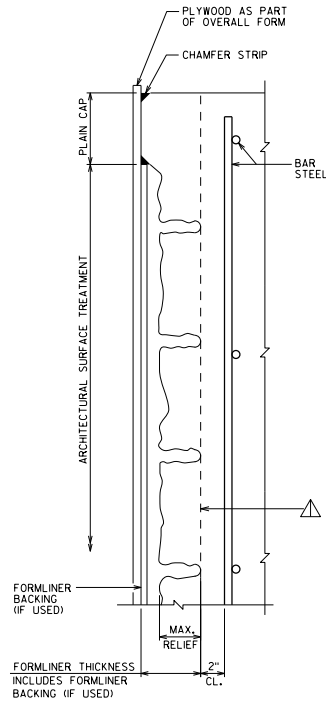
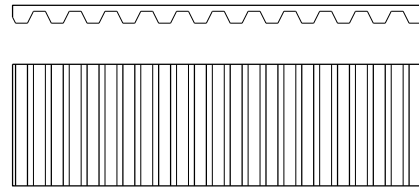




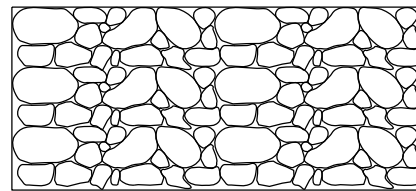
SECTION THRU FORMLINER

⚠ 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.



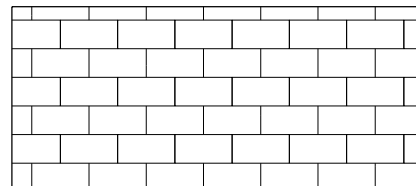
BROKEN RIB

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



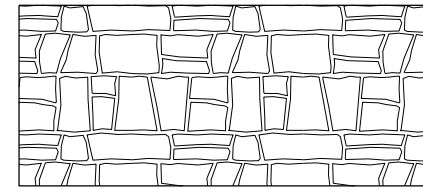
FIELD STONE - RANDOM

FORMLINER THICKNESS = $3\frac{1}{2}"$
SIZES BETWEEN 6" & 24"
MAX. RELIEF = $2\frac{1}{2}"$



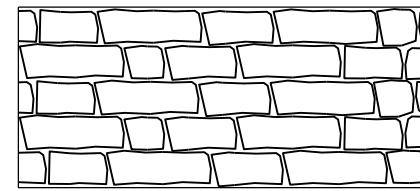
RECTANGULAR BRICK

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 $5\frac{1}{2}"$
COURSE HEIGHT = $\pm 2"$
MAX. RELIEF = 3" TO $4\frac{1}{2}"$

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.

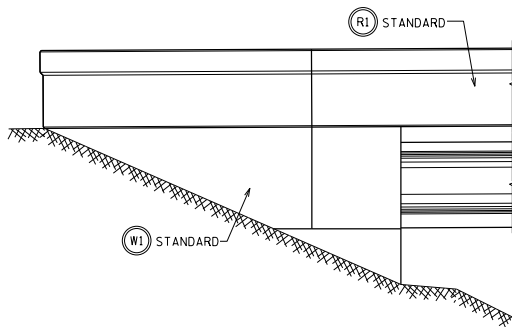
FORMLINER DETAILS



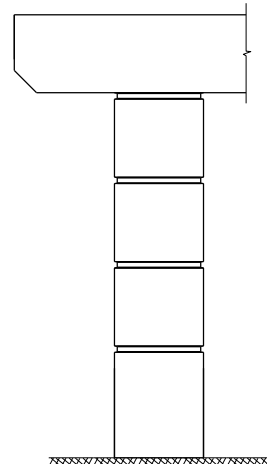
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

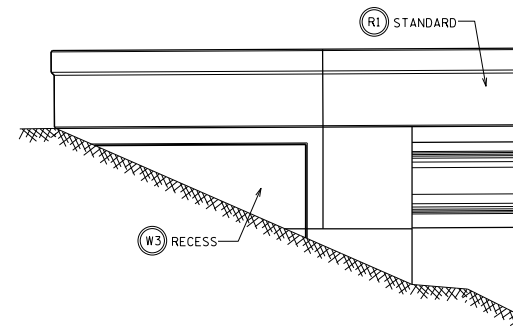
DATE:
7-16



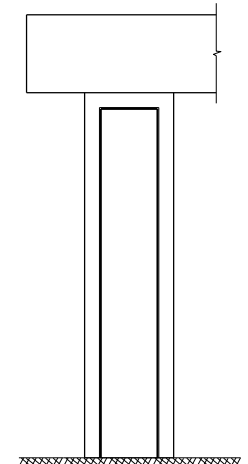
TYPE I



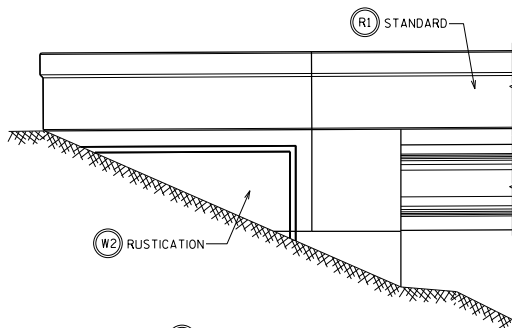
(P1) SINGLE RUSTICATION LINES



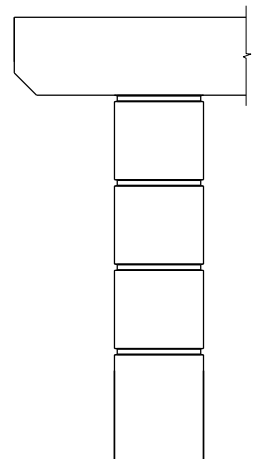
TYPE III



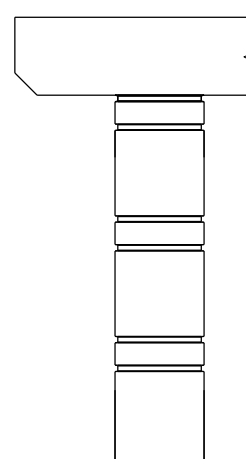
(P3) RECESSED PANEL



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.

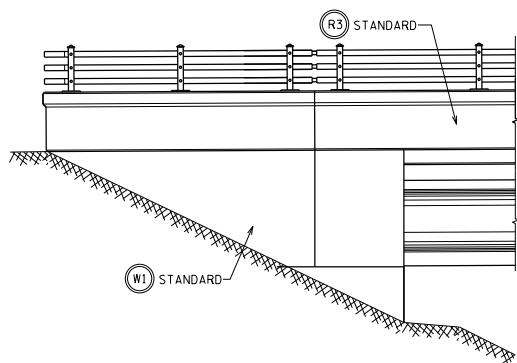
AESTHETIC CONCEPTS WITHOUT PEDESTRIAN ACCOMMODATIONS



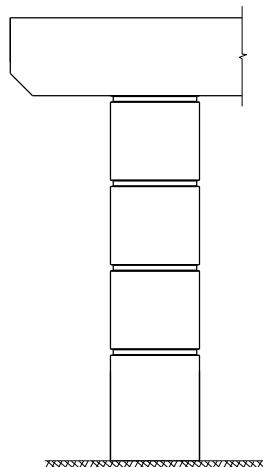
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

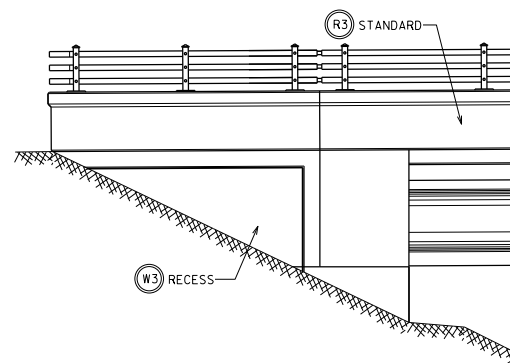
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7-15



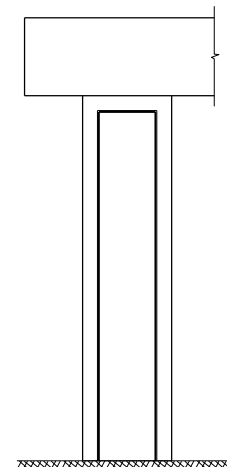
TYPE I



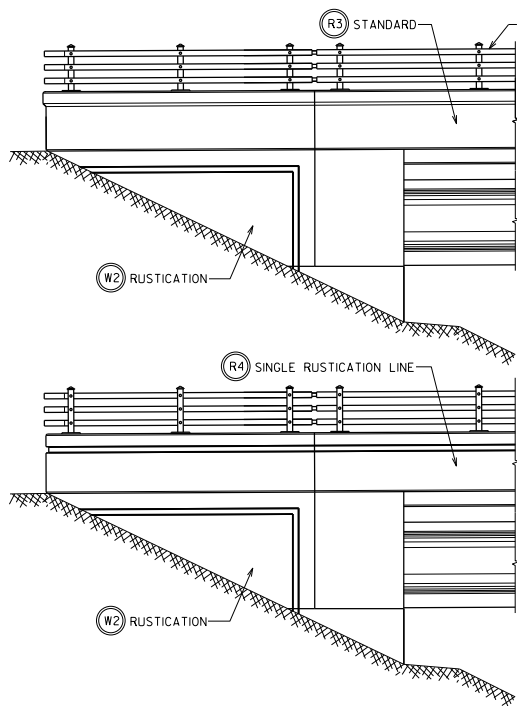
(P1) SINGLE RUSTICATION LINES



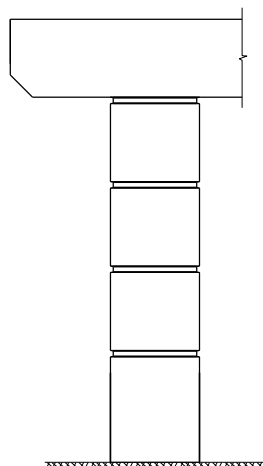
TYPE III



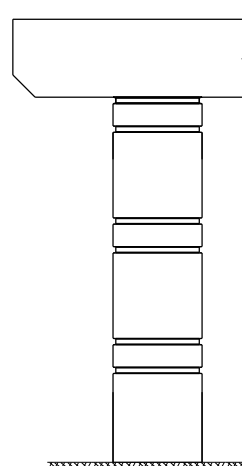
(P3) RECESSED PANEL



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.

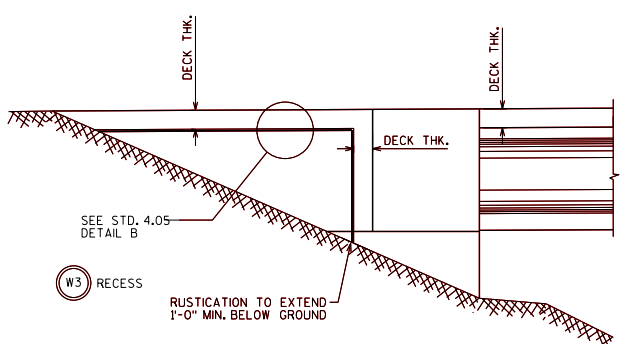
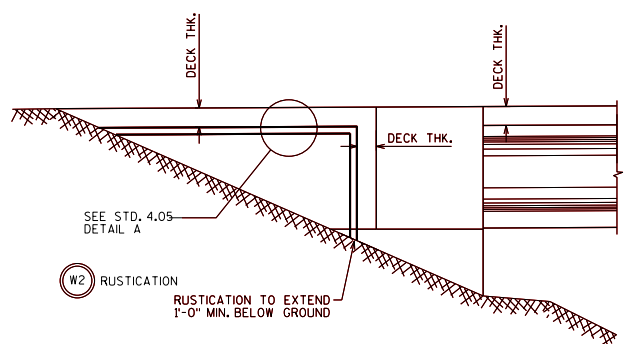
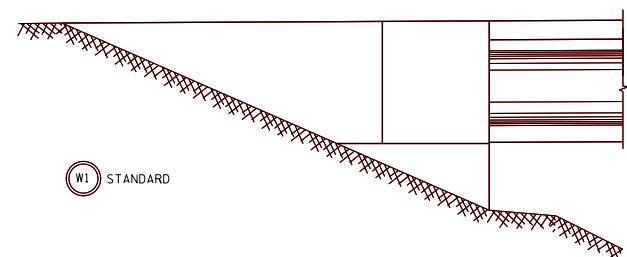
AESTHETIC CONCEPTS WITH PEDESTRIAN ACCOMMODATIONS



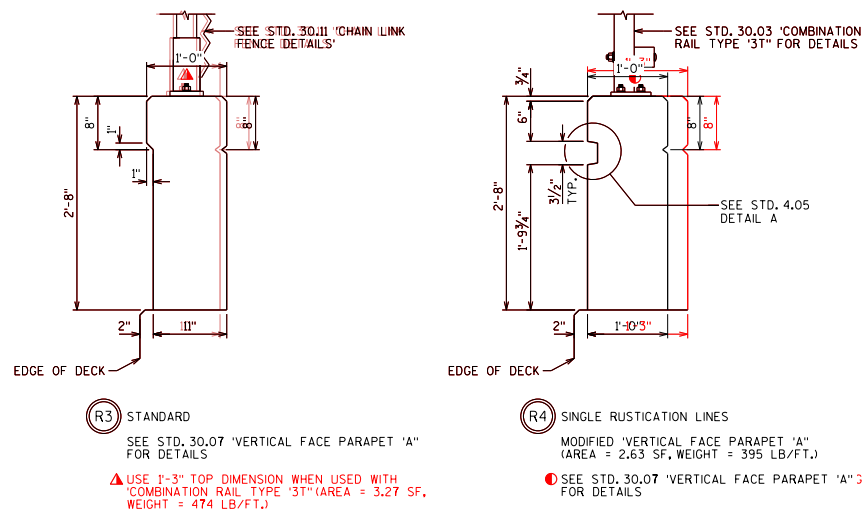
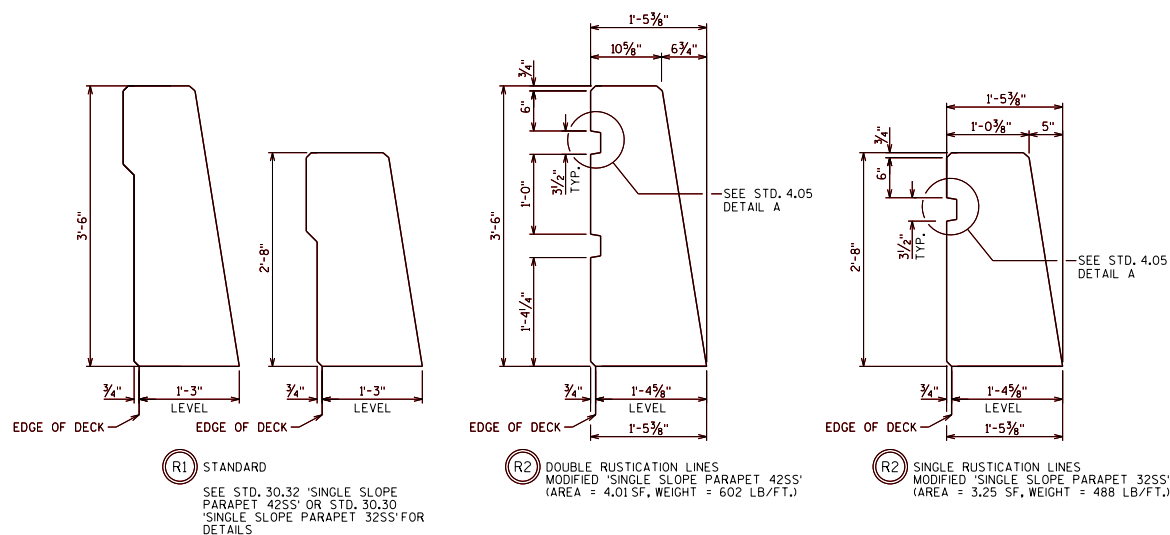
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-15



WING OPTIONS

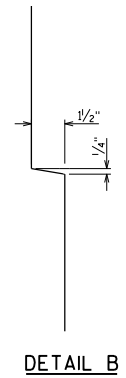
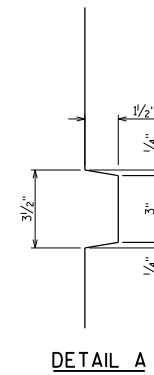
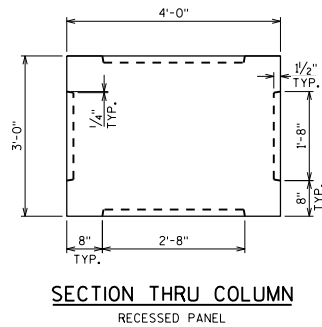
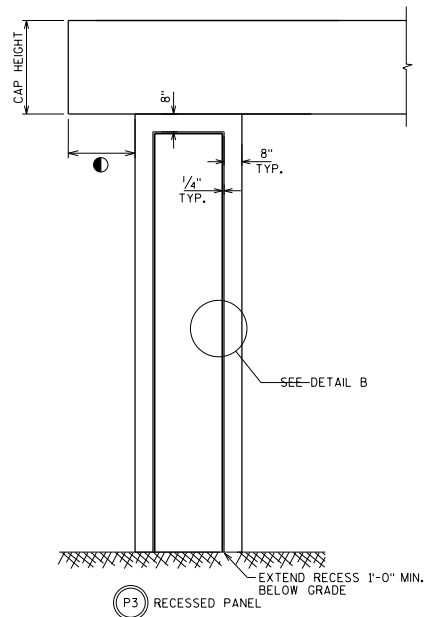
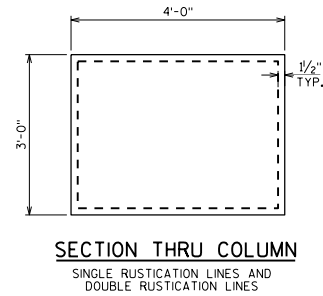
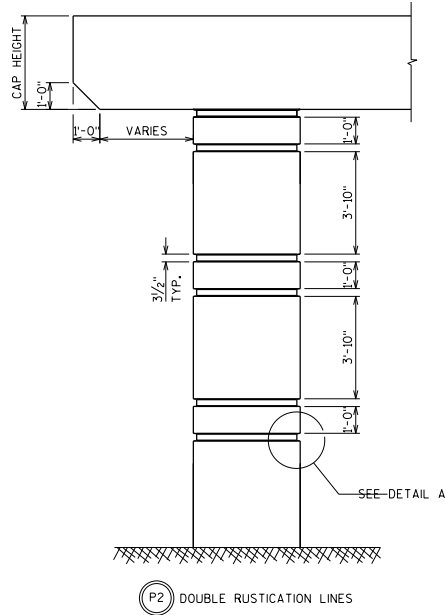
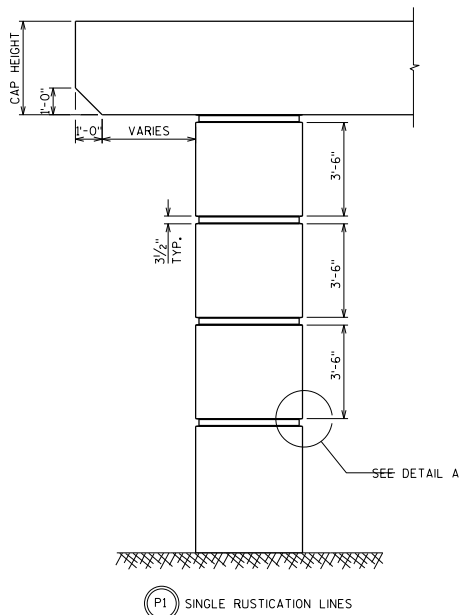


PARAPET OPTIONS

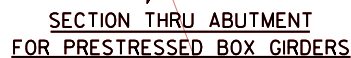
DESIGNER NOTES

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.

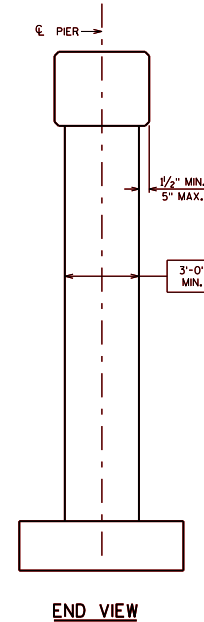
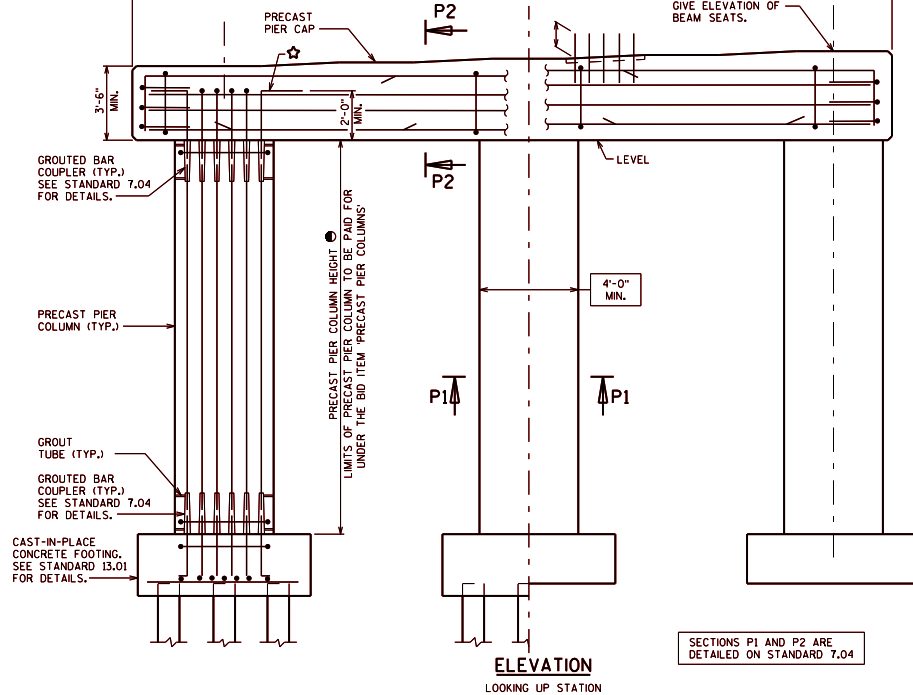


*LENGTH MEASURED FROM FRONT FACE OF MODULAR BLOCK TO END OF FRONT FINGER (DOES NOT INCLUDE WRAPPED GEOTEXTILE WHERE APPLICABLE).
GEOTEXTILE FABRIC,
(DOES NOT INCLUDE WRAPPED
GEOTEXTILE FABRIC WHERE APPLICABLE).

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 (S09.10000.91XX)
PRECAST PIER COLUMNS (SPV.0090.0XXX)
PRECAST PIER CAPS (SPV.0090.0XXX)

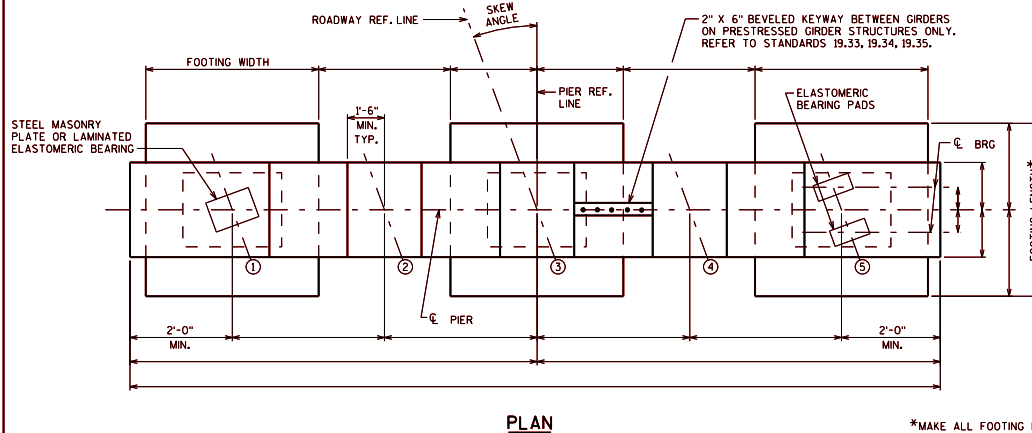
THE MAXIMUM WEIGHT OF EACH PRECAST ELEMENT SHALL BE 90 KIP.

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.

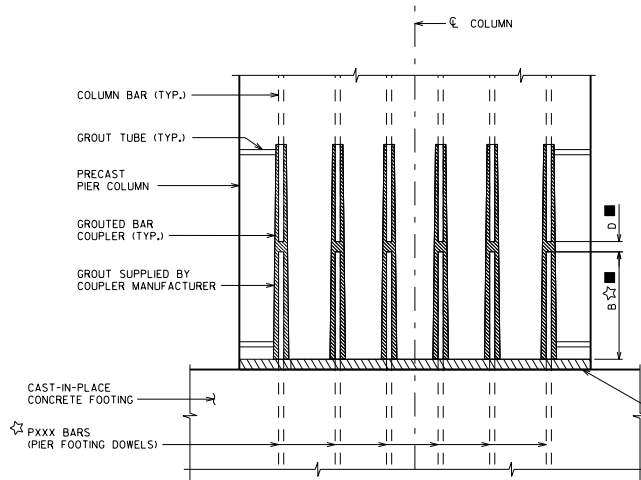
DETAILS AS SHOWN ON THIS STANDARD ARE INTENDED FOR REQUIRED PRECAST PIERS DESIGNED TO MEET PROJECT SPECIFIC REQUIREMENTS. SEE 7.1.4.1.2 IN THE BRIDGE/90 MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE. ALTERNATIVES TO CAST-IN-PLACE PIERS: SEE 7.1.4.1.2 IN THE BRIDGE MANUAL AND STANDARDS 7.05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



MATERIAL PROPERTIES:
CONCRETE MASONRY
BAR REINFORCEMENT, GRADE 60

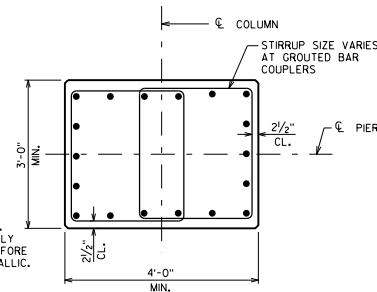
$f'_c = 3,500$ P.S.I.
 $f_y = 60,000$ P.S.I.

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



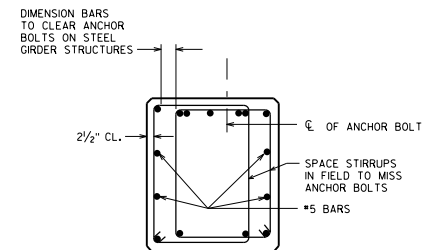
GROUTED BAR COUPLER DETAILS

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



SECTION P1

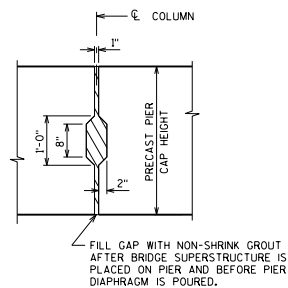
(PRECAST PIER COLUMN REINF. TO BE DESIGNED BY DESIGN ENGINEER)



SECTION P2

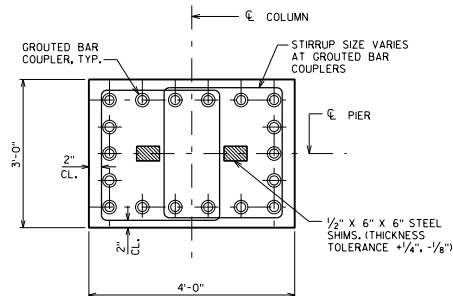
(PRECAST PIER CAP REINF. TO BE DESIGNED BY DESIGN ENGINEER)

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.

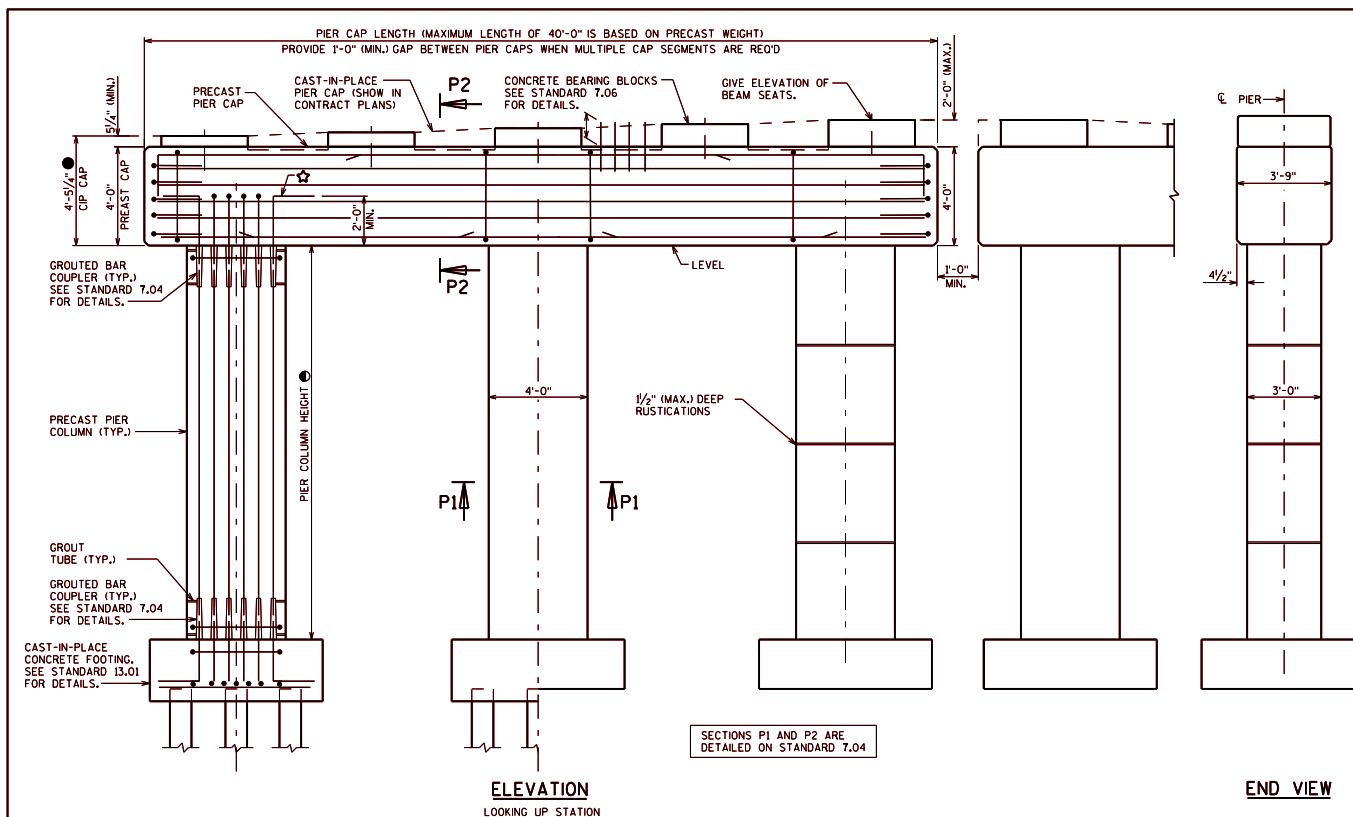
PRECAST PIER CAP AND COLUMN DETAILS



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 (SBP050000XKX)
PRECAST PIER COLUMNS (SBP000000XKX)
PRECAST PIER CAPS (SBP000000XKX)

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.

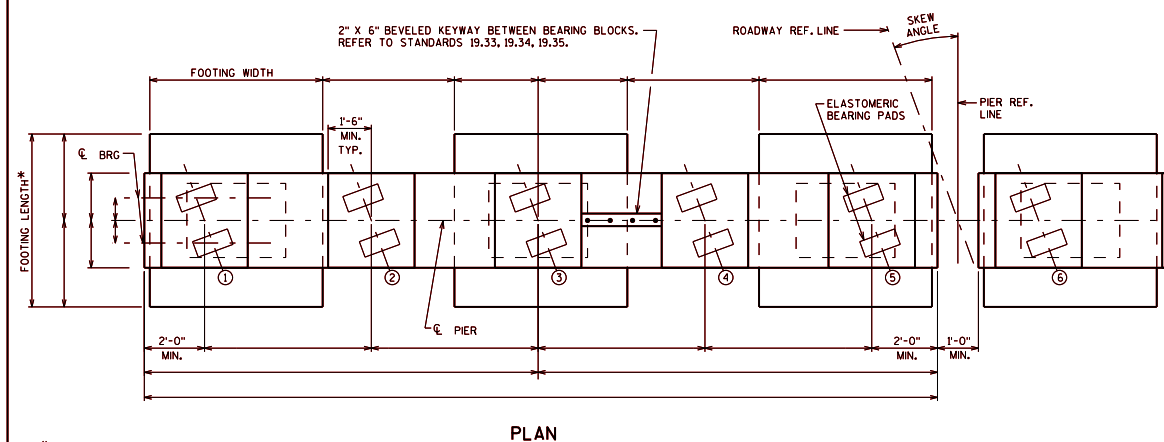
SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

★ **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.

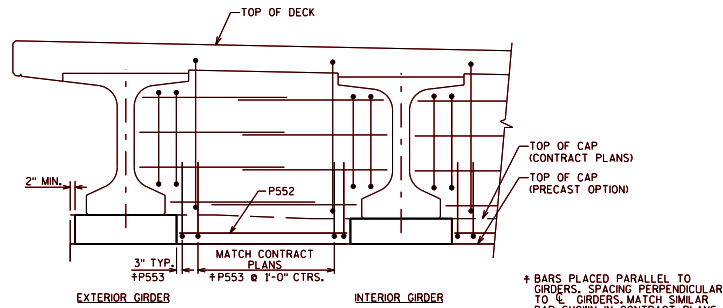


*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER

MATERIAL PROPERTIES:
CONCRETE MASONRY
BAR REINFORCEMENT, GRADE 60

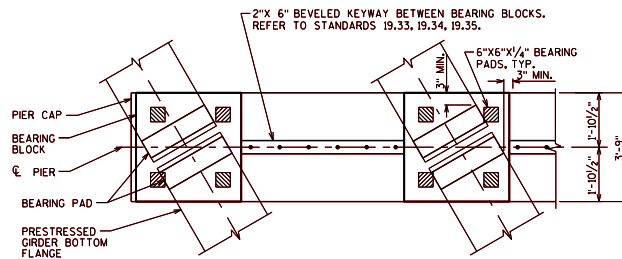
$f'_c = 3,500$ P.S.I.
 $f_y = 60,000$ P.S.I.

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

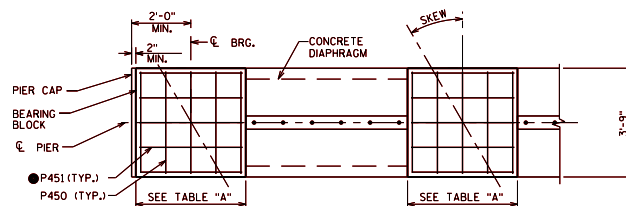


PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER

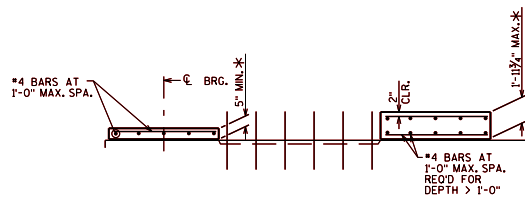
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



PLAN



PLAN



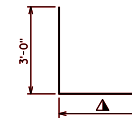
ELEVATION

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.

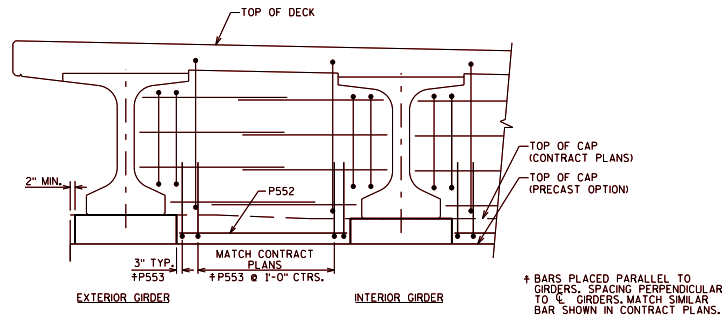
PRECAST BEARING BLOCK DETAILS



**BUREAU OF
STRUCTURES**

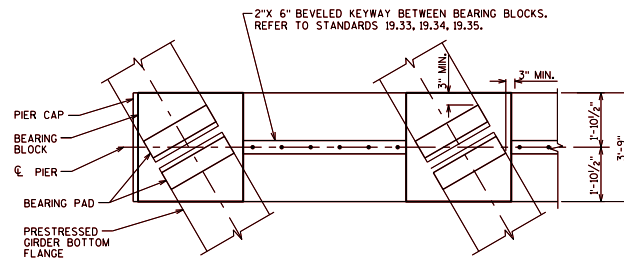
APPROVED: Bill Oliva

DATE:
1-18

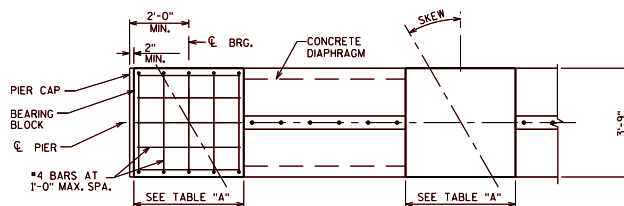


PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER

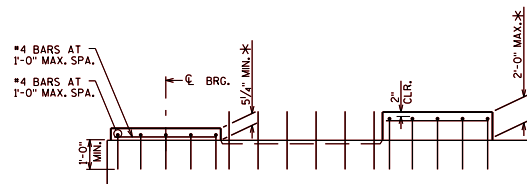
STD. 19.35 SHOWN (STD. 19.33 & 19.34 SIM.)



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.

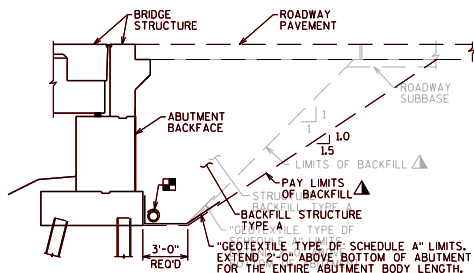
CAST-IN-PLACE BEARING BLOCK DETAILS



**BUREAU OF
STRUCTURES**

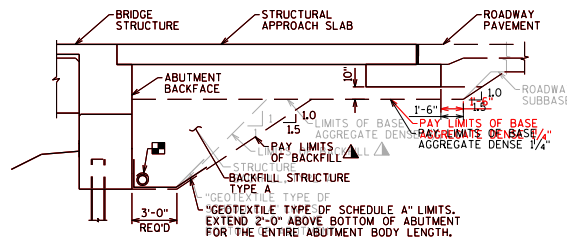
APPROVED: Bill Oliva

DATE:
1-18



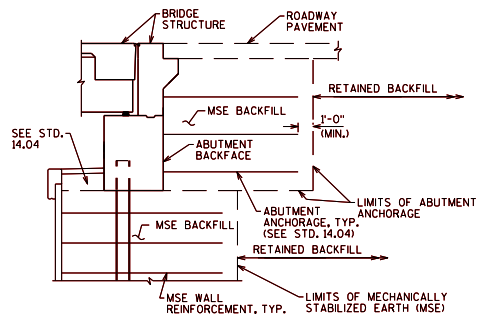
**TYPICAL SECTION
THRU ABUTMENT**

(A3 ABUTMENT WITH STRUCTURAL APPROACH)
(A3 ABUTMENT WITHOUT STRUCTURAL APPROACH)

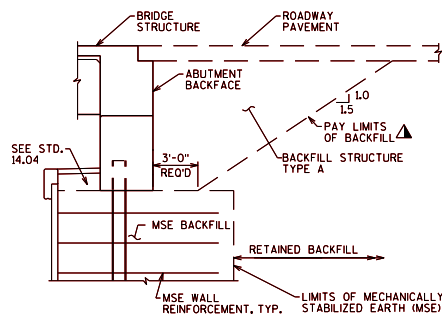


**TYPICAL SECTION
THRU ABUTMENT**

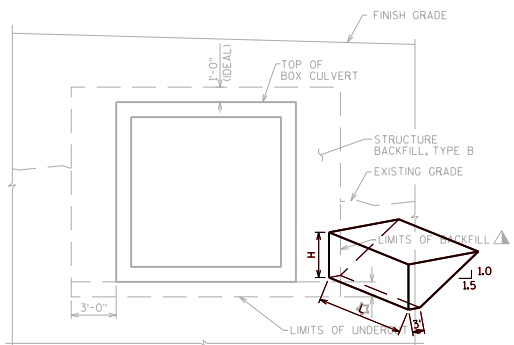
(A1 ABUTMENT WITH STRUCTURAL APPROACH)



**TYPICAL SECTION
THRU ABUTMENT AT MSE WALL
WITH ABUTMENT ANCHORAGE**



**TYPICAL SECTION
THRU ABUTMENT AT MSE WALL**



**TYPICAL SECTION
THRU RETAINING WALL**

**ABUTMENT BACKFILL DIAGRAM
FOR WINGS PARALLEL TO ROADWAY**

L = OUT-TO-OUT OF ABUTMENT, INCLUDING WINGS (FT)
 H = AVERAGE ABUTMENT FILL HEIGHT (FT)
 EF = EXPANSION FACTOR (1.20 FOR CY BID ITEMS AND 1.00 FOR TON BID ITEMS)
 $V_{cy} = (L)(X)(H) + (L)(X)(S)(H)(H)$
 $V_{cy} = V_{cy}(EF)/27$
 $V_{ton} = V_{cy}(2.0)$

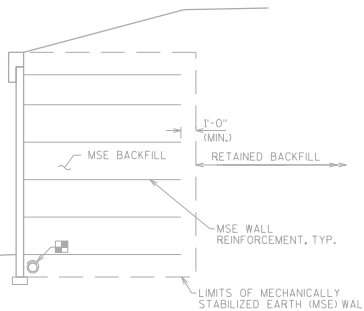
PIPE UNDERDRAIN WRAPPED (6-INCH), SLOPE 0.5% MIN. TO
 SUITABLE DRAINAGE. ATTACH RODENT SHIELD AT ENDS OF PIPE
 UNDERDRAIN. (SHOW DETAIL ON PLANS)

**TYPICAL SECTION
THRU RETAINING WALL**

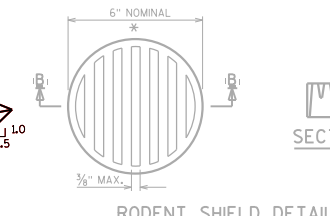
**ABUTMENT BACKFILL DIAGRAM
FOR WINGS PARALLEL TO ABUTMENT**

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)
 $V_{cy} = (L)(X)(H) + (L)(X)(S)(H)(H) + (X)(W1)(H)(H) + (X)(W2)(H)(H)$
 $V_{cy} = V_{cy}(EF)/27$
 $V_{ton} = V_{cy}(2.0)$

**TYPICAL SECTION
THRU MSE RETAINING WALL**



**TYPICAL SECTION
THRU MSE RETAINING WALL**



RODENT SHIELD DETAIL

NOTES (ABUTMENTS)

THE UPPER LIMITS OF "EXCAVATION" FOR STRUCTURES BRIDGES B-5-1 SHALL BE THE EXISTING GROUNDLINE/EXISTING GROUNDLINE.

THE BACKFILL QUANTITIES ARE BASED ON THE PAY LIMITS SHOWN ON THE PLANS AND MAY NOT REFLECT ACTUAL PLACED QUANTITIES. "BACKFILL" STRUCTURE TYPE "A" REQUIRED DIRECTLY BEHIND ABUTMENTS AND ABUTMENT WINGS FOR 3 FEET. BACKFILL PLACED BEYOND PAY LIMITS OR EXCEEDING PLAN QUANTITIES SHALL BE INCIDENTAL TO EXCAVATION FOR STRUCTURES. EXCAVATION BELOW THE ABUTMENT AND ABUTMENT BEDDING MATERIALS REQUIRES ENGINEER APPROVAL. GEOTEXTILE SHALL BE SET AT THE BOTTOM OF EXCAVATION AND EXTEND 2'-0" ABOVE BOTTOM OF ABUTMENT. (NOTE INTENDED FOR PILE-SUPPORTED ABUTMENTS; SEE DESIGNER NOTES FOR MORE INFORMATION AND EXTEND 2'-0" ABOVE BOTTOM OF ABUTMENT; (NOTE INTENDED FOR PILE-SUPPORTED ABUTMENTS; SEE DESIGNER NOTES FOR MORE INFORMATION))

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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.

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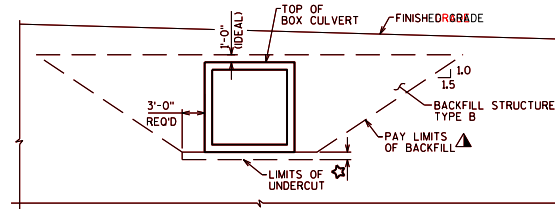
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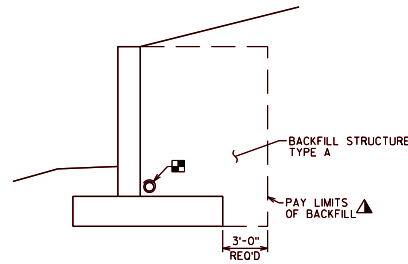
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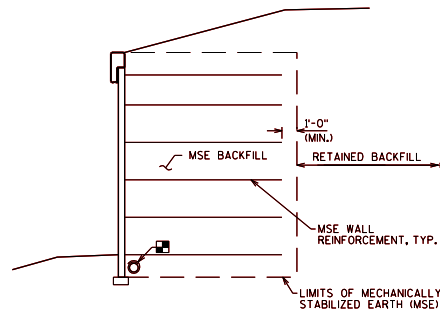
STRUCTURE BACKFILL LIMITS AND NOTES 1	
	BUREAU OF STRUCTURES
APPROVED: <i>Bill Oliva</i>	DATE: <i>7-20</i>
STANDARD 9.01	



**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

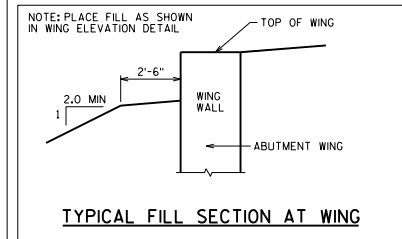
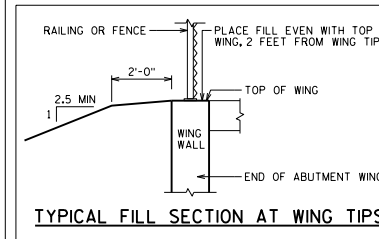
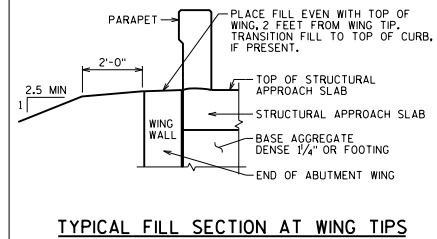
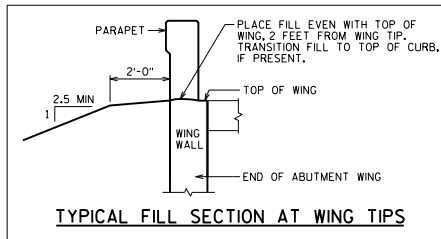
STANDARD WING

WITH STRUCTURAL APPROACH SLAB

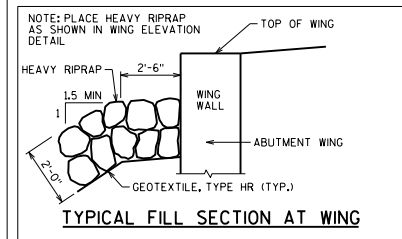
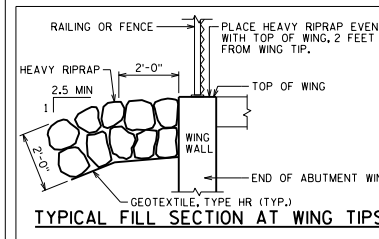
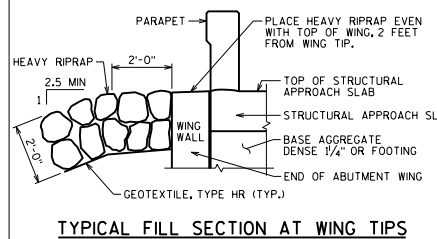
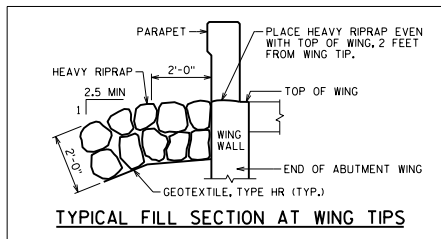
WITH RAILING OR FENCE ONLY

STANDARD WING

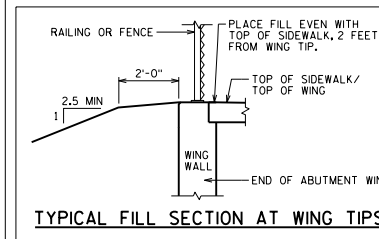
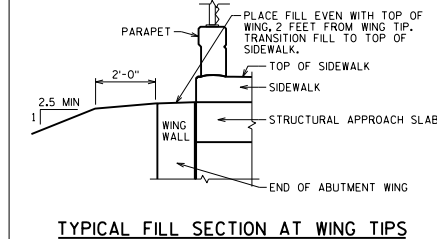
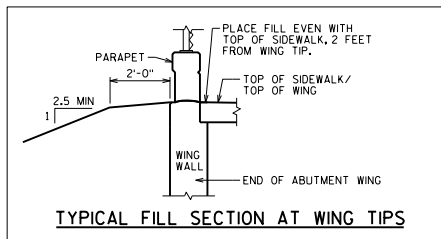
STANDARD FILL



RIP RAP



STANDARD FILL WITH SIDEWALK



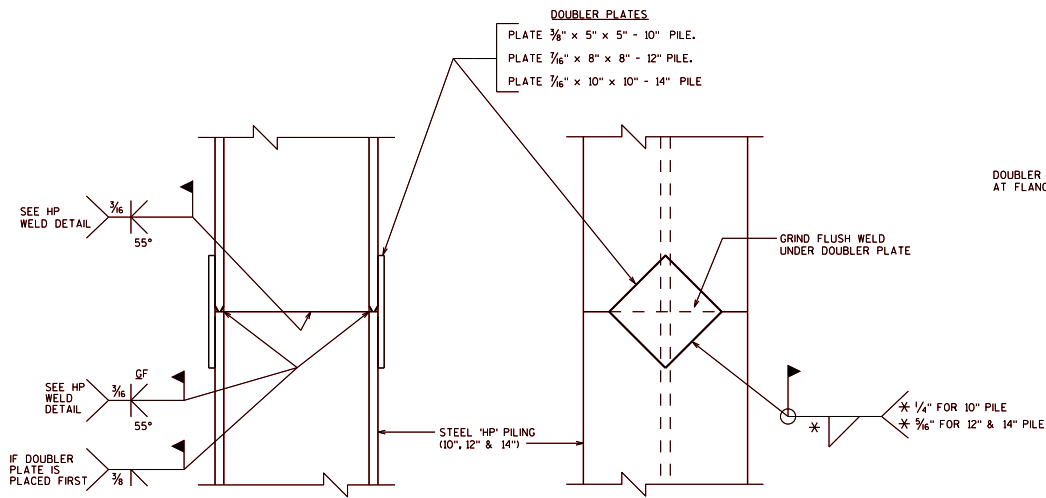
WING FILL SECTIONS AT WING TIPS



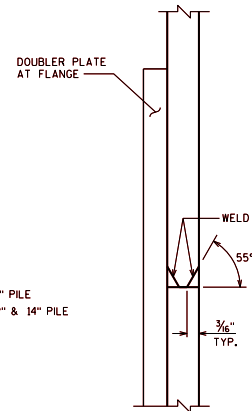
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

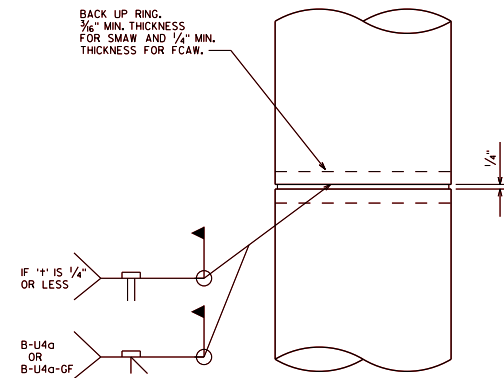
DATE:
1-18



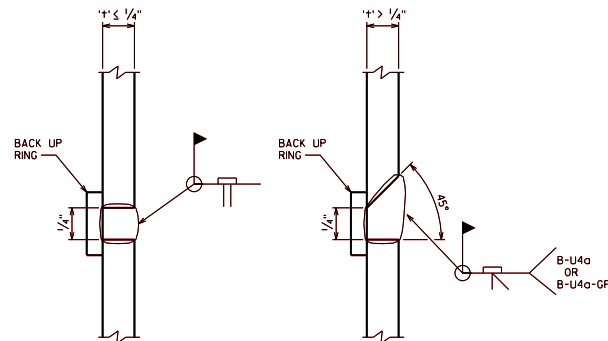
STEEL 'HP' SHAPES



HP WELD DETAIL
FLANGE SHOWN, WEB SIMILAR



CAST-IN-PLACE 'PIPE PILE'



CIP PILE WELD DETAIL

DESIGNER NOTES

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

SEE WISDOT POLICY ITEM IN BRIDGE MANUAL 11.3.112.3 FOR GUIDANCE ON "HP" PILES.

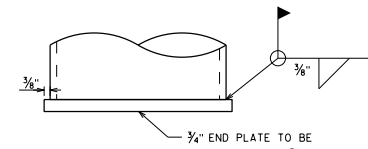
SEE BRIDGE MANUAL SECTION 11.3.117.7 FOR PILE RESISTANCE VALUES.

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

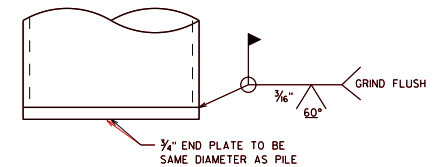
NOTES

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



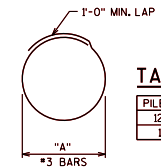
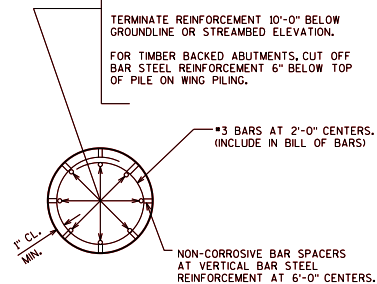
**END PLATE DETAIL FOR CIP PILING
IN ARTESIAN CONDITIONS**

(ONLY USE FOR ARTESIAN CONDITIONS)

FOR $12\frac{3}{4}$ " DIA. PILES, USE 6 - #7 BARS.
FOR 14" DIA. PILES, USE 8 - #7 BARS.
INCLUDE IN BILL OF BARS, EXTEND 1'-0" (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.



TABLE

PILE DIA.	DIM "A"	LENGTH
$12\frac{3}{4}$ "	$9\frac{3}{4}$ "	3'-7"
14"	11"	3'-11"

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

PILE DETAILS



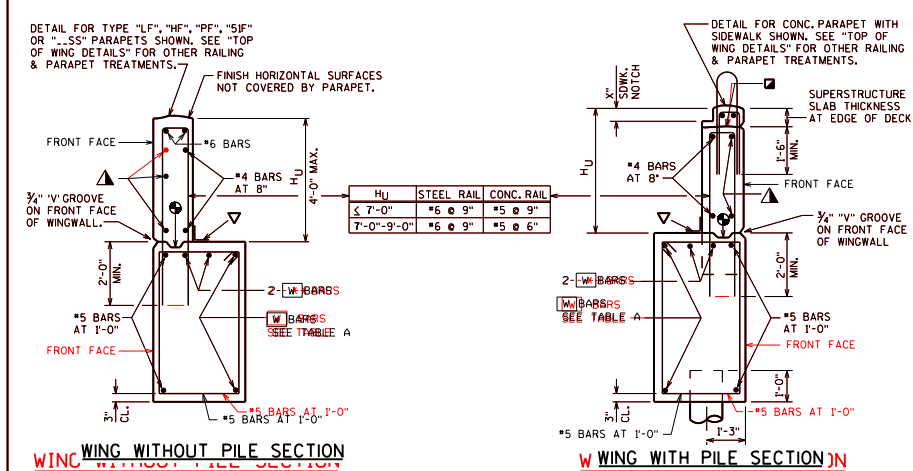
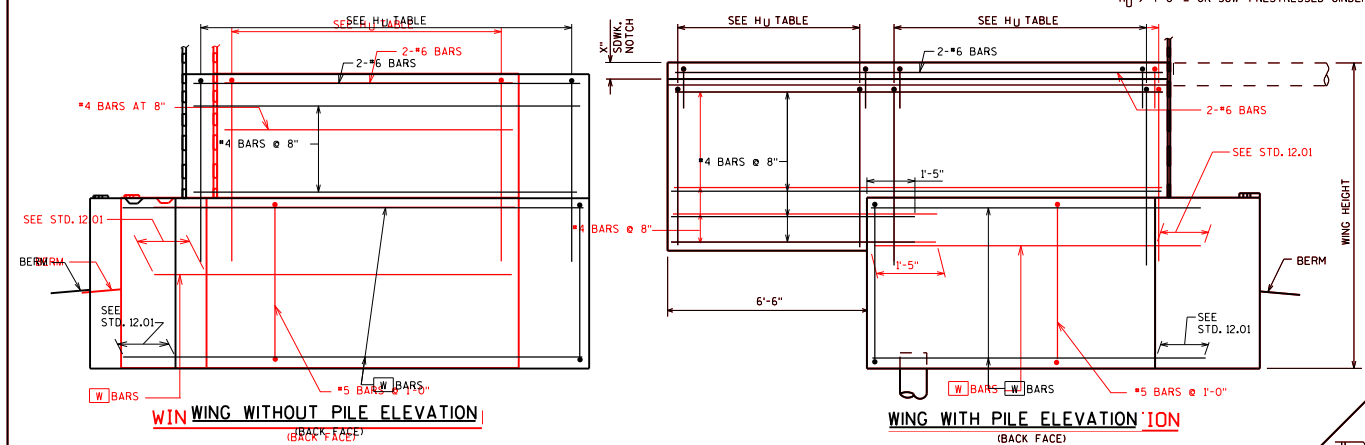
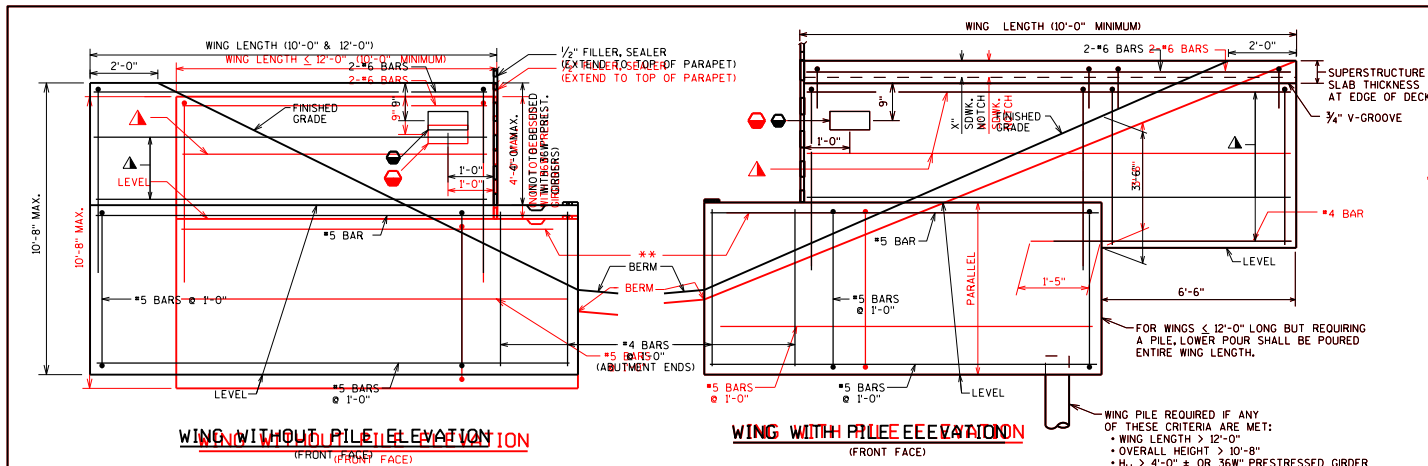
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18



STANDARD 12.01



DESIGNER NOTES

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

NAME PLATE ONLY FOR TYPE BARS. NAME PLATE BEAD BAR BARS AS SHOWN ON STANDARD SHEET. LOCATE NAME PLATE ON FIRST RIGHT WING TRAVELING UP STATION.

WING BARS AND DOWEL BARS SHALL BE EPOXY COATED.

SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF 1/2" FILLER WITH NON-SHANNING, NON-BITUMINOUS, FLEXIBLE SEALER. DEEP AND HOLD 1/4" BELOW SURFACE OF CONCRETE. IN BACKFACE SEALER IS BEHIND GUTTER RAIL AND INSIDE FACE.

LRFD DESIGN LOADS

NO VERTICAL SURFACES OF 1/2" FILLER WITH NON-SHANNING, NON-BITUMINOUS, FLEXIBLE SEALER. DEEP AND HOLD 1/4" BELOW SURFACE OF CONCRETE. EXTERIOR SEALANT BEHIND GUTTER RAIL AND INSIDE FACE.

$f_c = 3,500$ P.S.I.
 $f_y = 60,000$ P.S.I.
 $\gamma_{DC} = 1.25$
 $\gamma_{EH} = 1.50$
 $\gamma_{EV} = 1.35$
 $\gamma_{LS} = 1.75$
 HORIZ. EARTH LOAD BASED ON: 35 P.C.F. EQUIV. FLUID UNIT WEIGHT OF SOIL

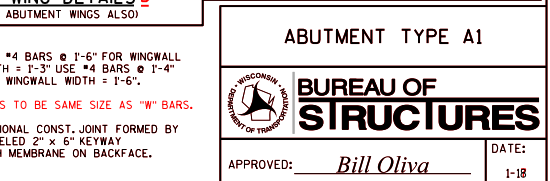
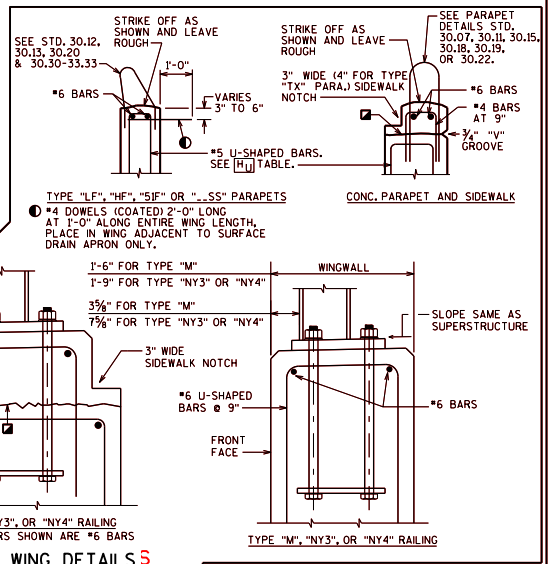
TABLE A - SIGN LOADS

WING LENGTH $\geq 2'-0"$ SURCHING WING HEIGHT EXPOSURE CLASS 2, $\gamma_e = 0.75$

WING HEIGHT	10'-0"	11'-6"	13'-0"	14'-6"	16'-0"	17'-6"	19'-0"	20'-0"	21'-6"	23'-0"	24'-0"
10'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
11'-6"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
13'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
14'-6"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
16'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
17'-6"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
19'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
20'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
21'-6"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
23'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6
24'-0"	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6	#6-#6

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

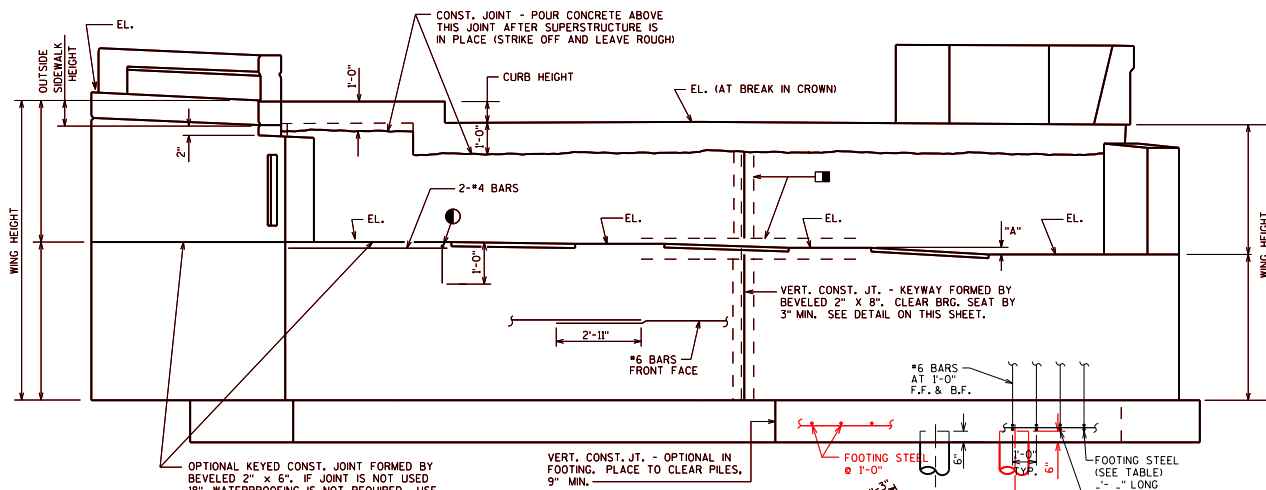
* WING WITHOUT PILE VALUES SHOWN. (FOR WING WITH PILE THAT HAS WING LENGTH IN THIS REGION, USE VALUES FOR 11'-6" WING HEIGHT.)



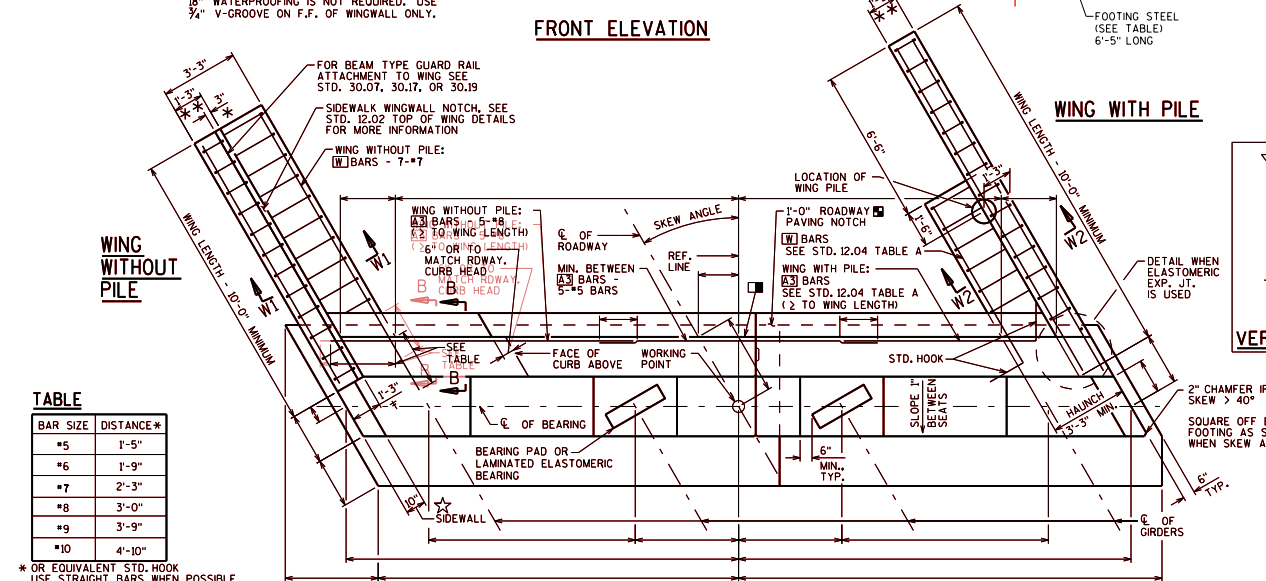
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-18



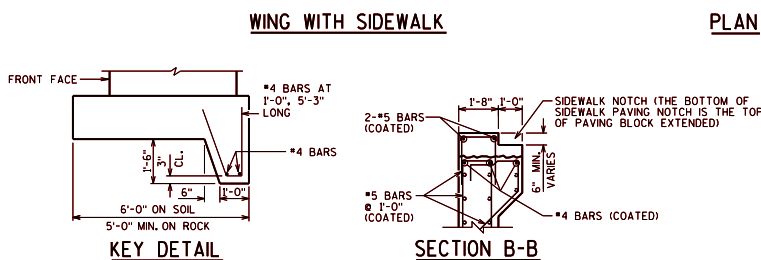
FRONT ELEVATION



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



PILE REACTIONS PER FOOT IN KIPS

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

NOTES:

h = WING HEIGHT (FT.)

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

FRONT ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH γ_{DC} = 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_{DC} 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.

PIILING 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.

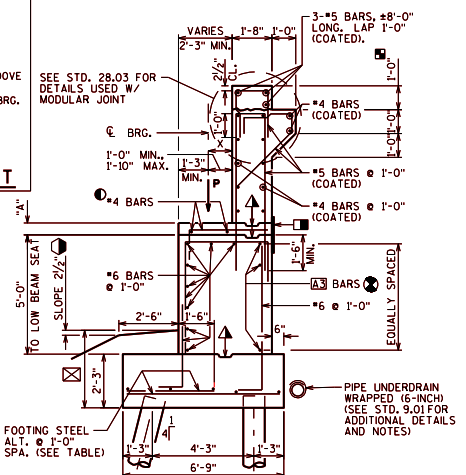
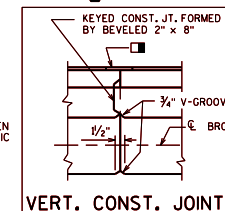
PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

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

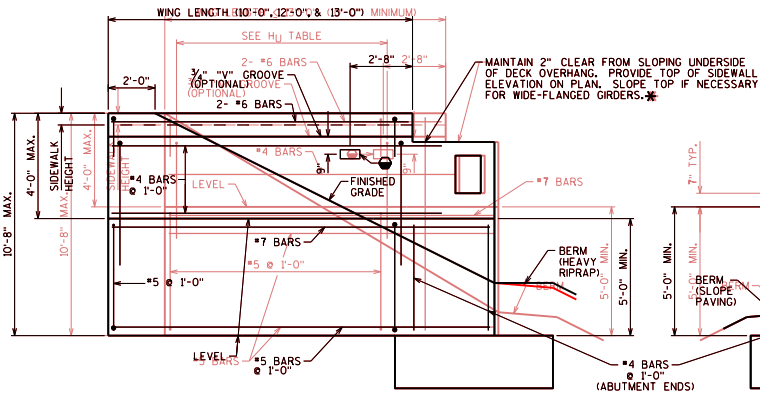
ABUTMENT TYPE A3



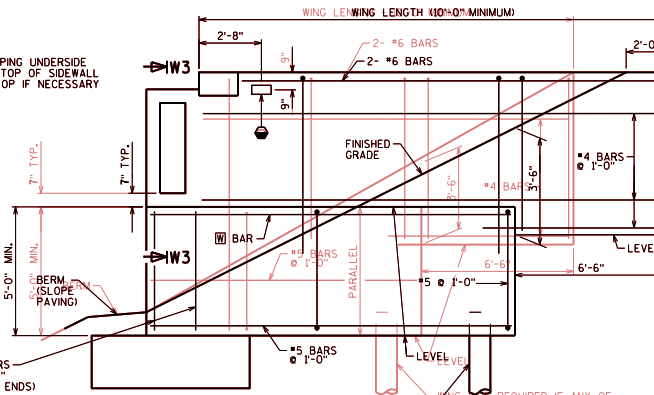
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

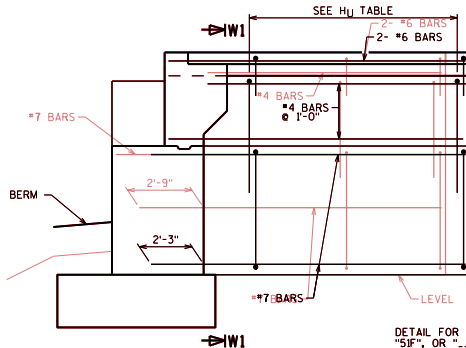
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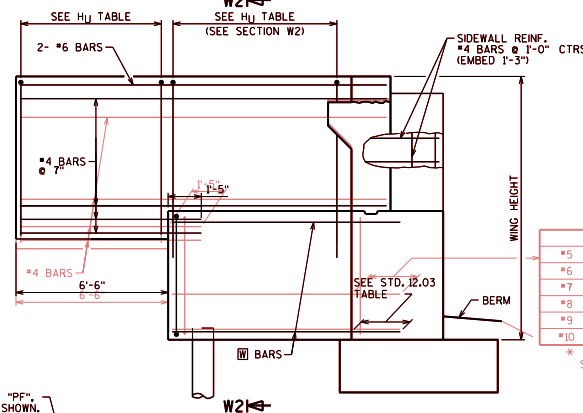
WING WITHOUT PILE ELEVATION
(FRONT FACE)



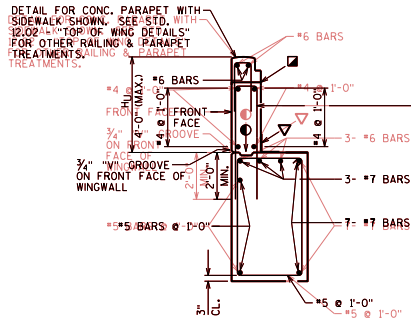
WING WITH PILE ELEVATION
(FRONT FACE)



WING WITHOUT PILE ELEVATION
(BACK FACE)

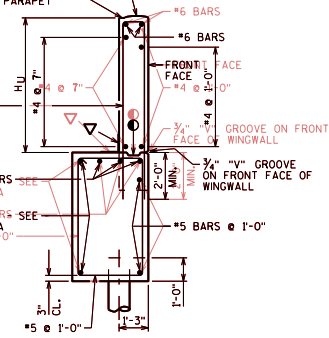


WING WITH PILE ELEVATION
(BACK FACE)

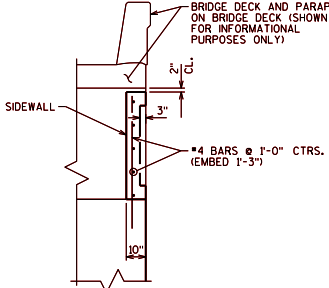


SECTION W1
(WING WITHOUT PILE)

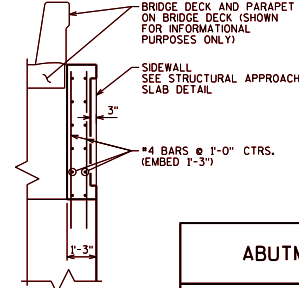
H ₁	STEEL RAIL	CONC. RAIL
< 7'-0"	#6 @ 9"	#5 @ 1'-0"
7'-0" - 9'-6"	#6 @ 9"	#5 @ 6"



SECTION W2
(WING WITH PILE)



SECTION W3
(WITHOUT STRUCTURAL APPROACH SLAB)



SECTION W3
(WITH STRUCTURAL APPROACH SLAB)

DESIGNER NOTES

SEE STD. 12.03 FOR ADDITIONAL DESIGNER NOTES.

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

NAME PLATE (ONLY FOR TYPE "W", "W", AND "M" OR TIMBER RAIL AS SHOWN ON STANDARD 30.24). LOCATE NAME PLATE ON FIRST RIGHT WING, TRAVELING UP STATION. SHALL BE BASED ON A 7'-0" MAX. TOP TENSION BAR SPACING. FOR MODULAR EXPANSION JOINTS WITH CONCRETE DIAPHRAGMS RUNNING TO EDGE OF DECK, IF SIDEWALK IS USED, FORM SIDEWALL SHALL BE BELOW CONCRETE DIAPHRAGM.

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

OPTIONAL CONSTRUCTION JOINT: FORMED BY BEVELED 2" X 6" KEYWAY WITH MEMBRANE ON BACKFACE. C.F. WITH $\frac{1}{2}$ IN. $\frac{1}{2}$ IN. AND 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. SHALL 2" BELOW CONCRETE DIAPHRAGM.

LRFD DESIGN LOADS

LIVE LOAD: 2.0 KIP/FT² SURCHARGE OPTIONAL FOR OTHERS. POUR LOAD FACTORS: 1.25

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

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

EXPOSURE CLASS 2, $\phi = 0.15$

1.5 KIP/FT² SURCHARGE

TABLE A

WING 2' LENGTH	WING 2' HEIGHT	WING 2' BARS
10'-0"	11'-6"	13'-0"
12'-0"	13'-0"	14'-6"
14'-0"	14'-6"	16'-0"
16'-0"	16'-0"	17'-6"
18'-0"	17'-6"	19'-0"
20'-0"	19'-0"	20'-6"
22'-0"	20'-6"	22'-0"
24'-0"	22'-0"	23'-6"
26'-0"	23'-6"	25'-0"

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

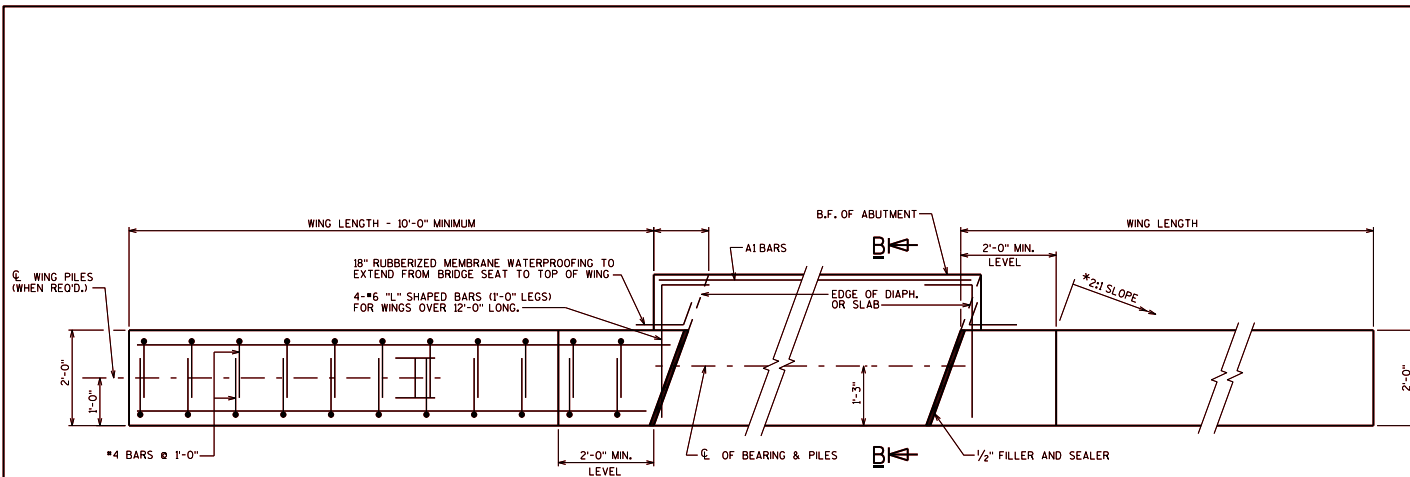
ABUTMENT TYPE A3



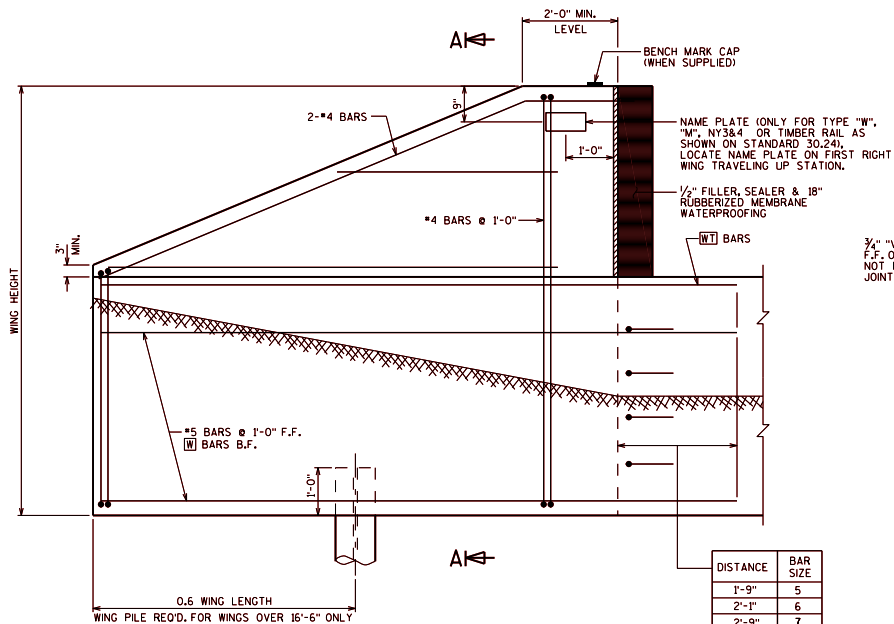
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 1-20

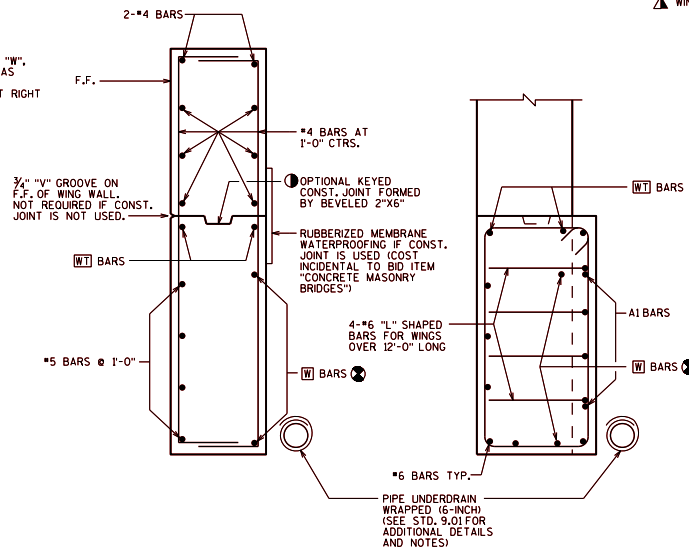


PLAN FOR TYPE A1 ABUTMENT
(SEE STD. 12.01 FOR ABUTMENT BODY DETAILS)



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'-0" FOR THE UNSTABLE CLAYS.
*USE 2'-0" FOR THE UNSTABLE CLAYS (WHICH ARE SOMETIMES ENCOUNTERED IN THE SUPERIOR AREA).

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

ALL WING BARS SHALL BE EPOXY COATED.

2 SHOW ALL LONGITUDINAL BARS FOR CLARITY.

LRFD DESIGN LOADS (WINGS)

LIVE LOAD = 1'-0" SURCHARGE

LOAD FACTORS:

$\phi_{DC} = 1.25$

$\phi_{EM} = 1.50$

$\phi_{LS} = 1.75$

EXPOSURE CLASS 2, $X_c = 0.75$

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

WEIGHT OF SOIL

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

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

TABLE A

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

▲ WING PILE REQUIRED

DETAILS FOR WINGS
PARALLEL TO A1
ABUTMENT CENTERLINE

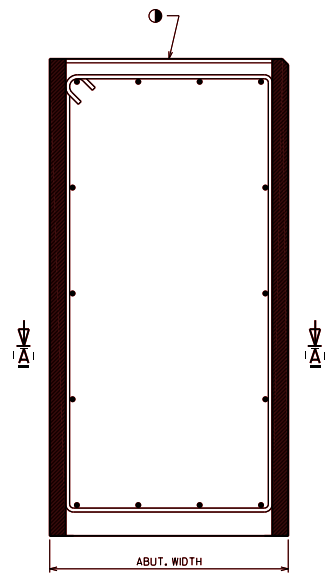
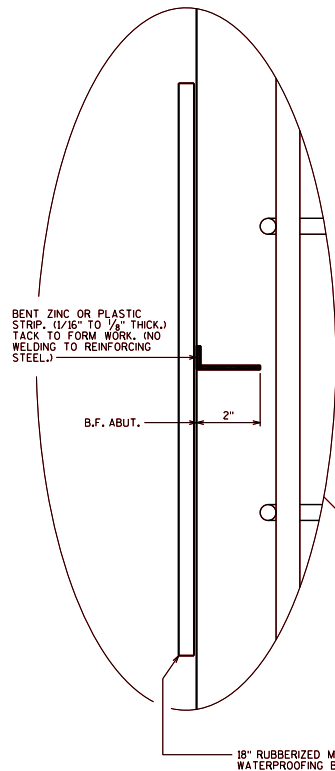
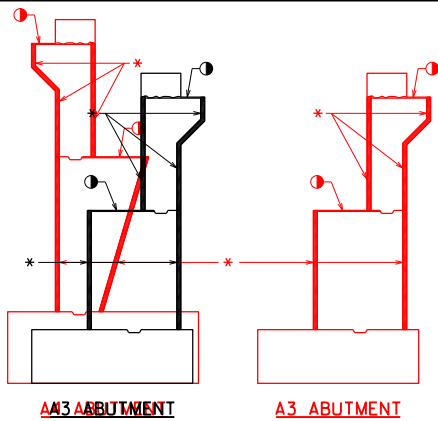


**BUREAU OF
STRUCTURES**

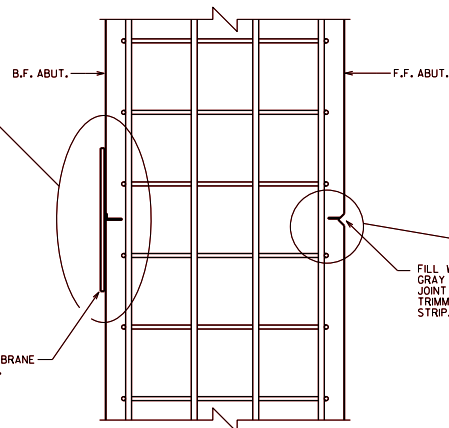
APPROVED: Bill Oliva

DATE:

1-11

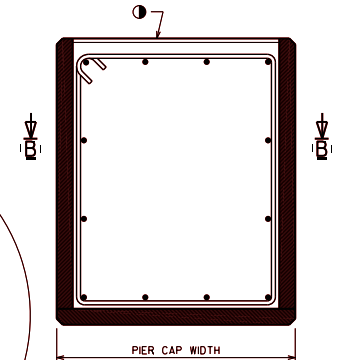
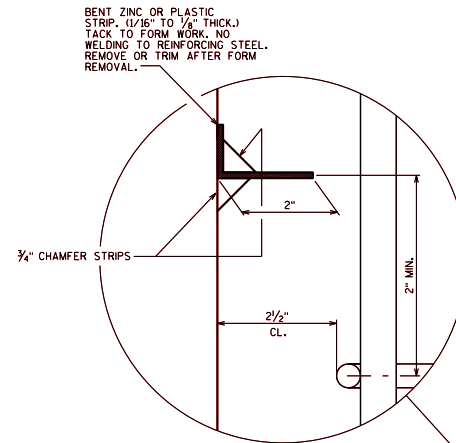


SECTION THRU
ABUTMENT BODY
A1 ABUTMENT SHOWN, A5 SIMILAR

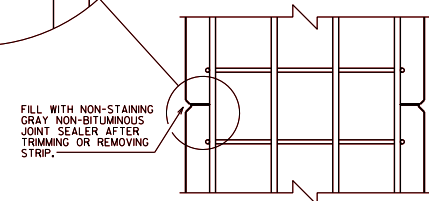


SECTION A-A

ALTERNATE CONSTRUCTION JOINT AT ABUTMENT

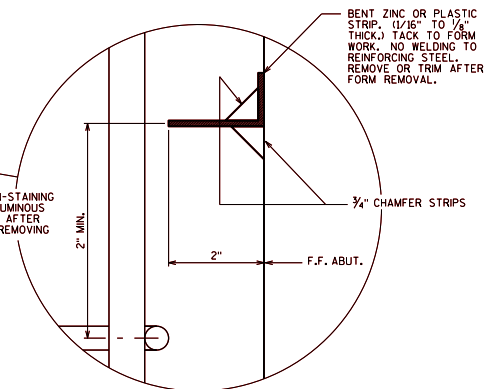


SECTION THRU
PIER CAP



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.

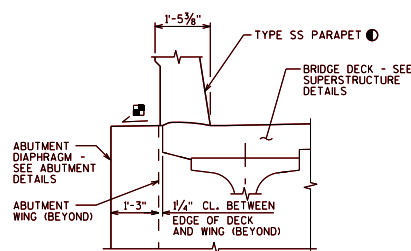
- 1 USE A JOINT TOOL TO CONSTRUCT A CONTRACTION JOINT APPROXIMATELY 1/2" DEEP.
- * BENT ZINC OR PLASTIC STRIP.

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

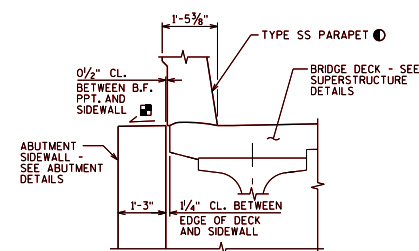


-
- Diagram showing the elevation view of the wing wall and approach slab. Key dimensions and components include:
- Wing wall height: 1'-5 3/8"
 - Wing wall thickness: 1/2" CL. BETWEEN B.F. PRT / APPROACH SLAB AND B.F. WING
 - Reinforcement: TYPE SS PARAPET (1), T510 @ 1'-0" (BETWEEN T508), T507 @ 1'-0", T508 @ 1'-0", T505 @ 1'-0"
 - Abutment wing wall - SEE ABUTMENT DETAILS
 - Approach slab: T803 @ 7 1/2"
 - Wing wall base: 3"
 - Approach slab base: 9 SPA. @ 6 1/2" = 4'-10 1/2"
 - Reinforcement: T803

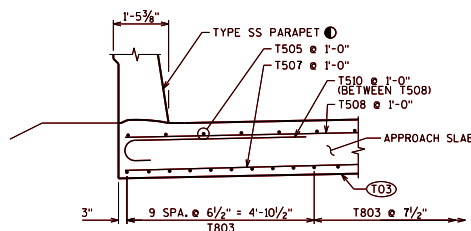
SECTION C-C
(AT WINGWALLS PARALLEL TO BRIDGE)



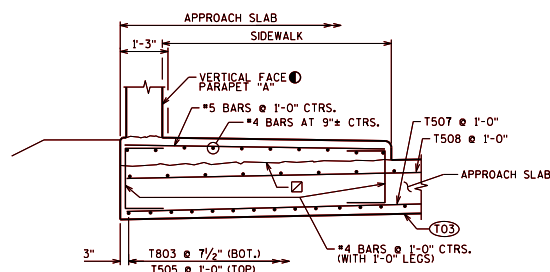
SECTION D-D
(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT.)



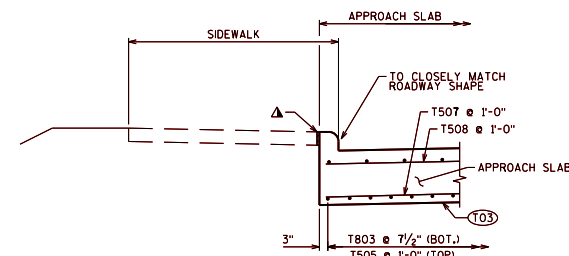
SECTION D-D*
(AT/AT WING WALLS PARALLEL TO BRIDGE A3 A3 ABUT.) (T.)



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

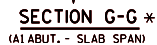
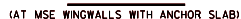


SECTION C-C*
(AT WINGWALLS PARALLEL TO ABUT.)

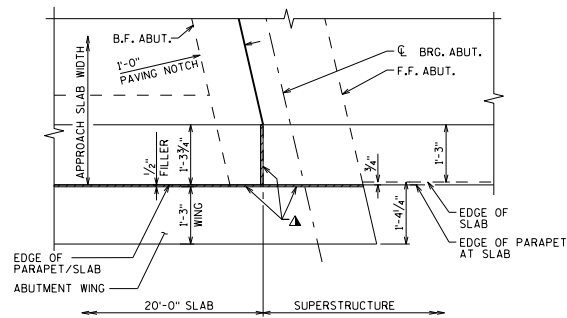


SECTION C-C*
(AT WINGWALLS PARALLEL TO ABUT.)

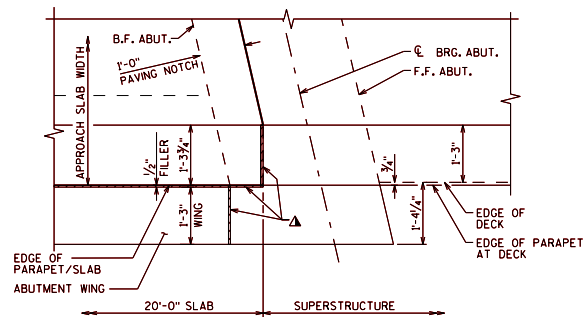
STANDARD 12.11



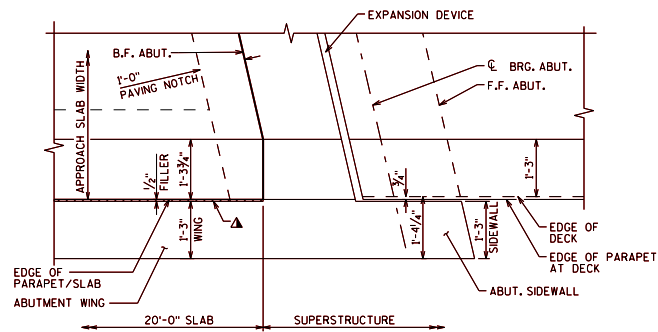
STANDARD 12.12



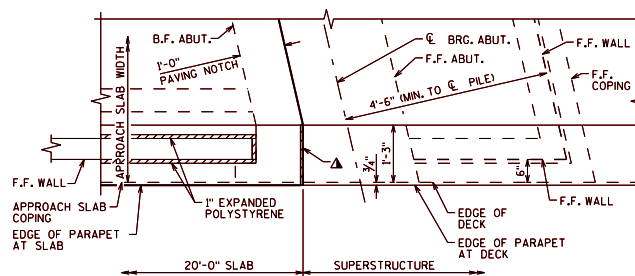
APPROACH SLAB PARTIAL PLAN
(AT WINGWALLS PARALLEL TO BRIDGE - A1 ABUT. - SLAB SPAN)



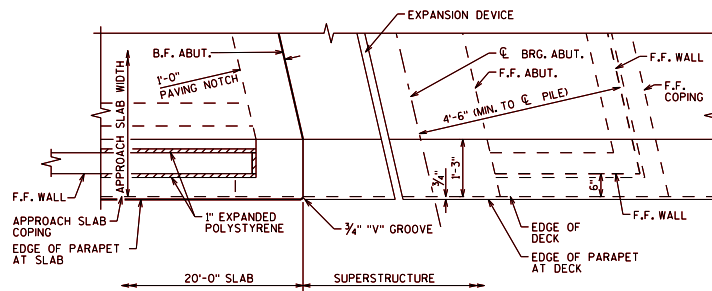
APPROACH SLAB PARTIAL PLAN
(AT WINGWALLS PARALLEL TO BRIDGE - B1 ABUT. - ABUT. SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - B1 ABUT. - ABUT. SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - B1 ABUT. - ABUT. SPAN)



APPROACH SLAB PARTIAL PLAN *
(AT WINGWALLS PARALLEL TO BRIDGE - B1 ABUT. - ABUT. 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

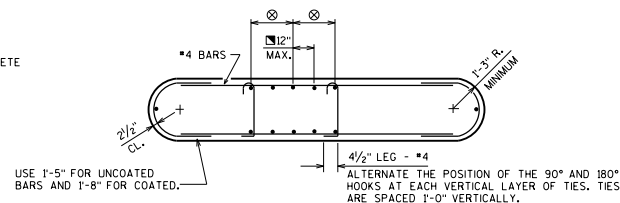
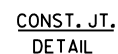
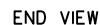


**BUREAU OF
STRUCTURES**

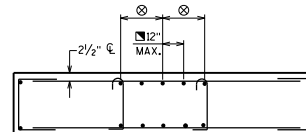
APPROVED: Bill Oliva

DATE:
7-18

CONCRETE SLAB STRUCTURES



SECTION P1



ALTERNATE SECTION P1

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 DOES NOT EXCEED 25'-0". DETAIL BAR SPLICES AT OPTIONAL JOINTS IF THE BAR PROJECTION WOULD BE GREATER THAN 20'-0". RUSTICATIONS SHOWN IN "CONST. JT. DETAIL" MAY BE OMITTED AT THE OPTION OF THE DESIGNER.

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

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

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

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

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

1. FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS
WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.
SEE STANDARD 13.01.
2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF
CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

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

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

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

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

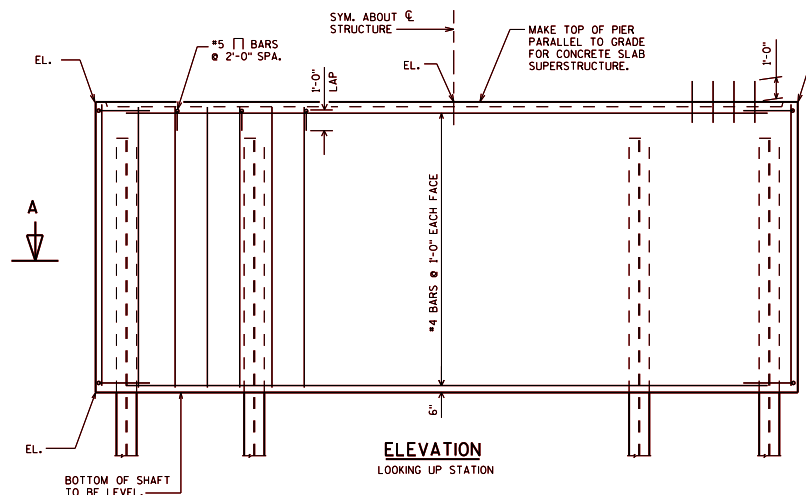
EPOXY COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS
UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE SEPARATIONS.

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

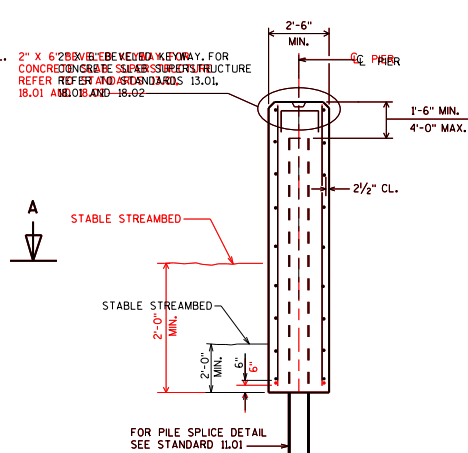
- ⊗ MAXIMUM SPACING BETWEEN UNRESTRAINED VERTICAL BAR AND RESTRAINED (TIED ACROSS MEMBER) VERTICAL BAR IS 24 INCHES.

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.

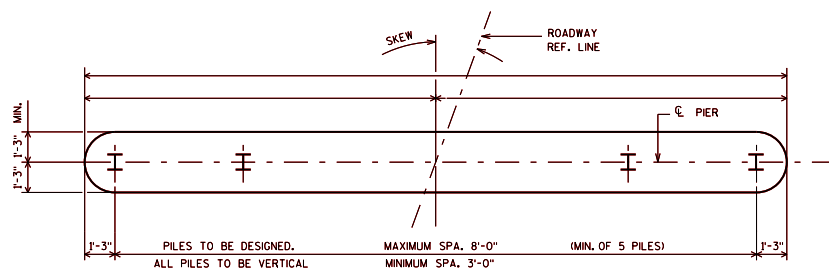
HAMMERHEAD PIER	
	BUREAU OF STRUCTURES DATE: _____ 1-15
APPROVED: _____ <i>Bill Oliva</i> _____	



ELEVATION
LOOKING UP STATION

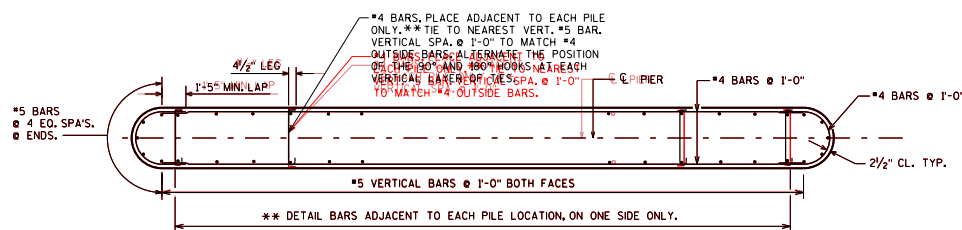


END VIEW

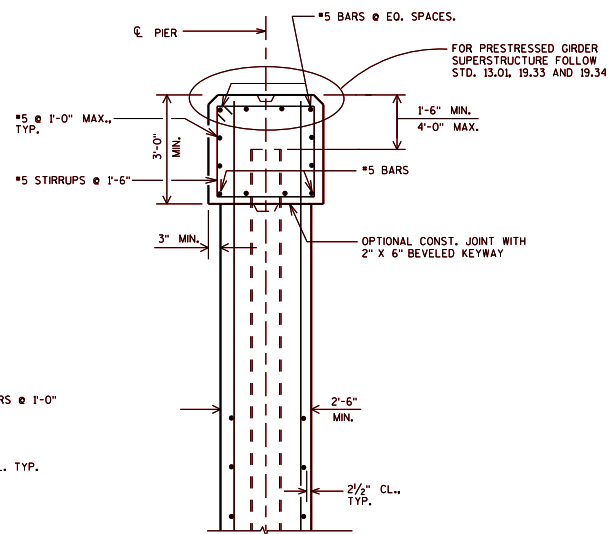


PLAN

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



SECTION A-A



CAP TYPE DETAIL

USE WHEN ECONOMICAL FOR GIRDERS
ON LARGE SKEWS

NOTES

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

DESIGNER NOTES

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

SEE BRIDGE MANUAL SECTION 13.11.5 FOR GUIDANCE ON COFFERDAMS.

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

SEE STANDARD 13.01 FOR ADDITIONAL, APPLICABLE DESIGNER NOTES

PILE ENCASED PIER



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:

1-19

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

SYM. ABOUT C
OF STRUCTURE

MAX. LENGTH OF SINGLE PILE 40 FT. WHEN USED AS BEVELLED 2"x6" KEYS BETWEEN PILES.
(SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINT)

GIVE ELEVATIONS
OF BEAM SEATS

EL.

SEE STD. 13.01 FOR CRITERIA
ON WHEN TO SLOPE BOTTOM
OF CAP.

BATTER EXTERIOR
PILING 2" PER FT.

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

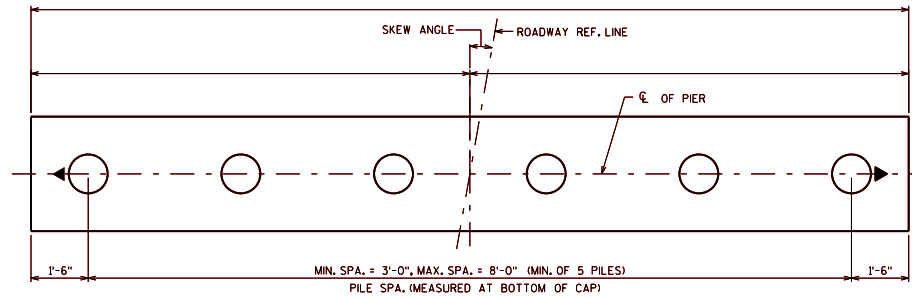
DESIGNER NOTES

1. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP (PARALLEL TO GRADE) SEE STANDARD 13.01 BEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.
2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP (PARALLEL TO GRADE) SEE STANDARD 13.01 BEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

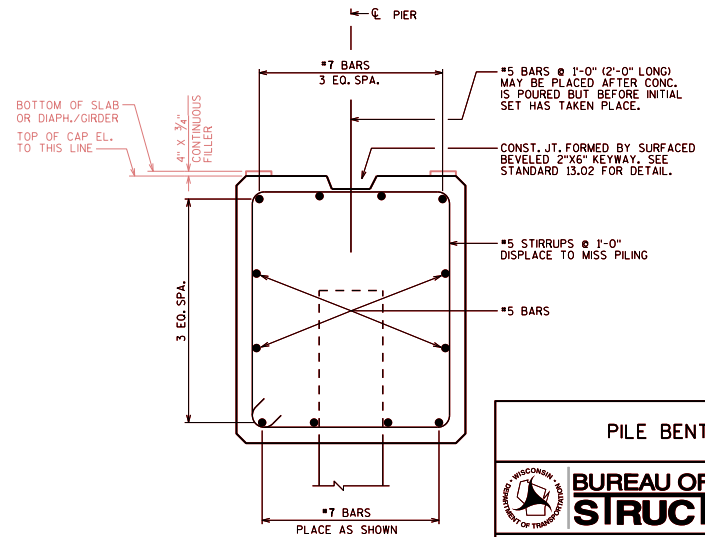
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

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

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



PLAN



SECTION A-A

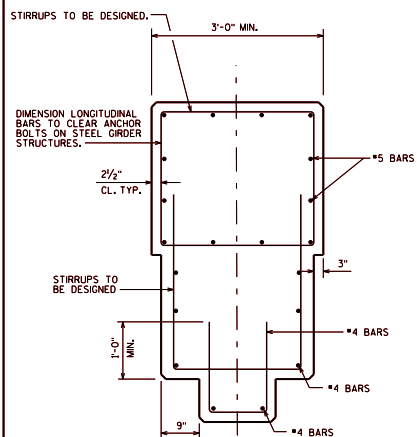
PILE BENT



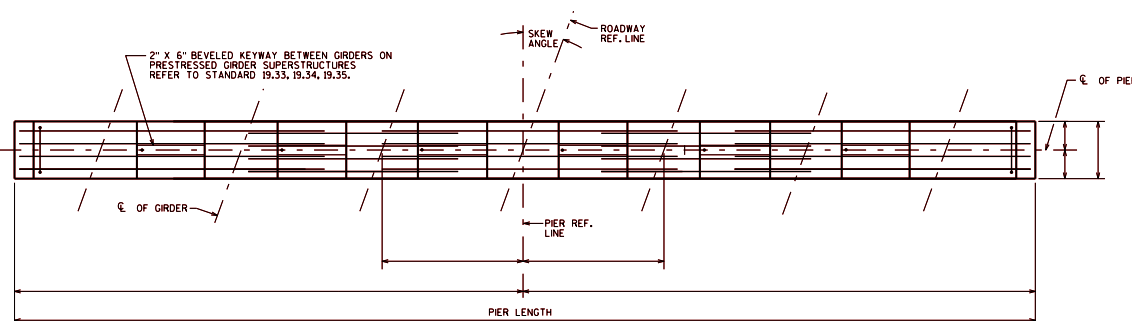
**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

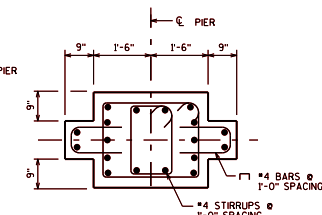
DATE:
1-20



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 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.

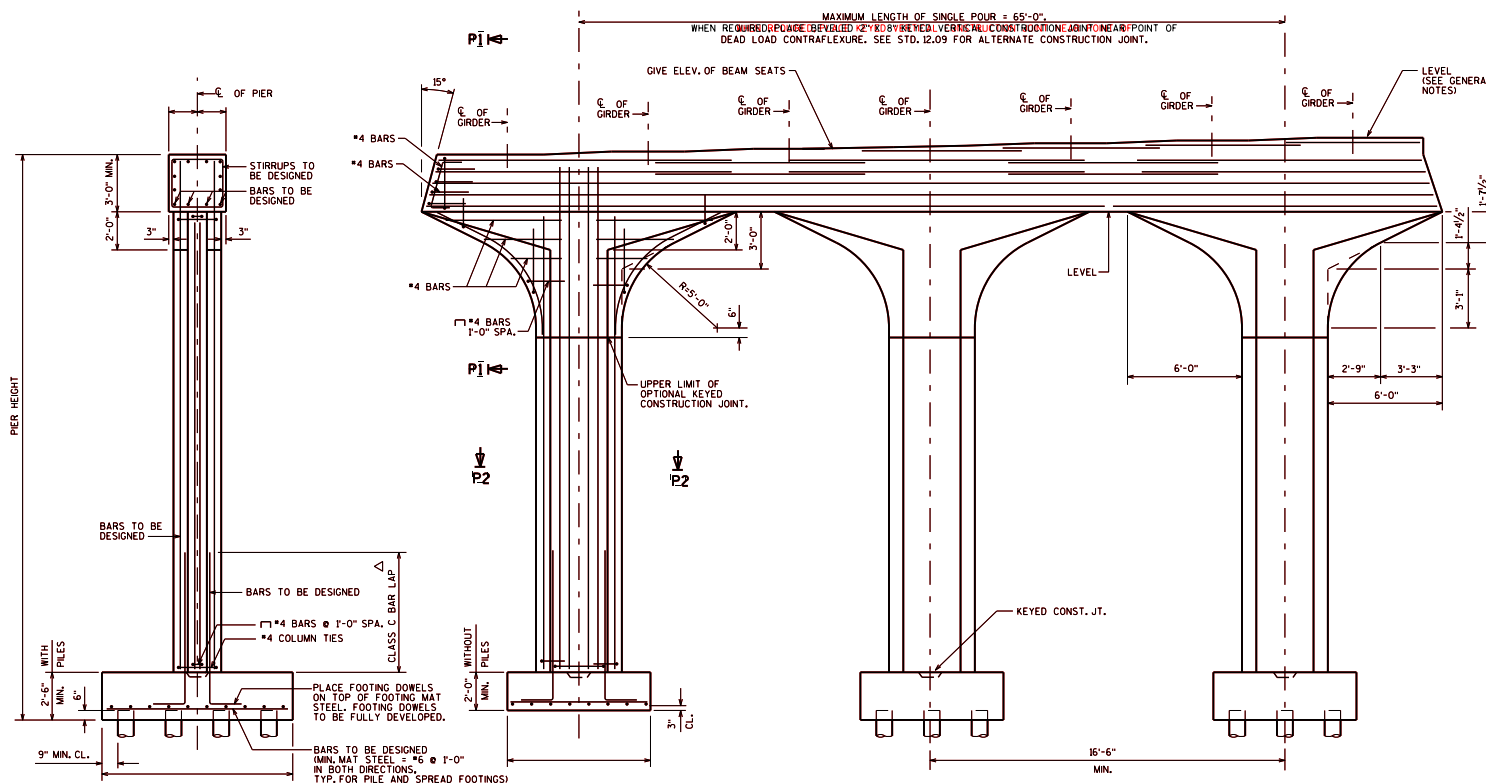
BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.

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 13.410 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

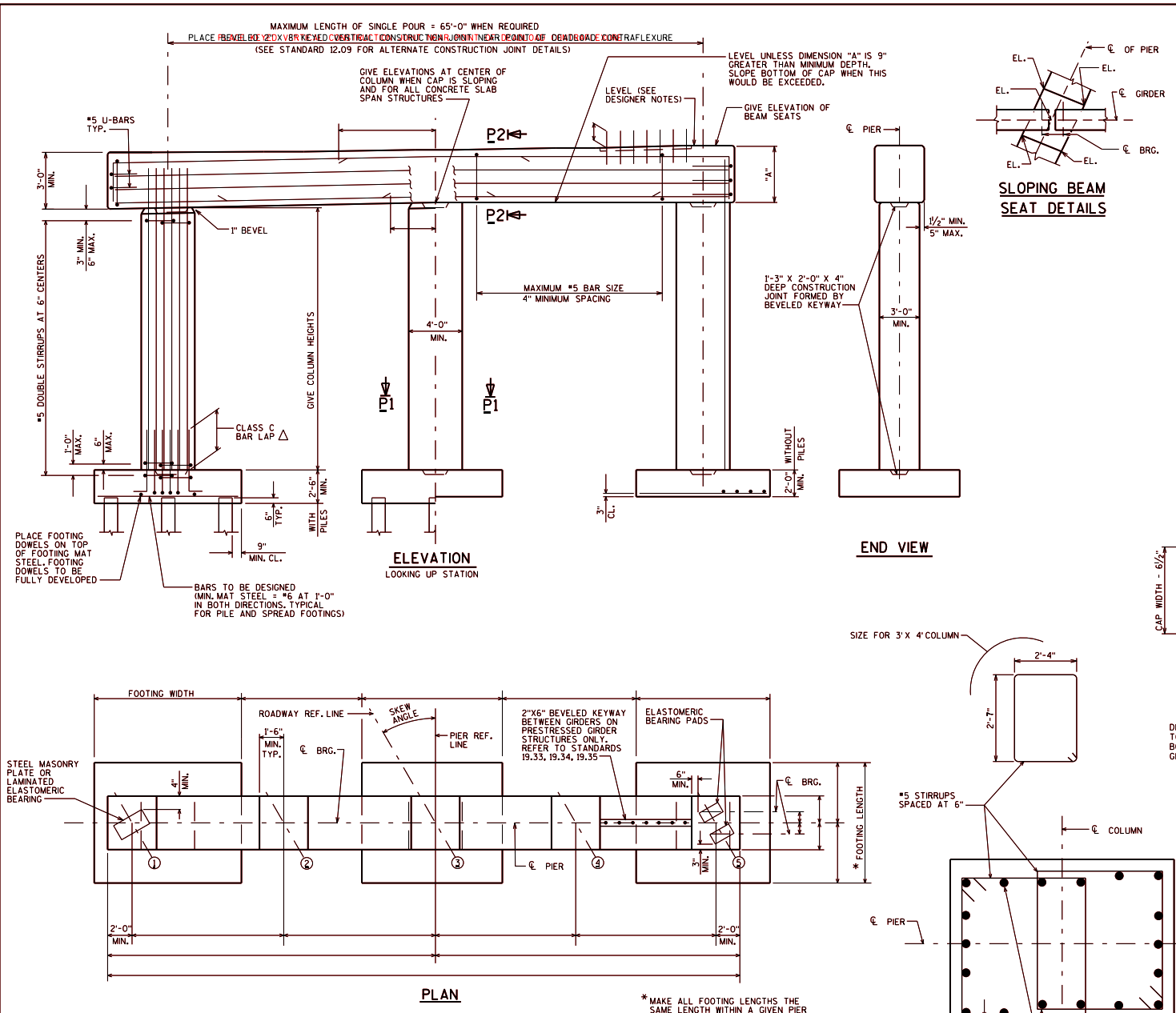
**MULTI-COLUMNED
PIER TYPE 2**



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-20



DESIGNER NOTES

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

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

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

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

1. FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.

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

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

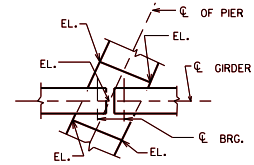
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

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

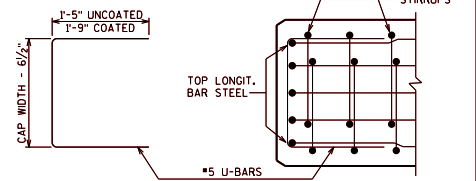
BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT STEEL) MAY BE DETAILED FULL LENGTH IF A MINOR COST INCREASE.

SEE BRIDGE MANUAL 13.4.10 FOR MULTI-COLUMNED PIER DESIGN REGARDING VEHICULAR COLLISION FORCE. THE PIER AS DETAILED ON THIS STANDARD IS ADEQUATE TO RESIST THE REQUIREMENTS OF AASHTO LRFD 3.6.5 FOR VEHICULAR COLLISION FORCE PROVIDED THAT RUSTICATIONS DO NOT EXCEED 1-1/2 INCH.

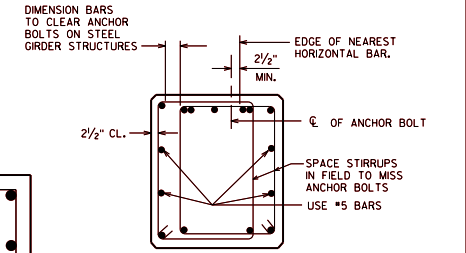
△ NORMALLY THIS LAP IS OMITTED AND FOOTING DOWELS EXTENDED INTO THE CAP IF THE LAP IS GREATER THAN ONE-HALF THE COLUMN HEIGHT.



SLOPING BEAM SEAT DETAILS



PLAN VIEW SHOWING END OF CAP REINF.



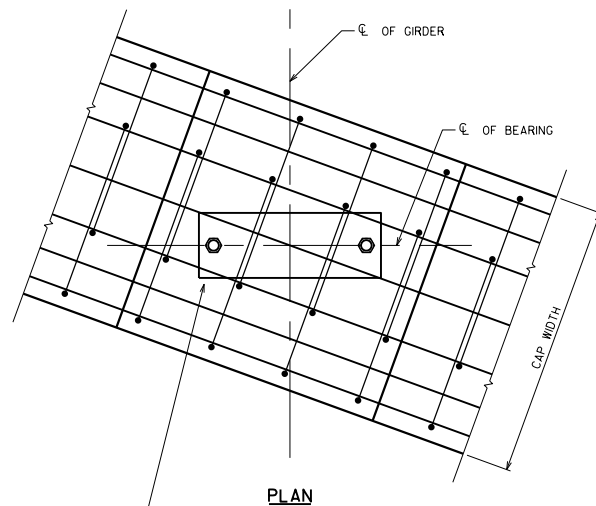
SECTION P2

MULTI-COLUMNED PIER WITH RECTANGULAR COLUMNS

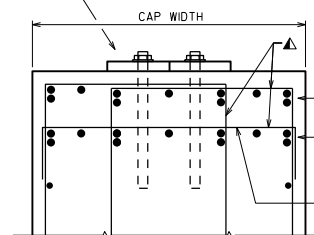


BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-20



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:

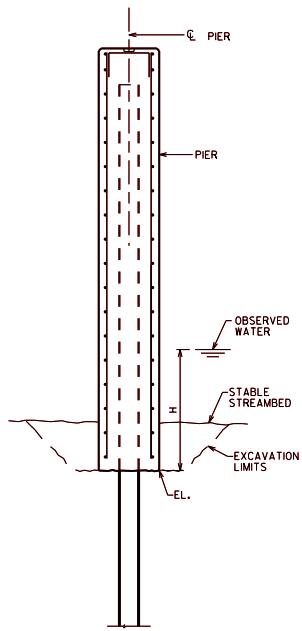
TYPE 1 - COFFERDAM BID ITEM NOT PROVIDED. CONSIDER PROVIDING UNDERWATER INSPECTION BID ITEM.

TYPE 2 - COFFERDAM AND UNDERWATER INSPECTION BID ITEMS REQUIRED.

TYPE 3 - COFFERDAM AND SEAL BID ITEMS REQUIRED.

WALL PIER ALTERNATIVES:

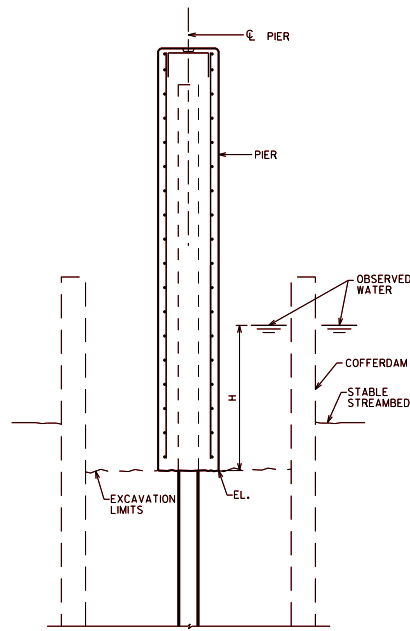
- SOLID WALL (AS SHOWN ON THIS STANDARD)
- HAMMERHEAD (SEE STANDARD 13.02)



END VIEW

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

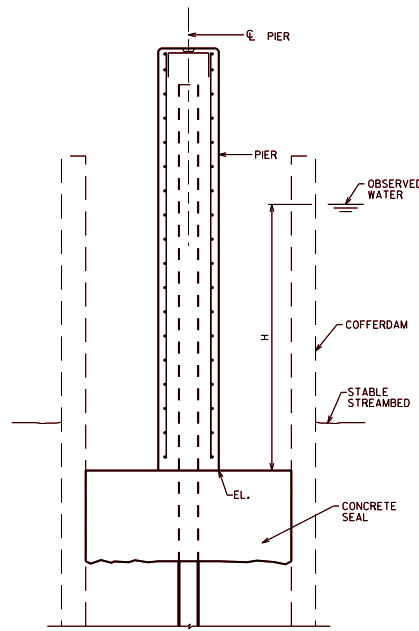
ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.9000.S	UNDERWATER SUBSTRUCTURES INSPECTION (STRUCTURE)	EACH



END VIEW

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

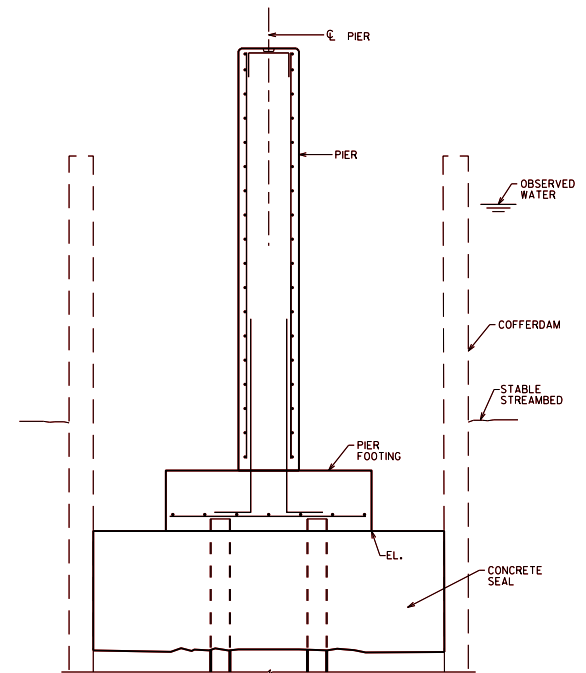
ITEM NUMBER	BID ITEM	UNIT
206.5000	COFFERDAMS (STRUCTURE)	LS
502.1100	CONCRETE MASONRY SEAL	CY



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)

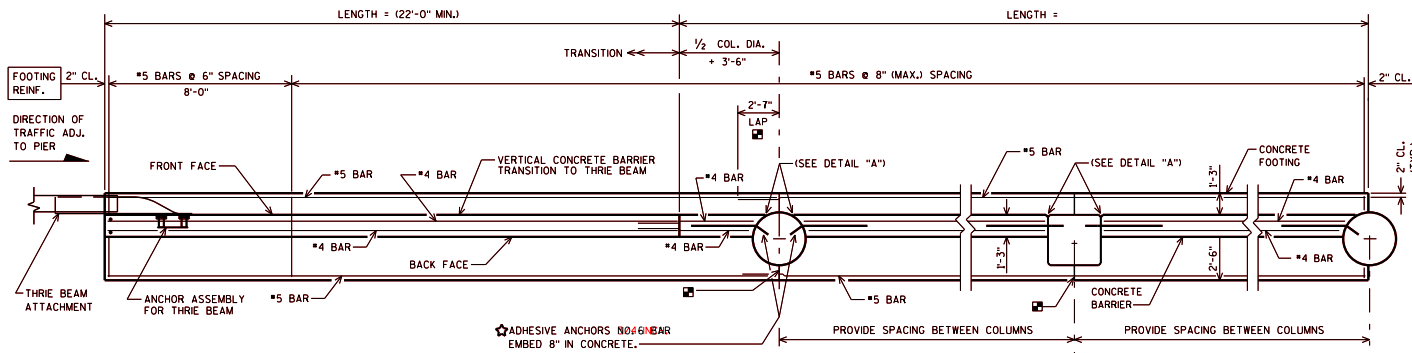


**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

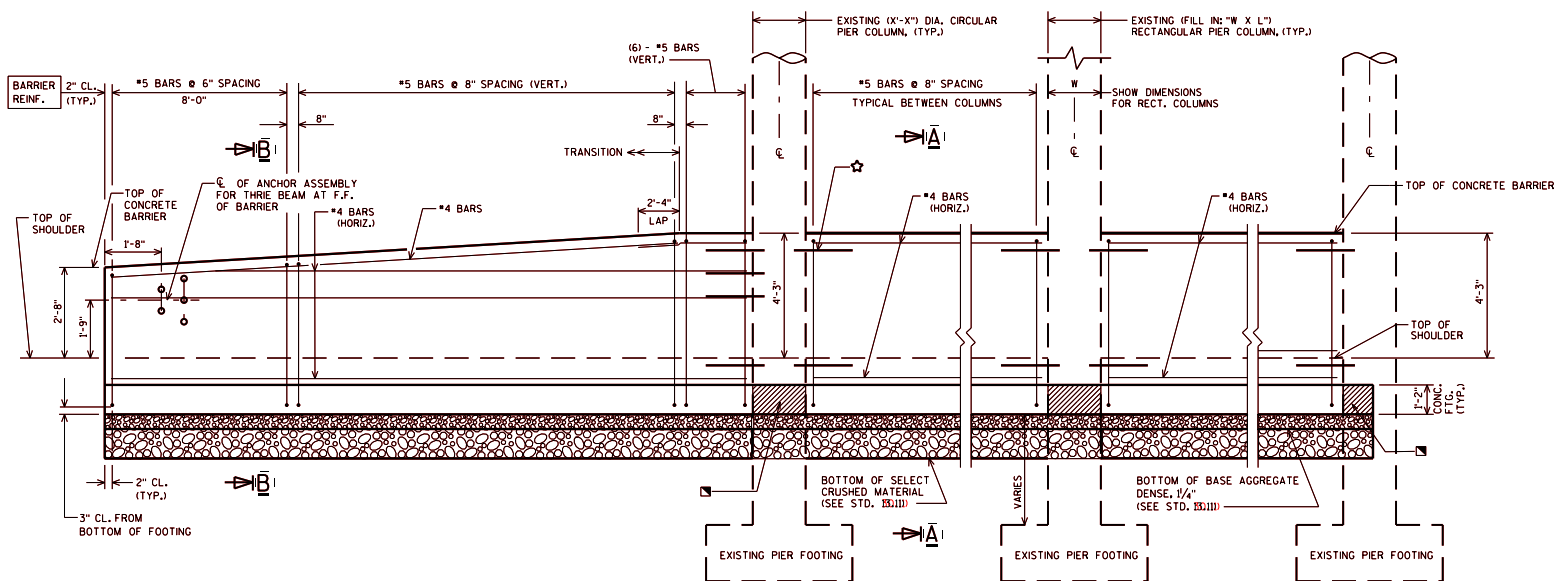
DATE:

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

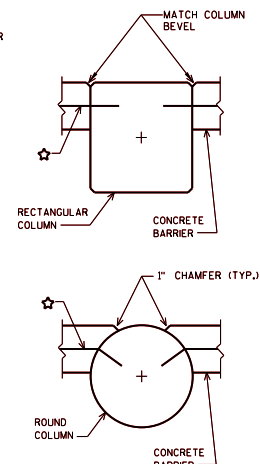


ULTIMATE DESIGN STRESSES:

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.

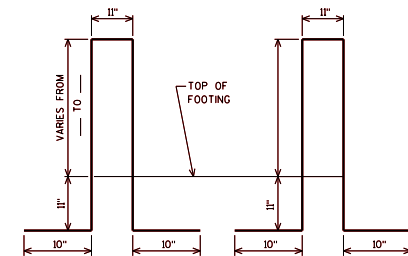
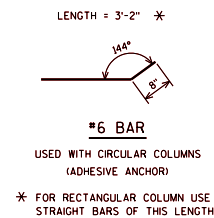
51-INCH CONCRETE INTEGRAL BARRIER



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-26



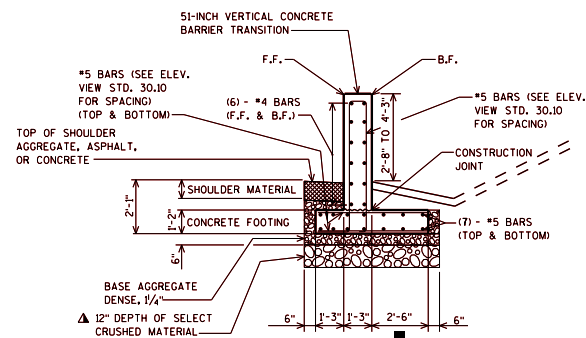
#5 BAR
BARRIER REINF. IN
TRANSITION REGION

#5 BAR
BARRIER REINF.
BETWEEN COLUMNS

BAR BENDING DIAGRAMS

BAR DIMENSIONS ARE OUT TO OUT OF BAR

SECTION 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.

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:

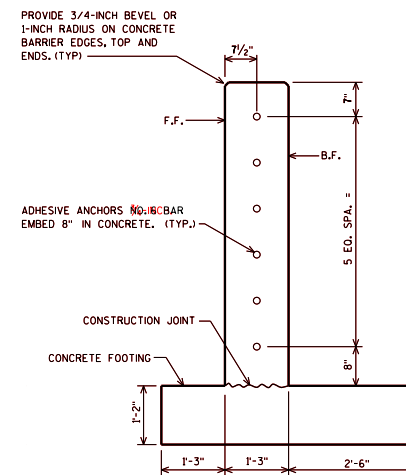
- TWO-LANE ROAD IS ADJACENT TO BARRIER AND THERE IS A CONCERN FOR TRAFFIC TO CROSS-OVER.
- FUTURE TRAFFIC CONTROL NEEDS MAY CAUSE THE DIRECTION OF TRAFFIC ADJACENT TO BARRIER TO BE REVERSED.
- HAZARDS MAY EXIST IN THIS REGION THAT REQUIRE SHIELDING.

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.

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



ADHESIVE ANCHOR LAYOUT

INTEGRAL BARRIER DETAILS



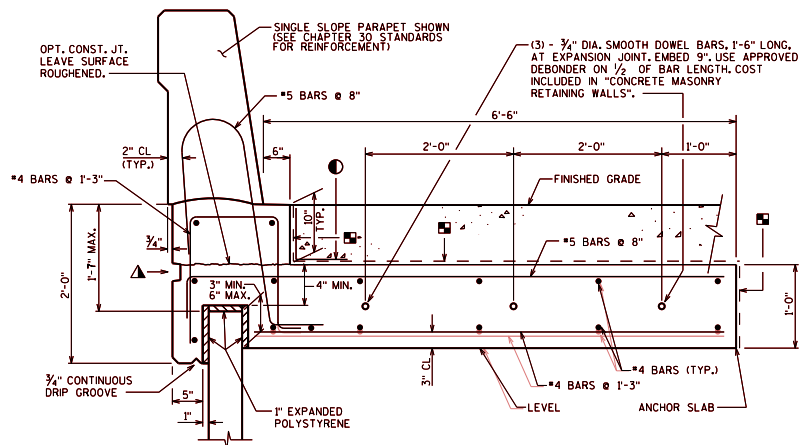
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-26

51-INCH VERTICAL CONCRETE BARRIER AND TRANSITION

SEE STANDARD 13.10 FOR ADDITIONAL DETAILS



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.

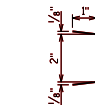
LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".

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.

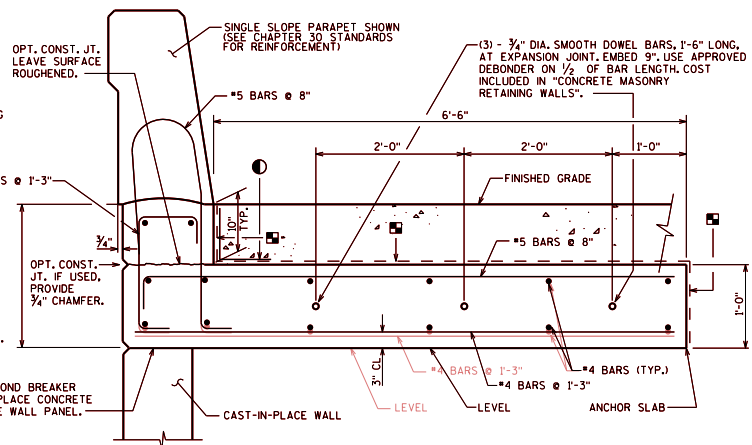
IF THE OPT. CONST. JOINT IS USED, PLACE 18" MEMBRANE WATERPROOFING ALONG THE ENTIRE LONGITUDINAL JOINT. THE MEMBRANE WATERPROOFING SEALING THE OPTIONAL CONST. JOINT IS INCIDENTAL TO THE CONCRETE MASONRY BID ITEM.



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.

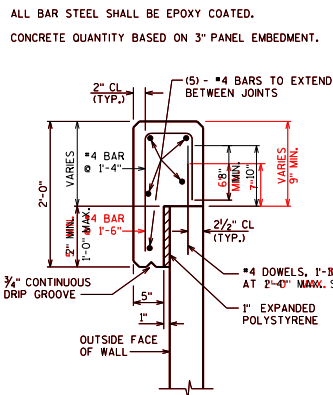


CAST-IN-PLACE CONCRETE TRAFFIC BARRIER DETAIL FOR CAST-IN-PLACE WALL PANELS

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.

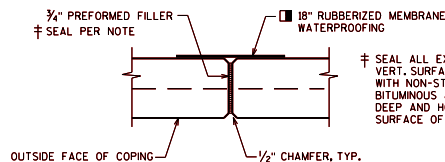
LAP LONGITUDINAL #4 BARS A MINIMUM OF 1'-0".

ALL BAR STEEL SHALL BE EPOXY COATED.



CAST-IN-PLACE CONCRETE COPING DETAIL

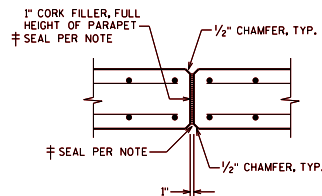
NOTES: (1) CONCRETE COPING DESIGNED FOR STANDARD PAVED ROADWAY WITH 10% MINIMUM OVERTHROW SPACING AREA. WHEN 15% IS MADE.



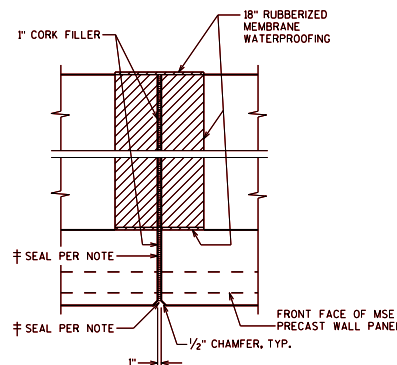
COPING EXPANSION JOINT

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.

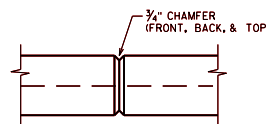


TRAFFIC BARRIER EXPANSION JOINT DETAIL



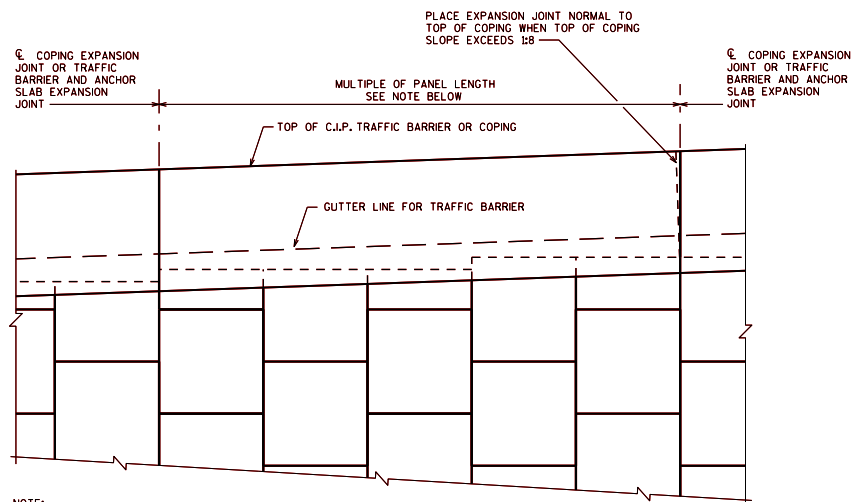
ANCHOR SLAB EXPANSION JOINT DETAIL

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'



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

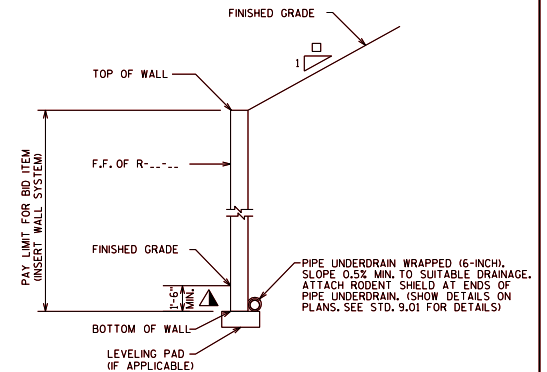
THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED UPON THE MINIMUM DESCRIBED IN THE WALL SYSTEM SPECIAL PROVISIONS OR EXTERNAL AND OVERALL STABILITY AT THE DESIGNATED LOCATIONS. THESE DESIGNATED LOCATIONS REPRESENT TYPICAL AND CRITICAL WALL LOCATIONS, BUT SHALL NOT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



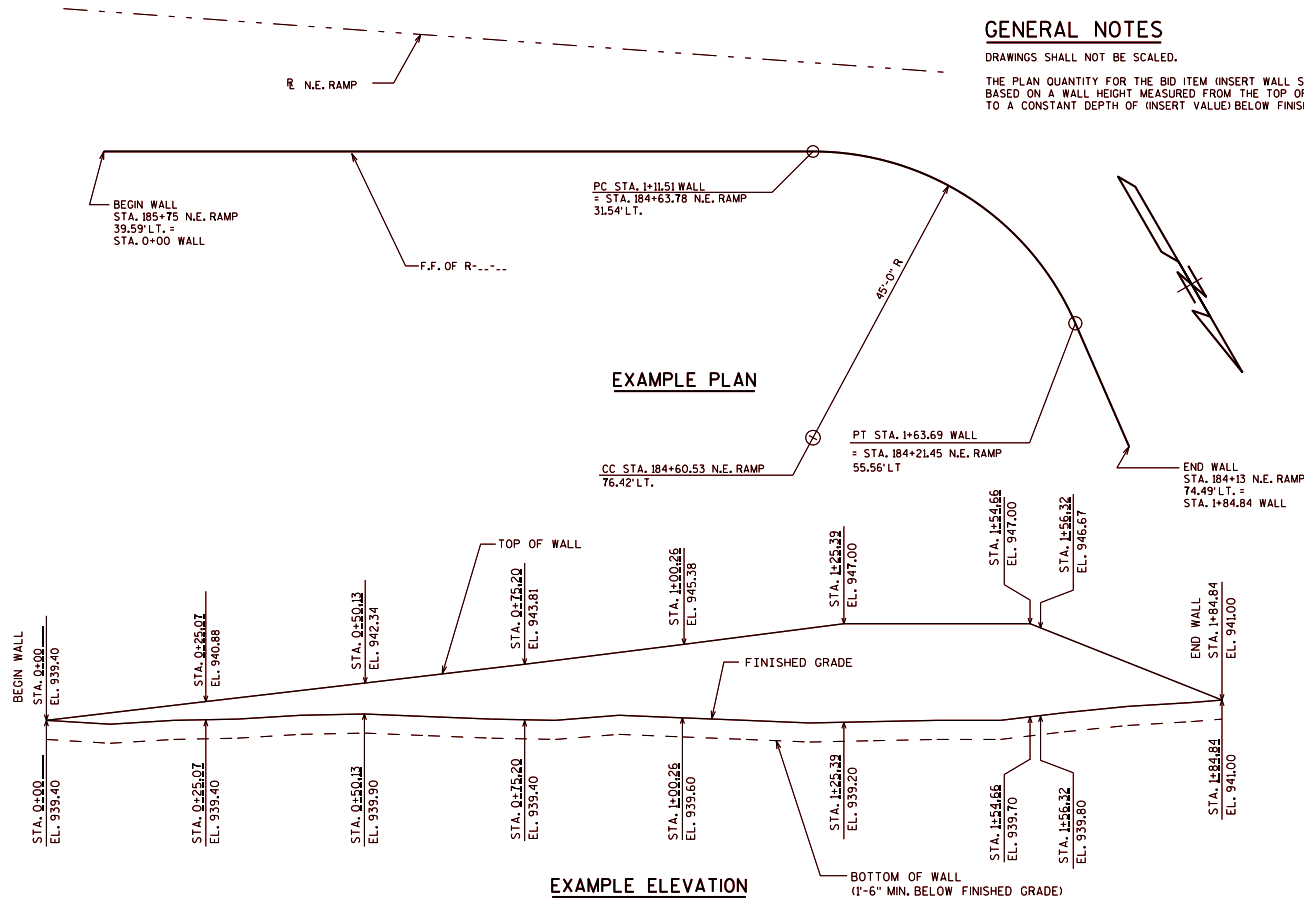
BUREAU OF STRUCTURES

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.

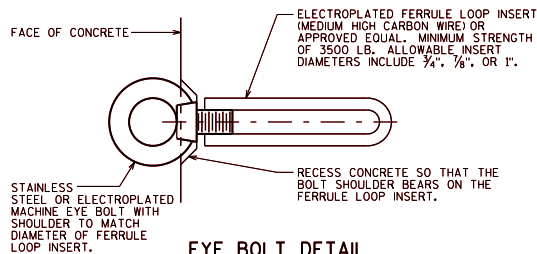
SOIL PARAMETERS

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

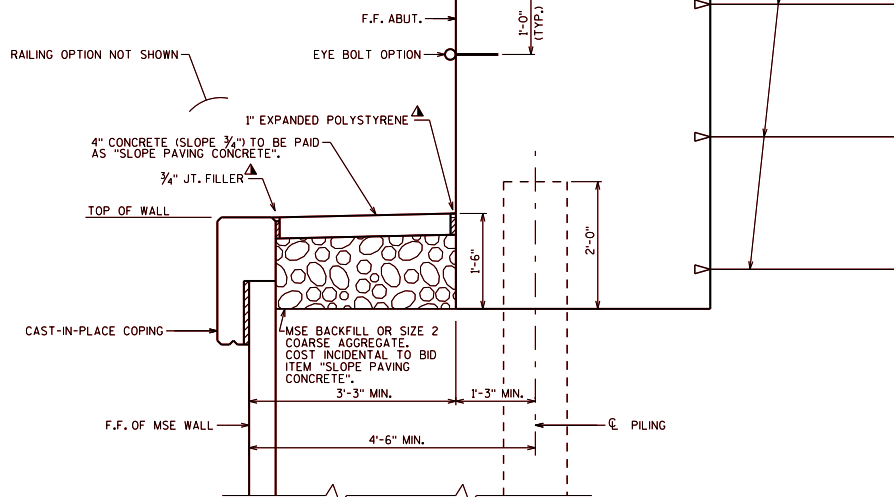
WALL EXTERNAL & OVERALL STABILITY EVALUATION

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)	



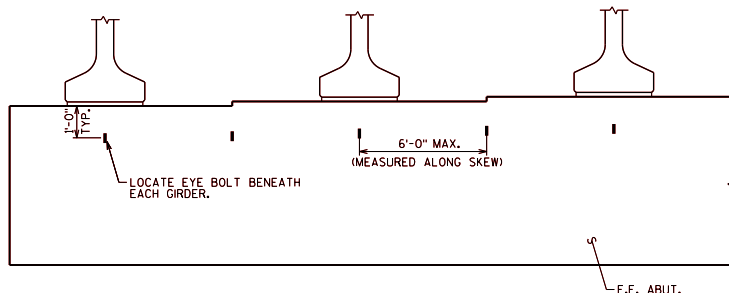
EYE BOLT DETAIL

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

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

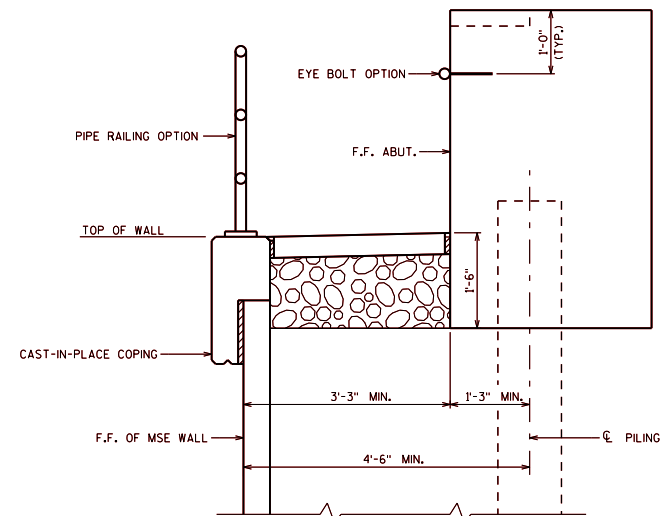
BR = --- KLF WS = --- KLF
TU = --- KLF WL = --- KLF

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\"/>

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

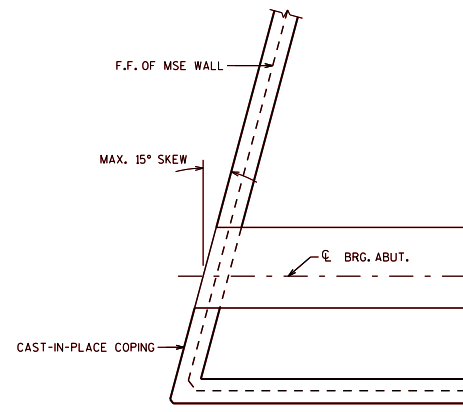
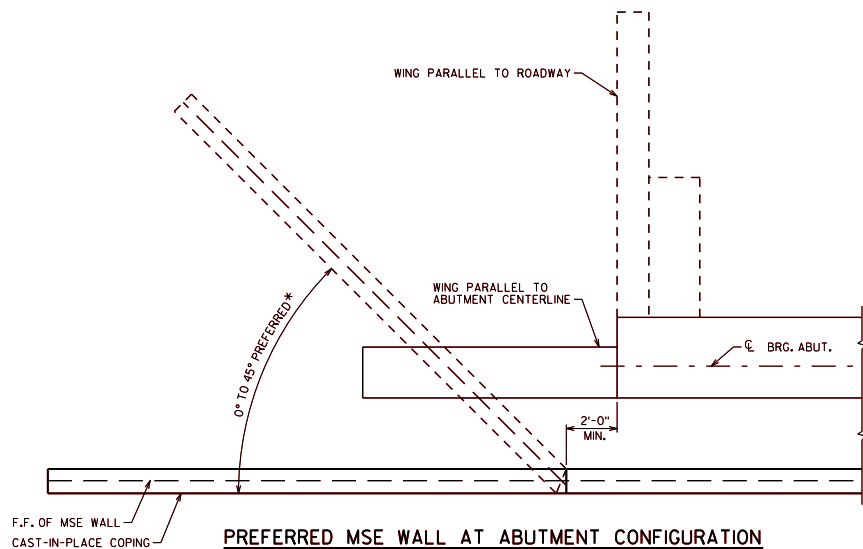
MSE WALL AT ABUTMENT



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:
1-18

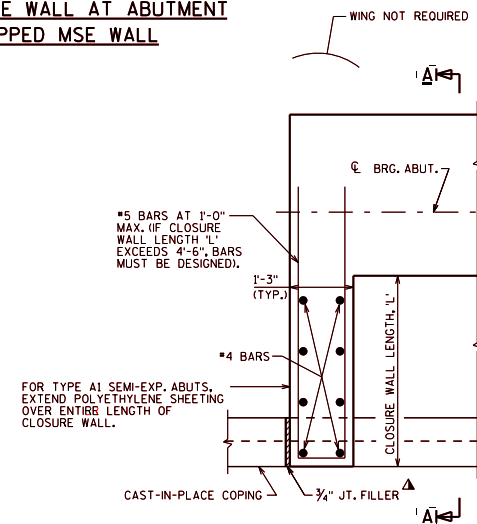
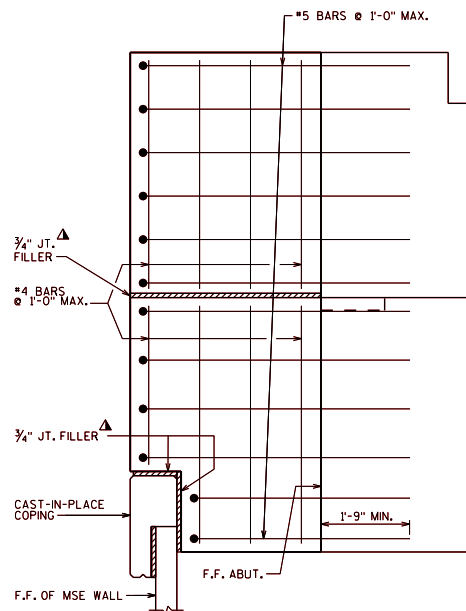
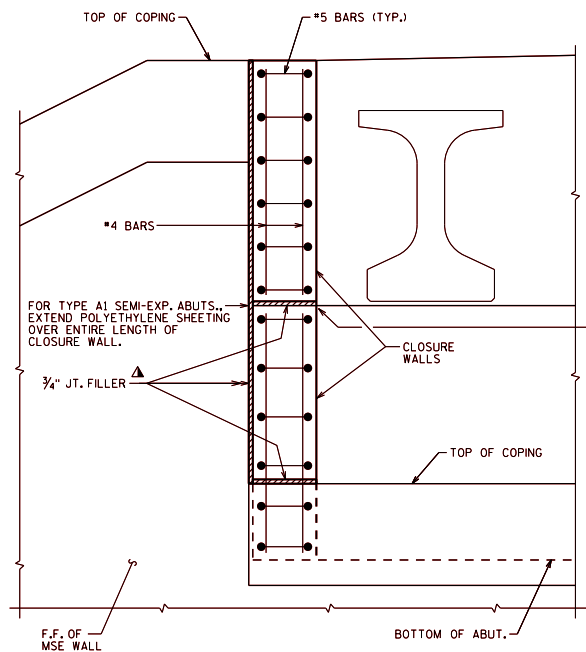


DESIGNER NOTES

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 $\frac{1}{8}$ " 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.

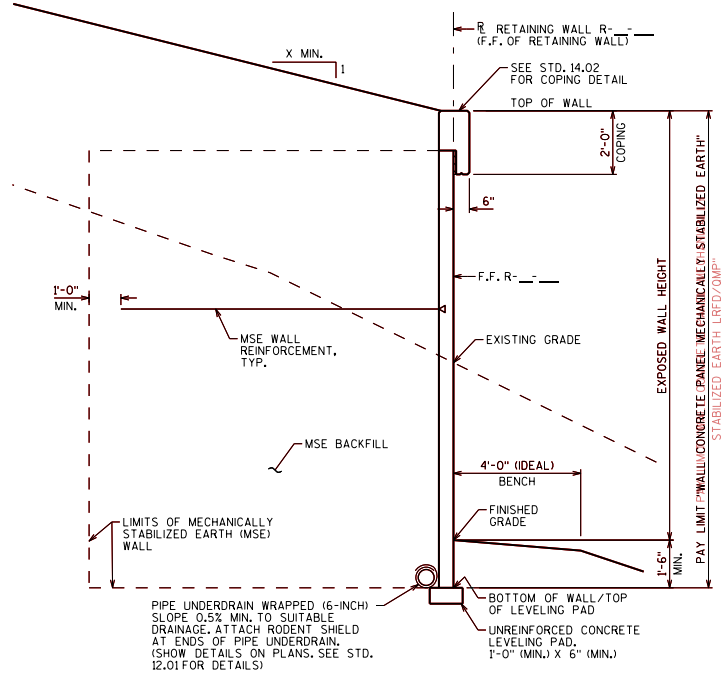
MSE WALL AT ABUTMENT LAYOUT DETAILS



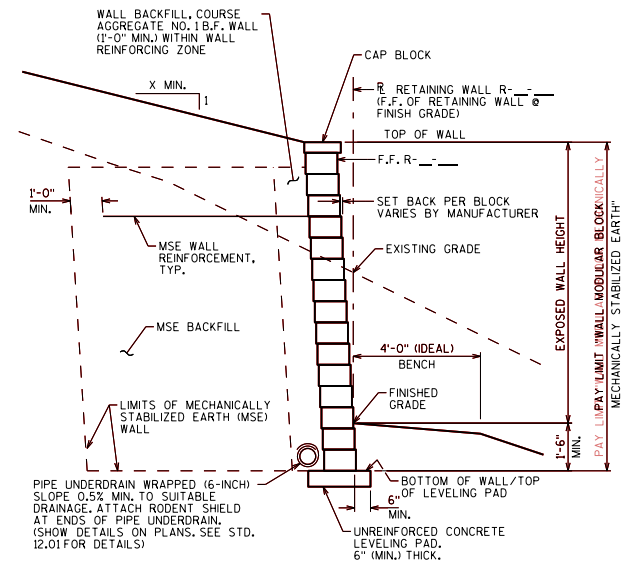
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-17



TYPICAL SECTION
(MSE WALL WITH CONCRETE PANEL FACING)

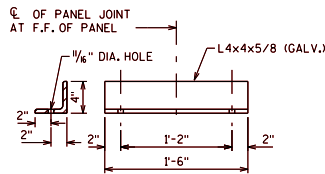


TYPICAL SECTION
(MSE WALL WITH MODULAR BLOCK FACING)

DESIGNER NOTE

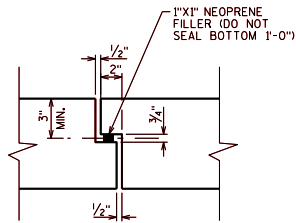
SEE STANDARD 14.02 FOR ADDITIONAL INFORMATION

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

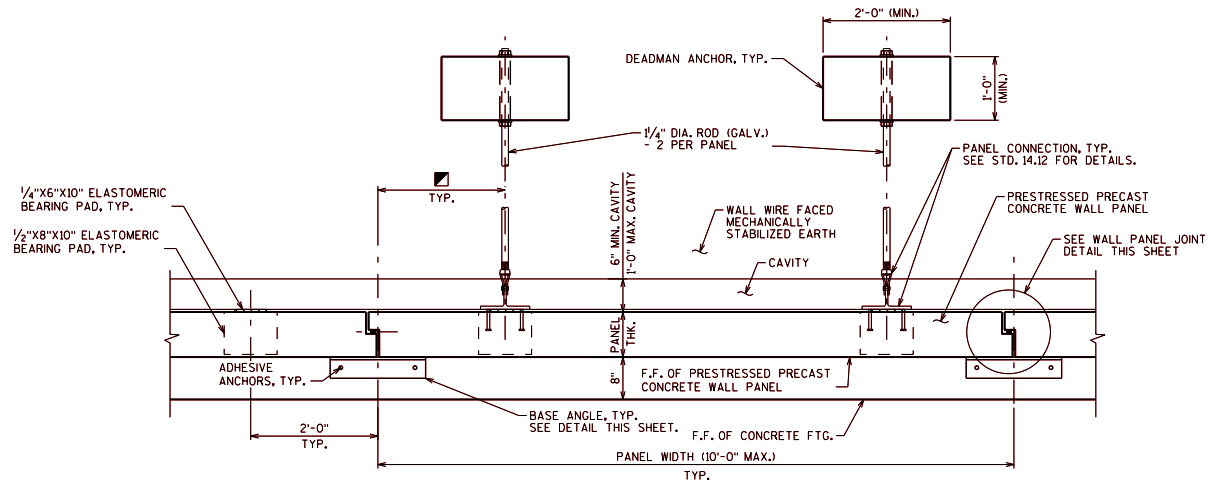


BASE ANGLE DETAIL

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

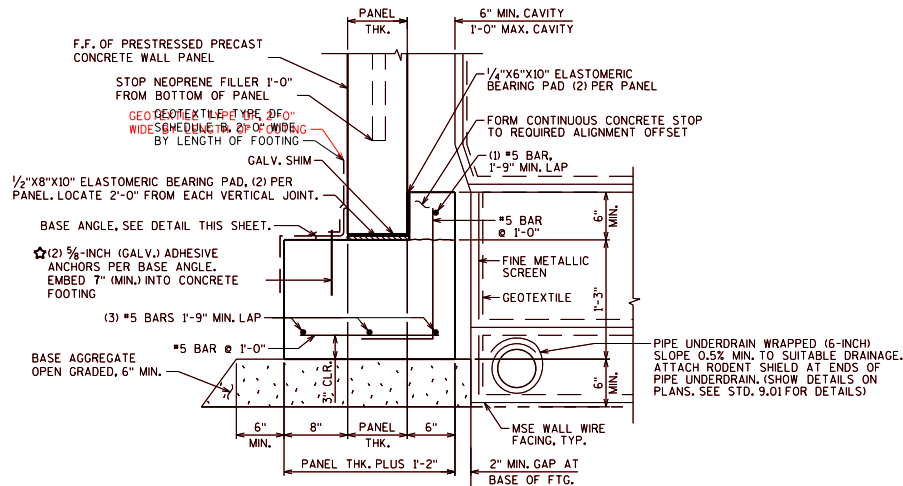


WALL PANEL JOINT DETAIL



TYPICAL WALL PANEL CONNECTION - PLAN VIEW

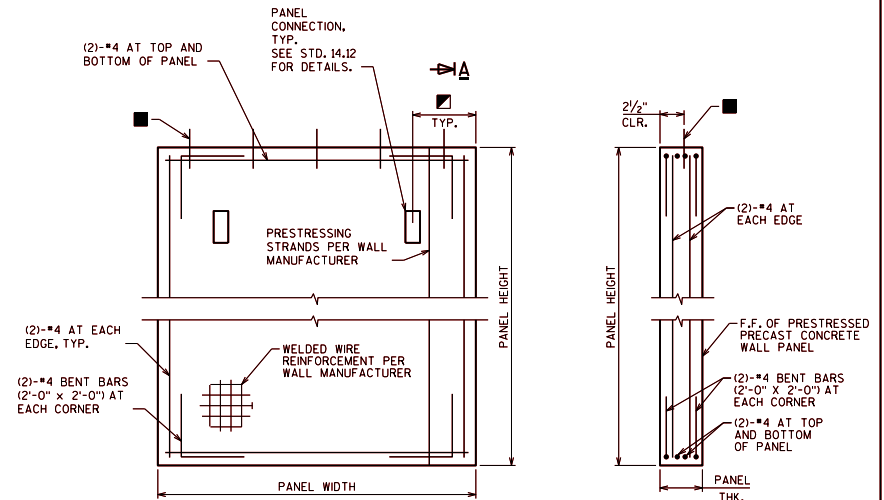
ALL ITEMS SHOWN ARE INCLUDED IN BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL".



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".

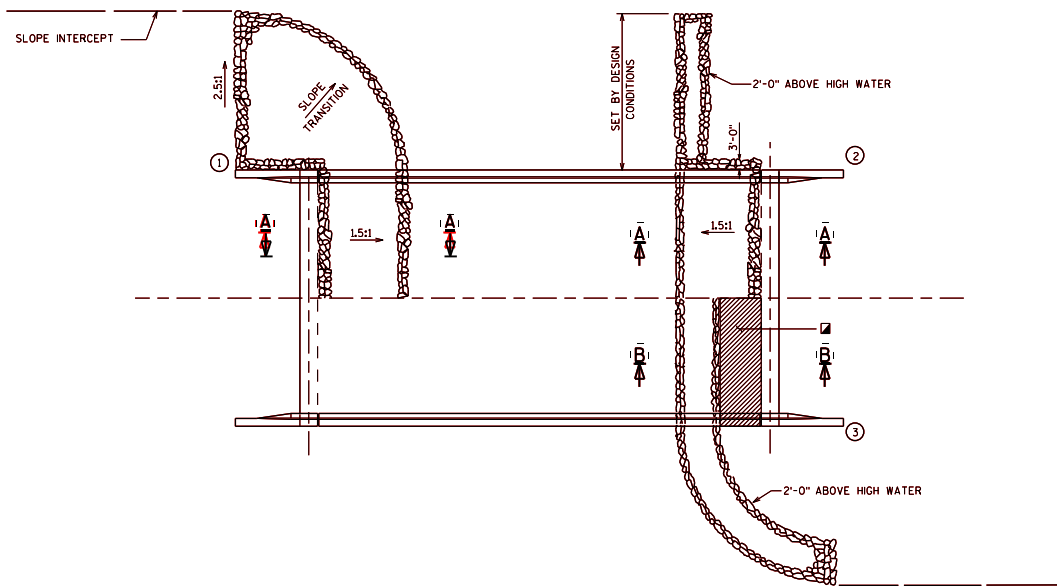
MSE WALL WIRE FACING 2



**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:
7-18



ALTERNATE ①

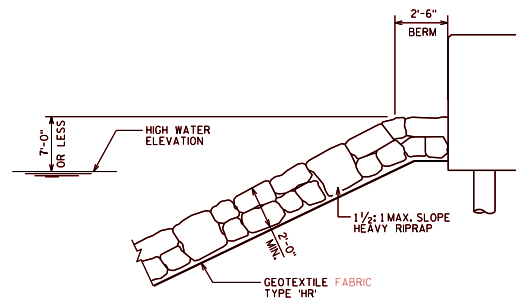
NORMAL CONDITION FOR EMBANKMENT FILLS

ALTERNATE ②

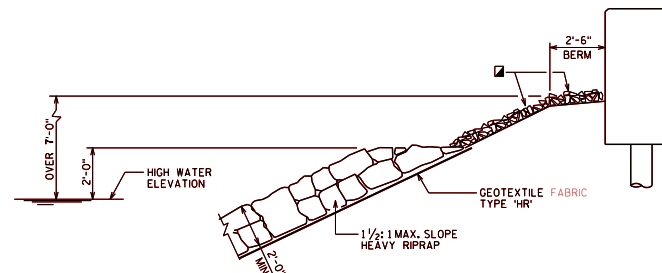
USE WHERE BERM ELEVATION IS LESS THAN 7'-0" ABOVE HIGH WATER

ALTERNATE ③

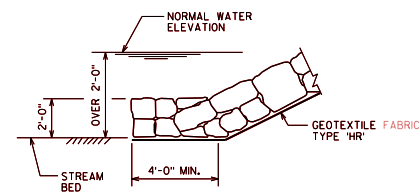
USE WHERE BERM ELEVATION IS OVER 7'-0" ABOVE HIGH WATER



SECTION A-A

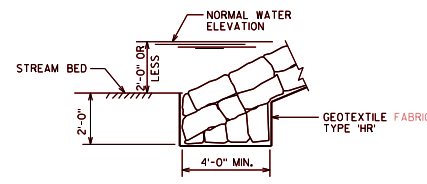


SECTION B-B



TOE DETAIL

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

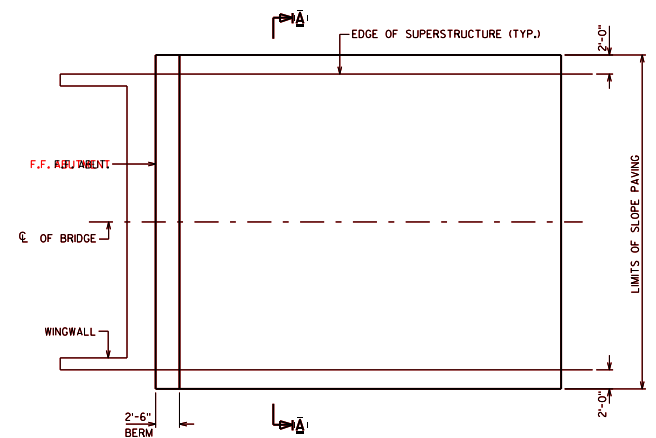
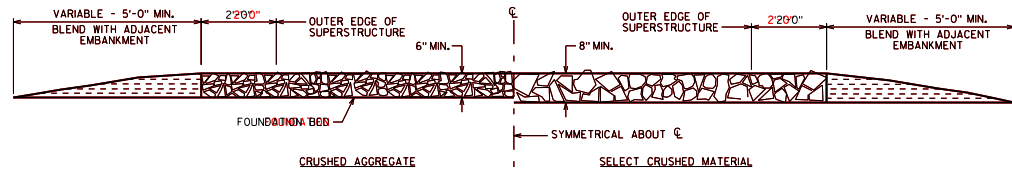
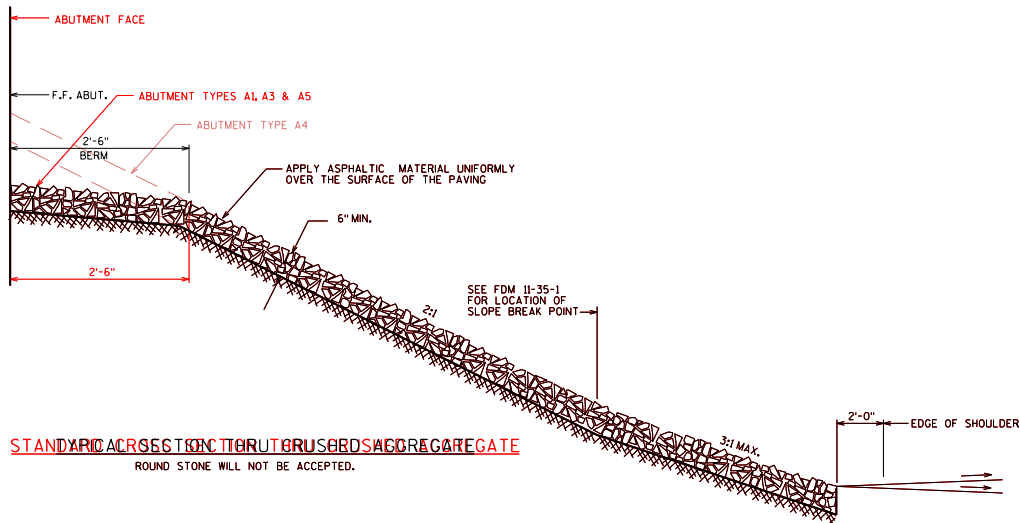
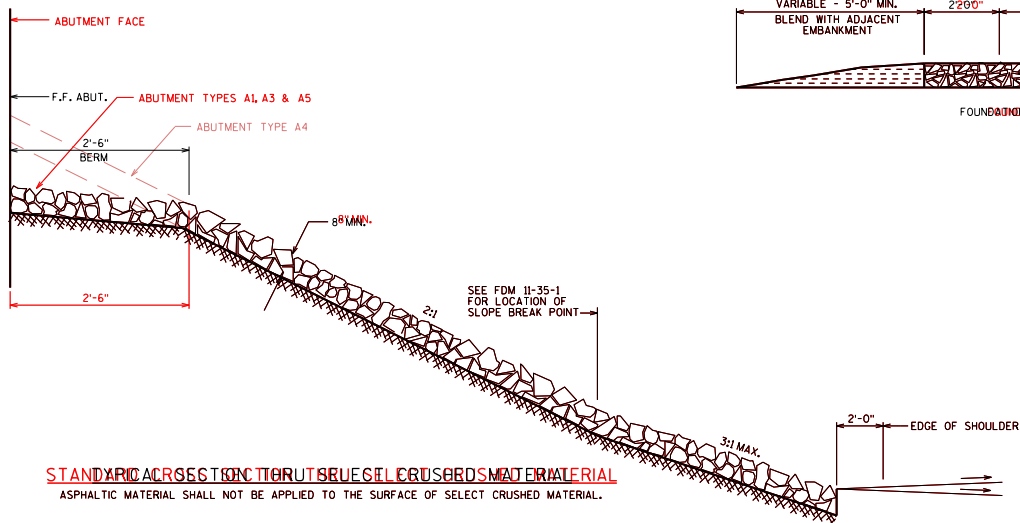


TOE DETAIL

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

☑ HEAVY RIPRAP OR OTHER SLOPE PROTECTION. IF HEAVY RIPRAP IS USED, PLACE GEOTEXTILE TYPE 'HR' BELOW IT. (LOW IT).

PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS	
	BUREAU OF STRUCTURES
	DATE: 1-19
APPROVED: <u>Bill Oliver</u>	



NOTES

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

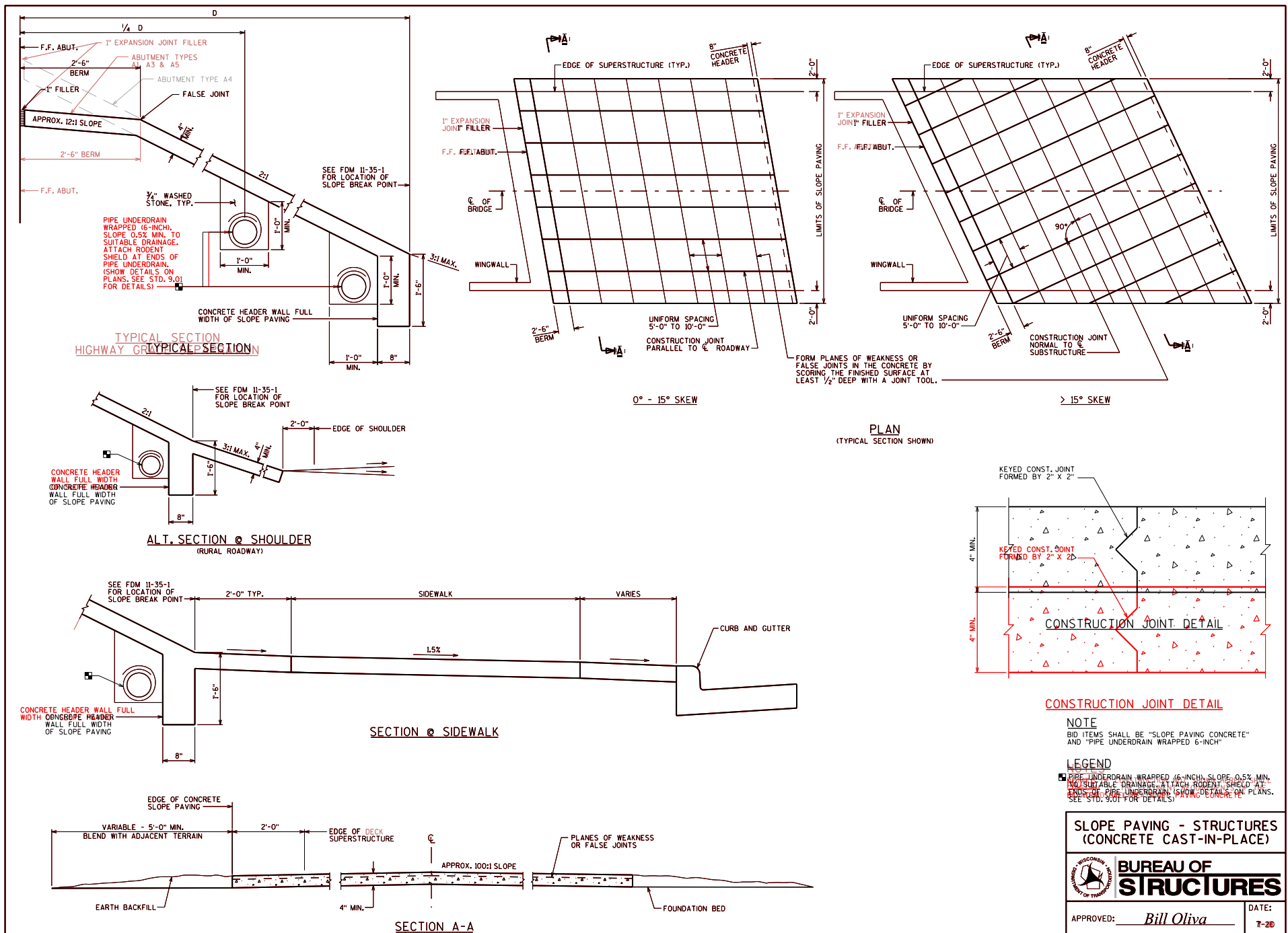
WOOD FORMS MAY BE LEFT IN PLACE WHEN OF DESIGNER'S CHOICE TO THE ENGINEER.
 PREFERRED SECTION SHOWN; FOR ALTERNATE SECTION SEE FDM II-35-1.

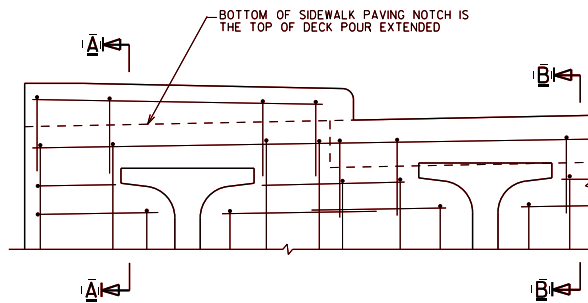
**SLOPE PAVING - STRUCTURES
 (CRUSHED AGGREGATE &
 SELECT CRUSHED MATERIAL)**



**BUREAU OF
 STRUCTURES**

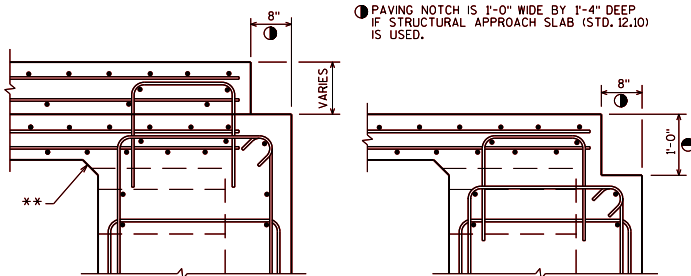
APPROVED: Bill Oliva DATE: 7-88





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.)

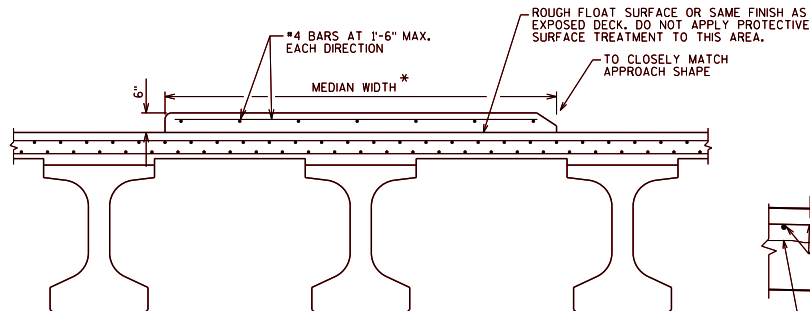


SECTION A-A

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

SECTION B-B

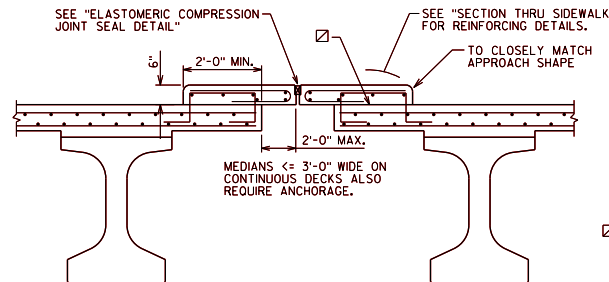
- SEE STANDARDS 19.33, 19.34, 19.35 FOR REINFORCEMENT DETAILS
- DETAILS SHOWN ARE FOR GIRDER STRUCTURES. SIMILAR REINFORCEMENT FOR SLAB STRUCTURES SHALL BE USED WITH A REMINDER THAT THE TRANSVERSE AND LONGITUDINAL REINFORCEMENT LAYERS ARE REVERSED.



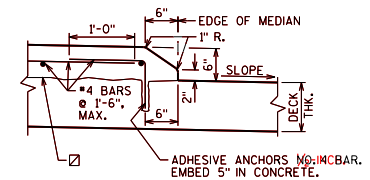
CROSS SECTION THRU UNANCHORED MEDIAN

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

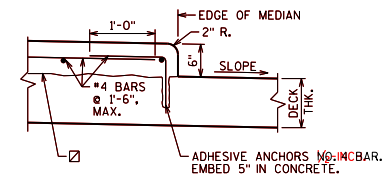
NOTE: CLEAN ALL LOOSE MATERIAL ON THE DECK AT THE MEDIAN LOCATION PRIOR TO MEDIAN PLACEMENT USING HIGH PRESSURE WATER OR AIR, ENSURING ALL FREE-STANDING WATER IS REMOVED PRIOR TO MEDIAN PLACEMENT. NEAT CEMENT IS REQUIRED AS PER 509.3.9.2 OF THE STANDARD SPECIFICATIONS UNLESS THE MEDIAN IS POURED WITHIN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



CROSS SECTION THRU MEDIAN WITH A JOINT

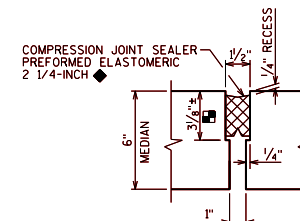


ANCHORED MEDIAN CURB DETAIL



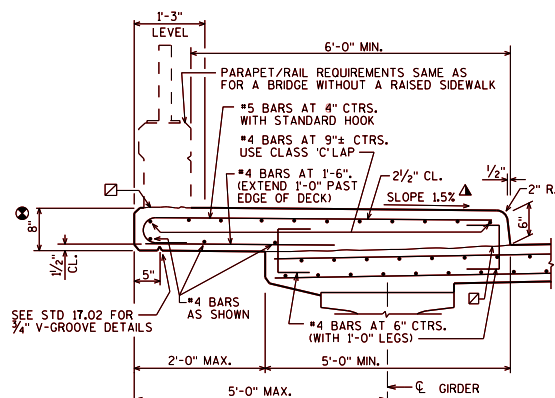
ANCHORED MEDIAN CURB DETAIL

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

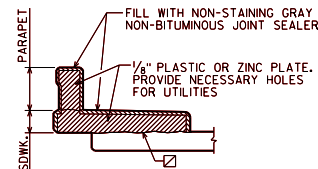


ELASTOMERIC COMPRESSION SEAL DETAIL

☑ VARIES BASED ON JOINT MANUFACTURER
◆ MANUFACTURER SHALL LABEL TOP OF SEAL



SECTION THRU SIDEWALK



DEFLECTION JOINT DETAIL

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

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

NOTES

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

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

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

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

DESIGNER NOTES

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

MEDIAN AND RAISED SIDEWALK DETAILS

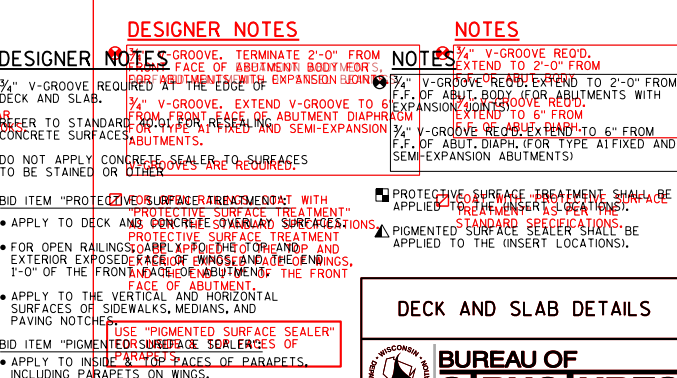
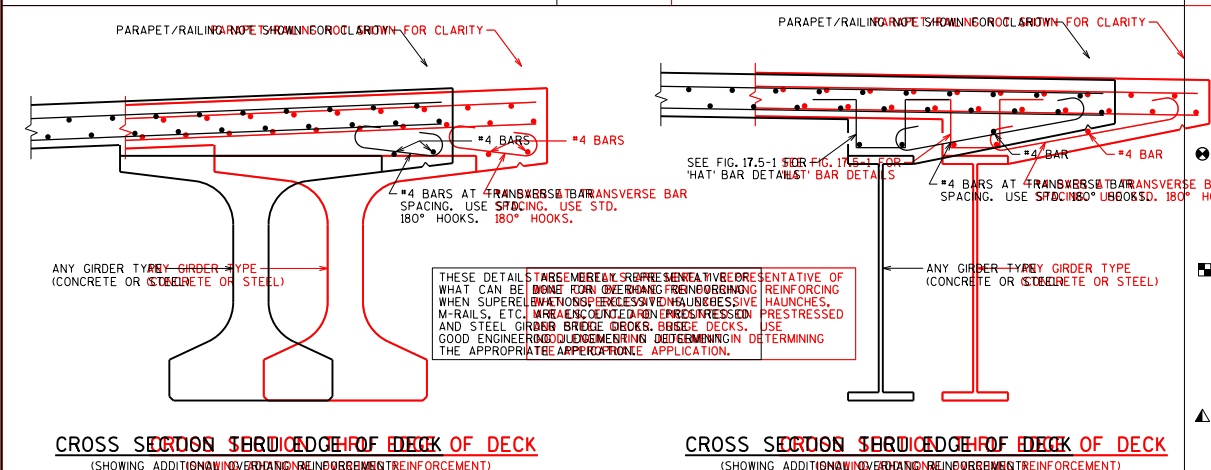
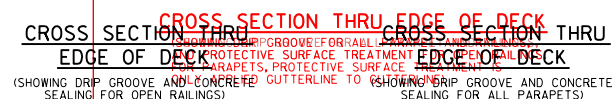


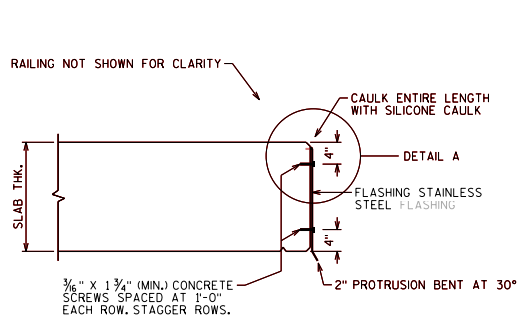
**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:
1-20

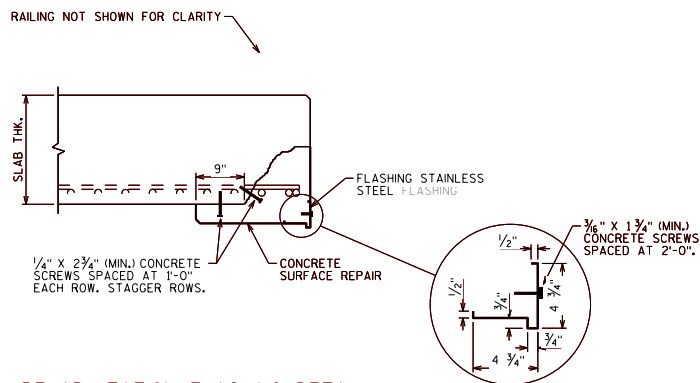
SEE STD. 24.11 FOR DECK JOINT DETAIL FOR LONGITUDINAL AND TRANSVERSE JOINTS.





FLASHING DETAIL FOR NEW BRIDGES WITH OPEN RAILING

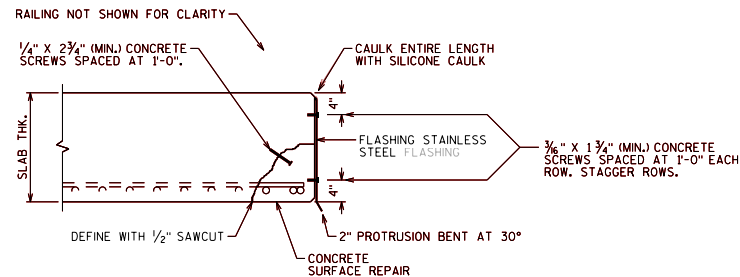
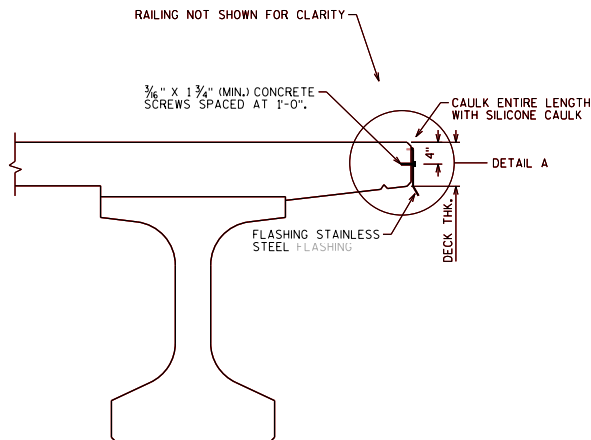
THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK, 3/16" CONCRETE SCREWS, AND CLEANING THE EDGE OF THE DECK PRIOR TO ATTACHMENT OF THE FLASHING.



REHABILITATION FLASHING DETAIL 1

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

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



REHABILITATION FLASHING DETAIL 2

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

DESIGNER NOTES

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

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

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

NOTES

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

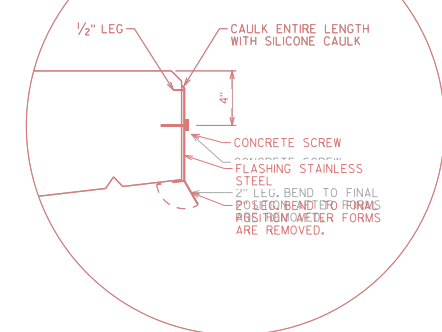
FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE TREATMENT APPLICATION.

CONCRETE SCREWS SHALL BE 410 STAINLESS STEEL.

EXTEND FLASHING TO B.F. OF ABUTMENT DIAPHRAGM.

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

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



DETAIL A

DETAIL FOR CONCRETE SLAB BRIDGE SIMILAR

EDGE OF DECK FLASHING

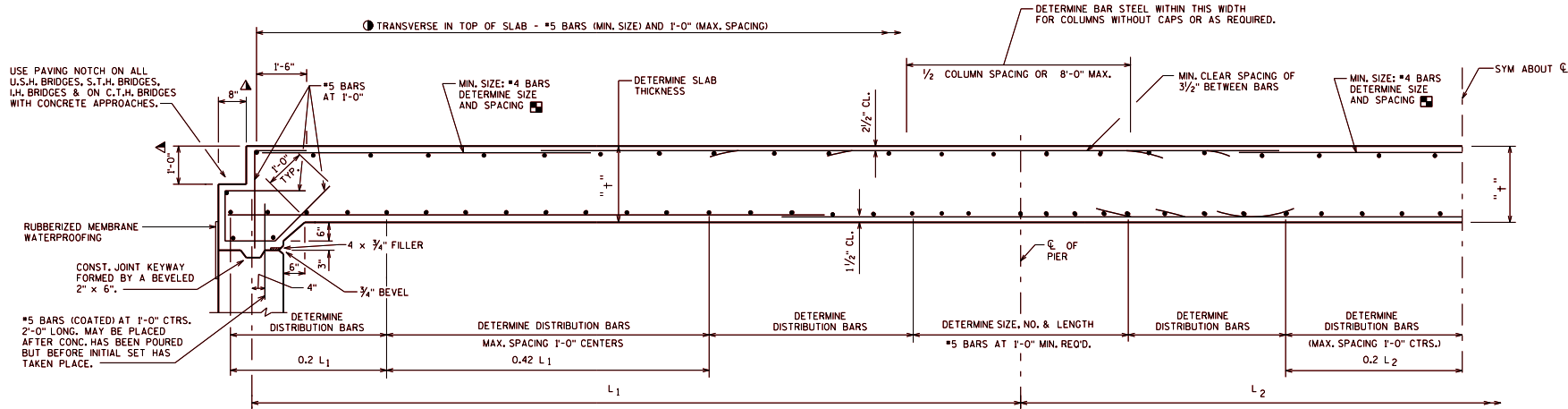


BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:

7-19



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.

DESIGNER NOTES

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

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

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

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

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

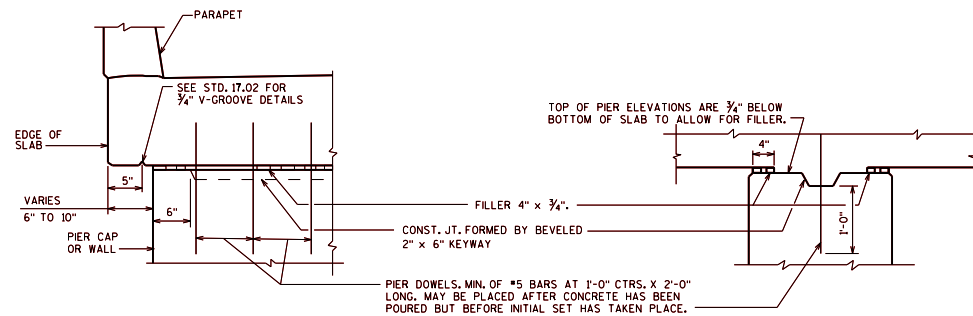
FLOOR DRAINS ARE TO BE OMITTED FROM SLAB STRUCTURES WHERE POSSIBLE. IF FLOOR DRAINS ARE REQUIRED, PLACE ONLY AT THE 2/10 AND 8/10 PTS. BEND MAIN REBARS PAST DRAINS - DO NOT CUT.

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

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

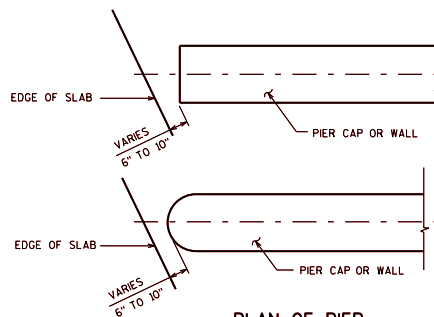
▲ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

■ REINFORCEMENT IN SLAB MUST MEET TEMPERATURE AND SHRINKAGE REQUIREMENTS.



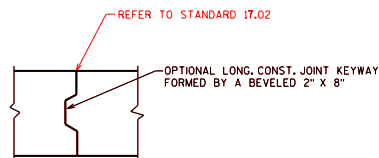
PIER CAP OR WALL TYPE PIER

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



PLAN OF PIER

OPTIONAL LONGITUDINAL CONSTRUCTION JOINT



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

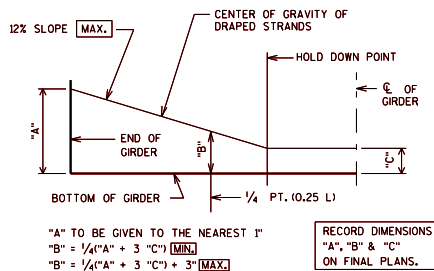
CONTINUOUS FLAT SLAB



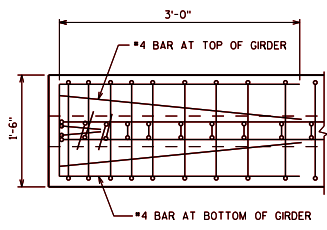
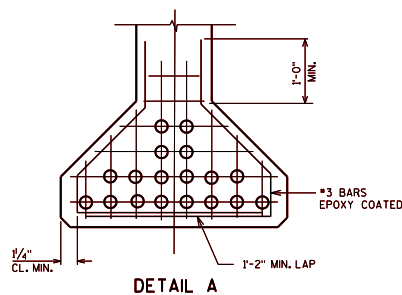
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

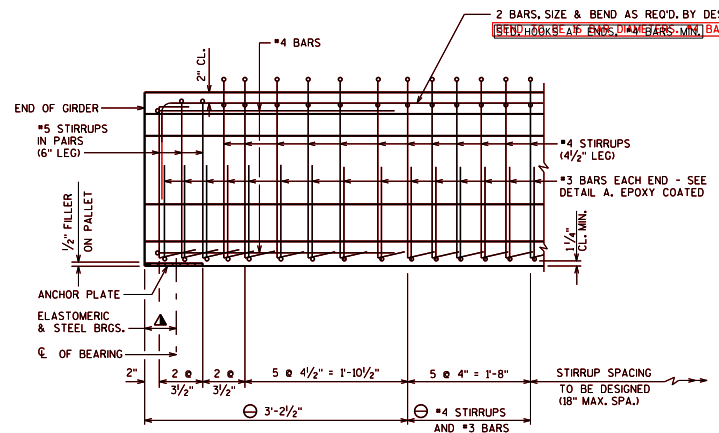
DATE: 1-17



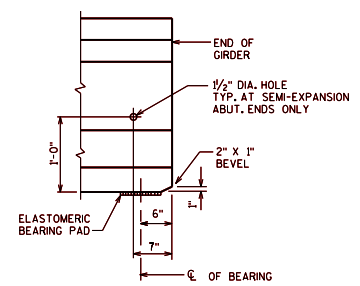
LOCATION OF DRAPED STRANDS



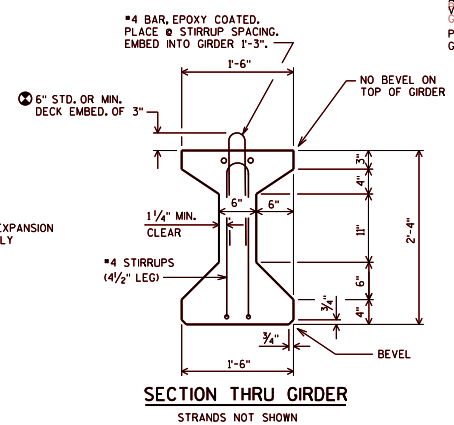
PLAN VIEW



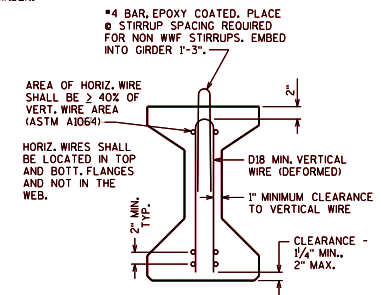
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.



SUPPORT WITH 1/2\"/>



SECTION THRU GIRDER
STRANDS NOT SHOWN



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

NOTES

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2\"/>

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

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

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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

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

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

DESIGNER NOTES

BID ITEM SHALL BE PRESTRESSED GIRDER TYPE 28-INCH, A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI, MAXIMUM RELEASE SPECIFY CONCRETE STRENGTH(S) 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 0.15\"/>

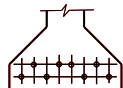
VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2\"/>

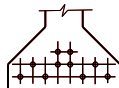
THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2\"/>

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

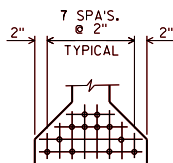
28\"/> 	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-19</u>



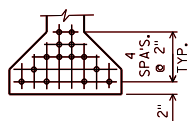
8 STRANDS



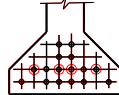
10 STRANDS



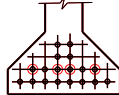
12 STRANDS



14 STRANDS



*16 STRANDS



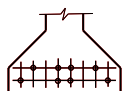
*18 STRANDS

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

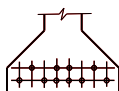
* NEEDS BOND BREAKERS AT ENDS. SEE BOND BREAKER DETAIL.

⊙ INDICATES STRAND TO BE DEBONDED

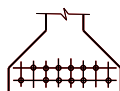
**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
TO AVOID DRAPING OF 0.6" DIA. STRANDS**
(0.5" DIA. STRANDS MAY ALSO BE USED)



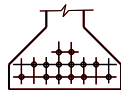
8 STRANDS



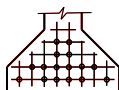
10 STRANDS



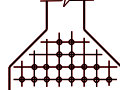
12 STRANDS



14 STRANDS



16 STRANDS



18 STRANDS

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

28" GIRDER

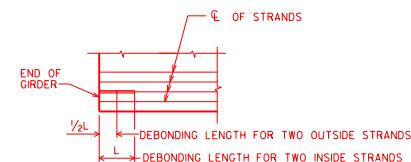
$A = 312 \text{ SQ. IN.}$
 $r^2 = 91.95 \text{ IN.}^2$
 $y_t = 14.58 \text{ IN.}$
 $y_b = -13.42 \text{ IN.}$
 $I = 28,687 \text{ IN.}^4$
 $S_t = 1,968 \text{ IN.}^3$
 $S_b = -2,138 \text{ IN.}^3$
 $WT. = 325 \text{ \#/FT.}$

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

(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	-10.40	352	2.841
10	-9.80	439	3.419
12	-8.73	527	3.841
14	-7.97	615	4.264
*16	-9.4	703	5.345
*18	-9.6	791	6.087
STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)			
8	-10.4	248	2.001
10	-10.6	310	2.531
12	-10.4	372	3.002
14	-10.0	434	3.421
16	-9.4	496	3.771
18	-9.6	558	4.294



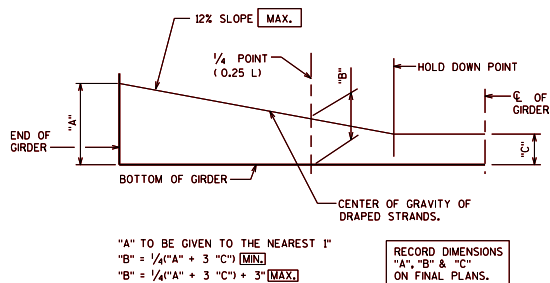
BOND BREAKER DETAIL

SHOWING LENGTHS OF DEBONDING FROM END OF GIRDER. DEBOND LENGTHS TO BE DESIGNED. STRAND TRANSFER LENGTH IS 60 X STRAND DIAMETER.

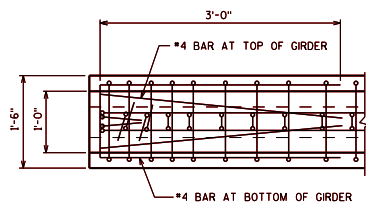
DESIGNER NOTES

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.

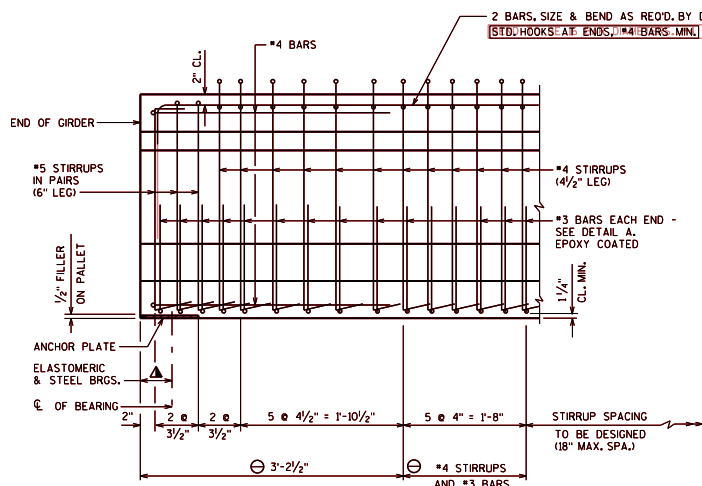
28" PRESTRESSED GIRDER DESIGN DATA	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>



LOCATION OF DRAPED STRANDS

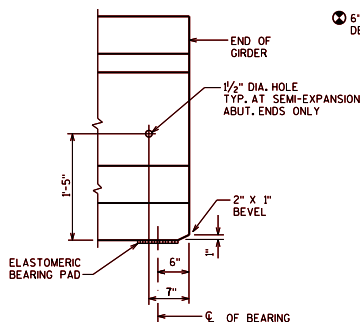


PLAN VIEW

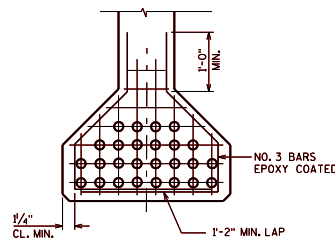


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER

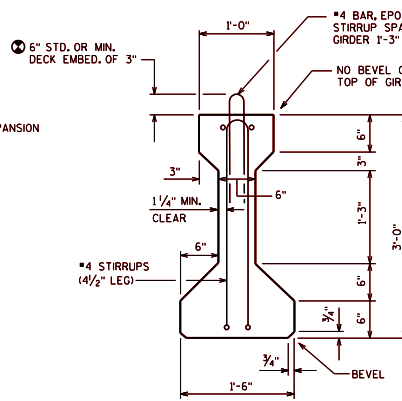


SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD



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

RESSES GIRDER TYPE I 36-INCH.

BID ITEM SHALL BE PRESTRESSED GIRDER TYPE I 36-INCH. A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6,000 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 OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.04 AND REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.04 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1 USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

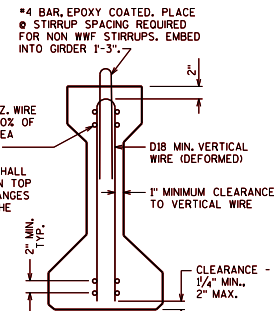
BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)

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

DETAIL: TYPICAL AT EACH END. THIS VALUE BASED ON 2" MIN. HAUNCH AT END OF GIRDER. PROFILE GRADE LINE AND CALCULATED

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

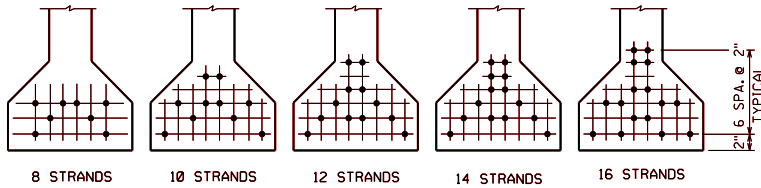
APPROVED:

Bill Oliva

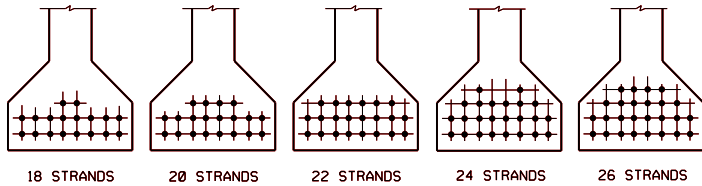
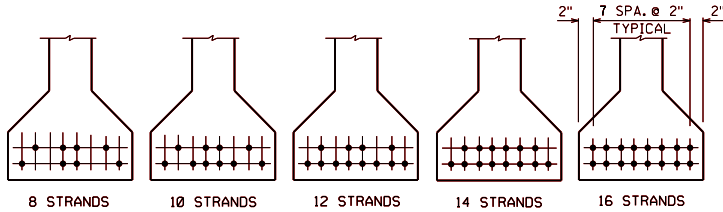
DATE:

7-28

STANDARD 19.03



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



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

36" GIRDER

$$A = 369 \text{ SQ. IN.}$$

$$r^2 = 138.15 \text{ IN.}^2$$

$$y_T = 20.17 \text{ IN.}$$

$$y_B = -15.83 \text{ IN.}$$

$$I = 50,979 \text{ IN.}^4$$

$$S_T = 2,527 \text{ IN.}^3$$

$$S_B = -3,220 \text{ IN.}^3$$

$$\text{WT.} = 384 \text{ #/FT.}$$

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

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

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

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

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

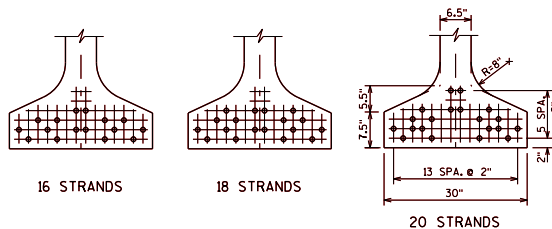
DO NOT USE THE 36" PRESTRESSED
GIRDER SHOWN ON THIS SHEET.
IT WILL BE MOVED TO CH 40 IN
THE FUTURE.

(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	1.668
10	-13.03	310	2.094
12	-13.16	372	2.528
14	-12.97	434	2.924
16	-12.83	496	3.320
18	-12.50	558	3.678
20	-12.23	620	4.034
22	-12.01	682	4.392
24	-11.66	744	4.710
26	-11.37	806	5.030

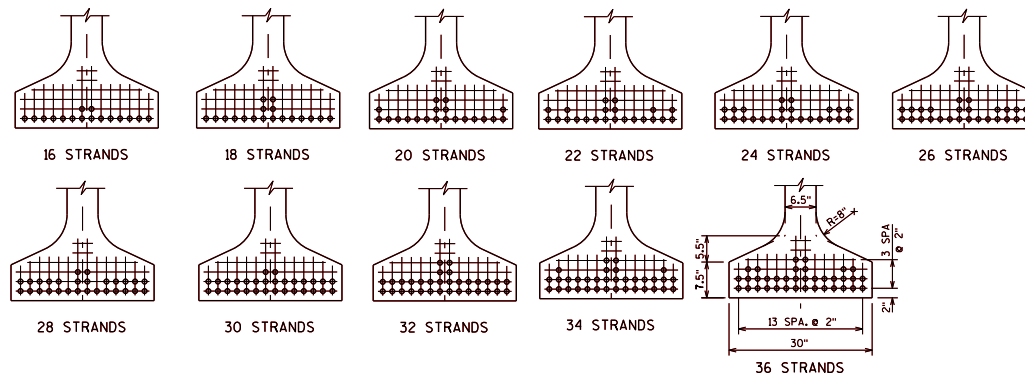
DESIGNER NOTES

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

36" PRESTRESSED GIRDER DESIGN DATA	
 BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-27</u>



**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

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.

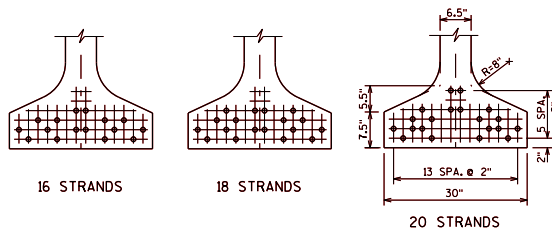
36W" PRESTRESSED GIRDER DESIGN DATA



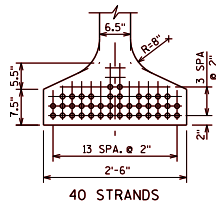
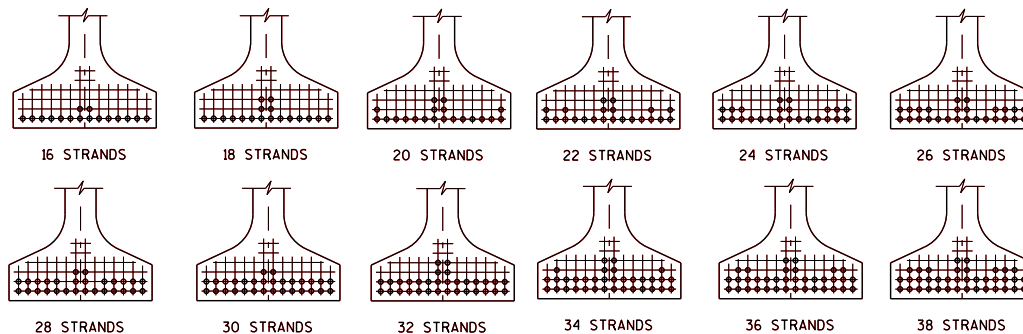
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-12



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

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

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

(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	-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.

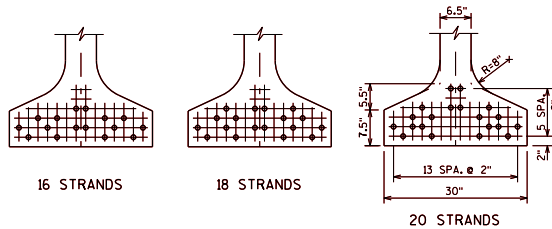
45W" PRESTRESSED GIRDER DESIGN DATA



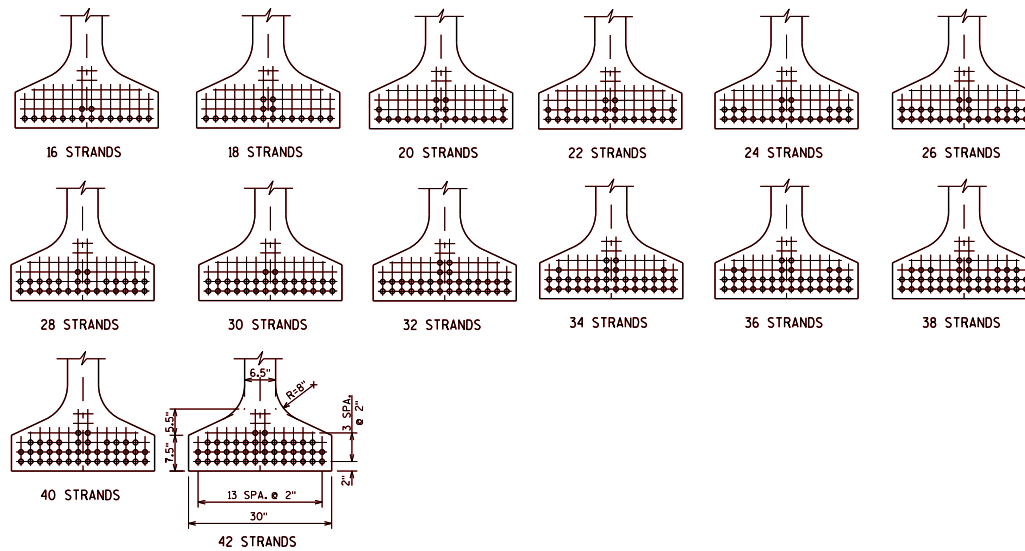
**BUREAU OF
STRUCTURES**

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.

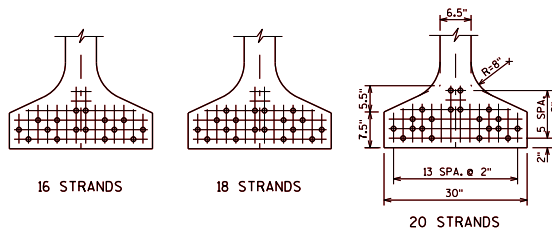
54W" PRESTRESSED GIRDER DESIGN DATA



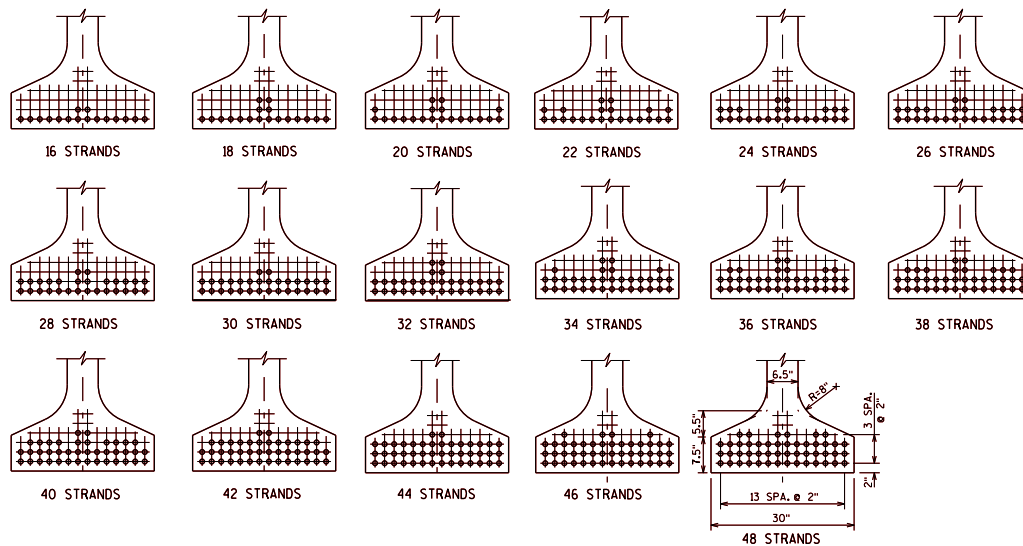
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-18



**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.

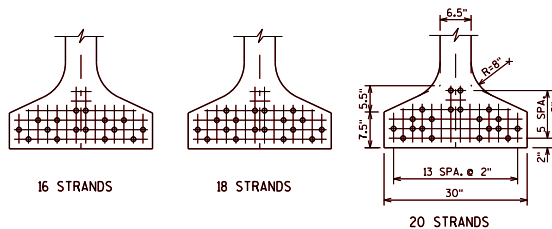
72W" PRESTRESSED GIRDER DESIGN DATA



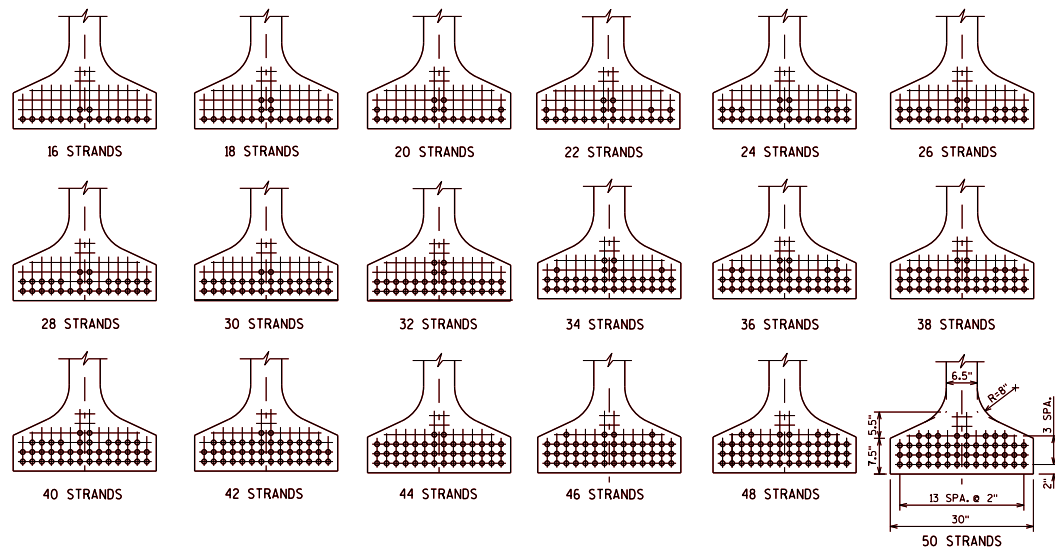
**BUREAU OF
STRUCTURES**

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

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

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

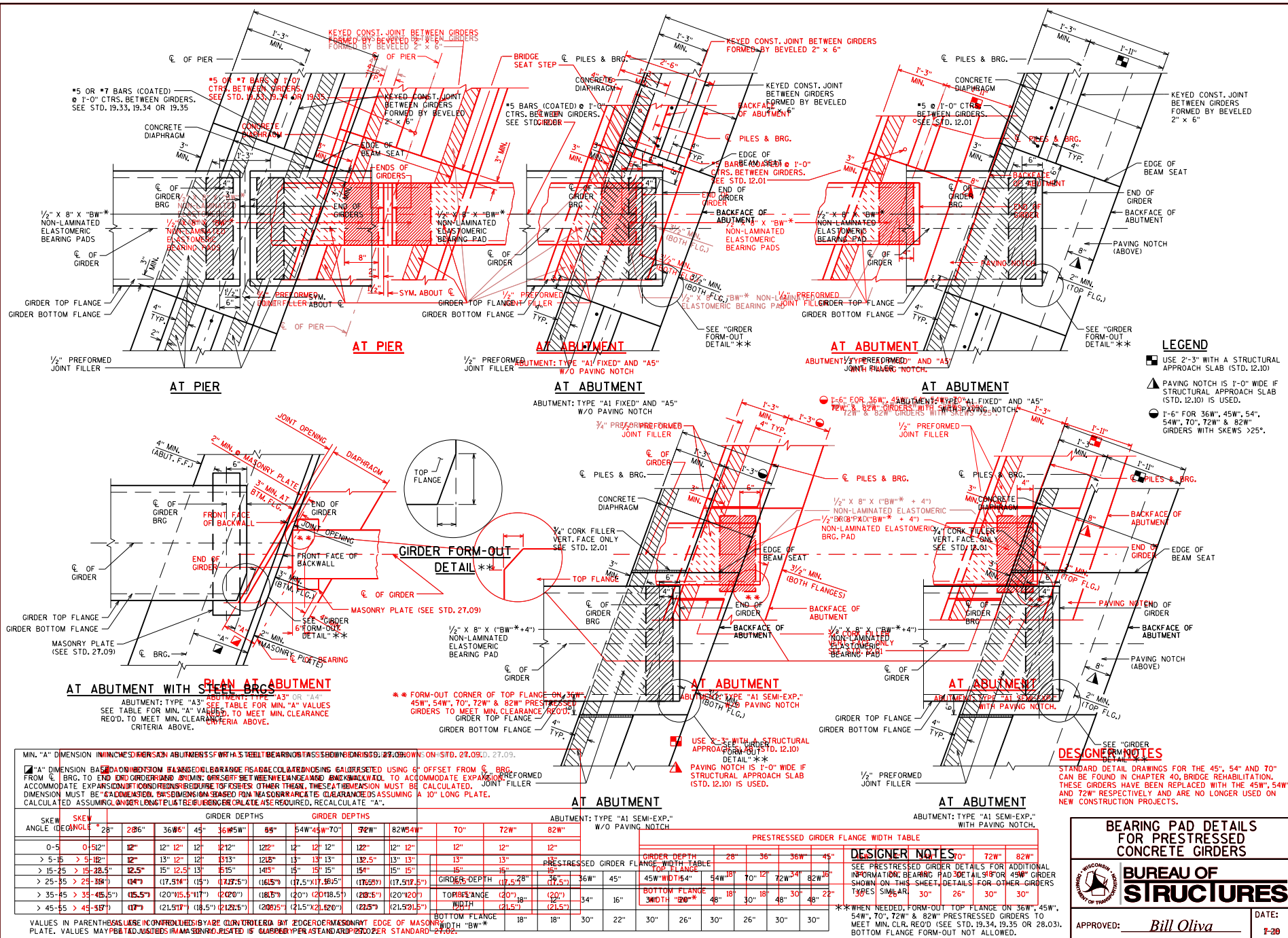
(COMPRESSION IS POSITIVE)			
NO. STRANDS	e_s (inches)	$P(\text{init.})=A_s f_s$ (KIPS)	$f_B (\text{init.})$ (K/sq.in.)
STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS			
16	-35.18	703	1.801
18	-34.79	791	2.013
20	-34.08	879	2.209
STANDARD STRAND PATTERNS FOR DRAPED STRANDS			
16	-37.43	703	1.870
18	-37.01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

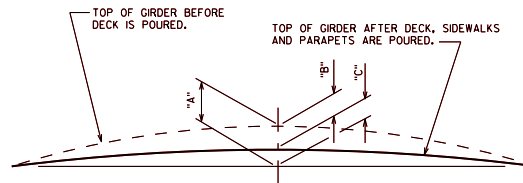
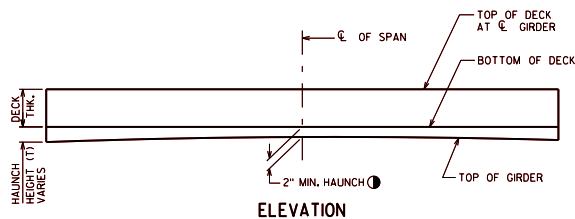
DESIGNER NOTES

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

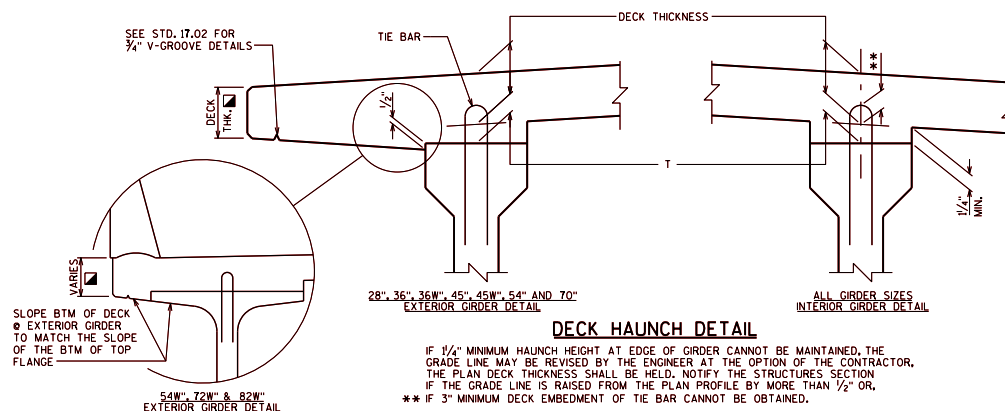
THERE IS CURRENTLY A MORATORIUM
ON THE USE OF 82W" PRESTRESSED
GIRDERS.

82W" PRESTRESSED GIRDER DESIGN DATA	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: <u>7-17</u>





- * "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.

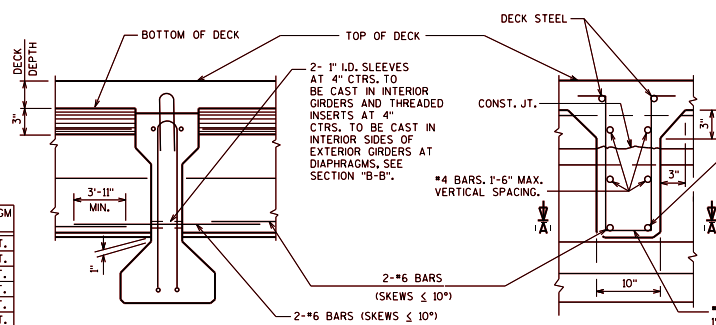
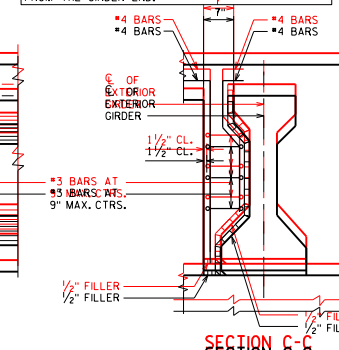
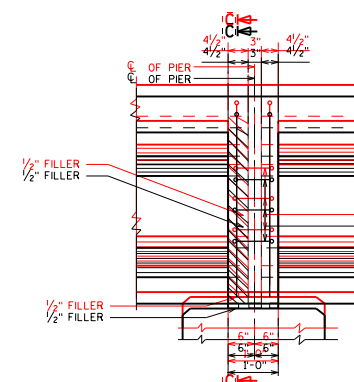
FOR SKEWS $\leq 10^\circ$, PLACE INTERMEDIATE DIAPHRAGMS IN A STRAIGHT LINE. REFER TO STANDARD 19.36, PROVIDE OFFSET FOR SKEWS $> 10^\circ$.

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

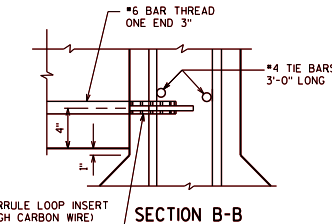
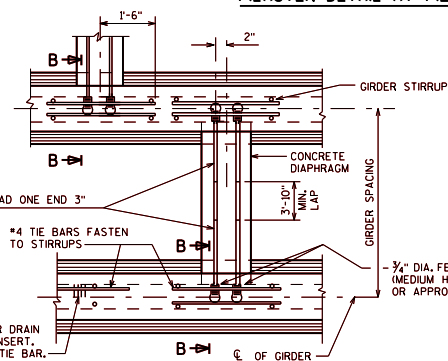
DIAPHRAGM SPACING: FOR SPANS $\leq 80'-0"$ PLACE ONE DIAPHRAGM AT MID-LENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS OF THE GIRDER LENGTH.

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



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.

SECTION THRU DIAPHRAGM



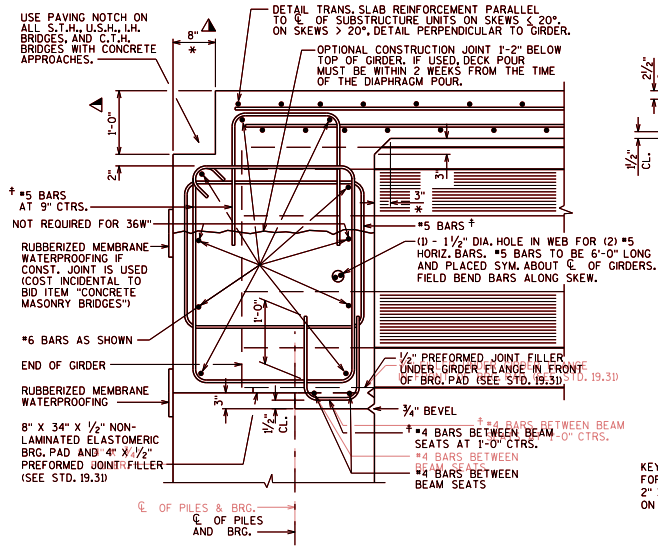
PRESTRESSED GIRDER DETAILS



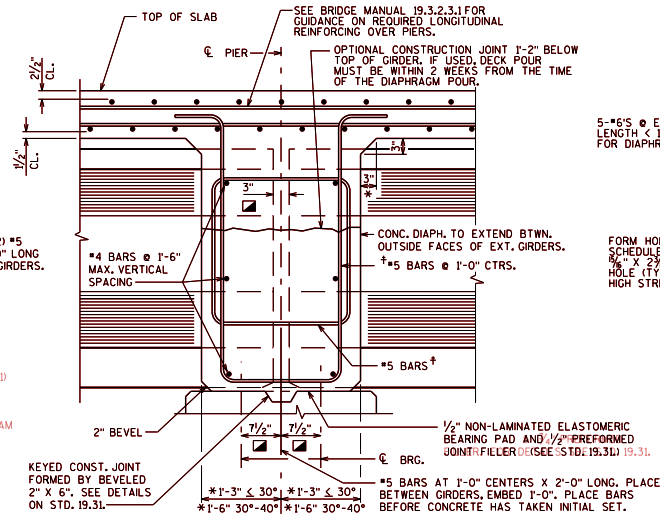
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

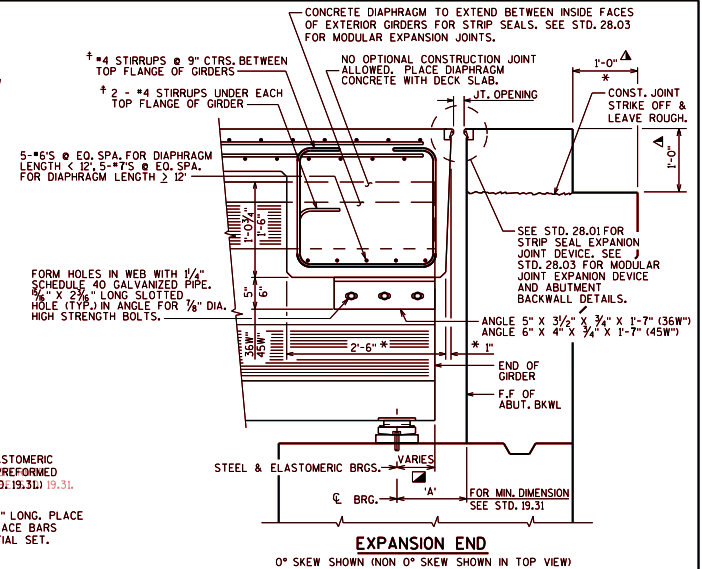
DATE: 1-19



PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



DIAPHRAGM AT 1/2" ELASTOMERIC BEARING



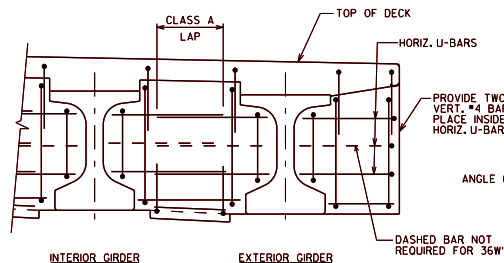
LEGEND

■ DIMENSION IS TAKEN PARALLEL TO ϕ GIRDER.

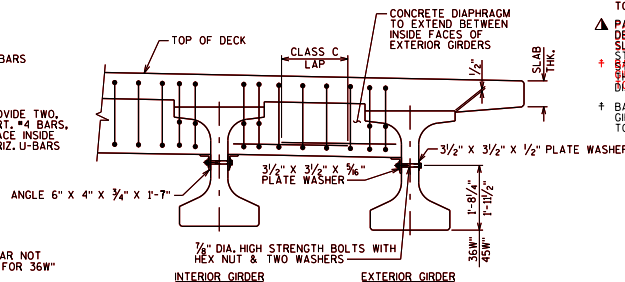
* DIMENSION IS TAKEN NORMAL TO ϕ SUBSTRUCTURE UNITS.

▲ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD. 12.12) FOR BRIDGE SECTION APPROACH ABUT. DIAPH. GIRDERS.

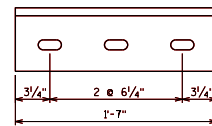
† BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO ϕ GIRDERS.



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".

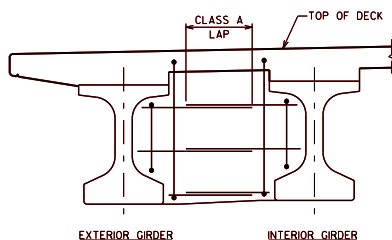
DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

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

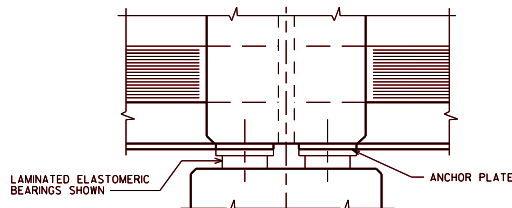
STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION SHALL BE SHUT-TIGHT PLUS 1/4" TURN. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 OR ASTM A449.

DESIGNER NOTE

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

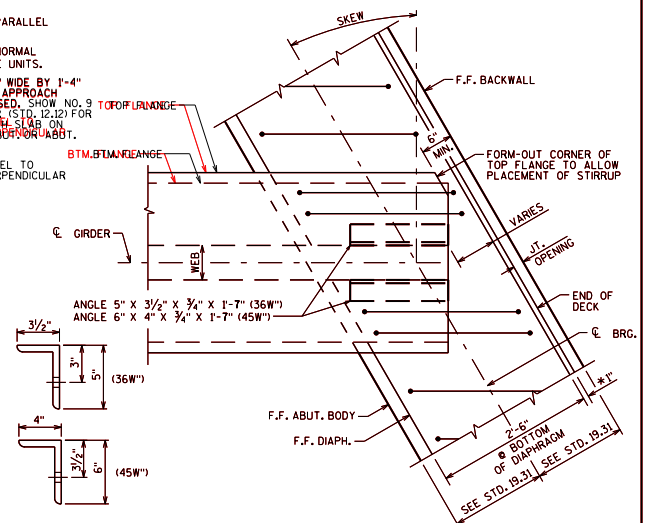


PART TRANSVERSE SECTION AT DIAPHRAGM PIER



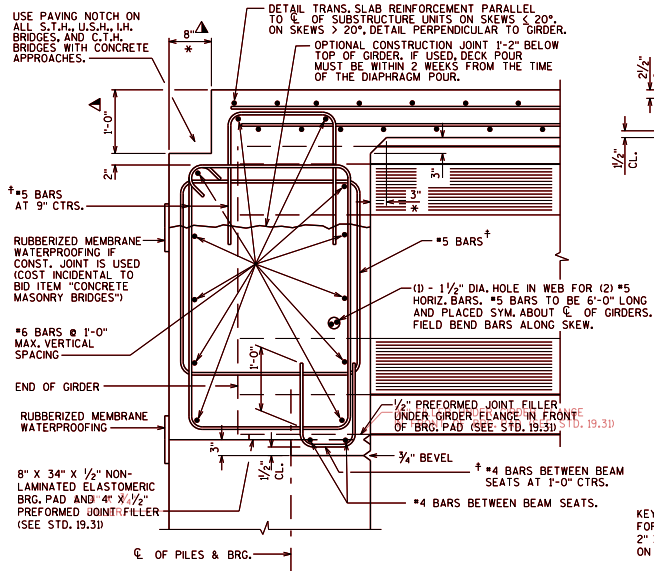
DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

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

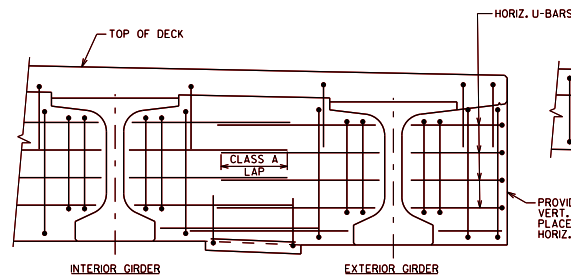


TOP VIEW OF DIAPHRAGM (EXPANSION END)

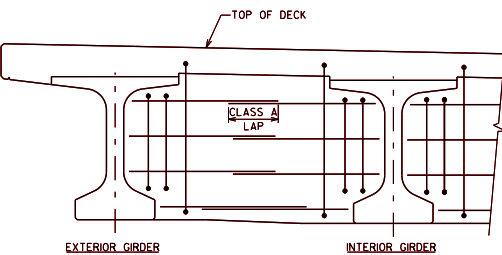
PRESTRESSED 36W" & 45W" GIRDER SLAB & SUPERSTRUCTURE DETAILS	
BUREAU OF STRUCTURES	DATE: 1-19
APPROVED: <u>Bill Oliva</u>	



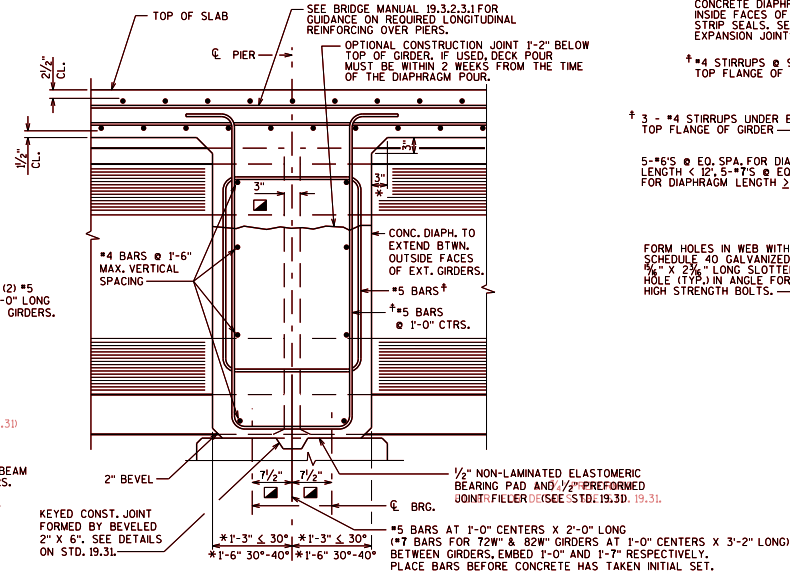
PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



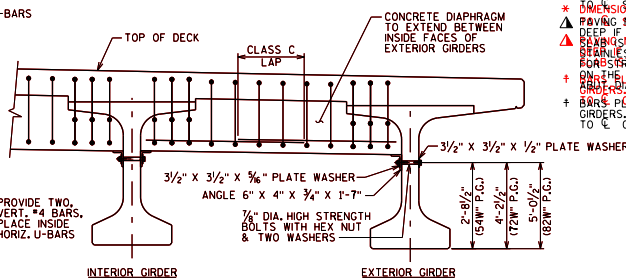
PART TRANSVERSE SECTION AT DIAPHRAGM SEMIEXPANSION END



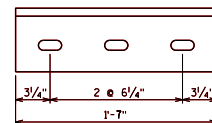
PART TRANSVERSE SECTION AT DIAPHRAGM PIER



DIAPHRAGM AT 1/2" ELASTOMERIC BEARING



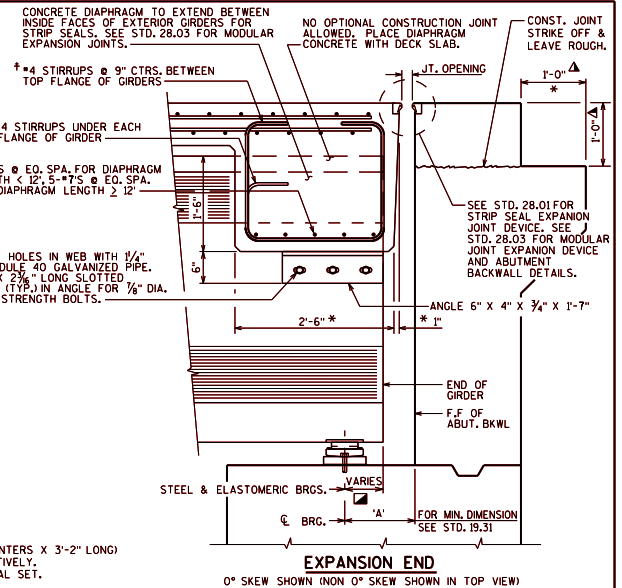
PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END



ANGLE

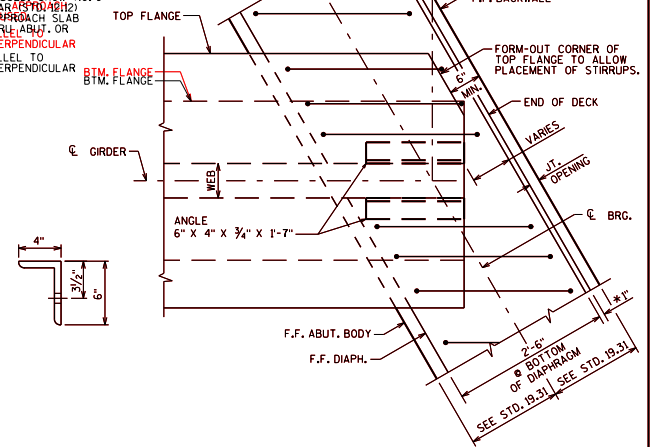
DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

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



LEGEND

- DIMENSION IS TAKEN PARALLEL TO GIRDER
- DIMENSION IS TAKEN PERPENDICULAR TO GIRDER
- * DIMENSION IS TAKEN NORMAL TO GIRDER
- △ DIMENSION IS TAKEN PARALLEL TO GIRDER
- △ DIMENSION IS TAKEN PERPENDICULAR TO GIRDER
- △ DIMENSION IS TAKEN PARALLEL TO GIRDER
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- △ DIMENSION IS TAKEN PARALLEL TO GIRDER
- △ DIMENSION IS TAKEN PERPENDICULAR TO GIRDER



TOP VIEW OF DIAPHRAGM (EXPANSION END)

NOTES

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

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

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

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

DESIGNER NOTES

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

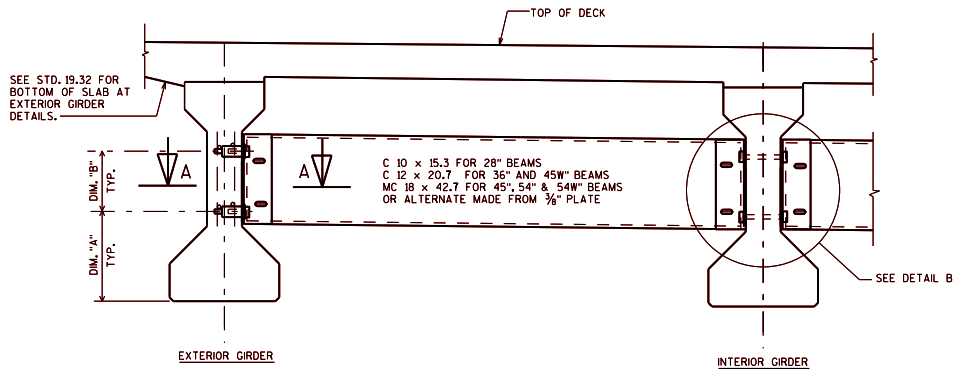
PRESTRESSED 54W", 72W" & 82W" GIRDER SLAB & SUPERSTRUCTURE DETAILS



BUREAU OF STRUCTURES

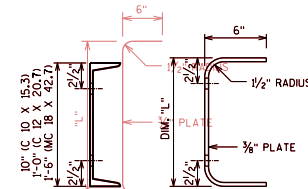
APPROVED: *Bill Oliva*

DATE: 1-18

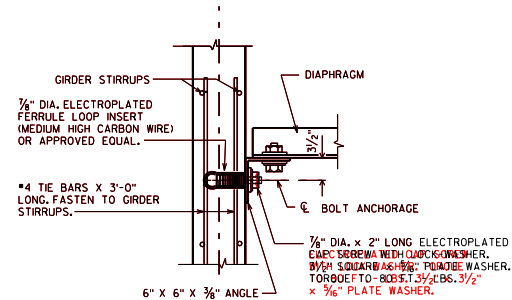


PART TRANSVERSE SECTION AT DIAPHRAGM

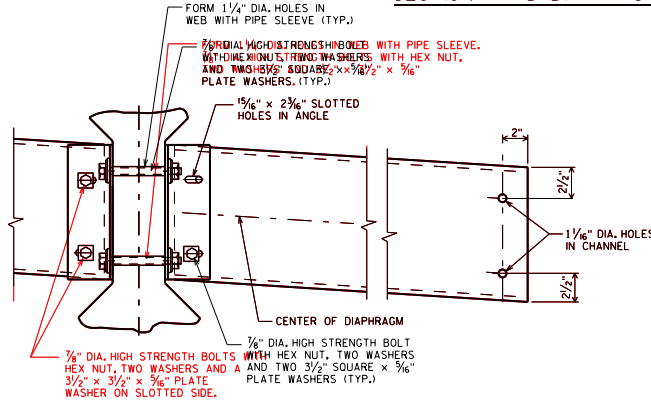
GIRDER HEIGHT	DIM. "A"	DIM. "B"	DIM. "L"	* DIM. "X"
28"	1'-0 1/8"	5 1/4"	9 1/2"	2 1/4"
36"	1'-2 1/4"	9 3/4"	1'-1 1/2"	3 1/4"
45"	1'-5 3/8"	1'-1 3/8"	1'-5 1/2"	2 1/4"
45W"	1'-9 1/8"	8 3/4"	1'-0 1/2"	2 3/4"
54"	1'-7 1/4"	1'-5 1/8"	1'-9 1/2"	4 1/4"
54W"	1'-9 1/8"	1'-5 3/8"	1'-9 1/2"	4 1/4"



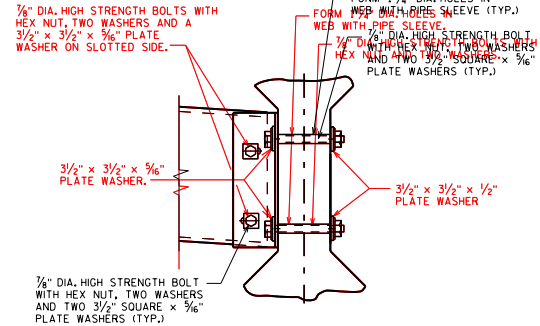
SECTION THRU DIAPHRAGM
*DIM. "X" = 2 1/2" FOR ALTERNATE PLATE DIAPHRAGM



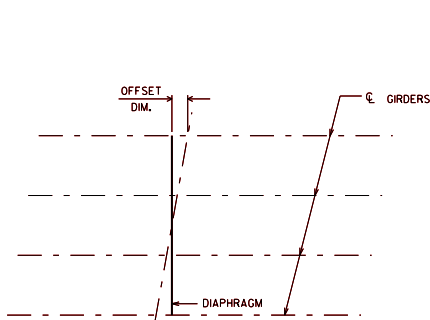
SECT. A-A
(FOR EXTERIOR ATTACHMENT)



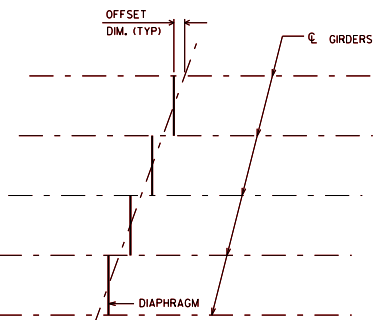
DETAIL B
(FOR CONTINUOUS LINE OF DIAPHRAGMS)



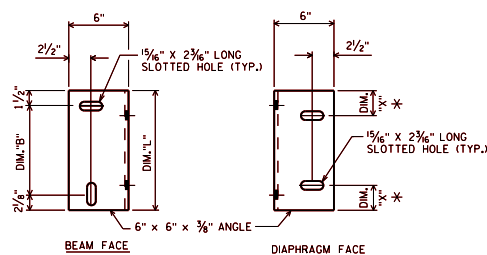
SECTION AT INTERIOR GIRDERS THRU DIAPHRAGM FOR SKEW ANGLES > 10°



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

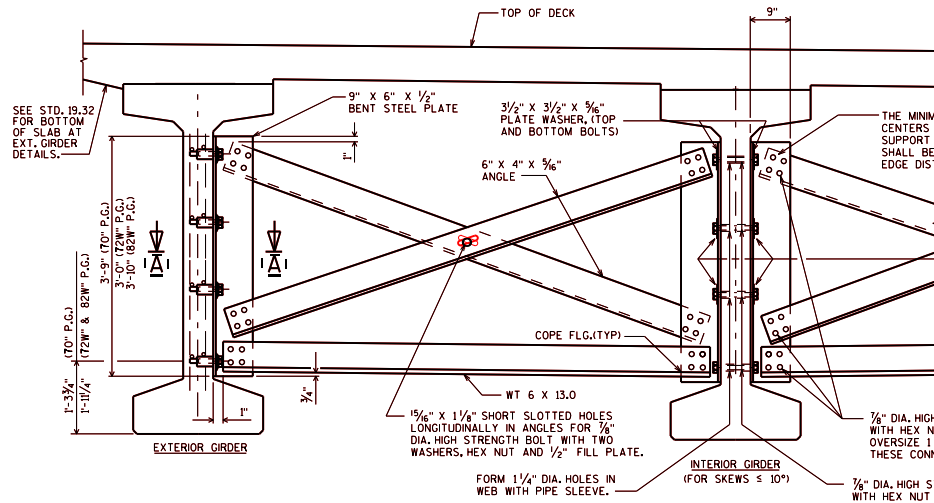
FOR SPANS EQUAL TO OR LESS THAN 80'-0", PLACE ONE DIAPHRAGM AT MID-LENGTH OF GIRDER. FOR SPANS OVER 80'-0", PLACE AT 1/3 AND 2/3 POINTS.

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.

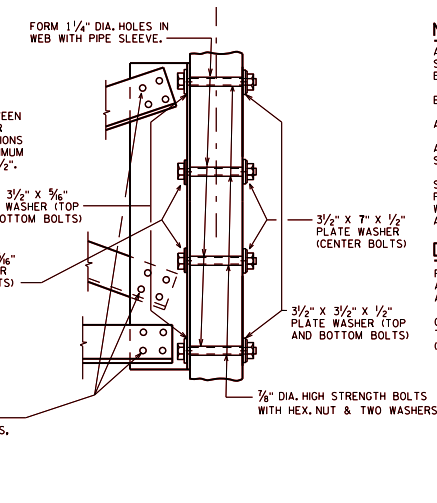
INTER. STEEL DIAPHS. FOR 28", 36", 45", 45W" 54" & 54W" PRESTRESSED GIRDERS

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.

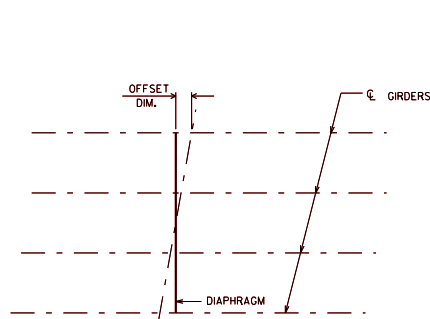
ALL DIAPHRAGM MATERIAL INCLUDING BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

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.

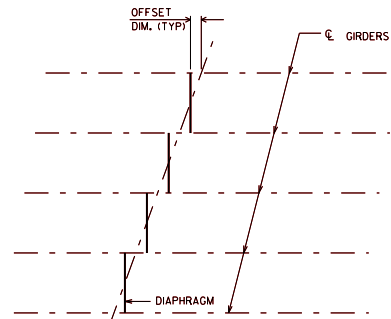
DESIGNER NOTES

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.

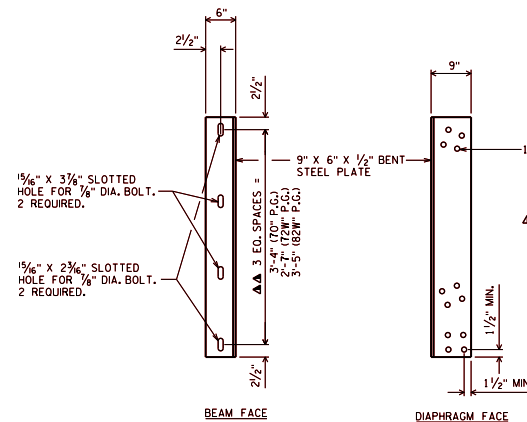
ON THE PLANS, SHOW LOCATION OF INSERTS/HOLES FOR DIAPHRAGM TO WEB CONNECTION, NOT ONLY FROM THE BOTTOM OF THE GIRDER (DIM "A" AND "B"), BUT ALSO FROM THE ENDS OF EACH GIRDER.



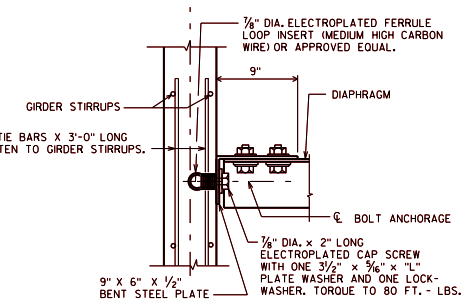
PLAN FOR SKEW ANGLES ≤ 10°



PLAN FOR SKEW ANGLES > 10°



DIAPHRAGM SUPPORT



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

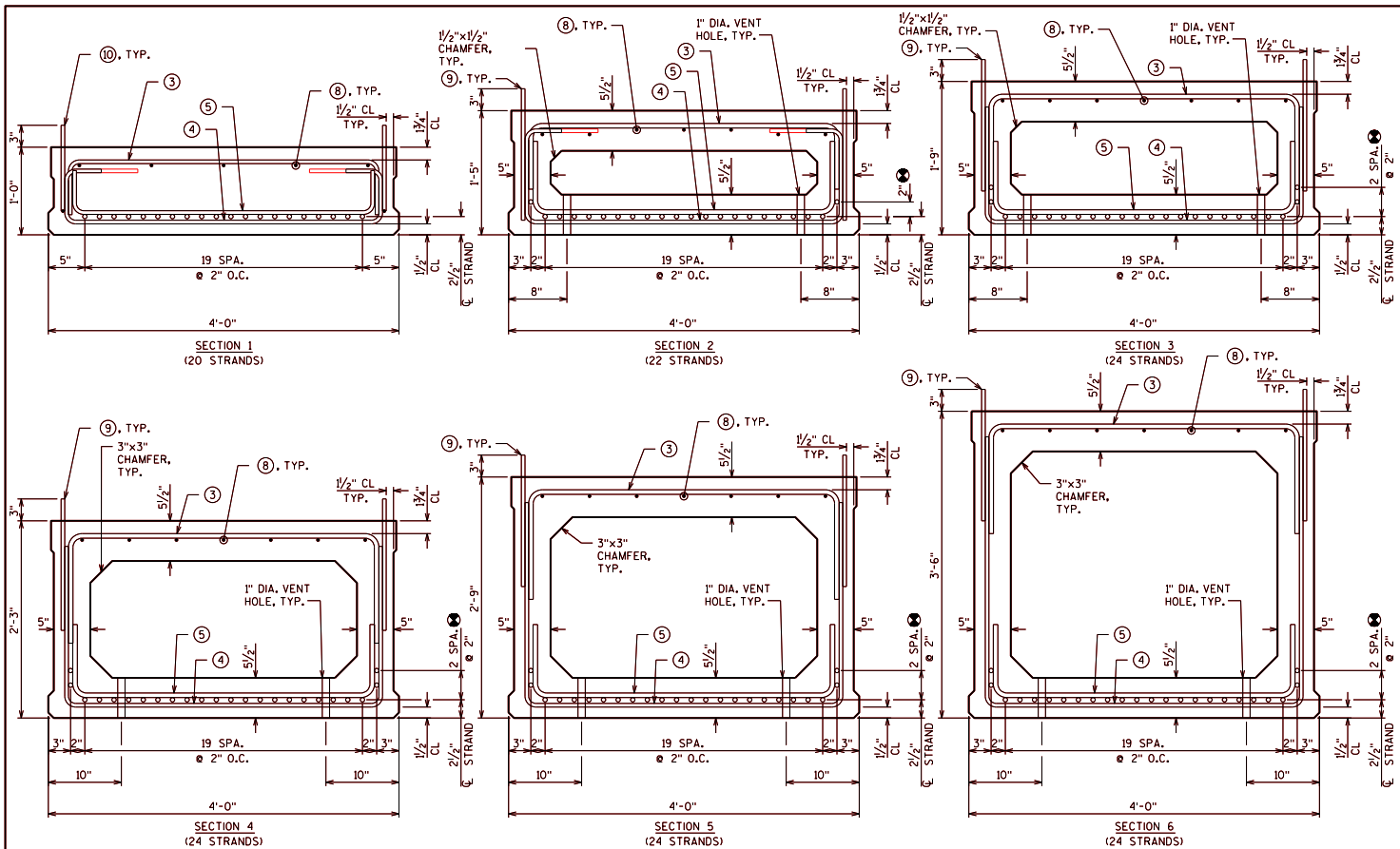
"L" = 3 1/2"; TOP & BOTTOM BOLTS
"L" = 7"; CENTER BOLTS

▲▲ 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

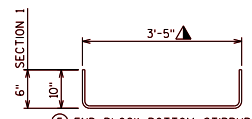
APPROVED: Bill Oliva DATE: 7-17



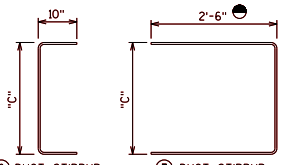
4'-0" SECTIONS

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"



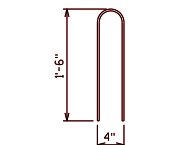
⑤ END BLOCK BOTTOM STIRRUP
#4 AND #5 BARS
SEE ELEVATION FOR SPACING



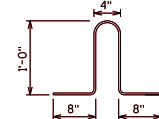
⑥ DUCT STIRRUP
#4 AT 9" MAX.
(16) EACH GIRDER END
⑦ DUCT STIRRUP
#4 AT 9" MAX.
(16) EACH GIRDER END



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



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



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

SHEAR KEY RECESS DETAIL

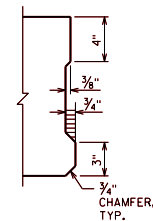
OMIT SHEAR KEY ON
EXTERIOR FACE OF
EXTERIOR GIRDERS.

DESIGNER NOTE

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

LEGEND

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



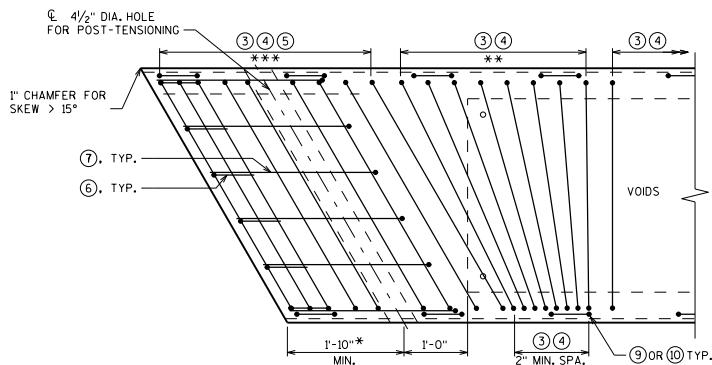
4'-0" PRESTRESSED BOX GIRDER SECTIONS



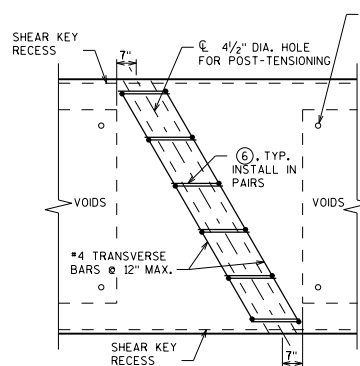
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

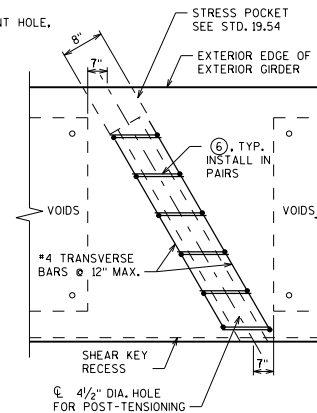
DATE:
1-18



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



INTERIOR GIRDER DUCT PLAN



EXTERIOR GIRDER DUCT PLAN

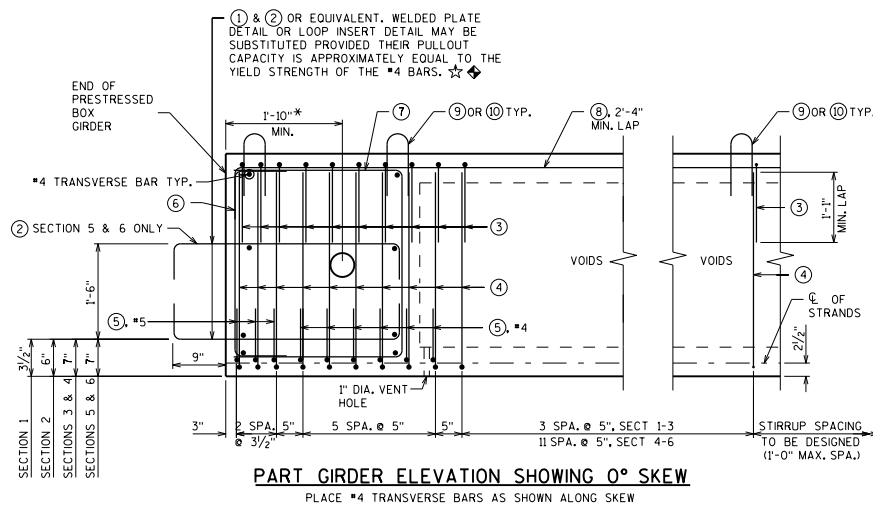
LEGEND

- ☆ 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.

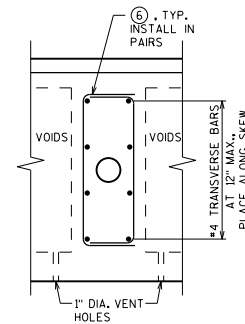
DESIGNER NOTES

FOR BAR BEND DETAILS, SEE STANDARD 19.50 AND STANDARD 19.51

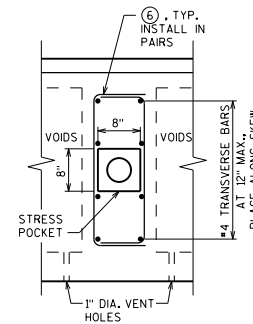
FOR SKEWED STRUCTURES CAST END OF PRESTRESSED BOX GIRDER ALONG SKEW.



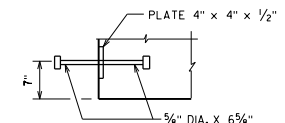
PART GIRDER ELEVATION SHOWING 0° SKEW
PLACE #4 TRANSVERSE BARS AS SHOWN ALONG SKEW



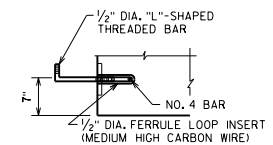
INTERIOR GIRDER DUCT ELEVATION



EXTERIOR GIRDER DUCT ELEVATION



WELDED PLATE DETAIL
(EQUIVALENT TO ONE #4 BAR)



LOOP INSERT DETAIL

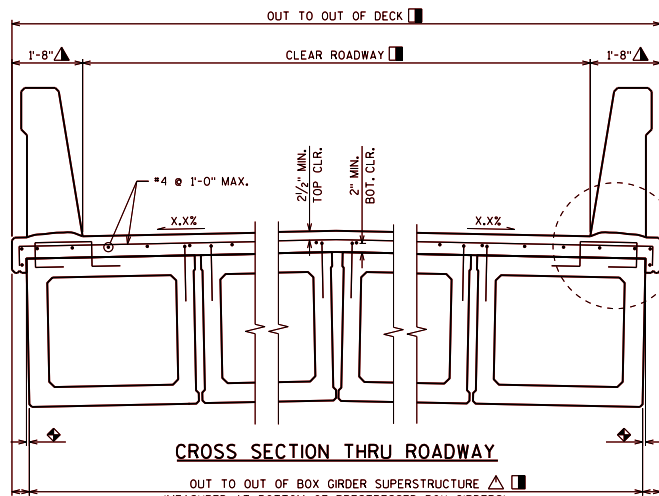
PRESTRESSED BOX GIRDER DETAILS 1



BUREAU OF STRUCTURES

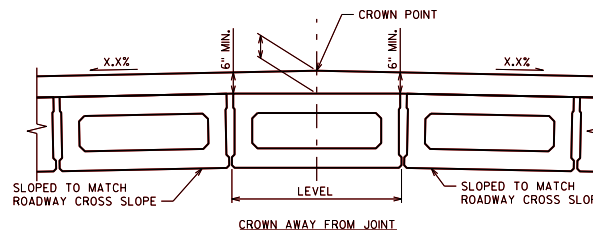
APPROVED: Bill Oliva

DATE:
1-17



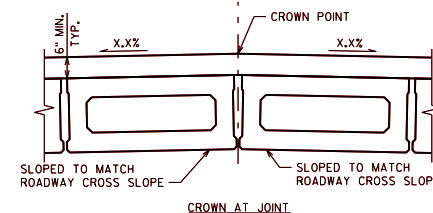
CROSS SECTION THRU ROADWAY

OUT TO OUT OF BOX GIRDER SUPERSTRUCTURE
(MEASURED AT BOTTOM OF PRESTRESSED BOX GIRDERS)



CROWN AWAY FROM JOINT

CROWN DETAIL AT LOCATION OF MIN. DECK THICKNESS

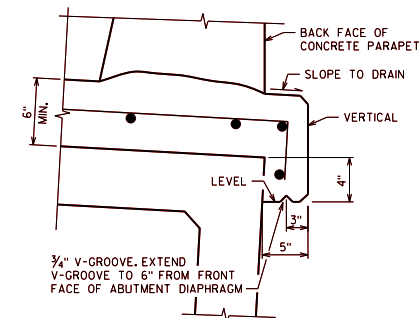


CROWN AT JOINT

NUMBER OF SECTIONS

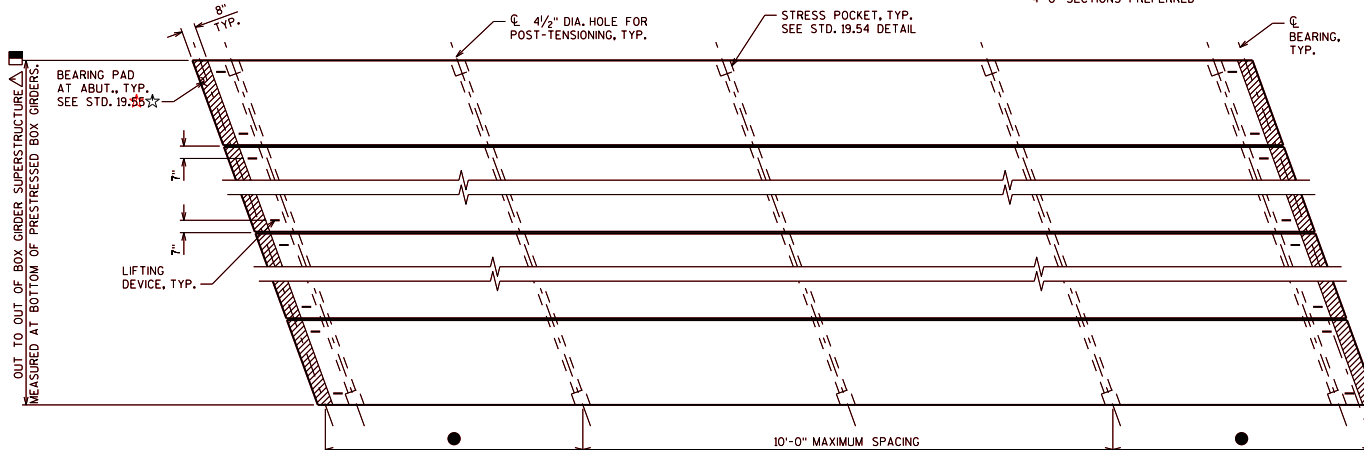
CLEAR ROADWAY	3'-0" SECTION	4'-0" * SECTION
26'-0"	10	7
30'-0"	11	8
36'-0"	13	10
40'-0"	14	11
44'-0"	16	12

* 4'-0" SECTIONS PREFERRED

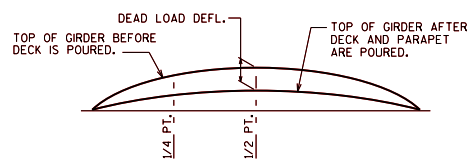


DECK OVERHANG DETAIL

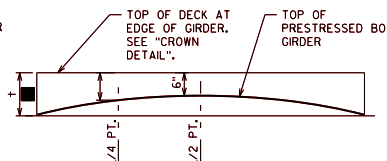
SEE STANDARD 19.56 FOR ADDITIONAL DETAILS



PLAN



DEAD LOAD DEFLECTION DIAGRAM



DECK THICKNESS DIAGRAM

■ 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.

DESIGNER NOTES

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

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

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

NOTES

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

VARIATIONS TO THE GRADE LINE OVER 1/4" MUST BE SUBMITTED BY THE FIELD ENGINEER TO THE STRUCTURES DESIGN SECTION FOR REVIEW.

LEGEND

☆ BEARING PAD NOT REQUIRED FOR GRS ABUTMENTS.

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

■ DIMENSION ASSUMES 1" JOINT WIDTH. JOINT WIDTH DIMENSIONS MAY VARY DUE TO ±1/4" JOINT TOLERANCES.

▲ MAY BE REDUCED TO 1'-7" TO MAINTAIN ROADWAY CLEAR WIDTH.

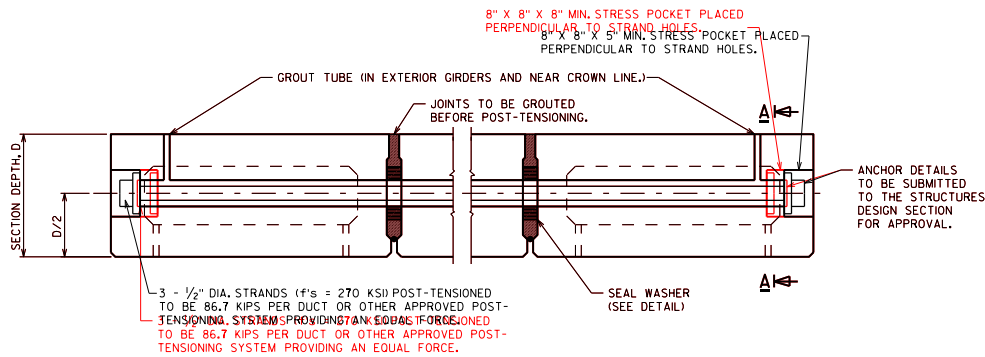
PRESTRESSED BOX GIRDER DETAILS 2



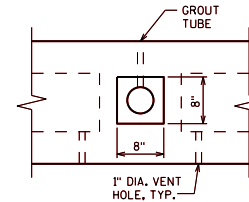
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

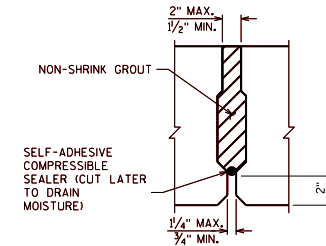
DATE:
7-18



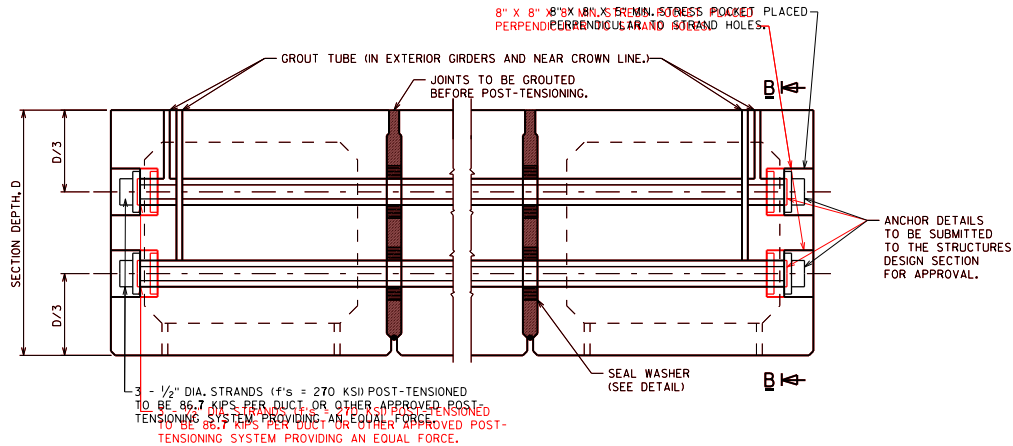
POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM
(SECTIONS 1 THROUGH 4)



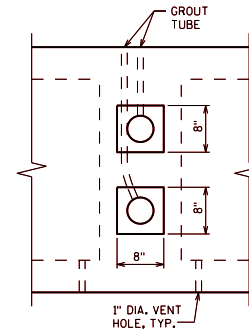
SECTION A-A



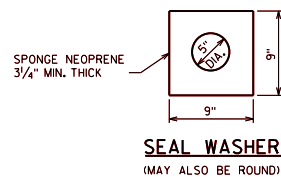
SHEAR KEY DETAIL



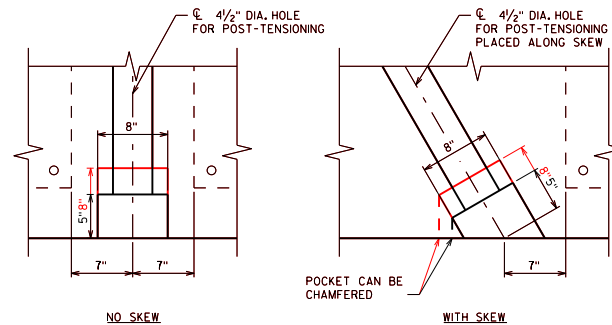
POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM
(SECTIONS 5 AND 6)



SECTION B-B

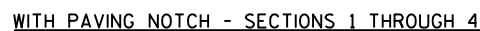
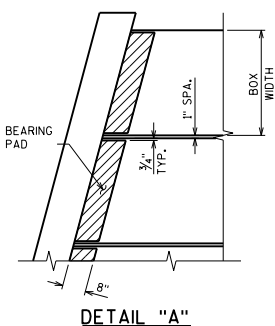


SEAL WASHER
(MAY ALSO BE ROUND)



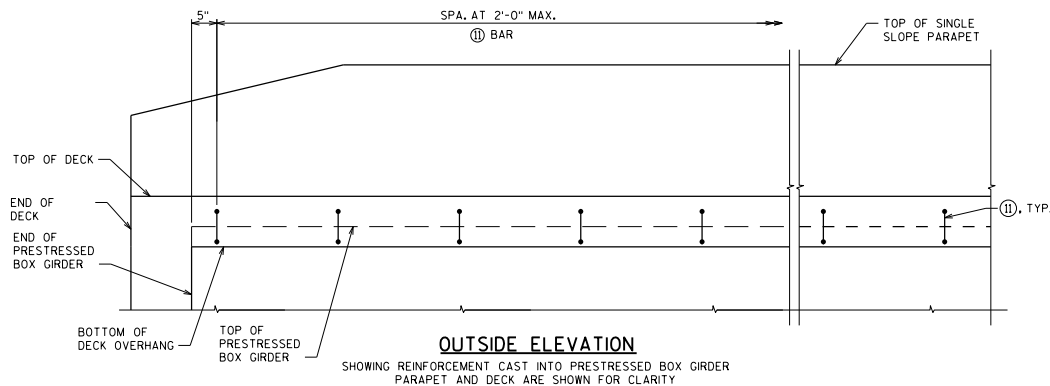
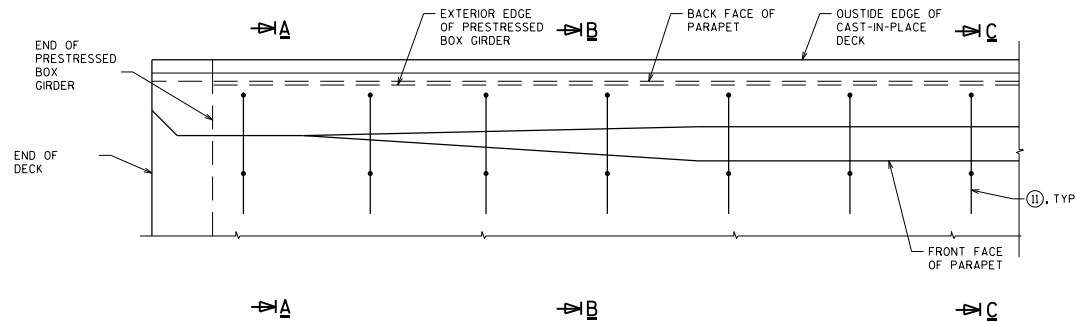
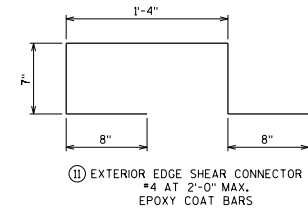
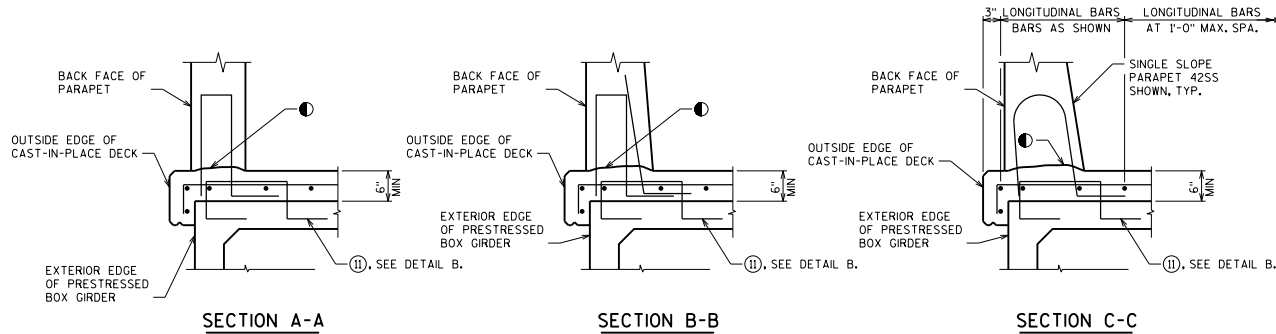
STRESS POCKET DETAIL

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



WITH PAVING NOTCH - SECTIONS 5 AND 6

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



LEGEND

● CONST. JOINT - STRIKE OFF AS SHOWN.

NOTE

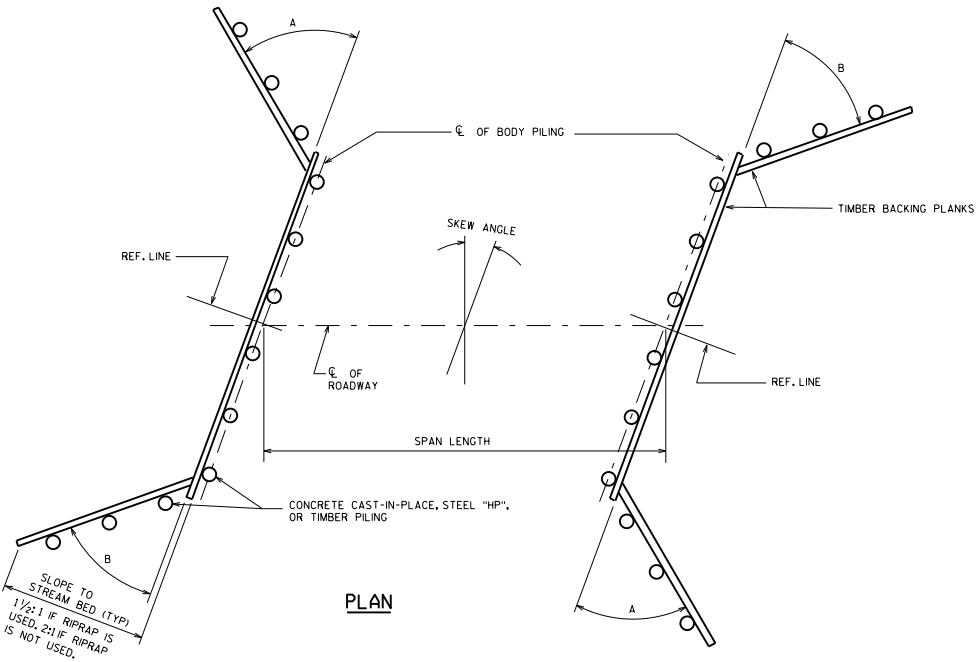
BAR 11 TO BE PAID AS PART OF BID ITEM "PRESTRESSED BOX GIRDER TYPE XX-INCH".

DESIGNER NOTES

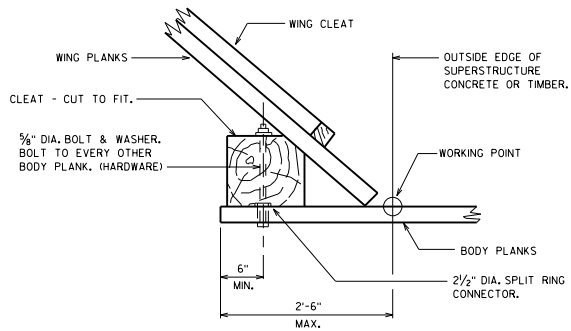
SEE CHAPTER 30 STANDARDS FOR SINGLE SLOPE PARAPET DETAILS.

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

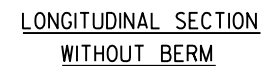
TIMBER ABUTMENTS GENERAL

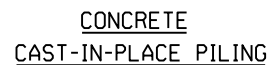


**BUREAU OF
STRUCTURES**

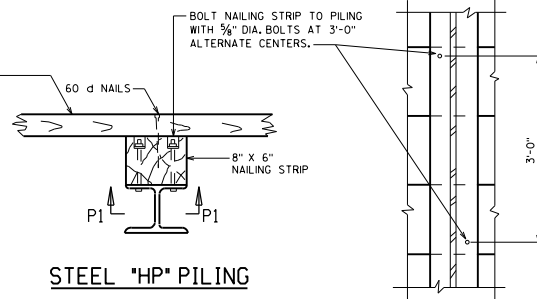
APPROVED: Bill Oliva

DATE:
7-16

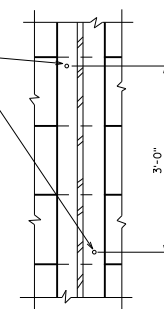
STANDARD 23.02



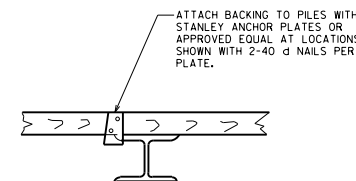
TIMBER PILING



STEEL "HP" PILING

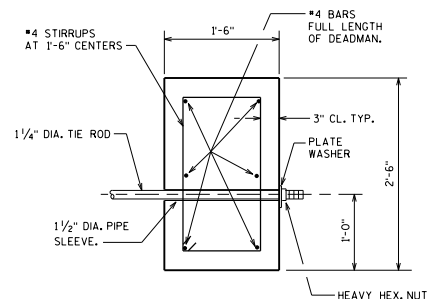


SECTION P1



STEEL "HP" PILING
(ALTERNATE ATTACHMENT)

PILE CAP DETAIL
(TIMBER GIRDER)



SECTION THRU DEADMAN

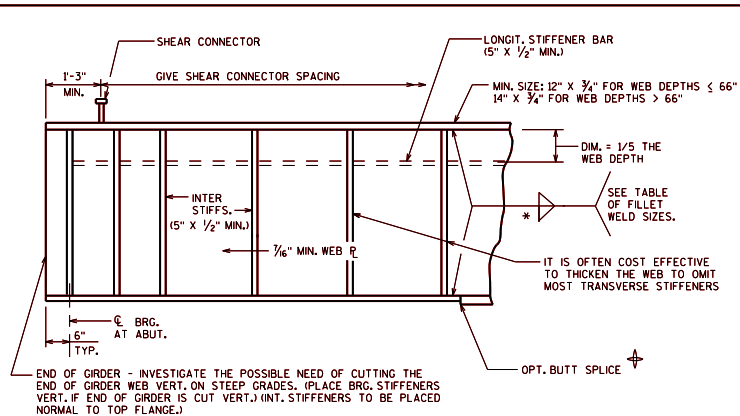
TIMBER ABUTMENT DETAILS



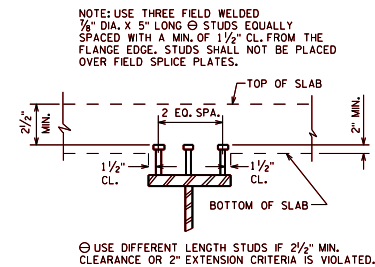
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

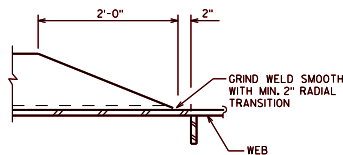
DATE:	3-16
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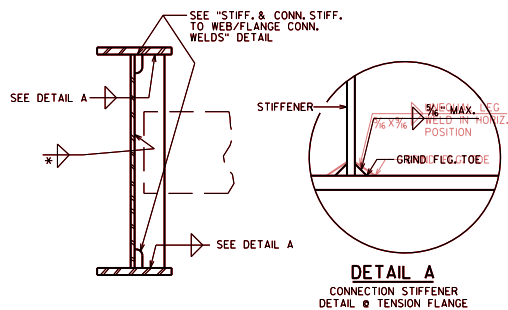
PART GIRDER ELEVATION



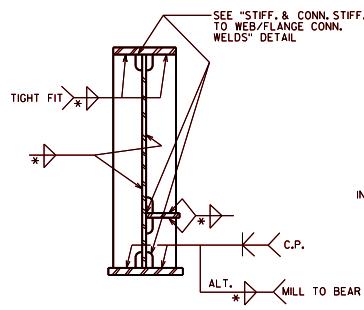
SHEAR CONN. DETAILS



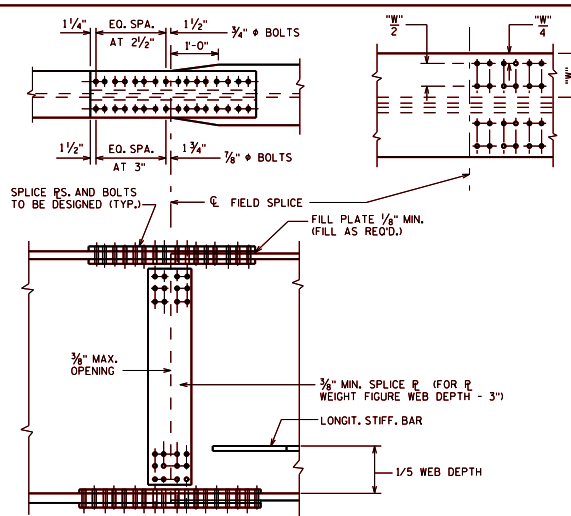
LONGIT. STIFF. TERMINATION



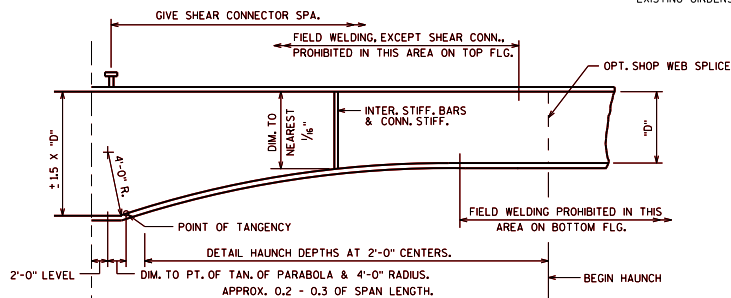
CONNECTION STIFF. DETAILS



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



FIELD SPlice DETAILS



PARABOLIC HAUNCH DETAILS

NOTES

OPTIONAL WELDED SHOP SPICES MAY BE USED FOR ALL FLANGE AND WEB PLATES OVER 60'-0" LONG. IF USED, THE LOCATION OF THE SPICE SHALL BE SHOWN ON SHOP DRAWINGS AND WILL BE SUBJECT TO THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

OPTIONAL FLANGE BUTT SPICE, A FLANGE PLATE OF THE LARGER SIZE MAY BE FURNISHED FULL LENGTH, BUT PAY WEIGHT SHALL BE BASED ON SECTIONS AS DETAILED. IF A PERMANENT HOLD DOWN DEVICE IS USED AT THE ABUTMENT, THEN THE BUTT SPICE SHALL NOT BE OPTIONAL.

PRIOR TO STEEL BLAST, ALL FLAME CUT EDGES OF PLATE THAT ARE TO BE PAINTED SHALL BE GROUND OR PLANED TO REMOVE THE HARDENED SURFACE CAUSE BY THE FLAME, AND CORNERS CHAMFERED 1/16" MINIMUM.

DESIGNER NOTES

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

AT EXTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON ONE SIDE OF GIRDERS AND LONGITUDINAL STIFFENERS ON THE OUTSIDE FACE OF ORDER. PLACE LONGITUDINAL STIFFENERS ON THE OUTSIDE FACE.

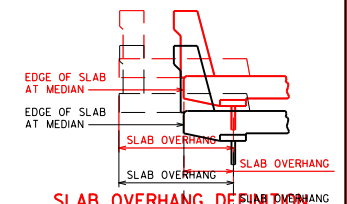
AT INTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON ONE SIDE OF GIRDERS AND LONGITUDINAL STIFFENERS ON THE OUTSIDE FACE OF ORDER. PLACE LONGITUDINAL STIFFENERS ON THE OUTSIDE FACE.

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

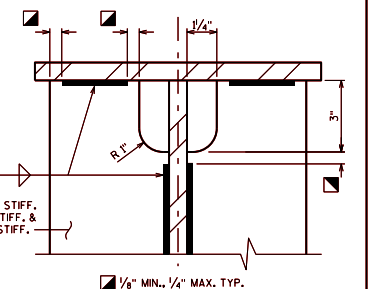
AT EXTERIOR GIRDER PLACE INTERMEDIATE TRANSVERSE STIFFENERS ALONG ENTIRE LENGTH OF GIRDER. PLACE INTERMEDIATE TRANSVERSE STIFFENERS ALONG ENTIRE LENGTH OF GIRDER AT MAX. SPACING. GIVE LONG. STIFFENERS WEB SPACING EQUALLY BETWEEN DIAPHRAGM CONNECTIONS. STIFFENERS SHALL BE BRACED MIN. INCESS AND BE BRACED OR TIED TO FLANGE WEB. BRACING SHALL BE BRACED AND MAY BE BRACED TO THE SLAB OVERHANG. MIN. BRACING SHALL BE 1'-6" OR LESS OR ANY OF THE FOLLOWING CRITERIA

AREAS SATISFYING > 3/4" AND WEB DEPTH < 48"
WEB THICKNESS > 3/4" AND WEB DEPTH < 48"
WEB THICKNESS > 3/4" AND WEB DEPTH < 48"
WEB THICKNESS > 3/4" AND WEB DEPTH < 48"

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



SLAB OVERHANG DEFINITION



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

PLATE GIRDER DETAILS



**BUREAU OF
STRUCTURES**

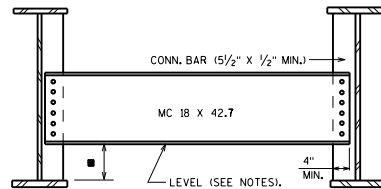
APPROVED: Bill Oliva

DATE: 1-19

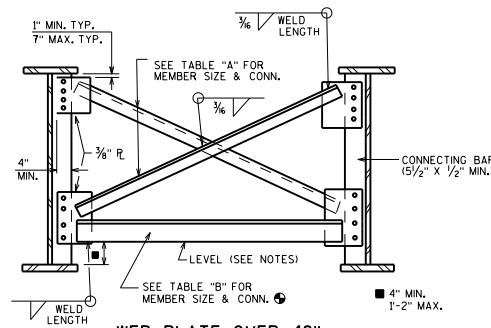
* TABLE OF FILLET WELD SIZES

MATERIAL THICKNESS OF THICKER PART JOINED	* MIN. SIZE OF FILLET WELD
TO 1/2" INCLUSIVE	3/16"
OVER 1/2" TO 3/4"	1/4"
OVER 3/4" TO 1 1/2"	5/16"
OVER 1 1/2"	3/8"

* EXCEPT THAT THE WELD SIZE SHALL NOT EXCEED THE THICKNESS OF THE THINNER PART JOINED.
△ MIN. PASS SIZE IS 3/16"



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



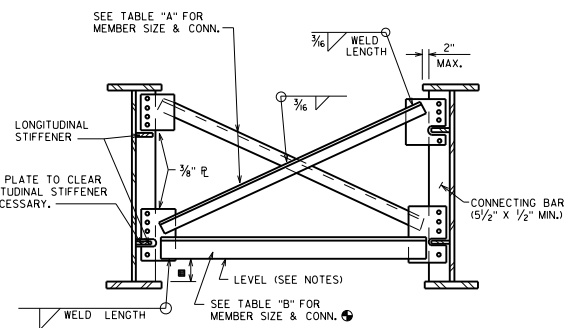
WEB PLATE OVER 48"
TYP. IN SPAN & AT PIER

TABLE "A"

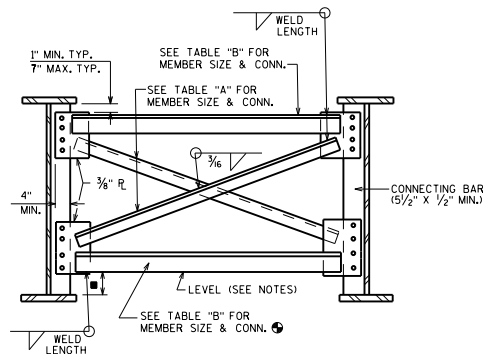
SIZE	MAX. LENGTH OF MEMBER	WELD LENGTH	NO. OF 3/4" ϕ BOLTS	WEIGHT PER FT.
L 3 1/2 X 3 1/2 X 5/16	21'-6"	9"	4	7.2*
L 4 X 4 X 5/16	25'-0"	11"	4	8.2*
L 5 X 5 X 5/16	31'-0"	14"	5	10.3*

TABLE "B"

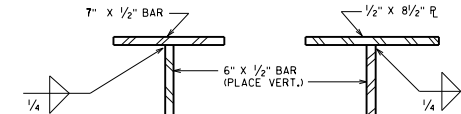
SIZE	MAX. LENGTH OF MEMBER	WELD SIZE	WELD LENGTH	NO. OF 3/4" ϕ BOLTS	WEIGHT PER FT.
L 5 X 5 X 5/16	11'-6"	1/4"	11"	4	10.3*
L 6 X 6 X 5/16	13'-6"	3/16"	13"	6	14.9*
1/2" T SECTION SEE DETAIL "A"	17'-6"	3/16"	14"	7	16.6*
1/2" T SECTION SEE DETAIL "B"	22'-0"	3/16"	13"	7	18.5*



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.

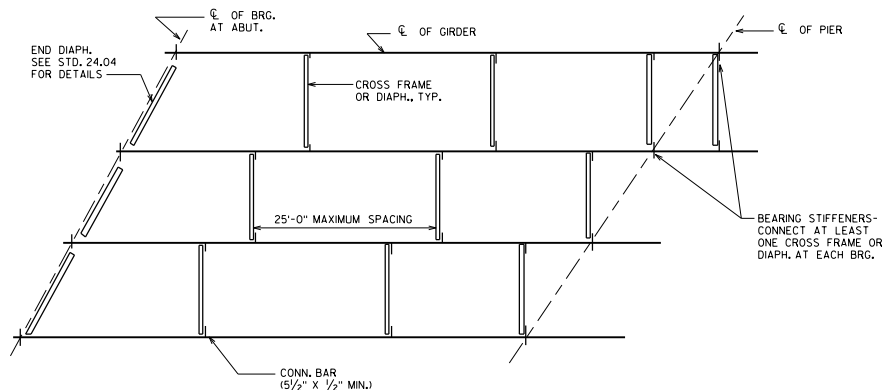
HOLES IN CROSS FRAME CONNECTIONS MAY BE OVERSIZED ϕ 1/16" DIA. IN 1 PLY.

DESIGNER NOTES

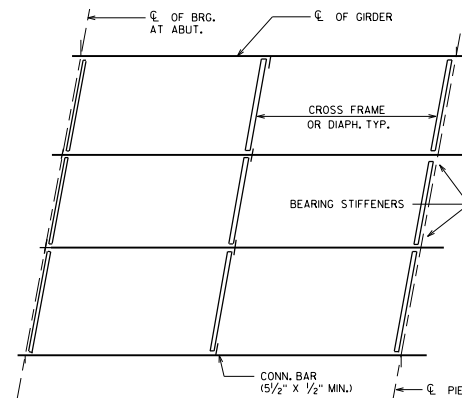
SEE STD. 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.

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.

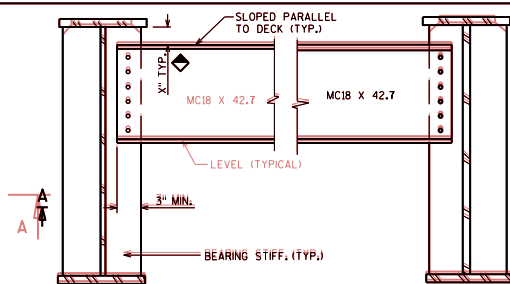


FRAMING PLAN FOR SKEW > 15°

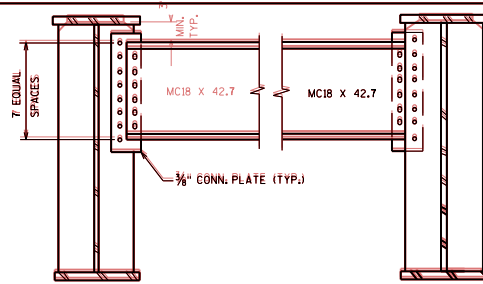


FRAMING PLAN FOR SKEW < 15°

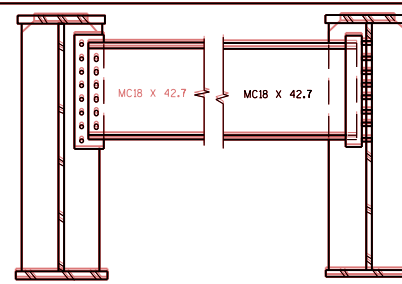
PLATE GIRDER DIAPHRAGMS AND CROSS FRAMES	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-15</u>



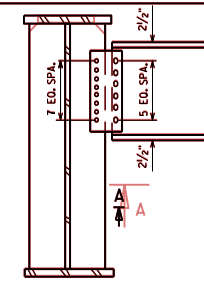
SKEWS 0° - 15°



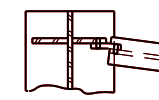
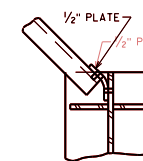
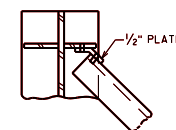
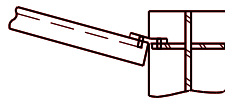
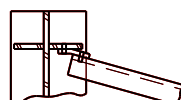
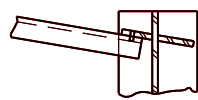
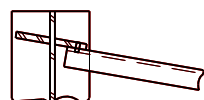
SKEWS > 15° < 30°



SKEW > 30°

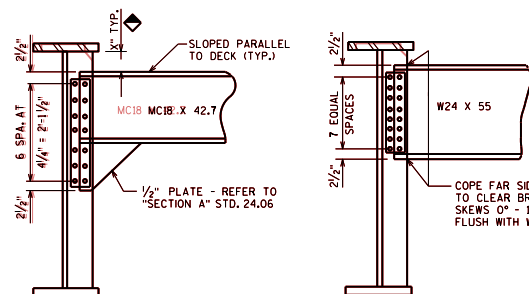


W24 X 55 TYPICAL CONN.



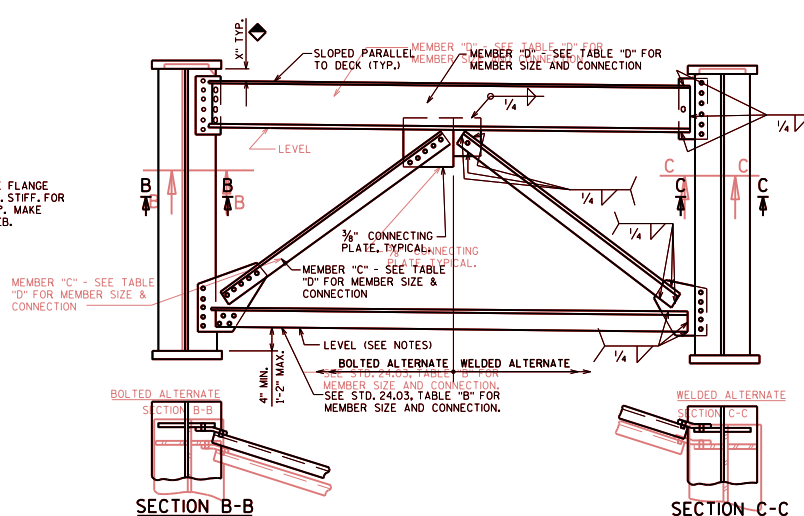
SECTION A-A

END DIAPHRAGM CONNECTIONS - WEB DEPTHS < 48"



TYPICAL CONNECTION FOR MC18 X 42.7 AND W24 X 55. USE MC18 X 42.7 WHEN DIAPHRAGM LENGTH IS < 13'-6". USE W24 X 55 FOR LENGTHS > 13'-6" < 22'-0". (SKEW > 15° < 30° SHOWN)

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



SECTION B-B

SECTION C-C

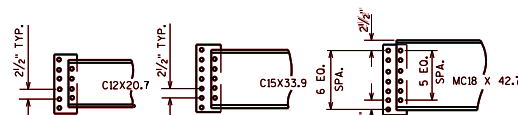
END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 60"

SKEWS > 15° < 30° SHOWN

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 3/8	5	13	4 X 4 X 3/8	5	12	4 X 4 X 3/8	5	11	C12 X 20.7	6 @ 2 1/2"	4 @ 2 1/2"	
13'-6"	5 X 5 X 3/8	6	17	5 X 5 X 3/8	6	15	5 X 5 X 3/8	6	15	C12 X 20.7	6 @ 2 1/2"	4 @ 2 1/2"	
17'-6"	6 X 6 X 3/8	8	20	5 X 5 X 3/8	7	18	5 X 5 X 3/8	6	16	C15 X 33.9	7 @ 2 1/2"	5 @ 2 1/2"	
22'-0"	6 X 6 X 3/8	9	23	6 X 6 X 3/8	8	21	6 X 6 X 3/8	7	19	MC18 X 42.7	7 @ 2 1/2"	6 @ 2 1/2"	

NOTE: ALL MEMBER "C" SIZES REPRESENT ANGLES.



MEMBER "D" END CONNECTIONS

OMIT END CONNECTING PLATE FOR SKEWS 0° - 15°

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.

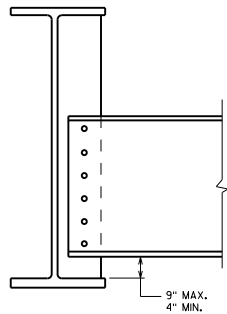
END DIAPHRAGMS



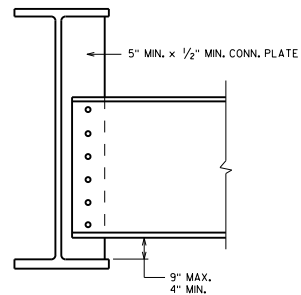
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 1-18



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

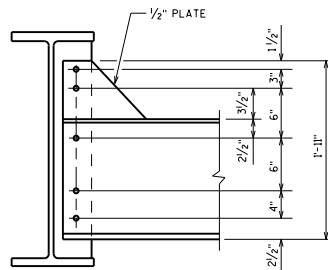
DIAPHRAGMS SHALL BE HORIZONTAL EXCEPT WHEN THE DIFFERENCE IN ADJACENT GIRDER ELEVATIONS IS OF A MAGNITUDE THAT NECESSITATES SLOPING THE DIAPHRAGMS.

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

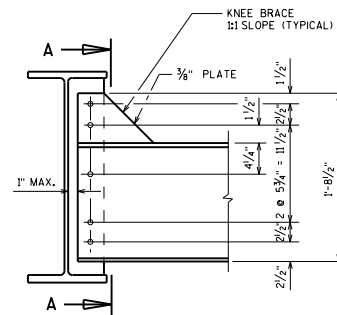
ALL BOLTED CONNECTIONS SHALL BE MADE WITH 3/4" ϕ HIGH STRENGTH ASTM A325 BOLTS.

DESIGNER NOTES

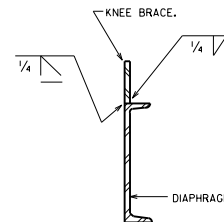
SEE STANDARD 24.02 FOR CONNECTION BAR CORNER COPE & WELD DETAILS.



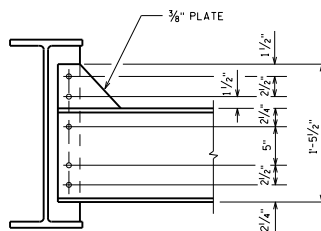
30" W. GIRDER



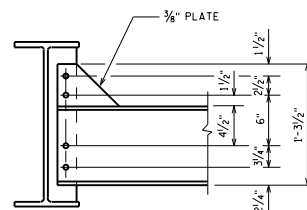
27" W. GIRDER



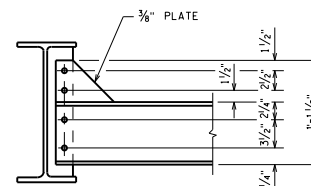
SECTION A



24" W. GIRDER



21" W. GIRDER



18" W. GIRDER

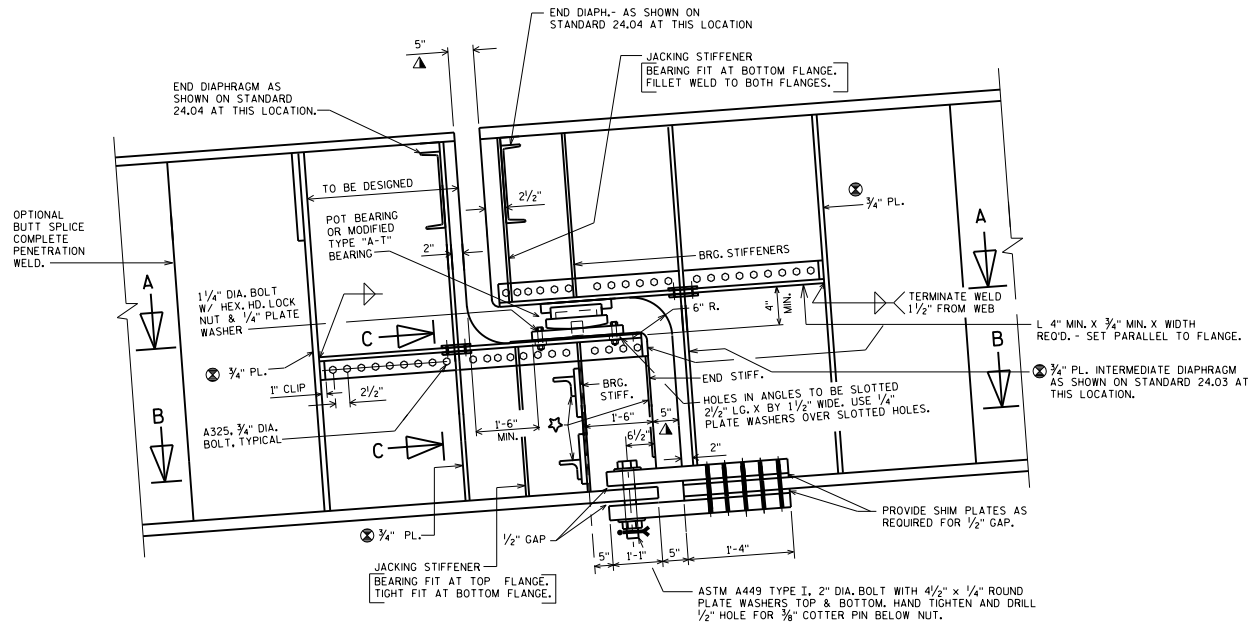
ROLLED GIRDER DIAPHRAGMS



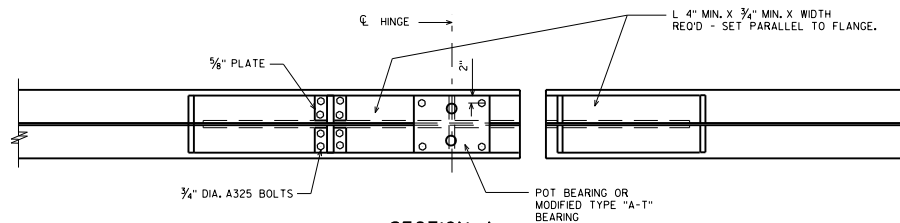
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

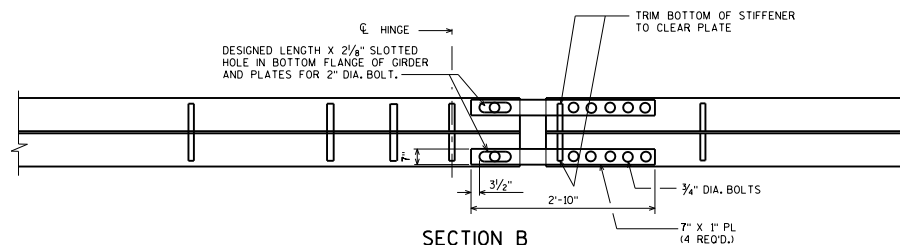
DATE:
7-15



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

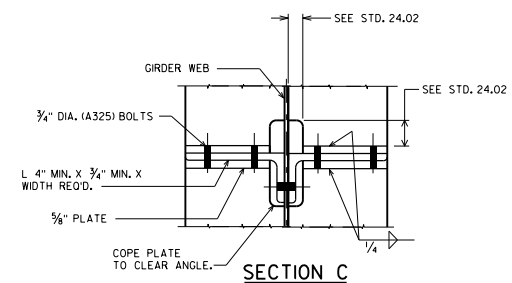
SIZE AND LENGTH OF ANGLES, NUMBER OF BOLTS THRU ANGLES, THICKNESS OF WEB PLATE, AND SIZE OF BEARING STIFFENERS AND JACKING STIFFENERS SHALL BE DETERMINED FROM AN ANALYSIS USING THE VERTICAL AND HORIZONTAL FORCES ACTING AT THE HINGE.

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

SLOTTED HOLES OF 6" IN THE FLANGES AND CONNECTING BARS WILL ACCOMMODATE A TOTAL TEMPERATURE MOVEMENT OF 8" ($\pm 4"$ FROM 45°F). THE DESIGNER MAY NEED TO INCREASE OR DECREASE THE LENGTH OF THE SLOT TO MEET SPECIFIC JOB REQUIREMENTS.

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

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



SECTION C

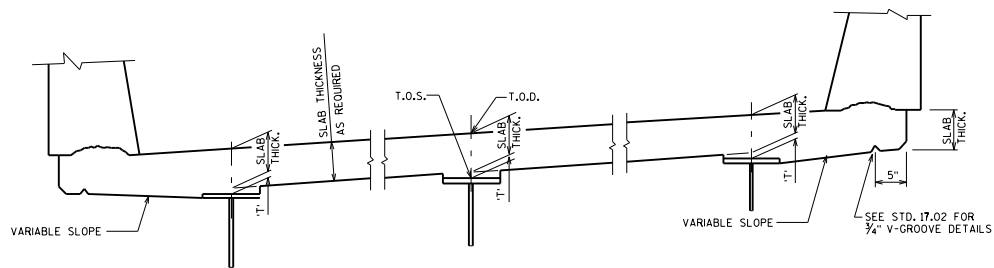
EXPANSION HINGE JOINT DETAILS



BUREAU OF STRUCTURES

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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.

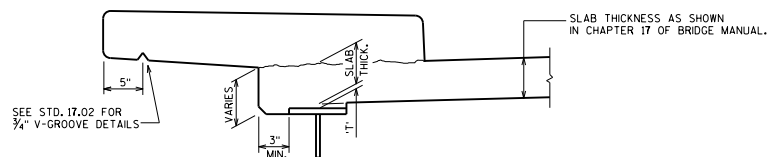
TOP OF DECK ELEVATION AT FINAL GRADE

- TOP OF STEEL ELEVATION AFTER STEEL ERECTION

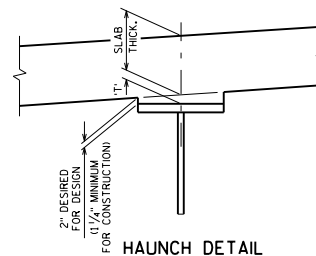
+ CONC. ONLY DEFLECTION; DOWNWARD DEFLECTION IS ADDED, UPWARD DEFLECTION IS SUBTRACTED

- SLAB THICKNESS

= 'T' VALUE FOR SETTING HAUNCH



TREATMENT OF EXTERIOR GIRDER
AT SIDEWALK OVERHANG

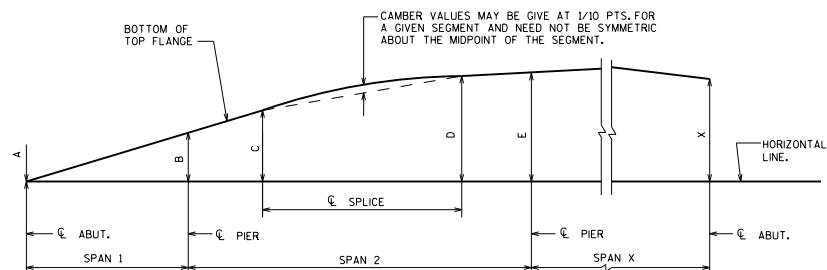


HAUNCH DETAIL

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

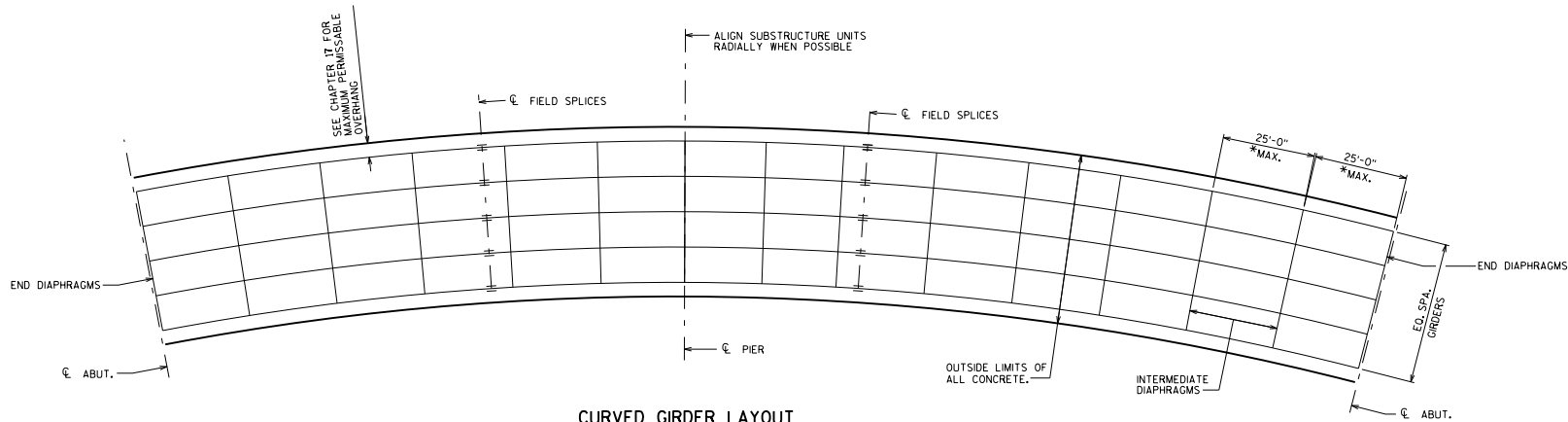
BLOCKING & SLAB HAUNCH DETAILS



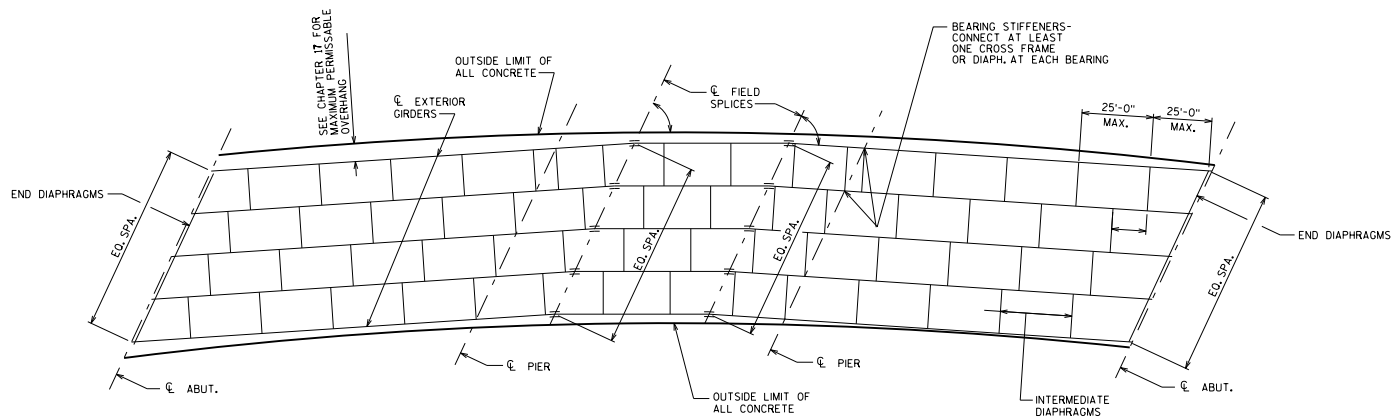
**BUREAU OF
STRUCTURES**

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 $\mathcal{C}$ OF SUBSTRUCTURE UNITS AND $\mathcal{C}$ 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



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

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

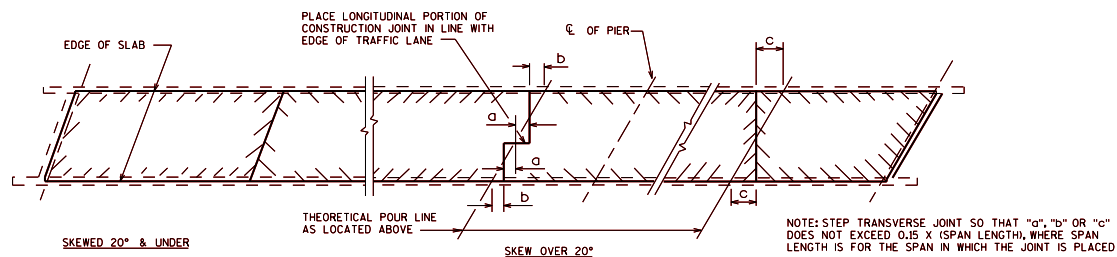
(CONTINUOUS STEEL GIRDER - 2 SPANS SHOWN)



(CONTINUOUS STEEL GIRDER - 3 SPANS SHOWN)



(CONTINUOUS STEEL GIRDER - ANY NUMBER OF SPANS SHOWN)



PLAN VIEW - SHOWING PLACEMENT OF TRANSVERSE CONSTRUCTION JOINTS

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 CONTRUCTION JOINTS ARE SHOWN)

THE CONTRACTOR SHALL POUR THE ENTIRE DECK PER THE DECK POUR SEQUENCE IF REQUIRED TRANSVERSE CONSTRUCTION JOINTS ARE SHOWN ON THE PLANS. THE CONTRACTOR MAY SUBMIT AN ALTERNATE POURING SEQUENCE SUBJECT TO THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

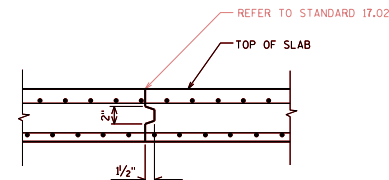
(NOTE: REQUIRED WHEN REQUIRED TRANSVERSE CONTRUCTION JOINTS ARE SHOWN)

* 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 SHALL BE DETERMINED BY THE RATIO OF SPAN TO 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 $\mathcal{C}$ OF IN SPAN
HINGES. (ONE ON EACH SIDE OF HINGE) THE CONCRETE BETWEEN THESE JOINTS
SHOULD BE THE LAST POUR PLACED.

[illegible]

SECTION THRU TRANSVERSE
OR LONGITUDINAL JOINT

SLAB POURING SEQUENCE

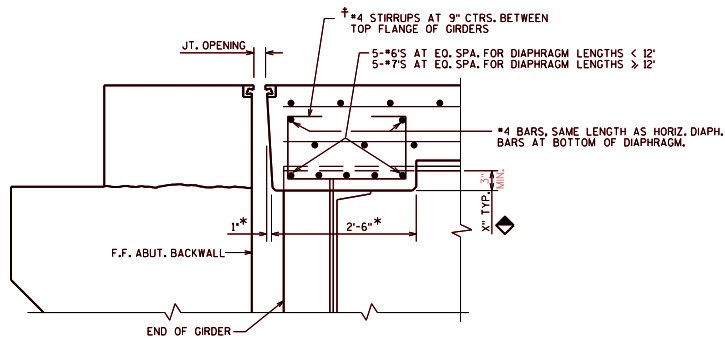


BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

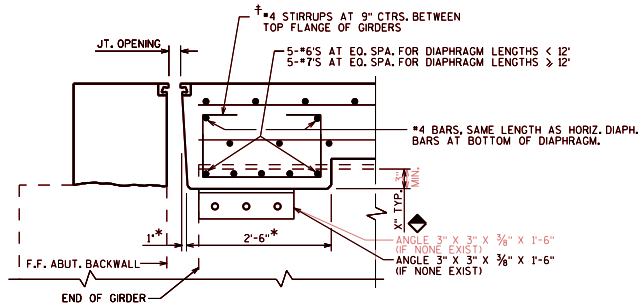
DATE:

13



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.

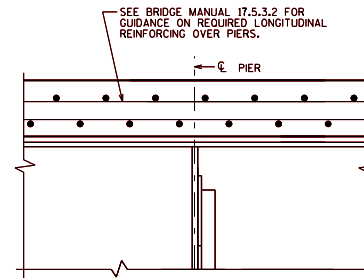
DESIGNER NOTE

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

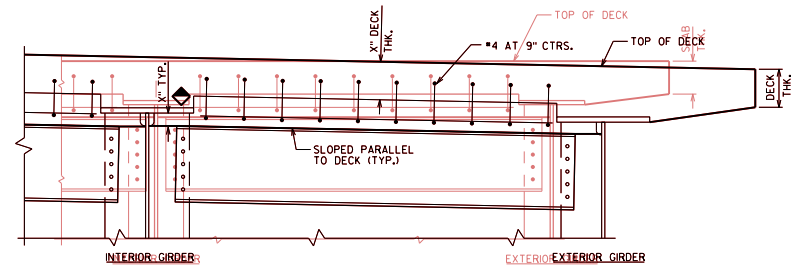
LEGEND

† 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

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

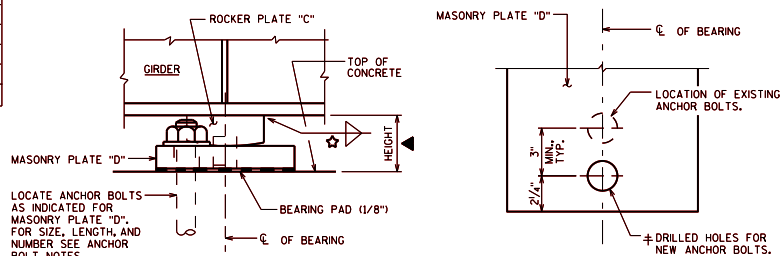
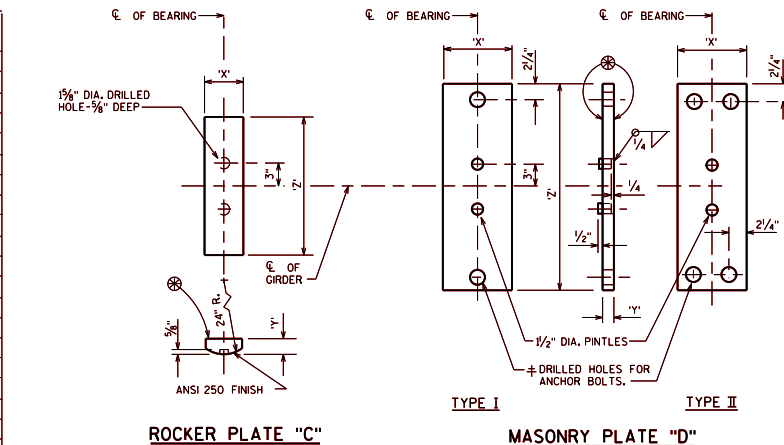
ANCHOR BOLT NOTES

FOR SPAN LENGTHS UP TO 100'-0":
USE A TYPE I MASONRY PLATE "D" WITH
(2) - 1/4" DIA. x 1'-5" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS FROM 100'-0" UP TO 150'-0":
USE A TYPE I MASONRY PLATE "D" WITH
(2) - 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

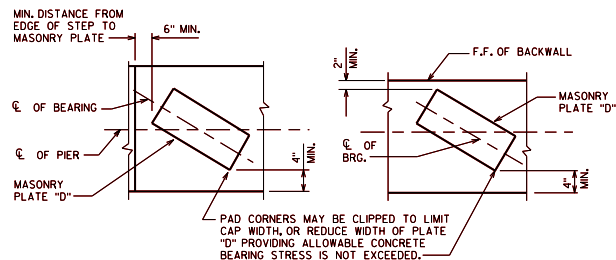
FOR SPAN LENGTHS GREATER THAN 150'-0":
USE A TYPE II MASONRY PLATE "D" WITH
(4) - 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE
HORIZONTAL CAPACITY.

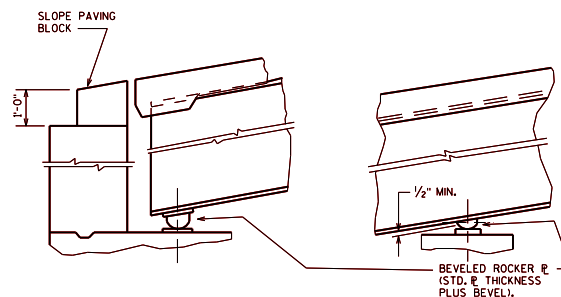


FIXED BEARING ASSEMBLY
(SEE "DESIGNER NOTES" FOR BEARING REPLACEMENTS)

MASONRY PLATE "D"
BEARING REPLACEMENTS



AT SKEWED PIER
AT SKEWED ABUTMENTS
CLEARANCE DIAGRAM



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

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT CL OF GIRDER AND CL OF BEARING.

IN LIEU OF USING SHIM PLATES, FABRICATOR MAY INCREASE THICKNESS OF MASONRY PLATE "D" BY THE SHIM PLATE THICKNESS.

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

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

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

ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STANDARD WROUGHT WASHER AND ONE HEX NUT PER BOLT. PROJECT ANCHOR BOLTS, MASONRY PLATE "D" THICKNESS + 2/4", ABOVE TOP OF CONCRETE.

ALL MATERIAL IN BEARINGS, INCLUDING SHIM PLATES, BUT EXCLUDING PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

STEEL PINTLES SHALL CONFORM TO ASTM A449 OR ASTM A572 FOR ADEQUATE YIELD STRENGTH AND ELONGATION.

ALL MATERIAL IN TYPE "A" BEARINGS, INCLUDING SHIM PLATES AND BEARING PADS, SHALL BE GALVANIZED OR HOT DIPPED IN GALVANIZING SOLUTION. GALVANIZING SHALL BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY. GALVANIZING SHALL BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY. GALVANIZING SHALL BE PAID FOR AT THE UNIT PRICE BID FOR BEARING ASSEMBLY.

CHAMFER TOP OF PINTLES 1/8". DRILL HOLES FOR ALL PINTLES IN MASONRY PLATE "D" FOR A DRIVING FIT.

PROVIDE 1/4" THICK BEARING PAD THE SAME SIZE AS MASONRY PLATE "D" FOR EACH BEARING. 1/8" THICK BEARING PAD THE SAME SIZE AS MASONRY PLATE "D" FOR EACH BEARING.

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM F1554 GRADE 50, OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

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

ROCKER PLATE "C" SHALL BE SHOP PAINTED WITH A WELDABLE PRIMER.

MASONRY PLATE "D" SHALL BE GALVANIZED.

PLACE SHIM PLATES BETWEEN BEARING PAD AND MASONRY PLATE "D". PLATES SHALL HAVE "X" AND "Z" DIMENSIONS THAT MATCH MASONRY PLATE "D".

DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 3/16" LARGER THAN ANCHOR BOLT.

FINISH THESE SURFACES TO ANSI 250 IF "Y" DIMENSION IS GREATER THAN 2".

FINISH THESE SURFACES TO ANSI 250 IF "Y" DIMENSION IS GREATER THAN 2".

DESIGNER NOTES

HEIGHT OF BEARINGS GIVEN IN TABLE INCLUDES 1/8" BEARING PAD.

DETAIL SHIM PLATES AS DESCRIBED IN NOTES ON STANDARD 24.02.

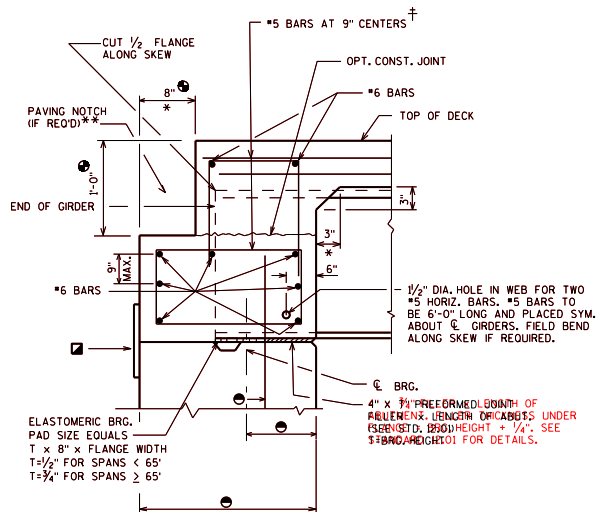
REFER TO THE DETAILS BELOW FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 3% AND ALSO CLEARANCE REQUIREMENTS.

FOR WELD SIZE, REFER TO STANDARD 24.02

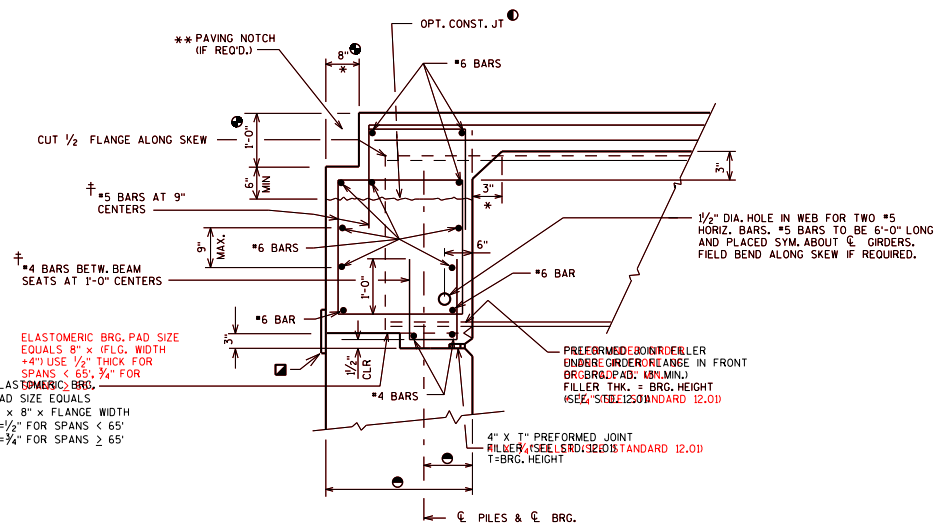
ADJUST HEIGHT IF BEVELED ROCKER PLATE "C" IS USED.

FOR BEARING REPLACEMENTS, DESIGNER SHALL UTILIZE A WIDER BEARING THAN THE EXISTING GIRDER BOTTOM FLANGE WIDTH TO ALLOW FOR FIELD WELDING OF THE EDGE OF THE BOTTOM FLANGE TO THE TOP OF PLATE "C". SEE STANDARD 40.08 FOR DETAILS.

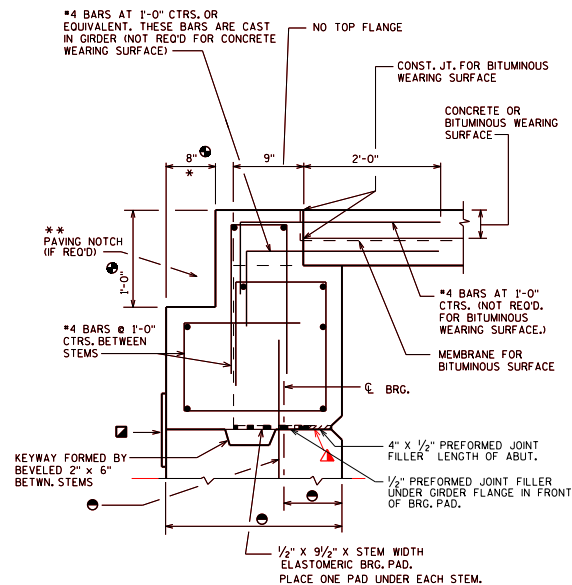
CALCULATE THE REACTION AT THE BEARINGS DUE TO "TOTAL LOADS".
CALCULATE THE REACTION AT THE BEARINGS DUE TO "TOTAL LOADS".
USE THE AASHTO LRFD SERVICE I LOAD COMBINATION, CONSIDERING ONLY DEAD LOAD (DC) + DW AND HL-93 LIVE LOADS (LL), INCLUDING A 33% DYNAMIC LOAD ALLOWANCE (IM).
THE VALUES IN THE TABLES ARE THE BEARING CAPACITIES FOR "TOTAL LOAD" (DC + DW + (LL + IM)).
SELECT A BEARING THAT HAS A CAPACITY GREATER THAN OR EQUAL TO THE CALCULATED REACTION FOR "TOTAL LOADS".



**STEEL GIRDER WITH
FIXED SEAT**



**STEEL GIRDER WITH
SEMI-EXPANSION SEAT**



**PRECAST DOUBLE TEE OR
MULTI-STEM SECTION**

NOTES

FOR SKEWED STRUCTURES CAST END OF PRECAST TEE ALONG SKEW.

- ▲ DIMENSION IS TAKEN NORMAL TO SUBSTRUCTURE UNITS. 1/2" 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

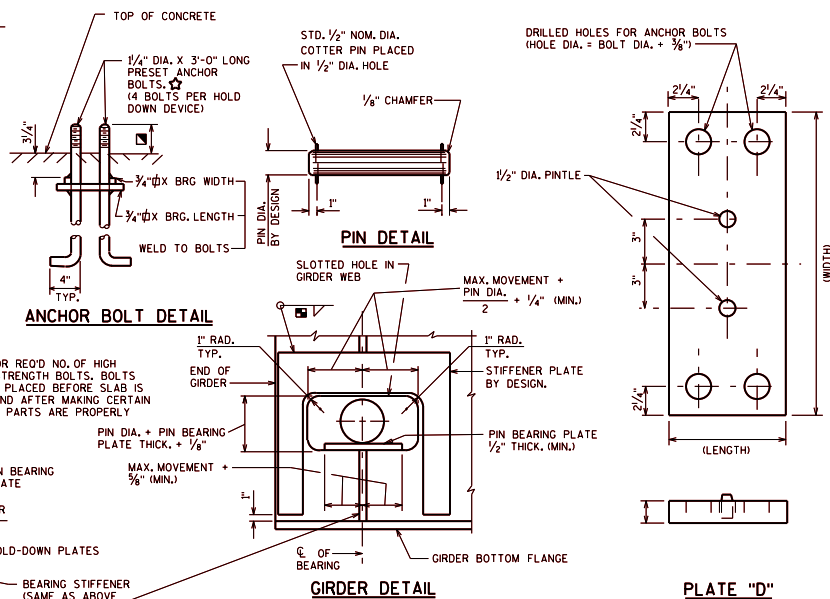
DESIGNER NOTES

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.
- PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SEE STD. 12.01
- 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.

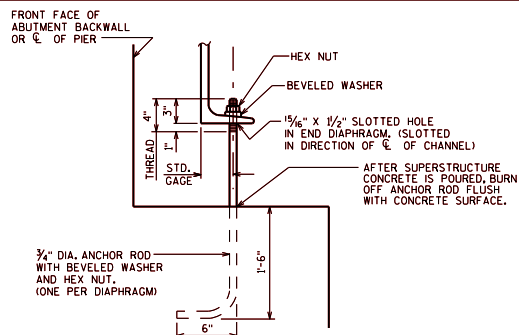
ALL MATERIAL WELDED TO THE GIRDERS, WHICH INCLUDES BEARING STIFFENERS, STIFFENER PLATE, AND PIN BEARING PLATE, SHALL MATCH THE STEEL REQUIREMENTS OF THE WEB AT THAT LOCATION.

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

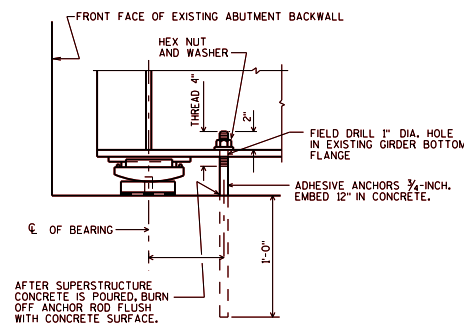
ALL MATERIAL IN HOLD DOWN DEVICES, WHICH INCLUDES HOLD-DOWN PLATES, HIGH TENSILE STRENGTH BOLTS, PINS AND ANCHOR BOLTS, SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B- - -".

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 $\bar{C}$ OF GIRDER. ANCHOR ROD, NUT, WASHER, AND DRILLED HOLE IN GIRDER FLANGE SHALL BE PAID FOR AS "ADHESIVE ANCHORS $\frac{3}{4}$ -INCH".

TEMPORARY HOLD DOWN DEVICE

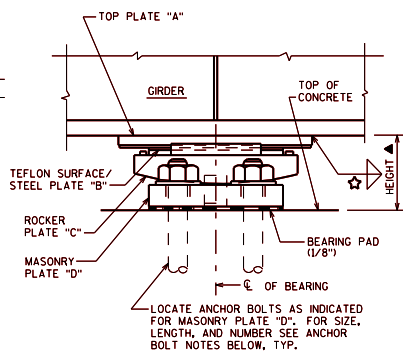
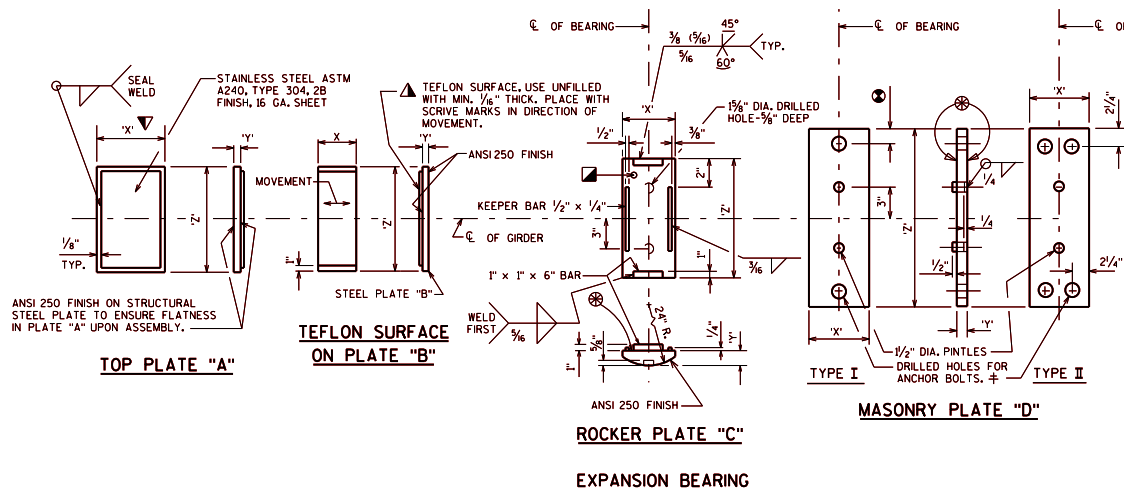
HOLD DOWN DEVICES



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE: 7-26



DESIGNER NOTES

HEIGHT OF BEARINGS GIVEN IN TABLES INCLUDES $\frac{1}{8}$ " BEARING PAD, 16 GAGE STAINLESS STEEL SHEET AND $\frac{1}{16}$ " TEFLON SURFACE.

DETAIL SHIM PLATES AS DESCRIBED IN NOTES ON STANDARD 24.02.

SEE STANDARD 27.02 FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 3% AND ALSO CLEARANCE REQUIREMENTS.

AT ABUTMENTS, WHEN THE "X" DIMENSION OF PLATE "A" EXCEEDS 12", INCREASE STANDARD DISTANCE FROM ϵ 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 FOR BEARING REPLACEMENTS. SEE STD. 27.02 FOR MINIMUM ANCHOR BOLT CLEARANCE INFORMATION.

FOR BEARING REPLACEMENTS, SEE STD. 27.02 FOR MINIMUM ANCHOR BOLT CLEARANCE INFORMATION.

FOR BEARING REPLACEMENTS, SEE STD. 27.02 FOR MINIMUM ANCHOR BOLT CLEARANCE INFORMATION.

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) - $\frac{1}{4}$ " 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) - $\frac{1}{2}$ " DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS GREATER THAN 150'-0":
USE A TYPE II MASONRY PLATE "D" WITH (4) - $\frac{1}{2}$ " DIA. X 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT ϵ OF GIRDER AND ϵ 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 SHIM PLATES, BUT EXCLUDING STAINLESS STEEL SHEET, TEFLON SURFACE, PINTLES, ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

IN LIEU OF USING SHIM PLATES, FABRICATOR MAY INCREASE THICKNESS OF TOP PLATE "A" OR MASONRY PLATE "D" BY THE SHIM PLATE THICKNESS.

★ DIMENSION IS 2" WHEN $\frac{1}{4}$ " DIA. ANCHOR BOLTS ARE USED AND $\frac{2}{4}$ " WHEN $\frac{1}{2}$ " DIA. ANCHOR BOLTS ARE USED.

ALL MATERIAL IN TYPE "A-T" BEARINGS, INCLUDING SHIM PLATES AND BEARING PADS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES EXPANSION B-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 $\frac{1}{4}$ " 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 + $\frac{2}{4}$ ", ABOVE TOP OF CONCRETE.

CHAMFER TOP OF PINTLES $\frac{1}{4}$ ". 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 SHIM PLATES BETWEEN BEARING PAD AND MASONRY PLATE "D". PLATES SHALL BE GALVANIZED AND DIMENSIONS SHALL MATCH MASONRY PLATE "D".

PROVIDE A METHOD FOR HANDLING ROCKER PLATE "C" DURING GALVANIZING.

★ BOND STEEL PLATE "B" AND TEFLON WITH ADHESIVE MATERIAL MEETING THE REQUIREMENTS OF THE STANDARD SPECIFICATION.

★ DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER $\frac{1}{8}$ " 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 ALL DUST, MOISTURE OR ANY OTHER FOREIGN MATTER.

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"	$\frac{3}{8}$ "	10"	5"	$\frac{1}{2}$ "	10"	7"	$1\frac{1}{8}$ "	1'-0" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	1'-8"	0.360
180	1'-1"	$\frac{3}{8}$ "	10"	9"	$\frac{1}{2}$ "	10"	11"	$2\frac{3}{8}$ "	1'-0" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	1'-8"	0.438
260	1'-5"	$\frac{3}{8}$ "	10"	1'-1"	$\frac{1}{2}$ "	10"	1'-3"	$3\frac{3}{8}$ "	1'-0" $\frac{1}{4}$ "	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"	$\frac{3}{8}$ "	1'-2"	7"	$\frac{1}{2}$ "	1'-2"	9"	$1\frac{1}{8}$ "	1'-4" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	2'-0"	0.401
375	1'-5"	$\frac{3}{8}$ "	1'-2"	1'-1"	$\frac{1}{2}$ "	1'-2"	1'-3"	$3\frac{3}{8}$ "	1'-4" $\frac{1}{4}$ "	1'-2"	$2\frac{3}{8}$ "	2'-0"	0.677
500	1'-9"	$\frac{3}{8}$ "	1'-2"	1'-5"	$\frac{1}{2}$ "	1'-2"	1'-7"	$4\frac{7}{8}$ "	1'-4" $\frac{1}{4}$ "	1'-5"	$3\frac{3}{8}$ "	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"	$\frac{3}{8}$ "	1'-6"	7"	$\frac{1}{2}$ "	1'-6"	9"	$1\frac{1}{8}$ "	1'-8" $\frac{1}{4}$ "	9"	2"	2'-4"	0.443
360	1'-1"	$\frac{3}{8}$ "	1'-6"	9"	$\frac{1}{2}$ "	1'-6"	11"	$2\frac{3}{8}$ "	1'-8" $\frac{1}{4}$ "	11"	2"	2'-4"	0.479
600	1'-7"	$\frac{3}{8}$ "	1'-6"	1'-3"	$\frac{1}{2}$ "	1'-6"	1'-5"	$3\frac{3}{8}$ "	1'-8" $\frac{1}{4}$ "	1'-5"	$3\frac{3}{8}$ "	2'-5"	0.719
650	1'-11"	$\frac{3}{8}$ "	1'-6"	1'-7"	$\frac{1}{2}$ "	1'-6"	1'-9"	$4\frac{7}{8}$ "	1'-8" $\frac{1}{4}$ "	1'-10"	$3\frac{3}{8}$ "	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"	$\frac{3}{8}$ "	1'-0"	5"	$\frac{1}{2}$ "	1'-0"	7"	$1\frac{1}{8}$ "	1'-2" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	1'-10"	0.360
175	11"	$\frac{3}{8}$ "	1'-0"	7"	$\frac{1}{2}$ "	1'-0"	9"	$1\frac{1}{8}$ "	1'-2" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	1'-10"	0.401
275	1'-3"	$\frac{3}{8}$ "	1'-0"	11"	$\frac{1}{2}$ "	1'-0"	1'-1"	$2\frac{3}{8}$ "	1'-2" $\frac{1}{4}$ "	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"	$\frac{3}{8}$ "	1'-4"	7"	$\frac{1}{2}$ "	1'-4"	9"	$1\frac{1}{8}$ "	1'-6" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	2'-2"	0.401
370	1'-3"	$\frac{3}{8}$ "	1'-4"	11"	$\frac{1}{2}$ "	1'-4"	1'-1"	$2\frac{3}{8}$ "	1'-6" $\frac{1}{4}$ "	1'-0"	$2\frac{3}{8}$ "	2'-3"	0.552
525	1'-7"	$\frac{3}{8}$ "	1'-4"	1'-3"	$\frac{1}{2}$ "	1'-4"	1'-5"	$3\frac{3}{8}$ "	1'-6" $\frac{1}{4}$ "	1'-4"	$3\frac{3}{8}$ "	2'-3"	0.719
575	1'-9"	$\frac{3}{8}$ "	1'-4"	1'-5"	$\frac{1}{2}$ "	1'-4"	1'-7"	$4\frac{7}{8}$ "	1'-6" $\frac{1}{4}$ "	1'-6"	$3\frac{3}{8}$ "	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"	$\frac{3}{8}$ "	1'-8"	5"	$\frac{1}{2}$ "	1'-8"	7"	$1\frac{1}{8}$ "	1'-10" $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "	2'-6"	0.360
315	11"	$\frac{3}{8}$ "	1'-8"	7"	$\frac{1}{2}$ "	1'-8"	9"	$1\frac{1}{8}$ "	1'-10" $\frac{1}{4}$ "	9"	2"	2'-6"	0.443
495	1'-3"	$\frac{3}{8}$ "	1'-8"	11"	$\frac{1}{2}$ "	1'-8"	1'-1"	$2\frac{3}{8}$ "	1'-10" $\frac{1}{4}$ "	1'-1"	$2\frac{3}{8}$ "	2'-7"	0.594
675	1'-7"	$\frac{3}{8}$ "	1'-8"	1'-3"	$\frac{1}{2}$ "	1'-8"	1'-5"	$3\frac{3}{8}$ "	1'-10" $\frac{1}{4}$ "	1'-6"	$3\frac{3}{8}$ "	2'-7"	0.760
705	1'-11"	$\frac{3}{8}$ "	1'-8"	1'-7"	$\frac{1}{2}$ "	1'-8"	1'-9"	$4\frac{7}{8}$ "	1'-10" $\frac{1}{4}$ "	1'-11"	$3\frac{3}{8}$ "	2'-7"	0.844

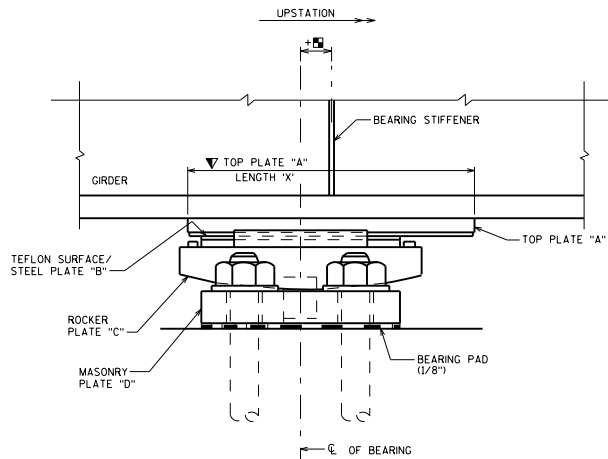
STAINLESS STEEL - TFE
EXPANSION BEARING
DETAILS TYPE 'A-T'

**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE: 1-21





EXPANSION BEARING ASSEMBLY
FOR STEEL GIRDER
(SHOW ON PLANS)

Diagram illustrating the layout of a bridge with six piers and two abutments. The piers are labeled PIER 1 through PIER 6. The abutments are labeled E S. ABUT and E N. ABUT. Vertical lines connect the labels to the piers.

BELOW SHOWS AN EXAMPLE BEARING OFFSET TABLE BASED ON THE SAMPLE BRIDGE SHOWN ABOVE. SUCH A TABLE SHOULD BE PROVIDED FOR STEEL GIRDER BRIDGES. THE OFFSET TABLE MAY BE OMITTED AT THE DISCRETION OF THE DESIGN ENGINEER IF THE VALUES ARE NEGLIGIBLE.
(THE BRIDGE SCHEMATIC SHOULD NOT BE SHOWN ON THE PLANS)

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

BEARING OFFSET TABLE

ALL DIMENSIONS IN INCHES
AMBIENT TEMPERATURE DURING GIRDER INSTALLATION

NOTES

FOR STEEL GIRDER BEARINGS:
USE TEMPERATURE SETTING TABLE, RATHER THAN CENTERING BEARINGS BENEATH BEARING STIFFENERS FOR ALL TEMPERATURES.

FOR PRESTRESSED GIRDER BEARINGS:
PLACE BEARINGS AS SHOWN ON THE SUBSTRUCTURE PLAN, PROVIDING ADJUSTMENT FOR SUBSTRUCTURE LOCATION DISCREPANCIES. PLACE EACH GIRDER CENTERED BETWEEN ITS GIVEN BEARINGS.

DESIGNER NOTES

THIS STANDARD SHOULD ONLY BE USED FOR STEEL BEARINGS.

TOP PLATE "A" FOR STEEL GIRDER BEARINGS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT AND CONSTRUCTION TOLERANCE. (USE GREATER OF VALUE FROM PROCEDURE BELOW OR SIZE FROM STANDARD 27.08).

PROCEDURE FOR SIZING TOP PLATE "A":

$\frac{1}{2}$ 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)

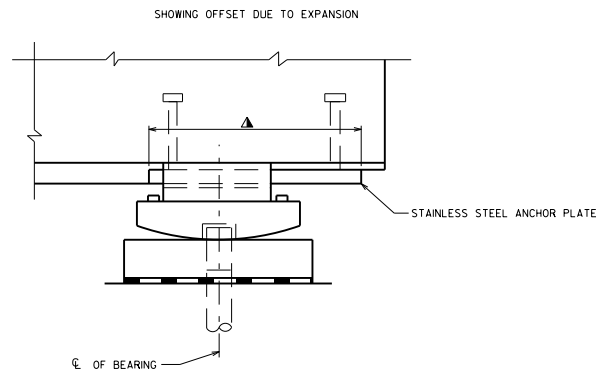
ANCHOR PLATES IN PRESTRESSED GIRDERS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT, GIRDER SHRINKAGE AND CONSTRUCTION TOLERANCE.

PROCEDURE FOR SIZING ANCHOR PLATE:

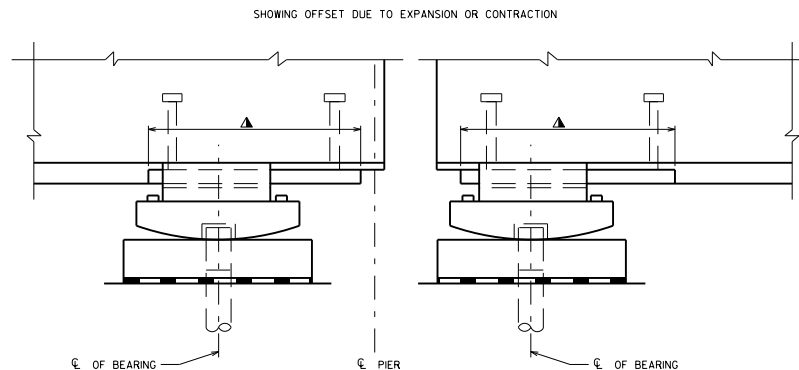
$\frac{2}{3}$ INCHES = $\frac{1}{2}$ TEFLON PLATE LENGTH
+ THERMAL MOVEMENT (USE $60 - 5 = 55$ DEGREES)
+ SHRINKAGE = 0.0003 L
+ F CONSTRUCTION TOLERANCE
= $\frac{1}{2}$ ANCHOR PLATE LENGTH (DOUBLE THIS FOR ANCHOR PLATE LENGTH)

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

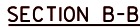
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1-17



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

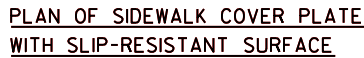


SECTION AT SIDEWALK



☒ 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.

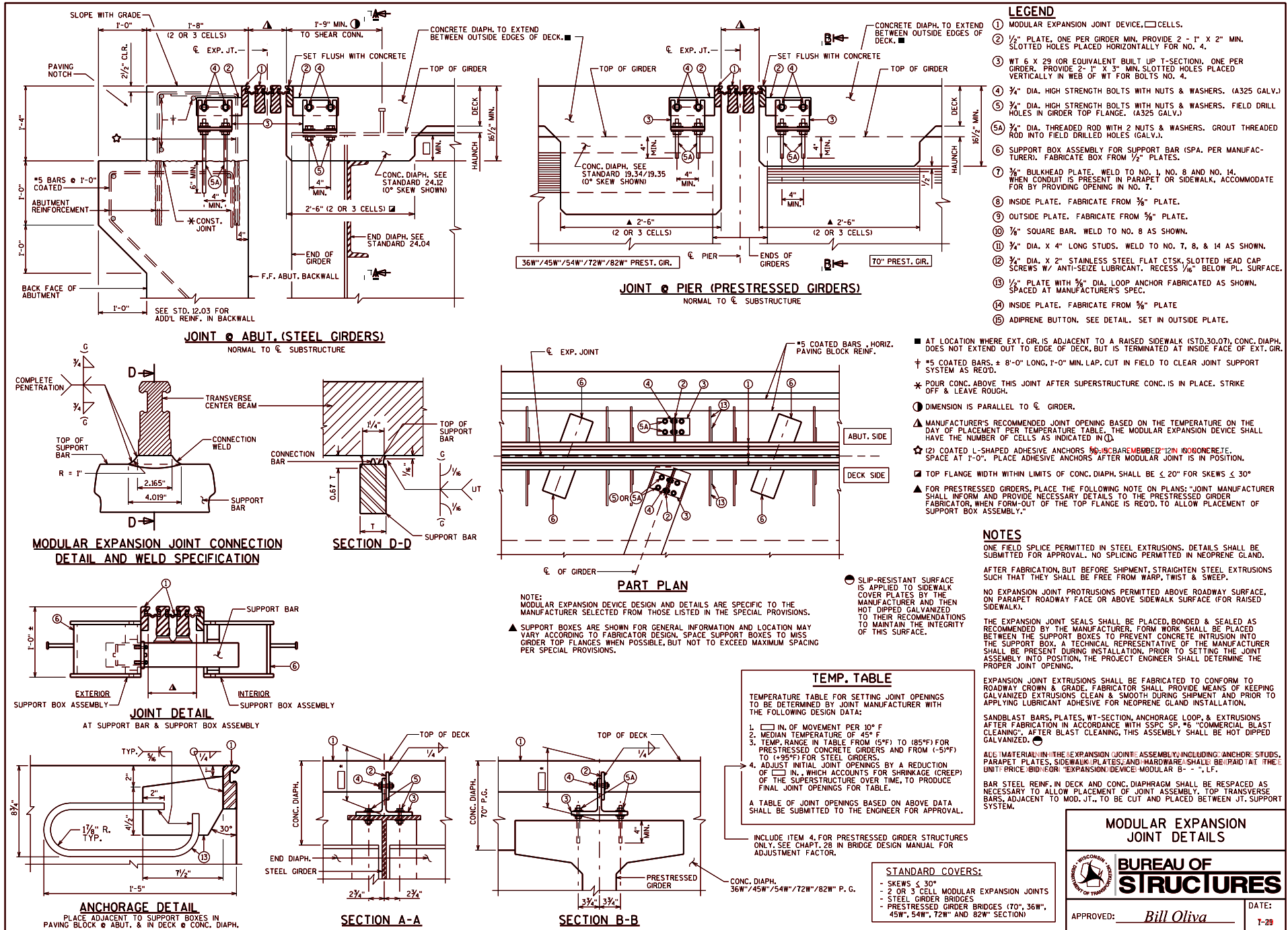
APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

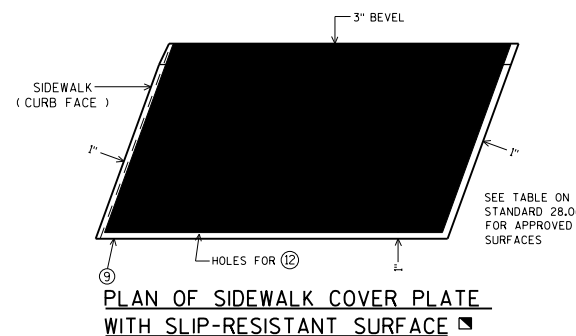
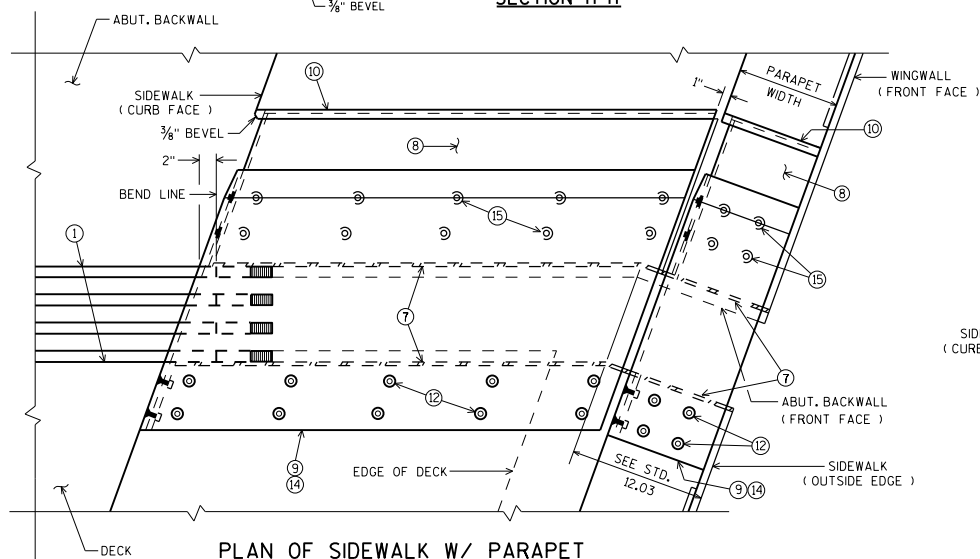
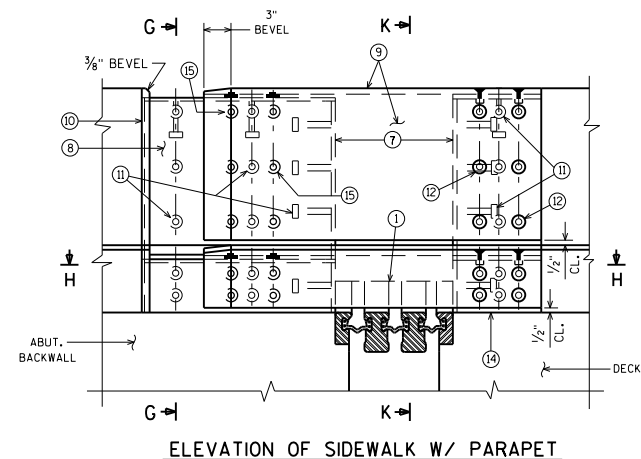
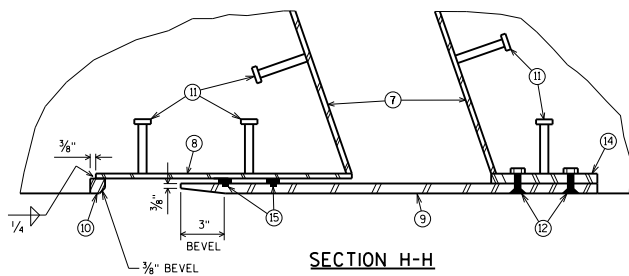
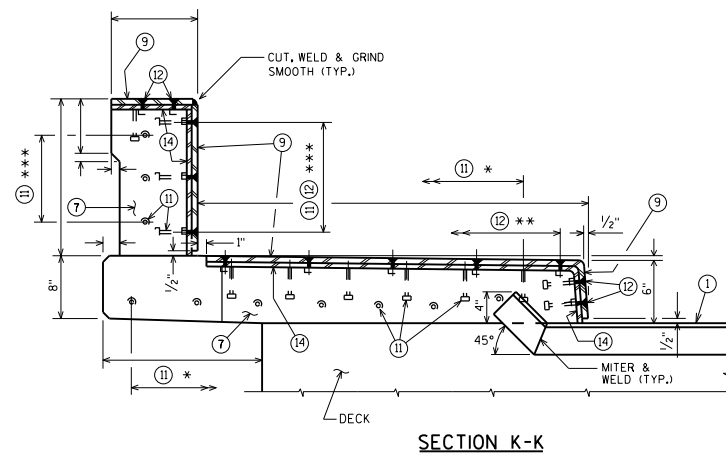


BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-18





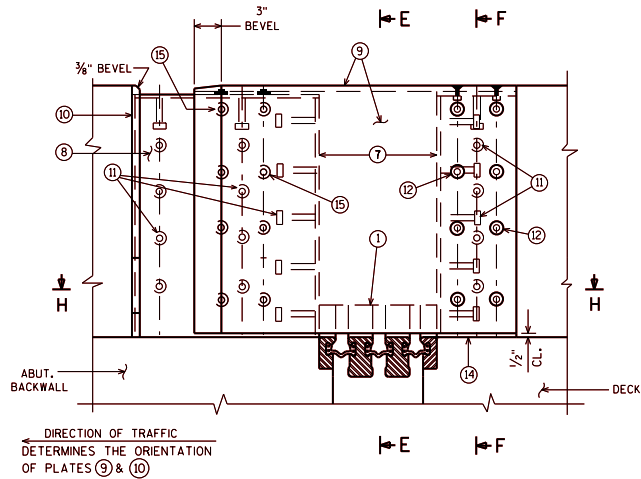
■ PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE). GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.

COVER PLATES FOR
SIDEWALK W/ CONC. PARA.

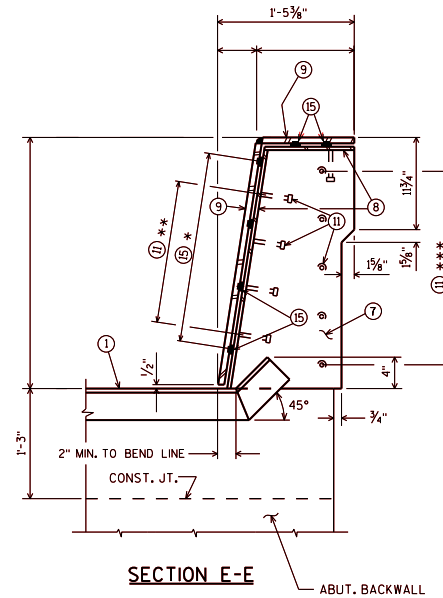
**BUREAU OF
STRUCTURES**

APPROVED: Scot Becker

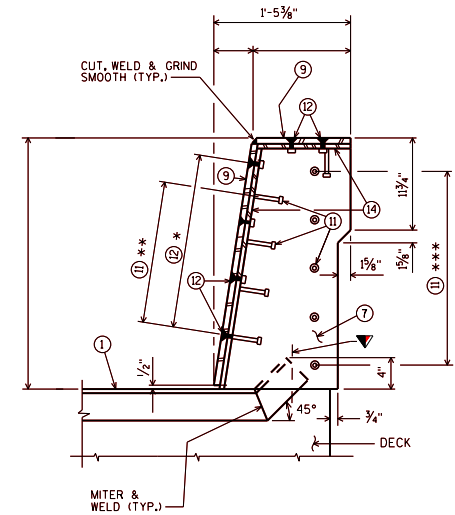
DATE:	3-11
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ELEVATION OF SINGLE SLOPE PARAPET

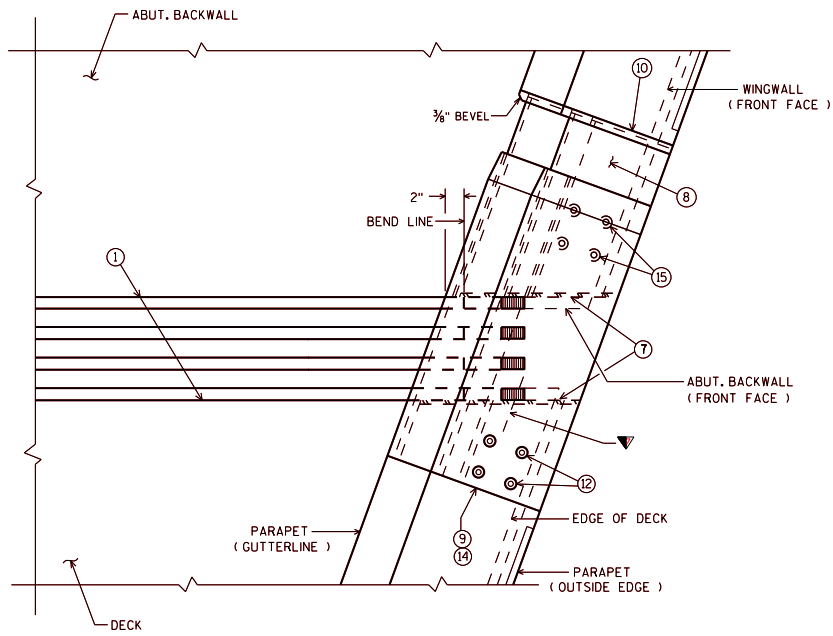


SECTION E-E

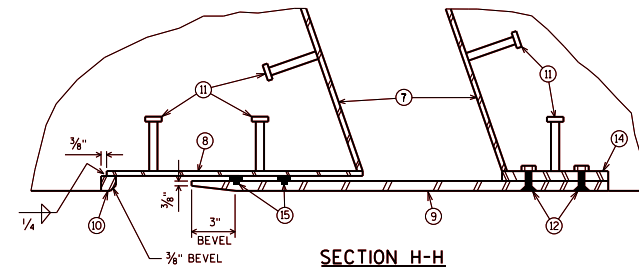


SECTION F-F

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



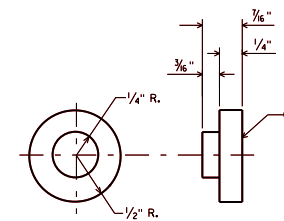
PLAN OF SINGLE SLOPE PARAPET



SECTION H-H

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

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



ADIPRENE BUTTON DETAIL

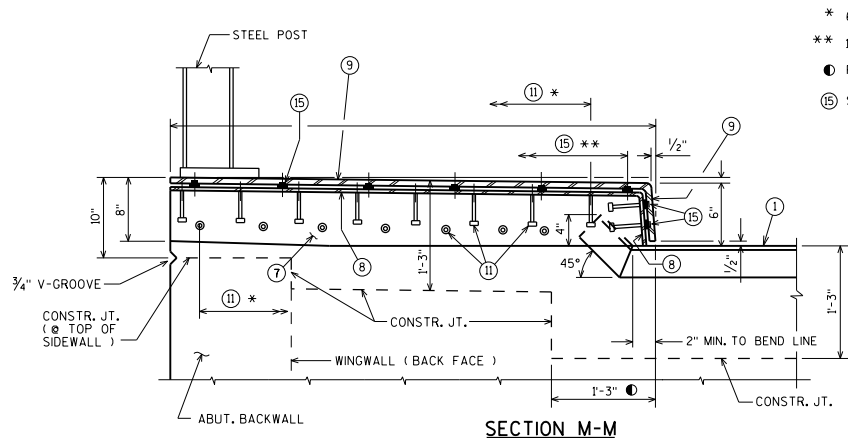
**COVER PLATES FOR
SINGLE SLOPE PARAPET**



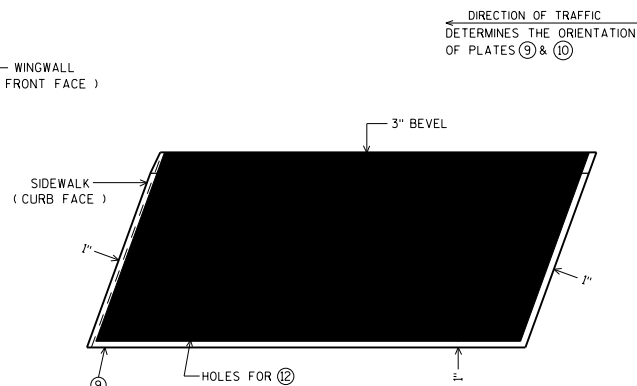
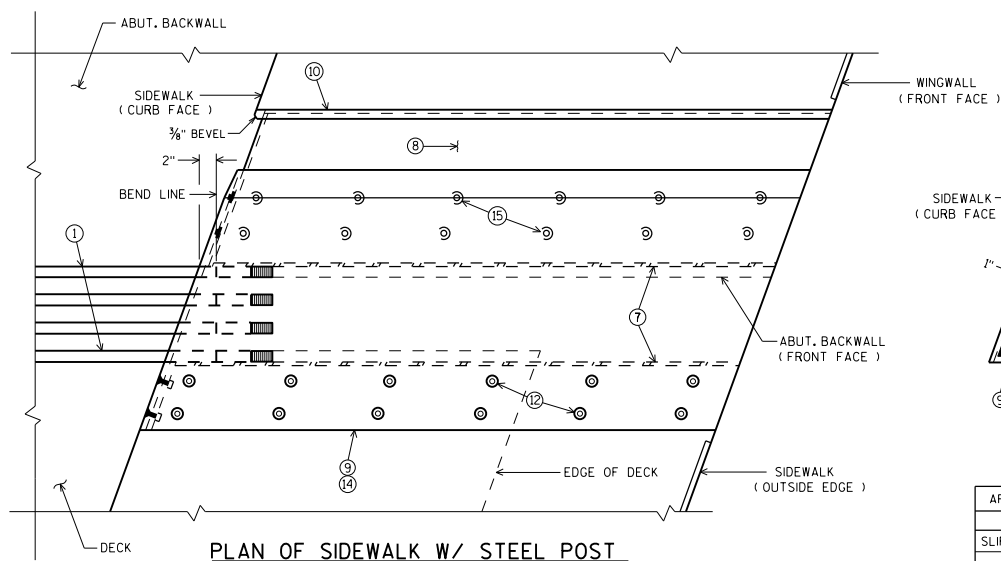
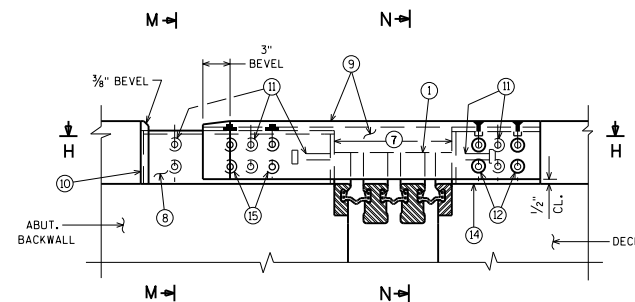
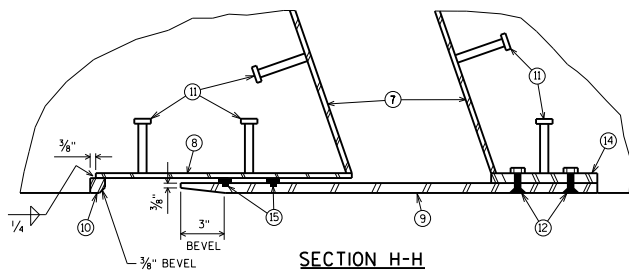
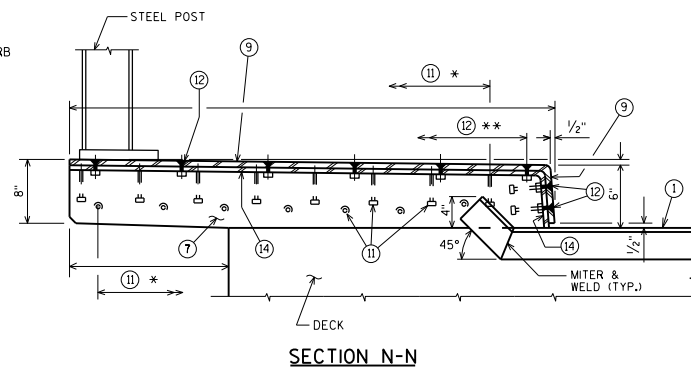
**BUREAU OF
STRUCTURES**

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

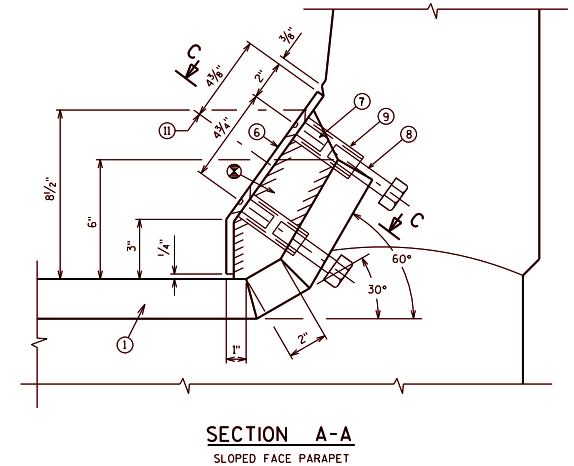
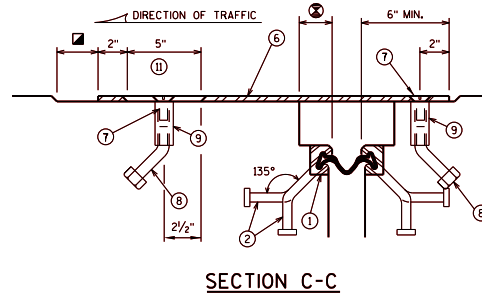
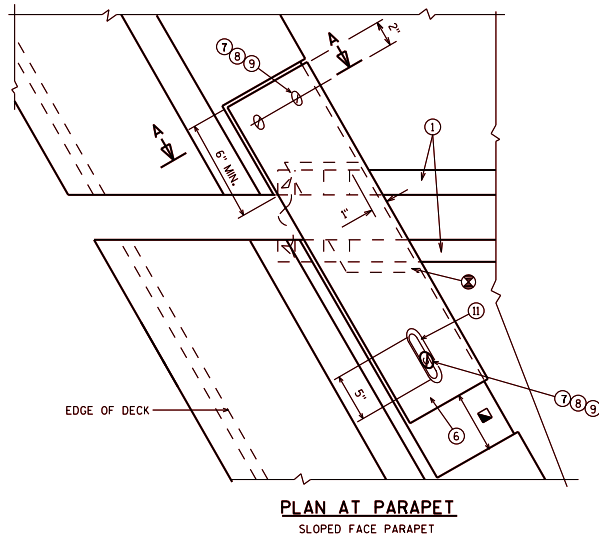


PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE

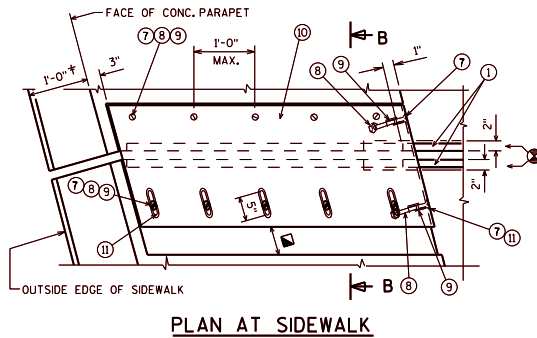
APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES		
PRODUCT	MANUFACTURER	CONTACT AT
SLIPNOT GRADE 2, STEEL	W. S. MOLNAR COMPANY	1-800-SLIPNOT
ALGRIP, STEEL	ROSS TECHNOLOGY CORP.	1-800-345-8170

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

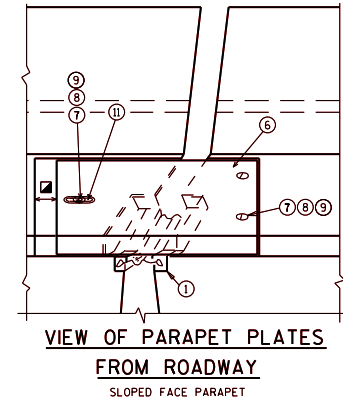
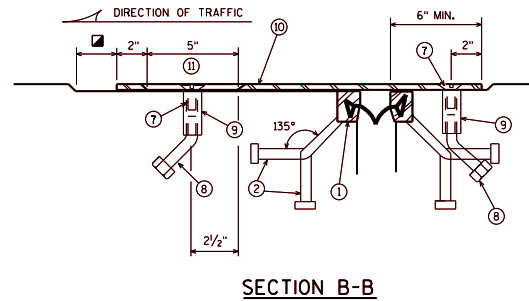
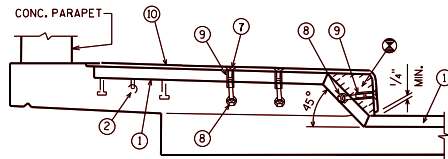
COVER PLATES FOR SIDEWALK W/ STEEL RAIL	
 BUREAU OF STRUCTURES	
APPROVED: <u>Scot Becker</u>	DATE: <u>7-11</u>



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



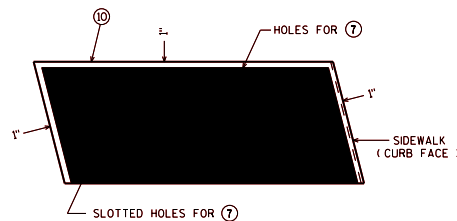
* 1'-2" WHEN "VERTICAL FACE PARAPET TYPE 'TX' IS USED



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

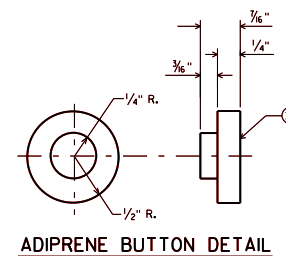
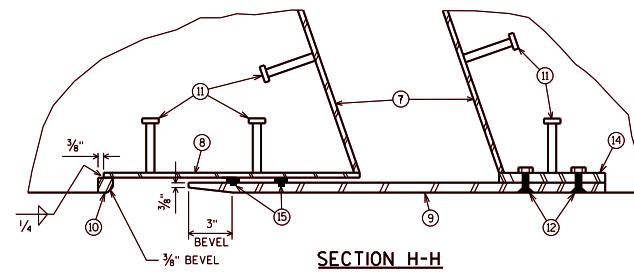
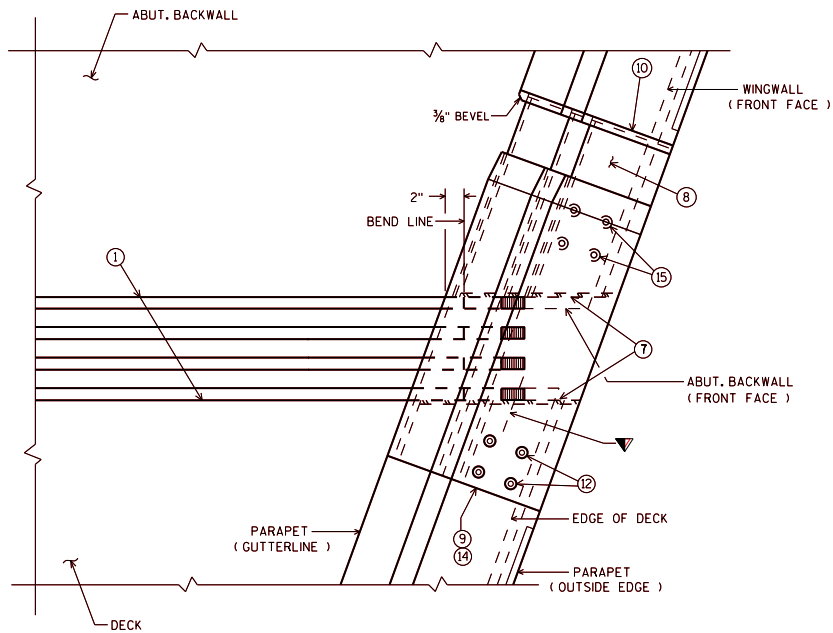
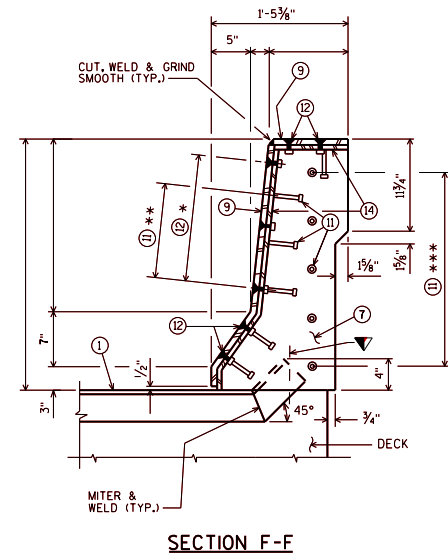
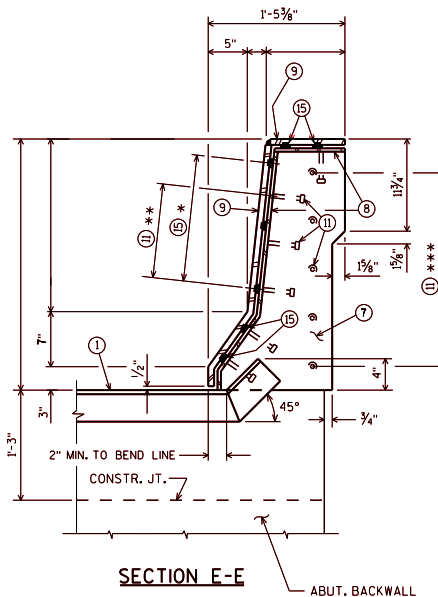
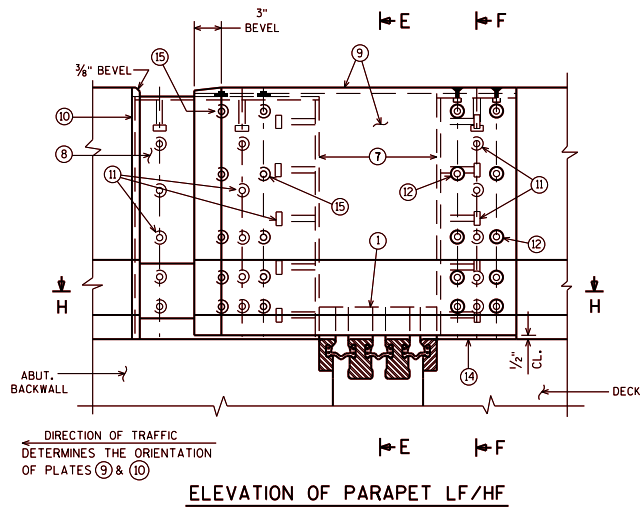
PLACE SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY (NOT ON CURB FACE).

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.



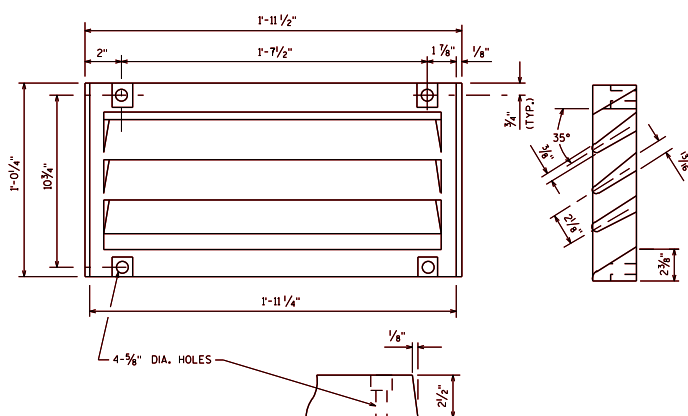
APPROVED: Bill Oliva DATE: 7-20



- * 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"

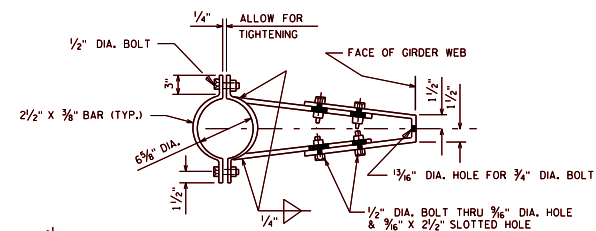
COVER PLATES FOR PARAPET 'LF/HF'	
 BUREAU OF STRUCTURES	DATE: 7-18
APPROVED: <u>Bill Oliva</u>	



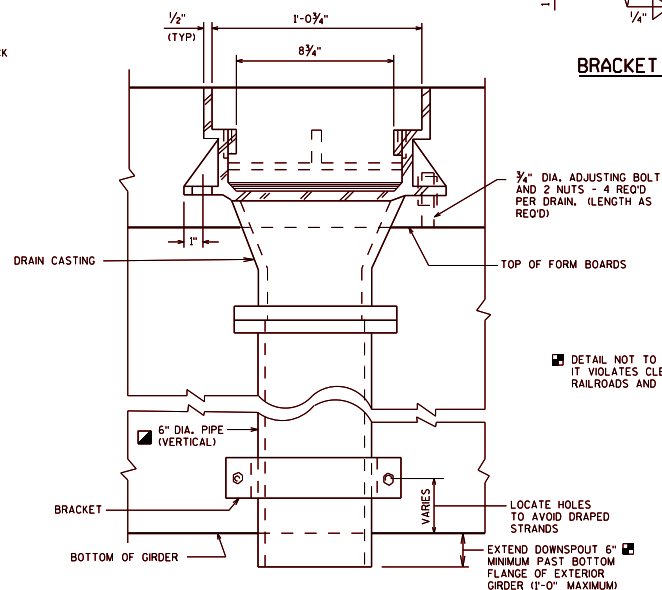
GRATE CASTING DETAIL

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.



BRACKET DETAIL



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

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 ALUMINUM ~~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.
GRADE HOLD DOWN DRAINS SHALL BE REINFORCED ~~INTERMEDIATE BRACKETS ARE NOT REQUIRED~~ VANADIZED STANDARD PIPE CONFORMING TO ASTM A53.
GRADE HOLD DOWN DRAINS SHALL BE REINFORCED ~~INTERMEDIATE BRACKETS ARE NOT REQUIRED~~ THERMOSETTING RESIN PIPE (RTRP) OR GALVANIZED STANDARD PIPE CONFORMING TO ASTM A53.

DESIGNER'S NOTE
ALL MATERIAL FOR DOWNSPOUTS AS SHOWN 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, 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



POSTS, RAIL MEMBER
VE PROVISIONS FOR
BEAM CONNECTION
ON SDD 14 B 20
OS.

END POST

FIRST PANEL VARIABLE
IF NEEDED 6'-3" MAX.

11" MIN.

11" MIN.
1'-7" MAX.

FIXED JOINT

TYPICAL POST
SPACING = 6'-3"

10" MIN.

SLAB CONST. JT.

EXPANSION JOINT

11" MIN.
1'-7" MAX.

FIRST PANEL VARIABLE
IF NEEDED 6'-3" MAX.

11" MIN.

END POST

EXPANSION SPLICE IN BEAM GUARD AND CHANNEL
RAIL SHALL BE DETAILED AT A POST ON EITHER
SIDE OF EXPANSION JOINT. (ONLY ONE REQ'D.)

END OF WINGWALL

POSTS, RAIL MEMBER
VE PROVISIONS FOR
BEAM CONNECTION
ON SDD 14 B 20
OS.

END POST

FIRST PANEL VARIABLE
IF NEEDED 6'-3" MAX.

11" MIN.

11" MIN.
1'-7" MAX.

FIXED JOINT

TYPICAL POST
SPACING = 6'-3"

10" MIN.

SLAB CONST. JT.

EXPANSION JOINT

11" MIN.
1'-7" MAX.

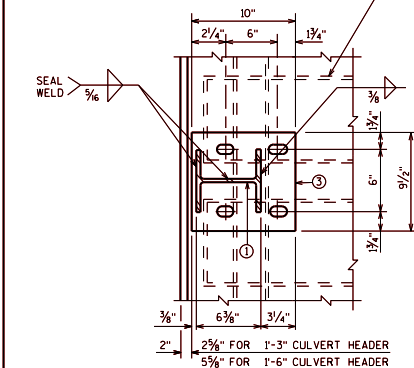
FIRST PANEL VARIABLE
IF NEEDED 6'-3" MAX.

11" MIN.

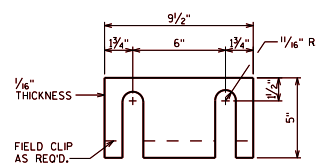
END POST

EXPANSION SPLICE IN BEAM GUARD AND CHANNEL
RAIL SHALL BE DETAILED AT A POST ON EITHER
SIDE OF EXPANSION JOINT. (ONLY ONE REQ'D.)

END OF WINGWALL



Technical drawing of a 1'-6" culvert header. The drawing shows a cross-section of the header with various dimensions and weld specifications. Key dimensions include a total width of 10" and a total height of 9 1/2". The header is divided into sections with widths of 2 1/4", 6", and 1 3/4". The height is divided into sections of 3 1/4", 6", and 1 3/4". The drawing also shows a 3/8" thick plate and a 2" thick plate. Weld specifications are given as 25% for 1'-3" culvert header and 50% for 1'-6" culvert header. A seal weld is indicated on the left side.



Technical drawing of a field clip. The drawing shows a cross-section of the clip with the following dimensions and labels:

- Overall width: $9\frac{1}{2}"$
- Distance between the centers of the two holes: $6"$
- Radius of the top corners: $1\frac{1}{4}"$
- Radius of the bottom corners: $1\frac{1}{4}"$
- Radius of the outer corners: $1\frac{1}{16}" R$
- Thickness of the material: $\frac{1}{16}"$ THICKNESS
- Label: FIELD CLIP AS REQD.
- Overall height: $1\frac{1}{2}"$



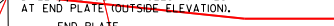
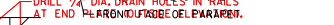
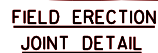
- ① W6x25 WITH 2 - $3/4"$ x $2 1/2"$ VERT. SLOTS IN FL.G. (ISLOT ON OTHER SIDE OF WEB IS OPTIONAL) FOR NO.7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POSTS VERTICAL AND NORMAL TO GRADE LINE.
- ② C8x15S WITH $1 1/4"$ DIA. HOLES FOR NO. 8.
- ③ BASE PLATE 1" x $9 1/2"$ x $10"$ WITH $1 1/4"$ x $1 1/2"$ SLOTTED HOLES FOR ANCHOR BOLTS NO. 4. WELD TO NO.1AS SHOWN.
- ④ A325 - $1/4"$ HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER $1 1/4"$ LONG AT END POSTS AND AT POSTS ON CONCRETE OR SUPERSTRENGTH STEEL WHERE THE SLAB THICKNESS IS $> 15"$. USE 8" LONG AT ALL OTHER LOCATIONS. 4 REQ. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO.3. CHAMFER TOP OF BOLTS BEFORE THREADING.
- ⑤ $1/4"$ x $8"$ x $8"$ FLAT BAR WITH $1 1/4"$ DIA. HOLES FOR ANCHOR BOLTS NO. 4.
- ⑥ $1 1/2"$ x $3"$ MOUNTING BOLT WASHER (GALVANIZED).
- ⑦ $3/8"$ DIA. BUTTON HEAD POST MOUNTING BOLT WITH ROUND WASHER AND NUT.
- ⑧ $5/8"$ DIA. x $2"$ HEX BOLTS WITH NUT AND TWO WASHERS EACH.
- ⑨ PLATE $1/2"$ x $5 1/2"$ x $6"$ AT BASIC POST CONNECTION. $1/4"$ DIA. HOLES IN PLATE. $1/8"$ DIA. HOLES IN CHANNEL.
- ⑩ PLATE $1/2"$ x $5 1/2"$ x $1-2 1/2"$. $1/4"$ DIA. HOLES IN PLATE. $1/8"$ DIA. HOLES IN CHANNEL. EXPANSION SLOTS ON JOINT SIDE OF POST. $1/16"$ x $2 1/2"$ IN PLATE. $1/16"$ x $2 1/4"$ IN CHANNEL. (AT EXPANSION SPLICE.)
- ⑪ PLATE $1/2"$ x $5 1/2"$ x $1 1/2"$. $1/4"$ DIA. HOLES IN PLATE. $1/8"$ DIA. HOLES IN CHANNEL. (AT TYPICAL SPLICE.)

WEIGHT = 45 LB/FT



APPROVED: *Bill Oliva*

STANDARD	30.02
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NOTES

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

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM A307. IF A307 IS USED ELECTRO-GALVANIZE NUTS, WASHERS & TOP 3/2" OF ANCHOR BOLTS.

CLOSURE ENDS ON STEEL RAILING SHALL BE 1/4" PLATE.
WELD AND GRIND SMOOTH.

RAILINGS SHALL BE FABRICATED IN 2 AND 3 PANEL LENGTHS.

RAILING POSTS SHALL BE SET NORMAL TO GRADE LINE.

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

SHIMS SHALL BE USED UNDER POSTS AND END PLATES
WHERE REQ'D. FOR ALIGNMENT.

FILL ALL EXPOSED OPENINGS BETWEEN SHIMS AND POST ANCHOR BOLT HOLES WITH NON-STAINING GRA NON-BITUMINOUS JOINT SEALER.

RAILS, POSTS & SHIMS SHALL BE MADE FROM MATERIALS
CONFORMING TO ASTM DESIGNATION A709, GRADE 36.

ALL MATERIALS, EXCEPT ANCHORAGES, SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.

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

RAILING WEIGHT = 30 LB/FT

LEGEND

- $\frac{5}{16}" \times \frac{3}{8}"$ WELDED STUDS
- ⬡ 3" DIA. STD. PIPE $\times$ 1'-10" LONG
- 3" DIA. EXTRA STRONG PIPE $\times$ 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.

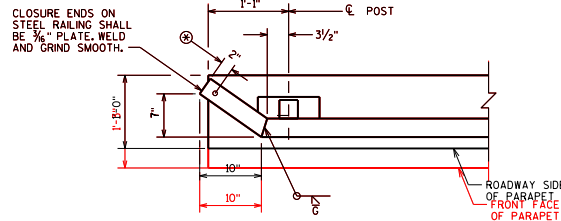
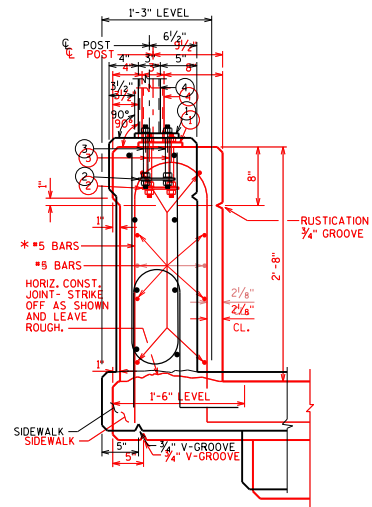
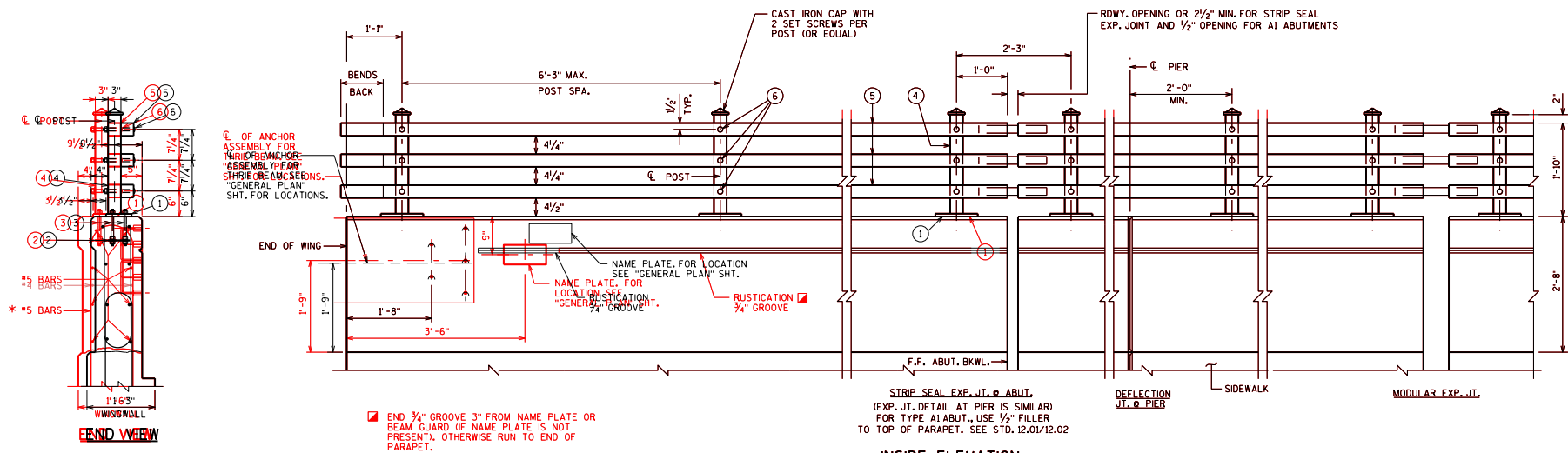
TUBULAR RAILING
TYPE 'H' (STEEL)



BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

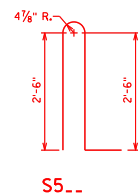
DATE: 7-19



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.



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.

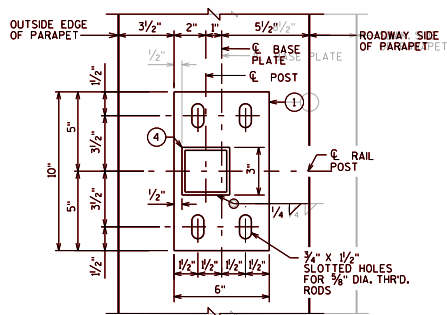
COMBINATION RAILING TYPE '3T'



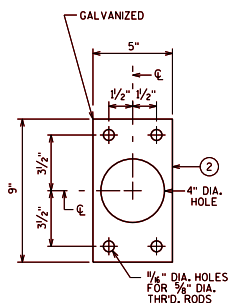
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

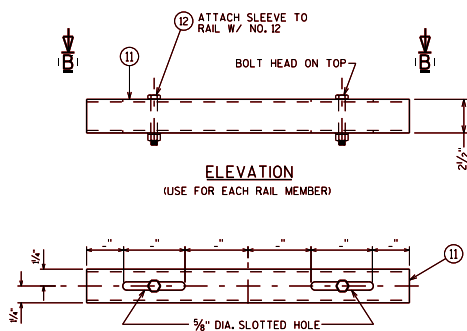
DATE:
1-13



TYPICAL RAIL POST BASE PLATE



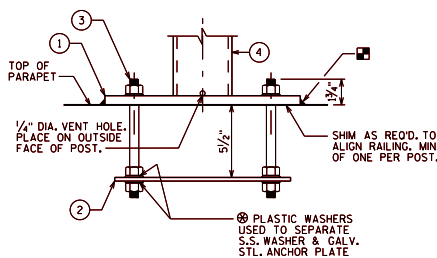
ANCHOR PLATE



SECTION B-B

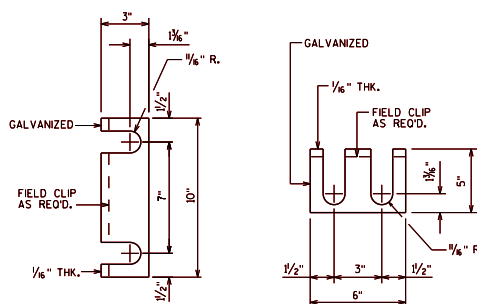
SLEEVE DETAIL
(AT MODULAR EXP. JT.)

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

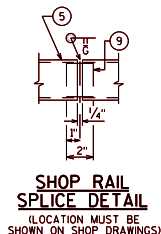
NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.



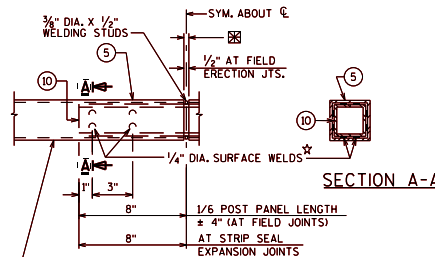
RAIL POST SHIM DETAIL

(2 SETS PER POST)

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



SHOP RAIL SPLICE DETAIL
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



FIELD ERECTION JOINT DETAIL

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

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

LEGEND

- 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.
- 1/4" X 5" X 9" ANCHOR PLATE (GALVANIZED) WITH 1/4" DIA. HOLES FOR THRD. RODS NO. 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.
- 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.
- 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.
- 3/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1 1/2" X 1/2" WASHER, AND LOCK WASHER.
- RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES, PROVIDE "SLIDING FIT".
- RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. (1'-4" FIELD ERECTION JTS.) (1'-4" STRIP SEAL EXP. JTS.)
- 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.
- 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, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. (FILL IN COLOR NAME).

INSIDE OF TUBES TO BE PAINTED AT ALL FIELD ERECTION AND EXPANSION JOINTS.

TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.

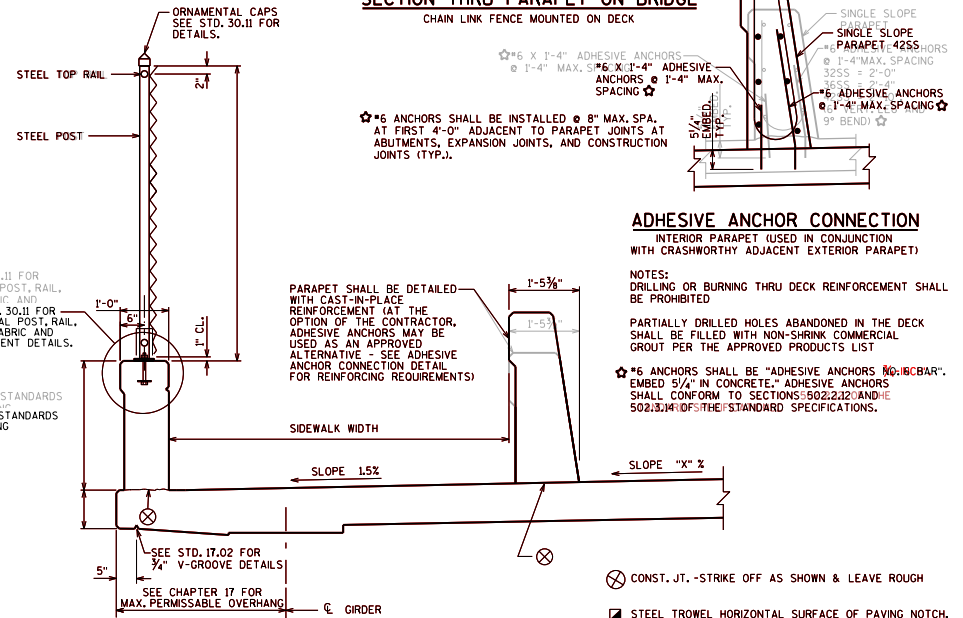
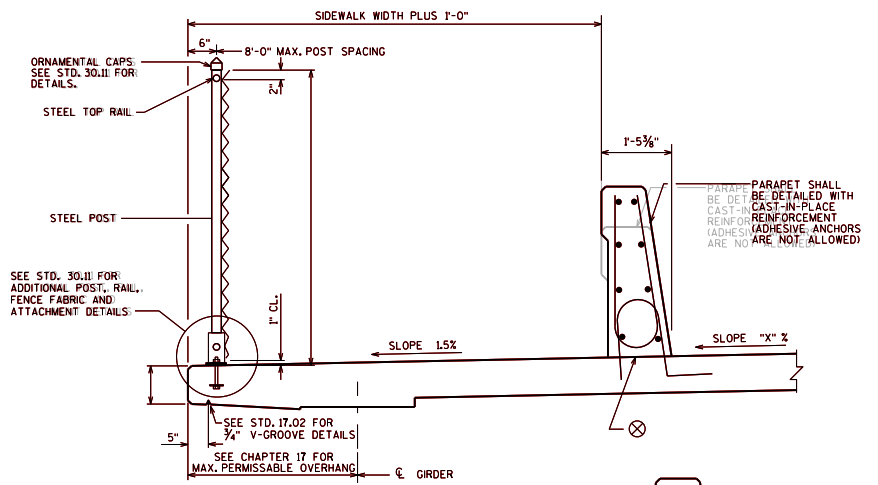
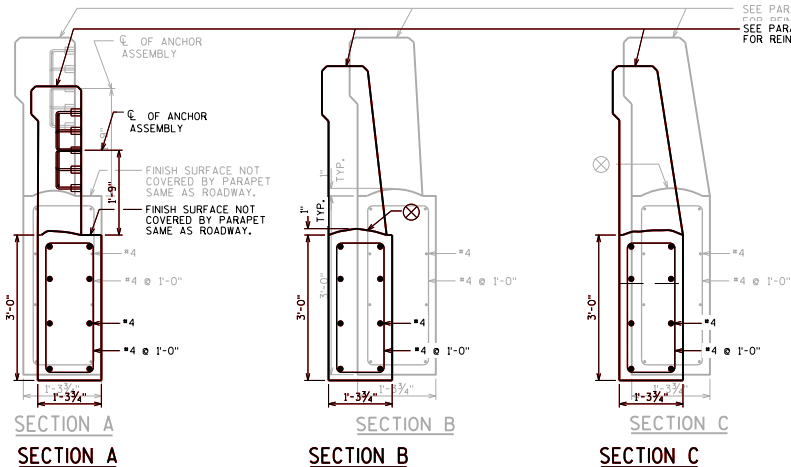
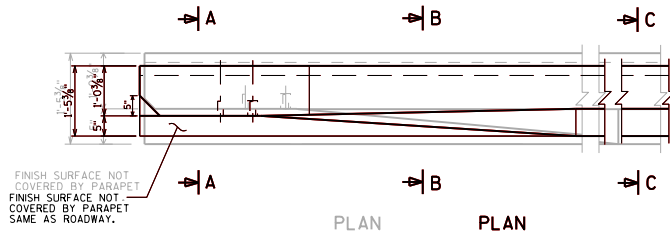
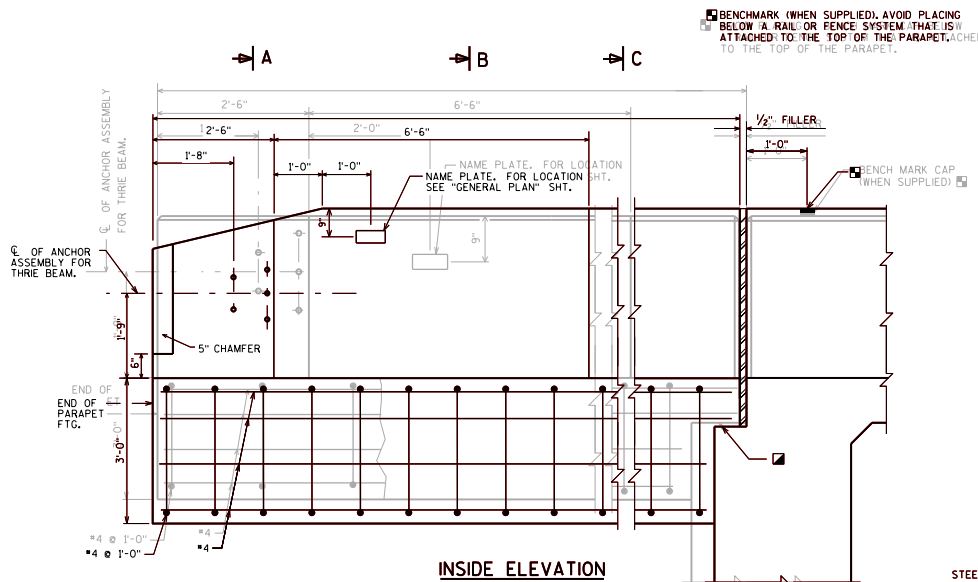
COMBINATION RAILING TYPE '3T' DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-20



DESIGNER NOTES

'42SS' PARAPET SHOWN IN THIS STANDARD, FOR DETAILS, INCLUDING REINFORCING, SEE STANDARD 30.32. SEE STANDARD 30.31, 30.32, AND 30.33 FOR SLOW DETAILS. ALL PARAPET FOOTING BARS SHALL BE EPOXY COATED.

DO NOT SHOW THE ADHESIVE ANCHOR CONNECTION DETAIL ON THE PLAN. THE CONTRACTOR MAY REQUEST THIS DETAIL IF DESIRED. ADHESIVE ANCHOR CONNECTION DETAIL ON THE PLAN, THE CONTRACTOR MAY REQUEST THIS DETAIL IF DESIRED.

ADHESIVE ANCHOR CONNECTION

INTERIOR PARAPET (USED IN CONJUNCTION WITH CRASHWORTHY ADJACENT EXTERIOR PARAPET)

NOTES:
DRILLING OR BURNING THRU DECK REINFORCEMENT SHALL BE PROHIBITED

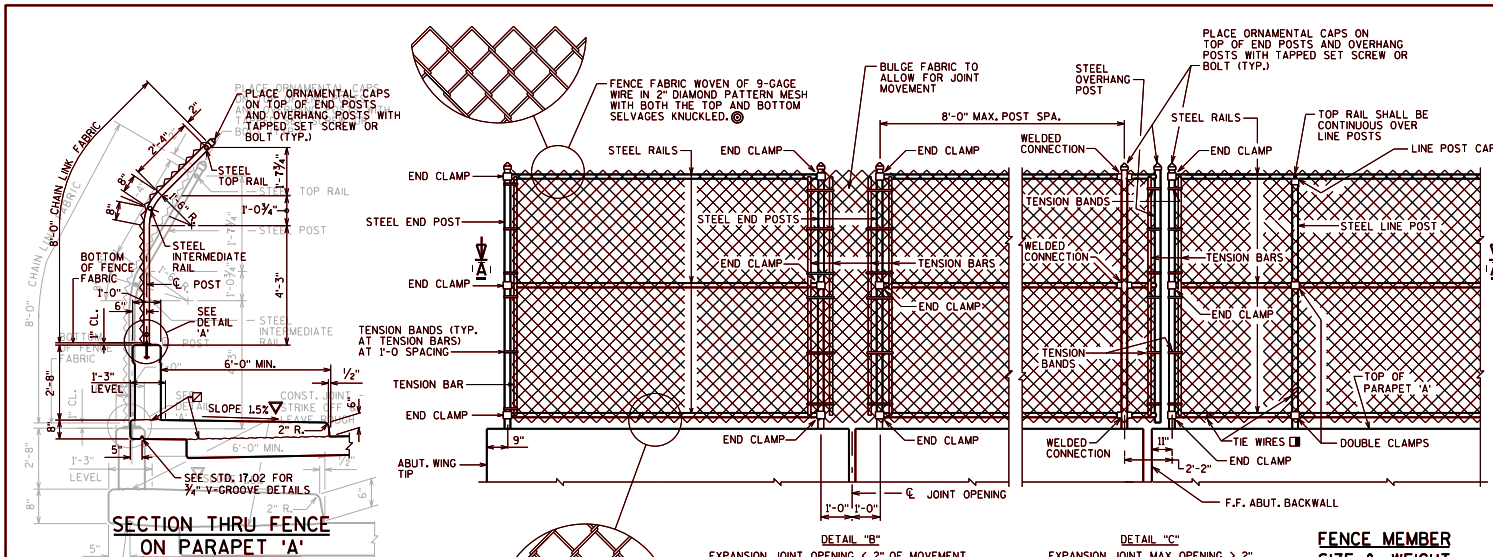
PARTIALLY DRILLED HOLES ABANDONED IN THE DECK SHALL BE FILLED WITH NON-SHRINK COMMERCIAL GROUT PER THE APPROVED PRODUCTS LIST

*6 ANCHORS SHALL BE "ADHESIVE ANCHORS 60816BAR". EMBED 5/4" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 502.2.12 AND 502.3.14 OF THE STANDARD SPECIFICATIONS.

CONST. JT. - STRIKE OFF AS SHOWN & LEAVE ROUGH

STEEL TROWEL HORIZONTAL SURFACE OF PAVING NOTCH. PLACE MULTIPLE LAYERS OF POLYETHYLENE SHEETS BETWEEN PARAPET FOOTING AND HORIZONTAL SURFACE OF PAVING NOTCH. TOTAL THICKNESS OF SHEETS SHALL BE AT LEAST 0.03'.

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



NOTES

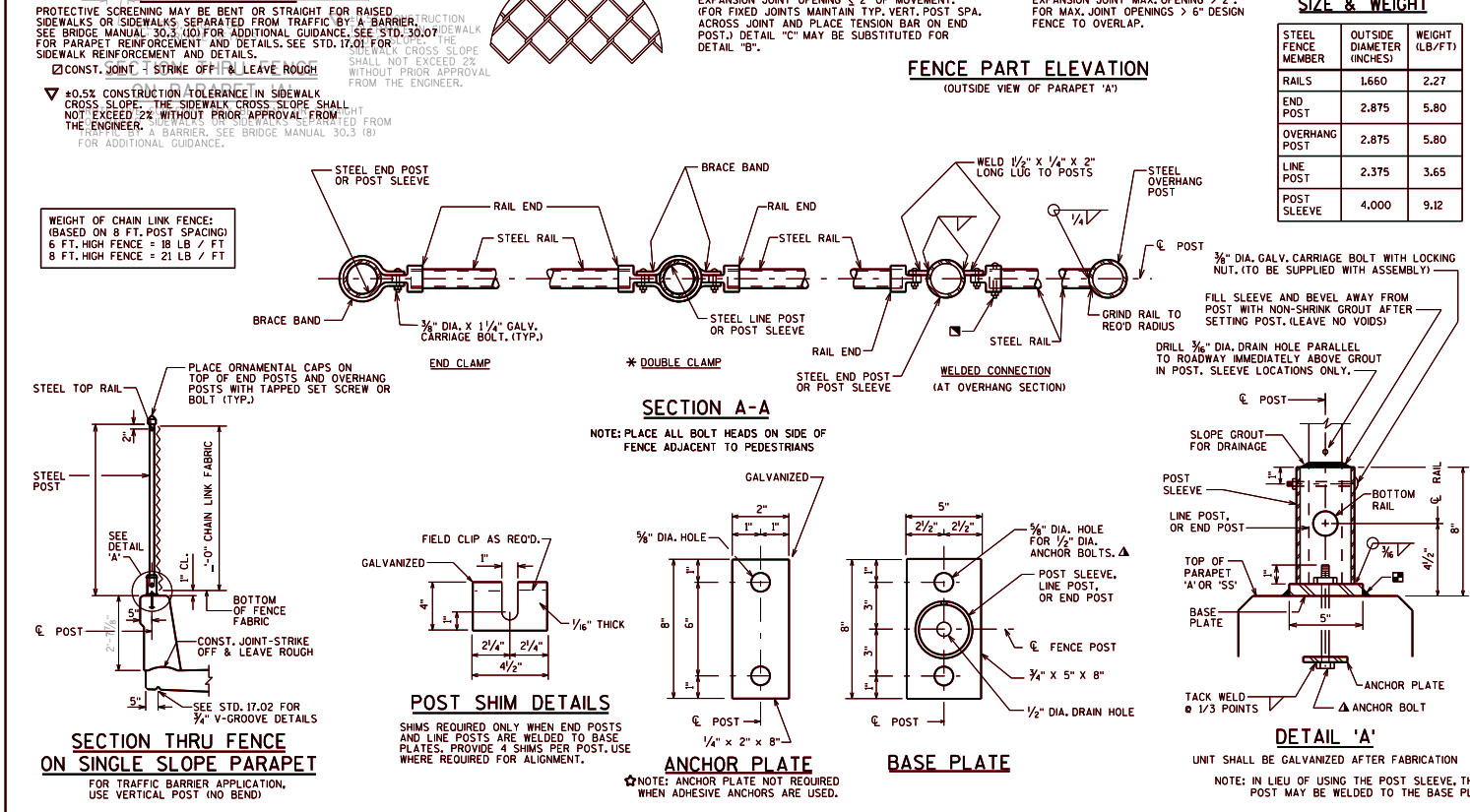
- POSTS ARE TO BE SET VERTICAL.
- METALLIC-COATED FENCE SYSTEM:
- ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT THE FENCE FABRIC WHICH MAY BE ALUMINUM-COATED STEEL OR GALVANIZED STEEL.
- FABRIC SHALL CONFORM TO ASTM A491 OR A392, CLASS 2. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626. PIPE (SCHEDULE 40), FITTINGS SHALL CONFORM TO ASTM F626.
- THE BID ITEM SHALL BE "FENCE CHAIN LINK - 4 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 "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 4 FT.".
- COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.
- POST PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- BASE PLATES, ANCHOR PLATES AND SHIMS SHALL BE ASTM A709, GRADE 50. ANCHOR PLATES AND SHIMS SHALL BE ASTM A709, GRADE 50.
- 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. THE POST SLEEVES OR DIRECTLY WELDED TO THE BASE PLATE.
- ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM 307. 307 IS USED; ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.
- ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS, 5/8" MIN. EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTIONS 5502.2.12 AND 5502.3.14 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.

FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
RAILS	1.660	2.27
END POST	2.875	5.80
OVERHANG POST	2.875	5.80
LINE POST	2.375	3.65
POST SLEEVE	4.000	9.12

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 II-35-1 FOR PROTECTIVE SCREENING.
- PROTECTIVE SCREENING IN HIGHLY VULNERABLE AREAS, OR AS STATED IN FDM PROCEDURE II-35-1 FOR PROTECTIVE SCREENING.
- PEDESTRIAN RAILING MAY BE USED ON MINOR PARAPETS IF CHAIN LINK FENCE DOES NOT CONTINUE BEYOND BRIDGE.
- HANDRAILS SHALL BE USED ALONG BRIDGE SIDEWALKS WHERE THE SLOPE OF THE SIDEWALK IS GREATER THAN 5%. TOP OF HANDRAIL GRIPPING SURFACES SHALL BE MOUNTED BETWEEN 30" & 34" ABOVE SIDEWALK SURFACE, USE 30" NEAR SCHOOL ZONES, IF FEASIBLE. HANDRAILS SHALL BE PROVIDED ALONG BOTH SIDES OF SIDEWALK. FOR HANDRAIL DETAILS, SEE STANDARD 37.02.
- THE DESIGN ENGINEER SHALL DESIGN THE SUPERSTRUCTURE TO ACCOUNT FOR THE MAXIMUM 2% SIDEWALK CROSS SLOPE.
- THE DESIGN ENGINEER SHALL DESIGN THE SUPERSTRUCTURE TO ACCOUNT FOR THE MAXIMUM 2% SIDEWALK CROSS SLOPE.

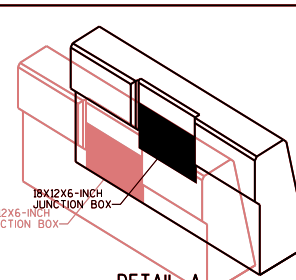
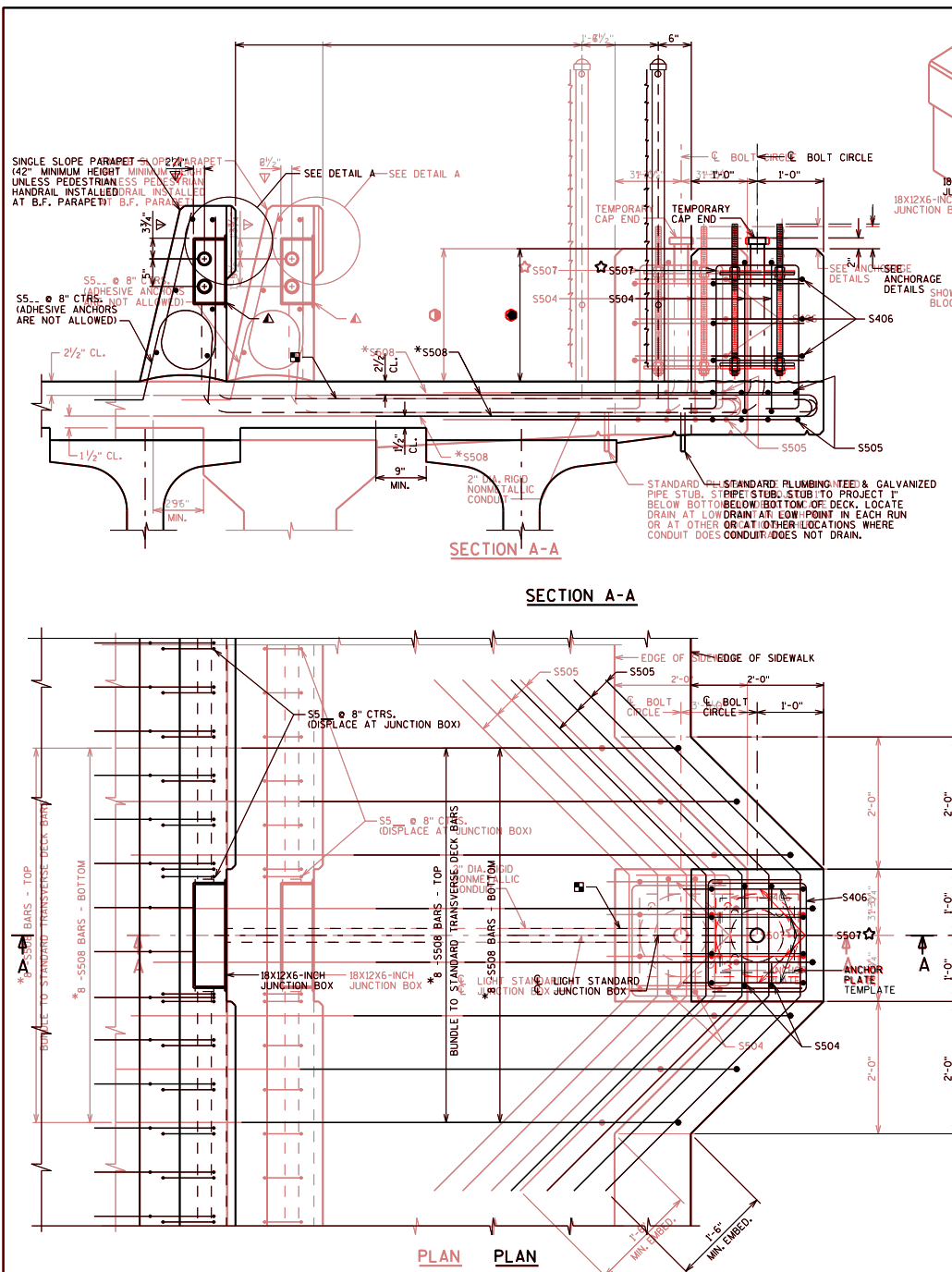


CHAIN LINK FENCE DETAILS

**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE: 7-20



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

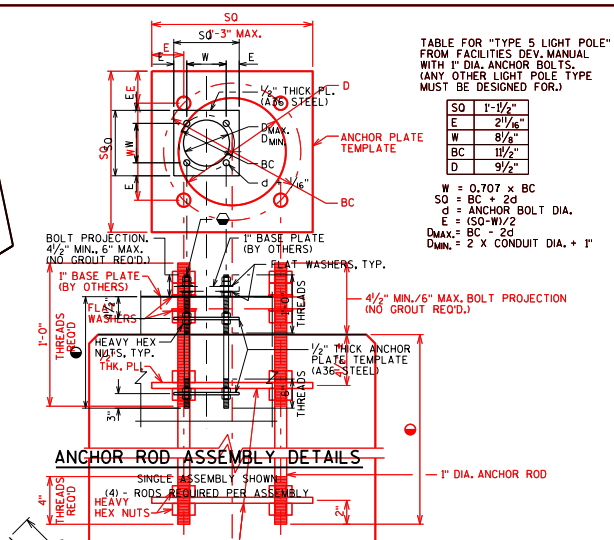


TABLE FOR "TYPE 5 LIGHT POLE"
FROM FACILITIES DEV. MANUAL
WITH 1" DIA. ANCHOR BOLTS.
(ANY OTHER LIGHT POLE TYPE
MUST BE DESIGNED FOR.)

SO	1'-1 1/2"
E	2 1/8"
W	8 5/8"
BC	11 1/2"
D	9 1/2"

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

- ANCHOR RODS
1" DIA. ANCHOR RODS ASTM F1554 GR 55, HEAVY HEX NUTS
ASTM F436, AND WASHERS ASTM F436. ANCHOR RODS MUST BE GALVANIZED PER SECTION 534 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 PESTAL
- 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.
- LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE
OF JUNCTION BOX.
- SEE STANDARD 30.21
- 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.
- END OF BRIDGE DETAILS
- 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 THICKNESS ≤ 8 1/2" - 1 1/4" DIA. RIGID NONMETALLIC
CONDUIT.

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 POLES MUST BE DESIGNED
DESIGNED.
SEE STD. 30.11 FOR FENCE DETAILS.
SEE STD. 30.11 FOR FENCE DETAILS.
SEE STD. 30.21 FOR
SEE - ADDITIONAL NOTES
- END OF BRIDGE DETAILS
- END OF BRIDGE DETAILS
THIS STANDARD IS NOT INTENDED TO BE USE WITH
TRANSFORMER BASES. IT IS INTENDED TO BE USE WITH
TRANSFORMER BASES.

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

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

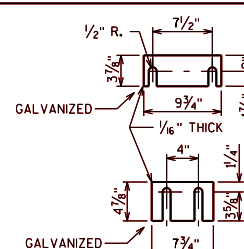
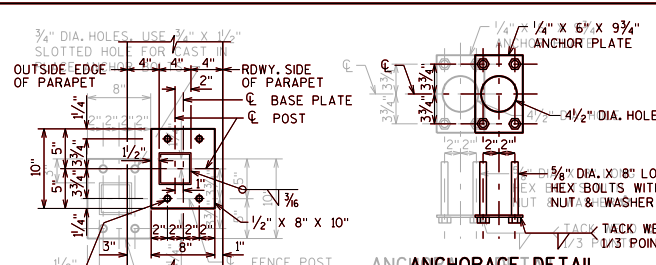
LIGHTING DETAIL



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

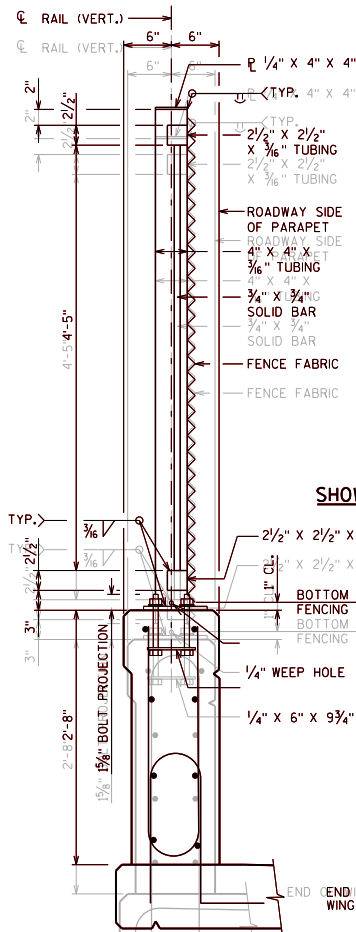
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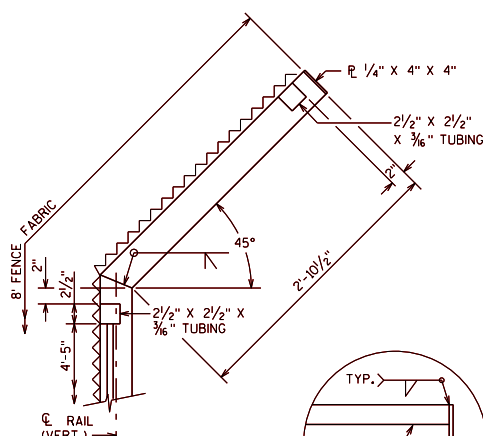
SHIM PLATE DETAILS

TWO SHIMS OF EACH SIZE
REQUIRED PER POST

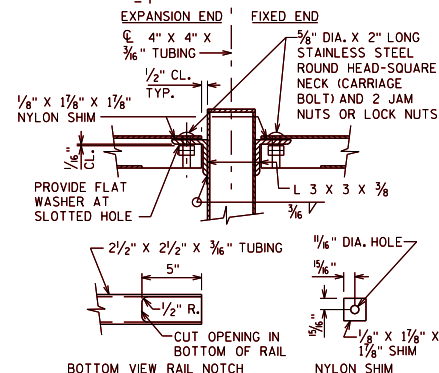
BASE PLATE



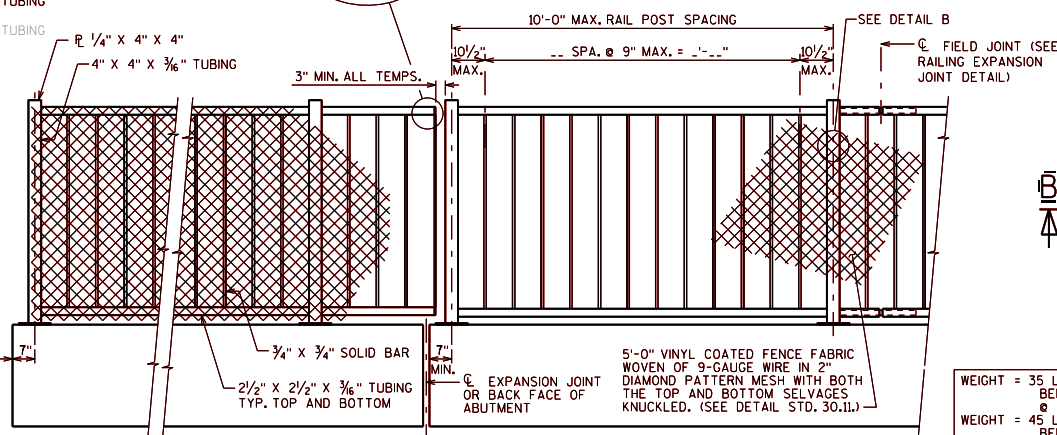
SECTION THRU FENCE
SHOWING DETAILS FOR BENT TOP



TOP RAIL CONNECTION
FOR FENCE W/ BENT TOP



INSIDE ELEVATION OF RAILING



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

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 SURFACE PREPARATION. AFTER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS, THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. [] (FILL IN COLOR NAME). FENCE FABRIC AND TIES TO BE VINYL-COATED, COLOR SHALL BE (SPECIFY: DARK GREEN, BROWN OR BLACK) IN ACCORDANCE WITH ASTM F934.

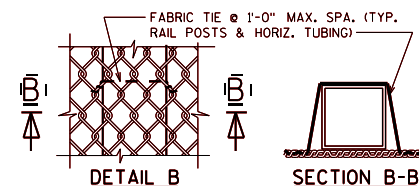
THE END OF THE FABRIC SHALL BE ATTACHED TO THE POST BY MEANS OF A TENSION BAR THREADED THROUGH THE END LOOPS OF THE FABRIC AND SECURED TO THE POST WITH CLAMPS & BOLT. THE FABRIC SHALL BE STRETCHED TO REMOVE ALL SLACK.

DESIGNER NOTES

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

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

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



TUBULAR STEEL
RAILING SCREENING



**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE: 7-20



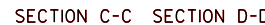
RDWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1 1/4" TO 3/4" OPENING FOR A1 ABUTMENT.



ANCHOR PLATE
AT BEAM GUARD ATTACHMENT



TYPICAL RAIL TO POST CONNECTIONS



- ① W6 x 25 WITH 1/4" x 1 1/2" HORIZONTAL SLOTS ON EACH SIDE OF POST FOR ROOF 6.6, CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- ② PLATE 1/4" x 12 1/2" x 1'-8" WITH 1 1/2" DIA. SLOTTED HOLES 5' FOR ANCHOR BOLTS. HOLE LOCATIONS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ③ ASTM A449 - 1/4" DIA. ANCHOR BOLTS WITH NUT AND HARDENED WASHER (AS GALVANIZED REOD. PER POST). THREAD 3" AND PLACE NORMAL TO PLATE. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 1'-9" LONG IN ABUTMENT WINGS, AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WITH THICKNESS IS 18" USE 1'-3" LONG. USE 10'-4" LONG AT ALL OTHER LOCATIONS. (AN EQUIVALENT THREADED ROD WITH NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REOD. FOR CONSTRUCTION.)
- ④ 3/4" x 11" x 1'-8" ANCHOR PLATE (GALVANIZED WITH 1/2" DIA. HOLES FOR ANCHOR BOLTS NO. 3)
- ⑤ TS 5 x 4 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
- ⑥ TS 5 x 5 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
- ⑦ 3/4" DIA. A325 SLOTTED ROUND HEAD BOLT WITH NUT, 3/4" x 1 1/2" x 1 1/2" MIN. WASHER, AND LOCK WASHER (2 REOD. AT EACH RAIL TO POST LOCATION).
- ⑧ 1/2" THK. BACK-UP PLATE WITH 2 - 3/4" x 1 1/2" THREADED SHOPELDED STUD NO. 12. BOLT TO RAIL AS SHOWN IN DETAIL. REQUIRED AT THREE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.
- ⑨ 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5A FOR 3/4" DIA. A325 BOLTS WITH HEX NUTS AND WASHERS. 6 HOLES IN TUBES AND SLIDE NO. 7.
- ⑩ SPLICER SLEEVE FABRICATED FROM 1/4" PLATE. PROVIDE "SLIDING FIT".
- ⑪ 3/4" x 3 3/8" x 2'-4" PLATE. 2 PER RAIL. USED IN NO. 5 & 5A.
- ⑫ 3/4" x 2 5/8" x 2'-4" PLATE USED IN NO. 5, 5A & 3 3/8" x 3 3/8" x 2'-4" PLATE USED IN NO. 5 & 5A, 2 PER RAIL.
- ⑬ 3/4" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER. USE 1/2" DIA. TUBES IN DETAIL. DELTATION. AS SHOWN IN DETAIL. REQUIRED ABOUT TUBES BEING GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5A.
- ⑭ 1/2" DIA. 2" LONG A325 HEX BOLT WITH NUT AND WASHER (5 REOD.).
- ⑮ 1/2" DIA. 2" LONG A325 HEX BOLT WITH NUT AND WASHER (5 REOD.).
- ⑯ 1" DIA. HOLES IN TUBES NO. 5A FOR 1/2" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER (4 REOD. 4 HOLES IN TUBES).

- [illegible]

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

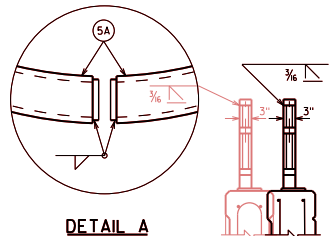
TUBULAR STEEL
RAILING TYPE 'M'



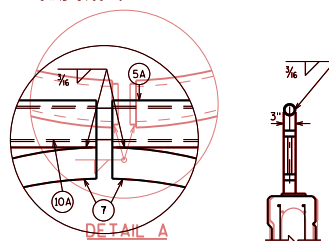
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

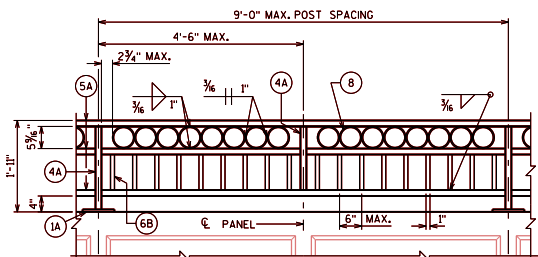
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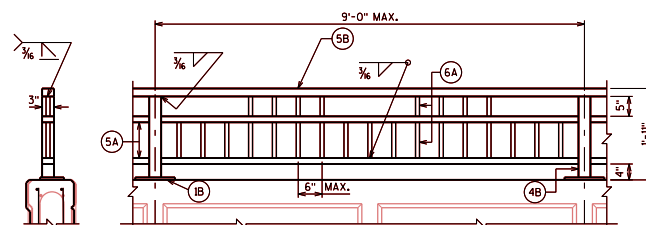
DETAIL A
SEAL ENDS ON CURVED
STRUCTURAL TUBING WITH
1/4" PLATE WELD AND
GRIND SMOOTH.



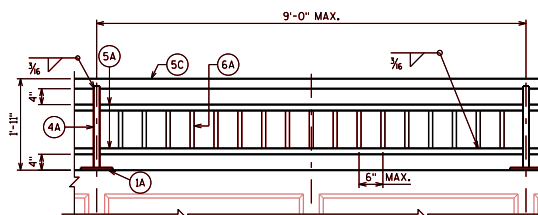
DETAIL A
SEAL ENDS ON CURVED
STRUCTURAL TUBING WITH
1/4" PLATE WELD AND
GRIND SMOOTH.
DETAIL B
SEAL ENDS ON CURVED
STRUCTURAL TUBING WITH
1/4" PLATE WELD AND
GRIND SMOOTH.



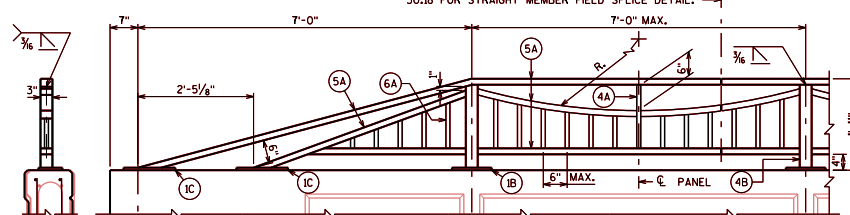
TYPE C1



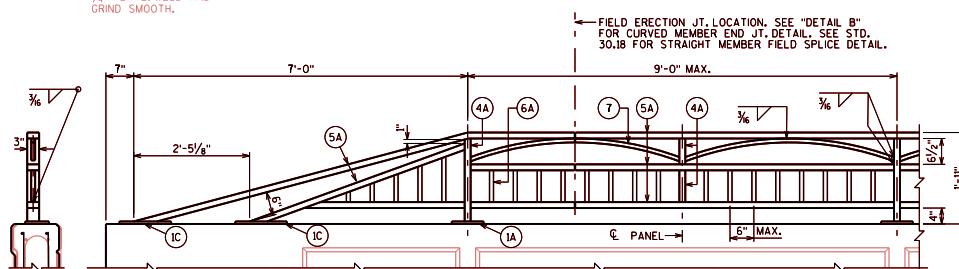
TYPE C4



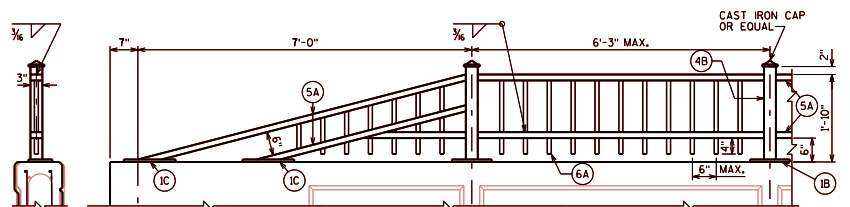
TYPE C2



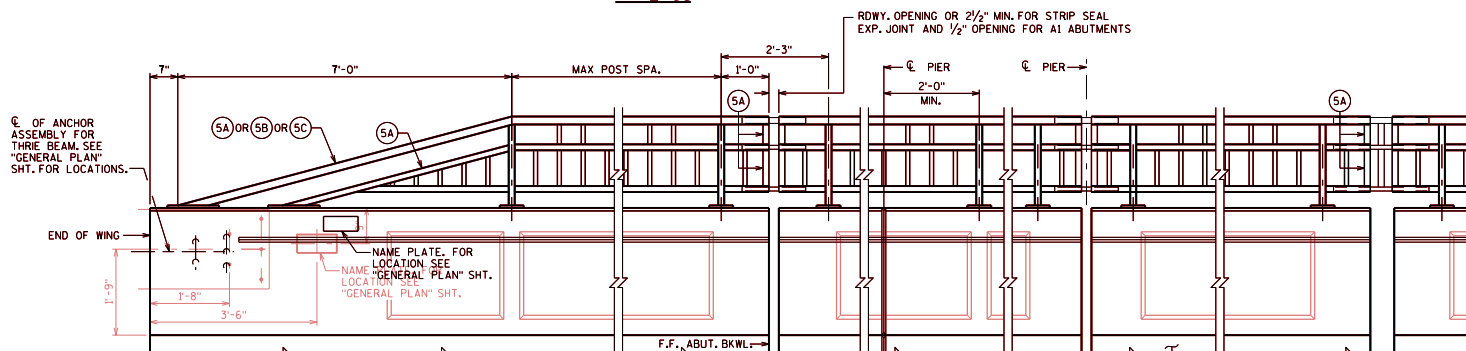
TYPE C5



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" FILLER
TO TOP OF PARAPET. SEE STD. 12.01/12.02

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".
MIN. JOINT SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A 3/4" V-GROOVE.

RAILING WEIGHT = 22 LB/FT

DESIGNER NOTES

COMBINATION RAILINGS TYPE C1-C6 MAY ALSO BE USED AS A
PEDESTRIAN RAIL MOUNTED DIRECTLY TO A BRIDGE SIDEWALK
OR RETAINING WALL BY INCREASING THE RAILING HEIGHT TO A
MINIMUM OF 3'-6" AND A MAXIMUM OF 4'-6" AND USING A
MINIMUM POST SIZE OF 3"x3"x3/8". WHEN USED ON A BRIDGE,
A TRAFFIC BARRIER IS REQUIRED BETWEEN THE ROADWAY
AND THE SIDEWALK. FOR THIS PEDESTRIAN RAILING, BD ITEM
SHALL BE "RAILING STEEL PEDESTRIAN TYPE C1-C6". THE
CLEAR SPACE BETWEEN THE TOP TWO RAILS MAY BE
INCREASED TO A 6" MAXIMUM EXCEPT FOR "TYPE C1"
RAILING.

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

SEE STANDARD 30.18 FOR ADDITIONAL RAILING DETAILS.

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

COMBINATION RAILING TYPES 'C1 - C6'

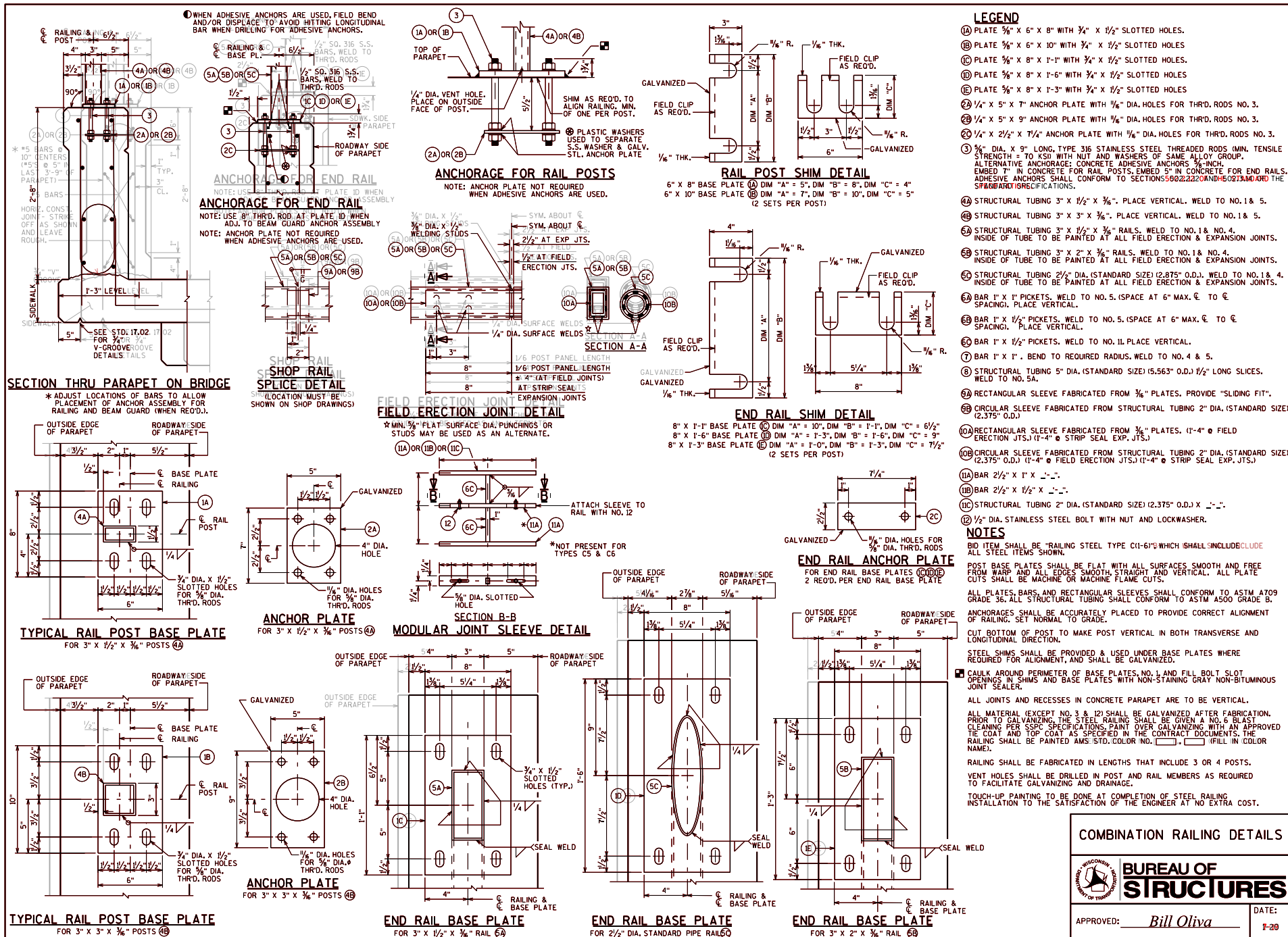


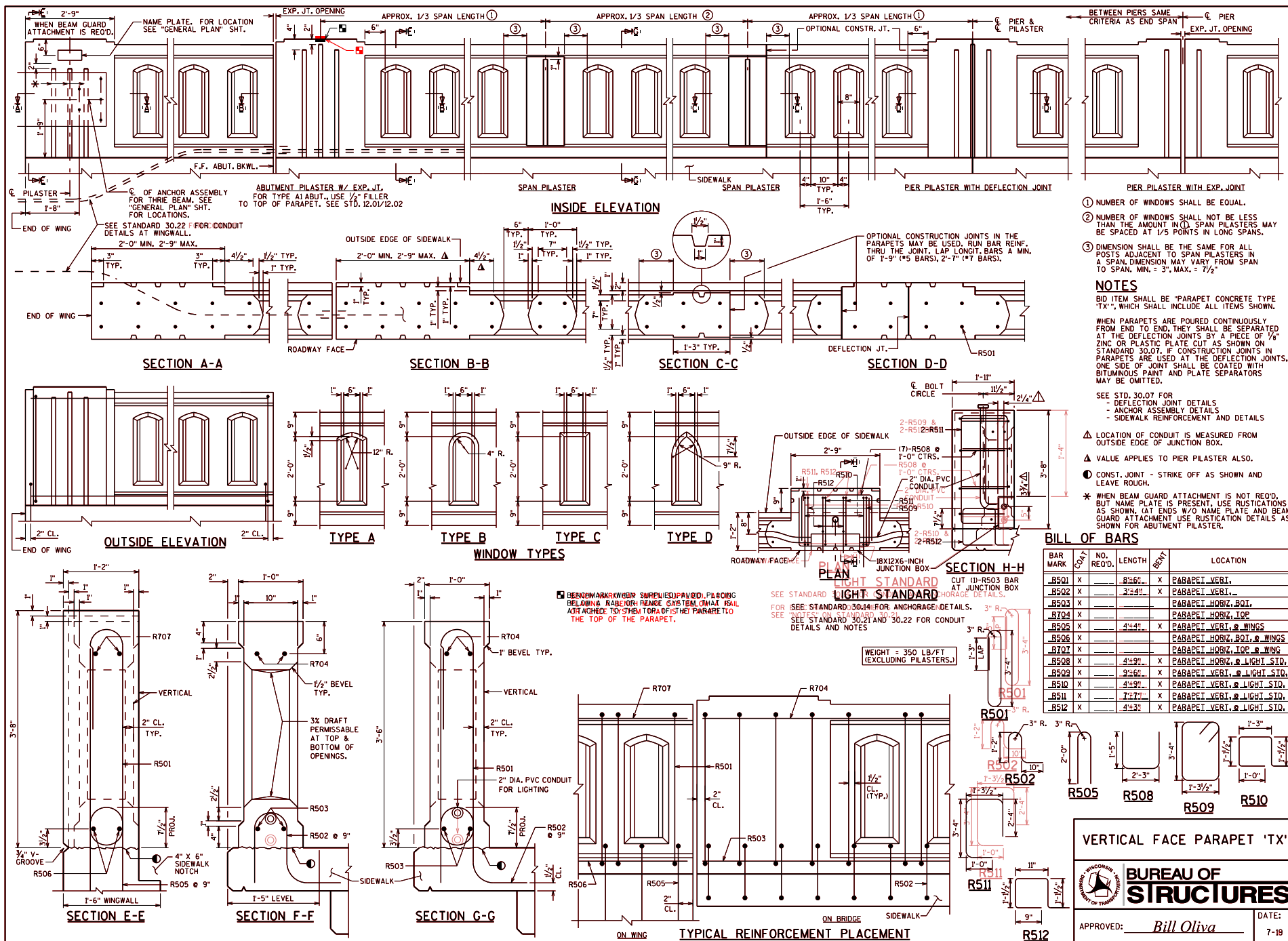
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- NUMBER OF WINDOWS SHALL BE EQUAL.
- NUMBER OF WINDOWS SHALL NOT BE LESS THAN THE AMOUNT IN ①. SPAN PILASTERS MAY BE SPACED AT 1/5 POINTS IN LONG SPANS.
- DIMENSION SHALL BE THE SAME FOR ALL POSTS ADJACENT TO SPAN PILASTERS IN A SPAN. DIMENSION MAY 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.

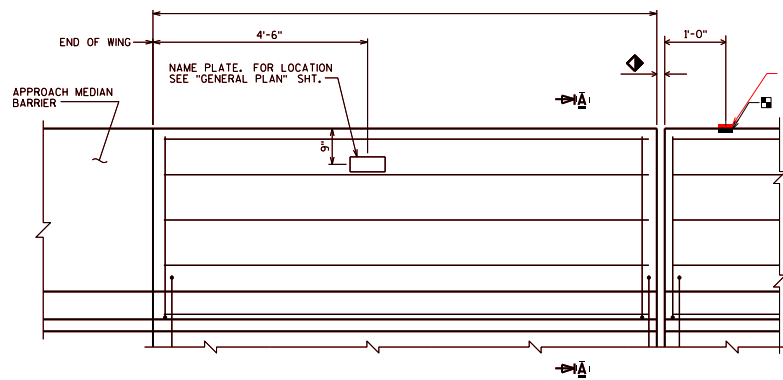
* WHEN BEAM GUARD ATTACHMENT IS NOT REQ'D, BUT NAME PLATE IS PRESENT, USE RUSTICATIONS AS SHOWN. (AT ENDS W/O NAME PLATE AND BEAM GUARD ATTACHMENT USE RUSTICATION DETAILS AS SHOWN FOR ABUTMENT PILASTER.

VERTICAL FACE PARAPET 'TX'



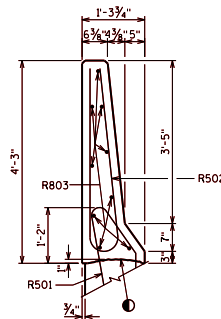
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5 BENCHMARK WHEN SUPPLIED TO AVOID PEACING
BELOW APPROACH OR FENCE SYSTEMS THAT ATTACHED
TO TABS OF THE FACE OF THE PARAPET.

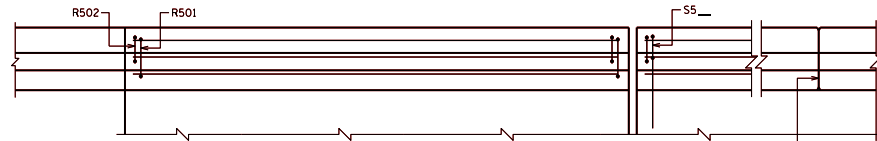


INSIDE ELEVATION

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



SECTION A

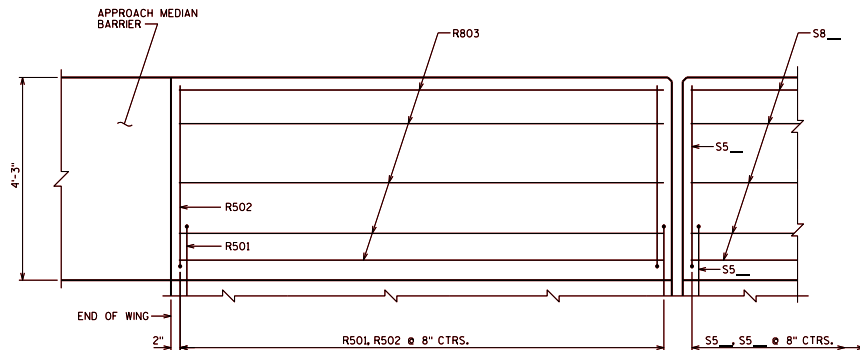


PLAN

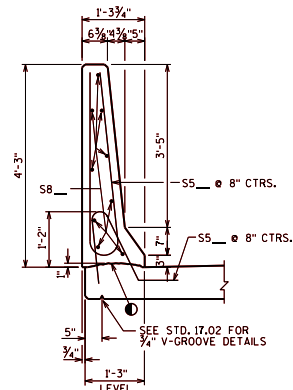
EXPANSION JOINT @ ABUT.
0° SKEW SHOWN, MATCH EXP.
JT. OPENING.

FOR TYPE A1 ABUT., USE 1/4"
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" - 'V' GROOVE.



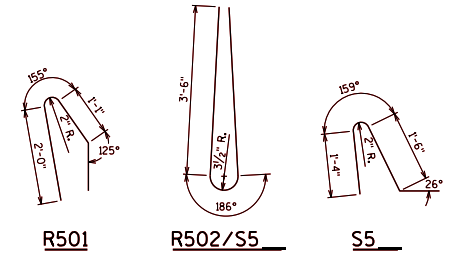
OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE

BILL OF BARS FOR ABUTMENT PARAPETS

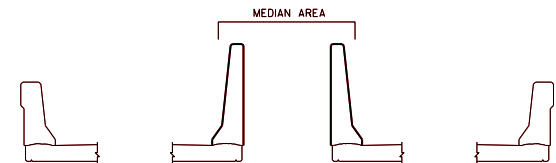
BAR MARK	COAT	ABUT.	ABUT.	LENGTH	REIN.	LOCATION
B501	X			4'-6"	X	PARAPET VERT.
B502	X			7'-11"	X	PARAPET VERT.
B803	X					PARAPET HORIZ.
S5	X			4'-2"	X	PARAPET VERT.
S5	X			7'-11"	X	PARAPET VERT.
S8	X					PARAPET HORIZ.



R501

R502/S5

S5



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

◆ CONST. JOINT - STRIKE OFF AS SHOWN.

A R501 BAR MAY BE USED IN LIEU OF A
TYPICAL S5... BAR ADJACENT TO THE
PAVING NOTCH ON TYPE A1 ABUTMENTS.

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

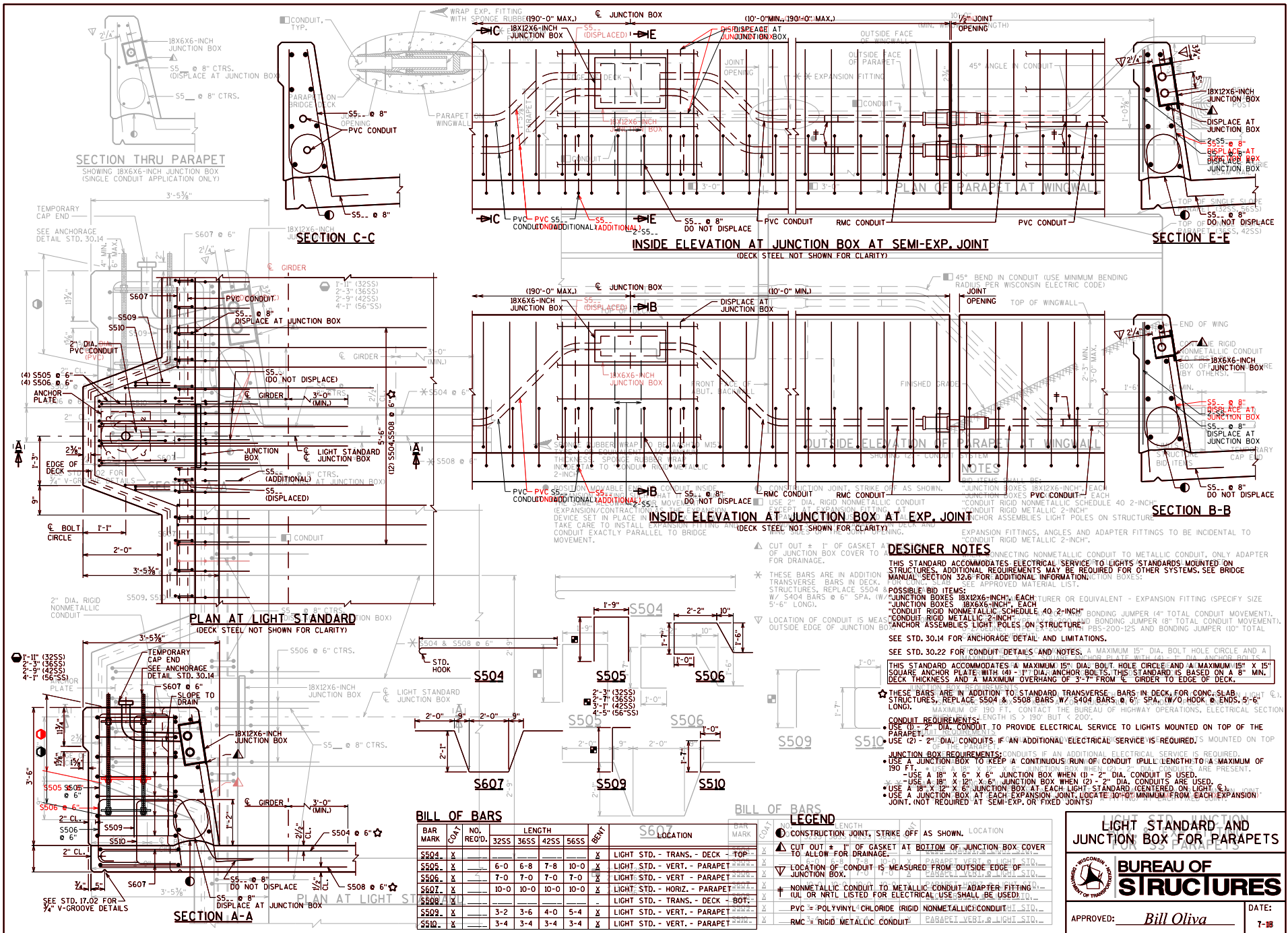
SLOPED FACE PARAPET '51F'

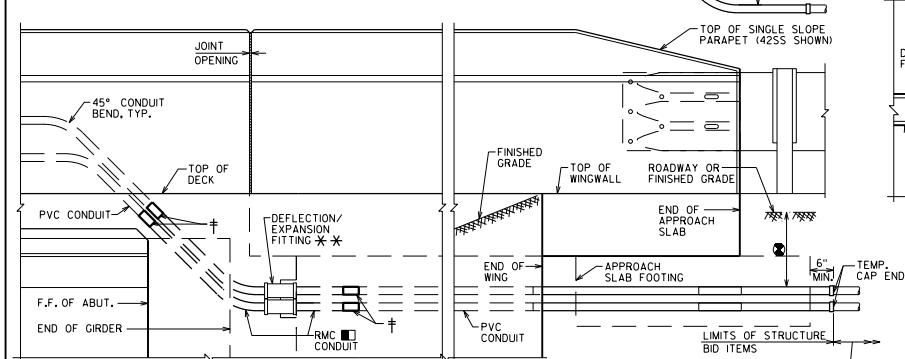
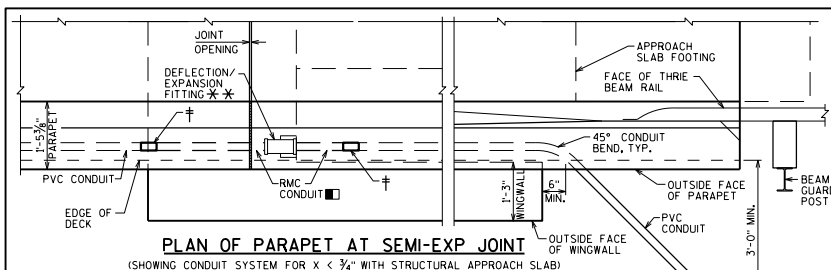


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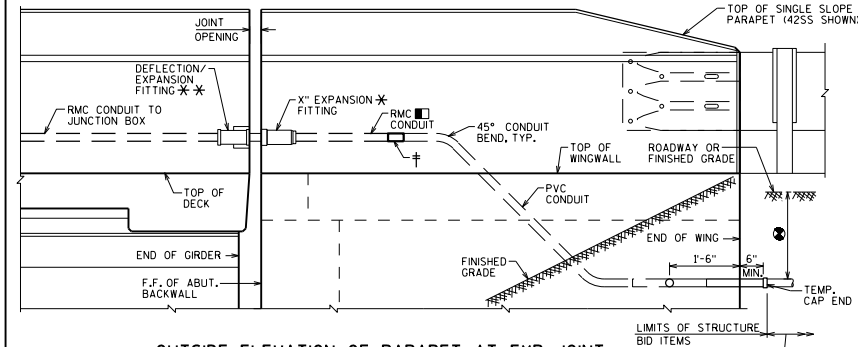
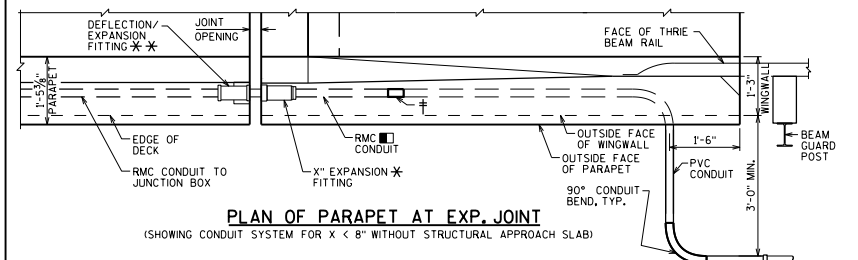
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7-19

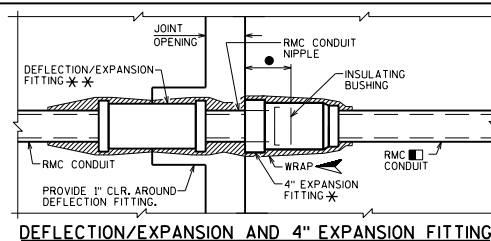




OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP. JOINT
(SHOWING CONDUIT SYSTEM FOR $X < \frac{3}{4}$ WITH STRUCTURAL APPROACH SLAB)

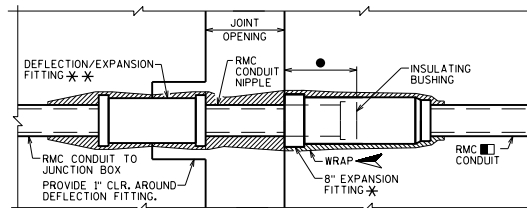


OUTSIDE ELEVATION OF PARAPET AT EXP. JOINT
(SHOWING CONDUIT SYSTEM FOR $X < 8$ WITHOUT STRUCTURAL APPROACH SLAB)



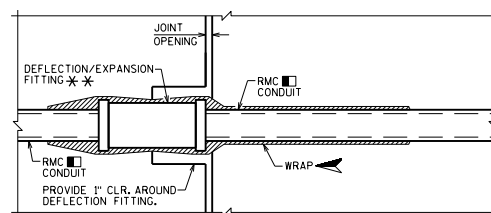
DEFLECTION/EXPANSION AND 4" EXPANSION FITTING

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



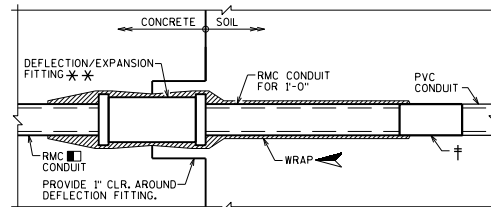
DEFLECTION/EXPANSION AND 8" EXPANSION FITTING

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



DEFLECTION/EXPANSION FITTING

THIS DETAIL ACCOMMODATES A MAXIMUM OF $\frac{3}{4}$ " 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 $\frac{3}{4}$ " TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION. BOND JUMPER NOT SHOWN FOR CLARITY (CONCRETE TO SOIL FITTING)

NOTES

CONDUIT SHALL BE EMBEDDED 2" CLEAR.

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

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

CONDUIT BENDS SHALL CONFORM TO THE NATIONAL ELECTRIC CODE.

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

PROVIDE JUNCTION BOXES FROM THE APPROVED PRODUCTS LIST.

DESIGNER NOTES

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

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

LEGEND

■ 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 - $\frac{1}{2}$ " 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

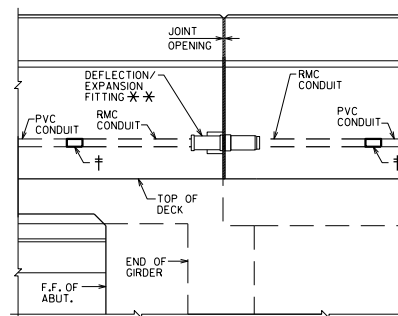
CONDUIT FITTING RECOMMENDATIONS TABLE:

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



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

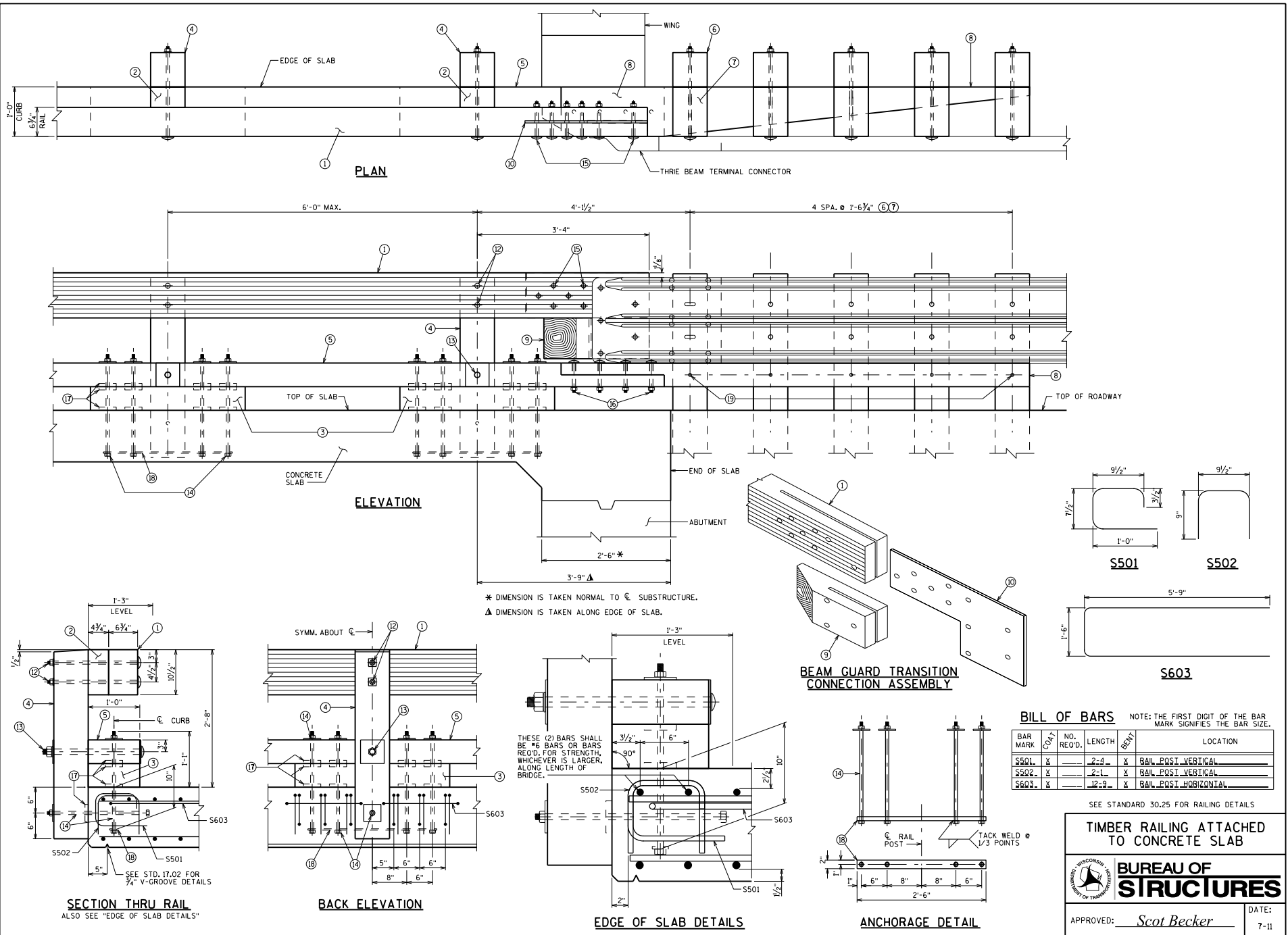


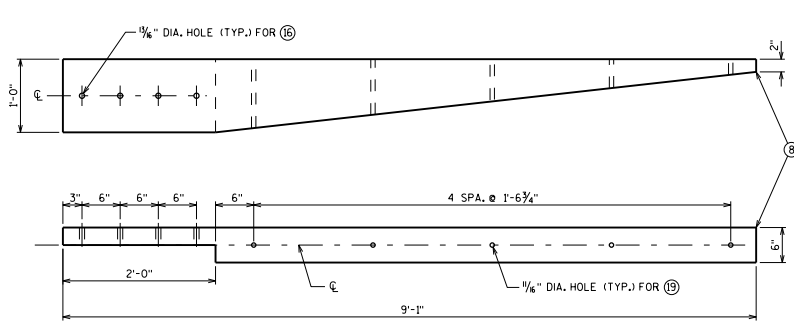
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STRUCTURES**

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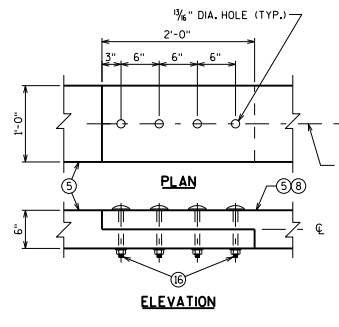
DATE:

7-17

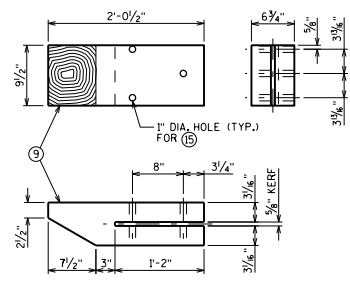




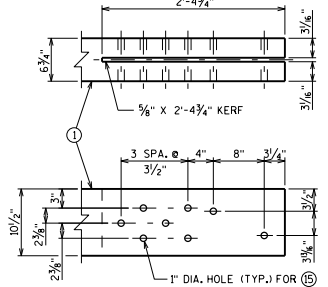
CURB TRANSITION



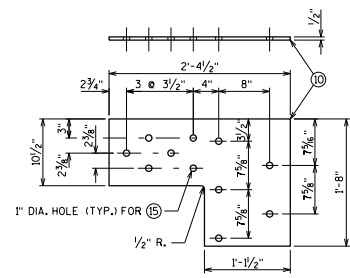
CURB SPLICE DETAIL



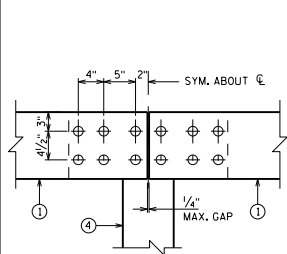
TRANSITION BLOCK



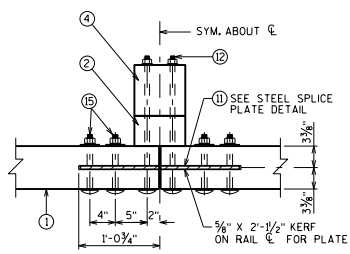
TRANSITION GLULAM RAIL BORING DETAIL



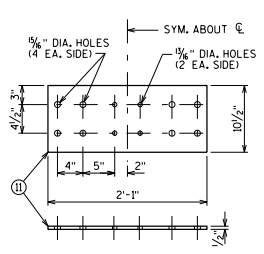
STEEL TRANSITION PLATE



ELEVATION



PLAN VIEW



STEEL SPLICE PLATE

RAIL SPLICE DETAILS

LEGEND

- ① GLULAM RAIL 6 3/4" X 10 1/2"
- ② RAIL SPACER BLOCK 8" X 4 3/4" X 10 1/2"
- ③ SCUPPER BLOCK 6" X 12" X 3'-0"
- ④ RAIL POST @ STRUCTURE 8" X 8" X 3'-8"
- ⑤ CURB 6" X 12"
- ⑥ RAIL POST @ BEAM GUARD 8" X 8"
- ⑦ RAIL SPACER BLOCK @ BEAM GUARD 8" X 10 1/2" X 1'-10 1/2"
- ⑧ CURB TRANSITION @ BEAM GUARD
- ⑨ TRANSITION BLOCK @ BEAM GUARD
- ⑩ STEEL TRANSITION PLATE, ASTM A36.
- ⑪ STEEL SPLICE PLATE, ASTM A36.
- ⑫ 3/4" DIA. X 1'-10" LONG ASTM A307, GRADE 2, DOME-HEAD BOLT W/ 1-PLATE WASHER PER BOLT. (2 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 - 5/8" X 5/8" 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	---	8" X 10 1/2" X 2'-0 1/2"	---	---
STEEL TRANSITION PLATE	---	8" X 10 1/2" X 1'-10 1/2"	---	---
STEEL SPLICE PLATE	---	8" X 10 1/2" X 1'-10 1/2"	---	---
TOTAL MBM	---	---	---	---

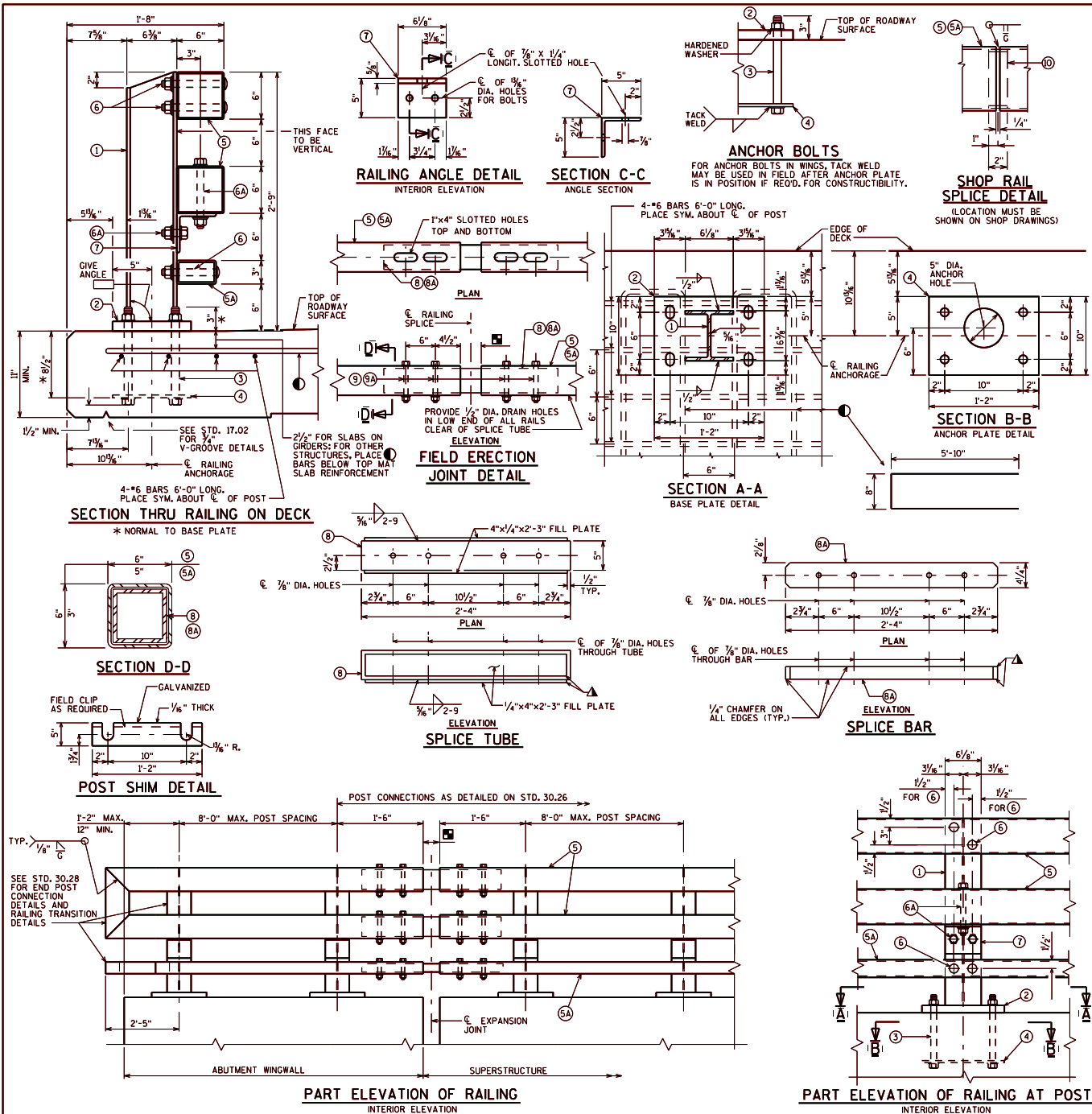
THESE RAILING DETAILS MAY BE USED WITH CONCRETE SLAB SUPERSTRUCTURES (SLAB DEPTH > 14") THAT HAVE ABUTMENTS WITH WINGS PARALLEL TO ϵ OF ABUTMENT OR HAVE AS ABUTMENTS.

TIMBER RAILING ATTACHED TO CONCRETE SLAB DETAILS

BUREAU OF STRUCTURES

DATE: _____

APPROVED: Bill Oliva



LEGEND

- WE 3 X 25 WITH $\frac{1}{4}$ " X $\frac{1}{4}$ " HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT NO. 5. USE 1" DIA. HOLES FOR BOLT NO. 6 AT NO. 5A AND FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- PLATE $\frac{1}{4}$ " X 10" X 1'-2" WITH $\frac{1}{4}$ " X $\frac{1}{4}$ " SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE $\frac{1}{2}$ " LONG BOLT FOR CONCRETE DECKS, ON CONCRETE SLAB SUPERSTRUCTURES, USE 1'-3" LONG BOLT FOR SLAB THICKNESS ≥ 16 " AND $\frac{1}{2}$ " LONG FOR THICKNESS ≤ 16 ". USE 1'-9" LONG IN ABUTMENT WINGS. AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTABILITY.)
- $\frac{3}{4}$ " X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH $\frac{1}{4}$ " DIA. HOLES FOR ANCHOR BOLTS NO. 3.
- TS 6 X 6 X $\frac{3}{8}$ " STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & $\frac{1}{2}$ " DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
- TS 5 X 3 X $\frac{1}{4}$ " STRUCTURAL TUBING. USE $\frac{1}{4}$ " X $\frac{1}{4}$ " HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- $\frac{7}{8}$ " DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, $\frac{3}{4}$ " X $\frac{1}{4}$ " X $\frac{1}{4}$ " WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
- $\frac{3}{4}$ " DIA. A325 BOLT WITH HEX NUT & SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE & 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH $\frac{3}{4}$ " X $\frac{1}{4}$ " X $\frac{1}{4}$ " WASHER).
- L 5 X 5 X $\frac{3}{8}$ " STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
- TS 5 X 5 X $\frac{3}{8}$ " X 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.
- $\frac{1}{4}$ " X 4" X 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.
- $\frac{3}{4}$ " DIA. A325 FULLY THREADED BOLTS, $\frac{1}{2}$ " LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5.
- $\frac{3}{4}$ " DIA. A325 FULLY THREADED BOLTS, $\frac{1}{2}$ " LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5A.
- SPLICE SLEEVE FABRICATED FROM $\frac{1}{4}$ " PLATE. PROVIDE "SLIDING FIT".
- ROADWAY OPENING OR $\frac{1}{4}$ " MIN. FOR STRIP SEAL EXP. JOINT & $\frac{1}{2}$ " OPENING FOR A1 ABUTMENT. $\frac{1}{4}$ " AT FIXED JOINTS. SPLICES ARE REQUIRED IN ANY RAILING SPAN BETWEEN POSTS THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT.

NOTES

BID ITEM SHALL BE "RAILING STEEL TYPE NY3" WHICH, INCLUDING LATEST REVISIONS SHOWN, SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE. POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP, BEND, AND ALL EDGES SMOOTH, STRAIGHT, AND SQUARE. SMOOTH PLATE EDGES SHALL BE MACHINE OR MACHINE FLAME CUT. ALL PLATE CUTS SHALL BE ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL FABRICATING, POSITIVE, RUST, AND SURFACE DEFECTS, AND ALL SURFACES SHALL BE CLEANED AND PREPARED AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED OR COATED AS SPECIFIED IN THE CONTRACT DOCUMENTS. COLOR SHALL BE PAINTED OR COATED AS SPECIFIED IN THE CONTRACT DOCUMENTS. (FILL IN COLOR NAME).

RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE 50 OR EQUIVALENT. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE 50 OR EQUIVALENT. ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE 50. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL $\frac{1}{4}$ TURN.

FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. SEALER SHALL BE APPLIED TO THE PERIMETER OF THE BOLT SLOT OPENING AND THE PERIMETER OF THE BOLT SLOT OPENING SHALL BE SEALER.

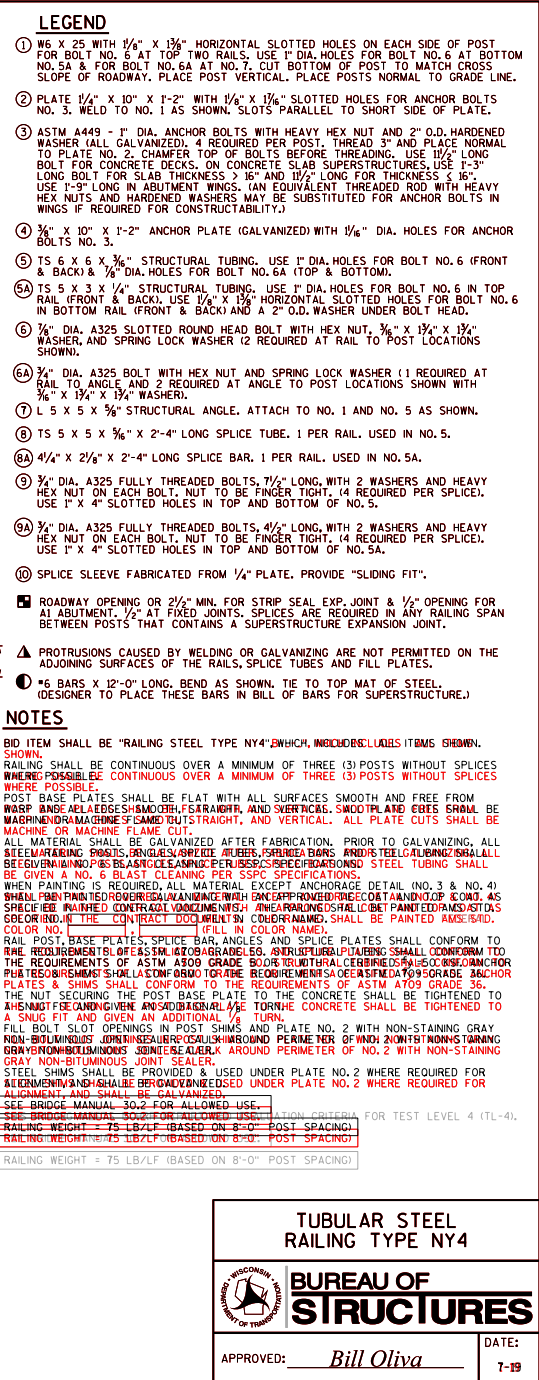
STEEL SHIMS SHALL BE PROVIDED UNDER PLATE NO. 2 WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.

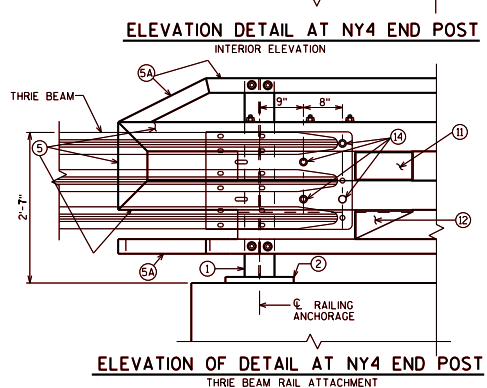
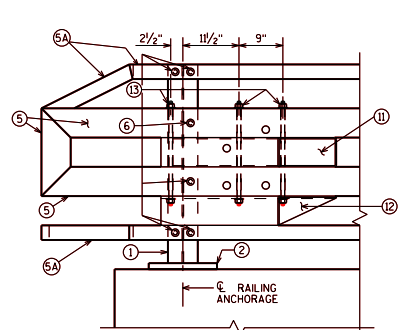
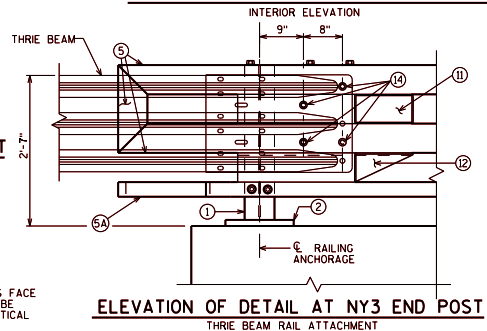
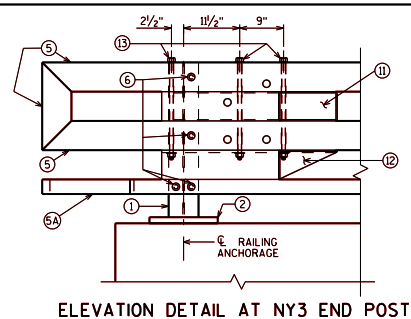
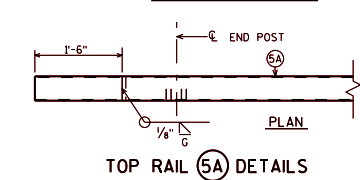
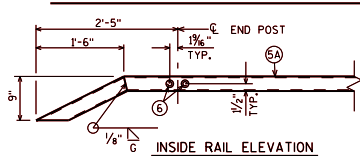
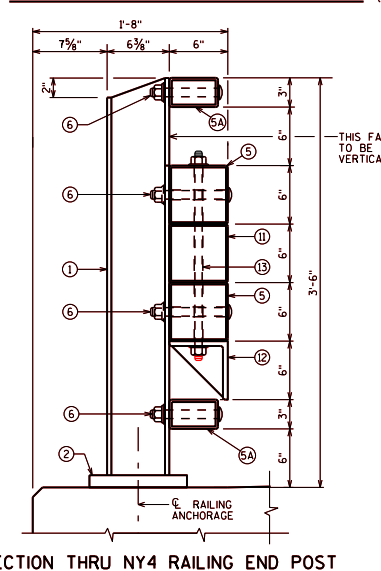
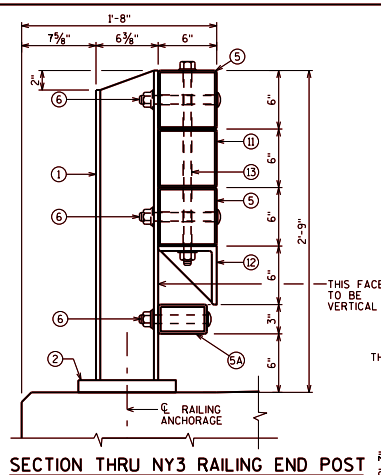
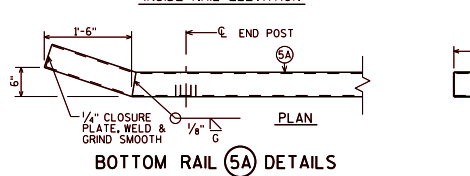
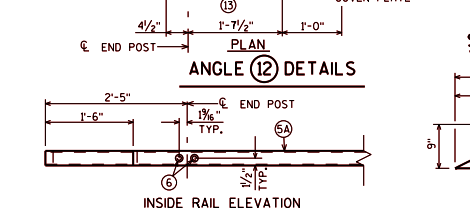
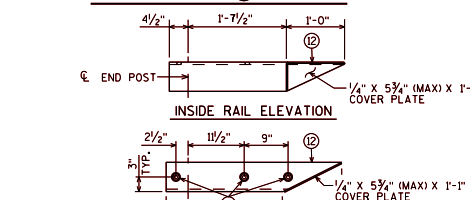
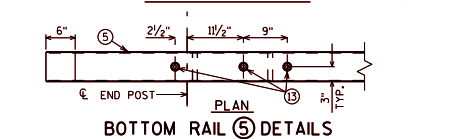
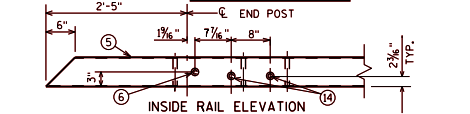
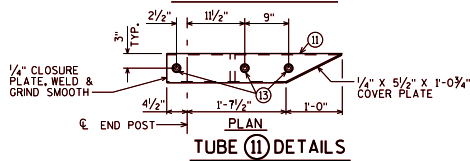
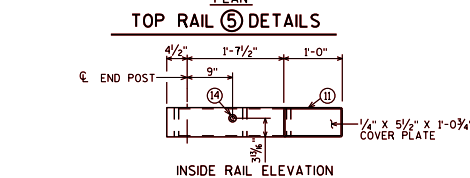
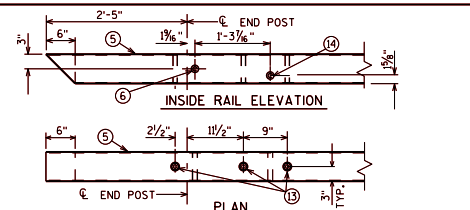
SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

RAILING WEIGHT = 60 LB/LF (BASED ON 8'-0" POST SPACING)

RAILING WEIGHT = 60 LB/LF (BASED ON 8'-0" POST SPACING)

TUBULAR STEEL RAILING TYPE NY3	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-19</u>



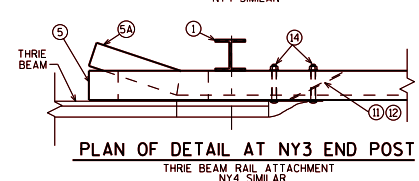
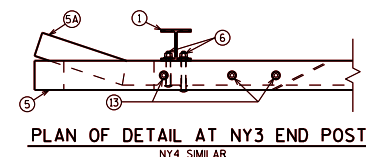


LEGEND

- 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.
- PLATE 1/2" X 10" X 1"-2". SEE STANDARDS 30.26 AND 30.27 FOR MORE INFORMATION.
- 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.
- 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.
- 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).
- 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.
- L 6 X 6 X 1/2" STRUCTURAL ANGLE. USE 7/8" DIA. HOLES IN TOP FLANGE FOR BOLT NO. 13.
- 3/4" DIA. A325 FULLY THREADED BOLTS, 2 WASHERS AND A HEAVY HEX NUT, ON EACH BOLT. NUT TO BE FINGER TIGHT, 3 BOLTS AT EACH END POST.
- 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



**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:
1-21

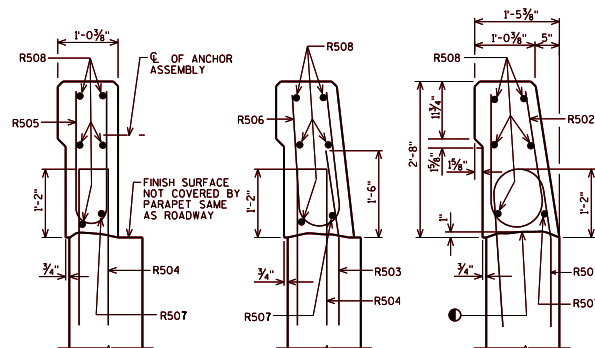


- FOR ALL TUBULAR STEEL RAILING TYPE NY4 DETAILS SEE STD. 30.27.

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

INSIDE ELEVATION

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



SECTION A

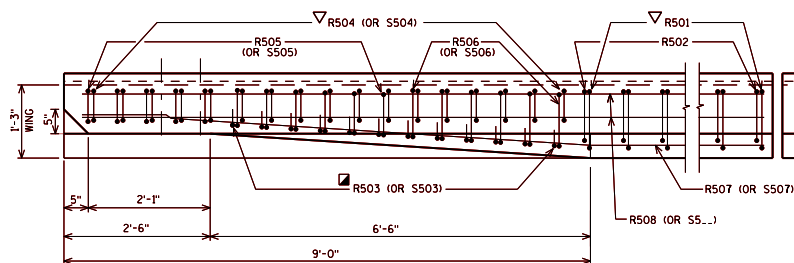
SECTION B

SECTION C

BILL OF BARS

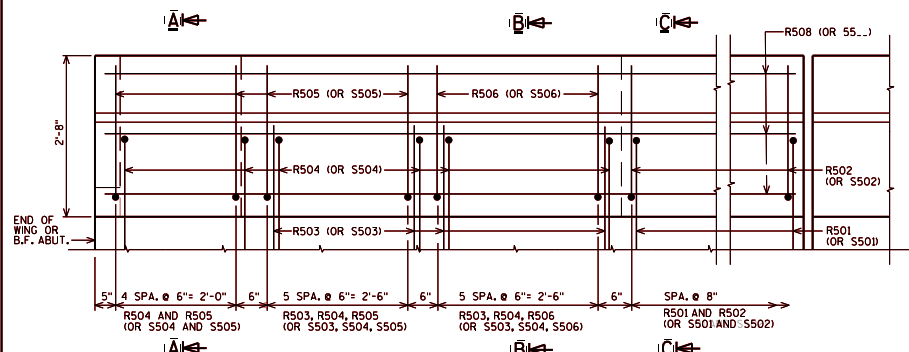
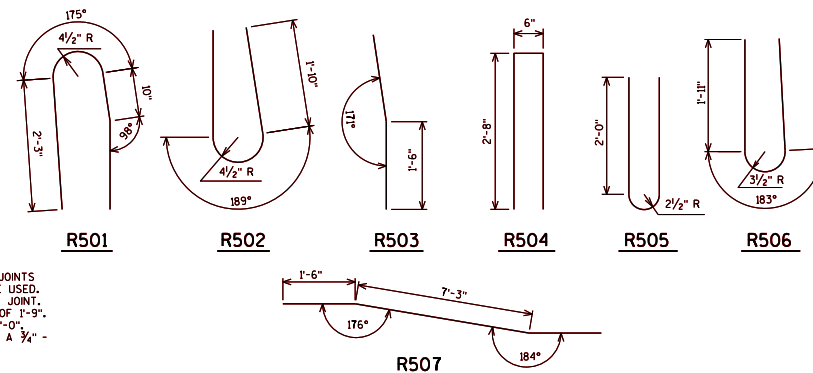
FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	SEAL	LOCATION
B501.	X	---	---	5-10	X	PASAPET-VERI.
B502.	X	---	---	5-0	X	PASAPET-VERI.
B503.	X	---	---	3-0	X	PASAPET-VERI.
B504.	X	---	---	5-7	X	PASAPET-VERI.
B505.	X	---	---	4-9	X	PASAPET-VERI.
B506.	X	---	---	4-10	X	PASAPET-VERI.
B507.	X	---	---	---	X	PASAPET-HORIZ.
B508.	X	---	---	---	---	PASAPET-HORIZ.
					-	
					-	
					-	
					-	
					-	
S501.	X	---	---	4-5	X	PASAPET-VERI.
S503.	X	---	---	2-9	X	PASAPET-VERI.
S504.	X	---	---	4-4	X	PASAPET-VERI.

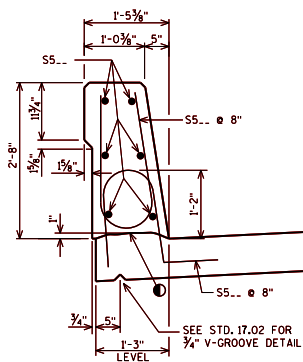


PLAN

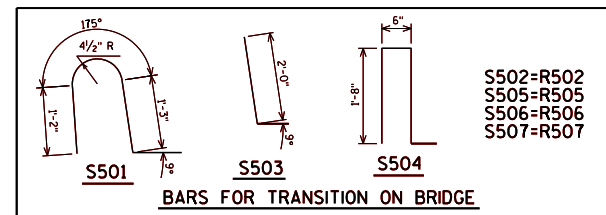
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A $\frac{3}{4}$ " - "V" GROOVE.



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



S502=R502
S505=R505
S506=R506
S507=R507

AREA = 3.09 SF
WEIGHT = 464 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

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

▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.
DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

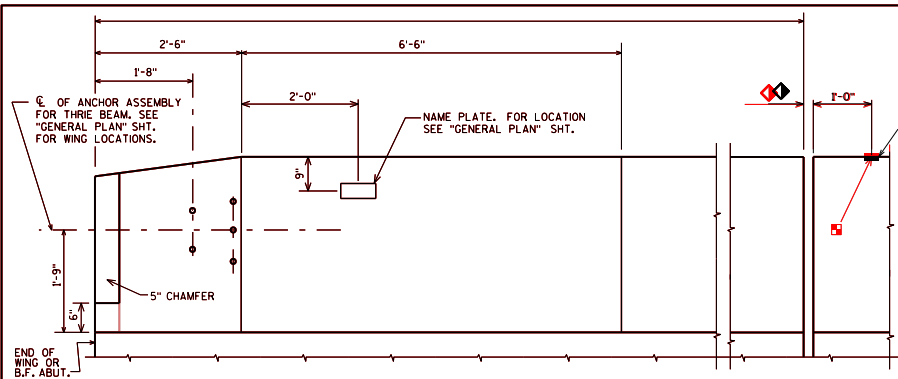
SINGLE SLOPE PARAPET 32SS



**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:

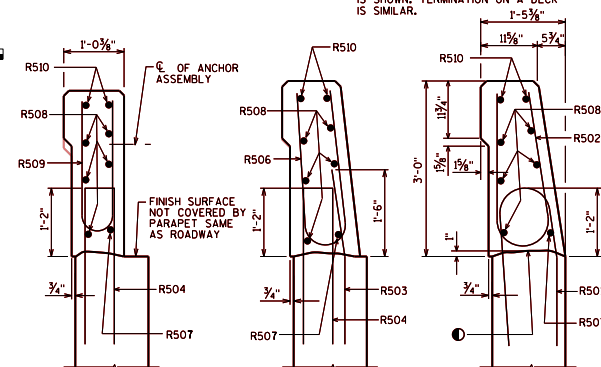


INSIDE ELEVATION

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

BECKENMARKER BAR SHOWN FOR INFO. PLACING BECKENMARKER BAR SYSTEM ON A RAIL ADJACENT TO THEM TOP OF THE PARAPET TO THE TOP OF THE PARAPET.

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



SECTION A

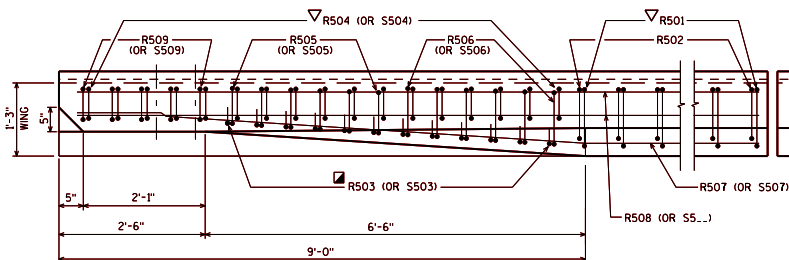
SECTION B

SECTION C

BILL OF BARS

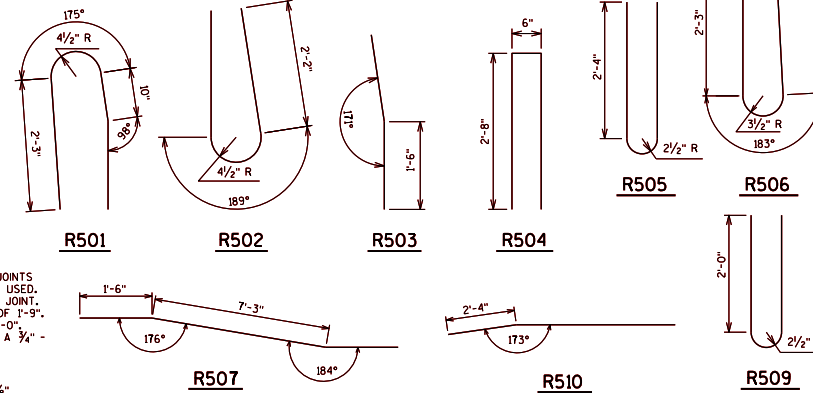
FOR ABUTMENT PARAPETS

BAR MARK	QTY	ABUT.	ABUT.	LENGTH	BEY.	LOCATION
R501	X			5-10	X	PARAPET-VERTL.
R502	X			5-8	X	PARAPET-VERTL.
R503	X			3-9	X	PARAPET-VERTL.
R504	X			5-7	X	PARAPET-VERTL.
R505	X			5-5	X	PARAPET-VERTL.
R506	X			5-6	X	PARAPET-VERTL.
R507	X				X	PARAPET-HORIZ.
R508	X				X	PARAPET-HORIZ.
R509	X			4-9	X	PARAPET-VERTL.
R510	X				X	PARAPET-HORIZ.
S501	X			4-5	X	PARAPET-VERTL.
S503	X			2-9	X	PARAPET-VERTL.
S504	X			4-4	X	PARAPET-VERTL.



PLAN

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



R501

R502

R503

R504

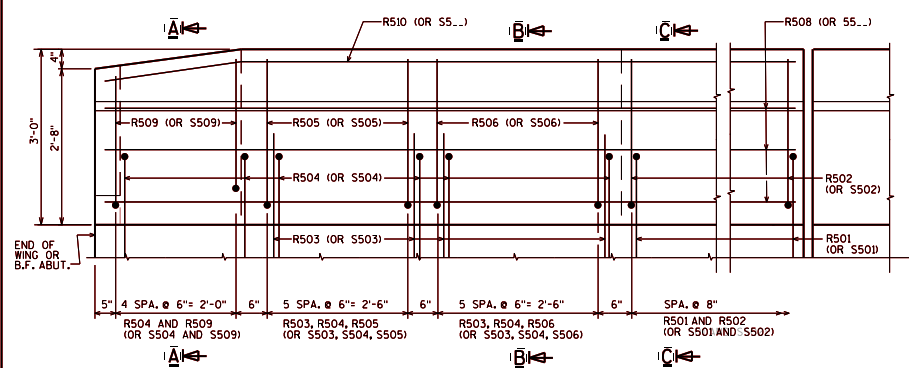
R505

R506

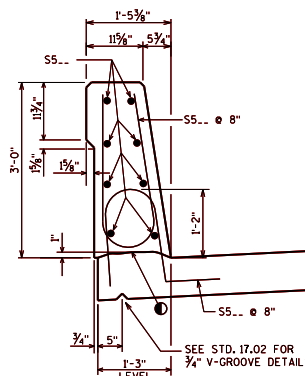
R507

R510

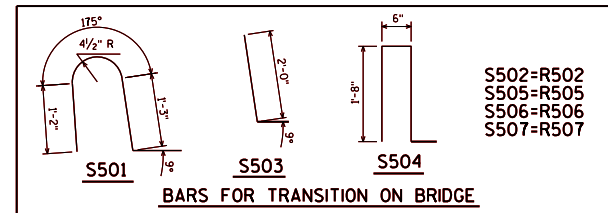
R509



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

AREA = 3.36 SF
WEIGHT = 504 LB/FT

◆ CONST. JOINT - STRIKE OFF AS SHOWN.

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

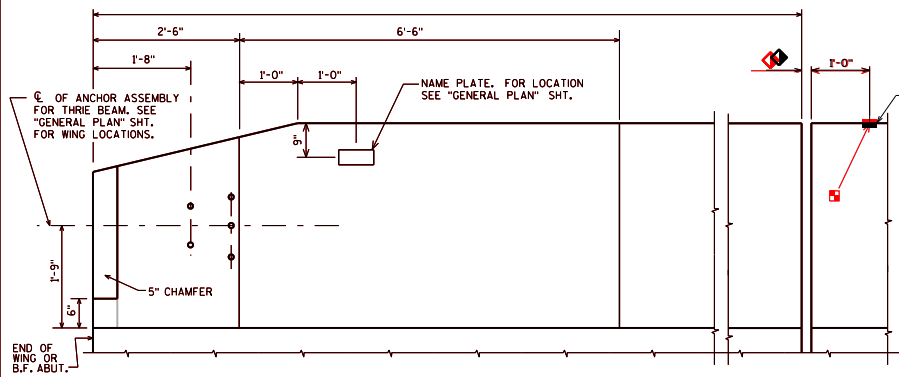
▽ R501 AND R504 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED. DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE AT ABUTMENTS.

SINGLE SLOPE PARAPET 36SS

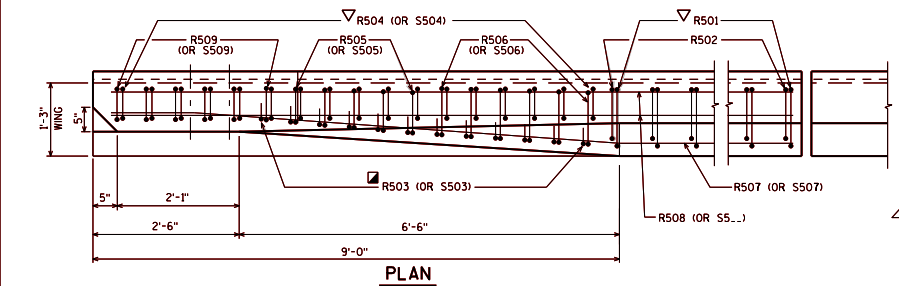


APPROVED: *Bill Oliva*

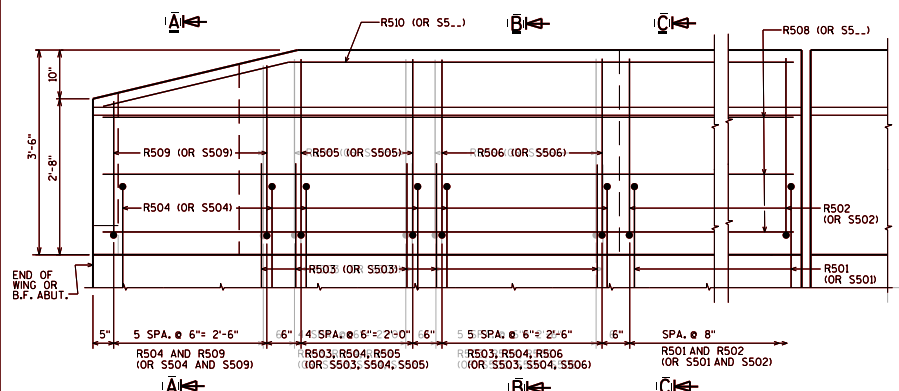
DATE: 7-19



INSIDE ELEVATION



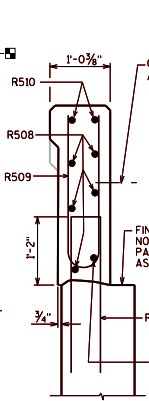
PLAN



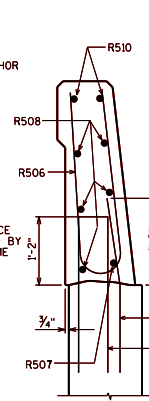
OUTSIDE ELEVATION

BENCHMARK (WHEN USED FOR PARAPET RAILING)
 BEARING AS RAILING OR MOUNTING SYSTEM WITH TAB.
 OR TAPPED SHOULDER TIGHT ON THE PARAPET.
 THE TOP OF THE PARAPET.

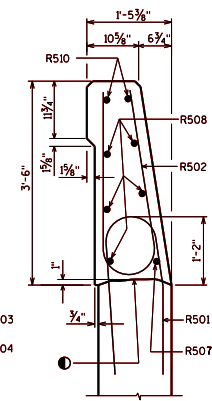
NOTE: FOR SECTIONS A, B & C ONLY
 THE PARAPET TERMINATING ON A WING
 IS SHOWN. TERMINATION ON A DECK
 IS SIMILAR.



SECTION A

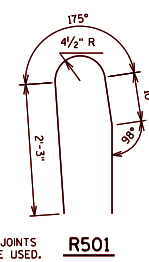


SECTION B

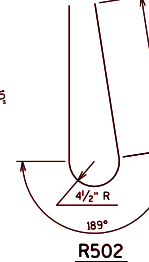


SECTION C

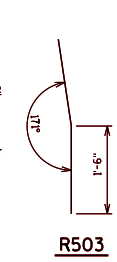
OPTIONAL CONSTRUCTION JOINTS
 IN THE PARAPETS MAY BE USED.
 RUN BAR REINF. THRU THE JOINT.
 LAP LONGIT. BARS A MIN. OF 1'-9".
 MIN. JOINT SPACING OF 80'-0".
 DEFINE CONST. JOINT WITH A 3/4" -
 V-GROOVE.



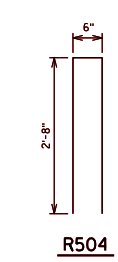
R501



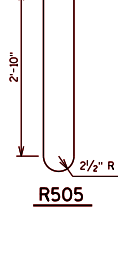
R502



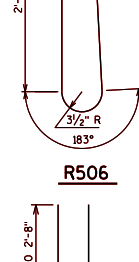
R503



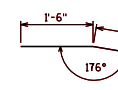
R504



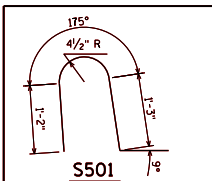
R505



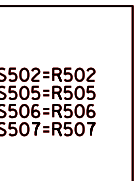
R506



R507



R510



R509

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 R503 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 R501 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-VERB.
R508	X			6-8	X	PARAPET-VERB.
R509	X			6-8	X	PARAPET-VERB.
R510	X			6-8	X	PARAPET-VERB.
R501	X			6-8	X	PARAPET-VERB.
R502	X			6-8	X	PARAPET-VERB.
R503	X			6-8	X	PARAPET-VERB.
R504	X			6-8	X	PARAPET-VERB.
R505	X			6-8	X	PARAPET-VERB.
R506	X			6-8	X	PARAPET-VERB.
R507	X			6-8	X	PARAPET-VERB.
R508	X			6-8	X	PARAPET-VERB.
R509	X			6-8	X	PARAPET-VERB.
R510	X			6-8	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
R501	1	4'-8" TO 6'-8"

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.



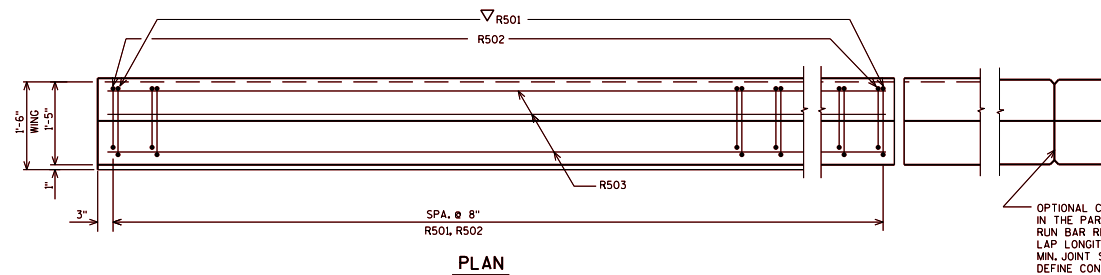
1'-5 3/4"

8 3/4"

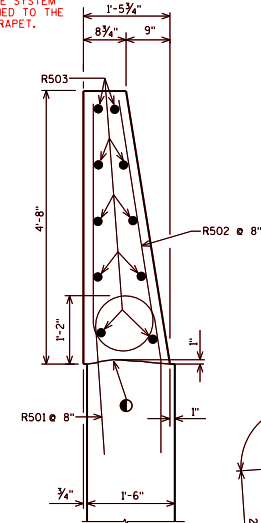
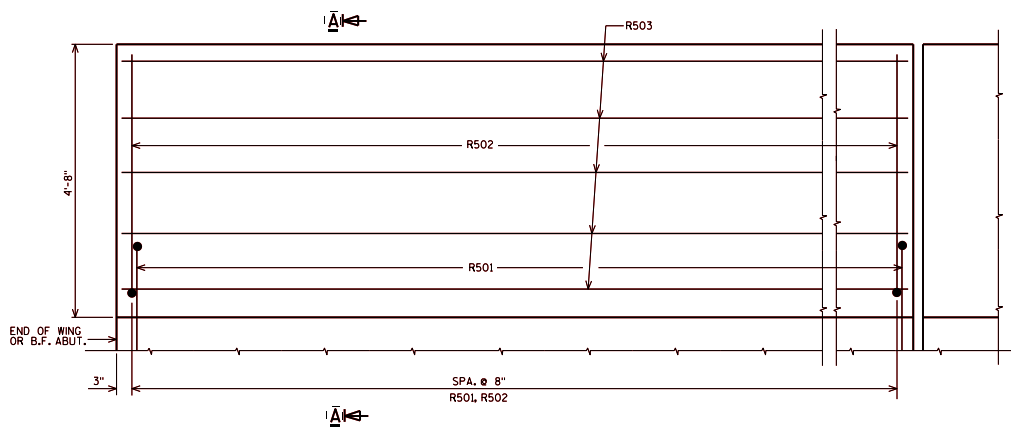
9"

INSIDE ELEVATION

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

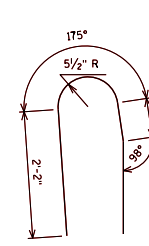
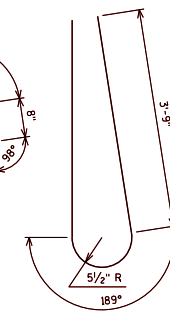


OUTSIDE ELEVATION

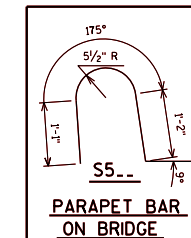


SECTION A

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.

R501

R502



PARAPET BAR
ON BRIDGE

BILL OF BARS

FOR ABUTMENT PARAPETS

[illegible]

DESIGNER NOTES

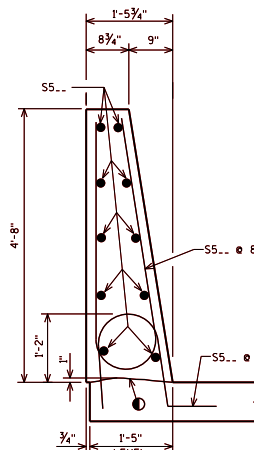
THE '56SS' PARAPET IS ONLY TO BE USED IF A 'TYPE S56'
SINGLE SLOPE CONCRETE ROADWAY BARRIER ADJOINS THE END OF
THE '56SS' PARAPET.

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.

▽ R501BARS 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
A1ABUMENTS.



SECTION THRU PARAPET ON BRIDGE

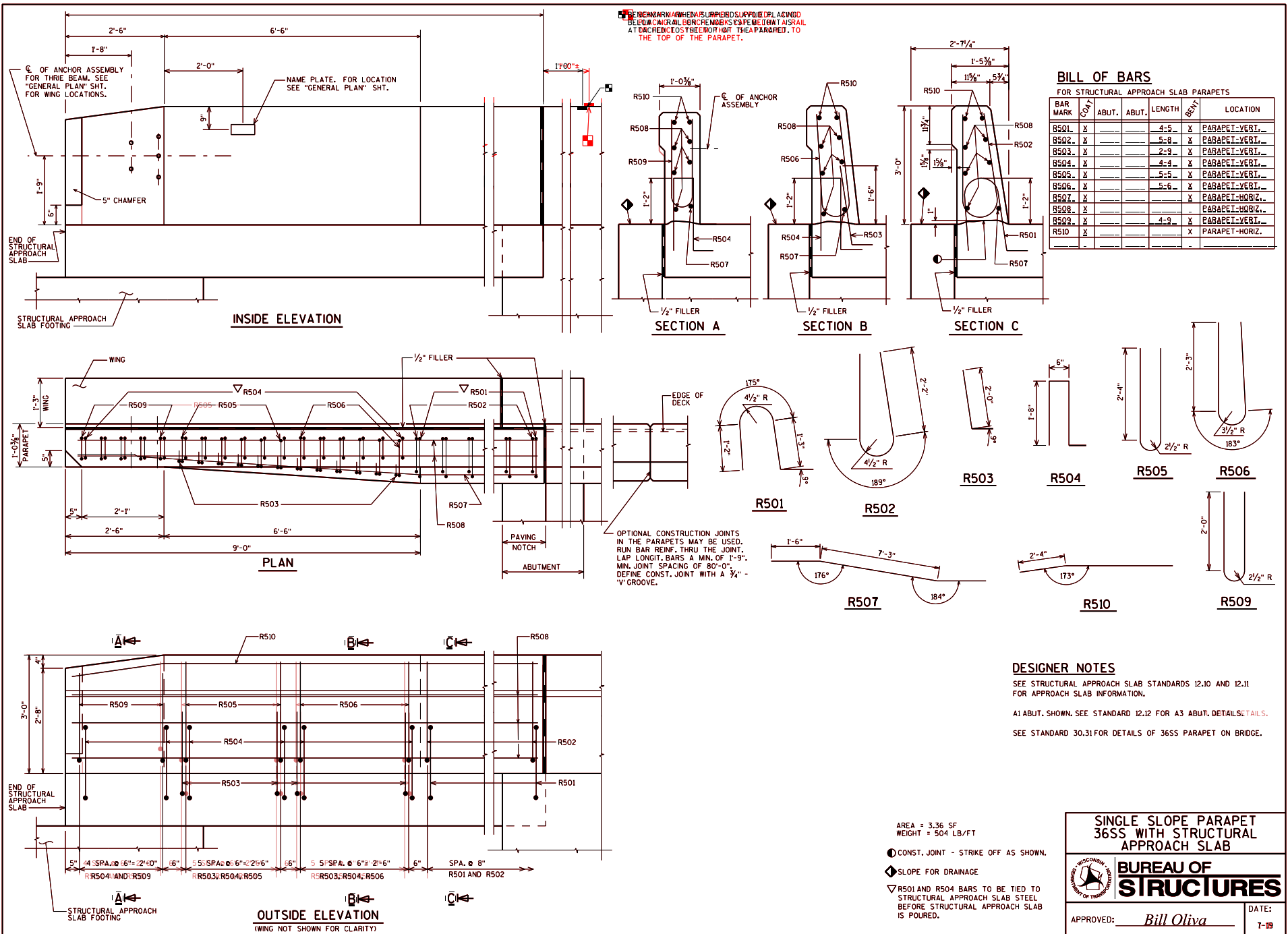
SINGLE SLOPE PARAPET 56SS

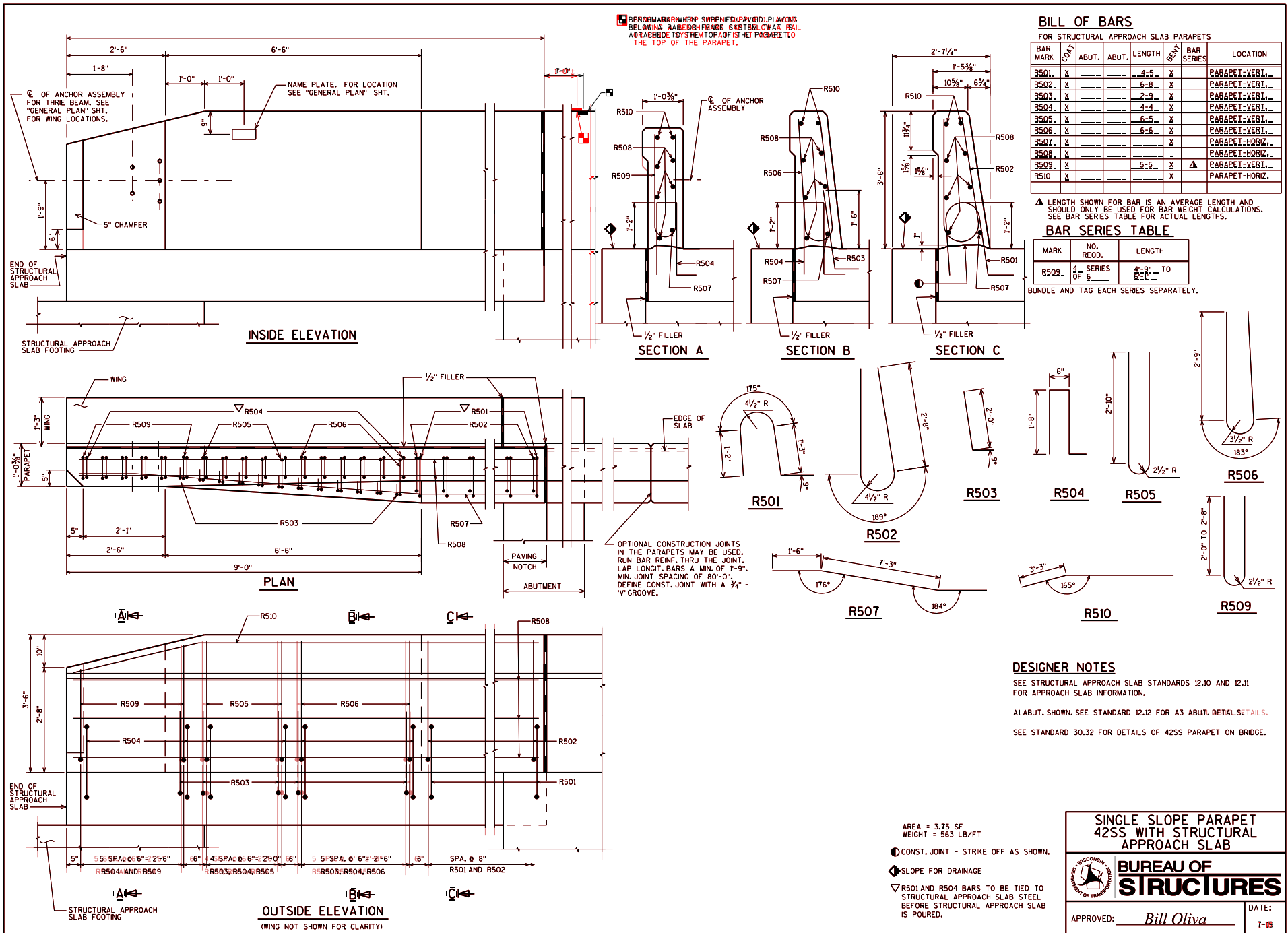


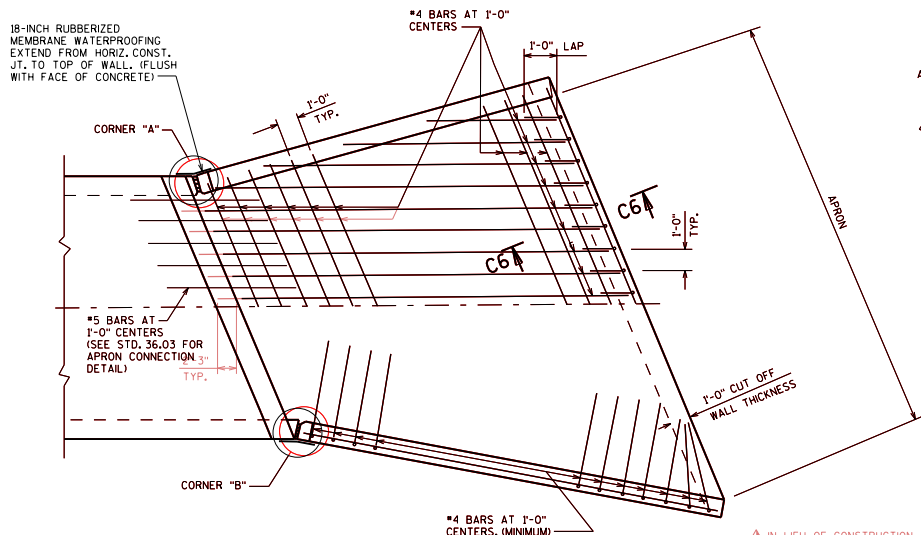
BUREAU OF STRUCTURES

APPROVED: *Bill Oliva*

DATE:

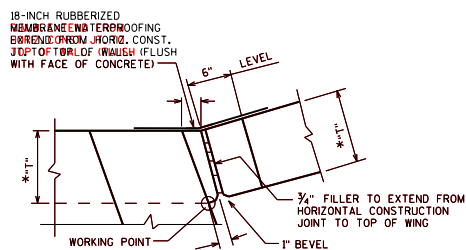






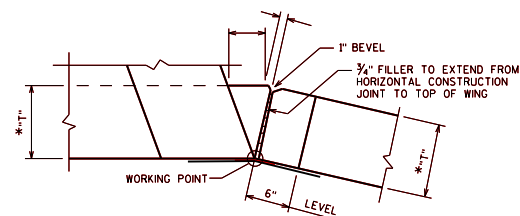
APRON DETAIL

APRON DETAIL

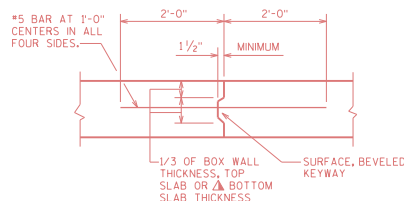


CORNER "A"

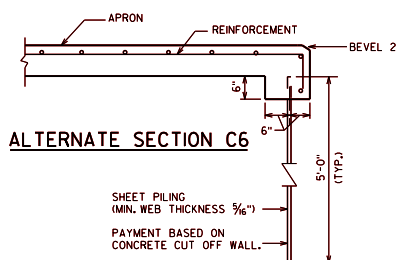
* DIMENSION "T" TO BE DETERMINED FROM BARREL DESIGN



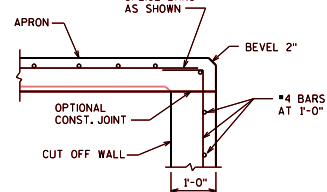
CORNER "B"



VERTICAL CONSTRUCTION JOINT



ALTERNATE CUT OFF WALL



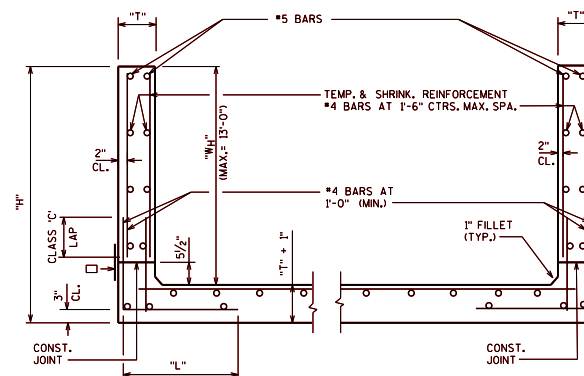
SECTION C6

"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 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 36.05 AND 36.06 FOR PRECAST CONCRETE BOX CULVERT DETAILS.

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.

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.

SEE STANDARDS 9.01 AND 36.01 FOR ADDITIONAL NOTES.

SEE STANDARDS 36.05 AND 36.06 FOR PRECAST BOX CULVERT DETAILS.

BOX CULVERT APRON DETAILS



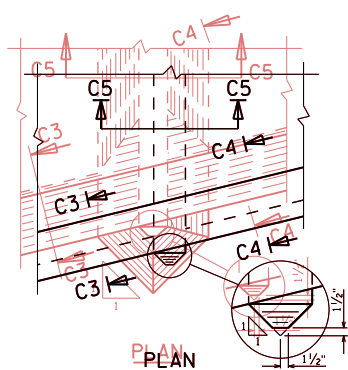
BUREAU OF
STRUCTURES

APPROVED:

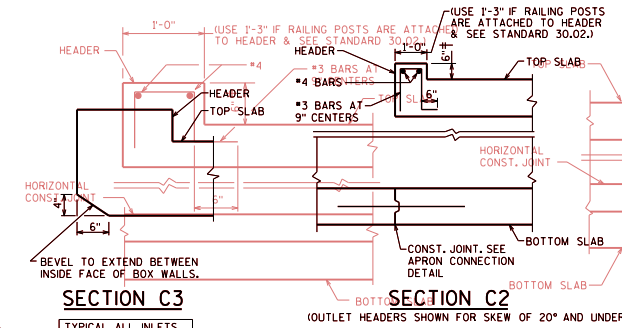
Bill Oliva

DATE:

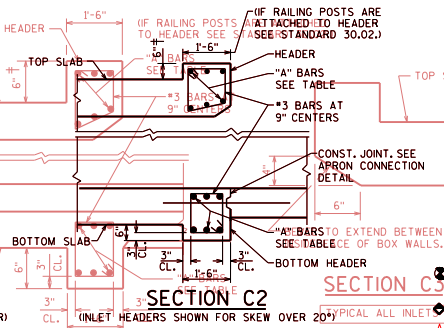
1-21



PLAN



SECTION C3
TYPICAL ALL INLETS



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

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

* HEADER LENGTH EQUALS THE DISTANCE BETWEEN C. OF WALLS IN ONE CELL 7'-0" MEASURED ALONG THE SKEW.

DESIGNER NOTES

SEE BRIDGE MANUAL SECTION 36.2 FOR ADDITIONAL REQUIREMENTS FOR PEDESTRIAN UNDERPASSES AND CATTLEPASSES.

DETAIL NOT ALLOWED WHEN HAUNCHES ARE REQUIRED OR FOR PEDESTRIAN UNDERPASSES, OMIT 1" FILLET IF ALTERNATIVE CONSTRUCTION JOINT IS USED.

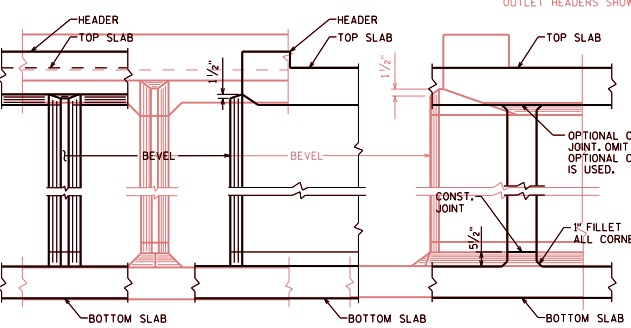
† = 1'-0" MIN. FOR PEDESTRIAN UNDERPASSES AND SLABS WITH DEPTH OF FILLS < 2'-0"

★ = 6/2" MIN. OTHERWISE

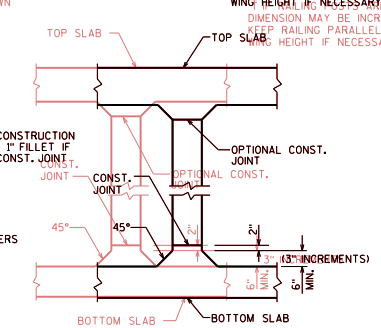
☆ TOP BARS FOR TOP SLAB:
- FOR + < 10' WITH DEPTH OF FILLS > 2'-0": BARS NOT REQUIRED
- FOR + > 10': #4 AT 1'-6" MAX. EACH DIRECTION
- FOR PEDESTRIAN UNDERPASSES: #4 AT 1'-6" MAX. EACH DIRECTION
- FOR SLABS WITH DEPTH OF FILLS < 2'-0": #4 AT 1'-0" MAX. EACH DIRECTION. USE CLASS "C" LAPS

▲ USE "SHEET MEMBRANE WATERPROOFING FOR TOP SLAB C-1" (516.0610.5) FOR PEDESTRIAN UNDERPASSES. INCLUDE THE FOLLOWING NOTE:

SHEET MEMBRANE WATERPROOFING REQUIRED UP WALLS & ACROSS TOP SLAB FOR ENTIRE CULVERT LENGTH. EXTEND 6" MIN. BELOW THE TOP OF BOTTOM SLAB.



ELEVATION SECTION C4



SECTION C5

HAUNCH DETAIL

HAUNCH DETAIL (PROVIDE HAUNCH DETAIL ONLY WHEN AND WHEN REQUIRED AS PER DESIGN)

INLET NOSE CENTERWALL DETAILS

1" FILLET MAY BE REQUIRED FOR HYDRAULIC PURPOSES.

TYPICAL ALL INLETS

1" FILLET MAY BE REQUIRED FOR HYDRAULIC PURPOSES.

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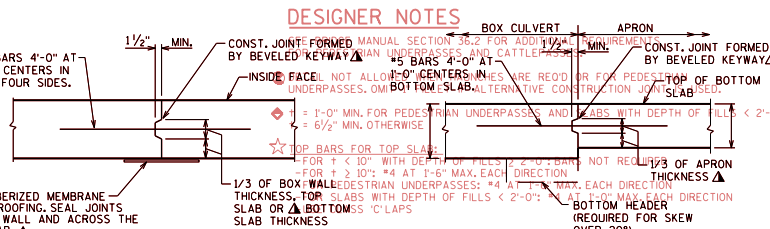
1" FILLET MAY BE REQUIRED FOR HYDRAULIC PURPOSES.

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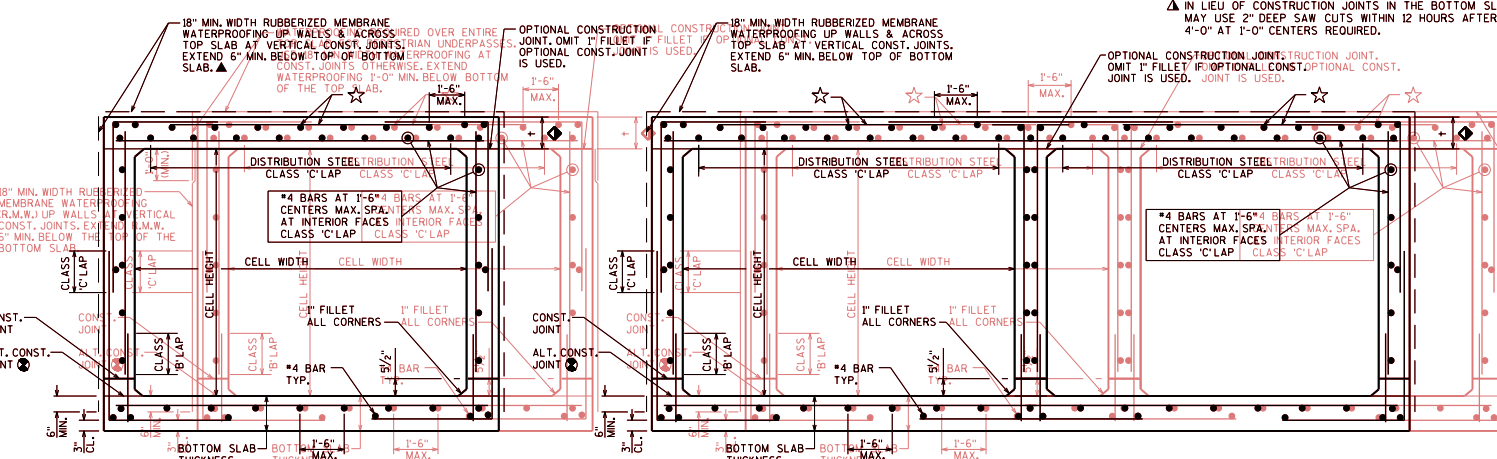
1" FILLET MAY BE REQUIRED FOR HYDRAULIC PURPOSES.



VERTICAL CONSTRUCTION JOINT

APRON CONNECTION DETAIL

▲ IN LIEU OF CONSTRUCTION JOINTS IN THE BOTTOM SLAB, THE CONTRACTOR MAY USE 2" DEEP SAW CUTS WITHIN 12 HOURS AFTER POURING. #5 BARS 4'-0" AT 1'-0" CENTERS REQUIRED.



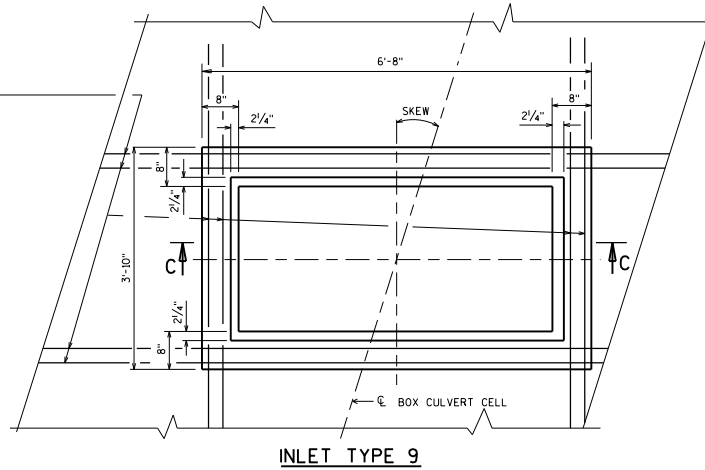
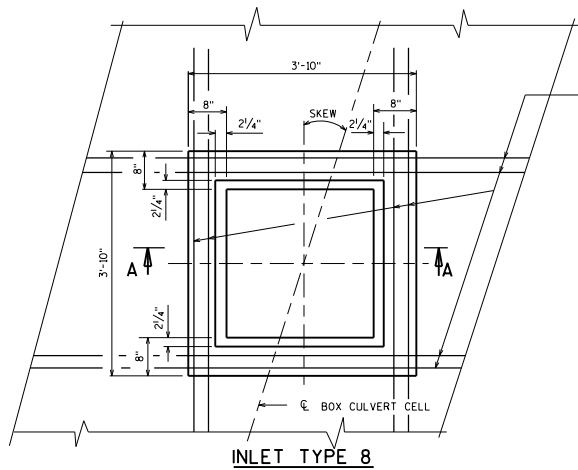
SECTION THRU BOX HRU BOX
SINGLE CELL BOX SINGLE CELL BOX

SECTION THRU BOX HRU BOX
TWIN CELL BOX TWIN CELL BOX

BOX CULVERT DETAILS



APPROVED: Bill Oliva DATE: 7-20



MEDIAN INLET PLAN
(INLET COVER NOT SHOWN)

NOTES

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

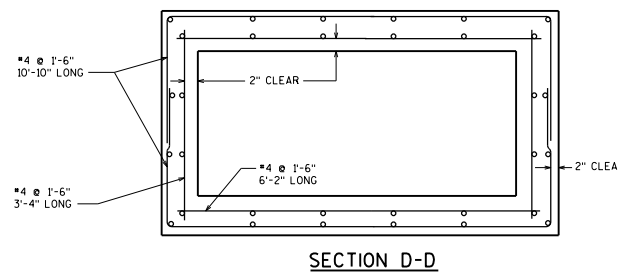
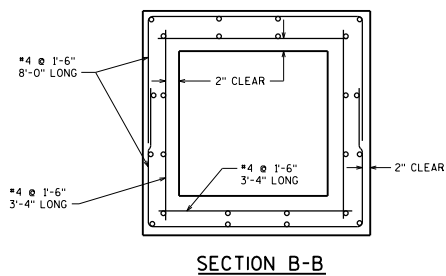
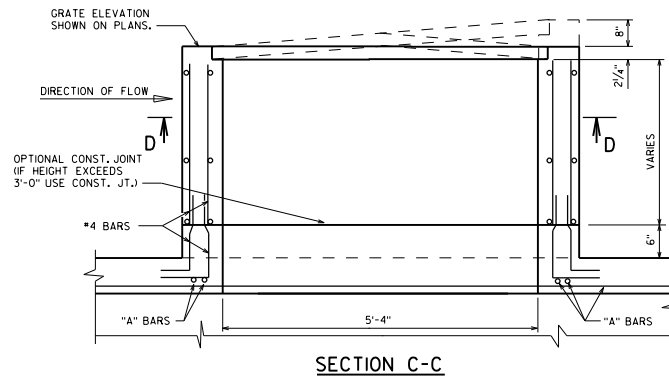
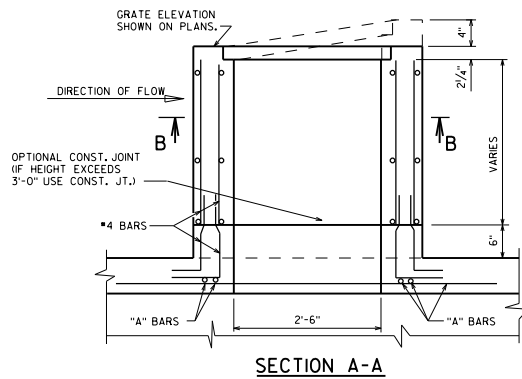
ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF MORTAR AND BRICK. MAXIMUM ADJUSTMENT SHALL BE 8".

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..



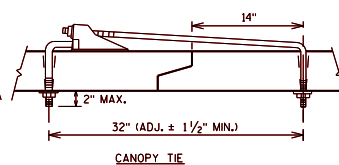
**BOX CULVERT MANHOLE
FOR INLET TYPE 8 & 9**

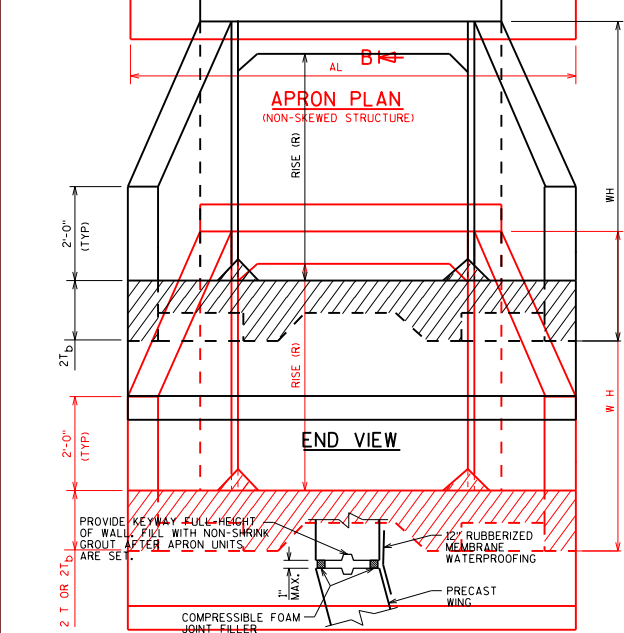


**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16

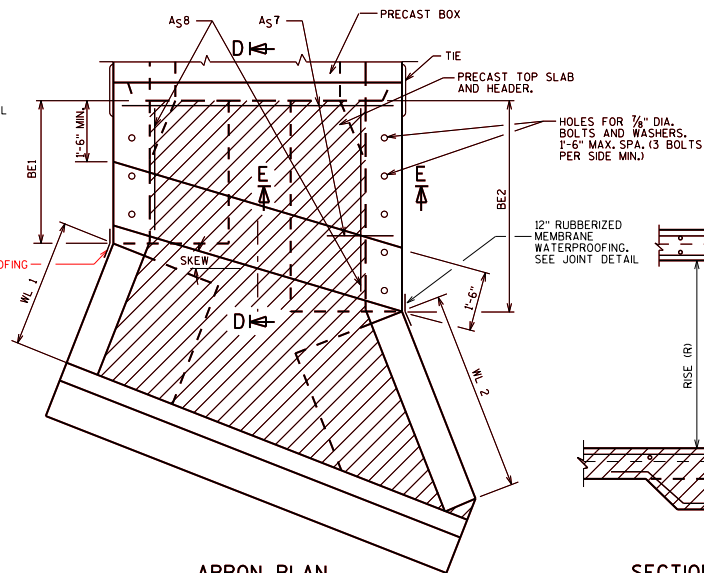




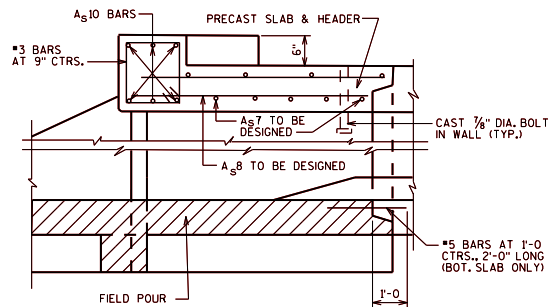
JOINT DETAIL

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

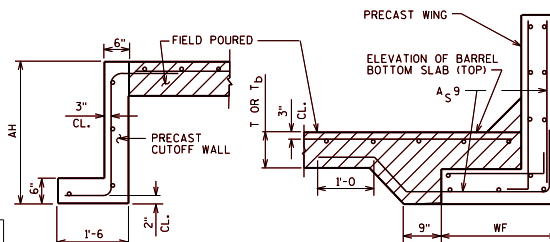
BOX CULVERT APRON DATA

[illegible]

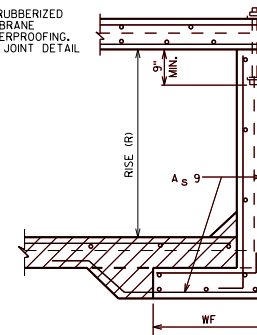
APRON PLAN
(SKEWED STRUCTURE)



SECTION D-D



SECTION B-B

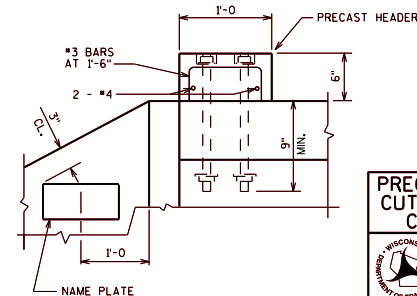


SECTION E-E

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

		S(FT.)	R.(FT.)	T OR T ₅ (IN)	SKEW	ANGLE	DESIGNER'S NOTE:	HA	WH	BE1	BE2
T	INLET						PROVIDE "BOX CULVERT APRON DATA" TABLE ON CONTRACT PLANS WHEN A PRECAST ONLY DESIGN IS				
	OUTLET						PROVIDED.				

SPAN (S)	A 430 BARS		
	0°-15°	16°-30°	31°-45°
6'-0"	(6b = 86)	(6) = 96	(6) = 96
7'-0"	(6b = 86)	(6) = 96	(6) = 97
8'-0"	(6b = 86)	(6) = 97	(6) = 98
10'-0"	(6b = 97)	(6) = 98	(6) = 98



SECTION C-C

NOTES

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

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

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

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

THE MINIMUM CONCRETE STRENGTH OF THE CONCRETE IN THE PRECAST 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 A₅₁₀ BARS, SHALL BE #5.

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

ALL EXPOSED CORNERS SHALL BE BEVELED $\frac{3}{4}$ " ON THE SIDES OR TOOL EDGED WITH A $\frac{1}{2}$ " MINIMUM RADIUS EDGER.

PRECAST CUT OFF WALLS MAY BE FIELD SPICED BY EXTENDING THE REINFORCING STEEL FROM BOTH SEGMENTS TO BE SPICED 1'-6" INTO THE SPICE ZONE, LAPPING THE STEEL $\pm$ 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.

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



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

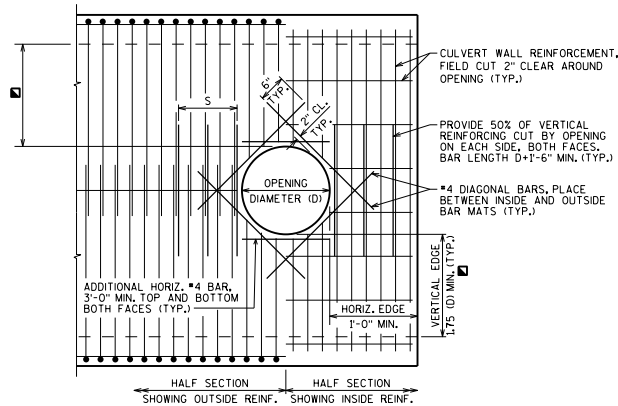
DATE: 7-26

NOTES

ALL BAR STEEL REINFORCEMENT SHALL BE CUT 2" CLEAR AROUND OPENING.

DESIGNER NOTES

DETAILS SHOWN ARE FOR CAST-IN-PLACE CULVERTS. PRECAST CULVERT DETAILS TO BE SIMILAR.



ELEVATION

WHEN D ≤ 1'-6" S = 1'-6"
WHEN D > 1'-6" S = 1'-6" MIN, D MAX

PIPE OPENING IN CULVERT WALL	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	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), 5" (center), 1/4" (bottom).
- Bottom edge dimensions: 1" (left), 1'-0" (center), 1/4" (right).
- Left edge dimensions: 8 1/2" (top), 1" (bottom).
- Top-left corner: 1/8" DIA. HOLE (TYP.)
- Top-right corner: 1/4" * (weld symbol)
- Center: C/L POST & BASE PLATE
- Bottom-right corner: 5/16" * 3 PASS WELD * (weld symbol)
- Bottom-left corner: * 1/4" (weld symbol)

1/8" DIA. HOLE (TYP.)

3" 7" 3"

4 1/2" 5"

4 1/2" 6" 6"

2 1/2"

Diagram illustrating a vertical pipe with a $\frac{3}{4}$ " DIA. HOLE. The hole is positioned 14" from the top and 14" from the bottom. An arrow indicates the DIRECTION OF TRAFFIC flow from right to left.

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 S.D.D. 14 B 15-6 PLUS 6".

FOR SHORTER SPAN CULVERTS, WHERE BEAM GUARD CROSSES THE LENGTH OF THE STRUCTURE, CONSIDERATION SHALL BE GIVEN TO THE DETAILS SHOWN ON S.D.D. 14 B 43-3 PROVIDED ALL REQUIREMENTS ON THIS STANDARD CAN BE MET.

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

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

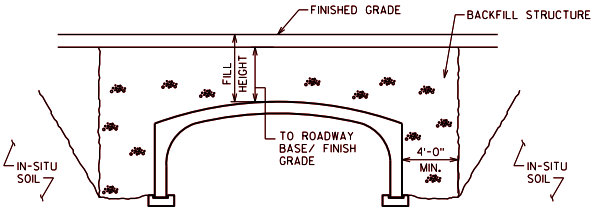
PLACE FOOTINGS BELOW SCOUR AND FROST DEPTHS. PLACE BOTTOM OF FOOTING AT A MINIMUM DEPTH EQUAL TO PREVAILING FROST DEPTH OR SCOUR DEPTH BUT NOT LESS THAN 4'-0" BELOW GROUND ELEVATION UNLESS CONSTRUCTED ON ROCK FOUNDATION OR OTHERWISE INDICATED.

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

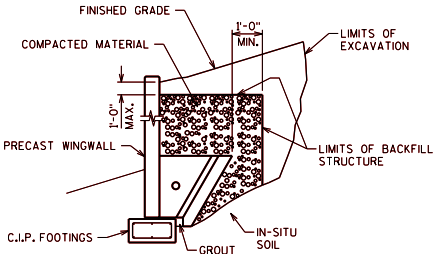
BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.

LRFD DESIGN LOADS

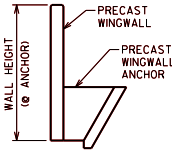
LIVE LOAD: HL-93
HORIZONTAL EARTH PRESSURE: UNIT WEIGHT = 125 PCF
VERTICAL EARTH PRESSURE: UNIT WEIGHT = 120 PCF



BACKFILL REQUIREMENTS



WALL BACKFILL REQUIREMENTS



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

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

PRECAST THREE-SIDED BOX
CULVERT DESIGN NOTES

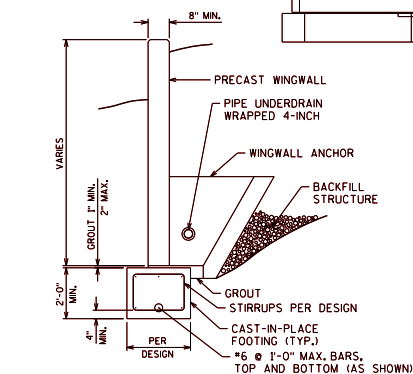
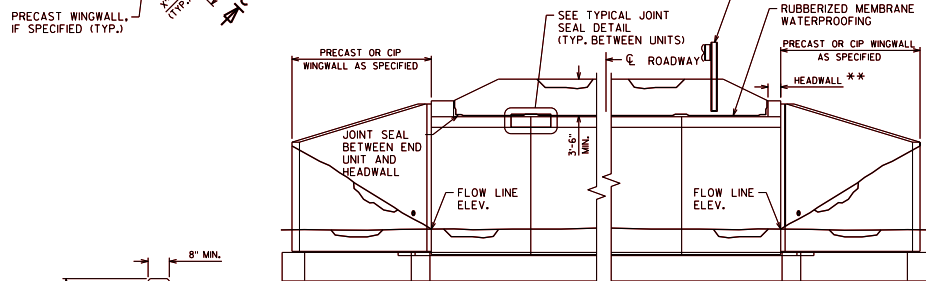
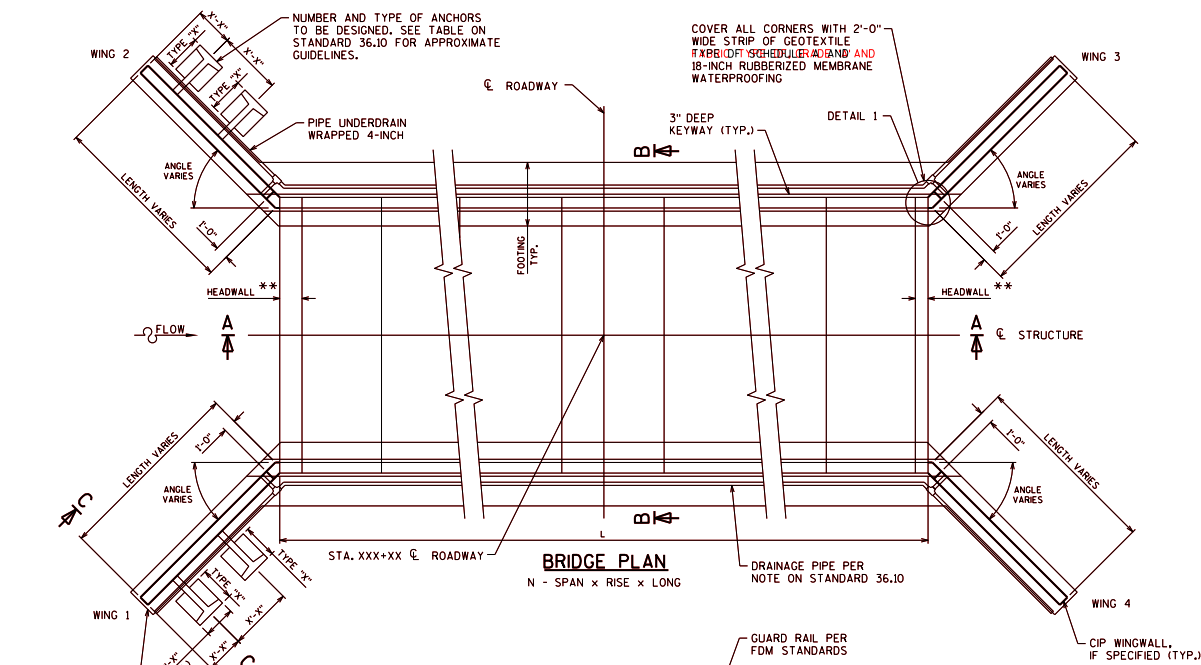


**BUREAU OF
STRUCTURES**

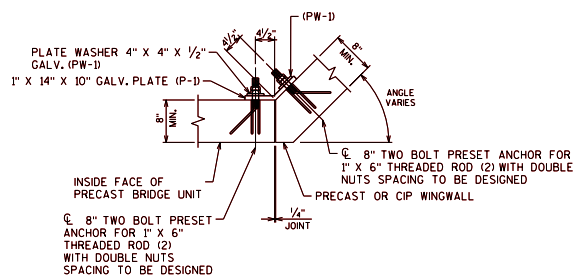
APPROVED: Bill Oliva

DATE:

1-18



SECTION C



DETAIL 1

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

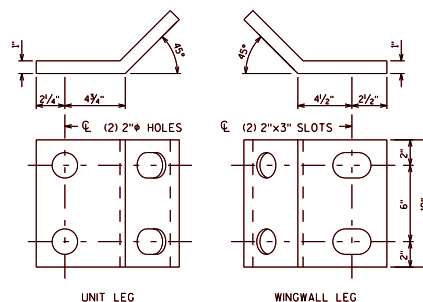


PLATE P-1

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

GENERAL NOTES:

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

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

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

PROVIDE CONCRETE COVER ON REINFORCING BARS AS NOTED HEREIN.

CHAMFER EXPOSED CONCRETE EDGES $3/4" \times 3/4"$ EXCEPT AS NOTED.

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

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

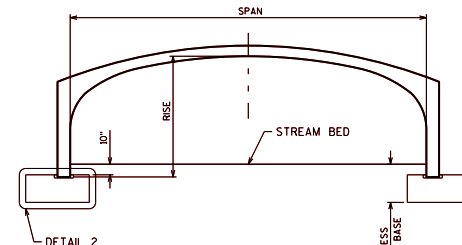
AT ANY TIME DURING PLACEMENT OF THE BACKFILL, DO NOT PERMIT A DIFFERENCE IN FILL ELEVATION ON THE SIDES OF THE CULVERT BARREL IN EXCESS OF 2'-0". DURING COMPACTION OF THE BACKFILL, DO NOT ALLOW THE WHEELS OF ROLLERS TO COME CLOSER THAN 1'-0" TO THE FACE OF THE OF THE STRUCTURE.

DESIGNER NOTES:

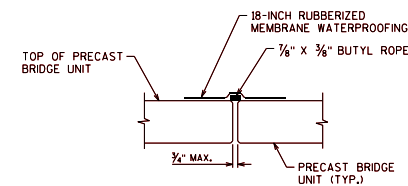
ALL BAR SPLICES TO BE "CLASS C" TENSION LAP SPLICES.

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

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



SECTION B



TYPICAL JOINT SEAL DETAIL

PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS



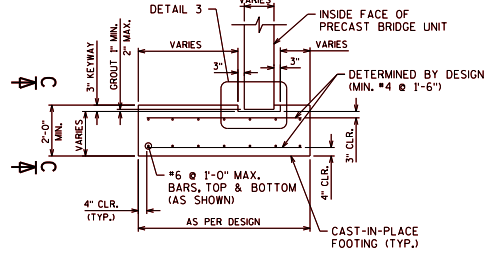
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

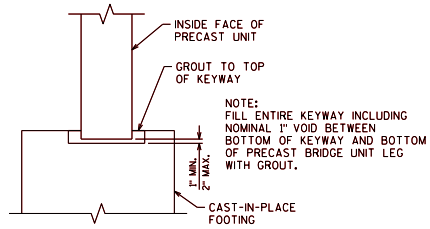
DATE:

7-18

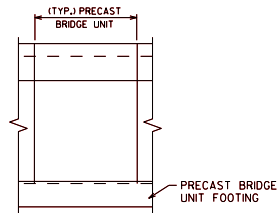
SPREAD FOOTING SHOWN, OTHER FOUNDATION TYPES POSSIBLE. (FOR PEDESTAL WALL, PILE AND BASE SLAB FOUNDATIONS, "SEE OPTIONAL DETAIL 2")



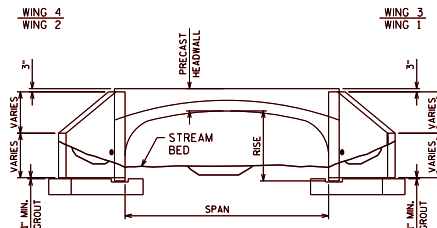
DETAIL 2



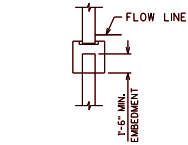
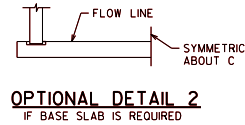
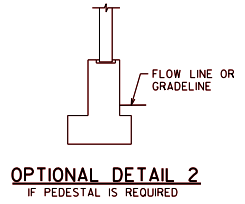
DETAIL 3



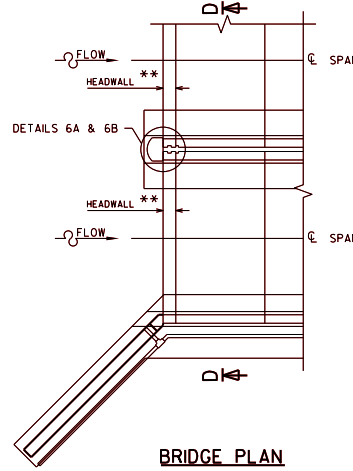
SECTION C



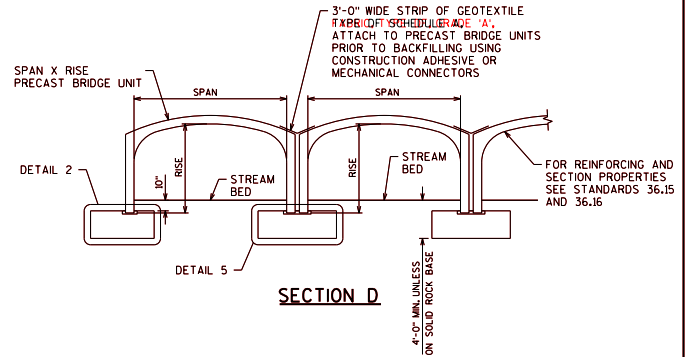
TYPICAL END ELEVATION



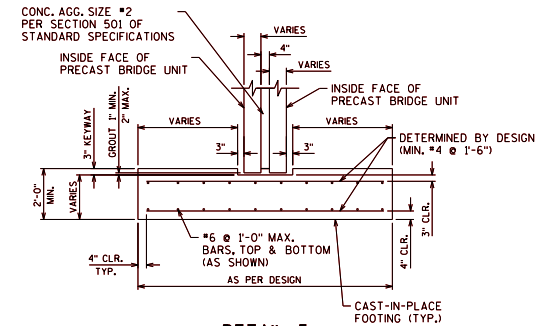
OPTIONAL DETAIL 2
IF PILES ARE REQUIRED



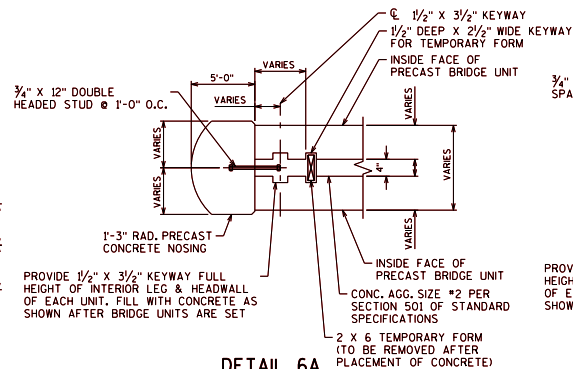
BRIDGE PLAN



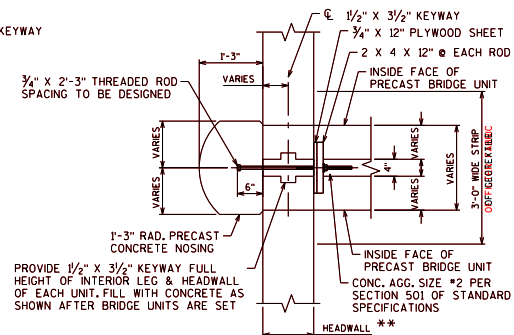
SECTION D



DETAIL 5



DETAIL 6A



DETAIL 6B

NOTES:

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

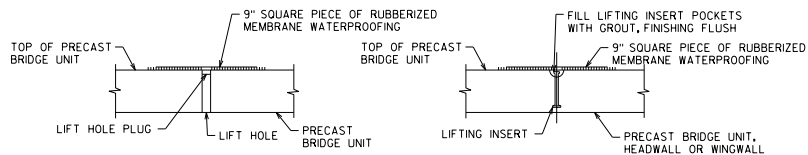
PRECAST THREE-SIDED BOX CULVERT DETAILS



BUREAU OF STRUCTURES

APPROVED: *S. Bill Dierker*

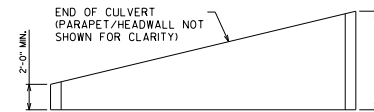
DATE: 7-18



LIFTING HOLES

LIFTING INSERTS

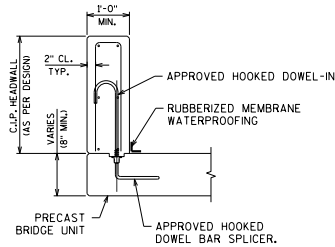
TYPICAL LIFT POINT SEALING DETAIL



SKewed UNITS

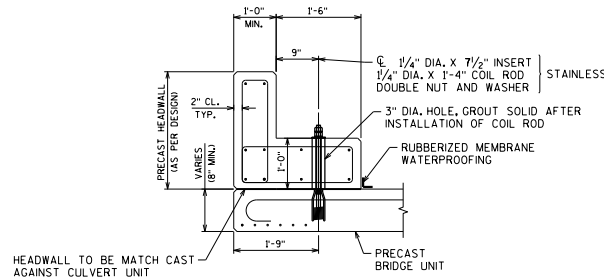
TYPICAL SKEW LIMITS PLAN VIEW - NOT TO SCALE

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



CAST-IN-PLACE HEADWALL DETAIL

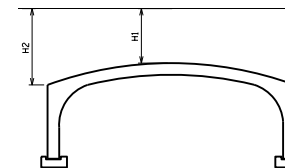
NOT TO SCALE



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

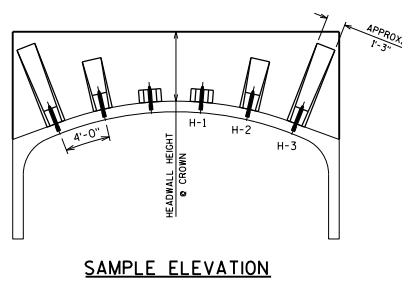
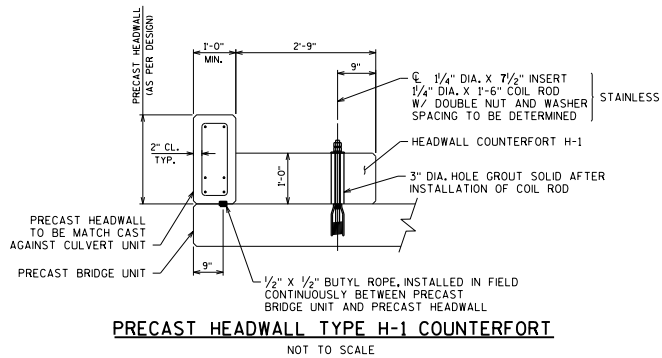
PRECAST THREE-SIDED BOX
CULVERT HEADWALL DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: Scot Becker

DATE:
1-11

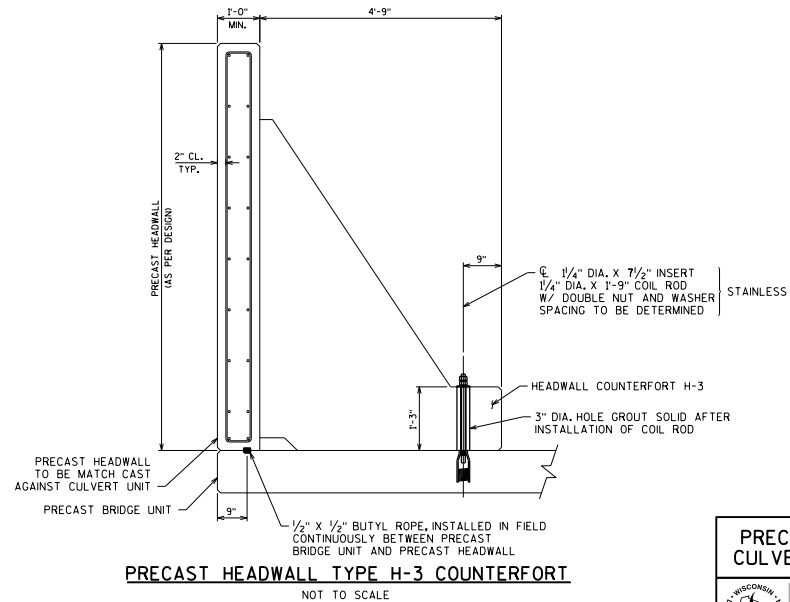
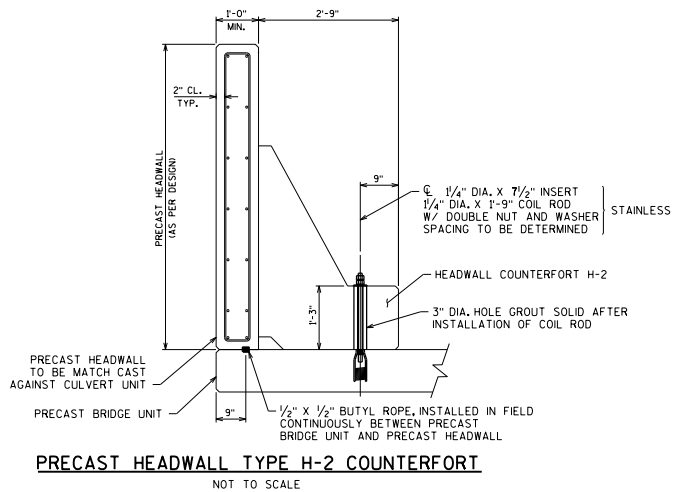


NOTE:
THE ACTUAL NUMBER AND TYPE OF
PRECAST HEADWALL COUNTERFORTS
IS TO BE DESIGNED. HOWEVER, USE
THE FOLLOWING CHART AS A
GENERAL GUIDE TO FEASIBILITY OF
COUNTERFORT USE.

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

LRFD HEADWALL COUNTERFORTS

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

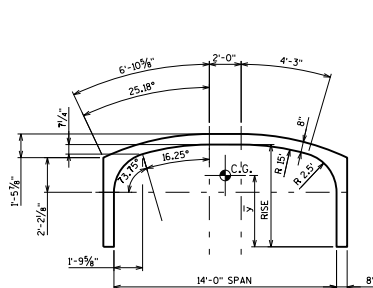


PRECAST THREE-SIDED BOX CULVERT HEADWALL DETAILS

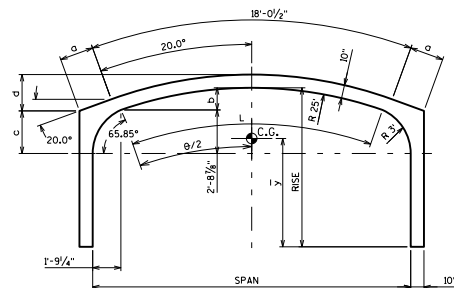


**BUREAU OF
STRUCTURES**

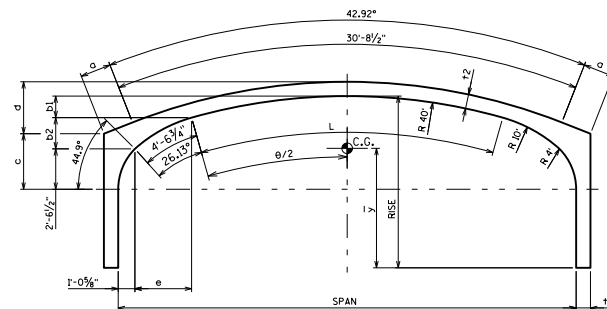
APPROVED: Scot Becker DATE: 1-11



14'-0" SPAN



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



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

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

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

	SPAN - FT				
	20	24	28	36	42
θ	38.43°	48.29°	25.30°	37.93°	47.86°
L	16.77	21.07	17.66	26.48	33.41
a	2.13	4.25	0.00	4.48	4.48
b	1.39	2.19			
b1			0.97	2.17	3.50
b2			1.96	2.40	2.75
c	2.68	2.75	3.76	3.91	4.31
d	2.29	3.01	2.84	4.48	5.66
e			4.07	3.83	3.63
t1			1.00	1.17	1.17
t2			0.83	1.00	1.00

(REFER TO STANDARDS 36.16 FOR REINFORCING DETAILS)

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

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

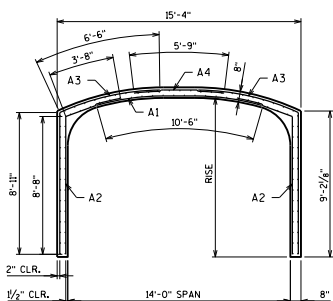
NOTE:
THESE STEEL AREAS ARE SHOWN FOR COVER OF 12'-0" OR LESS.

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

**BUREAU OF
STRUCTURES**

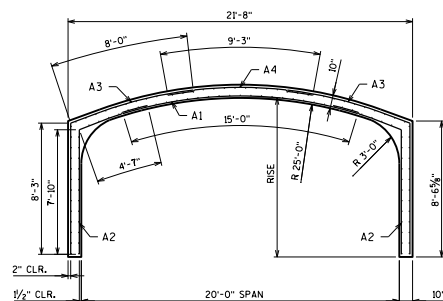
APPROVED: Scot Becker

DATE:
1-11



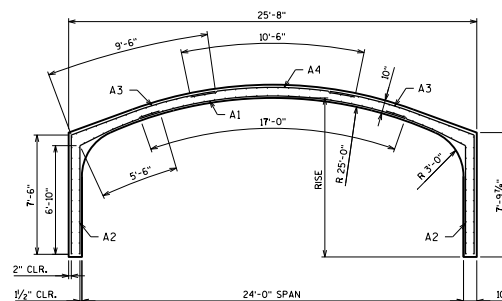
14'-0" SPAN

RISE = 10'-0" **SEE NOTE



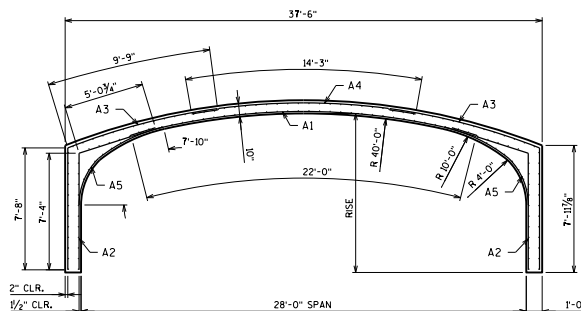
20'-0" SPAN

RISE = 10'-0" **SEE NOTE



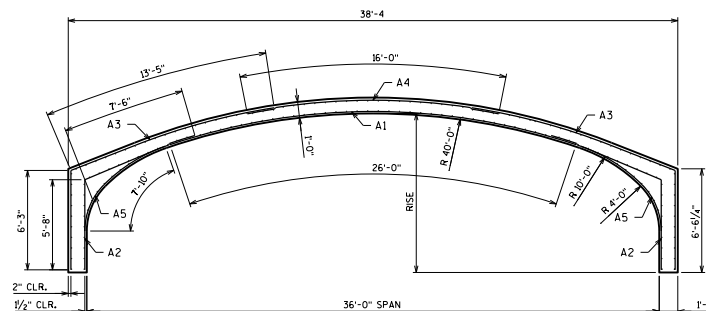
24'-0" SPAN

RISE = 10'-0" **SEE NOTE



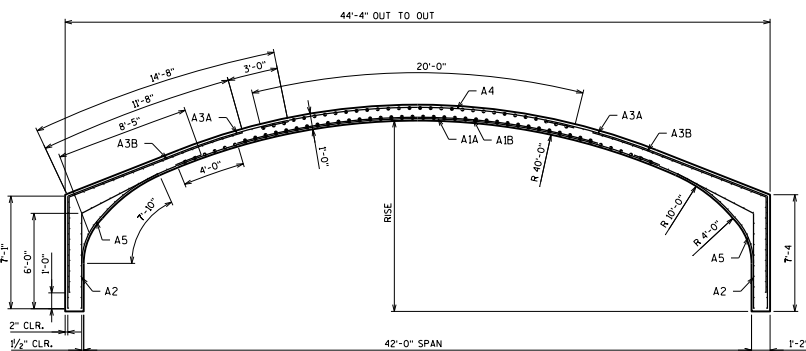
28'-0" SPAN

RISE = 10'-0"



36'-0" SPAN

RISE = 10'-0"



42'-0" SPAN

RISE = 12'-0"

NOTES:

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

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

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

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

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

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

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

MINIMUM COVER FOR WILDED WIRE FABRIC: 1-INCH

DESIGN DATA:

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

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

ARCH UNIT LONGITUDINAL REINFORCEMENT (MINIMUM)							
14'-0" SPAN				20'-0" SPAN			
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"	

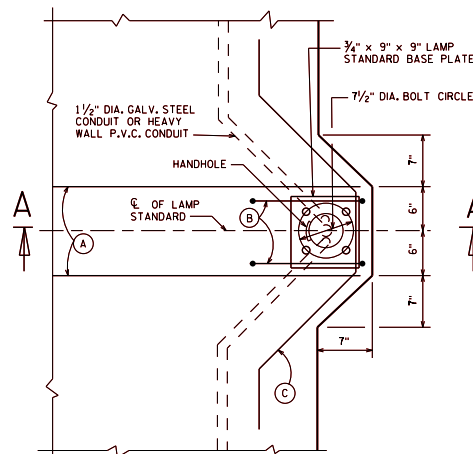
PRECAST THREE-SIDED BOX
CULVERT REINFORCEMENT



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

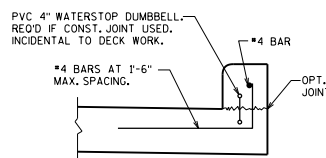
DATE:
7-14



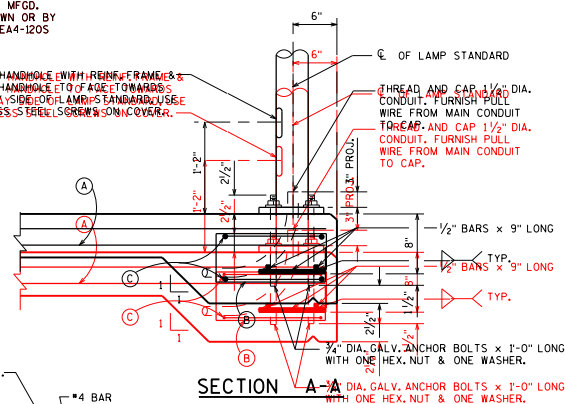
(A) 4 - #5 BARS 4'-6" LONG
 (B) 2 - #4 BARS 4'-3" LONG
 (C) 2 - #4 BARS 5'-9" LONG

— GALV. STEEL DAVIT POLE ROUND
4.43" x 3.17" #11 GAGE AS MFGD.
BY UNION METAL AS SHOWN OR BY
MILLERBERND MODEL NO. EA4-120S
OR AN APPROVED EQUAL

SEE STANDARD 30.11 FOR ADDITIONAL "DESIGNER NOTES".



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

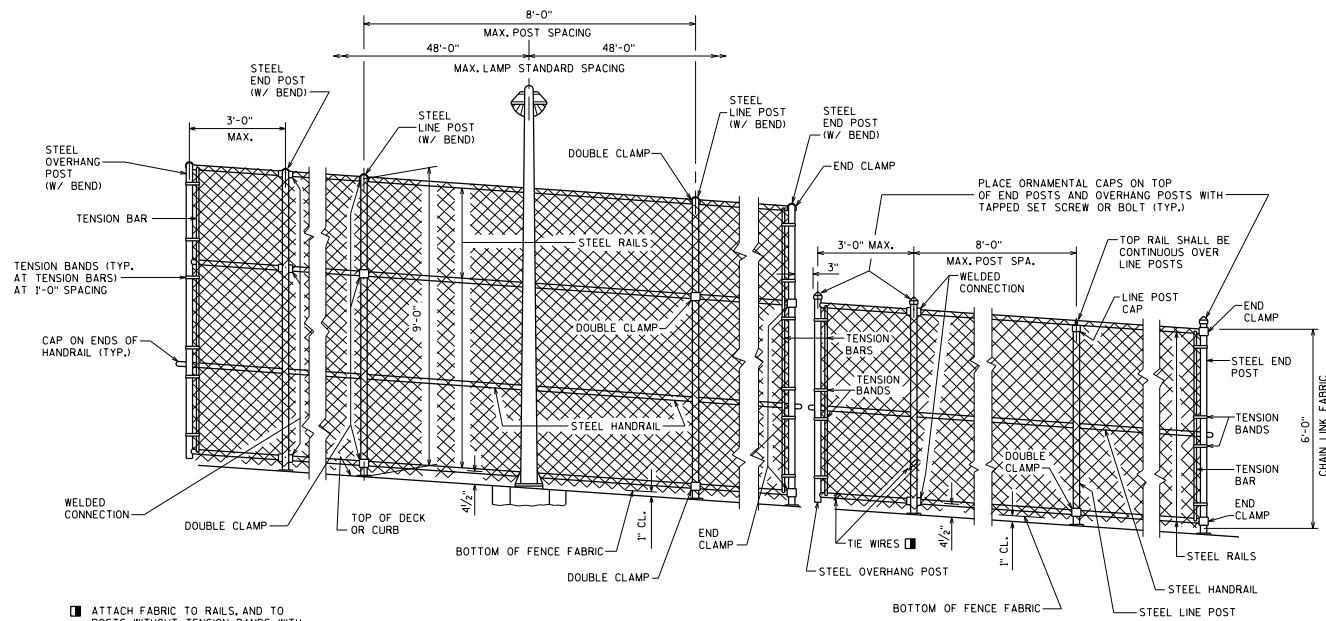


SECTION A-A

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

BUREAU OF STRUCTURES

7-25

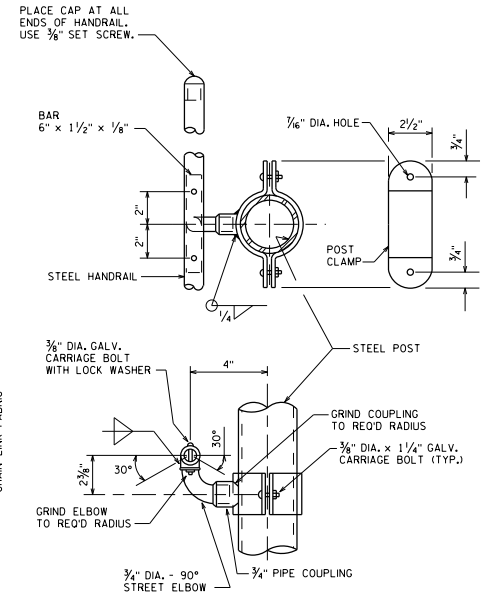


ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH TIE WIRES (ROUND, 9-GAGE) SPACED AT 1'-0".

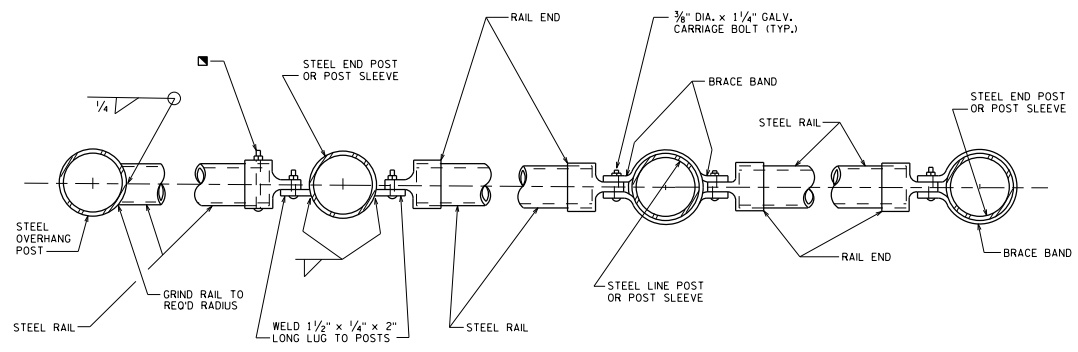
AT LAMP STANDARD

AT EXPANSION JOINT

ELEVATION OF FENCE



HANDRAIL DETAILS



WELDED CONNECTION (AT OVERHANG SECTION)

* DOUBLE CLAMP

END CLAMP

PLAN OF RAILING

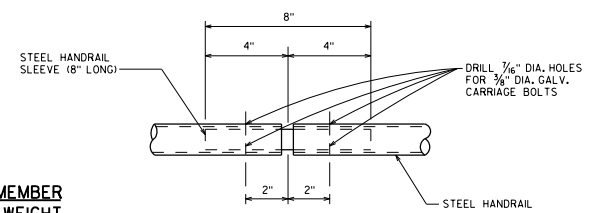
BOLT RAIL TO RAIL END TO SECURE OVERHANG SECTION. ALTERNATE IS TO WELD RAIL DIRECTLY TO END POST.

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



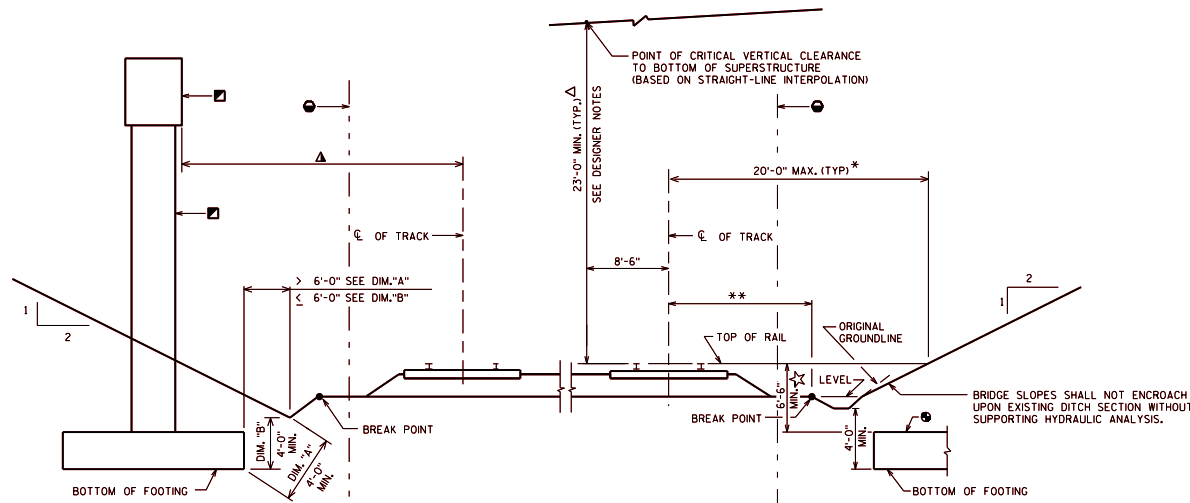
HANDRAIL SPLICE

PEDESTRIAN OVERPASS DETAILS

BUREAU OF STRUCTURES

APPROVED: Scot Becker

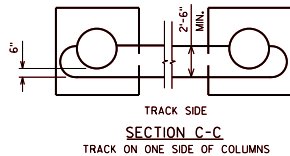
DATE: 7-10



RAILROAD IN FILL

RAILROAD CROSS SECTIONS

RAILROAD IN CUT

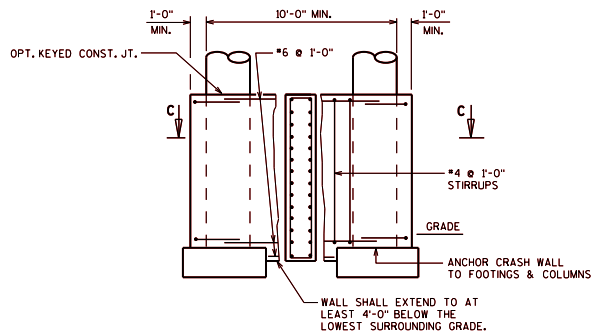


SECTION C-C

TRACK ON ONE SIDE OF COLUMNS

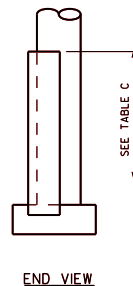
	PIER LOCATION	HEIGHT OF CRASH WALL ABOVE TOP OF RAIL
GENERAL AREMA REQUIREMENT	PIERS $\leq 12'-0"$ FROM ϕ TRACK	12'-0"
	PIERS 12'-0" TO 25'-0"	6'-0"
CP RAIL REQUIREMENT	PIERS $< 15'-0"$ FROM ϕ TRACK	12'-0"
	PIERS $\geq 15'-0"$ TO 25'-0"	8'-0"

TABLE C

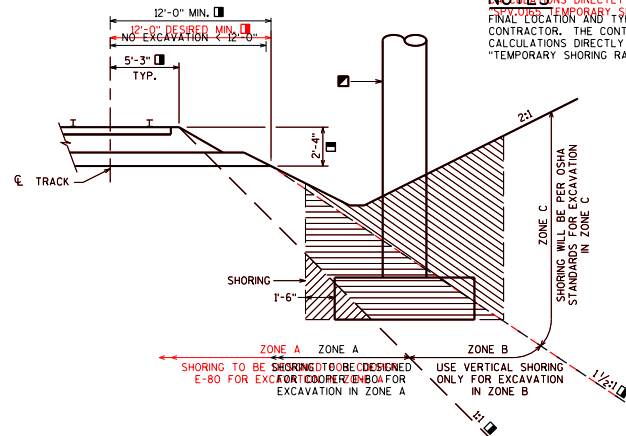


ELEVATION

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. SHORING SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS.

★ BNSF AND UP RAILROADS REQUIRE A DEPTH OF FOOTING AND MIN. PERMITS 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. THE 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". THE 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

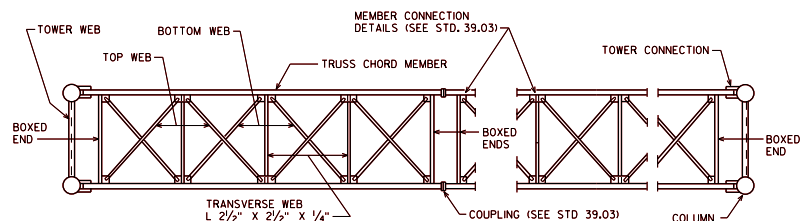
HIGHWAY OVER RAILROAD DESIGN REQUIREMENTS



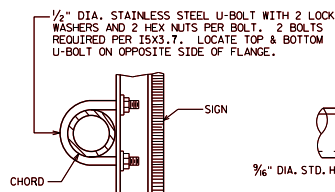
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

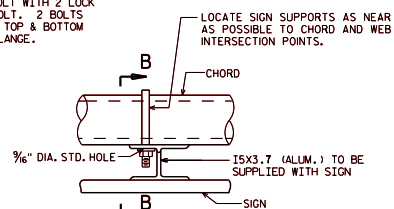
DATE: 7-17



PLAN

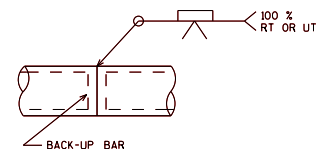


SECTION B-B

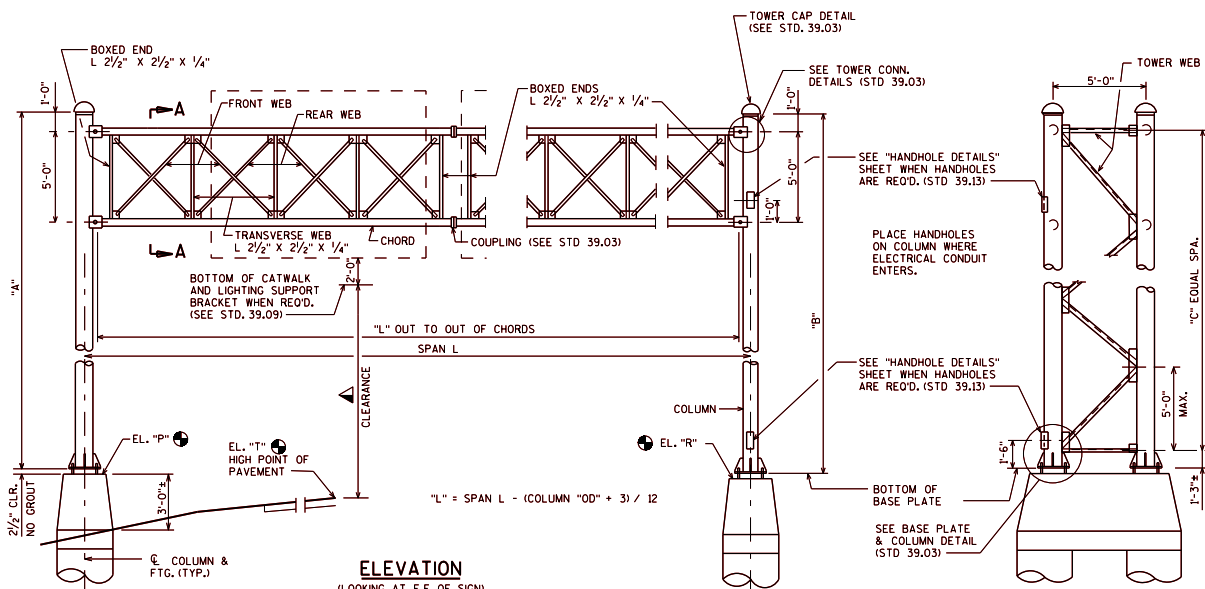


TYPICAL SIGN CONNECTION

USE FOR TYPE I AND II SIGNS ONLY



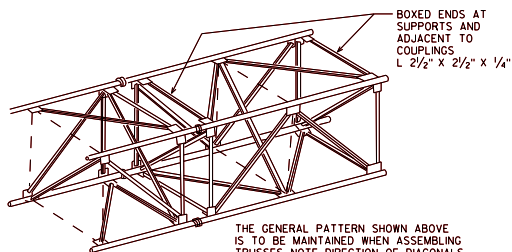
CHORD SPLICE



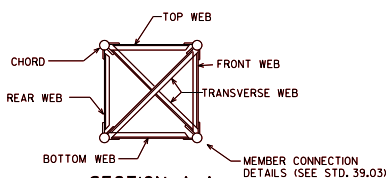
ELEVATION

(LOOKING AT F.F. OF SIGN)

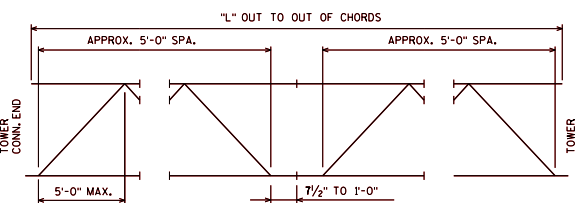
END VIEW



TYPICAL TRUSS SECTION



SECTION A-A



TRUSS ARRANGEMENT

FABRICATOR MAY MAKE TRUSSES ANY LENGTH KEEPING A SECTION A MINIMUM OF 20'-0" & A MULTIPLE OF 5'-0". CHORD FIELD SPLICES SHALL BE MADE WITH COUPLINGS. CHORD SHOP SPLICE SHALL BE THE WELDED SPLICE SHOWN ABOVE.

NOTES

DRAWINGS SHALL NOT BE SCALED.

STEEL COLUMN AND CHORD PIPES SHALL BE API SPEC. 5L GRADE X42 $F_y = 42,000 \text{ PSI}$

PLATES, BARS & STRUCTURAL ANGLES SHALL BE ASTM A709 GRADE 36 $F_y = 36,000 \text{ PSI}$

STEEL ANCHOR RODS SHALL MEET THE REQUIREMENTS OF ASTM F1554 GRADE 55, ASTM A563A HEAVY HEX NUTS, AND ASTM F436 WASHERS.

UNLESS DETAILED OTHERWISE IN THE PLANS, ALL H.S. BOLTED CONNECTIONS SHALL BE MADE WITH 3/4" DIA. A325 GALVANIZED BOLTS. FIELD CONNECTIONS SHALL BE INSTALLED WITH DTI WASHERS.

ALL STRUCTURAL STEEL MEMBERS, PLATES, ANCHOR RODS, H.S. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

WELDED CONNECTIONS CAN BE USED IN LIEU OF BOLTED CONNECTIONS, IF A TRUSS UNIT CAN BE GALVANIZED IN ONE PIECE.

WELD TEST AS PER AWS D11.

EXACT LOCATION OF SIGN BRIDGE SHALL BE DETERMINED BY THE REGION TRAFFIC ENGINEER.

SEE SIGN PLATE NO. A4-6 OF THE SIGN PLATE MANUAL FOR INSTRUCTION ON CENTERING SIGN VERTICALLY ON TRUSS.

** AN ALTERNATE MATERIAL MAY BE SUBSTITUTED, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION. SEE SECTION 39.3 IN THE BRIDGE MANUAL FOR ACCEPTABLE MATERIAL.

☉ ELEVATIONS TO BE SHOWN ON "GENERAL LAYOUT" SHEET.

▲ 20'-0" MIN. FOR OSOW HIGH CLEARANCE ROUTE, 18'-3" MIN. FOR ALL OTHERS.

DESIGN DATA

DEAD LOAD - 3 PSF OF SIGN, WT. OF SUPPORTING STRUCTURE, CATWALK, LIGHTS AND RAILINGS.
ICE LOAD - 3 PSF TO 1 FACE OF SIGN & AROUND SURFACE OF MEMBERS.
WIND PRESSURE - 90 MPH (3-SECOND GUST SPEED) TO SIGN AREA & EXPOSED MEMBERS.
FATIGUE GROUP LOAD IS APPLIED PER SECTION 39.4.2 OF THE WISDOT BRIDGE MANUAL.

DESIGNED ACCORDING TO THE 6TH EDITION OF AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS."

STANDARDS 39.03, 39.09, AND 39.13 DETAILS ARE USED WITH THIS STANDARD TO DETAIL A "4-CHORD GALVANIZED STEEL SIGN BRIDGE" FOR TYPE I AND II SIGNS ONLY.

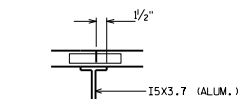
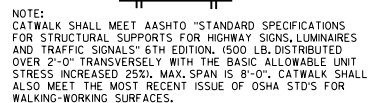
4-CHORD GALVANIZED STEEL SIGN BRIDGE



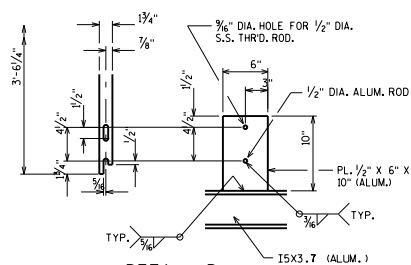
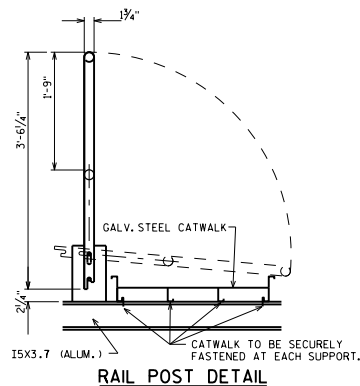
BUREAU OF STRUCTURES

APPROVED: Bill Oliva

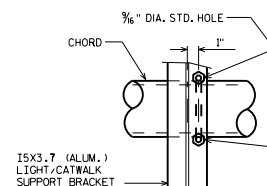
DATE:
7-18



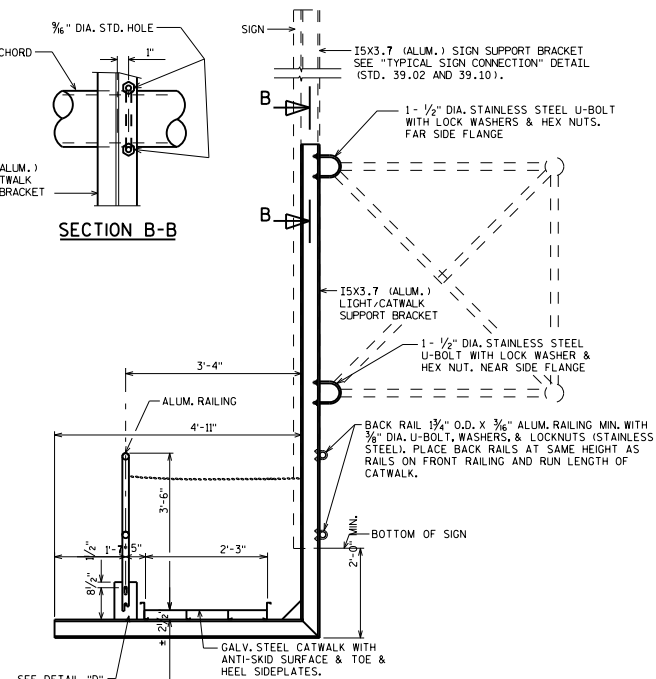
CATWALK SPLICE
LOCATION DETAIL



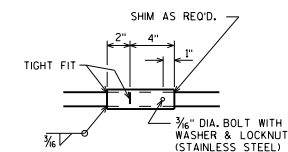
DETAIL "D"



SECTION B-B

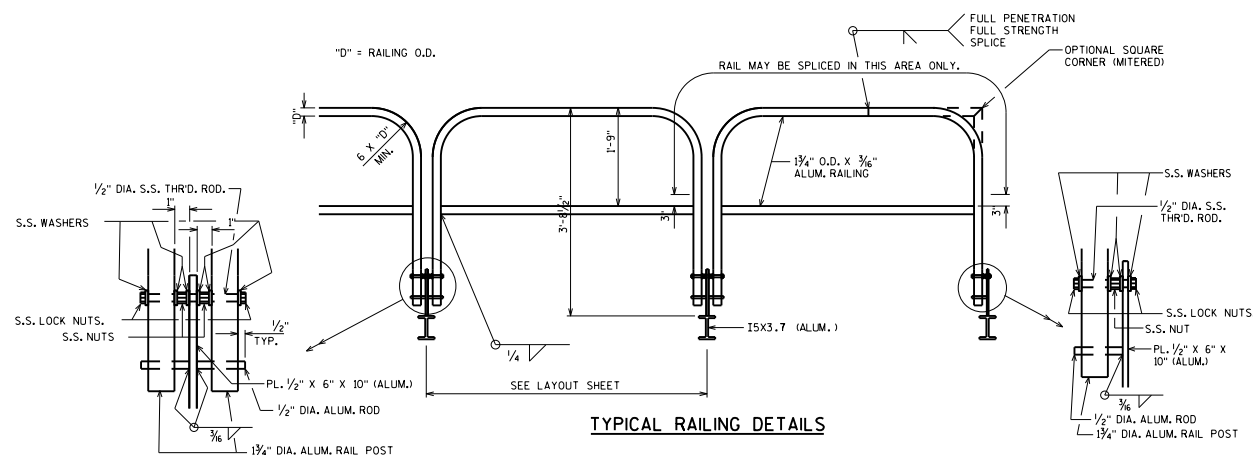


SECTION THRU WALKWAY

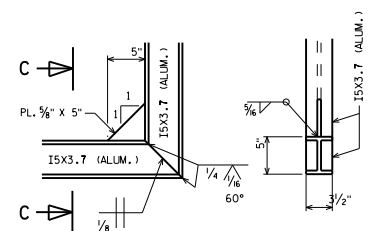


BACKRAIL SPLICE

ONE SPLICE ALLOWED FOR LENGTHS OVER 30'-0"



TYPICAL RAILING DETAILS



BRACKET DETAIL

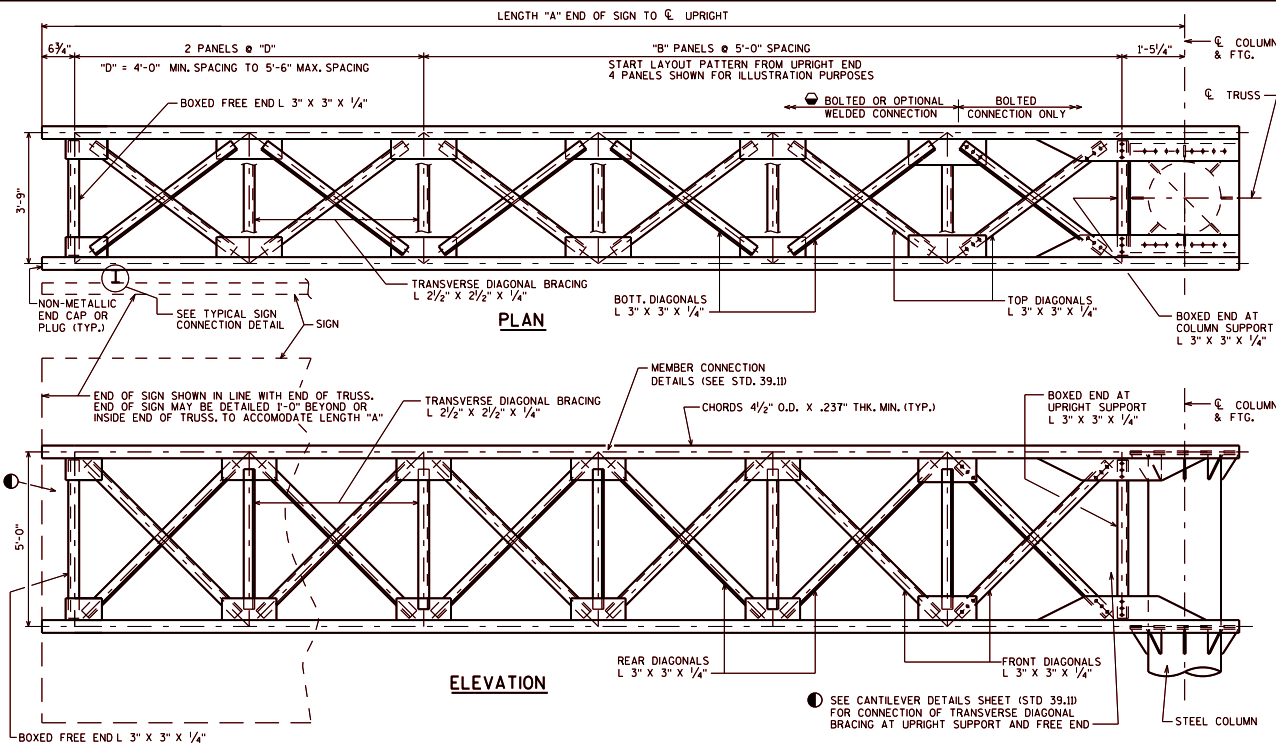
SECTION C-C

SIGN BRIDGE CATWALK
FOR TYPE I AND II SIGNS



APPROVED: *Bill Oliva*

DATE:	7-16
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NOTES

DRAWINGS SHALL NOT BE SCALED.

STEEL COLUMN AND CHORD PIPES SHALL BE API SPEC. 5L GRADE X42, PSL-2, $F_y = 42,000$ PSI**

PLATES, BARS & STRUCTURAL ANGLES SHALL BE ASTM A709 GRADE 36, $F_y = 36,000$ PSI

STEEL ANCHOR RODS SHALL MEET THE REQUIREMENTS OF ASTM F1554 GRADE 55, ASTM A563A HEAVY HEX NUTS, AND ASTM F436 WASHERS.

UNLESS DETAILED OTHERWISE IN THE PLANS, ALL H.S. BOLTED CONNECTIONS SHALL BE MADE WITH 3/4" DIA. A325 GALVANIZED BOLTS. FIELD CONNECTIONS SHALL BE INSTALLED WITH DTI WASHERS.

ALL STRUCTURAL STEEL MEMBERS, PLATES, ANCHOR RODS, H.S. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

WELD TEST AS PER AWS D11.

EXACT LOCATION OF SIGN BRIDGE SHALL BE DETERMINED BY THE REGION TRAFFIC ENGINEER.

PREFABRICATE CAMBER INTO THE HORIZONTAL SUPPORT PROVIDING AN AMOUNT "Y" AT END OF TRUSS SHOWN IN "CAMBER DIAGRAM". DO NOT RAKE VERTICAL UPRIGHT BY ADJUSTMENT OF LEVELING NUTS.

SEE SIGN PLATE, NO. 44-6 OF THE SIGN PLATE MANUAL FOR INSTRUCTION ON CENTERING SIGN VERTICALLY ON TRUSS.

** ARE ALL REPAIRS TO MATERIALS IN THIS SUBSECTION, UNLESS APPROVED BY THE TRUSTEES DEVELOPMENT/ISSUED UNDER SECTION 39.39 OF THE BRIDGE MANUAL FOR AGRICULTURAL MATERIALS.

WELDED CONNECTIONS MAY BE USED IF UNIT CAN BE GALVANIZED IN ONE PIECE.

ELEVATIONS TO BE SHOWN ON "GENERAL LAYOUT" SHEET.

20'-0" MIN. FOR OSOW HIGH CLEARANCE ROUTE, 18'-3" MIN. FOR ALL OTHERS.

DESIGN DATA

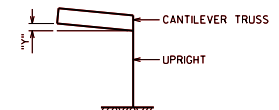
DEAD LOAD - 3 PSF OF SIGN, WT. OF SUPPORTING STRUCTURE, CATWALK, LIGHTS AND RAILINGS.
ICE LOAD - 3 PSF TO 1 FACE OF SIGN & AROUND SURFACE OF MEMBERS.
WIND PRESSURE - 90 MPH (3-SECOND GUST SPEED) TO SIGN AREA & EXPOSED MEMBERS.
FATIGUE CATEGORY 1 WITHOUT GALLOPING WIND EFFECTS.

DESIGNED ACCORDING TO THE 4TH EDITION AND INTERIM REVISIONS OF AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS."

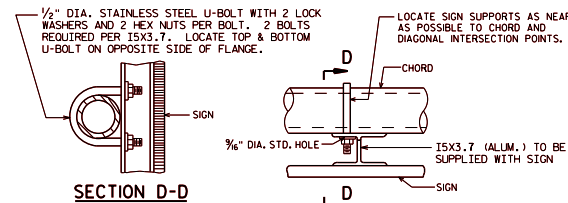
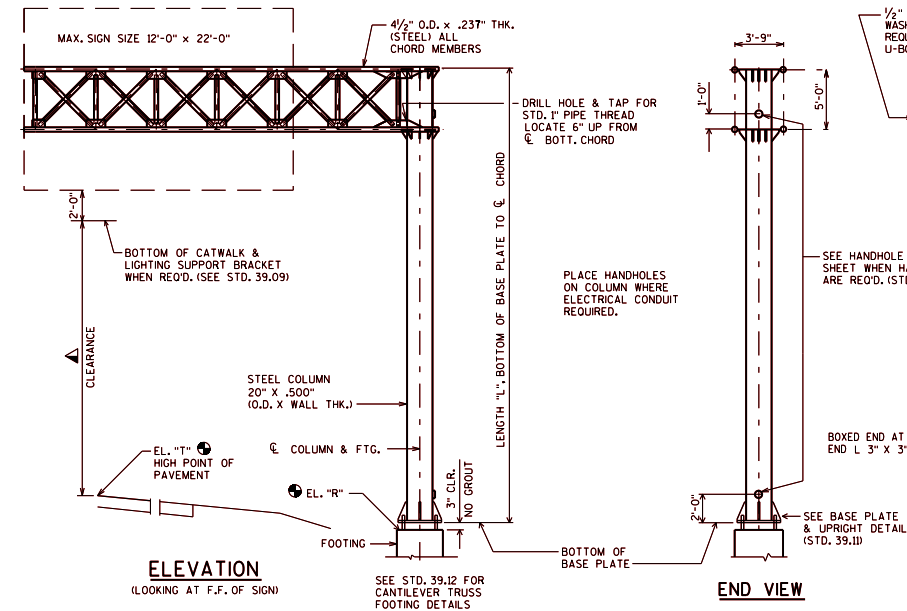
DESIGNER NOTES

CAMBER VALUES		"Y" (IN.)				
"L"	"A"	32	30	28	26	24
30	4 1/4	3 1/4	2 3/4	2 3/8	2 1/4	1 3/4
28	3 3/4	3 1/4	2 3/4	2 1/4	2 1/4	1 3/4
26	3 3/4	3	2 1/2	2 1/4	2 1/4	1 3/4
24	3 3/4	2 3/4	2 3/8	2 3/8	2	1 3/4
22	3 1/4	2 3/4	2 3/8	2 1/4	1 3/4	1 1/4

"A" & "L" IN FT.
INTERPOLATE FOR VALUES NOT SHOWN
TABLES REFLECT CATWALK LOADING. FOR CAMBER VALUES WITHOUT CATWALK LOADING, MULTIPLY TABLE VALUES ABOVE AS FOLLOWS:
MULTIPLY "Y" BY .72



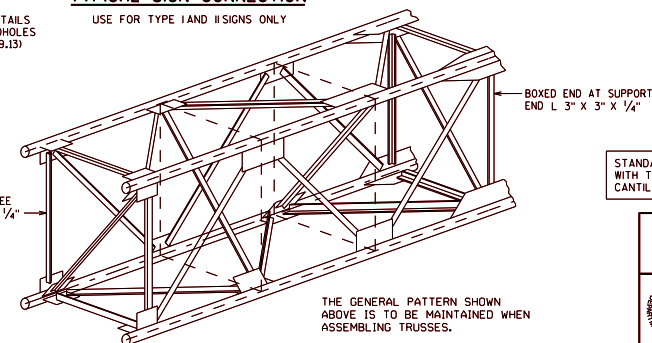
CAMBER DIAGRAM



SECTION D-D

TYPICAL SIGN CONNECTION

USE FOR TYPE I AND II SIGNS ONLY



THE GENERAL PATTERN SHOWN ABOVE IS TO BE MAINTAINED WHEN ASSEMBLING TRUSSES.

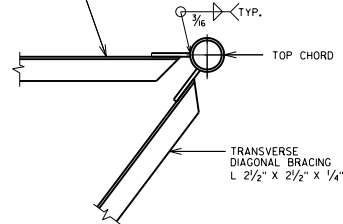
TYPICAL TRUSS SECTION

STANDARDS 39.9, 39.11, 39.12 AND 39.13 DETAILS ARE USED WITH THIS STANDARD TO DETAIL A "GALVANIZED STEEL CANTILEVER SIGN TRUSS" FOR TYPE I AND II SIGNS ONLY.

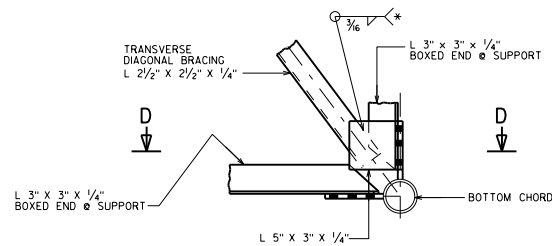
GALVANIZED STEEL CANTILEVER SIGN TRUSS	
	BUREAU OF STRUCTURES
	APPROVED: <u>Bill Oliva</u> DATE: <u>7-18</u>

TOP DIAGONAL
L 3" X 3" X 1/4"

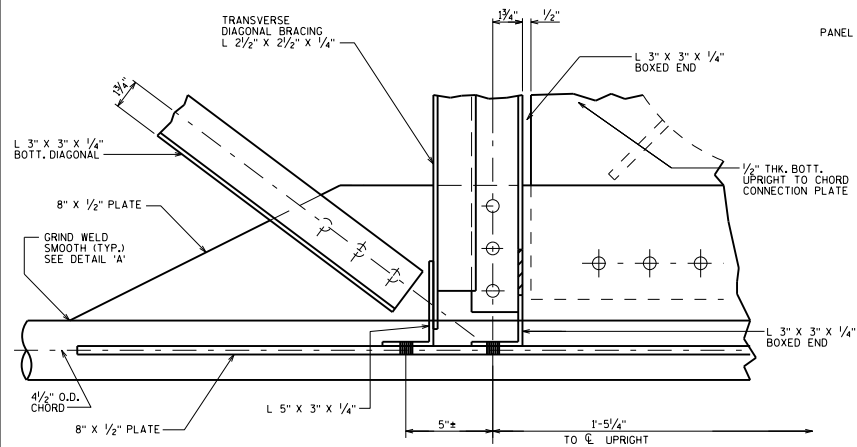
ANGLE SIZE	*WELD LENGTH (MIN.)
L 2 1/2" X 2 1/2" X 1/4"	7"
L 3" X 3" X 1/4"	8"



SECTION B-B



SECTION C-C

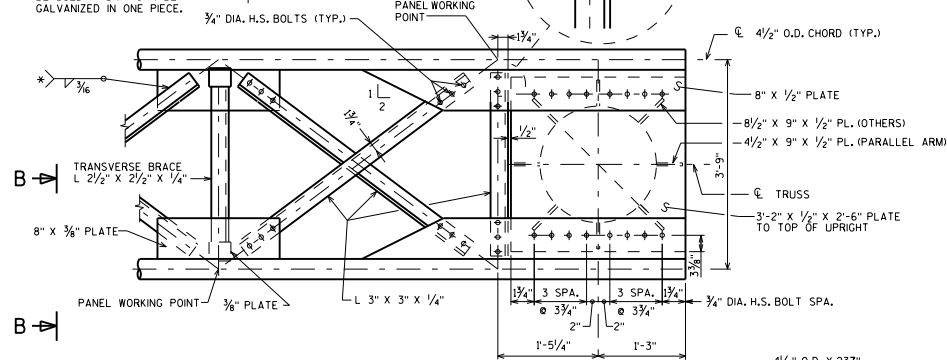


SECTION D-D

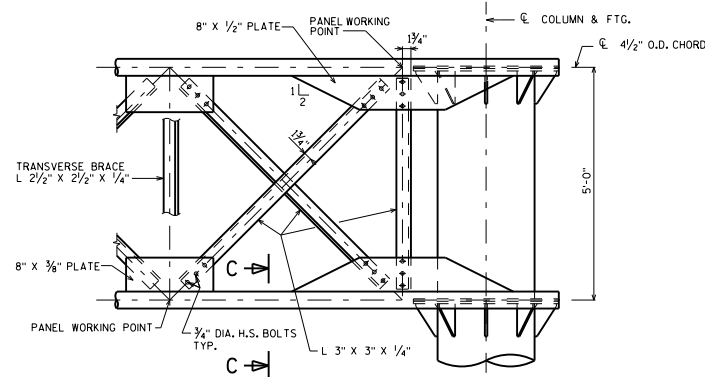
(LOOKING DOWN @ BOTT. HORIZ. PLANE @ FRONT CHORD)

● BOLTED OR OPTIONAL WELDED CONNECTION
● BOLTED CONNECTION ONLY

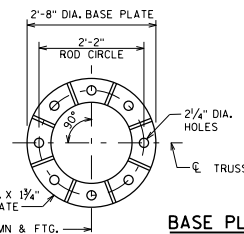
● WELDED CONNECTIONS MAY BE USED IF UNIT CAN BE GALVANIZED IN ONE PIECE.



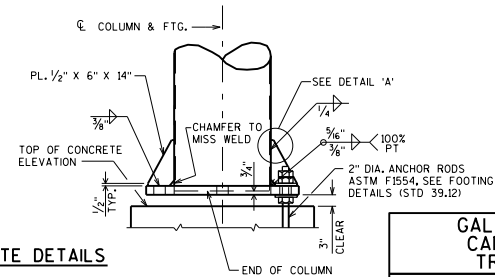
PLAN TRUSS TO UPRIGHT



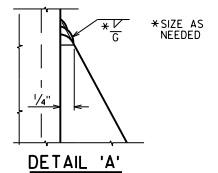
ELEVATION TRUSS TO UPRIGHT



BASE PLATE DETAILS

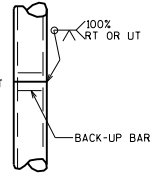


END VIEW
TRUSS TO UPRIGHT



DETAIL 'A'

SEPARATE OPTIONAL SPLICE FROM GUSSET PLATES BY 6" MIN.

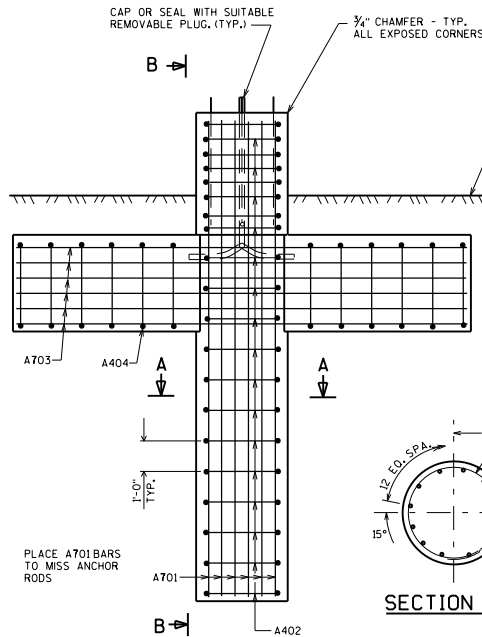


OPTIONAL COLUMN
OR CHORD SPLICE
DETAIL

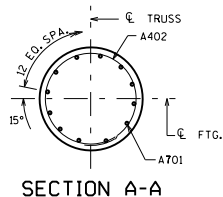
GALVANIZED STEEL CANTILEVER SIGN TRUSS DETAILS

BUREAU OF STRUCTURES

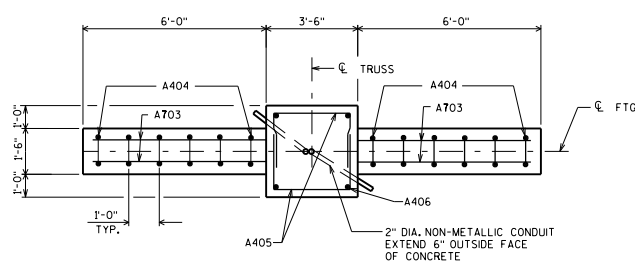
APPROVED: Bill Oliva DATE: 1-17



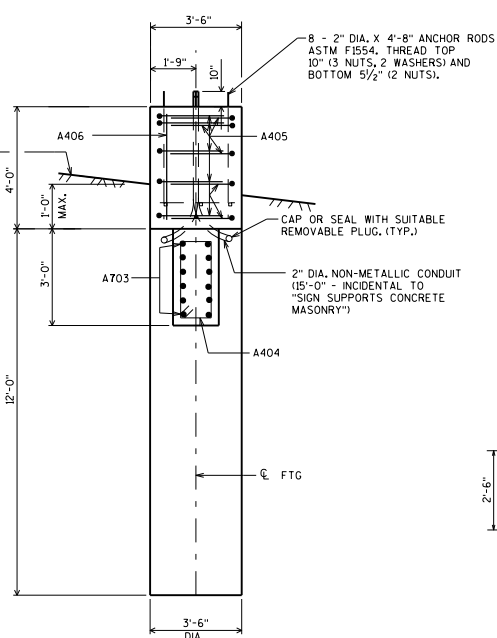
ELEVATION



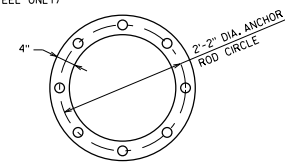
SECTION A-A



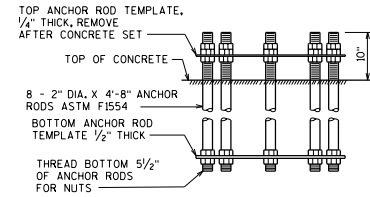
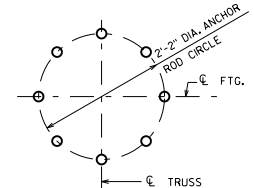
PLAN



SECTION B-B
(SHOWING WING AND CAP STEEL ONLY)



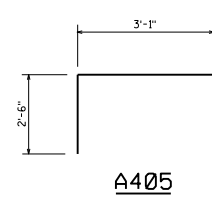
TOP VIEW OF TOP & BOTTOM TEMPLATES



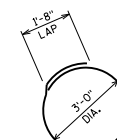
ANCHOR ROD DETAILS

BILL OF BARS

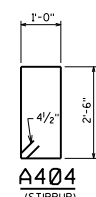
BAR MARK	NO.	LENGTH	BENT	CUT. DIAG.	BUN. DLE	LOCATION
A701	X 12	15'-6"				FOOTING - COLUMN TOP
A402	X 16	11'-2"	X			FOOTING - COLUMN TOP
A703	X 12	15'-0"				FOOTING - WINGS
A404	X 12	7'-6"	X			FOOTING - WINGS
A405	X 10	7'-11"	X			FOOTING - TOP
A406	X 4	3'-6"				FOOTING - TOP - COLUMNS



A405



A402



A404
(STIRRUP)

NOTES

DRAWINGS SHALL NOT BE SCALED.
THE FIRST OR FIRST TWO DIGITS OF THE BAR MARK SIGNIFIES THE BAR SIZE.
BAR STEEL REINFORCEMENT SHALL BE EMBEDDED 3" CLEAR UNLESS DETAILED OTHERWISE.
BENDING DIMENSIONS ARE OUT TO OUT OF BAR.
CENTER ANCHOR ROD ASSEMBLY TO MISS BAR STEEL REINFORCEMENT AND MAKE SURE IT IS PLUMB. MAINTAIN ANCHOR ROD PROJECTION ABOVE FOOTING AS DETAILED ON PLAN. ANCHOR ROD ASSEMBLY SHALL BE RIGIDLY SECURE IN POSITION DURING AND AFTER CONCRETE PLACEMENT. DO NOT WELD THE ANCHOR ROD.

ULTIMATE DESIGN STRESSES

CONCRETE MASONRY $f'_c=3,500$ PSI
BAR STEEL REINFORCEMENT, GRADE 60 $f_y=60,000$ PSI
ANCHOR BOLTS ASTM F1554 $f_y=55,000$ PSI

FOUNDATION DATA

ALLOWABLE SOIL BEARING PRESSURE = 2T/5F

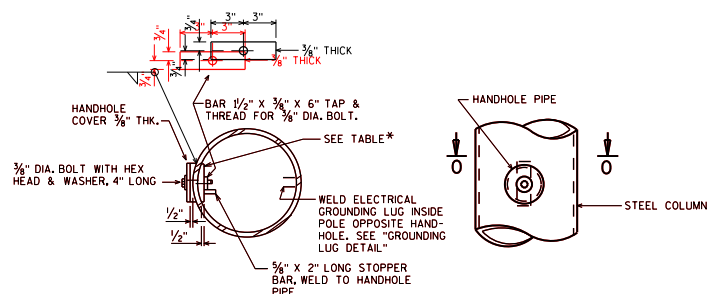
TOTAL ESTIMATED QUANTITIES (1 FTG.)

SIGN SUPPORTS CONCRETE MASONRY 8 CY
SIGN SUPPORTS STEEL REINFORCEMENT HS 990 LB

CANTILEVER TRUSS FOOTING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-16



SECTION 0-0

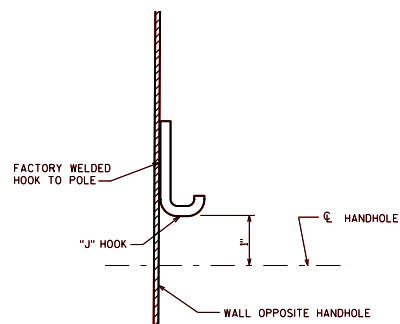
HANDHOLE DETAILS

HANDHOLE NOTES

HANDHOLES SHALL BE LOCATED IN ONE COLUMN OF THE SIGN BRIDGE STRUCTURE IF ELECTRICALLY OPERATED DEVICES ARE INSTALLED ON/IN THE STRUCTURE. COLUMNS WITH HANDHOLES SHALL BE NEAR THE ELECTRICAL SERVICE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF THE ELECTRICAL SERVICE ENTRANCE WITH THE REGION TRAFFIC SECTION PRIOR TO FABRICATION OF THE SIGN BRIDGE COLUMNS AND MEMBERS. CONDUIT (AS REQ'D.) SHALL BE LOCATED, PLACED AND SIZED AS SHOWN ON THE ELECTRICAL PLAN DETAIL SHEETS.

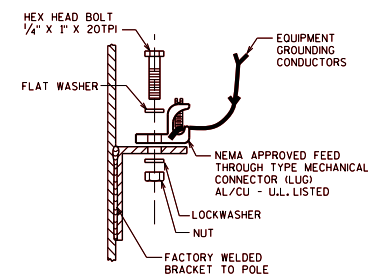
UNLESS NOTED OTHERWISE, ALL HANDHOLE ELEMENTS TO BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

* COLUMN SIZE O.D. X THK.	HANDHOLE PIPE O.D. X MIN. THK.
UP TO AND INCLUDING 16" X 0.375"	5.562" X 0.500"
GREATER THAN 16" X 0.375" TO AND INCLUDING 24" X 0.562"	6.625" X 0.562"

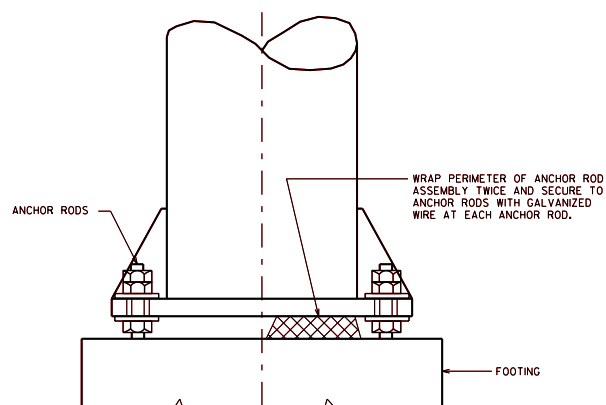


TYPICAL "J" HOOK LOCATION

THE "J" HOOK SHALL BE FACTORY WELDED TO THE INSIDE OF ALL COLUMNS CONTAINING ELECTRICAL WIRING. THE "J" HOOK SHALL BE ATTACHED ABOVE THE CENTERLINE OF THE UPPER HANDHOLE AND MOUNTED DIRECTLY OPPOSITE THE HANDHOLE AS SHOWN IN THE DRAWING.



GROUNDING LUG DETAIL



RODENT SCREEN
(ONLY REQ'D. WHEN ELECTRICAL DEVICES ARE INSTALLED)

HANDHOLE DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-18

PARAPET REPAIR DETAIL

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 UNDERSIDE OF PARAPETS. 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.

CURB REPAIR DETAIL

502.3205 PROTECTIVE SURFACE TREATMENT RESEAL SY
509.1200 CURB REPAIR LF

DESIGNER NOTES

DETAILS MAY BE SHOWN ON PLANS IF NECESSARY FOR CLARITY.

INCLUDE APPLICABLE CONCRETE MASONRY BID ITEM TO FILL REPAIRS.

REFER TO STANDARD 17.02 FOR TYPICAL SEALING LOCATIONS.

THE "RESEAL" QUANTITY SHOULD INCLUDE THE REPAIRED CONCRETE SURFACES. FOR EXAMPLE, "PIGMENTED SURFACE SEALER RESEAL" SHOULD BE APPLIED TO THE EXISTING AND REPAIRED PARAPET SURFACES, AS SHOWN.

ANCHOR DETAIL (EXAMPLE)

502.41.. ADHESIVE ANCHORS .-INCH EACH
502.42.. ADHESIVE ANCHORS NO. .BAR EACH
505.0605 BAR STEEL REINFORCEMENT HS COATED STRUCTURES LB

NOTE

ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS. (PROVIDE NOTE WHEN THE ADHESIVE ANCHOR BID ITEM IS NOT USED, BUT ARE ALLOWED AS AN ALTERNATIVE ANCHORAGE)

☆ (CHOOSE ONE OF THE FOLLOWING AND PLACE ON PLAN)

ADHESIVE ANCHORS X/X-INCH. EMBED X" IN CONCRETE.

ADHESIVE ANCHORS NO. X BAR. EMBED X" IN CONCRETE.

☆ (CHOOSE ONE OF THE FOLLOWING AND PLACE ON PLAN)

ADHESIVE ANCHORS X/X-INCH. EMBED X" IN CONCRETE.

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

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

DECK REPAIR DETAIL - PLAN

FOR DESIGNER INFORMATION ONLY (DO NOT PLACE ON PLANS)

509.0301 PREPARATION DECKS TYPE 1 SY
509.0302 PREPARATION DECKS TYPE 2 SY
*509.0310.S SAWING PAVEMENT DECK/ PREPARATION AREAS LF
*509.2000 FULL-DEPTH DECK/ REPAIR LAY DECKS SY
*509.2500 CONCRETE/ MASONRY/ OVERLAY/ DECKS/ AREAS CY

DECK REPAIR DETAIL - SECTION

FOR DESIGNER INFORMATION ONLY (DO NOT PLACE ON PLANS)

509.0301 PREPARATION DECKS TYPE 1 SY
509.0302 PREPARATION DECKS TYPE 2 SY
*509.0310.S SAWING PAVEMENT DECK/ PREPARATION AREAS LF
*509.2000 FULL-DEPTH DECK/ REPAIR LAY DECKS SY
*509.2500 CONCRETE/ MASONRY/ OVERLAY/ DECKS/ AREAS CY

FULL-DEPTH DECK REPAIR DETAIL

FOR DESIGNER INFORMATION ONLY (DO NOT PLACE ON PLANS)

*509.0310.S SAWING PAVEMENT DECK/ PREPARATION AREAS LF
*509.2000 FULL-DEPTH DECK/ REPAIR LAY DECKS SY
*509.2500 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.

▲ 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.

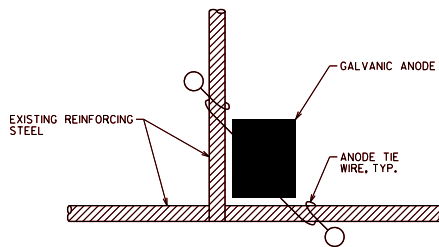
RESTRICTIONS ON REMOVAL ITEMS SHALL BE PLACED ON THE PLANS TO PREVENT DAMAGE TO REINFORCING STEEL.

CONCRETE REPAIR DETAILS

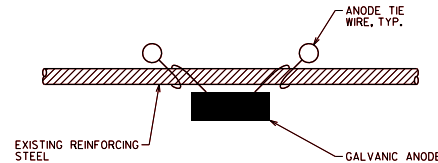
BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-28

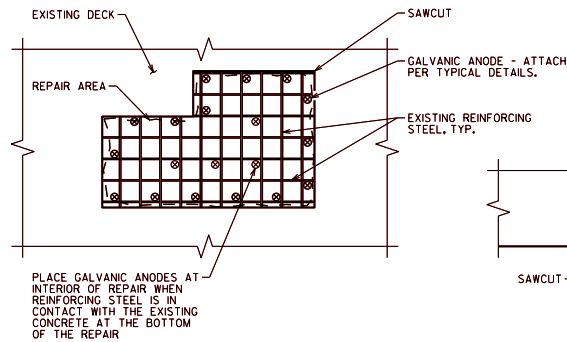
STANDARD 40.01



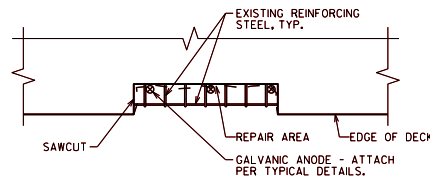
TYPICAL INSTALLATION AT
BAR STEEL INTERSECTION



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".

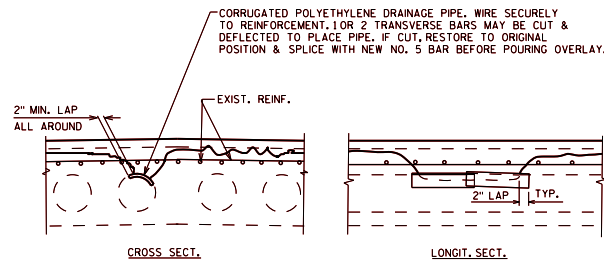
CATHODIC PROTECTION



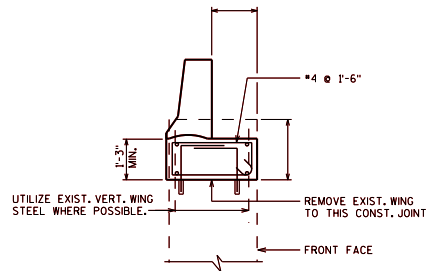
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

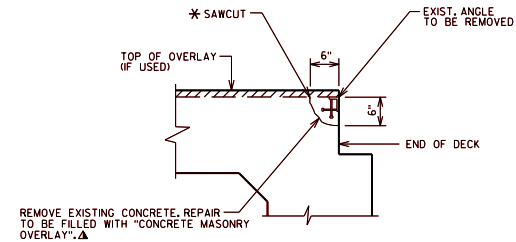
DATE:
1-21



RUPTURED VOID REPAIR



SECTION THRU PARAPET ON WING

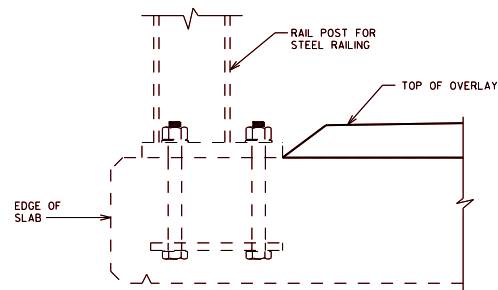


SECTION AT END OF SLAB

509.0301	PREPARATION DECKS TYPE 1	SY
509.0302	PREPARATION DECKS TYPE 2	SY
*509.03005	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.

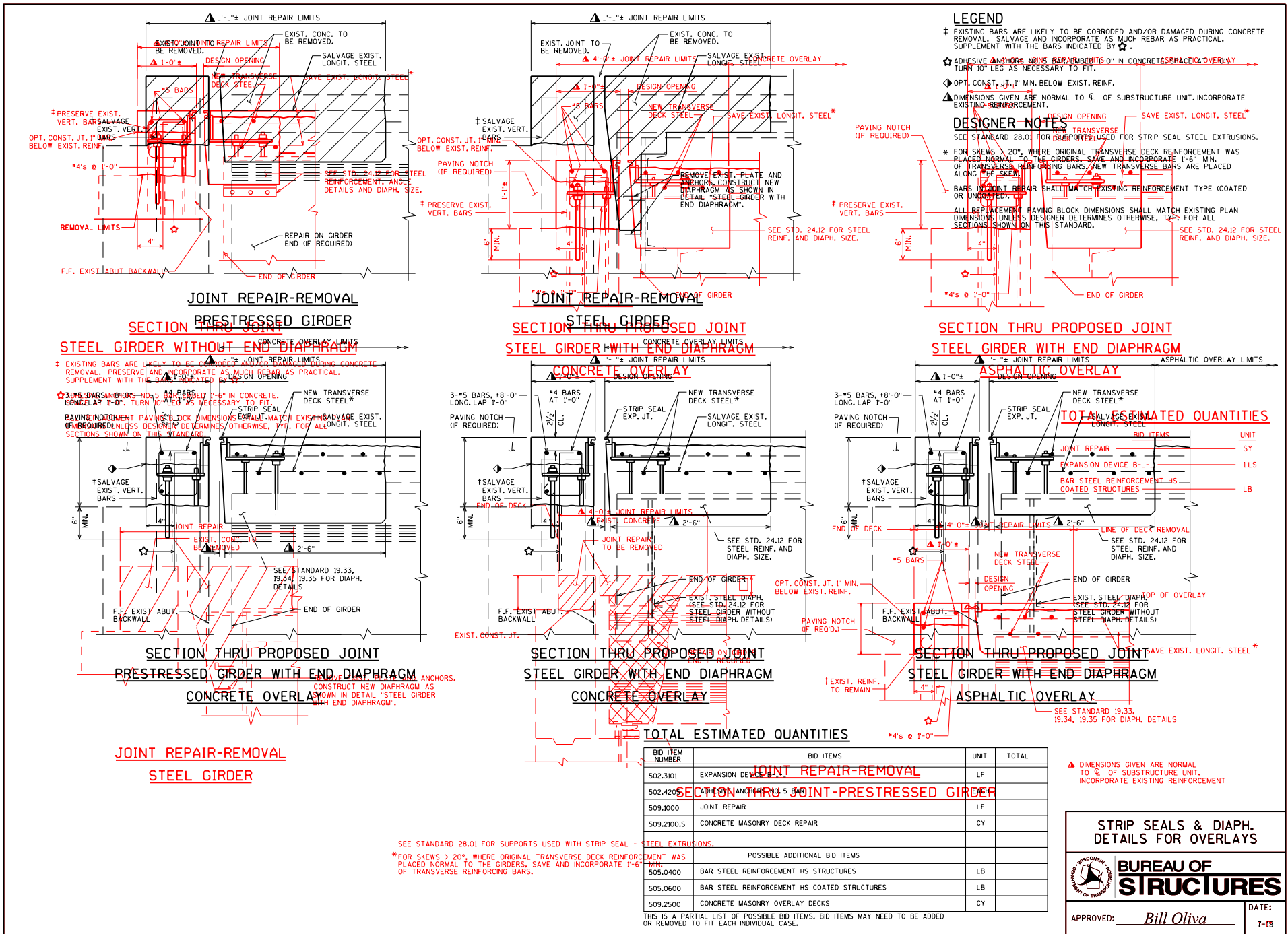
OVERLAY DETAILS

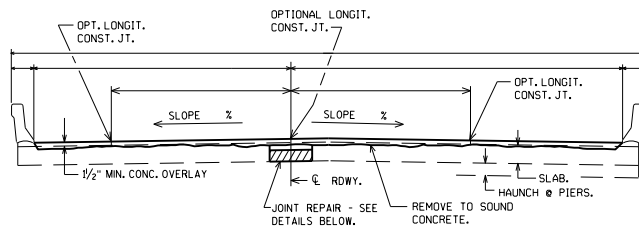


BUREAU OF STRUCTURES

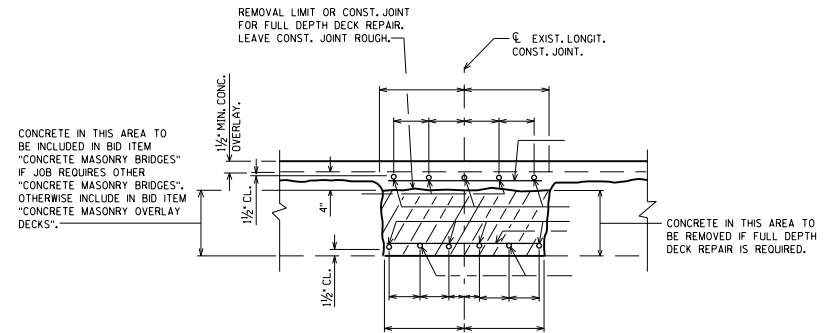
APPROVED: Bill Oliva

DATE:
1-18

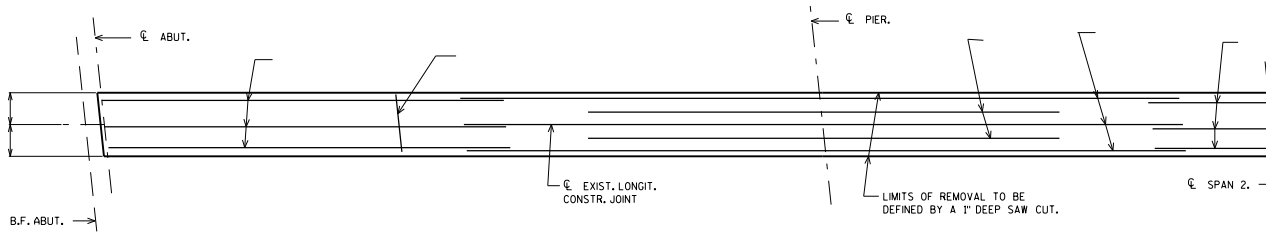




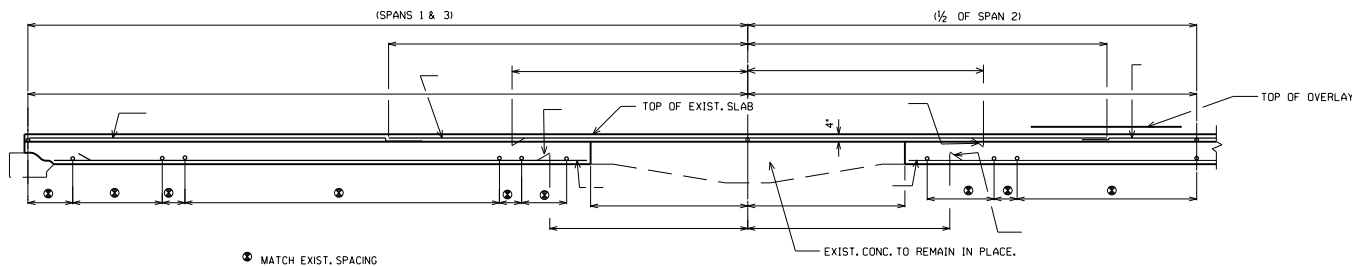
CROSS SECTION THRU ROADWAY LOOKING EAST



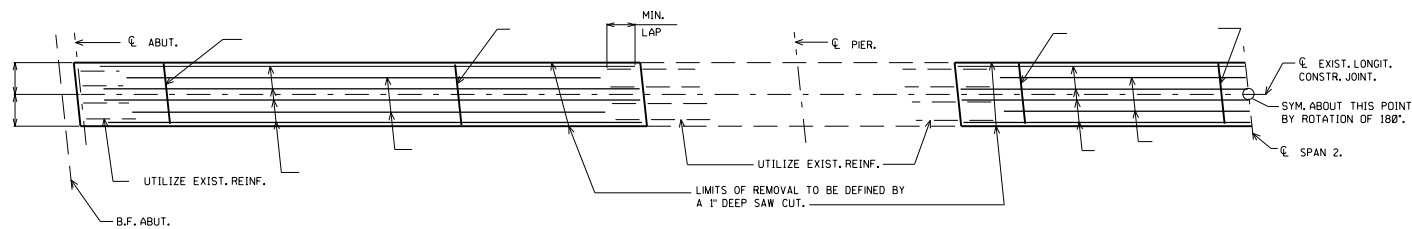
TYP. SECTION THRU JOINT



HALF PLAN SHOWING TOP BAR STEEL REINF.



HALF LONGIT. SECTION



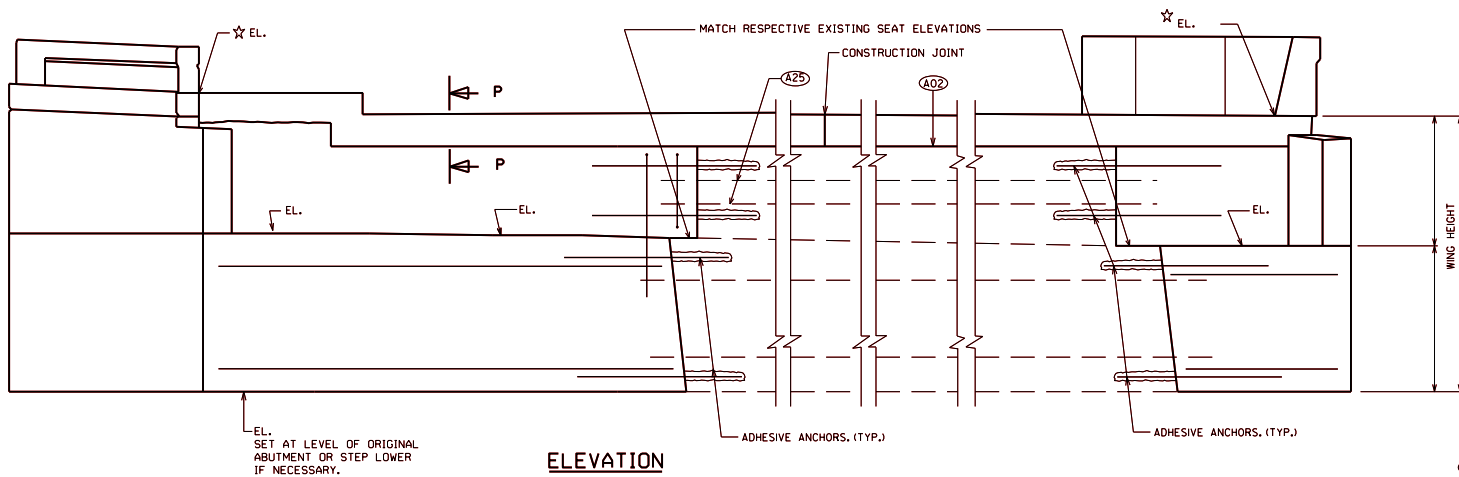
HALF PLAN SHOWING BOTTOM BAR STEEL REINF

(REQUIRED ONLY FOR FULL DEPTH DECK REPAIR)

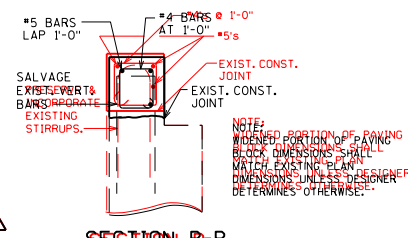
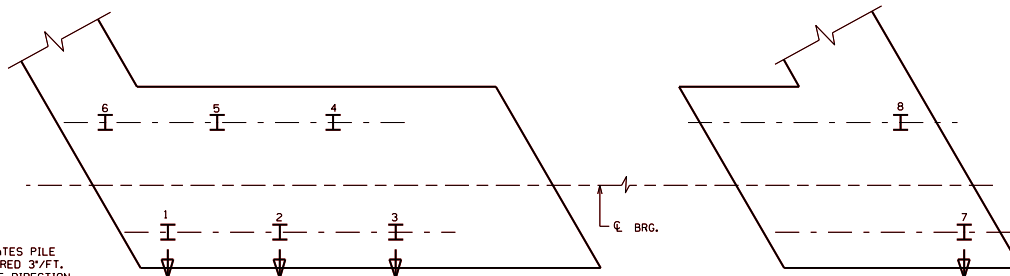
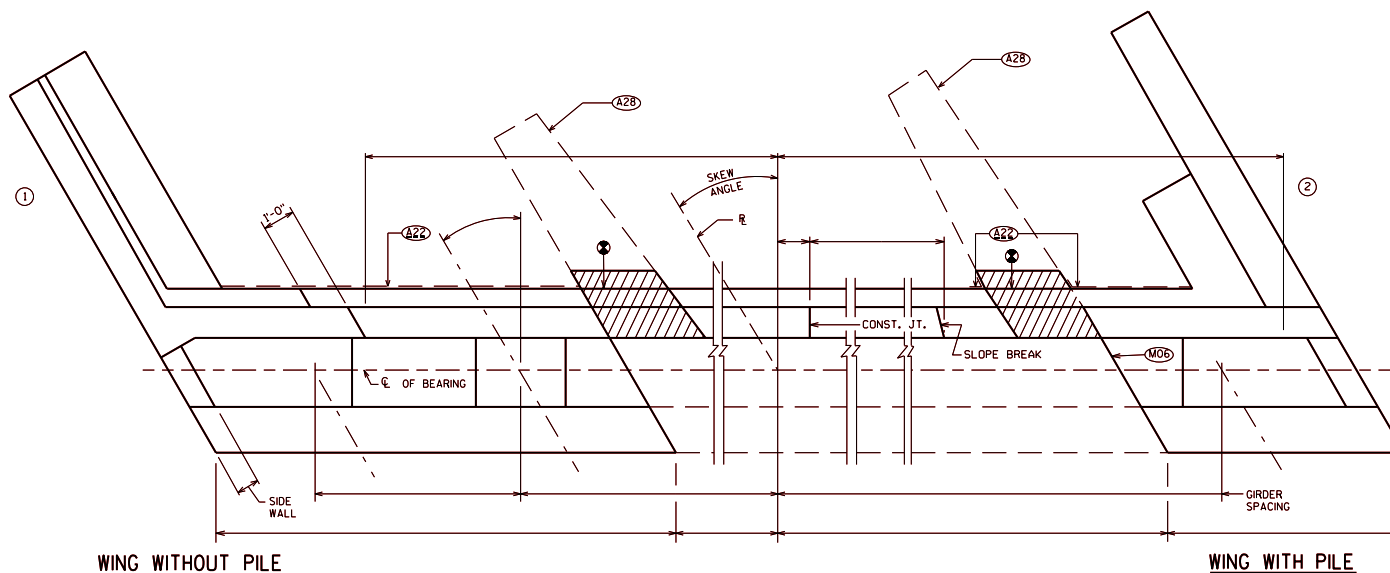
TOTAL ESTIMATED QUANTITIES

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: <u>7-16</u>



ELEVATION



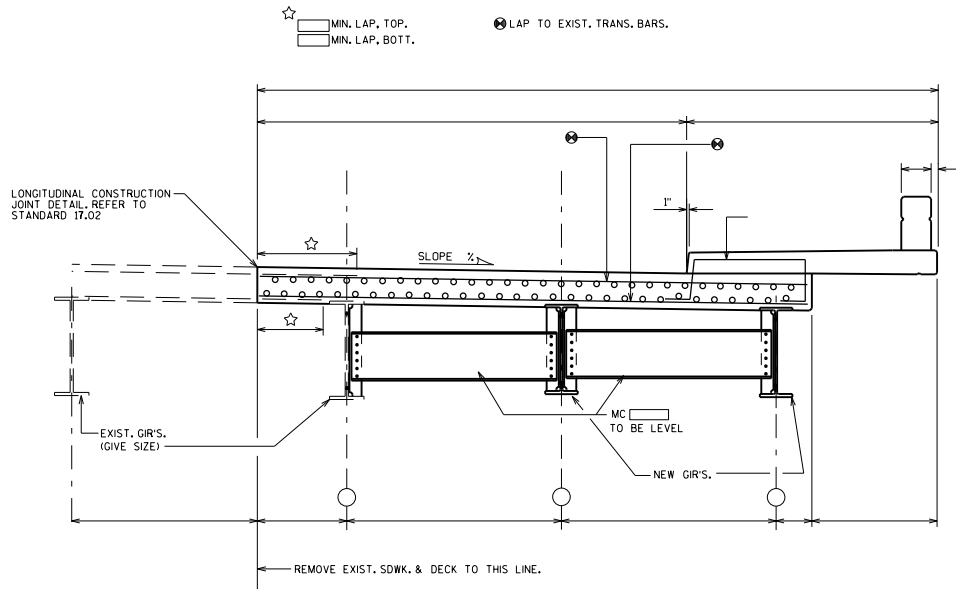
NOTES

- (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.

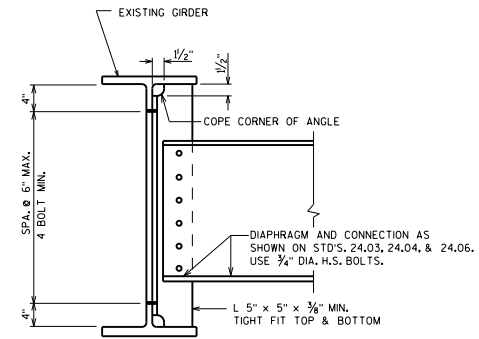
DESIGNER NOTES

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

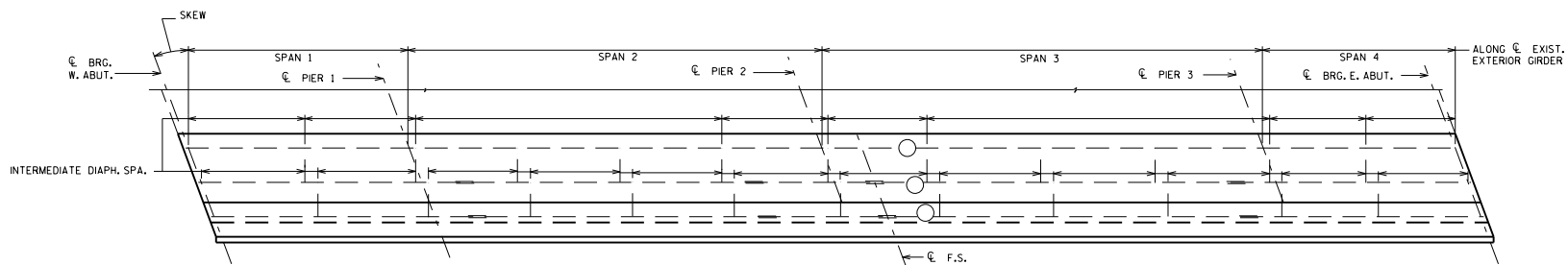
ABUTMENT WIDENING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-19</u>



CROSS SECT. THRU RDWY.



DIAPHRAGM CONNECTION TO EXISTING STEEL GIRDER



PLAN

SLAB WIDENING

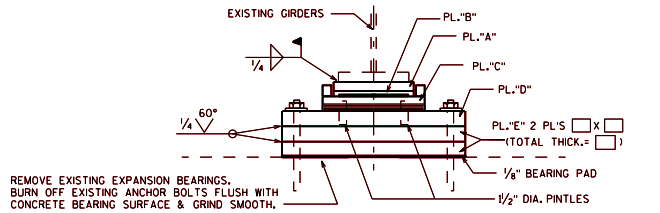


BUREAU OF STRUCTURES

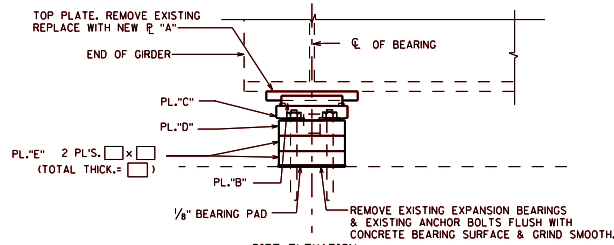
APPROVED: *Bill Oliva*

DATE:
7-16

STANDARD 40.07



FRONT ELEVATION



SIDE ELEVATION

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS

STEEL BEARINGS

SEE STANDARD 27.08 FOR BEARING DETAILS

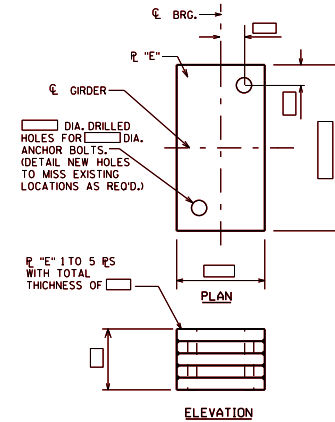
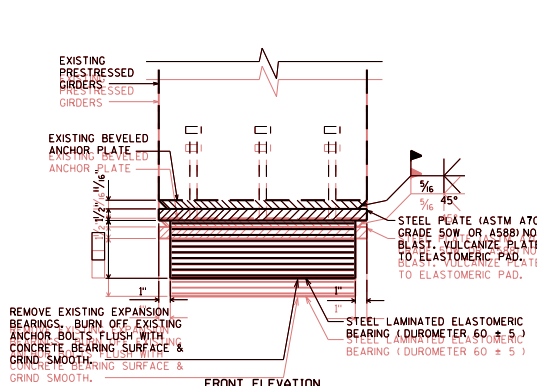
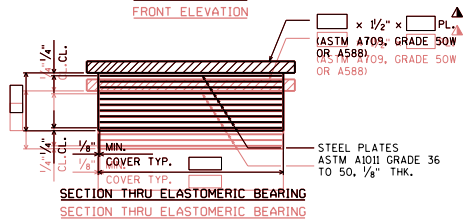


PLATE 'E' DETAILS

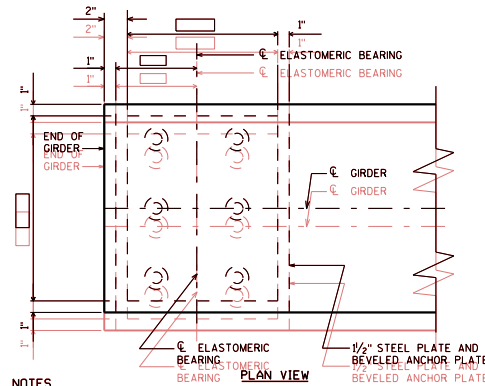
(SEE STD. 40.10 FOR CONCRETE BLOCK ALTERNATE)



FRONT ELEVATION



SECTION THRU ELASTOMERIC BEARING



NOTES

ALL MATERIAL USED FOR BEARINGS SHALL BE PAID AT THE UNIT PRICE BID FOR "BEARING PADS ELASTOMERIC, LAMINATED."

ELASTOMERIC BEARING SHALL BE PAID AT THE UNIT PRICE BID FOR "ELASTOMERIC BEARING."

GRIND EXIST. WELD THAT ATTACHED EXIST. TOP PLATE TO EXIST. BOT. FLANGE. GRIND AFFECTED AREAS SMOOTH.

ELASTOMERIC BEARING EXIST. TOP PLATE TO EXIST. BOT. FLANGE. GRIND AFFECTED AREAS SMOOTH.

DESIGNER NOTES

THE STEEL TOP PLATE THICKNESS MAY BE REDUCED (3/4" MIN. TO MATCH THE OVERALL EXISTING BEARING HEIGHT. WHEN THE THICKNESS IS REDUCED, THE FOLLOWING SHALL BE LOCATED ON THE PLANS:

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.

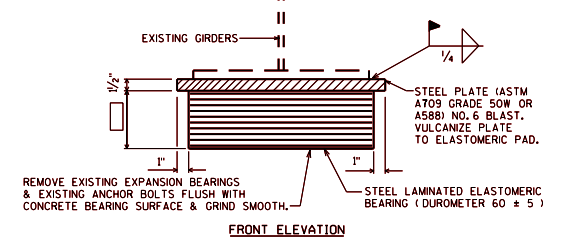
TOP STEEL PLATE MAY NOT BE OMITTED.

CHECK 27.21 ELASTOMERIC BEARINGS IN THE BRIDGE MANUAL FOR REQUIREMENTS TO SEE IF THIS PLATE SHOULD BE TAPERED.

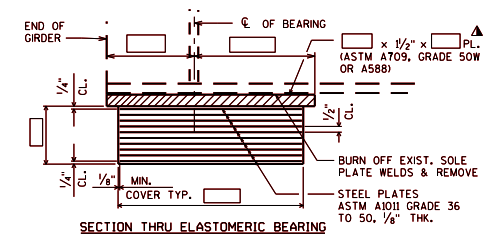
TOP PLATE MAY NOT BE OMITTED.

DO NOT INCLUDE PRESTRESSED GIRDER SHRINKAGE WHEN DESIGNING BEARINGS FOR BRIDGE REHABILITATION OR ADDITIONAL INFORMATION.

SEE STANDARD 27.07 FOR ADDITIONAL INFORMATION.



FRONT ELEVATION



SECTION THRU ELASTOMERIC BEARING

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS

ELASTOMERIC BEARINGS

NOTES & DESIGNER NOTES

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

EXPANSION BEARING REPLACEMENT DETAILS



BUREAU OF STRUCTURES

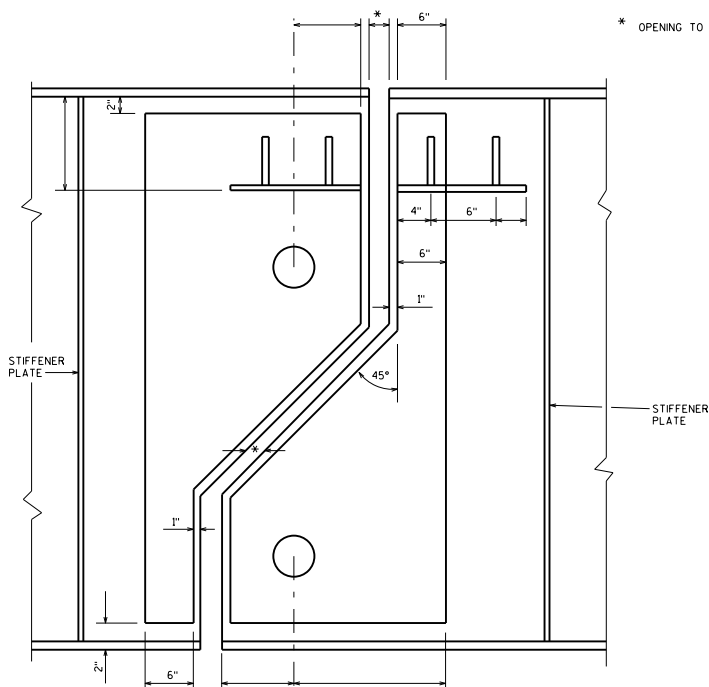
APPROVED: *Bill Oliva*

DATE: 8-20

STANDARD 40.08

EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS

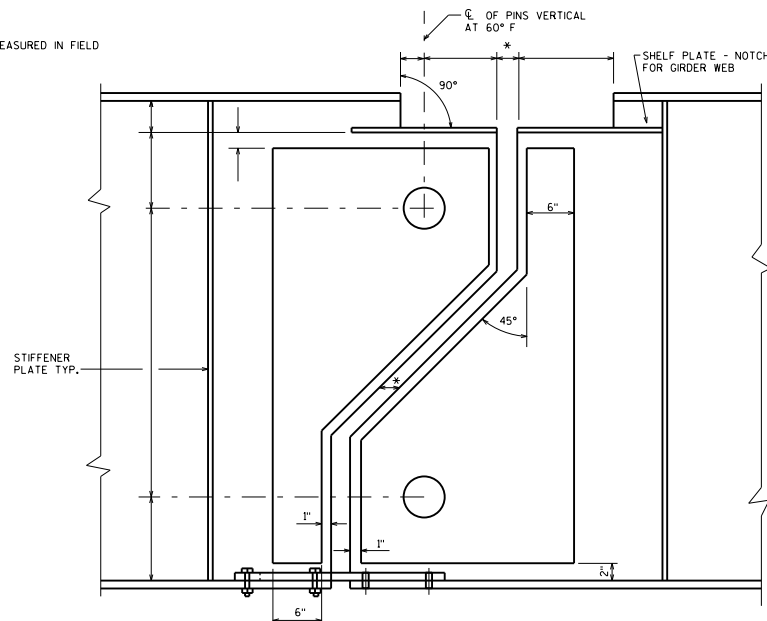
ELASTOMERIC BEARINGS



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.

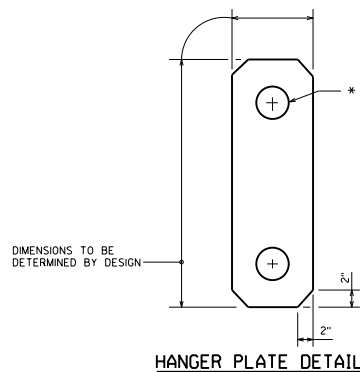
NON-METALLIC WASHERS SHALL HAVE AN INSIDE DIAMETER OF BETWEEN 0.005" AND 0.010" LARGER THAN THE PIN DIAMETER.

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.

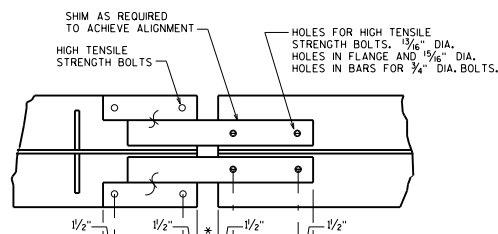
- BUSHINGS SHALL BE GAR-MAX AS MANUFACTURED BY GARLOCK BEARINGS, INC. OR DURALON JOURNAL BEARINGS AS MANUFACTURED BY REYNOLD BEARING DIVISION, OR APPROVED EQUAL. BUSHINGS SHALL HAVE A NOMINAL WALL THICKNESS OF $\frac{1}{4}$ ".

- △ 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

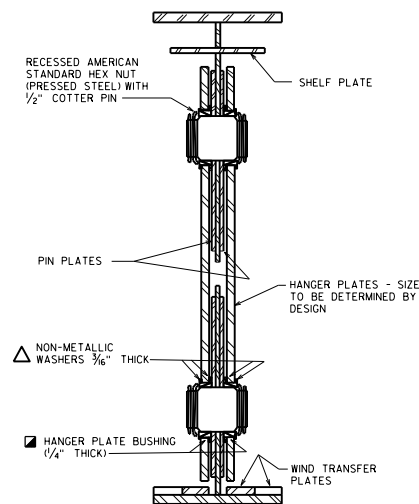


HANGER PLATE DETAIL



TYPICAL WIND TRANSFER PLATES DETAIL

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



SECTION THRU HINGE

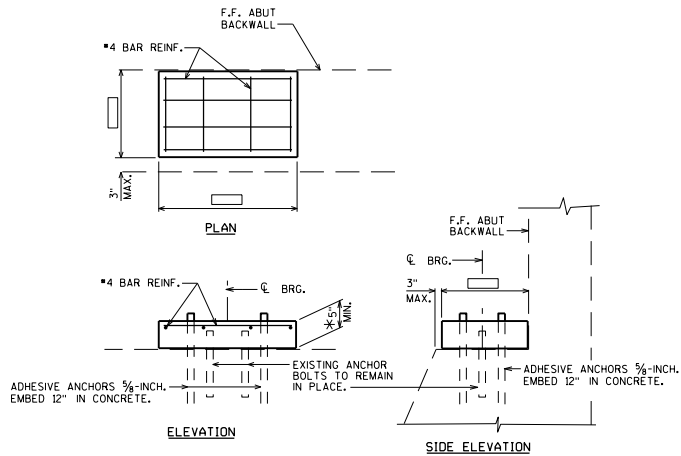
HINGED JOINT REHABILITATION



**BUREAU OF
STRUCTURES**

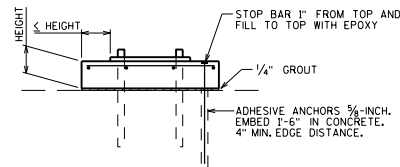
APPROVED: Bill Oliva

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" *

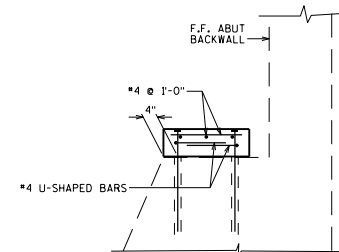
ANCHOR IN AT LEAST 4 LOCATIONS (ANCHORS INCLUDE ADHESIVE ANCHORS, ANCHOR BOLTS OR COMBINATION).

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)

CONCRETE BEARING BLOCK DETAILS

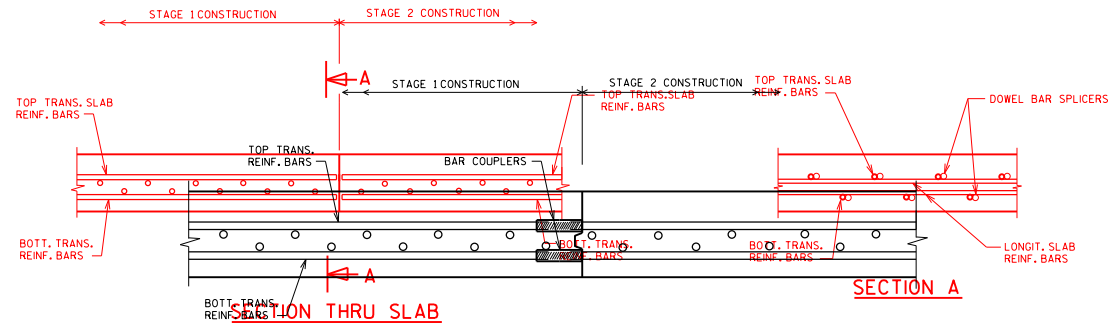


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STANDARD 40.10

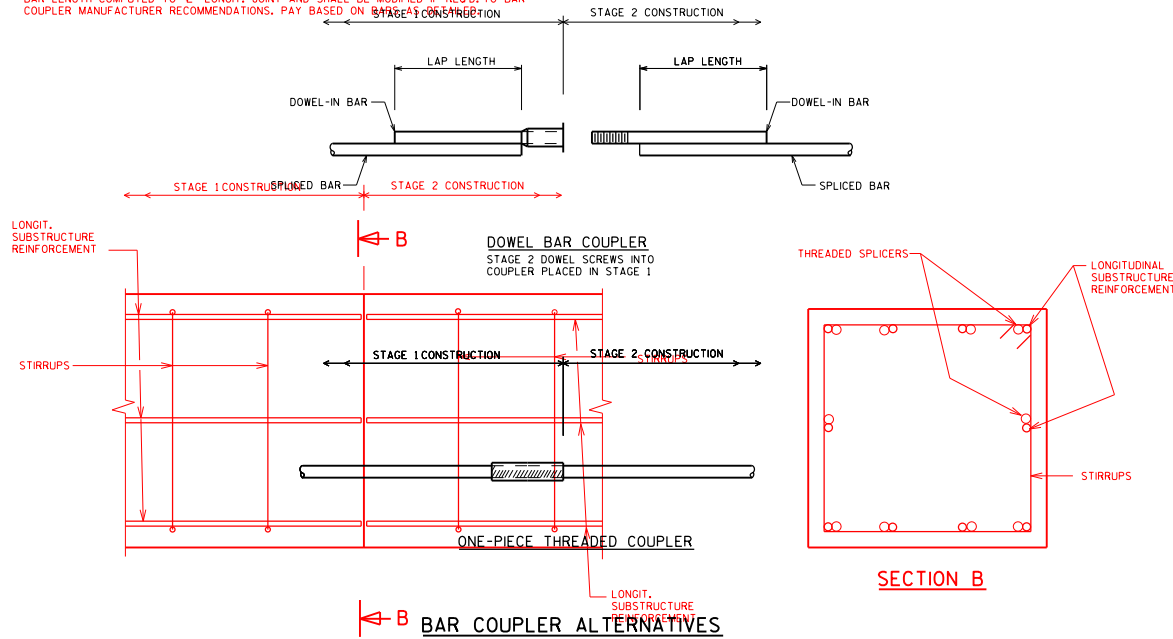


SECTION THRU DECK
ONE-PIECE THREADED COUPLER SHOWN

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'-10"	3'-6"	4'-8"	6'-1"	7'-10"	9'-10"	12'-1"
	$f_c = 4000$	2'-3"	2'-10"	3'-6"	4'-5"	5'-8"	7'-4"	9'-2"	11'-4"

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



SECT. THRU SUBSTRUCTURE UNIT

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)".

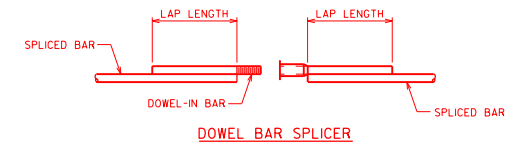
FOR DOWEL BAR SPLICERS, ALL REINFORCEMENT BARS SHALL BE LAPPED AND TIED TO THE LONGIT. PLANS SHOW DETAILS SIMILAR TO "SECTION THRU DECK" AND "BAR COUPLER ALTERNATIVES".

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 JOINT OF THE CONSTRUCTION JOINT AND 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 = $1.25 \times f_y \times \text{AREA OF SPLICED REINFORCEMENT BAR}$

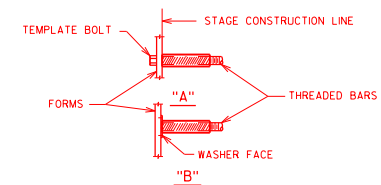
WHERE f_y = YIELD STRENGTH OF SPLICED REINFORCEMENT BARS

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.

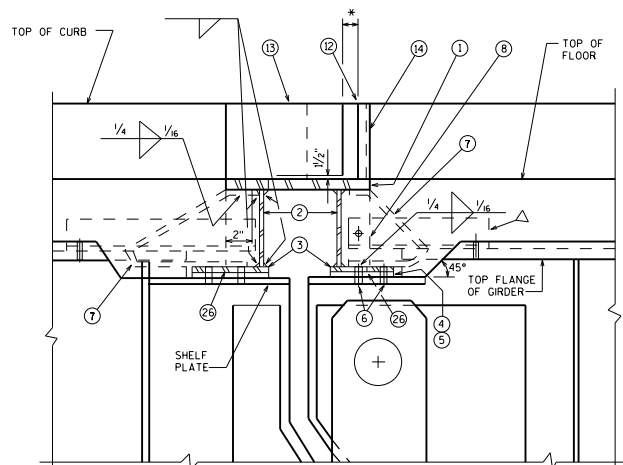
BAR SPLICER (COUPLER)
DETAILS AT STAGE
CONSTRUCTION



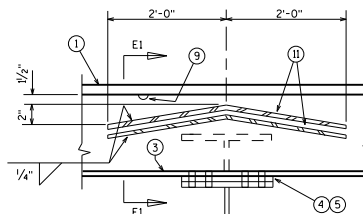
BUREAU OF
STRUCTURES

APPROVED: *S. Bill Dinkar*

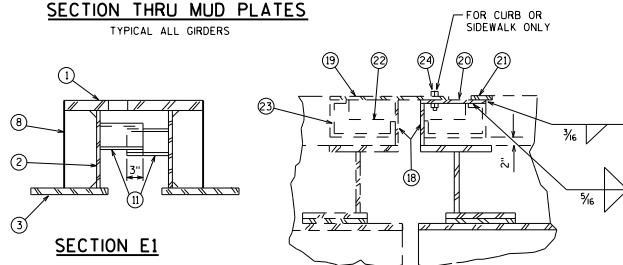
DATE:
7-03



SECTION THRU JOINT
MUD PLATES NOT SHOWN

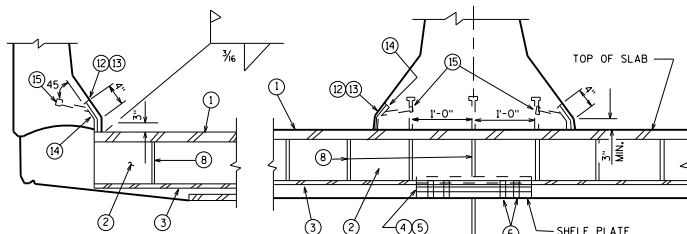


SECTION THRU MUD PLATES
TYPICAL ALL GIRDERS



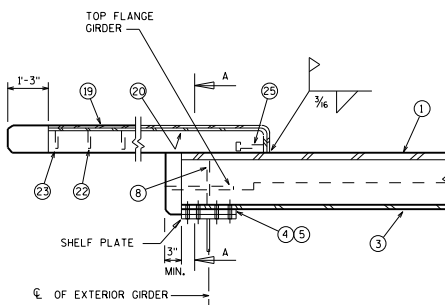
SECTION E1

SECTION A-A

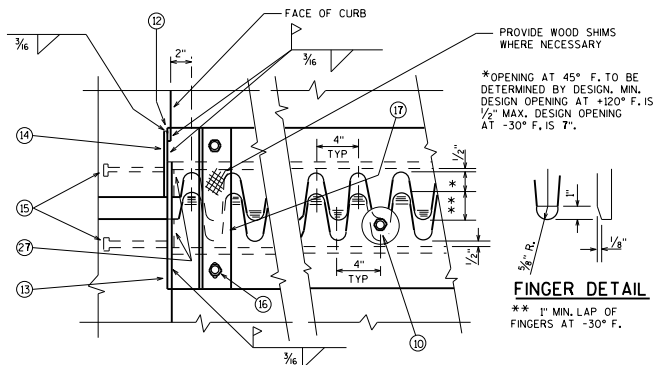


DETAIL AT PARAPET

DETAIL AT MEDIAN



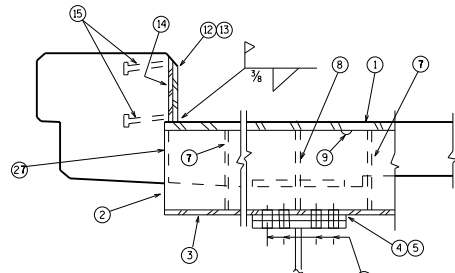
SECTION THRU SIDEWALK



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.

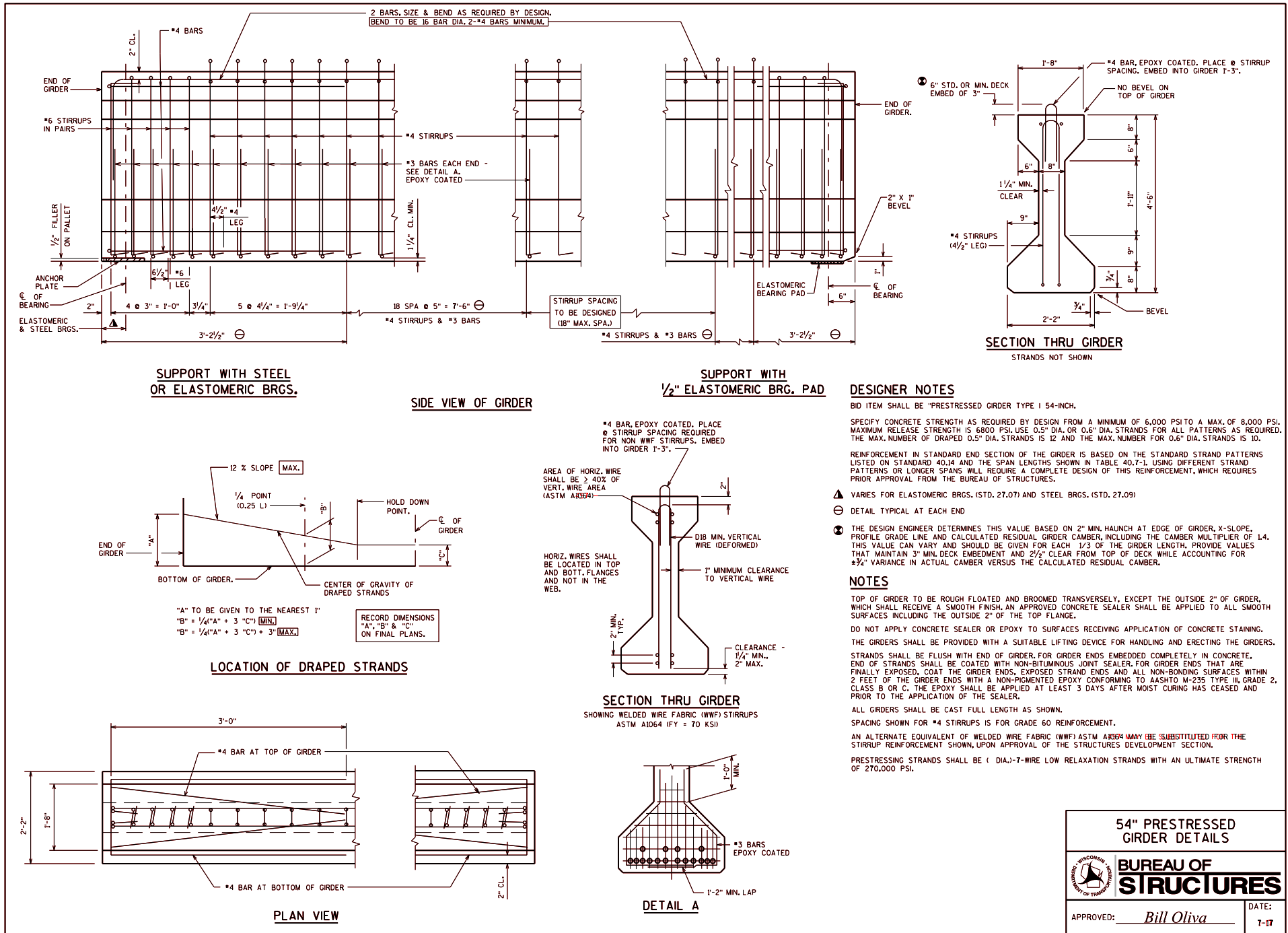
FINGER TYPE EXPANSION JOINT - PLATE GIRDER



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE:
7-16

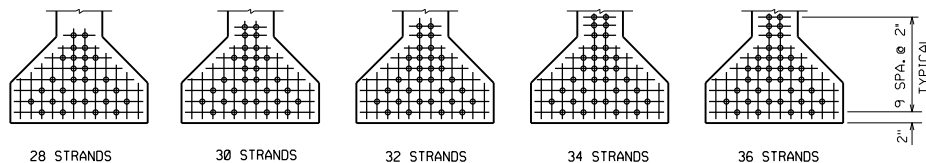
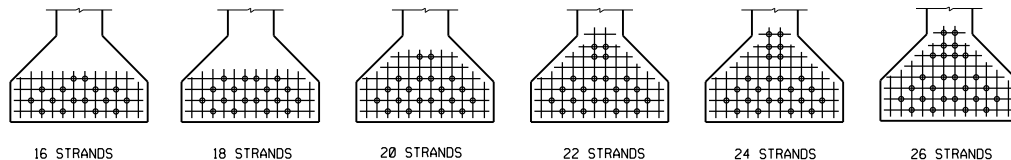


54" PRESTRESSED GIRDER DETAILS

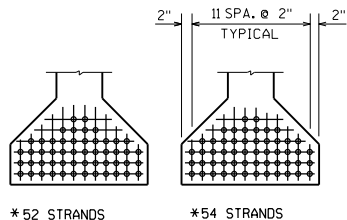
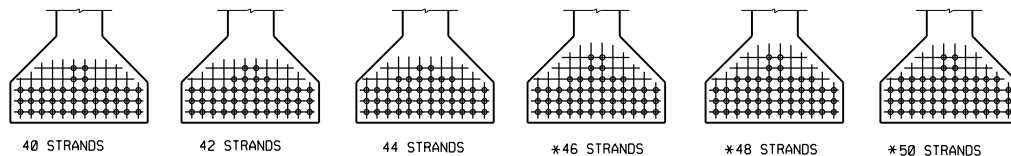
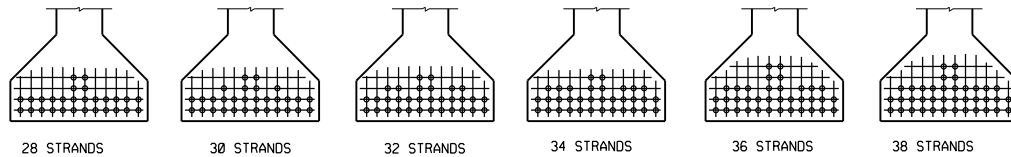
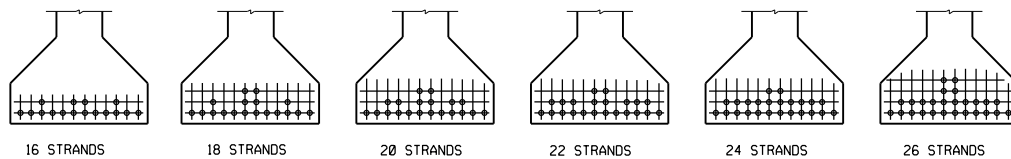


BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 7-17



**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

$A = 789 \text{ SQ. IN.}$
 $r^2 = 330.46 \text{ IN.}^2$
 $y_T = 29.27 \text{ IN.}$
 $y_B = -24.73 \text{ IN.}$
 $I = 260,730 \text{ IN.}^4$
 $S_T = 8,908 \text{ IN.}^3$
 $S_B = -10,543 \text{ IN.}^3$
 $WT. = 822 \text{ #/FT.}$

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

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

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

(COMPRESSION IS POSITIVE)

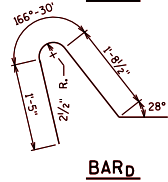
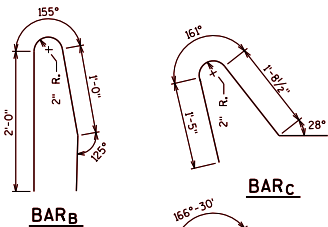
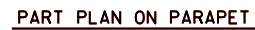
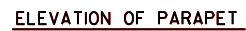
N NO. STRANDS	(1) e_s (inches)	(2) $(1 + \frac{e_s y_B}{r^2})$ (inches)	(3) $(A/(2))$ (sq. in.)	(4) $P(ini +) = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(4) $P(ini +) = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) $f_B (ini +) = (4)/(3)$ 0.5" DIA. STRANDS (K/Sq. In.)	(5) $f_B (ini +) = (4)/(3)$ 0.6" DIA. STRANDS (K/Sq.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

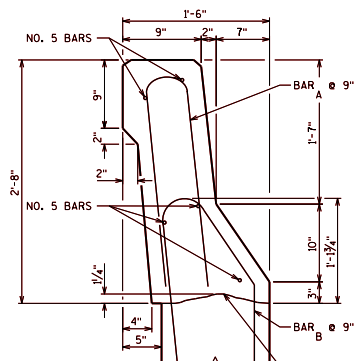
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

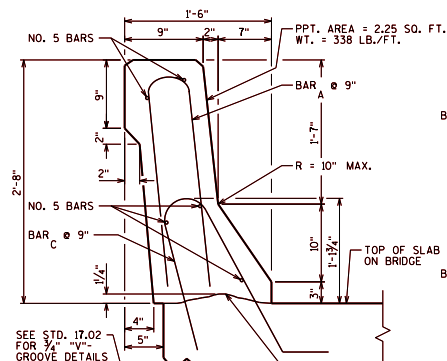
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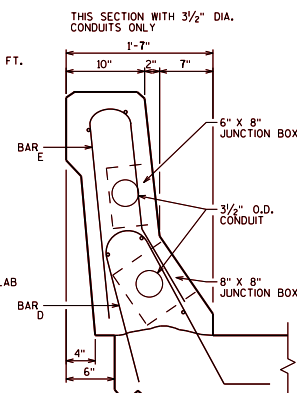
BAR	LENGTH
A	4'-10"
B	4'-7"
C	4'-3"
D	4'-4"
E	4'-4"



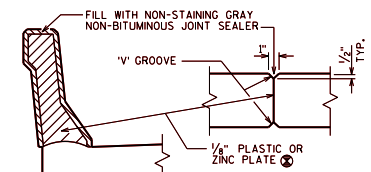
SECTION A



SECTION B

SECTION B₁

SEE SECTION B FOR DETAILS UNLESS OTHERWISE SHOWN OR NOTED



SECTION C

SECTION D

SLOPED FACE PARAPET 'B'



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

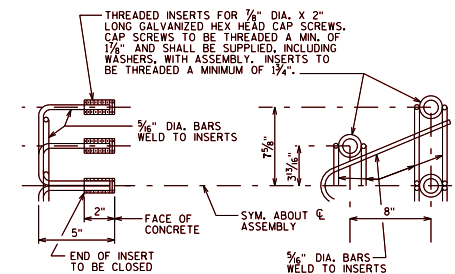
DATE: 7-19

STANDARD	40.15
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ALL SLOPED FACE PARAPET "B" REINFORCEMENT ARE NO. 4 BARS UNLESS OTHERWISE SHOWN.

- ✖ **PLATE REQUIRED WHEN DEFLECTION JOINTS ARE REQUIRED. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED, PLATE SEPARATORS SHALL BE OMITTED. DEFLECTION JOINTS ARE REQUIRED ON SLAB SPAN STRUCTURES ONLY.**
 ○ **OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINFORCEMENT THRU THE JOINT. PLACE LONGIT. BARS A MIN. OF 2'-1" MIN. JOINT SPACING OF 80-0". DEFINE CONST. JOINT WITH A 1" V GROOVE.**
 ● **CONST. JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.**

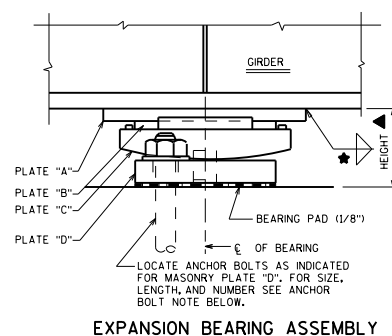
	PARAPET
AREA	2.25 SF
WEIGHT	338 LB/FT



DETAIL OF ANCHOR ASSEMBLY

NOTE: HEX HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M232, CLASS C.

ASSEMBLY SHALL BE BID ITEM "ANCHOR ASSEMBLIES FOR STEEL
PLATE BEAM GUARD" EACH -



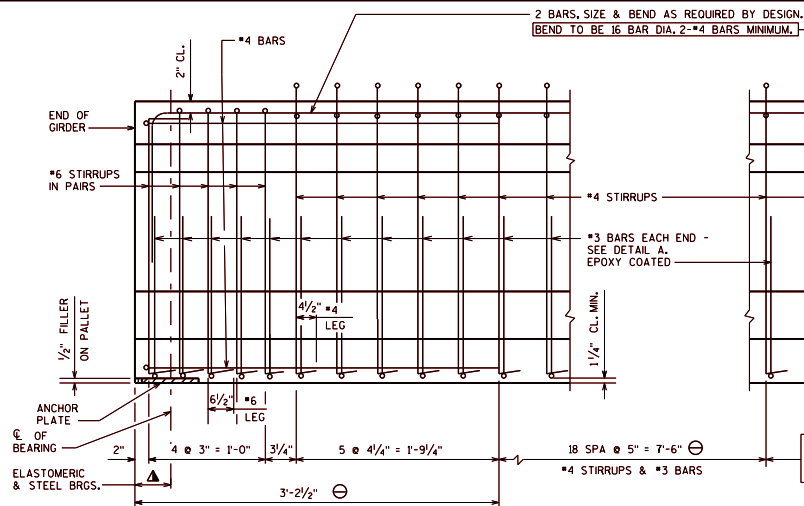
FOR NEW OR REPLACEMENT STEEL BEARINGS, INCLUDING STEEL BEARINGS USED FOR BRIDGE WIDENINGS, USE TYPE "A-T" AS SHOWN ON STANDARD 27.08. THIS STANDARD IS FOR INFORMATIONAL PURPOSES ONLY.

14" BEARING											
CAP. PLATE	X		Z		PLATE B		PLATE C		PLATE D		HEIGHT FEET
	X	Z	X	Z	X	Z	X	Z	X	Z	
105	9"	1'-2"	5"	1'-2"	7"	1 1/8"	1'-4 1/4"	8"	1 1/2"	2'-0"	.354
145	11"	1'-2"	7"	1'-2"	9"	1 1/8"	1'-4 1/4"	8"	1 1/2"	2'-0"	.376
185	1'-1"	1'-2"	9"	1'-2"	11"	1 1/8"	1'-4 1/4"	8"	1 1/2"	2'-0"	.395
225	1'-3"	1'-2"	11"	1'-2"	1'-1"	2 3/8"	1'-4 1/4"	10"	1 3/4"	2'-0"	.453
270	1'-5"	1'-2"	1'-1"	1'-2"	1'-3"	2 3/8"	1'-4 1/4"	1'-0"	2"	2'-0"	.516
310	1'-7"	1'-2"	1'-3"	1'-2"	1'-5"	3 7/8"	1'-4 1/4"	1'-1"	2 3/8"	2'-0"	.630
350	1'-9"	1'-2"	1'-5"	1'-2"	1'-7"	3 7/8"	1'-4 1/4"	1'-3"	2 1/2"	2'-1"	.672
390	1'-11"	1'-2"	1'-7"	1'-2"	1'-9"	4 1/8"	1'-4 1/4"	1'-4"	2 7/8"	2'-1"	.755
435	2'-1"	1'-2"	1'-9"	1'-2"	1'-11"	4 7/8"	1'-4 1/4"	1'-6"	3 1/4"	2'-1"	.838

20" BEARING												
CAP. PLATE	X		Z		PLATE B		PLATE C		PLATE D		HEIGHT FEET	
	X	Z	X	Z	X	Z	X	Y	Z	Y		Z
150	9"	1'-8"	5"	1'-8"	7"	1 1/8"	1'-10 1/4"	8"	1 1/2"	2'-6"	.354	
210	11"	1'-8"	7"	1'-8"	9"	1 1/8"	1'-10 1/4"	8"	1 1/2"	2'-6"	.375	
270	1'-1"	1'-8"	9"	1'-8"	11"	1 1/8"	1'-10 1/4"	10"	1 3/4"	2'-6"	.417	
325	1'-3"	1'-8"	11"	1'-8"	1'-1"	2 3/8"	1'-10 1/4"	11"	2"	2'-6"	.474	
385	1'-5"	1'-8"	1'-1"	1'-8"	1'-3"	2 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 7/8"	2'-7"	.672	
565	1'-11"	1'-8"	1'-7"	1'-8"	1'-9"	4 1/8"	1'-10 1/4"	1'-7"	3 7/8"	2'-7"	.838	
625	2'-1"	1'-8"	1'-9"	1'-8"	1'-11"	4 7/8"	1'-10 1/4"	1'-9"	3 7/8"	2'-7"	.838	

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

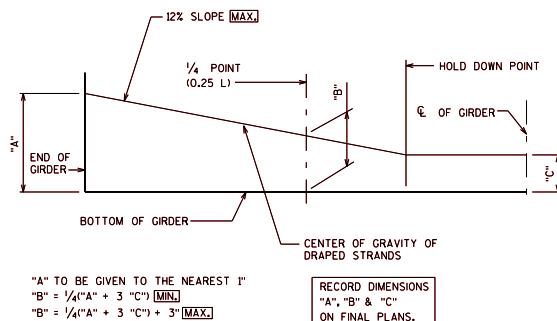
STANDARD 40.16



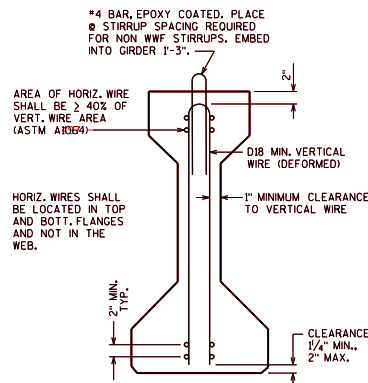
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SIDE VIEW OF GIRDER

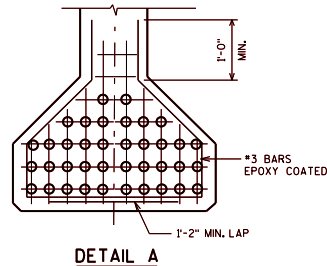
SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD



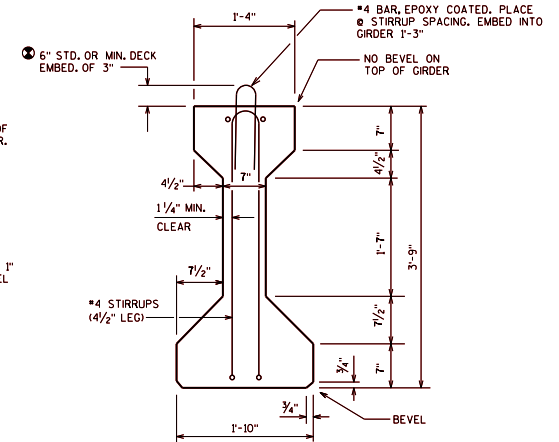
LOCATION OF DRAPED STRANDS



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.

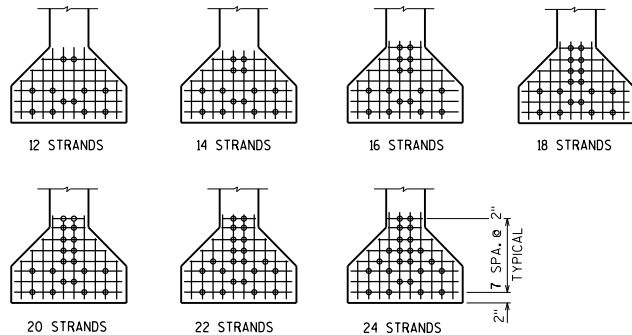
45" PRESTRESSED GIRDER DETAILS



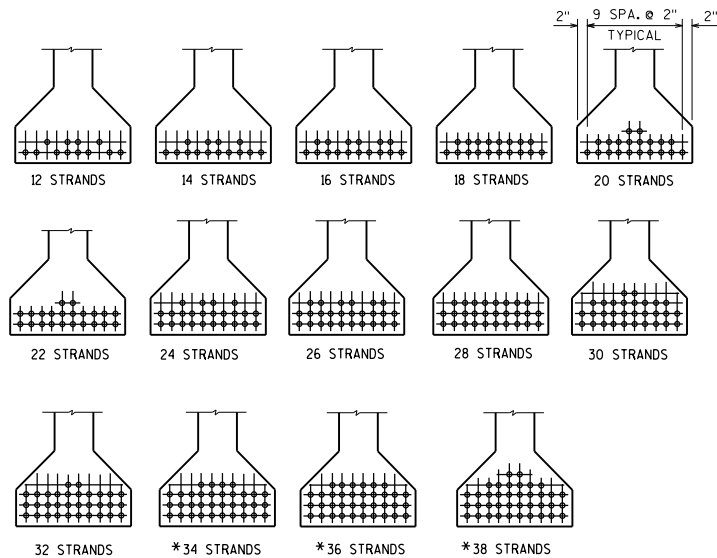
BUREAU OF STRUCTURES

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

$A = 560 \text{ SQ. IN.}$
 $r^2 = 223.91 \text{ IN.}^2$
 $y_T = 24.73 \text{ IN.}$
 $y_B = -20.27 \text{ IN.}$
 $I = 125,390 \text{ IN.}^4$
 $S_T = 5,070 \text{ IN.}^3$
 $S_B = -6,186 \text{ IN.}^3$
 $WT. = 583 \text{ #/FT.}$

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.
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = \underline{31.00 \text{ KIPS}}$
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = \underline{43.94 \text{ KIPS}}$
 $\frac{y_B}{r^2} = \frac{-20.27}{223.91} = -0.09053 \text{ IN./IN.}^2$

(COMPRESSION IS POSITIVE)

N NO. STRANDS	(1) e_s (inches)	(2) $(1 + \frac{e_s y_B}{r^2})$	(3) $(A/(2))$ (sq. in.)	(4) $P(\text{ini}+) = A_s f_s$ 0.5" DIA. STRANDS (KIPS)	(4) $P(\text{ini}+) = A_s f_s$ 0.6" DIA. STRANDS (KIPS)	(5) $f_B (\text{ini}+) = (4)/(3)$ 0.5" DIA. STRANDS (K/Sq. in.)	(5) $f_B (\text{ini}+) = (4)/(3)$ 0.6" DIA. STRANDS (K/Sq. in.)
STANDARD PATTERNS FOR UNDRAPED STRANDS							
12	-14.94	2.352	238.10		527		2.213
14	-14.27	2.292	244.33		615		2.517
16	-13.27	2.201	254.43		703		2.763
18	-13.15	2.190	255.71		791		3.093
20	-12.27	2.111	265.28		879		3.313
22	-12.27	2.111	265.28		967		3.645
24	-12.10	2.095	267.30		1055		3.947
STANDARD PATTERNS FOR DRAPED STRANDS							
12	-17.60	2.593	215.97	372	527	1.722	2.440
14	-17.70	2.602	215.22	434	615	2.017	2.858
16	-17.52	2.586	216.55	496	703	2.290	3.246
18	-17.38	2.573	217.64	558	791	2.564	3.634
20	-17.07	2.545	220.04	620	879	2.818	3.995
22	-17.01	2.540	220.47	682	967	3.093	4.386
24	-16.77	2.518	222.40	744	1055	3.345	4.744
26	-16.58	2.501	223.91	806	1143	3.600	5.105
28	-16.41	2.486	225.26	868	1230	3.853	5.460
30	-16.13	2.460	227.64	930	1318	4.085	5.790
32	-16.02	2.450	228.57	992	1406	4.340	6.151
34	-15.80	2.430	230.45	1054		4.574	
36	-15.60	2.412	232.17	1116		4.807	
38	-15.32	2.387	234.60	1178		5.021	

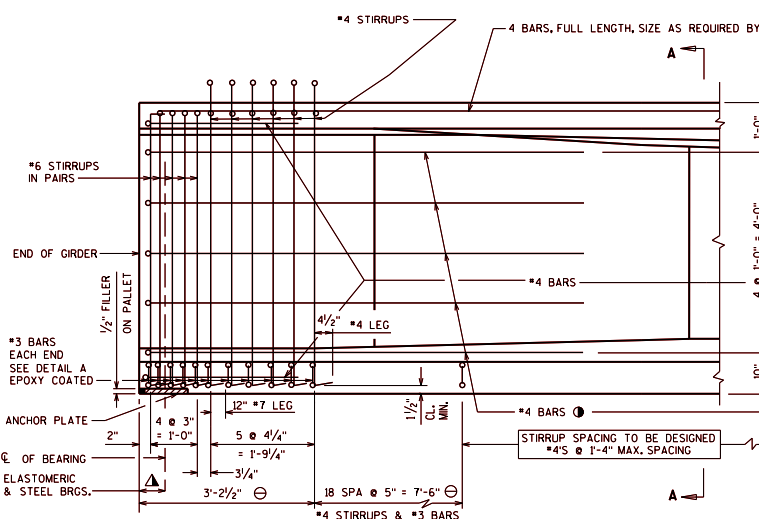
45" PRESTRESSED GIRDER DESIGN DATA



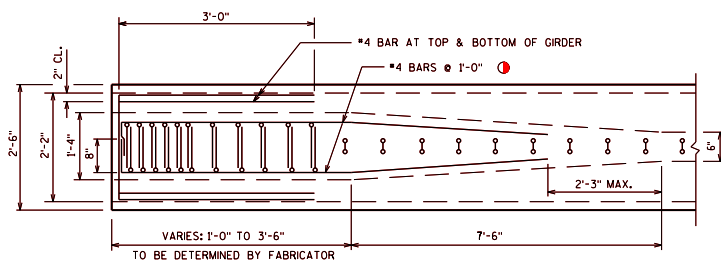
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

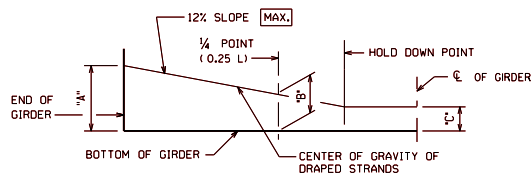
DATE:
7-16



**SUPPORT WITH STEEL
OR ELASTOMERIC BRGS.**



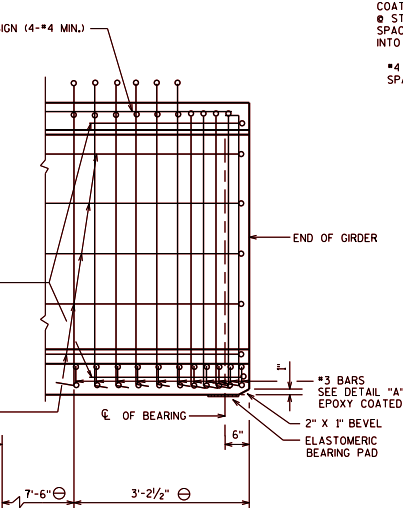
PLAN VIEW



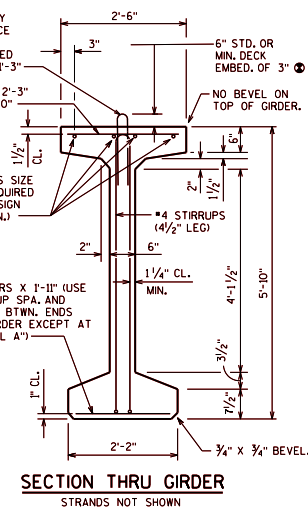
"A" TO BE GIVEN TO THE NEAREST 1"
"B" = $\frac{1}{4}A + 3$ (MIN.)
"C" = $\frac{1}{4}A + 3$ (MAX.)

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

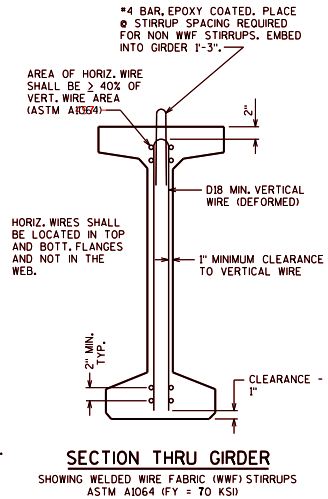
LOCATION OF DRAPED STRANDS



**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.

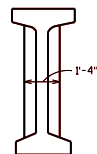
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED
ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.20
AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT
STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE
DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL
FROM THE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

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

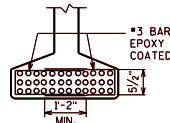
⊖ DETAIL TYPICAL AT EACH END

● 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 () DIA. 1/2" 7-WIRE LOW-RELAXATION STRANDS
WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

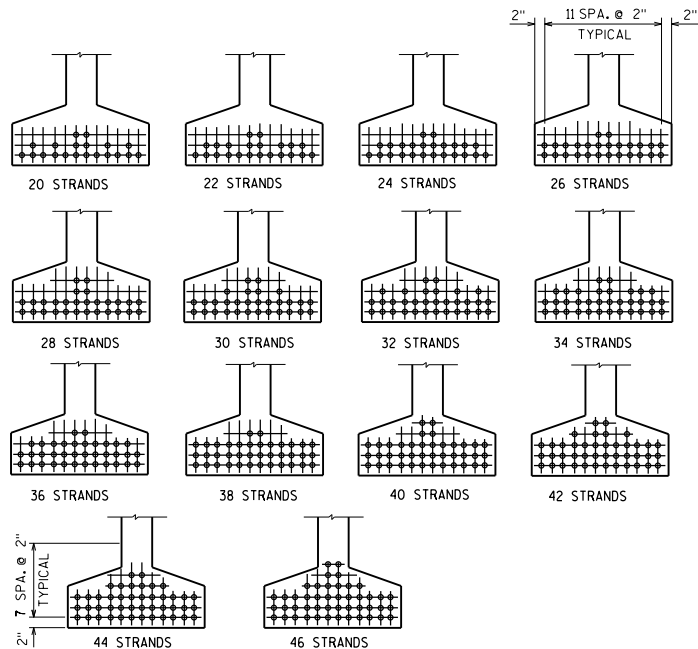
70" PRESTRESSED GIRDER DETAILS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-17



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

(COMPRESSION IS NEGATIVE)					
N NO. STRANDS	(1) e_s 0.5" DIA. STRANDS (inches)	(2) $(1 + \frac{e_s y_B}{r^2})$ 0.5" DIA. STRANDS (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

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

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

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

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

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

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

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

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

PRE-TENSION

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

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

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

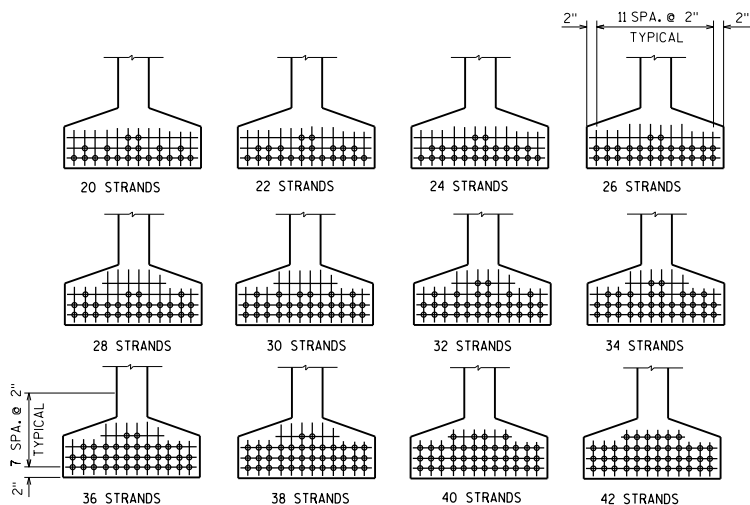
$$= 0.1531 \times 202,500 = 31.00 \text{ KIPS}$$

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

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

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

(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



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

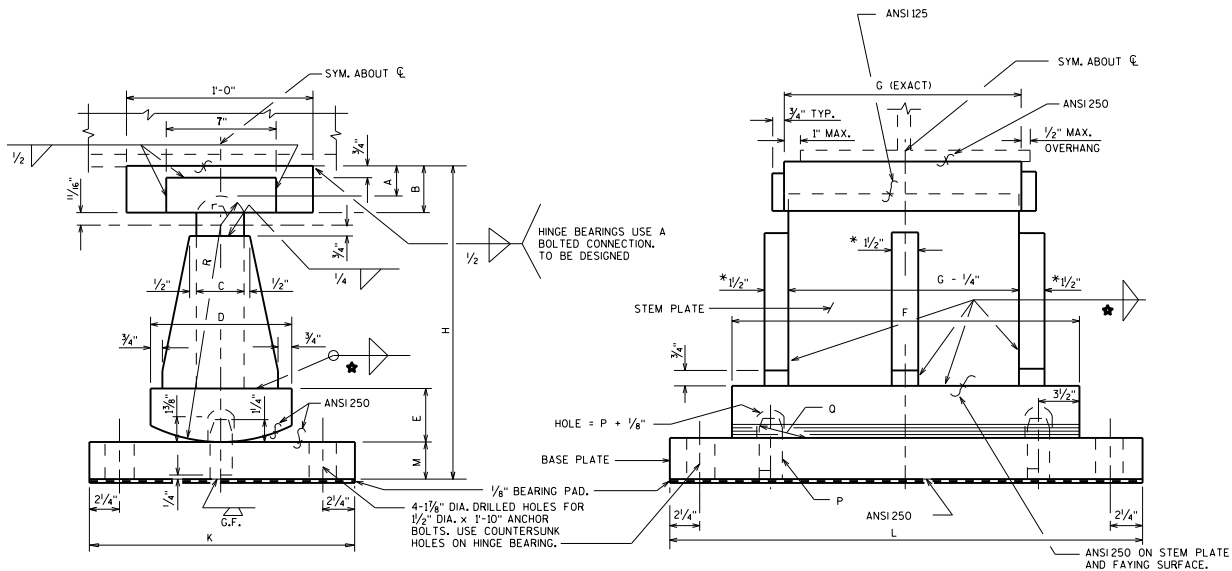
70" PRESTRESSED
GIRDER DESIGN DATA



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16



ROCKER

★ 400 K ≤ REACTION < 1000 K, USE 5/8" WELD.
1000 K ≤ REACTION ≤ 1500 K, USE 3/4" WELD.

* FOR REACTION ≥ 1000 KIPS
USE 2" STIFFENERS.

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 7/8"	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"	—	—	—	—	1'-9 1/2"	1'-8"	2 7/8"	1'-3"	1 1/8"	1 5/8"	2"	3 1/2"
700-799	2 1/8"	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 1/8"	1 5/8"	2"	3 1/2"
800-899	2 1/8"	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 1/8"	1 5/8"	2"	3 1/2"
900-999	2 1/8"	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 1/8"	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 3/8"	1'-7"	2 3/8"	2 5/8"	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 3/8"	1'-8"	2 3/8"	2 5/8"	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 3/8"	1'-9"	2 3/8"	2 5/8"	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 3/8"	1'-10"	2 3/8"	2 5/8"	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 3/8"	1'-11"	2 3/8"	2 5/8"	2 1/2"	3 3/4"
							G=1'-2"				G=1'-3"				G=1'-4"										
							G=1'-7"	2'-3"			1'-8"	2'-4"			1'-9"	2'-5"		1'-5"		2 3/8"	11"	1 1/8"	1 5/8"	2"	3 1/2"
0-300	1 1/8"	2 5/8"	3"	1'-0"	2 3/8"																				

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	(+)		(-)	
	PIER	PIER	PIER	PIER
120				
100				
80				
60				
40				
20				
0				
-20				

ROCKER BEARING SHALL BE SET VERTICAL AT 45° F.

ROCKER BEARING SHALL BE USED WITH A MINIMUM FRICTION VALUE OF 2% AND A MAXIMUM FRICTION VALUE OF 4%.

MAXIMUM MOVEMENT FROM 45° F = (D - 1")/2 BUT ACTUAL MOVEMENT NOT TO EXCEED R/3.

OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

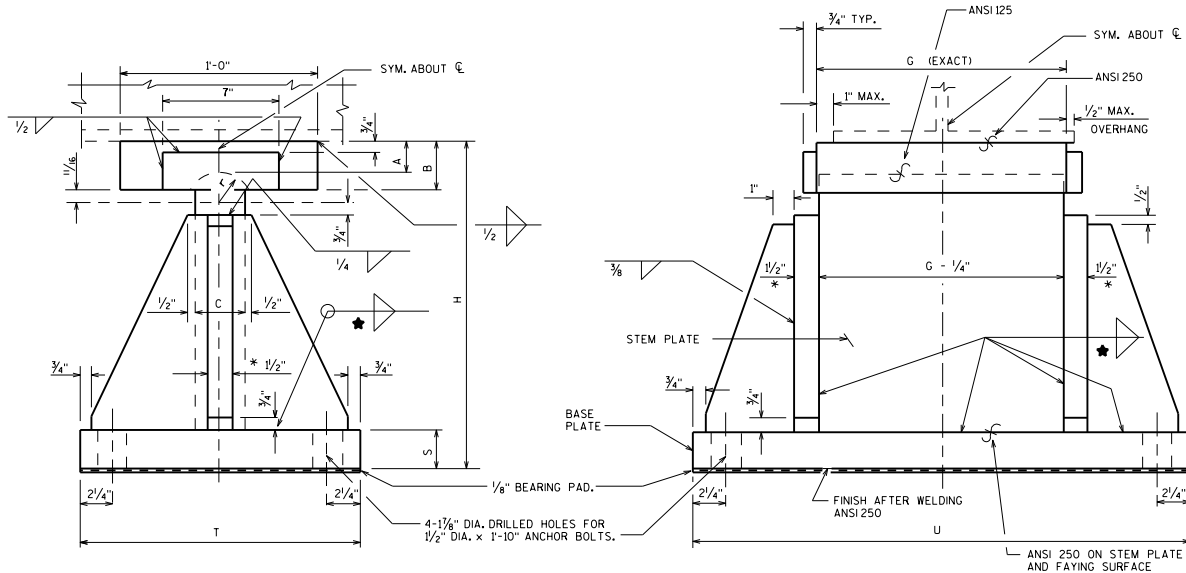
ROCKER BEARING TYPE 'B' - STEEL GIRDERS



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-16



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"

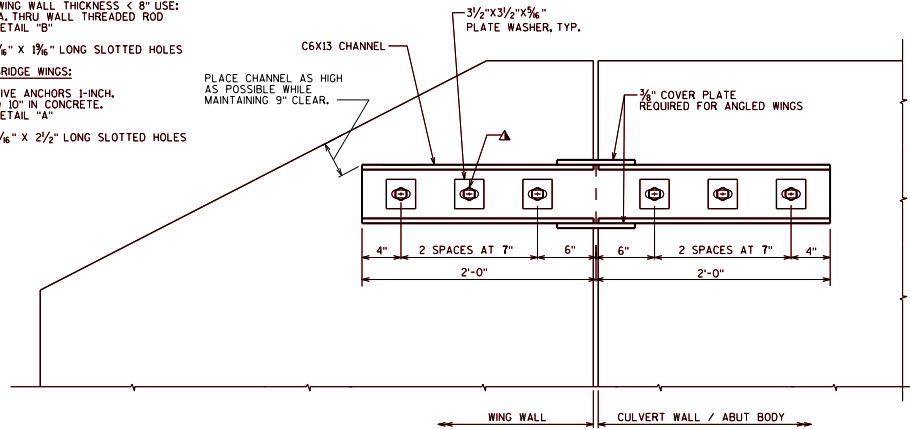
WITH WING WALL THICKNESS $< 8"$ USE:
 $\frac{3}{8}"$ DIA. THRU WALL THREADED ROD
SEE DETAIL "B"

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

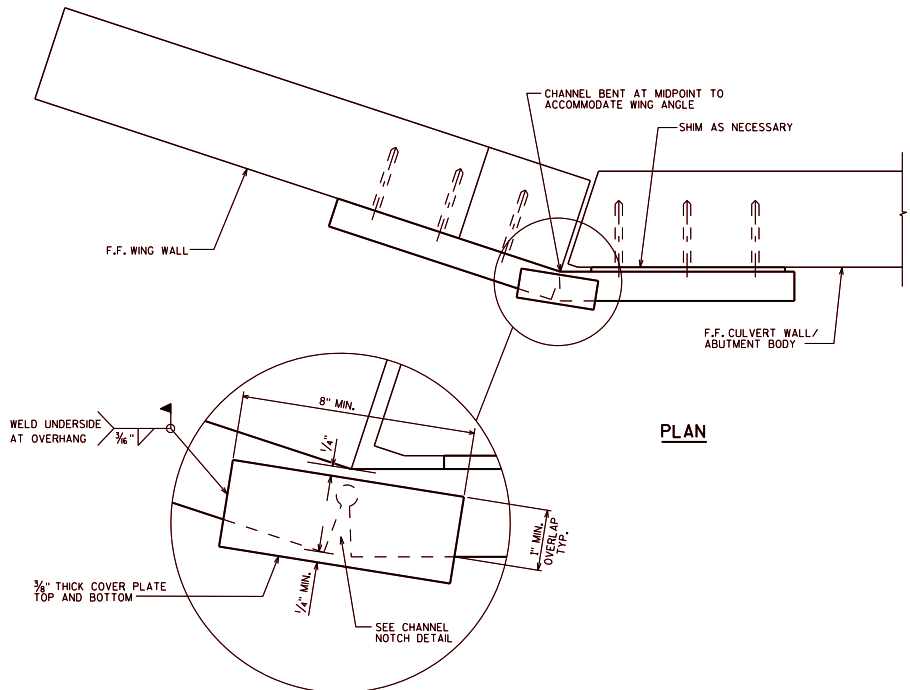
FOR BRIDGE WINGS:

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

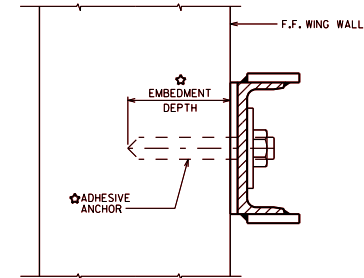
USE $\frac{1}{4}" \times 2\frac{1}{2}"$ LONG SLOTTED HOLES



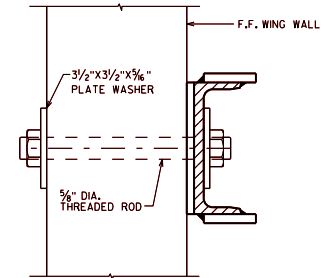
WING ELEVATION



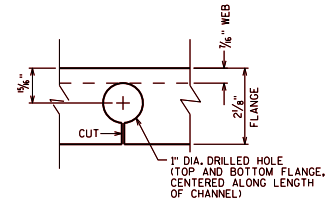
PLAN



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.

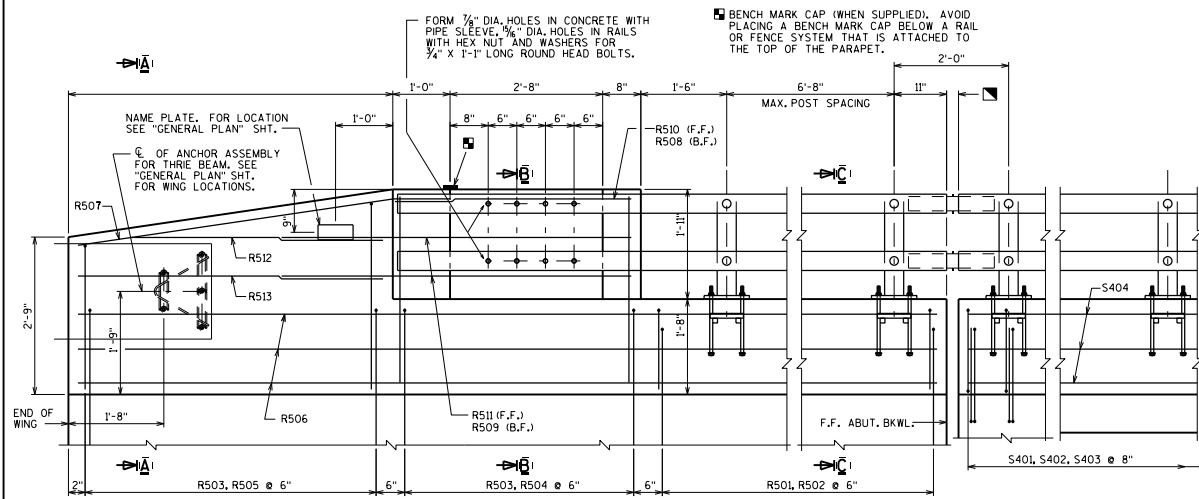
WING STRAPPING



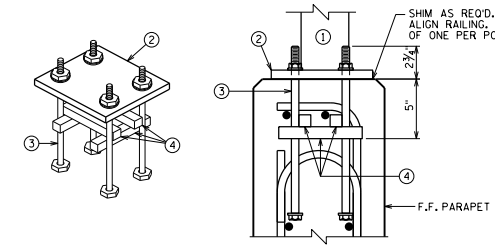
**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
7-18



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

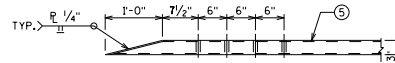


ANCHOR BOLTS FOR RAIL POSTS

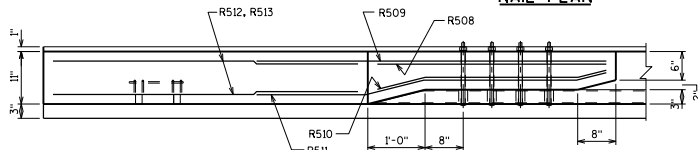
STRIP SEAL EXP. JT. @ ABUT. FOR TYPE A1 ABUT. USE 1/2" FILLER TO TOP OF PARAPET. SEE STD. 12.01/12.02

INSIDE ELEVATION

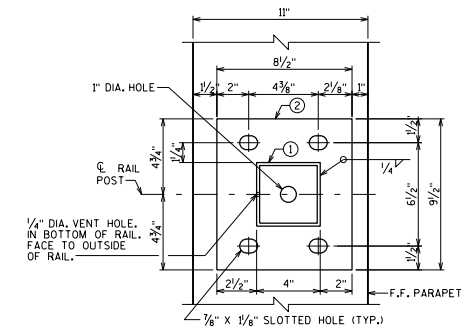
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-5". MIN CONSTR. JT. SPACING OF 80'-0". DEFINE CONSTR. JT. WITH A 3/4" V-GROOVE.



RAIL PLAN



PARAPET PLAN

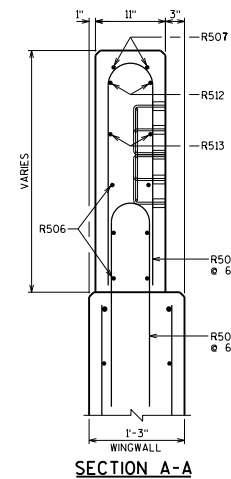


BASE PLATE

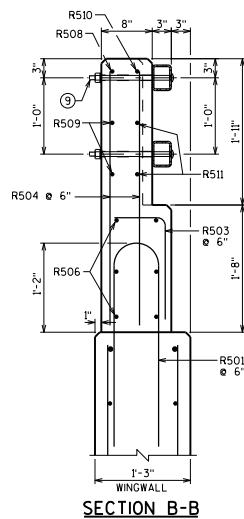
DESIGNER NOTES

DETAILS LIMITED TO SKEWS < 40°. SEE STANDARD 40.25 FOR RAILING DETAILS

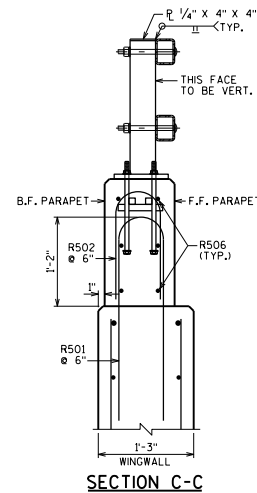
RAILING WEIGHT = 30 LB/FT



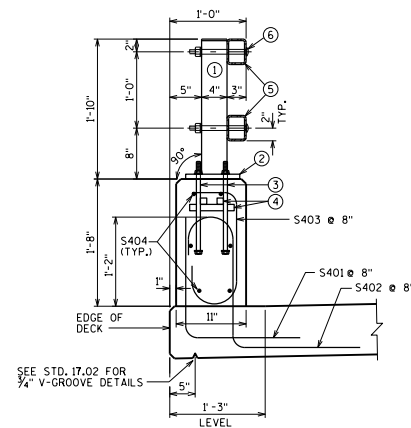
SECTION A-A



SECTION B-B



SECTION C-C



SECTION THRU DECK

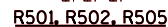
ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD (WHEN REQ'D.).

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



NOTES

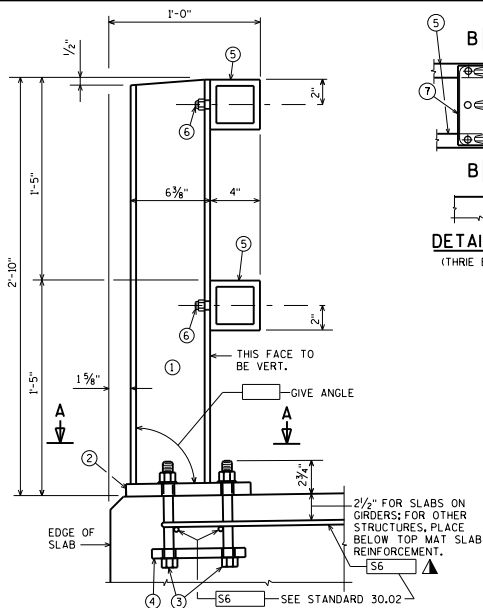
- ① TS 4 X 4 X 0.25 X 1'-9 1/2" STRUCTURAL TUBING WITH 3/4" DIA. HOLES FOR BOLT NO. 6. PLACE POSTS VERTICAL IN TRANSVERSE DIRECTION. WELD TO NO. 2. PLACE POSTS NORMAL TO GRADE LINE
- ② PLATE 3/4" X 8 1/2" X 3/2" WITH SLOTS X 1/4" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ③ 3/4" DIA. X 1'-1" LONG ASTM A325 HEX BOLTS (GALVANIZED) WITH A325 NUT AND WASHER, 4 REQD. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. EMBED A MIN. OF 10". CHAMFER TOP OF BOLTS BEFORE THREADING.
- ④ BAR 3/4" SQ. X 7" LONG. WELD TO ANCHOR BOLTS NO. 3 (GALVANIZED).
- ⑤ TS 4 X 3 X 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH BOLTS NO. 6. PROVIDE 3/4" DIA. HOLE FOR NO. 6.
- ⑥ 3/4" DIA. X 9" LONG ROUND HEAD BOLTS, ASTM A307, WITH HEX. NUT AND WASHERS AND LOCK WASHER, (1 REQD. AT EACH RAIL TO POST LOCATION.)
- ⑦ RECTANGULAR SLEEVE FABRICATED FROM 1/4" PLATES, 1'-6" LONG.
- ⑧ RECTANGULAR SLEEVE FABRICATED FROM 1/2" PLATES. PROVIDE "SLIDING FIT" WITH MIN. OUT TO OUT DIMENSION OF 3 3/4" X 2 1/2".
- ⑨ RECTANGULAR SLEEVE FABRICATED FROM 1/2" PLATES. PROVIDE "SLIDING FIT" WITH MIN. OUT TO OUT DIMENSION OF 3 3/4" X 2 1/2" WITH 3/4" PLATE AT ONE END WELDED ALL AROUND TO BLOCK WATER.
- ⑩ 3/4" DIA. X 1'-1" LONG ROUND HEAD BOLTS, ASTM A307, WITH HEX NUT AND WASHERS



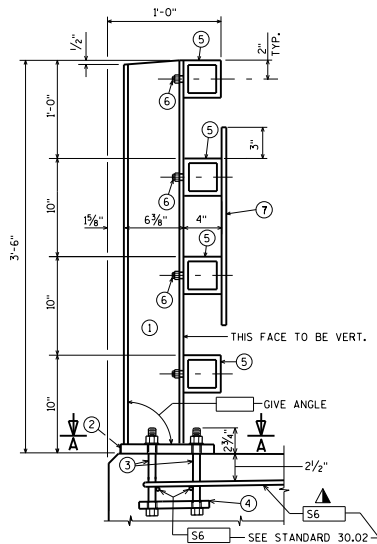
BAR MARK	FOOT	NO. RECD.	LENGTH	FOOT	BAR SERIES	LOCATION
54901.	X		3'-0"	X	-	CASAPPEI_YEB1.
54902.	X		4'-1"	X	-	CASAPPEI_YEB1.
54903.	X		2'-9"	X	-	CASAPPEI_YEB1.
54904.	X			-	-	CASAPPEI_YGB12.
B5001.	X		5'-9"	X	-	CASAPPEI_YEB1.
55002.	X		3'-1"	X	-	CASAPPEI_YEB1.
55003.	X		1'-11"	X	-	CASAPPEI_YEB1.
55004.	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.
55100.	X		4'-0"	X	-	CASAPPEI_HOB12.
55101.	X		6'-0"	X	-	CASAPPEI_HOB12.
55102.	X			-	-	CASAPPEI_HOB12.
55103.	X			-	-	CASAPPEI_HOB12.

MARK	NO. REQD.	LENGTH
R505	SERIES OF	5'-5" TO 6'-11"

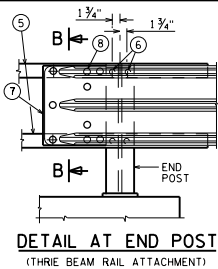
RAILING TUBULAR TYPE 'PF' DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-18</u>



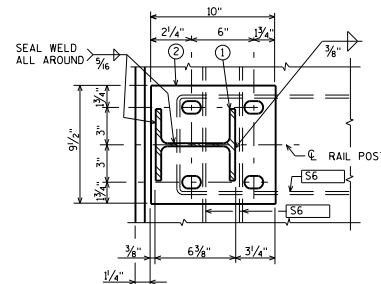
SECTION THRU RAILING ON DECK



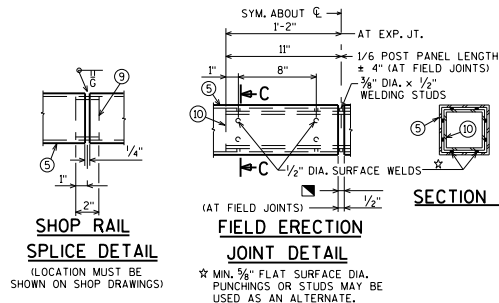
SECTION THRU RAILING ON SIDEWALK



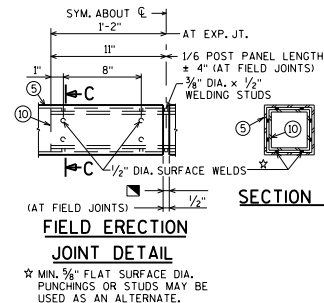
DETAIL AT END POST
(THREE BEAM RAIL ATTACHMENT)



SECTION A

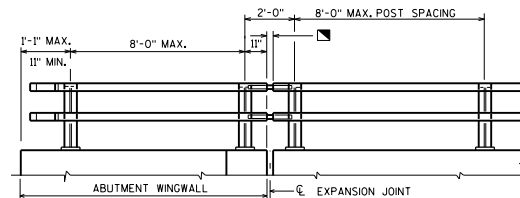


SHOP RAIL
SPlice DETAIL
(LOCATION MUST BE
SHOWN ON SHOP DRAWINGS)

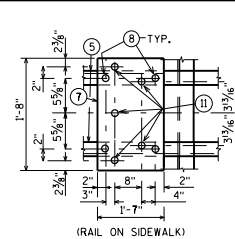


FIELD ERECTION
JOINT DETAIL

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

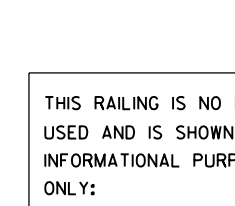


PART ELEVATION OF RAILING



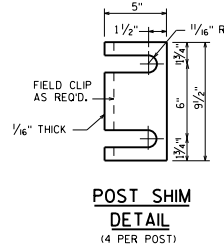
DETAIL FOR END POSTS

WITH OR WITHOUT THREE BEAM RAIL ATTACHMENT
(END POST MAY BE LOCATED ON
SUPERSTRUCTURE OR WINGWALLS)

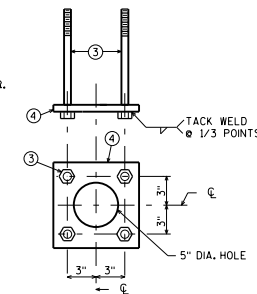


SECTION C

THIS RAILING IS NO LONGER
USED AND IS SHOWN FOR
INFORMATIONAL PURPOSES
ONLY:



POST SHIM
DETAIL
(4 PER POST)



ANCHORAGE DETAIL

LEGEND

- W6 x 25 WITH 1/4" DIA. HOLES ON EACH SIDE OF POST FOR STUD NO. 6, CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY (OR SIDEWALK, AS APPLICABLE). PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- PLATE 1" x 9 1/2" x 10" WITH 1/6" x 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3, WELD TO NO. 1 AS SHOWN.
- A325 - 3/8" DIA. HEX BOLTS (GALVANIZED) WITH A325 NUT & WASHER. 14" LONG AT END POSTS AND AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS > 15". USE 8" LONG AT ALL OTHER LOCATIONS. 4 REQ'D. PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING.
- 1/4" x 8" x 8" FLAT BAR WITH 15/16" DIA. HOLES FOR ANCHOR BOLTS NO. 3
- TS 4 x 4 x 0.25 STRUCTURAL TUBING, CONFORMING TO ASTM DESIGNATION A501 OR A500 GRADE B. ATTACH TO NO. 1 WITH STUDS NO. 6.
- 3/8" DIA. x 1 1/2" LONG SHOP WELDED STUDS WITH HEX NUT AND 2" WASHERS (2 REQ'D. AT EACH RAIL TO POST LOCATION.)
- PLATE 3/8" x 1'-4" (1'-7" ON SDWK.) x 1'-8". BOLT TO RAIL AS SHOWN IN DETAIL. REQ'D. AT THREE BEAM GUARD RAIL ATTACHMENTS ONLY. PLACE SYMMETRICALLY ABOUT TUBES NO. 5.
- 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5 FOR 3/8" DIA. A325 BOLTS W/ HEX NUTS AND WASHERS.
- SQUARE SLEEVE FABRICATED FROM 1/4" PLATE. PROVIDE "SLIDING FIT" WITH A MINIMUM OUT TO OUT DIMENSION OF 3 13/32".
- TS 3 x 3 x 0.25 x (2'-4" AT EXPANSION JOINTS) & (1'-10" AT FIELD JOINTS) LONG. PROVIDE 1/2" DIA. SURFACE WELDS ON ALL SIDES AS SHOWN. GRIND WELDS TO FIT FREE INTO I.D. OF NO. 5. PROVIDE 3/8" DIA. x 1 1/2" WELDING STUDS ON TOP AND BOTTOM SURFACES AT CENTERLINE.
- 3/8" DIA. x 1 1/2" LONG THREADED SHOP WELDED STUDS. (REQ'D. FOR SDWK. RAIL ONLY.)

NOTES

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

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

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

FOR RAILING NOT TO BE PAINTED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 4 SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.

FOR RAILING TO BE PAINTED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL NO. 3 & 4, SHALL BE PAINTED WITH A THREE-COAT ZINC RICH EPOXY SYSTEM, PRIOR TO PAINTING. ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 11 NEAR WHITE BLAST CLEANING BY SSPC SPECIFICATIONS.

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

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

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

PLACE FIRST BOTTOM LONGITUDINAL BAR CLEAR OF DRIP GROOVE.

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

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

▲ TIE TO TOP MAT OF STEEL.

TUBULAR STEEL RAILING TYPE 'F'	
BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-16</u>

[illegible]

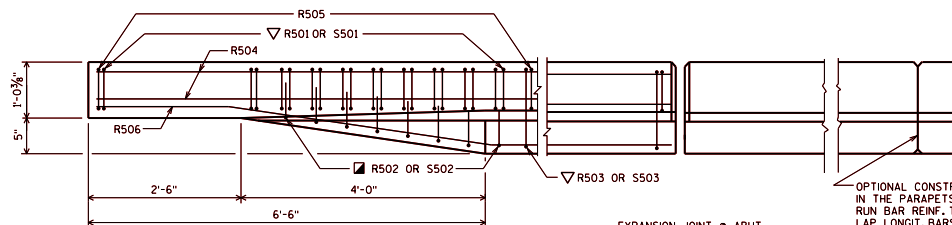
◆ ROADWAY OPENING OR 2½" MIN. FOR EXPANSION JOINT.
USE ½" OPENING WITH FILLER FOR A1 ABUTMENTS

SECTION B

SECTION C

FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.		LENGTH	BENT	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.

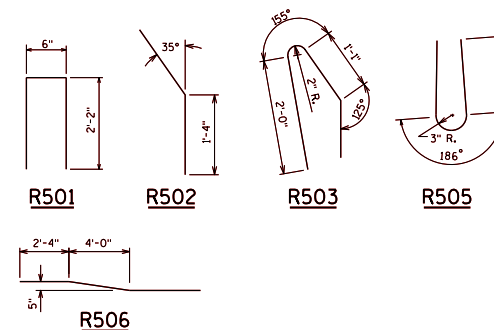


PLAN

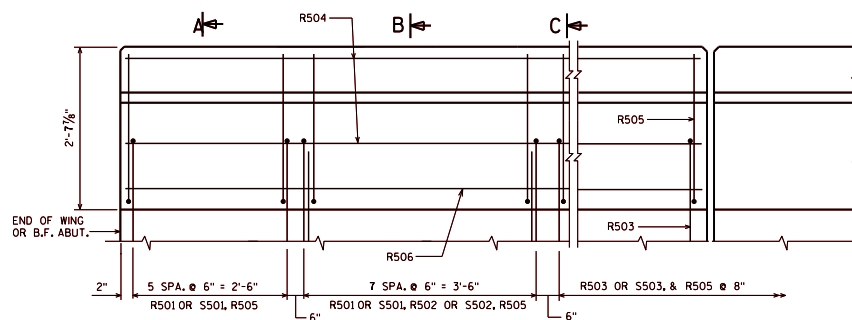
EXPANSION JOINT @ ABUT.
0° SKEW SHOWN. MATCH EXP.
JT. OPENING.

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

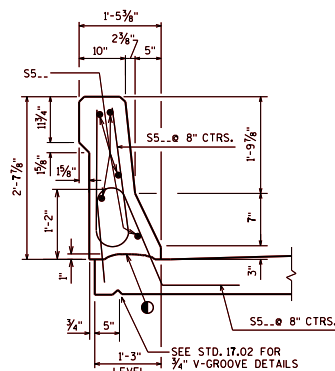
OPTIONAL CONSTRUCTION JOINTS
IN THE PARAPETS MAY BE USED.
RUN BAR REINF. THRU THE JOINT.
LAP LONGIT. BARS A MIN. OF 1'-9".
MIN. JOINT SPACING OF 80'-0".
DEFINE CONST. JOINT WITH A $\frac{3}{4}$ " -
"V" GROOVE.



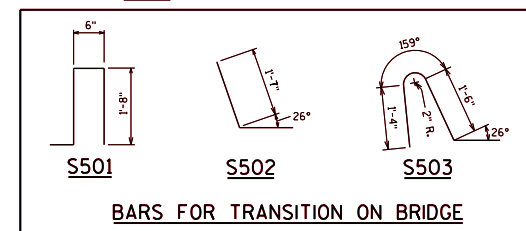
R506



OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE



BARS FOR TRANSITION ON BRIDGE

AREA = 2.58 SF
WEIGHT = 387 LB/FT

● CONST. JOINT - STRIKE OFF AS SHOWN.

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

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

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

SLOPED FACE PARAPET 'LF'



**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:

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

INSIDE ELEVATION

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

SECTION A

SECTION B

SECTION C

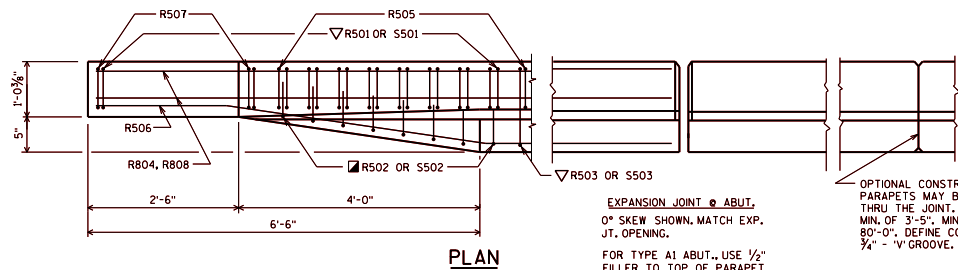
BILL OF BARS

FOR ABUTMENT PARAPETS

BAR MARK	COAT	ABUT.	ABUT.	LENGTH	BEAT	BAR SERIES	LOCATION
B5Q1.	X			4'-7"	X		PARAPEL VERT.
B5Q2.	X			2'-4"	X		PARAPEL VERT.
B5Q3.	X			4'-7"	X		PARAPEL VERT.
B8Q4.	X						PARAPEL HORIZ.
B5Q5.	X			6'-6"	X		PARAPEL VERT.
B5Q6.	X				X		PARAPEL HORIZ.
B5Q7.	X			5'-8"		▲	PARAPEL VERT.
B8Q8.	X				X		PARAPEL HORIZ.
	-						
	-						
	-						
	-						
	-						
S5Q1.	X			4'-5"	X		PARAPEL VERT.
S5Q2.	X			2'-4"	X		PARAPEL VERT.
S5Q3.	X			4'-2"	X		PARAPEL VERT.

BAR SERIES TABLE

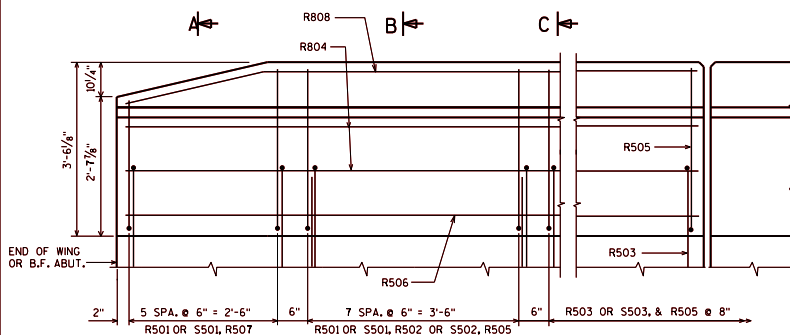
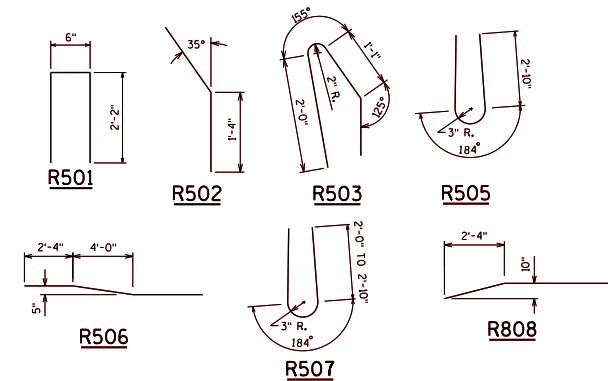
MARK	NO. REOD.	LENGTH
B507..	4_ SERIES OF 6_	4'-10" TO 6'-6"



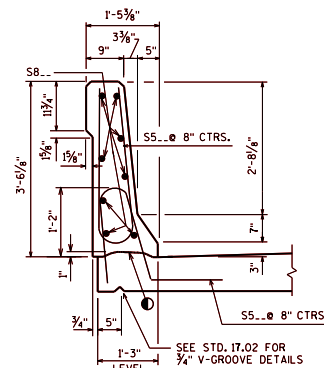
EXPANSION JOINT @ ABUT.
0° SKEW SHOWN. MATCH EXP.
JT. OPENING.

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

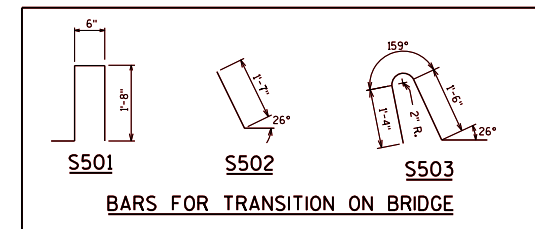
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 3'-5". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A $\frac{3}{4}$ " - 'V' GROOVE.



OUTSIDE ELEVATION



SECTION THRU PARAPET 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.

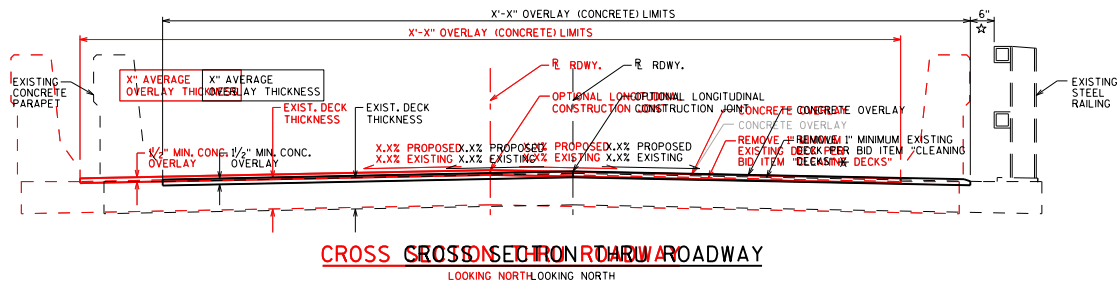
SLOPED FACE PARAPET 'HF'



BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-19



DESIGN DATA

LIVE LOAD:
INVENTORY RATING: HS-20-44
OPERATING RATING: HS-20-44
WISCONSIN STANDARD PERMIT VEHICLE (WIS-SPV) = 700 KIPS

MATERIAL PROPERTIES:
CONCRETE MASONRY OVERLAY DECKS $f'_c = 4,000$ P.S.I.

NOTES

DRAWINGS SHALL NOT BE SCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

PROTECTIVE SURFACE TREATMENT SHALL BE APPLIED TO THE ENTIRE TOP SURFACE OF THE NEW CONCRETE OVERLAY.

SEAL OVERLAY CONSTRUCTION JOINTS ACCORDING TO SECTION 502.3.13.1 OF THE STANDARD SPECIFICATIONS. COST IS INCIDENTAL TO BID ITEM "CONCRETE MASONRY OVERLAY DECKS".

A MINIMUM OF 1" OF CONCRETE SHALL BE REMOVED FROM THE ENTIRE BRIDGE DECK UNDER THE BID ITEM "CLEANING DECKS" AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY OVERLAY DECKS". THE AVERAGE OVERLAY THICKNESS IS BASED ON THE MINIMUM OVERLAY THICKNESS PLUS $\frac{1}{2}$ " INCH TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE, AT OR JOINT REPAIRS AT THE ABUTMENTS TO BE CONSIDERED INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS". PREPARATION DECKS TYPE 1, PREPARATION DECKS TYPE 2, AND FULL-DEPTH DECK REPAIR AREAS ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY OVERLAY DECKS". EXPECTED AVERAGE OVERLAY THICKNESS IS 2" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN $\frac{1}{2}$ ", CONTACT THE STRUCTURES DESIGN SECTION.

DRAINS REMOVED OR CLOSED IS INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS".

DESIGNER NOTES

PLAN VIEW APPLICABLE TO ALL OVERLAY METHODS AND DECK REPAIRS WITHOUT OVERLAYS.

FOR CROSS SECTIONS NOT IN SUPERELEVATION TRANSITIONS, THE PREFERRED MINIMUM SLOPE IS 2%.

PROVIDE AN AVERAGE OVERLAY THICKNESS ON THE PLANS. THE AVERAGE OVERLAY THICKNESS IS THE MINIMUM OVERLAY THICKNESS PLUS $\frac{1}{2}$ " TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE. CHANGES IN CROSS-SLOPE INCREASE THE AVERAGE OVERLAY THICKNESS. QUANTITIES ARE BASED ON THE AVERAGE OVERLAY THICKNESS.

DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

DO NOT INCLUDE BID ITEM "SAWING PAVEMENT DECK PREPARATION AREAS" FOR DECK PREPARATION.

* REMOVAL OF 1" OF EXISTING DECK UNDER BID ITEM "CLEANING DECKS" IS NOT INTENDED FOR PREVIOUSLY OVERLAIN DECKS. EXISTING CONCRETE COVER (1" MIN.) SHALL BE MAINTAINED AND CONSIDERED WHEN DETERMINING CONCRETE REMOVALS. INCLUDE THE BID ITEM "CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY" WHEN REMOVING EXISTING OVERLAY.

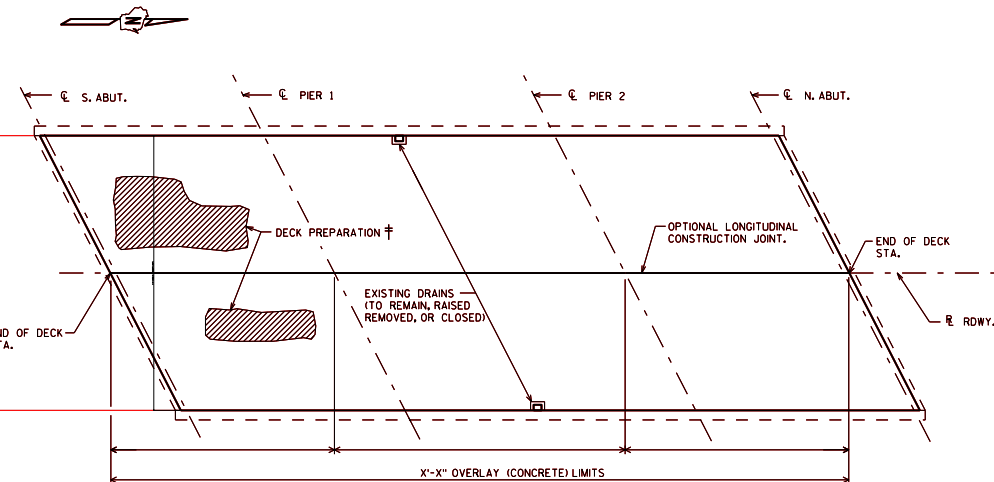
† PROVIDE (IF AVAILABLE) DECK CONDITION ASSESSMENT SURVEY ON PLANS. INCLUDE SURVEY TYPE AND DATE COMPLETED.

JOINT REPAIR AREAS SHOULD NOT BE INCLUDED IN DECK REPAIR AREAS OR OVERLAY QUANTITIES. SEE STANDARD 40.04.

INCLUDE THE BID ITEM "ADJUSTING FLOOR DRAINS" WHEN DRAINS ARE TO BE RAISED.

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

* OVERLAY LIMIT SHOULD BE OFFSET FROM EXISTING OPEN STEEL RAILING FOR IMPROVED ACCESS FOR DECK REMOVAL AND OVERLAY PLACEMENT. OVERLAY LIMITS FOR PREVIOUSLY OVERLAIN DECKS SHALL BE BASED ON THE EXISTING OVERLAY LIMITS.



† SURVEY TYPE:
SURVEY COMPLETED DATE: --/--/----

PLAN
TOP OF DECK SHOWN

TOTAL ESTIMATED QUANTITIES TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	BID ITEM NUMBER	UNIT	TOTAL	BID ITEMS	UNIT	TOTAL
502.3200	PROTECTIVE SURFACE TREATMENT	502.3200	PROTECTIVE SURFACE TREATMENT			SY	
509.0301	PREPARATION DECKS TYPE 1	509.0301	PREPARATION DECKS TYPE 1			SY	
509.0302	PREPARATION DECKS TYPE 2	509.0302	PREPARATION DECKS TYPE 2			SY	
509.0500	CLEANING DECKS	509.0500	CLEANING DECKS			SY	
509.2000	FULL-DEPTH DECK REPAIR	509.2000	FULL-DEPTH DECK REPAIR			SY	
509.2500	CONCRETE MASONRY OVERLAY DECKS	509.2500	CONCRETE MASONRY OVERLAY DECKS			CY	
	POSSIBLE ADDITIONAL BID ITEMS		POSSIBLE ADDITIONAL BID ITEMS				
502.3210	PIGMENTED SURFACE SEALER	502.3210	PIGMENTED SURFACE SEALER			SY	
* 509.0505.S	CLEANING DECKS TO REAPPLY CONCRETE MASONRY OVERLAY	509.0505.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	

THIS IS A PARTIAL LIST OF POSSIBLE BID ITEMS. BID ITEMS MAY NEED TO BE ADDED OR REMOVED TO FIT EACH INDIVIDUAL CASE.

CONCRETE OVERLAY



**BUREAU OF
STRUCTURES**

APPROVED: *Bill Oliva*

DATE:
7-29



DESIGN DATA

LIVE LOAD:
INVENTORY RATING: HS-20
OPERATING RATING: HS-20
MAXIMUM STANDARD PERMIT VEHICLE (WIS-SPV) = ... KIPS

NOTES

DRAWINGS SHALL NOT BE ISCALED.

DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.

1/2" 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".

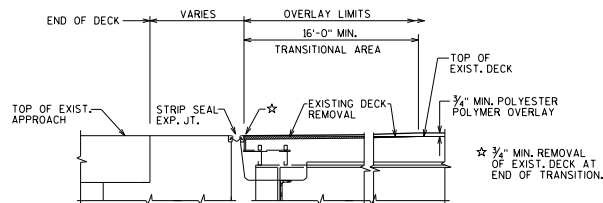
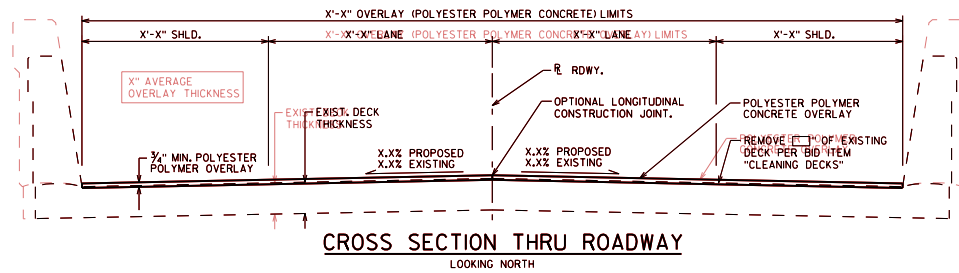
OVERLAY CONSTRUCTION JOINTS SHALL BE APPROVED BY THE ENGINEER. AVOID PLACING LONGITUDINAL JOINTS NEAR WHEEL PATHS. WHEN REQUIRED, PLACE LONGITUDINAL JOINTS AT LANE LINES OR IN THE MIDDLE OF THE LANE. WHEEL PATHS DURING TEMPORARY TRAFFIC STAGING NEED NOT BE CONSIDERED.

DESIGNER NOTES

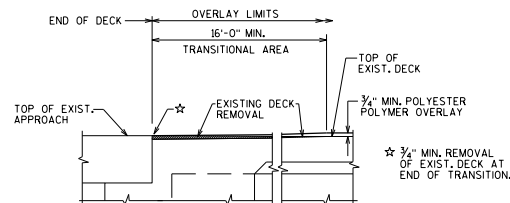
USE OF PPC OVERLAYS ARE LIMITED. SEE 40.5 IN THE BRIDGE MANUAL FOR ADDITIONAL GUIDANCE.

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 SPECIFIED THE MINIMUM TRANSITION AREA LENGTH. PROVIDE OVERLAY TRANSITIONAL AREA DETAILS AND IDENTIFY LOCATIONS ON THE PLANS. SEE 40.5.6 FOR ADDITIONAL GUIDANCE. WHEN PARTIAL DEPTH REMOVAL OF THE ENTIRE EXISTING DECK IS WARRANTED, USE BID ITEM "CLEANING DECKS". PLANS SHALL SPECIFY THE REQUIRED REMOVAL DEPTH. DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS. DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.

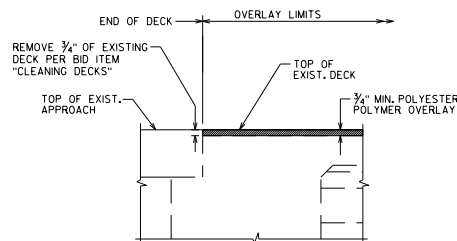


SECTION THRU ABUTMENT
TRANSITIONAL AREA ON DECK
AT EXPANSION JOINT



SECTION THRU ABUTMENT
TRANSITIONAL AREA ON DECK
AT SEMI-EXPANSION OR FIXED JOINT

NOTE: TRANSITIONAL AREA REQUIRED WHEN APPROACH PAVEMENT HAS BEEN PLACED PRIOR TO OVERLAY PLACEMENT.



SECTION THRU ABUTMENT
(WHEN BID ITEM "CLEANING DECKS" IS USED, TRANSITIONAL AREA NOT REQUIRED.)

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
TOTAL ESTIMATED QUANTITIES			
BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0310	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.

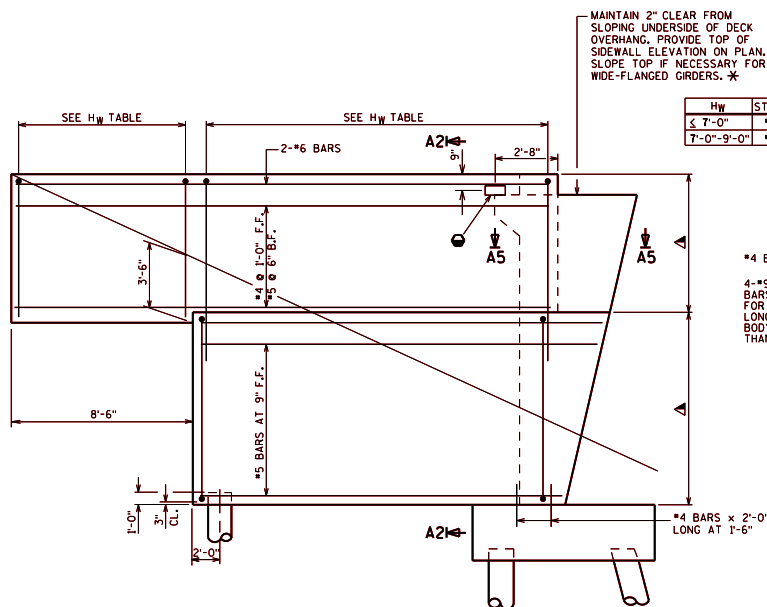
POLYESTER POLYMER CONCRETE OVERLAY



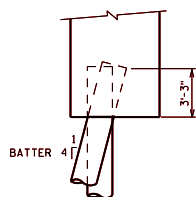
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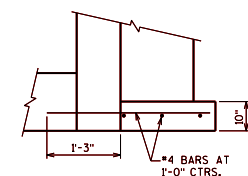
DATE:
7-20



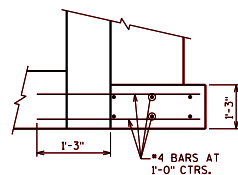
WING ELEVATION
WING LENGTH TO 26'-6"



SECTION A4

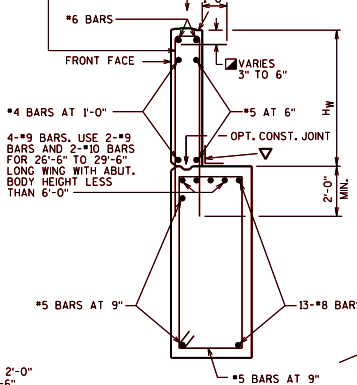


SECTION A5
(WITHOUT STRUCTURAL APPROACH SLAB)

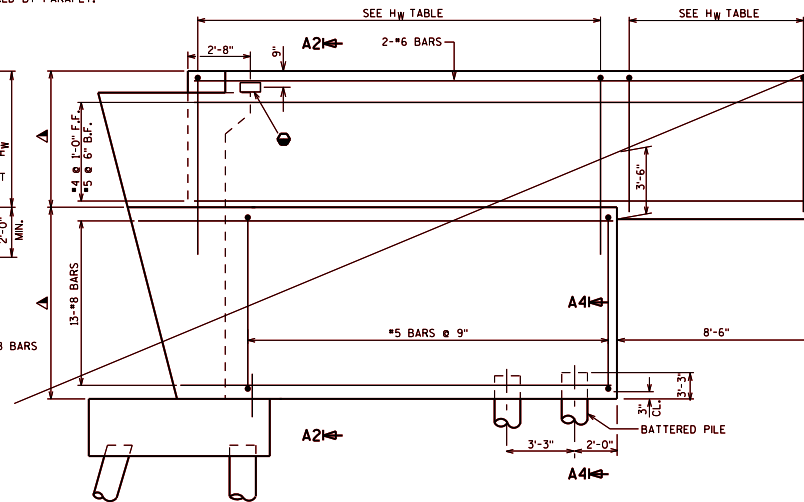


SECTION A5
(WITH STRUCTURAL APPROACH SLAB)

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.

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:
 $\gamma_{DC} = 1.25$
 $\gamma_{DW} = 1.50$
 $\gamma_{DEH} = 1.50$
 $\gamma_{DEH_{MIN}} = 0.90$
 $\gamma_{DEW} = 1.35$
 $\gamma_{LL} = 1.75$
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



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APPROVED: Bill Oliva

DATE:

1-18