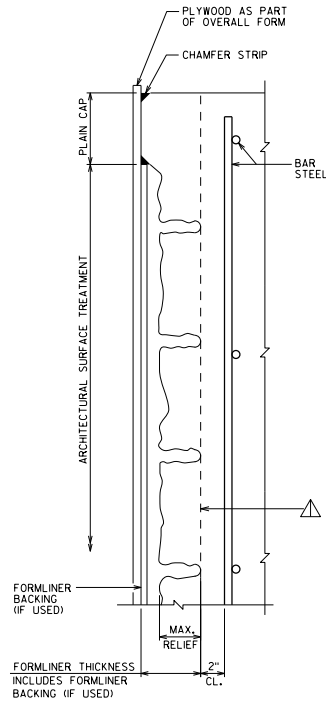
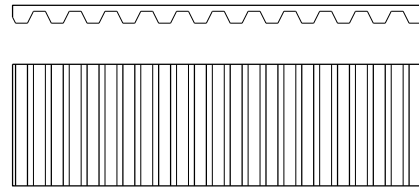




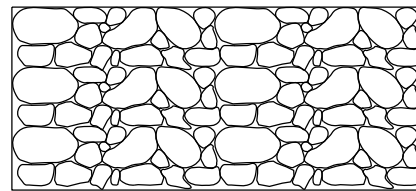
SECTION THRU FORMLINER

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



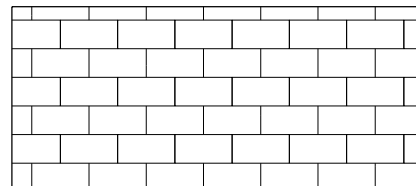
BROKEN RIB

FORMLINER THICKNESS = $3" \pm \frac{1}{2}"$
WIDTH = $2" \pm \frac{1}{2}"$
MAX. RELIEF = $\frac{1}{2}" \pm \frac{1}{2}"$



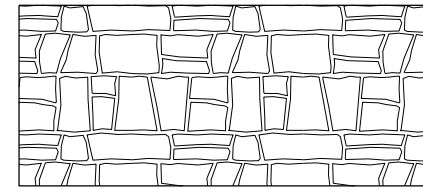
FIELD STONE - RANDOM

FORMLINER THICKNESS = $\frac{3}{2}"$
SIZES BETWEEN 6" & 24"
MAX. RELIEF = $\frac{2}{2}"$



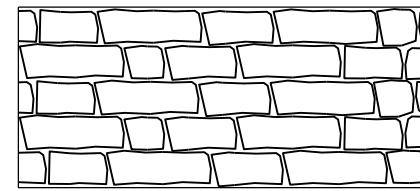
RECTANGULAR BRICK

FORMLINER THICKNESS = 2"
SIZE = VARIES
MAX. RELIEF = 1"



RUSTIC ASHLAR

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



RECTANGULAR CUT STONE

FORMLINER THICKNESS = 4" TO $\frac{5}{2}"$
COURSE HEIGHT = $\pm 2"$
MAX. RELIEF = 3" TO $\frac{4}{2}"$

WARNING

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

RETAINING WALL NOTES

FORMLINER COURSING ON RETAINING WALLS SHALL BE LEVEL.

ABUTMENT NOTES

FORMLINER COURSING ON ABUTMENTS AND WINGS SHALL BE LEVEL.

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

THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS.

WRAPAROUND/MATCH FORMLINER PATTERN AT CORNERS.

PIER NOTES

FORMLINER COURSING ON PIERS SHALL BE LEVEL.

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

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

THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS.

WRAPAROUND/MATCH FORMLINER PATTERN AT CORNERS.

PARAPET NOTES

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

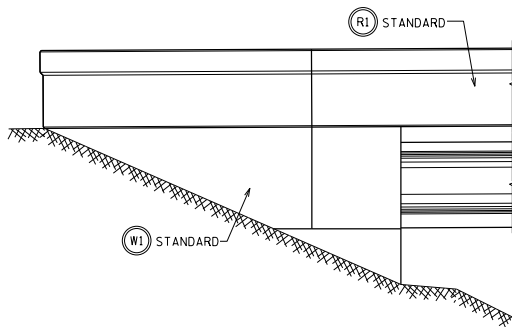
FORMLINER DETAILS



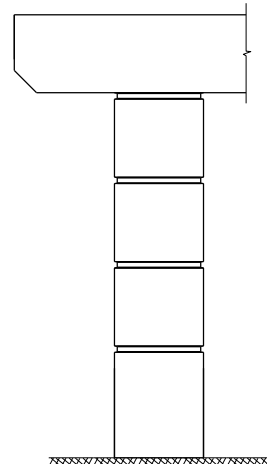
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

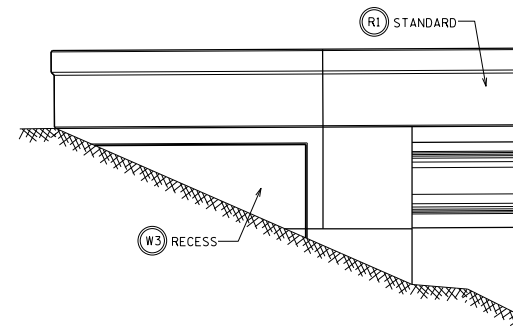
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7-16



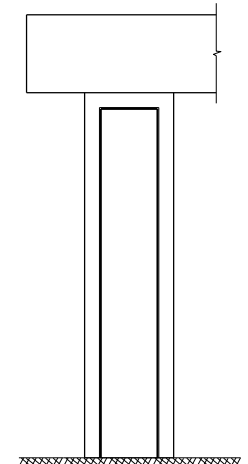
TYPE I



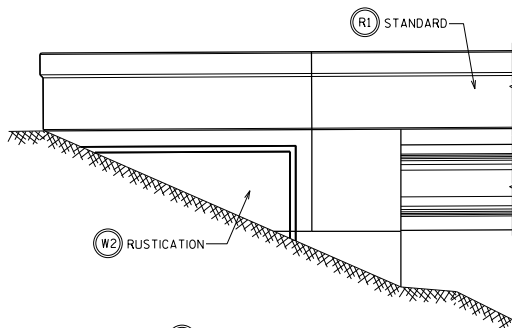
(P1) SINGLE RUSTICATION LINES



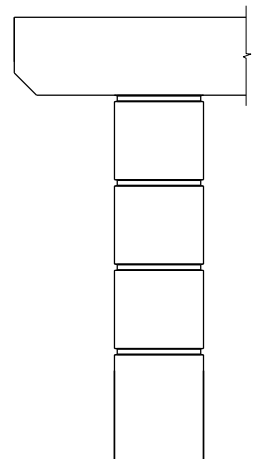
TYPE III



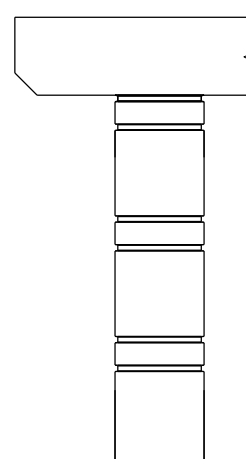
(P3) RECESSED PANEL



TYPE II



(P1) SINGLE RUSTICATION LINES



(P2) DOUBLE RUSTICATION LINES

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.

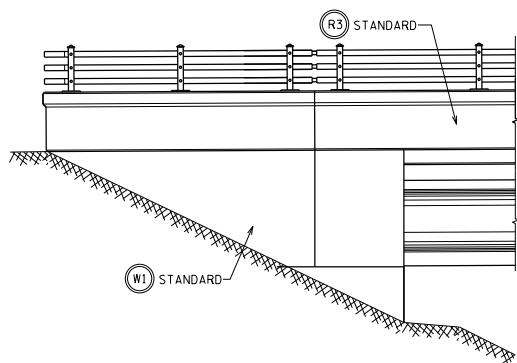
AESTHETIC CONCEPTS WITHOUT PEDESTRIAN ACCOMMODATIONS



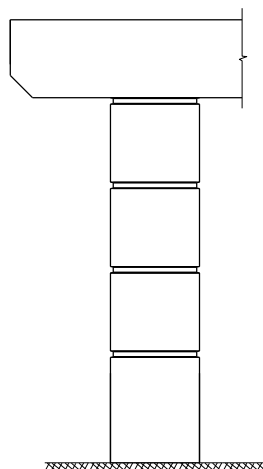
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

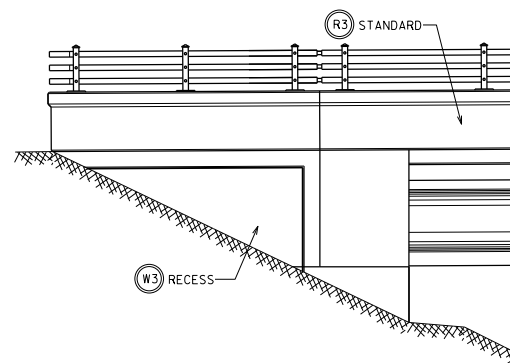
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7-15



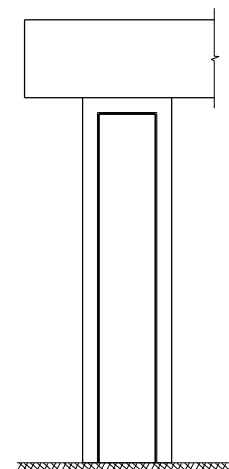
TYPE I



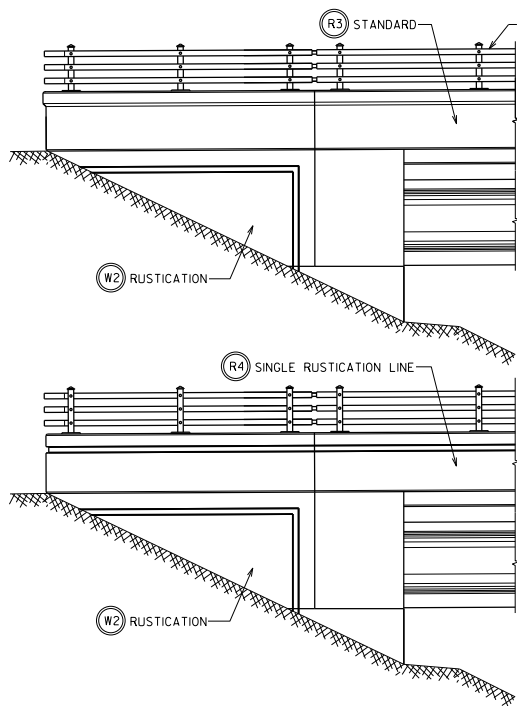
(P1) SINGLE RUSTICATION LINES



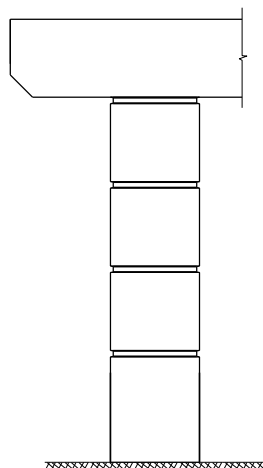
TYPE III



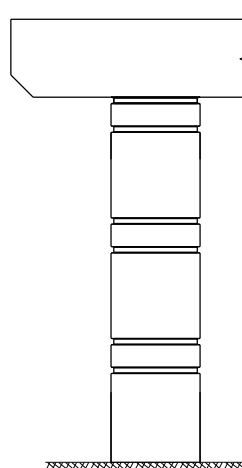
(P3) RECESSED PANEL



TYPE II



(P1) SINGLE RUSTICATION LINES



(P2) DOUBLE RUSTICATION LINES

DESIGNER NOTES

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

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

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

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

SEE STANDARDS 4.04 AND 4.05 FOR ADDITIONAL DETAILS.

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

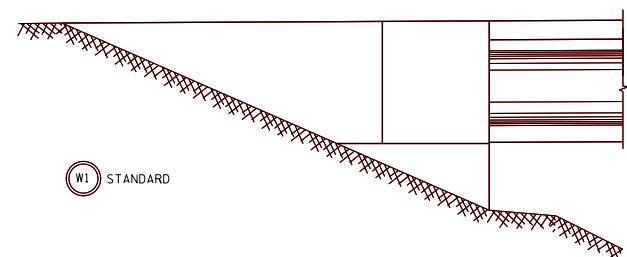
AESTHETIC CONCEPTS WITH PEDESTRIAN ACCOMMODATIONS



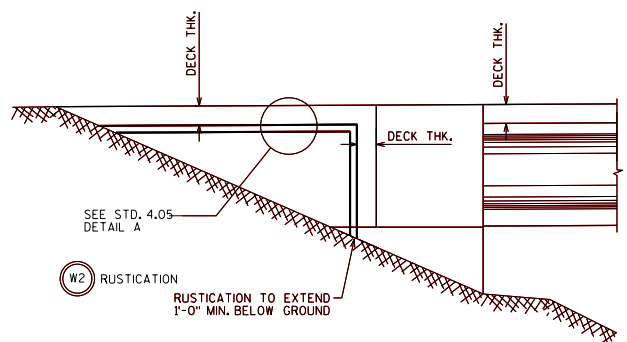
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

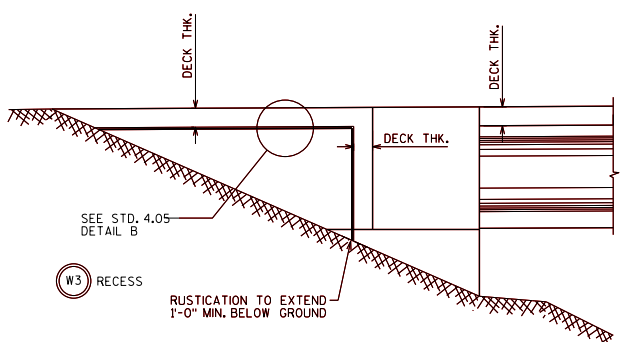
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7-15



W1 STANDARD

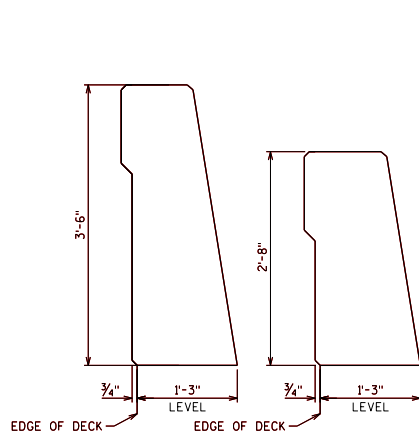


W2 RUSTICATION



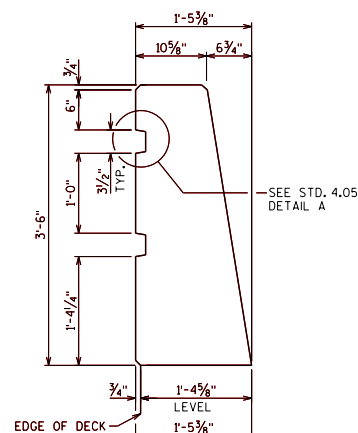
W3 RECESS

WING OPTIONS



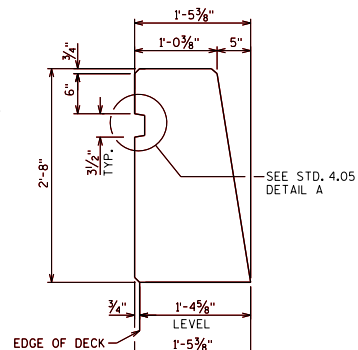
R1 STANDARD

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



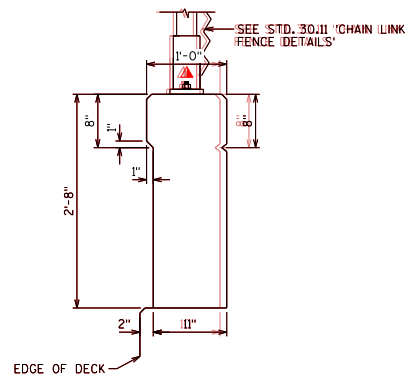
R2

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



R2

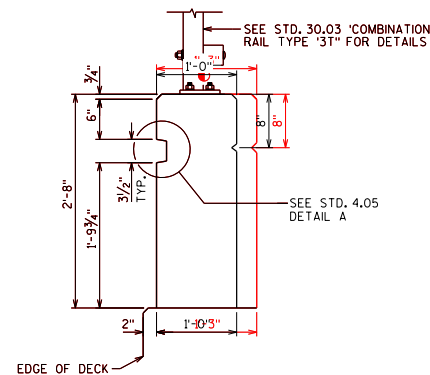
SINGLE RUSTICATION LINES
MODIFIED 'SINGLE SLOPE PARAPET 32SS'
(AREA = 3.25 SF, WEIGHT = 488 LB/FT.)



R3 STANDARD

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

▲ 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.)

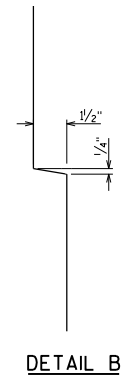
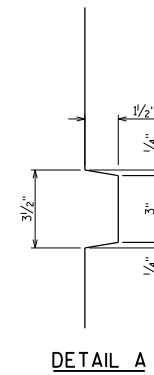
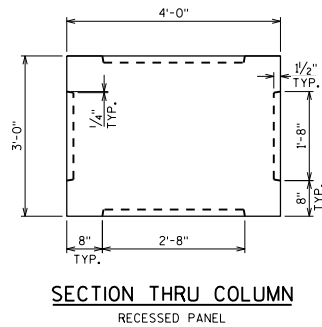
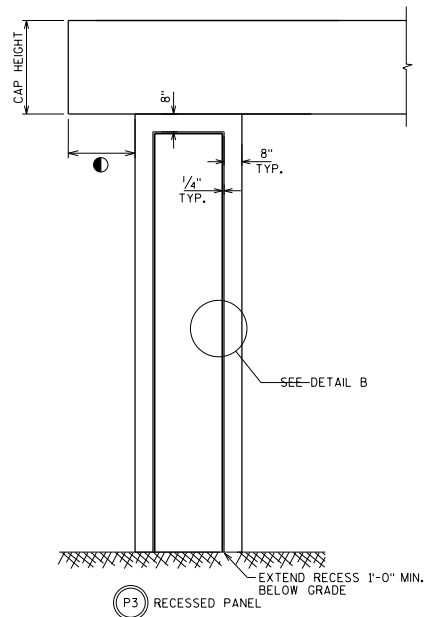
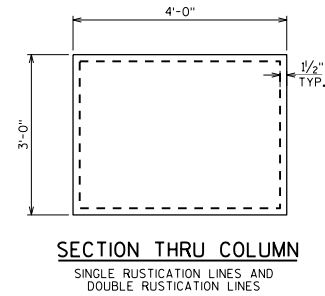
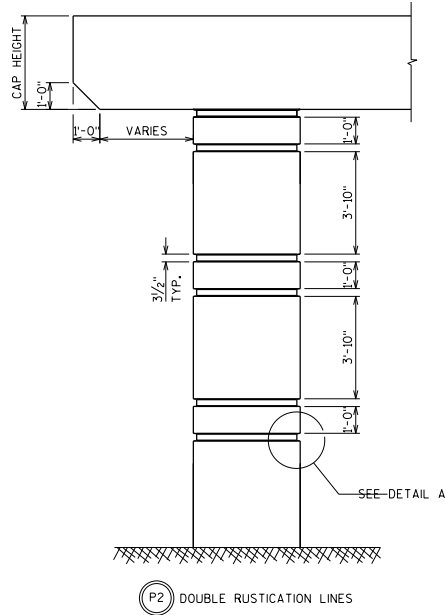
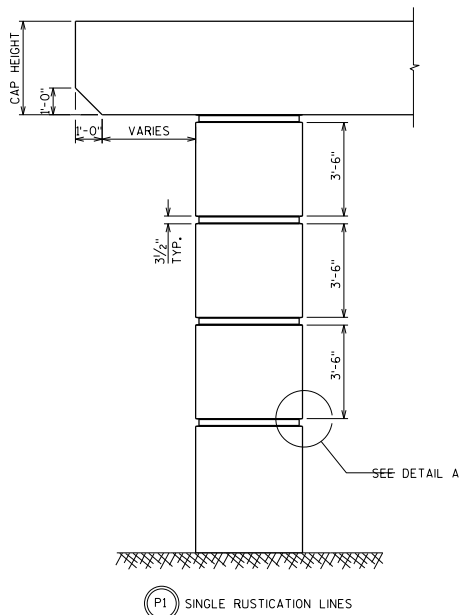
● SEE STD. 30.07 'VERTICAL FACE PARAPET 'A' FOR DETAILS

PARAPET OPTIONS

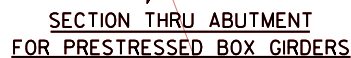
DESIGNER NOTES

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: 1-19	



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



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

** CONCRETE SPREAD FOOTING TO BE DETERMINED PER DESIGN.

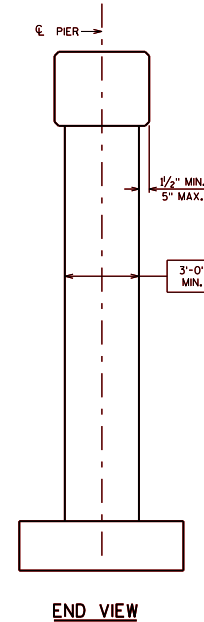
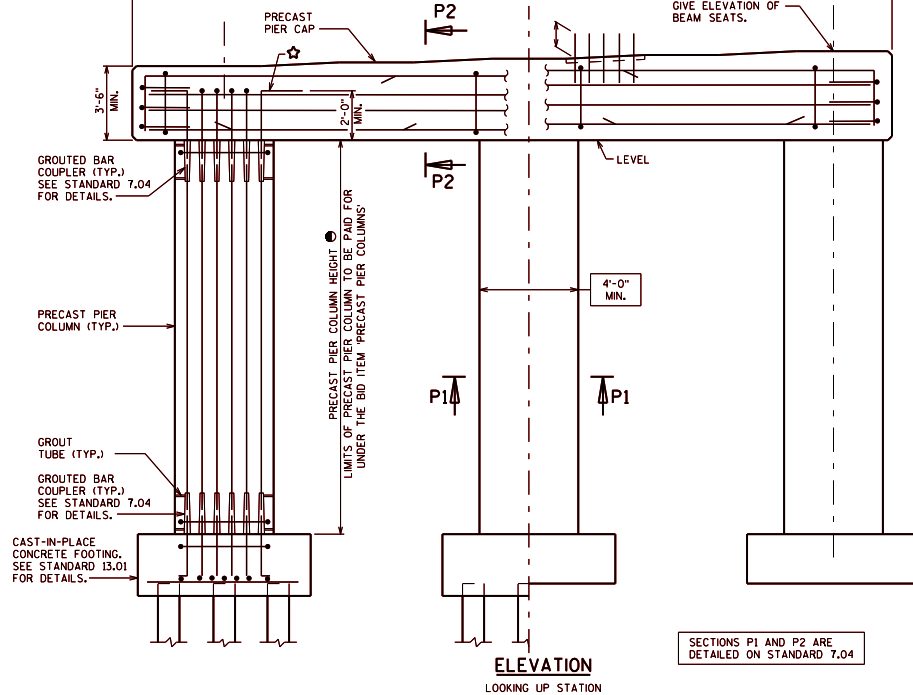


*LENGTH MEASURED FROM FRONT FACE OF MODULAR BLOCK TO END OF FRONT FINGER (DOES NOT INCLUDE WRAPPED GEOTEXTILE WHERE APPLICABLE).
GEOTEXTILE FABRIC,
(DOES NOT INCLUDE WRAPPED
GEOTEXTILE FABRIC WHERE APPLICABLE).

STANDARD 7.02

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

PRECAST PIER CAP LENGTH (MAXIMUM LENGTH OF EACH CAP SEGMENT IS BASED ON WEIGHT)
LIMITS OF PRECAST PIER CAP TO BE PAID FOR UNDER THE BID ITEM "PRECAST PIER CAPS"
SEE KEYED CONSTR. JOINT DETAIL (STANDARD 7.04) WHEN MULTIPLE PIER CAP SEGMENTS ARE REQUIRED



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 (S09.0000.0XXX)
PRECAST PIER COLUMNS (SPV.0090.0XXX)
PRECAST PIER CAPS (SPV.0090.0XXX)

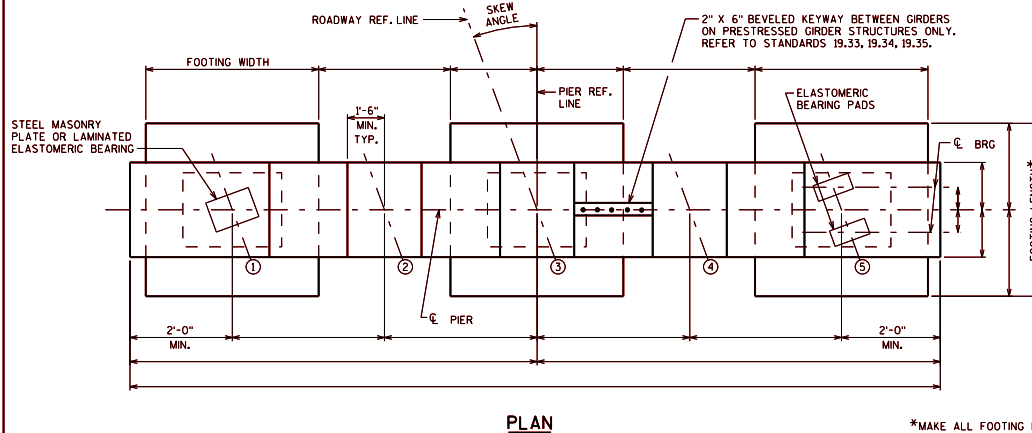
THE MAXIMUM WEIGHT OF EACH PRECAST ELEMENT SHALL BE 90 KIP.

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.

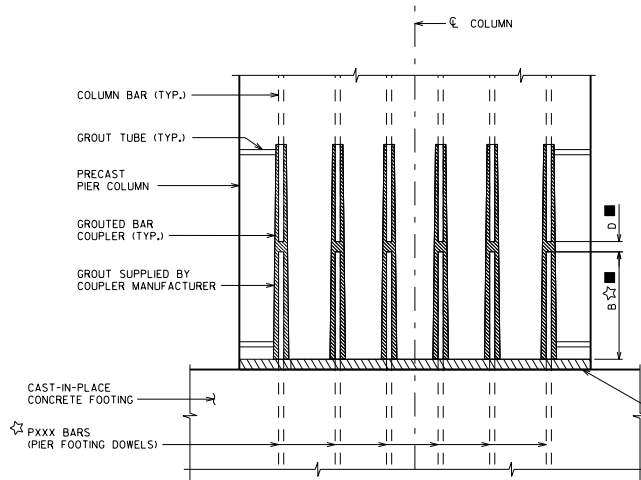
DETAILS AS SHOWN ON THIS STANDARD ARE INTENDED FOR REQUIRED PRECAST PIERS DESIGNED TO MEET PROJECT SPECIFIC REQUIREMENTS. SEE 7.1.4.1.2 IN THE 'BRIDGE' / 90 MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE. ALTERNATIVES TO CAST-IN-PLACE PIERS: SEE 7.1.4.1.2 IN THE BRIDGE MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE.



MATERIAL PROPERTIES:
CONCRETE MASONRY
BAR REINFORCEMENT, GRADE 60

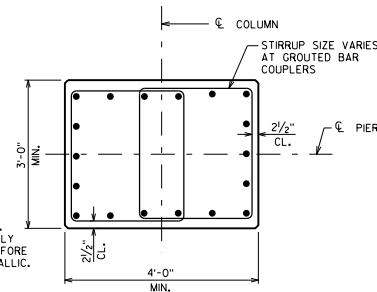
$f'_c = 3,500$ P.S.I.
 $f_y = 60,000$ P.S.I.

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



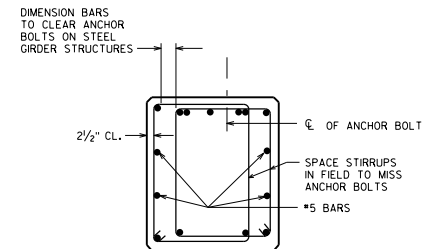
GROUTED BAR COUPLER DETAILS

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



SECTION P1

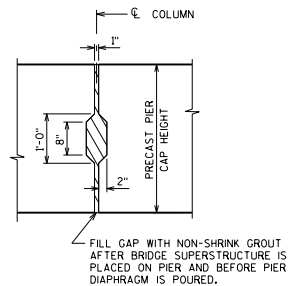
(PRECAST PIER COLUMN REINF. TO BE DESIGNED BY DESIGN ENGINEER)



SECTION P2

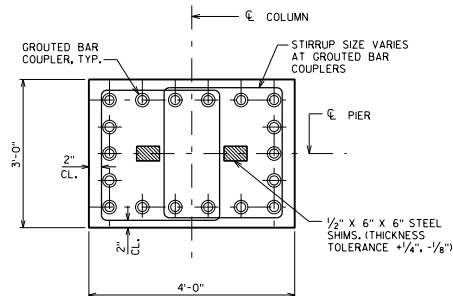
(PRECAST PIER CAP REINF. TO BE DESIGNED BY DESIGN ENGINEER)

SECTIONS P1 AND P2 ARE CUT ON STANDARD 7.03



KEYED CONSTR. JOINT ELEVATION DETAIL

(FOR PRECAST PIER CAPS WITH MULTIPLE SEGMENTS)



GROUTED COUPLER PLAN AT TOP AND BOTTOM OF COLUMN

GROUTED SPLICE COUPLER CONNECTION SEQUENCE

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

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

GROUTED COUPLER NOTES

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

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

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

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

ALL GROUTED COUPLERS SHALL BE EPOXY COATED.

ADJUST SHIM STACK HEIGHT TO CONTROL ERECTION ELEVATIONS.

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

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

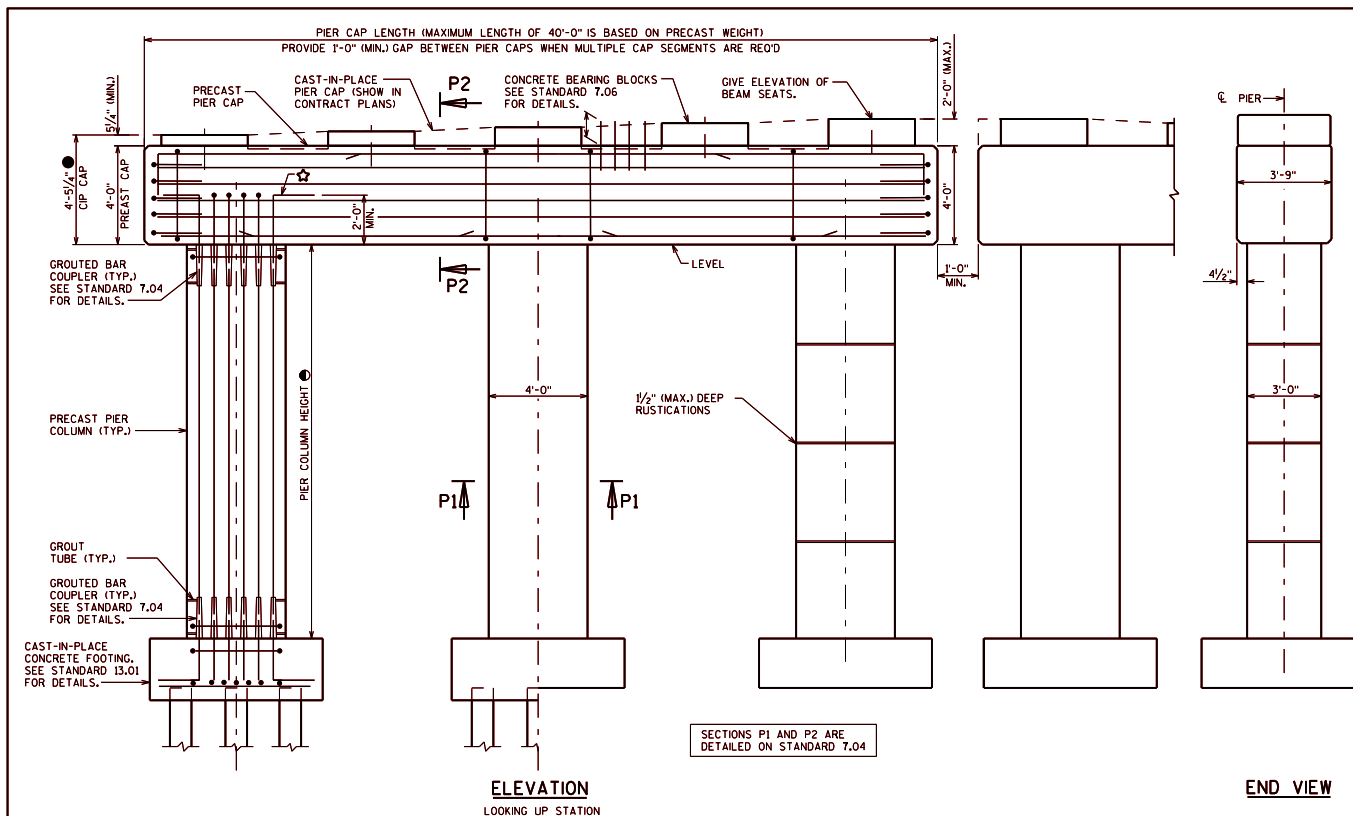
PRECAST PIER CAP AND COLUMN DETAILS



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:
1-14



CONTRACTOR NOTES

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

PROVIDE A SUITABLE LIFTING DEVICE FOR THE PRECAST CAP, COLUMN AND BEARING BLOCK 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 (SBP050000XK)
PRECAST PIER COLUMNS (SBP000900XKX)
PRECAST PIER CAPS (SBP000900XKX)

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.

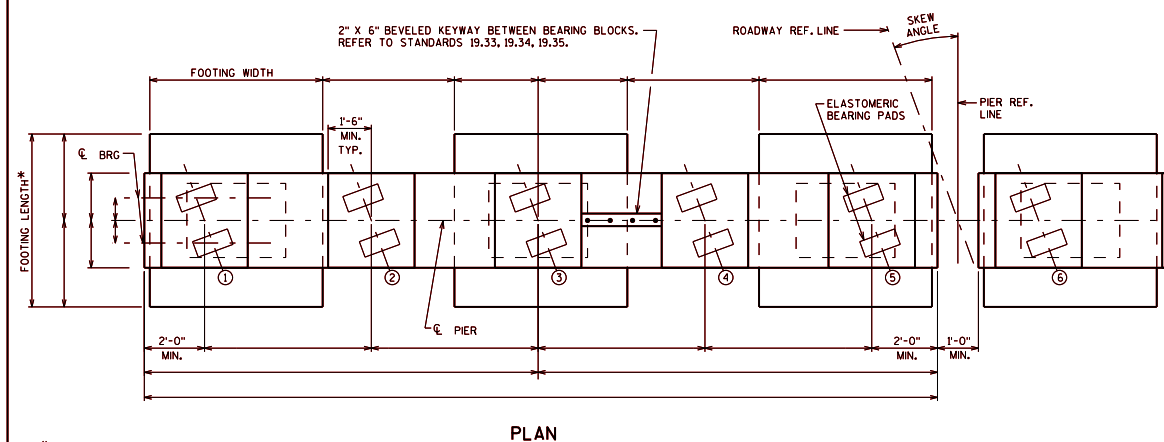
SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

LEGEND (TYP.) ROTATE AND STAGGER AS NEEDED.

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

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.

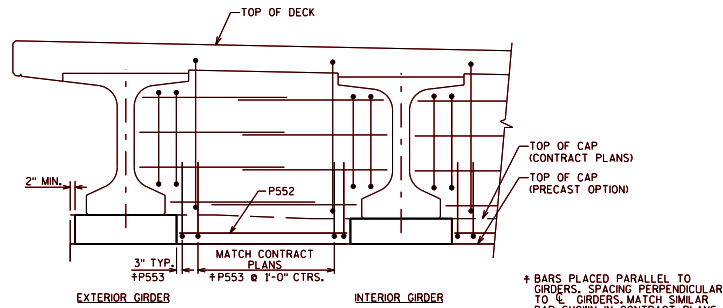


*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER

MATERIAL PROPERTIES:
CONCRETE MASONRY
BAR REINFORCEMENT, GRADE 60

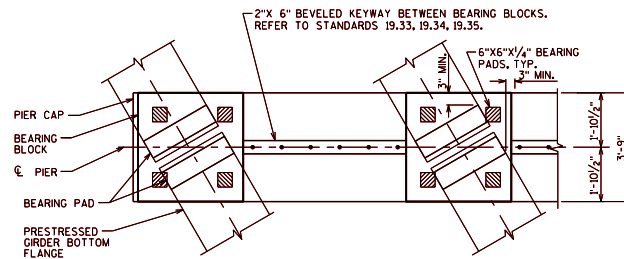
$f'_c = 3,500$ P.S.I.
 $f_y = 60,000$ P.S.I.

PRECAST PIER (OPTIONAL) CAP AND COLUMNS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-18</u>

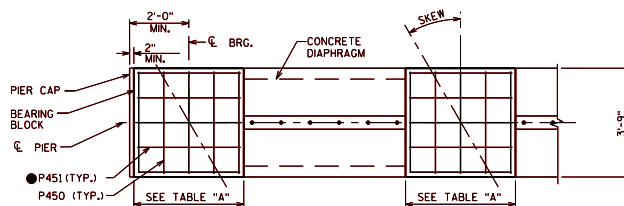


PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER

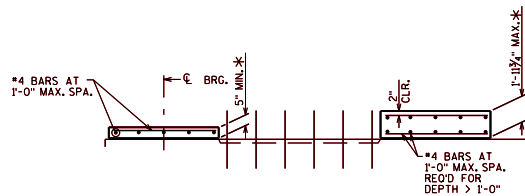
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



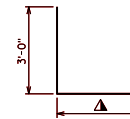
ELEVATION

BILL OF BARS

TOTAL COATED: XX LBS

BAR MARK	NO. REQ'D.	LENGTH	COAT	BENT	LOCATION
P450		3'-5"	X	-	TOP & BOT. TRANS.
P451		3'-5"	X	-	TOP & BOT. LONG.
P552		1'-10"	X	-	PIER DIAPHRAGM - BOTH FACES HORIZ. - BTWN GIRDERS
P553		1'-10"	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 3/4" 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.

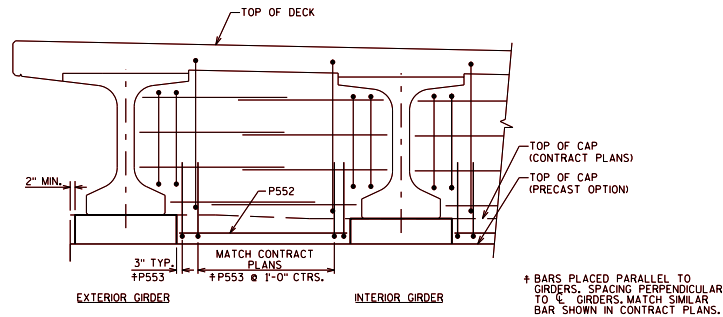
PRECAST BEARING BLOCK DETAILS



**BUREAU OF
STRUCTURES**

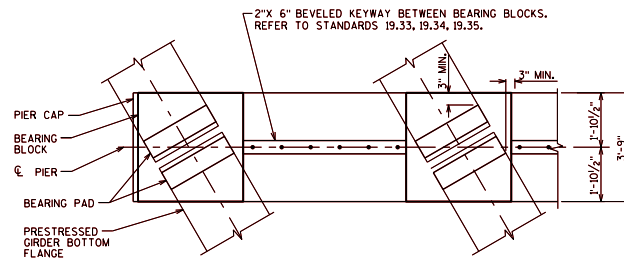
APPROVED: Bill Oliva

DATE:
1-18

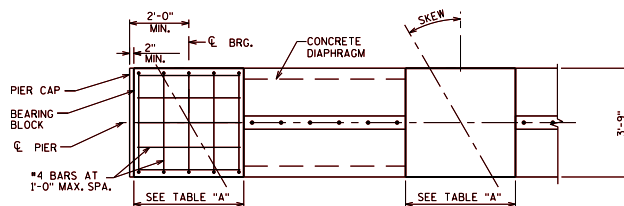


PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER

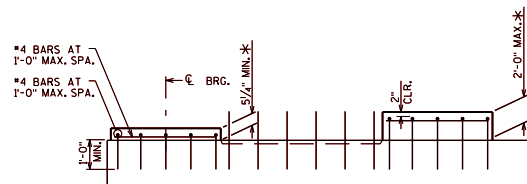
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



ELEVATION

DESIGNER NOTE

SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

CONTRACTOR NOTES

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

CAST-IN-PLACE CONCRETE DETAIL NOTES

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

* CAST-IN-PLACE HEIGHT = VARIES (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.

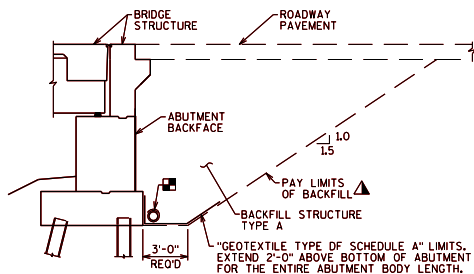
CAST-IN-PLACE BEARING BLOCK DETAILS



**BUREAU OF
STRUCTURES**

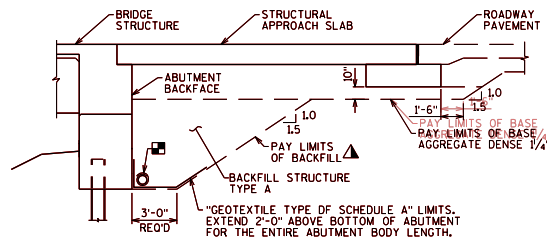
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DATE:
1-18



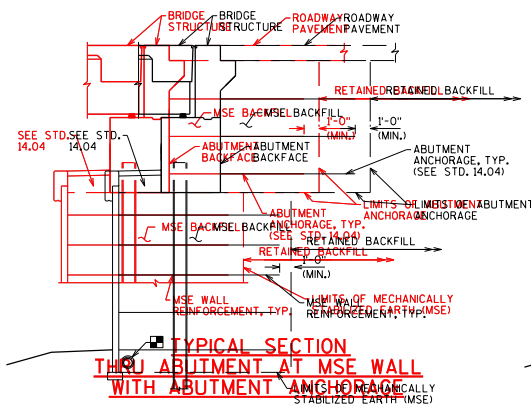
TYPICAL SECTION THRU ABUTMENT

(A3 ABUTMENT WITHOUT STRUCTURAL APPROACH)



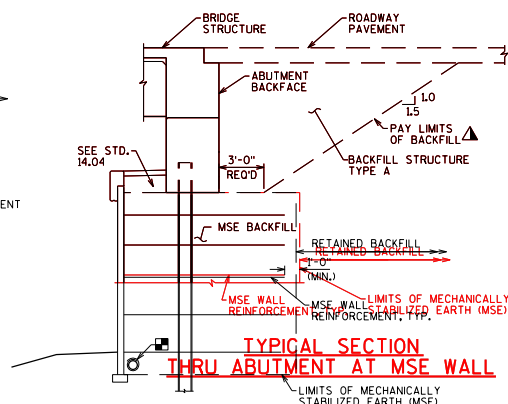
TYPICAL SECTION THRU ABUTMENT

(A1 ABUTMENT WITH STRUCTURAL APPROACH)



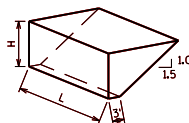
TYPICAL SECTION THRU ABUTMENT AT MSE WALL WITH ABUTMENT ANCHORAGE

(A3 ABUTMENT WITH ABUTMENT ANCHORAGE)



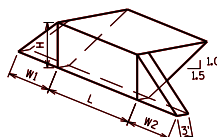
TYPICAL SECTION THRU ABUTMENT AT MSE WALL

(A1 ABUTMENT WITHOUT STRUCTURAL APPROACH)



ABUTMENT BACKFILL DIAGRAM FOR WINGS PARALLEL TO ROADWAY

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



ABUTMENT BACKFILL DIAGRAM FOR WINGS PARALLEL TO ABUTMENT

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

NOTES

THE UPPER LIMITS OF EXCAVATION FOR STRUCTURES BRIDGES B-1-1 SHALL BE THE EXISTING GROUNDLINE.

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

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

DESIGNER NOTES

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

SUBSURFACE DRAINAGE DETAILS AND NOTES SHOULD DIRECT DRAINAGE AROUND THE ABUTMENT RATHER THAN BELOW THE ABUTMENT. DRAINAGE UNDER THE ABUTMENT MAY CAUSE SLOPE PAVING DAMAGE OR FAILURE. GEOTEXTILE SHALL EXTEND THE ENTIRE LENGTH OF THE ABUTMENT BODY. SEE STANDARD 12.08 FOR GUIDANCE ON UNDERDRAIN PLACED ABOVE NORMAL WATER. FOR UNDERDRAIN EXPOSED TO HIGH WATER, CONSIDER CAPPING THE UPSTREAM END TO PREVENT CLOGGING. GEOTEXTILE ARE NOT REQUIRED BEHIND ABUTMENTS. FOR ABUTMENTS WITH MSE BACKFILL, BELOW THE REQUIRED "BACKFILL STRUCTURE TYPE A" WIDTH, PIPE UNDERDRAIN AND GEOTEXTILE ARE NOT REQUIRED BEHIND ABUTMENTS. PIPE UNDERDRAIN IS REQUIRED AT THE BOTTOM OF THE MSE WALL.

SEE STANDARD 9.03 FOR WING FILL SECTIONS AT WING TIPS. SEE STANDARD 9.02 FOR RETAINING WALL AND BOX CULVERT DETAILS.

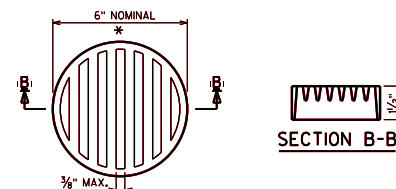
SEE STANDARD 9.03 FOR WING FILL SECTIONS AT WING TIPS.

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

LEGEND

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

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



RODENT SHIELD DETAIL

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

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

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

STRUCTURE BACKFILL LIMITS AND NOTES 1

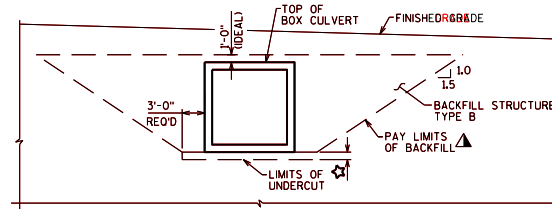


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STRUCTURES**

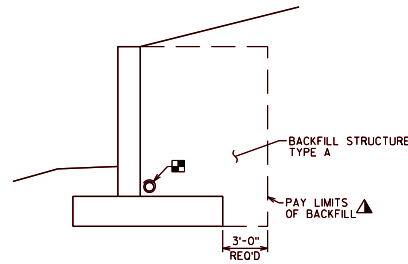
APPROVED: *Bill Oliva*

DATE:
7-20

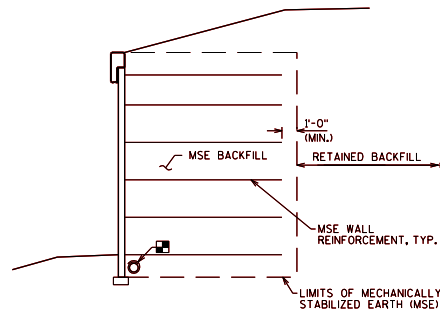
STANDARD 9.01



**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-1-1" 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-1-1" 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:
1-19

WINGS PARALLEL TO ROADWAY

WINGS PARALLEL TO ABUTMENT

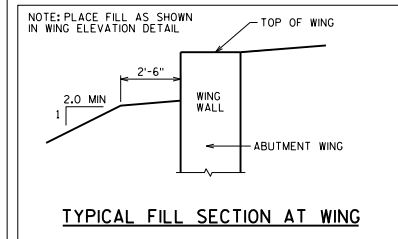
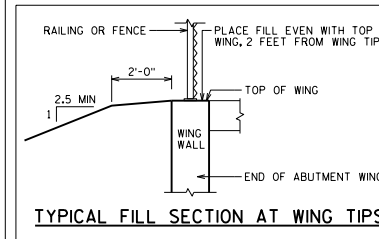
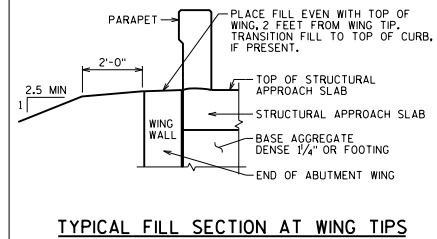
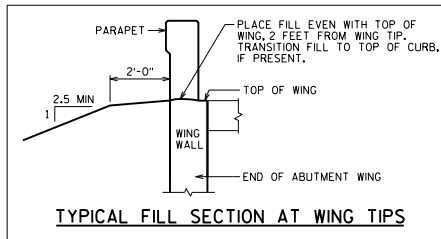
STANDARD WING

WITH STRUCTURAL APPROACH SLAB

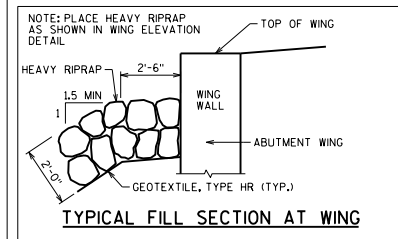
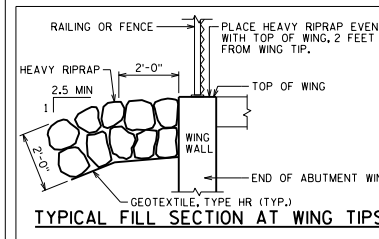
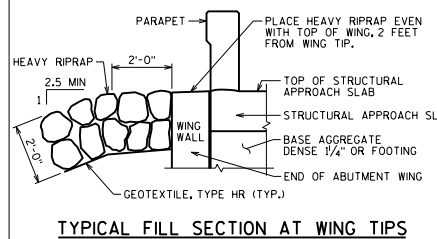
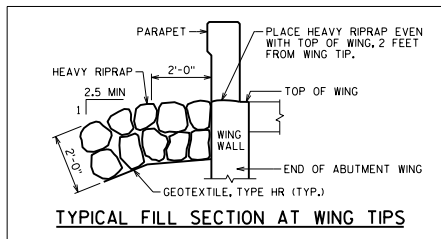
WITH RAILING OR FENCE ONLY

STANDARD WING

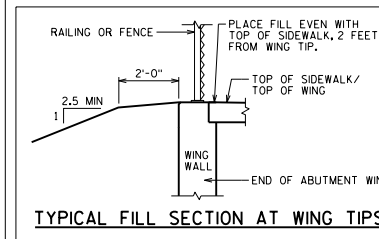
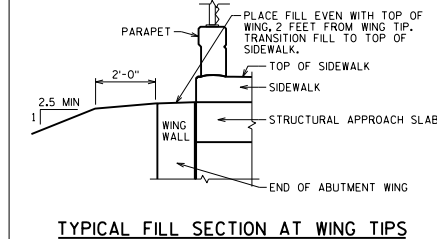
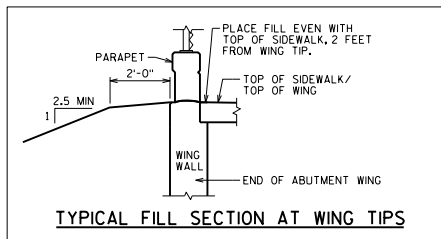
STANDARD FILL



RIP RAP



STANDARD FILL WITH SIDEWALK



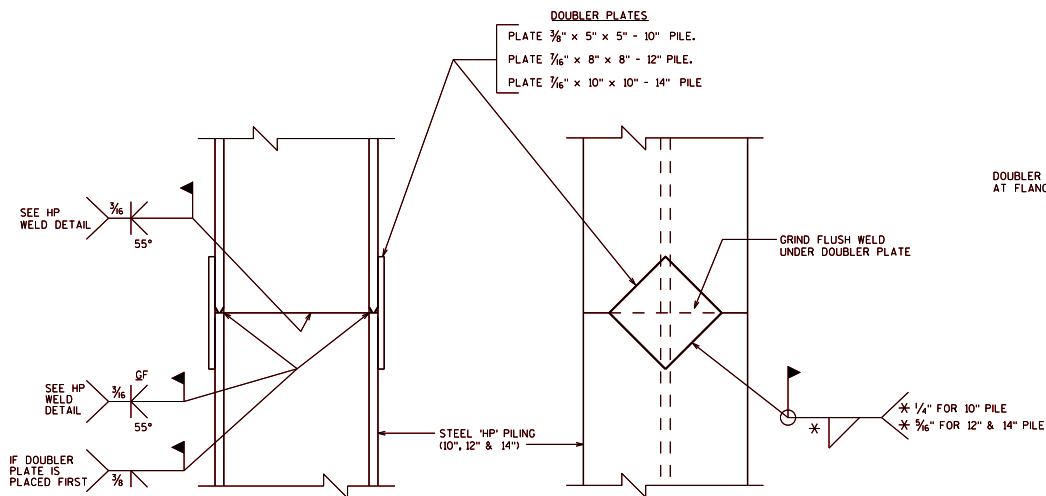
WING FILL SECTIONS AT WING TIPS



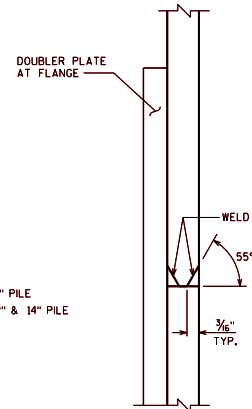
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

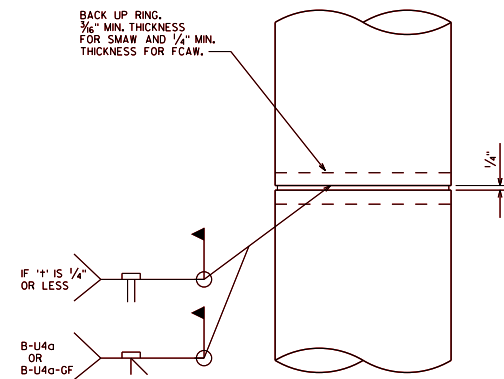
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1-18



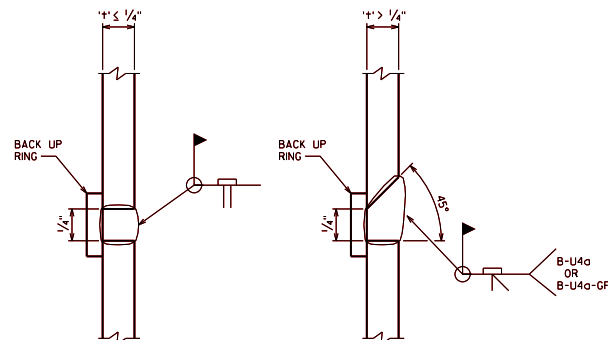
STEEL 'HP' SHAPES



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.

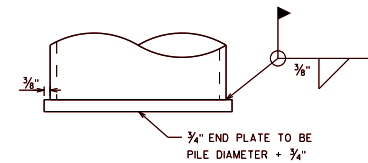
SEE BRIDGE MANUAL SECTION 11.3.1.17.7 FOR PILE RESISTANCE VALUES.

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.

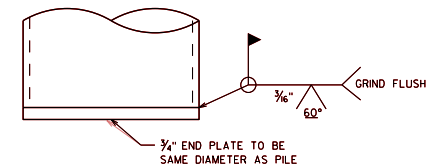
NOTES

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

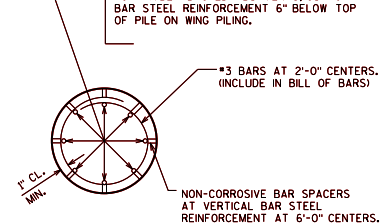
IN ARTESIAN CONDITIONS

(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.



SECTION THRU CONCRETE

CAST-IN-PLACE PILING
USED WHEN PILES ARE EXPOSED
(OPEN PILE BENTS OR TIMBER BACKED ABUTMENTS)

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)

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 = $\frac{W}{L} \times 100$ (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".
- ① USE 1'-3" FOR SLAB SPANS AND FOR GIRDER SPANS WITH NO PAVING NOTCH. USE 1'-6" FOR GIRDER SPANS WITH NO PAVING NOTCH, BUT WHERE 36W", 45W", 54W", 70W", 72W" OR 82W" GIRDERS ARE USED, AND SKEW > 25°. USE 1'-3" FOR SLAB SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
- USE 1'-11" FOR GIRDER SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
- USE 1'-7" FOR SLAB SPANS WITH A STRUCTURAL APPROACH SLAB, (STD. 12.10)
- USE 2'-3" FOR GIRDER SPANS WITH A STRUCTURAL APPROACH SLAB, (STD. 12.10)
- DIMENSION IS FROM BOTTOM OF ABUTMENT TO LOW BEAM SEAT OR LOW SIDE OF SLAB TYPE SUPERSTRUCTURE.
- ▽ 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.
- ▲ KEYED CONST. JOINT FORMED BY BEVELED 2" x 6".
- * WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX" OR SINGLE SLOPE PARAPET "5655" IS USED. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
- ① 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.
- ② SHOW ALL BARS FOR CLARITY.
- NO SLOPE FOR HEAVY RIPRAP. SEE STANDARD 12.08 FOR DETAILS.

TABLE

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

* OR EQUIVALENT STD. HOOK USE STRAIGHT BARS WHEN POSSIBLE

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

ABUTMENT TYPE A1 (INTEGRAL ABUTMENT)

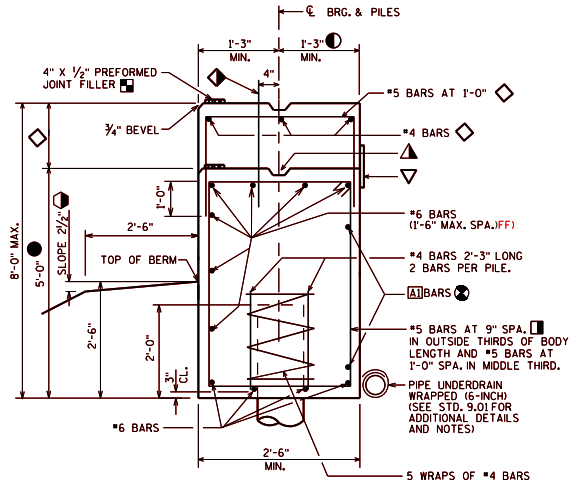


**BUREAU OF
STRUCTURES**

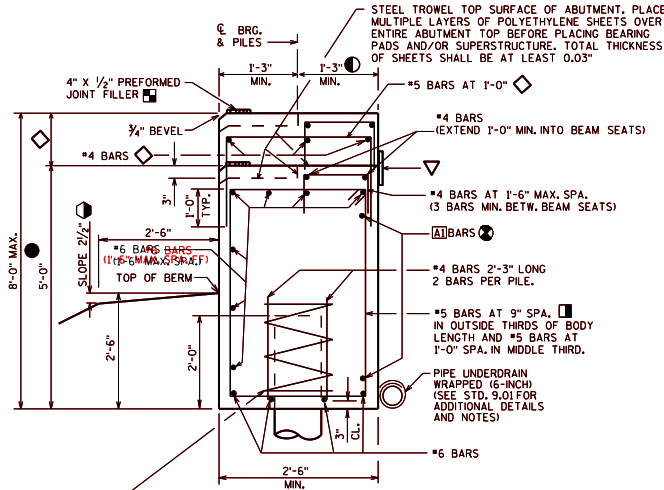
APPROVED: Bill Oliva

DATE:
1-22

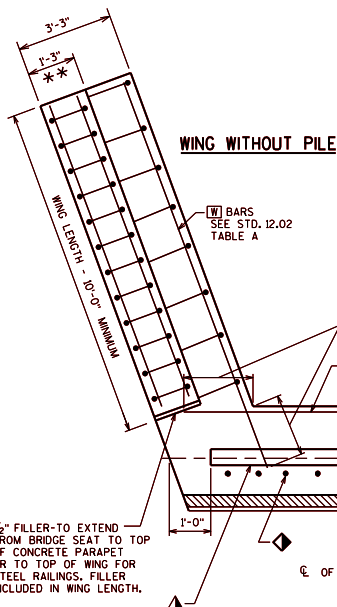
STANDARD 12.01



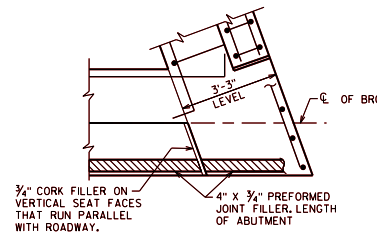
TYPE A1 WITH FIXED SEAT



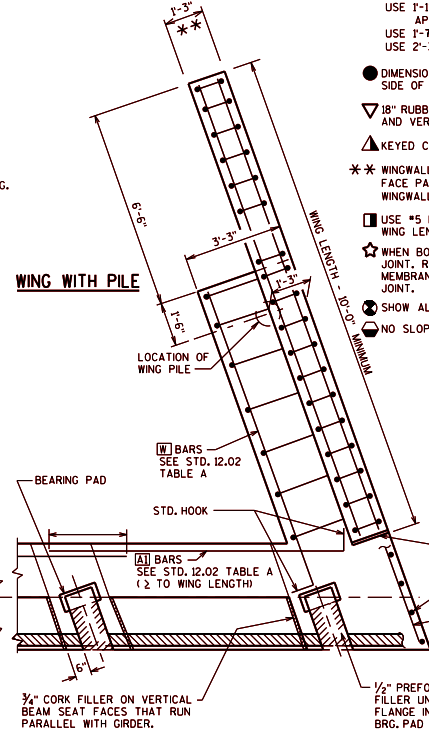
TYPE A1 WITH
SEMI-EXPANSION SEAT



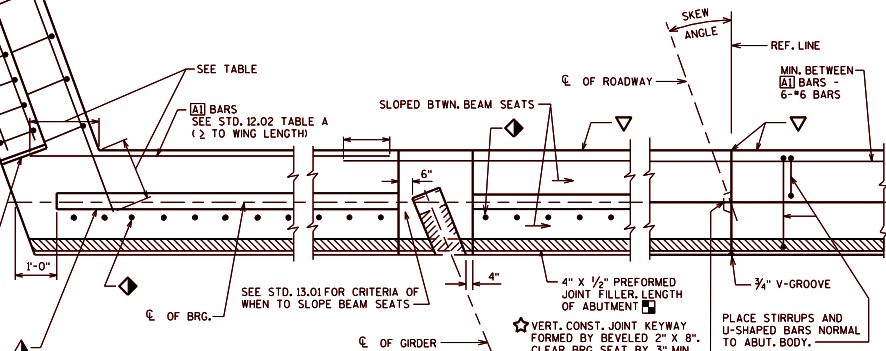
WING WITHOUT PILE



SLAB SPAN WITH
SEMI-EXPANSION SEAT



WING WITH PILE

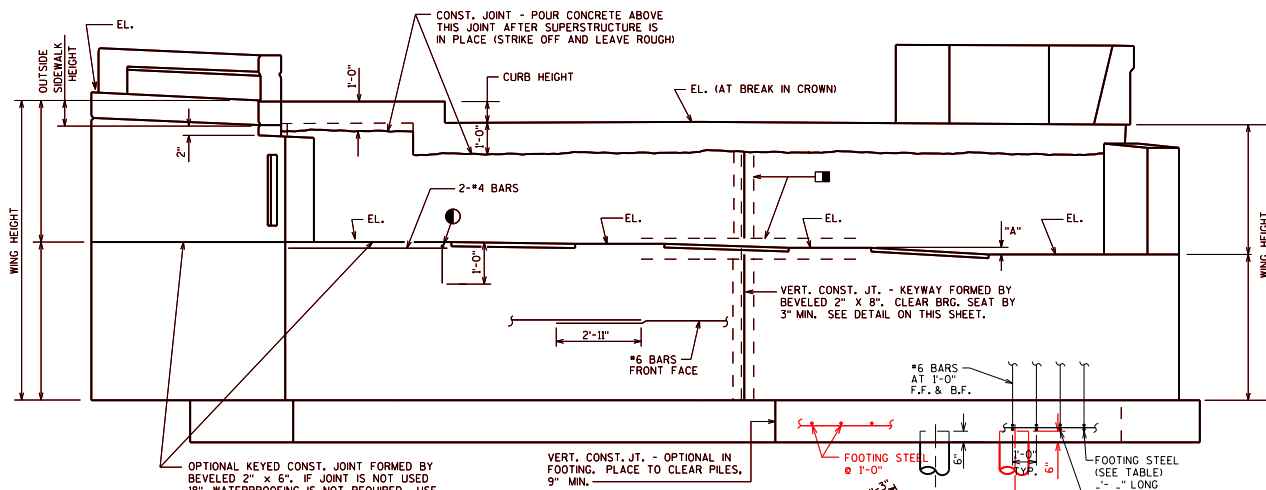


SLAB SPAN WITH
FIXED SEAT

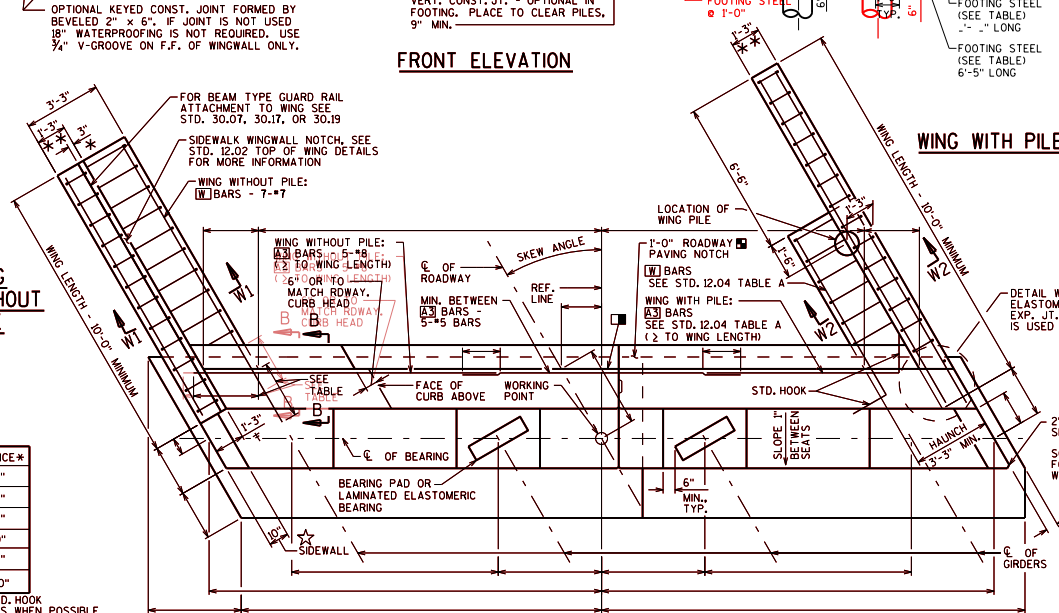
GIRDER SPAN WITH
FIXED SEAT

SLAB SPAN WITH
SEMI-EXPANSION SEAT

GIRDER SPAN WITH
SEMI-EXPANSION SEAT



FRONT ELEVATION



TABLE

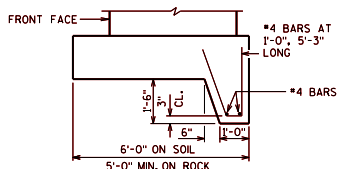
BAR SIZE	DISTANCE*
#5	1'-5"
#6	1'-9"
#7	2'-3"
#8	3'-0"
#9	3'-9"
#10	4'-10"

* OR EQUIVALENT STD. HOOK
USE STRAIGHT BARS WHEN POSSIBLE

WING WITH SIDEWALK

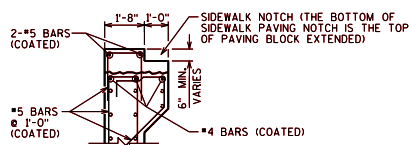
PLAN

WING WITH SLOPED FACE PARAPET



KEY DETAIL

FOR SILL ABUTMENT WITHOUT PILING PLACED ON SOIL



SECTION B-B

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

NOTES:

h = WING HEIGHT (FT.)

$P = \gamma D_c (P_{DC} + \gamma D_w P_{DW}) + \gamma (LL + LL_c) (k/FT.)$

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 γ_{EH} MIN. = 0.90, AND "P".

PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS

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.

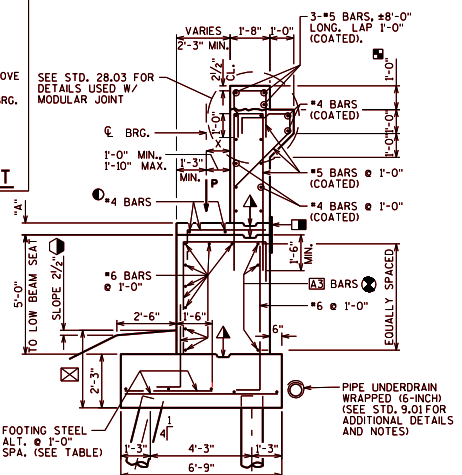
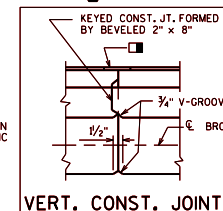
PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

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 BACKFACE ABOVE FOOTING.
- KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".
- 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'-0" BETWEEN SEATS. THIS STEEL IS REQUIRED ONLY IF DIMENSION "A" EXCEEDS 4'-0".
- 1'-5" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- 4" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- 2" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.
- WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "W" RAILING. VERTICAL FACE PARAPET "TX" OR SINGLE SLOPE PARAPET "56SS" IS USED. "56SS" 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)
- 1'-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.
- SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SHOW ALL BARS FOR CLARITY.
- NO SLOPE FOR HEAVY RIPRAP. SEE STANDARD 12.08 FOR DETAILS.



SECTION THRU BODY

ALL FOOTING BARS NOT IDENTIFIED ARE #5 BARS

ABUTMENT TYPE A3



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-20



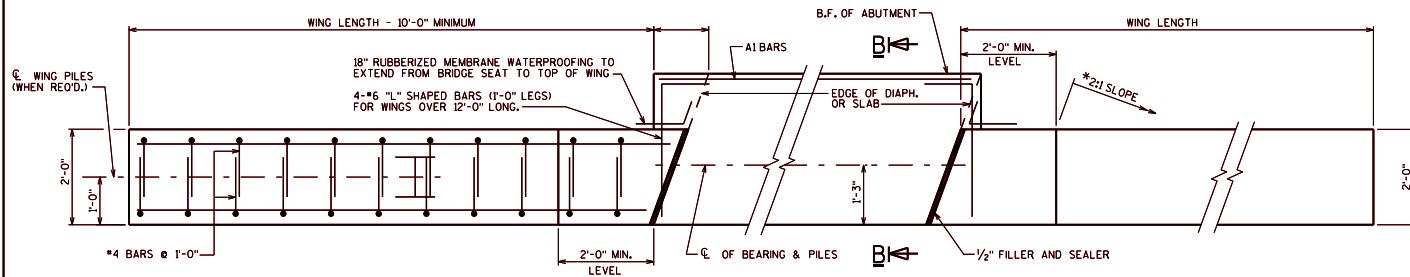
WING 2' LENGTH	WING 2' HEIGHT				
	10'-0"	11'-6"	13'-0"	14'-6"	BARS
12'-0"	6'-6" S	7'-5" S	8'-7" S	9'-8" S	W
16'-0"	8'-6" S	7'-7" S	8'-7" S	9'-8" S	A3
20'-0"	7'-6" S	5'-8" S	7'-7" S	8'-7" S	A3
24'-0"	8'-7" S	9'-7" S	9'-8" S	10'-8" S	W
26'-0"	5'-9" S	6'-9" S	7'-9" S	8'-9" S	A3
28'-0"	9'-8" S	10'-8" S	10'-9" S	8'-10" S	W
30'-0"	9'-8" S	9'-9" S	9'-10" S	10'-10" S	A3
32'-0"	9'-9" S	10'-9" S	9'-9" S	10'-9" S	W
34'-0"	7'-10" S	9'-10" S	9'-10" S	10'-10" S	A3

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

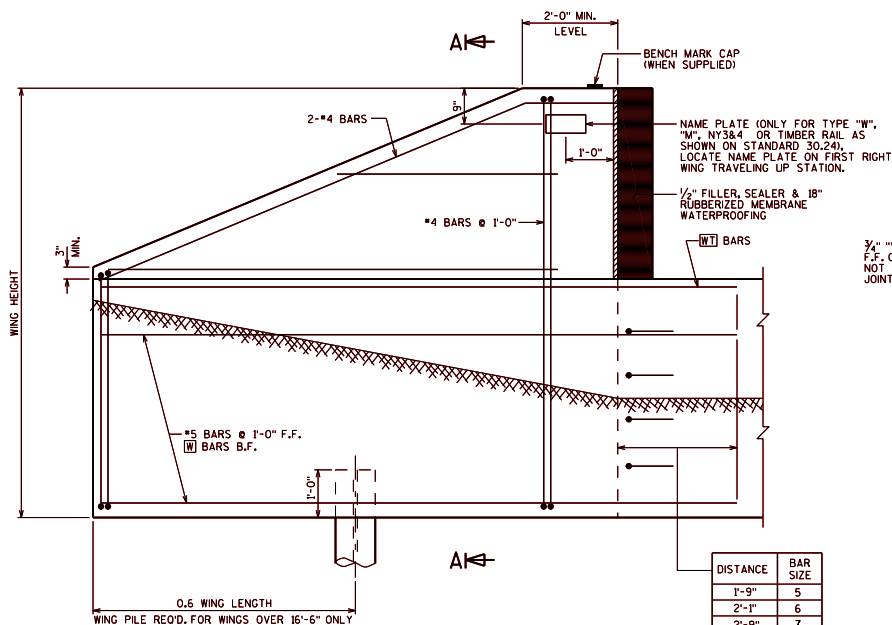
WING 2' LENGTH	WING 2' HEIGHT				
	10'-0"	11'-6"	13'-0"	14'-6"	BARS
16'-0"	8'-6" S	7'-7" S	8'-7" S	9'-8" S	W
20'-0"	7'-6" S	5'-8" S	7'-7" S	8'-7" S	A3
24'-0"	8'-7" S	9'-7" S	9'-8" S	10'-8" S	A3
28'-0"	5'-9" S	6'-9" S	7'-9" S	8'-9" S	A3
32'-0"	9'-8" S	10'-8" S	10'-9" S	8'-10" S	W
36'-0"	9'-8" S	9'-9" S	9'-10" S	10'-10" S	A3
40'-0"	9'-9" S	10'-9" S	9'-9" S	10'-9" S	W
44'-0"	7'-10" S	9'-10" S	9'-10" S	10'-10" S	A3

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

STANDARD 12.04

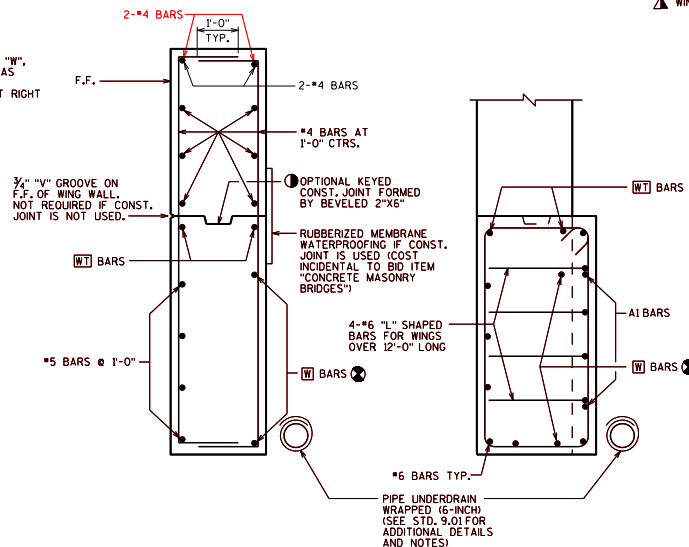


PLAN FOR TYPE A1 ABUTMENT
(SEE STD. 12.01 FOR ABUTMENT BODY DETAILS)



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

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 2/1 SLOPE FOR THE UNSTABLE CLAYS

*USE 2/2.1 FOR THE UNSTABLE CLAYS WHICH ARE SOMETIMES ENCOUNTERED IN NORTHWEST WISC. (SUPERIOR AREA)

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

ALL WING BARS SHALL BE EPOXY COATED.

- SHOW ALL LONGITUDINAL BARS FOR CLARITY.

LRFD DESIGN LOADS (WINGS)

LIVE LOAD = 1'-0" SURCHARGE

LOAD FACTORS:

$\gamma_{DC} = 1.25$

$\gamma_{EH} = 1.50$

$\gamma_{FS} = 1.75$

EXPOSURE CLASS 2, $\gamma_e = 0.75$

HORIZ. EARTH LOAD BASED ON: 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"	
5'-6"	5-#5s	5-#5s	6-#5s		W
10'-0"	2-#5s	2-#5s	2-#5s		WT
4-#6s	4-#6s	5-#6s			A1
12'-0"	5-#6s	5-#7s	6-#7s		W
	2-#7s	2-#7s	2-#8s		WT
	5-#6s	6-#6s	6-#7s		A1
16'-0"	5-#8s	6-#8s	5-#9s		W
	2-#8s	2-#8s	2-#9s		WT
	5-#8s	6-#8s	7-#8s		A1
20'-0"		8-#8s	8-#9s		W
		2-#8s	2-#9s		WT
		7-#9s	8-#9s		A1

▲ WING PILE REQUIRED

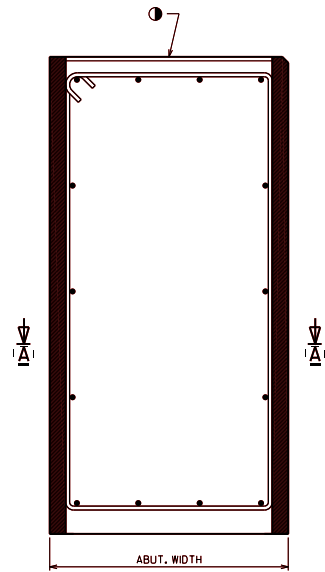
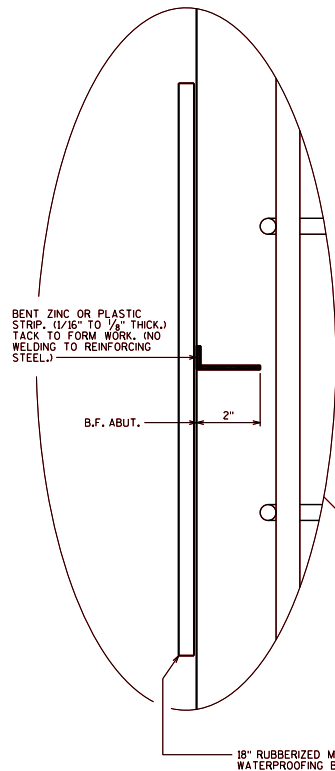
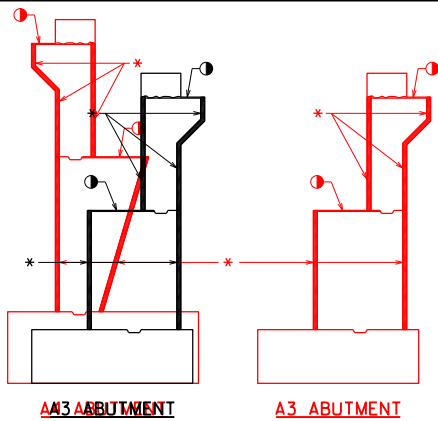
DETAILS FOR WINGS
PARALLEL TO A1
ABUTMENT CENTERLINE



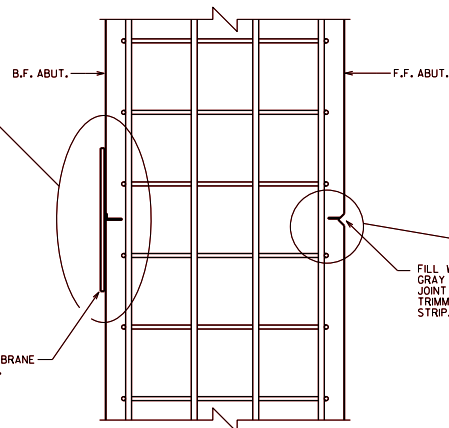
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-21

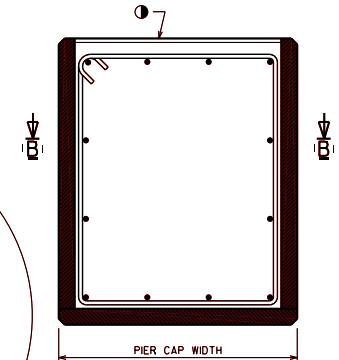
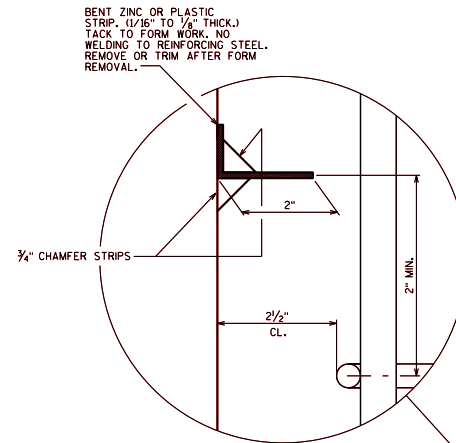


SECTION THRU
ABUTMENT BODY
A1 ABUTMENT SHOWN, A5 SIMILAR

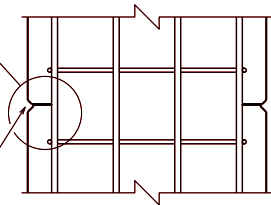


SECTION A-A

ALTERNATE CONSTRUCTION JOINT AT ABUTMENT



SECTION THRU
PIER CAP



SECTION B-B

ALTERNATE CONSTRUCTION JOINT AT PIER CAP

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\"/>

* BENT ZINC OR PLASTIC STRIP.

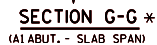
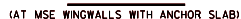
ALTERNATE CONSTRUCTION JOINT	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: <u>1-18</u>



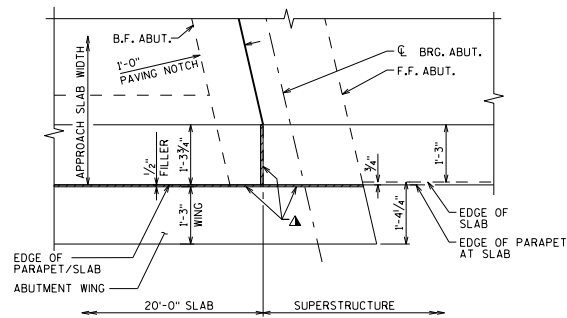
- (T02) STEEL TROWEL TOP SURFACE OF FOOTING AND PAVEMENT MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF FOOTING.
- (T03) PAVEMENT MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF SUBGRADE BENEATH SLAB.
- ▲ SEAL ALL EXPOSED HORIZONTAL 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).
- ① 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.



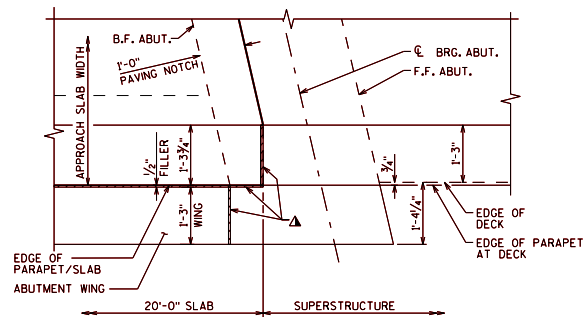
STANDARD 12.11



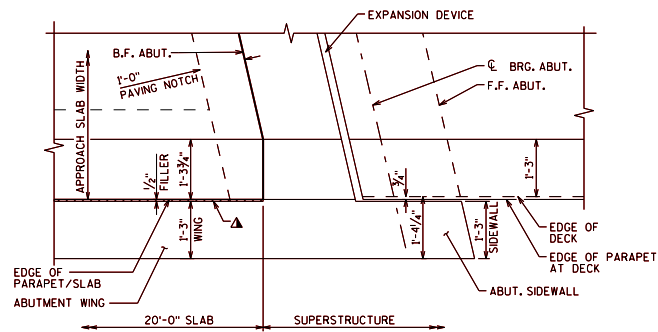
STANDARD 12.12



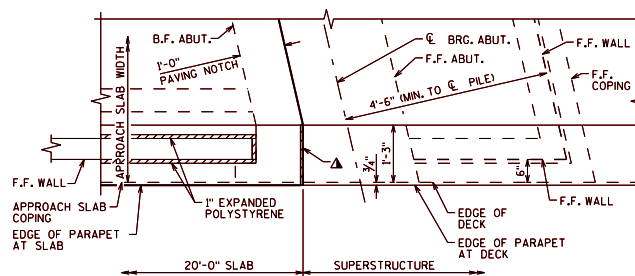
APPROACH SLAB PARTIAL PLAN
(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT. - SLAB SPAN)



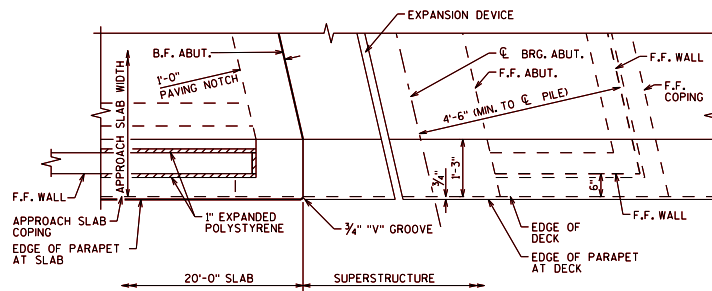
APPROACH SLAB PARTIAL PLAN
(AT WINGWALLS PARALLEL TO BRIDGE - BRG ABUT - A1 ABUT. - SLAB SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - BRG ABUT - A1 ABUT. - SLAB SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - BRG ABUT - A1 ABUT. - SLAB SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - BRG ABUT - A1 ABUT. - SLAB SPAN)

PARTIAL PLANS SHOWN HERE ARE FROM STANDARD 12.10

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.

STRUCTURAL APPROACH SLAB DETAILS 3



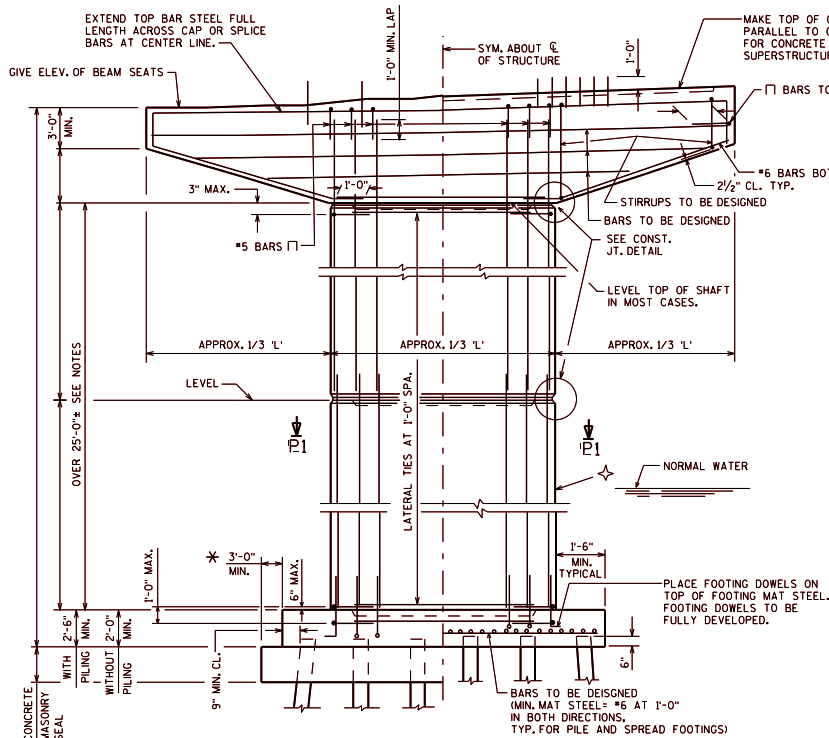
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

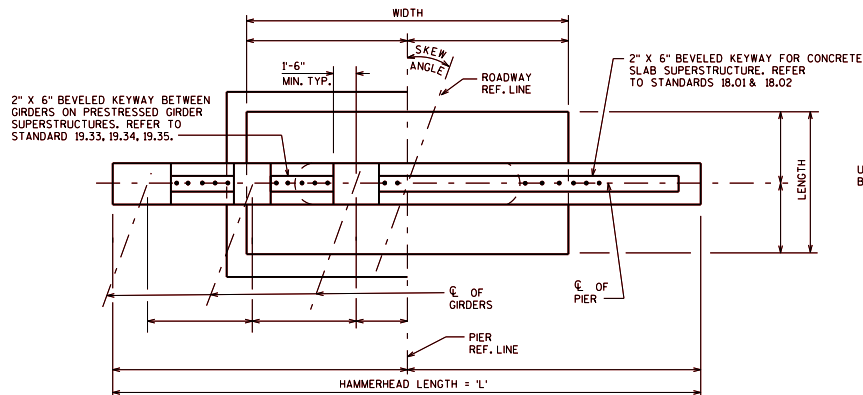
DATE:
7-18

GIRDER STRUCTURES

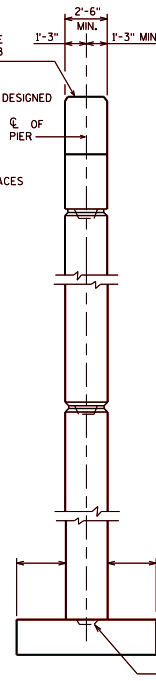
CONCRETE SLAB STRUCTURES



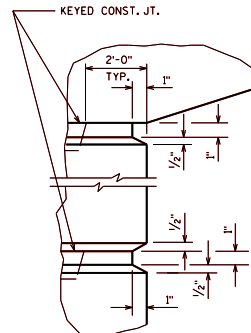
ELEVATION
LOOKING UP STATION



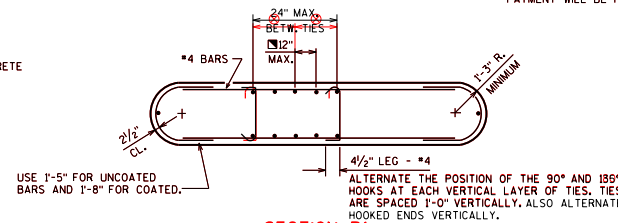
PLAN



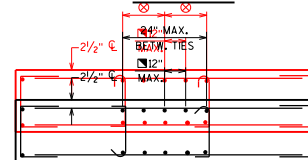
END VIEW



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.

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

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

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

PLAN NOTES

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

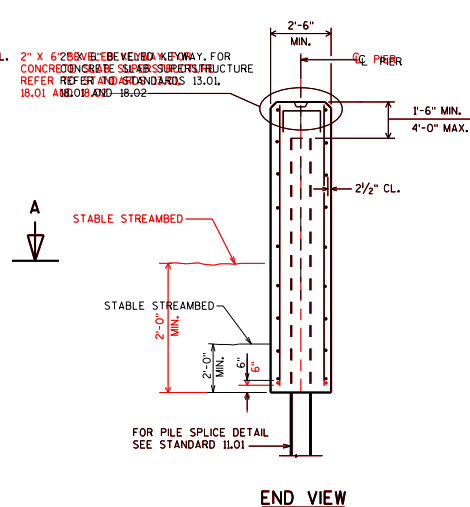
HAMMERHEAD PIER



BUREAU OF
STRUCTURES

APPROVED: Bill Oliva

DATE:
7-21



TYPE 1 PIER [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 31.15 FOR**

TYPE 2 PIER [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.

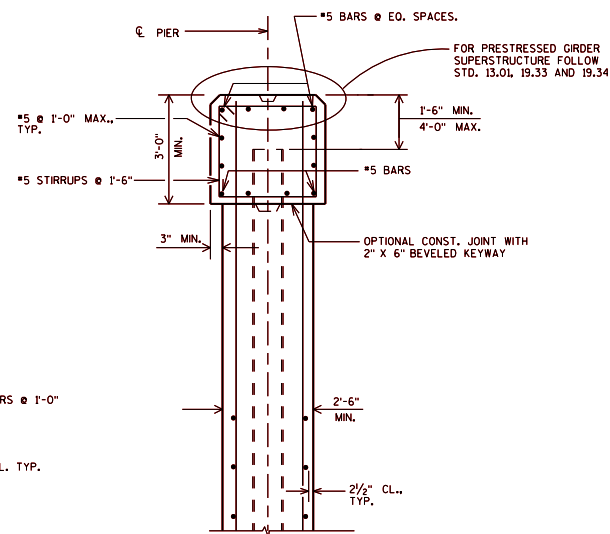
TYPE 3 PIER [AT PIER ... COFFERDAM AND COFFERDAM DEWATERING REQUIRED.
COFFERDAM SHALL BE DEWATERED PRIOR TO PLACING PIER CONCRETE.

SEE BRIDGE MANUAL SECTION 13.2.3 AND STANDARD 13.09 FOR GUIDANCE ON PIER TYPES, DETAILS, AND APPLICABLE BID ITEMS.

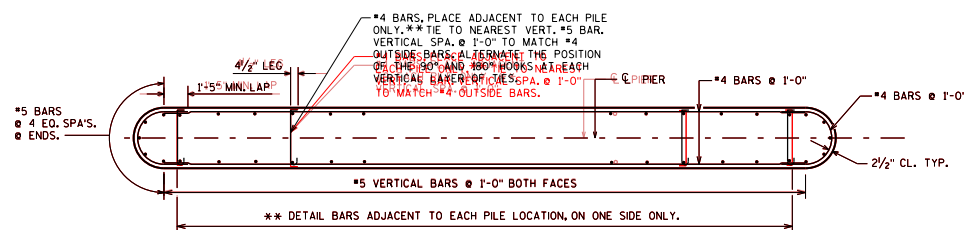
SEE BRIDGE MANUAL SECTION 13.11.5 FOR GUIDANCE ON COFFERDAMS.

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

SEE STANDARD 13.01 FOR ADDITIONAL, APPLICABLE DESIGNER NOTES



USE WHEN ECONOMICAL FOR GIRDERS
ON LARGE SKEWS



SECTION A-A

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

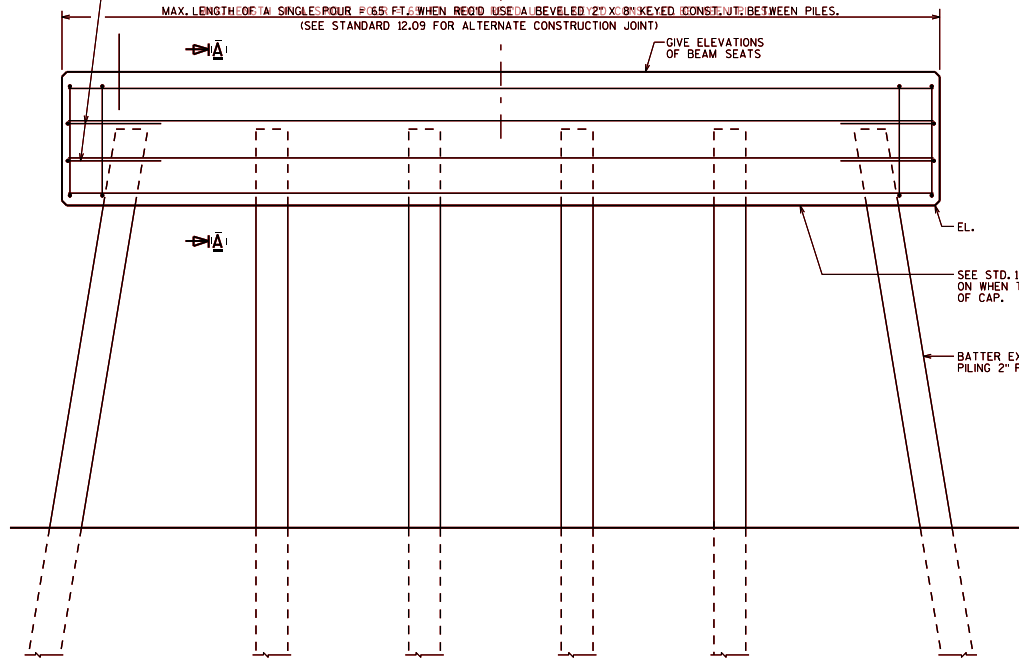
DATE: 7-19

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

SYM. ABOUT C
OF STRUCTURE

MAX. LENGTH OF A SINGLE POUR PILES 65 FT. WHEN REQ'D USE A BEVELED 2" X 6" KEYED JOINT BETWEEN PILES.
(SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINT)

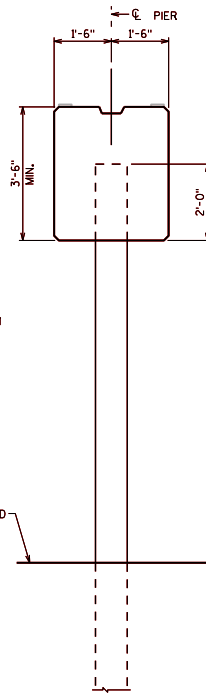
GIVE ELEVATIONS
OF BEAM SEATS



ELEVATION

LOOKING UP STATION

STABLE
STREAMBED



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

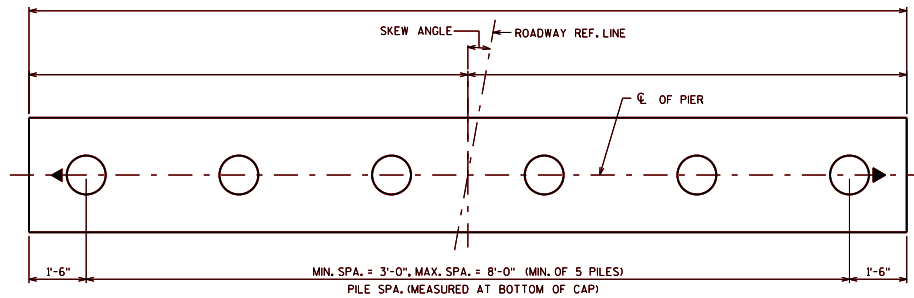
ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE UNLESS OTHERWISE SHOWN. ELASTOMERIC BEARING PADS SHALL BE USED FOR ALL GIRDERS SLOPING MORE THAN 1% BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE TWO CASES LISTED BELOW:

1. FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS THE TOP OF WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01 ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.
2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

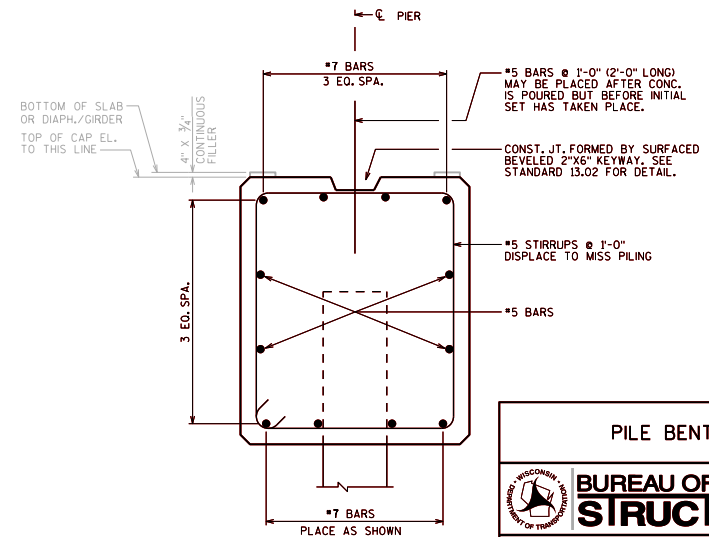
BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

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

PILES SHALL BE 12 1/4" OR 14" DIAMETER CAST-IN-PLACE WITH MINIMUM WALL THICKNESS OF 3/4".
SEE STANDARD 10.01 FOR BEAM AND PILE REINFORCING DETAILS. THE STRUCTURES DEVELOPMENT CHIEF, (608) 266-0075. PILE USE REQUIRES PRIOR APPROVAL DURING DESIGN OF THE STRUCTURES DEVELOPMENT CHIEF, (608) 266-0075.



PLAN



SECTION A-A

PILE BENT



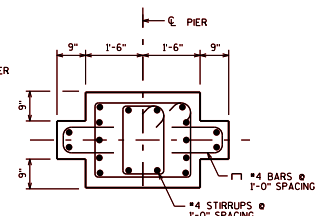
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-20

SECTION P1

PLAN OF PIER CAP



SECTION P2

DESIGNER NOTES

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

OPTIONAL KEYED CONSTRUCTION JOINTS IN COLUMNS (IF USED) AND REQUIRED KEYED JOINTS FOR FOOTINGS SHALL BE FORMED BY A BEVELED KEYWAY 2" DEEP x 1'-3" x 1'-3". EXPOSED EDGES OF CONSTRUCTION JOINTS SHALL BE FLUSH AND NOT BEVELED IN COLUMNS.

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

1. FOR GIRDERS WITH $\frac{1}{2}$ " ELASTOMERIC BEARING PADS
WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

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

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

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

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

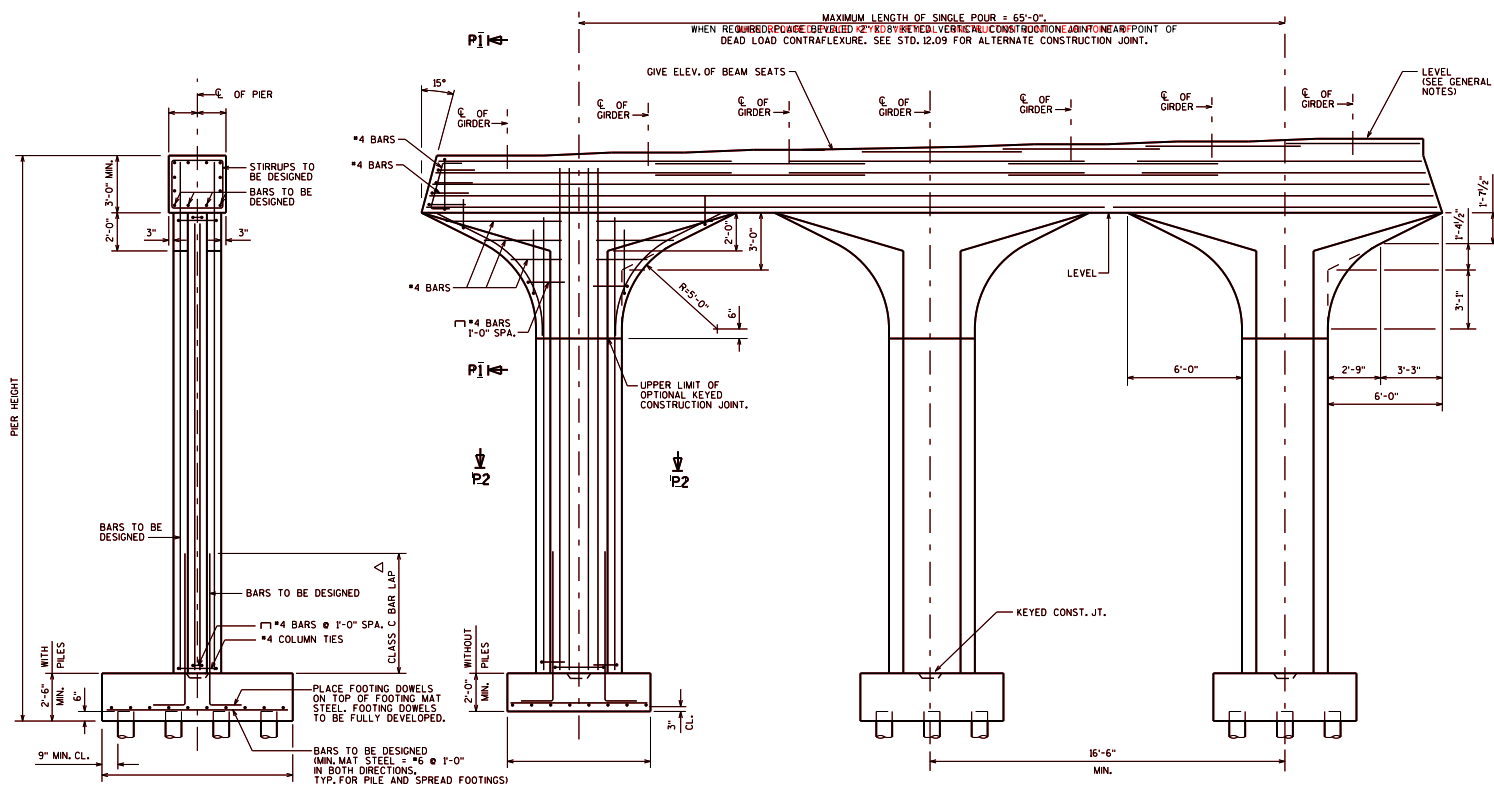
BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE
DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY
AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR
STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT
STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST
INCREASE.

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

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

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



END VIEW

ELEVATION
LOOKING UP STATION

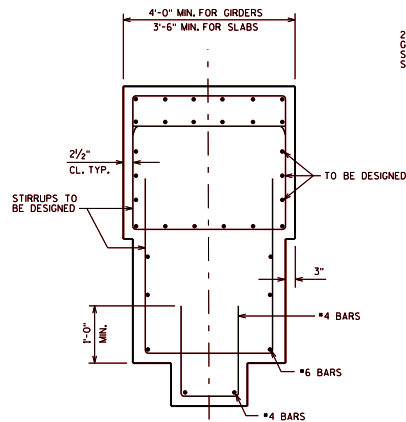
MULTI-COLUMNED
PIER TYPE 2



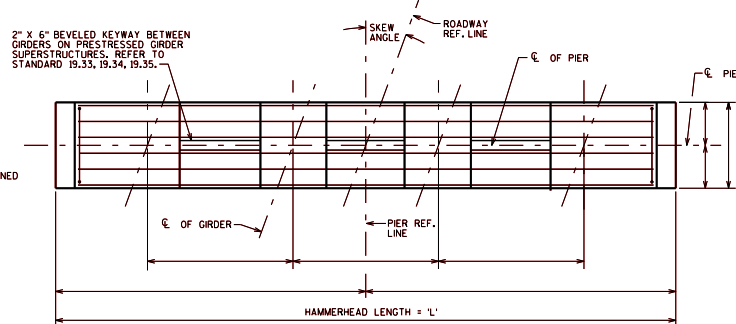
**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

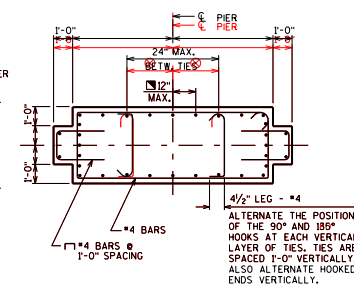
DATE: 7-20



SECTION P1



PLAN OF PIER CAP



SECTION P2

NOTES

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

DESIGNER NOTES (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

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%.

2. WHEN A CAP IS USED FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF CAP PARALLEL TO GRADE. SEE STANDARD 13.01.

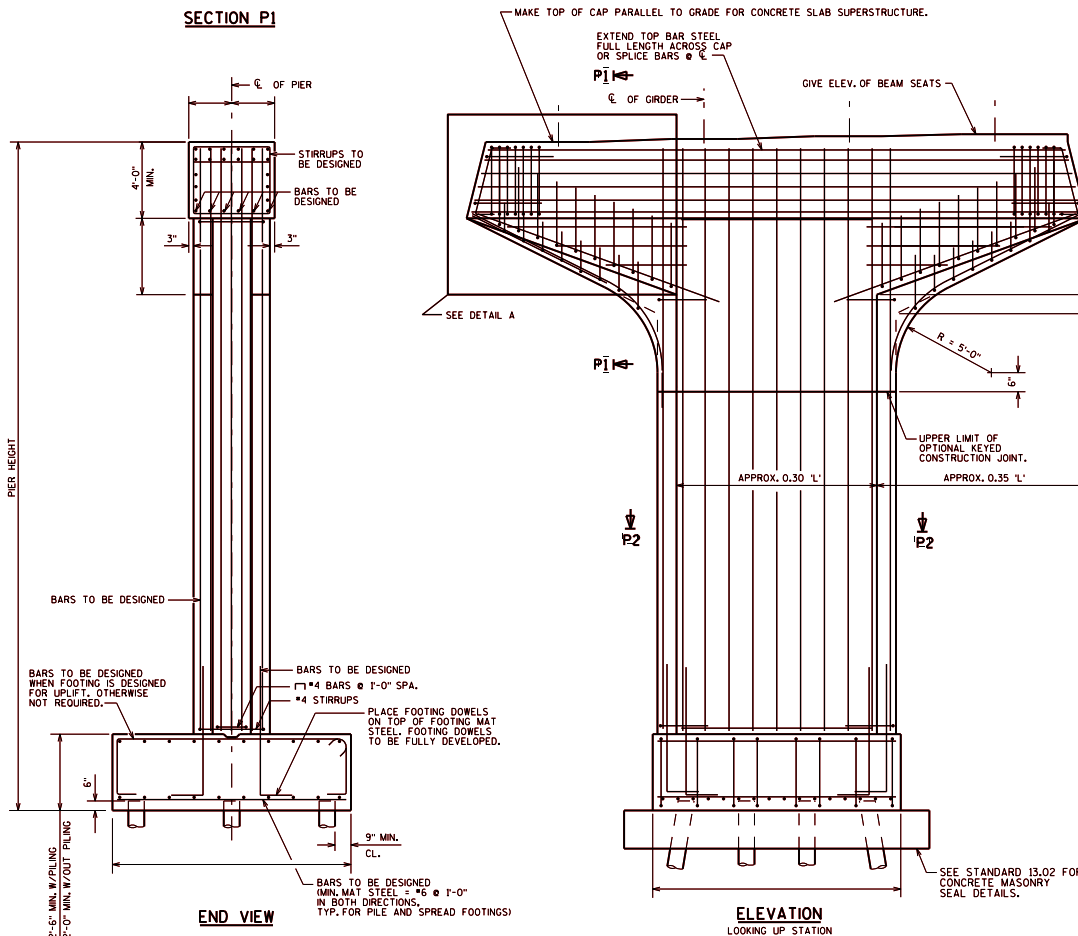
BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

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

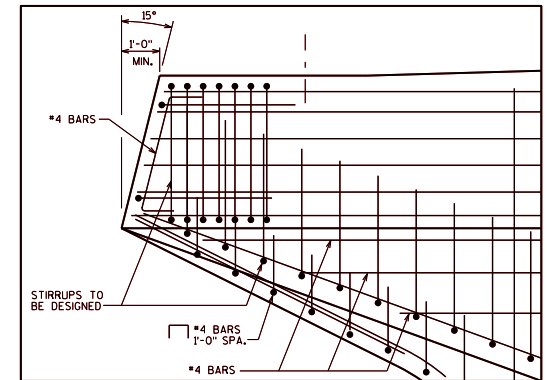
FOR "HAMMERHEAD LENGTH" GREATER THAN 45'-0", CONSIDER A TWO SHAFT PIER FRAME RESEMBLING TWO HAMMERHEAD PIERS PLACED SIDE BY SIDE.

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

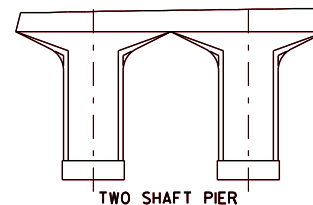
EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.



ELEVATION
LOOKING UP STATION



DETAIL A



TWO SHAFT PIER

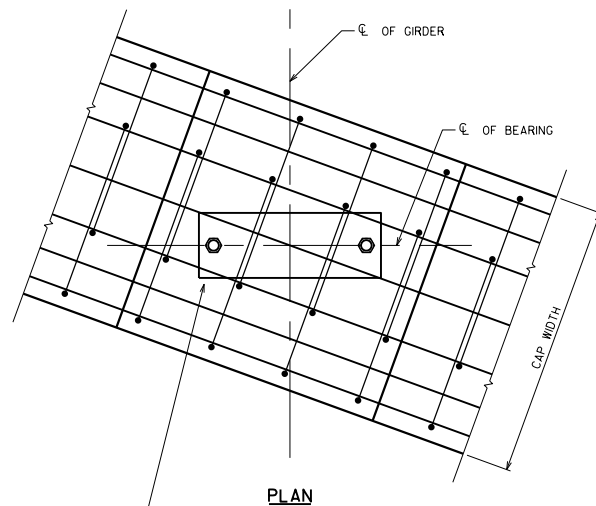
HAMMERHEAD PIER - TYPE 2



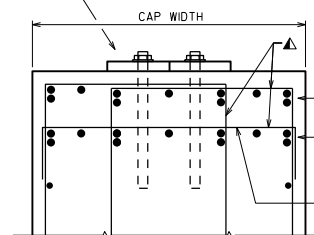
**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:
7-21



PROVIDE ADEQUATE CLEARANCE FOR
POST-INSTALLED ANCHORS



SECTION THRU PIER CAP

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:

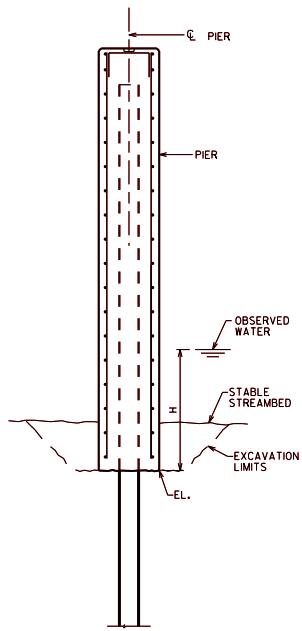
TYPE 1 - COFFERDAM BID ITEM NOT PROVIDED. CONSIDER PROVIDING UNDERWATER INSPECTION BID ITEM.

TYPE 2 - COFFERDAM AND UNDERWATER INSPECTION BID ITEMS REQUIRED.

TYPE 3 - COFFERDAM AND SEAL BID ITEMS REQUIRED.

WALL PIER ALTERNATIVES:

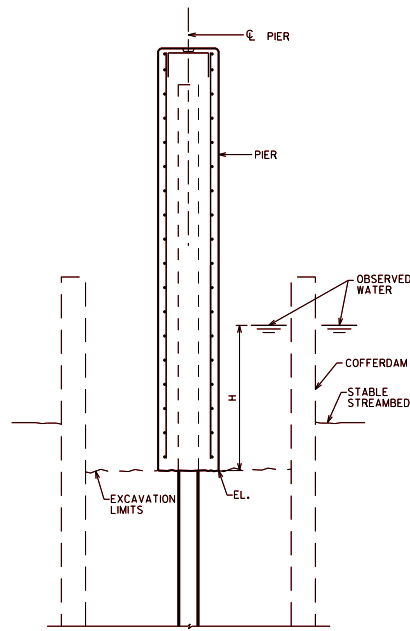
- SOLID WALL (AS SHOWN ON THIS STANDARD)
- HAMMERHEAD (SEE STANDARD 13.02)



END VIEW

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

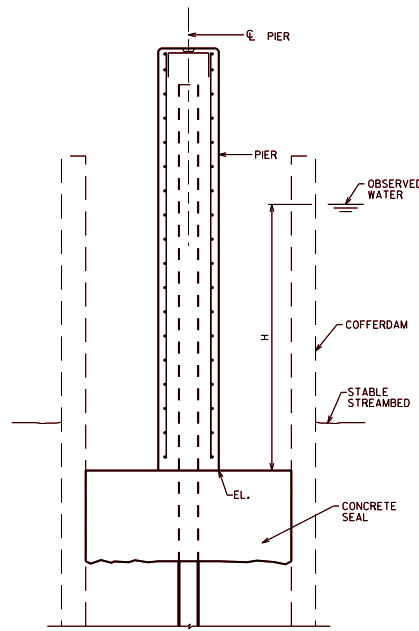
ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.9000.S	UNDERWATER SUBSTRUCTURES INSPECTION (STRUCTURE)	EACH



END VIEW

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

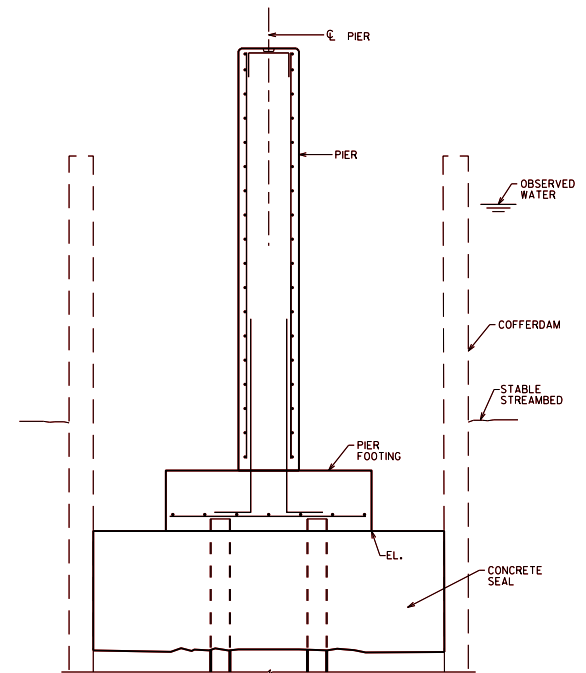
ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.1100	CONCRETE MASONRY SEAL	CY



END VIEW

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

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



END VIEW

SOLID WALL PIER
(PILE ENCASED PIER ALTERNATIVE)

PILE ENCASED PIER (TYPES)

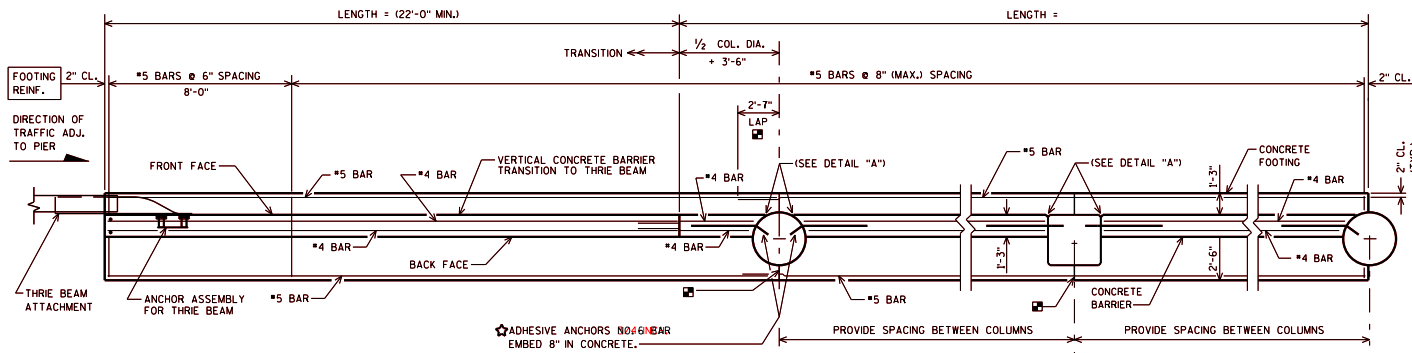


**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

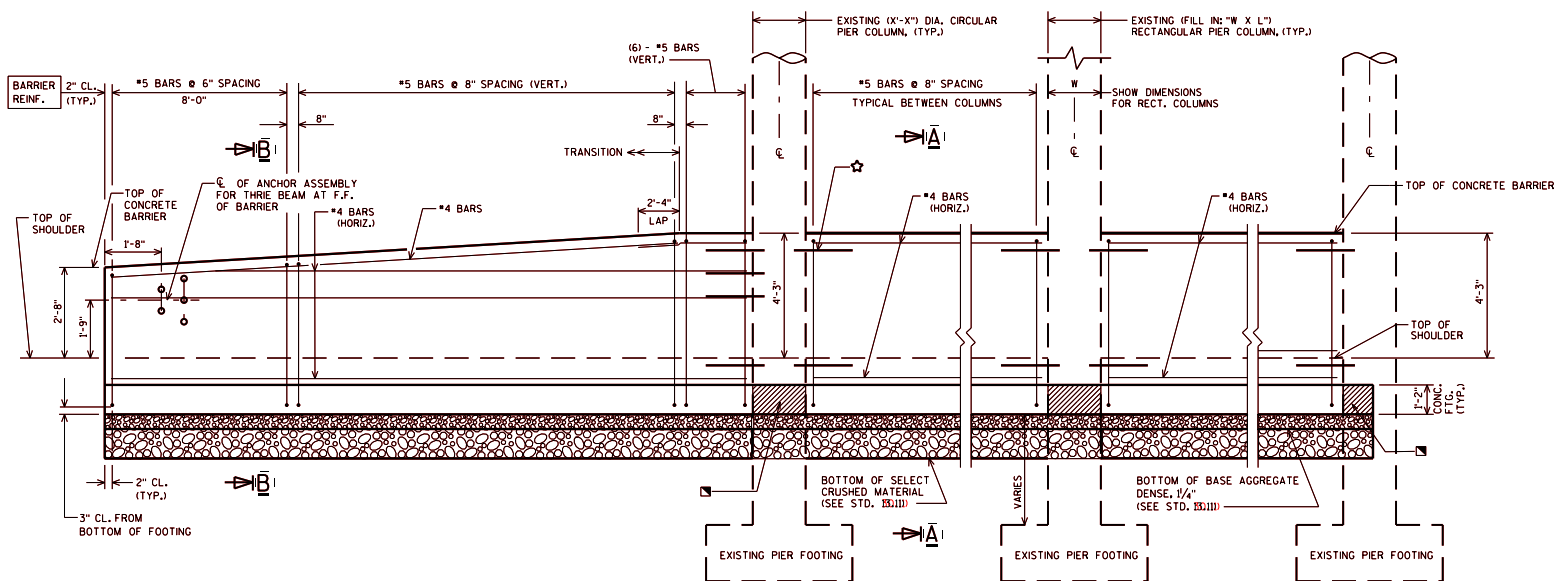
DATE:

7-20



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

PLAN
DETAILS FOR CIRCULAR AND RECTANGULAR COLUMNS

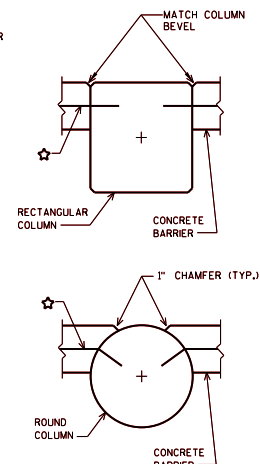


ULTIMATE DESIGN STRESSES:

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

ELEVATION
LOOKING AT B.F. OF BARRIER

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



DETAIL A

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

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

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.

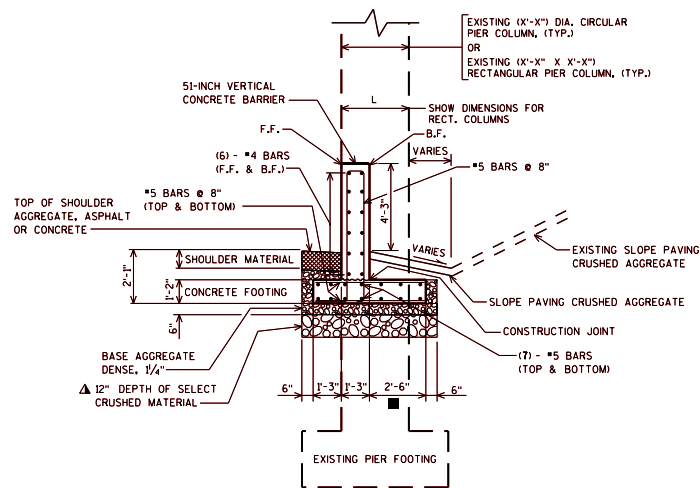
51-INCH CONCRETE INTEGRAL BARRIER



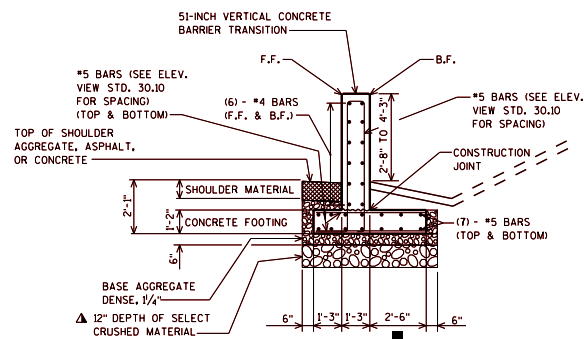
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-26



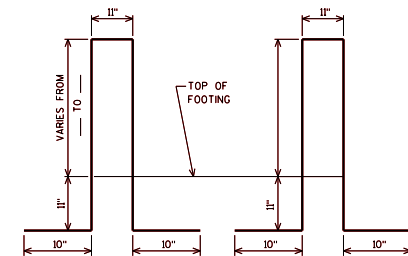
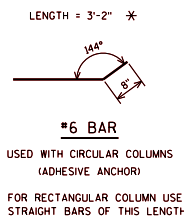
SECTION A-A
BETWEEN COLUMNS



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.



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.

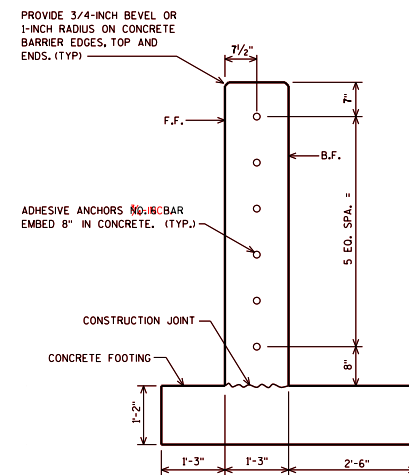
CONSIDER PROVIDING AN ADDITIONAL TRANSITION SECTION ADJACENT TO THE OTHER EXTERIOR PIER COLUMN FOR THE FOLLOWING CONDITIONS:

- 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.



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

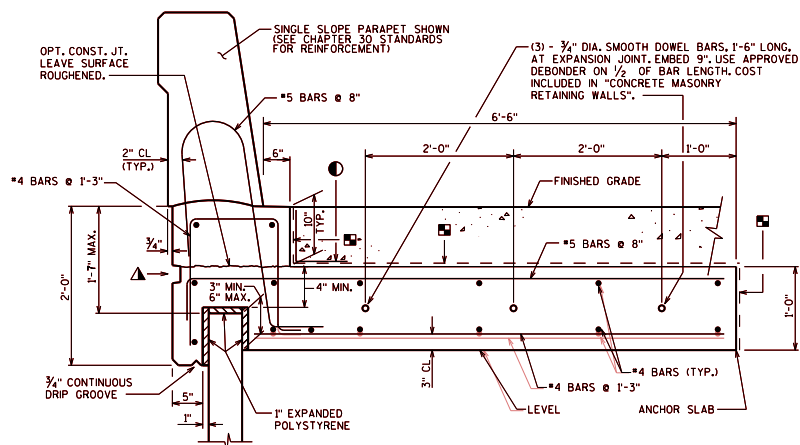
INTEGRAL BARRIER DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-26



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 $\frac{3}{4}$ "-V" GROOVE.

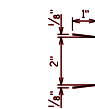
LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".

ALL BAR STEEL SHALL BE EPOXY COATED.

CONCRETE QUANTITY BASED ON 3" PANEL EMBEDMENT.

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

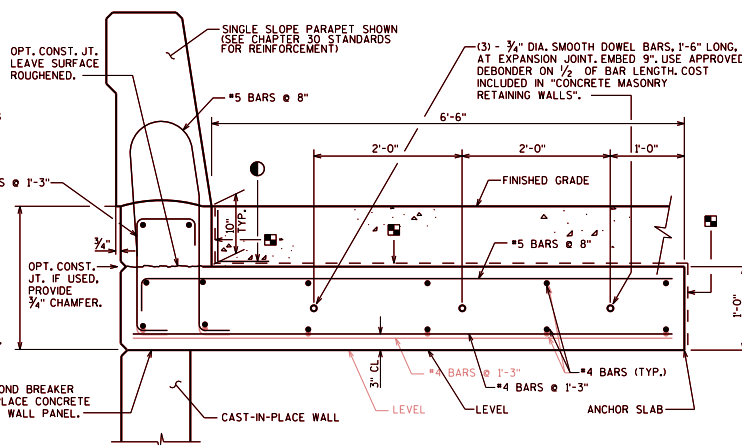
IF THE OPT. CONST. JOINT IS USED, PLACE 18" MEMBRANE WATERPROOFING ALONG THE ENTIRE LONGITUDINAL JOINT. THE MEMBRANE WATERPROOFING SEALING THE OPTIONAL CONST. JOINT IS INCIDENTAL TO THE CONCRETE MASONRY BID ITEM.



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.

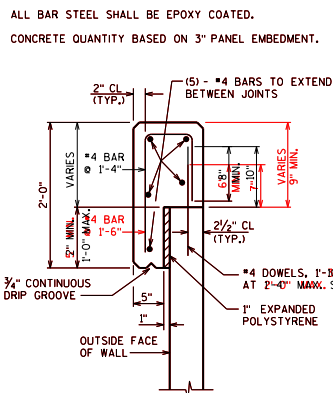


CAST-IN-PLACE CONCRETE TRAFFIC BARRIER DETAIL FOR CAST-IN-PLACE WALL PANELS

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 $\frac{3}{4}$ "-V" GROOVE.

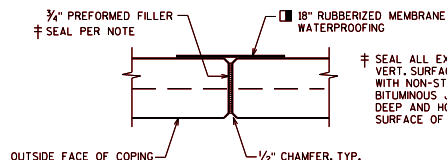
LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".

ALL BAR STEEL SHALL BE EPOXY COATED.



CAST-IN-PLACE CONCRETE COPING DETAIL

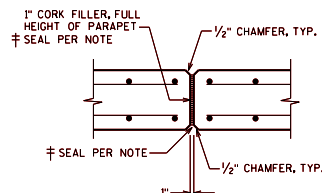
NOTES: (1) CONCRETE REINFORCING DESIGNED FOR 18" STANDARD PRECAST WALL PANELS WITH 18" MAXIMUM OF POSITIVE SPACING AREA. WHEN 18" IS MADE.



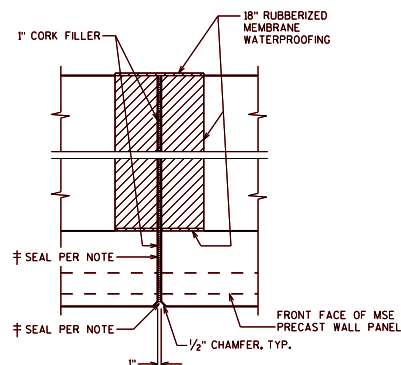
COPING EXPANSION JOINT

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

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

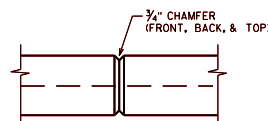


TRAFFIC BARRIER EXPANSION JOINT DETAIL



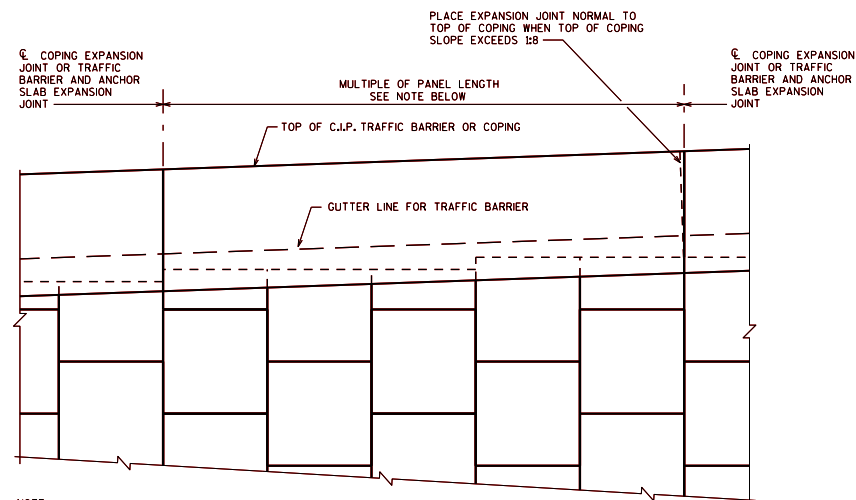
ANCHOR SLAB EXPANSION JOINT DETAIL

EXPANSION JOINTS TO BE SPACED AT A MINIMUM OF 20' AND A MAXIMUM OF 30'. LOCATE EXPANSION JOINTS OVER WALL JOINTS. DO NOT RUN BAR STEEL THRU JOINT, EXCEPT FOR DOWEL BARS. JOINT TO EXTEND FULL DEPTH OF PARAPET AND ANCHOR SLAB. PROVIDE THE NUMBER OF BARS AND OVERALL LENGTH FOR QUANTITY PURPOSES, ONLY. DO NOT DETAIL SPECIFIC BAR LENGTHS BETWEEN EXPANSION JOINTS AS THESE LENGTHS ARE BASED ON UNKNOWN MSE PANEL LENGTH AND CONFIGURATION.



COPING CONTRACTION JOINT

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



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

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

DESIGNER NOTES

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

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

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

MSE RETAINING WALL DETAILS



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

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 FOR 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

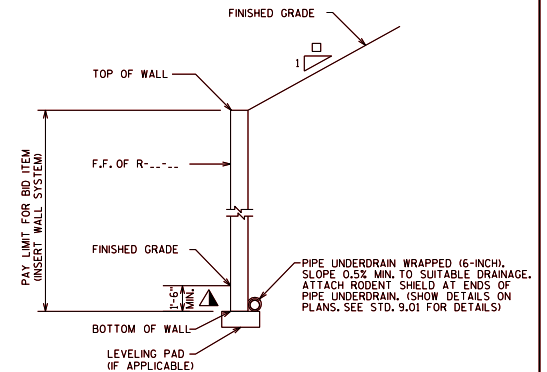
THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED UPON THE MINIMUM DESCRIBED IN THE WALL SYSTEM SPECIAL PROVISIONS OR EXTERNAL AND OVERALL STABILITY AT THE DESIGNATED LOCATIONS. THESE DESIGNATED LOCATIONS REPRESENT TYPICAL AND CRITICAL WALL LOCATIONS, BUT SHALL NOT 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 CONTRACTOR'S 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.



TYP. CROSS SECT. OF RETAINING WALL

LIST OF DRAWINGS

1. (INSERT WALL SYSTEM)
2. SUBSURFACE EXPLORATION

LRFD PROPRIETARY RETAINING WALLS (GENERAL PLAN)



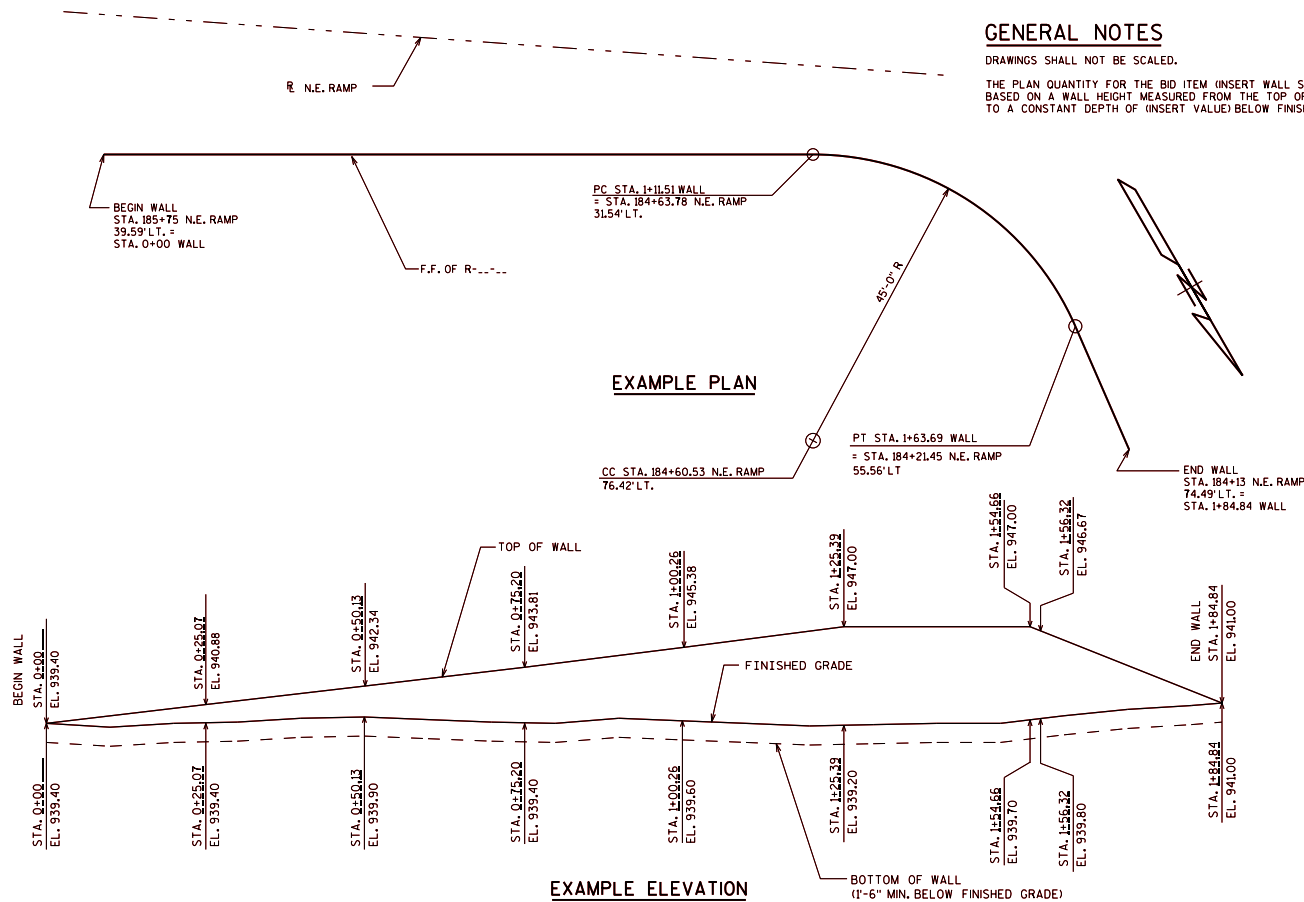
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-18

STANDARD 14.03

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.

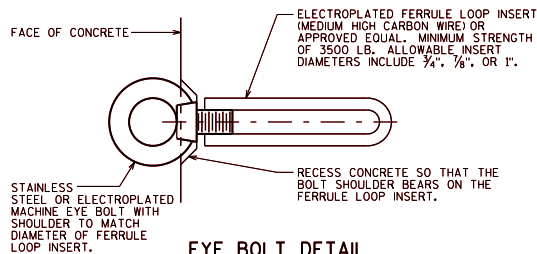
SOIL PARAMETERS

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

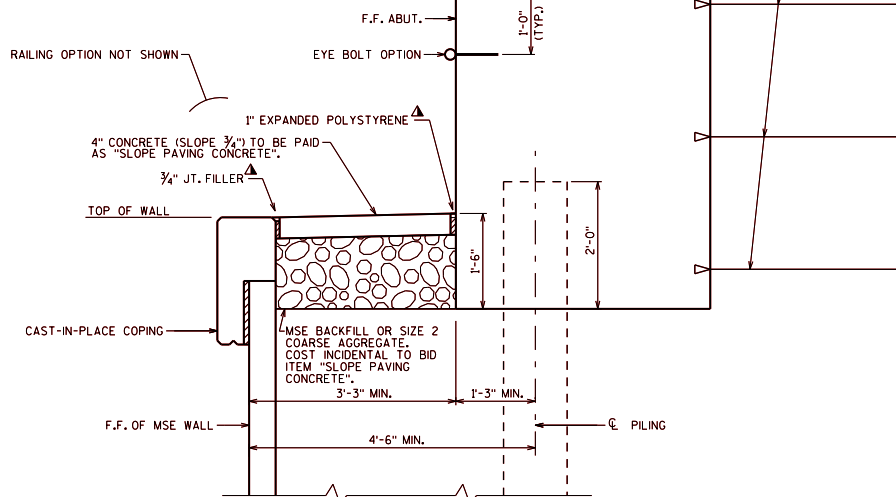
WALL EXTERNAL & OVERALL STABILITY EVALUATION

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)	



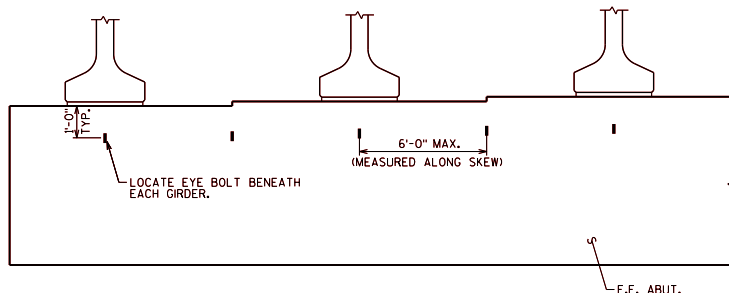
EYE BOLT DETAIL

COST INCIDENTAL TO BID ITEM "CONCRETE MASONRY BRIDGES".



CROSS SECTION THRU ABUTMENT AT MSE WALL

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



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

RETAINING WALL NOT SHOWN

DESIGNER NOTES

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

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

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

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

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

NOTES

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

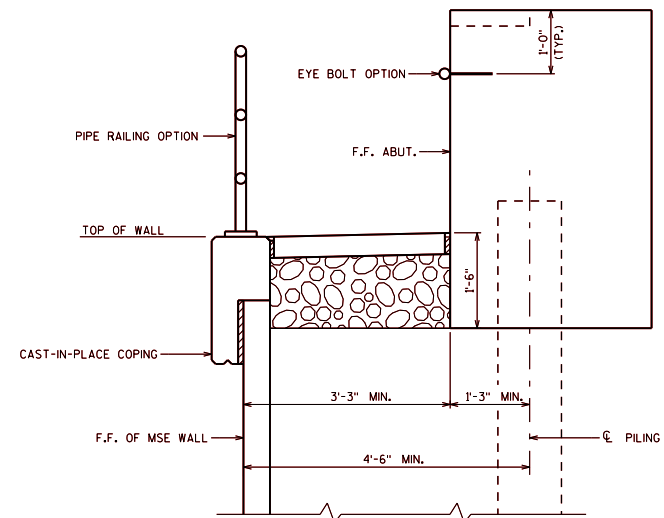
BR = --- KLF WS = --- KLF
TU = --- KLF WL = --- KLF

FOR SEMI-EXPANSION OR FIXED TYPE A1 ABUTMENTS:

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

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

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



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

TYPE A1 SEMI-EXPANSION ABUTMENT SHOWN

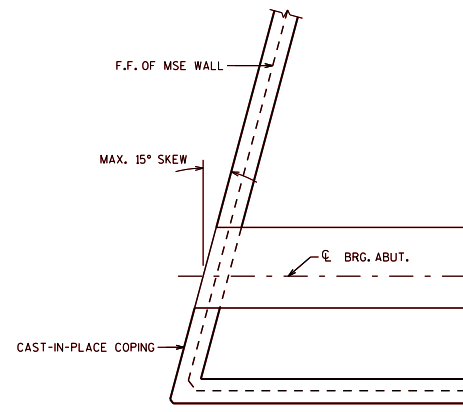
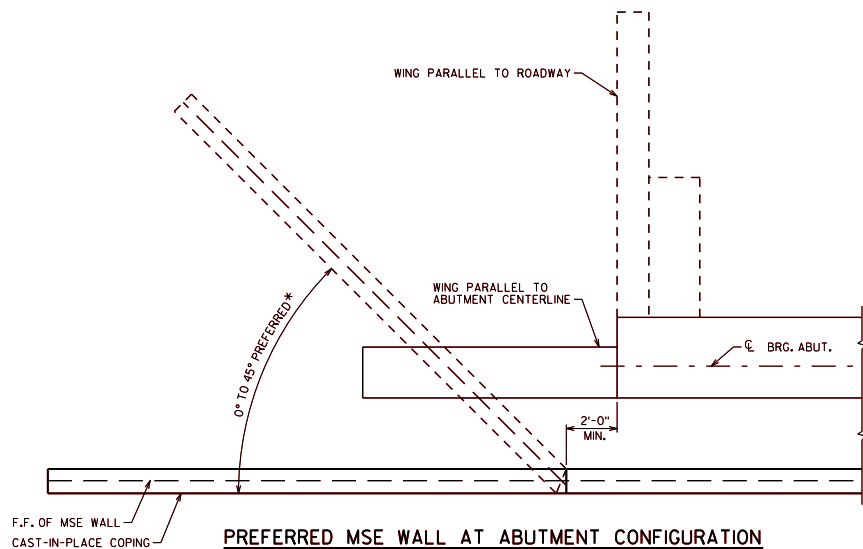
MSE WALL AT ABUTMENT



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-18

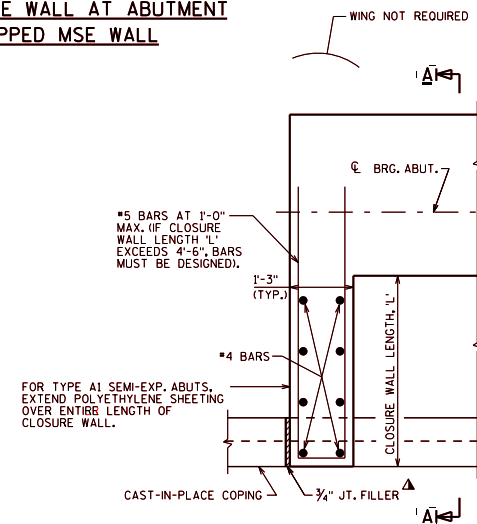
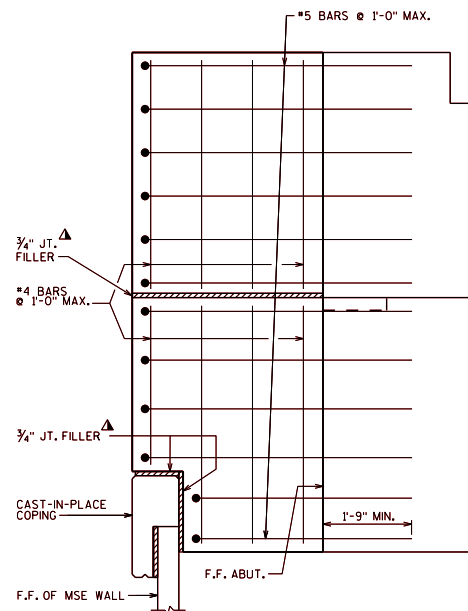
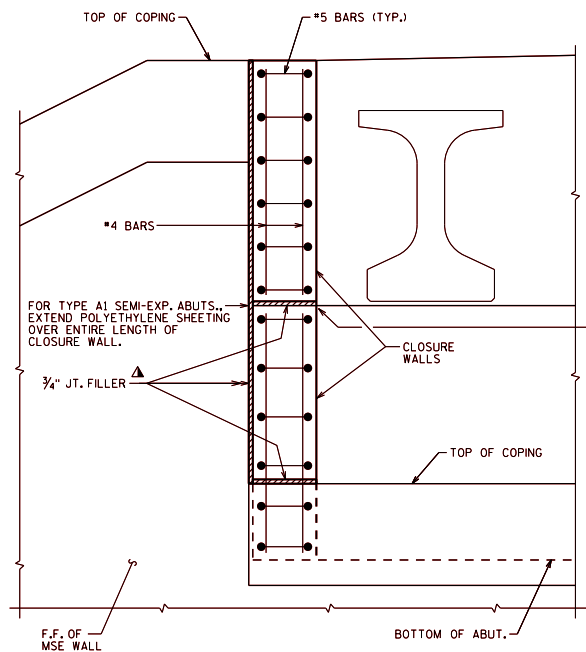


DESIGNER NOTES

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.



PLAN VIEW OF ALTERNATE MSE WALL AT ABUTMENT WITH CLOSURE WALL

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

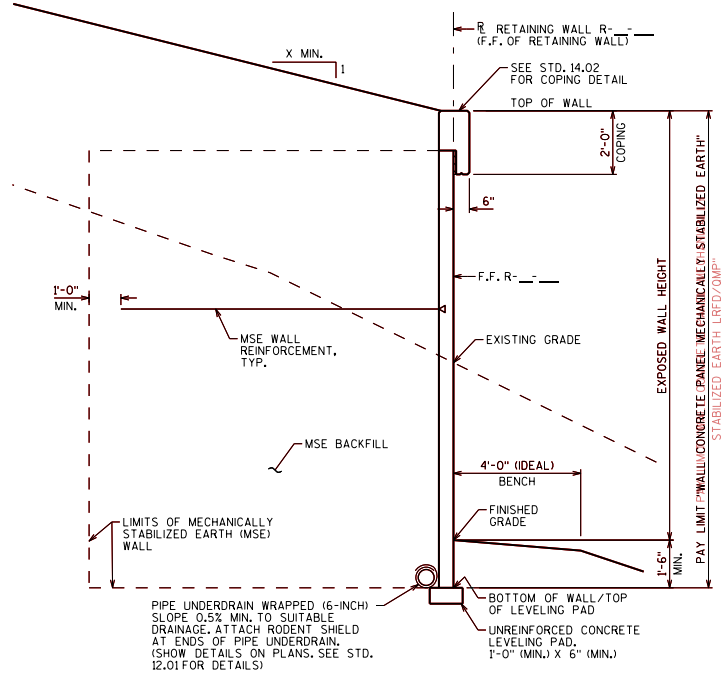
MSE WALL AT ABUTMENT LAYOUT DETAILS



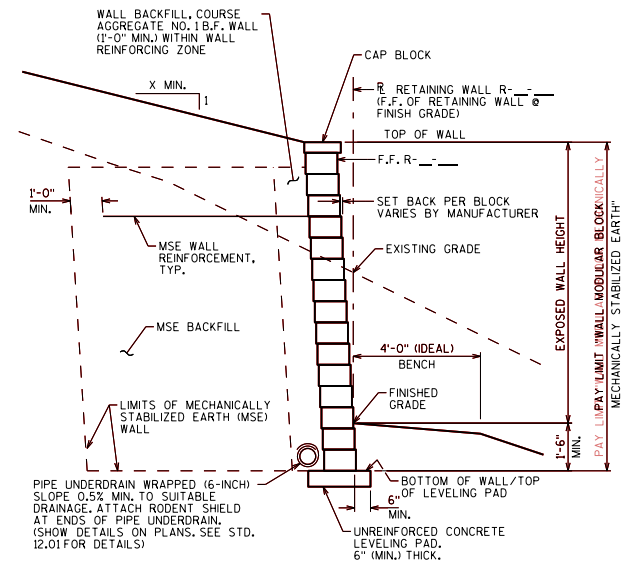
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17



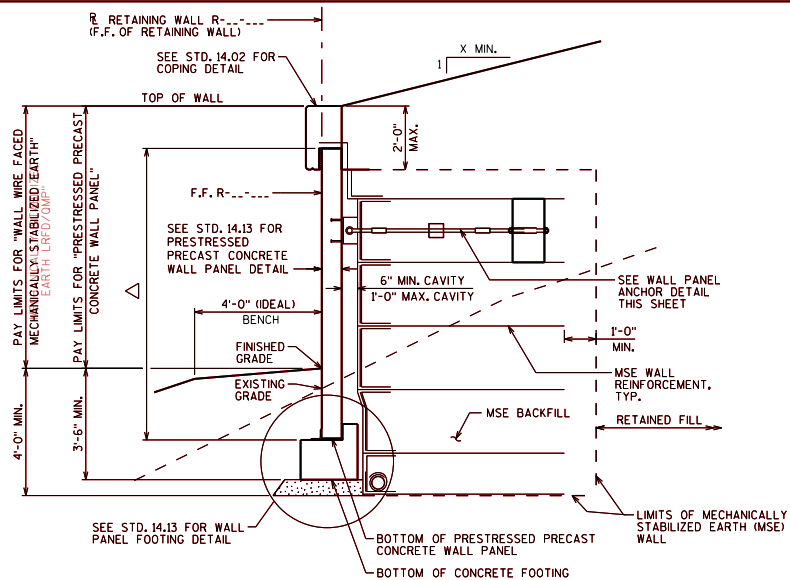
TYPICAL SECTION
(MSE WALL WITH CONCRETE PANEL FACING)



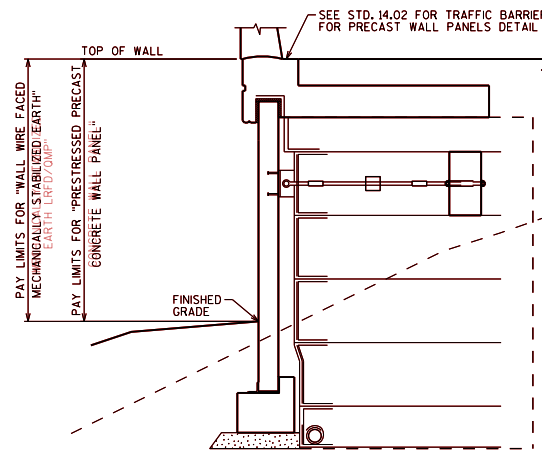
TYPICAL SECTION
(MSE WALL WITH MODULAR BLOCK FACING)

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**

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

MATERIAL PROPERTIES

CONCRETE MASONRY RETAINING WALLS	$f'_c = 3,500$ PSI
PRESTRESSED PRECAST CONCRETE WALL PANEL	$f'_c = 5,000$ PSI
BAR STEEL REINFORCEMENT GRADE 60	$f_y = 60,000$ PSI
STRUCTURAL CARBON STEEL - ASTM A36	$f_y = 36,000$ 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 THE BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL".

FORCES APPLIED TO THE DEADMAN ANCHOR MUST BE ACCOUNTED FOR IN THE DESIGN OF MSE REINFORCEMENT WHEN 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.

Z SHAPED W.W.F. CLOSURE PANEL EXTEND OVER PRESTRESSED

P2 SHAPED W.W.F. CLOSURE PANEL EXTEND OVER PRESTRESSED PRECAST CONCRETE WALL PANEL

TOP OF PRESTRESSED PRECAST CONCRETE WALL PANEL

ST6X25, SEE PANEL CONNECTION DETAIL THIS SHEET.

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

F.F. OF PRESTRESSED PRECAST CONCRETE WALL PANEL

PANEL THK. 1'-0" MAX. CAVITY

6'-0" MIN.

2'-0" MIN.

2'-0" MIN.

2'-0" MIN.

2'-0" MIN.

2'-0" MIN.

2'-0" MIN.

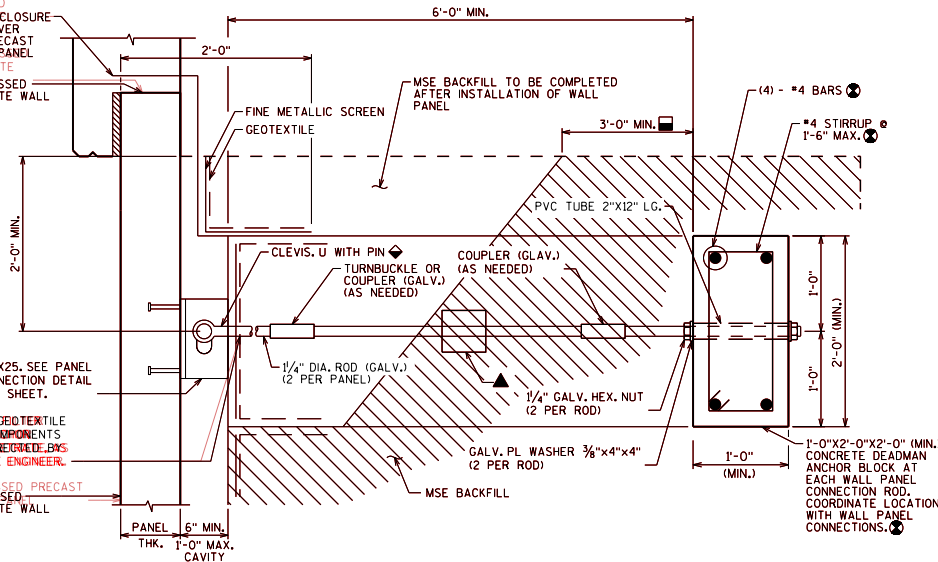
2'-0" MIN.

2'-0" MIN.

2'-0" MIN.

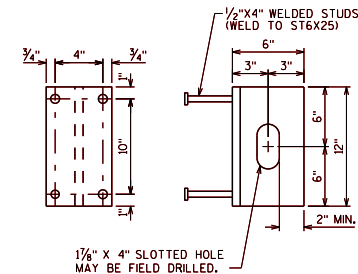
2'-0" MIN.

2'-0" MIN.



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" x 4" STUDS ANCHORED IN PRECAST CONCRETE PANEL. RESTORE ZINC COATING AROUND ANY WELDED AREAS. SUBMIT DETAILS FOR APPROVAL BY THE ENGINEER.

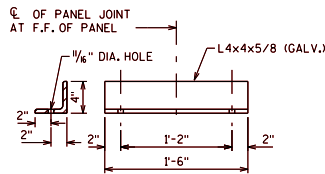
MSE WALL WIRE FACING 1



**BUREAU OF
STRUCTURES**

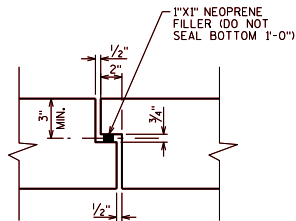
APPROVED: Bill Oliva

DATE:
1-18

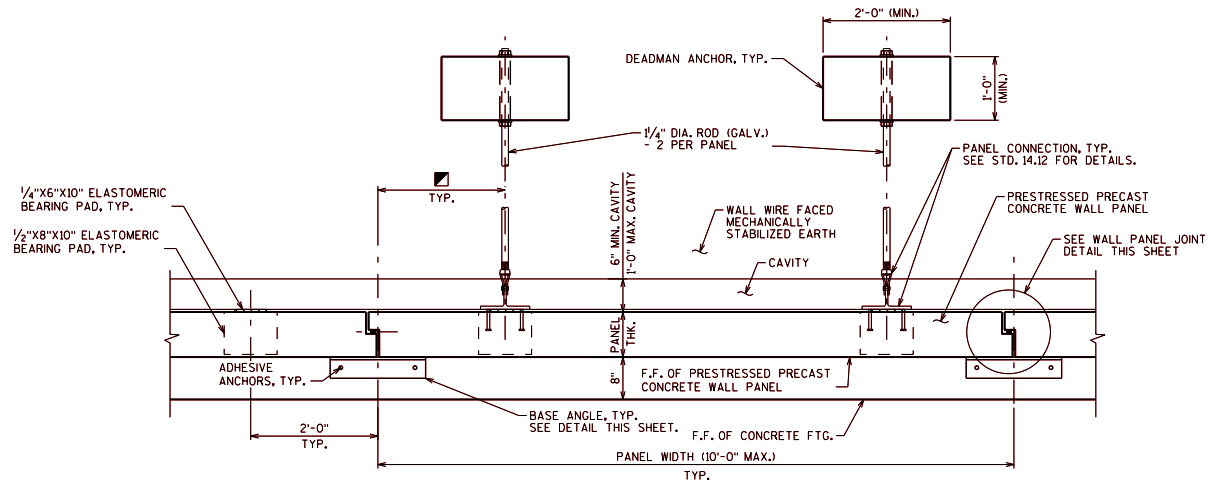


BASE ANGLE DETAIL

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

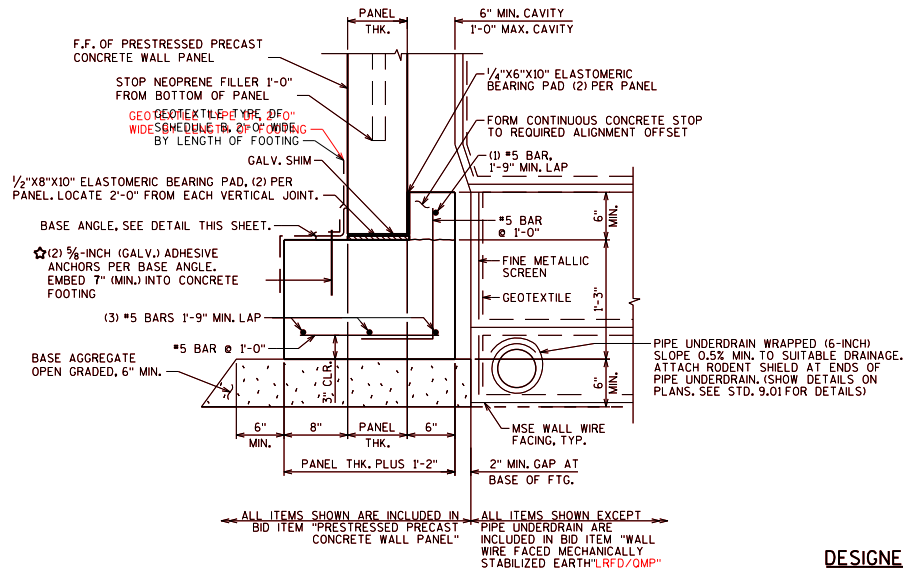


WALL PANEL JOINT DETAIL



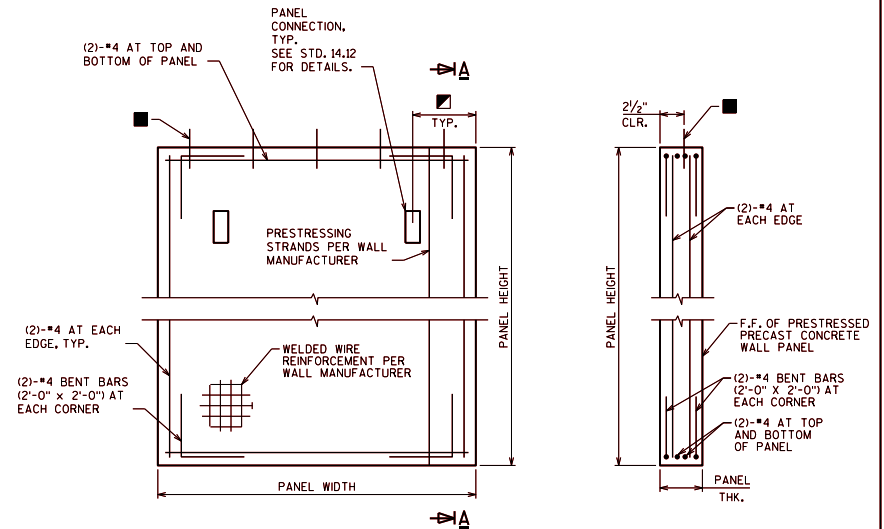
TYPICAL WALL PANEL CONNECTION - PLAN VIEW

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



WALL PANEL FOOTING DETAIL

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



ELEVATION PRESTRESSED PRECAST CONCRETE WALL PANEL

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

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

SECTION A-A

PRESTRESSING STRANDS NOT SHOWN FOR CLARITY.

DESIGNER NOTE

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

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

LEGEND

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

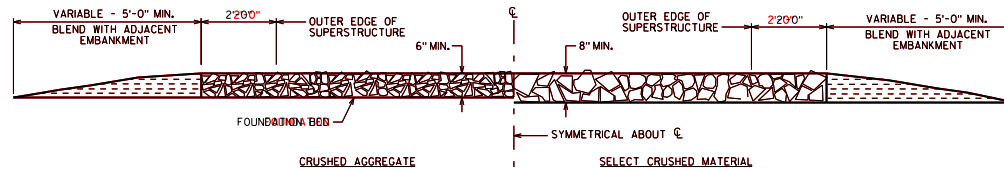
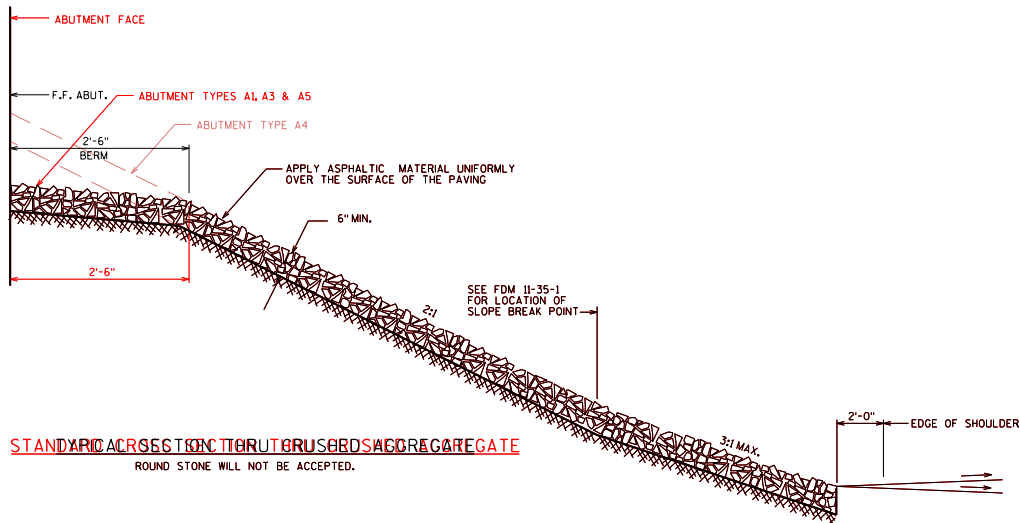
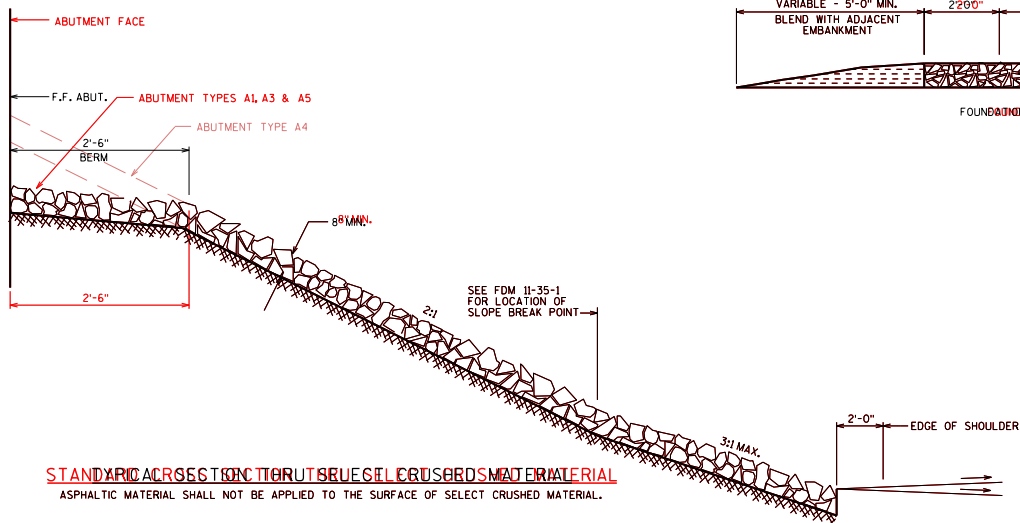
MSE WALL WIRE FACING 2



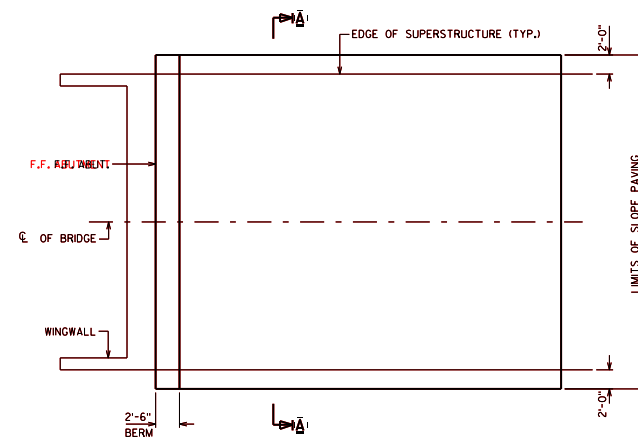
**BUREAU OF
STRUCTURES**

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DATE:
7-18



SECTION A-A



PLAN

NOTES

NO ITEM SHALL BE "SLOPE PAVING CRUSHED AGGREGATE" FOR "SLOPE PAVING SELECT CRUSHED MATERIAL" OF CONSTRUCTION, MATERIALS AND WORKMANSHIP MAY BE SHOWN ON THIS DRAWING OF "QUALITY UNACCEPTABLE" OF THE ENGINEER.

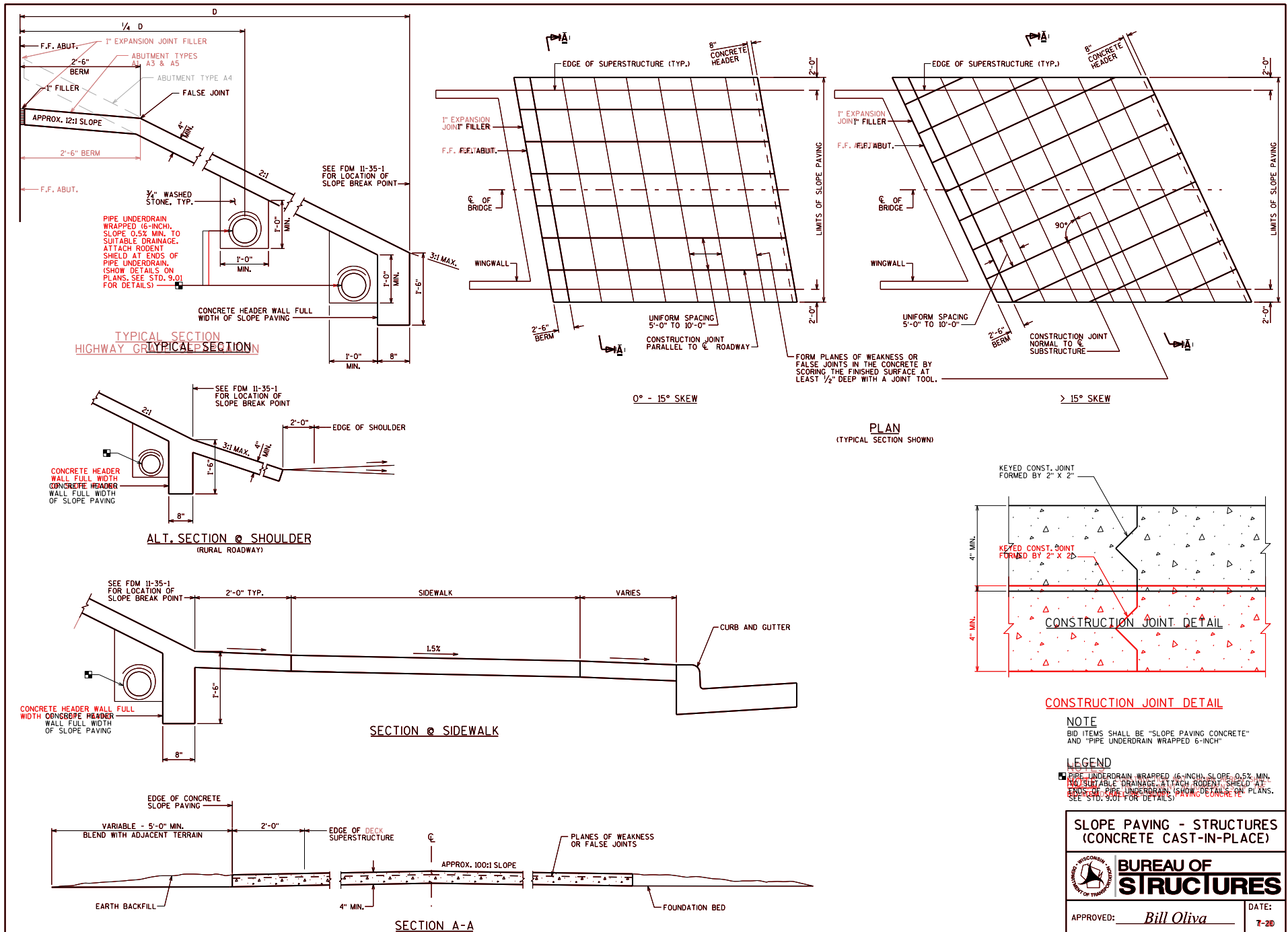
WOOD FORMS MAY BE LEFT IN PLACE WHEN OF DESIGNER'S CHOICE TO THE ENGINEER. PREFERRED SECTION SHOWN; FOR ALTERNATE SECTION SEE FDM II-35-1.

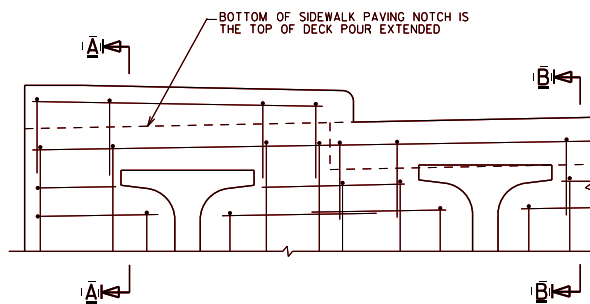
**SLOPE PAVING - STRUCTURES
(CRUSHED AGGREGATE &
SELECT CRUSHED MATERIAL)**



**BUREAU OF
STRUCTURES**

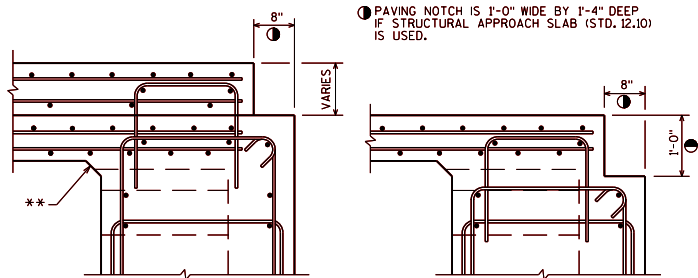
APPROVED: Bill Oliva DATE: 7-88





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.)

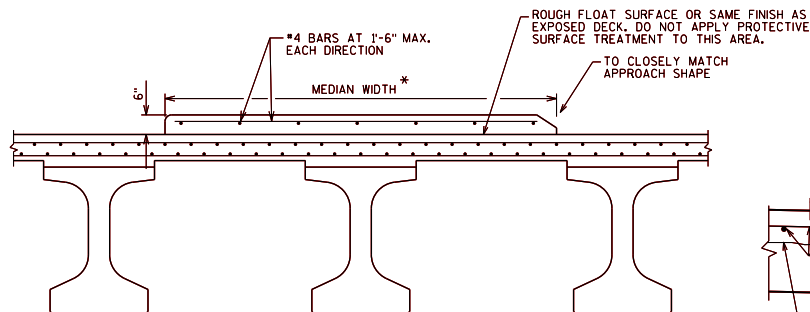


SECTION A-A

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

SECTION B-B

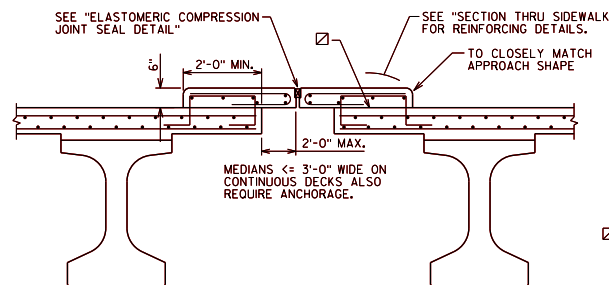
- SEE STANDARDS 19.33, 19.34, 19.35 FOR REINFORCEMENT DETAILS
- DETAILS SHOWN ARE FOR GIRDER STRUCTURES. SIMILAR REINFORCEMENT FOR SLAB STRUCTURES SHALL BE USED WITH A REMINDER THAT THE TRANSVERSE AND LONGITUDINAL REINFORCEMENT LAYERS ARE REVERSED.



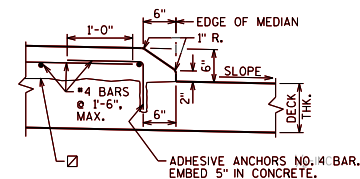
CROSS SECTION THRU UNANCHORED MEDIAN

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

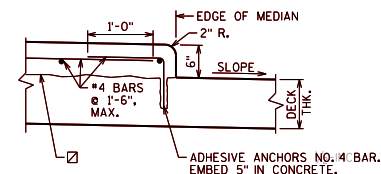
NOTE: CLEAN ALL LOOSE MATERIAL ON THE DECK AT THE MEDIAN LOCATION PRIOR TO MEDIAN PLACEMENT USING HIGH PRESSURE WATER OR AIR, ENSURING ALL FREE-STANDING WATER IS REMOVED PRIOR TO MEDIAN PLACEMENT. NEAT CEMENT IS REQUIRED AS PER 509.3.9.2 OF THE STANDARD SPECIFICATIONS UNLESS THE MEDIAN IS POURED WITHIN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



CROSS SECTION THRU MEDIAN WITH A JOINT

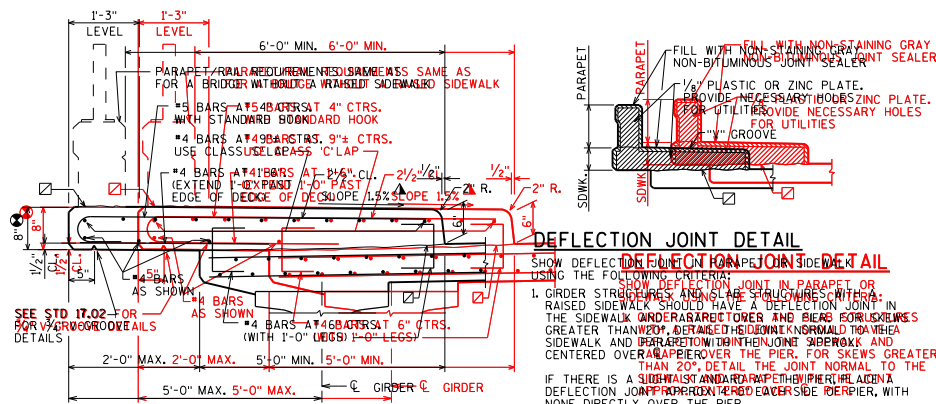


ANCHORED MEDIAN CURB DETAIL



ANCHORED MEDIAN CURB DETAIL

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



SECTION C-C THRU SIDEWALK

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.

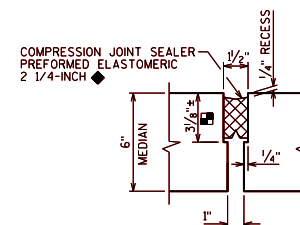
8" MIN. SIDEWALK THICKNESS ALSO REQ'D AT EDGE OF DECK/SLOPE.

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

DESIGNER'S 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

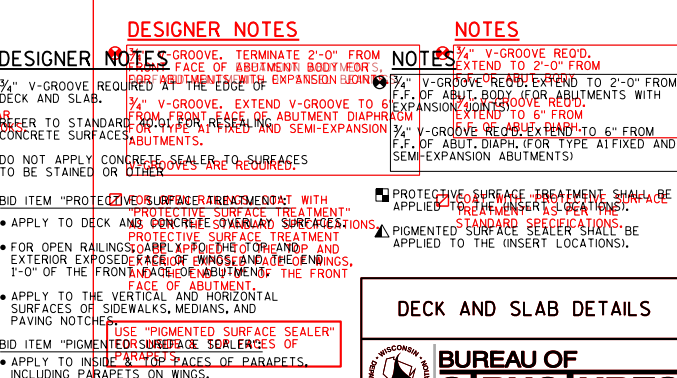
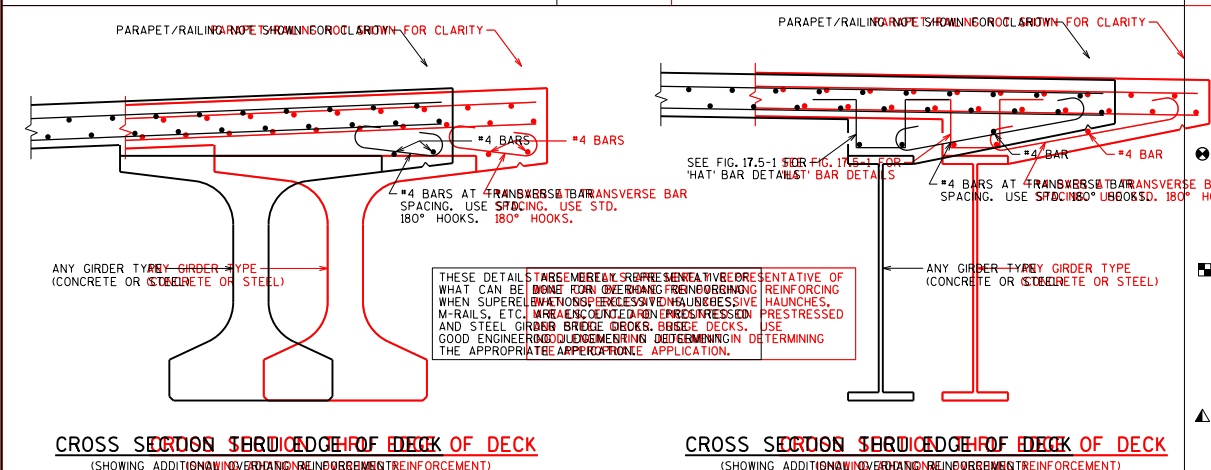
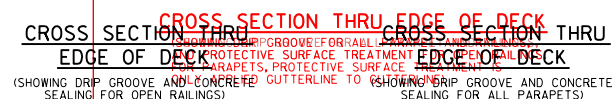


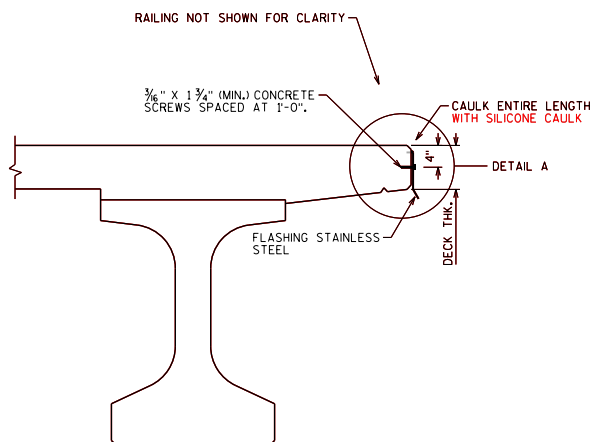
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STRUCTURES**

APPROVED: *Bill Oliva*

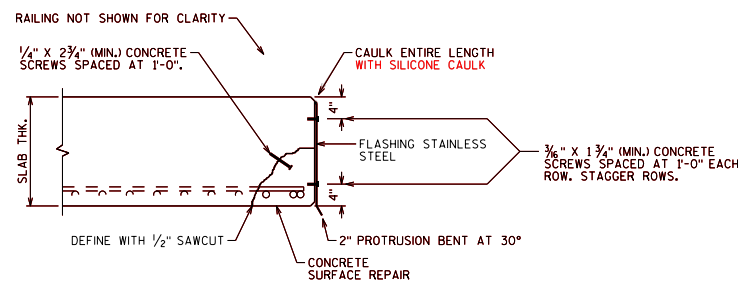
DATE:
1-22

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





THE BID ITEM "FLASHING STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STEEL STEEL FLASHING, SAULING 6% CONCRETE SCREWS AND EPOXY ANCHORING THE EDGE OF DECK PRIOR TO ACHIEVING THE FLASHING.



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.

THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE, PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, GALVNE/CAND, 1/4" CONCRETE SCREWS, AND BRASS ANCHORS AND COUPLERS OF EDGE DETAIL FOR ROCK PRIOR ATTACHMENT OF THE FLASHING.

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 A SLAB BRIDGE.

FOR A SL
NOTES

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

FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE
TREATMENT APPLICATION.

NOTES

NOTES CONCRETE SCREWS SHALL BE 410 STAINLESS STEEL.

THE BID ITEM FLASHING TO BE INSTALLED SHALL COM-
PREHEND PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING,
SLOPE FLASHING AND THE CONCRETE FIX SCREWS. **BELOW**
TOP OF DECK/SLAB SURFACE.
FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE
TREATMENT APPLICATION. A CONSTANT HEIGHT BASED
ON THE THINNESS SLAB DEPTH OVER THE BRIDGE LENGTH.
CONCRETE SCREWS SHALL BE 410 STAINLESS STEEL.

EXTEND FLASHING TO B.F. OF ABUTMENT DIAPHRAGM.

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

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
3/16" X 2" (MIN.) CONCRETE SCREWS.

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

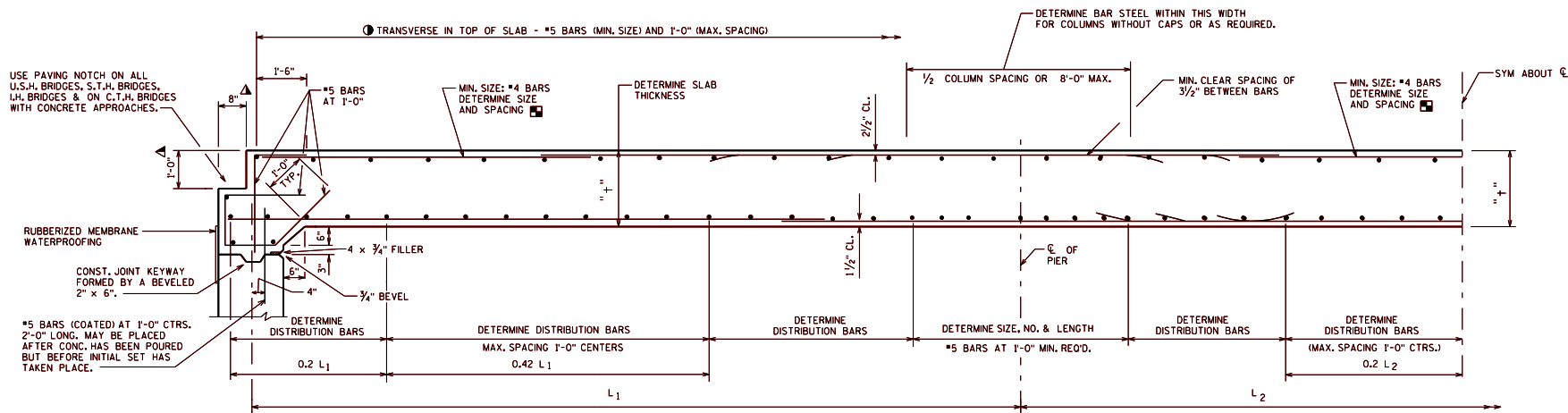
2" LEG. BEND TO FINAL POSITION AFTER FORMS ARE REMOVED.

DETAIL FOR CONCRETE SLAB BRIDGE SIMILAR

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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. OF ABUTMENTS, THE C. OF PIERS AND AT 5/10 PTS. TO VERIFY CAMBER. TAKE ELEVATIONS ALONG GUTTER LINES AND CROWN OR C. 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.

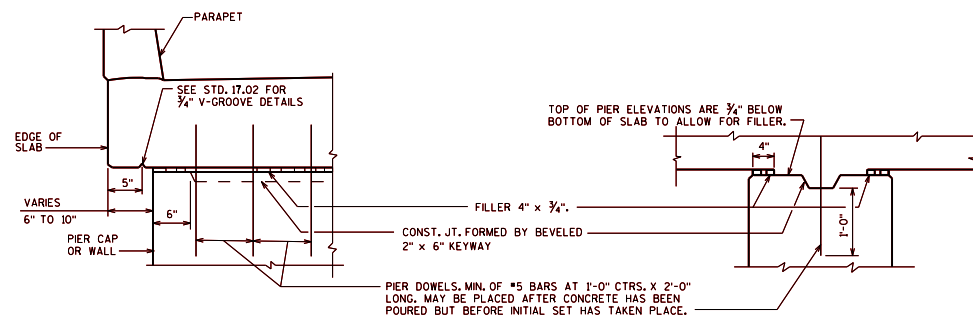
FLOOR DRAINS ARE TO BE OMITTED FROM SLAB STRUCTURES WHERE POSSIBLE. IF FLOOR DRAINS ARE REQUIRED, PLACE ONLY AT THE 2/10 AND 8/10 PTS. BEND MAIN REBARS PAST DRAINS - DO NOT CUT.

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 BEREBRENDE LINE (AND CROWN) AND SET EDGE SLOPES AS SLAB TAPER POINTS. SEE STD. 18.03

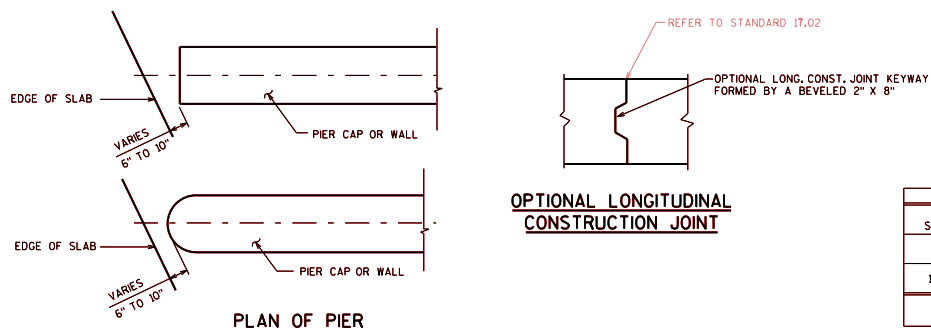
▲ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

■ 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.



OPTIONAL LONGITUDINAL CONSTRUCTION JOINT

PLAN OF PIER

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	

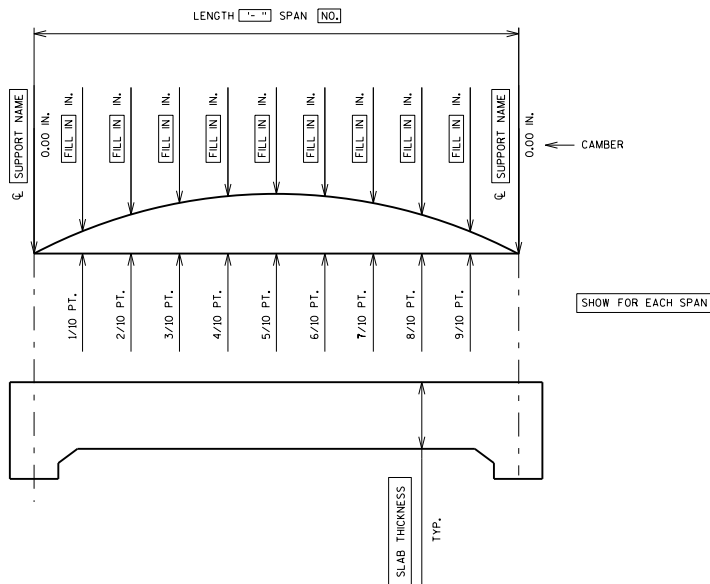
CONTINUOUS FLAT SLAB



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DATE:
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
FILL IN GUTTER			
SELECT CROWN AND/OR R			
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

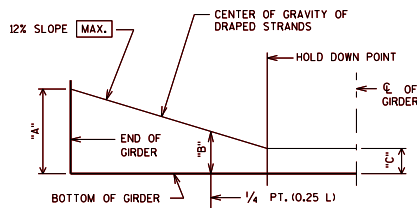
	℄ BRG. SUPPORT NAME	1/10	2/10	3/10	4/10	5/10	6/10	7/10	8/10	9/10	℄ BRG. SUPPORT NAME
FILL IN EDGE OF SLAB											
SELECT CROWN AND/OR R											
FILL IN EDGE OF SLAB											

CONCRETE SLAB DETAILS



**BUREAU OF
STRUCTURES**

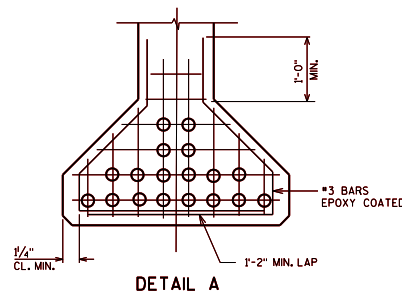
APPROVED: Bill Oliva DATE: 7-21



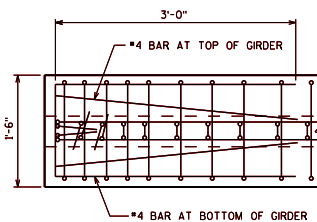
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = $\frac{1}{4}"A + 3"$ (MIN.)
 "C" = $\frac{1}{4}"A + 3"$ (MAX.)

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

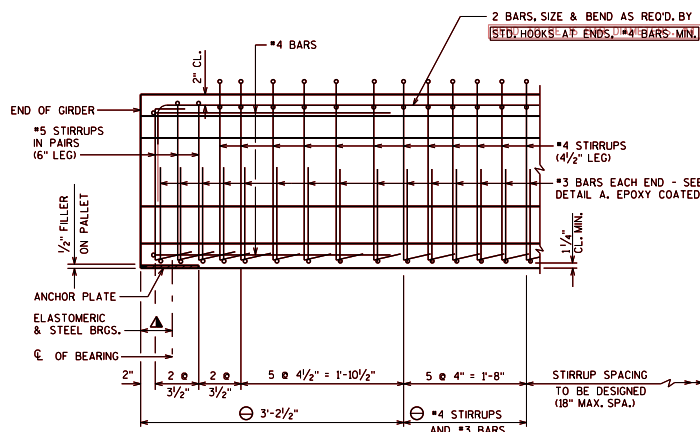
LOCATION OF DRAPED STRANDS



DETAIL A



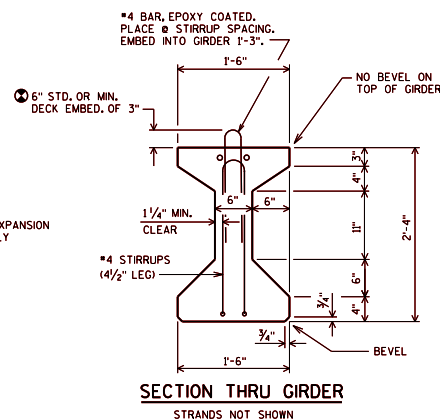
PLAN VIEW



SUPPORT WITH STEEL
OR ELASTOMERIC BRGS.

SUPPORT WITH
1/2" ELASTOMERIC BRG. PAD

SIDE VIEW OF GIRDER



SECTION THRU GIRDER

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 503.3.4 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. USE OF WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL. MIN. ULTIMATE STRENGTH OF 270,000 PSI.

PRESTRESSING STRANDS SHALL BE (1 DIA.) 7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE 1 28-INCH" A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE 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.

THE DESIGNER SHALL BASE THE DESIGN 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-L. 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).

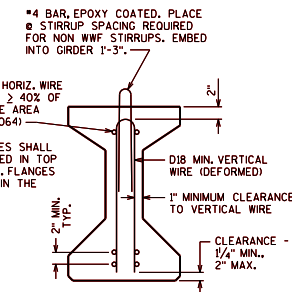
1. FROM ONLY ONE STRAND BASED ON THE PLANS AND STEEL BRGS. (STD. 27.09)

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

3. 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 *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 = TO KSI)

28" PRESTRESSED GIRDER DETAILS

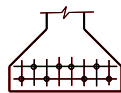


**BUREAU OF
STRUCTURES**

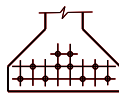
APPROVED: *Bill Oliva*

DATE:

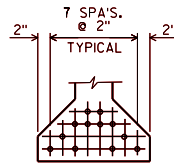
1-22



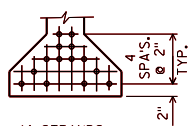
8 STRANDS



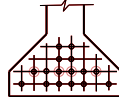
10 STRANDS



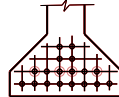
12 STRANDS



14 STRANDS



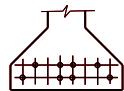
*16 STRANDS



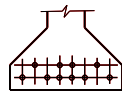
*18 STRANDS

* NEEDS BOND BREAKERS AT ENDS. SEE BOND BREAKER DETAIL.
* MAY REQUIRE DEBONDING AT ENDS, WHICH IS TO BE AVOIDED.
@ INDICATES STRAND TO BE DEBONDED

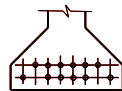
STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS (0.5" DIA. STRANDS MAY ALSO BE USED)



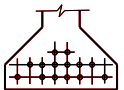
8 STRANDS



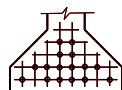
10 STRANDS



12 STRANDS



14 STRANDS



16 STRANDS



18 STRANDS

ARRANGEMENT AT $\frac{1}{4}$ SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS

28" GIRDER

$A = 312 \text{ SQ. IN.}$
 $r^2 = 91.95 \text{ IN.}^2$
 $y_T = 14.58 \text{ IN.}$
 $y_B = -13.42 \text{ IN.}$
 $I = 28,687 \text{ IN.}^4$
 $S_T = 1,968 \text{ IN.}^3$
 $S_B = -2,138 \text{ IN.}^3$
 $WT. = 325 \text{ \#/FT.}$

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
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = \underline{31.00 \text{ KIPS}}$
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = \underline{43.94 \text{ KIPS}}$
 $\frac{y_B}{r^2} = \frac{-13.42}{91.95} = -0.1459 \text{ IN./IN.}^2$
 $f_B (\text{init.}) = \frac{A_s f_s}{A} (1 + \frac{e_s y_B}{r^2})$

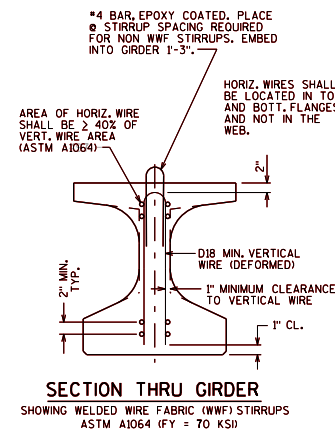
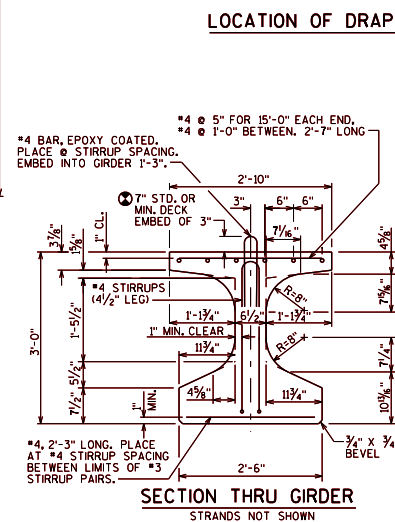
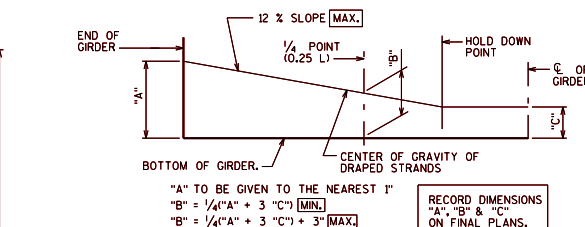
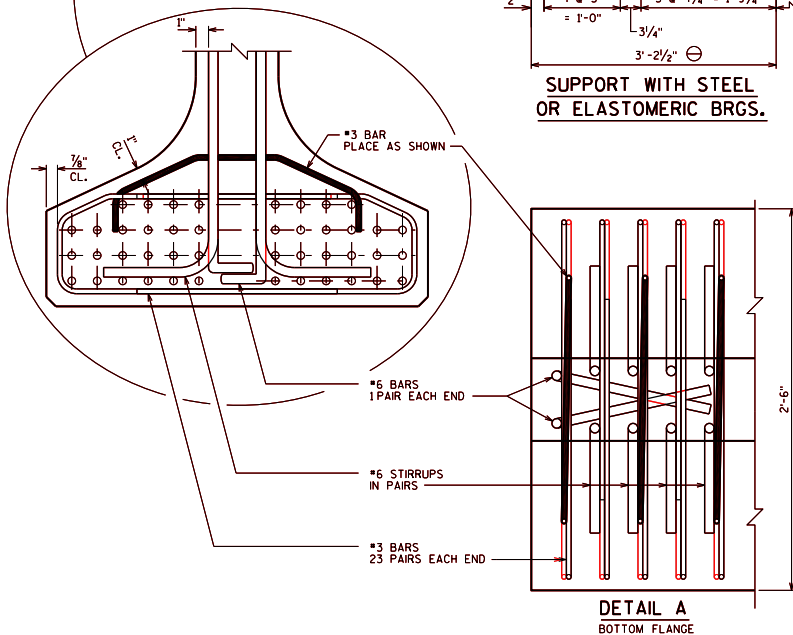
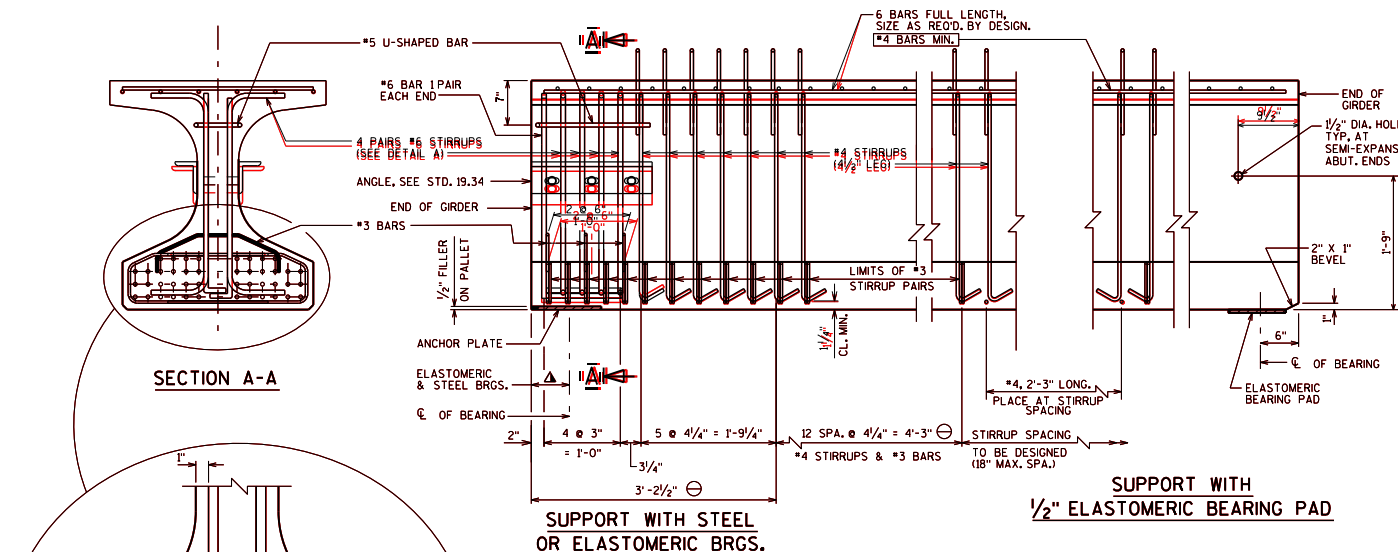
NO. STRANDS	e_s (inches)	$P(\text{init.}) = A_s f_s$ (KIPS)	$f_B (\text{init.})$ (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)			
8	-10.40	352	2.848
10	-9.80	439	3.428
12	-8.75	527	3.846
14	-7.99	615	4.269
*16	-9.42	703	5.395
*18	-9.64	791	6.102
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.5" DIA.)			
8	-10.42	248	2.008
10	-10.62	310	2.534
12	-10.42	372	2.715
14	-10.99	434	3.023
16	-9.42	496	3.775
18	-9.64	558	4.305

NO. STRANDS	e (inches)	$P(\text{init.}) = A_s f_s$ (KIPS)	$f_B (\text{init.})$ (K/sq.in.)
STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)			
8	-10.42	248	2.004
10	-10.62	310	2.534
12	-10.42	372	3.006
14	-10.0	434	3.421
16	-9.42	496	3.775
18	-9.64	558	4.305

DESIGNER NOTES

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

28" PRESTRESSED GIRDER DESIGN DATA	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-22</u>



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 503.3.4 OF STANDARD SPECIFICATIONS FOR GUIDANCE.

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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

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

DESIGNER NOTES

BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE 1 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.

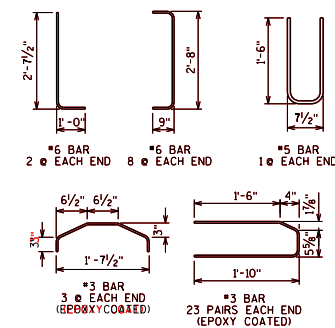
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.12 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE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

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

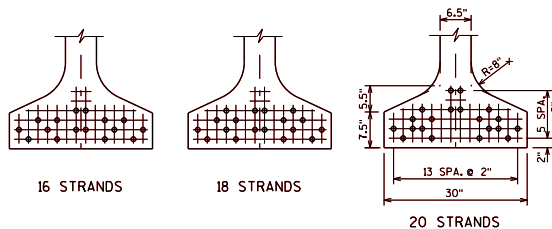
⊖ DETAIL TYPICAL AT EACH END

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

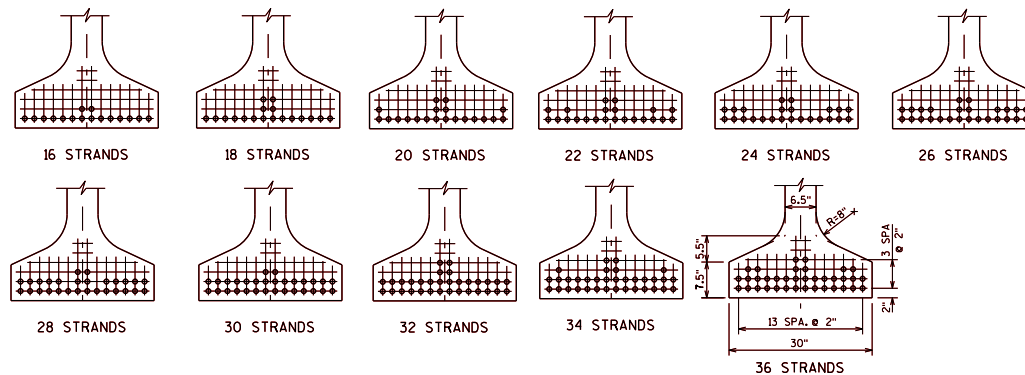
PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.



36W" PRESTRESSED GIRDER DETAILS	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-22</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 0.6" DIA. STRANDS

36W" GIRDER

$$A = 632 \text{ SQ. IN.}$$

$$r^2 = 158.20 \text{ IN.}^2$$

$$y_T = 19.37 \text{ IN.}$$

$$y_B = -16.63 \text{ IN.}$$

$$I = 99,980 \text{ IN.}^4$$

$$S_T = 5,162 \text{ IN.}^3$$

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

$$\text{WT.} = 658 \text{ \# / FT.}$$

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

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

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

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

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

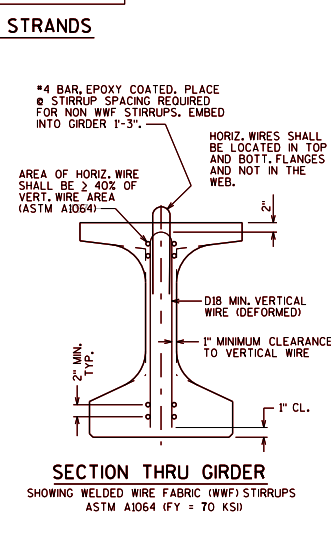
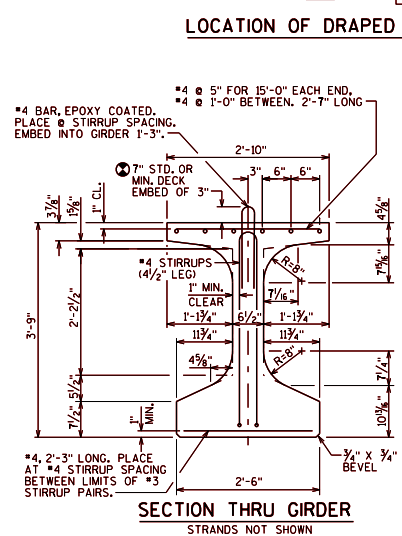
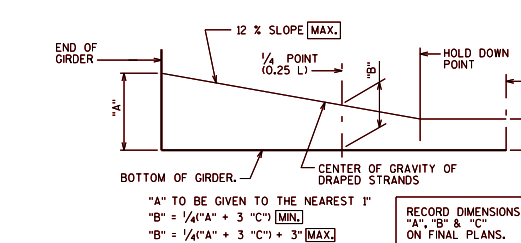
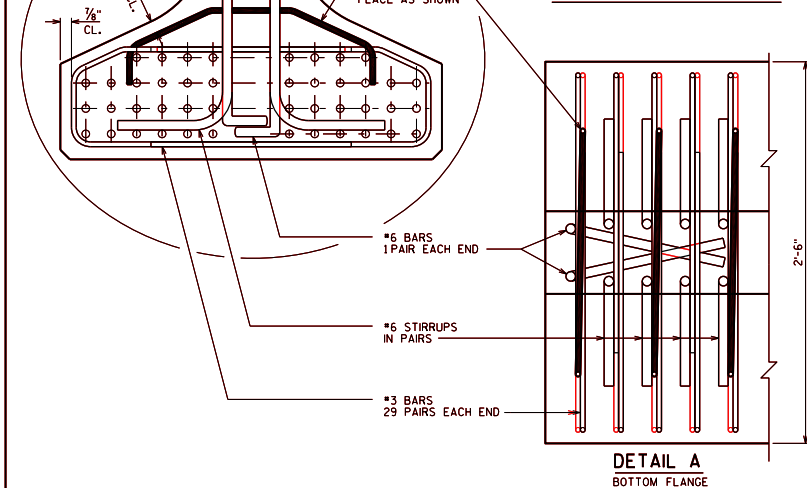
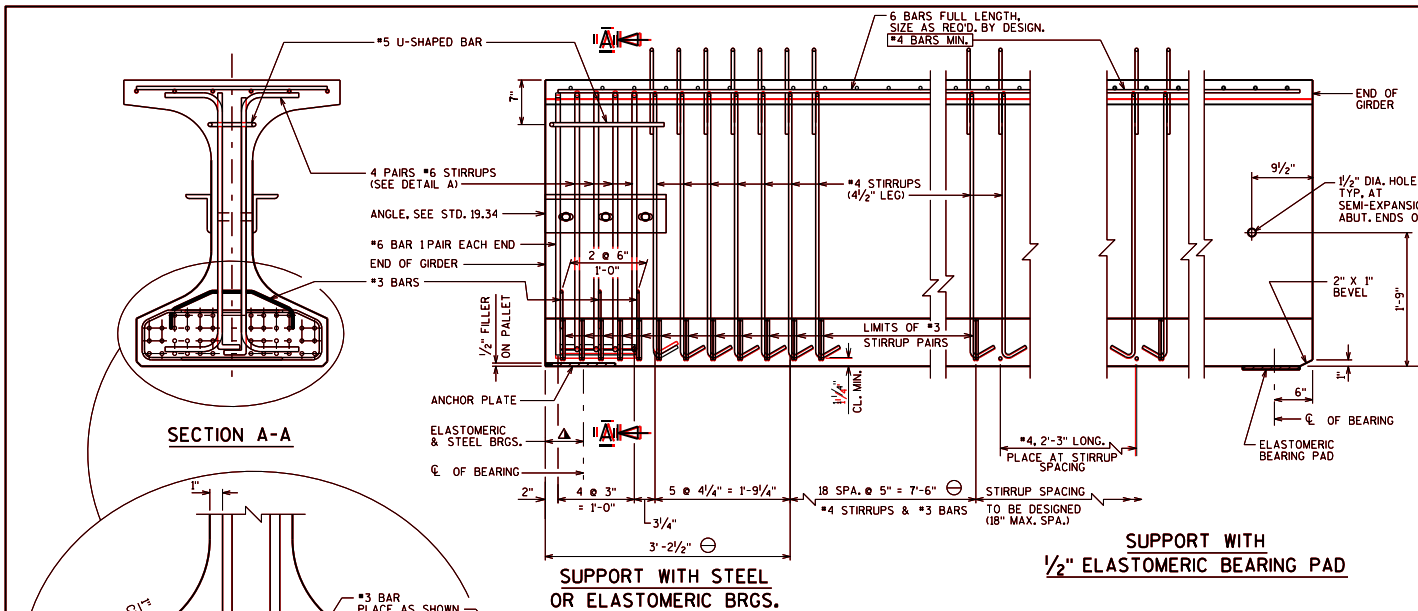
36W" PRESTRESSED GIRDER DESIGN DATA



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-12



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 503.3.9 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 II, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

AN EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES MAINTENANCE SECTION. IF USED, WWF SUBSTITUTION DETAILS SHALL BE SUBMITTED ELECTRONICALLY TO THE WSDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

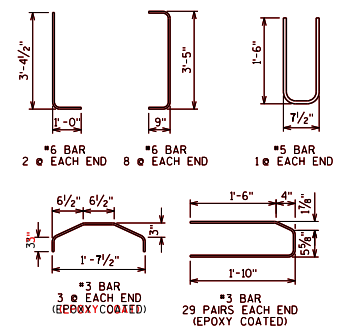
PRESTRESSING STRANDS SHALL BE 0.6" DIA., 7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI. BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE 145W-INCH".

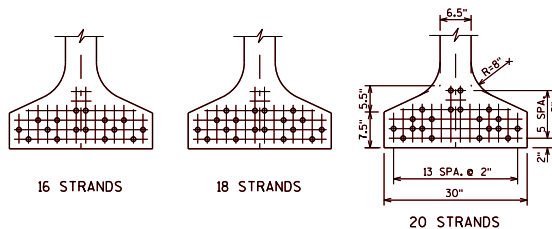
DESIGNER NOTES

THIS REINFORCEMENT SHALL BE AS REQUIRED BY DESIGN FROM A BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE 145W-INCH" RELEASE STRENGTH IS 6800 PSI, USE 0.6" DIA. STRAND FOR ALL PATTERNS. 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 16 GIRDER 19.14 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1 USING DIFFERENT STRAND REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.14 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1 USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE D, 27.09) BUREAU OF STRUCTURES.

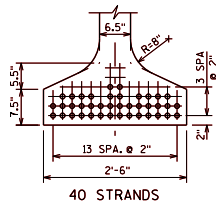
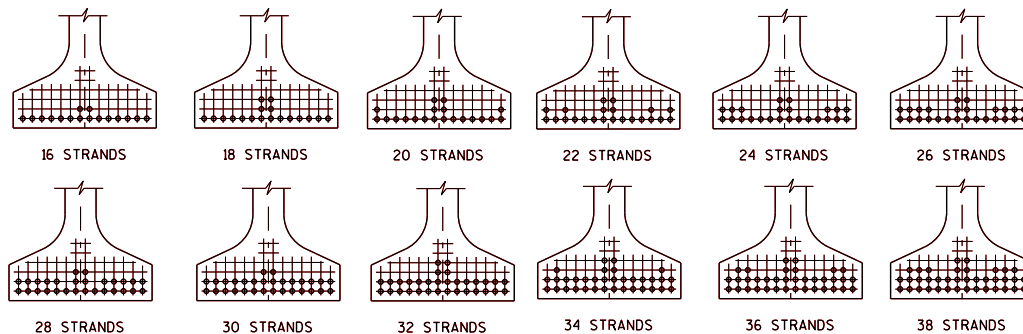
DETAIL TYPICAL AT EACH END
VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)
THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH
DETAIL TYPICAL AT EACH END PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER INCLUDING THE CAMBER MULTIPLIER OF 1.4.
THE DESIGN ENGINEER 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 ORDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ± 3/4" OF VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

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





**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

45W" GIRDER

$A = 692 \text{ SQ. IN.}$

$r^2 = 258.70 \text{ IN.}^2$

$y_T = 24.26 \text{ IN.}$

$y_B = -20.74 \text{ IN.}$

$I = 178,971 \text{ IN.}^4$

$S_T = 7,377 \text{ IN.}^3$

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

$WT. = 721 \text{ #/FT.}$

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 = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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

(COMPRESSION IS POSITIVE)			
NO. STRANDS	e _s (inches)	P (ini t.)=A _s f _s (KIPS)	f _B (ini t.) (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.

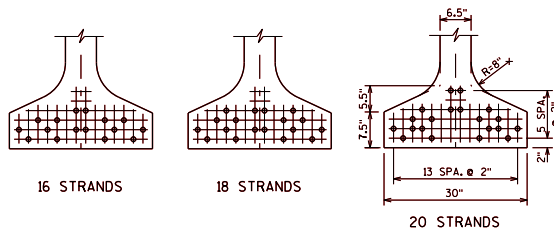
45W" PRESTRESSED GIRDER DESIGN DATA



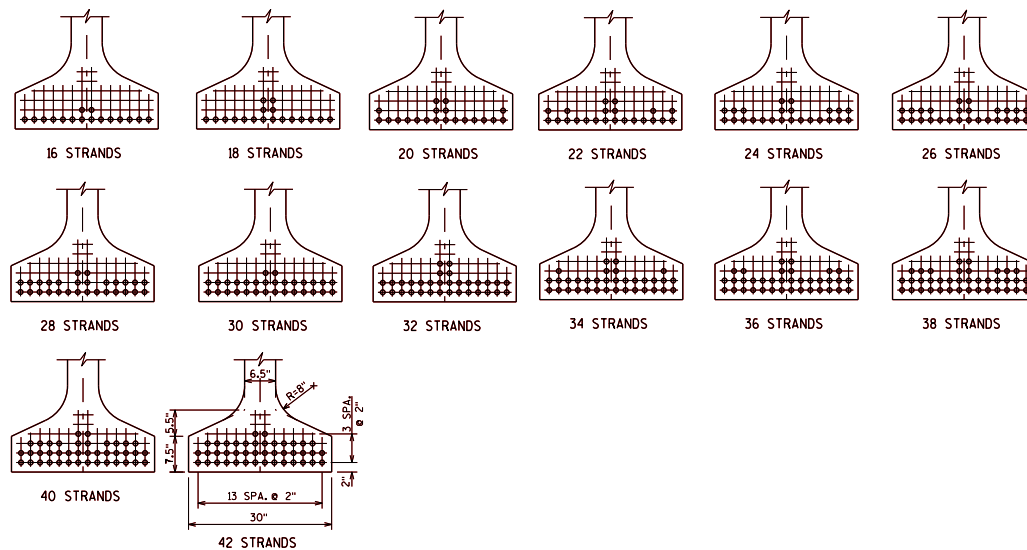
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-14



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

54W" GIRDER

$$A = 798 \text{ SQ. IN.}$$

$$r^2 = 402.41 \text{ IN.}^2$$

$$y_T = 27.70 \text{ IN.}$$

$$y_B = -26.30 \text{ IN.}$$

$$I = 321,049 \text{ IN.}^4$$

$$S_T = 11,592 \text{ IN.}^3$$

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

$$\text{WT.} = 831 \text{ * /FT.}$$

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

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

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

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

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

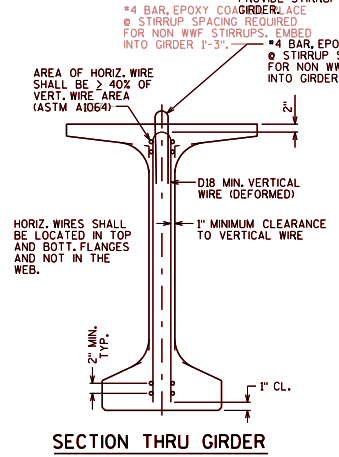
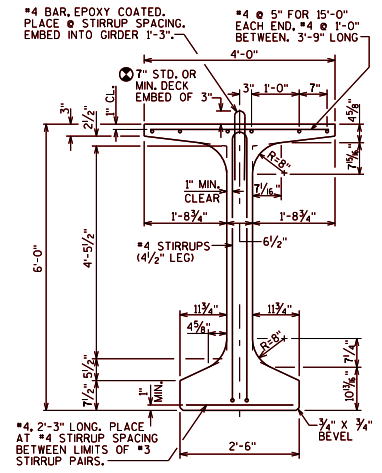
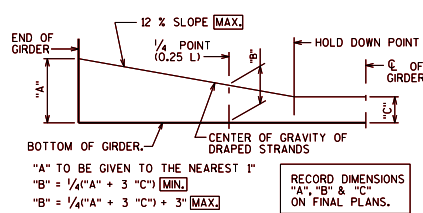
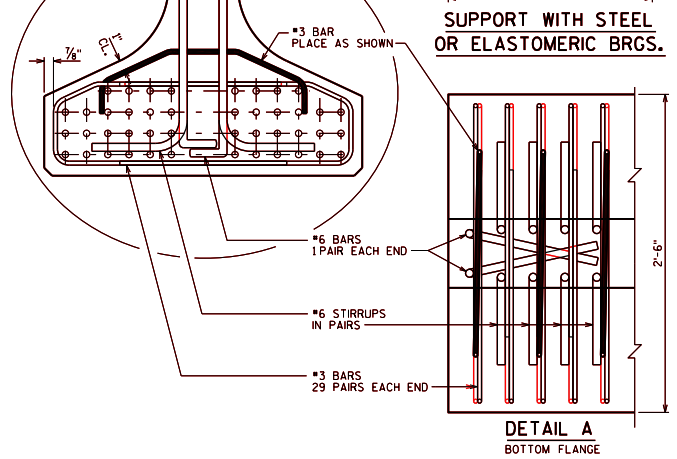
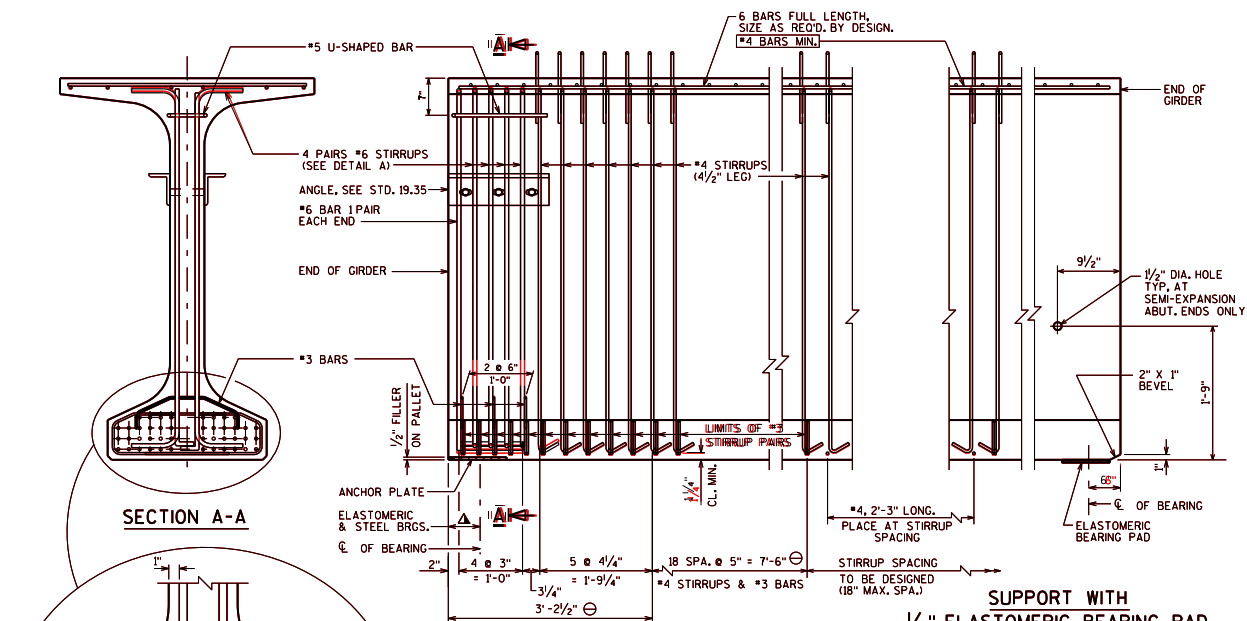
54W" PRESTRESSED GIRDER DESIGN DATA



**BUREAU OF
STRUCTURES**

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 III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

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

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

FOR THE 72W GIRDER, THE STRANDS ARE REINFORCED.

THIS NOTE APPLIES TO LONG SPANS AS DEFINED IN THE NOTES FOR THE 72W GIRDER, TABLE 19.3-2 OF THE BRIDGE MANUAL. CONTRACTOR IS RESPONSIBLE FOR STORAGE, HANDLING, AND TRANSPORTING. THIS GIRDER IS REINFORCED TO ALLOW A MAXIMUM OVERHANG FROM THE LIFTING LOCATION OR POINT OF SUPPORT OF UP TO 1/10 THE GIRDER LENGTH. THE CONTRACTOR IS RESPONSIBLE FOR LATERAL STABILITY OF THE GIRDER UNTIL THE DECK IS CURED. (IF NOTE DOES NOT APPLY, REFERENCE SECT. 503.3.4 OF STD. SPEC. FOR GUIDANCE.)

DO NOT SHALL BE PRESTRESSED GIRDER TYPE 172W INCH.

DESIGNER NOTES

THE GIRDER SHALL BE CAST AS REQUIRED BY DESIGN FROM A BID ITEM SHALL BE PRESTRESSED GIRDER TYPE 172W INCH. THE GIRDER SHALL BE CAST AS REQUIRED BY DESIGN FROM A BID ITEM SHALL BE PRESTRESSED GIRDER TYPE 172W INCH. THE GIRDER SHALL BE CAST AS REQUIRED BY DESIGN FROM A BID ITEM SHALL BE PRESTRESSED GIRDER TYPE 172W 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 6,000 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8. 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 19.3B AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT. 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. EMBED INTO GIRDER 1'-3".

#4 BAR, EPOXY COATED. PLACE @ STIRRUP SPACING. 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.

1" MINIMUM CLEARANCE TO VERTICAL WIRE

D18 MIN. VERTICAL WIRE (DEFORMED)

2" MIN. TYP.

1" CL.

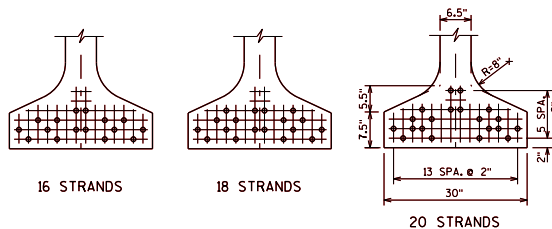
72W" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

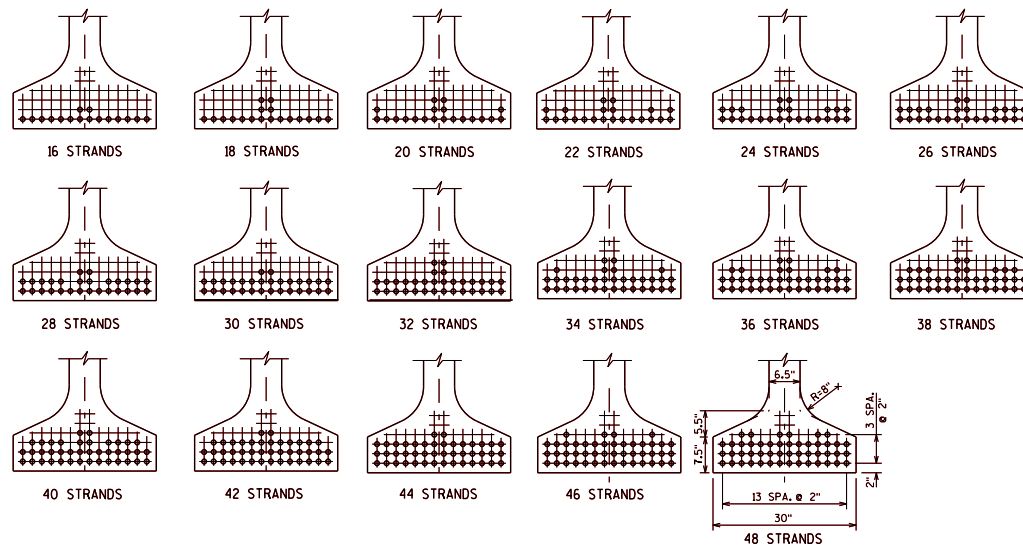
APPROVED: *Bill Oliva*

DATE: *1-22*

STANDARD 19.17



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



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

72W" GIRDER

$$A = 915 \text{ SQ. IN.}$$

$$r^2 = 717.5 \text{ IN.}^2$$

$$y_T = 37.13 \text{ IN.}$$

$$y_B = -34.87 \text{ IN.}$$

$$I = 656,426 \text{ IN.}^4$$

$$S_T = 17,680 \text{ IN.}^3$$

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

$$\text{WT.} = 953 \text{ \#/FT.}$$

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

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

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

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

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

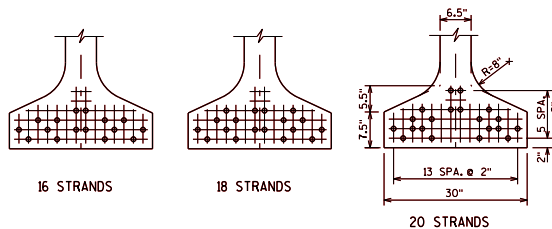
72W" PRESTRESSED GIRDER DESIGN DATA



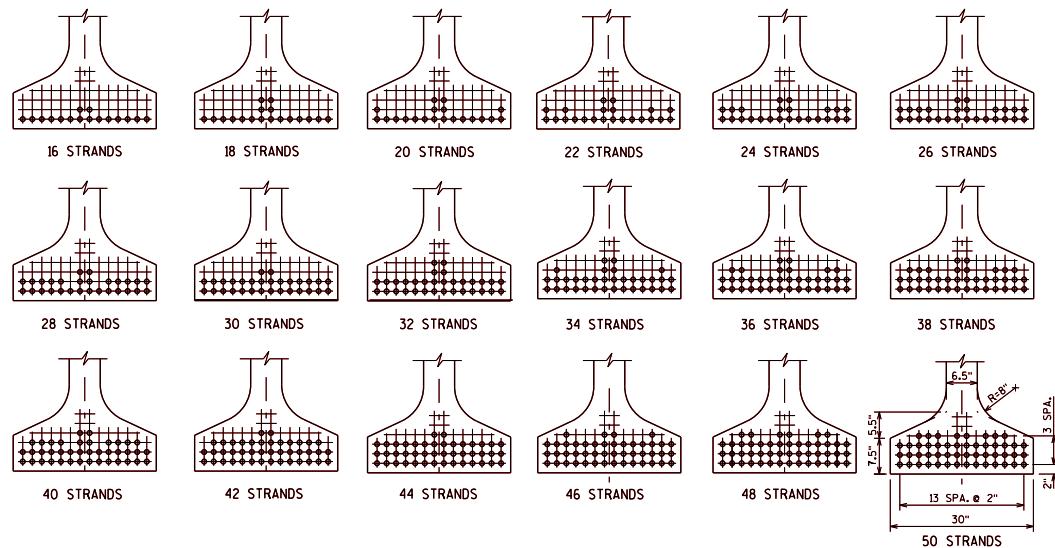
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-18



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

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 = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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

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

DESIGNER NOTES

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

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

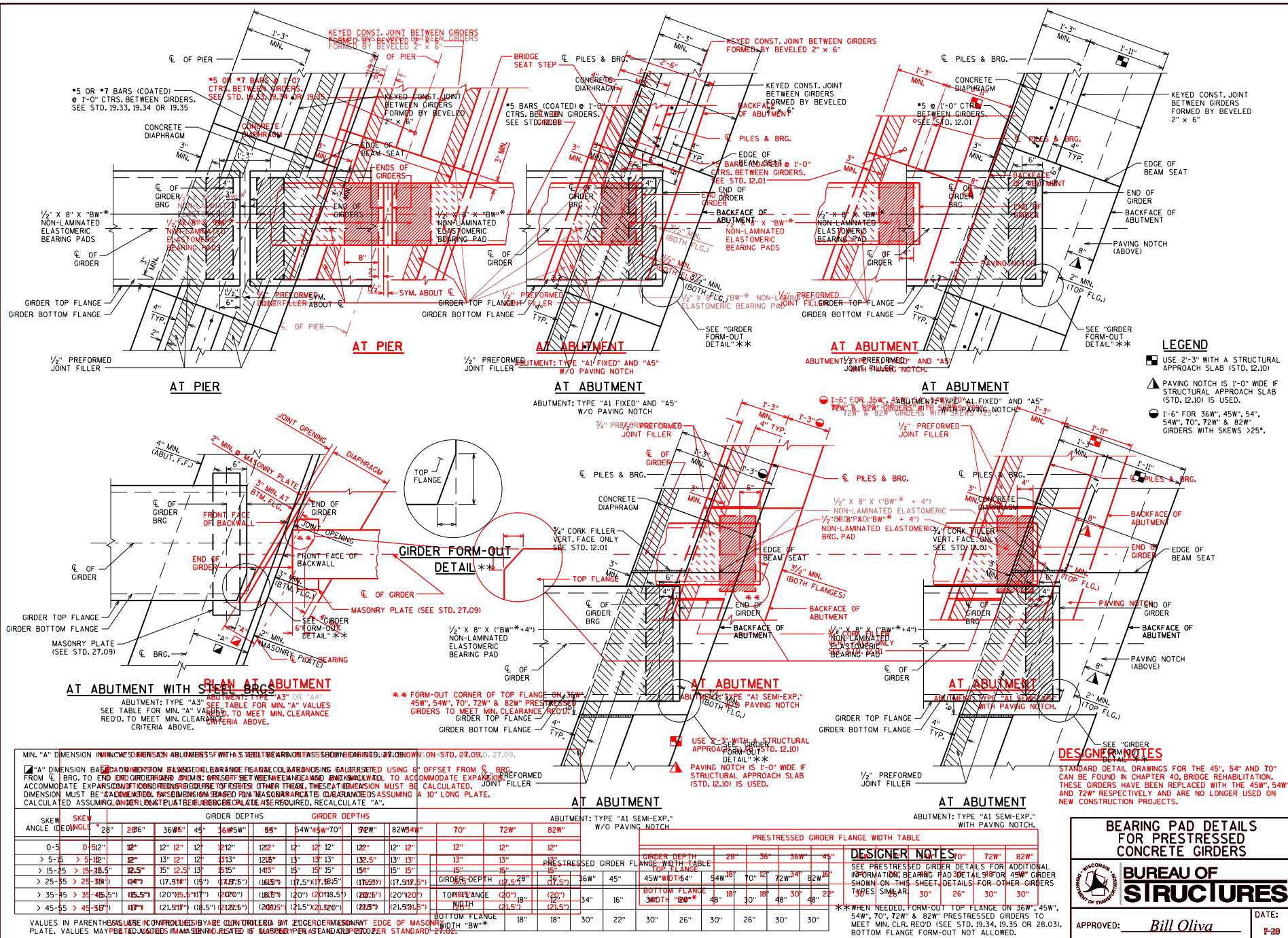
82W" PRESTRESSED GIRDER DESIGN DATA

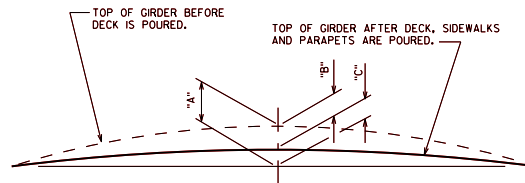
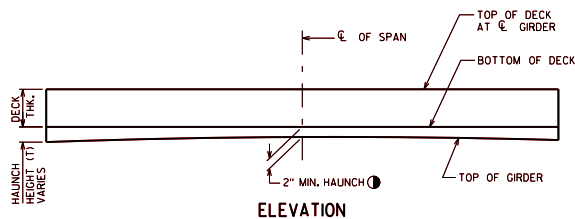


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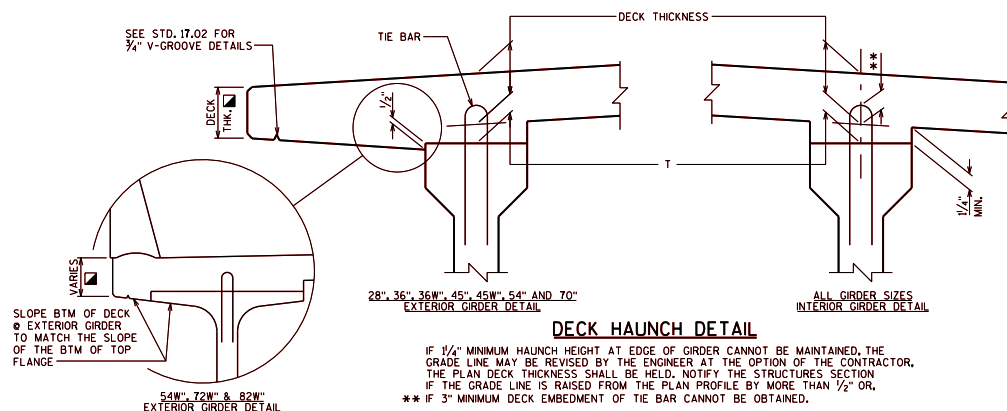
APPROVED: Bill Oliva

DATE:
7-17





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



IF 1/2" 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 C. 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".

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.

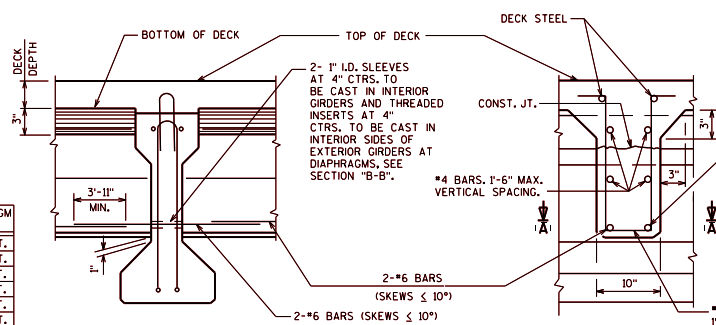
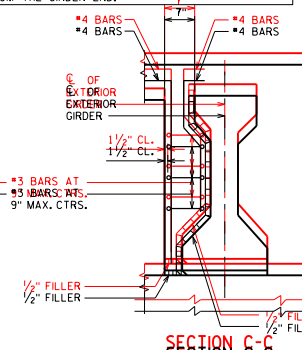
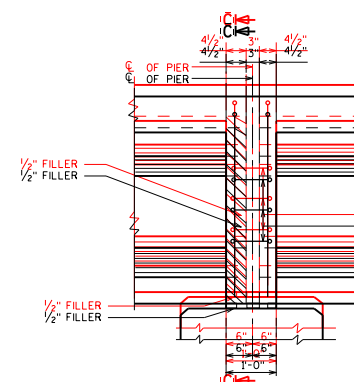
FOR SKEWS $\leq 10^\circ$, PLACE INTERMEDIATE DIAPHRAGMS IN A STRAIGHT LINE. REFER TO STANDARD 19.36, PROVIDE OFFSET FOR SKEWS $> 10^\circ$.

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

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

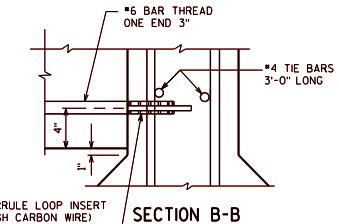
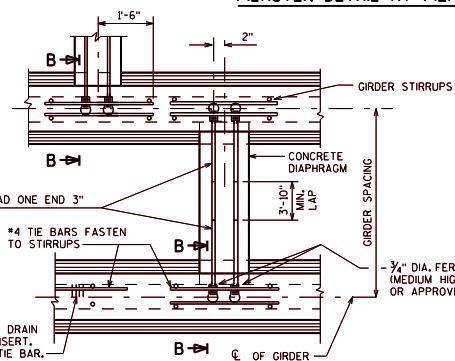
DIAPHRAGM SPACING FOR SPANS $\leq 80'-0"$ PLACE ONE DIAPHRAGM AT MIDLENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS OF THE GIRDER LENGTH.

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



ELEVATION OF DIAPHRAGM

SECTION A-A



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

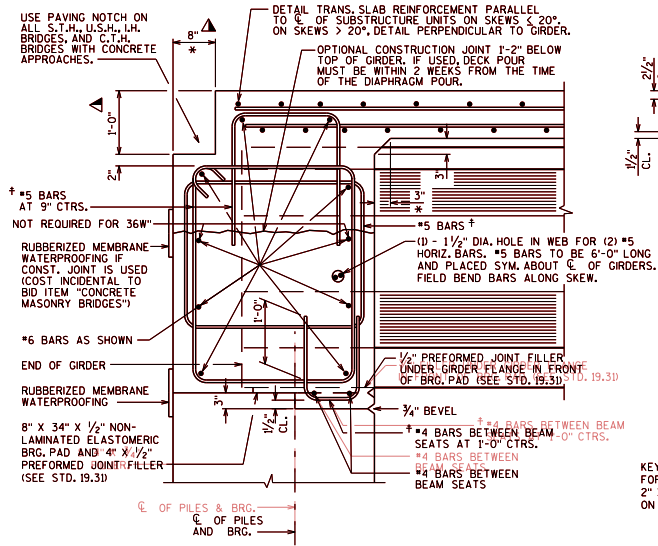
PRESTRESSED GIRDER DETAILS



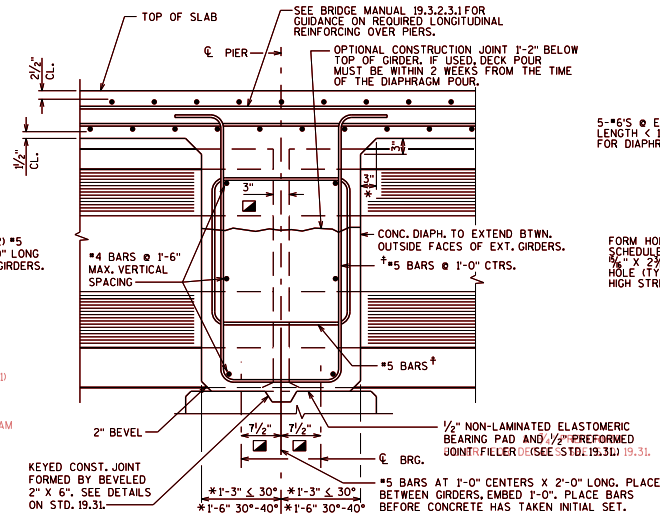
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

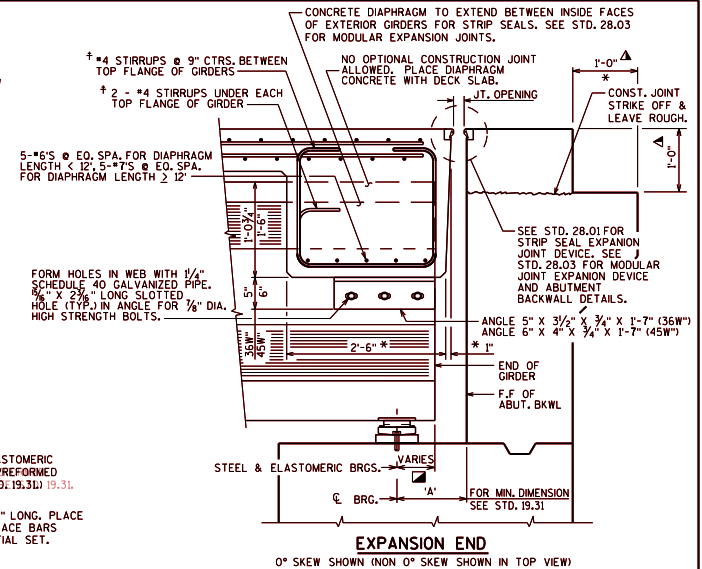
DATE: 1-19



PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT

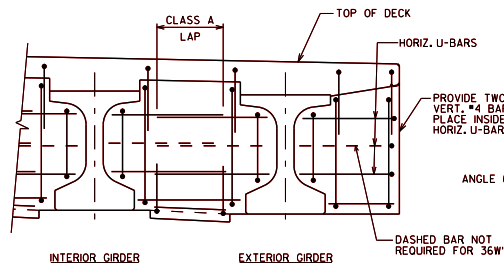


DIAPHRAGM AT 1/2" ELASTOMERIC BEARING

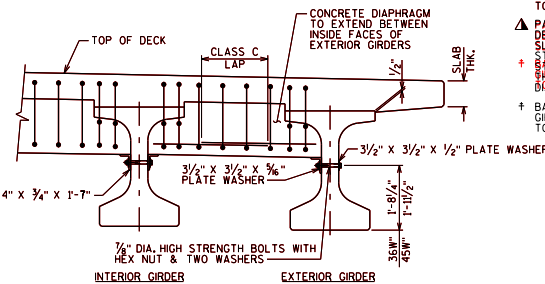


LEGEND

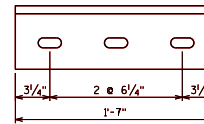
- $\square$ DIMENSION IS TAKEN PARALLEL TO ϕ GIRDER.
- * DIMENSION IS TAKEN NORMAL TO ϕ SUBSTRUCTURE UNITS.
- Δ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD. 12.12) FOR BRIDGE SECTION AND APPROX. ABUT. DIAPH. GIRDERS.
- $\dagger$ BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ϕ GIRDERS.



PART TRANSVERSE SECTION AT DIAPHRAGM SEMI-EXPANSION END



PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END

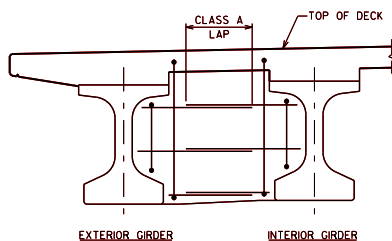


NOTES

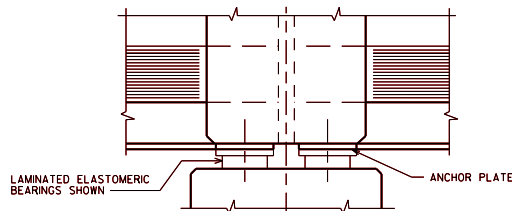
- ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "CONCRETE MASONRY BRIDGES".
- DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.
- ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.
- STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION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

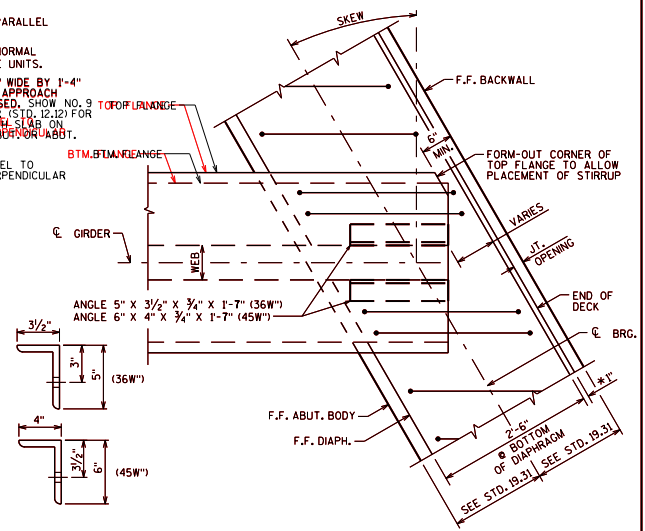


PART TRANSVERSE SECTION AT DIAPHRAGM PIER



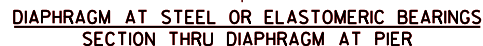
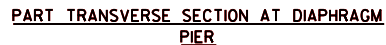
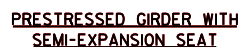
DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

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



TOP VIEW OF DIAPHRAGM (EXPANSION END)

PRESTRESSED 36W" & 45W" GIRDER SLAB & SUPERSTRUCTURE DETAILS	
BUREAU OF STRUCTURES	DATE: 1-19
APPROVED: <u>Bill Oliva</u>	



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



- ❌ DIMENSION IS TAKEN PARALLEL TO GIRDER.
- ❑ DIMENSION IS TAKEN PARALLEL TO GIRDER.
- * DIMENSION IS TAKEN NORMAL TO GIRDER.
- * DIMENSION IS TAKEN NORMAL TO GIRDER.
- ⚠️ PAVING NOT RISE THE WIDE BY 1" DEEP IF STRUCTURAL APPROACH SLAB IS USED.
- ⚠️ SLAB IS USED FOR ROW 1, ROW 2, STAIRS, UP AND DOWN.
- ⚠️ FOR STRUCTURAL APPROACH SLAB ON THE SECTION, TRAIL ABUT, OR ORDER, SPACING PERPENDICULAR TO GIRDER.
- + BARS PLACED PARALLEL TO GIRDER, SPACING PERPENDICULAR TO GIRDER.



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

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

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.

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

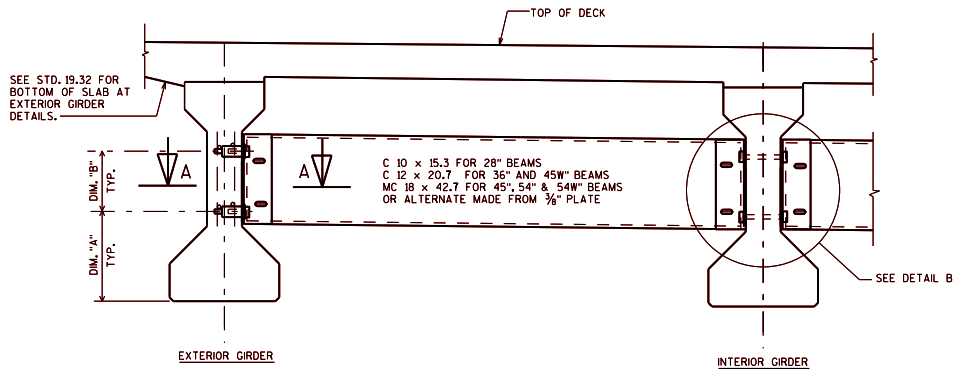
PRESTRESSED 54W", 72W"
& 82W" GIRDER SLAB &
SUPERSTRUCTURE DETAILS



BUREAU OF STRUCTURES

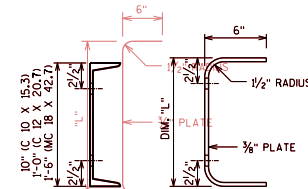
APPROVED: *Bill Oliva*

DATE:

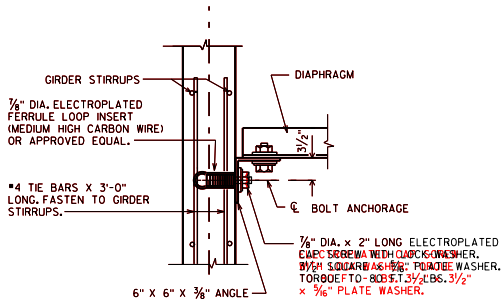


PART TRANSVERSE SECTION AT DIAPHRAGM

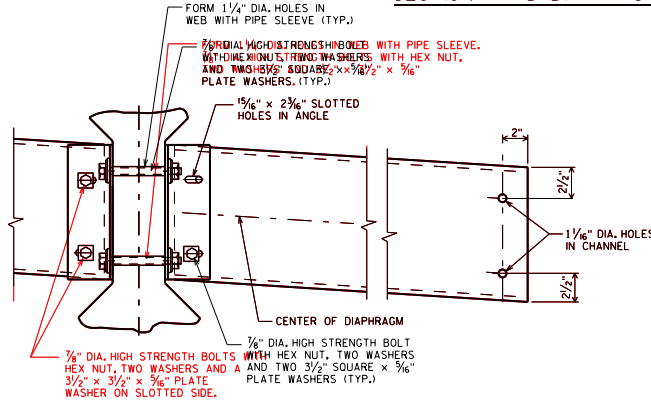
GIRDER HEIGHT	DIM. "A"	DIM. "B"	DIM. "L"	* DIM. "X"
28"	1'-0 1/8"	5 1/4"	9 1/2"	2 1/4"
36"	1'-2 1/4"	9 3/4"	1'-1 1/2"	3 1/4"
45"	1'-5 3/8"	1'-1 3/8"	1'-5 1/2"	2 1/4"
45W"	1'-9 1/8"	8 3/4"	1'-0 1/2"	2 3/4"
54"	1'-7 1/4"	1'-5 1/8"	1'-9 1/2"	4 1/4"
54W"	1'-9 1/8"	1'-5 3/8"	1'-9 1/2"	4 1/4"



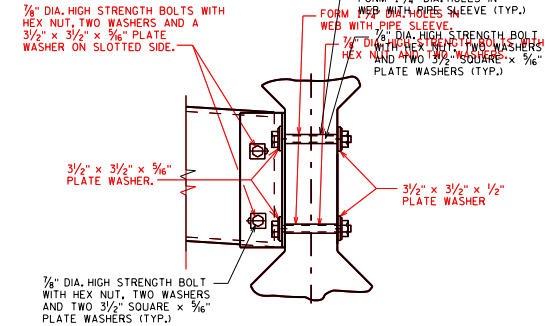
SECTION THRU DIAPHRAGM
*DIM. "X" = 2 1/2" FOR ALTERNATE PLATE DIAPHRAGM



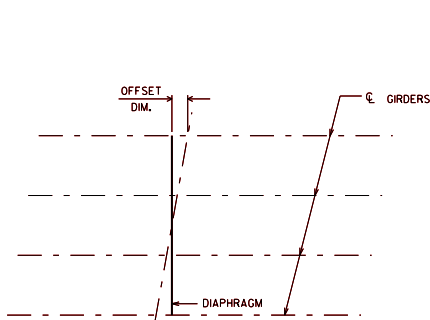
SECT. A-A
(FOR EXTERIOR ATTACHMENT)



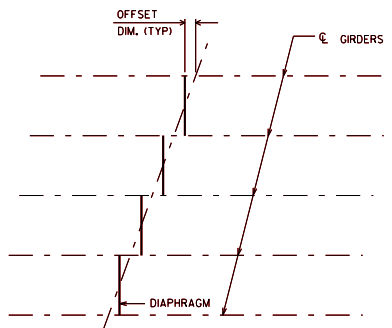
DETAIL B
(FOR CONTINUOUS LINE OF DIAPHRAGMS)



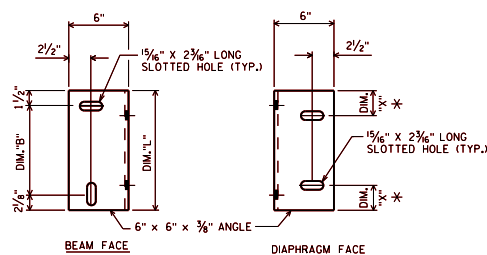
SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°



PLAN FOR SKEW ANGLES ≤ 10°



PLAN FOR SKEW ANGLES > 10°



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

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

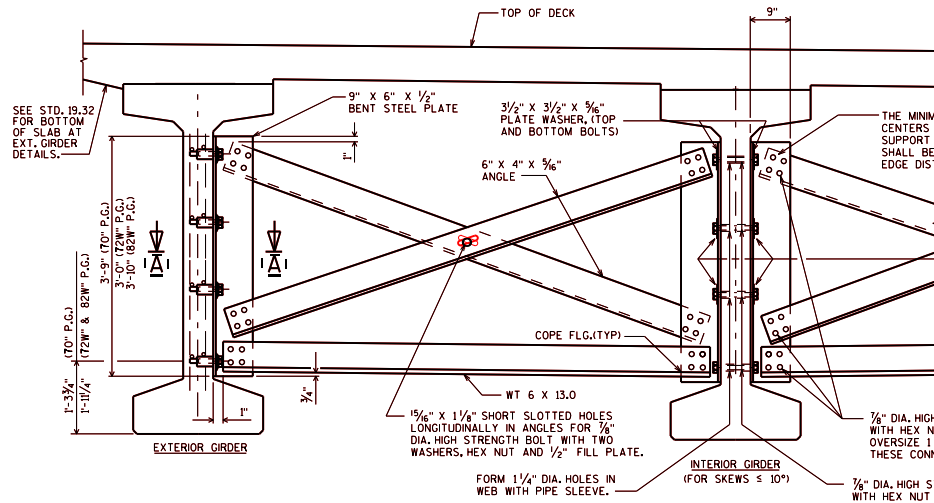
FOR SPANS EQUAL TO OR LESS THAN 80'-0", PLACE ONE DIAPHRAGM AT MID-LENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS.

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.

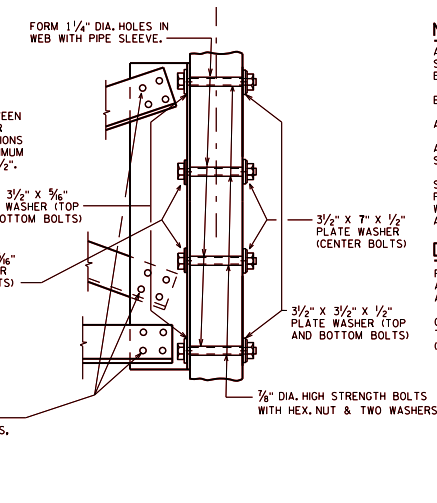
INTER. STEEL DIAPHS. FOR 28", 36", 45", 45W" 54" & 54W" PRESTRESSED GIRDERS

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.

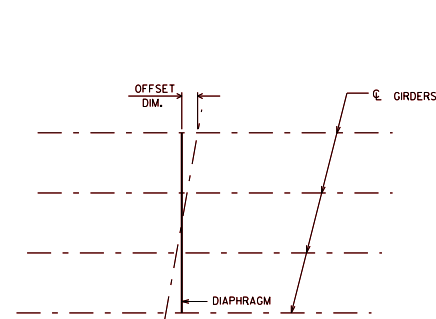
ALL DIAPHRAGM MATERIAL INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

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.

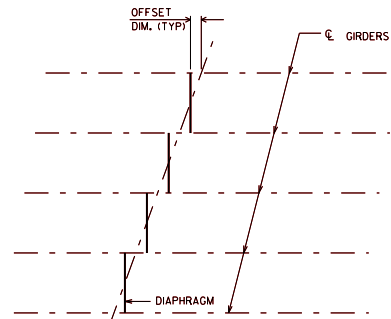
DESIGNER NOTES

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.

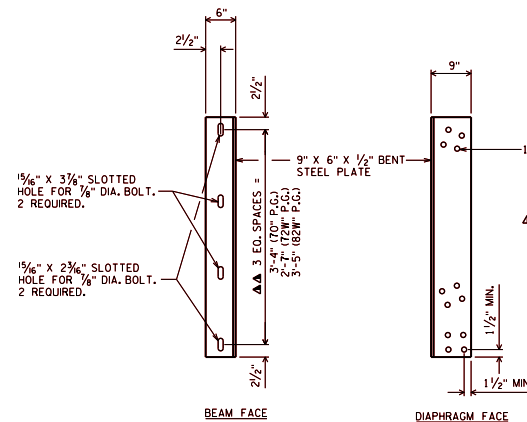
ON THE PLANS, SHOW LOCATION OF INSERTS/HOLES FOR DIAPHRAGM TO WEB CONNECTION, NOT ONLY FROM THE BOTTOM OF THE GIRDER (DIM "A" AND "B"), BUT ALSO FROM THE ENDS OF EACH GIRDER.



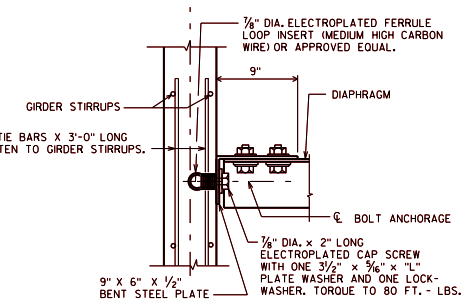
PLAN FOR SKEW ANGLES ≤ 10°



PLAN FOR SKEW ANGLES > 10°



DIAPHRAGM SUPPORT



**SECT. A-A
(FOR EXTERIOR ATTACHMENT)**

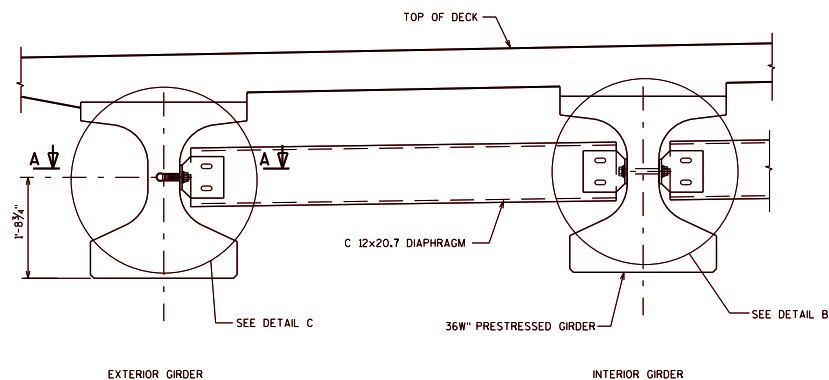
"L" = 3 1/2"; TOP & BOTTOM BOLTS
"L" = 7"; CENTER BOLTS

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

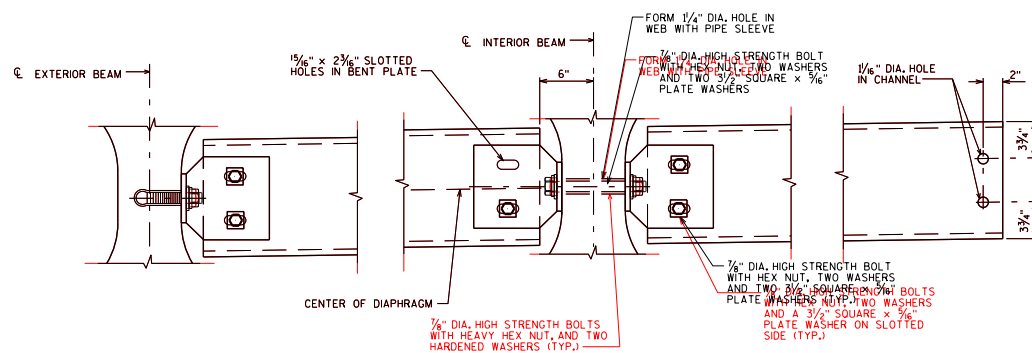
INTERMEDIATE STEEL DIAPHRAGMS FOR 70", 72W" & 82W" PRESTRESSED GIRDERS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-17

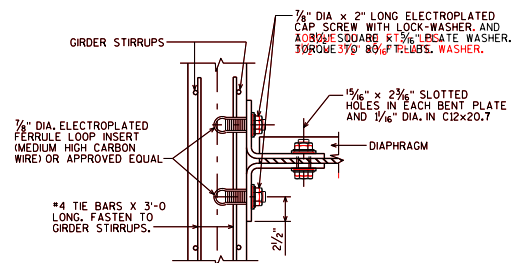


PART TRANSVERSE SECTION AT DIAPHRAGM

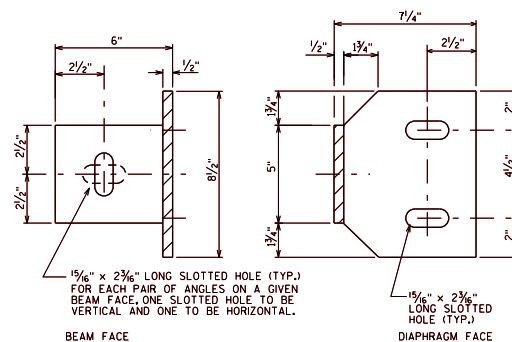


DETAIL C

DETAIL B

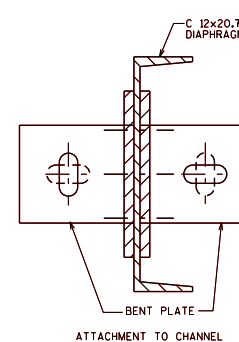


SECTION A-A
(FOR EXTERIOR ATTACHMENT)

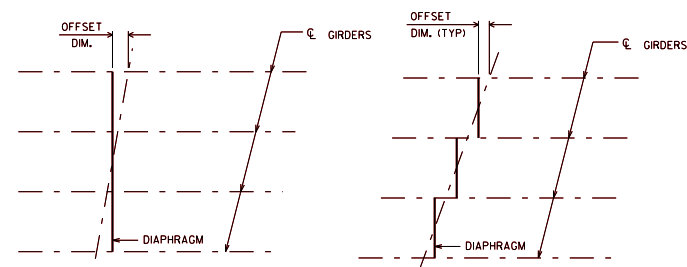


BEAM FACE

DIAPHRAGM FACE

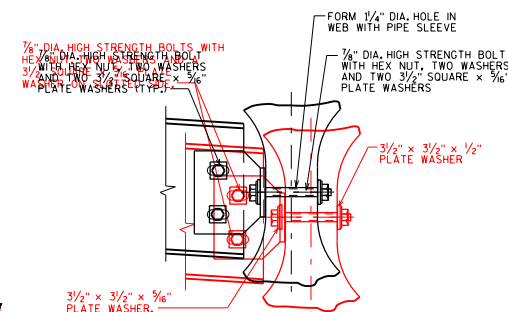


ATTACHMENT TO CHANNEL



PLAN FOR SKEW ANGLES ≤ 10°

PLAN FOR SKEW ANGLES > 10°



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

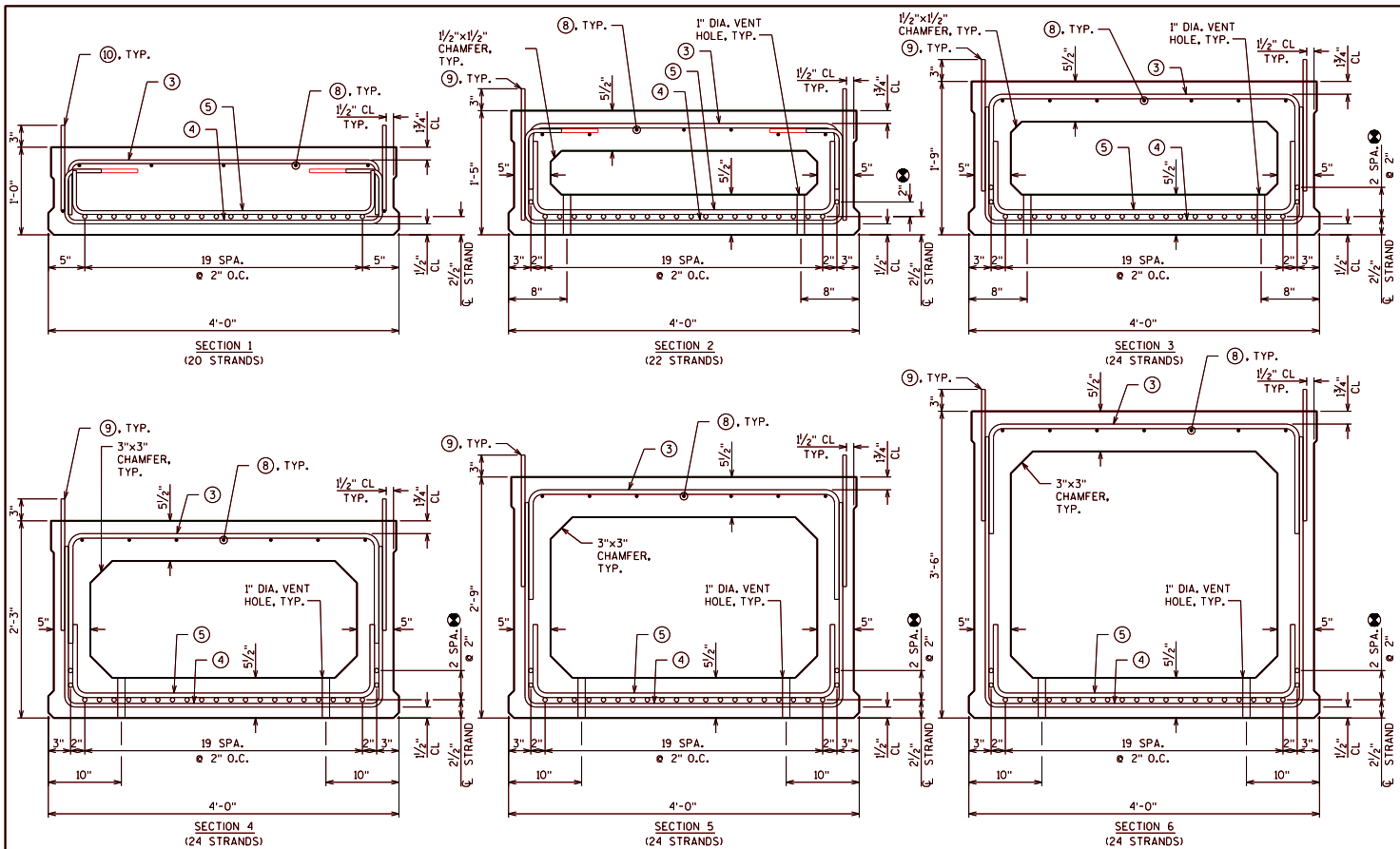
INTER. STEEL DIAPHS. FOR
36W PRESTRESSED GIRDERS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

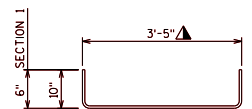
DATE:
7-19



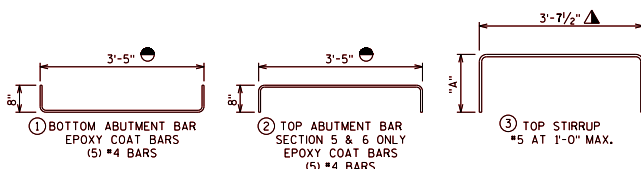
4'-0" SECTIONS

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"



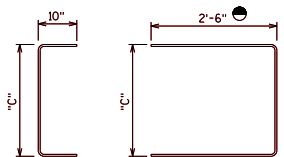
⑤ END BLOCK BOTTOM STIRRUP
#4 AND #5 BARS
SEE ELEVATION FOR SPACING



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

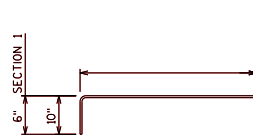
② TOP ABUTMENT BAR
SECTION 5 & 6 ONLY
EPOXY COAT BARS
(5) #4 BARS

③ TOP STIRRUP
#5 AT 1'-0" MAX.

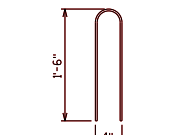


⑥ DUCT STIRRUP
#4 AT 9" MAX.
(16) EACH GIRDER END
(12) EACH GIRDER DUCT

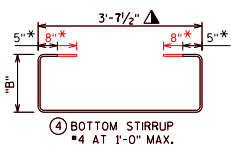
⑦ DUCT STIRRUP
#4 AT 9" MAX.
(6) EACH GIRDER END



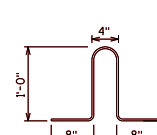
⑧ LONGITUDINAL BAR
(5) #4 BARS MIN. FOR SECTION 1
(7) #4 BARS MIN. FOR SECTIONS 2-6



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



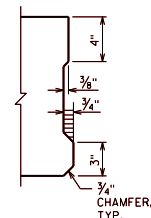
④ BOTTOM STIRRUP
#4 AT 1'-0" MAX.
*OMIT 90° BEND FOR SECTIONS 3-6



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

SHEAR KEY RECESS DETAIL

OMIT SHEAR KEY ON
EXTERIOR FACE OF
EXTERIOR GIRDERS.



DESIGNER NOTE

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

LEGEND

- ④ 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.
- ④ SHOW SPACING FOR THESE STRANDS ONLY
IF REQUIRED BY DESIGN.
- ④ SUBSTITUTE ⑩ BAR ON EXTERIOR EDGE OF
EXTERIOR GIRDERS. SEE STANDARD 19.56.

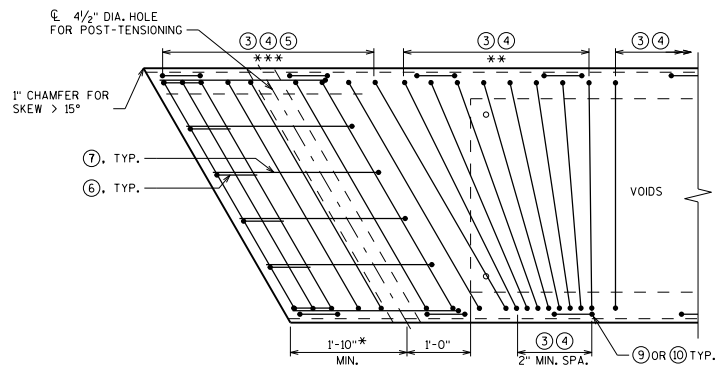
4'-0" PRESTRESSED BOX GIRDER SECTIONS



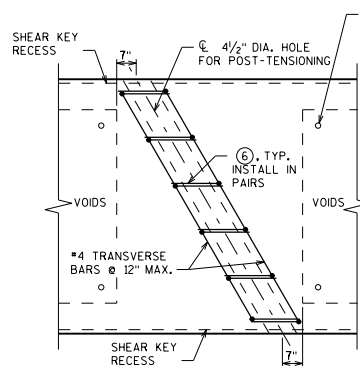
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

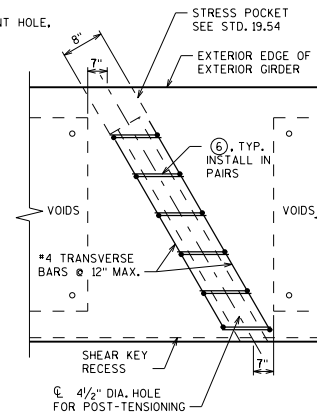
DATE:
1-18



PART GIRDER PLAN WITH SKEW
①, ② & #4 TRANSVERSE BARS NOT SHOWN FOR CLARITY



INTERIOR GIRDER DUCT PLAN



EXTERIOR GIRDER DUCT PLAN

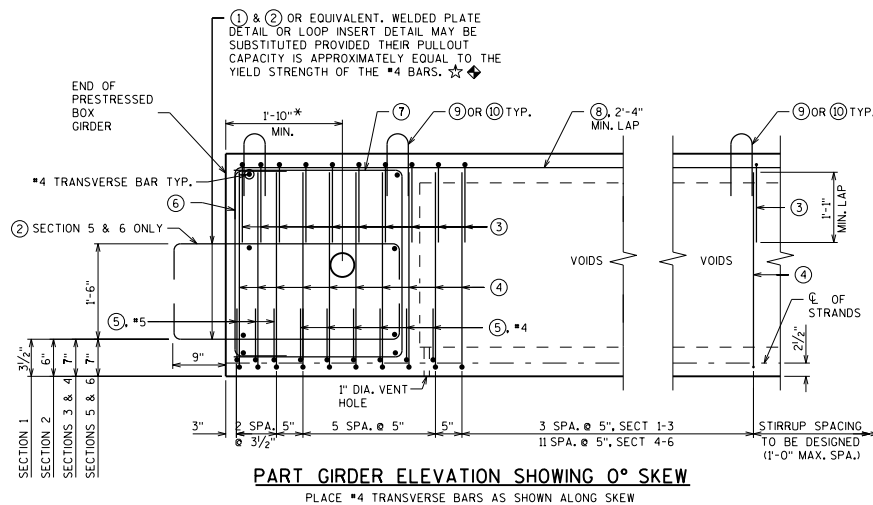
LEGEND

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

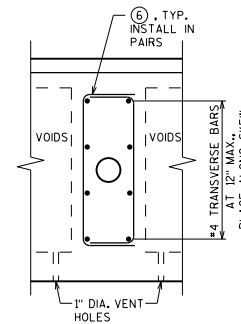
DESIGNER NOTES

FOR BAR BEND DETAILS, SEE STANDARD 19.50 AND STANDARD 19.51

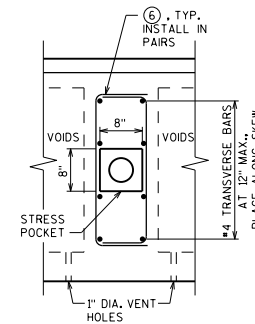
FOR SKEWED STRUCTURES CAST END OF PRESTRESSED BOX GIRDER ALONG SKEW.



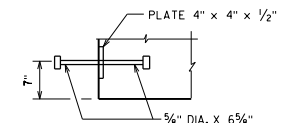
PART GIRDER ELEVATION SHOWING 0° SKEW
PLACE #4 TRANSVERSE BARS AS SHOWN ALONG SKEW



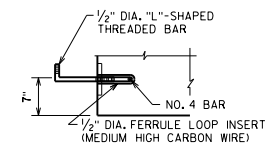
INTERIOR GIRDER DUCT ELEVATION



EXTERIOR GIRDER DUCT ELEVATION



WELDED PLATE DETAIL
(EQUIVALENT TO ONE #4 BAR)



LOOP INSERT DETAIL

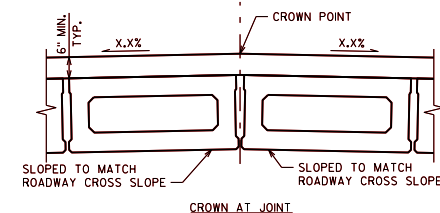
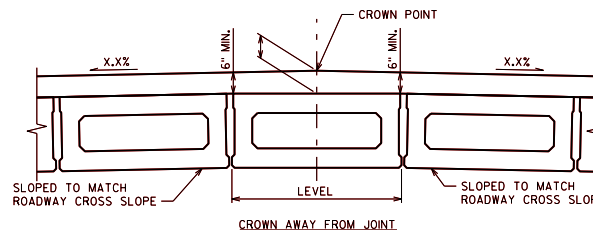
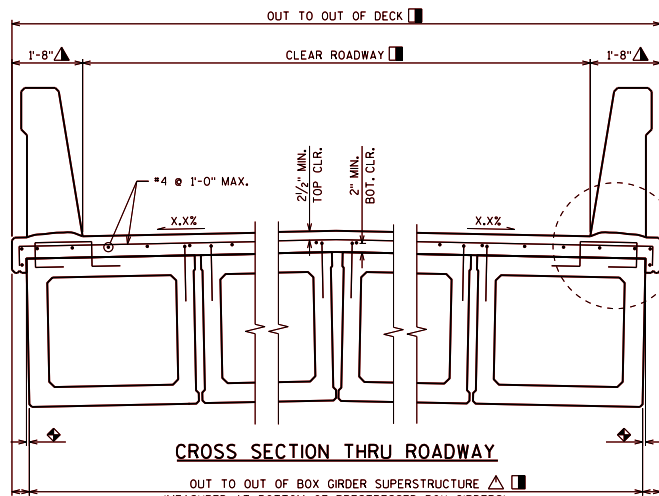
PRESTRESSED BOX GIRDER DETAILS 1



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-17

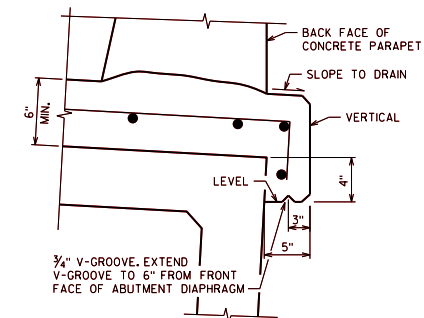


CROWN DETAIL AT LOCATION OF MIN. DECK THICKNESS

NUMBER OF SECTIONS

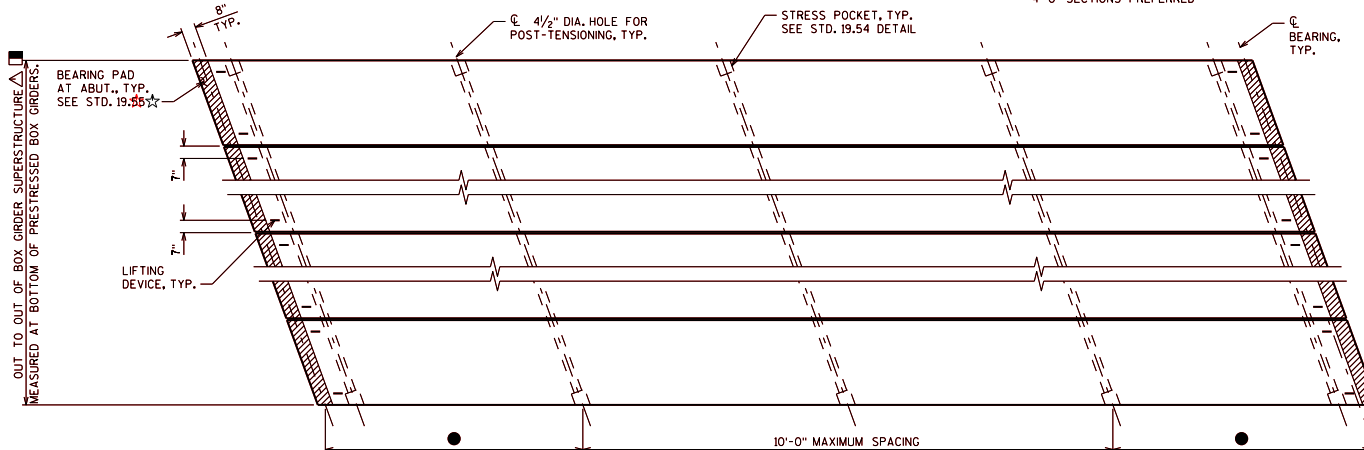
CLEAR ROADWAY	3'-0" SECTION	4'-0" * SECTION
26'-0"	10	7
30'-0"	11	8
36'-0"	13	10
40'-0"	14	11
44'-0"	16	12

* 4'-0" SECTIONS PREFERRED



DECK OVERHANG DETAIL

SEE STANDARD 19.56 FOR ADDITIONAL DETAILS



DESIGNER NOTES

△ ACCOUNT FOR NUMBER OF PRESTRESSED BOX GIRDERS, NUMBER OF JOINTS (AT 1" NORMAL TO G 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.

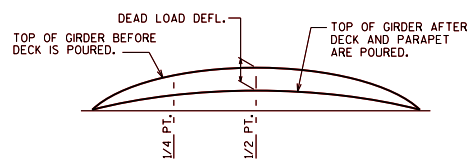
LEGEND

☆ BEARING PAD NOT REQUIRED FOR GRS ABUTMENTS.

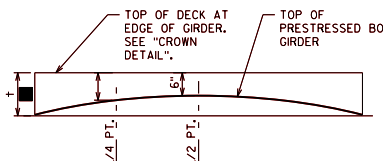
● 1/4 SPAN FOR SPANS UP TO 80'-0".
1/5 SPAN FOR SPANS OVER 80'-0".

■ 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.



DEAD LOAD DEFLECTION DIAGRAM



DECK THICKNESS DIAGRAM

■ 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 DEFL. (IN.)	CONC. STRENGTH f'c (PSI)	DIA. OF STRAND (IN.)	UNDRAINED PATTERN	TOTAL NO. OF STRANDS	TOTAL INITIAL PRESTRESS FORCE (KIPS)	f'ci (PSI) *
1			1/4 PT. 1/2 PT.						*

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

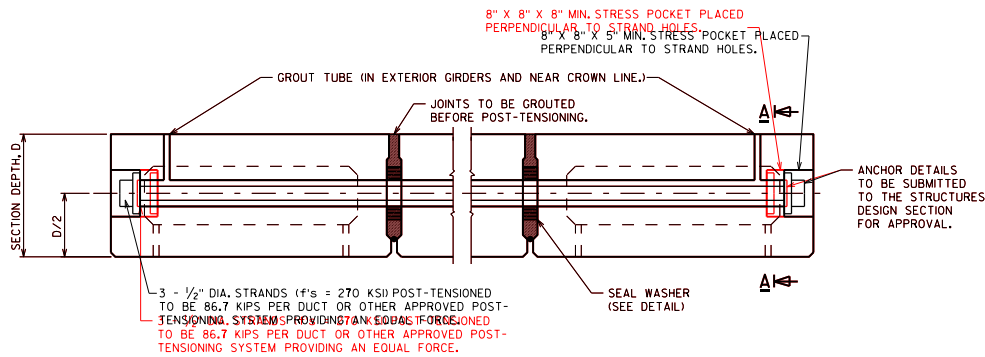
PRESTRESSED BOX GIRDER DETAILS 2



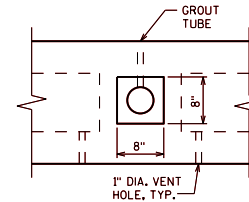
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

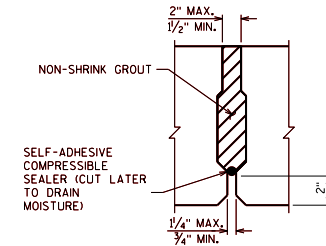
DATE: 7-18



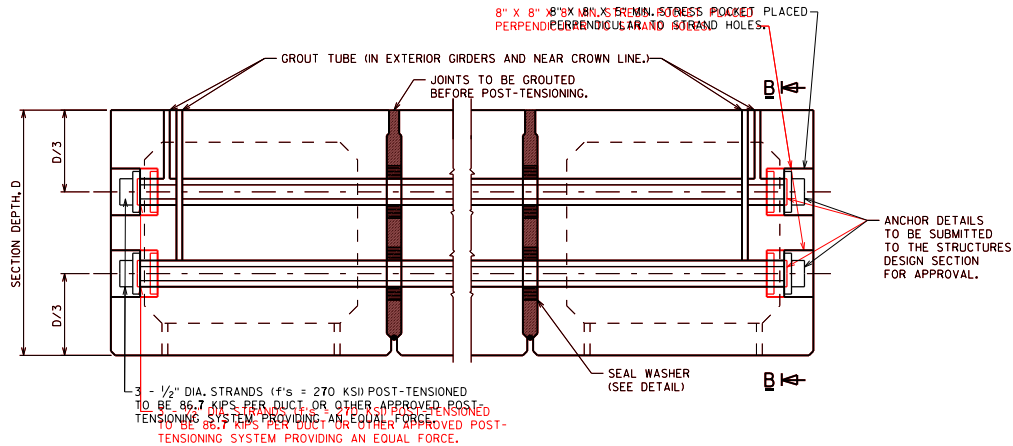
POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM
(SECTIONS 1 THROUGH 4)



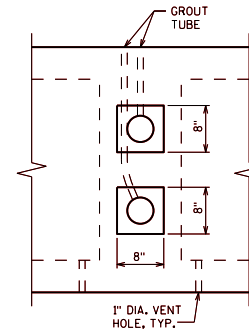
SECTION A-A



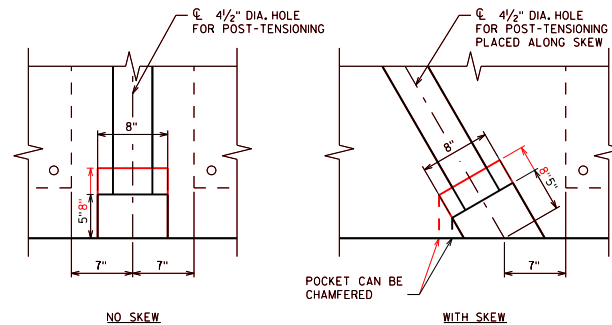
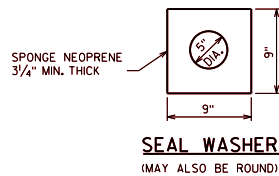
SHEAR KEY DETAIL



POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM
(SECTIONS 5 AND 6)



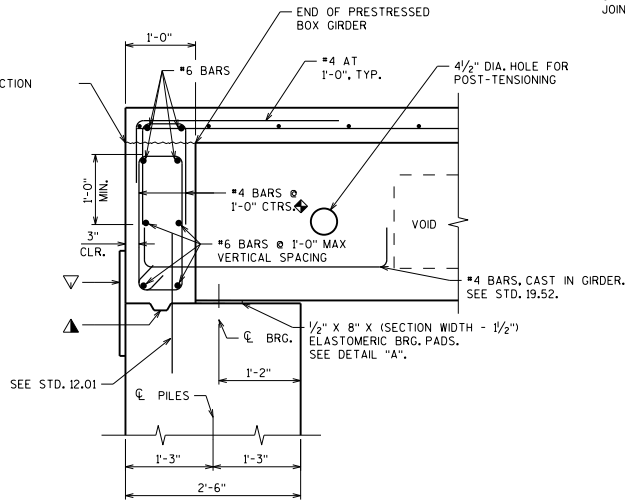
SECTION B-B



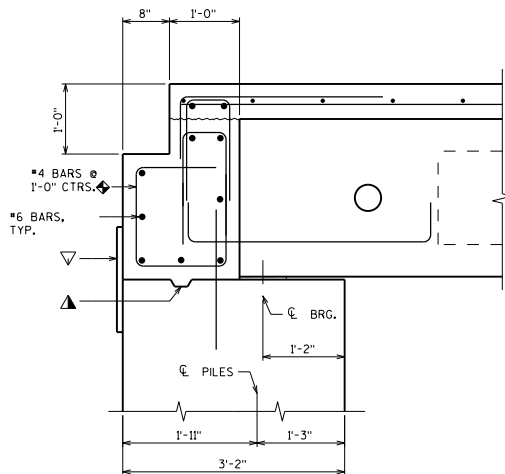
STRESS POCKET DETAIL

PRESTRESSED BOX GIRDER DETAILS 3	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: <u>1-18</u>

OPTIONAL CONSTRUCTION JOINT.



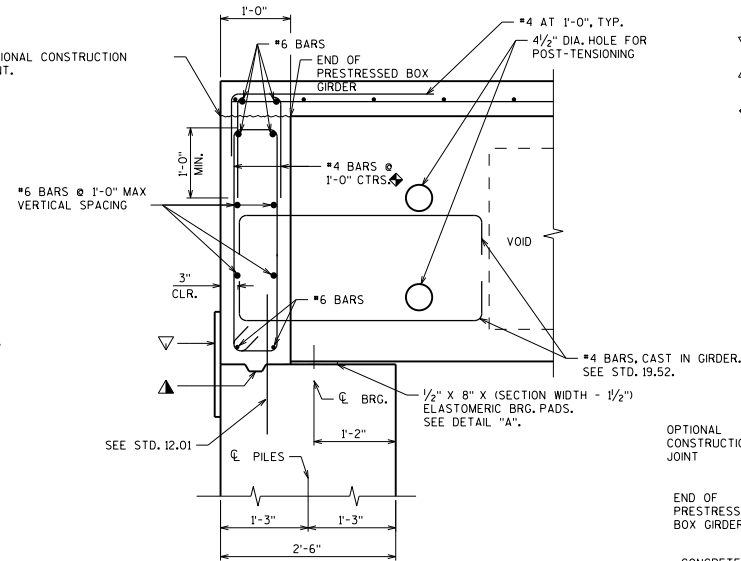
NO PAVING NOTCH - SECTIONS 1 THROUGH 4



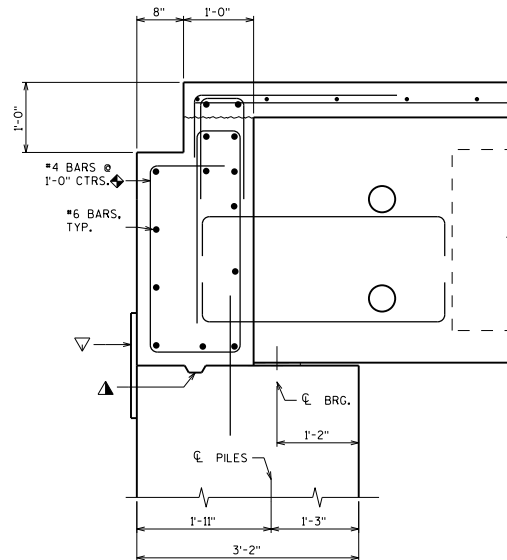
WITH PAVING NOTCH - SECTIONS 1 THROUGH 4

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

OPTIONAL CONSTRUCTION JOINT.



NO PAVING NOTCH - SECTIONS 5 AND 6

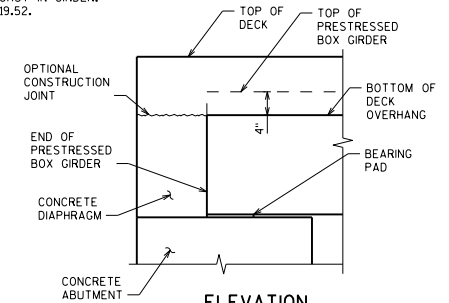


WITH PAVING NOTCH - SECTIONS 5 AND 6

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

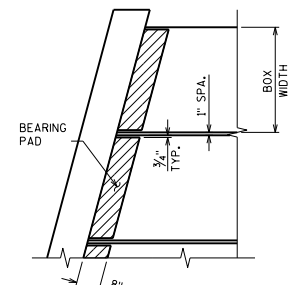
LEGEND

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



ELEVATION

(SHOWING DECK OVERHANG TERMINATION AT CONCRETE ABUTMENT)



DETAIL "A"

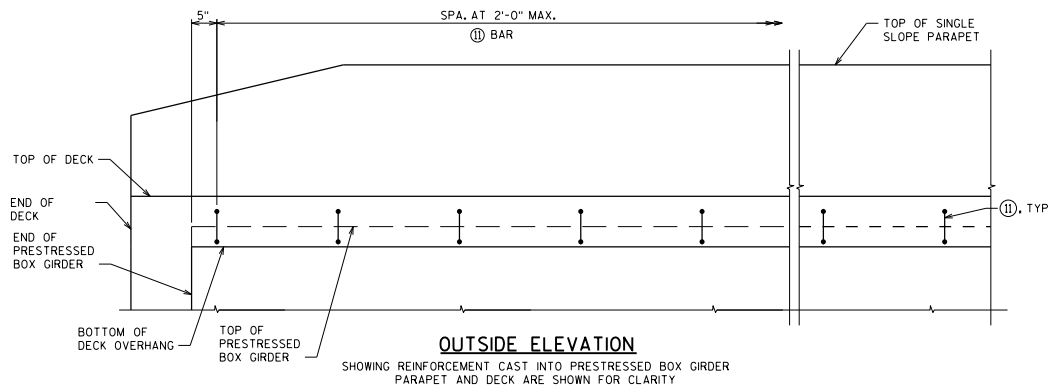
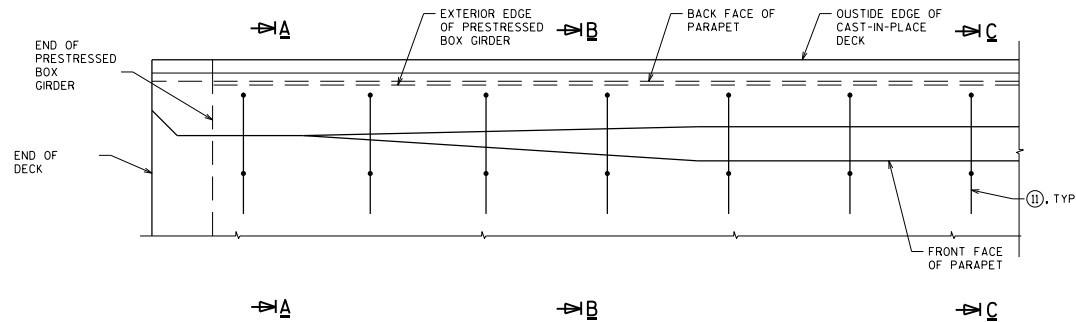
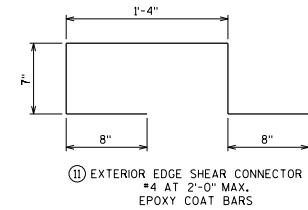
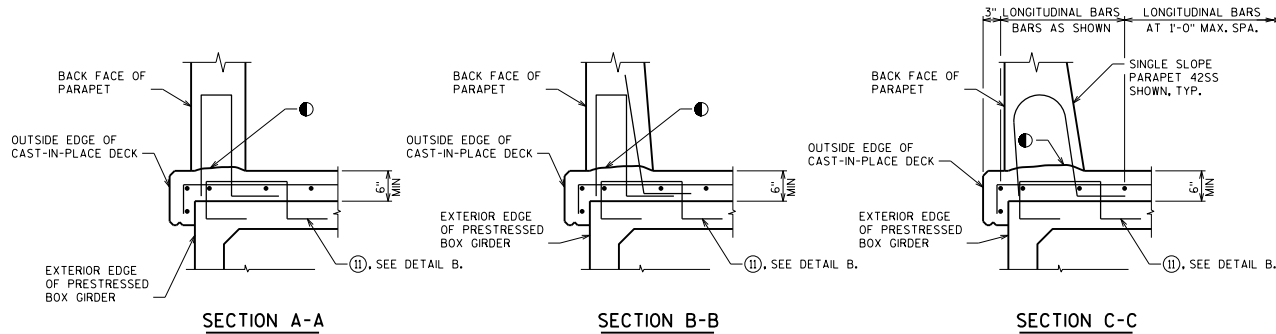
PRESTRESSED BOX GIRDER DETAILS 4



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-16



LEGEND

● CONST. JOINT - STRIKE OFF AS SHOWN.

NOTE

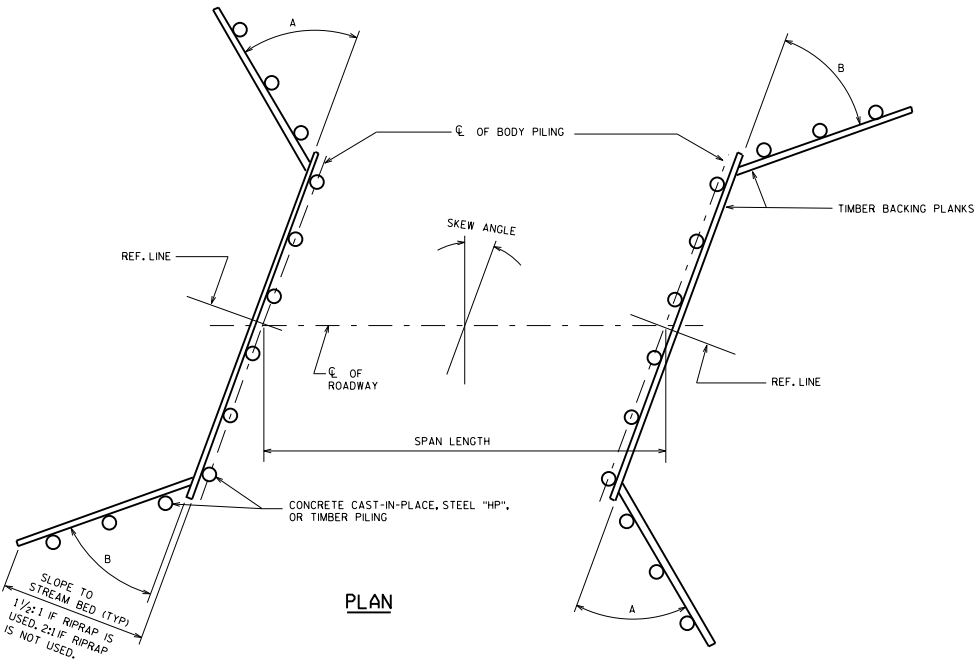
BAR 11 TO BE PAID AS PART OF BID ITEM "PRESTRESSED BOX GIRDER TYPE XX-INCH".

DESIGNER NOTES

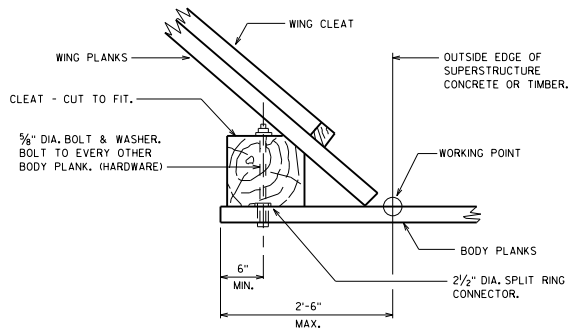
SEE CHAPTER 30 STANDARDS FOR SINGLE SLOPE PARAPET DETAILS.

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

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



PLAN



CORNER DETAIL

NOTES

ALL TIMBER CONNECTORS AND HARDWARE EXCEPT THOSE OF MALLEABLE IRON SHALL BE GALVANIZED.

TREAT ALL LUMBER AND TIMBER WITH ONE OF THE PRESERVATIVES RECOMMENDED IN THE STANDARD SPECIFICATIONS.

TIE RODS SHALL BE COATED WITH THE COAL TAR OR BITUMASTIC COMPOUND USED FOR COVERING WING PILE ENDS.

REFER TO AASHTO LRFD SPECIFICATIONS FOR LUMBER AND TIMBER DESIGN REQUIREMENTS.

THE BODY BACKING PLANKS SHALL BE CONTINUOUS OVER 4 PILES (3 PANELS). PLANK SPLICES, IF REQUIRED SHALL BE AT THE CENTERLINE OF PILING AND ADJACENT SPLICES SHALL BE STAGGERED.

ALL TIE RODS, TURNBUCKLES, NUTS AND WASHERS SHALL BE PAID FOR AS "STRUCTURAL STEEL CARBON".

TIMBER CONNECTORS AND HARDWARE SHALL BE INCLUDED IN THE COST FOR "TREATED LUMBER AND TIMBER".

ALTERNATE DETAILS MAY BE SUBMITTED USING EITHER GALVANIZED STEEL BRIDGE PLANK OR PRECAST CONCRETE PLANK IN LIEU OF TIMBER BACKED ABUTMENT PLANKING, SUBJECT TO APPROVAL BY THE ENGINEER.

SKEW ANGLE	"H" HEIGHT FROM STREAM BED OR BERM TO GRADE	WING ANGLE "A"	WING ANGLE "B"
0° TO 15° INCL.	$H \leq 10'-0"$	45°	45°
0° TO 15° INCL.	* $H > 10'-0"$	50°	50°
15° TO 20° INCL.	$H \leq 10'-0"$	55°	30°
15° TO 20° INCL.	* $H > 10'-0"$	50°	50°
OVER 20°	$H \leq 10'-0"$	65°	25°
OVER 20°	● $H > 10'-0"$	65°	25°

* USE TIE RODS ON WING PILING

● USE TIE RODS WITH A DEADMAN ON WING PILING.

SECTION	MOMENT CAPACITY (INCH - KIPS/FT.)
10 GAGE (6' x 2') GRADE A * ARMCO	22.9 ($f_b = 18$ K.S.I.)
7 GAGE (6' x 2') GRADE A * ARMCO	30.0 ($f_b = 18$ K.S.I.)

*ASTM A446

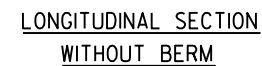
TIMBER ABUTMENTS GENERAL



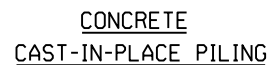
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16

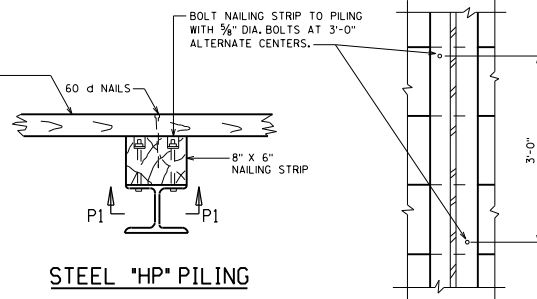


STANDARD 23.02

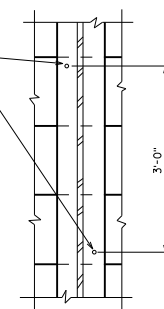


A cross-sectional diagram of a timber beam. A horizontal line represents the beam's length. Below it, a circular cross-section of a log is shown with concentric growth rings. A vertical line passes through the center of the log and the beam. Above the beam, a horizontal line is labeled "60 d NAILS". To the right of the beam, a horizontal line is labeled "BACKING PLANK".

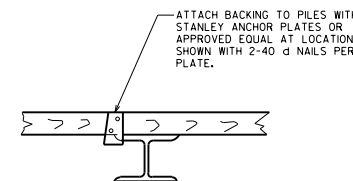
TIMBER PILING



STEEL "HP" PILING



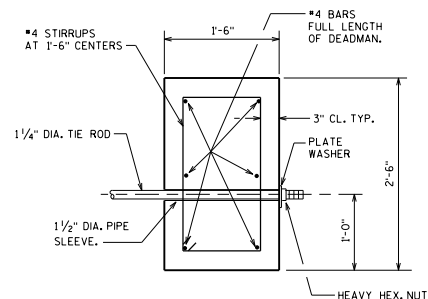
SECTION P1



STEEL "HP" PILING
(ALTERNATE ATTACHMENT)

[illegible]

PILE CAP DETAIL
(TIMBER GIRDER)

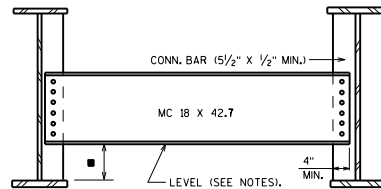


SECTION THRU DEADMAN

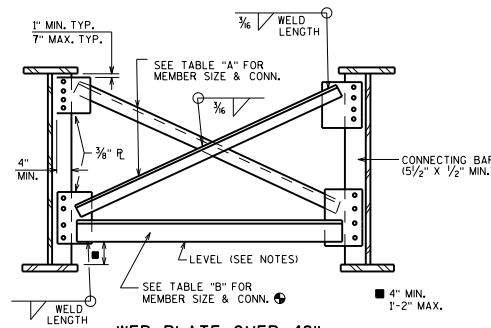
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:	3-16
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WEB PLATE < 48"
TYP. IN SPAN & AT PIER



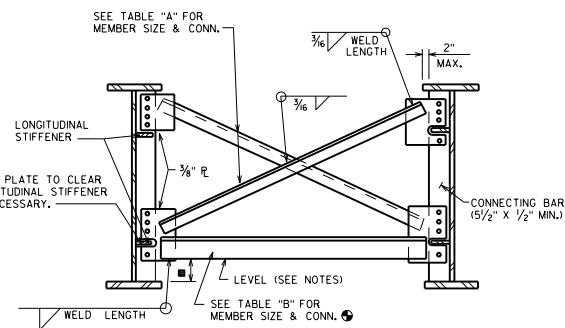
WEB PLATE OVER 48"
TYP. IN SPAN & AT PIER

TABLE "A"

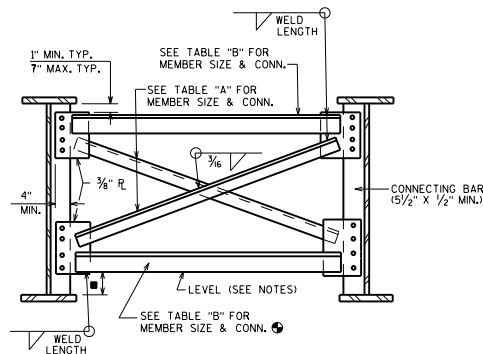
SIZE	MAX. LENGTH OF MEMBER	WELD LENGTH	NO. OF 3/4" ϕ BOLTS	WEIGHT PER FT.
L 3 1/2 X 3 1/2 X 5/16	21'-6"	9"	4	7.2*
L 4 X 4 X 5/16	25'-0"	11"	4	8.2*
L 5 X 5 X 5/16	31'-0"	14"	5	10.3*

TABLE "B"

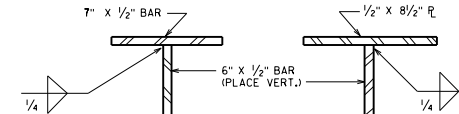
SIZE	MAX. LENGTH OF MEMBER	WELD SIZE	WELD LENGTH	NO. OF 3/4" ϕ BOLTS	WEIGHT PER FT.
L 5 X 5 X 5/16	11'-6"	1/4"	11"	4	10.3*
L 6 X 6 X 5/16	13'-6"	3/16"	13"	6	14.9*
1/2" T SECTION SEE DETAIL "A"	17'-6"	3/16"	14"	7	16.6*
1/2" T SECTION SEE DETAIL "B"	22'-0"	3/16"	13"	7	18.5*



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" ϕ HIGH STRENGTH ASTM A325 BOLTS WITH DOUBLE WASHERS.

DIAPHRAGMS OR LOWER CROSS FRAME MEMBERS ARE SLOPED WHEN DIFFERENCE IN ADJACENT BOTTOM FLANGE ELEVATIONS EXCEEDS 6". HOLD 8" FROM TOP OF ADJACENT FLANGES TO BOTTOM OF DIAPHRAGMS OR LOWER CROSS FRAME WHEN THESE MEMBERS ARE SLOPED.

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

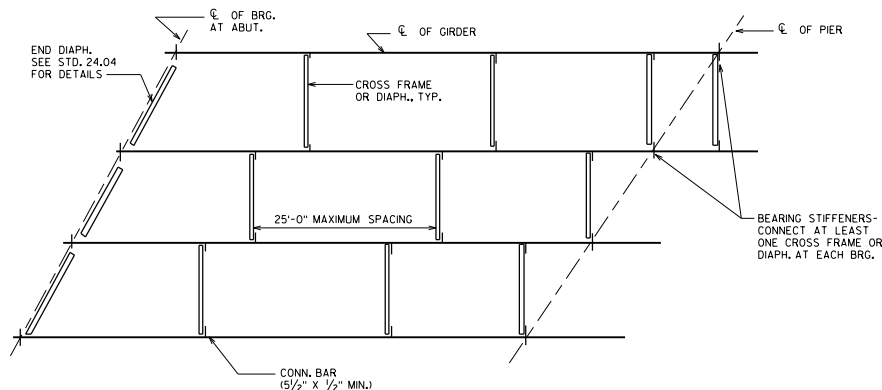
HOLES IN CROSS FRAME CONNECTIONS MAY BE OVERSIZED ϕ 1/16" DIA. IN 1 PLY.

DESIGNER NOTES

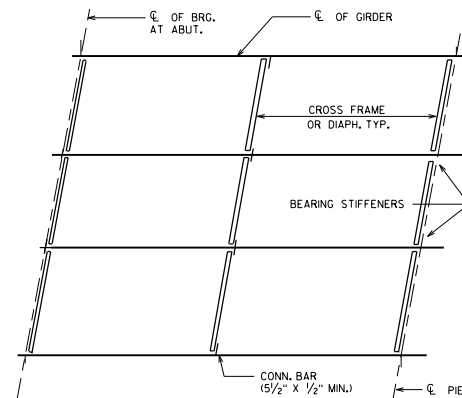
SEE STD. 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.

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°

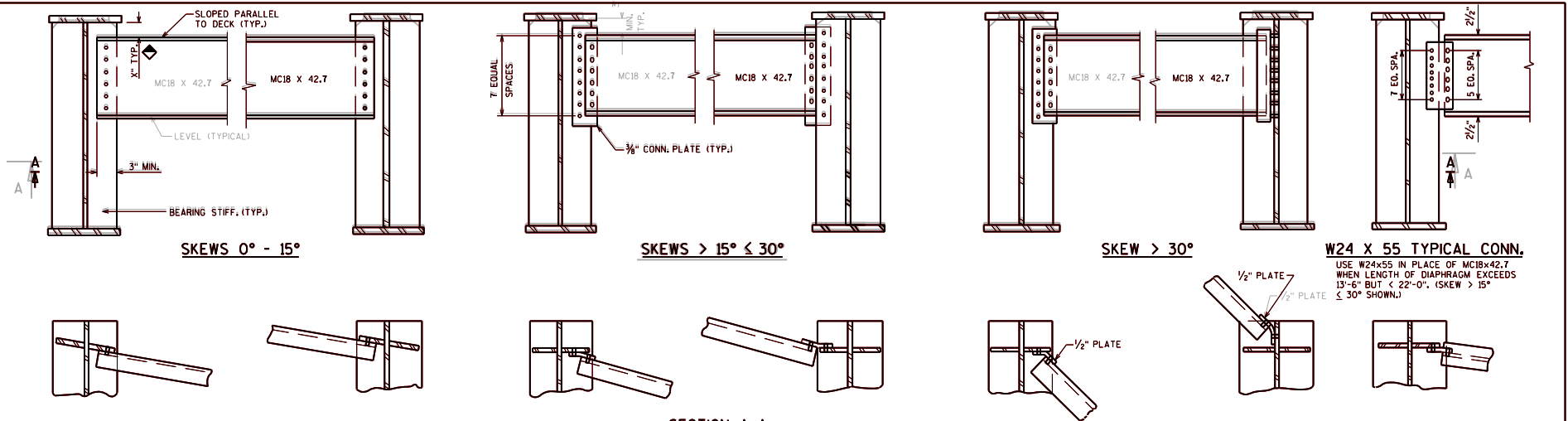
PLATE GIRDER DIAPHRAGMS AND CROSS FRAMES



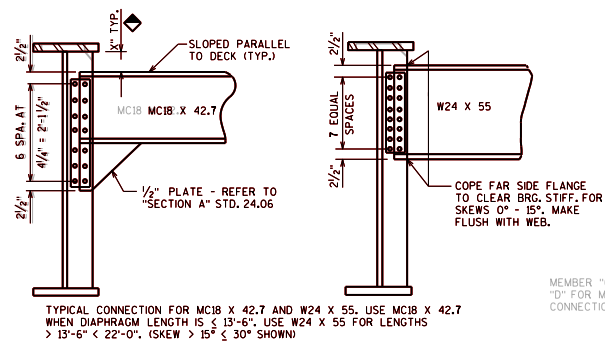
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

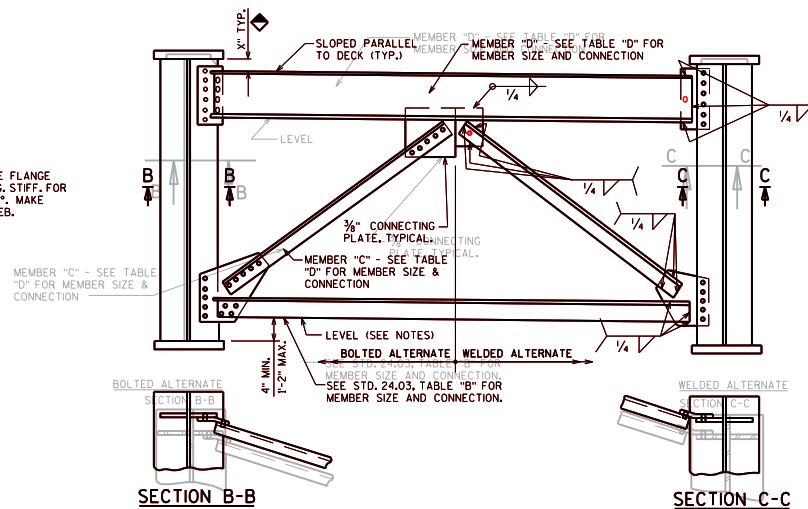
DATE:
7-15



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



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

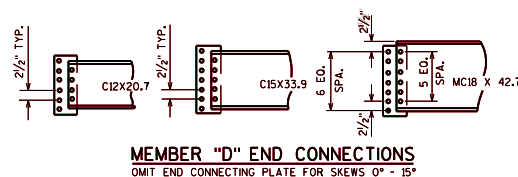


END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 60"
SKEWS > 15° ≤ 30° SHOWN

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

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.

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.

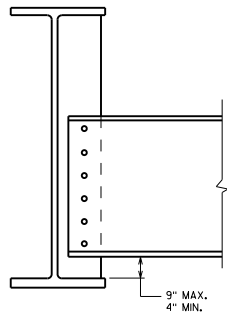
END DIAPHRAGMS



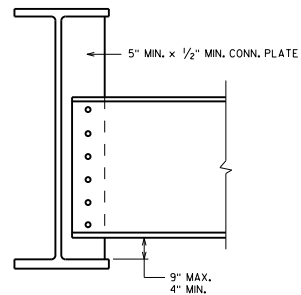
**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:
7-21



36" W. GIRDER



33" W. GIRDER

INTERMEDIATE DIAPHRAGM SIZES

ALL INTERMEDIATE CONNECTIONS	
GIRDER DEPTH	INTERMEDIATE DIAPHRAGMS
36"	MC18 X 42.7
33"	MC18 X 42.7
30"	C15 X 33.9
27"	C15 X 33.9
24"	C12 X 20.7
21"	C10 X 15.3
18"	C8 X 11.5

NOTES

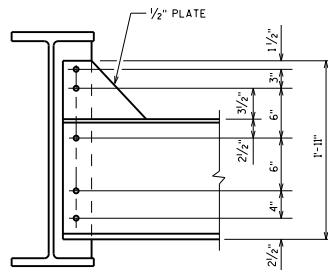
DIAPHRAGMS SHALL BE HORIZONTAL EXCEPT WHEN THE DIFFERENCE IN ADJACENT GIRDER ELEVATIONS IS OF A MAGNITUDE THAT NECESSITATES SLOPING THE DIAPHRAGMS.

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

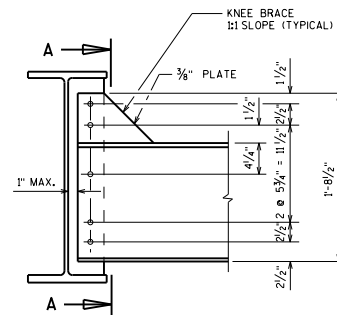
ALL BOLTED CONNECTIONS SHALL BE MADE WITH 3/4" ϕ HIGH STRENGTH ASTM A325 BOLTS.

DESIGNER NOTES

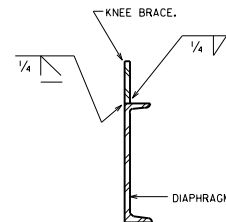
SEE STANDARD 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.



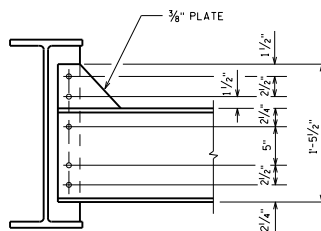
30" W. GIRDER



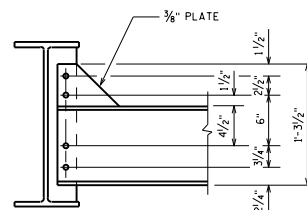
27" W. GIRDER



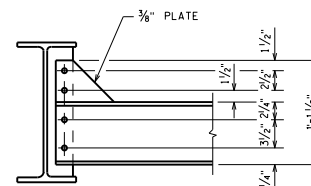
SECTION A



24" W. GIRDER



21" W. GIRDER



18" W. GIRDER

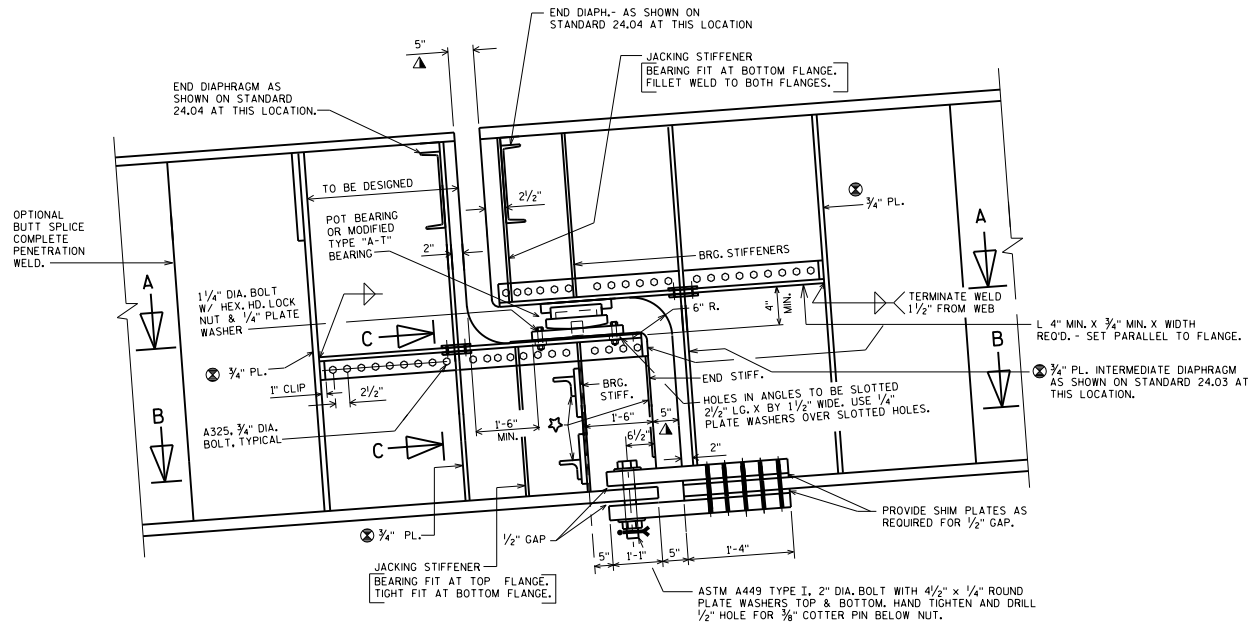
ROLLED GIRDER DIAPHRAGMS



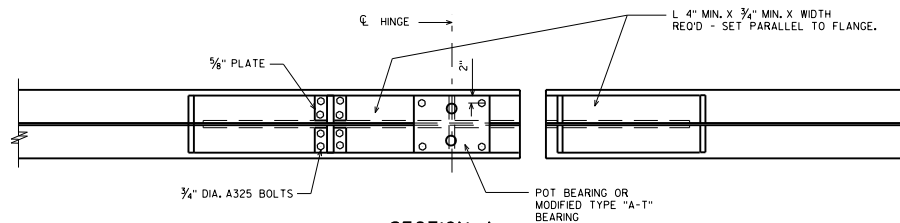
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

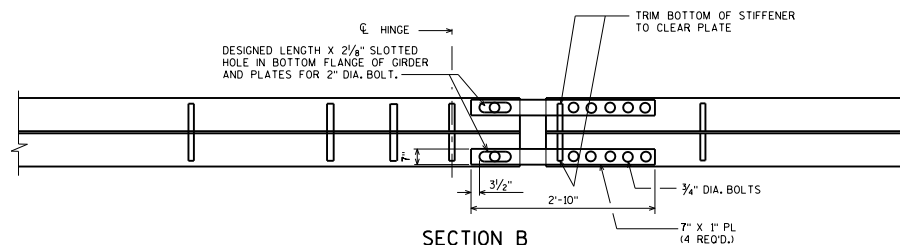
DATE:
7-15



ELEVATION



SECTION A



SECTION B

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

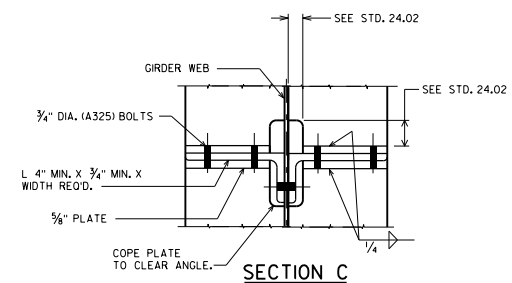
SIZE AND LENGTH OF ANGLES, NUMBER OF BOLTS THRU ANGLES, THICKNESS OF WEB PLATE, AND SIZE OF BEARING STIFFENERS AND JACKING STIFFENERS SHALL BE DETERMINED FROM AN ANALYSIS USING THE VERTICAL AND HORIZONTAL FORCES ACTING AT THE HINGE.

- THE 5\"/>

SLOTTED HOLES OF 6\"/>

- CROSS FRAME UNDER BRG. AND END STIFFENER IS ONLY REQ'D. IF TOTAL WEB HEIGHT EXCEEDS 8'-0\"/>

SEE BRIDGE MANUAL, SECTION 24.1 FOR CRITERIA FOR LOCATING HINGE JOINTS.



SECTION C

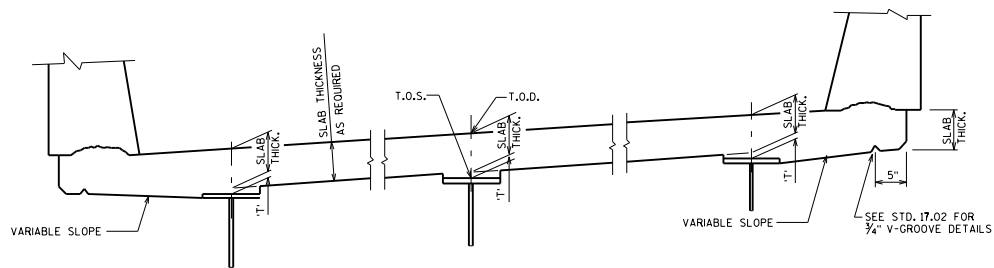
EXPANSION HINGE JOINT DETAILS



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

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 $\frac{3}{4}$ ", 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.

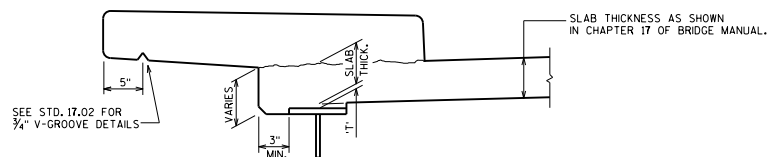
TOP OF DECK ELEVATION AT FINAL GRADE

- TOP OF STEEL ELEVATION AFTER STEEL ERECTION

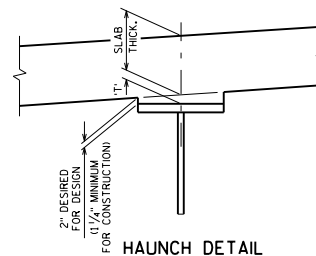
+ CONC. ONLY DEFLECTION; DOWNWARD DEFLECTION IS ADDED, UPWARD DEFLECTION IS SUBTRACTED

- SLAB THICKNESS

= 'T' VALUE FOR SETTING HAUNCH



TREATMENT OF EXTERIOR GIRDER
AT SIDEWALK OVERHANG

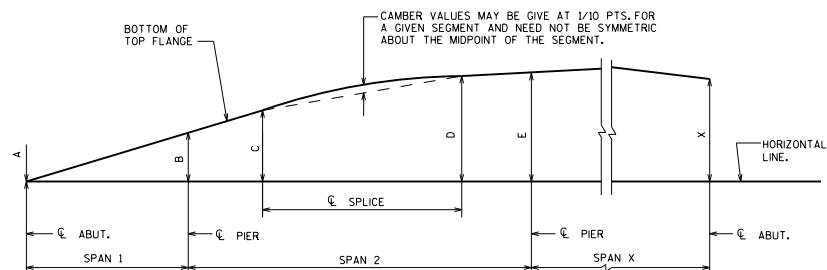


HAUNCH DETAIL

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

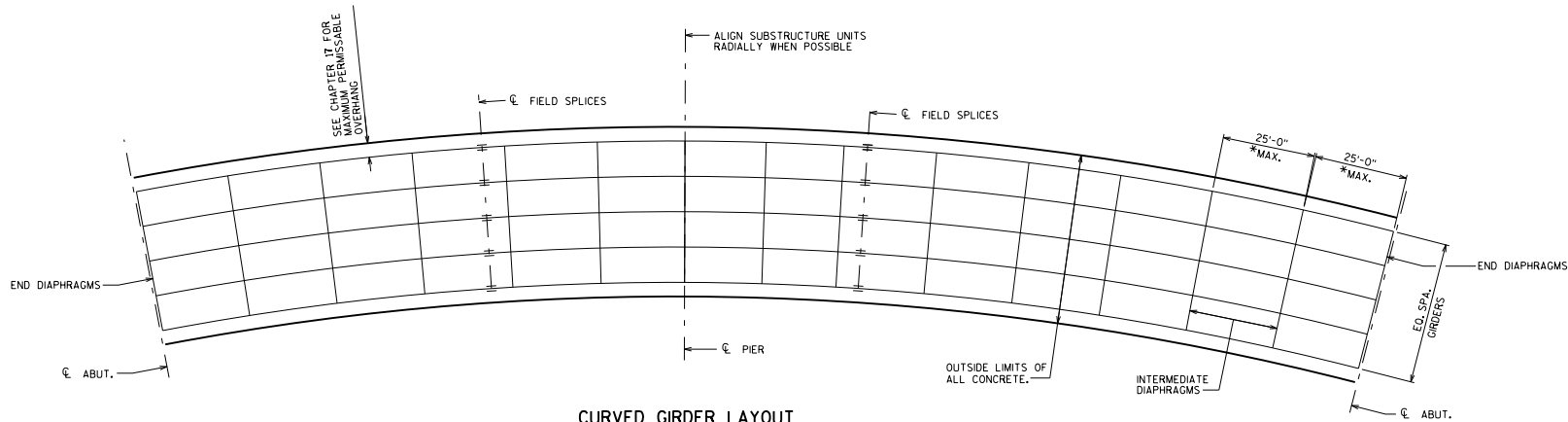
BLOCKING & SLAB HAUNCH DETAILS



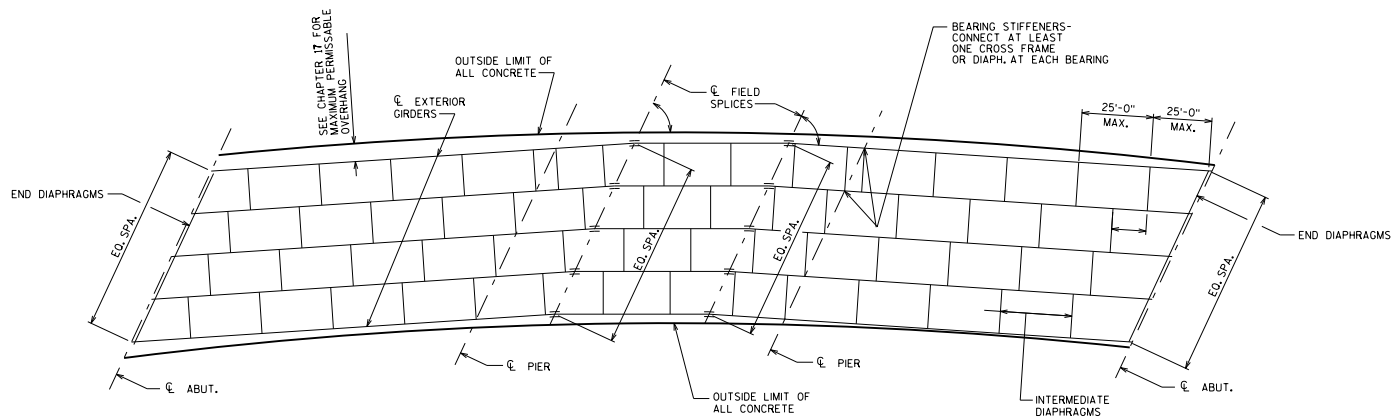
**BUREAU OF
STRUCTURES**

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 SPICES 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 SPICE LOCATIONS.

FOR KINKED GIRDER LAYOUT:
HOLD ϕ OF SUBSTRUCTURE UNITS AND ϕ OF SPICES PARALLEL TO EACH OTHER WHEN POSSIBLE.

GIRDERS ARE TO BE HELD PARALLEL TO EACH OTHER BETWEEN FIELD SPICES.

FOR CURVED GIRDER LAYOUT:
PLACE SUBSTRUCTURE UNITS ON RADIAL LINES WHEN POSSIBLE.

*TIGHTER SPACING MAY BE REQ'D. FOR MORE SEVERE CURVATURES

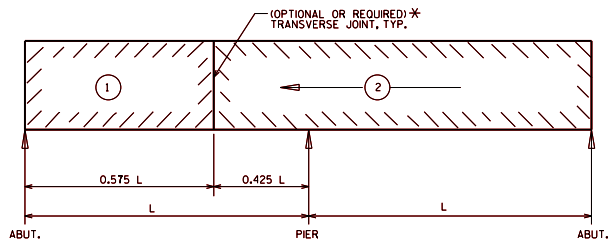
GIRDER LAYOUT ON CURVE



**BUREAU OF
STRUCTURES**

APPROVED: Scot Becker

DATE:
7-10

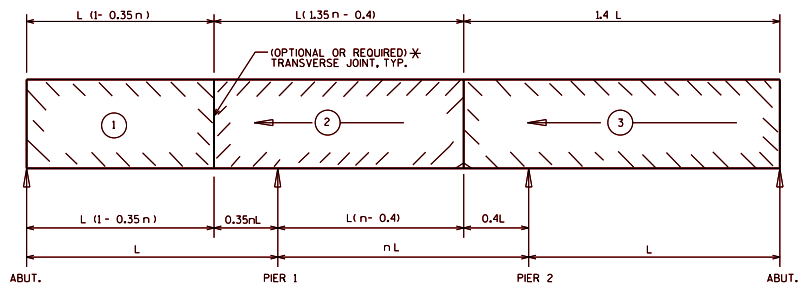


IDEAL DECK POUR SEQUENCE
(CONTINUOUS STEEL GIRDER - 2 SPANS SHOWN)

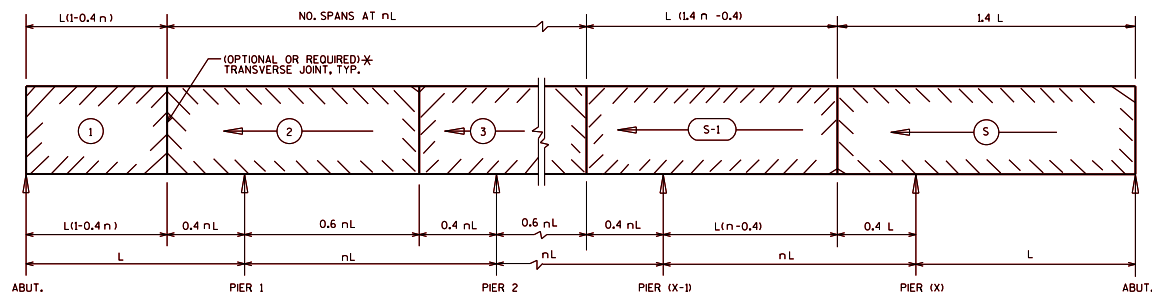
← ② → INDICATES POUR NUMBER AND DIRECTION OF POUR

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

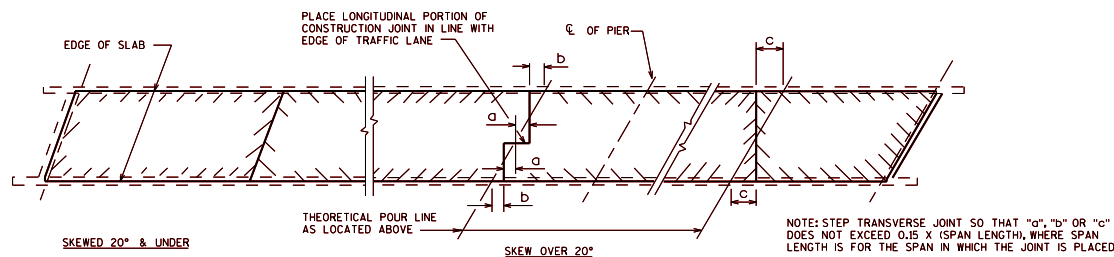
n = $\frac{\text{INTERIOR SPAN}}{\text{END SPAN}}$



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



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



PLAN VIEW - SHOWING PLACEMENT OF TRANSVERSE CONSTRUCTION JOINTS

NOTES

THE RATE OF PLACING CONCRETE SHALL EQUAL OR EXCEED $\frac{1}{2}$ 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)

DESIGNER NOTES

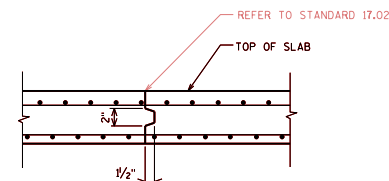
* THE DESIGNER SHALL DETERMINE IF TRANSVERSE JOINTS ARE OPTIONAL OR REQUIRED.

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/L 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, A LONGITUDINAL CONSTRUCTION JOINT SHALL BE DETAILED. FOR DECK WIDTHS BETWEEN 20 AND 30 FEET, LONGITUDINAL CONSTRUCTION JOINTS SHALL BE DETAILED. FOR DECK WIDTHS GREATER THAN 30 FEET, LONGITUDINAL CONSTRUCTION JOINTS SHALL BE DETAILED. FOR GRADES OVER 3% THE PREFERRED DIRECTION OF POUR IS UPHILL. AN ALTERNATE POURING SEQUENCE IS TO POUR THE DL POSITIVE MOMENT AREAS FIRST THEN POUR THE DL NEGATIVE MOMENT AREAS. THE SEQUENCE MAY BE STARTED ANYWHERE ON THE BRIDGE.



SECTION THRU TRANSVERSE OR LONGITUDINAL JOINT

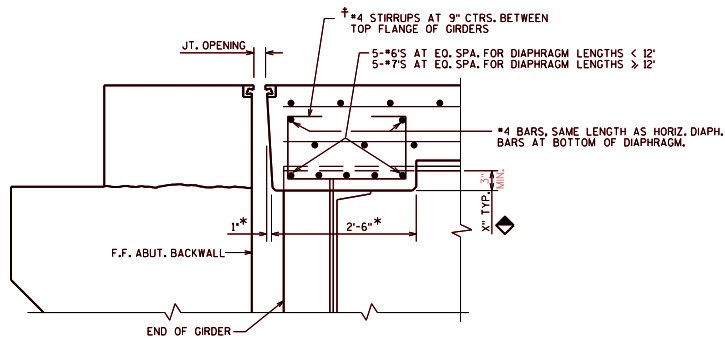
SLAB POURING SEQUENCE



BUREAU OF STRUCTURES

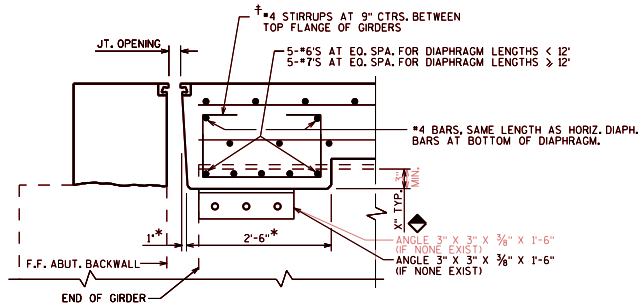
APPROVED: Bill Oliva

DATE:
7-19



SECTION THRU EXPANSION END

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



**SECTION THRU EXPANSION END OF NEW DECK
SHOWING EXISTING STEEL GIRDER
WITHOUT EXISTING STEEL DIAPHRAGM**

(SEE STD. 40.04 FOR ADDITIONAL DETAILS)

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.

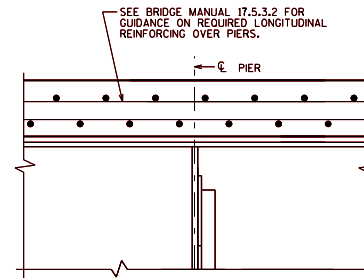
DESIGNER NOTE

3" MINIMUM, USE 3" UNLESS INCREASED TO ACCOMMODATE LARGE EXPANSION DEVICES.

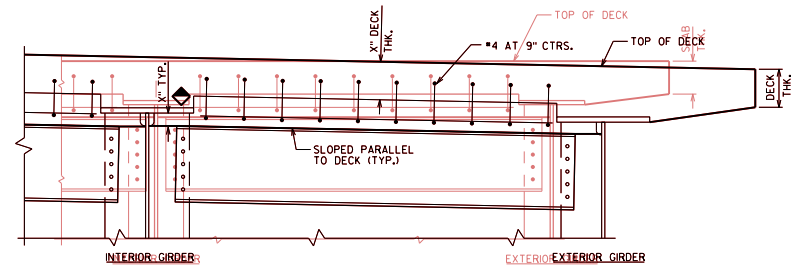
LEGEND

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

* DIMENSION IS TAKEN NORMAL TO G ABUTMENT



SECTION AT PIER



**PART TRANSVERSE SECTION AT DIAPHRAGM
EXPANSION END**

STEEL GIRDER SLAB & SUPERSTRUCTURE DETAILS

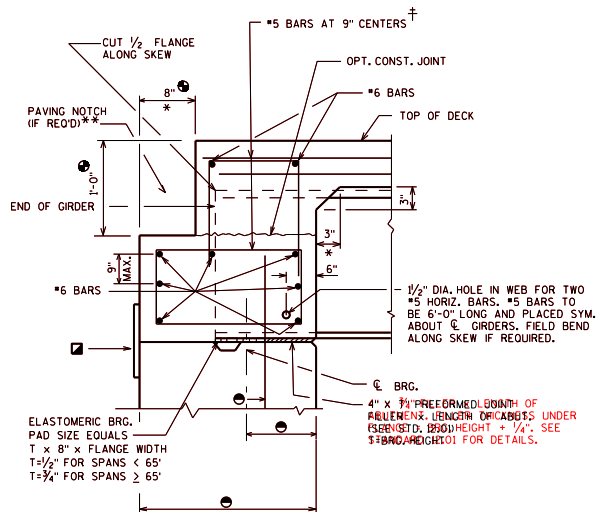


BUREAU OF STRUCTURES

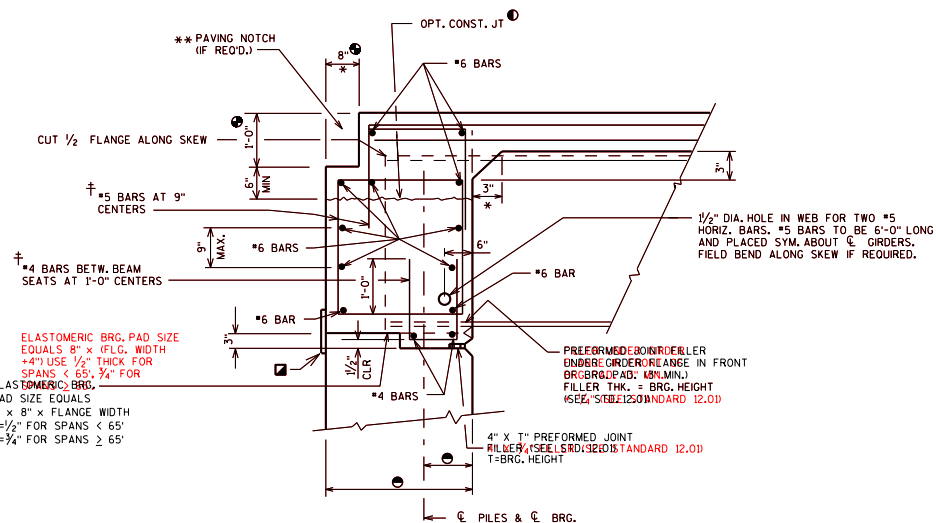
APPROVED: Bill Oliva

DATE:

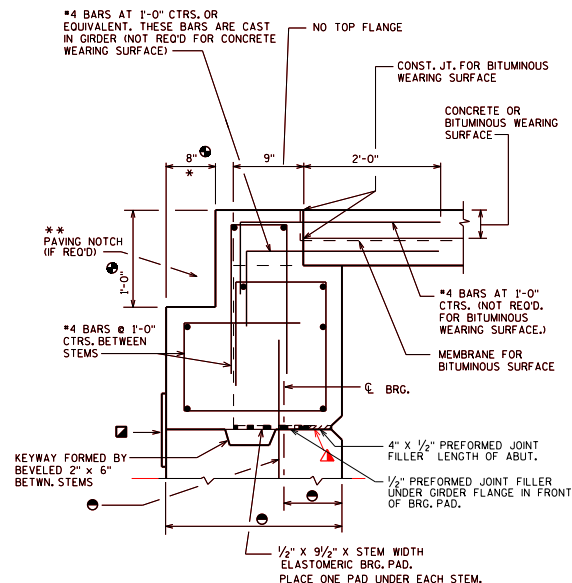
1-18



**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 C.G. SUBSTRUCTURE BARS. PLACED PARALLEL TO GIRDERS, SPACING PERPENDICULAR TO C.G. GIRDERS.
- 1'-6" RUBBERIZED MEMBRANE WATERPROOFING

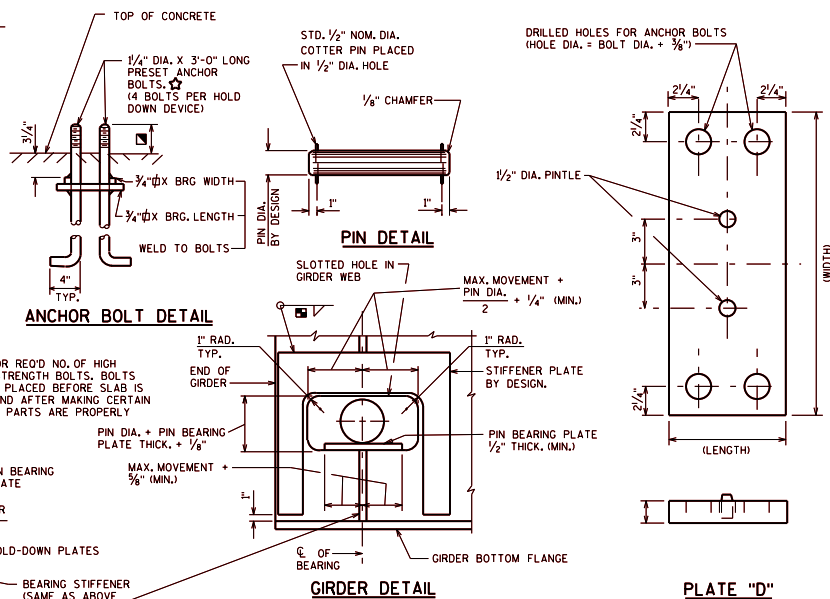
DESIGNER NOTES

SEE STANDARD 19.55 FOR PRESTRESSED BOX GIRDER BEARING DETAILS.

DESIGNER NOTES

- ① THE USE OF THIS OPT. CONST. JOINT IS NOT RECOMMENDED FOR SKEWS OVER 15° WHEN LARGE DEADLOAD BEND ROTATION IS ANTICIPATED.
- ✱ USE PAVING NOTCH ON ALL SKEWS. BRIDGES WITH LARGE DEADLOAD BEND ROTATION IS ANTICIPATED.
- ② PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- ③ SEE STD. 12.01
- ④ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- ⑤ SEE STD. 12.01

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



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.

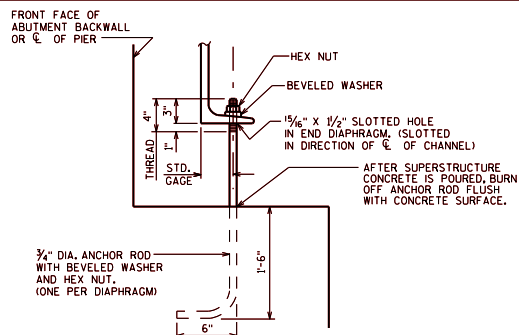
ALL MATERIAL WELDED TO THE GIRDERS, WHICH INCLUDES BEARING STIFFENERS, STIFFENER PLATE, AND PIN BEARING PLATE, SHALL MATCH THE STEEL REQUIREMENTS OF THE WEB AT THAT LOCATION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM ~~A550~~ GRADE 50 OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

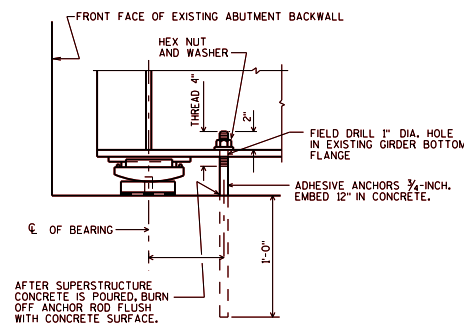
ALL MATERIAL IN HOLD DOWN DEVICES, WHICH INCLUDES HOLD-DOWN PLATES, HIGH TENSILE STRENGTH BOLTS, PINS AND ANCHOR BOLTS, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B- - -".

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 DETAILLED.
- ▲ 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.
- ① 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.
- ⊕ HOLE FOR PIN IN HOLD-DOWN PLATES AND PLATE WASHERS SHALL BE AS STATED IN STANDARD SPECIFICATION 506.3.17.



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 $\frac{1}{4}$ OF GIRDER. TO BE PAID FOR AS "STRUCTURAL CARBON STEEL".



PLACE ONE ANCHOR ROD PER GIRDER AT ABUTMENT WHERE SLAB POUR TERMINATES. LOCATE 4" (NORMAL) OFF C OF GIRDER. ANCHOR ROD, NUT, WASHER, AND DRILLED HOLE IN GIRDER FLANGE SHALL BE PAID FOR AS "ADHESIVE ANCHORS 3/4-INCH".

TEMPORARY HOLD DOWN DEVICE

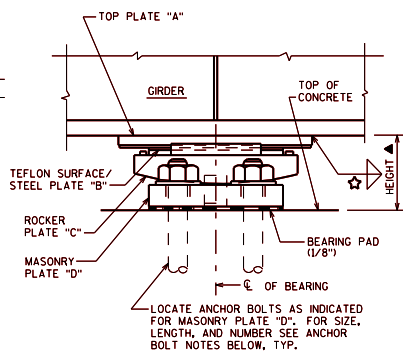
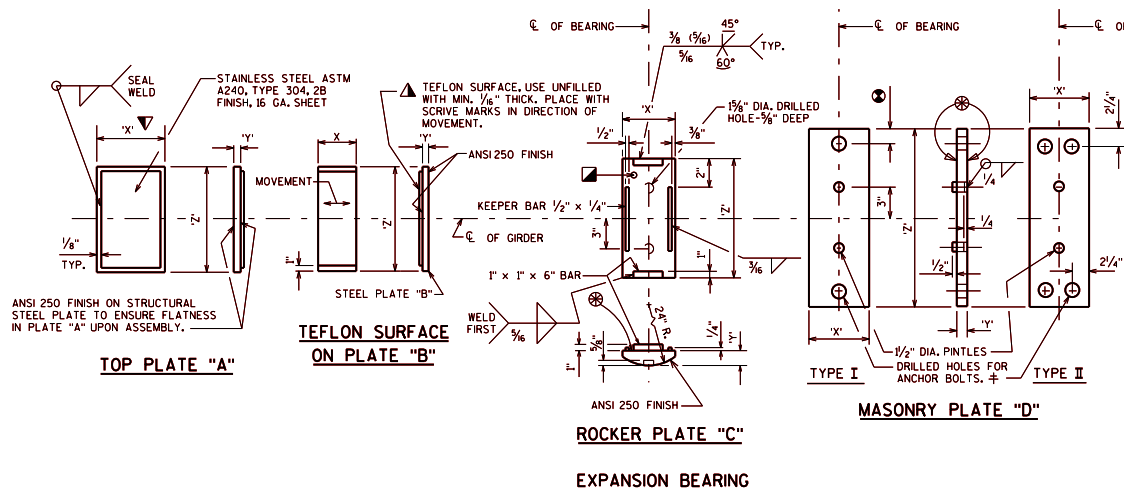
HOLD DOWN DEVICES



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-26



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 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 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

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 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

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

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 1/2"	1'-10"	0.360
175	11"	3/8"	1'-0"	7"	1/2"	1'-0"	9"	1 1/8"	1'-2 1/4"	8"	1 1/2"	1'-10"	0.401
275	1'-3"	3/8"	1'-0"	11"	1/2"	1'-0"	1'-1"	2 3/8"	1'-2 1/4"	11"	2"	1'-10"	0.521

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 1/2"	2'-2"	0.401
370	1'-3"	3/8"	1'-4"	11"	1/2"	1'-4"	1'-1"	2 3/8"	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

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 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 3/8"	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

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT $\bar{C}$ OF GIRDER AND $\bar{C}$ OF BEARING.

FINISH THESE SURFACES TO ANSI250 IF "Y" DIMENSION IS GREATER THAN 2".

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C.

ROCKER PLATE "C" AND MASONRY PLATE "D" SHALL BE GALVANIZED, TOP PLATE "A" AND STEEL PLATE "B" SHALL BE SHOP PAINTED, USE A WELDABLE PRIMER ON TOP PLATE "A". DO NOT PAINT STAINLESS STEEL OR TEFLON SURFACES.

ALL MATERIAL IN BEARINGS, INCLUDING SHM 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 SHM PLATES, FABRICATOR MAY INCREASE THICKNESS OF TOP PLATE "A" OR MASONRY PLATE "D" BY THE SHM 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 SHM PLATES AND BEARING PADS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B-T", 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 FOR GRADE 50. YIELD STRENGTH AND ELONGATION. ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A153 FOR GRADE 50. YIELD STRENGTH AND ELONGATION. PLACE SHM PLATES BETWEEN BEARING PAD AND MASONRY PLATE "D". PLATES SHALL BE 1/4" THICK AND 2" DIMENSIONS. MATCH MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION. PLACE SHM PLATES BETWEEN BEARING PAD AND MASONRY PLATE "D". PLATES SHALL BE 1/4" THICK AND 2" DIMENSIONS. MATCH MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION. PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.

BOND STEEL PLATE "B" AND TEFLON WITH ADHESIVE MATERIALS MEETING THE REQUIREMENTS OF FOUNDATION STANDARD 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 PLATE OF THE BEARING IS CLEAN AND THE SLIDING SURFACE OF THE BEARING IS CLEAN AND FREE FROM 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 SHM 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 $\bar{C}$ OF BEARING TO END OF ORDER.

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.

STAINLESS STEEL - TFE EXPANSION BEARING DETAILS TYPE "A-T"



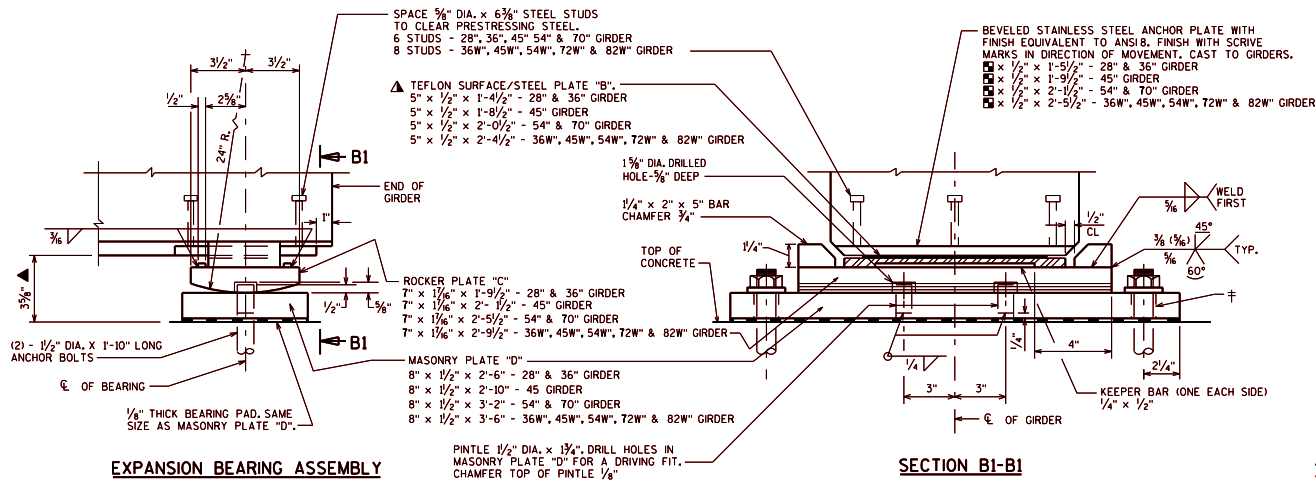
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APPROVED:

Bill Oliva

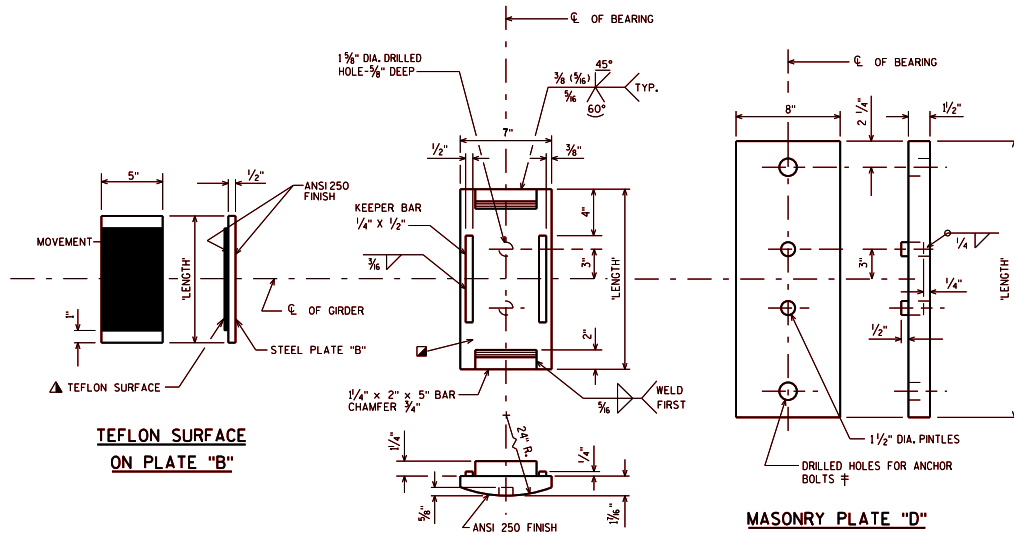
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EXPANSION BEARING ASSEMBLY

SECTION B1-B1



TEFLON SURFACE ON PLATE "B"

ROCKER PLATE "C"

EXPANSION BEARING

MASONRY PLATE "D"

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT CL OF GIRDER AND CL 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 50YIELD STRENGTH AND ELONGATION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM F1554 GRADE 50, OR WATERBURY GRADE 50W AND WELD ELEVATION ADDITION (ASTM A709 GRADE 36, OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION).

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH AND FREE FROM WARP, AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL.

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

ALL FINISHED SURFACES SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS.

ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER ANCHOR BOLT.

PROVIDE FOR OFFER OF CONCRETE, PROJECT ANCHOR BOLTS, MASONRY PLATE "D" THICKNESS + 2 $\frac{1}{4}$ ", ABOVE TOP OF CONCRETE.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

MASONRY PLATE "D", ROCKER PLATE "C", ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A653, GRADE 50, 55, 60, 65, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000.

ALL MATERIAL IN "STEEL BEARINGS FOR PRESTRESSED CONCRETE GIRDERS", INCLUDING BEARING PADS, SHALL BE PAINTED FOR THE ENTIRE SURFACE OF THE BEARING ASSEMBLY.

DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER $\frac{3}{8}$ "

LARGER THAN ANCHOR BOLT. BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER $\frac{3}{8}$ "

LARGER THAN ANCHOR BOLT.

TEFLON SURFACE, USE UNFILLED WITH MINIMUM $\frac{1}{16}$ " THICKNESS. PLACE WITH SCRIBE MARKS TO INDICATE TOP OF MOVEMENT. BEARING PLATE "D" THICKNESS SHALL BE MINIMUM $\frac{1}{2}$ " THICK.

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 SLIDING FACE OF THE LOWER ELEMENT HAVE THE SURFACE FINISH SPECIFIED AND ARE CLEAN AND FREE OF ALL DUST, MOISTURE, AND ANY OTHER FOREIGN MATTER.

DESIGNER NOTES

IF ALL BEARINGS ON A GIVEN SUBSTRUCTURE UNIT ARE FIXED, UTILIZE $\frac{1}{2}$ " 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 TENSILE STRENGTH OF 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.

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.

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

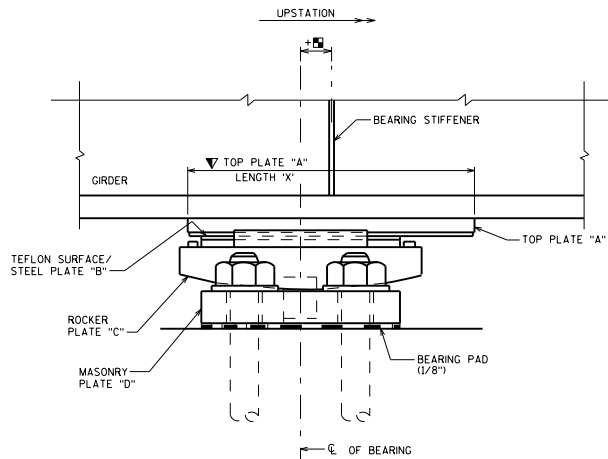
BEARING CAPACITY (KIPS)

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
S. ABUT

E

E

F

F

E

E
N. ABUT

PIER 1

PIER 2

PIER 3

PIER 4

PIER 5

PIER 6

BELOW SHOWS AN EXAMPLE BEARING OFFSET TABLE BASED ON THE SAMPLE BRIDGE SHOWN ABOVE. SUCH A TABLE SHOULD BE PROVIDED FOR STEEL GIRDER BRIDGES. THE OFFSET TABLE MAY BE OMITTED AT THE DISCRETION OF THE DESIGN ENGINEER IF THE VALUES ARE NEGLIGIBLE.

(THE BRIDGE SCHEMATIC SHOULD NOT BE SHOWN ON THE PLANS)

*F S. ABUT	PIER 1	PIER 2	PIER 5	PIER 6	N. ABUT
30	0.7	0.5	0.3	-0.3	-0.5
45	0	0	0	0	0
60	-0.7	-0.5	-0.3	0.3	0.5
75	-1.6	-1.1	-0.7	0.7	1.1
90	-2.4	-1.7	-1.0	1.0	1.7

❏

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":

$\frac{1}{2}$ TEFLON PLATE "B" LENGTH "X"
+ THERMAL MOVEMENT (USE $60 - (-30) = 90$ DEGREES)
+ F CONSTRUCTION TOLERANCE
= $\frac{1}{2}$ TOP PLATE "A" LENGTH (DOUBLE THIS FOR PLATE "A" LENGTH)

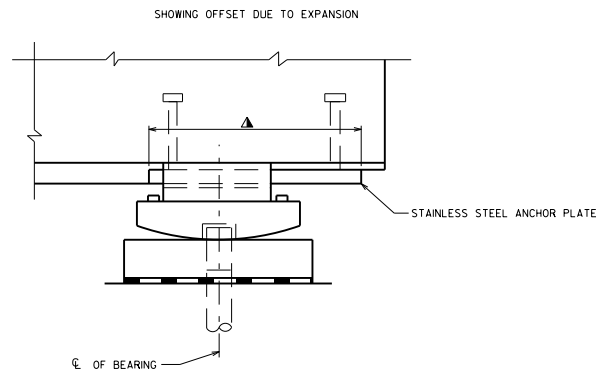
ANCHOR PLATES IN PRESTRESSED GIRDERS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT, GIRDER SHRINKAGE AND CONSTRUCTION TOLERANCE.

PROCEDURE FOR SIZING ANCHOR PLATE:

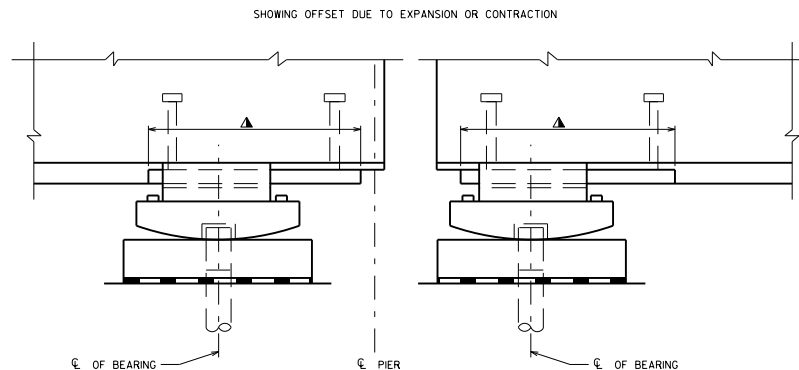
$\frac{2}{3}$ INCHES = $\frac{1}{2}$ TEFLON PLATE LENGTH
+ THERMAL MOVEMENT (USE $60 - 5 = 55$ DEGREES)
+ SHRINKAGE = 0.0003 L
+ F CONSTRUCTION TOLERANCE
= $\frac{1}{2}$ ANCHOR PLATE LENGTH (DOUBLE THIS FOR ANCHOR PLATE LENGTH)

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 CONCRETE 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: Bill Oliva

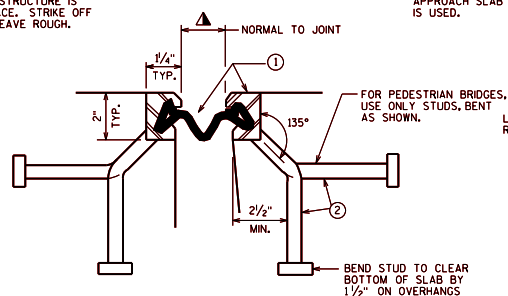
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TYPICAL SECTION THRU JOINT AT STEEL GIRDER

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

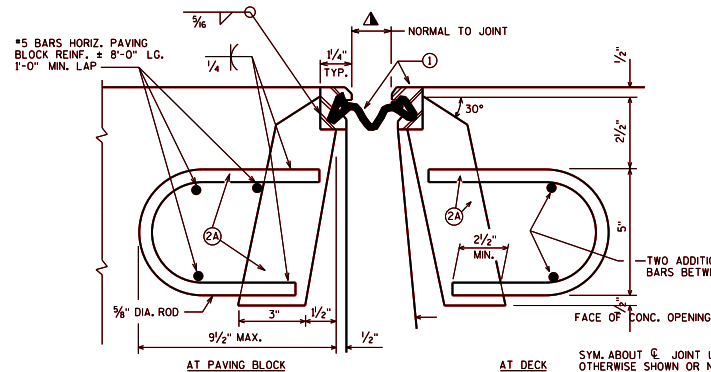
NORMAL TO $\mathbb{Q}$ SUBSTRUCTURE

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



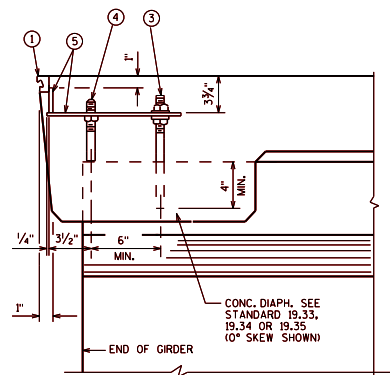
SECTION THRU JOINT

EXTERIOR GIRDER TO EDGE OF DECK, AND
AT PARAPETS, MEDIANS AND SIDEWALKS



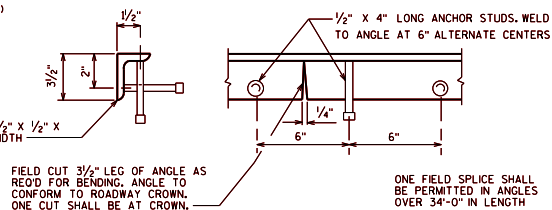
SECTION THRU JOINT

ROADWAY TRAFFIC AREA BETWEEN EXTERIOR GIRDERS.



PART SECTION THRU JOINT AT
PRESTRESSED GIRDERS

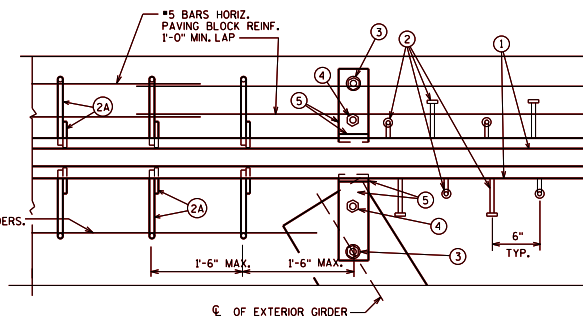
NORMAL TO $\mathbb{Q}$ SUBSTRUCTURE



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."

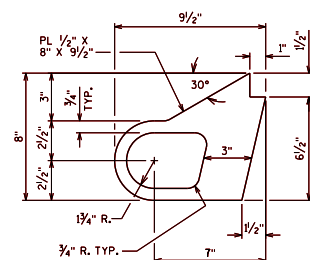


PART PLAN

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 GROSS 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.
- ②A 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.
- ③ 3/4" DIA. THREADED ROD WITH 2 NUTS AND PLATE WASHERS. FOR PRESTRESSED GIRDERS, GROUT THREADED ROD INTO FIELD DRILLED HOLES ON 1/2" OF GROSS. FOR STEEL GIRDERS, GROUT THREADED ROD TO TOP FLANGE OR ATTACH BY BOLTING THRU FLANGE. ON ABUTMENT SIDE, GROUT THREADED ROD INTO FIELD DRILLED HOLES IN ABUTMENT BACKWALL AS SHOWN.
- ④ 3/4" DIA. THREADED ROD WITH NUT. TACK WELD NUT TO NO. 5.
- ⑤ FABRICATE SUPPORT FROM 3" X 1/2" BAR AS SHOWN OR EQUIVALENT. ONE PER GIRDER PER SLOPE SHOP OR FIELD. WELD TO NO. 1 IF SLOPE WELDED. COVER WELDED AREAS WITH EPOXY-COATING MATERIAL. PROVIDE 1/2" DIA. HOLE FOR NO. 3 AND 1" DIA. HOLE FOR NO. 4.
- ⑥ GALVANIZED PLATE 3/8" X 10" X (2'-2" LONG FOR SKEWS TO 45° AND 3'-0" LONG FOR SKEWS > 45°) WITH HOLES FOR NO. 7. FOR SINGLE SLOPE PARAPET. FOR SLOPED FACE PARAPET, SEE STANDARD 28.07.
- ⑦ 3/4" DIA. X 1 1/2" STAINLESS STEEL SOCKET FLAT HEAD SCREWS WITH ANTI-SEIZE LUBRICANT. PLACE IN COUNTERSUNK HOLE. RECESS 1/8" BELOW PLATE SURFACE.
- ⑧ 3/4" DIA. X 4" GALVANIZED HEX HEAD BOLT, BEND 45°.
- ⑨ 3/4" DIA. X 2 1/4" GALVANIZED THREADED COUPLING.
- ⑩ SIDEWALK COVER PLATE 3/8" 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. GALVANIZED PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.
- ⑪ 1" X 5" SLOTTED COUNTERSUNK HOLE FOR NO. 7. PLACE SLOT PARALLEL TO DIRECTION OF MOVEMENT.

NOTES

[illegible]

ALTERNATE STRIP SEAL ANCHOR

STRIP SEAL EXPANSION
JOINT DETAILS

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

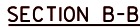
DATE: 7-20



"X" - VALUES IN INCHES														USE "X" = 6½" FOR 0° SKEW													
SKEW	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°														
RHF	6½	6½	6½	6½	6½	6½	6½	6½	6½	7	7	7½	8														
LHF	7	7½	8	8½	9	9½	10½	11	11½	13	13½	14½	15½														

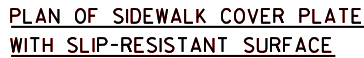


SECTION AT SIDEWALK



FROM ROADWAY
SINGLE SLOPE PARAPET

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



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.

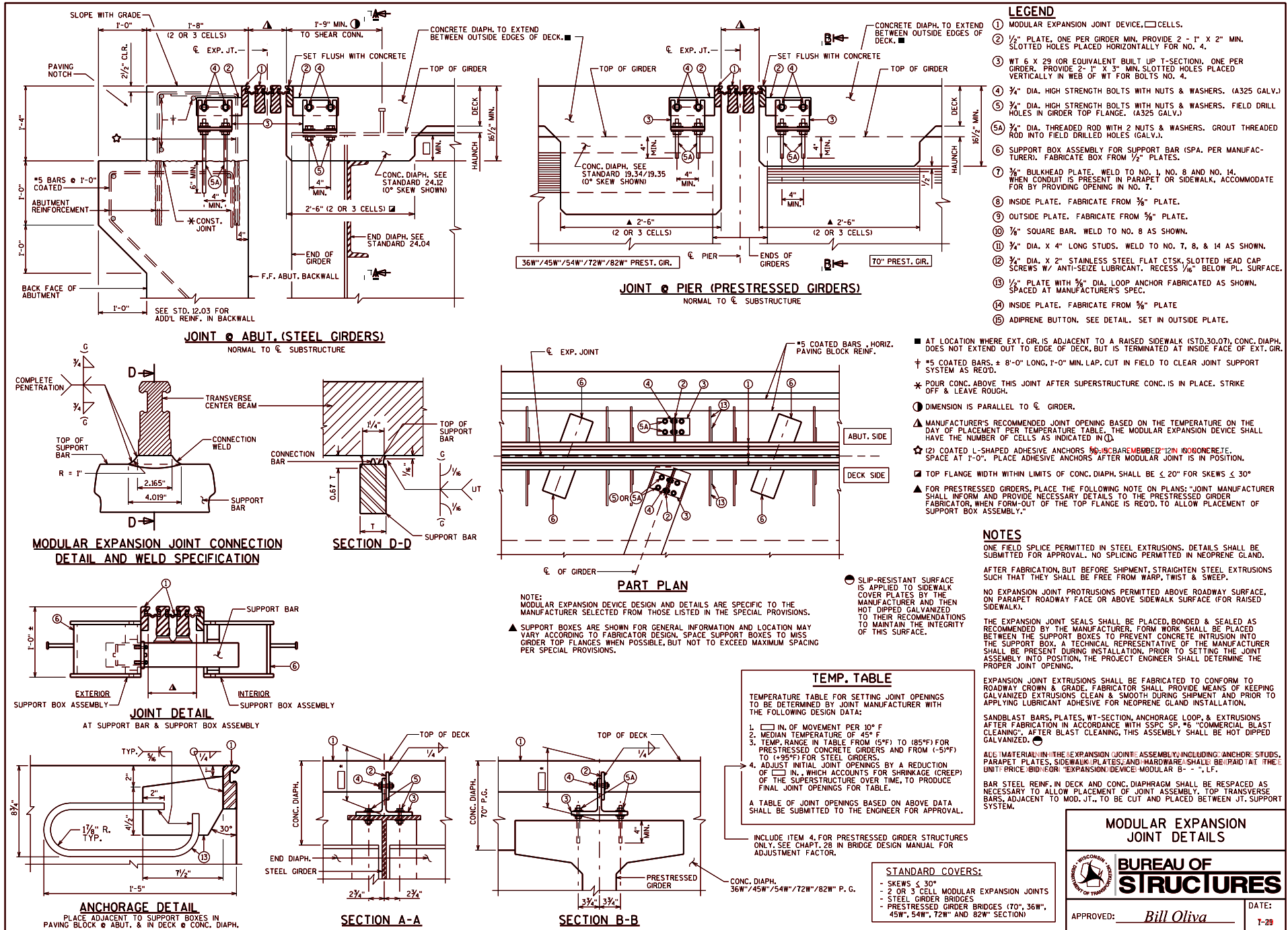
APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

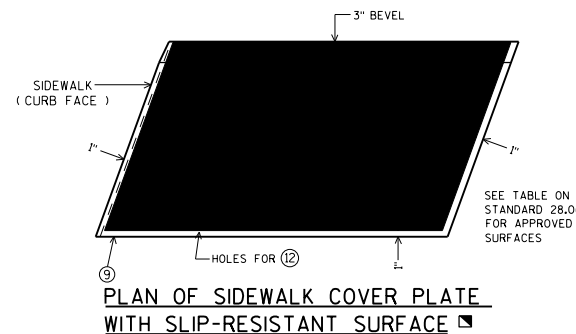
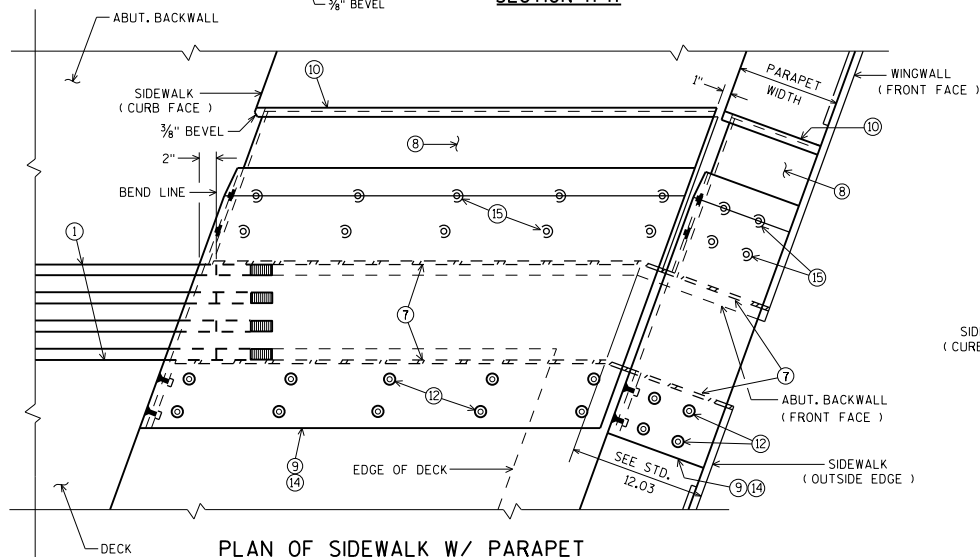
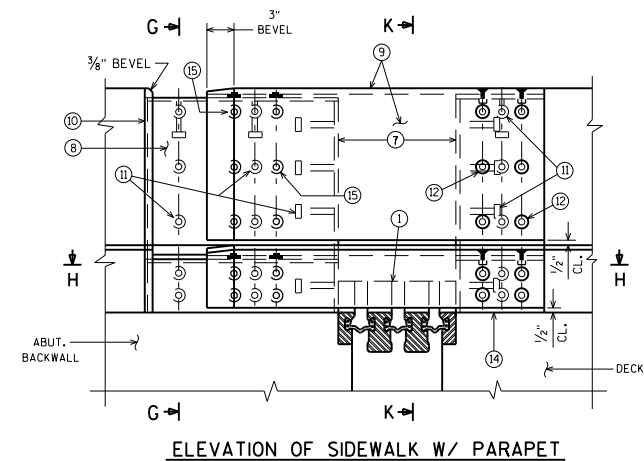
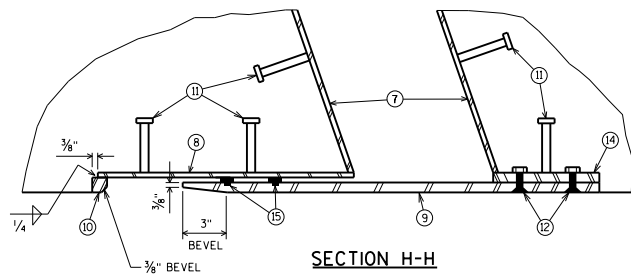
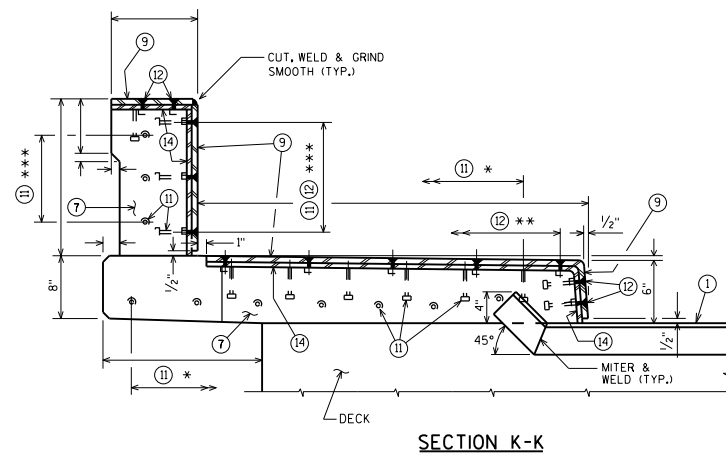


BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-19





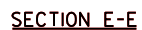
■ PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE). GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.

COVER PLATES FOR
SIDEWALK W/ CONC. PARA.

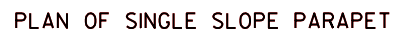
BUREAU OF STRUCTURES

APPROVED: Scot Becker

DATE:	3-11
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CROSS SECTION SHOWN FOR 32", 36", AND 42" SINGLE SLOPE PARAPET.
DETAILS FOR 56" PARAPET ARE SIMILAR.



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

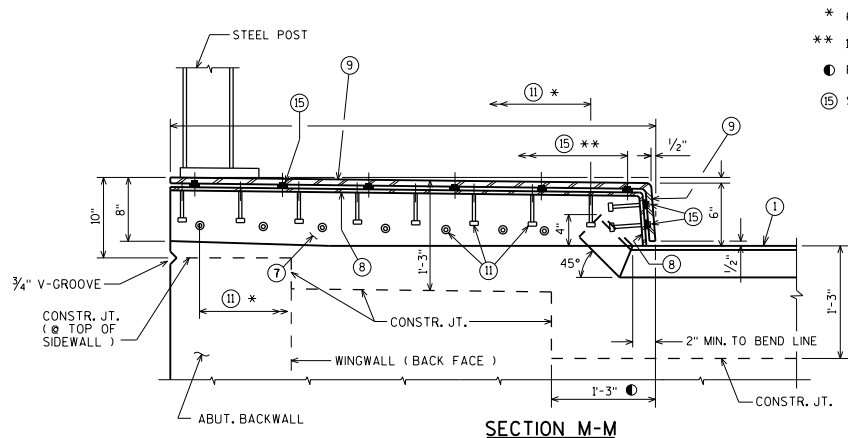
COVER PLATES FOR SINGLE SLOPE PARAPET



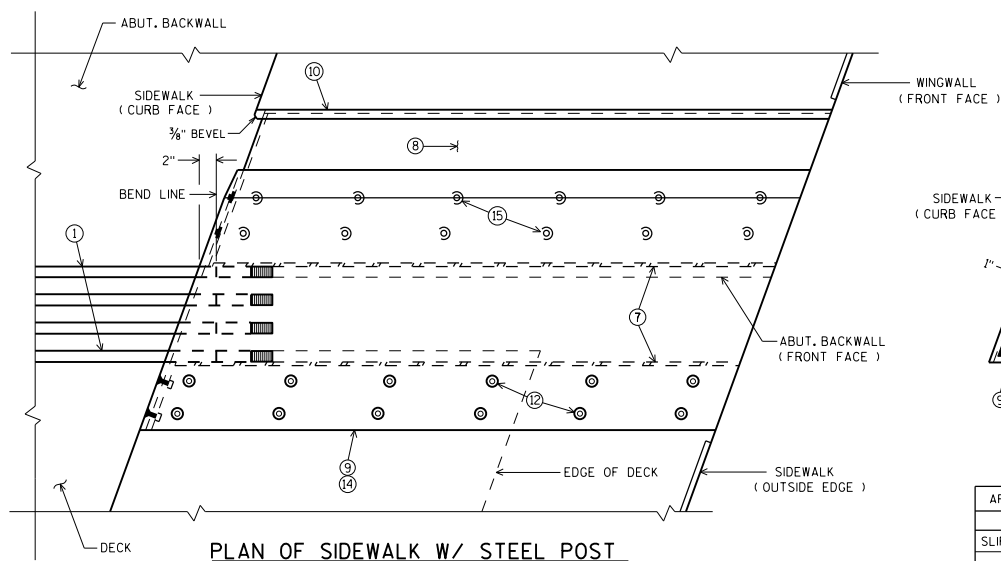
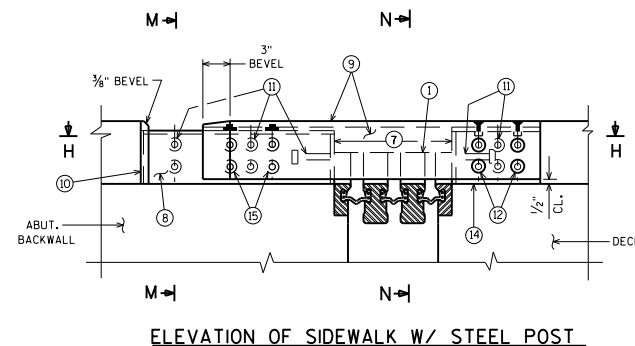
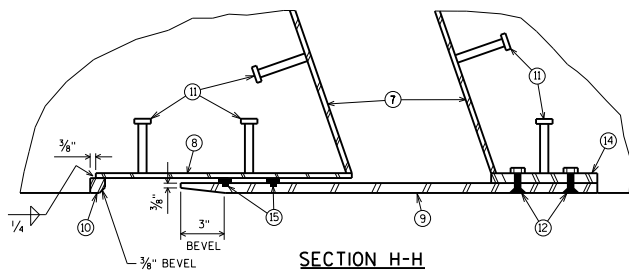
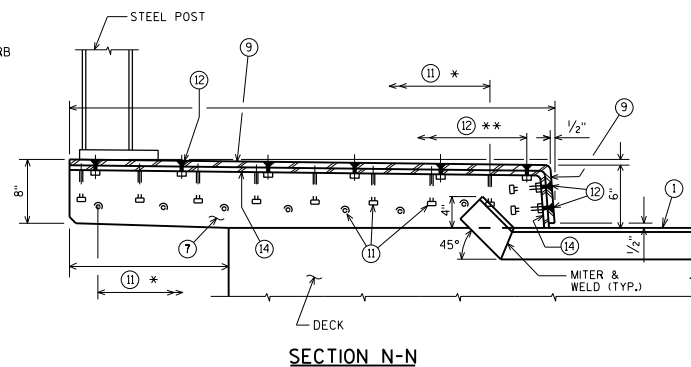
APPROVED: *Bill Oliva*

DATE:

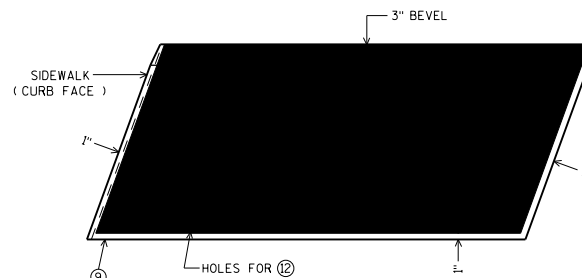
7-18



- * 6" MAX. SPA.
 ** 1'-0" MAX. SPA.
 1 PERPENDICULAR TO FACE OF CURB
 15 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

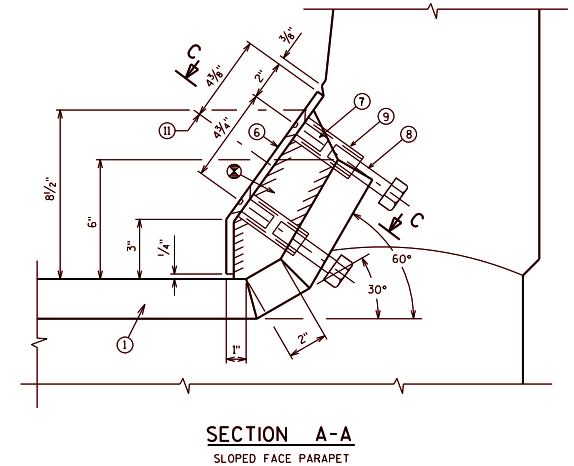
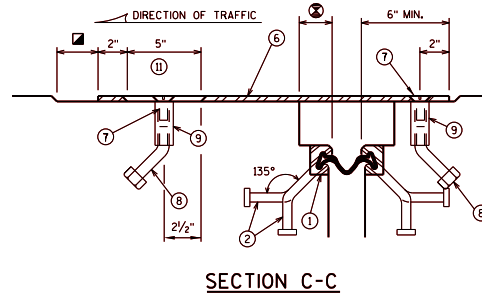
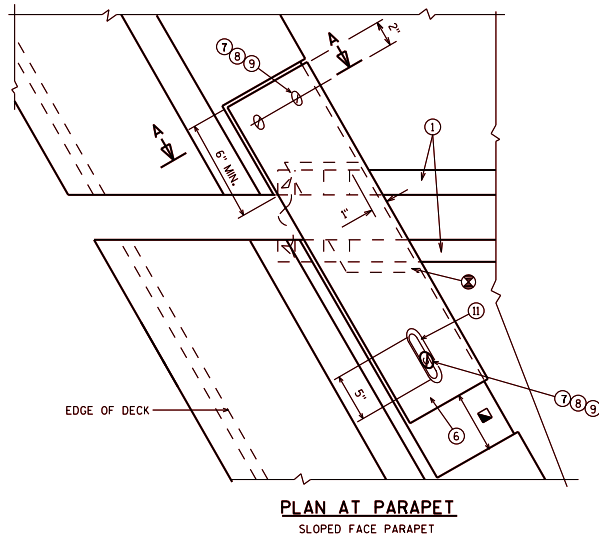
COVER PLATES FOR SIDEWALK W/ STEEL RAIL



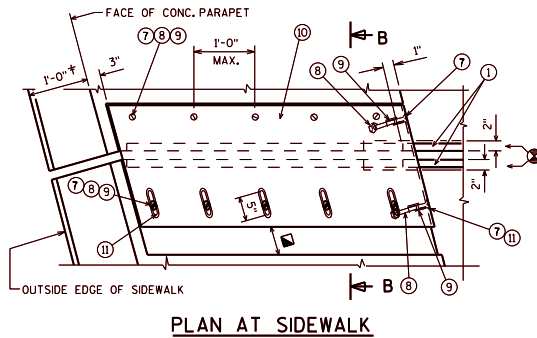
BUREAU OF STRUCTURES

APPROVED: Scot Becker

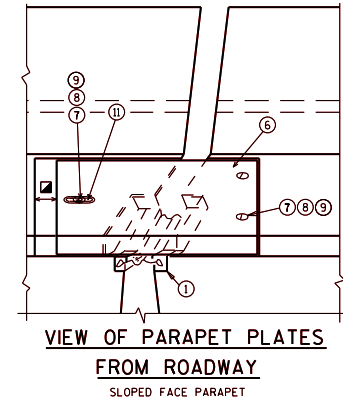
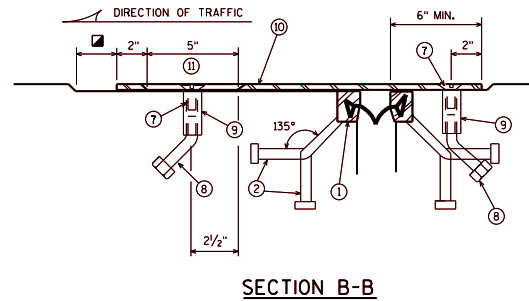
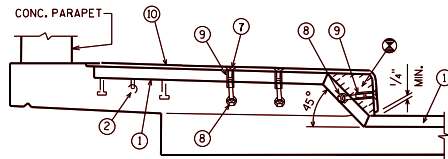
DATE:
7-11



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



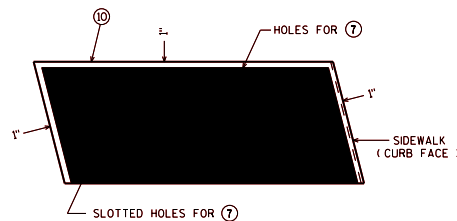
* 1'-2" WHEN "VERTICAL FACE PARAPET TYPE 'TX' IS USED



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.



PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE

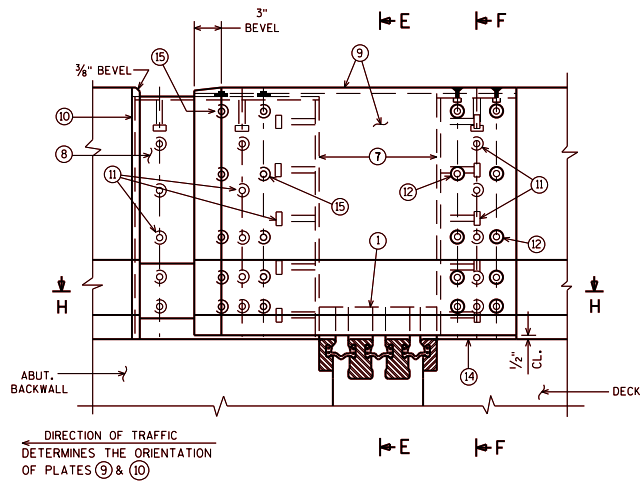
PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE).

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

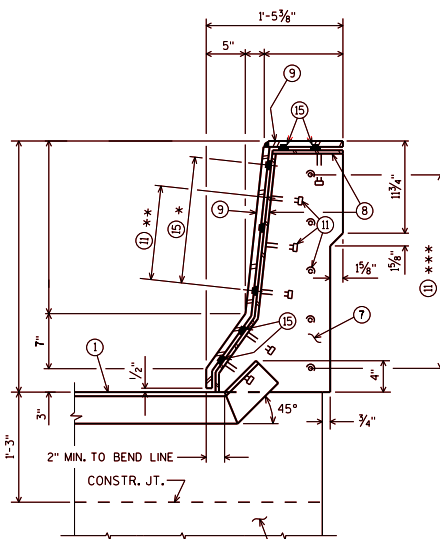
STRIP SEAL COVER PLATES SLOPED FACE PARA./SDWK.



APPROVED: Bill Oliva DATE: 7-20

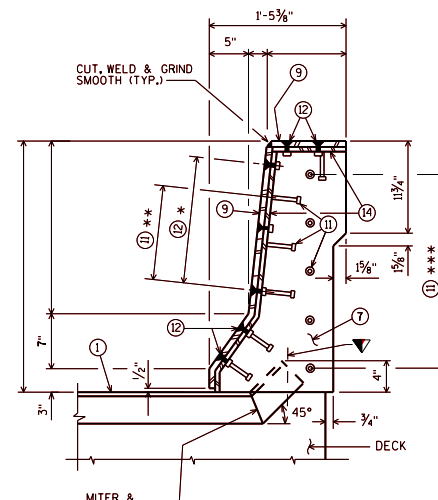


ELEVATION OF PARAPET LF/HF

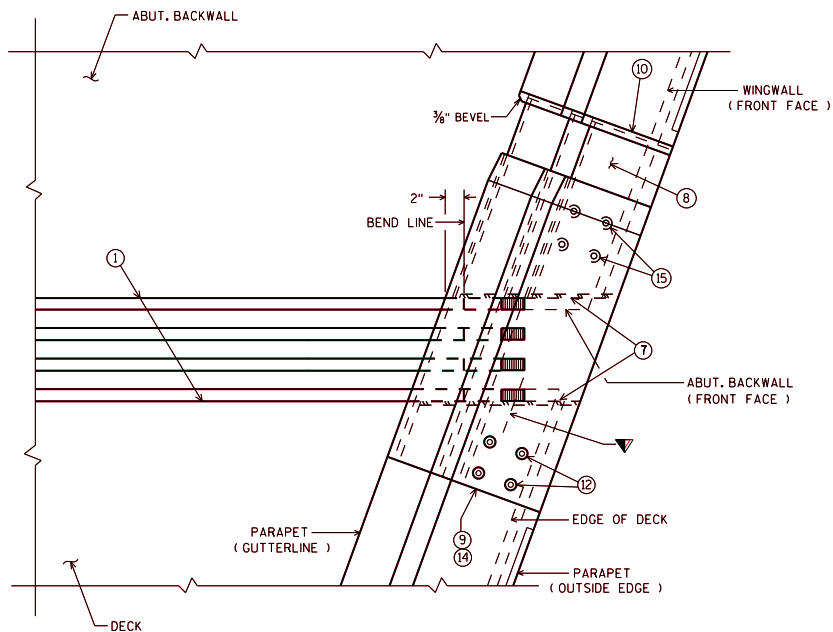


SECTION E-E

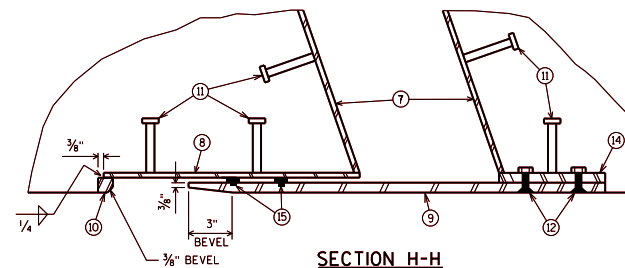
ABUT. BACKWALL



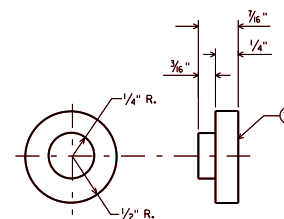
SECTION F-F



PLAN OF LF/HF



SECTION H-H

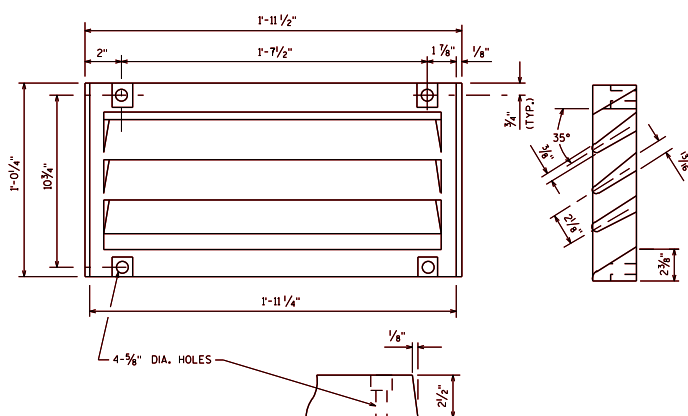


ADIPRENE BUTTON DETAIL

- * 2 EQ. SPA. (LF)
- 4 EQ. SPA. (HF)
- ** 2 SPA. (LF)
- 4 SPA. (HF)
- *** 4 SPA. (LF)
- 6 SPA. (HF)

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

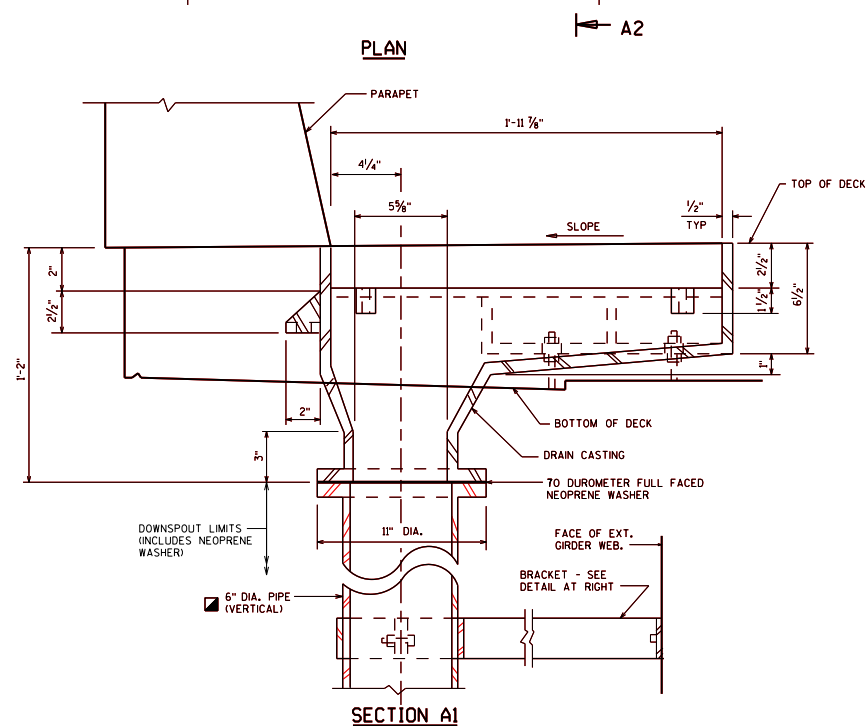
COVER PLATES FOR PARAPET 'LF/HF'	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>



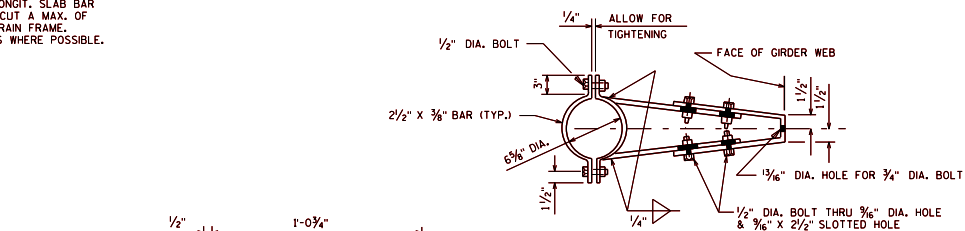
GRATE CASTING DETAIL

ATTACH GRATE TO FRAME FOR SHIPMENT

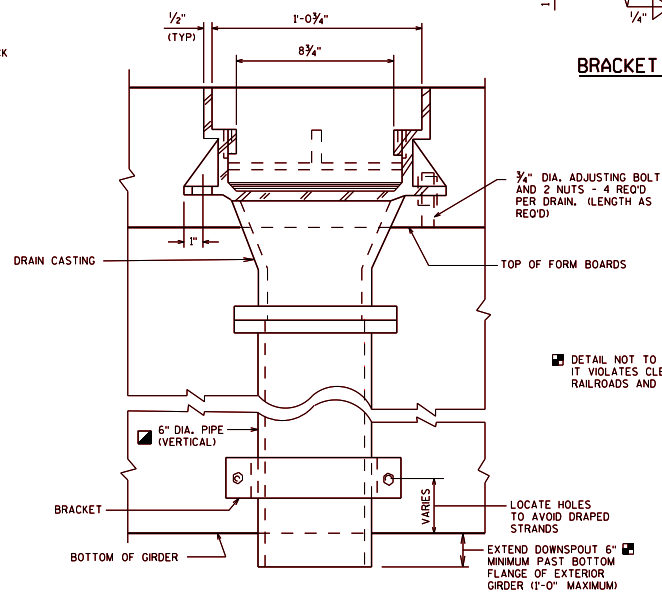
TRANS. AND LONGIT. SLAB BAR
REINF. TO BE CUT A MAX. OF
1" CL. FROM DRAIN FRAME.
DISPLACE BARS WHERE POSSIBLE.



SECTION A1



BRACKET DETAIL



SECTION A2

ALL MATERIAL FOR TYPE "GC" CASTING, EXCLUDING GRADE HOLD DOWN SCREWS, SHALL BE GRAY IRON ~~DOWNPOUT~~ CONFORMING TO ASTM A8, CLASS 30.
(APPROXIMATE WEIGHT = 225#)
ALL MATERIAL FOR TYPE "GC" CASTING, EXCLUDING GRADE HOLD DOWN SCREWS, SHALL BE GRAY IRON ~~DOWNPOUT~~ CONFORMING TO ASTM A8, CLASS 30.
(APPROXIMATE WEIGHT = 225#)
ALL MATERIAL FOR TYPE "GC" DRAINS TO BE INCLUDED WITH GRADE HOLD DOWN DRAINS ~~TYPE "D"~~ TO ASTM A36.
ALL MATERIAL FOR DOWNSPOUTS, DOWNSPOUT CONNECTIONS AND BRACKET SITS TO BE INCLUDED WITH GRADE HOLD DOWN DRAINS ~~TYPE "D"~~ TO ASTM A36.
ALL MATERIAL FOR DOWNSPOUTS SHALL BE REINFORCED ~~INTERMEDIATE BRACINGS ARE NOT ALLOWED~~ WITH VANISHED STANDARD PIPE CONFORMING TO ASTM A53.
ALL MATERIAL FOR DOWNSPOUTS SHALL BE REINFORCED ~~INTERMEDIATE BRACINGS ARE NOT ALLOWED~~ WITH VANISHED STANDARD PIPE CONFORMING TO ASTM A53.

ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER. IN THE BID ITEM "DOWNSPOUT 6-INCH". ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS ON THE PRESTRESSED GIRDER SHEET, SHOWED LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER. ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.

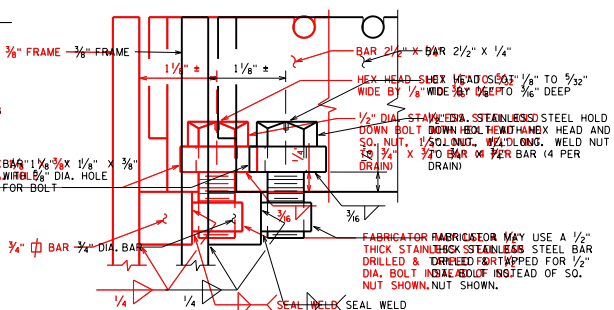
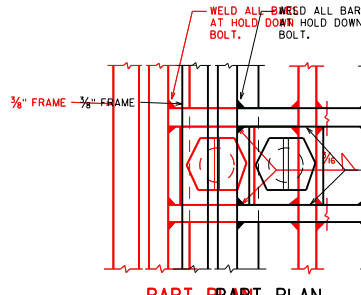
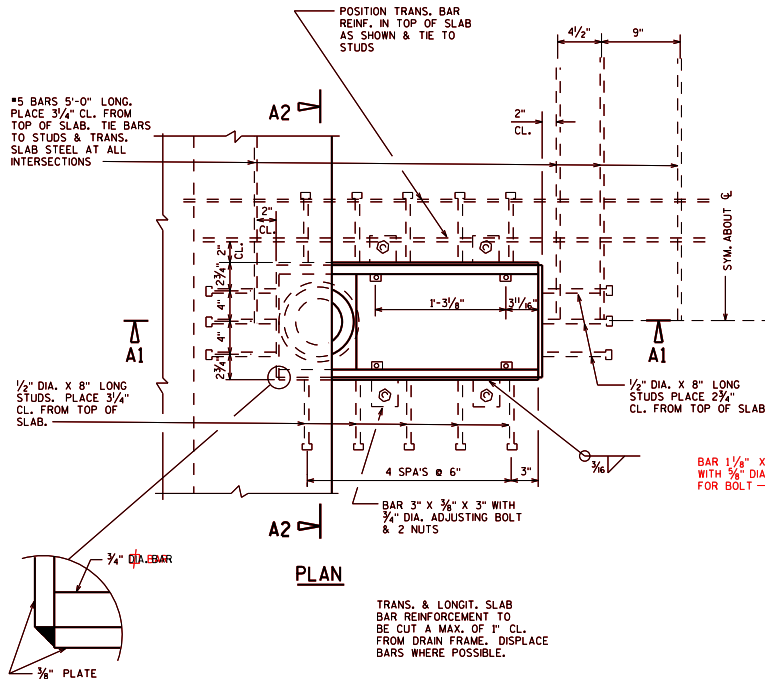
FLOOR DRAIN TYPE 'GC'



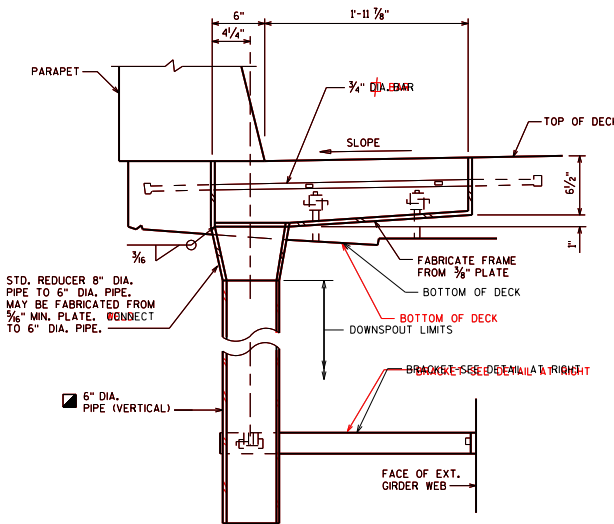
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

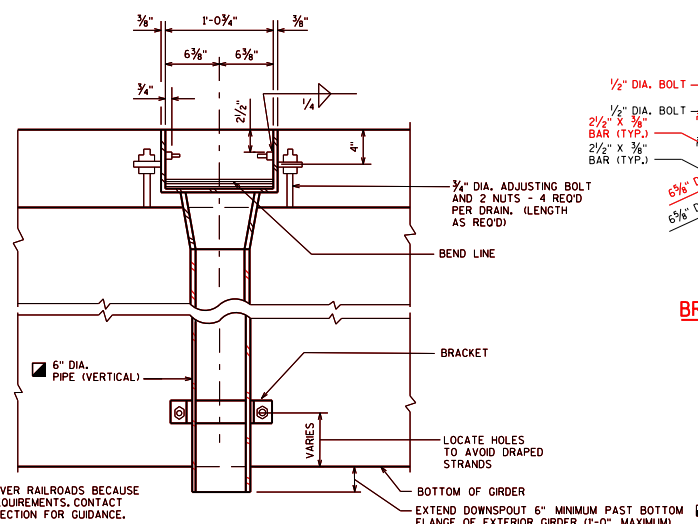
DATE: 7-20



SECTION AT HOLD DOWN BOLT



SECTION A1



SECTION A2

NOTES

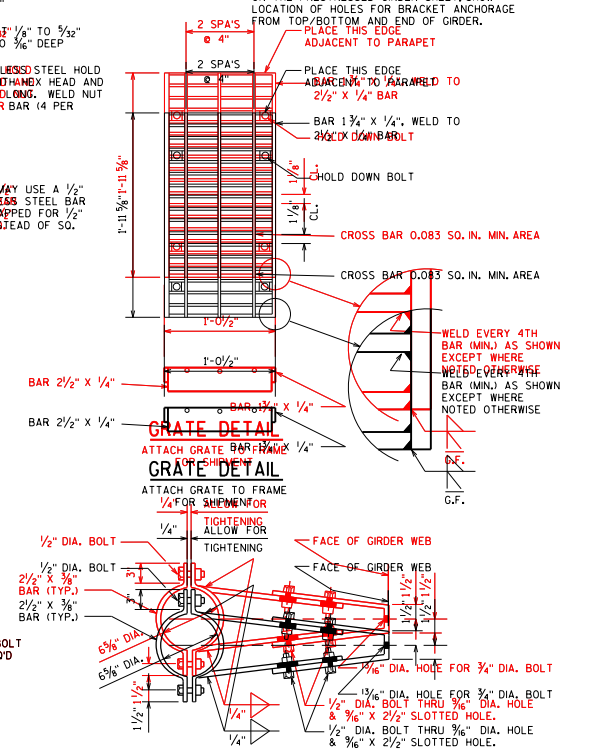
- ALL DRAIN MATERIAL INCLUDING GRATE, EXCLUDING PIPE & GRATE HOLD DOWN BOLTS, SHALL BE ASTM A36 STEEL.
- MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A36.
- INTERMEDIATE BRACKETS ARE NOT ALLOWED. ALTERNATE TYPE OF BRACKET, THE PROPOSED ALTERNATE DETAILS SHALL BE SUBMITTED TO THE BUREAU OF STRUCTURES FOR REVIEW.
- SEAL WELD INSIDE OF DRAIN. WELDS SHALL BE MADE WITH LOW HYDROGEN ELECTRODES.
- PRIOR TO GALVANIZING A NO. 6 BLAST CLEANING IS REQ'D.
- SEAL WELD INSIDE OF DRAIN.
- FLANGED 6" DIA. DOWNSPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.

NOTES

- DESIGNER'S NOTES
- ALL MATERIAL FOR BRACKETS, EXCLUDING PIPE & GRATE HOLD DOWN BOLTS, SHALL BE ASTM A36 STEEL.
- MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A36.
- INTERMEDIATE BRACKETS ARE NOT ALLOWED.
- ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS SHALL BE GALVANIZED OR GALVANIZED AFTER FABRICATION.
- ALL MATERIAL FOR FLOOR DRAINS TO BE INCLUDED IN THE BID ITEM "FLOOR DRAINS".
- LOCATION OF HOLES FOR BRACKET ANCHORAGE SHALL BE SHOWN ON THE DRAWING.
- SEAL WELD INSIDE OF DRAIN.
- PRIOR TO GALVANIZING A NO. 6 BLAST CLEANING IS REQ'D.
- FLANGED 6" DIA. DOWNSPOUTS SHALL BE REINFORCED THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.

DESIGNER NOTE

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

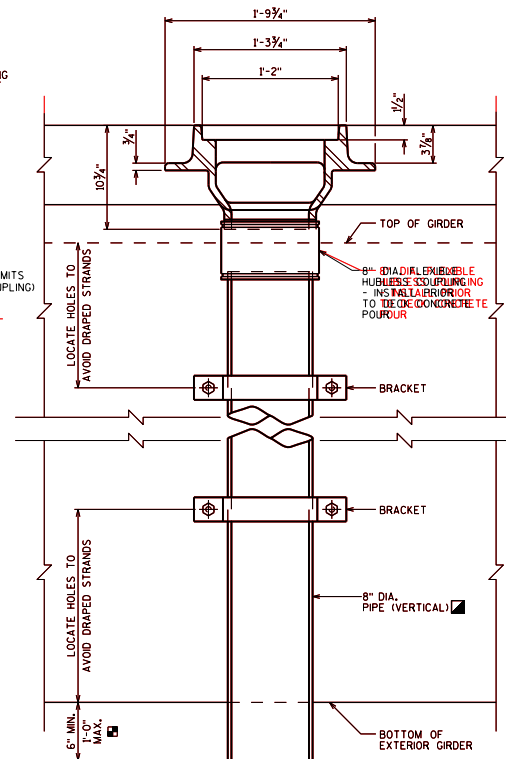
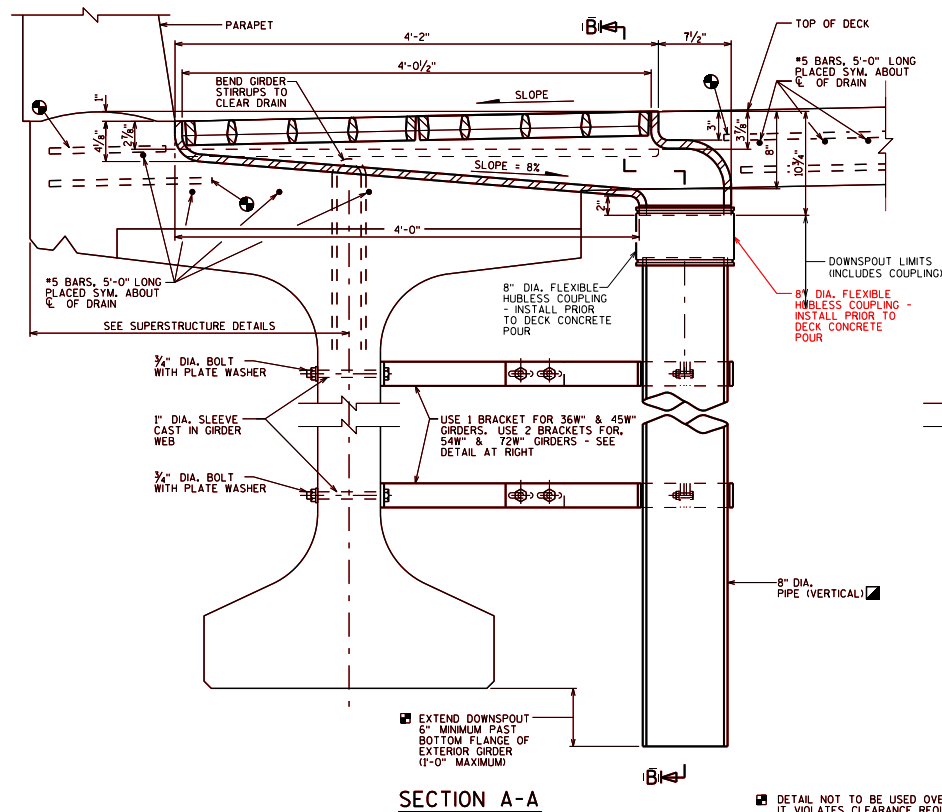
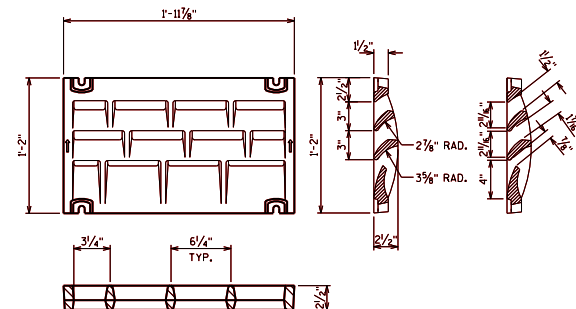
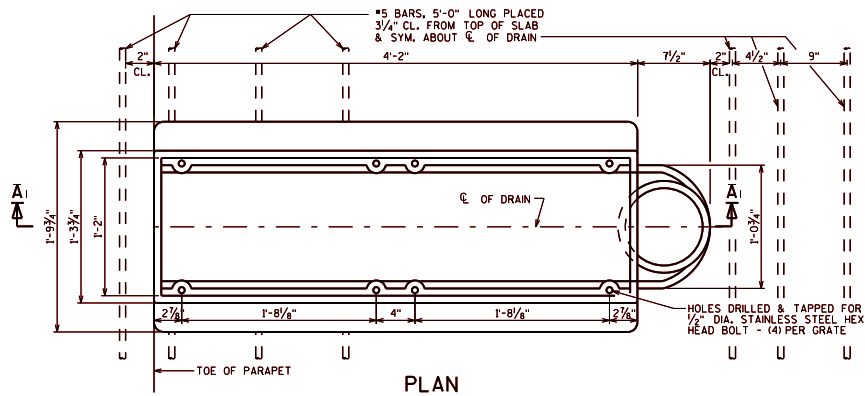


BRACKET DETAIL

BRACKET DETAIL

FLOOR DRAIN TYPE 'H'

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

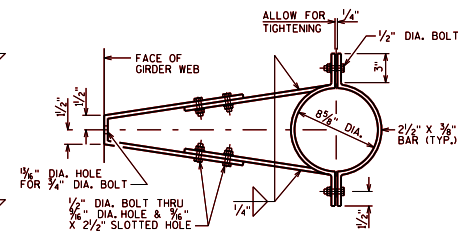


NOTES

ALL MATERIAL FOR TYPE "WF" CASTING AND 8" DIA. **HOLES FOR** PIPE, EXCLUDING GRATE HOLD DOWN **STAYS** SHALL BE GRAY IRON CONFORMING TO ASTM A48, CLASS 30. **CONNECTION PIPE**, EXCLUDING GRATE HOLD DOWN MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A48, CLASS 30.

MATERIAL BRACKETS ARE NOT ALLOWED TO ASTM A48. ALL MATERIAL FOR FLOOR DRAINS TO BE INCLUDED **IN THE BID ITEM "DOWNSPOUTS AND BRACKETS"** TYPE OF BRACKET IN THE PROPOSED ALTERNATE **ALL MATERIALS FOR DOWNSPOUTS AND BRACKETS TO BE INCLUDED IN THE BID ITEM "DOWNSPOUT 8-INCH"** TRANSVERSE & LONGITUDINAL SLAB BAR **BEING DOWNSPOUTS SHALL REQUIRE REINFORCED THERMOSETTING RESIN PIPE (OR TRACE BARS WHERE POSSIBLE) LONGITUDINAL SLAB BAR TRANSVERSE & LONGITUDINAL SLAB BAR OF 1" REINFORCEMENT TO BE CUT IN A MAXIMUM OF 1" CLEAR FROM DRAIN FRAME. REPLACE BARS WHERE POSSIBLE.**

DESIGNER'S NOTE ALL MATERIAL FOR FLOOR DRAINS AS SHOWN ON **THIS SHEET SHALL 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. IT SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 8-INCH"** MATERIAL FOR DOWNSPOUTS, CONNECTORS, AND BRACKETS AS SHOWN ON THIS SHEET SHALL **ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER. ON THE PRESTRESSED GIRDER SHEET, SHOW LOCATION OF HOLES FOR BRACKET ANCHORAGE FROM TOP/BOTTOM AND END OF GIRDER.**



FLOOR DRAIN TYPE "WF"



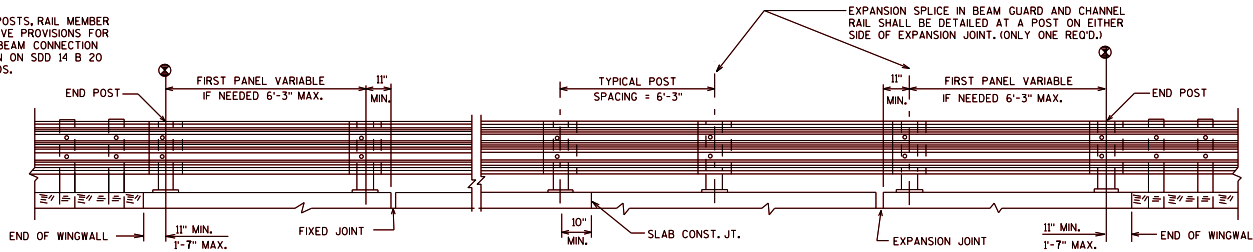
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

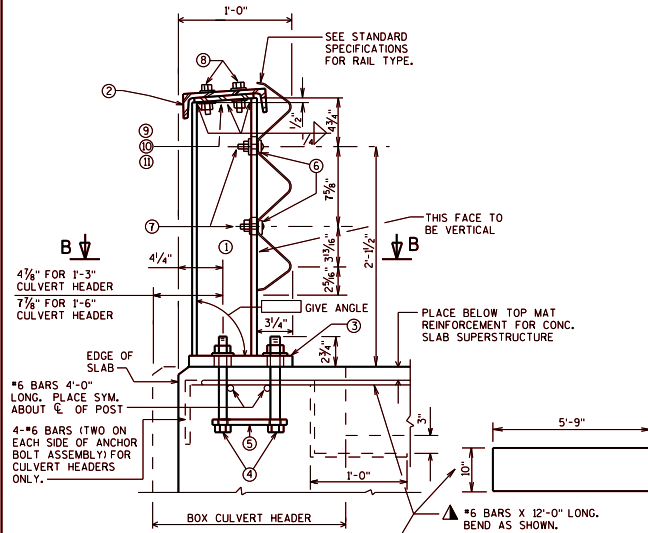
DATE: 7-20

STANDARD 29.03

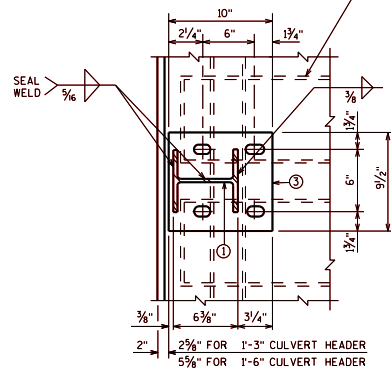
AT END POSTS, RAIL MEMBER SHALL HAVE PROVISIONS FOR A THREE BEAM CONNECTION AS SHOWN ON SDD 14 B 20 STANDARDS.



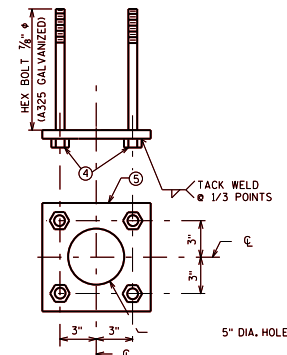
ELEVATION OF RAILING



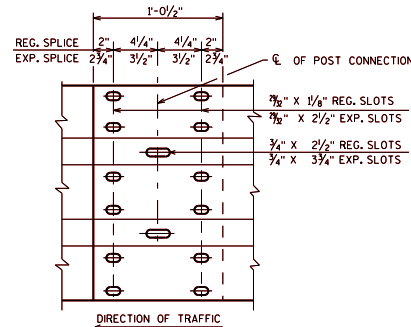
SECTION THRU RAILING



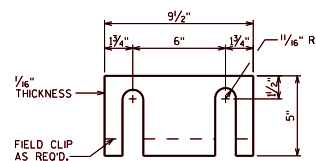
SECTION B-B



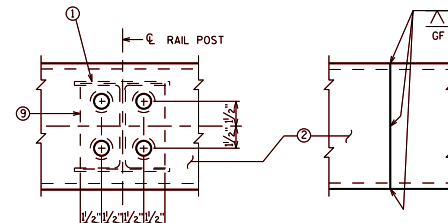
ANCHORAGE DETAIL



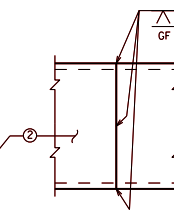
RAIL MEMBER SPLICE
3/8" DIA. BUTTON HEAD OVAL SHOULDER BOLTS WITH HEX NUTS AT ALL SLOTS.



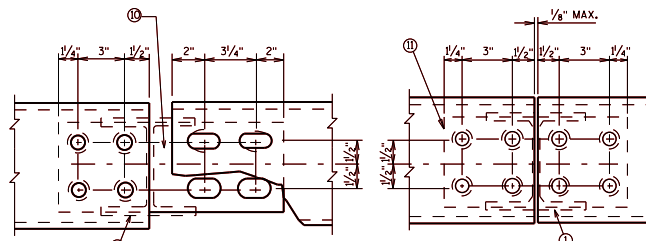
POST SHIM DETAIL
4 PER POST



BASIC POST CONNECTION



OPTIONAL SHOP SPLICE



EXPANSION SPLICE

TYPICAL SPLICE

CHANNEL MEMBER DETAILS

SHIM PLATES 6" X 1/16" X 6" MAY BE USED BETWEEN TOP OF POST AND CHANNEL MEMBER TO ACHIEVE VERT. ALIGNMENT.

LEGEND

- ① 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 13/16" DIA. HOLES FOR NO. 8.
- ③ BASE PLATE 1" X 9 1/2" x 10" WITH 1/16" x 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO. 4. WELD TO NO. 1 AS SHOWN.
- ④ A325 - 1/2" HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER, 14" LONG AT END POSTS AND AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS > 15". USE 8" LONG AT ALL OTHER LOCATIONS. 4 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 3. CHAMFER TOP OF BOLTS BEFORE THREADING.
- ⑤ 1/4" x 8" x 8" FLAT BAR WITH 13/16" DIA. HOLES FOR ANCHOR BOLTS NO. 4.
- ⑥ 1 3/4" 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. 13/16" DIA. HOLES IN CHANNEL.
- ⑩ PLATE 1/2" x 5 3/4" x 1'-2 1/2". 1/4" DIA. HOLES IN PLATE. 13/16" DIA. HOLES IN CHANNEL. EXPANSION SLOTS ON JOINT SIDE OF POST. 1/16" x 2 1/4" IN PLATE. 1/16" 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. 13/16" DIA. HOLES IN CHANNEL. (AT TYPICAL SPLICE.)

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE W" B--" WHICH INCLUDES ALL ITEMS SHOWN.

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

ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 5 SHALL BE GALVANIZED AFTER FABRICATION.

PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS AND CHANNELS SHALL BE GIVEN A NO. 6 COMMERCIAL BLAST CLEANING BY SSPC SPECS.

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

FILL BOLT SLOT OPENINGS IN POST SHIMS & PLATE NO. 3 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

SEE STANDARD SPECIFICATIONS FOR RAIL TYPE.

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

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

STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REQ'D. FOR ALIGNMENT.

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

- ▲ TIE TO TOP MAT OF STEEL. PUT THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE. NOT REQ'D. FOR BOX CULVERT HEADERS.
- PAY LIMITS FOR TYPE "W" STEEL RAILING.

WEIGHT = 45 LB/FT

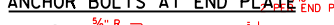
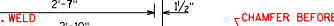
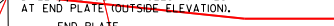
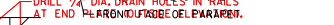
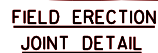
STEEL RAILING TYPE "W"



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-19



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 1/2" 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 MATERIAL
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

- $\frac{9}{16}$ " x $\frac{3}{8}$ " WELDED STUDS
- ⬡ 3" DIA. STD. PIPE x 1'-10" LONG
- 3" DIA. EXTRA STRONG PIPE x 1'-10" LONG
- △ $\frac{1}{2}$ " 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.

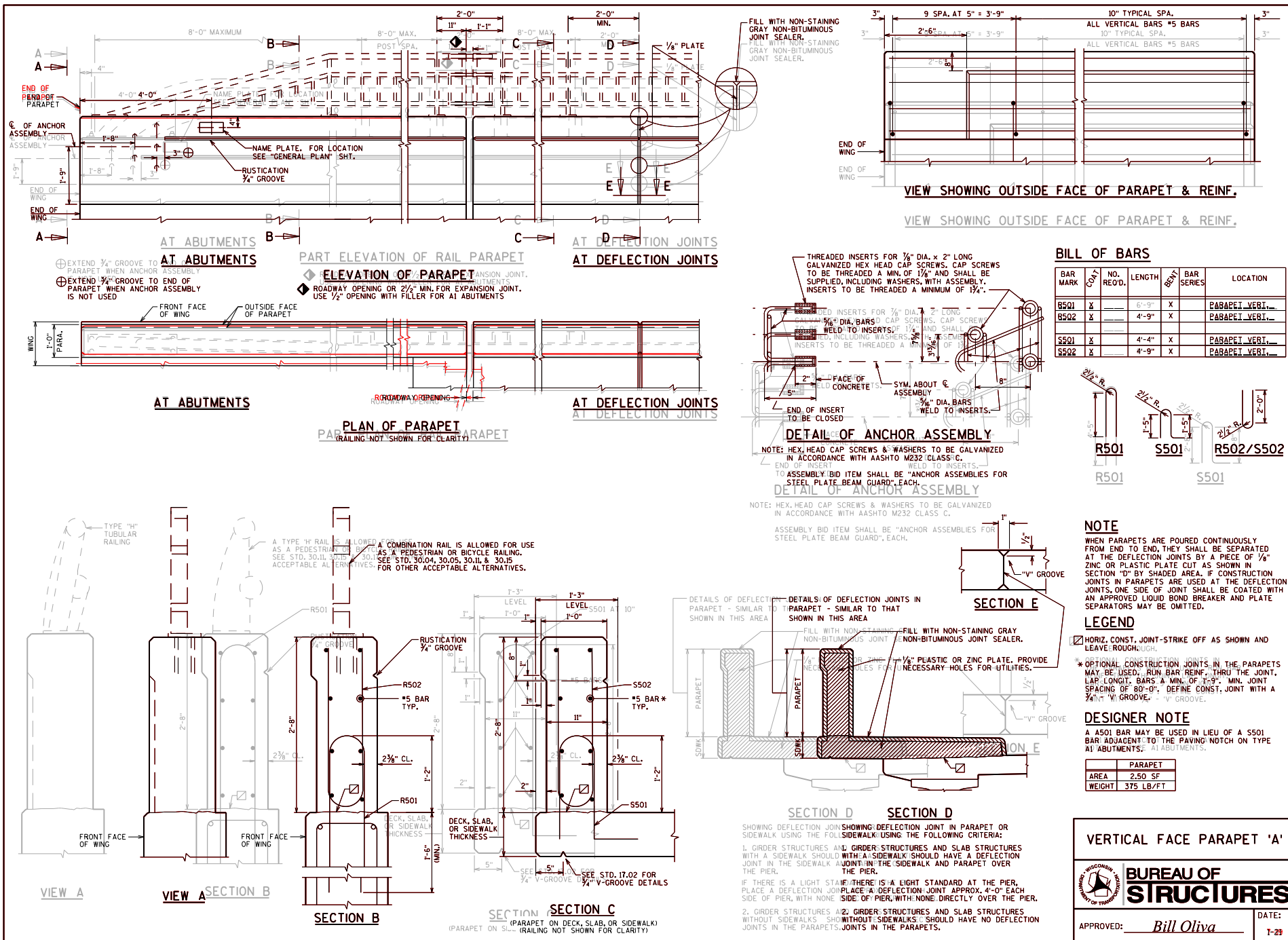
TUBULAR RAILING
TYPE 'H' (STEEL)

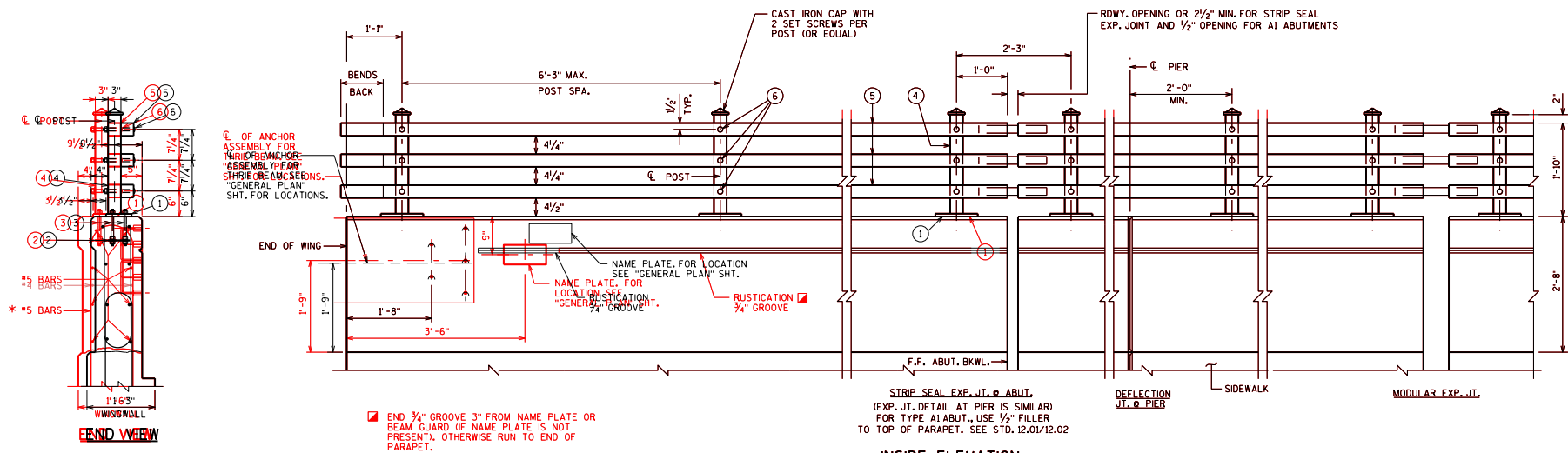


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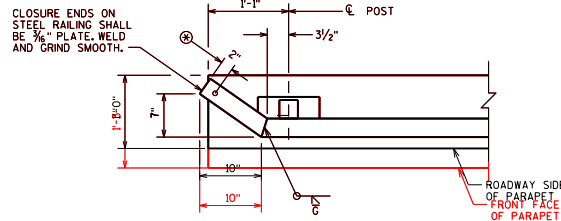
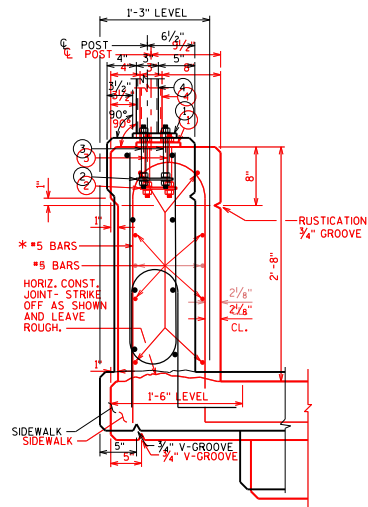
APPROVED: *Bill Oliva*

DATE: 7-19





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



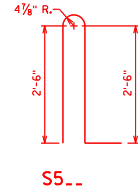
③ 3/4" DIA. DRAIN HOLE IN BOTTOM OF ALL TUBES.

④ 3/4" DIA. DRAIN HOLE IN BOTTOM OF ALL TUBES.

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.



SECTION THRU PARAPET ON BRIDGE

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

2'-8" CONC. PARAPET
AREA 3.16 S.F.
WEIGHT 474 LB./FT.

STEEL RAILING WEIGHT = 25 LB/FT BASED ON 6'-3" POST SPA.

DESIGNER NOTES

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

STEEL RAILING WEIGHT = 25 LB/FT BASED ON 6'-3" POST SPA.

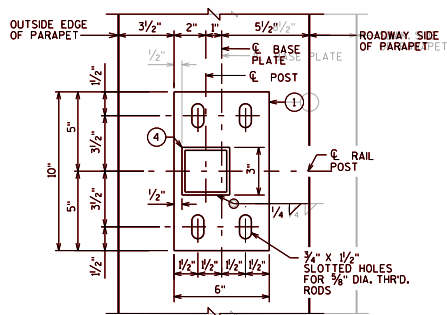
COMBINATION RAILING TYPE '3T'



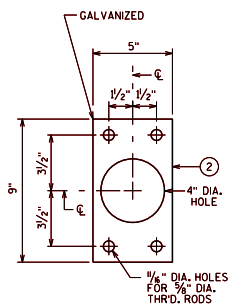
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

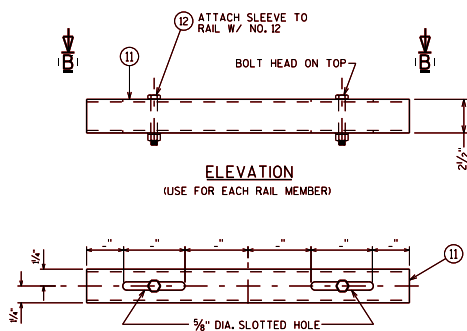
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TYPICAL RAIL POST BASE PLATE



ANCHOR PLATE

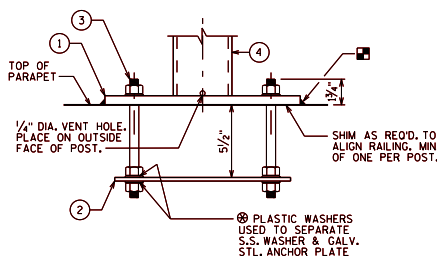


SECTION B-B

SLEEVE DETAIL

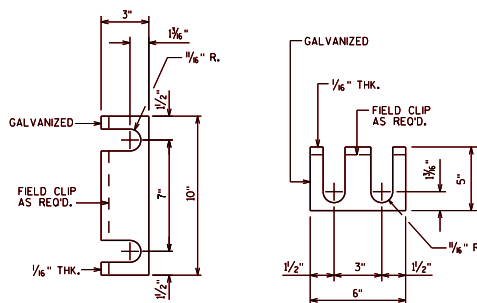
(AT MODULAR EXP. JT.)

NOTE: CONSTRUCT BOTTOM RAIL AND SLEEVE CONNECTION FIRST, THEN MIDDLE RAIL, AND THEN TOP RAIL, TO ALLOW EASE IN PLACEMENT OF BOLT NO. 12.



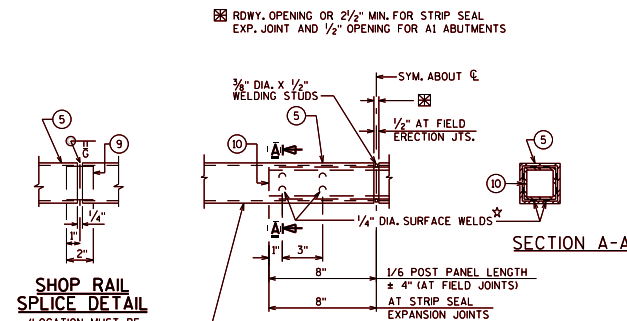
ANCHORAGE FOR RAIL POSTS

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)

FIELD ERECTION JOINT DETAIL

MIN. 3/8" FLAT SURFACE DIA. PUNCHING 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 3/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1 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" @ FIELD ERECTION JTS.) (1'-4" @ 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 5/8"-INCH, EMBED 7" IN CONCRETE, ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 560.2.2.2.2 AND 502.3.3.3.3 OF THE STANDARD 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. 1, (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

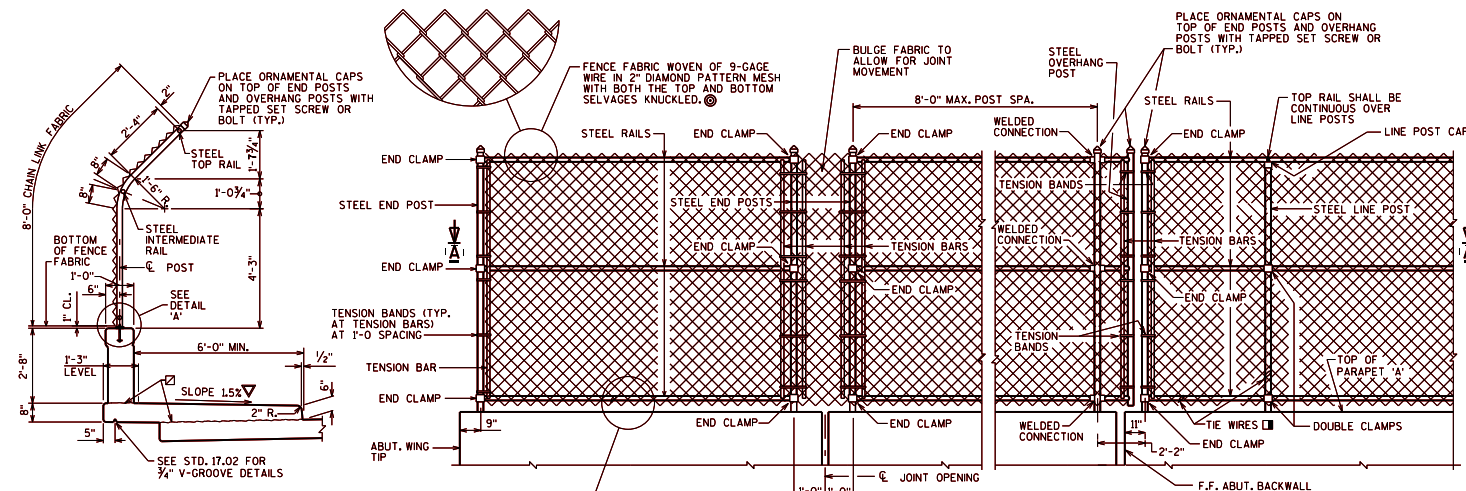


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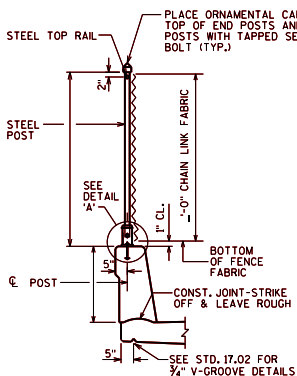
SECTION THRU FENCE ON PARAPET 'A'

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

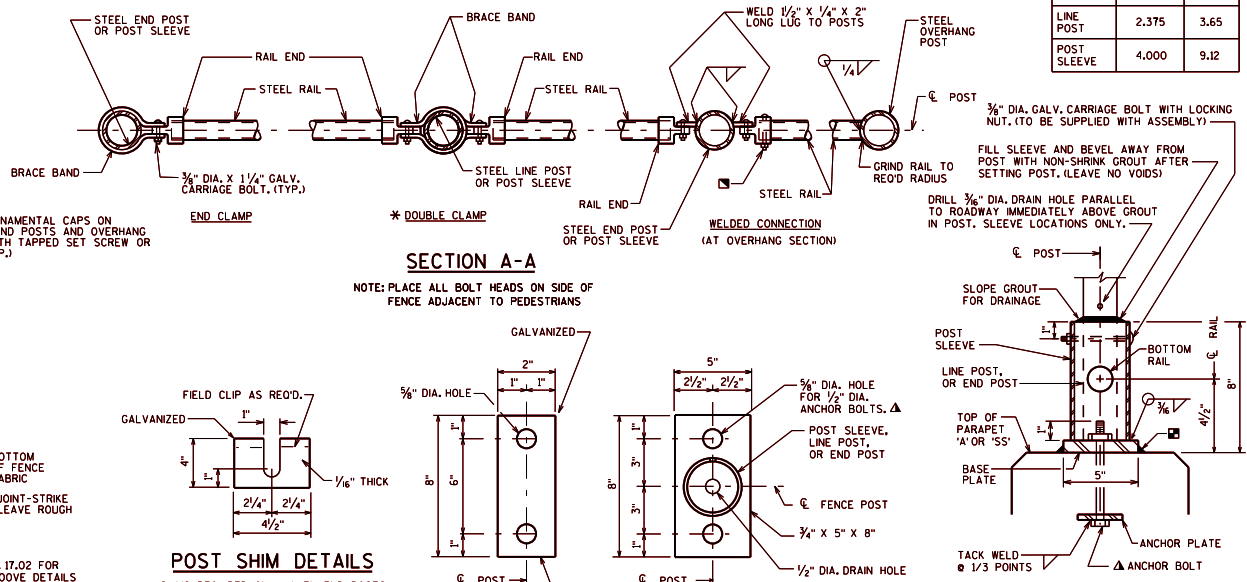
±0.5% CONSTRUCTION TOLERANCE IN SIDEWALK CROSS SLOPE. THE SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

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)



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, EMBED 1" 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".

A 1" MESH MAY BE USED ON PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE 11-35-1 FOR PROTECTIVE SCREENING.

PEDESTRIAN RAILING MAY BE USED ON WINGWALL PARAPETS IF CHAIN LINK FENCE DOES NOT CONTINUE BEYOND BRIDGE.

HANDRAILS SHALL BE USED ALONG BRIDGE SIDEWALKS WHERE THE SLOPE OF THE SIDEWALK IS GREATER THAN 5%. TOP OF HANDRAIL GRIPPING SURFACES SHALL BE MOUNTED BETWEEN 30" & 34" ABOVE SIDEWALK SURFACE. USE 30" NEAR SCHOOL ZONES, IF FEASIBLE. HANDRAILS SHALL BE PROVIDED ALONG BOTH SIDES OF SIDEWALK. FOR HANDRAIL DETAILS SEE STANDARD 37.02.

FOR DESIGNER AND USER CONSIDERATION, THE SUPERSEDED DESIGNER SHALL ACCOUNT FOR A MAXIMUM 2% SIDEWALK CROSS SLOPE.

CHAIN LINK FENCE DETAILS

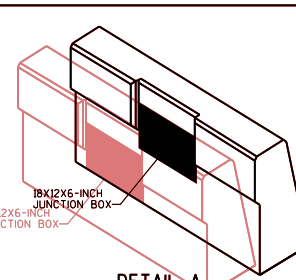
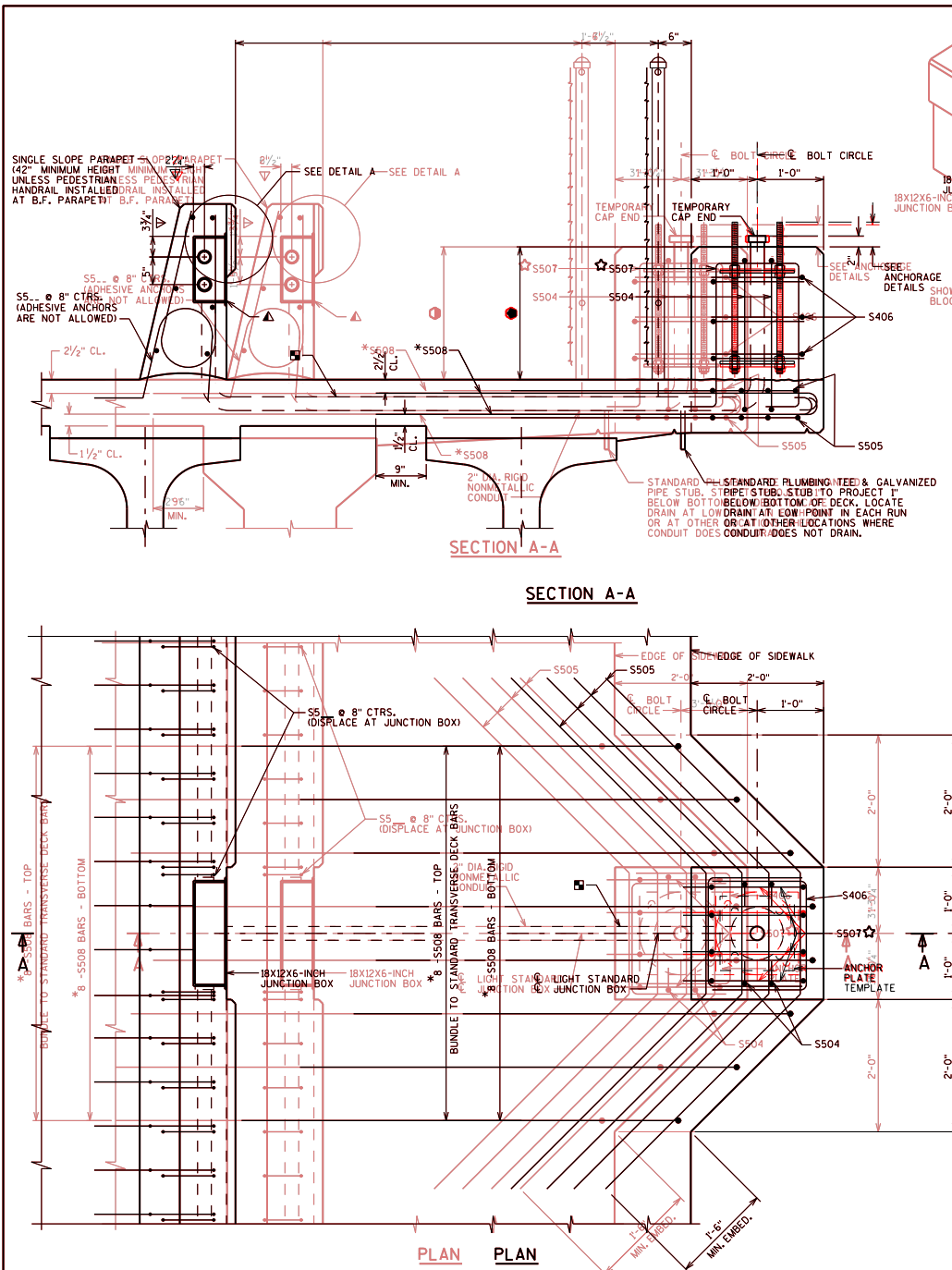


BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE:

7-20



DETAIL A
SHOWING B.F. OF PARAPET WITH ANCHORAGE DETAILS
SHOWING BLOCK OUT FOR JUNCTION BOX.

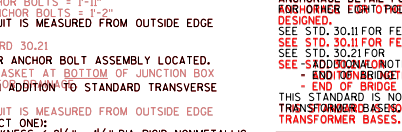
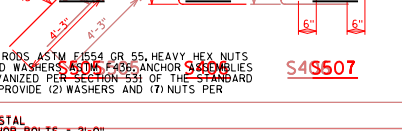
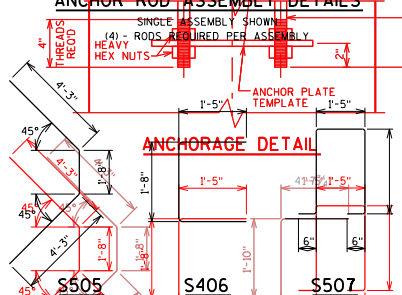
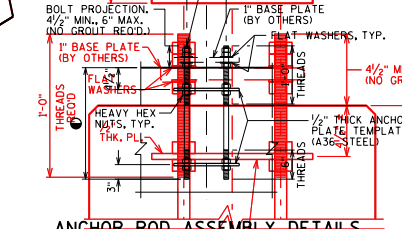
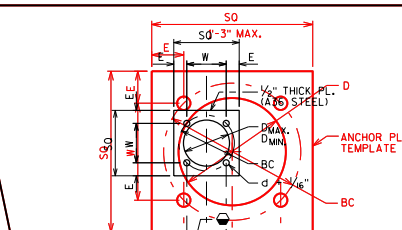


TABLE FOR "TYPE 5 LIGHT POLE"
FROM FACILITIES DEV. MANUAL
WITH 1" DIA. ANCHOR BOLTS.
(ANY OTHER LIGHT POLE TYPE
MUST BE DESIGNED FOR.)

SO	1'-1 1/2"
E	2 1/8"
W	8 1/8"
BC	11 1/2"
D	9 1/2"

W = 0.707 x BC
SO = BC + 2d
d = ANCHOR BOLT DIA.
E = (SO-W)/2
Dmax = BC - 2d
Dmin = 2 x CONDUIT DIA. + 1"

- ANCHOR RODS
1" DIA. ANCHOR RODS ASTM A193 GR 55, HEAVY HEX NUTS
ASTM A193 GR 55, AND WASHERS ASTM A193 GR 55. ANCHOR RODS
SHALL BE GALVANIZED PER SECTION 334 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
- 1" DIA. ANCHOR BOLTS = 2'-0"
- < 1" DIA. ANCHOR BOLTS = 1'-3"
- CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX
COVER TO ALLOW FOR DRAINAGE.
- CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX
- SEE STANDARD 30.21
- LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE
OF JUNCTION BOX.
- TIE IN PLACE AFTER ANCHOR BOLT ASSEMBLY LOCATED.
CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX
- THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE
BARS IN DECK.
- LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE
OF JUNCTION BOX.
- CONDUIT SIZE SELECT ONE:
FOR DECK THICKNESS ≤ 8 1/2" - 1 1/4" DIA. RIGID NONMETALLIC
CONDUIT (DESIGNER TO VERIFY CONDUIT SIZE, BASED ON
SERVICE NEEDS)
- TIE IN PLACE AFTER ANCHOR BOLT ASSEMBLY LOCATED.
CUT OUT ± 1" OF GASKET AT BOTTOM OF JUNCTION BOX
- THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE
BARS IN DECK.
- CONDUIT SIZE SELECT ONE:
FOR DECK THICKNESS ≤ 8 1/2" - 1 1/4" DIA. RIGID NONMETALLIC
CONDUIT (DESIGNER TO VERIFY CONDUIT SIZE, BASED ON
SERVICE NEEDS)

NOTE
ANCHOR ASSEMBLY POLES ON
STRUCTURES, EACH "ANCHOR ASSEMBLY LIGHT POLES ON
STRUCTURES", EACH

DESIGNER NOTES
ANCHORAGE DETAIL FOR "TYPE 5 LIGHT POLE". ANCHORAGE
ROD OR OTHER LIGHT POLE. (DESIGNER MUST BE RESPONSIBLE
FOR DESIGNING).
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 USED WITH
TRANSFORMER BASES. IT IS INTENDED TO BE USED WITH
TRANSFORMER BASES.

THIS STANDARD ACCOMMODATES A MAXIMUM 15" DIA. BOLT
HOLE CIRCLE AND A MAXIMUM 15" X 15" SQUARE ANCHOR
PLATE WITH (4) 1" DIA. ANCHOR BOLTS. THIS STANDARD
IS BASED ON A 8" MIN. DECK THICKNESS.

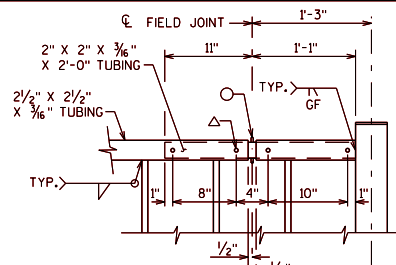
BILL OF BARS

BAR MARK	NO. REQD.	LENGTH	BAR	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

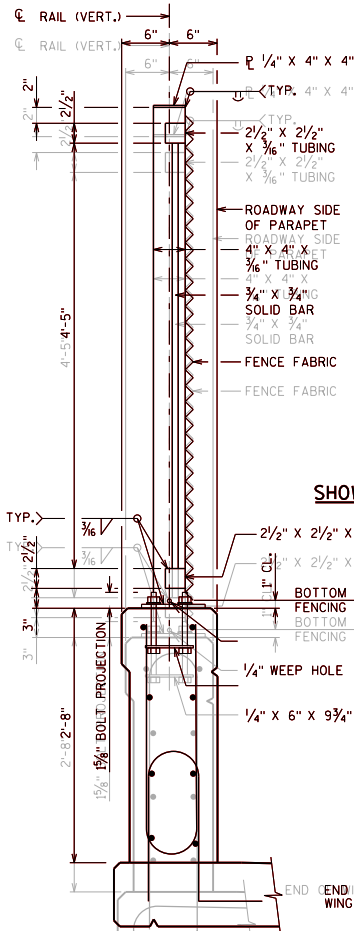
LIGHTING DETAIL

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-20

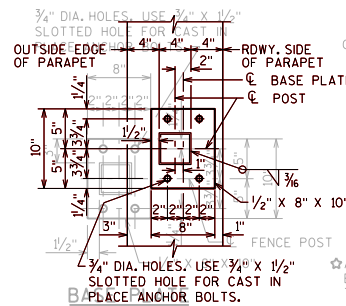


RAILING EXPANSION JOINT DETAIL

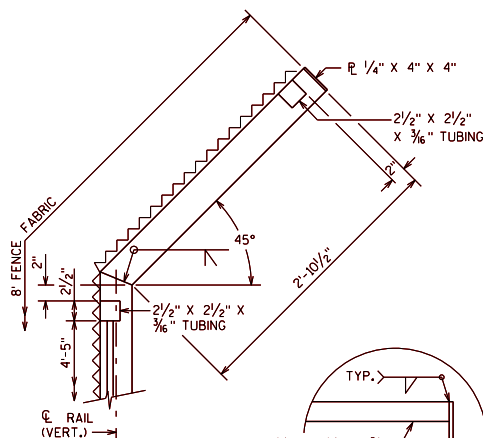


SECTION THRU RAILING

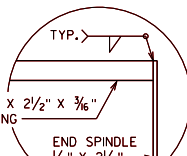
(SEE STD. 30.07 FOR PARAPET REINFORCEMENT AND DETAILS)



BASE PLATE



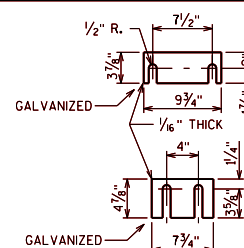
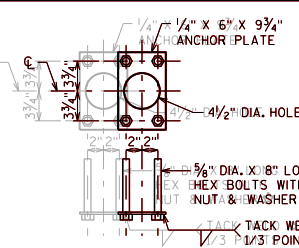
**SECTION THRU FENCE
SHOWING DETAILS FOR BENT TOP**



ANCHORAGE DETAIL

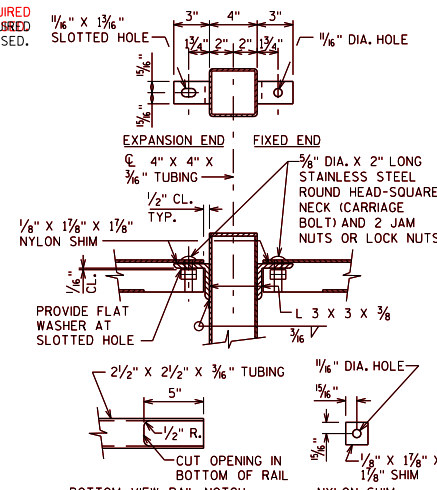
ALTERNATIVE ANCHORAGE: ADHESIVE ANCHORS, 5/8"-INCH. EMBEDDED, 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.05 OF SDG 502.05 AND 502.05.1.1. STANDARD SPECIFICATIONS.

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

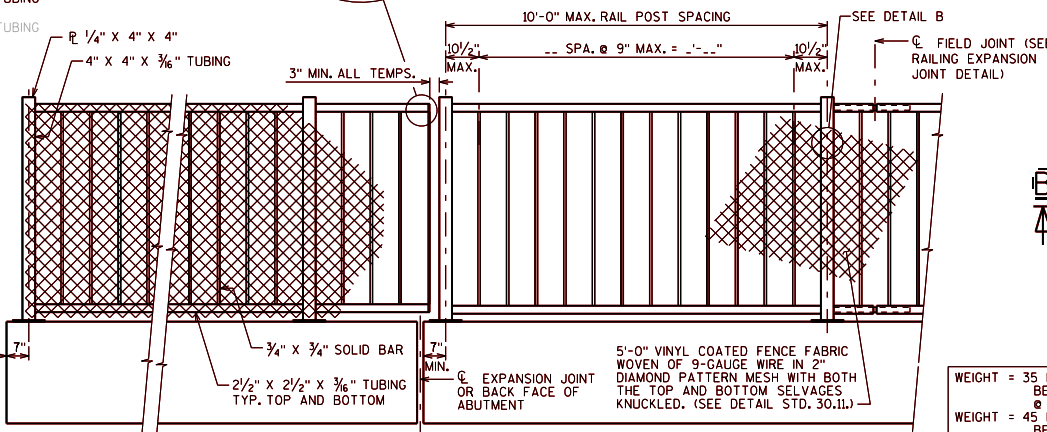


SHIM PLATE DETAILS

TWO SHIMS OF EACH SIZE REQUIRED PER POST



**TOP RAIL CONNECTION
FOR FENCE W/ BENT TOP**



INSIDE ELEVATION OF RAILING

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

NOTES

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

STRUCTURAL TUBING SHALL CONFORM TO ASTM A500, GRADE B, PLATES, ANGLES, BARS AND SHIMS SHALL CONFORM TO ASTM A709, GRADE 36. FENCE FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B.

ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET POSTS NORMAL TO GRADE.

ALL POST SPACINGS ARE TAKEN HORIZONTAL ALONG CENTERLINE OF RAILING AT BASE OF POST.

STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATES WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

CAULK AROUND PERIMETER OF BASE PLATES AND FILL PORTION OF SLOTTED HOLES AROUND ANCHOR BOLTS WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

CUT BOTTOM OF POST TO MAKE VERTICAL IN TRANSVERSE DIRECTION.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM 307. IF 307 IS USED, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.

THE BID ITEM SHALL BE "RAILING TUBULAR SCREENING" 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. 1 (FILL IN COLOR NAME). FENCE FABRIC AND TIES TO BE VINYL-COATED. COLOR SHALL BE (SPECIFY: DARK GREEN, BROWN OR BLACK) IN ACCORDANCE WITH ASTM F934.

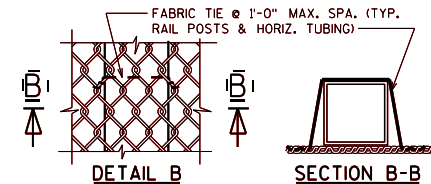
THE END OF THE FABRIC SHALL BE ATTACHED TO THE POST BY MEANS OF A TENSION BAR THREADED THROUGH THE END LOOPS OF THE FABRIC AND SECURED TO THE POST WITH CLAMPS & BOLT. THE FABRIC SHALL BE STRETCHED TO REMOVE ALL SLACK.

DESIGNER NOTES

TUBULAR SCREENING MAY BE USED ON STRUCTURES WITH A 45 M.P.H. DESIGN SPEED OR LESS, OR WHEN THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A PARAPET.

THIS RAILING MAY BE MOUNTED DIRECTLY TO A BRIDGE SIDEWALK OR RETAINING WALL PROVIDED THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A TRAFFIC BARRIER. USE 6" CLEAR SPACING BETWEEN VERTICAL MEMBERS IF CHAIN LINK FENCE IS NOT USED.

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



DETAIL B

SECTION B-B

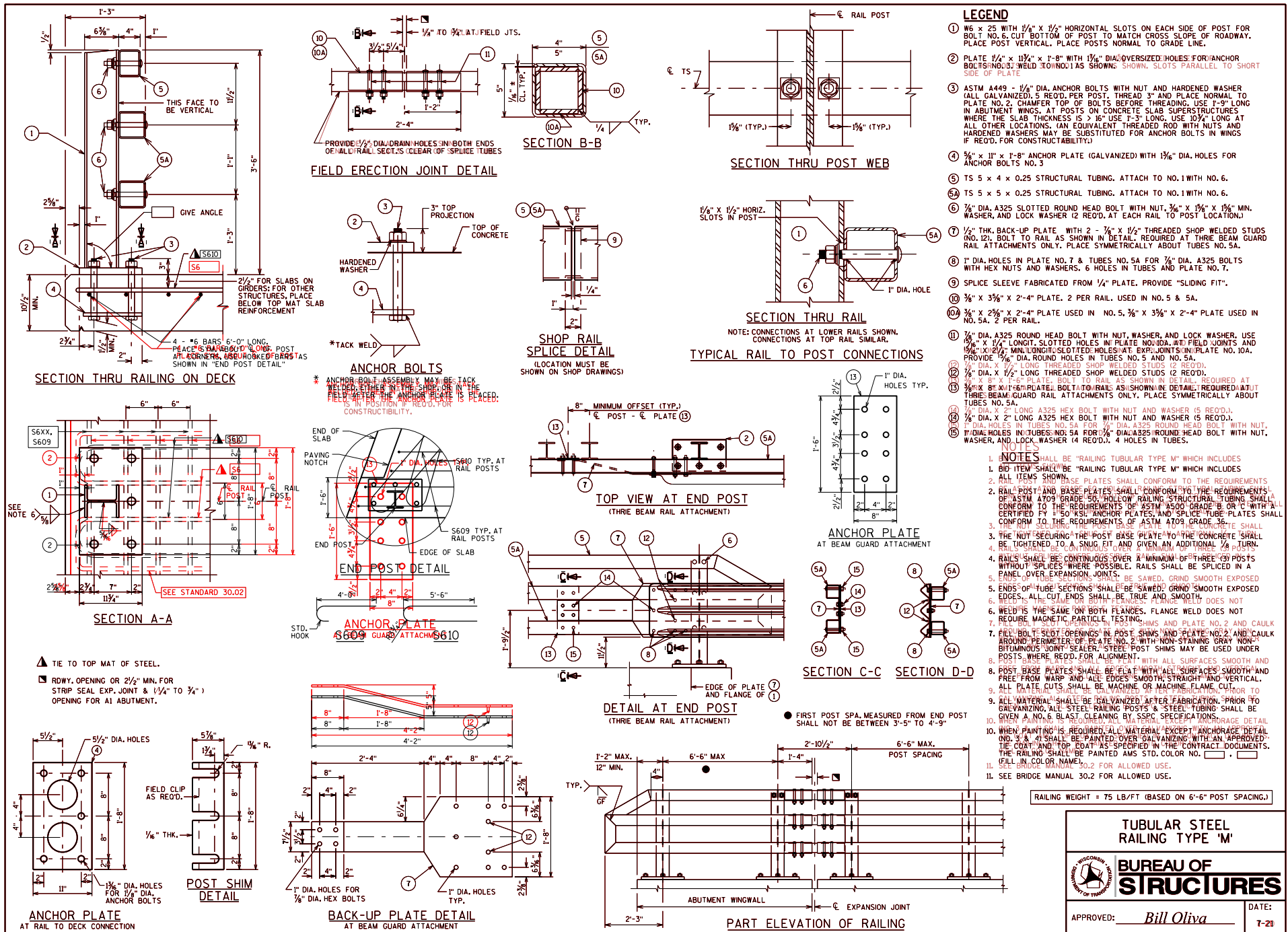
TUBULAR STEEL RAILING SCREENING

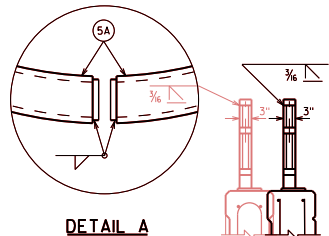


**BUREAU OF
STRUCTURES**

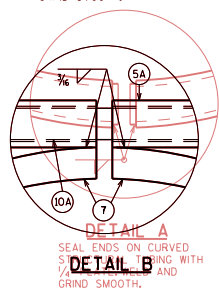
APPROVED: *Bill Oliva*

DATE: 7-20

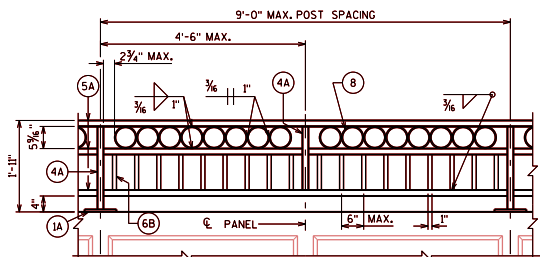




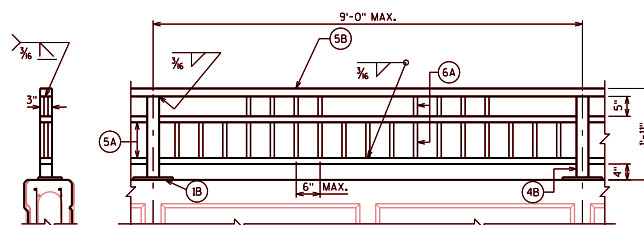
DETAIL A
SEAL ENDS ON CURVED
STRUCTURAL TUBING WITH
1/4\"/>



DETAIL A
SEAL ENDS ON CURVED
STRUCTURAL TUBING WITH
1/4\"/>

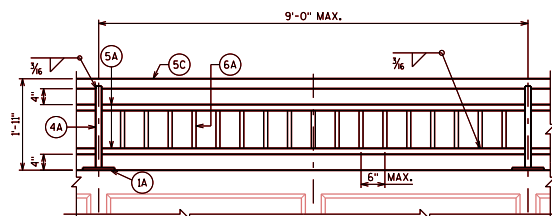


TYPE C1

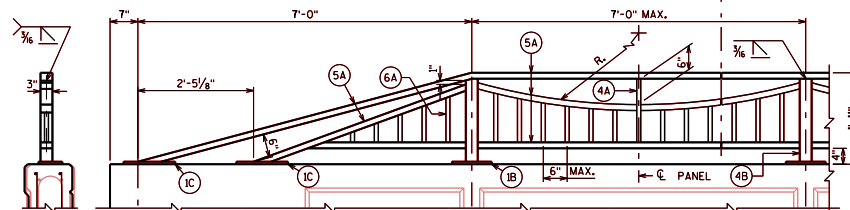


TYPE C4

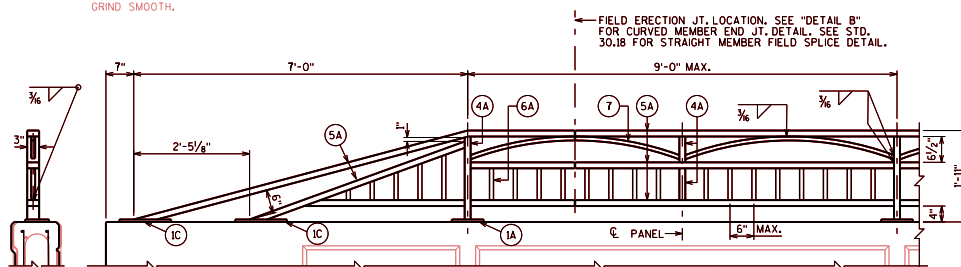
FIELD ERECTION JT. LOCATION. SEE "DETAIL A"
FOR CURVED MEMBER END CLOSURE. SEE STD.
30.18 FOR STRAIGHT MEMBER FIELD SPLICE DETAIL.



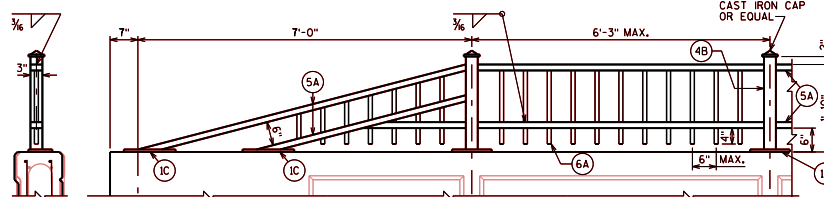
TYPE C2



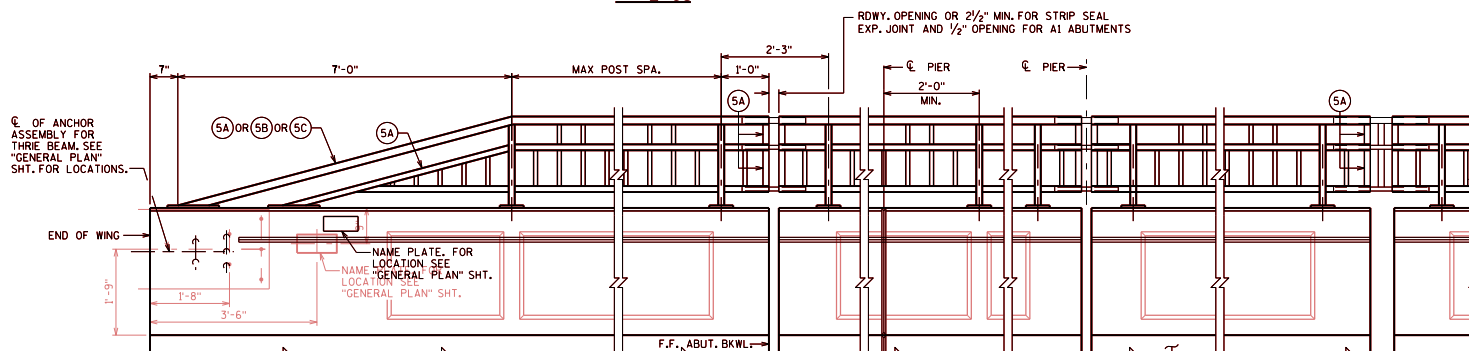
TYPE C5



TYPE C3



TYPE C6



USE THIS END TRANSITION FOR ALL
RAILING TYPES UNLESS SHOWN OTHERWISE

STRIP SEAL EXP. JT. & ABUT.
FOR TYPE A1 ABUT., USE 1/2\"/>

DEFLECTION
JT. & PIER

STRIP SEAL EXP. JT. & PIER SIDEWALK

MODULAR EXP. JT.

INSIDE ELEVATION

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED.
RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5\"/>

RAILING WEIGHT = 22 LB/FT

DESIGNER NOTES

COMBINATION RAILINGS TYPE C1-C6 MAY ALSO BE USED AS A
PEDESTRIAN RAIL MOUNTED DIRECTLY TO A BRIDGE SIDEWALK
OR RETAINING WALL BY INCREASING THE RAILING HEIGHT TO A
MINIMUM OF 3'-6\"/>

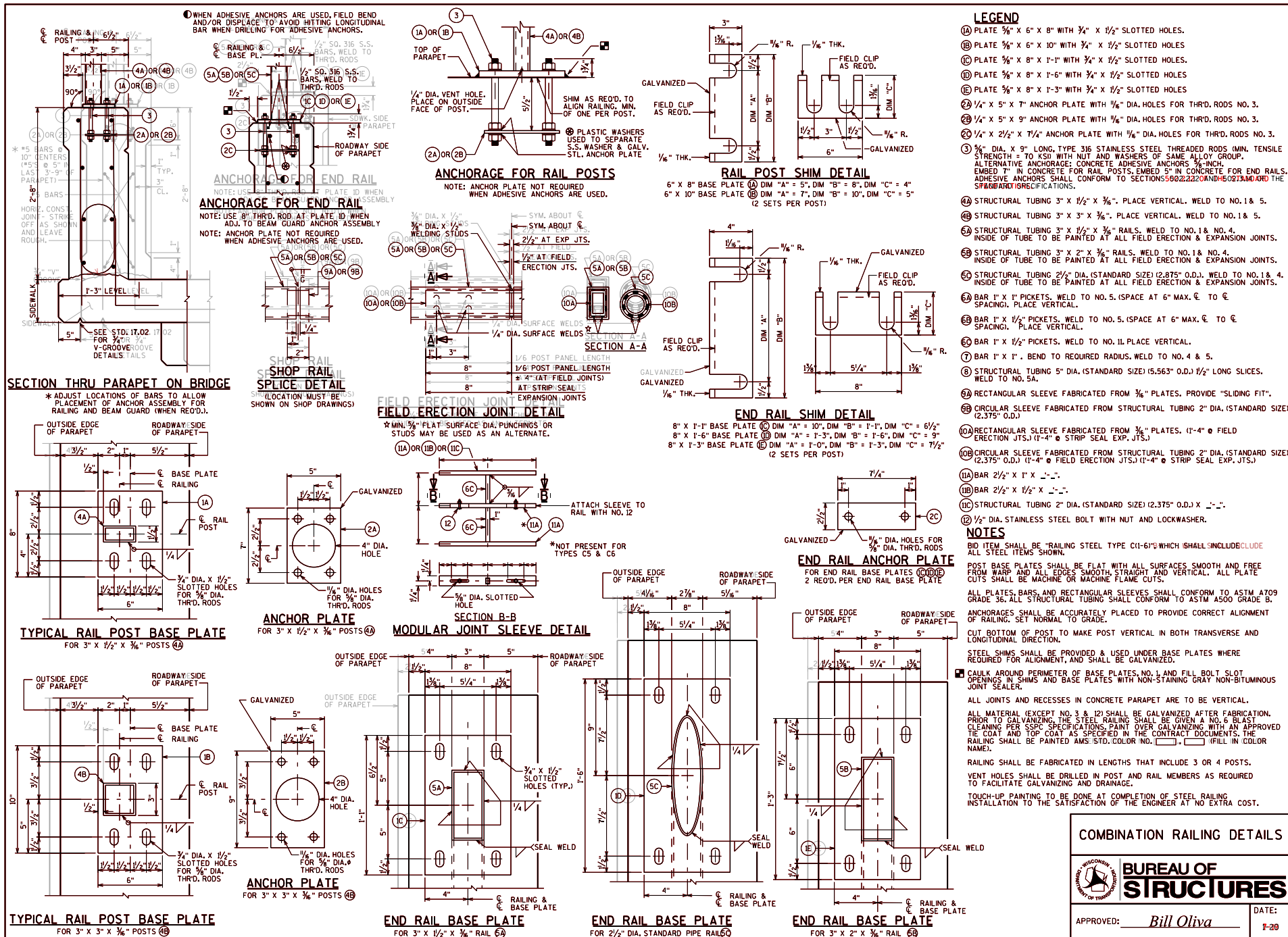
A MINIMUM 12'-0\"/>

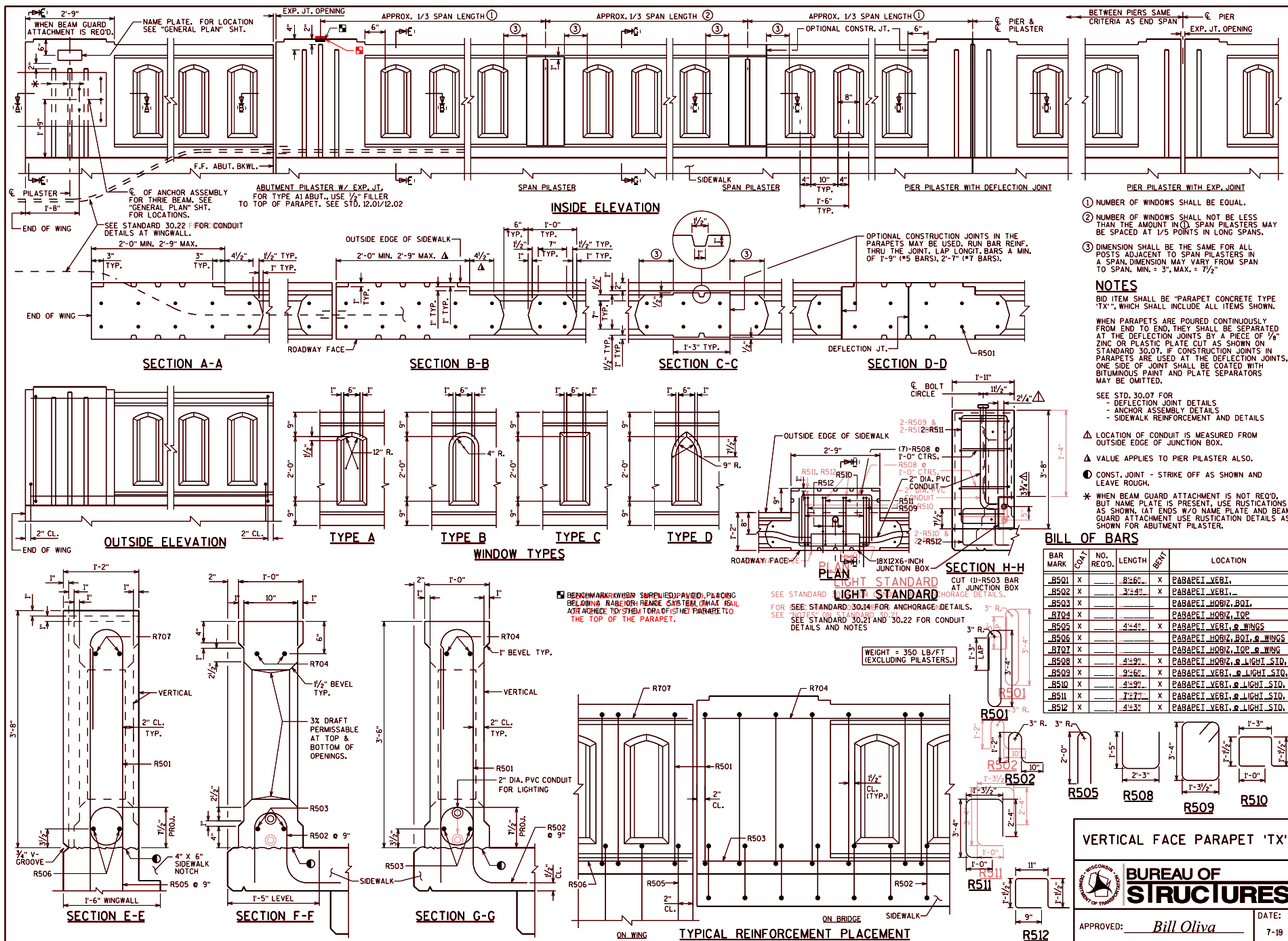
SEE STANDARD 30.18 FOR ADDITIONAL RAILING DETAILS.

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>	





- ① NUMBER OF WINDOWS SHALL BE EQUAL.
- ② NUMBER OF WINDOWS SHALL NOT BE LESS THAN THE AMOUNT IN ①. SPAN PILASTERS MAY BE SPACED AT 1/5 POINTS IN LONG SPANS.
- ③ DIMENSION SHALL BE THE SAME FOR ALL POSTS ADJACENT TO SPAN PILASTERS IN A SPAN. DIMENSION MAY VARY FROM SPAN TO SPAN, MIN. = 3", MAX. = 7 1/2".

NOTES

BID ITEM SHALL BE "PARAPET CONCRETE TYPE 'TX'", WHICH SHALL INCLUDE ALL ITEMS SHOWN.

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF 1/4" ZINC OR PLASTIC PLATE CUT AS SHOWN ON STANDARD 30.07. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH BITUMINOUS PAINT AND PLATE SEPARATORS MAY BE OMITTED.

SEE STD. 30.07 FOR
- DEFLECTION JOINT DETAILS
- ANCHOR ASSEMBLY DETAILS
- SIDEWALK REINFORCEMENT AND DETAILS

△ LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.

△ VALUE APPLIES TO PIER PILASTER ALSO.

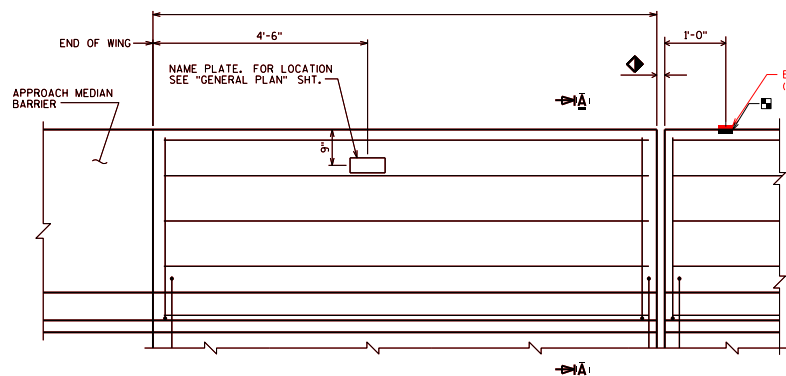
● CONST. JOINT - STRIKE OFF AS SHOWN AND LEAVE ROUGH.

* WHEN BEAM GUARD ATTACHMENT IS NOT REQ'D, BUT NAME PLATE IS PRESENT, USE RUSTICATIONS AS SHOWN. (AT ENDS W/O NAME PLATE AND BEAM GUARD ATTACHMENT USE RUSTICATION DETAILS AS SHOWN FOR ABUTMENT PILASTER.

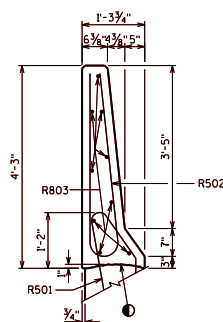
VERTICAL FACE PARAPET 'TX'



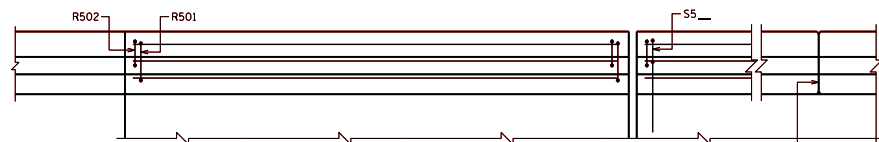
APPROVED: Bill Oliva DATE: 7-19



ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT.
USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS



SECTION A

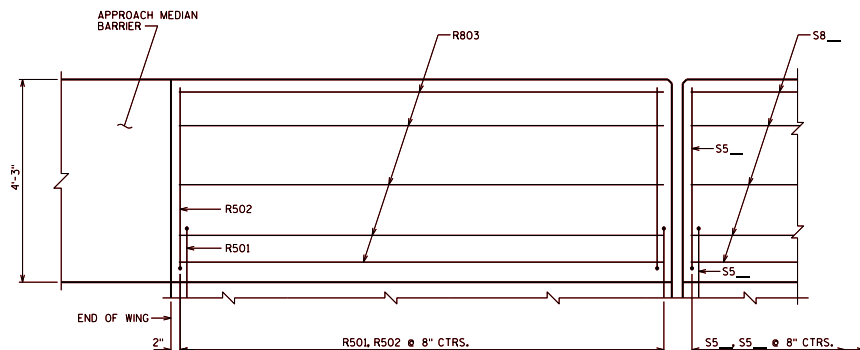


PLAN

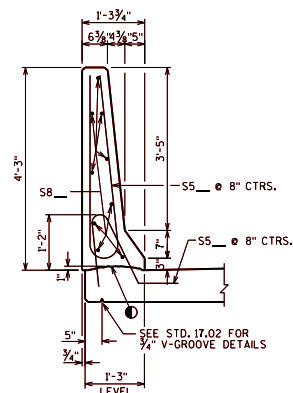
EXPANSION JOINT @ ABUT.
0° SKEW SHOWN. MATCH EXP.
JT. OPENING.

FOR TYPE A1 ABUT., USE 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 $\frac{3}{4}$ " - "V" GROOVE.

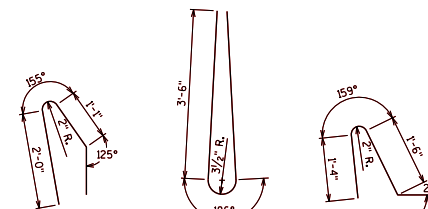


OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE

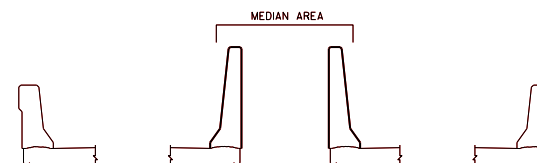
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
B5Q1.	X	-	-	4'-6"	X	PAPAPEI VERI.
B5Q2.	X	-	-	7'-11"	X	PAPAPEI VERI.
B8Q3.	X	-	-	-	-	PAPAPEI HORIZ.
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
S5	X	-	-	4'-2"	X	PAPAPEI VERI.
S5	X	-	-	7'-11"	X	PAPAPEI VERI.
S8	X	-	-	-	-	PAPAPEI HORIZ.



R501

R502/S5

S5



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

● CONST. JOINT - STRIKE OFF AS SHOWN.

A R501BAR MAY BE USED IN LIEU OF A
TYPICAL S5... BAR ADJACENT TO THE
PAVING NOTCH ON TYPE A1ABUTMENTS.

AREA = 3.41 FT.²
WEIGHT = 512 LBS./FT.

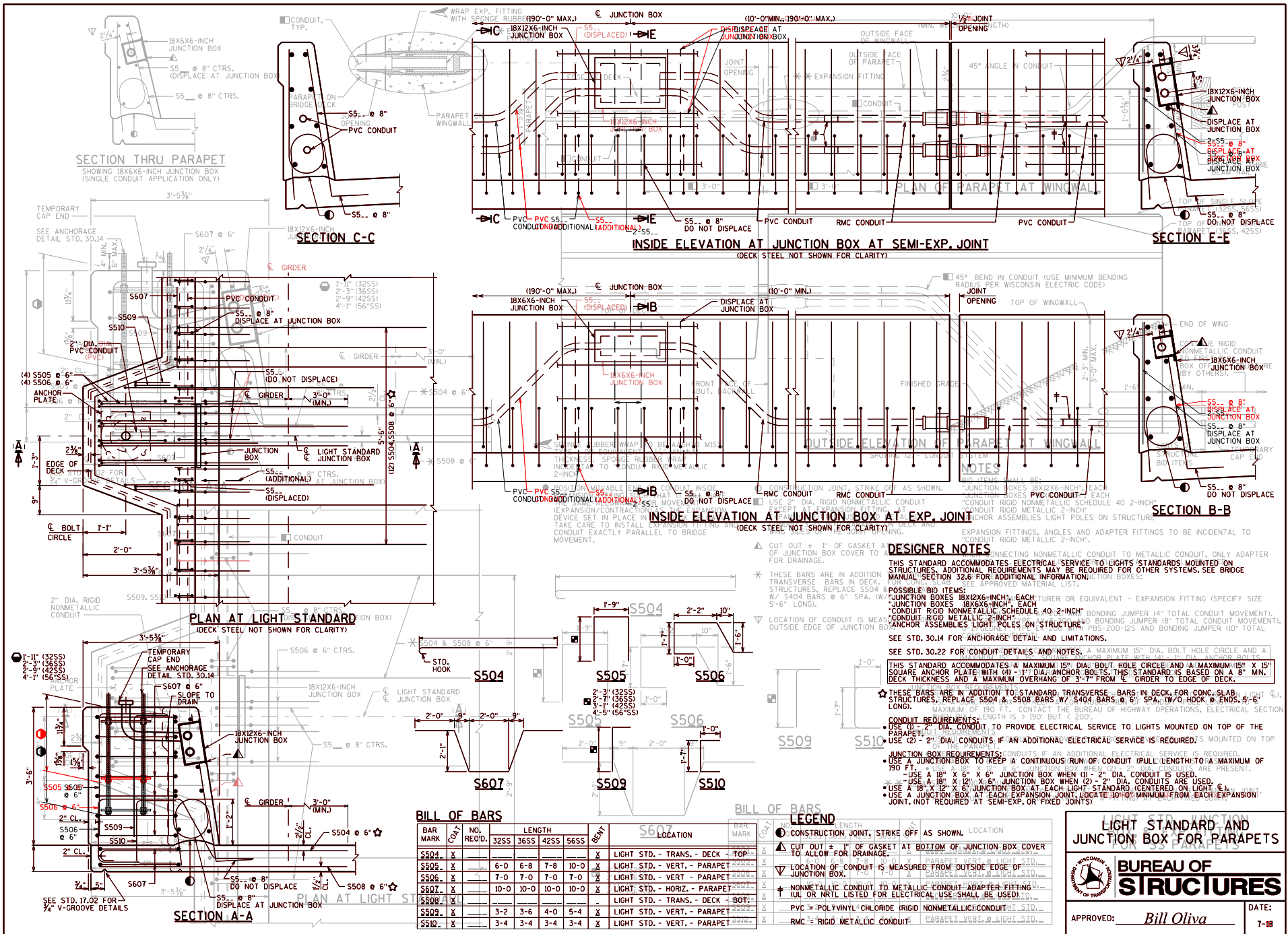
SLOPED FACE PARAPET '51F'

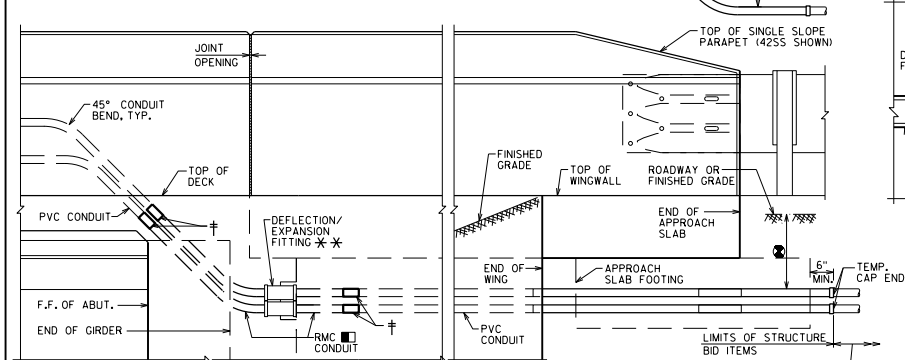
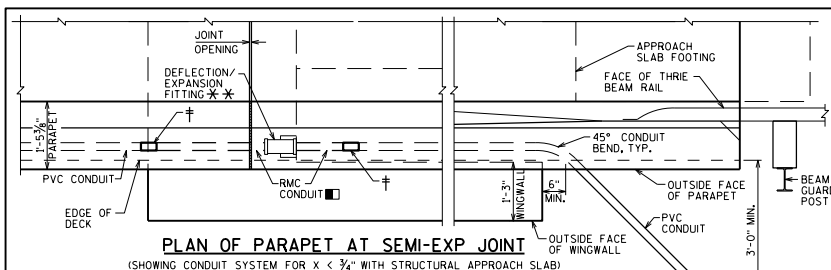


BUREAU OF STRUCTURES

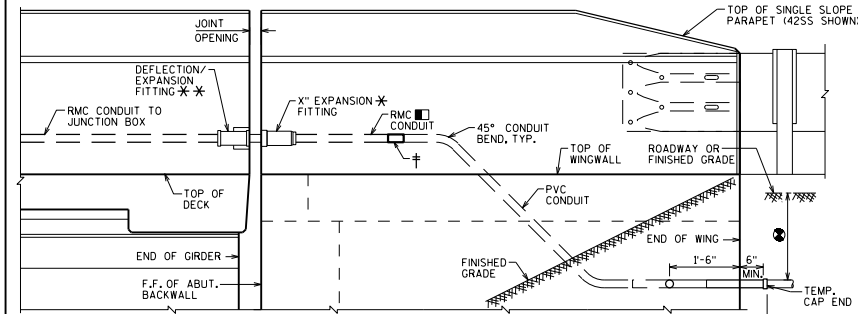
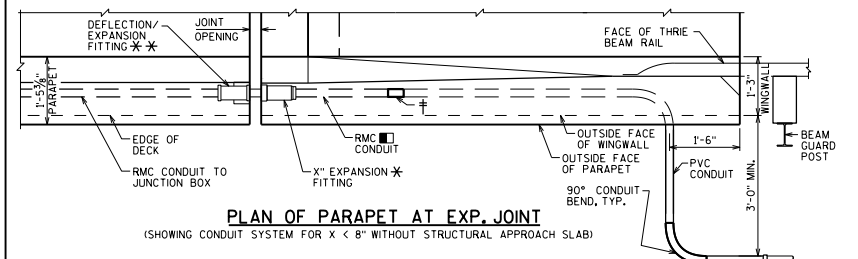
APPROVED: *Bill Oliva*

DATE:

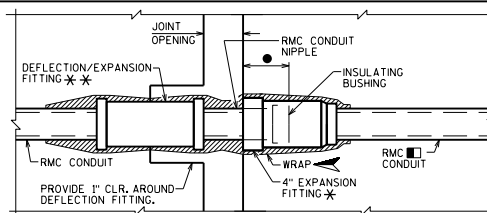




OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP. JOINT
(SHOWING CONDUIT SYSTEM FOR $X < \frac{3}{4}$ WITH STRUCTURAL APPROACH SLAB)

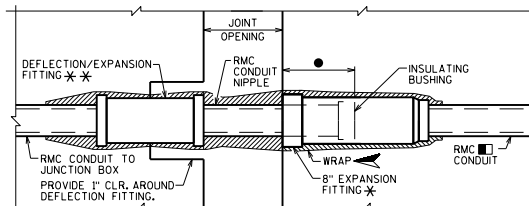


OUTSIDE ELEVATION OF PARAPET AT EXP. JOINT
(SHOWING CONDUIT SYSTEM FOR $X < 8$ WITHOUT STRUCTURAL APPROACH SLAB)



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

NOTES

CONDUIT SHALL BE EMBEDDED 2" CLEAR.

USE 2" DIA. RIGID NONMETALLIC CONDUIT (PVC) UNLESS NOTED OTHERWISE.

CONDUIT FITTINGS, CONDUIT BENDS, AND ADAPTER FITTINGS INCIDENTAL TO CONDUIT WORK.

CONDUIT BENDS SHALL CONFORM TO THE NATIONAL ELECTRIC CODE.

2'-0" MIN. CONDUIT COVER UNDER ROADWAYS, 1'-6" OTHERWISE. CONDUIT COVER SHOULD NOT EXCEED 3'-0".

PROVIDE JUNCTION BOXES FROM THE APPROVED PRODUCTS LIST.

DESIGNER NOTES

THIS STANDARD ACCOMMODATES A MAXIMUM 8" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.

PLANS SHALL SPECIFY SIZE, TYPE, AND LOCATION FOR CONDUIT, JUNCTION BOXES, AND FITTINGS. SEE TABLE BELOW FOR CONDUIT FITTING RECOMMENDATIONS.

LEGEND

■ USE 2" DIA. RIGID METALLIC (RMC) CONDUIT AT FITTINGS. PROVIDE RMC FOR 3'-0" MIN. ON EACH SIDE OF JOINT OPENINGS UNLESS NOTED OTHERWISE.
† NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED)

◀ SPONGE RUBBER WRAP TO BE AASHTO M153, TYPE 1 OR EQUIVALENT - 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):
4" UP TO 3/4" CONDUIT CONTRACTION OR EXPANSION AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION WITH BONDING JUMPER

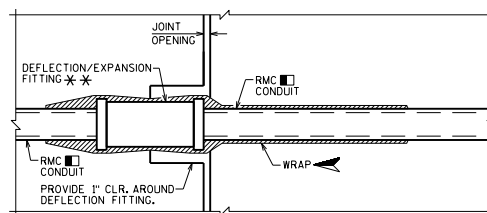
CONDUIT FITTING RECOMMENDATIONS TABLE:

LOCATION	JOINT TYPE	REQUIREMENT	FITTING TYPE
BRIDGE	FIXED	NONE	NONE - RUN PVC CONDUIT THRU JOINT
	SEMI-EXP.	$X < \frac{3}{4}$	DEFL./EXP. FITTING
		$\frac{3}{4} \leq X < 4'$	4" EXP. FITTING
		$S \leq 30^\circ$ $S \geq 30^\circ$	DEFL./EXP. AND 4" EXP. FITTING
	EXPANSION	$X < 4'$ $4' \leq X < 8'$ $X \geq 8'$	DEFL./EXP. AND 4" EXP. FITTING DEFL./EXP. AND 8" EXP. FITTING CONSIDER FLEXIBLE METAL CONDUIT SYSTEM (NOT SHOWN)
WALL	CONTRACTION	NONE	NONE - RUN PVC CONDUIT THRU JOINT
	EXPANSION	$L < 90$ FEET	DEFL./EXP. FITTING

X = TOTAL ANTICIPATED LONGITUDINAL JOINT MOVEMENT

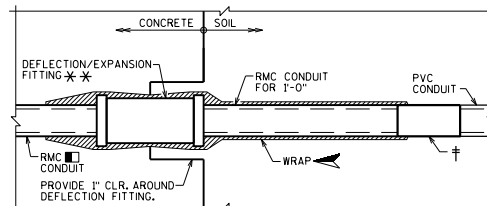
L = DISTANCE BETWEEN EXPANSION JOINTS

S = SKEW



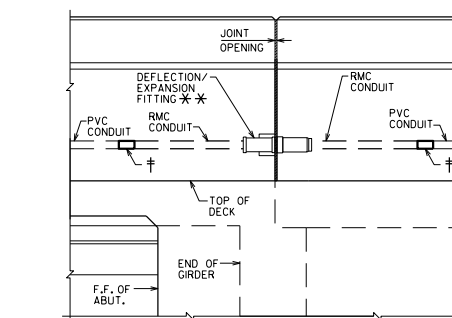
DEFLECTION/EXPANSION FITTING

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)



OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP JOINT
(SHOWING CONDUIT SYSTEM FOR $X \geq \frac{3}{4}$ WITHOUT STRUCTURAL APPROACH SLAB)

CONDUIT DETAILS AND NOTES

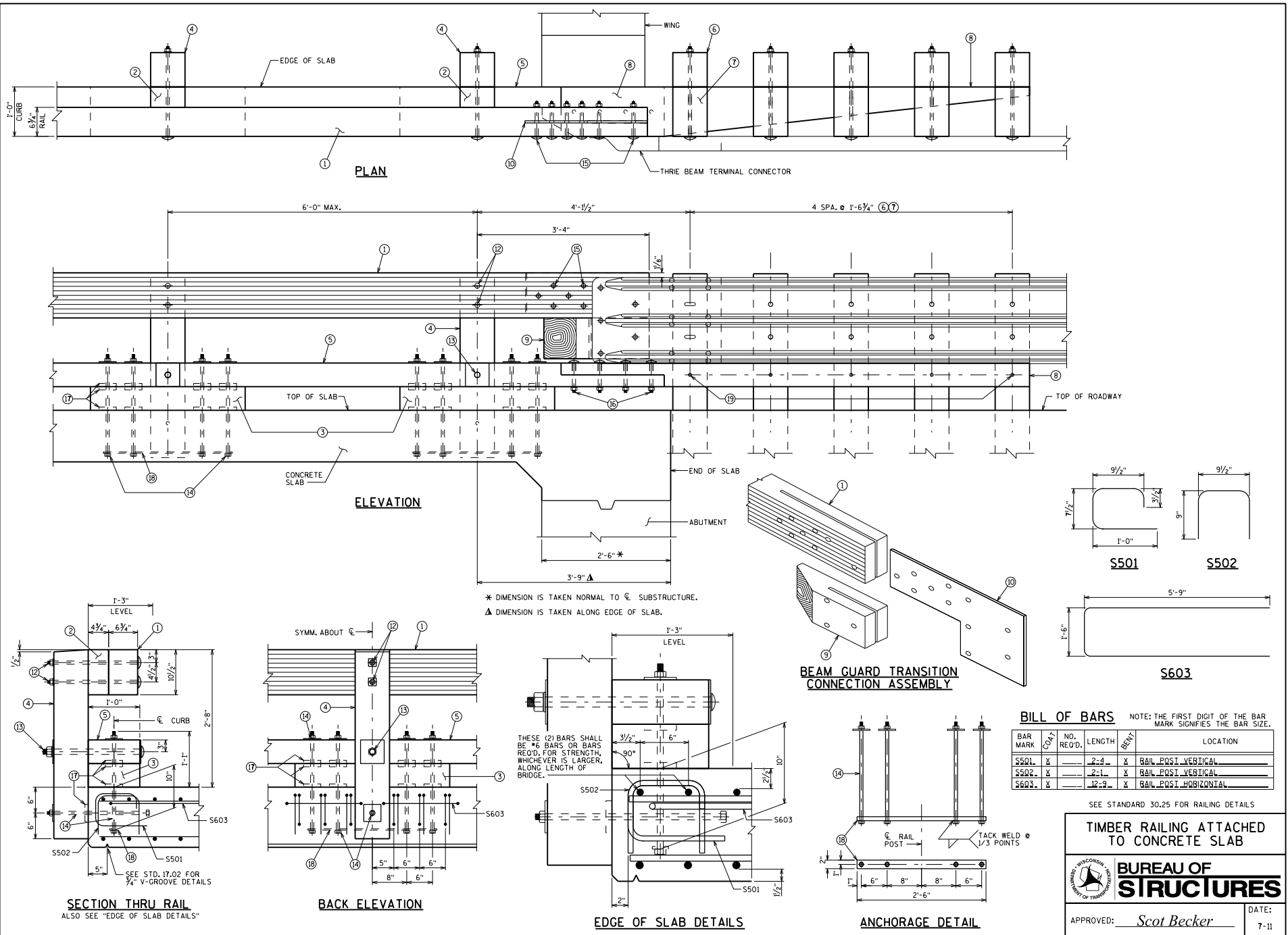


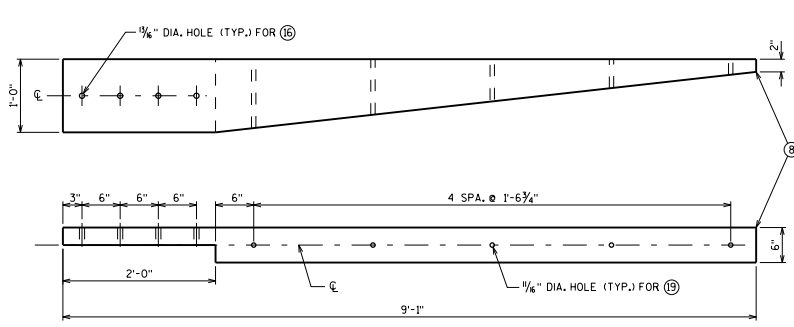
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

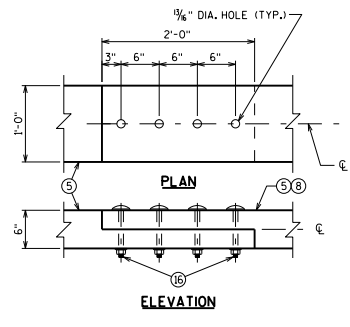
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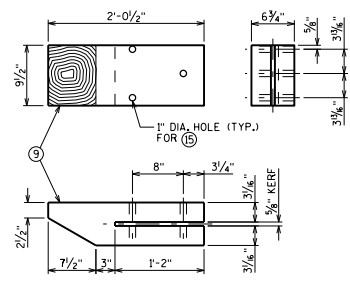




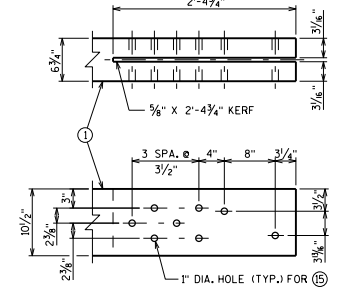
CURB TRANSITION



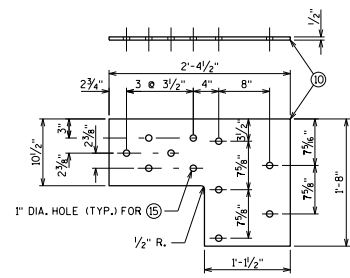
CURB SPLICE DETAIL



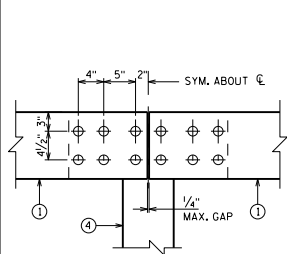
TRANSITION BLOCK



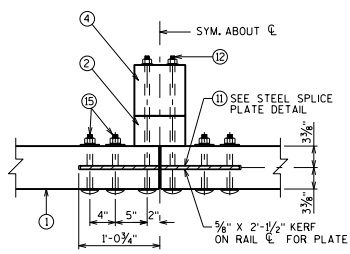
TRANSITION GLULAM RAIL BORING DETAIL



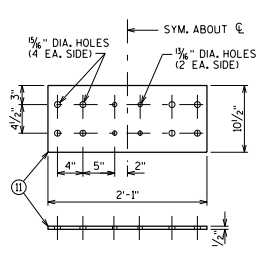
STEEL TRANSITION PLATE



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 REQ'D. @ EACH RAIL TO POST CONNECTION, 4 REQ'D. @ 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 REQ'D. @ EACH CURB TO POST CONNECTION.)
- ⑭ 3/4" DIA. X 1'-11" LONG ASTM A325 BOLT, 1 - 4" X 4" X 3/8" PLATE WASHER REQ'D. AT CURB TO SLAB CONNECTION, 1 - 4" X 4" X 3/8" PLATE WASHER REQ'D. AT POST TO SLAB CONNECTION.
- ⑮ 3/4" 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 REQ'D. @ EACH CURB SPLICE DETAIL).
- ⑰ 4" DIA. SHEAR PLATE (8 REQ'D. @ EACH CURB TO SCUPPER CONNECTION, 4 REQ'D. @ EACH SCUPPER TO SLAB CONNECTION AND 1 REQ'D. @ EACH POST TO SLAB CONNECTION). MALLEABLE IRON MEETING REQUIREMENTS OF ASTM A47, GRADE 32510.
- ⑱ 2" X 2'-6" X 3/8" ANCHOR PLATE WITH 4 - 1/8" DIA. HOLES FOR ANCHOR BOLTS NO. 14 (CURB TO SLAB CONNECTION).
- ⑲ 3/4" DIA. ASTM A325 DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT. (1 REQ'D. @ 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 T SHALL BE CUT OFF. REPAIR END OF BOLT BY PAINTING WITH ZINC RICH PRIMER.
13. WHEN PLACING OVERLAY (FWS) ON TOP OF EXISTING SLAB, THE THICKNESS OF THE OVERLAY MUST BE TAPERED NEAR THE VICINITY OF THE RAILING TO MAINTAIN THE REQ'D. (CRASH TESTED) DISTANCE FROM TOP OF SLAB TO TOP OF RAIL TO 32 INCHES.
14. THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 2 (TL-2).

BILL OF TREATED LUMBER

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

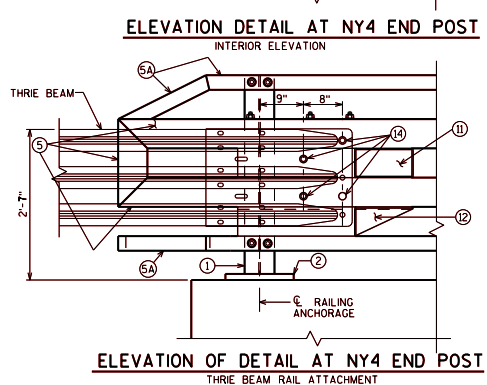
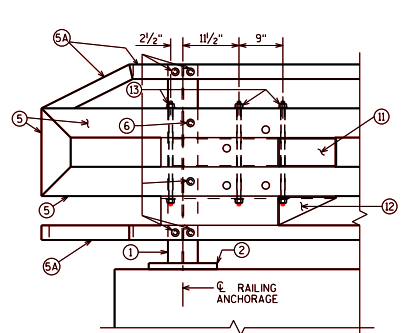
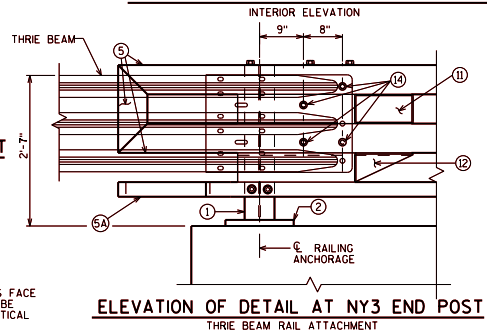
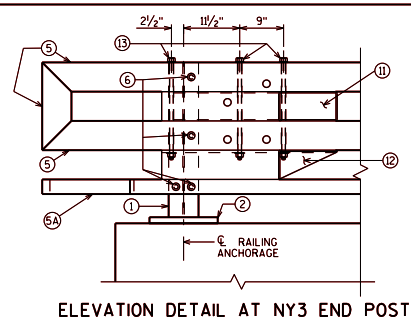
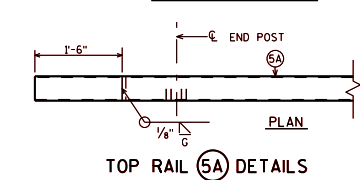
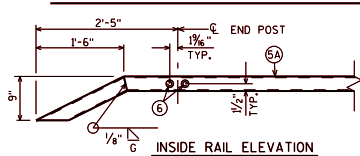
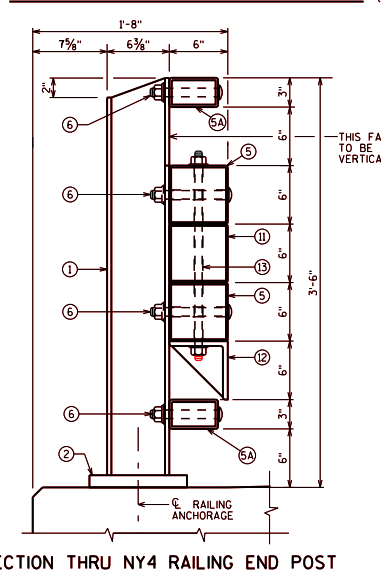
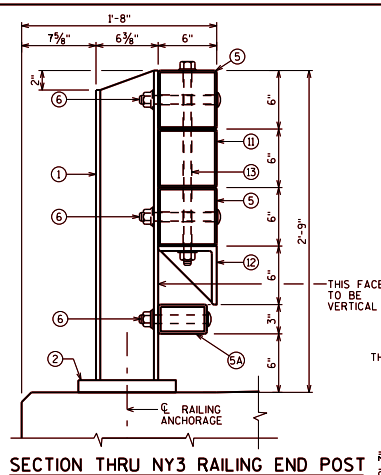
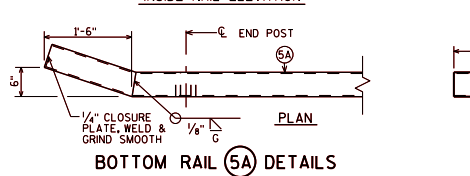
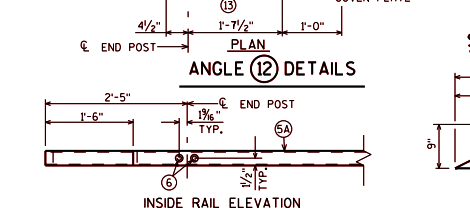
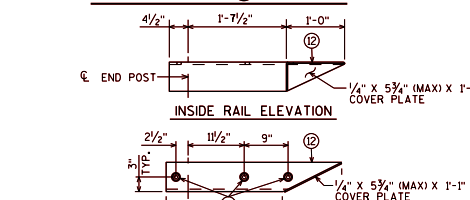
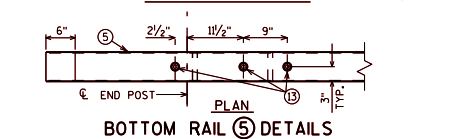
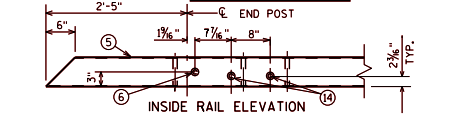
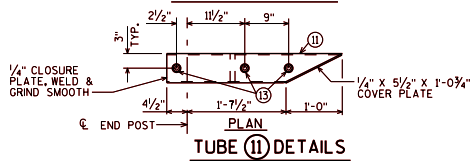
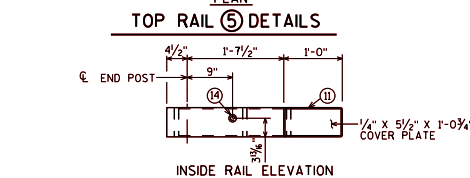
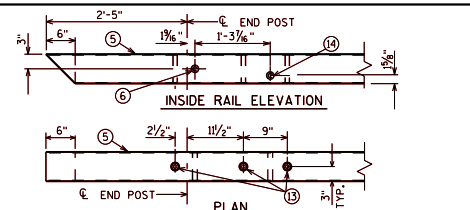
THESE RAILING DETAILS MAY BE USED WITH CONCRETE SLAB SUPERSTRUCTURES (SLAB DEPTH > 14") THAT HAVE ABUTMENTS WITH WINGS PARALLEL TO ϵ OF ABUTMENT OR HAVE AS ABUTMENTS.

TIMBER RAILING ATTACHED TO CONCRETE SLAB DETAILS

BUREAU OF STRUCTURES

DATE: _____

APPROVED: Bill Oliva

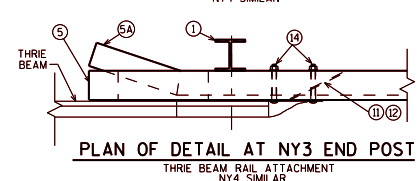
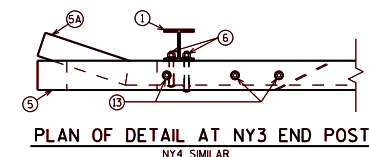


LEGEND

- 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.
- ④ 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 3/4" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- ⑤ 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 (1 REQUIRED AT RAIL NO. 5 TO POST NO. 1 CONNECTION LOCATIONS SHOWN, 2 REQUIRED AT RAIL NO. 5A TO POST NO. 1 CONNECTION LOCATIONS SHOWN).
- ⑥ 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.
- ⑦ L 6 X 6 X 1/2" STRUCTURAL ANGLE. USE 7/8" DIA. HOLES IN TOP FLANGE FOR BOLT NO. 13.
- ⑧ 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.
- ⑨ 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT AND 7/8" 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 $F_y \geq 50$ KSI. STRUCTURAL ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50.



END POST DETAILS FOR TUBULAR STEEL RAILING TYPE NY3 & NY4



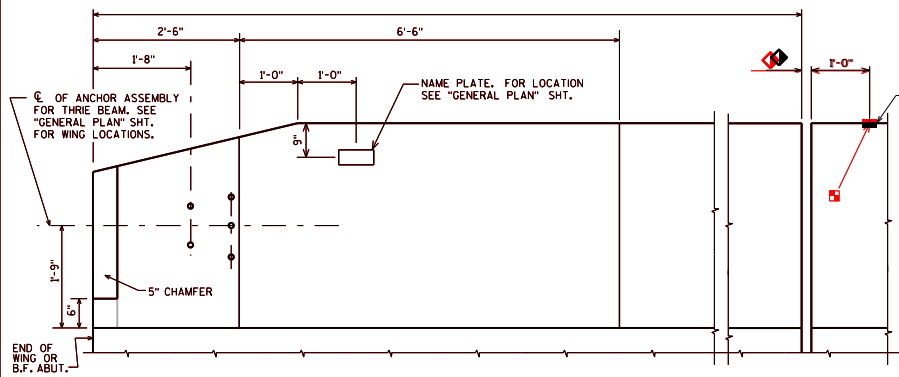
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STRUCTURES**

APPROVED: Bill Oliva

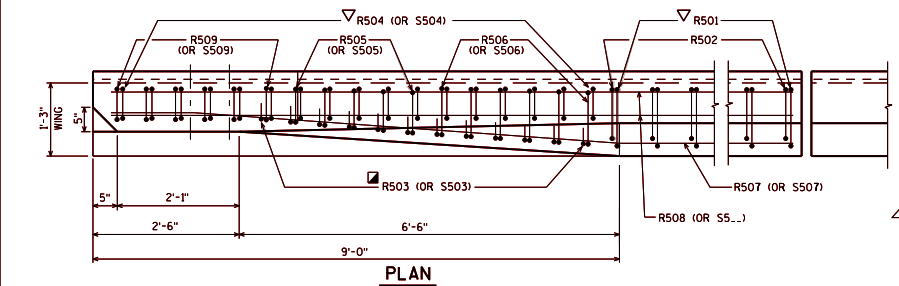
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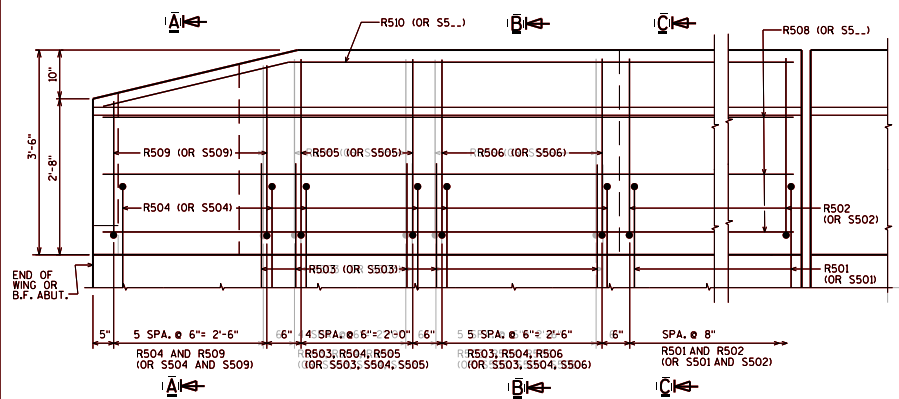
- FOR ALL TUBULAR STEEL RAILING TYPE NY4 DETAILS SEE STD. 30.27.



INSIDE ELEVATION



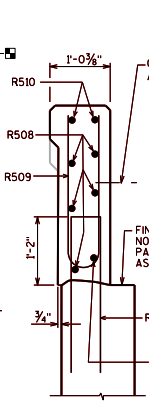
PLAN



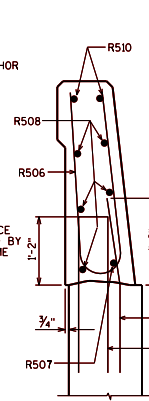
OUTSIDE ELEVATION

BENCHMARK (WHEN USED FOR PARAPET RAILING)
 BEARING AS RAILING OR MENCEASING WITH TAB.
 OR TADDED SHOTLINE THOT OF ARE PARAPET.
 THE TOP OF THE PARAPET.

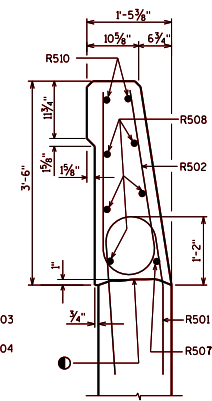
NOTE: FOR SECTIONS A, B & C ONLY
 THE PARAPET TERMINATING ON A WING
 IS SHOWN. TERMINATION ON A DECK
 IS SIMILAR.



SECTION A

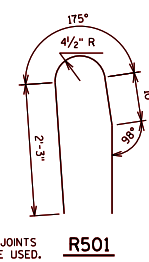


SECTION B

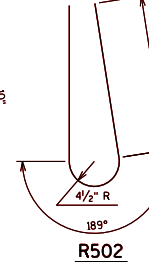


SECTION C

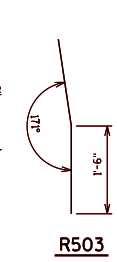
OPTIONAL CONSTRUCTION JOINTS
 IN THE PARAPETS MAY BE USED.
 RUN BAR REINF. THRU THE JOINT.
 LAP LONGIT. BARS A MIN. OF 1'-9".
 MIN. JOINT SPACING OF 80'-0".
 DEFINE CONST. JOINT WITH A 3/4" -
 V-GROOVE.



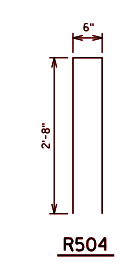
R501



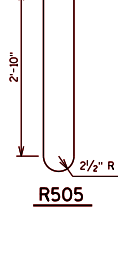
R502



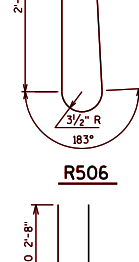
R503



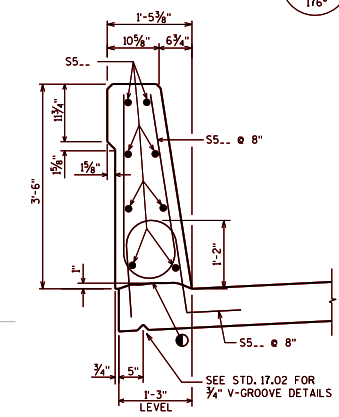
R504



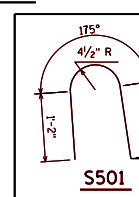
R505



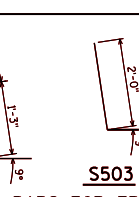
R506



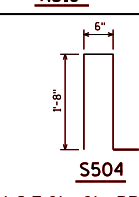
SECTION THRU PARAPET ON BRIDGE



S501



S503



S504

BARS FOR TRANSITION ON BRIDGE

AREA = 3.75 SF
 WEIGHT = 563 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

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

▽ R501 AND R504 BARS TO BE TIED TO
 WING STEEL BEFORE WING IS POURED.

DESIGNER MAY ELECT TO USE A R501
 BAR IN LIEU OF A S501 BAR ADJACENT
 TO THE PAVING NOTCH ON TYPE
 ABUTMENTS.

BILL OF BARS

FOR ABUTMENT PARAPETS

BAR MARK	CO.	ABUT.	ABUT.	LENGTH	BAR SERIES	LOCATION
R501	X			5-10	X	PARAPET-VERB.
R502	X			6-8	X	PARAPET-VERB.
R503	X			3-0	X	PARAPET-VERB.
R504	X			5-1	X	PARAPET-VERB.
R505	X			6-8	X	PARAPET-VERB.
R506	X			6-8	X	PARAPET-VERB.
R507	X			6-8	X	PARAPET-HORIZ.
R508	X			6-8	X	PARAPET-HORIZ.
R509	X			6-8	X	PARAPET-VERB.
R510	X			6-8	X	PARAPET-HORIZ.
S501	X			4-5	X	PARAPET-VERB.
S503	X			2-9	X	PARAPET-VERB.
S504	X			4-4	X	PARAPET-VERB.

△ 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	3	4'-8" TO 6'-1"

BUNDLE AND TAG EACH SERIES SEPARATELY.

SINGLE SLOPE PARAPET 42SS

BUREAU OF STRUCTURES

APPROVED: *Bill Oliva* DATE: 7-19

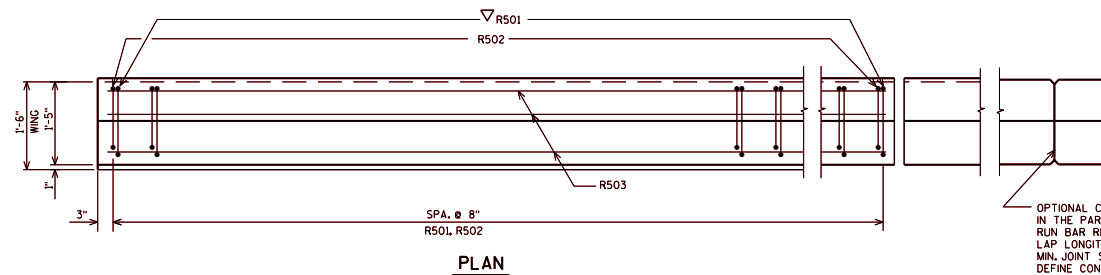
BENCH BENCHMARK WHEN SUPPLIED), AVOID PLACING SUPPLIED BELOW A RAIL OR FENCE SYSTEM THAT IS A BENCH ATTACHED TO THE TOP OF THE PARAPET.

1'-5 3/4"

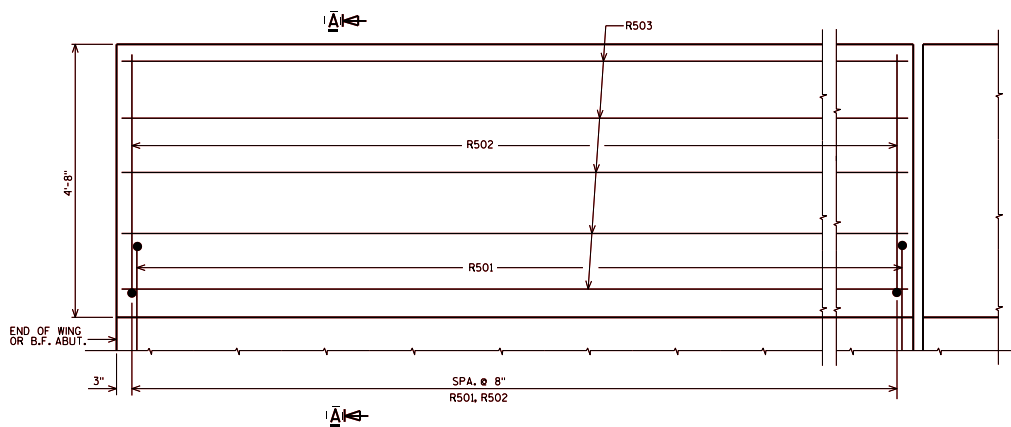
8 3/4" 9"

INSIDE ELEVATION

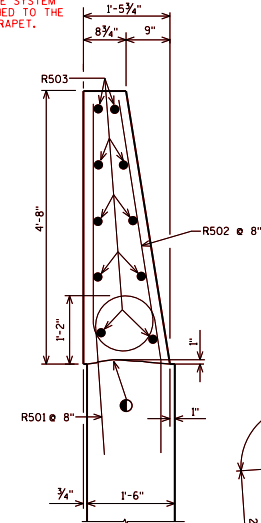
ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT.
USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS



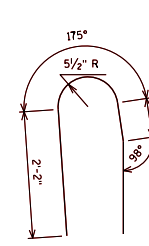
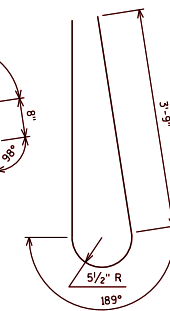
PLAN



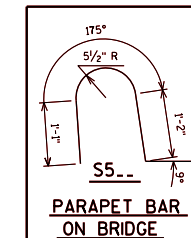
OUTSIDE ELEVATION



SECTION A

R501

R502



PARAPET BAR
ON BRIDGE

BILL OF BARS

FOR ABUTMENT PARAPETS

BAR MARK	COUNT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501.	X			5-11	X	PARGPET-VB81..
R502.	X			9-1	X	PARGPET-VB81..
R503.	X					PARGPET-HQ81..
S5..	X			4-6	X	PARGPET-VB81..

DESIGNER NOTES

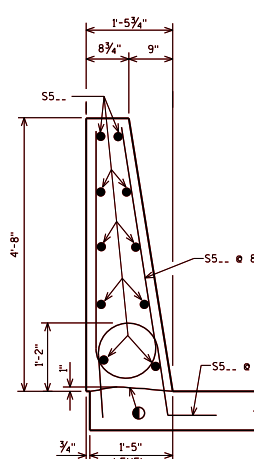
THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE S56'
SINGLE SLOPE CONCRETE ROADWAY BARRIER ADJOINS THE END OF
THE '56SS' PARAPET.

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

AREA = 5.16 SF
WEIGHT = 774 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

▽ R501 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED. DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S5... BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.



SECTION THRU PARAPET ON BRIDGE

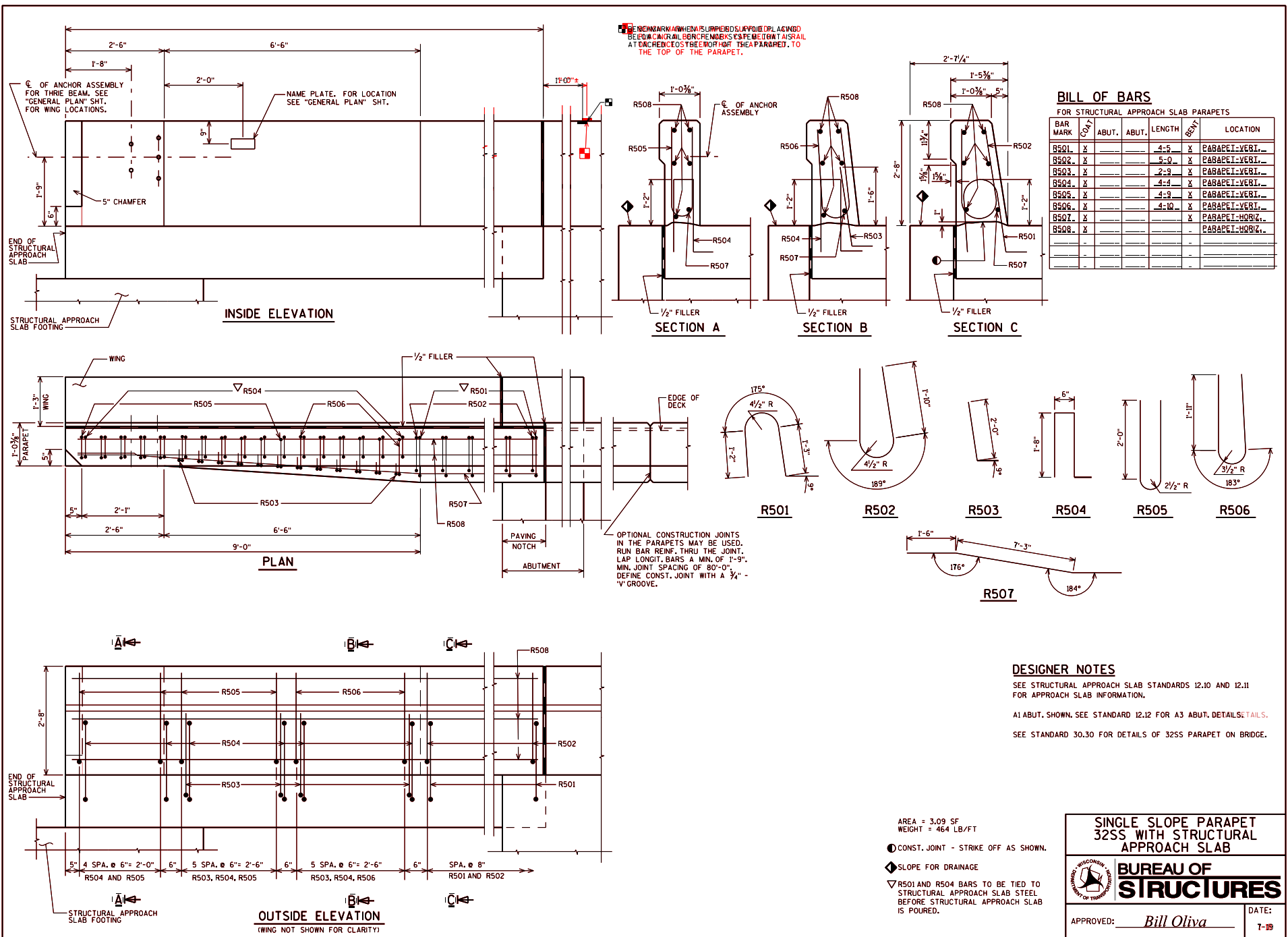
SINGLE SLOPE PARAPET 56SS

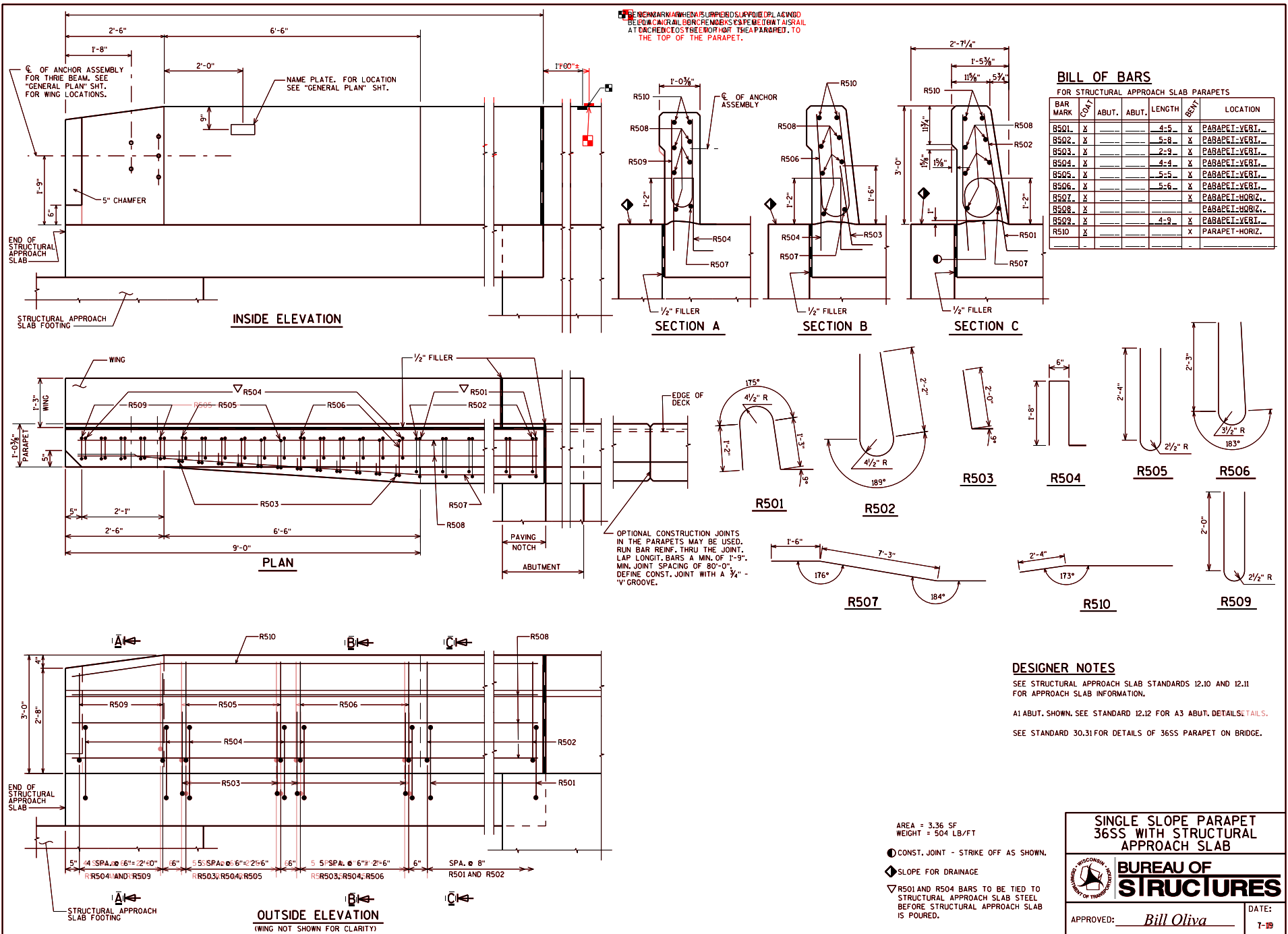


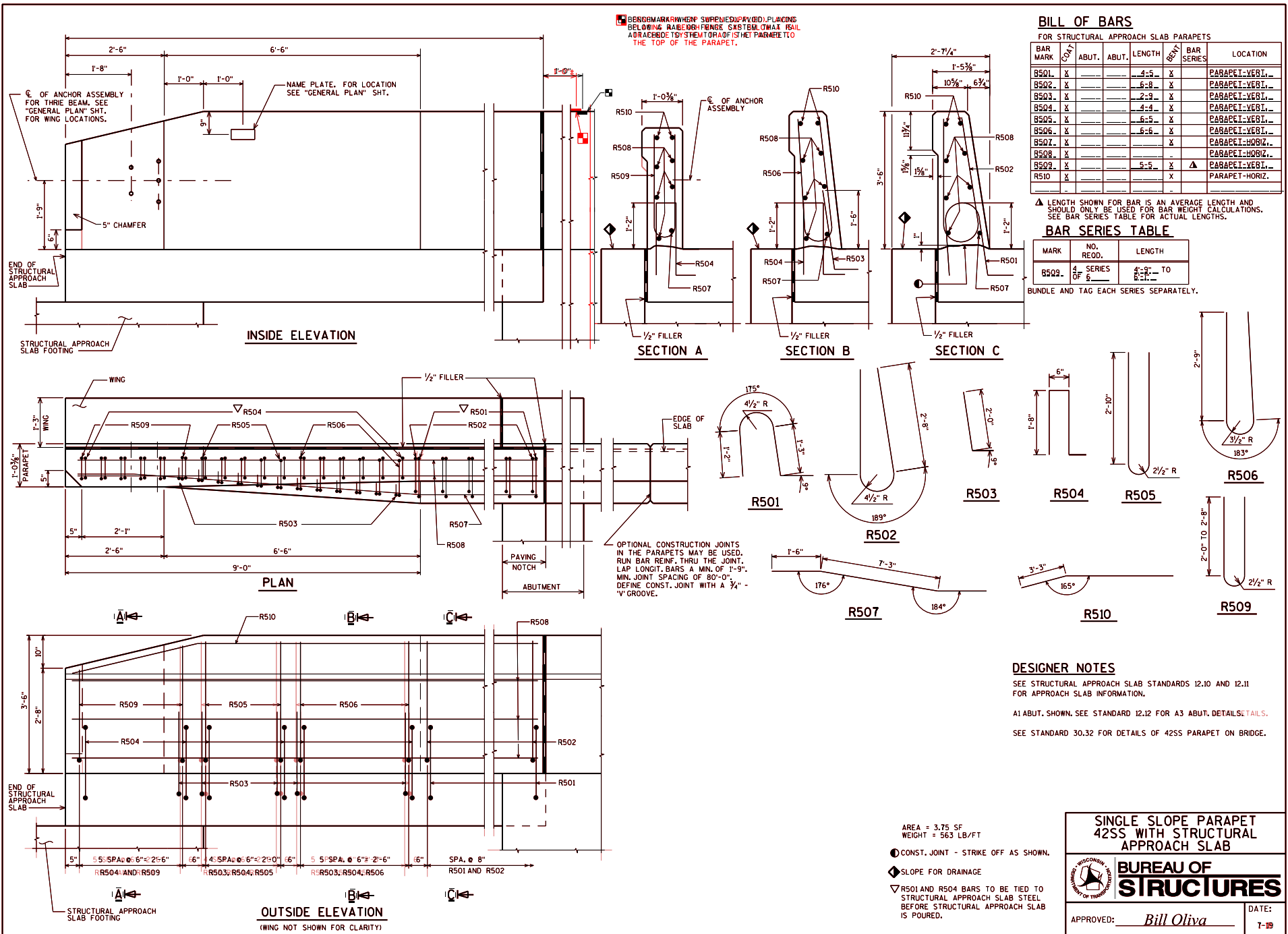
BUREAU OF STRUCTURES

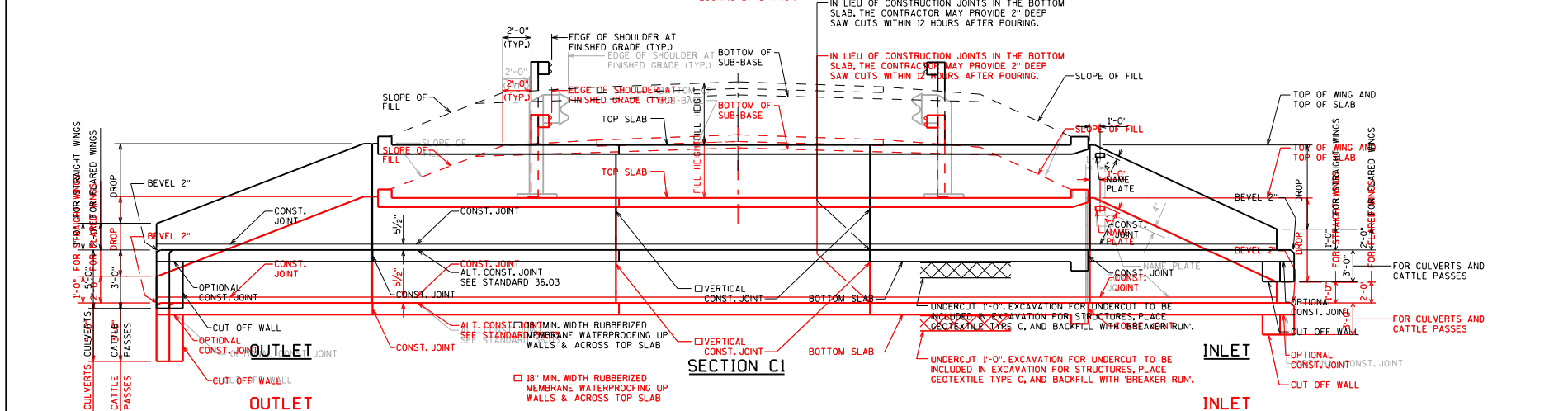
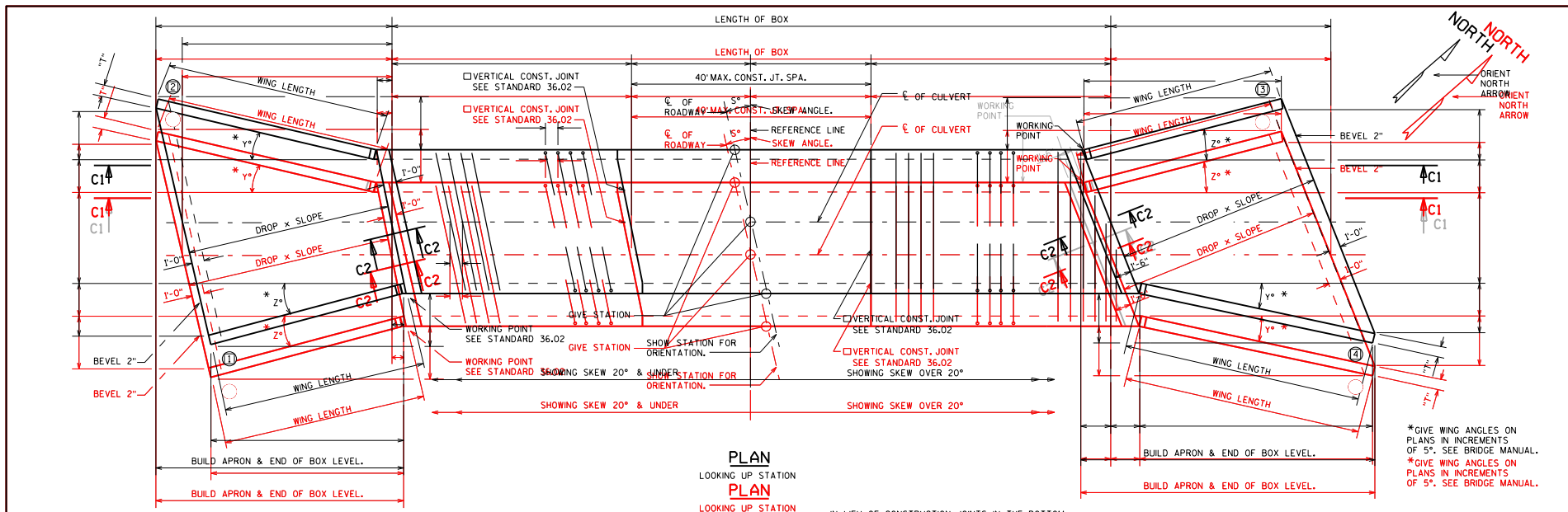
APPROVED: *Bill Oliva*

DATE:









LEGEND
 ○ INDICATES WING NUMBER
 ○ INDICATES WING NUMBER

DESIGN DATA
 LIVE LOAD: 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))
 ** DESIGNED FOR FILL HEIGHT RANGE OF 0 FEET TO 4 FEET
MATERIAL PROPERTIES:
 CONCRETE MASONRY $f_c = 3,500$ P.S.I.
 BAR STEEL REINFORCEMENT $f_y = 60,000$ P.S.I.

NOTES
 SEE STANDARD 36.02 FOR NOTES.
 TYPICAL UNDERCUT, SHOWN, SEE STANDARD 9.01 FOR ALTERNATIVES.
DESIGNER'S NOTES
 NO ADDITIONAL NOTES
 ** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS, HEIGHT TO NEAREST FOOT, ON FILLS OVER 4 FEET AND 0.5 FEET NEARER.
 ** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS, HEIGHT TO NEAREST FOOT, ON FILLS UNDER 4 FEET AND 0.5 FEET NEARER.
 ** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS, HEIGHT TO NEAREST FOOT, ON FILLS UNDER 4 FEET AND 0.5 FEET NEARER.

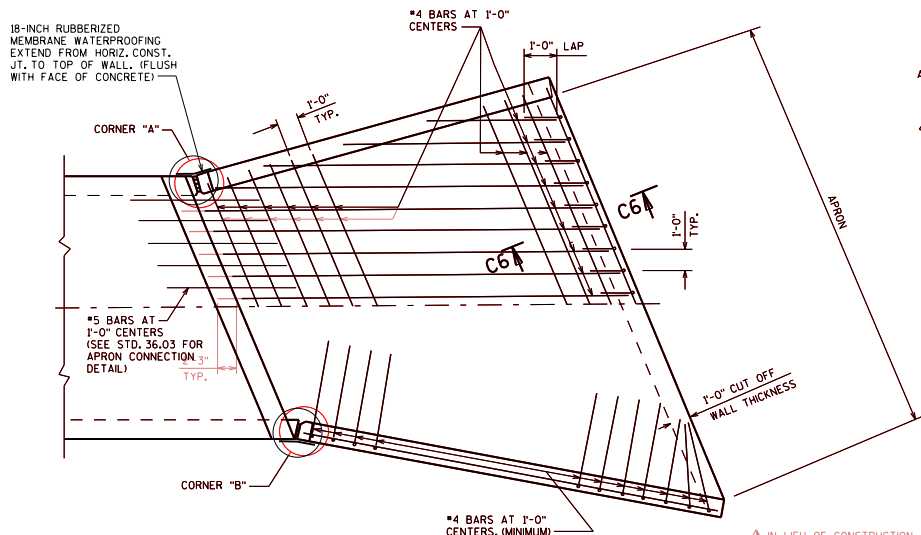
BOX CULVERT LAYOUT

**BUREAU OF
STRUCTURES**

DATE: 7-20

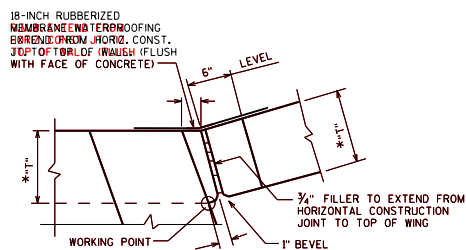
APPROVED: Bill Oliva

7-20



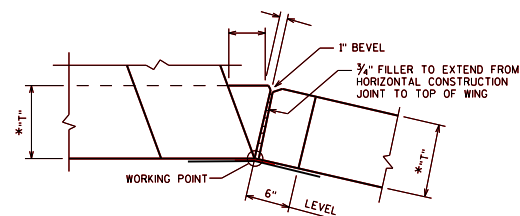
APRON DETAIL

APRON DETAIL

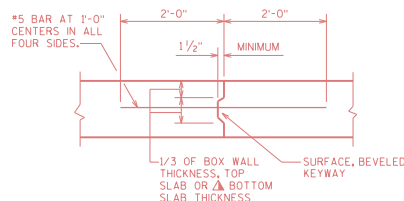


CORNER "A"

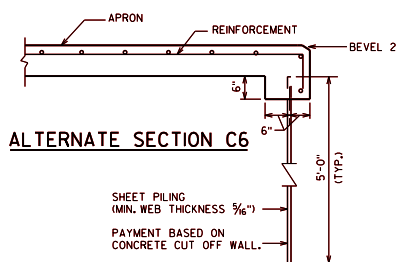
* DIMENSION "T" TO BE DETERMINED FROM BARREL DESIGN



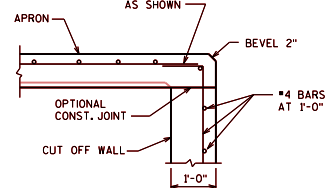
CORNER "B"



VERTICAL CONSTRUCTION JOINT



ALTERNATE CUT OFF WALL



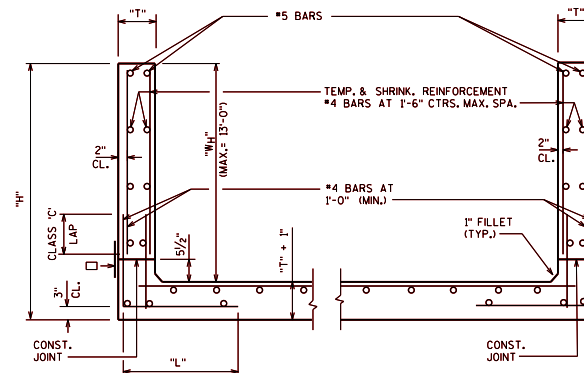
SECTION C6

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

"H" IS MAX. WING WALL HEIGHT

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

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



SECTION THRU WINGWALLS

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

NOTES

BAR STEEL FOR REINFORCEMENT SHALL BE EPOXY COATED UNLESS OTHERWISE SHOWN OR NOTED.

THE CONCRETE IN THE CUT OFF WALL SHALL BE PLACED UNDER WATER THE EXCAVATION CAN ONLY BE REINFORCED.

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

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

DESIGNER NOTES

THE CONCRETE IN THE CUT OFF WALL SHALL BE PLACED UNDER WATER THE EXCAVATION CAN ONLY BE REINFORCED.

DESIGNER NOTES

SEE STANDARDS 9.01 AND 36.01 FOR PRECAST CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE BOX CULVERT WITH THE ACCEPTANCE OF THE SHOP DRAWINGS AND THE DESIGNER'S APPROVAL. THE PRECAST CONCRETE BOX CULVERT SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 36 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL. PAYMENT FOR THE PRECAST BOX CULVERT SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 36 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL. PAYMENT FOR THE PRECAST BOX CULVERT SHALL BE BASED ON THE QUANTITIES AND PRICES BID FOR THE ITEMS LISTED IN THE BIDDING.

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.

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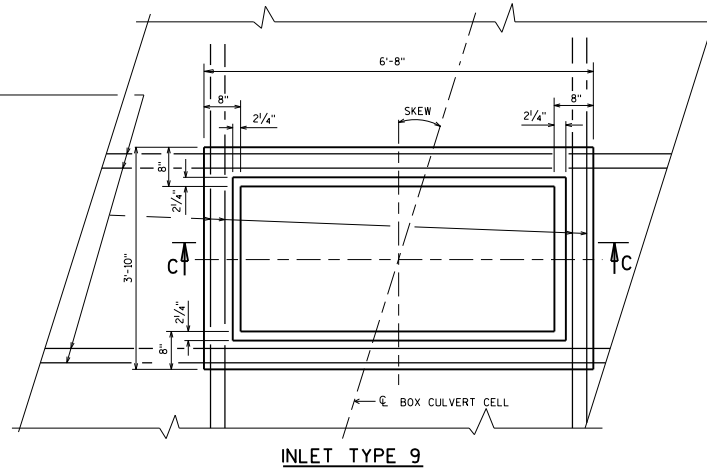
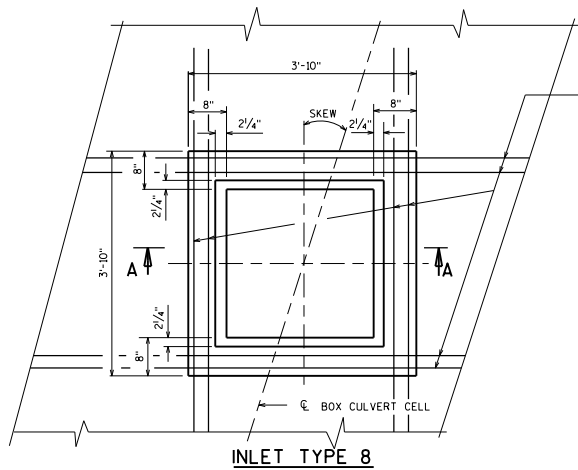
FOR "B" DESIGNATED CONCRETE BOX CULVERTS HAVING THEIR TOP SURFACE AT GRADE, HAND HELD FINISHING MACHINES MAY BE USED. NOTE THIS ON PLANS WHEN APPLICABLE.

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BOX CULVERT APRON DETAILS



APPROVED: Bill Oliva DATE: 1-21



MEDIAN INLET PLAN
(INLET COVER NOT SHOWN)

NOTES

FIELD CUT BAR STEEL REINFORCEMENT IN TOP SLAB TO CLEAR THE OPENING PROVIDED FOR MEDIAN INLET.

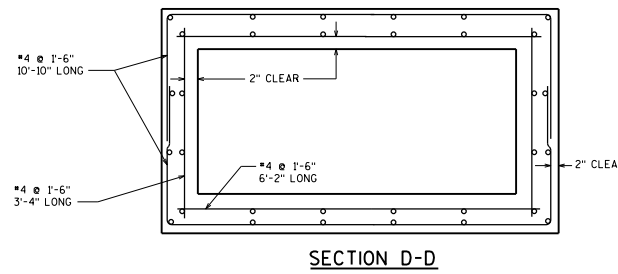
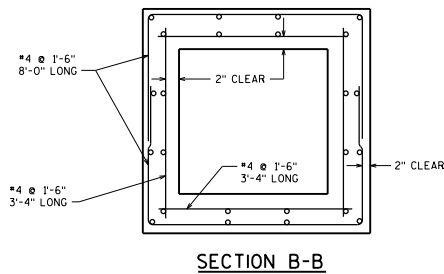
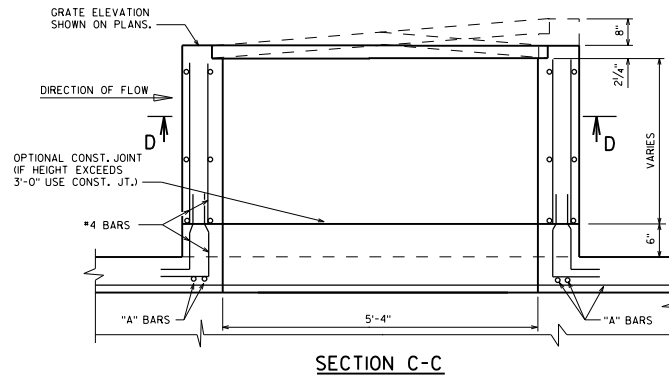
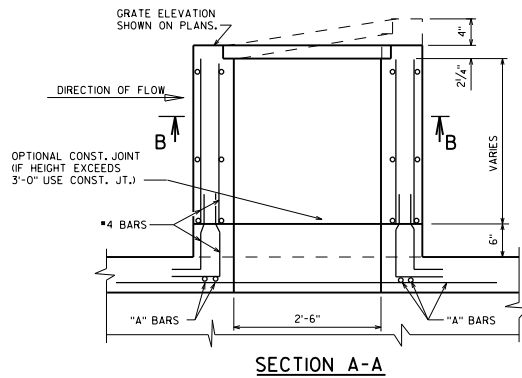
ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. MAXIMUM ADJUSTMENT SHALL BE 8".

DESIGN NOTES

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

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

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



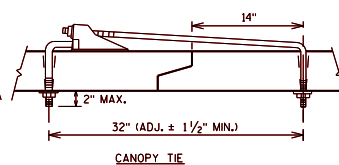
**BOX CULVERT MANHOLE
FOR INLET TYPE 8 & 9**



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16

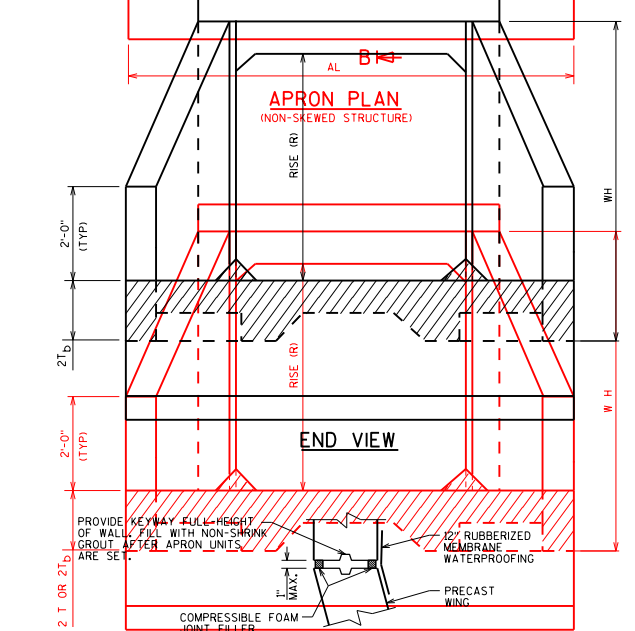


3/8" DIA. ANCHOR BOLTS AND BLOCKOUTS FOR WASHERS AND NUTS. FILL WITH APPROVED GROUT.

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

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

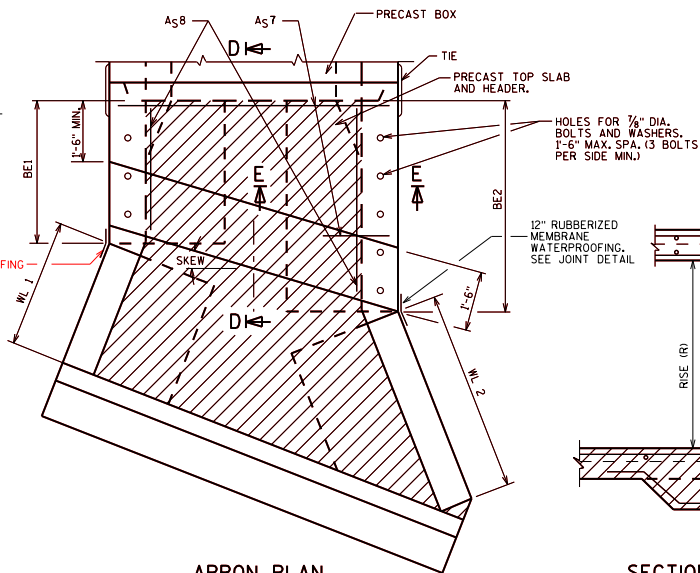
FILL WITH CONC. FROM BOTTOM (TYP.) OF WING FTG. (TYP.)



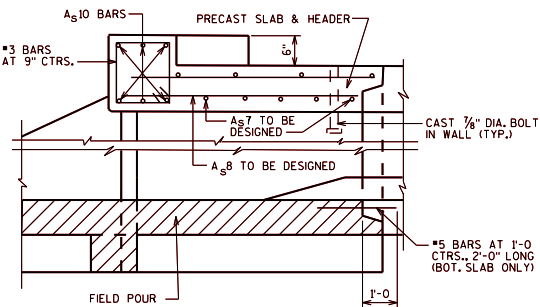
JOINT DETAIL
JOINT DETAIL EXAMPLE SHOWN. PRECAST SUPPLIER TO SUBMIT JOINT DETAIL FOR ACCEPTANCE.

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													



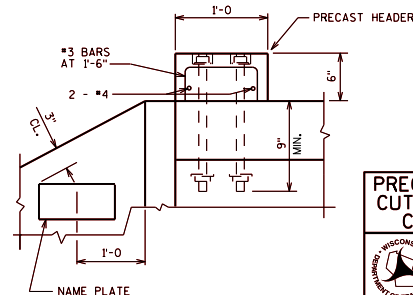
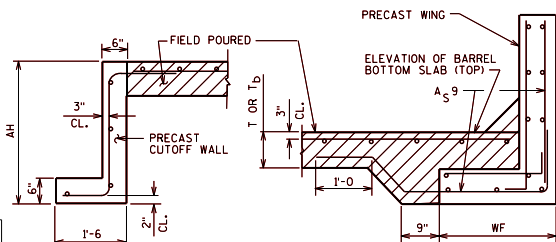
RISE(R)	A _{S9} IN. ² /FT	WF
4'-0"	0.19	2'-6"
6'-0"	0.24	3'-6"
8'-0"	0.31	4'-0"
10'-0"	0.34	4'-9"



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

SPAN (S)	A _{S10} BARS		
	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"



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 PRECAST APRON ELEMENTS SHALL BE 4,000 P.S.I.

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

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

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

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

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

THE 3/8" 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.



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

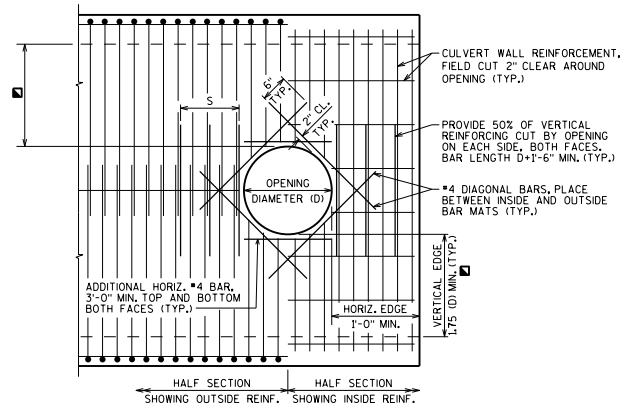
DATE:
7-28

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: Bill Oliva

DATE:
1-13

Technical drawing of a C/L POST & BASE PLATE. The drawing shows a rectangular plate with dimensions 1'-0" by 1'-0". Key features and dimensions include:

- Overall dimensions: 1'-0" by 1'-0".
- Top edge dimensions: 3" (left), 7" (center), 2" (right).
- Right edge dimensions: 1/4" (top), 1/4" (center), 1/4" (bottom).
- Bottom edge dimensions: 1/4" (left), 1/4" (center), 1/4" (right).
- Left edge dimensions: 1/4" (top), 1/4" (center), 1/4" (bottom).
- Internal dimensions: 8 1/2" (left), 1" (center), 1" (right).
- Top edge features: 1/8" DIA. HOLE (TYP.) (left), 1/4" (center), 1/4" (right).
- Bottom edge features: 1/4" (left), 1/4" (center), 1/4" (right).
- Internal features: 1/4" (left), 1/4" (center), 1/4" (right).
- Weld specifications: 3 PASS WELD * (left), 3 PASS WELD * (right).
- Labels: C/L POST & BASE PLATE (center), 1/4" (top right), 1/4" (bottom right), 1/4" (bottom left), 1/4" (top left).

Technical drawing of a 4-hole plate. The plate is 7 inches wide and 5 inches high. It features four square holes, each measuring 6 inches in width and 4 1/2 inches in height. The holes are arranged in a 2x2 grid, with 3 inches of spacing between them horizontally and vertically. A 1/8 inch diameter hole is located in the top-left corner. The plate has a 2 1/8 inch thick edge on the right and a 2 1/2 inch thick edge on the bottom.

A diagram of a vertical rectangular plate. A horizontal line represents a crack, labeled "1/4\" DIA. HOLE". The crack is located at a distance of "1/4\" Y\" from the bottom edge. The total height of the plate is labeled "1/4\" X\". An arrow on the right side points downwards, labeled "DIRECTION OF TRAFFIC".

Technical drawing of a W-beam rail assembly, showing side and end views with dimensions and labels.

Labels:

- W6X9 STEEL POST
- C/L POST
- THIS FACE TO BE VERTICAL
- 1" DIA. THREADED ROD
- ADHESIVE ANCHORS
- BASE PLATE 8 1/2" X 1'-0" X 1/2"
- TOP SLAB OF CULVERT
- POST BOLT
- W-BEAM RAIL
- PLASTIC BLOCKOUT

Dimensions:

- 3"
- "B"
- 3/4"
- "H"
- "D"
- 8" MIN.
- 2" MIN.
- 1/4"
- 1"

Section Lines:

- A-A
- C-C

USE FOR THICKNESS "T" OF 10 INCHES OR MORE AND
MINIMUM CONCRETE STRENGTH (f'_c) OF 4,000 PSI

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 ⁵ / ₈ "	8"	7"	1 ³ / ₁₆ "
MGS GUARDRAIL	2'-7 ¹ / ₈ "	12"	7 ¹ / ₈ "	3 ¹ / ₄ "

W6X9 STEEL POST

C/L POST

THIS FACE TO BE VERTICAL

3"

"B"

3/4"

PLASTIC BLOCKOUT

W-BEAM RAIL

POST BOLT

A

A

1" DIA. HEX BOLT

BASE PLATE
8 1/2" X 1'-0" X 1/2"

TOP SLAB OF CULVERT

B

B

BOTTOM PLATES-(4)
6" X 4 1/2" X 1/4" EACH

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

Technical drawing of a metal bracket. The drawing shows a side view of a bracket with the following dimensions and labels:

- 1/8" PLATE THICKNESS**: Label pointing to the top horizontal section.
- 6"**: Dimension for the total width of the bracket.
- 8 1/2"**: Dimension for the total height of the bracket.
- 3/4"**: Dimension for the height of the top horizontal section.
- 5/8" R.**: Label pointing to the rounded corner of the bracket.
- 3/4"**: Dimension for the height of the bottom horizontal section.
- 2"**: Dimension for the width of the bottom horizontal section.
- FIELD CLIP AS REQ'D.**: Label pointing to the vertical section of the bracket.

4 PER 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.

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 SDDOT 4848 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 SDDOT 4848 PROVIDED REQUIREMENTS DON'T SHOW STANDARD AND BEAM MEET.

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 SDDOT 4838 AND SDDOT 4834 FOR CONCRETE BARRIER DETAILS.

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

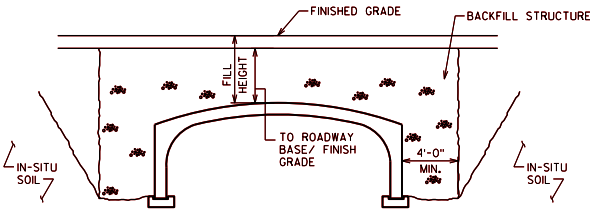
PLACE FOOTINGS BELOW SCOUR AND FROST DEPTHS. PLACE BOTTOM OF FOOTING AT A MINIMUM DEPTH EQUAL TO PREVAILING FROST DEPTH OR SCOUR DEPTH BUT NOT LESS THAN 4'-0" BELOW GROUND ELEVATION UNLESS CONSTRUCTED ON ROCK FOUNDATION OR OTHERWISE INDICATED.

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

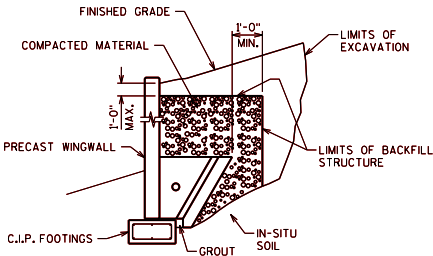
BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.

LRFD DESIGN LOADS

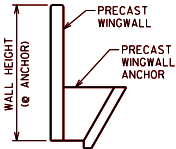
LIVE LOAD: HL-93
HORIZONTAL EARTH PRESSURE: UNIT WEIGHT = 125 PCF
VERTICAL EARTH PRESSURE: UNIT WEIGHT = 120 PCF



BACKFILL REQUIREMENTS



WALL BACKFILL REQUIREMENTS



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

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

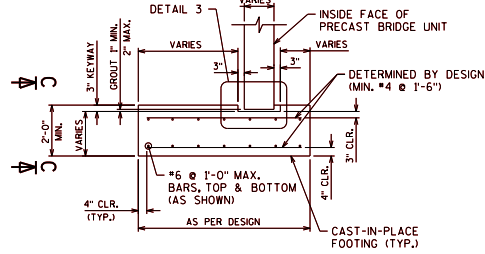
PRECAST THREE-SIDED BOX
CULVERT DESIGN NOTES



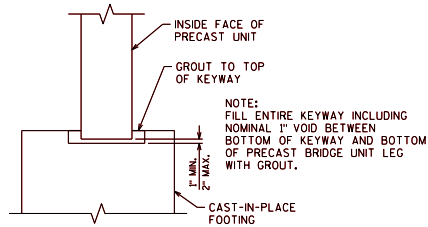
BUREAU OF
STRUCTURES

APPROVED: Bill Oliva DATE: 7-21

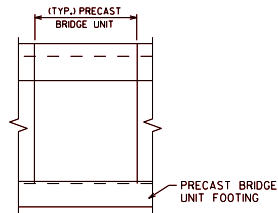
SPREAD FOOTING SHOWN, OTHER FOUNDATION TYPES POSSIBLE. (FOR PEDESTAL WALL, PILE AND BASE SLAB FOUNDATIONS, "SEE OPTIONAL DETAIL 2")



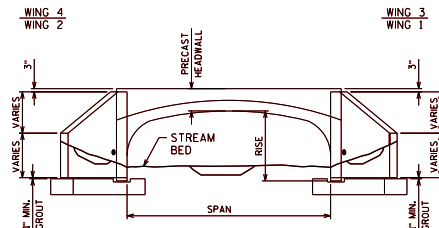
DETAIL 2



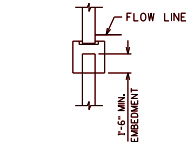
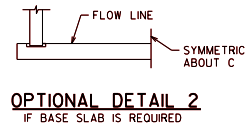
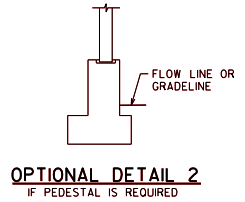
DETAIL 3



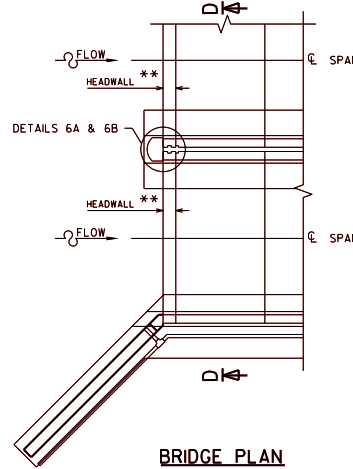
SECTION C



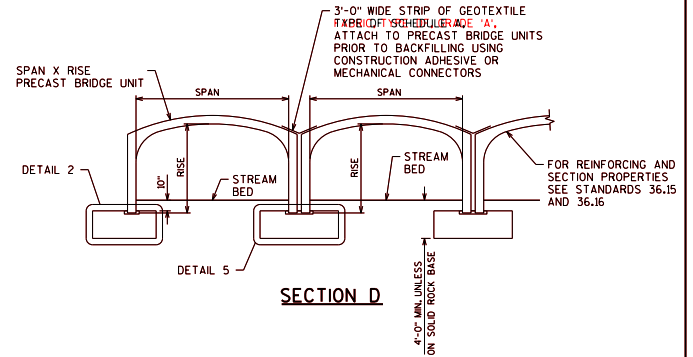
TYPICAL END ELEVATION



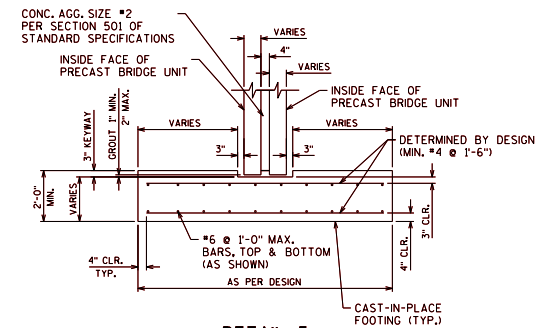
OPTIONAL DETAIL 2
IF PILES ARE REQUIRED



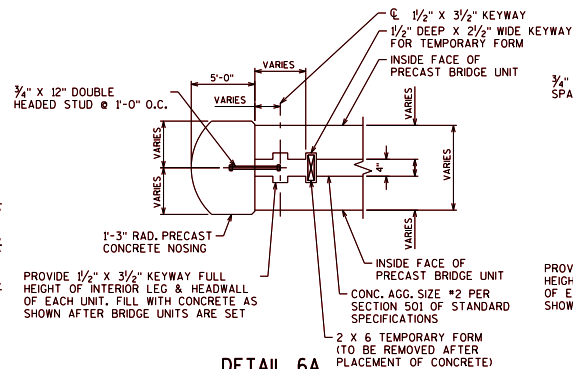
BRIDGE PLAN



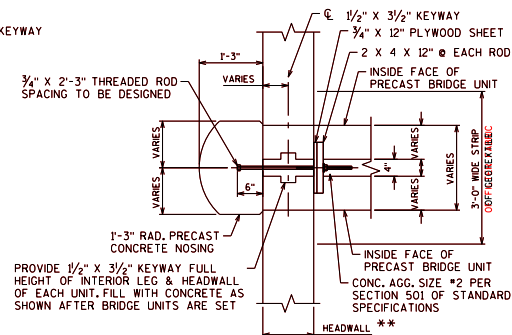
SECTION D



DETAIL 5



DETAIL 6A



DETAIL 6B

NOTES:

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

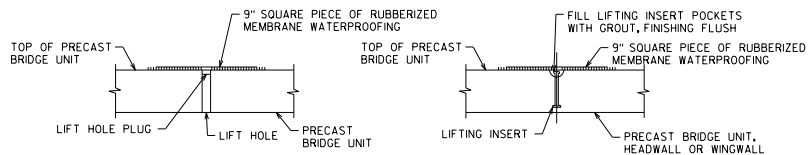
PRECAST THREE-SIDED BOX CULVERT DETAILS



BUREAU OF STRUCTURES

APPROVED: *S. Bill Dierker*

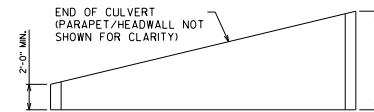
DATE: 7-18



LIFTING HOLES

LIFTING INSERTS

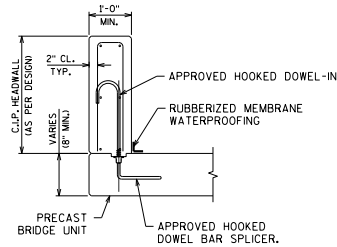
TYPICAL LIFT POINT SEALING DETAIL



SKewed UNITS

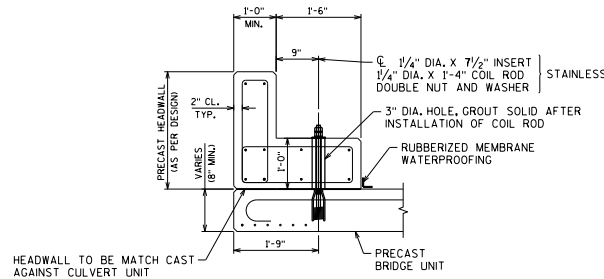
TYPICAL SKEW LIMITS PLAN VIEW - NOT TO SCALE

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



CAST-IN-PLACE HEADWALL DETAIL

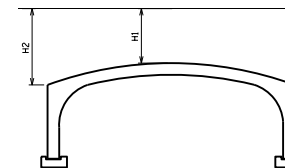
NOT TO SCALE



PRECAST HEADWALL DETAIL WITH COLLAR

NOT TO SCALE

	H1	H2
UNIT SPAN	MAX. HEIGHT @ CROWN TO 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

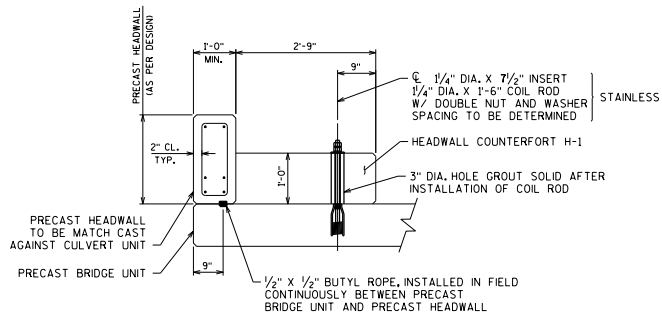
PRECAST THREE-SIDED BOX
CULVERT HEADWALL DETAILS



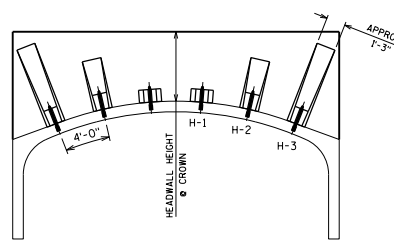
**BUREAU OF
STRUCTURES**

APPROVED: Scot Becker

DATE:
1-11



PRECAST HEADWALL TYPE H-1 COUNTERFORT
NOT TO SCALE



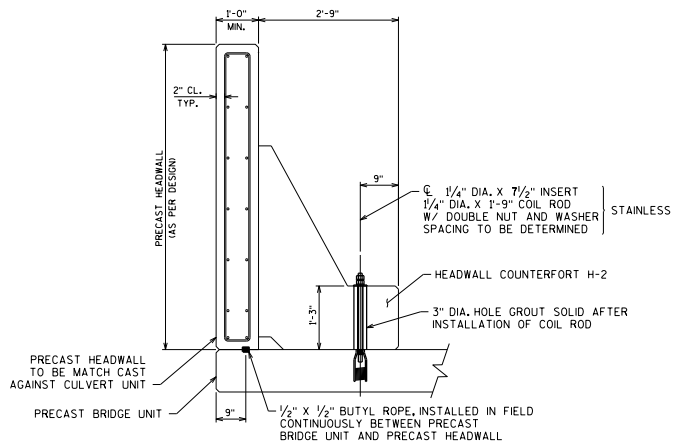
SAMPLE ELEVATION

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

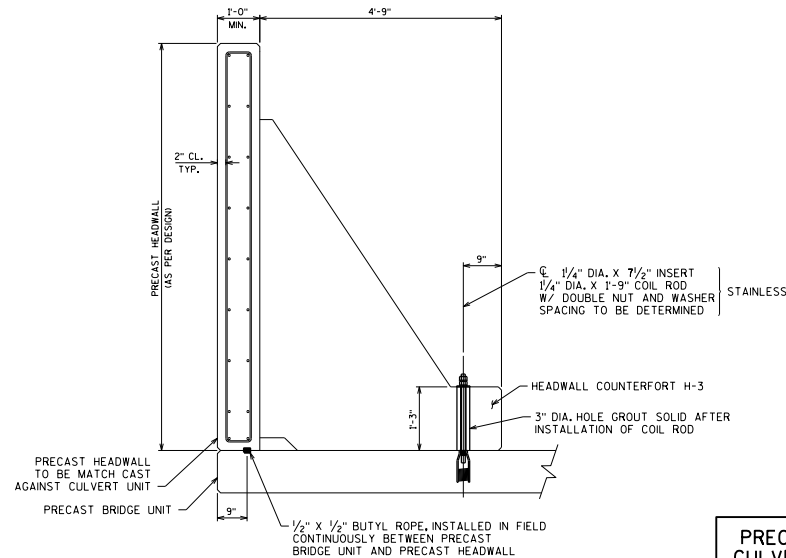
	COUNTERFORT	MAX HEADWALL HEIGHT @ COUNTERFORT LOCATION	
		NO SURCHARGE	W/ 2'-0" SURCHARGE
14'-0" SPAN	H-1	7'-0"	5'-0"
	H-2	7'-0"	5'-0"
	H-3	8'-0"	6'-0"
20'-0" - 42'-0" SPANS	H-1	8'-0"	6'-0"
	H-2	10'-0"	7'-0"
	H-3	10'-0"	8'-0"

LRFD HEADWALL COUNTERFORTS

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



PRECAST HEADWALL TYPE H-2 COUNTERFORT
NOT TO SCALE



PRECAST HEADWALL TYPE H-3 COUNTERFORT
NOT TO SCALE

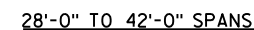
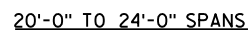
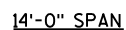
**PRECAST THREE-SIDED BOX
CULVERT HEADWALL DETAILS**



**BUREAU OF
STRUCTURES**

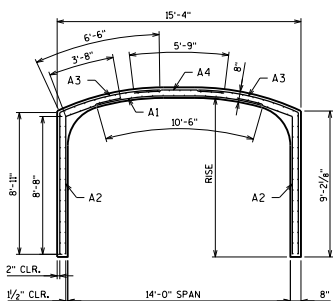
APPROVED: Scot Becker

DATE:
1-11



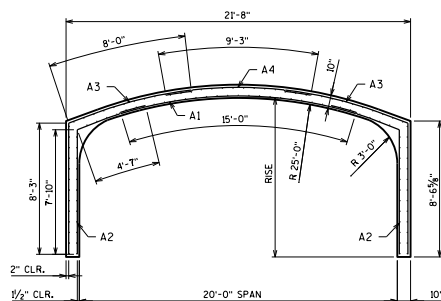
GEOMETRIC PROPERTIES (FT.) (NOT SHOWN ON DRAWING)					
	SPAN - FT				
	20	24	28	36	42
θ	38.43°	48.29°	25.30°	37.93°	47.86°
L	16.77	21.07	17.66	26.48	33.41
a	2.13	4.25	0.00	4.48	4.48
b	1.39	2.19			
b1			0.97	2.17	3.50
b2			1.96	2.40	2.75
c	2.68	2.75	3.76	3.91	4.31
d	2.29	3.01	2.84	4.48	5.66
e			4.07	3.83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

COVER ft	ARCH UNIT PRIMARY REINFORCING (MINIMUM)																	
	14'-0" SPAN 4'-0" TO 10'-0" RISE			20'-0" SPAN 5'-0" TO 10'-0" RISE			24'-0" SPAN 6'-0" TO 10'-0" RISE			28'-0" SPAN 7'-0" TO 11'-0" RISE			36'-0" SPAN 8'-0" TO 13'-0" RISE			42'-0" SPAN 10'-0" TO 13'-0" RISE		
	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI	A1 SQ. IN/FT	A3 SQ. IN/FT	f'c REQ'D. PSI
3	0.66	0.48	5000	0.90	0.78	5000	0.72	0.84	5000	0.96	1.08	5000	1.50	1.68	6000	1.44	1.44	6000
6	0.66	0.48	5000	0.72	0.78	5000	0.72	1.08	5000	0.96	1.32	5000	1.50	1.92	6000	1.44	1.44	6000
9	0.66	0.48	5000	0.72	0.90	5000	0.72	1.44	5000	0.96	1.68	5000 (1)	1.50	2.40	6000	1.44	1.92	6000 (1)
12	0.66	0.60	5000	0.72	1.08	5000	0.72	1.80	6000 (1)	0.96	1.80	6000 (1)	1.50	3.00	6000 (1)	1.44	2.16	6000 (1)



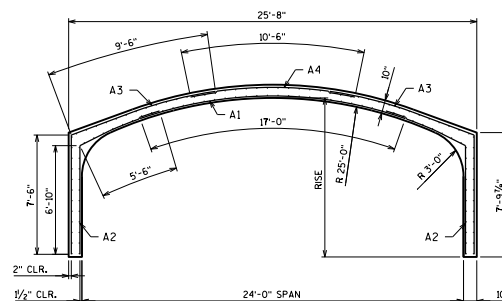
14'-0" SPAN

RISE = 10'-0" **SEE NOTE



20'-0" SPAN

RISE = 10'-0" **SEE NOTE



24'-0" SPAN

RISE = 10'-0" **SEE NOTE

NOTES:

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

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

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

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

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

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

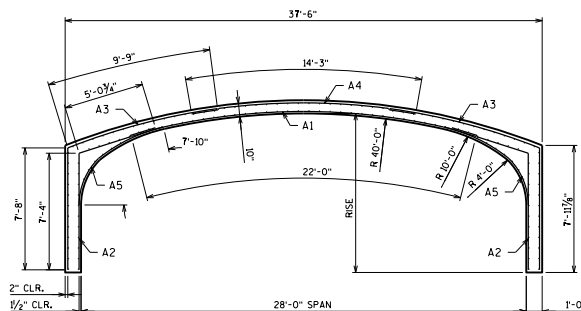
THE CLEAR DISTANCE OF THE END CIRCUMFERENTIAL WIRES SHALL NOT BE LESS THAN 1" NOR MORE THAN 2" FROM THE ENDS OF EACH SECTION. AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A497 MAY BE SUBSTITUTED FOR THE REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.

MINIMUM COVER FOR WILDED WIRE FABRIC: 1-INCH

DESIGN DATA:

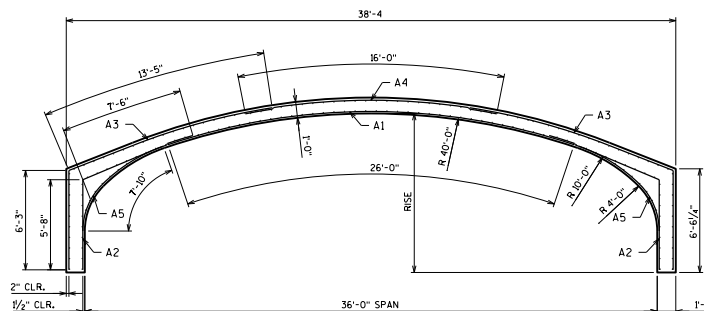
f'_c = 5000 PSI MINIMUM FOR CONCRETE
 f_y = 60,000 PSIFOR STEEL REINFORCING BARS
 f_y = 65,000 PSIFOR WELDED WIRE FABRIC (IN FLAT SHEET)

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



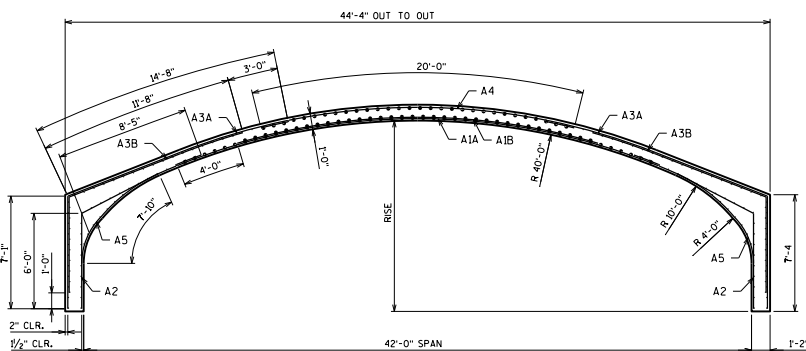
28'-0" SPAN

RISE = 10'-0"



36'-0" SPAN

RISE = 10'-0"



42'-0" SPAN

RISE = 12'-0"

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

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"	

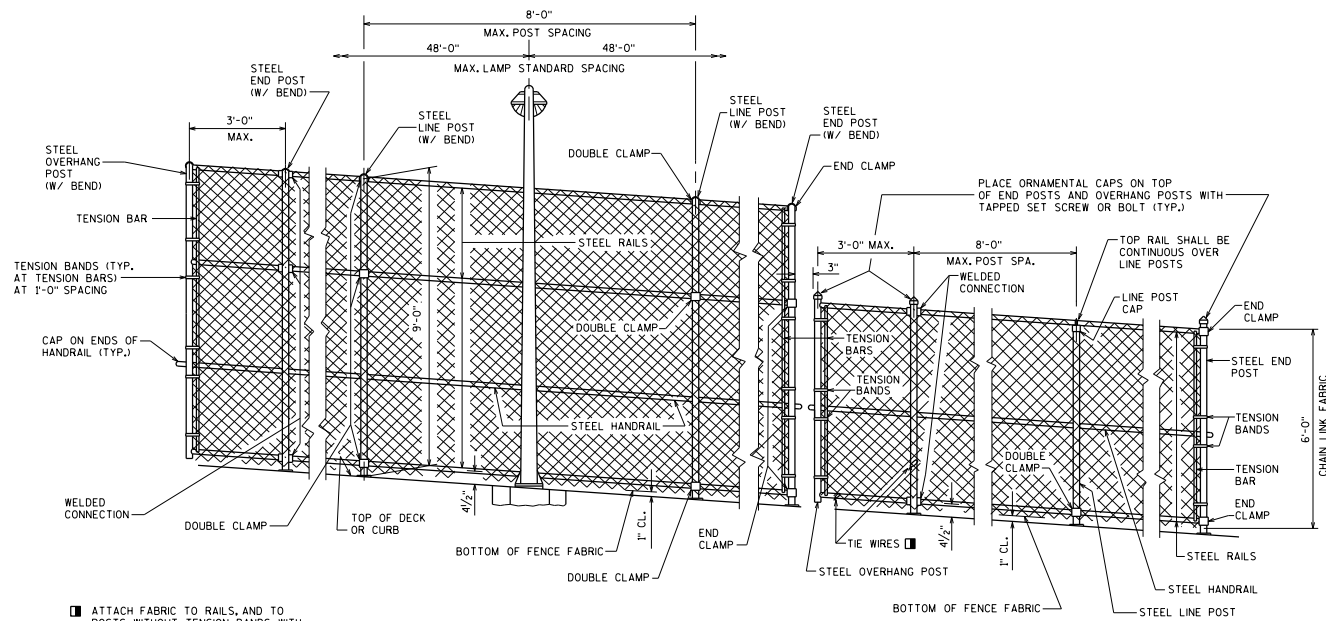
PRECAST THREE-SIDED BOX
CULVERT REINFORCEMENT



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-14

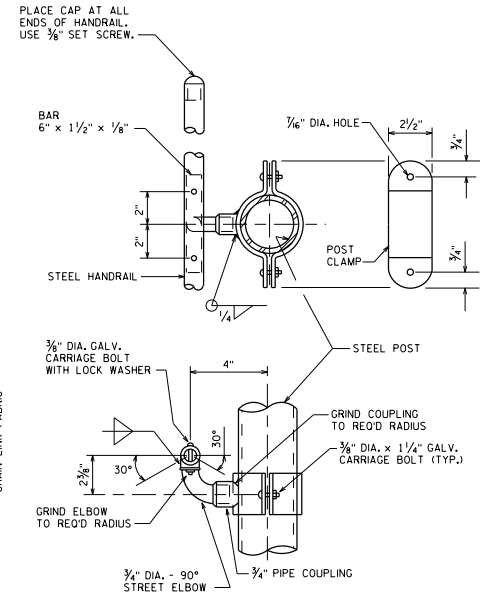


■ ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH TIE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".

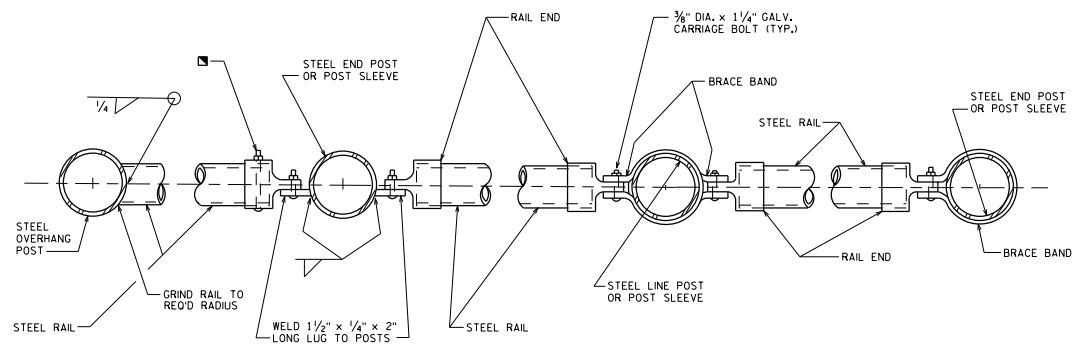
AT LAMP STANDARD

AT EXPANSION JOINT

ELEVATION OF FENCE



HANDRAIL DETAILS



WELDED CONNECTION
(AT OVERHANG SECTION)

* DOUBLE CLAMP

END CLAMP

PLAN OF RAILING

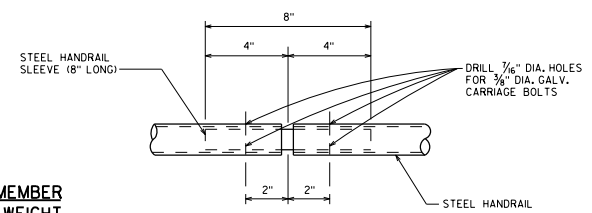
■ BOLT RAIL TO RAIL END TO SECURE OVERHANG SECTION. ALTERNATE IS TO WELD RAIL DIRECTLY TO END POST.

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 30.1)

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



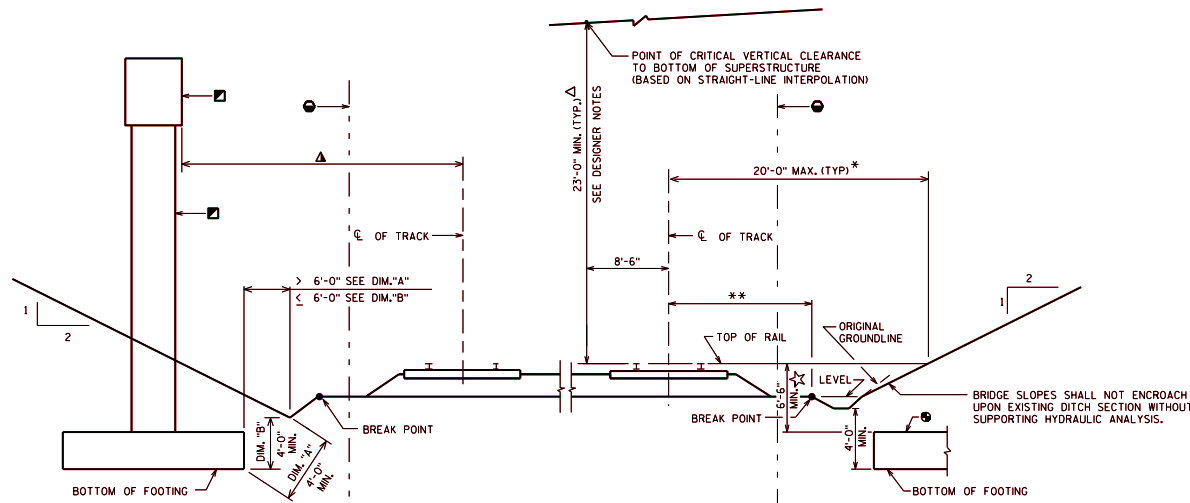
HANDRAIL SPLICE

PEDESTRIAN OVERPASS DETAILS

BUREAU OF STRUCTURES

APPROVED: Scot Becker

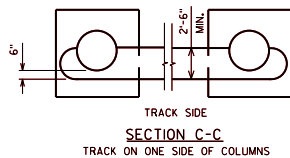
DATE:
7-10



RAILROAD IN FILL

RAILROAD CROSS SECTIONS

RAILROAD IN CUT

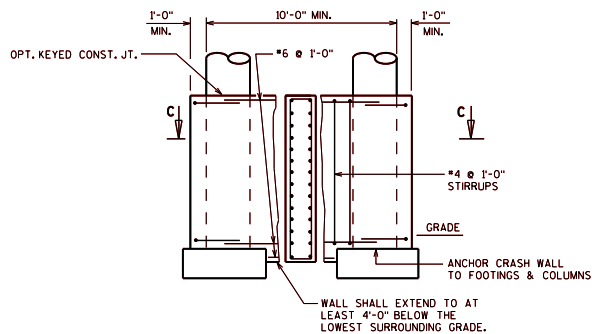


SECTION C-C

TRACK ON ONE SIDE OF COLUMNS

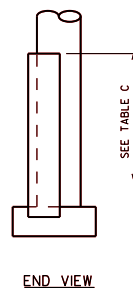
	PIER LOCATION	HEIGHT OF CRASH WALL ABOVE TOP OF RAIL
GENERAL AREMA REQUIREMENT	PIERS $\leq 12'-0"$ FROM ϕ TRACK	12'-0"
	PIERS 12'-0" TO 25'-0"	6'-0"
CP RAIL REQUIREMENT	PIERS $< 15'-0"$ FROM ϕ TRACK	12'-0"
	PIERS $\geq 15'-0"$ TO 25'-0"	8'-0"

TABLE C

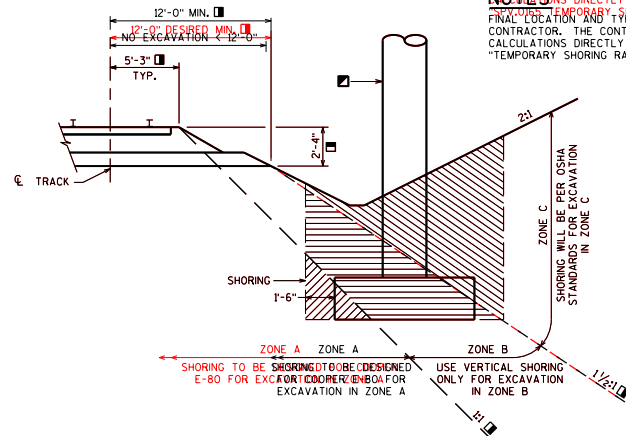


ELEVATION

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. I.E. 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'-3/4" IS ALLOWED BY FHWA. VERTICAL CLEARANCE LESS THAN 23'-0" MAY BE PROVIDED IN SOME SITUATIONS WITH APPROVAL OF THE OFFICE OF THE COMMISSIONER OF RAILROADS. CONSULT WITH CENTRAL OFFICE RAILROAD UNIT.

** VARIABLE DISTANCE WHICH IS FOUND FROM FIELD SURVEY.

* SITE SPECIFIC JUSTIFICATION REQUIRED FOR GREATER DISTANCES. LATERAL CLEARANCES SHALL BE ESTABLISHED BASED ON SITE SPECIFIC CONDITIONS AND ECONOMICAL STRUCTURE DESIGN. CONSULT WITH CENTRAL OFFICE RAILROAD UNIT. SEE 23 CODE OF FEDERAL REGULATIONS PT 646, SUBPT. B APPENDIX.

▲ FOR OFFSETS UP TO, AND INCLUDING 25'-0", A CRASH WALL OR HAMMERHEAD PIER DESIGNED TO AREMA STANDARDS (30.50 FT. MIN. X-SECT) IS REQUIRED. CP RAIL REQUIRES CRASH WALLS BE DESIGNED TO RESIST A 600 KIP EXTREME EVENT FORCE APPLIED 6 FEET ABOVE THE GROUND. THE CRASH WALLS SHOWN ON THIS STANDARD ARE NOT DESIGNED TO ACCOUNT FOR THIS LOAD.

▲ ACCOMMODATION FOR ADDITIONAL TRACKS REQUIRES DEPARTMENT APPROVAL. CONFER WITH STATEWIDE RAILROAD STRUCTURE AND TRACK ENGINEER IN CENTRAL OFFICE RAILROADS AND HARBORS SECTION AT (608) 266-0233.

▲ HORIZONTAL CLEARANCES LESS THAN 18'-0" SHOULD BE REVIEWED WITH THE STATEWIDE RAILROAD AND TRACK ENGINEER IN THE CENTRAL OFFICE RAILROADS AND HARBORS SECTION. 18'-0" CLEARANCE IS MEASURED TO THE NEAREST ENCROACHING ELEMENT (PIER CAPS, MSE WALL COPING, ETC.)

TEMPORARY CONSTRUCTION CLEARANCES ARE 21'-0" VERTICAL (21'-6" FOR BNSF AND UP RAILROADS) AND 12'-0" HORIZONTAL (15'-0" FOR BNSF AND UP RAILROADS) FROM CENTERLINE OF TRACK TO FALSEWORK, UNLESS INSTRUCTED OTHERWISE. A CONSTRUCTION CLEARANCE DETAIL SHOULD NOT BE INCLUDED IN THE PLANS AS CONSTRUCTION CLEARANCES ARE SPECATED 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 ENCROACHES ZONE A AND/OR ZONE B IF BEDROCK IS PRESENT.

★ BNSF AND UP RAILROADS REQUIRE BEDROCK PRESENTATIONS ONLY. THE DESIGN ENGINEER SHALL CONTACT THE RAILROAD FOR THEIR REQUIREMENTS. THIS STANDARD IS TO MEET WISDOT REQUIREMENTS ONLY. THE DESIGN ENGINEER SHALL CONTACT THE RAILROAD FOR THEIR REQUIREMENTS. CONFER WITH STATEWIDE RAILROAD STRUCTURE AND TRACK ENGINEER IN CENTRAL OFFICE.

★ BNSF AND UP RAILROADS HAVE GREATER REQUIREMENTS THAN SHOWN. CONFER WITH STATEWIDE RAILROAD STRUCTURE AND TRACK ENGINEER IN CENTRAL OFFICE.

★ RAILROADS (AND HARBORS SECTION) DESIGNER SHOULD CONSIDER EXISTING CLEARANCES AND CONTINGENCIES WHEN SHOWING SHORING REQUIREMENTS. (REPER: 007) GUIDELINES FOR TEMPORARY SHORING PUBLICATION. BIDDING AND CONSTRUCTION REQUIREMENTS.

★ BNSF AND UP RAILROADS REQUIRE A DEPTH OF FOOTING AND MIN. HEIGHT BASED ON RAIL BEDROCK OR 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.

NOTES

★ AESTHETICS SHALL NOT BE EMPLOYED ALONG RAILROAD TRACKS. LOCATION AND TYPE OF SHORING SYSTEM TO BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT ALL DESIGN DRAWINGS AND CALCULATIONS DIRECTLY TO THE RAILROAD. SHORING COVERED BY BID ITEM "TEMPORARY SHORING RAILROAD". FINAL LOCATION AND TYPE OF SHORING SYSTEM TO BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT ALL DESIGN DRAWINGS AND CALCULATIONS DIRECTLY TO THE RAILROAD. SHORING COVERED BY BID ITEM "TEMPORARY SHORING RAILROAD".

- ▨ ZONE A SHORING
- ▨ ZONE B SHORING
- ▨ ZONE C SHORING

HIGHWAY OVER RAILROAD DESIGN REQUIREMENTS



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17

SAW CUT (TYP.)

CONCRETE SURFACE REPAIR

SAW CUT (TYP.)

CONCRETE SURFACE REPAIR

502.3205 PROTECTIVE SURFACE TREATMENT RESEAL SY

502.3215 PIGMENTED SURFACE SEALER RESEAL SY

509.1500 CONCRETE SURFACE REPAIR SF

NOTES

PROTECTIVE SURFACE TREATMENT RESEAL SHALL BE APPLIED TO THE UNREPAIRED SURFACES. 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".

DESIGNER NOTES

DETAILS MAY BE SHOWN ON PLANS IF NECESSARY FOR CLARITY.

INCLUDE APPLICABLE CONCRETE MASONRY BID ITEM TO FILL REPAIRS.

SAW CUT

UTILIZE EXIST. REINF.

CURB REPAIR

SAW CUT

1" BEHIND REBAR OR TO SOUND CONCRETE.

UTILIZE EXIST. REINF.

CURB REPAIR

1" BEHIND REBAR OR TO SOUND CONCRETE.

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.

NEW

EXISTING

XXXX

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. OR USE IN CRACKED CONCRETE.

ADHESIVE ANCHORS NO. X BAR. EMBED X" IN CONCRETE. OR USE IN CRACKED CONCRETE.

ANCHOR DETAIL (EXAMPLE)

502.41.. ADHESIVE ANCHORS .-INCH EACH

502.42.. ADHESIVE ANCHORS NO. .BAR EACH

505.0605 BAR STEEL REINFORCEMENT HS COATED STRUCTURES LB

DESIGNER NOTES

THE DESIGN ENGINEER SHALL PROVIDE ANCHOR DETAILS AS NEEDED. PLANS SHALL INCLUDE ANCHOR "NOTES" WHEN ADHESIVE ANCHORS ARE USED.

ANCHOR DETAIL EXAMPLE APPLICABLE FOR ADHESIVE ANCHORS LOCATED IN UNCRACKED CONCRETE. SEE CHAPTER 40.16 FOR ADDITIONAL GUIDANCE.

SAW CUT *

UNSOUND CONCRETE LIMITS

DECK REPAIR LEGEND:

- PREPARATION DECKS TYPE 1
- PREPARATION DECKS TYPE 2
- FULL-DEPTH DECK

509.0301 PREPARATION DECKS TYPE 1 SY

509.0302 PREPARATION DECKS TYPE 2 SY

*509.0310.S SAWING PAVEMENT DECK/ PREPARATION AREAS LF

Δ509.2000 FULL-DEPTH DECK/ REPAIR LAY DECKS SY

Δ509.2500 CONCRETE/ MASONRY/ OVERLAY/ DECKS/ AREAS CY

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

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.S) FOR DECK REPAIRS UNDER POLYMER, ASPHALTIC, OR POLYMER MOD. ASPHALTIC OVERLAYS. USE "CONCRETE MASONRY DECK REPAIR" FOR DECK REPAIRS WITHOUT OVERLAYS.

RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

SAW CUT *

EXISTING DECK

FOR DESIGNER INFORMATION ONLY (DO NOT PLACE ON PLANS)

*509.0310.S SAWING PAVEMENT DECK/ PREPARATION AREAS LF

Δ509.2000 FULL-DEPTH DECK/ REPAIR LAY DECKS SY

Δ509.2500 CONCRETE/ MASONRY/ OVERLAY/ DECKS/ AREAS 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.S) FOR DECK REPAIRS UNDER POLYMER, ASPHALTIC, OR POLYMER MOD. ASPHALTIC OVERLAYS. USE "CONCRETE MASONRY DECK REPAIR" FOR DECK REPAIRS WITHOUT OVERLAYS.

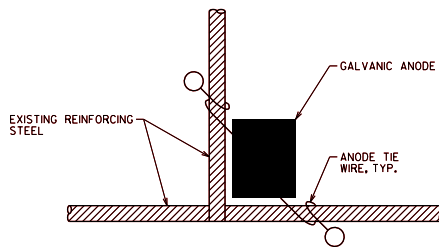
RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

CONCRETE REPAIR DETAILS

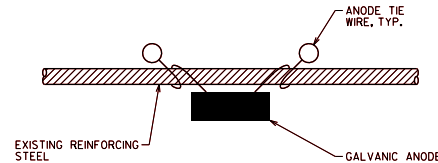
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-28

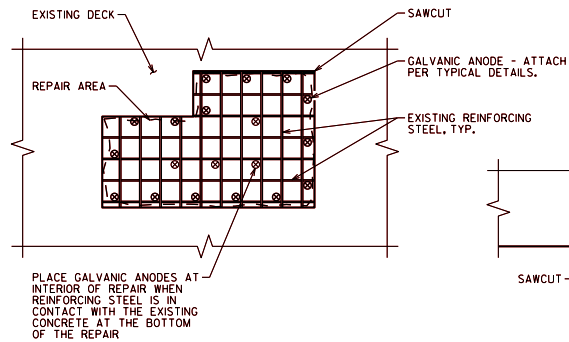
STANDARD 40.01



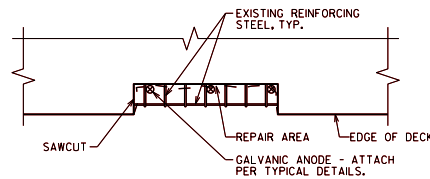
TYPICAL INSTALLATION AT
BAR STEEL INTERSECTION



TYPICAL INSTALLATION
FOR BAR STEEL



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.

NOTES

SEE SPECIAL PROVISION "EMBEDDED GALVANIC ANODES" FOR DESCRIPTION, MATERIALS, CONSTRUCTION, MEASUREMENT, AND PAYMENT INFORMATION.

ANODES NEAREST TO EDGE OF REPAIR TO BE WITHIN 6" OF EDGE.

AFTER PLACEMENT, GALVANIC ANODES SHOULD MAINTAIN A MINIMUM TOP COVER OF 1/2" AND A MINIMUM BOTTOM COVER OF 3/4"

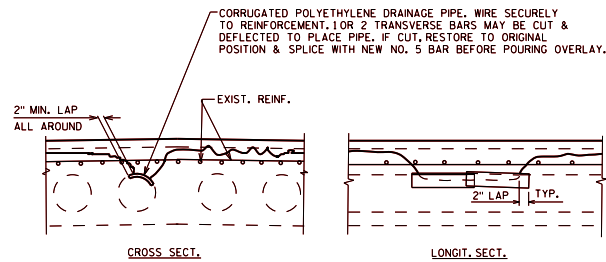
CATHODIC PROTECTION



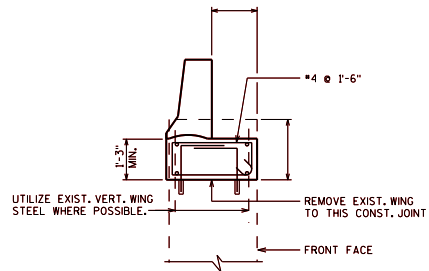
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

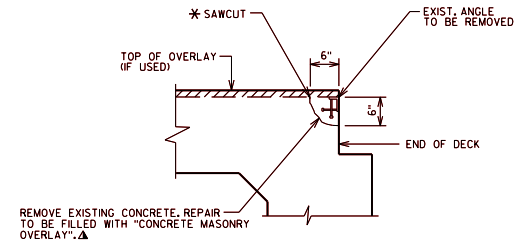
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RUPTURED VOID REPAIR



SECTION THRU PARAPET ON WING

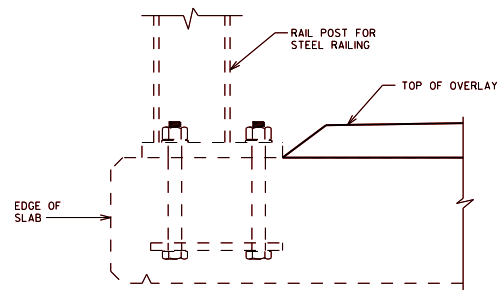


SECTION AT END OF SLAB

509.0301	PREPARATION DECKS TYPE 1	SY
509.0302	PREPARATION DECKS TYPE 2	SY
*509.03005	SAWING PAVEMENT DECK PREPARATION AREAS	6F
509.2600	EPOXY REPAIR DECK REPAIR LAY DECKS	SY
509.2600	CONCRETE MASONRY OVERLAY DECK 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.

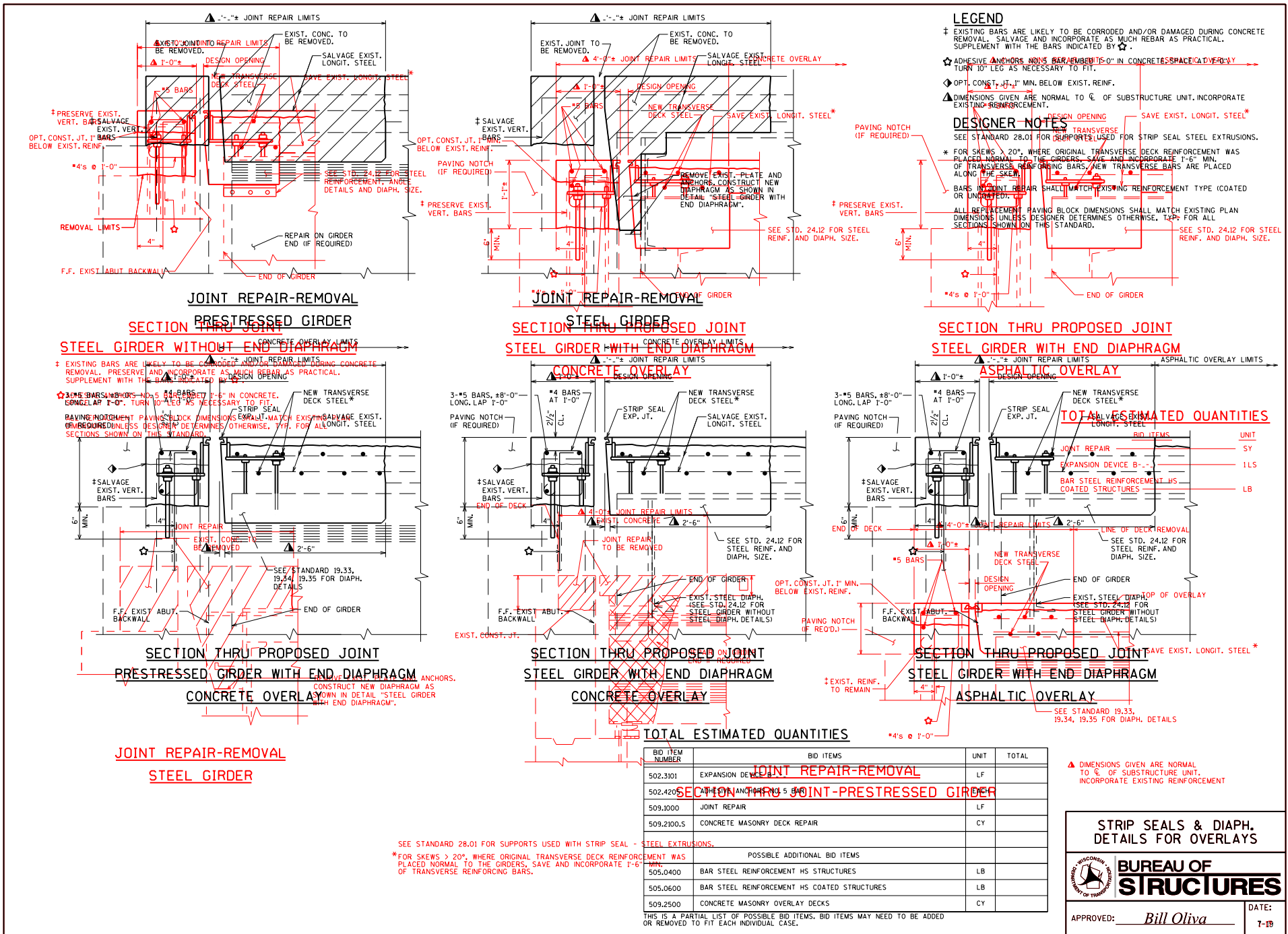
OVERLAY DETAILS

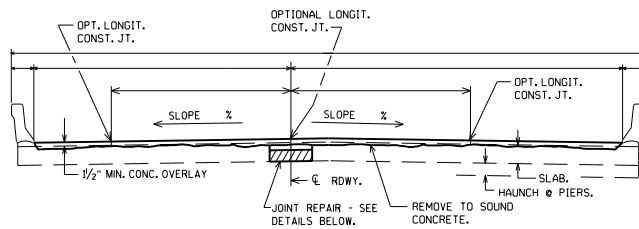


BUREAU OF STRUCTURES

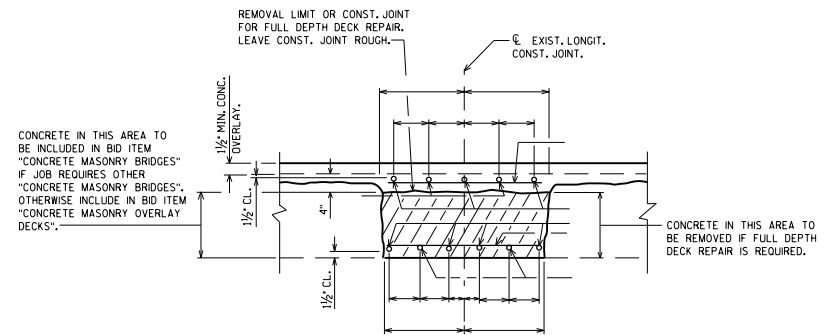
APPROVED: Bill Oliva

DATE:
1-18

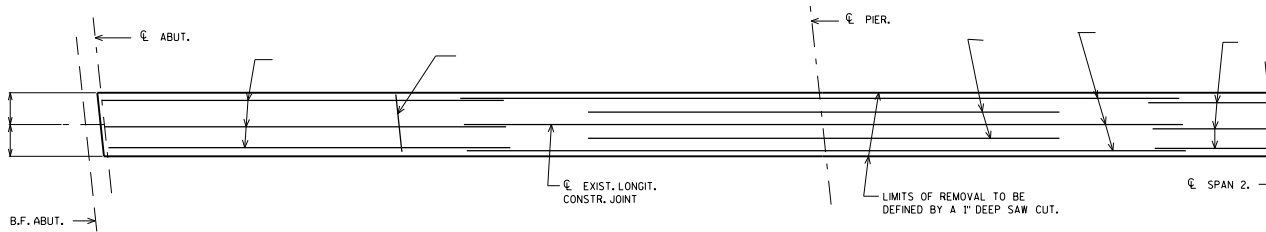




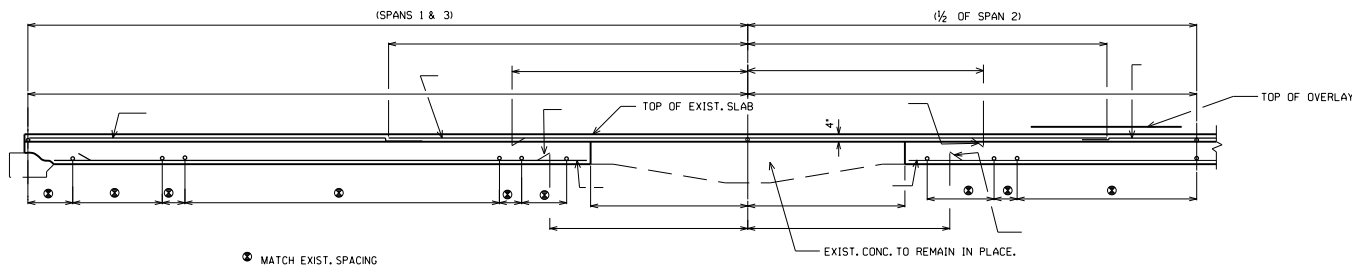
CROSS SECTION THRU ROADWAY LOOKING EAST



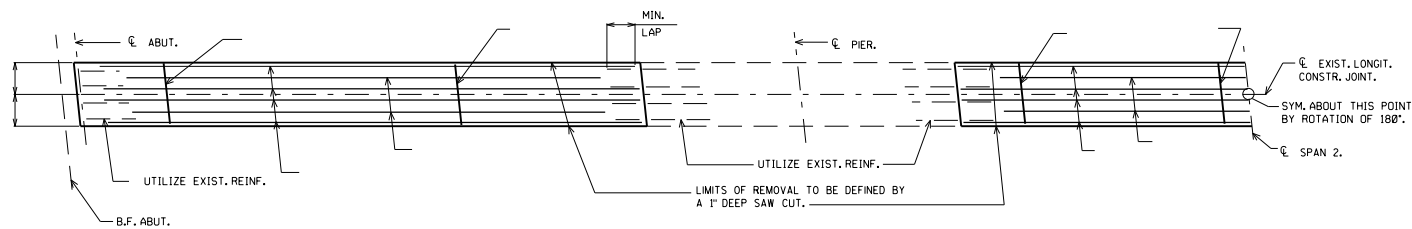
TYP. SECTION THRU JOINT



HALF PLAN SHOWING TOP BAR STEEL REINF.



HALF LONGIT. SECTION



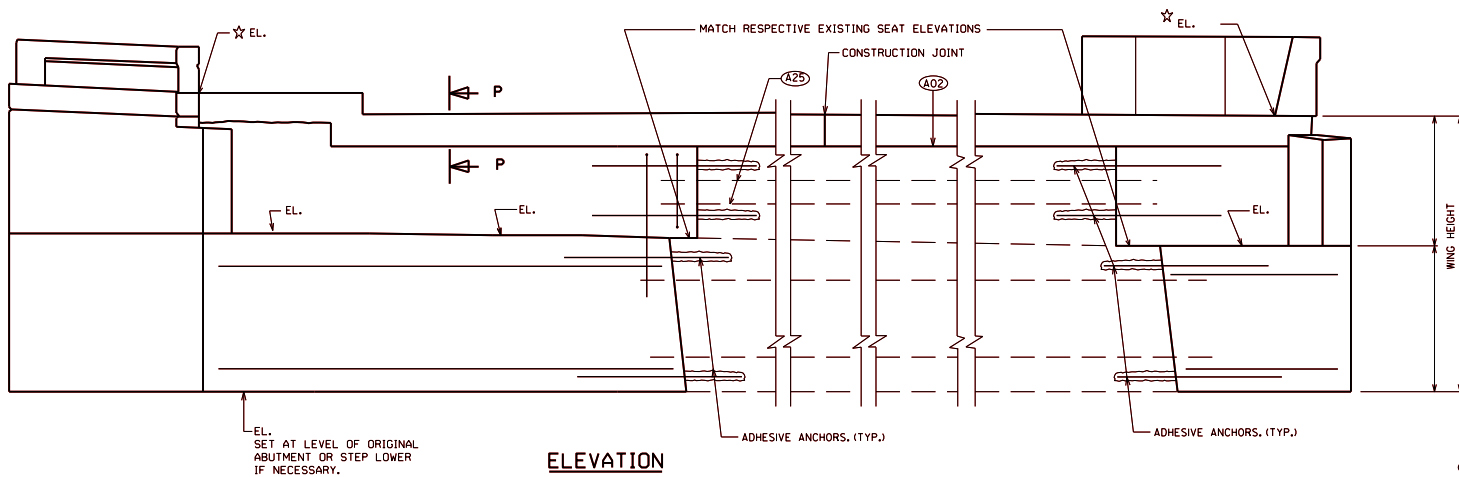
HALF PLAN SHOWING BOTTOM BAR STEEL REINF

(REQUIRED ONLY FOR FULL DEPTH DECK REPAIR)

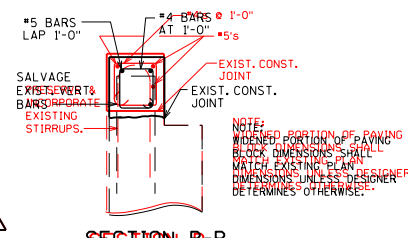
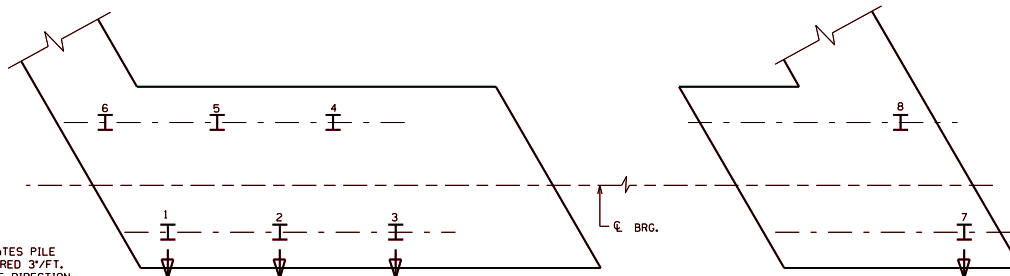
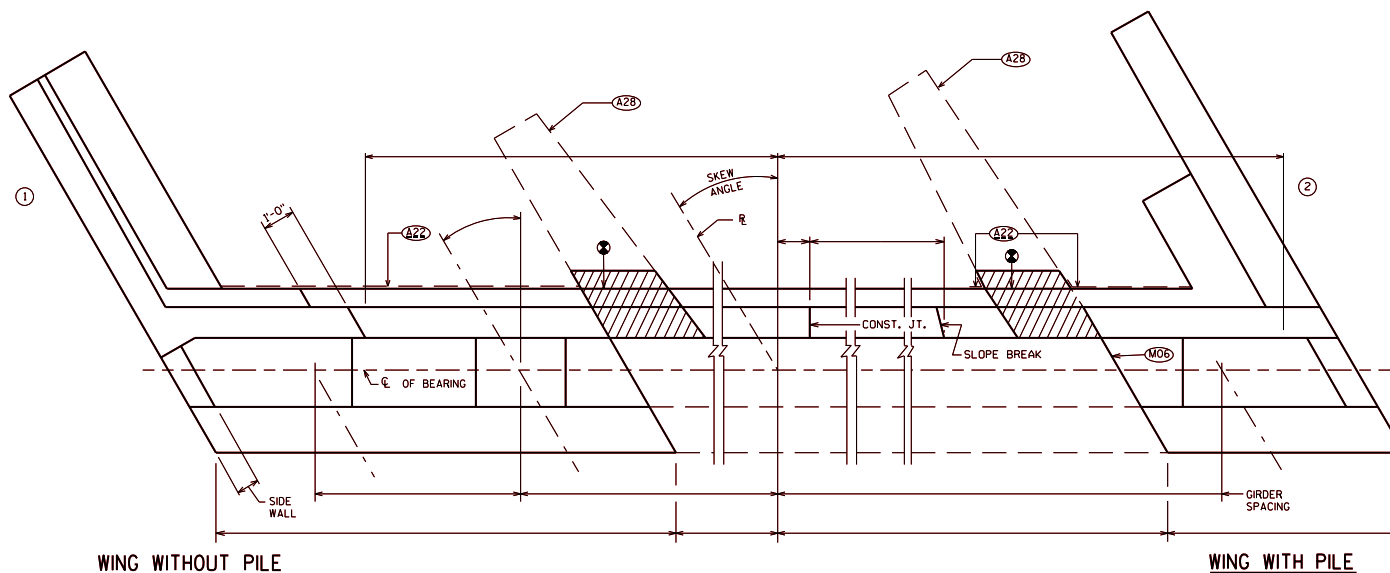
TOTAL ESTIMATED QUANTITIES

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: <u>Bill Oliva</u>	DATE: 7-16



ELEVATION



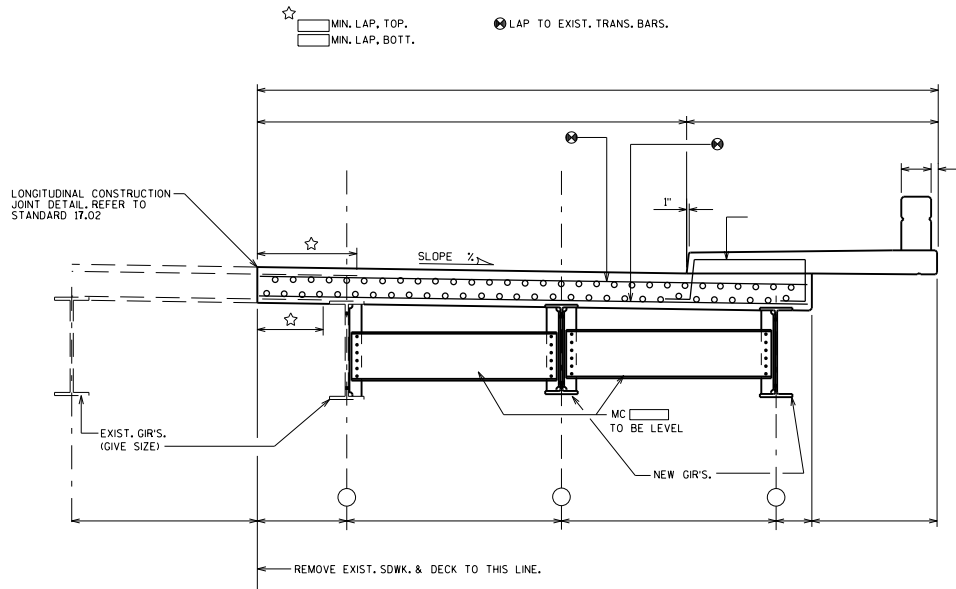
NOTES

- (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.
- (MO6) 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.

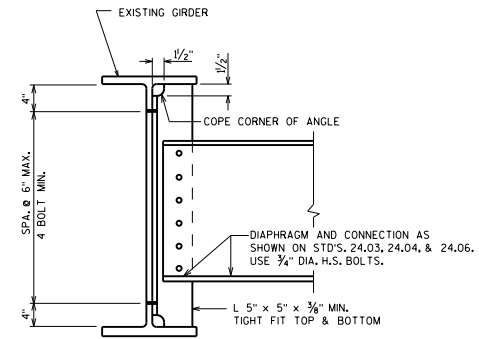
DESIGNER NOTES

SEE CHAPTER 12 FOR NEW BAR STEEL PLACEMENT, DETAILS, DIMENSIONS, & NOTES.

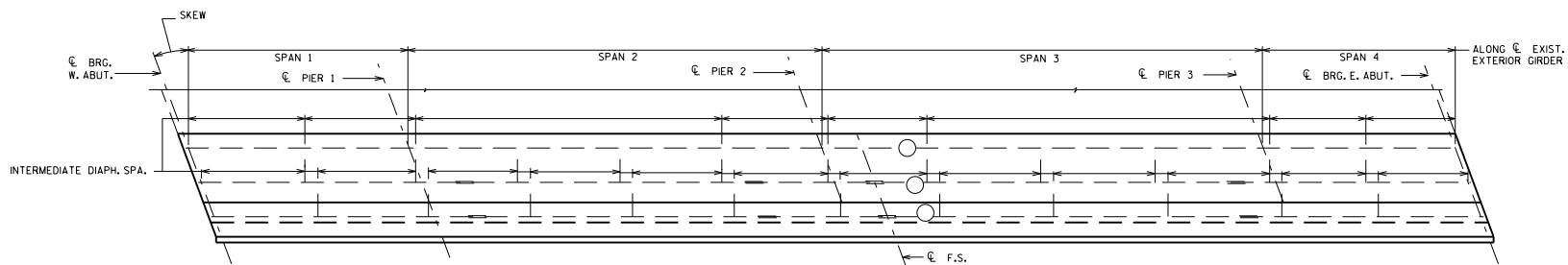
ABUTMENT WIDENING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-19</u>



CROSS SECT. THRU RDWY.



DIAPHRAGM CONNECTION TO
EXISTING STEEL GIRDER



PLAN

SLAB WIDENING



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16

STANDARD 40.07

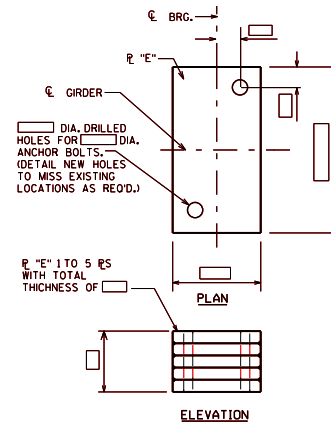
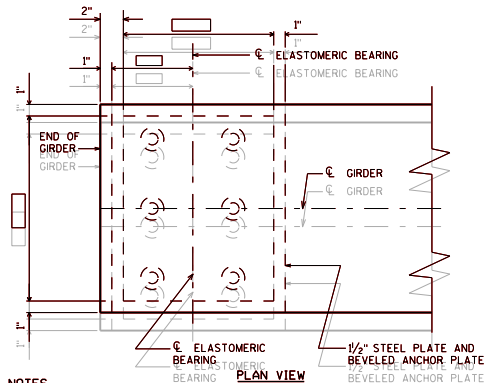


PLATE 'E' DETAILS
(SEE STD. 40.10 FOR CONCRETE BLOCK ALTERNATE)

SEE STANDARD 27.08 FOR BEARING DETAILS



NOTES

ALL MATERIAL USED FOR BEARINGS SHALL BE PAID AT THE UNIT PRICE BID FOR
 "BEARING PADS ELASTOMERIC LAMINATED."
 BEARING PADS ELASTOMERIC LAMINATED SHALL BE PAID AT THE UNIT PRICE BID FOR
 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.
 DESIGNER NOTES: BEAS SMOOTH.

DESIGNER NOTES

EXISTING
NOTE
WELDING PROCEDURES SHALL BE ESTABLISHED BY THE CONTRACTOR TO RESTRICT THE MAXIMUM TEMPERATURE REACHED BY SURFACES IN CONTACT WITH ELASTOMER TO 200°F (93°C). TEMPERATURES SHALL BE CONTROLLED BY TEMPERATURE INDICATING WAX PENCILS OR OTHER SUITABLE MEANS APPROVED BY THE ENGINEER.

TOP STEEL PLATE MAY NOT BE OMITTED.

▲ CHECK 27.2.1 ELASTOMERIC BEARINGS IN THE BRIDGE MANUAL FOR REQUIREMENTS TO SEE IF THIS PLATE SHOULD BE TAPERED:

DO NOT INCLUDE PRESTRESSED GIRDER SHRINKAGE WHEN DESIGNING BEARINGS FOR BRIDGE REHABILITATION PROJECTS.

SEE STANDARD 27.07 FOR ADDITIONAL INFORMATION.

PRESTRESSED GIRDERS

The image contains two technical drawings of a bearing assembly.

FRONT ELEVATION

This drawing shows the top view of the bearing assembly. It features a central rectangular area with horizontal hatching, representing the bearing. Above this area, there are two vertical lines labeled "EXISTING GIRDERS". To the left, a dimension of $1/2"$ is shown. To the right, a dimension of $1"$ is shown. A dimension of $1/4"$ is shown at the top right. Below the central area, a dimension of $1"$ is shown. The text "STEEL PLATE (ASTM A709 GRADE 50W OR A588) NO. 6 BLAST, VULCANIZE PLATE TO ELASTOMERIC PAD." is written to the right. Below the central area, the text "STEEL LAMINATED ELASTOMERIC BEARING (DUROMETER 60 $\pm$ 5)" is written. The text "ANCHOR BOLTS FLUSH WITH BEARING SURFACE & GRIND SMOOTH." is written to the left. The text "EXPANSION BEARINGS" is written to the left.

SECTION THRU ELASTOMERIC BEARING

This drawing shows a cross-section of the bearing assembly. It features a central rectangular area with horizontal hatching, representing the bearing. Above this area, there are two vertical lines labeled "OF BEARING". To the left, a dimension of $1/4"$ is shown. To the right, a dimension of $1/2"$ is shown. A dimension of $1/4"$ is shown at the top right. Below the central area, a dimension of $1/4"$ is shown. The text "END OF GIRDER" is written to the left. The text "STEEL PLATE (ASTM A709, GRADE 50W OR A588)" is written to the right. The text "BURN OFF EXIST. SOLE PLATE WELDS & REMOVE" is written to the right. The text "STEEL PLATES ASTM A1011 GRADE 36 TO 50, 1/8" THK." is written to the right. The text "MIN. COVER TYP." is written below the central area.

NOTES & DESIGNER NOTES

SEE "EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS" ON THIS STANDARD.

EXPANSION BEARING REPLACEMENT DETAILS



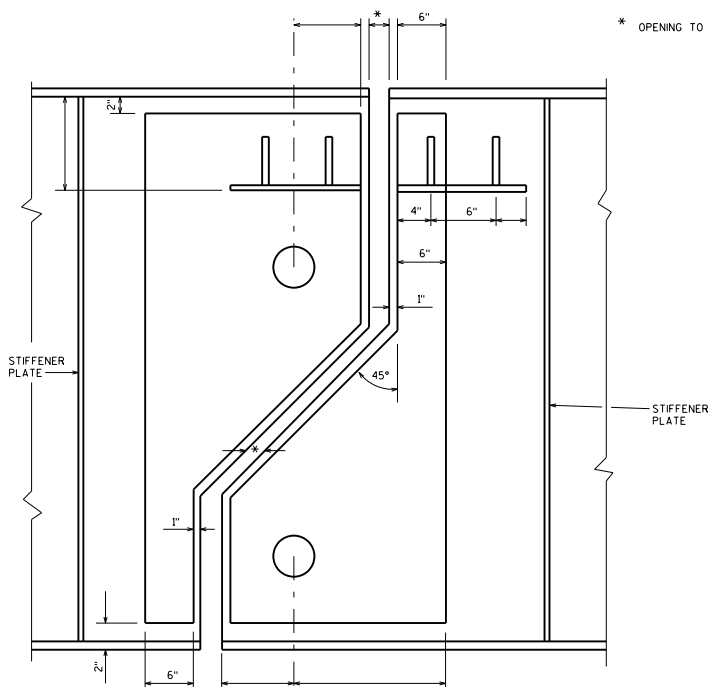
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE:

1-20

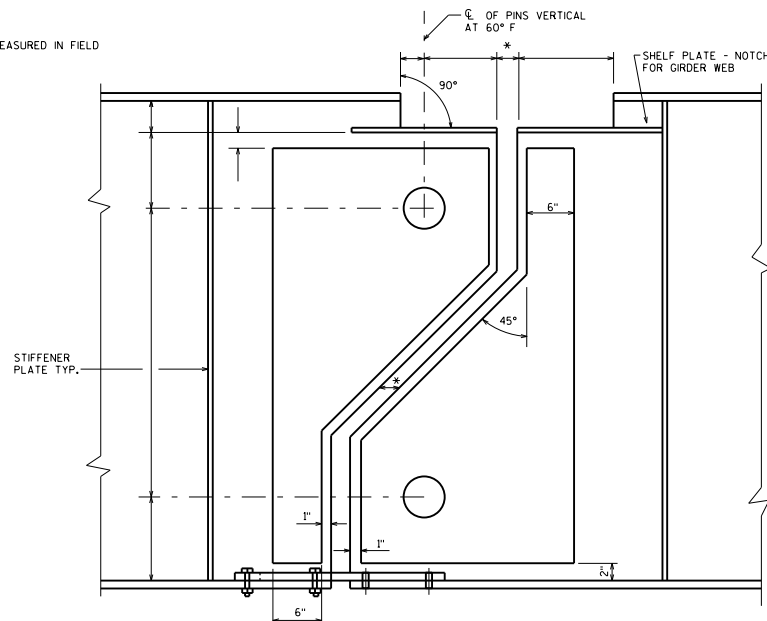
STANDARD 40.08



TYPICAL HINGE DETAIL FOR WATERTIGHT EXPANSION DEVICE

NOTES:
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 ANSI125.

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 $\frac{1}{4}$ " 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.

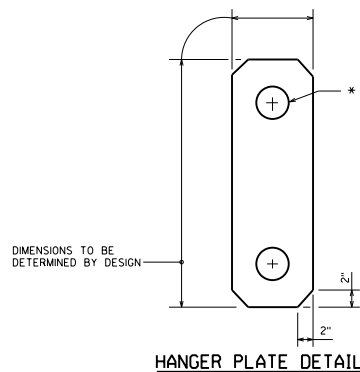
NON-METALLIC WASHERS SHALL HAVE AN INSIDE DIAMETER OF BETWEEN 0.005" AND 0.010" LARGER THAN THE PIN DIAMETER.

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 ANSI63.

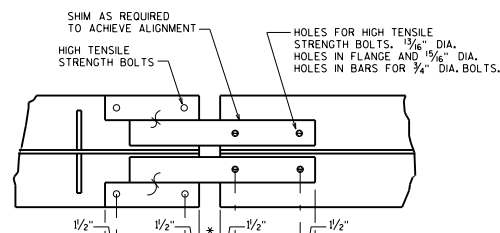
■ BUSHINGS SHALL BE GAR-MAX AS MANUFACTURED BY GARLOCK BEARINGS, INC. OR DURALON JOURNAL BEARINGS AS MANUFACTURED BY REYNOLD BEARING DIVISION, OR APPROVED EQUAL. BUSHINGS SHALL HAVE A NOMINAL WALL THICKNESS OF $\frac{1}{4}$ ".

△ NON-METALLIC WASHERS REQUIRED FOR USE AS SPACERS BETWEEN THE PIN PLATES AND THE HANGER PLATES AND THE HANGER PLATES AND NUTS SHALL BE MADE FROM ONE OF THE FOLLOWING MATERIALS:

1. PHENOLIC, CANVAS REINFORCED, MIL-P-15035
2. POLYETHYLENE, HIGH DENSITY, ASTM D4976, CLASS 3
3. ACETAL, FEDERAL SPECIFICATION L-P-392
4. TEFLON TFE, MIL-P-22241A

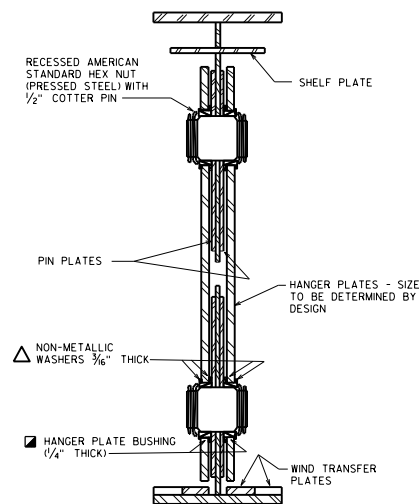


HANGER PLATE DETAIL



TYPICAL WIND TRANSFER PLATES DETAIL

CONTACT AREA OF WIND TRANSFER PLATES TO BE FINISHED ANSI 125.



SECTION THRU HINGE

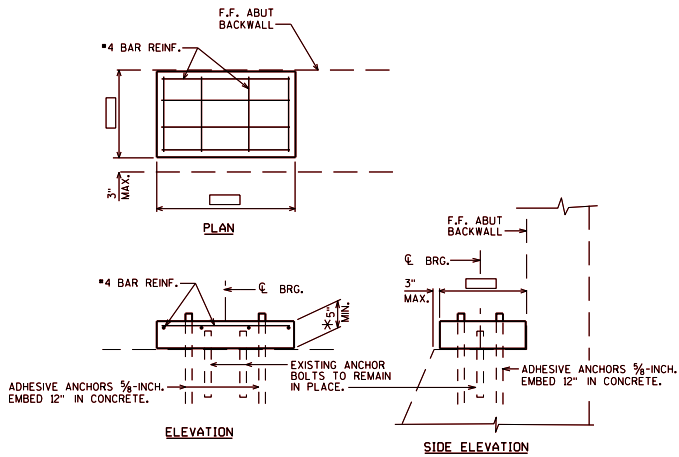
HINGED JOINT REHABILITATION



**BUREAU OF
STRUCTURES**

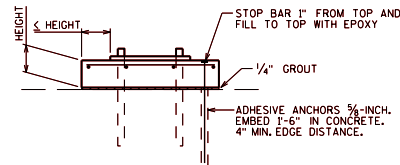
APPROVED: Bill Oliva

DATE:
7-15



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" *

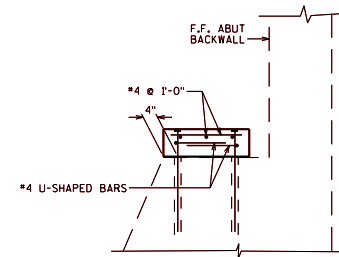
ANCHOR IN AT LEAST 4 LOCATIONS (ANCHORS INCLUDE ADHESIVE ANCHORS, ANCHOR BOLTS OR COMBINATION).

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)

		℄ BRG. SUPPORT NAME	℄ BRG. SUPPORT NAME	℄ 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.

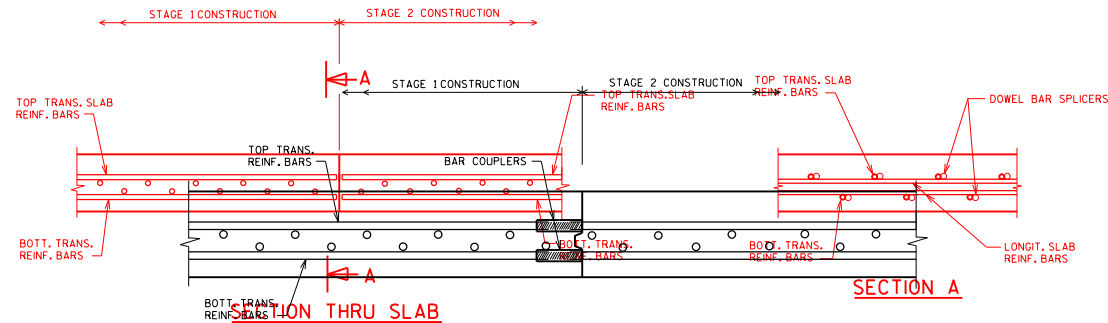
DESIGNER NOTES

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
	DATE: _____ APPROVED: <u>Bill Oliva</u>

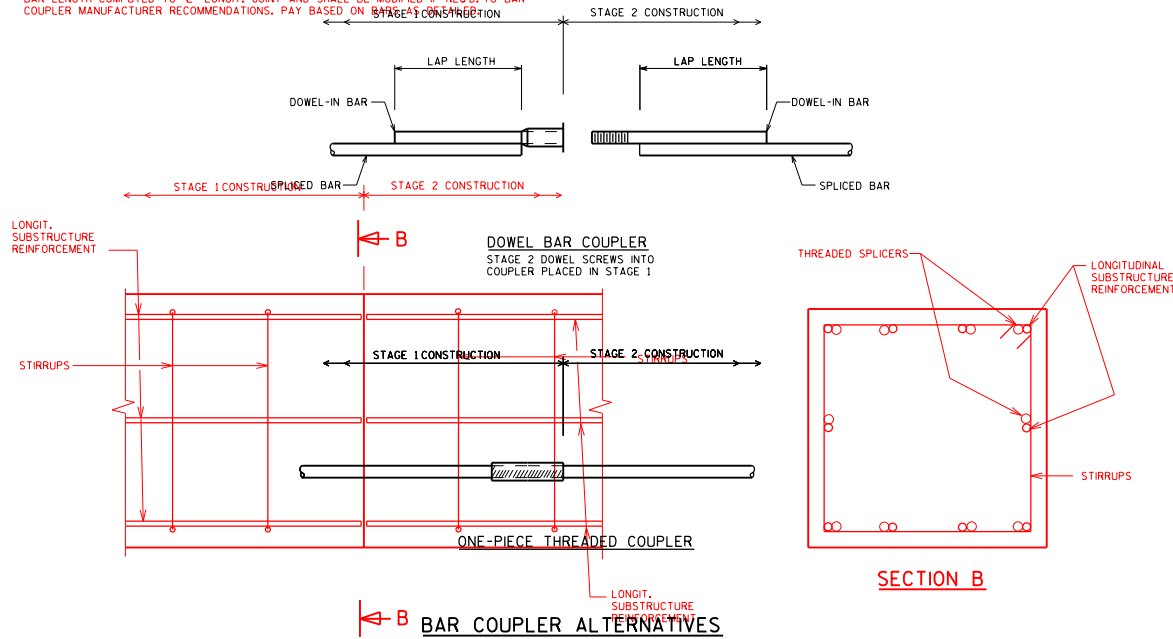


SECTION THRU DECK
ONE-PIECE THREADED COUPLER SHOWN

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 6' LONGIT. JOINT AND SHALL BE MODIFIED IF REQ'D. TO BAR COUPLER MANUFACTURER RECOMMENDATIONS. PAY BASED ON



SECT. THRU SUBSTRUCTURE UNIT

NOTES

FOR DOWEL BAR COUPLERS, ALL DOWEL BARS SHALL BE LAPPED AND TIED TO THE LAPPED 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 NOT LESS THAN THAT OF THE LAPPED REINFORCEMENT BARS.

DESIGNER NOTES

ON THE 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)".

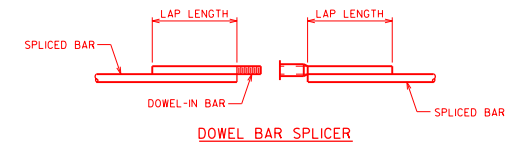
FOR DOWEL BAR SPLICERS, ALL REINFORCEMENT BARS SHALL BE LAPPED AND TIED TO THE LONGIT. BARS. SHOW DETAILS SIMILAR TO "SECTION THRU DECK" AND "BAR COUPLER ALTERNATIVES".

SPLICER (COUPLER) ASSEMBLY IN THE SLAB SHALL BE EPOXY COATED IN ACCORDANCE WITH ARE THEOREMATIC. (SEE BAR COUPLER) HIGH 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 10' OF THE CONSTRUCTION JOINT. SHALL BE MODIFIED IF REQ'D. TO BAR COUPLER MANUFACTURER RECOMMENDATIONS. TESTING DOWEL BARS ARE NOT TO BE DETAILED AS THOSE BARS ARE INCLUDED IN THE FOLLOWING BIDDING ITEM SHOULD THE DOWEL OPTION BE CHOSEN.

① MINIMUM CAPACITY = $1.25 \times f_y \times \text{AREA OF SPLICED REINFORCEMENT BAR}$

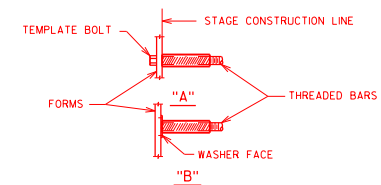
WHERE f_y = YIELD STRENGTH OF SPLICED REINFORCEMENT BARS

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)".



ONE PIECE THREADED SPLICER

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

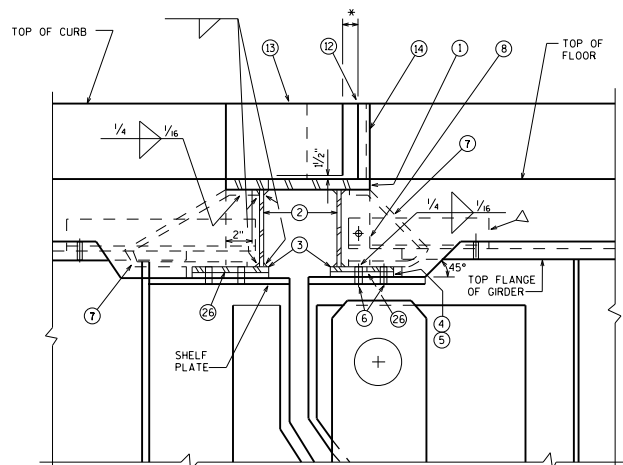


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STRUCTURES

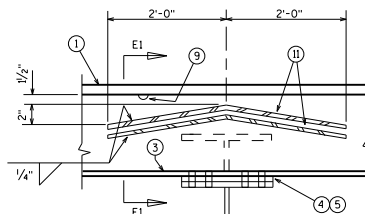
APPROVED: *S. Bill Dinkar*

DATE:

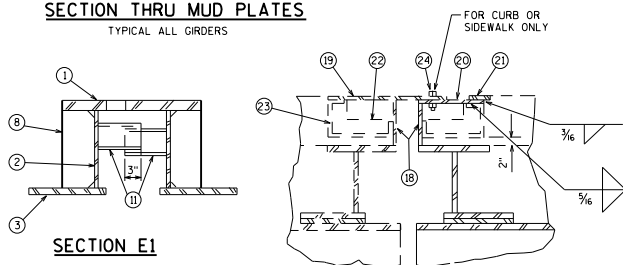
7-13



SECTION THRU JOINT
MUD PLATES NOT SHOWN

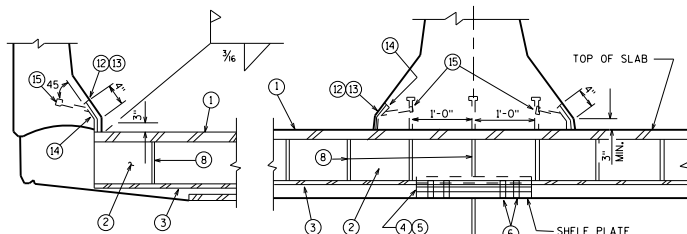


SECTION THRU MUD PLATES
TYPICAL ALL GIRDERS

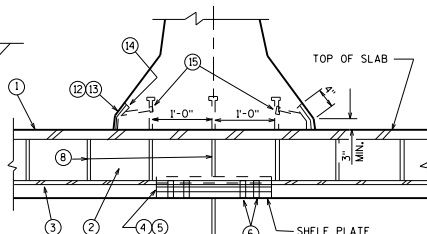


SECTION E1

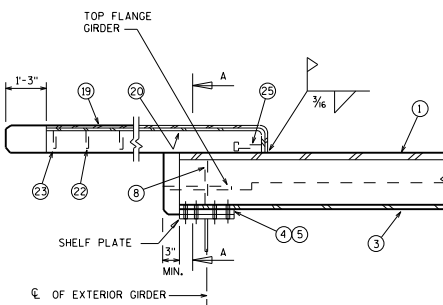
SECTION A-A



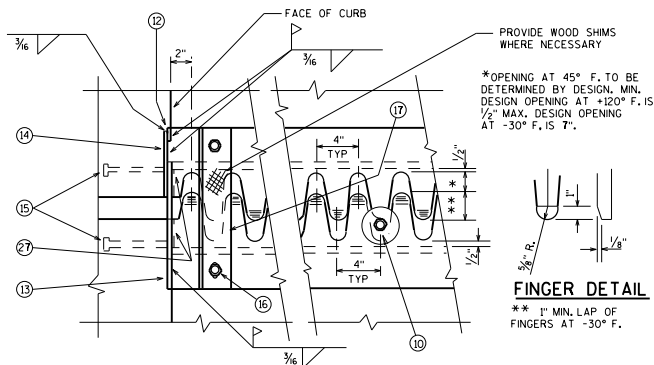
DETAIL AT PARAPET



DETAIL AT MEDIAN



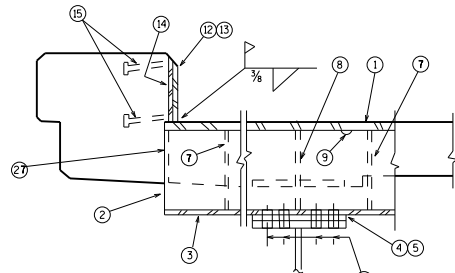
SECTION THRU SIDEWALK



PART PLAN OF FINGER PLATE AT BRUSH CURB
NO SKEW

FINGER DETAIL

** 1" MIN. LAP OF FINGERS AT -30° F.



SECTION THRU JOINT AT BRUSH CURB

MUD PLATES NOT SHOWN.
△ ANGLE 3/4" x 3/4" x 3/4" FIELD DRILL 3/4" DIA. ERECTION BOLT HOLES OR WELD TO STIFFENER OR TOP FLG.

LEGEND

1. FINGER PLATE. SIZE TO BE DETERMINED BY DESIGN.
2. WEB PLATE. SIZE TO BE DETERMINED BY DESIGN.
3. FLANGE PLATE. SIZE TO BE DETERMINED BY DESIGN.
4. BEVELED SHIM PLATE 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 1/2 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 3/8" 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" + 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 3/8" LONG. BEND AFTER WELD.
24. 3/4" DIA. BOLT WITH SO. NUT. GREASE FOR EASY REMOVAL. 3/8" X 1 1/2" SLOTTED HOLE IN PL. NO. 19. LONG DIMENSION OF HOLE PARALLEL TO 1/2 OF ROADWAY. TACK WELD NUT TO PLATE NO. 20 + 2'-0" SPA.
25. 3/8" DIA. STUDS X 6 3/8" 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.

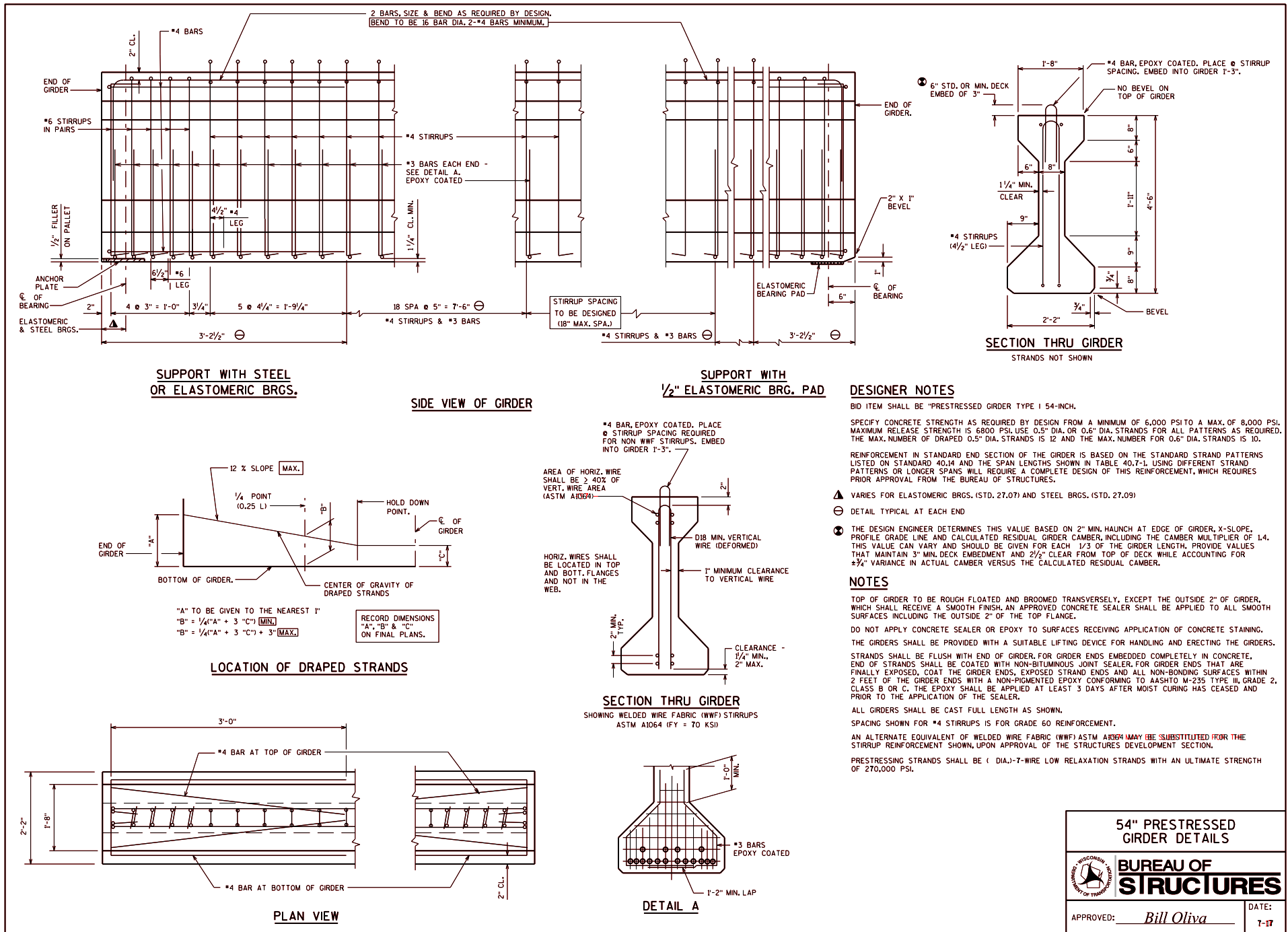
FINGER TYPE EXPANSION JOINT - PLATE GIRDER



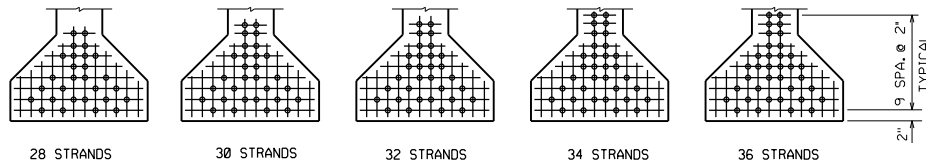
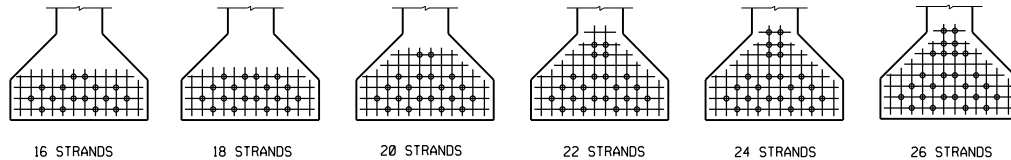
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

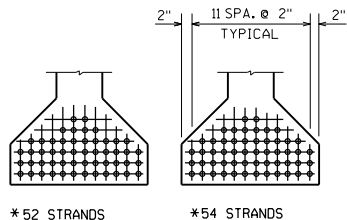
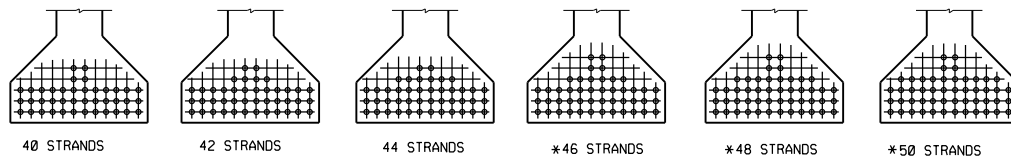
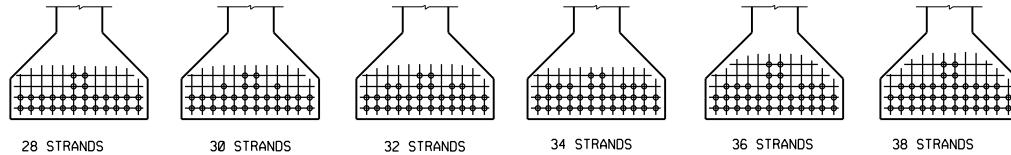
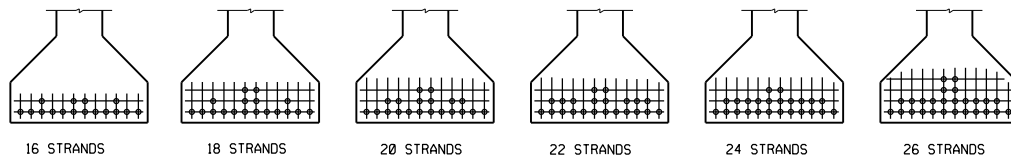
DATE:
7-16



54" PRESTRESSED GIRDER DETAILS	
 BUREAU OF STRUCTURES	DATE: _____ APPROVED: <u>Bill Oliva</u>



**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
TO AVOID DRAPING OF 0.5" DIA. AND 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

54" GIRDER

$A = 789 \text{ SQ. IN.}$

$r^2 = 330.46 \text{ IN.}^2$

$y_T = 29.27 \text{ IN.}$

$y_B = -24.73 \text{ IN.}$

$I = 260,730 \text{ IN.}^4$

$S_T = 8,908 \text{ IN.}^3$

$S_B = -10,543 \text{ IN.}^3$

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.

Pi PER 0.5" DIA. STRAND = $0.1531 \times 202,500 = 31.00 \text{ KIPS}$
Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94 \text{ KIPS}$

(5)

$\frac{y_B}{r^2} = \frac{-24.73}{330.46} = -0.07484 \text{ IN./IN.}^2$

$f_B (\text{ini.}) = \frac{(4)}{(3)} \text{ (K/Sq. In.)}$

(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)	$f_B (\text{ini.}) = (4)/(3)$ 0.5" DIA. STRANDS (K/Sq. In.)	$f_B (\text{ini.}) = (4)/(3)$ 0.6" DIA. STRANDS (K/Sq. In.)

STANDARD PATTERNS FOR UNDRAPED STRANDS

16	-20.23	2.514	313.84	496	703	1.580	2.240
18	-19.84	2.485	317.51	558	791	1.757	2.491
20	-19.13	2.432	324.42	620	879	1.911	2.709
22	-18.37	2.375	332.21	682	967	2.053	2.911
24	-17.55	2.313	341.12	744	1055	2.181	3.093
26	-17.18	2.286	345.14	806	1143	2.335	3.312
28	-17.02	2.274	346.97	868	1230	2.502	3.545
30	-16.33	2.222	355.09	930	1318	2.619	3.712
32	-16.23	2.215	356.21	992	1406	2.785	3.947
34	-15.54	2.163	364.77	1054	1494	2.889	4.096
36	-15.50	2.160	365.28	1116	1582	3.055	4.331

STANDARD PATTERNS FOR DRAPED STRANDS

16	-22.23	2.664	296.17	496	703	1.675	2.374
18	-21.84	2.634	299.54	558	791	1.863	2.641
20	-21.73	2.626	300.46	620	879	2.064	2.926
22	-21.64	2.619	301.26	682	967	2.264	3.210
24	-21.57	2.614	301.84	744	1055	2.465	3.495
26	-21.19	2.586	305.10	806	1143	2.642	3.746
28	-21.16	2.584	305.34	868	1230	2.843	4.028
30	-20.99	2.571	306.88	930	1318	3.031	4.295
32	-20.85	2.560	308.20	992	1406	3.219	4.562
34	-20.73	2.551	309.29	1054	1494	3.408	4.830
36	-20.39	2.526	312.35	1116	1582	3.573	5.065
38	-20.31	2.520	313.10	1178	1670	3.762	5.334
40	-20.23	2.514	313.84	1240	1758	3.951	5.602
42	-20.06	2.501	315.47	1302	1846	4.127	5.852
44	-19.91	2.490	316.87	1364	1933	4.305	6.100
46	-19.60	2.467	319.82	1426		4.459	
48	-19.48	2.458	320.99	1488		4.636	
50	-19.37	2.450	322.04	1550		4.813	
52	-19.19	2.436	323.89	1612		4.977	
54	-19.03	2.424	325.50	1674		5.143	

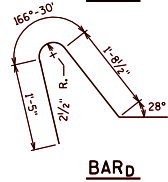
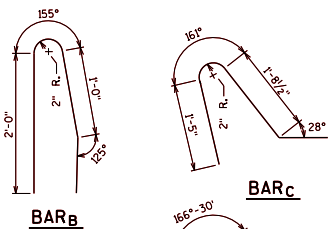
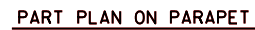
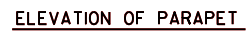
**54" PRETENSIONED
GIRDER DESIGN DATA**



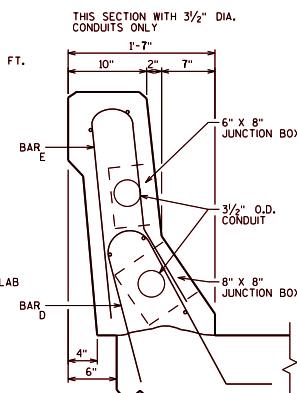
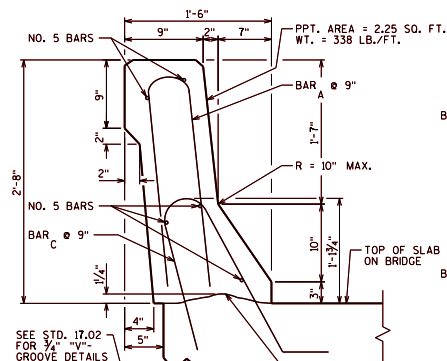
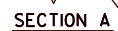
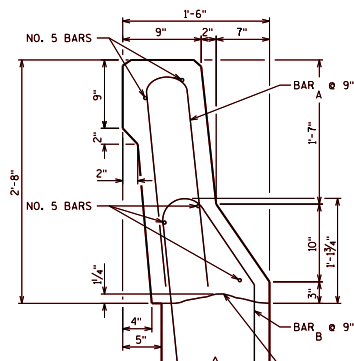
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16



BAR	LENGTH
A	4'-10"
B	4'-7"
C	4'-3"
D	4'-4"
E	4'-4"

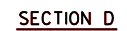
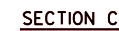


FILL WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER

"V" GROOVE

1/8" PLASTIC OR ZINC PLATE

1/2" TYP.



SLOPED FACE PARAPET 'B'



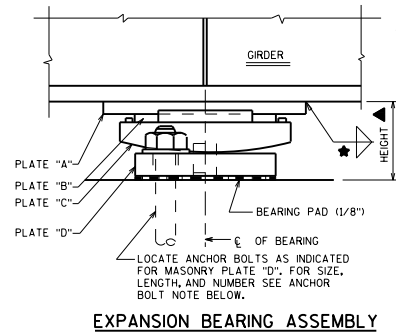
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-19

STANDARD	40.15
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	PARAPET
AREA	2.25 SF
WEIGHT	338 LB/FT



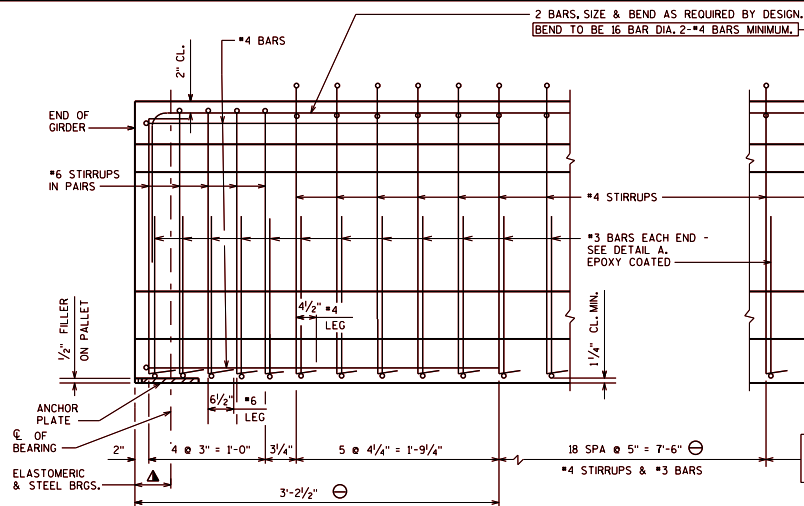
FOR NEW OR REPLACEMENT STEEL BEARINGS, INCLUDING STEEL BEARINGS USED FOR BRIDGE WIDENINGS, USE TYPE "A-T" AS SHOWN ON STANDARD 27.08. THIS STANDARD IS FOR INFORMATIONAL PURPOSES ONLY.

CAP. KIPS	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Z	X	Z			
105	9"	1'-2"	5"	1'-2"	7"	1½"	1'-4¼"	8"	1½"	2'-0"	.354
145	11"	1'-2"	7"	1'-2"	9"	1½"	1'-4¼"	8"	1½"	2'-0"	.375
185	11"	1'-2"	9"	1'-2"	11"	1½"	1'-4¼"	8"	1½"	2'-0"	.396
225	1'-3"	1'-2"	11"	1'-2"	1'-1"	2½"	1'-4¼"	10"	1¾"	2'-0"	.453
270	1'-5"	1'-2"	1'-1"	1'-2"	1'-3"	2½"	1'-4¼"	1'-0"	2"	2'-0"	.516
310	1'-7"	1'-2"	1'-3"	1'-2"	1'-5"	3½"	1'-4¼"	1'-1"	2½"	2'-0"	.630
350	1'-9"	1'-2"	1'-5"	1'-2"	1'-7"	3½"	1'-4¼"	1'-3"	2½"	2'-1"	.672
390	1'-11"	1'-2"	1'-7"	1'-2"	1'-9"	4½"	1'-4¼"	1'-4"	2½"	2'-1"	.755
435	2'-1"	1'-2"	1'-9"	1'-2"	1'-11"	4½"	1'-4¼"	1'-6"	3"	2'-1"	.838

CAP. PIPES	PLATE A		PLATE B		PLATE C		PLATE D		HEIGHT FEET		
	X	Z	X	Z	X	Z	X	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 3/8"	1'-10 1/4"	1'-1"	2 3/8"	2'-7"	.547
445	1'-7"	1'-8"	1'-3"	1'-8"	1'-5"	3 7/8"	1'-10 1/4"	1'-3"	2 7/8"	2'-7"	.672
505	1'-9"	1'-8"	1'-5"	1'-8"	1'-7"	3 7/8"	1'-10 1/4"	1'-5"	2 3/4"	2'-7"	.672
565	1'-11"	1'-8"	1'-7"	1'-8"	1'-9"	4 1/8"	1'-10 1/4"	1'-7"	3"	2'-7"	.838
625	2'-1"	1'-8"	1'-9"	1'-8"	1'-11"	4 7/8"	1'-10 1/4"	1'-9"	3 1/8"	2'-7"	.838

† DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER $\frac{3}{8}$ " LARGER THAN ANCHOR BOLT.

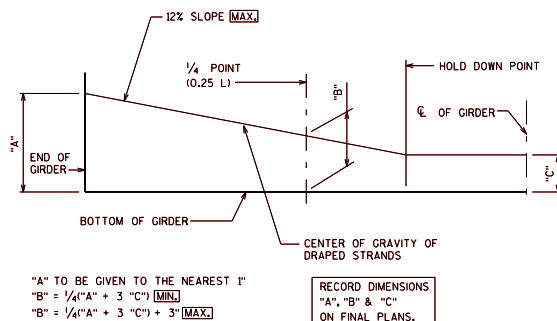
STANDARD 40.16



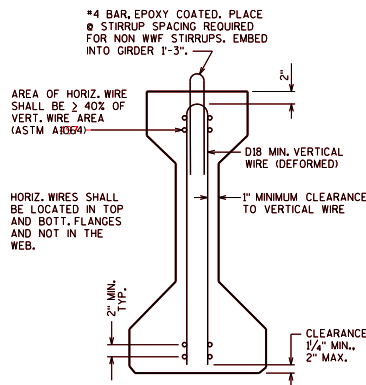
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER

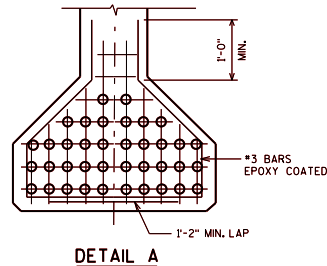
SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD



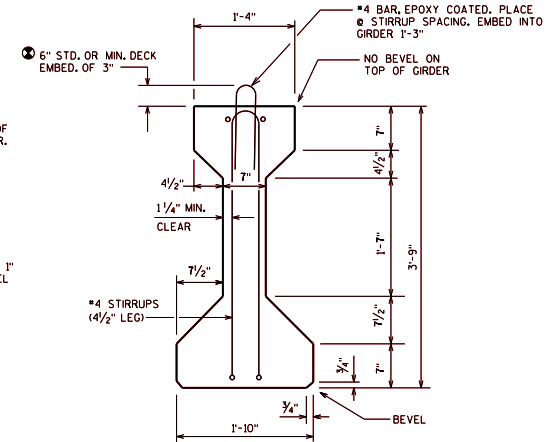
LOCATION OF DRAPED STRANDS



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



DETAIL A



SECTION THRU GIRDER

STRANDS NOT SHOWN

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 ±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.

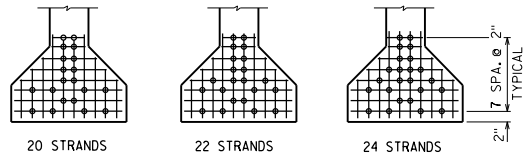
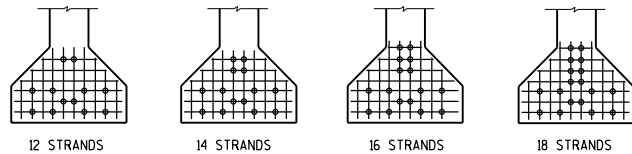
45" PRESTRESSED GIRDER DETAILS



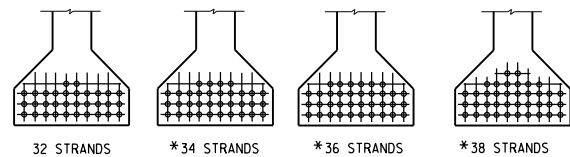
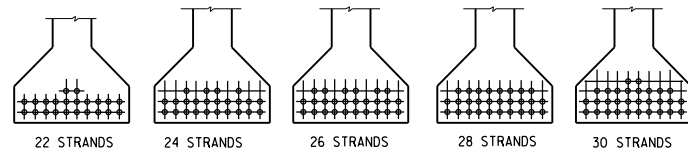
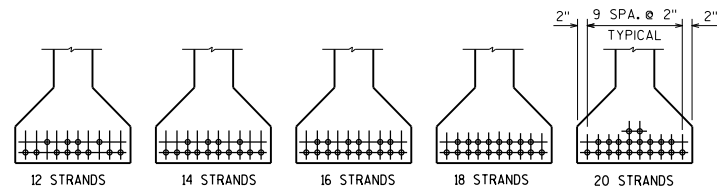
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-17



**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.
 $r^2 = 223.91$ IN.²
 $y_T = 24.73$ IN.
 $y_B = -20.27$ IN.
 $I = 125,390$ IN.⁴
 $S_T = 5,070$ IN.³
 $S_B = -6,186$ IN.³
WT. = 583 #/FT.

PRE-TENSION

$f'_s = 270,000$ P.S.I.
 $f_s = 0.75 \times 270,000 = 202,500$ P.S.I.
for low relaxation strands.
Pi PER 0.5" DIA. STRAND = $0.1531 \times 202,500 = 31.00$ KIPS
Pi PER 0.6" DIA. STRAND = $0.217 \times 202,500 = 43.94$ KIPS
 $\frac{y_B}{r^2} = \frac{-20.27}{223.91} = -0.09053$ IN./IN.²

(COMPRESSION IS POSITIVE)

N NO. STRANDS	(1) e_s (inches)	(2) $(1 + \frac{e_s y_B}{r^2})$	(3) $(A/(2))$ (sq. in.)	(4) $P(lnt.) = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(4) $P(lnt.) = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) $f_B(lnt.) = (4)/(3)$ 0.5" DIA. STRANDS (K/Sq. in.)	(5) $f_B(lnt.) = (4)/(3)$ 0.6" DIA. STRANDS (K/Sq. in.)
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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**

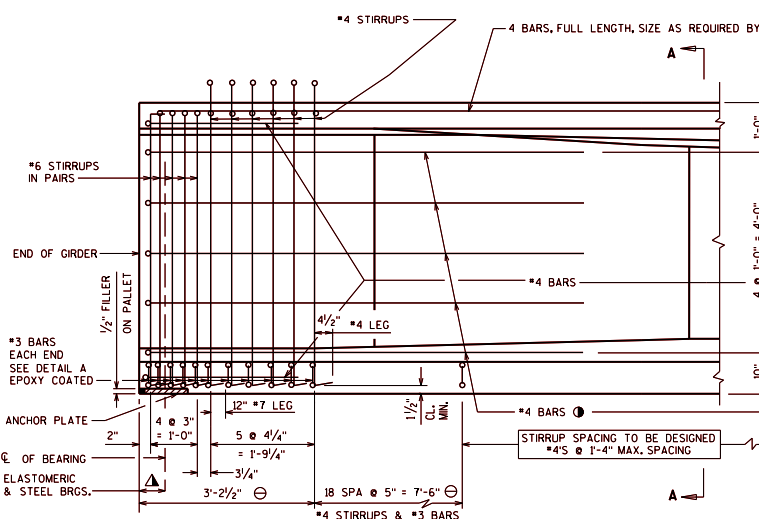


**BUREAU OF
STRUCTURES**

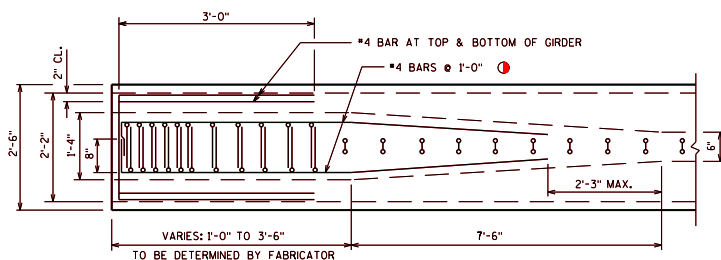
APPROVED: Bill Oliva

DATE:
7-16

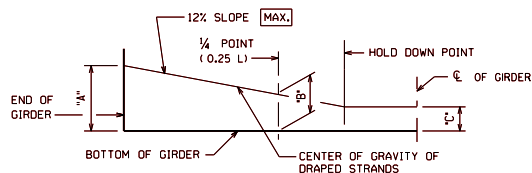
STANDARD 40.18



**SUPPORT WITH STEEL
OR ELASTOMERIC BRGS.**



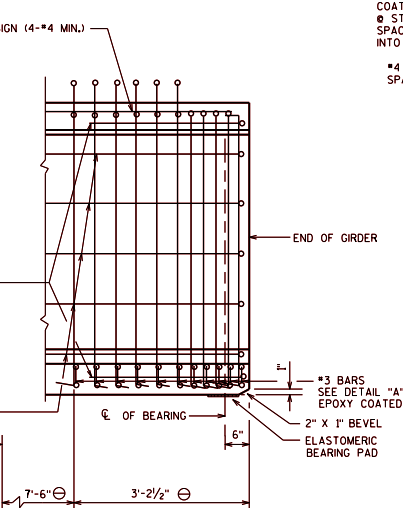
PLAN VIEW



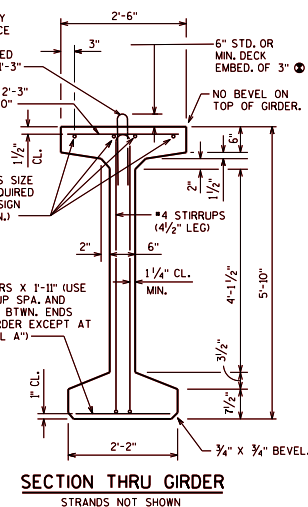
"A" TO BE GIVEN TO THE NEAREST 1"
"B" = $\frac{1}{4}A + 3$ "C" (MIN.)
"B" = $\frac{1}{4}A + 3$ "C" + 3" (MAX.)

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

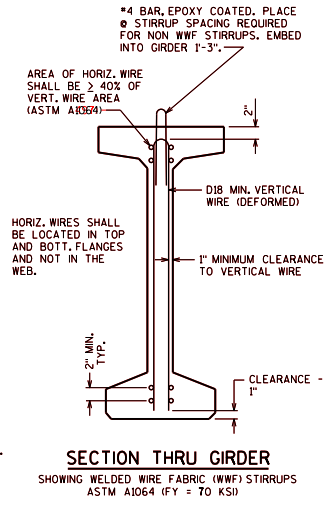
LOCATION OF DRAPED STRANDS



**SUPPORT WITH
1/2" ELASTOMERIC BEARING PAD**



SECTION THRU GIRDER
STRANDS NOT SHOWN



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

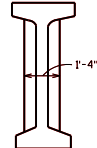
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED
ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.20
AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT
STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE
DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL
FROM THE BUREAU OF STRUCTURES.

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

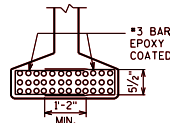
⊖ DETAIL TYPICAL AT EACH END

● 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.



SECTION A-A



DETAIL A

NOTES

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

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

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

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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1034 MAY
BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF
THE STRUCTURES DEVELOPMENT SECTION.

PRESTRESSING STRANDS SHALL BE 1" DIA. 7-WIRE LOW-RELAXATION STRANDS
WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

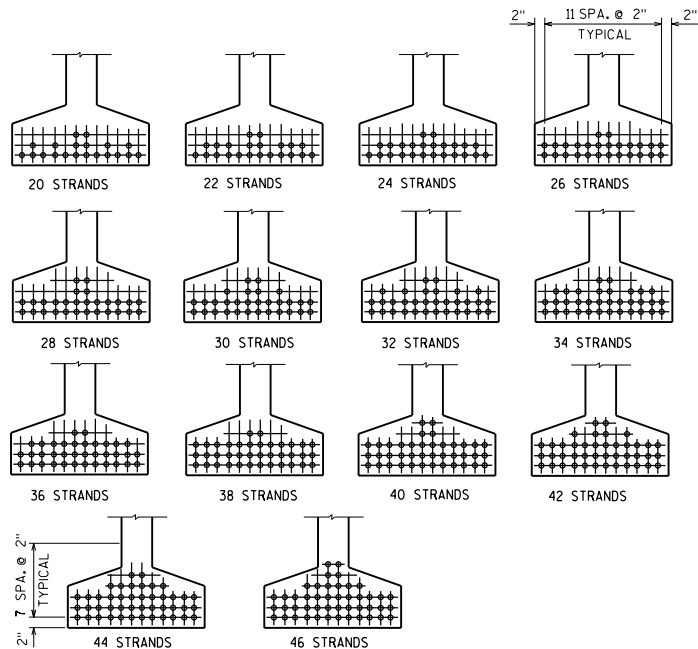
70" PRESTRESSED GIRDER DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-17



ARRANGEMENT AT $\mathcal{C}$ 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 (sq. in.)	(3) $(A/(2))$ 0.5" DIA. STRANDS (sq. in.)	(4) $P(\text{init.}) = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(5) $f_B (\text{init.}) = (4)/(3)$ 0.5" DIA. STRANDS (K/Sq. in.)
STANDARD PATTERNS - 0.5" DIA. DRAPED STRANDS					
20	-31.62	2.659	291.090	620	2.130
22	-31.53	2.655	291.530	682	2.339
24	-31.45	2.650	292.080	744	2.547
26	-31.39	2.647	292.410	806	2.756
28	-31.05	2.629	294.410	868	2.948
30	-30.89	2.621	295.310	930	3.149
32	-30.75	2.614	296.100	992	3.350
34	-30.62	2.607	296.890	1054	3.550
36	-30.51	2.601	297.580	1116	3.750
38	-30.41	2.596	298.150	1178	3.951
40	-30.12	2.581	299.880	1240	4.135
42	-29.95	2.572	300.930	1302	4.327
44	-29.80	2.564	301.870	1364	4.519
46	-29.49	2.548	303.770	1426	4.694

70" GIRDER

$$A = 774 \text{ SQ. IN.}$$

$$r^2 = 659.70 \text{ IN.}^2$$

$$y_T = 35.38 \text{ IN.}$$

$$y_B = -34.62 \text{ IN.}$$

$$I = 510,613 \text{ IN.}^4$$

$$S_T = 14,430 \text{ IN.}^3$$

$$S_B = -14,750 \text{ IN.}^3$$

$$WT. = 0.806 \text{ KIPS/FT.} + 6.6 \text{ KIPS FOR BOTH END BLOCKS}$$

(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 (sq. in.)	(3) $(A/(2))$ 0.6" DIA. STRANDS (sq. in.)	(4) $P(\text{init.}) = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) $f_B (\text{init.}) = (4)/(3)$ 0.6" DIA. STRANDS (K/Sq. in.)
STANDARD PATTERNS - 0.6" DIA. DRAPED STRANDS					
20	-31.62	2.659	291.090	879	3.020
22	-31.53	2.655	291.530	967	3.317
24	-31.45	2.650	292.080	1055	3.612
26	-31.39	2.647	292.410	1143	3.909
28	-31.19	2.637	293.520	1230	4.191
30	-31.02	2.628	294.520	1318	4.475
32	-30.74	2.614	296.100	1406	4.748
34	-30.62	2.607	296.890	1494	5.032
36	-30.51	2.601	297.580	1582	5.316
38	-30.41	2.596	298.150	1670	5.601
40	-30.22	2.586	299.300	1758	5.874
42	-30.05	2.577	300.350	1846	6.146

PRE-TENSION

$$f'_s = 270,000 \text{ P.S.I.}$$

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

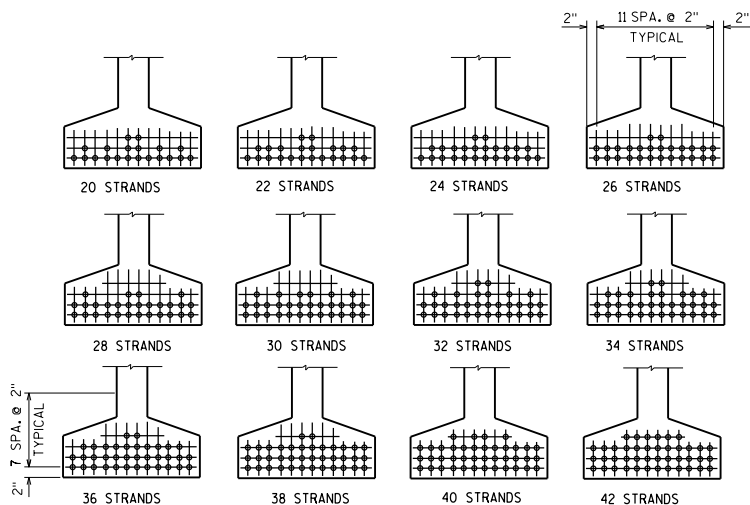
$$P_i \text{ PER 0.5" DIA. STRAND}$$

$$= 0.1531 \times 202,500 = 31.00 \text{ KIPS}$$

$$P_i \text{ PER 0.6" DIA. STRAND}$$

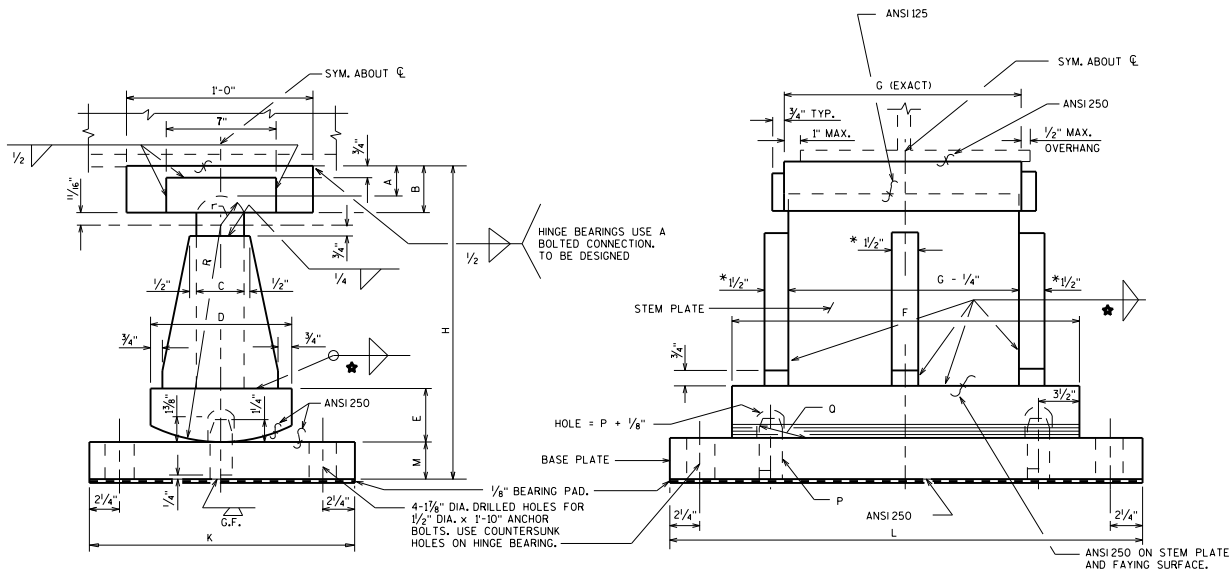
$$= 0.217 \times 202,500 = 43.94 \text{ KIPS}$$

$$\frac{y_B}{r^2} = \frac{-34.62}{659.70} = -0.05248 \text{ IN./IN.}^2$$



ARRANGEMENT AT $\mathcal{C}$ SPAN FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

70" PRESTRESSED GIRDER DESIGN DATA	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-16</u>



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.

TABLE OF DIMENSIONS

REACTION (KIPS)	A	B	C	D	E	G VALUES												H	K	M	R	r		PINTLE		
						G=1'-7"		G=1'-9"		G=1'-11"		G=2'-1"		G=2'-3"		G=2'-5"						STEM	PLATE	P DIA.	O	
						F	L	F	L	F	L	F	L	F	L	F	L									
400-499	1 ¹ / 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 ³ / ₈ "	1'-1"	1 ¹ / ₈ "	1 ⁵ / ₈ "	"	2"	3 ¹ / ₂ "
500-599	1 ¹ / 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 ¹ / 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 ¹ / 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 ¹ / 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 ¹ / 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 ¹ / ₈ "	3 ³ / ₈ "	4"	1'-6"	3 ⁷ / ₈ "	—	—	—	—	—	3'-1"	4'-1"	3'-1"	4'-1"	3'-1"	4'-1"	2'-3 ¹ / ₂ "	2'-4"	3 ⁷ / ₈ "	1'-7"	2 ³ / ₈ "	2 ³ / ₈ "	2 ¹ / ₂ "	3 ³ / ₄ "		
1100-1199	2 ¹ / ₈ "	3 ³ / ₈ "	4"	1'-6"	3 ⁷ / ₈ "	—	—	—	—	—	3'-3"	4'-2"	3'-3"	4'-2"	3'-3"	4'-2"	2'-4 ¹ / ₂ "	2'-6"	3 ⁷ / ₈ "	1'-8"	2 ³ / ₈ "	2 ³ / ₈ "	2 ¹ / ₂ "	3 ³ / ₄ "		
1200-1299	2 ¹ / ₈ "	3 ³ / ₈ "	4"	1'-6"	3 ⁷ / ₈ "	—	—	—	—	—	—	—	—	3'-5"	4'-4"	3'-5"	4'-4"	2'-5 ¹ / ₂ "	2'-7"	3 ⁷ / ₈ "	1'-9"	2 ³ / ₈ "	2 ³ / ₈ "	2 ¹ / ₂ "	3 ³ / ₄ "	
1300-1399	2 ¹ / ₈ "	3 ³ / ₈ "	4"	1'-6"	3 ⁷ / ₈ "	—	—	—	—	—	—	—	—	3'-7"	4'-7"	3'-7"	4'-7"	2'-6 ¹ / ₂ "	2'-8"	3 ⁷ / ₈ "	1'-10"	2 ³ / ₈ "	2 ³ / ₈ "	2 ¹ / ₂ "	3 ³ / ₄ "	
1400-1500	2 ¹ / ₈ "	3 ³ / ₈ "	4"	1'-6"	3 ⁷ / ₈ "	—	—	—	—	—	—	—	—	3'-9"	4'-9"	3'-9"	4'-9"	2'-7 ¹ / ₂ "	2'-9"	3 ⁷ / ₈ "	1'-11"	2 ³ / ₈ "	2 ³ / ₈ "	2 ¹ / ₂ "	3 ³ / ₄ "	

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 "J" 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.

ROCKER SETTING DATA

TEMPERATURE TIME OF SETTING - °F	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")/2 BUT ACTUAL MOVEMENT NOT TO EXCEED R/3.

OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

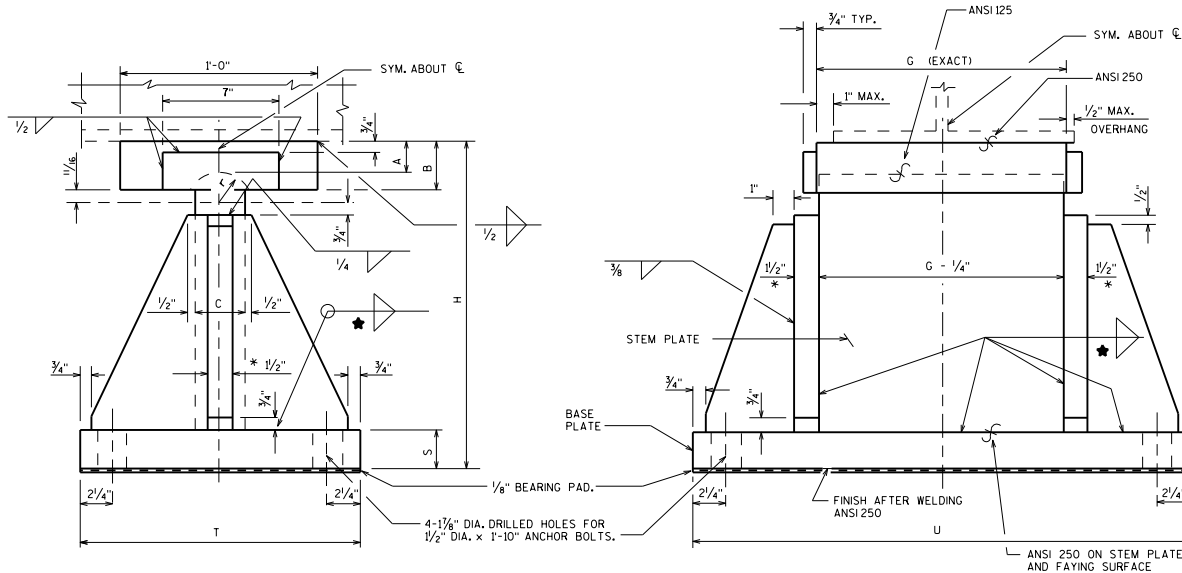
ROCKER BEARING TYPE 'B' - STEEL GIRDERS



**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" U	G=1'-9" U	G=1'-11" U	G=2'-1" U	G=2'-3" U	G=2'-5" U		STEM	PLATE		
400-499	1 5/8"	2 5/8"	3"	2'-8"	2'-8"	2'-10"	3'-0"	—	—	1'-6"	1 5/8"	1 5/8"	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 5/8"	1 5/8"	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 5/8"	1 5/8"	2 3/8"	1'-6"
700-799	2 3/8"	3 1/8"	3 1/2"	—	—	3'-6"	3'-6"	3'-6"	3'-6"	1'-10"	1 5/8"	1 5/8"	2 7/8"	1'-7"
800-899	2 3/8"	3 1/8"	3 1/2"	—	—	3'-9"	3'-9"	3'-9"	3'-9"	2'-0"	1 5/8"	1 5/8"	2 7/8"	1'-8"
900-999	2 3/8"	3 1/8"	3 1/2"	—	—	3'-10"	3'-10"	3'-10"	3'-10"	2'-1"	1 5/8"	1 5/8"	2 7/8"	1'-10"
1000-1099	2 1/8"	3 3/8"	4"	—	—	—	4'-0"	4'-0"	4'-0"	2'-3"	2 3/8"	2 3/8"	3 3/8"	1'-11"
1100-1199	2 1/8"	3 3/8"	4"	—	—	—	4'-2"	4'-2"	4'-2"	2'-4"	2 3/8"	2 3/8"	3 3/8"	2'-0"
1200-1299	2 1/8"	3 3/8"	4"	—	—	—	4'-4"	4'-4"	4'-4"	2'-5"	2 3/8"	2 3/8"	3 3/8"	2'-1"
1300-1399	2 1/8"	3 3/8"	4"	—	—	—	4'-6"	4'-6"	4'-6"	2'-6"	2 3/8"	2 3/8"	3 3/8"	2'-2"
1400-1500	2 1/8"	3 3/8"	4"	—	—	—	4'-8"	4'-8"	4'-8"	2'-7"	2 3/8"	2 3/8"	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 $\geq 8"$ USE:
ADHESIVE ANCHORS $\frac{3}{4}"$ INCH.
EMBED 5" IN CONCRETE.
SEE DETAIL "A"

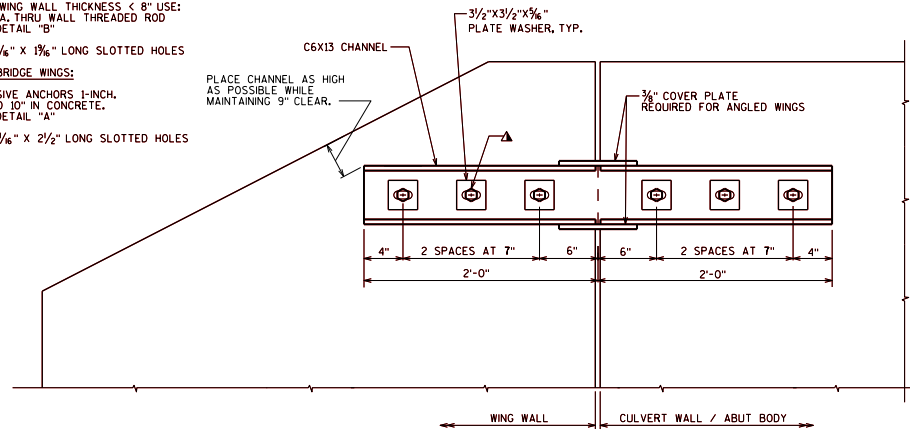
WITH WING WALL THICKNESS $< 8"$ USE:
 $\frac{3}{8}"$ DIA. THRU WALL THREADED ROD
SEE DETAIL "B"

USE $\frac{1}{4}" \times 1\frac{1}{4}"$ LONG SLOTTED HOLES

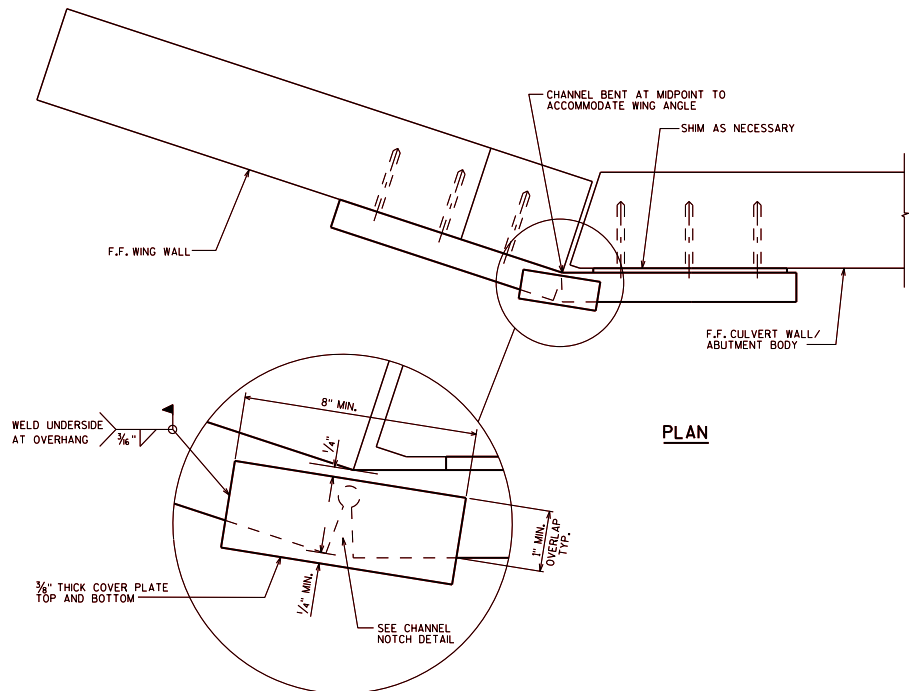
FOR BRIDGE WINGS:

ADHESIVE ANCHORS 1-INCH.
EMBED 10" IN CONCRETE.
SEE DETAIL "A"

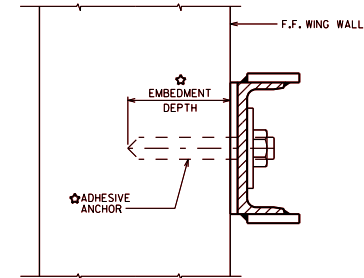
USE $\frac{1}{4}" \times 2\frac{1}{2}"$ LONG SLOTTED HOLES



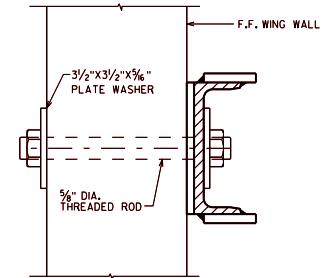
WING ELEVATION



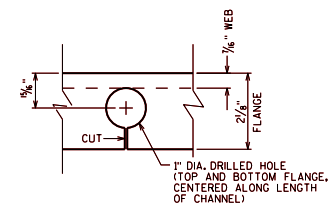
PLAN



DETAIL "A"
SECTION THRU CHANNEL



DETAIL "B"
SECTION THRU CHANNEL



CHANNEL NOTCH DETAIL
FOR USE WITH ANGLED WINGS ONLY

NOTES

WING STRAPPING DETAIL FOR THE PURPOSE OF MITIGATING INWARD WING TIPPING, AS AN ALTERNATIVE TO THE PREFERRED METHOD OF WING REPLACEMENT.

BID ITEM SHALL BE "STRAPPING B-XX-XXX" WHICH INCLUDES ALL ITEMS SHOWN.

WISDOT REGIONAL BRIDGE MAINTENANCE ENGINEER TO APPROVE USE OF DETAIL PRIOR TO INSTALLATION.

ALL PROVIDED STEEL MATERIAL SHALL CONFORM TO ASTM A36.

ALL STRUCTURAL STEEL SHOWN SHALL BE GALVANIZED, THREADED RODS, MASONRY ANCHORS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C.

CUTTING AND DRILLING OF CHANNEL SHALL BE DONE IN FABRICATION SHOP, PRIOR TO GALVANIZING.

IF WELDING COVER PLATE IN FIELD, PRIOR TO WELDING, REMOVE GALVANIZING FROM AREA TO BE WELDED, TOUCH UP WITH PAINT ALL AREAS LACKING GALVANIZING WHEN COMPLETE.

CAULK AROUND PERIMETER OF CHANNEL AND FILL PORTION OF HOLE AROUND ANCHOR BOLT AND SHIM WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.

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

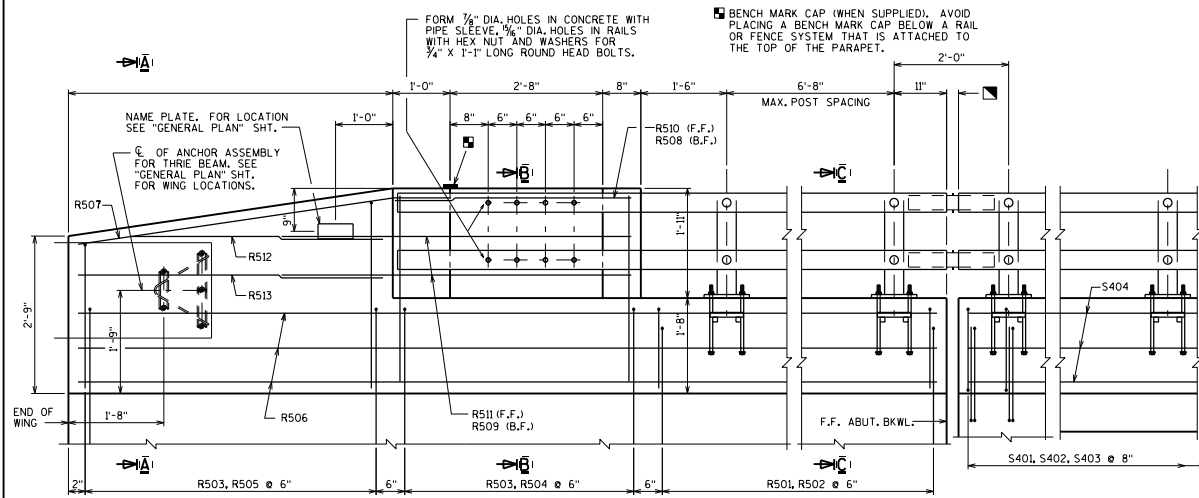
WING STRAPPING



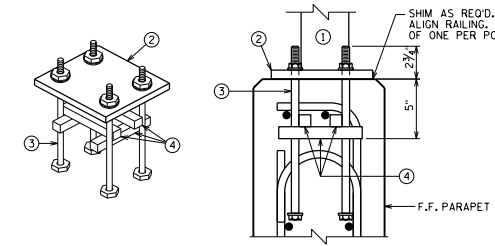
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:
7-18



RDWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR A1 ABUTMENT

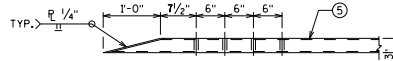


ANCHOR BOLTS FOR RAIL POSTS

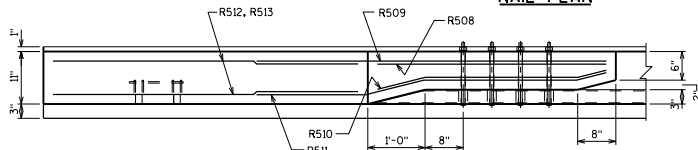
STRIP SEAL EXP. JT. @ ABUT. FOR TYPE A1 ABUT. USE 1/2" FILLER TO TOP OF PARAPET. SEE STD. 12.01/12.02

INSIDE ELEVATION

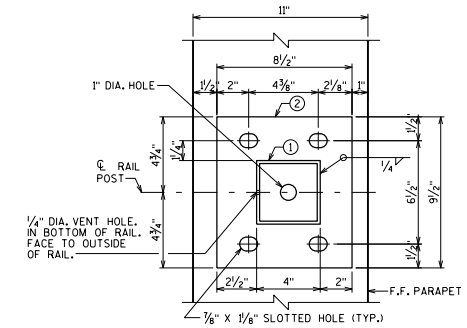
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5". MIN CONSTR. JT. SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A 3/4" V-GROOVE.



RAIL PLAN



PARAPET PLAN



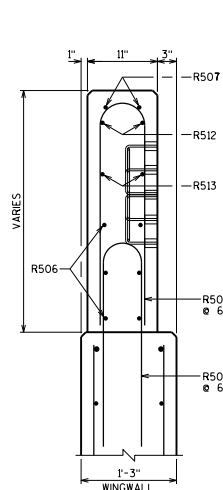
BASE PLATE

DESIGNER NOTES

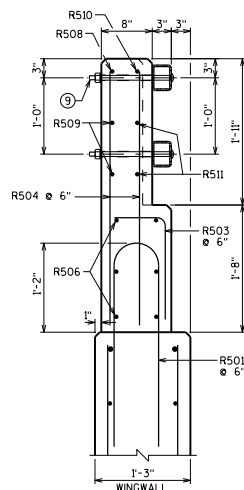
DETAILS LIMITED TO SKEWS < 40°.

SEE STANDARD 40.25 FOR RAILING DETAILS

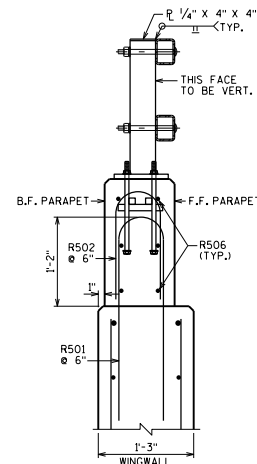
RAILING WEIGHT = 30 LB/FT



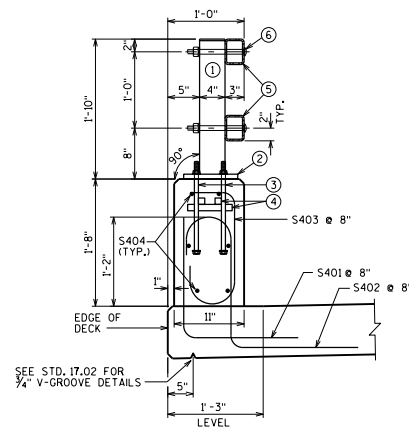
SECTION A-A



SECTION B-B



SECTION C-C



SECTION THRU DECK

ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD (WHEN REQ'D.).

RAILING TUBULAR TYPE 'PF'	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: <u>1-17</u>



NOTES

LEGEND

BILL OF BARS

BAR MARK	FOOT	NO. RECD.	LENGTH	FOOT	BAR SERIES	LOCATION
54901.	X		3'-0"	X	-	CASAPPEI_YEB1.
54902.	X		4'-1"	X	-	CASAPPEI_YEB1.
54903.	X		2'-9"	X	-	CASAPPEI_YEB1.
54904.	X			-	-	CASAPPEI_YGB12.
B5001.	X		5'-9"	X	-	CASAPPEI_YEB1.
55002.	X		3'-1"	X	-	CASAPPEI_YEB1.
55003.	X		1'-11"	X	-	CASAPPEI_YEB1.
55004.	X		3'-4"	X	-	CASAPPEI_YEB1.
55005.	X		6'-2"	X	▲	CASAPPEI_YEB1.
55006.	X			X	-	CASAPPEI_HOB12.
55007.	X			X	-	CASAPPEI_HOB12.
55008.	X		4'-0"	X	-	CASAPPEI_HOB12.
55009.	X		5'-8"	X	-	CASAPPEI_HOB12.
55010.	X		4'-0"	X	-	CASAPPEI_HOB12.
55011.	X		6'-0"	X	-	CASAPPEI_HOB12.
55012.	X			-	-	CASAPPEI_HOB12.
55013.	X			-	-	CASAPPEI_HOB12.

BAR SERIES TABLE

MARK	NO. REQD.	LENGTH
R505	<u>OF</u> SERIES	5'-5" TO 6'-11"

BUNDLE AND TAG EACH SERIES SEPARATELY.

RAILING TUBULAR
TYPE 'PF' DETAILS

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18

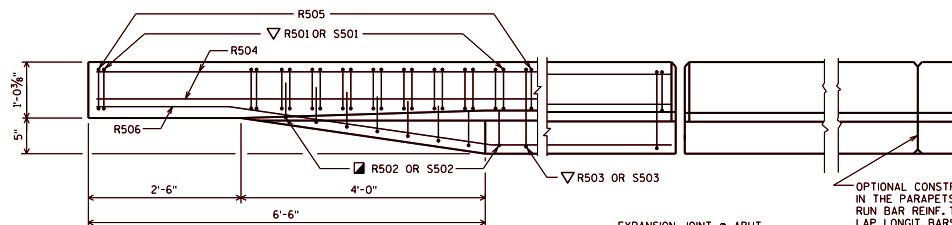
◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT.
USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

SECTION B

SECTION C

FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.		LENGTH	SEAT	LOCATION
		ABUT.	ABUT.			
B501.	X			2'-2"	X	PARAPEI VERB.
B502.	X			2'-4"	X	PARAPEI VERB.
B503.	X			4'-7"	X	PARAPEI VERB.
B504.	X					PARAPEI HOBIZ.
B505.	X			4'-10"	X	PARAPEI VERB.
B506.	X				X	PARAPEI HOBIZ.
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
S501.	X			4'-5"	X	PARAPEI VERB.
S502.	X			2'-4"	X	PARAPEI VERB.
S503.	X			4'-2"	X	PARAPEI VERB.

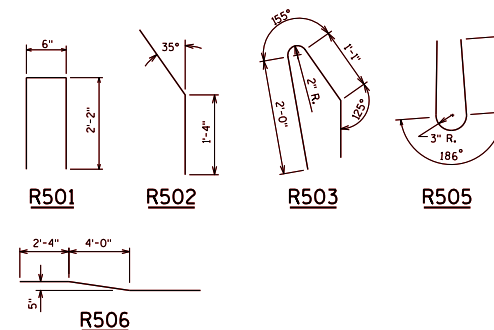


PLAN

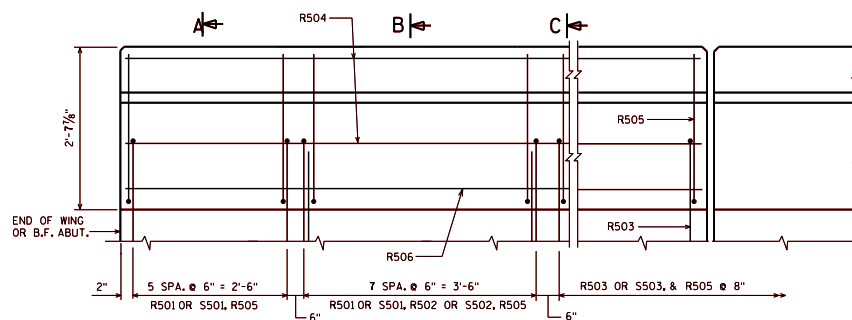
EXPANSION JOINT @ ABUT.
0° SKEW SHOWN. MATCH EXP.
JT. OPENING.

FOR TYPE A1 ABUT., USE 1/2" FILLER TO TOP OF PARAPET. SEE STD. 12.01.

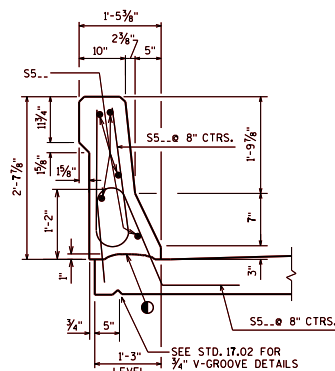
OPTIONAL CONSTRUCTION JOINTS
IN THE PARAPETS MAY BE USED.
RUN BAR REINF. THRU THE JOINT.
LAP LONGIT. BARS A MIN. OF 1'-9".
MIN. JOINT SPACING OF 80'-0".
DEFINE CONST. JOINT WITH A $\frac{3}{4}$ " -
"V" GROOVE.



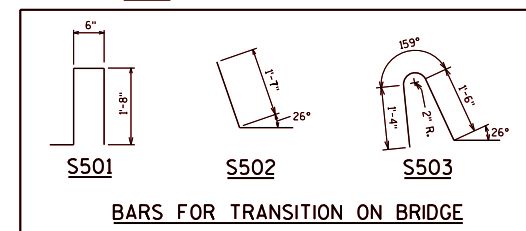
R506



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

● CONST. JOINT - STRIKE OFF AS SHOWN.

☑ R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R502 OR S502 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

▽ R501 AND R503 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

A R503 BAR MAY BE USED IN LIEU OF
A S503 BAR ADJACENT TO THE PAVING
NOTCH ON TYPE A1 ABUTMENTS.

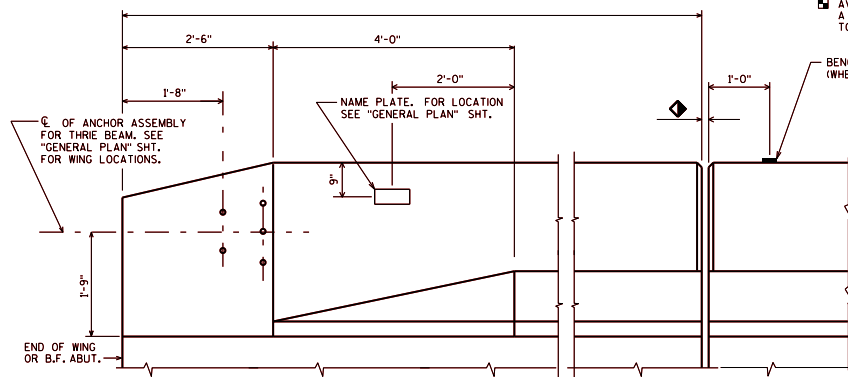
SLOPED FACE PARAPET 'LF'



**BUREAU OF
STRUCTURES**

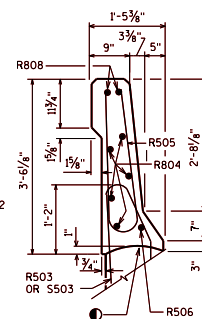
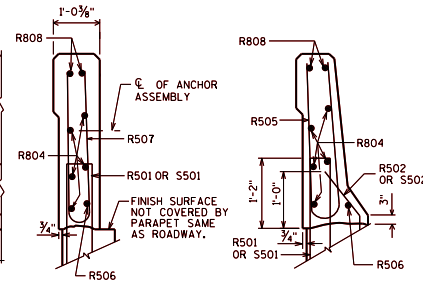
APPROVED: *Bill Oliva*

DATE: 7-19



AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

BENCH MARK CAP (WHEN SUPPLIED)



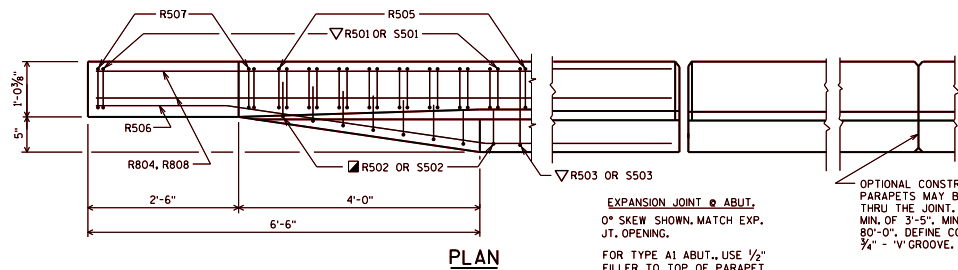
LENGTH SHOWN FOR BAR IS AN AVERAGE LENGTH AND SHOULD ONLY BE USED FOR BAR WEIGHT CALCULATIONS. SEE BAR SERIES TABLE FOR ACTUAL LENGTHS.

BILL OF BARS FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BEV	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.

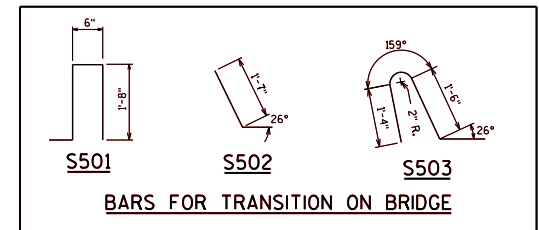
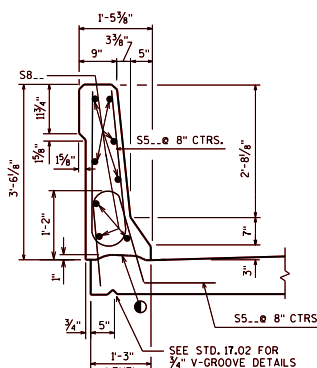
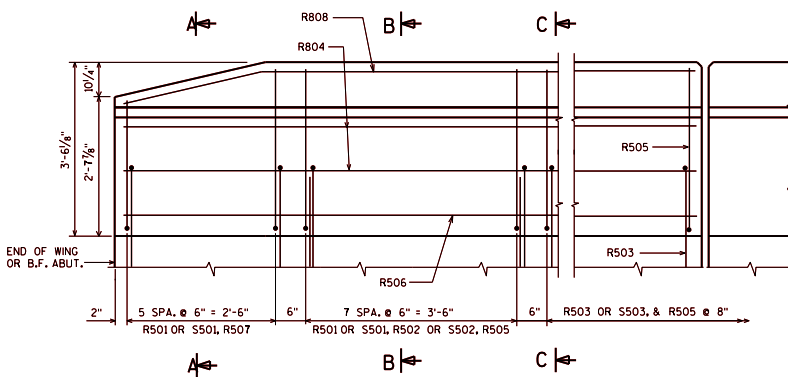
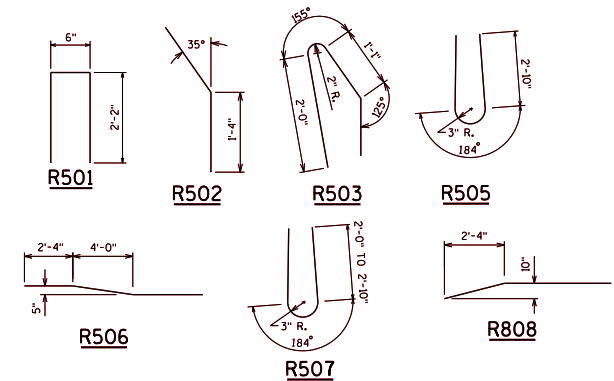
BAR SERIES TABLE

MARK	NO. REOD.	LENGTH
B501	4 - SERIES OF 6	4'-10" TO 6'-6"



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.



BARS FOR TRANSITION ON BRIDGE

AREA = 3.16 SF
WEIGHT = 474 LB/FT

CONST. JOINT - STRIKE OFF AS SHOWN.

R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R502 OR S502 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

R501 AND R503 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

A R503 BAR MAY BE USED IN LIEU OF A S503 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

SLOPED FACE PARAPET 'HF'



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-19

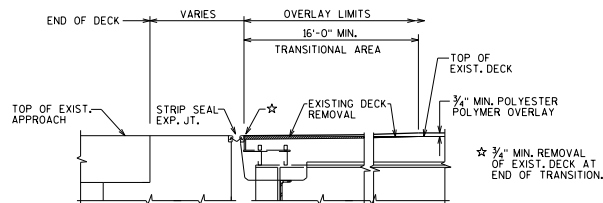
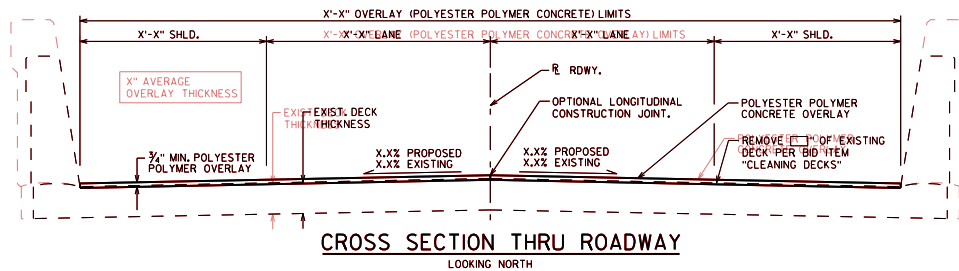


BID ITEM NUMBER	BID ITEMS	BID ITEM NUMBER	UNIT	TOTAL BID	ITEMS	ON THE EXISTING OVERLAY DECKS	OPTIONAL CONSTRUCTION JOINTS SHALL BE LOCATIONS COORDINATE STAGING TO AVOID GR
502.3200	PROTECTIVE SURFACE TREATMENT	502.3200	PROTECTIVE SURFACE TREATMENT				
509.0301	PREPARATION DECKS TYPE 1	509.0301	PREPARATION 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
509.9005.S	CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY	509.9005.S	CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY				SY
509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)	509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY (STRUCTURE)				SY
514.0900	ADJUSTING FLOOR DRAINS	514.0900	ADJUSTING FLOOR DRAINS				EACH

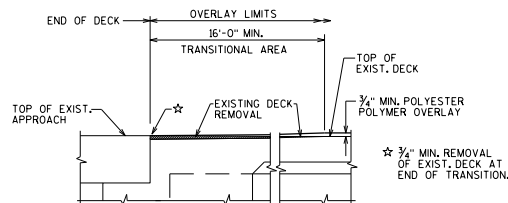
▲ OPTIONAL CONSTRUCTION JOINTS SHALL BE LOCATED AT CROWN POINTS AND OTHER GRADE BREAK LOCATIONS. COORDINATE STAGING TO AVOID GRADE BREAKS WITHIN A GIVEN STAGE, WHICH WILL REQUIRE SEPARATE OVERLAY POURS.

STANDARD 40.31



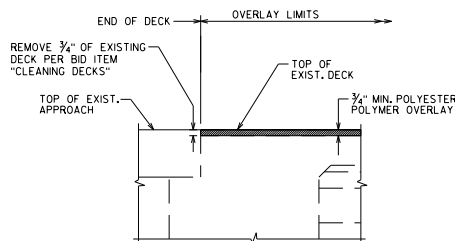


**SECTION THRU ABUTMENT
TRANSITIONAL AREA ON DECK
AT EXPANSION JOINT**



**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.)

DESIGN DATA

LIVE LIVE/LOAD:
INVENTORY RATING: HS-...
OPERATING RATING: HS-...
MAXIMUM STANDARD PERMIT VEHICLE (WIS-SPV)=... KIPS

NOTES

DRAWINGS SHALL NOT BE ISCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

☐ 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 OTHER 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 NOTES

USE OF POLYESTER POLYMER CONCRETE 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 AND TRANSITIONAL AREAS ARE NOT RECOMMENDED FOR CONCRETE APPROACHES. SHALL BE SHOWN AND SPECIFY THE MINIMUM TRANSITION AREA LENGTH. THE PROVIDED TRANSITION LENGTH, 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.

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	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			
509.0500	CLEANING DECKS	SY	

THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

POLYESTER POLYMER CONCRETE OVERLAY



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-20



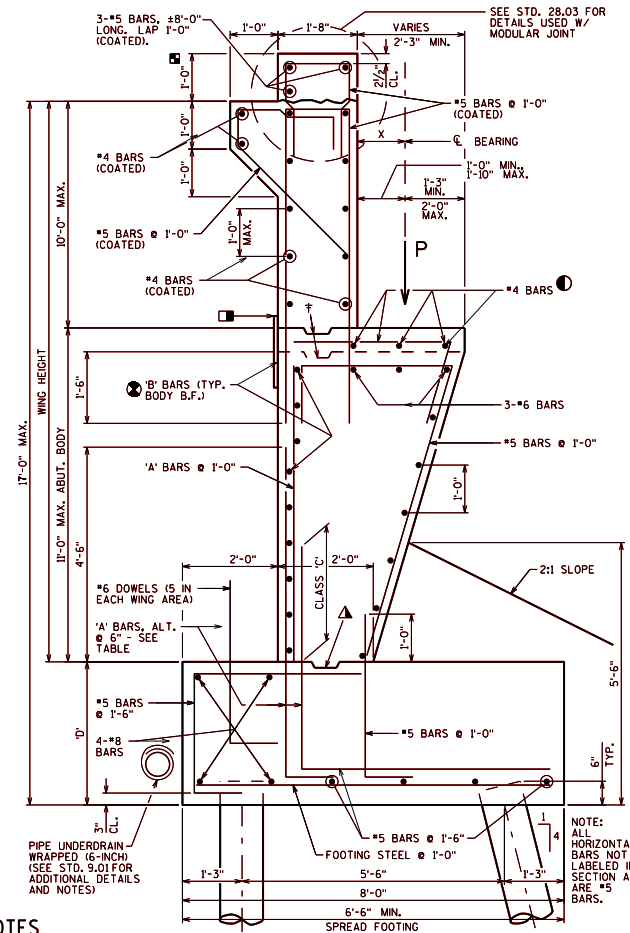
'P' K/FT	'A' BAR SIZE	FOOTING STEEL SIZE	FOOTING DEPTH 'D'
16	#6	#6	3'-0"
24	#7	#6	3'-0"
27	#7	#7	3'-0"
38	#8	#6	3'-3"
41	#8	#7	3'-3"
48	#9	#6	3'-3"
54	#9	#7	3'-3"

ABUTMENT BODY DEPTH	'B' BARS
< 7'	9- #11
≥ 7'	10- #10

h = WING HEIGHT

PILE REACTIONS PER FOOT IN KIPS
BACK ROW = $P(0.56-X/5.5)-\frac{\gamma^3}{915}+17.2$
FRONT ROW = $P(0.44+X/5.5)+\frac{\gamma^3}{425}+7.9$

(PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS)



DESIGNER NOTES

USAGE OF A4 ABUTMENTS IS DISCONTINUED. OVER THE YEARS
 AND IS CURRENTLY UNDER REVIEW TO BE DISCONTINUED.
 RUNDING RADIUS OF ABUTMENT FOOTING SHALL BE REQUIRED.
 8" OF MAXIMUM.
 PILING SPACING IN ABUTMENT FOOTING SHALL BE
 WHEN BODY SECTION IS MORE THAN 50'-0" LONG. PILING SHALL
 PROVIDE VERTICAL CONNECTION JOINT. RUN BAR
 STEEL BARS JOINT SEAM JOINT WITH 50'-0" LONG
 RUBBERIZED MEMBRANE WATERPROOFING. SEE STEP
 12.01.9 FOR ALTERNATE CONSTRUCTION JOINT.
 RUBBERIZED MEMBRANE WATERPROOFING. SEE STEP
 12.09 FOR ALTERNATE CONSTRUCTION JOINT.

LEGEND

- 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZ. AND VERT. JOINTS ON BACKFACE ABOVE FOOTING. SEE
 KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6". ABOUT
 * 4 AT 9" BEAM SEAT. SPACE AT 1'-6" BETWEEN SEATS. THIS STEEL IS REQUIRED SLAB
 IF DIMENSION "A" EXCEEDS 4". DETAIL
 † OPTIONAL KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6". USE 3/4"
 "V" GROOVE ON F.F. OF WING WALL ONLY. IF JOINT IS NOT USED,
 WATERPROOFING IS NOT REQUIRED.
 ** WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX",
 OR SINGLE SLOPE PARAPET "565S" IS USED. "565S" SHOULD NOT BE USED ON A SIDEWALK.
 WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
 PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
 ☆ SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
 SHOW ALL BARS FOR CLARITY.

SECTION A-A

DESIGNER NOTES CONT'D

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

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

PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

SEE STD. 12.03 FOR ADDITIONAL DETAILS.

ABUTMENT DETAILED WITHOUT STRUCTURAL

ADJUSTMENT. DETAILED WITH/OUT STRUCTURAL APPROACH
SLAB. SEE STD. 12.10 THRU 12.13 FOR STRUCTURAL APPROACH
DETAILS.

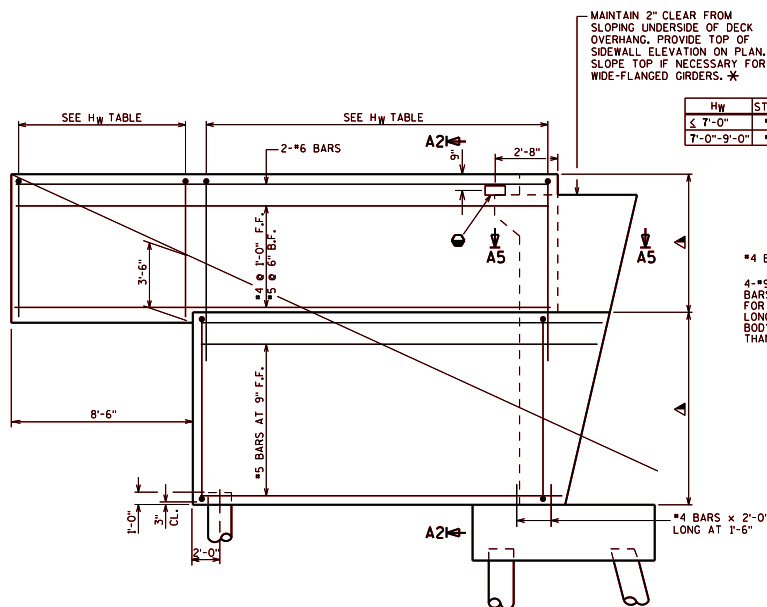
ABUTMENT A4 PILE FOOTING



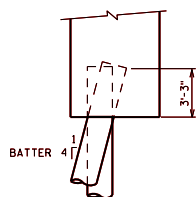
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

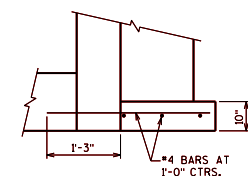
DATE: 7-18



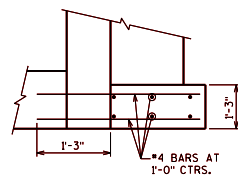
WING ELEVATION
WING LENGTH TO 26'-6"



SECTION A4

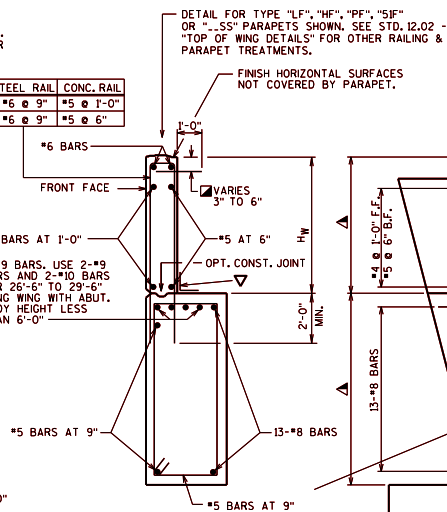


SECTION A5
(WITHOUT STRUCTURAL APPROACH SLAB)

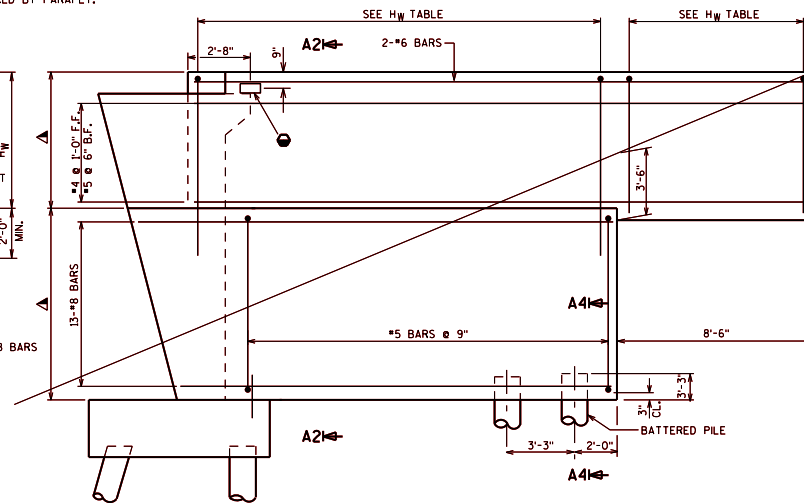


SECTION A5
(WITH STRUCTURAL APPROACH SLAB)

HW	STEEL RAIL	CONC. RAIL
≤ 7'-0"	*6 @ 9"	*5 @ 1'-0"
7'-0"-9'-0"	*6 @ 9"	*5 @ 6"



SECTION A2
ALL WING LENGTHS



WING ELEVATION
WING LENGTH OVER 26'-6" TO 29'-6"

DESIGNER NOTES

DESIGNER HAS BEEN LIMITED OVER THE YEARS. CHARGE OF ABUTMENTS IS DISCONTINUED. SUPERSTRUCTURE AND DECK 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 $\gamma_{DEH} = 1.50$, AND SUPERSTRUCTURE REACTIONS "P". BACK ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 20 P.C.F. WITH $\gamma_{DEH_{MIN}} = 0.90$, 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:
 $\gamma_{DC} = 1.25$
 $\gamma_{DW} = 1.50$
 $\gamma_{DEH} = 1.50$
 $\gamma_{DEH_{MIN}} = 0.90$
 $\gamma_{DEY} = 1.35$
 $\gamma_{LL} = 1.75$
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

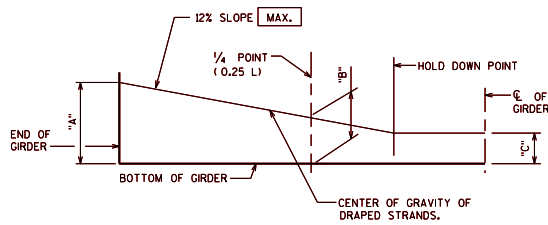


**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:

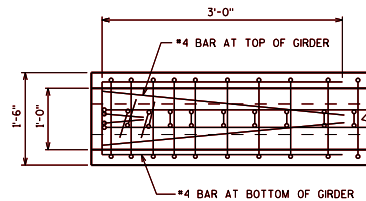
1-18



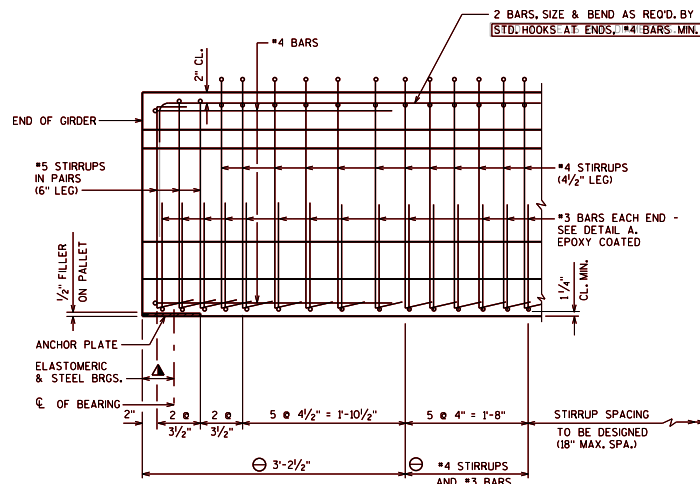
"A" TO BE GIVEN TO THE NEAREST 1"
 "B" = $\frac{1}{4}"A + 3" C$ (MIN.)
 "B" = $\frac{1}{4}"A + 3" C + 3"$ (MAX.)

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

LOCATION OF DRAPED STRANDS

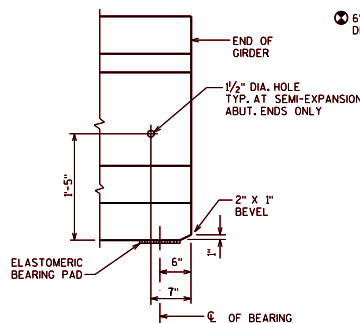


PLAN VIEW

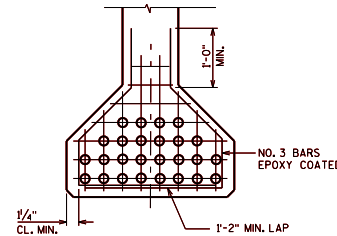


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER

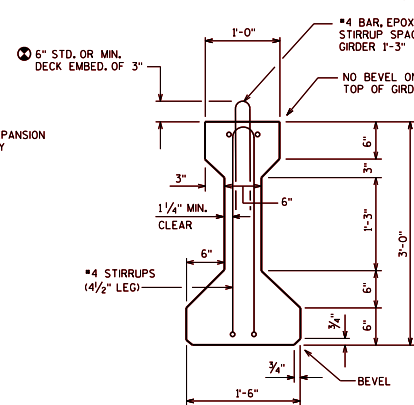


SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD



DETAIL A

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



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 WISDOT FABRICATION LIBRARY AND ACCEPTED PRIOR TO SHOP DRAWING SUBMITTAL.

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

DESIGNER NOTES

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

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

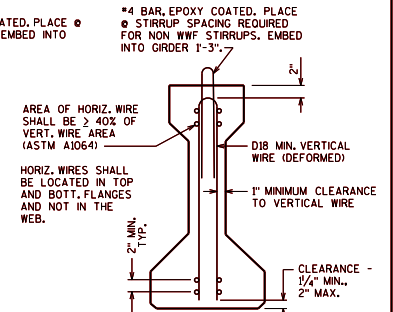
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD R004 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE 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)

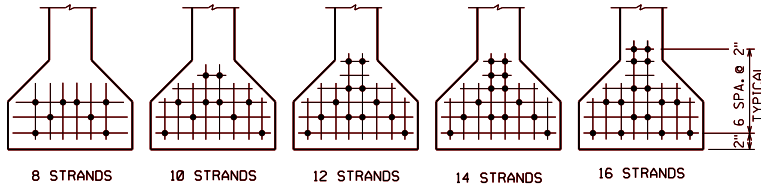
36" PRESTRESSED GIRDER DETAILS



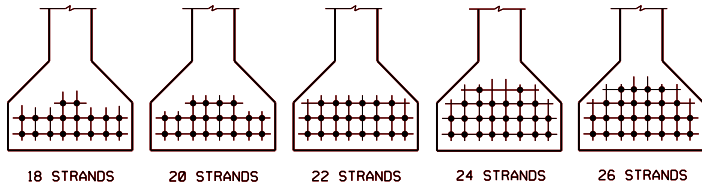
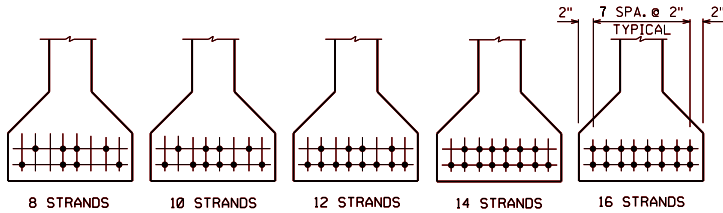
BUREAU OF STRUCTURES

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

36" GIRDER

$A = 369 \text{ SQ. IN.}$
 $r^2 = 138.15 \text{ IN.}^2$
 $y_T = 20.17 \text{ IN.}$
 $y_B = -15.83 \text{ IN.}$
 $I = 50,979 \text{ IN.}^4$
 $S_T = 2,527 \text{ IN.}^3$
 $S_B = -3,220 \text{ IN.}^3$
 $WT. = 384 \text{ #/FT.}$

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
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = \underline{31.00 \text{ KIPS}}$
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = \underline{43.94 \text{ KIPS}}$
 $\frac{y_B}{r^2} = \frac{-15.83}{138.15} = -0.1146 \text{ IN./IN.}^2$
 $f_B (\text{init.}) = \frac{A_s f_s}{A} (1 + \frac{e_s y_B}{r^2})$

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

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

DESIGNER NOTES

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

36" PRESTRESSED GIRDER DESIGN DATA	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u>
DATE: <u>7-21</u>	