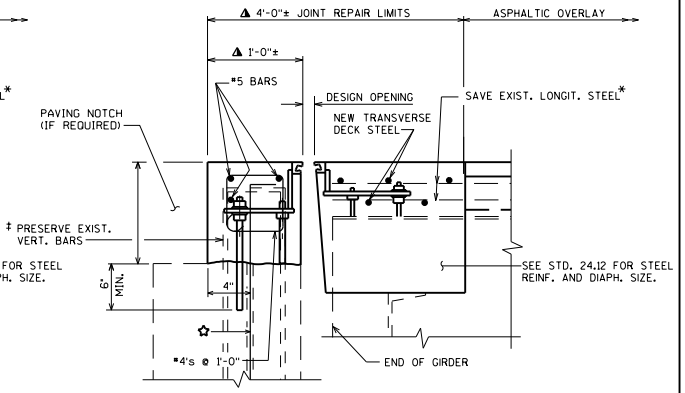
STANDARD 40.03



SECTION THRU JOINT STEEL GIRDER WITHOUT END DIAPHRAGM



SECTION THRU PROPOSED JOINT STEEL GIRDER WITH END DIAPHRAGM CONCRETE OVERLAY



SECTION THRU PROPOSED JOINT STEEL GIRDER WITH END DIAPHRAGM ASPHALTIC OVERLAY

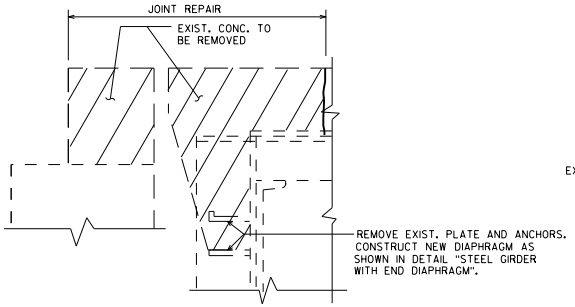
‡ EXISTING BARS ARE LIKELY TO BE CORRODED AND/OR DAMAGED DURING CONCRETE REMOVAL. PRESERVE AND INCORPORATE AS MUCH REBAR AS PRACTICAL. SUPPLEMENT WITH THE BARS INDICATED BY ✪.

✪ ADHESIVE ANCHORS NO. 5 BAR, EMBED 1'-6" IN CONCRETE. SPACE AT 1'-0". TURN 10" LEG AS NECESSARY TO FIT.

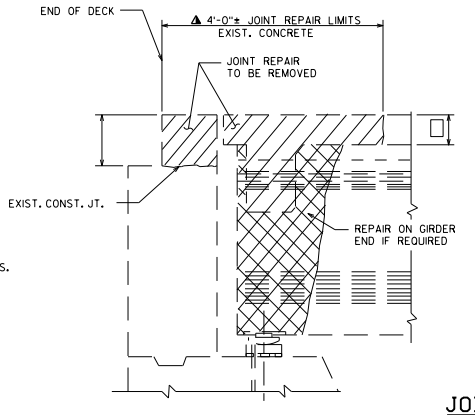
ALL REPLACEMENT PAVING BLOCK DIMENSIONS SHALL MATCH EXISTING PLAN DIMENSIONS UNLESS DESIGNER DETERMINES OTHERWISE, TYP. FOR ALL SECTIONS SHOWN ON THIS STANDARD.

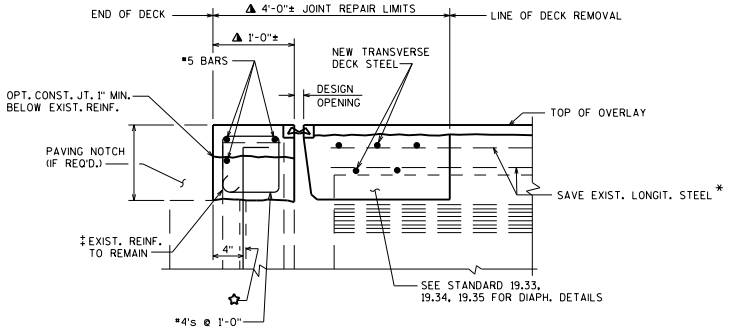
TOTAL ESTIMATED QUANTITIES

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



JOINT REPAIR-REMOVAL STEEL GIRDER





JOINT REPAIR-REMOVAL SECTION THRU JOINT-PRESTRESSED GIRDER

▲ DIMENSIONS GIVEN ARE NORMAL TO ℄ OF SUBSTRUCTURE UNIT. INCORPORATE EXISTING REINFORCEMENT

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

*FOR SKEWS > 20°, WHERE ORIGINAL TRANSVERSE DECK REINFORCEMENT WAS PLACED NORMAL TO THE GIRDERS, SAVE AND INCORPORATE 1'-6" MIN. OF TRANSVERSE REINFORCING BARS.

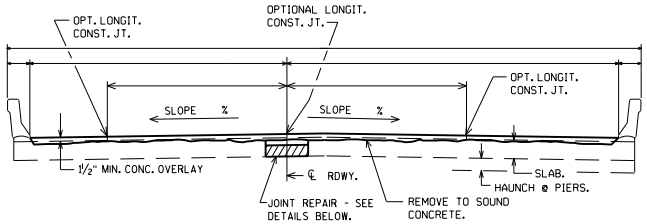
STRIP SEALS & DIAPH. DETAILS FOR OVERLAYS

BUREAU OF STRUCTURES

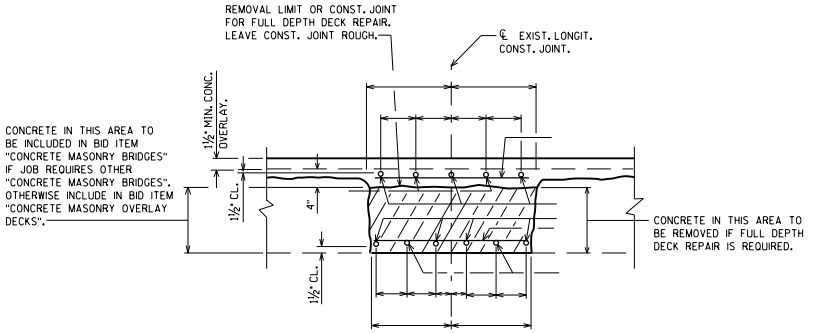
APPROVED: Bill Oliva

DATE: 1-17

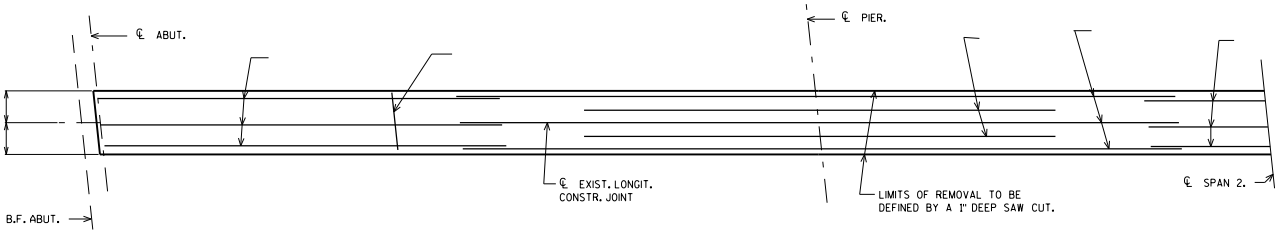
STANDARD 40.04



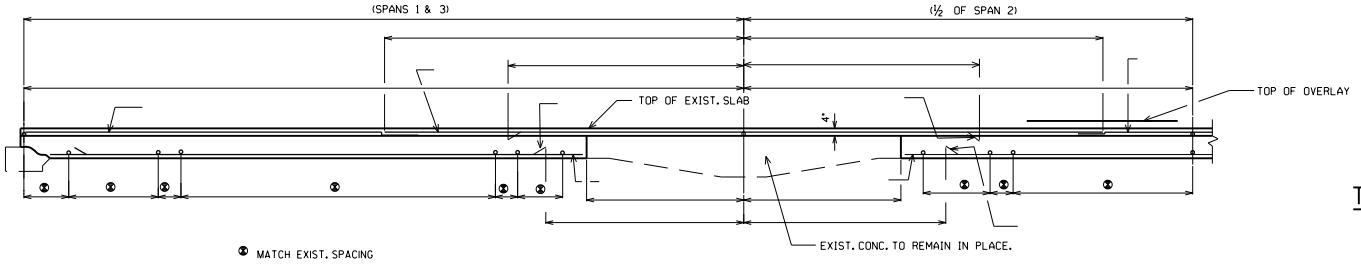
CROSS SECTION THRU ROADWAY LOOKING EAST



TYP. SECTION THRU JOINT



HALF PLAN SHOWING TOP BAR STEEL REINF.

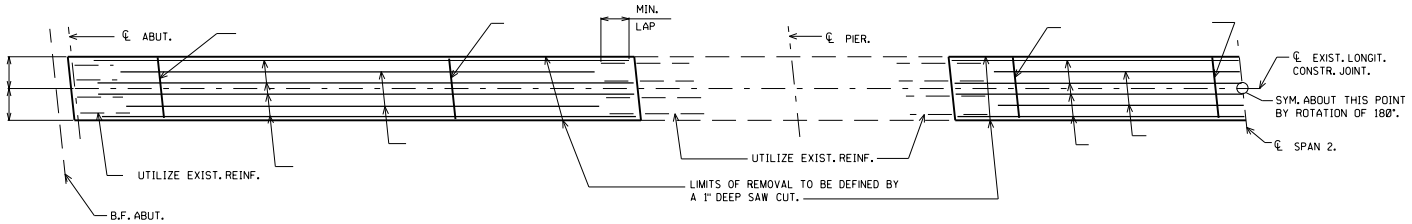


HALF LONGIT. SECTION

TOTAL ESTIMATED QUANTITIES

BID ITEMS

JOINT REPAIR	SY
BAR STEEL REINFORCEMENT HS COATED STRUCTURES	LB
CONCRETE MASONRY BRIDGES	CY
CONCRETE MASONRY OVERLAY DECKS	CY



HALF PLAN SHOWING BOTTOM BAR STEEL REINF

(REQUIRED ONLY FOR FULL DEPTH DECK REPAIR)

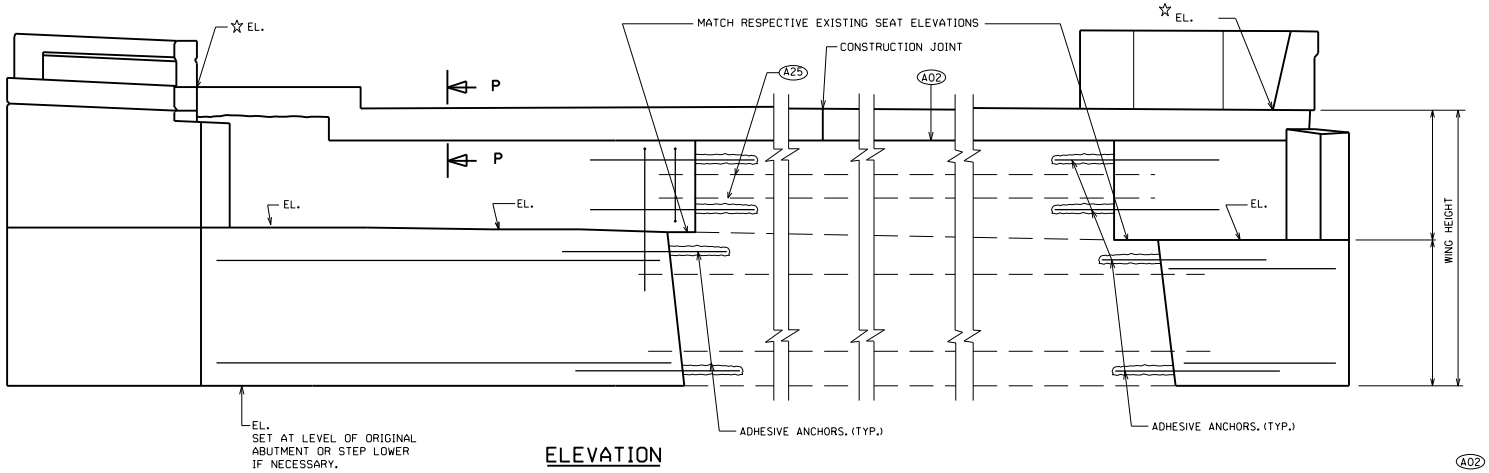
LONGIT. CONST. JOINT REPAIRS

BUREAU OF STRUCTURES

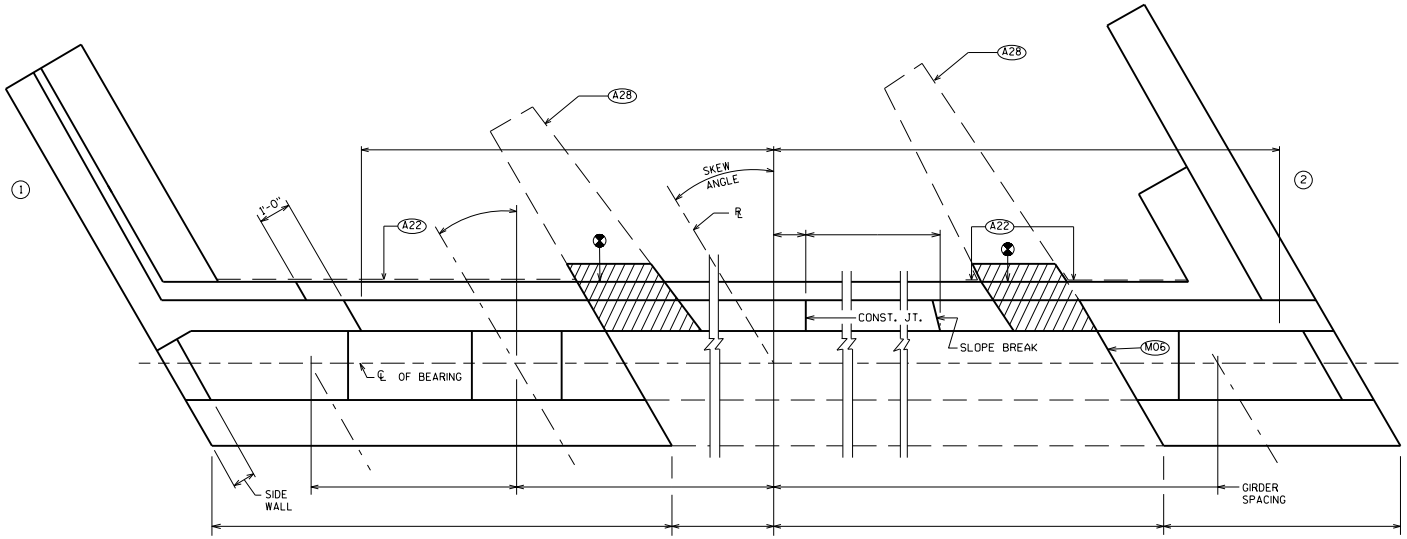
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 40.05



ELEVATION



WING WITHOUT PILE

WING WITH PILE

NOTES

A02 CONSTRUCTION JOINT: POUR CONCRETE ABOVE THIS JOINT AFTER SUPERSTRUCTURE CONCRETE IS IN PLACE. STRIKE OFF AND LEAVE ROUGH.

A22 18" (RMW) RUBBERIZED MEMBRANE WATERPROOFING SEAL ALL HORIZ. & VERT. JOINTS AT BACKFACE.

A25 SALVAGE EXIST. REINF. & EXTEND FULL LENGTH INTO NEW WORK.

M06 ROUGHEN SURFACE OF CONCRETE 1/4" DEEP MINIMUM AT ALL AREAS WHERE NEW CONCRETE CONTACTS EXISTING CONCRETE.

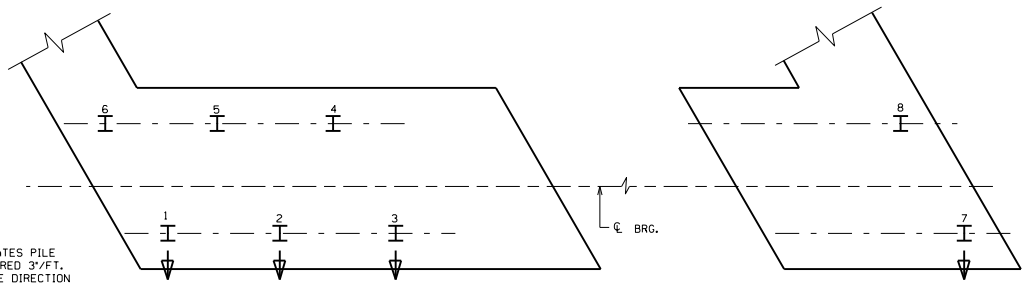
A28 EXISTING WINGS. REMOVE A MIN. OF 2'-0" BELOW FINISHED GRADE.

☆ ELEV. @ F.F. ABUT. BACKWALL AND GUTTERLINE.

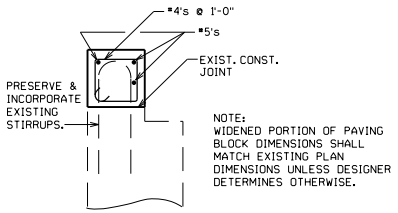
REMOVE CONC. IN THIS AREA DOWN TO EXIST. BRIDGE SEAT. INCORPORATE EXIST. BAR STEEL INTO NEW WORK.

DESIGNER NOTES

SEE CHAPTER 12 FOR NEW BAR STEEL PLACEMENT, DETAILS, DIMENSIONS, & NOTES.



PILE PLAN



SECTION P

ALSO SEE STANDARD 40.04

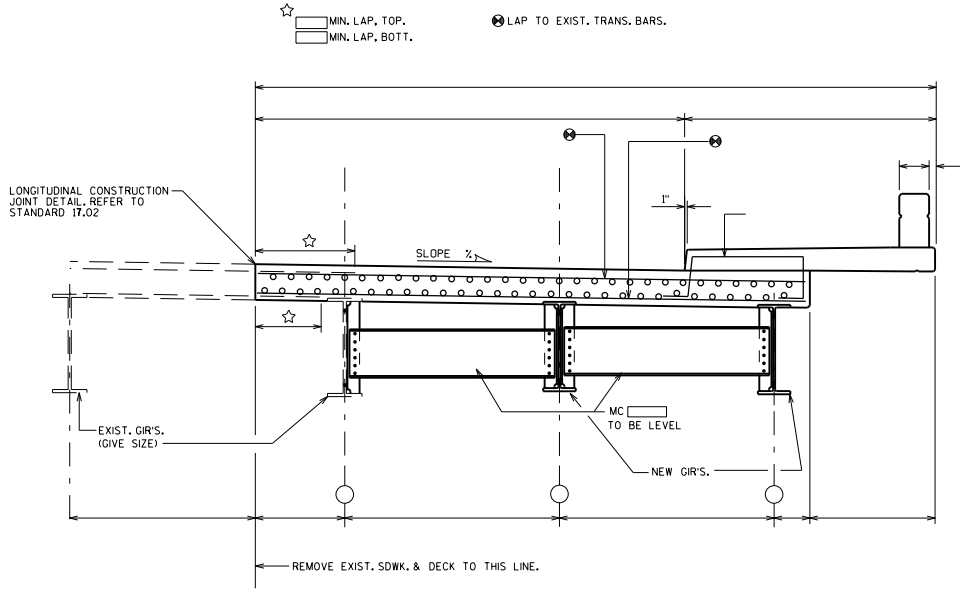
ABUTMENT WIDENING

BUREAU OF STRUCTURES

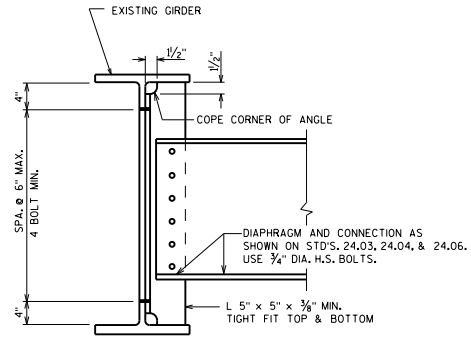
APPROVED: Bill Oliva

DATE: 7-16

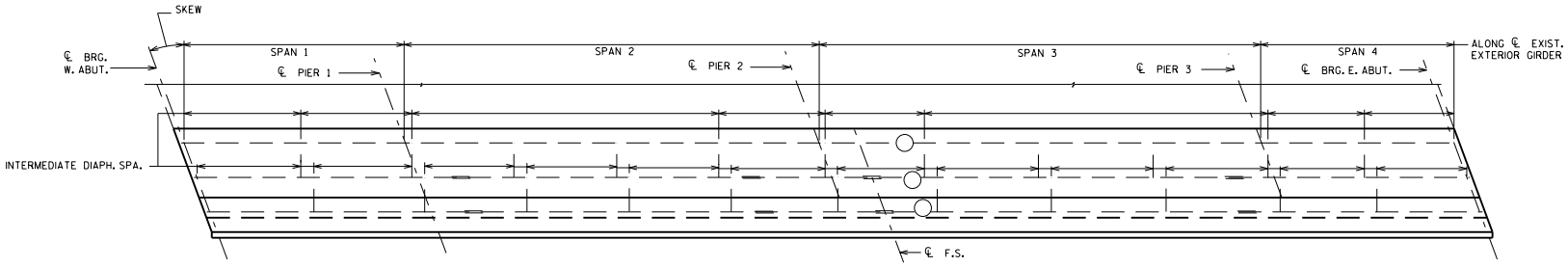
STANDARD 40.06



CROSS SECT. THRU RDWY.



DIAPHRAGM CONNECTION TO EXISTING STEEL GIRDER



PLAN

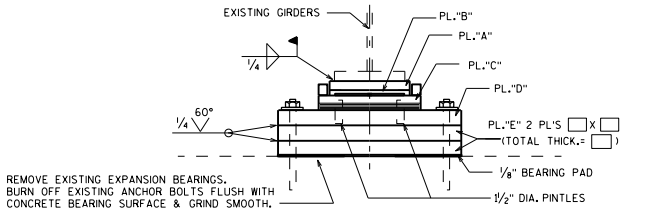
SLAB WIDENING

BUREAU OF STRUCTURES

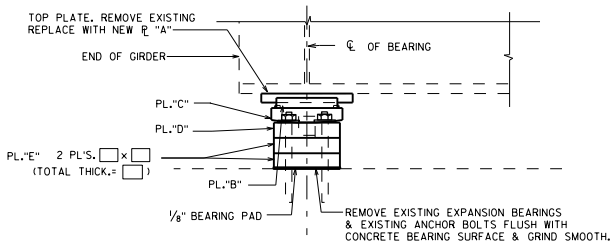
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 40.07



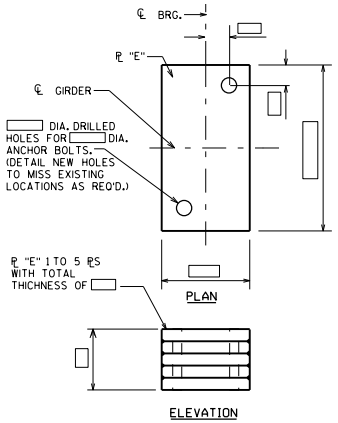
FRONT ELEVATION



SIDE ELEVATION

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS
STEEL BEARINGS

SEE STANDARD 27.08 FOR BEARING DETAILS

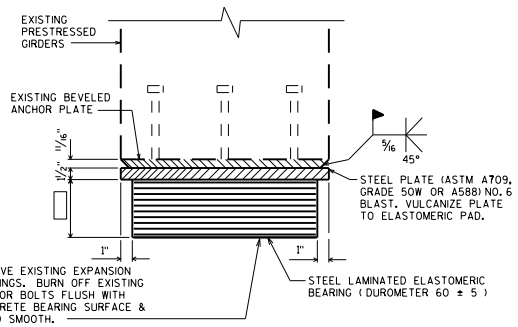


PLAN

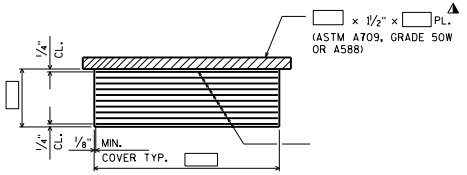
ELEVATION

PLATE 'E' DETAILS

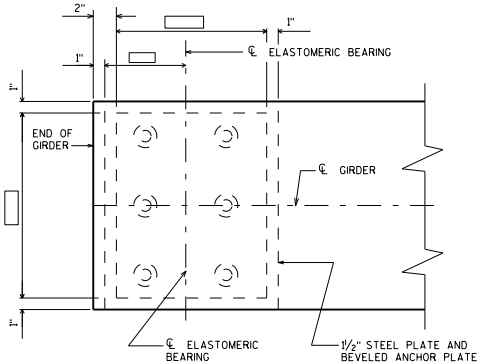
(SEE STD. 40.10 FOR CONCRETE BLOCK ALTERNATE)



FRONT ELEVATION



SECTION THRU ELASTOMERIC BEARING



PLAN VIEW

NOTES

ALL MATERIAL USED FOR BEARINGS SHALL BE PAID AT THE UNIT PRICE BID FOR "BEARING PADS ELASTOMERIC LAMINATED."

GRIND EXIST. WELD THAT ATTACHED EXIST. TOP PLATE TO EXIST. BOT. FLANGE. GRIND AFFECTED AREAS SMOOTH.

DESIGNER NOTES

THE STEEL TOP PLATE THICKNESS MAY BE REDUCED (1" MIN.) TO MATCH THE OVERALL EXISTING BEARING HEIGHT. WHEN THE THICKNESS IS REDUCED, THE FOLLOWING NOTE SHALL BE LOCATED ON THE PLANS:

"WELDING PROCEDURES SHALL BE ESTABLISHED BY THE CONTRACTOR TO RESTRICT THE MAXIMUM TEMPERATURE REACHED BY SURFACES IN CONTACT WITH ELASTOMER TO 200°F (93°C). TEMPERATURES SHALL BE CONTROLLED BY TEMPERATURE INDICATING WAX PENCILS OR OTHER SUITABLE MEANS APPROVED BY THE ENGINEER."

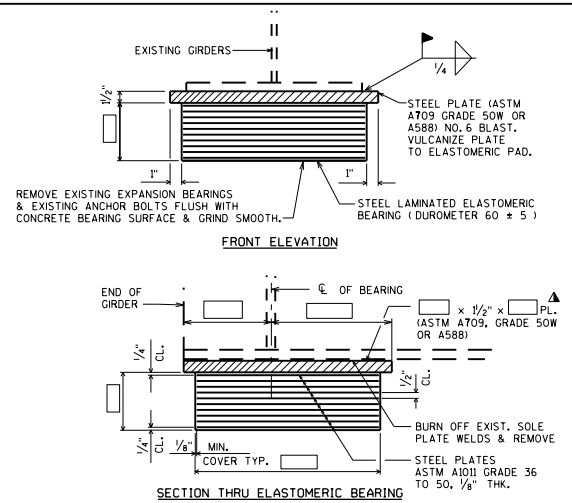
TOP STEEL PLATE MAY NOT BE OMITTED.

⚠ CHECK 27.2.1 ELASTOMERIC BEARINGS IN THE BRIDGE MANUAL FOR REQUIREMENTS TO SEE IF THIS PLATE SHOULD BE TAPERED.

DO NOT INCLUDE PRESTRESSED GIRDER SHRINKAGE WHEN DESIGNING BEARINGS FOR BRIDGE REHABILITATION PROJECTS.

SEE STANDARD 27.07 FOR ADDITIONAL INFORMATION.

EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS
ELASTOMERIC BEARINGS



FRONT ELEVATION

SECTION THRU ELASTOMERIC BEARING

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS
ELASTOMERIC BEARINGS

NOTES & DESIGNER NOTES

SEE "EXPANSION BEARING REPLACMENT - PRESTRESSED GIRDERS" ON THIS STANDARD.

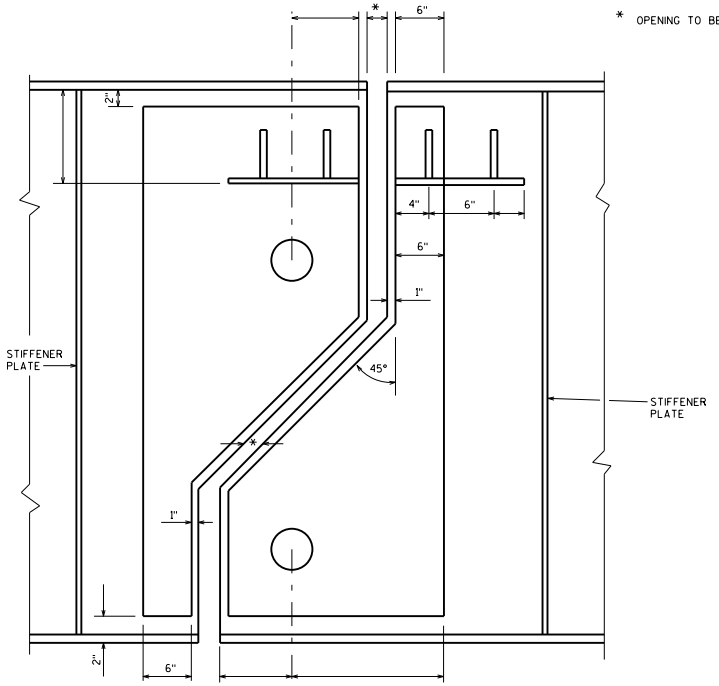
EXPANSION BEARING
REPLACEMENT DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

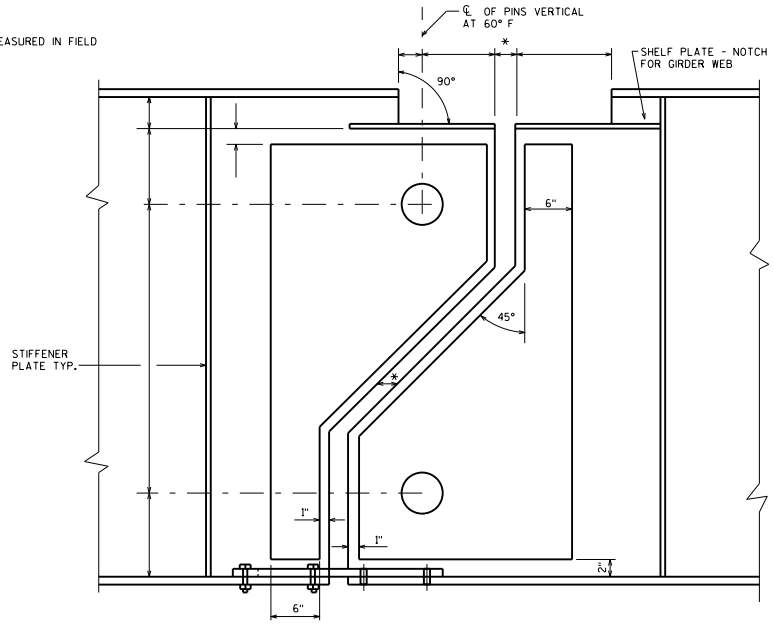
DATE: 1-19

STANDARD 40.08



TYPICAL HINGE DETAIL FOR WATERTIGHT EXPANSION DEVICE

NOTE:
DETAILS NOT SHOWN ARE IDENTICAL TO DETAILS SHOWN FOR "FINGER TYPE EXPANSION DEVICE".



TYPICAL HINGE DETAIL FOR FINGER TYPE EXPANSION DEVICE

(HANGER PLATES NOT SHOWN)

NOTES

INSIDE HOLES OF HANGER PLATES SHALL BE COATED WITH "BLOXIDE" OR AN APPROVED EQUAL AFTER FINISHING. THE BUSHINGS SHALL HAVE A PRESS FIT INTO HANGER PLATES. THE INSIDE DIAMETER OF THE BUSHING SHALL PROVIDE A CLEARANCE OF 0.005" MINIMUM AND 0.010" MAXIMUM OVER THE FINISHED DIAMETER OF THE PIN. NOTE THAT THE HOLE DIAMETER SHALL BE SMALLER THAN THE BUSHING O.D. BY AT LEAST 0.001". FINISH ANSI 125.

REMOVE EXISTING HANGER PLATES, PINS, AND WIND TRANSFER PLATES AND REPLACE WITH NEW MATERIALS.

BID ITEM SHALL BE "HINGE REPLACEMENT", EACH. ALL MATERIAL AND WORK INVOLVED SHALL BE PAID FOR UNDER "HINGE REPLACEMENT".

NEW PINS SHALL MATCH THE DIAMETER OF THE EXISTING PINS. CONTRACTOR TO CONTACT ENGINEER IF CORROSSION AT EXISTING PIN IS PRESENT.

BLAST CLEAN GIRDER WEB AND FLANGES WITHIN 2'-0" OF ℄ OF HINGE IN ACCORDANCE WITH THE STEEL STRUCTURES PAINTING COUNCIL'S SPECIFICATION SSPC-SP6. PAINT AREA CLEANED WITH ORGANIC ZINC RICH PAINT SYSTEM.

HANGER PLATES AND WIND TRANSFER PLATES SHALL BE SHOP PAINTED.

BUSHINGS SHALL BE THE SAME LENGTH AS THE HANGER PLATE THICKNESS.

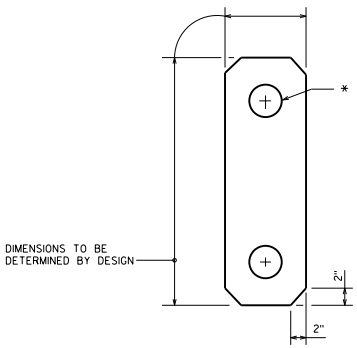
NON-METALLIC WASHERS SHALL HAVE AN INSIDE DIAMETER OF BETWEEN 0.005" AND 0.010" LARGER THAN THE PIN DIAMETER.

STEEL FOR PINS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 6.4.2 AND ASTM A276. PINS TO BE FINISHED ANSI 63.

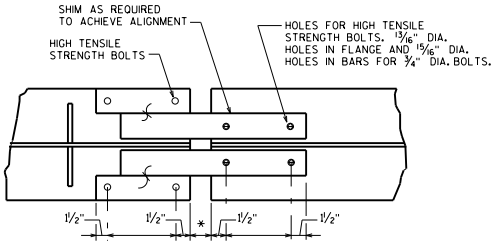
◪ BUSHINGS SHALL BE GAR-MAX AS MANUFACTURED BY GARLOCK BEARINGS, INC. OR DURALON JOURNAL BEARINGS AS MANUFACTURED BY REXNORD BEARING DIVISION, OR APPROVED EQUAL. BUSHINGS SHALL HAVE A NOMINAL WALL THICKNESS OF 1/4".

△ NON-METALLIC WASHERS REQUIRED FOR USE AS SPACERS BETWEEN THE PIN PLATES AND THE HANGER PLATES AND THE HANGER PLATES AND NUTS SHALL BE MADE FROM ONE OF THE FOLLOWING MATERIALS:

1. PHENOLIC, CANVAS REINFORCED, MIL-P-15035
2. POLYETHYLENE, HIGH DENSITY, ASTM D4976, CLASS 3
3. ACETAL, FEDERAL SPECIFICATION L-P-392
4. TEFLON TFE, MIL-P-22241A

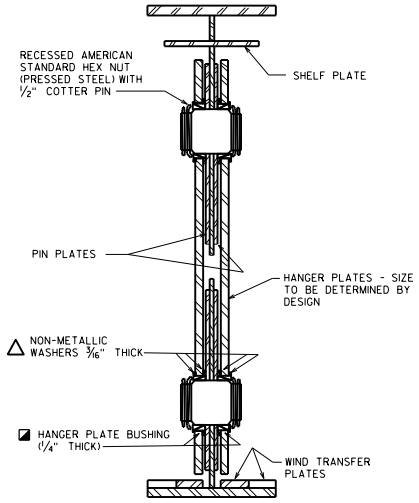


HANGER PLATE DETAIL



TYPICAL WIND TRANSFER PLATES DETAIL

CONTACT AREA OF WIND TRANSFER PLATES TO BE FINISHED ANSI 125.



SECTION THRU HINGE

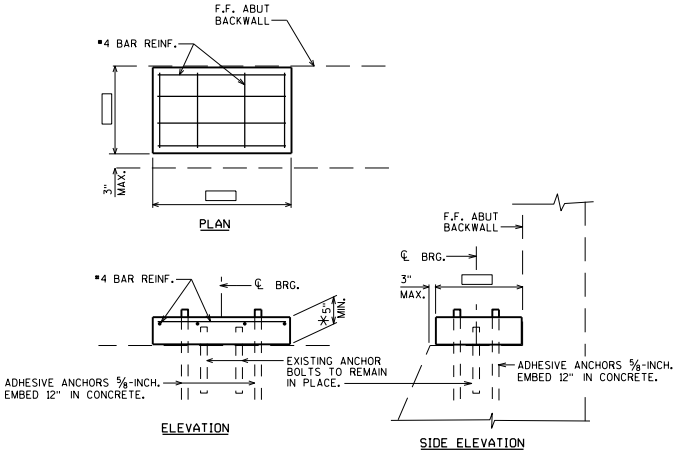
HINGED JOINT REHABILITATION

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

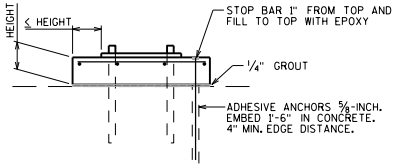
DATE: 7-15

STANDARD 40.09



CONCRETE BEARING BLOCK DETAILS

(MAY BE USED IN LIEU OF PLATE 'E' AS SHOWN ON STD. 40.08)



PRECAST CONCRETE BLOCK DETAIL

DEPTH = MIN. 5", MAX. 1'-0" ✳

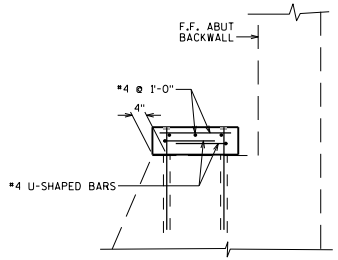
ANCHOR IN AT LEAST 4 LOCATIONS (ANCHORS INCLUDE ADHESIVE ANCHORS, ANCHOR BOLTS OR COMBINATION).

GROUT 1/4" BENEATH PRECAST ELEMENT - ELIMINATE STRESS CONCENTRATION AND REDUCE CRACKING.

PRECAST BLOCK (OR ANY CONCRETE BLOCK) MUST EXTEND BEYOND BEARING A DISTANCE EQUAL TO, OR GREATER THAN, THE HEIGHT OF THE CONCRETE BLOCK ✳. THIS IS TO ACCOUNT FOR 45-DEGREE DOWNWARD AND OUTWARD STRESS DISTRIBUTION. THIS PROVISION CAN BE DISREGARDED IF A FULL-DEPTH CONCRETE DIAPHRAGM IS USED IN CONJUNCTION WITH A 1/2" THICK ELASTOMERIC PAD (FIXED SEAT).

REINFORCEMENT SHOULD BE IN BOTH DIRECTIONS UTILIZING #4 @ 1'-0" MAXIMUM SPACING.

BURN EXISTING ANCHOR BOLTS OFF FLUSH WITH BEAM SEAT.



✳ ALTERNATE DETAIL

TO BE USED FOR CASES WHERE HEIGHT EXCEEDS 1'-0" OR INSUFFICIENT EDGE DISTANCE (PRECAST OPTION SHOWN)

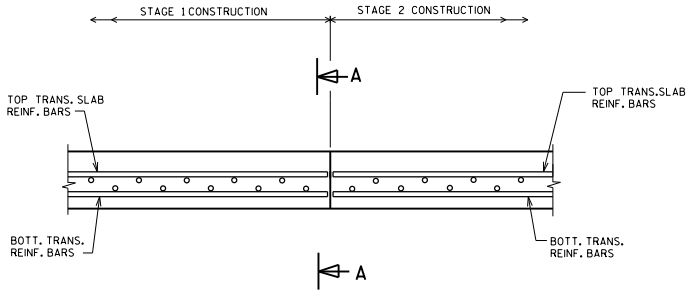
CONCRETE BEARING BLOCK DETAILS

BUREAU OF STRUCTURES

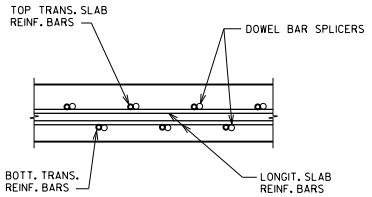
APPROVED: Bill Oliva

DATE: 7-16

STANDARD 40.10



SECTION THRU SLAB



SECTION A

NOTES

STEEL SPLICE (COUPLER) ASSEMBLY SHALL BE AN APPROVED TYPE AND SHALL DEVELOP IN TENSION AT LEAST 125% OF THE YIELD STRENGTH OF THE SPLICED REINFORCEMENT BARS.

DOWEL BAR SPLICERS SHALL BE OF MINIMUM 60 ksi YIELD STRENGTH, AND HAVE TENSILE STRENGTH AREA EQUAL OR GREATER THAN THAT OF THE LAPPED REINFORCEMENT BARS.

DOWEL BAR SPLICERS SHALL MEET THE DEFORMATION REQUIREMENTS FOR STANDARD ASTM DEFORMED REINFORCING BARS.

FOR DOWEL BAR SPLICERS, ALL REINFORCEMENT BARS SHALL BE LAPPED AND TIED TO THE SPLICER BARS.

SPLICER (COUPLER) ASSEMBLY IN THE SLAB SHALL BE EPOXY COATED IN ACCORDANCE WITH THE REQUIREMENTS FOR REINFORCEMENT BARS.

OTHER SYSTEMS OF SIMILAR DESIGN MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL. APPROVAL SHALL BE BASED ON CERTIFIED TEST RESULTS FROM AN APPROVED TESTING LABORATORY THAT THE PROPOSED SPLICER (COUPLER) ASSEMBLY SATISFIES THE FOLLOWING REQUIREMENT:

① MINIMUM CAPACITY = 1.25 X fy X AREA OF SPLICED REINFORCEMENT BAR.

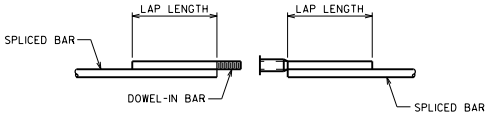
WHERE fy = YIELD STRENGTH OF SPLICED REINFORCEMENT BARS

ON PLANS PROVIDE LOCATION, STAGING, SIZE AND QUANTITY REQ'D. DO NOT GIVE SPECIFIC INFORMATION REGARDING THE COUPLER AS THIS IS COVERED BY THE BID ITEM "BAR COUPLERS (SIZE)".

DOWEL BAR SPLICER LAP LENGTHS

CONCRETE UNDER BAR	BAR SIZE	4	5	6	7	8	9	10	11
12" OR LESS	f'c = 3500	1'-8"	2'-8"	3'-2"	4'-3"	5'-6"	7'-0"	8'-9"	10'-11"
	f'c = 4000	1'-8"	2'-8"	3'-2"	4'-0"	5'-2"	6'-6"	8'-3"	10'-2"
MORE THAN 12"	f'c = 3500	2'-3"	2'-11"	3'-6"	4'-8"	6'-1"	7'-10"	9'-10"	12'-1"
	f'c = 4000	2'-3"	2'-11"	3'-6"	4'-5"	5'-8"	7'-4"	9'-2"	11'-4"

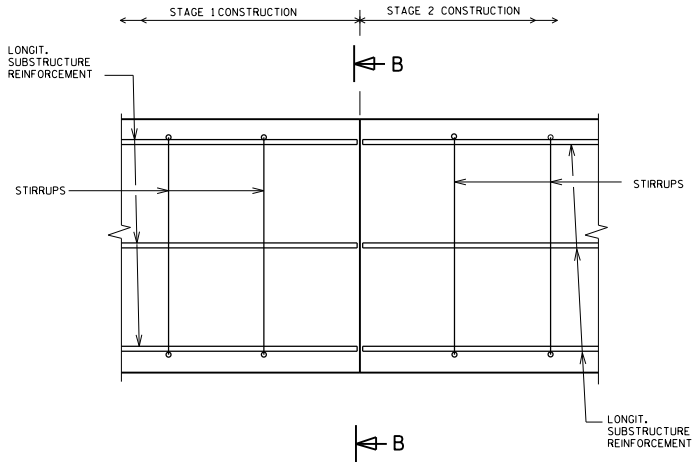
BAR LENGTH COMPUTED TO ℄ LONGIT. JOINT AND SHALL BE MODIFIED IF REQ'D. TO BAR COUPLER MANUFACTURER RECOMMENDATIONS. PAY BASED ON BARS AS DETAILED.



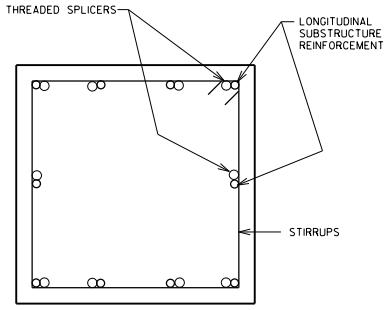
DOWEL BAR SPLICER

ONE PIECE THREADED SPLICER

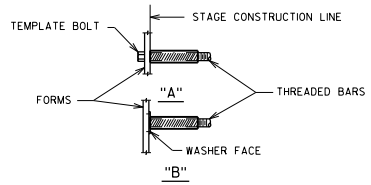
SPLICER ALTERNATIVES



SECT. THRU SUBSTRUCTURE UNIT



SECTION B



INSTALLATION AND SETTING METHODS

"A" SET SPLICER BY MEANS OF A TEMPLATE BOLT
"B" SET SPLICER BY NAILING TO WOOD FORMS OR CEMENTING TO STEEL FORMS.

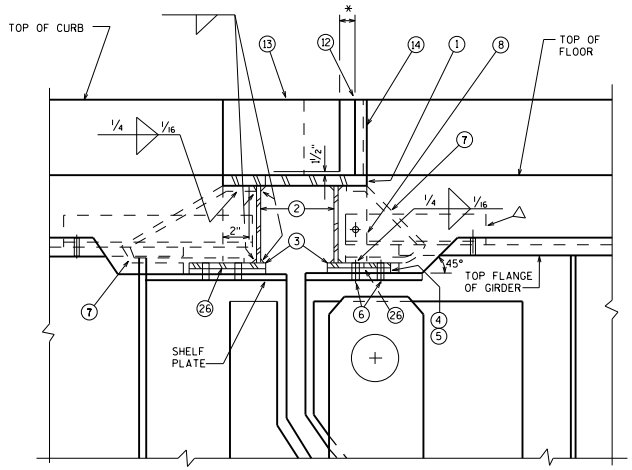
BAR SPLICER (COUPLER) DETAILS AT STAGE CONSTRUCTION

BUREAU OF STRUCTURES

APPROVED: Scot Becker

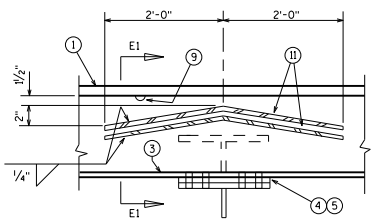
DATE: 7-08

STANDARD 40.11



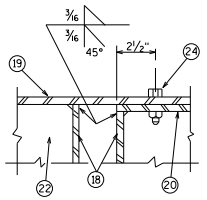
SECTION THRU JOINT

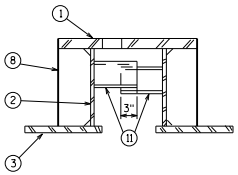
MUD PLATES NOT SHOWN



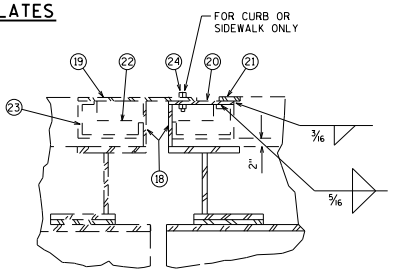
SECTION THRU MUD PLATES

TYPICAL ALL GIRDERS

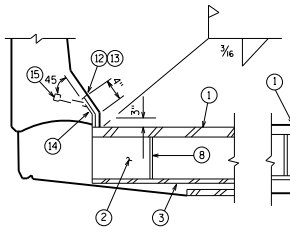




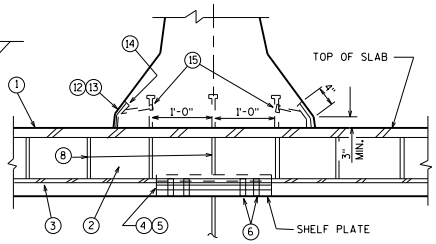
SECTION E1



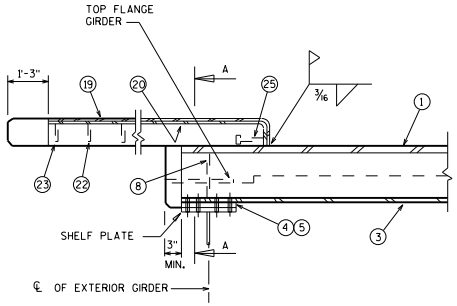
SECTION A-A



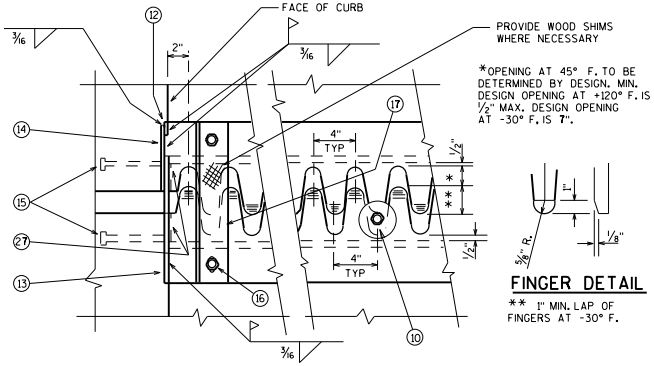
DETAIL AT PARAPET



DETAIL AT MEDIAN



SECTION THRU SIDEWALK

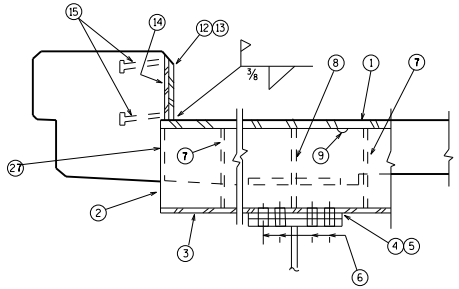


PART PLAN OF FINGER PLATE AT BRUSH CURB

NO SKEW

FINGER DETAIL

** 1" MIN. LAP OF FINGERS AT -30° F.



SECTION THRU JOINT AT BRUSH CURB

MUD PLATES NOT SHOWN

△ ANGLE 3½" x 3½" x 5/16" FIELD DRILL ¾" DIA. ERECTION BOLT HOLES OR WELD TO STIFFENER OR TOP FLG.

LEGEND

1. FINGER PLATE. SIZE TO BE DETERMINED BY DESIGN.
2. WEB PLATE. SIZE TO BE DETERMINED BY DESIGN.
3. FLANGE PLATE. SIZE TO BE DETERMINED BY DESIGN.
4. BEVELED SHIM PLATE ⅜" THICK. 15/16" DIA. HOLES FOR NO. 6.
5. ¾" LAMINATED SHIM WITH SLOTTED OPENINGS
6. ¾" DIA. ERECTION BOLTS. DRILL HOLES IN SHELF PLATE IN THE FIELD.
7. ANCHOR BAR ⅝" DIA. AT 1'-0" CENTERS. BEND AS SHOWN.
8. STIFFENER BAR ⅜" THICK. ¼" FILLET WELD ALL AROUND. PLACE AT ℄ OF GIRDER AND AT +2'-0" CENTERS BETWEEN GIRDERS.
9. ⅞" VENT HOLES AT 3'-0" CENTERS.
10. ¾" DIA. ADJUSTING BOLT AT APPROX. 4'-0" CENTERS WITH TWO 9/16 DIA. X ⅜" PLATE WASHERS. ONE ON EACH SIDE OF FINGER PLATE.
11. MUD PLATE ¼" THICK
12. ⅜" PLATE. BEND AS SHOWN.
13. ⅜" PLATE BEND AS SHOWN.
14. ⅜" PLATE BEND AS SHOWN.
15. ⅝" DIA. STUDS X 6 5/16" LONG. WELD TO PLATES NO. 13 AND NO. 14.
16. ¾" DIA. BOLT FOR SHIPPING. TACK WELD NUT TO BOTTOM OF PLATE NO. 1.
17. 3" DIA. X 3" DIA. X ¼" + 5'-0" SPACING. SLOTTED HOLE ⅞" X 2⅜" IN ONE END OF ANGLE AS SHOWN. FOR BOLT NO. 16.
18. CLOSING PLATE ⅜" CUT AS SHOWN. SEE WELD DETAIL
19. ⅜" PLATE. BEND AS SHOWN.
20. ⅜" PLATE. BEND AS SHOWN.
21. ⅜" PLATE. BEND AS SHOWN.
22. ¾" PLATE. WELD ALL AROUND, ¼" FILLET WELD TO PLATES NO. 18, 19, & 20.
23. ⅝" DIA. STUDS X 6 5/16" LONG. BEND AFTER WELD.
24. ¾" DIA. BOLT WITH SQ. NUT. GREASE FOR EASY REMOVAL. ⅞" X 1¾" SLOTTED HOLE IN PL. NO. 19. LONG DIMENSION OF HOLE PARALLEL TO ℄ OF ROADWAY. TACK WELD NUT TO PLATE NO. 20 + 2'-0" SPA.
25. ⅝" DIA. STUDS X 6 5/16" LONG. WELD TO PLATE NO. 20.
26. FLANGE PLATE. SAME THICKNESS AS PLATE NO. 3 AND SAME WIDTH AS SHELF PLATE. SHOP BUTT WELD TO PLATE NO. 3.
27. ⅜" CLOSING PLATE. WELD TO PLATES NO. 1 AND NO. 2.

NOTES

REMOVE ANGLE NO. 17 AND ADJUSTING BOLT NO. 10 AFTER VERTICAL AND HORIZONTAL ALIGNMENT IS SECURE IN FIELD. FILL HOLES WITH HOT POURED JOINT SEALER.

IN SOME CASES THE GIRDER FLANGES AND WEB PLATES DO NOT HAVE TO BE CUT TO ACCOMMODATE THE FINGER JOINT SECTION, THE SLAB DEPTH MAY BE UTILIZED EFFECTIVELY.

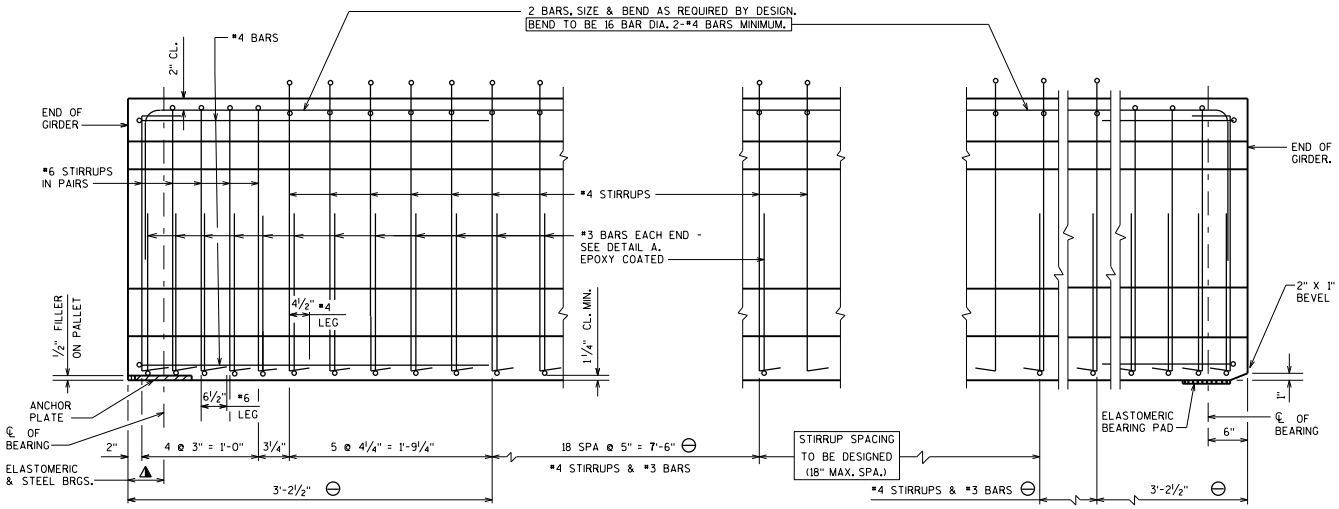
FINGER TYPE EXPANSION JOINT - PLATE GIRDER

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

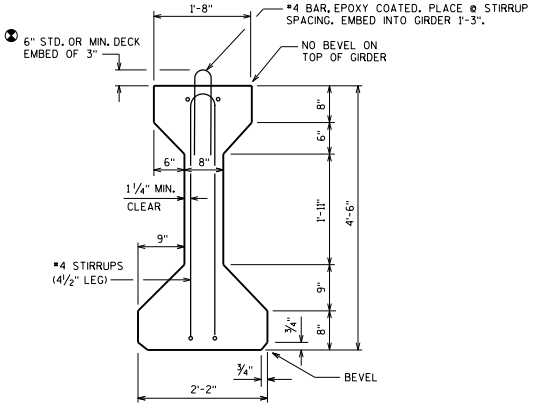
STANDARD 40.12



SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

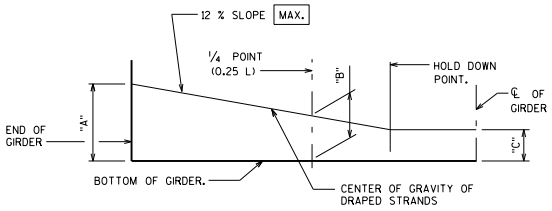
SIDE VIEW OF GIRDER

SUPPORT WITH ½" ELASTOMERIC BRG. PAD

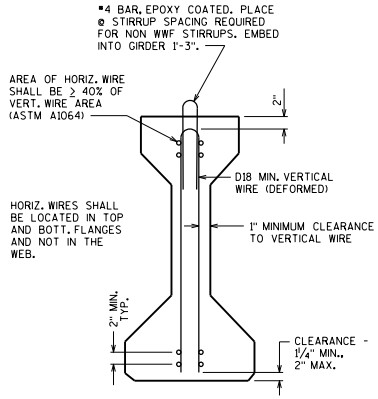


SECTION THRU GIRDER

STRANDS NOT SHOWN

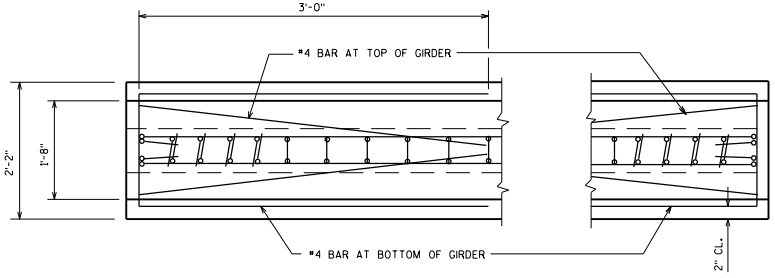


LOCATION OF DRAPED STRANDS

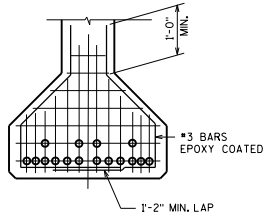


SECTION THRU GIRDER

SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)



PLAN VIEW



DETAIL A

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 54-INCH.

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.5" DIA. OR 0.6" DIA. STRANDS FOR ALL PATTERNS AS REQUIRED. THE MAX. NUMBER OF DRAPED 0.5" DIA. STRANDS IS 12 AND THE MAX. NUMBER FOR 0.6" DIA. STRANDS IS 10.

REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.14 AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 2" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.

PRESTRESSING STRANDS SHALL BE (DIA.)-7-WIRE LOW RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

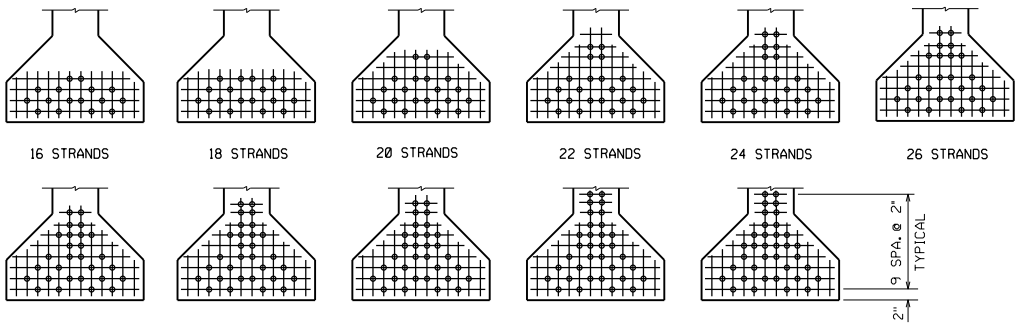
54" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

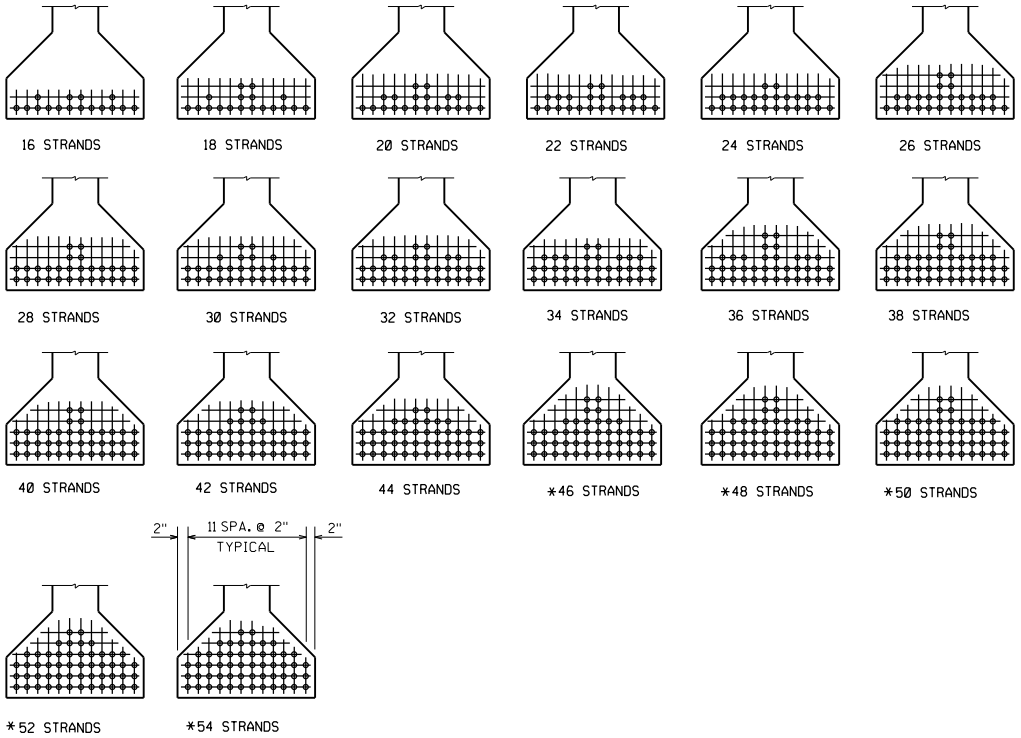
APPROVED: Bill Oliva

DATE: 7-17

STANDARD 40.13



STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.5" DIA. AND 0.6" DIA. STRANDS



ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. AND 0.6" DIA. STRANDS

*0.5" DIA. STRANDS ONLY

54" GIRDER

A = 789 SQ. IN.

r^2 = 330.46 IN.^{2}

y_T = 29.27 IN.

y_B = -24.73 IN.

I = 260,730 IN.^{4}

S_T = 8,908 IN.^{3}

S_B = -10,543 IN.^{3}

WT. = 822 #/FT.

PRE-TENSION

f'_s = 270,000 P.S.I

f_s = 0.75 X 270,000 = 202,500 P.S.I for low relaxation strands.

Pi PER 0.5" DIA. STRAND = 0.1531 X 202,500 = 31.00 KIPS

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

$\frac{y_B}{r^2} = \frac{-24.73}{330.46} = -0.07484$ IN./IN.^{2}

f_B (Init.) $= \frac{(4)}{(3)}$ (K/Sq. In.)

(COMPRESSION IS POSITIVE)

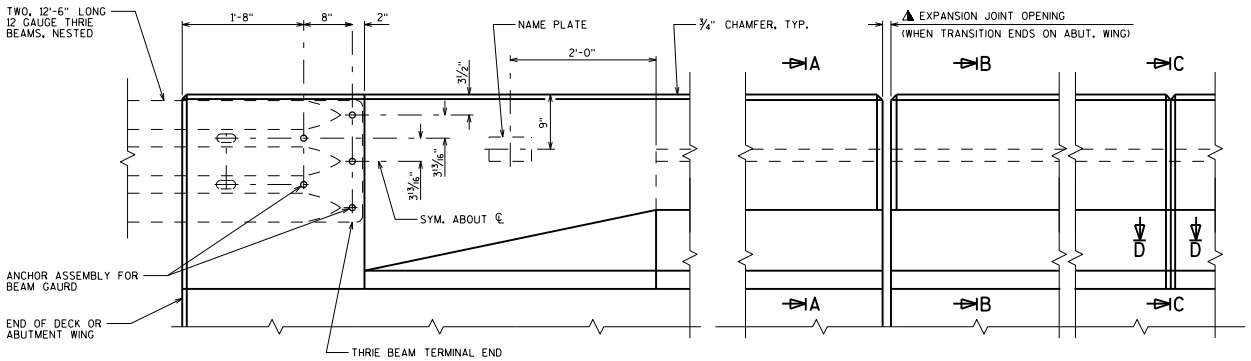
N NO. STRANDS	(1) e_s (inches)	(2) $(1+\frac{e_s y_B}{r^2})$	(3) (A/(2)) (sq. in.)	(4) P(Init.) = $A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(4) P(Init.) = $A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) f_B (Init.)=(4)/(3) 0.5" DIA. STRANDS (K/Sq. In.)	(5) f_B (Init.)=(4)/(3) 0.6" DIA. STRANDS (K/Sq. In.)
STANDARD PATTERNS FOR UNDRAPED STRANDS							
16	-20.23	2.514	313.84	496	703	1.580	2.240
18	-19.84	2.485	317.51	558	791	1.757	2..491
20	-19.13	2.432	324.42	620	879	1.911	2.709
22	-18.37	2.375	332.21	682	967	2.053	2.911
24	-17.55	2.313	341.12	744	1055	2.181	3.093
26	-17.18	2.286	345.14	806	1143	2.335	3.312
28	-17.02	2.274	346.97	868	1230	2.502	3.545
30	-16.33	2.222	355.09	930	1318	2.619	3.712
32	-16.23	2.215	356.21	992	1406	2.785	3.947
34	-15.54	2.163	364.77	1054	1494	2.889	4.096
36	-15.50	2.160	365.28	1116	1582	3.055	4.331
STANDARD PATTERNS FOR DRAPED STRANDS							
16	-22.23	2.664	296.17	496	703	1.675	2.374
18	-21.84	2.634	299.54	558	791	1.863	2.641
20	-21.73	2.626	300.46	620	879	2.064	2.926
22	-21.64	2.619	301.26	682	967	2.264	3.210
24	-21.57	2.614	301.84	744	1055	2.465	3.495
26	-21.19	2.586	305.10	806	1143	2.642	3.746
28	-21.16	2.584	305.34	868	1230	2.843	4.028
30	-20.99	2.571	306.88	930	1318	3.031	4.295
32	-20.85	2.560	308.20	992	1406	3.219	4.562
34	-20.73	2.551	309.29	1054	1494	3.408	4.830
36	-20.39	2.526	312.35	1116	1582	3.573	5.065
38	-20.31	2.520	313.10	1178	1670	3.762	5.334
40	-20.23	2.514	313.84	1240	1758	3.951	5.602
42	-20.06	2.501	315.47	1302	1846	4.127	5.852
44	-19.91	2.490	316.87	1364	1933	4.305	6.100
46	-19.60	2.467	319.82	1426		4.459	
48	-19.48	2.458	320.99	1488		4.636	
50	-19.37	2.450	322.04	1550		4.813	
52	-19.19	2.436	323.89	1612		4.977	
54	-19.03	2.424	325.50	1674		5.143	

54" PRETENSIONED GIRDER DESIGN DATA

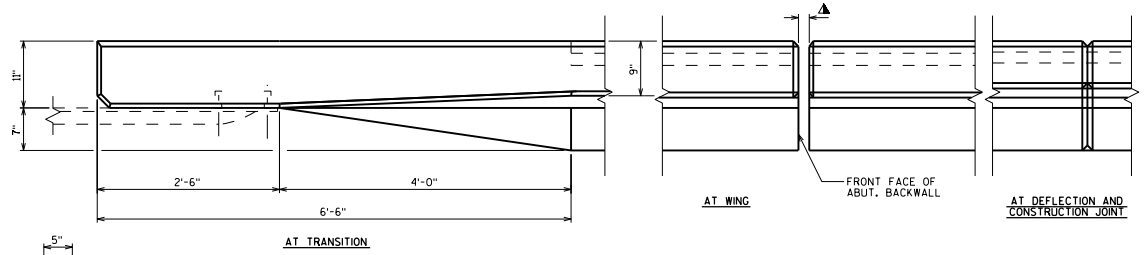
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16



ELEVATION OF PARAPET



PART PLAN ON PARAPET

NOTES

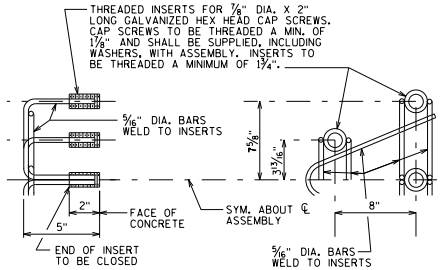
ALL SLOPED FACE PARAPET "B" REINFORCEMENT ARE NO. 4 BARS UNLESS OTHERWISE SHOWN.

⊗ PLATE REQUIRED WHEN DEFLECTION JOINTS ARE REQUIRED. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED, PLATE SEPARATORS SHALL BE OMITTED. DEFLECTION JOINTS ARE REQUIRED ON SLAB SPAN STRUCTURES ONLY.

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINFORCEMENT THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 2'-11". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 1" 'V' GROOVE.

● CONST. JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.

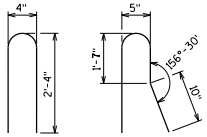
	PARAPET
AREA	2.25 SF
WEIGHT	338 LB/FT



DETAIL OF ANCHOR ASSEMBLY

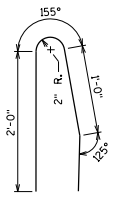
NOTE: HEX HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M232, CLASS C.

ASSEMBLY SHALL BE BID ITEM "ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD" EACH - ☐

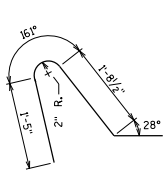


BAR A

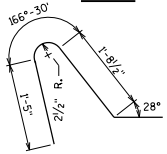
BAR E



BAR B

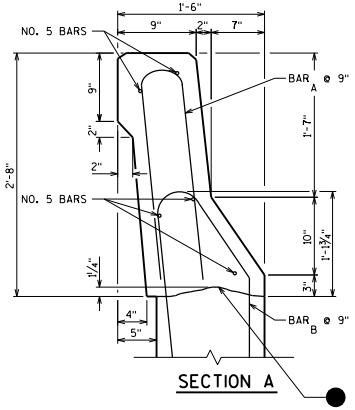


BAR C

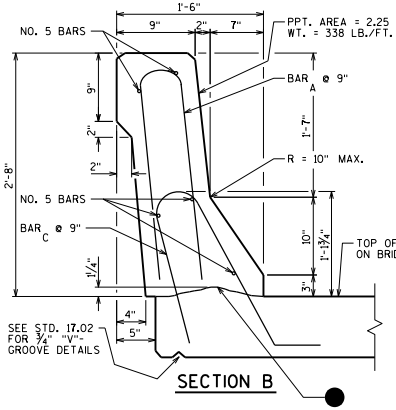


BAR D

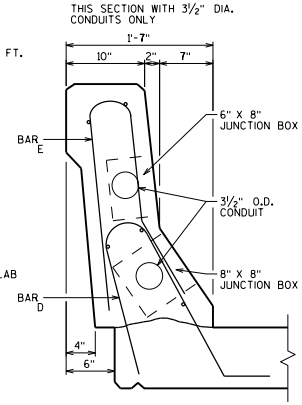
BAR	LENGTH
A	4'-10"
B	4'-7"
C	4'-3"
D	4'-4"
E	4'-4"



SECTION A

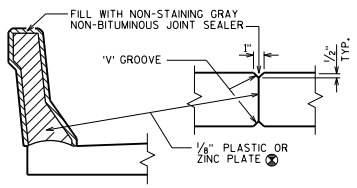


SECTION B



SECTION B1

SEE SECTION B FOR DETAILS UNLESS OTHERWISE SHOWN OR NOTED



SECTION C SECTION D

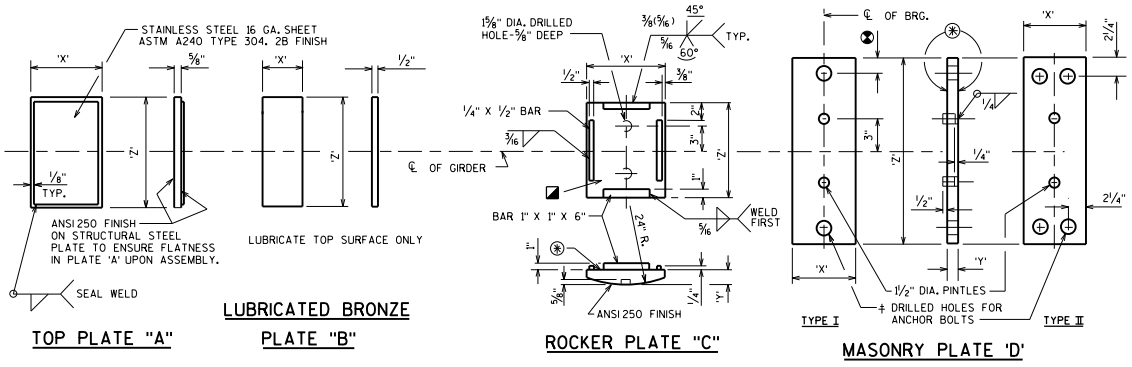
SLOPED FACE PARAPET 'B'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 40.15



◪ PROVIDE A METHOD FOR HANDLING PLATE "C" DURING GALVANIZING.

NOTES

FOR BEARING NOTES, CLEARANCE DIAGRAM, AND WHEN TO BEVEL ROCKER PLATES, SEE STANDARD 27.02.

⊛ FINISH THESE SURFACES ANSI 250 IF DIMENSION 'Y' IS GREATER THAN 2".

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AS REQUIRED BY ASTM DESIGNATION A153, CLASS "C". PLATE "C" & "D" SHALL BE GALVANIZED. FOR UNPAINTED STRUCTURES PLATE "C" & "D" SHALL BE SHOP PAINTED AFTER GALVANIZING. PLATE "A" SHALL BE SHOP PAINTED. USE WELDABLE PRIMER ON PLATE "A".

AT ABUTMENTS WHEN THE "X" DIMENSION OF PLATE "A" EXCEEDS 11" INCREASE STANDARD DISTANCE FROM ℄ BRG. TO END OF GIRDER.

ALL MATERIAL INCLUDING SHIMS, BUT EXCLUDING STAINLESS STEEL SHEET, BRONZE PLATE, PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

★ WELD SIZE, REFER TO STANDARD 24.2.

▲ ADJUST HEIGHT IF TAPERED BEARINGS ARE REQUIRED.

FABRICATOR MAY INCREASE PLATE "A" OR PLATE "D" THICKNESS AS AN ALTERNATE TO SHIMS.

⊠ DIMENSION IS 2" WHEN 1¼" DIA. ANCHOR BOLTS ARE USED AND 2¼" WHEN 1½" DIA. ANCHOR BOLTS ARE USED.

FOR NEW OR REPLACEMENT STEEL BEARINGS, INCLUDING STEEL BEARINGS USED FOR BRIDGE WIDENINGS, USE TYPE "A-T" AS SHOWN ON STANDARD 27.08. THIS STANDARD IS FOR INFORMATIONAL PURPOSES ONLY.

10" BEARING

CAP. KIPS	PLATE A X	PLATE A Z	PLATE B X	PLATE B Z	PLATE C X	PLATE C Y	PLATE C Z	PLATE D X	PLATE D Y	PLATE D Z	HEIGHT FEET
75	9"	10"	5"	10"	7"	1 7/16"	1'-0 1/4"	8"	1 1/2"	1'-8"	.354
105	11"	10"	7"	10"	9"	1 11/16"	1'-0 1/4"	8"	1 1/2"	1'-8"	.375
135	1'-1"	10"	9"	10"	11"	1 15/16"	1'-0 1/4"	8"	1 1/2"	1'-8"	.396
160	1'-3"	10"	11"	10"	1'-1"	2 3/8"	1'-0 1/4"	9"	1 1/2"	1'-8"	.432
190	1'-5"	10"	1'-1"	10"	1'-3"	2 7/8"	1'-0 1/4"	10"	1 3/4"	1'-8"	.495
220	1'-7"	10"	1'-3"	10"	1'-5"	3 3/8"	1'-0 1/4"	1'-0"	2"	1'-8"	.599
250	1'-9"	10"	1'-5"	10"	1'-7"	3 3/8"	1'-0 1/4"	1'-1"	2 3/8"	1'-8"	.630
280	1'-11"	10"	1'-7"	10"	1'-9"	4 1/8"	1'-0 1/4"	1'-3"	2 7/8"	1'-8"	.755
310	2'-1"	10"	1'-9"	10"	1'-11"	4 1/8"	1'-0 1/4"	1'-4"	2 7/8"	1'-8"	.755

12" BEARING

CAP. KIPS	PLATE A X	PLATE A Z	PLATE B X	PLATE B Z	PLATE C X	PLATE C Y	PLATE C Z	PLATE D X	PLATE D Y	PLATE D Z	HEIGHT FEET
90	9"	1'-0"	5"	1'-0"	7"	1 7/16"	1'-2 1/4"	8"	1 1/2"	1'-10"	.354
125	11"	1'-0"	7"	1'-0"	9"	1 11/16"	1'-2 1/4"	8"	1 1/2"	1'-10"	.375
160	1'-1"	1'-0"	9"	1'-0"	11"	1 15/16"	1'-2 1/4"	8"	1 1/2"	1'-10"	.396
195	1'-3"	1'-0"	11"	1'-0"	1'-1"	2 3/8"	1'-2 1/4"	9"	1 1/2"	1'-10"	.432
230	1'-5"	1'-0"	1'-1"	1'-0"	1'-3"	2 7/8"	1'-2 1/4"	11"	2"	1'-10"	.516
265	1'-7"	1'-0"	1'-3"	1'-0"	1'-5"	3 3/8"	1'-2 1/4"	1'-1"	2 3/8"	1'-10"	.630
300	1'-9"	1'-0"	1'-5"	1'-0"	1'-7"	3 3/8"	1'-2 1/4"	1'-2"	2 3/8"	1'-10"	.630
335	1'-11"	1'-0"	1'-7"	1'-0"	1'-9"	4 1/8"	1'-2 1/4"	1'-4"	2 7/8"	1'-10"	.755
370	2'-1"	1'-0"	1'-9"	1'-0"	1'-11"	4 1/8"	1'-2 1/4"	1'-5"	2 7/8"	1'-11"	.755

14" BEARING

CAP. KIPS	PLATE A X	PLATE A Z	PLATE B X	PLATE B Z	PLATE C X	PLATE C Y	PLATE C Z	PLATE D X	PLATE D Y	PLATE D Z	HEIGHT FEET
105	9"	1'-2"	5"	1'-2"	7"	1 7/16"	1'-4 1/4"	8"	1 1/2"	2'-0"	.354
145	11"	1'-2"	7"	1'-2"	9"	1 11/16"	1'-4 1/4"	8"	1 1/2"	2'-0"	.375
185	1'-1"	1'-2"	9"	1'-2"	11"	1 15/16"	1'-4 1/4"	8"	1 1/2"	2'-0"	.396
225	1'-3"	1'-2"	11"	1'-2"	1'-1"	2 3/8"	1'-4 1/4"	10"	1 3/4"	2'-0"	.453
270	1'-5"	1'-2"	1'-1"	1'-2"	1'-3"	2 7/8"	1'-4 1/4"	1'-0"	2"	2'-0"	.516
310	1'-7"	1'-2"	1'-3"	1'-2"	1'-5"	3 3/8"	1'-4 1/4"	1'-1"	2 3/8"	2'-0"	.630
350	1'-9"	1'-2"	1'-5"	1'-2"	1'-7"	3 3/8"	1'-4 1/4"	1'-3"	2 7/8"	2'-1"	.672
390	1'-11"	1'-2"	1'-7"	1'-2"	1'-9"	4 1/8"	1'-4 1/4"	1'-4"	2 7/8"	2'-1"	.755
435	2'-1"	1'-2"	1'-9"	1'-2"	1'-11"	4 1/8"	1'-4 1/4"	1'-6"	3 3/8"	2'-1"	.838

16" BEARING

CAP. KIPS	PLATE A X	PLATE A Z	PLATE B X	PLATE B Z	PLATE C X	PLATE C Y	PLATE C Z	PLATE D X	PLATE D Y	PLATE D Z	HEIGHT FEET
120	9"	1'-4"	5"	1'-4"	7"	1 7/16"	1'-6 1/4"	8"	1 1/2"	2'-2"	.354
165	11"	1'-4"	7"	1'-4"	9"	1 11/16"	1'-6 1/4"	8"	1 1/2"	2'-2"	.375
215	1'-1"	1'-4"	9"	1'-4"	11"	1 15/16"	1'-6 1/4"	9"	1 1/2"	2'-2"	.396
260	1'-3"	1'-4"	11"	1'-4"	1'-1"	2 3/8"	1'-6 1/4"	11"	2"	2'-2"	.474
310	1'-5"	1'-4"	1'-1"	1'-4"	1'-3"	2 7/8"	1'-6 1/4"	1'-0"	2"	2'-2"	.516
355	1'-7"	1'-4"	1'-3"	1'-4"	1'-5"	3 3/8"	1'-6 1/4"	1'-2"	2 3/8"	2'-3"	.630
400	1'-9"	1'-4"	1'-5"	1'-4"	1'-7"	3 3/8"	1'-6 1/4"	1'-3"	2 7/8"	2'-3"	.672
450	1'-11"	1'-4"	1'-7"	1'-4"	1'-9"	4 1/8"	1'-6 1/4"	1'-5"	2 7/8"	2'-3"	.755
500	2'-1"	1'-4"	1'-9"	1'-4"	1'-11"	4 1/8"	1'-6 1/4"	1'-7"	3 3/8"	2'-3"	.838

18" BEARING

CAP. KIPS	PLATE A X	PLATE A Z	PLATE B X	PLATE B Z	PLATE C X	PLATE C Y	PLATE C Z	PLATE D X	PLATE D Y	PLATE D Z	HEIGHT FEET
135	9"	1'-6"	5"	1'-6"	7"	1 7/16"	1'-8 1/4"	8"	1 1/2"	2'-4"	.354
185	11"	1'-6"	7"	1'-6"	9"	1 11/16"	1'-8 1/4"	8"	1 1/2"	2'-4"	.375
240	1'-1"	1'-6"	9"	1'-6"	11"	1 15/16"	1'-8 1/4"	9"	1 1/2"	2'-4"	.396
295	1'-3"	1'-6"	11"	1'-6"	1'-1"	2 3/8"	1'-8 1/4"	11"	2"	2'-4"	.474
350	1'-5"	1'-6"	1'-1"	1'-6"	1'-3"	2 7/8"	1'-8 1/4"	1'-1"	2 3/8"	2'-5"	.547
400	1'-7"	1'-6"	1'-3"	1'-6"	1'-5"	3 3/8"	1'-8 1/4"	1'-2"	2 3/8"	2'-5"	.630
455	1'-9"	1'-6"	1'-5"	1'-6"	1'-7"	3 3/8"	1'-8 1/4"	1'-4"	2 7/8"	2'-5"	.672
505	1'-11"	1'-6"	1'-7"	1'-6"	1'-9"	4 1/8"	1'-8 1/4"	1'-6"	3 3/8"	2'-5"	.838
560	2'-1"	1'-6"	1'-9"	1'-6"	1'-11"	4 1/8"	1'-8 1/4"	1'-8"	3 3/8"	2'-5"	.838

20" BEARING

CAP. KIPS	PLATE A X	PLATE A Z	PLATE B X	PLATE B Z	PLATE C X	PLATE C Y	PLATE C Z	PLATE D X	PLATE D Y	PLATE D Z	HEIGHT FEET
150	9"	1'-8"	5"	1'-8"	7"	1 7/16"	1'-10 1/4"	8"	1 1/2"	2'-6"	.354
210	11"	1'-8"	7"	1'-8"	9"	1 11/16"	1'-10 1/4"	8"	1 1/2"	2'-6"	.375
270	1'-1"	1'-8"	9"	1'-8"	11"	1 15/16"	1'-10 1/4"	10"	1 3/4"	2'-6"	.417
325	1'-3"	1'-8"	11"	1'-8"	1'-1"	2 3/8"	1'-10 1/4"	11"	2"	2'-6"	.474
385	1'-5"	1'-8"	1'-1"	1'-8"	1'-3"	2 7/8"	1'-10 1/4"	1'-1"	2 3/8"	2'-7"	.547
445	1'-7"	1'-8"	1'-3"	1'-8"	1'-5"	3 3/8"	1'-10 1/4"	1'-3"	2 7/8"	2'-7"	.672
505	1'-9"	1'-8"	1'-5"	1'-8"	1'-7"	3 3/8"	1'-10 1/4"	1'-5"	2 7/8"	2'-7"	.672
565	1'-11"	1'-8"	1'-7"	1'-8"	1'-9"	4 1/8"	1'-10 1/4"	1'-7"	3 3/8"	2'-7"	.838
625	2'-1"	1'-8"	1'-9"	1'-8"	1'-11"	4 1/8"	1'-10 1/4"	1'-9"	3 3/8"	2'-7"	.838

ANCHOR BOLT NOTES:

FOR SPAN LENGTHS UP TO 100'-0", USE A TYPE I MASONRY PLATE 'D' WITH (2) 1¼" DIA. X 1'-5" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS FROM 100'-0" UP TO 150'-0", USE A TYPE I MASONRY PLATE "D" WITH (2) 1½" DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS GREATER THAN 150'-0", USE A TYPE II MASONRY PLATE "D" WITH (4) 1½" DIA. X 1'-10" LONG ANCHOR BOLTS.

‡ DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER ⅜" LARGER THAN ANCHOR BOLT.

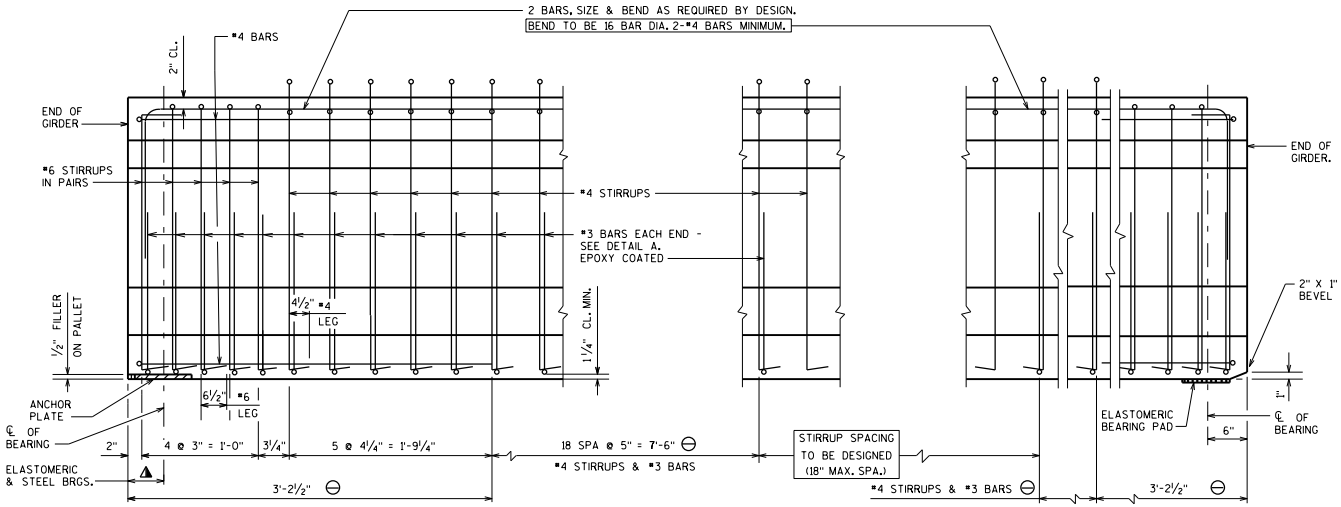
EXPANSION BEARING DETAILS TYPE 'A' - STEEL GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

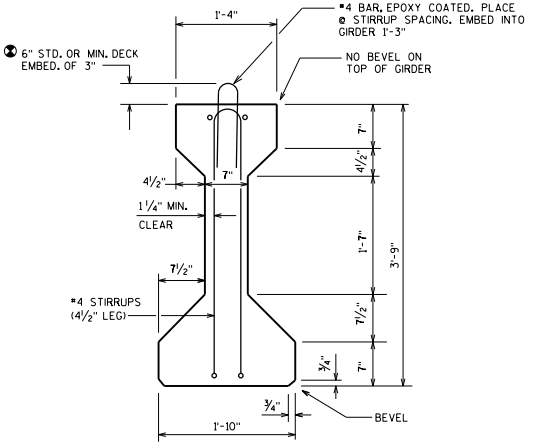
STANDARD 40.16



SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

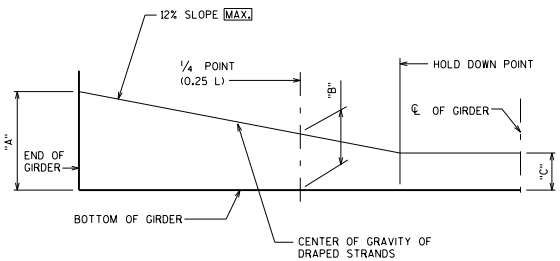
SIDE VIEW OF GIRDER

SUPPORT WITH ½" ELASTOMERIC BRG. PAD



SECTION THRU GIRDER

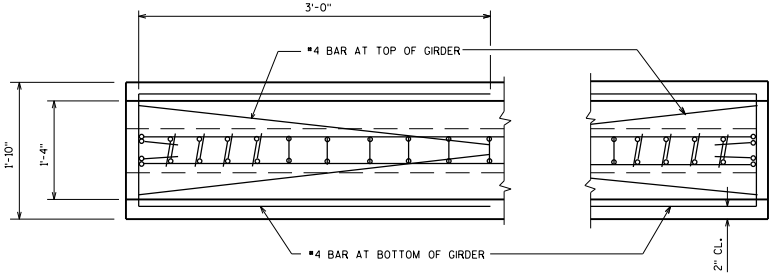
STRANDS NOT SHOWN



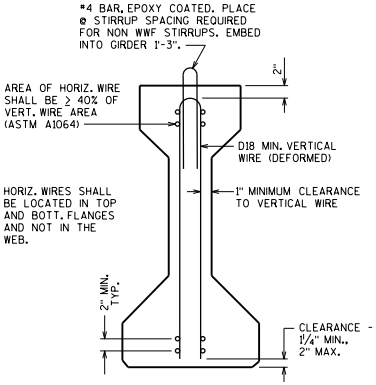
"A" TO BE GIVEN TO THE NEAREST 1"
"B" = ¼("A" + 3 "C") MIN.
"B" = ¼("A" + 3 "C") + 3" MAX.

RECORD DIMENSIONS "A", "B" & "C" ON FINAL PLANS.

LOCATION OF DRAPED STRANDS

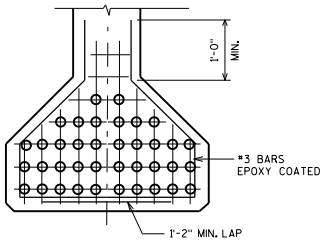


PLAN VIEW



SECTION THRU GIRDER

SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)



DETAIL A

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 45-INCH.

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.5" OR 0.6" DIA. STRANDS FOR THE DRAPED PATTERN AS REQUIRED. THE MAX. NUMBER OF DRAPED 0.5" DIA. STRANDS IS 10 AND THE MAX. NUMBER FOR 0.6" DIA. STRANDS IS 8. FOR THE STRAIGHT PATTERN USE ONLY 0.6" DIA. STRANDS.

REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.18 AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

⊖ DETAIL TYPICAL AT EACH END

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 2" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.

PRESTRESSING STRANDS SHALL BE (DIA.)-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

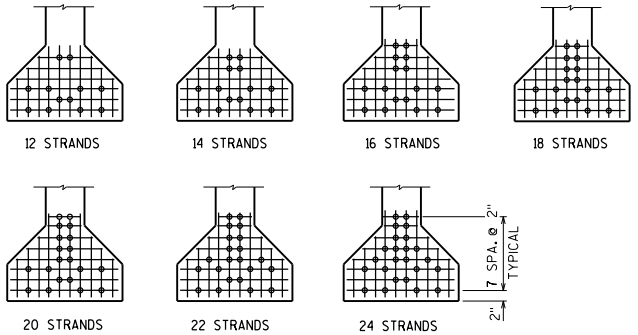
45" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

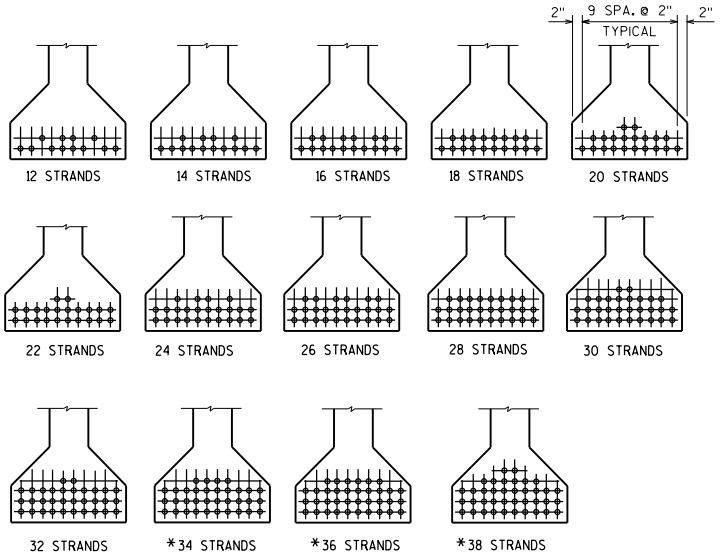
APPROVED: Bill Oliva

DATE: 7-17

STANDARD 40.17



STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS



ARRANGEMENT AT ℄ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. AND 0.6" DIA. STRANDS

*0.5" DIA. STRANDS ONLY

45" GIRDER

A = 560 SQ. IN.

r^2 = 223.91 IN.^{2}

y_T = 24.73 IN.

y_B = -20.27 IN.

I = 125,390 IN.^{4}

S_T = 5,070 IN.^{3}

S_B = -6,186 IN.^{3}

WT. = 583 #/FT.

PRE-TENSION

f'_s = 270,000 P.S.I

f_s = 0.75 X 270,000 = 202,500 P.S.I
for low relaxation strands.

Pi PER 0.5" DIA. STRAND = 0.1531 X 202,500 = 31.00 KIPS

Pi PER 0.6" DIA. STRAND = 0.217 X 202,500 = 43.94 KIPS

$\frac{y_B}{r^2} = \frac{-20.27}{223.91} = -0.09053$ IN./IN.^{2}

(COMPRESSION IS POSITIVE)

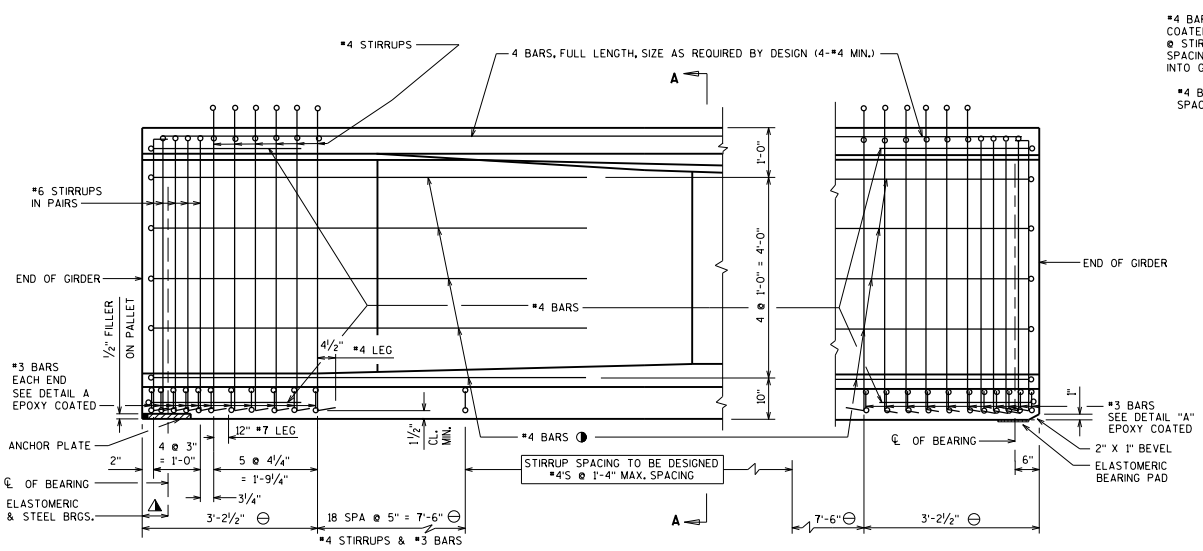
N NO. STRANDS	(1) e_s (inches)	(2) $(1 + \frac{e_s \; y_B}{r^2})$	(3) (A/(2)) (sq. in.)	(4) P(Init.) = A_s f_s 0.5" DIA. STRANDS (KIPS)	(4) P(Init.) = A_s f_s 0.6" DIA. STRANDS (KIPS)	(5) f_B (Init.)=(4)/(3) 0.5" DIA. STRANDS (K/Sq. In.)	(5) f_B (Init.)=(4)/(3) 0.6" DIA. STRANDS (K/Sq. In.)
STANDARD PATTERNS FOR UNDRAPED STRANDS							
12	-14.94	2.352	238.10		527		2.213
14	-14.27	2.292	244.33		615		2.517
16	-13.27	2.201	254.43		703		2.763
18	-13.15	2.190	255.71		791		3.093
20	-12.27	2.111	265.28		879		3.313
22	-12.27	2.111	265.28		967		3.645
24	-12.10	2.095	267.30		1055		3.947
STANDARD PATTERNS FOR DRAPED STRANDS							
12	-17.60	2.593	215.97	372	527	1.722	2.440
14	-17.70	2.602	215.22	434	615	2.017	2.858
16	-17.52	2.586	216.55	496	703	2.290	3.246
18	-17.38	2.573	217.64	558	791	2.564	3.634
20	-17.07	2.545	220.04	620	879	2.818	3.995
22	-17.01	2.540	220.47	682	967	3.093	4.386
24	-16.77	2.518	222.40	744	1055	3.345	4.744
26	-16.58	2.501	223.91	806	1143	3.600	5.105
28	-16.41	2.486	225.26	868	1230	3.853	5.460
30	-16.13	2.460	227.64	930	1318	4.085	5.790
32	-16.02	2.450	228.57	992	1406	4.340	6.151
34	-15.80	2.430	230.45	1054		4.574	
36	-15.60	2.412	232.17	1116		4.807	
38	-15.32	2.387	234.60	1178		5.021	

45" PRESTRESSED
GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

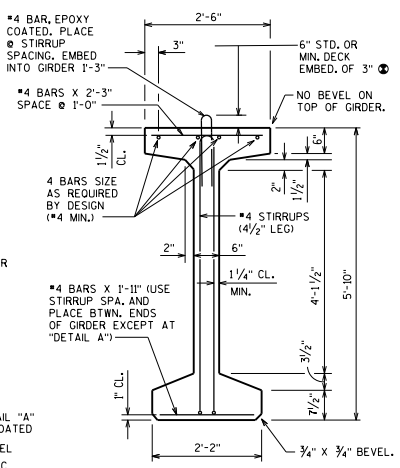
DATE: 7-16



SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

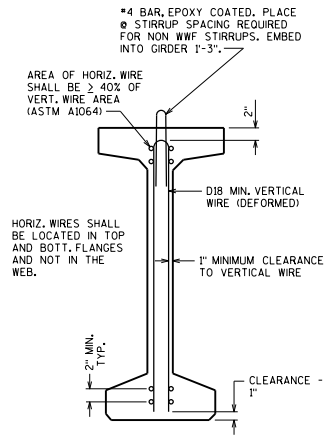
SUPPORT WITH ½" ELASTOMERIC BEARING PAD

SIDE VIEW OF GIRDER



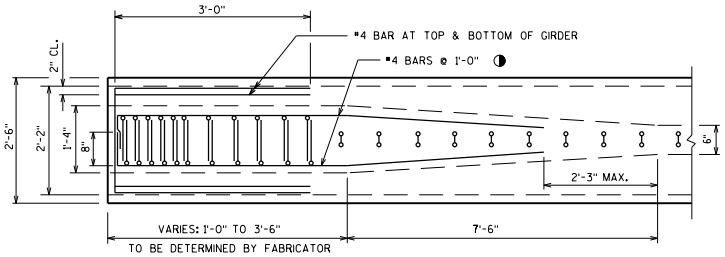
SECTION THRU GIRDER

STRANDS NOT SHOWN

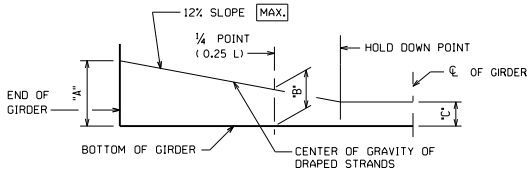


SECTION THRU GIRDER

SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS ASTM A1064 (FY = 70 KSI)



PLAN VIEW ⊖



"A" TO BE GIVEN TO THE NEAREST 1"
"B" = ¼("A" + 3 "C") MIN.
"B" = ¼("A" + 3 "C") + 3" MAX.

RECORD DIMENSIONS "A", "B" & "C" ON FINAL PLANS.

LOCATION OF DRAPED STRANDS

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 70-INCH.

SHOW ONLY ONE STRAND SIZE ON THE PLANS.

GIRDER LENGTHS IN EXCESS OF 140 FEET MAY BE CONTROLLED BY TRANSPORTATION LIMITATIONS AND REQUIRE APPROVAL BY THE PRESTRESS GIRDER MANUFACTURERS AND CONCURRANCE BY THE STRUCTURES DEVELOPMENT SECTION.

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.5" OR 0.6" DIA. STRANDS FOR ALL PATTERNS AS REQUIRED. USE ONLY ONE STRAND SIZE IN EACH PATTERN. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.

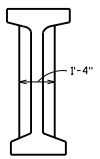
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.20 AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

⚠ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

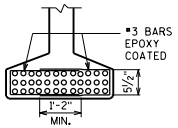
⊖ DETAIL TYPICAL AT EACH END

◑ INCREASE THE SIZE OF THESE BARS IF REQUIRED BY AASHTO LRFD 5.8.3.5

⊠ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2½" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±¾" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.



SECTION A-A



DETAIL A

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 2" OF THE TOP FLANGE.

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.

PRESTRESSING STRANDS SHALL BE (DIA.)-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

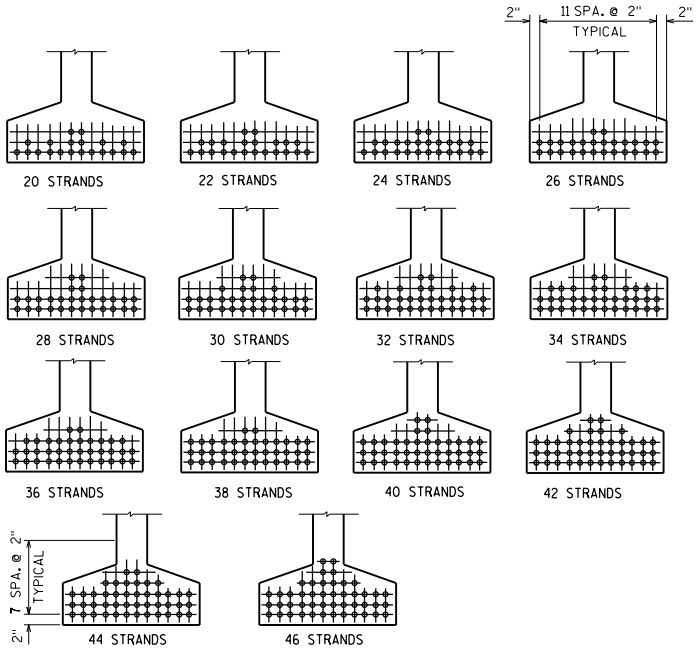
70" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17

STANDARD 40.19



ARRANGEMENT AT ℄ SPAN FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS

(COMPRESSION IS NEGATIVE)

N NO. STRANDS	(1) e_s 0.5" DIA. STRANDS (inches)	(2) $(1+\frac{e_s\ y_B}{r^2})$ 0.5" DIA. STRANDS	(3) (A/(2)) 0.5" DIA. STRANDS (sq. in.)	(4) P(Init.) = $A_s\ f_s$ 0.5" DIA. STRANDS (KIPS)	(5) f_B (Init.)=(4)/(3) 0.5" DIA. STRANDS (K/Sq. In.)
STANDARD PATTERNS - 0.5" DIA. DRAPED STRANDS					
20	-31.62	2.659	291.090	620	2.130
22	-31.53	2.655	291.530	682	2.339
24	-31.45	2.650	292.080	744	2.547
26	-31.39	2.647	292.410	806	2.756
28	-31.05	2.629	294.410	868	2.948
30	-30.89	2.621	295.310	930	3.149
32	-30.75	2.614	296.100	992	3.350
34	-30.62	2.607	296.890	1054	3.550
36	-30.51	2.601	297.580	1116	3.750
38	-30.41	2.596	298.150	1178	3.951
40	-30.12	2.581	299.880	1240	4.135
42	-29.95	2.572	300.930	1302	4.327
44	-29.80	2.564	301.870	1364	4.519
46	-29.49	2.548	303.770	1426	4.694

70" GIRDER

A = 774 SQ. IN.

r^2 = 659.70 IN.^{2}

y_T = 35.38 IN.

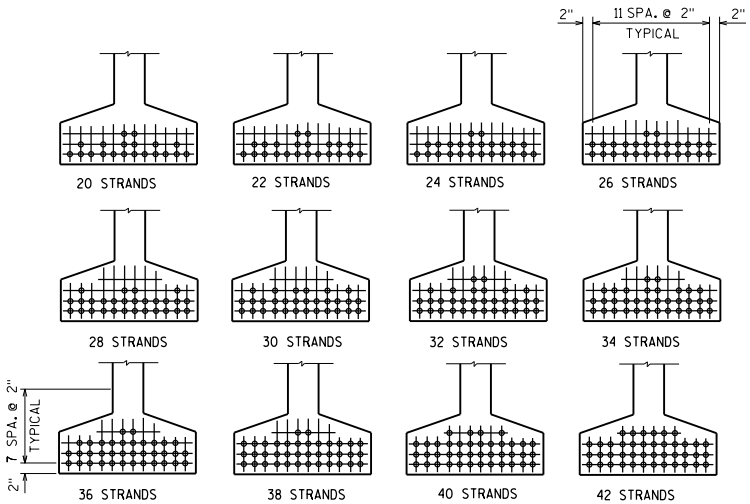
y_B = -34.62 IN.

I = 510,613 IN.^{4}

S_T = 14,430 IN.^{3}

S_B = -14,750 IN.^{3}

WT. = 0.806 KIPS/FT. +
6.6 KIPS FOR BOTH END BLOCKS



ARRANGEMENT AT ℄ SPAN FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

(COMPRESSION IS NEGATIVE)

N NO. STRANDS	(1) e_s 0.6" DIA. STRANDS (inches)	(2) $(1+\frac{e_s\ y_B}{r^2})$ 0.6" DIA. STRANDS	(3) (A/(2)) 0.6" DIA. STRANDS (sq. in.)	(4) P(Init.) = $A_s\ f_s$ 0.6" DIA. STRANDS (KIPS)	(5) f_B (Init.)=(4)/(3) 0.6" DIA. STRANDS (K/Sq. In.)
STANDARD PATTERNS - 0.6" DIA. DRAPED STRANDS					
20	-31.62	2.659	291.090	879	3.020
22	-31.53	2.655	291.530	967	3.317
24	-31.45	2.650	292.080	1055	3.612
26	-31.39	2.647	292.410	1143	3.909
28	-31.19	2.637	293.520	1230	4.191
30	-31.02	2.628	294.520	1318	4.475
32	-30.74	2.614	296.100	1406	4.748
34	-30.62	2.607	296.890	1494	5.032
36	-30.51	2.601	297.580	1582	5.316
38	-30.41	2.596	298.150	1670	5.601
40	-30.22	2.586	299.300	1758	5.874
42	-30.05	2.577	300.350	1846	6.146

PRE-TENSION

f'_s = 270,000 P.S.I.

f_s = 0.75 X 270,000 = 202,500 P.S.I.
for low relaxation strands

Pi PER 0.5" DIA. STRAND
= 0.1531 X 202,500 = 31.00 KIPS

Pi PER 0.6" DIA. STRAND
= 0.217 X 202,500 = 43.94 KIPS

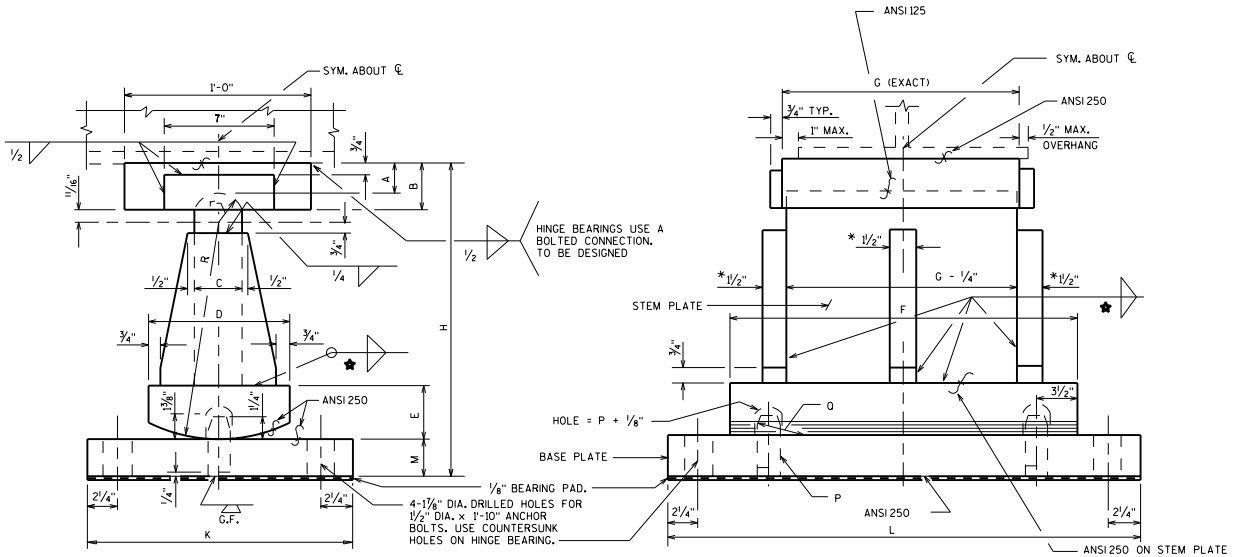
$$\frac{y_B}{r^2} = \frac{-34.62}{659.70} = -0.05248\ \text{IN./IN.}^2$$

70" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16



ROCKER

★ 400 K ≤ REACTION < 1000 K. USE 5/8" WELD.
1000 K ≤ REACTION ≤ 1500 K. USE 3/4" WELD.

* FOR REACTION ≥ 1000 KIPS USE 2" STIFFENERS.

NOTES

FABRICATOR MAY INCREASE 'BASE PLATE' THICKNESS AS AN ALTERNATE TO SHIMS.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS. ON WELDED BEARINGS, FINAL MACHINING CAN BE PERFORMED BEFORE WELDING IS COMPLETED.

ALL MATERIAL IN TYPE "B" ROCKER BEARINGS, INCLUDING SHIMS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B-_-_".

ALL MATERIALS FOR BEARINGS INCLUDING SHIMS BUT EXCLUDING PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION TYPE A709 GRADE 50W STEEL.

PINTLES SHALL CONFORM TO ASTM SPECIFICATION TYPE A449 ⬢ STEEL. PINTLES SHALL BE MACHINED TO A DRIVING FIT.

ALL ANCHOR BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION TYPE A709 GRADE 36 ⬢ STEEL. ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. PROJECT ANCHOR BOLTS "M" PLATE THICKNESS + 2 1/4" ABOVE TOP OF CONCRETE MASONRY. CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

RADIAL SURFACES ON ROCKER SHALL BE MACHINE FINISHED AFTER WELDING.

ALL SURFACES MARKED "℄" SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS. THE CONTACT AREA OF BOTTOM SURFACE OF THE GIRDER FLANGE SHALL BE MACHINE FINISHED.

ANCHOR BOLT EDGE DISTANCE ALONG "L" MAY BE INCREASED FROM MINIMUM SHOWN WHEN A COMMON GRID DETAIL IS DESIRED FOR SEVERAL BEARINGS.

FOR UNPAINTED STRUCTURES THE UPPER 6" OF ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AS REQUIRED BY ASTM DESIGNATION A153, CLASS C OR B633.

USE AASHTO LRFD SERVICE I LOADS FOR BEARING SELECTION. CONSIDER ONLY DEAD LOAD AND HL-93 LIVE LOADS INCLUDING 33% DYNAMIC LOAD ALLOWANCE. THE BEARINGS ON THIS STANDARD WERE DESIGNED USING THE STANDARD SPECIFICATION.

TABLE OF DIMENSIONS

REACTION (KIPS)	A	B	C	D	E	G VALUES										H	K	M	R	r		PINTLE	
						G=1'-7"		G=1'-9"		G=1'-11"		G=2'-1"		G=2'-3"		G=2'-5"						STEM	PLATE	P DIA.	Q
						F	L	F	L	F	L	F	L	F	L	F	L								
400-499	1 15/16"	2 5/16"	3"	1'-2"	2 7/8"	2'-0"	2'-11"	2'-2"	2'-11"	2'-4"	3'-0"	2'-6"	3'-2"	—	—	—	—	1'-7 1/2"	1'-6"	2 7/8"	1'-1"	1 11/16"	1 5/64"	2"	3 1/2"
500-599	1 15/16"	2 5/16"	3"	1'-2"	2 7/8"	2'-1"	3'-4"	2'-2"	3'-4"	2'-4"	3'-4"	2'-6"	3'-4"	—	—	—	—	1'-8 1/2"	1'-7"	2 7/8"	1'-2"	1 11/16"	1 5/64"	2"	3 1/2"
600-699	1 15/16"	2 5/16"	3"	1'-2"	2 7/8"	—	—	2'-3"	3'-8"	2'-4"	3'-8"	2'-6"	3'-8"	2'-8"	3'-8"	—	—	1'-9 1/2"	1'-8"	2 7/8"	1'-3"	1 11/16"	1 5/64"	2"	3 1/2"
700-799	2 3/16"	3 7/16"	3 1/2"	1'-4"	3 3/8"	—	—	—	—	2'-6"	3'-10"	2'-6"	3'-10"	2'-8"	3'-10"	2'-10"	3'-10"	1'-11 1/2"	1'-10"	3 3/8"	1'-4"	1 15/16"	1 1/64"	2"	3 1/2"
800-899	2 3/16"	3 7/16"	3 1/2"	1'-4"	3 3/8"	—	—	—	—	2'-7"	3'-11"	2'-7"	3'-11"	2'-8"	3'-11"	2'-10"	3'-11"	2'-0 1/2"	2'-0"	3 3/8"	1'-5"	1 15/16"	1 1/64"	2"	3 1/2"
900-999	2 3/16"	3 7/16"	3 1/2"	1'-4"	3 3/8"	—	—	—	—	2'-11"	4'-0"	2'-11"	4'-0"	2'-11"	4'-0"	2'-11"	4'-0"	2'-1 1/2"	2'-2"	3 3/8"	1'-6"	1 15/16"	1 1/64"	2"	3 1/2"
1000-1099	2 7/16"	3 5/8"	4"	1'-6"	3 7/8"	—	—	—	—	—	—	3'-1"	4'-1"	3'-1"	4'-1"	3'-1"	4'-1"	2'-3 1/2"	2'-4"	3 7/8"	1'-7"	2 3/16"	2 19/64"	2 1/2"	3 3/4"
1100-1199	2 7/16"	3 5/8"	4"	1'-6"	3 7/8"	—	—	—	—	—	—	3'-3"	4'-2"	3'-3"	4'-2"	3'-3"	4'-2"	2'-4 1/2"	2'-6"	3 7/8"	1'-8"	2 3/16"	2 19/64"	2 1/2"	3 3/4"
1200-1299	2 7/16"	3 5/8"	4"	1'-6"	3 7/8"	—	—	—	—	—	—	—	—	3'-5"	4'-4"	3'-5"	4'-4"	2'-5 1/2"	2'-7"	3 7/8"	1'-9"	2 3/16"	2 19/64"	2 1/2"	3 3/4"
1300-1399	2 7/16"	3 5/8"	4"	1'-6"	3 7/8"	—	—	—	—	—	—	—	—	3'-7"	4'-7"	3'-7"	4'-7"	2'-6 1/2"	2'-8"	3 7/8"	1'-10"	2 3/16"	2 19/64"	2 1/2"	3 3/4"
1400-1500	2 7/16"	3 5/8"	4"	1'-6"	3 7/8"	—	—	—	—	—	—	—	—	3'-9"	4'-9"	3'-9"	4'-9"	2'-7 1/2"	2'-9"	3 7/8"	1'-11"	2 3/16"	2 19/64"	2 1/2"	3 3/4"
						G=1'-2"				G=1'-3"				G=1'-4"											
0-300	1 15/16"	2 15/16"	3"	1-0"	2 3/8"	1'-7"	2'-3"			1'-8"	2'-4"			1'-9"	2'-5"			1'-5"	1'-4"	2 3/8"	11"	1 11/16"	1 5/64"	2"	3 1/2"

ROCKER SETTING DATA

TEMPERATURE TIME OF SETTING - °F	(+) VERTICAL (-)			
	PIER	PIER	PIER	PIER
120				
100				
80				
60				
40				
20				
0				
-20				

ROCKER BEARING SHALL BE SET VERTICAL AT 45° F.

ROCKER BEARING SHALL BE USED WITH A MINIMUM FRICTION VALUE OF 2% AND A MAXIMUM FRICTION VALUE OF 4%.

MAXIMUM MOVEMENT FROM 45° F = (D - 1")/2 BUT ACTUAL MOVEMENT NOT TO EXCEED R/3.

⬢ OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

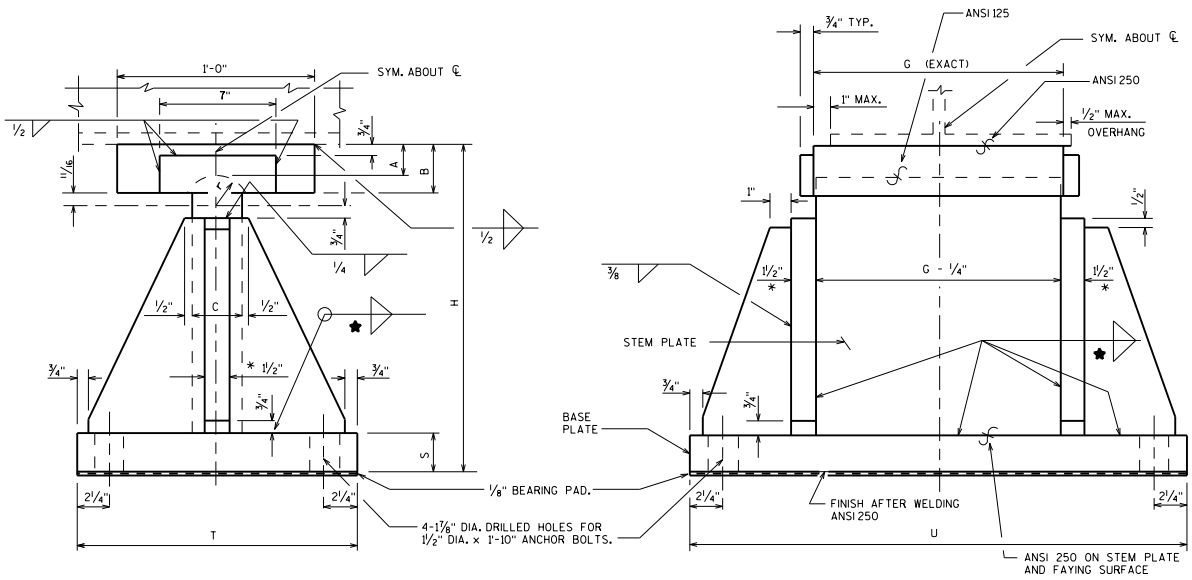
ROCKER BEARING TYPE 'B' - STEEL GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 40.21



FIXED SHOE

★ 400 K ≤ REACTION < 1000 K, USE ⅝" WELD.
1000 K ≤ REACTION ≤ 1500 K, USE ¾" WELD

* FOR REACTIONS ≥ 1000 KIPS
USE 2" STIFFENERS.

NOTES

FABRICATOR MAY INCREASE 'BASE PLATE' THICKNESS AS AN ALTERNATE TO SHIMS.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS, ON WELDED BEARINGS. FINAL MACHINING CAN BE PERFORMED BEFORE WELDING IS COMPLETED.

ALL MATERIAL FOR BEARINGS INCLUDING SHIMS BUT EXCLUDING ANCHOR BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION TYPE A709 GRADE 50W STEEL.

ALL ANCHOR BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION TYPE A709 GRADE 36 ⬢ STEEL. ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. PROJECT ANCHOR BOLTS "S" PLATE THICKNESS + 2¼" ABOVE TOP OF CONCRETE MASONRY. CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

AFTER WELDING SHOE ASSEMBLY, FINISH BOTTOM OF BASE PLATE TO A FLAT SURFACE.

ALL SURFACES MARKED ℱ SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS. THE CONTACT AREA OF BOTTOM SURFACE OF THE GIRDER FLANGE SHALL BE MACHINE FINISHED.

ANCHOR BOLT DISTANCES ALONG "T" OR "U" MAY BE INCREASED FROM MINIMUM SHOWN WHEN A COMMON GRID DETAIL IS DESIRED FOR SEVERAL BEARINGS.

FOR UNPAINTED STRUCTURES THE UPPER 6" OF THE ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AS REQUIRED BY ASTM DESIGNATION A153, CLASS C OR B633.

ALL MATERIALS IN TYPE "B" FIXED SHOE BEARINGS, INCLUDING SHIMS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES FIXED B-_-_".

⬢ OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

USE AASHTO LRFD SERVICE I LOADS FOR BEARING SELECTION. CONSIDER ONLY DEAD LOAD AND HL-93 LIVE LOADS INCLUDING 33% DYNAMIC LOAD ALLOWANCE. THE BEARINGS ON THIS STANDARD WERE DESIGNED USING THE STANDARD SPECIFICATION.

TABLE OF DIMENSIONS

REACTION (KIPS)	A	B	C	G VALUES						H	r		S	T
				G=1'-7"	G=1'-9"	G=1'-11"	G=2'-1"	G=2'-3"	G=2'-5"		STEM	PLATE		
				U	U	U	U	U	U					
400-499	1 15/16"	2 15/16"	3"	2'-8"	2'-8"	2'-10"	3'-0"	—	—	1'-6"	1 1/16"	1 1/64"	2 3/8"	1'-4"
500-599	1 15/16"	2 15/16"	3"	3'-0"	3'-0"	3'-0"	3'-0"	—	—	1'-7"	1 1/16"	1 5/64"	2 3/8"	1'-5"
600-699	1 15/16"	2 15/16"	3"	—	3'-3"	3'-3"	3'-3"	3'-3"	—	1'-9"	1 1/16"	1 5/64"	2 3/8"	1'-6"
700-799	2 3/16"	3 3/16"	3 1/2"	—	—	3'-6"	3'-6"	3'-6"	3'-6"	1'-10"	1 5/16"	1 61/64"	2 7/8"	1'-7"
800-899	2 3/16"	3 3/16"	3 1/2"	—	—	3'-9"	3'-9"	3'-9"	3'-9"	2'-0"	1 5/16"	1 61/64"	2 7/8"	1'-8"
900-999	2 3/16"	3 3/16"	3 1/2"	—	—	3'-10"	3'-10"	3'-10"	3'-10"	2'-1"	1 5/16"	1 61/64"	2 7/8"	1'-10"
1000-1099	2 7/16"	3 5/8"	4"	—	—	—	4'-0"	4'-0"	4'-0"	2'-3"	2 3/16"	2 9/64"	3 3/8"	1'-11"
1100-1199	2 7/16"	3 5/8"	4"	—	—	—	4'-2"	4'-2"	4'-2"	2'-4"	2 3/16"	2 9/64"	3 3/8"	2'-0"
1200-1299	2 7/16"	3 5/8"	4"	—	—	—	—	4'-4"	4'-4"	2'-5"	2 3/16"	2 9/64"	3 3/8"	2'-1"
1300-1399	2 7/16"	3 5/8"	4"	—	—	—	—	4'-6"	4'-6"	2'-6"	2 3/16"	2 9/64"	3 3/8"	2'-2"
1400-1500	2 7/16"	3 5/8"	4"	—	—	—	—	4'-8"	4'-8"	2'-7"	2 3/16"	2 9/64"	3 3/8"	2'-3"

TYPE 'B' - STEEL
GIRDERS FIXED SHOE

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 40.22

✿ FOR CULVERT WINGS:

WITH WING WALL THICKNESS ≥ 8" USE:
ADHESIVE ANCHORS ⅝-INCH.
EMBED 5" IN CONCRETE.
SEE DETAIL "A"

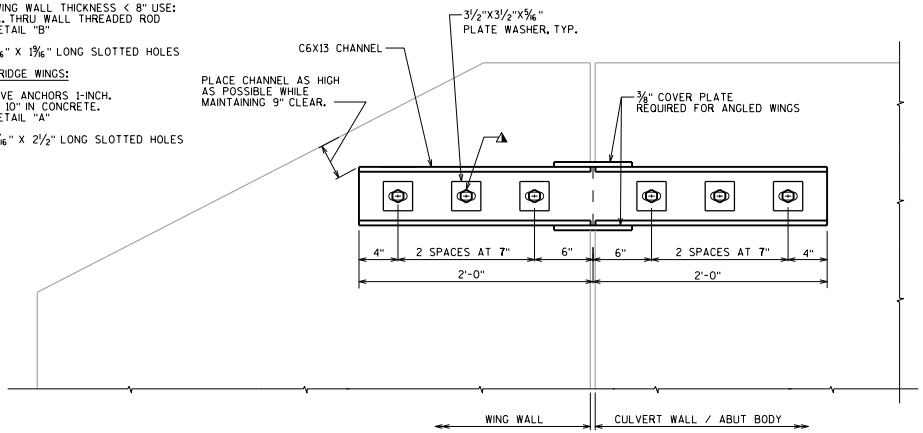
WITH WING WALL THICKNESS < 8" USE:
⅝" DIA. THRU WALL THREADED ROD
SEE DETAIL "B"

USE 11/16" X 1 3/16" LONG SLOTTED HOLES

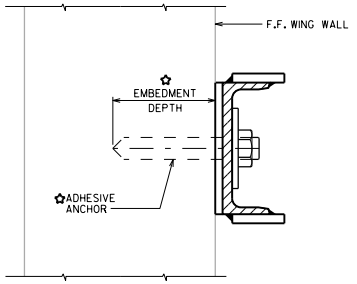
FOR BRIDGE WINGS:

ADHESIVE ANCHORS 1-INCH.
EMBED 10" IN CONCRETE.
SEE DETAIL "A"

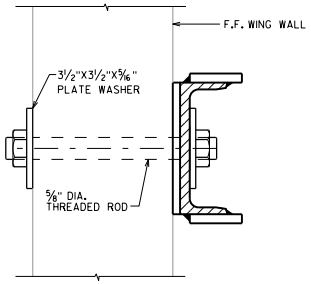
USE 1 1/16" X 2 1/2" LONG SLOTTED HOLES



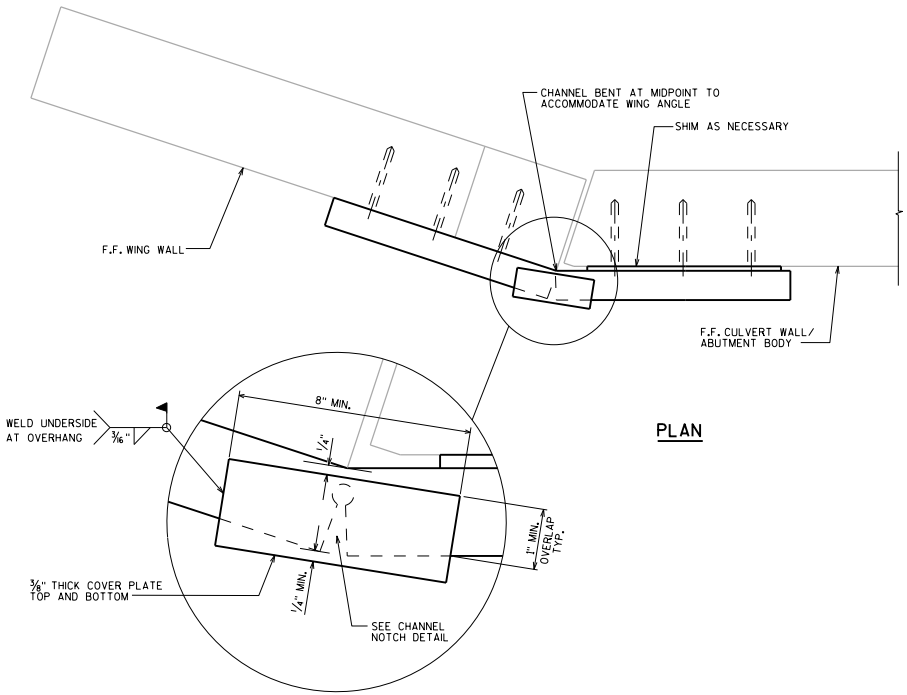
WING ELEVATION



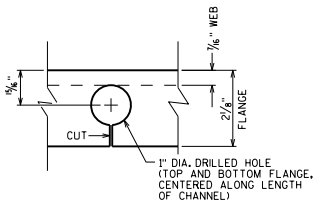
DETAIL "A"
SECTION THRU CHANNEL



DETAIL "B"
SECTION THRU CHANNEL



PLAN



CHANNEL NOTCH DETAIL
FOR USE WITH ANGLED WINGS ONLY

NOTES

WING STRAPPING DETAIL FOR THE PURPOSE OF MITIGATING INWARD WING TIPPING, AS AN ALTERNATIVE TO THE PREFERRED METHOD OF WING REPLACEMENT.

BID ITEM SHALL BE "STRAPPING B-XX-XXX" WHICH INCLUDES ALL ITEMS SHOWN.

WISDOT REGIONAL BRIDGE MAINTENANCE ENGINEER TO APPROVE USE OF DETAIL PRIOR TO INSTALLATION.

ALL PROVIDED STEEL MATERIAL SHALL CONFORM TO ASTM A36.

ALL STRUCTURAL STEEL SHOWN SHALL BE GALVANIZED. THREADED RODS, MASONRY ANCHORS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C.

CUTTING AND DRILLING OF CHANNEL SHALL BE DONE IN FABRICATION SHOP, PRIOR TO GALVANIZING.

IF WELDING COVER PLATE IN FIELD, PRIOR TO WELDING, REMOVE GALVANIZING FROM AREA TO BE WELDED. TOUCH UP WITH PAINT ALL AREAS LACKING GALVANIZING WHEN COMPLETE.

CAULK AROUND PERIMETER OF CHANNEL AND FILL PORTION OF HOLE AROUND ANCHOR BOLT AND SHIM WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

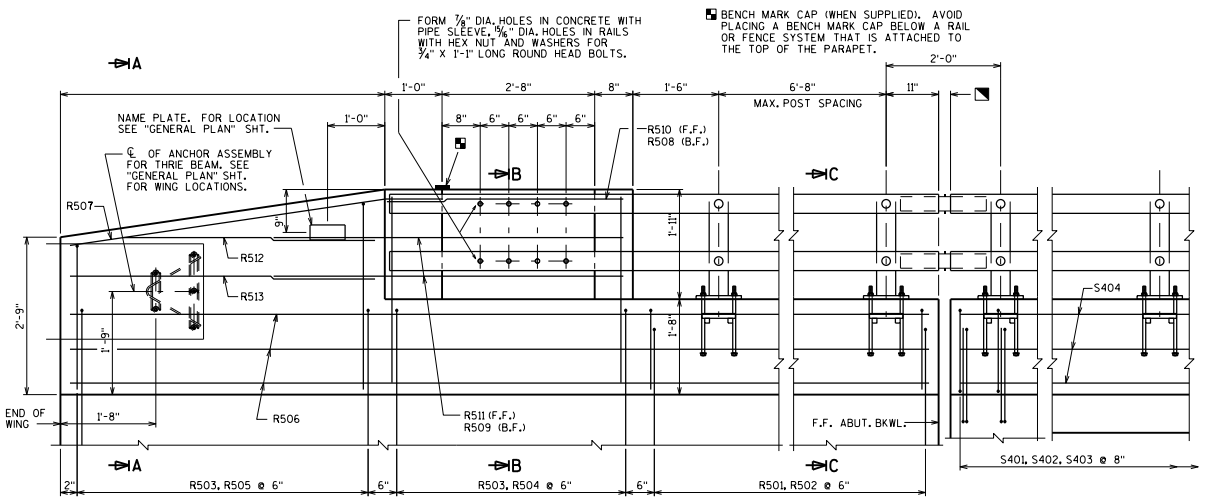
WING STRAPPING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

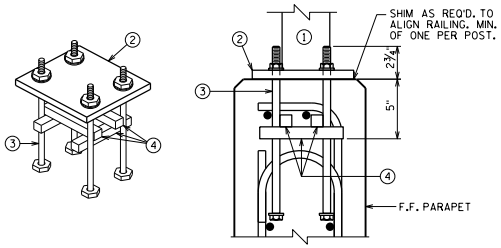
STANDARD 40.23



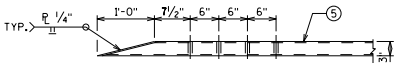
STRIP SEAL EXP. JT. @ ABUT.
FOR TYPE A1 ABUT., USE ½" FILLER TO TOP OF PARAPET. SEE STD. 12.01/12.02

INSIDE ELEVATION

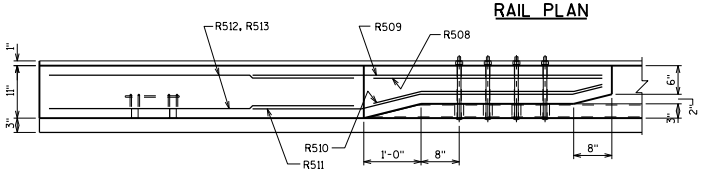
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5". MIN CONSTR. JT. SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A ¾" "V"-GROOVE.



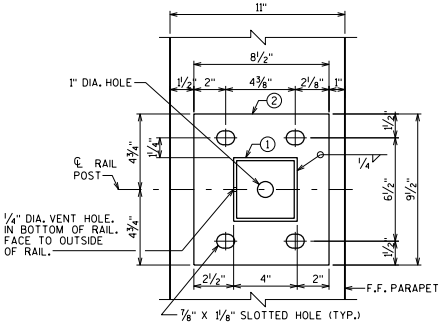
ANCHOR BOLTS FOR RAIL POSTS



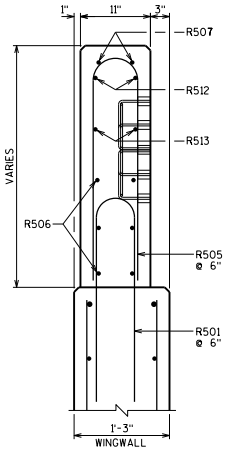
RAIL PLAN



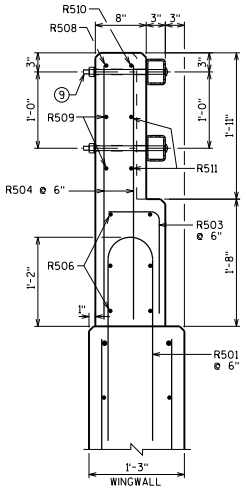
PARAPET PLAN



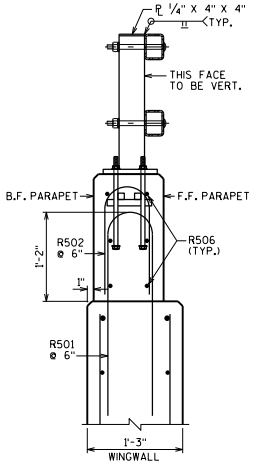
BASE PLATE



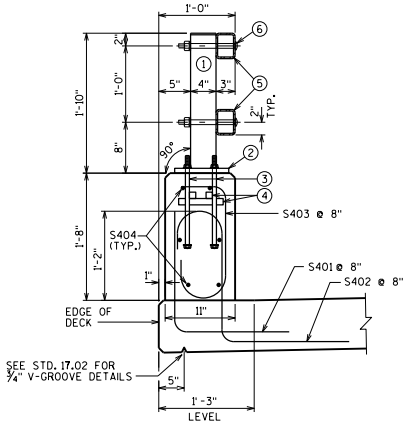
SECTION A-A



SECTION B-B



SECTION C-C



SECTION THRU DECK

ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD (WHEN REQ'D.).

DESIGNER NOTES

DETAILS LIMITED TO SKEWS < 40°.

SEE STANDARD 40.25 FOR RAILING DETAILS

RAILING WEIGHT = 30 LB/FT

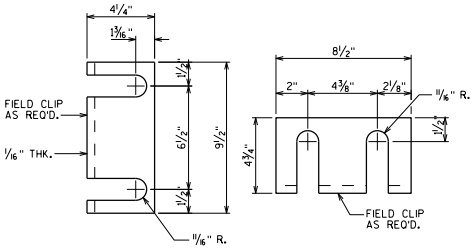
RAILING TUBULAR TYPE 'PF'

BUREAU OF STRUCTURES

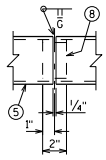
APPROVED: Bill Oliva

DATE: 1-17

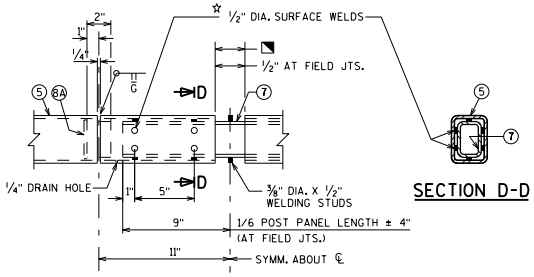
STANDARD 40.24



POST SHIM DETAILS



SHOP RAIL SPLICE DETAIL
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



SECTION D-D

FIELD ERECTION JOINT DETAIL

☆ MIN. ⅝" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.

NOTES

BID ITEM SHALL BE "RAILING TUBULAR TYPE PF B-_-_", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN, AND PAINTING.

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 CUTS.

NO. 2, NO. 7 AND NO. 8 SHALL CONFORM TO ASTM A709 GRADE 36. STRUCTURAL TUBING, NO. 1 AND NO. 5, SHALL CONFORM TO ASTM A500 GRADE B .

ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET POSTS NORMAL TO GRADE.

CUT BOTTOM OF POST TO MAKE POST VERTICAL IN TRANSVERSE DIRECTION.

STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATES WHERE REQUIRED FOR ALIGNMENT.

FILL BOLT SLOT OPENINGS IN SHIMS AND PLATE NO. 2 AND CAULK AROUND PERIMETER OF PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

ALL JOINTS IN CONCRETE PARAPET ARE TO BE VERTICAL.

AFTER FABRICATION, ALL MATERIAL, EXCEPT ANCHORAGE NO. 3 & 4 & SHIMS SHALL BE PAINTED WITH A THREE COAT ZINC-RICH EPOXY SYSTEM PER WISDOT STANDARD SPECIFICATION, SECTION 517, EPOXY SYSTEM. SHIMS SHALL BE GIVEN ONE COAT OF ZINC RICH PRIMER PAINT. THE FINISH COLOR SHALL BE AMS STD. COLOR NO. . .

¼" DIA. VENT HOLES TO BE LOCATED AT LOW END OF RAILS.

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

TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.

SEE STD. 30.07 FOR BEAM GUARD ANCHOR ASSEMBLY DETAILS.

THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 2 (TL-2).

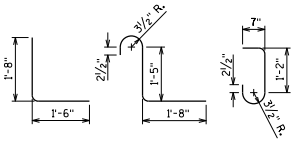
◥ RDWY. OPENING OR 2½" MIN. FOR STRIP SEAL EXP. JOINT & ½" OPENING FOR A1 ABUTMENT.

LEGEND

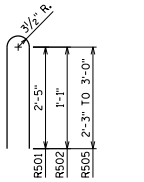
1. TS 4 X 4 X 0.25 X 1'-9¼" STRUCTURAL TUBING WITH ⅝" DIA. HOLES FOR BOLT NO. 6. PLACE POSTS VERTICAL IN TRANSVERSE DIRECTION. WELD TO NO. 2. PLACE POSTS NORMAL TO GRADE LINE
2. PLATE ¾" X 8½" X 9½" WITH ⅞" X 1⅛" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
3. ⅝" DIA. X 1'-1" LONG ASTM A325 HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER. 4 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. EMBED A MIN. OF 10". CHAMFER TOP OF BOLTS BEFORE THREADING.
4. BAR ¾" SQ. X 7" LONG. WELD TO ANCHOR BOLTS NO. 3 (GALVANIZED).
5. TS 4 X 3 X 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH BOLTS NO. 6. PROVIDE 11/16" DIA. HOLE FOR NO. 6.
6. ¾" DIA. X 9" LONG ROUND HEAD BOLTS, ASTM A307, WITH HEX. NUT AND WASHERS AND LOCK WASHER. (1 REQ'D. AT EACH RAIL TO POST LOCATION.)
7. RECTANGULAR SLEEVE FABRICATED FROM ¼" PLATES. 1'-6" LONG.
8. RECTANGULAR SLEEVE FABRICATED FROM ¼" PLATES. PROVIDE "SLIDING FIT" WITH MIN. OUT TO OUT DIMENSION OF 3 11/32" X 2 11/32".

8A. RECTANGULAR SLEEVE FABRICATED FROM ¼" PLATES. PROVIDE "SLIDING FIT" WITH MIN. OUT TO OUT DIMENSION OF 3 11/32" X 2 11/32" WITH 3/16" PLATE AT ONE END WELDED ALL AROUND TO BLOCK WATER.

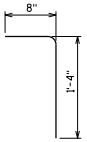
9. ¾" DIA. X 1'-1" LONG ROUND HEAD BOLTS, ASTM A307, WITH HEX NUT AND WASHERS



S401 S402 S403

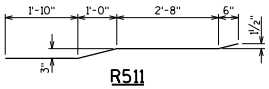


R501, R502, R505

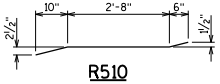


R503

R507



R511



R510

BAR SERIES TABLE

MARK	NO. REQD.	LENGTH
R505	OF SERIES	5'-5" TO 6'-11"

BUNDLE AND TAG EACH SERIES SEPARATELY.

BILL OF BARS

NOTE: THE FIRST OR FIRST TWO DIGITS OF THE BAR MARK SIGNIFIES THE BAR SIZE.

BAR MARK	COAT	NO. REQ'D.	LENGTH	BENT	BAR SERIES	LOCATION
S401	X		3'-0"	X		PARAPET VERT.
S402	X		4'-1"	X		PARAPET VERT.
S403	X		2'-9"	X		PARAPET VERT.
S404	X					PARAPET HORIZ.
R501	X		5'-9"	X		PARAPET VERT.
R502	X		3'-1"	X		PARAPET VERT.
R503	X		1'-11"	X		PARAPET VERT.
R504	X		3'-4"			PARAPET VERT.
R505	X		6'-2"	X	◮	PARAPET VERT.
R506	X					PARAPET HORIZ.
R507	X			X		PARAPET HORIZ.
R508	X		4'-0"			PARAPET HORIZ.
R509	X		5'-8"			PARAPET HORIZ.
R510	X		4'-0"	X		PARAPET HORIZ.
R511	X		6'-0"	X		PARAPET HORIZ.
R512	X					PARAPET HORIZ.
R513	X					PARAPET HORIZ.

◮ LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.

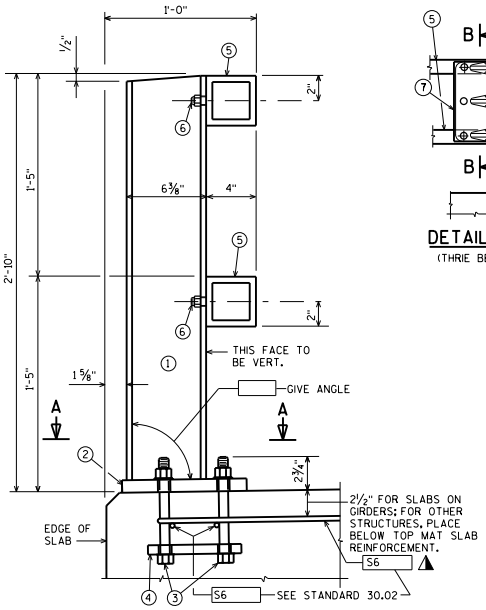
RAILING TUBULAR TYPE 'PF' DETAILS

BUREAU OF STRUCTURES

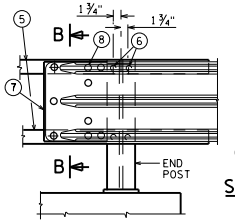
APPROVED: Bill Oliva

DATE: 1-19

STANDARD 40.25

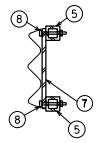


SECTION THRU RAILING ON DECK

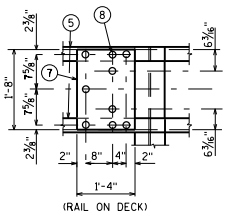


DETAIL AT END POST

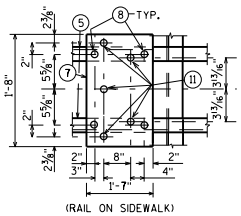
(THRIE BEAM RAIL ATTACHMENT)



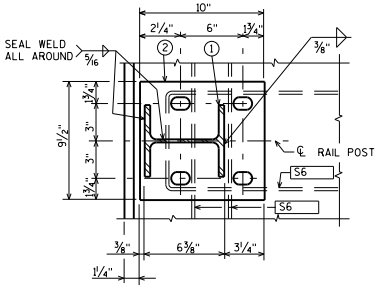
SECTION B



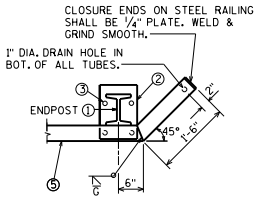
(RAIL ON DECK)



(RAIL ON SIDEWALK)



SECTION A



DETAIL FOR END POSTS

WITH OR WITHOUT THRIE BEAM RAIL ATTACHMENT

(END POST MAY BE LOCATED ON SUPERSTRUCTURE OR WINGWALLS)

LEGEND

1. W6 x 25 WITH 1¼" 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 9½" x 10" WITH 1 1/16" x 1½" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN.
3. A325 - ⅞" 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 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING.
4. ¼" x 8" x 8" FLAT BAR WITH 15/16" 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. ⅝" DIA. x 1½" LONG SHOP WELDED STUDS WITH HEX NUT AND 2" WASHERS (2 REQ'D. AT EACH RAIL TO POST LOCATION.)
7. PLATE ⅜" x 1'-4" (1'-7" ON SDWK.) x 1'-8". BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THRIE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO 5.
8. 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5 FOR ⅞" DIA. A325 BOLTS W/HEX NUTS AND WASHERS.
9. SQUARE SLEEVE FABRICATED FROM ¼" PLATE. PROVIDE "SLIDING FIT" WITH A MINIMUM OUT TO OUT DIMENSION OF 3 13/32".
10. TS 3 x 3 x 0.25 x (2'-4" AT EXPANSION JOINTS) & (1'-10" AT FIELD JOINTS) LONG. PROVIDE ½" DIA. SURFACE WELDS ON ALL SIDES AS SHOWN. GRIND WELDS TO FIT FREE INTO I.D. OF NO. 5. PROVIDE ⅜" DIA. x ½" WELDING STUDS ON TOP AND BOTTOM SURFACES AT CENTERLINE.
11. ⅞" DIA. x 1½" LONG THREADED SHOP WELDED STUDS. (REQ'D. FOR SDWK. RAIL ONLY.)

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. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.

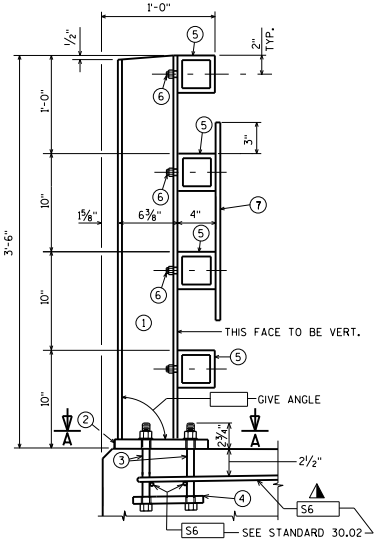
FOR RAILING TO BE PAINTED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 3 & 4, SHALL BE PAINTED WITH A THREE-COAT ZINC RICH EPOXY SYSTEM. PRIOR TO PAINTING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 11 NEAR WHITE BLAST CLEANING BY SSPC SPECIFICATIONS.

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

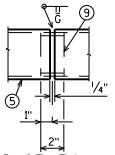
FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REQ'D. FOR ALIGNMENT.

PLACE FIRST BOTTOM LONGITUDINAL BAR CLEAR OF DRIP GROOVE.

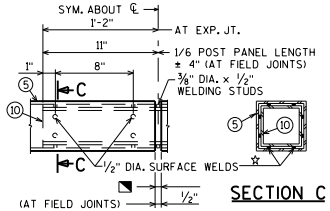


SECTION THRU RAILING ON SIDEWALK



SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



FIELD ERECTION JOINT DETAIL

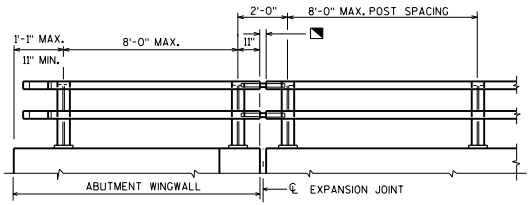
☆ MIN. 5/16" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.

SECTION C

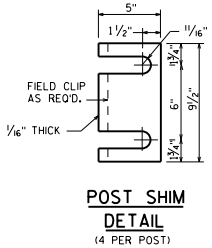
THIS RAILING IS NO LONGER USED AND IS SHOWN FOR INFORMATIONAL PURPOSES ONLY:

FOR 2'-10" RAILING ON DECK:

RAILING WEIGHT = 37 LB/LF (BASED ON 8'-0" POST SPACING.)

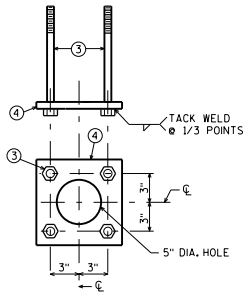


PART ELEVATION OF RAILING



POST SHIM DETAIL

(4 PER POST)



ANCHORAGE DETAIL

◥ RDWY. OPENING OR 2½" MIN. FOR STRIP SEAL EXP. JOINT & ½" OPENING FOR A1 ABUTMENTS.

◭ TIE TO TOP MAT OF STEEL.

TUBULAR STEEL RAILING TYPE 'F'

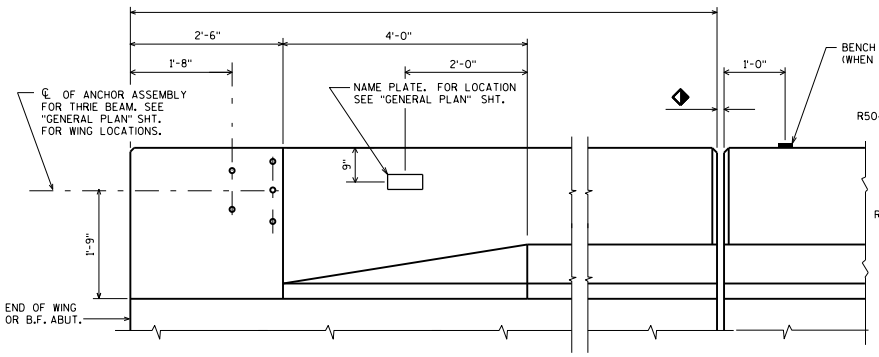
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

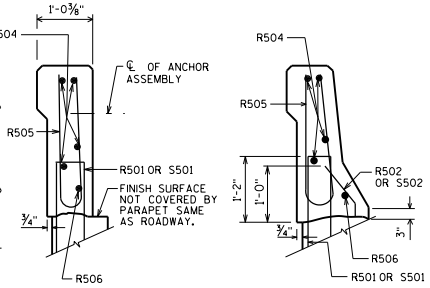
DATE: 7-16

STANDARD 40.26

AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

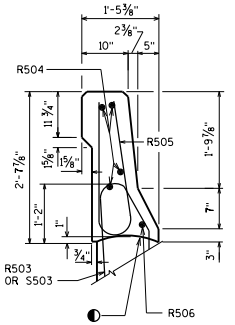


INSIDE ELEVATION



SECTION A

SECTION B



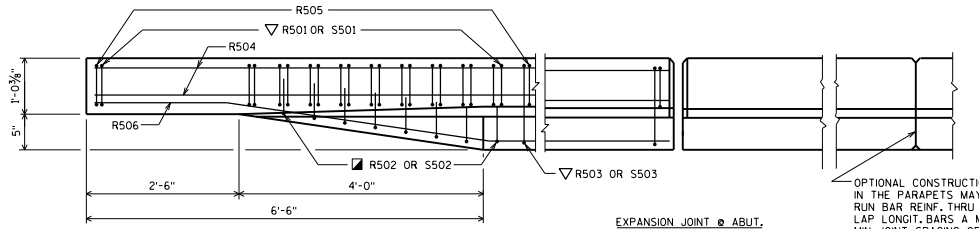
SECTION C

BILL OF BARS

FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4'-7"	X	PARAPET VERT.
R502	X			2'-4"	X	PARAPET VERT.
R503	X			4'-7"	X	PARAPET VERT.
R504	X					PARAPET HORIZ.
R505	X			4'-10"	X	PARAPET VERT.
R506	X				X	PARAPET HORIZ.
S501	X			4'-5"	X	PARAPET VERT.
S502	X			2'-4"	X	PARAPET VERT.
S503	X			4'-2"	X	PARAPET VERT.

◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS



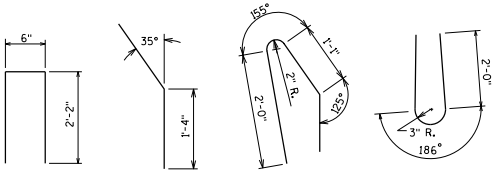
PLAN

EXPANSION JOINT @ ABUT.

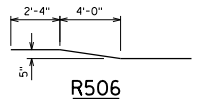
0° SKEW SHOWN. MATCH EXP. JT. OPENING.

FOR TYPE A1 ABUT., USE ½" FILLER TO TOP OF PARAPET. SEE STD. 12.01.

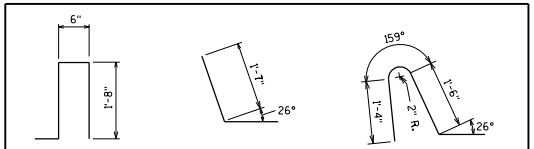
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.



R501 R502 R503 R505

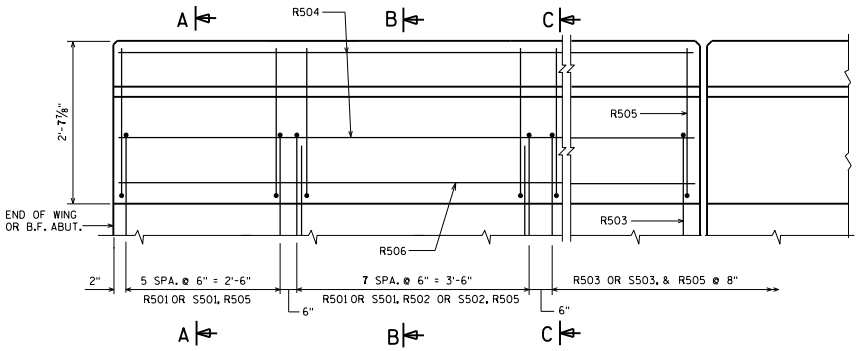


R506

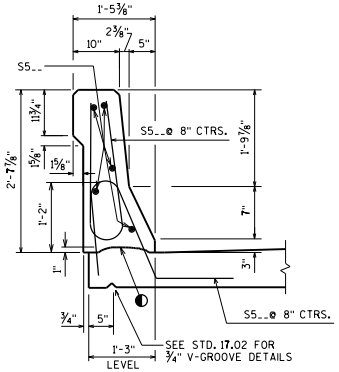


S501 S502 S503

BARS FOR TRANSITION ON BRIDGE



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE

AREA = 2.58 SF
WEIGHT = 387 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◪ R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R502 OR S502 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R503 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

A R503 BAR MAY BE USED IN LIEU OF A S503 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

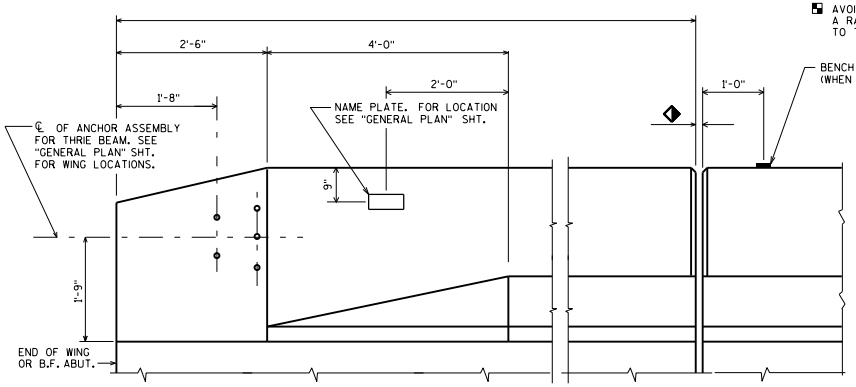
SLOPED FACE PARAPET 'LF'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

STANDARD 40.27

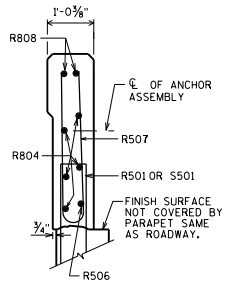


INSIDE ELEVATION

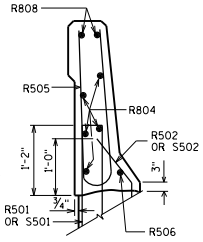
◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT. USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

■ AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

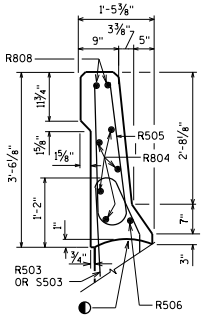
BENCH MARK CAP (WHEN SUPPLIED) ■



SECTION A



SECTION B



SECTION C

▲ LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.

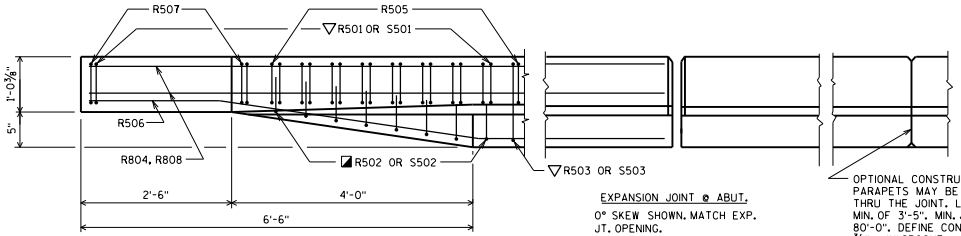
BILL OF BARS

FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	BAR SERIES	LOCATION
R501	X			4'-7"	X		PARAPET VERT.
R502	X			2'-4"	X		PARAPET VERT.
R503	X			4'-7"	X		PARAPET VERT.
R804	X						PARAPET HORIZ.
R505	X			6'-6"	X		PARAPET VERT.
R506	X				X		PARAPET HORIZ.
R507	X			5'-8"	X	▲	PARAPET VERT.
R808	X				X		PARAPET HORIZ.
S501	X			4'-5"	X		PARAPET VERT.
S502	X			2'-4"	X		PARAPET VERT.
S503	X			4'-2"	X		PARAPET VERT.

BAR SERIES TABLE

MARK	NO. REQD.	LENGTH
R507	4 SERIES OF 6	4'-10" TO 6'-6"



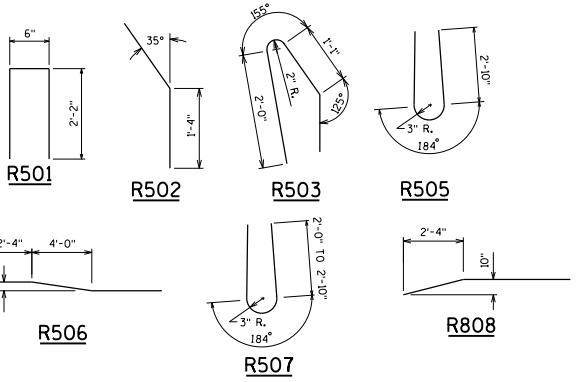
PLAN

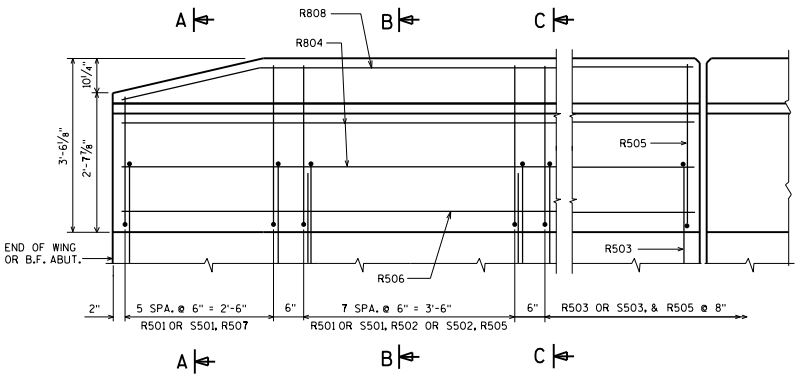
EXPANSION JOINT ⌀ ABUT.

0° SKEW SHOWN. MATCH EXP. JT. OPENING.

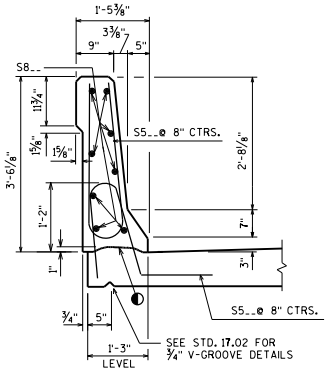
FOR TYPE A1 ABUT., USE ½" FILLER TO TOP OF PARAPET. SEE STD. 12.01.

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 3'-5". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A ¾" - 'V' GROOVE.

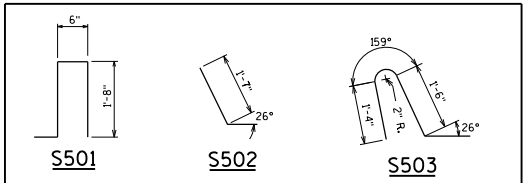




OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

AREA = 3.16 SF
WEIGHT = 474 LB/FT

◐ CONST. JOINT - STRIKE OFF AS SHOWN.

◪ R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R502 OR S502 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R503 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

A R503 BAR MAY BE USED IN LIEU OF A S503 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

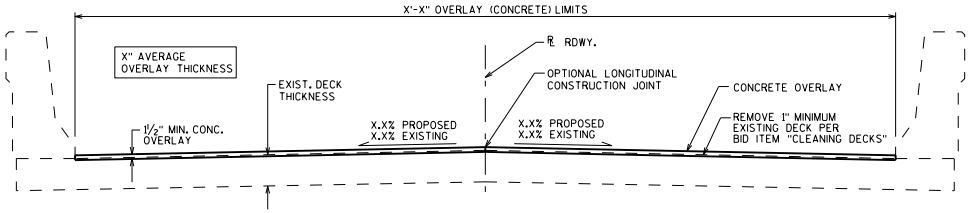
SLOPED FACE PARAPET 'HF'

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

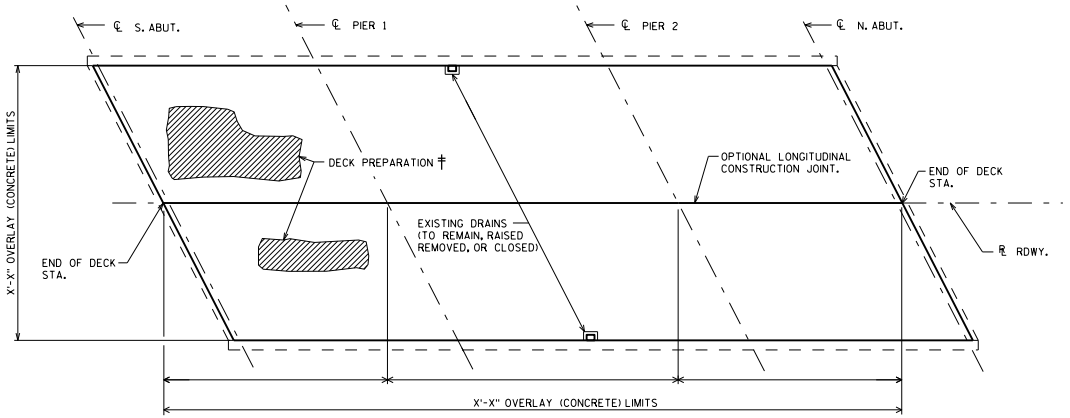
DATE: 1-19

STANDARD 40.28



CROSS SECTION THRU ROADWAY

LOOKING NORTH



PLAN

TOP OF DECK SHOWN

‡ SURVEY TYPE:
SURVEY COMPLETED DATE: __/__/____

DESIGN DATA

LIVE LOAD:

INVENTORY RATING; HS-
OPERATING RATING; HS - ---
MAXIMUM STANDARD PERMIT VEHICLE LOAD = --- KIPS

MATERIAL PROPERTIES:

CONCRETE MASONRY OVERLAY DECKS f'c = 4,000 P.S.I.

NOTES

DRAWINGS SHALL NOT BE SCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

PROTECTIVE SURFACE TREATMENT SHALL BE APPLIED TO THE ENTIRE TOP SURFACE OF THE NEW CONCRETE OVERLAY.

SEAL OVERLAY CONSTRUCTION JOINTS ACCORDING TO SECTION 502.3.13.1 OF THE STANDARD SPECIFICATIONS. COST INCIDENTAL TO BID ITEM "CONCRETE MASONRY OVERLAY DECKS"

A MINIMUM OF 1-INCH OF CONCRETE SHALL BE REMOVED FROM THE ENTIRE BRIDGE DECK UNDER THE BID ITEM "CLEANING DECKS".

THE AVERAGE OVERLAY THICKNESS IS BASED ON THE MINIMUM OVERLAY THICKNESS PLUS ½-INCH TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE.

PREPARATION DECKS TYPE 1, PREPARATION DECKS TYPE 2, AND FULL-DEPTH DECK REPAIR AREAS ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY OVERLAY DECKS".

ANY EXCAVATION REQUIRED TO COMPLETE THE OVERLAY OR JOINT REPAIRS AT THE ABUTMENTS TO BE CONSIDERED INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS".

PROFILE GRADE LINE SHALL BE DETERMINED IN THE FIELD BASED ON A MINIMUM OVERLAY THICKNESS OF 1½" PLACED ABOVE THE DECK SURFACE AFTER SURFACE PREPARATION. EXPECTED AVERAGE OVERLAY THICKNESS IS 2" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN ½", CONTACT THE STRUCTURES DESIGN SECTION.

DRAINS REMOVED OR CLOSED IS INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS".

DESIGNER NOTES

PLAN VIEW APPLICABLE TO ALL OVERLAY METHODS AND DECK REPAIRS WITHOUT OVERLAYS.

FOR CROSS SECTIONS NOT IN SUPERELEVATION TRANSITIONS, THE PREFERRED MINIMUM SLOPE IS 2%.

PROVIDE AN AVERAGE OVERLAY THICKNESS ON THE PLANS. THE AVERAGE OVERLAY THICKNESS IS THE THE MINIMUM OVERLAY THICKNESS PLUS ½" TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE. CHANGES IN CROSS-SLOPE INCREASE THE AVERAGE OVERLAY THICKNESS. QUANTITIES ARE BASED ON THE AVERAGE OVERLAY THICKNESS.

DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

DO NOT INCLUDE BID ITEM "SAWING PAVEMENT DECK PREPARATION AREAS" FOR DECK PREPARATION.

⁎ REMOVAL OF 1" OF EXISTING DECK UNDER BID ITEM "CLEANING DECKS" IS NOT INTENDED FOR PREVIOUSLY OVERLAID DECKS. EXISTING CONCRETE COVER (1" MIN.) SHALL BE MAINTAINED AND CONSIDERED WHEN DETERMINING CONCRETE REMOVALS. INCLUDE THE BID ITEM "CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY" WHEN REMOVING EXISTING OVERLAY.

‡ PROVIDE (IF AVAILABLE) DECK CONDITION ASSESSMENT SURVEY ON PLANS. INCLUDE SURVEY TYPE AND DATE COMPLETED.

JOINT REPAIR AREAS SHOULD NOT BE INCLUDED IN DECK REPAIR AREAS OR OVERLAY QUANTITES. SEE STANDARD 40.04.

INCLUDE THE BID ITEM "ADJUSTING FLOOR DRAINS" WHEN DRAINS ARE TO BE RAISED.

RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

TOTAL ESTIMATED QUANTITIES

	BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
	502.3200	PROTECTIVE SURFACE TREATMENT	SY	
	509.0301	PREPARATION DECKS TYPE 1	SY	
	509.0302	PREPARATION DECKS TYPE 2	SY	
	509.0500	CLEANING DECKS	SY	
	509.2000	FULL-DEPTH DECK REPAIR	SY	
	509.2500	CONCRETE MASONRY OVERLAY DECKS	CY	
		POSSIBLE ADDITIONAL BID ITEMS		
	502.3210	PIGMENTED SURFACE SEALER	SY	
⁎	509.0505.S	CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY	SY	
⁎	509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)	SY	
	514.0900	ADJUSTING FLOOR DRAINS	EACH	

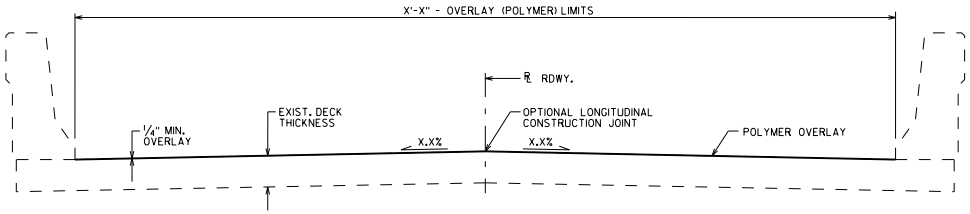
THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

CONCRETE OVERLAY

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18



CROSS SECTION THRU ROADWAY

LOOKING NORTH

DESIGNER NOTES

REPAIRS USING CONCRETE REQUIRE A MINIMUM CURE TIME OF 28 DAYS BEFORE PLACING OVERLAY. WHEN DEEMED ABSOLUTELY NECESSARY (BY REGION AND BOS DESIGN STAFF) "RAPID SET DECK REPAIR" MAY BE USED IN LIEU OF "CONCRETE MASONRY DECK REPAIR" TO SHORTEN TIME REQUIRED FOR PLACING OVERLAY.

DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

POLYMER OVERLAYS SHALL NOT BE PLACED ON CONCRETE APPROACHES.

REHABILITATION OVERLAY

DESIGN DATA

LIVE LOAD:

INVENTORY RATING: HS-___
OPERATING RATING: HS- ___
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ___ KIPS

MATERIAL PROPERTIES:

CONCRETE MASONRY - DECK PATCHING f'c = 4,000 P.S.I.

NOTES

DRAWINGS SHALL NOT BE SCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

DECK SURFACE PREPARATION IS INCLUDED IN THE BID ITEM "POLYMER OVERLAY".

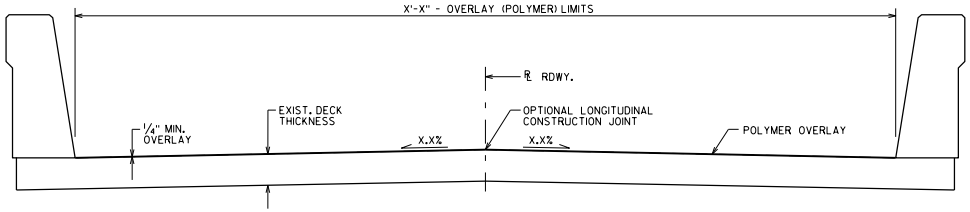
AREAS OF "PREPARATION DECKS TYPE 1" SHALL BE DEFINED BY A SAW CUT.

PREPARATION DECKS TYPE 1, PREPARATION DECKS TYPE 2, AND FULL-DEPTH DECK REPAIR AREAS ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY DECK REPAIR".

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
509.2000	FULL-DEPTH DECK REPAIR	SY	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
509.5100.S	POLYMER OVERLAY	SY	
	POSSIBLE BID ITEM		
SPV.0035	RAPID SET DECK REPAIR	CY	

THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.



CROSS SECTION THRU ROADWAY

LOOKING NORTH

DESIGNER NOTES

PREVENTATIVE OVERLAY INTENDED FOR USE ON DECKS WITH A MINIMUM AGE OF 28 DAYS AND A MAXIMUM AGE OF 2 YEARS. AN ADDITIONAL CONTRACT MAY BE REQUIRED FOR APPLYING THE OVERLAY DUE TO SCHEDULE AND DECK AGE CONSIDERATIONS.

WHEN BID ITEM "POLYMER OVERLAY" IS USED RATING SHOULD INCLUDE THE 5 PSF OVERLAY.

POLYMER OVERLAYS SHALL NOT BE PLACED ON CONCRETE APPROACHES.

PREVENTATIVE OVERLAY

DESIGN DATA

LIVE LOAD:

DESIGN LOADING: HL-93
INVENTORY RATING FACTOR: RF=1.__
OPERATING RATING FACTOR: RF=1.__
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ___ KIPS

STRUCTURE IS DESIGNED FOR A FUTURE WEARING SURFACE OF 20 POUNDS PER SQUARE FOOT.

NOTES

DRAWINGS SHALL NOT BE SCALED.

DECK SURFACE PREPARATION IS INCLUDED IN THE BID ITEM "POLYMER OVERLAY".

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.5100.S	POLYMER OVERLAY	SY	

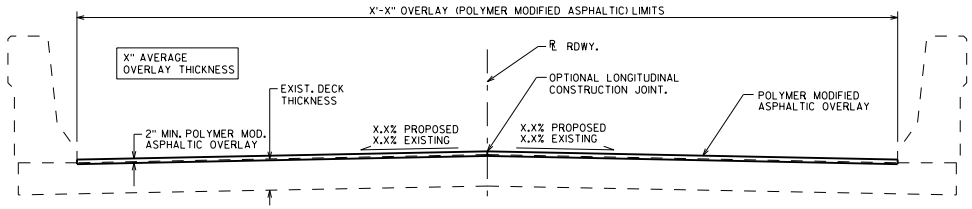
POLYMER OVERLAY

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-19

POLYMER MODIFIED ASPHALTIC OVERLAY



CROSS SECTION THRU ROADWAY

LOOKING NORTH

DESIGNER NOTES

CONCRETE OVERLAYS ARE THE CURRENT PREFERRED METHOD TO OVERLAY A BRIDGE.

REPAIRED AREAS REQUIRE A MINIMUM CURE TIME OF 7 DAYS BEFORE PLACING OVERLAY. ALTERNATIVES TO CONCRETE DECK PATCHES MAY BE USED TO SHORTEN TIME REQUIRED FOR PLACING OVERLAY.

PROVIDE AN AVERAGE OVERLAY THICKNESS ON THE PLANS. THIS AVERAGE OVERLAY THICKNESS VALUE IS BASED ON THE THEORETICAL AVERAGE OVERLAY THICKNESS PLUS ½" TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE. QUANTITIES ARE BASED ON THE AVERAGE OVERLAY THICKNESS.

DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

OVERLAYS NOT REQUIRING SHEET MEMBRANE WATERPROOFING ARE PREFERRED.

DESIGNER TO CONTACT THE REGIONAL BRIDGE MAINTENANCE ENGINEER TO DETERMINE IF POLYMER MODIFIED ASPHALTIC MATERIAL IS AVAILABLE.

RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
509.2000	FULL-DEPTH DECK REPAIR	SY	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
509.3500.S	HMA OVERLAY POLYMER-MODIFIED	TON	
	POSSIBLE ADDITIONAL BID ITEMS		
509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)	SY	
509.9010.S	REMOVING ASPHALTIC CONCRETE DECK OVERLAY (STRUCTURE)	SY	

THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

DESIGN DATA

LIVE LOAD:

INVENTORY RATING; HS-___
OPERATING RATING; HS- ___
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ___ KIPS

MATERIAL PROPERTIES:

CONCRETE MASONRY - DECK PATCHING f'c = 4,000 P.S.I.

NOTES

DRAWINGS SHALL NOT BE SCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

AREAS OF "PREPARATION DECKS TYPE 1" SHALL BE DEFINED BY A SAW CUT.

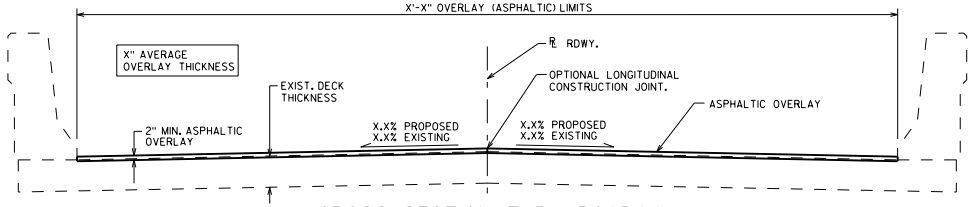
PREPARATION DECKS TYPE 1, PREPARATION DECKS TYPE 2, AND FULL-DEPTH DECK REPAIR AREAS ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY DECK REPAIR".

ANY EXCAVATION REQUIRED TO COMPLETE THE OVERLAY OR JOINT REPAIR AT THE ABUTMENTS TO BE CONSIDERED INCIDENTAL TO THE BID ITEM "HMA OVERLAY POLYMER-MODIFIED".

THE PLAN QUANTITY FOR THE BID ITEM "HMA OVERLAY POLYMER-MODIFIED" IS BASED ON THE AVERAGE OVERLAY THICKNESS.

PROFILE GRADE LINE SHALL BE DETERMINED IN THE FIELD BASED ON A MINIMUM OVERLAY THICKNESS OF 2" PLACED ABOVE THE DECK SURFACE. EXPECTED AVERAGE OVERLAY THICKNESS IS 2½" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN ½", CONTACT THE STRUCTURES DESIGN SECTION.

ASPHALTIC OVERLAY



CROSS SECTION THRU ROADWAY

LOOKING NORTH

DESIGNER NOTES

CONCRETE OVERLAYS ARE THE CURRENT PREFERRED METHOD TO OVERLAY A BRIDGE.

REPAIRS USING CONCRETE REQUIRE A MINIMUM CURE TIME OF 7 DAYS BEFORE PLACING OVERLAY. ALTERNATIVES TO CONCRETE DECK PATCHES MAY BE USED TO SHORTEN TIME REQUIRED FOR PLACING OVERLAY.

PROVIDE AN AVERAGE OVERLAY THICKNESS ON THE PLANS. THIS AVERAGE OVERLAY THICKNESS VALUE IS BASED ON THE THEORETICAL AVERAGE OVERLAY THICKNESS PLUS ½" TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE. QUANTITIES ARE BASED ON THE AVERAGE OVERLAY THICKNESS.

DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

OVERLAYS NOT REQUIRING SHEET MEMBRANE WATERPROOFING ARE PREFERRED.

COORDINATE WITH REGION BRIDGE MAINTENANCE AND ROADWAY ENGINEERS FOR THE ASPHALTIC DESIGN AND QUANTITIES.

RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
455.0605	TACK COAT	GAL	
460.1XXX	HMA PAVEMENT (INSERT TYPE)	TON	
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
509.2000	FULL-DEPTH DECK REPAIR	SY	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
	POSSIBLE ADDITIONAL BID ITEMS		
509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)	SY	
509.9010.S	REMOVING ASPHALTIC CONCRETE DECK OVERLAY (STRUCTURE)	SY	

THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

DESIGN DATA

LIVE LOAD:

INVENTORY RATING; HS-___
OPERATING RATING; HS- ___
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ___ KIPS

MATERIAL PROPERTIES:

CONCRETE MASONRY - DECK PATCHING f'c = 4,000 P.S.I.

NOTES

DRAWINGS SHALL NOT BE SCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

AREAS OF "PREPARATION DECKS TYPE 1" SHALL BE DEFINED BY A SAW CUT.

PREPARATION DECKS TYPE 1, PREPARATION DECKS TYPE 2, AND FULL-DEPTH DECK REPAIR AREAS ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY DECK REPAIR".

ANY EXCAVATION REQUIRED TO COMPLETE THE OVERLAY OR JOINT REPAIR AT THE ABUTMENTS TO BE CONSIDERED INCIDENTAL TO THE BID ITEM "HMA PAVEMENT TYPE E-X".

THE PLAN QUANTITY FOR THE BID ITEM "HMA PAVEMENT TYPE E-X" IS BASED ON THE AVERAGE OVERLAY THICKNESS.

PROFILE GRADE LINE SHALL BE DETERMINED IN THE FIELD BASED ON A MINIMUM OVERLAY THICKNESS OF 2" PLACED ABOVE THE DECK SURFACE. EXPECTED AVERAGE OVERLAY THICKNESS IS 2½" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN ½", CONTACT THE STRUCTURES DESIGN SECTION.

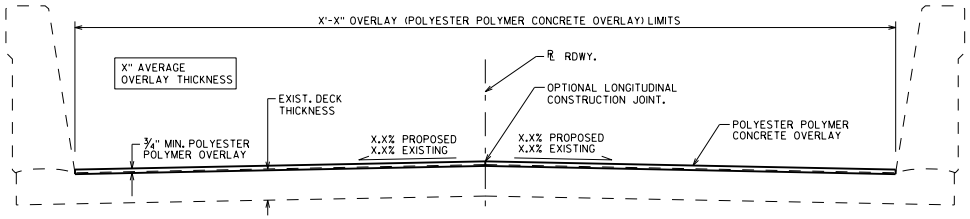
POLYMER MODIFIED ASPHALTIC AND ASPHALTIC OVERLAYS

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 40.33



CROSS SECTION THRU ROADWAY

LOOKING NORTH

DESIGN DATA

LIVE LOAD:

INVENTORY RATING: HS-___
OPERATING RATING: HS- ___
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ___ KIPS

NOTES

DRAWINGS SHALL NOT BE SCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

DESIGNER NOTES

USE OF POLYESTER POLYMER CONCRETE OVERLAYS ARE LIMITED. SEE 40.5 IN THE BRIDGE MANUAL FOR ADDITIONAL GUIDANCE.

SPECIAL PROVISIONS, NOTES, AND DESIGNER NOTES ARE STILL UNDER DEVELOPMENT.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
	POSSIBLE ADDITIONAL BID ITEMS		

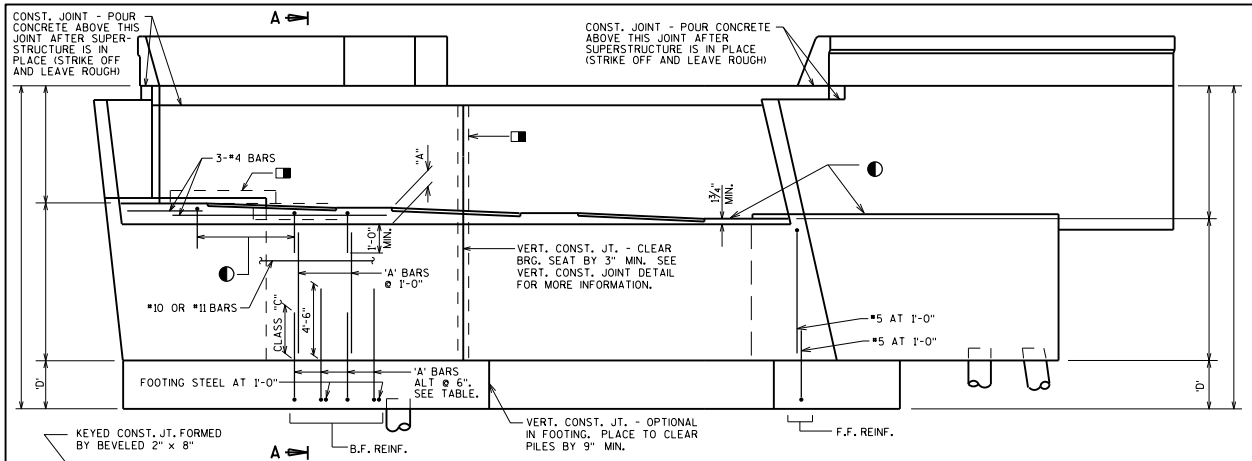
THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

POLYESTER POLYMER CONCRETE OVERLAY

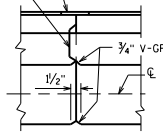
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18



FRONT ELEVATION



VERT. CONST. JOINT

$P = \gamma_{DC}(P_{DC}) + \gamma_{DW}(P_{DW}) + \gamma_{LL}(P_{LL})$

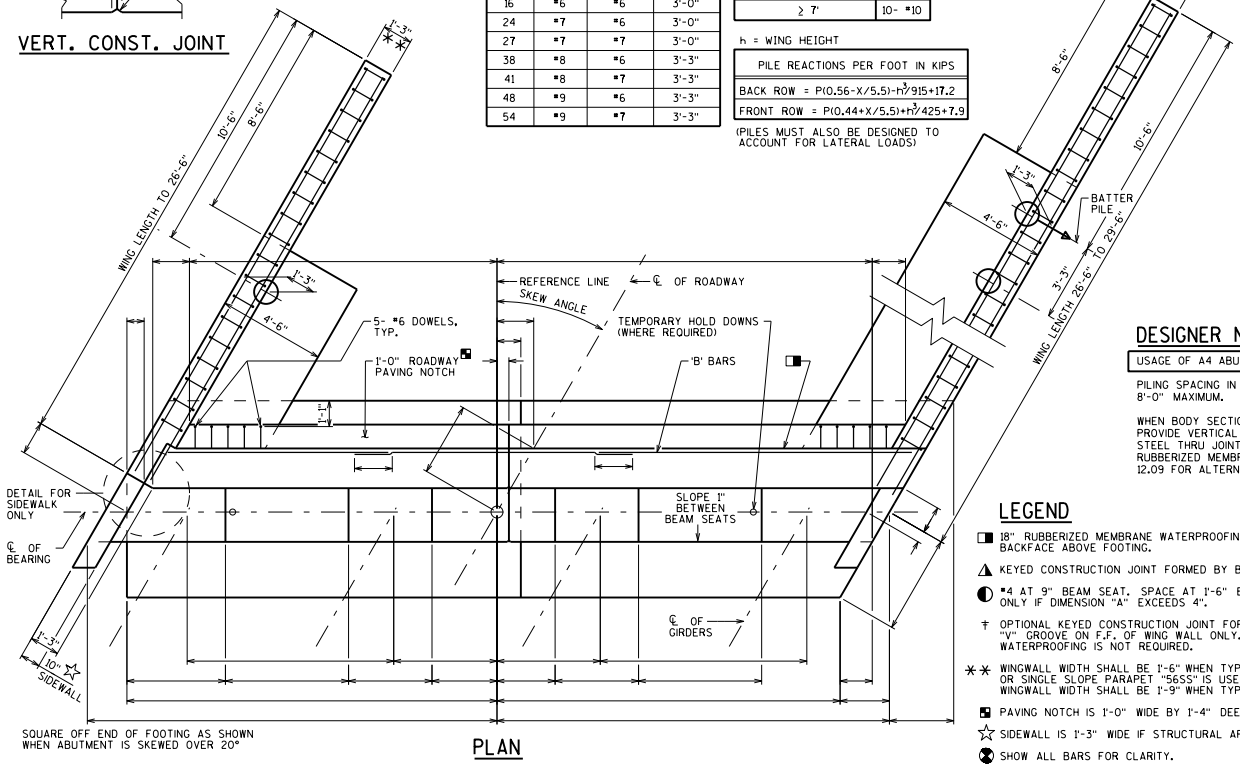
'P' K/FT	'A' BAR SIZE	FOOTING STEEL SIZE	FOOTING DEPTH 'D'
16	#6	#6	3'-0"
24	#7	#6	3'-0"
27	#7	#7	3'-0"
38	#8	#6	3'-3"
41	#8	#7	3'-3"
48	#9	#6	3'-3"
54	#9	#7	3'-3"

ABUTMENT BODY DEPTH	'B' BARS
< 7'	9- #11
≥ 7'	10- #10

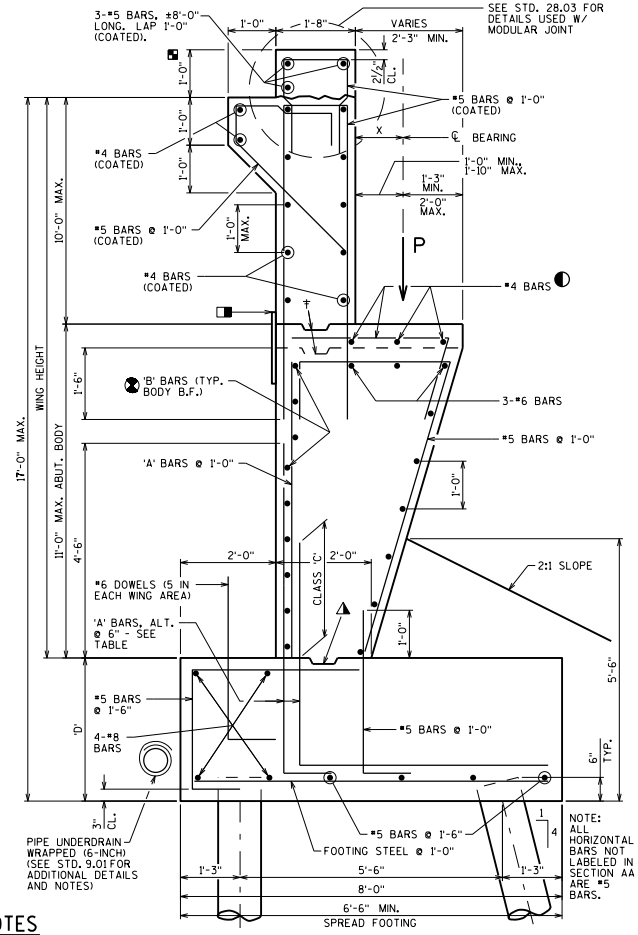
h = WING HEIGHT

PILE REACTIONS PER FOOT IN KIPS
BACK ROW = $P(0.56-X/5.5)-h^2/915+17.2$
FRONT ROW = $P(0.44+X/5.5)+h^2/425+7.9$

(PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS)



PLAN



SECTION A-A

DESIGNER NOTES

USAGE OF A4 ABUTMENTS IS DISCONTINUED.

PILING SPACING IN ABUTMENT FOOTING SHALL BE 8'-0" MAXIMUM.

WHEN BODY SECTION IS MORE THAN 50'-0"± LONG, PROVIDE VERTICAL CONSTRUCTION JOINT. RUN BAR STEEL THRU JOINT, SEAL JOINT WITH 18" RUBBERIZED MEMBRANE WATERPROOFING. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.

DESIGNER NOTES CONT'D

IN "FRONT ELEVATION" VIEW, GIVE ELEVATION OF ALL BEARING AREAS AND ELEVATION AT BOTTOM OF PARAPETS AT EACH END OF WINGS. ALL ELEVATIONS ARE TAKEN AT FRONT FACE OF BACKWALL.

LAP LENGTHS FOR HORIZONTAL BARS SHALL BE BASED ON A "CLASS C" TOP TENSION LAP SPLICE.

PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

SEE STD. 12.03 FOR ADDITIONAL DETAILS.

ABUTMENT DETAILED WITHOUT STRUCTURAL APPROACH SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH DETAILS.

LEGEND

- 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZ. AND VERT. JOINTS ON BACKFACE ABOVE FOOTING.
- KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".
- #4 AT 9" BEAM SEAT. SPACE AT 1'-6" BETWEEN SEATS. THIS STEEL IS REQUIRED ONLY IF DIMENSION "A" EXCEEDS 4".
- † OPTIONAL KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6". USE 3/4" "V" GROOVE ON F.F. OF WING WALL ONLY. IF JOINT IS NOT USED, WATERPROOFING IS NOT REQUIRED.
- ** WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX", OR SINGLE SLOPE PARAPET "S6SS" IS USED. "S6SS" SHOULD NOT BE USED ON A SIDEWALK. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
- PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SHOW ALL BARS FOR CLARITY.

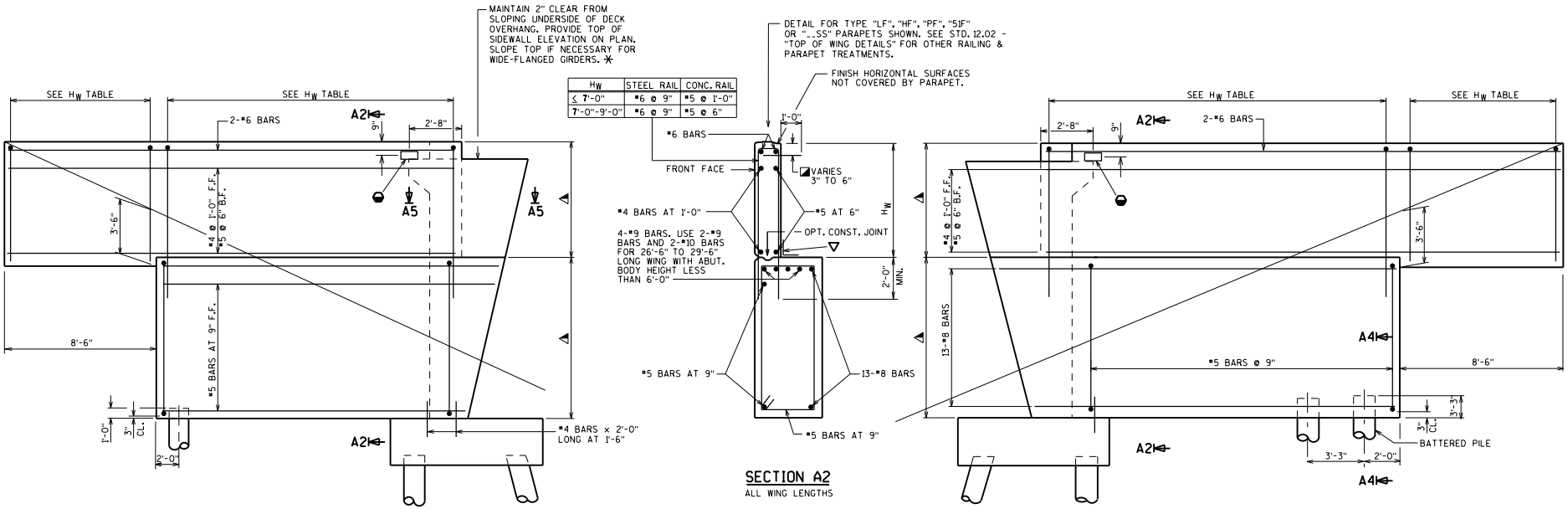
ABUTMENT A4 PILE FOOTING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

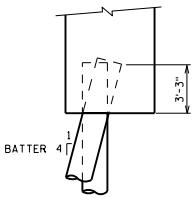
STANDARD 40.40



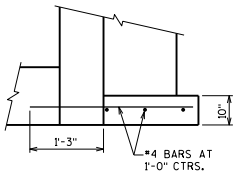
WING ELEVATION
WING LENGTH TO 26'-6"

SECTION A2
ALL WING LENGTHS

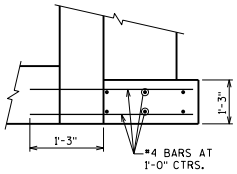
WING ELEVATION
WING LENGTH OVER 26'-6" TO 29'-6"



SECTION A4



SECTION A5
(WITHOUT STRUCTURAL APPROACH SLAB)



SECTION A5
(WITH STRUCTURAL APPROACH SLAB)

DESIGNER NOTES

USAGE OF A4 ABUTMENTS IS DISCONTINUED.

BODY DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F., A 1'-6" SURCHARGE, AND SUPERSTRUCTURE REACTIONS "P".

WING DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 35 P.C.F. AND A 2'-0" SURCHARGE. A 5 KIP LATERAL RESISTANCE IS USED FOR EACH WING PILE.

FRONT ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH γ_{pEH} = 1.50, AND SUPERSTRUCTURE REACTIONS "P". BACK ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 20 P.C.F. WITH $\gamma_{pEH_{MIN.}}$ = 0.90, AND "P".

UNIT WEIGHT OF SOIL IS ASSUMED AS 120 P.C.F.

BRIDGE SEATS BETWEEN BEARINGS SHALL SLOPE 1" FROM FRONT FACE OF BACKWALL.

PAY LIMITS FOR EXCAVATION FOR STRUCTURES & GRANULAR BACKFILL IS SHOWN IN CHAPTER 12 OF THE BRIDGE MANUAL.

BARS IN WINGS, ABUTMENT BACKWALL, AND PAVING BLOCK SHALL BE EPOXY COATED.

◒ NAME PLATE (ONLY FOR TYPE "W", "M", NY3&4 OR TIMBER RAIL AS SHOWN ON STANDARD 30.24), LOCATE NAME PLATE ON FIRST RIGHT WING TRAVELING UP STATION.

FOR MODULAR EXPANSION JOINTS W/CONC. DIAPH. RUNNING TO EDGE OF DECK: IF SIDEWALL IS USED, FORM SIDEWALL 2" BELOW CONC. DIAPH.

◪ #4 DOWELS (COATED), 2'-0" LONG AT 1'-0" CTRS. FROM WING TIP TO PAVING NOTCH. PLACE IN WING ADJACENT TO SURFACE DRAIN APRON ONLY.

◭ DIMENSIONS TO BE CONSTANT.

▽ 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.

✳ ABUTMENT DETAILED WITHOUT STRUCTURAL APPROACH SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH DETAILS.

LRFD DESIGN LOADS

LIVE LOAD
BODY = 1'-6" SURCHARGE
WINGS = 2'-0" SURCHARGE
HORIZ. EARTH LOAD BASED ON:
BODY = 40 P.C.F. EQUIV. FLUID UNIT WGT. OF SOIL
WINGS = 35 P.C.F. EQUIV. FLUID UNIT WGT. OF SOIL
LOAD FACTORS:
γ_{pDC} = 1.25
γ_{pDW} = 1.50
γ_{pEH} = 1.50
$\gamma_{pEH\ MIN.}$ = 0.90
γ_{pEV} = 1.35
γ_{LL} = 1.75
EXPOSURE CLASS 2, γ_E = 0.75
f_y = 60,000 P.S.I.
f'_c = 3,500 P.S.I.

ABUTMENT A4 PILE FOOTING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18

STANDARD 40.41