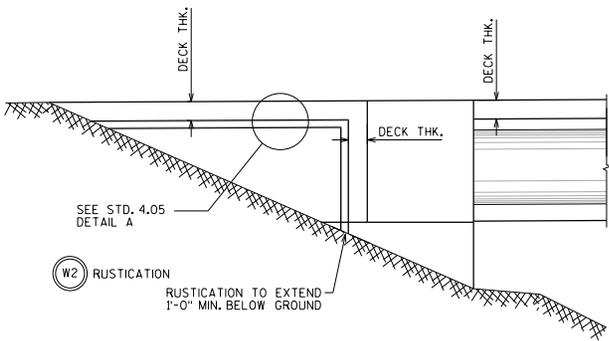
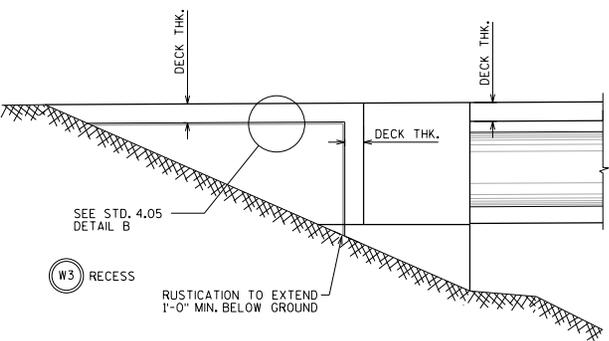


W1 STANDARD



W2 RUSTICATION

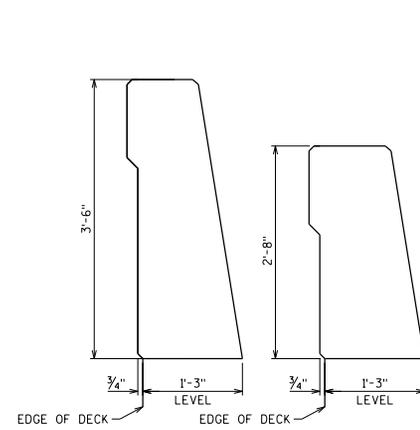
RUSTICATION TO EXTEND 1'-0" MIN. BELOW GROUND



W3 RECESS

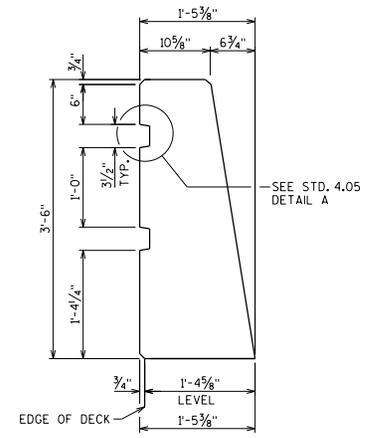
RUSTICATION TO EXTEND 1'-0" MIN. BELOW GROUND

WING OPTIONS



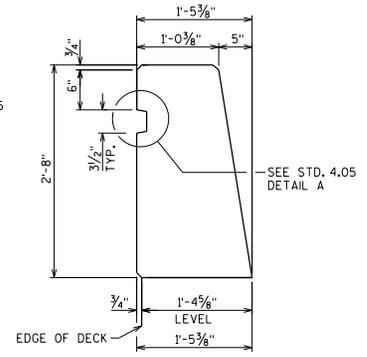
R1 STANDARD

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



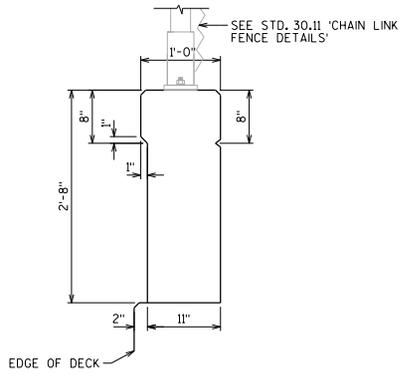
R2 DOUBLE RUSTICATION LINES

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



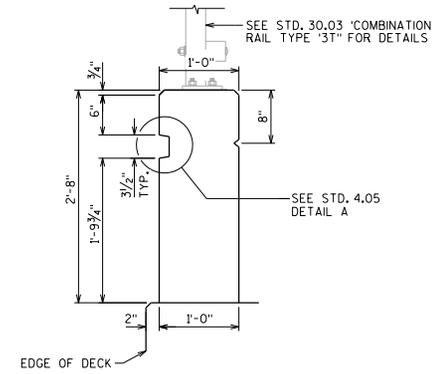
R2 SINGLE RUSTICATION LINES

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



R3 STANDARD

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



R4 SINGLE RUSTICATION LINES

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

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

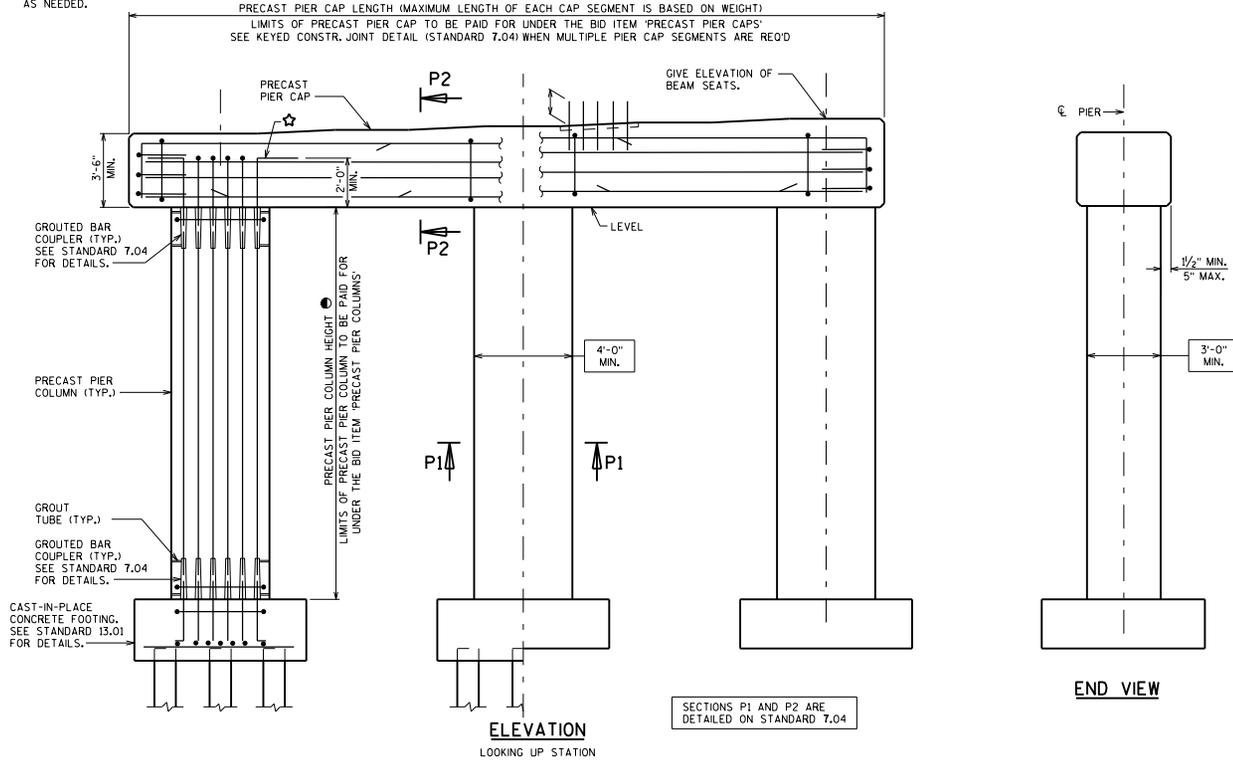
PARAPET OPTIONS

DESIGNER NOTES

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

WING & PARAPET AESTHETIC DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19

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



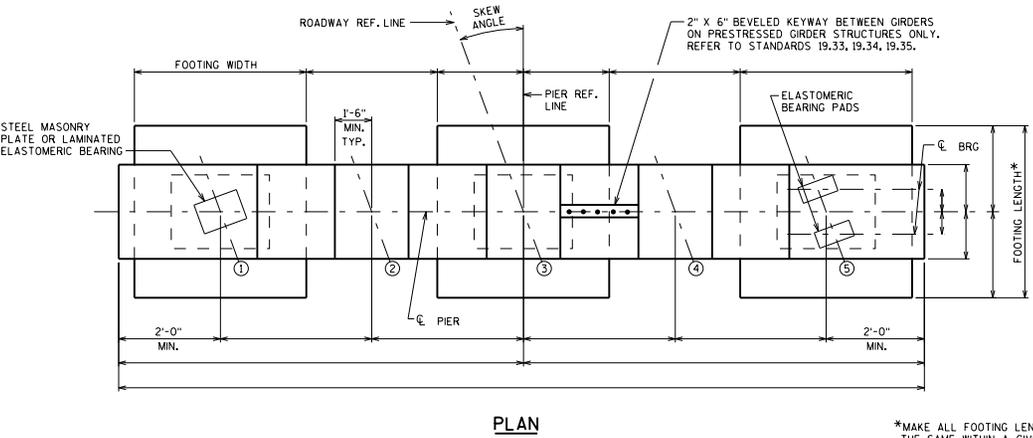
NOTES

- PROVIDE A SUITABLE LIFTING DEVICE FOR THE PRECAST CAP AND COLUMN(S). CAST-IN-PLACE ALTERNATIVE IS NOT ALLOWED.
- STIRRUPS AT THE GROUTED COUPLERS ARE SIZED BASED ON A XX" OUTER DIAMETER COUPLER SLEEVE. ADJUST STIRRUP DIMENSIONS AS REQUIRED IF THE ACTUAL COUPLER SLEEVE DIAMETER DIFFERS.
- MANUFACTURER TO DETERMINE THE PRECAST PIER COLUMN LENGTHS ASSUMING 1/2" STEEL SHIMS AT THE TOP AND BOTTOM OF THE COLUMN.
- BID ITEM "PRECAST PIER COLUMNS" PAID PER PLAN VALUE AS BOTTOM OF PIER CAP ELEVATION MINUS TOP OF FOOTING ELEVATION.

DESIGNER NOTES

- PIERS SHALL BE SUPPORTED BY A MINIMUM OF 3 COLUMNS. WHEN MULTIPLE PIER CAPS ARE USED EACH SEGMENT SHALL BE SUPPORT BY A MINIMUM OF 2 COLUMNS.
- THE FOLLOWING SPECIAL PROVISIONS SHALL BE USED:
GROUTED BAR COUPLERS (505.1000.S)
PRECAST PIER COLUMNS (SPV.0090.XXX)
PRECAST PIER CAPS (SPV.0090.XXX)
- THE MAXIMUM WEIGHT OF EACH PRECAST ELEMENT SHALL BE 90 KIP.
- GROUTED COUPLER SLEEVES MAY BE OVERSIZED TO ALLOW FOR ADDITIONAL LATERAL TOLERANCE IN THE FIELD. STANDARD WISDOT PRACTICE IS TO OVERSIZE COUPLER SLEEVES BY 1 BAR SIZE. ADJUST SHEAR STIRRUPS AS NECESSARY TO ACCOUNT FOR LARGER DIAMETER COUPLER SLEEVES.
- VERIFY SEVERAL MANUFACTURER'S COUPLER SLEEVE DIMENSIONS PRIOR TO DESIGN. ASSUME THE MAXIMUM DIAMETER OF COUPLER SLEEVE FOR COLUMN REINFORCEMENT DESIGN.
- SEE STANDARDS 13.01 AND 13.07 FOR ADDITIONAL PIER NOTES AND DETAILS.

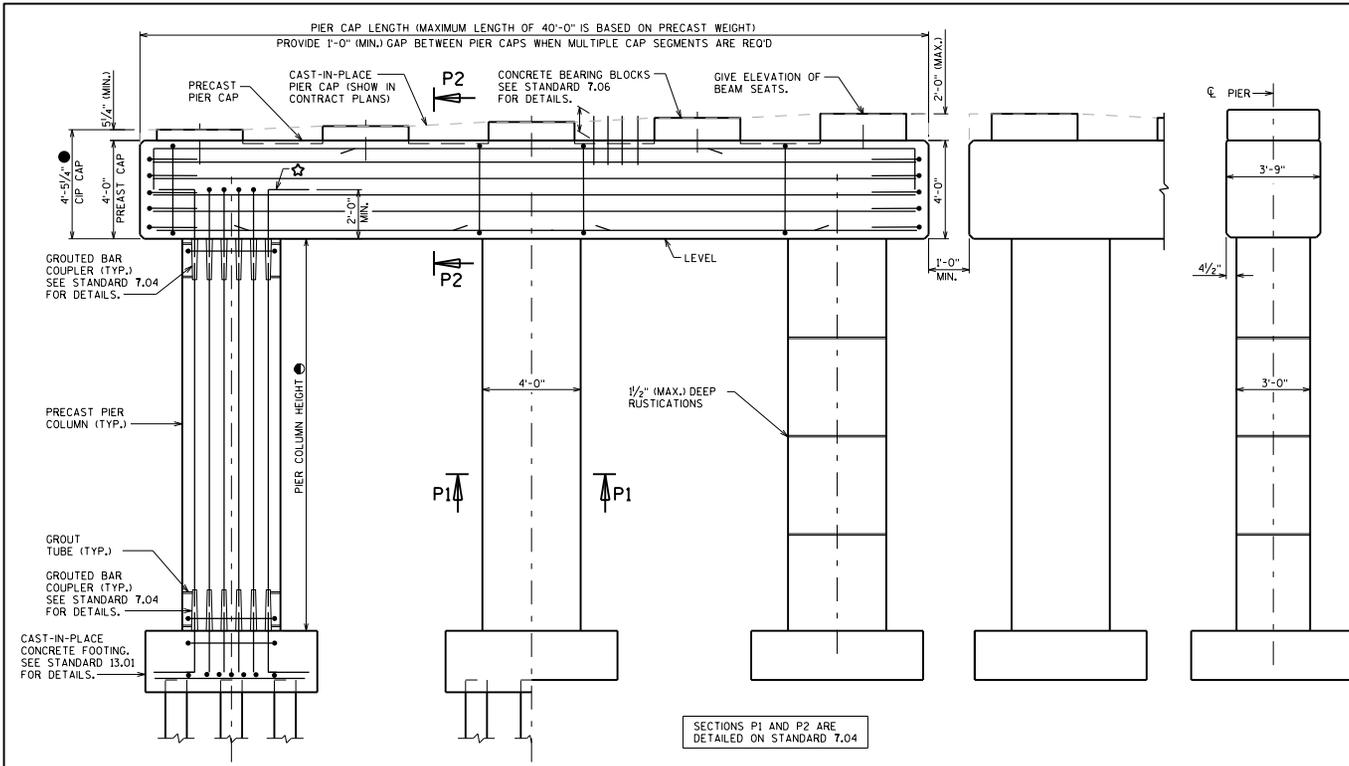
DETAILS AS SHOWN ON THIS STANDARD ARE INTENDED FOR REQUIRED PRECAST PIERS DESIGNED TO MEET PROJECT SPECIFIC REQUIREMENTS. SEE 7.1.4.1.2 IN THE BRIDGE MANUAL AND STANDARDS 7.05 AND 7.06 FOR ADDITIONAL GUIDANCE.



*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER

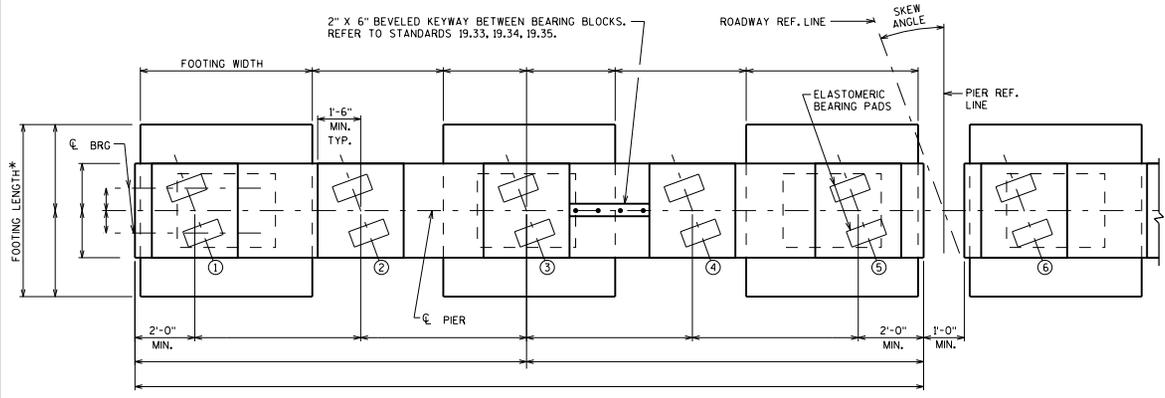
MATERIAL PROPERTIES:
CONCRETE MASONRY $f'_c = 3,500$ P.S.I.
BAR REINFORCEMENT, GRADE 60 $f_y = 60,000$ P.S.I.

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



ELEVATION
LOOKING UP STATION

END VIEW



PLAN

*MAKE ALL FOOTING LENGTHS THE SAME WITHIN A GIVEN PIER

CONTRACTOR NOTES

- THE CONTRACTOR SHALL FOLLOW THIS STANDARD WHEN PRECAST PIERS ARE USED IN LIEU OF THE CAST-IN-PLACE PIER. THE USE OF OPTIONAL PRECAST PIER DETAILS SHALL ONLY BE USED WHEN PLANS INDICATE ALLOWANCE OR WITH APPROVAL BY THE BUREAU OF STRUCTURES.
- PROVIDE A SUITABLE LIFTING DEVICE FOR THE PRECAST CAP, COLUMN AND BEARING BLOCK UNITS.
- STIRRUPS AT THE GROUTED COUPLERS ARE SIZED BASED ON A XX" OUTER DIAMETER COUPLER SLEEVE. ADJUST STIRRUP DIMENSIONS AS REQUIRED IF THE ACTUAL COUPLER SLEEVE DIAMETER DIFFERS.
- MANUFACTURER TO DETERMINE THE PRECAST PIER COLUMN LENGTHS ASSUMING 1/2" STEEL SHIMS AT THE TOP AND BOTTOM OF THE COLUMN.
- GROUTED COUPLER SLEEVES MAY BE OVERSIZED TO ALLOW FOR ADDITIONAL LATERAL TOLERANCE IN THE FIELD. STANDARD WISDOT PRACTICE IS TO OVERSIZE COUPLER SLEEVES BY 1 BAR SIZE. ADJUST SHEAR STIRRUPS AS NECESSARY TO ACCOUNT FOR LARGER DIAMETER COUPLER SLEEVES.
- ALL PRECAST ELEMENTS AND DIAPHRAGM ITEMS PAID PER C.I.P. BID ITEMS. NO ADDITIONAL PAYMENT WILL BE PROVIDED FOR THE PRECAST PIER OPTION.
- THE FOLLOWING SPECIAL PROVISIONS SHALL BE USED:
 - GROUTED BAR COUPLERS (505,1000,S)
 - PRECAST PIER COLUMNS (SPV,0090,XXX)
 - PRECAST PIER CAPS (SPV,0090,XXX)
- THE FOLLOWING ADDITIONAL STANDARDS SHALL BE USED:
 - STANDARD 7.04 - PRECAST PIER CAP AND COLUMN DETAILS
 - STANDARD 7.06 - PRECAST BEARING BLOCKS DETAILS
- THE CONTRACTOR MAY USE PRECAST SEGMENTS AT THEIR DISCRETION (E.G. PRECAST CAP ONLY) WITH APPROVAL BY THE BUREAU OF STRUCTURES. SEE STANDARD 7.07 FOR CAST-IN-PLACE BEARING BLOCK DETAILS AND ADDITIONAL NOTES.

DESIGNER NOTES

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

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

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

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

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

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

PROVIDE A CONCRETE DIAPHRAGM BETWEEN PIER CAP SEGMENTS.

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

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

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

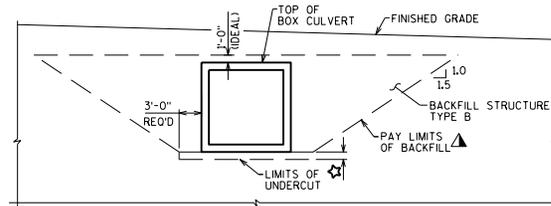
SEE 7.1.4.1.2 FOR ADDITIONAL PRECAST PIER GUIDANCE.

LEGEND

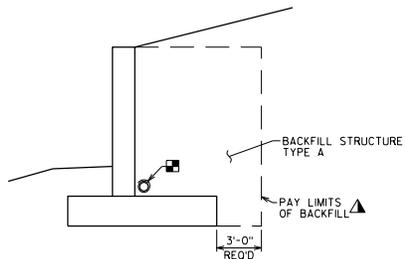
- ☆ STD. HOOK (TYP.) ROTATE AND STAGGER AS NEEDED.
- DIMENSION IS FROM BOTTOM OF PIER CAP TO LOW BEAM SEAT.

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

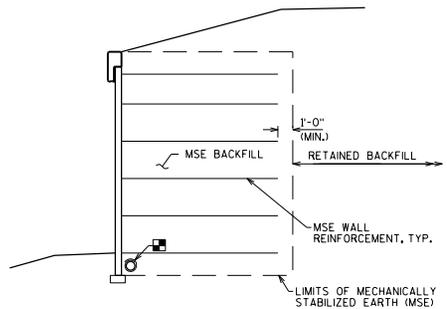
PRECAST PIER (OPTIONAL) CAP AND COLUMNS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19



**TYPICAL SECTION
THRU BOX CULVERT**



**TYPICAL SECTION
THRU RETAINING WALL**



**TYPICAL SECTION
THRU MSE RETAINING WALL**

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

NOTES (BOX CULVERTS)

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

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

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

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

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

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

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

NOTES (RETAINING WALLS)

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

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

DESIGNER NOTES

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

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

LEGEND

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

■ PIPE UNDERDRAIN (WRAPPED 16-INCH), SLOPE 0.5% MIN. TO SUITABLE DRAINAGE. ATTACH RODENT SHIELD AT ENDS OF PIPE UNDERDRAIN. (SHOW DETAIL ON PLANS)

**STRUCTURE BACKFILL
LIMITS AND NOTES 2**



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva

DATE:
1-19

DESIGNER NOTES

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

WING BARS AND DOWEL BARS SHALL BE EPOXY COATED.

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

TOTAL LENGTH OF [A] BARS SHALL BE ≥ TO WING LENGTH.

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

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

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

WHEN THE BOTTOM OF GIRDER SLOPES MORE THAN 1% SLOPE THE BEAM SEAT BASED ON ADDING THESE TWO VALUES:

- LONGITUDINAL GRADE OF GIRDER (PERCENT)
- CAMBER EFFECT = $\frac{4RC}{L} \times 100$ (PERCENT), WHERE:

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

(SEE STANDARD 13.01 FOR SLOPED SEAT DETAILS)

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

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

LEGEND

- ◆ #5 BARS (COATED) AT 1'-0" (2'-0" LONG). THESE BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE.
- ◇ WHEN THIS DIMENSION ≥ 4" THIS ADDITIONAL REINFORCEMENT SHALL BE ADDED. MAX. SPA. OF HORIZ. #4 BARS = 1'-0".
- USE 1'-3" FOR SLAB SPANS AND FOR GIRDER SPANS WITH NO PAVING NOTCH. USE 1'-6" FOR GIRDER SPANS WITH NO PAVING NOTCH, BUT WHERE 36W, 45W, 54W, 54W, 70W, 72W OR 82W GIRDERS ARE USED, AND SKEW > 25°. USE 1'-3" FOR SLAB SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
- ▲ USE 1'-11" FOR GIRDER SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
- ▲ USE 1'-7" FOR SLAB SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
- ▲ USE 2'-3" FOR GIRDER SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
- DIMENSION IS FROM BOTTOM OF ABUTMENT TO LOW BEAM SEAT OR LOW SIDE OF SLAB TYPE SUPERSTRUCTURE.
- ▽ 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZONTAL AND VERTICAL JOINTS ON BACKFACE.
- ▲ KEYED CONST. JOINT FORMED BY BEVELED 2" x 6".
- * * * WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TY" OR SINGLE SLOPE PARAPET "5655" IS USED. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.
- USE #5 BARS AT 6" SPA. IN OUTSIDE THIRDS OF BODY LENGTH WHEN THE WING LENGTH > 20'-0" AND WING HEIGHT > 10'-0".
- ☆ WHEN BODY SECTION IS > 50'-0" LONG PROVIDE VERTICAL CONSTRUCTION JOINT. RUN BAR STEEL THRU JOINT AND SEAL JOINT WITH 18" RUBBERIZED MEMBRANE WATERPROOFING. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.
- SHOW ALL BARS FOR CLARITY.

TABLE

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

* OR EQUIVALENT STD. HOOK USE STRAIGHT BARS WHEN POSSIBLE

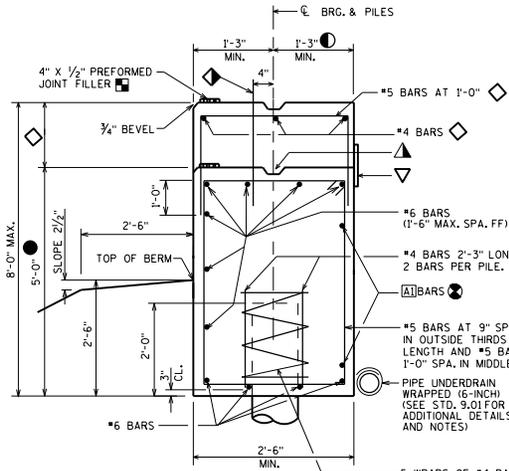
1/2" FILLER - TO EXTEND FROM BRIDGE SEAT TO TOP OF CONCRETE PARAPET OR TO TOP OF WING FOR STEEL RAILINGS. FILLER INCLUDED IN WING LENGTH.

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

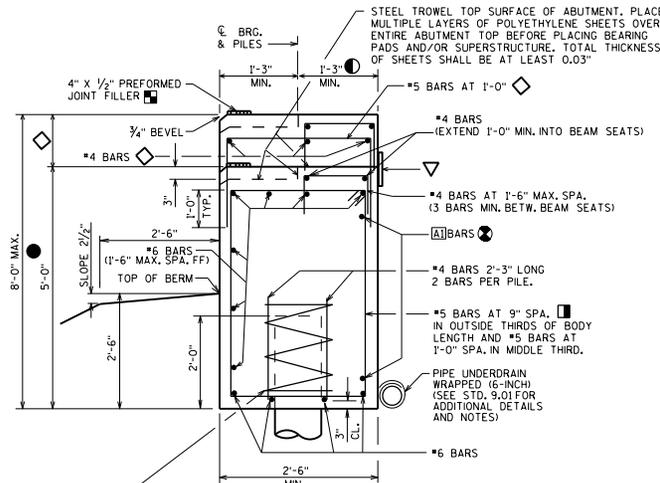
ABUTMENT TYPE A1 (INTEGRAL ABUTMENT)



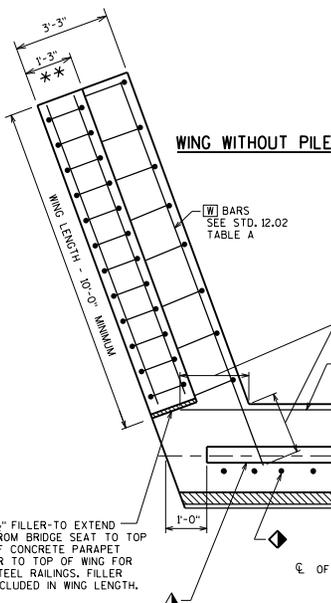
APPROVED: Bill Oliva DATE: 1-19



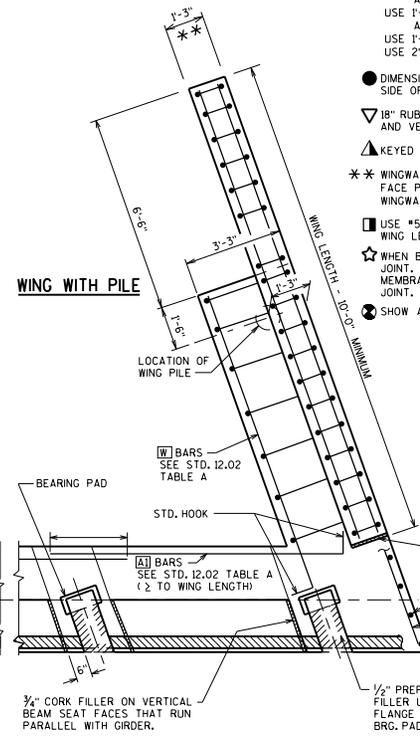
TYPE A1 WITH FIXED SEAT



TYPE A1 WITH SEMI-EXPANSION SEAT



WING WITHOUT PILE



WING WITH PILE

SLAB SPAN WITH FIXED SEAT

GIRDER SPAN WITH FIXED SEAT

SLAB SPAN WITH SEMIEXPANSION SEAT

GIRDER SPAN WITH SEMIEXPANSION SEAT

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

SEE TABLE

[A] BARS SEE STD. 12.02 TABLE A (2 TO WING LENGTH)

SEE STD. 13.01 FOR CRITERIA OF WHEN TO SLOPE BEAM SEATS

4" x 1/2" PREFORMED JOINT FILLER, LENGTH OF ABUTMENT

VERT. CONST. JOINT KEYWAY FORMED BY BEVELED 2" x 8" CLEAR BRG. SEAT BY 3" MIN. CLEAR PILES BY 9" MIN.

PLACE STIRRUPS AND U-SHAPED BARS NORMAL TO ABUT. BODY.

3/4" CORK FILLER ON VERTICAL BEAM SEAT FACES THAT RUN PARALLEL WITH GIRDER.

1/2" PREFORMED JOINT FILLER UNDER GIRDER FLANGE IN FRONT OF BRG. PAD

SKEW ANGLE

REF. LINE

MIN. BETWEEN [A] BARS - 6" #6 BARS

CE OF ROADWAY

SLOPED BTWN. BEAM SEATS

CE OF GIRDER

LOCATION OF WING PILE

[W] BARS SEE STD. 12.02 TABLE A

STD. HOOK

[A] BARS SEE STD. 12.02 TABLE A (2 TO WING LENGTH)

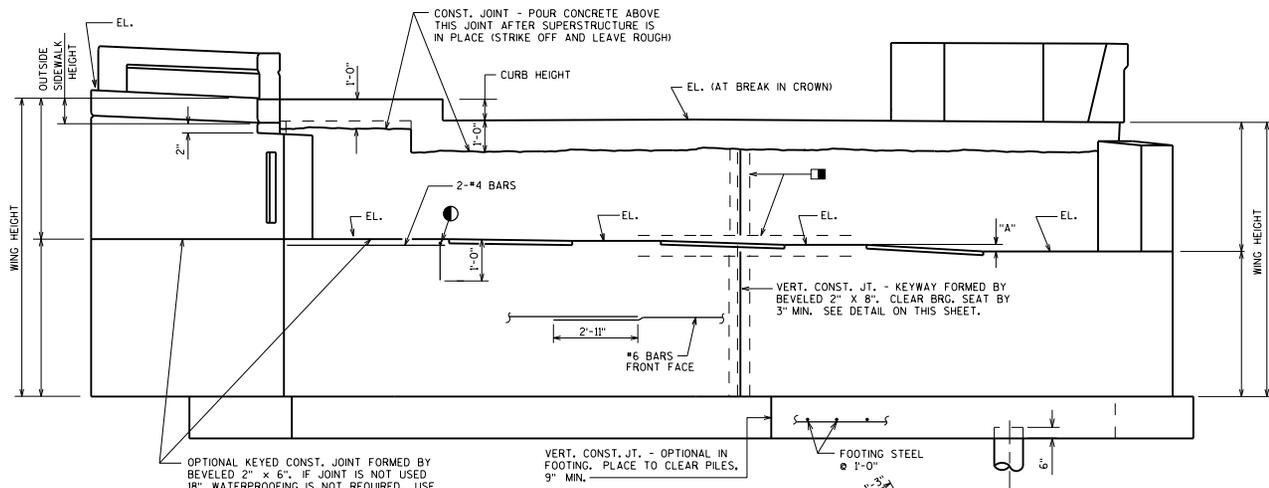
BEARING PAD

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

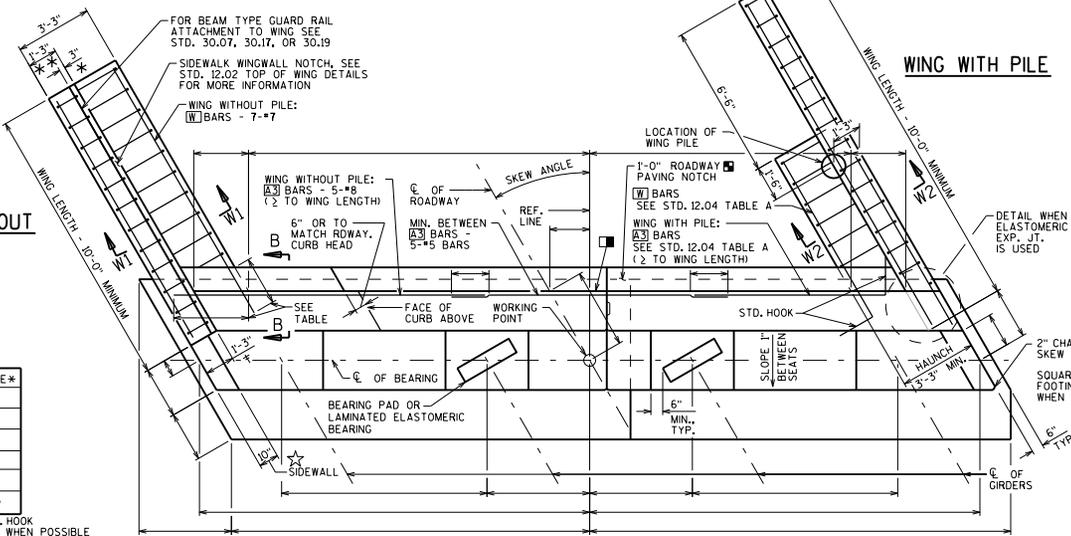
#4 BARS AT 1'-0" ABUTMENT ENDS

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

1/2" PREFORMED JOINT FILLER UNDER GIRDER FLANGE IN FRONT OF BRG. PAD



FRONT ELEVATION

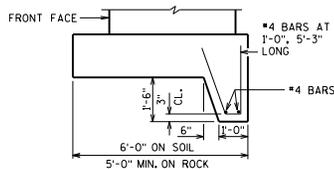


PLAN

TABLE

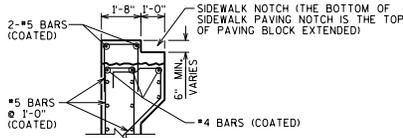
BAR SIZE	DISTANCE*
#5	1'-5"
#6	1'-9"
#7	2'-3"
#8	3'-0"
#9	3'-9"
#10	4'-10"

* OR EQUIVALENT STD. HOOK USE STRAIGHT BARS WHEN POSSIBLE



KEY DETAIL

FOR SILL ABUTMENT WITHOUT PILING PLACED ON SOIL



SECTION B-B

PILE REACTIONS PER FOOT IN KIPS

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

NOTES:

H = WING HEIGHT (FT.)

X = DISTANCE FROM FACE OF CURB TO PILE (FT.)

P = $\frac{1}{2} DC (PDC)^2 \times DW (PDW)^3 \times (LL) (k/FT.)$

FRONT ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH $\frac{3}{4}EH = 1.50$, AND SUPERSTRUCTURE REACTIONS "P". BACK ROW PILE DESIGN IS BASED ON AN EQUIVALENT FLUID UNIT WEIGHT OF SOIL OF 40 P.C.F. WITH $\frac{3}{4}EH \text{ MIN.} = 0.90$, AND "P".

PILES MUST ALSO BE DESIGNED TO ACCOUNT FOR LATERAL LOADS

DESIGNER NOTES

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

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

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

PILE REACTION EQUATIONS ARE FOR PRELIMINARY PILE LAYOUT PURPOSES ONLY.

TOTAL LENGTH OF #3 BARS SHALL BE 2 TO WING LENGTH.

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

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

PARAPET NOT SHOWN IN PLAN VIEW FOR CLARITY.

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

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

LEGEND

▣ 18" RUBBERIZED MEMBRANE WATERPROOFING. SEAL ALL HORIZ. AND VERT. JOINTS ON BACKFACE ABOVE FOOTING.

▲ KEYS CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".

● #4 AT 9" BEAM SEAT. SPACE AT 1'-0" BETWEEN SEATS. THIS STEEL IS REQUIRED ONLY IF DIMENSION "A" EXCEEDS 4".

† 1'-5" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.

* 4" WHEN VERTICAL FACE PARAPET TYPE "TX" IS USED.

* * WINGWALL WIDTH SHALL BE 1'-6" WHEN TYPE "M" RAILING, VERTICAL FACE PARAPET "TX", OR SINGLE SLOPE PARAPET "S655" IS USED. "S655" SHOULD NOT BE USED ON A SIDEWALK. WINGWALL WIDTH SHALL BE 1'-4" WHEN PARAPET "A" ON A RAISED SIDEWALK IS USED. WINGWALL WIDTH SHALL BE 1'-9" WHEN TYPE "NY3" OR "NY4" RAILING IS USED.

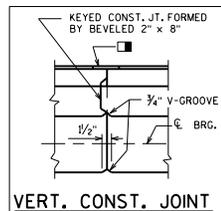
☒ 3'-3" (SLOPE PAVING), 4'-6" (HEAVY RIPRAP)

■ PAVING NOTCH IS 1'-0" WIDE BY 1'-4" DEEP IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED. SHOW NO. 9 STAINLESS STEEL BAR (STD 12.12) FOR STRUCTURAL APPROACH SLAB ON THE ABUTMENT SHEET.

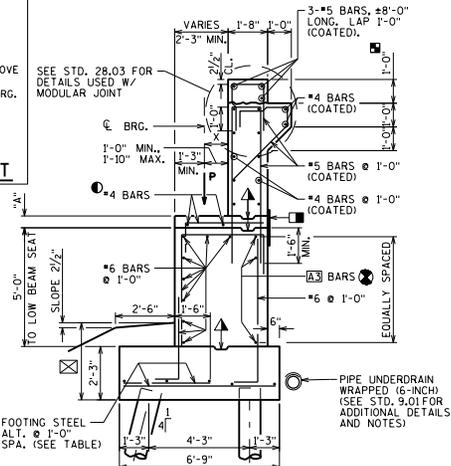
☆ SIDEWALL IS 1'-3" WIDE IF STRUCTURAL APPROACH SLAB (STD. 12.10) IS USED.

● SHOW ALL BARS FOR CLARITY.

WING WITH PILE



VERT. CONST. JOINT



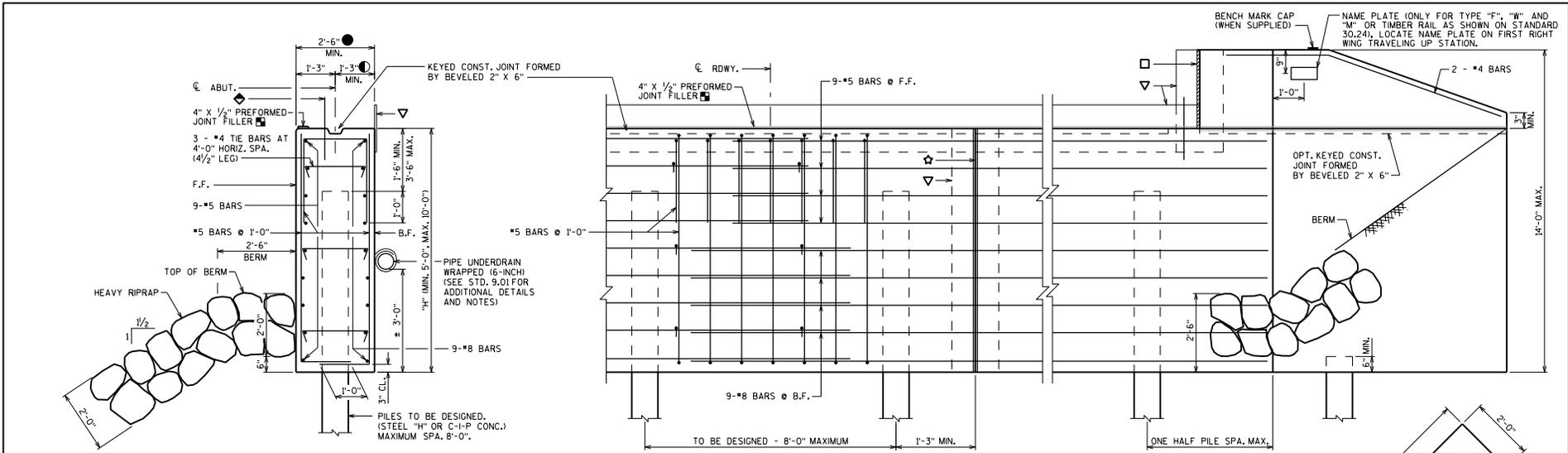
SECTION THRU BODY

ALL FOOTING BARS NOT IDENTIFIED ARE #5 BARS

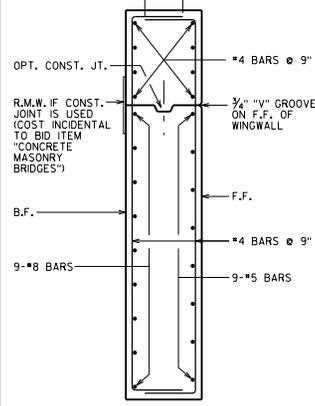
ABUTMENT TYPE A3



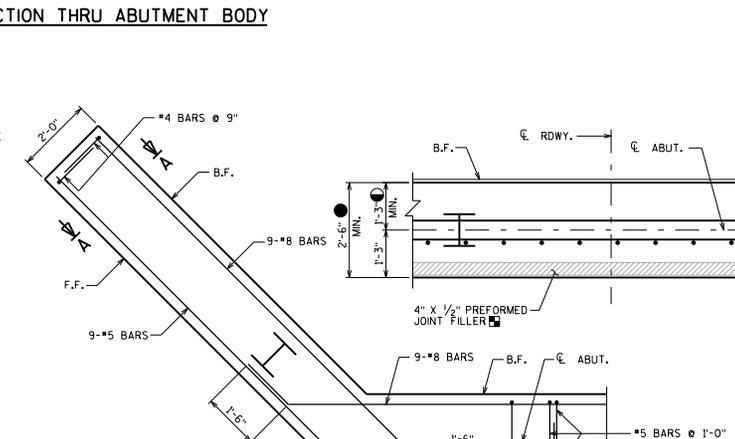
APPROVED: Bill Oliva DATE: 1-19



TYP. SECTION THRU ABUTMENT BODY

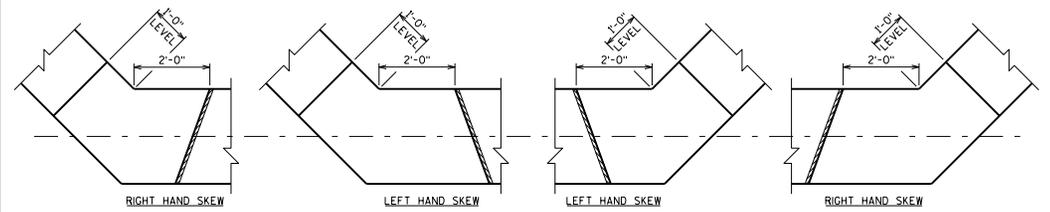


SECTION A-A



PLAN

SHOWING BAR STEEL REINFORCEMENT



WING DETAIL FOR SKEWED STRUCTURES

ELEVATION

PLAN

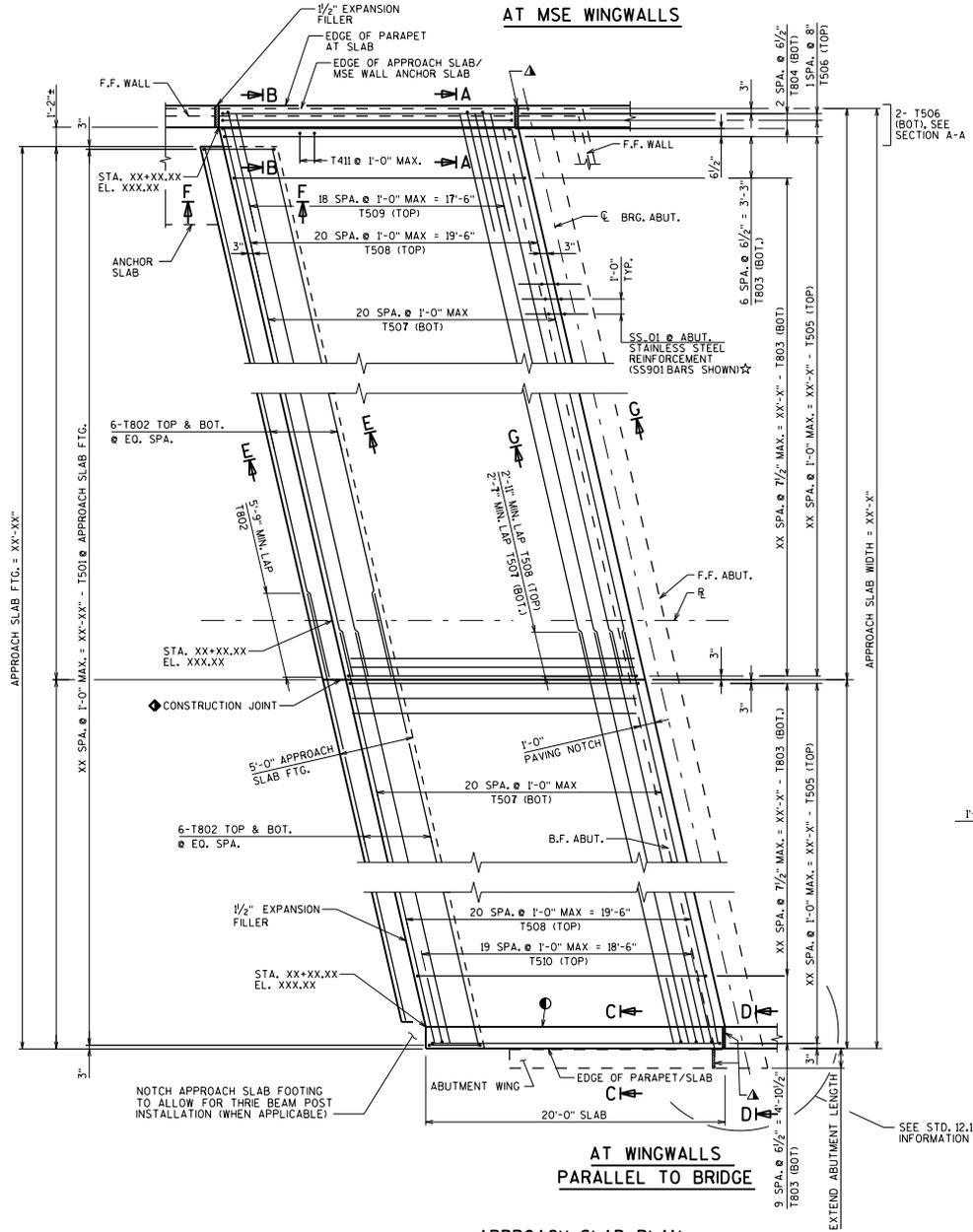
DESIGNER NOTES

- FOR SLAB AND PRESTRESSED GIRDER SPANS $L < 200'-0"$ & FOR STEEL GIRDER SPANS $L < 150'-0"$ WHERE $L =$ LENGTH OF CONTINUOUS SUPERSTRUCTURE BETWEEN ABUTMENTS.
- WHEN GIRDERS WITH SEMIEXPANSION SEAT OR FIXED SEAT, OR SLAB SPAN WITH SEMIEXPANSION SEAT ARE USED, MAKE BEAM SEATS SIMILAR TO THAT SHOWN ON STANDARD 12.01.
- WING BARS AND DOWEL BARS SHALL BE EPOXY COATED.
- WHEN BODY SECTION IS $> + 50'-0"$ LONG, PROVIDE VERT. CONST. JOINT, RUN BAR STEEL THRU JOINT. BEVEL EXPOSED EDGES $3/4"$ AND SEAL JOINT. SEE STD. 12.09 FOR ALTERNATE CONSTRUCTION JOINT.
- USE 1'-3" FOR SLAB SPANS AND FOR GIRDER SPANS WITH NO PAVING NOTCH. USE 1'-6" FOR GIRDER SPANS WITH NO PAVING NOTCH, BUT WHERE 36", 45", 54", 54", 70", 72" OR 82" GIRDERS ARE USED, AND SKEW $> 25^\circ$.
- USE 1'-3" FOR SLAB SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
- USE 1'-11" FOR GIRDER SPANS WITH A PAVING NOTCH, BUT NO STRUCTURAL APPROACH SLAB.
- USE 1'-7" FOR SLAB SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
- USE 2'-3" FOR GIRDER SPANS WITH A STRUCTURAL APPROACH SLAB. (STD. 12.10)
- LAP LENGTH FOR HORIZONTAL BARS SHALL BE BASED ON A "CLASS C" TOP TENSION LAP SPLICE.
- SEAL ALL EXPOSED HORIZ. & VERT. SURFACES OF $1/2"$ JOINT FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD $1/8"$ BELOW SURFACE OF CONC.)
- DO NOT PLACE FILL ABOVE 3'-0" FROM BOTTOM OF ABUTMENT UNTIL SUPERSTRUCTURE IS IN PLACE.
- 18" RUBBERIZED MEMBRANE WATERPROOFING.
- WHEN ABUTMENT WIDTH $> 2'-10"$ FIXED POINT OF WING ROTATION SHALL BE ON F.F. OF ABUTMENT (0° SKEW ONLY).
- THESE BARS MAY BE PLACED AFTER CONCRETE IS POURED, BUT BEFORE INITIAL SET HAS TAKEN PLACE. SEE STD. 12.01 & 27.05
- USE 3/4" THICK FILLER FOR SLAB STRUCTURES.

ABUTMENT A5 (INTEGRAL, PILE ENCASED ABUTMENT)

BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-19



DESIGNER NOTES

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

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

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

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

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

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

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

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

SEE STANDARD 9.01 FOR BACKFILL AND BASE AGGREGATE DENSE 1-1/4 INCH DETAILS. SHOW "DESIGN DATA" INFORMATION ON FIRST SHEET OF PLANS

DESIGN DATA

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

LEGEND

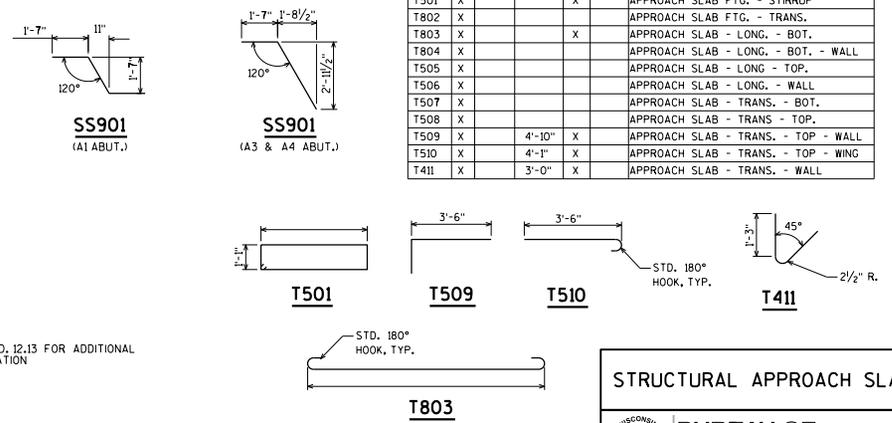
- ▲ SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF 1/2" FILLER WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. (1" DEEP AND HOLD 1/8" BELOW SURFACE OF CONCRETE).
- SEE PARAPET STANDARD DETAILS FOR LOCATION OF NAME PLATE AND BENCH MARK WITH RESPECT TO THE END OF PARAPET.

BILL OF BARS

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

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

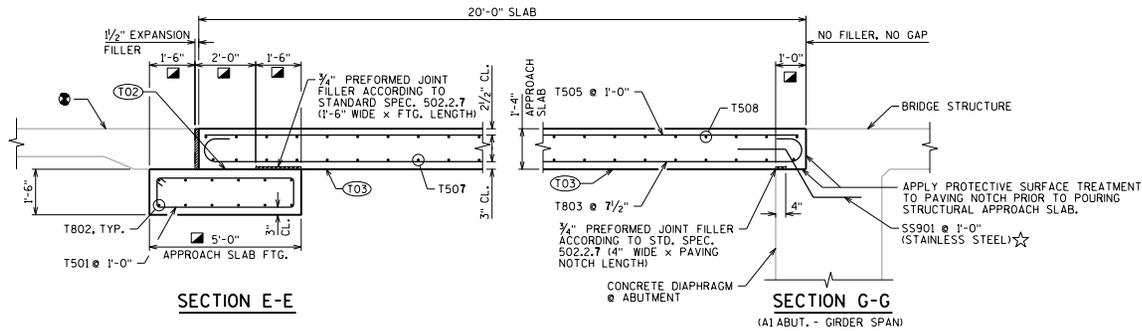


SECTIONS A-A THRU C-C ARE SHOWN ON STANDARD 12.11 & 12.12

STRUCTURAL APPROACH SLAB

WISCONSIN DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES

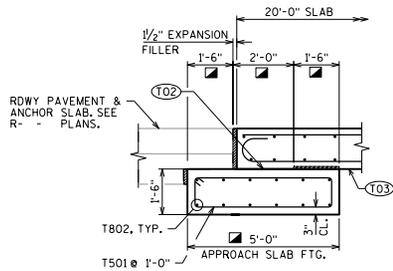
APPROVED: Bill Oliva DATE: 1-19



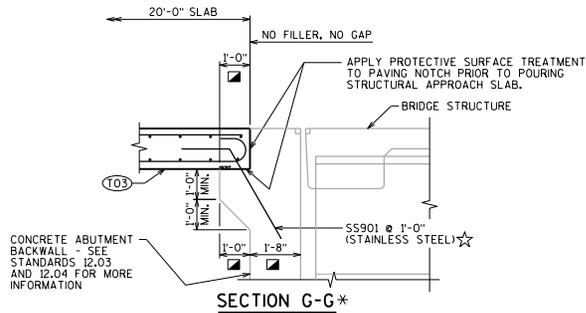
SECTION E-E

SECTION THRU APPROACH SLAB

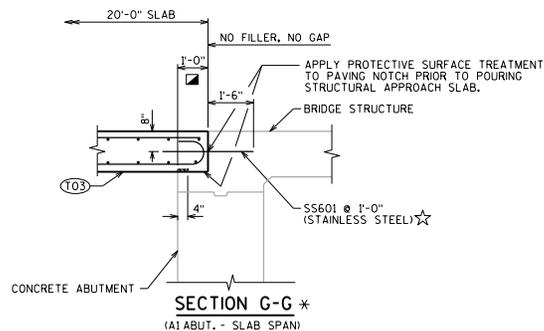
SECTION G-G
(A1 ABUT. - GIRDER SPAN)



SECTION F-F
(AT MSE WINGWALLS WITH ANCHOR SLAB)



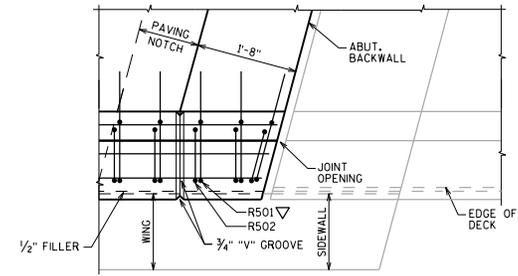
SECTION G-G*
(A3 ABUT.)



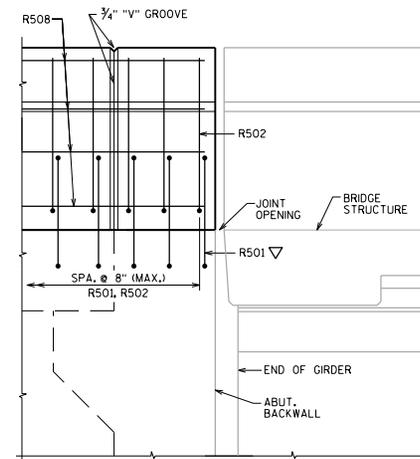
SECTION G-G*
(A1 ABUT. - SLAB SPAN)

LEGEND

- (T02) STEEL TROWEL TOP SURFACE OF FOOTING AND PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF FOOTING.
- (T03) PLACE MULTIPLE LAYERS (0.03" MIN. TOTAL THK.) OF POLYETHYLENE SHEETS OVER THE ENTIRE TOP OF SUBGRADE BENEATH SLAB.
- MEASURED NORMAL TO ABUTMENT
- FOLLOW FDM 14-10-15 REQUIREMENTS FOR ROADWAY APPROACH PAVEMENT.
- * SECTION REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARD 12.10 FOR DIFFERENT APPLICATION.
- ☆ THE BID ITEM FOR SS901 AND SS601 BARS SHALL BE STANDARD SPECIAL PROVISION "BAR STEEL REINFORCEMENT HS STAINLESS STRUCTURES".
- ▽ R501 BARS TO BE TIED TO STRUCTURAL APPROACH SLAB STEEL AND ABUT. STEEL BEFORE STRUCTURAL APPROACH SLAB IS POURED.



PLAN
(PARAPET ON STRUCTURAL APPROACH SLAB AT A3 ABUT.)



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

DESIGNER NOTES

SEE CHAPTER 30 FOR PARAPETS ON STRUCTURAL APPROACH SLAB DETAILS.

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

STRUCTURAL APPROACH
SLAB DETAILS 2



**BUREAU OF
STRUCTURES**

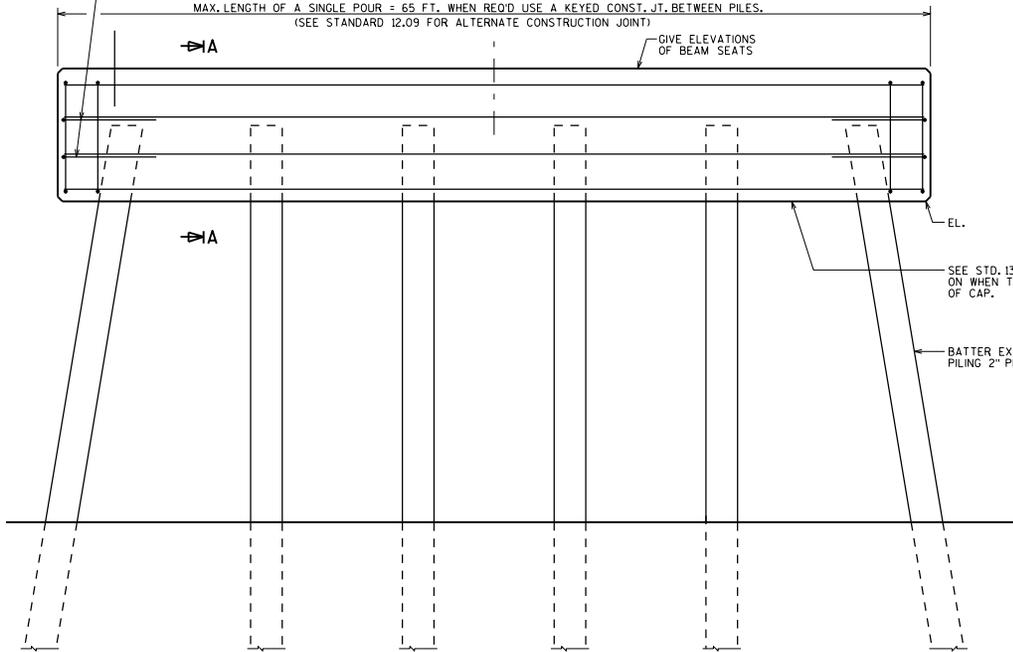
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*5 U-BARS
(1'-5" UNCOATED LAP
1'-9" COATED LAP)

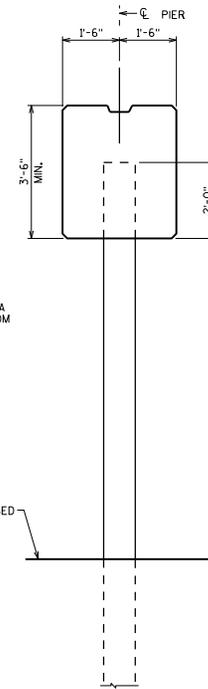
SYM. ABOUT C
OF STRUCTURE

MAX. LENGTH OF A SINGLE POUR = 65 FT., WHEN REQ'D USE A KEYED CONST. JT. BETWEEN PILES.
(SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINT)

GIVE ELEVATIONS
OF BEAM SEATS



ELEVATION
LOOKING UP STATION



END VIEW

NOTES

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

DESIGNER NOTES

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

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

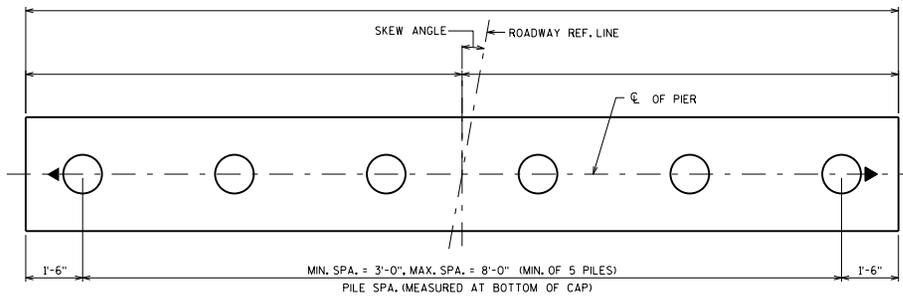
1. FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%. SEE STANDARD 13.01.
2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

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

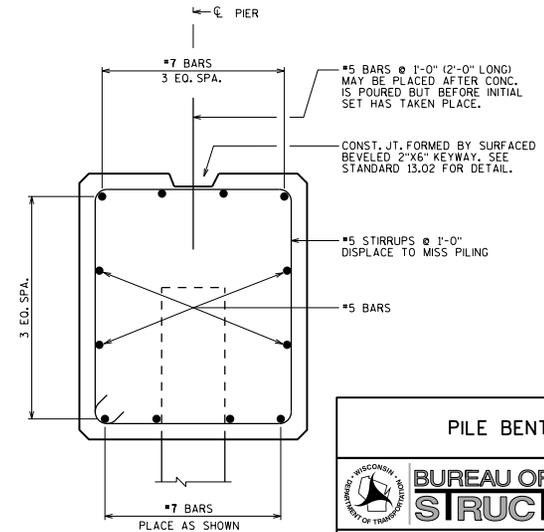
SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

PILES SHALL BE 12 3/4" OR 14" DIAMETER CAST-IN-PLACE WITH MINIMUM WALL THICKNESS OF 3/8".

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



PLAN



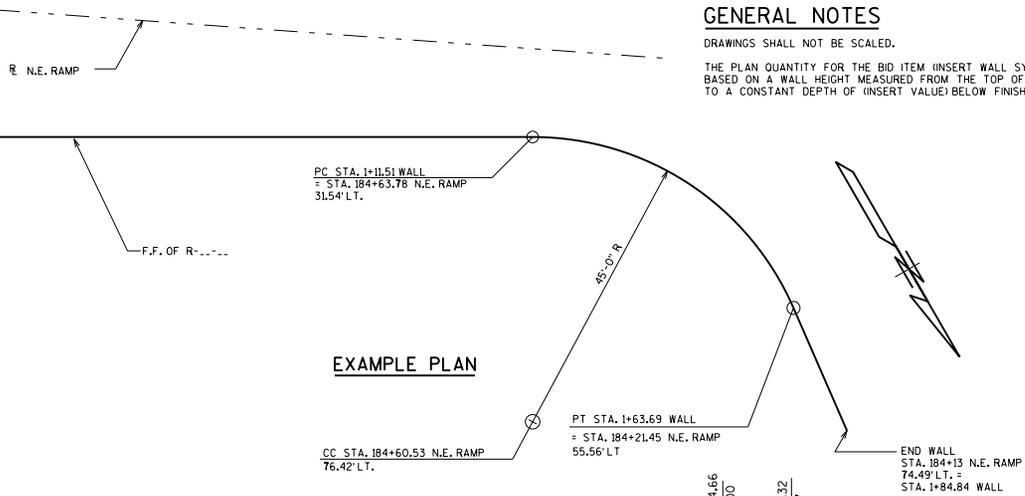
SECTION A-A

PILE BENT

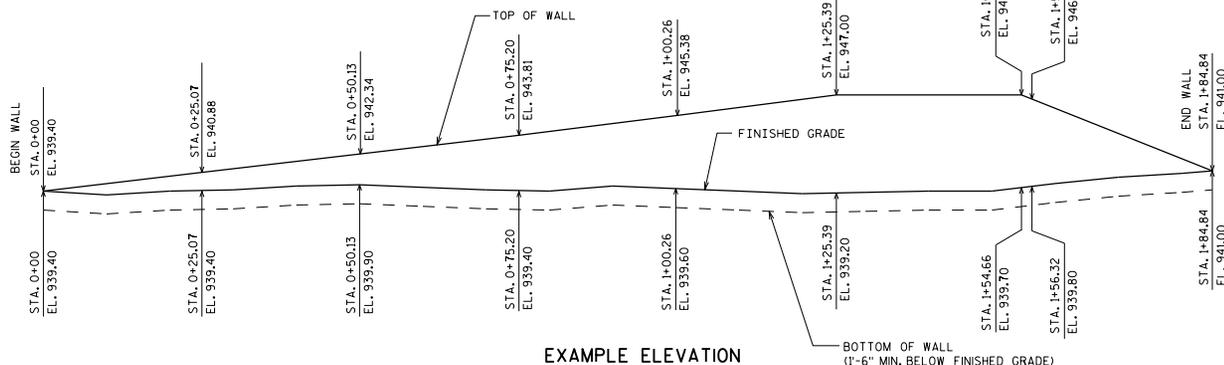


BUREAU OF STRUCTURES

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EXAMPLE PLAN



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

GEOMETRY TABLE

WALL STATION	ROADWAY STATION	OFFSET TO F.F. WALL	TOP OF WALL ELEV.	FINISHED GRADE ELEV.
0+00	0+00	0.00	939.40	939.40
0+25.07	0+25.07	0.00	940.88	940.88
0+50.13	0+50.13	0.00	942.34	942.34
0+75.20	0+75.20	0.00	939.40	939.40
1+00.26	1+00.26	0.00	939.60	939.60
1+25.39	1+25.39	0.00	939.20	939.20
1+54.66	1+54.66	0.00	939.70	939.70
1+56.32	1+56.32	0.00	939.80	939.80
1+84.84	1+84.84	0.00	941.00	941.00

SOIL PARAMETERS

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

* DESIGN WALL FOR THESE VALUES

WALL EXTERNAL & OVERALL STABILITY EVALUATION

DIMENSIONS	EVALUATED LOCATIONS
WALL HEIGHT (FEET)	
EXPOSED WALL HEIGHT (FEET)	
MINIMUM LENGTH OF REINFORCEMENT (FEET) <input checked="" type="checkbox"/>	
WALL STATION	
BORING USED	
CAPACITY TO DEMAND RATIO (CDR)	
SLIDING (CDR>1.0)	
ECCENTRICITY (CDR>1.0)	
OVERALL STABILITY (CDR>1.0) ☆	
BEARING RESISTANCE (CDR>1.0)	
FACTORED BEARING RESISTANCE (PSF)	

GENERAL NOTES

DRAWINGS SHALL NOT BE SCALED.
THE PLAN QUANTITY FOR THE BID ITEM (INSERT WALL SYSTEM) IS BASED ON A WALL HEIGHT MEASURED FROM THE TOP OF WALL TO A CONSTANT DEPTH OF (INSERT VALUE) BELOW FINISHED GRADE.

DESIGN DATA

THE CONTRACTOR SHALL PROVIDE COMPLETE DESIGN, PLANS, DETAILS, SPECIFICATIONS, AND SHOP DRAWINGS FOR THE RETAINING WALLS IN ACCORDANCE WITH THE SPECIAL PROVISIONS. THE RETAINING WALL MANUFACTURER SHALL PROVIDE TECHNICAL ASSISTANCE TO THE CONTRACTOR DURING CONSTRUCTION. THE COST OF FURNISHING THESE ITEMS SHALL BE INCLUDED IN THE BID ITEM "INSERT WALL SYSTEM OR SYSTEMS".

PLANS, ELEVATIONS AND DETAILS SHOWN ON THESE DRAWINGS ARE INTENDED TO INDICATE WALL LOCATIONS, LENGTHS, HEIGHTS, AND DETAILS COMMON TO THE WALL SYSTEM SELECTED. THE CONTRACTOR SHALL VERIFY THAT THE WALL SYSTEM SELECTED WILL CONFORM TO THE REQUIRED ALIGNMENTS AND DETAILS.

THE RETAINING WALL IS TO BE DESIGNED USING THE ELEVATIONS GIVEN ON THIS SHEET.

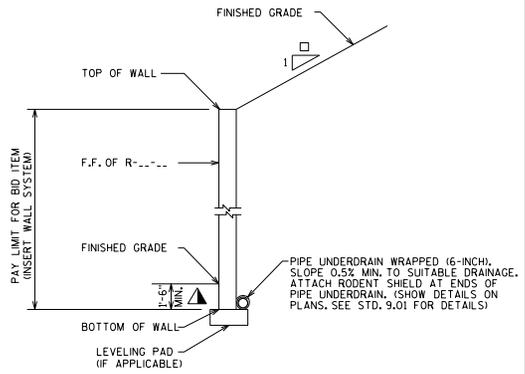
DESIGN FOR RETAINING WALL TO PROVIDE FOR FINISHED GRADE SLOPED BEHIND WALL AS SHOWN.

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

THE MAXIMUM VALUE OF THE ANGLE OF INTERNAL FRICTION OF THE WALL BACKFILL MATERIAL IN THE REINFORCED ZONE SHALL BE ASSUMED TO BE 30° WITHOUT CERTIFIED TEST VALUES.

DESIGNER NOTES

- THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED UPON THE MINIMUM DESCRIBED IN THE WALL SYSTEM SPECIAL PROVISIONS OR EXTERNAL AND OVERALL STABILITY AT THE DESIGNATED LOCATIONS. THESE DESIGNATED LOCATIONS REPRESENT TYPICAL AND CRITICAL WALL LOCATIONS, BUT SHALL NOT BE CONSIDERED ALL-INCLUSIVE. THE CONTRACTOR DESIGN LENGTHS SHALL MEET OR EXCEED THE MINIMUM VALUES REPRESENTED IN THE TABLE AT THESE DESIGNATED LOCATIONS.
- ☆ THE LENGTHS PROVIDED IN THE TABLE ARE THE MINIMUM REQUIRED REINFORCEMENT LENGTHS BASED ON OVERALL STABILITY PERFORMED BY THE WALL DESIGNER. COMPOUND STABILITY IS THE CONTRACTORS RESPONSIBILITY.
- ▲ MINIMUM EMBEDMENT BASED ON SITE SPECIFIC PARAMETERS (1'-6" MINIMUM FOR ALL WALLS ON LEVEL GROUND). FIELD EMBEDMENTS SHALL MEET OR EXCEED THE MINIMUM EMBEDMENT. FIELD EMBEDMENTS BELOW MINIMUM EMBEDMENT SHALL NOT BE INCLUDED IN THE PAY LIMITS.
- ⊗ STRATUM LOCATIONS & SOIL DESCRIPTIONS AT EACH BORING LOCATION. NOMINAL MSE PANEL DIMENSIONS ARE 5-FOOT HIGH AND 5-10 FOOT WIDE. THE WALL DESIGNER SHALL PROVIDE DETAILS BASED ON NOMINAL PANEL DIMENSIONS AND CONFIGURATION. DETAILS SHALL BE ABLE TO ACCOMMODATE VARIOUS PANEL DIMENSIONS. THE CONTRACTOR AND WALL SUPPLIER SHALL COORDINATE DETAILS BASED ON THE ACTUAL PANEL DIMENSIONS.



TYP. CROSS SECT. OF RETAINING WALL

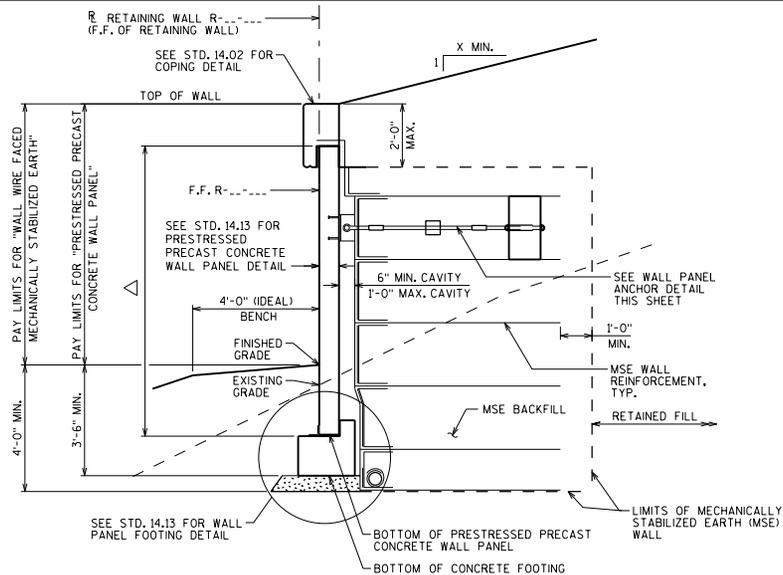
LIST OF DRAWINGS

1. (INSERT WALL SYSTEM)
2. SUBSURFACE EXPLORATION

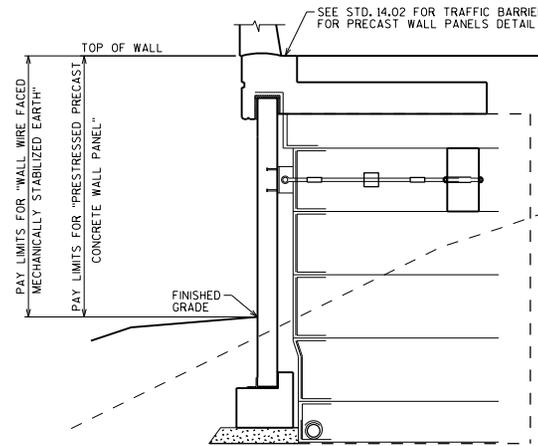
LRFD PROPRIETARY RETAINING WALLS (GENERAL PLAN)



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TYPICAL WALL SECTION WITH CAST-IN-PLACE CONCRETE COPING



TYPICAL WALL SECTION WITH CAST-IN-PLACE CONCRETE COPING

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

MATERIAL PROPERTIES

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

NOTES

CLEVIS, CLEVIS PIN, COUPLER, MULTIDIRECTIONAL CONNECTOR, AND TURNBUCKLE TO BE CORROSION RESISTANT AND DEVELOP 125% OF THE ULTIMATE STRENGTH OF THE 1/2" DIAMETER ROD.

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

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

DESIGNER NOTES

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

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

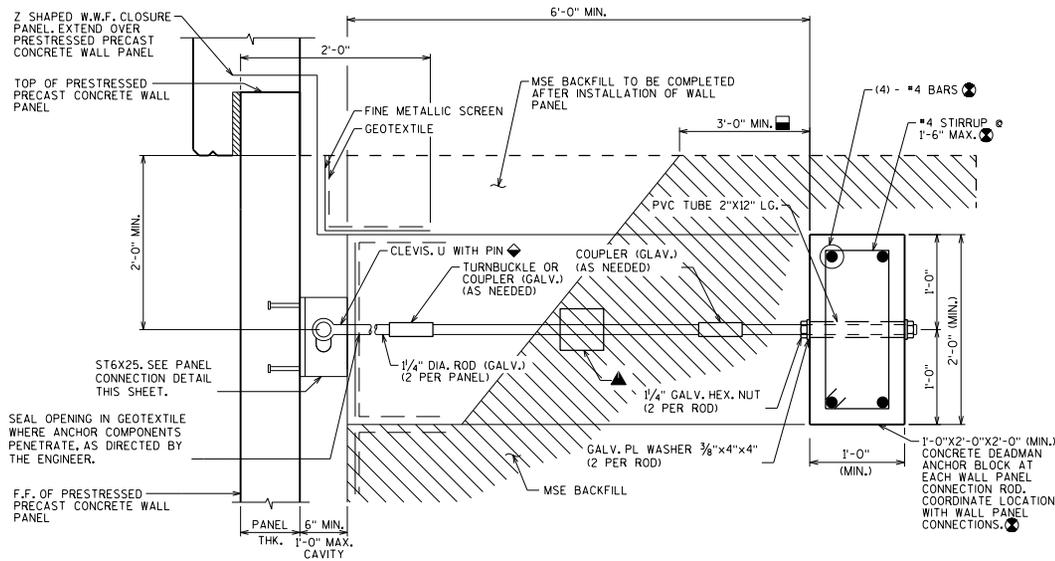
LEGEND

▣ CONTRACTOR TO DESIGN LENGTH TO PROVIDE REQUIRED HORIZONTAL CAPACITY OF ANCHOR ASSEMBLY, MINIMUM OF 3'-0" OF COMPACTED FILL IN FRONT OF DEADMAN ANCHOR PRIOR TO WALL PANEL ERECTION. 1/2" ROD TO BE 2'-0" MIN. BELOW TOP OF REINFORCED SOIL ZONE.

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

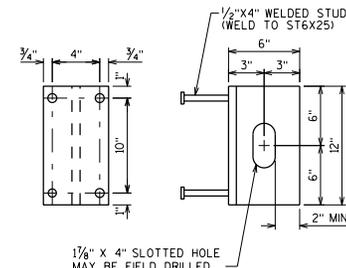
▲ OPTIONAL MULTIDIRECTIONAL CONNECTOR MAY BE USED TO FACILITATE ALIGNMENT AT THE CONNECTION.

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



WALL PANEL ANCHOR DETAIL

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

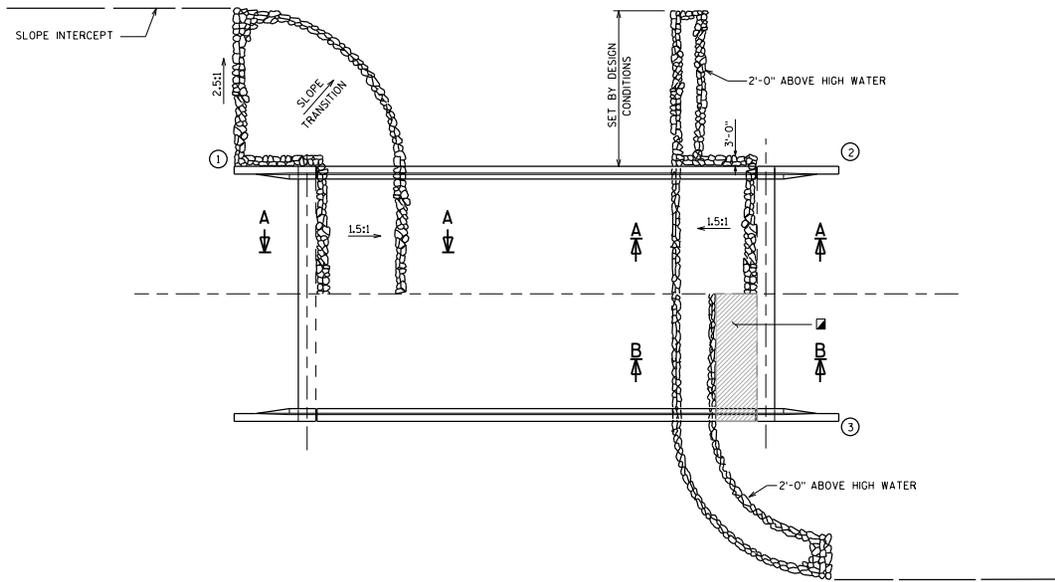


PANEL CONNECTION DETAIL

AS AN ALTERNATIVE, 1/2" (GALV.) ADHESIVE ANCHORS MAY BE USED TO AVOID AN OBSTRUCTION. ALTERNATIVE SHALL BE LIMITED TO ONE PANEL CONNECTION PER PANEL.

ST6X25 MAY BE WELDED TO 3/4" THICK PLATE WITH (4)-1/2"X4" STUDS ANCHORED IN PRECAST CONCRETE PANEL. RESTORE ZINC COATING AROUND ANY WELDED AREAS. SUBMIT DETAILS FOR APPROVAL BY THE ENGINEER.

MSE WALL WIRE FACING 1	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19



ALTERNATE ①

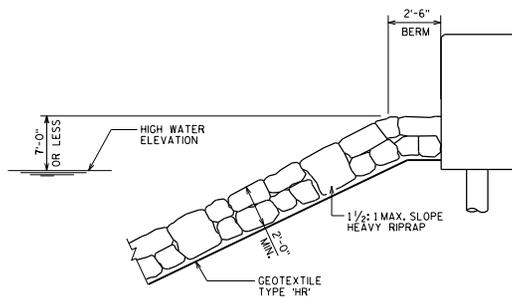
NORMAL CONDITION FOR EMBANKMENT FILLS

ALTERNATE ②

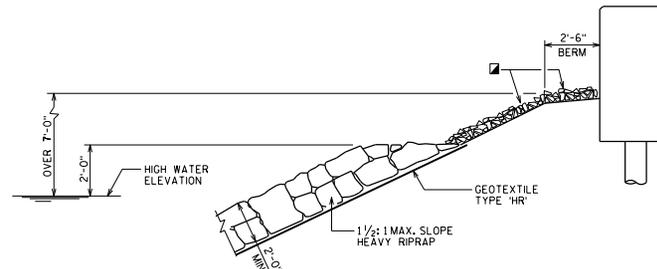
USE WHERE BERM ELEVATION IS LESS THAN 7'-0" ABOVE HIGH WATER

ALTERNATE ③

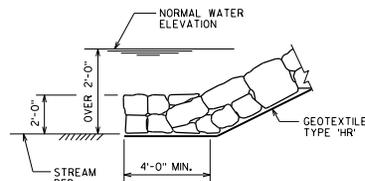
USE WHERE BERM ELEVATION IS OVER 7'-0" ABOVE HIGH WATER



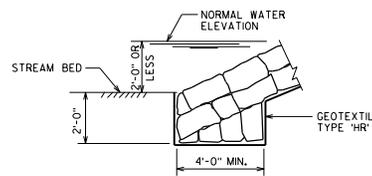
SECTION A-A



SECTION B-B



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



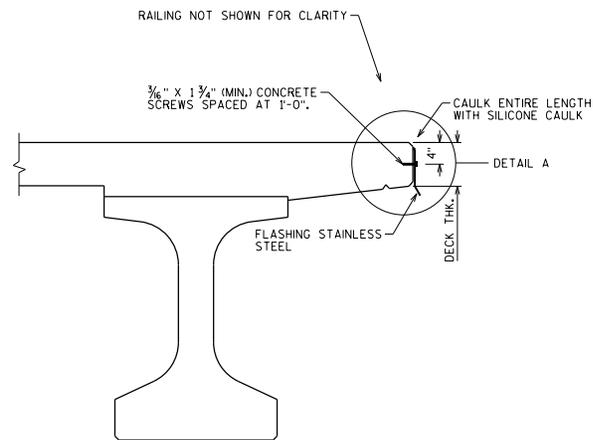
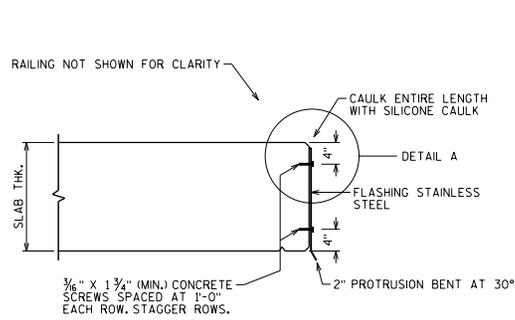
TOE DETAIL
NORMAL WATER ELEVATION ≤ 2'-0" ABOVE STREAM BED

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

PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS

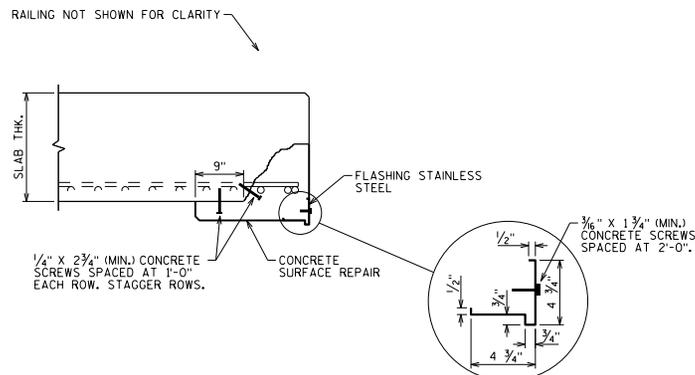


APPROVED: Bill Oliva DATE: 1-19



FLASHING DETAIL FOR NEW BRIDGES WITH OPEN RAILING

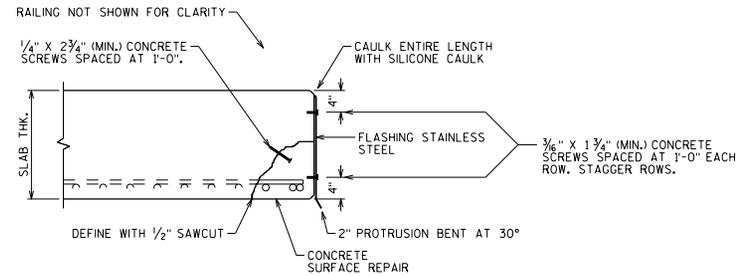
THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK, 3/8" CONCRETE SCREWS AND CLEANING THE EDGE OF THE DECK PRIOR TO ATTACHMENT OF THE FLASHING.



REHABILITATION FLASHING DETAIL 1

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

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



REHABILITATION FLASHING DETAIL 2

THE BID ITEM "FLASHING STAINLESS STEEL" SHALL INCLUDE PROVIDING AND INSTALLING THE STAINLESS STEEL FLASHING, SILICONE CAULK, 3/8" AND 1/4" CONCRETE SCREWS, AND CLEANING THE EDGE OF THE DECK PRIOR TO ATTACHMENT OF THE FLASHING.

DESIGNER NOTES

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

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

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

NOTES

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

FLASHING TO BE INSTALLED AFTER PROTECTIVE SURFACE TREATMENT APPLICATION.

CONCRETE SCREWS SHALL BE 410 STAINLESS STEEL.

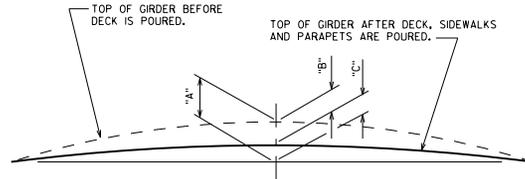
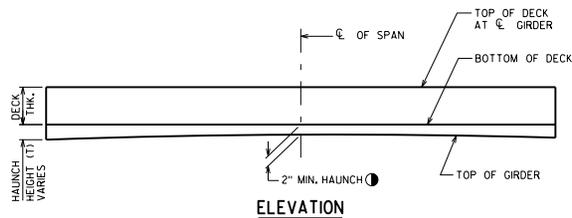
EXTEND FLASHING TO B.F. OF ABUTMENT DIAPHRAGM.

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

EDGE OF DECK FLASHING



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

DESIGNER NOTES

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

THE MINIMUM HAUNCH (AT EDGE OF GIRDER FLANGE) ALLOWED IN CONSTRUCTION IS 1/4".

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

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

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

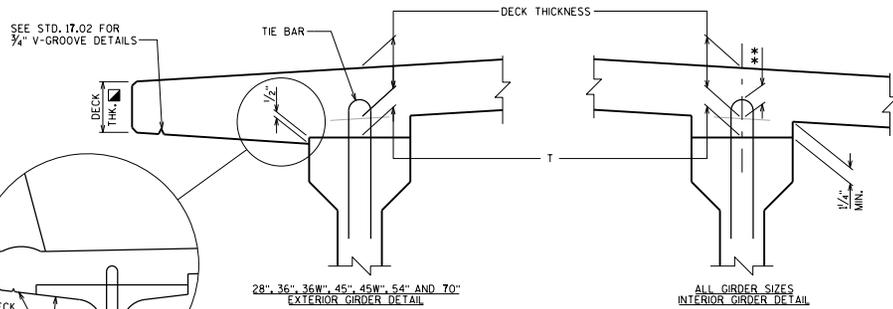
FOR SKEWS $\leq 10^\circ$, PLACE INTERMEDIATE DIAPHRAGMS IN A STRAIGHT LINE. REFER TO STANDARD 19.36. PROVIDE OFFSET FOR SKEWS $> 10^\circ$.

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

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

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

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

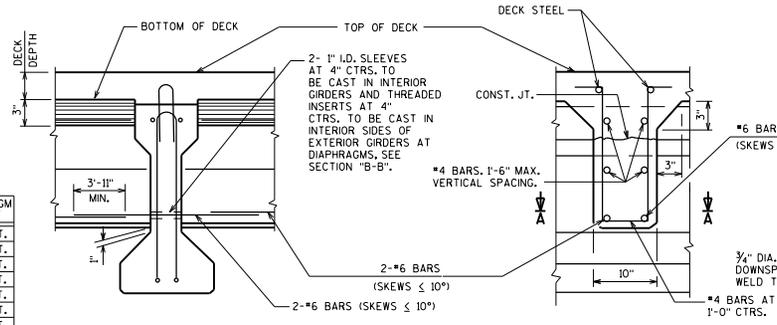
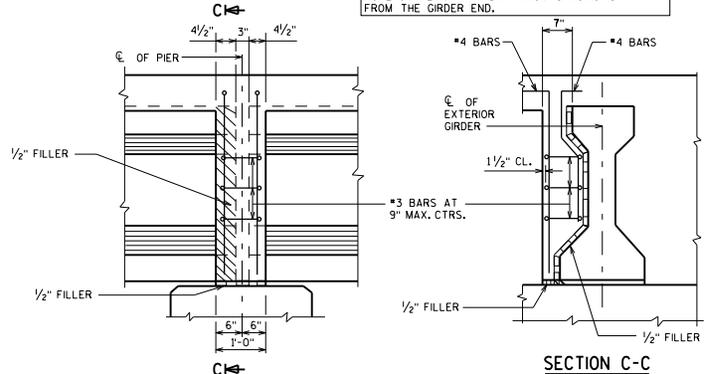


IF 1/4" MINIMUM HAUNCH HEIGHT AT EDGE OF GIRDER CANNOT BE MAINTAINED, THE GRADE LINE MAY BE REVISED BY THE ENGINEER AT THE OPTION OF THE CONTRACTOR. THE PLAN DECK THICKNESS SHALL BE HELD, NOTIFY THE STRUCTURES SECTION IF THE GRADE LINE IS RAISED FROM THE PLAN PROFILE BY MORE THAN 1/2" OR, ** IF 3" MINIMUM DECK EMBEDMENT OF TIE BAR CANNOT BE OBTAINED.

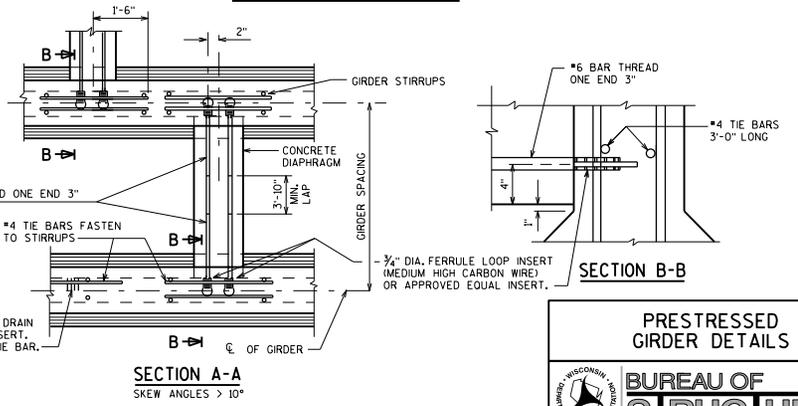
TO DETERMINE "T", ELEV. OF TOP OF GRS. AT ϕ OF SUBSTRUCTURE UNITS & AT 1/10 POINTS OF EACH SPAN SHALL BE TAKEN. THEN FOLLOW THIS PROCESS:

TOP OF DECK ELEV. AT FINAL GRADE
- TOP OF GIRDER ELEVATION
+ DEAD LOAD DEFLECTION
- DECK THICKNESS
= HAUNCH HEIGHT "T"

NOTE: AN AVERAGE HAUNCH ("T") WAS USED IN THE QUANTITY "CONCRETE MASONRY BRIDGES".



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



INTERMEDIATE CONCRETE DIAPHRAGM DETAILS

SECTION THRU DIAPHRAGM

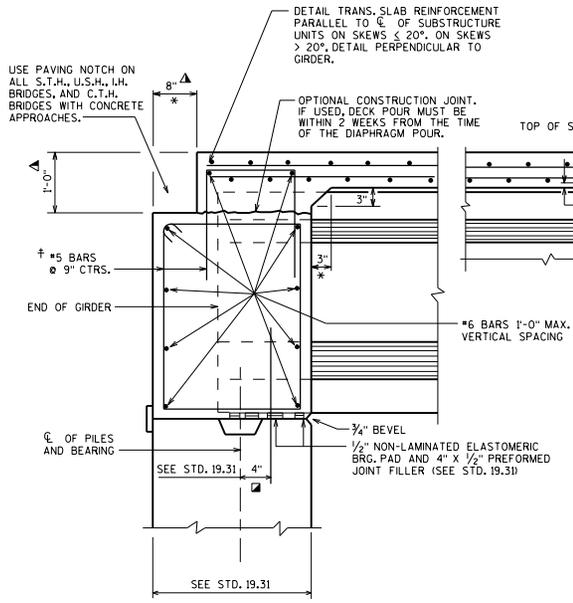
PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

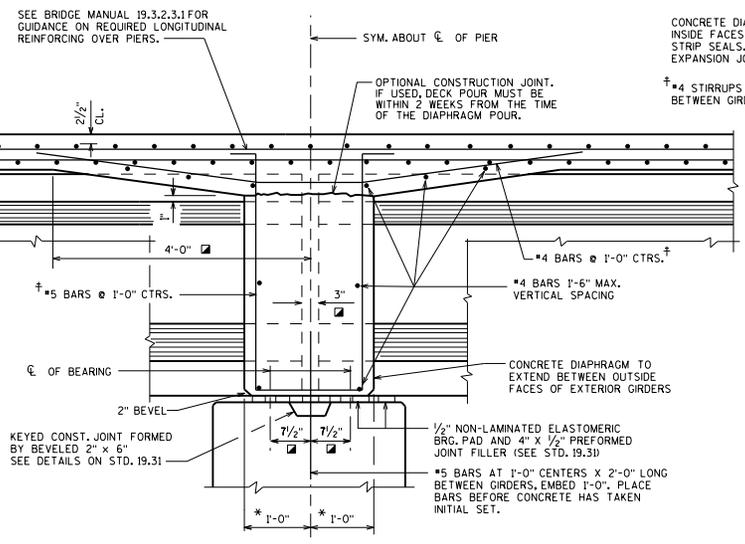
WISCONSIN DEPARTMENT OF TRANSPORTATION

DATE: 1-19

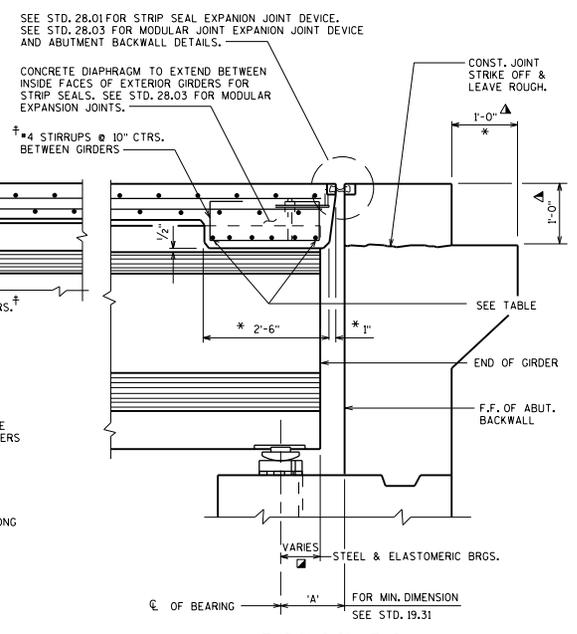
APPROVED: Bill Oliva



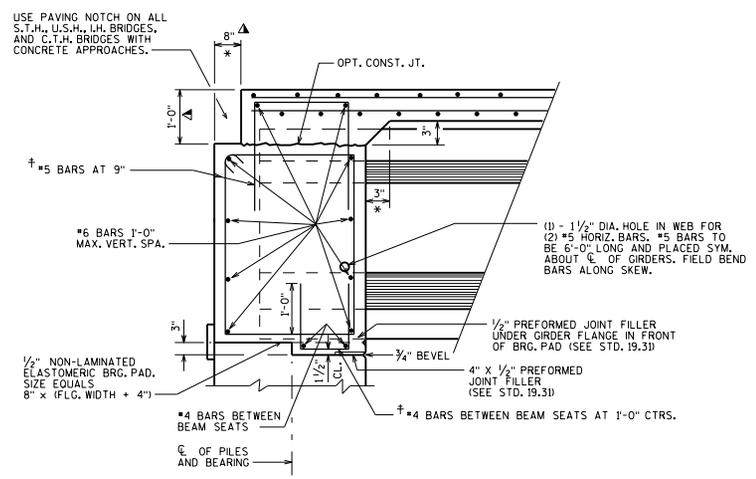
**FIXED END
FOR SKEWED AND SQUARE STRUCTURES**



DIAPHRAGM AT 1/2" ELASTOMERIC BEARING



EXPANSION END



**PRESTRESSED GIRDER WITH
SEMI-EXPANSION SEAT**

EXPANSION END DIAPHRAGM STEEL

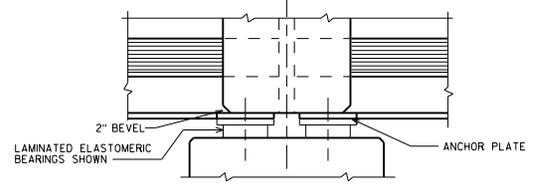
DIAPHRAGM LENGTH (ALONG SKEW) BETWEEN GIRDERS (\bar{C} TO \bar{C} OF GRDS.)	NO. OF BARS & BAR SIZE	
	28"	36"
$\leq 8'-4"$	6 - #6	6 - #6
$> 8'-4" \leq 11'-4"$	6 - #8	6 - #7
$> 11'-4" \leq 14'-9"$		6 - #8

DESIGNER NOTES

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

LEGEND

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



**DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS
SECTION THRU DIAPHRAGM AT PIER**

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

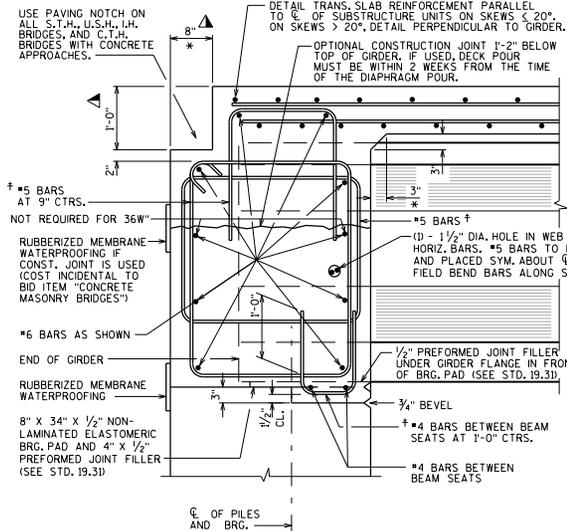
SEE STANDARD 19.34 FOR 36W" & 45W" PRESTRESSED GIRDERS SLAB AND SUPERSTRUCTURE DETAILS

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

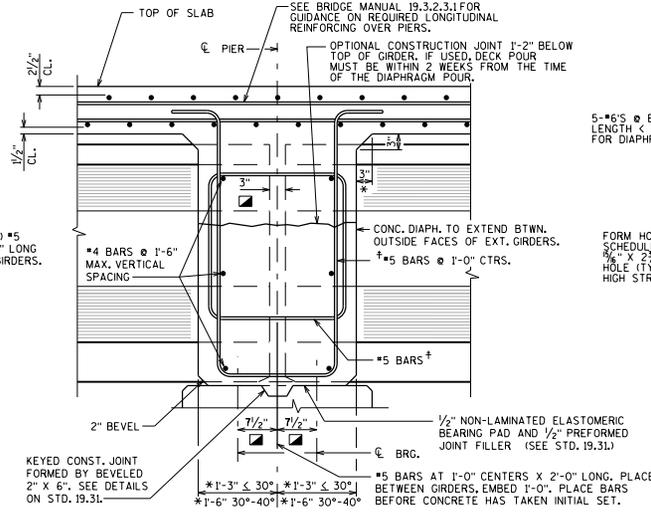
**28" & 36" PRESTRESSED
GIRDERS SLAB &
SUPERSTRUCTURE DETAILS**

**BUREAU OF
STRUCTURES**

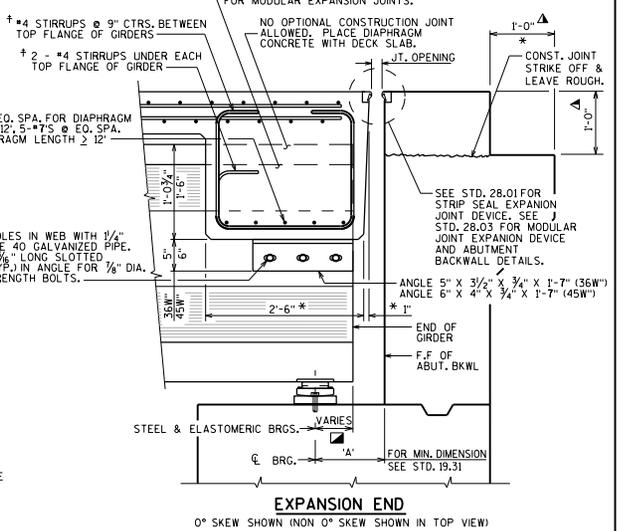
APPROVED: Bill Oliva DATE: 1-19



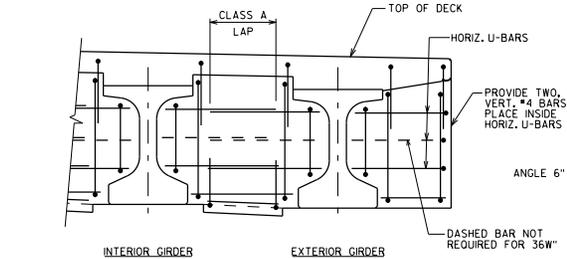
PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT



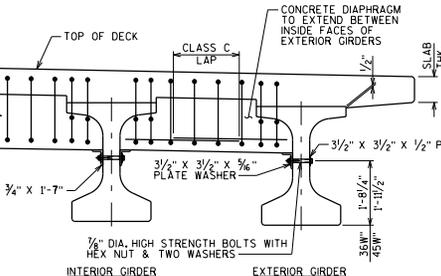
DIAPHRAGM AT 1/2" ELASTOMERIC BEARING



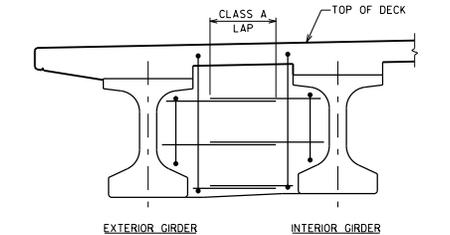
EXPANSION END
0° SKEW SHOWN (NON 0° SKEW SHOWN IN TOP VIEW)



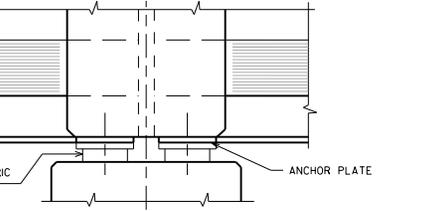
PART TRANSVERSE SECTION AT DIAPHRAGM SEMIEXPANSION END



PART TRANSVERSE SECTION AT DIAPHRAGM EXPANSION END



PART TRANSVERSE SECTION AT DIAPHRAGM PIER

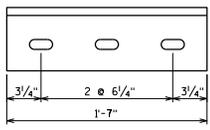


DIAPHRAGM AT STEEL OR ELASTOMERIC BEARINGS SECTION THRU DIAPHRAGM AT PIER

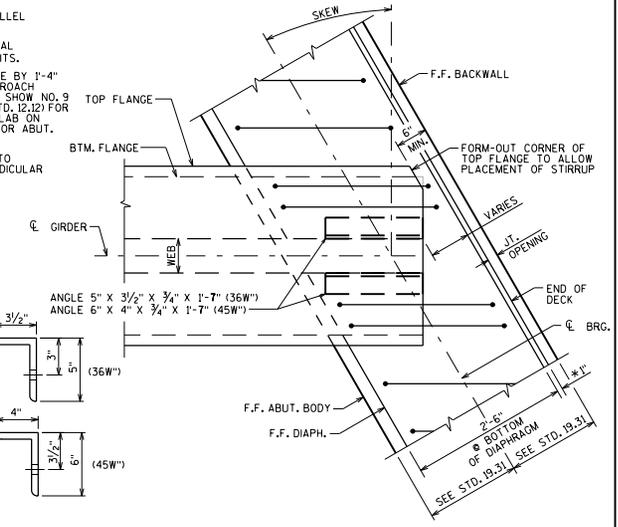
FOR STEEL BEARINGS, FORM DIAPHRAGM APPROXIMATELY 1/2" ABOVE BEARING KEEPER BARS

LEGEND

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



ANGLE



TOP VIEW OF DIAPHRAGM (EXPANSION END)

NOTES

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

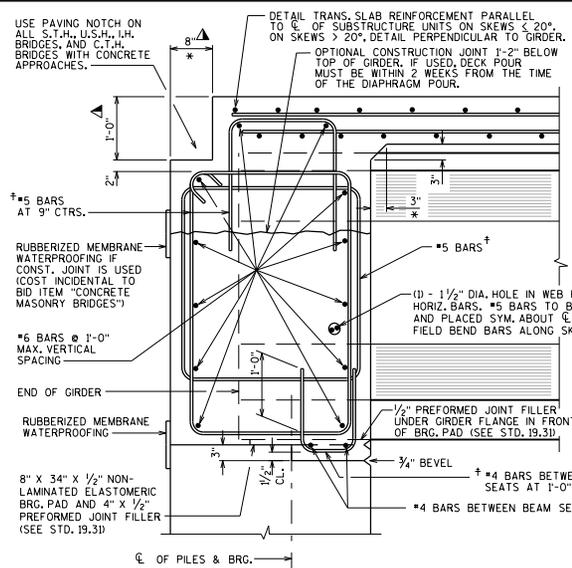
DESIGNER NOTE

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

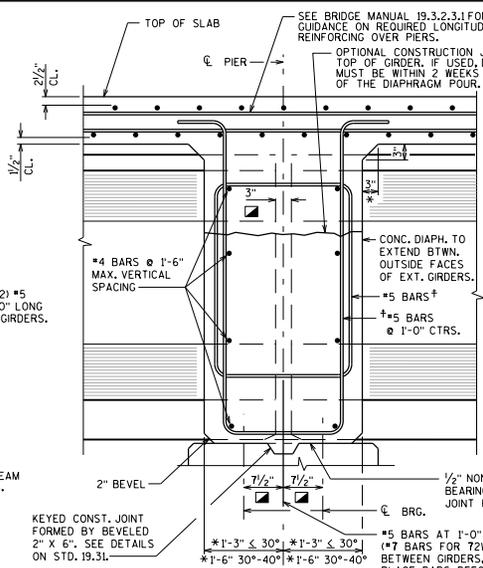
PRESTRESSED 36" & 45" GIRDER SLAB & SUPERSTRUCTURE DETAILS

BUREAU OF STRUCTURES

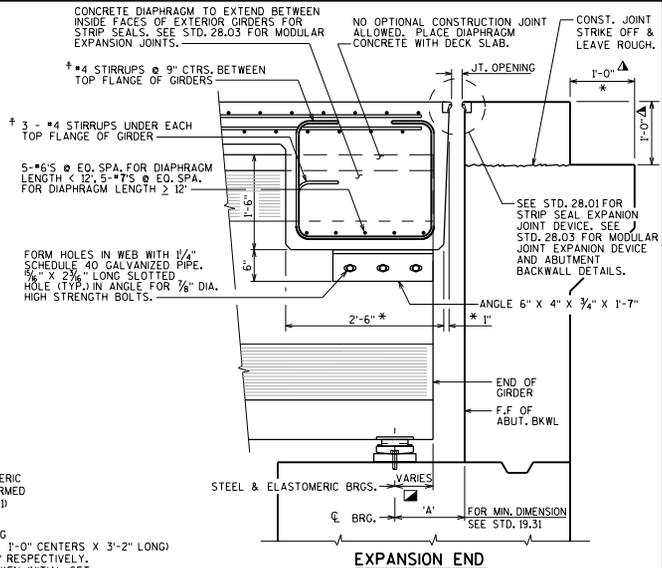
APPROVED: Bill Oliva DATE: 1-19



PRESTRESSED GIRDER WITH SEMI-EXPANSION SEAT

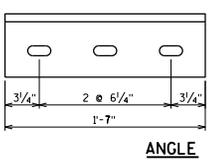
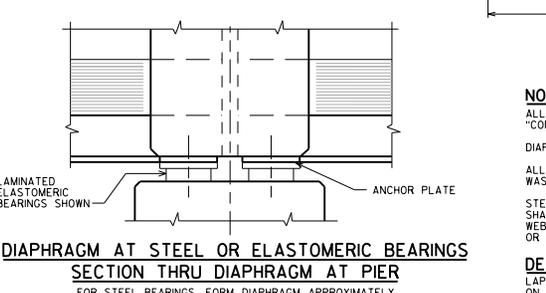
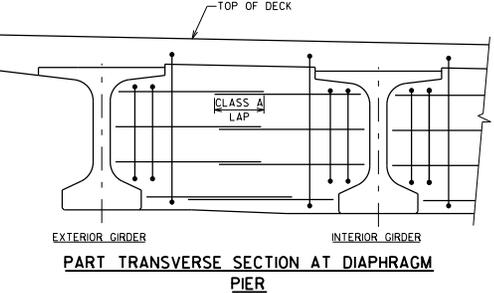
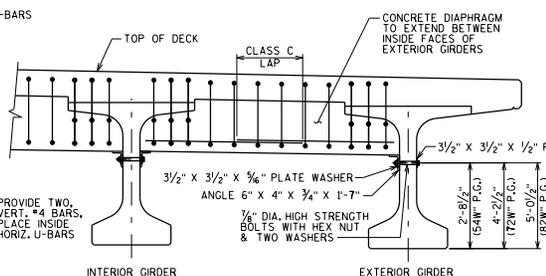
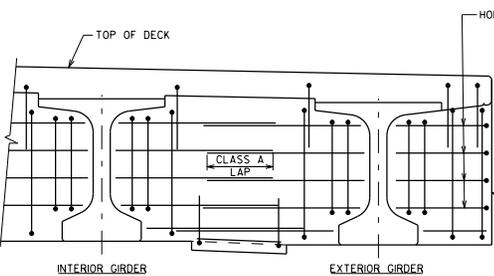


DIAPHRAGM AT 1/2" ELASTOMERIC BEARING



LEGEND

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

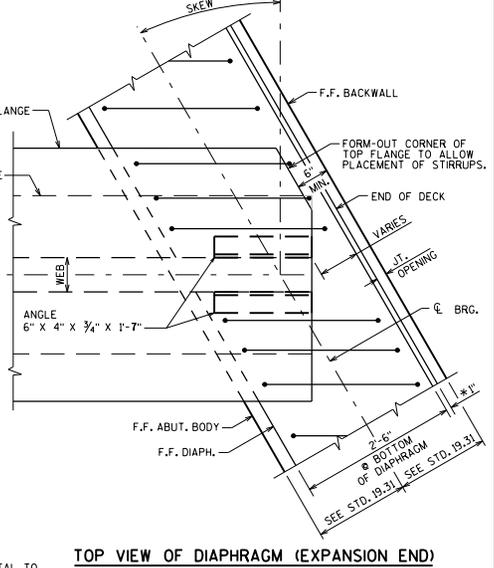


NOTES

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

DESIGNER NOTES

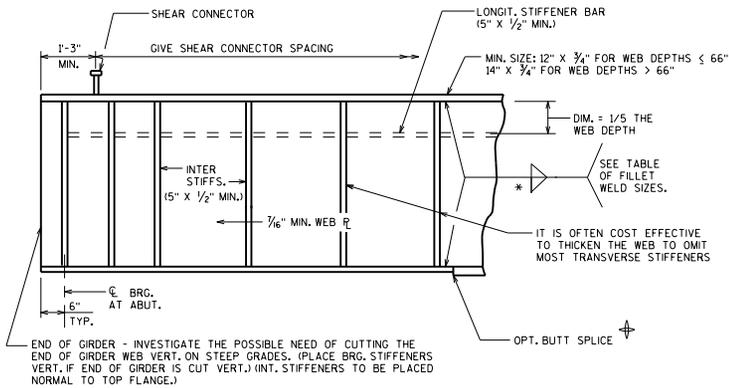
LAP LENGTHS FOR DIAPHRAGM REINFORCEMENT SHALL BE BASED ON A CLASS "C" TENSION LAP SPLICE, UNLESS OTHERWISE NOTED.



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

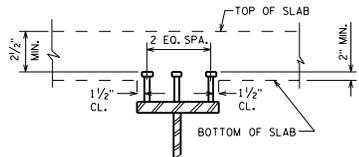


APPROVED: Bill Oliva DATE: 1-19



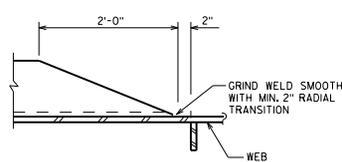
PART GIRDER ELEVATION

NOTE: USE THREE FIELD WELDED 7/8" DIA. X 5" LONG @ STUDS EQUALLY SPACED WITH A MIN. OF 1 1/2" CL. FROM THE FLANGE EDGE. STUDS SHALL NOT BE PLACED OVER FIELD SPLICE PLATES.

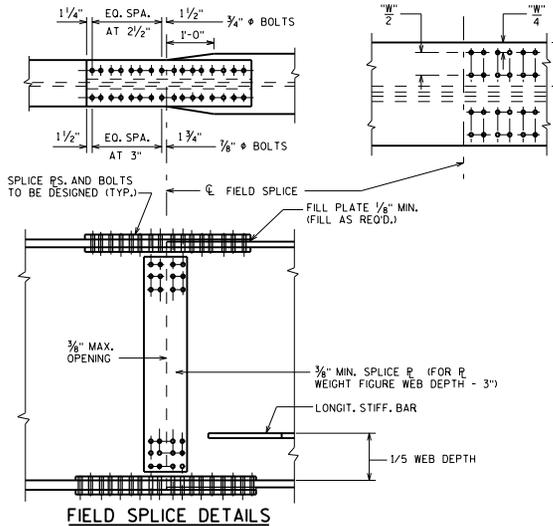


⊕ USE DIFFERENT LENGTH STUDS IF 2 1/2" MIN. CLEARANCE OR 2" EXTENSION CRITERIA IS VIOLATED.

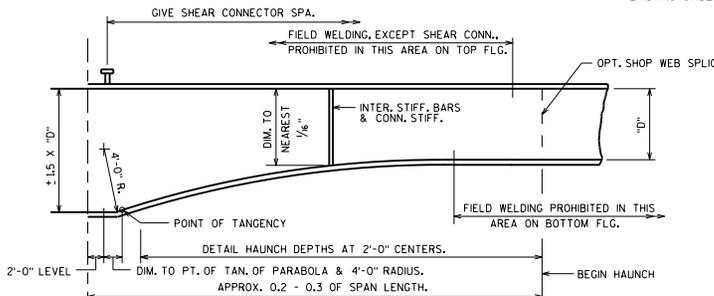
SHEAR CONN. DETAILS



LONGIT. STIFF. TERMINATION



FIELD SPLICE DETAILS



PARABOLIC HAUNCH DETAILS

NOTES

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

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

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

DESIGNER NOTES

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

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

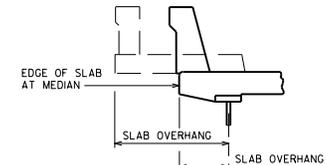
AT INTERIOR GIRDERS PLACE INTERMEDIATE TRANSVERSE STIFFENERS ON ONE SIDE OF GIRDER AND LONGITUDINAL STIFFENERS ON THE OPPOSITE SIDE OF GIRDER. KEEP INTERMEDIATE STIFFENERS ON ONE SIDE WHEN LONGITUDINAL STIFFENERS ARE NOT REQUIRED.

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

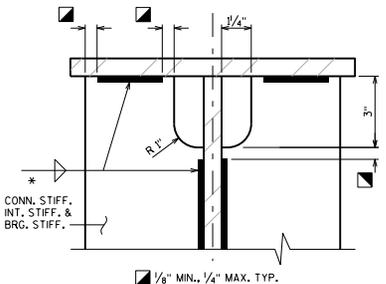
AT EXTERIOR GIRDER PLACE INTERMEDIATE STIFFENERS ALONG ENTIRE LENGTH OF GIRDER AT A MAX. SPACING EQUAL TO 1.5 X THE DEPTH OF WEB. SPACE EQUALLY BETWEEN DIAPHRAGM CONNECTION STIFFENER. THIS REQUIREMENT IS NECESSARY TO SUPPORT THE FALSEWORK FOR THE SLAB OVERHANG AND MAY BE DISREGARDED IF THE SLAB OVERHANG, MEASURED FROM Ⓞ WEB, IS 1'-6" OR LESS OR ANY OF THE FOLLOWING CRITERIA ARE SATISFIED:

- ...WEB THICKNESS > 3/8" AND WEB DEPTH < 48"
- ...WEB THICKNESS > 1/16" AND WEB DEPTH < 60"
- ...WEB THICKNESS > 1/2" AND WEB DEPTH < 66"

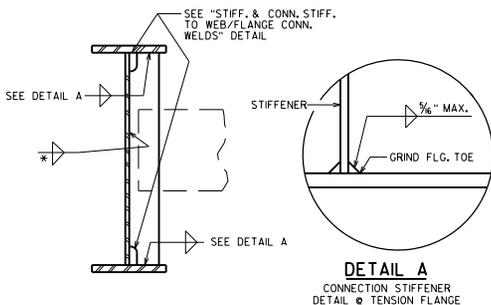
SEE STANDARD 40.07 FOR CONNECTING ANY NEW STIFFENERS TO EXISTING GIRDERS.



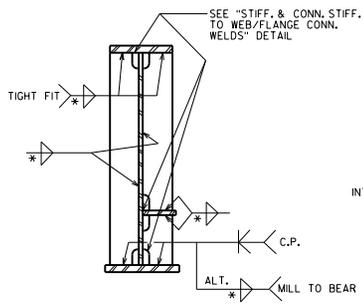
SLAB OVERHANG DEFINITION



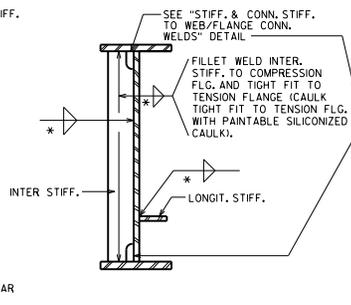
STIFF. & CONN. STIFF. TO WEB/FLANGE CONN. WELDS



CONNECTION STIFF. DETAILS



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



INTERMEDIATE & LONGITUDINAL STIFF. DETAILS (ALL GIRDERS)

*** TABLE OF FILLET WELD SIZES**

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

⊕ EXCEPT THAT THE WELD SIZE SHALL NOT EXCEED THE THICKNESS OF THE THINNER PART JOINED.
Δ MIN. PASS SIZE IS 3/8"

PLATE GIRDER DETAILS



APPROVED: Bill Oliva DATE: 1-19

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

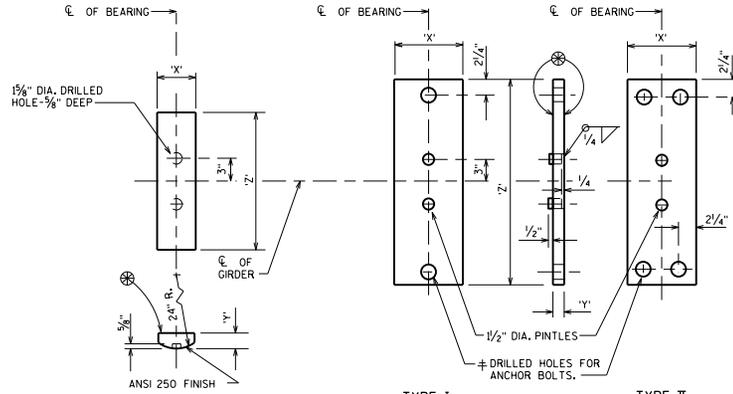
ANCHOR BOLT NOTES

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

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

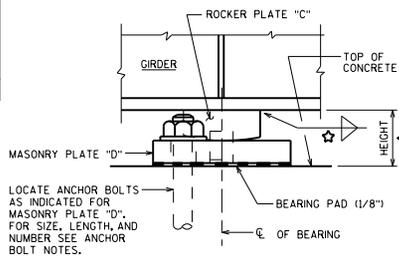
FOR SPAN LENGTHS GREATER THAN 150'-0":
USE A TYPE II MASONRY PLATE "D" WITH
(4) - 1/2" DIA. x 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.



ROCKER PLATE "C"

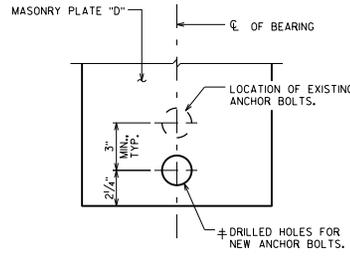
MASONRY PLATE "D"



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

FIXED BEARING ASSEMBLY

(SEE "DESIGNER NOTES" FOR BEARING REPLACEMENTS)



MASONRY PLATE "D"

BEARING REPLACEMENTS

BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT C.E. OF GIRDER AND C.E. OF BEARING.
IN LIEU OF USING SHIM PLATES, FABRICATOR MAY INCREASE THICKNESS OF MASONRY PLATE "D" BY THE SHIM PLATE THICKNESS.

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

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

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

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

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

STEEL PINTLES SHALL CONFORM TO ASTM A449 OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

ALL MATERIAL IN TYPE "A" BEARINGS, INCLUDING SHIM PLATES AND BEARING PADS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLY FIXED B-...", EACH.

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

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

CHAMFER ANCHOR BOLTS PRIOR TO THREADING.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 36, OR MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

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

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

MASONRY PLATE "D" SHALL BE GALVANIZED.

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

DRILLED HOLES FOR ANCHOR BOLTS IN MASONRY PLATE "D" SHALL HAVE A DIAMETER 3/8" LARGER THAN ANCHOR BOLT.

FINISH THESE SURFACES TO ANS1250 IF "Y" DIMENSION IS GREATER THAN 2".

DESIGNER NOTES

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

DETAIL SHIM PLATES AS DESCRIBED IN NOTES ON STANDARD 24.02.

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

FOR WELD SIZE, REFER TO STANDARD 24.02

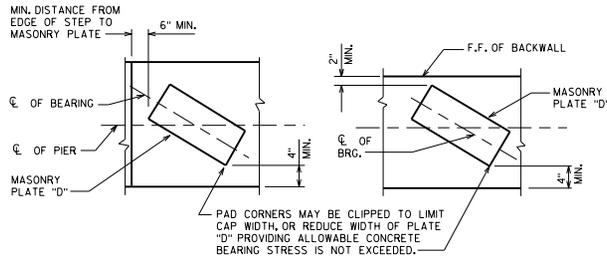
ADJUST HEIGHT IF BEVELED ROCKER PLATE "C" IS USED.

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

CALCULATE THE REACTION AT THE BEARINGS DUE TO "TOTAL LOADS". USE THE AASHTO LRFD SERVICE I LOAD COMBINATION. CONSIDER ONLY DEAD LOAD (DC + DW) AND HL-93 LIVE LOADS (LL), INCLUDING A 33% DYNAMIC LOAD ALLOWANCE (IM).

THE VALUES IN THE TABLES ARE THE BEARING CAPACITIES FOR "TOTAL LOAD" (DC + DW + (LL + IM)).

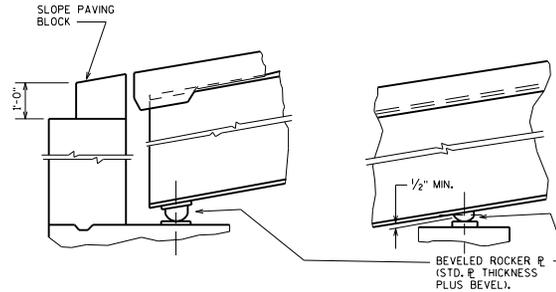
SELECT A BEARING THAT HAS A CAPACITY GREATER THAN OR EQUAL TO THE CALCULATED REACTION FOR "TOTAL LOADS".



AT SKEWED PIER

AT SKEWED ABUTMENTS

CLEARANCE DIAGRAM



AT EXPANSION BRG.

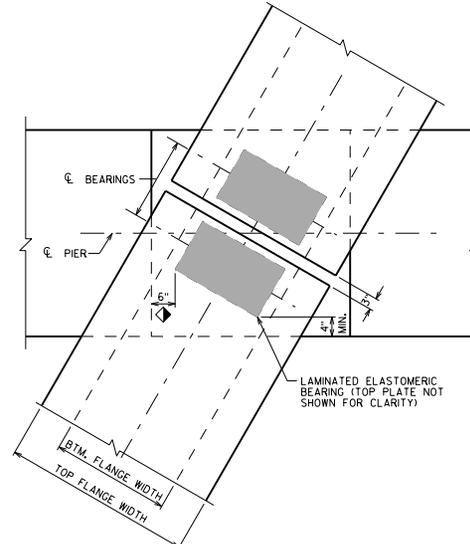
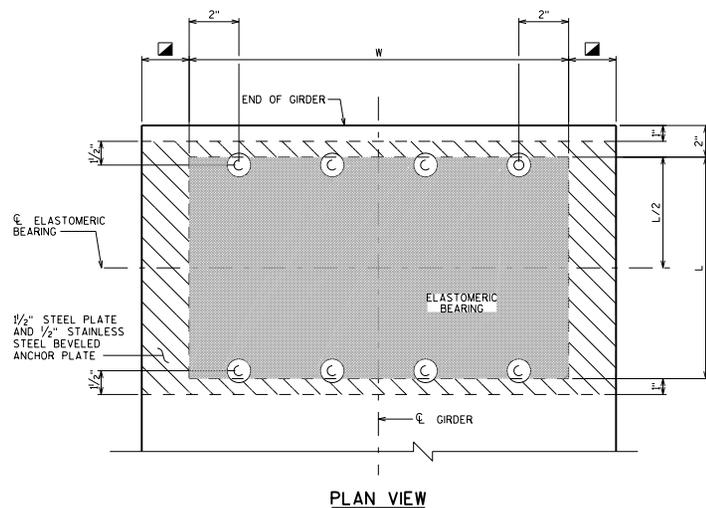
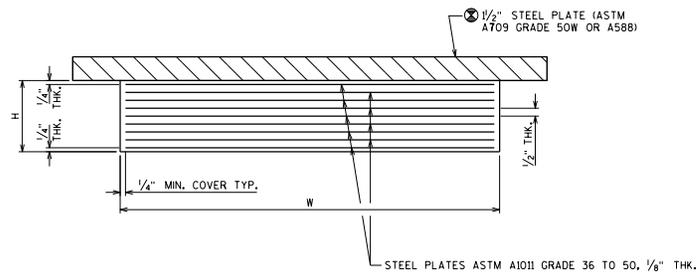
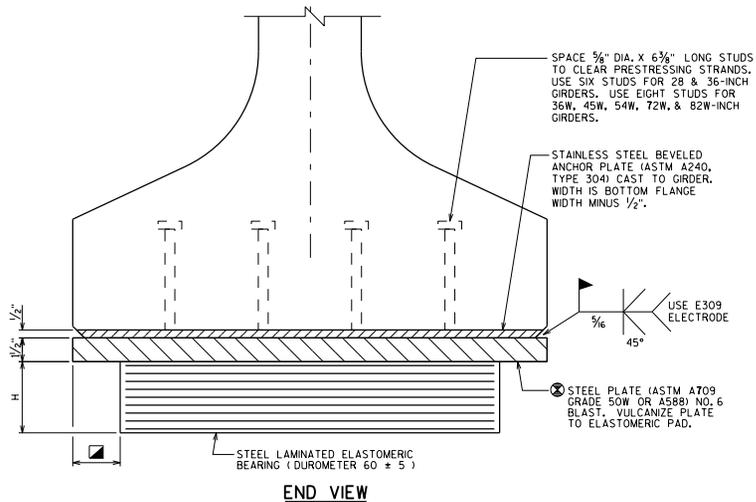
AT FIXED BRG.

BEVELED ROCKERS WITH GRADES GREATER THAN 3%

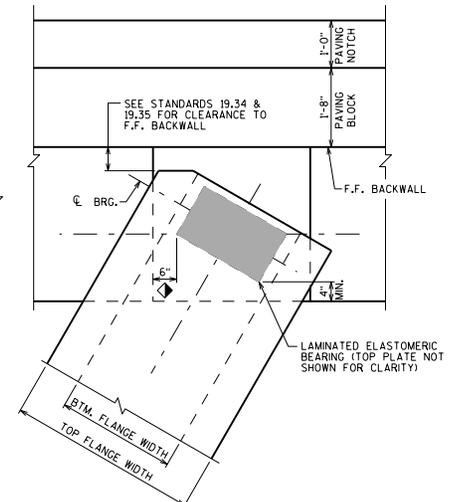
**FIXED BEARING DETAILS
TYPE 'A' - STEEL GIRDERS**



APPROVED: Bill Oliva DATE: 1-19



DETAIL SHOWN IS FOR A CONTINUOUS DECK AT AN EXPANSION PIER. IF PIER CAP WIDTH BECOMES EXCESSIVE, CONSIDER USING STEEL BEARINGS.



CLEARANCE DIAGRAM

DESIGNER NOTES

SEE CHAPTER 40 STANDARDS FOR USE OF ELASTOMERIC BEARINGS ON NEW AND REHABILITATED STEEL GIRDER BRIDGES.

FOR ALL NEW BRIDGES, THE STEEL TOP PLATE SHALL HAVE A MINIMUM THICKNESS OF $\frac{1}{2}$ ".

FOR BEARINGS USED IN BEARING REPLACEMENT PROJECTS, THE STEEL TOP PLATE THICKNESS MAY BE REDUCED (TO A MINIMUM OF $\frac{3}{4}$ ") TO MATCH THE OVERALL EXISTING BEARING HEIGHT. WHEN THE THICKNESS IS REDUCED, THE FOLLOWING NOTE SHALL BE LOCATED ON THE PLANS:

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

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

- 3" FOR 36W, 45W, 54W, 72W & 82W
- 1" FOR 28" & 36"

- ◆ MIN. DISTANCE FROM EDGE OF PIER/ABUTMENT. STEP TO LAMINATED ELASTOMERIC BEARING.

- ⊗ TAPER THE TOP PLATE IF THE GIRDER ANGLE RELATIVE TO HORIZONTAL IS GREATER THAN 0.01 RADIAN OR IF THIS ANGLE MULTIPLIED BY THE TOP PLATE LENGTH IS $\frac{1}{8}$ " OR MORE. TO DETERMINE THIS ANGLE, ADD THESE TWO VALUES:
 - LONGITUDINAL GRADE OF GIRDER
 - CAMBER EFFECT = $4RC/L$, WHERE:
 - RC = RESIDUAL CAMBER (INCHES)
 - L = GIRDER LENGTH (INCHES)

NOTES

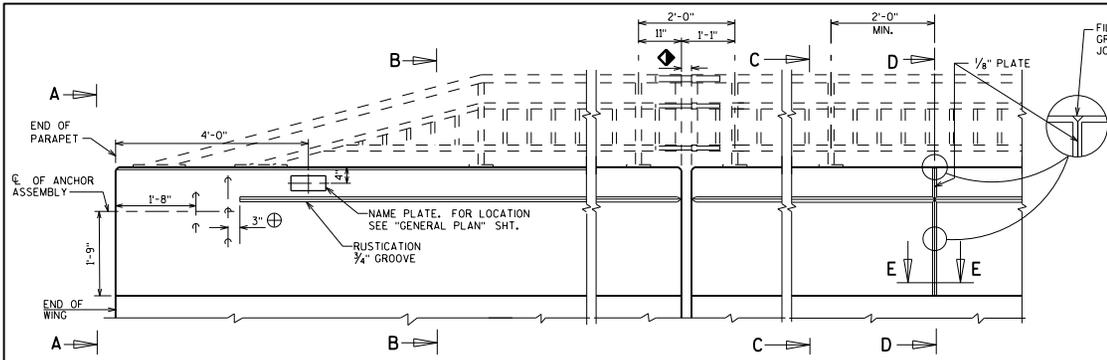
BEARINGS SHALL NOT BE PLACED AT A TEMPERATURE GREATER THAN 85° F.

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

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

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.

ELASTOMERIC BEARINGS FOR PRESTRESSED CONCRETE GIRDERS	
 BUREAU OF STRUCTURES	
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-19</u>



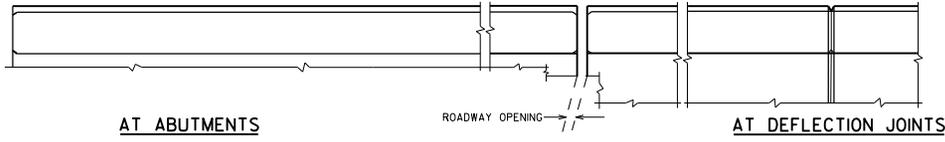
AT ABUTMENTS

AT DEFLECTION JOINTS

ELEVATION OF PARAPET

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

◆ ROADWAY OPENING OR 2/4" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR AT ABUTMENTS

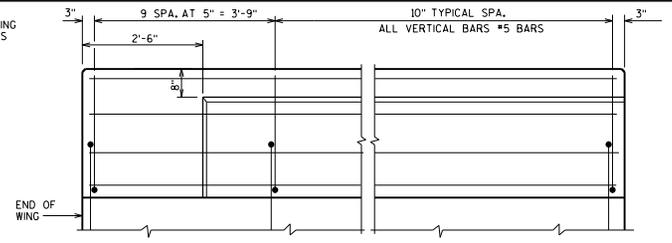


AT ABUTMENTS

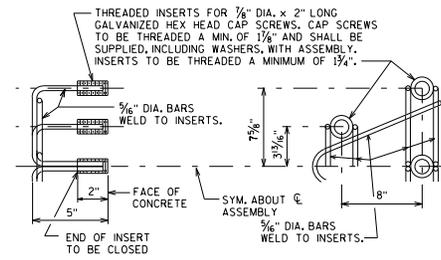
AT DEFLECTION JOINTS

PLAN OF PARAPET
(RAILING NOT SHOWN FOR CLARITY)

FILL WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.



VIEW SHOWING OUTSIDE FACE OF PARAPET & REINF.



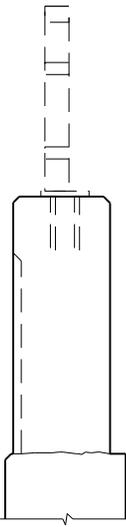
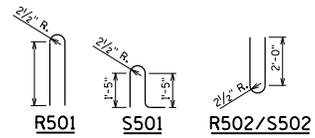
DETAIL OF ANCHOR ASSEMBLY

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

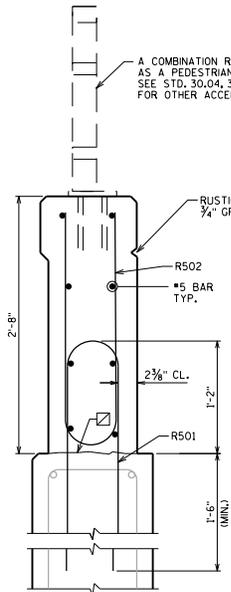
ASSEMBLY BID ITEM SHALL BE "ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD", EACH.

BILL OF BARS

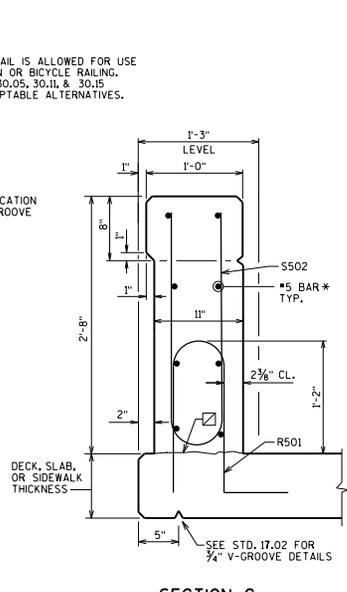
BAR MARK	CON.	NO. REQ'D.	LENGTH	BAR	BAR SERIES	LOCATION
R501	X			X		PARAPET VERT.
R502	X		4'-9"	X		PARAPET VERT.
S501	X		4'-4"	X		PARAPET VERT.
S502	X		4'-9"	X		PARAPET VERT.



VIEW A



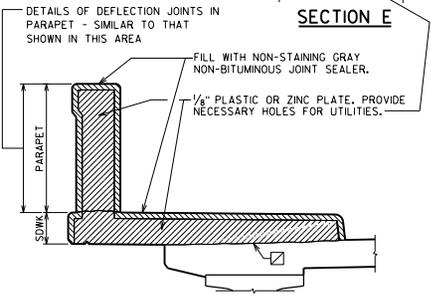
SECTION B



SECTION C

(PARAPET ON DECK, SLAB, OR SIDEWALK)
(RAILING NOT SHOWN FOR CLARITY)

A COMBINATION RAIL IS ALLOWED FOR USE AS A PEDESTRIAN OR BICYCLE RAILING. SEE STD. 30.04, 30.05, 30.11 & 30.15 FOR OTHER ACCEPTABLE ALTERNATIVES.



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

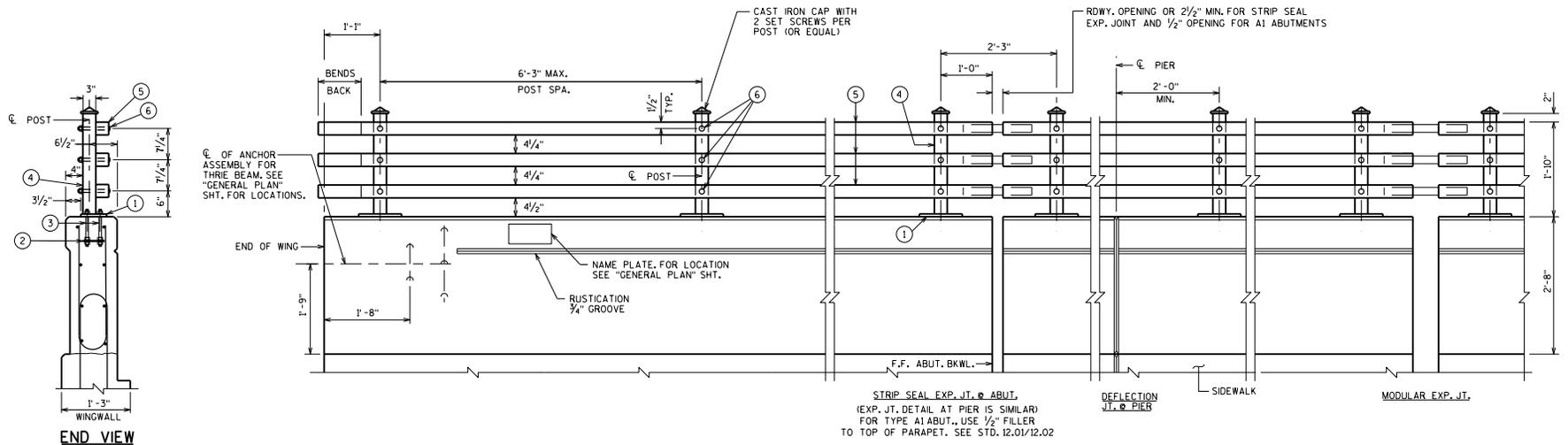
A #501 BAR MAY BE USED IN LIEU OF A S501 BAR ADJACENT TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.

AREA	PARAPET
2.50 SF	
375 LB/FT	

VERTICAL FACE PARAPET 'A'



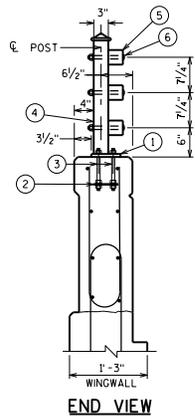
APPROVED: Bill Oliva DATE: 1-19



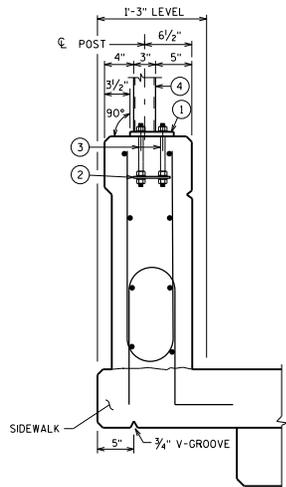
STRIP SEAL EXP. JT. @ ABUT.
 (EXP. JT. DETAIL AT PIER IS SIMILAR)
 FOR TYPE A1 ABUT., USE 1/2" FILLER
 TO TOP OF PARAPET. SEE STD. 12.01/12.02

INSIDE ELEVATION

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

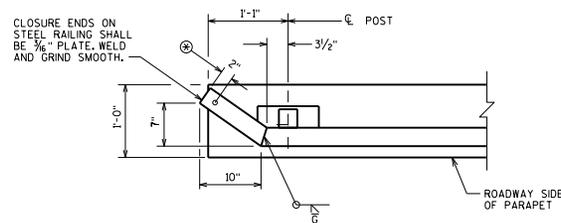


END VIEW



SECTION THRU PARAPET ON BRIDGE

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



END POST DETAIL

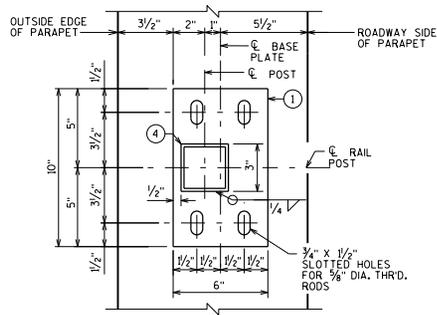
⊕ 3/4" DIA. DRAIN HOLE IN
 BOTTOM OF ALL TUBES.

DESIGNER NOTES

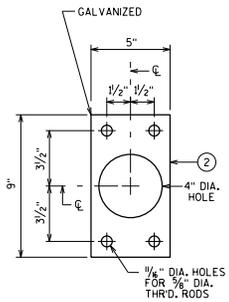
- SEE STANDARD 30.09 FOR ADDITIONAL RAILING DETAILS
- SEE STANDARD 30.07 FOR:
 - DEFLECTION JOINT DETAILS AND NOTES
 - BEAM GUARD ANCHOR ASSEMBLY DETAILS
 - SIDEWALK REINFORCEMENT AND DETAILS
 - PARAPET REINFORCING BAR SIZE AND SPACING

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

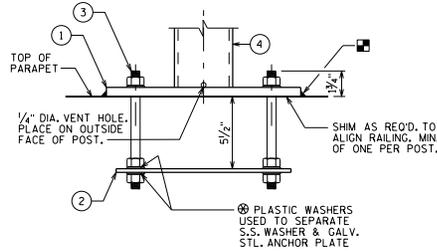
COMBINATION RAILING TYPE '3T'	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19



TYPICAL RAIL POST BASE PLATE

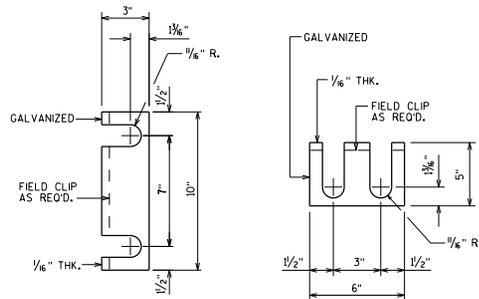


ANCHOR PLATE



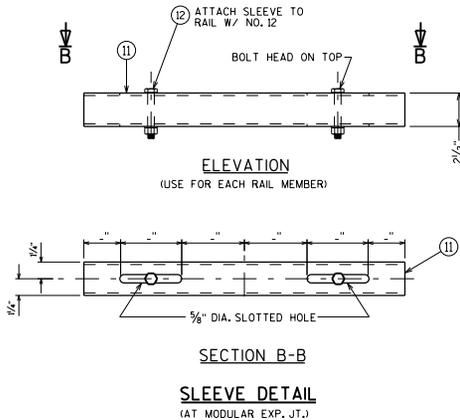
ANCHORAGE FOR RAIL POSTS

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

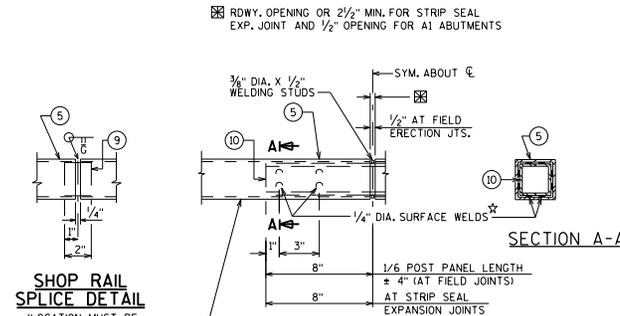


RAIL POST SHIM DETAIL

(2 SETS PER POST)



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



SHOP RAIL SPLICE DETAIL

(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)

FIELD ERECTION JOINT DETAIL

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

LEGEND

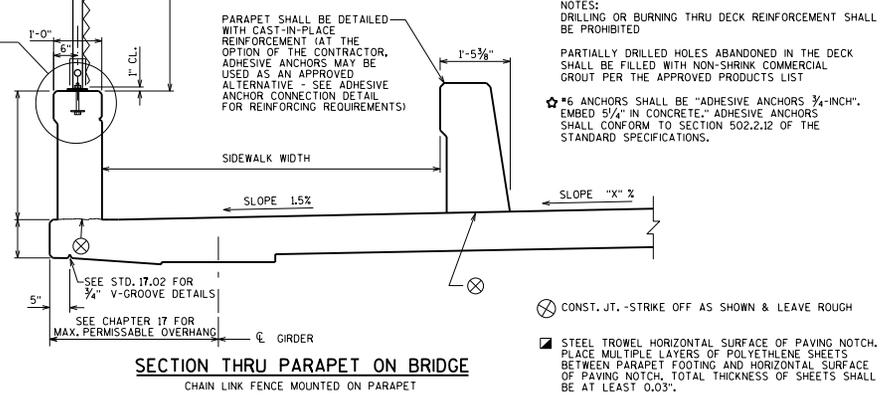
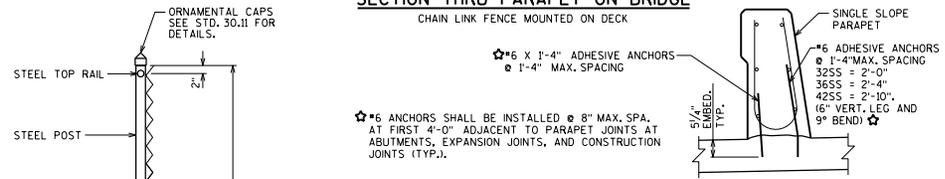
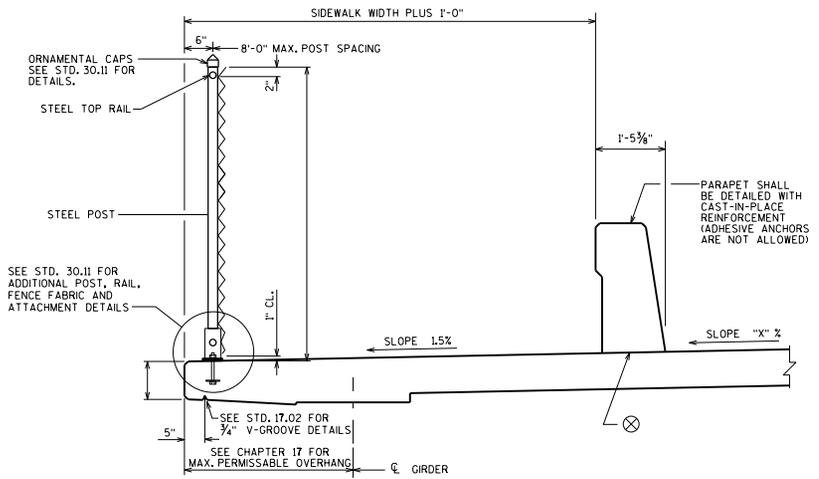
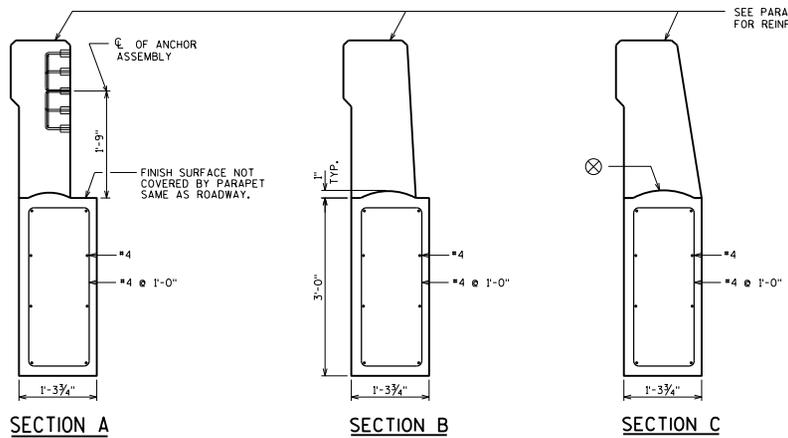
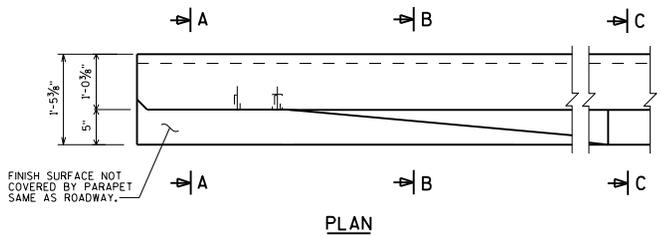
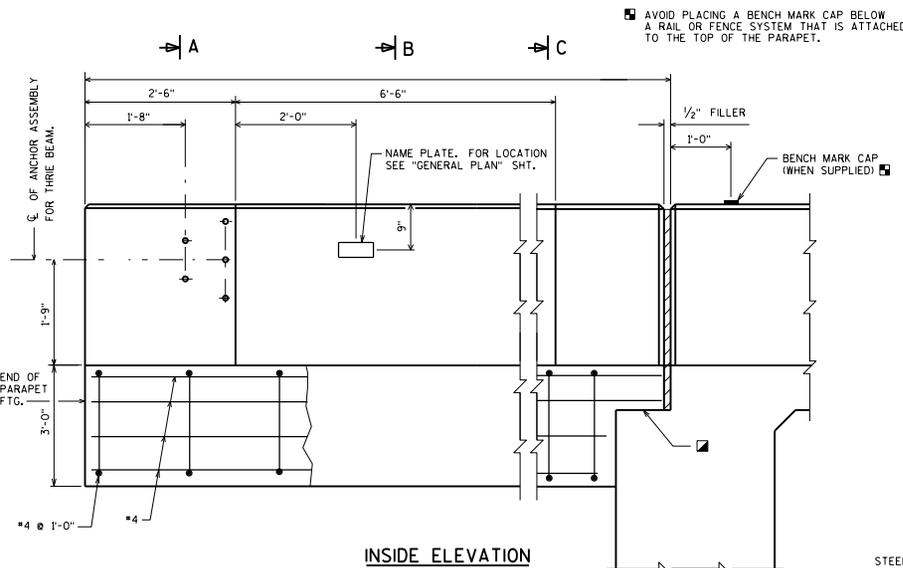
- ① BASE PLATE 3/8" X 6" X 10" WITH 3/4" X 1/2" SLOTTED HOLES FOR THRD RODS NO. 3. WELD TO NO. 4 AS SHOWN. SLOTS PARALLEL TO LONG SIDE OF PLATE.
- ② 1/2" X 5" X 9" ANCHOR PLATE (GALVANIZED) WITH 1/8" DIA. HOLES FOR THRD. RODS NO. 3.
- ③ 3/4" DIA. X 9" LONG, TYPE 316 STAINLESS STEEL THREADED RODS (MIN. TENSILE STRENGTH = 70 KSI) WITH NUT AND WASHERS OF SAME ALLOY GROUP. ☆
- ④ STRUCTURAL TUBING 3" X 3" X 3/8" POSTS, PLACE VERTICAL. WELD TO NO. 1 AND USE 1" DIA. HOLES (FRONT AND BACK) FOR BOLT NO. 6.
- ⑤ STRUCTURAL TUBING 3" X 3" X 3/8" RAILS, WITH 1/8" DIA. HOLES (FRONT AND BACK) FOR BOLT NO. 6. BOLT TO NO. 4.
- ⑥ 3/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" X 1/2" X 1/2" WASHER, AND LOCK WASHER.
- ⑦ RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. PROVIDE "SLIDING FIT".
- ⑧ RECTANGULAR SLEEVE FABRICATED FROM 3/8" PLATES. 11-4" Ø FIELD ERECTION JTS. 11-4" Ø STRIP SEAL EXP. JTS.
- ⑨ SLEEVE FABRICATED FROM STRUCTURAL TUBING 2 1/2" X 2 1/2" X 3/8" X 1" LONG. SLOTTED HOLES IN TOP AND BOTTOM.
- ⑩ 1/2" DIA. STAINLESS STEEL BOLT WITH NUT AND LOCKWASHER.

☆ ALTERNATIVE ANCHORAGE: 4 EQUIVALENT STAINLESS STEEL CONCRETE ADHESIVE ANCHORS 3/8" INCH, EMBED 7" IN CONCRETE, ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

NOTES

- BID ITEM SHALL BE "RAILING STEEL TYPE 3T B-...", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- ENDS OF STRUCTURAL TUBING SHALL BE SAWED, GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.
- ALL PLATES AND RECTANGULAR SLEEVES SHALL CONFORM TO ASTM A709 GRADE 36. ALL STRUCTURAL TUBING SHALL CONFORM TO ASTM A500 GRADE B.
- ANCHORAGES SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF RAILING. SET NORMAL TO GRADE.
- CUT BOTTOM OF POST TO MAKE POST VERTICAL IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTION.
- STEEL SHIMS SHALL BE PROVIDED & USED UNDER BASE PLATE NO. 1, WHERE REQUIRED FOR ALIGNMENT, AND SHALL BE GALVANIZED.
- CAULK AROUND PERIMETER OF BASE PLATES, NO. 1, AND FILL BOLT SLOT OPENINGS IN SHIMS AND BASE PLATES WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER. ALL JOINTS IN CONCRETE PARAPET ARE TO BE VERTICAL.
- ALL MATERIAL (EXCEPT NO. 3 & 12) SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, THE STEEL RAILING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.
- VENT HOLES SHALL BE DRILLED IN POST AND RAIL MEMBERS AS REQUIRED TO FACILITATE GALVANIZING AND DRAINAGE.
- RAILING SHALL BE FABRICATED IN LENGTHS THAT INCLUDE 3 OR 4 POSTS.
- WHEN PAINTING REQ'D: (ADD)
- PAINT OVER GALVANIZING (EXCEPT NO. 2) WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. [] (FILL IN COLOR NAME).
- INSIDE OF TUBES TO BE PAINTED AT ALL FIELD ERECTION AND EXPANSION JOINTS.
- TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.

COMBINATION RAILING TYPE '3T' DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: <u>1-19</u>



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.

ADHESIVE ANCHOR CONNECTION

INTERIOR PARAPET USED IN CONJUNCTION WITH CRASHWORTHY ADJACENT EXTERIOR PARAPET

NOTES:
DRILLING OR BURNING THRU DECK REINFORCEMENT SHALL BE PROHIBITED

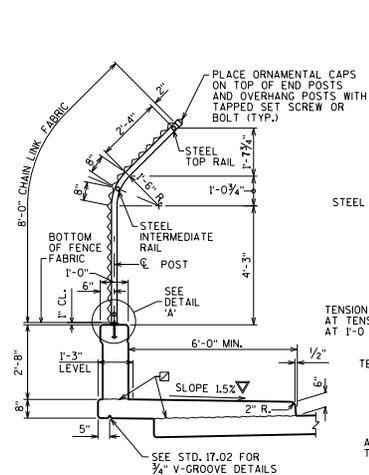
PARTIALLY DRILLED HOLES ABANDONED IN THE DECK SHALL BE FILLED WITH NON-SHRINK COMMERCIAL GROUT PER THE APPROVED PRODUCTS LIST

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

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

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

PARAPET FOOTING	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19



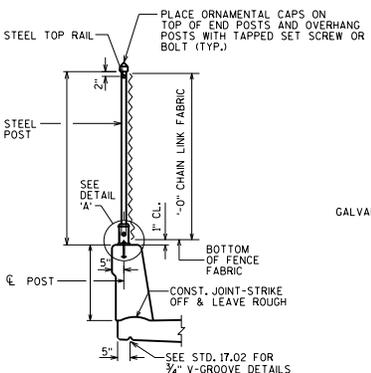
SECTION THRU FENCE ON PARAPET 'A'

PROTECTIVE SCREENING MAY BE BENT OR STRAIGHT FOR RAISED SIDEWALKS OR SIDEWALKS SEPARATED FROM TRAFFIC BY A BARRIER. SEE BRIDGE MANUAL 30.3 (D) FOR ADDITIONAL GUIDANCE. SEE STD. 30.07 FOR PARAPET REINFORCEMENT AND DETAILS. SEE STD. 17.01 FOR SIDEWALK REINFORCEMENT AND DETAILS.

CONST. JOINT - STRIKE OFF & LEAVE ROUGH

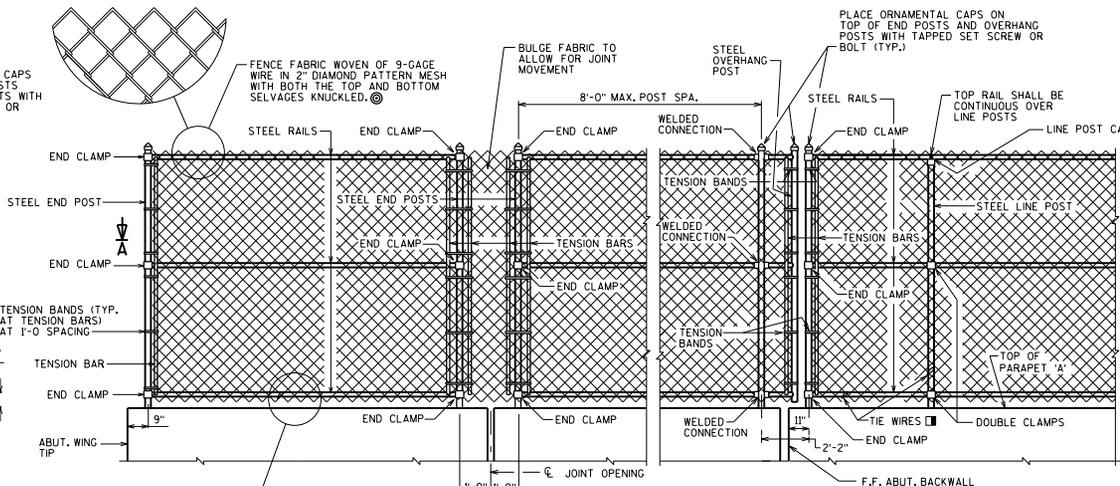
+0.5% CONSTRUCTION TOLERANCE IN SIDEWALK CROSS SLOPE. THE SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

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



SECTION THRU FENCE ON SINGLE SLOPE PARAPET

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



FENCE PART ELEVATION

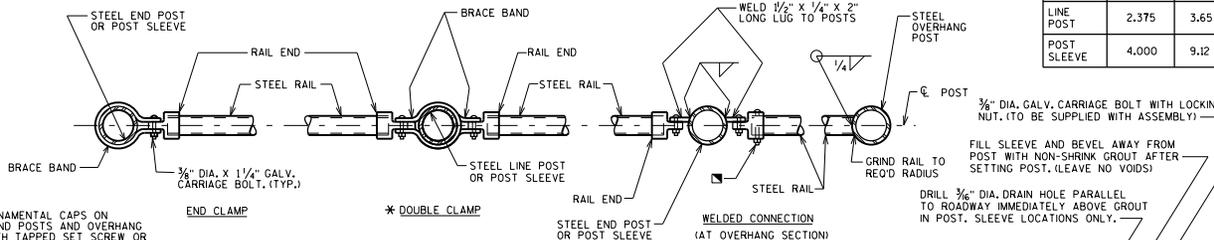
(OUTSIDE VIEW OF PARAPET 'A')

DETAIL "B": EXPANSION JOINT OPENING ≤ 2" OF MOVEMENT. (FOR FIXED JOINTS MAINTAIN TYP. VERT. POST SPA. ACROSS JOINT AND PLACE TENSION BAR ON END POST.) DETAIL "C" MAY BE SUBSTITUTED FOR DETAIL "B".

DETAIL "C": EXPANSION JOINT MAX. OPENING > 2". FOR MAX. JOINT OPENINGS > 6" DESIGN FENCE TO OVERLAP.

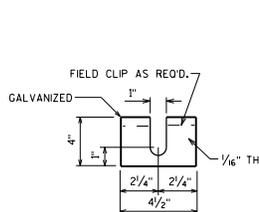
FENCE MEMBER SIZE & WEIGHT

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



SECTION A-A

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

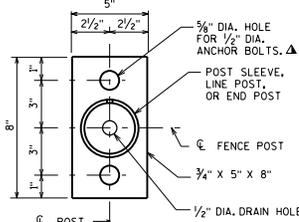


POST SHIM DETAILS

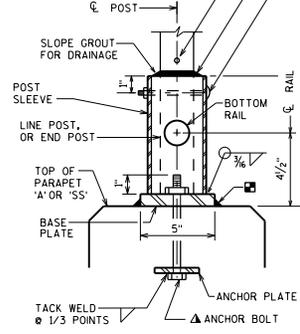
SHIMS REQUIRED ONLY WHEN END POSTS AND LINE POSTS ARE WELDED TO BASE PLATES. PROVIDE 4 SHIMS PER POST, USE WHERE REQUIRED FOR ALIGNMENT.

ANCHOR PLATE

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



BASE PLATE



DETAIL 'A'

ANCHOR PLATE SHALL BE GALVANIZED AFTER FABRICATION

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

NOTES

POSTS ARE TO BE SET VERTICAL.

METALLIC-COATED FENCE SYSTEM:

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

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

THE BID ITEM SHALL BE "FENCE CHAIN LINK - FT."

POLYMER-COATED FENCE SYSTEM:

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

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

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

THE BID ITEM SHALL BE "FENCE CHAIN LINK POLYMER - COATED - FT. B. - FT."

COMPLETE ANY REQUIRED WELDING OF COMPONENTS BEFORE GALVANIZING.

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

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

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

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

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

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

ALTERNATIVE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 3/8-INCH, EMBED 7" IN CONCRETE. ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

ATTACH FABRIC TO RAILS, AND TO POSTS WITHOUT TENSION BANDS, WITH 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.

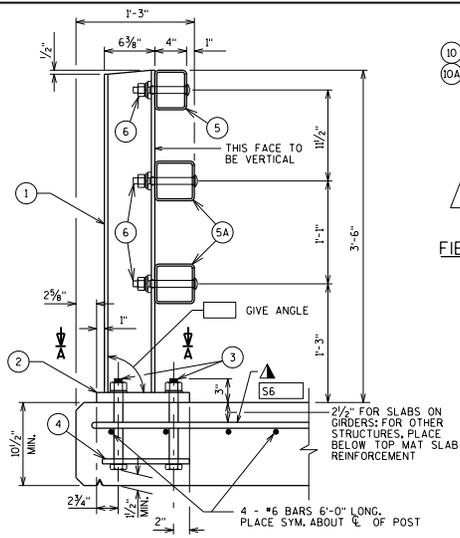
PEDESTRIAN RAILING MAY BE USED ON WINGWALL PARAPETS IF CHAIN LINK FENCE DOES NOT CONTINUE BEYOND BRIDGE.

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.

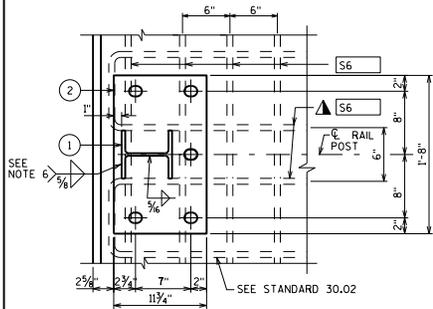
THE DESIGN ENGINEER SHALL DESIGN THE SUPERSTRUCTURE TO ACCOUNT FOR THE MAXIMUM 2% SIDEWALK CROSS SLOPE.

CHAIN LINK FENCE DETAILS

DATE: _____
APPROVED: *Bill Oliva* 1-19

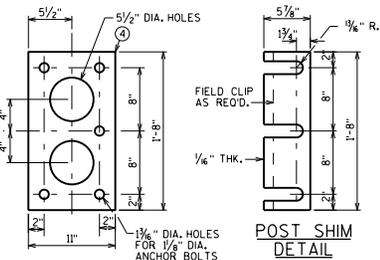


SECTION THRU RAILING ON DECK

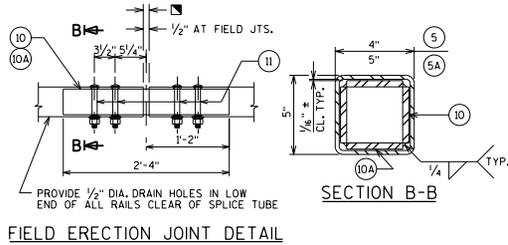


SECTION A-A

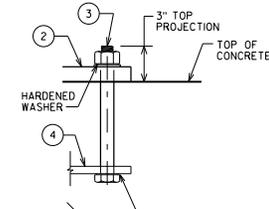
- ▲ TIE TO TOP MAT OF STEEL.
- ▣ RDWY. OPENING OR 2 1/2" MIN. FOR STRIP SEAL EXP. JOINT & 1/2" OPENING FOR A1 ABUTMENT.



ANCHOR PLATE AT RAIL TO DECK CONNECTION

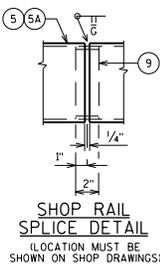


FIELD ERECTION JOINT DETAIL



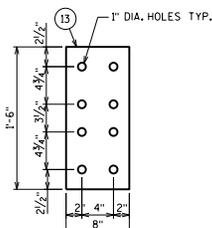
ANCHOR BOLTS

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

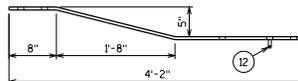


SHOP RAIL SPLICE DETAIL

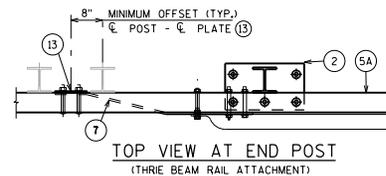
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



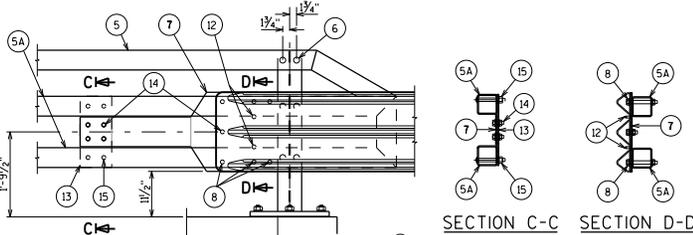
ANCHOR PLATE AT BEAM GUARD ATTACHMENT



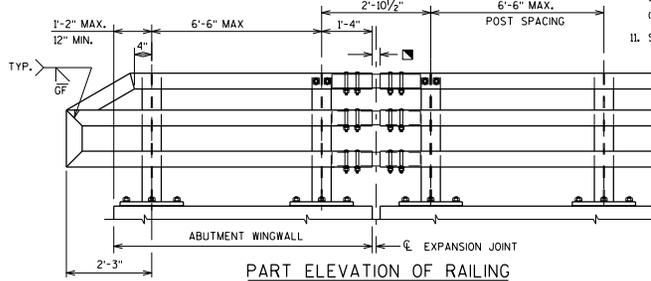
BACK-UP PLATE DETAIL AT BEAM GUARD ATTACHMENT



TOP VIEW AT END POST (THREE BEAM RAIL ATTACHMENT)



DETAIL AT END POST (THREE BEAM RAIL ATTACHMENT)



PART ELEVATION OF RAILING

LEGEND

- 1 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.
- 2 PLATE 1/4" x 11/2" x 1'-8" WITH 1 3/8" x 1 5/8" SLOTTED HOLES FOR ANCHOR BOLTS NO. 3. WELD TO NO. 1 AS SHOWN. SLOTS PARALLEL TO SHORT SIDE OF PLATE
- 3 ASTM A449 - 1 1/8" DIA. ANCHOR BOLTS WITH NUT AND HARDENED WASHER (ALL GALVANIZED, 5 REQ'D. PER POST, THREAD 3" AND PLACE NORMAL TO PLATE NO. 2. CHAMFER TOP OF BOLTS BEFORE THREADING. USE 1'-9" LONG IN ABUTMENT WINGS, AT POSTS ON CONCRETE SLAB SUPERSTRUCTURES WHERE THE SLAB THICKNESS IS > 16" USE 1'-3" LONG, USE 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 REQ'D. FOR CONSTRUCTIBILITY.)
- 4 3/4" x 11" x 1'-8" ANCHOR PLATE (GALVANIZED) WITH 1 3/8" DIA. HOLES FOR ANCHOR BOLTS NO. 3
- 5 TS 5 x 4 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
- 5A TS 5 x 5 x 0.25 STRUCTURAL TUBING. ATTACH TO NO. 1 WITH NO. 6.
- 6 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH NUT, 3/8" x 1 5/8" x 1 5/8" WASHER, AND LOCK WASHER (2 REQ'D. AT EACH RAIL TO POST LOCATION.)
- 7 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.
- 8 1" DIA. HOLES IN PLATE NO. 7 & TUBES NO. 5A FOR 3/4" DIA. A325 BOLTS WITH HEX NUTS AND WASHERS, 6 HOLES IN TUBES AND PLATE NO. 7.
- 9 SPLICE SLEEVE FABRICATED FROM 1/4" PLATE. PROVIDE "SLIDING FIT".
- 10 3/8" x 3 3/8" x 2'-4" PLATE, 2 PER RAIL. USED IN NO. 5 & 5A.
- 10A 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.
- 11 1 1/8" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER. USE 1 5/8" x 1/2" LONG; SLOTTED HOLES AT FIELD JOINTS AND 1 5/8" x 2 1/4" MIN. LONG; SLOTTED HOLES AT EXP. JOINTS IN PLATE NO. 10A.
- 12 7/8" DIA. x 1/2" LONG THREADED SHOP WELDED STUDS (2 REQ'D.)
- 13 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.
- 14 7/8" DIA. x 2" LONG A325 HEX BOLT WITH NUT AND WASHER (5 REQ'D.).
- 15 1" DIA. HOLES IN TUBES NO. 5A FOR 3/4" DIA. A325 ROUND HEAD BOLT WITH NUT, WASHER, AND LOCK WASHER (4 REQ'D.). 4 HOLES IN TUBES.

NOTES

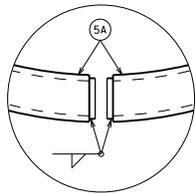
1. BID ITEM SHALL BE "RAILING TUBULAR TYPE M B--" WHICH INCLUDES ALL ITEMS SHOWN.
2. RAIL POST AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50, HOLLOW RAILING STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED FY = 50 KSI. ANCHOR PLATES,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

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

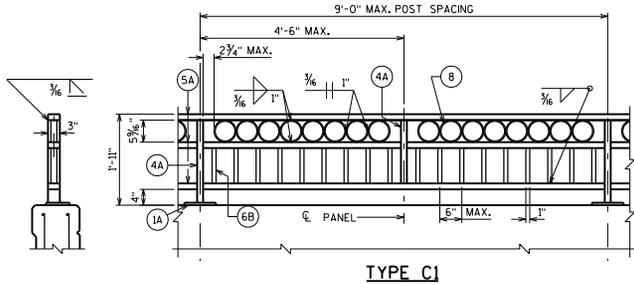
TUBULAR STEEL RAILING TYPE "M"

BUREAU OF STRUCTURES

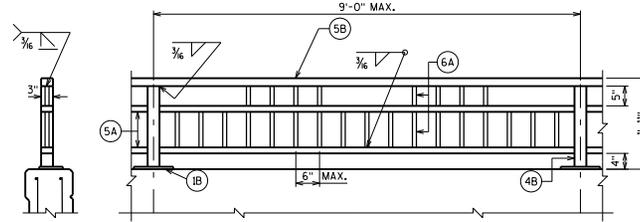
APPROVED: Bill Oliva DATE: 1-19



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

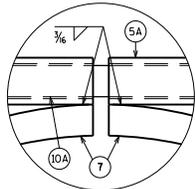


TYPE C1

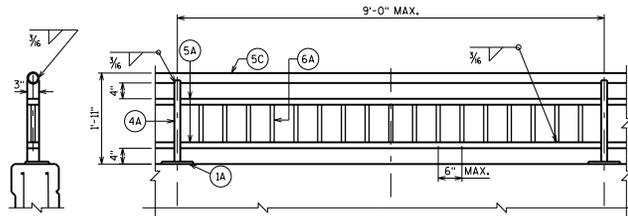


TYPE C4

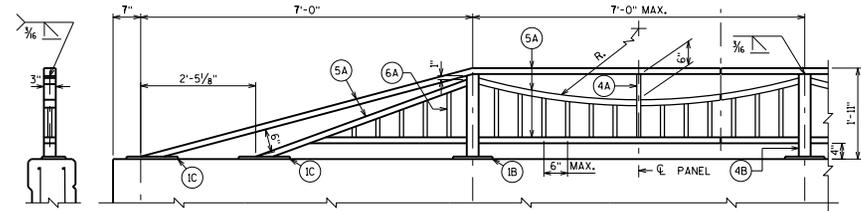
FIELD ERECTION JT. LOCATION. SEE "DETAIL A" FOR CURVED MEMBER END CLOSURE. SEE STD. 30.18 FOR STRAIGHT MEMBER FIELD SPLICE DETAIL.



DETAIL B

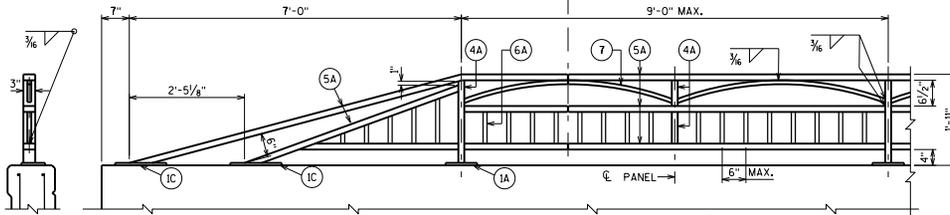


TYPE C2

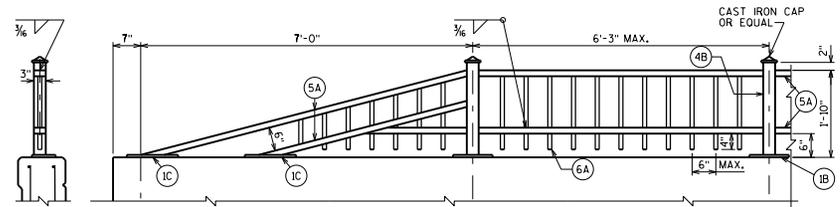


TYPE C5

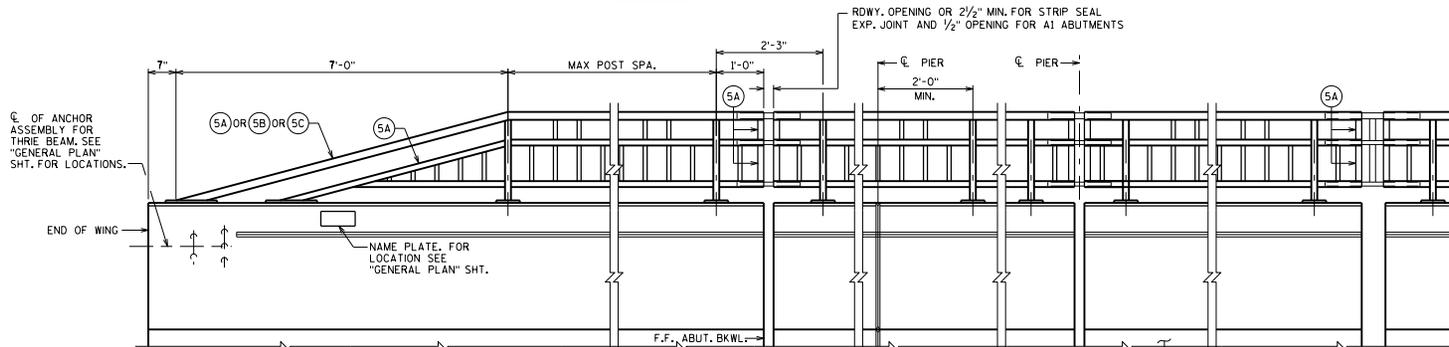
FIELD ERECTION JT. LOCATION. SEE "DETAIL B" FOR CURVED MEMBER END JT. DETAIL. SEE STD. 30.18 FOR STRAIGHT MEMBER FIELD SPLICE DETAIL.



TYPE C3



TYPE C6



Ø OF ANCHOR ASSEMBLY FOR THRIE BEAM. SEE "GENERAL PLAN" SHT. FOR LOCATIONS.

NAME PLATE. FOR LOCATION SEE "GENERAL PLAN" SHT.

USE THIS END TRANSITION FOR ALL RAILING TYPES UNLESS SHOWN OTHERWISE

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

DEFLECTION JT. @ PIER

STRIP SEAL EXP. JT. @ PIER

RAILING WEIGHT = 22 LB/FT

DESIGNER NOTES

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

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

- SEE STANDARD 30.18 FOR ADDITIONAL RAILING DETAILS.
- SEE STANDARD 30.07 FOR:
 - DEFLECTION JOINT DETAILS AND NOTES
 - BEAM GUARD ANCHOR ASSEMBLY DETAILS
 - PARAPET REINFORCING BAR SIZE AND SPACING

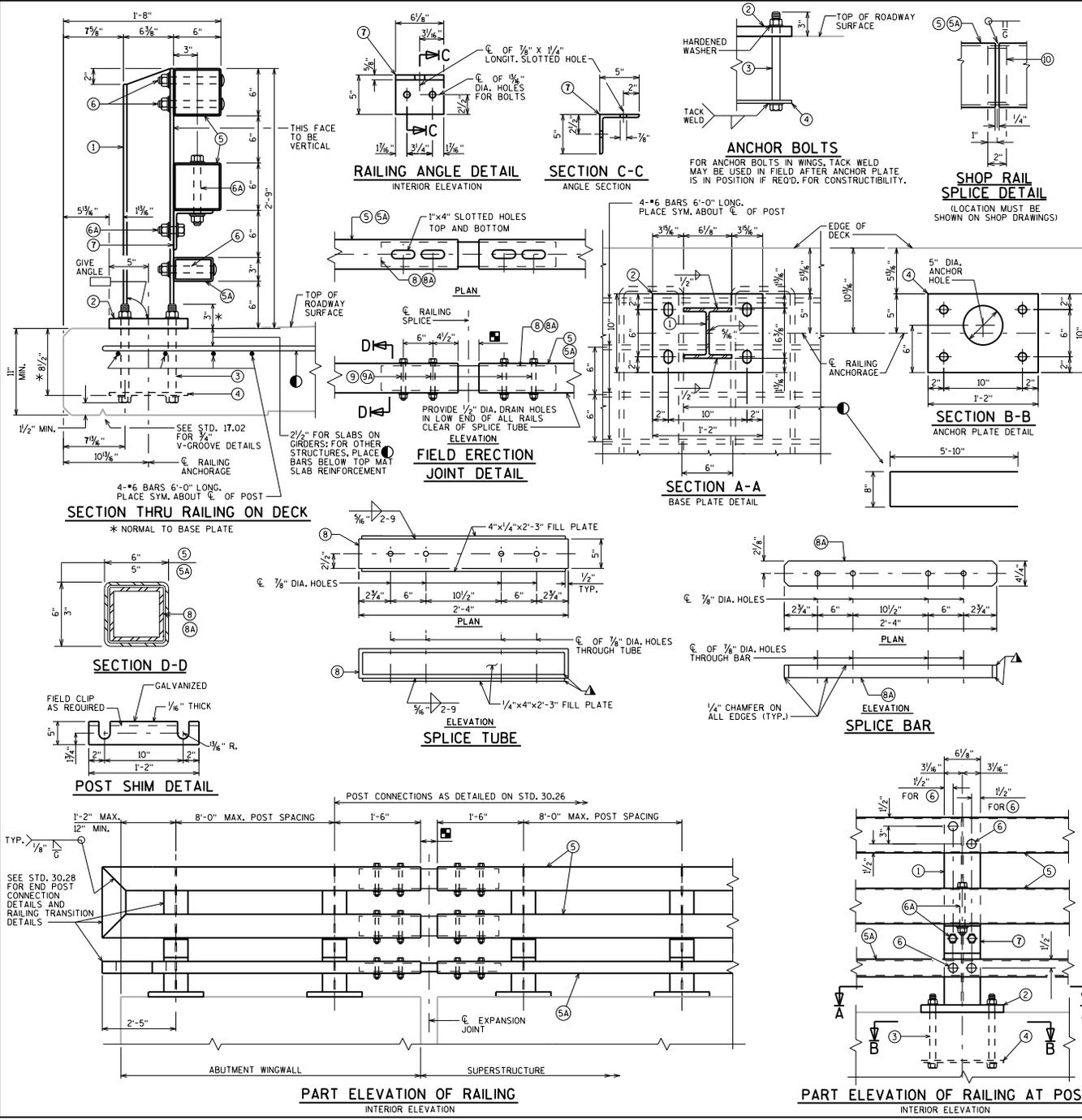
COMBINATION RAILING TYPES 'C1 - C6'



BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-19

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



- LEGEND**
- 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.
 - 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.
 - 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 CONSTRUCTIBILITY.)
 - 3/4" x 10" x 1'-2" ANCHOR PLATE (GALVANIZED) WITH 1/8" DIA. HOLES FOR ANCHOR BOLTS NO. 3.
 - TS 6 x 6 x 3/8" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 (FRONT & BACK) & 7/8" DIA. HOLES FOR BOLT NO. 6A (TOP & BOTTOM).
 - TS 5 x 3 x 1/4" STRUCTURAL TUBING. USE 1/2" x 13/8" HORIZONTAL SLOTTED HOLES FOR BOLT NO. 6 (FRONT & BACK) AND A 2" O.D. WASHER UNDER BOLT HEAD.
 - 7/8" DIA. A325 SLOTTED ROUND HEAD BOLT WITH HEX NUT, 3/8" x 13/4" x 13/4" WASHER, AND SPRING LOCK WASHER (2 REQUIRED AT RAIL TO POST LOCATIONS SHOWN).
 - 3/4" DIA. A325 BOLT WITH HEX NUT & SPRING LOCK WASHER (1 REQUIRED AT RAIL TO ANGLE & 2 REQUIRED AT ANGLE TO POST LOCATIONS SHOWN WITH 3/8" x 13/4" x 13/4" WASHER).
 - L 5 x 5 x 3/8" STRUCTURAL ANGLE. ATTACH TO NO. 1 AND NO. 5 AS SHOWN.
 - TS 5 x 5 x 3/8" x 2'-4" LONG SPLICE TUBE. 1 PER RAIL. USED IN NO. 5.
 - 4/4" x 2/4" x 2'-4" LONG SPLICE BAR. 1 PER RAIL. USED IN NO. 5A.
 - 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).
 - 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).
 - 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 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 FILL PLATES.
- #6 BARS X 12'-0" LONG. BEND AS SHOWN. TIE TO TOP MAT OF STEEL. (DESIGNER TO PLACE THESE BARS IN BILL OF BARS FOR SUPERSTRUCTURE.)

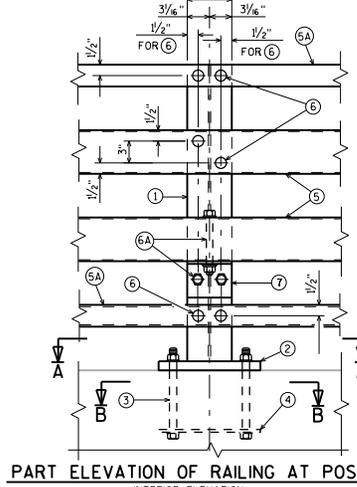
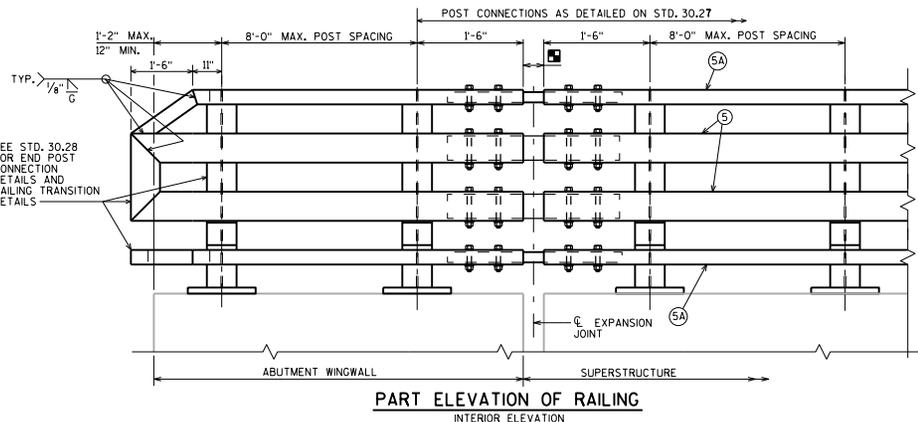
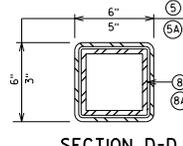
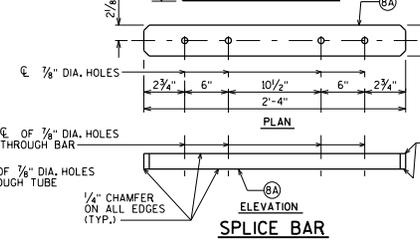
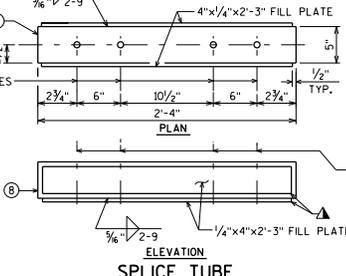
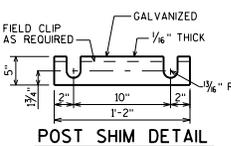
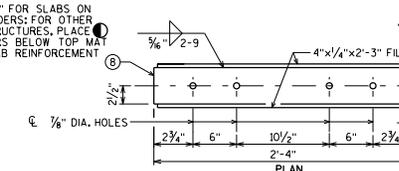
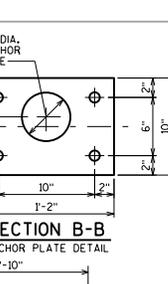
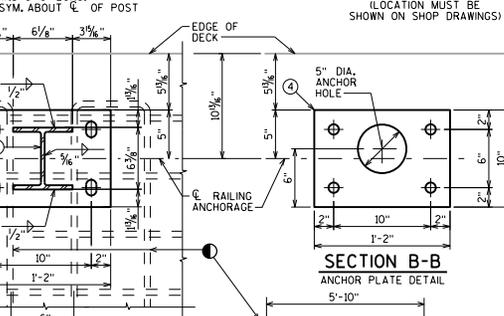
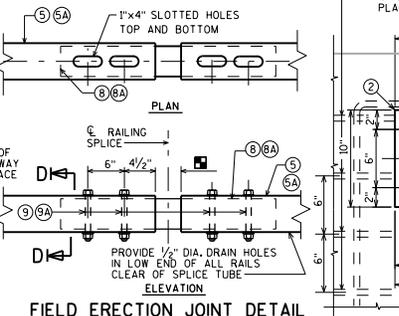
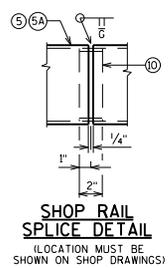
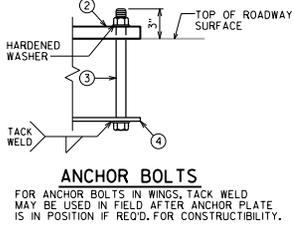
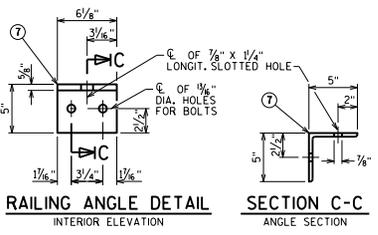
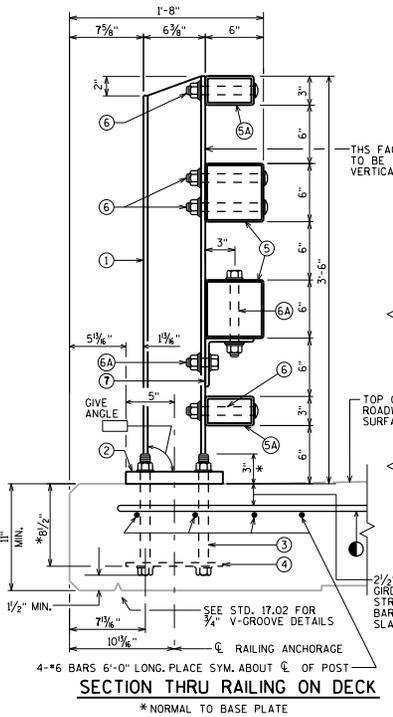
- NOTES**
- BID ITEM SHALL BE "RAILING STEEL TYPE NY3 B-...", WHICH INCLUDES ALL ITEMS SHOWN.
- RAILING SHALL BE CONTINUOUS OVER A MINIMUM OF THREE (3) POSTS WITHOUT SPLICES WHERE POSSIBLE.
- POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT, AND VERTICAL. ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUT.
- ALL MATERIAL SHALL BE GALVANIZED AFTER FABRICATION. PRIOR TO GALVANIZING, ALL STEEL RAILING POSTS, ANGLES, SPLICE TUBES, SPLICE BARS AND STEEL TUBING SHALL BE GIVEN A NO. 6 BLAST CLEANING PER SSPC SPECIFICATIONS.
- WHEN PAINTING IS REQUIRED, ALL MATERIAL EXCEPT ANCHORAGE DETAIL (NO. 3 & NO. 4) SHALL BE PAINTED OVER GALVANIZING WITH AN APPROVED TIE COAT AND TOP COAT AS SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. COLOR NO. [] (FILL IN COLOR NAME).
- RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED 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 1-19

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 1/2" 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'-3" LONG BOLT FOR SLAB THICKNESS > 16" AND 1 1/2" LONG FOR THICKNESS < 16". USE 1'-9" LONG IN ABUTMENT WINGS. (AN EQUIVALENT THREADED ROD WITH HEAVY HEX NUTS AND HARDENED WASHERS MAY BE SUBSTITUTED FOR ANCHOR BOLTS IN WINGS IF REQUIRED FOR 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).
 - 6A TS 5 x 3 x 1/4" STRUCTURAL TUBING. USE 1" DIA. HOLES FOR BOLT NO. 6 IN TOP RAIL (FRONT & BACK). USE 1/8" 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 3/8" 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 5/8" 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 AMS STD. COLOR NO. [] (FILL IN COLOR NAME).
- RAIL POST, BASE PLATES, SPLICE BAR, ANGLES AND SPLICE PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A709 GRADE 50. STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500 GRADE B OR C WITH A CERTIFIED $f_y \geq 50$ 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)

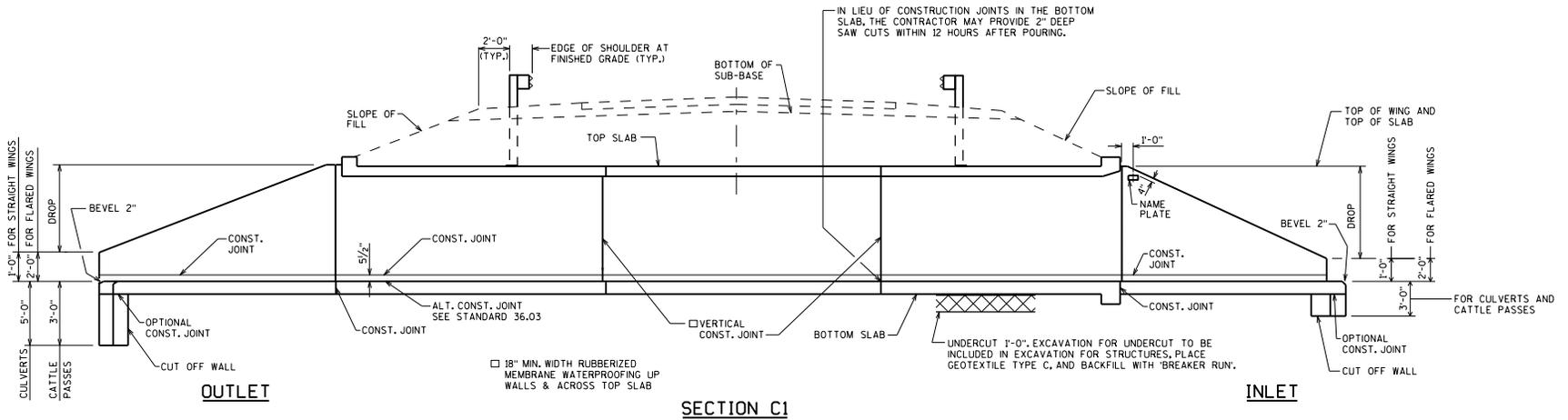
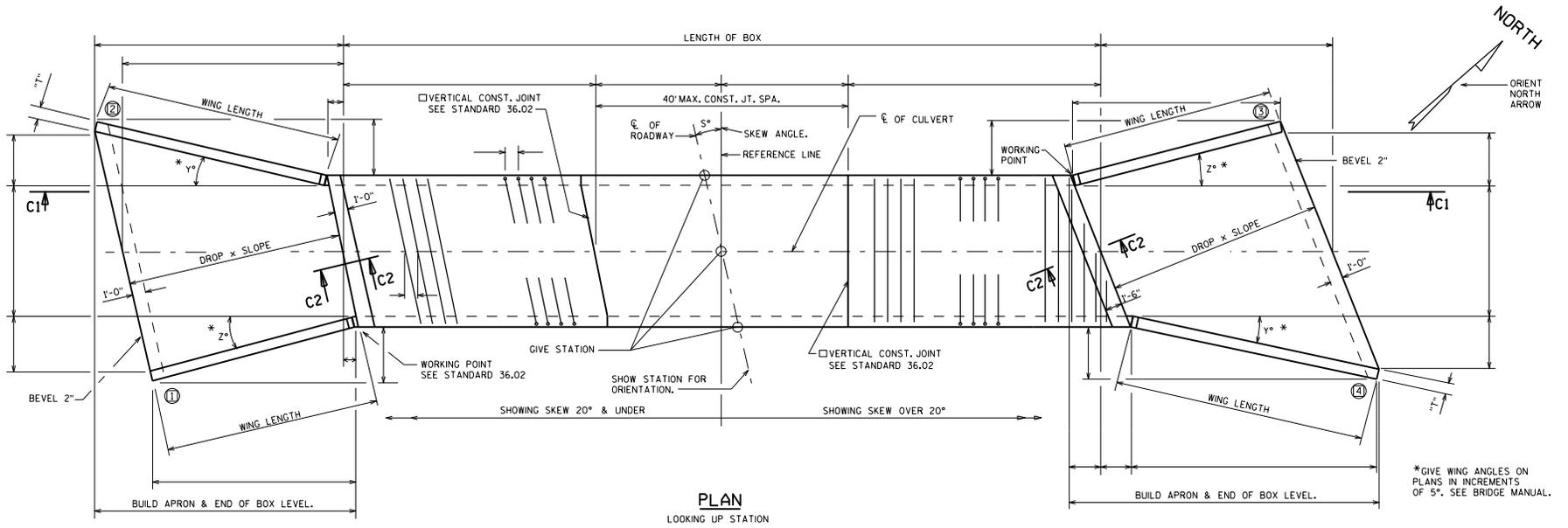
TUBULAR STEEL RAILING TYPE NY4

BUREAU OF STRUCTURES

DATE: _____

APPROVED: Bill Oliva 1-19

STANDARD 30.27

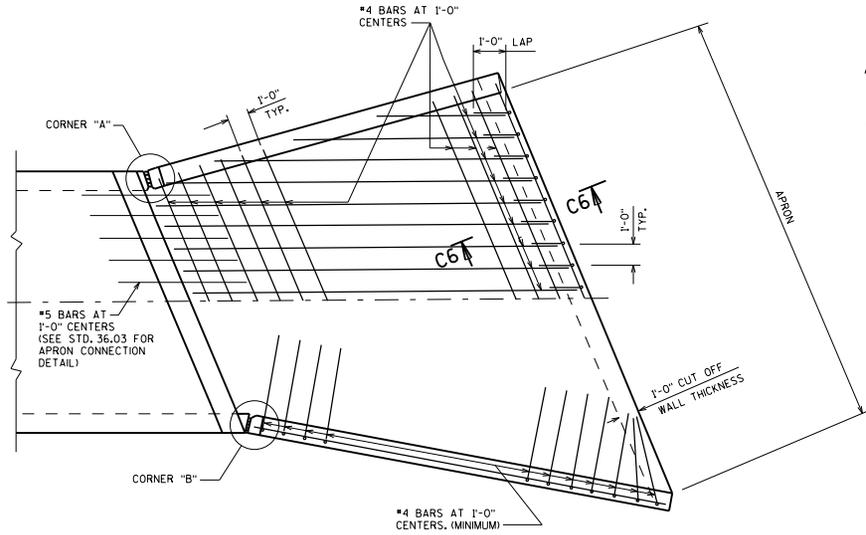


LEGEND
 ○ INDICATES WING NUMBER

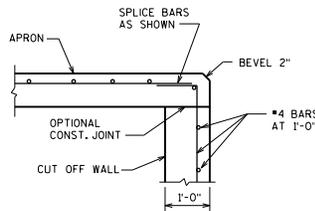
DESIGN DATA
 LIVE LOAD:
 DESIGN LOADING: HL-93
 INVENTORY RATING FACTOR: RF=L05
 OPERATING RATING FACTOR: RF=L35
 WISCONSIN STANDARD PERMIT VEHICLE (WIS.-SPV): 255 (KIPS)
 ** EARTH LOAD: DESIGNED FOR FILL HEIGHT RANGE OF ___ TO ___ FEET
 MATERIAL PROPERTIES:
 CONCRETE MASONRY $f'c = 3.5$ K.S.I.
 BAR STEEL REINFORCEMENT $f_y = 60.0$ K.S.I.

DESIGNER NOTES
 TYPICAL UNDERCUT SHOWN. SEE STANDARD 9.01 FOR ALTERNATIVES AND ADDITIONAL NOTES.
 FOR SECTION C2 AND CONST. JOINT DETAILS SEE STANDARD 36.03
 ** SEE SECTION 36.5 FOR DESIGN RANGE OF FILL HEIGHTS.
 HEIGHT TO BE TO THE NEAREST 0.5 FEET ON FILLS UNDER 4 FEET AND TO THE NEAREST FOOT ON FILLS OVER 4 FEET.

BOX CULVERT LAYOUT	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19



APRON DETAIL



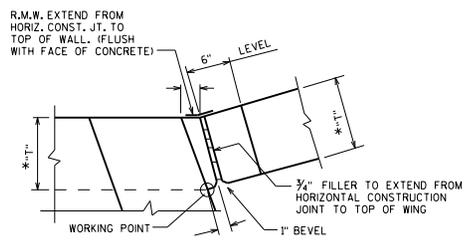
SECTION C6

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

"H" IS MAX. WING WALL HEIGHT

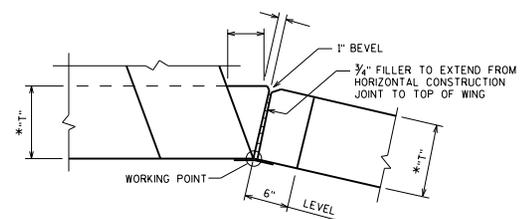
THE AREA OF REINFORCING STEEL NOT IDENTIFIED IN SECTIONS SHALL CONFORM TO THE FOLLOWING TEMPERATURE AND SHRINKAGE REQUIREMENTS:

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

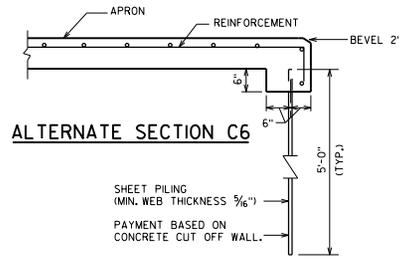


CORNER "A"

* DIMENSION "T" TO BE DETERMINED FROM BARREL DESIGN



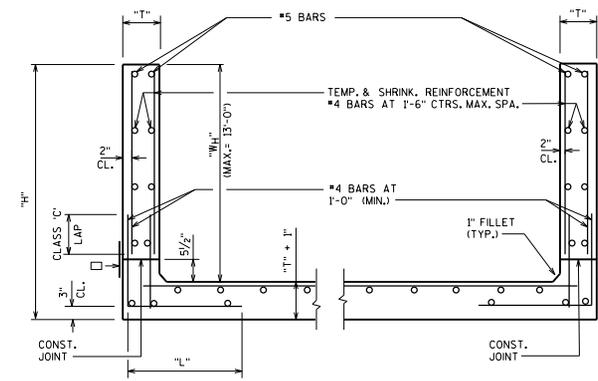
CORNER "B"



ALTERNATE SECTION C6

ALTERNATE CUTOFF WALL

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



SECTION THRU WINGWALLS

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

NOTES

- BAR STEEL REINFORCEMENT SHALL BE EMBEDDED 2" CLEAR UNLESS OTHERWISE SHOWN OR NOTED.
- THE CONCRETE IN THE CUT OFF WALL MAY BE PLACED UNDERWATER IF THE EXCAVATION CANNOT BE DEWATERED.
- THE ALTERNATE CUT OFF WALL MAY BE USED IN LIEU OF THE CAST-IN-PLACE CONCRETE CUT OFF WALLS. PAYMENT SHALL BE BASED ON CONCRETE CUT OFF WALLS.
- LOCATE NAME PLATE ON NEAREST RIGHT WING TRAVELING UP STATION, FACE NAME PLATE UP STATION.
- THE CONTRACTOR MAY FURNISH A PRECAST CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE BOX CULVERT WITH THE ACCEPTANCE OF THE SHOP DRAWINGS BY THE STRUCTURES DESIGN SECTION. THE PRECAST CONCRETE BOX CULVERT SHALL CONFORM TO PRECAST DETAILS IN CHAPTER 36 STANDARDS OF THE CURRENT WISCONSIN DOT BRIDGE MANUAL. PAYMENT FOR THE PRECAST CULVERT SHALL BE BASED ON THE QUANTITIES AND PRICES BID FOR THE ITEMS LISTED IN THE "TOTAL ESTIMATED QUANTITIES".

DESIGNER NOTES

- SEE STANDARD 9.01 FOR ADDITIONAL NOTES.
- ALL BAR STEEL FOR CAST-IN-PLACE CONCRETE BOX CULVERTS SHALL BE UNCOATED, EXCEPT WHEN THERE IS NO FILL OVER THE CULVERT, EPOXY COATED BARS SHALL BE USED FOR THE TOP AND BOTTOM BARS IN THE TOP SLAB.
- BAR STEEL FOR CAST-IN-PLACE CONCRETE APRONS SHALL BE UNCOATED AND BAR STEEL FOR WINGWALL DOWELS AND ALL WINGWALL BARS SHALL BE EPOXY COATED.
- FOR "B" DESIGNATED CONCRETE BOX CULVERTS HAVING THEIR TOP SURFACE AT GRADE, HAND HELD FINISHING MACHINES MAY BE USED. NOTE THIS ON PLANS WHEN APPLICABLE.

BOX CULVERT APRON DETAILS



APPROVED: Bill Oliva DATE: 1-19

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

* HEADER LENGTH EQUALS THE DISTANCE BETWEEN $\frac{1}{4}$ OF WALLS IN ONE CELL MEASURED ALONG THE SKEW.

DESIGNER NOTES

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

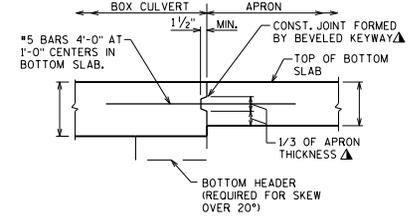
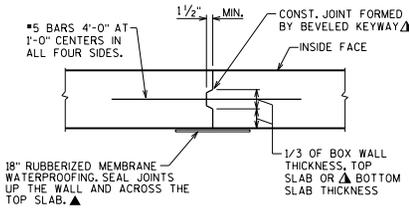
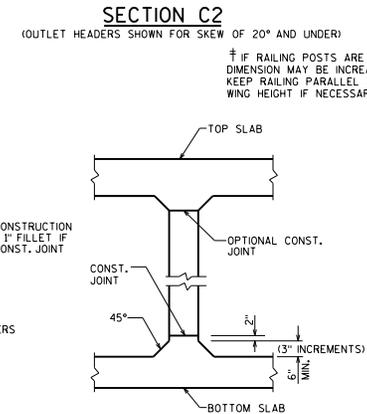
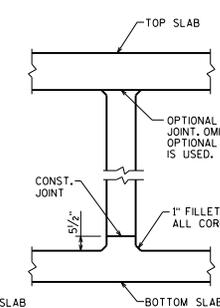
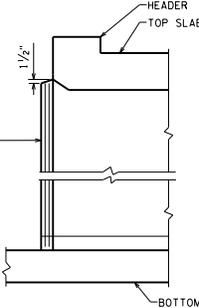
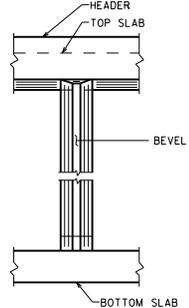
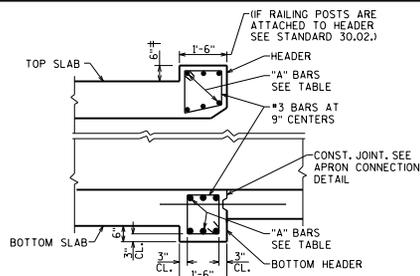
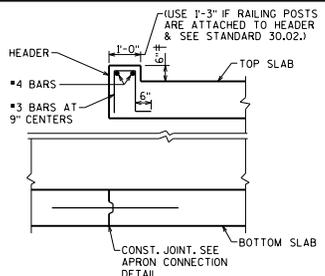
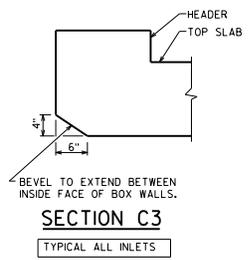
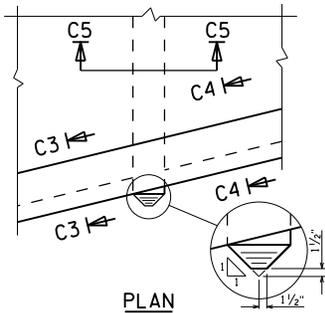
⊙ DETAIL NOT ALLOWED WHEN HAUNCHES ARE REQ'D OR FOR PEDESTRIAN UNDERPASSES. OMIT 1" FILLET IF ALTERNATIVE CONSTRUCTION JOINT IS USED.

◆ † = 1'-0" MIN. FOR PEDESTRIAN UNDERPASSES AND SLABS WITH DEPTH OF FILLS < 2'-0"
 ☆ † = 6/2" MIN. OTHERWISE

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

▲ USE "SHEET MEMBRANE WATERPROOFING FOR TOP SLAB C--" (516.0610.S) FOR PEDESTRIAN UNDERPASSES. INCLUDE THE FOLLOWING NOTE:

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

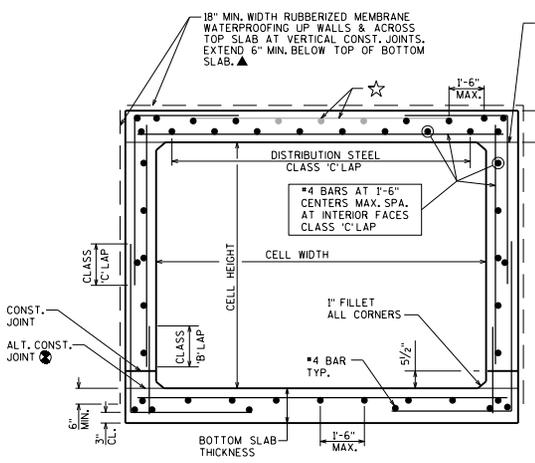


INLET NOSE CENTERWALL DETAILS

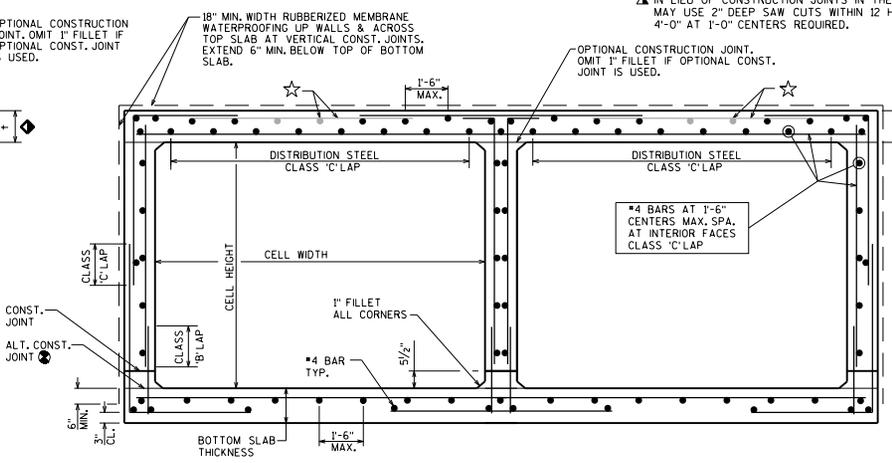
TYPICAL ALL INLETS

VERTICAL CONSTRUCTION JOINT

APRON CONNECTION DETAIL



SECTION THRU BOX
SINGLE CELL BOX



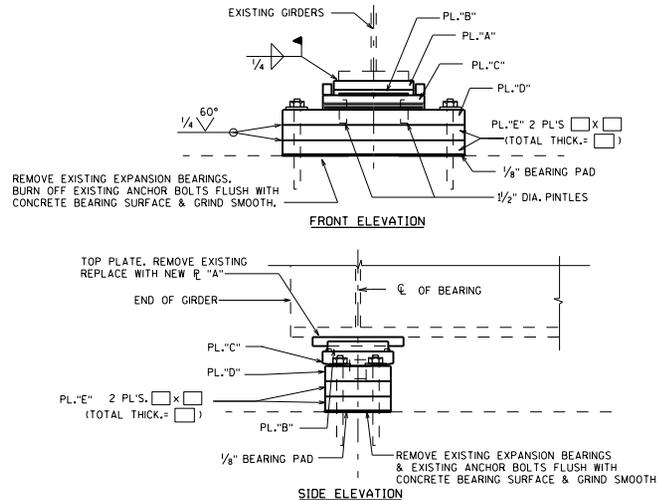
SECTION THRU BOX
TWIN CELL BOX

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

BOX CULVERT DETAILS



APPROVED: Bill Oliva DATE: 1-19



EXPANSION BEARING REPLACEMENT - STEEL GIRDERS
STEEL BEARINGS

SEE STANDARD 27.08 FOR BEARING DETAILS

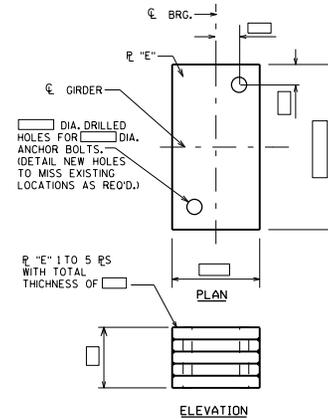
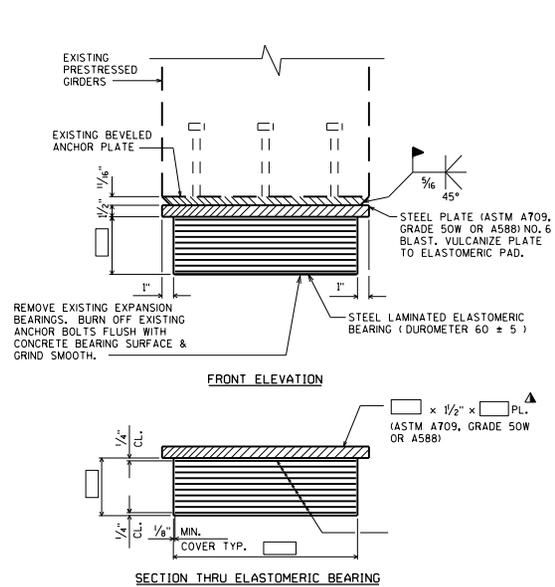
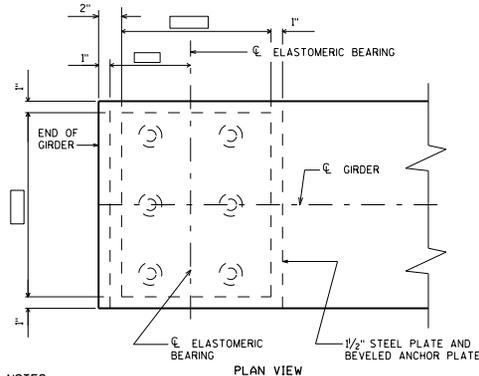


PLATE 'E' DETAILS
(SEE STD. 40.10 FOR CONCRETE BLOCK ALTERNATE)



EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS
ELASTOMERIC BEARINGS



NOTES
ALL MATERIAL USED FOR BEARINGS SHALL BE PAID AT THE UNIT PRICE BID FOR "BEARING PADS ELASTOMERIC LAMINATED."
GRIND EXIST. WELD THAT ATTACHED EXIST. TOP PLATE TO EXIST. BOT. FLANGE. GRIND AFFECTED AREAS SMOOTH.

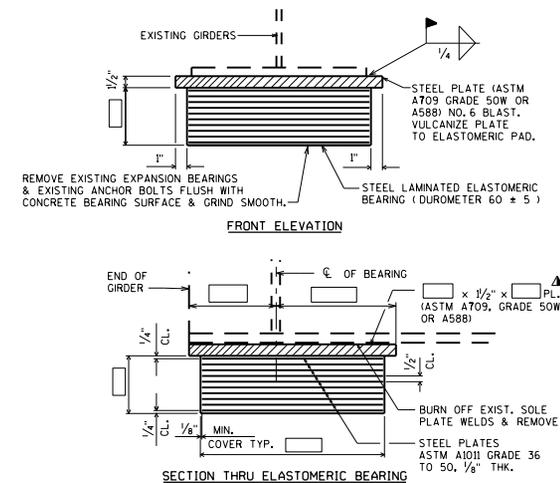
DESIGNER NOTES
THE STEEL TOP PLATE THICKNESS MAY BE REDUCED (1" MIN.) TO MATCH THE OVERALL EXISTING BEARING HEIGHT. WHEN THE THICKNESS IS REDUCED, THE FOLLOWING NOTE SHALL BE LOCATED ON THE PLANS:
"WELDING PROCEDURES SHALL BE ESTABLISHED BY THE CONTRACTOR TO RESTRICT THE MAXIMUM TEMPERATURE REACHED BY SURFACES IN CONTACT WITH ELASTOMER TO 200°F (93°C). TEMPERATURES SHALL BE CONTROLLED BY TEMPERATURE INDICATING WAX PENCILS OR OTHER SUITABLE MEANS APPROVED BY THE ENGINEER."

TOP STEEL PLATE MAY NOT BE OMITTED.

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

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

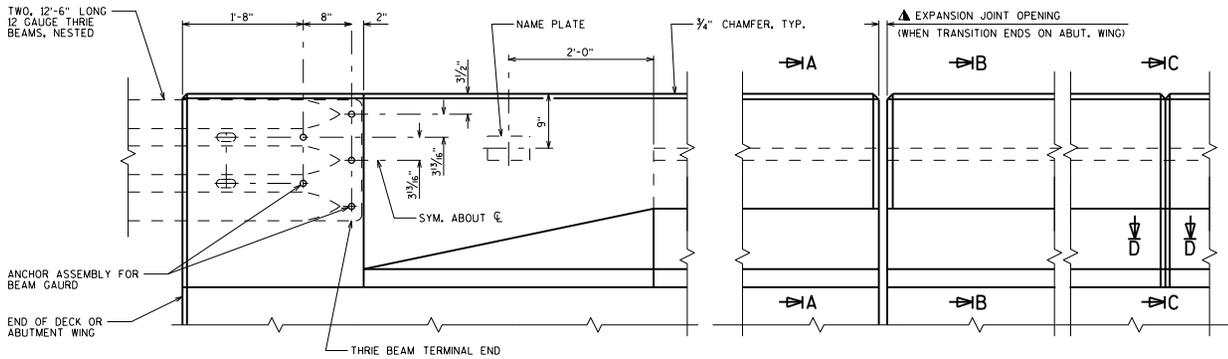
SEE STANDARD 27.07 FOR ADDITIONAL INFORMATION.



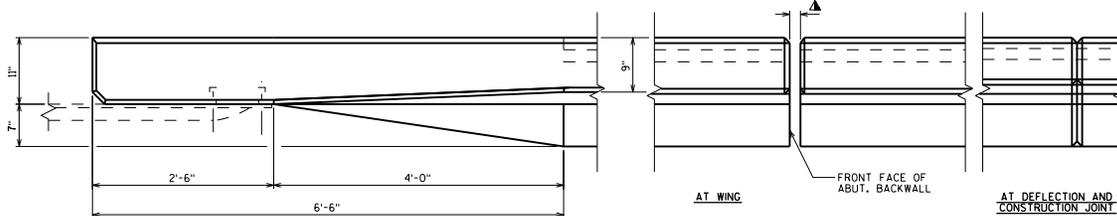
EXPANSION BEARING REPLACEMENT - STEEL GIRDERS
ELASTOMERIC BEARINGS

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

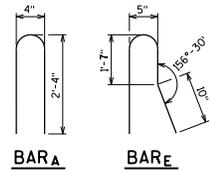
EXPANSION BEARING REPLACEMENT DETAILS	
	BUREAU OF STRUCTURES
APPROVED: <u>Bill Oliva</u>	DATE: 1-19



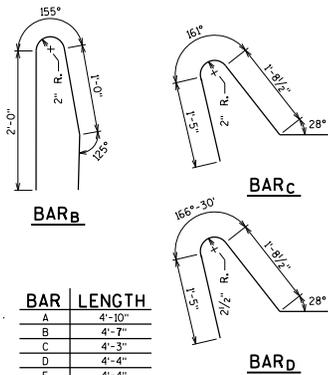
ELEVATION OF PARAPET



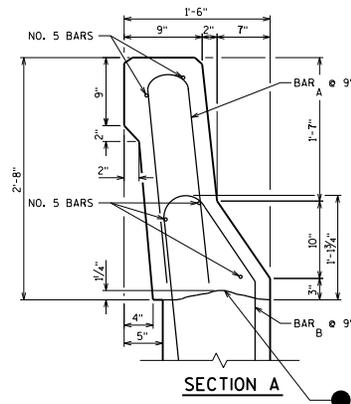
PART PLAN ON PARAPET



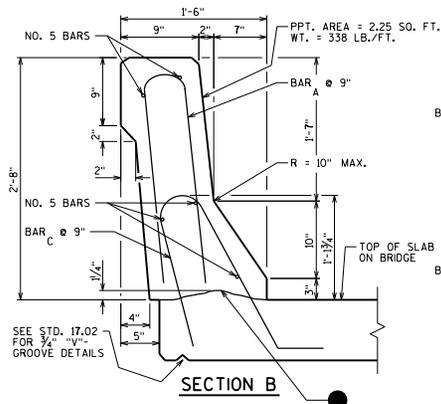
BAR A **BAR E**



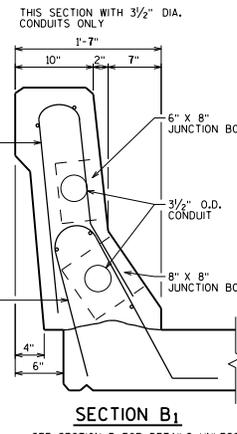
BAR	LENGTH
A	4'-10"
B	4'-7"
C	4'-3"
D	4'-4"
E	4'-4"



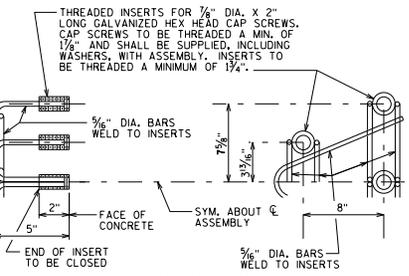
SECTION A



SECTION B

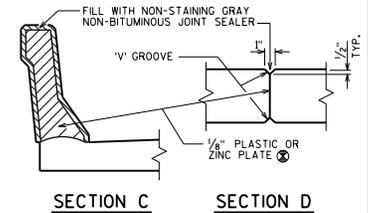


SECTION B1



DETAIL OF ANCHOR ASSEMBLY

NOTE: HEX HEAD CAP SCREWS & WASHERS TO BE GALVANIZED IN ACCORDANCE WITH AASHTO M232, CLASS C.
ASSEMBLY SHALL BE BID ITEM "ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD" EACH -



SECTION C

SECTION D

NOTES

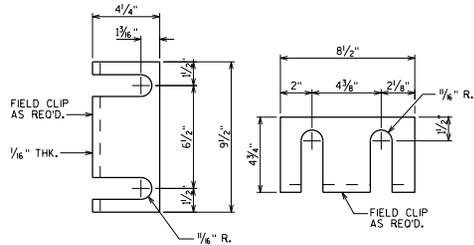
- ALL SLOPED FACE PARAPET "B" REINFORCEMENT ARE NO. 4 BARS UNLESS OTHERWISE SHOWN.
- PLATE REQUIRED WHEN DEFLECTION JOINTS ARE REQUIRED. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED, PLATE SEPARATORS SHALL BE OMITTED. DEFLECTION JOINTS ARE REQUIRED ON SLAB SPAN STRUCTURES ONLY.
- OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINFORCEMENT THRU THE JOINT. LAP LONGT. BARS A MIN. OF 2'-11" MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 1" V GROOVE.
- CONST. JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.

	PARAPET
AREA	2.25 SF
WEIGHT	338 LB/FT

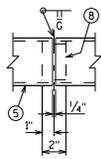
SLOPED FACE PARAPET 'B'



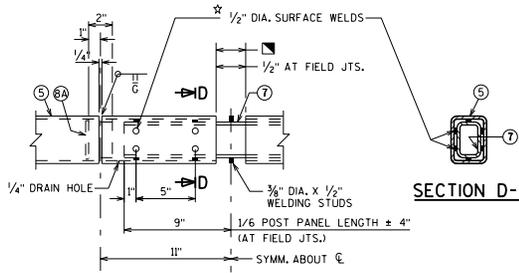
APPROVED: Bill Oliva DATE: 1-19



POST SHIM DETAILS

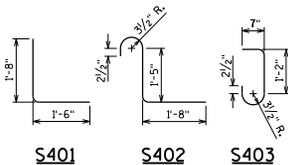


SHOP RAIL SPLICE DETAIL
(LOCATION MUST BE SHOWN ON SHOP DRAWINGS)



FIELD ERECTION JOINT DETAIL

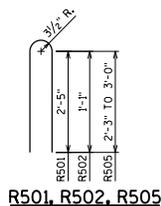
* MIN. 3/8" FLAT SURFACE DIA. PUNCHINGS OR STUDS MAY BE USED AS AN ALTERNATE.



S401

S402

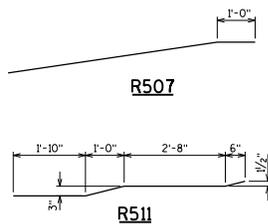
S403



R501, R502, R505



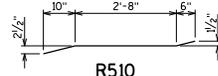
R503



R507



R511



R510

BAR SERIES TABLE

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

BUNDLE AND TAG EACH SERIES SEPARATELY.

BILL OF BARS

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

BAR MARK	NO. REQ'D.	LENGTH	REV	BAR SERIES	LOCATION
S401	X	3'-0"	X		PARAPET VERT.
S402	X	4'-1"	X		PARAPET VERT.
S403	X	2'-9"	X		PARAPET VERT.
S404	X				PARAPET HORIZ.
R501	X	5'-9"	X		PARAPET VERT.
R502	X	3'-1"	X		PARAPET VERT.
R503	X	1'-11"	X		PARAPET VERT.
R504	X	3'-4"			PARAPET VERT.
R505	X	6'-2"	X	▲	PARAPET VERT.
R506	X				PARAPET HORIZ.
R507	X		X		PARAPET HORIZ.
R508	X	4'-0"			PARAPET HORIZ.
R509	X	5'-8"			PARAPET HORIZ.
R510	X	4'-0"	X		PARAPET HORIZ.
R511	X	6'-0"	X		PARAPET HORIZ.
R512	X				PARAPET HORIZ.
R513	X				PARAPET HORIZ.

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

NOTES

BID ITEM SHALL BE "RAILING TUBULAR TYPE PF B-...", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWN, AND PAINTING.

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

NO. 2, NO. 7 AND NO. 8 SHALL CONFORM TO ASTM A709 GRADE 36. STRUCTURAL TUBING, NO. 1 AND NO. 5, SHALL CONFORM TO ASTM A500 GRADE B.

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

CUT BOTTOM OF POST TO MAKE POST VERTICAL IN TRANSVERSE DIRECTION.

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

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

ALL JOINTS IN CONCRETE PARAPET ARE TO BE VERTICAL.

AFTER FABRICATION, ALL MATERIAL, EXCEPT ANCHORAGE NO. 3 & 4 & SHIMS SHALL BE PAINTED WITH A THREE COAT ZINC-RICH EPOXY SYSTEM PER WISDOT STANDARD SPECIFICATION, SECTION 512, EPOXY SYSTEM. SHIMS SHALL BE GIVEN ONE COAT OF ZINC RICH PRIMER PAINT. THE FINISH COLOR SHALL BE AMS STD. COLOR NO. ...

1/4" DIA. VENT HOLES TO BE LOCATED AT LOW END OF RAILS.

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

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

SEE STD. 30.07 FOR BEAM GUARD ANCHOR ASSEMBLY DETAILS.

THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 2 (TL-2).

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

LEGEND

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

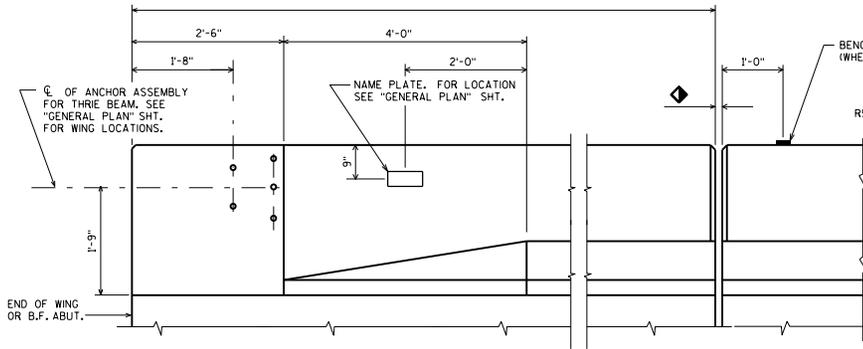
RAILING TUBULAR
TYPE 'PF' DETAILS



BUREAU OF STRUCTURES

APPROVED: Bill Oliva DATE: 1-19

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



INSIDE ELEVATION

SECTION A

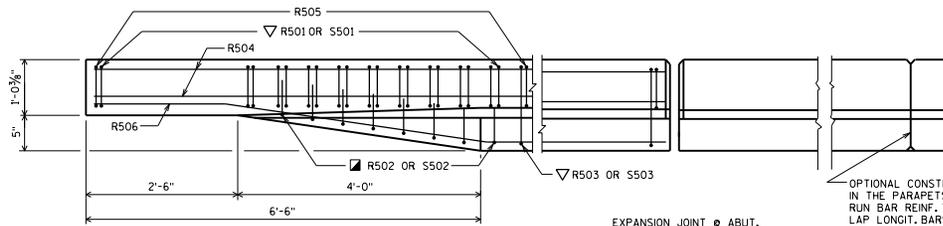
SECTION B

SECTION C

BILL OF BARS
FOR ABUTMENT PARAPETS

BAR MARK	COUNT	ABUT.	ABUT.	LENGTH	BENT	LOCATION
R501	X			4'-7"	X	PARAPET VERT.
R502	X			2'-4"	X	PARAPET VERT.
R503	X			4'-7"	X	PARAPET VERT.
R504	X					PARAPET HORIZ.
R505	X			4'-10"	X	PARAPET VERT.
R506	X				X	PARAPET HORIZ.
S501	X			4'-5"	X	PARAPET VERT.
S502	X			2'-4"	X	PARAPET VERT.
S503	X			4'-2"	X	PARAPET VERT.

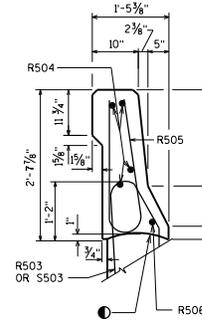
ROADWAY OPENING OR 2 1/2" MIN. FOR EXPANSION JOINT. USE 1/2" OPENING WITH FILLER FOR A1 ABUTMENTS



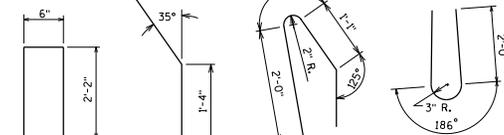
PLAN

EXPANSION JOINT @ ABUT.
0° SKEW SHOWN. MATCH EXP. JT. OPENING.
FOR TYPE A1 ABUT., USE 1/2" FILLER TO TOP OF PARAPET. SEE STD. 12.01.

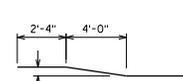
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINF. THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 1'-9". MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 3/4" V-GROOVE.



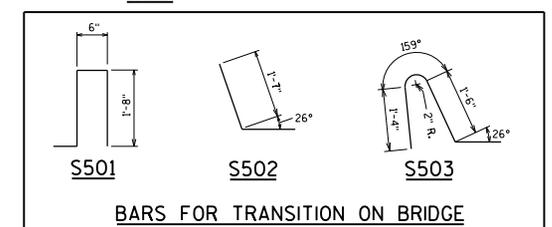
SECTION C



R501 R502 R503 R505



R506



S501 S502 S503

BARS FOR TRANSITION ON BRIDGE

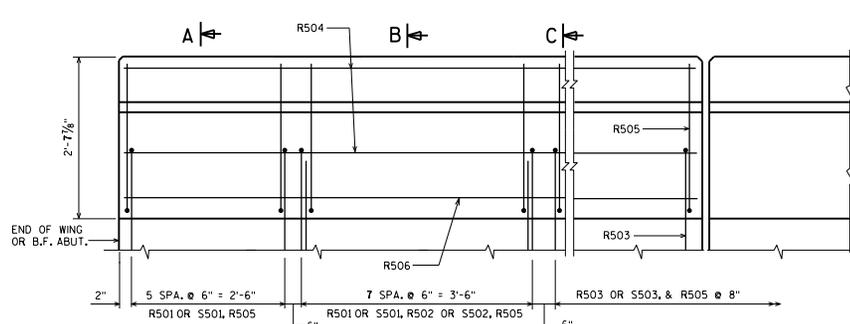
AREA = 2.58 SF
WEIGHT = 387 LB/FT

CONST. JOINT - STRIKE OFF AS SHOWN.

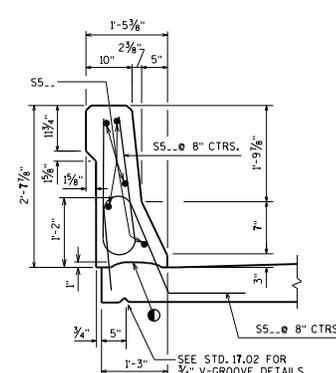
R502 BARS MAY BE PLACED AFTER CONCRETE IS POURED BUT BEFORE INITIAL SET HAS TAKEN PLACE. USE CARE TO PLACE R502 OR S502 BARS CORRECTLY ALONG TRANSITION OF PARAPET.

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

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



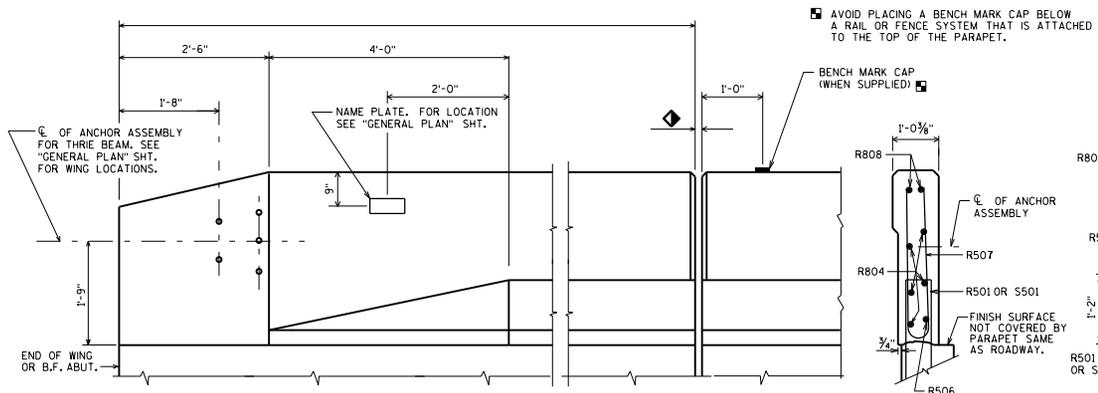
OUTSIDE ELEVATION



SECTION THRU PARAPET ON BRIDGE

SLOPED FACE PARAPET 'LF'

DATE: _____
APPROVED: Bill Oliva 1-19

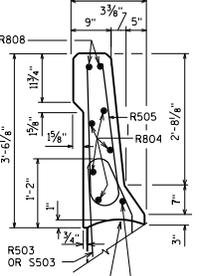
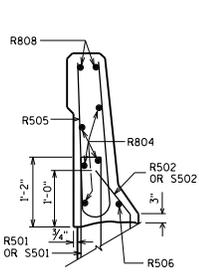
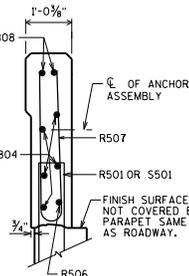


AVOID PLACING A BENCH MARK CAP BELOW A RAIL OR FENCE SYSTEM THAT IS ATTACHED TO THE TOP OF THE PARAPET.

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

BILL OF BARS FOR ABUTMENT PARAPETS

BAR MARK	COM.	ABUT.	ABUT.	LENGTH	BENT	BAR SERIES	LOCATION
R501	X			4'-7"	X		PARAPET VERT.
R502	X			2'-4"	X		PARAPET VERT.
R503	X			4'-7"	X		PARAPET VERT.
R804	X						PARAPET HORIZ.
R505	X			6'-6"	X		PARAPET VERT.
R506	X				X		PARAPET HORIZ.
R507	X			5'-8"	X	▲	PARAPET VERT.
R808	X				X		PARAPET HORIZ.
S501	X			4'-5"	X		PARAPET VERT.
S502	X			2'-4"	X		PARAPET VERT.
S503	X			4'-2"	X		PARAPET VERT.

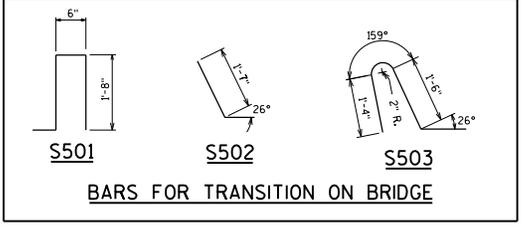
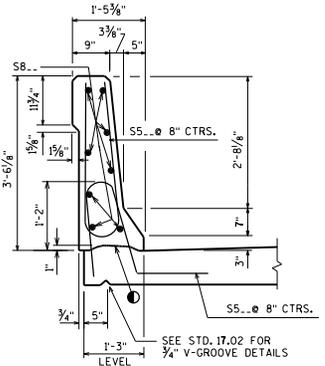
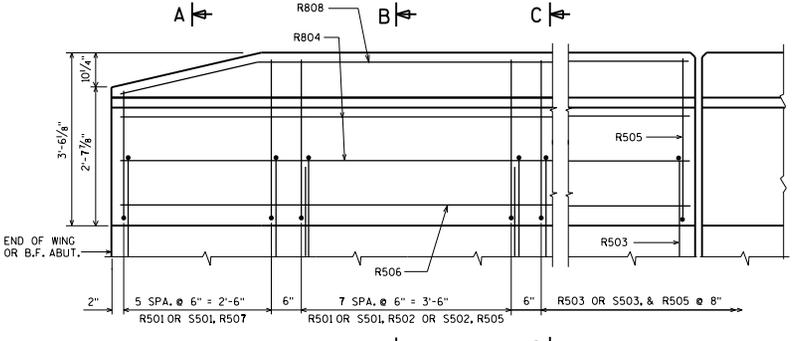
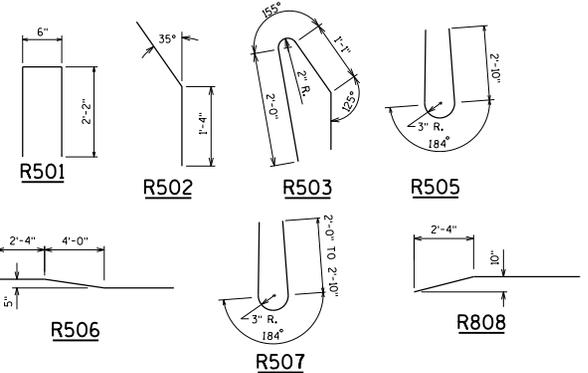
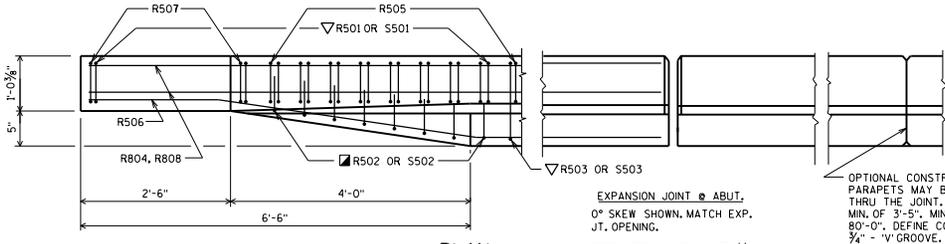


BAR SERIES TABLE

MARK	NO. REOD.	LENGTH
R507	4 SERIES OF 6	4'-10" TO 6'-6"

INSIDE ELEVATION

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



AREA = 3.16 SF
WEIGHT = 474 LB/FT

CONST. JOINT - STRIKE OFF AS SHOWN.

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

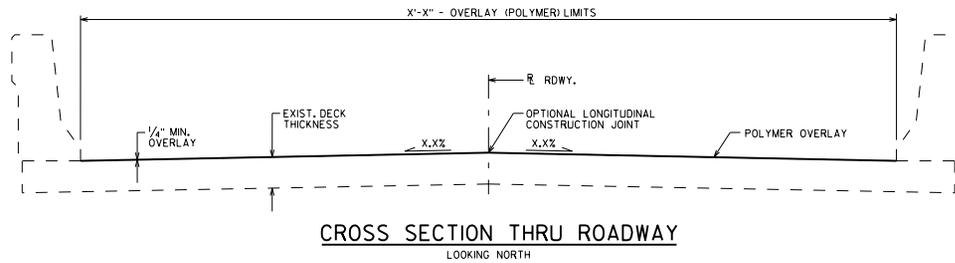
R501 AND R503 BARS TO BE TIED TO WING STEEL BEFORE WING IS POURED.

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

SLOPED FACE PARAPET 'HF'



APPROVED: Bill Oliva DATE: 1-19



CROSS SECTION THRU ROADWAY
LOOKING NORTH

DESIGNER NOTES

REPAIRS USING CONCRETE REQUIRE A MINIMUM CURE TIME OF 28 DAYS BEFORE PLACING OVERLAY. WHEN DEEMED ABSOLUTELY NECESSARY (BY REGION AND BOS DESIGN STAFF) RAPID SET DECK REPAIR MAY BE USED IN LIEU OF "CONCRETE MASONRY DECK REPAIR" TO SHORTEN TIME REQUIRED FOR PLACING OVERLAY.
DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.
POLYMER OVERLAYS SHALL NOT BE PLACED ON CONCRETE APPROACHES.

DESIGN DATA

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

MATERIAL PROPERTIES:
CONCRETE MASONRY - DECK PATCHING $f'_c = 4,000$ P.S.I.

NOTES

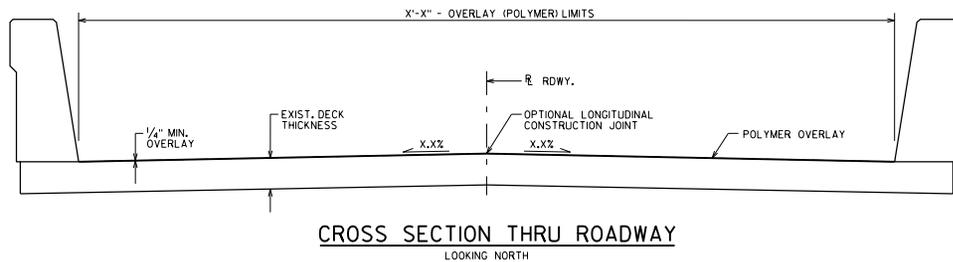
DRAWINGS SHALL NOT BE SCALED.
DIMENSIONS SHOWN ARE BASED ON THE ORIGINAL STRUCTURE PLANS.
DECK SURFACE PREPARATION IS INCLUDED IN THE BID ITEM "POLYMER OVERLAY".
AREAS OF "PREPARATION DECK TYPE 1" SHALL BE DEFINED BY A SAW CUT.
PREPARATION DECKS TYPE 1, PREPARATION DECKS TYPE 2, AND FULL-DEPTH DECK REPAIR AREAS ARE BASED ON THE PLANS AND AS DETERMINED BY THE ENGINEER. DECK PREPARATION AND FULL-DEPTH DECK REPAIRS SHALL BE FILLED WITH "CONCRETE MASONRY DECK REPAIR".

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.0301	PREPARATION DECKS TYPE 1	SY	
509.0302	PREPARATION DECKS TYPE 2	SY	
509.0310.S	SAWING PAVEMENT DECK PREPARATION AREAS	LF	
509.2000	FULL-DEPTH DECK REPAIR	SY	
509.2100.S	CONCRETE MASONRY DECK REPAIR	CY	
509.5100.S	POLYMER OVERLAY	SY	
	POSSIBLE BID ITEM		
SPV.0035	RAPID SET DECK REPAIR	CY	

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

REHABILITATION
OVERLAY



CROSS SECTION THRU ROADWAY
LOOKING NORTH

DESIGNER NOTES

PREVENTATIVE OVERLAY INTENDED FOR USE ON DECKS WITH A MINIMUM AGE OF 28 DAYS AND A MAXIMUM AGE OF 2 YEARS. AN ADDITIONAL CONTRACT MAY BE REQUIRED FOR APPLYING THE OVERLAY DUE TO SCHEDULE AND DECK AGE CONSIDERATIONS.
WHEN BID ITEM "POLYMER OVERLAY" IS USED RATING SHOULD INCLUDE THE 5 PSF OVERLAY.
POLYMER OVERLAYS SHALL NOT BE PLACED ON CONCRETE APPROACHES.

DESIGN DATA

LIVE LOAD:
DESIGN LOADINGS: HL-93
INVENTORY RATING FACTOR: RF=1...
OPERATING RATING FACTOR: RF=1...
MAXIMUM STANDARD PERMIT VEHICLE LOAD = ... KIPS

STRUCTURE IS DESIGNED FOR A FUTURE WEARING SURFACE OF 20 POUNDS PER SQUARE FOOT.

NOTES

DRAWINGS SHALL NOT BE SCALED.
DECK SURFACE PREPARATION IS INCLUDED IN THE BID ITEM "POLYMER OVERLAY".

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	TOTAL
509.5100.S	POLYMER OVERLAY	SY	

PREVENTATIVE
OVERLAY

POLYMER OVERLAY



**BUREAU OF
STRUCTURES**

APPROVED: Bill Oliva DATE: 1-19