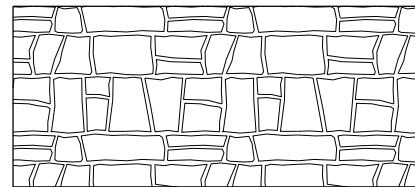


BROKEN RIB

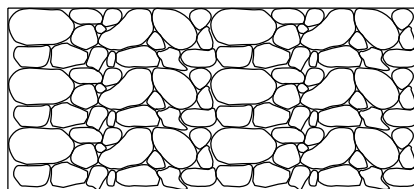
FORMLINER THICKNESS = 3" ± 1/2"
 WIDTH = 2" ± 1/2"
 MAX. RELIEF = 2" ± 1/2"



RUSTIC ASHLAR

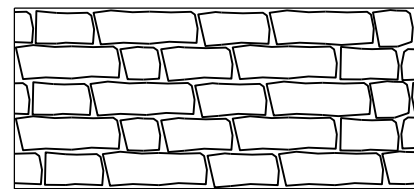
FORMLINER THICKNESS = 3"
 SIZE = 8" TO 32"
 MAX. RELIEF = 2"

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



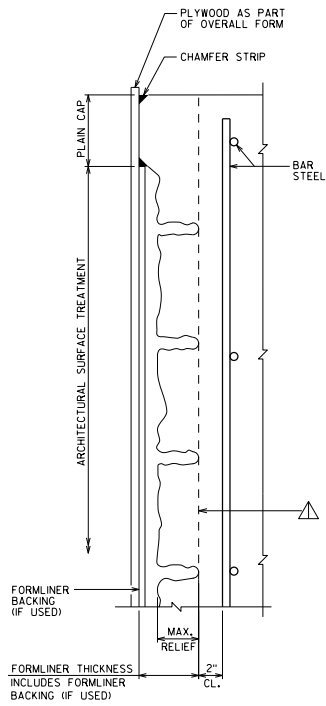
FIELD STONE - RANDOM

FORMLINER THICKNESS = 3 1/2"
 SIZES BETWEEN 6" & 24"
 MAX. RELIEF = 2 1/2"



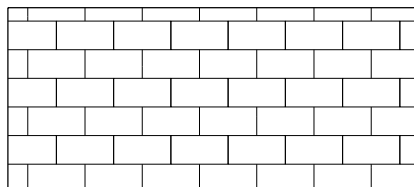
RECTANGULAR CUT STONE

FORMLINER THICKNESS = 4" TO 5 1/2"
 COURSE HEIGHT = ± 2"
 MAX. RELIEF = 3" TO 4 1/2"



SECTION THRU FORMLINER

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



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.

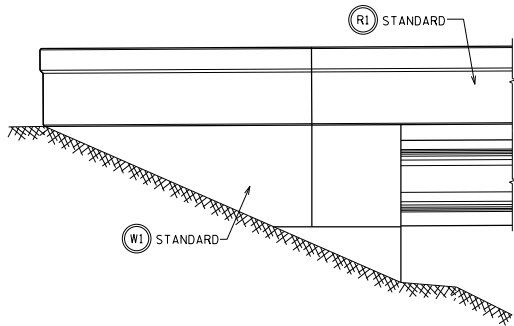
THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS.

WRAPAROUND/MATCH FORMLINER PATTERN AT CORNERS.

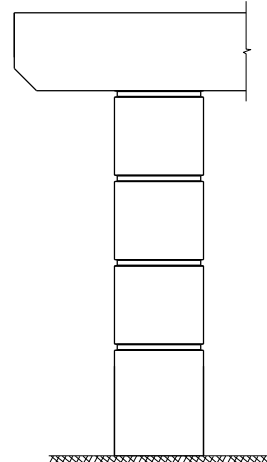
PARAPET NOTES

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

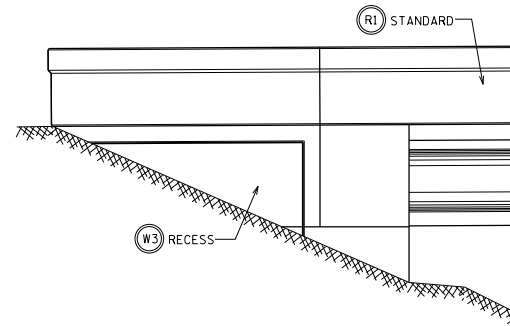
FORMLINER DETAILS	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: 7-16



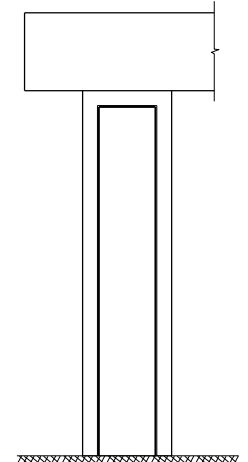
TYPE I



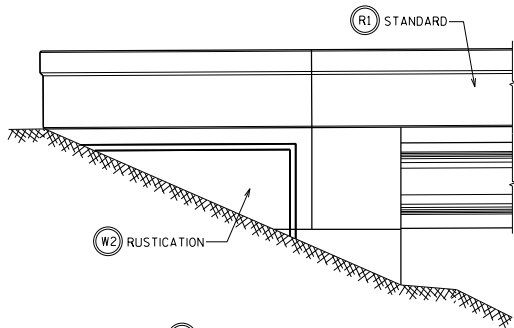
(P1) SINGLE RUSTICATION LINES



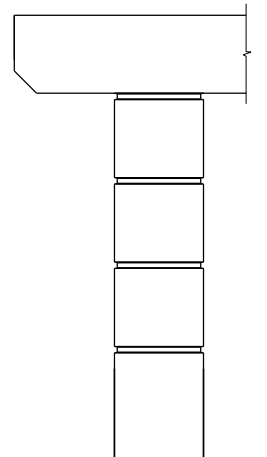
TYPE III



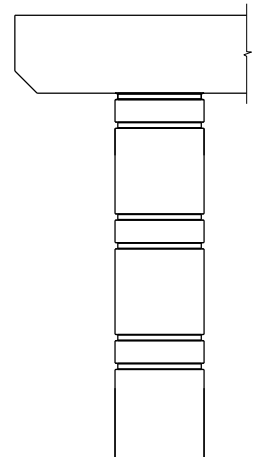
(P3) RECESSED PANEL



TYPE II



(P1) SINGLE RUSTICATION LINES



(P2) DOUBLE RUSTICATION LINES

(R2) DOUBLE RUSTICATION LINES
(SINGLE RUSTICATION LINE ON
32SS PARAPET MAY ALSO BE USED)

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.

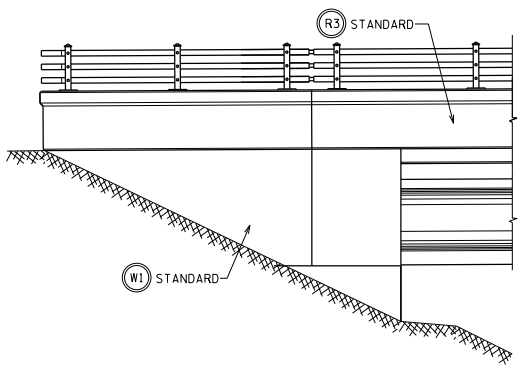
ONLY THE CHOICE OF PARAPET, WING AND PIER DETAILS SHOWN FOR A GIVEN TYPE SHOULD BE USED FOR THAT TYPE.

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

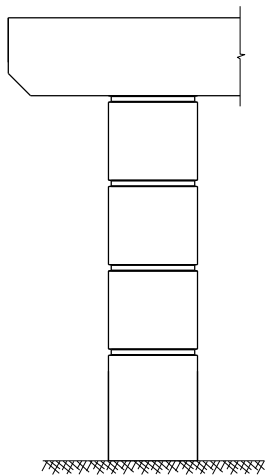
SEE STANDARDS 4.04 AND 4.05 FOR ADDITIONAL DETAILS.

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

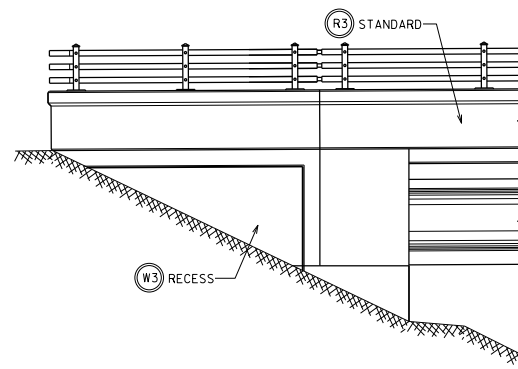
AESTHETIC CONCEPTS WITHOUT PEDESTRIAN ACCOMMODATIONS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-15



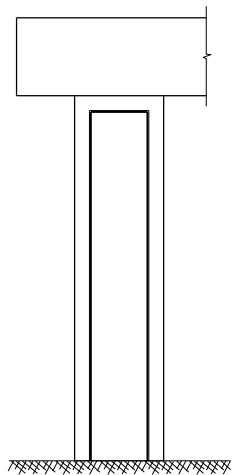
TYPE I



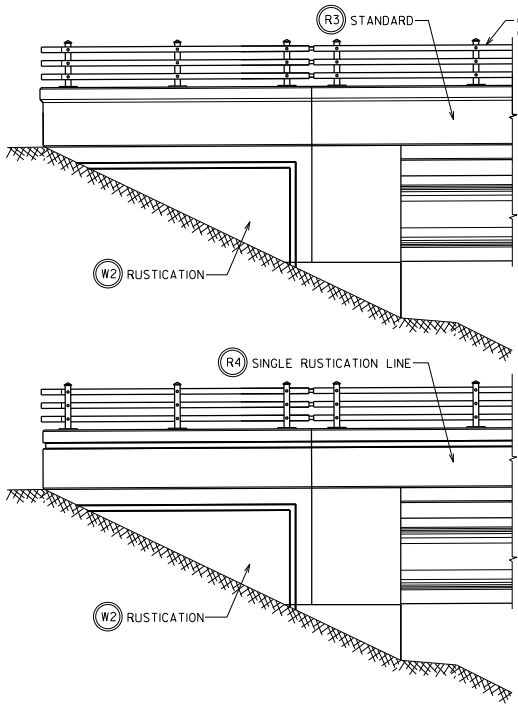
(P1) SINGLE RUSTICATION LINES



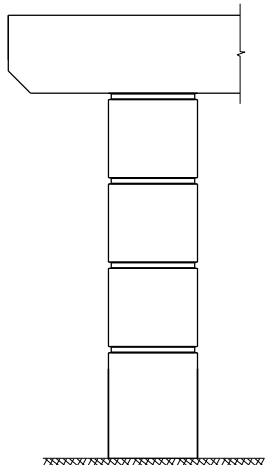
TYPE III



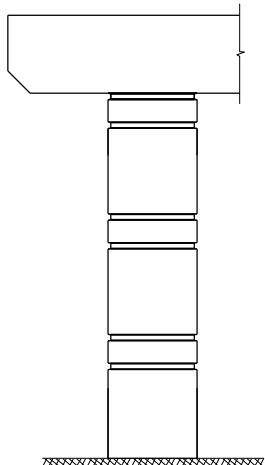
(P3) RECESSED PANEL



TYPE II



(P1) SINGLE RUSTICATION LINES



(P2) DOUBLE RUSTICATION LINES

COMBINATION RAILING TYPE '3T'
(SEE 'DESIGNER NOTES')

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.

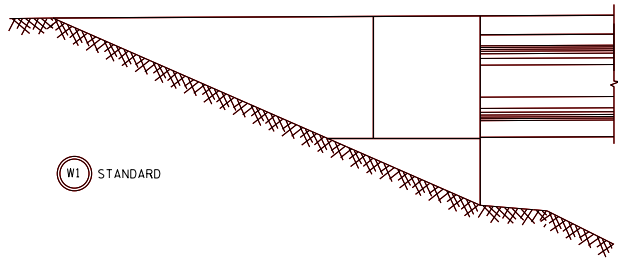
WINGS PARALLEL TO CENTERLINE OF ABUTMENT (ELEPHANT EAR) ARE TO BE PLAIN (TYPE I).

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

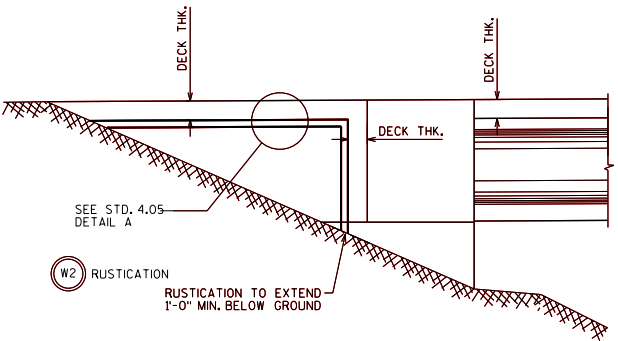
SEE STANDARDS 4.04 AND 4.05 FOR ADDITIONAL DETAILS.

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

AESTHETIC CONCEPTS WITH PEDESTRIAN ACCOMMODATIONS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-15

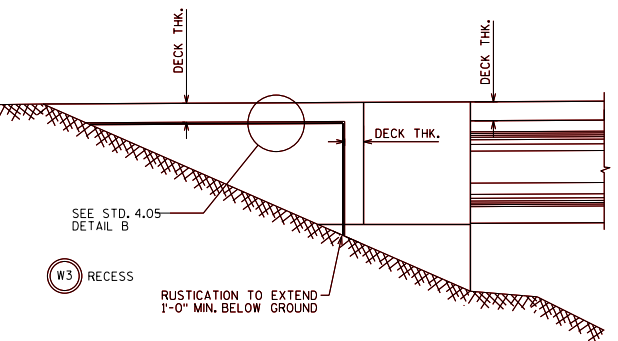


W1 STANDARD



W2 RUSTICATION

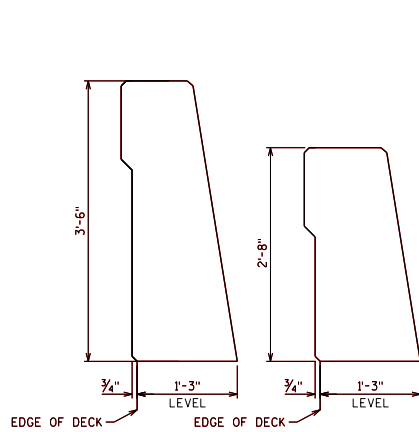
RUSTICATION TO EXTEND
1'-0" MIN. BELOW GROUND



W3 RECESS

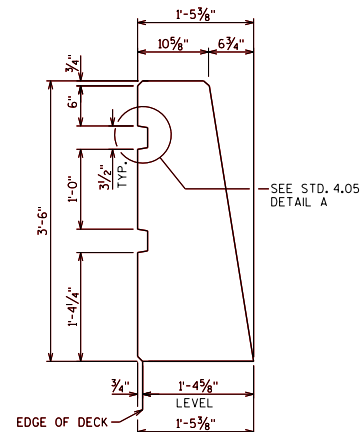
RUSTICATION TO EXTEND
1'-0" MIN. BELOW GROUND

WING OPTIONS



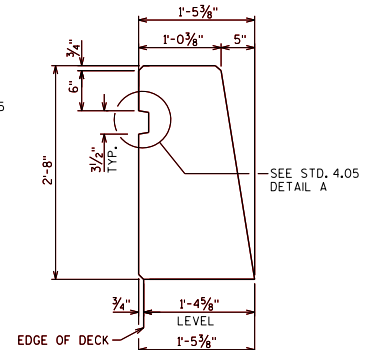
R1 STANDARD

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



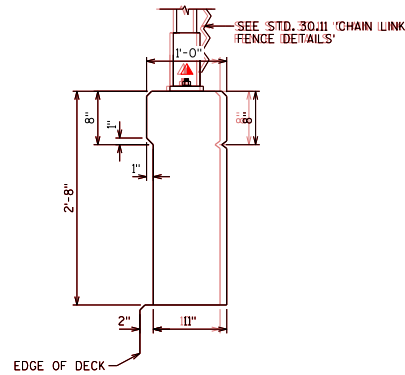
R2 DOUBLE RUSTICATION LINES

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



R2 SINGLE RUSTICATION LINES

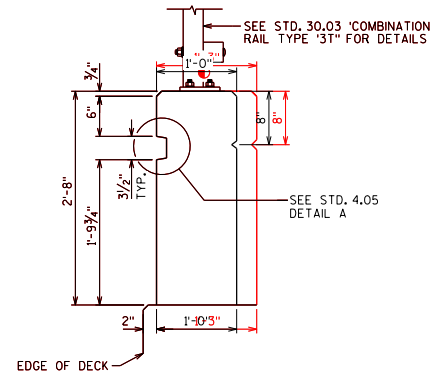
MODIFIED 'SINGLE SLOPE PARAPET 32SS'
(AREA = 3.25 SF, WEIGHT = 488 LB/FT.)



R3 STANDARD

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

▲ USE 1'-3" TOP DIMENSION WHEN USED WITH
'COMBINATION RAIL TYPE '3T'' (AREA = 3.27 SF,
WEIGHT = 474 LB/FT.)



R4 SINGLE RUSTICATION LINES


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

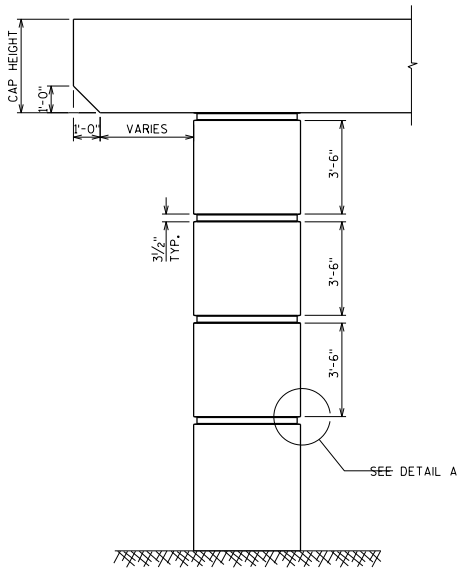
● SEE STD. 30.07 'VERTICAL FACE PARAPET 'A'
FOR DETAILS

PARAPET OPTIONS

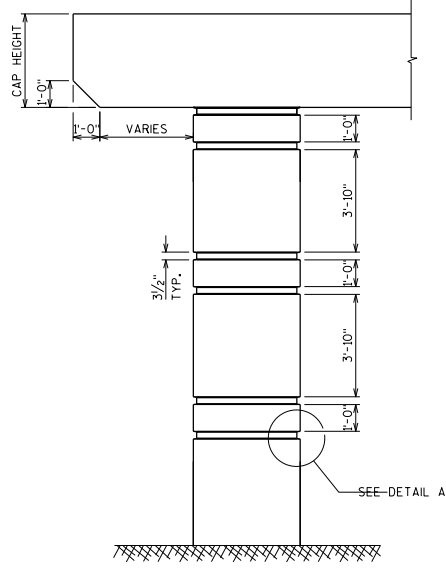
DESIGNER NOTES

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

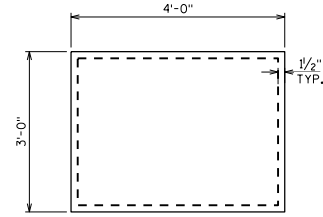
WING & PARAPET AESTHETIC DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-18



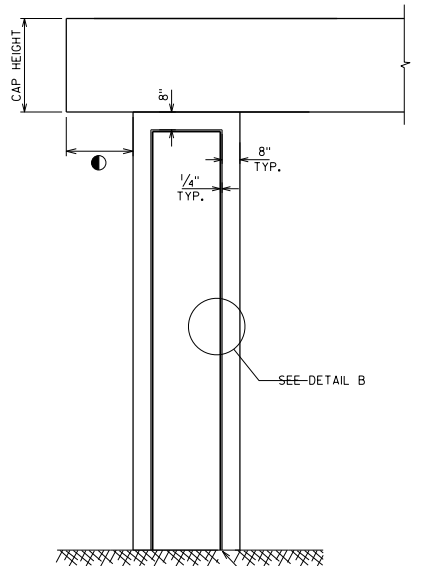
(P1) SINGLE RUSTICATION LINES



(P2) DOUBLE RUSTICATION LINES



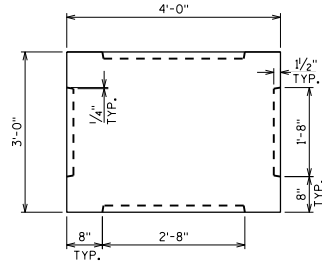
SECTION THRU COLUMN
SINGLE RUSTICATION LINES AND
DOUBLE RUSTICATION LINES



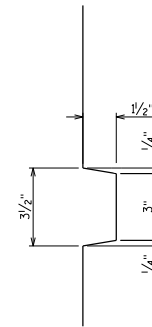
(P3) RECESSED PANEL

EXTEND RECESS 1'-0" MIN.
BELOW GRADE

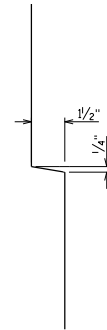
● DIM. = APPROXIMATELY 3/4 CAP HEIGHT




SECTION THRU COLUMN
RECESSED PANEL

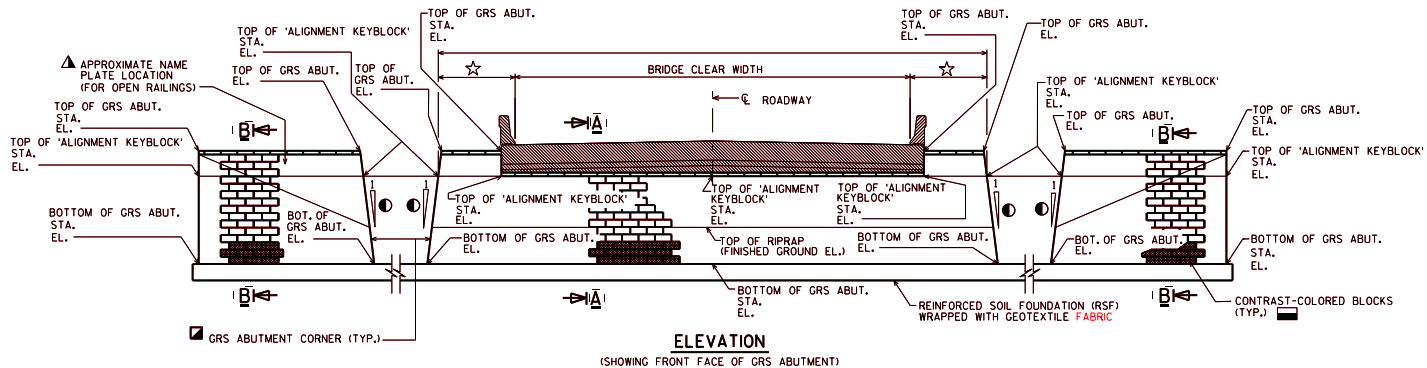
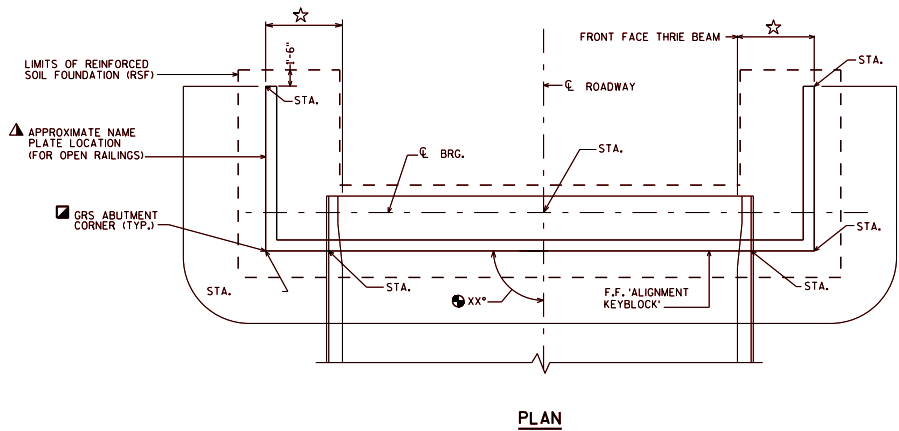


DETAIL A



DETAIL B

MULTI-COLUMNED PIER AESTHETIC DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-15



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

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'.

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.

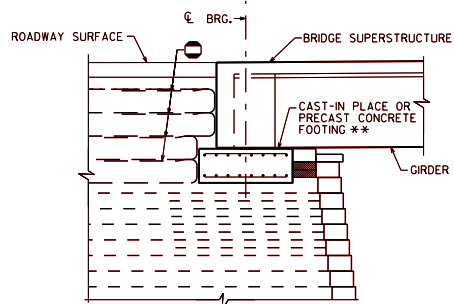
NOTE: STATIONS AND OFFSETS GIVEN AT FRONT FACE OF 'ALIGNMENT KEYBLOCK' AND AT ELEVATION XX.XX. THESE STATIONS AND OFFSETS SHALL BE HELD REGARDLESS OF ACTUAL MODULAR BLOCK SIZE OR GRS ABUTMENT BATTER.

**GRS ABUTMENT
GENERAL PLAN**

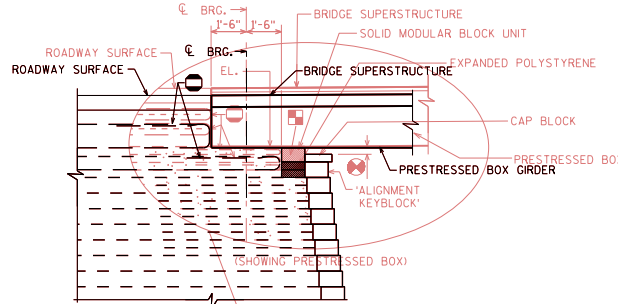
**BUREAU OF
STRUCTURES**

DATE: 7-18

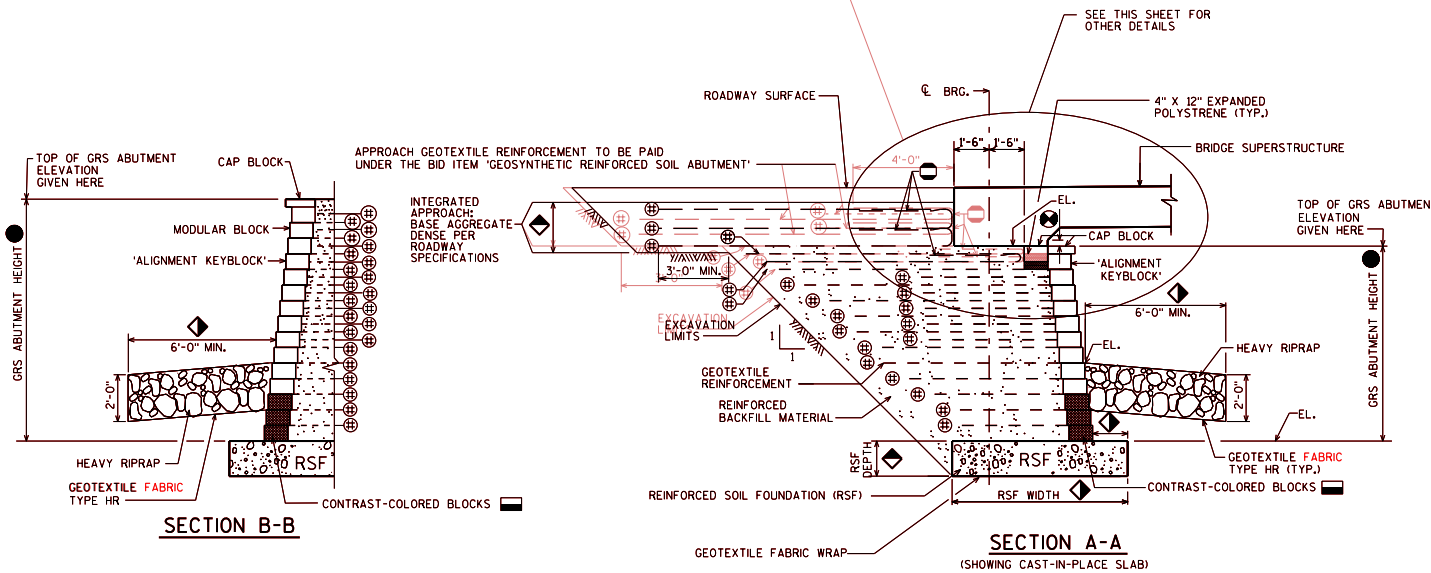
APPROVED: Bill Oliva



SECTION THRU ABUTMENT FOR GIRDERS



SECTION THRU ABUTMENT FOR PRESTRESSED BOX GIRDERS



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

NOTES

- FULL HEIGHT
- ④ FRONT FACE OF 'ALIGNMENT KEYBLOCK' LOCATION TO BE HELD REGARDLESS OF ACTUAL MODULAR BLOCK SIZE OR GRS ABUTMENT BATTER.
- ④ 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.

GRS ABUTMENT INFORMATION

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

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

GRS ABUTMENT DETAILS

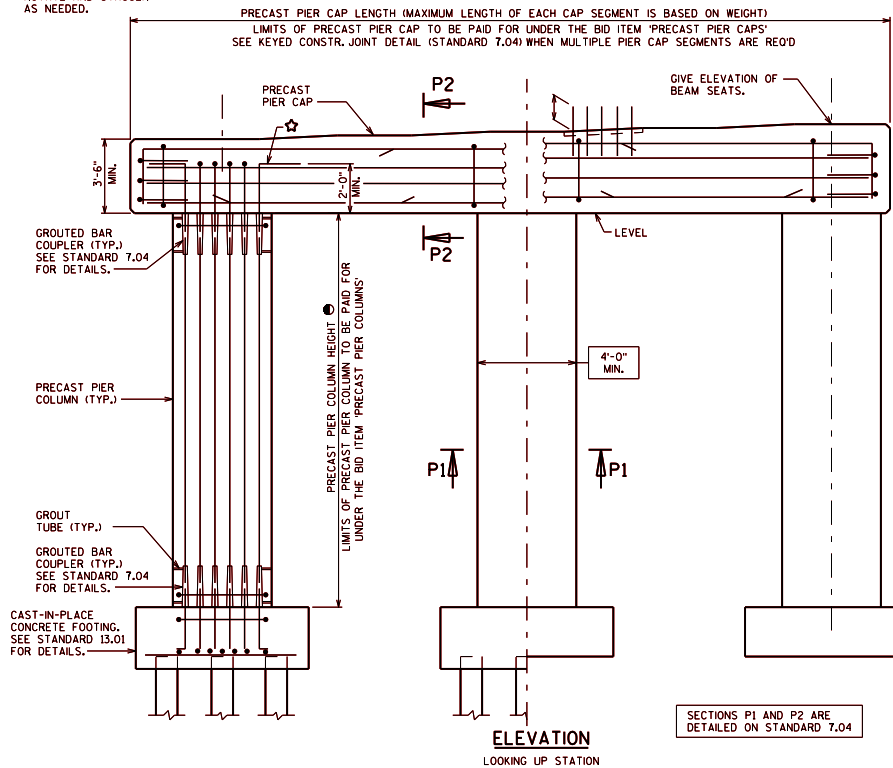


BUREAU OF STRUCTURES

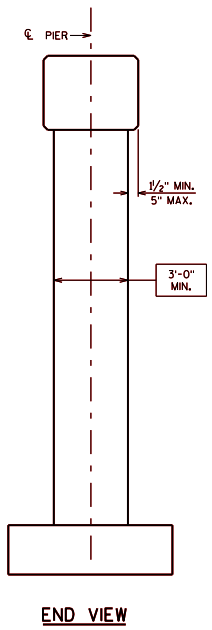
APPROVED: Bill Oliva

DATE: 7-18

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



SECTIONS P1 AND P2 ARE
DETAILED ON STANDARD 7.04



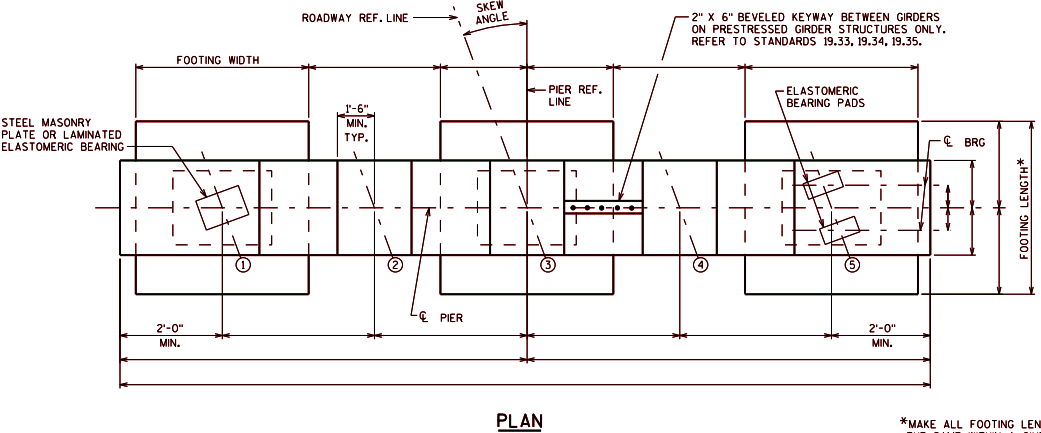
NOTES

- 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 1/2" 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 (S69,0000,91XX)
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/90 MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE. ALTERNATIVES TO CAST-IN-PLACE PIERS: SEE 7.1.4.1.2 IN THE BRIDGE MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE.



*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 $f_y = 60,000$ P.S.I.

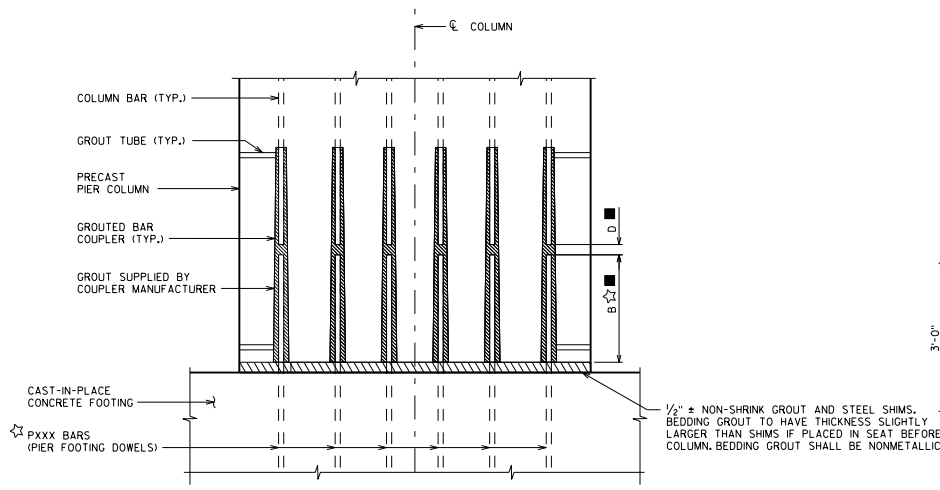
PRECAST PIER CAP AND COLUMNS	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: 1-19

BILL OF BARS

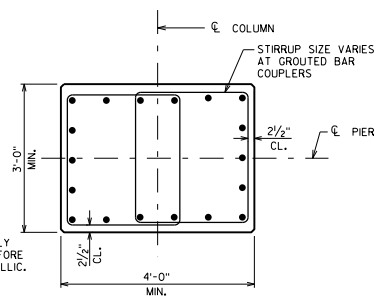
TOTAL COATED: XX LBS

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

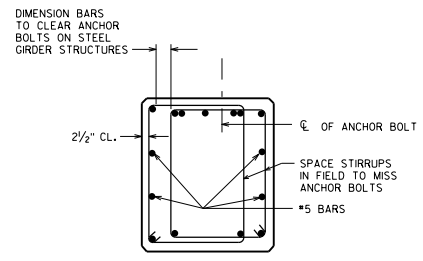
NOTE: THIS BILL OF BARS IS SHOWN FOR INFORMATION ONLY. PAYMENT FOR REINFORCEMENT IN PRECAST COLUMNS AND PRECAST CAP IS INCLUDED IN THE BID ITEMS 'PRECAST PIER COLUMNS' AND 'PRECAST PIER CAPS'.



GRouted BAR COUPLER DETAILS
(PIER COLUMN/FOOTING CONNECTION SHOWN. PIER CAP/COLUMN CONNECTION SIMILAR)

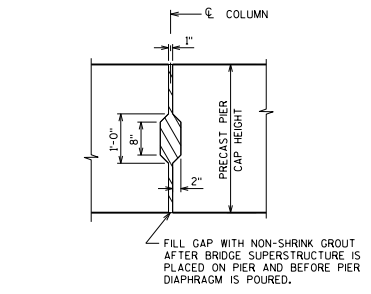


SECTION P1
(PRECAST PIER COLUMN REINF. TO BE DESIGNED BY DESIGN ENGINEER)

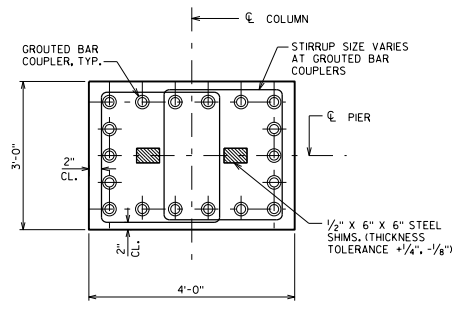


SECTION P2
(PRECAST PIER CAP REINF. TO BE DESIGNED BY DESIGN ENGINEER)

SECTIONS P1 AND P2 ARE CUT ON STANDARD T.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:
- IT IS RECOMMENDED THAT THE ELEMENT WITH THE REINFORCEMENT BARS EXTENDING OUT BE FABRICATED WITH EXTRA BAR LENGTHS.
 - SURVEY LOCATION AND ELEVATION OF LOWER ELEMENT.
 - DETERMINE THE REQUIRED REINFORCING BAR EXTENSION LENGTHS AND THE REQUIRED SHIM HEIGHTS BASED ON THE SURVEY.
 - 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.
 - 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.
 - ERECT UPPER ELEMENT TO WITHIN THE SPECIFIED ERECTION TOLERANCES INDICATED IN THE SPECIAL PROVISIONS. PREVENT BEDDING GROUT FROM FLOWING INTO COUPLER.
 - MAINTAIN INTEGRITY OF GROUT BED DURING SETTING OPERATION. REPAIR GROUT THAT IS DISPLACED OR GAPS THAT DEVELOP IN THE GROUT JOINT USING HAND TOOLS.
 - BRACE THE UPPER ELEMENT.
 - 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.
 - 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.

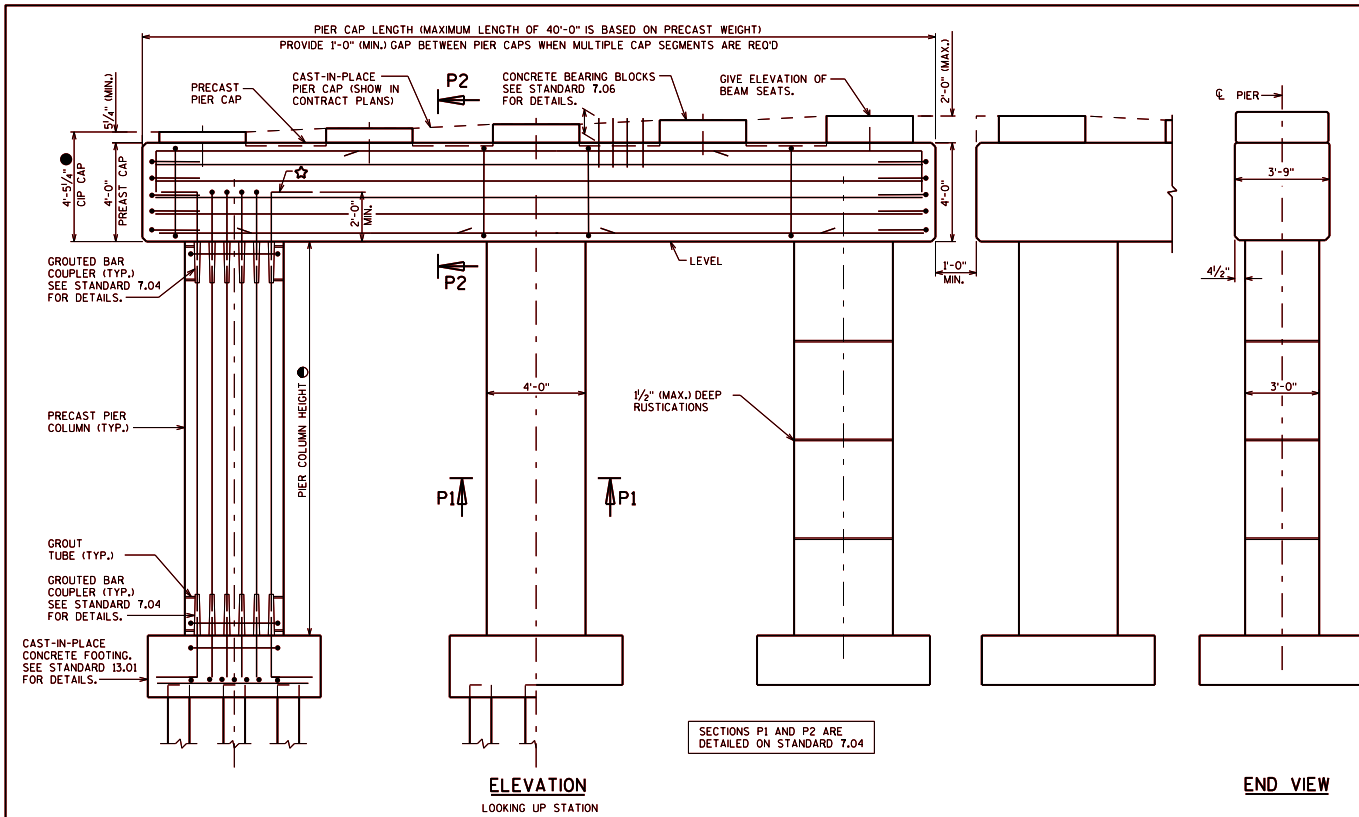
GRouted COUPLER NOTES

- 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



SECTIONS P1 AND P2 ARE DETAILED ON STANDARD 7.04

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 UNITS.
- 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 1/2" 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 (3605) (1000) (SHX)
 - PRECAST PIER COLUMNS (36P) (0090) (XXX)
 - PRECAST PIER CAPS (36P) (0080) (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

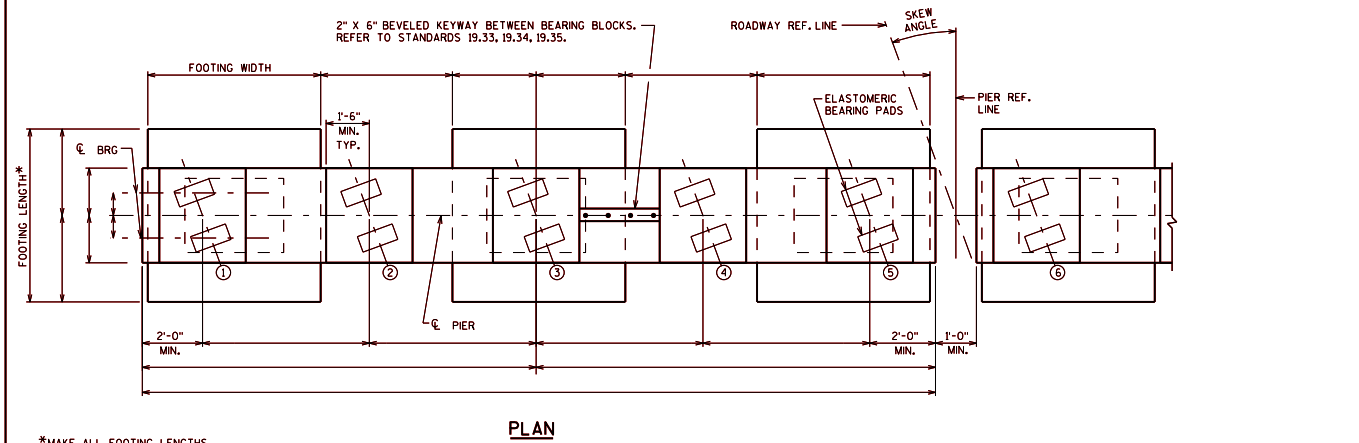
- INCLUDE THE FOLLOWING NOTE ON AT LEAST ONE PIER SHEET FOR EACH PIER:

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

- (TYP.) ROTATE AND STAGGER AS NEEDED.
 - STD. HOOK (TYP.) ROTATE AND STAGGER AS NEEDED.
 - BEAM SEAT.
 - DIMENSION IS FROM BOTTOM OF PIER CAP TO LOW BEAM SEAT.
- POLICY AND DETAILS REGARDING THE USE OF PRECAST PIER CAPS AND COLUMNS IS BEING DEVELOPED BY THE BUREAU OF STRUCTURES IN CONJUNCTION WITH THE I-39/90 PROJECT. SEE 7.1.4.1.2 FOR ADDITIONAL GUIDANCE.

END VIEW



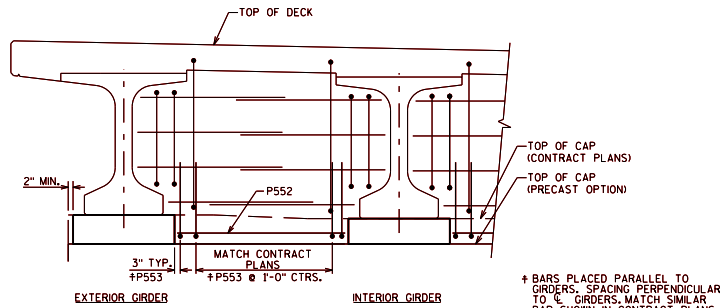
*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER

MATERIAL PROPERTIES:
 CONCRETE MASONRY $f_c = 3,500$ P.S.I.
 BAR REINFORCEMENT, GRADE 60 $f_y = 60,000$ P.S.I.

PRECAST PIER (OPTIONAL) CAP AND COLUMNS

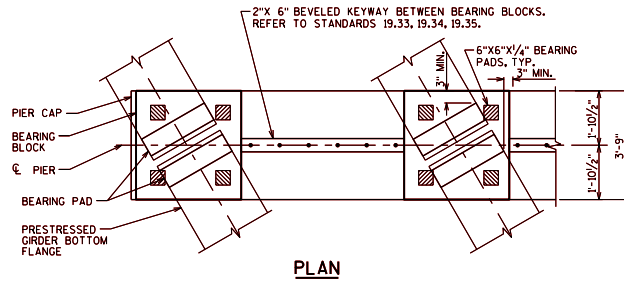
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-18

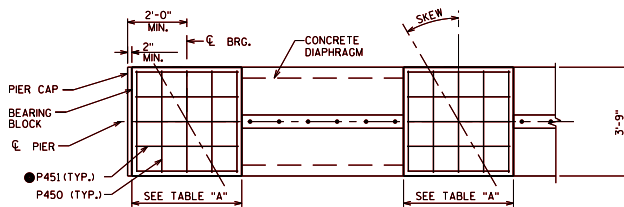


**PARTIAL TRANSVERSE SECTION
AT DIAPHRAGM PIER**

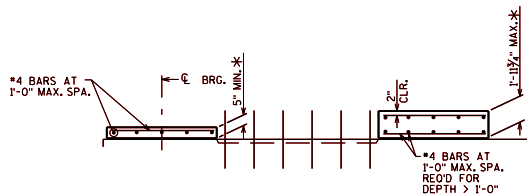
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



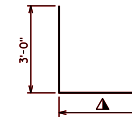
ELEVATION

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		2'-2"	X	-	PIER DIAPHRAGM - BOTH FACES HORIZ. - BTWN GIRDERS
P553		2'-2"	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

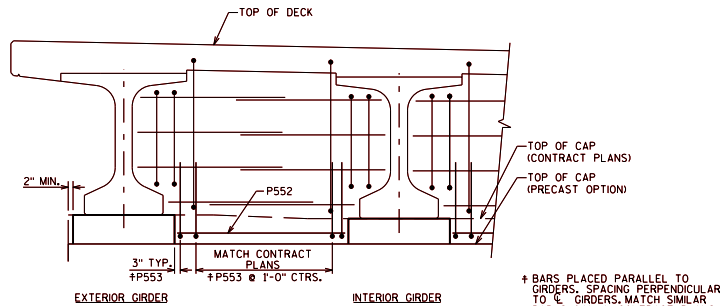
PRECAST BEARING BLOCK DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE FOR PRECAST PIERS.

* PRECAST HEIGHT = VARIES (5" MIN. TO 1'-11 1/4" 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.

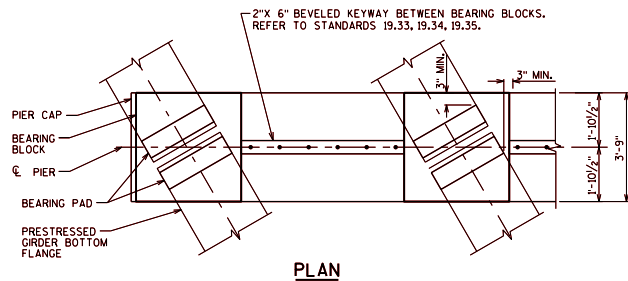
POLICY AND DETAILS REGARDING THE USE OF PRECAST PIER CAPS AND COLUMNS IS BEING DEVELOPED BY THE BUREAU OF STRUCTURES IN CONJUNCTION WITH THE I-39/90 PROJECT. SEE 7.1.4.1.2 FOR ADDITIONAL GUIDANCE.

PRECAST BEARING BLOCK DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-18</u>

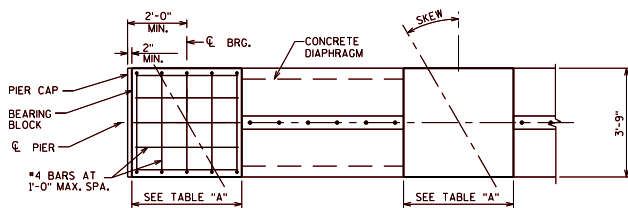


**PARTIAL TRANSVERSE SECTION
AT DIAPHRAGM PIER**

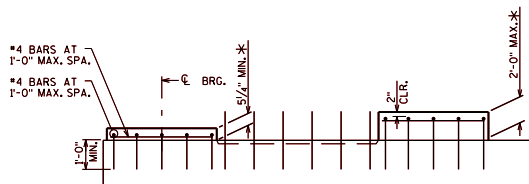
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



ELEVATION

DESIGNER NOTE

SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.


CONTRACTOR NOTES

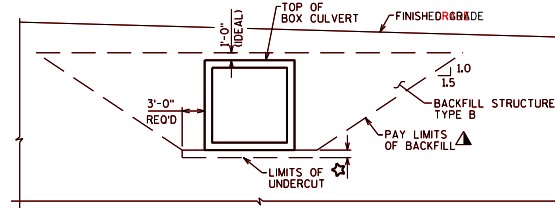
THE CONTRACTOR SHALL FOLLOW THIS STANDARD WHEN PRECAST PIERS ARE USED AND WHEN CAST-IN-PLACE BEARING BLOCKS ARE USED IN LIEU OF PRECAST BEARING BLOCKS. SEE STANDARD 7.06 FOR ADDITIONAL NOTES AND DETAILS.

CAST-IN-PLACE CONCRETE DETAIL NOTES

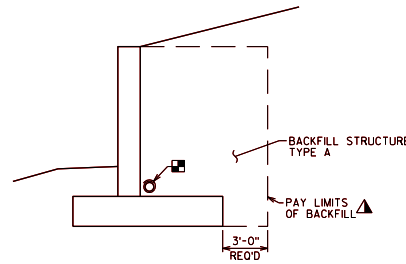
CAST-IN-PLACE BEARING BLOCK DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE FOR PRECAST PIERS.
 ✖ CAST-IN-PLACE HEIGHT = VARIES (5/4" MIN. TO 2'-0" MAX.). CONTRACTOR TO DETERMINE THE CAST-IN-PLACE BEARING BLOCK HEIGHTS.

POLICY AND DETAILS REGARDING THE USE OF PRECAST PIER CAPS AND COLUMNS IS BEING DEVELOPED BY THE BUREAU OF STRUCTURES IN CONJUNCTION WITH THE I-39/90 PROJECT. SEE 7.1.4.1.2 FOR ADDITIONAL GUIDANCE.

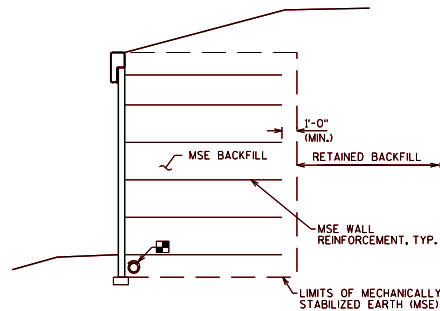
CAST-IN-PLACE BEARING BLOCK DETAILS	
 BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: 1-18



**TYPICAL SECTION
THRU BOX CULVERT**



**TYPICAL SECTION
THRU RETAINING WALL**



**TYPICAL SECTION
THRU MSE RETAINING WALL**

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.

★ 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 STRUCTURE 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.

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)

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)

STRUCTURE BACKFILL
LIMITS AND NOTES 2



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
T-18

WINGS PARALLEL TO ROADWAY

WINGS PARALLEL TO ABUTMENT

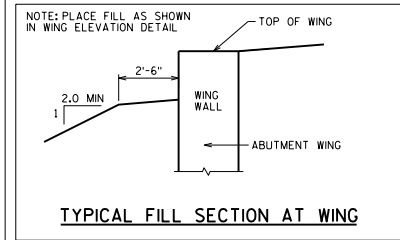
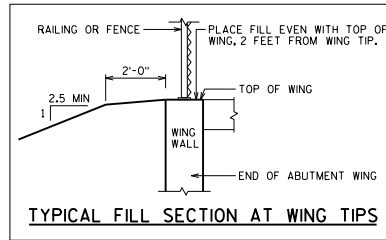
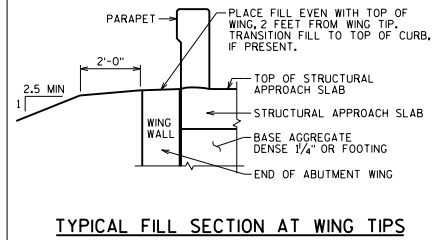
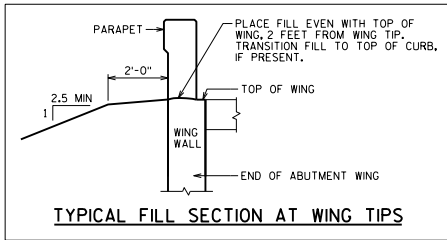
STANDARD WING

WITH STRUCTURAL APPROACH SLAB

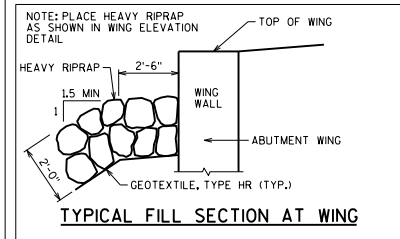
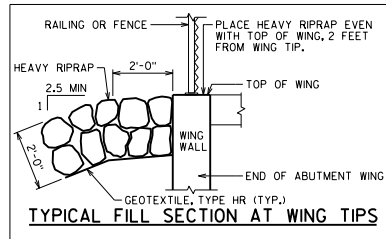
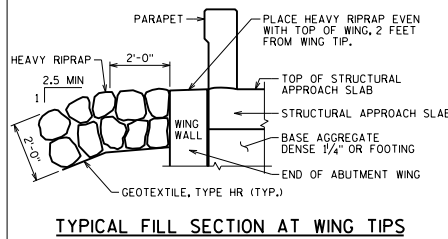
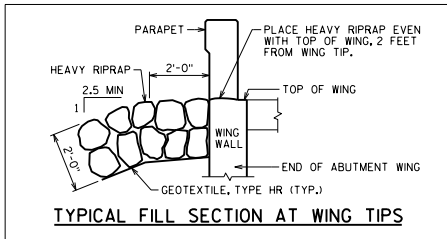
WITH RAILING OR FENCE ONLY

STANDARD WING

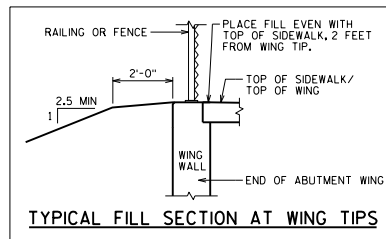
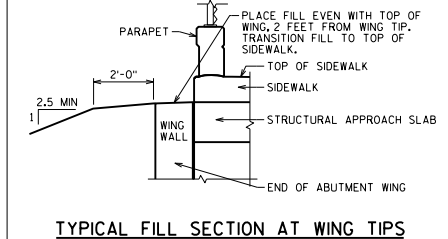
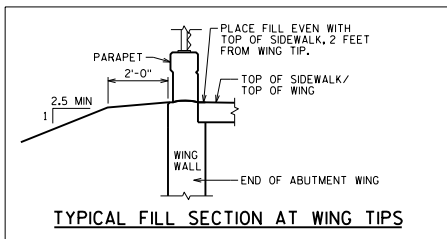
STANDARD FILL




RIP RAP



STANDARD FILL WITH SIDEWALK

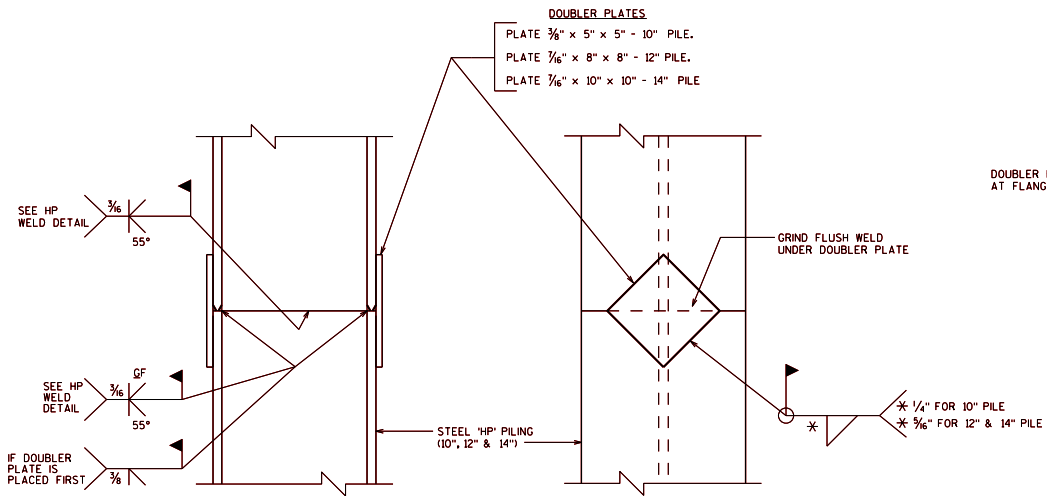


WING FILL SECTIONS AT WING TIPS

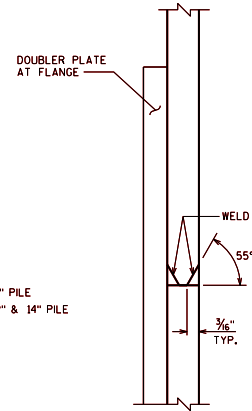


BUREAU OF STRUCTURES

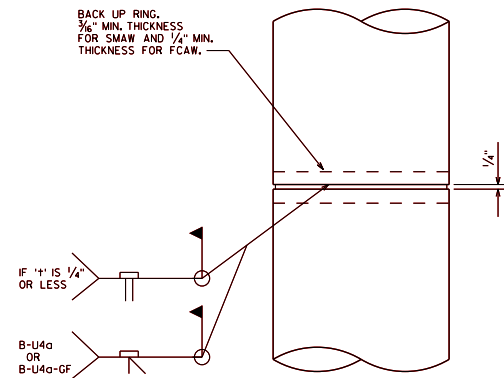
APPROVED: Bill Oliva DATE: 1-18



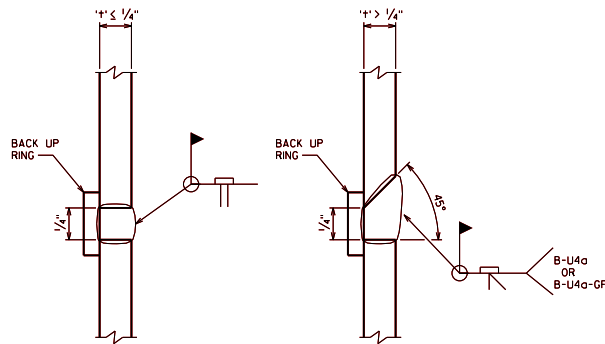
STEEL 'HP' SHAPES



HP WELD DETAIL
FLANGE SHOWN, WEB SIMILAR



CAST-IN-PLACE 'PIPE PILE'



CIP PILE WELD DETAIL

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.

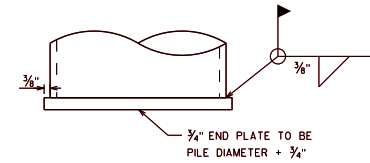
SEE BRIDGE MANUAL SECTION 11.3.1.17.7 FOR PILE RESISTANCE VALUES.

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. TECHNICAL ENGINEER REGARDING POSSIBLE ESTIMATED PILE LENGTH ADJUSTMENT.

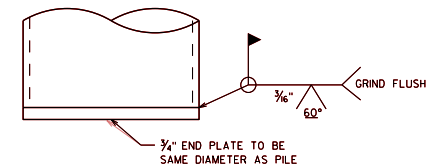
NOTES

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)

FOR 12 3/4" DIA. PILES, USE 6 - #7 BARS.
FOR 14" DIA. PILES, USE 8 - #7 BARS.
INCLUDE IN BILL OF BARS, EXTEND 1'-2"
(FOR ALL PILE SIZES) INTO CONCRETE CAP.

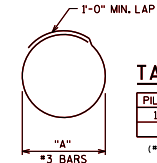
TERMINATE REINFORCEMENT 10'-0" BELOW
GROUNDLINE OR STREAMBED ELEVATION.

FOR TIMBER BACKED ABUTMENTS, CUT OFF
BAR STEEL REINFORCEMENT 6" BELOW TOP
OF PILE ON WING PILING.



#3 BARS AT 2'-0" CENTERS.
(INCLUDE IN BILL OF BARS)

NON-CORROSIVE BAR SPACERS
AT VERTICAL BAR STEEL
REINFORCEMENT AT 6'-0" CENTERS.



TABLE

PILE DIA.	DIM "A"	LENGTH
12 3/4"	9 3/4"	3'-7"
14"	11"	3'-11"

(#3 BAR WT. = 0.38 LB/FT)

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: 7-28

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 [A] 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 = $4RC/L$ X 100 (PERCENT), WHERE:

RC = RESIDUAL CAMBER (INCHES)
L = GIRDER LENGTH (INCHES)

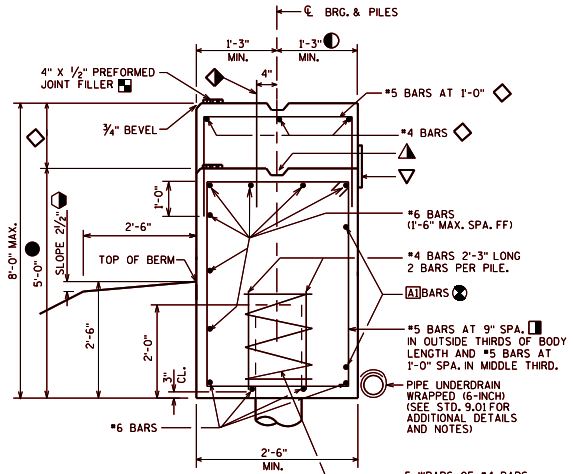
(SEE STANDARD 13.01 FOR SLOPED SEAT DETAILS)

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

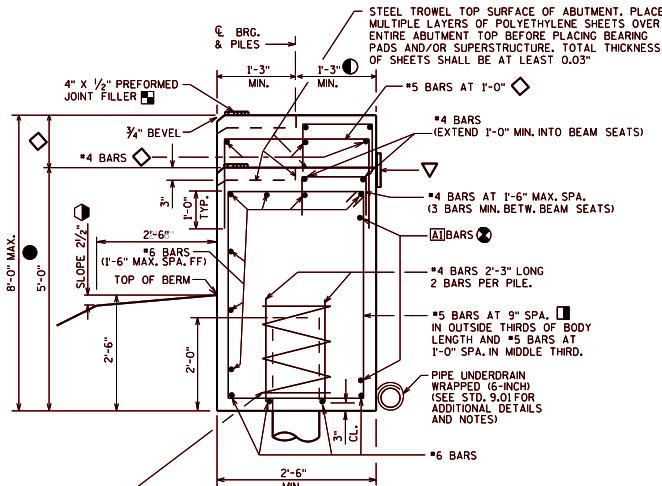
USE 3/4" THICK FILLER FOR SLAB STRUCTURES.

LEGEND

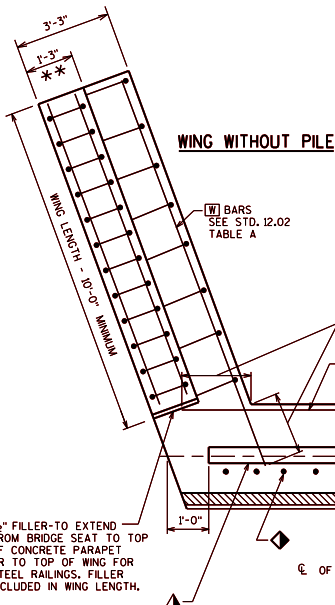
- ◆ #5 BARS (COATED) AT 1'-0" (2'-0" LONG). THESE BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE.
- ◇ WHEN THIS DIMENSION ≥ 4" THIS ADDITIONAL REINFORCEMENT SHALL BE ADDED. MAX. SPA. OF HORIZ. #4 BARS = 1'-0".
- USE 1'-3" FOR SLAB SPANS AND FOR GIRDER SPANS WITH NO PAVING NOTCH. USE 1'-6" FOR GIRDER SPANS WITH NO PAVING NOTCH, BUT WHERE 36", 45", 54", 54", 70", 72" OR 82" 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 "TY" OR SINGLE SLOPE PARAPET "SS5" 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.
- NO SLOPE FOR HEAVY RIPRAP. SEE STANDARD 12.08 FOR DETAILS.



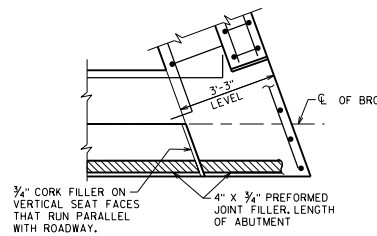
TYPE A1 WITH FIXED SEAT



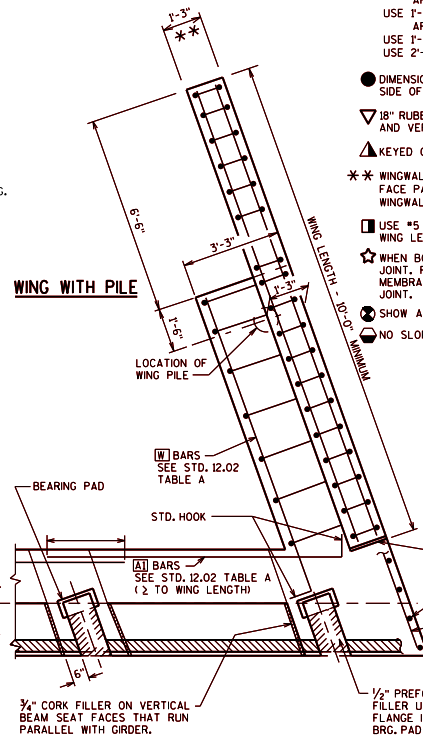
TYPE A1 WITH SEMI-EXPANSION SEAT



WING WITHOUT PILE



SLAB SPAN WITH SEMIEXPANSION SEAT



WING WITH PILE

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

1/2" FILLER-TO EXTEND FROM BRIDGE SEAT TO TOP OF CONCRETE PARAPET OR TO TOP OF WING FOR STEEL RAILINGS. FILLER INCLUDED IN WING LENGTH.

#4 BARS AT 1'-0" ABUTMENT ENDS
#5 BARS AT 1'-0" SEE STD. 12.02

SLAB SPAN WITH FIXED SEAT

GIRDER SPAN WITH FIXED SEAT

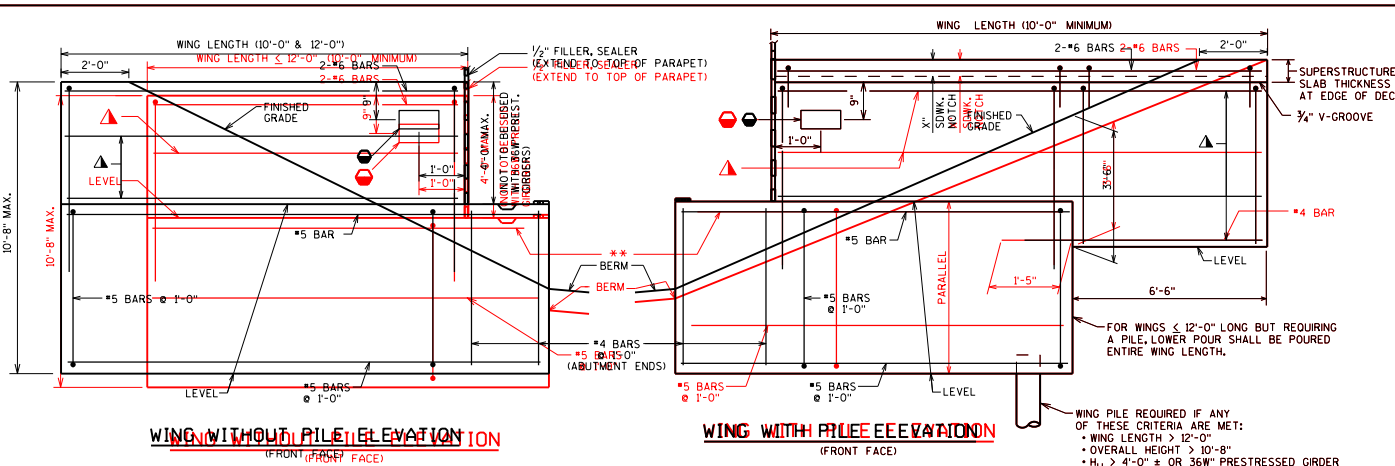
SLAB SPAN WITH SEMIEXPANSION SEAT

GIRDER SPAN WITH SEMIEXPANSION SEAT

ABUTMENT TYPE A1 (INTEGRAL ABUTMENT)



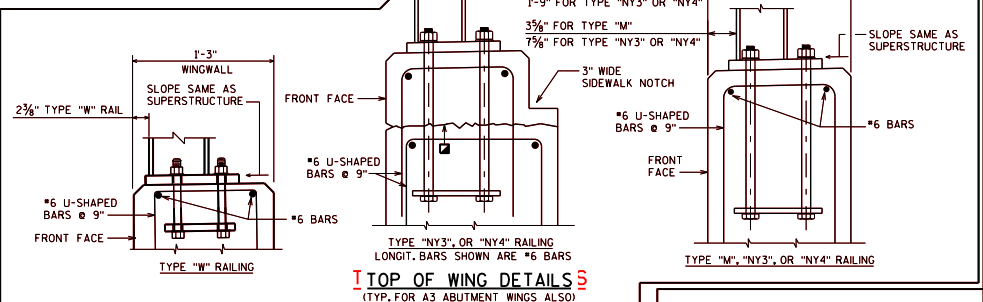
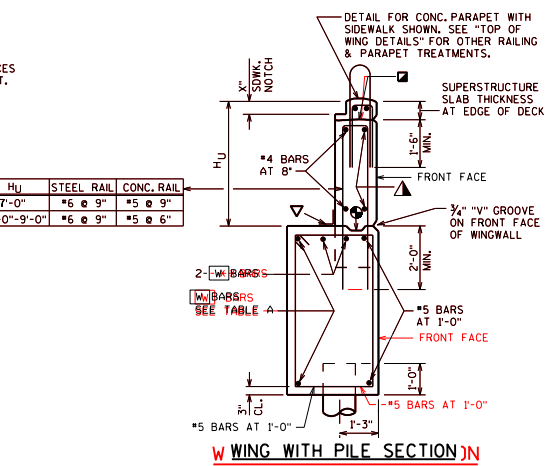
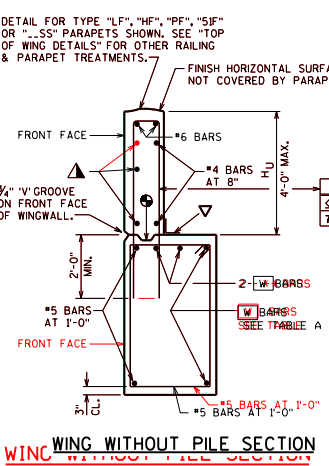
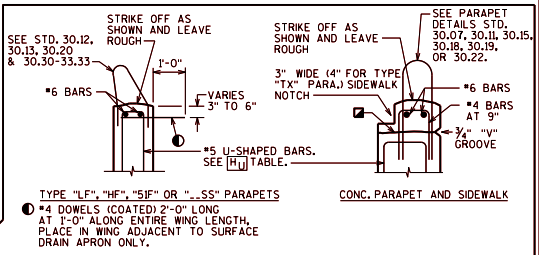
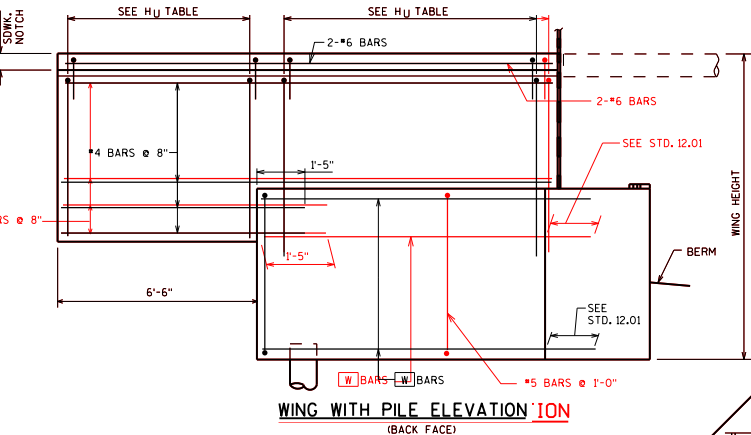
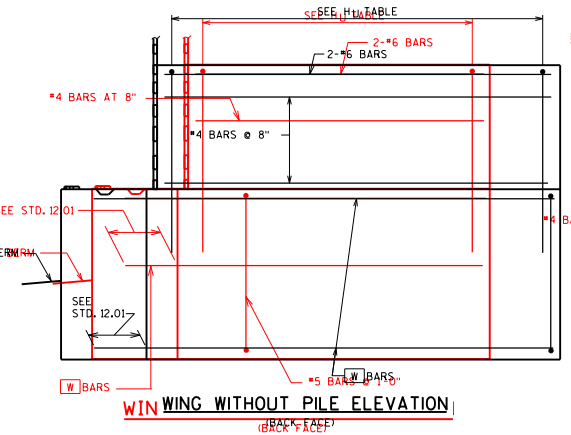
APPROVED: Bill Oliva DATE: 1-23



DESIGNER NOTES
 SECS 12.02.01 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 FOR TYPE BARS WHEN PRECASTED TIMBER BARS AS SHOWN ON STANDARD S2021. LOCATE NAME PLATE ON FIRST RIGHT WING TRAVELING UP STATION.
 WING BARS AND DOWEL BARS SHALL BE EPOXY COATED.
 SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF 1/2" FILLER WITH MINNESAPAIN ONLY NON-BYBROMOUS WOOD PRESERVATIVE. HOLD 1/4" BELOW SURFACE OF CONCRETE. MAKE SURE SEALER IS BELOW GUTTER LINE AND INSIDE FACE.
LRFD DESIGN LOADS NO VERTICAL SURFACES OF 1/2" FILLER WITH NON-STAINING AIR-CURABLE WOOD PRESERVATIVE DEEP AND HOLD 1/4" BELOW FACE OF CONCRETE. EXTERIOR SURFACES BELOW GUTTER LINE AT INSIDE FACE.
 $f_c = 3,500$ P.S.I.
 $f_{tE} = 1.25$
 $f_{tEV} = 1.50$ HORIZ. EARTH LOAD BASED ON:
 $f_{tES} = 1.35$ 35 P.C.F. EQUIV. FLUID UNIT
 $f_{tES} = 1.75$ WEIGHT OF SOIL

TABLE A SIGN LOADS

WING LENGTH	WING HEIGHT	EXPOSURE CLASS 2, $f_c = 0.75$	WEIGHT OF SOIL
10'-0"	10'-0"	6-#6's	W
10'-0"	11'-6"	6-#6's	W
10'-0"	12'-0"	6-#6's	W
10'-0"	12'-0"	7-#8's	W
10'-0"	12'-0"	6-#5's	W
10'-0"	12'-0"	7-#5's	W
10'-0"	12'-0"	7-#6's	W
10'-0"	12'-0"	6-#7's	W
10'-0"	12'-0"	7-#7's	W
10'-0"	12'-0"	8-#8's	W
10'-0"	12'-0"	7-#9's	W
10'-0"	12'-0"	8-#9's	W
10'-0"	12'-0"	9-#10's	W
10'-0"	12'-0"	8-#10's	W
10'-0"	12'-0"	9-#10's	W
10'-0"	12'-0"	10-#11's	W
10'-0"	12'-0"	11-#11's	W
10'-0"	12'-0"	12-#11's	W
10'-0"	12'-0"	13-#11's	W
10'-0"	12'-0"	14-#11's	W
10'-0"	12'-0"	15-#11's	W
10'-0"	12'-0"	16-#11's	W
10'-0"	12'-0"	17-#11's	W
10'-0"	12'-0"	18-#11's	W
10'-0"	12'-0"	19-#11's	W
10'-0"	12'-0"	20-#11's	W
10'-0"	12'-0"	21-#11's	W
10'-0"	12'-0"	22-#11's	W
10'-0"	12'-0"	23-#11's	W
10'-0"	12'-0"	24-#11's	W
10'-0"	12'-0"	25-#11's	W
10'-0"	12'-0"	26-#11's	W
10'-0"	12'-0"	27-#11's	W
10'-0"	12'-0"	28-#11's	W
10'-0"	12'-0"	29-#11's	W
10'-0"	12'-0"	30-#11's	W
10'-0"	12'-0"	31-#11's	W
10'-0"	12'-0"	32-#11's	W
10'-0"	12'-0"	33-#11's	W
10'-0"	12'-0"	34-#11's	W
10'-0"	12'-0"	35-#11's	W
10'-0"	12'-0"	36-#11's	W
10'-0"	12'-0"	37-#11's	W
10'-0"	12'-0"	38-#11's	W
10'-0"	12'-0"	39-#11's	W
10'-0"	12'-0"	40-#11's	W
10'-0"	12'-0"	41-#11's	W
10'-0"	12'-0"	42-#11's	W
10'-0"	12'-0"	43-#11's	W
10'-0"	12'-0"	44-#11's	W
10'-0"	12'-0"	45-#11's	W
10'-0"	12'-0"	46-#11's	W
10'-0"	12'-0"	47-#11's	W
10'-0"	12'-0"	48-#11's	W
10'-0"	12'-0"	49-#11's	W
10'-0"	12'-0"	50-#11's	W



WING WITHOUT PILE SECTION

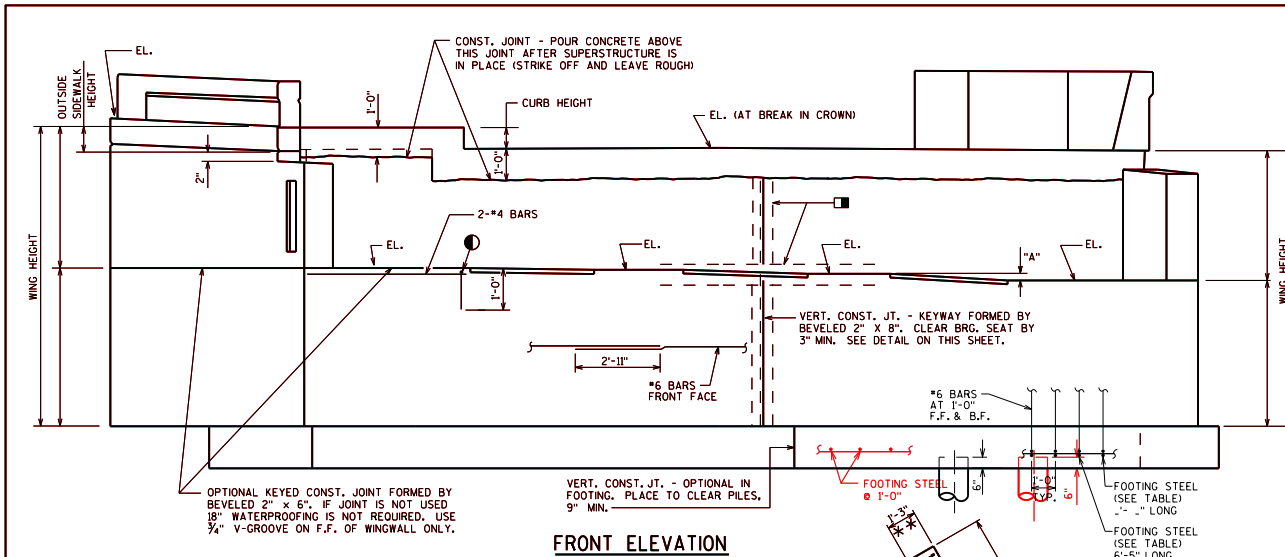
WING WITH PILE SECTION

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").
USE #4 BARS @ 1'-6" FOR WINGWALL WIDTH = 1'-3". USE #4 BARS @ 1'-4" FOR WINGWALL WIDTH = 1'-6".
BARS TO BE SAME SIZE AS "W" BARS.
OPTIONAL CONST. 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 TYPE A1

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva* DATE: 1-18



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 #3 BARS SHALL BE 2 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.

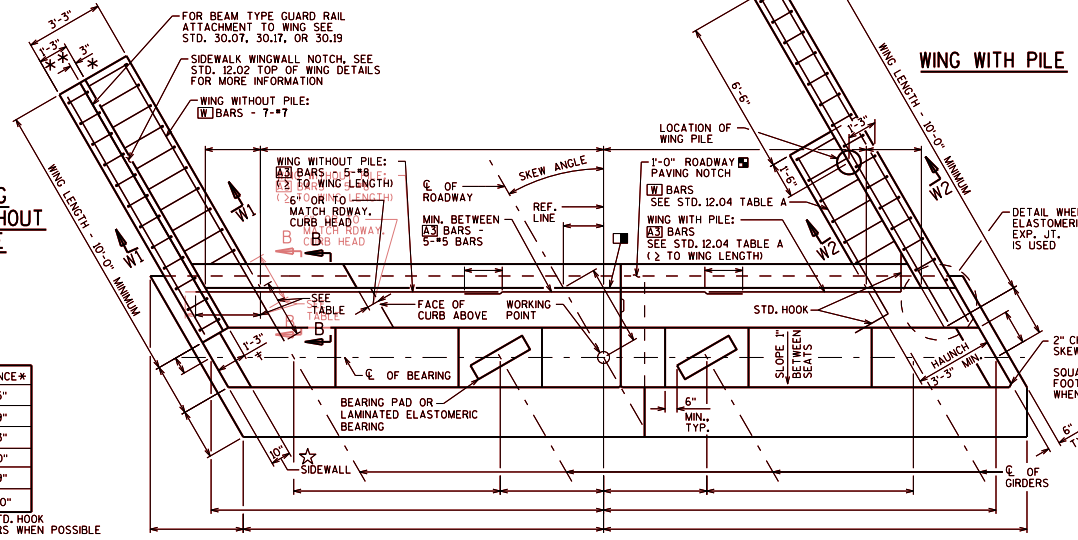
PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

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. WATERPROOFING. SEAL ALL HORIZ. AND VERT. JOINTS ON RACEFACE 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.
- ‡ 1'-5" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- § 4" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- ¶ WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- * WHEN SINGLE SLOPE PARAPET "S6SS" IS USED, "S6SS" SHOULD NOT BE USED ON A SIDEWALK. WINGWALL WIDTH 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)
- ⊗ 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. STEEL BAR (STD. 12.12) FOR STRUCTURAL APPROACH SLAB ON THE ABUTMENT SHEET.
- ☆ SIDEWALK IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- ⊙ SIDEWALK IS 3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SHOW ALL BARS FOR CLARITY.
- NO SLOPE FOR HEAVY RIPRAP. SEE STANDARD 12.08 FOR DETAILS.



PLAN

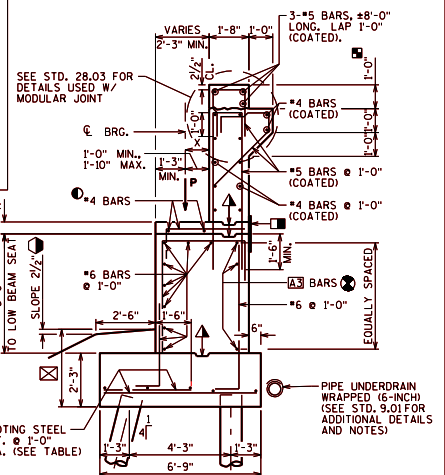
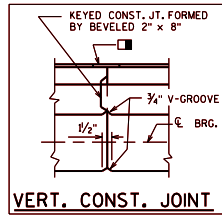
TABLE

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

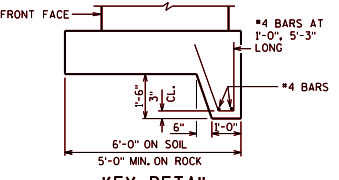
* OR EQUIVALENT STD. HOOK USE STRAIGHT BARS WHEN POSSIBLE

WING WITH SIDEWALK

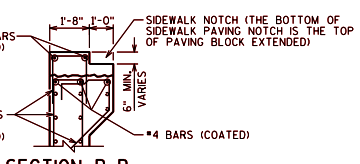
WING WITH SLOPED FACE PARAPET



SECTION THRU BODY



KEY DETAIL



SECTION B-B

PILE REACTIONS PER FOOT IN KIPS

FRONT ROW = $P[(0.22+x/4.25)] + [(n+2.25)^3/310] + 4.6$
BACK ROW = $P[(0.78-x/4.25)] - [(n+2.25)^3/705] + 16.8$

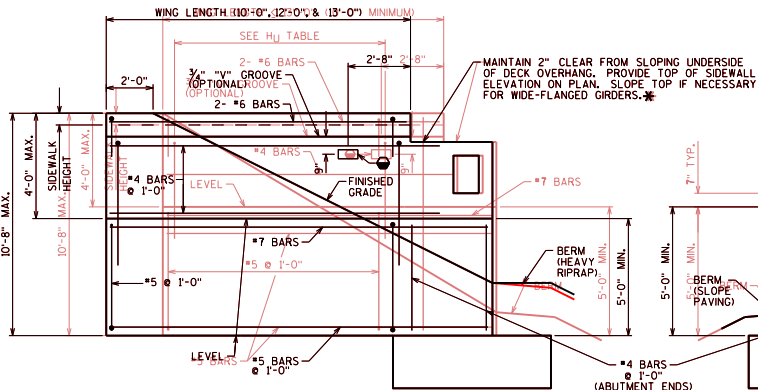
NOTES:

h = WING HEIGHT (FT.)
 $P = \gamma D_c (P D_c) \times \gamma D W (P D_w) \times \gamma L (L) (k/FT.)$
 FRONT ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH $\gamma_{EH} = 1.50$, AND SUPERSTRUCTURE REACTIONS "P". BACK ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH $\gamma_{EH} \text{ MIN.} = 0.90$, AND "P".
 PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS

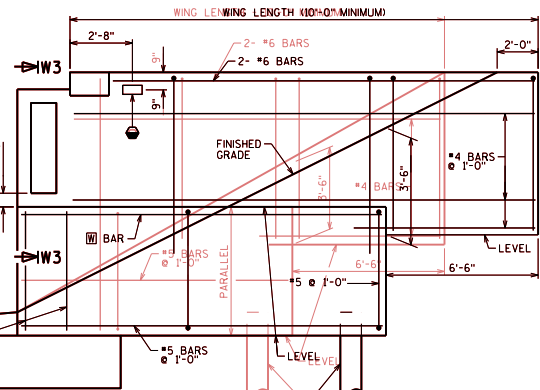
ABUTMENT TYPE A3

BUREAU OF STRUCTURES

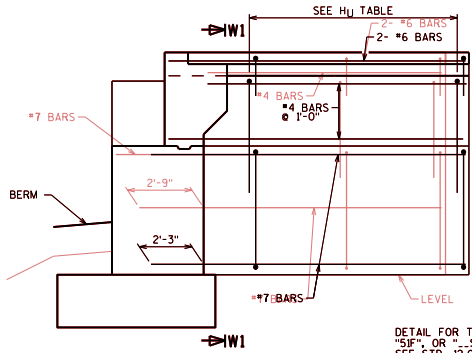
APPROVED: Bill Oliva DATE: 7-20



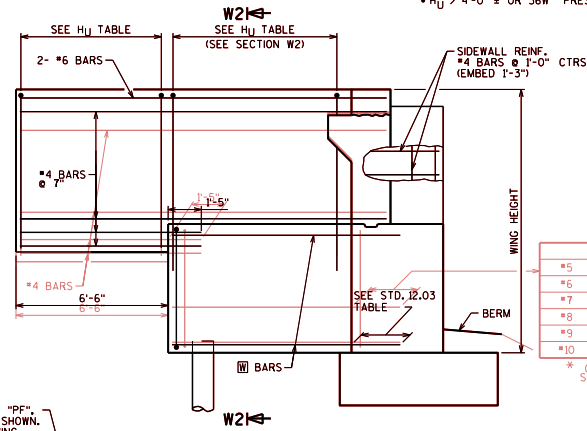
WING WITHOUT PILE ELEVATION
(FRONT FACE)



WING WITH PILE ELEVATION
(FRONT FACE)



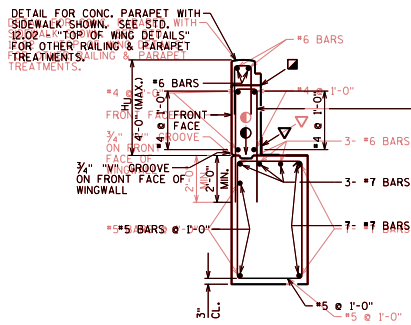
WING WITHOUT PILE ELEVATION
(BACK FACE)



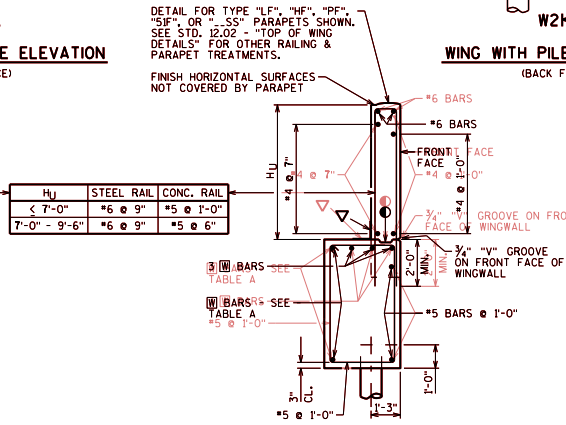
WING WITH PILE ELEVATION
(BACK FACE)

W BARS DISTANCE *
#5 1'-9"
#6 2'-1"
#7 2'-9"
#8 3'-8"
#9 4'-7"
#10 5'-10"

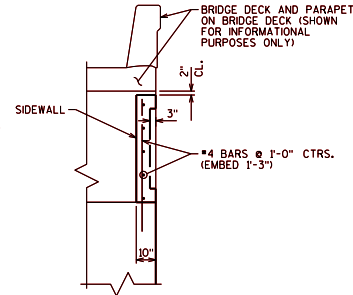
* OR EQUIVALENT STANDARD HOOK



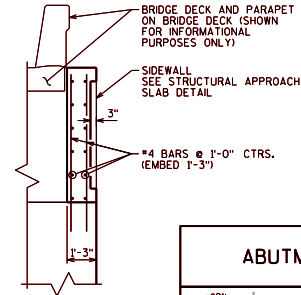
SECTION W1
(WING WITHOUT PILE)



SECTION W2
(WING WITH PILE)



SECTION W3
(WITHOUT STRUCTURAL APPROACH SLAB)



SECTION W3
(WITH STRUCTURAL APPROACH SLAB)

DESIGNER NOTES

- SEE STD. 12.03 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. REFER TO LIMITATIONS SHOWN ON FACE PARAPETS.
- NAME PLATE (ONLY FOR TYPE "LF", "WF", AND "M" OR TIMBER RAIL AS SHOWN ON STANDARD 30.24). LOCATE NAME PLATE ON FIRST RIGHT WING TRAVELING UP STATION. SHALL BE BASED ON A 7/16" PLATE TOP TENSION BAR SPACING.
- FOR MODULAR EXPANSION JOINTS WITH CONCRETE DIAPHRAGMS RUNNING TO EDGE OF DECK IF SIDEWALK IS USED, FORM SIDEWALL 2" BELOW CONCRETE DIAPHRAGM.
- CONSTRUCTION JOINT: LEAVE ROUGH. REQUIRED FOR PRESTRESSED CONCRETE SUPERSTRUCTURES. OPTIONAL FOR OTHERS. POUR FIRST CONCRETE ABOVE THIS JOINT AFTER DECK IS IN PLACE.
- OPTIONAL CONSTRUCTION JOINT: FORMED BY BEVELED 2" X 6" KEYWAY WITH MEMBRANE ON BACKFACE. CF. WITH $h_{ef} = 1.50$ AND $h_{ef} = 1.50$.
- 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. ALL 2" BELOW CONCRETE DIAPHRAGM.
- LRFD DESIGN LOADS: LEAVE ROUGH. REQUIRED FOR PRESTRESSED LIVE LOAD SURCHARGE. OPTIONAL FOR OTHERS. POUR LOAD FACTORS: $\gamma = 1.25$, $\gamma = 1.50$.
- OPTIONAL CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6" KEYWAY WITH MEMBRANE ON BACKFACE.
- RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.
- EXPOSURE CLASS 2, $h_{ef} = 0.15$.
- FOR 80,000 P.S.I. WITHOUT STRUCTURAL APPROACH SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH DETAILS.
- HORIZONTAL EARTH LOAD BASED ON 15 P.C. EQUIVALENT FLUID UNIT WEIGHT OF SOIL.

LRFD DESIGN LOADS

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

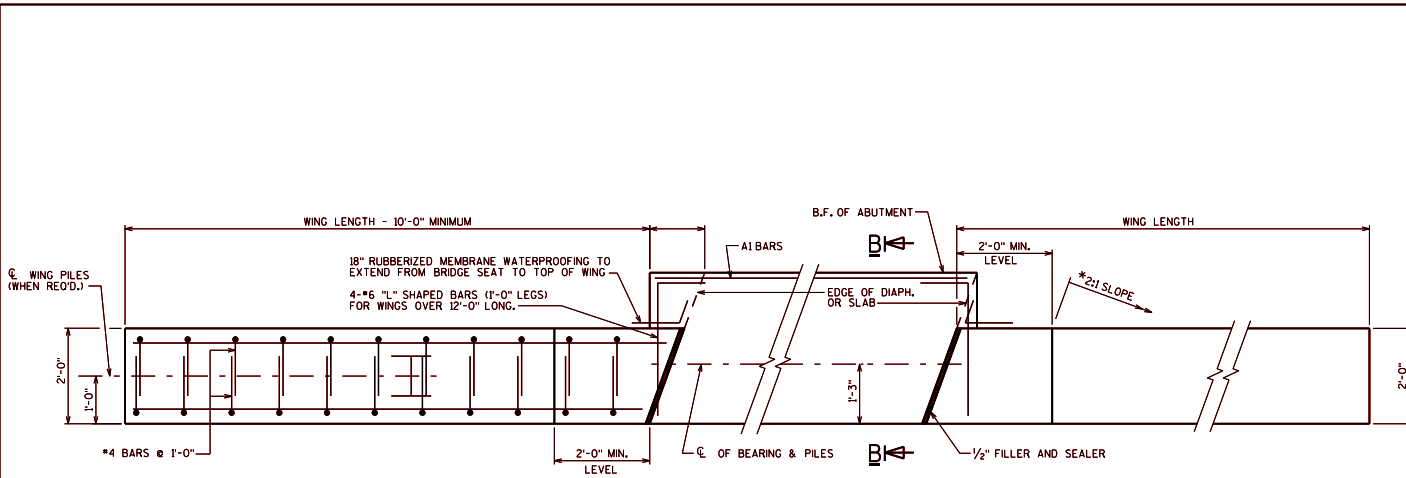
* USE #6 FOR LOWER WING POUR WIDTH
** USE #3-3" MIN. FOR BEARING SEAT WIDTH

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

ABUTMENT TYPE A3

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-20



PLAN FOR TYPE A1 ABUTMENT
(SEE STD. 12.01 FOR ABUTMENT BODY DETAILS)

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 2'-4" FOR THE UNSTABLE CLAYS

*USE 2'-5" FOR THE UNSTABLE CLAYS WHICH ARE SOMETIMES ENCOUNTERED IN NORTHWEST WISCONSIN (SUPERIOR AREA)

- 1 WHEN TIMBER RAILING IS USED AS PER STANDARD 30.24, AND THE SKEW IS > 0°, THIS CONSTRUCTION JOINT SHALL BE MANDATORY. THE WING CONCRETE SHALL BE PLACED ABOVE CONSTR. JT. AFTER THE TIMBER END POSTS ARE IN PLACE.

ALL WING BARS SHALL BE EPOXY COATED.

- 2 SHOW ALL LONGITUDINAL BARS FOR CLARITY.

LRFD DESIGN LOADS (WINGS)

LIVE LOAD = 1'-0" SURCHARGE

LOAD FACTORS:

$\gamma_{DC} = 1.25$

$\gamma_{WH} = 1.50$

$\gamma_{E} = 1.75$

EXPOSURE CLASS 2, $\gamma_e = 0.75$

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

WEIGHT OF SOIL

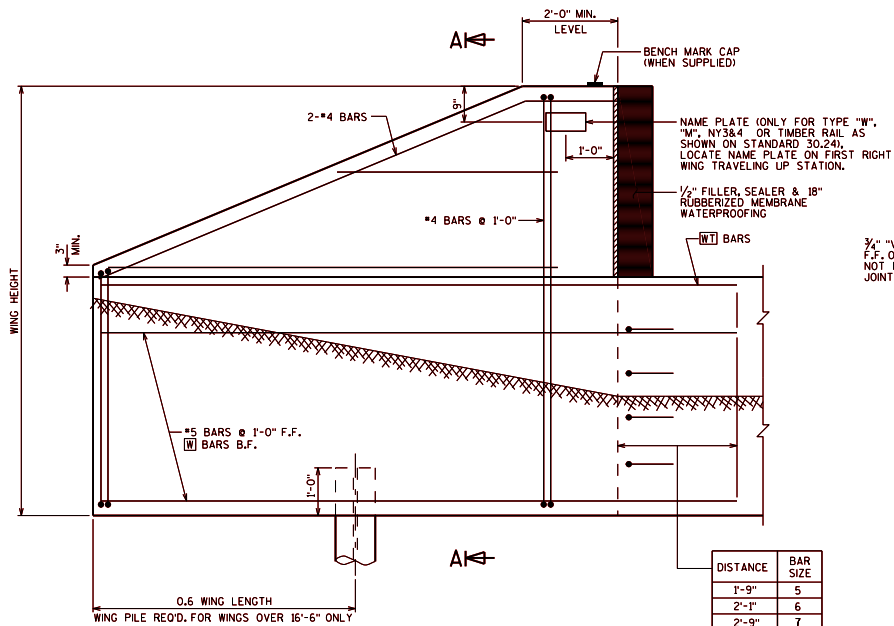
FC = 60,000 P.S.I.

FC = 3,500 P.S.I.

TABLE A

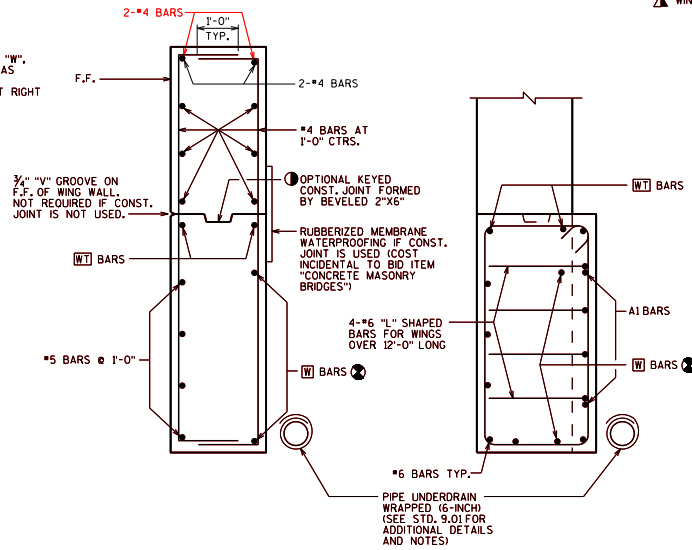
WING LENGTH	WING HEIGHT				BARS
	8'-6"	10'-0"	11'-6"	13'-0"	
8'-6"	5-#5s	5-#5s	6-#5s	6-#5s	W
	2-#5s	2-#5s	2-#5s	2-#5s	WT
10'-0"	4-#6s	4-#6s	5-#6s	5-#6s	A1
	5-#6s	5-#7s	6-#7s	6-#7s	W
12'-0"	2-#7s	2-#7s	2-#8s	2-#8s	WT
	5-#6s	6-#6s	6-#7s	6-#7s	A1
16'-0"	5-#8s	6-#8s	5-#9s	5-#9s	W
	2-#8s	2-#8s	2-#9s	2-#9s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

▲ WING PILE REQUIRED



WING ELEVATION
(A1 ABUTMENT)

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



SECTION A-A

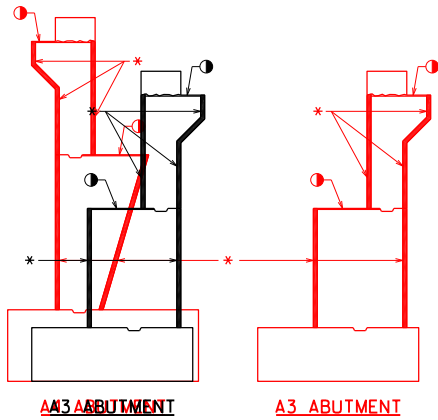
SECTION B-B

SEE STD. 12.01 & 12.02 FOR NOTES & DETAILS

DETAILS FOR WINGS PARALLEL TO A1 ABUTMENT CENTERLINE

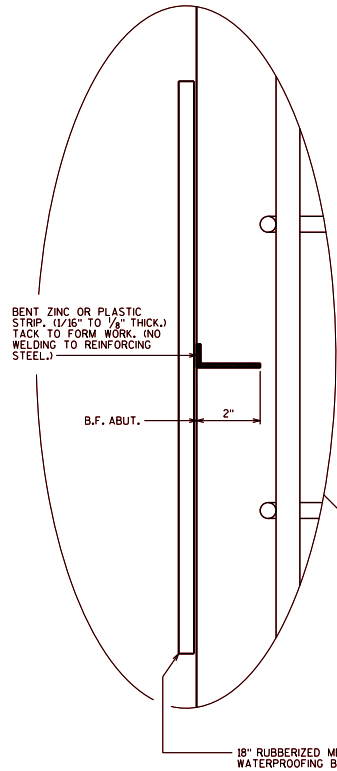
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-21



AA3 ABUTMENT

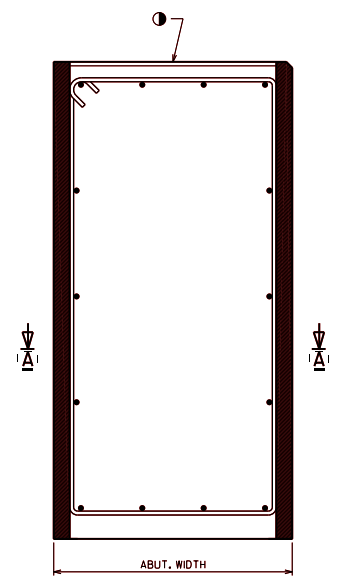
A3 ABUTMENT



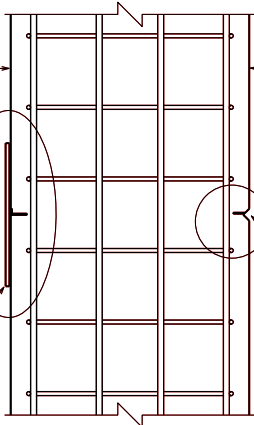
BENT ZINC OR PLASTIC STRIP. (1/16" TO 1/8" THICK.) TACK TO FORM WORK. (NO WELDING TO REINFORCING STEEL.)

B.F. ABUT. 2"

18" RUBBERIZED MEMBRANE WATERPROOFING B.F.

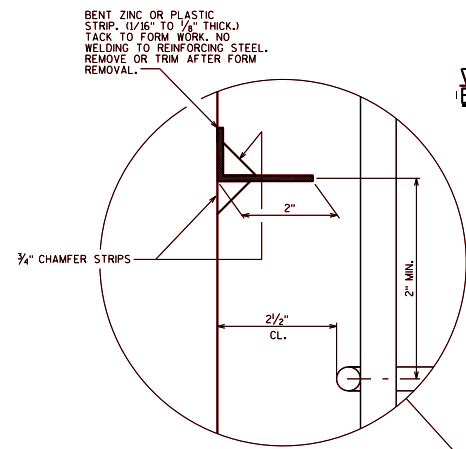


SECTION THRU ABUTMENT BODY
A1 ABUTMENT SHOWN, A5 SIMILAR



SECTION A-A

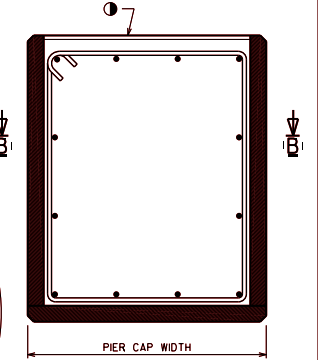
ALTERNATE CONSTRUCTION JOINT AT ABUTMENT



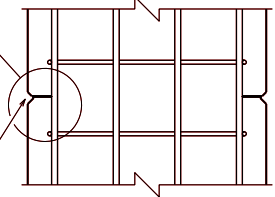
3/4" CHAMFER STRIPS

2 1/2" CL.

2" MIN.

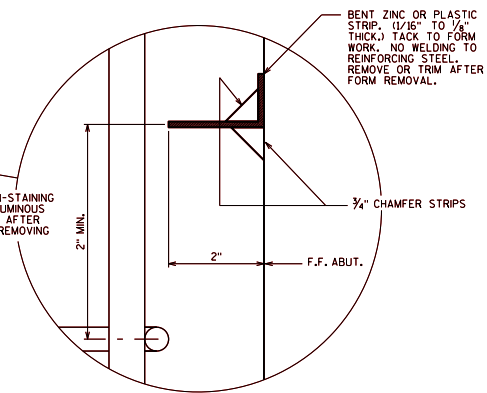


SECTION THRU PIER CAP



SECTION B-B

ALTERNATE CONSTRUCTION JOINT AT PIER CAP



BENT ZINC OR PLASTIC STRIP. (1/16" TO 1/8" THICK.) TACK TO FORM WORK. NO WELDING TO REINFORCING STEEL. REMOVE OR TRIM AFTER FORM REMOVAL.

3/4" CHAMFER STRIPS

F.F. ABUT. 2"


2" MIN.

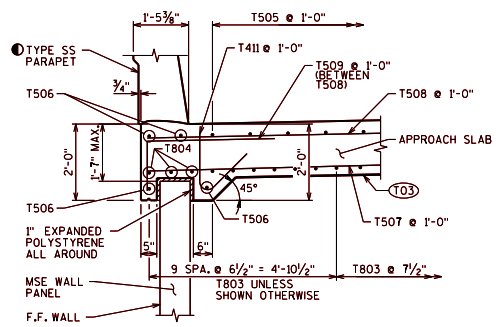
FILL WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER AFTER TRIMMING OR REMOVING STRIP.

NOTES

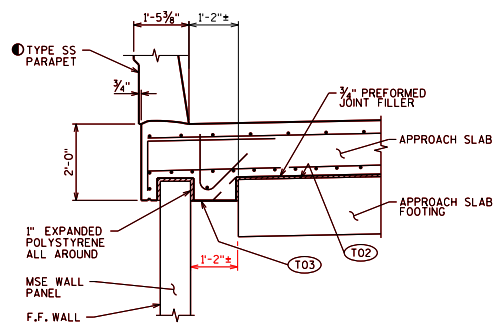
- PARTIAL ZINC OR PLASTIC BULKHEAD MAY BE USED AS ALTERNATE CONSTRUCTION JOINT, WITH THE PERMISSION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
- VERTICAL CONSTRUCTION JOINT KEYWAY IS NOT REQUIRED WHEN USING ALTERNATE CONSTRUCTION JOINT.
- CARE IS TO BE USED IN CASTING CONCRETE AROUND BULKHEAD TO PREVENT DISLOCATION OR MISALIGNMENT OF THE BULKHEAD.
- SAW CUTTING JOINT IS NOT ALLOWED.

- ① USE A JOINT TOOL TO CONSTRUCT A CONTRACTION JOINT APPROXIMATELY 1/2" DEEP.
- * BENT ZINC OR PLASTIC STRIP.

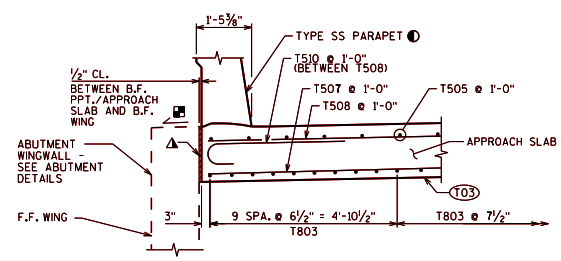
ALTERNATE CONSTRUCTION JOINT	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u>
	DATE: 1-18



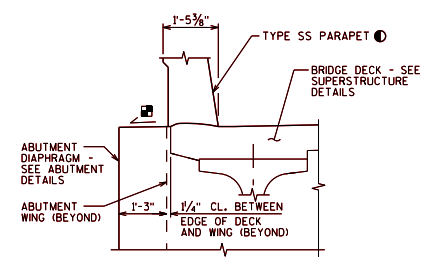
SECTION A-A
(AT MSE WINGWALLS)



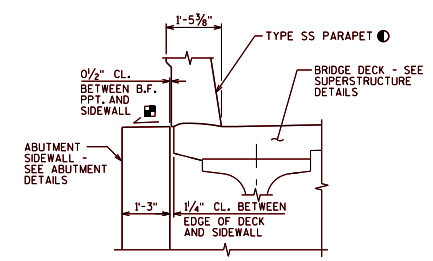
SECTION B-B
(AT MSE WINGWALLS)



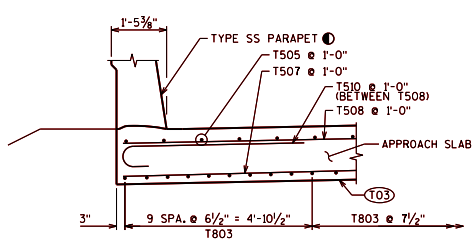
SECTION C-C
(AT WINGWALLS PARALLEL TO BRIDGE)



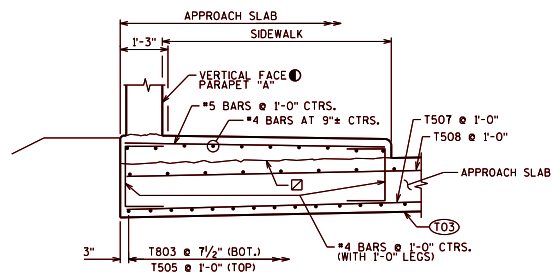
SECTION D-D
(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT.)



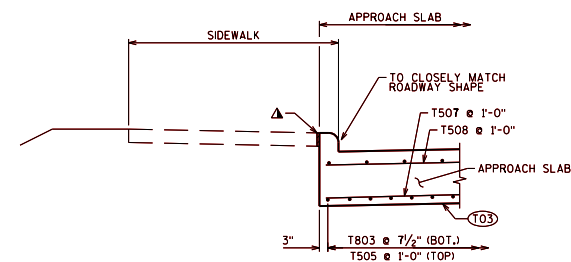
SECTION D-D*
(AT WINGWALLS PARALLEL TO BRIDGE - A3 ABUT.)



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



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



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

LEGEND

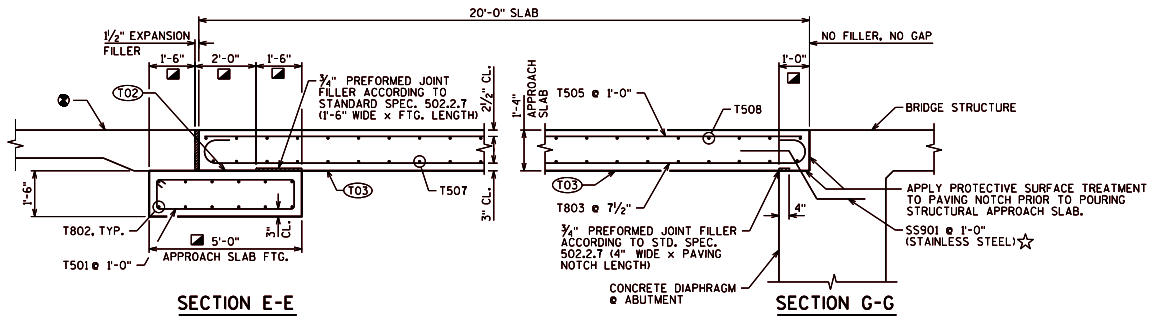
- (T02) STEEL TROWEL TOP SURFACE OF FOOTING AND PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF FOOTING.
- (T03) PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF SUBGRADE BENEATH SLAB.
- ▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF 1/2" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER; (1" DEEP AND HOLD 1/8" 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.

STRUCTURAL APPROACH SLAB DETAILS 1

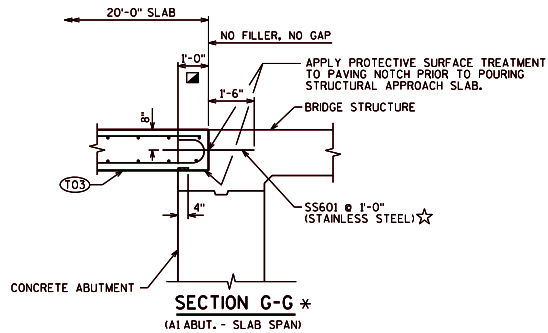
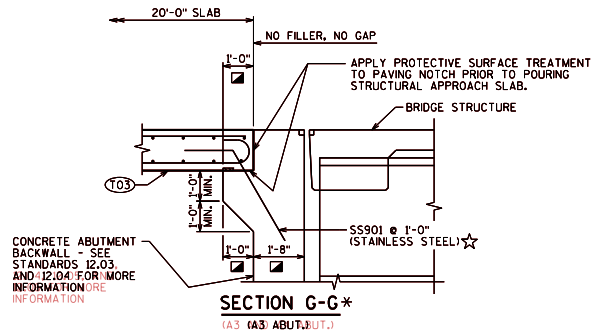
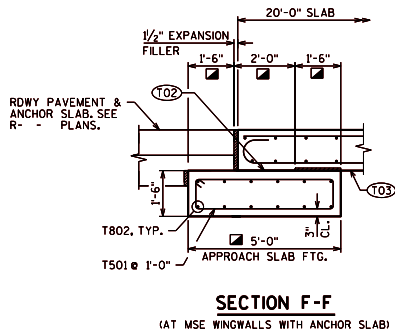


SECTIONS A-A THRU G-G ARE FROM STANDARD 12.10

APPROVED: Bill Oliva DATE: 8-20

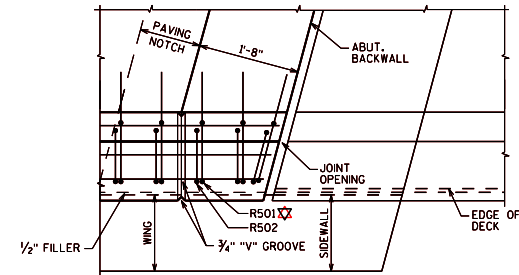


SECTION THRU APPROACH SLAB

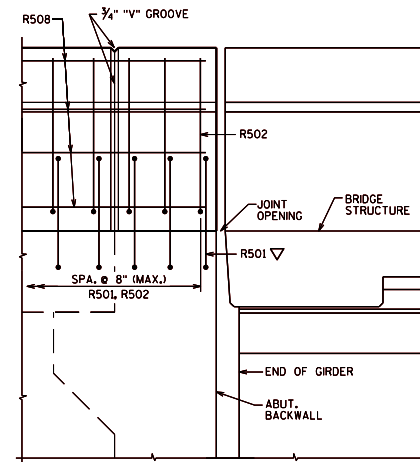


LEGEND

- (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 14-10-25 REQUIREMENTS FOR ROADWAY APPROACH PAVEMENT.
- * SECTION REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARD 12.10 FOR DIFFERENT APPLICATION.
- ☆ THE BID ITEM FOR S5901 AND S5601 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.




(PARAPET ON STRUCTURAL APPROACH SLAB AT A3 ABUT./JUT.)

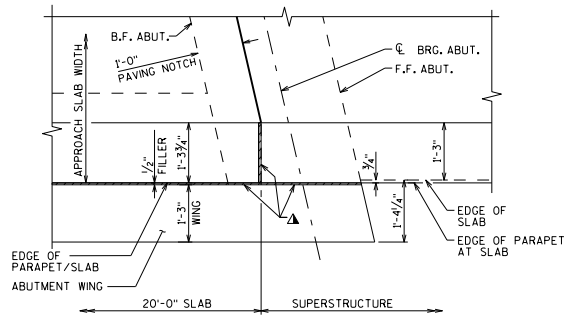


(PARAPET ON STRUCTURAL APPROACH SLAB AT A3 ABUT./JUT.) (WING NOT SHOWN FOR CLARITY)

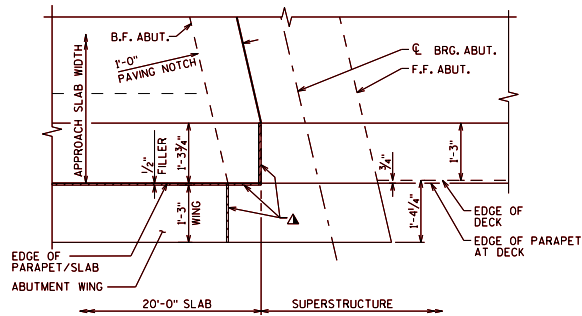
DESIGNER NOTES

SEE CHAPTER 30 FOR PARAPETS ON STRUCTURAL APPROACH SLAB DETAILS.
SECTIONS A-A THRU G-G ARE FROM STANDARD 12.10

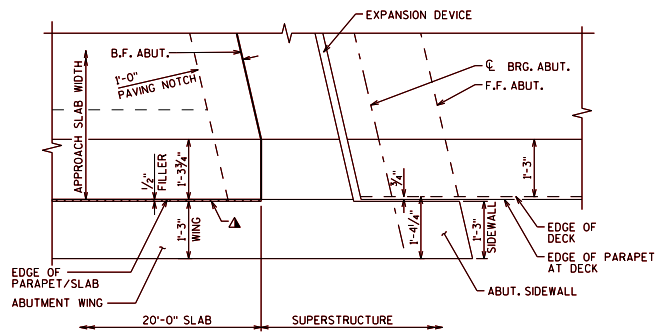
STRUCTURAL APPROACH SLAB DETAILS 2	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-18</u>



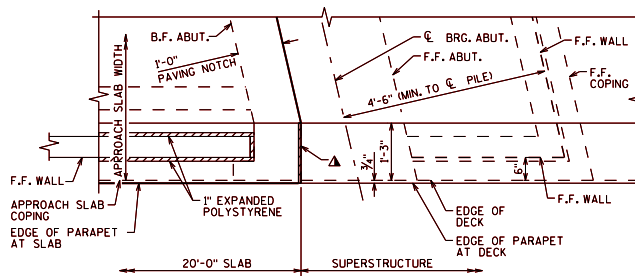
APPROACH SLAB PARTIAL PLAN
(AT WINGWALLS PARALLEL TO BRIDGE - AT ABUT. - SLAB SPAN)



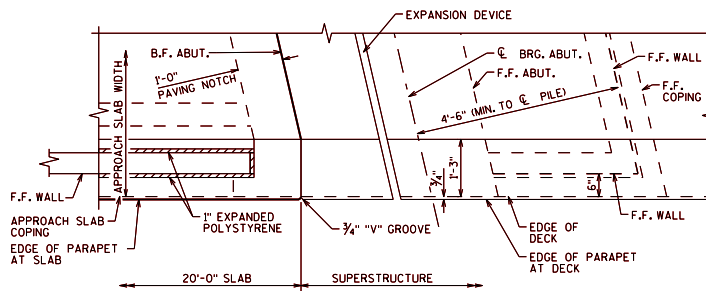
APPROACH SLAB PARTIAL PLAN
(AT WINGWALLS PARALLEL TO BRIDGE - AT ABUT. - ABUT. SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - AT ABUT. - GIRDER SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - AT ABUT. - ABUT. SPAN) WITH WINGWALLS ON GIRDER SPAN




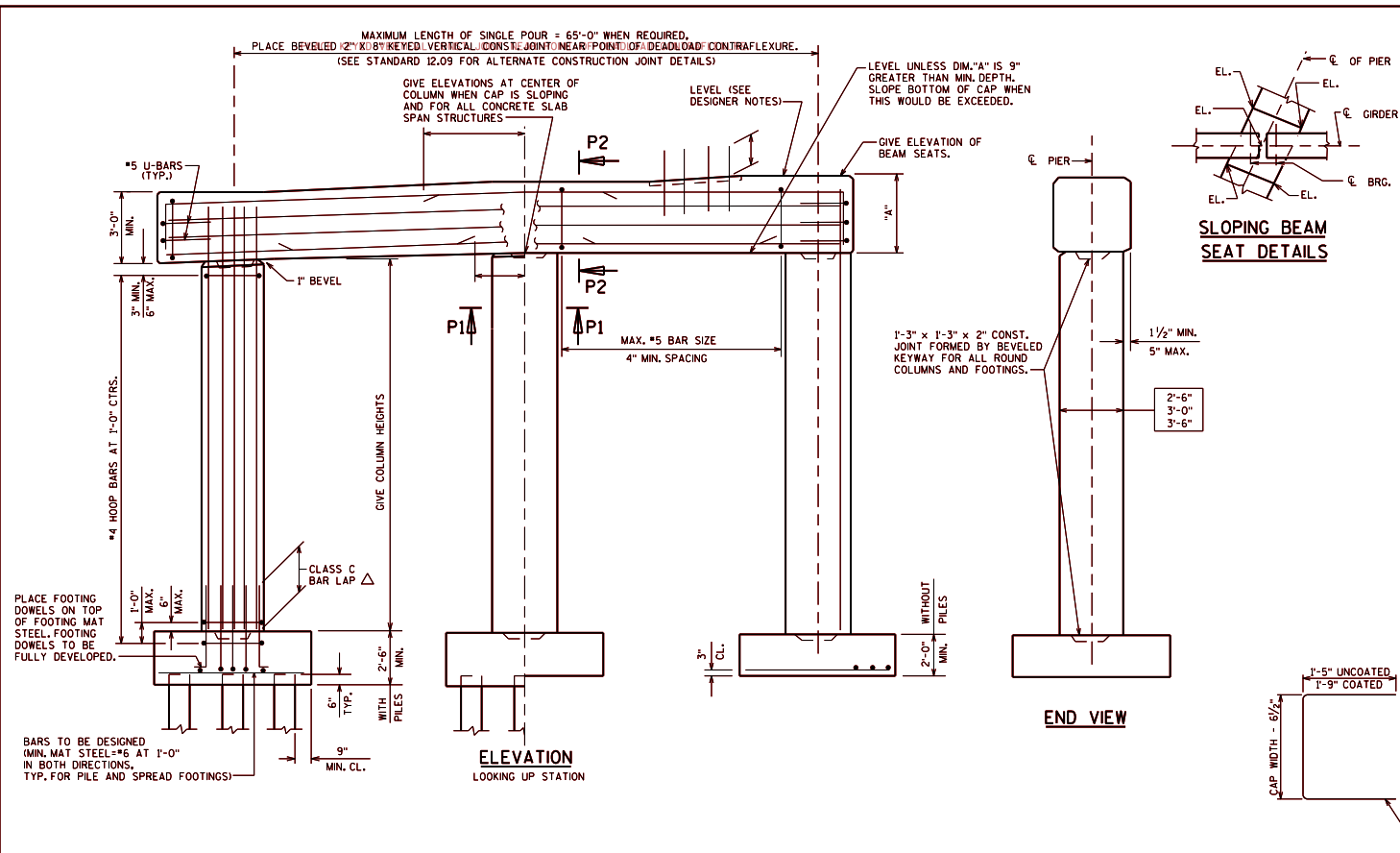
APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - AT ABUT. - GIRDER SPAN) WITH WINGWALLS ON GIRDER SPAN

LEGEND

- ▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF 1/2" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER (1" DEEP AND HOLD 1/8" BELOW SURFACE OF CONCRETE).
- * PARTIAL PLAN REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARD 12.10 FOR DIFFERENT APPLICATION.

PARTIAL PLANS SHOWN HERE ARE FROM STANDARD 12.10

STRUCTURAL APPROACH SLAB DETAILS 3	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>



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 1/2" ELASTOMERIC BEARING PADS AND THE GIRDER BOTTOM SLOPES MORE THAN 1/4" THAN 1/4' ADD THESE TWO VALUES TO DETERMINE THE GIRDER SLOPE.
2. WHEN LONGITUDINAL GRADE OF GIRDER (PERCENT) PER STRUCTURE MAKE - CAMBER EFFECT = (RC)/L X 100 (PERCENT); WHERE: STANDARD RC = RESIDUAL CAMBER (INCHES) L = GIRDER LENGTH (INCHES)

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN

2. WHEN A CAP IS USED FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 12.01.2 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

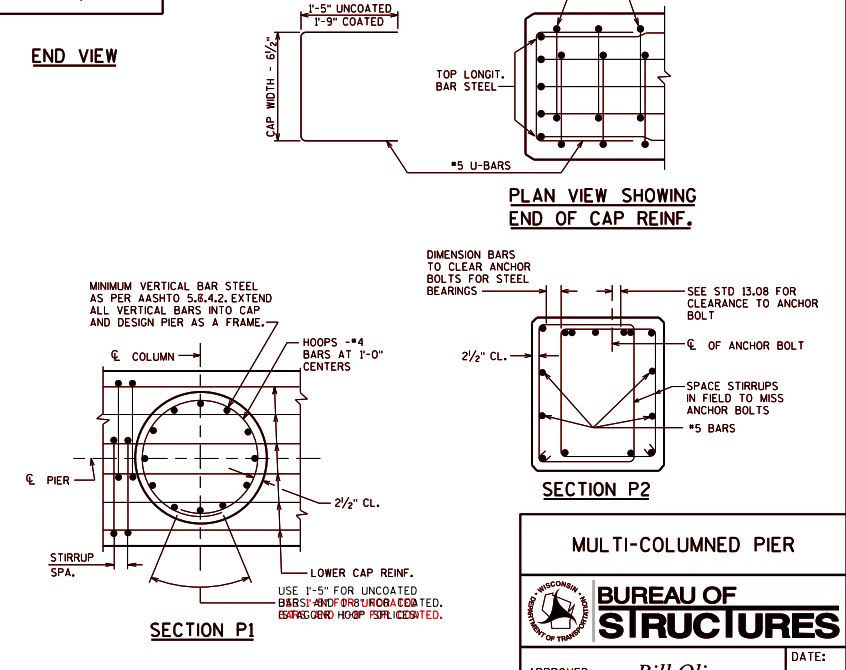
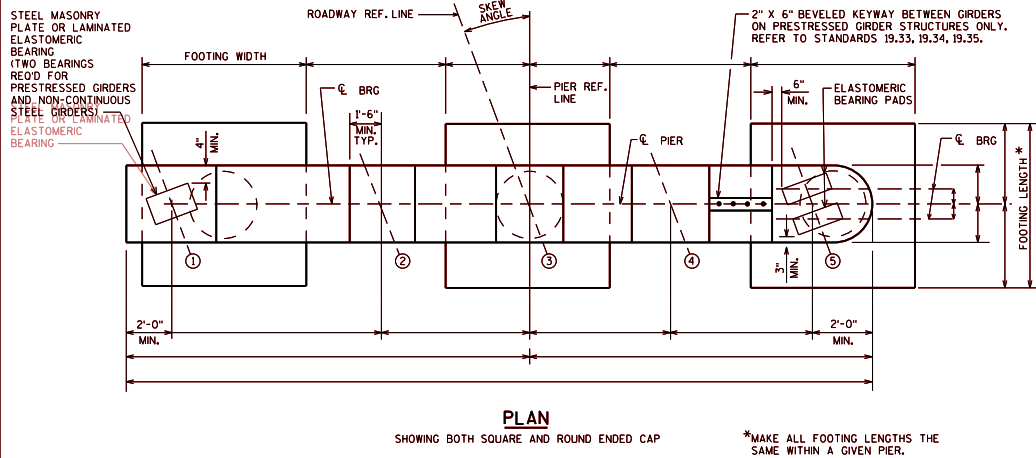
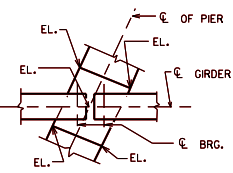
REINFORCING BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL GRADE IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE EPOXY COAT (BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS. TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.

BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY (SIGN 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-COLUMN PIER DESIGN REGARDING VEHICULAR COLLISION FORCE. THE PIER OPTIONS ENDED 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.



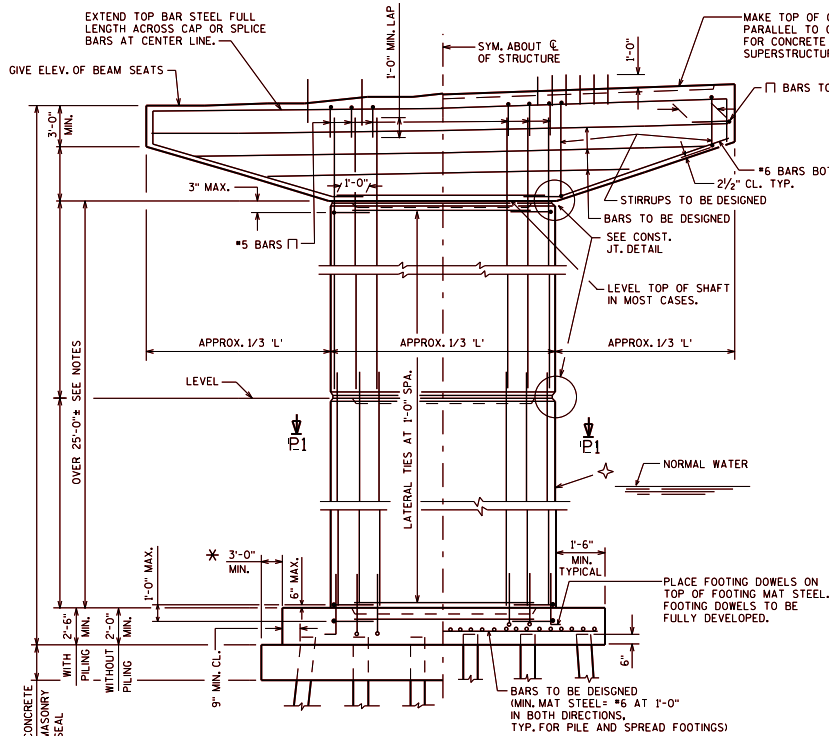
MULTI-COLUMNED PIER

BUREAU OF STRUCTURES

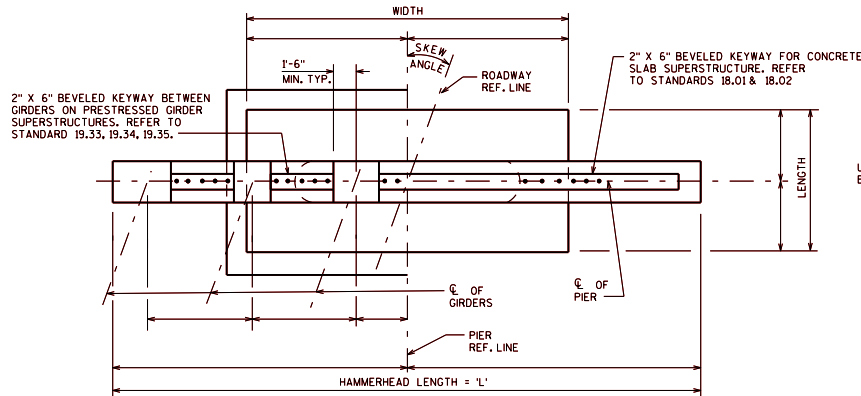
APPROVED: *Bill Oliva* DATE: 7-20

GIRDER STRUCTURES

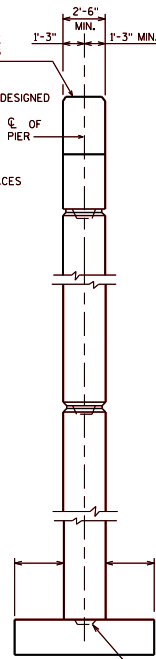
CONCRETE SLAB STRUCTURES



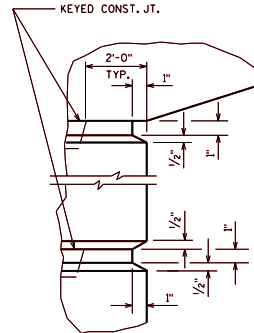
ELEVATION
LOOKING UP STATION



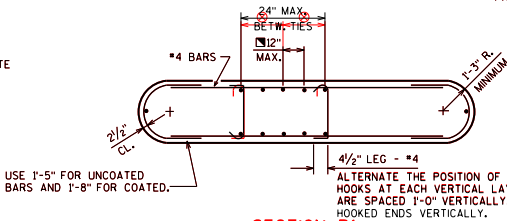
PLAN



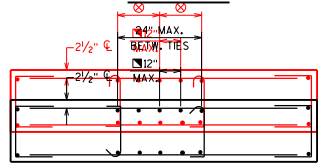
END VIEW



CONST. JT. DETAIL



SECTION B1



ALTERNATE SECTION B1

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 10X 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 1/2" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1X. 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 1X 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.

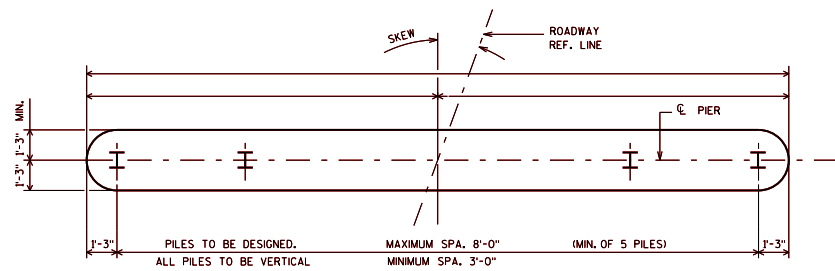
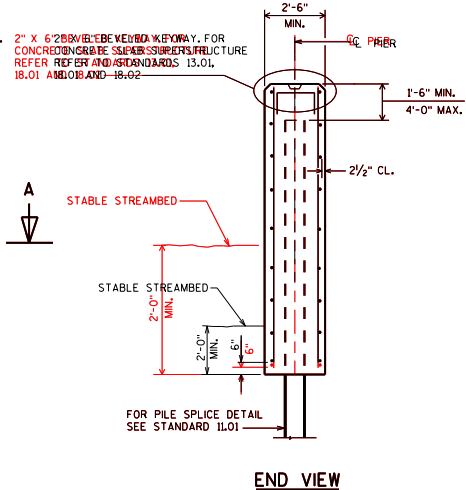
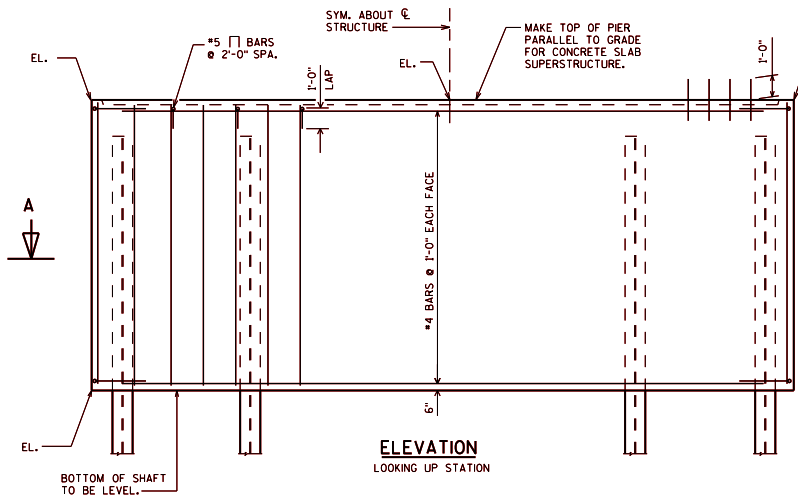
★ INCREASE THIS DIMENSION IF NECESSARY TO PREVENT BATTERED PILES FROM DRIVING INTO SHEET PILING. ALSO INCREASE DIMENSION TO FACILITATE OVERHEAD SHEETING CLEARANCE IF THE TOP OF PIER IS BEYOND NORMAL SEAL SIZE AND NO CONSTRUCTION JOINT IS PROVIDED IN THE SHAFT/CAP REGION (E.G. TAPERED WALL PIERS OR SHORTER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

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

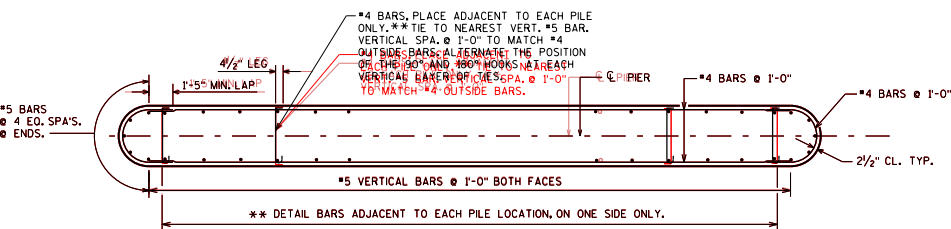
PLAN NOTES

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.

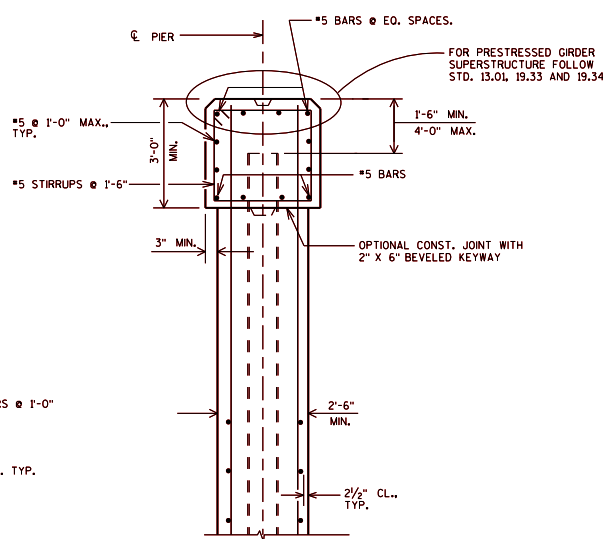
HAMMERHEAD PIER	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-21</u>



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



SECTION A-A



CAP TYPE DETAIL
USE WHEN ECONOMICAL FOR GIRDERS ON LARGE SKEWS


NOTES

- TYPE 1 [AT PIER ... CONCRETE POURED UNDERWATER WILL BE ALLOWED AND SHALL BE DONE IN ACCORDANCE WITH STANDARD SPEC 502.3.5.3. CONCRETE POURED UNDERWATER SHALL NOT EXCEED 10.0 FEET IN DEPTH, UNLESS APPROVED OTHERWISE. SECTION 13.11.5 FOR GUIDANCE ON COFFERDAM
- TYPE 2 [AT PIER ... COFFERDAM REQUIRED. CONCRETE POURED UNDERWATER WILL BE ALLOWED AND SHALL BE DONE IN ACCORDANCE WITH STANDARD SPEC 502.3.5.3. CONCRETE POURED UNDERWATER SHALL NOT EXCEED 10.0 FEET IN DEPTH, UNLESS APPROVED OTHERWISE.
- TYPE 3 [AT PIER ... COFFERDAM AND COFFERDAM DEWATERING REQUIRED. COFFERDAM SHALL BE DEWATERED PRIOR TO PLACING PIER CONCRETE.

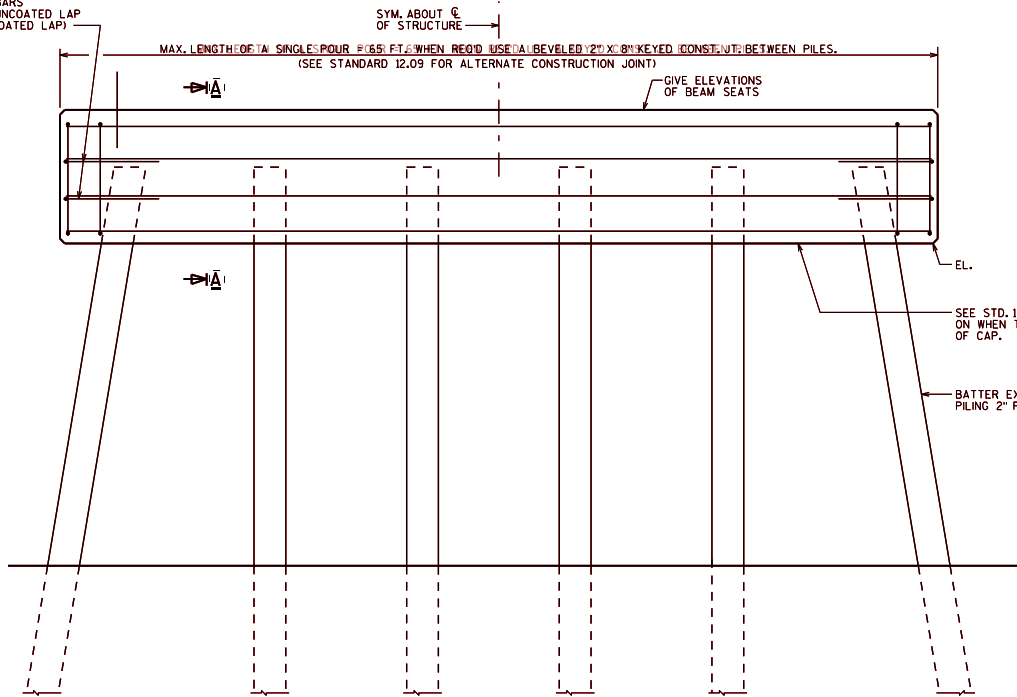
DESIGNER NOTES

SEE BRIDGE MANUAL SECTION 13.2.3 AND STANDARD 13.09 FOR GUIDANCE ON PIER TYPES, DETAILS, AND APPLICABLE BID ITEMS.
SEE BRIDGE MANUAL SECTION 13.11.5 FOR GUIDANCE ON COFFERDAMS.
CONSTRUCTION JOINTS ARE NOT REQUIRED, REGARDLESS OF LENGTH OF PILE ENCASED PIER.

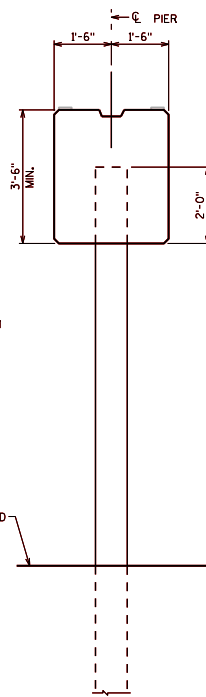
SEE STANDARD 13.01 FOR ADDITIONAL, APPLICABLE DESIGNER NOTES

PILE ENCASED PIER	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-19</u>

*5 U-BARS
(1'-5" UNCOATED LAP
1'-9" COATED LAP)



ELEVATION
LOOKING UP STATION



END VIEW

NOTES

PILES SHALL BE PAINTED IN ACCORDANCE WITH SECTION 550.3.11.3 OF THE STANDARD SPECIFICATIONS. TENSION LAP SPLICE UNLESS OTHERWISE SHOWN.

DESIGNER NOTES

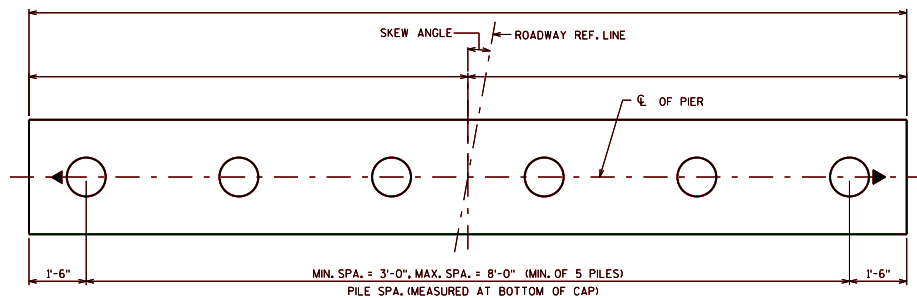
ALL BAR SPLICES TO BE LEVEL EXCEPT FOR THE TENSION LAP SPLICE. ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE UNLESS OTHERWISE SHOWN. ELASTOMERIC BEARING PADS SHALL BE USED UNDER ALL GIRDER SUPERSTRUCTURE BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01 FOR CRITERIA ON WHEN TO SLOPE BOTTOM OF CAP.
 2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 13.01 FOR CRITERIA ON WHEN TO SLOPE BOTTOM OF CAP.
- BEARING SEAT AREAS SHALL BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

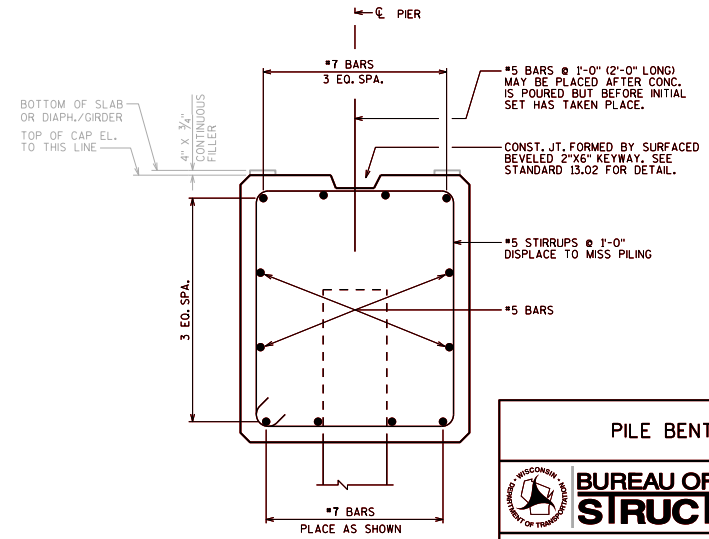
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

PILES SHALL BE 12 3/4" OR 14" DIAMETER CAST-IN-PLACE WITH MINIMUM WALL THICKNESS OF 3/4".

SEE STANDARD 13.01 FOR BEARING PILE BEARING PILE DETAILS. PILE USE REQUIRES PRIOR APPROVAL DURING DESIGN OF THE STRUCTURES DEVELOPMENT CHIEF, (608) 266-0075.

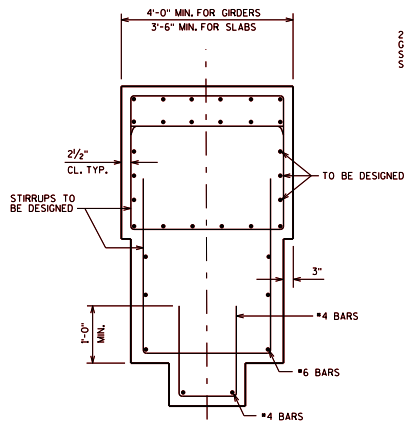


PLAN

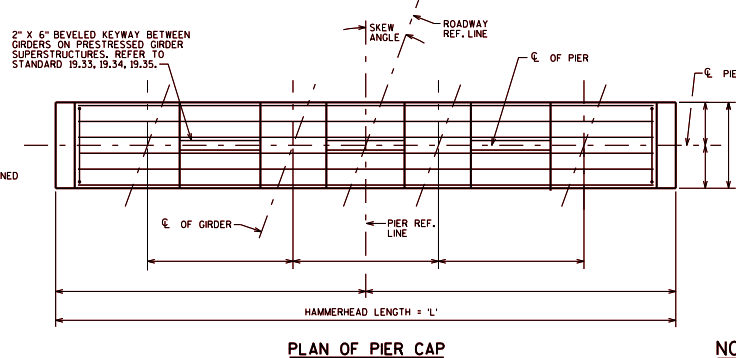


SECTION A-A

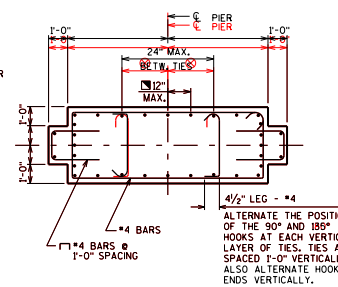
PILE BENT	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-23</u>



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 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 1/2" 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 13.01.

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.

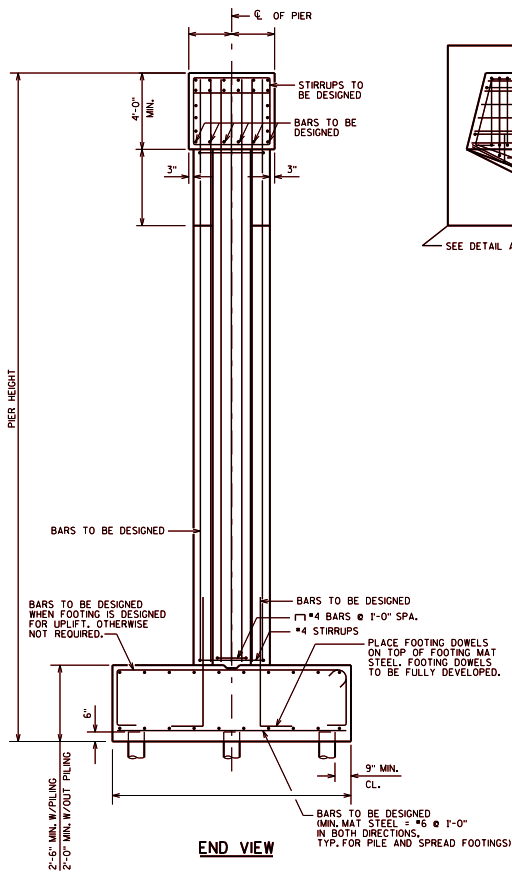
NOTES

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.

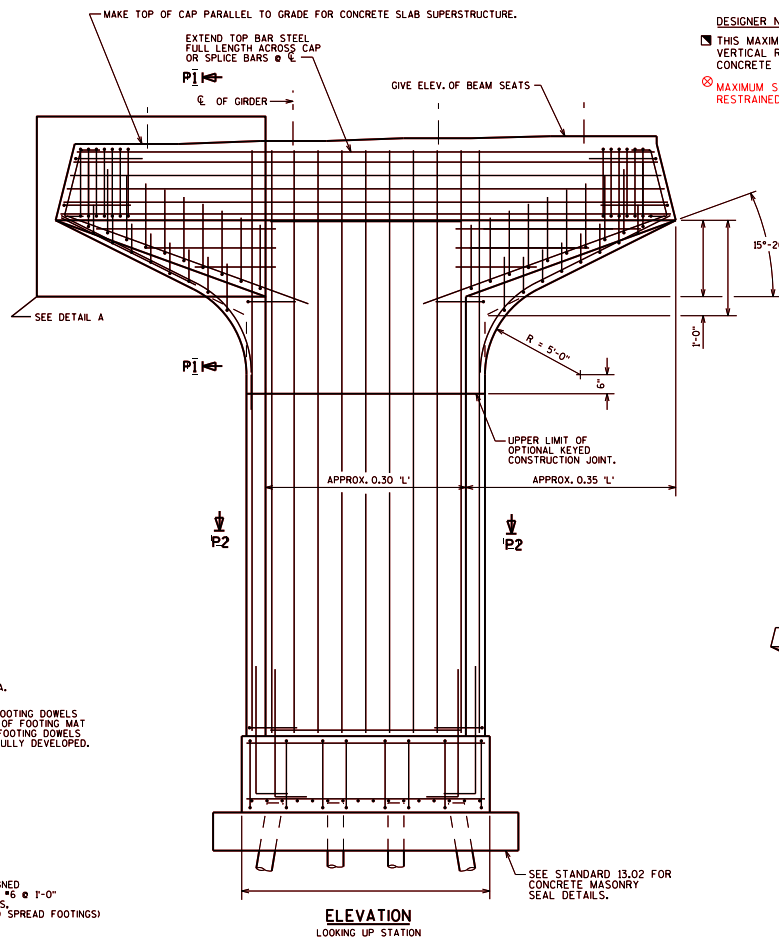
DESIGNER NOTES (CONT)

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

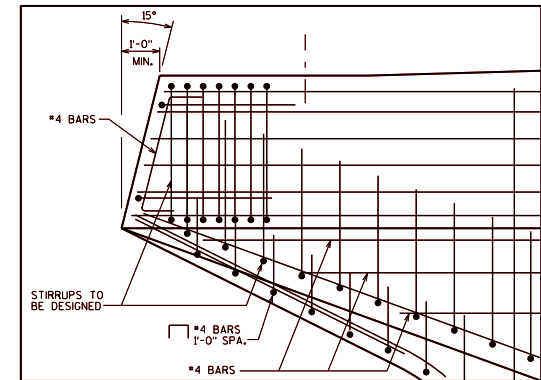
MAXIMUM SPACING BETWEEN UNRESTRAINED VERTICAL BAR AND RESTRAINED (TIED ACROSS MEMBER) VERTICAL BAR IS 24 INCHES



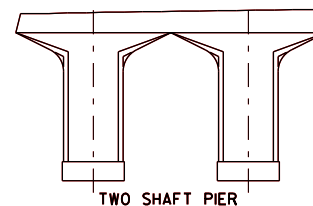
END VIEW



ELEVATION
LOOKING UP STATION



DETAIL A



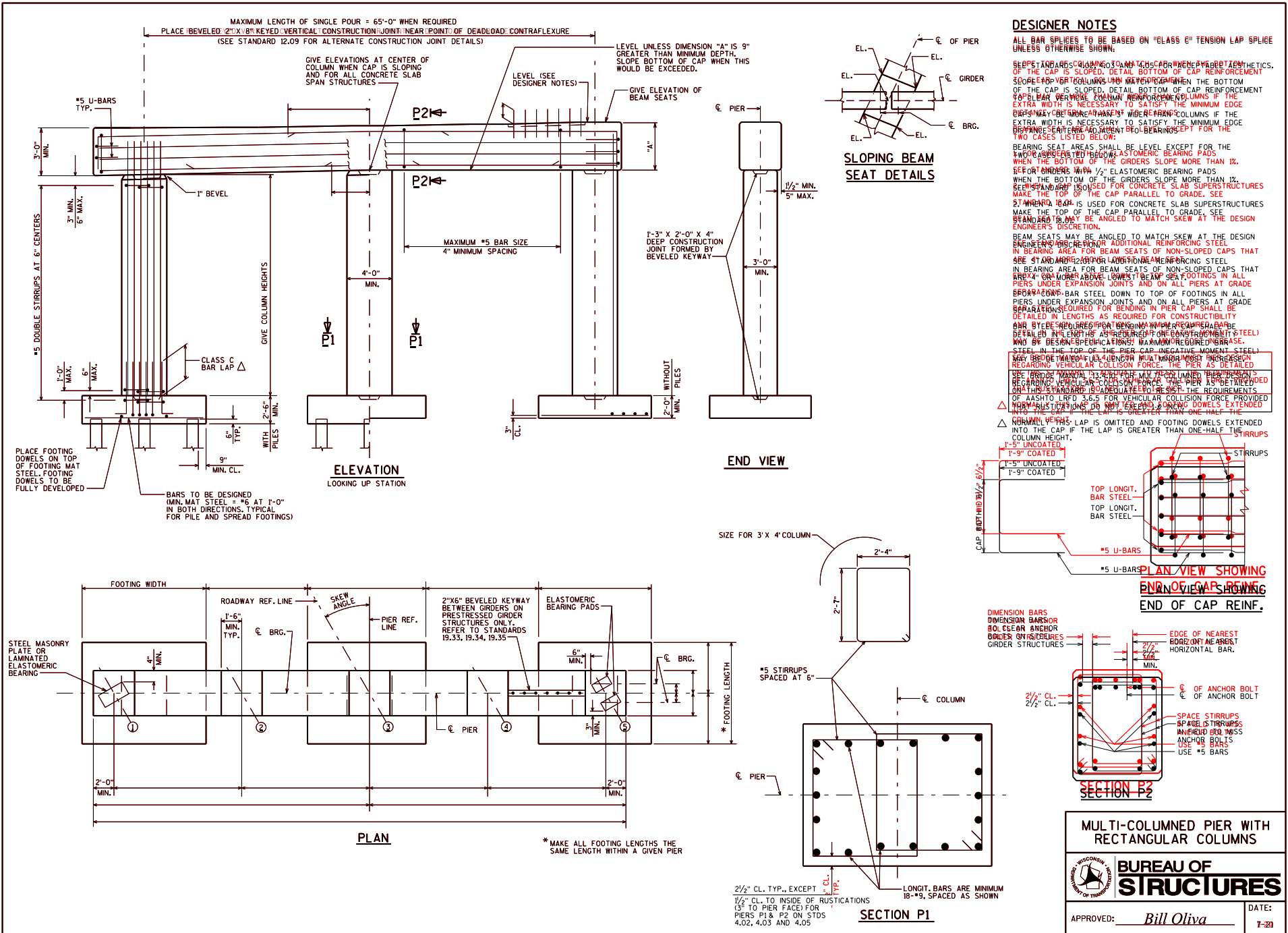
TWO SHAFT PIER

HAMMERHEAD PIER - TYPE 2



BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-21



DESIGNER NOTES

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

SEE STANDARD 13.07 FOR MULTICOLUMN PIERS WITH RECTANGULAR COLUMNS. DETAIL BOTTOM OF CAP REINFORCEMENT SLOPE AND VERTICAL CONSTRUCTION JOINT NEAR POINT OF CONTRAFLEXURE. DETAIL BOTTOM OF CAP REINFORCEMENT OF CAP IS SLOPED, DETAIL BOTTOM OF CAP REINFORCEMENT OF PIER VERGEE COLUMN REINFORCEMENT COLUMNS IF THE EXTRA WIDTH IS NECESSARY TO SATISFY THE MINIMUM EDGE DISTANCE REQUIREMENTS OF BEARING COLUMNS IF THE EXTRA WIDTH IS NECESSARY TO SATISFY THE MINIMUM EDGE DISTANCE REQUIREMENTS OF BEARING COLUMNS IF THE TWO CASES LISTED BELOW:

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE FOLLOWING CASES:

- 1. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 2. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 3. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE FOLLOWING CASES:

- 1. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 2. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 3. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE FOLLOWING CASES:

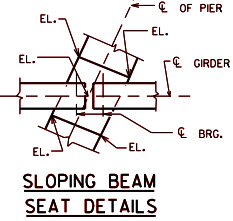
- 1. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 2. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 3. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE FOLLOWING CASES:

- 1. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 2. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 3. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

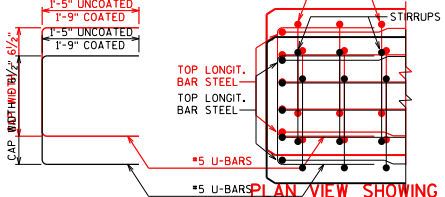
BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE FOLLOWING CASES:

- 1. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 2. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
- 3. WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

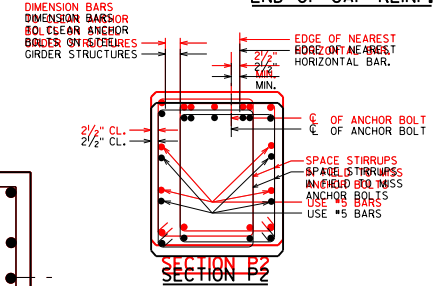


SLOPING BEAM SEAT DETAILS

END VIEW



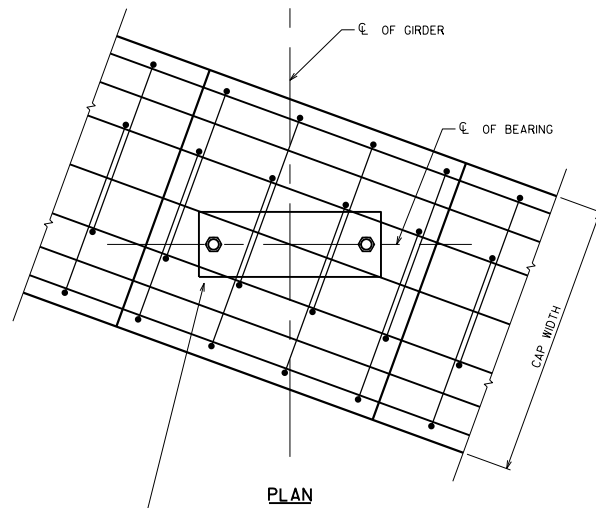
PLAN VIEW SHOWING END OF CAP REINFORCEMENT



MULTI-COLUMN PIER WITH RECTANGULAR COLUMNS

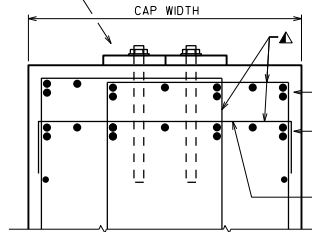
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva* DATE: 7-20



PLAN

PROVIDE ADEQUATE CLEARANCE FOR POST-INSTALLED ANCHORS



SECTION THRU PIER CAP

DETAIL MULTIPLE LAYERS OF BAR STEEL TO AVOID SPACING THAT IS TOO TIGHT. BUNDLED BARS MAY BE USED. AVOID LAPPING BUNDLED BARS.

PROVIDE REINFORCEMENT NECESSARY TO SUPPORT MAIN REINFORCEMENT.

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.

PIER CAP REINFORCEMENT
DETAILING



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
1-17

DESIGNER NOTES

PIER TYPES SHOWN ON THIS STANDARD ARE BASED ON THE OBSERVED WATER ELEVATION. OTHER FACTORS (VELOCITY, H₂ ELEVATION, ETC.) SHOULD ALSO BE CONSIDERED WHEN SELECTING THE APPROPRIATE BID ITEMS AND PLAN NOTES.

PILE ENCASED PIER TYPES:

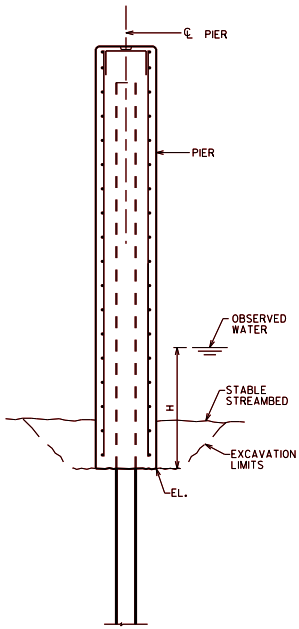
TYPE 1 - COFFERDAM BID ITEM NOT PROVIDED. CONSIDER PROVIDING UNDERWATER INSPECTION BID ITEM.

TYPE 2 - COFFERDAM AND UNDERWATER INSPECTION BID ITEMS REQUIRED.

TYPE 3 - COFFERDAM AND SEAL BID ITEMS REQUIRED.

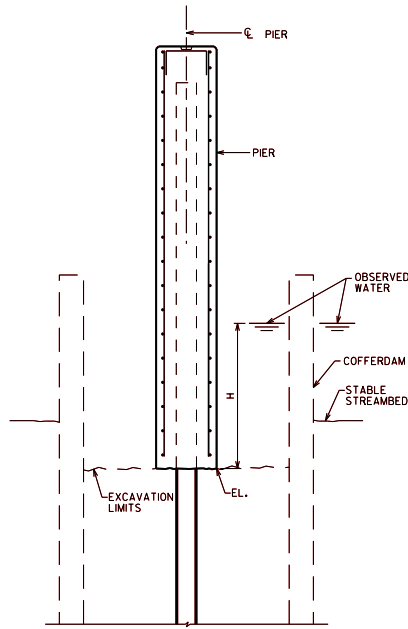
WALL PIER ALTERNATIVES:

- SOLID WALL (AS SHOWN ON THIS STANDARD)
- HAMMERHEAD (SEE STANDARD 13.02)



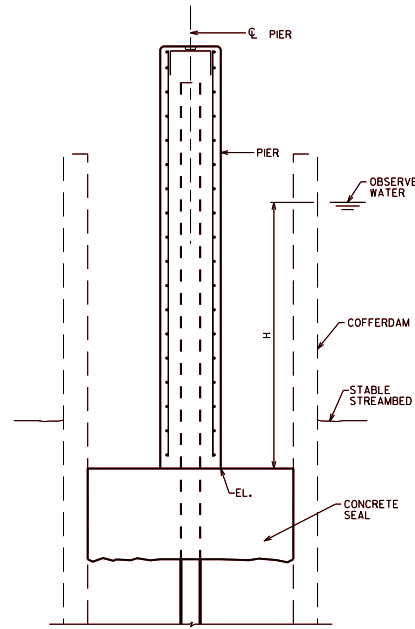
END VIEW

PILE ENCASED PIER - TYPE 1
(H < 5.0 FEET)



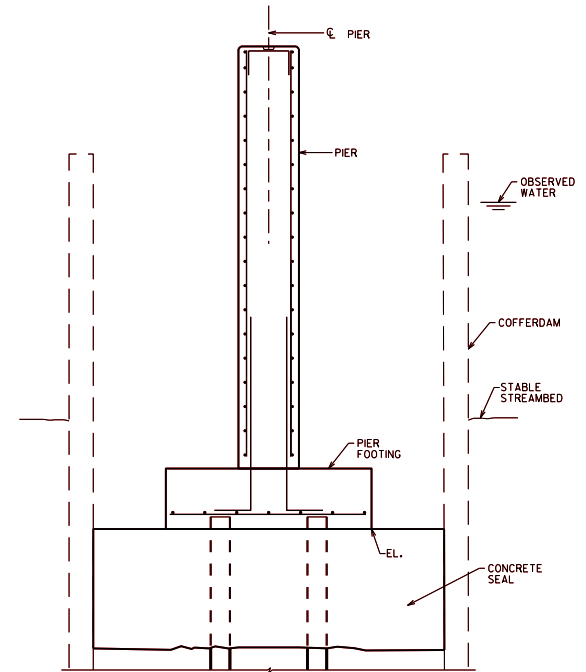
END VIEW

PILE ENCASED PIER - TYPE 2
(5.0 FT < H < 10.0 FT)



END VIEW

PILE ENCASED PIER - TYPE 3
(H > 10.0 FT)



END VIEW

SOLID WALL PIER
(PILE ENCASED PIER ALTERNATIVE)

ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.9000.S	UNDERWATER SUBSTRUCTURES INSPECTION (STRUCTURE)	EACH

ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.1100	CONCRETE MASONRY SEAL	CY

ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.1100	CONCRETE MASONRY SEAL	CY

PILE ENCASED PIER (TYPES)

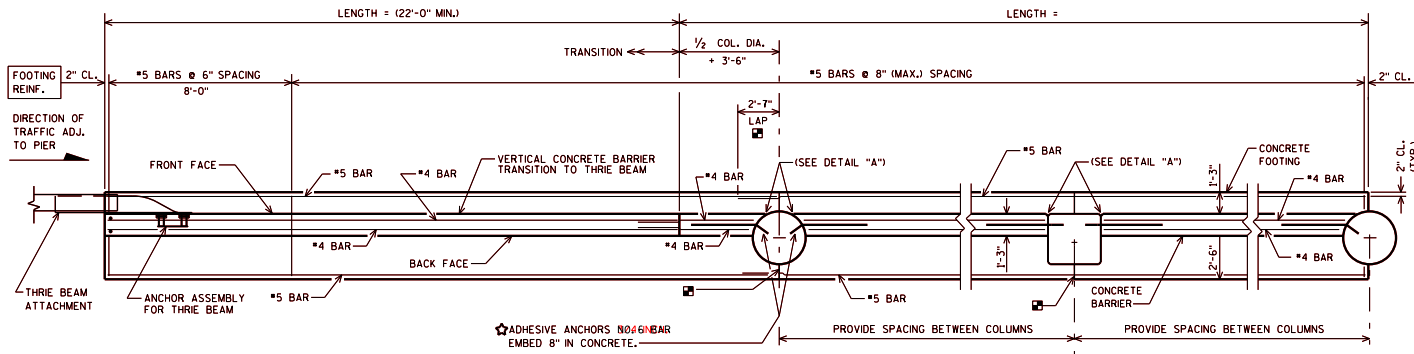


BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:

7-20



PLAN

DETAILS FOR CIRCULAR AND RECTANGULAR COLUMNS

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

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.

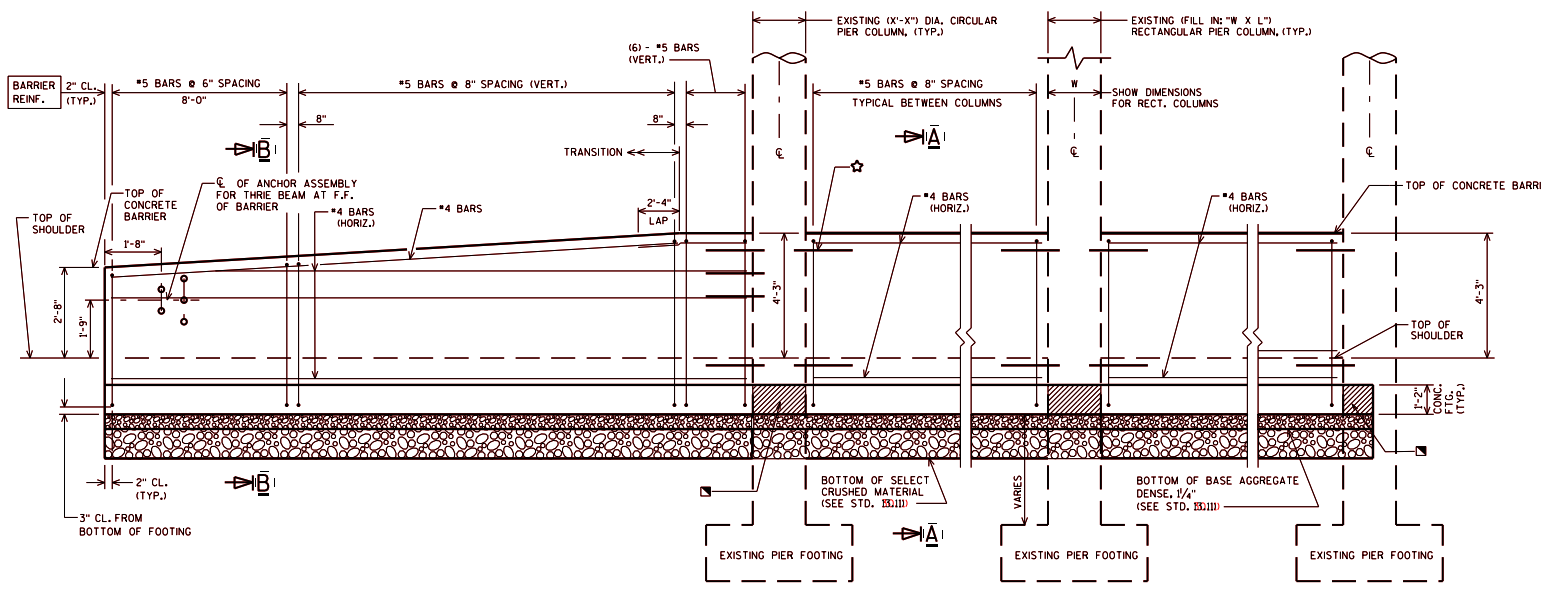
USE 2-INCH MINIMUM BAR CLEARANCE, EXCEPT AT FOOTINGS. PROVIDE 3-INCH BAR CLEARANCE FROM BOTTOM OF FOOTING TO BOTTOM TRANSVERSE REINFORCEMENT.

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.



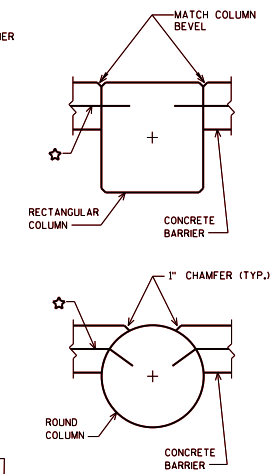
ELEVATION

LOOKING AT B.F. OF BARRIER

ULTIMATE DESIGN STRESSES:

CONCRETE MASONRY $f'_c = 4,000$ P.S.I.
 HIGH-STRENGTH BAR STEEL
 REINFORCEMENT, GRADE 60 $f_y = 60,000$ P.S.I.

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



DETAIL A

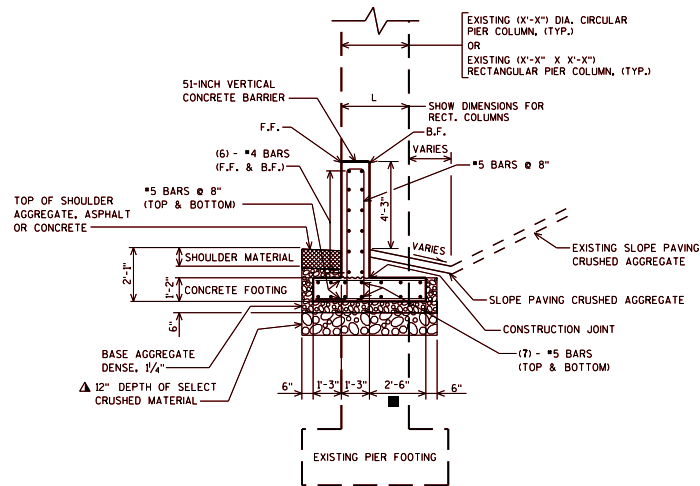
F.F. OF BARRIER IS FLUSH WITH FACE OF COLUMN

PLACE 1/2" FILLER BETWEEN COLUMN AND CONCRETE FOOTING (TYP.)

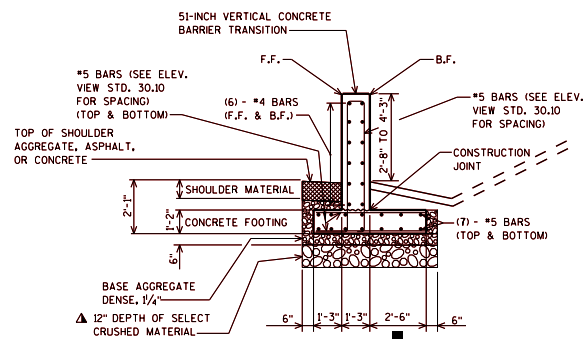
51-INCH CONCRETE INTEGRAL BARRIER

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-25



SECTION A-A
BETWEEN COLUMNS

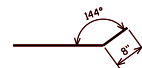


SECTION B-B
TRANSITION REGION

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

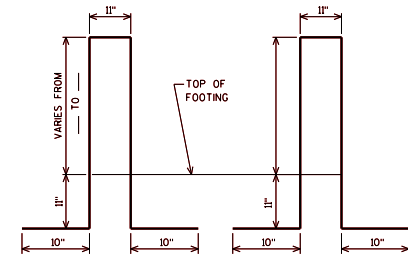
■ FOR COLUMNS WITH "DIA." OR "L" GREATER THAN 3'-0", INCREASE THIS VALUE SO THAT B.F. OF FOOTING EXTENDS 9" BEYOND B.F. OF COLUMN.

LENGTH = 3'-2" *



#6 BAR

USED WITH CIRCULAR COLUMNS (ADHESIVE ANCHOR)
* FOR RECTANGULAR COLUMN USE STRAIGHT BARS OF THIS LENGTH



BAR BENDING DIAGRAMS

BAR DIMENSIONS ARE OUT TO OUT OF BAR

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:

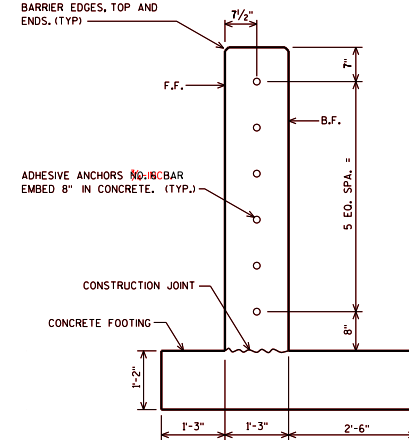
- TWO-LANE ROAD IS ADJACENT TO BARRIER AND THERE IS A CONCERN FOR TRAFFIC TO CROSS-OVER.
- FUTURE TRAFFIC CONTROL NEEDS MAY CAUSE THE DIRECTION OF TRAFFIC ADJACENT TO BARRIER TO BE REVERSED.
- HAZARDS MAY EXIST IN THIS REGION THAT REQUIRE SHIELDING.

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.

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



ADHESIVE ANCHOR LAYOUT

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

51-INCH VERTICAL CONCRETE BARRIER AND TRANSITION

SEE STANDARD 13.10 FOR ADDITIONAL DETAILS

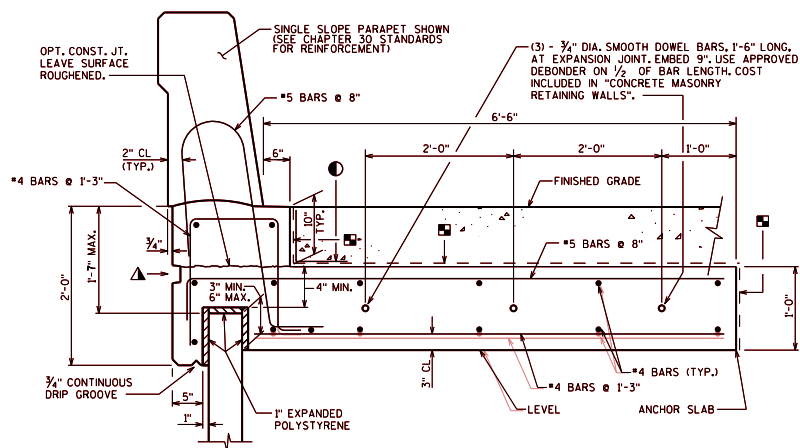
INTEGRAL BARRIER DETAILS



BUREAU OF STRUCTURES

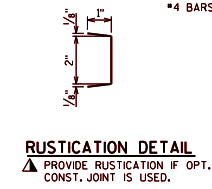
APPROVED: Bill Oliva

DATE:
7-25

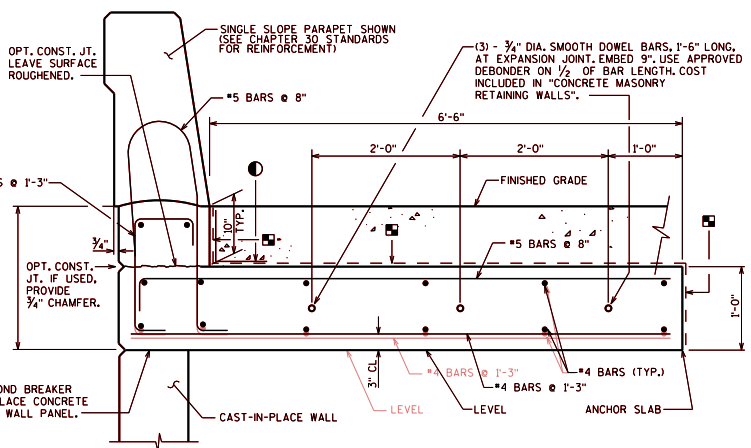


18" RUBBERIZED MEMBRANE WATERPROOFING TO BE PLACED ON THESE SURFACES AT EACH JOINT.

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 CONCRETE MASONRY BIDDING ITEM.



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

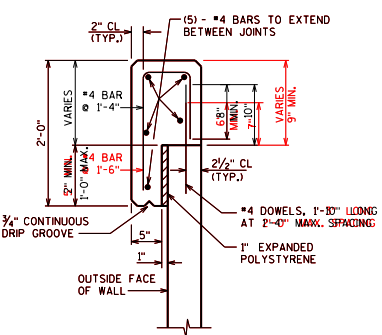


LIQUID OR OTHER BOND BREAKER BETWEEN CAST-IN-PLACE CONCRETE AND CAST-IN-PLACE WALL PANEL.

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

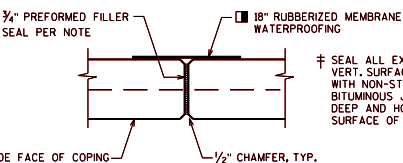
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPET AND ANCHOR SLAB BETWEEN EXPANSION JOINTS MAY BE USED. RUN BAR REINFORCEMENT THRU THE JOINT. SEE STANDARDS 30.07, 30.12, 30.13 & 30.30-30.32 FOR MINIMUM LAP LENGTHS IN PARAPET BARS. DEFINE CONSTRUCTION JOINT WITH A 3/4" V-GROOVE.

LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".
 ALL BAR STEEL SHALL BE EPOXY COATED.
 CONCRETE QUANTITY BASED ON 3" PANEL EMBEDMENT.



CAST-IN-PLACE CONCRETE COPING DETAIL

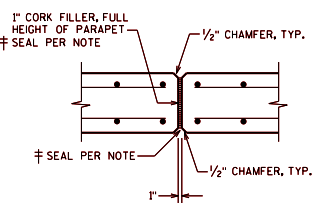
NOTES: CONCRETE COPING DESIGNED FOR STANDARD PAVED ROADWAY WITH 10% FINISHING OPPOSITE SPACING AREA. REINFORCEMENT SHALL BE MADE.



COPING EXPANSION JOINT

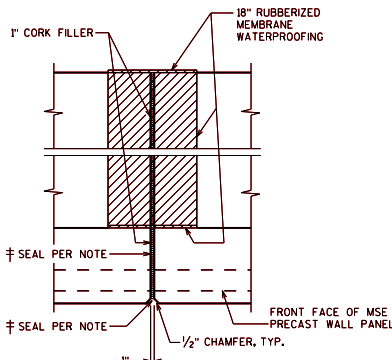
DO NOT RUN BAR STEEL THRU JOINT. MAX. SPACING OF JOINT = 5'

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



TRAFFIC BARRIER EXPANSION JOINT DETAIL

1" CORK FILLER, FULL HEIGHT OF PARAPET



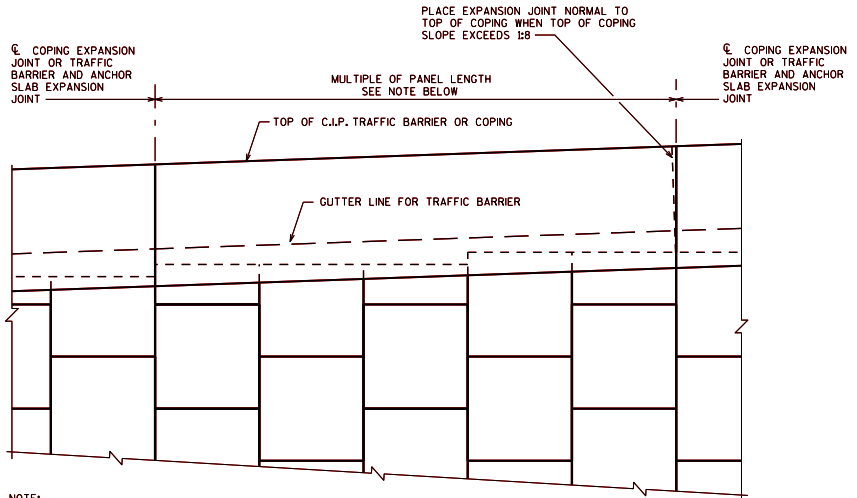
ANCHOR SLAB EXPANSION JOINT DETAIL

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.

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 3/4" V-GROOVE.

LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".
 ALL BAR STEEL SHALL BE EPOXY COATED.



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

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

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	
	BUREAU OF STRUCTURES
APPROVED: <i>Bill Oliva</i>	DATE: 7-20

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.

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.

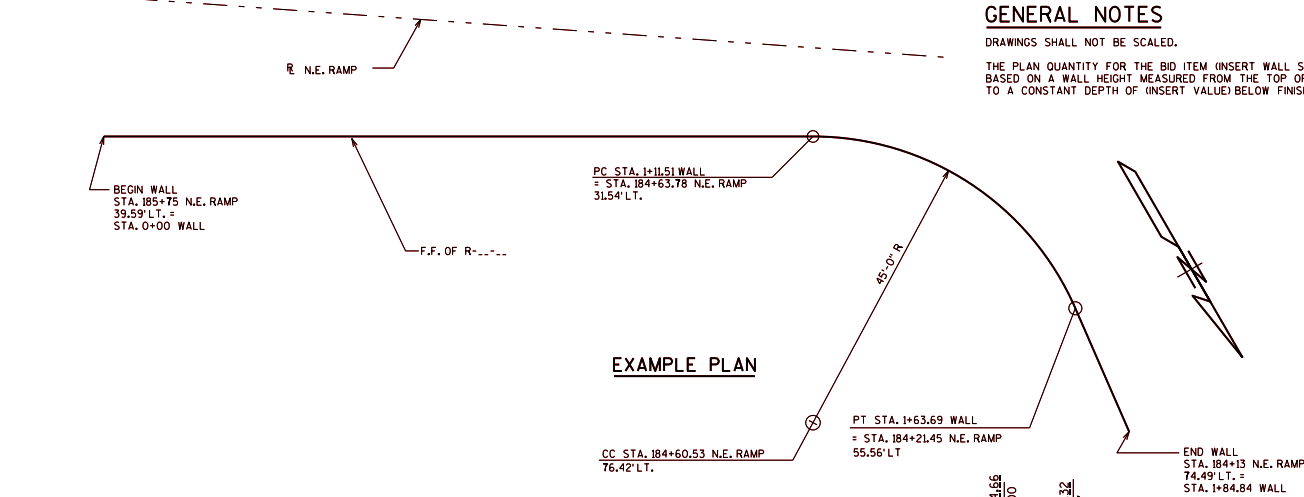
DESIGN RETAINING WALLS FOR A LIVE LOAD SURCHARGE OF (INSERT VALUE).

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.
 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

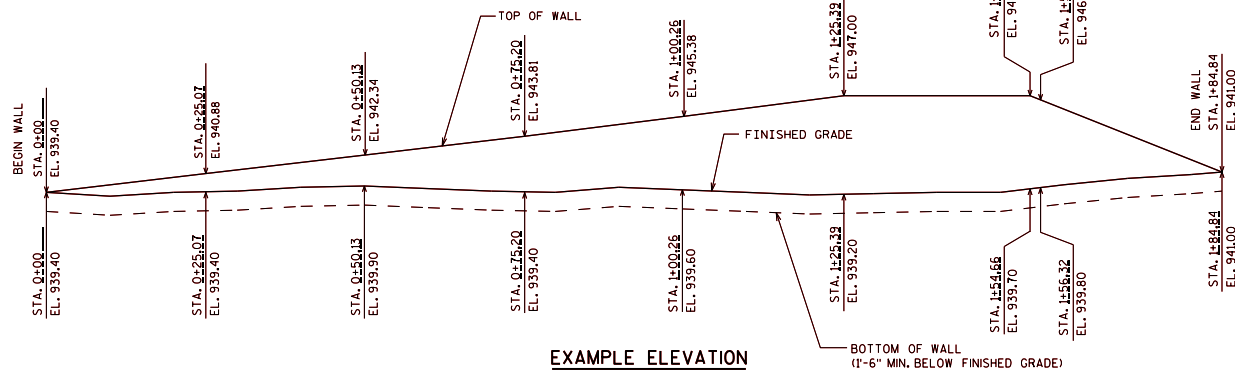
- THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED UPON THE MINIMUM DESCRIBED IN THE WALL SYSTEM SPECIAL PROVISIONS OR EXTERNAL AND OVERALL STABILITY AT THE DESIGNATED LOCATIONS. THESE DESIGNATED LOCATIONS REPRESENT TYPICAL AND CRITICAL WALL LOCATIONS, BUT SHALL 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 RESPONSIBILITY.
 - ▲ MINIMUM EMBEDMENT BASED ON SITE SPECIFIC PARAMETERS (1'-6" MINIMUM FOR ALL WALLS ON LEVEL GROUND). FIELD EMBEDMENTS SHALL MEET OR EXCEED THE MINIMUM EMBEDMENT. 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.

EXAMPLE PLAN



EXAMPLE ELEVATION

(LOOKING @ F.F. OF WALL)



GEOMETRY TABLE

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

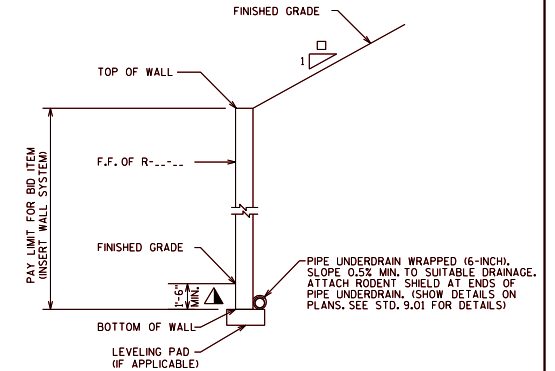
SOIL PARAMETERS

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

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)	



TYP. CROSS SECT. OF RETAINING WALL

LIST OF DRAWINGS

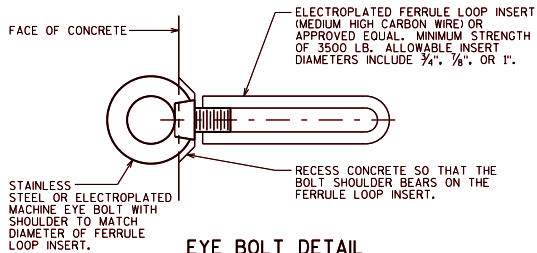
1. (INSERT WALL SYSTEM)
2. SUBSURFACE EXPLORATION

LRFD PROPRIETARY RETAINING WALLS (GENERAL PLAN)



APPROVED: *Bill Oliva*

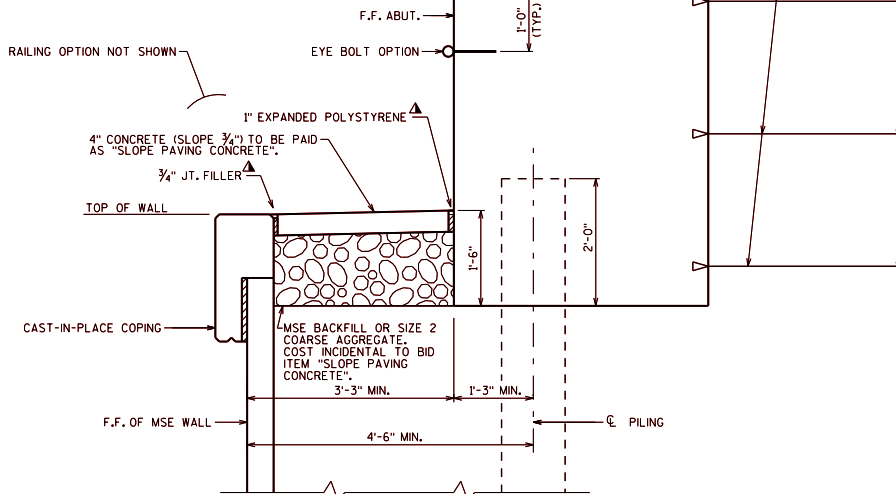
DATE: 1-18



EYE BOLT DETAIL

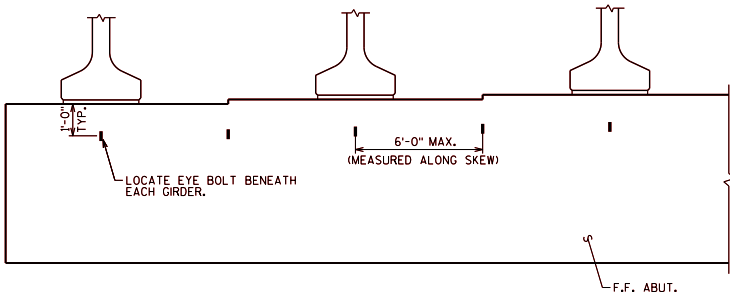
COST INCIDENTAL TO BID ITEM "CONCRETE MASONRY BRIDGES".

ABUTMENT ANCHORAGE TO BE DETERMINED BY THE MSE WALL DESIGNER, AND TO BE PAID AS "ABUTMENT ANCHORAGE" SHOWN. (SOIL REINFORCEMENT STRIPS SHOWN).



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 PLANS:

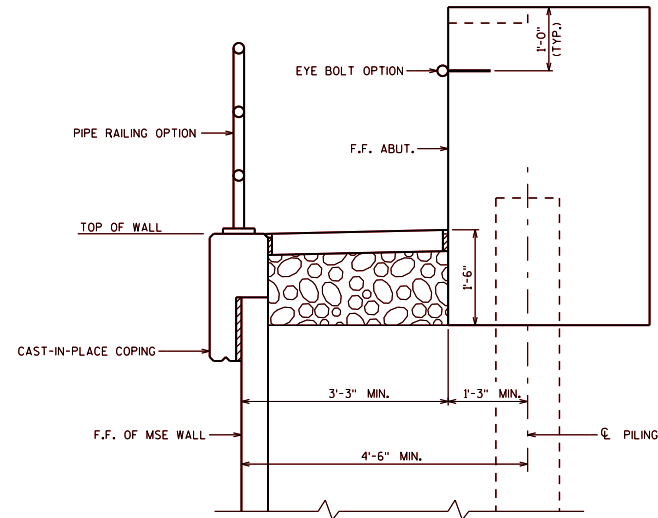
BR = --- KLF WS = --- KLF
TU = --- KLF WL = --- KLF

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

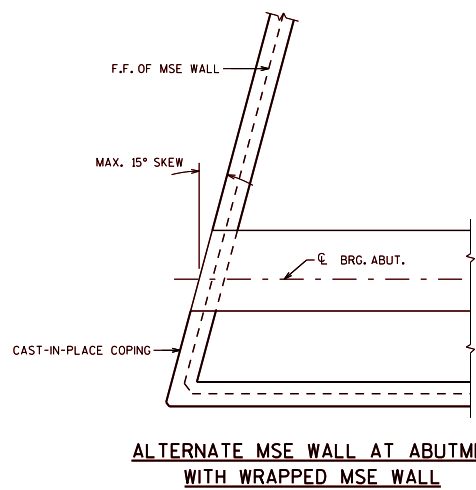
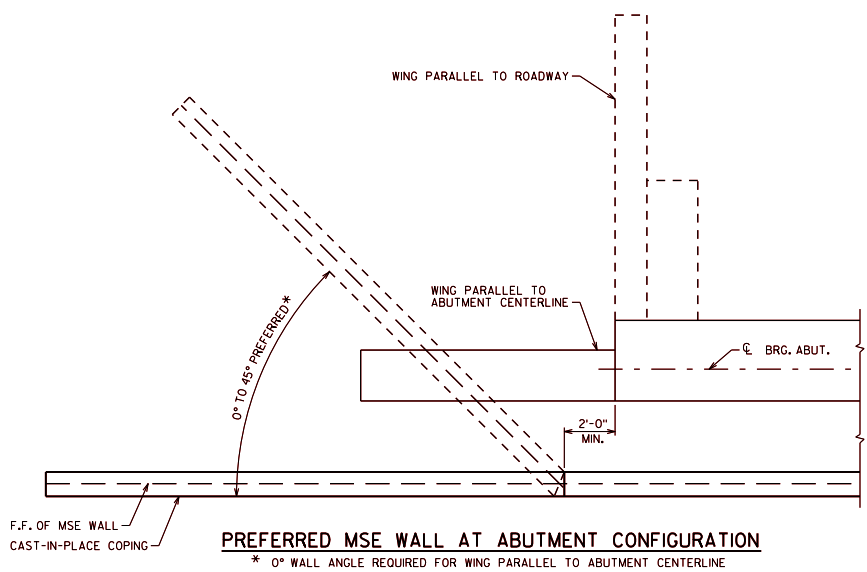


BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE:

1-18

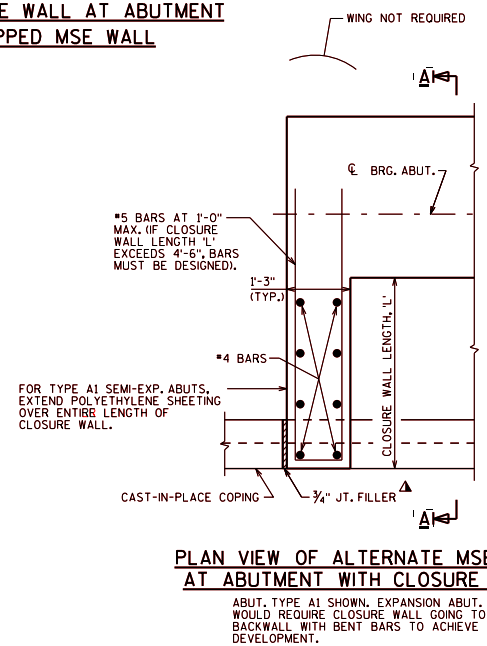
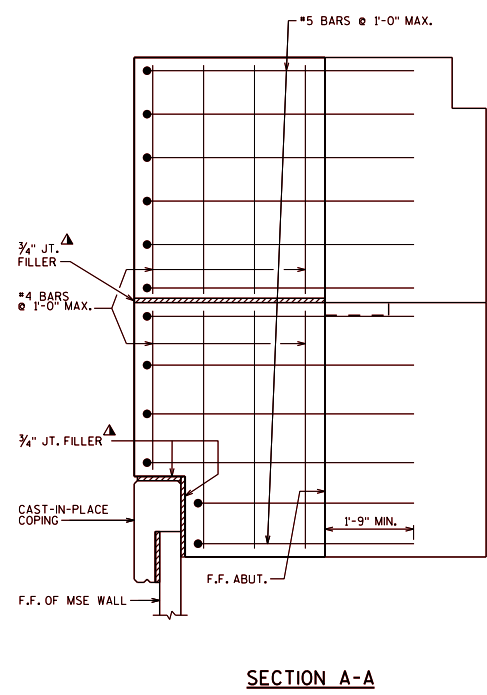
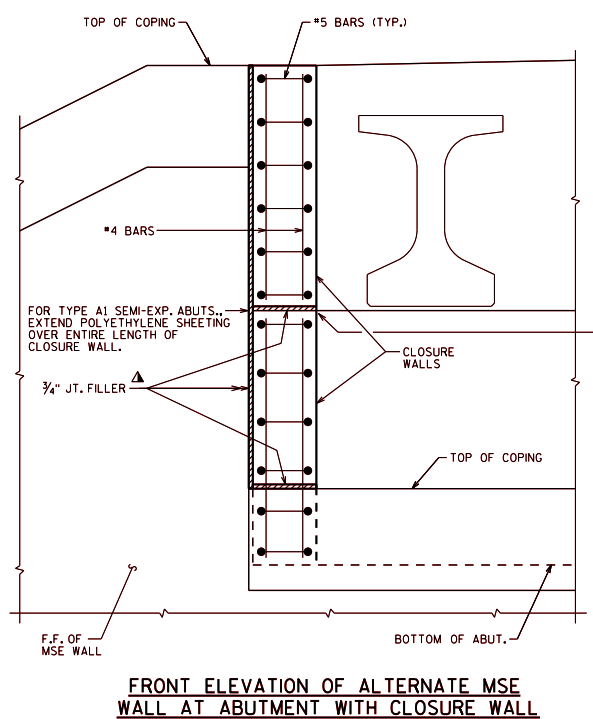


DESIGNER NOTES


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

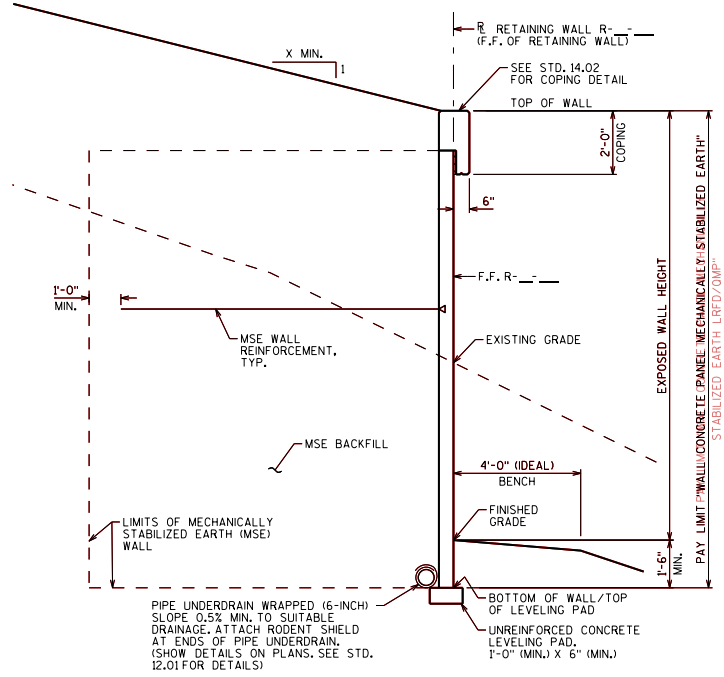
▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF FILLER WITH NON-STAINING GRAY, NON-BITUMINOUS JOINT SEALER, 1" DEEP AND HOLD 1/8" BELOW SURFACE OF CONCRETE.



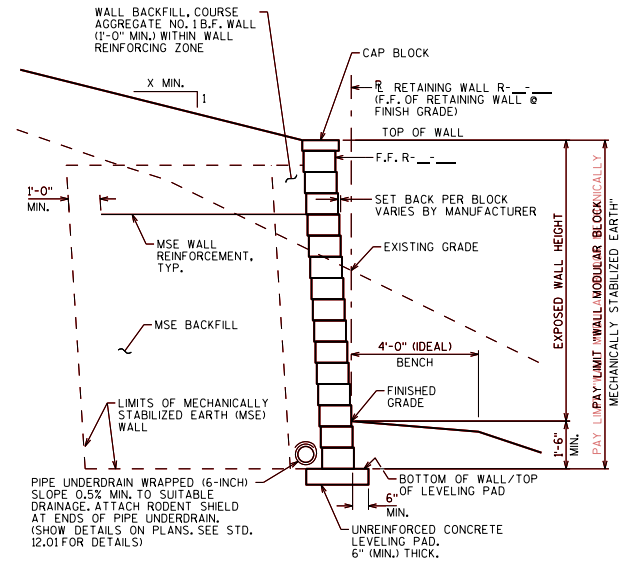
MSE WALL AT ABUTMENT LAYOUT DETAILS

 **BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



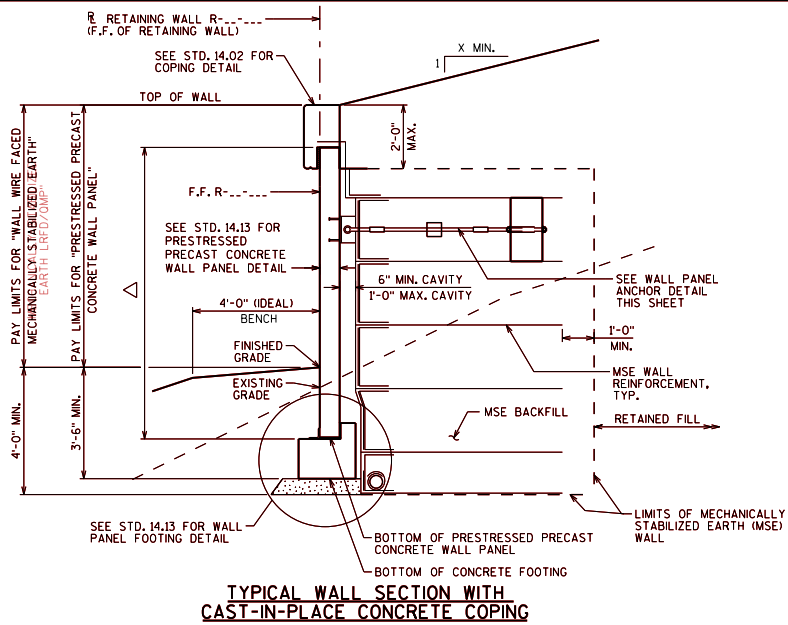
TYPICAL SECTION
(MSE WALL WITH CONCRETE PANEL FACING)



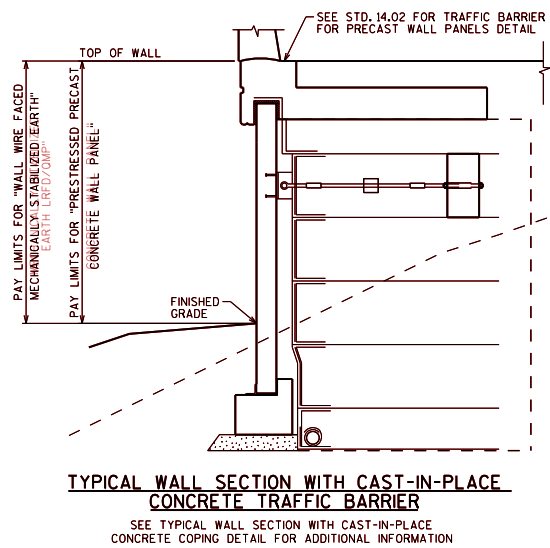
TYPICAL SECTION
(MSE WALL WITH MODULAR BLOCK FACING)

DESIGNER NOTE
SEE STANDARD 14.02 FOR ADDITIONAL INFORMATION

MSE WALL PANEL AND BLOCK FACING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-20</u>



TYPICAL WALL SECTION WITH CAST-IN-PLACE CONCRETE COPING



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

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

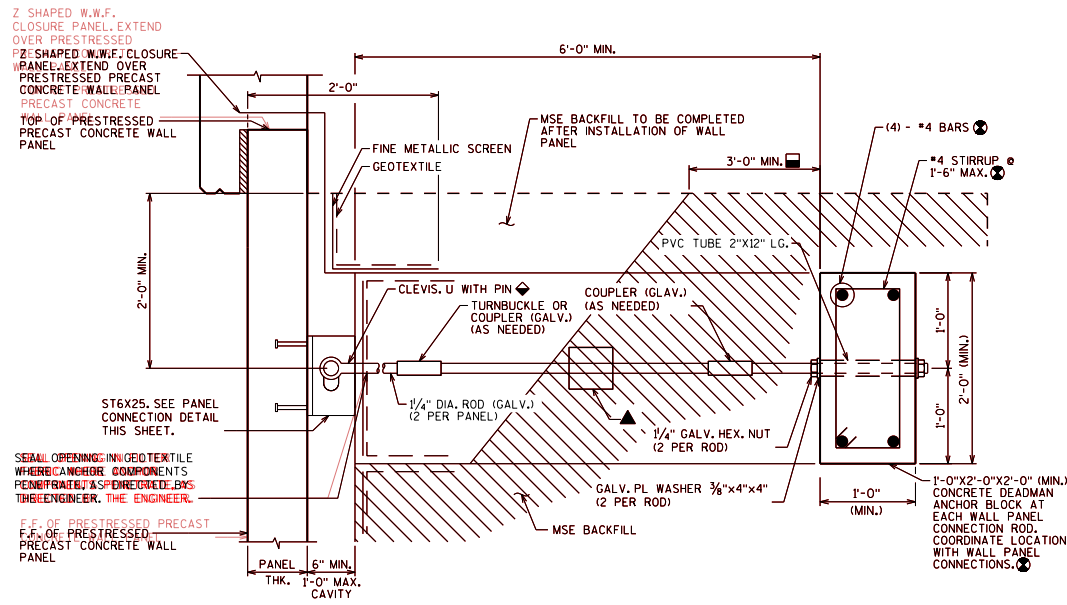
- CLEVIS, CLEVIS PIN, COUPLER, MULTIDIRECTIONAL CONNECTOR, AND TURNBUCKLE TO BE CORROSION RESISTANT AND DEVELOP 125% OF THE ULTIMATE STRENGTH OF THE 1/4" DIAMETER ROD.
- ST6X25 ROD, CONNECTING HARDWARE, AND DEADMAN ANCHOR INCLUDING ALL ASSOCIATED REINFORCEMENT ARE INCLUDED IN BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL".
- FORCES APPLIED TO THE DEADMAN ANCHOR MUST BE ACCOUNTED FOR IN THE DESIGN OF MSE REINFORCEMENT WHEN SATISFYING 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'.

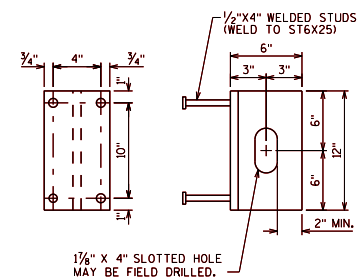
LEGEND

- 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. 1/4" 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, 1/2" (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 3/4" THICK PLATE WITH (4) 1/2"x4" STUDS ANCHORED IN PRECAST CONCRETE PANEL. RESTORE ZINC COATING AROUND ANY WELDED AREAS. SUBMIT DETAILS FOR APPROVAL BY THE ENGINEER.

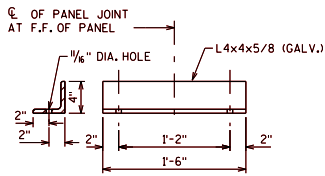
Z SHAPED W.W.F. CLOSURE PANEL. EXTEND OVER PRESTRESSED PRECAST CONCRETE WALL PANEL.

TOP OF PRESTRESSED PRECAST CONCRETE WALL PANEL

SEAL OPENING IN GEOTEXTILE WHERE ANCHOR COMPONENTS PENETRATE. AS DIRECTED BY THE ENGINEER, THE ENGINEER.

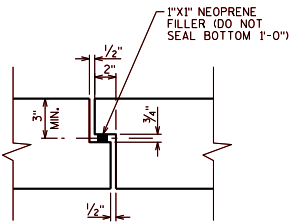
F.F. OF PRESTRESSED PRECAST CONCRETE WALL PANEL

MSE WALL WIRE FACING 1	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-18</u>

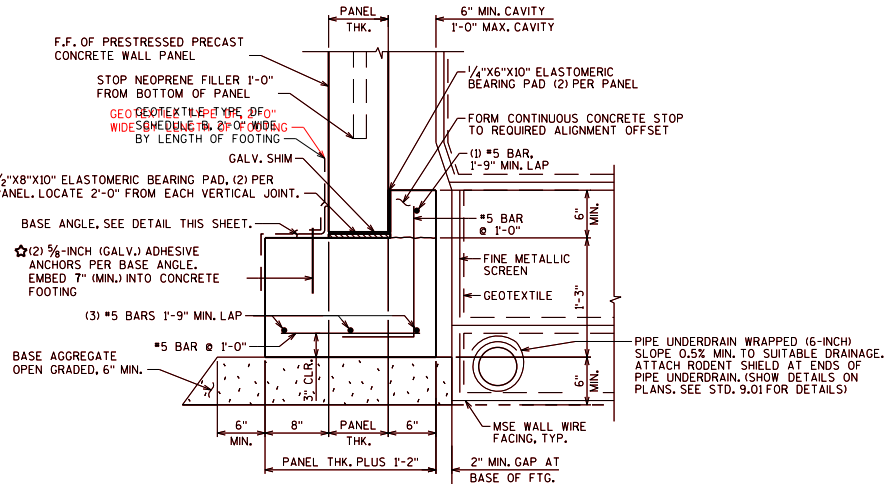


BASE ANGLE DETAIL

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



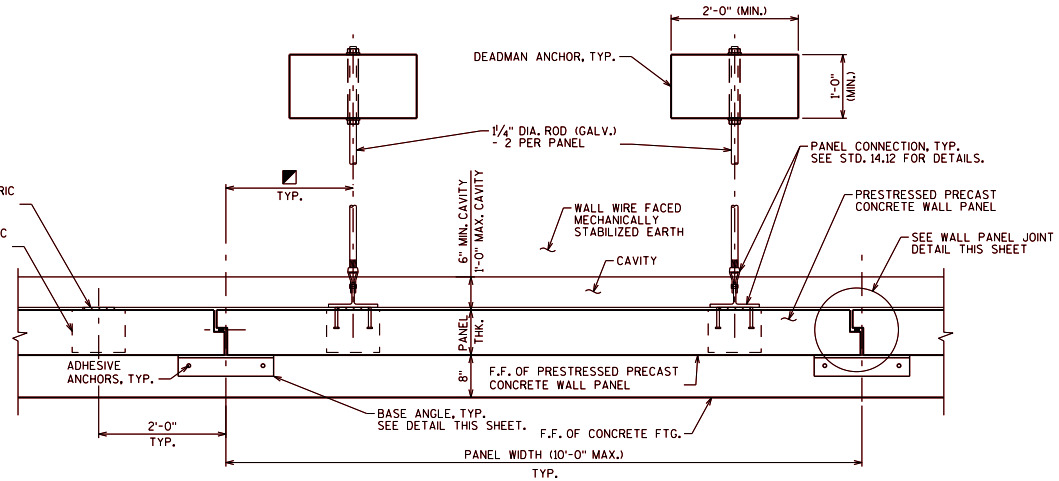
WALL PANEL JOINT DETAIL



WALL PANEL FOOTING DETAIL

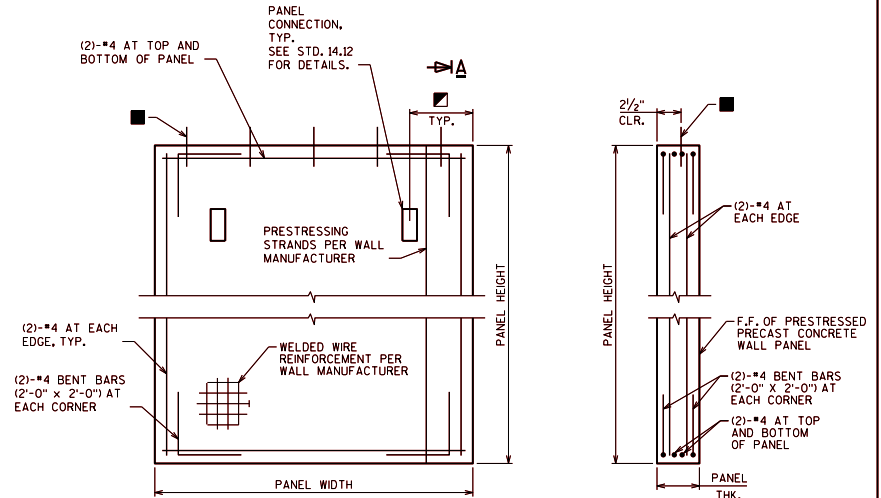
ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

1/4"x6"x10" ELASTOMERIC BEARING PAD, TYP.
1/2"x8"x10" ELASTOMERIC BEARING PAD, TYP.



TYPICAL WALL PANEL CONNECTION - PLAN VIEW

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



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".

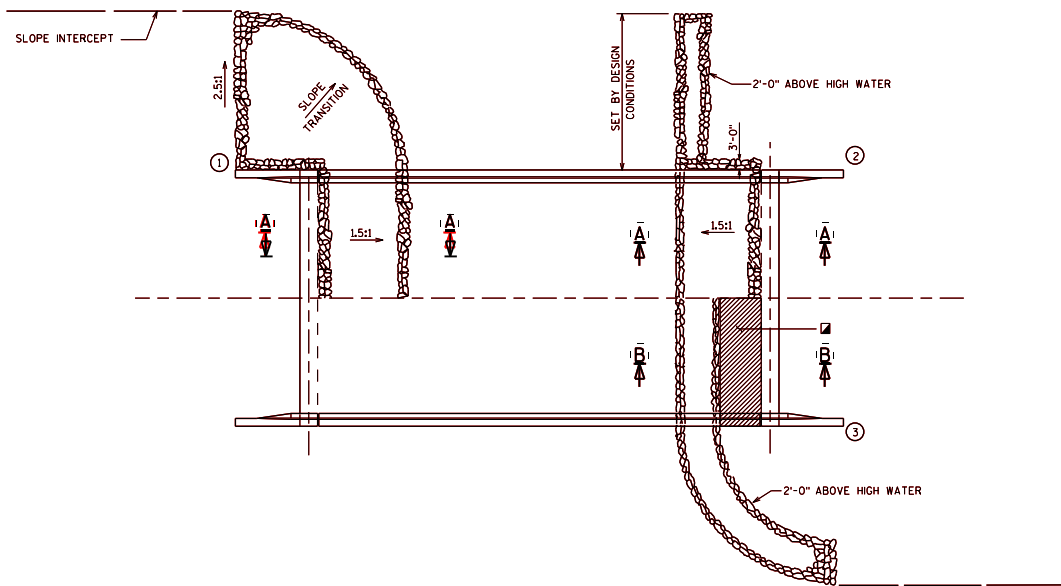
MSE WALL WIRE FACING 2



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-18



ALTERNATE ①

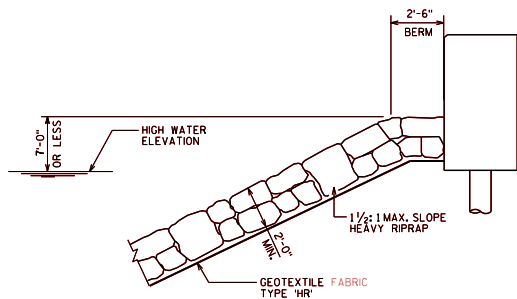
NORMAL CONDITION FOR EMBANKMENT FILLS

ALTERNATE ②

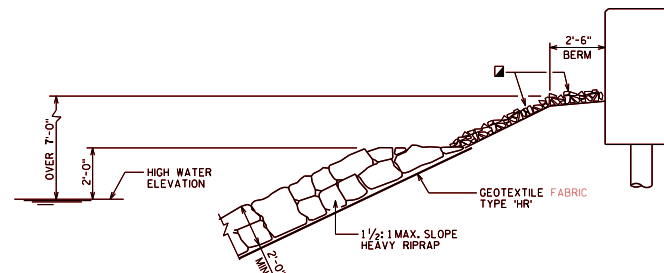
USE WHERE BERM ELEVATION IS LESS THAN 7'-0" ABOVE HIGH WATER

ALTERNATE ③

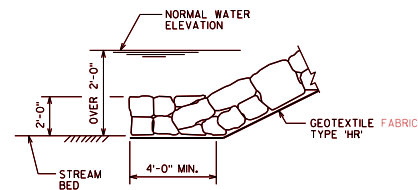
USE WHERE BERM ELEVATION IS OVER 7'-0" ABOVE HIGH WATER



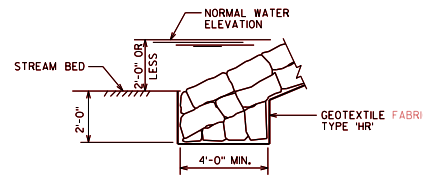
SECTION A-A



SECTION B-B




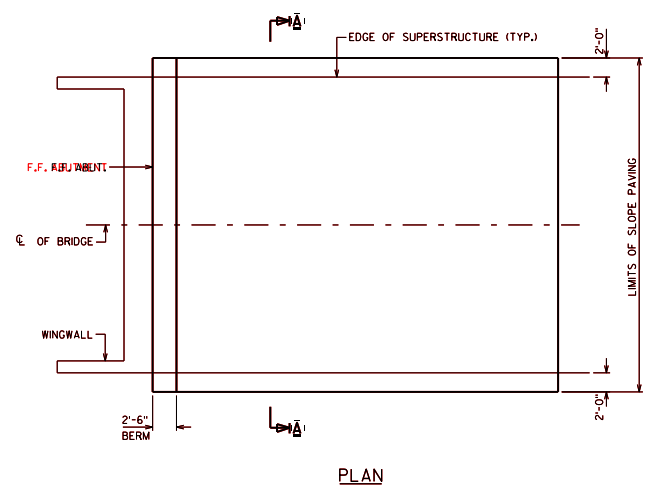
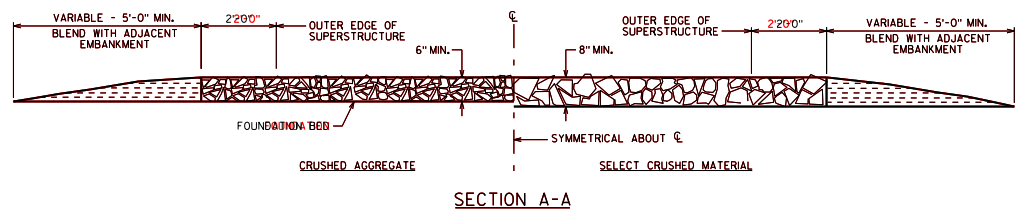
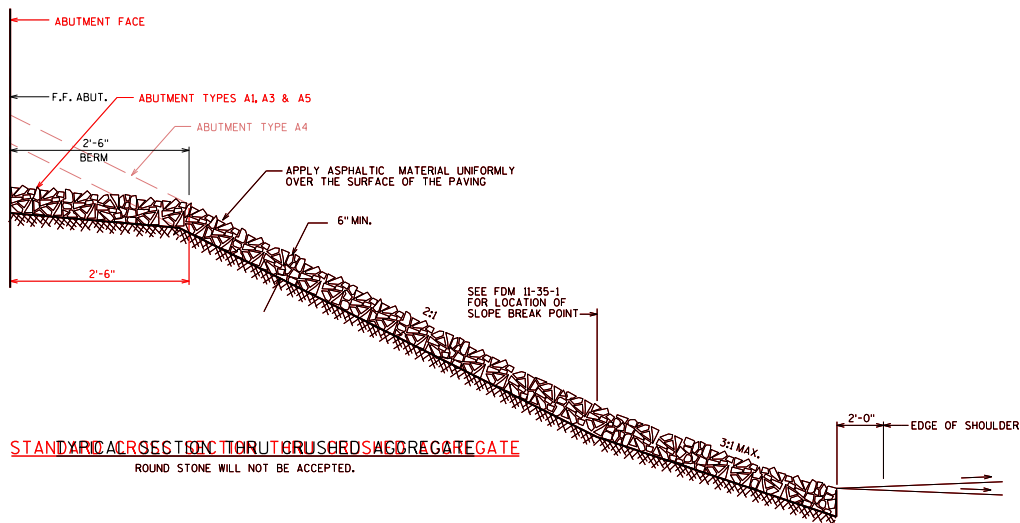
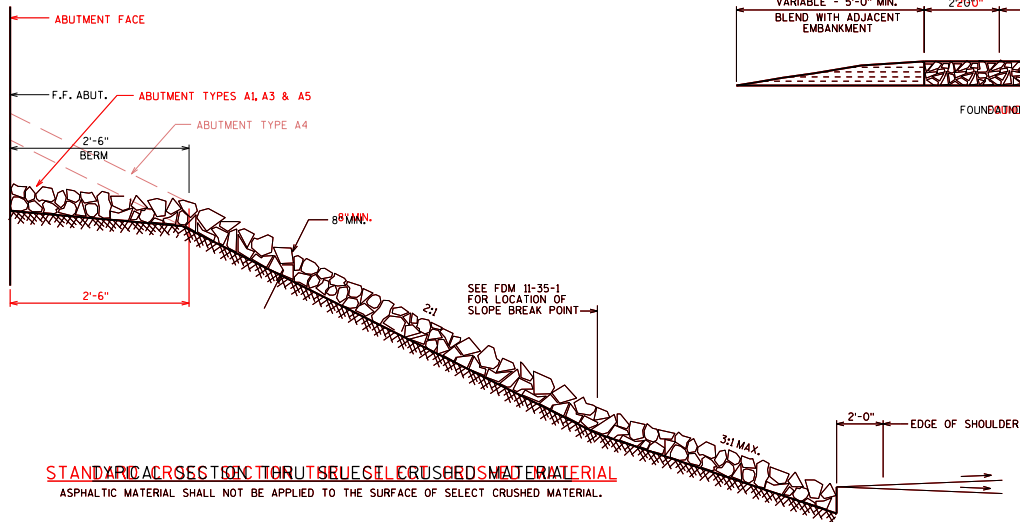
TOE DETAIL
NORMAL WATER ELEVATION > 2'-0" ABOVE STREAM BED



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/LOW IT.

PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS	
	BUREAU OF STRUCTURES
APPROVED: <i>Bill Oliver</i>	DATE: 1-18




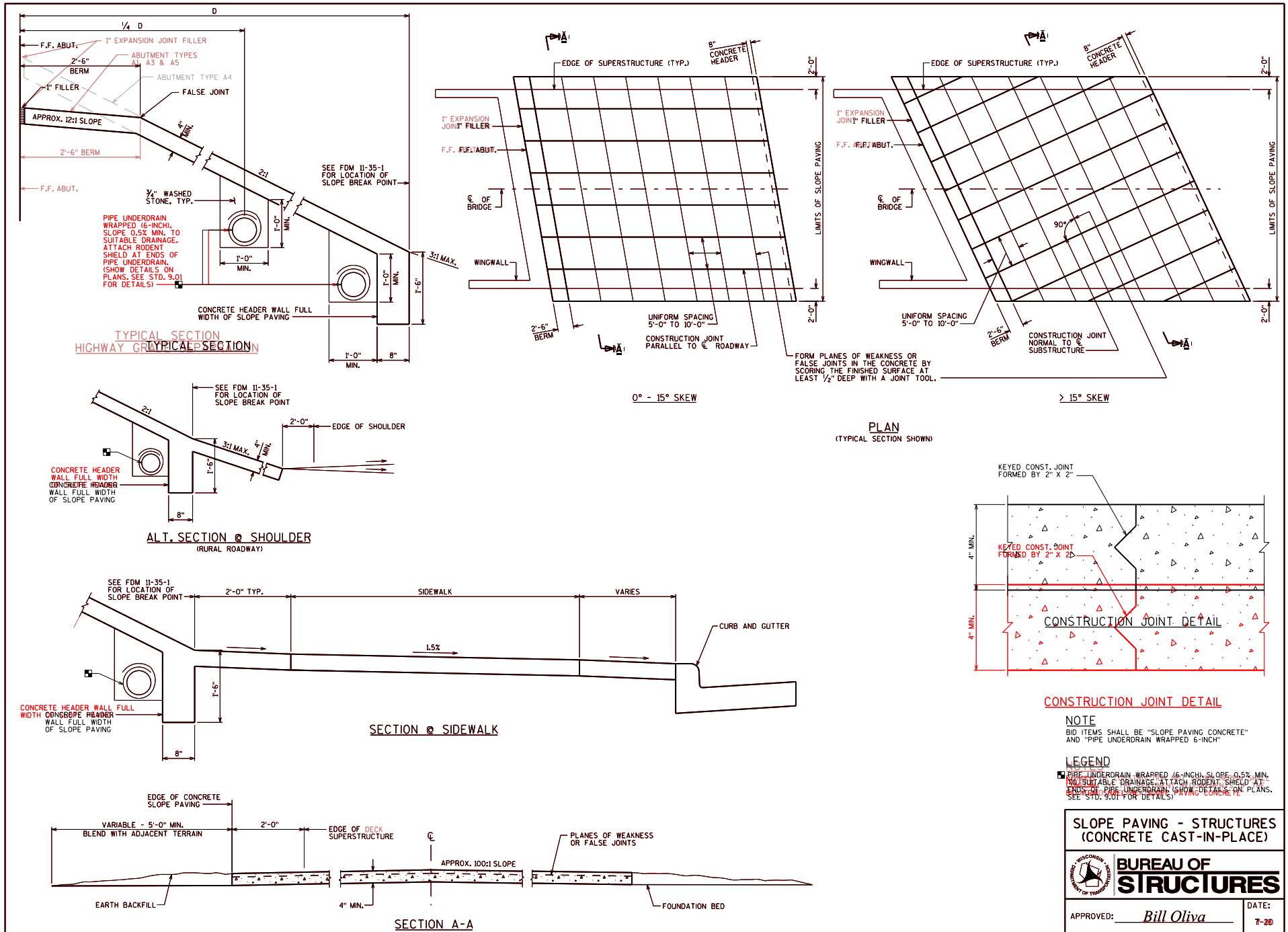
NOTES

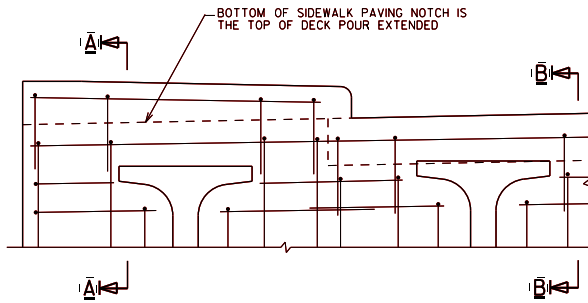
BID ITEM SHALL BE "SLOPE PAVING CRUSHED AGGREGATE" FOR "SLOPE PAVING SELECT CRUSHED MATERIAL" OF CONSTRUCTION MATERIALS AND WORKMANSHIP MAY BE SHOWN ON THIS DRAWING IF QUALITY IS NOT SATISFACTORY TO THE ENGINEER OF THE STANDARD SPECIFICATIONS.

WOOD FORMS MAY BE LEFT IN PLACE WHEN OF DESIGNER'S CHOICE TO THE ENGINEER.

PREFERRED SECTION SHOWN; FOR ALTERNATE SECTION SEE FDM II-35-1.

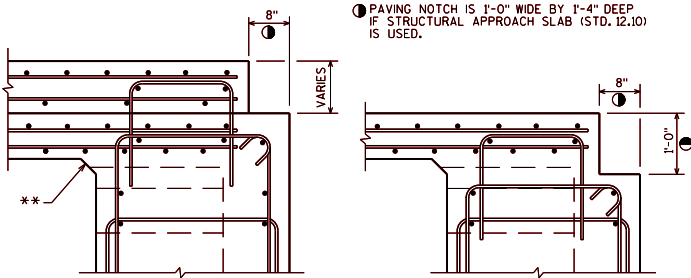
SLOPE PAVING - STRUCTURES (CRUSHED AGGREGATE & SELECT CRUSHED MATERIAL)	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>





**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.)

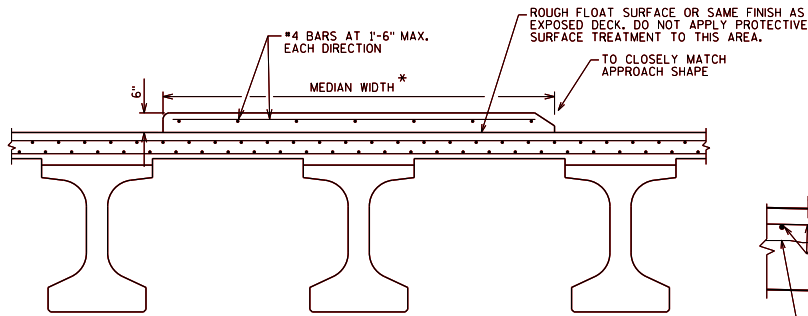


SECTION A-A

SECTION B-B

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

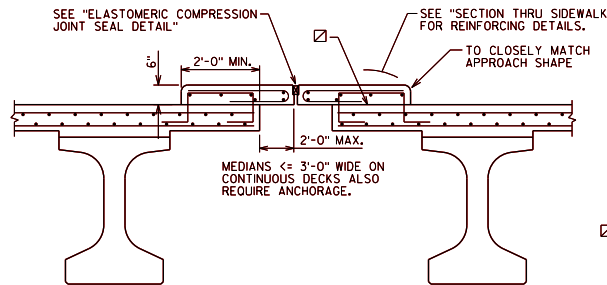
- SEE STANDARDS 19.33, 19.34, 19.35 FOR REINFORCEMENT DETAILS
- DETAILS SHOWN ARE FOR GIRDER STRUCTURES. SIMILAR REINFORCEMENT FOR SLAB STRUCTURES SHALL BE USED WITH A REMINDER THAT THE TRANSVERSE AND LONGITUDINAL REINFORCEMENT LEGS ARE BENT 90 DEGREES.



CROSS SECTION THRU UNANCHORED MEDIAN

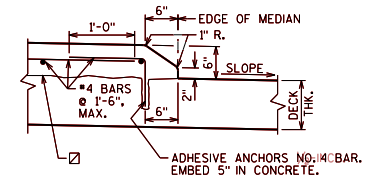
* (ANCHORAGE TO DECK NOT REQUIRED FOR WIDTHS > 3'-0", EXCEPT ALL MEDIAN SECTIONS ON TOP OF PAVING BLOCK MUST BE ANCHORED)

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 509.3.3.2 OF THE STANDARD SPECIFICATIONS UNLESS THE MEDIAN IS POURED WITHIN 45 DAYS OF COMPLETING THE DECK POUR.

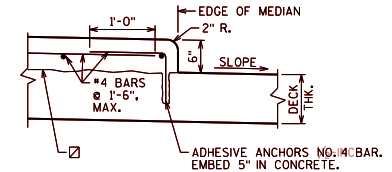


CROSS SECTION THRU MEDIAN WITH A JOINT

MEDIANS <= 3'-0" WIDE ON CONTINUOUS DECKS ALSO REQUIRE ANCHORAGE.

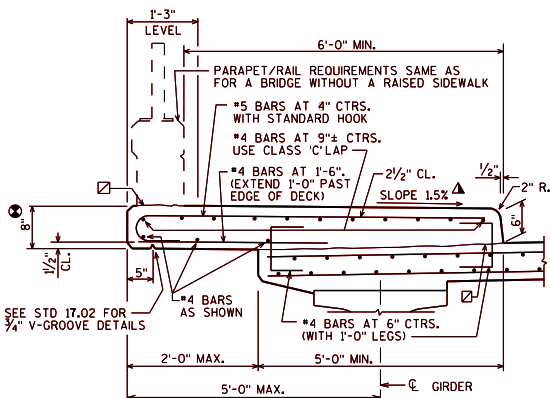


ANCHORED MEDIAN CURB DETAIL

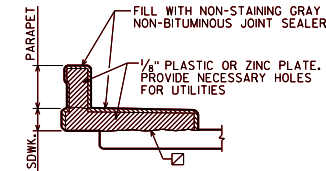


ANCHORED MEDIAN CURB DETAIL

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:

- 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 THE PIER.
- GIRDER STRUCTURES AND SLAB STRUCTURES WITHOUT SIDEWALKS SHOULD HAVE NO DEFLECTION JOINTS IN THE PARAPETS.

NOTES

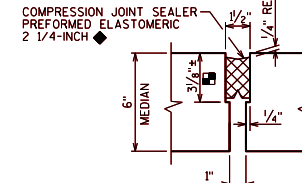
WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF 1/8" ZINC OR PLASTIC PLATE CUT AS SHOWN IN THE "DEFLECTION JOINT DETAIL". IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH 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.

FOR DEAD LOAD PURPOSES, THE SUPERSTRUCTURE DESIGN SHALL ACCOUNT FOR A MAXIMUM 2% SIDEWALK CROSS SLOPE.



ELASTOMERIC COMPRESSION SEAL DETAIL

- VARIABLES BASED ON JOINT MANUFACTURER
- MANUFACTURER SHALL LABEL TOP OF SEAL

MEDIAN AND RAISED SIDEWALK DETAILS

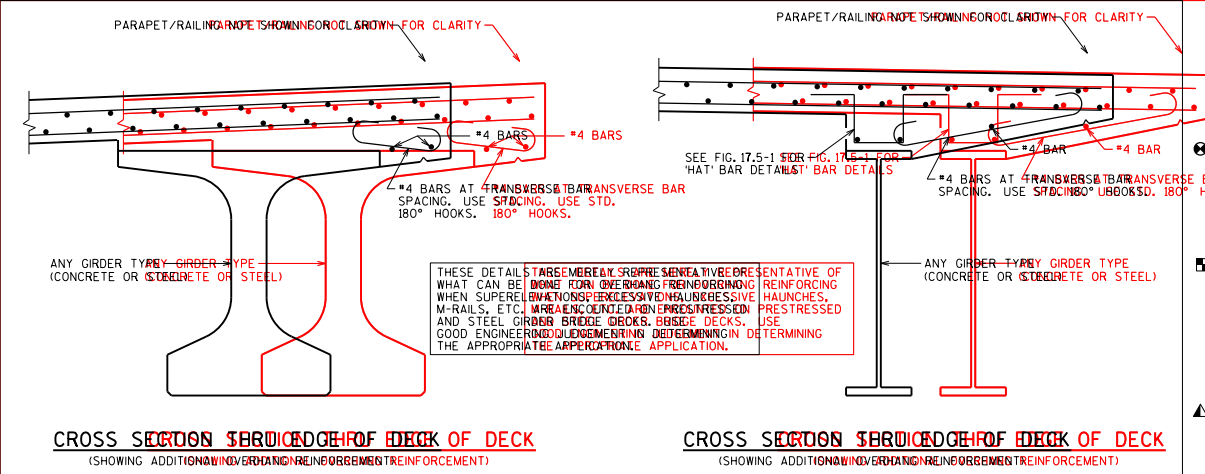
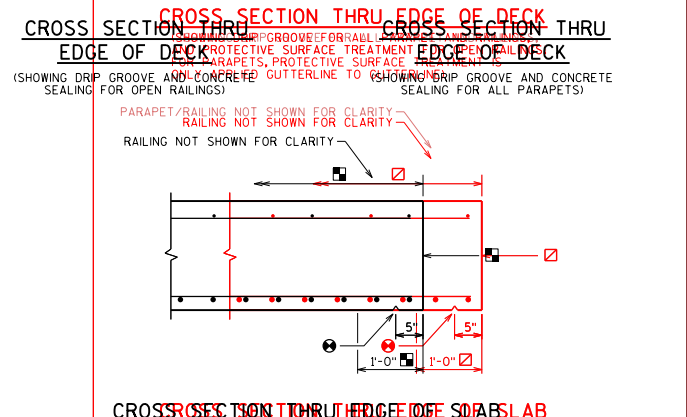
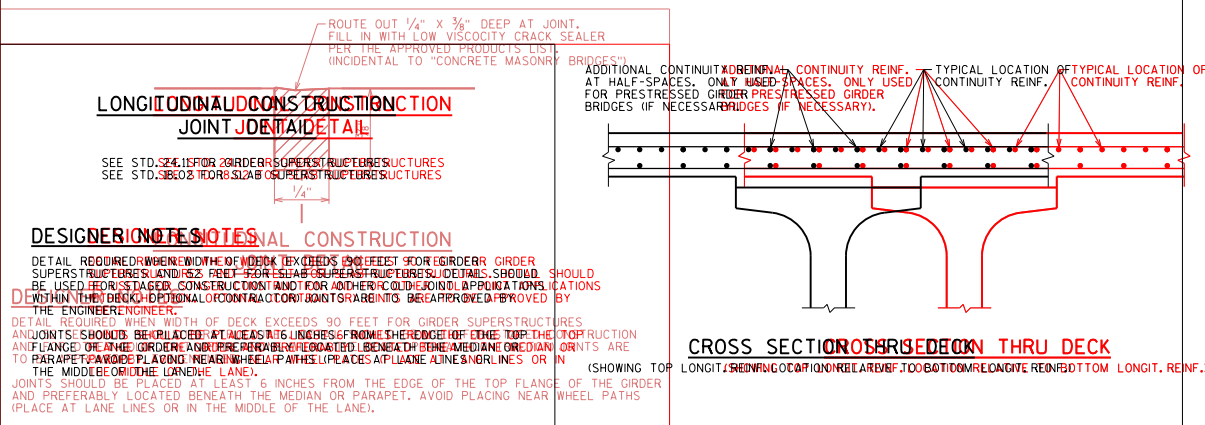
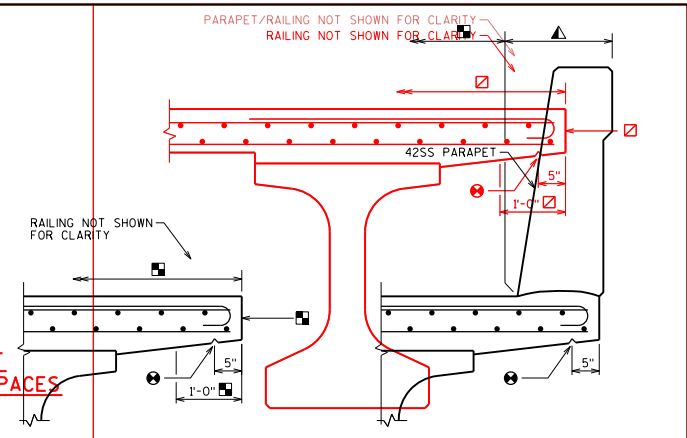
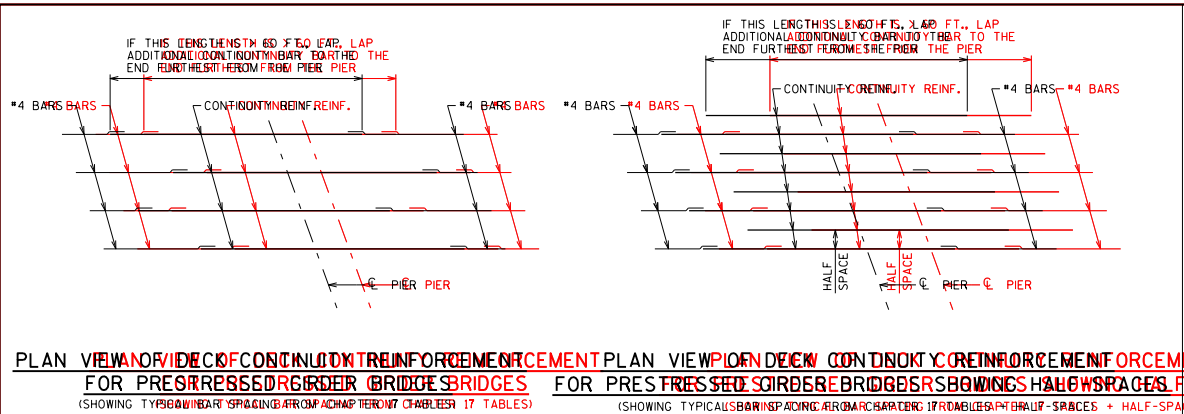


BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-21

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



DESIGNER NOTES

- 1/4" V-GROOVE REQUIRED AND THE EDGE OF EXPANSION JOINT
- 3/4" V-GROOVE, EXTEND V-GROOVE TO 6" FROM FACE OF ABUTMENT AND SEMI-EXPANSION ABUTMENTS.
- DO NOT APPLY CONCRETE SEALER TO SURFACES TO BE STAINED OR OTHER
- BID ITEM "PROTECTIVE SURFACE TREATMENT WITH PROTECTIVE SURFACE TREATMENT"
- APPLY TO DECK AND CONCRETE OVERLAP SURFACES
- FOR OPEN RAILINGS, APPLY TO THE TOP AND EXTERIOR EXPOSED FACE OF WINGS AND ENDS, 1'-0" OF THE FRONT FACE OF ABUTMENT
- APPLY TO THE VERTICAL AND HORIZONTAL SURFACES OF SIDEWALKS, MEDIANS, AND PAVING NOTCHES
- USE "PIGMENTED SURFACE SEALER"
- BID ITEM "PIGMENTED SURFACE SEALER OF CONCRETE"
- APPLY TO INSIDE SURFACES OF PARAPETS, INCLUDING PARAPETS ON WINGS.

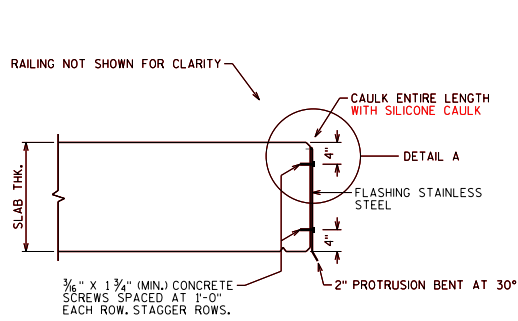
NOTES

- 3/4" V-GROOVE REOD. EXTEND TO 2'-0" FROM F.F. OF ABUT. BODY OF ABUTMENTS WITH EXPANSION JOINTS
- 1/4" V-GROOVE REOD. EXTEND TO 6" FROM F.F. OF ABUT. DIAPH. (FOR TYPE AT FIXED AND SEMI-EXPANSION ABUTMENTS)
- PROTECTIVE SURFACE TREATMENT SHALL BE APPLIED TO ALL EXPOSED SURFACES
- PIGMENTED SURFACE SEALER SHALL BE APPLIED TO THE (INSERT LOCATIONS).

DECK AND SLAB DETAILS

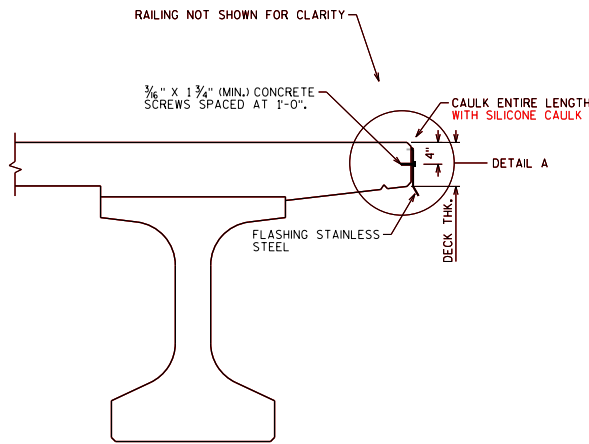
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-21



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 AND 3/8" X 1 3/4" (MIN.) CONCRETE SCREWS. THE BID ITEM "CONCRETE SURFACE REPAIR" SHALL INCLUDE PROVIDING AND INSTALLING THE CONCRETE SURFACE REPAIR AND 1/4" X 2 3/4" (MIN.) CONCRETE SCREWS. THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK AND 3/8" X 1 3/4" (MIN.) CONCRETE SCREWS. THE BID ITEM "CONCRETE SURFACE REPAIR" SHALL INCLUDE PROVIDING AND INSTALLING THE CONCRETE SURFACE REPAIR AND 1/4" X 2 3/4" (MIN.) CONCRETE SCREWS.



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.

DO NOT USE FLASHING IF FREEBOARD IS LESS THAN 3" FOR SLAB BRIDGE.

NOTES
THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK AND 3/8" CONCRETE SCREWS.

FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE TREATMENT APPLICATION.

NOTES SCREWS SHALL BE 410 STAINLESS STEEL.

THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK AND 3/8" CONCRETE SCREWS.

FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE TREATMENT APPLICATION. A CONSTANT HEIGHT BASED ON THE THINNEST SLAB DEPTH OVER THE BRIDGE LENGTH. CONCRETE SCREWS SHALL BE 410 STAINLESS STEEL.

EXTEND FLASHING TO B.F. OF ABUTMENT DIAPHRAGM. WITH SILICONE CAULK TOP OF FLASHING TO BEGIN APPROX. 1-INCH BELOW TOP OF DECK/SLAB SURFACE.

THE FLASHING IS TO BE A CONSTANT HEIGHT BASED ON THE THINNEST SLAB DEPTH OVER THE BRIDGE LENGTH.

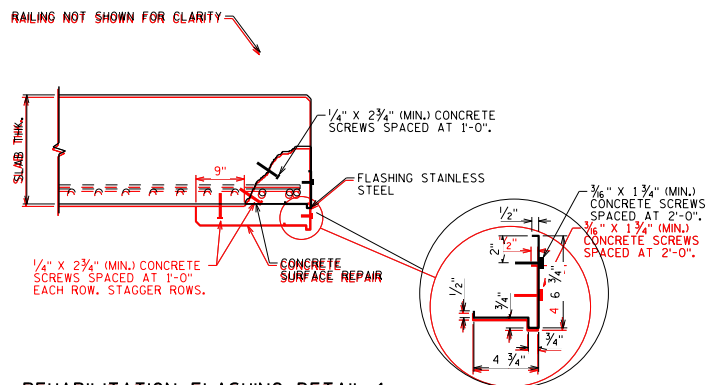
PROVIDE 2" MINIMUM FLASHING OVERLAP, FASTEN WITH 3/8" X 2" (MIN.) CONCRETE SCREWS.

CAULK SHALL BE NON-STAINING, GRAY, NON-BITUMINOUS JOINT SEALER.

2" LEG, BEND TO FINAL POSITION AFTER FORMS ARE REMOVED.

DETAIL A

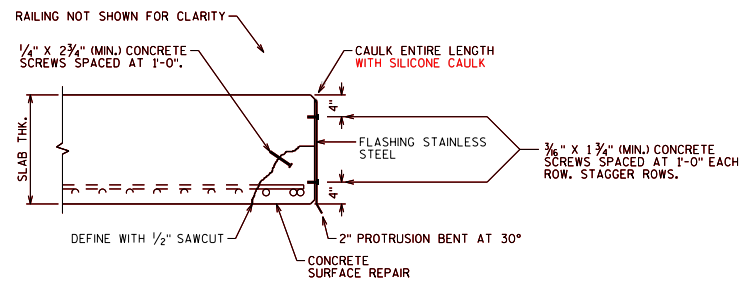
DETAIL FOR CONCRETE SLAB BRIDGE SIMILAR



REHABILITATION FLASHING DETAIL 1


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

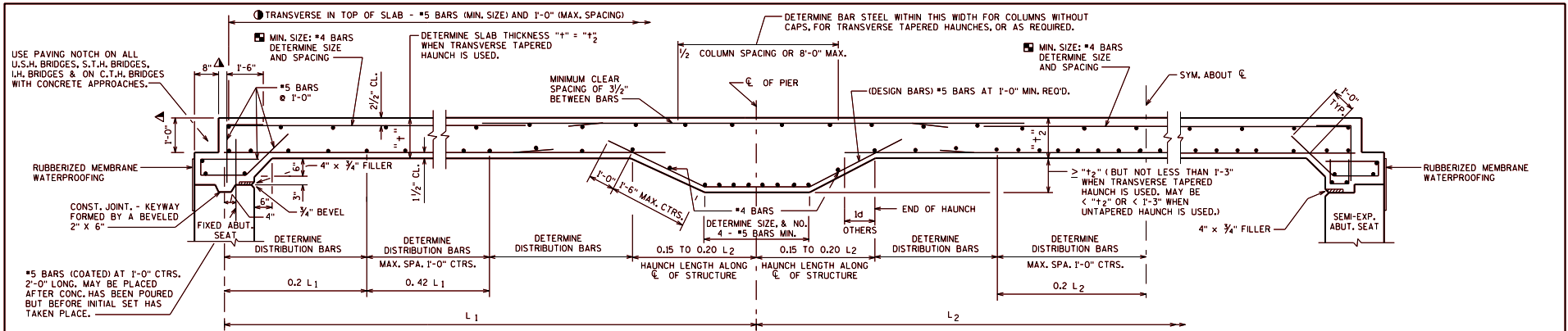
THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING AND CONCRETE SCREWS, INCLUDING THE 1/4" SCREWS USED TO SECURE THE CONCRETE SURFACE REPAIR.



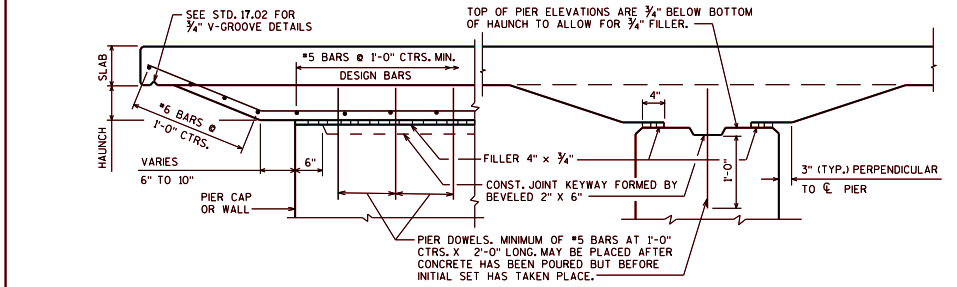
REHABILITATION FLASHING DETAIL 2

THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK AND 3/8" CONCRETE SCREWS. THE BID ITEM "CONCRETE SURFACE REPAIR" SHALL INCLUDE PROVIDING AND INSTALLING THE CONCRETE SURFACE REPAIR AND 1/4" CONCRETE SCREWS.

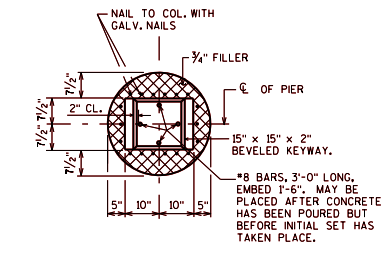
EDGE OF DECK FLASHING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-21</u>



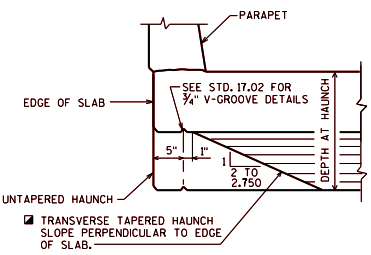
LONGITUDINAL SECTION



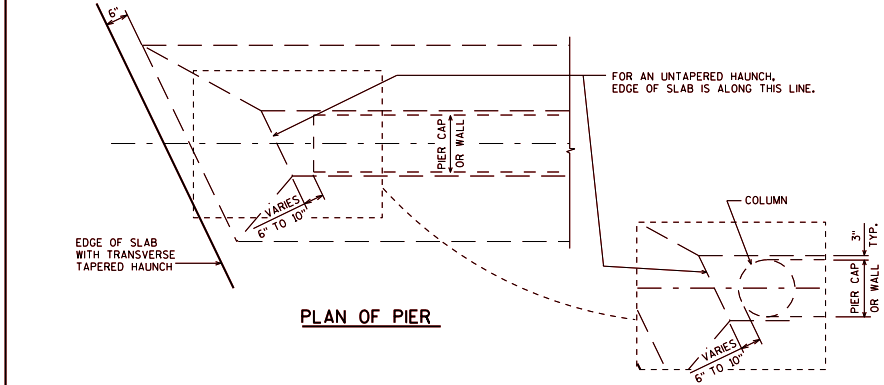
PIER CAP OR WALL TYPE PIER
SHOWING TRANSVERSE TAPERED HAUNCH



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



TAPERED/UNTAPERED HAUNCH
CROSS SECTION



PLAN OF PIER

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 2'-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 C/L OF ABUTMENTS, THE C/L OF PIERS AND AT 5/10 PTS. TO VERIFY CAMBER. TAKE ELEVATIONS ALONG GUTTER LINES AND CROWN OR C/L RECORD ELEVATIONS ON AS BUILT PLANS. SEE STD. 18.03

DESIGNER NOTES

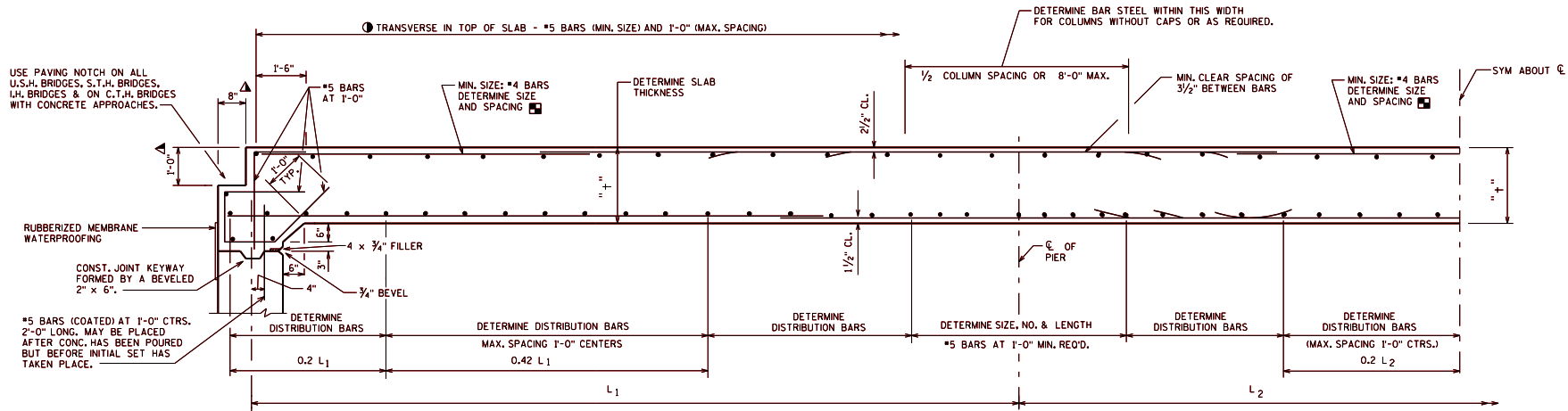
- THE MAXIMUM ALLOWABLE SKEW ANGLE OF STRUCTURE SHALL BE 30°.
- ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE.
- USE OPTIONAL LONGITUDINAL JOINTS WHEN OVERALL SLAB WIDTH IS OVER 52'-0". SEE STANDARD 18.02 FOR DETAIL.
- FOR BRIDGES LOCATED IN REMOTE AREAS USE OPTIONAL TRANSVERSE JOINT WHEN 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 REFERENCE LINE (OR CROWN AND) QUINCY DET. EDGE OF SLAB ABUTMENT. SEE STD. 18.03
- 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: 7-21



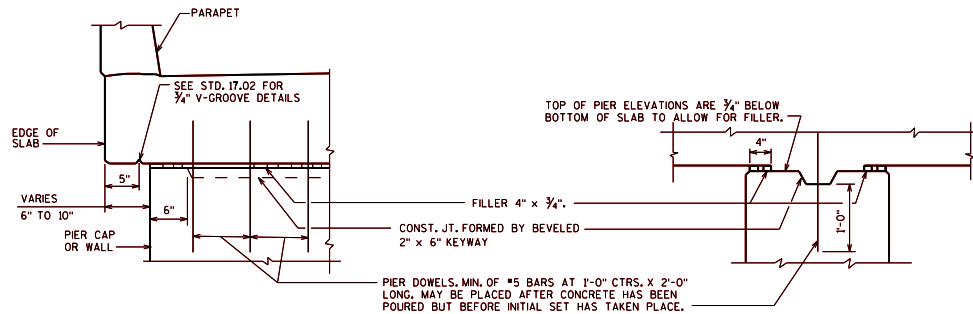
HALF LONGITUDINAL SECTION

NOTES

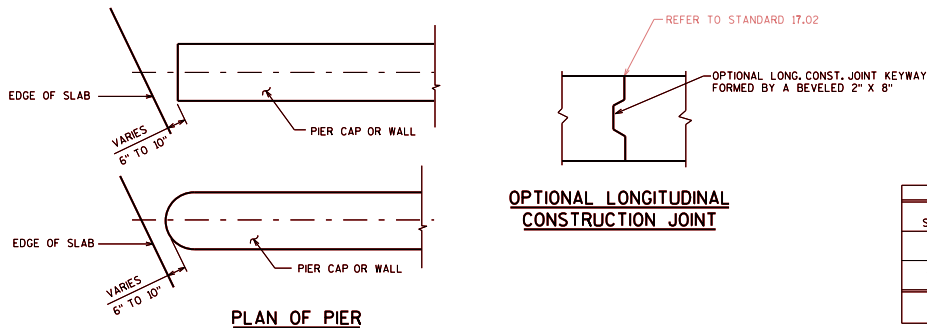
- TOP TRANSVERSE BARS IN SLAB SHALL BE SUPPORTED BY INDIVIDUAL BAR CHAIRS AT APPROXIMATELY 3'-0" CENTERS EACH WAY. BOTTOM LONGITUDINAL BARS SHALL BE SUPPORTED BY CONTINUOUS BAR CHAIRS AT APPROXIMATELY 4'-0" CENTERS.
- ALL SLAB THICKNESS DIMENSIONS ARE MINIMUM. ANY TOLERANCES NECESSARY TO CORRECT CONSTRUCTION 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 C.E. OF ABUTMENTS, THE C.E. OF PIERS AND AT 5/10 PTS. TO VERIFY CAMBER. TAKE ELEVATIONS ALONG GUTTER LINES AND CROWN OR C.E. RECORD ELEVATIONS ON AS BUILT PLANS. SEE STD. 18.03

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 BERBERNDE LINE (0+0.000) AND QUARTER EDGE EDGE OF SLAB TENTH POINTS (SEE STD. 18.03)
- ▲ 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.



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



PLAN OF PIER

OPTIONAL LONGITUDINAL
CONSTRUCTION JOINT

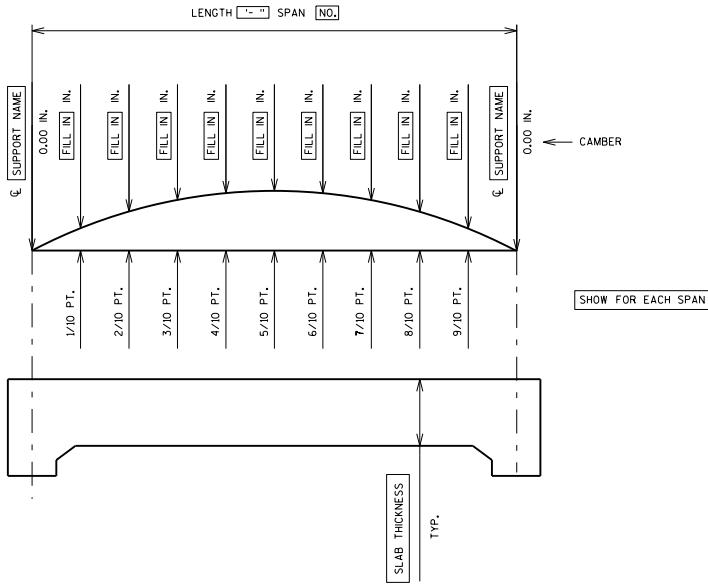
TOP TRANSVERSE REINF. FOR RAILINGS/PARAPETS		
SINGLE SLOPE OR SLOPED FACE PARAPETS	MAIN BARS RUN FROM EDGE TO EDGE OF SLAB	SHORT BARS PLACED BETWEEN MAIN BARS AT EDGE OF SLAB
SLAB THICK. ≥ 15"	(*5 @ 1'-0")	(*5 @ 1'-0") 5'-0" LONG NO HOOK REQ'D. AT END
13" ≤ SLAB THICK. < 15"	(*5 @ 10")	(*5 @ 10") 5'-0" 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**

DATE: _____

APPROVED: Bill Oliva 7-21



CAMBER AND SLAB THICKNESS DIAGRAM

CAMBER SHOWN IS BASED ON 3 TIMES DEAD LOAD DEFLECTION.
 CAMBER SPANS AS SHOWN TO PROVIDE FOR DEAD LOAD DEFLECTION AND FUTURE CREEP. CAMBER DOES NOT INCLUDE ALLOWANCE FOR FORM SETTLEMENT.
 PARAPETS, SIDEWALKS AND MEDIANS PLACED ON TOP OF THE SLAB SHALL BE POURED AFTER FALSEWORK HAS BEEN RELEASED, EXCEPT FOR STAGED CONSTRUCTION.

TO DETERMINE FALSEWORK ELEVATION AT EDGE OF SLAB, CROWN OR REFERENCE LINE FOLLOW THIS PROCEDURE:
 TOP OF SLAB ELEVATION AT FINAL GRADE
 MINUS..... SLAB THICKNESS
 PLUS..... CAMBER
 PLUS..... FORM SETTLEMENT/DEFLECTION DUE TO PLACEMENT OF SLAB CONCRETE (TO BE COMPUTED BY THE CONTRACTOR)
 EQUALS = TOP OF SLAB FALSEWORK ELEVATION

SURVEY TOP OF SLAB ELEVATIONS SHOW FOR EACH SPAN

	€ BRG. SUPPORT NAME	5/10 PT.	€ BRG. SUPPORT NAME
<input type="checkbox"/> FILL IN GUTTER			
<input type="checkbox"/> SELECT CROWN AND/OR R			
<input type="checkbox"/> FILL IN GUTTER			

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 R. RECORD THE ELEVATIONS IN THE ABOVE TABLE FOR THE "AS BUILT" PLANS.

NOTES


FILL IN THE TABLE OF "SURVEY TOP OF SLAB ELEVATIONS" FOR EACH SPAN ON AS BUILT PLANS.

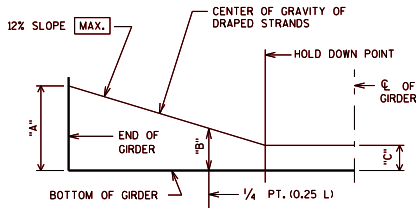
DESIGNER NOTES

PROVIDE A "CAMBER AND SLAB THICKNESS DIAGRAM" AND TABLE OF "TOP OF SLAB ELEVATIONS" FOR EACH SPAN ON CONTRACT PLANS.
 INCLUDE THE "SURVEY TOP OF SLAB ELEVATIONS" TABLE ON THE CONTRACT PLANS SO THAT IT MAY BE FILLED IN DURING CONSTRUCTION.
 FOR BRIDGES WITH R LINE NOT ON THE CROWN, PROVIDE ELEVATIONS AT BOTH LOCATIONS.

TOP OF SLAB ELEVATIONS SHOW FOR EACH SPAN

	€ BRG. SUPPORT NAME	1/10	2/10	3/10	4/10	5/10	6/10	7/10	8/10	9/10	€ BRG. SUPPORT NAME
<input type="checkbox"/> FILL IN EDGE OF SLAB											
<input type="checkbox"/> SELECT CROWN AND/OR R											
<input type="checkbox"/> FILL IN EDGE OF SLAB											

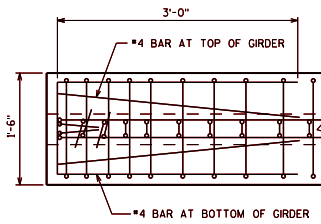
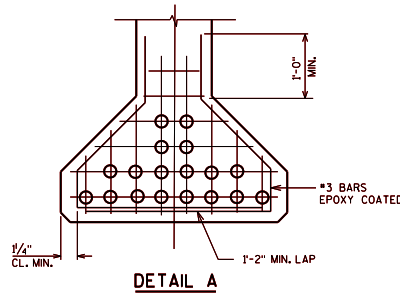
CONCRETE SLAB DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-21



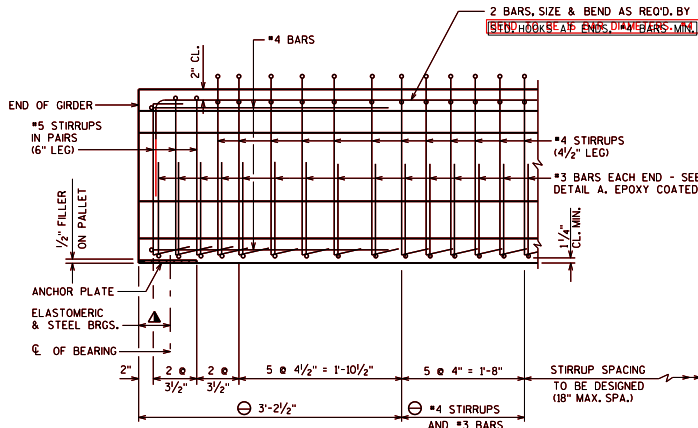
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = $\frac{1}{4}("A" + 3 "C")$ (MIN)
 "B" = $\frac{1}{4}("A" + 3 "C") + 3$ (MAX)

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

LOCATION OF DRAPED STRANDS

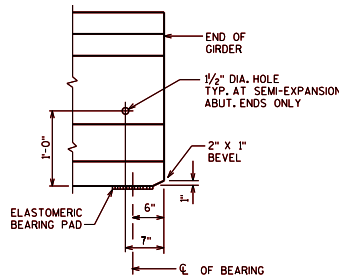


PLAN VIEW

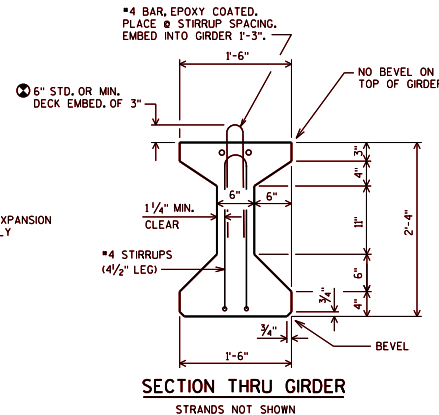


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER



SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD



SECTION THRU GIRDER

STRANDS NOT SHOWN

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 ASTM 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 WSDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

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

DESIGNER NOTES

PRESTRESSED GIRDER TYPE I 28-INCH.
 BID ITEM SHALL BE PRESTRESSED GIRDER TYPE I 28-INCH. A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE SPECIFY CONCRETE STRENGTHS REQUIRED BY DESIGN FROM WRAPED 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. THE DESIGNER SHALL USE ONE OF THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.02 AND 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, BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

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

THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH 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.

#4 BAR, EPOXY COATED. PLACE STIRRUP SPACING REQUIRED FOR NON WWF STIRRUPS. EMBED INTO GIRDER 1'-3".

AREA OF HORIZ. WIRE SHALL BE > 40% OF VERT. WIRE AREA (ASTM A1064)

HORIZ. WIRES SHALL BE LOCATED IN TOP AND BOTT. FLANGES AND NOT IN THE WEB.

D18 MIN. VERTICAL WIRE (DEFORMED)

1" MINIMUM CLEARANCE TO VERTICAL WIRE

CLEARANCE - 1/4" MIN., 2" MAX.

SECTION THRU GIRDER

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

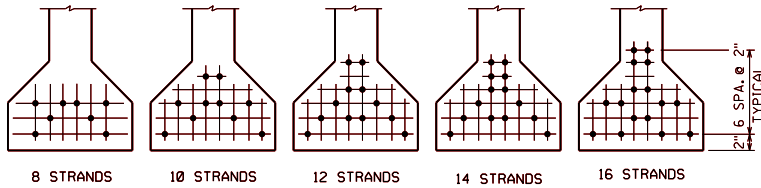
28" PRESTRESSED GIRDER DETAILS



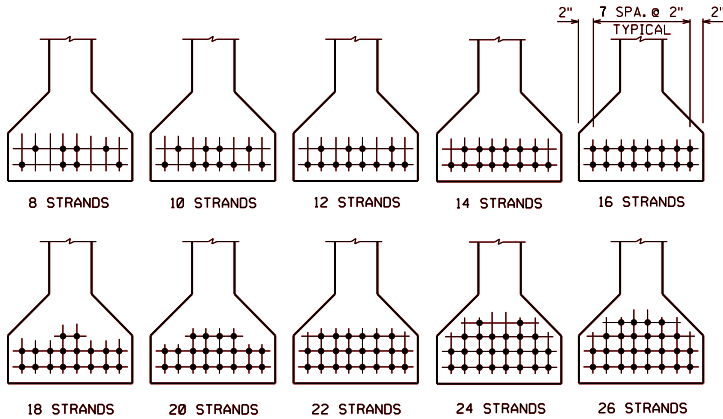
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-19



**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 $\frac{1}{4}$ 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.
 $f_s = 0.75 \times 270,000 = 202,500$ P.S.I.
 for low relaxation strands
 P_i PER 0.5" DIA. STRAND = $0.1531 \times 202,500 = 31,00$ KIPS
 P_i PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43,94$ KIPS
 $\frac{y_B}{r^2} = \frac{-15.83}{138.15} = -0.1146$ IN./IN.²
 f_g (ini t.) = $\frac{A_s f_s}{A} (1 + \frac{e_s y_B}{r^2})$


DO NOT USE THE 36" PRESTRESSED GIRDER SHOWN ON THIS SHEET.
 IT WILL BE MOVED TO CH 40 IN THE FUTURE.

NO. STRANDS	e_s (inches)	(COMPRESSION IS POSITIVE)	
		P (ini t.)= $A_s f_s$ (KIPS)	f_g (ini t.) (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	1,668
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

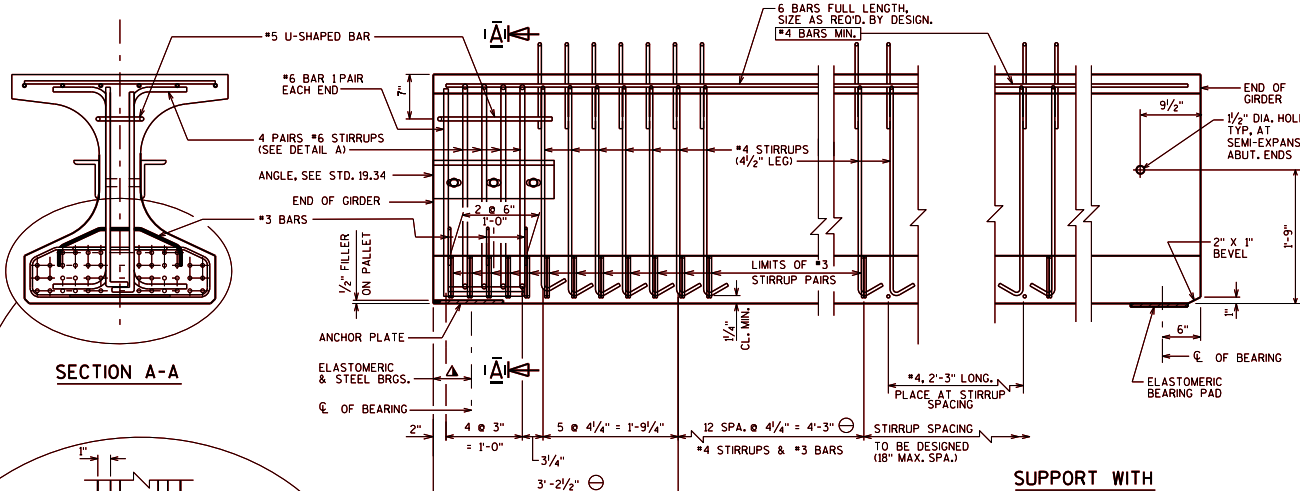
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

36" PRESTRESSED GIRDER DESIGN DATA



BUREAU OF STRUCTURES

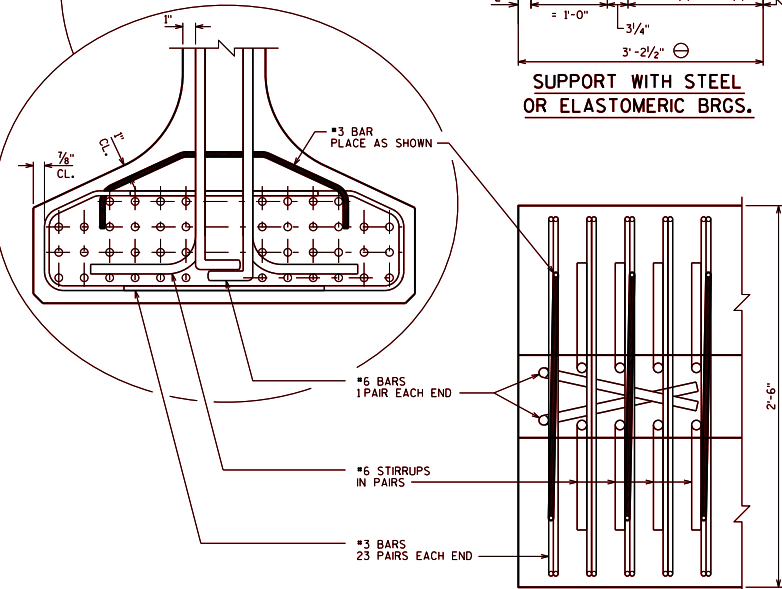
APPROVED: Bill Oliva DATE: 7-21



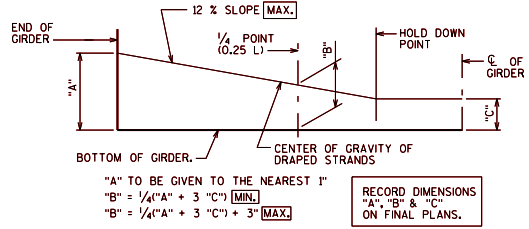
SECTION A-A

SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

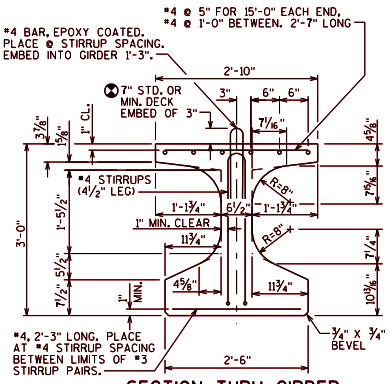
SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD



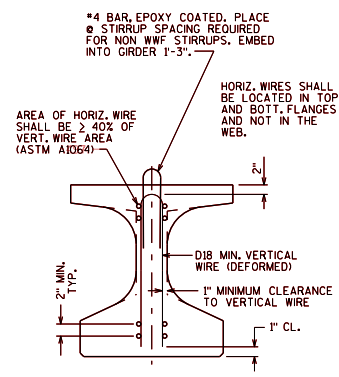
DETAIL A
BOTTOM FLANGE



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 WELDED WIRE FABRIC (WWF) SHALL BE SUBMITTED FOR APPROVAL OF THE STRUCTURES DIVISION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISCONSIN DEPARTMENT OF TRANSPORTATION PRIOR TO SHOP DRAWING SUBMITTAL WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

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.

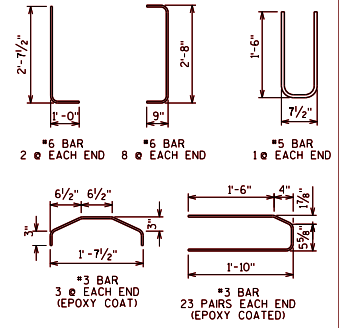
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.12 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1 USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE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

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

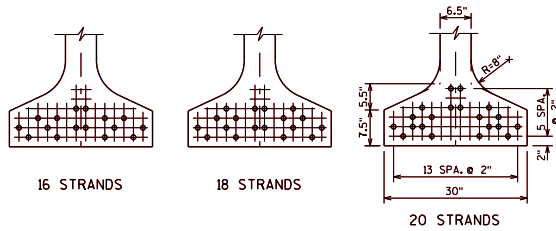
DETAIL TYPICAL AT EACH END

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 VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

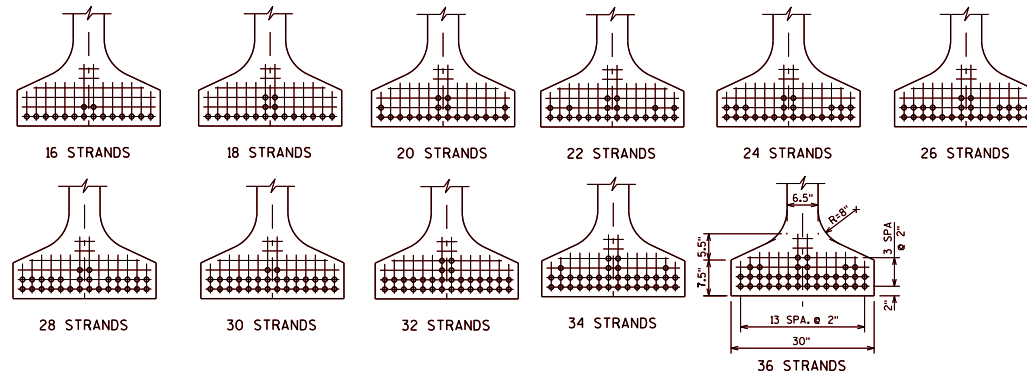
PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.



36W" PRESTRESSED GIRDER DETAILS	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>



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



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

36W" GIRDER

A = 632 SQ. IN.
 $r^2 = 158.20 \text{ IN.}^2$
 $y_T = 19.37 \text{ IN.}$
 $y_B = -16.63 \text{ IN.}$
 $I = 99,980 \text{ IN.}^4$
 $S_T = 5,162 \text{ IN.}^3$
 $S_B = -6,012 \text{ IN.}^3$
 WT. = 658 #/FT.

PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands

Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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

NO. STRANDS	e_s (inches)	(COMPRESSION IS POSITIVE)	
		$P(\text{init.}) = A_s f_s$ (KIPS)	$f_B (\text{init.})$ (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

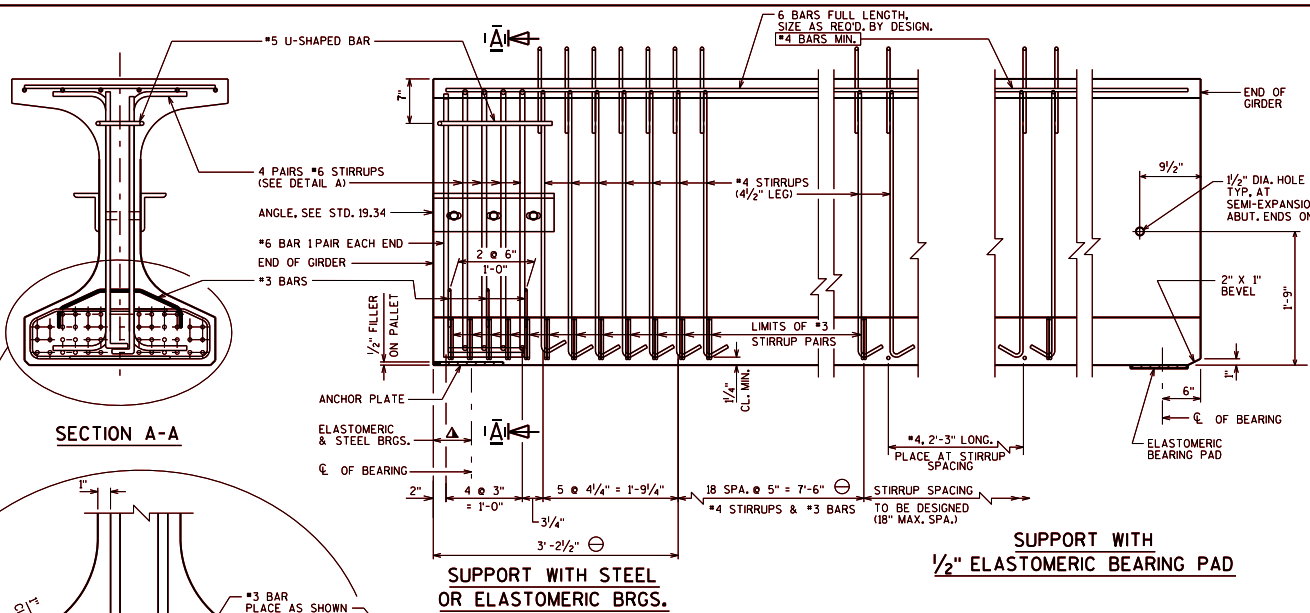
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE, AND LABEL THE SPAN IT IS USED IN.

36W" PRESTRESSED GIRDER DESIGN DATA

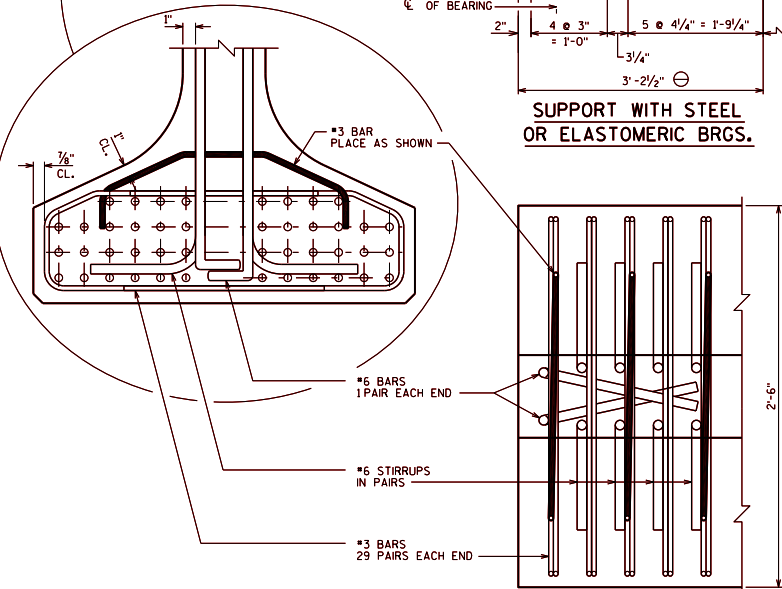
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

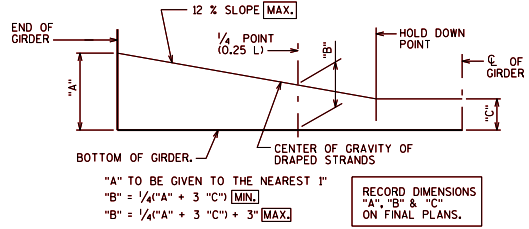
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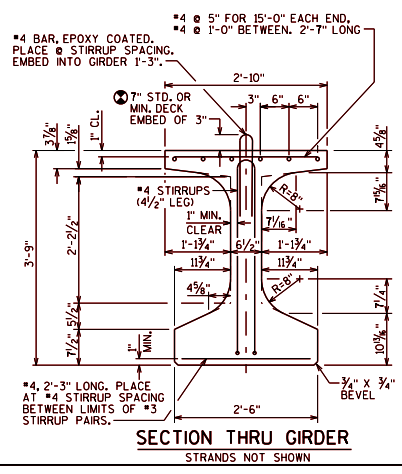
SECTION A-A



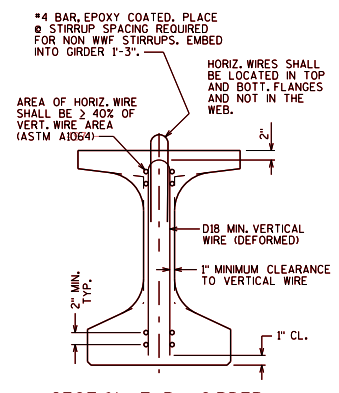
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.



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 EMBEDMENT OF 1/2\"/>

PRESSURE STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI. BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE 1 45W-INCH".

DESIGNER NOTES

THE DESIGNER SHALL 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. SPECIFY COMBINATION OF TENSILE AND COMPRESSIVE STRANDS TO MAINTAIN 6800 PSI RELEASE STRENGTH. THE MAX. NUMBER OF DRAPED STRANDS IS STANDARD 19.14 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERN OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF BUREAU OF STRUCTURES.

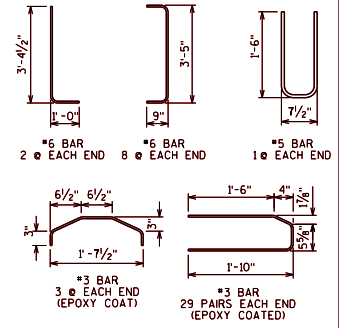
VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH

RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4.

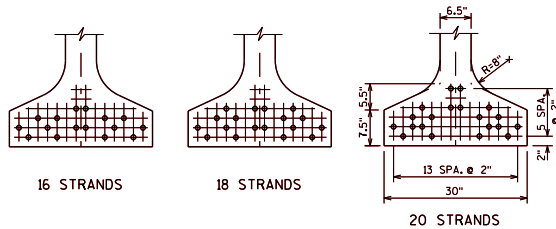
AND 1/2" CLEARANCE FROM TOP OF DECK WHEN ACCOUNTING FOR 0.4% OF VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

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



45W" PRESTRESSED GIRDER DETAILS

APPROVED: Bill Oliva DATE: 7-18



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

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.

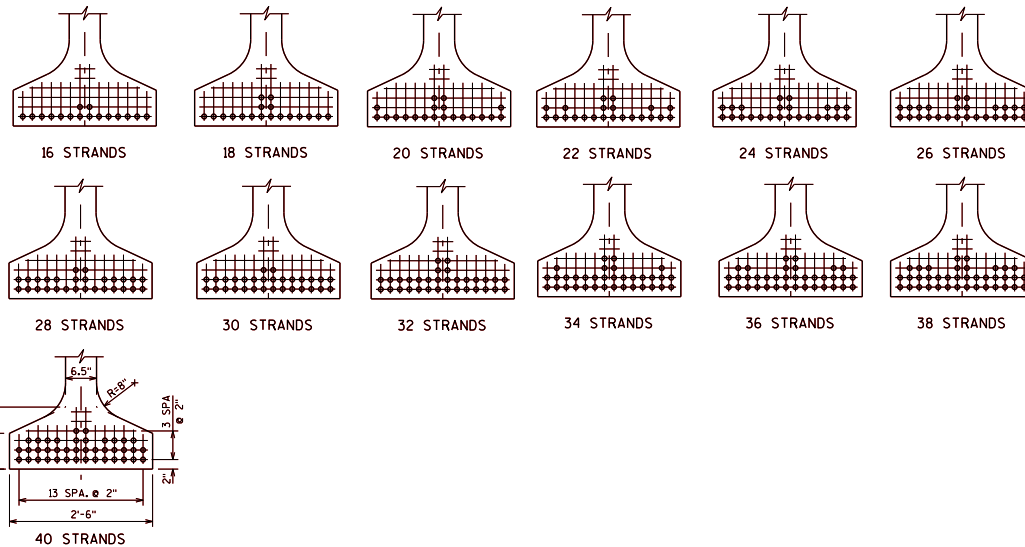
PRE-TENSION

$f'_s = 270,000$ P.S.I.
 $f_s = 0.75 \times 270,000 = 202,500$ P.S.I.
 for low relaxation strands

Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94$ KIPS

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

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



ARRANGEMENT AT $\frac{L}{4}$ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

NO. STRANDS	e_s (inches)	(COMPRESSION IS POSITIVE)	
		$P(\text{ini.}) = A_s f_s$ (KIPS)	$f_B (\text{ini.})$ (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

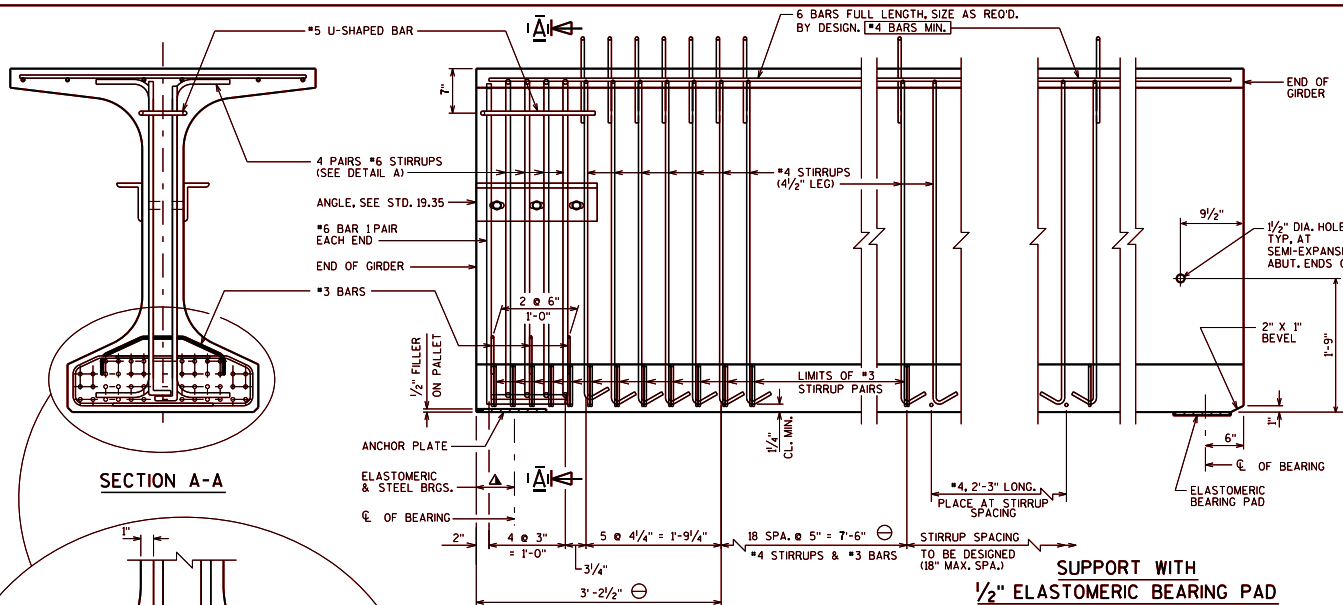
DESIGNER NOTES

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

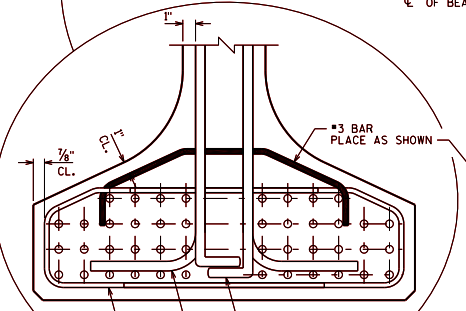
APPROVED: Bill Oliva DATE: 7-14



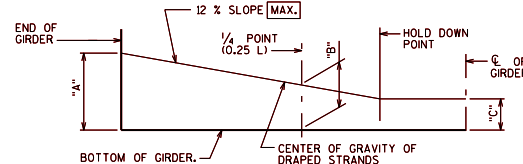
SECTION A-A

SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD



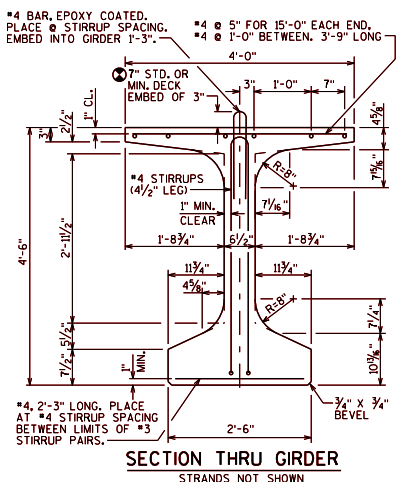
DETAIL A
BOTTOM FLANGE



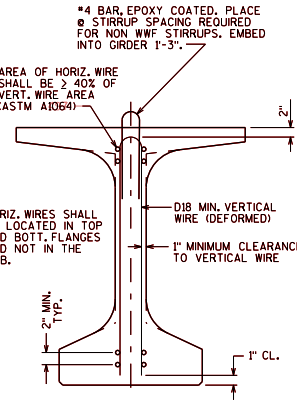
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = 1/4("A" + 3 "C") + 3" MIN.
 "B" = 1/4("A" + 3 "C") + 3" MAX.

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 (WFF) STIRRUPS
ASTM A1064 (FY = TO 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 EMBEDMENT FOR WELDED WIRE FABRIC (WFF) STIRRUPS SHALL BE APPROVED BY THE STRUCTURES DIVISION. IF USED, WFF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISCONSIN FABRICATION BOARD AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

PRESTRESSING STRANDS SHALL BE 0.6" DIA.-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI. BID ITEM SHALL BE "PRESTRESSED GIRDERS TYPE SAW-TOOTH".

DESIGNER SHALL BE RESPONSIBLE FOR DESIGN FROM A MINIMUM OF 8,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH SHALL BE 8,000 PSI. MAXIMUM RELEASE STRENGTH SHALL BE 8,000 PSI. MAXIMUM RELEASE STRENGTH SHALL BE 8,000 PSI.

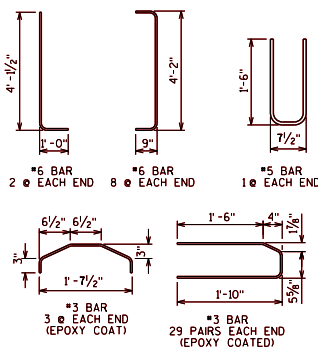
THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8. SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 8,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH SHALL BE 8,000 PSI. MAXIMUM RELEASE STRENGTH SHALL BE 8,000 PSI. MAXIMUM RELEASE STRENGTH SHALL BE 8,000 PSI.

REINFORCEMENT PATTERNS FOR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

VARIES FOR ENDS EMBEDDED INTO CONCRETE OR BRGS. (SEE TABLE 19.16) AT EDGE OF GIRDER. X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL CAMBER AT EACH END 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 3/16 IN. DECK EMBEDMENT AND EDGE OF GIRDER. X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL 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 3/16 IN. DECK EMBEDMENT AND 2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR 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

54W" GIRDER

A = 798 SQ. IN.
 $r^2 = 402.41 \text{ IN.}^2$
 $y_T = 27.70 \text{ IN.}$
 $y_B = -26.30 \text{ IN.}$
 $I = 321,049 \text{ IN.}^4$
 $S_T = 11,592 \text{ IN.}^3$
 $S_B = -12,205 \text{ IN.}^3$
 WT. = 831 #/FT.

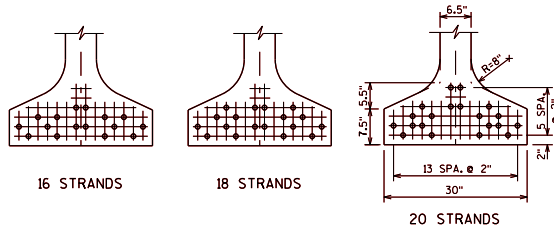
PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands

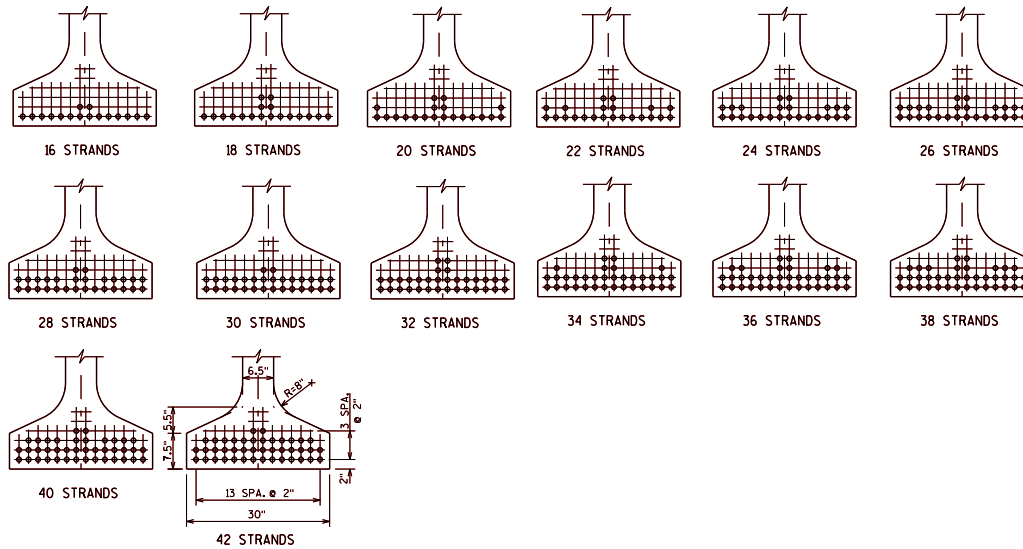
Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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



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



ARRANGEMENT AT $\frac{1}{4}$ SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

NO. STRANDS	e_s (inches)	(COMPRESSION IS POSITIVE)	
		$P(\text{init.}) = A_s f_s$ (KIPS)	$f_B (\text{init.})$ (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

DATE: _____

APPROVED: Bill Oliva

72W" GIRDER

A = 915 SQ. IN.
 $r^2 = 717.5 \text{ IN.}^2$
 $y_T = 37.13 \text{ IN.}$
 $y_B = -34.87 \text{ IN.}$
 $I = 656,426 \text{ IN.}^4$
 $S_T = 17,680 \text{ IN.}^3$
 $S_B = -18,825 \text{ IN.}^3$
 WT. = 953 #/FT.

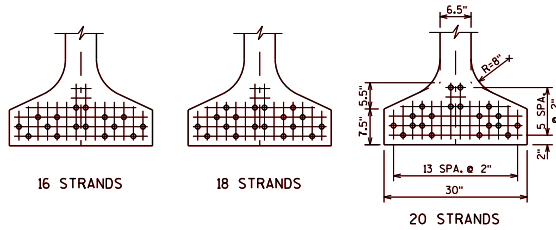
PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands

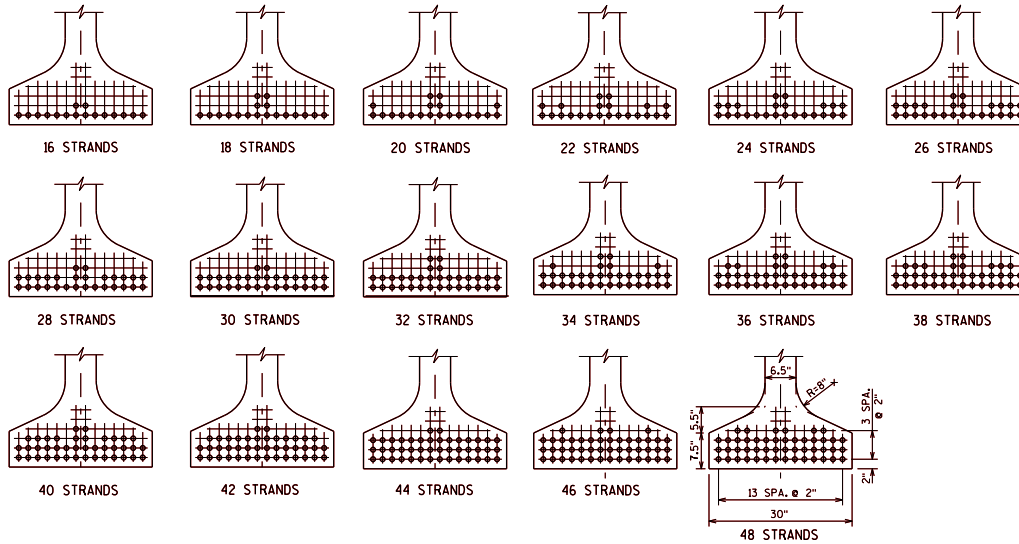
Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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



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




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

NO. STRANDS	e _s (inches)	(COMPRESSION IS POSITIVE)	
		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: 7-18

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 II, GRADE 2, CLASS B OR THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOST 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 DEWOUND WIRE FABRIC WWF FASTAC A1064 ASTM A1064 MAY BE SUBSTITUTED FOR THE REBROCK REINFORCEMENT MESH OR WIRE MESH 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, IN AN ULTIMATE STRENGTH OF 210,000 PSI.

PRESTRESSED STRANDS SHALL BE PROTECTED WITH 1/2" DIA. HOLES OR PROTECTIVE COATINGS THROUGHOUT THE ENTIRE LENGTH OF THE GIRDER. FOR STORAGE, HANDLING AND TRANSPORTING THIS GIRDER IS REINFORCED WITH ANCHOR PLATES AND STEEL BRGS. BEHIND THE CAMBER GROUP. THE REINFORCEMENT SHALL BE 2" MIN. THICK AND SHALL BE EMBEDDED INTO THE GIRDER ENDS TO A MINIMUM OF 18" MAX. SPA. APPROVED FOR STORAGE, HANDLING AND TRANSPORTING THE GIRDER IS REINFORCED TO CARRY A MAXIMUM OVERHEAD FROM THE LIFTING POSITION FOR POINT OF SUPPORT TO 1/10 THE GIRDER LENGTH. THE CONTRACTOR IS RESPONSIBLE FOR LATERAL STABILITY OF THE GIRDER UNTIL THE DECK IS CURED. (NOTE DOESN'T APPLY, REFERENCE SECT. 503.3.3 OF STD. 207.07)

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

DESIGNER'S NOTES

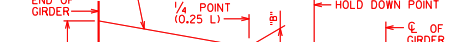
STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MIN. CONCRETE COVER FOR TENSION REBAR SHALL BE 3" FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 8000 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED STRANDS BEYOND STANDARD IS 20 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2 USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF REINFORCEMENT ON STANDARD AND SECTION OF THE GIRDER BEYOND STANDARD. STANDARD STRAND PATTERNS FROM STANDARD IS 20 AND BUREAU ENGINEERS SHOWING IN TABLE 19.3-2 USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF REINFORCEMENT WHICH REQUIRES PRIOR APPROVAL FROM THE (207.09) BUREAU OF STRUCTURES.

DETAIL TYPICAL AT EACH END.

VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09) RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4.

THIS DESIGN ENGINEER DETERMINES THE VALUE BASED ON 2" MIN. THICK AND 1/2" DIA. STRANDS. THE VALUE OF THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH RESIDUAL GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 1/2" CLEAR FROM TOP TO DECK WHEN ACCOUNTING FOR 0.2% OF VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

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



"A" TO BE GIVEN TO THE NEAREST 1"

"B" = 1/4(A) + 3 (C") [MIN.]

"B" = 1/4(A) + 3 (C") + 3" [MAX.]

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

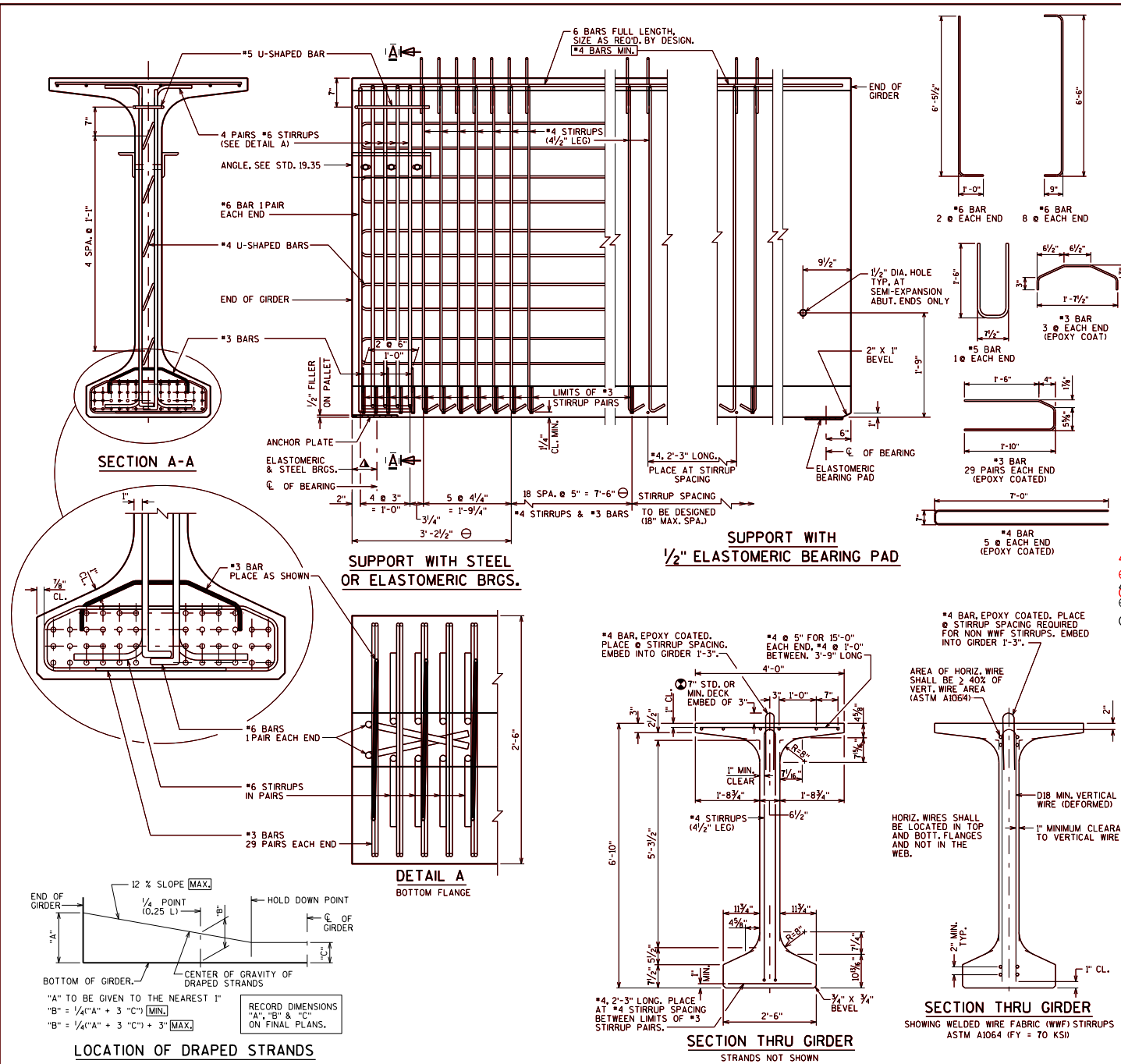
LOCATION OF DRAPED STRANDS

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



SECTION A-A

SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD

DETAIL A BOTTOM FLANGE

SECTION THRU GIRDER STRANDS NOT SHOWN

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

LOCATION OF DRAPED STRANDS

"A" TO BE GIVEN TO THE NEAREST 1"

"B" = 1/4(A) + 3 (C") [MIN.]

"B" = 1/4(A) + 3 (C") + 3" [MAX.]

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

82W" GIRDER

A = 980 SQ. IN.
 $r^2 = 924.1 \text{ IN.}^2$
 $y_T = 42.32 \text{ IN.}$
 $y_B = -39.68 \text{ IN.}$
 $I = 905,453 \text{ IN.}^4$
 $S_T = 21,396 \text{ IN.}^3$
 $S_B = -22,819 \text{ IN.}^3$
 WT. = 1021 #/FT.

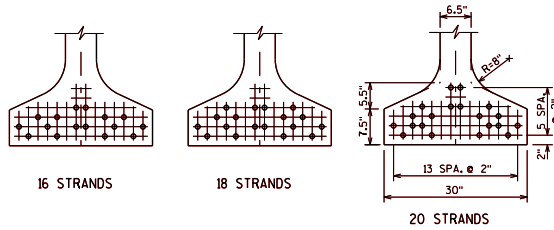
PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands

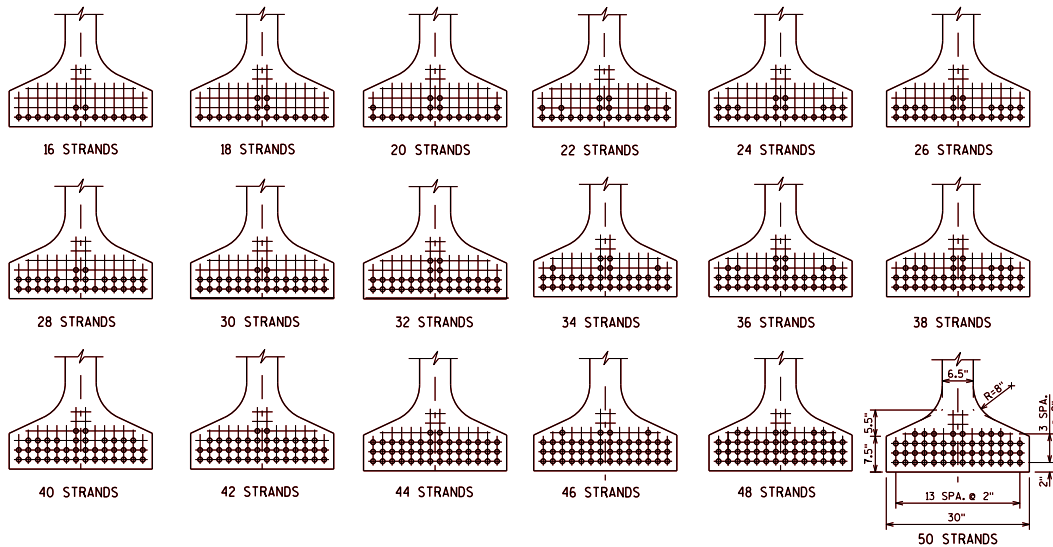
Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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



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



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

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.

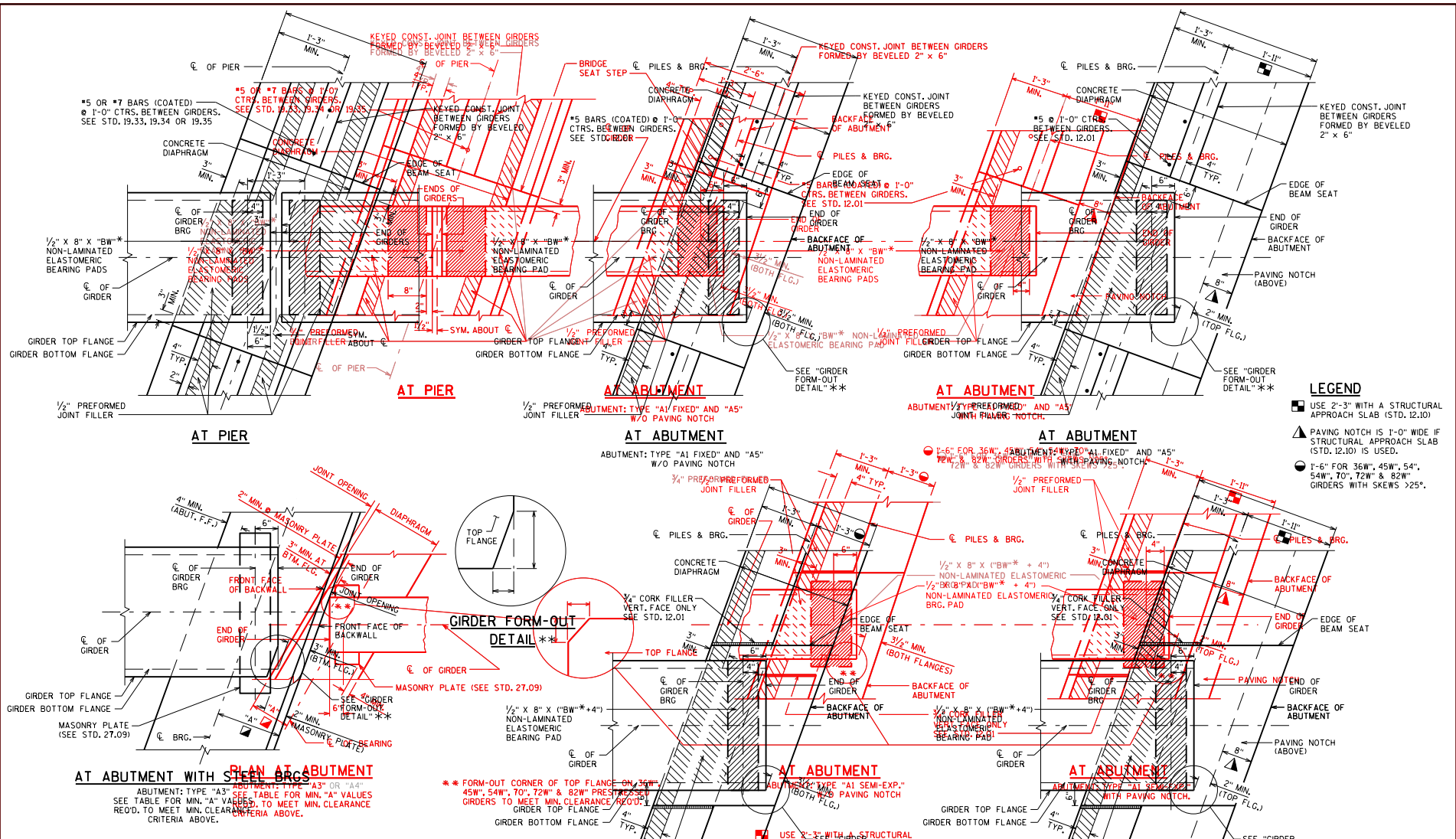
NO. STRANDS	e_s (inches)	(COMPRESSION IS POSITIVE)	
		$P(\text{init.}) = A_s f_s$ (KIPS)	$f_B (\text{init.})$ (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-35.18	703	1.801
18	-34.79	791	2.013
20	-34.08	879	2.209
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-37.43	703	1.870
18	-37.01	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

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

82W" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-18



- LEGEND**
- USE 2'-3" WITH A STRUCTURAL APPROACH SLAB (STD. 12.01)
 - ▲ PAVING NOTCH IS 1'-0" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.01) IS USED.
 - 1'-6" FOR 36W, 45W, 54W, 54W, 70W, 72W & 82W GIRDERS WITH SKEWS >25°.

MIN. "A" DIMENSION IN INCHES DIMENSION ABUTMENTS WITH STEEL BEARING PADS SHOWN IN RED ON STD. 27.09.D, 27.09.E, 27.09.F, 27.09.G, 27.09.H, 27.09.I, 27.09.J, 27.09.K, 27.09.L, 27.09.M, 27.09.N, 27.09.O, 27.09.P, 27.09.Q, 27.09.R, 27.09.S, 27.09.T, 27.09.U, 27.09.V, 27.09.W, 27.09.X, 27.09.Y, 27.09.Z, 27.09.aa, 27.09.ab, 27.09.ac, 27.09.ad, 27.09.ae, 27.09.af, 27.09.ag, 27.09.ah, 27.09.ai, 27.09.aj, 27.09.ak, 27.09.al, 27.09.am, 27.09.an, 27.09.ao, 27.09.ap, 27.09.aq, 27.09.ar, 27.09.as, 27.09.at, 27.09.au, 27.09.av, 27.09.aw, 27.09.ax, 27.09.ay, 27.09.az, 27.09.ba, 27.09.bb, 27.09.bc, 27.09.bd, 27.09.be, 27.09.bf, 27.09.bg, 27.09.bh, 27.09.bi, 27.09.bj, 27.09.bk, 27.09.bl, 27.09 bm, 27.09.bn, 27.09.bo, 27.09.bp, 27.09.bq, 27.09.br, 27.09.bs, 27.09.bt, 27.09.bu, 27.09.bv, 27.09.bw, 27.09.bx, 27.09.by, 27.09.bz, 27.09.ca, 27.09.cb, 27.09.cc, 27.09.cd, 27.09.ce, 27.09.cf, 27.09.cg, 27.09.ch, 27.09.ci, 27.09.cj, 27.09.ck, 27.09.cl, 27.09.cm, 27.09.cn, 27.09.co, 27.09.cp, 27.09.cq, 27.09.cr, 27.09.cs, 27.09.ct, 27.09.cu, 27.09.cv, 27.09.cw, 27.09.cx, 27.09.cy, 27.09.cz, 27.09.da, 27.09.db, 27.09.dc, 27.09.dd, 27.09.de, 27.09.df, 27.09.dg, 27.09.dh, 27.09.di, 27.09.dj, 27.09.dk, 27.09.dl, 27.09.dm, 27.09.dn, 27.09.do, 27.09.dp, 27.09.dq, 27.09.dr, 27.09.ds, 27.09.dt, 27.09.du, 27.09.dv, 27.09.dw, 27.09.dx, 27.09.dy, 27.09.dz, 27.09.ea, 27.09.eb, 27.09.ec, 27.09.ed, 27.09.ee, 27.09.ef, 27.09.eg, 27.09.eh, 27.09.ei, 27.09.ej, 27.09.ek, 27.09.el, 27.09.em, 27.09.en, 27.09. eo, 27.09.ep, 27.09.eq, 27.09.er, 27.09.es, 27.09.et, 27.09.eu, 27.09.ev, 27.09.ew, 27.09.ex, 27.09.ey, 27.09.ez, 27.09.fa, 27.09.fb, 27.09.fc, 27.09.fd, 27.09.fe, 27.09.ff, 27.09.fg, 27.09.fh, 27.09.fi, 27.09.fj, 27.09.fk, 27.09.fl, 27.09.fm, 27.09.fn, 27.09.fo, 27.09.fp, 27.09.fq, 27.09.fr, 27.09.fs, 27.09.ft, 27.09.fu, 27.09.fv, 27.09.fw, 27.09.fx, 27.09.fy, 27.09.fz, 27.09.ga, 27.09.gb, 27.09.gc, 27.09.gd, 27.09.ge, 27.09.gf, 27.09.gg, 27.09.gh, 27.09.gi, 27.09.gj, 27.09.gk, 27.09.gl, 27.09.gm, 27.09.gn, 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27.09.zv, 27.09.zw, 27.09.zx, 27.09.zy, 27.09.zz

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

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

DESIGNER'S 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.

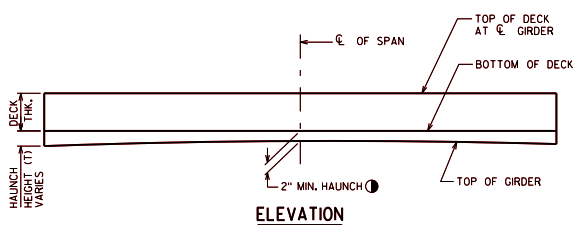
SKEW ANGLE (DEGREE)	SKEW	GIRDER DEPTHS												ABUTMENT: TYPE "A1" SEMI-EXP. WITH PAVING NOTCH					
		28"	28 1/2"	36W6"	45"	36W5"	45"	85"	54W"	45W"	70"	72W"	82W"	70"	72W"	82W"			
0-5	0-5/2"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"			
> 5-15	> 5-12"	12"	13"	12"	12"	13"	13"	12"	13"	13"	13"	13"	13"	13"	13"	13"			
> 15-25	> 15-28 1/2"	12 1/2"	15"	12 1/2"	13"	15"	14 1/2"	15"	15"	15"	15"	15"	15"	15"	15"	15"			
> 25-35	> 25-38 1/2"	14 1/2"	17"	15 1/4"	15 1/2"	17"	16 1/2"	17 1/2"	17 1/2"	17 1/2"	17 1/2"	17 1/2"	17 1/2"	17 1/2"	17 1/2"	17 1/2"			
> 35-45	> 35-45 1/2"	15 1/2"	17 1/2"	15 1/2"	17 1/2"	17 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"	18 1/2"			
> 45-55	> 45-57 1/2"	17 1/2"	18 1/2"	17 1/2"	18 1/2"	18 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"	19 1/2"			

GIRDER DEPTH		PRESTRESSED GIRDER FLANGE WIDTH TABLE			
GIRDER DEPTH	TOP FLANGE	28"	36"	36W"	45"
45W"	15 1/2"	18"	18"	18"	18"
54W"	17 1/2"	20"	20"	20"	20"
70"	22"	24"	24"	24"	24"
72W"	22 1/2"	24 1/2"	24 1/2"	24 1/2"	24 1/2"
82W"	24"	26"	26"	26"	26"

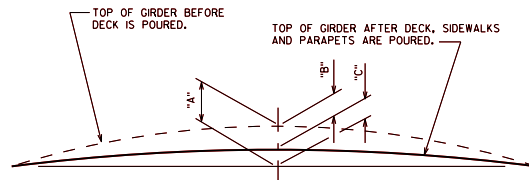
BEARING PAD DETAILS FOR PRESTRESSED CONCRETE GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-20



ELEVATION



CAMBER & DEFLECTION DIAGRAM

- * "A" = PRESTRESS CAMBER
- * "B" = DEAD LOAD DEFLECTION * ROUND OFF TO NEAREST 1/8"
- * "C" = RESIDUAL CAMBER

DESIGNER NOTES

1 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 1/4".

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.

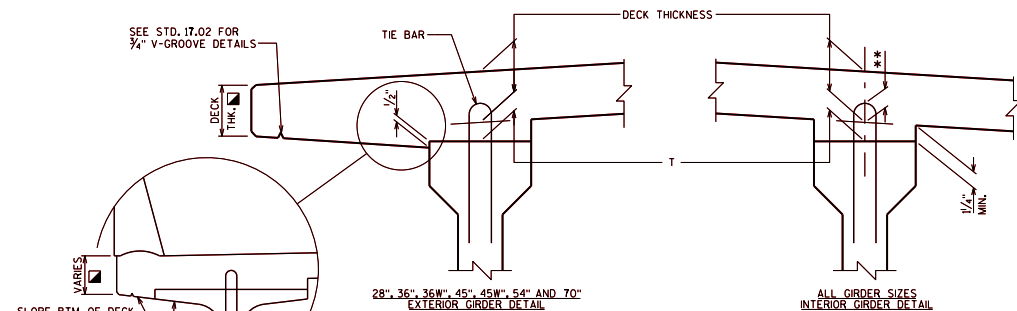
FOR SKEWS $\leq 10^\circ$, PLACE INTERMEDIATE DIAPHRAGMS IN A STRAIGHT LINE. REFER TO STANDARD 19.36. PROVIDE OFFSET FOR SKEWS $> 10^\circ$.

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 36", 45W", 54W", 72W" OR 82W".

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

DIAPHRAGM SPACING: FOR SPANS $\leq 80'-0"$ PLACE ONE DIAPHRAGM AT MIDLENGTH 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.



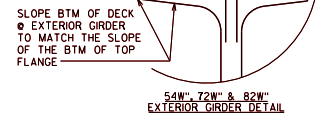
DECK HAUNCH DETAIL

IF 1/4" 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 1/2" OR, ** IF 3" MINIMUM DECK EMBEDMENT OF TIE BAR CANNOT BE OBTAINED.

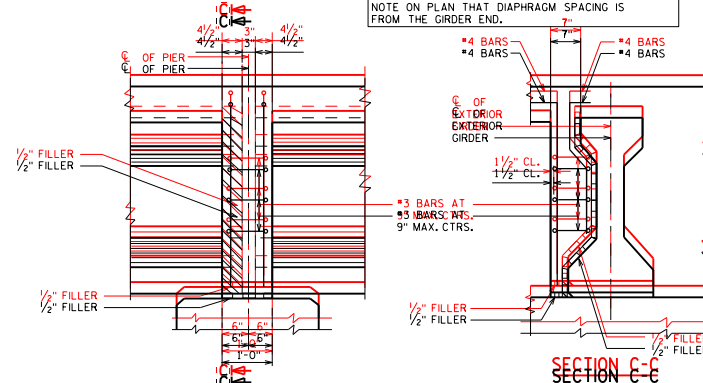
TO DETERMINE 'T', ELEV. OF TOP OF GRS. AT \odot OF SUBSTRUCTURE UNITS & AT 1/10 POINTS OF EACH SPAN SHALL BE TAKEN, THEN FOLLOW THIS PROCESS:

- 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".

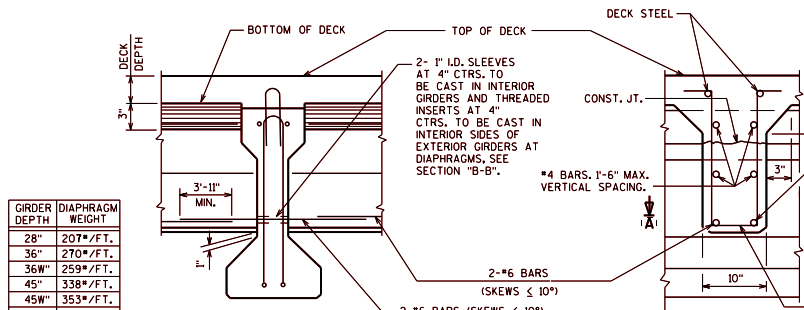


54W", 72W" & 82W" EXTERIOR GIRDER DETAIL

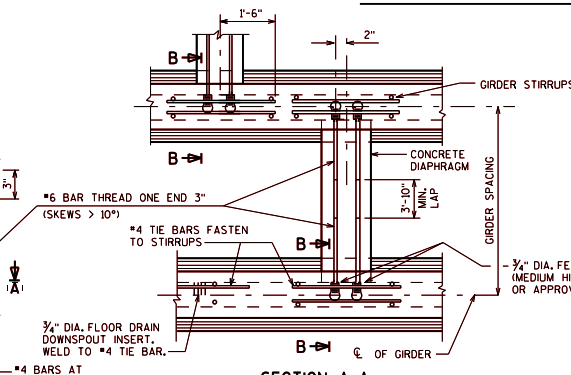


PIER DETAIL AT PIERS

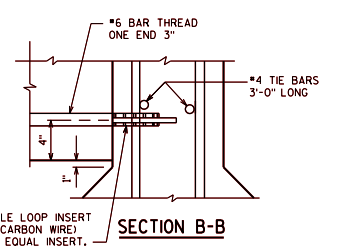
SECTION C-E



ELEVATION OF DIAPHRAGM



SECTION A-A
SKEW ANGLES $> 10^\circ$



SECTION B-B

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.

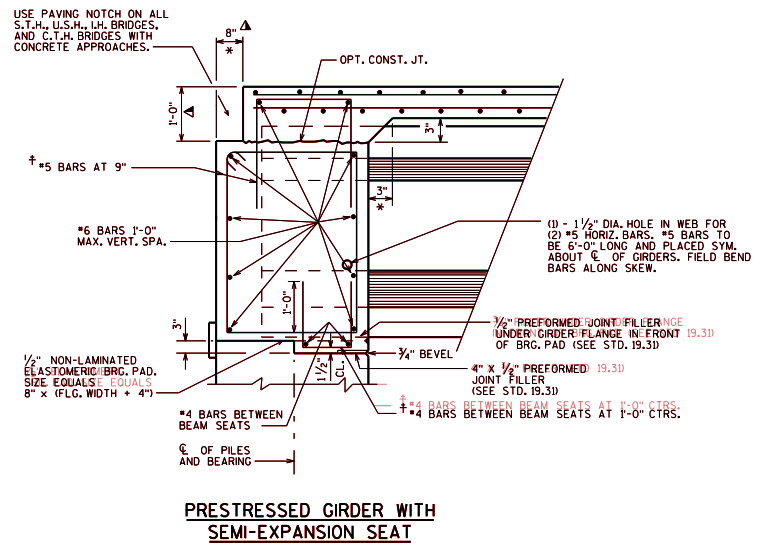
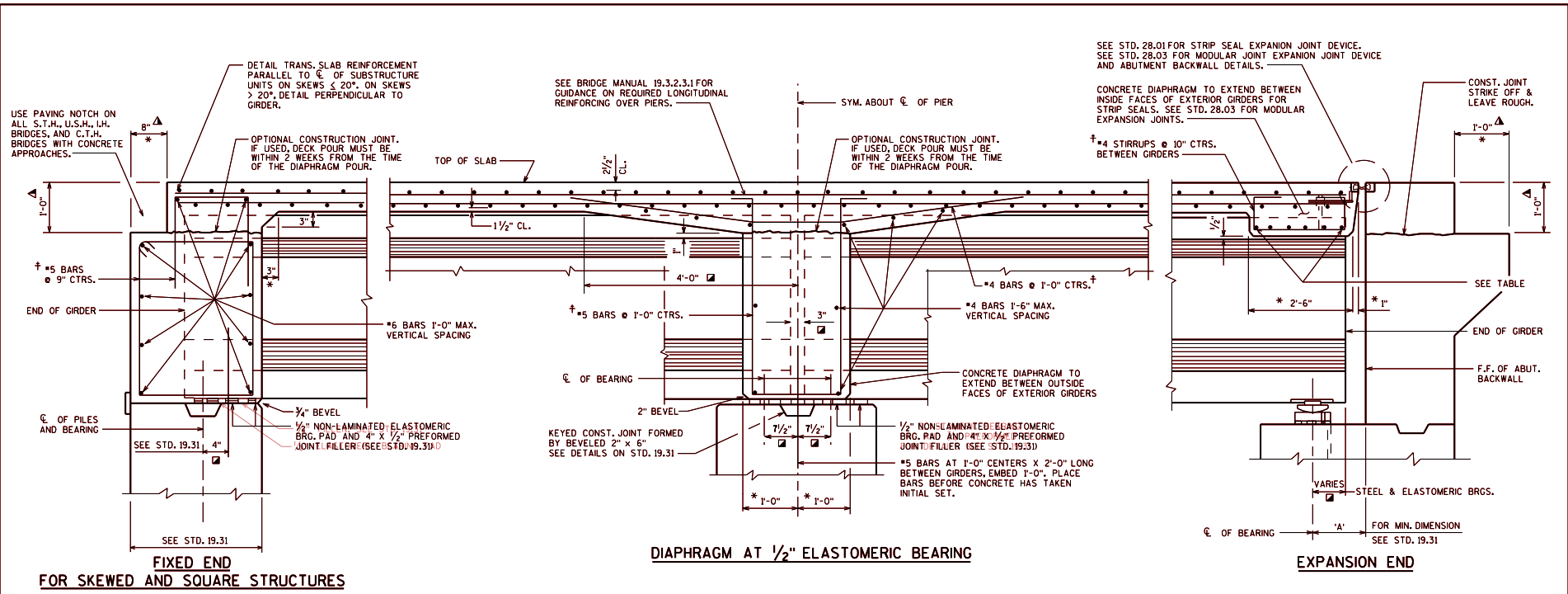
INTERMEDIATE CONCRETE DIAPHRAGM DETAILS

PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

DATE: _____

APPROVED: Bill Oliva



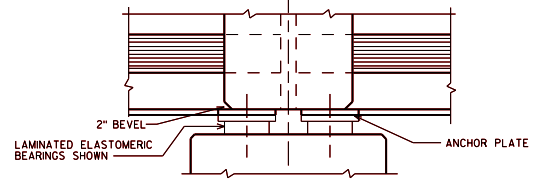
EXPANSION END DIAPHRAGM STEEL

DIAPHRAGM LENGTH (ALONG SKEW) BETWEEN GIRDERS (CL TO CL 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

DESIGNER NOTES

LAP LENGTHS FOR ALL BARS SHALL BE BASED ON DESIGNER'S CHOICE. LAP SPLICE, EXCEPT HORIZONTAL DIAPHRAGM BARS, IF SPLICED, CAN UTILIZE THE ASSA TENSION LAP SPLICE, EXCEPT ON A "CLASS A" TENSION LAP SPLICE, EXCEPT HORIZONTAL DIAPHRAGM BARS, IF SPLICED, CAN UTILIZE A "CLASS A" TENSION LAP SPLICE.

- LEGEND**
- ☑ DIMENSION IS TAKEN PARALLEL TO CL GIRDER.
 - ✳ DIMENSION IS TAKEN NORMAL TO CL SUBSTRUCTURE UNITS.
 - ✳ DIMENSION IS TAKEN PARALLEL TO CL GIRDER.
 - ⚠ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF DIMENSIONAL APPROACHES ARE USED TO SUBSTRUCTURE UNITS.
 - ⚠ SHOW NO. 9 STAINLESS STEEL BAR (STD. 12.12) FOR SKIRT OR GULL APPROACH SLAB OR #4 REINFORCING IRON STRUC. ABUT. OR PABOTH DIAPHR. (STD. 12.10) IS USED.
 - † BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO CL GIRDERS.



DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY 1/2" ABOVE BEARING KEEPER BARS

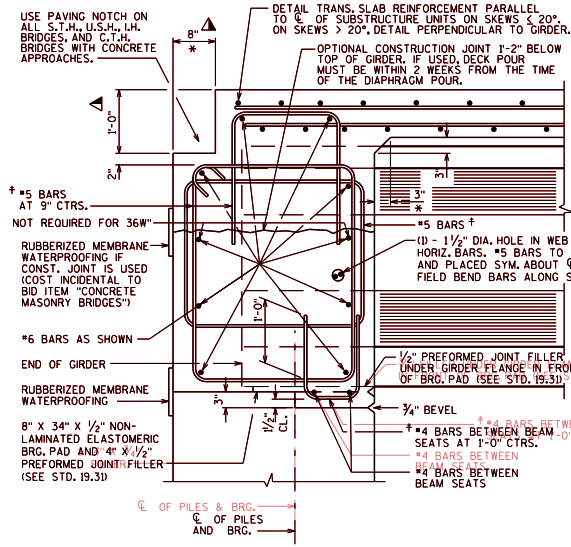
SEE STANDARD 19.34 FOR 36W" & 45W" PRESTRESSED GIRDERS SLAB AND SUPERSTRUCTURE DETAILS.

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

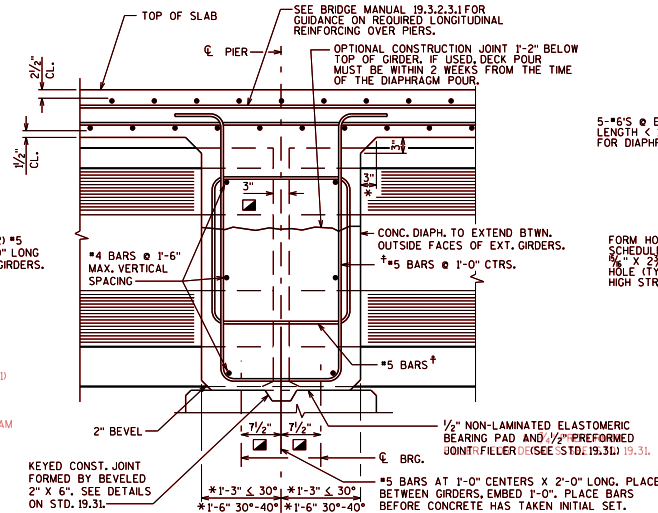
28" & 36" PRESTRESSED GIRDERS SLAB & SUPERSTRUCTURE DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-19



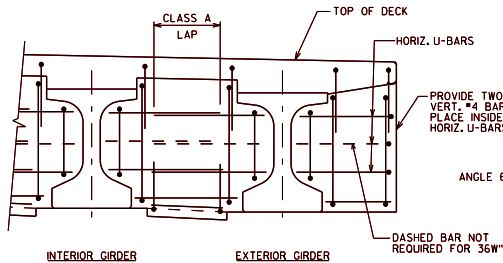
PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



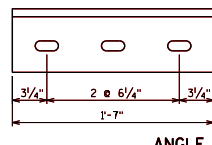
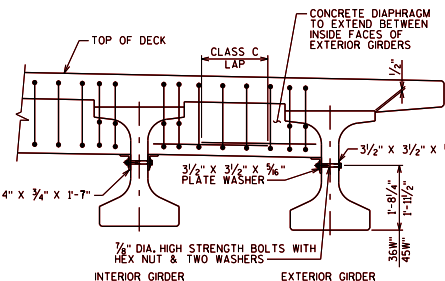
PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END

LEGEND

- DIMENSION IS TAKEN PARALLEL TO \bar{C} GIRDER.
- * DIMENSION IS TAKEN NORMAL TO \bar{C} 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 BRIDGE SECTION (CHURN) ABOVE OR ABUT. DIAPH. GIRDERS.
- † BARS PLACED PARALLEL TO GIRDERS, SPACING PERPENDICULAR TO \bar{C} GIRDERS.



PART TRANSVERSE SECTION AT DIAPHRAGM SEMI-EXPANSION END

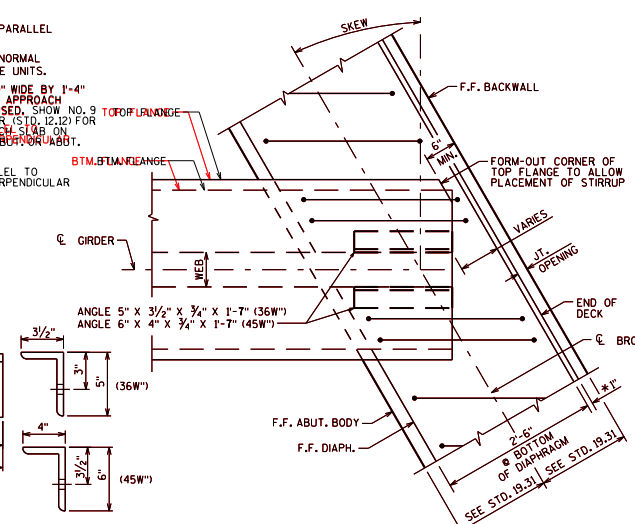


NOTES

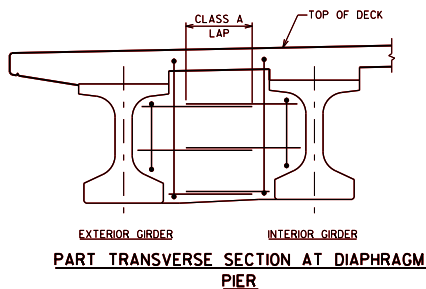
- ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "CONCRETE MASONRY BRIDGES".
- DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.
- ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.
- STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS 1/4" TURN. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

DESIGNER NOTE

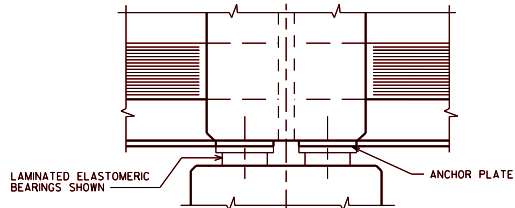
LAP LENGTHS FOR DIAPHRAGM REINFORCEMENT SHALL BE BASED ON A CLASS "C" TENSION LAP SPLICE, UNLESS OTHERWISE NOTED.



TOP VIEW OF DIAPHRAGM (EXPANSION END)



PART TRANSVERSE SECTION AT DIAPHRAGM PIER



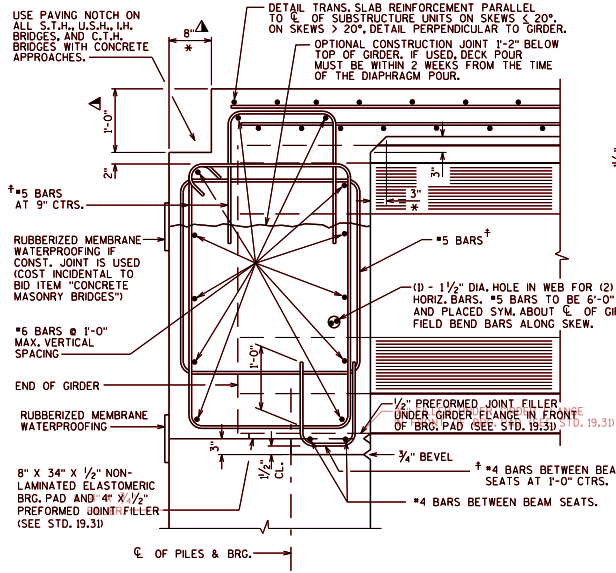
DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY 1/2" ABOVE BEARING KEEPER BARS

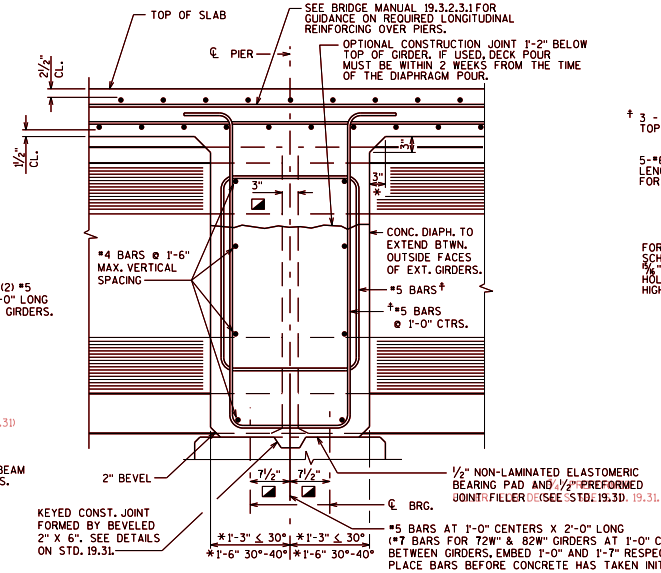
PRESTRESSED 36W" & 45W" GIRDER SLAB & SUPERSTRUCTURE DETAILS

BUREAU OF STRUCTURES

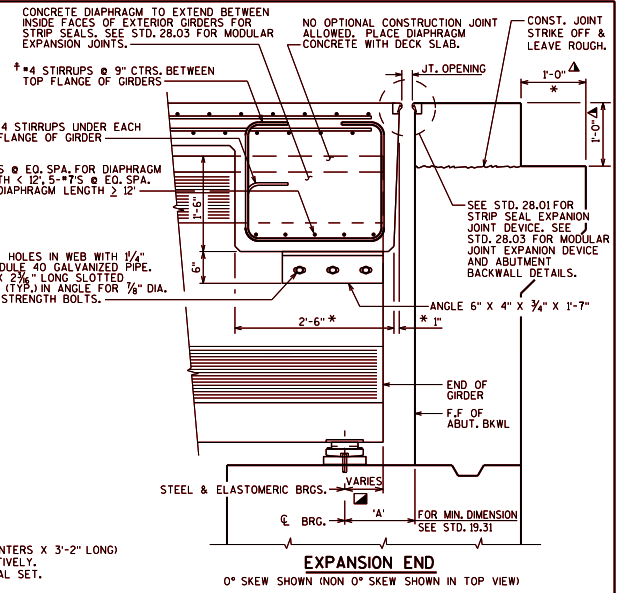
APPROVED: Bill Oliva DATE: 1-18



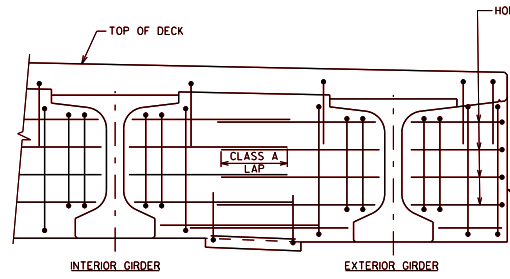
PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



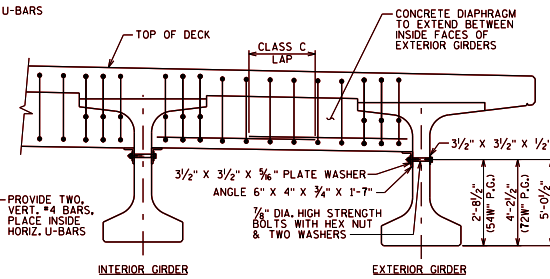
DIAPHRAGM AT 1/2" ELASTOMERIC BEARING



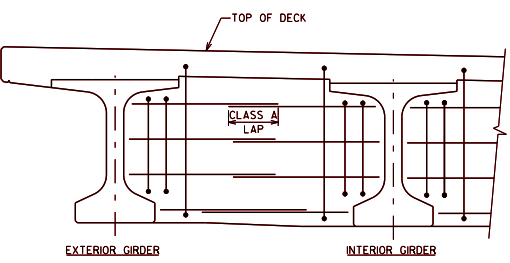
EXPANSION END
0° SKEW SHOWN (NON 0° SKEW SHOWN IN TOP VIEW)



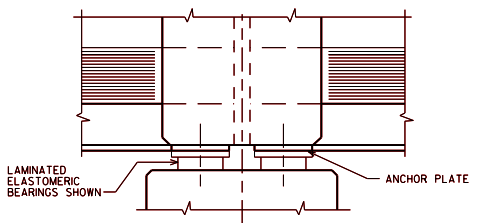
PART TRANSVERSE SECTION AT DIAPHRAGM SEMIEXPANSION END



PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END



PART TRANSVERSE SECTION AT DIAPHRAGM PIER

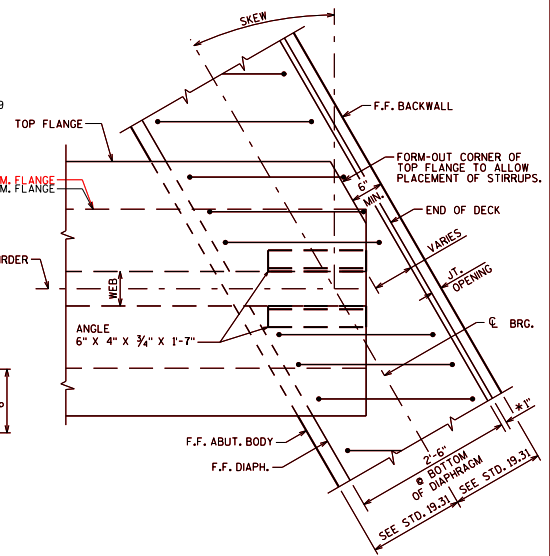


DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY 1/2" ABOVE BEARING KEEPER BARS

LEGEND

- DIMENSIONS TAKEN PARALLEL TO GIRDER
- DIMENSIONS TAKEN NORMAL TO GIRDER
- * DIMENSIONS TAKEN NORMAL TO SUBSTRUCTURE UNITS
- △ PAVING NOTCHES 1/2" WIDE BY 1-4" DEEP IF STRUCTURAL APPROACH
- △ BEARINGS (STD. 28.03) USED AS ROW NO. 9
- △ BEARINGS (STD. 28.03) USED AS ROW NO. 2
- △ FOR STRUCTURAL APPROACH SLAB
- + ON THE SECTION, PERPENDICULAR TO GIRDER
- + BARS PLACED PARALLEL TO GIRDER, SPACING PERPENDICULAR TO C. GIRDERS.



TOP VIEW OF DIAPHRAGM (EXPANSION END)

NOTES

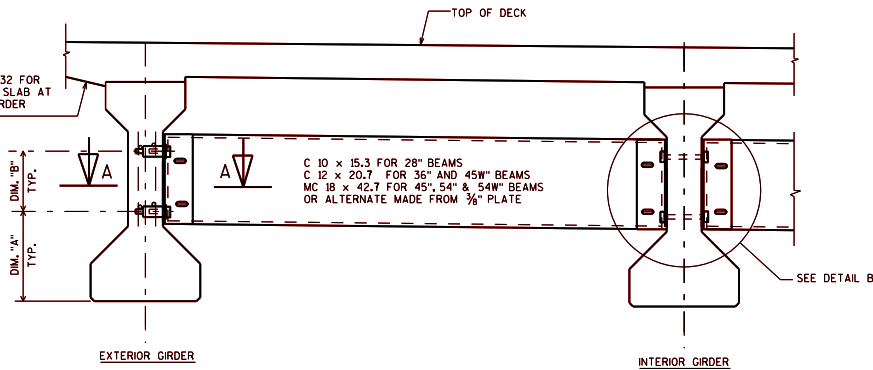
- ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "CONCRETE MASONRY BRIDGES".
- DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.
- ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.
- STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS 1/4" 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.

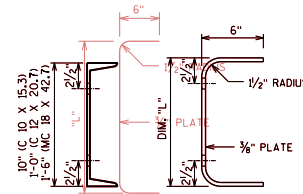
PRESTRESSED 54W", 72W" & 82W" GIRDER SLAB & SUPERSTRUCTURE DETAILS	
BUREAU OF STRUCTURES	
APPROVED: <i>Bill Oliva</i>	DATE: 1-18

SEE STD. 19.32 FOR BOTTOM OF SLAB AT EXTERIOR GIRDER DETAILS.

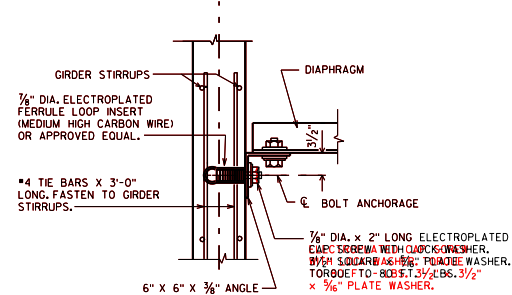


PART TRANSVERSE SECTION AT DIAPHRAGM

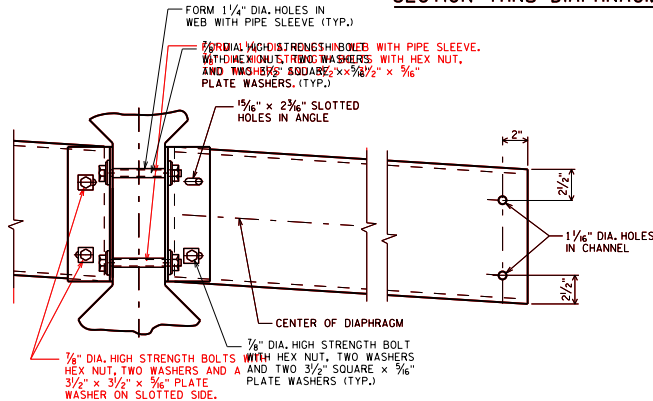
TABLE				
GIRDER HEIGHT	DIM. "A"	DIM. "B"	DIM. "L"	* DIM. "X"
28"	1'-0 1/8"	5 1/4"	9 1/2"	2 1/4"
36"	1'-2 1/4"	9 1/4"	1'-1 1/2"	3 1/4"
45"	1'-5 1/8"	1'-1 3/8"	1'-5 1/2"	2 1/4"
45W"	1'-9 1/8"	8 1/4"	1'-0 1/2"	2 3/4"
54"	1'-7 1/4"	1'-5 1/8"	1'-9 1/2"	4 1/4"
54W"	1'-9 1/8"	1'-5 1/8"	1'-9 1/2"	4 1/4"



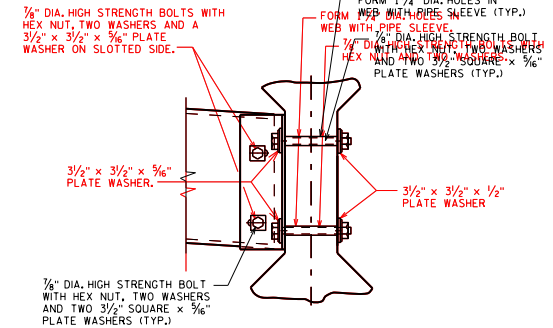
SECTION THRU DIAPHRAGM
 C 10 x 15.3
 C 12 x 20.7
 MC 18 x 42.7
 *DIM. "X" = 2 1/2" FOR ALTERNATE PLATE DIAPHRAGM



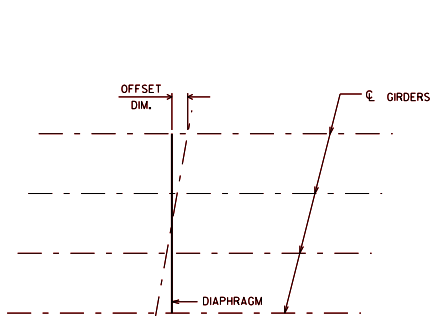
SECT. A-A
(FOR EXTERIOR ATTACHMENT)



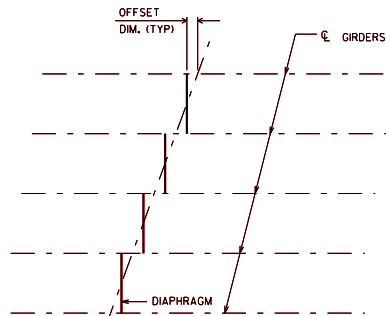
DETAIL B
(FOR CONTINUOUS LINE OF DIAPHRAGMS)



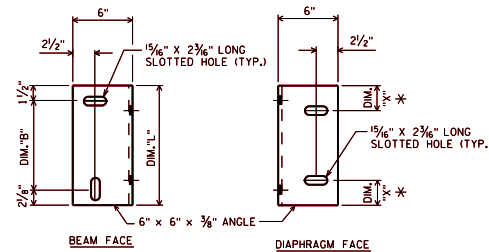
SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°



PLAN FOR SKEW ANGLES ≤ 10°



PLAN FOR SKEW ANGLES > 10°

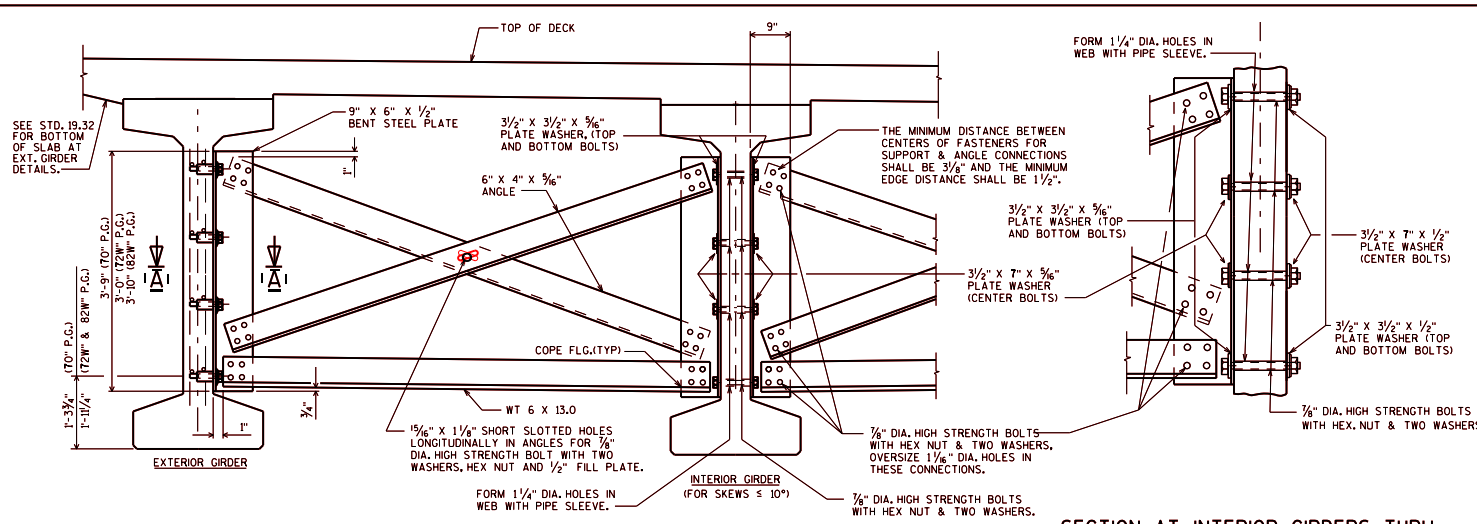


DIAPHRAGM SUPPORT
 *2 1/2" FOR ALTERNATE PLATE DIAPHRAGM

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

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-19

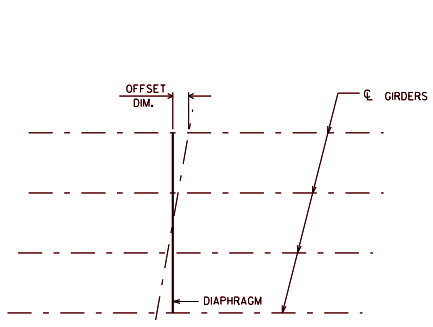


PART TRANSVERSE SECTION AT DIAPHRAGM

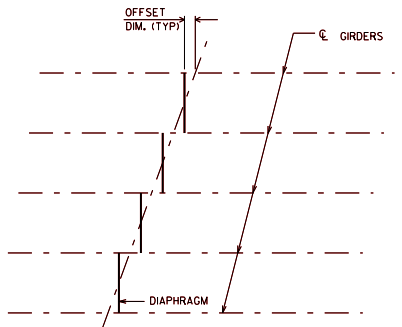
SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°

NOTES

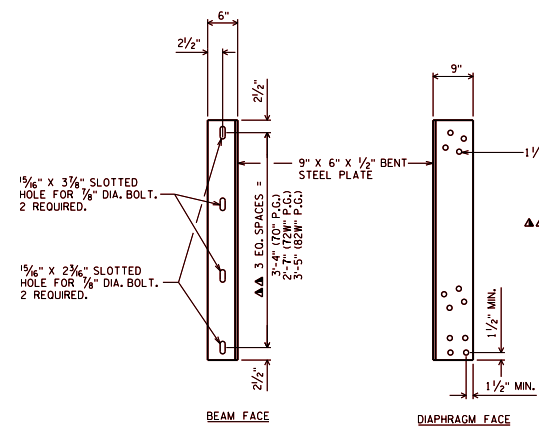
- ALL DIAPHRAGM MATERIAL NOT EMBEDDED IN THE CONCRETE GIRDER SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "STEEL DIAPHRAGMS B-...", EACH.
 - EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.
 - ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.
 - ALL DIAPHRAGM MATERIAL INCLUDING BOLTS, 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.



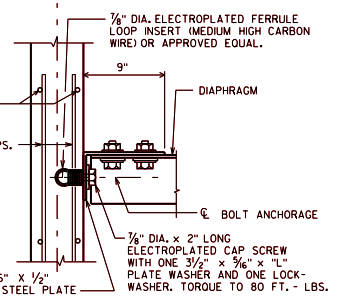
PLAN FOR SKEW ANGLES ≤ 10°



PLAN FOR SKEW ANGLES > 10°



DIAPHRAGM SUPPORT

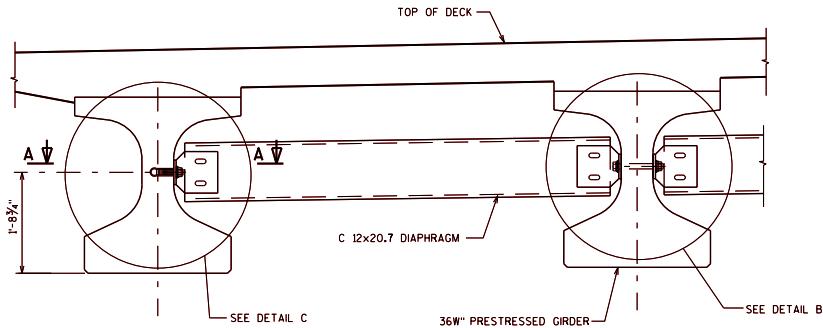


SECT. A-A (FOR EXTERIOR ATTACHMENT)

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

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

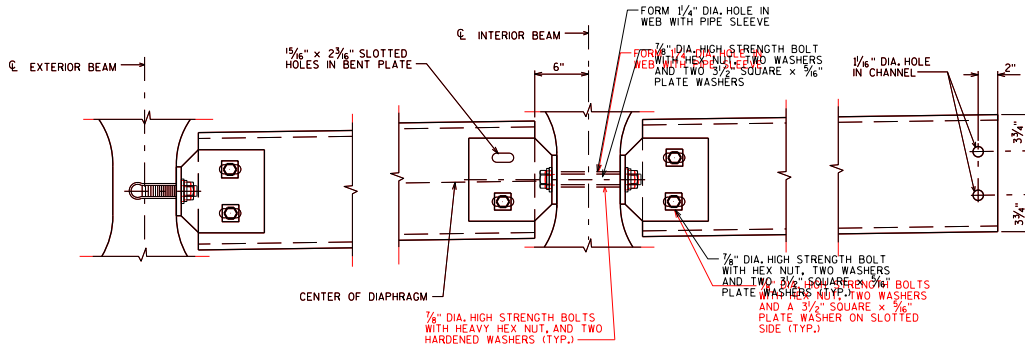
INTERMEDIATE STEEL DIAPHRAGMS FOR 70", 72W" & 82W" PRESTRESSED GIRDERS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-17</u>



EXTERIOR GIRDER

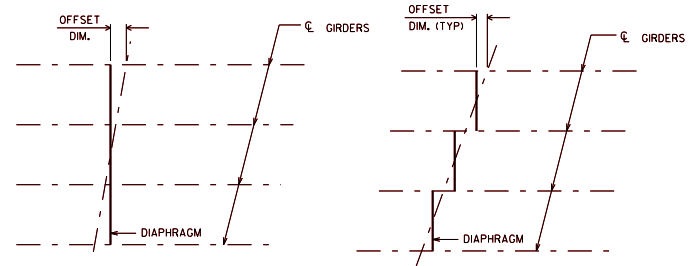
INTERIOR GIRDER

PART TRANSVERSE SECTION AT DIAPHRAGM



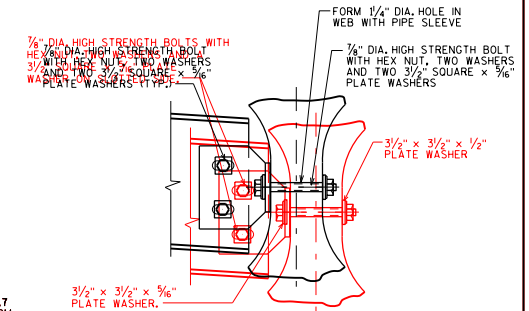
DETAIL C

DETAIL B

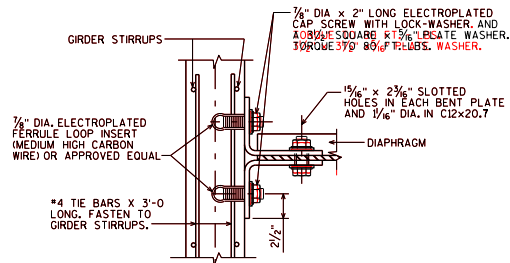


PLAN FOR SKEW ANGLES $\leq 10^\circ$

PLAN FOR SKEW ANGLES $> 10^\circ$

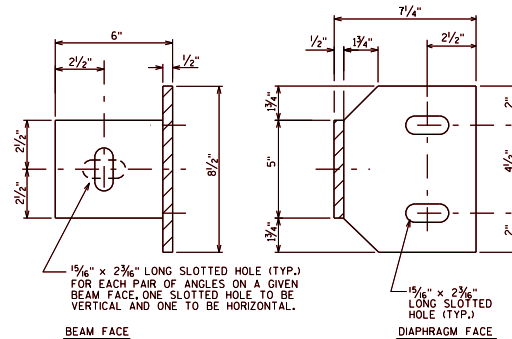


SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES $> 10^\circ$
 DIAPHRAGM FOR SKEW ANGLES $> 10^\circ$



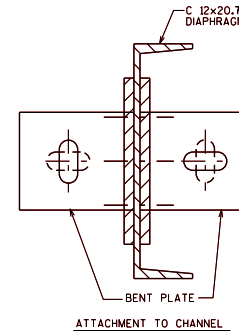
SECTION A-A

(FOR EXTERIOR ATTACHMENT)



BEAM FACE

DIAPHRAGM FACE



ATTACHMENT TO CHANNEL

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.

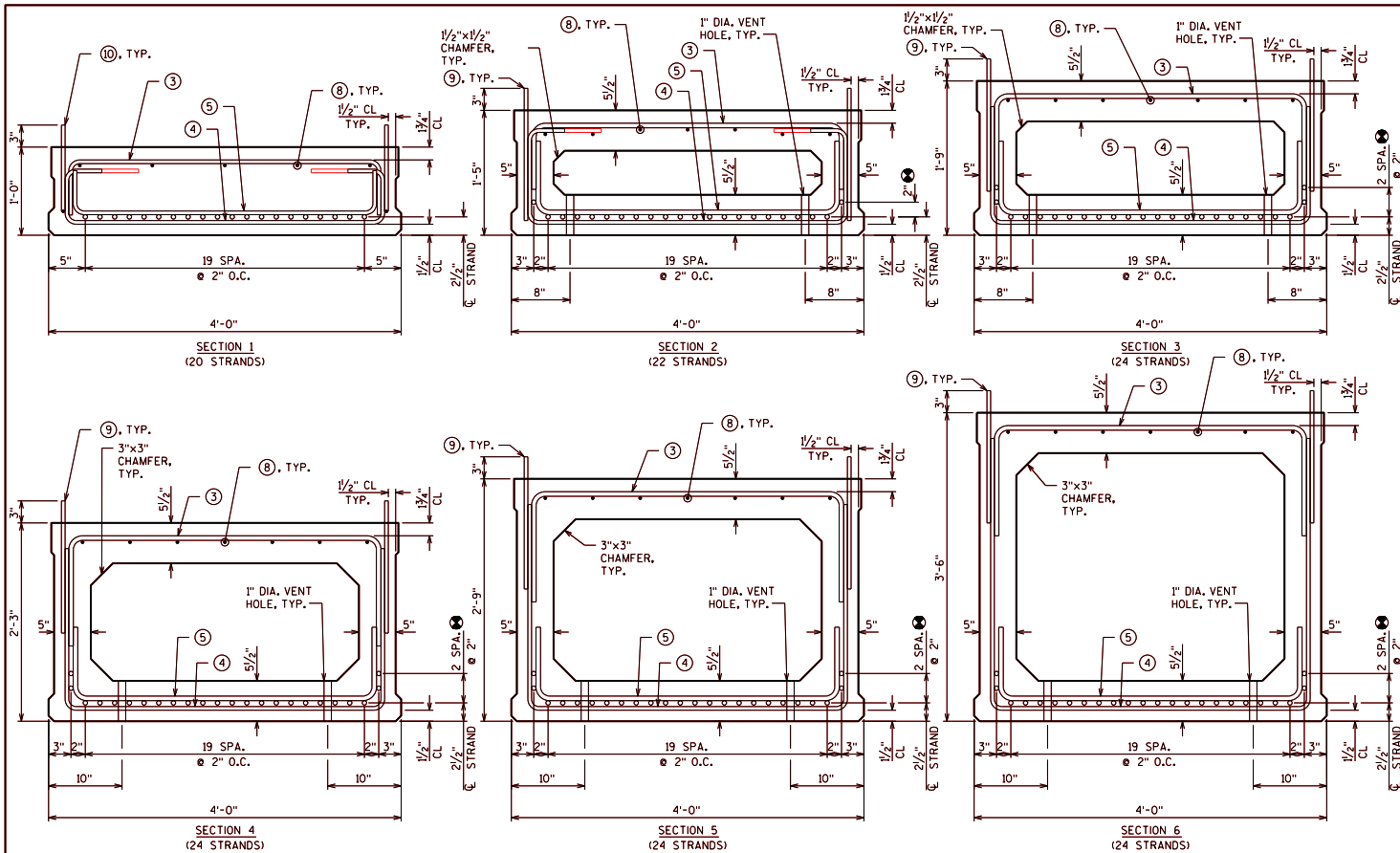
STEEL DIAPHRAGM TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT PLUS $1/4$ TURN, UNLESS NOTED OTHERWISE. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

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.

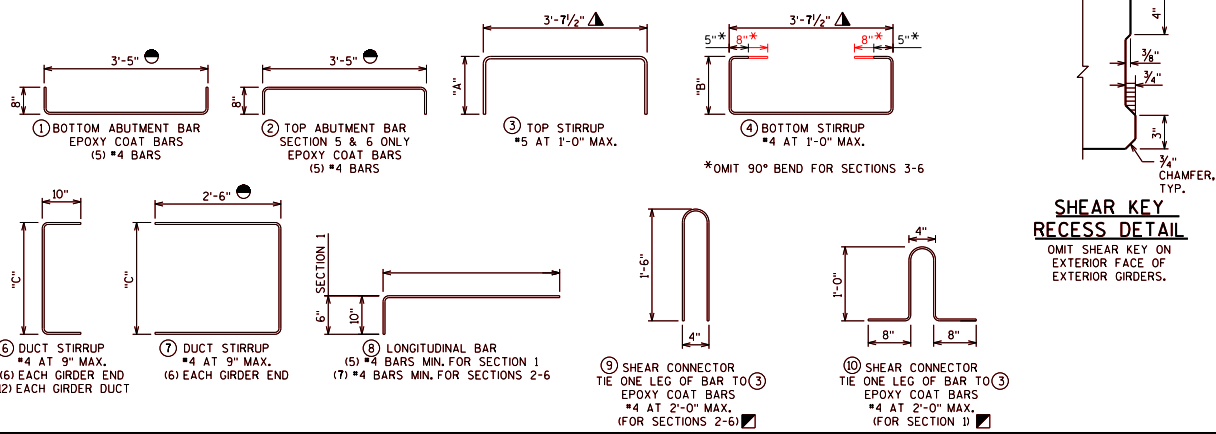
INTERM. STEEL DIAPHS. FOR 36W" PRESTRESSED GIRDERS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-19



4'-0" SECTIONS

REBAR DIMENSION

SECT. DEPTH	SECT. NO.	"A"	"B"	"C"
1'-0"	1	7 1/2"	7 1/2"	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"



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 (1) BAR ON EXTERIOR EDGE OF EXTERIOR GIRDERS. SEE STANDARD 19.56.

SHEAR KEY RECESS DETAIL

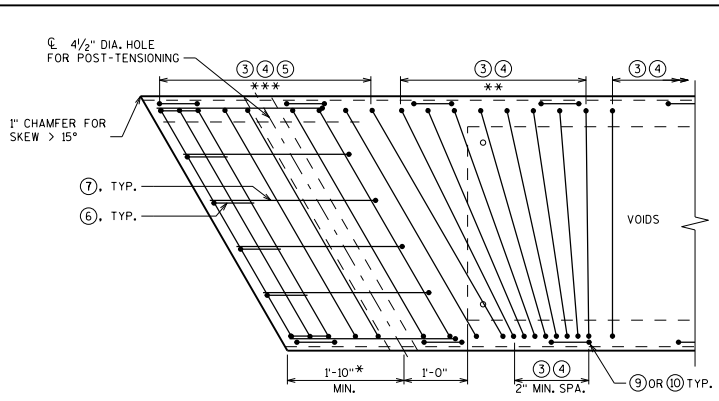
OMIT SHEAR KEY ON EXTERIOR FACE OF EXTERIOR GIRDERS.

4'-0" PRESTRESSED BOX GIRDER SECTIONS

BUREAU OF STRUCTURES

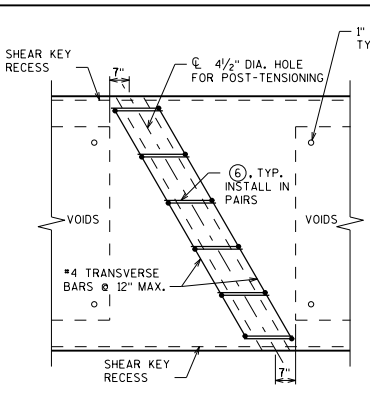
DATE: _____

APPROVED: Bill Oliva

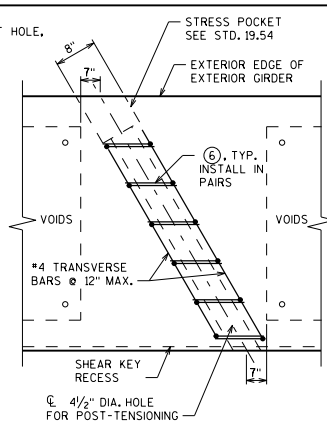


PART GIRDER PLAN WITH SKEW

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



INTERIOR GIRDER DUCT PLAN



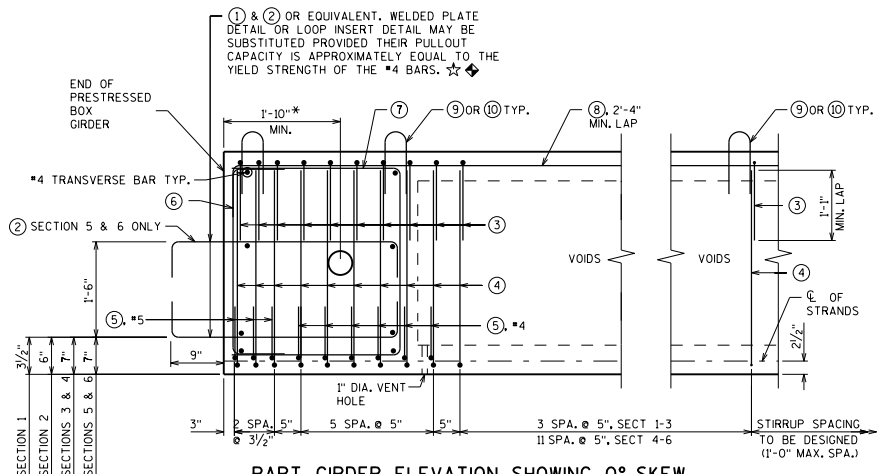
EXTERIOR GIRDER DUCT PLAN

LEGEND

- ☆ BARS NOT REQUIRED WHEN USED ON GRS ABUTMENTS.
- ◆ BARS PLACED PARALLEL TO GIRDERS. SPACING IS PERPENDICULAR TO THE ϵ OF THE GIRDERS.
- * WHEN WINGS ARE PARALLEL TO ABUTMENT ϵ , USE DIMENSIONS TO ALLOW FOR EASE OF POST-TENSIONING OPERATION.
- ** PLACE AT 5" MAX. SPACING UNTIL PERPENDICULAR TO THE ϵ OF THE GIRDER.
- *** PLACE ALONG SKEW FROM END OF PRESTRESSED BOX GIRDER UNTIL ALL END BLOCK BOTTOM STIRRUP BARS, ⑤, ARE PLACED.

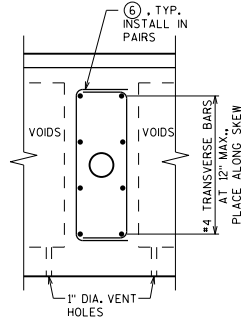
DESIGNER NOTES

FOR BAR BEND DETAILS, SEE STANDARD 19.50 AND STANDARD 19.51
 FOR SKEWED STRUCTURES CAST END OF PRESTRESSED BOX GIRDER ALONG SKEW.

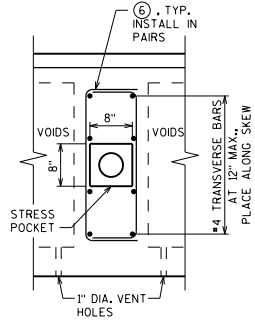


PART GIRDER ELEVATION SHOWING 0° SKEW

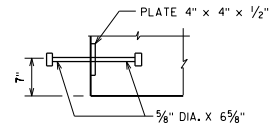
PLACE #4 TRANSVERSE BARS AS SHOWN ALONG SKEW



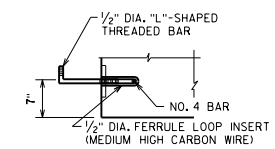
INTERIOR GIRDER DUCT ELEVATION




EXTERIOR GIRDER DUCT ELEVATION

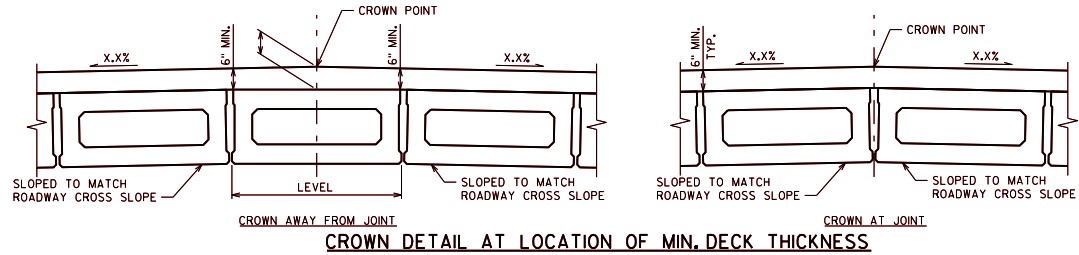
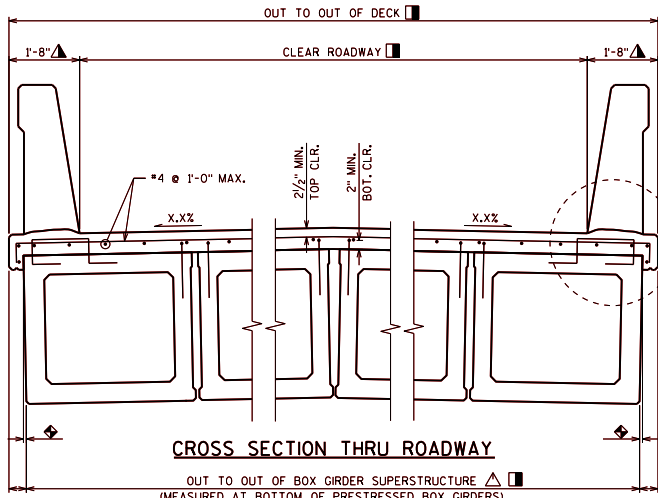


WELDED PLATE DETAIL
 (EQUIVALENT TO ONE #4 BAR)



LOOP INSERT DETAIL

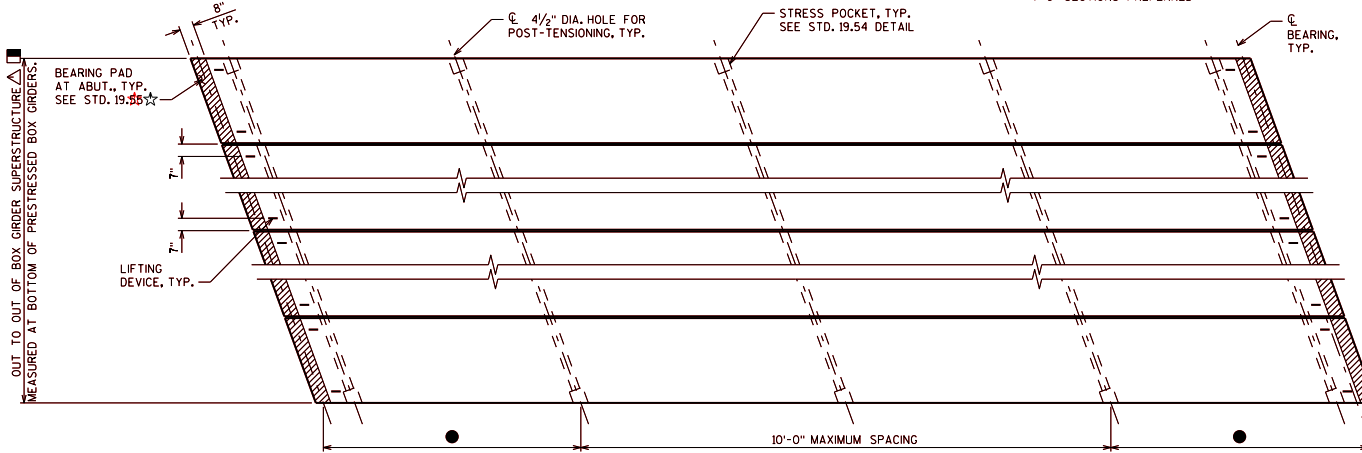
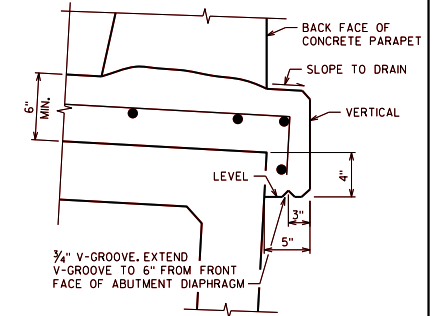
PRESTRESSED BOX GIRDER DETAILS 1	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-17



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



DESIGNER NOTES

▲ ACCOUNT FOR NUMBER OF PRESTRESSED BOX GIRDERS, NUMBER OF JOINTS (AT 1" NORMAL TO CL 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 1/4" MUST BE SUBMITTED BY THE FIELD ENGINEER TO THE STRUCTURES DESIGN SECTION FOR REVIEW.

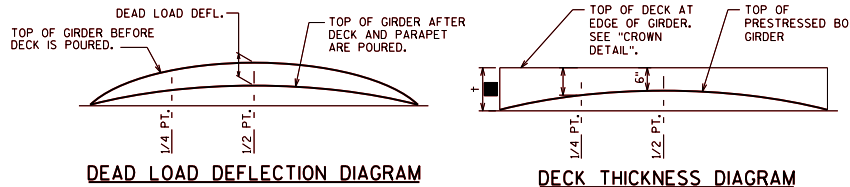
LEGEND

☆ BEARING PAD NOT REQUIRED FOR GRS ABUTMENTS.

● 1/4 SPAN FOR SPANS UP TO 80'-0".
1/5 SPAN FOR SPANS OVER 80'-0".

■ DIMENSION ASSUMES 1" JOINT WIDTH. JOINT WIDTH DIMENSIONS MAY VARY DUE TO ±1/4" 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. 1/4 PT. MAY BE INTERPOLATED. USE FIELD MEASURED GIRDER CAMBER FOR ACTUAL DECK THICKNESS. THE 1/4 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 DEF. (IN.)		CONC. STRENGTH #C (1 PSI)	DIA. OF STRAND (IN.)	UNDRAINED PATTERN	TOTAL NO. OF STRANDS	TOTAL INITIAL PRESTRESS FORCE (KIPS)	f'ci (PSI) *
			1/4 PT.	1/2 PT.						
1										

* MINIMUM CYLINDER STRENGTH OF CONCRETE @ TIME OF TRANSFER OF PRESTRESS FORCE.

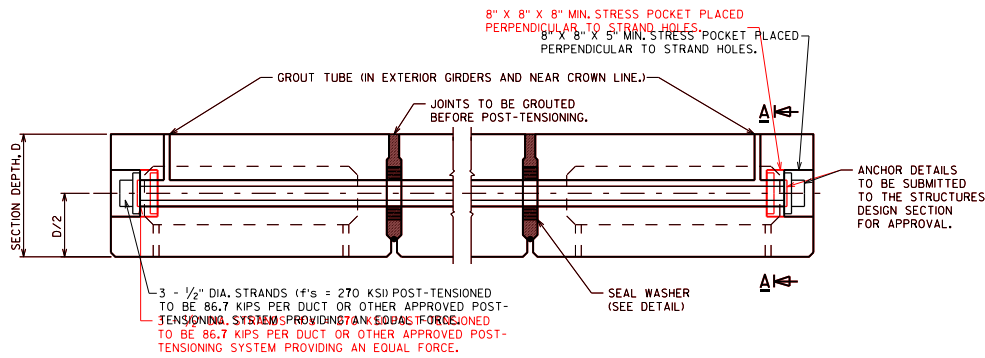
PRESTRESSED BOX GIRDER DETAILS 2



BUREAU OF STRUCTURES

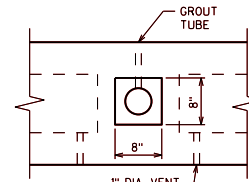
APPROVED: Bill Oliva

DATE: 7-18

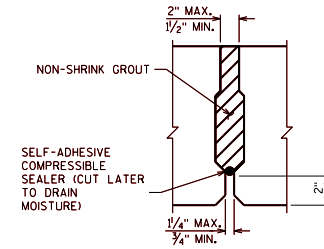


POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM

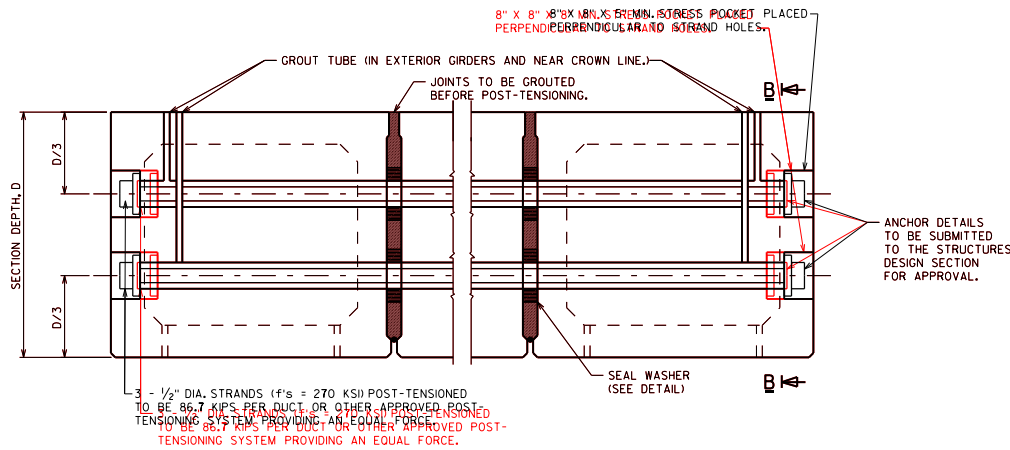
(SECTIONS 1 THROUGH 4)



SECTION A-A

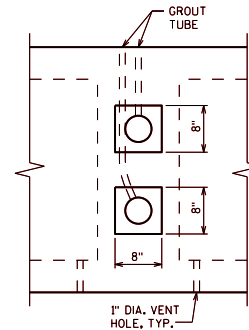


SHEAR KEY DETAIL

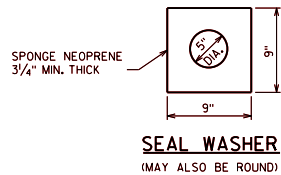


POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM

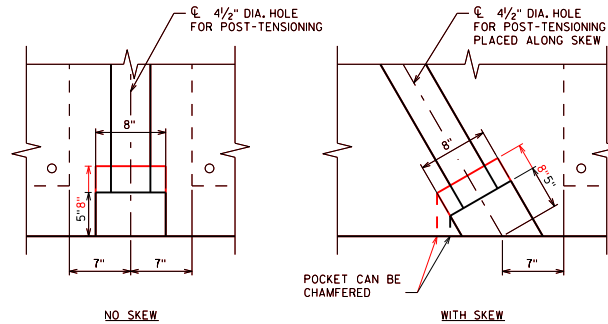
(SECTIONS 5 AND 6)



SECTION B-B



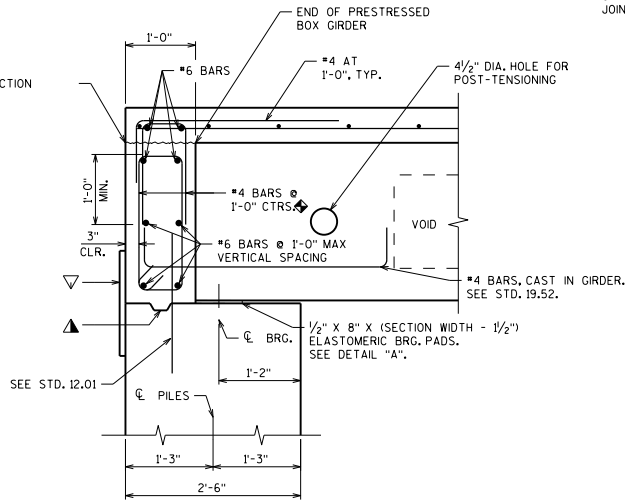
SEAL WASHER
(MAY ALSO BE ROUND)



STRESS POCKET DETAIL

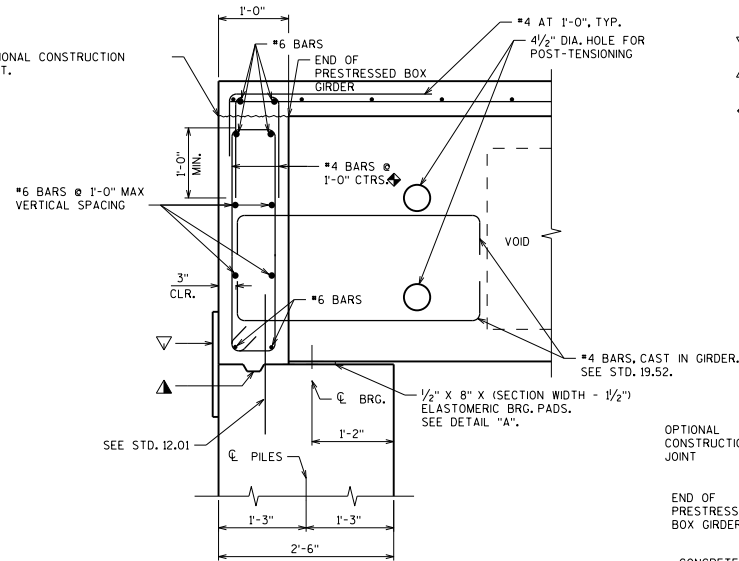
PRESTRESSED BOX GIRDER DETAILS 3	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>T-18</u>

OPTIONAL CONSTRUCTION JOINT.



NO PAVING NOTCH - SECTIONS 1 THROUGH 4

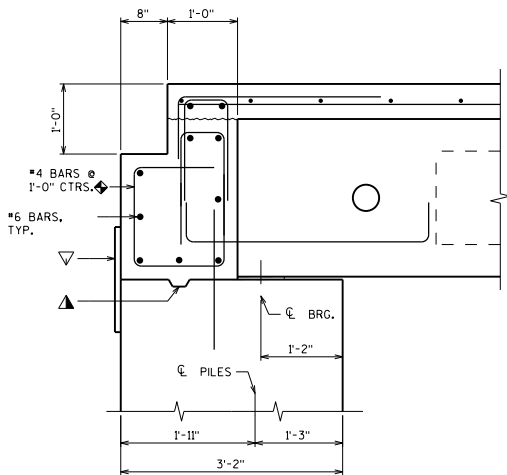
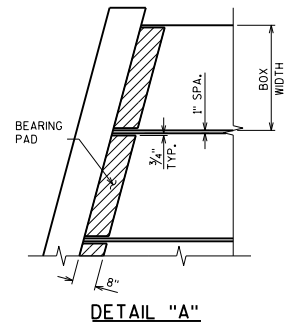
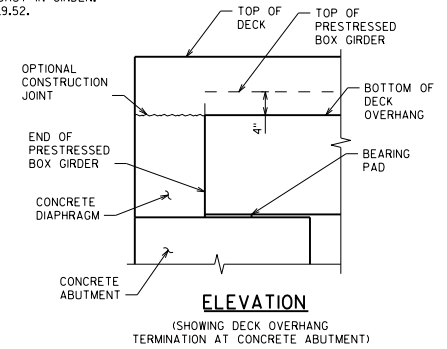
OPTIONAL CONSTRUCTION JOINT.



NO PAVING NOTCH - SECTIONS 5 AND 6

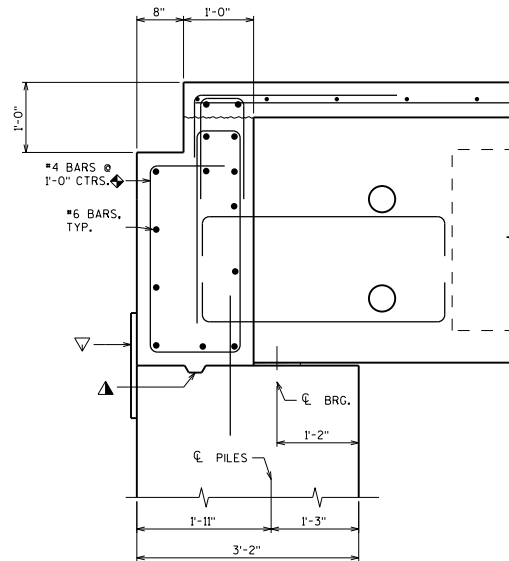
LEGEND

- ▽ 1'-6" RUBBERIZED MEMBRANE WATERPROOFING
- ▲ KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".
- ◆ BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO \bar{C} GIRDERS.



WITH PAVING NOTCH - SECTIONS 1 THROUGH 4

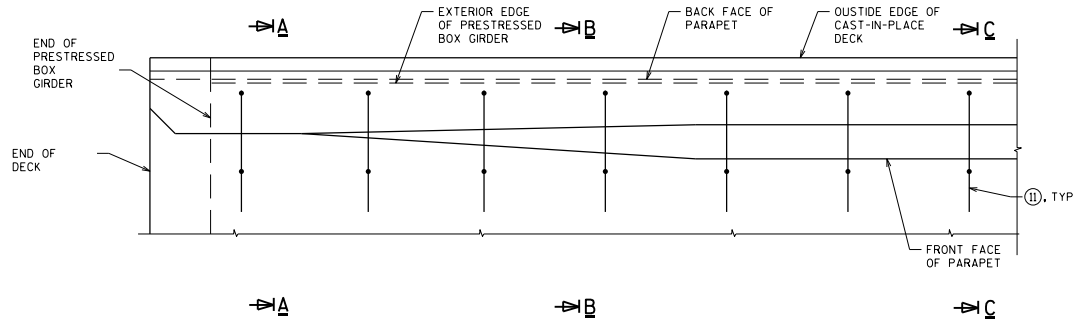
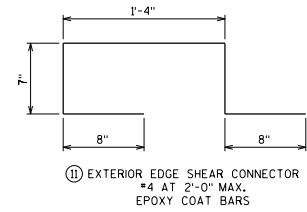
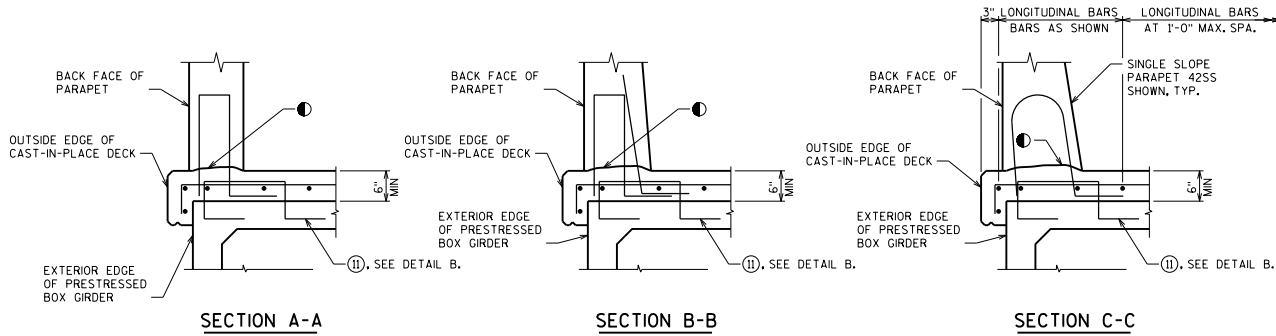
SEE NO PAVING NOTCH - SECTIONS 1 THROUGH 4 DETAIL FOR ADDITIONAL INFORMATION



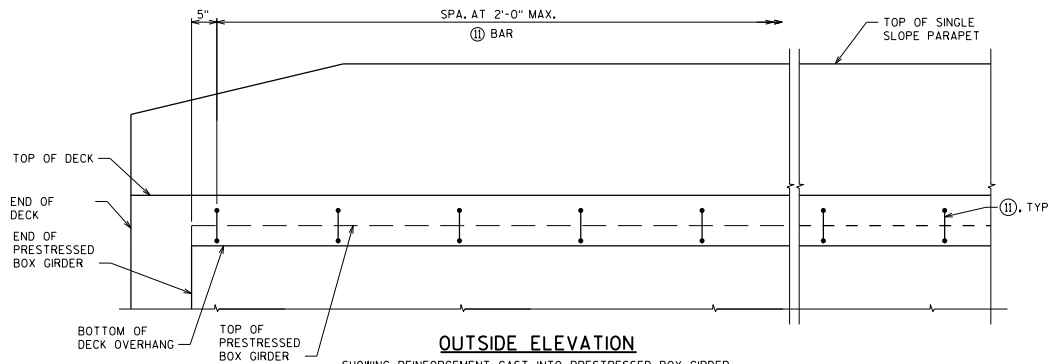
WITH PAVING NOTCH - SECTIONS 5 AND 6

SEE NO PAVING NOTCH - SECTIONS 5 AND 6 DETAIL FOR ADDITIONAL INFORMATION

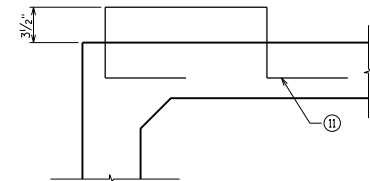
PRESTRESSED BOX GIRDER DETAILS 4	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-16



SHOWING REINFORCEMENT CAST INTO PRESTRESSED BOX GIRDER
PARAPET AND DECK ARE SHOWN FOR CLARITY



SHOWING REINFORCEMENT CAST INTO PRESTRESSED BOX GIRDER
PARAPET AND DECK ARE SHOWN FOR CLARITY



DETAIL B

LEGEND

● CONST. JOINT - STRIKE OFF AS SHOWN.


NOTE

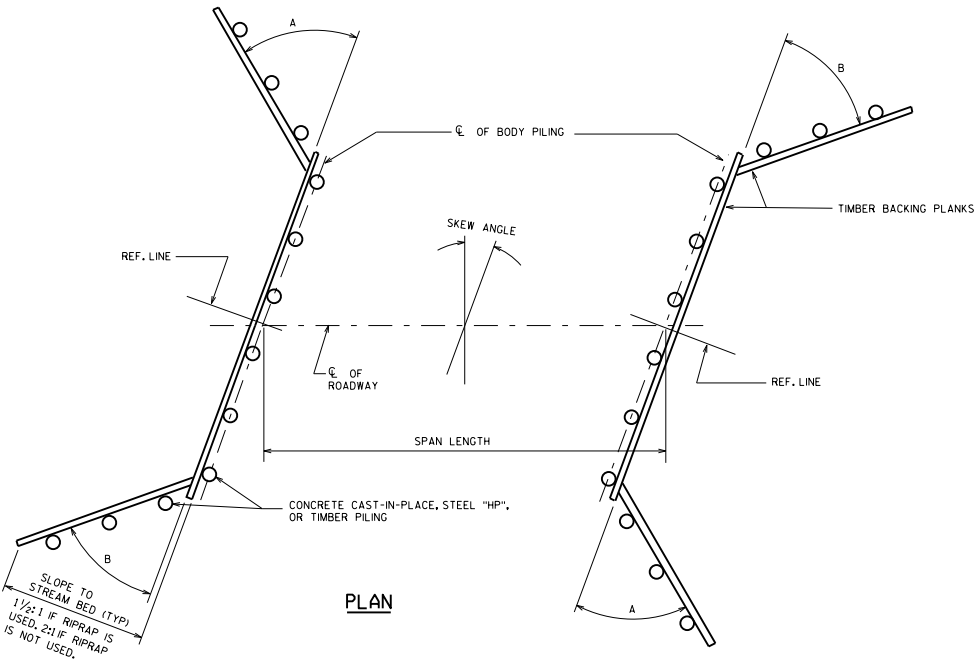
BAR ① TO BE PAID AS PART OF BID ITEM
"PRESTRESSED BOX GIRDER TYPE XX-INCH".

DESIGNER NOTES

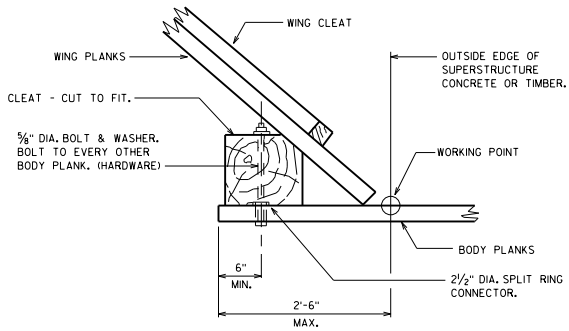
SEE CHAPTER 30 STANDARDS FOR SINGLE SLOPE
PARAPET DETAILS.

DETAILS SHOWN ARE APPLICABLE FOR CONCRETE
ABUTMENTS. DETAILS TO BE MODIFIED FOR GRS
ABUTMENTS.

PRESTRESSED BOX GIRDER DETAILS 5	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-16



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.
- THE 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.


SKREW 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

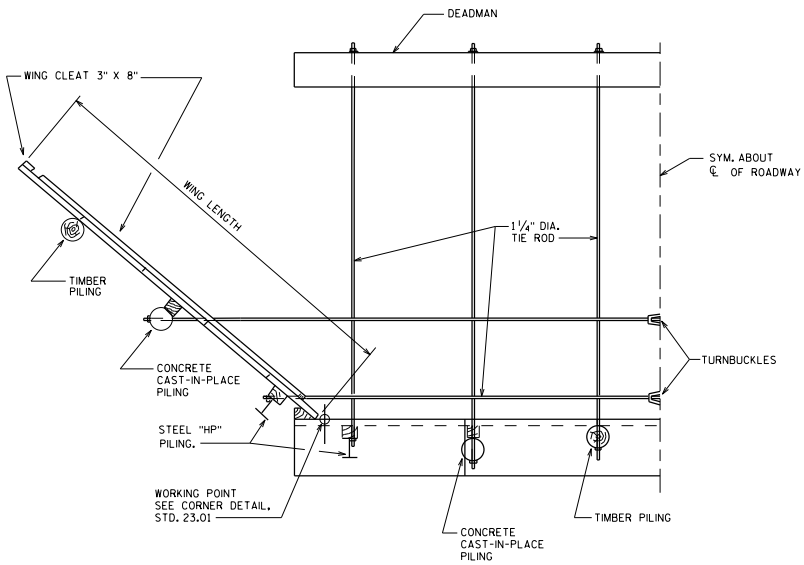
TIMBER ABUTMENTS GENERAL



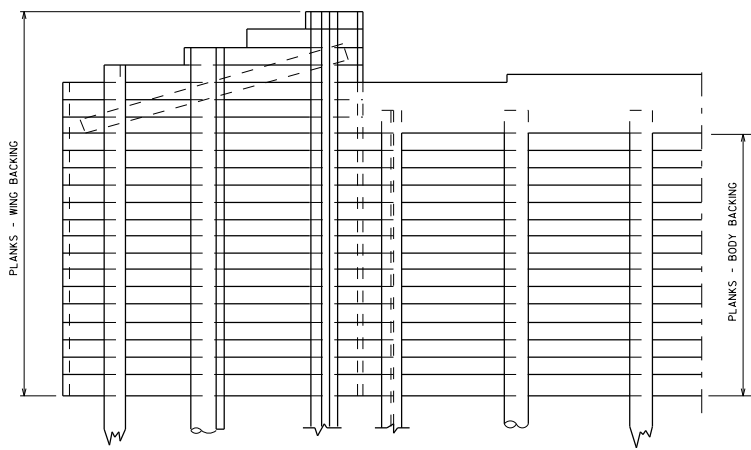
BUREAU OF STRUCTURES

DATE:
7-16

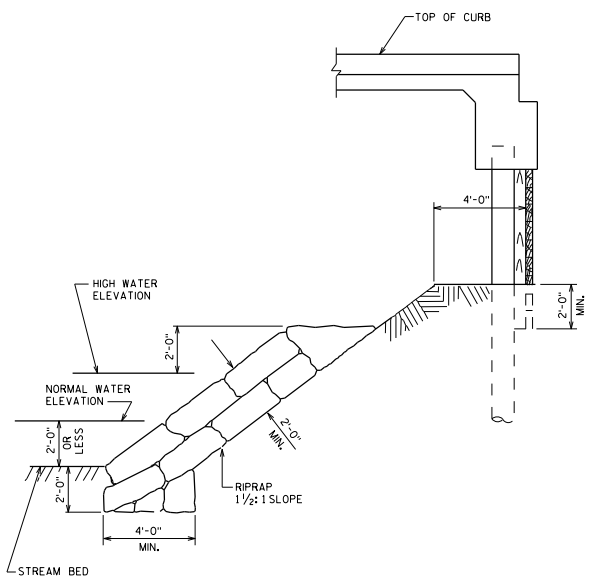
APPROVED: Bill Oliva



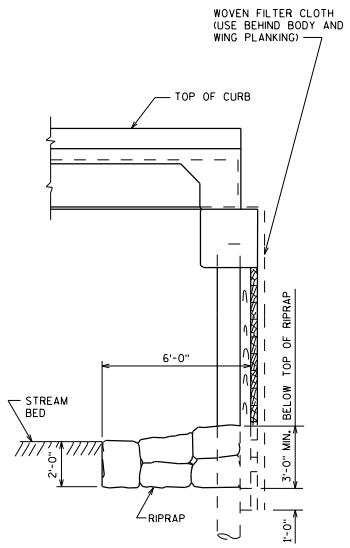
HALF PLAN



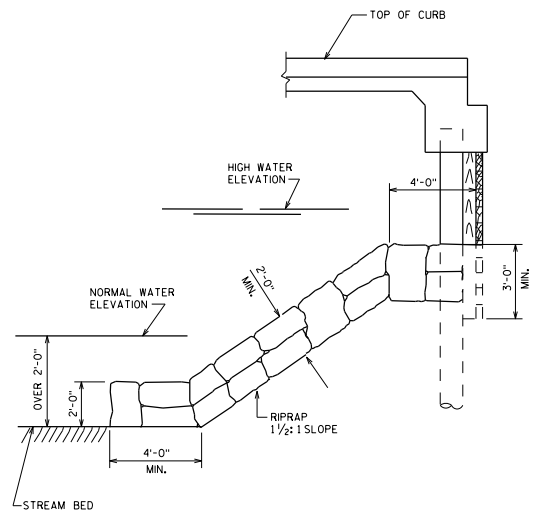
HALF ELEVATION



LONGITUDINAL SECTION WITH BERM
SHOWING TOE OF RIPRAP WHEN WATER IS 2'-0" OR LESS IN DEPTH.

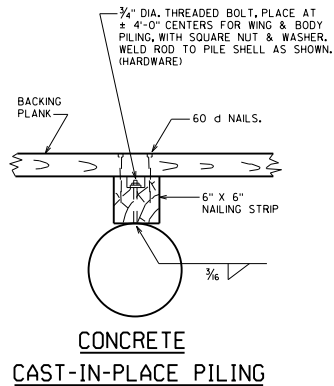


LONGITUDINAL SECTION WITHOUT BERM

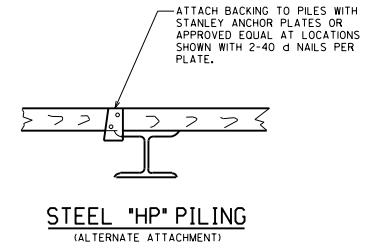
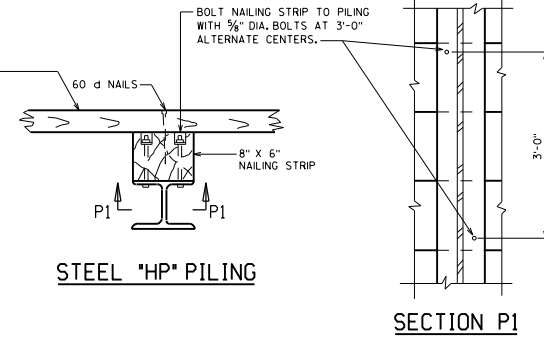
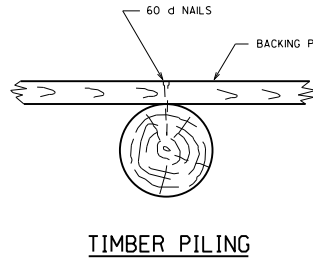


LONGITUDINAL SECTION WITH BERM
SHOWING TOE OF RIPRAP WHEN WATER IS OVER 2'-0" IN DEPTH.

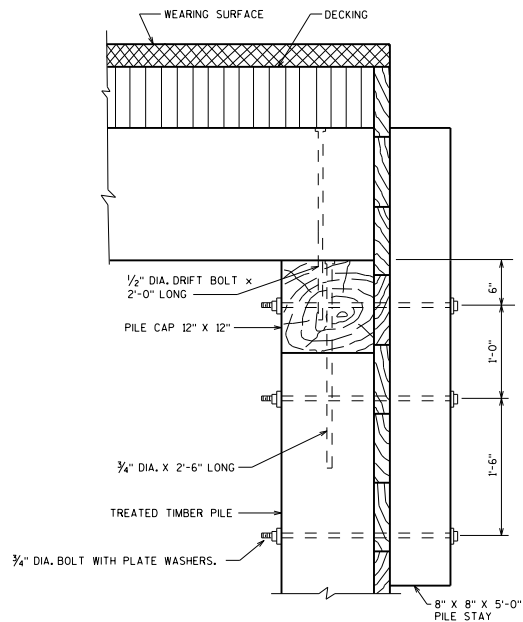
TIMBER ABUTMENT	
	BUREAU OF STRUCTURES
	APPROVED: <i>Bill Oliva</i>
DATE: 7-16	



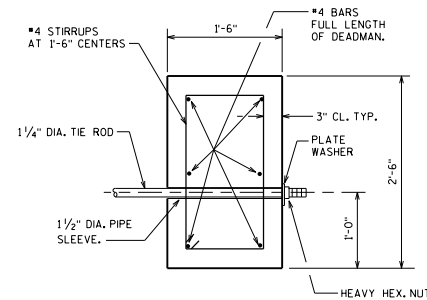
REFER TO STANDARD 1101 FOR SECTION THRU REINFORCED CAST-IN-PLACE PILING WHEN PILES ARE EXPOSED.



BODY & WING PLANK CONNECTION DETAILS



PILE CAP DETAIL
(TIMBER GIRDER)



SECTION THRU DEADMAN

TIMBER ABUTMENT DETAILS

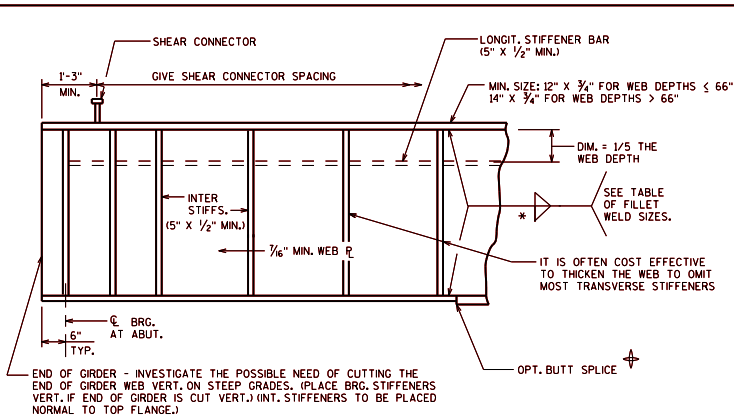


**BUREAU OF
STRUCTURES**

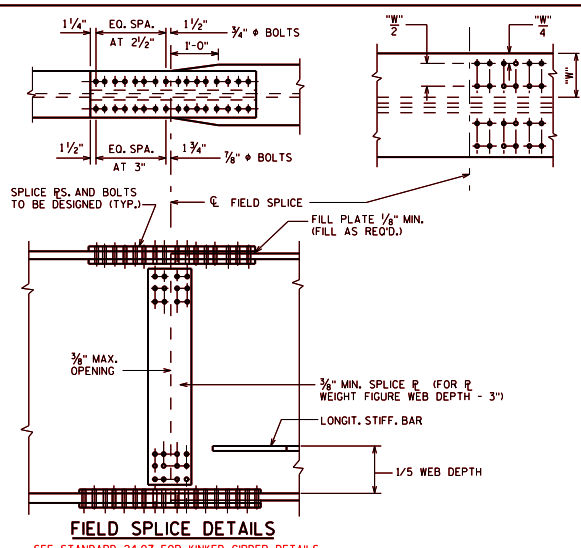
APPROVED: Bill Oliva

DATE:

7-16



PART GIRDER ELEVATION



FIELD SPLICE DETAILS
SEE STANDARD 24.07 FOR KINKED GIRDER 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 CAUSED BY THE FLAME, AND CORNERS CHAMFERED 1/16" MINIMUM.

DESIGNER NOTES

BASE BEAM SEAT ELEVATIONS AT ABUTMENT ON THICKER FLANGE BASE BEAM SEAT ELEVATIONS AT ABUTMENT ON THINNER FLANGE AND DETAIL SHIM PLATES TO ACCOMMODATE THINNER FLANGE.

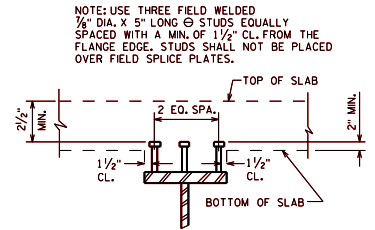
AT EXTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON EXTERIOR FACE OF GIRDER. PLACE LONGIT. TRANSVERSE STIFFENERS ON INTERIOR FACE OF GIRDER. PLACE LONGITUDINAL STIFFENERS ON THE OUTSIDE FACE.

AT INTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON INTERIOR FACE OF GIRDER. PLACE LONGIT. TRANSVERSE STIFFENERS ON ONE SIDE OF GIRDER. INTERMEDIATE TRANSVERSE STIFFENERS ON ONE SIDE WHEN LONGITUDINAL STIFFENERS ARE NOT REQUIRED.

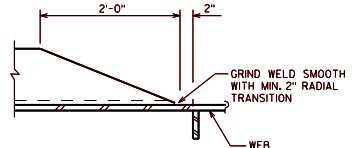
AVOID USE OF LONGITUDINAL STIFFENERS IF PRACTICAL BY THICKENING AND WELDING OF NOMINAL STIFFENERS IF PRACTICAL BY THICKENING WEB. WHERE LONGITUDINAL STIFFENERS ARE USED, RUN THEM CONTINUOUS WITHOUT BREAKS AT CONNECTION STIFFENERS.

AT EXTERIOR GIRDER PLACE INTERMEDIATE STIFFENERS ALONG ENTIRE LENGTH OF GIRDER. PLACE INTERMEDIATE TRANSVERSE STIFFENERS AT EQUAL SPACING ALONG ENTIRE LENGTH OF GIRDER AT MAX. SPACING GOVERNED BY THE DEPTHS OF WEB. SPACE EQUALLY BETWEEN DIAPHRAGM CONNECTION STIFFENERS. THIS SPACING SHALL NOT EXCEED 1/5 OF THE FLANGE WEB DEPTH. THE MAX. SPACING SHALL NOT EXCEED 1/5 OF THE FLANGE WEB DEPTH. THE MAX. SPACING SHALL NOT EXCEED 1/5 OF THE FLANGE WEB DEPTH. THE MAX. SPACING SHALL NOT EXCEED 1/5 OF THE FLANGE WEB DEPTH.

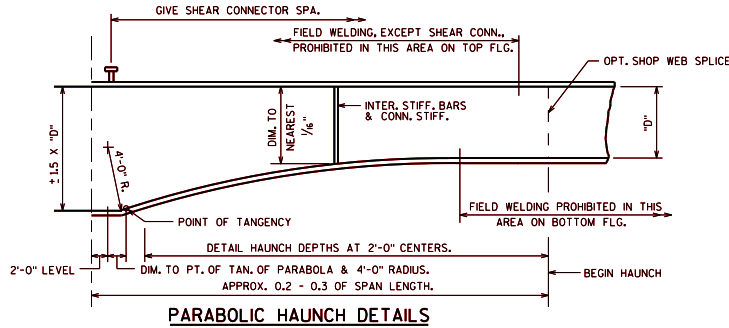
SEE STANDARD 40.07 FOR CONNECTING ANY NEW STIFFENERS TO EXISTING GIRDERS.



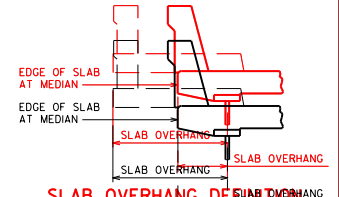
SHEAR CONN. DETAILS



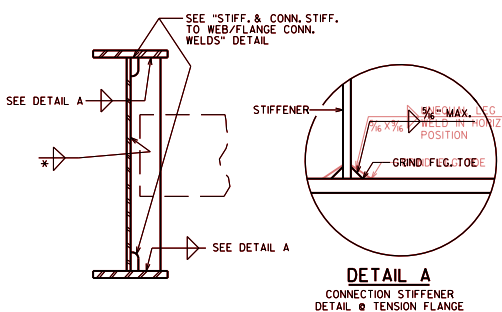
LONGIT. STIFF. TERMINATION



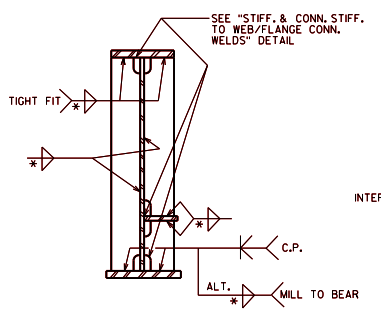
PARABOLIC HAUNCH DETAILS



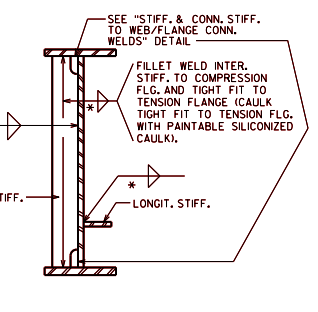
SLAB OVERHANG DEFINITION



CONNECTION STIFF. DETAILS



BRG. STIFF. DETAILS TYP. AT ABUT. & PIER

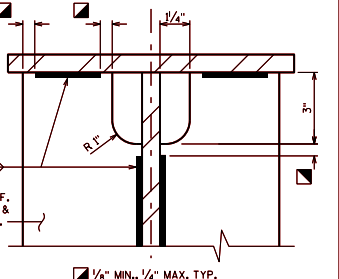


INTERMEDIATE & LONGITUDINAL STIFF. DETAILS (ALL GIRDERS)

*** 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 3/16"

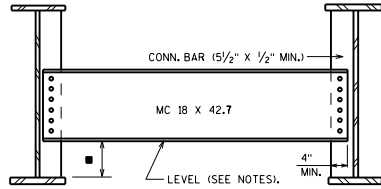


STIFF. & CONN. STIFF. TO WEB/FLANGE CONN. WELDS

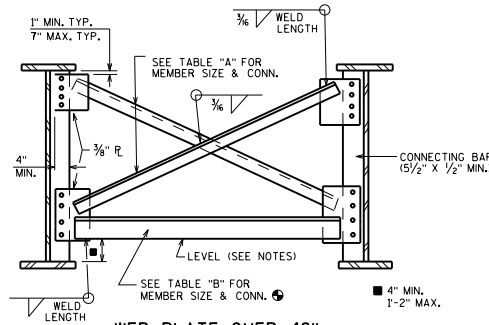
PLATE GIRDER DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-18



WEB PLATE < 48"
TYP. IN SPAN & AT PIER



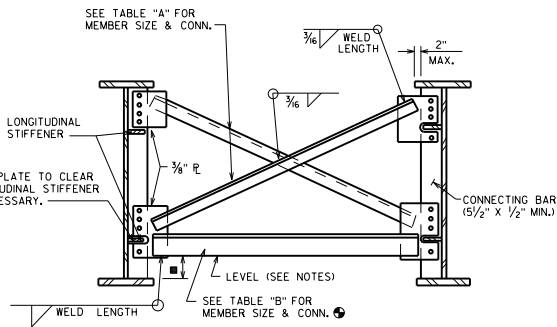
WEB PLATE OVER 48"
TYP. IN SPAN & AT PIER

TABLE "A"

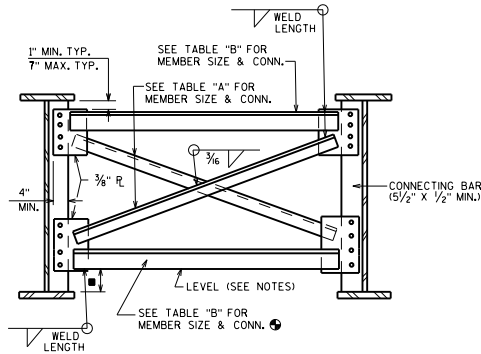
SIZE	MAX. LENGTH OF MEMBER	WELD LENGTH	NO. OF 3/4" Ø BOLTS	WEIGHT PER FT.
L 3 1/2 x 3 1/2 x 5/16	21'-6"	9"	4	7.2*
L 4 x 4 x 5/16	25'-0"	11"	4	8.2*
L 5 x 5 x 5/16	31'-0"	14"	5	10.3*

TABLE "B"

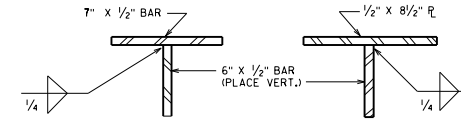
SIZE	MAX. LENGTH OF MEMBER	WELD SIZE	WELD LENGTH	NO. OF 3/4" Ø BOLTS	WEIGHT PER FT.
L 5 x 5 x 5/16	11'-6"	1/4"	11"	4	10.3*
L 6 x 6 x 5/16	13'-6"	5/16"	13"	6	14.9*
1/2" T SECTION SEE DETAIL "A"	17'-6"	5/16"	14"	7	16.6*
1/2" T SECTION SEE DETAIL "B"	22'-0"	5/16"	13"	7	18.5*



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



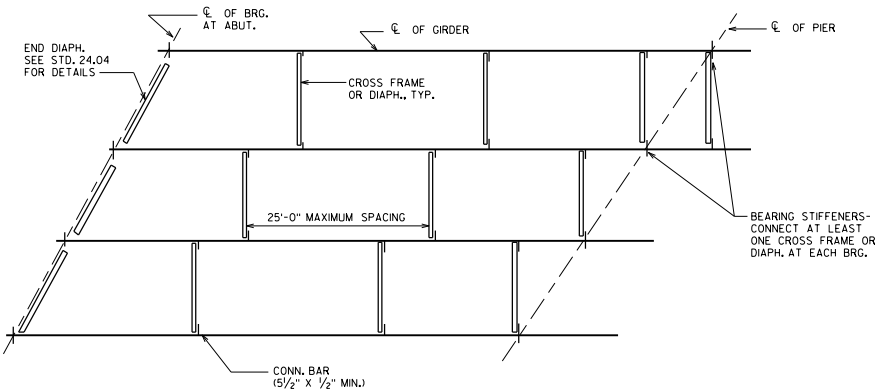
NOTE: WT 6 x 25 MAY BE SUBSTITUTED FOR DETAIL "A" OR "B"

NOTES

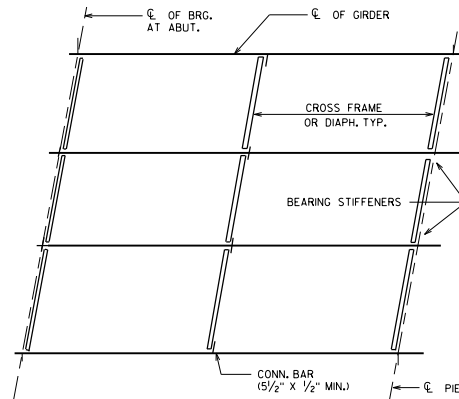
- ALL BOLTED CONNECTIONS SHALL BE FRICTION TYPE USING 3/4" Ø HIGH STRENGTH ASTM A325 BOLTS WITH DOUBLE WASHERS.
- DIAPHRAGMS OR LOWER CROSS FRAME MEMBERS ARE SLOPED WHEN DIFFERENCE IN ADJACENT BOTTOM FLANGE ELEVATIONS EXCEEDS 6". HOLD 8" FROM TOP OF ADJACENT BOTTOM OF DIAPHRAGMS OR LOWER CROSS FRAME 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 5/16" 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°

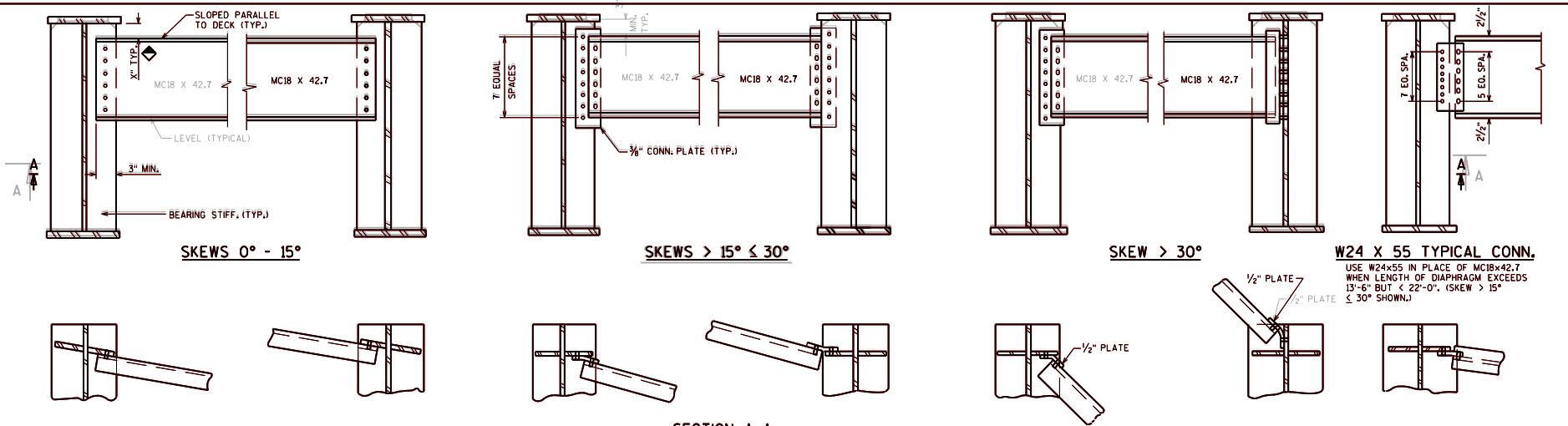


FRAMING PLAN FOR SKEW ≤ 15°

PLATE GIRDER DIAPHRAGMS AND CROSS FRAMES

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-15



SECTION A-A
END DIAPHRAGM CONNECTIONS - WEB DEPTHS ≤ 48"

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.)

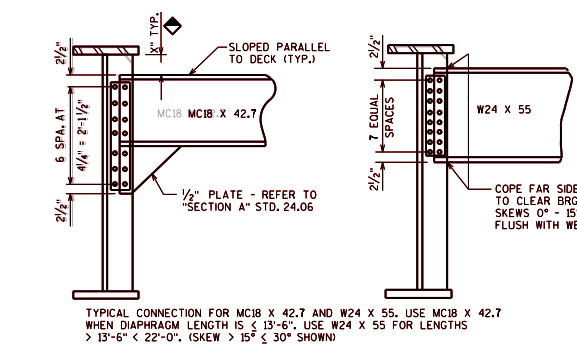
NOTES
 ALL BOLTED CONNECTIONS SHALL BE FRICTION TYPE USING 3/4" DIA. HIGH STRENGTH ASTM A325 BOLTS WITH DOUBLE WASHERS.

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.

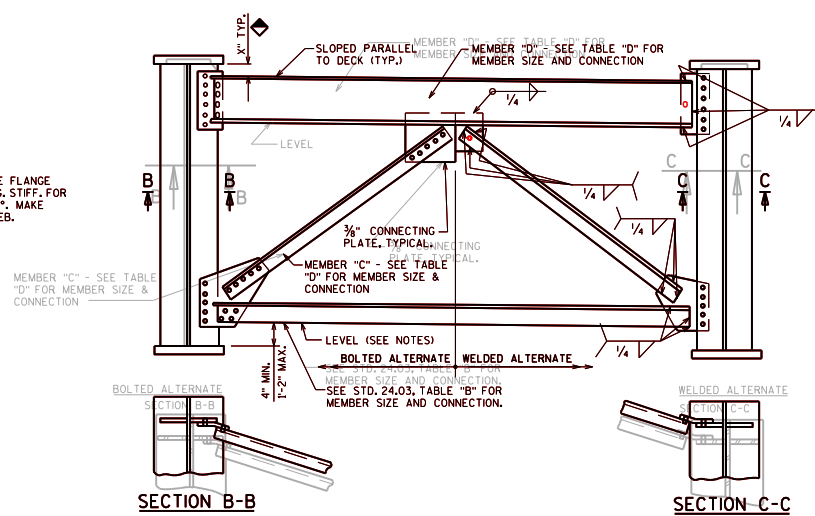
LOWER CROSS FRAME MEMBERS THAT ARE LEVEL SHALL BE PLACED 4" ABOVE THE TOP OF THE HIGHER BOTTOM FLANGE OF ADJACENT GIRDERS.

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 ACCOMMODATE LARGE EXPANSION DEVICES.



END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 48" ≤ 60"



END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 60"
 SKEWS > 15° ≤ 30° SHOWN

NOTES
 ALL BOLTED CONNECTIONS SHALL BE FRICTION TYPE MADE WITH 3/4" DIA. HIGH STRENGTH ASTM A325 BOLTS.

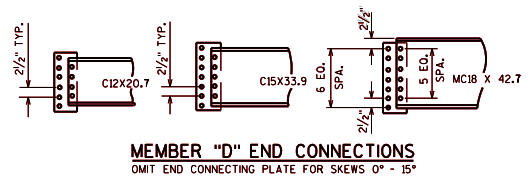
DESIGNER NOTES
 SEE STANDARD 24.02 FOR BEARING STIFFENER COPE & WELD DETAILS.

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.

TABLE "D"

MEMBER "C"	WEB DEPTH									MEMBER "D"	MEMBER "D" CONN.	
	5'-0" - 6'-6"			6'-6" - 7'-6"			7'-6" - 8'-9"				NO. OF 3/4" DIA. BOLTS	MEMBER "D" SIZE
MAXIMUM LENGTH	MEMBER "C" SIZE	NO. OF 1/2" DIA. BOLTS	LENGTH OF 1/2" WELD	MEMBER "C" SIZE	NO. OF 3/4" DIA. BOLTS	LENGTH OF 1/2" WELD	MEMBER "C" SIZE	NO. OF 3/4" DIA. BOLTS	LENGTH OF 1/2" WELD	CONN. PLATE TO BRG. STIFF.		
11'-6"	4 x 4 x 3/8	5	13	4 x 4 x 3/8	5	12	4 x 4 x 3/8	5	11	C12 X 20.7	6 @ 2 1/2"	4 @ 2 1/2"
13'-6"	5 x 5 x 3/8	6	17	5 x 5 x 3/8	6	16	5 x 5 x 3/8	6	15	C12 X 20.7	6 @ 2 1/2"	4 @ 2 1/2"
17'-6"	6 x 6 x 3/8	8	20	5 x 5 x 3/8	7	18	5 x 5 x 3/8	6	16	C15 X 33.9	7 @ 2 1/2"	5 @ 2 1/2"
22'-0"	6 x 6 x 3/8	9	23	6 x 6 x 3/8	8	21	6 x 6 x 3/8	7	19	MC18 X 42.7	7 @ 2 1/2"	6 @ 2 1/2"

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: 7-21

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"	CB X 11.5

NOTES

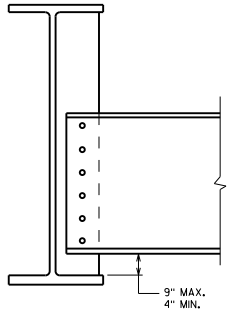
DIAPHRAGMS SHALL BE HORIZONTAL EXCEPT WHEN THE DIFFERENCE IN ADJACENT GIRDER ELEVATIONS IS OF A MAGNITUDE THAT NECESSITATES SLOPING THE DIAPHRAGMS.

WHEN DIAPHRAGMS ARE SLOPED, PLACE CENTER OF DIAPHRAGM AT MID-DEPTH OF GIRDER.

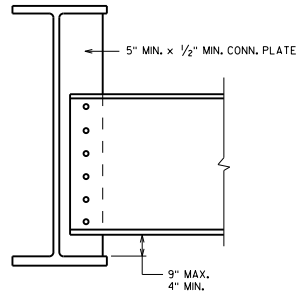
ALL BOLTED CONNECTIONS SHALL BE MADE WITH $\frac{3}{4}$ " ϕ HIGH STRENGTH ASTM A325 BOLTS.

DESIGNER NOTES

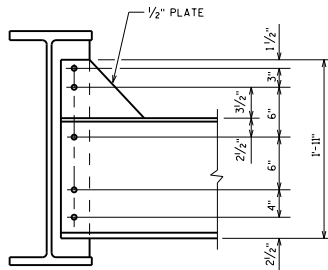
SEE STANDARD 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.



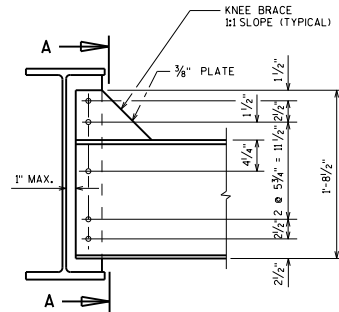
36" W. GIRDER



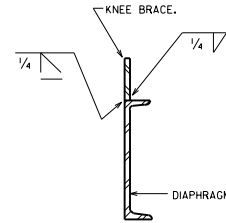
33" W. GIRDER



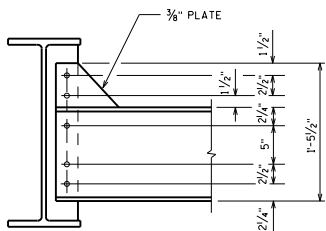
30" W. GIRDER



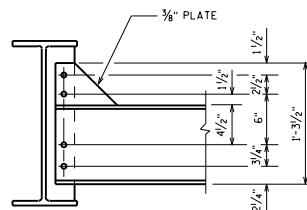
27" W. GIRDER



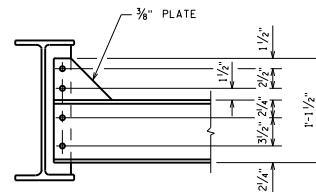
SECTION A



24" W. GIRDER



21" W. GIRDER



18" W. GIRDER

ROLLED GIRDER DIAPHRAGMS

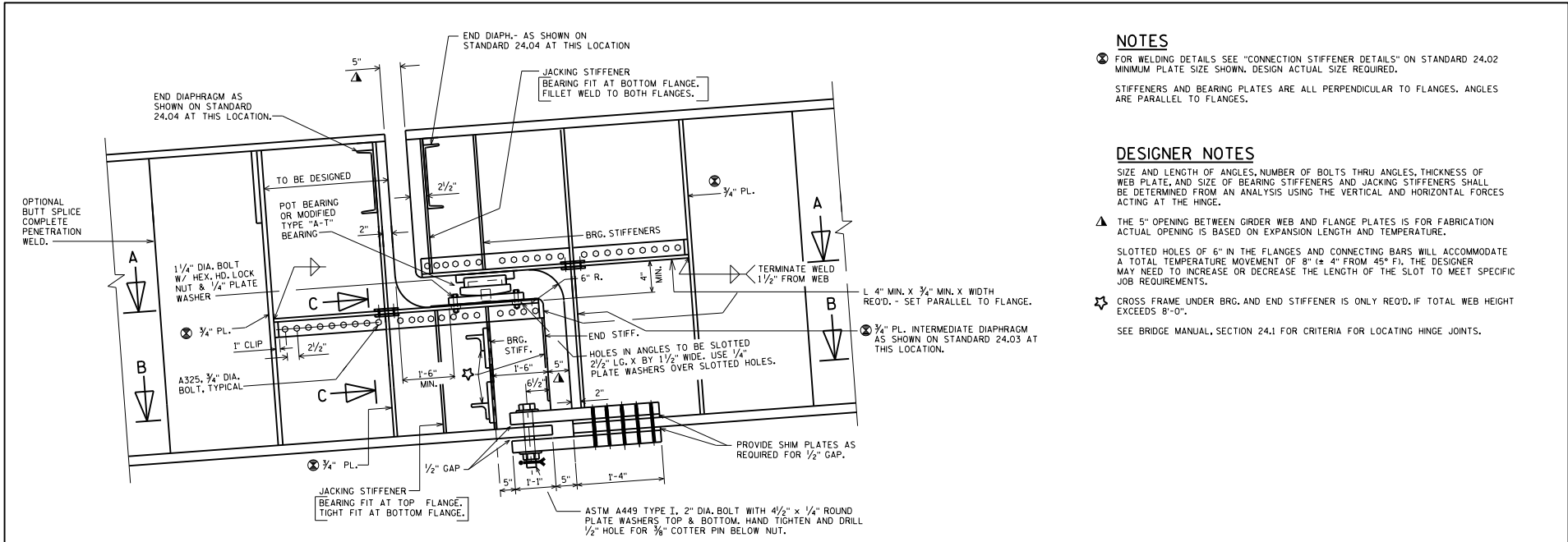


BUREAU OF STRUCTURES

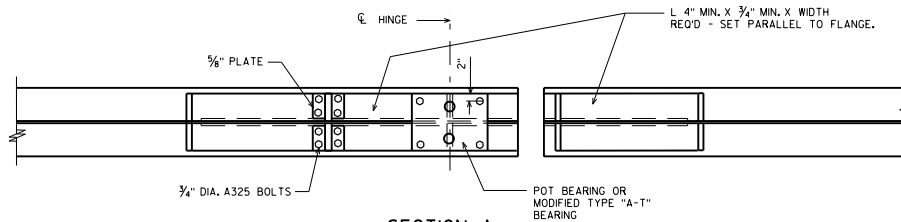
APPROVED: *Bill Oliva*

DATE:

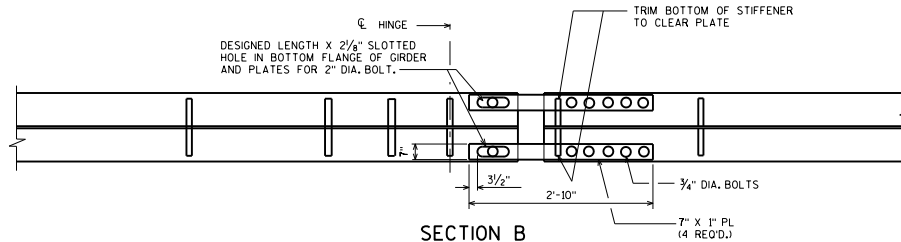
7-15



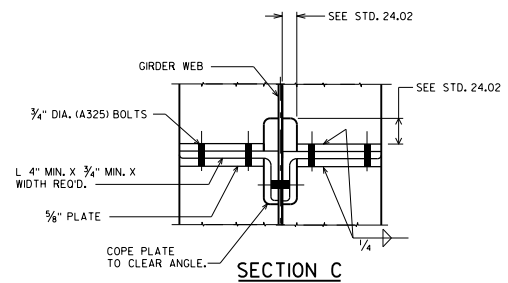
ELEVATION



SECTION A



SECTION B



SECTION C

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.

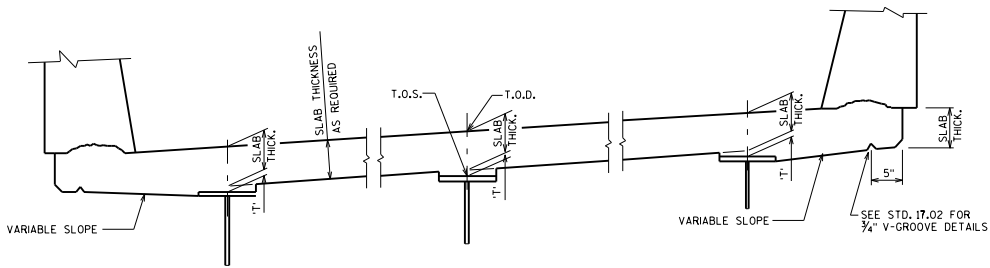
⊠ THE 5" OPENING BETWEEN GIRDER WEB AND FLANGE PLATES IS FOR FABRICATION. ACTUAL OPENING IS BASED ON EXPANSION LENGTH AND TEMPERATURE.

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.

EXPANSION HINGE JOINT DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-16



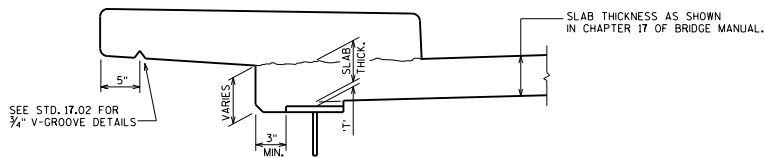
SECTION THRU SLAB

DESIGNER NOTES

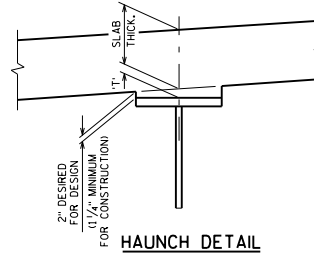
HAUNCH HEIGHTS WILL NORMALLY BE MADE 2" AT EDGE OF GIRDER, AT ABUTMENTS, HINGES, AND FIELD SPLICES.
 HAUNCH DEPTH VARIATIONS NEED NOT BE SHOWN ON THE PLANS.
 IF HAUNCH VARIATIONS EXCEED 3/4", THE GIRDER SHALL BE CAMBERED TO REDUCE THE VARIATIONS IN HAUNCH THICKNESS.

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

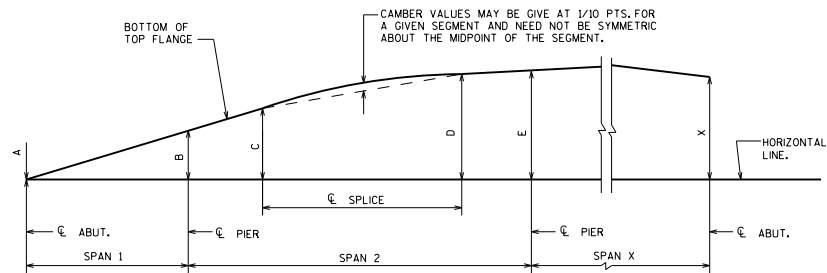


HAUNCH DETAIL

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.

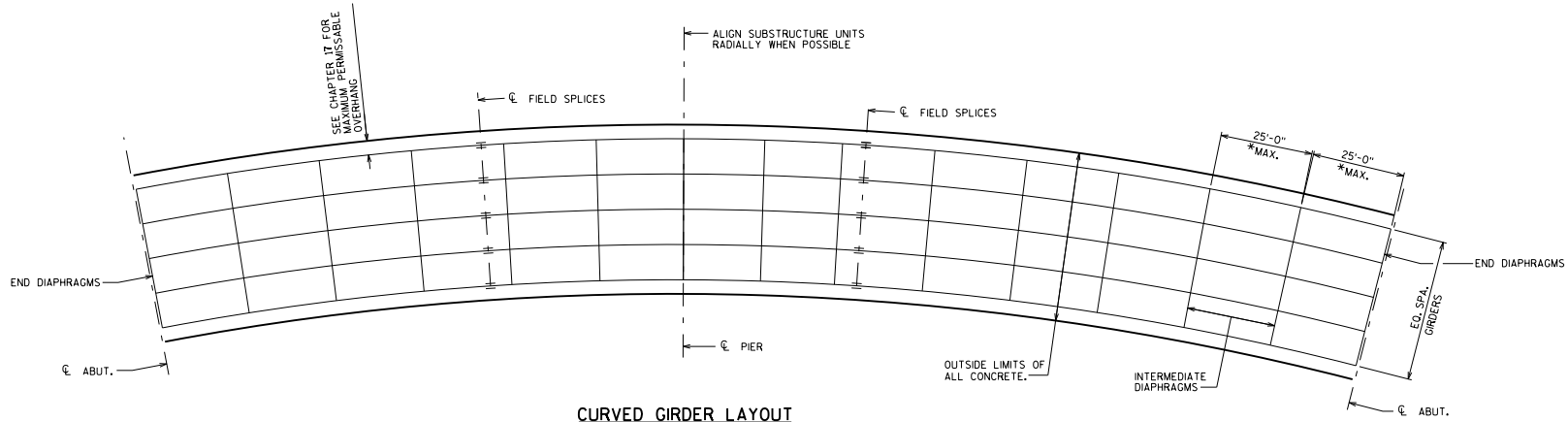


BLOCKING DIAGRAM

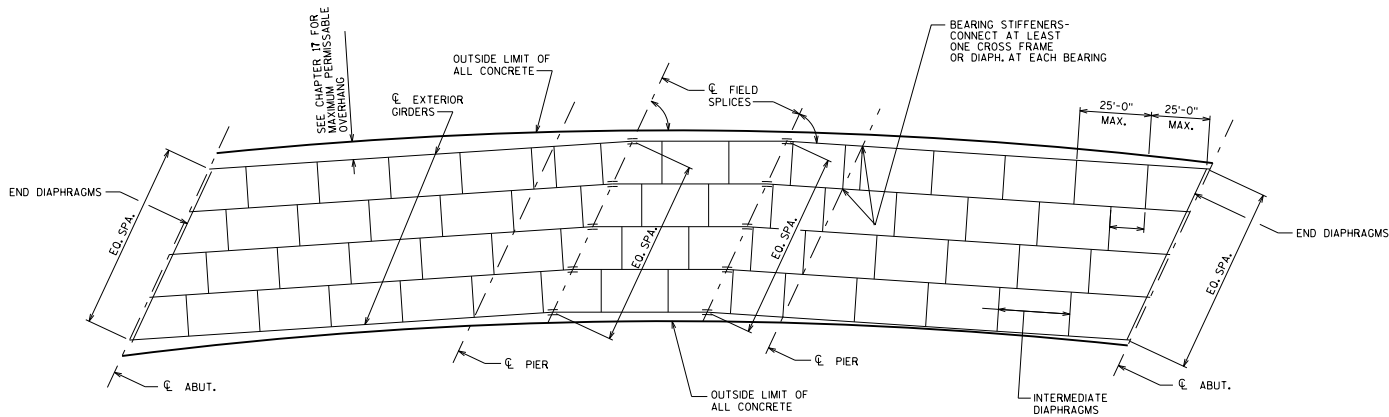
BLOCKING & SLAB HAUNCH DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-12



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 \ominus OF SUBSTRUCTURE UNITS AND \ominus 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

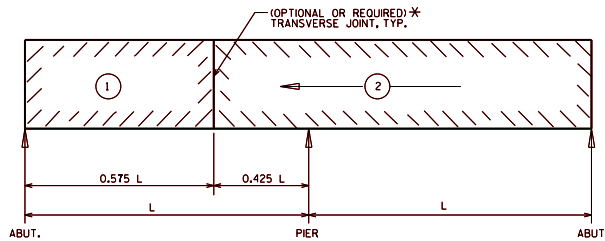
GIRDER LAYOUT ON CURVE



BUREAU OF STRUCTURES

APPROVED: Scot Becker

DATE:
7-10



IDEAL DECK POUR SEQUENCE
(CONTINUOUS STEEL GIRDER - 2 SPANS SHOWN)

② INDICATES POUR NUMBER AND DIRECTION OF POUR

S = TOTAL NUMBER OF SPANS
L = LENGTH OF END SPAN

n = $\frac{\text{INTERIOR SPAN}}{\text{END SPAN}}$

NOTES

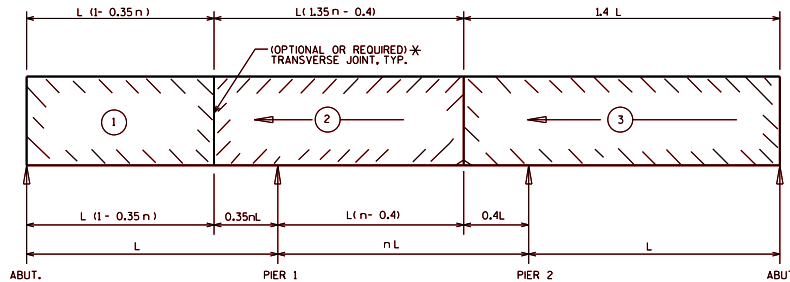
THE RATE OF PLACING CONCRETE SHALL EQUAL OR EXCEED 1/2 SPAN LENGTH PER HOUR BUT NEED NOT EXCEED 100 CU. YDS. PER HOUR. (REQUIRED ONLY FOR CONTINUOUS STEEL GIRDERS.)

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.

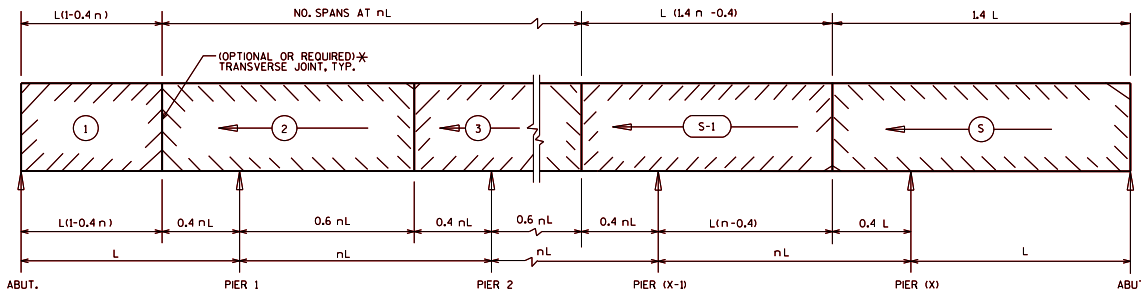
THE NEXT DECK POUR CAN BE MADE NO LESS THAN 72 HOURS AFTER THE PREVIOUS POUR.

THE CONTRACTOR MAY SUBMIT AN ALTERNATE POURING SEQUENCE SUBJECT TO THE APPROVAL OF THE STRUCTURES DESIGN SECTION.
(NOTE: APPLICABLE WHEN OPTIONAL TRANSVERSE CONSTRUCTION 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 CONSTRUCTION JOINTS ARE SHOWN)



IDEAL DECK POUR SEQUENCE
(CONTINUOUS STEEL GIRDER - 3 SPANS SHOWN)



IDEAL DECK POUR SEQUENCE
(CONTINUOUS STEEL GIRDER - ANY NUMBER OF SPANS SHOWN)

DESIGNER NOTES

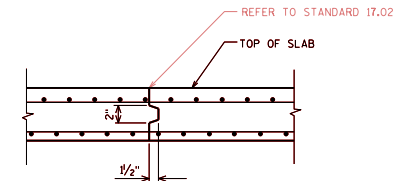
* THE DESIGNER SHALL DETERMINE IF TRANSVERSE JOINTS ARE OPTIONAL OR REQUIRED.

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.

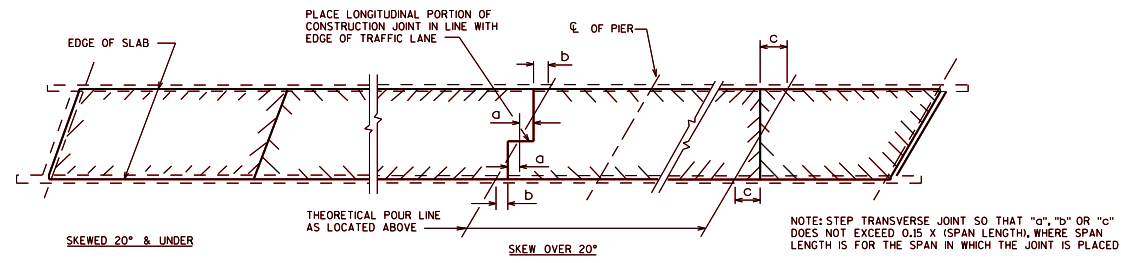
REQUIRED TRANSVERSE CONSTRUCTION JOINTS SHALL BE DETAILED ON THE PLANS ONLY WHEN REQUIRED BY DESIGN. SEQUENTIAL STAGES ARE DISCUSSED IN SECTION 24.12.2. ALL PLACEMENT REQUIREMENTS SHALL BE NOTED ON THE PLANS.

DETAIL TRANSVERSE CONSTRUCTION JOINTS 5'-0" FROM C 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 THE DECK IS GREATER THAN 20 FEET, THE LONGITUDINAL CONSTRUCTION JOINT SHALL BE DETAILED. FOR DECK WIDTHS BETWEEN 20 AND 30 FEET, THE LONGITUDINAL CONSTRUCTION JOINT SHALL BE DETAILED. EDGE OF DECK SHALL BE DETAILED 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 UP HILL. AN ALTERNATE POURING SEQUENCE IS TO POUR THE DL POSITIVE MOMENT AREAS FIRST, THEN POSITIVE MOMENT AREAS, THEN POSITIVE MOMENT AREAS AND THEN NEGATIVE MOMENT AREAS. THE SEQUENCE MAY BE STARTED ANYWHERE ON THE BRIDGE.

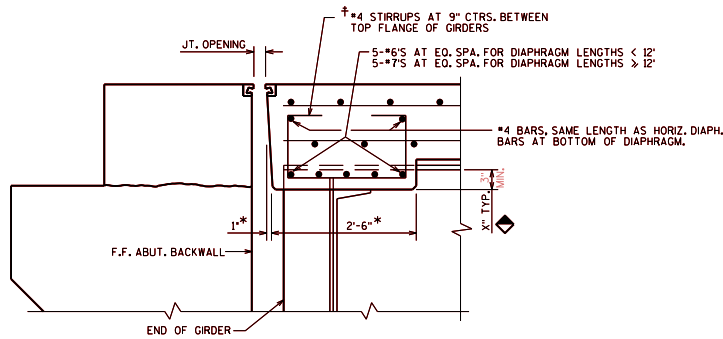


SECTION THRU TRANSVERSE OR LONGITUDINAL JOINT



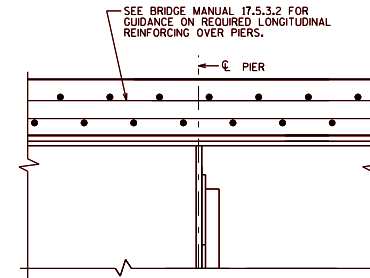
PLAN VIEW - SHOWING PLACEMENT OF TRANSVERSE CONSTRUCTION JOINTS

SLAB POURING SEQUENCE	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-19</u>

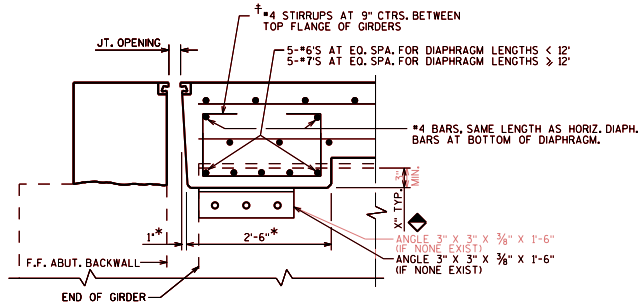


SECTION THRU EXPANSION END

DIAPHRAGM TO EXTEND TO GIRDER WEB
(SEE PART TRANSVERSE SECTION AT DIAPHRAGM
EXPANSION END FOR TYPICAL EXTENTS)

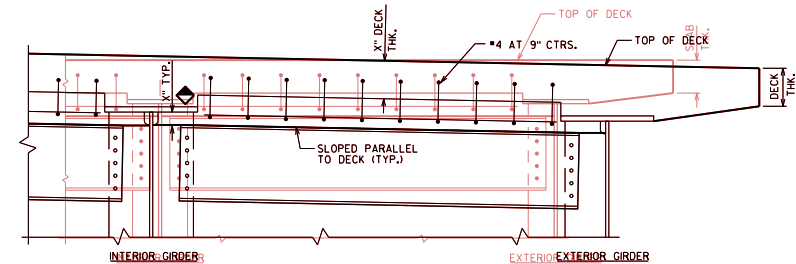


SECTION AT PIER



**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 3/4" DIA. ALL BOLTS, NUTS AND WASHERS SHALL BE
ASTM/A325 TYPE 1 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 C GIRDERS.

* DIMENSION IS TAKEN NORMAL TO C ABUTMENT

**STEEL GIRDER SLAB &
SUPERSTRUCTURE DETAILS**



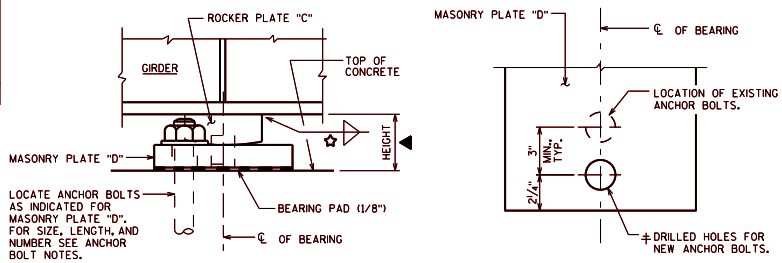
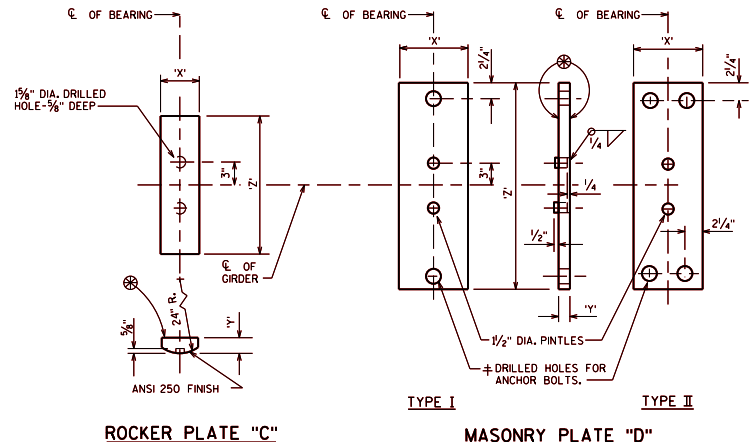
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:

1-18

LENGTH OF PLATE "C"	TOTAL LOAD KIPS	PLATE C			PLATE D			HEIGHT FEET
		X	Y	Z	X	Y	Z	
10"	215	5"	2 3/4"	10"	8"	1 3/4"	1'-7"	0.354
	260	5"	2 3/4"	1'-0"	9"	1 3/4"	1'-9"	0.354
12"	280	5"	2 3/4"	1'-0"	10"	2 3/4"	1'-9"	0.406
	280	5"	1 3/4"	1'-2"	9"	1 3/4"	1'-11"	0.318
14"	335	5"	2 3/4"	1'-2"	11"	2 3/4"	1'-11"	0.406
	385	5"	2 3/4"	1'-2"	1'-1"	2 3/4"	1'-11"	0.448
	410	5"	2 3/4"	1'-2"	1'-3"	2 3/4"	2'-0"	0.448
	275	5"	1 3/4"	1'-4"	8"	1 3/4"	2'-1"	0.318
16"	330	5"	1 3/4"	1'-4"	10"	2 3/4"	2'-1"	0.370
	390	5"	2 3/4"	1'-4"	1'-0"	2 3/4"	2'-1"	0.406
	465	5"	2 3/4"	1'-4"	1'-2"	2 3/4"	2'-2"	0.448
	490	5"	2 3/4"	1'-4"	1'-4"	3 3/4"	2'-2"	0.490
18"	325	5"	1 3/4"	1'-6"	9"	1 3/4"	2'-3"	0.318
	390	5"	1 3/4"	1'-6"	11"	2 3/4"	2'-3"	0.370
	465	5"	2 3/4"	1'-6"	1'-1"	2 3/4"	2'-4"	0.448
	495	5"	2 3/4"	1'-6"	1'-2"	2 3/4"	2'-4"	0.448
20"	560	5"	2 3/4"	1'-6"	1'-4"	3 3/4"	2'-4"	0.490
	350	5"	1 3/4"	1'-8"	9"	1 3/4"	2'-5"	0.318
	380	5"	1 3/4"	1'-8"	10"	2 3/4"	2'-5"	0.370
	460	5"	2 3/4"	1'-8"	1'-0"	2 3/4"	2'-6"	0.406
22"	530	5"	2 3/4"	1'-8"	1'-2"	2 3/4"	2'-6"	0.448
	600	5"	2 3/4"	1'-8"	1'-4"	3 3/4"	2'-6"	0.490
	640	5"	2 3/4"	1'-8"	1'-6"	3 3/4"	2'-6"	0.531
	405	5"	1 3/4"	1'-10"	10"	2 3/4"	2'-7"	0.370
24"	490	5"	1 3/4"	1'-10"	1'-0"	2 3/4"	2'-8"	0.370
	565	5"	2 3/4"	1'-10"	1'-2"	2 3/4"	2'-8"	0.448
	635	5"	2 3/4"	1'-10"	1'-4"	3 3/4"	2'-8"	0.490
	705	5"	2 3/4"	1'-10"	1'-6"	3 3/4"	2'-8"	0.531
720	5"	2 3/4"	1'-10"	1'-8"	3 3/4"	2'-8"	0.531	



ANCHOR BOLT NOTES

FOR SPAN LENGTHS UP TO 100'-0":
USE A TYPE I MASONRY PLATE "D" WITH
(2) - 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) - 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

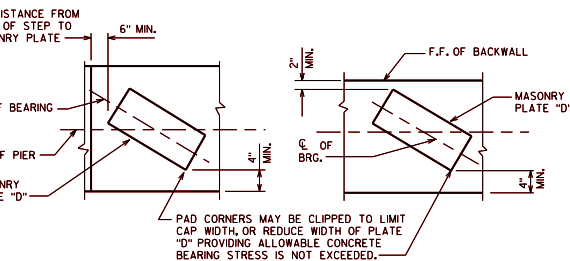
FOR SPAN LENGTHS GREATER THAN 150'-0":
USE A TYPE II MASONRY PLATE "D" WITH
(4) - 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE
HORIZONTAL CAPACITY.

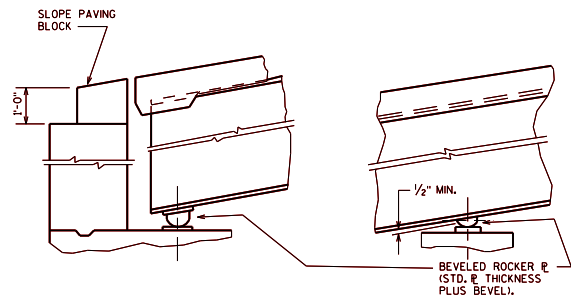
LOCATE ANCHOR BOLTS
AS INDICATED FOR
MASONRY PLATE "D".
FOR SIZE, LENGTH, AND
NUMBER SEE ANCHOR
BOLT NOTES.

FIXED BEARING ASSEMBLY
(SEE "DESIGNER NOTES" FOR BEARING REPLACEMENTS)

MASONRY PLATE "D"
BEARING REPLACEMENTS



AT SKEWED PIER **AT SKEWED ABUTMENTS**
CLEARANCE DIAGRAM



AT EXPANSION BRG. **AT FIXED BRG.**
BEVELED ROCKERS WITH GRADES GREATER THAN 3%

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT \bar{C} OF GIRDER AND \bar{C} 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 + 2/4", 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 ASTM A572 FOR GRADE 50 YIELD
STRENGTH AND ELONGATION.
ALL MATERIAL IN TYPE "A" BEARINGS, INCLUDING SHIM PLATES AND BEARING PADS,
SHALL BE PROVIDED FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY. EACH SHALL
BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY. EACH SHALL BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY. EACH SHALL BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY. EACH SHALL BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY.

CHAMFER TOP OF PINTLES 1/8". DRILL HOLES FOR ALL PINTLES IN MASONRY PLATE "D"
FOR A DRIVING FIT.
PROVIDE 1/2" THICK BEARING PAD THE SAME SIZE AS MASONRY PLATE "D" FOR EACH
BEARING. 1/8" THICK BEARING PAD THE SAME SIZE AS MASONRY PLATE "D" FOR EACH
BEARING.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.
CHAMFER ANCHOR BOLTS PRIOR TO THREADING.
ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM F1554 GRADE 50,
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.
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".
FINISH THESE SURFACES TO ANSI 250 IF "Y" DIMENSION IS GREATER THAN 2".

DESIGNER NOTES

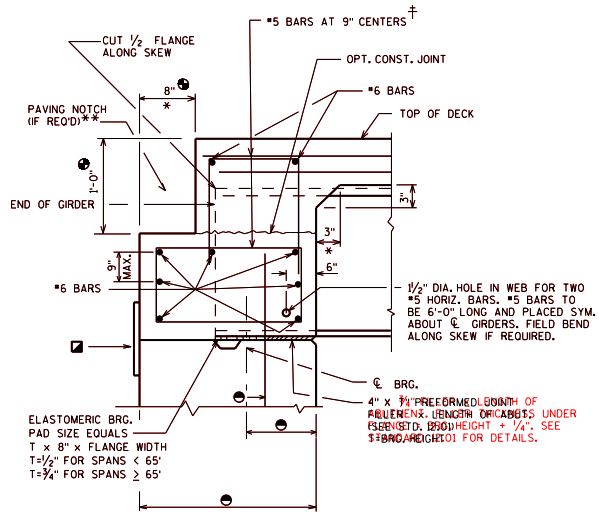
HEIGHT OF BEARINGS GIVEN IN TABLE INCLUDES 1/8" BEARING PAD.
DETAIL SHIM PLATES AS DESCRIBED IN NOTES ON STANDARD 24.02.
REFER TO THE DETAILS BELOW FOR THE USE OF BEVELED ROCKER PLATE "C"
ON GRADES GREATER THAN 3% AND ALSO CLEARANCE REQUIREMENTS.
FOR WELD SIZE, REFER TO STANDARD 24.02
ADJUST HEIGHT IF 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 GRADING
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".
CALCULATE THE REACTION AT THE BEARINGS DUE TO "TOTAL LOADS".
USE THE AASHTO LRFD SERVICE I LOAD COMBINATION, INCLUDING
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".

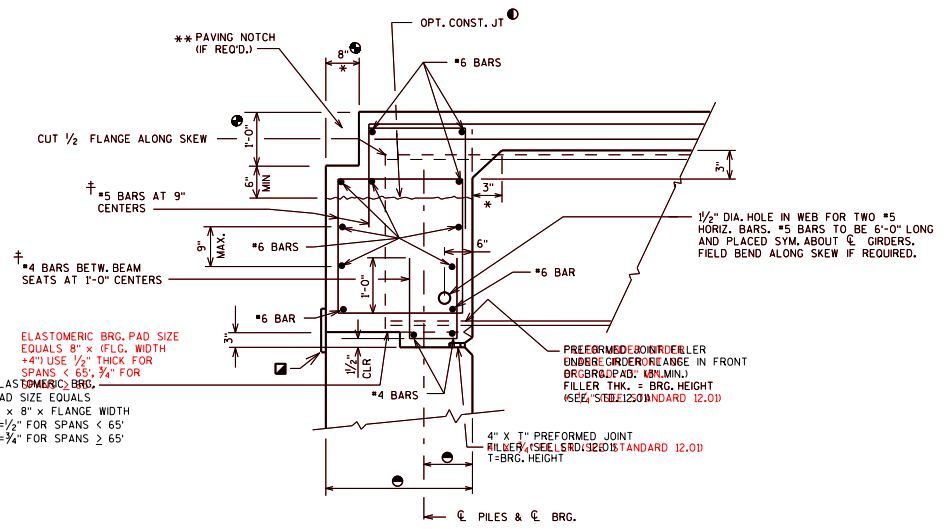
FIXED BEARING DETAILS
TYPE 'A' - STEEL GIRDERS

BUREAU OF
STRUCTURES

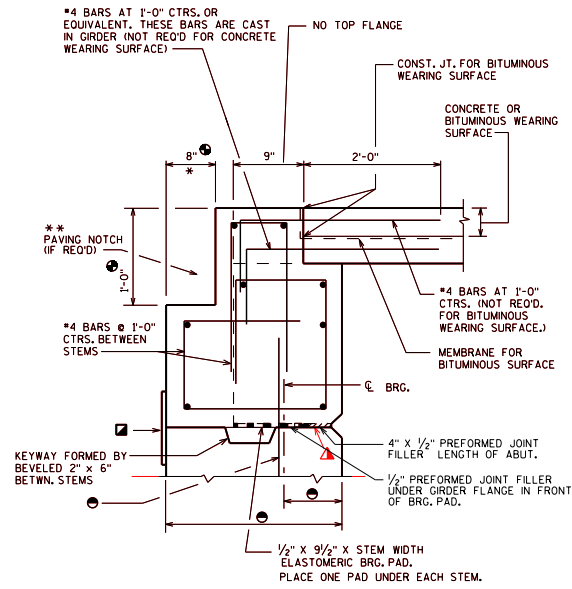
APPROVED: Bill Oliva DATE: 1-23



**STEEL GIRDER WITH
FIXED SEAT**




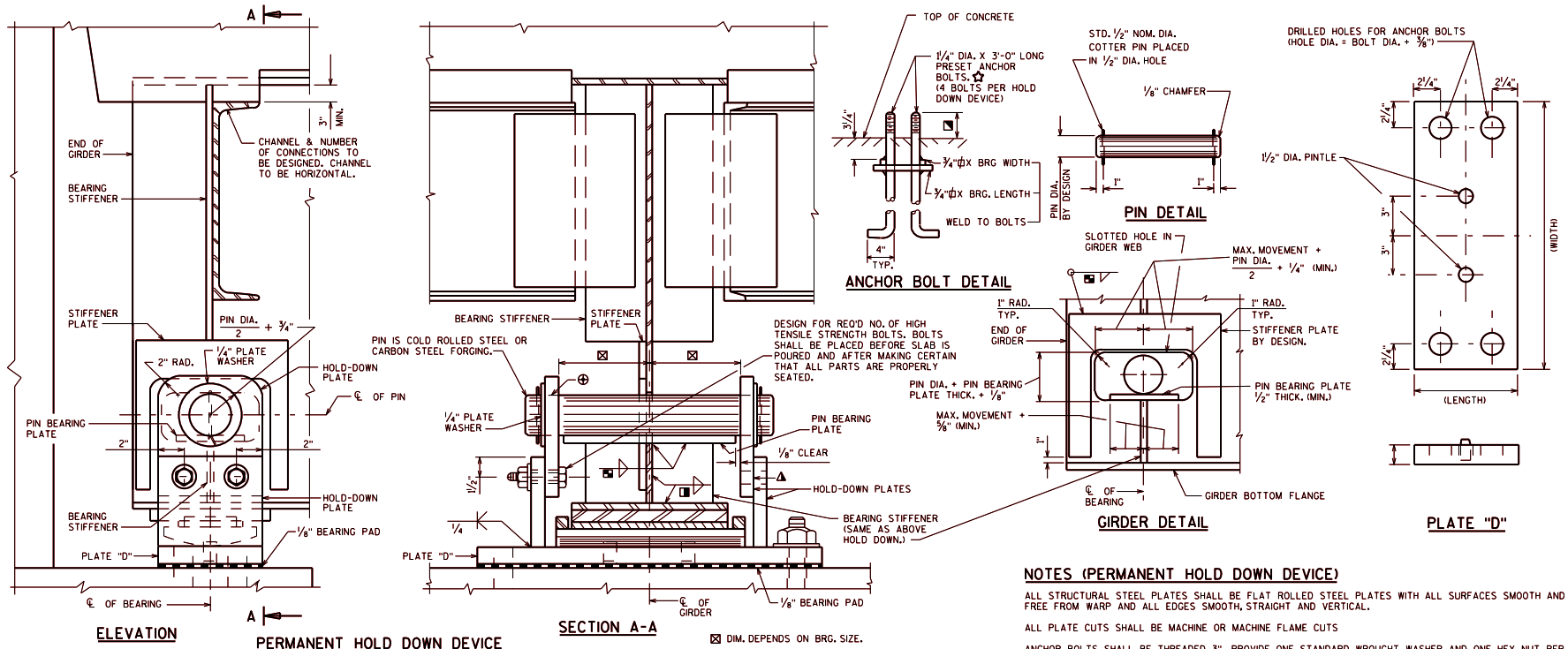
**STEEL GIRDER WITH
SEMI-EXPANSION SEAT**



**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. DIMENSIONAL FILLER BETWEEN BRG. PAD AND 3/4" x 4" FILLER.
 - 1-6" RUBBERIZED MEMBRANE WATERPROOFING
 - * DIMENSION IS TAKEN NORMAL TO SUBSTRUCTURE BARS. BARS PLACED PARALLEL TO GIRDERS, SPACING PERPENDICULAR TO GIRDERS.
 - † 1-6" RUBBERIZED MEMBRANE WATERPROOFING
 - ‡ **DESIGNER NOTES** GIRDERS, SPACING PERPENDICULAR TO GIRDERS. SEE STANDARD 19.55 FOR PRESTRESSED BOX GIRDER BEARING DETAILS.
 - ① **DESIGNER NOTES** THE USE OF THIS OFF-CENT. JOINT IS NOT RECOMMENDED FOR SKEWS UNLESS WHEN LARGE DEADLOAD AND ROTATION IS ANTICIPATED.
 - ② USE PAVING NOTCH ON ALL VLS. HOLES IN STEEL BRIDGES. HOLES IN CONCRETE BRIDGES. CONCRETE APPROACHES IS ANTICIPATED.
 - ③ PAVING NOTCH IS 1-0" WIDE BY 1-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
 - ④ SEE STD. 12.01
 - ⑤ PAVING NOTCH IS 1-0" WIDE BY 1-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
 - ⑥ SEE STD. 12.01

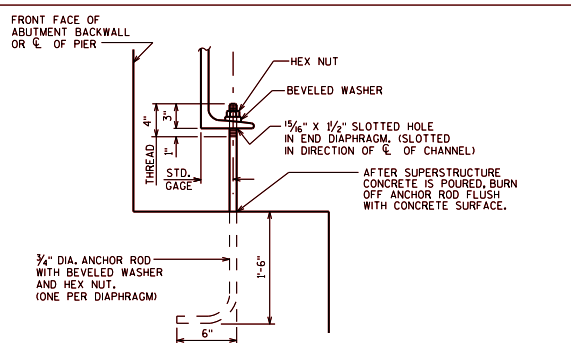
BRG. DETAILS FOR STEEL GDRS. AND PRECAST UNITS ON A1 ABUTMENTS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-18



WHEN REQUIRED, HOLD DOWN DEVICES SHALL BE PLACED SYMMETRICALLY ABOUT LONGITUDINAL ϕ 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.

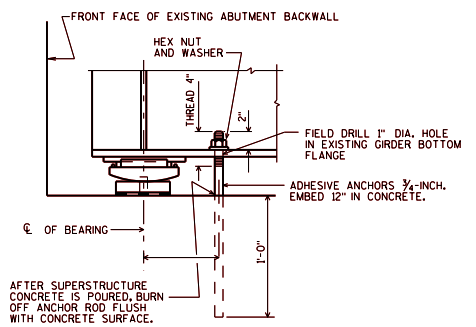
NOTES (PERMANENT HOLD DOWN DEVICE)

- 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 ~~A153~~ **GRADE 50** 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 1/2" 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 + 2/4", 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 ϕ OF GIRDER. TO BE PAID FOR AS "STRUCTURAL CARBON STEEL".

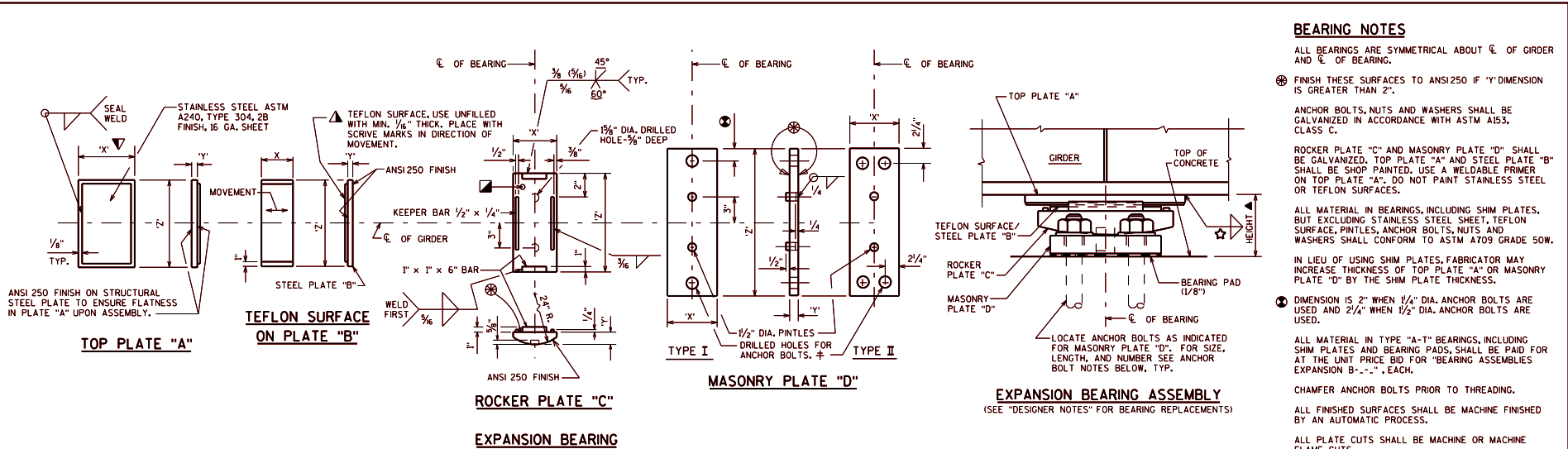


ELEVATION - DECK REPLACEMENT

PLACE ONE ANCHOR ROD PER GIRDER AT ABUTMENT WHERE SLAB POUR TERMINATES. LOCATE 4" (NORMAL) OFF ϕ 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: <u>Bill Oliva</u>	DATE: <u>7-26</u>



BEARING NOTES

- ALL BEARINGS ARE SYMMETRICAL ABOUT ϵ OF GIRDER AND ϵ 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 WEARABLE 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 1/4" DIA. ANCHOR BOLTS ARE USED AND 2 1/4" WHEN 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 1/4" 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 + 2/4", ABOVE TOP OF CONCRETE.
- CHAMFER TOP OF PINTLES 1/4". DRILL HOLES FOR ALL PINTLES IN MASONRY PLATE "D" FOR A DRIVING FIT.
- STEEL PINTLES SHALL CONFORM TO ASTM A449 OR ASTM A572 GRADE 50 YIELD STRENGTH AND ELONGATION.
- ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A153 GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C.
- PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.
- BOND STEEL PLATE "B" AND TEFLON WITH ADHESIVE MATERIAL MEETING THE REQUIREMENT OF FOUNDATION SPECIFICATIONS.
- DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 1/8" LARGER THAN ANCHOR BOLT.
- AT INSTALLATION, ENSURE STAINLESS STEEL SLIDING FACE OF THE BEARING AND THE SLIDING SURFACE OF THE MASONRY PLATE ARE FREE OF OIL, GREASE, DIRT, 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 1/8" 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 ϵ 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 ASHTO 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) - 1/4" 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) - 1/2" DIA. X 1'-10" LONG ANCHOR BOLTS.
- FOR SPAN LENGTHS GREATER THAN 150'-0": USE A TYPE II MASONRY PLATE "D" WITH (4) - 1/2" DIA. X 1'-10" LONG ANCHOR BOLTS.
- CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.

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"	3/8"	10"	5"	1/2"	10"	7"	1 1/8"	1'-0 1/4"	8"	1/2"	1'-8"	0.360
180	1'-1"	3/8"	10"	9"	1/2"	10"	11"	2 3/8"	1'-0 1/4"	8"	1/2"	1'-8"	0.438
260	1'-5"	3/8"	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"	3/8"	1'-0"	5"	1/2"	1'-0"	7"	1 1/8"	1'-2 1/4"	8"	1/2"	1'-10"	0.360
175	11"	3/8"	1'-0"	7"	1/2"	1'-0"	9"	1 3/8"	1'-2 1/4"	8"	1/2"	1'-10"	0.401
275	1'-3"	3/8"	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"	3/8"	1'-2"	7"	1/2"	1'-2"	9"	1 1/8"	1'-4 1/4"	8"	1/2"	2'-0"	0.401
375	1'-5"	3/8"	1'-2"	1'-1"	1/2"	1'-2"	1'-3"	3 3/8"	1'-4 1/4"	1'-2"	2 3/8"	2'-0"	0.677
500	1'-9"	3/8"	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"	3/8"	1'-4"	7"	1/2"	1'-4"	9"	1 1/8"	1'-6 1/4"	8"	1/2"	2'-2"	0.401
370	1'-3"	3/8"	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"	3/8"	1'-4"	1'-3"	1/2"	1'-4"	1'-5"	3 3/8"	1'-6 1/4"	1'-4"	3 3/8"	2'-3"	0.719
575	1'-9"	3/8"	1'-4"	1'-5"	1/2"	1'-4"	1'-7"	4 7/8"	1'-6 1/4"	1'-6"	3 3/8"	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"	3/8"	1'-6"	7"	1/2"	1'-6"	9"	1 1/8"	1'-8 1/4"	9"	2"	2'-4"	0.443
360	1'-1"	3/8"	1'-6"	9"	1/2"	1'-6"	11"	2 3/8"	1'-8 1/4"	11"	2"	2'-4"	0.479
600	1'-7"	3/8"	1'-6"	1'-3"	1/2"	1'-6"	1'-5"	3 3/8"	1'-8 1/4"	1'-5"	3 3/8"	2'-5"	0.719
650	1'-11"	3/8"	1'-6"	1'-7"	1/2"	1'-6"	1'-9"	4 7/8"	1'-8 1/4"	1'-10"	3 3/8"	2'-5"	0.844

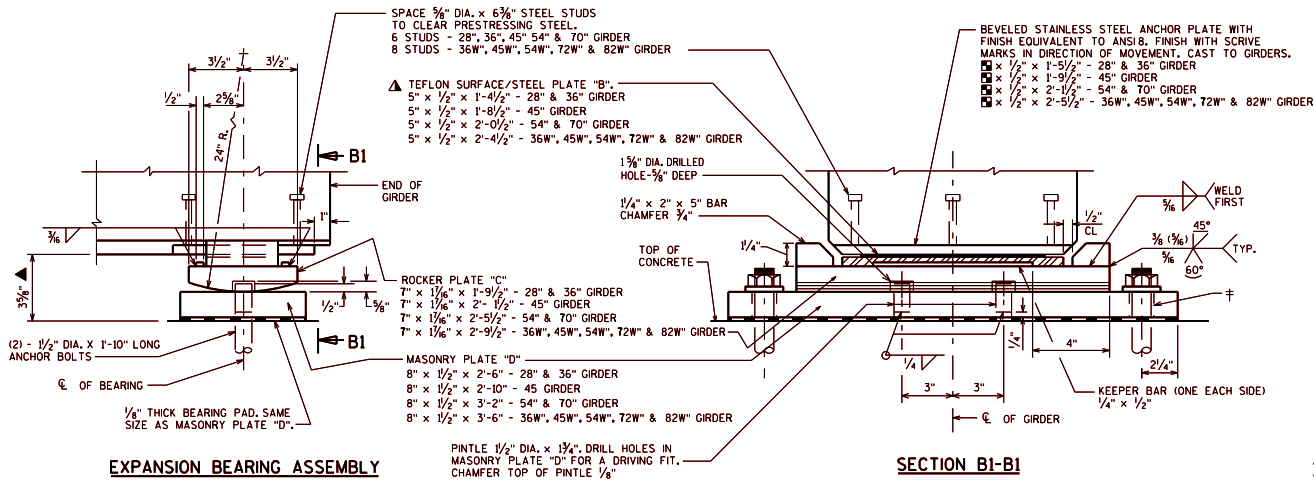
20" BEARING

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"	3/8"	1'-8"	5"	1/2"	1'-8"	7"	1 1/8"	1'-10 1/4"	8"	1/2"	2'-6"	0.360
315	11"	3/8"	1'-8"	7"	1/2"	1'-8"	9"	1 1/8"	1'-10 1/4"	9"	2"	2'-6"	0.443
495	1'-3"	3/8"	1'-8"	11"	1/2"	1'-8"	1'-1"	2 7/8"	1'-10 1/4"	1'-1"	2 3/8"	2'-7"	0.594
675	1'-7"	3/8"	1'-8"	1'-3"	1/2"	1'-8"	1'-5"	3 3/8"	1'-10 1/4"	1'-6"	3 3/8"	2'-7"	0.760
705	1'-11"	3/8"	1'-8"	1'-7"	1/2"	1'-8"	1'-9"	4 7/8"	1'-10 1/4"	1'-11"	3 3/8"	2'-7"	0.844

STAINLESS STEEL - TFE EXPANSION BEARING DETAILS TYPE 'A-T'



APPROVED: *Bill Oliva* DATE: 1-21



BEARING NOTES

- ALL BEARINGS ARE SYMMETRICAL ABOUT \bar{C} OF GIRDER AND \bar{C} 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 ~~ASTM A572~~ GRADE 50YENT YIELD STRENGTH AND ELONGATION.
- ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM F1554 GRADE 50, OR WATERBURY EQLVANT END WELDS 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, LAMINAR ALL EDGES SMOOTH, STRAIGHT, WITH AND VERTICALS 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 BOLT PER BOLT BE PROVIDED ANCHOR BOLT SO LONG AND DIA. THAT IT PROTRUS $\frac{1}{2}$ " 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 A108, B3, B33, NUTS, STEEL PLATES SHALL BE SHOP PAINTED, DO NOT PAINT TEFLON SURFACES.
- 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 BEARING".
- DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER $\frac{3}{16}$ " LARGER THAN ANCHOR BOLT.
- DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER $\frac{3}{16}$ " LARGER THAN ANCHOR BOLT.
- △ TEFLON SURFACE, USE UNFILLED WITH MINIMUM $\frac{1}{2}$ " THICKNESS. PLACE WITH SCRIVE MARKS IN DIRECTION OF MOVEMENT. END OF BEARING PLATE SHALL BE FINISHED ON A BEARING SURFACE MEETING THE REQUIREMENTS FOUND IN THE STANDARD SPECIFICATION WITH ADHESIVE MATERIAL MEETING THE REQUIREMENTS FOUND IN THE STANDARD SPECIFICATION.
- △ PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.
- △ PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.
- AT INSTALLATION, ENSURE STAINLESS STEEL SLIDING FACE OF THE UPPER ELEMENT AND THE STAINLESS STEEL LOWER ELEMENT HAVE THE SURFACE FINISH SPECIFIED AND ARE CLEAN AND FREE OF ALL DUST, MOISTURE AND ANY OTHER FOREIGN MATTER AND ARE CLEAN AND FREE OF ALL DUST, MOISTURE, AND ANY OTHER FOREIGN MATTER.

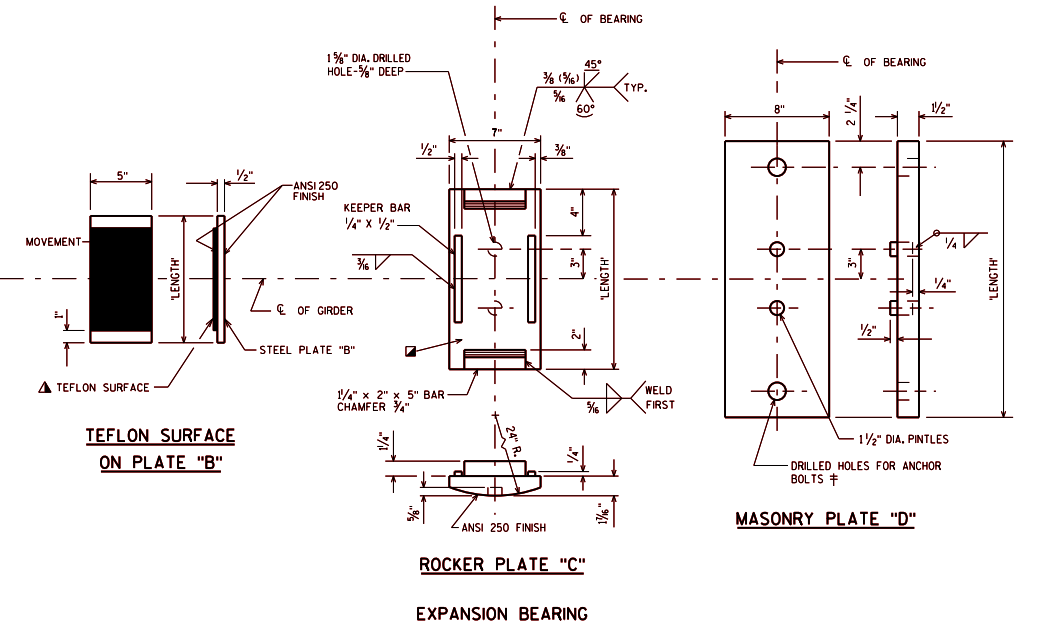
DESIGNER NOTES

- IF ALL BEARINGS BY GIVEN SUBSTRUCTURE UNIT ARE FIXED, UTILIZE $\frac{1}{2}$ " THICK ELASTOMERIC BEARING PADS AND FULL-DEPTH CONCRETE DIAPHRAGMS. $\frac{1}{2}$ " THICK ELASTOMERIC BEARING PADS AND FULL-DEPTH CONCRETE DIAPHRAGMS.
- FOR EXPANSION BEARINGS, USE LAMINATED ELASTOMERIC BEARINGS WHENEVER POSSIBLE. FOR EXPANSION BEARINGS, USE LAMINATED ELASTOMERIC BEARINGS WHENEVER POSSIBLE. SEE STANDARD 27.02 AND 19.31 FOR CLEARANCE REQUIREMENTS AND STANDARD 27.02 FOR STAINLESS STEEL BEARING PLATE FINISH REQUIREMENTS MORE THAN 3/16" FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 36".
- HEIGHT OF BEARING SHOWN IN "EXPANSION BEARING ASSEMBLY" INCLUDES $\frac{1}{8}$ " BEARING PAD AND $\frac{1}{16}$ " TEFLON SURFACE. IN "EXPANSION BEARING ASSEMBLY" INCLUDES $\frac{1}{8}$ " BEARING PAD AND $\frac{1}{16}$ " TEFLON SURFACE.
- △ ADJUST HEIGHT IF BEVELED ROCKER PLATE "C" IS USED.
- △ 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.
- 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 CAPACITIES 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"
TOTAL LOAD (DC+DW+(LL+IM))	180	230	280	330
DEAD LOAD (DC + DW)	110	140	170	200

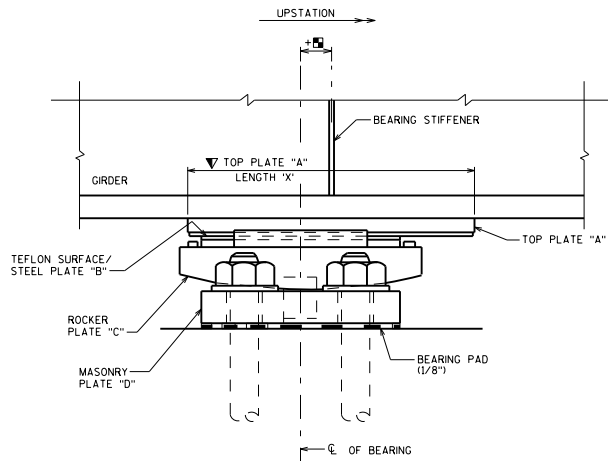


STEEL BEARINGS FOR PRESTRESSED CONCRETE GIRDERS

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-28



EXPANSION BEARING ASSEMBLY
FOR STEEL GIRDER
(SHOW ON PLANS)

E	E	E	F	F	E	E	E
S. ABUT	PIER 1	PIER 2	PIER 3	PIER 4	PIER 5	PIER 6	N. ABUT
0.7	0.5	0.3	-0.3	-0.5	-0.7		
0	0	0	0	0	0		
-0.7	-0.5	-0.3	0.3	0.5	0.7		
-1.6	-1.1	-0.7	0.7	1.1	1.6		
-2.4	-1.7	-1.0	1.0	1.7	2.4		

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)

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":

- 1/2 TEFLON PLATE "B" LENGTH "X"
- + THERMAL MOVEMENT (USE 60-(-30)=90 DEGREES)
- + CONSTRUCTION TOLERANCE
- = 1/2 TOP PLATE "A" LENGTH (DOUBLE THIS FOR PLATE "A" LENGTH)

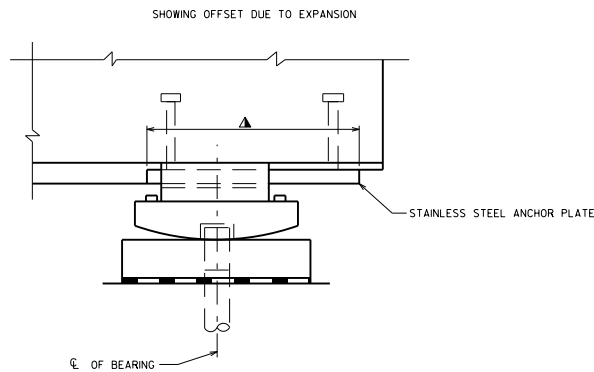
ANCHOR PLATES IN PRESTRESSED GIRDERS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT, GIRDER SHRINKAGE AND CONSTRUCTION TOLERANCE.

PROCEDURE FOR SIZING ANCHOR PLATE:

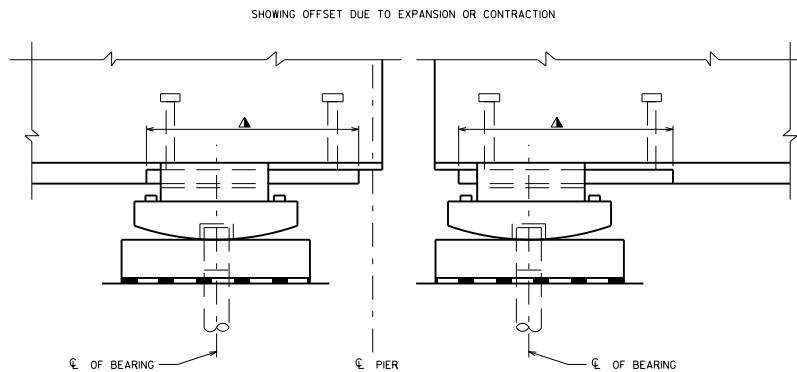
- 2 1/2 INCHES = 1/2 TEFLON PLATE LENGTH
- + THERMAL MOVEMENT (USE 60-5-55 DEGREES)
- + SHRINKAGE = 0.0003 L'
- + 1" CONSTRUCTION TOLERANCE
- = 1/2 ANCHOR PLATE LENGTH (DOUBLE THIS FOR ANCHOR PLATE LENGTH)

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.

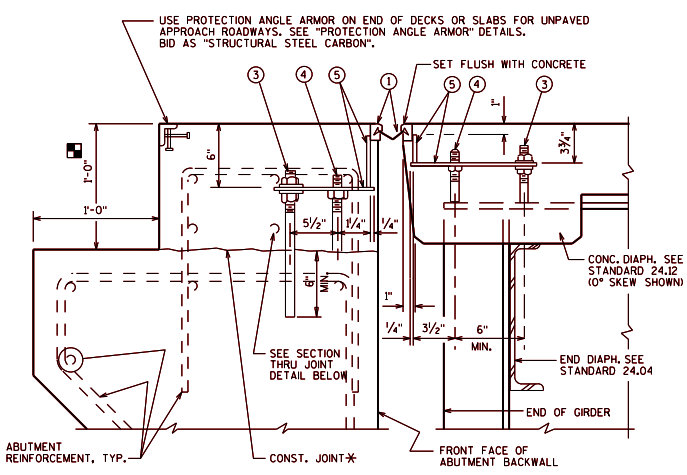


EXPANSION BEARING AT ABUTMENT
PRESTRESSED GIRDER
(FOR DESIGNER INFORMATION, ONLY
(DO NOT PUT ON THE PLANS))



EXPANSION BEARINGS AT PIER
PRESTRESSED GIRDER (CONC. DIAPHS. NOT SHOWN FOR CLARITY)
(FOR DESIGNER INFORMATION, ONLY
(DO NOT PUT ON THE PLANS))

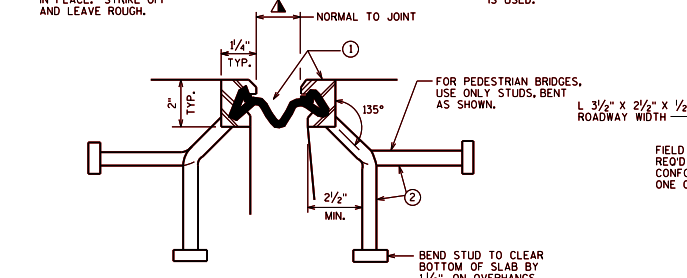
STEEL EXPANSION BEARING DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-17



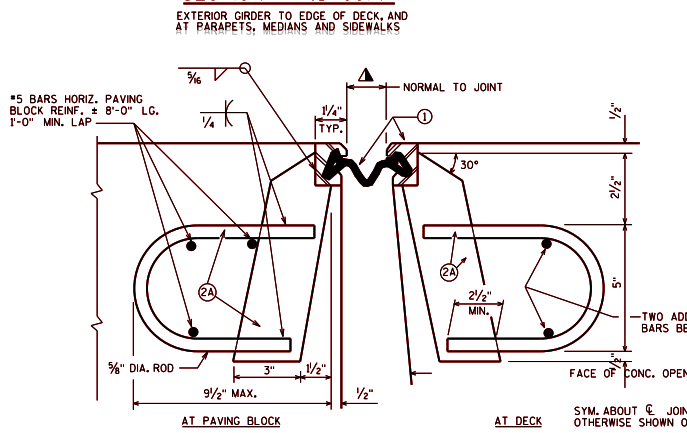
TYPICAL SECTION THRU JOINT AT STEEL GIRDER

* POUR CONC. ABOVE THIS JOINT AFTER SUPERSTRUCTURE IS IN PLACE. STRIKE OFF AND LEAVE ROUGH.

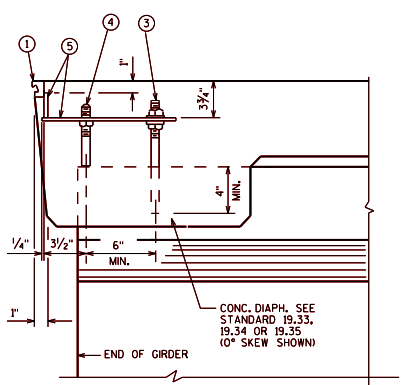
PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.12) IS USED.



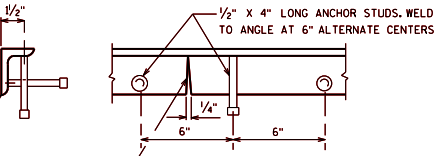
SECTION THRU JOINT



SECTION THRU JOINT



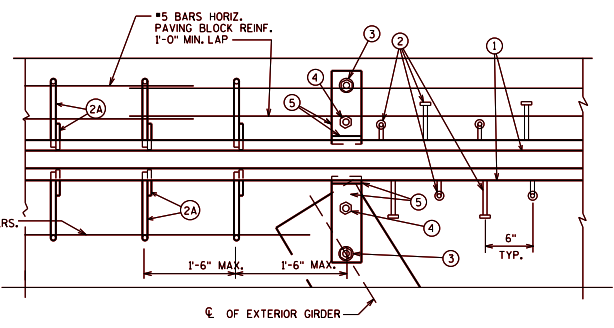
PART SECTION THRU JOINT AT PRESTRESSED GIRDERS



PROTECTION ANGLE ARMOR

SANDBLAST PROTECTION ANGLE AFTER FABRICATION PER NOTES. AFTER BLAST CLEANING, THE PROTECTION ANGLE SHALL BE HOT DIPPED GALVANIZED.

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."



PART PLAN

LEGEND

- ① NEOPRENE STRIP SEAL (1-INCH) AND STEEL EXTRUSIONS. SET JOINT OPENING AT 1 3/4". 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 3/8" DIA. X 6 3/4" LONG AT 6" ALTERNATE CENTERS. WELD TO EXTRUSIONS AND BEND AS SHOWN AFTER WELDING.
- ③ 1/2" THICK ANCHOR PLATE WITH 3/8" DIA. ROD (OR ALTERNATE STRIP SEAL ANCHOR). WELD ROD TO ANCHOR PLATE, WELD ANCHOR PLATE TO NO. 1 AT 1'-6" CENTERS BETWEEN GIRDERS.
- ④ 3/4" DIA. THREADED ROD WITH 2 NUTS AND PLATE WASHERS. FOR PRESTRESSED GIRDERS, GROUT THREADED ROD INTO FIELD DRILLED HOLES ON ϵ 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.
- ⑤ 3/4" DIA. THREADED ROD WITH NUT. TACK WELD NUT TO NO. 5.
- ⑥ FABRICATE SUPPORT FROM 3" X 1/2" 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 1/2" DIA. HOLE FOR NO. 3 AND 1" DIA. HOLE FOR NO. 4.
- ⑦ GALVANIZED PLATE 3/4" 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.
- ⑧ 3/4" DIA. X 1/2" STAINLESS STEEL SOCKET FLAT HEAD SCREWS WITH ANTI-SEIZE LUBRICANT. PLACE IN COUNTERSUNK HOLE. RECESS 1/16" BELOW PLATE SURFACE.
- ⑨ 3/4" DIA. X 4" GALVANIZED HEX HEAD BOLT, BEND 45°.
- ⑩ 3/4" DIA. X 2 1/4" GALVANIZED THREADED COUPLING.
- ⑪ SIDEWALK COVER PLATE 3/4" 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.
- ⑫ 1" X 5" SLOTTED COUNTERSUNK HOLE FOR NO. 7. PLACE SLOT PARALLEL TO DIRECTION OF MOVEMENT.

REFER TO STANDARD 28.02 & 28.07

NOTES

ONE FIELD SPLICE PERMITTED IN STEEL EXTRUSIONS, UNLESS MORE ARE REQUIRED FOR STAGED CONSTRUCTION, HANDLING OR GALVANIZING REQUIREMENTS. IF USED, DDC#006 PLATE SCHEDULE BE PROVIDED PERFORM. EACH SIDE OF JOINT. IF FIELD WELDED, DDC#006 SHALL BE SUBMITTED FOR APPROVAL. NO SPlicing PERMITTED IN NEOPRENE STRIP SEAL.

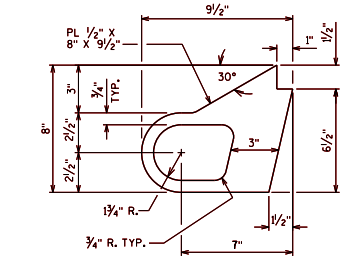
AFTER FABRICATION, BUT BEFORE SHIPMENT, STRAIGHTEN STEEL EXTRUSIONS SUCH AS PER FABRICATION DRAWINGS WITH STRAIGHTENING PEEL EXTRUSIONS SUCH THAT THEY SHALL BE FREE FROM WARP, TWIST AND SWEEP.

FABRICATOR SHALL PROVIDE MEANS OF KEEPING GALVANIZED EXTRUSIONS CLEAN AND PROTECTIVE SURFACE AND PREVENT GALVANIZED EXTRUSIONS FROM BEING CLEANED OR DAMAGED DURING SHIPMENT AND PRIOR TO APPLYING LUBRICANT ADHESIVE FOR NEOPRENE GLAND INSTALLATION.

SANDBLAST PLATES, SUPPORTS AND EXTRUSIONS AFTER FABRICATION IN ACCORDANCE WITH SANDBLASTING PLATE SCHEDULES AND EXTRUSIONS (ART. 18.01) IN ACCORDANCE WITH ARTS 18.01 & 18.02. GALVANIZED EXTRUSIONS SHALL BE CLEANED AND GALVANIZED. SURFACES, SUPPORTS AND EXTRUSIONS SHALL BE HOT DIPPED GALVANIZED TO RESIST ANTI-CORROSION. GALVANIZED EXTRUSIONS SHALL BE MANUFACTURED AND FINISHED IN ACCORDANCE WITH 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.

ALL MATERIAL IN THE EXPANSION JOINT ASSEMBLY, INCLUDING ANCHORS, STUDS AND HARDWARE SHALL BE GALVANIZED TO THE EXPANSION JOINT ASSEMBLY INCLUDING ANCHORS, STUDS AND HARDWARE SHALL BE PAID AT THE UNIT PRICE BID FOR "EXPANSION DEVICE B-...-...". LF.

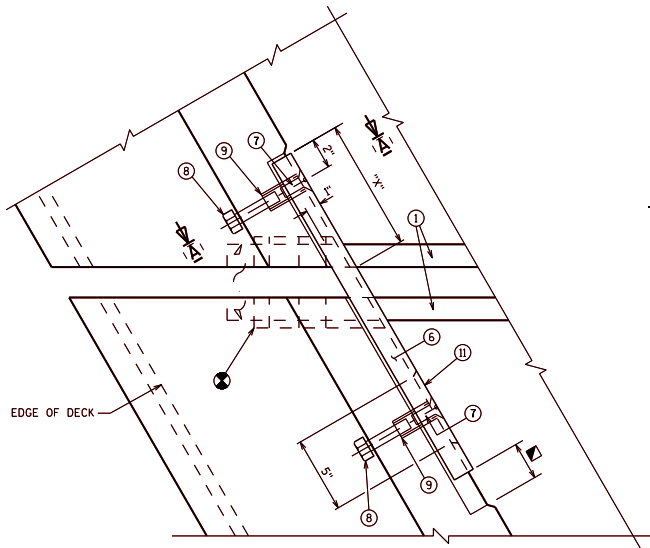


ALTERNATE STRIP SEAL ANCHOR

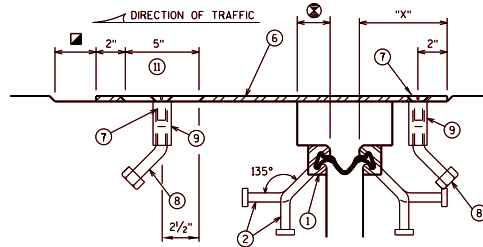
STRIP SEAL EXPANSION JOINT DETAILS

BUREAU OF STRUCTURES

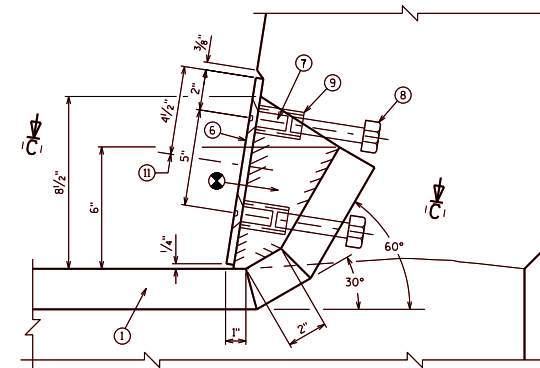
APPROVED: Bill Oliva DATE: 7-20



PLAN AT PARAPET
SINGLE SLOPE PARAPET

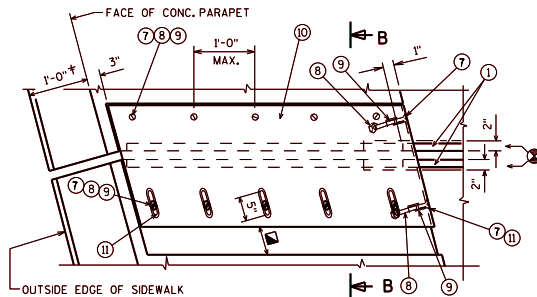


SECTION C-C



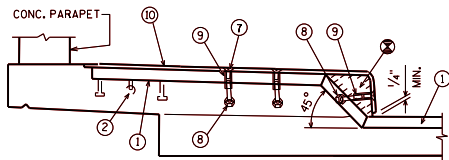
SECTION A-A
SINGLE SLOPE PARAPET

"X" - VALUES IN INCHES		USE "X" = 6 1/2" FOR 0° SKEW													
SKEW	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°		
RHF	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	7	7	7 1/2	8		
LHF	7	7 1/2	8	8 1/2	9	9 1/2	10 1/2	11	11 1/2	13	13 1/2	14 1/2	15 1/2		

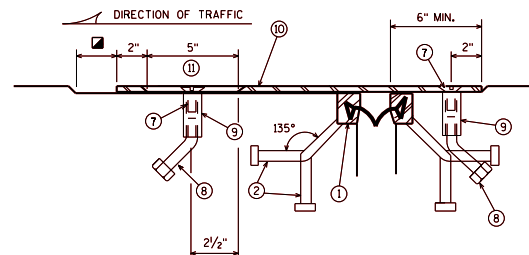


PLAN AT SIDEWALK

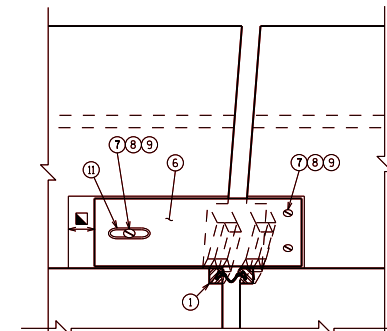
† 1'-2" WHEN "VERTICAL FACE PARAPET TYPE 'TX' IS USED



SECTION AT SIDEWALK

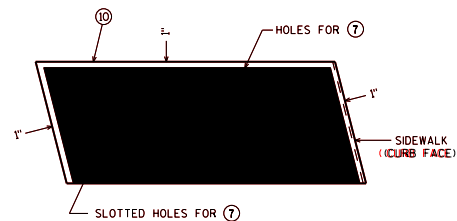


SECTION B-B



VIEW OF PARAPET PLATES

FROM ROADWAY
SINGLE SLOPE PARAPET



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):

DESIGNER NOTES

FOR NEW BRIDGES, JOINT TO BE DETAILED STRAIGHT.

FOR JOINT REPLACEMENT PROJECTS, JOINT SHALL BE DETAILED TO MATCH ORIGINAL CONFIGURATION (STRAIGHT OR KINKED) IN ORDER TO REDUCE SUBSTRUCTURE MODIFICATIONS REQUIRED.

PLAN DETAILS SHALL REMOVE ENOUGH PARAPET LATERALLY, AND FULL HEIGHT, TO ENSURE DURABILITY OF THE JOINT REPLACEMENT.

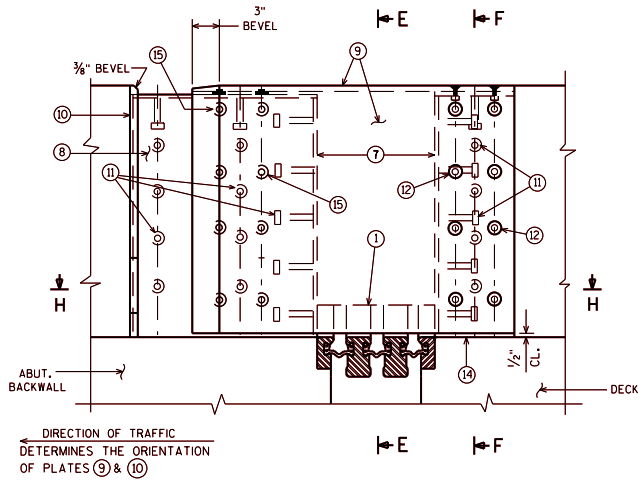
- ⊗ BLOCK OUT CONCRETE 2" EACH SIDE OF JOINT OPENING
- ⊠ JOINT OPENING DIM. ALONG SKEW PLUS 1/2"

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

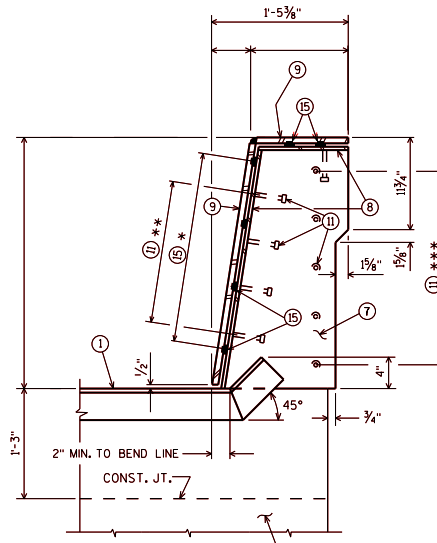
STRIP SEAL COVER PLATES
SINGLE SLOPE PARA./SDWK.



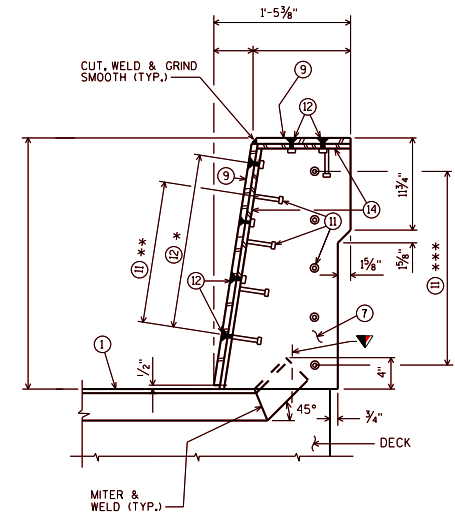
APPROVED: Bill Oliva DATE: 7-19



ELEVATION OF SINGLE SLOPE PARAPET

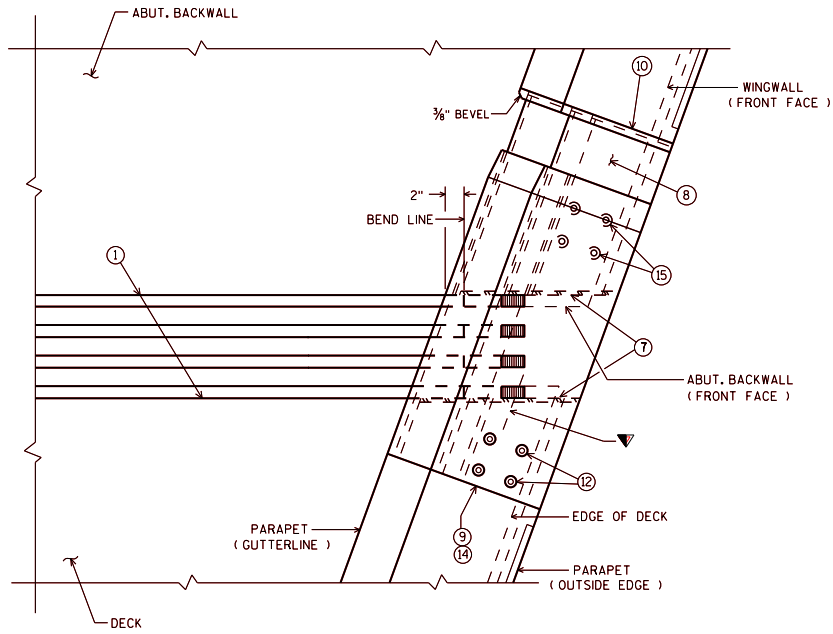


SECTION E-E

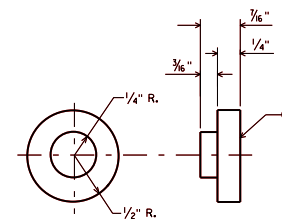
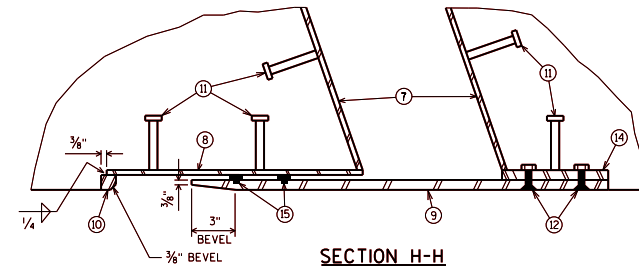


SECTION F-F

CROSS SECTION SHOWN FOR 32", 36", AND 42" SINGLE SLOPE PARAPET.
DETAILS FOR 56" PARAPET ARE SIMILAR.




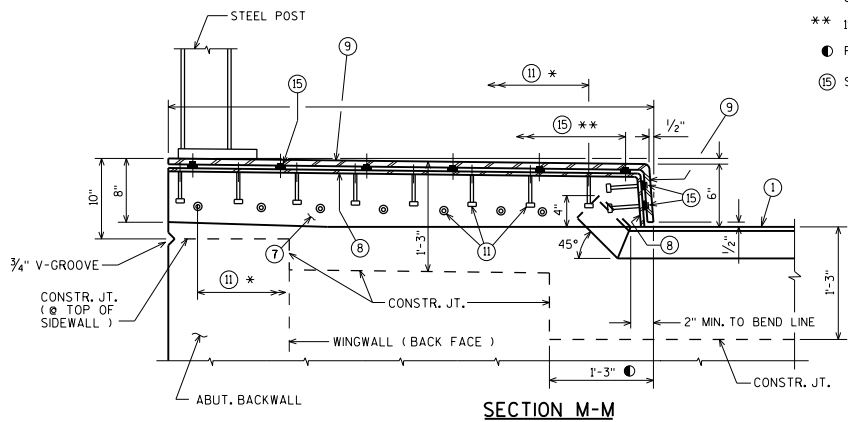
PLAN OF SINGLE SLOPE PARAPET



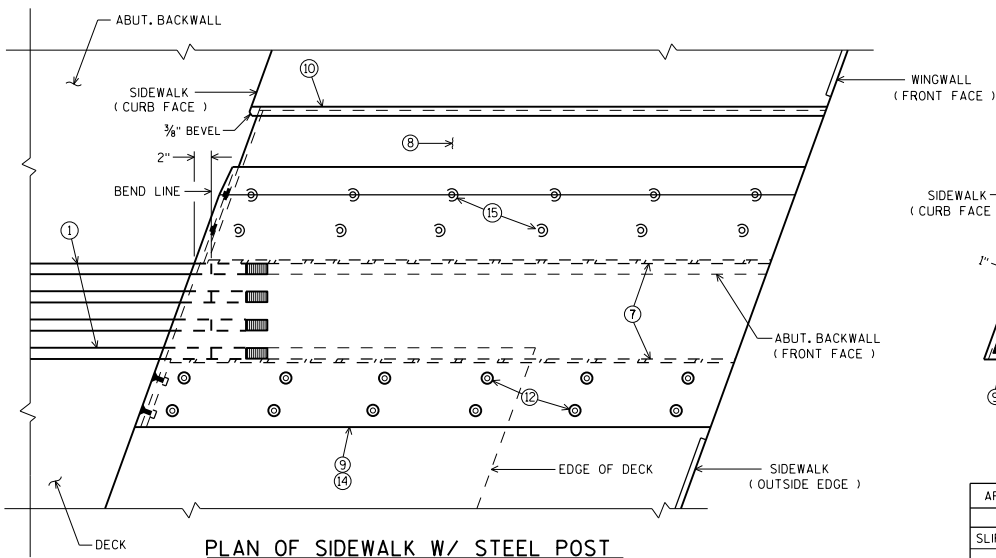
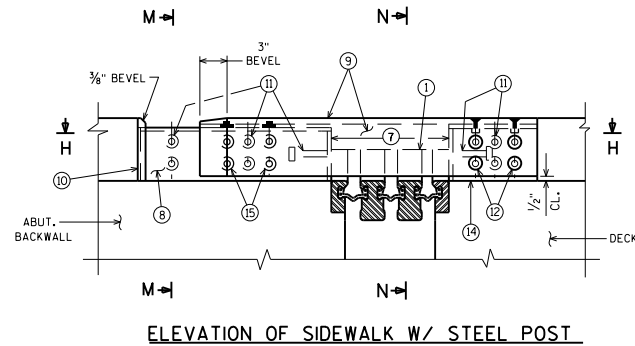
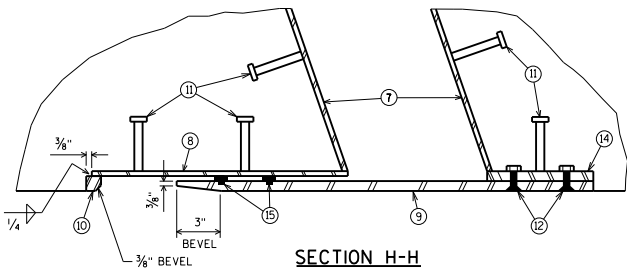
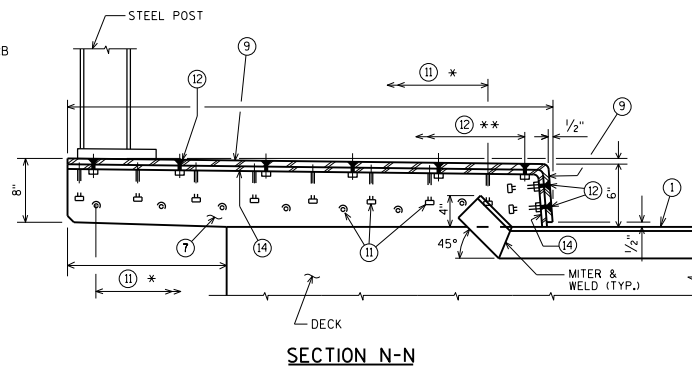
- * 3 EQ. SPA. (32")
- 4 EQ. SPA. (36")
- 5 EQ. SPA. (42")
- 7 EQ. SPA. (56")
- ** 3 SPA. (32")
- 4 SPA. (36")
- 5 SPA. (42")
- 7 EQ. SPA. (56")
- *** 4 SPA. (32")
- 5 SPA. (36")
- 6 SPA. (42")
- 8 SPA. (56")

▼ FOR STRUCTURES WITH SKEWS, ADD NOTE
TO PLANS: "MITER EXTRUSION ENDS AS
REQ'D TO PROVIDE CLEARANCE"

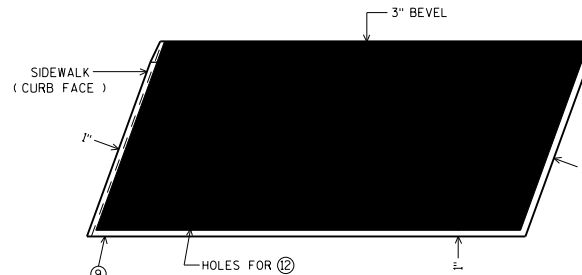
COVER PLATES FOR SINGLE SLOPE PARAPET	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: T-1B



- * 6" MAX. SPA.
- ** 1'-0" MAX. SPA.
- PERPENDICULAR TO FACE OF CURB
- ⊙ SEE DETAIL ON STANDARD 28.05



DIRECTION OF TRAFFIC
DETERMINES THE ORIENTATION
OF PLATES 9 & 10



PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE). GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.

PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE

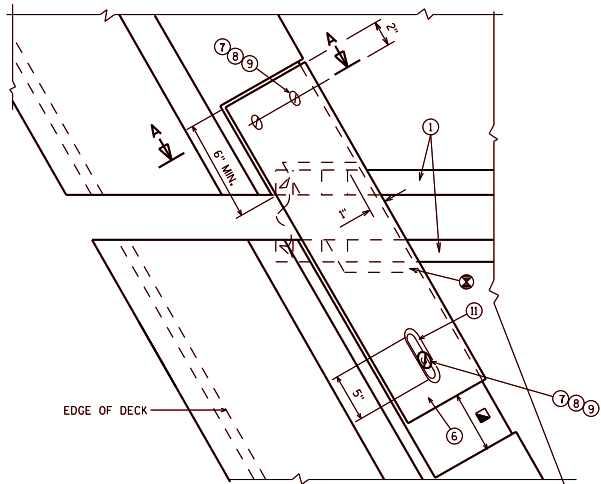
APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

COVER PLATES FOR SIDEWALK W/ STEEL RAIL

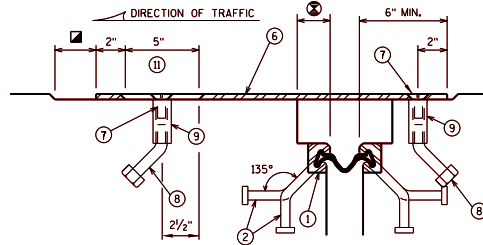
BUREAU OF STRUCTURES

DATE: 7-11

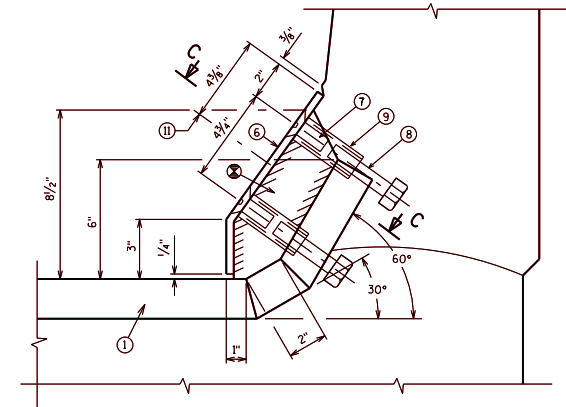
APPROVED: Scot Becker



PLAN AT PARAPET
SLOPED FACE PARAPET

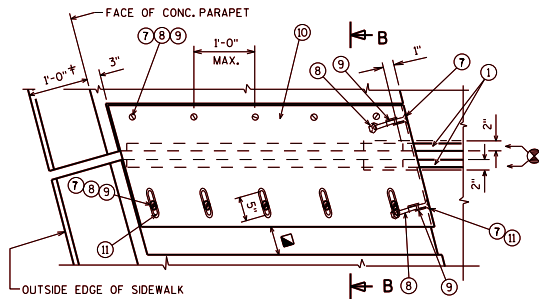


SECTION C-C



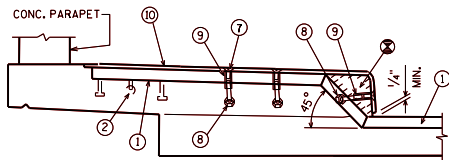
SECTION A-A
SLOPED FACE PARAPET

⑥ GALVANIZED PLATE $\frac{3}{8}$ " x $10\frac{1}{2}$ " x (2'-2" LONG FOR SKEWS TO 45° AND 3'-0" LONG FOR SKEWS \geq 45°) WITH HOLES FOR NO. 7. BEND AS SHOWN.

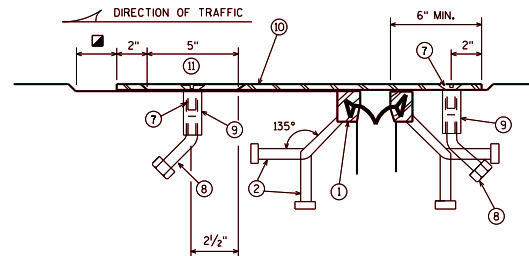


PLAN AT SIDEWALK

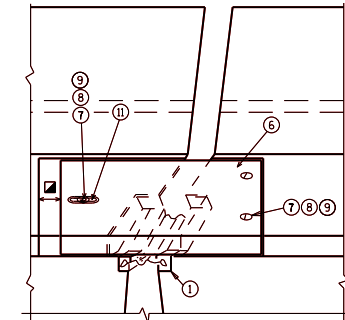
† 1'-2" WHEN "VERTICAL FACE PARAPET TYPE 'TX' IS USED



SECTION AT SIDEWALK

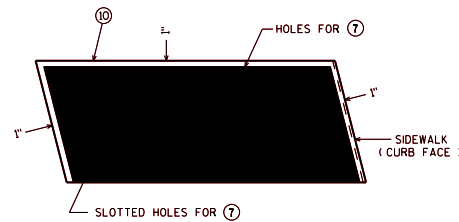


SECTION B-B



VIEW OF PARAPET PLATES

FROM ROADWAY
SLOPED FACE PARAPET



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).

DESIGNER NOTES

FOR JOINT REPLACEMENT PROJECTS, JOINT SHALL BE DETAILED TO MATCH ORIGINAL CONFIGURATION (STRAIGHT OR KINKED IN ORDER TO REDUCE SUBSTRUCTURE MODIFICATIONS REQUIRED).

PLAN DETAILS SHALL REMOVE ENOUGH PARAPET Laterally, AND FULL HEIGHT, TO ENSURE DURABILITY OF THE JOINT REPLACEMENT.

- ⊗ BLOCK OUT CONCRETE 2" EACH SIDE OF JOINT OPENING
- ⊠ JOINT OPENING DIM. ALONG SKEW PLUS $\frac{1}{2}$ "

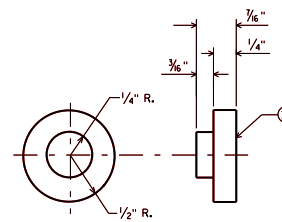
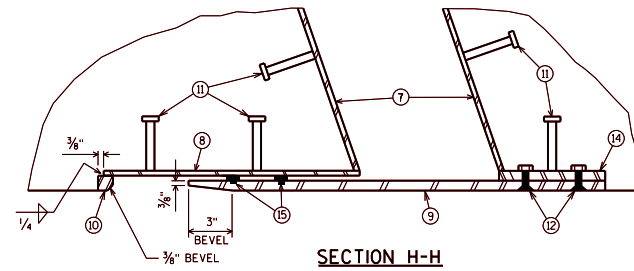
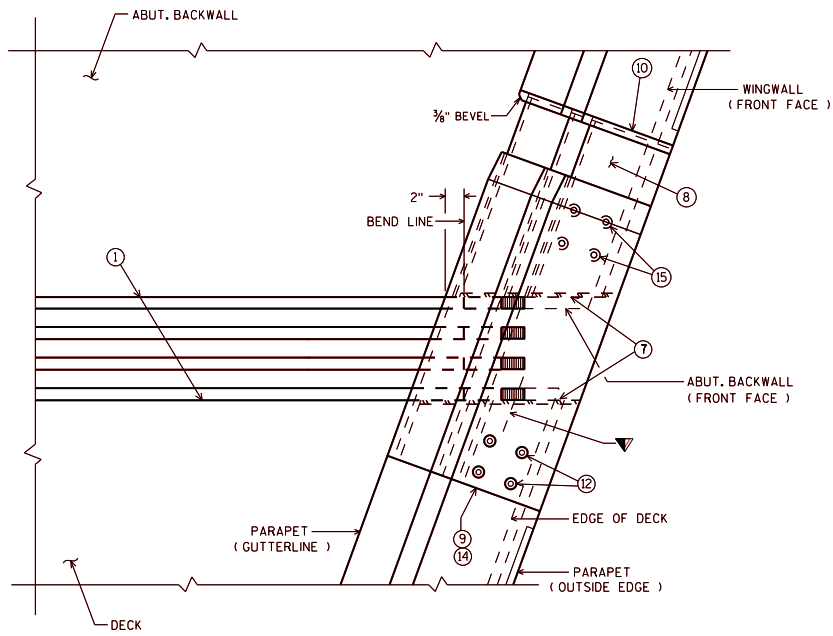
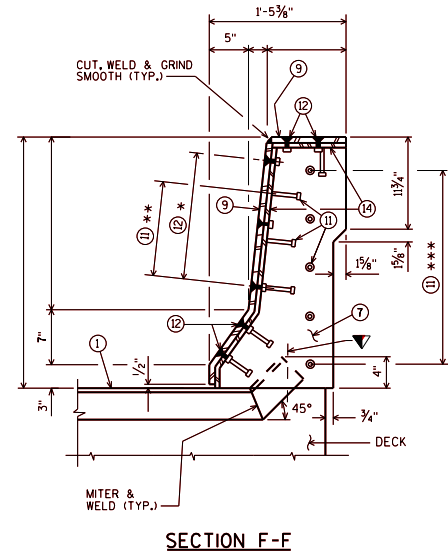
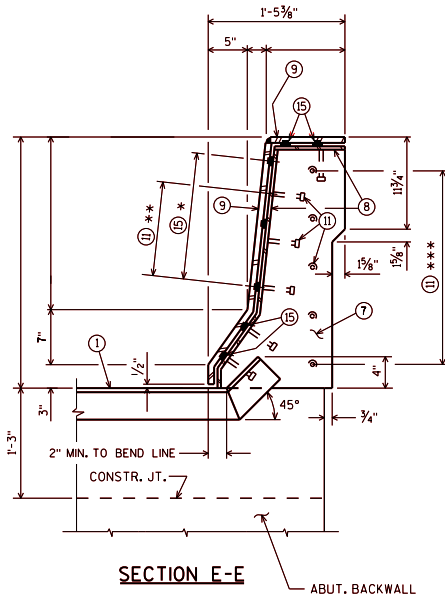
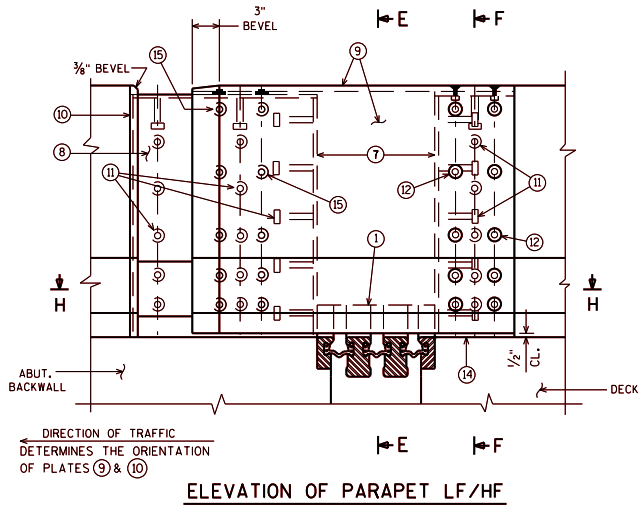
APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES

PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

STRIP SEAL COVER PLATES
SLOPED FACE PARA./SDWK.



APPROVED: Bill Oliva DATE: 7-20



- * 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"

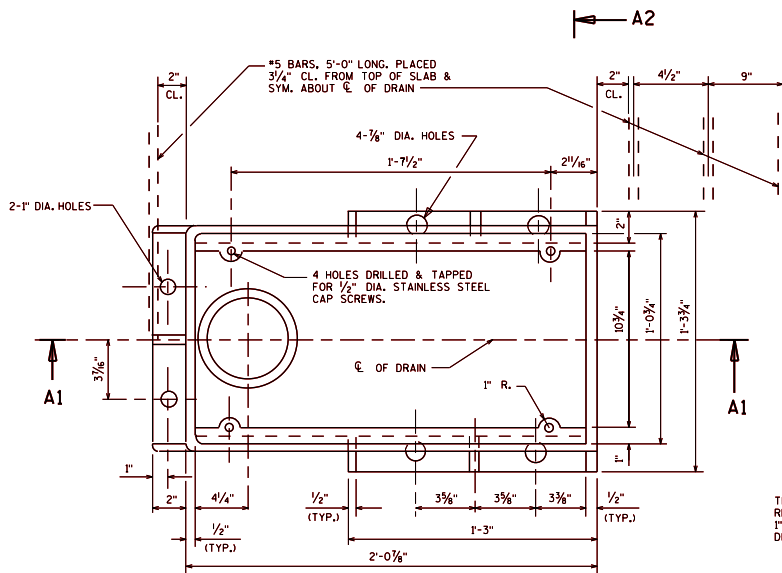
COVER PLATES FOR
PARAPET 'LF/HF'



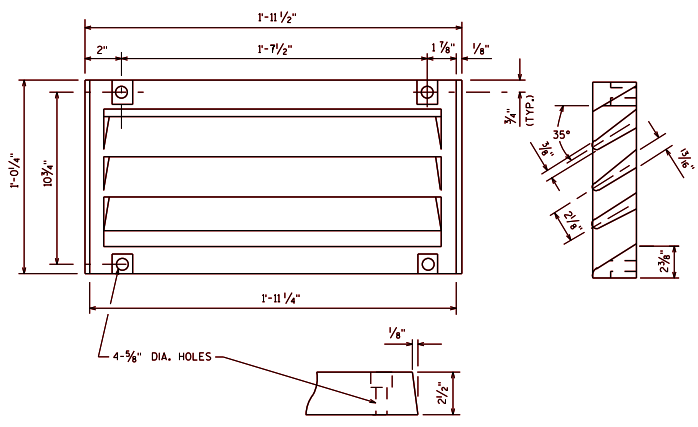
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
T-1B

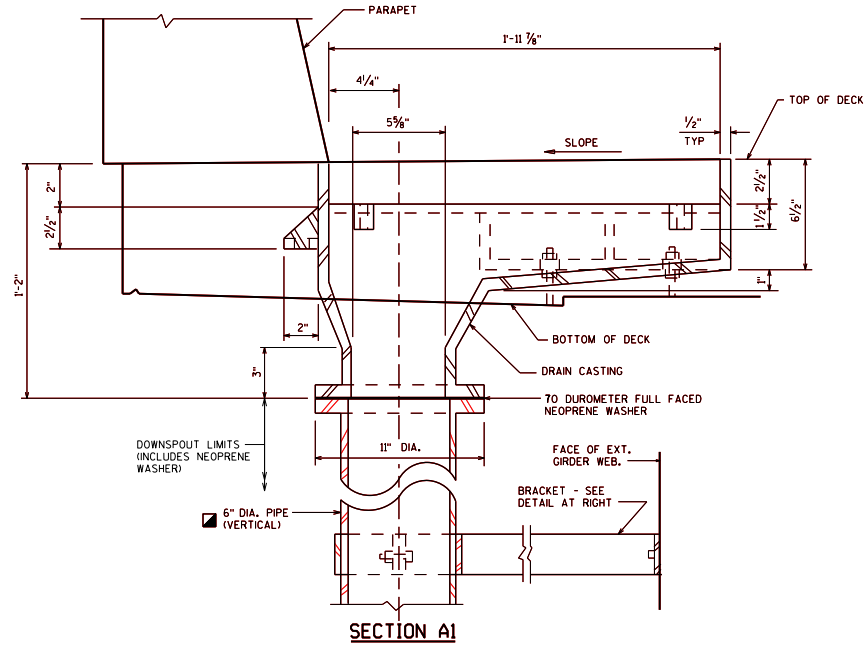


PLAN

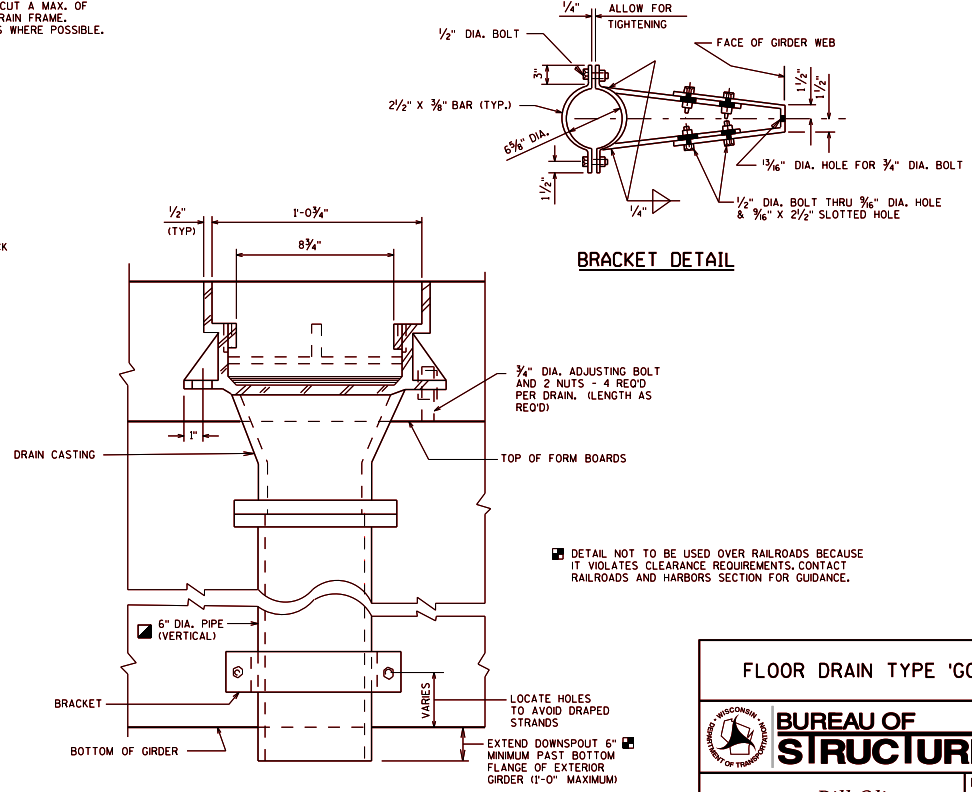


GRATE CASTING DETAIL
ATTACH GRATE TO FRAME FOR SHIPMENT

TRANS. AND LONGIT. SLAB BAR REINF. TO BE CUT A MAX. OF 1" CL. FROM DRAIN FRAME. DISPLACE BARS WHERE POSSIBLE.



SECTION A1



SECTION A2

NOTES

ALL MATERIAL FOR TYPE "GC" CASTING, EXCLUDING GRATE HOLD DOWN SCREWS, SHALL BE GRAY IRON DUCTILE (APPROXIMATE WEIGHT = 225#)

ALL MATERIAL FOR TYPE "GC" CASTING, EXCLUDING GRATE HOLD DOWN SCREWS, SHALL BE GALVANIZED STEEL (APPROXIMATE WEIGHT = 225#)

ALL MATERIAL FOR FLOOR DRAINS TO BE INCLUDED IN THE BID ITEM "DOWNSPOUT 6-INCH".

FLANGED 6" DIA. (DOWNSPOUTS) SHALL BE REINFORCED ALTERNATE BRACKET ARE NOT ALLOWED. VARIANZ STANDARD PIPE CONFORMING TO ASTM A53.


FLANGED 6" DIA. DOWNSPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (TRRP) OR GALVANIZED STEEL PIPE CONFORMING TO ASTM A53.

DESIGNER NOTE

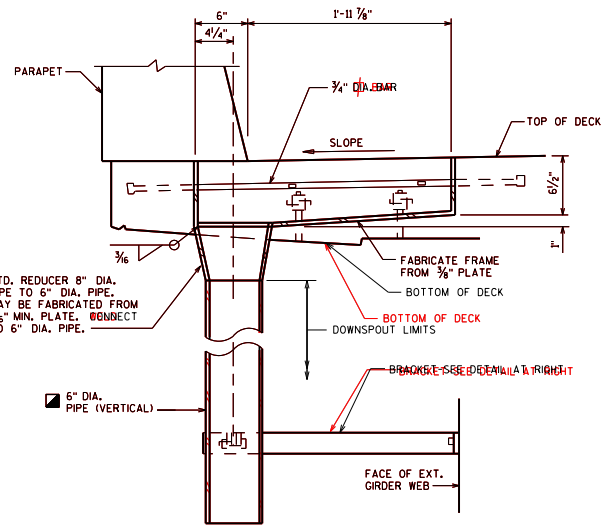
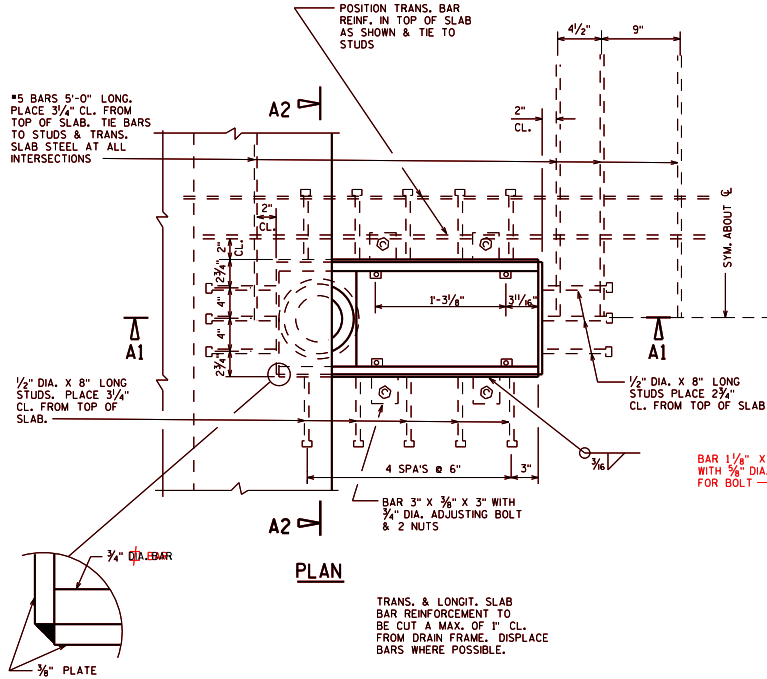
ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS TO BE INCLUDED IN THE BID ITEM "DOWNSPOUT 6-INCH".

ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER. ALL BRACKETS ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.

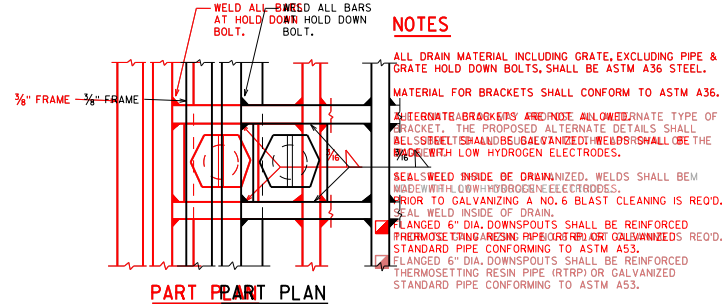
FLOOR DRAIN TYPE 'GC'

 **BUREAU OF STRUCTURES**

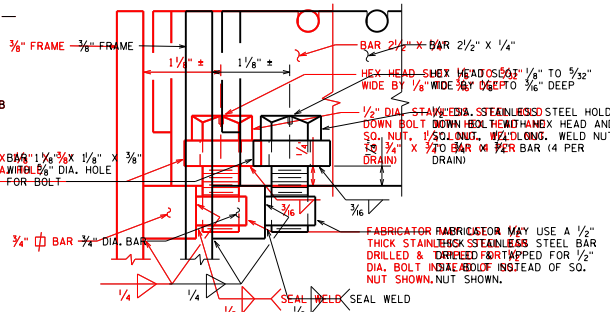
APPROVED: Bill Oliva DATE: 7-20



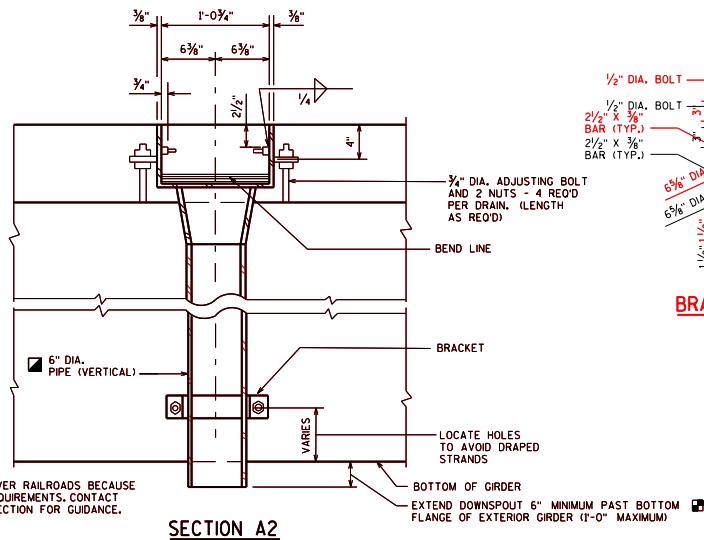
SECTION A1



PART PART PLAN



SECTION SECTION AT HOLD DOWN BOLT



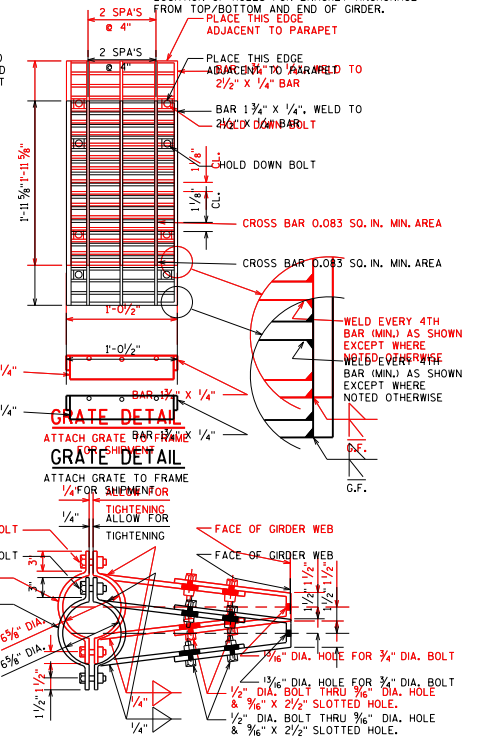
SECTION A2

NOTES

- DESIGNER NOTES**
- ALL MATERIAL INCLUDING GRATE, EXCLUDING PIPE & GRATE HOLD-DOWN BOLTS, SHALL BE ASTM A36 STEEL.
 - MATERIAL FOR BRACKETS OR ANCHORS SHOWN IN THIS SHEET SHALL BE INCLUDED IN THE BID ITEM FLOOR ALTERNATE BRACKETS ARE NOT ALLOWED.
 - ALL MATERIAL FOR DOWNPOUTS, WELD BRACKETS & MATERIAL WITH LOW HYDROGEN ELECTRODES, SHALL BE INCLUDED IN THE BID ITEM DOWNPOUT 6-INCH.
 - ALL MATERIAL FOR FLOOR DRAINS TO BE INCLUDED IN THE BID ITEM FLOOR DRAINS. SHEET SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM CENTER OF DOWNPOUT OR DOWNPOUT CONNECTIONS, AND BRACKETS TO BE INCLUDED IN THE BID ITEM "DOWNPOUT 6-INCH".
 - SEAL WELD INSIDE OF DRAIN.
 - PRIOR TO GALVANIZING A NO. 6 BLAST CLEANING IS REQ'D.
 - FLANGED 6" DIA. DOWNPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.
 - FLANGED 6" DIA. DOWNPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.

DESIGNER NOTE

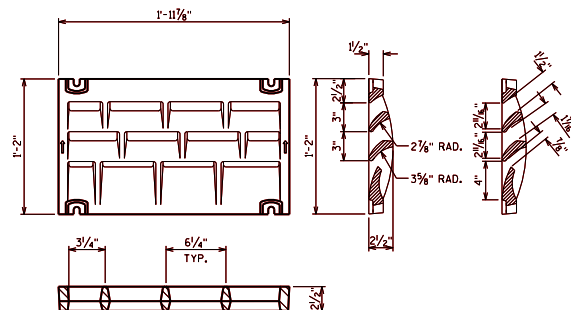
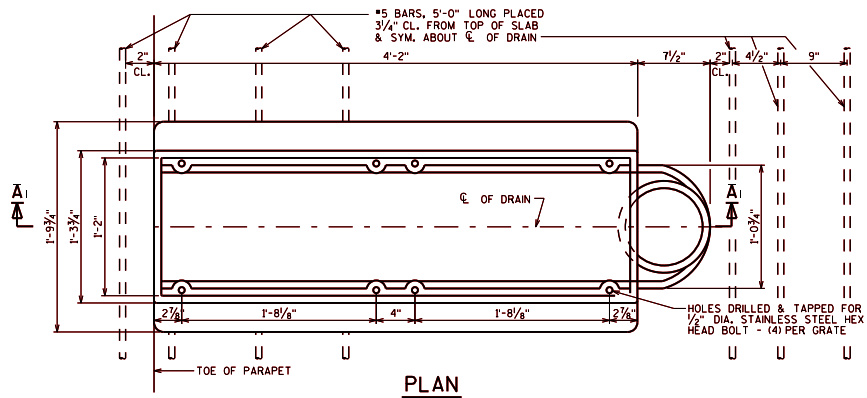
ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.



BRACKET DETAIL

DETAIL NOT TO BE USED OVER RAILROADS BECAUSE IT VIOLATES CLEARANCE REQUIREMENTS, CONTACT RAILROADS AND HARBORS SECTION FOR GUIDANCE.

FLOOR DRAIN TYPE 'H'	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: <u>7-20</u>



NOTES

ALL MATERIAL FOR TYPE "WF" CASTING AND 8" DIA. HOLES FOR PIPE, EXCLUDING GRATE HOLD DOWN BOLTS SHALL BE GRAY IRON CONFORMING TO ASTM A883, CLASS 30XPE "WF" CASTING AND 8" DIA. CONNECTION PIPE, EXCLUDING GRATE HOLD DOWN MATERIAL SHALL CONFORM TO ASTM A883, CLASS 30.

ALTERNATE BRACKET ARE NOT ALLOWED TO ASTM A36.

ALL MATERIAL FOR FLOOR DRAINS TO BE INCLUDED IN THE BID. PROVIDE DOWN DRAINS AND BRACKET TYPE OF BRACKET FOR THE PROPOSED ALTERNATE TYPE OF BRACKET FOR DOWN DRAINS TO BE INCLUDED IN THE BID.

ALL MATERIALS FOR DOWN DRAINS, DOWNSPOUTS, CONNECTIONS AND BRACKETS TO BE INCLUDED IN THE BID ITEM "DOWNSPOUT 8-INCH".

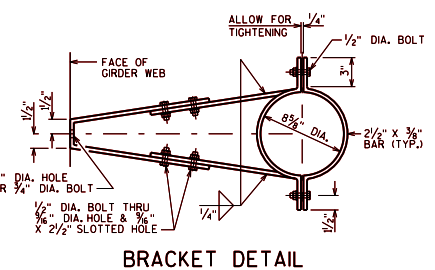
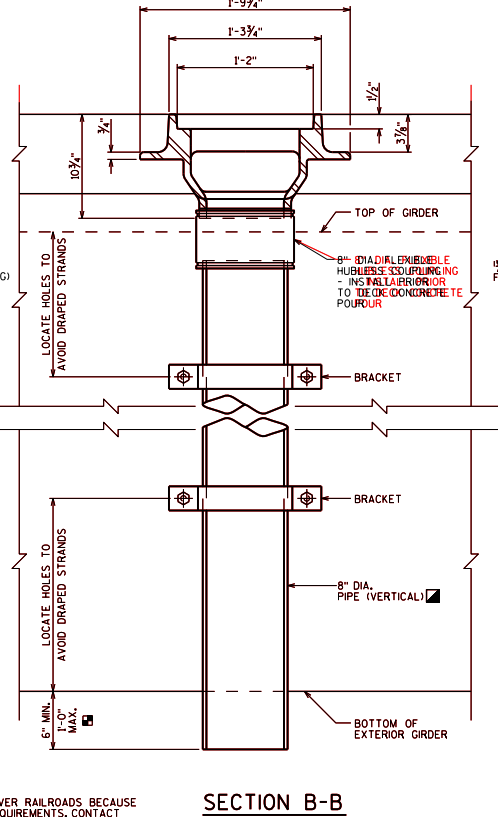
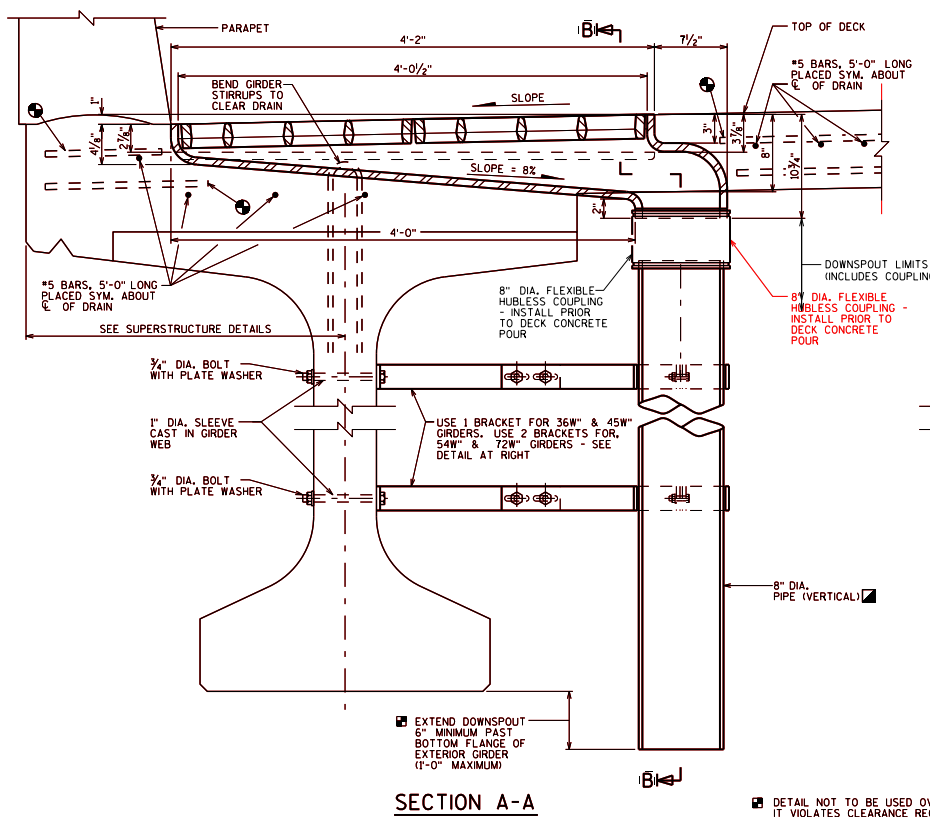
TRANSVERSE & LONGITUDINAL SLAB BAR REINFORCEMENT TO BE CUT A MAXIMUM OF 1" CLEAR FROM BRACKET FRAME. REPLACE BARS WHERE POSSIBLE.

DESIGNER'S NOTE

ALL MATERIAL FOR FLOOR DRAINS AS SHOWN ON THIS SHEET TO BE INCLUDED IN THE BID.

ON THE PRESTRESSED GIRDER SHEETS SHOWN ON LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 8-INCH". MATERIAL FOR DOWNSPOUT, CONNECTORS, AND BRACKETS AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID.

ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.



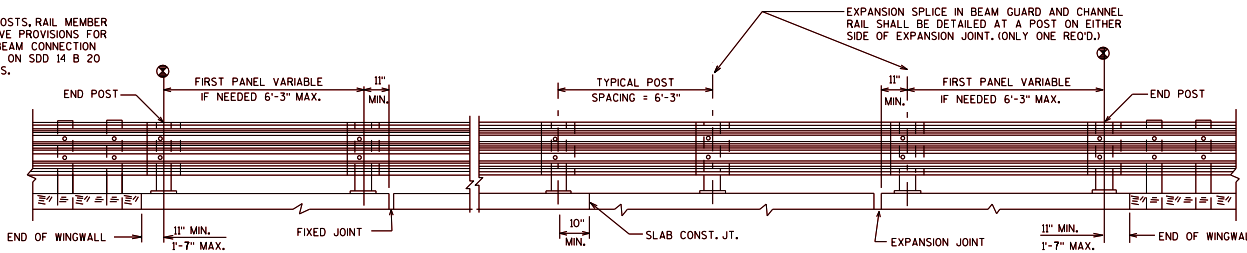
DETAIL NOT TO BE USED OVER RAILROADS BECAUSE IT VIOLATES CLEARANCE REQUIREMENTS CONTACT RAILROADS AND HARBORS SECTION FOR GUIDANCE.

FLOOR DRAIN TYPE "WF"

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-20

AT END POSTS, RAIL MEMBER SHALL HAVE PROVISIONS FOR A THREE BEAM CONNECTION AS SHOWN ON SDD 14 B 20 STANDARDS.



ELEVATION OF RAILING

LEGEND

- ① W6x25 WITH 2 - 3/4" x 2 1/2" VERT. SLOTS IN FLG. (SLOT ON OTHER SIDE OF WEB IS OPTIONAL) FOR NO.1 CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POSTS VERTICAL AND NORMAL TO GRADE LINE.
- ② C8x11.5 WITH 1 1/8" DIA. HOLES FOR NO.8.
- ③ BASE PLATE 1" x 9 1/2" x 10" WITH 1 1/8" x 1 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO.4. WELD TO NO.1 AS SHOWN.
- ④ A325 - 1/8" HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER, 1 1/4" 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 REQD. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO.3. CHAMFER TOP OF BOLTS BEFORE THREADING.
- ⑤ 1/4" x 8" x 8" FLAT BAR WITH 1 1/8" DIA. HOLES FOR ANCHOR BOLTS NO.4.
- ⑥ 1 1/4" x 3" MOUNTING BOLT WASHER (GALVANIZED).
- ⑦ 3/8" DIA. BUTTON HEAD POST MOUNTING BOLT WITH ROUND WASHER AND NUT.
- ⑧ 3/8" DIA. x 2" HEX BOLTS WITH NUT AND TWO WASHERS EACH.
- ⑨ PLATE 1/2" x 5 3/4" x 6" AT BASIC POST CONNECTION. 1/4" DIA. HOLES IN PLATE.
- ⑩ PLATE 1/2" x 5 3/4" x 1-2 1/2". 1/4" DIA. HOLES IN PLATE. 1 1/8" DIA. HOLES IN CHANNEL. EXPANSION SLOTS ON JOINT SIDE OF POST. 1 1/8" x 2 1/4" IN PLATE. 1 1/8" x 2 1/4" IN CHANNEL. (AT EXPANSION SPLICE.)
- ⑪ PLATE 1/2" x 5 3/4" x 1 1/2". 1/4" DIA. HOLES IN PLATE. 1 1/8" 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.

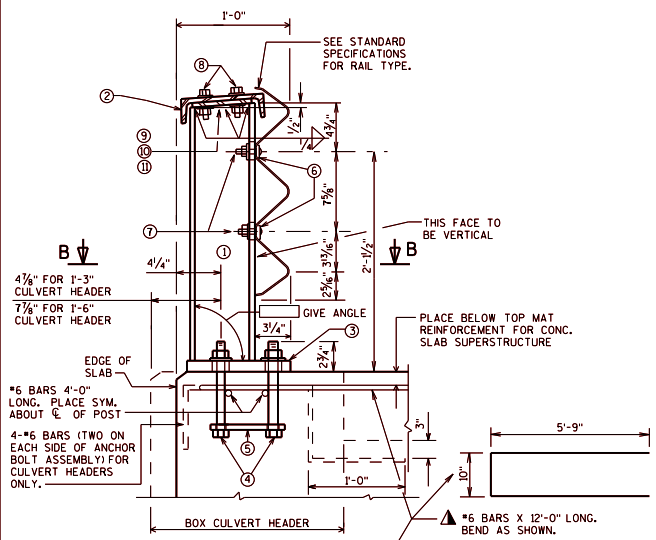
SEE STANDARD SPECIFICATIONS FOR RAIL TYPE.

CHANNEL MEMBER SHALL BE ATTACHED CONTINUOUSLY TO A MINIMUM OF FOUR POSTS AND A MAXIMUM OF EIGHT (EXCEPT AT ABUTMENTS).

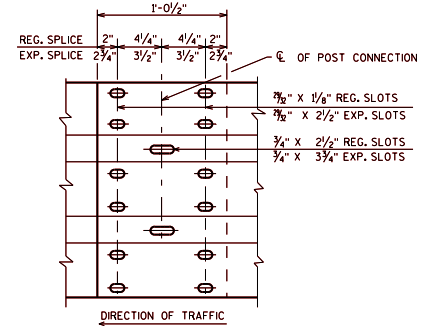
AT EXPANSION SLOTS IN RAIL AND CHANNEL MEMBERS, TIGHTEN BOLTS, BACK OFF ONE HALF TURN AND BURR THREADS. RAIL MEMBERS SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC AND THE UPPER RAIL SHALL LAP THE LOWER RAIL.

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

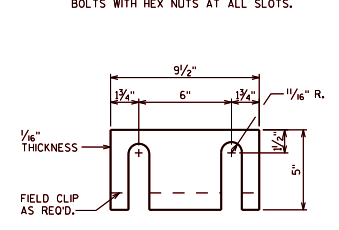
SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.



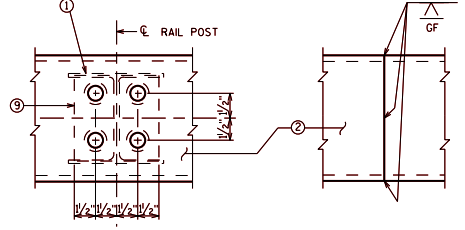
SECTION THRU RAILING



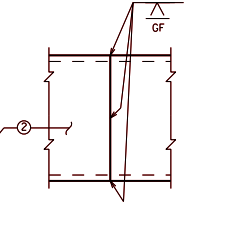
RAIL MEMBER SPLICE
3/8" DIA. BUTTON HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS.



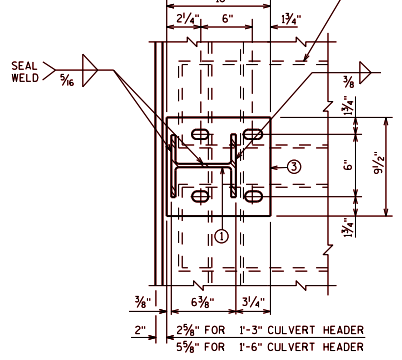
POST SHIM DETAIL
4 PER POST



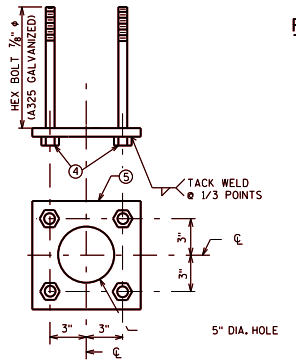
BASIC POST CONNECTION



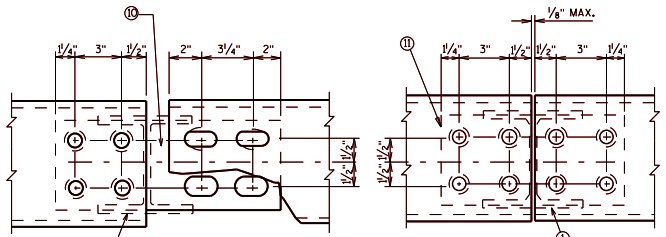
OPTIONAL SHOP SPLICE




SECTION B-B

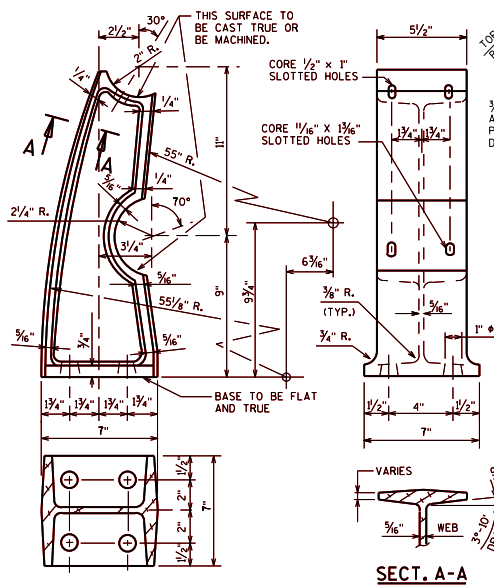


ANCHORAGE DETAIL

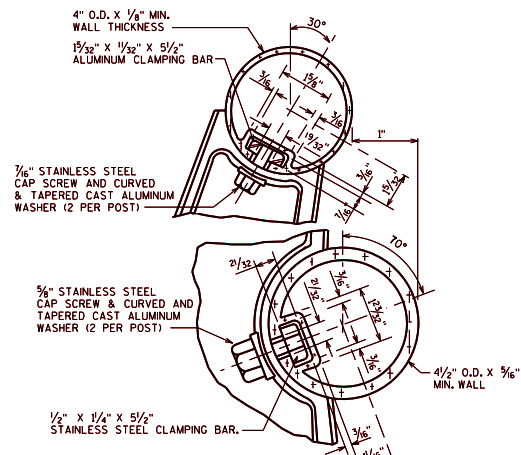


EXPANSION SPLICE CHANNEL MEMBER DETAILS
SHIM PLATES 6" x 1 1/8" x 6" MAY BE USED BETWEEN TOP OF POST AND CHANNEL MEMBER TO ACHIEVE VERT. ALIGNMENT.

STEEL RAILING TYPE 'W'	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-19</u>

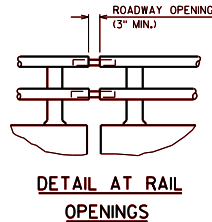
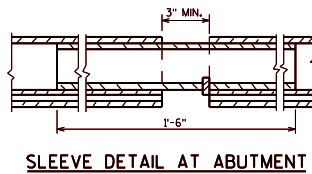
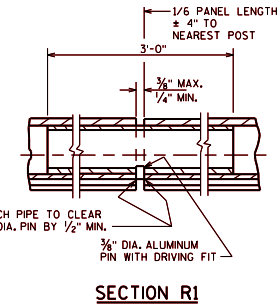
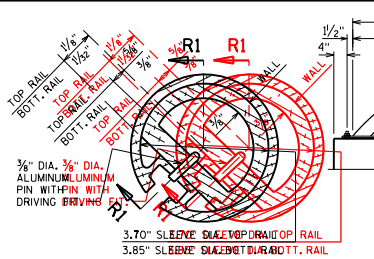


ALUMINUM POST CASTING

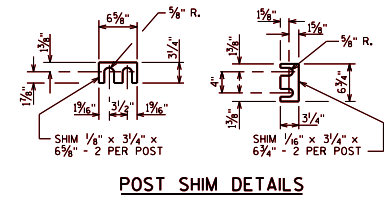
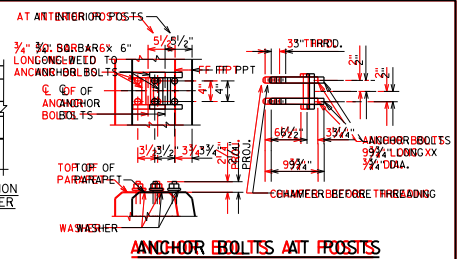
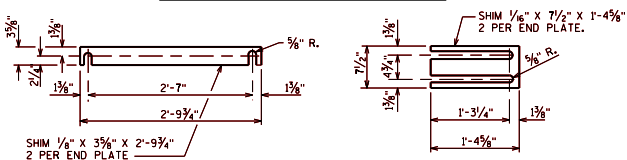
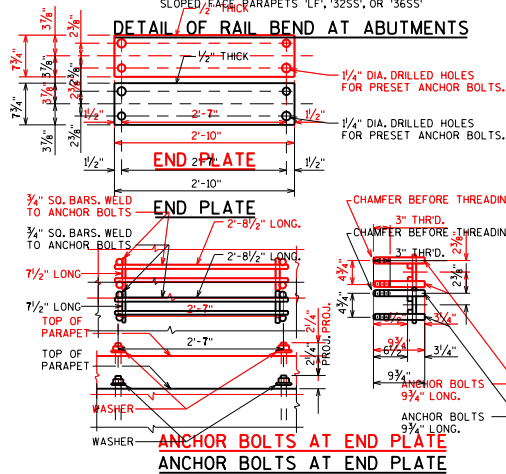
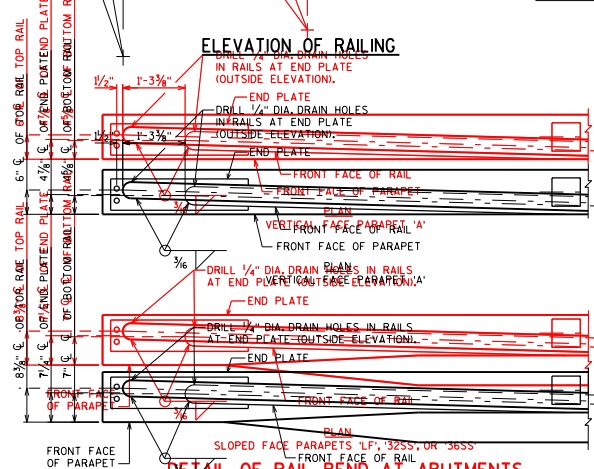
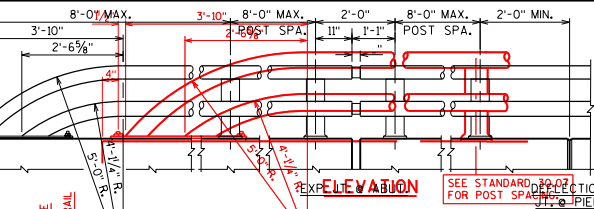


DETAIL OF ATTACHMENT TO POST

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 3/8".



ALL SLEEVE DETAILS SAME AS "RAIL SPLICING DETAIL" UNLESS SHOWN OTHERWISE



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.

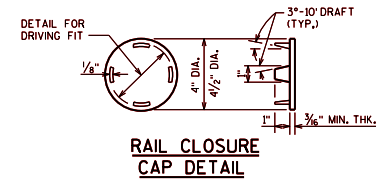
ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG CENTERLINE OF THE POST BASE.

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.

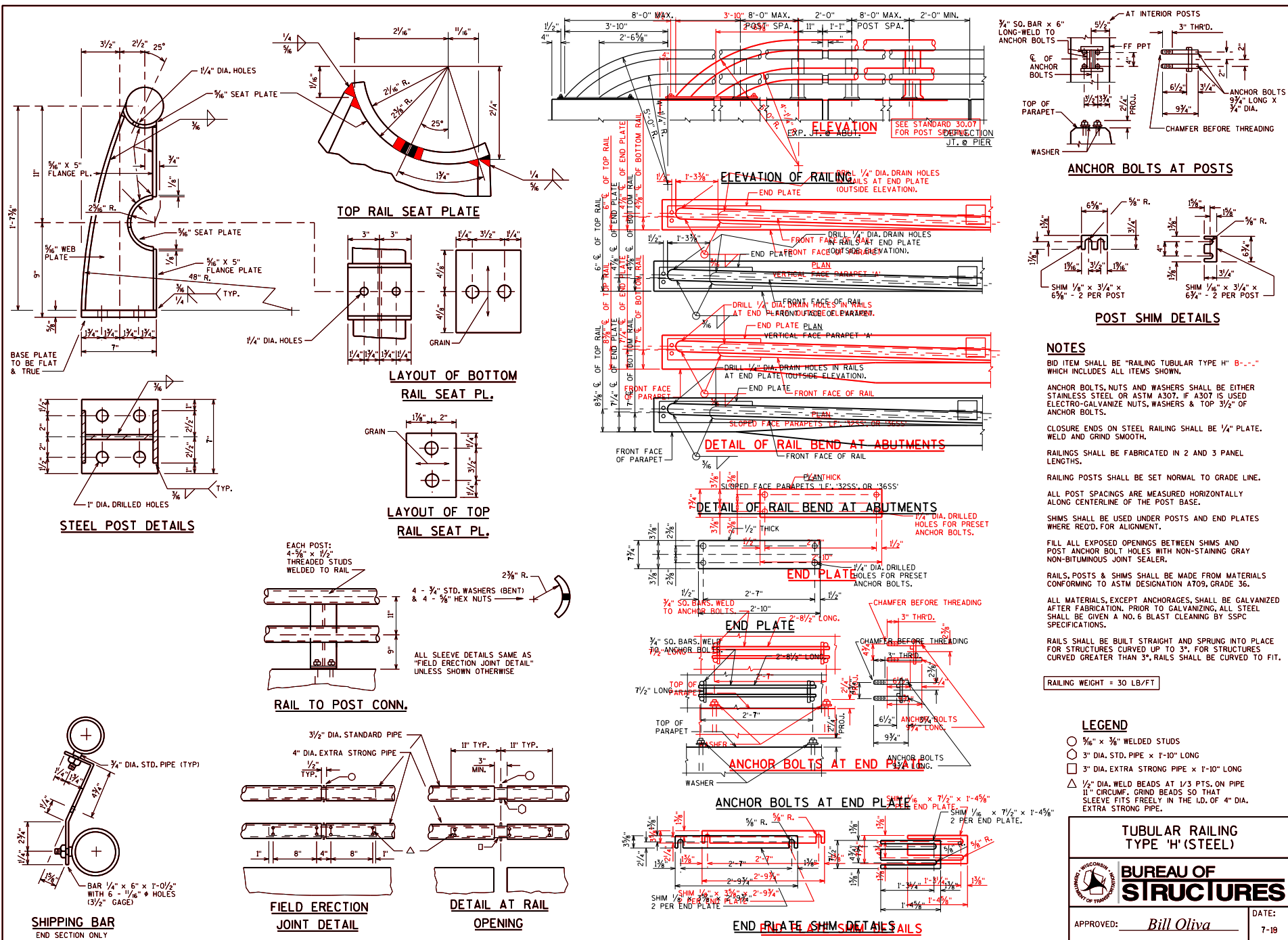
RAILING WEIGHT = 20 LB/FT



TUBULAR RAILING TYPE 'H' (ALUM.)

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-19



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 3/2" OF ANCHOR BOLTS.

CLOSURE ENDS ON STEEL RAILING SHALL BE 1/4" 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.

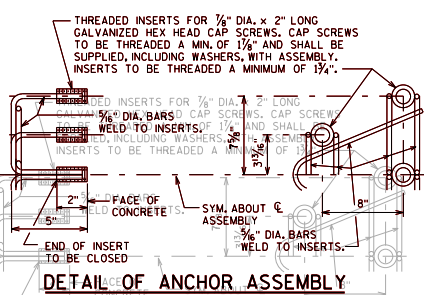
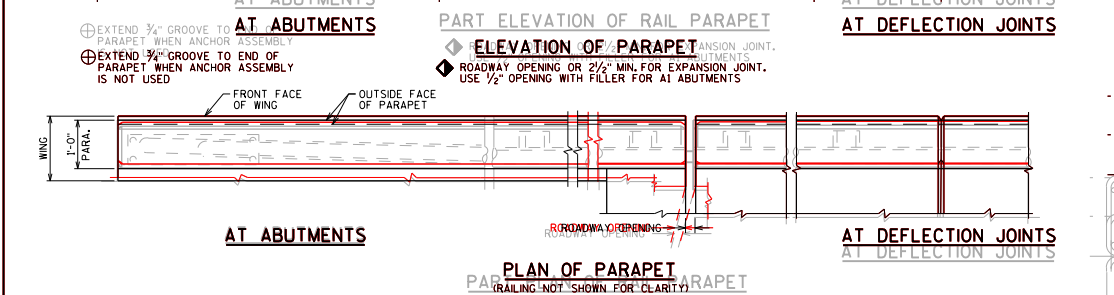
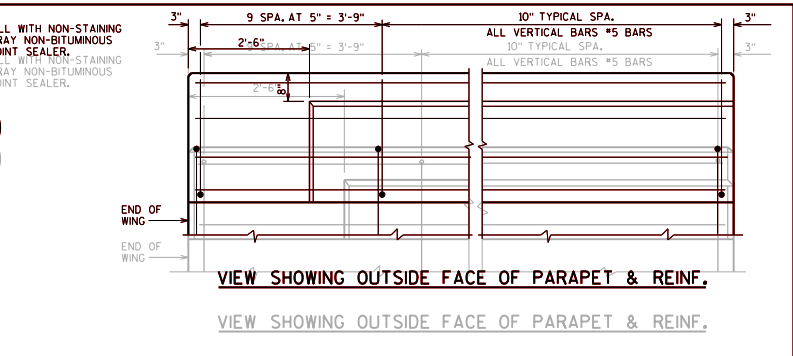
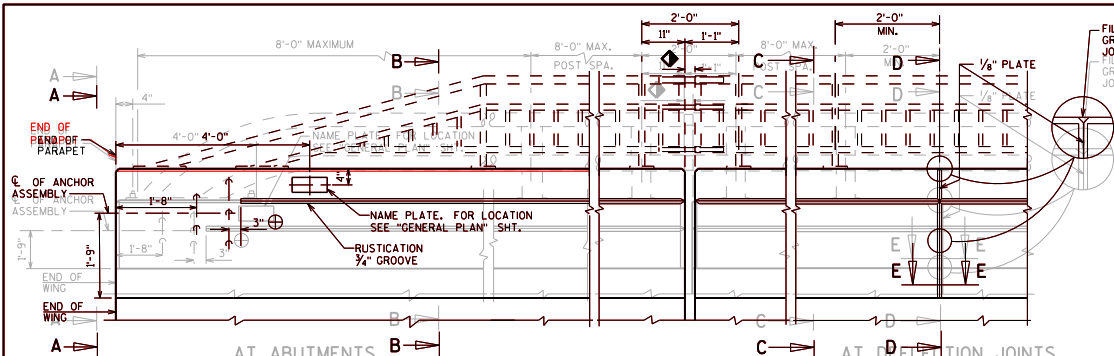
RAILS SHALL BE BUILT STRAIGHT AND SPRUNG INTO PLACE FOR STRUCTURES CURVED UP TO 3". FOR STRUCTURES CURVED GREATER THAN 3", RAILS SHALL BE CURVED TO FIT.

RAILING WEIGHT = 30 LB/FT

LEGEND

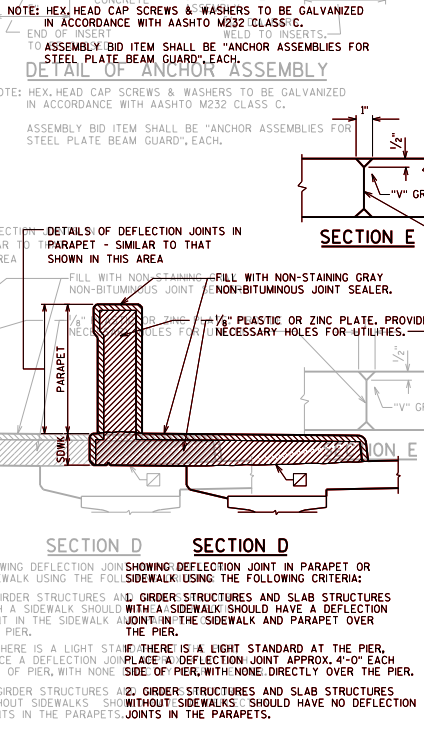
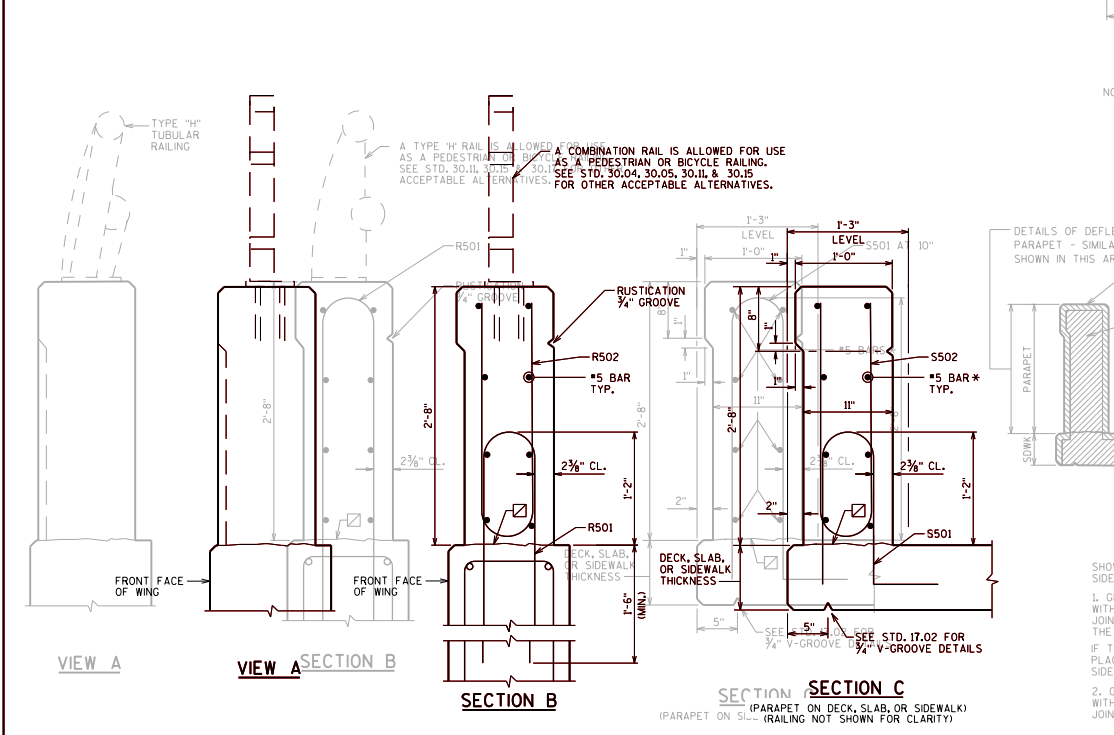
- 3/16" x 3/8" WELDED STUDS
- 3" DIA. STD. PIPE x 1'-10" LONG
- 3" DIA. EXTRA STRONG PIPE x 1'-10" LONG
- △ 1/2" DIA. WELD BEADS AT 1/3 PTS. ON PIPE 11" CIRCUMF. GRIND BEADS SO THAT SLEEVE FITS FREELY IN THE I.D. OF 4" DIA. EXTRA STRONG PIPE.

	TUBULAR RAILING TYPE 'H' (STEEL)	
	BUREAU OF STRUCTURES	
APPROVED: <i>Bill Oliva</i>	DATE: 7-19	



BILL OF BARS

BAR MARK	NO.	NO. REQ'D.	LENGTH	BAR SERIES	LOCATION
R501	X	---	6'-9"	X	PARAPET_VERT...
R502	X	---	4'-9"	X	PARAPET_VERT...
S501	X	---	4'-4"	X	PARAPET_VERT...
S502	X	---	4'-9"	X	PARAPET_VERT...



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
[Symbol] HORIZ. CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH.
[Symbol] *OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED; RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-0" MIN. JOINT SPACING OF 80'-0"; DEFINE CONST. JOINT WITH A 7/8" V GROOVE - 'V' GROOVE.

DESIGNER NOTE
A 4501 BAR MAY BE USED IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE 'A' ABUTMENTS.

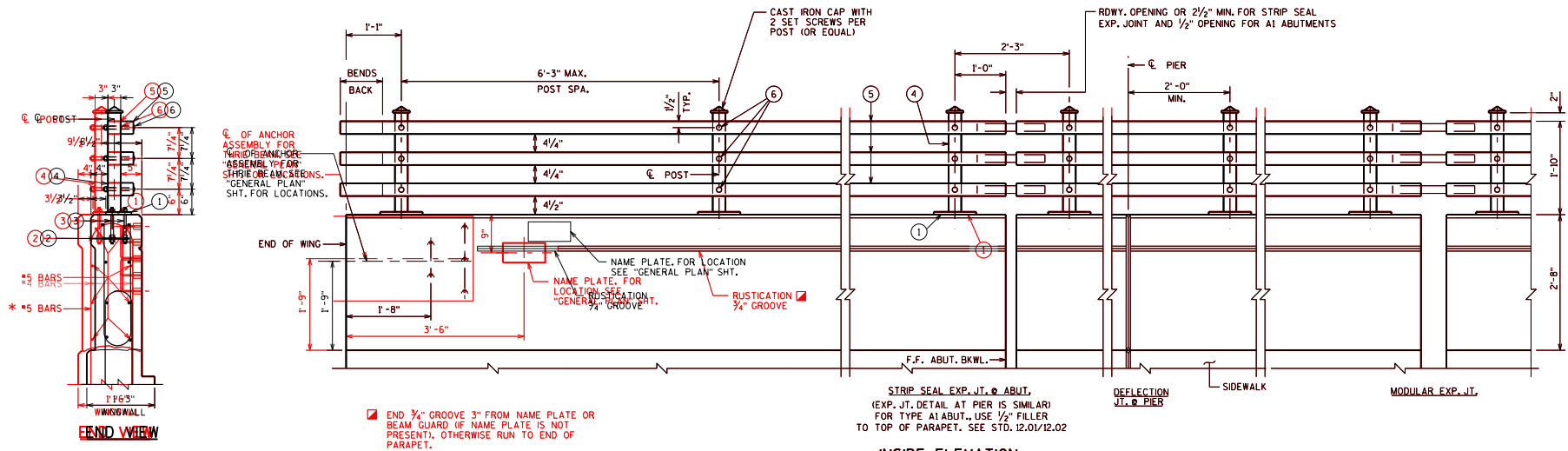
AREA	PARAPET
2.50 SF	
375 LB/FT	

VERTICAL FACE PARAPET 'A'

BUREAU OF STRUCTURES

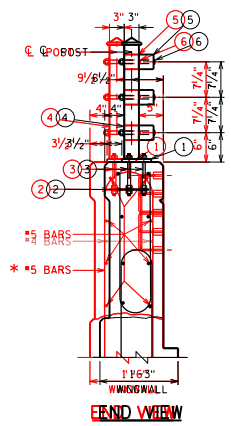
APPROVED: Bill Oliva DATE: 1-23

STANDARD 30.07

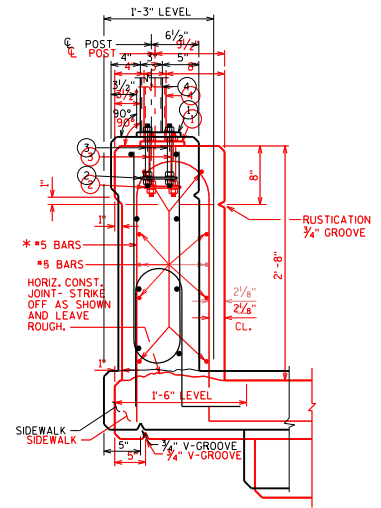


INSIDE ELEVATION

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGT. BARS A MIN. OF 1'-9\"/>

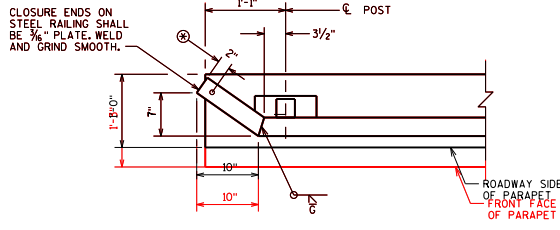


END VIEW



SECTION THRU PARAPET ON BRIDGE

*ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD.



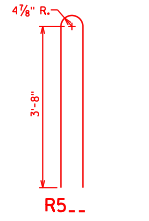
END POST DETAIL

⊙ 3/4\"/>

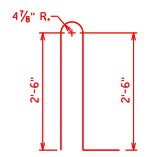
BILL OF BARS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R5..	X			8-8	X	PARAPET VERT. & WINGS
R4..	X			---		PARAPET HORIZ. & WINGS

BAR MARK	QTY	SUPERSTR.	LENGTH	BENT	LOCATION
S5..	X		7-0	X	PARAPET VERT.-SUPER.
S4..	X		---		PARAPET VERT.-SUPER.



R5..



S5..

2'-8\"/>
AREA 3.16 S.F.
WEIGHT 474 LB./FT.

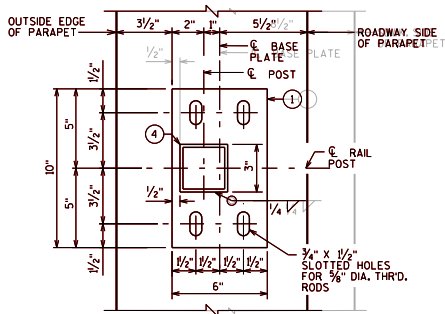
STEEL RAILING WEIGHT = 25 LB/FT BASED ON 6'-3\"/>

DESIGNER NOTES

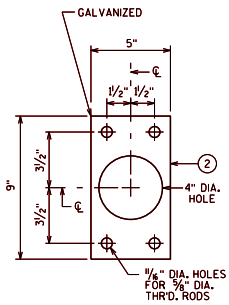
SEE STANDARD 30.09 FOR ADDITIONAL RAILING DETAILS
 SEE STANDARD 30.07 FOR:
 - DEFLECTION JOINT DETAILS AND NOTES
 - BEAM GUARD ANCHOR ASSEMBLY DETAILS
 - SIDEWALK REINFORCEMENT AND DETAILS
 - PARAPET REINFORCING BAR SIZE AND SPACING

STEEL RAILING WEIGHT = 25 LB/FT BASED ON 6'-3\"/>

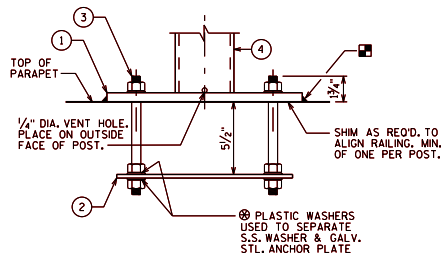
COMBINATION RAILING TYPE '3T'	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-13</u>



TYPICAL RAIL POST BASE PLATE

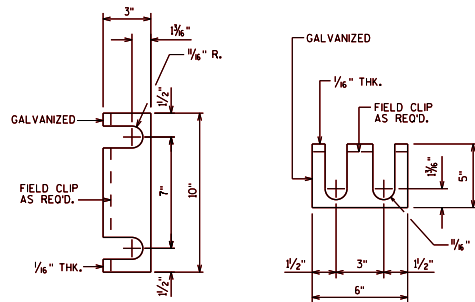


ANCHOR PLATE



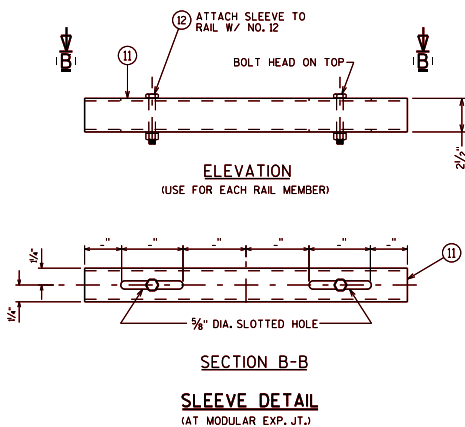
ANCHORAGE FOR RAIL POSTS

★NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



RAIL POST SHIM DETAIL

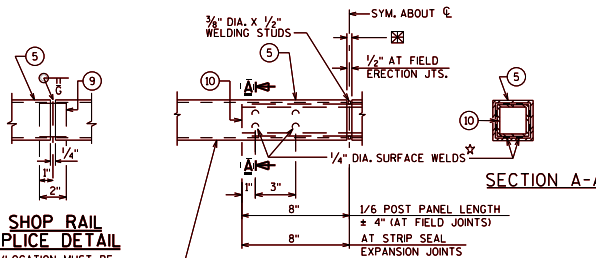
(2 SETS PER POST)



SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)

⊠ ROWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT AND 1/2" OPENING FOR A1 ABUTMENTS



FIELD ERECTION JOINT DETAIL

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

PROVIDE 3/4" DIA. DRAIN HOLES IN LOW END OF ALL RAILS, CLEAR OF SPLICE SLEEVE.


LEGEND

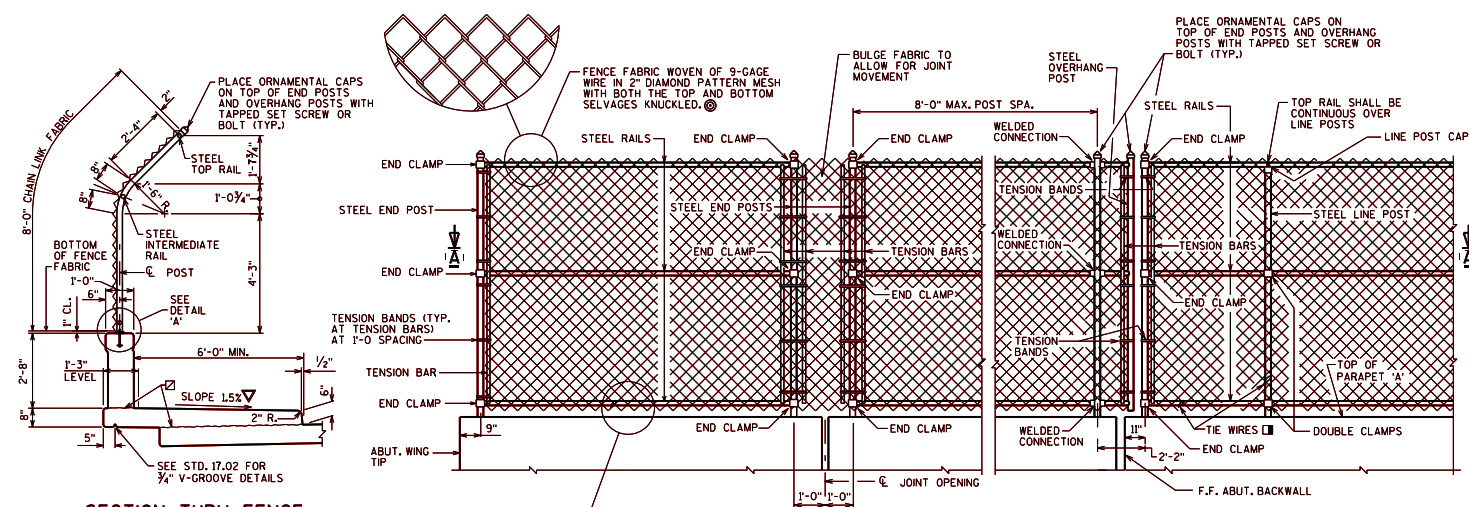
- ① BASE PLATE 3/8" X 6" X 10" WITH 3/4" X 1/2" SLOTTED HOLES FOR THRD RODS NO. 3, WELD TO NO. 4 AS SHOWN. SLOTS PARALLEL TO LONG SIDE OF PLATE.
- ② 1/4" X 5" X 9" ANCHOR PLATE (GALVANIZED) WITH 1/4" DIA. HOLES FOR THRD. RODS NO. 3.
- ③ 3/8" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP.
- ④ STRUCTURAL TUBING 3" X 3" X 3/8" 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 3/8" RAILS, WITH 1/4" DIA. HOLES (FRONT AND BACK) FOR BOLT NO. 6. BOLT TO NO. 4.
- ⑥ 3/4" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1/2" X 1/2" WASHER, AND LOCK WASHER.
- ⑦ RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. PROVIDE "SLIDING FIT".
- ⑧ RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. (1'-4" Ø FIELD ERECTION JTS.) (1'-4" Ø STRIP SEAL EXP. JTS.)
- ⑨ SLEEVE FABRICATED FROM STRUCTURAL TUBING 2 1/2" X 2 1/2" X 3/8" X 1'-2" LONG. SLOTTED HOLES IN TOP AND BOTTOM.
- ⑩ 1/2" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCKWASHER.

★ ALTERNATIVE ANCHORAGE: 4 EQUIVALENT STAINLESS STEEL CONCRETE ADHESIVE ANCHORS 3/8"-INCH EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 5602.2220 AND 502.33 AND 02.33 AND 02.33 STANDARDS. SPECIFICATIONS.

NOTES

- BID ITEM SHALL BE "RAILING STEEL TYPE 3T" 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.

COMBINATION RAILING TYPE '3T' DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>8-20</u>



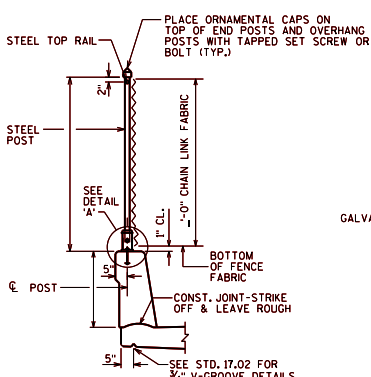
SECTION THRU FENCE ON PARAPET 'A'

PROTECTIVE SCREENING MAY BE BENT OR STRAIGHT FOR RAISED SIDEWALKS OR SIDEWALKS SEPARATED FROM TRAFFIC BY A BARRIER. SEE BRIDGE MANUAL 30.3 (D) 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.

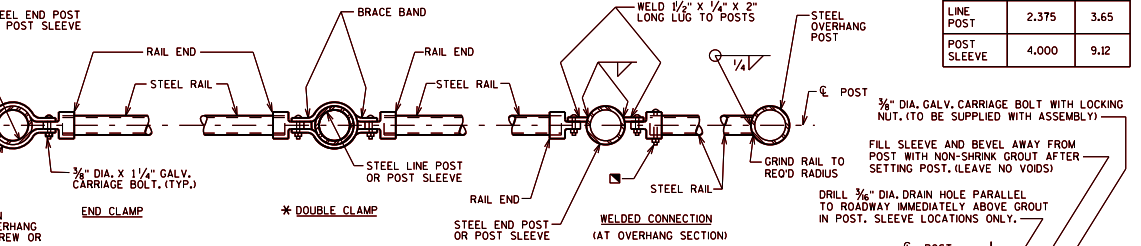
WEIGHT OF CHAIN LINK FENCE:
(BASED ON 8 FT. POST SPACING)
6 FT. HIGH FENCE = 18 LB / FT
8 FT. HIGH FENCE = 21 LB / FT



SECTION THRU FENCE ON SINGLE SLOPE PARAPET

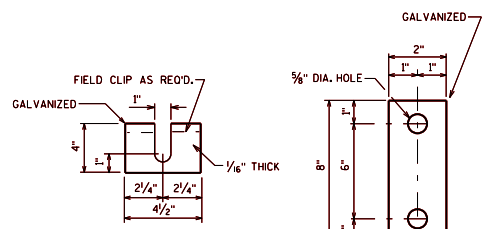
FOR TRAFFIC BARRIER APPLICATION, USE VERTICAL POST (NO BEND)

FENCE PART ELEVATION
(OUTSIDE VIEW OF PARAPET 'A')



SECTION A-A

NOTE: PLACE ALL BOLT HEADS ON SIDE OF FENCE ADJACENT TO PEDESTRIANS

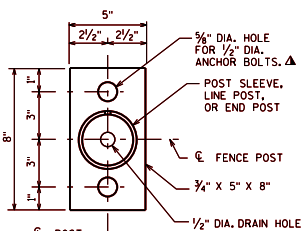


POST SHIM DETAILS

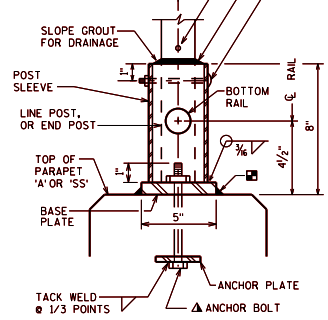
SHIMS REQUIRED ONLY WHEN END POSTS AND LINE POSTS ARE WELDED TO BASE PLATES. PROVIDE 4 SHIMS PER POST, USE WHERE REQUIRED FOR ALIGNMENT.

ANCHOR PLATE

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



BASE PLATE



DETAIL 'A'

NOTE: IN LIEU OF USING THE POST SLEEVE, THE FENCE POST MAY BE WELDED TO THE BASE PLATE.

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

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 - FT."
- 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 1/2" INCH, EMBEDD 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.
- ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH THE 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 1/4 POINT OF POST SPACING.

DESIGNER NOTES

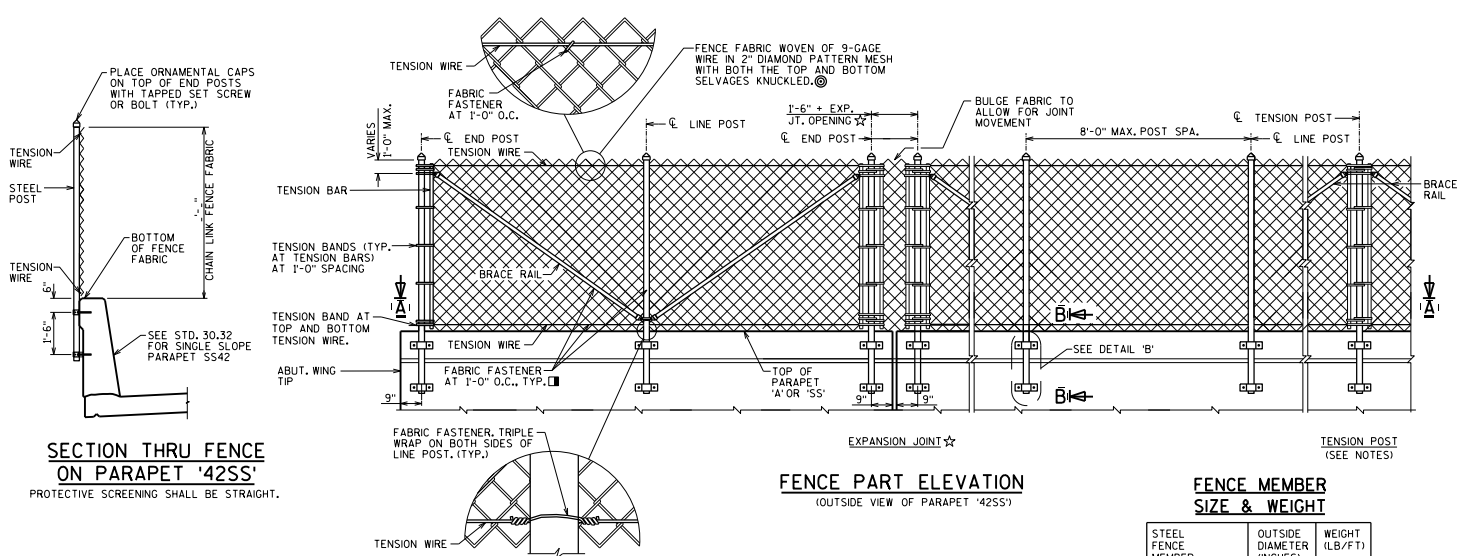
- THE CHAIN LINK FENCE SYSTEM SELECTED FOR THE STRUCTURE SHALL BE A "METALLIC-COATED FENCE SYSTEM" OR A "POLYMER-COATED FENCE SYSTEM".
- 1" MESH MAY BE USED ON PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE 11-35-1 FOR PROTECTIVE SCREENING.
- PEDESTRIAN RAILING MAY BE 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.
- FOR DESIGN AND CONSTRUCTION OF THE SIDEWALK RAILING DESIGNER SHALL ACCOUNT FOR A MINIMUM 1/2" SIDEWALK CROSS SLOPE.

CHAIN LINK FENCE DETAILS



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva* DATE: *7-20*



SECTION THRU FENCE ON PARAPET '42SS'
PROTECTIVE SCREENING SHALL BE STRAIGHT.

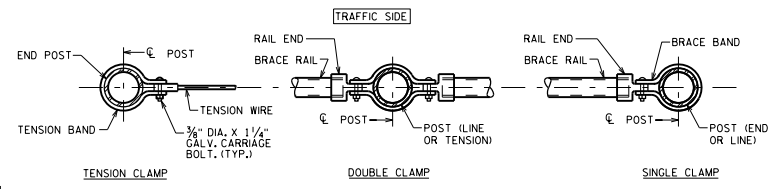
FENCE PART ELEVATION
(OUTSIDE VIEW OF PARAPET '42SS')

FENCE MEMBER SIZE & WEIGHT

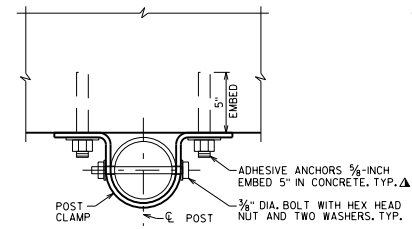
STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
POST (END, LINE, OR TENSION)	3.50	7.576
BRACE RAIL	1.66	2.273

NOTES

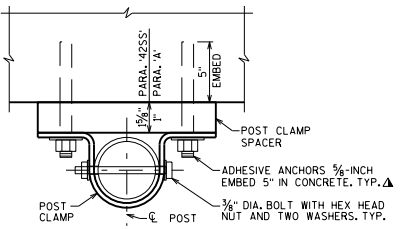
- POSTS ARE TO BE SET VERTICAL.
- METALLIC-COATED FENCE SYSTEM:**
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT THE FENCE FABRIC WHICH MAY BE ALUMINUM-COATED STEEL OR GALVANIZED STEEL.
FABRIC SHALL CONFORM TO ASTM A491 OR A392, CLASS 2. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM 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-..."
- ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG THE C/L OF THE POST.
- ANCHOR RODS SHALL BE F1554 GRADE 36. BOLTS SHALL BE ASTM A307, NUTS SHALL BE ASTM A563, AND WASHERS SHALL BE ASTM F436. POST CLAMPS AND POST CLAMP SPACERS SHALL BE ASTM A709, GRADE 36. TENSION WIRE SHALL BE 7 GAGE STEEL WIRE COATED IN ACCORDANCE WITH ASTM A824 AND A817 AS EITHER TYPE I (ALUMINUMIZED) OR TYPE II, CLASS 4 (GALVANIZED).
- ANCHOR RODS, BOLTS, NUTS, POST CLAMPS, POST CLAMP SPACERS AND WASHERS SHALL BE GALVANIZED.
- COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.



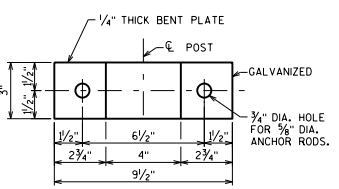
SECTION A-A
NOTE: PLACE ALL BOLT HEADS ON THE TRAFFIC SIDE



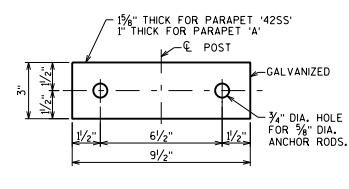
SECTION C-C



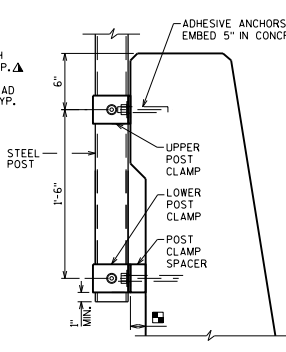
SECTION D-D



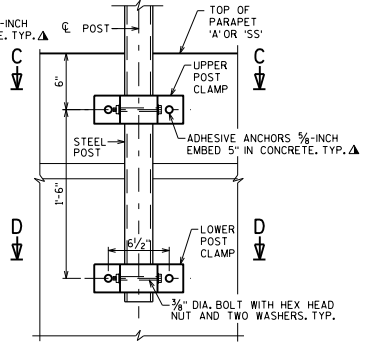
POST CLAMP DETAIL



POST CLAMP SPACER DETAIL



SECTION B-B



DETAIL 'B'

- CONCRETE ADHESIVE ANCHORS 3/8"-INCH, EMBED 5" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.
- ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH THE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".
- PROVIDE TENSION POST AND BRACE RAILS TO LIMIT TENSION WIRE RUNS TO LESS THAN 500 FEET.
- DESIGNER NOTES**
THE SIDE-MOUNTED CHAIN LINK FENCE SHOULD ONLY BE USED WHEN THE DESIGN SPEED EXCEEDS 45 MPH AND PROTECTIVE SCREENING IS WARRANTED. FOR DESIGN SPEEDS 45 MPH OR LESS, THE TOP-MOUNTED CHAIN LINK FENCE (STANDARD 30.11) SHOULD BE USED.
THE CHAIN LINK FENCE SYSTEM SELECTED FOR THE STRUCTURE SHALL BE A "METALLIC-COATED FENCE SYSTEM" OR A "POLYMER-COATED FENCE SYSTEM".
PROVIDE 6'-0" CHAIN LINK FENCE FABRIC, UNLESS DIRECTED OTHERWISE. SEE BRIDGE MANUAL 30.9 FOR ADDITIONAL INFORMATION.
- A 1" MESH MAY BE USED ON PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE II-35-1 FOR PROTECTIVE SCREENING.
- EXPANSION JOINT OPENING ≤ 6" OF MOVEMENT. FOR FIXED JOINTS MAINTAIN TYP. VERT. POST SPA. ACROSS JOINT AND PLACE TENSION BAR ON END POST. FOR JOINT OPENINGS > 6" REFER TO STD. 30.11.

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

CHAIN LINK FENCE SIDE-MOUNTED DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-21

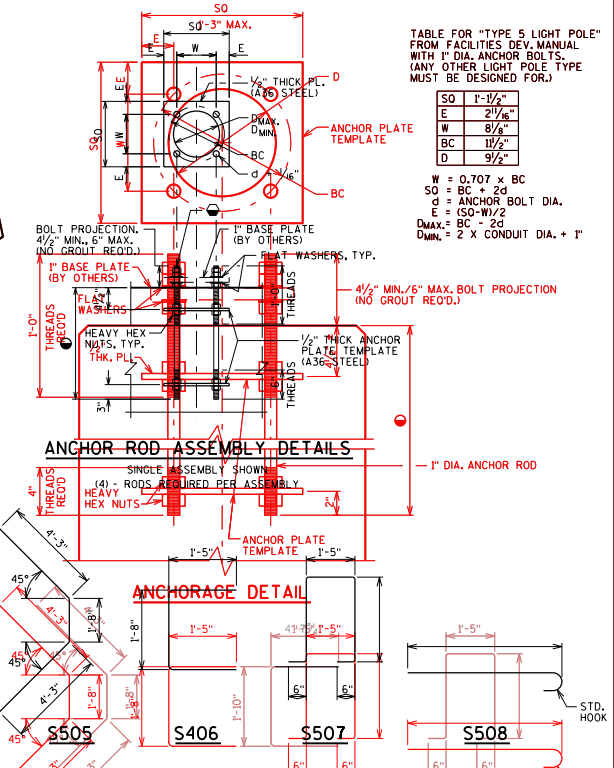
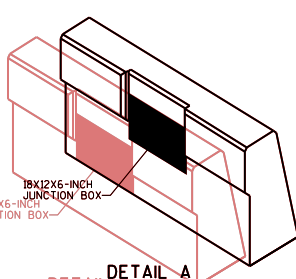
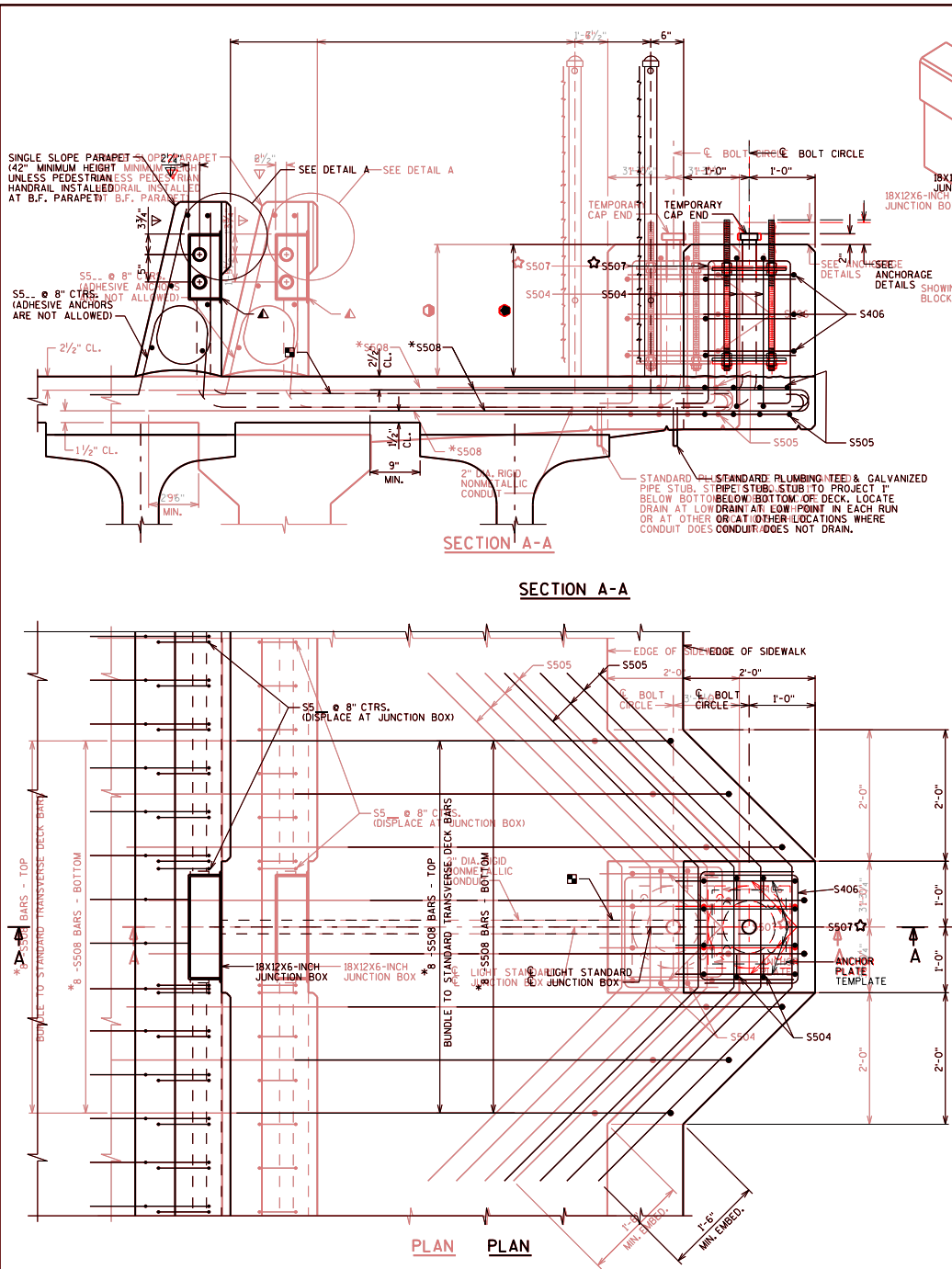


TABLE FOR "TYPE 5 LIGHT POLE" FROM FACILITIES DEV. MANUAL WITH 1" DIA. ANCHOR BOLTS. (ANY OTHER LIGHT POLE TYPE MUST BE DESIGNED FOR.)

SO	1-1/2"
E	2 1/16"
W	8 5/8"
BC	1 1/2"
D	9 1/2"

$W = 0.707 \times BC$
 $SO = BC + 2d$
 $d = \text{ANCHOR BOLT DIA.}$
 $E = (SO - W) / 2$
 $D_{MAX} = BC - 2d$
 $D_{MIN} = 2 \times \text{CONDUIT DIA.} + 1"$

- ANCHOR RODS
1" DIA. ANCHOR RODS ASTM F1554 GR 55, HEAVY HEX NUTS ASTM F436, AND WASHERS ASTM F436 ANCHOR RODS SHALL BE GALVANIZED PER SECTION 331 OF THE STANDARD SPECIFICATION, PROVIDE (2) WASHERS AND (7) NUTS PER ANCHOR ROD.
- 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 BUSTER PEDESTAL
SEE STANDARD 30.21 S = 2'-0"
< 1" DIA. ANCHOR BOLTS = 1'-3"
- CUT OUT = 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE 1'-11"
- CONDUIT SIZE SELECT ONE:
< 1" DIA. ANCHOR BOLTS = 1'-3"
> 1" DIA. ANCHOR BOLTS = 1'-2"
- LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.
- SEE STANDARD 30.21
- TIE IN PLACE AFTER ANCHOR BOLT ASSEMBLY LOCATION.
- CUT OUT = 1" OF GASKET AT BOTTOM OF JUNCTION BOX
- SEE ADDITIONAL NOTES
- END OF BRIDGE DETAILS
- END OF BRIDGE DETAILS
- THIS STANDARD IS NOT INTENDED TO BE USE WITH TRANSFORMER BASES INTENDED TO BE USE WITH TRANSFORMER BASES.

NOTE
THIS SHALL BE "ANCHOR ASSEMBLY POLES ON STRUCTURES" LEAVE "ANCHOR ASSEMBLY LIGHT POLES ON STRUCTURES", EACH

DESIGNER NOTES
ANCHORAGE DETAIL FOR "TYPE 5 LIGHT POLE". ANCHORAGE FOR OTHER LIGHT POLES MUST BE BEING DESIGNED.
SEE STD. 30.11 FOR FENCE DETAILS.
SEE STD. 30.11 FOR FENCE DETAILS.
SEE STD. 30.21 FOR
SEE ADDITIONAL NOTES
- END OF BRIDGE DETAILS
- END OF BRIDGE DETAILS

THIS STANDARD IS NOT INTENDED TO BE USE WITH TRANSFORMER BASES INTENDED TO BE USE WITH TRANSFORMER BASES.

THIS STANDARD ACCOMMODATES A MAXIMUM 1 1/2" DIA. BOLT HOLE CIRCLE AND A MAXIMUM 1 1/2" X 1 1/2" SQUARE ANCHOR PLATE WITH (4) 1" DIA. ANCHOR BOLTS. THIS STANDARD IS BASED ON A 8" MIN. DECK THICKNESS.

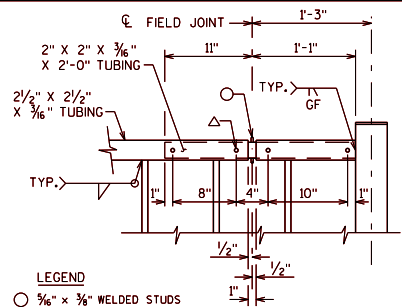
BILL OF BARS

BAR MARK	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'-4"	X	LIGHT STD., HORIZ.
S507	X		X	LIGHT STD., VERT.
S508	X		X	LIGHT STD., TRANSV. IN DECK

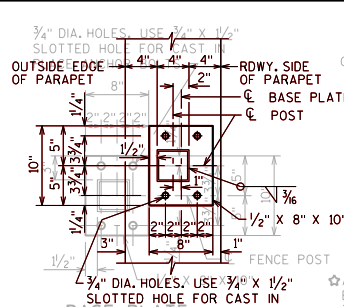
LIGHTING DETAIL

BUREAU OF STRUCTURES

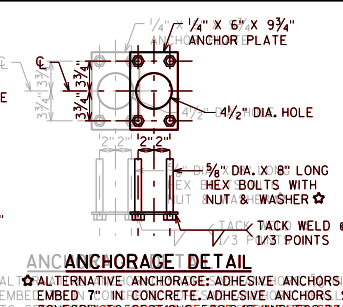
APPROVED: Bill Oliva DATE: 7-20



RAILING EXPANSION JOINT DETAIL

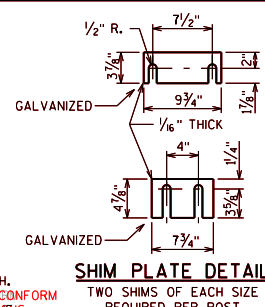


BASE PLATE



ANCHORAGE DETAIL

ALTERNATIVE ANCHORAGE: ADHESIVE ANCHORS, 5/8-INCH EMBEDDED, 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 050205 SECTION 502.02 AND 502.03.4 FOR DETAILS. STANDARD SPECIFICATIONS.
 NOTE: ANCHOR PLATE NOT REQUIRED WHEN ANCHORS ARE PAINTED AND WIRE REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



SHIM PLATE DETAILS

TWO SHIMS OF EACH SIZE REQUIRED PER POST

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" 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.

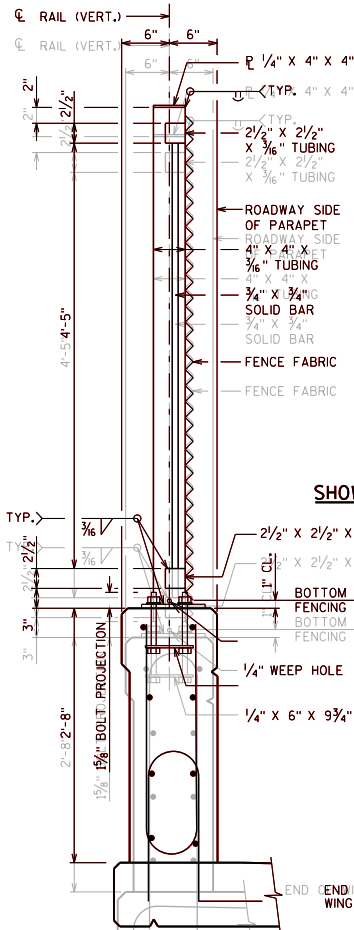
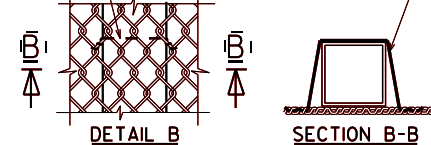
DESIGNER NOTES

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.

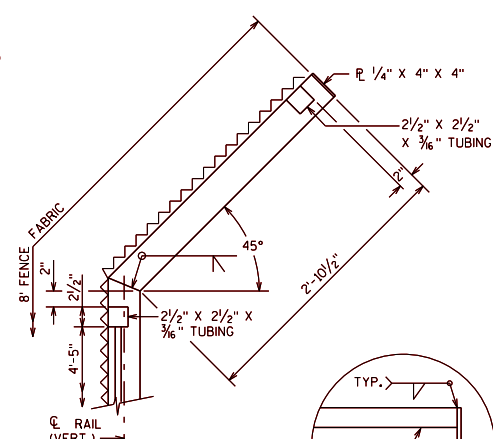
FENCE HEIGHT, CURVED OR STRAIGHT, MESH SIZE, COATING AND COLOR SHOULD BE COORDINATED WITH THE REGION. SEE BRIDGE MANUAL 30.3 (8) FOR ADDITIONAL GUIDANCE.

FABRIC TIE @ 1'-0" MAX. SPA. (TYP. RAIL POSTS & HORIZ. TUBING)

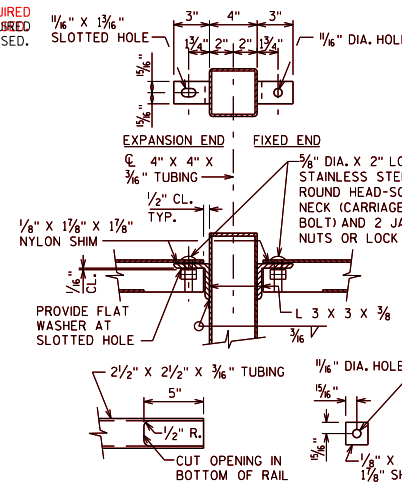


SECTION THRU RAILING

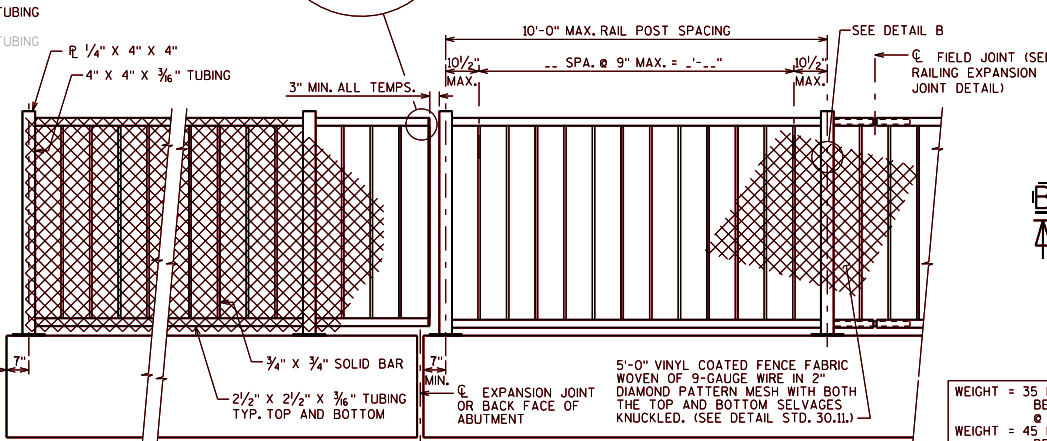
(SEE STD. 30.07 FOR PARAPET REINFORCEMENT AND DETAILS)



SECTION THRU FENCE SHOWING DETAILS FOR BENT TOP



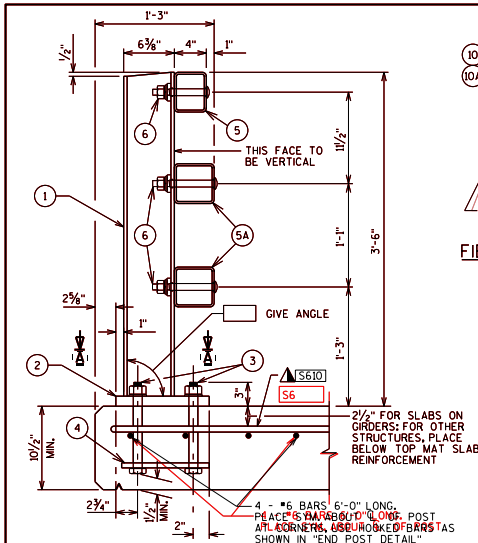
TOP RAIL CONNECTION FOR FENCE W/ BENT TOP



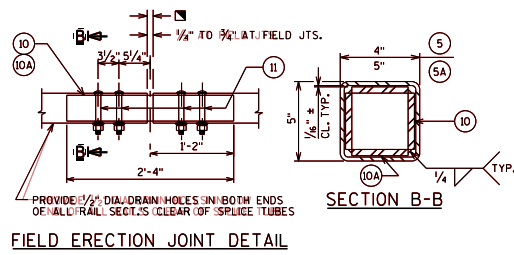
INSIDE ELEVATION OF RAILING

WEIGHT = 35 LB/FT (W/O BENT SECTION @ TOP)
 WEIGHT = 45 LB/FT (W/ BENT SECTION @ TOP)

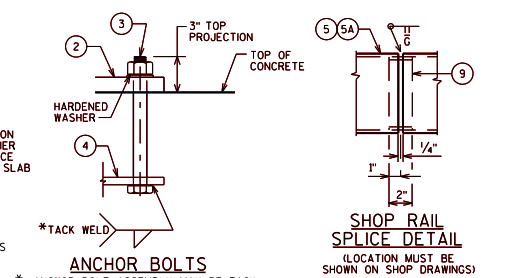
TUBULAR STEEL RAILING SCREENING	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-20</u>



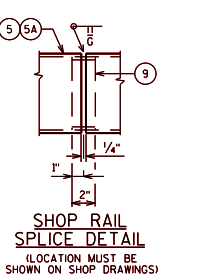
SECTION THRU RAILING ON DECK



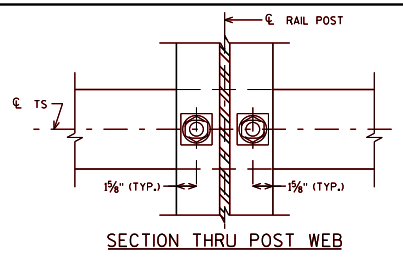
FIELD ERECTION JOINT DETAIL



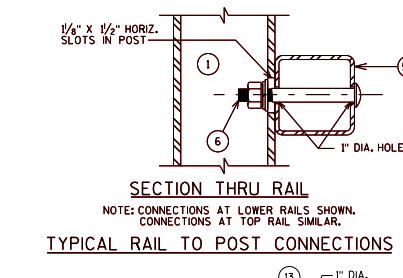
ANCHOR BOLTS



SHOP RAIL SPlice DETAIL

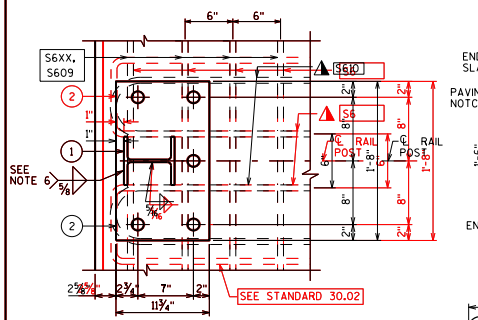


SECTION THRU POST WEB

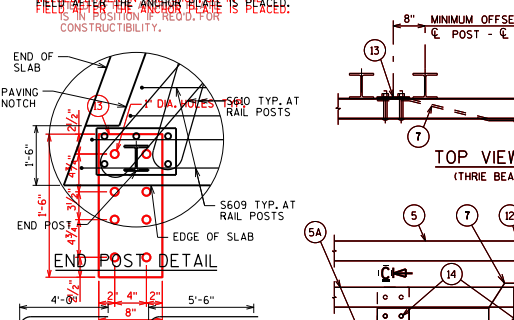


SECTION THRU RAIL

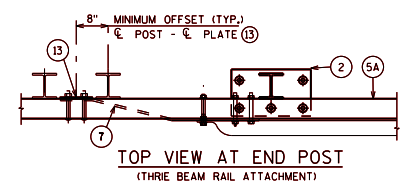
TYPICAL RAIL TO POST CONNECTIONS



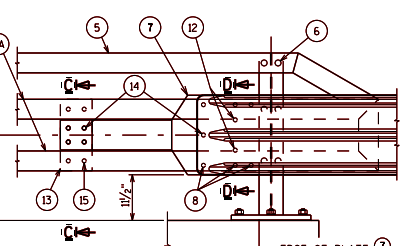
SECTION A-A



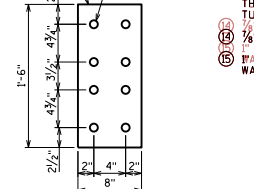
END POST DETAIL



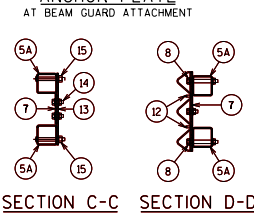
TOP VIEW AT END POST



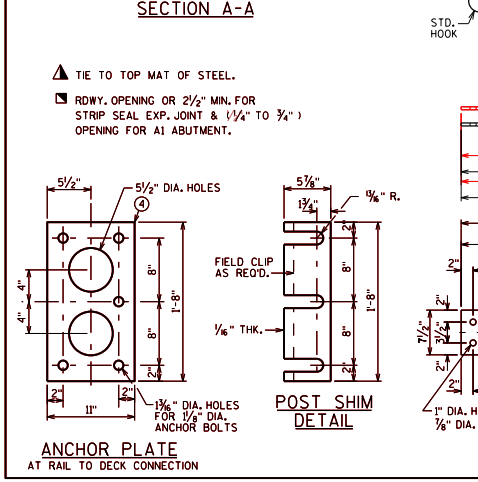
DETAIL AT END POST



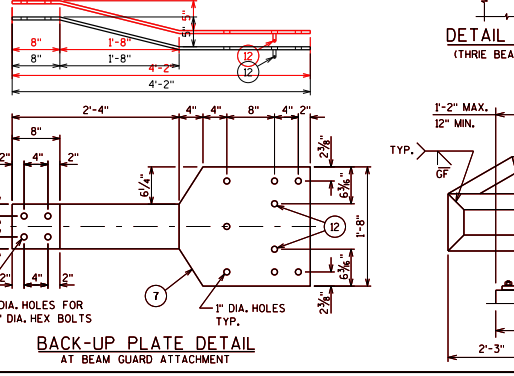
ANCHOR PLATE AT BEAM GUARD ATTACHMENT



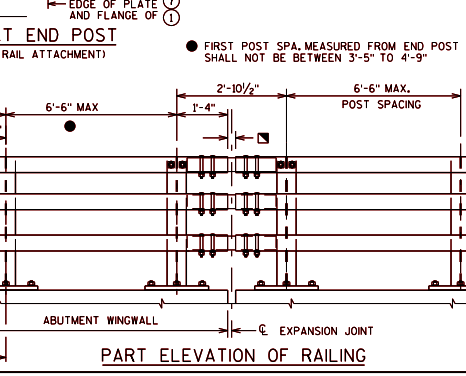
SECTION C-C SECTION D-D



ANCHOR PLATE AT RAIL TO DECK CONNECTION



BACK-UP PLATE DETAIL AT BEAM GUARD ATTACHMENT



PART ELEVATION OF RAILING

- LEGEND**
- W6 x 25 WITH 1/4" x 1/2" 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.
 - PLATE 1/4" x 1 1/2" x 1-8" WITH 1/16" DIA. UNSLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO INCL. AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
 - ASTM A449 - 1/8" DIA. ANCHOR BOLTS WITH NUT AND HARDENED WASHER (ALL GALVANIZED), 5 REOD. 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 10 1/2" LONG AT ALL OTHER LOCATIONS. (AN EQUIVALENT THREADED ROD WITH NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REOD. FOR CONSTRUCTABILITY.)
 - 3/4" x 11" x 1-8" ANCHOR PLATE (GALVANIZED) WITH 3/16" DIA. HOLES FOR ANCHOR BOLTS NO. 3
 - TS 5 x 4 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
 - TS 5 x 5 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
 - 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH NUT, 3/4" x 1 1/2" x 1 1/2" MIN. WASHER, AND LOCK WASHER (2 REOD. AT EACH RAIL TO POST LOCATION.)
 - 1/2" THK. BACK-UP PLATE WITH 2 - 3/8" x 1/2" THREADED SHOP WELDED STUDS (NO. 12). BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THREE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.
 - 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5A FOR 7/8" DIA. A325 BOLTS WITH HEX NUTS AND WASHERS. 6 HOLES IN TUBES AND PLATE NO. 7.
 - SPlice SLEEVE FABRICATED FROM 1/4" PLATE. PROVIDE "SLIDING FIT".
 - 3/8" x 3 3/8" x 2-4" PLATE. 2 PER RAIL. USED IN NO. 5 & 5A.
 - 3/8" x 2 3/8" x 2-4" PLATE USED IN NO. 5. 3/8" x 3 3/8" x 2-4" PLATE USED IN NO. 5A. 2 PER RAIL.
 - 1/2" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER. USE 1 1/2" x 1/2" LONG. SLOTTED HOLES IN PLATE NO. 10A. AT FIELD JOINTS AND 1 1/2" x 1/2" MIN. LONG. SLOTTED HOLES AT END JOINTS (IN PLATE NO. 10A). PROVIDE 1/8" DIA. ROUND HOLES IN TUBES NO. 5 AND NO. 5A.
 - 1/2" DIA. x 1 1/2" LONG THREADED SHOP WELDED STUDS (2 REOD.).
 - 1/2" x 8" x 1-6" PLATE. BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THREE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.
 - 7/8" DIA. x 2" LONG A325 HEX BOLT WITH NUT AND WASHER (5 REOD.).
 - 7/8" DIA. x 2" LONG A325 HEX BOLT WITH NUT AND WASHER (5 REOD.).
 - 1" DIA. HOLES IN TUBES NO. 5A FOR 7/8" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER (4 REOD.). 4 HOLES IN TUBES.

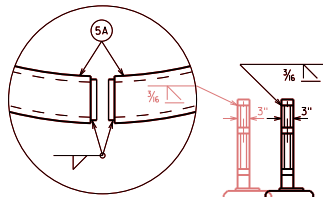
- NOTES**
- THIS SHALL BE "RAILING TUBULAR TYPE M" WHICH INCLUDES
 - BID ITEM SHALL BE "RAILING TUBULAR TYPE M" WHICH INCLUDES
 - ALL ITEMS SHOWN
 - RAILING BASE PLATES SHALL CONFORM TO THE REQUIREMENTS
 - RAIL POSTS AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. HOLLOW RAILING STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH ALL CERTIFIED FT & 50 KSI ANCHOR BOLTS AND SPlice TUBE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE 36.
 - THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/8" TURN.
 - RAIL SHALL BE CONTINUOUS OVER A MINIMUM OF THREE POSTS
 - RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPICES WHERE POSSIBLE. RAILS SHALL BE SPliced IN A PANEL OVER EXPANSION JOINTS.
 - ENDS OF TUBE SECTIONS SHALL BE SAWED, GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.
 - WELDS BE THE SAME ON BOTH FLANGES. FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING.
 - RAIL JOINTS DEPENDENT ON POST SHIMS AND PLATE NO. 2 AND CAULK
 - RAIL JOINT SLOTTED 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 REOD. FOR ALIGNMENT.
 - ALL SURFACES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND
 - POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.
 - ALL CUTS SHALL BE MACHINE OR MACHINE FLANGE CUT TO
 - ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 10 SURFACE PREPARE.
 - 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. 1.
 - SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.
 - SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

RAILING WEIGHT = 75 LB/FT (BASED ON 6'-6" POST SPACING.)

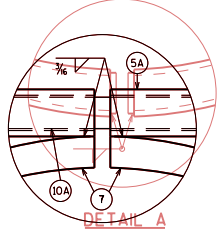
TUBULAR STEEL RAILING TYPE "M"

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-21

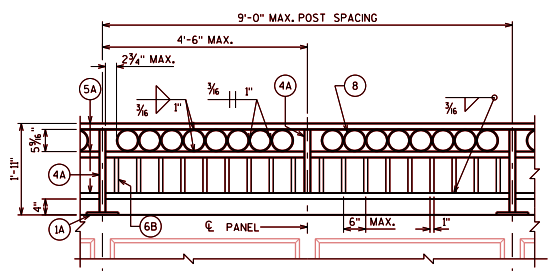


DETAIL A
SEAL ENDS ON CURVED STRUCTURAL TUBING WITH 1/2" PLATE WELD AND GRIND SMOOTH.

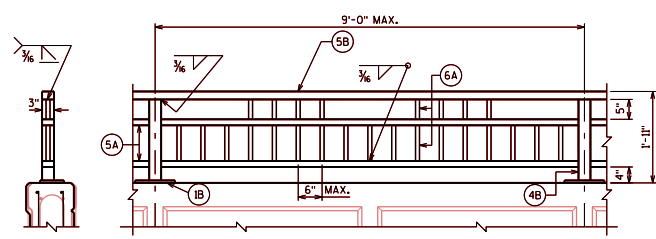


DETAIL A
SEAL ENDS ON CURVED STRUCTURAL TUBING WITH 5/8" PLATE WELD AND GRIND SMOOTH.

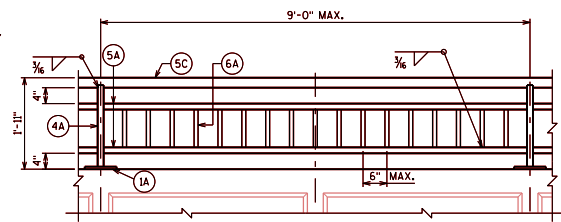
DETAIL B
SEAL ENDS ON CURVED STRUCTURAL TUBING WITH 5/8" PLATE WELD AND GRIND SMOOTH.



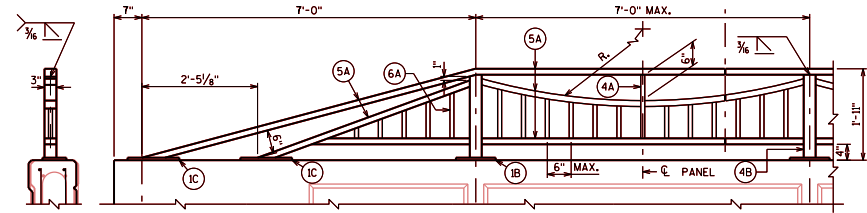
TYPE C1



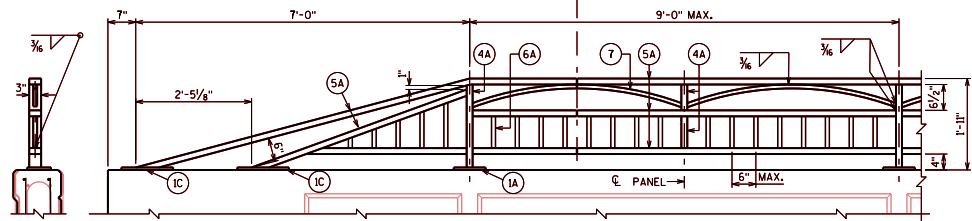
TYPE C4



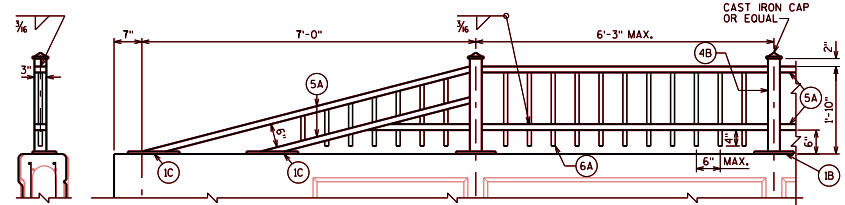
TYPE C2



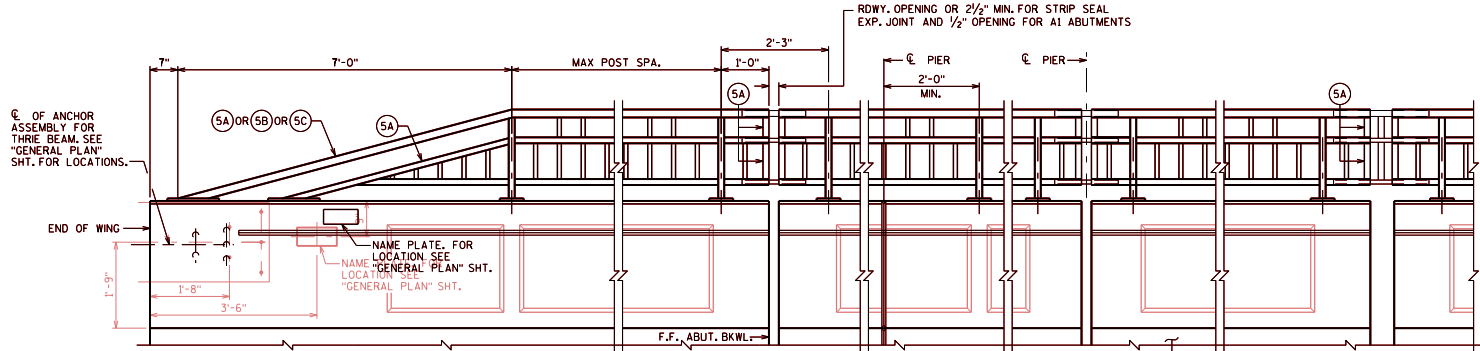
TYPE C5



TYPE C3



TYPE C6



INSIDE ELEVATION


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"x3/8". WHEN USED ON A BRIDGE, A TRAFFIC BARRIER IS REQUIRED BETWEEN THE ROADWAY AND THE SIDEWALK. FOR THIS PEDESTRIAN RAILING, BD ITEM SHALL BE "RAILING STEEL PEDESTRIAN TYPE C1-C6". THE CLEAR SPACE BETWEEN THE TOP TWO RAILS MAY BE INCREASED TO A 6" MAXIMUM EXCEPT FOR "TYPE C1" RAILING.

A MINIMUM 12'-0" WIND LENGTH IS RECOMMENDED TO ACCOMMODATE THE RAIL END TRANSITION AND PROVIDE A POST SPACING ON THE WING THAT WILL MAINTAIN THE RAIL AESTHETICS.

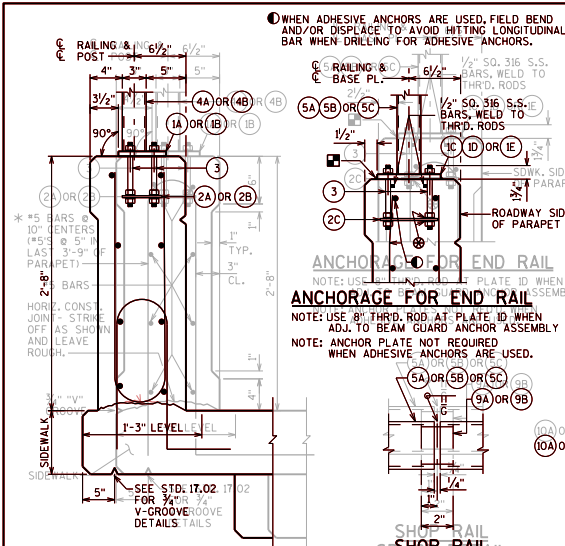
SEE STANDARD 30.18 FOR ADDITIONAL RAILING DETAILS.

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: <u>Bill Oliva</u>	DATE: <u>7-19</u>

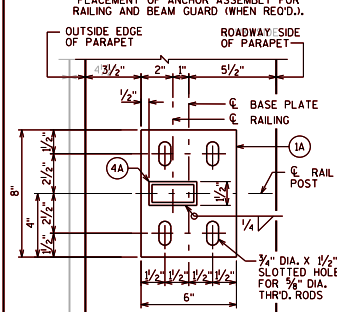
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5". MIN. JOINT SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A 3/4" V-GROOVE.

RAILING WEIGHT = 22 LB/FT

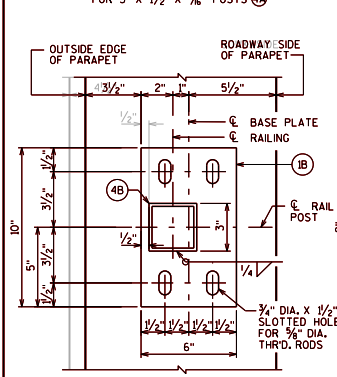


SECTION THRU PARAPET ON BRIDGE

* ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD WHEN REQUIRED.

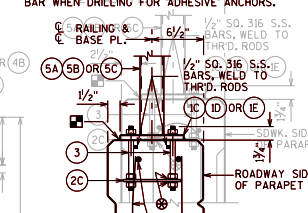


TYPICAL RAIL POST BASE PLATE FOR 3" x 1 1/2" x 3/8" POSTS (4A)



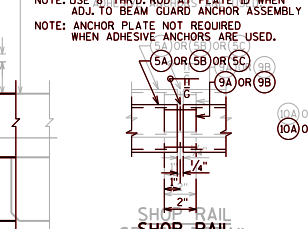
TYPICAL RAIL POST BASE PLATE FOR 3" x 3" x 3/8" POSTS (4B)

WHEN ADHESIVE ANCHORS ARE USED, FIELD BEND AND/OR DISPLACE TO AVOID HITTING LONGITUDINAL BAR WHEN DRILLING FOR ADHESIVE ANCHORS.



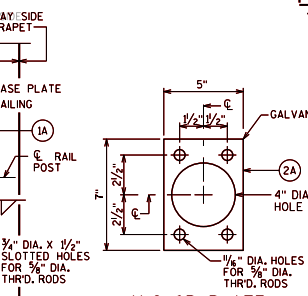
ANCHORAGE FOR END RAIL

NOTE: USE 8" THRD. ROD AT PLATE ID WHEN ADJ. TO BEAM GUARD ANCHOR ASSEMBLY. NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

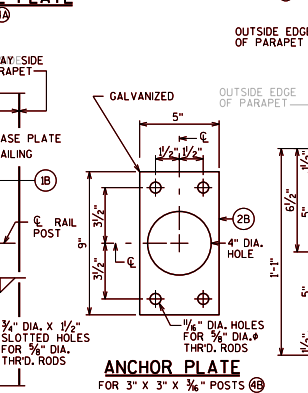


SHOP RAIL SPLICE DETAIL

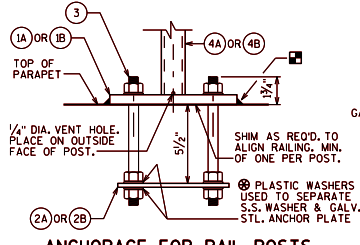
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



ANCHOR PLATE FOR 3" x 1 1/2" x 3/8" POSTS (4A)

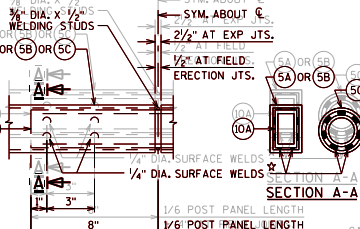


ANCHOR PLATE FOR 3" x 3" x 3/8" POSTS (4B)



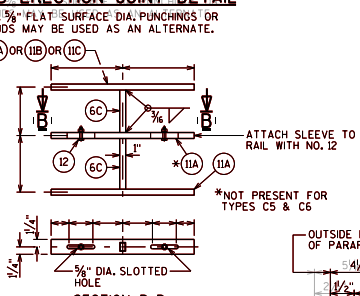
ANCHORAGE FOR RAIL POSTS

NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

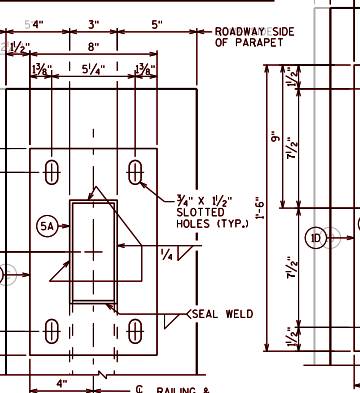


FIELD ERECTION JOINT DETAIL

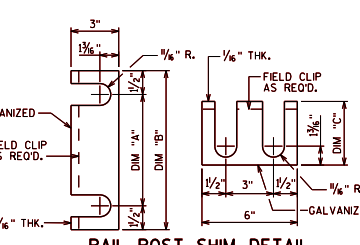
FIELD ERECTION JOINT DETAIL



SECTION B-B MODULAR JOINT SLEEVE DETAIL

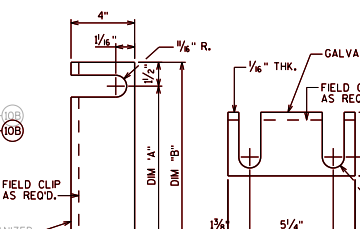


END RAIL BASE PLATE FOR 3" x 1 1/2" x 3/8" RAIL (6A)



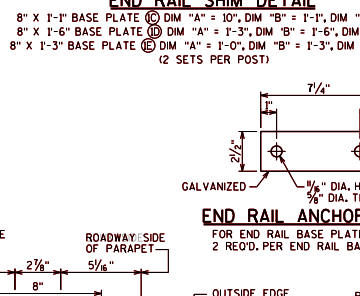
RAIL POST SHIM DETAIL

6" x 8" BASE PLATE (4) DIM "A" = 5", DIM "B" = 8", DIM "C" = 4"
6" x 10" BASE PLATE (6) DIM "A" = 7", DIM "B" = 10", DIM "C" = 5"
(2 SETS PER POST)

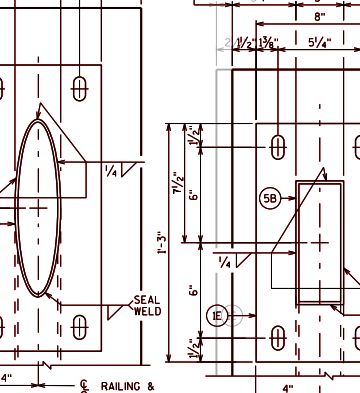


END RAIL SHIM DETAIL

8" x 1-1" BASE PLATE (10) DIM "A" = 10", DIM "B" = 1-1", DIM "C" = 6 1/2"
8" x 1-6" BASE PLATE (10) DIM "A" = 1-3", DIM "B" = 1-6", DIM "C" = 9"
8" x 1-3" BASE PLATE (10) DIM "A" = 1-0", DIM "B" = 1-3", DIM "C" = 7 1/2"
(2 SETS PER POST)



END RAIL ANCHOR PLATE



END RAIL BASE PLATE FOR 2 1/2" DIA. STANDARD PIPE RAIL (6D)

LEGEND

- (1A) PLATE 3/4" x 6" x 8" WITH 3/4" x 1/2" SLOTTED HOLES.
- (1B) PLATE 3/4" x 6" x 10" WITH 3/4" x 1/2" SLOTTED HOLES.
- (1C) PLATE 3/4" x 8" x 1-1" WITH 3/4" x 1/2" SLOTTED HOLES.
- (1D) PLATE 3/4" x 8" x 1-6" WITH 3/4" x 1/2" SLOTTED HOLES.
- (1E) PLATE 3/4" x 8" x 1-3" WITH 3/4" x 1/2" SLOTTED HOLES.
- (2A) 1/4" x 5" x 7" ANCHOR PLATE WITH 1/4" DIA. HOLES FOR THRD. RODS NO. 3.
- (2B) 1/4" x 5" x 9" ANCHOR PLATE WITH 1/4" DIA. HOLES FOR THRD. RODS NO. 3.
- (2C) 1/4" x 2 1/2" x 7 1/4" ANCHOR PLATE WITH 1/4" DIA. HOLES FOR THRD. RODS NO. 3.
- (3) 3/4" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = TO KSD) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 7/8" INCH EMBED 7" IN CONCRETE FOR RAIL POSTS; EMBED 5" IN CONCRETE FOR END RAILS. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 5802.222 AND 5023.1 AND THE STANDARD SPECIFICATIONS.
- (4A) STRUCTURAL TUBING 3" x 1 1/2" x 3/8". PLACE VERTICAL. WELD TO NO. 1 & 5.
- (4B) STRUCTURAL TUBING 3" x 3" x 3/8". PLACE VERTICAL. WELD TO NO. 1 & 5.
- (4C) STRUCTURAL TUBING 3" x 1 1/2" x 3/8" 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 3/8" RAILS. WELD TO NO. 1 & NO. 4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
- (5D) STRUCTURAL TUBING 2 1/2" 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. @ C TO @ SPACING). PLACE VERTICAL.
- (6B) BAR 1" x 1 1/2" PICKETS. WELD TO NO. 5. (SPACE AT 6" MAX. @ C TO @ SPACING). PLACE VERTICAL.
- (6C) BAR 1" x 1 1/2" 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.) 1/2" LONG SLICES. WELD TO NO. 5A.
- (9A) RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. PROVIDE "SLIDING FIT".
- (9B) CIRCULAR SLEEVE FABRICATED FROM STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.).
- (10A) RECTANGULAR SLEEVE FABRICATED FROM 3/8" 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 2 1/2" x 1" x 1/2".
- (11B) BAR 2 1/2" x 1 1/2" x 1/2".
- (11C) STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.) x 1'-4".
- (12) 1/2" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCKWASHER.

NOTES

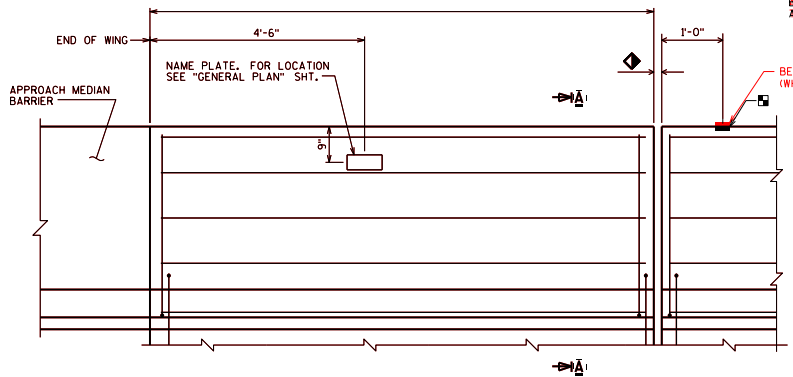
- BID ITEM SHALL BE "RAILING STEEL TYPE C11-6" WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.
- POST BASE PLATES SHALL BE FLAT WITH SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.
- ALL PLATES, BARS, AND RECTANGULAR SLEEVES 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 PRIMER AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. 1 (WHITE) (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

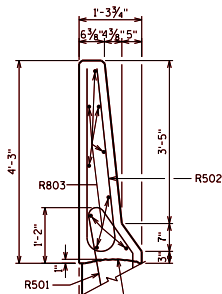
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva* DATE: 7-20

□ BENCHMARK WHEN SUPPLIED: VOID PEACING BELOW APPROX. FENCE SYSTEM THAT IS SHED AT TAG BED OF THE HEAD OF THE PARAPET.



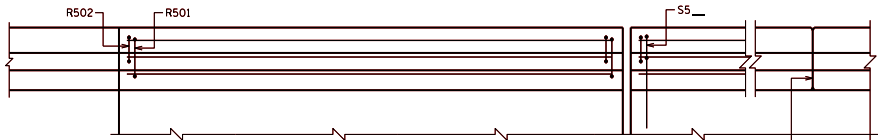
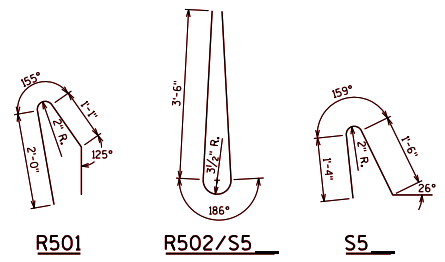
INSIDE ELEVATION



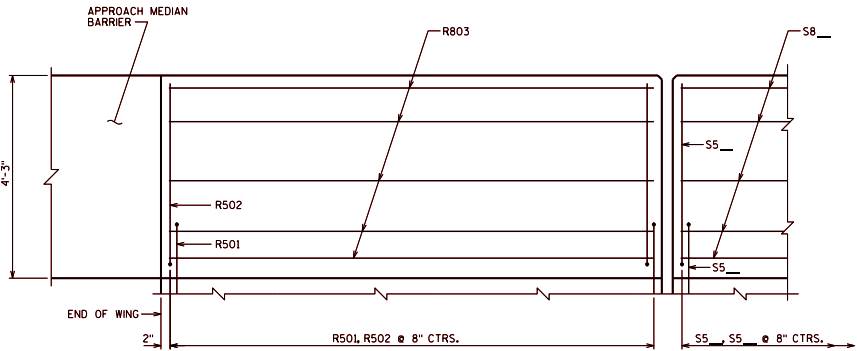
SECTION A

BILL OF BARS FOR ABUTMENT PARAPETS

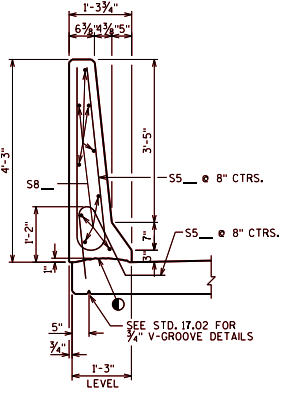
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	REIN.	LOCATION
R501	X			4'-6"	X	PARAPET VERT.
R502	X			7'-11"	X	PARAPET VERT.
R803	X					PARAPET HORIZ.
S5	X			4'-2"	X	PARAPET VERT.
S5	X			7'-11"	X	PARAPET VERT.
S8	X					PARAPET HORIZ.



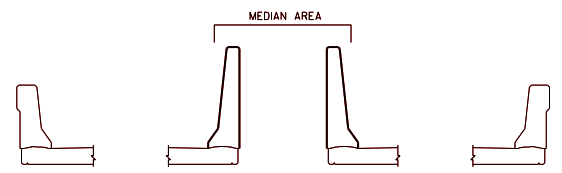
PLAN



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



SLOPED FACE PARAPET '51F' MAY BE USED IN MEDIAN AREA OF ADJACENT STRUCTURES WHEN HIGHWAY MEDIAN APPROACH CONCRETE BARRIER IS 51" HIGH

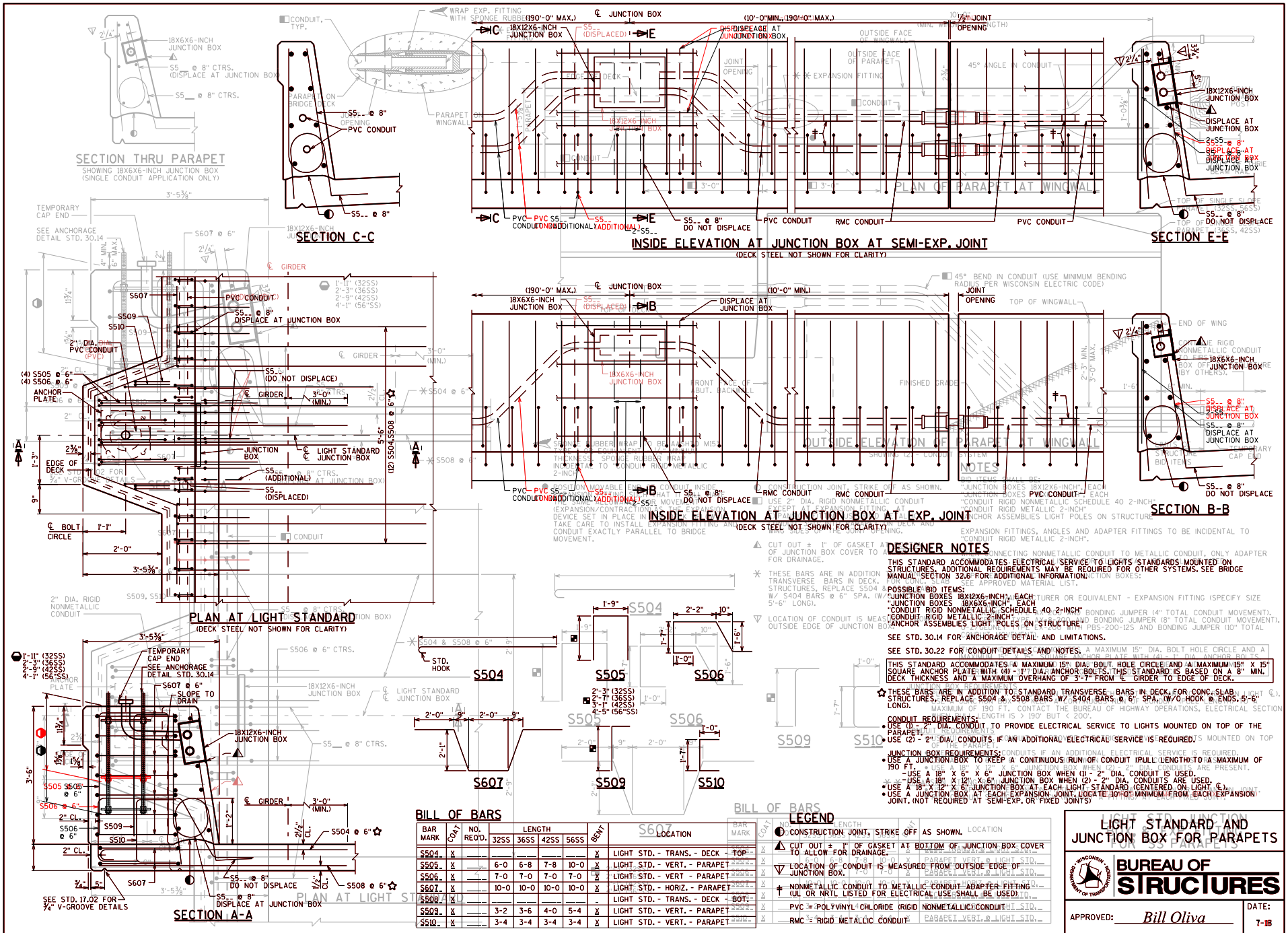
- CONST. JOINT - STRIKE OFF AS SHOWN.
- A R501 BAR MAY BE USED IN LIEU OF A TYPICAL S5... BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.
- AREA = 3.41 FT.²
- WEIGHT = 512 LBS./FT.

SLOPED FACE PARAPET '51F'



APPROVED: Bill Oliva

DATE: 7-19



INSIDE ELEVATION AT JUNCTION BOX AT SEMI-EXP. JOINT
(DECK STEEL NOT SHOWN FOR CLARITY)

INSIDE ELEVATION AT JUNCTION BOX AT EXP. JOINT
(DECK STEEL NOT SHOWN FOR CLARITY)

DESIGNER NOTES

- CONNECTIONS BETWEEN NONMETALLIC CONDUIT TO METALLIC CONDUIT, ONLY ADAPTER 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"
 - "CONDUIT RIGID NONMETALLIC SCHEDULE 40 2-INCH"
 - "CONDUIT RIGID METALLIC 2-INCH"
 - "ANCHOR ASSEMBLIES LIGHT POLES ON STRUCTURE"
- EXPANSION FITTINGS, ANGLES AND ADAPTER FITTINGS TO BE INCIDENTAL TO CONDUIT RIGID METALLIC 2-INCH.
- CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE.
- THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK. FOR CONC. SLAB STRUCTURES, REPLACE S504 W/ S404 BARS @ 6" SPA. (W/O HOOK @ 1'-5" LONG).
- LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.
- SEE STD. 30.14 FOR ANCHORAGE DETAIL AND LIMITATIONS.
- SEE STD. 30.22 FOR CONDUIT DETAILS AND NOTES. A MAXIMUM 15" DIA. BOLT HOLE CIRCLE AND A PARAPET WITH 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" FROM GIRDERS TO EDGE OF DECK.
- THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK. FOR CONC. SLAB STRUCTURES, REPLACE S504 W/ S404 BARS @ 6" SPA. (W/O HOOK @ 1'-5" LONG).
- MAXIMUM OF 190 FT. CONTACT THE BUREAU OF HIGHWAY OPERATIONS, ELECTRICAL SECTION.
- 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, MOUNTED ON TOP OF THE PARAPET.
- JUNCTION BOX REQUIREMENTS:
 - CONDUITS IF AN ADDITIONAL ELECTRICAL SERVICE IS REQUIRED.
 - USE A JUNCTION BOX TO KEEP A CONTINUOUS RUN OF CONDUIT (PULL LENGTH) TO A MAXIMUM OF 190 FT. IF THE PARAPETS ARE PRESENT.
 - 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 6" X 6" JUNCTION BOX AT EACH LIGHT STANDARD (CENTERED ON LIGHT).
 - USE A JUNCTION BOX AT EACH EXPANSION JOINT. LOCATE 10" MINIMUM FROM EACH EXPANSION JOINT. (NOT REQUIRED AT SEMI-EXP. OR FIXED JOINTS)

BILL OF BARS

BAR MARK	NO. REQ'D.	3255	3655	4255	5655	BEWT	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
S608	X					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

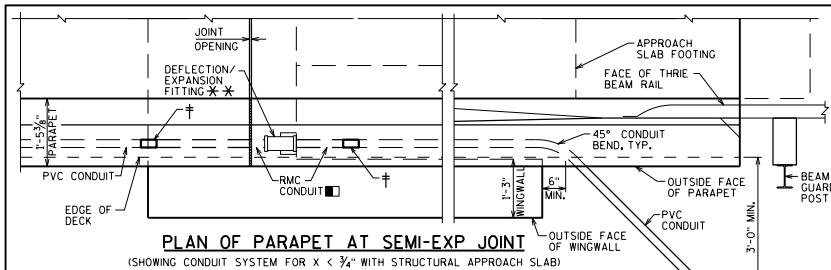
BILL OF BARS

BAR MARK	NO. REQ'D.	LENGTH	LOCATION
S607	X	10'-0"	LIGHT STD. - HORIZ. - PARAPET
S608	X	10'-0"	LIGHT STD. - TRANS. - DECK - BOT.
S609	X	3'-2"	LIGHT STD. - VERT. - PARAPET
S610	X	3'-4"	LIGHT STD. - VERT. - PARAPET

LIGHT STANDARD AND JUNCTION BOX FOR PARAPETS

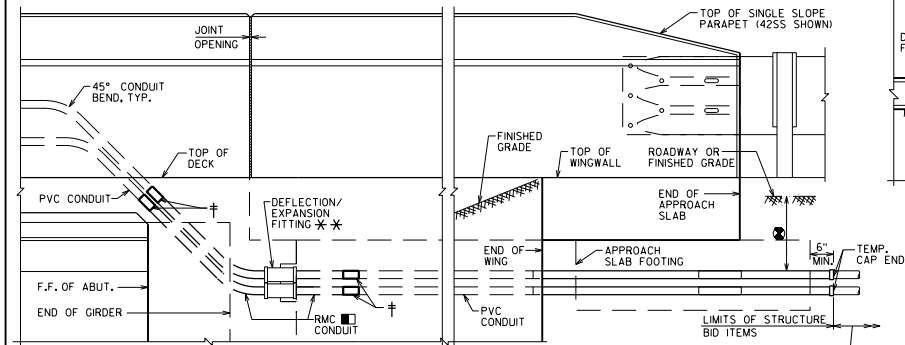
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-18



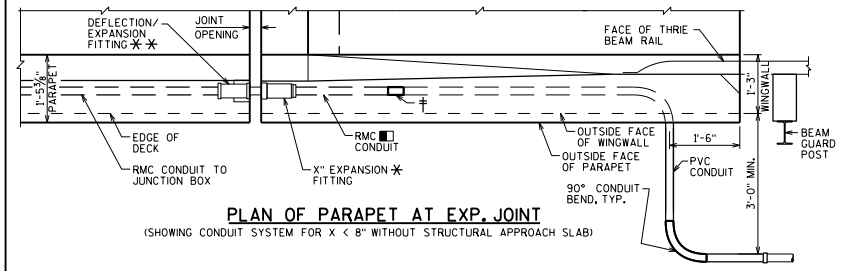
PLAN OF PARAPET AT SEMI-EXP JOINT

(SHOWING CONDUIT SYSTEM FOR X < 3/4" WITH STRUCTURAL APPROACH SLAB)



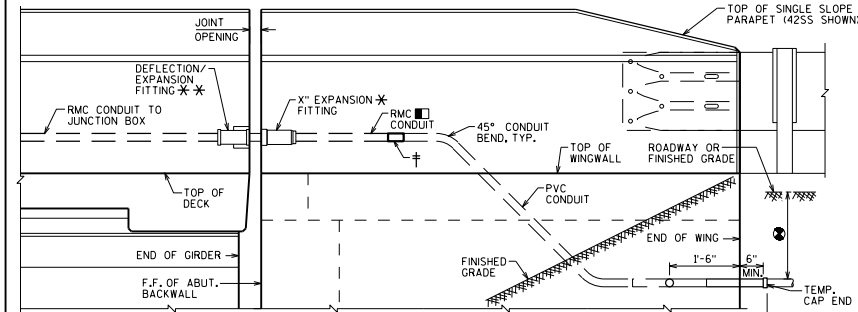
OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP JOINT

(SHOWING CONDUIT SYSTEM FOR X < 3/4" WITH STRUCTURAL APPROACH SLAB)



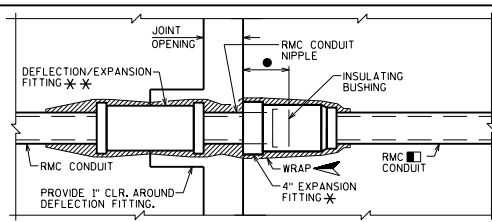
PLAN OF PARAPET AT EXP. JOINT

(SHOWING CONDUIT SYSTEM FOR X < 8" WITHOUT STRUCTURAL APPROACH SLAB)



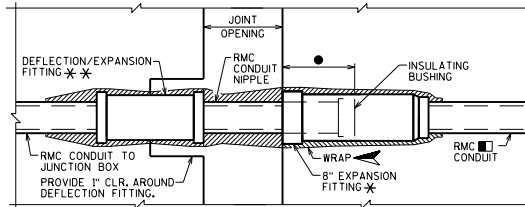
OUTSIDE ELEVATION OF PARAPET AT EXP. JOINT

(SHOWING CONDUIT SYSTEM FOR X < 8" WITHOUT STRUCTURAL APPROACH SLAB)



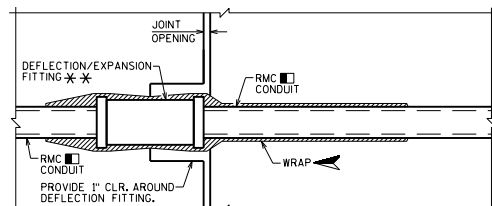
DEFLECTION/EXPANSION AND 4" EXPANSION FITTING

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



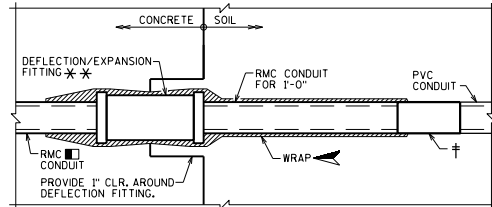
DEFLECTION/EXPANSION AND 8" EXPANSION FITTING

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 3/4" 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 3/4" 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.

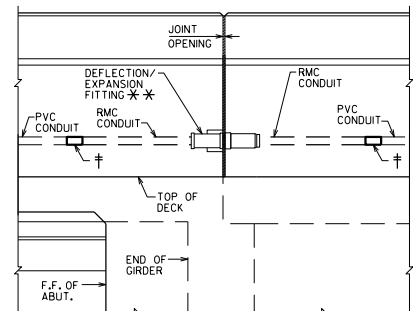
LEGEND

- 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 I OR EQUIVALENT - 1/2" 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 < 3/4"	DEFL./EXP. FITTING	
		3/4" ≤ 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		
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



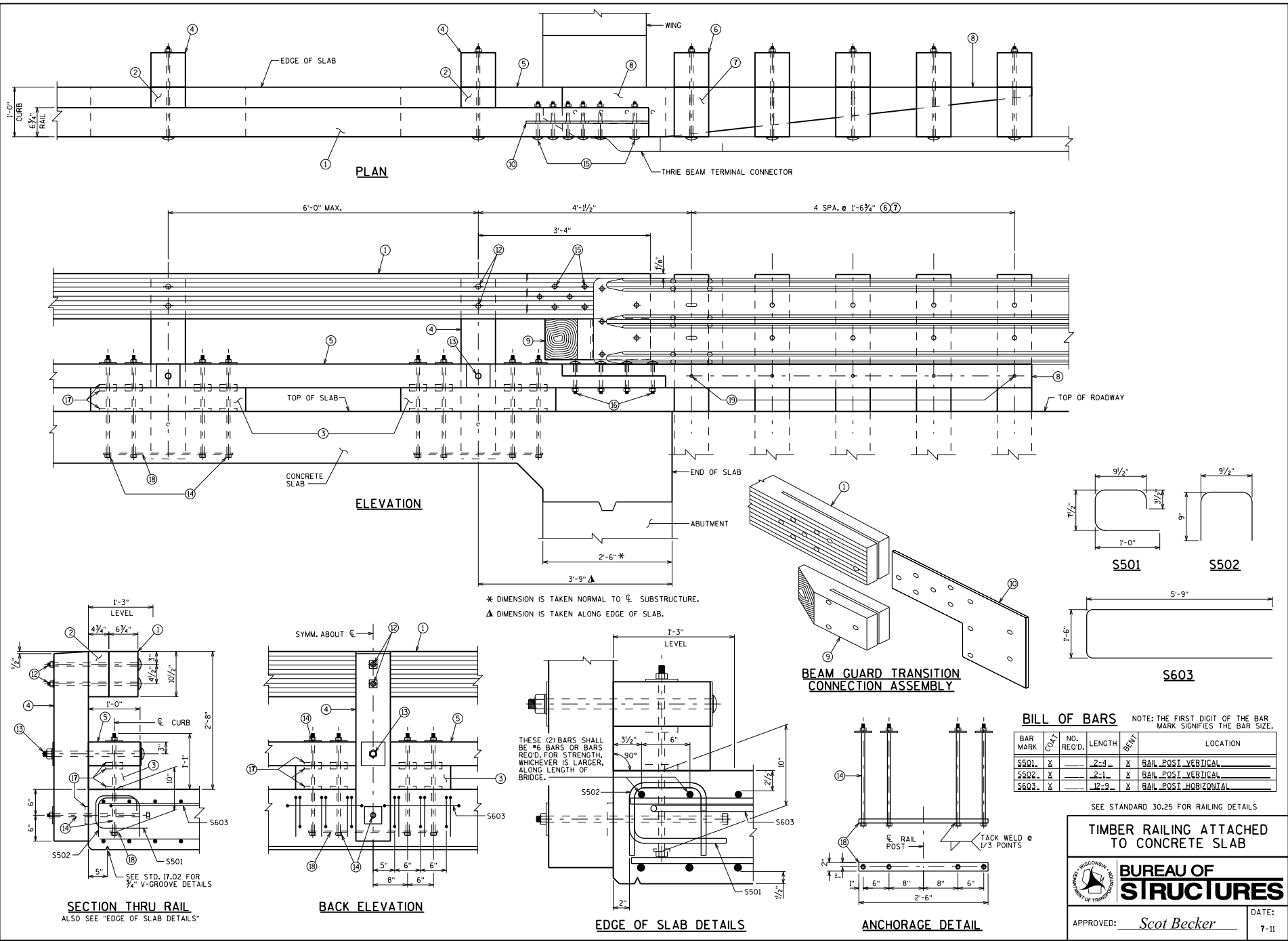
OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP JOINT

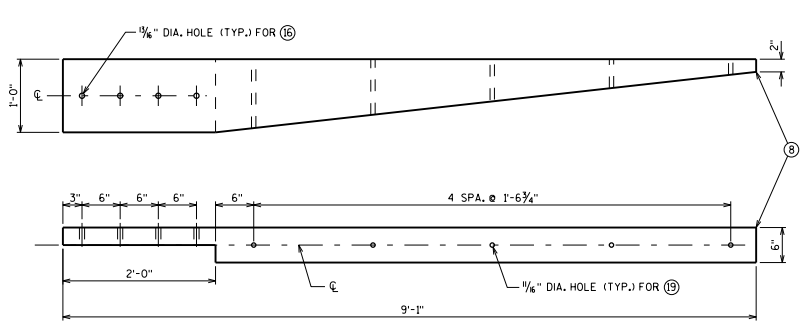
(SHOWING CONDUIT SYSTEM FOR X > 3/4" WITHOUT STRUCTURAL APPROACH SLAB)

CONDUIT DETAILS AND NOTES

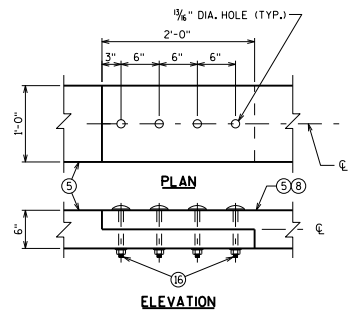
 **BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17

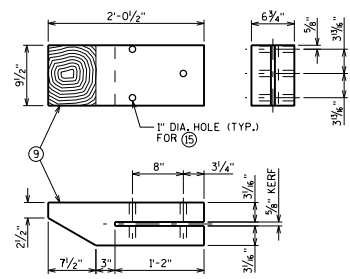




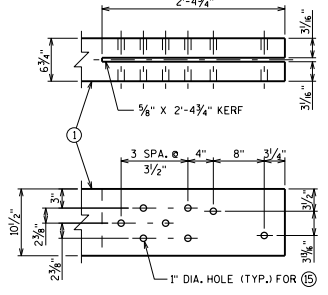
CURB TRANSITION



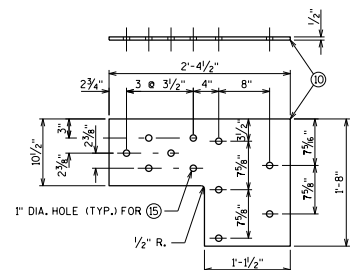
CURB SPLICE DETAIL



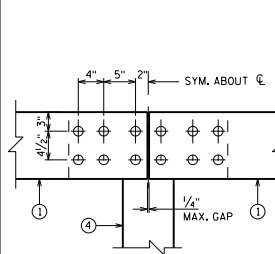
TRANSITION BLOCK



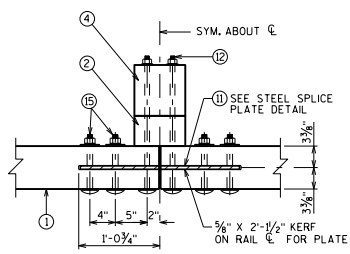
TRANSITION GLULAM RAIL BORING DETAIL



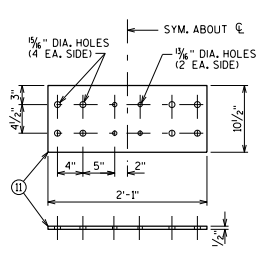
STEEL TRANSITION PLATE



ELEVATION



PLAN VIEW



STEEL SPLICE PLATE

RAIL SPLICE DETAILS

LEGEND

- ① GLULAM RAIL 6 3/4" X 10 1/2"
- ② RAIL SPACER BLOCK 8" X 4 3/4" X 10 1/2"
- 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 10 1/2" X 1'-10 1/2"
- ⑧ CURB TRANSITION @ BEAM GUARD
- ⑨ TRANSITION BLOCK @ BEAM GUARD
- ⑩ STEEL TRANSITION PLATE, ASTM A36.
- ⑪ STEEL SPLICE PLATE, ASTM A36.
- ⑫ 3/4" DIA. X 1'-10" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT, (2 REOD. @ EACH RAIL TO POST CONNECTION, 4 REOD. @ EACH RAIL SPLICE).
- ⑬ 1/4" DIA. X 1'-10" LONG ASTM A325, DOME-HEAD BOLT W/ 2 - 5/2" X 5/2" X 1/4" PLATE WASHERS, W/ 1/8" DIA. HOLE, (1 REOD. @ EACH CURB TO SLAB CONNECTION.)
- ⑭ 3/4" DIA. X 1'-11" LONG ASTM A325 BOLT, 1 - 4" X 4" X 3/8" PLATE WASHER REOD. AT CURB TO SLAB CONNECTION, 1 - 4" X 4" X 3/8" PLATE WASHER REOD. AT POST TO SLAB CONNECTION.
- ⑮ 7/8" DIA. X 9" LONG ASTM A307, GRADE 2, DOME HEAD BOLT AT RAIL SPLICE DETAIL AND AT BEAM GUARD ATTACHMENT
- ⑯ 3/4" DIA. X 8" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT (4 REOD. @ EACH CURB SPLICE DETAIL)
- ⑰ 4" DIA. SHEAR PLATE (8 REOD. @ EACH CURB TO SCUPPER CONNECTION, 4 REOD. @ EACH SCUPPER TO SLAB CONNECTION AND 1 REOD. @ EACH POST TO SLAB CONNECTION). MALLEABLE IRON MEETING REQUIREMENTS OF ASTM A47, GRADE 32510.
- ⑱ 2" X 2'-6" X 5/8" ANCHOR PLATE WITH 4 - 1/8" DIA. HOLES FOR ANCHOR BOLTS NO. 14 (CURB TO SLAB CONNECTION).
- ⑳ 3/4" DIA. ASTM A325 DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT, (1 REOD. @ EACH THREE 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 THREE 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 1/2" 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 15 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:
 $F_b = 1,800 \text{ LB/IN}^2$ $E = 1,800,000 \text{ LB/IN}^2$
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:
 $F_b = 1,350 \text{ LB/IN}^2$ $E = 1,500,000 \text{ LB/IN}^2$
8. ALL STEEL COMPONENTS AND FASTENERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M118 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 (EWS) ON TOP OF EXISTING SLAB, THE THICKNESS OF THE OVERLAY MUST BE TAPERED NEAR THE VICINITY OF THE RAILING TO MAINTAIN THE REOD. (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

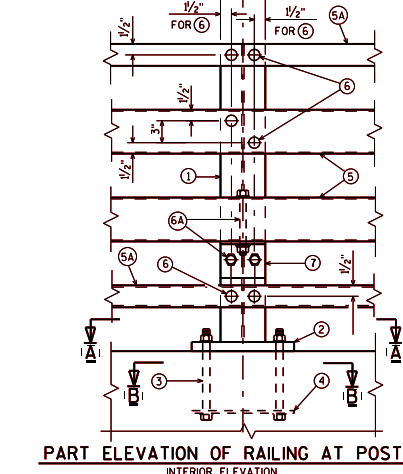
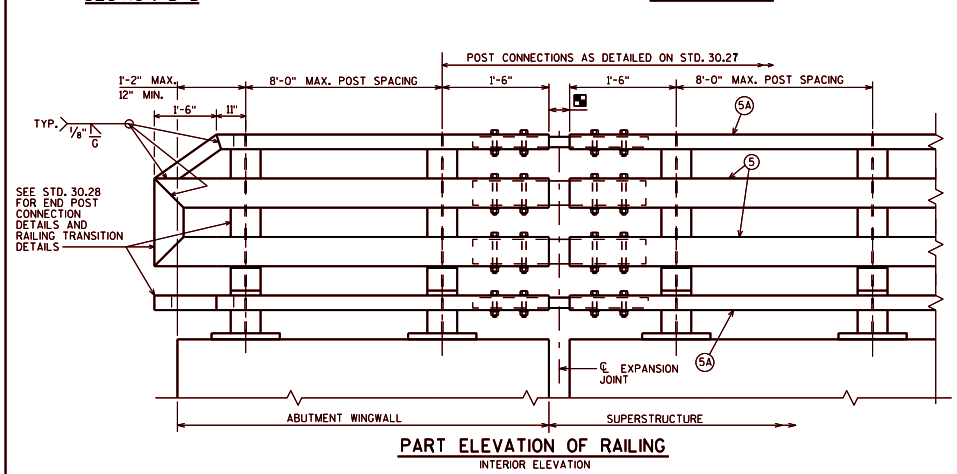
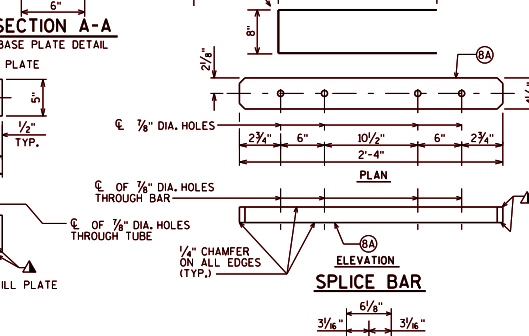
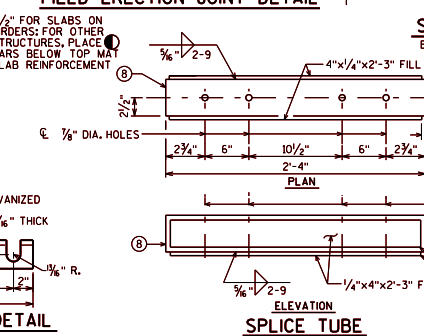
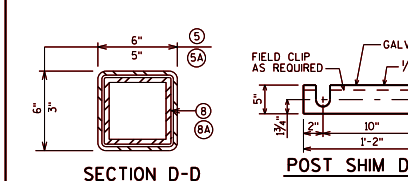
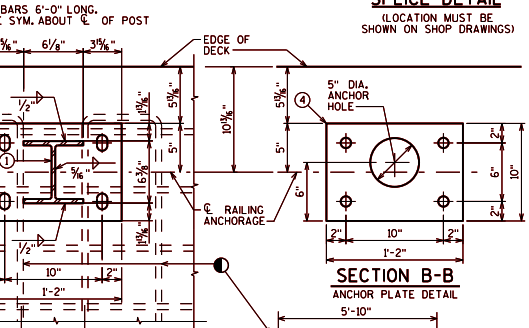
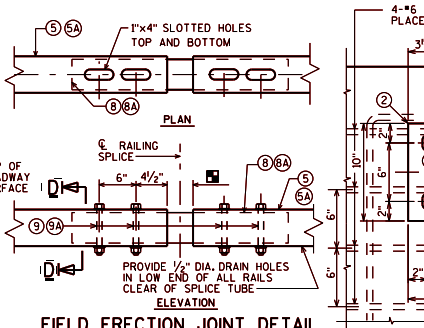
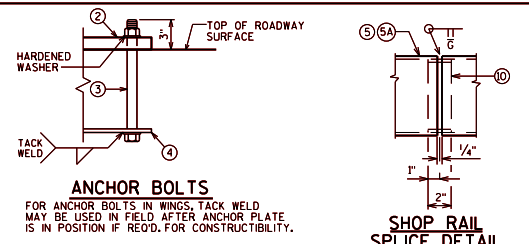
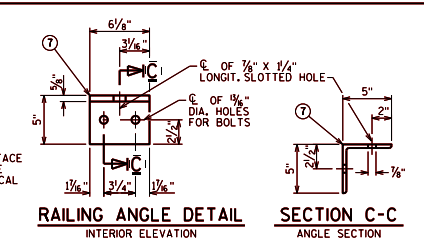
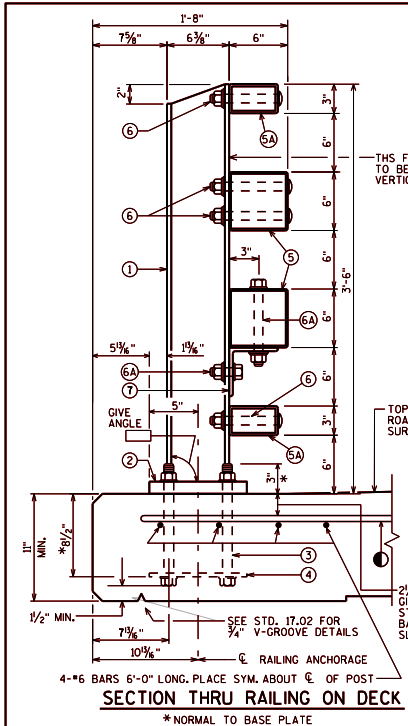
ITEM	NO. REQ'D.	SIZE	LENGTH	MBM
GLULAM RAIL	---	6 3/4" X 10 1/2"	---	---
RAIL SPACER BLOCK	---	8" X 4 3/4" X 10 1/2"	---	---
SCUPPER BLOCK	---	6" X 12" X 3'-0"	---	---
RAIL POST	---	8" X 8"	---	---
CURB	---	6" X 12"	---	---
CURB TRANSITION	---	---	---	---
TRANSITION BLOCK	---	---	---	---
TOTAL MBM	---	---	---	---

TIMBER RAILING ATTACHED TO CONCRETE SLAB DETAILS



THESE RAILING DETAILS MAY BE USED WITH CONCRETE SLAB SUPERSTRUCTURES (SLAB DEPTH > 14") THAT HAVE ABUTMENTS WITH WINGS PARALLEL TO ϵ OF ABUTMENT OR HAVE AS ABUTMENTS.

APPROVED: Bill Oliva DATE: 7-16



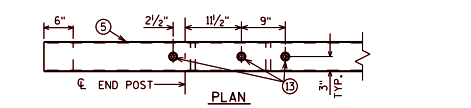
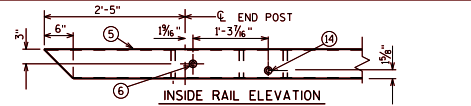
- LEGEND**
- WE X 25 WITH 1/4" X 1 1/2" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT TOP TWO RAILS, USE 1" DIA. HOLES FOR BOLT NO. 6 AT BOTTOM NO. 5A & FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH GRADE LINE. SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO CROSS LINE.
 - PLATE 1 1/2" X 10" X 1/2" WITH 1/6" X 1 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
 - 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 1 1/2" LONG BOLT FOR CONCRETE DECKS, ON CONCRETE SLAB SUPERSTRUCTURES, USE 1-3" LONG BOLT FOR SLAB THICKNESS > 16" AND 1 1/2" 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 CONSTRUCTIBILITY.)
 - 3/4" X 10" X 1-2" ANCHOR PLATE (GALVANIZED) WITH 1/6" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
 - TS 6 X 6 X 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 3/8" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
 - TS 5 X 3 X 1/4" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK); USE 1/4" X 1 1/2" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
 - 3/4" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1 1/2" X 1 1/2" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
 - 3/4" 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 3/8" X 1 1/2" X 1 1/2" WASHER).
 - TS 5 X 5 X 3/8" X 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.
 - 4 1/4" X 2 1/8" X 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.
 - 3/4" DIA. A325 FULLY THREADED BOLTS, 7 1/2" 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 HOLE IN TOP AND BOTTOM OF NO. 5.
 - 3/4" DIA. A325 FULLY THREADED BOLTS, 4 1/2" 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.
 - SPLICE SLEEVE FABRICATED FROM 1/4" PLATE. PROVIDE "SLIDING FIT".
- ROADWAY OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR ALL ABUTMENT. 1/2" 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.
- 4" X 12" O.D. 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" WHICH INCLUDES ITEMS SHOWN. RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE. 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 SHARP. FILL PLATES AND SPLICE TUBES SHALL BE MACHINE OR MACHINE FLAME CUT.
- ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL FABRICATING, BENDING, OR DRILLING OPERATIONS SHALL BE COMPLETED. ALL GALVANIZING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A700 GRADE 36. GALVANIZING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A700 GRADE 36. WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED WITH AN APPROVED EPOXY PAINT. PAINTING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A700 GRADE 36. PAINTING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A700 GRADE 36. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/4" TURN. CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/4" TURN.
- FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. SEALER SHALL BE APPLIED TO THE PERIMETER OF BOLT SLOTS IN NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. SEALER SHALL BE APPLIED TO THE PERIMETER OF BOLT SLOTS IN 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.
- SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.
- RAILING WEIGHT = 75 LB/LF (BASED ON 8'-0" POST SPACING)
- RAILING WEIGHT = 75 LB/LF (BASED ON 8'-0" POST SPACING)

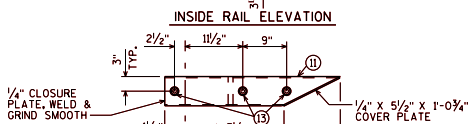
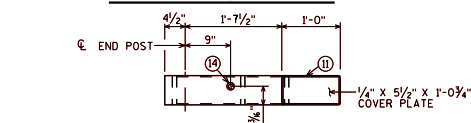
TUBULAR STEEL RAILING TYPE NY4

BUREAU OF STRUCTURES

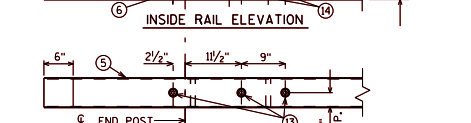
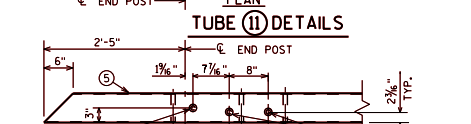
APPROVED: Bill Oliva DATE: 7-19



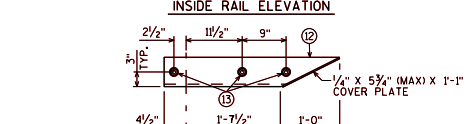
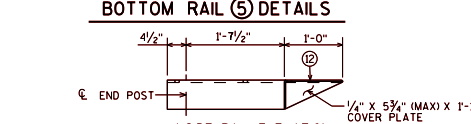
TOP RAIL (5) DETAILS



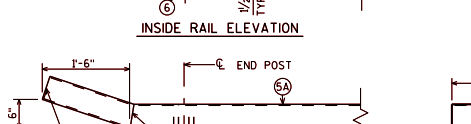
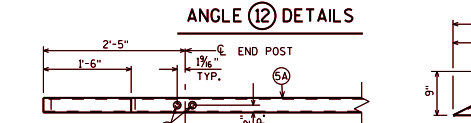
TUBE (11) DETAILS



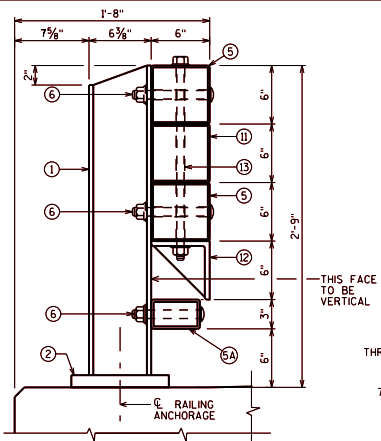
BOTTOM RAIL (5) DETAILS



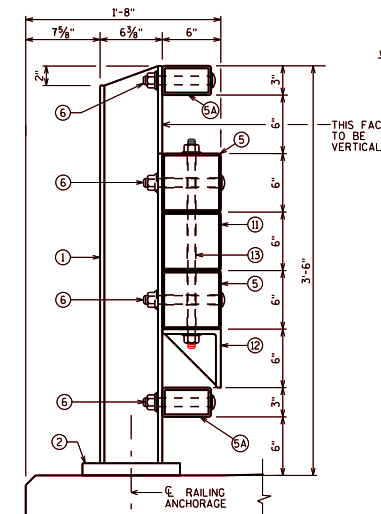
ANGLE (12) DETAILS



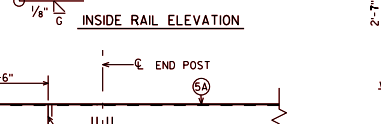
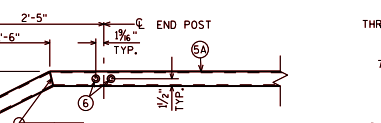
BOTTOM RAIL (5A) DETAILS



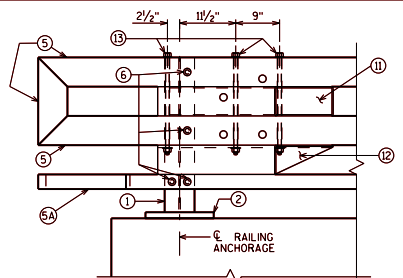
SECTION THRU NY3 RAILING END POST



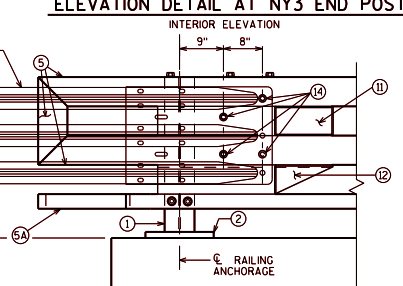
SECTION THRU NY4 RAILING END POST



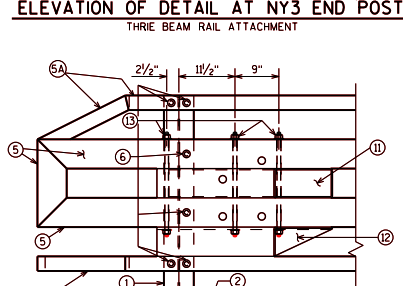
TOP RAIL (5A) DETAILS



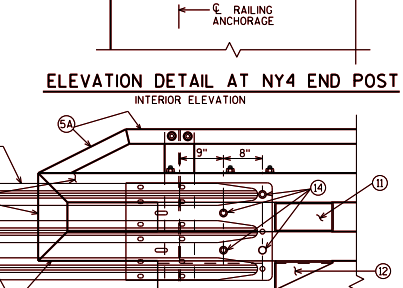
ELEVATION DETAIL AT NY3 END POST



ELEVATION OF DETAIL AT NY3 END POST



ELEVATION DETAIL AT NY4 END POST



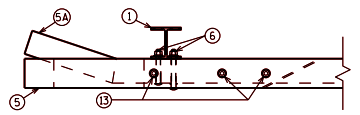
ELEVATION OF DETAIL AT NY4 END POST

LEGEND

- ① W6 X 25 WITH 1/4" X 1 3/4" 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 1/2" X 10" X 1'-2". SEE STANDARDS 30,26 AND 30,27 FOR MORE INFORMATION.
- ③ TS 6 X 6 X 3/8" STRUCTURAL TUBING. USE 7/8" 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.
- ④A TS 5 X 3 X 1/2" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL FOR NY4 (FRONT & BACK). USE 1/8" X 1 3/8" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- ⑥ 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT. 3/4" X 1 3/4" X 1 3/4" WASHER, AND SPRING LOCK WASHER (I 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 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES IN FRONT AND BACK FOR BOLT NO. 14 & 7/8" DIA. HOLES IN TOP & BOTTOM FOR BOLT NO. 13.
- ⑫ L 6 X 6 X 1/2" STRUCTURAL ANGLE. USE 7/8" DIA. HOLES IN TOP FLANGE FOR BOLT NO. 13.
- ⑬ 3/4" 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 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT AND 1/8" X 2" X 2" WASHER FOR CONNECTION OF THRIE BEAM (4 REQUIRED)

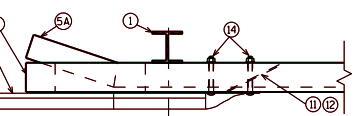
NOTES

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

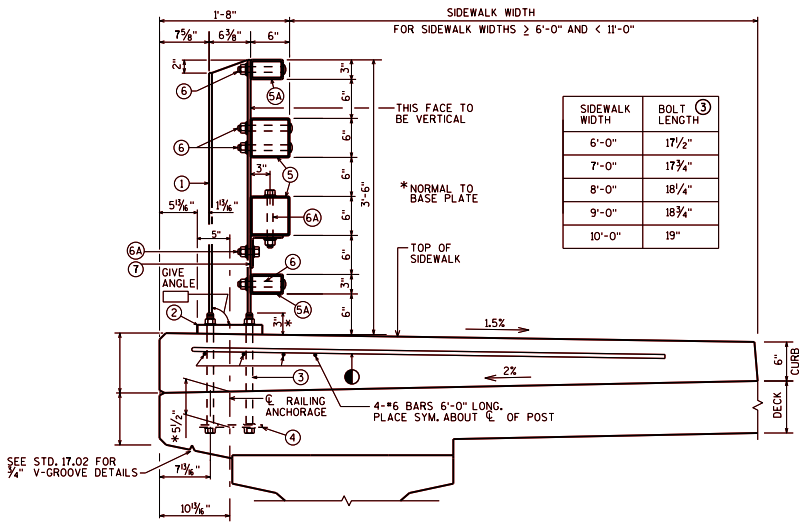
NY4 SIMILAR



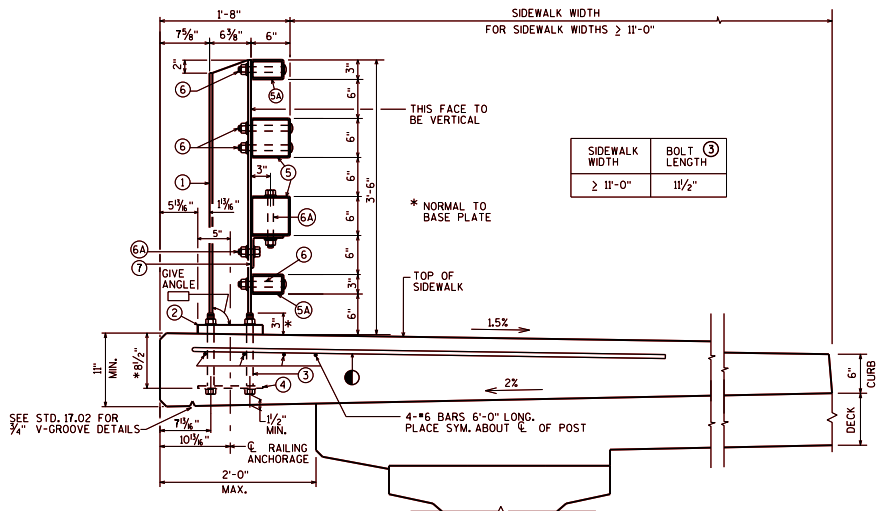
PLAN OF DETAIL AT NY3 END POST

THRIE BEAM RAIL ATTACHMENT
NY4 SIMILAR

<p>END POST DETAILS FOR TUBULAR STEEL RAILING TYPE NY3 & NY4</p>	
<p>BUREAU OF STRUCTURES</p>	
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-21</u>



SECTION THRU RAILING ON SIDEWALK




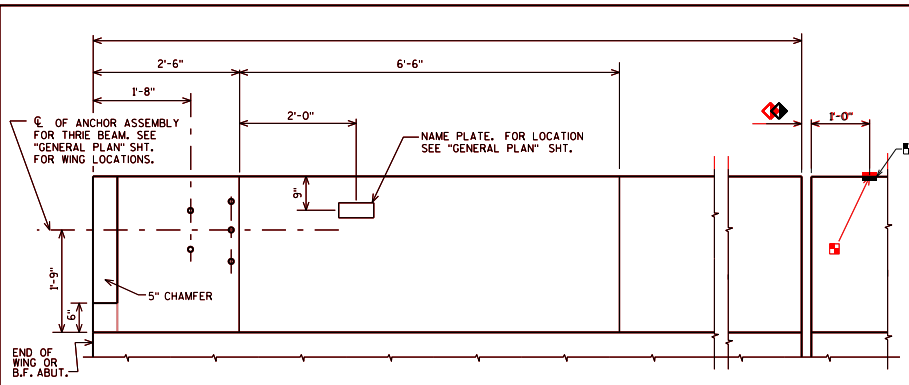
SECTION THRU RAILING ON SIDEWALK

LEGEND

- ① W6 X 25 WITH 1/6" X 1 3/8" 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 1/4" X 10" X 1'-2" WITH 1/4" X 1 1/4" 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 1 1/2" 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 3/4" X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1/6" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
- ⑤ TS 6 X 6 X 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 1/8" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
- ⑤A TS 5 X 3 X 3/4" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK). USE 1/6" X 1 3/8" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- ⑥ 3/4" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1 3/4" X 1 3/4" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
- ⑥A 3/4" 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 3/8" X 1 3/4" X 1 3/4" WASHER).
- ⑦ L 5 X 5 X 3/8" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
- ⑧ #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: <u>Bill Oliva</u>	DATE: 7-16

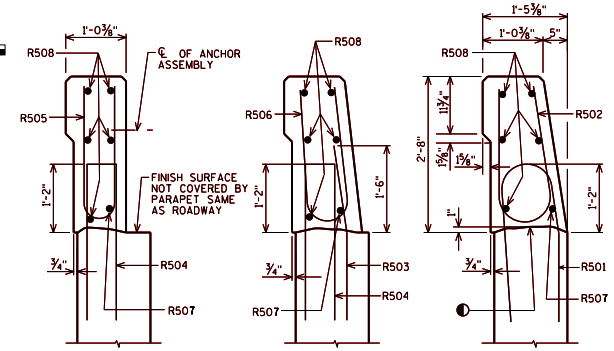


INSIDE ELEVATION

◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR ABUTMENTS

□ BENCHMARK OR SURVEY POINT. PLACING BELOW RABE OR HEAD SYSTEM WHAT ISIL NOT ADJACED TO STEM TOP OF THE PARAPET 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.

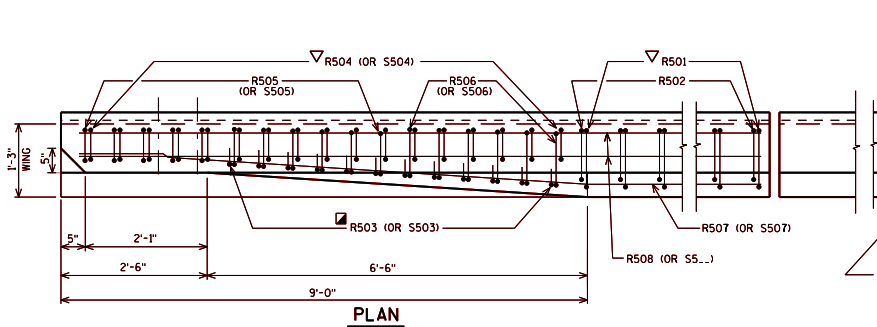


SECTION A SECTION B SECTION C

BILL OF BARS

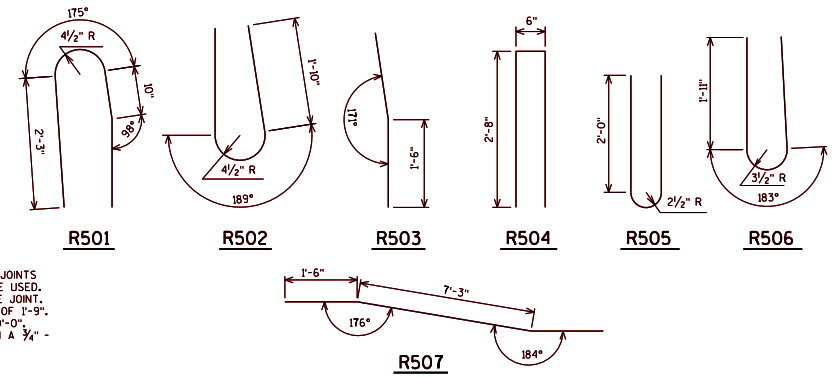
FOR ABUTMENT PARAPETS

BAR MARK	COPY	ABUT.	ABUT.	LENGTH	Qty	LOCATION
R501	X			5-10	X	PARAPET-VEHIC...
R502	X			5-0	X	PARAPET-VEHIC...
R503	X			3-0	X	PARAPET-VEHIC...
R504	X			5-7	X	PARAPET-VEHIC...
R505	X			4-9	X	PARAPET-VEHIC...
R506	X			4-10	X	PARAPET-VEHIC...
R507	X				X	PARAPET-HOIST...
R508	X				X	PARAPET-HOIST...
S501	X			4-5	X	PARAPET-VEHIC...
S503	X			2-9	X	PARAPET-VEHIC...
S504	X			4-4	X	PARAPET-VEHIC...

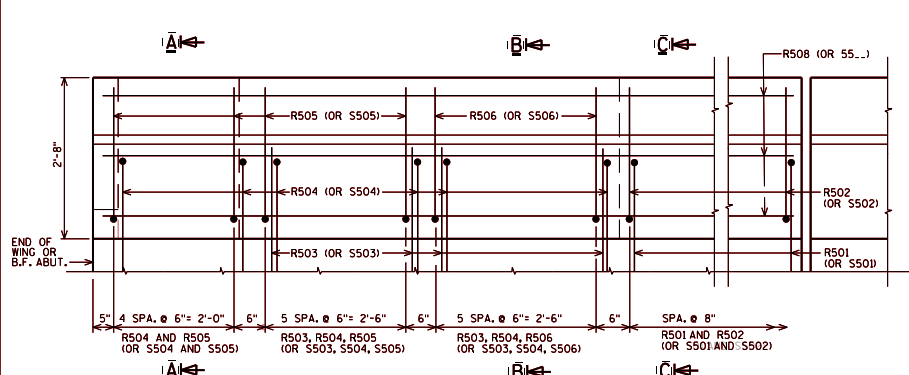


PLAN

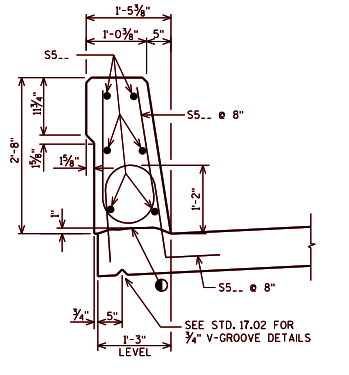
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 3/4" V-GROOVE.



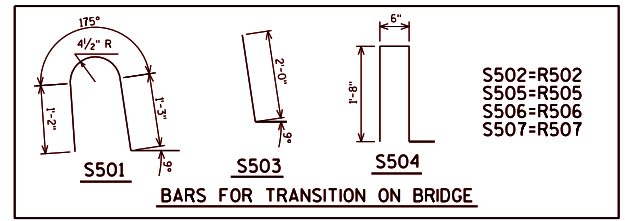
R501 R502 R503 R504 R505 R506 R507



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

AREA = 3.09 SF
WEIGHT = 464 LB/FT
● CONST. JOINT - STRIKE OFF AS SHOWN.

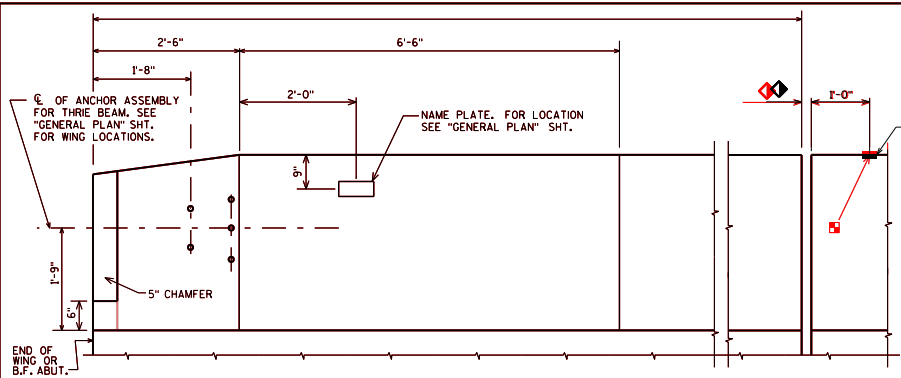
□ R503 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R503 OR S503 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ 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 ABUTMENTS.

SINGLE SLOPE PARAPET 32SS

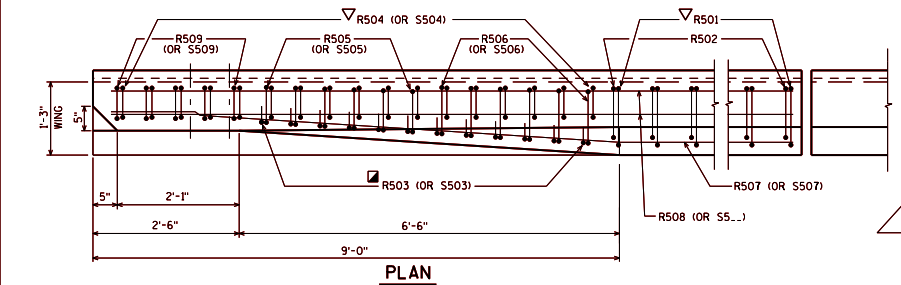
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-19

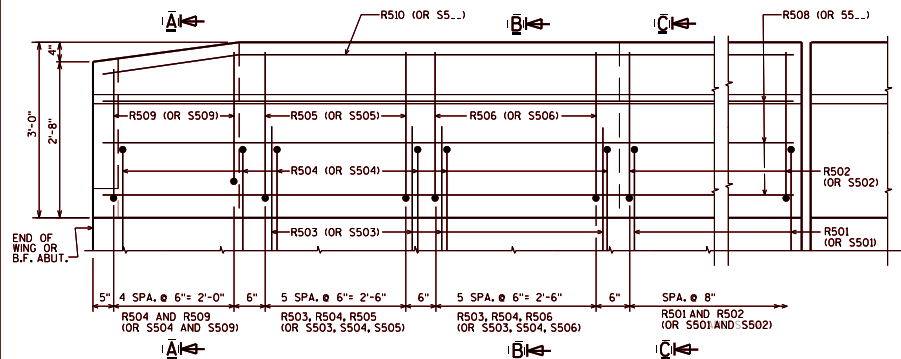


INSIDE ELEVATION

◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT.
USE 1/2" OPENING WITH FILLER FOR A1 ABUTMENTS



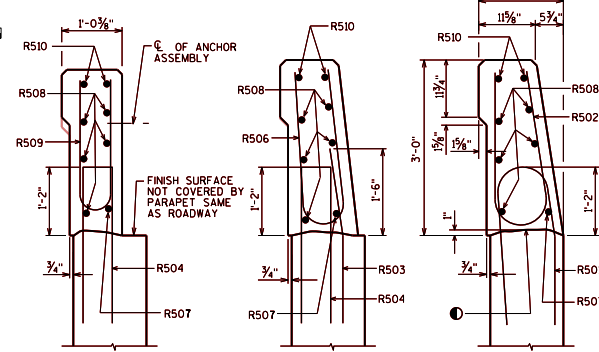
PLAN



OUTSIDE ELEVATION

◆ BENCHMARK BAR SUPPLIED/PAVED. PLACING
BELOWIN TABLE/HEAD SYSTEM ON AT R511
AFTER THE TOP OF THE PARAPET 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.



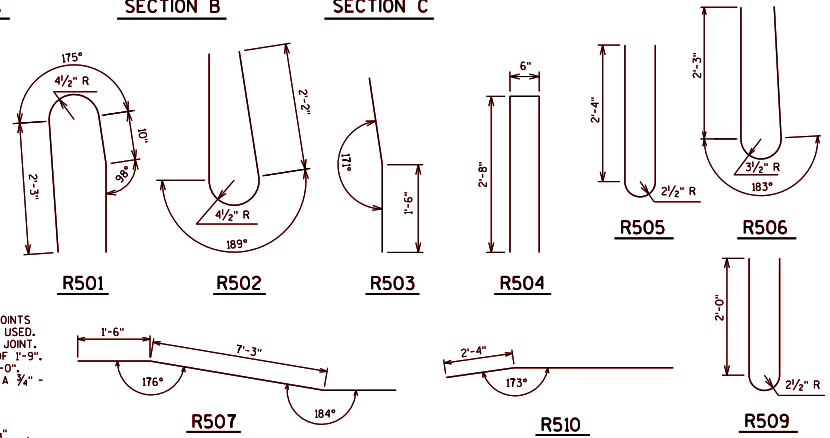
SECTION A

SECTION B

SECTION C

BILL OF BARS

FOR ABUTMENT PARAPETS						
BAR MARK	COY	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				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.



R501

R502

R503

R504

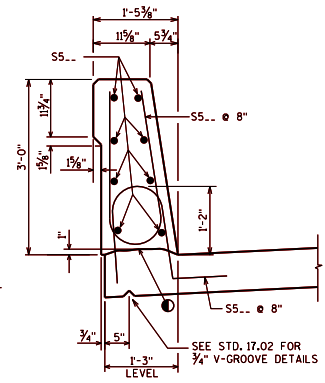
R505

R506

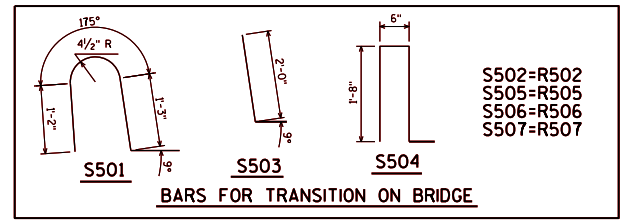
R507

R510

R509



SECTION THRU PARAPET ON BRIDGE



AREA = 3.36 SF
WEIGHT = 504 LB/FT

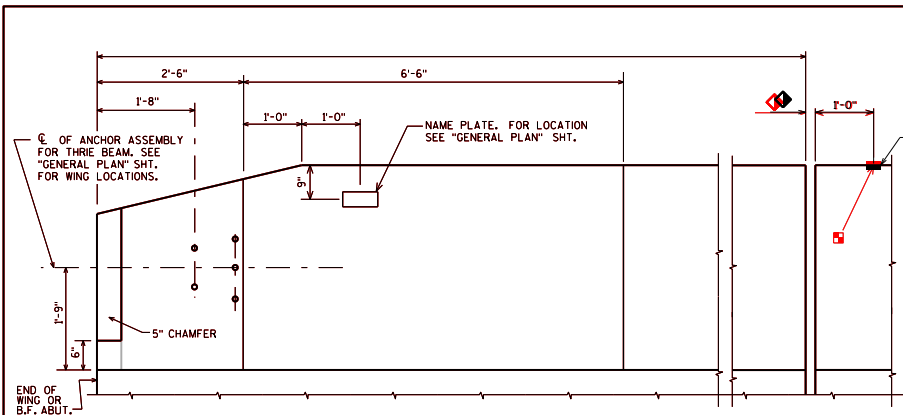
● CONST. JOINT - STRIKE OFF AS SHOWN.

□ 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

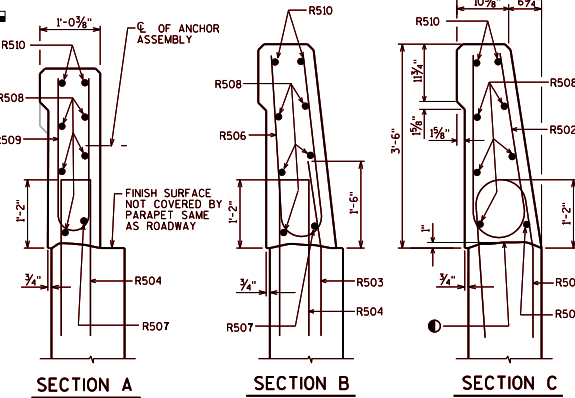
APPROVED: Bill Oliva DATE: 7-19



◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR ALL ABUTMENTS.

BENCHMARK (WHEN USED) IS TO BE PLACED ON THE TOP OF THE PARAPET. BEARING AS REBAR OR REINFORCING STEEL WITH THE BAR OR TYPED SYMBOL TO THE RIGHT OF THE PARAPET.

NOTE: FOR SECTIONS A, B & C ONLY THE PARAPET TERMINATING ON A WING IS SHOWN. TERMINATION ON A DECK IS SIMILAR.



BILL OF BARS

FOR ABUTMENT PARAPETS

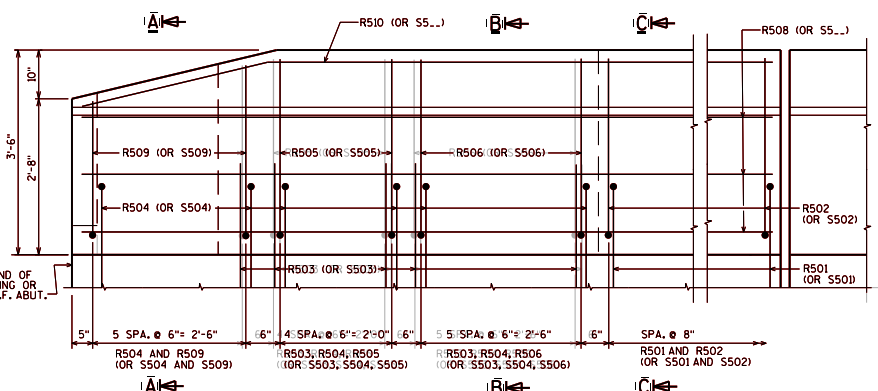
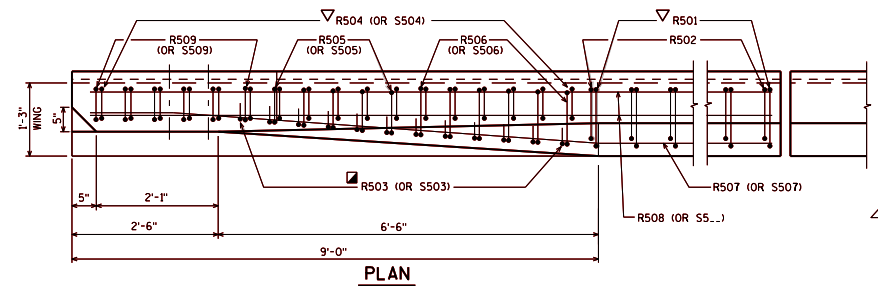
BAR MARK	COEF.	ABUT.	ABUT.	LENGTH	BAR SERIES	LOCATION
R501	X			5-10	X	PARAPET-VERT.
R502	X			6-8	X	PARAPET-VERT.
R503	X			3-0	X	PARAPET-VERT.
R504	X			6-1	X	PARAPET-VERT.
R505	X			6-5	X	PARAPET-VERT.
R506	X			6-6	X	PARAPET-VERT.
R507	X			6-6	X	PARAPET-HORIZ.
R508	X				X	PARAPET-HORIZ.
R509	X			5-5	X	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.

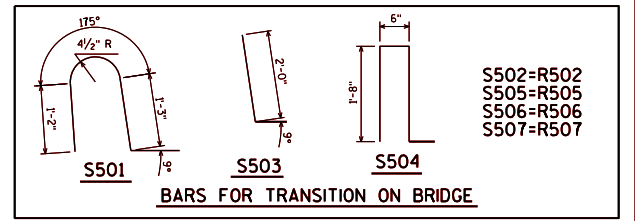
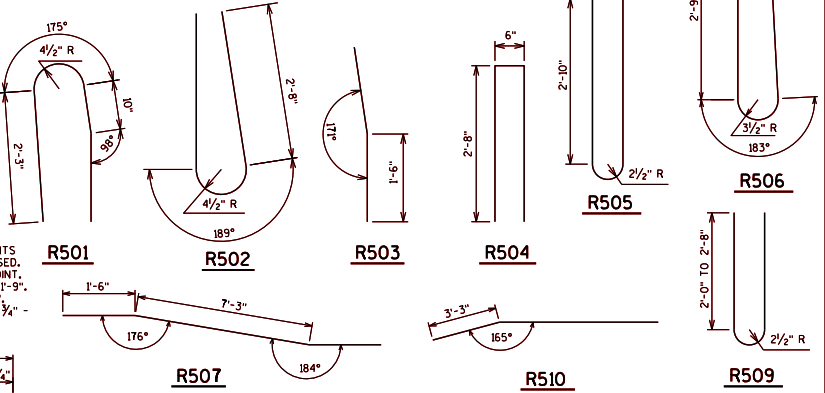
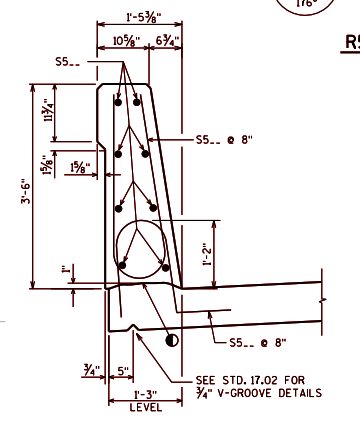
BAR SERIES TABLE

MARK	NO. REQD.	LENGTH
R502	4	4'-8" TO 6'-6"

BUNDLE AND TAG EACH SERIES SEPARATELY.



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.



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 AT ABUTMENTS.

SINGLE SLOPE PARAPET 42SS



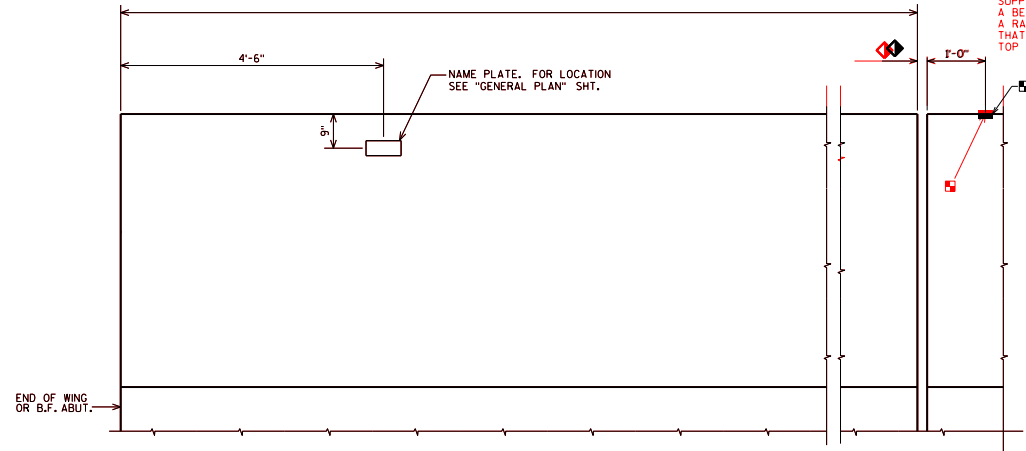
APPROVED: Bill Oliva DATE: 7-19

■ BENCH MARK (WHEN SUPPLIED), AVOID PLACING SUPPLIED BELOW A RAIL OR FENCE SYSTEM THAT IS A BENCH MARKED TO THE TOP OF THE PARAPET. A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

BILL OF BARS

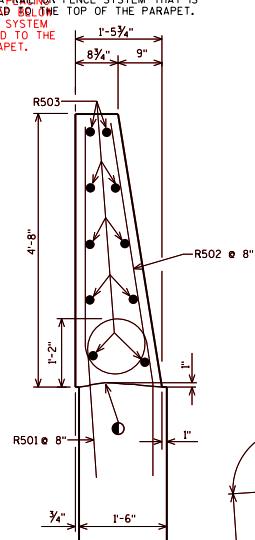
FOR ABUTMENT PARAPETS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	BEY	LOCATION
R501	X			5-11	X	PARAPET-VEBT...
R502	X			9-1	X	PARAPET-VEBT...
R503	X					PARAPET-HORIZ...
S5..	X			4-6	X	PARAPET-VEBT...

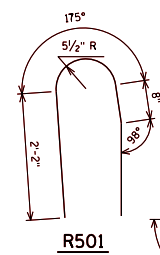


INSIDE ELEVATION

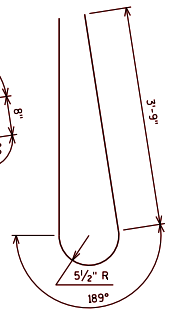
◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR A1 ABUTMENTS



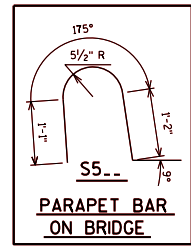
SECTION A



R501

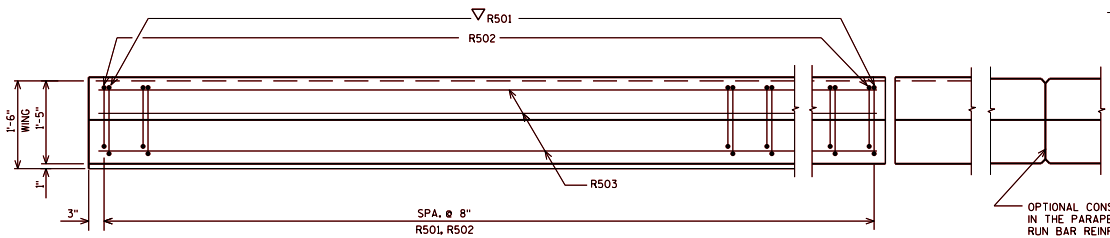


R502



PARAPET BAR ON BRIDGE

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.



PLAN

DESIGNER NOTES

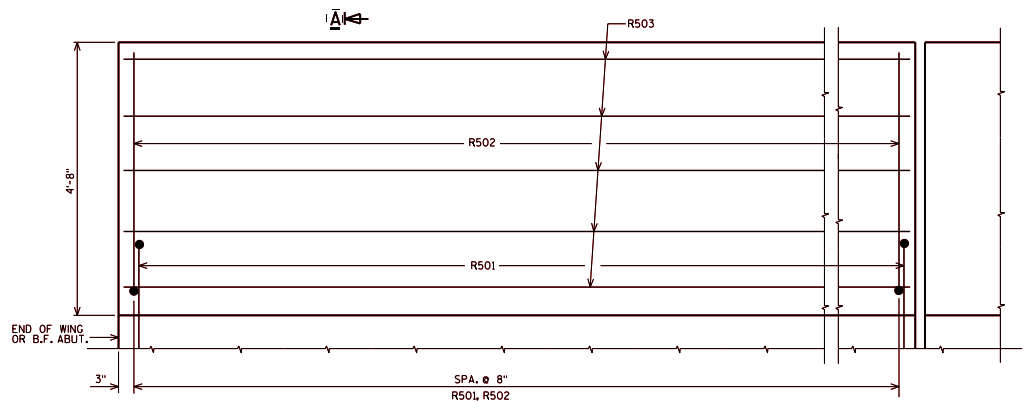
THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE S56' SINGLE SLOPE CONCRETE ROADWAY BARRIER ADJOINS THE END OF THE '56SS' PARAPET.

USE A 1'-6" WING WIDTH FOR WINGS PARALLEL TO THE ROADWAY.

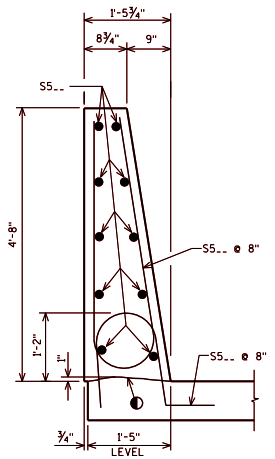
AREA = 5.16 SF
 WEIGHT = 774 LB/FT

● 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 ABUTMENTS.



OUTSIDE ELEVATION



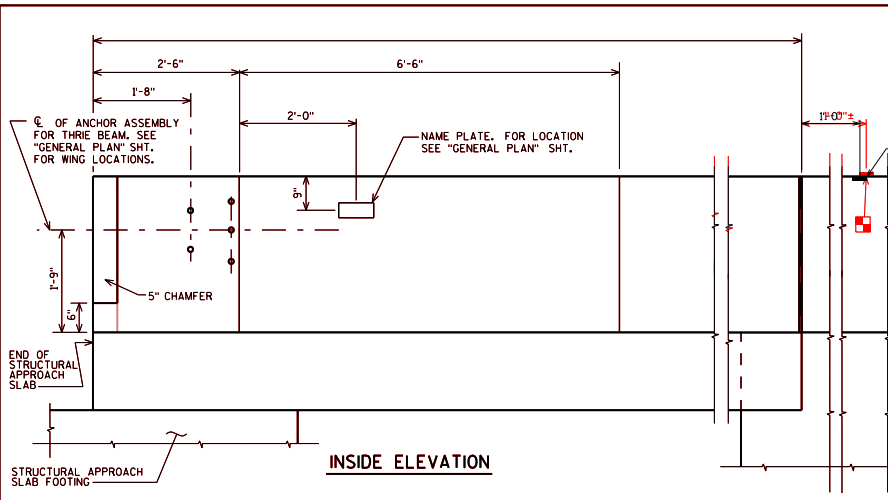
SECTION THRU PARAPET ON BRIDGE

SINGLE SLOPE PARAPET 56SS

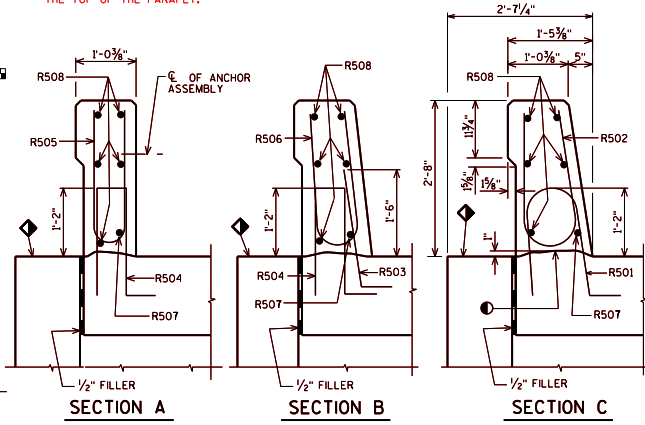


APPROVED: Bill Oliva

DATE: 7-19

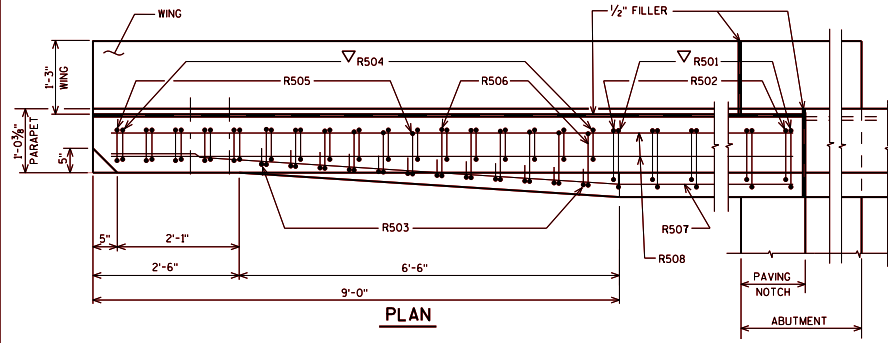


BE BENCHMARK WHEN SURF PAVED SURFACE IS TO BE PLACED BELOW CURB OR BENCH MARKS. SET BENCHMARK AIR RAIL AT EACH END OF THE DECK OR AT THE PARAPET, TO THE TOP OF THE PARAPET.

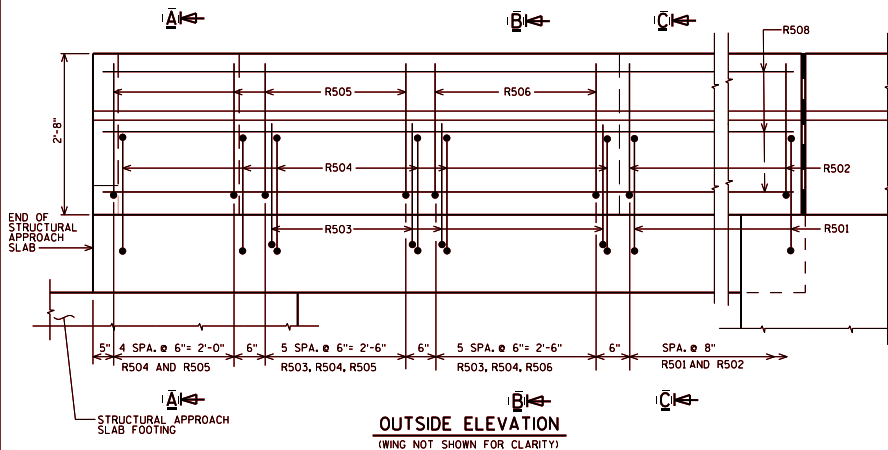
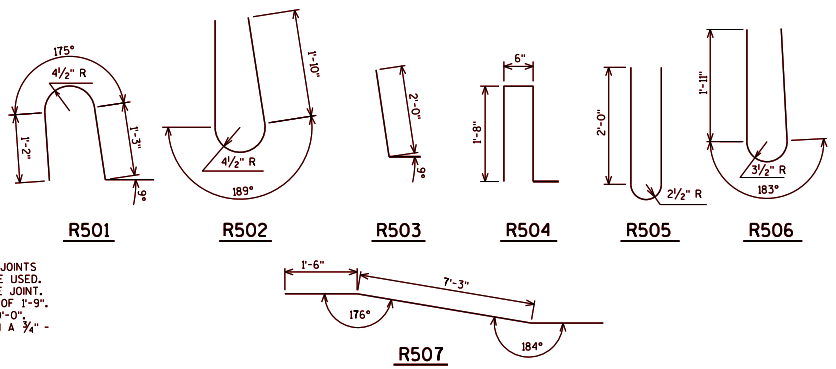


BILL OF BARS
FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	REIN.	LOCATION
R501	X			4-5	X	PARAPET-VERB...
R502	X			5-0	X	PARAPET-VERB...
R503	X			2-9	X	PARAPET-VERB...
R504	X			4-4	X	PARAPET-VERB...
R505	X			4-9	X	PARAPET-VERB...
R506	X			4-10	X	PARAPET-VERB...
R507	X				X	PARAPET-HO32...
R508	X					PARAPET-HO32...



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.



AREA = 3.09 SF
WEIGHT = 464 LB/FT

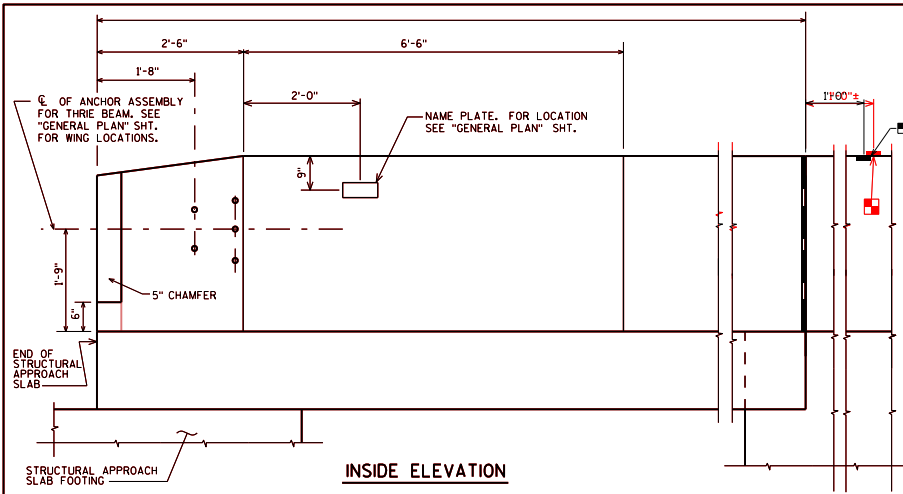
- CONST. JOINT - STRIKE OFF AS SHOWN.
- ◆ SLOPE FOR DRAINAGE
- ▽ R501 AND R504 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.

DESIGNER NOTES

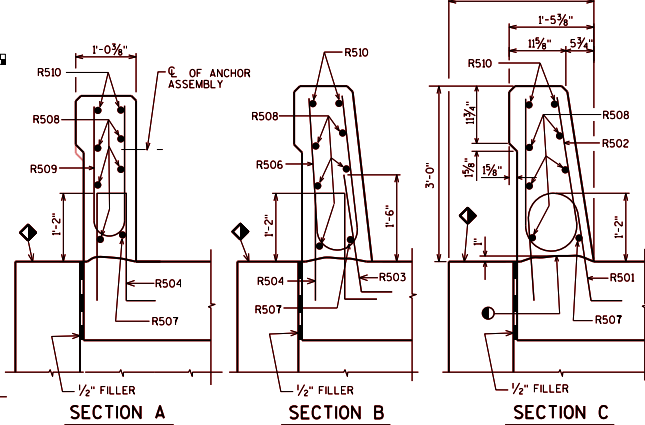
SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.
A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS. SEE STANDARD 30.30 FOR DETAILS OF 32SS PARAPET ON BRIDGE.

**SINGLE SLOPE PARAPET
32SS WITH STRUCTURAL
APPROACH SLAB**

APPROVED: Bill Oliva DATE: 1-18

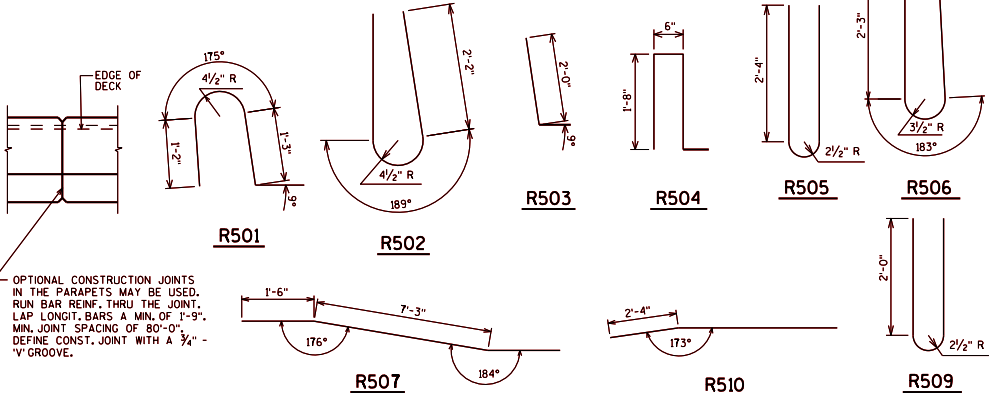
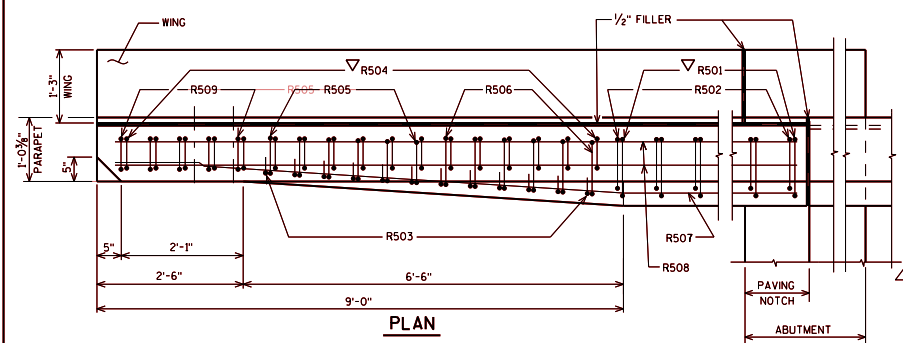


BE BENCHMARK WHEN SURF PAVED SLAB IS PLACED BELOW CURB OR RAIL BENCH MARKS SET IN TOWARD AIR RAIL AT TOP OF CURB OR RAIL. THE PARAPET TO THE TOP OF THE PARAPET.

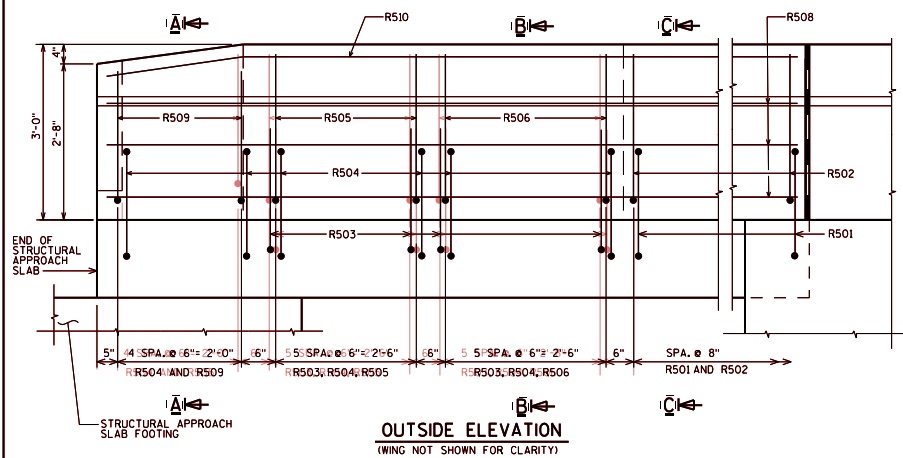


BILL OF BARS
FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	REIN.	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					PARAPET-HORIZ.
R508	X					PARAPET-HORIZ.
R509	X			4-9	X	PARAPET-VERT.
R510	X				X	PARAPET-HORIZ.



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" - 1" GROOVE.



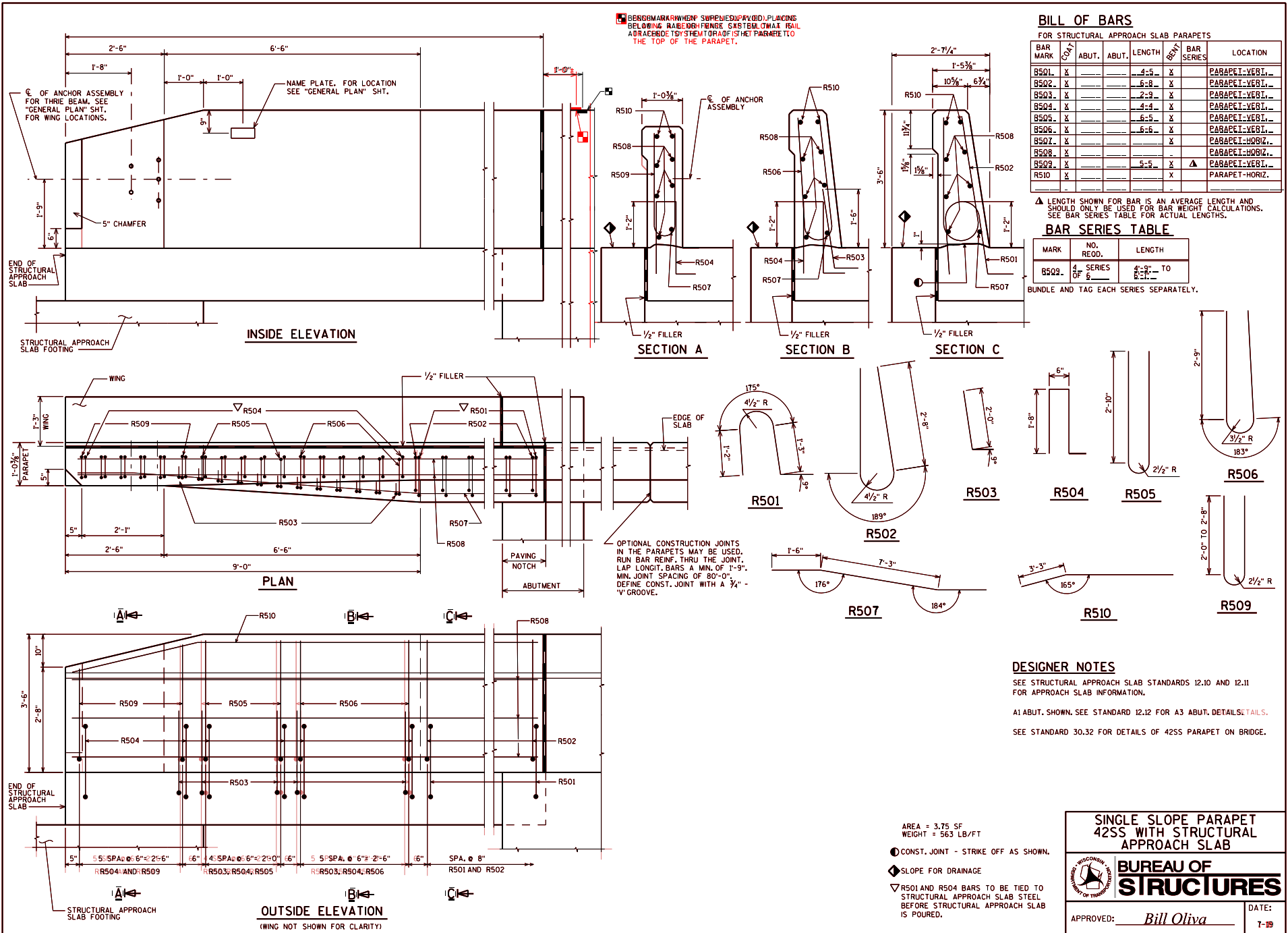
DESIGNER NOTES
SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR APPROACH SLAB INFORMATION.
A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS & TAILS.
SEE STANDARD 30.31 FOR DETAILS OF 36SS PARAPET ON BRIDGE.

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: 7-99



**SINGLE SLOPE PARAPET
42SS WITH STRUCTURAL
APPROACH SLAB**

**BUREAU OF
STRUCTURES**

DATE: _____

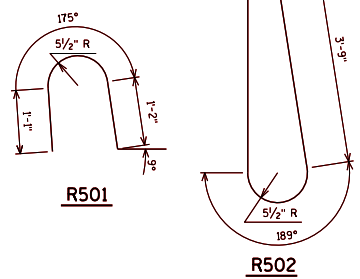
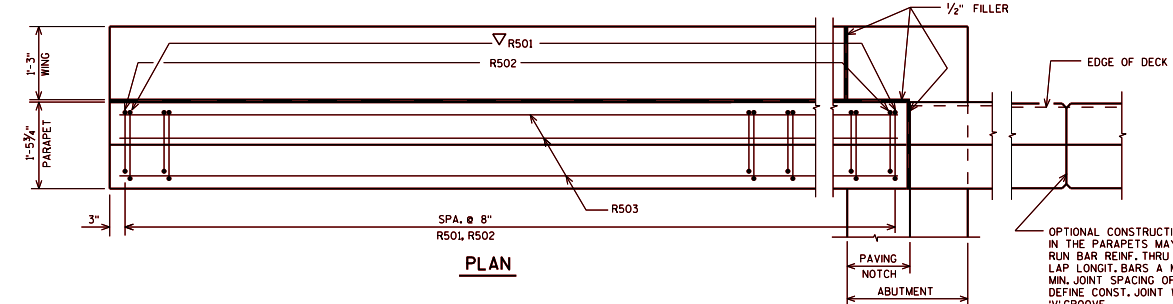
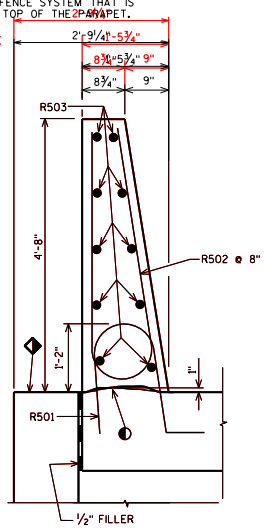
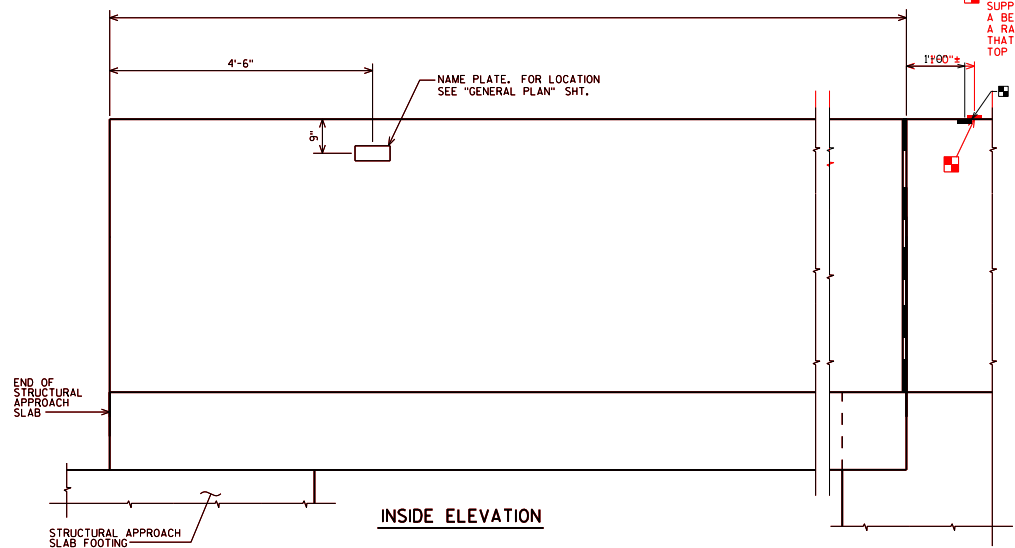
APPROVED: Bill Oliva 7-89

BENCHMARK WHEN SUPPLIED, AVOID PLACING SUPPLIES BELOW RAIL OR FENCE SYSTEM THAT IS A BENCHMARK READ BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

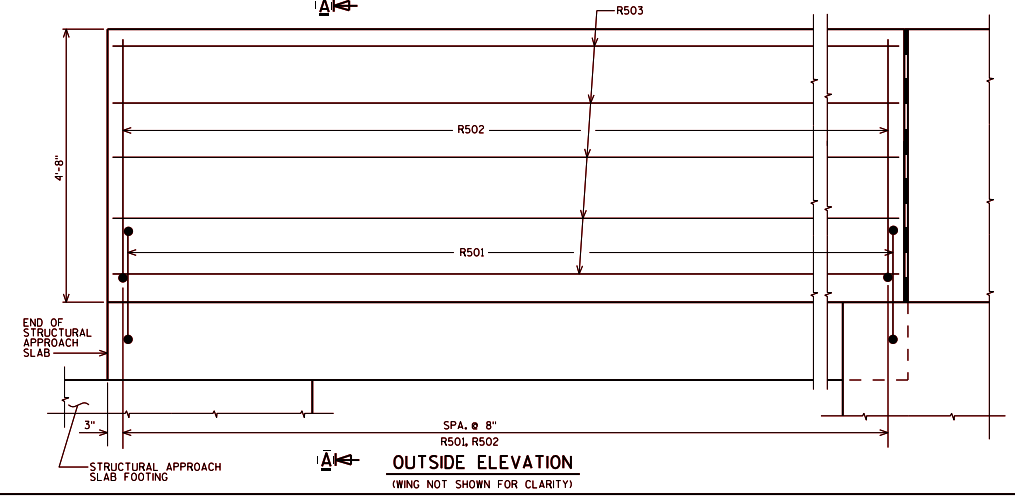
BILL OF BARS

FOR STRUCTURAL APPROACH SLAB PARAPETS

BAR MARK	COY.	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4-6	X	PARAPET_VEBI...
R502	X			9-1	X	PARAPET_VEBI...
R503	X					PARAPET_HORIZ...



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 NOTES

THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE 56S' 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.

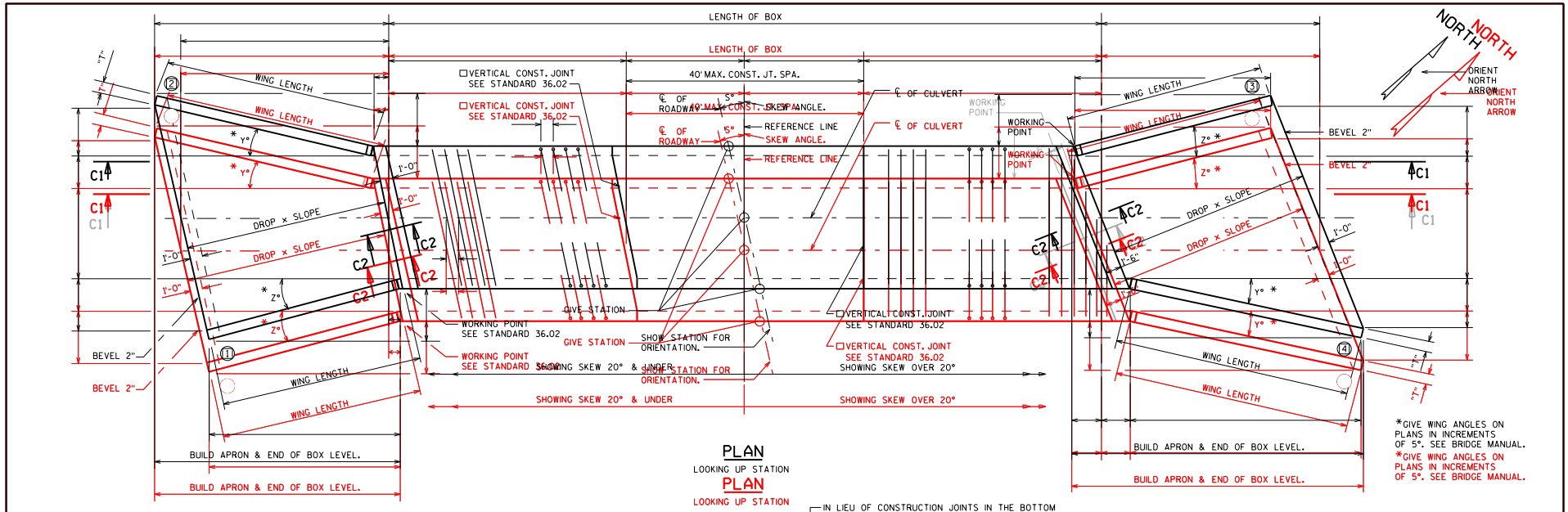
AREA = 5.16 SF
WEIGHT = 174 LB/FT

- 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

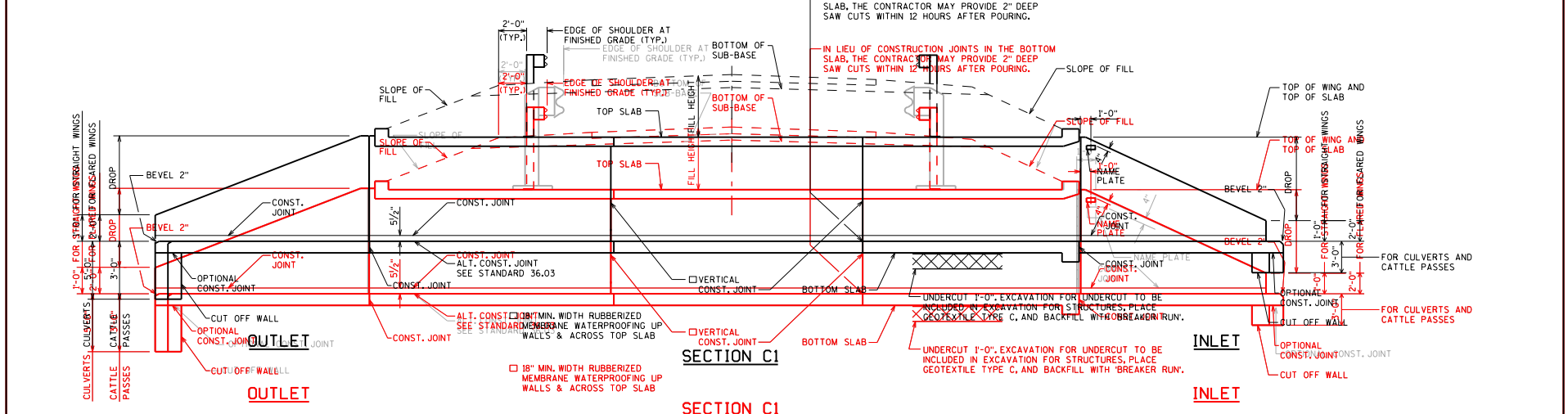
SINGLE SLOPE PARAPET 56SS WITH STRUCTURAL APPROACH SLAB

DATE: _____

APPROVED: Bill Oliva 7-39



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



LEGEND
 ○ INDICATES WING NUMBER
 ○ INDICATES WING NUMBER

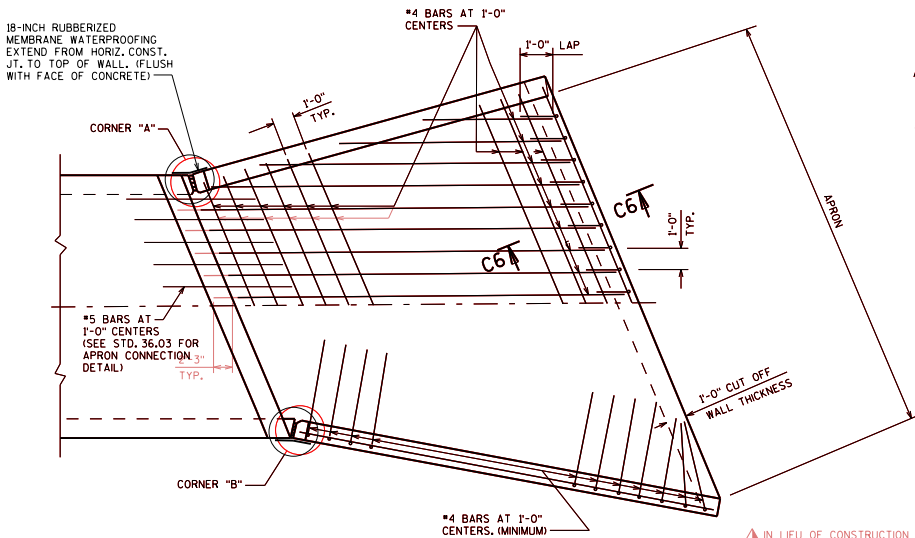
DESIGN DATA
 LIVE LOAD: HS-20
 DESIGN LOAD: HL-93
 INVENTORY RATING FACTOR: RF=1.05
 DESIGN RATING FACTOR: RF=1.35
 OPERATING RATING FACTOR: RF=1.35
 WISCONSIN STANDARD PERMIT VEHICLE (WIS.-SPV): 255 (KIPS)
 WISCONSIN STANDARD PERMIT TRAILER (WIS.-SPT): 255 (KIPS)
 ** DESIGNED FOR TRUCK HEIGHT RANGE OF _____ FEET
 MATERIAL PROPERTIES:
 CONCRETE MASONRY f'c = 3,500 P.S.I.
 BAR STEEL REINFORCEMENT f_y = 60,000 P.S.I.
 CONCRETE MASONRY f'c = 3.5 K.S.I.
 BAR STEEL REINFORCEMENT f_y = 60.0 K.S.I.

NOTES
 SEE STANDARD 36.02 FOR NOTES.
 TYPICAL UNDERCUT SHOWN, SEE STANDARD 9.01 FOR ALTERNATIVES.
 DESIGNER'S NOTES
 AND ADDITIONAL NOTES
 ** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS, HEIGHT TO NEAREST NEAREST FOOT ON FILLS OVER 4 FEET UNDER 4 FEET AND 10 FEET NEAREST NEAREST FOOT ON FILLS UNDER 4 FEET.
 ** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS, HEIGHT TO NEAREST NEAREST FOOT ON FILLS OVER 4 FEET.
 ** SEE STANDARD 36.02 FOR ADDITIONAL DESIGNER NOTES, AND TO THE NEAREST FOOT ON FILLS OVER 4 FEET.

BOX CULVERT LAYOUT

BUREAU OF STRUCTURES

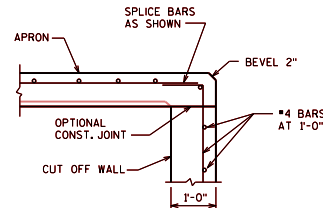
APPROVED: Bill Oliva DATE: 7-20



APRON DETAIL

APRON DETAIL

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



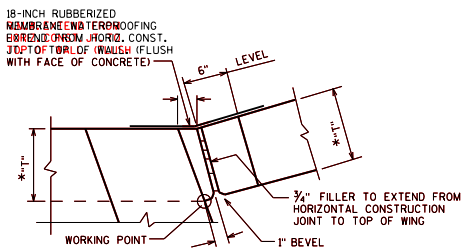
SECTION C6

"H" (FT.)	"L" (FT.)
≤ 5'-0"	3'-8"
> 5'-0" - 7'-0"	5'-2"
> 7'-0" - 8'-0"	5'-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

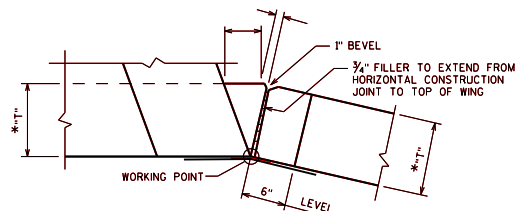
THE AREA OF REINFORCING STEEL NOT IDENTIFIED IN SECTIONS SHALL CONFORM TO THE FOLLOWING TEMPERATURE AND SHRINKAGE REQUIREMENTS:

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

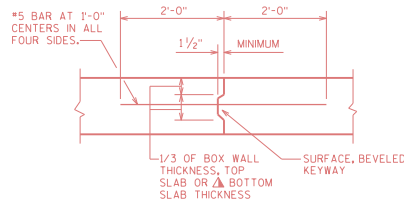


CORNER "A"

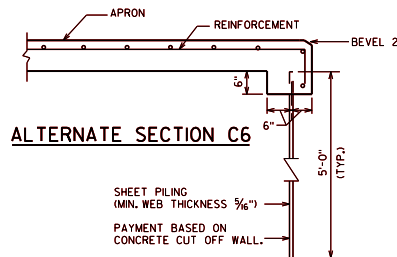
* DIMENSION "T" TO BE DETERMINED FROM BARREL DESIGN



CORNER "B"



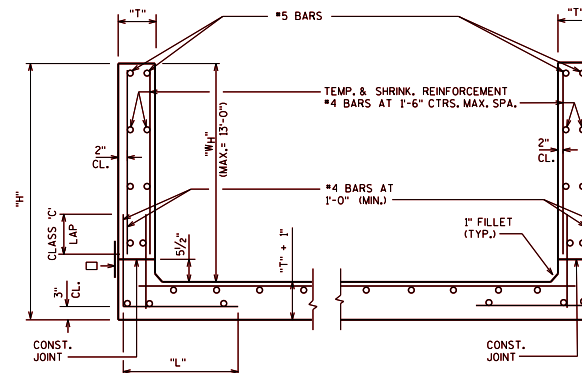
VERTICAL CONSTRUCTION JOINT



ALTERNATE SECTION C6

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

ALTERNATE CUT OFF WALL



SECTION THRU WINGWALLS

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

NOTES

BAR STEEL REINFORCEMENT SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED.

THE CONCRETE IN THE CUT OFF WALL SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED.

THE ALTERNATE CUT OFF WALL DETAIL SHOWN ON THIS SHEET MAY BE USED CONCRETE LIEU OF THE CAST-IN-PLACE CONCRETE BASED ON CONCRETE CUT OFF WALLS.

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

DESIGNER NOTES

THE CONTRACTOR SHALL PRECAST CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE BOX CULVERT WITH THE ACCEPTANCE OF THE SHOP DRAWINGS. THE CONTRACTOR SHALL PROVIDE THE PRECAST ELEMENTS ON THE BOX CULVERT SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 36 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL. LOWER PRECAST ELEMENTS IN LIEU OF THE CAST-IN-PLACE BOX CULVERT WITH THE ACCEPTANCE OF THE SHOP DRAWINGS. THE CONTRACTOR SHALL PROVIDE THE PRECAST ELEMENTS IN LIEU OF THE CAST-IN-PLACE BOX CULVERT SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 36 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL. PAYMENT FOR THE PRECAST ELEMENTS SHALL BE BASED ON THE QUANTITIES AND PRICES BID FOR THE ITEMS LISTED IN THE BIDDING DOCUMENTS.

DESIGNER NOTES

SEE STANDARD PRECAST ELEMENTS INCLUDE: BOX CULVERT BARREL SECTIONS, WINGWALLS, HEADERS, AND CUTOFF WALLS. APRON FLOORS SHALL BE CAST-IN-PLACE. ALL BAR UNLESS DESIGNATED OTHERWISE SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED. PRECAST ELEMENTS SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED. PRECAST ELEMENTS SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED. PRECAST ELEMENTS SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED. PRECAST ELEMENTS SHALL BE ORDERED AS SHOWN UNLESS OTHERWISE SHOWN OR NOTED.

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.

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.

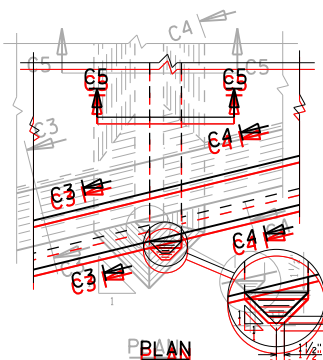
FOR "B" DESIGNATED CONCRETE BOX CULVERTS HAVING THEIR TOP SURFACE AT GRADE, HAND HELD FINISHING MACHINES MAY BE USED. NOTE THIS ON PLANS WHEN APPLICABLE.

SEE STANDARDS 9.01 AND 36.01 FOR ADDITIONAL NOTES.
SEE STANDARDS 36.05 AND 36.06 FOR PRECAST BOX CULVERT DETAILS.

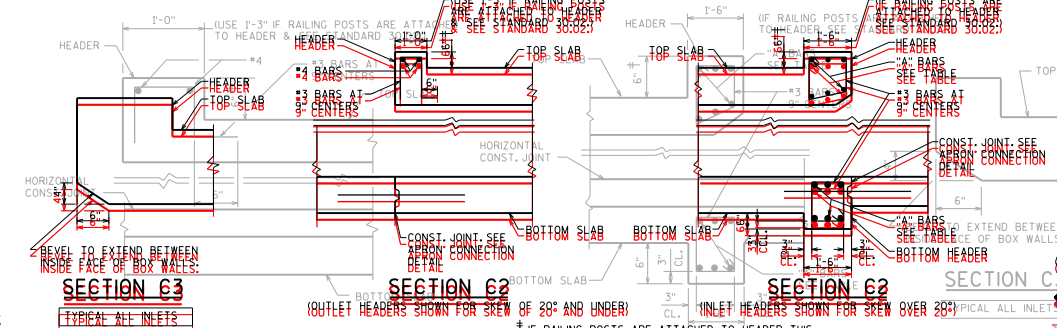
BOX CULVERT APRON DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-23



PLAN



SECTION C3
TYPICAL ALL INLETS

SECTION C2
(OUTLET HEADERS SHOWN FOR SKEW OF 20° AND UNDER)

SECTION C4
HAUNCH DETAIL

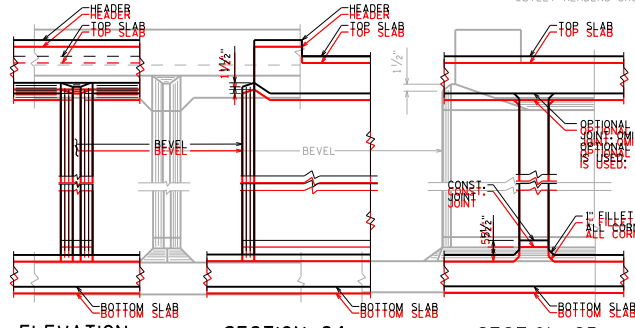
SECTION C5

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

* HEADER LENGTH EQUALS THE DISTANCE BETWEEN THE FACE OF WALLS IN ONE CELL 7'-0" 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 REQUIRED FOR PEDESTRIAN UNDERPASSES; OMIT 1" FILLET IF ALTERNATIVE CONSTRUCTION JOINT IS USED.
- 1" = 1'-0" MIN. FOR PEDESTRIAN UNDERPASSES AND SLABS WITH DEPTH OF FILLS < 2'-0".
- 1" = 6/2" MIN. OTHERWISE.
- TOP BARS FOR TOP SLAB:
 - FOR 1'-0" TO 2'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 2'-0" TO 4'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 4'-0" TO 6'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 6'-0" TO 8'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 8'-0" TO 10'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 10'-0" TO 12'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 12'-0" TO 14'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 14'-0" TO 16'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 16'-0" TO 18'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 18'-0" TO 20'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
- ▲ USE "SHEET MEMBRANE WATERPROOFING FOR TOP SLAB C-1" (516.0610.5) FOR PEDESTRIAN UNDERPASSES; INCLUDE THE FOLLOWING NOTE:
 - SHEET MEMBRANE WATERPROOFING REQUIRED UP WALLS AND ACROSS TOP OF SLAB AT VERTICAL CONST. JOINTS; EXTEND ENTIRE CULVERT LENGTH; BOTTOM SLAB: BELOW THE TOP OF BOTTOM SLAB.

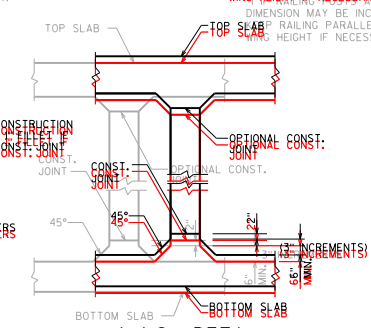


ELEVATION SECTION C4

ELEVATION SECTION C5

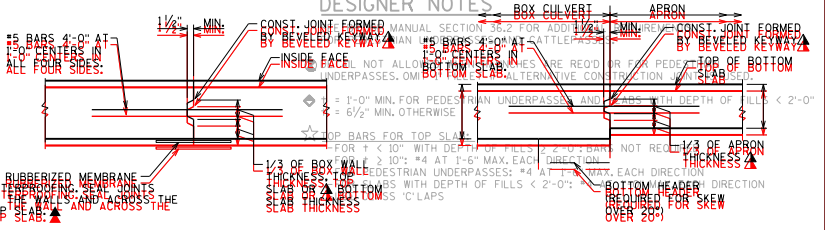
INLET NOSE CENTERWALL DETAILS

TYPICAL ALL INLETS: #4 BARS MAY BE REQUIRED FOR HYDRAULIC PURPOSES.



HAUNCH DETAIL

PROVIDE HAUNCH DETAIL ONLY WHEN REQUIRED AS PER DESIGN AND WHEN REQUIRED AS PER DESIGN.

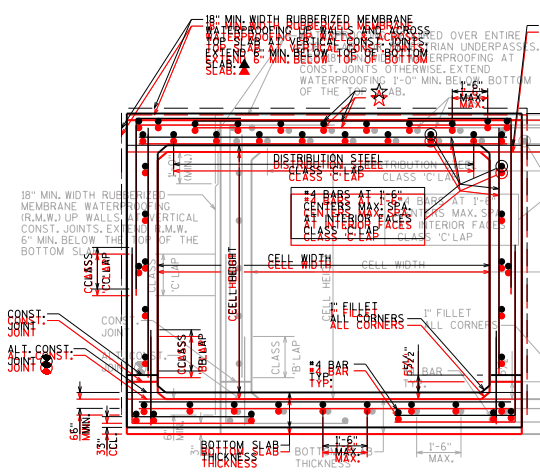


VERTICAL CONSTRUCTION JOINT

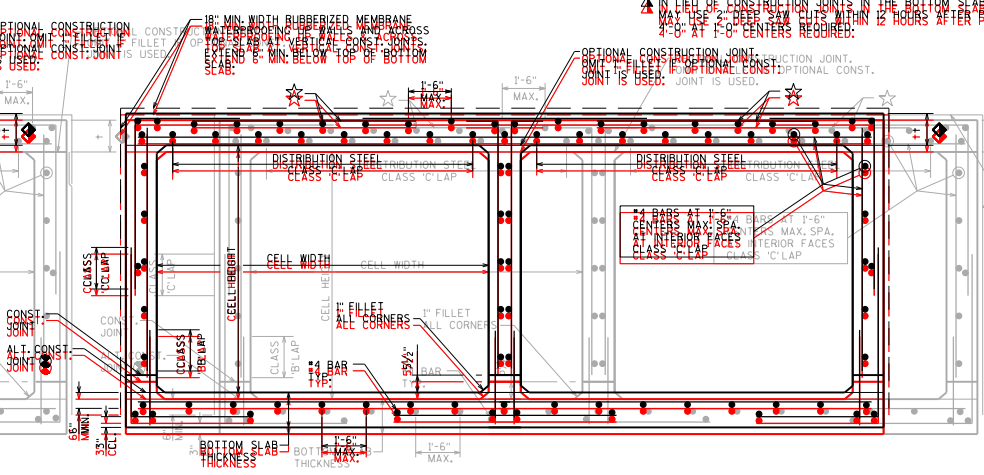
APRON CONNECTION DETAIL

DESIGNER NOTES

- ▲ IN LIEU OF CONSTRUCTION JOINTS IN THE BOTTOM SLAB, THE CONTRACTOR MAY USE 2" DEEP SAW CUTS WITHIN 12 HOURS AFTER POURING; #5 BARS 1'-0" AT 1'-0" CENTERS REQUIRED.
- 1" = 1'-0" MIN. FOR PEDESTRIAN UNDERPASSES AND SLABS WITH DEPTH OF FILLS < 2'-0".
- 1" = 6/2" MIN. OTHERWISE.
- TOP BARS FOR TOP SLAB:
 - FOR 1'-0" TO 2'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 2'-0" TO 4'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 4'-0" TO 6'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 6'-0" TO 8'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 8'-0" TO 10'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 10'-0" TO 12'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 12'-0" TO 14'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 14'-0" TO 16'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 16'-0" TO 18'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
 - FOR 18'-0" TO 20'-0" WITH DEPTH OF FILLS < 2'-0": #4 BARS NOT REQUIRED
- ▲ RUBBERIZED MEMBRANE WATERPROOFING REQUIRED UP WALLS AND ACROSS THE TOP OF SLAB AT VERTICAL CONST. JOINTS; EXTEND ENTIRE CULVERT LENGTH; BOTTOM SLAB: BELOW THE TOP OF BOTTOM SLAB.



SECTION THRU BOX
SINGLE CELL BOX



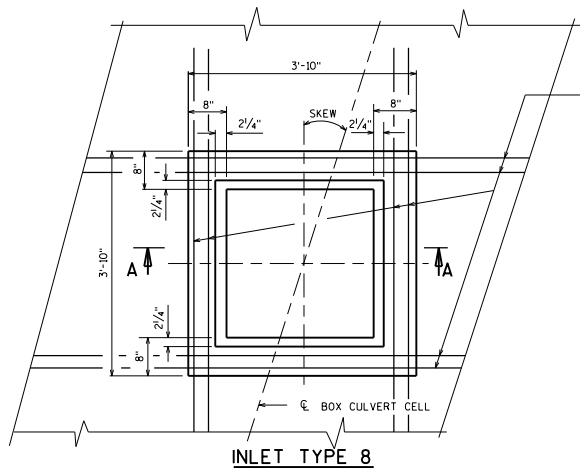
SECTION THRU BOX
TWIN CELL BOX

BOX CULVERT DETAILS

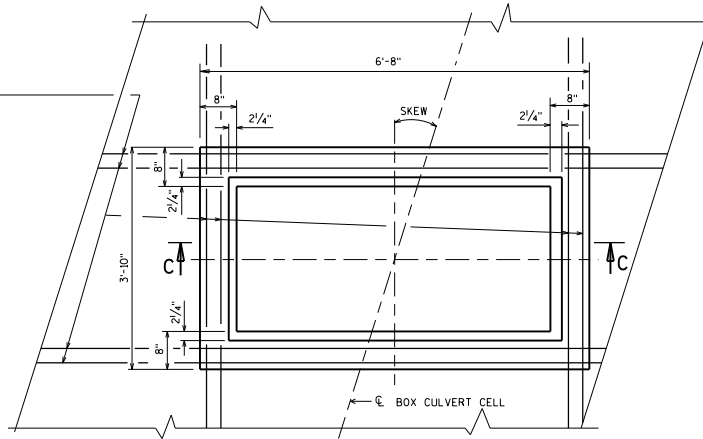
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-26

STANBARD 36:03



INLET TYPE 8



INLET TYPE 9

MEDIAN INLET PLAN
(INLET COVER NOT SHOWN)

NOTES

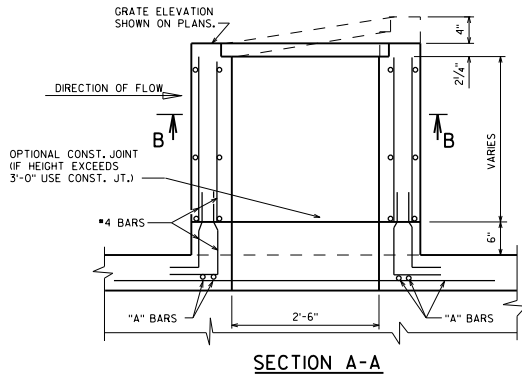
FIELD CUT BAR STEEL REINFORCEMENT IN TOP SLAB TO CLEAR THE OPENING PROVIDED FOR MEDIAN INLET.
ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. MAXIMUM ADJUSTMENT SHALL BE 8".

DESIGN NOTES

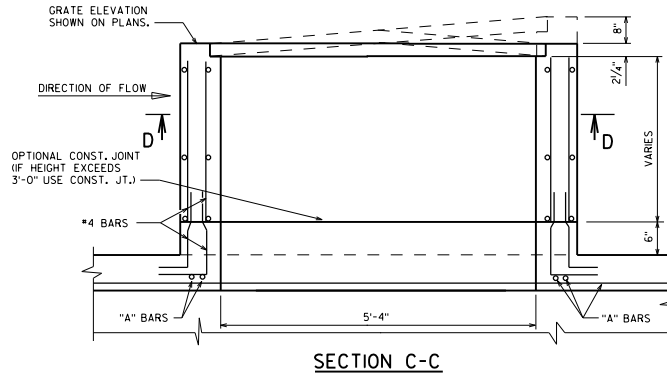
SIZE AND LENGTH OF "A" BARS TO BE DETERMINED BY THE DESIGNER.

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

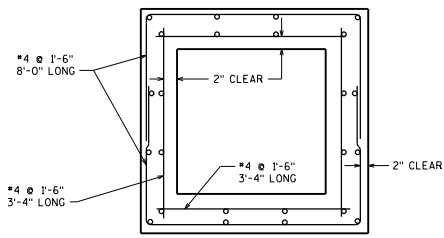
VERTICAL STEEL ADEQUATE FOR DEPTH UP TO 25'-0" ASSUMING WIND LOAD OF 50#/SQ.FT..



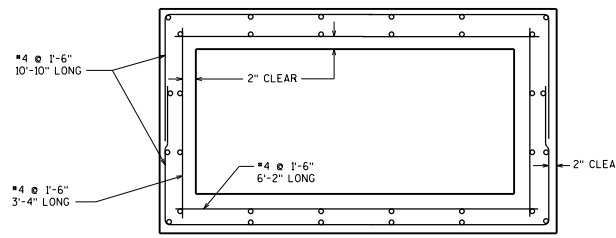
SECTION A-A



SECTION C-C



SECTION B-B



SECTION D-D

BOX CULVERT MANHOLE FOR INLET TYPE 8 & 9

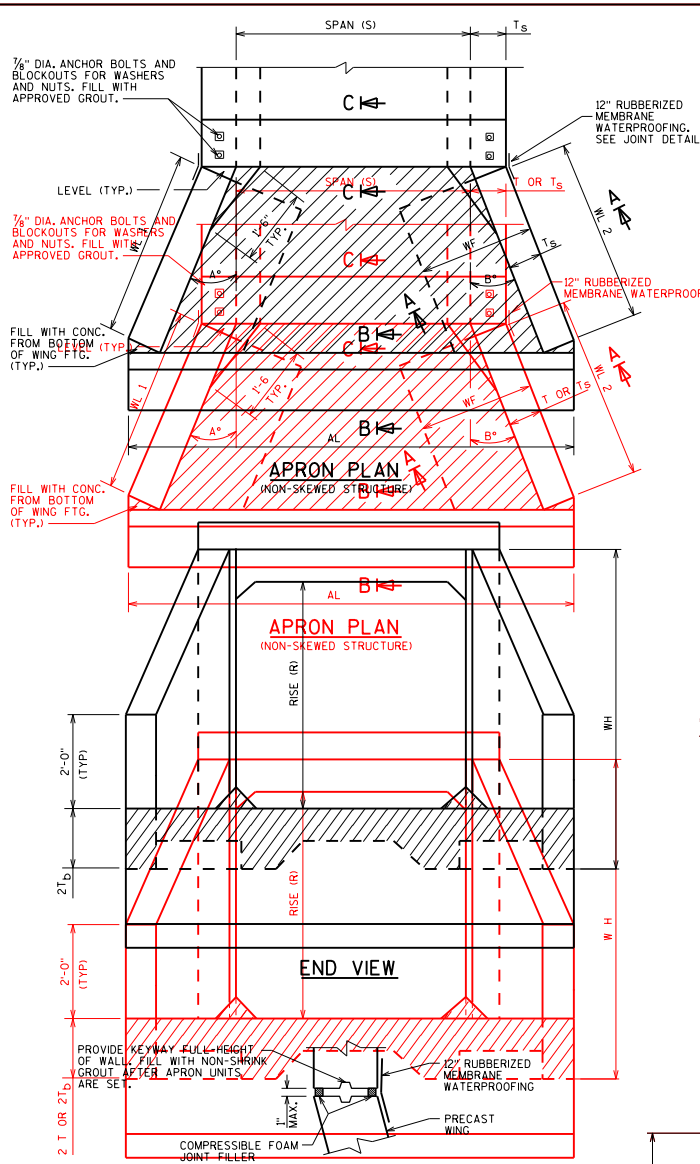


BUREAU OF STRUCTURES

APPROVED: Bill Oliva

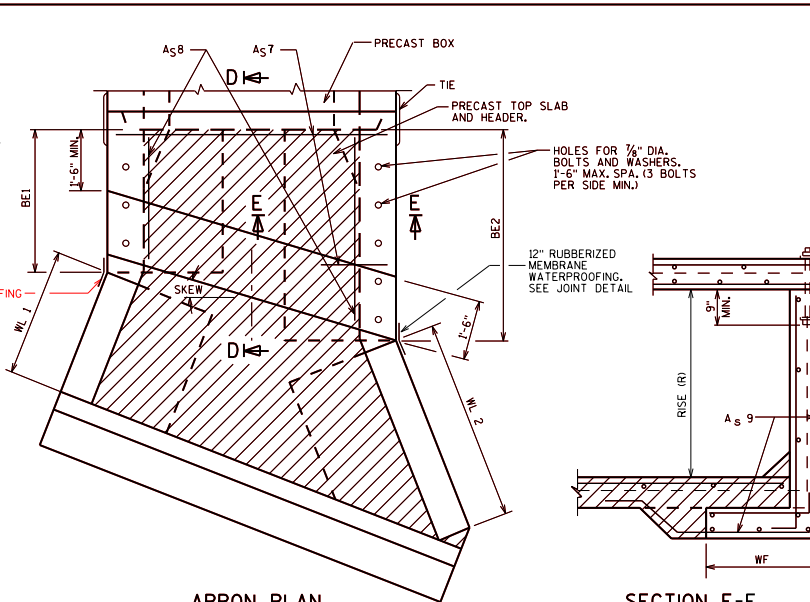
DATE:

7-16



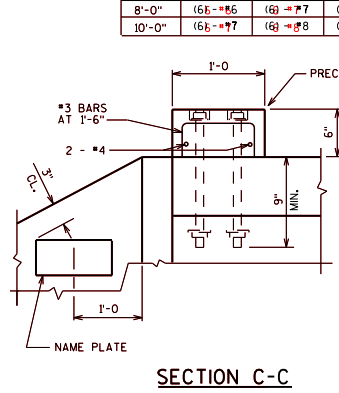
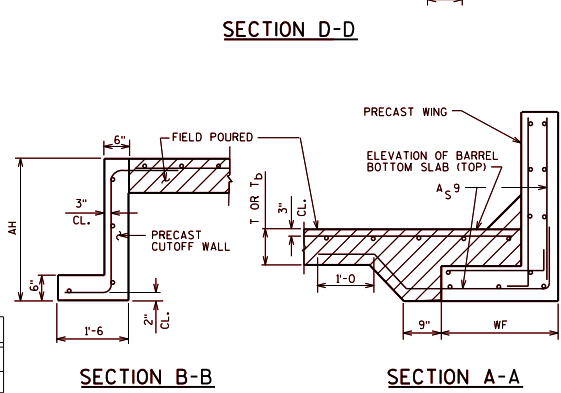
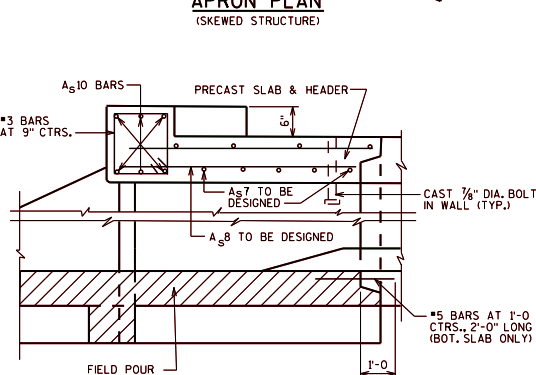
BOX CULVERT APRON DATA

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



SECTION E-E

RISE (R)	A _{S9} IN. ² /FT	WF
4'-0"	0.19	2'-6"
6'-0"	0.24	3'-6"
8'-0"	0.31	4'-0"
10'-0"	0.34	4'-9"



NOTES

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

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

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

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

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

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

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

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

THICKNESS T & S REINF.	A _{S9}	WF
≤ 12"	#4 @ 18"	
> 12" - 18"	#4 @ 12"	

THE MAXIMUM BAR SIZE OF GRADE 60 DEFORMED BARS, OTHER THAN THE A_{S10} BARS, SHALL BE #5.

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

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

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

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

APRON SHALL BE POURED AND CURED PRIOR TO BACKFILLING WINGWALLS.

DESIGNER NOTE:

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

(S)(F.T.)	R.(F.T.)	T OR T _S (IN)	SKEW	ANGLE	AH	WH	BE1	BE2
INLET								
OUTLET								

A_{S10} BARS

SPAN (S)	SKEW		
	0°-15°	16°-30°	31°-45°
6'-0"	(6) #5	(6) #6	(6) #6
7'-0"	(6) #5	(6) #6	(6) #7
8'-0"	(6) #5	(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

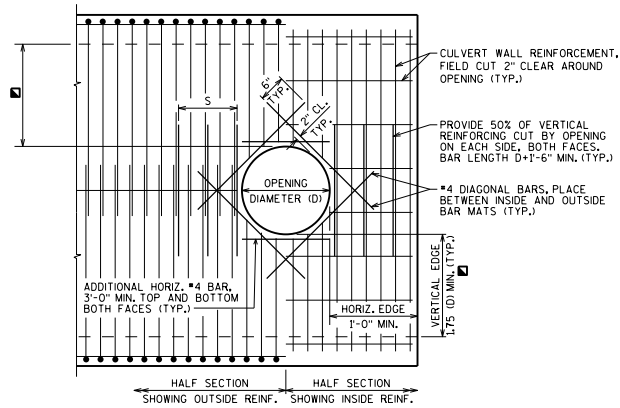
APPROVED: *Bill Oliva* DATE: 7-28

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.

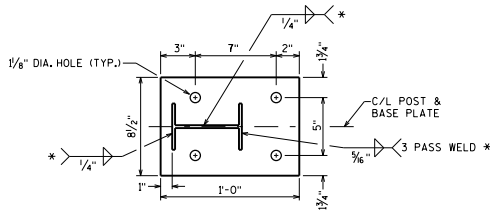


ELEVATION

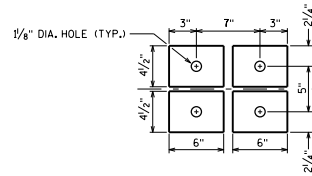
WHEN $D \leq 1'-6"$ $S = 1'-6"$
 WHEN $D > 1'-6"$ $S = 1'-6"$ MIN, D MAX

PIPE OPENING IN CULVERT WALL	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-13

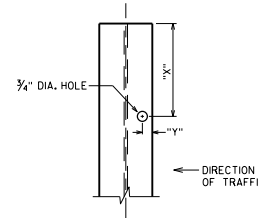
* WELDING IS TO BE COMPLETED USING THE GAS-METAL ARC WELDING (GMAW) PROCESS WITH ERTOS-3 WELDING WIRE AND ARGON-OXYGEN OR CO₂ COVER GAS.



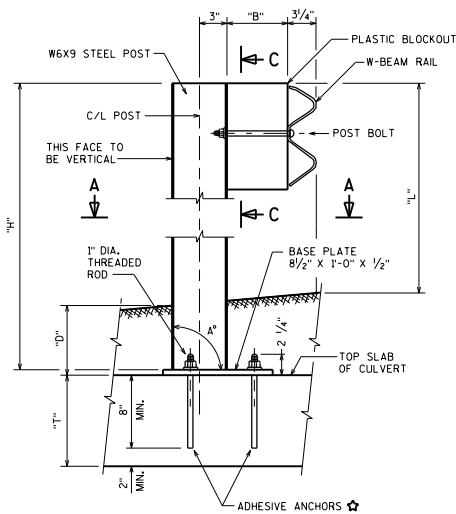
SECTION A-A
POST & BASE PLATE



SECTION B-B
(4)-BOTTOM PLATES



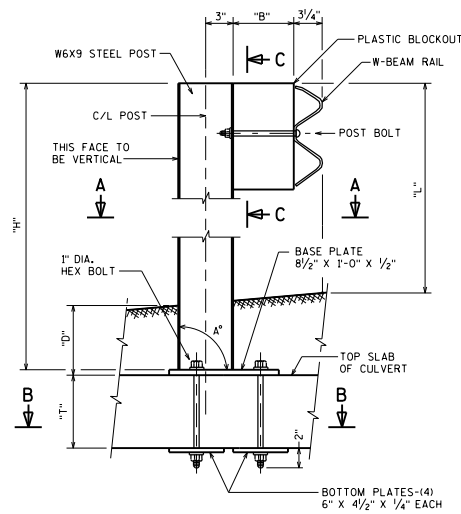
SECTION C-C
HOLE IN POST FLANGE ON APPROACHING TRAFFIC SIDE



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

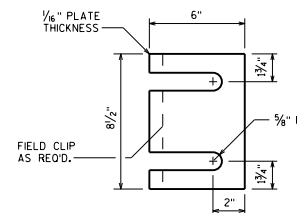
USE FOR THICKNESS "T" OF 8 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (f'_c) OF 3,500 PSI

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'-4 3/8"	8"	7"	13/16"
MGS GUARDRAIL	2'-7 7/8"	12"	7 1/8"	3/4"



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 S05.

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'-1 1/2" PER FDM SDD 14 B 51-1. SEE FDM SDD 14 B 51-1 FOR MINIMUM CLEARANCES 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: <u>Bill Oliva</u>
DATE: 7-16	

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 SDD14848 PLUS PLUS 6".

FOR SHORTER SPAN CULVERTS, WHERE BEAM GUARD CROSSES THE LENGTH OF THE STRUCTURE, CONSIDERATION SHALL BE GIVEN TO THE DETAILS SHOWN ON SDD14848 PROVIDED ADEQUATE REQUIREMENTS DON'T SHOW STANDARD BEAM 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 SDD14838 AND SDD 5434 FOR CONCRETE BARRIER DETAIL.

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.

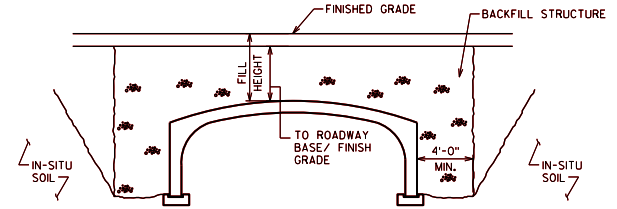
PLACE FOOTINGS BELOW SCOUR AND FROST DEPTHS. PLACE BOTTOM OF FOOTING AT A MINIMUM DEPTH EQUAL TO PREVAILING FROST DEPTH OR SCOUR DEPTH BUT NOT LESS THAN 4'-0" BELOW GROUND ELEVATION UNLESS CONSTRUCTED ON ROCK FOUNDATION OR OTHERWISE INDICATED.

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

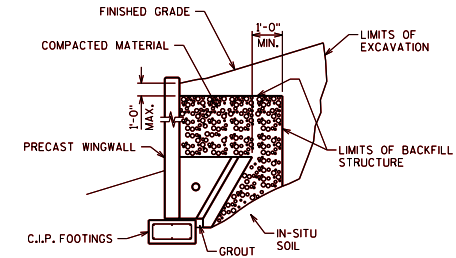
BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.

LRFD DESIGN LOADS

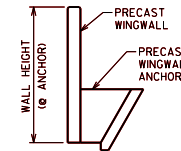
LIVE LOAD: HL-93
 HORIZONTAL EARTH PRESSURE: UNIT WEIGHT = 125 PCF
 VERTICAL EARTH PRESSURE: UNIT WEIGHT = 120 PCF



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

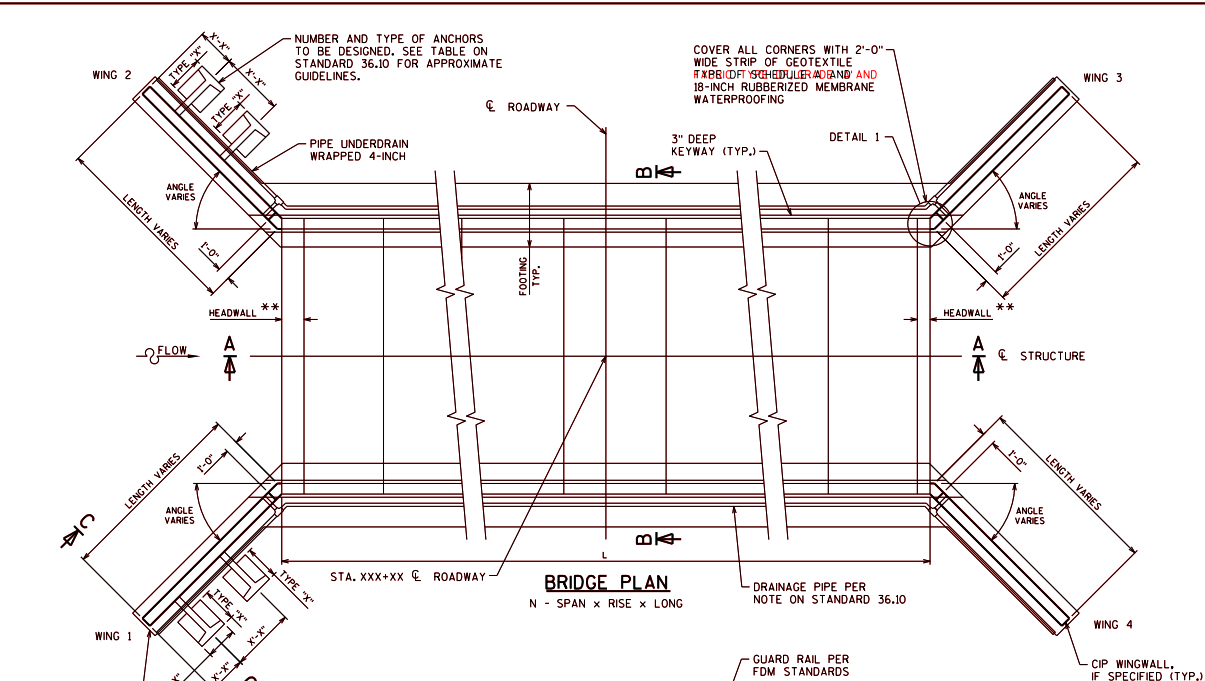
*NOTE: ADJACENT SEGMENTS SHALL BE ATTACHED TO EACH OTHER TO KEEP FRONT FACES IN ALIGNMENT. PLACE A FILLER AT THESE JOINTS WITH A MEMBRANE ALONG THE JOINT AT THE BACK FACE.

PRECAST THREE-SIDED BOX CULVERT DESIGN NOTES



BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-21



GENERAL NOTES:

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

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

USE GRADE A CONCRETE IN FOOTING AND WINGWALLS. $f'_c = 4$ KSI (MIN.)

PROVIDE CONCRETE COVER ON REINFORCING BARS AS NOTED HEREIN.

CHAMFER EXPOSED CONCRETE EDGES $\frac{3}{4}$ " x $\frac{3}{4}$ " EXCEPT AS NOTED.

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

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

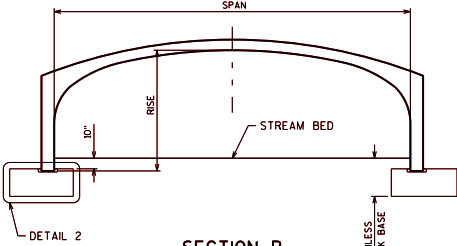
AT ANY TIME DURING PLACEMENT OF THE BACKFILL, DO NOT PERMIT A DIFFERENCE IN FILL ELEVATION ON THE SIDES OF THE CULVERT BARREL IN EXCESS OF 2'-0". DURING COMPACTION OF THE BACKFILL, DO NOT ALLOW THE WHEELS OF ROLLERS TO COME CLOSER THAN 1'-0" TO THE FACE OF THE OF THE STRUCTURE.

DESIGNER NOTES:

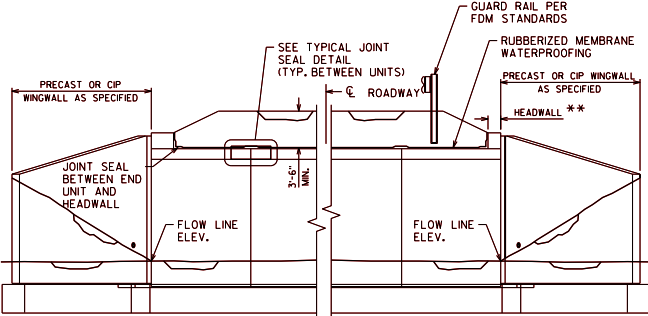
ALL BAR SPLICES TO BE "CLASS C" TENSION LAP SPLICES.

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

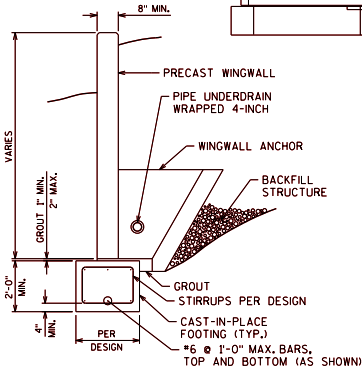
** SEE STANDARD 36.13 AND STANDARD 36.14 FOR HEADWALL DETAILS AND FEASIBILITY GUIDELINES



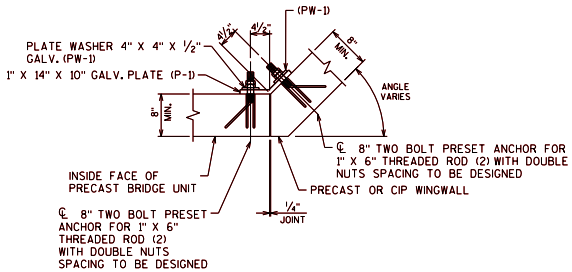
SECTION B



SECTION A



SECTION C



DETAIL 1

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

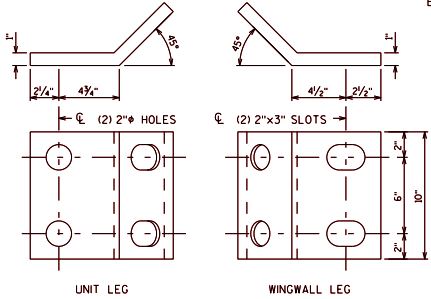
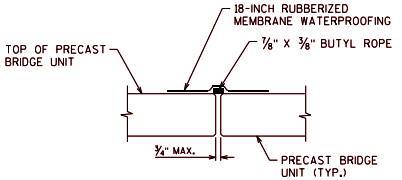



PLATE P-1

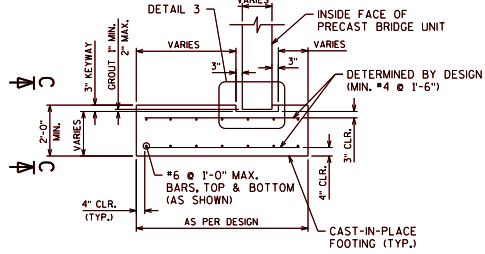
NOTE: PLATE LENGTH AND THICKNESS SHALL BE INCREASED AS REQUIRED BY DESIGN.



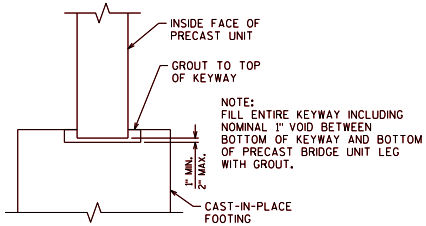
TYPICAL JOINT SEAL DETAIL

PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>

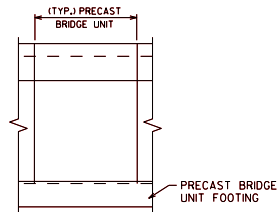
SPREAD FOOTING SHOWN, OTHER FOUNDATION TYPES POSSIBLE. (FOR PEDESTAL WALL, PILE AND BASE SLAB FOUNDATIONS, "SEE OPTIONAL DETAIL 2")



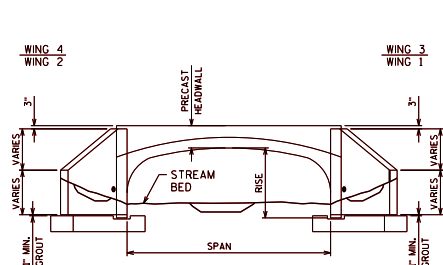
DETAIL 2



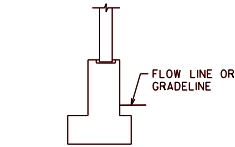
DETAIL 3



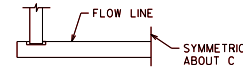
SECTION C



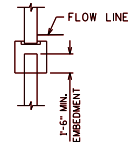
TYPICAL END ELEVATION



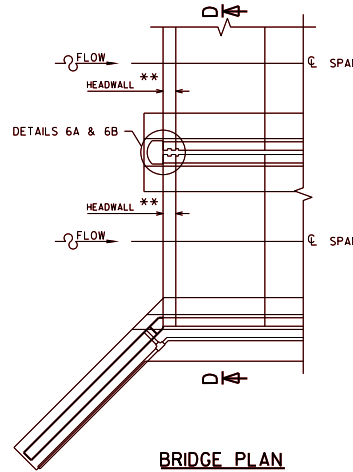
OPTIONAL DETAIL 2
IF PEDESTAL IS REQUIRED



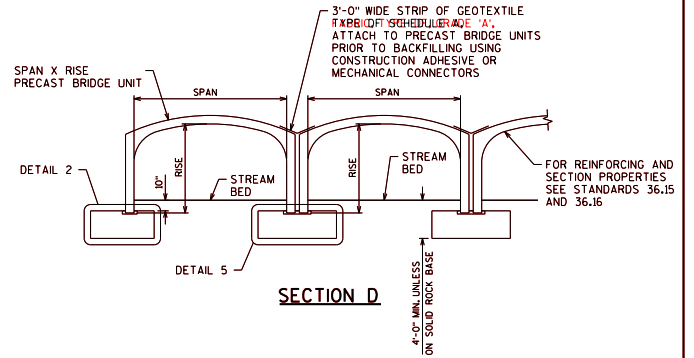
OPTIONAL DETAIL 2
IF BASE SLAB IS REQUIRED



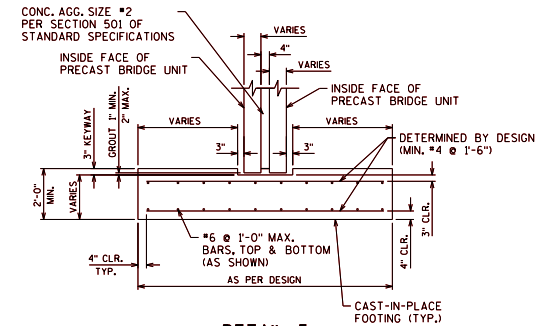
OPTIONAL DETAIL 2
IF PILES ARE REQUIRED



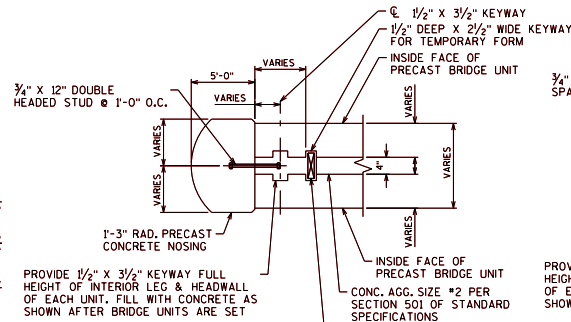
BRIDGE PLAN



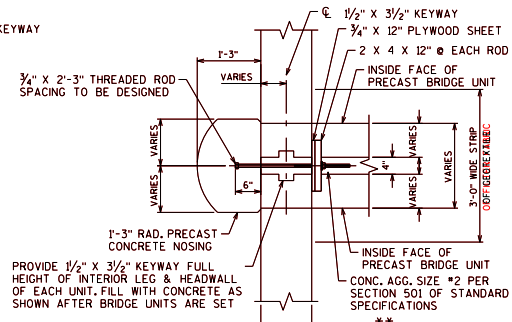
SECTION D



DETAIL 5




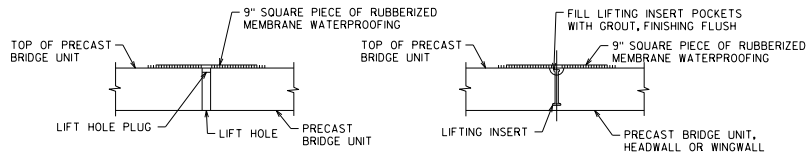
DETAIL 6A



DETAIL 6B

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

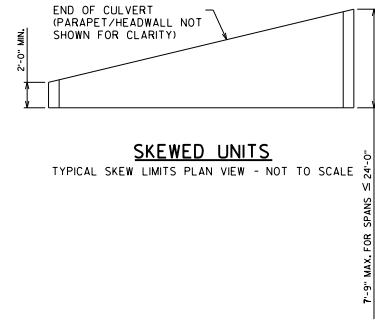
PRECAST THREE-SIDED BOX CULVERT DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <i>S. Bill Dwyer</i>	DATE: 7-18



LIFTING HOLES

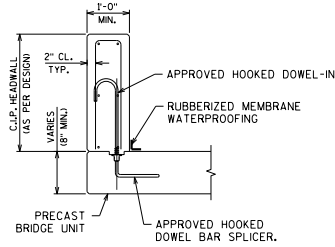
LIFTING INSERTS

TYPICAL LIFT POINT SEALING DETAIL



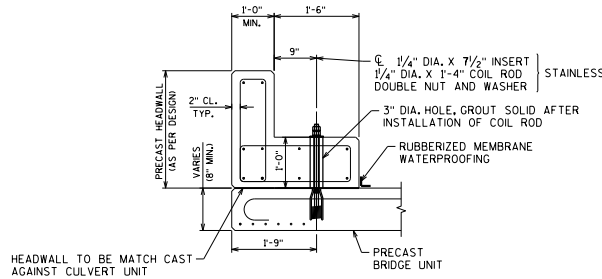
SKEWED UNITS

TYPICAL SKEW LIMITS PLAN VIEW - NOT TO SCALE



CAST-IN-PLACE HEADWALL DETAIL

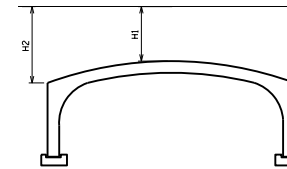
NOT TO SCALE



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'-6 3/4"
20'-0" - 28'-0"	7'-0"	10'-0"
36'-0"	6'-0"	10'-6"
42'-0"	4'-0"	10'-0"



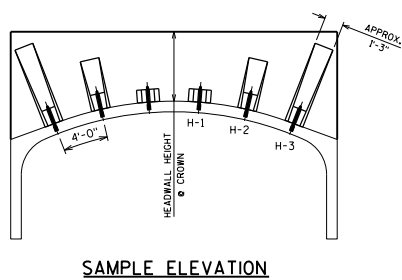
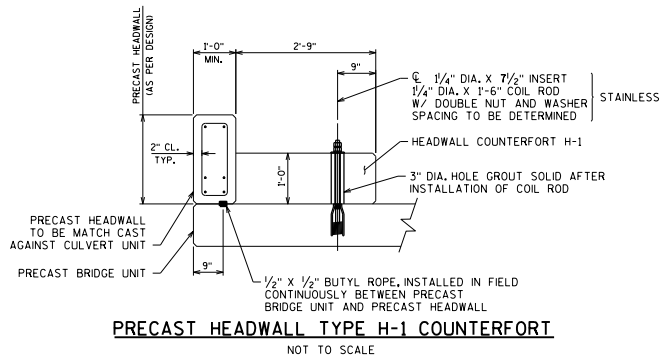
LRFD COLLAR/HEADWALL DESIGN NOTES:

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

**PRECAST THREE-SIDED BOX
CULVERT HEADWALL DETAILS**

**BUREAU OF
STRUCTURES**

APPROVED: Scot Becker DATE: 1-11

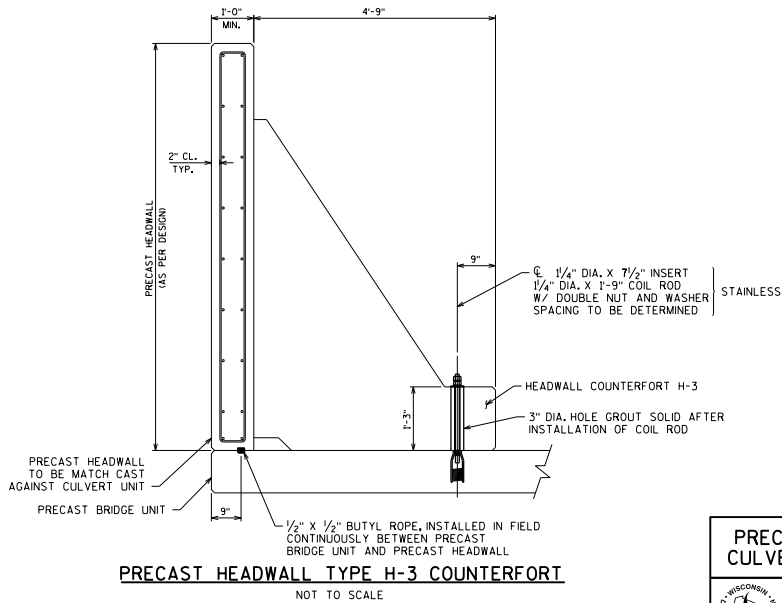
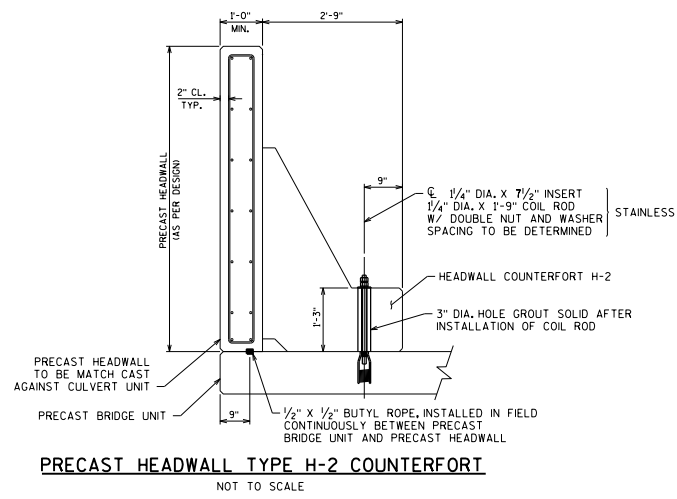


NOTE:
THE ACTUAL NUMBER AND TYPE OF PRECAST HEADWALL COUNTERFORTS IS TO BE DESIGNED. HOWEVER, USE THE FOLLOWING CHART AS A GENERAL GUIDE TO FEASIBILITY OF COUNTERFORT USE.

	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

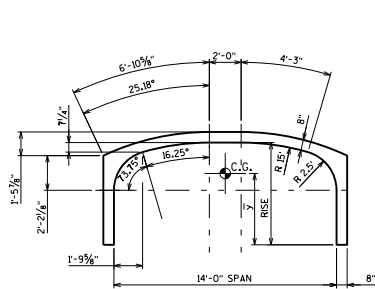
- HEADWALL DETAILS SHOWN HERE HAVE ONLY BEEN DESIGNED FOR THE FOLLOWING 2 LOAD CASES:
 - 1) EARTH PRESSURE ONLY
 - 2) EARTH PRESSURE + LIVE LOAD SURCHARGE
- THESE DETAILS ARE NOT TO BE USED WHERE A VEHICLE LOAD CAN BE TRANSMITTED THROUGH A BARRIER TO THE HEADWALL.
- ASSUMED 4'-0" SPACING OF COUNTERFORTS
- 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



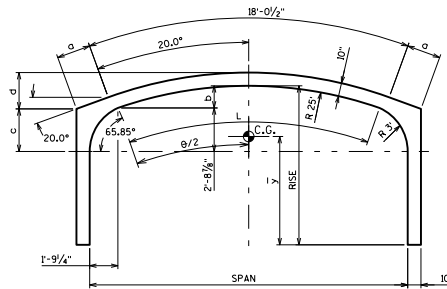
PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

BUREAU OF STRUCTURES

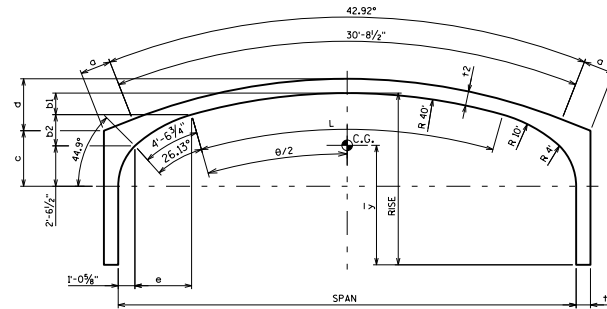
APPROVED: Scot Becker DATE: 1-11



14'-0" SPAN



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



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

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

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

	SPAN - FT				
	20	24	28	36	42
	θ	38.43°	48.29°	25.30°	37.93°
L	16.77	21.07	17.66	26.48	33.41
a	2.13	4.25	0.00	4.48	4.48
b	1.39	2.19			
b1			0.97	2.17	3.50
b2			1.96	2.40	2.75
c	2.68	2.75	3.76	3.91	4.31
d	2.29	3.01	2.84	4.48	5.66
e			4.07	3.83	3.63
t1			1.00	1.17	1.17
t2			0.83	1.00	1.00

(REFER TO STANDARDS 36.16 FOR REINFORCING DETAILS)

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

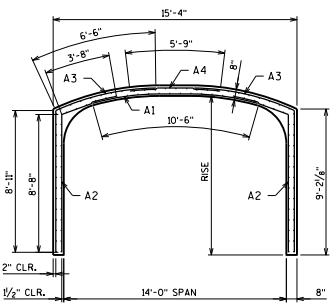
- ① SHEAR REINFORCEMENT REQUIRED
- ② SHEAR REINFORCEMENT REQUIRED FOR 6'-0" & 7'-0" RISE
- ③ SHEAR REINFORCEMENT REQUIRED FOR 8'-0" & 9'-0" RISE
- ④ SHEAR REINFORCEMENT REQUIRED FOR 10'-0" & 11'-0" RISE
- ⑤ MINIMUM PRECAST UNIT WIDTH = 3'-11 1/4"

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

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

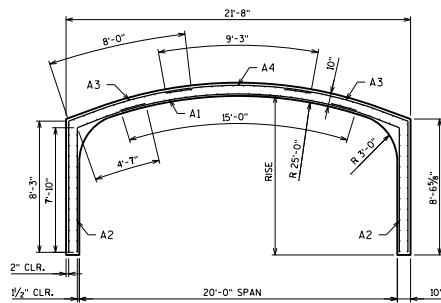
**BUREAU OF
STRUCTURES**

APPROVED: Scot Becker DATE: 1-11



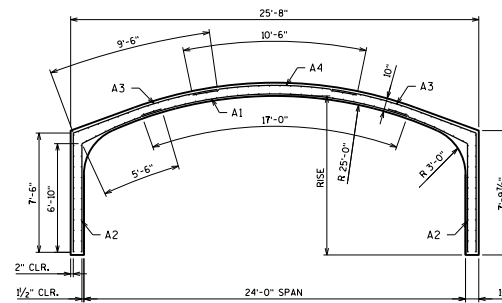
14'-0" SPAN

RISE = 10'-0" **SEE NOTE



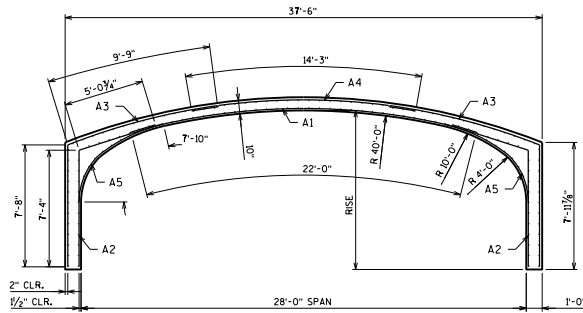
20'-0" SPAN

RISE = 10'-0" **SEE NOTE



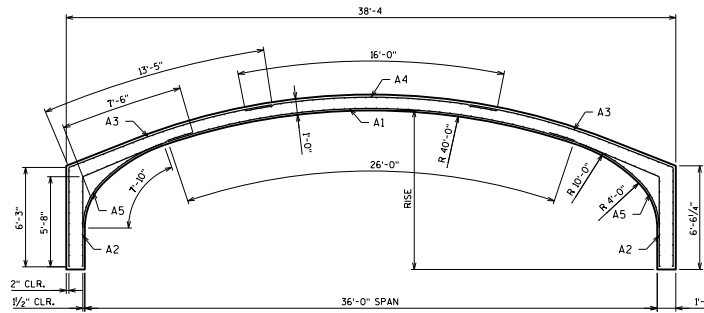
24'-0" SPAN

RISE = 10'-0" **SEE NOTE



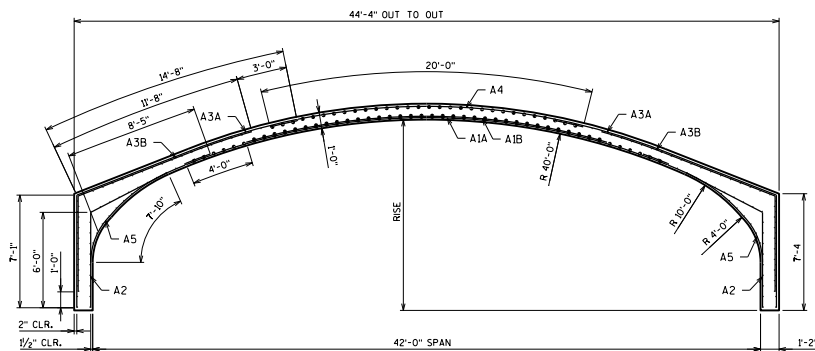
28'-0" SPAN

RISE = 10'-0"



36'-0" SPAN

RISE = 10'-0"



42'-0" SPAN

RISE = 12'-0"

NOTES:

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

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

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

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

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

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

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

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

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

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
A1 = **	0.13	10'-6"	A1 = **	0.13	15'-0"	A1 = **	0.13
A2 = 0.24	0.13	12'-3"	A2 = 0.24	0.13	12'-5"	A2 = 0.24	0.13
A3 = **	0.13	15'-4"	A3 = **	0.13	16'-3"	A3 = **	0.13
A4 = 0.24	0.13	5'-9"	A4 = 0.24	0.13	9'-3"	A4 = 0.24	0.13

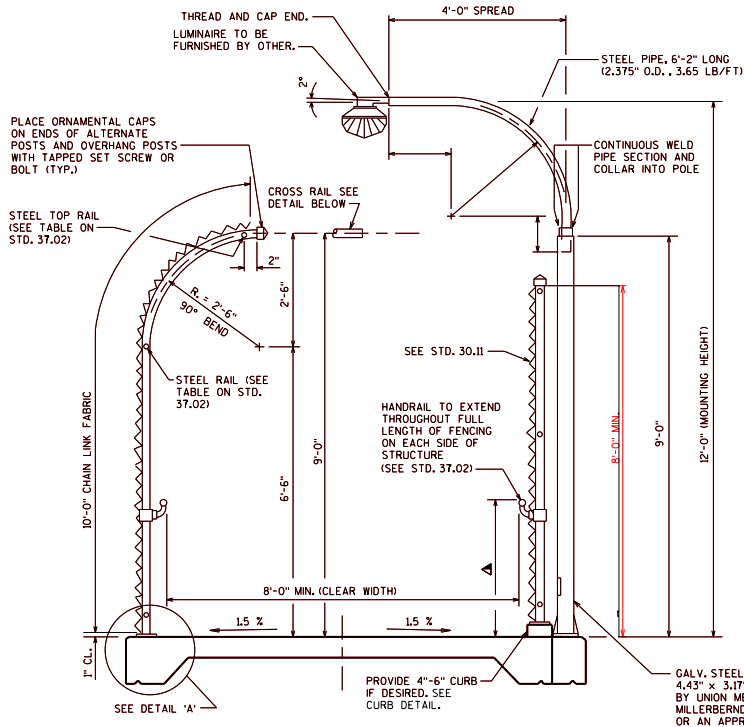
28'-0" SPAN			36'-0" SPAN			42'-0" SPAN		
CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT	CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT	CIRCUMF. AREA REQ'D SQ. IN/FT	LONGITUDINAL AREA REQ'D SQ. IN/FT	LENGTH FT
A1A = **	0.13	22'-0"	A1A = **	0.13	26'-0"	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

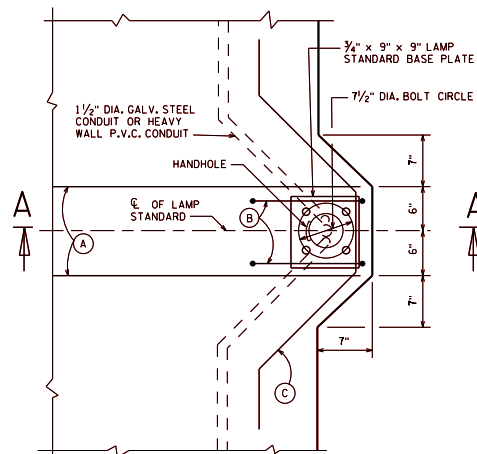


BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-14



SECTION THRU PEDESTRIAN STRUCTURE

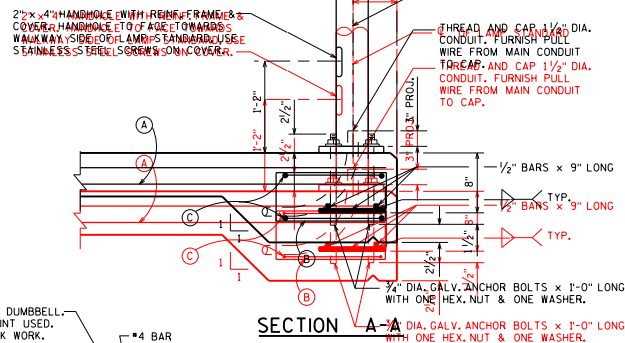


PLAN AT LAMP STANDARD

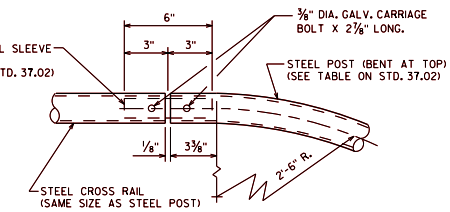
BAR STEEL REINFORCEMENT AT EACH LAMP STANDARD.

- (A) 4 - #5 BARS 4'-6" LONG
- (B) 2 - #4 BARS 4'-3" LONG
- (C) 2 - #4 BARS 5'-9" LONG

GALV. STEEL DAVIT POLE ROUND 4.43" x 3.17" #11 GAGE AS MFGD. BY UNION METAL AS SHOWN OR BY MILLERBERND MODEL NO. EA4-1205 OR AN APPROVED EQUAL



SECTION A-A



DETAIL OF CROSS RAIL AT TOP

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 HANDHOLE. GROUND WIRE FROM LUG TO CONDUIT SHALL BE NUMBER 6 AWG BARE OR WEATHER-PROOF COPPER, SINGLE CONDUCTOR.

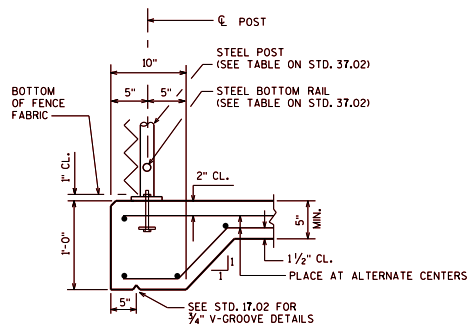
SEE STANDARD 30.11 FOR ADDITIONAL "NOTES".

DESIGNER NOTES

▲ TOP OF HANDRAIL GRIPPING SURFACES SHALL BE MOUNTED BETWEEN 30" AND 34" ABOVE WALKING SURFACE. USE 30" NEAR SCHOOL ZONES.

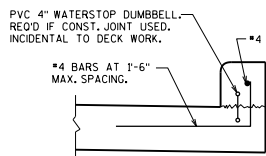
FENCE HEIGHT, CURVED OR STRAIGHT, MESH SIZE, COATING AND COLOR SHOULD BE COORDINATED WITH THE REGION AND ALL OTHER APPLICABLE AGENCIES. SEE BRIDGE MANUAL SECTION 30.3 FOR ADDITIONAL GUIDANCE.

SEE STANDARD 30.11 FOR ADDITIONAL "DESIGNER NOTES".



DETAIL 'A'

SEE STANDARD 30.11 FOR BASE PLATE, ANCHOR PLATE, SHIM, POST SLEEVE AND ANCHORAGE DETAILS. SEE THIS STANDARD ALSO FOR FENCE FABRIC REQUIREMENTS.



CURB DETAIL

(DECK REINFORCEMENT NOT SHOWN FOR CLARITY. CURB DETAIL WITH RAILING ATTACHMENT SIMILAR)

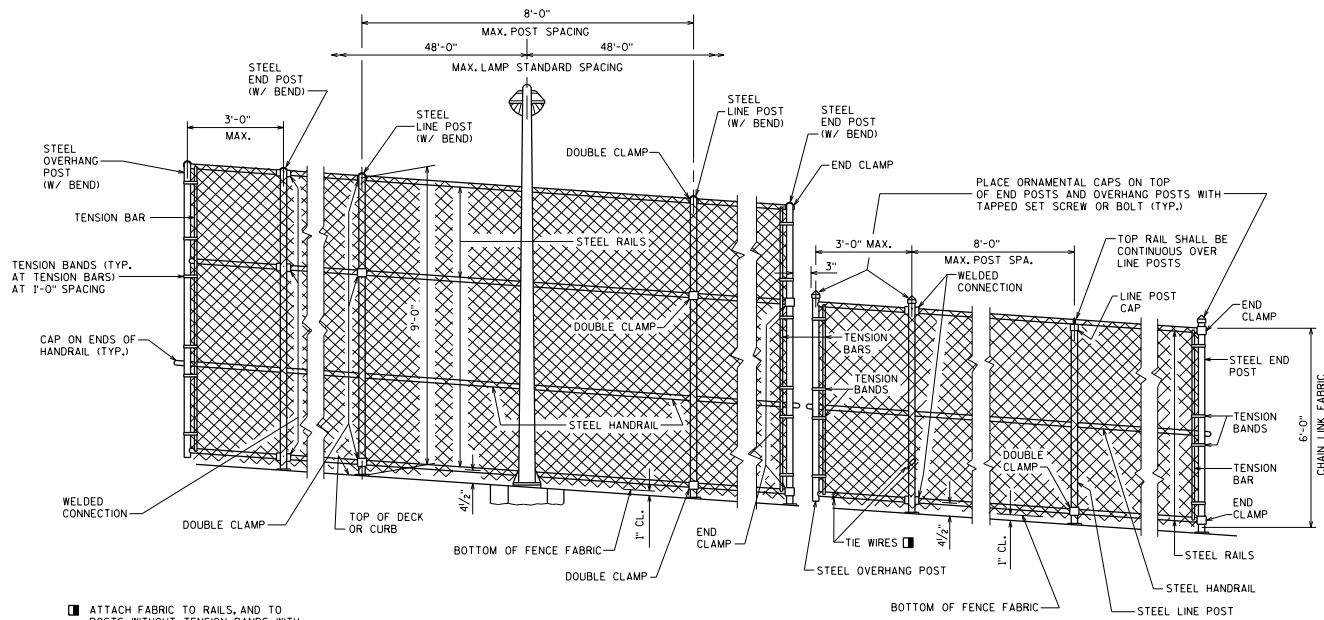
PEDESTRIAN OVERPASS



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-23

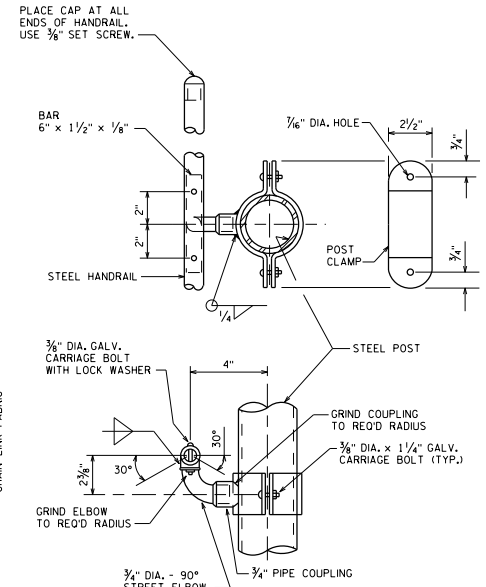


ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH TIE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".

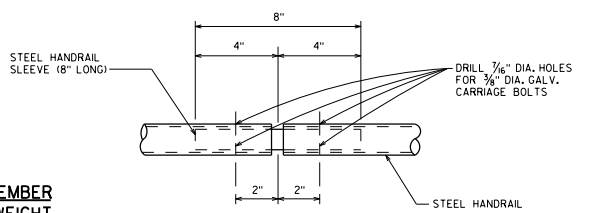
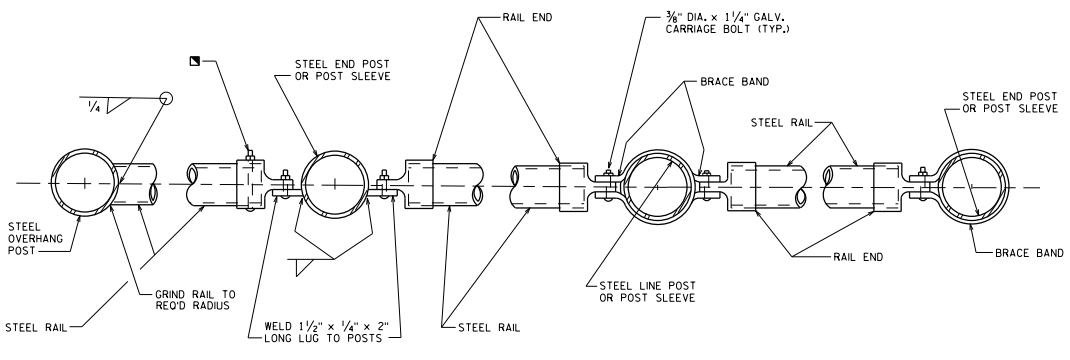
AT LAMP STANDARD

AT EXPANSION JOINT

ELEVATION OF FENCE



HANDRAIL DETAILS



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

PLAN OF RAILING

BOLT RAIL TO RAIL END TO SECURE OVERHANG SECTION. ALTERNATE IS TO WELD RAIL DIRECTLY TO END POST.

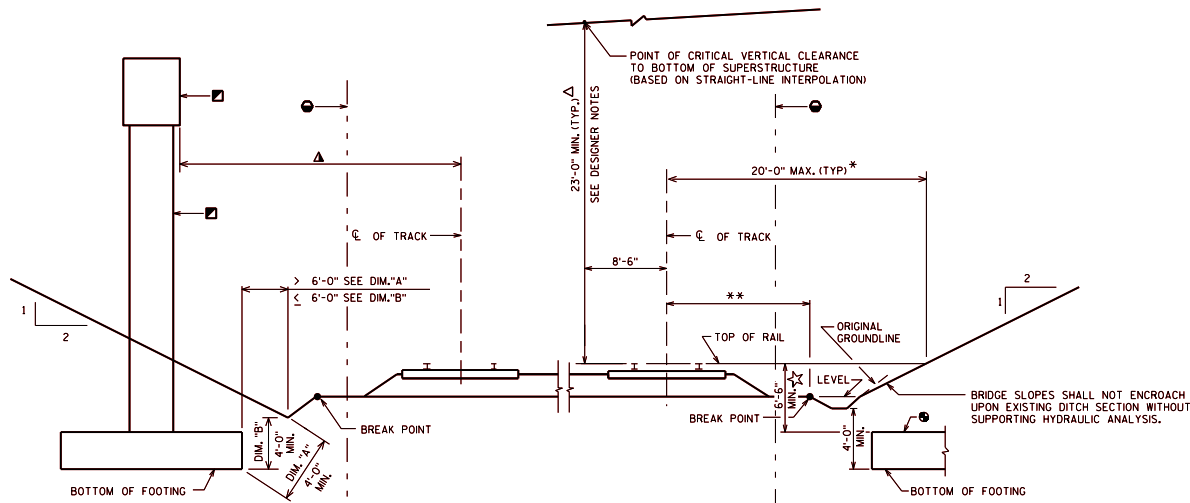
NOTE: PLACE ALL BOLT HEADS ON SIDE OF FENCE ADJACENT TO PEDESTRIANS

* 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)

PEDESTRIAN OVERPASS DETAILS

STRUCTURES

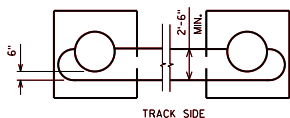
APPROVED: Scot Becker DATE: 7-10



RAILROAD IN FILL

RAILROAD CROSS SECTIONS

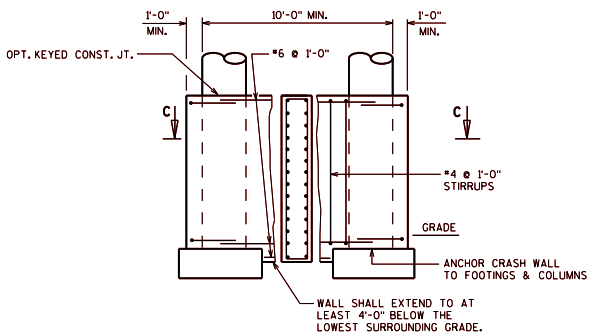
RAILROAD IN CUT



SECTION C-C
TRACK ON ONE SIDE OF COLUMNS

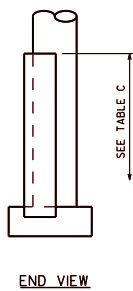
	PIER LOCATION	HEIGHT OF CRASH WALL ABOVE TOP OF RAIL
GENERAL AREMA REQUIREMENT	PIERS $\leq 12'-0"$ FROM ϵ OF TRACK	12'-0"
	PIERS 12'-0" TO 25'-0"	6'-0"
CP RAIL REQUIREMENT	PIERS $< 15'-0"$ FROM ϵ OF TRACK	12'-0"
	PIERS $\geq 15'-0"$ TO 25'-0"	8'-0"

TABLE C

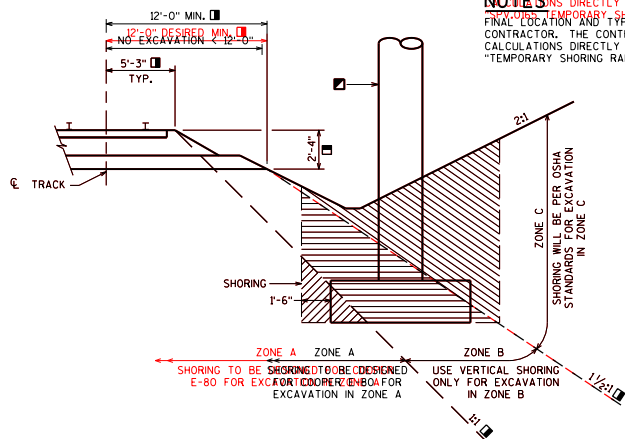


ELEVATION

CRASH WALL DETAILS



END VIEW



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. LI 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'-3/2" 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 THE 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 (30.50 FT. MIN. X-SECTION) 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 ENCRANCHING 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 SPECIFIED IN SECTION 07.17 OF THE STANDARD SPECIFICATIONS. DESIGNER SHALL ALSO DETERMINE IF THE SHORING IS TO BE DESIGNED FOR ZONE A. DESIGNER SHALL SHOW HORIZONTAL LOCATION OF SHORING NEEDED IN PLAN VIEW. INCLUDE BID ITEM "TEMPORARY SHORING RAILROAD" WHEN SHORING ENCRACHES ZONE A AND/OR B. READ IF BEDROCK IS PRESENT.

★ BNSF AND UP RAILROADS REQUIRE A DEPARTMENT OF FOOTING AND MIN. PERMITS BASED ON RAIL BEDROCK LOCATIONS WHERE BEDROCK IS PRESENT. COORDINATE FOOTING DEPTHS WITH RAILROAD PROJECT COORDINATION ENGINEER.

★ AESTHETICS SHALL NOT BE EMPLOYED ALONG RAILROAD TRACKS. LIMITS OF RAILROAD RIGHT-OF-WAY. LOCATIONS SHOWN ARE FOR REFERENCE ONLY AND NEED NOT BE DIMENSIONED.

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HIGHWAY OVER RAILROAD DESIGN REQUIREMENTS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-17

PARAPET REPAIR DETAIL

502.3205 PROTECTIVE SURFACE TREATMENT RESEAL SY
 502.3215 PIGMENTED SURFACE SEALER RESEAL SY
 509.1500 CONCRETE SURFACE REPAIR SF

DESIGNER NOTES
 DETAILS MAY BE SHOWN ON PLANS IF NECESSARY FOR CLARITY.
 INCLUDE APPLICABLE CONCRETE MASONRY BID ITEM TO FILL REPAIRS.

PARAPET REPAIR NOTES
 PROTECTIVE SURFACE TREATMENT RESEAL SHALL BE APPLIED TO THE INSIDE LOCATIONS. SURFACE PREPARATION IS INCLUDED IN THE BID ITEM "PROTECTIVE SURFACE TREATMENT RESEAL".
 PIGMENTED SURFACE SEALER SHALL BE APPLIED TO CONCRETE SURFACES (INSERT LOCATIONS). SURFACE PREPARATION IS INCLUDED IN THE BID ITEM "PIGMENTED SURFACE SEALER RESEAL".
 CLEANING PARAPETS

CURB REPAIR DETAIL

502.3205 PROTECTIVE SURFACE TREATMENT RESEAL 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.
 REFER TO STANDARD 17.02 FOR TYPICAL SEALING LOCATIONS.
 THE "RESEAL" QUANTITY SHOULD INCLUDE THE REPAIRED CONCRETE SURFACES. FOR EXAMPLE, "PIGMENTED SURFACE SEALER RESEAL" SHOULD BE APPLIED TO THE EXISTING AND REPAIRED PARAPET SURFACES, AS SHOWN.

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.

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 NO. X BAR. EMBED X" IN CONCRETE.
 ☆ (CHOOSE ONE OF THE FOLLOWING AND PLACE ON PLAN)
 ADHESIVE ANCHORS X/X-INCH. EMBED X" IN CONCRETE.
 ADHESIVE ANCHORS NO. X BAR. EMBED X" IN CONCRETE.
 ADHESIVE ANCHORS X/X-INCH. EMBED X" IN CONCRETE OR ANCHORS SHALL BE APPROVED FOR USE IN CRACKED CONCRETE.

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
 *509.0310.5 SAWING PAVEMENT DECK PREPARATION AREAS LF
 Δ509.2000 FULL-DEPTH DECK REPAIR LAY DECKS SY
 ▲509.2500 CONCRETE MASONRY OVERLAY DECKS CY

DECK REPAIR DETAIL - SECTION

FOR DESIGNER INFORMATION ONLY (DO NOT PLACE ON PLANS)

EXISTING DECK
 SAW CUT *
 PREPARATION DECKS TYPE 1
 PREPARATION DECKS TYPE 2
 REMOVE EXISTING PATCHING AND REMOVE TO SOUND CONCRETE
 CONCRETE OVERLAY
 FULL DEPTH DECK REPAIR

FULL-DEPTH DECK REPAIR DETAIL

FOR DESIGNER INFORMATION ONLY (DO NOT PLACE ON PLANS)

*509.0310.5 SAWING PAVEMENT DECK PREPARATION AREAS LF
 Δ509.2000 FULL-DEPTH DECK REPAIR LAY DECKS SY
 ▲509.2500 CONCRETE MASONRY OVERLAY DECKS CY

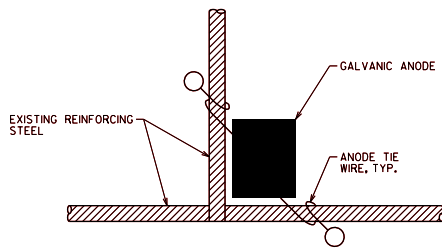
DESIGNER NOTES
 DETAILS APPLICABLE TO ALL OVERLAY METHODS AND DECK REPAIRS WITHOUT OVERLAYS.
 * "SAWING PAVEMENT DECK PREPARATION AREAS" NOT REQUIRED FOR CONCRETE OVERLAYS.
 Δ USE "CONCRETE MASONRY DECK REPAIR" (509.2100.5) FOR DECK REPAIRS UNDER POLYMER, ASPHALTIC, OR POLYMER MOD. ASPHALTIC OVERLAYS. 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

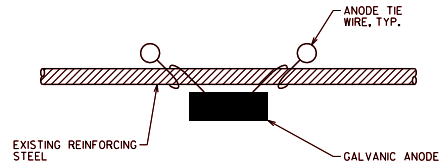
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-28

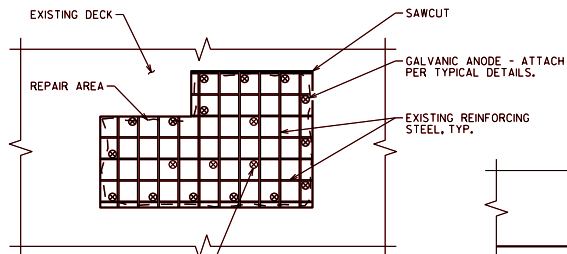
STANDARD 40.01



TYPICAL INSTALLATION AT
BAR STEEL INTERSECTION

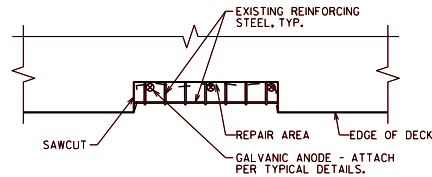


TYPICAL INSTALLATION
FOR BAR STEEL



PLACE GALVANIC ANODES AT INTERIOR OF REPAIR WHEN REINFORCING STEEL IS IN CONTACT WITH THE EXISTING CONCRETE AT THE BOTTOM OF THE REPAIR

NOTE:
EXISTING REINFORCING STEEL TO BE COMPLETELY CLEANED OF CORRODED MATERIAL PRIOR TO INSTALLATION OF GALVANIC ANODES.



PART. PLAN TYPICAL REPAIR DETAIL

509.1500 CONCRETE SURFACE REPAIR SF
SPV.0060 EMBEDDED GALVANIC ANODES EACH

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.

NOTES

SURFACE REPAIR AREAS WITH CATHODIC PROTECTION ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. THE PLAN QUANTITY FOR THE BID ITEM "EMBEDDED GALVANIC ANODES" IS BASED ON A MAXIMUM SPACING OF 24-INCHES AROUND THE SURFACE REPAIR PERIMETER. THE ACTUAL QUANTITY SHALL BE BASED ON THE FIELD CONDITIONS AND AS RECOMMENDED BY THE GALVANIC ANODE SUPPLIER.

SURFACE REPAIRS SHALL BE FILLED WITH REPAIR MATERIALS COMPATIBLE WITH CATHODIC PROTECTION, AS RECOMMENDED BY THE ANODE SUPPLIER.

EXISTING REINFORCING STEEL TO BE COMPLETELY CLEANED OF CORRODED MATERIAL AND CONCRETE TO PROVIDE SUFFICIENT ELECTRICAL CONNECTION AND BOND. CATHODIC PROTECTION PREPARATIONS ARE INCLUDED IN THE BID ITEM "EMBEDDED GALVANIC ANODES".

ANODES NEAREST TO EDGE OF REPAIR TO BE WITHIN 6" OF EDGE.

AFTER PLACEMENT, GALVANIC ANODES SHOULD MAINTAIN A MINIMUM TOP COVER OF 1/2" AND A MINIMUM BOTTOM COVER OF 3/4"

DESIGNER NOTES


CATHODIC PROTECTION SHALL BE USED ONLY AT THE REQUEST OF THE REGIONAL BRIDGE MAINTENANCE ENGINEER.

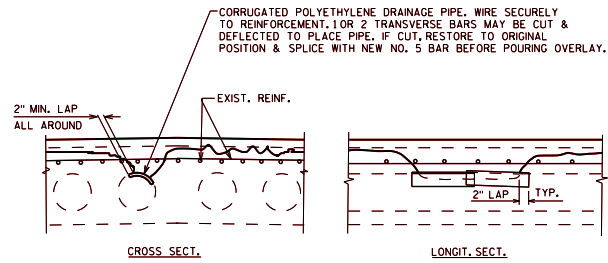
INCLUDE APPLICABLE CONCRETE MASONRY BID ITEM TO FILL REPAIRS.

SEE SPECIAL PROVISION "EMBEDDED GALVANIC ANODES" FOR DESCRIPTION, MATERIALS, CONSTRUCTION, MEASUREMENT, AND PAYMENT INFORMATION.

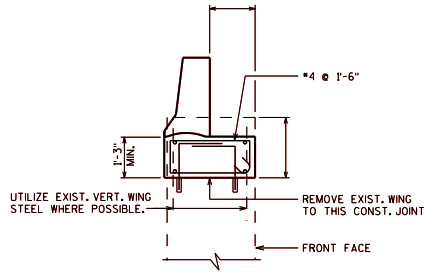
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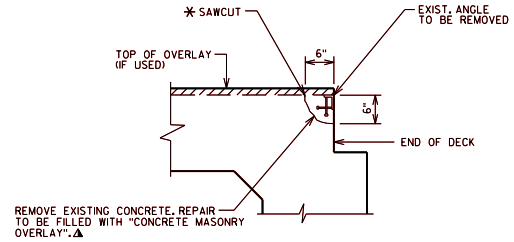
CATHODIC PROTECTION	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-21



RUPTURED VOID REPAIR



SECTION THRU PARAPET ON WING

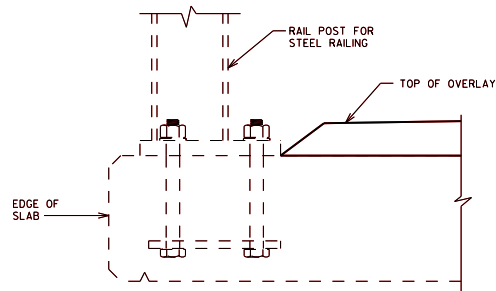


SECTION AT END OF SLAB

509.0301	PREPARATION DECKS TYPE 1	SY
509.0302	PREPARATION DECKS TYPE 2	SY
*509.0303S	SAWING PAVEMENT DECK PREPARATION AREAS	6F
▲509.2600	EQUILIBRIUM DECK REPAIR LAY DECKS	SY
▲509.2600	CONCRETE MASONRY OVERLAY ABCKN AREAS	CF


DESIGNER NOTES

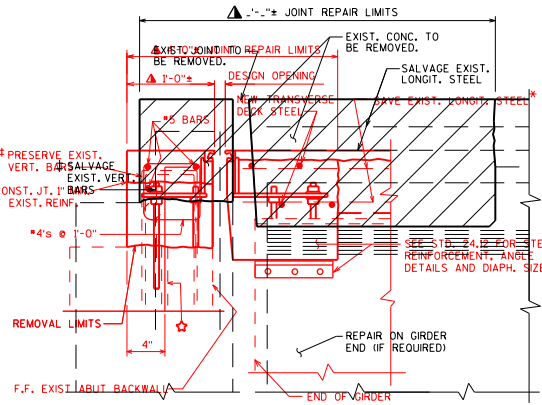
- * "SAWING PAVEMENT DECK PREPARATION AREAS" NOT REQUIRED FOR CONCRETE OVERLAYS.
- ▲ USE "CONCRETE MASONRY DECK REPAIR" (SPV.0035) FOR DECK REPAIRS UNDER POLYMER, ASPHALTIC, OR POLYMER MOD. ASPHALTIC OVERLAYS. USE "CONCRETE MASONRY DECK REPAIR" FOR DECK REPAIRS WITHOUT OVERLAYS.



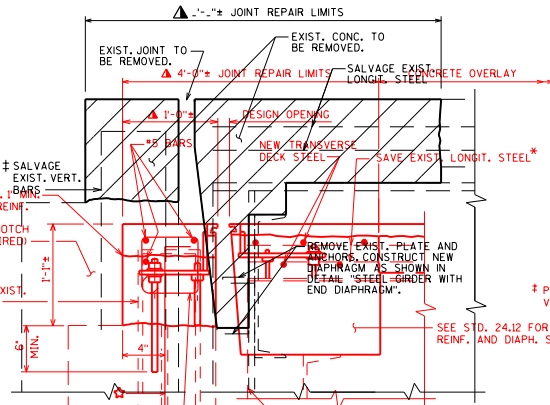
SECTION THRU RAILING

ATTACHING PARAPETS OR RAILINGS TO BRIDGE DECKS WITH EPOXY ANCHORS IS NOT ALLOWED BY FHWA.

OVERLAY DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-18



**JOINT REPAIR-REMOVAL
PRESTRESSED GIRDER**



**JOINT REPAIR-REMOVAL
STEEL GIRDER**

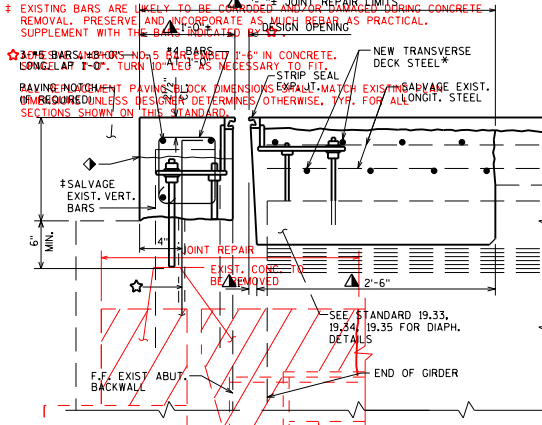
LEGEND

- ‡ EXISTING BARS ARE LIKELY TO BE CORRODED AND/OR DAMAGED DURING CONCRETE REMOVAL. SALVAGE AND INCORPORATE AS MUCH REBAR AS PRACTICAL. SUPPLEMENT WITH THE BARS INDICATED BY ☆.
- ☆ ADHESIVE ANCHORS NON-BAR REBAR TO BE 1'-0" IN CONCRETE. SPACE AS NEEDED. TURN TO LEG AS NECESSARY TO FIT.
- ◇ OPT. CONST. JT. 1" MIN. BELOW EXIST. REINF.
- ▲ DIMENSIONS GIVEN ARE NORMAL TO C OF SUBSTRUCTURE UNIT. INCORPORATE EXISTING REINFORCEMENT.

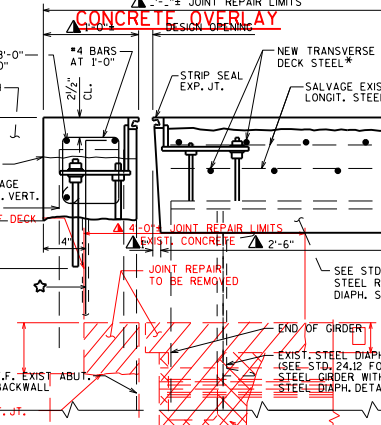
DESIGNER NOTES

- * FOR SKEWS > 20°, WHERE ORIGINAL TRANSVERSE DECK REINFORCEMENT WAS PLACED NORMAL TO THE GIRDERS, SAVE AND INCORPORATE 1'-6" MIN. OF TRANSVERSE REINFORCING BARS. NEW TRANSVERSE BARS ARE PLACED ALONG THE SKEW.
- † BARS IN JOINT REBAR SHALL MATCH EXISTING REINFORCEMENT TYPE (COATED OR UNCOATED).
- ‡ ALL REPLACEMENT PAVING BLOCK DIMENSIONS SHALL MATCH EXISTING PLAN DIMENSIONS UNLESS DESIGNER DETERMINES OTHERWISE. TYPE FOR ALL SECTIONS SHOWN ON THIS STANDARD.

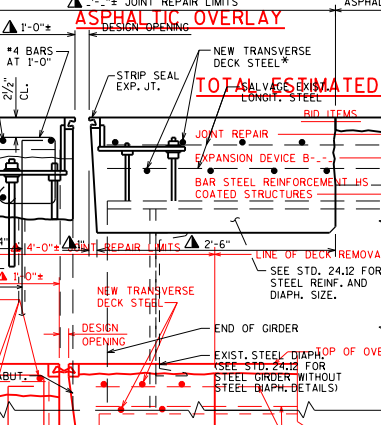
**SECTION THRU JOINT
STEEL GIRDER WITHOUT END DIAPHRAGM**



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



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



**SECTION THRU PROPOSED JOINT
PRESTRESSED GIRDER WITH END DIAPHRAGM**



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



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



**JOINT REPAIR-REMOVAL
STEEL GIRDER**

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" OF TRANSVERSE REINFORCING BARS.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
502.3101	EXPANSION DEVICE B	LF	
502.4202	JOINT REPAIR-REMOVAL	LF	
509.1000	JOINT REPAIR	LF	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
505.0400	BAR STEEL REINFORCEMENT HS STRUCTURES	LB	
505.0600	BAR STEEL REINFORCEMENT HS COATED STRUCTURES	LB	
509.2500	CONCRETE MASONRY OVERLAY DECKS	CY	


THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

TOTAL ESTIMATED QUANTITIES

BID ITEMS	UNIT
JOINT REPAIR-REMOVAL	LF
EXPANSION DEVICE B	1LS
BAR STEEL REINFORCEMENT HS COATED STRUCTURES	LB

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

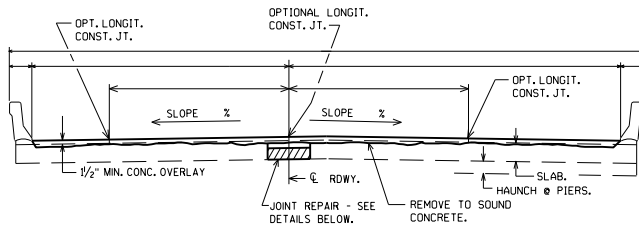
STRIP SEALS & DIAPH. DETAILS FOR OVERLAYS



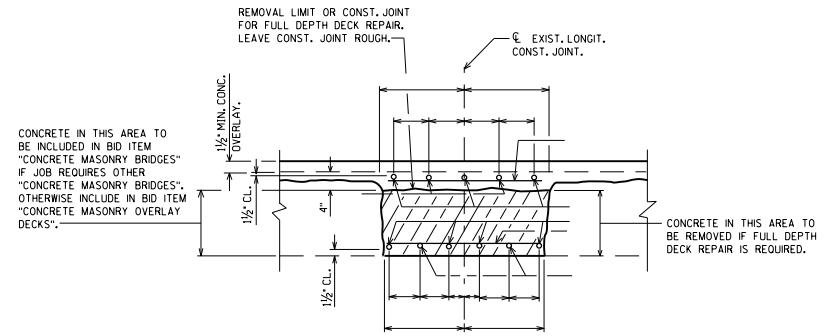
**BUREAU OF
STRUCTURES**

DATE: _____

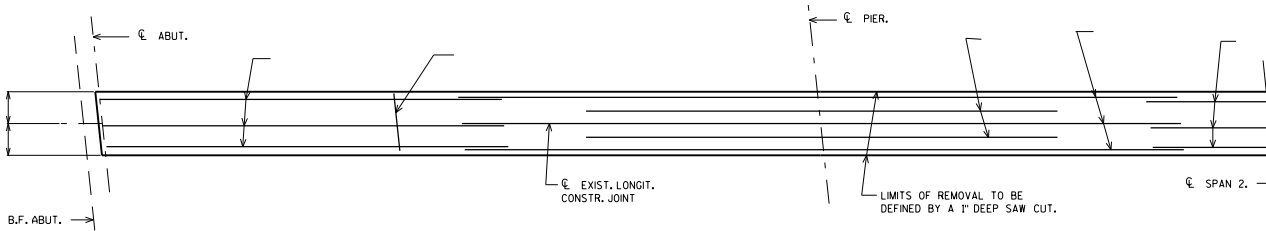
APPROVED: Bill Oliva



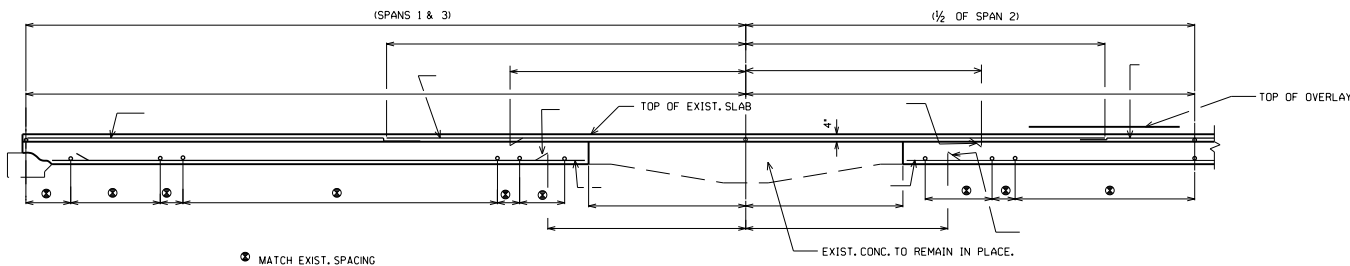
CROSS SECTION THRU ROADWAY LOOKING EAST



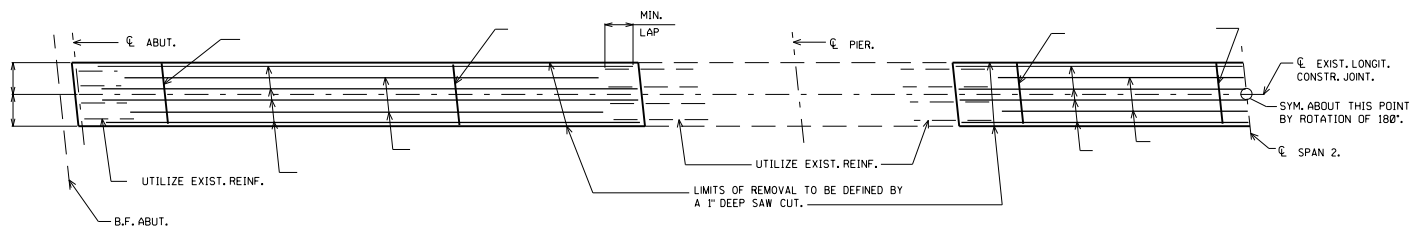
TYP. SECTION THRU JOINT



HALF PLAN SHOWING TOP BAR STEEL REINF.



HALF LONGIT. SECTION



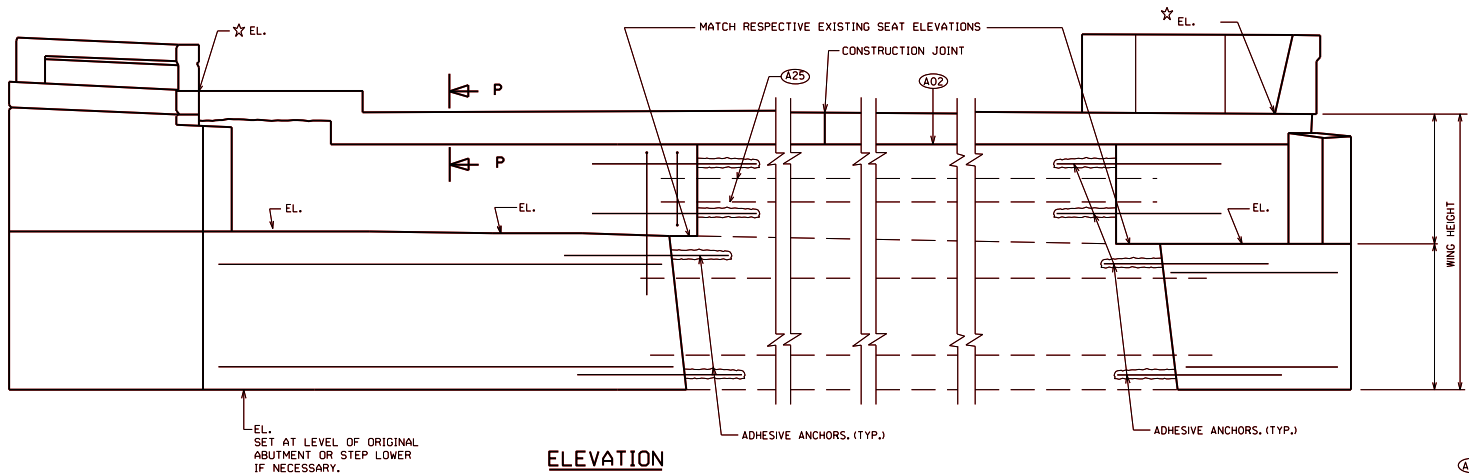
HALF PLAN SHOWING BOTTOM BAR STEEL REINF

(REQUIRED ONLY FOR FULL DEPTH DECK REPAIR)

TOTAL ESTIMATED QUANTITIES

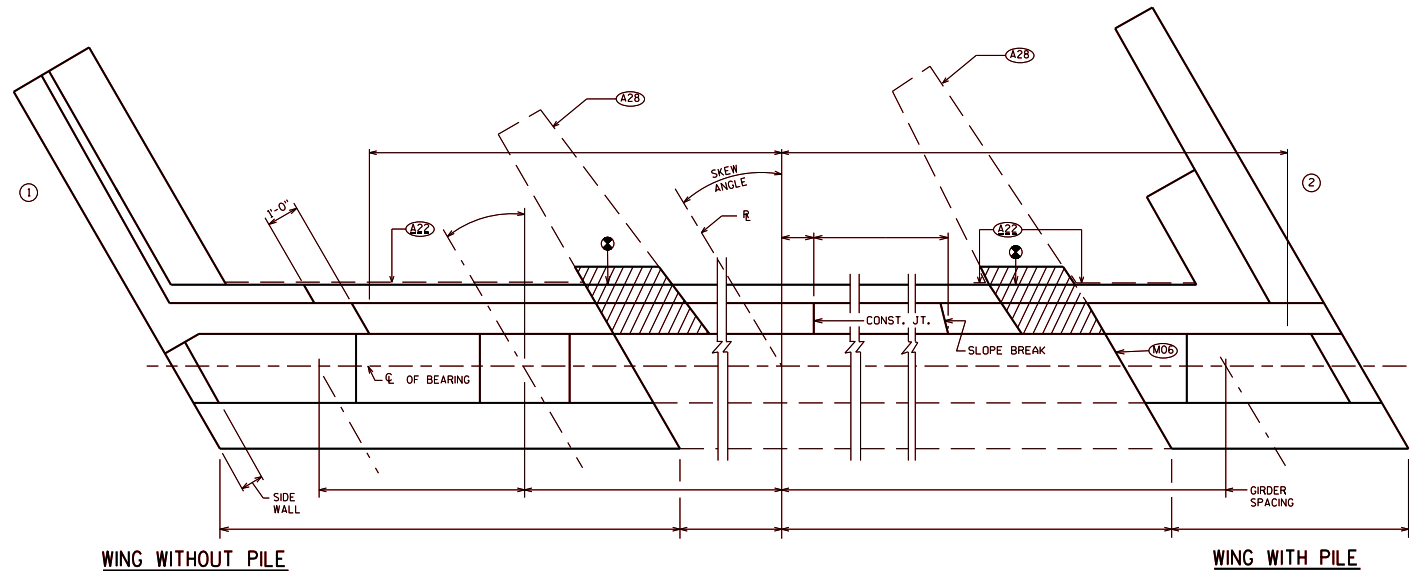
BID ITEMS	
JOINT REPAIR	SY
BAR STEEL REINFORCEMENT HS COATED STRUCTURES	LB
CONCRETE MASONRY BRIDGES	CY
CONCRETE MASONRY OVERLAY DECKS	CY

LONGIT. CONST. JOINT REPAIRS	
BUREAU OF STRUCTURES	
APPROVED: <i>Bill Oliva</i>	DATE: 7-16



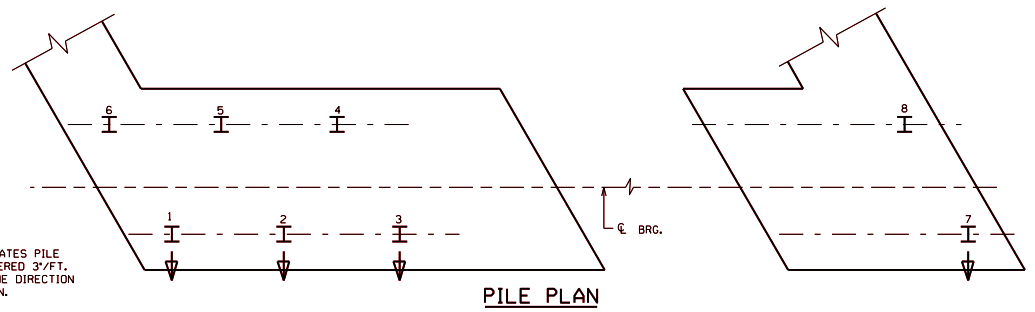
ELEVATION

EL. SET AT LEVEL OF ORIGINAL ABUTMENT OR STEP LOWER IF NECESSARY.

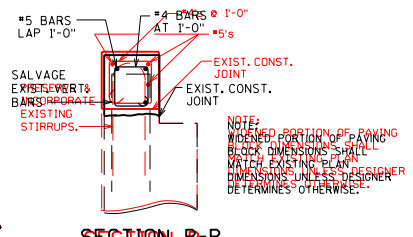


WING WITHOUT PILE

WING WITH PILE



PILE PLAN



SECTION P-P

SEE STANDARD 40.04 FOR ADDITIONAL DETAILS

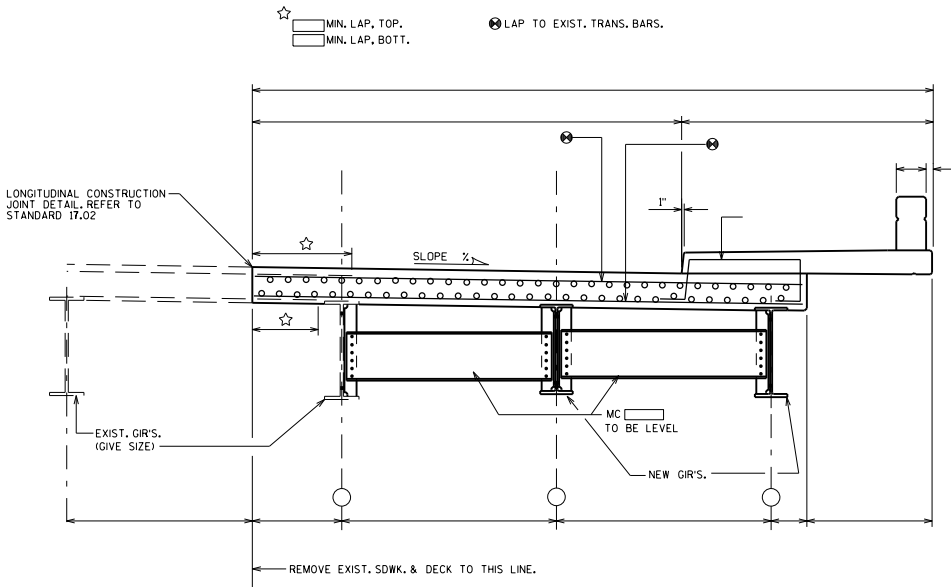
NOTES

- (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.

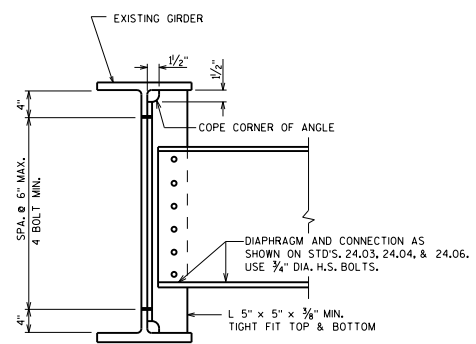
DESIGNER NOTES

SEE CHAPTER 12 FOR NEW BAR STEEL PLACEMENT, DETAILS, DIMENSIONS, & NOTES.

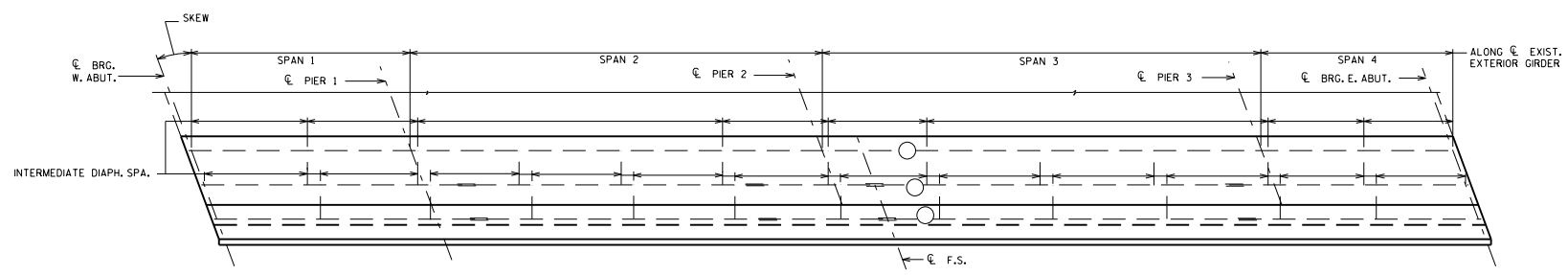
ABUTMENT WIDENING	
BUREAU OF STRUCTURES	
APPROVED: <i>Bill Oliva</i>	DATE: 7-19




CROSS SECT. THRU RDWY.

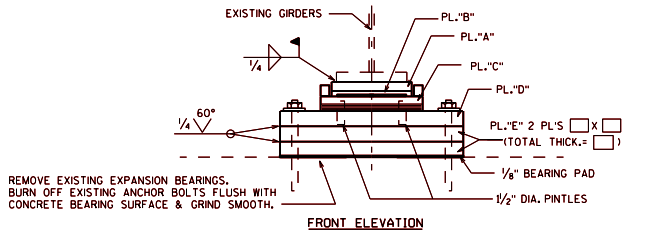


DIAPHRAGM CONNECTION TO EXISTING STEEL GIRDER



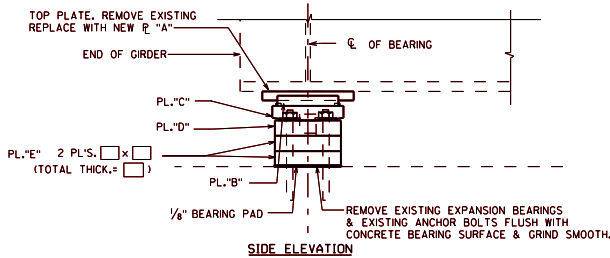
PLAN

SLAB WIDENING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-16



REMOVE EXISTING EXPANSION BEARINGS. BURN OFF EXISTING ANCHOR BOLTS FLUSH WITH CONCRETE BEARING SURFACE & GRIND SMOOTH.

FRONT ELEVATION



SIDE ELEVATION

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS
STEEL BEARINGS

SEE STANDARD 27.08 FOR BEARING DETAILS

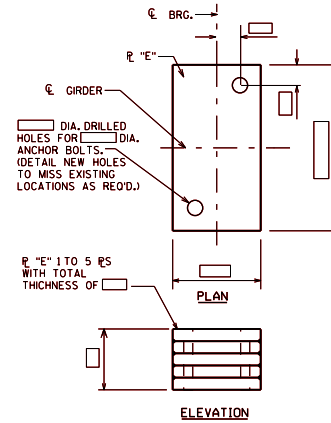
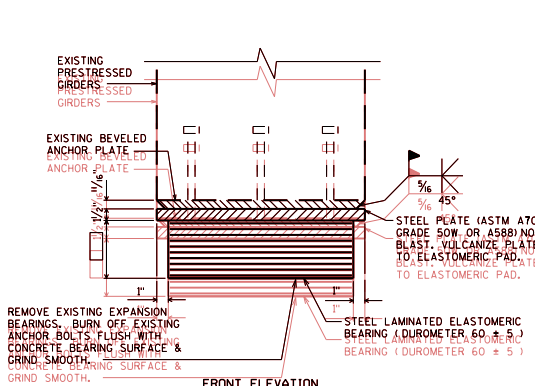
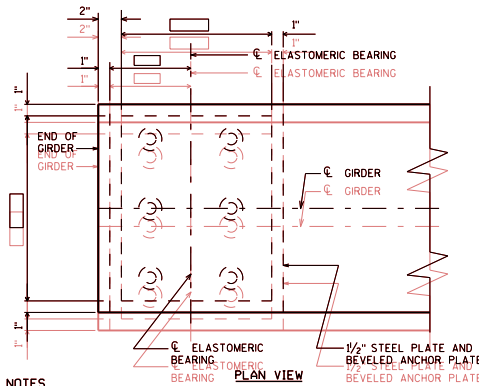


PLATE 'E' DETAILS

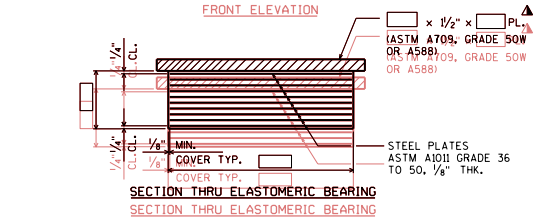
(SEE STD. 40.10 FOR CONCRETE BLOCK ALTERNATE)



FRONT ELEVATION



PLAN VIEW



SECTION THRU ELASTOMERIC BEARING

NOTES

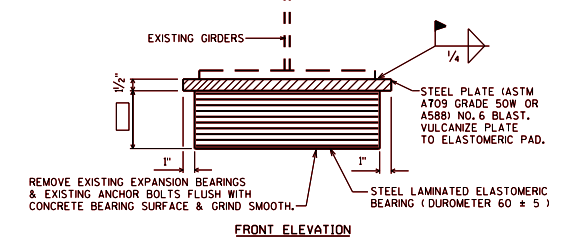
ALL MATERIAL USED FOR BEARINGS SHALL BE PAID AT THE UNIT PRICE BID FOR BEARING PADS ELASTOMERIC, LAMINATED. ALL WELDING SHALL BE PAID AT THE UNIT PRICE BID FOR WELDING. GRIND EXIST. WELD THAT ATTACHED EXIST. TOP PLATE TO EXIST. BOT. FLANGE. GRIND AFFECTED AREAS SMOOTH. GRIND EXIST. WELD THAT ATTACHED EXIST. TOP PLATE TO EXIST. BOT. FLANGE. GRIND AFFECTED AREAS SMOOTH.

DESIGNER NOTES

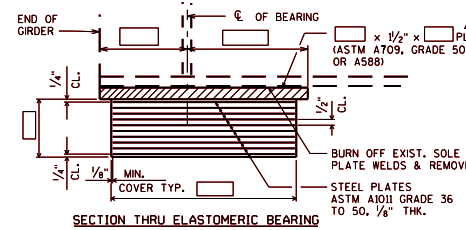
THE STEEL TOP PLATE THICKNESS MAY BE REDUCED (3/4 MIN.) TO MATCH THE OVERALL EXISTING BEARING HEIGHT. WHEN THE THICKNESS IS REDUCED, THE FOLLOWING NOTE SHALL BE LOCATED ON THE PLANS: THE THICKNESS OF THE TOP PLATE SHALL BE REDUCED TO MATCH THE OVERALL BEARING HEIGHT. WELDING PROCEDURES SHALL BE ESTABLISHED 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. WAX PENCILS OR OTHER SUITABLE MEANS APPROVED BY THE ENGINEER.

TOP STEEL PLATE MAY NOT BE OMITTED. CHECK 27.21 ELASTOMERIC BEARINGS IN THE BRIDGE MANUAL FOR REQUIREMENTS TO SEE IF THIS PLATE SHOULD BE TAPERED.

TOP STEEL PLATE SHALL NOT BE OMITTED. DO NOT INCLUDE PRESTRESSED GIRDER SHRINKAGE WHEN DESIGNING BEARINGS FOR BRIDGE REHABILITATION PROJECTS. FOR ADDITIONAL INFORMATION, SEE STANDARD 27.07 FOR ADDITIONAL INFORMATION.



FRONT ELEVATION



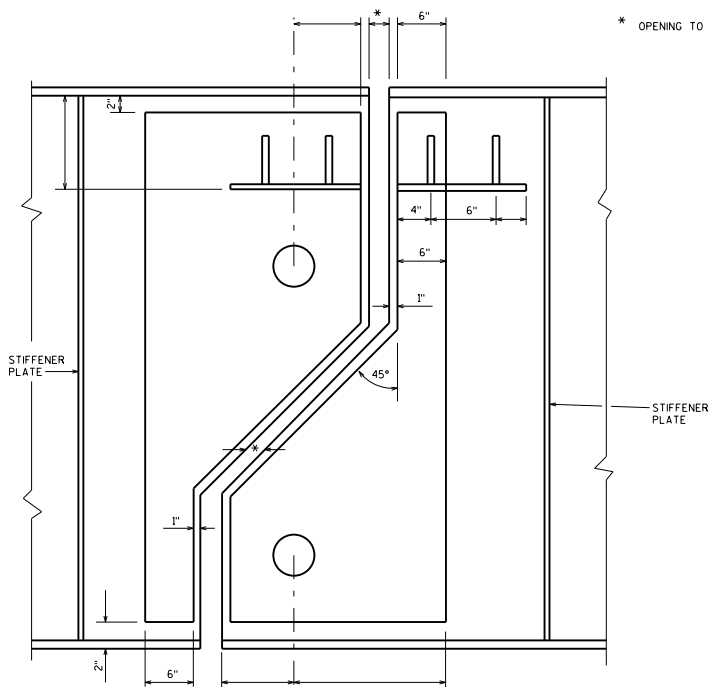
SECTION THRU ELASTOMERIC BEARING

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS
ELASTOMERIC BEARINGS

NOTES & DESIGNER NOTES
SEE "EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS" ON THIS STANDARD.

EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS
ELASTOMERIC BEARINGS

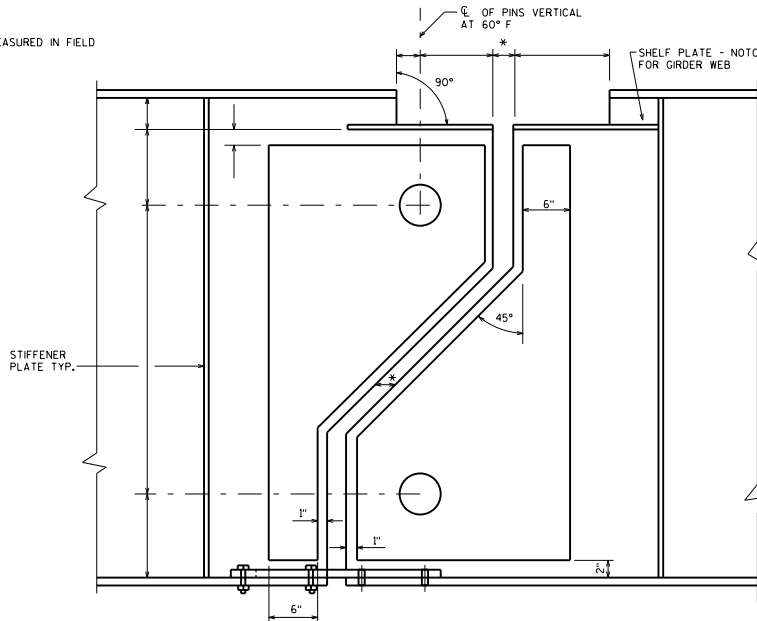
EXPANSION BEARING REPLACEMENT DETAILS	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>8-20</u>



TYPICAL HINGE DETAIL FOR WATERTIGHT EXPANSION DEVICE

NOTE:
DETAILS NOT SHOWN ARE IDENTICAL TO DETAILS SHOWN
FOR "FINGER TYPE EXPANSION DEVICE".

* OPENING TO BE MEASURED IN FIELD



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 CORROSION AT EXISTING PIN IS PRESENT.

BLAST CLEAN GIRDER WEB AND FLANGES WITHIN 2'-0" OF \bar{C} 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.

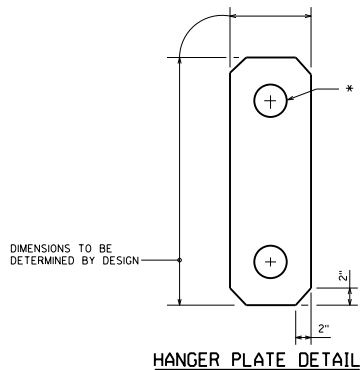
NON-METALLIC WASHERS SHALL HAVE AN INSIDE DIAMETER OF BETWEEN 0.005" AND 0.010" LARGER THAN THE PIN DIAMETER.

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.

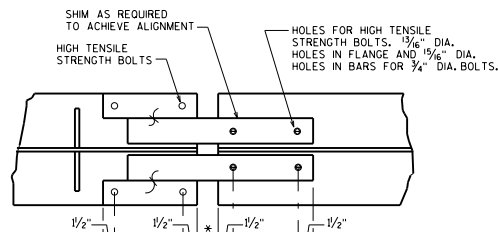
☑ BUSHINGS SHALL BE GAR-MAX AS MANUFACTURED BY GARLOCK BEARINGS, INC. OR DURALON JOURNAL BEARINGS AS MANUFACTURED BY REYNOLD BEARING DIVISION, OR APPROVED EQUAL. BUSHINGS SHALL HAVE A NOMINAL WALL THICKNESS OF 1/4".

△ 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

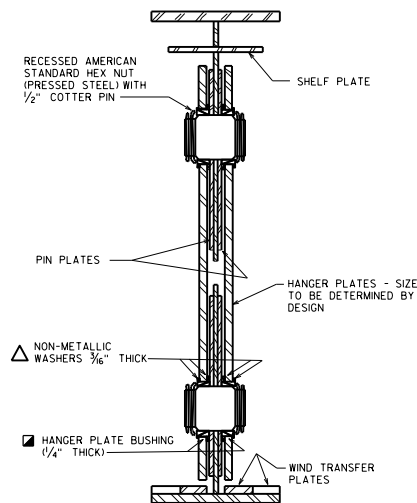


HANGER PLATE DETAIL



TYPICAL WIND TRANSFER PLATES DETAIL

CONTACT AREA OF WIND TRANSFER PLATES TO BE FINISHED ANSI 125.



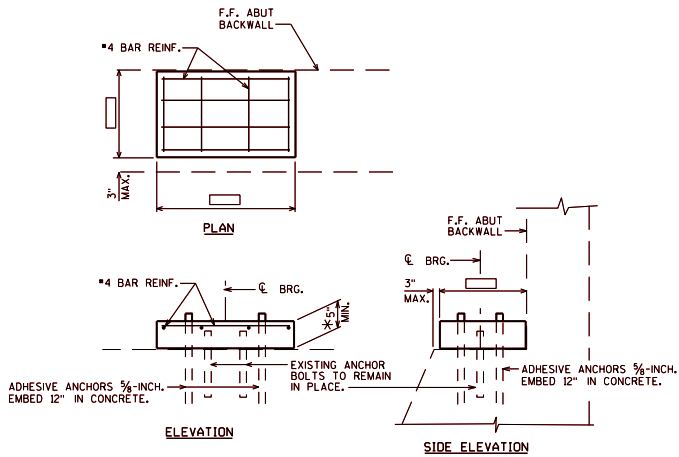
SECTION THRU HINGE

HINGED JOINT REHABILITATION



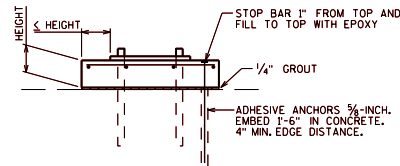
APPROVED: Bill Oliva

DATE:
7-15



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"*

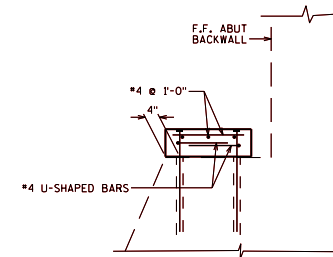
ANCHOR IN AT LEAST 4 LOCATIONS (ANCHORS INCLUDE ADHESIVE ANCHORS, ANCHOR BOLTS OR COMBINATION).

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)

GIRDER REACTIONS AT BEARINGS (KIPS)

		C. BRG. SUPPORT NAME	C. BRG. SUPPORT NAME	C. BRG. SUPPORT NAME
INTERIOR GIRDER	DL			
	LL			
EXTERIOR GIRDER	DL			
	LL			

NOTES

THE THEORETICAL SERVICE LOADS (UNFACTORED) SHOWN IN THE TABLE ARE BASED ON THE BRIDGE IN ITS FINAL CONFIGURATION. ADDITIONAL LOAD RESULTING FROM STAGING AND/OR CONTRACTOR OPERATIONS, SUCH AS UNEVEN JACKING OF ADJACENT GIRDERS OR ADJACENT SUBSTRUCTURE UNITS, IS NOT INCLUDED.

THE LL REACTIONS ARE BASED ON (HS-20/HL-93) AND INCLUDE IMPACT.

EXTERIOR GIRDER DEAD LOAD REACTIONS WERE INCREASED 10% TO ACCOUNT FOR VARIABILITY IN COMPOSITE DL DISTRIBUTION METHODS.


IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE ADEQUACY OF THE GIRDER AT THE JACKING LOCATION.

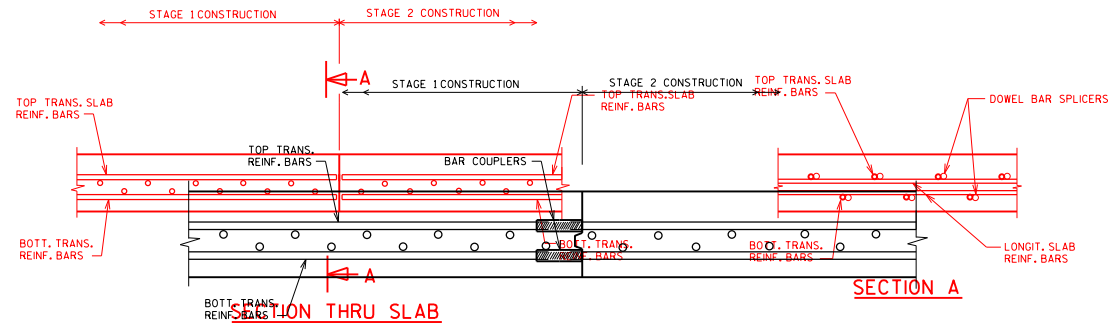
DESIGNER NOTES

ADD 10% TO THE EXTERIOR GIRDER DL TO ACCOUNT FOR VARIABILITY IN COMPOSITE DL DISTRIBUTION METHODS.

INDICATE WHETHER HS-20 OR HL-93 LOADING WAS USED TO DETERMINE THE LL REACTIONS, WHICH INCLUDE IMPACT.

DO NOT INCLUDE LL REACTIONS FOR JACKING SITUATIONS THAT WILL NOT BE UNDER TRAFFIC.

CONCRETE BEARING BLOCK DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-21

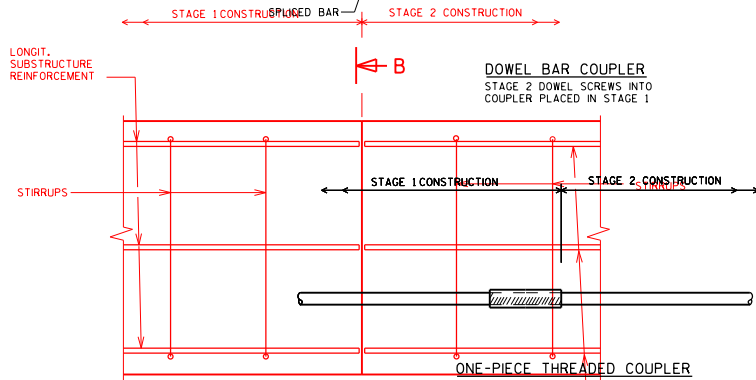
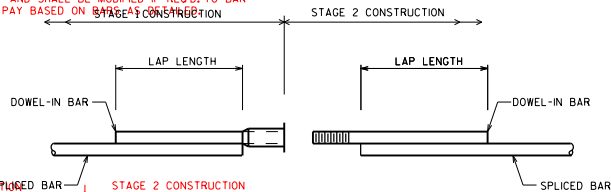


SECTION THRU DECK
ONE-PIECE THREADED COUPLER SHOWN

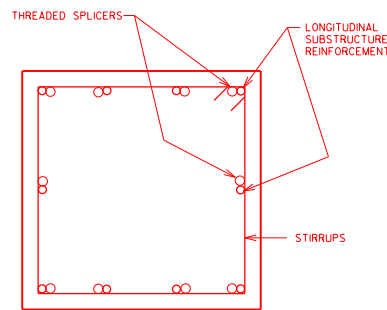
DOWEL BAR SPLICER LAP LENGTHS

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 Q. LONGIT. JOINT AND SHALL BE MODIFIED IF REQ'D. TO BAR COUPLER MANUFACTURER RECOMMENDATIONS. PAY BASED ON



SECT. THRU SUBSTRUCTURE UNIT



SECTION B

NOTES

FOR DOWEL BAR COUPLERS, THE DOWEL BARS SHALL BE LAPPED AND TIED TO THE LAP REINFORCEMENT BARS. 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 EQUAL TO OR GREATER THAN THAT OF THE LAPPED REINFORCEMENT BARS.

DESIGNER NOTES

ON THE BARS, 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)".

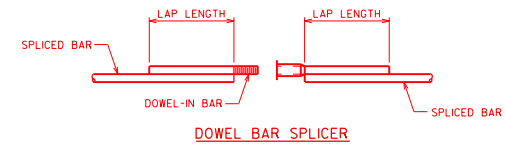
FOR DOWEL BAR SPLICERS, ALL REINFORCEMENT BARS SHALL BE LAPPED AND TIED TO THE LONGIT. BARS SHOW DETAILS SIMILAR TO "SECTION THRU DECK" AND "BAR COUPLER ALTERNATIVES".

SPLICER (COUPLER) ASSEMBLY IN THE SLAB SHALL BE EPOXY COATED IN ACCORDANCE WITH ARE TROOP MANUALS. COUPLERS (COUPLER) WHICH BARS REQUIRE BAR COUPLERS BY USE OF A SYMBOL. USING THE SAME SYMBOL, ADD A NOTE STATING THAT A BAR COUPLER IS REQUIRED. BAR LENGTHS ARE COMPUTED TO THE TIE TO THE CONSTRUCTION JOINT AND ALL SHALL BE MODIFIED BY THE BAR COUPLER MANUFACTURER'S RECOMMENDATIONS. TESTING DOWEL BARS ARE NOT TO BE DETAIL AS THOSE BARS ARE INCLUDED IN THE BAR LAPPING REQUIREMENT. ITEM SHOULD THE DOWEL OPTION BE CHOSEN.

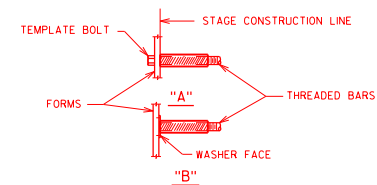
① MINIMUM CAPACITY = 1.25 x f_y x AREA OF SPLICED REINFORCEMENT BAR.

WHERE f_y = 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)".



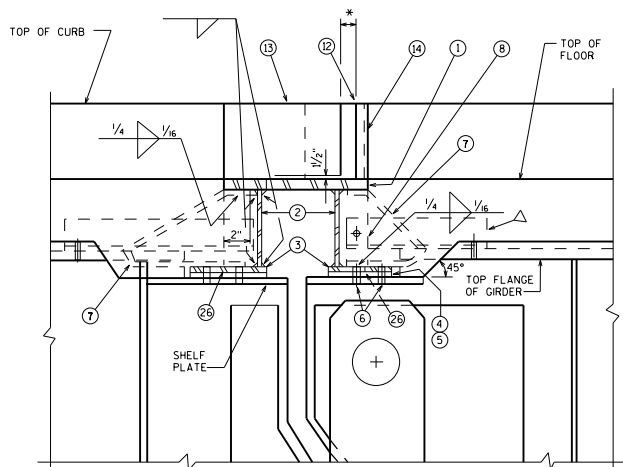
SPLICER ALTERNATIVES



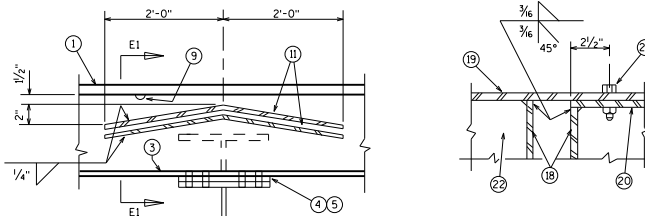
INSTALLATION AND SETTING METHODS

"A" SET SPLICER BY MEANS OF A TEMPLATE BOLT
"B" SET SPLICER BY NAILING TO WOOD FORMS OR CEMENTING TO STEEL FORMS.

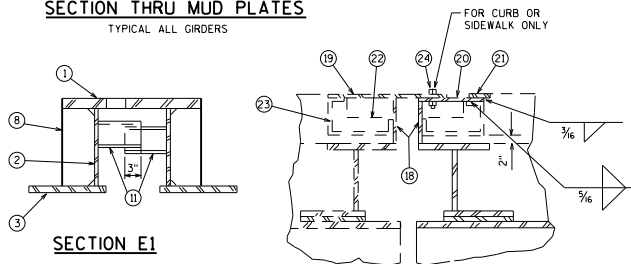
BAR SPLICER (COUPLER) DETAILS AT STAGE CONSTRUCTION	
	BUREAU OF STRUCTURES
APPROVED: <i>SBill Dinkar</i>	DATE: 7-03



SECTION THRU JOINT
MUD PLATES NOT SHOWN

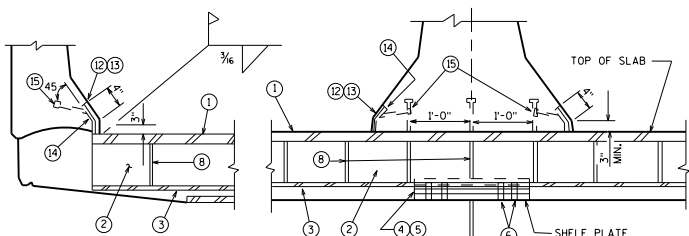


SECTION THRU MUD PLATES
TYPICAL ALL GIRDERS



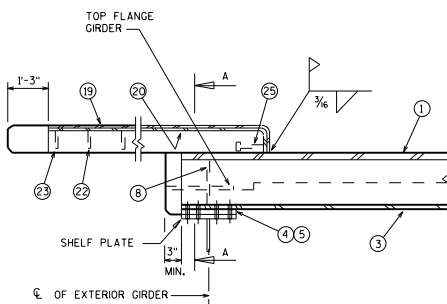
SECTION E1

SECTION A-A

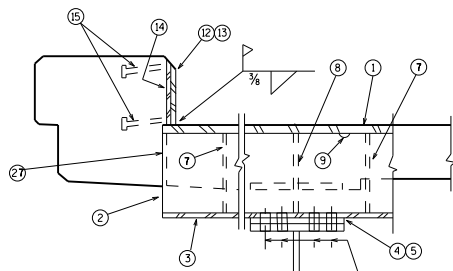


DETAIL AT PARAPET

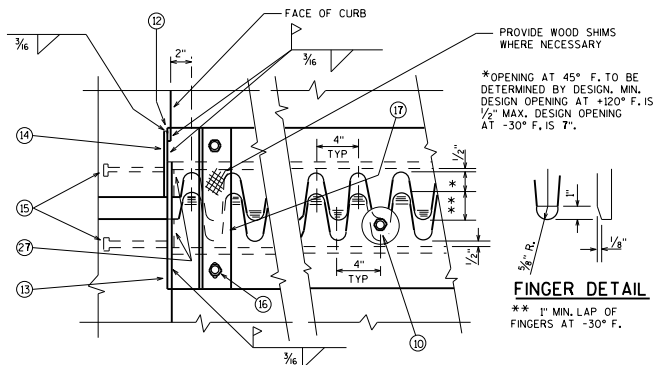
DETAIL AT MEDIAN



SECTION THRU SIDEWALK



SECTION THRU JOINT AT BRUSH CURB




PART PLAN OF FINGER PLATE AT BRUSH CURB
NO SKEW

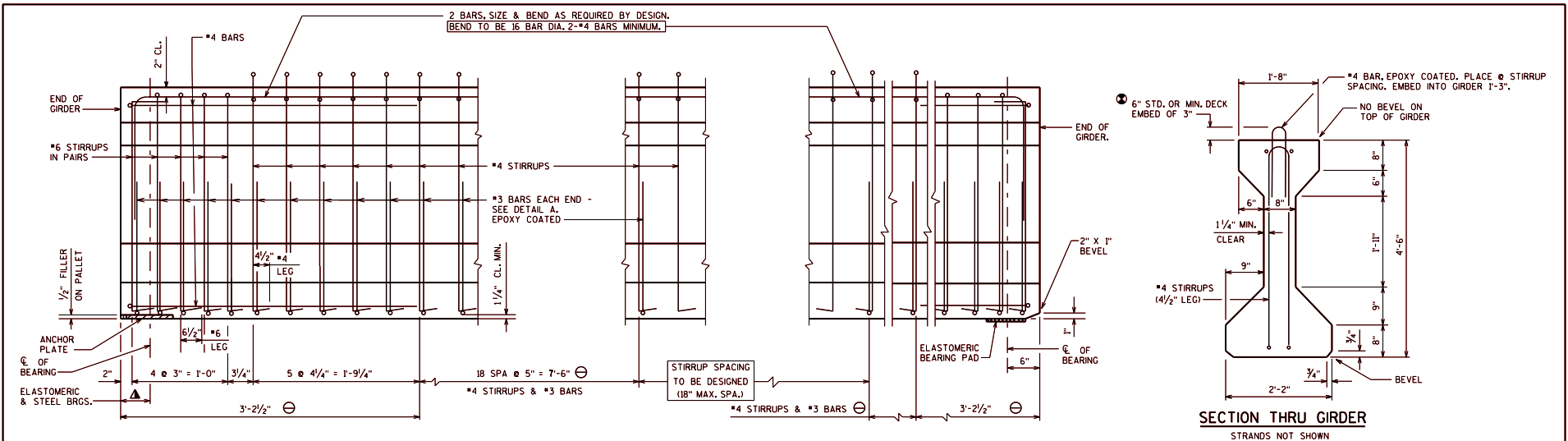
LEGEND

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 3/8" THICK. 1/8" DIA. HOLES FOR NO. 6.
5. 3/4" LAMINATED SHIM WITH SLOTTED OPENINGS
6. 3/4" DIA. ERECTION BOLTS. DRILL HOLES IN SHELF PLATE IN THE FIELD.
7. ANCHOR BAR 5/8" DIA. AT 1'-0" CENTERS. BEND AS SHOWN.
8. STIFFENER BAR 3/8" THICK. 1/4" FILLET WELD ALL AROUND. PLACE AT C/L OF GIRDER AND AT +2'-0" CENTERS BETWEEN GIRDERS.
9. 3/8" VENT HOLES AT 3'-0" CENTERS.
10. 3/4" DIA. ADJUSTING BOLT AT APPROX. 4'-0" CENTERS WITH TWO 3/8" DIA. X 3/8" PLATE WASHERS. ONE ON EACH SIDE OF FINGER PLATE.
11. MUD PLATE 1/4" THICK
12. 3/8" PLATE. BEND AS SHOWN.
13. 3/8" PLATE BEND AS SHOWN.
14. 3/8" PLATE BEND AS SHOWN.
15. 3/8" DIA. STUDS X 6 5/16" LONG. WELD TO PLATES NO. 13 AND NO. 14.
16. 3/4" DIA. BOLT FOR SHIPPING. TACK WELD NUT TO BOTTOM OF PLATE NO. 1.
17. 3" DIA. X 3" DIA. X 1/4" X 5'-0" SPACING. SLOTTED HOLE 3/8" X 2 3/8" IN ONE END OF ANGLE AS SHOWN. FOR BOLT NO. 16.
18. CLOSING PLATE 3/8" CUT AS SHOWN. SEE WELD DETAIL
19. 3/8" PLATE. BEND AS SHOWN.
20. 3/8" PLATE. BEND AS SHOWN.
21. 3/8" PLATE. BEND AS SHOWN.
22. 3/8" PLATE. WELD ALL AROUND. 1/4" FILLET WELD TO PLATES NO. 18, 19, & 20.
23. 3/8" DIA. STUDS X 6 5/16" LONG. BEND AFTER WELD.
24. 3/4" DIA. BOLT WITH SO. NUT. GREASE FOR EASY REMOVAL. 7/8" X 1 1/2" SLOTTED HOLE IN PL. NO. 19. LONG DIMENSION OF HOLE PARALLEL TO C/L OF ROADWAY. TACK WELD NUT TO PLATE NO. 20 + 2'-0" SPA.
25. 3/8" 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. 3/8" 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: <u>Bill Oliva</u>	DATE: 7-16

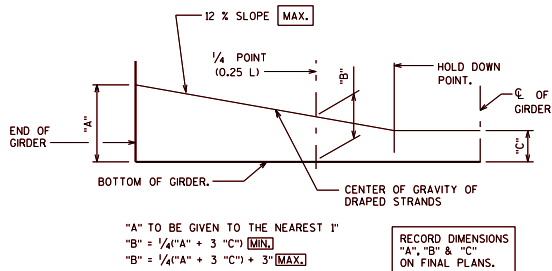


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

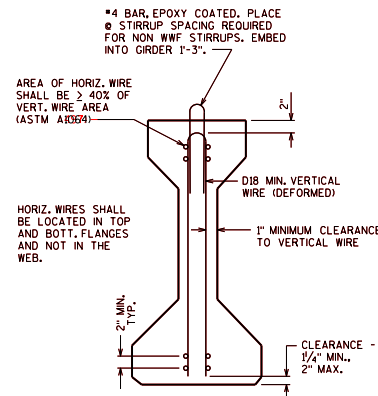
SIDE VIEW OF GIRDER

SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD

SECTION THRU GIRDER
STRANDS NOT SHOWN

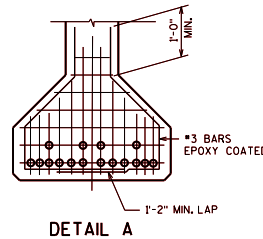


LOCATION OF DRAPED STRANDS

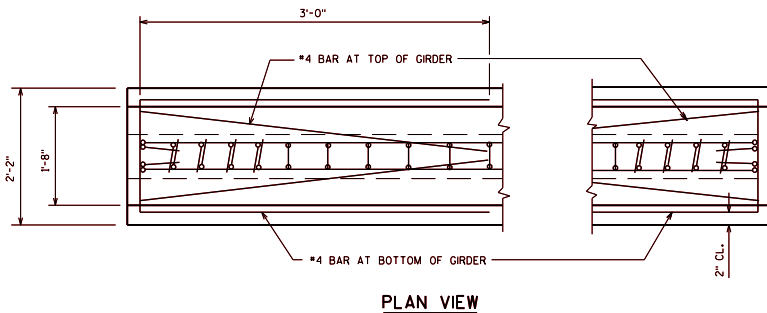


SECTION THRU GIRDER

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



DETAIL A



PLAN VIEW

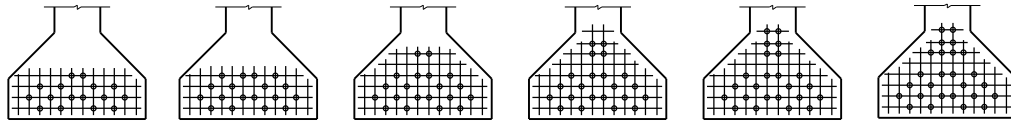
DESIGNER NOTES

- ▲ 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 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ± 3/4" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

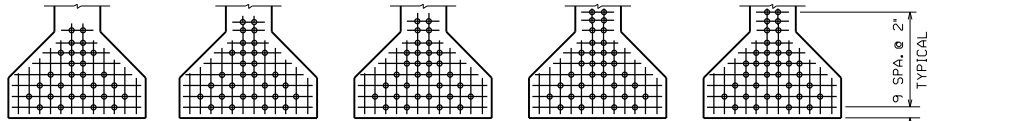
NOTES

- 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: <u>Bill Oliva</u>	DATE: <u>7-17</u>

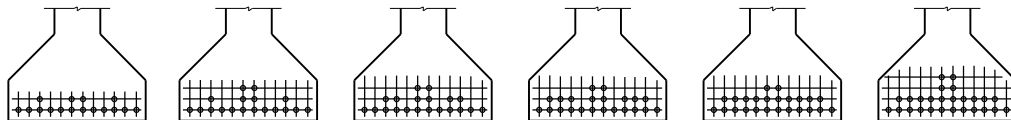


16 STRANDS 18 STRANDS 20 STRANDS 22 STRANDS 24 STRANDS 26 STRANDS

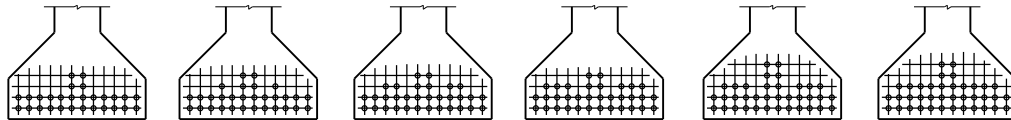


28 STRANDS 30 STRANDS 32 STRANDS 34 STRANDS 36 STRANDS

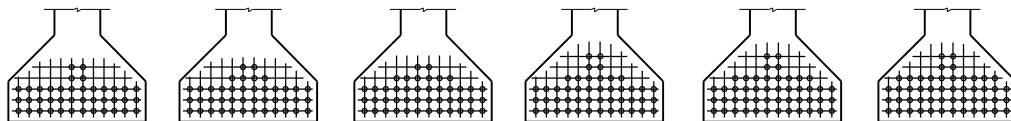
**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
TO AVOID DRAPING OF 0.5" DIA. AND 0.6" DIA. STRANDS**



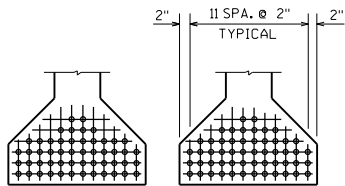
16 STRANDS 18 STRANDS 20 STRANDS 22 STRANDS 24 STRANDS 26 STRANDS



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



40 STRANDS 42 STRANDS 44 STRANDS *46 STRANDS *48 STRANDS *50 STRANDS



*52 STRANDS *54 STRANDS

ARRANGEMENT AT C_g SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. AND 0.6" DIA. STRANDS

*0.5" DIA. STRANDS ONLY

54' GIRDER

A = 789 SQ. IN.
 $r^2 = 330.46 \text{ IN.}^2$
 $y_T = 29.27 \text{ IN.}$
 $y_B = -24.73 \text{ IN.}$
 $I = 260,730 \text{ IN.}^4$
 $S_T = 8,908 \text{ IN.}^3$
 $S_B = -10,543 \text{ IN.}^3$
 WT. = 822 #/FT.

PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands.
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = 31.00 \text{ KIPS}$
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = 43.94 \text{ KIPS}$


(5)
 $f_B \text{ (ini+)} = \frac{(4)}{(3)}$
 $\frac{y_B}{r^2} = \frac{-24.73}{330.46} = -0.07484 \text{ IN./IN.}^2$ (K/Sq. In.)

(COMPRESSION IS POSITIVE)

N	(1)	(2)	(3)	(4)	(4)	(5)	(5)
NO. STRANDS	e_s (inches)	$(1 + \frac{e_s y_B}{r^2})$	$(A/(2))$ (sq. in.)	$P \text{ (ini+)} = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	$P \text{ (ini+)} = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	$f_B \text{ (ini+)} = (4)/(3)$ (K/Sq. In.)	$f_B \text{ (ini+)} = (4)/(3)$ (K/Sq. In.)
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

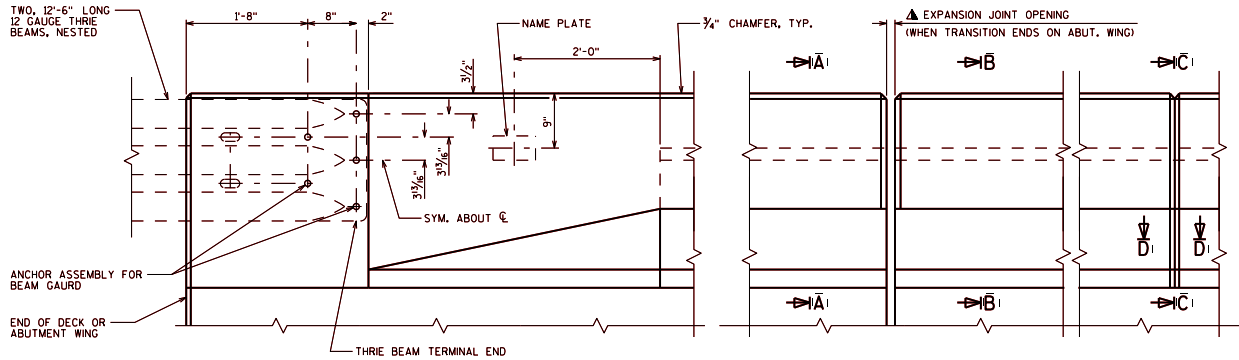
N	(1)	(2)	(3)	(4)	(4)	(5)	(5)
NO. STRANDS	e_s (inches)	$(1 + \frac{e_s y_B}{r^2})$	$(A/(2))$ (sq. in.)	$P \text{ (ini+)} = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	$P \text{ (ini+)} = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	$f_B \text{ (ini+)} = (4)/(3)$ (K/Sq. In.)	$f_B \text{ (ini+)} = (4)/(3)$ (K/Sq. In.)
16	-22.23	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

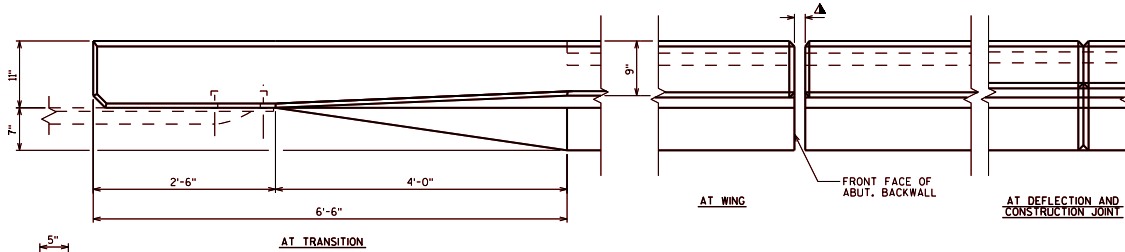


BUREAU OF STRUCTURES

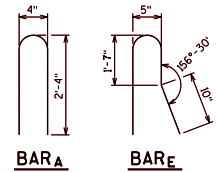
APPROVED: Bill Oliva DATE: 7-16



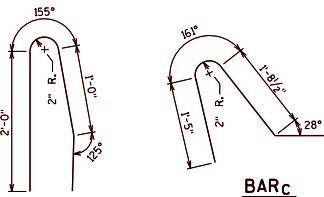
ELEVATION OF PARAPET



PART PLAN ON PARAPET

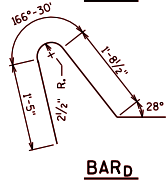


BAR A **BAR E**

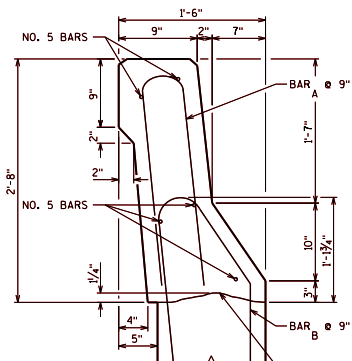


BAR B **BAR C**

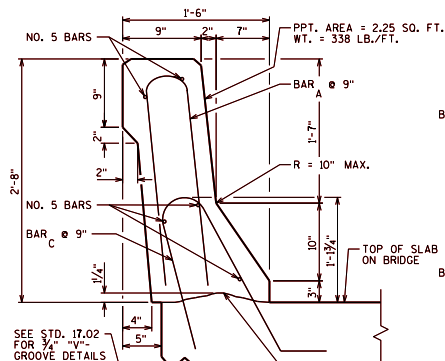
BAR	LENGTH
A	4'-10"
B	4'-7"
C	4'-3"
D	4'-4"
E	4'-4"



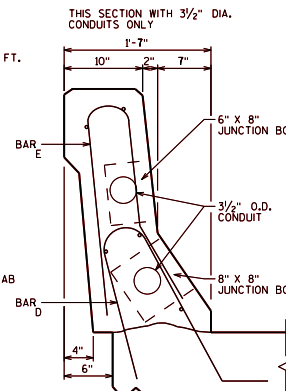
BAR D



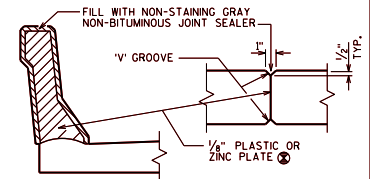
SECTION A



SECTION B



SECTION B1



SECTION C **SECTION D**

NOTES

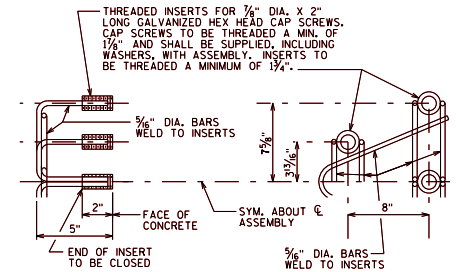
ALL SLOPED FACE PARAPET "B" REINFORCEMENT ARE NO. 4 BARS UNLESS OTHERWISE SHOWN.

⊗ 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\"/>

● 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 -

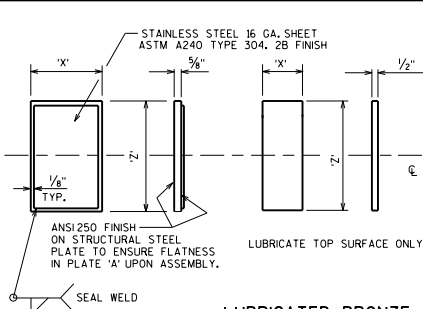
SLOPED FACE PARAPET 'B'



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

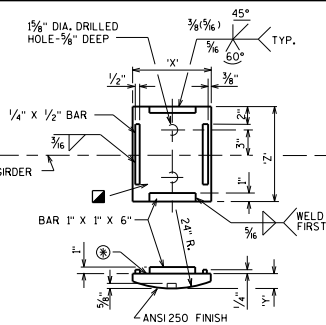
DATE: 1-13



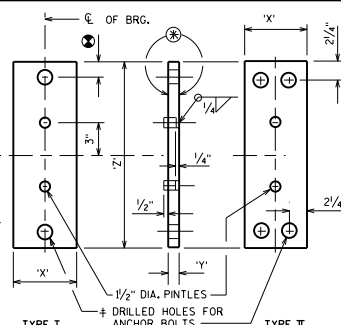
TOP PLATE "A"

LUBRICATED BRONZE

PLATE "B"

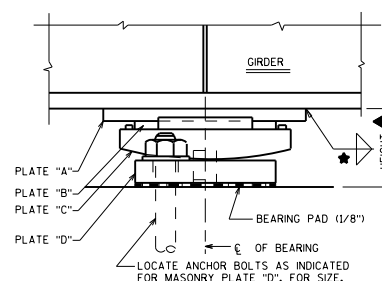


ROCKER PLATE "C"



MASONRY PLATE "D"

PROVIDE A METHOD FOR HANDLING PLATE "C" DURING GALVANIZING.



EXPANSION BEARING ASSEMBLY

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 12" INCREASE STANDARD DISTANCE FROM ϕ 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 1/4" DIA. ANCHOR BOLTS ARE USED AND 2 1/4" WHEN 1/2" DIA. ANCHOR BOLTS ARE USED.

FOR NEW OR REPLACEMENT STEEL BEARINGS, INCLUDING STEEL BEARINGS USED FOR BRIDGE WIDENINGS, USE TYPE "A-1" AS SHOWN ON STANDARD 27.08. THIS STANDARD IS FOR INFORMATIONAL PURPOSES ONLY.

10" BEARING

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Y	Z				
75	9"	10"	5"	10"	7"	1 1/8"	1'-0 1/4"	8"	1 1/2"	1'-8"	.354
105	11"	10"	7"	10"	9"	1 1/8"	1'-0 1/4"	8"	1 1/2"	1'-8"	.375
135	1'-1"	10"	9"	10"	11"	1 1/8"	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'-8"	1'-8"	.495
220	1'-7"	10"	1'-3"	10"	1'-5"	3 1/8"	1'-0 1/4"	1'-0"	2"	1'-8"	.599
250	1'-9"	10"	1'-5"	10"	1'-7"	3 5/8"	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 5/8"	1'-0 1/4"	1'-4"	2 7/8"	1'-8"	.755

12" BEARING

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Y	Z				
90	9"	1'-0"	5"	1'-0"	7"	1 1/8"	1'-2 1/4"	8"	1 1/2"	1'-10"	.354
125	11"	1'-0"	7"	1'-0"	9"	1 1/8"	1'-2 1/4"	8"	1 1/2"	1'-10"	.375
160	1'-1"	1'-0"	9"	1'-0"	11"	1 1/8"	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 1/8"	1'-2 1/4"	1'-1"	2 3/8"	1'-10"	.630
300	1'-9"	1'-0"	1'-5"	1'-0"	1'-7"	3 5/8"	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 5/8"	1'-2 1/4"	1'-5"	2 7/8"	1'-11"	.755

14" BEARING

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Y	Z				
105	9"	1'-2"	5"	1'-2"	7"	1 1/8"	1'-4 1/4"	8"	1 1/2"	2'-0"	.354
145	11"	1'-2"	7"	1'-2"	9"	1 1/8"	1'-4 1/4"	8"	1 1/2"	2'-0"	.375
185	1'-1"	1'-2"	9"	1'-2"	11"	1 1/8"	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 1/8"	1'-4 1/4"	1'-1"	2 3/8"	2'-0"	.630
350	1'-9"	1'-2"	1'-5"	1'-2"	1'-7"	3 5/8"	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 5/8"	1'-4 1/4"	1'-6"	3 7/8"	2'-1"	.838

16" BEARING

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Y	Z				
120	9"	1'-4"	5"	1'-4"	7"	1 1/8"	1'-6 1/4"	8"	1 1/2"	2'-2"	.354
165	11"	1'-4"	7"	1'-4"	9"	1 1/8"	1'-6 1/4"	8"	1 1/2"	2'-2"	.375
215	1'-1"	1'-4"	9"	1'-4"	11"	1 1/8"	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 1/8"	1'-6 1/4"	1'-2"	2 3/8"	2'-3"	.630
400	1'-9"	1'-4"	1'-5"	1'-4"	1'-7"	3 5/8"	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 5/8"	1'-6 1/4"	1'-7"	3 7/8"	2'-3"	.838

18" BEARING

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Y	Z				
135	9"	1'-6"	5"	1'-6"	7"	1 1/8"	1'-8 1/4"	8"	1 1/2"	2'-4"	.354
185	11"	1'-6"	7"	1'-6"	9"	1 1/8"	1'-8 1/4"	8"	1 1/2"	2'-4"	.375
240	1'-1"	1'-6"	9"	1'-6"	11"	1 1/8"	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 1/8"	1'-8 1/4"	1'-2"	2 3/8"	2'-5"	.630
455	1'-9"	1'-6"	1'-5"	1'-6"	1'-7"	3 5/8"	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 7/8"	2'-5"	.838
560	2'-1"	1'-6"	1'-9"	1'-6"	1'-11"	4 5/8"	1'-8 1/4"	1'-8"	3 7/8"	2'-5"	.838

20" BEARING

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Y	Z				
150	9"	1'-8"	5"	1'-8"	7"	1 1/8"	1'-10 1/4"	8"	1 1/2"	2'-6"	.354
210	11"	1'-8"	7"	1'-8"	9"	1 1/8"	1'-10 1/4"	8"	1 1/2"	2'-6"	.375
270	1'-1"	1'-8"	9"	1'-8"	11"	1 1/8"	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 1/8"	1'-10 1/4"	1'-3"	2 7/8"	2'-7"	.672
505	1'-9"	1'-8"	1'-5"	1'-8"	1'-7"	3 5/8"	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 7/8"	2'-7"	.838
625	2'-1"	1'-8"	1'-9"	1'-8"	1'-11"	4 5/8"	1'-10 1/4"	1'-9"	3 7/8"	2'-7"	.838

ANCHOR BOLT NOTES:

FOR SPAN LENGTHS UP TO 100'-0", USE A TYPE I MASONRY PLATE 'D' WITH (2) 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) 1/2" DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS GREATER THAN 150'-0", USE A TYPE II MASONRY PLATE 'D' WITH (4) 1/2" DIA. X 1'-10" LONG ANCHOR BOLTS.

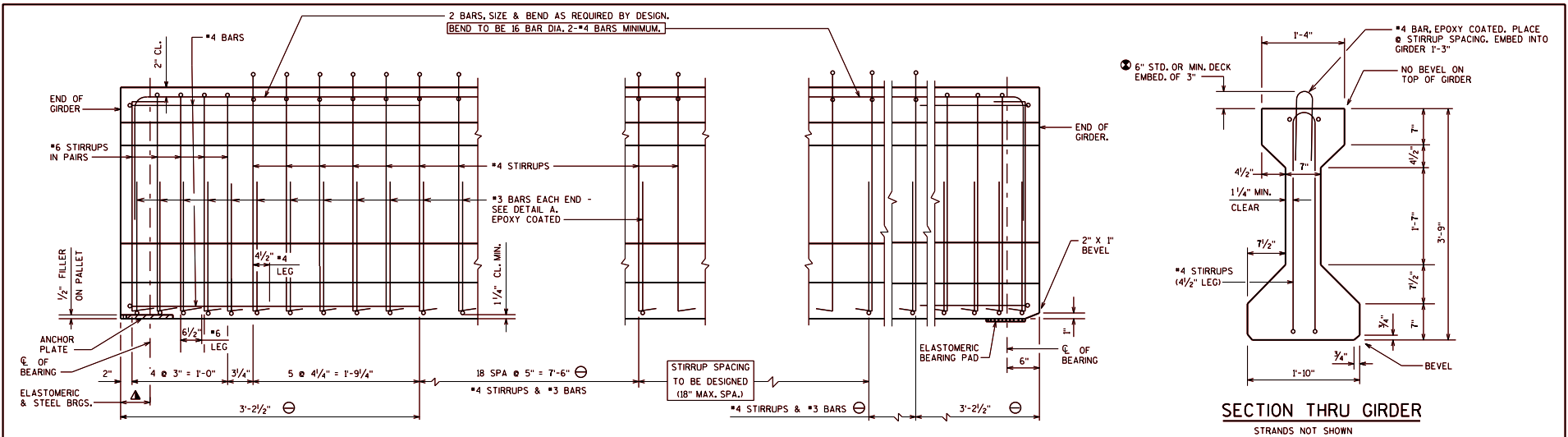
* DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 3/8" LARGER THAN ANCHOR BOLT.

EXPANSION BEARING DETAILS TYPE 'A' - STEEL GIRDERS



APPROVED: *Bill Oliva*

DATE: 7-16



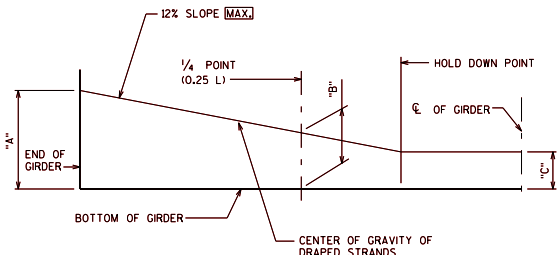
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER

SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD

DESIGNER NOTES

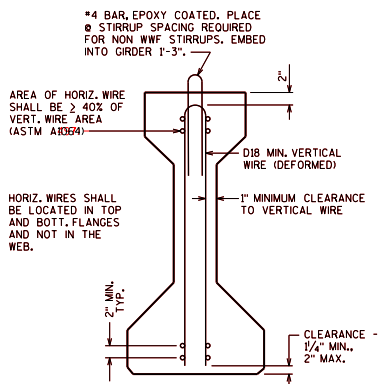
- Ⓐ BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 45-INCH.
- Ⓑ SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.5" OR 0.6" DIA. STRANDS FOR THE DRAPED PATTERN AS REQUIRED. THE MAX. NUMBER OF DRAPED 0.5" DIA. 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 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ± 3/4" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.



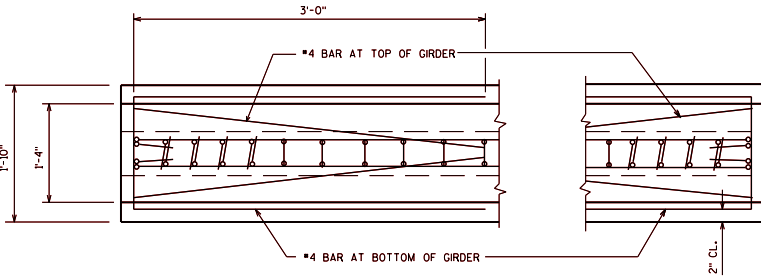
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = 1/4("A" + 3 "C") [MIN.]
 "B" = 1/4("A" + 3 "C") + 3" [MAX.]

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

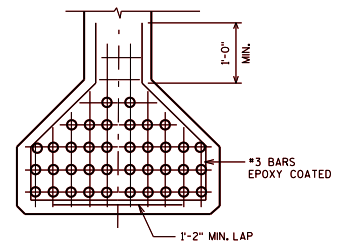
LOCATION OF DRAPED STRANDS



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




PLAN VIEW

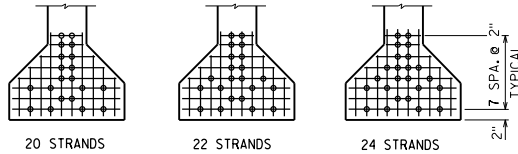
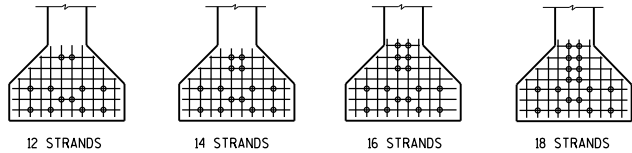


DETAIL A

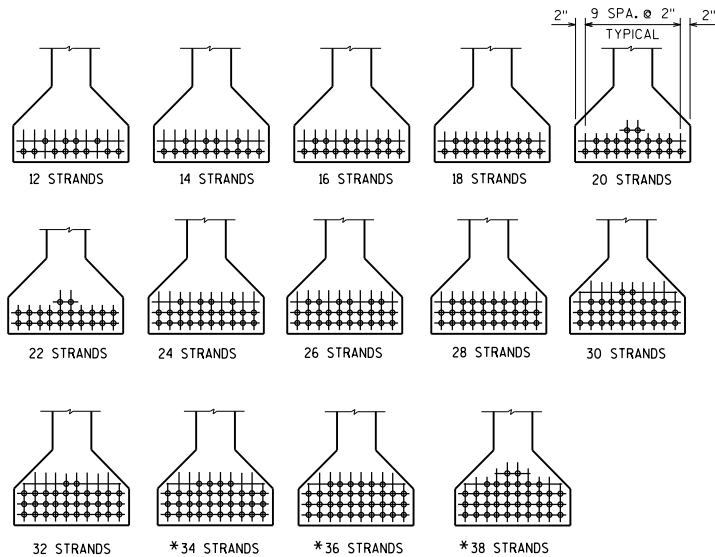
NOTES

- 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.

45" PRESTRESSED GIRDER DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-17</u>



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



ARRANGEMENT AT $\frac{1}{4}$ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. AND 0.6" DIA. STRANDS
*0.5" DIA. STRANDS ONLY

45" GIRDER

A = 560 SQ. IN.
 $r^2 = 223.91 \text{ IN.}^2$
 $y_T = 24.73 \text{ IN.}$
 $y_B = -20.27 \text{ IN.}$
 $I = 125,390 \text{ IN.}^4$
 $S_T = 5,070 \text{ IN.}^3$
 $S_B = -6,186 \text{ IN.}^3$
 WT. = 583 #/FT.

PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 For low relaxation strands.
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = \underline{31.00 \text{ KIPS}}$
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = \underline{43.94 \text{ KIPS}}$
 $\frac{y_B}{r^2} = \frac{-20.27}{223.91} = -0.09053 \text{ IN./IN.}^2$

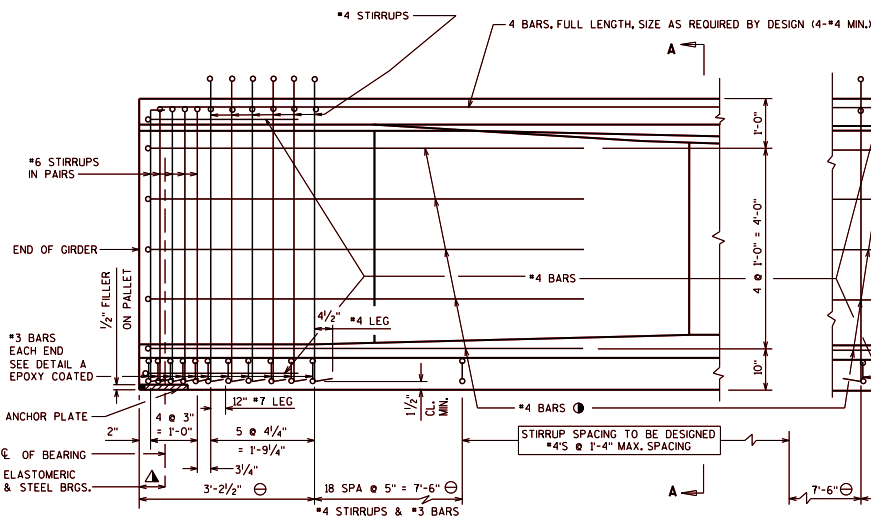
(COMPRESSION IS POSITIVE)

N NO. STRANDS	(1) e_s (inches)	(2) $(1 + \frac{e_s y_B}{r^2})$	(3) (A/r^2) (sq. in.)	(4) $P_i(\text{ini.}) = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(4) $P_i(\text{ini.}) = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) $f_B(\text{ini.})=(4)/(3)$ 0.5" DIA. STRANDS (K/Sq. In.)	(5) $f_B(\text{ini.})=(4)/(3)$ 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

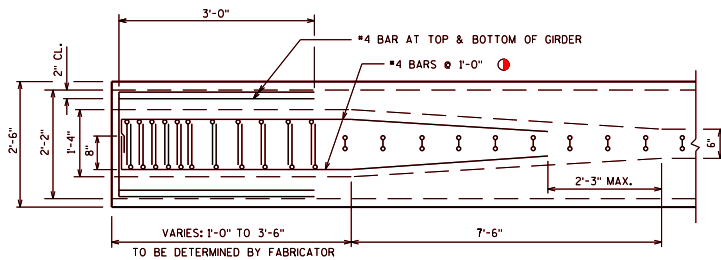
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-16

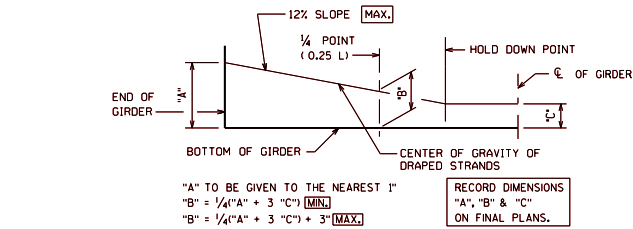


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER



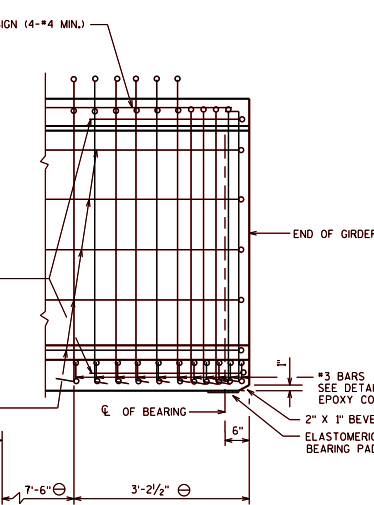
PLAN VIEW



LOCATION OF DRAPED STRANDS

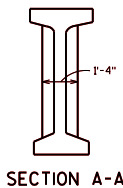
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = $\frac{1}{4}A + 3$ (MIN.)
 "B" = $\frac{1}{4}A + 3$ (MAX.)

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

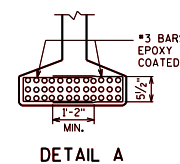


SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD

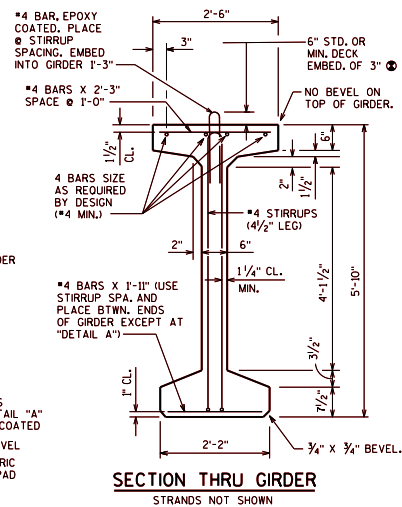
SIDE VIEW OF GIRDER



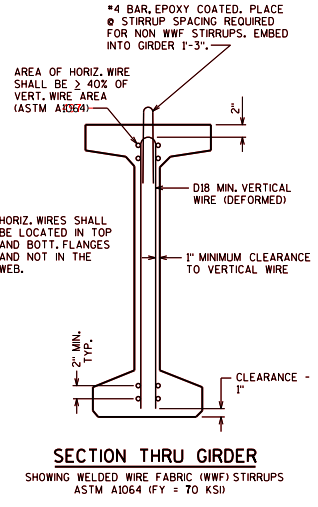
SECTION A-A



DETAIL A



SECTION THRU GIRDER



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

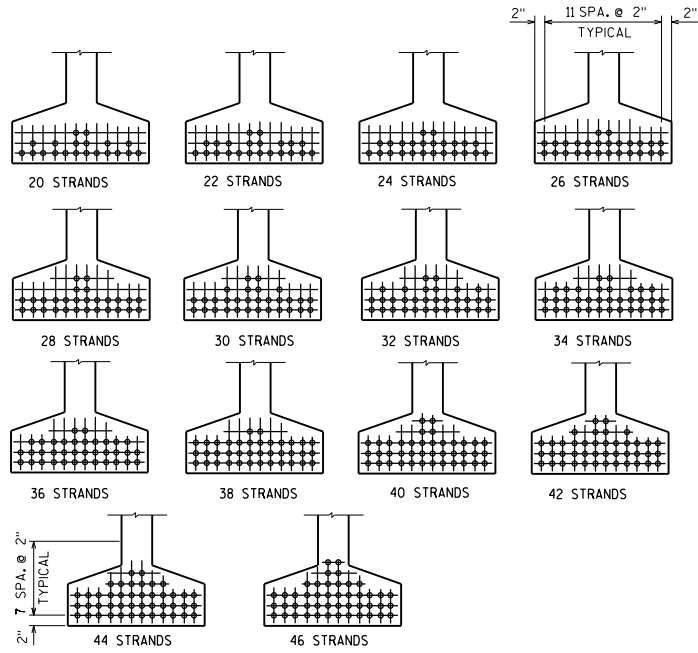
DESIGNER NOTES

- 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 CONCURRENCE 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 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ±3/4" 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.

70" PRESTRESSED GIRDER DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-17</u>



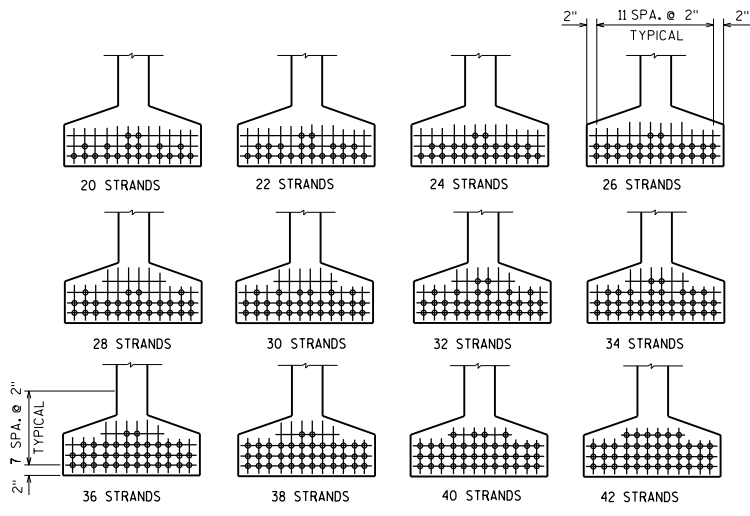
ARRANGEMENT AT $\frac{1}{4}$ SPAN FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS

(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) $P(\text{ini.}) = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(5) $f_B (\text{ini.}) = (4)/(3)$ 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.
 $r^2 = 659.70 \text{ IN.}^2$
 $y_T = 35.38 \text{ IN.}$
 $y_B = -34.62 \text{ IN.}$
 $I = 510,613 \text{ IN.}^4$
 $S_T = 14,430 \text{ IN.}^3$
 $S_B = -14,750 \text{ IN.}^3$
 WT. = 0.806 KIPS/FT. +
 6.6 KIPS FOR BOTH END BLOCKS



ARRANGEMENT AT $\frac{1}{4}$ 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) $P(\text{ini.}) = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) $f_B (\text{ini.}) = (4)/(3)$ 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

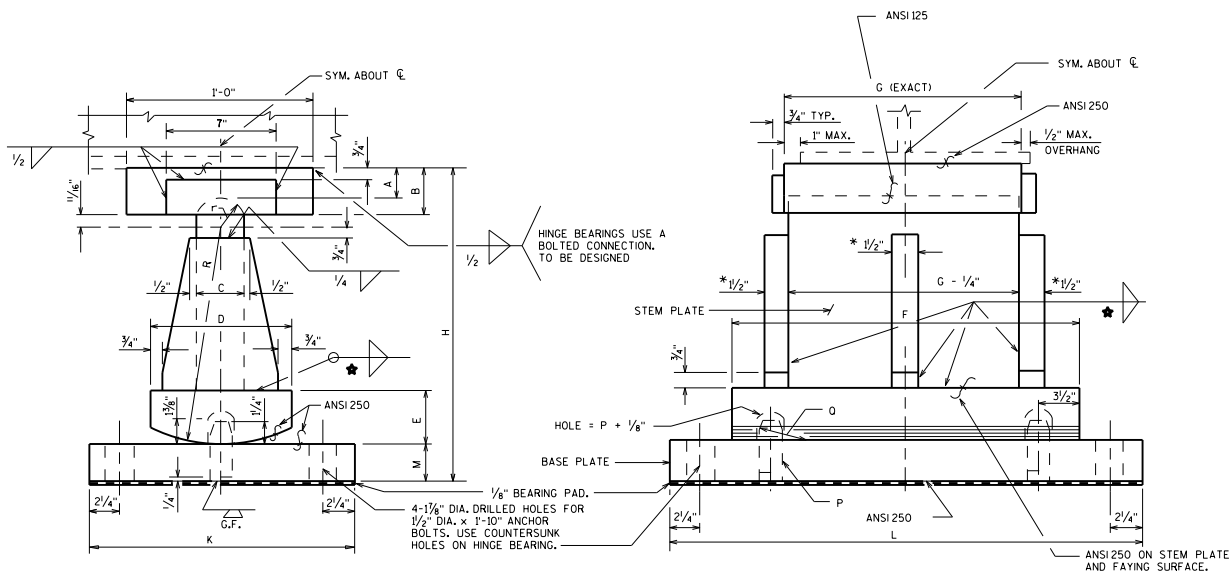
PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands
 P_i PER 0.5" DIA. STRAND
 $= 0.1531 \times 202,500 = 31.00 \text{ KIPS}$
 P_i PER 0.6" DIA. STRAND
 $= 0.217 \times 202,500 = 43.94 \text{ KIPS}$
 $\frac{y_B}{r^2} = \frac{-34.62}{659.70} = -0.05248 \text{ IN./IN.}^2$

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 + 2/4" ABOVE TOP OF CONCRETE MASONRY. CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

RADIAL SURFACES ON ROCKER SHALL BE MACHINE FINISHED AFTER WELDING.

ALL SURFACES MARKED "RF" 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 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	PINTLE			
						G=1'-7"		G=1'-9"		G=1'-11"		G=2'-1"		G=2'-3"		G=2'-5"						STEM	PLATE	P DIA.	O
						F	L	F	L	F	L	F	L	F	L	F	L								
400-499	1 5/8"	2 5/8"	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 1/8"	1 5/8"	2"	3 1/2"
500-599	1 5/8"	2 5/8"	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 1/8"	1 5/8"	2"	3 1/2"
600-699	1 5/8"	2 5/8"	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 1/8"	1 5/8"	2"	3 1/2"
700-799	2 3/8"	3 3/8"	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 5/8"	1 5/8"	2"	3 1/2"
800-899	2 3/8"	3 3/8"	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 5/8"	1 5/8"	2"	3 1/2"
900-999	2 3/8"	3 3/8"	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 5/8"	1 5/8"	2"	3 1/2"
1000-1099	2 3/8"	3 3/8"	4"	1'-6"	3 3/8"	—	—	—	—	—	—	—	—	3'-1"	4'-1"	3'-1"	4'-1"	3'-1"	4'-1"	3'-1"	4'-1"	2 3/8"	2 3/4"	2 1/2"	3 3/4"
1100-1199	2 3/8"	3 3/8"	4"	1'-6"	3 3/8"	—	—	—	—	—	—	—	—	3'-3"	4'-2"	3'-3"	4'-2"	2'-4 1/2"	2'-6"	3 3/8"	1'-8"	2 3/8"	2 3/4"	2 1/2"	3 3/4"
1200-1299	2 3/8"	3 3/8"	4"	1'-6"	3 3/8"	—	—	—	—	—	—	—	—	3'-5"	4'-4"	3'-5"	4'-4"	2'-5 1/2"	2'-7"	3 3/8"	1'-9"	2 3/8"	2 3/4"	2 1/2"	3 3/4"
1300-1399	2 3/8"	3 3/8"	4"	1'-6"	3 3/8"	—	—	—	—	—	—	—	—	3'-7"	4'-7"	3'-7"	4'-7"	2'-6 1/2"	2'-8"	3 3/8"	1'-10"	2 3/8"	2 3/4"	2 1/2"	3 3/4"
1400-1500	2 3/8"	3 3/8"	4"	1'-6"	3 3/8"	—	—	—	—	—	—	—	—	3'-9"	4'-9"	3'-9"	4'-9"	2'-7 1/2"	2'-9"	3 3/8"	1'-11"	2 3/8"	2 3/4"	2 1/2"	3 3/4"
										G=1'-2"				G=1'-3"											
0-300	1 5/8"	2 5/8"	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"	1 1/2"	1 5/8"	2"	3 1/2"	

ROCKER SETTING DATA

TEMPERATURE TIME OF SETTING	VERTICAL			
	(+)	(+)	(-)	(-)
120	PIER	PIER	PIER	PIER
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 1/2) BUT ACTUAL MOVEMENT NOT TO EXCEED R/3.

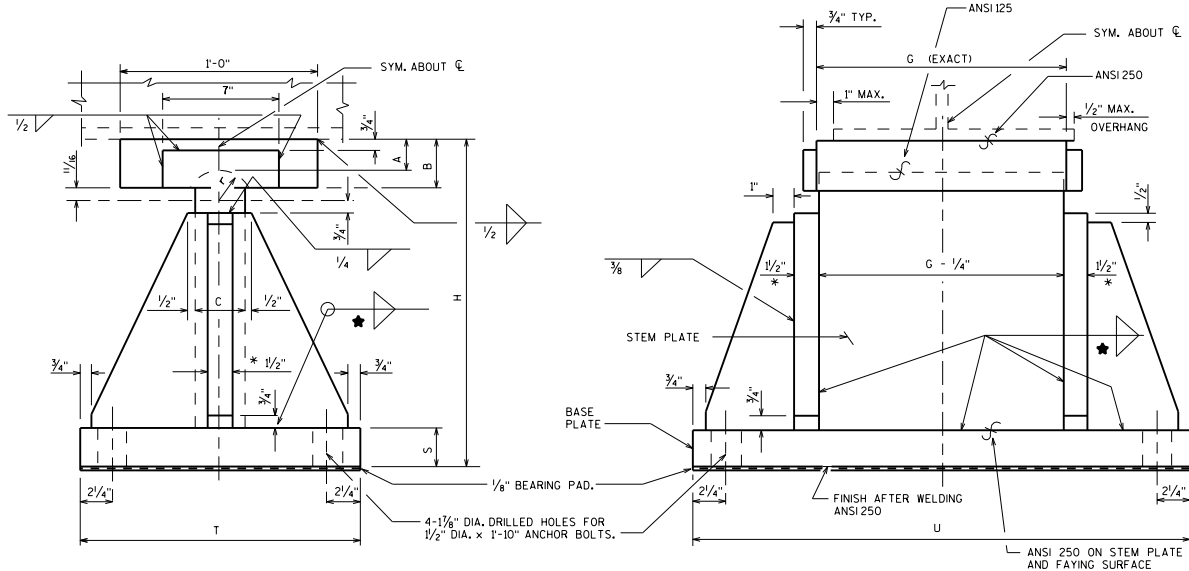
OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ROCKER BEARING TYPE 'B' - STEEL GIRDERS



BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-16



FIXED SHOE

★ 400 K ≤ REACTION < 1000 K, USE 5/8" WELD.
 1000 K ≤ REACTION ≤ 1500 K, USE 3/4" 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 + 2/4" 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 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 5/8"	2 5/8"	3"	2'-8"	2'-8"	2'-10"	3'-0"	—	—	1'-6"	1 1/4"	1 3/4"	2 3/8"	1'-4"
500-599	1 5/8"	2 5/8"	3"	3'-0"	3'-0"	3'-0"	3'-0"	—	—	1'-7"	1 1/8"	1 3/4"	2 3/8"	1'-5"
600-699	1 5/8"	2 5/8"	3"	—	3'-3"	3'-3"	3'-3"	3'-3"	—	1'-9"	1 1/8"	1 3/4"	2 3/8"	1'-6"
700-799	2 3/8"	3 3/8"	3 1/2"	—	—	3'-6"	3'-6"	3'-6"	3'-6"	1'-10"	1 5/8"	1 3/4"	2 7/8"	1'-7"
800-899	2 3/8"	3 3/8"	3 1/2"	—	—	3'-9"	3'-9"	3'-9"	3'-9"	2'-0"	1 5/8"	1 3/4"	2 7/8"	1'-8"
900-999	2 3/8"	3 3/8"	3 1/2"	—	—	3'-10"	3'-10"	3'-10"	3'-10"	2'-1"	1 5/8"	1 3/4"	2 7/8"	1'-10"
1000-1099	2 3/8"	3 3/8"	4"	—	—	4'-0"	4'-0"	4'-0"	4'-0"	2'-3"	2 3/8"	2 3/4"	3 3/8"	1'-11"
1100-1199	2 3/8"	3 3/8"	4"	—	—	4'-2"	4'-2"	4'-2"	4'-2"	2'-4"	2 3/8"	2 3/4"	3 3/8"	2'-0"
1200-1299	2 3/8"	3 3/8"	4"	—	—	—	4'-4"	4'-4"	4'-4"	2'-5"	2 3/8"	2 3/4"	3 3/8"	2'-1"
1300-1399	2 3/8"	3 3/8"	4"	—	—	—	4'-6"	4'-6"	4'-6"	2'-6"	2 3/8"	2 3/4"	3 3/8"	2'-2"
1400-1500	2 3/8"	3 3/8"	4"	—	—	—	4'-8"	4'-8"	4'-8"	2'-7"	2 3/8"	2 3/4"	3 3/8"	2'-3"

**TYPE 'B' - STEEL
GIRDERS FIXED SHOE**



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva DATE: 7-16

★ FOR CULVERT WINGS:

WITH WING WALL THICKNESS ≥ 8" USE:
ADHESIVE ANCHORS 3/4" INCH.
EMBED 5" IN CONCRETE.
SEE DETAIL "A"

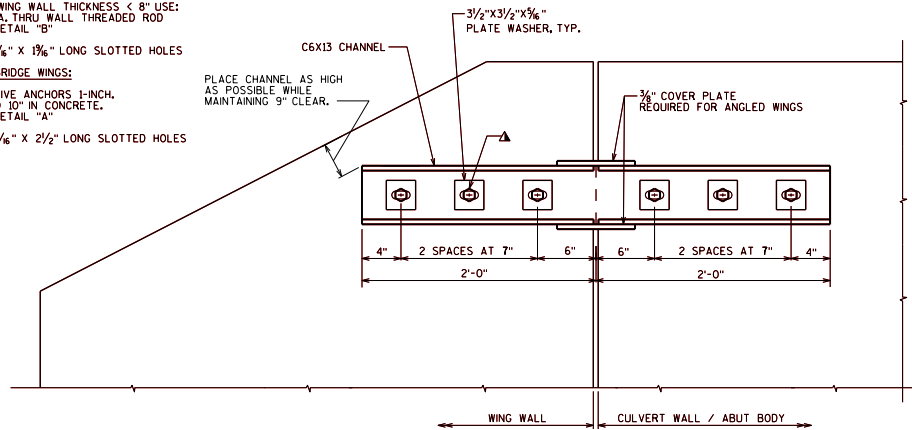
WITH WING WALL THICKNESS < 8" USE:
3/8" DIA. THRU WALL THREADED ROD
SEE DETAIL "B"

USE 1/4" X 1 1/4" LONG SLOTTED HOLES

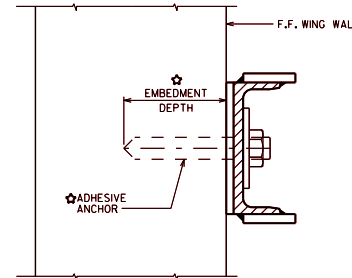
FOR BRIDGE WINGS:

ADHESIVE ANCHORS 1-INCH.
EMBED 10" IN CONCRETE.
SEE DETAIL "A"

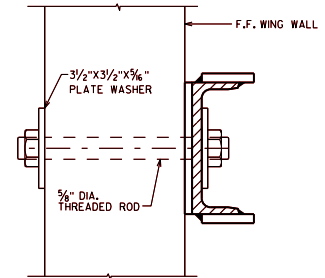
USE 1/4" X 2 1/2" LONG SLOTTED HOLES



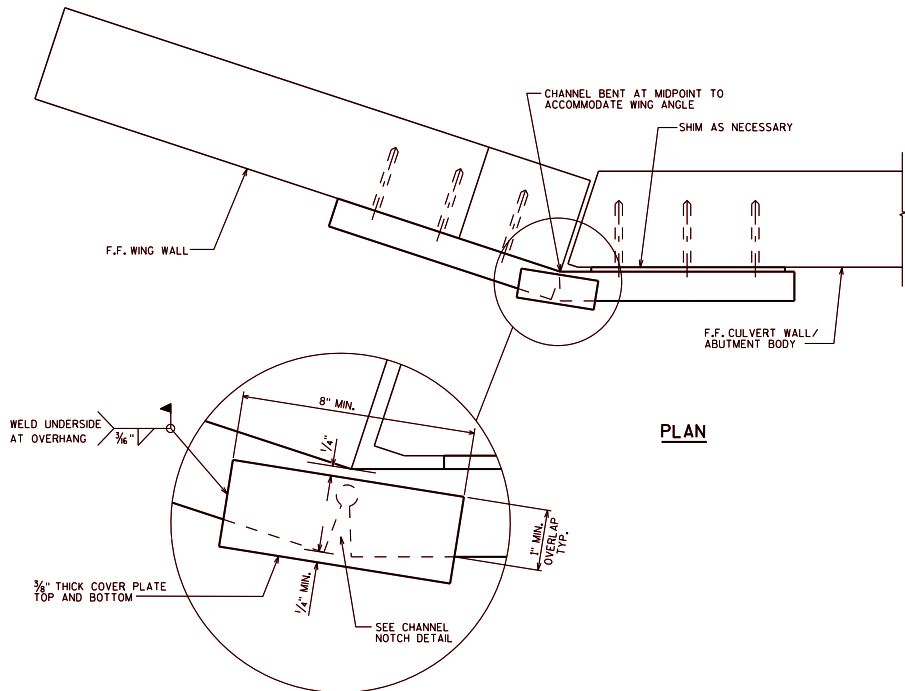
WING ELEVATION



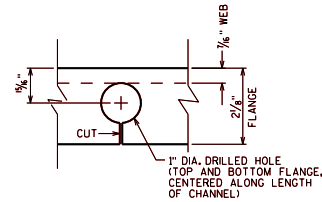
DETAIL "A"
SECTION THRU CHANNEL



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.

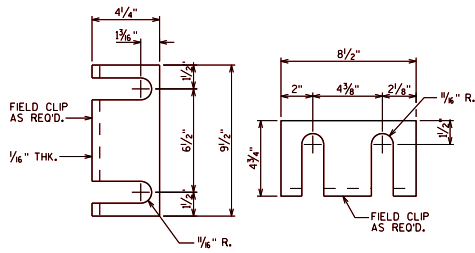
CUTTING AND DRILLING OF CHANNEL SHALL BE DONE IN FABRICATION SHOP, PRIOR TO GALVANIZING.

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.

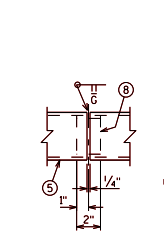
CAULK AROUND PERIMETER OF CHANNEL AND FILL PORTION OF HOLE AROUND ANCHOR BOLT AND SHIM WITH NON-BITUMINOUS JOINT SEALER.

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

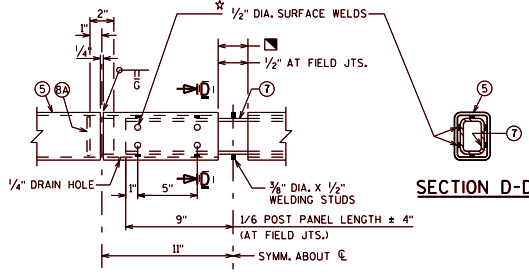
WING STRAPPING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 7-18



POST SHIM DETAILS

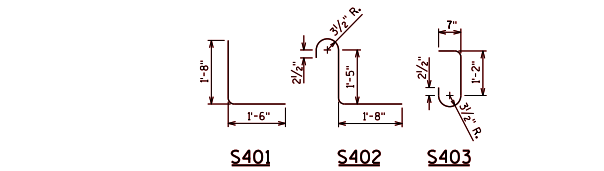


SHOP RAIL SPLICE DETAIL
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)

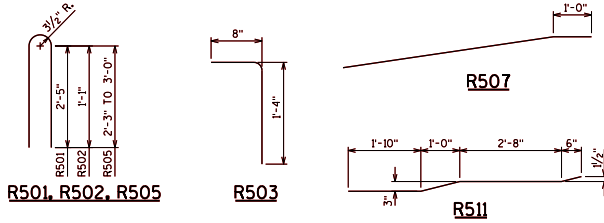


FIELD ERECTION JOINT DETAIL

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



S401 S402 S403



R501, R502, R505

R503

R507

R511

R510

BAR SERIES TABLE

MARK	NO. REOD.	LENGTH
R505	OF	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	NO. REOD.	LENGTH	BEV'T	BAR SERIES	LOCATION
S401	X	3'-0"	X	-	PARAPEI_VERT.
S402	X	4'-1"	X	-	PARAPEI_VERT.
S403	X	2'-9"	X	-	PARAPEI_VERT.
S404	X	-	-	-	PARAPEI_HORIZ.
R501	X	5'-9"	X	-	PARAPEI_VERT.
R502	X	3'-1"	X	-	PARAPEI_VERT.
R503	X	1'-11"	X	-	PARAPEI_VERT.
R504	X	3'-4"	-	-	PARAPEI_VERT.
R505	X	6'-2"	X	▲	PARAPEI_VERT.
R506	X	-	-	-	PARAPEI_HORIZ.
R507	X	-	X	-	PARAPEI_HORIZ.
R508	X	4'-0"	-	-	PARAPEI_HORIZ.
R509	X	5'-8"	-	-	PARAPEI_HORIZ.
R510	X	4'-0"	X	-	PARAPEI_HORIZ.
R511	X	6'-0"	X	-	PARAPEI_HORIZ.
R512	X	-	-	-	PARAPEI_HORIZ.
R513	X	-	-	-	PARAPEI_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.

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 AMSC 154D, COLOR NO. 1.

1/4" 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 ASSEMBLY DETAILS.

THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 2 (TL-2).

▣ ROWY, OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR ABUTMENT.

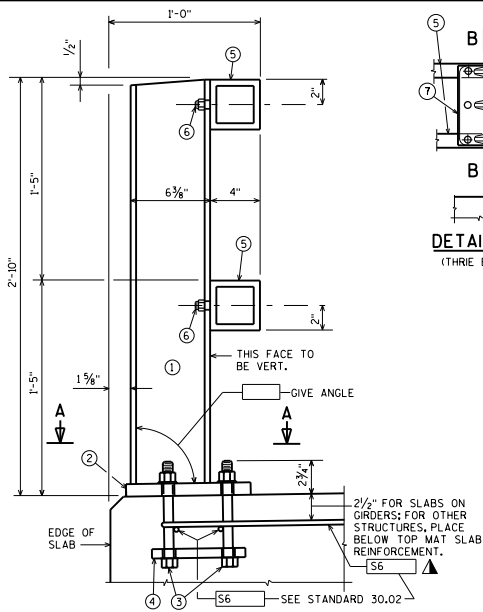
LEGEND

- ① TS 4 x 4 x 0.25 X 1'-9 1/4" STRUCTURAL TUBING WITH 3/8" DIA. HOLES FOR BOLT NO. 6. PLACE POSTS VERTICAL IN TRANSVERSE DIRECTION. WELD TO NO. 2. PLACE POSTS NORMAL TO GRADE LINE
- ② PLATE 3/4" X 8 1/2" X 9 1/2" WITH 3/8" X 1 1/4" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ③ 3/8" DIA. X 1'-1" LONG ASTM A325 HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER. 4 REOD. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. EMBED A MIN. OF 10". CHAMFER TOP OF BOLTS BEFORE THREADING.
- ④ BAR 3/4" 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 3/8" DIA. HOLE FOR NO. 6.
- ⑥ 3/4" DIA. X 9" LONG ROUND HEAD BOLTS, ASTM A307, WITH HEX. NUT AND WASHERS AND LOCK WASHER. (1 REOD. AT EACH RAIL TO POST LOCATION)
- ⑦ RECTANGULAR SLEEVE FABRICATED FROM 1/4" PLATES. 1'-6" LONG.
- ⑧ RECTANGULAR SLEEVE FABRICATED FROM 1/4" PLATES. PROVIDE "SLIDING FIT" WITH MIN. OUT TO OUT DIMENSION OF 3 3/8" X 2 3/8".
- ⑨ RECTANGULAR SLEEVE FABRICATED FROM 1/4" PLATES. PROVIDE "SLIDING FIT" WITH MIN. OUT TO OUT DIMENSION OF 3 3/8" X 2 3/8" WITH 3/8" PLATE AT ONE END WELDED ALL AROUND TO BLOCK WATER.
- ⑩ 3/4" DIA. X 1'-1" LONG ROUND HEAD BOLTS, ASTM A307, WITH HEX NUT AND WASHERS

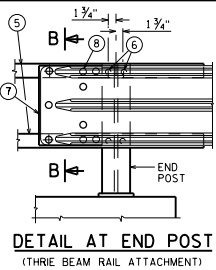
RAILING TUBULAR TYPE 'PF' DETAILS

BUREAU OF STRUCTURES

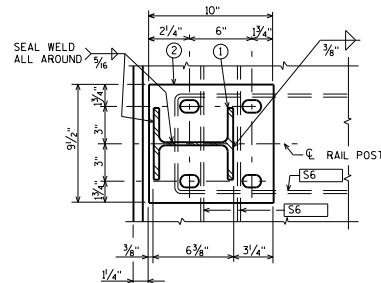
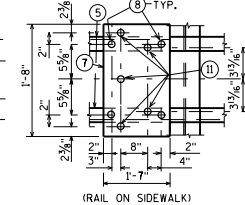
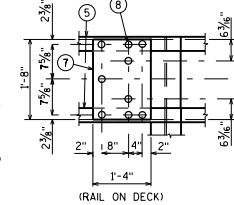
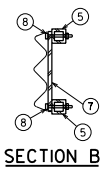
APPROVED: Bill Oliva DATE: 1-18



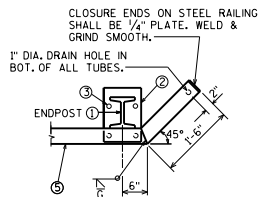
SECTION THRU RAILING ON DECK



DETAIL AT END POST
(THREE BEAM RAIL ATTACHMENT)

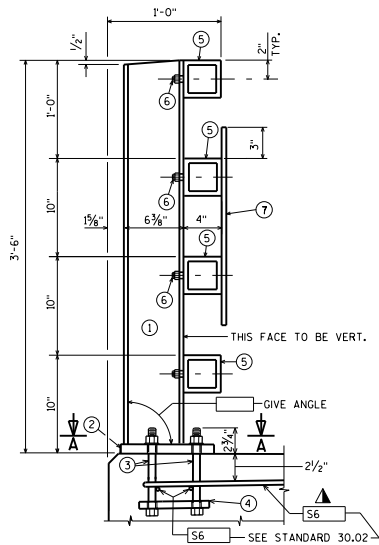


SECTION A

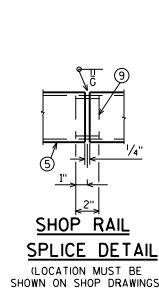


DETAIL FOR END POSTS

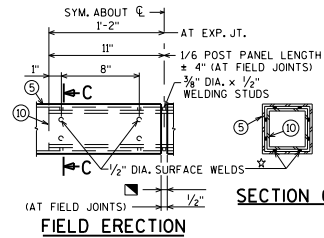
WITH OR WITHOUT THREE BEAM RAIL ATTACHMENT
(END POST MAY BE LOCATED ON SUPERSTRUCTURE OR WINGWALLS)



SECTION THRU RAILING
ON SIDEWALK



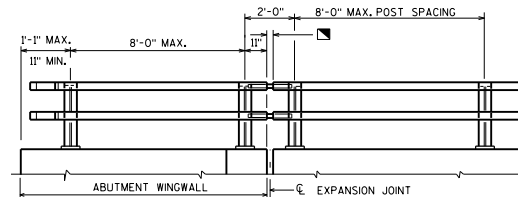
SHOP RAIL
SPLICE DETAIL
(LOCATION MUST BE
SHOWN ON SHOP DRAWINGS)



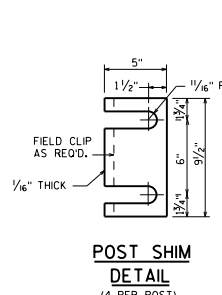
FIELD ERECTION
JOINT DETAIL

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

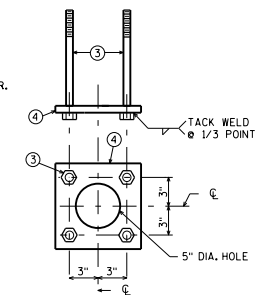
THIS RAILING IS NO LONGER
USED AND IS SHOWN FOR
INFORMATIONAL PURPOSES
ONLY:



PART ELEVATION OF RAILING



POST SHIM
DETAIL
(4 PER POST)



ANCHORAGE DETAIL

LEGEND

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

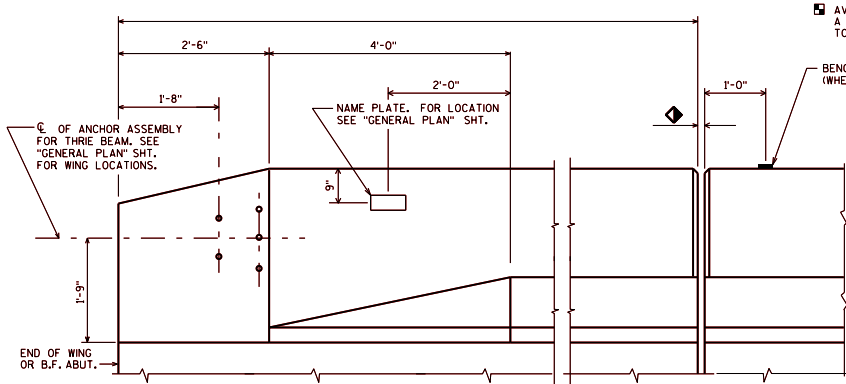
PLACE FIRST BOTTOM LONGITUDINAL BAR CLEAR OF DRIP GROOVE.

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

▣ RDWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR ABUTMENTS.

▲ TIE TO TOP MAT OF STEEL.

TUBULAR STEEL RAILING TYPE 'F'	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: 7-16

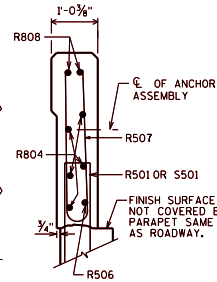


INSIDE ELEVATION

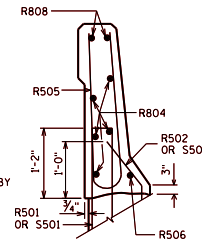
◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR ALL ABUTMENTS

■ AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

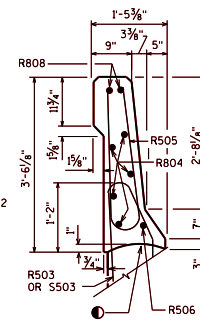
▲ LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.



SECTION A



SECTION B



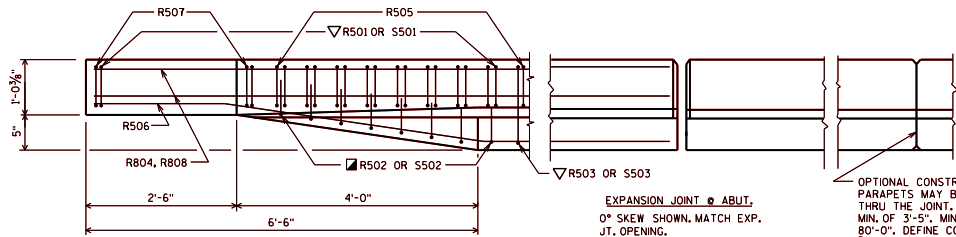
SECTION C

BILL OF BARS FOR ABUTMENT PARAPETS

BAR MARK	Qty	ABUT.	ABUT.	LENGTH	REIN.	BAR SERIES	LOCATION
B501	X			4'-7"	X		PARAPET VERT.
B502	X			2'-4"	X		PARAPET VERT.
B503	X			4'-7"	X		PARAPET VERT.
B804	X						PARAPET HORIZ.
B505	X			6'-6"	X		PARAPET VERT.
B506	X				X		PARAPET HORIZ.
B507	X			5'-8"	X	▲	PARAPET VERT.
B808	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

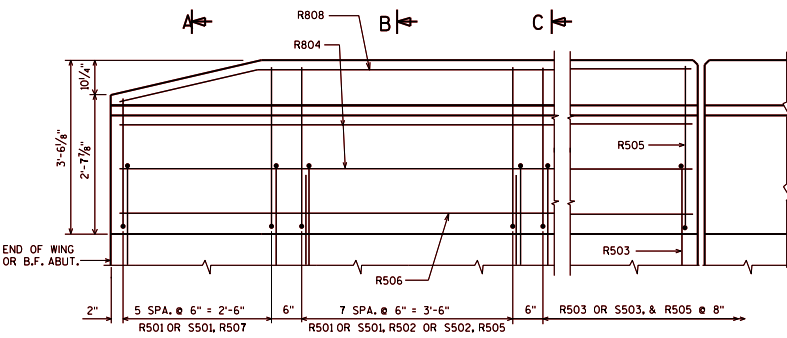
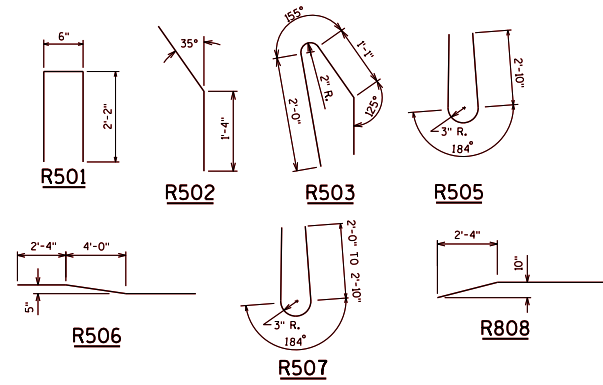
MARK	NO. REOD.	LENGTH
B501	4 - SERIES OF 6	4'-10" TO 6'-6"



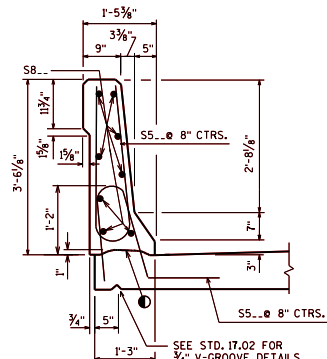
PLAN

EXPANSION JOINT @ ABUT. 0° SKEW SHOWN, MATCH EXP. JT. OPENING. FOR TYPE A1 ABUT., USE 1/2" FILLER TO TOP OF PARAPET. SEE STD. 12.01.

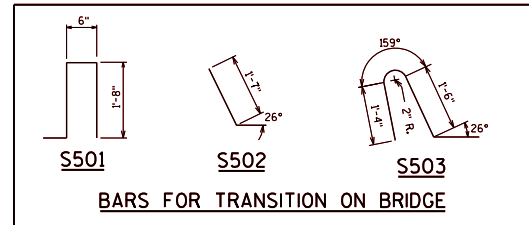
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 3'-5". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 3/4" - 1" GROOVE.



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 S503 BAR MAY BE USED IN LIEU OF A S503 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

SLOPED FACE PARAPET 'HF'



APPROVED: Bill Oliva DATE: 1-19

DESIGN DATA

LIVE LOAD:
 INVENTORY RATING: HS-...
 OPERATING RATING: HS-...
 WISCONSIN STANDARD PERMIT (VEHICLE) (WIS-SPV) = 400 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 1/2-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 1/2" 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 1/2", 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 MINIMUM OVERLAY THICKNESS PLUS 1/2" 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 OVERLAIN 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.

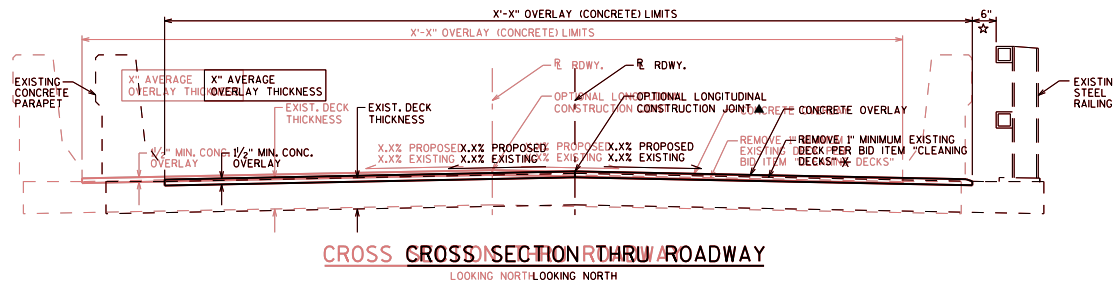
JOINT REPAIR AREAS SHOULD NOT BE INCLUDED IN DECK REPAIR AREAS OR OVERLAY QUANTITIES. SEE STANDARD 40.04.

INCLUDE THE BID ITEM "ADJUSTING FLOOR DRAINS" WHEN DRAINS ARE TO BE RAISED.

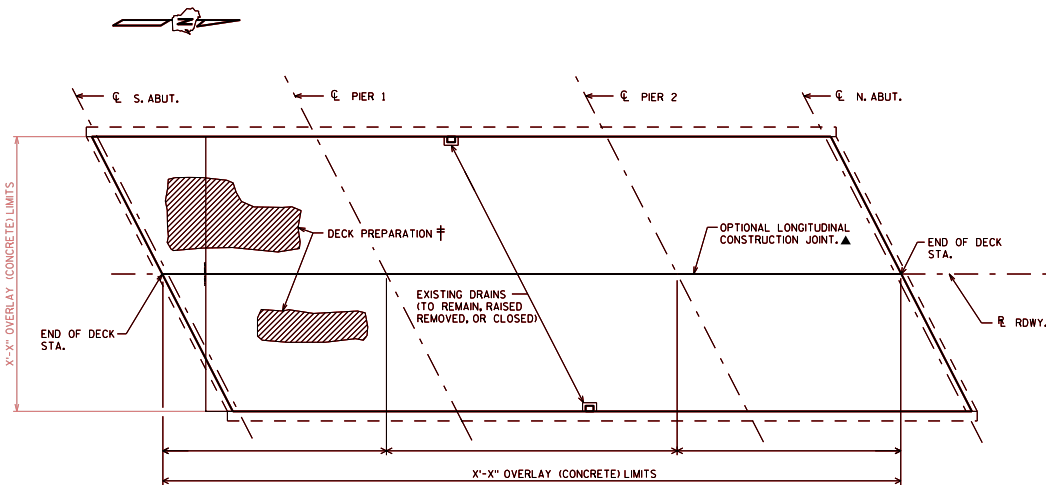
RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

* OVERLAY LIMIT SHOULD BE OFFSET FROM EXISTING OPEN STEEL RAILING FOR IMPROVED ACCESS FOR DECK REMOVAL AND OVERLAY PLACEMENT. OVERLAY LIMITS FOR PREVIOUSLY OVERLAIN DECKS SHALL BE BASED ON THE EXISTING OVERLAY LIMITS.

▲ OPTIONAL CONSTRUCTION JOINTS SHALL BE LOCATED AT CROWN POINTS AND OTHER GRADE BREAK LOCATIONS. COORDINATE STAGING TO AVOID GRADE BREAKS WITHIN A GIVEN STAGE, WHICH WILL REQUIRE SEPARATE OVERLAY POURS.



CROSS SECTION THRU ROADWAY
 LOOKING NORTH
 LOOKING NORTH



† SURVEY TYPE:
 SURVEY COMPLETED DATE: --/--/----

PLAN
 TOP OF DECK SHOWN

TOTAL ESTIMATED QUANTITIES TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	BID ITEM NUMBER	UNIT	TOTAL BID ITEMS
502.3200	PROTECTIVE SURFACE TREATMENT	502.3200	PROTECTIVE SURFACE TREATMENT	SY
509.0301	PREPARATION DECKS TYPE 1	509.0301	PREPARATION DECKS TYPE 1	SY
509.0302	PREPARATION DECKS TYPE 2	509.0302	PREPARATION DECKS TYPE 2	SY
509.0500	CLEANING DECKS	509.0500	CLEANING DECKS	SY
509.2000	FULL-DEPTH DECK REPAIR	509.2000	FULL-DEPTH DECK REPAIR	SY
509.2500	CONCRETE MASONRY OVERLAY DECKS	509.2500	CONCRETE MASONRY OVERLAY DECKS	CY
POSSIBLE ADDITIONAL BID ITEMS		POSSIBLE ADDITIONAL BID ITEMS		
502.3210	PIGMENTED SURFACE SEALER	502.3210	PIGMENTED SURFACE SEALER	SY
* 509.0505.S	CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY		CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY	SY
* 509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)		REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)	SY
514.0900	ADJUSTING FLOOR DRAINS	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: 7-21

DESIGN DATA

LIVE LOAD: HS-20
 INVENTORY RATING: HS-20
 OPERATING RATING: HS-20
 WISCONSIN STANDARD PERMIT VEHICLE (WIS-SPV) = 10,000 LBS

MATERIAL PROPERTIES:
 PORTLAND CEMENT MASONRY - DECK PATCHING f'c = 4,000 P.S.I.
 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.
 DIMENSIONS SHOWN FOR PREPARATION DECKS OR POLYMER OVERLAYS SHALL BE PERFORMED BY A SAW CUT.
 DECK PREPARATION DECKS OR POLYMER OVERLAYS SHALL BE PERFORMED BY A SAW CUT.
 AREAS OF FULL DEPTH DECK REPAIRS SHALL BE FILLED WITH CONCRETE MASONRY DECK REPAIR.
 PREPARATION DECKS OR POLYMER OVERLAYS SHALL BE PERFORMED ON DECK AREAS AS PORTLAND ARE BASED ON ENGINEER'S DESIGN AND SHALL BE PERFORMED TO A MINIMUM OF 28 DAYS PRIOR TO OVERLAY FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH CONCRETE MASONRY DECK REPAIR.
 SHOT BLASTING, DECK SURFACE PREPARATIONS, AND TRANSITIONAL AREAS ARE INCLUDED IN THE BID ITEM "POLYMER OVERLAY".

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0303	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
509.2000	FULL DEPTH DECK REPAIR	CY	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
509.5100.S	POLYMER OVERLAY	SY	
	POSSIBLE BID ITEM		

DESIGN DATA

DESIGN LOADING: HL-93
 INVENTORY RATING: RF=1...
 OPERATING RATING: RF=1...
 WISCONSIN STANDARD PERMIT VEHICLE (WIS-SPV) = 10,000 LBS

STRUCTURE IS DESIGNED FOR A FUTURE WEARING SURFACE OF 20 POUNDS PER SQUARE FOOT.

NOTES

DRAWINGS SHALL NOT BE SCALED.
 SHOT BLASTING, DECK SURFACE PREPARATIONS, AND TRANSITIONAL AREAS ARE INCLUDED IN THE BID ITEM "POLYMER OVERLAY".

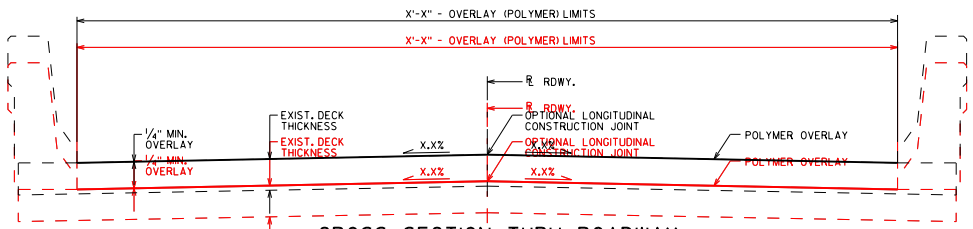
DESIGNER NOTES

DRAWINGS SHALL NOT BE SCALED.
 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.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.5100.S	POLYMER OVERLAY	SY	

REHABILITATION OVERLAY



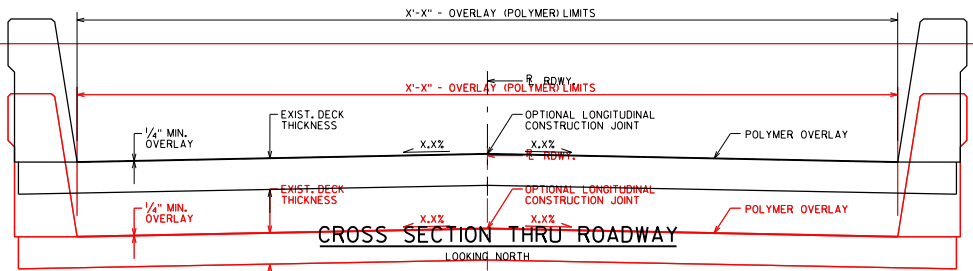
TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0303	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
509.2000	FULL DEPTH DECK REPAIR	CY	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
509.5100.S	POLYMER OVERLAY	SY	
	POSSIBLE BID ITEM		

DESIGNER NOTES

REPAIRS SHALL BE COMPLETED WITHIN A MINIMUM 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 THE "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.

THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.



TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.5100.S	POLYMER OVERLAY	SY	

DESIGN DATA

DESIGN LOADING: HL-93
 INVENTORY RATING: RF=1...
 OPERATING RATING: RF=1...
 WISCONSIN STANDARD PERMIT VEHICLE (WIS-SPV) = 10,000 LBS

STRUCTURE IS DESIGNED FOR A FUTURE WEARING SURFACE OF 20 POUNDS PER SQUARE FOOT.

NOTES

DRAWINGS SHALL NOT BE SCALED.
 SHOT BLASTING, DECK SURFACE PREPARATIONS, AND TRANSITIONAL AREAS ARE INCLUDED IN THE BID ITEM "POLYMER OVERLAY".

DESIGNER NOTES

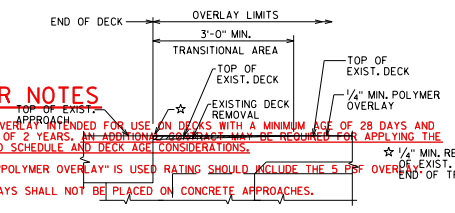
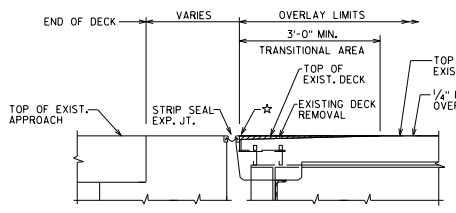
DRAWINGS SHALL NOT BE SCALED.
 PREVENTATIVE OVERLAY INTENDED FOR USE ON DECKS WITH A MINIMUM AGE OF 28 DAYS AND A MAXIMUM AGE OF 2 YEARS. AN ADDITIONAL CONTRACT MAY BE REQUIRED FOR APPLYING THE OVERLAY DUE TO SCHEDULE AND DECK AGE CONSIDERATIONS.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.5100.S	POLYMER OVERLAY	SY	

PREVENTATIVE OVERLAY

PREVENTATIVE OVERLAY



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.

NOTE: TRANSITIONAL AREA REQUIRED WHEN APPROACH PAVEMENT HAS BEEN PLACED PRIOR TO OVERLAY PLACEMENT.

POLYMER OVERLAY

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-20

POLYMER MODIFIED ASPHALTIC OVERLAY

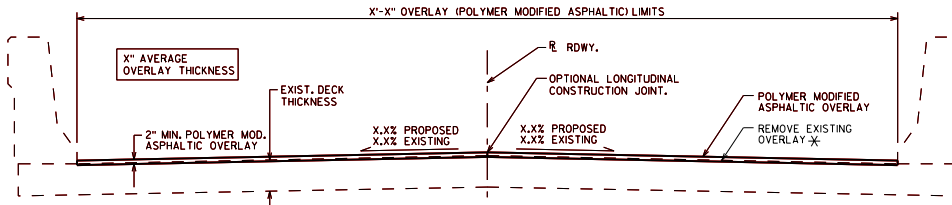
DESIGN DATA

LIVE LOAD:
INVENTORY RATING: HS-...
OPERATING RATING: HS-...
WISCONSIN STANDARD PERMIT VEHICLE (WS-SPV) = 300 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 2 1/2" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN 1/2", CONTACT THE STRUCTURES DESIGN SECTION.



CROSS SECTION THRU ROADWAY
LOOKING NORTH

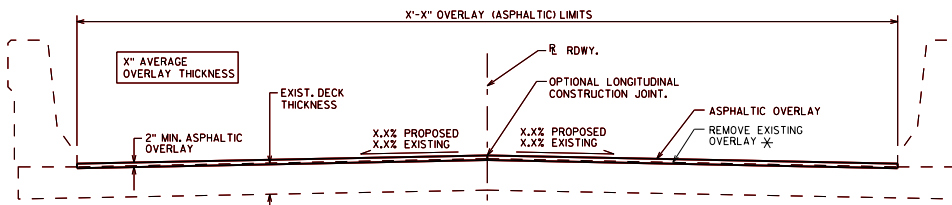
DESIGNER NOTES

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 1/2" 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.
* 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. 1/2" MINIMUM REMOVAL OF EXISTING DECK IS INCLUDED WITHIN "REMOVING (OVERLAY TYPE) DECK OVERLAY (STRUCTURE)" BID ITEMS.

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.



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 1/2" 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 REGIONAL BRIDGE MAINTENANCE AND ROADWAY ENGINEERS FOR THE ASPHALTIC DESIGN AND QUANTITIES.
THE PLAN QUANTITY FOR THE BID ITEM "HMA PAVEMENT TYPE E-X" IS BASED ON RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL. ADDITIONAL INFORMATION IS PROVIDED.
* 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. 1/2" MINIMUM REMOVAL OF EXISTING DECK IS INCLUDED WITHIN "REMOVING (OVERLAY TYPE) DECK OVERLAY (STRUCTURE)" BID ITEMS.
THE PLAN QUANTITY FOR THE BID ITEM "TACK COAT" IS BASED ON AN APPLICATION RATE OF 0.05 TO 0.07 GALLONS/SY. ASSUME 0.07 GALLONS/SY IF PLACING OVER MILLED HMA OR CONCRETE.
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 MATERIAL PGXX-XX	GAL	
460.10XX	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	
SPV.0090	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
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.

ASPHALTIC OVERLAY

DESIGN DATA

LIVE LOAD:
INVENTORY RATING: HS-...
OPERATING RATING: HS-...
WISCONSIN STANDARD PERMIT VEHICLE (WS-SPV) = 300 KIPS

MATERIAL PROPERTIES:
CONCRETE MASONRY - DECK PATCHING f'c = 4,000 P.S.I.

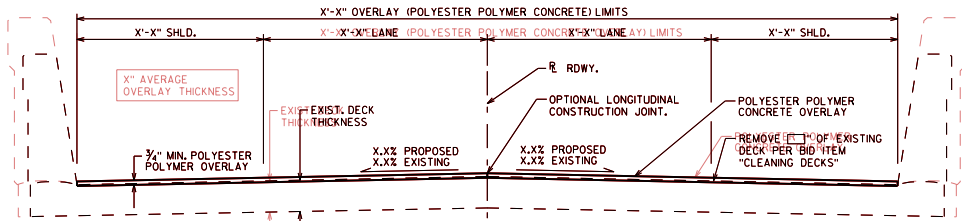
NOTES

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 2 1/2" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN 1/2", CONTACT THE STRUCTURES DESIGN SECTION.

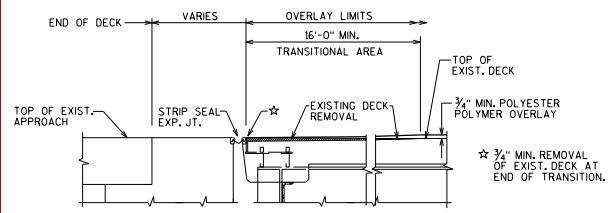
POLYMER MODIFIED ASPHALTIC AND ASPHALTIC OVERLAYS



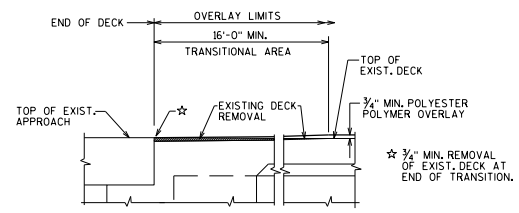
APPROVED: Bill Oliva DATE: 1-29



CROSS SECTION THRU ROADWAY
 LOOKING NORTH

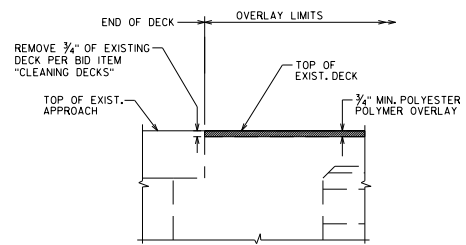


SECTION THRU ABUTMENT TRANSITIONAL AREA ON DECK AT EXPANSION JOINT



SECTION THRU ABUTMENT TRANSITIONAL AREA ON DECK AT SEMI-EXPANSION OR FIXED JOINT

NOTE: TRANSITIONAL AREA REQUIRED WHEN APPROACH PAVEMENT HAS BEEN PLACED PRIOR TO OVERLAY PLACEMENT.



SECTION THRU ABUTMENT

(WHEN BID ITEM "CLEANING DECKS" IS USED, TRANSITIONAL AREA NOT REQUIRED.)

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
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	
SPV.0035	RAPID SET DECK REPAIR	CY	
SPV.0180	POLYESTER POLYMER CONCRETE OVERLAY	SY	
	POSSIBLE ADDITIONAL BID ITEMS		
	POSSIBLE ADDITIONAL BID ITEMS		
509.0500D	CLEANING DECKS (SEE CASE)	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: HS-20
 INVENTORY RATING: HS-20
 OPERATING RATING: HS-20
 MAXIMUM STANDARD PERMIT VEHICLE (WIS-SPV): ... KIPS

NOTES

- DRAWINGS SHALL NOT BE SCALED.
- DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.
- 1/4" INCH OF CONCRETE SHALL BE REMOVED FROM THE ENTIRE BRIDGE DECK UNDER THE BID ITEM "CLEANING DECKS".
- 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 "RAPID SET DECK REPAIR", POLYESTER POLYMER CONCRETE AND PORTLAND CEMENT BASED CONCRETE PATCHES MAY BE SUBSTITUTED AT NO EXTRA COST. PORTLAND CEMENT BASED CONCRETE PATCHES SHALL BE USED FOR JOINT REPAIRS AND FULL-DEPTH REPAIRS WITH A PLAN AREA LARGER THAN 4 SF, UNLESS APPROVED OTHERWISE BY THE STRUCTURES DESIGN SECTION.
- DECK REPAIRS SHALL BE FILLED PRIOR TO OVERLAY PLACEMENT. DECK REPAIRS USING A PORTLAND CEMENT BASED CONCRETE REQUIRES A MINIMUM CURE TIME OF 28 DAYS PRIOR TO OVERLAY PLACEMENT.
- SHOT BLASTING, OVERLAY PRIME COAT, DECK SURFACE PREPARATIONS AND TRANSITIONAL AREAS ARE INCLUDED IN THE BID ITEM "POLYESTER POLYMER CONCRETE OVERLAY".
- OVERLAY CONSTRUCTION JOINTS SHALL BE APPROVED BY THE ENGINEER. AVOID PLACING LONGITUDINAL JOINTS NEAR WHEEL PATHS. WHEN REQUIRED, PLACE LONGITUDINAL JOINTS AT LANE LINES OR IN THE MIDDLE OF THE LANE. WHEEL PATHS DURING TEMPORARY TRAFFIC STAGING NEED NOT BE CONSIDERED.

DESIGNER'S NOTES

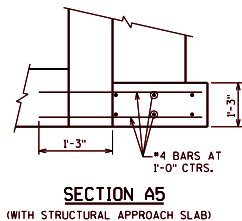
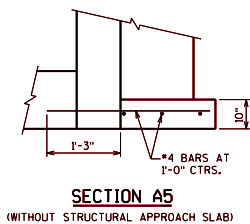
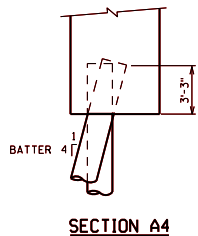
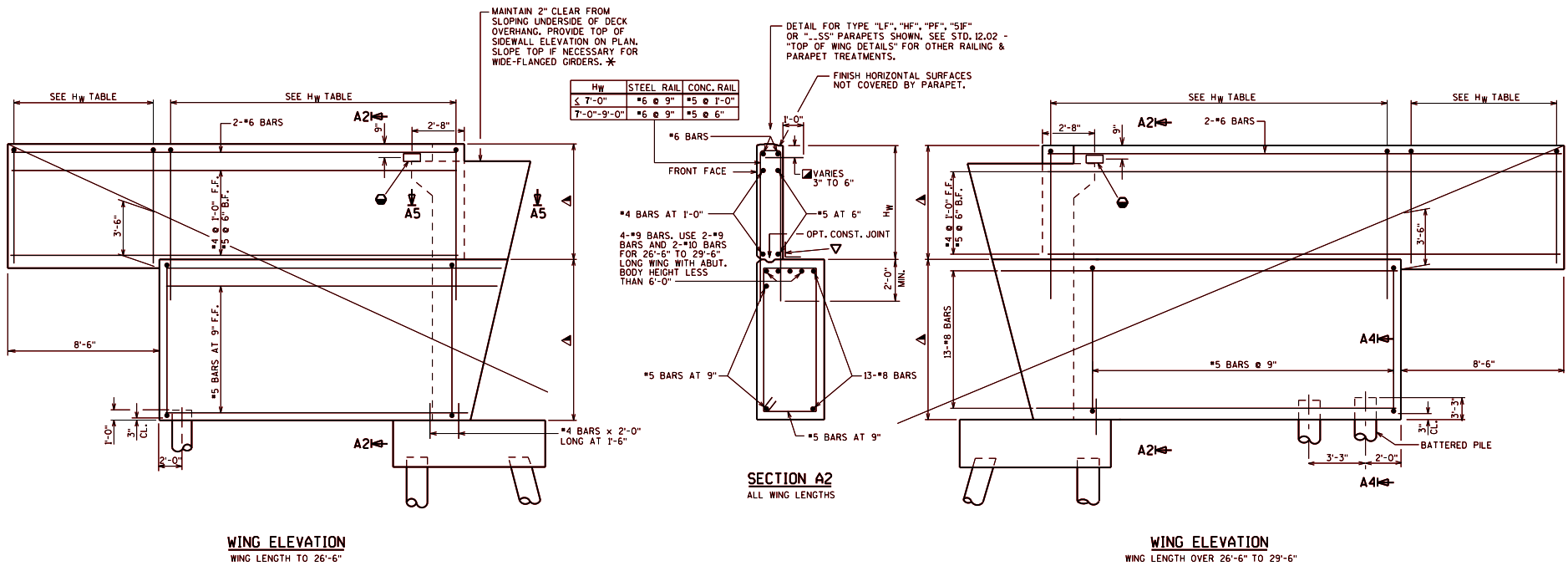
USE OF PPC OVERLAYS ARE LIMITED. SEE 40.5 IN THE BRIDGE MANUAL FOR ADDITIONAL GUIDANCE.
 USE OF PPC OVERLAYS ARE LIMITED. SEE 40.5 IN THE BRIDGE MANUAL FOR ADDITIONAL GUIDANCE.

PPC OVERLAYS ARE INTENDED TO BE PLACED ON DECKS WITH MINIMAL SURFACE DISTRESS WHERE FULL-DEPTH JOINT REPAIRS, FULL-DEPTH DECK REPAIRS, OR THE NEED TO PARTIALLY REMOVE THE ENTIRE DECK WITH BID ITEM "CLEANING DECKS" IS NOT EXPECTED OR WARRANTED.
 PPC OVERLAYS ARE NOT RECOMMENDED FOR CONCRETE APPROACHES. SHALL BE SHOWN ON THE PLANS. BASED ON OVERLAY THICKNESS. PROVIDE OVERLAY TRANSITIONAL AREA DETAILS AND IDENTIFY LOCATIONS ON THE PLANS. SEE 40.5.6 FOR ADDITIONAL GUIDANCE.
 WHEN PARTIAL-DEPTH REMOVAL OF THE ENTIRE EXISTING DECK IS WARRANTED, USE BID ITEM "CLEANING DECKS". PLANS SHALL SPECIFY THE REQUIRED REMOVAL DEPTH.
 DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.
 DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

POLYESTER POLYMER CONCRETE OVERLAY

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-20



DESIGNER NOTES

DESIGNER HAS BEEN LIMITED OVER THE YEARS
 CHANGE OF MATERIALS IS DISCONTINUED, CONTINUED,
 OR REVISED FOR DESIGN IS REQUIRED.

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 $\delta_{DEH} = 1.50$, AND SUPERSTRUCTURE REACTIONS "P". BACK ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 20 P.C.F. WITH $\delta_{DEH_{MIN}} = 0.90$, 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.

ALL 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.

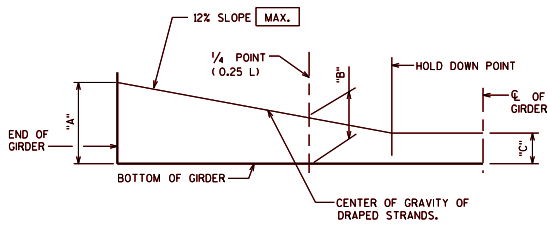
LRFD DESIGN LOADS

- 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:**
 $\gamma_{DC} = 1.25$
 $\gamma_{DW} = 1.50$
 $\gamma_{DEH} = 1.50$
 $\gamma_{DEH_{MIN}} = 0.90$
 $\gamma_{DEV} = 1.35$
 $\gamma_{LL} = 1.75$
- EXPOSURE CLASS 2, $\gamma_{E} = 0.75$
 $f_y = 60,000$ P.S.I.
 $f_c = 3,500$ P.S.I.

ABUTMENT A4 PILE FOOTING

BUREAU OF STRUCTURES

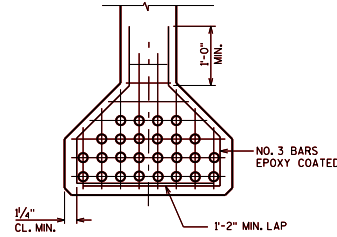
APPROVED: Bill Oliva DATE: 1-18



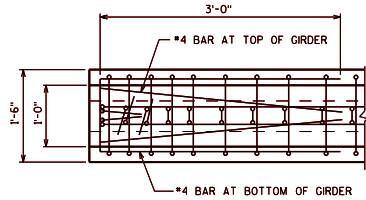
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = $1/4(A) + 3$ (C) (MIN.)
 "B" = $1/4(A) + 3$ (C) + 3" (MAX.)

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

LOCATION OF DRAPED STRANDS

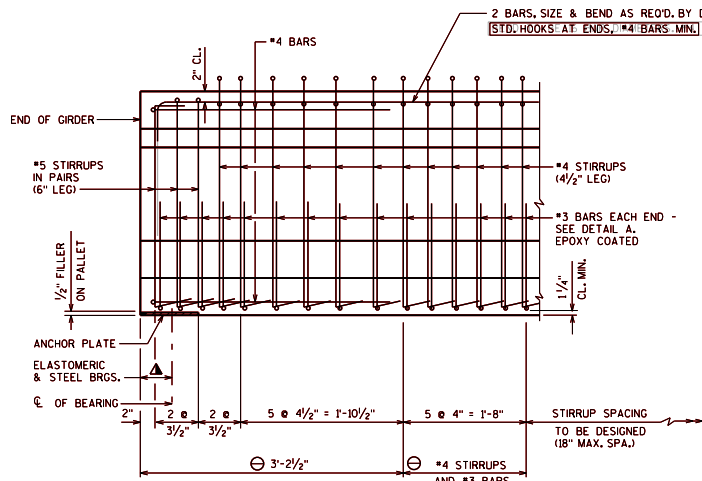


DETAIL A



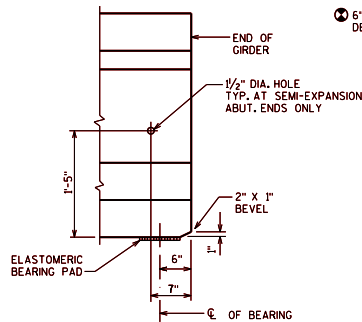
PLAN VIEW

DO NOT USE THE 36" PRESTRESSED GIRDER SHOWN ON THIS SHEET.
IT WILL BE MOVED TO CH 40 IN THE FUTURE.

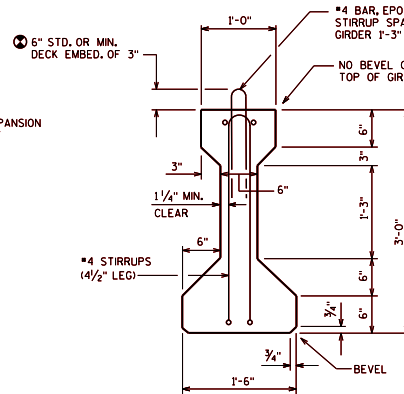


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER



SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD



SECTION THRU GIRDER

STRANDS NOT SHOWN

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 WSDOT 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.

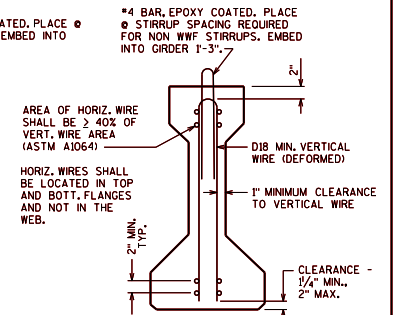
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD RD409 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE 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.



SECTION THRU GIRDER

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

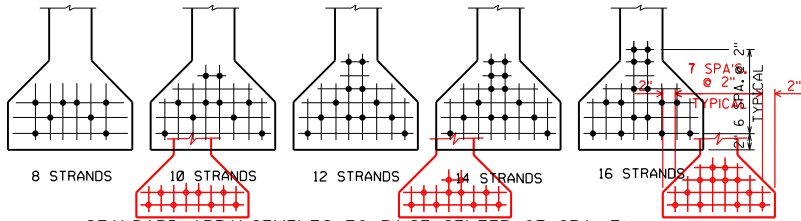
36" PRESTRESSED GIRDER DETAILS



BUREAU OF STRUCTURES

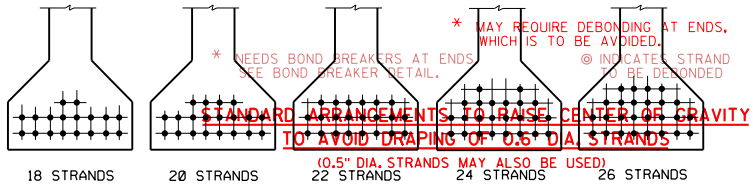
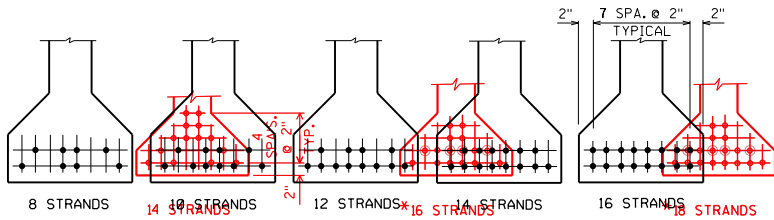
APPROVED: Bill Oliva

DATE:
7-21

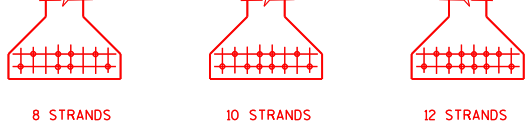


STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY

TO AVOID DRAPING OF 0.6" DIA. STRANDS
(0.5" DIA. STRANDS MAY ALSO BE USED)



ARRANGEMENT AT $\frac{1}{4}$ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS



ARRANGEMENT AT $\frac{1}{4}$ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS

36" GIRDER
28" GIRDER
 $A = 312 \text{ SQ. IN.}$
 $r^2 = 138.15 \text{ IN.}^2$
 $r = 11.75 \text{ IN.}$
 $y_B = 20.37 \text{ IN.}$
 $y_B = -13.42 \text{ IN.}$
 $I = 28,687 \text{ IN.}^4$
 $S_T = 1,968 \text{ IN.}^3$
 $S_B = 2,527 \text{ IN.}^3$
 $J_T = 3,220 \text{ IN.}^3$
 WT. = 384 #/FT.

PRE-TENSION PRE-TENSION

$f'_s = 270,000 \text{ P.S.I.}$
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$
 for low relaxation strands
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = 31.00 \text{ KIPS}$
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.1531 \times 202,500 = 31.00 \text{ KIPS}$
 $P_i \text{ PER } 0.617" \text{ DIA. STRAND} = 0.217 \times 202,500 = 43.94 \text{ KIPS}$
 $\frac{y_B}{r^2} = \frac{-13.42}{138.15} = -0.1459 \text{ IN./IN.}^2$
 $f_B (\text{init.}) = \frac{A_s f_s}{A} (1 + \frac{e_s y_B}{r^2})$
 $f_B (\text{init.}) = \frac{A_s f_s}{A} (1 + \frac{e_s y_B}{r^2})$

NO. STRANDS	e_s (Inches)	$P(\text{ini.}) = A_s f_s$ (KIPS)	$f_B (\text{ini.})$ (K/sq.in.)	(COMPRESSION IS POSITIVE)	
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)					
8	-10.40	352	2.841	(COMPRESSION IS POSITIVE)	
10	-9.80	439	3.419	$P(\text{ini.})$	$f_B (\text{ini.})$
12	-8.73	527	4.281	$A_s f_s$ (KIPS)	(K/sq.in.)
14	-7.97	615	5.000	STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)	
*16	-9.1	703	5.721		
*18	-9.1	791	6.441		
STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)					
8	-10.1	14	2.48	615	3.435
10	-10.6	310	2.531	783	3.887
12	-10.1	16	2.531	783	3.887
14	-10.1	17	3.002	806	4.339
16	-9.1	8	2.83	248	1.660
18	-9.1	10	3.03	310	2.094
12	-13.16	372	2.528	620	3.678
14	-12.97	434	2.924	620	4.034
16	-12.83	496	3.320	620	4.392
18	-12.50	558	3.716	744	4.710
20	-12.23	620	4.112	806	5.038
22	-12.01	682	4.508		
24	-11.66	744	4.904		
26	-11.37	806	5.300		

BOND BREAKER DETAIL

SHOWING LENGTHS OF DEBONDING FROM END OF GIRDER. DEBOND LENGTHS TO BE DESIGNED. STRAND TRANSFER LENGTH IS 60 X STRAND DIAMETER.

DESIGNER'S NOTES

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

36" PRESTRESSED GIRDER DESIGN DATA

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-24