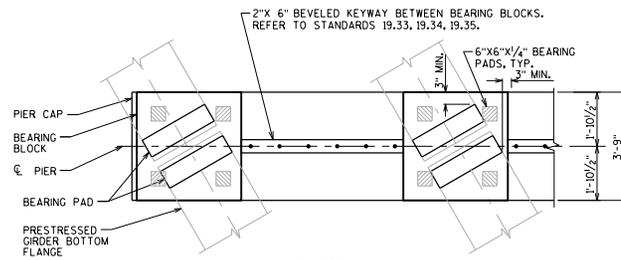


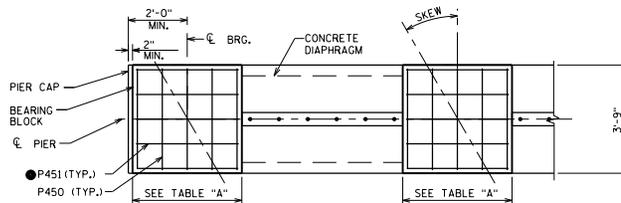
**PARTIAL TRANSVERSE SECTION  
AT DIAPHRAGM PIER**

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

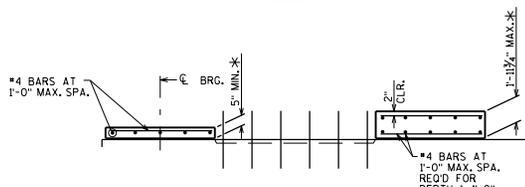
† BARS PLACED PARALLEL TO GIRDERS. SPACING PERPENDICULAR TO GIRDERS. MATCH SIMILAR BAR SHOWN IN CONTRACT PLANS.



**PLAN**



**PLAN**



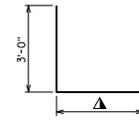
**ELEVATION**

**BILL OF BARS**

**TOTAL COATED: XX LBS**

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

SKREW 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"

**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**

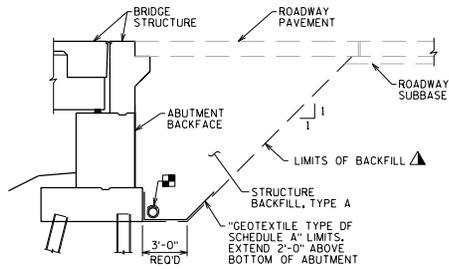
PRECAST BEARING BLOCK DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE FOR PRECAST PIERS.

\* 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.

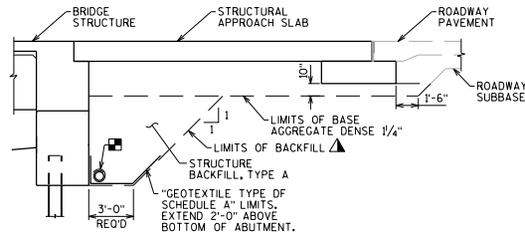
POLICY AND DETAILS REGARDING THE USE OF PRECAST PIER CAPS AND COLUMNS IS BEING DEVELOPED BY THE BUREAU OF STRUCTURES IN CONJUNCTION WITH THE I-39/90 PROJECT. SEE 7.1.4.1.2 FOR ADDITIONAL GUIDANCE.

<b>PRECAST BEARING BLOCK DETAILS</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17



**TYPICAL SECTION  
THRU ABUTMENT**

(A3) ABUTMENT WITHOUT STRUCTURAL APPROACH



**TYPICAL SECTION  
THRU ABUTMENT**

(A1) ABUTMENT WITH STRUCTURAL APPROACH

**NOTES (ABUTMENTS)**

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

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

AT THE BACKFACE OF ABUTMENT ALL VOLUME WHICH CANNOT BE PLACED BEFORE ABUTMENT CONSTRUCTION AND IS NOT OCCUPIED BY THE NEW STRUCTURE SHALL BE BACKFILLED WITH STRUCTURE BACKFILL.

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)

**NOTES (BOX CULVERTS)**

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

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

ALL VOLUME WHICH CANNOT BE PLACED BEFORE CULVERT CONSTRUCTION AND NOT OCCUPIED BY THE NEW STRUCTURE SHALL BE BACKFILLED WITH STRUCTURE BACKFILL WITHIN THE LENGTH OF THE CULVERT INCLUDING THE APRON WING WALLS.

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 "STRUCTURE BACKFILL 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 "STRUCTURE BACKFILL TYPE B" OF 6" MINIMUM DEPTH. (NOTE APPLICABLE WHEN PRECAST NOTE IS SHOWN ON THE PLANS)

**NOTES (RETAINING WALLS)**

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

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

AT THE BACKFACE OF WALL ALL VOLUME WHICH CANNOT BE PLACED BEFORE WALL CONSTRUCTION AND NOT OCCUPIED BY THE NEW STRUCTURE SHALL BE BACKFILLED WITH STRUCTURE BACKFILL. (NOTE APPLICABLE FOR CAST-IN-PLACE CONCRETE CANTILEVER WALLS AND SIMILAR STRUCTURES)

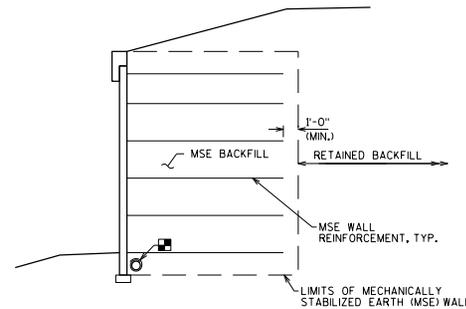
**DESIGNER NOTES**

▲ 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.

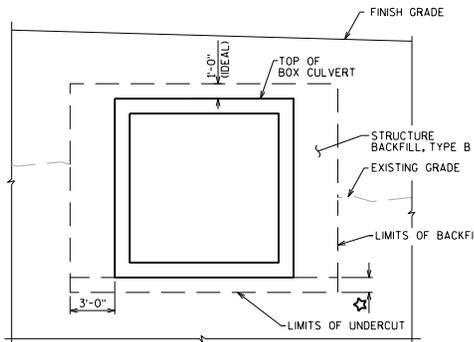
FOR CULVERTS, THE ABOVE NOTE REGARDING POTENTIAL SUBSTITUTION OF BREAKER RUN SHOULD ONLY BE INCLUDED ON THE PLANS IF ALLOWED BY THE REGION GEOTECHNICAL ENGINEER.

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

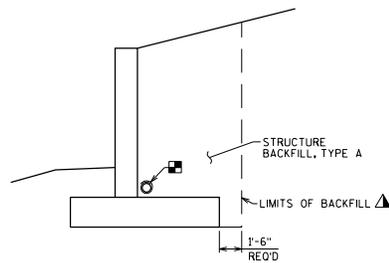
★ CULVERT UNDERCUT AND BEDDING BACKFILL TO BE DETERMINED BY GEOTECHNICAL ENGINEER. (CHOOSE APPLICABLE NOTE, MODIFY AS NEEDED)



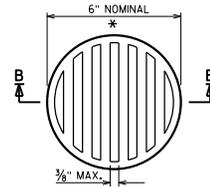
**TYPICAL SECTION  
THRU MSE RETAINING WALL**



**TYPICAL SECTION  
THRU BOX CULVERT**



**TYPICAL SECTION  
THRU RETAINING WALL**



**RODENT SHIELD DETAIL**

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

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

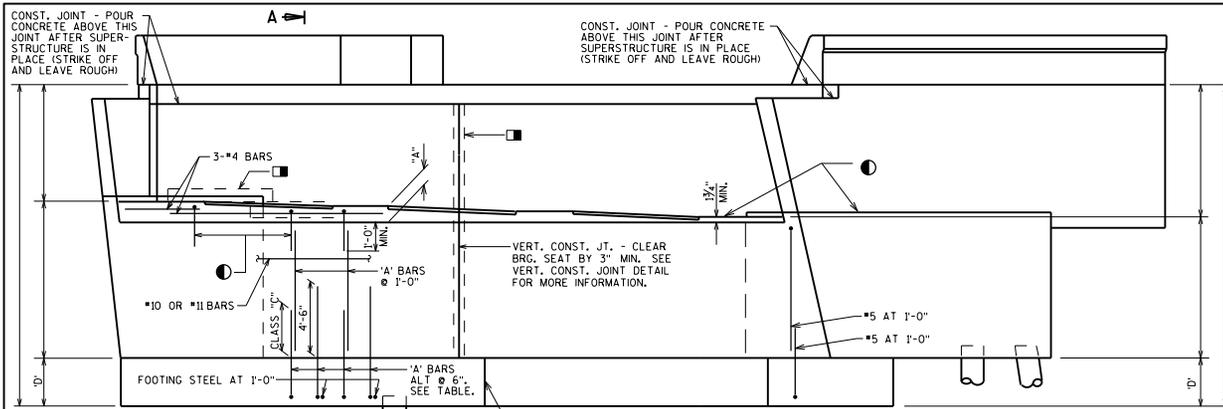
THE RODENT SHIELD SHALL BE A PVC GRATE SIMILAR TO THIS DETAIL. THE GRATE IS COMMERCIALY AVAILABLE AS A FLOOR STRAINER. A PIPE COUPLING IS REQUIRED FOR THE ATTACHMENT OF THIS SHIELD TO THE EXPOSED END OF THE PIPE UNDERDRAIN. THE SHIELD SHALL BE FASTENED TO THE PIPE COUPLING WITH TWO OR MORE NO. 10 X 1-INCH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



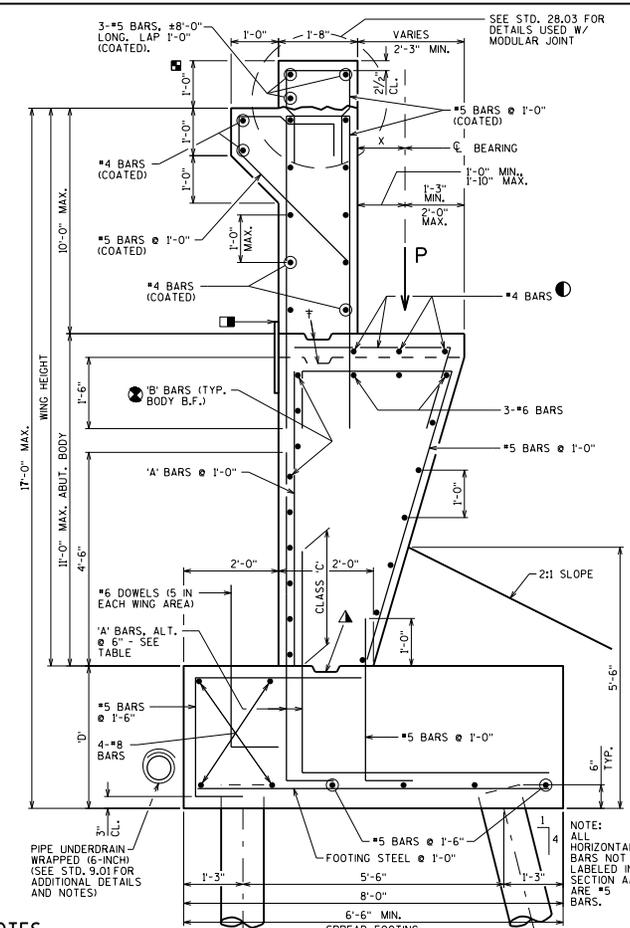
**SECTION B-B**

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

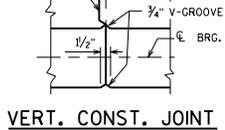
<b>STRUCTURE BACKFILL LIMITS AND NOTES</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-17</u>



**FRONT ELEVATION**



**SECTION A-A**



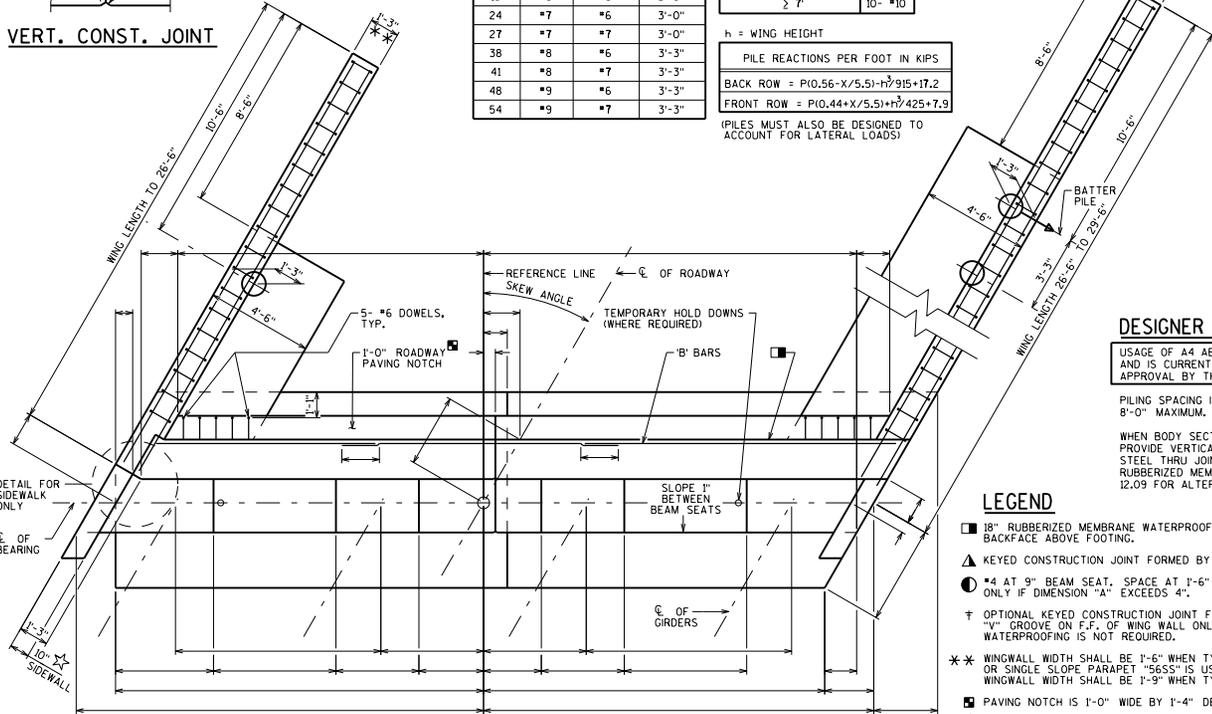
**VERT. CONST. JOINT**

$$P = \gamma DC (P_{DC}) + \gamma D_w (P_{D_w}) + \gamma_{LL} (P_{LL})$$

'P' k/FT	'A' BAR SIZE	FOOTING STEEL SIZE	FOOTING DEPTH 'D'
16	#6	#6	3'-0"
24	#7	#6	3'-0"
27	#7	#7	3'-0"
38	#8	#6	3'-3"
41	#8	#7	3'-3"
48	#9	#6	3'-3"
54	#9	#7	3'-3"

ABUTMENT BODY DEPTH	'B' BARS
< 7'	9- #11
> 7'	10- #10

h = WING HEIGHT  
**PILE REACTIONS PER FOOT IN KIPS**  
 BACK ROW =  $P(0.56 - X/5.5) + 7/915 + 17.2$   
 FRONT ROW =  $P(0.44 + X/5.5) + 7/425 + 7.9$   
 (PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS)



**PLAN**

**DESIGNER NOTES**

USAGE OF A4 ABUTMENTS HAS BEEN LIMITED OVER THE YEARS AND IS CURRENTLY UNDER REVIEW TO BE DISCONTINUED. APPROVAL BY THE BUREAU OF STRUCTURES IS REQUIRED.

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

WHEN BODY SECTION IS MORE THAN 50'-0" LONG, PROVIDE VERTICAL CONSTRUCTION JOINT. RUN BAR STEEL THRU JOINT, SEAL JOINT WITH 38" RUBBERIZED MEMBRANE WATERPROOFING. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.

**LEGEND**

- 38" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZ. AND VERT. JOINTS ON BACKFACE ABOVE FOOTING.
- ▲ KEYPED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".
- #4 AT 9" BEAM SEAT. SPACE AT 1'-6" BETWEEN SEATS. THIS STEEL IS REQUIRED ONLY IF DIMENSION "A" EXCEEDS 4".
- † OPTIONAL KEYPED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6". USE 3/4" V-GROOVE ON F.F. OF WING WALL ONLY. IF JOINT IS NOT USED, WATERPROOFING IS NOT REQUIRED.
- \* WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX", OR SINGLE SLOPE PARAPET "56SS" IS USED. "56SS" SHOULD NOT BE USED ON A SIDEWALK. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
- PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- ☆ SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.
- SHOW ALL BARS FOR CLARITY.

**DESIGNER NOTES CONT'D**

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

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

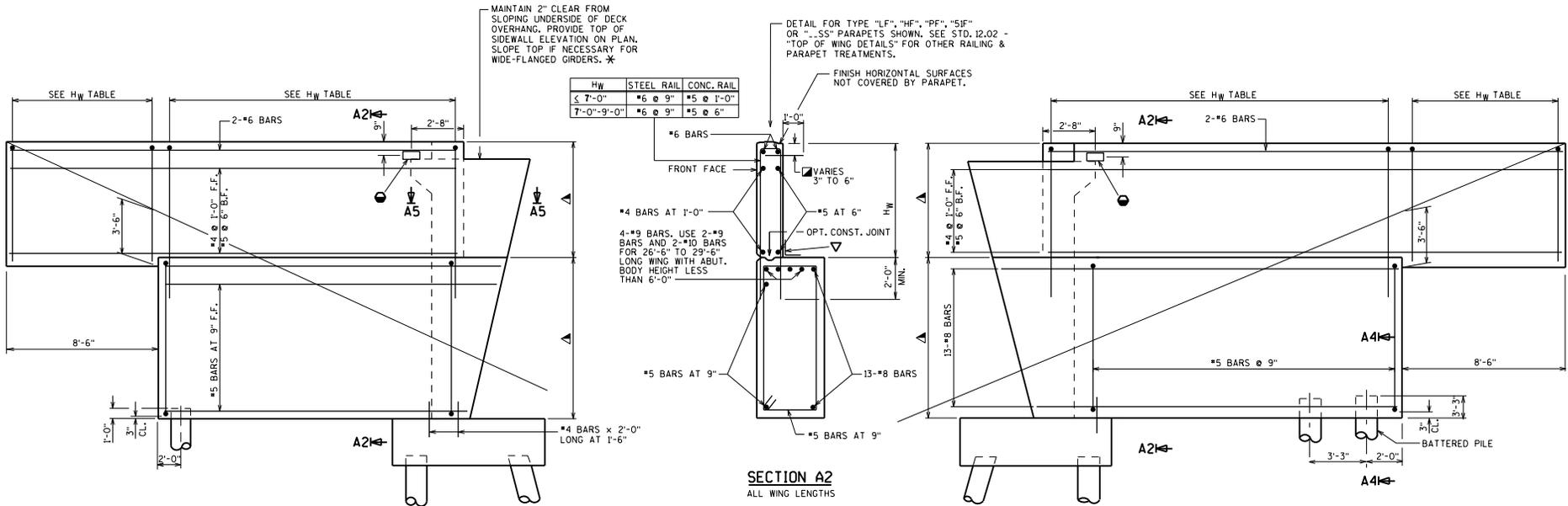
PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY. SEE STD. 12.03 FOR ADDITIONAL DETAILS.

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

**ABUTMENT A4 PILE FOOTING**

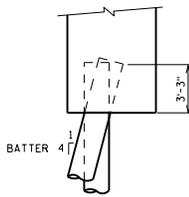


DATE: \_\_\_\_\_  
 APPROVED: Bill Oliva 7-17

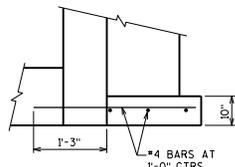


**WING ELEVATION**  
WING LENGTH TO 26'-6"

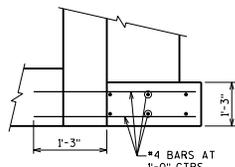
**WING ELEVATION**  
WING LENGTH OVER 26'-6" TO 29'-6"



**SECTION A4**



**SECTION A5**  
(WITHOUT STRUCTURAL APPROACH SLAB)



**SECTION A5**  
(WITH STRUCTURAL APPROACH SLAB)

**DESIGNER NOTES**

USAGE OF A4 ABUTMENTS HAS BEEN LIMITED OVER THE YEARS AND IS CURRENTLY UNDER REVIEW TO BE DISCONTINUED. APPROVAL BY THE BUREAU OF STRUCTURES 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".

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  $\gamma_{DEHmin} = 0.90$ , 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.

\*A DOWELS (COATED), 2'-0" LONG AT 1'-0" CTRS. FROM WING TIP TO PAVING NOTCH, PLACE IN WING ADJACENT TO SURFACE DRAIN APRON ONLY.

ALL DIMENSIONS TO BE CONSTANT.

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

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

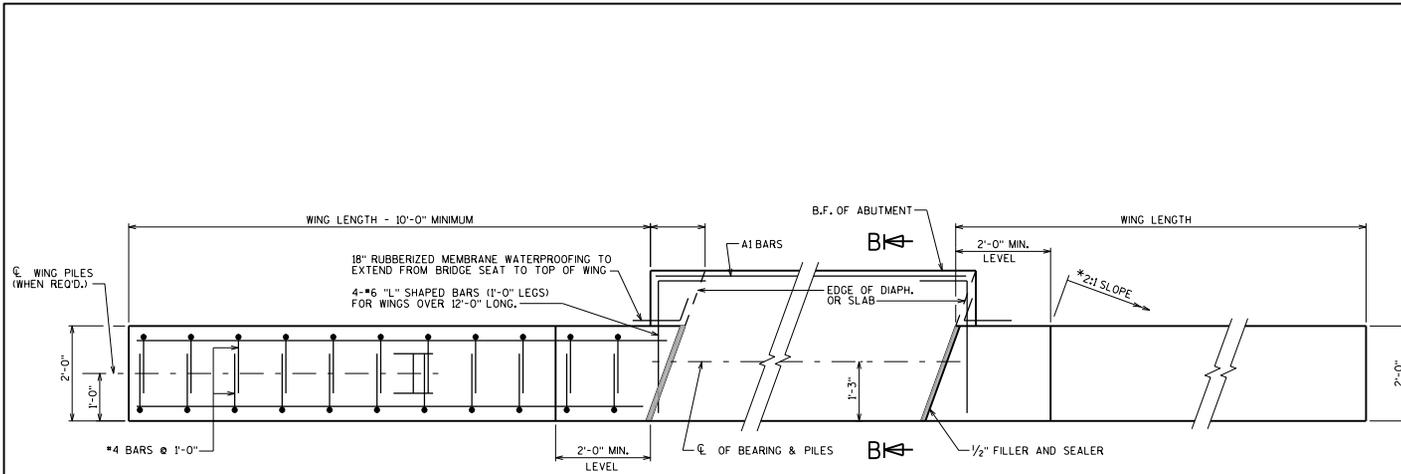
**LRFD DESIGN LOADS**

LIVE LOAD  
BODY = 1'-6" SURCHARGE  
WINGS = 2'-0" SURCHARGE  
HORIZ. EARTH LOAD BASED ON:  
BODY = 40 P.C.F. EQUIV. FLUID UNIT WGT. OF SOIL  
WINGS = 35 P.C.F. EQUIV. FLUID UNIT WGT. OF SOIL  
LOAD FACTORS:  
 $\gamma_{DC} = 1.25$   
 $\gamma_{DM} = 1.50$   
 $\gamma_{DEH} = 1.50$   
 $\gamma_{DEHmin} = 0.90$   
 $\gamma_{DEV} = 1.35$   
 $\gamma_{LL} = 1.75$   
EXPOSURE CLASS 2,  $\gamma_E = 0.75$   
 $f_y = 60,000$  P.S.I.  
 $f_c = 3,500$  P.S.I.

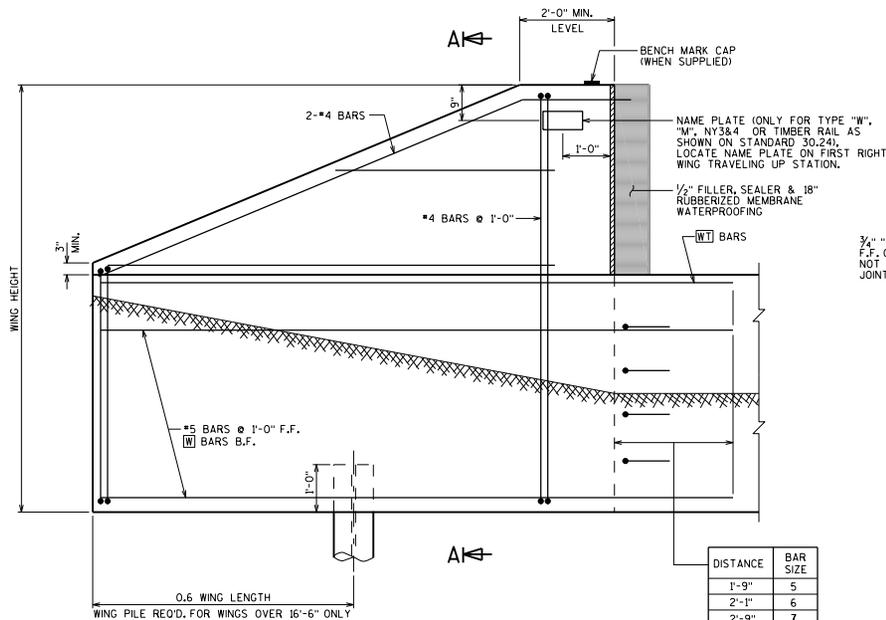
**ABUTMENT A4 PILE FOOTING**



APPROVED: Bill Oliva DATE: 7-17

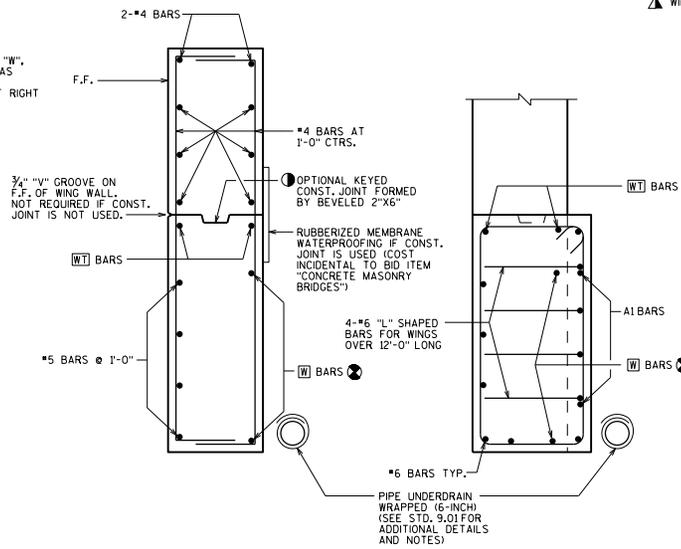


**PLAN FOR TYPE A1 ABUTMENT**  
(SEE STD. 12.01 FOR ABUTMENT BODY DETAILS)



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

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

ALL WING BARS SHALL BE EPOXY COATED.  
2 SHOW ALL LONGITUDINAL BARS FOR CLARITY.

**LRFD DESIGN LOADS (WINGS)**

LIVE LOAD = 1'-0" SURCHARGE

LOAD FACTORS:  
γ<sub>DC</sub> = 1.25  
γ<sub>IM</sub> = 1.50  
γ<sub>LS</sub> = 1.75

EXPOSURE CLASS 2, γ<sub>e</sub> = 0.75

HORIZ. EARTH LOAD BASED DN: 35 P.C.F. EQUIV. FLUID UNIT WEIGHT OF SOIL  
FY = 60,000 P.S.I.  
FC = 3,500 P.S.I.

**TABLE A**

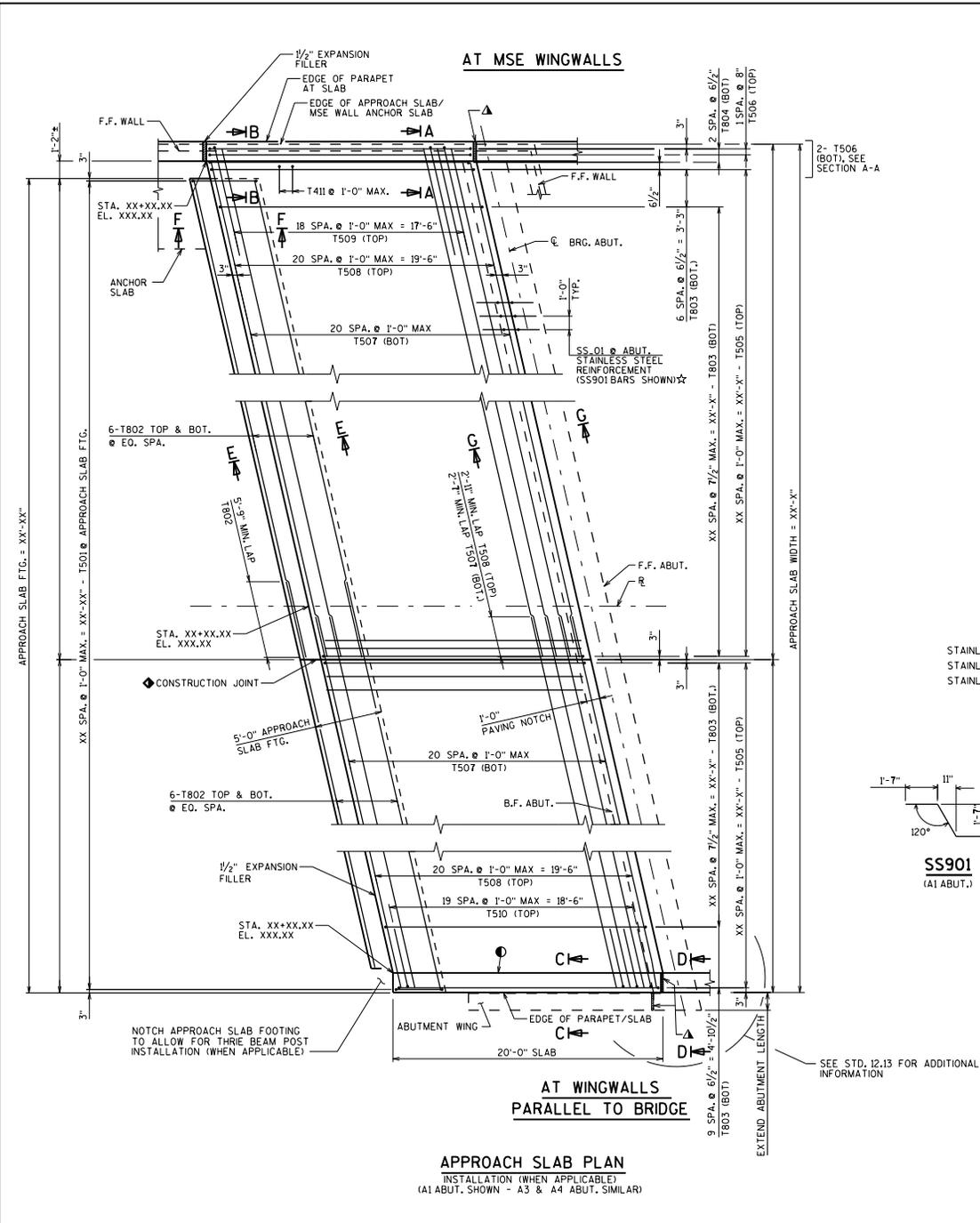
WING LENGTH	WING HEIGHT				BARS
	8'-6"	10'-0"	11'-6"	13'-0"	
8'-6"	5-#5's	5-#5's	6-#5's		W
	2-#5's	2-#5's	2-#5's		WT
10'-0"	4-#6's	4-#6's	5-#6's		A1
		5-#6's	5-#7's	6-#7's	W
12'-0"		2-#7's	2-#7's	2-#8's	WT
		5-#6's	6-#6's	6-#7's	A1
16'-0"		5-#8's	6-#8's	5-#9's	W
		2-#8's	2-#8's	2-#9's	WT
20'-0"		5-#8's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

▲ WING PILE REQUIRED

**DETAILS FOR WINGS PARALLEL TO A1 ABUTMENT CENTERLINE**



APPROVED: Bill Oliva DATE: 7-17



**DESIGNER NOTES**

STRUCTURAL APPROACH SLABS AND PARAPETS SHALL BE USED ON ALL BRIDGES CARRYING TRAFFIC VOLUMES GREATER THAN 3500 AADT (FUTURE DESIGN YEAR). OTHER LOCATIONS CAN BE CONSIDERED WITH THE APPROVAL OF THE CHIEF STRUCTURAL DESIGN ENGINEER.

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

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

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

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

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

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

DESIGNER TO COORDINATE LOCATION OF SURFACE DRAINS, INLETS, AND/OR FLUMES WITH ROADWAY DESIGNER AND FDM SDD 802 OR 803.

**LEGEND**

▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF 1/2" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. 1" DEEP AND 1/2" BELOW SURFACE OF CONCRETE.

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

**DESIGN DATA**

CONCRETE STRENGTH, f'c: 4,000 P.S.I.  
BAR STEEL REINFORCEMENT, GRADE 60, fy: 60,000 P.S.I.  
ALLOWABLE SOIL BEARING PRESSURE: 2,000 P.S.F.

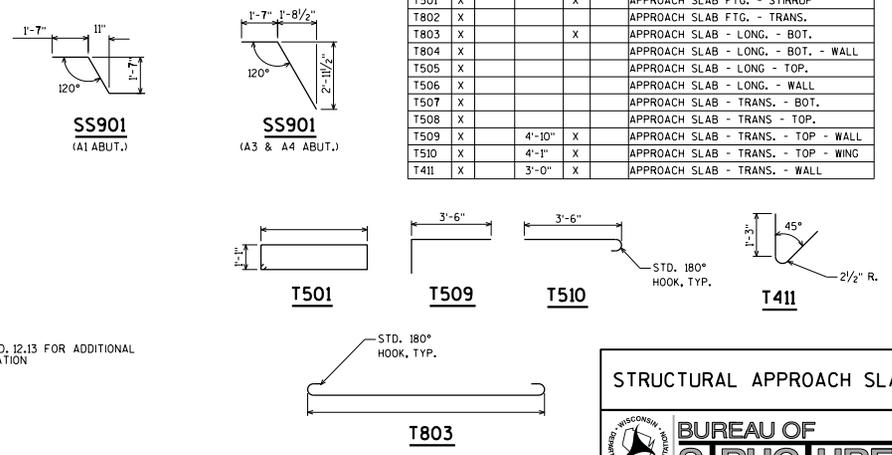
NOTE:  
FOR NEW STRUCTURES ON NEW ALIGNMENTS, BASE AGGREGATE DENSE 1-1/4 INCH AS PER FDM 14-5 AND BRIDGE MANUAL FIGURE 12-6-2 SHALL BE UTILIZED.  
FOR REPLACEMENT STRUCTURES ON EXISTING ALIGNMENTS, THE EXISTING SOIL MAY REMAIN IN PLACE IF THE REGION SOILS ENGINEER DETERMINES THAT THE EXISTING SOIL BEARING PRESSURE MEETS THE REQUIREMENT ABOVE.

**BILL OF BARS**

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

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

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

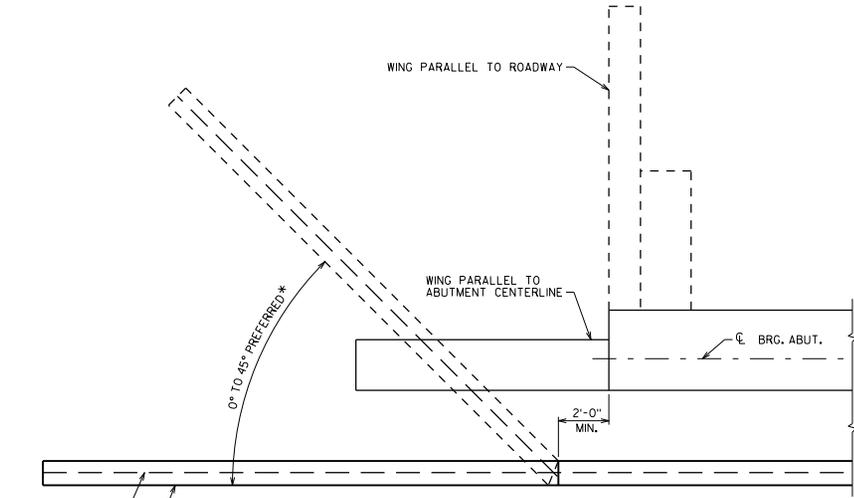


SECTIONS A-A THRU G-G ARE SHOWN ON STANDARD 12.11 & 12.12

**STRUCTURAL APPROACH SLAB**

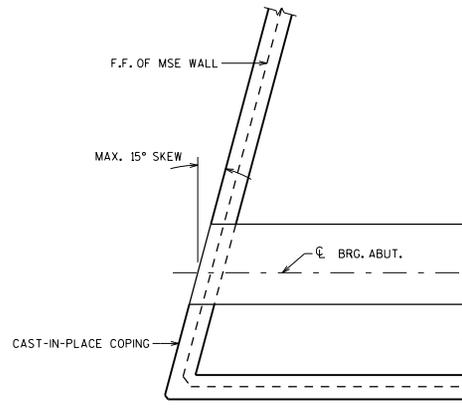
**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



**PREFERRED MSE WALL AT ABUTMENT CONFIGURATION**

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



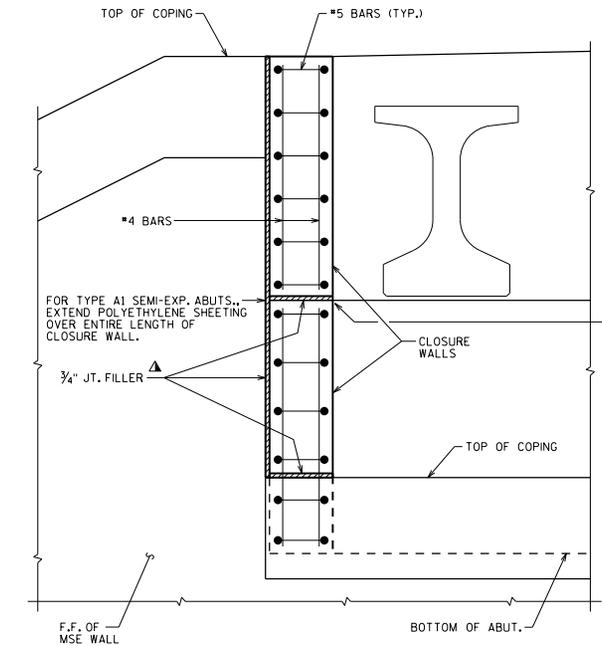
**ALTERNATE MSE WALL AT ABUTMENT WITH WRAPPED MSE WALL**

**DESIGNER NOTES**

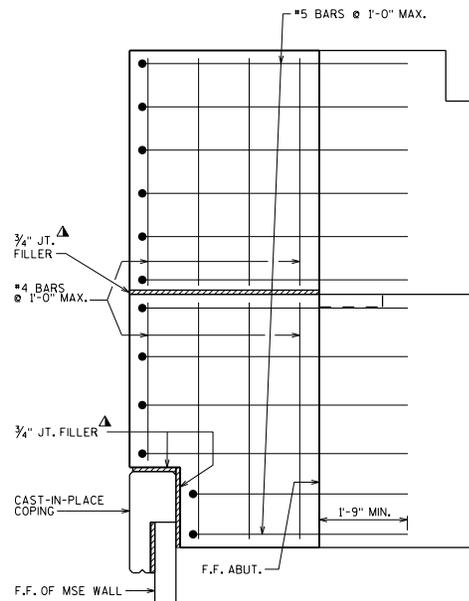
THE "PREFERRED MSE WALL AT ABUTMENT CONFIGURATION" IS THE DESIRED OPTION AS IT SEPARATES THE MSE WALL FROM THE ABUTMENT, MINIMIZING COMPLICATED DETAILS AND POTENTIAL SETTLEMENT ISSUES. THIS ADVICE IS MORE RELEVANT AS SKEW INCREASES.

**NOTES**

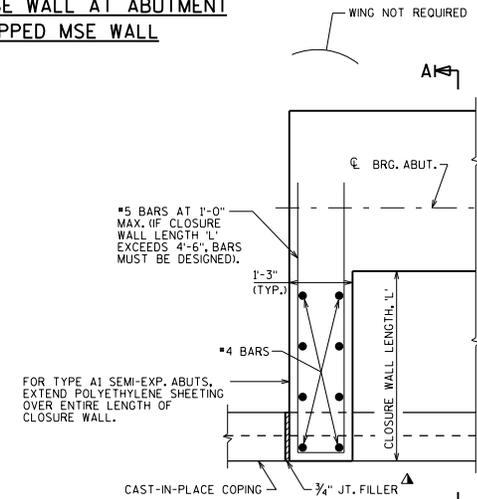
▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF FILLER WITH NON-STAINING GRAY, NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD 1/8" BELOW SURFACE OF CONCRETE).



**FRONT ELEVATION OF ALTERNATE MSE WALL AT ABUTMENT WITH CLOSURE WALL**



**SECTION A-A**



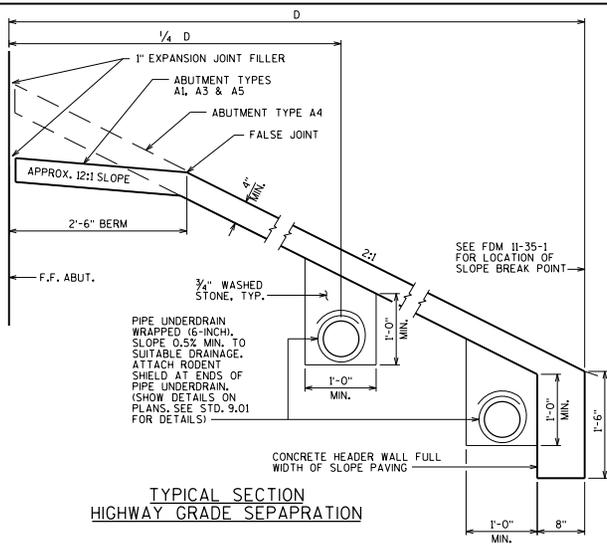
**PLAN VIEW OF ALTERNATE MSE WALL AT ABUTMENT WITH CLOSURE WALL**

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

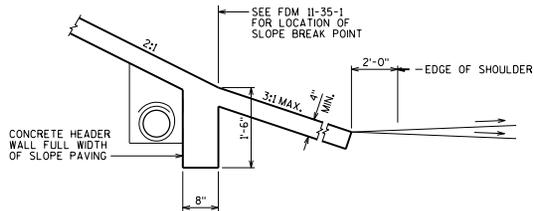
**MSE WALL AT ABUTMENT LAYOUT DETAILS**



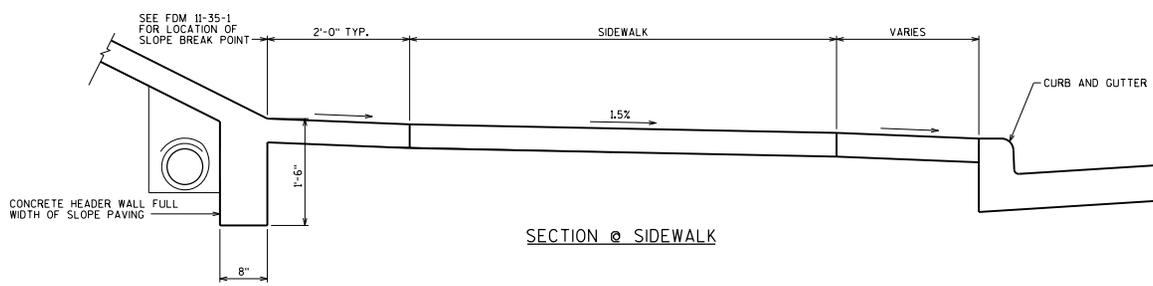
APPROVED: Bill Oliva DATE: 7-17



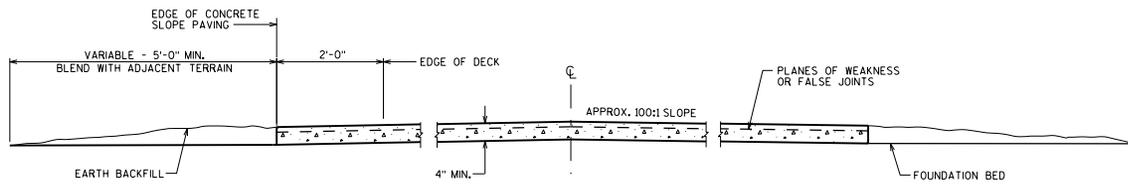
TYPICAL SECTION  
 HIGHWAY GRADE SEPARATION



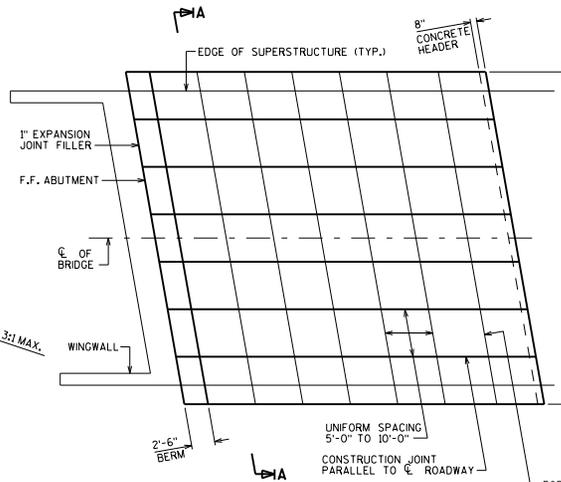
ALT. SECTION @ SHOULDER  
 (RURAL ROADWAY)



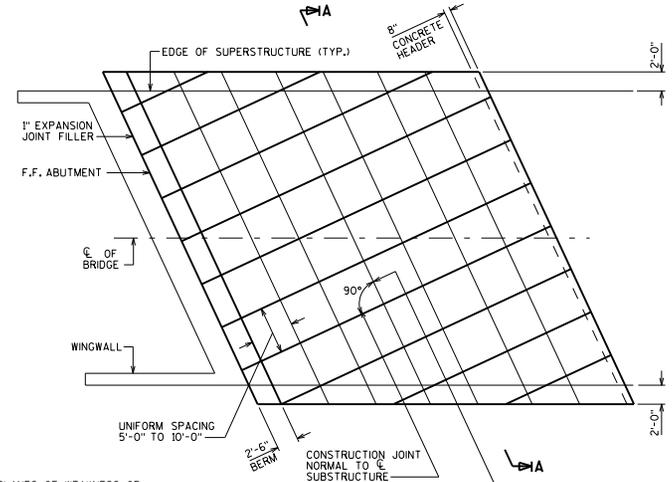
SECTION @ SIDEWALK



SECTION A-A

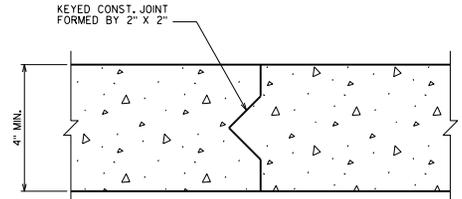


0° - 15° SKEW



> 15° SKEW

PLAN  
 (TYPICAL SECTION SHOWN)



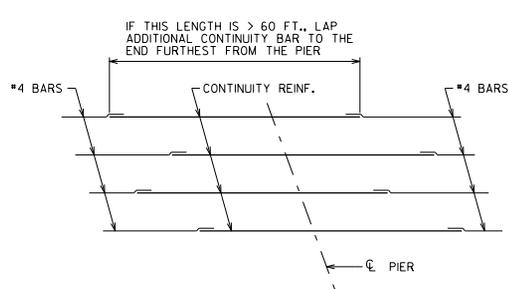
CONSTRUCTION JOINT DETAIL

NOTES  
 DETAILS OF CONSTRUCTION NOT SHOWN HEREIN SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS

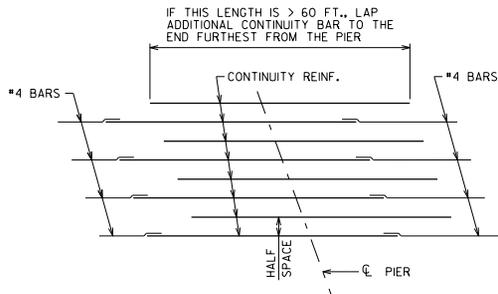
SLOPE PAVING - STRUCTURES  
 (CONCRETE CAST-IN-PLACE)

WISCONSIN DEPARTMENT OF TRANSPORTATION  
 BUREAU OF STRUCTURES

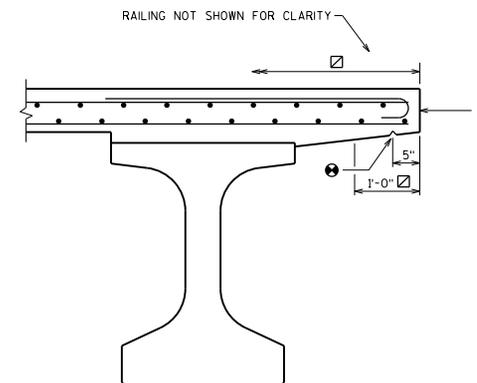
APPROVED: Bill Oliva DATE: 7-17



**PLAN VIEW OF DECK CONTINUITY REINFORCEMENT FOR PRESTRESSED GIRDER BRIDGES**  
(SHOWING TYPICAL BAR SPACING FROM CHAPTER 17 TABLES)



**PLAN VIEW OF DECK CONTINUITY REINFORCEMENT FOR PRESTRESSED GIRDER BRIDGES SHOWING HALF-SPACES**  
(SHOWING TYPICAL BAR SPACING FROM CHAPTER 17 TABLES + HALF-SPACE)



**CROSS SECTION THRU EDGE OF DECK**

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

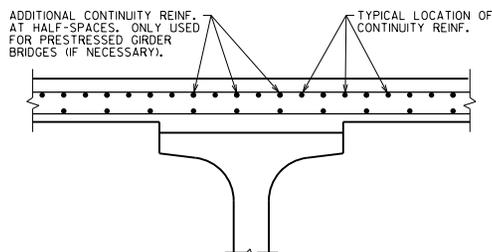
**LONGITUDINAL CONSTRUCTION JOINT DETAIL**

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

**DESIGNER NOTES**

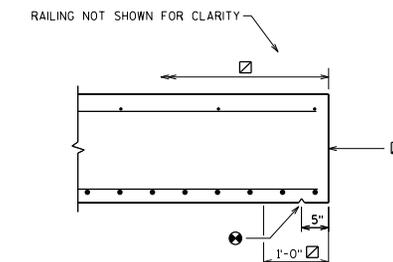
DETAIL REQUIRED WHEN WIDTH OF DECK EXCEEDS 90 FEET FOR GIRDER SUPERSTRUCTURES AND 52 FEET FOR SLAB SUPERSTRUCTURES. DETAIL SHOULD BE USED FOR STAGED CONSTRUCTION AND FOR OTHER COLD JOINT APPLICATIONS WITHIN THE DECK. OPTIONAL (CONTRACTOR) JOINTS ARE TO BE APPROVED BY THE ENGINEER.

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



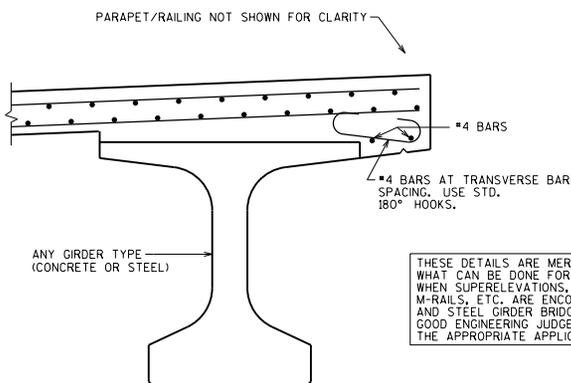
**CROSS SECTION THRU DECK**

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



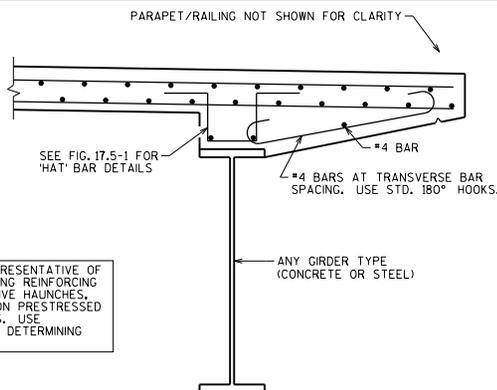
**CROSS SECTION THRU EDGE OF SLAB**

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



**CROSS SECTION THRU EDGE OF DECK**  
(SHOWING ADDITIONAL OVERHANG REINFORCEMENT)

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



**CROSS SECTION THRU EDGE OF DECK**  
(SHOWING ADDITIONAL OVERHANG REINFORCEMENT)

**DESIGNER NOTES**

- 3/4" V-GROOVE, TERMINATE 2'-0" FROM FRONT FACE OF ABUTMENT BODY FOR ABUTMENTS WITH EXPANSION JOINTS.
  - 3/4" V-GROOVE, EXTEND V-GROOVE TO 6" FROM FRONT FACE OF ABUTMENT DIAPHRAGM FOR TYPE A1 FIXED AND SEMI-EXPANSION ABUTMENTS.
- V-GROOVES ARE REQUIRED.

**NOTES**

- 3/4" V-GROOVE REQ'D. EXTEND TO 2'-0" FROM F.F. OF ABUT. BODY
- 3/4" V-GROOVE REQ'D. EXTEND TO 6" FROM F.F. OF ABUT. DIAPH.

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

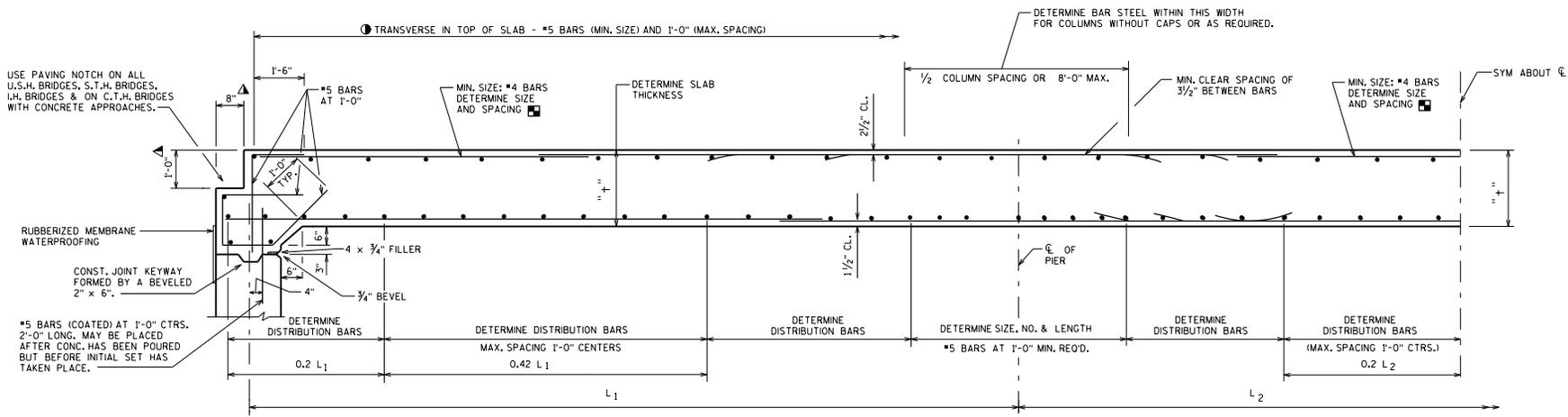
- ☑ COAT WITH "PROTECTIVE SURFACE TREATMENT" AS PER THE STANDARD SPECIFICATIONS.

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

**DECK AND SLAB DETAILS**



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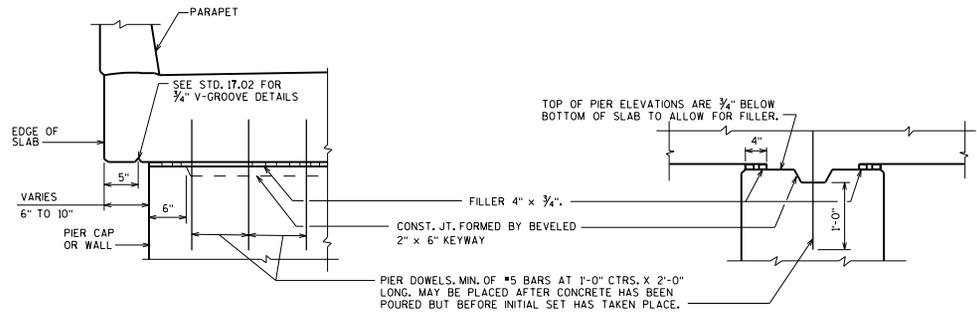
HALF LONGITUDINAL SECTION

**NOTES**

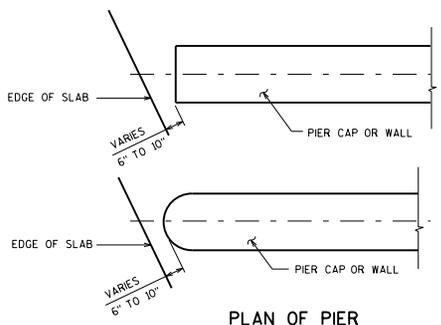
- TOP TRANSVERSE BARS IN SLAB SHALL BE SUPPORTED BY INDIVIDUAL BAR CHAIRS AT APPROXIMATELY 3'-0" CENTERS EACH WAY. BOTTOM LONGITUDINAL BARS SHALL BE SUPPORTED BY CONTINUOUS BAR CHAIRS AT APPROXIMATELY 4'-0" CENTERS.
- ALL SLAB THICKNESS DIMENSIONS ARE MINIMUM. ANY TOLERANCES NECESSARY TO CORRECT CONSTRUCTION DISCREPANCIES ARE TO BE PLUS (+).
- PARAPETS, SIDEWALKS AND MEDIANS PLACED ON TOP OF THE SLAB SHALL BE POURED AFTER FALSEWORK HAS BEEN RELEASED, EXCEPT FOR STAGED CONSTRUCTION.
- CAMBER SPANS AS SHOWN TO PROVIDE FOR DEAD LOAD DEFLECTION AND FUTURE CREEP. CAMBER DOES NOT INCLUDE ALLOWANCE FOR FORM SETTLEMENT.
- PRIOR TO RELEASING SLAB FALSEWORK, TAKE TOP OF SLAB ELEVATIONS AT THE C.E. OF ABUTMENTS, THE C.E. OF PIERS AND AT 5/10 PTS. TO VERIFY CAMBER. TAKE ELEVATIONS ALONG GUTTER LINES AND CROWN OR C.E.

**DESIGNER NOTES**

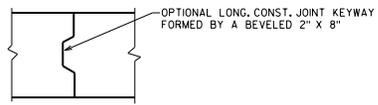
- THE MAXIMUM ALLOWABLE SKEW ANGLE OF STRUCTURE SHALL BE 30°.
- ALL BAR SPLICES TO BE BASED ON "CLASS C" TENSION LAP SPLICE.
- USE OPTIONAL LONGITUDINAL JOINTS WHEN OVERALL SLAB WIDTH IS OVER 52'-0".
- FOR BRIDGES LOCATED IN REMOTE AREAS USE OPTIONAL TRANSVERSE JOINT WHEN POUR EXCEEDS 400 C.Y. PLACE 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



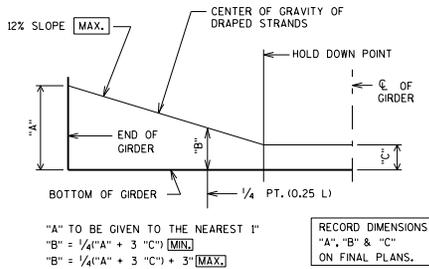
OPTIONAL LONGITUDINAL CONSTRUCTION JOINT

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. ≥ 15"	(*5 @ 1'-0")	(*5 @ 1'-0") 5'-0" LONG NO HOOK REQ'D. AT END
13" ≤ SLAB THICK. < 15"	(*5 @ 10")	(*5 @ 10") 5'-0" LONG STD. HOOK REQ'D. AT END
STEEL RAILINGS TYPE "NY"/"M"/"W"	TOP TRANSVERSE REINF. SPECIFIED IN "LONGIT. SECTION" IS ADEQUATE	

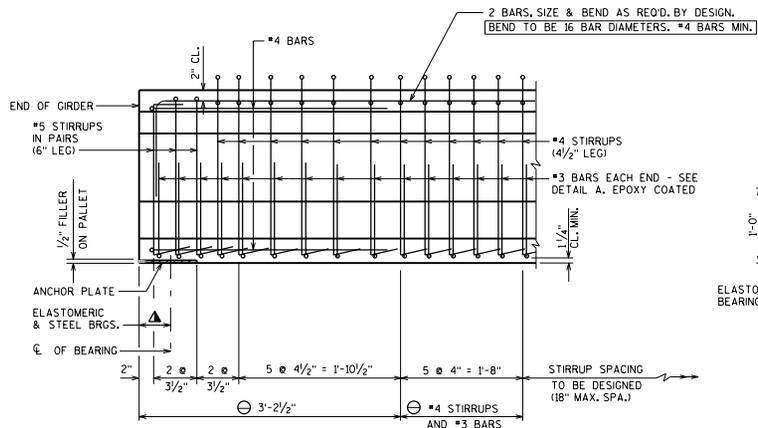
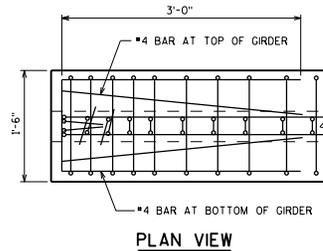
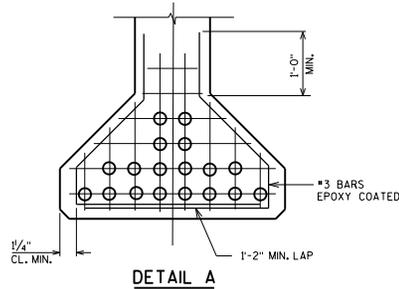
**CONTINUOUS FLAT SLAB**

**BUREAU OF STRUCTURES**

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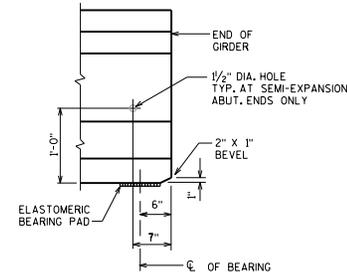


**LOCATION OF DRAPED STRANDS**

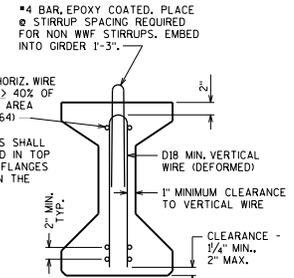
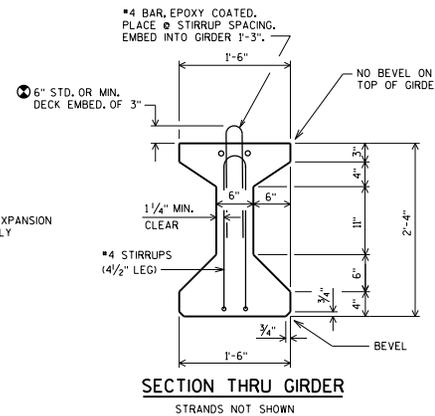


**SUPPORT WITH STEEL OR ELASTOMERIC BRGS.**

**SIDE VIEW OF GIRDER**



**SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD**



**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-295 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.

**DESIGNER NOTES**

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

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

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

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

○ DETAIL TYPICAL AT EACH END

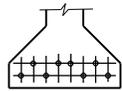
● THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 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.

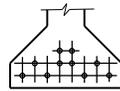
**28" PRESTRESSED GIRDER DETAILS**



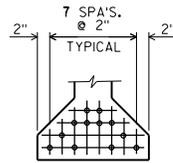
APPROVED: Bill Oliva DATE: 7-17



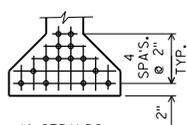
8 STRANDS



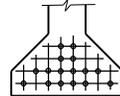
10 STRANDS



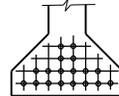
12 STRANDS



14 STRANDS



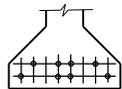
\*16 STRANDS



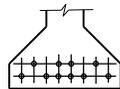
\*18 STRANDS

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

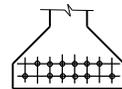
**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY TO AVOID DRAPING OF 0.6" DIA. STRANDS**  
(0.5" DIA. STRANDS MAY ALSO BE USED)



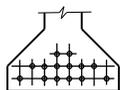
8 STRANDS



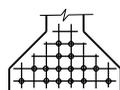
10 STRANDS



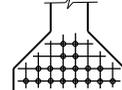
12 STRANDS



14 STRANDS



16 STRANDS



18 STRANDS

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

**28" GIRDER**

A = 312 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 #/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  
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = \underline{31,00 \text{ KIPS}}$   
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = \underline{43,94 \text{ KIPS}}$   
 $\frac{y_B}{r^2} = \frac{-13.42}{91.95} = -0.1459 \text{ IN./IN.}^2$   
 $f_B (\text{init.}) = \frac{A_s f_s}{A} \left( 1 + \frac{e_s y_B}{r^2} \right)$

(COMPRESSION IS POSITIVE)

NO. STRANDS	$e_s$ (Inches)	$P(\text{init.}) = A_s f_s$ (KIPS)	$f_B (\text{init.})$ (K/sq.in.)
<b>STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)</b>			
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
<b>STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)</b>			
8	-10.4	248	2.001
10	-10.6	310	2.531
12	-10.4	372	3.002
14	-10.0	434	3.421
16	-9.4	496	3.771
18	-9.6	558	4.294

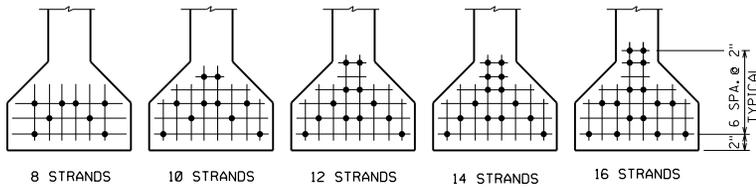
**DESIGNER NOTES**

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

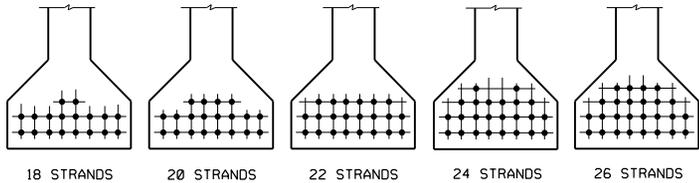
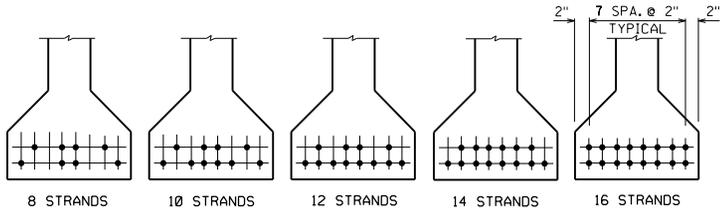
**28" PRESTRESSED GIRDER DESIGN DATA**

	<b>BUREAU OF STRUCTURES</b>	DATE:
		APPROVED: <u>Bill Oliva</u>





**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 SQ. IN.  
 $r^2 = 138.15 \text{ IN.}^2$   
 $y_T = 20.17 \text{ IN.}$   
 $y_B = -15.83 \text{ IN.}$   
 $I = 50,979 \text{ IN.}^4$   
 $S_T = 2,527 \text{ IN.}^3$   
 $S_B = -3,220 \text{ IN.}^3$   
 WT. = 384 #/FT.

**PRE-TENSION**

$f'_s = 270,000 \text{ P.S.I.}$   
 $f_s = 0.75 \times 270,000 = 202,500 \text{ P.S.I.}$   
 for low relaxation strands  
 $P_i \text{ PER } 0.5" \text{ DIA. STRAND} = 0.1531 \times 202,500 = \underline{31,00 \text{ KIPS}}$   
 $P_i \text{ PER } 0.6" \text{ DIA. STRAND} = 0.217 \times 202,500 = \underline{43,94 \text{ KIPS}}$   
 $\frac{y_B}{r^2} = \frac{-15.83}{138.15} = -0.1146 \text{ IN./IN.}^2$   
 $f_b (\text{ini t.}) = \frac{A_s f_s}{A} (1 + \frac{e_s y_B}{r^2})$

NO. STRANDS	$e_s$ (inches)	(COMPRESSION IS POSITIVE)	
		$P(\text{ini t.}) = A_s f_s$ (KIPS)	$f_b (\text{ini t.})$ (K/sq.in.)
<b>STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.)</b>			
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
<b>STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)</b>			
8	-12.83	248	1,660
10	-13.03	310	2,094
12	-13.16	372	2,528
14	-12.97	434	2,924
16	-12.83	496	3,320
18	-12.50	558	3,678
20	-12.23	620	4,034
22	-12.01	682	4,392
24	-11.66	744	4,710
26	-11.37	806	5,030

**DESIGNER NOTES**

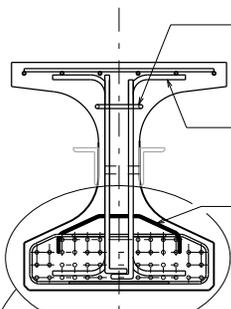
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

**36" PRESTRESSED GIRDER DESIGN DATA**

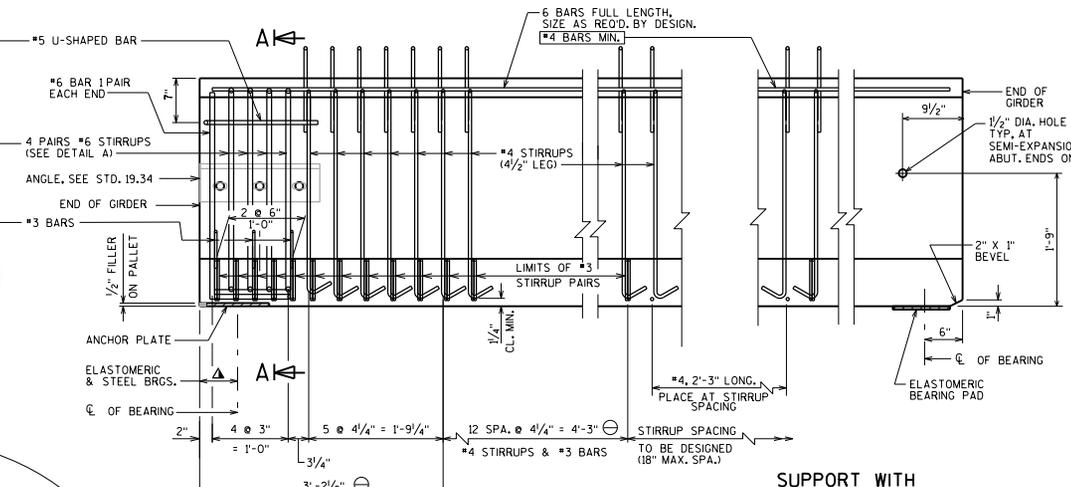
**BUREAU OF**  
**STRUCTURES**

APPROVED: Bill Oliva

DATE:  
7-17

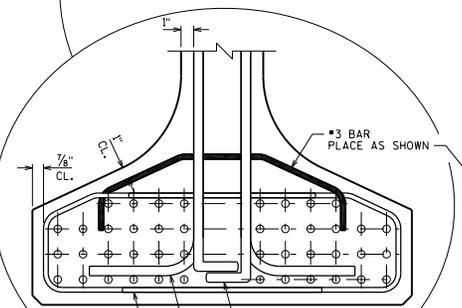


SECTION A-A

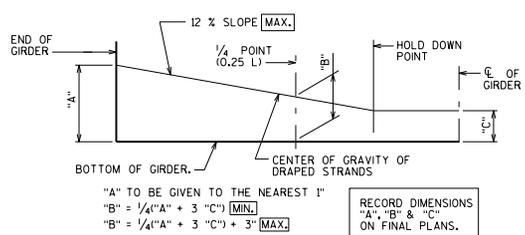


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

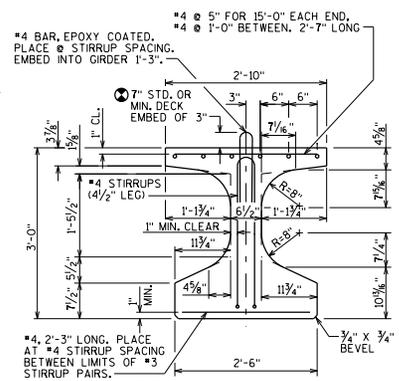
SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD



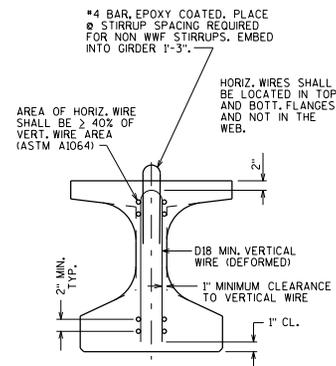
DETAIL A  
BOTTOM FLANGE



LOCATION OF DRAPED STRANDS



SECTION THRU GIRDER  
STRANDS NOT SHOWN



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

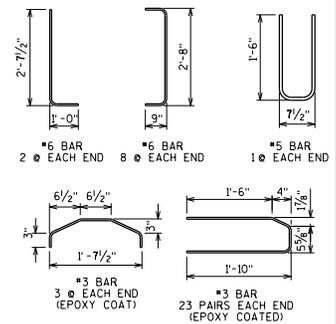
**NOTES**

- TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY. EXCEPT THE OUTSIDE 8" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 8" OF THE TOP FLANGE.
- DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.
- THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS. SEE SECTION 503.3.3 OF STANDARD SPECIFICATIONS FOR GUIDANCE.
- STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.
- ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.
- SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.
- AN 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.

**DESIGNER NOTES**

- BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 36W-INCH".
- SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.
- REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.12 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

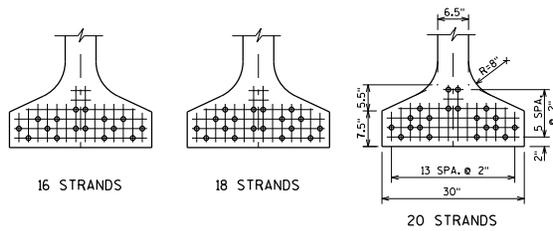
- ▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)
- ⊙ DETAIL TYPICAL AT EACH END
- ⊙ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ± 3/4" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.
- PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.



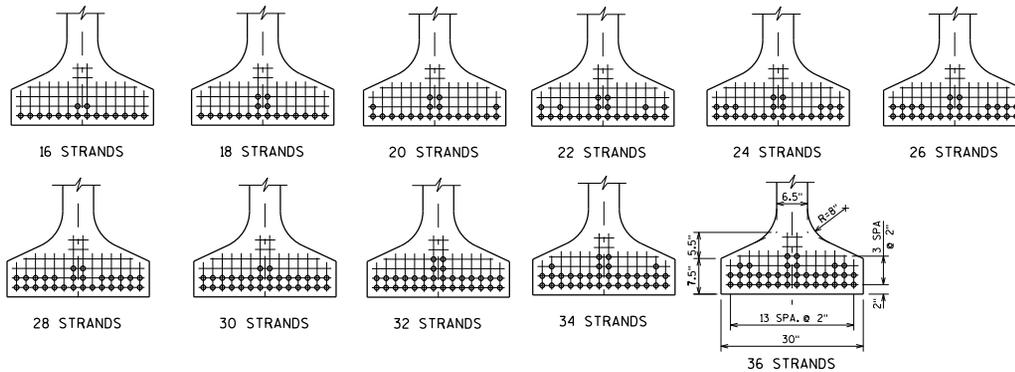
**36W" PRESTRESSED GIRDER DETAILS**

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



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 0.6" DIA. STRANDS

**36W" GIRDER**

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

**PRE-TENSION**

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

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

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

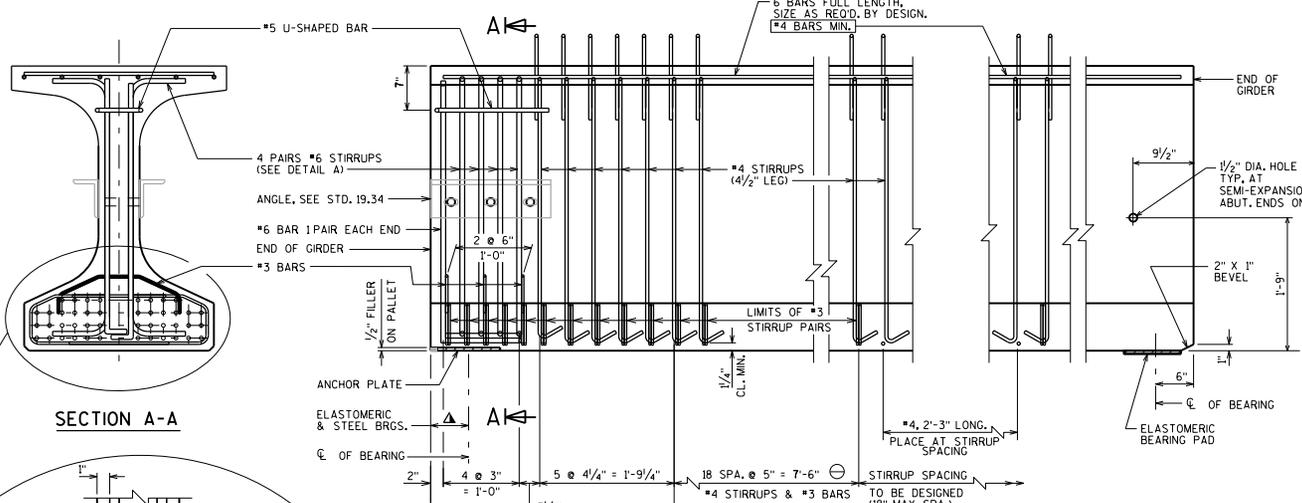
$$f_B (\text{ini.}) = \frac{A_s f_s}{A} \left( 1 + \frac{e_s y_B}{r^2} \right)$$

(COMPRESSION IS POSITIVE)			
NO. STRANDS	$e_s$ (inches)	$P(\text{ini.}) = A_s f_s$ (KIPS)	$f_B (\text{ini.})$ (K/sq.in.)
<b>STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS</b>			
16	-12.13	703	2.531
18	-11.74	791	2.796
20	-11.03	879	3.003
<b>STANDARD STRAND PATTERNS FOR DRAPED STRANDS</b>			
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

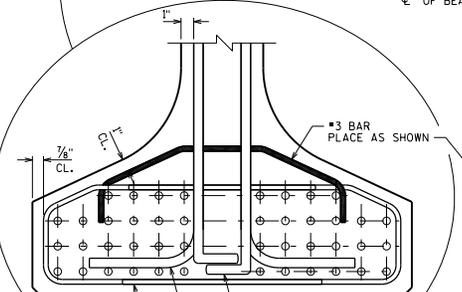
**DESIGNER NOTES**

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.

<b>36W" PRESTRESSED GIRDER DESIGN DATA</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17

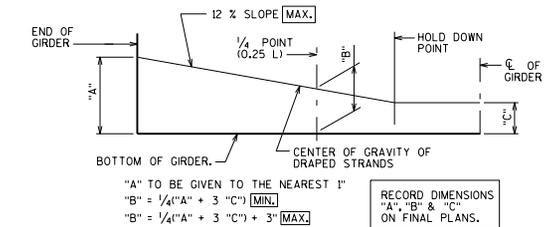


SECTION A-A

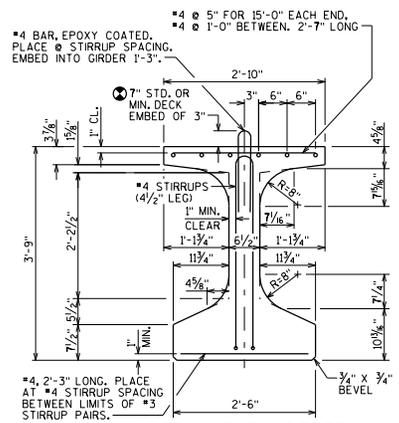


SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

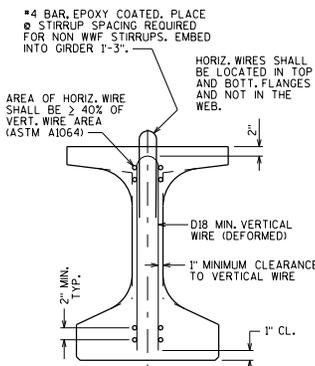
SUPPORT WITH 1/2\"/>



LOCATION OF DRAPED STRANDS



SECTION THRU GIRDER  
STRANDS NOT SHOWN



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

**NOTES**

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY. EXCEPT THE OUTSIDE 8" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH, AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 8" OF THE TOP FLANGE. DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

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

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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN. SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURE'S DEVELOPMENT SECTION. 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 145W-INCH".

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

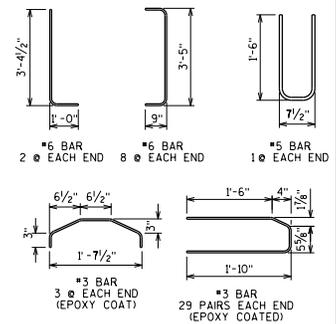
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.14 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-1 USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE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

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

⊙ DETAIL TYPICAL AT EACH END

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

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



**45W" PRESTRESSED GIRDER DETAILS**

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17

**45W" GIRDER**

A = 692 SQ. IN.  
 $r^2 = 258.70$  IN.<sup>2</sup>  
 $y_T = 24.26$  IN.  
 $y_B = -20.74$  IN.  
 $I = 178,971$  IN.<sup>4</sup>  
 $S_T = 7,377$  IN.<sup>3</sup>  
 $S_B = -8,629$  IN.<sup>3</sup>  
 WT. = 721 #/FT.

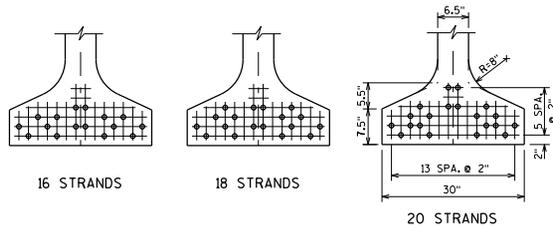
**PRE-TENSION**

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

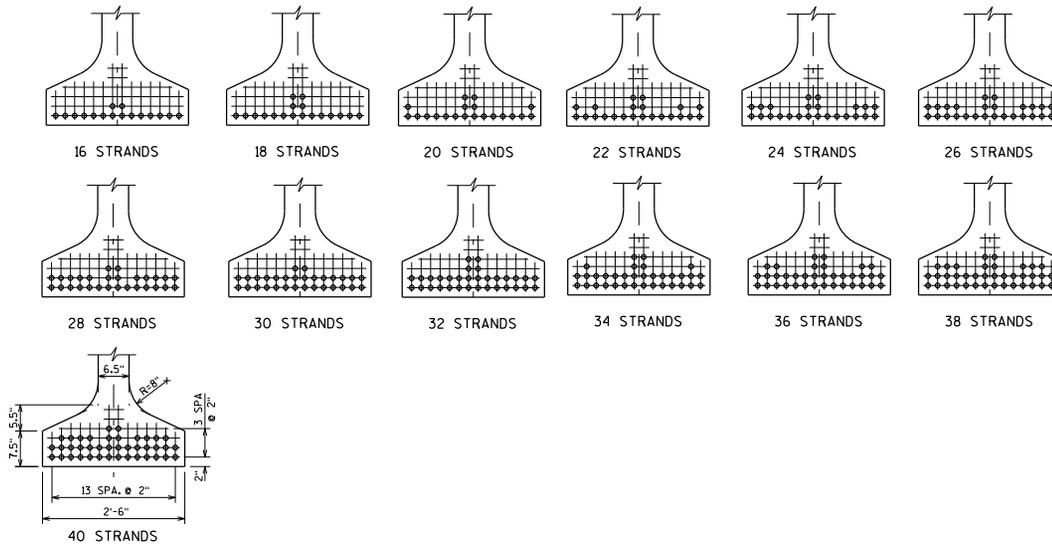
Pi PER 0.6" DIA. STRAND =  $0.217 \times 202,500 = 43.94$  KIPS

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

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



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



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

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

**DESIGNER NOTES**

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

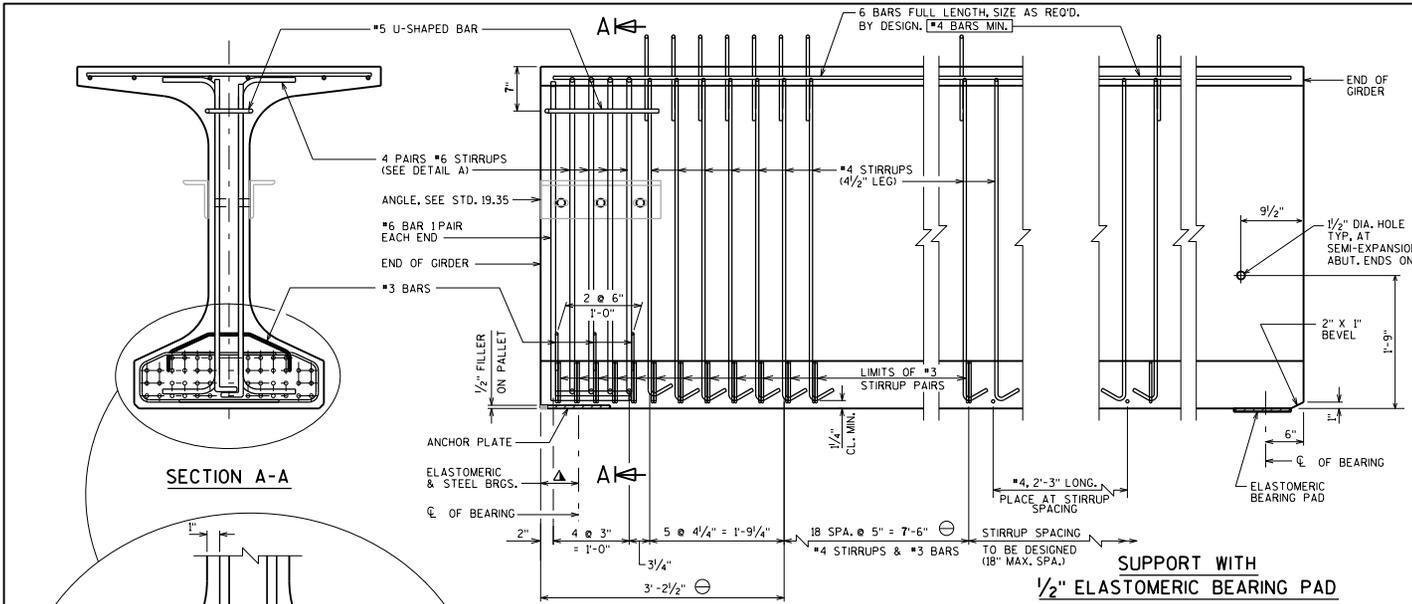
**45W" PRESTRESSED GIRDER DESIGN DATA**

**BUREAU OF**

**STRUCTURES**

APPROVED: Bill Oliva

DATE: 7-17



**NOTES**

TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY. EXCEPT THE OUTSIDE 15" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH, AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 15" OF THE TOP FLANGE. DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.

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

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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

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

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.

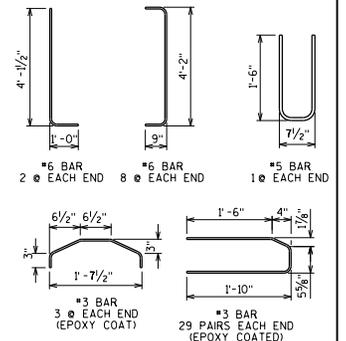
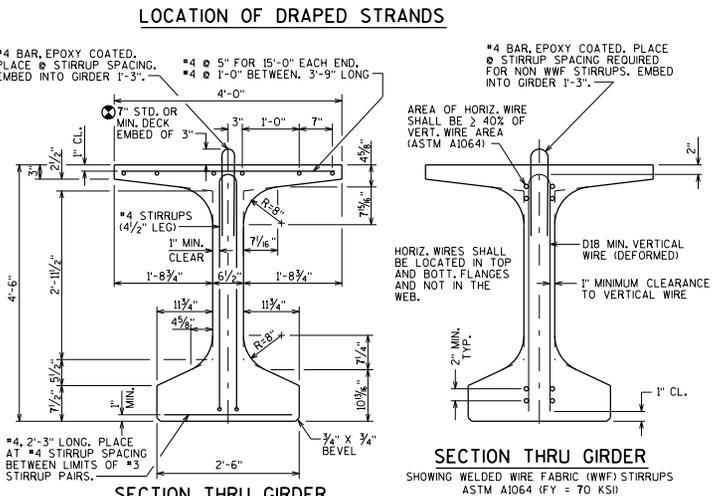
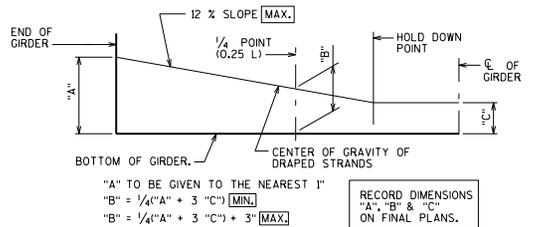
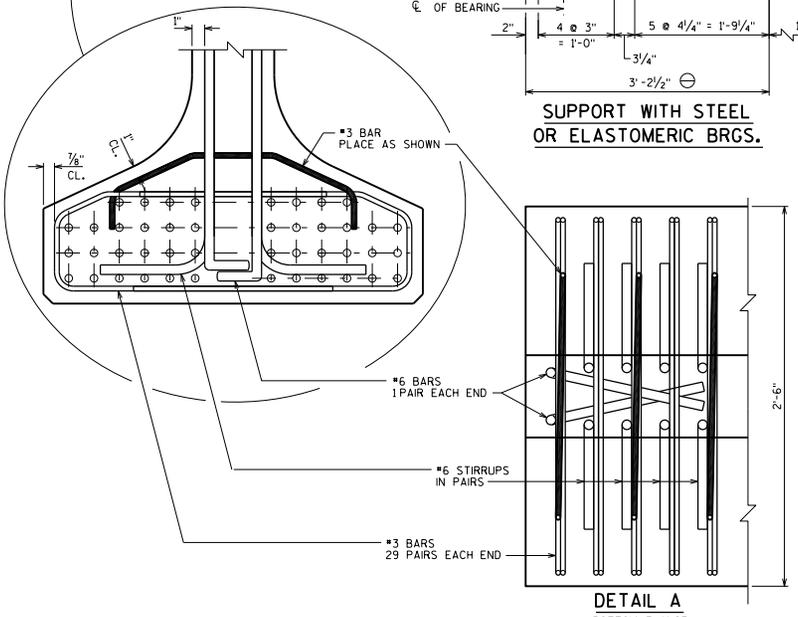
PRESTRESSING STRANDS SHALL BE ( DIA. )-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

**DESIGNER NOTES**

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

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

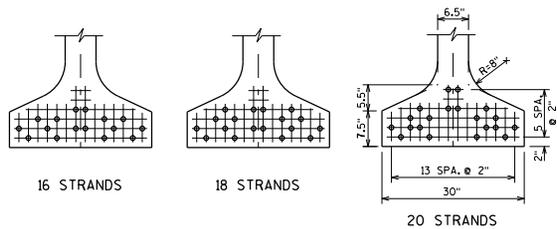
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.16 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE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



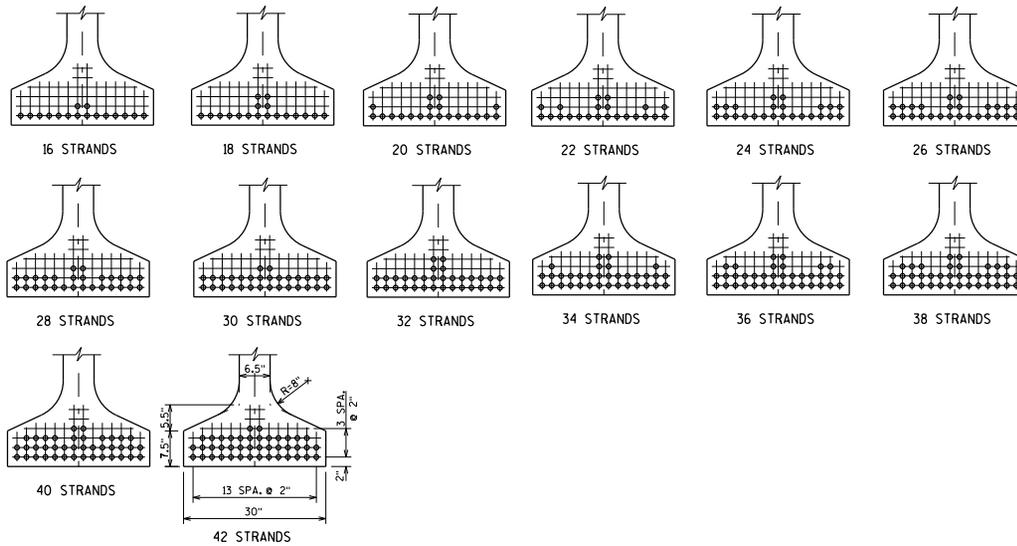
**54W" PRESTRESSED GIRDER DETAILS**

**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 0.6" DIA. STRANDS

**54W" GIRDER**

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

**PRE-TENSION**

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

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

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

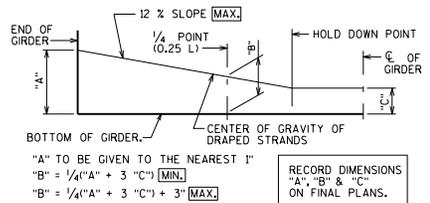
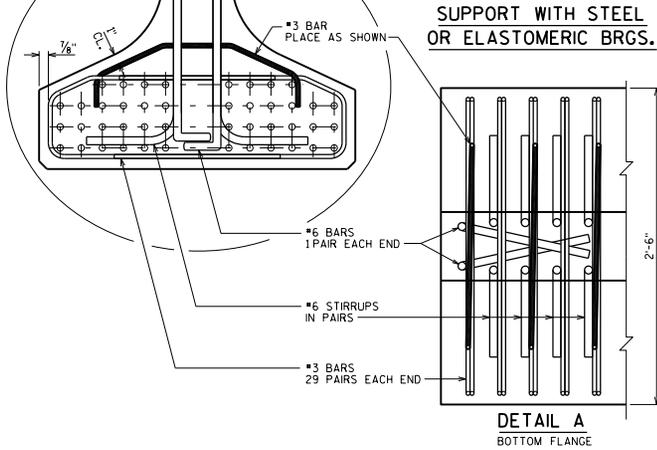
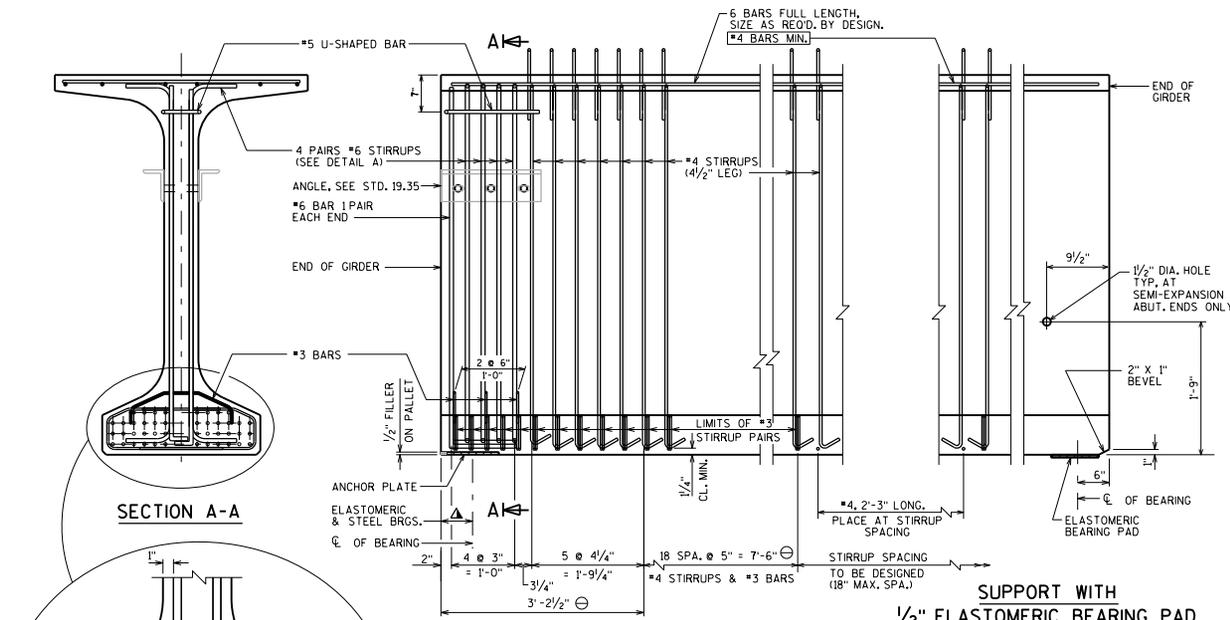
$$f_B (\text{ini.}) = \frac{A_s f'_s}{A} \left( 1 + \frac{e_s y_B}{r^2} \right)$$

NO. STRANDS	$e_s$ (inches)	P(ini.) = $A_s f'_s$ (KIPS)	(COMPRESSION IS POSITIVE)	
			$f_B$ (ini.) (K/sq.in.)	
<b>STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS</b>				
16	-21.80	703	2.136	
18	-21.41	791	2.378	
20	-20.70	879	2.592	
<b>STANDARD STRAND PATTERNS FOR DRAPED STRANDS</b>				
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**

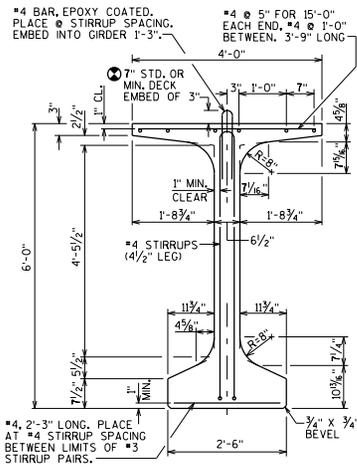
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

<b>54W" PRESTRESSED GIRDER DESIGN DATA</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: <u>7-17</u>

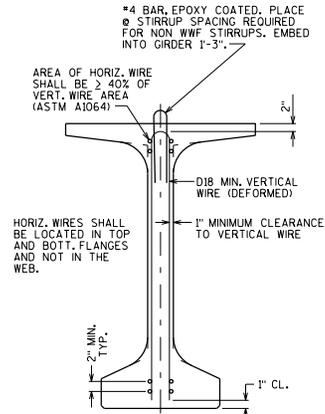


"A" TO BE GIVEN TO THE NEAREST 1"  
 "B" = 1/4("A" + 3 "C") [MIN.]  
 "B" = 1/4("A" + 3 "C") + 3" [MAX.]

LOCATION OF DRAPED STRANDS



SECTION THRU GIRDER  
 STRANDS NOT SHOWN



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

**NOTES**

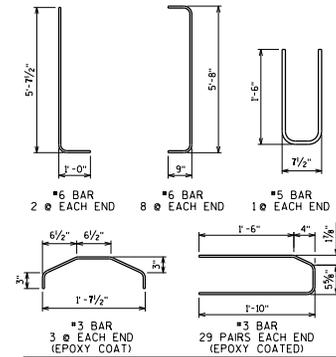
- TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 15" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 15" OF THE TOP FLANGE.
- DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.
- THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.
- STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.
- ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.
- SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.
- AN 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 7/16" DIA., 7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

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

**DESIGNER NOTES**

- BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE 1 72W-INCH".
- SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.
- REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.18 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRE PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

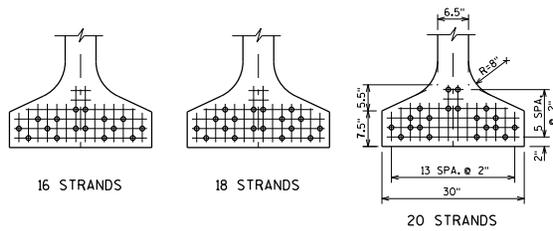
- VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)
- DETAIL TYPICAL AT EACH END
- THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE, AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ± 3% VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.
- PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.



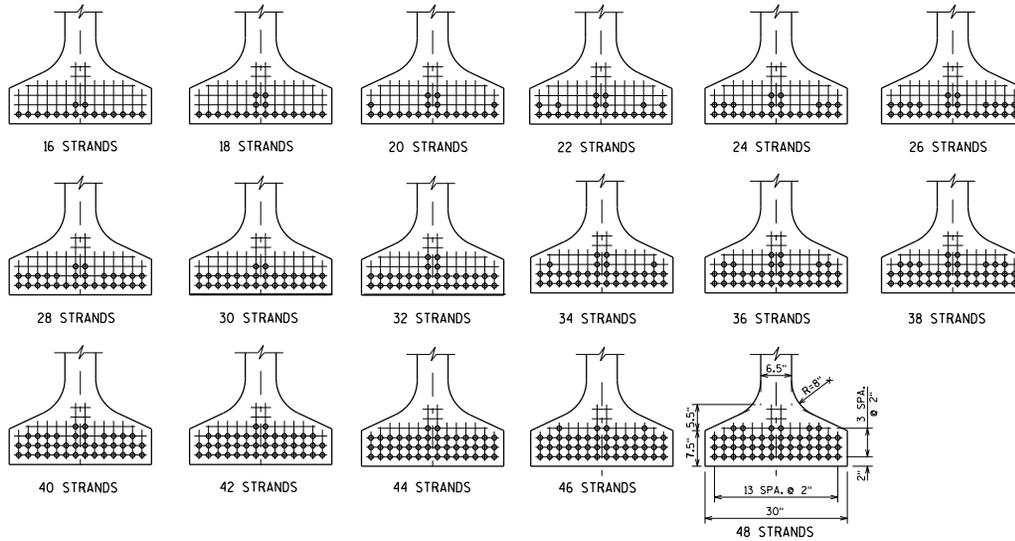
**72W" PRESTRESSED GIRDER DETAILS**

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



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 0.6" DIA. STRANDS

**72W" GIRDER**

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

**PRE-TENSION**

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

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

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

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

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

**DESIGNER NOTES**

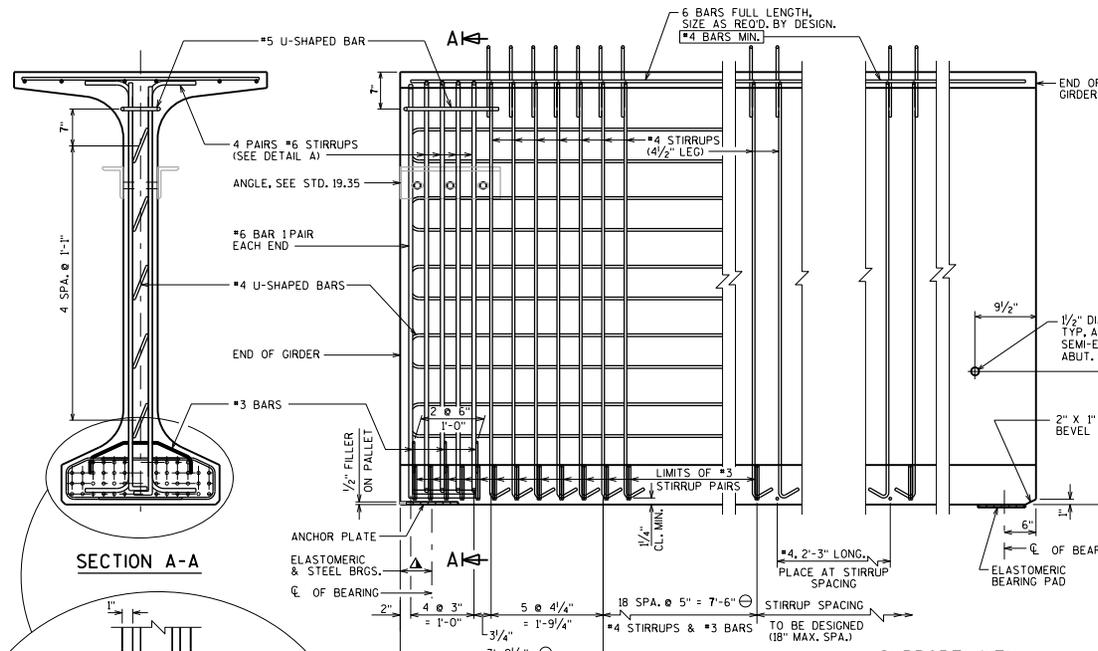
ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.

**72W" PRESTRESSED GIRDER DESIGN DATA**

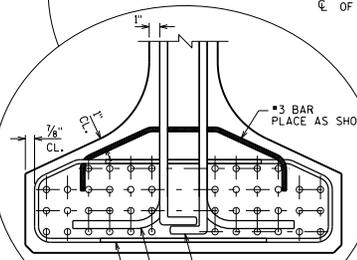
**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva

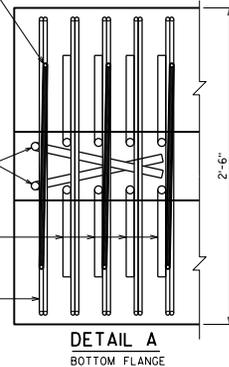
DATE: 7-17



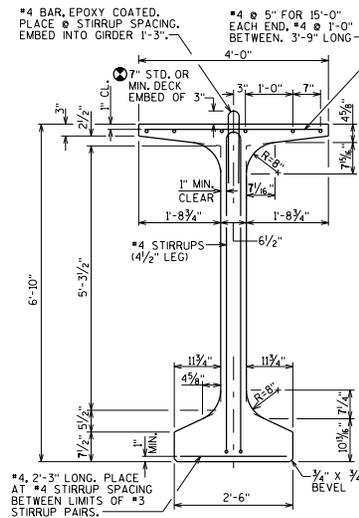
SECTION A-A



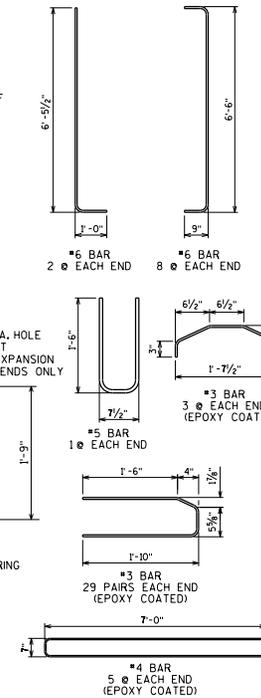
SUPPORT WITH STEEL OR ELASTOMERIC BRGS.



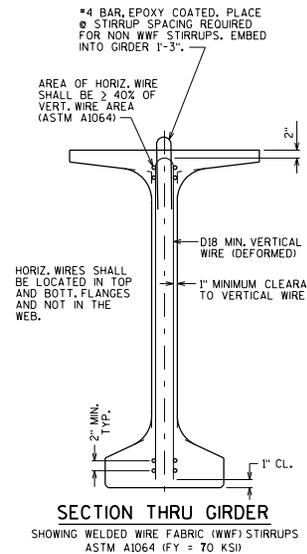
DETAIL A  
BOTTOM FLANGE



SECTION THRU GIRDER  
STRANDS NOT SHOWN



SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD



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

**NOTES**

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

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

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

STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED 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-FIGMENTED 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.

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

**DESIGNER NOTES**

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

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

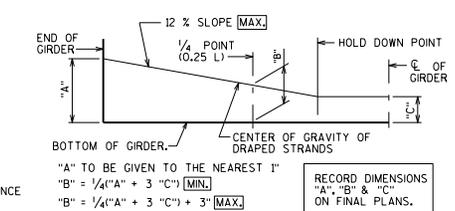
REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.20 AND THE SPAN LENGTHS SHOWN IN TABLE 19.3-2. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE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

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

⊖ DETAIL TYPICAL AT EACH END

⊙ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/2 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.



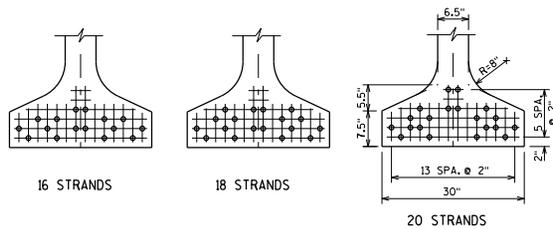
**LOCATION OF DRAPED STRANDS**

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

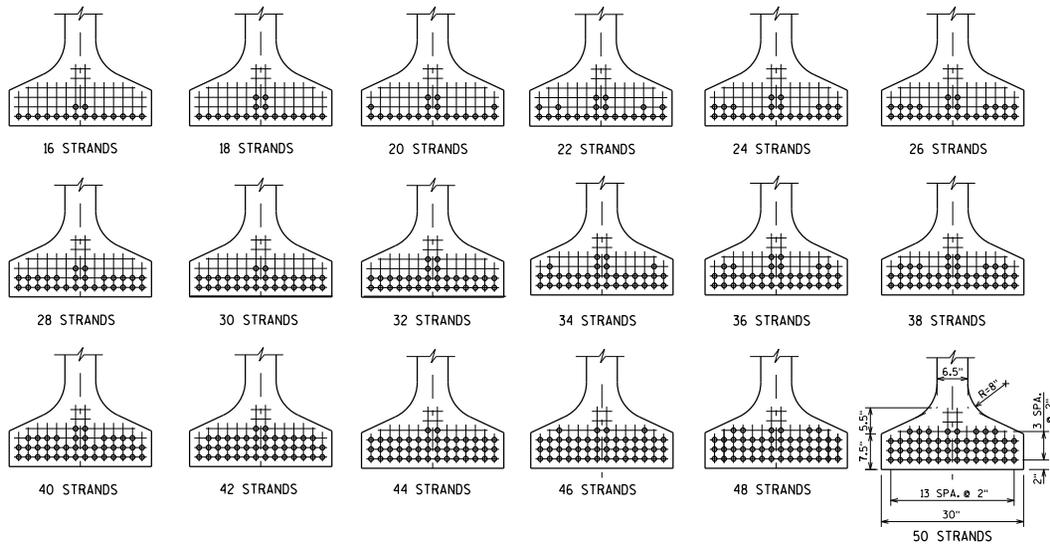
**82W" PRESTRESSED GIRDER DETAILS**

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



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 0.6" 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 =  $0.217 \times 202,500 = 43.94 \text{ KIPS}$

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

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

NO. STRANDS	$e_s$ (inches)	P(init.) = $A_s f_s$ (KIPS)	(COMPRESSION IS POSITIVE)	
			$f_B$ (init.) (K/sq.in.)	$f'_B$ (K/sq.in.)
<b>STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS</b>				
16	-35.18	703	1.801	
18	-34.79	791	2.013	
20	-34.08	879	2.209	
<b>STANDARD STRAND PATTERNS FOR DRAPED STRANDS</b>				
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	

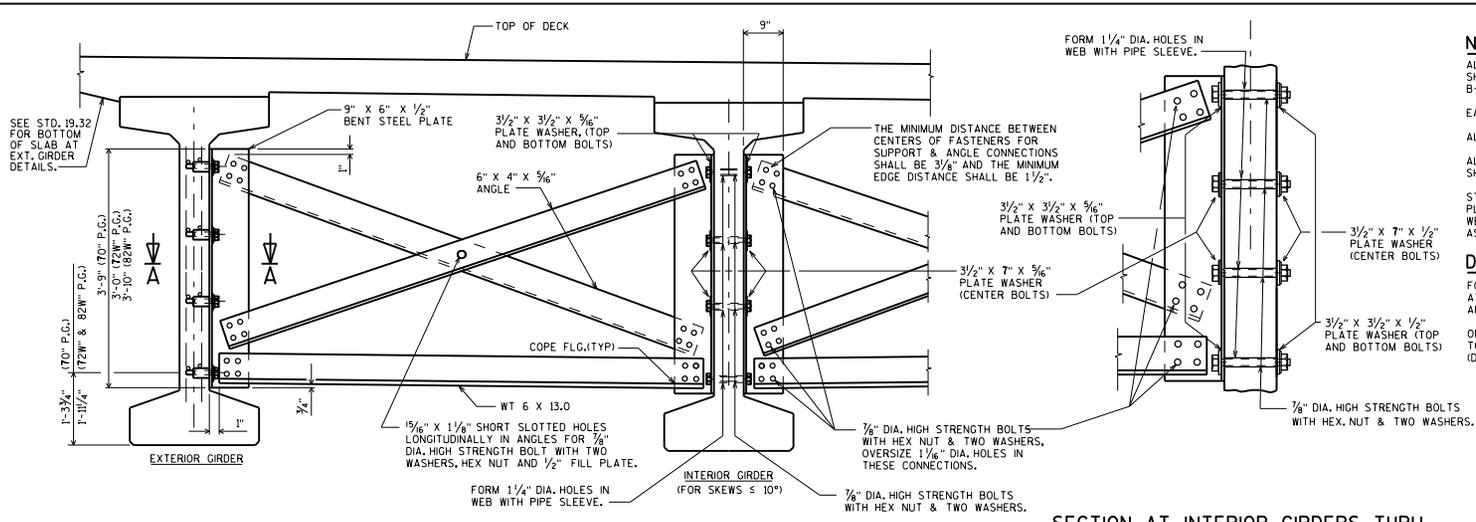
**DESIGNER NOTES**

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

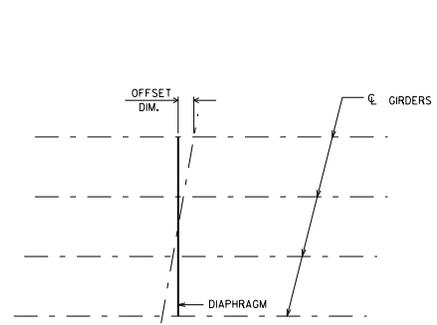
APPROVED: Bill Oliva DATE: 7-17



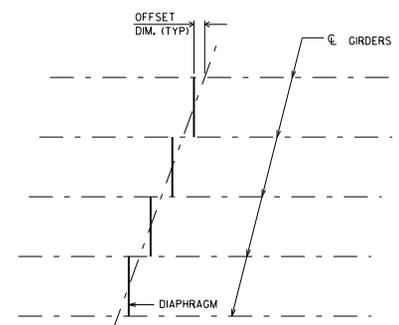
**PART TRANSVERSE SECTION AT DIAPHRAGM**

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

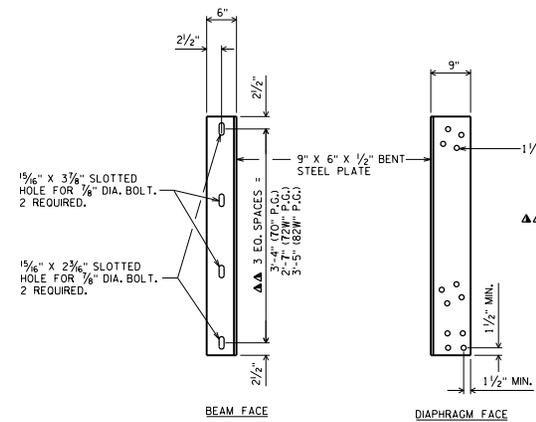
**NOTES**  
 ALL DIAPHRAGM MATERIAL NOT EMBEDDED IN THE CONCRETE GIRDER SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "STEEL DIAPHRAGMS B-1-1", EACH.  
 EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.  
 ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.  
 ALL DIAPHRAGM MATERIAL INCLUDING 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.



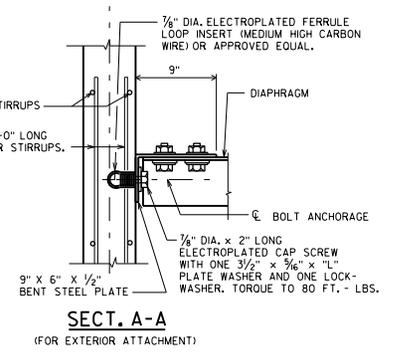
**PLAN FOR SKEW ANGLES ≤ 10°**



**PLAN FOR SKEW ANGLES > 10°**



**DIAPHRAGM SUPPORT**



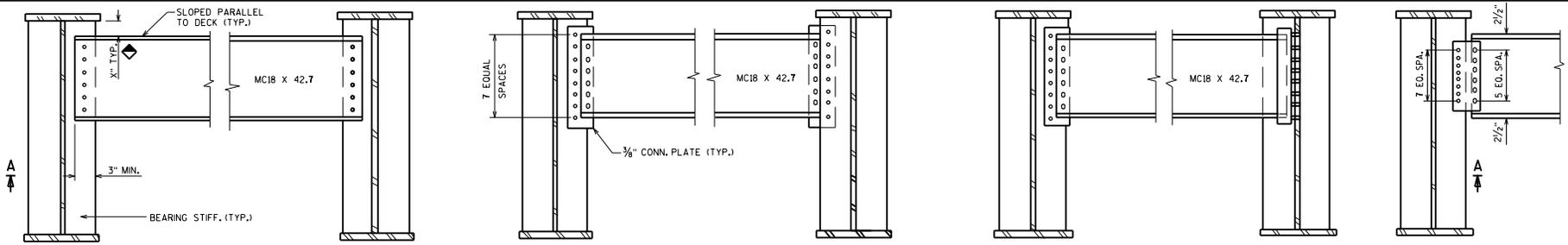
**SECT. A-A (FOR EXTERIOR ATTACHMENT)**

"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.

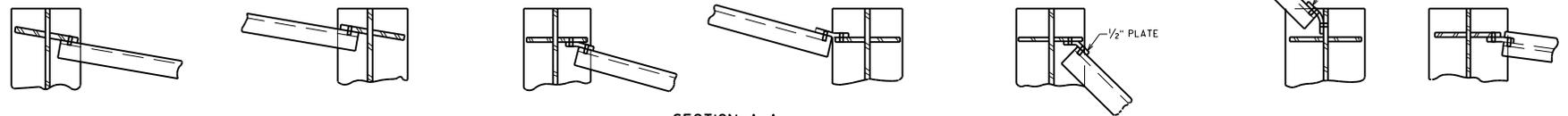
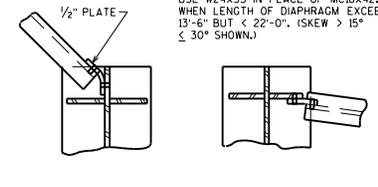
INTERMEDIATE STEEL DIAPHRAGMS FOR 70", 72W" & 82W" PRESTRESSED GIRDERS

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17

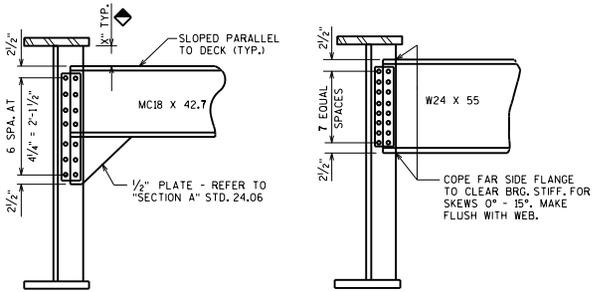


**W24 X 55 TYPICAL CONN.**  
 USE W24X55 IN PLACE OF MC18X42.7 WHEN LENGTH OF DIAPHRAGM EXCEEDS 13'-6" BUT < 22'-0". (SKEW > 15° <= 30° SHOWN.)



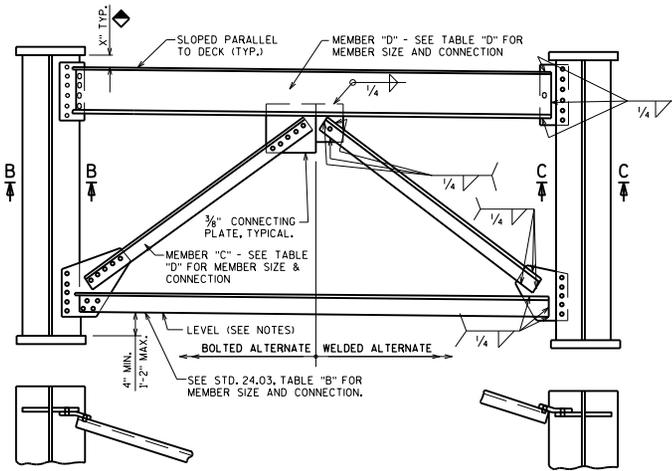
**NOTES**  
 ALL BOLTED CONNECTIONS SHALL BE FRICTION TYPE USING 3/4" DIA. HIGH STRENGTH ASTM A325 BOLTS WITH DOUBLE WASHERS.  
 LOWER CROSS FRAME MEMBERS ARE SLOPED WHEN DIFFERENCE IN ADJACENT BOTTOM FLANGE ELEVATIONS EXCEEDS 6". HOLD 8" FROM TOP OF ADJACENT FLANGES TO BOTTOM OF DIAPHRAGMS OR LOWER CROSS FRAME WHEN THESE MEMBERS ARE SLOPED.  
 LOWER CROSS FRAME MEMBERS THAT ARE LEVEL SHALL BE PLACED 4" ABOVE THE TOP OF THE HIGHER BOTTOM FLANGE OF ADJACENT GIRDERS.

**DESIGNER NOTES**  
 SEE STANDARD 24.02 FOR BEARING STIFFENER COPE & WELD DETAILS.  
 FOR WEB DEPTHS GREATER THAN 60", THE NUMBER OF BOLTS REQUIRED BETWEEN BEARING STIFFENERS AND LOWER CONNECTING PLATES EQUALS THE NUMBER OF BOLTS REQUIRED IN MEMBER "C" OR THE NUMBER REQUIRED IN THE LOWER HORIZONTAL MEMBER, WHICHEVER IS GREATER.  
 ◆ 3" MINIMUM. USE 3" UNLESS INCREASED TO ACCOMMODATE LARGE EXPANSION DEVICES.



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"**



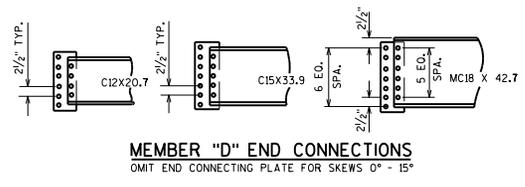
**END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 60"**

SKEWS > 15° <= 30° SHOWN

**TABLE "D"**

MEMBER "C" MAXIMUM LENGTH	WEB DEPTH						MEMBER "D" SIZE	MEMBER "D" CONN.	
	5'-0" - 6'-6"		6'-6" - 7'-6"		7'-6" - 8'-9"			CONN. PLATE TO BRG. STIFF.	MEMBER "D"
	MEMBER "C" SIZE	NO. OF 3/4" BOLTS	LENGTH OF 1/4" WELD	MEMBER "C" SIZE	NO. OF 3/4" BOLTS	LENGTH OF 1/4" WELD	MEMBER "C" SIZE	NO. OF 3/4" BOLTS	LENGTH OF 1/4" WELD
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
13'-6"	5 x 5 x 3/8"	6	17	5 x 5 x 3/8"	6	16	5 x 5 x 3/8"	6	15
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
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"

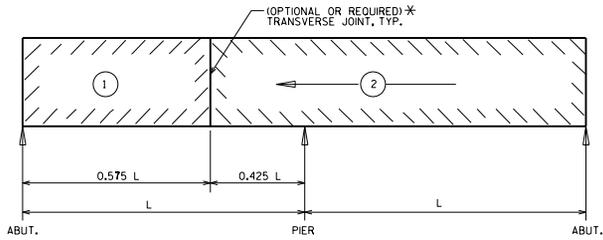
NOTE: ALL MEMBER "C" SIZES REPRESENT ANGLES.



**END DIAPHRAGMS**

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



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

② — INDICATES POUR NUMBER AND DIRECTION OF POUR

S = TOTAL NUMBER OF SPANS  
L = LENGTH OF END SPAN  
 $n = \frac{\text{INTERIOR SPAN}}{\text{END SPAN}}$

**NOTES**

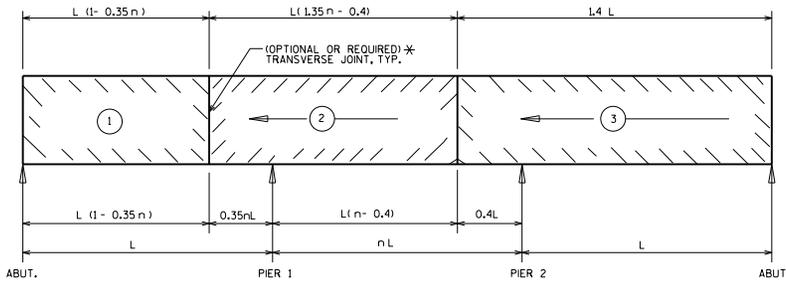
THE RATE OF PLACING CONCRETE SHALL EQUAL OR EXCEED  $\frac{1}{2}$  SPAN LENGTH PER HOUR BUT NEED NOT EXCEED 100 CU. YDS. PER HOUR. (REQUIRED ONLY FOR CONTINUOUS STEEL GIRDERS.)

IF OPTIONAL JOINTS ARE PROVIDED, TWO OR MORE SEQUENTIAL POURS MAY BE COMBINED AND PLACED IN ONE CONTINUOUS OPERATION. TWO OR MORE ALTERNATE DECK POURS (E.G. 1 & 3) MAY BE PLACED ON THE SAME DAY.

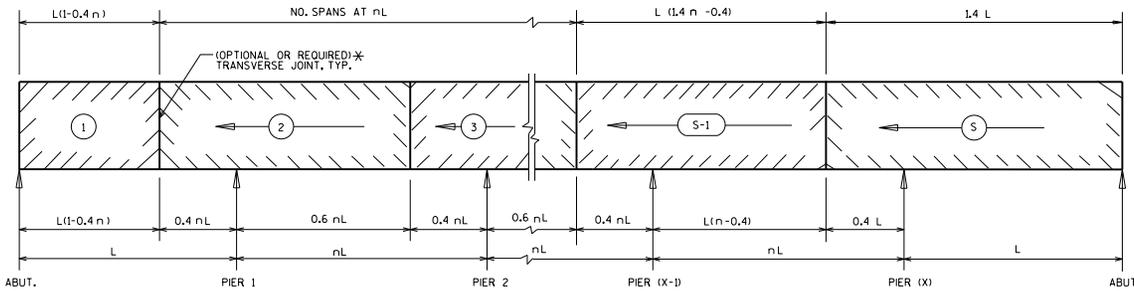
THE NEXT DECK POUR CAN BE MADE NO LESS THAN 72 HOURS AFTER THE PREVIOUS POUR.

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

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



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



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

**DESIGNER NOTES**

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

OPTIONAL TRANSVERSE CONSTRUCTION JOINTS SHALL BE DETAILED ON THE PLANS TO LIMIT THE VOLUME OF POUR TO < 600 CU. YDS. IN URBAN AREAS AND < 300 CU. YDS. IN OTHER AREAS. GENERALLY FOR STEEL GIRDER SUPERSTRUCTURES LOCATE THE TRANSVERSE JOINTS AT THE 0.6 POINT (CONCRETE IN 60% OF SPAN) AND FOR PRESTRESS GIRDER SUPERSTRUCTURES LOCATE JOINTS NEAR THE 0.75 POINT. (CONCRETE IN 75% OF SPAN) CONSIDER CUT-OFF POINTS OF CONTINUITY REINFORCING STEEL WHEN LOCATING JOINTS FOR PRESTRESS GIRDER SUPERSTRUCTURES. LOCATION OF JOINTS IN STEEL GIRDER SUPERSTRUCTURES MAY VARY IF DEFLECTIONS ARE INFLUENCED BY IN SPAN HINGES OR UNUSUAL SPAN LENGTH RATIOS. CHECK WITH THE STRUCTURES DEVELOPMENT SECTION FOR ADDITIONAL INFORMATION.

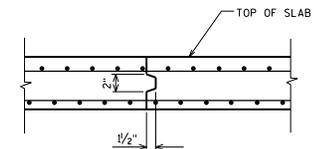
REQUIRED TRANSVERSE CONSTRUCTION JOINTS SHALL BE DETAILED ON THE PLANS ONLY WHEN REQUIRED BY DESIGN. SEQUENTIAL STAGES ARE DISCUSSED IN SECTION 24.12.2. ALL PLACEMENT REQUIREMENTS SHALL BE NOTED ON THE PLANS.

DETAIL TRANSVERSE CONSTRUCTION JOINTS 5'-0" FROM  $\phi$  OF IN SPAN HINGES, (ONE ON EACH SIDE OF HINGE) THE CONCRETE BETWEEN THESE JOINTS SHOULD BE THE LAST POUR PLACED.

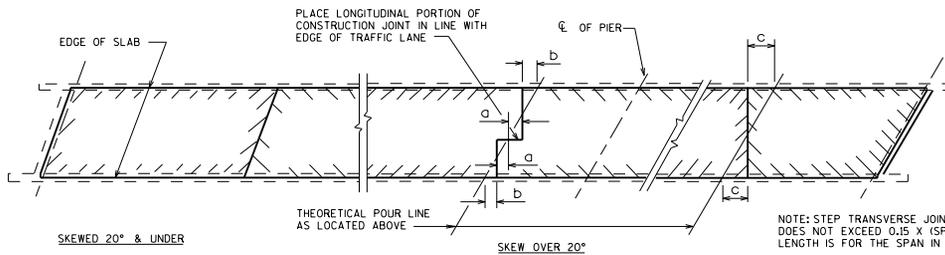
WHEN THE WIDTH OF SLAB IS GREATER THAN 90 FEET, A LONGITUDINAL CONSTRUCTION JOINT SHALL BE DETAILED. LOCATE LONGITUDINAL CONSTRUCTION JOINT ALONG EDGE OF LANE LINE AND AT LEAST 6 INCHES FROM EDGE OF TOP FLANGE OF GIRDER.

FOR GRADES OVER 3% THE PREFERRED DIRECTION OF POUR IS UPHILL.

AN ALTERNATE POURING SEQUENCE IS TO POUR THE DL POSITIVE MOMENT AREAS AND THEN THE DL NEGATIVE MOMENT AREAS. THE SEQUENCE MAY BE STARTED ANYWHERE ON THE BRIDGE.

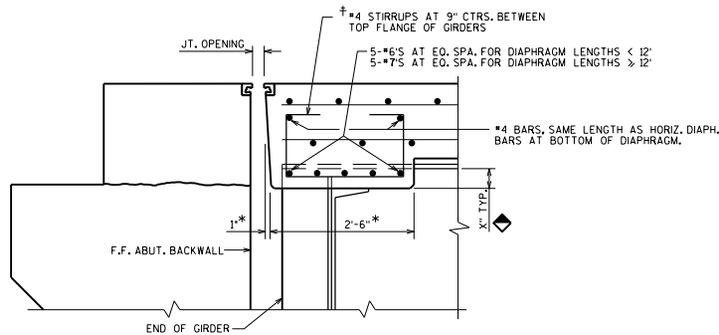


**SECTION THRU TRANSVERSE OR LONGITUDINAL JOINT**



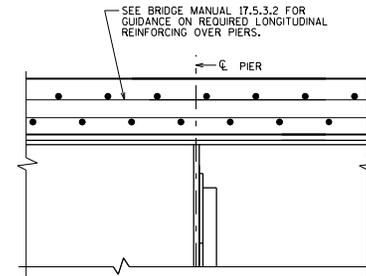
**PLAN VIEW - SHOWING PLACEMENT OF TRANSVERSE CONSTRUCTION JOINTS**

<b>SLAB POURING SEQUENCE</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17

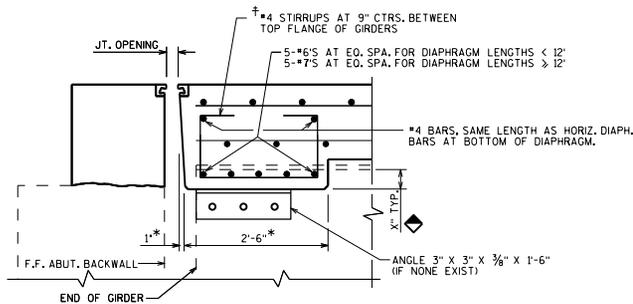


**SECTION THRU EXPANSION END**

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

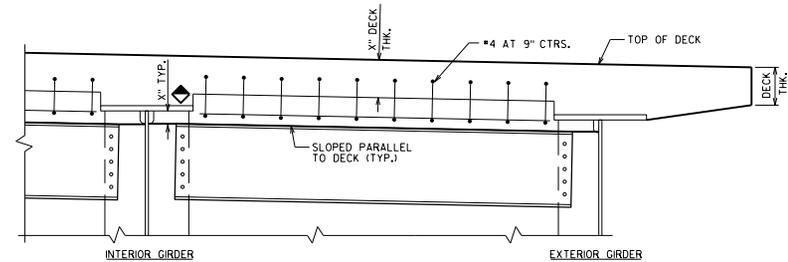


**SECTION AT PIER**



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

(SEE STD. 40.04 FOR ADDITIONAL DETAILS)



**PART TRANSVERSE SECTION AT DIAPHRAGM  
EXPANSION END**

**NOTES**

FOR REHABILITATION PROJECTS:

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.  
BOLTS ARE 3/4" DIA. ALL BOLTS, NUTS AND WASHERS SHALL BE  
ASTM A325 TYPE 1.

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  $\epsilon$  GIRDERS.

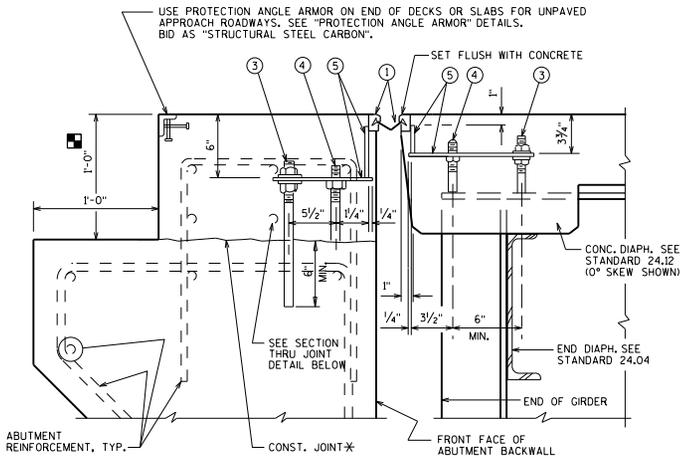
\* DIMENSION IS TAKEN NORMAL TO  $\epsilon$  ABUTMENT

**STEEL GIRDER SLAB &  
SUPERSTRUCTURE DETAILS**



**BUREAU OF  
STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17

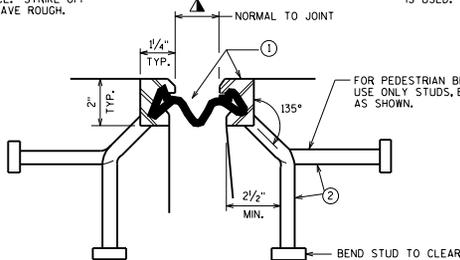


**TYPICAL SECTION THRU JOINT AT STEEL GIRDER**

NORMAL TO  $\bar{C}$  SUBSTRUCTURE

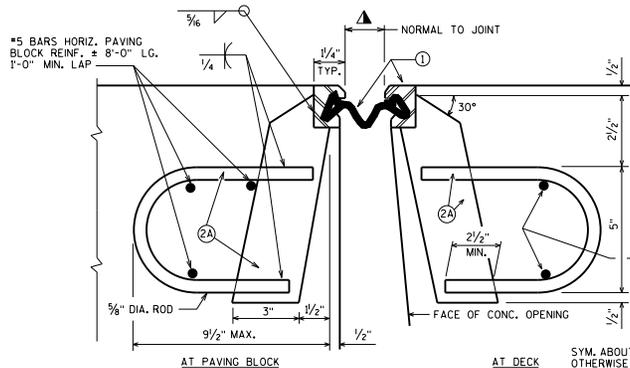
\* POUR CONC. ABOVE THIS JOINT AFTER SUPERSTRUCTURE IS IN PLACE. STRIKE OFF AND LEAVE ROUGH.

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



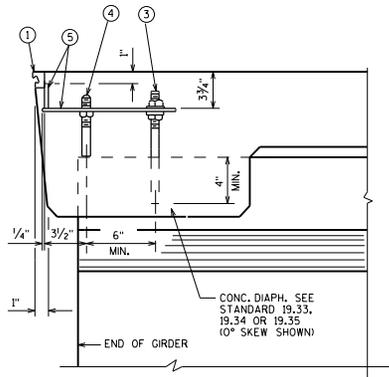
**SECTION THRU JOINT**

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



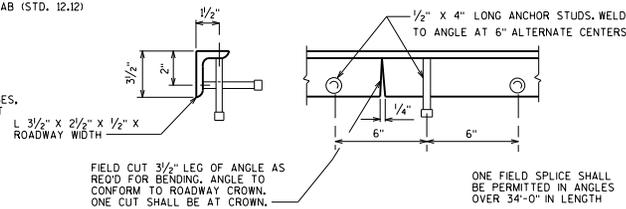
**SECTION THRU JOINT**

ROADWAY TRAFFIC AREA BETWEEN EXTERIOR GIRDERS.



**PART SECTION THRU JOINT AT PRESTRESSED GIRDERS**

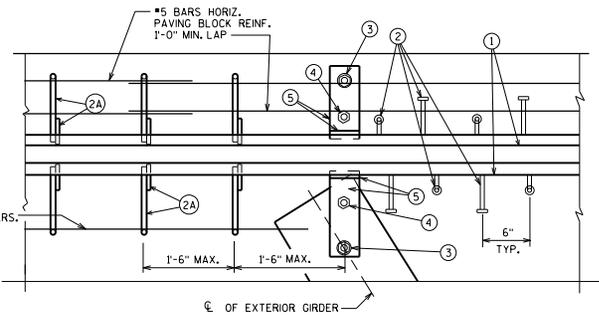
NORMAL TO  $\bar{C}$  SUBSTRUCTURE



**PROTECTION ANGLE ARMOR**

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

■ IF TEMPERATURE TABLE IS SHOWN, PLACE FOLLOWING NOTE ADJACENT TO TABLE: "A SMALL JOINT OPENING DUE TO A HIGH TEMPERATURE AT TIME OF CONSTRUCTION MAY REQUIRE NEOPRENE STRIP SEAL INSTALLATION INTO STEEL EXTRUSIONS PRIOR TO SETTING THE EXPANSION JOINT."



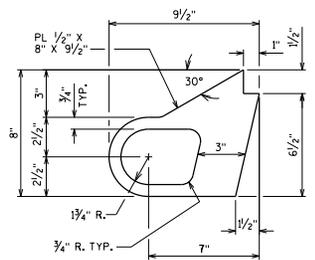
**PART PLAN**

**LEGEND**

- ▲ ① NEOPRENE STRIP SEAL (1-INCH) AND STEEL EXTRUSIONS. SET JOINT OPENING AT 1 1/2" WHEN EXPANSION LENGTH < 230'-0". WHEN EXPANSION LENGTH > 230'-0", PREPARE A TEMPERATURE TABLE SHOWING JOINT OPENINGS FROM 5°F TO 85°F IN 10°F INCREMENTS. ACCOUNT FOR PRESTRESSED GIRDER SHRINKAGE DUE TO CREEP WHEN DETERMINING THIS TABLE. JOINT OPENINGS GIVEN NORMAL TO JOINT. ■
- ② STUDS 3/4" DIA. X 6 3/4" LONG AT 6" ALTERNATE CENTERS. WELD TO EXTRUSIONS AND BEND AS SHOWN AFTER WELDING.
- ②A 1/2" THICK ANCHOR PLATE WITH 3/4" DIA. ROD (OR ALTERNATE STRIP SEAL ANCHOR). WELD ROD TO ANCHOR PLATE, WELD ANCHOR PLATE TO NO. 1 AT 1'-6" CENTERS BETWEEN GIRDERS.
- ③ 3/4" DIA. THREADED ROD WITH 2 NUTS AND PLATE WASHERS. FOR PRESTRESSED GIRDERS, GROUT THREADED ROD INTO FIELD DRILLED HOLES ON  $\bar{C}$  OF GIRDER. FOR STEEL GIRDERS, WELD THREADED ROD TO TOP FLANGE OR ATTACH BY BOLTING THRU FLANGE. ON ABUTMENT SIDE, GROUT THREADED ROD INTO FIELD DRILLED HOLES IN ABUTMENT BACKWALL AS SHOWN.
- ④ 3/4" DIA. THREADED ROD WITH NUT. TACK WELD NUT TO NO. 5.
- ⑤ FABRICATE SUPPORT FROM 3" X 1/2" BAR AS SHOWN OR EQUIVALENT. ONE PER GIRDER PER SIDE. SHOP OR FIELD WELD TO NO. 1. IF FIELD WELDED, COVER WELDED AREAS WITH EPOXY-COATING MATERIAL. PROVIDE 1/2" DIA. HOLE FOR NO. 3 AND 1" DIA. HOLE FOR NO. 4.
- ⑥ GALVANIZED PLATE 3/4" X 10" X 12'-2" LONG FOR SKEWS TO 45° AND 3'-0" LONG FOR SKEWS > 45° WITH HOLES FOR NO. 7. FOR SINGLE SLOPE PARAPET. FOR SLOPED FACE PARAPET, SEE STANDARD 28.07.
- ⑦ 3/4" DIA. X 1/2" STAINLESS STEEL SOCKET FLAT HEAD SCREWS WITH ANTI-SEIZE LUBRICANT. PLACE IN COUNTERSUNK HOLE. RECESS 1/16" BELOW PLATE SURFACE.
- ⑧ 3/4" DIA. X 4" GALVANIZED HEX HEAD BOLT, BEND 45°.
- ⑨ 3/4" DIA. X 2 1/4" GALVANIZED THREADED COUPLING.
- ⑩ SIDEWALK COVER PLATE 3/2" X 12'-0" WIDE FOR SKEWS TO 45° AND 3'-0" WIDE FOR SKEWS > 45° X LIMITS SHOWN. BEND DOWN FACE OF SIDEWALK WITH HOLES FOR NO. 7. GALVANIZE PLATE AFTER SLIP-RESISTANT SURFACE IS APPLIED.
- ⑪ 1" X 5" SLOTTED COUNTERSUNK HOLE FOR NO. 7. PLACE SLOT PARALLEL TO DIRECTION OF MOVEMENT.

**NOTES**

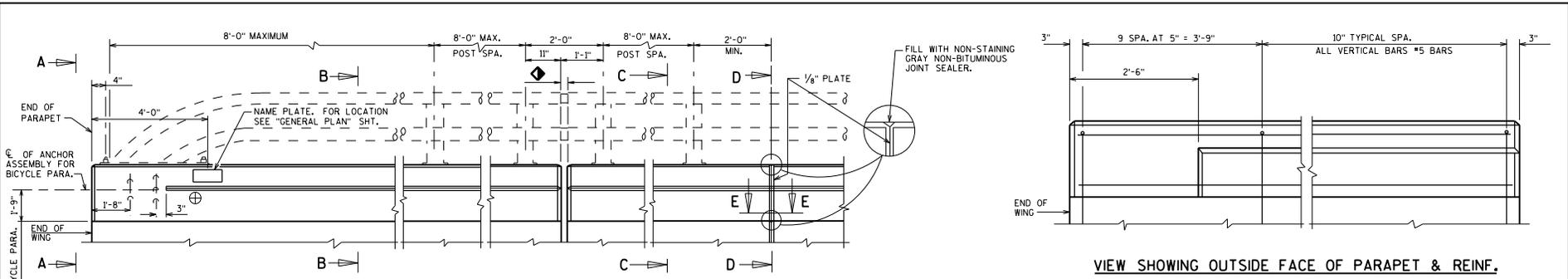
ONE FIELD SPLICE PERMITTED IN STEEL EXTRUSIONS, UNLESS MORE ARE REQUIRED FOR STAGED CONSTRUCTION, HANDLING OR GALVANIZING REQUIREMENTS. IF USED, DETAILS SHALL BE SUBMITTED FOR APPROVAL. NO SPLICING PERMITTED IN NEOPRENE STRIP SEAL. AFTER FABRICATION, BUT BEFORE SHIPMENT, STRAIGHTEN STEEL EXTRUSIONS SUCH THAT THEY SHALL BE FREE FROM WARP, TWIST AND SWEEP. FABRICATOR SHALL PROVIDE MEANS OF KEEPING GALVANIZED EXTRUSIONS CLEAN AND SMOOTH DURING SHIPMENT AND PRIOR TO APPLYING LUBRICANT ADHESIVE FOR NEOPRENE GLAND INSTALLATION. SANDBLAST PLATES, SUPPORTS AND EXTRUSIONS AFTER FABRICATION IN ACCORDANCE WITH SSPC SP. #6 "COMMERCIAL BLAST CLEANING". AFTER BLAST CLEANING, THE PLATES, SUPPORTS AND EXTRUSIONS SHALL BE HOT DIPPED GALVANIZED. SLIP-RESISTANT SURFACE IS APPLIED TO SIDEWALK COVER PLATES BY THE MANUFACTURER AND THEN HOT DIPPED GALVANIZED TO THEIR RECOMMENDATIONS TO MAINTAIN THE INTEGRITY OF THIS SURFACE. ANCHOR SYSTEM NO. 8 AND NO. 9 SHALL CONFORM TO ASTM A307 AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 CLASS C AND D. STRIP SEAL EXPANSION JOINT ASSEMBLY, INCLUDING ANCHOR STUDS AND HARDWARE WILL BE PAID FOR AT THE LUMP SUM PRICE BID FOR "EXPANSION DEVICE B-...".



**ALTERNATE STRIP SEAL ANCHOR**

<b>STRIP SEAL EXPANSION JOINT DETAILS</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17



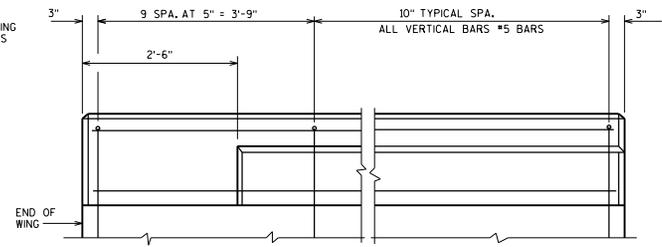


**AT ABUTMENTS**

**PART ELEVATION OF RAIL PARAPET**

⊕ EXTEND 3/4" GROOVE TO END OF PARAPET WHEN ANCHOR ASSEMBLY IS NOT USED

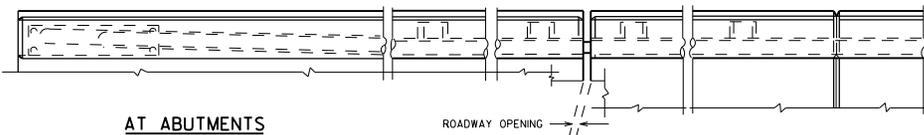
◆ ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR AT ABUTMENTS



**VIEW SHOWING OUTSIDE FACE OF PARAPET & REINF.**

**BILL OF BARS**

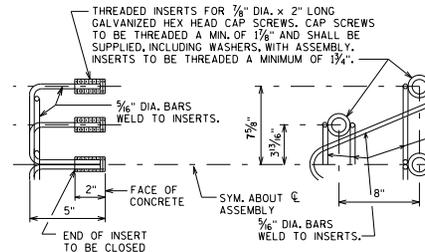
BAR MARK	CO. #	NO. REQ'D.	LENGTH	BENT	BAR SERIES	LOCATION
S501	X		6'-9"	X		PARAPET VERT.
A501	X		9'-6"	X		PARAPET VERT.



**AT ABUTMENTS**

**AT PIERS**

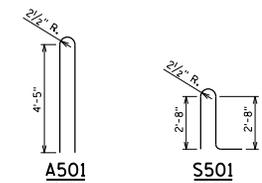
**PART PLAN OF RAIL PARAPET**



**DETAIL OF ANCHOR ASSEMBLY**

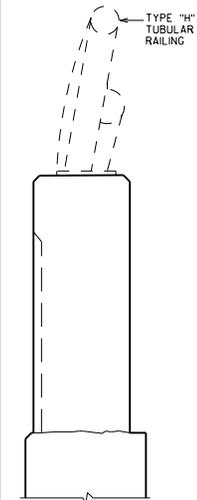
NOTE: HEX. HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 CLASS C.

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

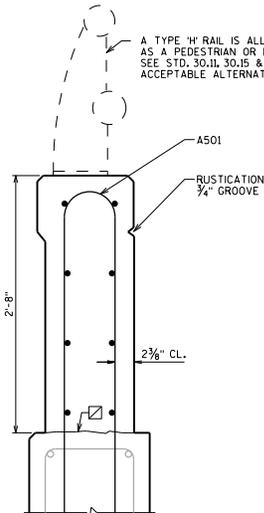


**A501**

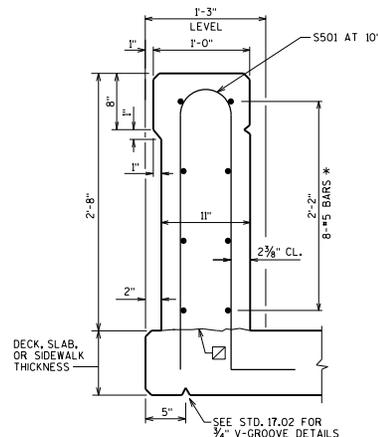
**S501**



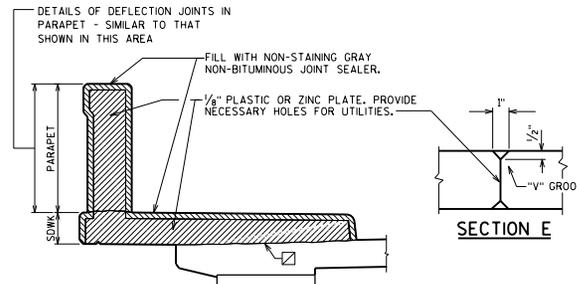
**VIEW A**



**SECTION B**



**SECTION C**  
(PARAPET ON SIDEWALK, DECK, OR SLAB)



**SECTION D**

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

1. GIRDER STRUCTURES AND SLAB STRUCTURES WITH A SIDEWALK SHOULD HAVE A DEFLECTION JOINT IN THE SIDEWALK AND PARAPET OVER THE PIER.
2. GIRDER STRUCTURES AND SLAB STRUCTURES WITHOUT SIDEWALKS SHOULD HAVE NO DEFLECTION JOINTS IN THE PARAPETS.

**NOTE**

WHEN PARAPETS ARE POURED CONTINUOUSLY FROM END TO END, THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF 1/4" ZINC OR PLASTIC PLATE CUT AS SHOWN IN SECTION 'D' BY SHADED AREA. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED AT THE DEFLECTION JOINTS, ONE SIDE OF JOINT SHALL BE COATED WITH AN APPROVED LIQUID BOND BREAKER AND PLATE SEPARATORS MAY BE OMITTED.

**LEGEND**

- ⊗ HORIZ. CONST. JOINT-STRIKE OFF AS SHOWN AND LEAVE ROUGH.
- \* OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT, LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 3/4" - 'V' GROOVE.

**DESIGNER NOTE**

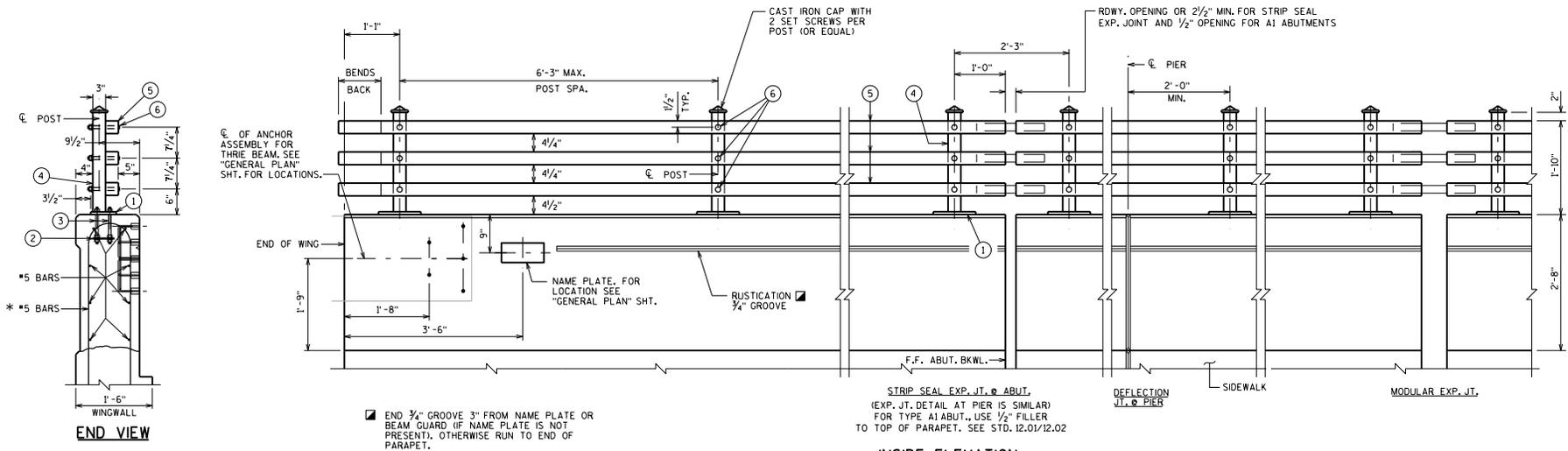
A A501 BAR MAY BE USED IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE 'A' ABUTMENTS.

	PARAPET
AREA	2.50 SF
WEIGHT	375 LB/FT

**VERTICAL FACE PARAPET 'A'**



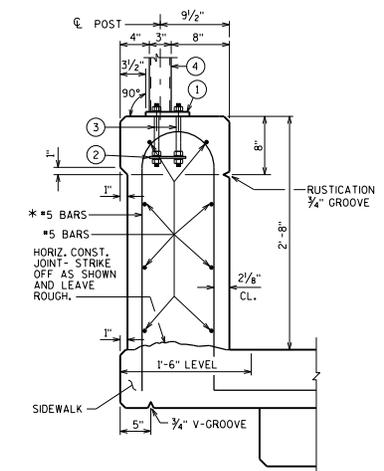
APPROVED: Bill Oliva DATE: 7-17



END 3/4\"/>

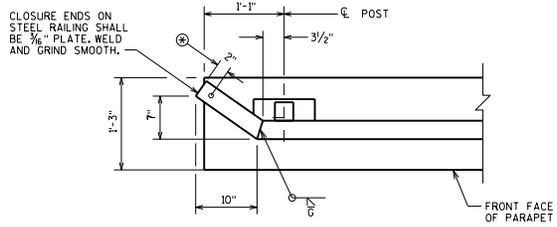
**INSIDE ELEVATION**

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



**SECTION THRU PARAPET ON BRIDGE**

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



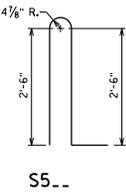
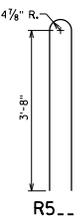
**END POST DETAIL**

3/4\"/>

**BILL OF BARS**

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

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



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

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

**DESIGNER NOTES**

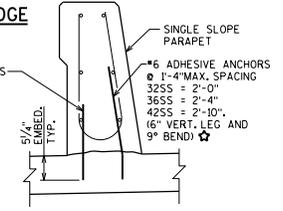
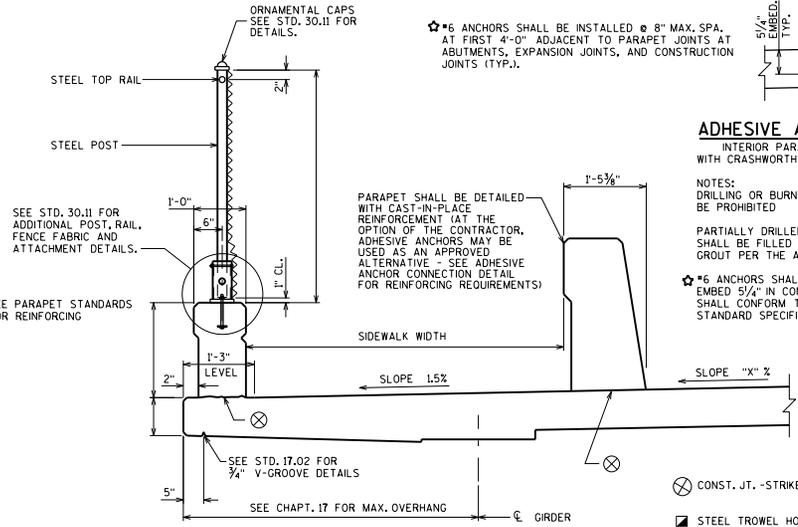
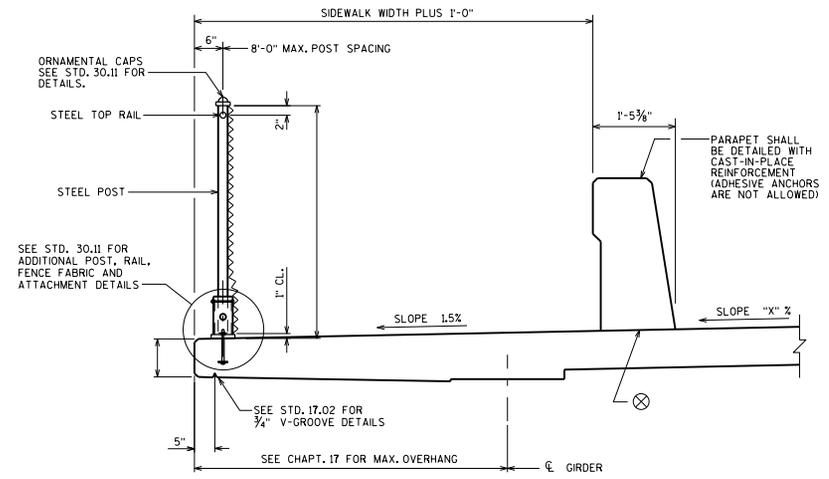
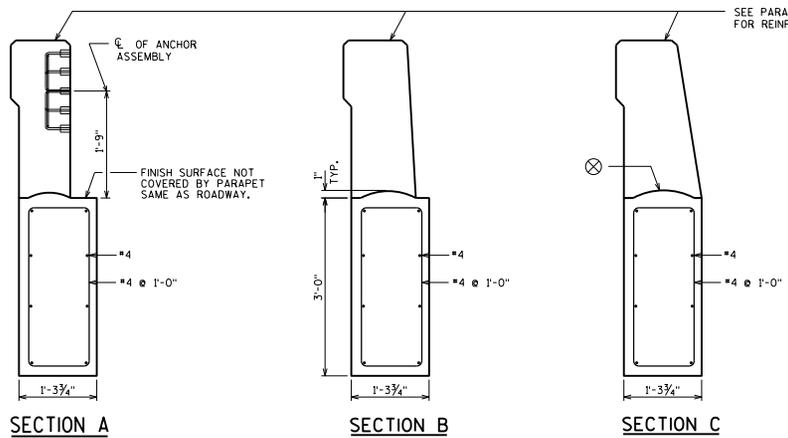
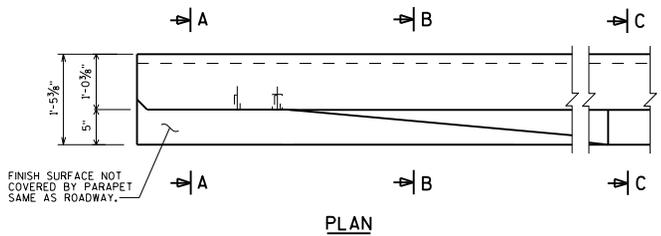
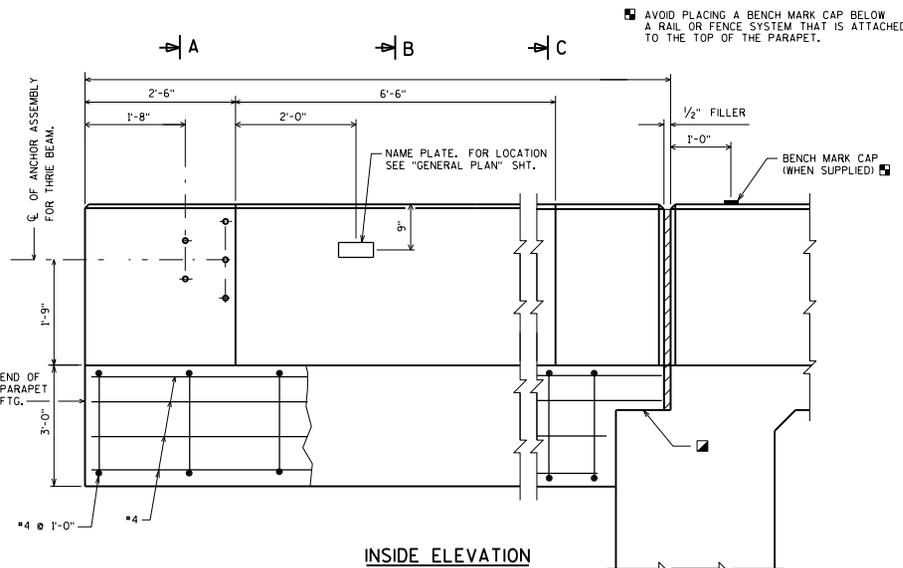
SEE STANDARD 30.09 FOR ADDITIONAL RAILING DETAILS  
 SEE STANDARD 30.07 FOR DEFLECTION JOINT DETAILS AND NOTES  
 - BEAM GUARD ANCHOR ASSEMBLY DETAILS  
 - SIDEWALK REINFORCEMENT AND DETAILS  
 - PARAPET REINFORCING BAR SIZE AND SPACING

**COMBINATION RAILING TYPE '3T'**



**BUREAU OF STRUCTURES**

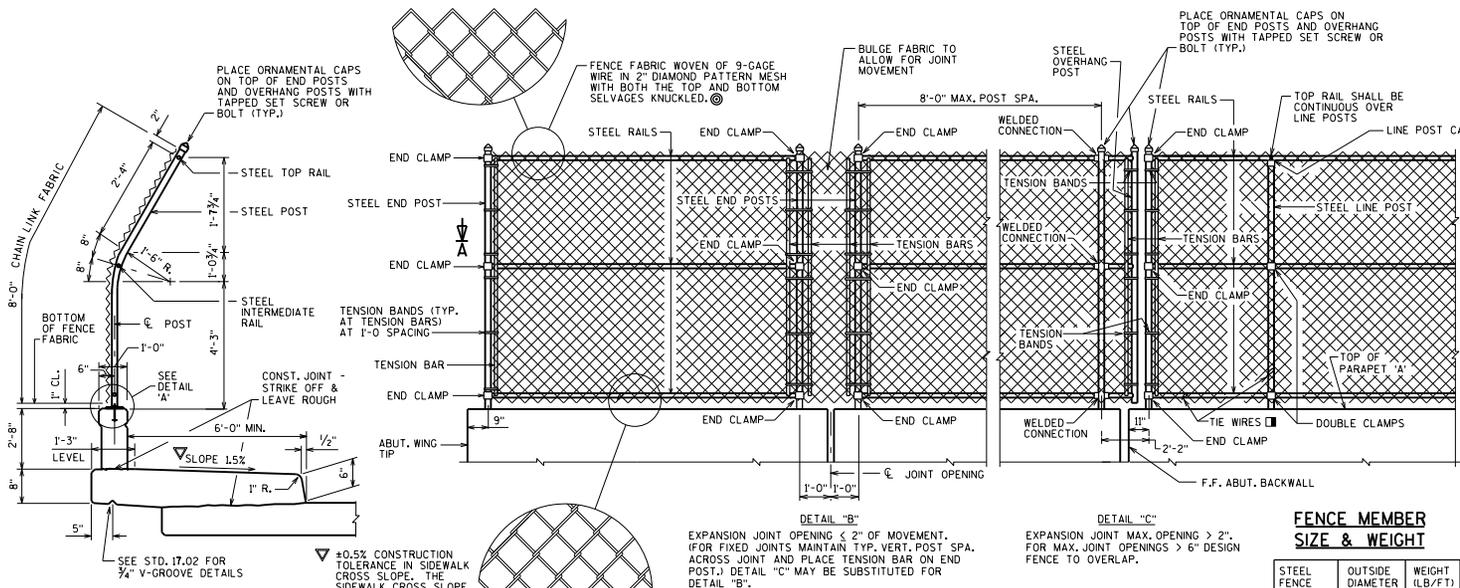
APPROVED: Bill Oliva DATE: 7-17



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 3/4"-INCH. EMBED 5/4" IN CONCRETE." ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

**DESIGNER NOTES**  
 #32SS PARAPET SHOWN IN THIS STANDARD, FOR DETAILS, INCLUDING REINFORCING, SEE STANDARD 30.30, SEE STANDARDS 30.31, 30.32, AND 30.33 FOR SIMILAR DETAILS USED WITH OTHER PARAPET TYPES.  
 ALL PARAPET FOOTING BARS SHALL BE EPOXY COATED.  
 DO NOT SHOW THE ADHESIVE ANCHOR CONNECTION DETAIL ON THE PLAN. THE CONTRACTOR MAY REQUEST THIS DETAIL IF DESIRED.

<b>PARAPET FOOTING</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17



**NOTES**

POSTS ARE TO BE SET VERTICAL.

**METALLIC-COATED FENCE SYSTEM:**  
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT THE FENCE FABRIC WHICH MAY BE ALUMINUM-COATED STEEL OR GALVANIZED STEEL.

FABRIC SHALL CONFORM TO ASTM A491 OR A392, CLASS 2. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626.

THE BID ITEM SHALL BE "FENCE CHAIN LINK - 1/2" FT. B-...". LF.

**POLYMER-COATED FENCE SYSTEM:**  
ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL WITH A COLORED POLYMER-COATING ON THE OUTSIDE.

FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B. STEEL RAILS, POSTS AND POST SLEEVES SHALL CONFORM TO ASTM F1083, STANDARD WEIGHT PIPE (SCHEDULE 40). FITTINGS SHALL CONFORM TO ASTM F626. SEE THE "BRIDGE SPECIAL PROVISIONS" FOR ADDITIONAL DETAILS.

THE COLOR OF POLYMER-COATING FOR THIS STRUCTURE SHALL BE (SPECIFY: DARK GREEN, BROWN OR BLACK) IN ACCORDANCE WITH ASTM F934.

THE BID ITEM SHALL BE "FENCE CHAIN LINK POLYMER - COATED - 1/2" FT. B-...". LF.

COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.

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

BASE PLATES, ANCHOR PLATES AND SHIMS SHALL BE ASTM A709, GRADE 36.

ALL POST SPACINGS ARE MEASURED HORIZONTALLY ALONG THE C/L OF THE POST.

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

ALTERNATE TO DOUBLE CLAMP: USE LINE RAIL CLAMP (BOULEVARD) OR 180° BRACE BAND, WHICH MAY BE USED WHEN THE POSTS ARE EITHER BOLTED TO THE POST SLEEVES OR DIRECTLY WELDED TO THE BASE PLATE.

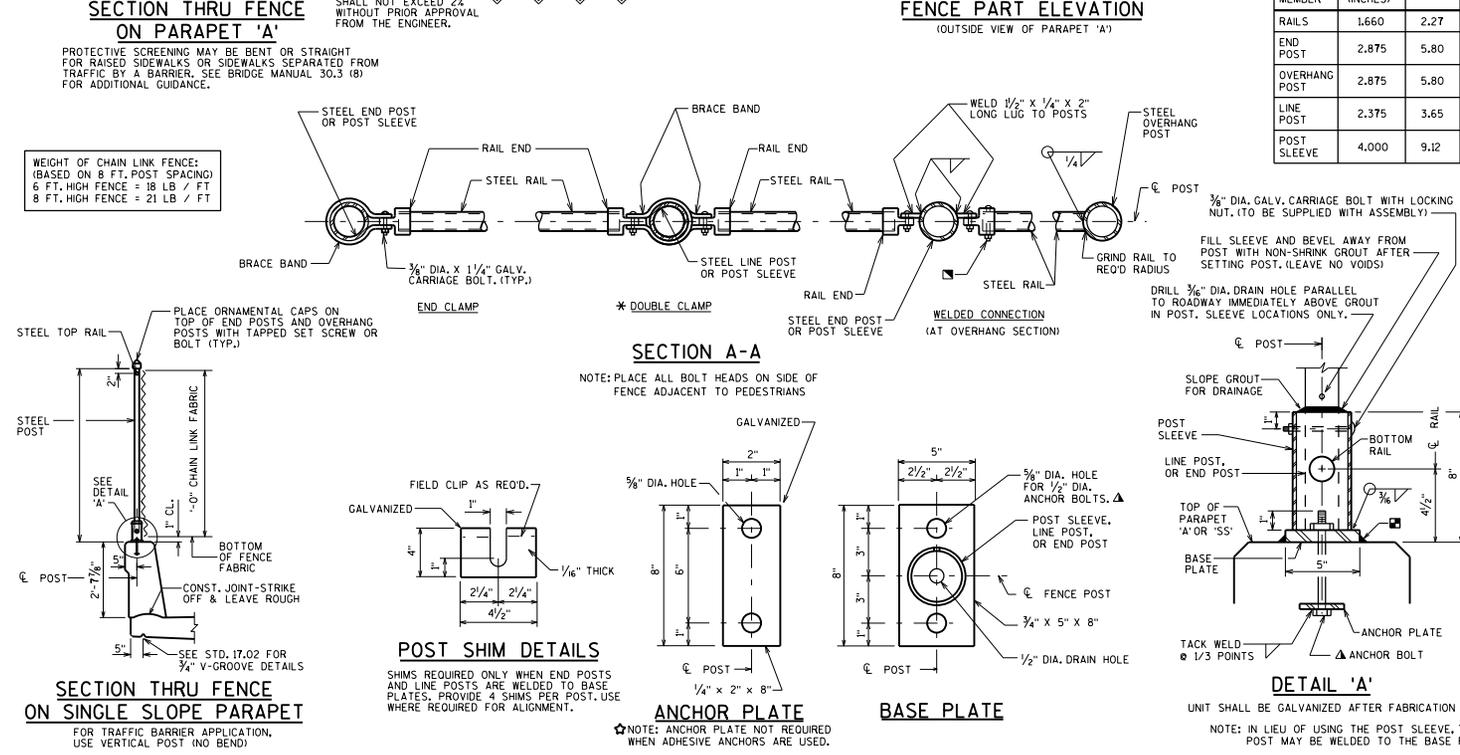
1/2" DIA. X 6 3/8" LONG GALVANIZED HEX BOLT WITH NUT & WASHER.

ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 1/2"-INCH. EMBED 1" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

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

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

MINIMUM LENGTH OF TOP RAIL BETWEEN SPLICES SHALL BE 20'-0". LOCATE SPLICES NEAR 1/4 POINT OF POST SPACING.



**DESIGNER NOTES**

THE CHAIN LINK FENCE SYSTEM SELECTED FOR THE STRUCTURE SHALL BE A "METALLIC-COATED FENCE SYSTEM" OR A "POLYMER-COATED FENCE SYSTEM".

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

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

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

THE DESIGN ENGINEER SHALL DESIGN THE SUPERSTRUCTURE TO ACCOUNT FOR THE MAXIMUM 2% SIDEWALK CROSS SLOPE.

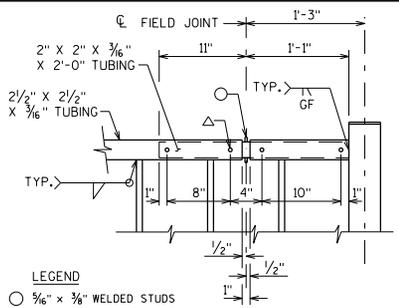
**CHAIN LINK FENCE DETAILS**

**BUREAU OF  
STRUCTURES**

DATE: \_\_\_\_\_

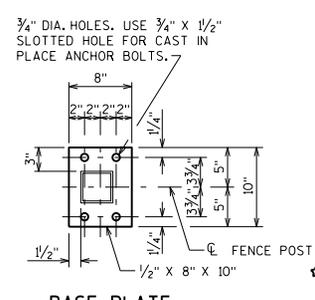
APPROVED: Bill Oliva 7-17

STANDARD 30.11

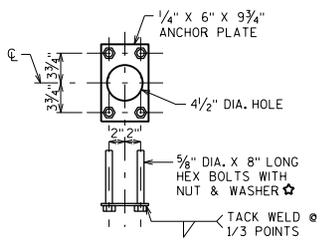


**LEGEND**  
 ○ 3/16" x 3/8" WELDED STUDS  
 △ WELD BEAD ON EACH SIDE OF TUBE, GRIND BEADS SO THAT SLEEVE FITS FREELY INSIDE THE 2 1/2" X 2 1/2" TUBE.

**RAILING EXPANSION JOINT DETAIL**

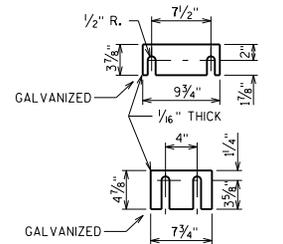


**BASE PLATE**



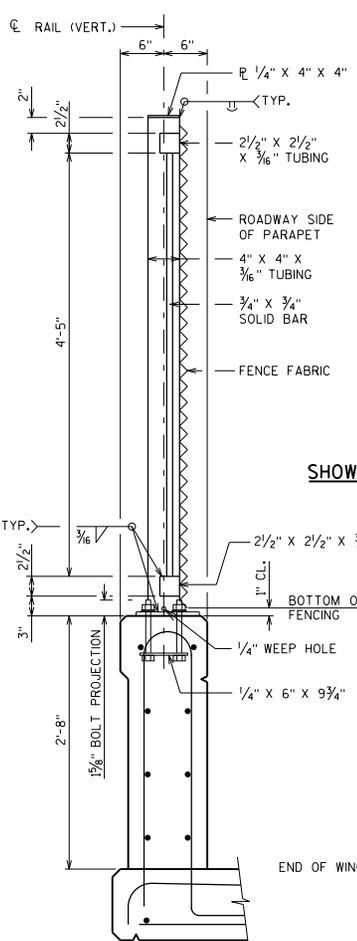
**ANCHORAGE DETAIL**

ALTERNATIVE ANCHORAGE: ADHESIVE ANCHORS 5/8-INCH EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.  
 NOTE: ANCHOR PLATE NOT REQUIRED WHEN ADHESIVE ANCHORS ARE USED.

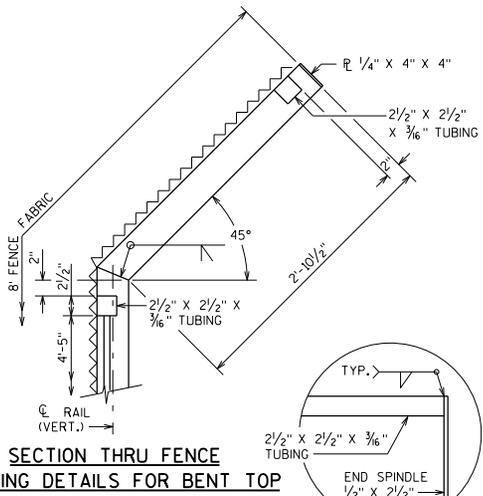


**SHIM PLATE DETAILS**

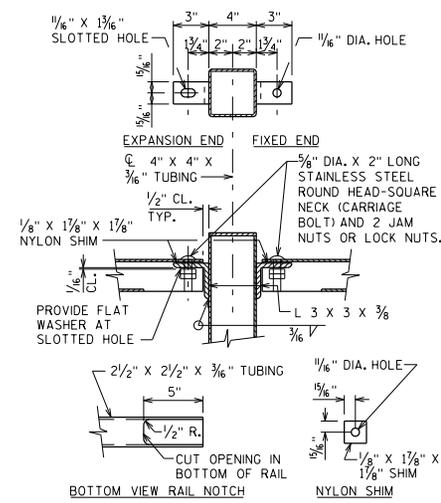
TWO SHIMS OF EACH SIZE REQUIRED PER POST



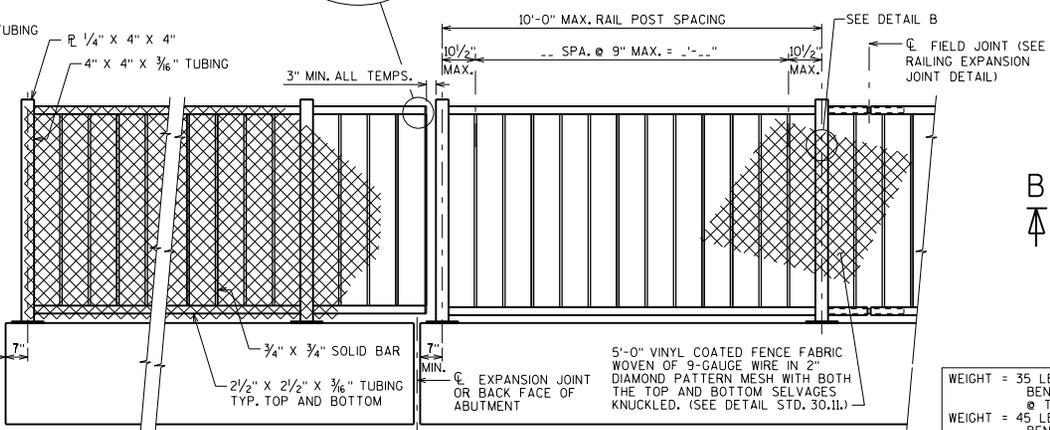
**SECTION THRU RAILING**



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



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



**INSIDE ELEVATION OF RAILING**

**NOTES**

POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.  
 STRUCTURAL TUBING SHALL CONFORM TO ASTM A500, GRADE B PLATES, ANGLES, BARS AND SHIMS SHALL CONFORM TO ASTM A709, GRADE 36. FENCE FABRIC SHALL CONFORM TO ASTM F668, CLASS 2B.  
 ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET POSTS NORMAL TO GRADE.  
 ALL POST SPACINGS ARE TAKEN HORIZONTAL ALONG CENTERLINE OF RAILING AT BASE OF POST.  
 STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATES WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.  
 CAULK AROUND PERIMETER OF BASE PLATES AND FILL PORTION OF SLOTTED HOLES AROUND ANCHOR BOLTS WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.  
 CUT BOTTOM OF POST TO MAKE VERTICAL IN TRANSVERSE DIRECTION.

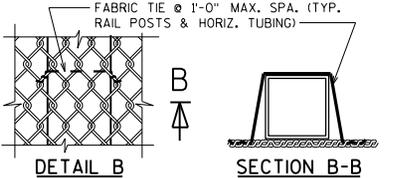
ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM 307. IF 307 IS USED, ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.  
 THE BID ITEM SHALL BE "RAILING TUBULAR SCREENING B-..." WHICH SHALL INCLUDE ALL ITEMS SHOWN.  
 RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE NOT MORE THAN 3 POSTS.  
 VENT HOLES SHALL BE DRILLED IN MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.

ALL RAILING MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING THE STEEL RAILING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS. PAINT OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED FEDERAL 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.

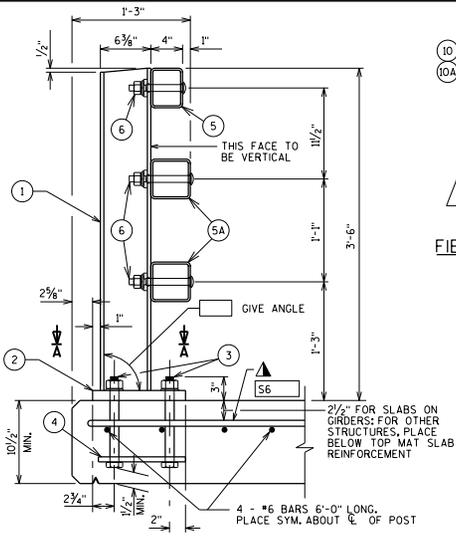


**TUBULAR STEEL RAILING SCREENING**

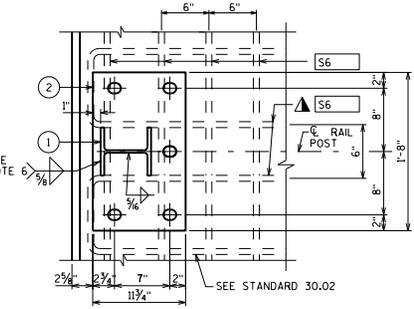
**BUREAU OF STRUCTURES**

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

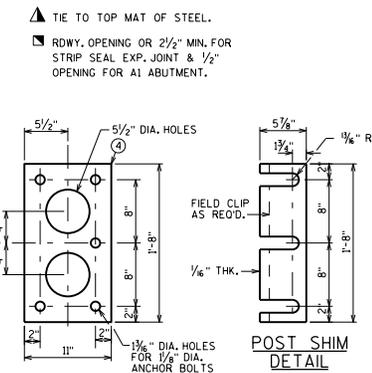
APPROVED: Bill Oliva DATE: 7-17



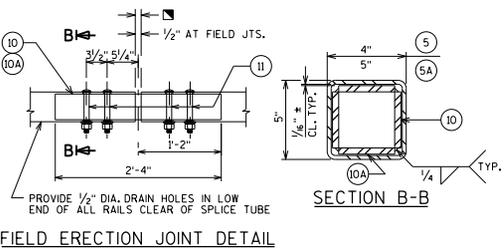
SECTION THRU RAILING ON DECK



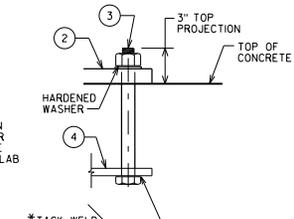
SECTION A-A



ANCHOR PLATE AT RAIL TO DECK CONNECTION

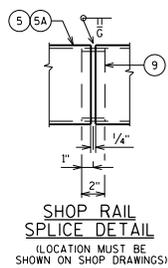


FIELD ERECTION JOINT DETAIL



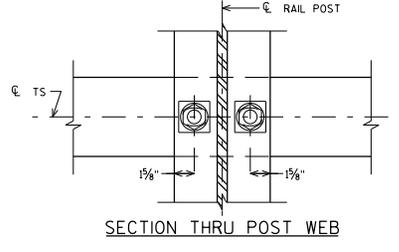
ANCHOR BOLTS

\*FOR ANCHOR BOLTS IN WINGS, TACK WELD MAY BE USED IN FIELD AFTER ANCHOR PLATE IS IN POSITION IF RECD. FOR CONSTRUCTIBILITY.

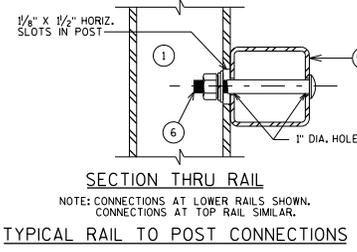


SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



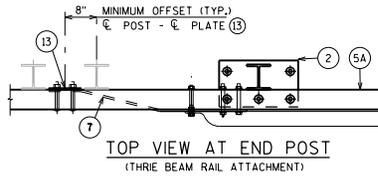
SECTION THRU POST WEB



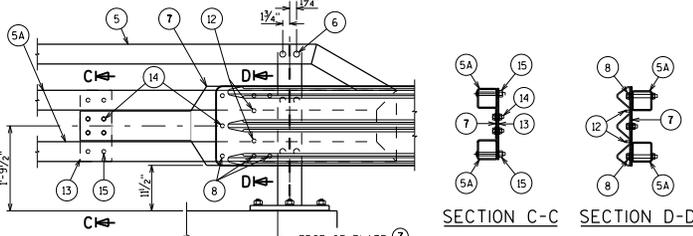
SECTION THRU RAIL

NOTE: CONNECTIONS AT LOWER RAILS SHOWN. CONNECTIONS AT TOP RAIL SIMILAR.

TYPICAL RAIL TO POST CONNECTIONS

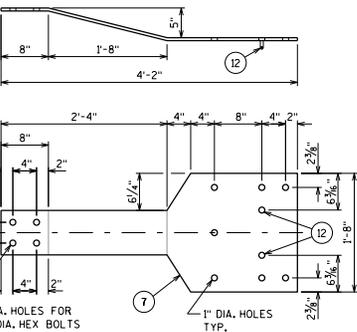


TOP VIEW AT END POST (THREE BEAM RAIL ATTACHMENT)

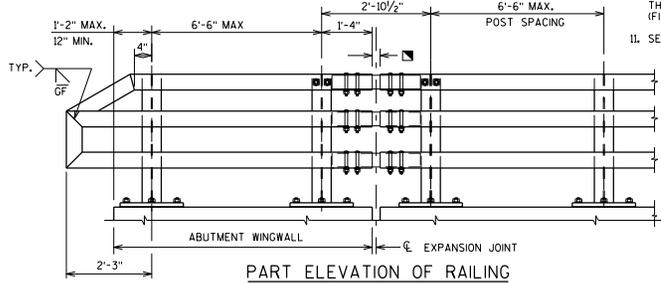


SECTION C-C SECTION D-D

DETAIL AT END POST (THREE BEAM RAIL ATTACHMENT)



BACK-UP PLATE DETAIL AT BEAM GUARD ATTACHMENT



PART ELEVATION OF RAILING

**LEGEND**

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

**NOTES**

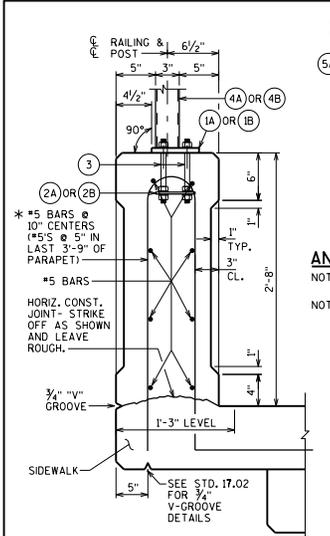
- BID ITEM SHALL BE "RAILING TUBULAR TYPE M B-1" WHICH INCLUDES ALL ITEMS SHOWN.
- RAIL POST AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50, HOLLOW RAILING STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED FY = 50 KSI. ANCHOR PLATES, AND SPLICE TUBE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.
- THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/8 TURN.
- RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE. RAILS SHALL BE SPLICED IN A PANEL OVER EXPANSION JOINTS.
- ENDS OF TUBE SECTIONS SHALL BE SAWS, GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.
- WELD IS THE SAME ON BOTH FLANGES. FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING.
- FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 AND CAULK AROUND PERIMETER OF PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. STEEL POST SHIMS MAY BE USED UNDER POSTS WHERE REOD. FOR ALIGNMENT.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS & STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING BY SSPC SPECIFICATIONS.
- WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED FEDERAL COLOR NO. [ ] . [ ] (FILL IN COLOR NAME).
- SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

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

**TUBULAR STEEL RAILING TYPE "M"**

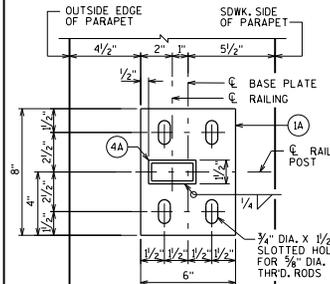
**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17

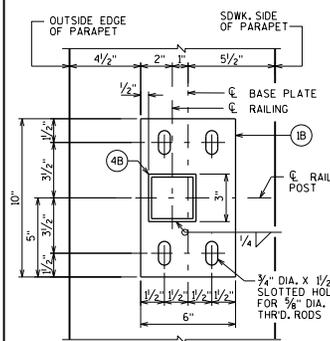


**SECTION THRU PARAPET ON BRIDGE**

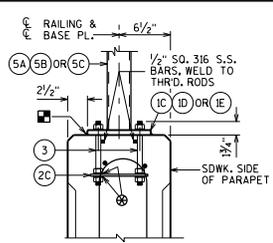
\* ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD ANCHOR (WHEN REQ'D.).



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

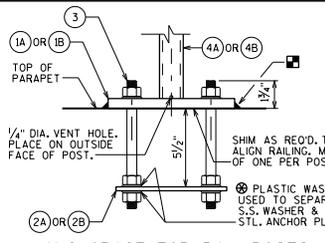


**TYPICAL RAIL POST BASE PLATE**  
FOR 3" X 3" X 3/8" POSTS (2B)



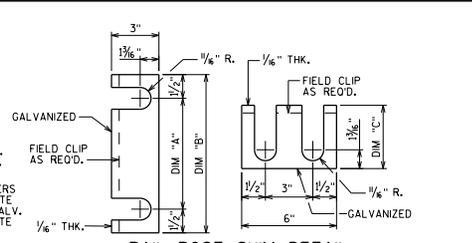
**ANCHORAGE FOR END RAIL**

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



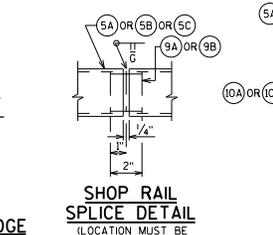
**ANCHORAGE FOR RAIL POSTS**

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



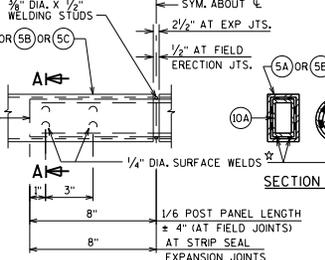
**RAIL POST SHIM DETAIL**

6" X 8" BASE PLATE (1A) DIM "A" = 5", DIM "B" = 8", DIM "C" = 4"  
6" X 10" BASE PLATE (1B) DIM "A" = 7", DIM "B" = 10", DIM "C" = 5"  
(2 SETS PER POST)



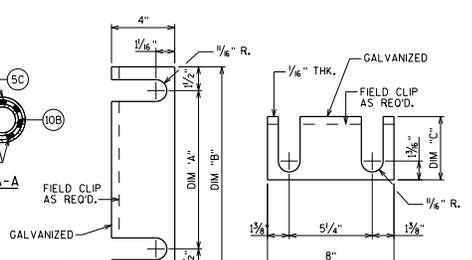
**SHOP RAIL SPLICE DETAIL**

(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.



**END RAIL SHIM DETAIL**

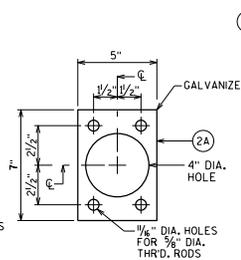
8" X 1-1" BASE PLATE (1A) DIM "A" = 10", DIM "B" = 1-1", DIM "C" = 6 1/2"  
8" X 1-6" BASE PLATE (1B) DIM "A" = 1-3", DIM "B" = 1-6", DIM "C" = 9"  
8" X 1-3" BASE PLATE (1C) DIM "A" = 1-0", DIM "B" = 1-3", DIM "C" = 7 1/2"  
(2 SETS PER POST)

**LEGEND**

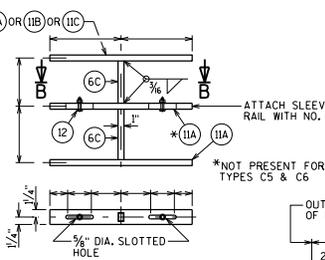
- (1A) PLATE 3/8" X 6" X 8" WITH 3/4" X 1/2" SLOTTED HOLES.
- (1B) PLATE 3/8" X 6" X 10" WITH 3/4" X 1/2" SLOTTED HOLES
- (1C) PLATE 3/8" X 8" X 1-1" WITH 3/4" X 1/2" SLOTTED HOLES.
- (1D) PLATE 3/8" X 8" X 1-6" WITH 3/4" X 1/2" SLOTTED HOLES
- (1E) PLATE 3/8" X 8" X 1-3" WITH 3/4" X 1/2" SLOTTED HOLES
- (2) 1/4" X 5" X 7" ANCHOR PLATE WITH 1/8" DIA. HOLES FOR THRD. RODS NO. 3.
- (2B) 1/4" X 5" X 9" ANCHOR PLATE WITH 1/8" DIA. HOLES FOR THRD. RODS NO. 3.
- (2B) 1/4" X 2 1/2" X 7 1/4" ANCHOR PLATE WITH 1/8" DIA. HOLES FOR THRD. RODS NO. 3.
- (3) 3/4" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS, 3/8"-INCH EMBED 7" IN CONCRETE FOR RAIL POSTS, EMBED 5" IN CONCRETE FOR END RAILS. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.212 OF THE STANDARD SPECIFICATIONS.
- (4A) STRUCTURAL TUBING 3" X 1 1/2" X 3/8". PLACE VERTICAL. WELD TO NO.1 & 5.
- (4B) STRUCTURAL TUBING 3" X 3" X 3/8". PLACE VERTICAL. WELD TO NO.1 & 5.
- (5A) STRUCTURAL TUBING 3" X 1 1/2" X 3/8" RAILS. WELD TO NO.1 & NO.4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
- (5B) STRUCTURAL TUBING 3" X 2" X 3/8" RAILS. WELD TO NO.1 & NO.4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
- (5C) STRUCTURAL TUBING 2 1/2" DIA. (STANDARD SIZE) (2.875" O.D.). WELD TO NO.1 & 4. INSIDE OF TUBE TO BE PAINTED AT ALL FIELD ERECTION & EXPANSION JOINTS.
- (6A) BAR 1" X 1" PICKETS. WELD TO NO.5. (SPACE AT 6" MAX. C TO C SPACING). PLACE VERTICAL.
- (6B) BAR 1" X 1 1/2" PICKETS. WELD TO NO.5. (SPACE AT 6" MAX. C TO C SPACING). PLACE VERTICAL.
- (6C) BAR 1" X 1 1/2" PICKETS. WELD TO NO.11. PLACE VERTICAL.
- (7) BAR 1" X 1". BEND TO REQUIRED RADIUS. WELD TO NO.4 & 5.
- (8) STRUCTURAL TUBING 5" DIA. (STANDARD SIZE) (5.563" O.D.) 1/2" LONG SLICES. WELD TO NO.5A.
- (9A) RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. PROVIDE "SLIDING FIT".
- (9B) CIRCULAR SLEEVE FABRICATED FROM STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.).
- (10A) RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. (1'-4" @ FIELD ERECTION JTS.) (1'-4" @ STRIP SEAL EXP. JTS.)
- (10B) CIRCULAR SLEEVE FABRICATED FROM STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.) (1'-4" @ FIELD ERECTION JTS.) (1'-4" @ STRIP SEAL EXP. JTS.)
- (11A) BAR 2 1/2" X 1" X " ".
- (11B) BAR 2 1/2" X 1 1/2" X " ".
- (11C) STRUCTURAL TUBING 2" DIA. (STANDARD SIZE) (2.375" O.D.) X " ".
- (12) 1/2" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCKWASHER.

**NOTES**

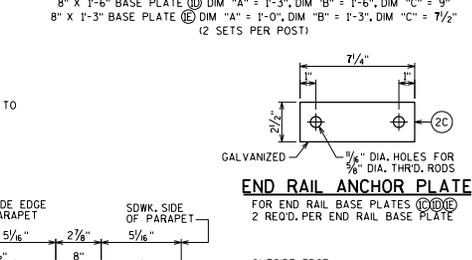
- BID ITEM SHALL BE "RAILING STEEL TYPE C(1-6) B--", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.
- ALL PLATES, BARS AND RECTANGULAR SLEEVES SHALL CONFORM TO ASTM A709 GRADE 50. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B.
- ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET NORMAL TO GRADE.
- CUT BOTTOM OF POST TO MAKE POST VERTICAL IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTION.
- STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATES WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.
- CAULK AROUND PERIMETER OF BASE PLATES, NO.1 AND FILL BOLT SLOT OPENINGS IN SHIMS AND BASE PLATES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.
- ALL JOINTS AND RECESSES IN CONCRETE PARAPET ARE TO BE VERTICAL.
- ALL MATERIAL (EXCEPT NO.3 & 12) SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, THE STEEL RAILING SHALL BE GIVEN A NO.6 BLAST CLEANING PER SSPC SPECIFICATIONS, PAINT OVER GALVANIZING WITH AN APPROVED TOP COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED FEDERAL COLOR NO. [ ] (FILL IN COLOR NAME).
- RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE 3 OR 4 POSTS.
- VENT HOLES SHALL BE DRILLED IN POST AND RAIL MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.
- TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.



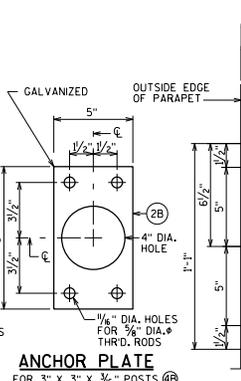
**ANCHOR PLATE**  
FOR 3" X 1 1/2" X 3/8" POSTS (4A)



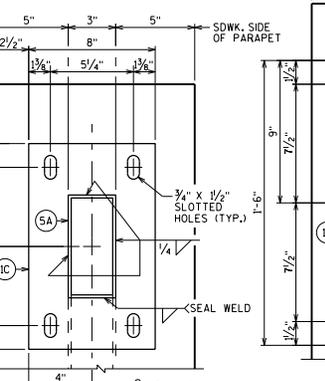
**MODULAR JOINT SLEEVE DETAIL**



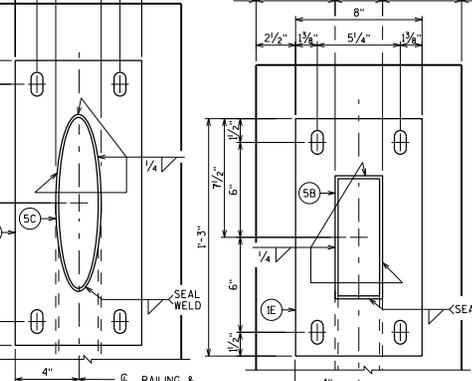
**END RAIL ANCHOR PLATE**  
FOR END RAIL BASE PLATES (10) (11) (12)  
2 REQ'D. PER END RAIL BASE PLATE



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



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



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

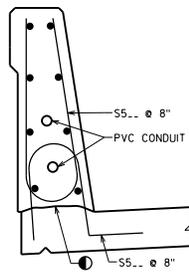
**COMBINATION RAILING DETAILS**


**BUREAU OF STRUCTURES**

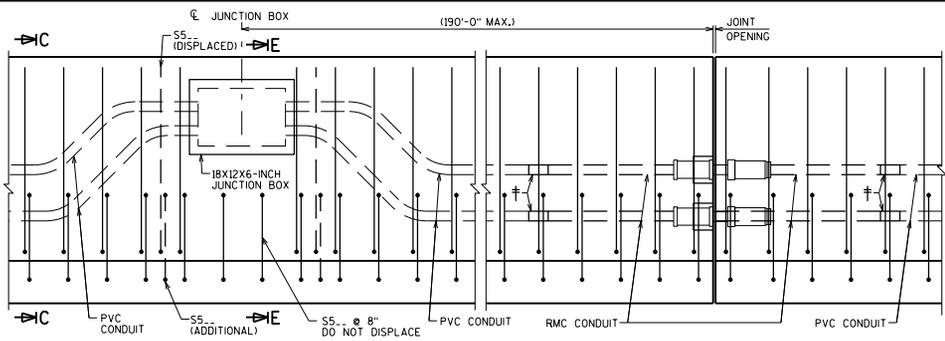
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APPROVED: Bill Oliva

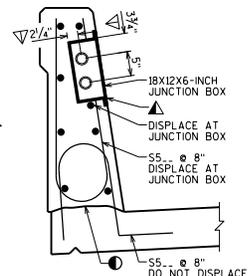
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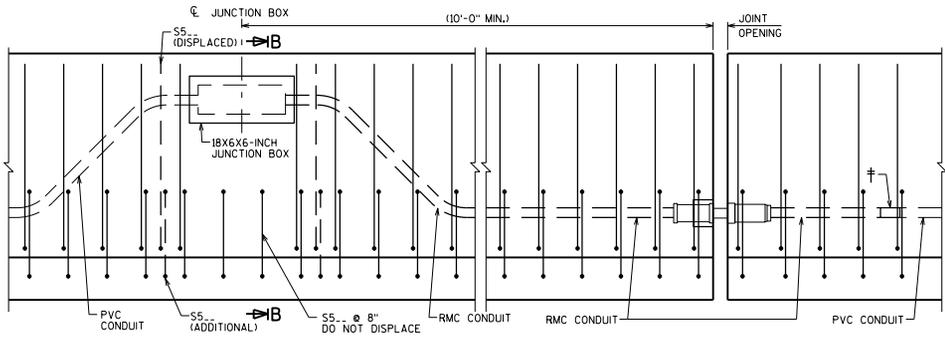
SECTION C-C



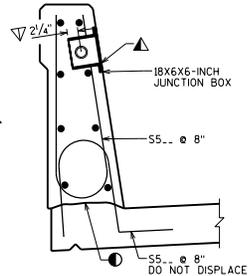
INSIDE ELEVATION AT JUNCTION BOX AT SEMI-EXP. JOINT  
(DECK STEEL NOT SHOWN FOR CLARITY)



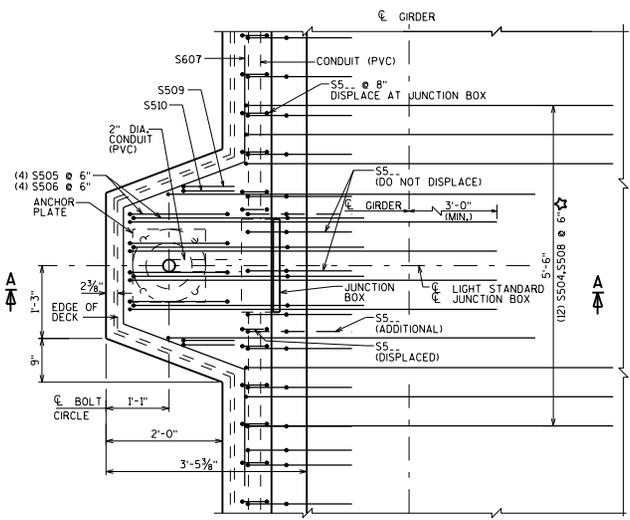
SECTION E-E



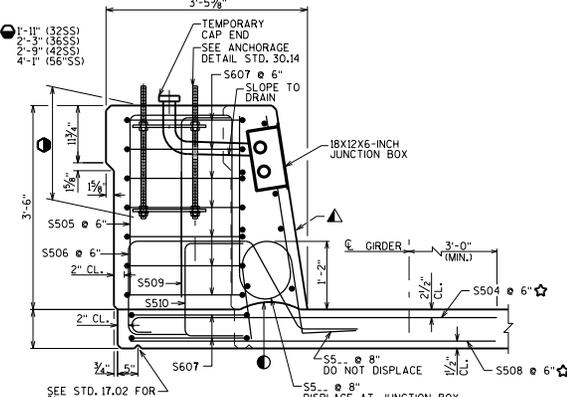
INSIDE ELEVATION AT JUNCTION BOX AT EXP. JOINT  
(DECK STEEL NOT SHOWN FOR CLARITY)



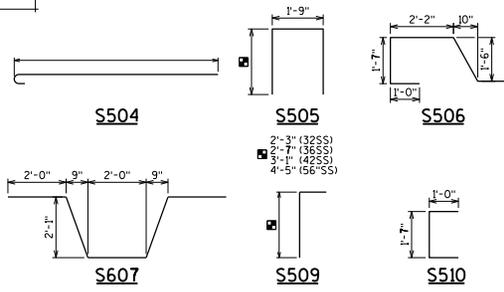
SECTION B-B



PLAN AT LIGHT STANDARD  
(DECK STEEL NOT SHOWN FOR CLARITY)



SECTION A-A



**BILL OF BARS**

BAR MARK	NO. REQ'D	LENGTH				REIN.	LOCATION
		32SS	36SS	42SS	56SS		
S504	X					X	LIGHT STD. - TRANS. - DECK - TOP
S505	X	6-0	6-8	7-8	10-0	X	LIGHT STD. - VERT. - PARAPET
S506	X	7-0	7-0	7-0	7-0	X	LIGHT STD. - VERT. - PARAPET
S607	X	10-0	10-0	10-0	10-0	X	LIGHT STD. - HORIZ. - PARAPET
S509	X					X	LIGHT STD. - TRANS. - DECK - BOT.
S508	X	3-2	3-6	4-0	5-4	X	LIGHT STD. - VERT. - PARAPET
S510	X	3-4	3-4	3-4	3-4	X	LIGHT STD. - VERT. - PARAPET

**DESIGNER NOTES**

- THIS STANDARD ACCOMMODATES ELECTRICAL SERVICE TO LIGHTS STANDARDS MOUNTED ON STRUCTURES. ADDITIONAL REQUIREMENTS MAY BE REQUIRED FOR OTHER SYSTEMS. SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.
- POSSIBLE BID ITEMS:
  - "JUNCTION BOXES 18X12X6-INCH", EACH
  - "JUNCTION BOXES 18X6X6-INCH", EACH
  - "CONDUIT RIGID NONMETALLIC SCHEDULE 40 2-INCH"
  - "CONDUIT RIGID METALLIC 2-INCH"
  - "ANCHOR ASSEMBLIES LIGHT POLES ON STRUCTURE"
- SEE STD. 30.14 FOR ANCHORAGE DETAIL AND LIMITATIONS.
- SEE STD. 30.22 FOR CONDUIT DETAILS AND NOTES.
- THIS STANDARD ACCOMMODATES A MAXIMUM 15" DIA. BOLT HOLE CIRCLE AND A MAXIMUM 15" X 15" SQUARE ANCHOR PLATE WITH (4) - 1" DIA. ANCHOR BOLTS. THIS STANDARD IS BASED ON A 8" MIN. DECK THICKNESS AND A MAXIMUM OVERHANG OF 3'-7" FROM GIRDER TO EDGE OF DECK.
- ★ THESE BARS ARE IN ADDITION TO STANDARD TRANSVERSE BARS IN DECK. FOR CONC. SLAB STRUCTURES, REPLACE S504 & S508 BARS W/ S404 BARS @ 6" SPA. (W/O HOOK @ ENDS, 5'-6" LONG).
- CONDUIT REQUIREMENTS:
  - USE (1) - 2" DIA. CONDUIT TO PROVIDE ELECTRICAL SERVICE TO LIGHTS MOUNTED ON TOP OF THE PARAPET.
  - USE (2) - 2" DIA. CONDUITS IF AN ADDITIONAL ELECTRICAL SERVICE IS REQUIRED.
- JUNCTION BOX REQUIREMENTS:
  - USE A JUNCTION BOX TO KEEP A CONTINUOUS RUN OF CONDUIT (PULL LENGTH) TO A MAXIMUM OF 150 FT.
    - USE A 18" X 6" X 6" JUNCTION BOX WHEN (1) - 2" DIA. CONDUIT IS USED.
    - USE A 18" X 12" X 6" JUNCTION BOX WHEN (2) - 2" DIA. CONDUITS ARE USED.
  - USE A 18" X 12" X 6" JUNCTION BOX AT EACH LIGHT STANDARD (CENTERED ON LIGHT C).
  - USE A JUNCTION BOX AT EACH EXPANSION JOINT. (NOT REQUIRED AT SEMI-EXP. OR FIXED JOINTS)

**LEGEND**

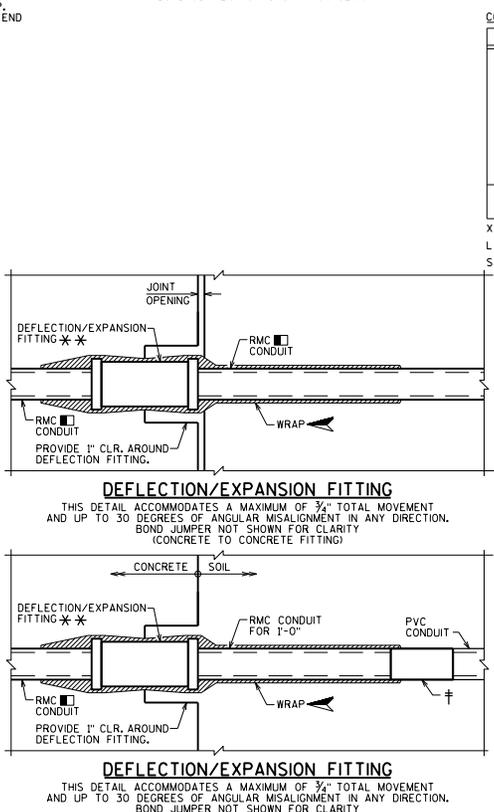
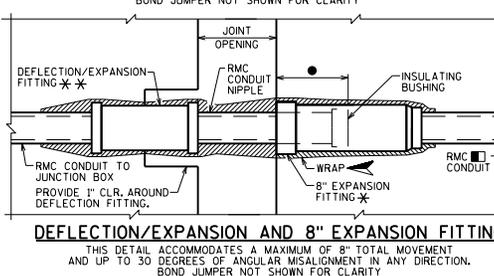
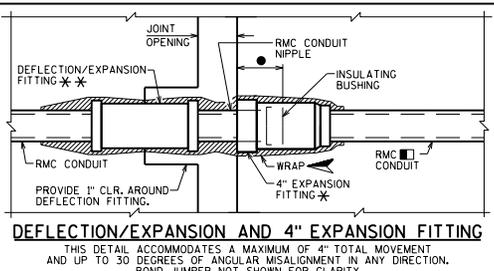
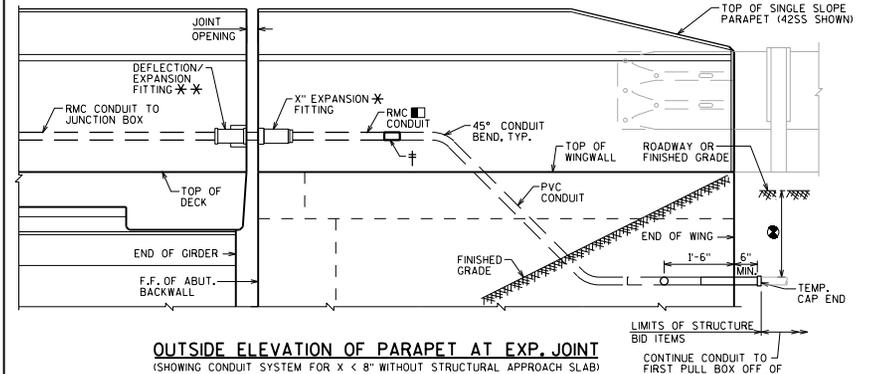
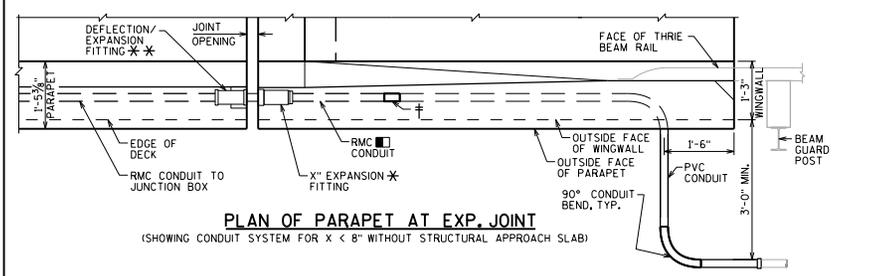
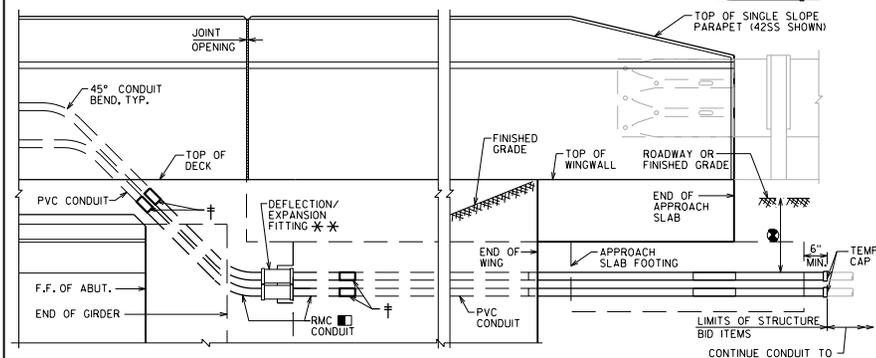
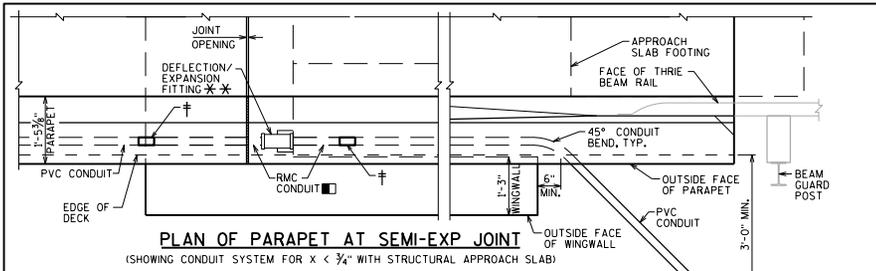
- CONSTRUCTION JOINT, STRIKE OFF AS SHOWN.
- ▲ CUT OUT + 1" OF GASKET AT BOTTOM OF JUNCTION BOX COVER TO ALLOW FOR DRAINAGE.
- ▽ LOCATION OF CONDUIT IS MEASURED FROM OUTSIDE EDGE OF JUNCTION BOX.
- † NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED)
- PVC = POLYVINYL CHLORIDE (RIGID NONMETALLIC) CONDUIT
- RMC = RIGID METALLIC CONDUIT

**LIGHT STANDARD AND JUNCTION BOX FOR PARAPETS**

**BUREAU OF STRUCTURES**

DATE: 7-17

APPROVED: Bill Oliva



**NOTES**  
 CONDUIT SHALL BE EMBEDDED 2" CLEAR.  
 USE 2" DIA. RIGID NONMETALLIC CONDUIT (PVC) UNLESS NOTED OTHERWISE.  
 CONDUIT FITTINGS, CONDUIT BENDS, AND ADAPTER FITTINGS INCIDENTAL TO CONDUIT WORK.  
 CONDUIT BENDS SHALL CONFORM TO THE NATIONAL ELECTRIC CODE.  
 2'-0" MIN. CONDUIT COVER UNDER ROADWAYS, 1'-6" OTHERWISE, CONDUIT COVER SHOULD NOT EXCEED 3'-0".  
 PROVIDE JUNCTION BOXES FROM THE APPROVED PRODUCTS LIST.

**DESIGNER NOTES**  
 THIS STANDARD ACCOMMODATES A MAXIMUM 8" TOTAL MOVEMENT AND UP TO 30 DEGREES OF ANGULAR MISALIGNMENT IN ANY DIRECTION, SEE BRIDGE MANUAL SECTION 32.6 FOR ADDITIONAL INFORMATION.  
 PLANS SHALL SPECIFY SIZE, TYPE, AND LOCATION FOR CONDUIT, JUNCTION BOXES, AND FITTINGS, SEE TABLE BELOW FOR CONDUIT FITTING RECOMMENDATIONS.

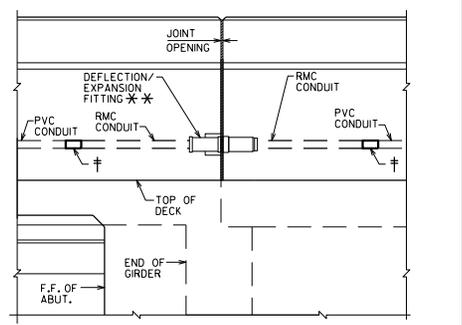
**LEGEND**

- USE 2" DIA. RIGID METALLIC (RMC) CONDUIT AT FITTINGS, PROVIDE RMC FOR 3'-0" MIN. ON EACH SIDE OF JOINT OPENINGS UNLESS NOTED OTHERWISE.
- ▬ NONMETALLIC CONDUIT TO METALLIC CONDUIT ADAPTER FITTING (UL OR NRTL LISTED FOR ELECTRICAL USE SHALL BE USED)
- ◀ SPONGE RUBBER WRAP TO BE AASHTO M153 TYPE 1 OR EQUIVALENT - 1/2" MINIMUM THICKNESS, PROVIDE WRAP FOR THE ENTIRE LENGTH OF THE FITTING OR AS SHOWN, SPONGE RUBBER WRAP INCIDENTAL TO "CONDUIT RIGID METALLIC 2-INCH."
- POSITION MOVABLE END OF CONDUIT INSIDE EXPANSION FITTING, SUCH THAT IT WILL HAVE THE SAME ALLOWANCE FOR MOVEMENT (EXPANSION/CONTRACTION) AS THE EXPANSION DEVICE SET IN PLACE IN THE DECK BELOW IT, TAKE CARE TO INSTALL EXPANSION FITTING AND CONDUIT EXACTLY PARALLEL TO BRIDGE MOVEMENT.
- \* EXPANSION FITTING REQUIREMENTS (IF USED):
  - 4" TOTAL CONDUIT MOVEMENT WITH BONDING JUMPER
  - 8" TOTAL CONDUIT MOVEMENT WITH BONDING JUMPER
- \* DEFLECTION/EXPANSION FITTING REQUIREMENTS (IF USED):
  - 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
		$X < 3/4"$	DEFL./EXP. FITTING
	SEMI-EXP.	$3/4" \leq X < 4"$	4" EXP. FITTING
		$X < 4"$	DEFL./EXP. AND 4" EXP. FITTING
	EXPANSION	$4" \leq X < 8"$	DEFL./EXP. AND 4" EXP. FITTING
$X \geq 8"$		DEFL./EXP. AND 8" EXP. FITTING	
WALL	CONTRACTION	NONE	NONE - RUN PVC CONDUIT THRU JOINT
	EXPANSION	$L < 90$ FEET	DEFL./EXP. FITTING

X = TOTAL ANTICIPATED LONGITUDINAL JOINT MOVEMENT  
 L = DISTANCE BETWEEN EXPANSION JOINTS  
 S = SKEW

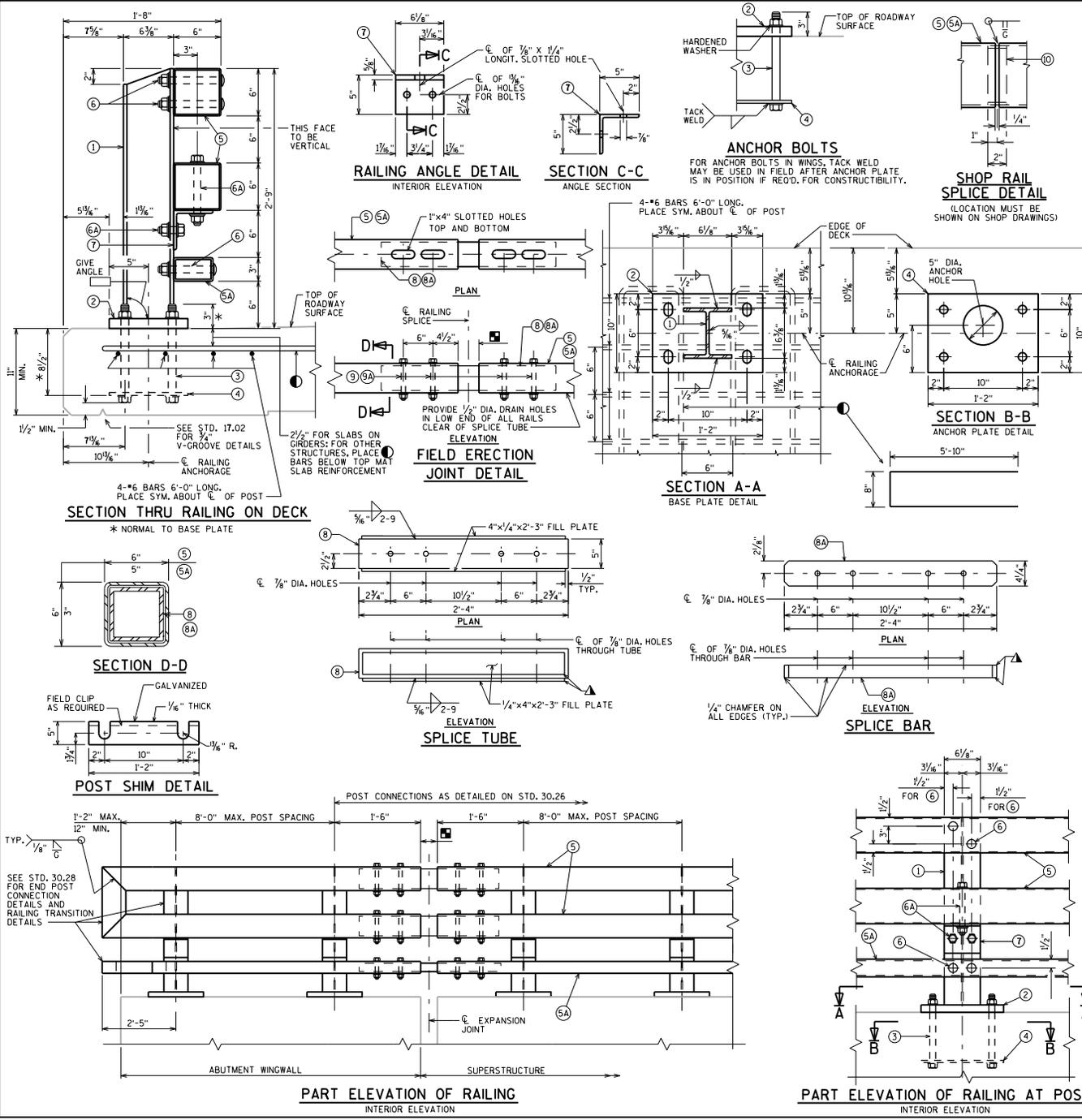


**OUTSIDE ELEVATION OF PARAPET AT SEMI-EXP JOINT (SHOWING CONDUIT SYSTEM FOR X ≥ 3/4" WITHOUT STRUCTURAL APPROACH SLAB)**

**CONDUIT DETAILS AND NOTES**

**BUREAU OF STRUCTURES**

APPROVED: Bill Oliva DATE: 7-17



**LEGEND**

- ① W6 X 25 WITH 1/8" X 1/8" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT NO. 5, USE 1" DIA. HOLES FOR BOLT NO. 6 AT NO. 5A AND FOR BOLT NO. 6A AT NO. 7. CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY. PLACE POST VERTICAL. PLACE POSTS NORMAL TO GRADE LINE.
- ② PLATE 1/4" X 10" X 1'-2" WITH 1/8" X 1/8" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE.
- ③ ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED). 4 REQUIRED PER POST. THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 11/2" LONG BOLT FOR CONCRETE DECKS. ON CONCRETE DECKS SUPERSTRUCTURE, USE 1'-3" LONG BOLT FOR SLAB THICKNESS > 16" AND 11/2" 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.)
- ④ 3/4" X 10" X 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1/8" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
- ⑤ TS 6 X 6 X 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 7/8" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
- ⑥A TS 5 X 3 X 1/4" STRUCTURAL TUBING. USE 1/2" X 1 3/8" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
- ⑦ 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1 1/2" X 1 3/4" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
- ⑧A 1/2" DIA. A325 BOLT WITH HEX NUT & SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE & 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH 3/8" X 1 3/4" X 1 3/4" WASHER).
- ⑨ L 5 X 5 X 3/8" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
- ⑩ TS 5 X 5 X 3/8" X 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.
- ⑪A 4/4" X 2/4" X 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.
- ⑫ 3/4" DIA. A325 FULLY THREADED BOLTS, 7 1/2" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5.
- ⑬A 3/4" DIA. A325 FULLY THREADED BOLTS, 4 1/2" LONG, WITH 2 WASHERS AND HEAVY HEX NUT ON EACH BOLT. NUT TO BE FINGER TIGHT. (4 REQUIRED PER SPLICE). USE 1" X 4" SLOTTED HOLES IN TOP AND BOTTOM OF NO. 5A.
- ⑭ SPLICE SLEEVE FABRICATED FROM 1/4" PLATE. PROVIDE "SLIDING FIT".

▲ ROADWAY OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR AI ABUTMENT. 1/2" AT FIXED JOINTS. SPLICES ARE REQUIRED IN ANY RAILING SPAN BETWEEN POSTS THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT.

▲ PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE RAILS, SPLICE TUBES AND TOP PLATES.

● \*6 BARS X 12'-0" LONG. BEND AS SHOWN, TIE TO TOP MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

**NOTES**

BID ITEM SHALL BE "RAILING STEEL TYPE NY3 B--", WHICH INCLUDES ALL ITEMS SHOWN.

RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE.

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

ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS, ANGLES, SPLICE TUBES, SPLICE BARS AND STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.

WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED FEDERAL COLOR NO. [ ] (FILL IN COLOR NAME).

RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED 4-50 KSI. ANCHOR PLATES & SHIMS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.

THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/8 TURN.

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

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

SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.

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

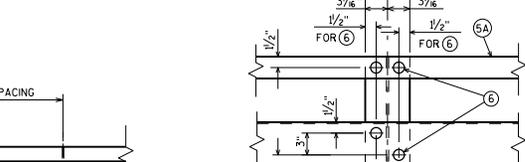
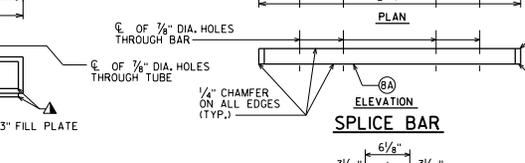
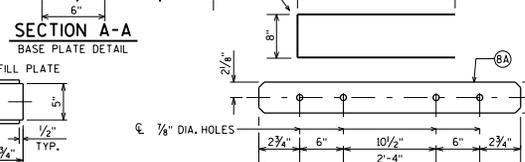
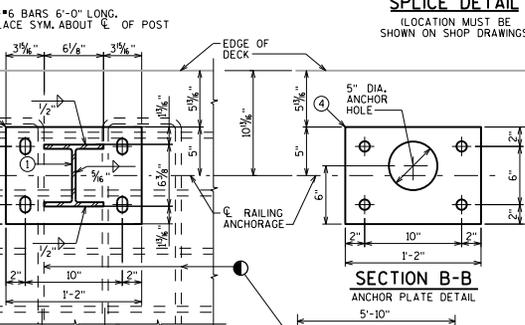
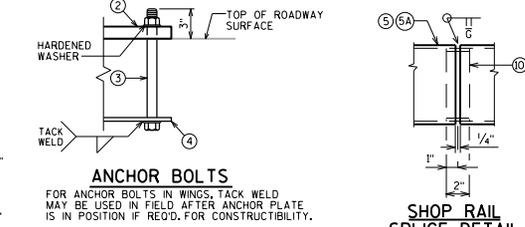
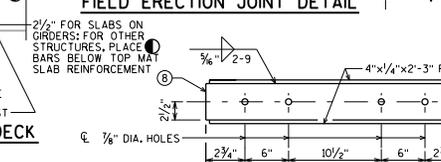
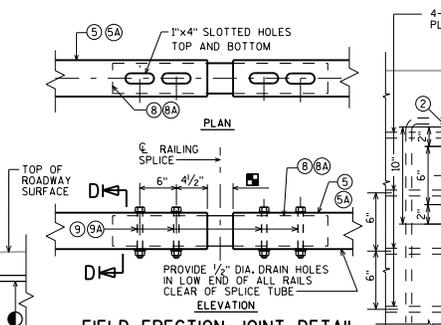
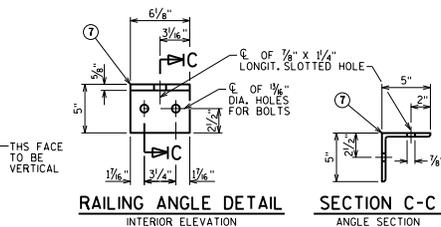
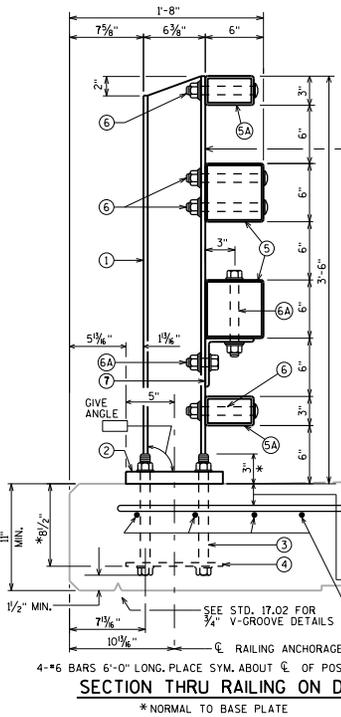
**TUBULAR STEEL RAILING TYPE NY3**

**BUREAU OF STRUCTURES**

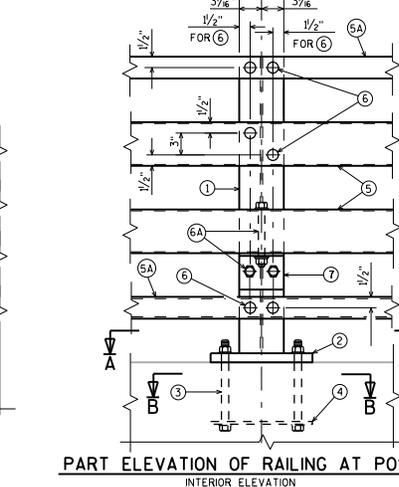
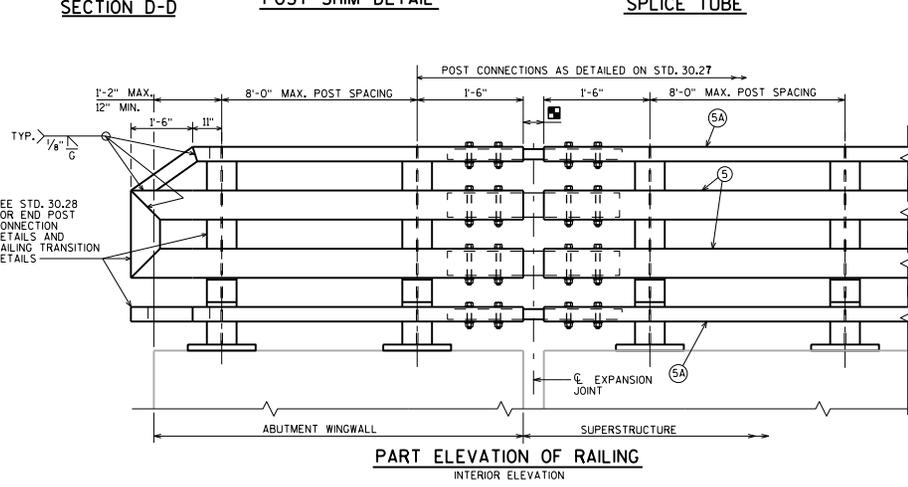
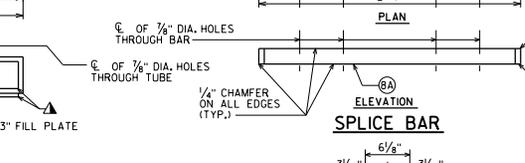
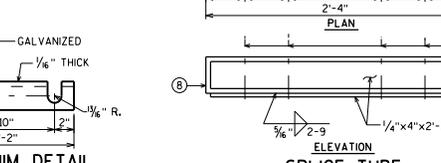
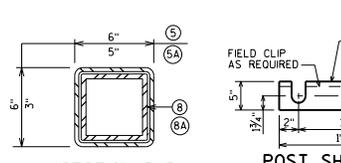
DATE: \_\_\_\_\_

APPROVED: Bill Oliva 7-17

STANDARD 30.26



- LEGEND**
- 1 #6 x 25 WITH 1/8" x 1 1/2" HORIZONTAL SLOTTED HOLES ON EACH SIDE OF POST FOR BOLT NO. 6 AT TOP TWO RAILS; USE 1" DIA. HOLES FOR BOLT NO. 6 AT BOTTOM NO. 5A & FOR BOLT NO. 6A AT NO. 7; CUT BOTTOM OF POST TO MATCH CROSS SLOPE OF ROADWAY, PLACE POST VERTICAL, PLACE POSTS NORMAL TO GRADE LINE.
  - 2 PLATE 1 1/4" x 10" x 1/2" WITH 1/4" x 1 1/2" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3, WELD TO NO. 1 AS SHOWN, SLOTS PARALLEL TO SHORT SIDE OF PLATE.
  - 3 ASTM A449 - 1" DIA. ANCHOR BOLTS WITH HEAVY HEX NUT AND 2" O.D. HARDENED WASHER (ALL GALVANIZED), 4 REQUIRED PER POST, THREAD 3" AND PLACE NORMAL TO PLATE NO. 2, CHAMFER TOP OF BOLTS BEFORE THREADING, USE 1 1/2" LONG BOLT FOR CONCRETE DECK; ON CONCRETE SLAB SUPERSTRUCTURE, USE 1 1/2" LONG BOLT FOR SLAB THICKNESS > 16" AND 1 1/2" LONG FOR THICKNESS < 16"; USE 1-9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR CONSTRUCTABILITY.)
  - 4 3/4" x 10" x 1/2" ANCHOR PLATE (GALVANIZED) WITH 1/8" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
  - 5 TS 6 x 6 x 3/16" STRUCTURAL TUBING, USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 7/8" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
  - 5A TS 5 x 3 x 1/4" STRUCTURAL TUBING, USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK), USE 1/2" x 1 1/2" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 IN BOTTOM RAIL (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
  - 6 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" x 1 1/2" x 1 1/2" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
  - 6A 3/4" DIA. A325 BOLT WITH HEX NUT AND SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE, AND 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH 7/8" x 1 1/2" x 1 1/2" WASHER).
  - 7 L 5 x 5 x 3/8" STRUCTURAL ANGLE, ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
  - 8 TS 5 x 5 x 3/8" x 2'-4" LONG SPLICE TUBE, 1 PER RAIL, USED IN NO. 5.
  - 8A 4/4" x 2/8" x 2'-4" LONG SPLICE BAR, 1 PER RAIL, USED IN NO. 5A.
  - 9 3/4" DIA. A325 FULLY THREADED BOLTS, 7/2" 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.
  - 9A 3/4" DIA. A325 FULLY THREADED BOLTS, 4/2" 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.
  - 10 SPLICE SLEEVE FABRICATED FROM 1/4" PLATE, PROVIDE "SLIDING FIT".
- ▲ ROADWAY OPENING OR 2/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR A1 ABUTMENT, 1/2" AT FIXED JOINTS. SPLICES ARE REQUIRED IN ANY RAILING SPAN BETWEEN POSTS THAT CONTAINS A SUPERSTRUCTURE EXPANSION JOINT.
- ▲ PROTRUSIONS CAUSED BY WELDING OR GALVANIZING ARE NOT PERMITTED ON THE ADJOINING SURFACES OF THE RAILS, SPLICE TUBES AND FILL PLATES.
- #6 BARS X 12'-0" LONG, BEND AS SHOWN, TIE TO TOP MAT OF STEEL, (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)



- NOTES**
- BID ITEM SHALL BE "RAILING STEEL TYPE NY4 B--", WHICH INCLUDES ALL ITEMS SHOWN.
- RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS, ANGLES, SPLICE TUBES, SPLICE BARS AND STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.
- WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED FEDERAL COLOR NO. [ ] (FILL IN COLOR NAME).
- RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50, STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED  $f_y \geq 50$  KSI. ANCHOR PLATES & SHIMS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 36.
- THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/8 TURN.
- FILL BOLT SLOT OPENINGS IN POST SHIMS AND PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER, CAULK AROUND PERIMETER OF NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.
- STEEL SHIMS SHALL BE PROVIDED & USED UNDER PLATE NO. 2 WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.
- SEE BRIDGE MANUAL 30.2 FOR ALLOWED USE.
- RAILING WEIGHT = 75 LB/LF (BASED ON 8'-0" POST SPACING)

**TUBULAR STEEL RAILING TYPE NY4**

**BUREAU OF STRUCTURES**

DATE: \_\_\_\_\_

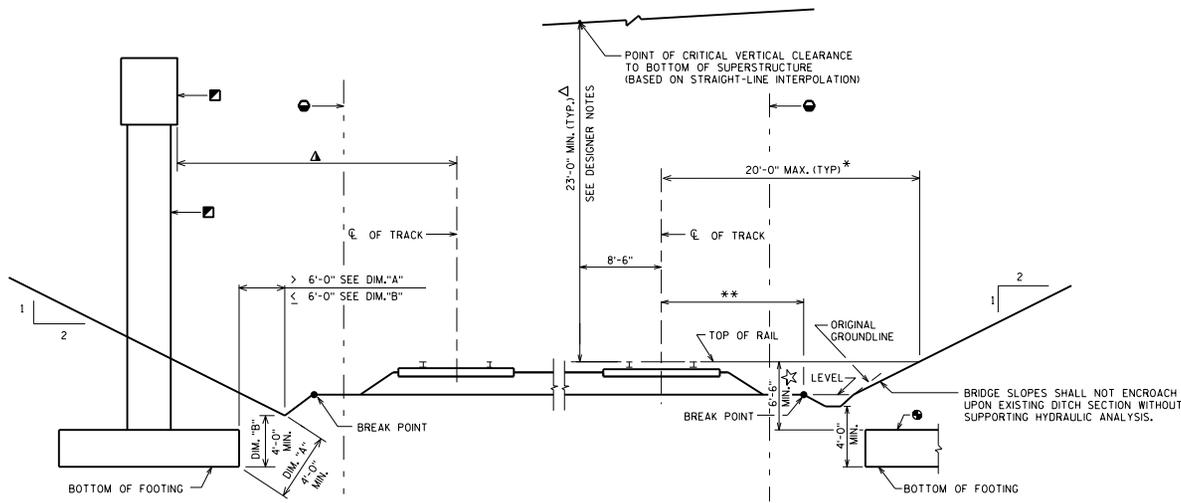
APPROVED: Bill Oliva 7-17







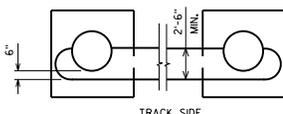




RAILROAD IN FILL

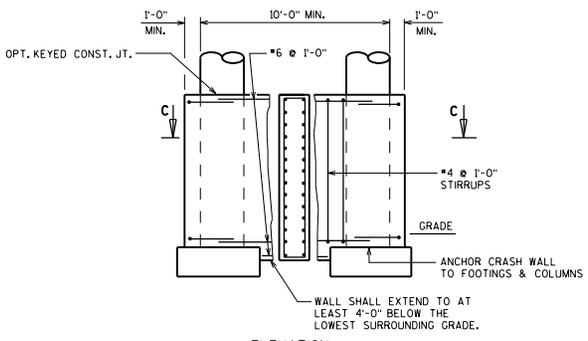
RAILROAD CROSS SECTIONS

RAILROAD IN CUT

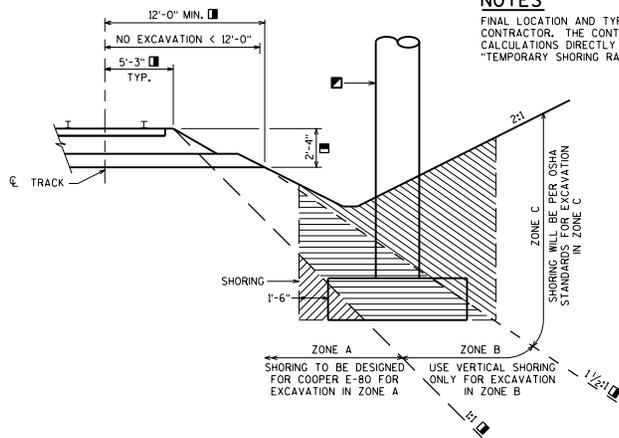
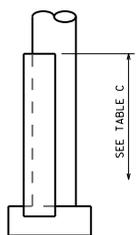


	PIER LOCATION	HEIGHT OF CRASH WALL ABOVE TOP OF RAIL
GENERAL AREMA REQUIREMENT	PIERS < 12'-0" FROM CL TRACK	12'-0"
	PIERS 12'-0" TO 25'-0"	6'-0"
CP RAIL REQUIREMENT	PIERS < 15'-0" FROM CL TRACK	12'-0"
	PIERS > 15'-0" TO 25'-0"	8'-0"

TABLE C



CRASH WALL DETAILS



LIMITS BEFORE SHORING REQUIRED

**DESIGNER NOTES**

- DIMENSIONS SHOWN APPLY TO CUT OR FILL SITUATIONS.
- DECK DRAINS OR DOWN SPOUTS SHALL NOT DISCHARGE ONTO RAILROAD TRACK BED.
- SINGLE SLOPE PARAPET SHALL BE USED. PEDESTRIAN RAILING WILL ONLY BE PROVIDED IF THERE IS A SIDEWALK. SEE CHAPTER 38 OF THE BRIDGE MANUAL.
- Δ VERTICAL CLEARANCE MUST BE AT LEAST 23'-0" AFTER CONSTRUCTION. USE A STRAIGHT-LINE INTERPOLATION BETWEEN TOP OF BEARINGS TO DETERMINE THE CLEARANCE, PROVIDED THAT POSITIVE CAMBER IS REALIZED. LL DEFLECTION NEED NOT BE CONSIDERED WITH THE STRAIGHT-LINE APPROACH. DESIGN FOR (APPROX.) 23'-2" TO AVOID GOING BELOW THE MINIMUM DURING CONSTRUCTION. MAXIMUM ALLOWABLE VERTICAL CLEARANCE OF 23'-3/2" IS ALLOWED BY FHWA. VERTICAL CLEARANCE LESS THAN 23'-0" MAY BE PROVIDED IN SOME SITUATIONS WITH APPROVAL OF THE OFFICE OF THE COMMISSIONER OF 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.
- Δ FOR OFFSETS UP TO, AND INCLUDING 25'-0", A CRASH WALL OR HAMMERHEAD PIER DESIGNED TO AREMA STANDARDS (30 SQ. FT. MIN. X-SECT) IS REQUIRED. CP RAIL REQUIRES CRASH WALLS BE DESIGNED TO RESIST A 600 KIP EXTREME EVENT FORCE APPLIED 6 FEET ABOVE THE GROUND. THE CRASH WALLS SHOWN ON THIS STANDARD ARE NOT DESIGNED TO ACCOUNT FOR THIS LOAD.
- Δ 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.
- Δ HORIZONTAL CLEARANCES LESS THAN 18'-0" SHOULD BE REVIEWED WITH THE STATEWIDE RAILROAD AND TRACK ENGINEER IN THE CENTRAL OFFICE RAILROADS AND HARBORS SECTION. 18'-0" CLEARANCE IS MEASURED TO THE NEAREST ENCRANCHING ELEMENT (PIER CAPS, MSE WALL COPING, ETC.)
- TEMPORARY CONSTRUCTION CLEARANCES ARE 21'-0" VERTICAL (21'-6" FOR BNSF AND UP RAILROADS) AND 12'-0" HORIZONTAL (15'-0" FOR BNSF AND UP RAILROADS) FROM CENTERLINE OF TRACK TO FALSEWORK, UNLESS INSTRUCTED OTHERWISE. A CONSTRUCTION CLEARANCE DETAIL SHOULD NOT BE INCLUDED IN THE PLANS AS CONSTRUCTION CLEARANCES ARE STATED IN SECTION 107.17.1 OF THE STANDARD SPECIFICATIONS.
- DESIGNER SHALL SHOW HORIZONTAL LOCATION OF SHORING NEEDED IN PLAN VIEW. INCLUDE BID ITEM "TEMPORARY SHORING RAILROAD" WHEN SHORING ENCROACHES ZONE A OR B.
- ☆ 6'-6" MIN. NOT REQ'D IF BEDROCK IS PRESENT.
- THIS STANDARD IS TO MEET WISDOT REQUIREMENTS ONLY. THE DESIGN ENGINEER SHALL CONTACT THE RAILROAD FOR THEIR REQUIREMENTS.
- 1 BNSF AND UP RAILROADS HAVE GREATER REQUIREMENTS THAN SHOWN. CONFER WITH STATEWIDE RAILROAD STRUCTURE AND TRACK ENGINEER IN CENTRAL OFFICE RAILROADS AND HARBORS SECTION. DESIGNER SHOULD CONSIDER FIELD TOLERANCES AND CONTINGENCIES WHEN SHOWING SHORING REQUIREMENTS. REFER TO "GUIDELINES FOR TEMPORARY SHORING" PUBLICATION BY UP AND BNSF FOR ADDITIONAL INFORMATION.
- 2 BNSF AND UP RAILROAD REQUIRE A DEPTH OF FOOTING 6'-0" MIN. FROM BASE OF RAIL TO TOP OF FOOTING. IN LOCATIONS WHERE BEDROCK IS PRESENT, COORDINATE FOOTING DEPTHS WITH RAILROAD PROJECT COORDINATION ENGINEER.
- 3 LIMITS OF RAILROAD RIGHT-OF-WAY. LOCATIONS SHOWN ARE FOR REFERENCE ONLY AND NEED NOT BE DIMENSIONED.
- 4 AESTHETICS SHALL NOT BE EMPLOYED ALONG RAILROAD TRACKS.

**NOTES**

FINAL LOCATION AND TYPE OF SHORING SYSTEM TO BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT ALL DESIGN DRAWINGS AND CALCULATIONS DIRECTLY TO THE RAILROAD. SHORING COVERED BY BID ITEM "TEMPORARY SHORING RAILROAD".

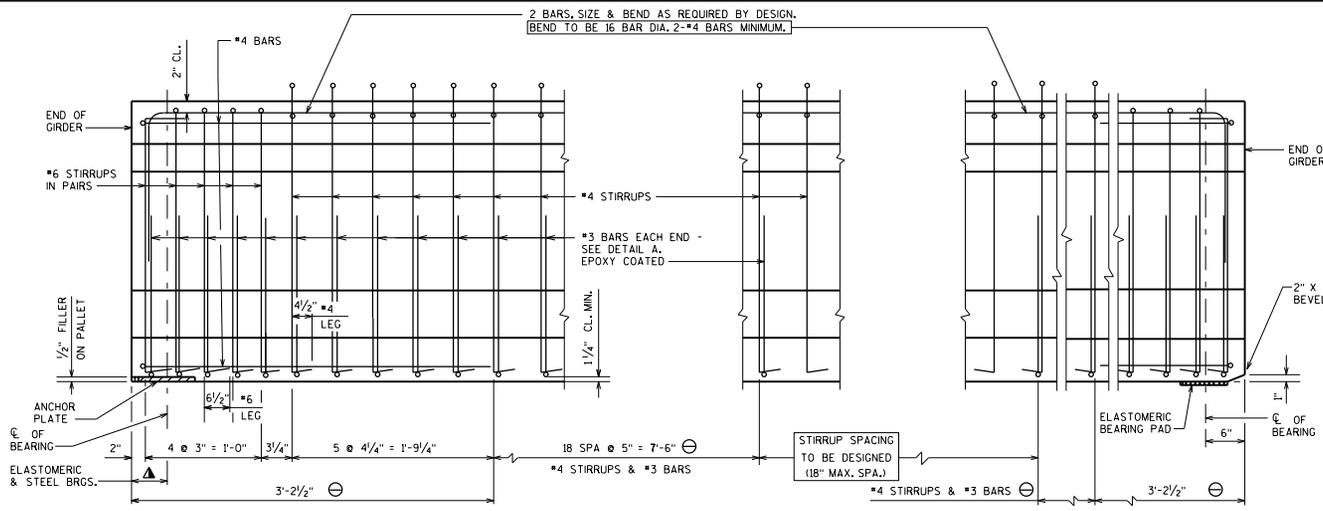
- [Hatched Pattern] ZONE A SHORING
- [Horizontal Line Pattern] ZONE B SHORING
- [Vertical Line Pattern] ZONE C SHORING

**HIGHWAY OVER RAILROAD DESIGN REQUIREMENTS**

**BUREAU OF STRUCTURES**

DATE: \_\_\_\_\_

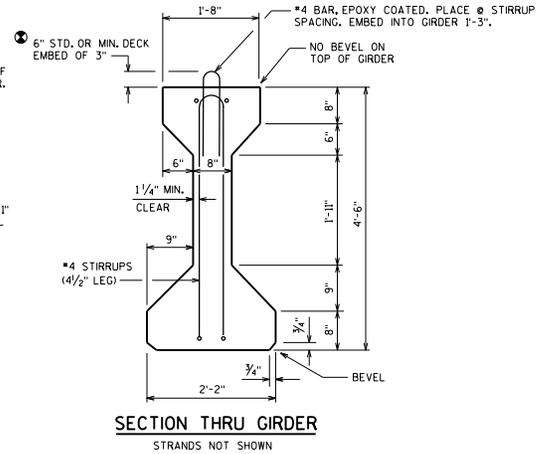
APPROVED: Bill Oliva 7-17



**SUPPORT WITH STEEL OR ELASTOMERIC BRGS.**

**SIDE VIEW OF GIRDER**

**SUPPORT WITH 1/2" ELASTOMERIC BRG. PAD**



**DESIGNER NOTES**

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

SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.5" DIA. OR 0.6" DIA. STRANDS FOR ALL PATTERNS AS REQUIRED. THE MAX. NUMBER OF DRAPED 0.5" DIA. STRANDS IS 12 AND THE MAX. NUMBER FOR 0.6" DIA. STRANDS IS 10.

REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.14 AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.

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

**NOTES**

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

DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING. THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.

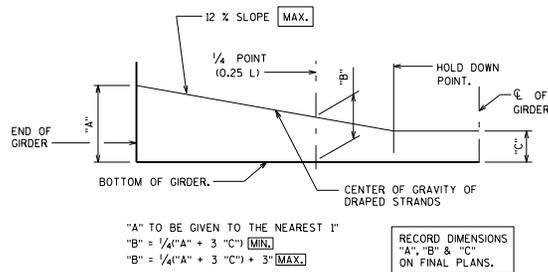
STRANDS SHALL BE FLUSH WITH END OF GIRDER, FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS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

ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.

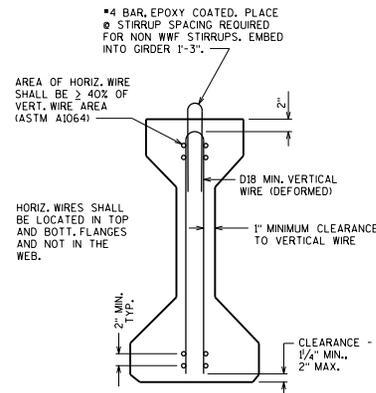
SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.

AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.

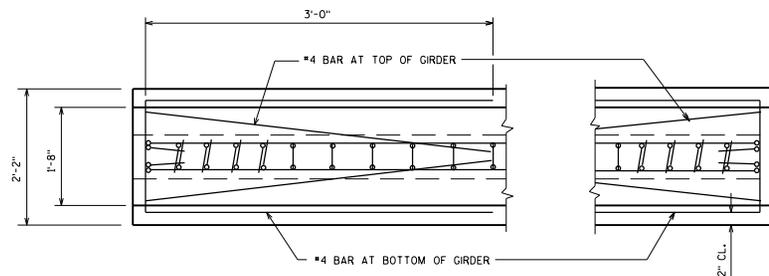
PRESTRESSING STRANDS SHALL BE ( DIA.)-7-WIRE LOW RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.



**LOCATION OF DRAPED STRANDS**



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

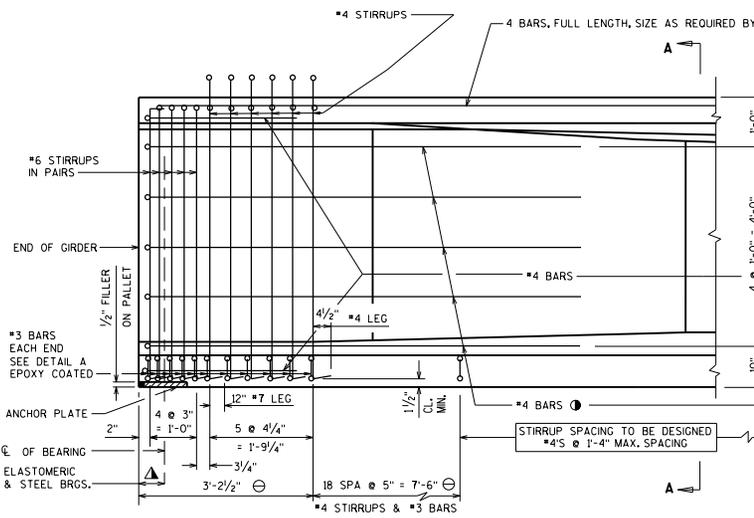


**PLAN VIEW**

**DETAIL A**

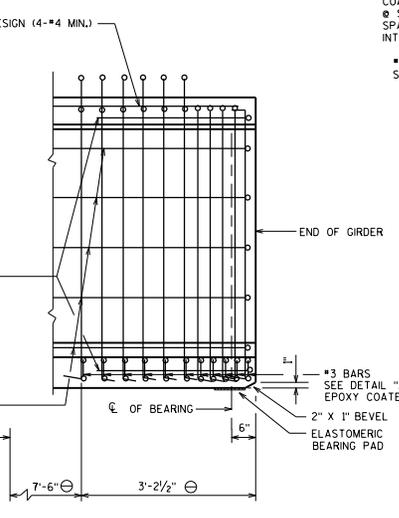
<b>54" PRESTRESSED GIRDER DETAILS</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17



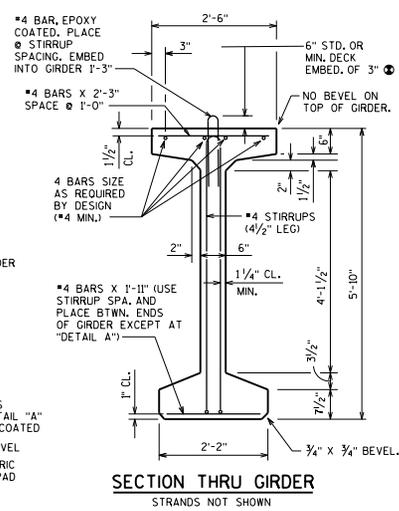


**SUPPORT WITH STEEL OR ELASTOMERIC BRGS.**

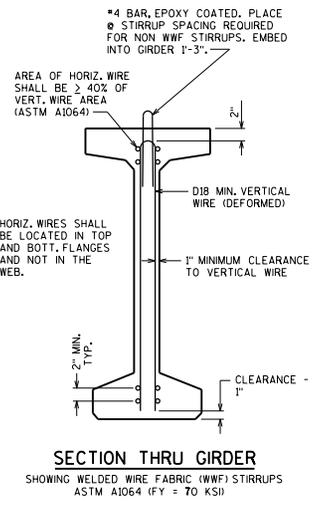
**SIDE VIEW OF GIRDER**



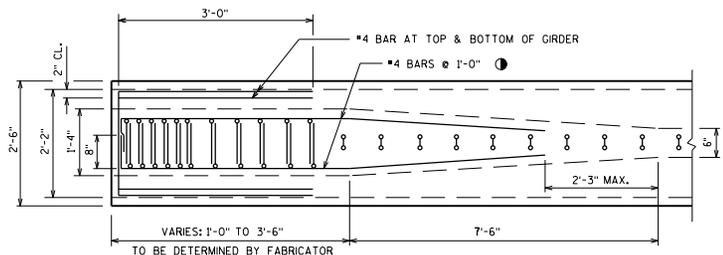
**SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD**



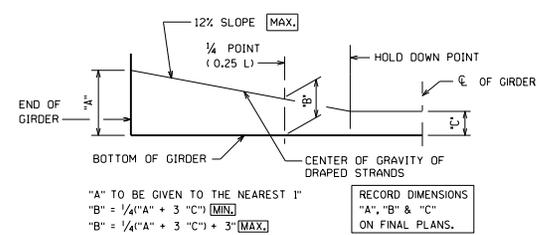
**SECTION THRU GIRDER**



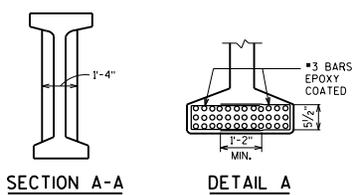
**SECTION THRU GIRDER**  
SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS  
ASTM A1064 (FY = 70 KSI)



**PLAN VIEW**



**LOCATION OF DRAPED STRANDS**



**SECTION A-A**

**DETAIL A**

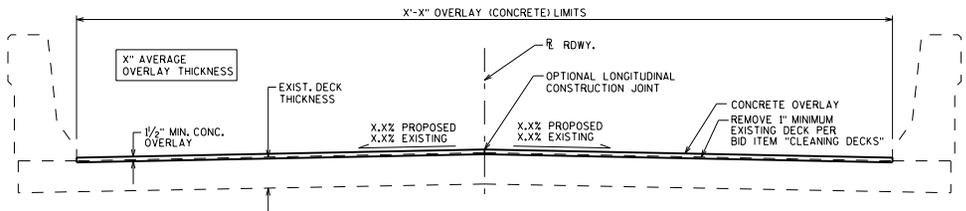
**DESIGNER NOTES**

- BID ITEM SHALL BE "PRESTRESSED GIRDER TYPE I 70-INCH. SHOW ONLY ONE STRAND SIZE ON THE PLANS.
- GIRDER LENGTHS IN EXCESS OF 140 FEET MAY BE CONTROLLED BY TRANSPORTATION LIMITATIONS AND REQUIRE APPROVAL BY THE PRESTRESS GIRDER MANUFACTURERS AND CONCURRENCE BY THE STRUCTURES DEVELOPMENT SECTION.
- SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE STRENGTH IS 6800 PSI. USE 0.5" OR 0.6" DIA. STRANDS FOR ALL PATTERNS AS REQUIRED. USE ONLY ONE STRAND SIZE IN EACH PATTERN. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.
- REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 40.20 AND THE SPAN LENGTHS SHOWN IN TABLE 40.7-1. USING DIFFERENT STRAND PATTERNS OR LONGER SPANS WILL REQUIRE A COMPLETE DESIGN OF THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES.
- ▲ VARIES FOR ELASTOMERIC BRGS. (STD. 27.07) AND STEEL BRGS. (STD. 27.09)
- ⊖ DETAIL TYPICAL AT EACH END
- INCREASE THE SIZE OF THESE BARS IF REQUIRED BY AASHTO LRFD 5.8.3.5
- ⊕ THE DESIGN ENGINEER DETERMINES THIS VALUE BASED ON 2" MIN. HAUNCH AT EDGE OF GIRDER, X-SLOPE, PROFILE GRADE LINE AND CALCULATED RESIDUAL GIRDER CAMBER, INCLUDING THE CAMBER MULTIPLIER OF 1.4. THIS VALUE CAN VARY AND SHOULD BE GIVEN FOR EACH 1/3 OF THE GIRDER LENGTH. PROVIDE VALUES THAT MAINTAIN 3" MIN. DECK EMBEDMENT AND 2 1/2" CLEAR FROM TOP OF DECK WHILE ACCOUNTING FOR ± 3/4" VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER.

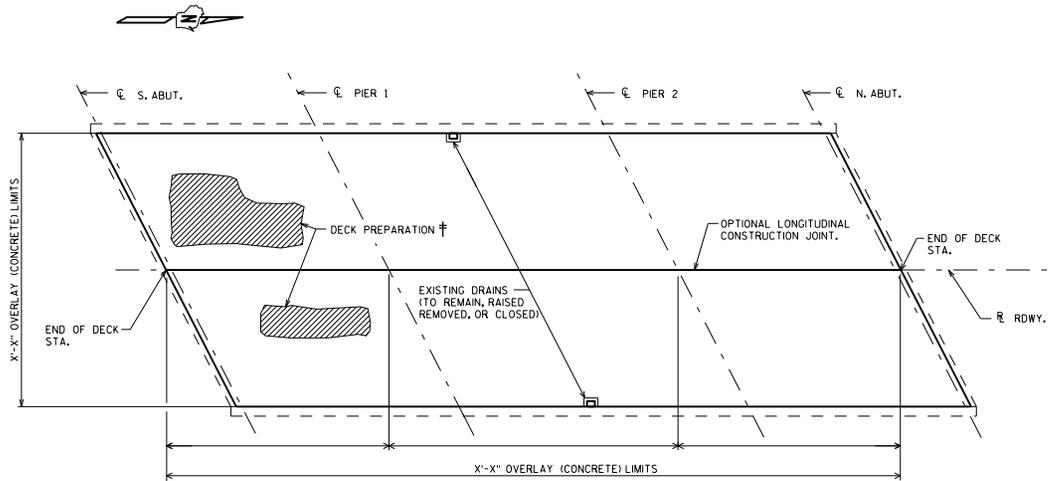
**NOTES**

- TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY, EXCEPT THE OUTSIDE 2" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 2" OF THE TOP FLANGE.
- DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.
- THE GIRDERS SHALL BE PROVIDED WITH A SUITABLE LIFTING DEVICE FOR HANDLING AND ERECTING THE GIRDERS.
- STRANDS SHALL BE FLUSH WITH END OF GIRDER. FOR GIRDER ENDS EMBEDDED COMPLETELY IN CONCRETE, END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR GIRDER ENDS THAT ARE FINALLY EXPOSED, COAT THE GIRDER ENDS, EXPOSED STRAND ENDS AND ALL NON-BONDING SURFACES WITHIN 2 FEET OF THE GIRDER ENDS WITH A NON-PIGMENTED EPOXY CONFORMING TO AASHTO M-235 TYPE III, GRADE 2, CLASS B OR C. THE EPOXY SHALL BE APPLIED AT LEAST 3 DAYS AFTER MOIST CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.
- ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN.
- SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.
- AN ALTERNATE EQUIVALENT OF WELDED WIRE FABRIC (WWF) ASTM A1064 MAY BE SUBSTITUTED FOR THE STIRRUP REINFORCEMENT SHOWN, UPON APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION.
- PRESTRESSING STRANDS SHALL BE ( DIA.)-7-WIRE LOW-RELAXATION STRANDS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.

<b>70" PRESTRESSED GIRDER DETAILS</b>	
	<b>BUREAU OF STRUCTURES</b>
APPROVED: <u>Bill Oliva</u>	DATE: 7-17



CROSS SECTION THRU ROADWAY  
LOOKING NORTH



† SURVEY TYPE:  
SURVEY COMPLETED DATE: .../.../....

PLAN  
TOP OF DECK SHOWN

**DESIGNER NOTES**

- PLAN VIEW APPLICABLE TO ALL OVERLAY METHODS AND DECK REPAIRS WITHOUT OVERLAYS.
- FOR CROSS SECTIONS NOT IN SUPERELEVATION TRANSITIONS, THE PREFERRED MINIMUM SLOPE IS 2%.
- PROVIDE AN AVERAGE OVERLAY THICKNESS ON THE PLANS. THE AVERAGE OVERLAY THICKNESS IS THE MINIMUM OVERLAY THICKNESS PLUS 1/2" TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE. CHANGES IN CROSS-SLOPE INCREASE THE AVERAGE OVERLAY THICKNESS. QUANTITIES ARE BASED ON THE AVERAGE OVERLAY THICKNESS.
- DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.
- DO NOT INCLUDE BID ITEM "SAWING PAVEMENT DECK PREPARATION AREAS" FOR DECK PREPARATION.
- \* REMOVAL OF 1" OF EXISTING DECK UNDER BID ITEM "CLEANING DECKS" IS NOT INTENDED FOR PREVIOUSLY OVERLAID DECKS. EXISTING CONCRETE COVER (1" MIN.) SHALL BE MAINTAINED AND CONSIDERED WHEN DETERMINING CONCRETE REMOVALS. DO NOT INCLUDE BID ITEM "CLEANING DECKS" 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.

**DESIGN DATA**

LIVE LOAD:  
INVENTORY RATING; HS-  
OPERATING RATING; HS - ---  
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ... KIPS

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

**NOTES**

- DRAWINGS SHALL NOT BE SCALED.
- DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.
- PROTECTIVE SURFACE TREATMENT SHALL BE APPLIED TO THE ENTIRE TOP SURFACE OF THE NEW CONCRETE OVERLAY.
- A MINIMUM OF 1-INCH OF CONCRETE SHALL BE REMOVED FROM THE ENTIRE BRIDGE DECK UNDER THE BID ITEM "CLEANING 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".
- ANY EXCAVATION REQUIRED TO COMPLETE THE OVERLAY OR JOINT REPAIRS AT THE ABUTMENTS TO BE CONSIDERED INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS".
- PROFILE GRADE LINE SHALL BE DETERMINED IN THE FIELD BASED ON A MINIMUM OVERLAY THICKNESS OF 1/2" PLACED ABOVE THE DECK SURFACE AFTER SURFACE PREPARATION. EXPECTED AVERAGE OVERLAY THICKNESS IS 2" (OR AS GIVEN ON THE PLANS). IF EXPECTED AVERAGE OVERLAY THICKNESS IS EXCEEDED BY MORE THAN 1/2", CONTACT THE STRUCTURE'S DESIGN SECTION.
- DRAINS REMOVED OR CLOSED IS INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS".

**TOTAL ESTIMATED QUANTITIES**

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
502.3200	PROTECTIVE SURFACE TREATMENT	SY	
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0500	CLEANING DECKS	SY	
509.2000	FULL-DEPTH DECK REPAIR	SY	
509.2500	CONCRETE MASONRY OVERLAY DECKS	CY	
POSSIBLE ADDITIONAL BID ITEMS			
502.3210	PIGMENTED SURFACE SEALER	SY	
* 509.9005.S	REMOVING CONCRETE MASONRY DECK OVERLAY	SY	
514.0900	ADJUSTING FLOOR DRAINS	EACH	

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

**CONCRETE OVERLAY**

**BUREAU OF**  
**STRUCTURES**

APPROVED: Bill Oliva

DATE:  
7-17