FORMLINER COURSING ON RETAINING WALLS SHALL BE LEVEL.

RETAINING WALL NOTES
FORMLINER COURSING ON RETAINING WALLS SHALL BE LEVEL.

ABUTMENT NOTES
FORMLINER COURSING ON ABUTMENTS AND WINGS SHALL BE LEVEL.

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

THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS.

wraparound/match formliner pattern at corners.

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

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

THE FORMLINER PATTERN SHALL BE CONTINUOUS ACROSS CONSTRUCTION JOINTS.

wraparound/match formliner pattern at corners.

PARAPET NOTES
FORMLINER COURSING ON PARAPETS SHALL BE PARALLEL TO TOP OF PARAPET.
The three types shown are preferred aesthetic concepts for WisDOT projects. When used without staining, costs are incidental to concrete masonry bridges and not subject to CSS funding. Only the choice of parapet, wing, and pier details shown for a given type should be used for that type. Wings parallel to centerline of abutment (elephant ear) are to be plain (type I). See standards 4.04 and 4.05 for additional details. See bridge manual section 4.9 for location of use and renderings.

Designer Notes

The three types shown are preferred aesthetic concepts for WisDOT projects. When used without staining, costs are incidental to concrete masonry bridges and not subject to CSS funding. Only the choice of parapet, wing, and pier details shown for a given type should be used for that type. Wings parallel to centerline of abutment (elephant ear) are to be plain (type I). See standards 4.04 and 4.05 for additional details. See bridge manual section 4.9 for location of use and renderings.
**Designer Notes**

The three types shown are preferred aesthetic concepts for WISDOT projects, which are not subject to concrete masonry bidding. Any type may be modified or substituted at the discretion of the designer. Only the choice of parapet, wing and pier details shown for a given type should be used for that type.

Wings parallel to centerline of abutment (elevator) are to be plain Type I.

Wings parallel to centerline of abutment (elevator) are to be plain Type I.

In lieu of the combination railing type shown, chain link fencing may be used. See standard 4.04 for details.

See standards 4.04 and 4.05 for additional details.

See bridge manual section 4.9 for location of use.

**Aesthetic Concepts with Pedestrian Accommodations**

**Bureau of Structures**

Approved: Bill Oliva

Date: 7-5

Standard 4.03
Wing Options

- Standard

- Rustication

- Recess

Parapet Options

- Standard

- Single Rustication Line

- Double Rustication Line

- Single Slope Parapet 32ss

- Single Slope Parapet 42ss

- Modified "Single Slope Parapet 32ss"

- Modified "Single Slope Parapet 42ss"

Aesthetic Details

- Wings Parallel to Centerline of Abutment

- Wings Parallel to Centerline of Abutment

- Wings Parallel to Centerline of Abutment

Designer Notes

- Wings Parallel to Centerline of Abutment (Type 1)

Approved: Bill Oliva

Date: 1-17, 1-18, 1-19

Standard 4.04
**NOTES**

- Drawings shall not be scaled.
- All GRS Abutment stations and offsets are given at the front face of the alignment keyblock. See Sections 4-4 and 5-5 on Standard 7.02 for location of the alignment keyblock.
- Factored bearing resistance of XX psi at bottom of reinforced soil foundation.
- Maximum allowable wall batter is 8 vertical to 1 horizontal or 7.1 degrees.
- Project modular block during placement of heavy riprap.
- See Sections 4-4 and 5-5 and GRS Abutment Information Table on Standard 7.02 for required lengths of geosynthetic reinforcement.
- Provide corner blocks and/or details compatible with the selected modular block system. Rounded corners are allowable.
- Temporary falsework not to be supported on the grs abutment unless approved by the Bureau of Structures Development Section.

**DESIGNER NOTES**

- The use of GRS Abutments is subject to prior approval by the Bureau of Structures.
- Provide an adequate working width for pipe inspection. Per仍旧 requirements, minimum width shall be 4'-6" from alignment keyblock to alignment keyblock.
- Maximum slab angle is 45°.
- The top of the concrete-colored blocks shall be 2-3 block courses below the top of riprap elevation.
- The top of the first right grs abutment shall be shown on the SPECIAL PROVISION, 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'.
- Maximum required tensile strength of the geosynthetic reinforcement shall be shown within the SPECIAL PROVISION, 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'.
- The minimum required tensile strength of the geosynthetic reinforcement shall be shown within the SPECIAL PROVISION, 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'.
- The maximum required tensile strength of the geosynthetic reinforcement shall be shown within the SPECIAL PROVISION, 'GEOSYNTHETIC REINFORCED SOIL ABUTMENT'.
- Maximum allowable wall batter is 8 vertical to 1 horizontal or 7.1 degrees.
- Maximum allowable wall batter is 8 vertical to 1 horizontal or 7.1 degrees.
- Protect modular block during placement of heavy riprap.
- Drawings shall not be scaled.

**TABLE OF GRS ABUTMENT STATIONS AND ELEVATIONS**

<table>
<thead>
<tr>
<th>GRS Abut.</th>
<th>Roadway Elevation</th>
<th>Station Elevation</th>
<th>Offset (ft)</th>
<th>GRS Abutment Elevation</th>
<th>Top GRS Abut. Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Stations and offsets shown at front face of alignment keyblock and at elevation XX ft. These stations and offsets shall be held regardless of actual modular block size or GRS Abutment batter.
NOTES

PROVIDE A SUITABLE LIFTING DEVICE FOR THE PRECAST CAP AND COLUMN UNITS.

CAST-IN-PLACE ALTERNATIVE IS NOT ALLOWED.

STIRRUPS AT THE GROUNDED COUPLERS ARE RECOMMENDED TO BE INSTALLED AS REQUIRED BY THE ACTUAL COUPLER SLEEVE DIAMETERS.

MANUFACTURER TO DETERMINE THE PRECAST PIER CAP LENGTHS ASSUMING 1/8" THICKNESS AT THE TOP AND BOTTOM OF THE COLUMN.

BID ITEM "PRECAST PIER CAP" PAID PER PLAN VALUE AS BOTTOM OF PIER CAP ELEVATION MINUS TOP OF POOLING ELEVATION.

DESIGNER NOTES

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

THE FOLLOWING SPECIAL PROVISIONS SHALL BE USED:

- GROUNDED BAR COUPLERS
- GROUNDED BAR SLEEVES WITH GRouted COUPLER SLEEVES

THE MAXIMUM WEIGHT OF EACH PRECAST ELEMENT SHALL BE 50,000 LBS.

GROUNDED COUPLER SLEEVES MAY BE OVERSIZED TO ALLOW FOR ADDITIONAL LATENT SHIM STORAGE IN THE FIELD. DEDUCTIVE PRACTICE IS TO OVERSIZE COUPLER SLEEVES BY 1/16" PER 1/4" BAR SIZE. INSTALL GRouted COUPLER SLEEVES AS NEEDED TO ACCOUNT FOR TOLERANCE IN THE FIELD. STANDARD WISDOT PRACTICE IS TO OVERSIZE COUPLER SLEEVES.

VERIFY SEVERAL MANUFACTURER'S COUPLER SLEEVE DIMENSIONS PRIOR TO DESIGN.

ASSEMBLE THE MAXIMUM DIAMETER OF COUPLER SLEEVES FOR COLUMN REINFORCEMENT DESIGN.

SEE STANDARDS 13.01 AND 13.07 FOR ADDITIONAL PIER NOTES AND DETAILS.

Material Properties:

- BAR REINFORCEMENT, GRADE 60
  - f_y = 60,000 P.S.I.
  - fy = 60,000 P.S.I.
- CONCRETE MASONRY
  - f'c = 3,500 P.S.I.
- f'c = 3,500 P.S.I.

Approved:

Bill Oliva

Date: 1-15

PRECAST PIER CAP AND COLUMNS

BUREAU OF STRUCTURES

STANDARD 7.03
GROUTED COUPLER NOTES

GROUTED SPLICE COUPLER CONNECTION SEQUENCE

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

GROUTED BAR COUPLER DETAILS

PRECAST PIER CAP AND COLUMN DETAILS

BILL OF BARS

<table>
<thead>
<tr>
<th>BAR MARK</th>
<th>NO. REQ'D</th>
<th>LENGTH</th>
<th>CDG</th>
</tr>
</thead>
</table>

TOTAL COATED: XX LBS

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

GROUTED COUPLER PLAN AT TOP AND BOTTOM OF COLUMN

STIRRUP SIZE VARIES AT GROUTED BAR COUPLERS

GROUT TUBE (TYP.)

FILL GAP WITH NON-SHRINK GROUT AFTER BRIDGE SUPERSTRUCTURE IS PLACED ON PIER AND BEFORE PIER DIAPHRAGM IS POURED.

STIRRUP SIZE VARIES AT GROUTED BAR COUPLERS

GROUTED BAR COUPLER DETAILS

PRECAST PIER COLUMN TEMP. TO BE DESIGNED BY DESIGN ENGINEER

PRECAST PIER CAP TEMP. TO BE DESIGNED BY DESIGN ENGINEER

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

ALL GROUTED COUPLERS SHALL BE EPOXY COATED.

ADJUST SHIM STACK HEIGHT TO CONTROL ERECTION ELEVATIONS.

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

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

FIELD CUT FOOTING AND CAP DOWELS AS REQUIRED.

CONSULT MANUFACTURER OF THE GROUTED COUPLER FOR PROPER DIMENSIONS "B" AND "D" AND FOR TOLERANCE OF THESE DIMENSIONS.

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PRECASTER SHALL PROVIDE PORTS IN THE PRECAST ELEMENTS TO ALLOW THE COUPLERS TO BE GROUTED AFTER THE PRECAST ELEMENTS HAVE BEEN ERECTED.
Cast-in-place bearing block details shall only be used when plans indicate allowance for precast piers.

Cast-in-place height = varies (5' min. to 2'-0' max.). Contractor to determine the cast-in-place bearing block heights.

The contractor shall follow this standard when precast piers are used and when cast-in-place bearing blocks are used in lieu of precast bearing blocks. See standard 7.06 for additional notes and details.

Designer note
See 7.1.4.1.2 for additional precast pier guidance.

Contractor notes
The contractor shall follow this standard when precast piers are used and when cast-in-place bearing blocks are used in lieu of precast bearing blocks. See standard 7.06 for additional notes and details.

Cast-in-place concrete detail notes
Cast-in-place bearing block details shall only be used when plans indicate allowance for precast piers.

In cast-in-place design, #4 bars at 2'-0' max. 1%5 bars at 2'-0' max. 15% Contractor to determine the cast-in-place bearing block weights.

Approved: Bill Oliva
Date: 3-9

Bureau of Structures

Standard 7.07
NOTES (BOX CULVERTS)
The upper limits of excavation for structures culverts (\(R\)...) 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.

The backfill quantities on the plans shall not be construed as mandatory limits of pay limits or pay quantities. The limits of excavation shall be determined by the contractor.

Undercut pay limits of excavation for structures shall be included in excavation for structures. Backfill with undercut structural type A required on box culvert sides of "backfill structure type B" shall be placed on a bedding of "backfill structure type B" of 6" minimum depth. All precast box sections shall be placed on a bedding of "backfill structure type B" of 6" minimum depth.

Undercut pay limits of excavation for structures shall be included in excavation for structures. Placement of "backfill structure type A" required for the entire wall length and behind apron wings for 3 feet. Backfill placed beyond pay limits or exceeding plan quantities shall be incidental to excavation for structures.

LIMITS AND NOTES (RETMALLS)
The upper limits of excavation for structures retaining walls (\(C\)...) 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 is 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 broken run shall be included in the plans if not allowed by the regional geotechnical engineer.

LEGEND
A Backfill Pay limits. Backfill beyond backfill pay limits shall be incidental to excavation for structures!
Limits of excavation shall be determined by the contractor.

A MSE wall under cut, slope or fill to "activation under cut". Attach notes "shoed in" at ends of pipe indicated other detail on plans.

MSE BACKFILL

HORIZONTAL

LIMITS OF MECHANICALLY STABILIZED EARTH MSE

VERTICAL

WALL BACKFILL

MSE BACKFILL

REINFORCEMENT, TYP.

LIMITS OF UNDERCUT

LIMITS OF BACKFILL

TOP OF BOX CULVERT

LIMITS OF UNDERCUT

LIMITS OF BACKFILL

TOP OF BOX CULVERT

TYPICAL SECTION
THRU BOX CULVERT

TYPICAL SECTION
THRU RETAINING WALL

TYPICAL SECTION
THRU MSE RETAINING WALL

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

STANDARD 9.02
<table>
<thead>
<tr>
<th></th>
<th>STANDARD WING</th>
<th>WITH STRUCTURAL APPROACH SLAB</th>
<th>WITH RAILING OR FENCE ONLY</th>
<th>STANDARD WING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STANDARD FILL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOP OF WING</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>PLACE FILL EVEN</strong></td>
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<tr>
<td><strong>WITH TOP OF WING, 2'-0&quot; FROM WING TP.</strong></td>
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<tr>
<td><strong>TOP OF STRUCTURAL APPROACH SLAB</strong></td>
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<td></td>
<td></td>
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<tr>
<td><strong>PLACE HEAVY RIPRAP</strong></td>
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<tr>
<td><strong>WITH TOP OF WING, 2'-0&quot; FROM WING TP.</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>BASE AGGREGATE</strong></td>
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<td><strong>TOP OF STRUCTURAL APPROACH SLAB</strong></td>
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<td></td>
<td></td>
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<tr>
<td><strong>PLACE FILL EVEN</strong></td>
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<tr>
<td><strong>WITH TOP OF WING, 2'-0&quot; FROM WING TP.</strong></td>
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<tr>
<td><strong>TOP OF WING</strong></td>
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<td><strong>WITH TOP OF WING, 2'-0&quot; FROM WING TP.</strong></td>
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<tr>
<td><strong>TOP OF STRUCTURAL APPROACH SLAB</strong></td>
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</tbody>
</table>

**TYPICAL FILL SECTION AT WING TIPS**

**WING FILL SECTIONS AT WING TIPS**

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**WING FILL SECTIONS AT WING TIPS**

**STANDARD 9.03**

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**BUREAU OF STRUCTURES**

**APPROVED: Bill Oliva**

**DATE:** 3-19
**Designer Notes**

The type of wing should be used when possible in lieu of wings parallel to the roadway. Do not use for the section of the roadway shown. Where water density is to exceed that shown in the cross-section of roadway, consult with the designer.

When timber railing is used as per standard 30.24, the user is to 30.23. Foundation concrete shall extend from bridge seat to top of wing, after the timber end posts are in place.

All wing bars shall be epoxy coated.

Show all longitudinal bars for clarity.

**LRFD Design Loads (Wings)**

Live Load: 2'-0" Surcharge

Dead Load: 0.6 Wing Length

**Wing Height**

Wing pile required for wings over 16'-6" only

Wing pile required for wings over 12'-0" long.

Wing length - 10'-0" minimum

**Wing Elevation**

Wing pile required for wings over 12'-0" long.

Extend from bridge seat to top of wing.

18" rubberized membrane waterproofing to filler and sealer.

**Details for Wings Parallel to A1 Abutment Centerline**

**Table A**

<table>
<thead>
<tr>
<th>Wing</th>
<th>Wing Height</th>
<th>Bar</th>
<th>#4 Bars @ 1'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'-0&quot;</td>
<td>0'-0&quot;</td>
<td>BT</td>
<td>2</td>
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<tr>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
<td>BT</td>
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<td>8'-0&quot;</td>
<td>8'-0&quot;</td>
<td>BT</td>
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</tr>
</tbody>
</table>

**Additional Details**

See STD. 12.01 & 12.02 for notes & details.
ALTERNATE CONSTRUCTION JOINT

ALTERNATE CONSTRUCTION JOINT AT ABUTMENT

ALTERNATE CONSTRUCTION JOINT AT PIER CAP

* BENT ZINC OR PLASTIC STRIP. (1/16” TO 3/32” THICK.) TACK TO FORM WORK. NO WELDING TO REINFORCING STEEL.

* USE A JOINT TOOL TO CONSTRUCT A CONTRACTION JOINT APPROXIMATELY 1/4” DEEP.

* SAW CUTTING JOINT IS NOT ALLOWED.

* PARTIAL ZINC OR PLASTIC BULKHEAD MAY BE USED AS ALTERNATE CONSTRUCTION JOINT, WITH THE PERMISSION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.

* VERTICAL CONSTRUCTION JOINT KEYWAY IS NOT REQUIRED WHEN USING ALTERNATE CONSTRUCTION JOINT.

* CARE IS TO BE USED IN CASTING CONCRETE AROUND BULKHEAD TO PREVENT DISLOCATION OR MISALIGNMENT OF THE BULKHEAD.

* SAW CUTTING JOINT IS NOT ALLOWED.

* ALTERNATE CONSTRUCTION JOINT

* Approved: Bill Oliva

* Date: 12.09
### Structural Approach Slab Design

**Bill of Bars**

<table>
<thead>
<tr>
<th>Bar Type</th>
<th>Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless Steel (A1 Abut.) - Slab Span</td>
<td>T803</td>
<td>T506</td>
</tr>
<tr>
<td>Stainless Steel (A1 Abut.) - Girder Span</td>
<td>T803</td>
<td>T506</td>
</tr>
<tr>
<td>Stainless Steel (A1 Abut.) - Approach Span</td>
<td>T803</td>
<td>T506</td>
</tr>
</tbody>
</table>

**Design Data**

- **Materials:**
  - Stainless steel (SS901) for approach slabs.
  - Standard HPC for construction joint.

- **Reinforcement:**
  - Longitudinal reinforcement shall be parallel to the bridge deck.
  - Transverse reinforcement shall be placed parallel to the construction joint.

- **Concrete:**
  - The total estimated quantities table in the final plans.

- **Soil Bearing:**
  - The existing soil bearing pressure meets the requirement.

- **Bridge Plan:**
  - Structural approach slabs to be part of the bridge plan.

**Design Engineer:**

Bill Oliva

**Date:**

7-19

**Standard 12.10**
**Pile Encased Pier**

**ELEVATION**

- Looking up station
- Steel piling shown, cast in place concrete slab superstructure
- See standard 13.03 for additional, applicable designer notes

**PLAN**

- Steel piling shown, cast in place concrete slab layout similar
- #4 bars @ 1'-0" each face
- #4 bars @ 1'-0" each face
- #4 bars @ 1'-0" each face

**SECTION A-A**

- #5 bars @ 1'-0" each face
- #5 bars @ 1'-0" each face
- #5 bars @ 1'-0" each face

**END VIEW**

- Concrete slab superstructure
- See standard 13.03 for additional, applicable designer notes

**NOTES**

- At pier __, concrete poured underwater will be allowed and shall be done in accordance with standard 13.01, 19.33, and 19.34. Concrete poured underwater shall not exceed 10.0 feet in depth, unless approved otherwise.
- At pier __, Cofferdam and cofferdam dewatering required. Cofferdam shall be dewatered prior to placing pier concrete. Construction joints are not required, regardless of length of pile encased piers.
- At pier __, concrete poured underwater will be allowed and shall be done in accordance with standard 13.01, 19.33, and 19.34. Concrete poured underwater shall not exceed 10.0 feet in depth, unless approved otherwise.
- At pier __, concrete poured underwater will be allowed and shall be done in accordance with standard 13.01, 19.33, and 19.34. Concrete poured underwater shall not exceed 10.0 feet in depth, unless approved otherwise.

**DESIGNER NOTES**

- See bridge manual section 13.2.3 and standard 13.01 for guidance on pier types, details, and applicable bid items.
STIRRUPS TO BE DESIGNED.

BOLTS ON STEEL GIRDER

STIRRUPS TO CLEAR ANCHOR

DIMENSION LONGITUDINAL

PIER HEIGHT

9" MIN.

CL. TYP.

2" MIN.

PILES

DESIGNED

BARS TO BE DESIGNED

#4 BARS IN FOOTING DOWELS (MIN. MAT STEEL = #6 @ 1'-0"

#4 COLUMN TIES

TO BE FULLY DEVELOPED.

STEEL. FOOTING DOWELS (SEE BRIDGE MANUAL 13.4.10 FOR MULTI-COLUMNED PIER TYPE MULTI-COLUMNED PIERS.

FOR CASES WITH CRASH WALLS, DEFER TO NON-AESTHETIC TO SIDES OF CAP AND TO ADJACENT BEARING SEAT STEPS.

SEE STANDARD 13.01 FOR MINIMUM OFFSETS FROM BEARINGS IN BOTH DIRECTIONS.

STEEL IN THE TOP OF THE PIER CAP (NEGATIVE MOMENT AND BY DESIGN SPECIFICATIONS. MAXIMUM REQUIRED BAR STEEL REQUIRED FOR BENDING IN PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY.

BAR STEEL IN THE TOP OF THE PIER CAP SHALL BE DETAILED IN LENGTHS AS REQUIRED FOR CONSTRUCTIBILITY.

PIERS UNDER EXPANSION JOINTS AND ON ALL PIERS AT GRADE LEVEL.

ABOVE LOWEST BEAM SEAT.

SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL ENGINEER'S DISCRETION.

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

SEE STANDARD 18.01.

WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

1. FOR GIRDERS WITH 1/2" ELASTOMERIC BEARING PADS BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE EXPOSED EDGES OF CONSTRUCTION JOINTS SHALL BE FLUSH AND NOT BEVELED IN COLUMNS.

EXPOSED EDGES OF CONSTRUCTION JOINTS SHALL BE FLUSH AND NOT BEVELED IN COLUMNS.

BE FORMED BY A BEVELED KEYWAY 2" DEEP x 1'-3" X 1'-3".

USE KEYED JOINTS FOR FOOTINGS SHALL OPTIONAL KEYED CONSTRUCTION JOINTS IN COLUMNS (IF USED) AND REQUIRED KEYED JOINTS FOR FOOTINGS SHALL OPTIONAL KEYED CONSTRUCTION JOINTS NEAR POINT OF LAP SPLICE UNLESS OTHERWISE SHOWN.

LEVELS OF PIER

STANDARD 13.05

Approved:

Bill Oliva

Date: 7-16-20
**Plan of Pier Cap**

- Make top of cap parallel to grade for concrete slab superstructure.
- Provide top of beam seats at each pier level.
- See Detail A for beam seat details.

**Section P1**

- Keyed construction joints shall be formed by beveled keyway between tied reinforcing steel in bearing areas, or beveled keyed construction joint, if provided, shall be flush and not recessed.
- The bar spacings at the optional, keyed construction joints may be eliminated and 4 4 bars spaced at a maximum of 24 inches vertically.

**Section P2**

- See Standard 13.01 for minimum offsets from bearings to sides of beam seats.

**Design Notes**

- All bar spaces to be based on "Class C" tension lap splice unless otherwise shown.
- Optional, keyed construction joints shall be formed by beveled keyway between tied reinforcing steel in bearing areas, or beveled keyed construction joint, if provided, shall be flush and not recessed.
- Keyed construction joints may be eliminated when the vertical reinforcement is 3% or none of the gross concrete area.
- Provide top of beam seats at each pier level.
- See Standard 13.01 for additional reinforcing steel in bearing areas for beam seats that are 4" or more in height, and adjacent beam seats.

**Design Notes (Cont.)**

- Optional, keyed construction joints may be eliminated when the vertical reinforcement is 3% or none of the gross concrete area.
- Provide top of beam seats at each pier level.
- See Standard 13.01 for additional reinforcing steel in bearing areas for beam seats that are 4" or more in height, and adjacent beam seats.

**Approved:**

- Bill Oliva
- July 26, 2006

- Standard 13.06

**Pier Frame Resembling Two Hammerhead Piers Placed for "Hammerhead Length" Greater Than 45'-0", Consider a Two Seat Structure.**

- When the bottom of the girders slope more than 1%, the bearing seat areas shall be level except for the two cases listed below:
  - Shaft pier frame resembling two hammerhead piers placed for "hammerhead length" greater than 45'-0", consider a two seat structure.
  - See Standard 12.01 for additional reinforcing steel in bearing areas for beam seats that are 4" or more in height, and adjacent beam seats.

**Notes**

- The bar spacings at the optional, keyed construction joints may be eliminated and 4 4 bars spaced at a maximum of 24 inches vertically.
- Provide top of beam seats at each pier level.
- See Standard 13.01 for minimum offsets from bearings to sides of beam seats.

**Engineer's Discretion**

- Beam seats may be angled to match skew at the design engineer's discretion.
- See Standard 18.01 for additional reinforcing steel in bearing areas for beam seats that are 4" or more in height, and adjacent beam seats.

**Two Shaft Pier**

- Shaft pier frame resembling two hammerhead piers placed for "hammerhead length" greater than 45'-0", consider a two seat structure.
- See Standard 12.01 for additional reinforcing steel in bearing areas for beam seats that are 4" or more in height, and adjacent beam seats.

**Details**

- #4 bars spaced at 1'-0" vertically.
- See Standard 13.06 for seal details.

- "L" is hammerhead length = 1'-0"
**Designer Notes**

Provide 4” clearance between anchor bolts and reinforcement.

For pier caps up to 10'-0" wide, provide at least one 5" clearance between reinforcing bars for tremie placement and vibration. For caps greater than 10'-0" wide, provide at least two such gaps.

Show anchors locations on pier cap sheets.

Abutment reinforcement layout similar to pier cap reinforcement detailing.

**Note**

Displace transverse stirrup bars as needed to provide 4” clearance between anchor bolts and reinforcement.

Provide adequate clearance for post-installed anchors.

Detail multiple layers of bar steel to avoid spacing that is too tight. Bundled bars may be used, avoid lapping bundled bars.

Provide reinforcement necessary to support main reinforcement.

---

**Section Thru Pier Cap**

**Plan**

**Approved:** Bill Oliver

**Date:** 10/17

**Standard:** 13.08
PIECE ENCASED PIER (TYPES)

Pier types shown on this standard are based on the observed water elevation. Other factors (velocity, H2 elevation, etc.) should also be considered when selecting the appropriate bid items and plan notes.

Pile Encased Pier types:
- Type 1 - cofferdam bid item not provided. Consider providing underwater inspection bid item.
- Type 2 - cofferdam and underwater inspection bid items required.
- Type 3 - cofferdam and seal bid items required.

WALL PIER ALTERNATIVES:
- Solid wall (as shown on this standard)
- Hammerhead (see Standard 13.02)

Approved: Bill Oliva

STANDARD 13.09
NOTES

DETAILS OF CONSTRUCTION MATERIALS AND WORKMANSHIP

NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE

PREDICTIVE REQUIREMENTS OF THE STANDARD SPECIFICATIONS

AND THE APPLICABLE SPECIFIC PROGRAMS.

BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE

CONCRETE CONSTRUCTION JOINTS SHALL NOT BE ALLOWED IN THE

BARRIER. CONSTRUCTION JOINTS ALL SHOWN IN THE

FOOTINGS AT LOCATIONS SHOWN IN THE "PLAN VIEW".

DO NOT CUT OR DRILL INTO EXISTING COLUMN BAR STEEL.

ALL REINFORCEMENT SHALL BE EPOXY-COATED.

USE 2-INCH MINIMUM BAR CLEARANCE EXCEPT AT FOOTINGS

PROVIDE 3-INCH MINIMUM CLEARANCE FROM BOTTOM OF EXISTING

TO BOTTOM TRANSVERSE REINFORCEMENT.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT

WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT

WITH THE ANCHOR ASSEMBLY FOR THE THRIE BEAM ATTACHMENT.

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WITH THE ANCHOR ASSEMBLY FOR THE THRIE BEAM ATTACHMENT.
**Integral Barrier Details**

**51-Inch Vertical Concrete Barrier and Transition**

For additional details, see Standard 13.11.

**Designer Notes**

The details shown in Standards 13.10 and 13.11 are for vehicle protection and are used with existing structures. Consider providing an additional transition section adjacent to the other exterior pier column for the following conditions:

- Where there is a change in grade.
- Where there is a change in direction.
- Where there is a change in road width.
- Where there is a change in road surface.
- Where there is a change in traffic volume.
- Where there is a change in weather conditions.

Contact the Regional Office for verification of any of these conditions.

These details meet criteria for Test Levels T1-T1-4.

For vehicle protection, see for 8-35-1 to determine when beam guard or concrete barrier should be placed between the traffic and the pier, or when an integral barrier should be used.

Approved: Bill Oliva

**Bar Bending Diagrams**

Bar dimensions are out to out of bar.

**Adhesive Anchor Layout**

- Provide 3/4-inch bevel or 3-inch drills on concrete barrier edges, top and ends, type.
- Provide 3/4-inch bevel or 3-inch drills on concrete barrier edges, top and ends, type.
- Provide 3/4-inch bevel or 3-inch drills on concrete barrier edges, top and ends, type.
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GENERAL NOTES

The plan quantity for the new MSE wall system is based on a wall height measured from the top of wall to a constant depth of finished grade below finished grade.

DESIGN DATA

The contractor shall provide complete design plans, details, specifications, and shop drawings for the retaining wall system in accordance with the special provisions. The retaining wall manufacturer shall provide technical assistance to the contractor during construction. The cost of furnishing these drawings shall be included in the bid item for the wall system.

EXAMPLE PLAN

EXPOSED WALL HEIGHT (FEET)

EXAMPLE ELEVATION

(WALL ELEV. = STA. 0+00)

GEOMETRY TABLE

WALL EXTERNAL & OVERALL STABILITY EVALUATION

SOIL PARAMETERS

TYP. CROSS SECT. OF RETAINING WALL

LIST OF DRAWINGS

1. RETAINING WALL SYSTEM
2. SUBSURFACE EXPLORATION
**Designer Notes**

Due to maintenance concerns, MSE walls shall not be used for the singular purpose of reducing span length. Other circumstances may also justify the use of MSE walls at abutments.

**Fall Protection**

Fall protection shall be provided, the option provided should be based on the preference of the bridge maintenance and region project staff.

If pipe railing is used, see STD. 30.26 for applicable notes. (Note: STD. 30.26 is still under development)

"Slope Paving Concrete" items to be shown as part of bridge plan.

**Notes**

- **Unfactored Superstructure Lateral Loads Transferred to the Abutment**
  - The following loads shall be noted on plans:
  - kips per foot of abutment length
  - The values are taken to be kips per foot of abutment length

- **Area of Abutment Anchorage**
  - The area of abutment anchorage of the MSE manufacturer's resident design shall be noted on plans

- **Backfill**
  - MSE backfill or size 2 coarse aggregate.
  - Sheet pile or MSE wall showing both eye bolt and railing fall protection options

- **Pipe Railing Option**
  - Notes

- **Pipe Laying**
  - Notes

- **Partial Elevation of F.F. Abutment**
  - Showing eye bolt fall protection option

- **Cross Section Thru Abutment at MSE Wall**
  - Expansions: 1' 0" (see Standards 12.01 & 12.02 for applicable code reinforcement and standards 12.03 & 12.04 for backwall and wing reinforcement)

- **Cross Section Thru Abutment at MSE Wall Showing Both Eye Bolt and Railing Fall Protection Options**

**Bureau of Structures**

Date: 3-19

Approved: Bill Oliva

Standard 14.04
**Designer Notes**

The "preferred MSE wall at abutment configuration" separates the MSE wall from the abutment, avoiding complicated details and potential settlement issues. This advice is more relevant as skew increases.

**Notes**

- Seal all exposed horizontal and vertical surfaces of filler with non-staining, non-bituminous joint sealer. It is held below surface of concrete.

**Preferred MSE Wall at Abutment Configuration**

- 0° wall angle required for wing parallel to abutment centerline.

**Alternate MSE Wall at Abutment with Wrapped MSE Wall**

- For type A1 semi-exp. abuts, extend polyethylene sheeting over entire length of closure wall.

**Plan View of Alternate MSE Wall at Abutment with Closure Wall**

- Abut. type A1 shown. Expansion abut would require closure wall going to backwall with bent bars to achieve development.

**Section A-A**

- #5 bars at 1'-0" max. (if closure wall length 'L' exceeds 4'-6", bars must be designed).
STREAM BED

LESS BERM OR LESS SET BY DESIGN CONDITIONS

SECTION A-A

SECTION B-B

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

TOE DETAIL

PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS
HEAVY RIPRAP OR OTHER SLOPE PROTECTION.
IF HEAVY RIPRAP IS USED, PLACE GEOTEXTILE TYPE 'HR' BELOW IT.

GEOTEXTILE FABRIC TYPE 'HR'

BUREAU OF STRUCTURES

STANDARD 15.01

Bill Oliva

APPROVED: Bill Oliva
DATE: 7-19
ASPHALTIC MATERIAL SHALL NOT BE APPLIED TO THE SURFACE OF SELECT CRUSHED MATERIAL.

ROUND STONE WILL NOT BE ACCEPTED.

APPLY ASPHALTIC MATERIAL UNIFORMLY OVER THE SURFACE OF THE PAVING.

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

LIMITS OF SLOPE PAVING

BUREAU OF STRUCTURES

NOTES

PLAN

SLOPE FACE

CRUSHED AGGREGATE

BLEND WITH ADJACENT VARIABLE - 5'-0" MIN.

EMBANKMENT 2'-0"

EDGE OF SUPERSTRUCTURE

OUTER EDGE OF SUPERSTRUCTURE

FUNCTIONAL V. 2'-0"

SYMMETRICAL ABOUT E

SUPERSTRUCTURE OUTER EDGE OF

OUTER EDGE OF SUPERSTRUCTURE

FOOTING PLATE

FOUNDATION Bed

CRUSHED AGGREGATE

SUPERSTRUCTURE

OUTER EDGE OF

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

8'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.

2'-0"

edge of shoulder

2'-6"

BERM

6'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.

2'-0"

edge of shoulder

2'-6"

BERM

6'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.

2'-0"

edge of shoulder

2'-6"

BERM

6'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.

2'-0"

edge of shoulder

2'-6"

BERM

6'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.

2'-0"

edge of shoulder

2'-6"

BERM

6'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.

2'-0"

edge of shoulder

2'-6"

BERM

6'' MIN.

2 :1

SLOPE BREAK POINT

FOR LOCATION OF
SEE FDM 11-35-1

3 :1 MAX.
PART TRANSVERSE SECTION AT ABUTMENT

TYPE A1 DIAPHRAGM WITH A RAISED SIDEWALK

MORE BARS SHOWN ARE THE 17 BARS.
DECK REINFORCEMENT NOT SHOWN FOR CLARITY.

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

PAVING WIDTH IS 2'-0" WIDE BY 4'-0" DEEP
ADOPTING A STRUCTURAL APPROACH SLAB IS USED.

SECTION A-A

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

- SEE STANDARDS 17.01, 17.02 FOR REINFORCEMENT DETAILS
- DETAILS SHOWN ARE FOR GIRDER STRUCTURES. SIMILAR REINFORCEMENT FOR SLAM STRUCTURES WILL BE USED
- WITH A REMINDER THAT THE TRANSVERSE AND LONGITUDINAL REINFORCEMENT LAYERS ARE REVERSED.

SECTION A-A

NOTES

- WHEN PARAPETS ARE POURED CONTINUOUSLY
FROM END TO END, THEY SHOULD BE SEPARATED
BY A Minimum 1'-0" OF PERMISSION TO DECK
AND LEAVE ROUGH. FOR DECK POOL, MATCH DECK SLOPE.
- ALL MEDIAN SECTIONS ON TOP OF PAVING BLOCK MUST BE ANCHORED
AS SHOWN.
- NEW MEDIAN IS POURED WITHIN 45 DAYS OF COMPLETING THE DECK POOL.

CROSS SECTION THRU ANCHORED MEDIAN

ANCHORAGE TO DECK NOT REQUIRED FOR WIDTHS > 3'-0", EXCEPT
ALL MEDIAN SECTIONS ON TOP OF PAVING BLOCK MUST BE ANCHORED
CLEAN ALL LOOSE MATERIAL ON THE DECK AT THE MEDIAN
LOCATION PRIOR TO MEDIAN PLACEMENT USING HIGH PRESSURE
WATER OR AIR, ENSURING ALL FREE-STANDING WATER IS
REMOVED PRIOR TO MEDIAN PLACEMENT. NECK CEMENT IS
REQUIRED FOR THE 5/8" OF THE STANDARD SPECIFICATIONS
UNLESS MEDIAN IS POURED WITHIN 45 DAYS OF COMPLETING
THE DECK POOL.

ANCHORED MEDIAN Curb DETAIL

CONSISTENT JOINT STRIKE OFF AS SHOWN
AND LEAVE ROUGH FOR DECK POOL, MATCH DECK SLOPE.

ANCHORED MEDIAN Curb DETAIL

SEE "ELASTOMERIC COMPRESSION JOINT SEAL DETAIL" FOR REINFORCEMENT DETAILS.

NOTE:

- Notes vary based on joint manufacturer
- Manufacturer shall label top of seal

DESIGNER’S NOTES

- FOR EXTREME SIDEWALK MOTHS AND/OR
- SUPERIMPOSED LOADS AT LEVEL EACH CROSS SECTIONS MAY BE LEVELLED TO REDUCE EXCESSIVE SIDEWALK THICKNESS.
- FOR DECK POOL PURPOSES, THE SUPERSTRUCTURE SIDER SHALL ACCOUNT FOR 4" MINIMUM SIDEWALK CROSS SLOPE.

STANDARD 17.01

BILL OLIVA

DATE:
**REHABILITATION FLASHING DETAIL 1**

Detail 1 is not to be used if clearance is an issue or if debris is a concern.

The flashing is not to be used if clearance is an issue or if debris is a concern.

The flashing is not to be used if clearance is an issue or if debris is a concern.

If debris is a concern, do not use flashing if freeboard is less than 3'.

**DESIGNER NOTES**

Edge of deck flashing is for open rail bridges and may be used for rehabilitation or new construction. Contact the design engineer for the selection on whether or not to use the flashing on new bridges.

Detail 1 or detail 2, or a combination of the two, may be used for rehabilitation.

The design engineer shall provide concrete surface repair details as needed. Conceptual details are shown on this standard.

Do not use flashing if freeboard is less than 3'.

**NOTES**

The flashing is not to be used if clearance is an issue or if debris is a concern.

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**DRAWING**

Edge of deck flashing is for open rail bridges and may be used for rehabilitation or new construction. Contact the design engineer for the selection on whether or not to use the flashing on new bridges.

Detail 1 or detail 2, or a combination of the two, may be used for rehabilitation.

The design engineer shall provide concrete surface repair details as needed. Conceptual details are shown on this standard.

Do not use flashing if freeboard is less than 3'.
**DESIGNER NOTES**

**CONCRETE SLAB DETAILS**

**Bill Oliva**

---

**TOP OF SLAB ELEVATIONS**

<table>
<thead>
<tr>
<th>Span</th>
<th>Elevation</th>
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<tbody>
<tr>
<td>1/10</td>
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<tr>
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<tr>
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<td>6/10</td>
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<td>7/10</td>
<td>8/10</td>
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<tr>
<td>9/10</td>
<td>10/10</td>
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</tbody>
</table>

**SURVEY TOP OF SLAB ELEVATIONS**

<table>
<thead>
<tr>
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<th>Elevation</th>
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<tbody>
<tr>
<td>1/10</td>
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<td>9/10</td>
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</tr>
</tbody>
</table>

**Camber and Slab Thickness Diagram**

Camber shown is based on 3 times dead load deflection.
Camber shown does not include allowance for form settlement.
Parapets, sidewalks, and medians placed on top of slab shall be finished after slab has been placed except for staged construction.

To determine falsework elevation at edge of slab, crown or reference line, follow these procedures:

1. **Top of slab elevation at final grade**
2. **Slab thickness**
3. **Camber**
4. **Form settlement/deflection due to placement of slab** (to be computed by the contractor)

Equals: Top of slab falsework elevation

---

**NOTES**

- Fill in the table of survey top of slab elevations for each span on the contract plans.
- Include the survey top of slab elevations table on the contract plans, to be filled in during construction.
- For bridges with a line not on the crown, provide elevations at both locations.

---

**CONCRETE SLAB DETAILS**

**BUREAU OF STRUCTURES**

Approved: Bill Oliva

Date: 7-21

Standard 18.03
**28” GIRDERS**

*STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6” DIA.)*

<table>
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<th>NO. STRANDS</th>
<th>E (inches)</th>
<th>PRE-TENSION (KIPS)</th>
<th>P(init.)=A f</th>
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<td>4.208</td>
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</table>

*STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5” DIA.)*

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**DESIGNER NOTES**

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

**BOND BREAKER DETAIL**

IS 60 X STRAND DIAMETER.

**PRE-TENSION**

\[ f = 0.75 \times 270,000 = 202,500 \text{ P.S.I} \]

**STRAIN**

\[ e = \frac{f}{f’} = \frac{202,500}{270,000} = 0.75 \]

**STRAIN FOR LOW RELAXATION STRANDS**

\[ e = \frac{f}{f’} = \frac{270,000}{270,000} = 1.0 \]

**STRAIN FOR 0.6” DIA. STRANDS**

\[ \epsilon = \frac{A f}{A f (0.6”)} = \frac{202,500}{310} = 650 \text{ KIPS} \]

**STRAIN FOR 0.5” DIA. STRANDS**

\[ \epsilon = \frac{A f}{A f (0.5”)} = \frac{202,500}{303} = 665 \text{ KIPS} \]

**STRAIN FOR 0.5” DIA. STRANDS**

\[ \epsilon = \frac{A f}{A f (0.5”)} = \frac{202,500}{303} = 665 \text{ KIPS} \]

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**STRAIN FOR 0.5” DIA. STRANDS**

\[ \epsilon = \frac{A f}{A f (0.5”)} = \frac{202,500}{303} = 665 \text{ KIPS} \]

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\[ \epsilon = \frac{A f}{A f (0.6”)} = \frac{202,500}{310} = 650 \text{ KIPS} \]

**STRAIN FOR 0.5” DIA. STRANDS**

\[ \epsilon = \frac{A f}{A f (0.5”)} = \frac{202,500}{303} = 665 \text{ KIPS} \]
**36" Prestressed Girder Design Data**

**36W" Girder**

- $f' = 270,000$ P.S.I.
- $f = 0.75 \times 270,000 = 202,500$ P.S.I.

**Pre-Tension for Low Relaxation Strands**

**Design Notes**

- For low relaxation strands, $f = 0.75 \times f'$.
- For 0.6" dia. strands, $P_{init} = 0.217 \times 202,500 = 43.94$ Kips.

**Standard Strand Patterns**

**Standard Arrangements to Raise Center of Gravity**

To avoid draping of 0.6" dia. strands.

**Arrangement at 6" Span - For Girders with Draped 0.6" Dia. Strands**

**Design Notes**

- In the strand pattern sheet, place a box around each strand pattern that applies to the designed structure and label the span it is used in.

**Bureau of Structures**

**Approved: Bill Oliva**

**Date: 7-18**

**Standard 19.12**
STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
TO AVOID DRAPING OF 0.6" DIA. STRANDS

STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS

STANDARD STRAND PATTERNS FOR DRAPED STRANDS

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

45W" Prestressed Girders Design Data

GIRDER DESIGN DATA

PRE-TENSION

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

ARRANGEMENT AT 5% SPAN - FOR GIRDERS WITH DRAPED 0.6" DIA. STRANDS

Bureau of Structures

Approved: Bill Oliva
Date: 7-14
SECTION A-A

#5 U-SHAPED BAR
4 PAIRS #6 STIRRUPS
#3 BARS END OF GIRDER EACH END
#6 BAR 1 PAIR END OF GIRDER EACH END
29 PAIRS EACH END
1 PAIR EACH END
ELASTOMERIC ANCHOR PLATE
#6 STIRRUPS = 1'-0" 2 @ 6" 1'-0"
#6 BAR 1 PAIR

2'-6" 3" BARS PLACE @ STIRRUP SPACING.
#4 BAR, EPOXY COATED.

1" C.L.

BOTTOM FLANGE DETAIL A

3" BAR, EPOXY COATED. PLACE @ STIRRUP SPACING REQUIRED

#4 STIRRUPS & #3 BARS PLACE @ STIRRUP SPACING.

LOCATION OF DRAPED STRANDS

STRANDS SHALL BE FLUSH WITH END OF GIRDER. ORDER ENDS EMBEDDED COMPLETELY IN CONCRETE. END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. FOR ORDER ENDS THAT ARE NOT COMPLETELY EMBEDDED, THE ORDER END STRANDS SHALL BE EMBEDDED WITH A NON-PREMIER EPOXY COMPOSITES 2006-220 SEI TYPE & SPACE CLEATED OR PLYWOOD SHEET SHALL BE APPLIED AT LEAST 7 DAYS AFTER MOLD CURING HAS CEASED AND PRIOR TO THE APPLICATION OF THE SEALER.

ALL BARS SHALL BE CAST FULL LENGTH AS SHOWN. SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT, AN EQUIVALENT OF STEEL BARS WITH THE AREA SHOWN SPECIFIED TO BE USED HISTORICALLY FOR NON-PREMIER JOINT SEALER. APPROVAL OF THE STRUCTURES DEVELOPMENT SECTION IS REQUIRED PRIOR TO SHOP DRAWING SUBMISSION.

PRESTRESSING STRANDS SHALL BE 0.6"-7-WIRE LOW-RELAXATION STRANDS WITH AN ALTERNATE END OF 270,000 PSI. #4 BARS SHALL BE "PRESTRESSED" WITH A 1.0-1.5" MINIMUM 270,000 PSI.

DESIGNER'S NOTES: AS REQUIRED BY DESIGN.

PRESTRESSING STRANDS SHALL BE FLUSH WITH END OF GIRDER. END OF STRANDS SHALL BE EMBEDDED COMPLETELY IN CONCRETE. END OF STRANDS SHALL BE COATED WITH NON-BITUMINOUS JOINT SEALER. THE END VARIANCE IN ACTUAL CAMBER VERSUS THE CALCULATED RESIDUAL CAMBER. 

54" PRESTRESSED GIRDER DETAILS

BUREAU OF STRUCTURES

STANDARD 19.15
1. **Girder End Details:**
- **END OF ORDER:**
  - For order end embedded completely in concrete, end of strands shall be coated with non-pigmented epoxy conforming to AASHTO M-235. The coating shall be applied at least 1⁄8" (3.175 mm) thick and cured in place.

2. **Concrete Details:**
- **CONCRETE STRENGTH:**
  - Min. 6,000 psi to a max. of 8,000 psi.
  - Maximum release variance in actual camber versus the calculated residual camber.

3. **Prestress Shrinkage:**
- **STRENGTH IS 6800 PSI:**
  - Use 0.6" dia. strands for all patterns.

4. **Dimensions and Spacings:**
- **#3 BAR:**
  - 29 pairs each end
  - 1" minimum clearance from top of deck while accounting for 1" of stiffened wire (deformed) support with vertical wire (Epoxy coated)

5. **Concrete Placement:**
- **TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY:**
  - Smooth surfaces including the outside 15" of the top flange.

6. **Concrete Staining:**
- **APPLICATION OF CONCRETE STAINING:**
  - An approved concrete sealer shall be applied to all smooth surfaces.

7. **Base Plate:**
- **BASE PLATE ELEMENTS:**
  - Epoxy coated and not in the area of horizontal wire (Epoxy coated). Provide stirrup spacing that is symmetrical about the C/L of the girder.

8. **Deck Reinforcement:**
- **DECK REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED:**
  - Minimum of 6,000 psi to a max. of 8,000 psi. Max. release variance in actual camber versus the calculated residual camber.

9. **Girder Placement:**
- **ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN:**
  - Spacing shown for #4 stirrups is for Grade 60 reinforcement.

10. **Detailing:**
- **DESIGNER NOTES:**
  - Provide stirrup spacing that is symmetrical about the C/L of the girder.

---

**69" PRESTRESSED GIRDER DETAILS**

**SECTION A-A**

**SUPPORT WITH STEEL OR ELASTOMERIC BARS**

**DETAIL A**

**BOTTOM FLANGE**

**LOCATION OF DRAPE STRANDS**

**SECTION A-A**

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

**SUPPORT WITH #5 BAR**

**29 PAIRS EACH END (EPOXY COATED)**

**4 BAR, EPOXY COATED, PLACE AT STIRRUP SPACING**

**END OF ORDER**

**RECORD DIMENSIONS ON FINAL PLANS.**

**CENTER OF GRAVITY OF DRAPE STRANDS**

**END OF ORDER**

**GIRDER LENGTH**

**MIN. DECK EMBEDMENT**

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

---

**NOTES**

**TOP OF GIRDER TO BE ROUGH FLOATED AND BROOMED TRANSVERSELY:**
- Smooth surfaces including the outside 15" of the top flange.

---

**BOUNDRY OF STRUCTURES**

**APPROVED:** Bill Oliva

**DATE:** 1/28

**STANDARD 19.17**
**PRE-TENSION**

- **f** = 270,000 P.S.I.
- **f** = 0.75 x 270,000 = 202,500 P.S.I.

**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY**

1. **To avoid draping of 0.6" dia. strands**
2. **Design notes**: Box around each strand pattern that applies to the designed structure.
3. **Standard strand patterns for undraped strands**
4. **Standard strand patterns for draped strands**

**Arrangement at 5' span - for girders with draped 0.6" dia. strands**

**Designer notes**: On the strand pattern sheet, place a box around each strand pattern that applies to the designed structure and label the span it is used in.

**Girder Design Data**

- **72W" Girder**
- **A** = 915 SQ. IN.
- **y** = -34.87 IN.
- **r** = 8 IN.
- **I** = 656,426 IN.
- **S** = -18,825 IN.
- **S** = 17,680 IN.
- **B** (KIPS) = 0.217 x 202,500 = 43.94 KIPS

**72W" Prestressed Girder Design Data**

- **A** = 915 SQ. IN.
- **y** = -34.87 IN.
- **r** = 8 IN.
- **I** = 656,426 IN.
- **S** = -18,825 IN.
- **S** = 17,680 IN.
- **B** (KIPS) = 0.217 x 202,500 = 43.94 KIPS

**Bill Oliva, GCM, Approved**

**Date:** 7-18
**STANDARD STRAND PATTERNS FOR DRAPED STRANDS**

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<th>NO. STRANDS</th>
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**DESIGNER NOTES**

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

**BUREAU OF STRUCTURES**

BILL OLIVA

DATE: 7-16

STANDARD 19.20
### Designer Notes

1. **DECK Haunch Detail**
   - For **minimum haunch** height at edge of outer flanges of 3", use theoretical average haunch height at centerline of flange for computing the haunch concrete quantity.
   - **INTERMEDIATE concrete diaphragms** shall be used only when the use of steel diaphragms is not feasible because of the type of structure, or when the type of structure is such that the use of both intermediate concrete & steel diaphragms on the same edge is not practical.
   - **For decks 1" thick, place intermediate diaphragms in a straight line**, refer to Standard 19.36. Provide offset for skew angles > 10°.
   - Pre-planted are typically not used but may be used as part of the bridge aesthetic package on 28" and 36" levels.
   - **Intermediate concrete diaphragms** shall be used only **when the use of steel diaphragms is not feasible because of the type of structure, or when the type of structure is such that the use of both intermediate concrete & steel diaphragms on the same edge is not practical**.
   - Provide offset for skew angles > 10°.

2. **DECK Camber & Deflection Diagram**
   - *A* - RESIDUAL CAMBER
   - *B* - Dead Load Deflection
   - *C* - Interim Camber

3. **Intermediate Concrete Diaphragm Details**
   - Design camber at centerline of flange for computing the haunch concrete quantity.
   - Use theoretical average haunch height at centerline of flange for computing the haunch concrete quantity.
   - **Minimum haunch** height at edge of outer flanges of 3", use theoretical average haunch height at centerline of flange for computing the haunch concrete quantity.

### Structural Details

- **Deck Steel**
- **Concrete Diaphragm**
- **Prestressed Girders**
- **Top of Deck**

---

**BUREAU OF STRUCTURES**

**Approved by:** Bill Oliva

**Date:** 1-17

**Standard 19.32**
NOTES

ALL DIAPHRAGM MATERIAL NOT EMBEDDED IN THE CONCRETE ORDER SHALL BE PAID FOR AT THE ONE PRICE BID FOR STEEL DIAPHRAGMS 6'-8" EACH.

EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.

ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A36 GRADE 36.

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

STEEL DIAPHRAGM TO CONCRETE WEB CONNECTION SHALL BE SNUG-TIGHT AT 80 FT.-LBS. TURN UNLESS NOTED OTHERWISE. HIGH STRENGTH BOLTS FOR DIAPHRAGM TO DIAPHRAGM SHALL MEET THE REQUIREMENTS FOR ASTM A490 OR ASTM A491.

DESIGNER NOTES

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

ON THE PLANS, SHOW LOCATION OF INSERTS/HOLES FOR DIAPHRAGM TO WEB CONNECTION, NOT ONLY FROM THE BOTTOM OF THE GIRDER BUT ALSO FROM THE ENDS OF EACH GIRDER.

INTERMEDIATE DIAPHRAGMS FOR 36" PRESTRESSED GIRDERS

SECTION AT INTERIOR GIRDER THROUGH DIAPHRAGM FOR SKEW ANGLES > 10°
**DECK OVERHANG DETAIL**

See standard 19.52 for additional details.

**DEAD LOAD DEFLECTION DIAGRAM**

See section 19.54 for additional details.

**DECK THICKNESS DIAGRAM**

See section 19.55 for additional details.

---

**CROWN DETAIL AT LOCATION OF MIN. DECK THICKNESS**

**NUMBER OF SECTIONS**

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**NOTES**

- The theoretical initial camber value at the time of strand release is interpolated between deck thickness at the end of deck and midpoint. These values are for informational purposes only.
- Minimum cylinder strength of concrete is the time of transfer of prestress force.
- Bearing pad not required for GRS abutments.
- Dimension assumes 1" joint width. Joint width dimensions may vary due to 1/16" joint tolerances. May be reduced to 1'-7" to maintain roadway clear width.
- See standard 19.56 for additional details.
POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM

SECTIONS 1 THROUGH 4

POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM

(SECTIONS 5 AND 6)

Sponge Neoprene

3/4" Min. Thick

SEAL WASHER

MAY ALSO BE ROUND

STRESS POCKET DETAIL

SEAL WASHER

MAY ALSO BE ROUND

STRESS POCKET DETAIL
LEGEND

- 1/4" RUBBERIZED MEMBRANE WATERPROOFING
- keyed construction joint formed by profiles 2" x 6".
- bars placed parallel to girders, spacing perpendicular to girders.

SEE STD. 12.01

#6 BARS

#6 BARS @ 1'-0" MAX VERTICAL SPACING

#4 AT 1'-0", TYP.

VOID

` PILES

#4 BARS, CAST IN GIRDER. SEE STD. 19.52.

4" DIA. HOLE FOR POST-TENSIONING

1'-6" RUBBERIZED MEMBRANE WATERPROOFING

KEYED CONSTRUCTION JOINT FORMED BY BEVELED 2" X 6".

BARS PLACED PARALLEL TO GIRDER, SPACING PERPENDICULAR TO GIRDER.

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

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

#6 BARS, TYP.

#4 AT 1'-0", TYP.

TOP OF DECK

TOP OF PRESTRESSED BOX GIRDER

TOP OF BOX DECK OVERHANG

BEARING PAD

CONCRETE ABUTMENT (SHOWING DECK OVERHANG TERMINATION AT CONCRETE ABUTMENT)

ELEVATION

DETAIL "A"

PRESTRESSED BOX GIRDER DETAILS 4

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE

STANDARD 19.55
PLAN
SHOWING REINFORCEMENT CAST INTO PRESTRESSED BOX GIRDER
PARAPET AND DECK ARE SHOWN FOR CLARITY

SECTION A-A
SECTION B-B
SECTION C-C

REAL EDGE OF CAST-IN-PLACE DECK
EXTERIOR EDGE OF PRESTRESSED BOX GIRDER

OUTSIDE EDGE SHEAR CONNECTOR
#4 AT 2'-0" MAX.
EPOXY COAT BARS

NOTE
BAR B TO BE PAID AS PART OF BID ITEM
“PRESTRESSED BOX GIRDER TYPE X"-inch.

DESIGNER NOTES
SEE CHAPTER 30 STANDARDS FOR SINGLE SLOPE PARAPET DETAILS.
DETAILS SHOWN ARE APPLICABLE FOR CONCRETE ABUTMENTS. DETAILS TO BE MODIFIED FOR GRS ABUTMENTS.

TOP OF DECK
END OF DECK
END OF PRESTRESSED BOX GIRDER

PRESTRESSED BOX GIRDER DETAILS 5
BUREAU OF STRUCTURES
APPROVED: Bill Oliva
DATE 7-16
STANDARD 19.56
NOTES

1. TIMBER CONNECTORS AND HARDWARE EXCEPT THOSE OF WOODEN PIN OR WOODEN PIN WITHIN A DISTANCE OF 3 INCHES FROM THE CENTERLINE OF THE TIMBER HANDLING PLANKS, SHALL BE GALVANIZED.

2. CONCRETE CAST-IN-PLACE, STEEL "HP", OR TIMBER PILING TO THE OUTSIDE EDGE OF THE SUPERSTRUCTURE CONCRETE OR TIMBER.

3. "WING" PLANKS FOR 10 GAGE (6' x 2') - GRADE A - ARMCO
   7 GAGE (6' x 2') - GRADE A - ARMCO

4. "WING" PLANKS FOR 10 GAGE (6' x 2') - GRADE A - ARMCO
   7 GAGE (6' x 2') - GRADE A - ARMCO

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

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

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

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

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

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

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

12. ALTERNATE DETAILS MAY BE SUBMITTED USING OTHER GALVANIZED STEEL TIMBER PLANKING OR PRECAST CONCRETE TIMBER PLANK IN LIEU OF TREATED LUMBER PLANKING, SUBJECT TO APPROVAL BY THE ENGINEER.

† "DIA. BOLT & WASHER. BOLT TO EVERY OTHER BODY PLANK. (HARDWARE)

‡ USE THE RODS ON WING PILE.

* USE THE RODS WITH A DECKBAR ON WING PILE.

---

** TIMBER ABUTMENTS GENERAL **

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

DATE: 7-16

STANDARD 23.01
TREATED TIMBER PILE DECKING (TIMBER GIRDER)

HEAVY HEX. NUT

60 d NAILS

BACKING PLANK (ALTERNATE ATTACHMENT)

SECTION THRU DEADMAN

STEEL "HP" PILING

CONCRETE CAST-IN-PLACE PILING

REFER TO STANDARD 11.01 FOR SECTION THRU REINFORCED CAST-IN-PLACE PILING WHEN PILES ARE EXPOSED.

BODY & WING PLANK CONNECTION DETAILS

PILE CAP DETAIL (TIMBER GIRDERS)

WEARING SURFACE DECKING

2 3/8" DRIFT BOLT x 2'-0" LONG

PILE CAP 10" x 10"

3/8" DRIFT BOLT x 2'-0" LONG

TREATED TIMBER PILE

3/8" DRIFT BOLT WITH PLATE WASHERS

6'-0" NAILING STRIP

8" x 6" NAILING STRIP

8" x 8" x 5'-0" PILE STAY

#4 STIRRUPS AT 1'-6" CENTERS

#4 BARS FULL LENGTH OF DECKMAN

1 1/2" OD PIPE SLEEVE

1/4" DIA. THREADED BOLT, PLACE AT 4'-0" CENTERS FOR WING & BODY PILING, WITH SQUARE NUT & WASHER.

WELD ROD TO PILE SHELL AS SHOWN.

(HARDWARE)

BOLT NAILING STRIP TO PILING WITH 3/8" DIA. BOLTS AT 3'-0" ALTERNATE CENTERS.

Approved: 

Date: 

STANDARD 23.03
INTERMEDIATE DIAPHRAGM SIZES

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<tr>
<th>GIRDER WIDTH</th>
<th>INTERMEDIATE DIAPHRAGMS</th>
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<tr>
<td>33&quot; W. GIRDER</td>
<td>D12 x 20.7</td>
</tr>
<tr>
<td></td>
<td>D12 x 20.7</td>
</tr>
<tr>
<td>30&quot; W. GIRDER</td>
<td>D10 x 15.3</td>
</tr>
<tr>
<td></td>
<td>D10 x 15.3</td>
</tr>
<tr>
<td>27&quot; W. GIRDER</td>
<td>D08 x 11.5</td>
</tr>
<tr>
<td></td>
<td>D08 x 11.5</td>
</tr>
</tbody>
</table>

NOTES
DIAPHRAGMS SHALL BE HORIZONTAL EXCEPT WHEN THE
DIFFERENCE IN ADJACENT GIRDER ELEVATIONS IS OF A
MAGNITUDE THAT NECESSITATES SLIGHTLY THE DIAPHRAGMS.
WHEN DIAPHRAGMS ARE SLOPED, PLACE CENTER OF
DIAPHRAGM AT MID-DEPTH OF GIRDER.
ALL BOLTED CONNECTIONS SHALL BE MADE WITH 3/8" HIGH
STRENGTH ASTM A325 BOLTS.

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

ROLLED GIRDER DIAPHRAGMS

BUREAU OF STRUCTURES

STANDARD 24.06
NOTES

1. For welding details see "Connection Stiffener Details" on Standard 24.02.
2. Minimum plate size shown. Design actual size required.
3. Stiffeners and bearing plates are all perpendicular to flanges, angles are parallel to flanges.

DESIGNER NOTES

1. Dimensions of angles, number of bolts thru angles, thickness of web plate, and size of bearing stiffeners and jacking stiffeners will be determined from an analysis using the vertical and horizontal forces acting at the hinge.
2. The 5" opening between flange plate and flange plate is for fabrication. Actual opening is based on expansion length and temperature.
3. Slotted holes of 6" in the flanges and connecting bars will accommodate a total temperature movement of 8" from 40°F to 140°F. The designer may need to increase or decrease the length of the cut to meet specific job requirements.
4. Cross frame under Brg. and end stiffener is only needed if total web height exceeds 8'.

See Bridge Manual, Section 24.04 for criteria for locating hinge joints.

EXPANSION HINGE

JOINT DETAILS

STANDARD 24.08

APPROVED Bill Oliva

DATE 7-16
**Designer Notes**

Haunch heights will normally be made at the edge of girders at abutments, hinges, and field splices. Haunch depth variations need not be shown on the plans. If haunch variations exceed the specified values, the girders shall be cambered to reduce the variations in haunch thickness.

**Notes**

- Haunch heights at centerline of girders.
- To determine haunch heights after all structural steel has been erected, elevations of the top flanges shall be taken at centerline of bearings and at 0.1 points.

### Elevations at Top of Deck (T.O.D.) & Top of Steel (T.O.S.)

<table>
<thead>
<tr>
<th>Span</th>
<th>T.O.D.</th>
<th>T.O.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>859.79</td>
<td>860.26</td>
</tr>
<tr>
<td>0.01</td>
<td>859.77</td>
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<td>0.02</td>
<td>859.75</td>
<td>860.22</td>
</tr>
<tr>
<td>0.03</td>
<td>859.73</td>
<td>860.20</td>
</tr>
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</table>

**Blocking & Slab Haunch Details**

**Standard** 24.09
Girder Layout On Curve

Alignment substructure units radially when possible.

Intermediate diaphragms outside limits of all concrete.

Field splices outside limits of all concrete.

For horizontal curves with a radius of less than 1400 ft, the girders shall be fabricated along the curve, for a radius greater than 1400 ft, consideration shall be given to kinking girders at field splice locations.

For kinked girder layout:
- Hold 'E' of substructure units and 'G' of splices parallel to each other when possible.
- Girders are to be held parallel to each other between field splices.

For curved girder layout:
- Place substructure units on radial lines when possible.

Tighter spacing may be needed for more severe curvatures.

General notes:
- Sketches and notes apply to any number of spans.
- Number and size of girders and location of field splices to be determined by design.
- Bearing stiffeners - connect at least one cross frame or diaph. at each bearing.

BUREAU OF STRUCTURES

Approved: Scot Becker
Date: 7-10

STANDARD 24,10
SECTION THRU EXPANSION END OF NEW DECK  
SHOWING EXISTING STEEL GIRDER  
WITHOUT EXISTING STEEL DIAPHRAGM  
SEE STD. 40.04 FOR ADDITIONAL DETAILS

NOTES

FOR REHABILITATION PROJECTS:
EXPANSION SUPPORT ANGLES SHALL BE ASTM A36 GRADE 36.
REINFORCEMENT AND REINFORCEMENT BLOCKS SHALL BE ASTM A615 TYPE 1, ASTM A706 TYPE 1.
ALL SUPPORT ANGLES SHALL BE HAND-THREADED GALVANIZED.
ALL BOLTS, NUTS, AND WASHERS SHALL BE HOT-DIPPED GALVANIZED.
ALL STEEL REINFORCEMENT BLOCKS SHALL BE 60,000 PSI CEMENT COMBINED.
ALL DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.
ALL DIAPHRAGM SUPPORT ANGLES SHALL BE HOT-DIPPED GALVANIZED.
ALL REPLACEMENT PAVING BLOCK DIMENSIONS SHALL MATCH EXISTING PLAN DIMENSIONS UNLESS DESIGNER DETERMINES OTHERWISE.

DESIGNER NOTE

1. "MINIMUM 2" UNLESS INCREASED TO ACCOMMODATE LARGE EXPANSION DEVICES.

LEGEND

+ BARS PLACED PARALLEL TO GIRDERS.
+ SPACING PERPENDICULAR TO A, BARS.
+ DIMENSION IS TAKEN NORMAL TO A, BARS.
+ DIMENSION IS TAKEN NORMAL TO A, BARS.
+ DIMENSION IS TAKEN NORMAL TO A, BARS.
BEARING NOTES

All bearings are symmetrical about \( \frac{1}{2} \) of girder and \( \frac{1}{2} \) of bearing.

A bearing of some symmetrical shape is required to increase the thickness of Masonry Plate "D" by the same amount.

All structural steel bearing pads shall be flat rolled steel plates with all surfaces smooth and free from all edges oil, rust, dirt, etc.

All plate cuts shall be made on machine or machine flame cut.

All finished surfaces shall be machine finished by an automatic process.

Anchor bolts shall be threaded 3". Provide one standard wrought iron and steel project anchor bolts, Masonry Plate "D" thickness + 3", above top of concrete.

Anchor bolts shall conform to ASTM A490 or equivalent/premium/eliminate wild variants and eliminate wild anchor bolts.

All materials in bearings including sleeves, anchor bolts, nuts and washers shall conform to ASTM A572 Grade 50. Steel pins as per ASTM A153, Class C.

All structural steel bearing plates shall be flat rolled steel plates with all surfaces smooth and free from all edges oil, rust, dirt, etc.

All plate cuts shall be made on machine or machine flame cut.

All finished surfaces shall be machine finished by an automatic process.

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All finished surfaces shall be machine finished by an automatic process.

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Anchor bolts shall conform to ASTM A490 or equivalent/premium/eliminate wild variants and eliminate wild anchor bolts.

All materials in bearings including sleeves, anchor bolts, nuts and washers shall conform to ASTM A572 Grade 50. Steel pins as per ASTM A153, Class C.

All structural steel bearing plates shall be flat rolled steel plates with all surfaces smooth and free from all edges oil, rust, dirt, etc.

All plate cuts shall be made on machine or machine flame cut.
When required, hold down devices shall be placed symmetrically about longitudinal or framing plane. Maximum spacing of hold down devices shall be by alternate orders.

HOLD-DOWN PLATE AND PLATE WASHERS SHALL BE AS STATED IN STANDARD SPECIFICATION.


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 CONFORM TO ASTM F1554 GRADE 50 OR MATERIAL OF EQUIVALENT TENSILE STRENGTH.

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

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE DESIGNED AND DRILLED HOLE IN GIRDER FLANGE SHALL BE PAID FOR AS "ADHESIVE ANCHORS 3/8-INCH".

ANCHOR BOLTS SHALL BE 1 1/2" DIAMETER X 3'-0" LONG AND FULLY THREADED.

PLATE CUTOFFS SHALL BE MACHINE OR MACHINE FLAME CUTS FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

BY DESIGN.

ALL PLATE CUTOFFS SHALL BE MACHINE OR MACHINE FLAME CUTS FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

ELEVATION - DECK REPLACEMENT

TEMPORARY HOLD-DOWN DEVICES SHALL BE PLACED AS TYPICAL AT EACH END OF ALL CONTINUOUS STEEL UNITS WHERE THE SLAB POUR TERMINATES. TEMPORARY HOLD-DOWN DEVICES SHALL BE PLACED AS TYPICAL AT EACH END OF ALL CONTINUOUS STEEL UNITS WHERE THE SLAB POUR TERMINATES.

ELEVATION - NEW CONSTRUCTION

TEMPORARY HOLD-DOWN DEVICES SHALL BE PLACED AS TYPICAL AT EACH END OF ALL CONTINUOUS STEEL UNITS WHERE THE SLAB POUR TERMINATES. TEMPORARY HOLD-DOWN DEVICES SHALL BE PLACED AS TYPICAL AT EACH END OF ALL CONTINUOUS STEEL UNITS WHERE THE SLAB POUR TERMINATES.

ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A709 GRADE 50W.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE 1 1/2" DIAMETER X 3'-0" LONG AND FULLY THREADED.

PLATE THICK. + 2"." THICKNESS + 2"." THICKNESS + 2"." THICKNESS.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE 1 1/2" DIAMETER X 3'-0" LONG AND FULLY THREADED.

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PLATE CUTOFFS SHALL BE MACHINE OR MACHINE FLAME CUTS FREE FROM WARP AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.

BY DESIGN.

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BEARING NOTES

ALL BEARINGS ARE SYMMETRICAL ABOUT "X" OF ORDER AND "Y" OF BEARING.

1. FINISH THESE SURFACES TO ANGLE SO "WIDENING" IS GREATER THAN "Y".

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A53, CLASS "A".

ROCKER PLATE "C" AND MASONRY PLATE "D" SHALL BE SERVICED. TOP PLATE "B" AND STEEL PLATE "A" SHALL BE SHAPED PRIOR TO USE. USE A WELDABLE PRIMER ON TOP PLATE "A" TO PROTECT STAINLESS STEEL OR TEFON SURFACES.

ALL MATERIAL IN BEARINGS, INCLUDING SLOB PLATES, BUT EXCLUDING STAINLESS STEEL SHEETS, LANDING PLATES, MASONRY PLATE "D" AND STEEL PLATE "A" SHALL CONFORM TO ASTM A490 GRADE 50.

FOR BEARING REPLACEMENTS, DESIGNER SHALL UTILIZE A WIDER PLATE "C". SEE STANDARD 27.08 FOR DETAILS.

EXPANSION BEARING NOTES

(DENOTES NOTES FOR BEARING REPLACEMENTS)

DESIGNER NOTES

1. MATERIALS USED IN TABLES INCLUDES "Y"'S BEARING PLATE "A", STEEL PLATE "B" AND TYPICAL TELON SURFACE. DETAILS SHOWN AS DESCRIBED IN NOTES ON STANDARD 24.02.

2. CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL TRANSPORTATION.

USE A TYPE II MASONRY PLATE "D" WITH (4) - 1" DIA. X 1'-10" LONG ANCHOR BOLTS.

USE A TYPE I MASONRY PLATE "D" WITH (2) - 1" DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS FROM 100'-0" UP TO 150'-0":

USE A TYPE I MASONRY PLATE "D" WITH (2) - 1" DIA. X 1'-5" LONG ANCHOR BOLTS.

CALCULATE THE REACTIONS AT THE BEARINGS DUE TO "TOTAL LOAD" AND "DEAD LOAD" ONLY. USE THE "TOTAL LOAD" SERVICE LOAD COMBINATION, CONSIDER ONLY "TOTAL LOAD" SERVICE LOAD COMBINATION, CONSIDER ONLY "TOTAL LOAD" SERVICE LOAD COMBINATION. THE VALUE OF THE BEARING CAPACITY FOR THE BEARING "TOTAL LOAD" ONLY OR "DEAD LOAD" ONLY. USE THE "TOTAL LOAD" SERVICE LOAD COMBINATION, CONSIDER ONLY "TOTAL LOAD" SERVICE LOAD COMBINATION.

ANCHOR BOLT NOTES

FOR SPANNING LAG BOLTS USE A TYPE II MASONRY PLATE "D" WITH (4) - 1" DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS GREATER THAN 150'-0" USE A TYPE I MASONRY PLATE "D" WITH (2) - 1" DIA. X 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.

ANCHOR BOLT NOTES

FOR SPANNING LAG BOLTS USE A TYPE II MASONRY PLATE "D" WITH (4) - 1" DIA. X 1'-10" LONG ANCHOR BOLTS.

FOR SPAN LENGTHS GREATER THAN 150'-0" USE A TYPE I MASONRY PLATE "D" WITH (2) - 1" DIA. X 1'-10" LONG ANCHOR BOLTS.

CHECK THAT ANCHOR BOLTS PROVIDE ADEQUATE HORIZONTAL CAPACITY.

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

All bearings are symmetrical about E & O of order.

All materials in bearings, except stainless steel plate, bearing surface, patties, anchor bolts, nuts and washers shall conform to ASTM A165 Grade 50.

**STAINLESS STEEL PLATE** shall conform to ASTM A182 Grade 304.

Stainless steel plate shall conform to ASTM A494 or M38.1-91. KEL STRENGTH AND ELONGATION.

Anchor bolts, nuts and washers shall conform to ASTM A563 Grade 50.

Steel plate shall conform to ASTM A646 or M38.1-91. KEL STRENGTH AND ELONGATION.

All material in the bearing shall be of equivalent material to the material described in the bearing notes.

All material in the bearing shall be of equivalent material to the material described in the bearing notes.

**TEFLON SURFACE** shall be equivalent to TFE surfaces specified in Structural Steel Bearing Specification.

**STEEL BEARINGS** for prestressed concrete girders shall conform to the requirements found in the standard specification.

Steel plate shall be of equivalent material to the standard specification.

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**DESIGNER NOTES**

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Steel plate shall be of equivalent material to the standard specification.
DESIGNER notes

EXPANSION BEARING ASSEMBLY

TOP PLATE "A"

LENGTH 'X'

TEFLON PLATE "B"

STAINLESS STEEL PLATE "B"

ANCHOR PLATE LENGTH (DOUBLE THIS FOR ANCHOR PLATE LENGTH)

FOR STEEL GIRDER BEARINGS:

USE TEMPERATURE SETTING TABLE (SEE FROM STANDARD 27.08)

PROCEDURE FOR SIZING TOP PLATE "A":

TOP PLATE "A" LENGTH CLOSER TO PLATE "A" LENGTH

ANCHOR PLATE LENGTH DOUBLE FOR ANCHOR PLATE LENGTH

Accordin to AASHTO, the load factor for steel bearings, based on a 90 degree temperature range, is slightly higher than for prestressed concrete, since at 45 degrees the steel would be 15.

NOTE

FOR STEEL BDG. BEARINGS,
USE TEMPERATURE SETTING TABLE RATHER THAN CENTERING BEARINGS BELOW BEARING LIPPLATE FOR ALL TEMPERATURES.

FOR PRESTRESSED BDG. BEARINGS
PLACE BEARINGS AS SHOWN ON THE SUBSTRUCTURE PLAN PROVIDING ADJUSTMENT FOR SUBSTRUCTURE LOCATION INCURRANCES, PLACE EACH GIRDER CENTERED BETWEEN ITS GROUN BEARINGS.

DESIGNER NOTES

THE STANDARD SHOULD ONLY BE USED FOR STEEL BEARINGS.

FOR PRESTRESSED CONCRETE BDG. BEARINGS TO BE DESIGNED TO ACCOUNT FOR THERMAL MOVEMENT AND CONSTRUCTION TOLERANCE, USE CENTERED BY VALUE FROM PROCEDURE BELOW OR SEE FROM STANDARD 27.08.

PROCEDURE FOR SIZING ANCHOR PLATES:

+ THERMAL MOVEMENT (USE 60-(-30)) DEGREES
+ CONSTRUCTION TOLERANCE

TOP PLATE "A" LENGTH CLOSER TO PLATE "A" LENGTH

ANCHOR PLATE LENGTH DOUBLE FOR ANCHOR PLATE LENGTH

AVERAGE TEMPERATURE RANG E FOR STEEL BEARINGS, BASED ON A 60 DEGREE SETTING TEMPERATURE, IS SLIGHTLY CONSERVATIVE IF THE BEARING OFFSET TABLE IS UTILIZED, SINCE AT 45 DEGREES THE OFFSET WOULD BE 15.

THE 90 DEGREE TEMPERATURE RANGE FOR STEEL BEARINGS, BASED ON A 60 DEGREE SETTING TEMPERATURE, IS SLIGHTLY CONSERVATIVE IF THE BEARING OFFSET TABLE IS UTILIZED, SINCE AT 45 DEGREES THE OFFSET WOULD BE 15.

† TEFLON PLATE "B" LENGTH 'X'

+ THERMAL MOVEMENT (USE 60-5=55 DEGREES)
+ SHRINKAGE = 0.0003'/'
+ 1" CONSTRUCTION TOLERANCE

THIS STANDARD SHOULD ONLY BE USED FOR STEEL BEARINGS.

TOP PLATE "A" LENGTH (DOUBLE THIS FOR ANCHOR PLATE "A")

ANCHOR PLATE LENGTH DOUBLE FOR ANCHOR PLATE "A"

ACCORDING TO AASHTO, THE LOAD FACTOR FOR TU IS 1.20 FOR DEFORMATIONS. THE PROCEDURE OUTLINED ABOVE SHOULD BE USED WITH A LOAD FACTOR OF 1.0, WITH THE 1" CONSTRUCTION TOLERANCE BEING USED IN LIEU OF THE HIGHER LOAD FACTOR.

BEARING OFFSET TABLE

FOR STEEL BEARINGS:

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

FOR PRESTRESSED GIRDER BEARINGS:

PLACE BEARINGS AS SHOWN ON THE SUBSTRUCTURE PLAN PROVIDING ADJUSTMENT FOR SUBSTRUCTURE LOCATION INCURRANCES, PLACE EACH GIRDER CENTERED BETWEEN ITS GROUN BEARINGS.

ACCORDING TO AASHTO, THE LOAD FACTOR FOR TU IS 1.20 FOR DEFORMATIONS. THE PROCEDURE OUTLINED ABOVE SHOULD BE USED WITH A LOAD FACTOR OF 1.0, WITH THE 1" CONSTRUCTION TOLERANCE BEING USED IN LIEU OF THE HIGHER LOAD FACTOR.

THE 90 DEGREE TEMPERATURE RANGE FOR STEEL BEARINGS, BASED ON A 60 DEGREE SETTING TEMPERATURE, IS SLIGHTLY CONSERVATIVE IF THE BEARING OFFSET TABLE IS UTILIZED, SINCE AT 45 DEGREES THE OFFSET WOULD BE 15.

The bridge schematic should not be shown on the plans.
COVER PLATES FOR SINGLE SLOPE PARAPET

ELEVATION OF SINGLE SLOPE PARAPET

PLAN OF SINGLE SLOPE PARAPET

SECTION F-F

SECTION H-H

DECK

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

PARAPET (OUTSIDE EDGE)

PARAPET (GUTTERLINE)

EDGE OF DECK

BEND LINE

1/8" LEVEL

3/16" LEVEL

DIRECTION OF TRAFFIC

DETERMINES THE ORIENTATION OF PLATES 9 & 10

DECK

ABUT. BACKWALL

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

SECTION F-F

SECTION H-H

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

PLAN OF SINGLE SLOPE PARAPET

SECTION F-F

SECTION H-H

DECK

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

PARAPET (OUTSIDE EDGE)

PARAPET (GUTTERLINE)

EDGE OF DECK

BEND LINE

1/8" LEVEL

3/16" LEVEL

DIRECTION OF TRAFFIC

DETERMINES THE ORIENTATION OF PLATES 9 & 10

DECK

ABUT. BACKWALL

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

SECTION F-F

SECTION H-H

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PLAN OF SINGLE SLOPE PARAPET

SECTION F-F

SECTION H-H

DECK

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

PARAPET (OUTSIDE EDGE)

PARAPET (GUTTERLINE)

EDGE OF DECK

BEND LINE

1/8" LEVEL

3/16" LEVEL

DIRECTION OF TRAFFIC

DETERMINES THE ORIENTATION OF PLATES 9 & 10

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ABUT. BACKWALL

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SECTION H-H

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PLAN OF SINGLE SLOPE PARAPET

SECTION F-F

SECTION H-H

DECK

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

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1/8" LEVEL

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DETERMINES THE ORIENTATION OF PLATES 9 & 10

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WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

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SECTION H-H

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

PLAN OF SINGLE SLOPE PARAPET

SECTION F-F

SECTION H-H

DECK

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

PARAPET (OUTSIDE EDGE)

PARAPET (GUTTERLINE)

EDGE OF DECK

BEND LINE

1/8" LEVEL

3/16" LEVEL

DIRECTION OF TRAFFIC

DETERMINES THE ORIENTATION OF PLATES 9 & 10

DECK

ABUT. BACKWALL

WINGWALL (FRONT FACE)

ABUT. BACKWALL (FRONT FACE)

SECTION F-F

SECTION H-H

FOR STRUCTURES WITH SKEWS, ADD NOTE TO PLANS: "MITER EXTRUSION ENDS AS REQ'D TO PROVIDE CLEARANCE"
PLAN OF SIDEWALK W/ STEEL POST

SECTION M-M

SECTION H-H

ELEVATION OF SIDEWALK W/ STEEL POST

PLAN OF SIDEWALK COVER PLATE WITH SLIP-RESISTANT SURFACE

COVER PLATES FOR SIDEWALK W/ STEEL RAIL
Section A1

Section A2

Notations

All materials for Type 'GC' casting, excluding grate hold-down screws, shall be gray iron per A36. All materials for Type 'GC' casting, excluding grate hold-down screws, shall be gray iron per ASTM A36, Class 30.

All materials for Type 'GC' casting, excluding grate hold-down screws, shall be gray iron per ASTM A36, Class 30.

All materials for Type 'GC' casting, excluding grate hold-down screws, shall be gray iron per ASTM A36, Class 30.

Bent flanges of exterior minimum past bottom extend downspout 6".

IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT DESIGNER NOTES

IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT DESIGNER NOTES

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Detail not to be used over railroads because it violates clearance requirements. Contact railroad and harbor section for guidance.

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Locate holes to avoid draped strands.

Locate holes to avoid draped strands.

Locate holes to avoid draped strands.

Minimum 2 strand 7/16" X 2-1/2" slotted hole.

Minimum 2 strand 7/16" X 2-1/2" slotted hole.

Minimum 2 strand 7/16" X 2-1/2" slotted hole.

6" dia. pipe vertically.

6" dia. pipe vertically.

6" dia. pipe vertically.

10 diameter full faced neoprene washer.

10 diameter full faced neoprene washer.

10 diameter full faced neoprene washer.

Face of ext. order, moll.

Face of ext. order, moll.

Face of ext. order, moll.

Bracket - See detail at right.

Bracket - See detail at right.

Bracket - See detail at right.

BRACKET DETAIL

GRAVE CASTING DETAIL

ATTACH GRATE TO FRAME FOR SHIPMENT

ATTACH GRATE TO FRAME FOR SHIPMENT

ATTACH GRATE TO FRAME FOR SHIPMENT

TIGHTENING

TIGHTENING

TIGHTENING

Bill Oliva

Bill Oliva

Bill Oliva

Date:

Date:

Date:

STANDARD 29.01
**ANCHORAGE FOR RAIL POSTS**

- Anchor plate not required when adhesive anchors are used.

**BASE PLATE**
- W/ No. 12 bolts.
- Place vertical, need to No. 4, and use 2 bolts, front and back post bolt holes.
- **NOTE:** 
- Anchorage shall be accurately placed to provide correct alignment of anchorages.
- Longitudinal direction.

**FIELD ERECTION JOINT**
- Details anchor plate no. 1, and fill bolt slot openings required for alignment, and shall be galvanized.

**STEEL SHIMS**
- Provided under base plate no. 1, where required for alignment, and shall be galvanized.

**STEEL SLEEVES**
- Fabricated from structural tubing, 2½" x 2½" x ⅜" x 18' long.

**STAINLESS STEEL BOLTS**
- Use 1" diameter holes (front and back) for bolt no. 6.

**NOTES**
- All cuts ends shall be true and smooth. Be machine or machine flame cut.

**ADHESIVE ANCHORS**

**RAILING STEEL TYPE 3T**
- Shall include all steel members shown.
- Post base plates shall be flat with all surfaces smooth and free from burr and all edges square, corners, and vertical. All plates shall be machine or machine flame cut.

**STRUCTURAL TUBING**
- 3" x 3" x ⅜" rails, with ¼" holes in front and back for bolting.

**STRENGTH**
- 70 KSI. with nut and washers of same alloy group.

**CONCRETE PARAPET**
- Anchorages shall be accurately placed to provide correct alignment of anchorages. Set normal to grade.

**PAINT**
- 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 and specified color.

**COMBINATION RAILING TYPE 3T**
- Shall conform to section 502.2.12 of the standard specifications.

**LEGEND**
- GALVANIZED
SECTION THRU FENCE ON PARAPET 'A'

NOTES

POSTS ARE TO BE SET VERTICAL.

DETAILS C:

* FENCE DETAILS ARE TO BE METALLIC-COATED STEEL.
* ALL FENCE COMPONENTS SHALL BE GALVANIZED STEEL, EXCEPT METALLIC-COATED FENCE SYSTEM:
  "A" MAY BE USED ON PROTECTIVE SCREENING EXCEPT METALLIC-COATED FENCE SYSTEM.
* THE BID ITEM SHALL BE "FENCE CHAIN LINK POLYMER - COATED STANDARD WEIGHT PIPE (SCHEDULE 40)."
  FITTINGS SHALL CONFORM TO ASTM F1083, COLOR CODED POLYMER-COATING ON THE OUTSIDE.
* POSTS ARE TO BE SET VERTICAL.
* POSTS ARE TO BE SET VERTICAL.
* POSTS MAY BE WELDED TO THE BASE PLATE.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM A307."
* ALTERNATE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 5/8" DIA. GALV. "A" MAY BE USED ON PROTECTIVE SCREENING EXCEPT METALLIC-COATED FENCE SYSTEM.
* HOT DIPPED GALVANIZED STEEL "A" MAY BE USED ON PROTECTIVE SCREENING EXCEPT METALLIC-COATED FENCE SYSTEM.

ANCHOR BOLTS, NUTS AND WASHERS SHALL BE EITHER STAINLESS STEEL OR ASTM A307.
* ALTERNATE ANCHORAGE: CONCRETE ADHESIVE ANCHORS 5/8" DIA. GALV. "A" MAY BE USED ON PROTECTIVE SCREENING EXCEPT METALLIC-COATED FENCE SYSTEM.

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DESIGNER NOTES

Combination railings types C1-C6 may also be used as a pedestrian barrier, provided they meet the criteria for pedestrian barriers specified in Standard 30.07. Types C1-C6 are designed to provide increased safety and security for pedestrians and cyclists. These railings are suitable for use in urban areas where pedestrian traffic is heavy.

Combination railings types C1-C6 may also be used as a traffic barrier, provided they meet the criteria for traffic barriers specified in Standard 30.07. Types C1-C6 are designed to provide increased safety and security for motor vehicles. These railings are suitable for use in areas where traffic is heavy or where a traffic barrier is required between the roadway and the sidewalk.

Combination railings types C1-C6 may also be used as a divider, provided they meet the criteria for dividers specified in Standard 30.07. Types C1-C6 are designed to provide increased safety and security for pedestrians and cyclists. These railings are suitable for use in urban areas where pedestrian traffic is heavy or where a divider is required to separate pedestrian and cyclist traffic.

Combination railings types C1-C6 may also be used as a barrier, provided they meet the criteria for barriers specified in Standard 30.07. Types C1-C6 are designed to provide increased safety and security for pedestrians and cyclists. These railings are suitable for use in urban areas where pedestrian traffic is heavy or where a barrier is required to prevent access to a pedestrian or cyclist walkway.

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DETAILS AND CONNECTIONS:

For end post:
- See std. 30.28

FIELD CLIP:
- 5 "G" 6 "angle

SECTION thru railing on deck:
- Place sym. about ` of post
- 4-#6 bars 6'-0" long.

JOINT DETAIL:
- SLAB REINFORCEMENT bars below top mat of steel
- Structures, place girders
- For other

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

NOTES:
- Steel shall be "RAILING STEEL TYPE NY3". MARKING IN VISIBLE.
- Tubing shall be continuous over a number of (3) posts without splices.
- Where applicable, (3) posts. Minimum spacing between posts shall be 1'-2". No. 3 bars are 1'-2" long. Bars shall be 1" diameter. Place #6 bars in bill of bars for steel superstructure.

COLOR NO. , (FILL IN COLOR NAME). SPECIFIED IN THE CONTRACT DOCUMENTS. THE RAILING SHALL BE PAINTED AMS STD. When painting is required, all material except anchorage detail (No. 3 & No. 4) shall be given a No. 6 blast cleaning per SSPC specifications.
- Steel railing posts, angles, splice tubes, splice bars and steel tubing shall be continuous over a minimum of three (3) posts without splices. (Designer to place these bars in bill of bars for superstructure.)

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

ANCHOR BOLTS:
- 1" x 4" slotted holes in top and bottom of No. 5.

BASE PLATE DETAIL:
- 1" x 4" slotted holes in top and bottom of No. 5.

SPICE TUBE:
- 1" x 4" slotted holes in top and bottom of No. 5.

SPICE BAR:
- 1" x 4" slotted holes in top and bottom of No. 5.

LEGEND:
- Holes for anchor bolts No. 2, 6, and 6a.
- No. 6 anchor bolts in wings, tack weld
- Bolt no. 6 at No. 5. USE 1" dia. holes for bolt No. 6 at No. 5.
- Bolt no. 6a at No. 7. USE 1" dia. holes for bolt No. 6a at No. 7.
- Use 1" dia. hole for anchor bolts No. 3.

BOLTS NO. 6 (FRONT & BACK) & ‥" dia. holes for bolt No. 6a (TOP & BOTTOM).

TUBULAR STEEL RAILING TYPE NY3

BUREAU OF STRUCTURES

TUBULAR STEEL RAILING TYPE NY3

PART ELEVATION OF RAILING

INTERIOR ELEVATION

PART ELEVATION OF RAILING AT POST

INTERIOR ELEVATION

APPROVED: Bill Oliva

STANDARD 30.26
**Designer Notes**

The '56SS parapet is only to be used if a '56SS parapet
element is utilized at the end of the '56SS parapet.

**Bill of Bars**

<table>
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<tr>
<th>Bar Mark</th>
<th>Qty</th>
<th>Dia</th>
<th>Length</th>
<th>Location</th>
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<tr>
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<tr>
<td>R503</td>
<td>1</td>
<td>8&quot;</td>
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</tbody>
</table>

**Parapet Steel Before Parapet is Poured**

1. Designator Notes

   Use a 1'-6" wing width for wings parallel to the roadway.

2. Designer May Elect to Use a R501 bar in lieu of a S5__ bar adjacent to the paving notch on type A1 abutments.

3. Joint Spacing: MIN. joint spacing of 80'-0".

**Option Construction Joint**

- Strike off as shown.
- Joint Spacing: MIN. joint spacing of 80'-0".
- Lap Long. Bars a MIN. of 1'-9".
- Run Bar Reinforcement through the joint.

**Parapet Bar**

- For Adjacent Parapets

**Standard**

- Single Slope Concrete Roadway Barrier adjoining the end of the '56SS Parapet.

**Area**

- 30.33 SF

**Weight**

- 774 LB/FT

**Approved**

- Bill Oliva

**Date**

- 7-19

**Bureau of Structures**

**SINGLE SLOPE PARAPET 56SS**

**Parapet Bar**

- For Adjacent Parapets

**Bill of Bars**

<table>
<thead>
<tr>
<th>Bar Mark</th>
<th>Qty</th>
<th>Dia</th>
<th>Length</th>
<th>Location</th>
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<td>R503</td>
<td>1</td>
<td>8&quot;</td>
<td></td>
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</tbody>
</table>
NOTES

1. Box Culvert reinforcement is not shown to clear the opening provided for median inlet.
2. Adjustment of the cover to grade may be accomplished by the use of mortar and brick. Maximum adjustment shall be 8".

DESIGN NOTES

1. See Fig. 3 for length of "A" bars to be determined by the designer.
2. Steel shown is adequate to depths up to 15'-6" for inlet type 9 and depth for inlet type 8 assuming a coefficient of external earth pressure of 0.5 and a unit weight of soil of 0.120 K/ft. L
3. Vertical steel adequate for depth up to 20'-0" assuming a unit load of 50#/ft.².

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

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

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

NOTE:

SKEW 3'-10" 2'
8"
2' 8"
2 ' 8" 3'-10 "

INLET TYPE 8
INLET TYPE 9

MEDIAN INLET PLAN
(INLET COVER NOT SHOWN)

GRATE ELEVATION SHOWN ON PLANS.

Optional concrete joint in median exceeds 3'-0" the concrete, Jr.

#4 @ 1'-6" 8'-0" long
#4 @ 1'-6" 3'-4" long
#4 @ 1'-6" 10'-10" long
#4 @ 1'-6" 3'-4" long

#4 @ 1'-6" 6'-2" long

#4 @ 1'-6" 3'-4" long

36.04
7-16
Bill Olliva
Box Culvert Manhole
For Inlet Type 8 & 9

GRATE ELEVATION SHOWN ON PLANS.

Optional concrete joint in median exceeds 3'-0" the concrete, Jr.

#4 @ 1'-6" 8'-0" long
#4 @ 1'-6" 3'-4" long

#4 @ 1'-6" 6'-2" long

#4 @ 1'-6" 3'-4" long

#4 @ 1'-6" 3'-4" long

2" CLEAR

2" CLEAR

2" CLEAR

2" CLEAR

BUREAU OF STRUCTURES

APPROVED: Bill Olliva

DATE: 7-16

STANDARD 36.04
ALL BAR STEEL REINFORCEMENT SHALL BE CUT 2" CLEAR AROUND OPENING.

DESIGNER NOTES
DETAIL SHOWS ARE FOR CAST-IN-PLACE CULVERTS. PRECAST CULVERT DETAILS TO BE SIMILAR.

OPENING

1'-0" min.

1.75 (D) min. (typ.)

Bar Steel Reinforcement shall be cut 2" clear around opening.

Provide 50% of vertical reinforcing cut by opening on each face, both sides. Bars length 5'-0" min. (typ.)

Additional notes:
- Provide 4 diagonal bars, place between inside and outside bar mats (typ.)
- Additional horizontal #4 bar, 3'-0" min. top and bottom both faces (typ.)
- Culvert wall reinforcement, field cut 2" clear around opening (typ.)

PIPE OPENING IN CULVERT WALL
**W-BEAM RAIL**

WELDING IS TO BE COMPLETED USING THE GAS-METAL ARC WELDING PROCESS WITH ER70S-3 WELDING WIRE AND ARGON-OXYGEN OR CO₂ COVER GAS.

**POST BOLT**

1'" DIA. HOLE (typ.)

**GUARDRAIL POST ANCHORS TYPE 1**

USE FOR THICKNESS "T" OF 10 INCHES OR MORE AND C/L POST

MINIMUM CONCRETE STRENGTH (     ) OF 4,000 PSI

**GUARDRAIL POST ANCHORS TYPE 2**

USE FOR THICKNESS "T" OF 8 INCHES OR MORE AND C/L POST

MINIMUM CONCRETE STRENGTH (     ) OF 3,500 PSI

**GUARDRAIL POST ANCHORAGE SYSTEM**

*(For posts with "D" embedment less than or equal to 9")

<table>
<thead>
<tr>
<th>Class</th>
<th>&quot;D&quot; Embedment</th>
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<tbody>
<tr>
<td>MGS</td>
<td>0&quot; - 9&quot;</td>
</tr>
<tr>
<td>GUARDRAIL</td>
<td>0&quot; - 9&quot;</td>
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</tbody>
</table>

**BASE PLATE**

1" DIA. HOLE

**GUARDRAIL POST ANCHORAGE SYSTEM**

*(For posts with "D" embedment greater than or equal to 9")

**STANDARD 36.08**

**BUREAU OF STRUCTURES**

**Bill Oliva**

**Date: 7-6**
ADJACENT SEGMENTS SHALL BE ATTACHED TO EACH OTHER TO

Horizontal Earth Pressure: Unit Weight = 125pcf

Live Load: HL-93

Steel for the corners of the bridge shall be bent to such an angle that is approximately equal to the standard detail drawings.

Provide ductile joint system between vertical leg of the precast segment and footer as indicated on the rock foundation or otherwise indicated.

Place footings below scour and frost depths. Place bottom of footing at a minimum depth equal to storm water conveyances.

If significant seepage or relatively rapid accumulation of water is anticipated behind the wall, incorporate provide a suitable drainage pipe along the culvert and wingwalls to release hydrostatic pressure. Where direct surface from drainage pipe to weep holes along the exterior face of the wall or to the storm water conveyances.

Plate footings below scour and frost depths. Place bottom of footing at a minimum depth equal to providing precast depth or scour depth but not less than 4'-0" below ground elevation unless constructed on rock foundation or otherwise indicated.

Provide ductile joint system between vertical leg of the precast segment and footer as indicated on the standard detail drawings.

Beading of reinforcement for precast bridge units - the outside and inside circumferential reinforcing steel for the corners of the bridge shall be bent to such an angle that is approximately equal to the configuration of the bridges outside corner.

LRFD Design Loads

Live load = 15 horizontal earth pressures unit weight = 125pcf

Vertical earth pressures unit weight = 100pcf

WALL BACKFILL REQUIREMENTS

Approximate/Guideline

<table>
<thead>
<tr>
<th>Type of Wall</th>
<th>Number of Anchors</th>
<th>L = 0'-0&quot;</th>
<th>L = 20'-0&quot;</th>
<th>L = 30'-0&quot;</th>
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*Note: Adjacent segments shall be attached to each other to keep front faces in alignment. Place a filler at these joints with a membrane along the joint at the back face.
GENERAL NOTES:
MATERIALS AND WORKSHOPS SHALL BE IN ACCORDANCE WITH WISCONSIN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS AND THE CONTRACT SPECIAL PROVISIONS.

DESIGN SPECIFICATIONS DESIGN STRUCTURE BY CURRENT EDITION ASHRAE LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY WISCONSIN BRIDGE MANUAL.

USE GRADE A CONCRETE IN FOOTINGS AND WALLS. FC = 4 ksi.

PRECAST CONCRETE CULVERT UNITS PLUS JOINTS @ 1'-0" TO 1-1/2" PER JOINT = 1" X 14" X 10" GALV. PLATE (P-1)

NOTE ON STANDARD 36.10 PLUS (N-1) JOINTS @ "T" TO 4" PER JOINT = L

PRECAST OR CIP WINGWALLS, HEADWALLS) AND FOOTERS WILL BE DESIGNED BY CONTRACTORS.

PRECAST CONCRETE CULVERT UNITS PLUS JOINTS @ 1'-0" TO 1-1/2" PER JOINT = 1" X 14" X 10" GALV. PLATE (P-1)

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

PRECAST THREE-SIDED BOX CULVERT LAYOUT DESIGNS

BILL OLIVA

PRECAST WINGWALLS

PLATE P-1

PLATE 1'-0" X 1'-0"

NOTE: PLATE LENGTH AND THICKNESS SHALL BE INCREASED AS REQUIRED BY DESIGN.
Precast Three-Sided Box Culvert Headwall Details

Scot Becker

Max Headwall Height & Counterfort Location

<table>
<thead>
<tr>
<th>SPAN</th>
<th>COUNTERFORT</th>
<th>NO SURCHARGE</th>
<th>W/ 2'-0&quot; SURCHARGE</th>
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NOTE:
The actual number and type of precast headwall counterforts to be designed
must be determined. However, use the following chart as a general guide to feasibility of counterfort use.

LRFD Headwall Counterforts

- Headwall details shown here have only been designed for the following 3 load cases:
  - Earth pressure only
  - Earth pressure + live load surcharge
  - Earth pressure + live load surcharge when a vehicle load can be transmitted through a barrier to the headwall
- Assumes 4'-0" spacing of counterforts
- No counterforts between
- Soil behind headwall is at same elevation as top of headwall
- Additional headwall height may be achieved with closer counterfort spacing
- For detailed headwall designs only

Precast Headwall Details

- Precast headwall to be match cast against culvert unit
- Precast bridge unit
- Precast bridge unit
- Precast bridge unit

3" Dia. hole grout solid after installation of coil rod

Butyl rope, installed in field continuously between precast bridge unit and precast headwall

1" Dia. x 7" insert
1" Dia. x 1'-9" coil rod w/ double nut and washer
Spacing to be determined

App. 1'-3"

App. 2'-9"
ELEVATION OF FENCE

PLAN OF RAILING

FENCE MEMBER SIZE & WEIGHT

HANDRAIL DETAILS

HANDRAIL SPLICE

PEDESTRIAN OVERPASS DETAILS

BUREAU OF STRUCTURES

APPROVED:

Date:

STANDARD 37.02
**RAILROAD CROSS SECTIONS**

**RAILROAD IN CUT**

- **Bottom of Footing**
- **Track on One Side of Columns**
- **Zone A**
- **Zone B**
- **Zone C**

**RAILROAD IN FILL**

- **Bottom of Footing**
- **Track on One Side of Columns**
- **Zone A**
- **Zone B**
- **Zone C**

**TABLE C**

- **Hw Location**
- **Mean of Crash Wall Above Top of Rail**
- **Hw from C, Track**
- **Hw from C, Track**
- **Ground Level**
- **Rip, Hw from C, Track**

**DESIGNER NOTES**

- **SHORING WILL BE PER OSHA STANDARDS FOR EXCAVATION**
- **ZONE C SHORING**
- **ZONE B SHORING**
- **ZONE A SHORING**

**RAILROAD IN CUT**

- **Bottom of Footing**
- **Track on One Side of Columns**
- **Zone A**
- **Zone B**
- **Zone C**

**RAILROAD IN FILL**

- **Bottom of Footing**
- **Track on One Side of Columns**
- **Zone A**
- **Zone B**
- **Zone C**

**TABLE C**

- **Hw Location**
- **Mean of Crash Wall Above Top of Rail**
- **Hw from C, Track**
- **Hw from C, Track**
- **Ground Level**
- **Rip, Hw from C, Track**

**DESIGNER NOTES**

- **SHORING WILL BE PER OSHA STANDARDS FOR EXCAVATION**
- **ZONE C SHORING**
- **ZONE B SHORING**
- **ZONE A SHORING**

**RAILROAD IN CUT**

- **Bottom of Footing**
- **Track on One Side of Columns**
- **Zone A**
- **Zone B**
- **Zone C**

**RAILROAD IN FILL**

- **Bottom of Footing**
- **Track on One Side of Columns**
- **Zone A**
- **Zone B**
- **Zone C**

**TABLE C**

- **Hw Location**
- **Mean of Crash Wall Above Top of Rail**
- **Hw from C, Track**
- **Hw from C, Track**
- **Ground Level**
- **Rip, Hw from C, Track**
DECK REPAIR DETAIL - SECTION

DECK REPAIR LEGEND:

- Preparation Decks Type 1
- Preparation Decks Type 2
- Full-Depth Deck

FOR DESIGNER INFORMATION ONLY
DO NOT PLACE ON PLANS

Existing Deck
Saw Cut
Preparation Decks Type 1
Preparation Decks Type 2

Remove Existing Patching
and Embed to Sound Concrete
Concrete Overlay

Full-Depth Deck Repair

DESIGNER NOTES:

Details may be shown on plans if necessary for clarity. Include applicable concrete masonry and rebar to fill repairs.

ANCHOR DETAIL (EXAMPLE)

ANCHORS SHALL BE APPROVED FOR EMBED XX" IN CONCRETE.
US IN CRACKED CONCRETE.
ADHESIVE ANCHORS NO. X BAR.

NOTE

Adhesive anchors shall conform to section 502.2.12 of the standard specifications. Place a note when the adhesive anchor is used. They are allowed as an alternative anchor.

CUT LIST

- SAWING PAVEMENT DECK PREPARATION AREAS
- PREPARATION DECKS TYPE 1
- PREPARATION DECKS TYPE 2
- FULL-DEPTH DECK REPAIR

DECK REPAIR DETAIL - PLAN

FOR DESIGNER INFORMATION ONLY
DO NOT PLACE ON PLANS

Saw Cut
Include Concrete Details

Deck Repair Legend:

- Preparation Decks Type 1
- Preparation Decks Type 2
- Full-Depth Deck

EXISTING DECK

DECK REPAIR DETAIL - PLAN

FOR DESIGNER INFORMATION ONLY
DO NOT PLACE ON PLANS

Saw Cut
Embedding Concrete Details

Deck Repair Legend:

- Preparation Decks Type 1
- Preparation Decks Type 2
- Full-Depth Deck

NOTE

Adhesive anchors shall conform to section 502.2.12 of the standard specifications. Place a note when the adhesive anchor is used. They are allowed as an alternative anchor.

CUT LIST

- SAWING PAVEMENT DECK PREPARATION AREAS
- PREPARATION DECKS TYPE 1
- PREPARATION DECKS TYPE 2
- FULL-DEPTH DECK REPAIR

DECK REPAIR DETAIL - PLAN

FOR DESIGNER INFORMATION ONLY
DO NOT PLACE ON PLANS
TYPICAL INSTALLATION AT BAR STEEL INTERSECTION

EXISTING REINFORCING STEEL

EXISTING DECK

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

EXISTING REINFORCING STEEL, typ.

EXISTING REINFORCING STEEL, typ.

GALVANIC ANODE - attach per typical details.

GALVANIC ANODE - attach per typical details.

Sawcut

PART PLAN TYPICAL REPAIR DETAIL

Concrete surface repair

Note: Existing reinforcing steel TO BE COMPLETELY CLEANED OF CORRODED MATERIAL PRIOR TO INSTALLATION OF GALVANIC ANODES.
ATTACHING PARAPETS OR RAILINGS TO BRIDGE DECKS WITH EPOXY ANCHORS IS NOT ALLOWED BY FHWA.

RAIL POST FOR STEEL RAILING EDGE OF SLAB

REMOVE EXISTING CONCRETE. REPAIR TO BE FILLED WITH "CONCRETE MASONRY OVERLAY".

"Sawing pavement deck preparation areas" not required for concrete overlays. Use "Concrete masonry deck repair" (spv.0035) for deck repairs under polymer, asphaltic, or polymer mod. asphaltic overlays. Use "Concrete masonry deck repair" for deck repairs without overlays.

OVERLAY DETAILS

BUREAU OF STRUCTURES

STANDARD 40.03
NOTES

CONSTRUCTION JOINTS: POUR CONCRETE ABOVE THE JOINT UNTIL SUPERSTRUCTURE CONCRETE IS IN PLACE. STRIKE OFF AND LEAVE ROUGH.

ROUGHEN SURFACE OF CONCRETE ½" DEEP IN ALL AREAS WHERE NEW CONCRETE CONTACTS EXISTING CONCRETE.

EXISTING WINGS: REMOVE A MIN. OF 2'-0" BELOW FINISHED GRADE.

REMOVE CONCRETE IN THIS AREA DOWN TO EXIST. BRIDGE SEAT. INCORPORATE EXIST. BAR STEEL INTO NEW WORK.

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

DESIGNER NOTES

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

1. Hinges of hanger plates shall be coated with "Bloxide" or an approved equal before coating. The bushing shall have a press fit in the hanger plate. If the bushing is replaced, the minimum inside diameter of the bushing shall be equal to the smallest size of the pin. The maximum inside diameter of the bushing shall be smaller than the bushing size by at least 0.010".

2. Hanger plates shall be replaced with new materials. The new plates shall be of the same length as the hanger plate thickness.

3. Non-metallic washers shall have an inside diameter of between 0.005" and 0.010" larger than the pin diameter.

4. Steel for pins shall conform to the requirements of AASHTO LRFD Bridge Design Specifications Section 6.4.2 and ASTM A276. Pins to be finished ANSI 63.

5. Bushings shall be Gar-Max as manufactured by Garlock Bearings, Inc. or Duralon Journal Bearings as manufactured by Rexnord Bearings Division, or approved equal. Bushings shall have a nominal wall thickness of 0.020".

6. Non-metallic washers required for use as spacers between the pin plates and the hanger plates. The non-metallic washers shall be made from one of the following materials:
   1. Phenolic, Canvas Reinforced, MIL-P-15035
   2. Polyethylene, High Density, ASTM D4976, Class 3
   3. Acetal, Federal Specification L-P-392
   4. Teflon TFE, MIL-P-22241A

STANDARD 40.09
CONCRETE BEARING BLOCK DETAILS

GIRDER REACTIONS AT BEARINGS (KIPS)

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NOTES

THE THEORETICAL SERVICE LOADS SUMMARIZED SHOWN IN THE EXISTING SW VALUES ARE BASED ON THE PRESENT DESIGN CONSTRUCTION METHODS AND ARE UNLESS NOTED TO INCLUDE JACKING OR APPLICA SUBSTRUCTURE SHALL NOT BE INCLUDED.

THE LL REACTIONS ARE BASED ON HS-20/HL-93 AND INCLUDE IMPACT.

EXTERIOR GIRDER DEAD LOAD REACTIONS WERE INCREASED 10% TO ACCOUNT FOR VARIABILITY IN COMPOSITE DL DISTRIBUTION METHODS.

IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE ADEQUACY OF THE DESIGN AT THE INCLINATION LOCATION.

DESIGNER NOTES

ADD 10% TO THE EXTERIOR GIRDER DL TO ACCOUNT FOR VARIABILITY IN COMPOSITE DL DISTRIBUTION METHODS.

INDICATE WHETHER HS-20 OR HL-93 LOADING WAS USED TO DETERMINE THE LL REACTIONS, WHICH INCLUDE IMPACT.

DO NOT INCLUDE LL REACTIONS FOR JACKING SITUATIONS THAT WILL NOT BE UNDER TRAFFIC.
**NOTES**

For Dowel Bar Couplers, only the distance shall be designated to the Coupler manufacturer. All couplers shall have a minimum of 60 ksi yield strength and have tensile strength area equal or greater than that of the lapped reinforcement bars.

On the plans provide location, staging, size and quantity required. Do not give specific information regarding the coupler as this is covered by the bid item "Bar Couplers (Size)."

On the plans show details similar to "Section Thru Deck" and "Bar Coupler Options." At the plan bill of bars, indicate which bars require bar couplers by use of a symbol. Using the same symbol, add a note stating that a bar coupler is required. Bar lengths are computed to the stage 1 construction joint and shall be modified by the coupler manufacturer recommendations.

Dowel bars are not to be detailed, as those bars are included in the bar coupler bid item should the dowel option be chosen.

On plans provide location, staging, size and quantity required. Do not give specific information regarding the coupler as this is covered by the bid item "Bar Couplers (Size)."

**Installation and Setting Methods**

Dowel bars shall be set by means of a template bolt to set them to load in tension forces or to anchor to steel forms.

**Splicer Alternatives**

1. Minimum capacity = 1.25 x fy x area of spliced reinforcement bar,

   \[ \text{where } f_y = \text{yield strength of spliced reinforcement bars} \]

   On plans provide location, staging, size and quantity required. Do not give specific information regarding the coupler as this is covered by the bid item "Bar Couplers (Size)."

   On the plans show details similar to "Section Thru Deck" and "Bar Coupler Options." At the plan bill of bars, indicate which bars require bar couplers by use of a symbol. Using the same symbol, add a note stating that a bar coupler is required. Bar lengths are computed to the stage 1 construction joint and shall be modified by the coupler manufacturer recommendations.

   Dowel bars are not to be detailed, as those bars are included in the bar coupler bid item should the dowel option be chosen.
LEGEND

6. FINGER PLATE. SIZE TO BE DETERMINED BY DESIGN.
7. WEB PLATE. SIZE TO BE DETERMINED BY DESIGN.
8. BEVELED SHIM PLATE. SIZE TO BE DETERMINED BY DESIGN.
9. FLANGE PLATE. SIZE TO BE DETERMINED BY DESIGN.
10. ACHIEVING HOLE. SIZE TO BE DETERMINED BY DESIGN.
11. ANCHOR BAR. SIZE TO BE DETERMINED BY DESIGN.
12. PLATE. BEND AS SHOWN.
13. PLATE. BEND AS SHOWN.
14. PLATE. BEND AS SHOWN.
15. STUDS X 6". WELD TO PLATES NO. 13 AND NO. 14.
16. STUDS X 6". WELD TO PLATE NO. 20.
17. FLANGE PLATE. SAME THICKNESS AS PLATE NO. 3 AND SAME WIDTH AS SHELF PLATE. SHOP BUTT WELD TO PLATE NO. 3.
18. CLOSING PLATE. WELD TO PLATES NO. 1 AND NO. 2.
19. PLATE. BEND AS SHOWN.
20. PLATE. BEND AS SHOWN.
21. PLATE. BEND AS SHOWN.
22. PLATE. WELD ALL AROUND, 3" FILLET WELD TO PLATES NO. 18, 19, & 20.
23. STUDS X 6". BEND AFTER WELD.
24. STUDS X 6". BOLT WITH SQ. NUT. GREASE FOR EASY REMOVAL. 3" X 1 1/2" SLOTTED HOLE IN PLATE NO. 19. LONG DIMENSION OF HOLE PARALLEL TO DIRECTION OF ROADSIDE. TACK WELD NUT TO PLATE NO. 20 + 2'-0" SPACE.
25. STUDS X 6". WELD TO PLATE NO. 20.
26. FLANGE PLATE. SAME THICKNESS AS PLATE NO. 3 AND SAME WIDTH AS SHELF PLATE. SHOP BUTT WELD TO PLATE NO. 3.
27. CLOSING PLATE. WELD TO PLATES NO. 1 AND NO. 2.

NOTES

1. PROVIDE WOOD SHIMS WHERE NECESSARY. *PROVIDE WOOD SHIMS WHERE NECESSARY.
2. REPLACE ALL PLATES WHERE NECESSARY. *PROVIDE WOOD SHIMS WHERE NECESSARY.
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STANDARD 40.12

FINGER TYPE EXPANSION JOINT - PLATE GIRDER
**54" GIRDER**

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**BUREAU OF STRUCTURES**

**54" PRE-TENSIONED GIRDER DESIGN DATA**

**APPROVED** Bill Oliver

**STANDARD 40,14**
NOTES

- All sloped face parapet 8" reinforcement are No. 4 bars unless otherwise shown.
- Plate required main deflection joints are required. If construction joints in parapets are used, plate separators shall be omitted. Deflection joints are required on span open structures only.
- Optional construction joints in the parapets may be used. Run bar reinforcement thru the joint. Joint spacing of 80'-0" before joint, joint with a 7" V-Groove.
- Beam joint - Strike off as shown & finish with a wooden trowel.

ANCHOR ASSEMBLY FOR STEEL BEAMS, NESTED 2'-0" R.

EXPANSION JOINT OPENING

MINIMUM JOINT SPACING OF 80'-0". DEFINE CONSTRUCTION JOINT WITH A 1" 'V' GROOVE.

CONSTRUCTION JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.

PART PLAN ON PARAPET

 NO. 5 BARS

CONSTRUCTION JOINTS ARE REQUIRED ON SLAB SPAN STRUCTURES ONLY.

PLATE REQUIRED WHEN DEFLECTION JOINTS ARE REQUIRED. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED, PLATE SEPARATORS SHALL BE OMITTED.

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINFORCEMENT THROUGH THE JOINT. JOINT SPACING OF 80'-0" BEFORE JOINT, JOINT WITH A 7" V-GROOVE.

lower joint - Strike off as shown & finish with a wooden trowel.

ANCHOR ASSEMBLY FOR STEEL BEAMS, NESTED 2'-0" R.

EXPANSION JOINT OPENING

MINIMUM JOINT SPACING OF 80'-0". DEFINE CONSTRUCTION JOINT WITH A 1" 'V' GROOVE.

CONSTRUCTION JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.

PART PLAN ON PARAPET

 NO. 5 BARS

CONSTRUCTION JOINTS ARE REQUIRED ON SLAB SPAN STRUCTURES ONLY.

PLATE REQUIRED WHEN DEFLECTION JOINTS ARE REQUIRED. IF CONSTRUCTION JOINTS IN PARAPETS ARE USED, PLATE SEPARATORS SHALL BE OMITTED.

OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR REINFORCEMENT THROUGH THE JOINT. JOINT SPACING OF 80'-0" BEFORE JOINT, JOINT WITH A 7" V-GROOVE.

lower joint - Strike off as shown & finish with a wooden trowel.

ANCHOR ASSEMBLY FOR STEEL BEAMS, NESTED 2'-0" R.

EXPANSION JOINT OPENING

MINIMUM JOINT SPACING OF 80'-0". DEFINE CONSTRUCTION JOINT WITH A 1" 'V' GROOVE.

CONSTRUCTION JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.

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lower joint - Strike off as shown & finish with a wooden trowel.

ANCHOR ASSEMBLY FOR STEEL BEAMS, NESTED 2'-0" R.

EXPANSION JOINT OPENING

MINIMUM JOINT SPACING OF 80'-0". DEFINE CONSTRUCTION JOINT WITH A 1" 'V' GROOVE.

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lower joint - Strike off as shown & finish with a wooden trowel.

ANCHOR ASSEMBLY FOR STEEL BEAMS, NESTED 2'-0" R.

EXPANSION JOINT OPENING

MINIMUM JOINT SPACING OF 80'-0". DEFINE CONSTRUCTION JOINT WITH A 1" 'V' GROOVE.

CONSTRUCTION JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.
Expansion Bearing Details

**Type A - Steel Grades**

**Dimensions**

- **Expansion Bearing Assembly**
  - Location
  - Dimensions

**Notes**

- For bearing notes, clearance drawings and anchor bolts to detail anchor plates, see standard 24.2.
- Ensure all surfaces are free of any obstruction other than the bearing itself.
- Anchor bolts, nuts, and washers shall be installed with a minimum clearance of 1/8" from the plate or structure to be bolted, along with a minimum 1" bearing plate.
- Anchor bolts shall be installed with a minimum 1" bearing plate, along with a minimum 1" bearing pad after tightening. Plate no shall be sufficiently long to provide secure anchorage.
- Expansion bearings shall be used in conjunction with expansion joints.

**Anchor Bolt Notes**

- **For spans** between 2'-0" and 18' span, use Type 2 Masonry Plate with 1" bolts.
- **For spans** between 18'-0" and 2'-0", use Type 1 Masonry Plate with 2" bolts.
- **For spans** between 1'-0" and 18'-0", use Type 1 Masonry Plate with 1" bolts.
- **For spans** between 1'-0" and 1'-0", use Type 1 Masonry Plate with 1" bolts.

**Expansion Bearing Details**

- **10' Bearing**
- **12' Bearing**
- **14' Bearing**
- **16' Bearing**
- **18' Bearing**
- **20' Bearing**

**Limitations**

- Expansion bearings shall be used in conjunction with expansion joints.
- Anchor bolts shall be installed with a minimum 1" bearing plate, along with a minimum 1" bearing pad after tightening. Plate no shall be sufficiently long to provide secure anchorage.
- Expansion bearings shall be used in conjunction with expansion joints.

**Commentary**

- Adjustment height if tapered bearings are required.
- Expansion bearings shall be used in conjunction with expansion joints.
- Anchor bolts shall be installed with a minimum 1" bearing plate, along with a minimum 1" bearing pad after tightening. Plate no shall be sufficiently long to provide secure anchorage.

**References**

- Standard 24.2 for informational purposes only.

---

**Date:** 7-16
45° ORDER
A • 565 SQ. FT.
$\tau = \frac{223.286}{202,500}$ in.
$\gamma_i = 2.423$ in.
$\gamma_e = -20.27$ in.
$\kappa = 150.390$ in.$^4$
$S_e = 5,070$ in.$^3$
WT. = 585 * KIPS

PRE-TENSION
45" GIRDER
$r = 223.91$ in.

$S_{P(Init.)} = A f$ (4)
$S_{(KIPS)} = \frac{f_{(Init.)}}{3}$ (5)
$B_S = \frac{2}{3}y + 2.352$ (inches)
$S_e$ (1)
$N$ NO. STRANDS

STANDARD PATTERNS FOR DRAPED STRANDS

STANDARD PATTERNS FOR UNDRAPED STRANDS

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
to avoid draping of 0.6" DIA. STRANDS

ARRANGEMENT AT 2^* SPAN - FOR GIRDERS WITH DRAPED 0.5" DIA. AND 0.6" DIA. STRANDS

*Flat Dia. Strands Only
ANCHOR PLATE

support with steel or elastomeric brgs.

SIDE VIEW OF GIRDER

DESIGNER NOTES

be flow shall be prestressed girder type 1 70-mc

show only one strand size on the plans.

order length in excess of 100 feet may be controlled by transportation limitations and require approval by the prestressing girder manufacturers and contractor by the

specify concrete strengths as required by design from a

minimum of 6000 psi x max. of 8000 psi. maximum release stresses in bridge bridge 0.675 psi or equal strands.

all girder shall be cast full length as shown.

not shown for #4 stirrups shown for grade 60 reinforcement.

spacing shown for #4 stirrups is for grade 60 reinforcement.

#4 bar coated, place stirrup x 2, top strand, and place point 12" of the top flange.

#4 bars x 1-1/2" as required by design.

#4 bars x 1-1/2" space @ 1'-0" max. spacing.

#4 bar coated, place stirrup x 2, top strand, and place point 12" of the top flange.

4 @ 3" "B" = ("A" + 3 "C") + 3" max.

4 @ 3" "B" = ("A" + 3 "C") min.

"A" to be given to the nearest 1".

"A", "B" & "C" record dimensions.

hold down point

location of draped strands

center of gravity of draped strands

12% slope

1/2" @ #4 bars

#4 bar coated.

#4 bar coated, place stirrup, embed into order, and

area of more than 3" should be a 2" overlay.

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a 20% vertical wire for

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### 70" Prestressed Girder Design Data

#### Standard Patterns - 0.5" Dia. Draped Strands

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#### Standard Patterns - 0.6" Dia. Draped Strands

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#### Notes
- **A** = 774 square inches
- **f'** = 270,000 psi
- **f** = 0.75 \( f' \) = 202,500 psi
- **I** = 510,613 in.\(^3\)
- **S** = 14,430 in.
- **y** = -34.62 in.
- **r** = 659.70 in.
- WT. = 0.806 kips/ft. + 6.6 kips for both end blocks
- 0.5" Dia. strands
- 0.6" Dia. strands

**Arrangement at 6" Span for Girders with Draped 0.6" Dia. Strands**

**Arrangement at 6" Span for Girders with Draped 0.5" Dia. Strands**
NOTES

EXCEPTIONS MAY REQUIRE BASE PLATE THICKNESS AS AN ALTERNATE TO SMALL.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES FROM ALL SURFACES FREE FROM MOLD AND ALL EDGE SHARP AS STATED IN THE STANDARD SPECIFICATION.

WELDING OF BEARING PLATES SHALL BE PERFORMED AFTER WELDING IS COMPLETED.

ALL MATERIALS FOR BEARINGS INCLUDING STEEL, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION TYPE A36 GRADE 36 STEEL.

ANCHOR BOLT EDGE DISTANCE ALONG "L" MAY BE INCREASED FROM MINIMUM SHOWN WHEN A COMMON GRID DETAIL IS DESIRED FOR SEVERAL BEARINGS.

ANCHOR BOLT EDGE DISTANCE ALONG "L" MAY BE INCREASED FROM MINIMUM SHOWN WHEN A COMMON GRID DETAIL IS DESIRED FOR SEVERAL BEARINGS.

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE MACHINE OR MACHINE FLAME CUT TO SHIMS.

ALL MATERIALS FOR BEARINGS INCLUDING STEEL, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION TYPE A709 GRADE 36 STEEL.

WELDING IS COMPLETED.

WELDED BEARINGS, FINAL MACHINING CAN BE PERFORMED BEFORE WELDING.

NOTES

FABRICATOR MAY INCREASE BASE PLATE THICKNESS AS AN ALTERNATIVE TO SHIM.

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

ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS, ON WELDED SURFACES, FINAL WELDING CAN BE PERFORMED BEFORE WELDING IS COMPLETED.

ALL MATERIAL FOR BEARINGS INCLUDING SHIMS BUT EXCLUDING ANCHOR BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION A709 GRADE 50W STEEL.

ANCHOR BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION A709 GRADE 36 STEEL. ANCHOR BOLTS SHALL BE threaded 3" and provide one standard wrought washer and one hex nut per bolt. Project anchor bolts "S" Plate thickness + 2" above top of concrete masonry. Chamfer anchor bolts prior to threading.

After welding shoe assembly, finish bottom of base plate to a flat surface.

ALL SURFACES WELDED "S" SHALL BE MACHINE FINISHED BY AN AUTOMATIC PROCESS. THE CONTACT AREA OF BOTTOM SURFACE OF THE GIRDER PLATE SHALL BE MACHINE FINISHED.

ANCHOR BOLT DISTANCES ALONG "T" OR "U" MAY BE INCREASED FROM MINIMUM SHOWN WHEN A COMMON GRID DETAIL IS DESIRED FOR SEVERAL BEARINGS.

FOR UNPAINTED STRUCTURES THE UPPER 6" OF THE ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AS REQUIRED BY ASTM DESIGNATION A153, CLASS A3 OR B633.

ALL MATERIALS IN TYPE "B" FIXED SHOE BEARINGS, INCLUDING SHIMS, SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "BEARING ASSEMBLIES FIXED B-_-_".

# IN MATERIAL OF EQUIVALENT YIELD STRENGTH AND ELONGATION.

---

**TABLE OF DIMENSIONS**

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<th>B</th>
<th>C</th>
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**TYPE "B" STEEL GIRDERS FIXED SHOE**

BUREAU OF STRUCTURES

APPROVED: Bill Oliva

STANDARD 40-22

---
**WING STRAPPING**

**WING STRAPPING DETAIL**

For use with angled wings only.

**DETAIL “A”**

Section thru channel

- **For angled wings:**
  - Use 1" x 2" long slotted holes
  - Embed 10" in concrete.
  - Adhesive anchors 1-inch.

**DETAIL “B”**

Section thru channel

- **For bridge wings:**
  - Use 1" x 1" long slotted holes
  - See detail “a”
  - Embed 5" in concrete.
  - Adhesive anchors 1-inch.

- **For culvert wings:**
  - Use 1" dia. thru wall threaded rod
  - With wing wall thickness < 8"
  - See detail “a”
  - Embed 5" in concrete.
  - Adhesive anchors 1-inch.

**NOTES**

- Wing strapping detail for the purpose of integrating wing replacement as an alternative to the prescribed method of wing replacement.
- All items shall be “strapping b-xx-xxx” which includes all items shown.
- WisDOT Regional Bridge Maintenance Engineer to approve use of detail, prior to installation.
- All provided steel material shall conform to ASTM A36.
- All structural steel shown shall be galvanized, threaded rods, masonry anchors, nuts and washers shall be galvanized in accordance with ASTM A153 class C.
- Cutting and drilling of channel shall be done in fabrication shop, prior to galvanizing
- Welding cover plate in field, prior to welding, remove galvanizing from area to be welded, touch up with paint, all areas lacking galvanizing when complete.
- All provided steel material shall conform to Section 20222 of the standard specifications.

**STANDARDS**

40.23

**DATE:**

7/18

**APPROVED:**

Bill Oliva

**BILL OLIVA**
ANCHOR BOLTS FOR RAIL POSTS

INSIDE ELEVATION

FORM TO BE USED IN CONCRETE MIN.
FOR TYPE A1 ABUT., USE 2'-9" DECK
WITH HOLE AND WASHERS FOR 3" LONG ROUND HEAD BOLTS.

NOTE: DESIGNER CAP HINGE SUPPLIED, AVOID EXCESSIVE FREQUENCY OF CURRENT OR ELECTRIC SHOCK FROM CONTACT WITH THE TOP OF THE PARAPET.

MAX. POST SPACING INSIDE ELEVATION

S401 @ 8"
S402 @ 8"
R504 @ 6"
R507
R512
R506
R513

PARAPET PLAN

BASE PLATE

DESIGNER NOTES

DETAILS LIMITED TO SKEWS < 40°.

SEE STANDARD 40.25 FOR RAILING DETAILS

RAILING TUBULAR TYPE 'PF'

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

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

FORM 7/8" DIA. HOLES IN CONCRETE WITH PIPE SLEEVE, 5/8" DIA. HOLES IN RAILS WITH HEX NUT AND WASHERS FOR ¾" X 1' DECK SHIM AS REQ'D TO ALIGN RAILING. MIN. OF ONE PER POST.

STEEL OPENING OR 2'-0" WALL FOR TOP RAIL VS. GUTT & 1/2" SPACING FOR ADJUSTMENT.

ADMIN. APPROVED: BILL OLIVA

DATE: 17-06-2022

STANDARD 40.24
**NOTES**

- **Design Data**
  - **Life Limit:**
  - **Operating Standard:**
  - **Resistance Standard:**
  - **Material Properties:**
    - Concrete Masonry Overlay Decks:
      - Unit:
      - SY

- **Notes**
  - **Design Notes**
  - **Construction Notes**
  - **Material Properties**
    - Concrete Masonry Overlay Decks:
      - f'c = 4,000 P.S.I.

- **Section Notes**
  - **Cross Section Through Roadway**
  - **Plan**

**Total Estimated Quantities**

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*Possible Additional Bid Items*:
- Protection Surface Decks
- Cleaning Decks

**Survey Notes**

- Survey Type: Survey Completed Date: __/__/____

**Surveyed Results**

- Deck Preparation
  - Deck Overlap
  - Existing Overlap
  - New Overlay

**Design Notes**

- Plan view applicable to all overlay methods and deck repairs without overlays.
- Provide average overlay thickness on the plans. The average overlay thickness is determined by the maximum overlay thickness plus 1/8" to account for variations in the deck surface. The average overlay thickness is calculated in cross-slope increases the average overlay thickness, quantities are based on the average overlay thickness.

**Construction Notes**

- Provide a profile grade line on the plans.
- Do not include any item "cleaning decks to reapply concrete masonry overlay" on the plans.
- Include the bid item "adjusting floor drains" when floor drains are to be raised or removed to fit each individual case.
- Deck repair areas should not be included in deck repair areas or overlay quantities.
- Include the bid item "removing concrete masonry overlay" when removing existing overlay.

**Notes**

- Deck repair areas should not be included in deck repair areas or overlay quantities.
- Oversight that is visible will be provided to existing steel to facilitate the required access for deck repair and overlay placement. All steel that is visible will be provided to existing steel to facilitate the required access for deck repair and overlay placement.

---

**Surveyed Results**

- Survey Type: Survey Completed Date: __/__/____

**Design Notes**

- Plan view applicable to all overlay methods and deck repairs without overlays.
- Provide average overlay thickness on the plans. The average overlay thickness is determined by the maximum overlay thickness plus 1/8" to account for variations in the deck surface. The average overlay thickness is calculated in cross-slope increases the average overlay thickness, quantities are based on the average overlay thickness.

**Construction Notes**

- Provide a profile grade line on the plans.
- Do not include any item "cleaning decks to reapply concrete masonry overlay" on the plans.
- Include the bid item "adjusting floor drains" when floor drains are to be raised or removed to fit each individual case.
- Deck repair areas should not be included in deck repair areas or overlay quantities.
- Include the bid item "removing concrete masonry overlay" when removing existing overlay.

**Notes**

- Deck repair areas should not be included in deck repair areas or overlay quantities.
- Oversight that is visible will be provided to existing steel to facilitate the required access for deck repair and overlay placement. All steel that is visible will be provided to existing steel to facilitate the required access for deck repair and overlay placement.

---

**Surveyed Results**

- Survey Type: Survey Completed Date: __/__/____

**Design Notes**

- Plan view applicable to all overlay methods and deck repairs without overlays.
- Provide average overlay thickness on the plans. The average overlay thickness is determined by the maximum overlay thickness plus 1/8" to account for variations in the deck surface. The average overlay thickness is calculated in cross-slope increases the average overlay thickness, quantities are based on the average overlay thickness.

**Construction Notes**

- Provide a profile grade line on the plans.
- Do not include any item "cleaning decks to reapply concrete masonry overlay" on the plans.
- Include the bid item "adjusting floor drains" when floor drains are to be raised or removed to fit each individual case.
- Deck repair areas should not be included in deck repair areas or overlay quantities.
- Include the bid item "removing concrete masonry overlay" when removing existing overlay.

**Notes**

- Deck repair areas should not be included in deck repair areas or overlay quantities.
- Oversight that is visible will be provided to existing steel to facilitate the required access for deck repair and overlay placement. All steel that is visible will be provided to existing steel to facilitate the required access for deck repair and overlay placement.
The plan quantity for the bid item "HMA pavement type e-x" is based on the average overlay thickness. Quantities are based on the theoretical average overlay thickness plus 0.5" to account for variations in the deck surface. Quantities are based on the average overlay thickness.

Alternatives to concrete deck patches may be used to shorten time required for repairs using concrete. REQUIRE a minimum cure time of 7 days before placing overlay.

Repair areas requiring a minimum cure time of 7 days before placing overlay. Alternatives to concrete deck patches may be used to shorten the required for placing overlay.

Provide an average overlay thickness on the plans. The average overlay thickness value is based on the theoretical average overlay thickness plus 0.5", to account for variations in the deck surface. Quantities are based on the average overlay thickness.

Do not provide a profile grade line on the plans.

Overlays not requiring sheet membrane waterproofing are preferred. Designate the required bridge maintenance engineer to determine if polymer-modified asphaltic material is available.

Restrictions on removals shall be placed on the plans to prevent damage to reinforcing steel.

Removal of top wearing deck under the "clearing grate" is not intended for previously existing concrete. Existing concrete other than slab, shall be removed and concrete shall be removed on deck surface to underlying concrete or hardscape.

For a full list of possible bid items may need to be added or removed to fit each individual case.

**DESIGNER NOTES**

Concrete overlays are the current preferred method to overlay a bridge. Repairs using concrete require a minimum cure time of 7 days before placing overlay. Alternatives to concrete deck patches may be used to shorten the required for placing overlay.

Provide an average overlay thickness on the plan. The average overlay thickness value is based on the theoretical average overlay thickness plus 0.5", to account for variations in the deck surface. Quantities are based on the average overlay thickness.

Overlays not requiring sheet membrane waterproofing are preferred. Coordinate with design, bridge maintenance and roadway engineering for the asphaltic overlay design and quantity.

Removal of top wearing deck under the 'clearing grate' is not intended for previously existing concrete. Existing concrete other than slab, shall be removed and concrete shall be removed on deck surface to underlying concrete or hardscape.

For a full list of possible bid items may need to be added or removed to fit each individual case.

**TOTAL ESTIMATED QUANTITIES**

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**POLYMER MODIFIED ASPHALTIC OVERLAY**

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**ASPHALTIC OVERLAY**

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**NOTES**

Dimensions shown are based on the original structure plans. Areas of preparation decks type 1 shall be defined by a saw cut.

Preparation decks type 1, preparation decks type 2, and full-depth deck repair areas are based on the plans and as determined by the engineer. Deck preparation and full-depth deck repairs shall be filled with concrete or asphaltic deck repair.

Any excavation required to complete the overlay or joint repair at the abutments to be considered incidental to the bid item "HMA OVERLAY Polymer-MODIFIED." The plan quantity for the bid item "HMA OVERLAY Polymer-MODIFIED" is based on the average overlay thickness.

Profile grade line shall be determined in the field based on a minimum overlay thickness of 0.5" placed above the deck surface. Expected average overlay thickness is 0.5" or as given on the plans. At point where expected average overlay thickness is exceeded by more than 0.5", contact the structures design section.

**DESIGN DATA**

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**BUREAU OF STRUCTURES**

Bill Oliva

Date: 1-17

Standard 40.33
**DEVELOPMENT DATA**

- **Design Load:**
- **BID ITEMS:**
- **INVENTORY RATING:**

**NOTES**

- Dimensions shown are based on the original structure plans.
- INCH OF CONCRETE SHALL BE REMOVED FROM THE ENTIRE BRIDGE DECK UNDER THE RD.
- **OPTIONAL LONGITUDINAL SPRAY:**
- **LIVE LOAD:**
- **INVENTORY RATING:**

**DESIGNER NOTES**

- Use of PPC overlays are limited. See also 40.5 in the Bridge Manual for additional guidance.
- PPC overlays are intended to be placed on decks with minimal surface distress. For full-depth repair, full-depth repair patches are required. When placing PPC overlays, keep the entire deck under the bid. Note that cleaning decks is not expected or warranted.
- Post-Polymer Concrete (PPC) overlays and concrete are recommended for the same approaches. The use of PPC overlays is intended to be placed on decks with minimal surface distress. For full-depth repair, full-depth repair patches are required. When placing PPC overlays, keep the entire deck under the bid. Note that cleaning decks is not expected or warranted.
- Use of PPC overlays are limited. See also 40.5 in the Bridge Manual for additional guidance.

**TOTAL ESTIMATED QUANTITIES**

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**NOTES**

Top of order to be rough finished and broom finished except the outside 2' of order which shall receive a smooth finish. An approved concrete sealer shall be applied to all smooth surfaces including the outside 2' of the top flange.

Do not apply concrete sealer or epoxy to surfaces requiring application of concrete stainings.

- **Plan View**
  - Location of draped strands
  - 3'-0" on pallet

- **Side View of Girder**
  - Clearances -
    - 1" MIN.
    - 0.5" dia. hole

- **Section Thru Girder**
  - Strands not shown

**DESIGNER NOTES**

Do not use the 36" prestressed girder shown on this sheet. It will be moved to ch 40 in the future.

**STRENGTH NOTIONS**

- Design strength as required by design.
- Use only 0.5" dia. strand for the straight pattern, unless only 0.5" dia. work for 1'-3" lap.
- Use only 0.5" dia. strand for the straight pattern, unless only 0.5" dia. work for 1'-3" lap.

**APPROVALS**

- Bill Oliva
- Date: 7-20

**BUREAU OF STRUCTURES**

- 36" Prestressed Girder Details
- Standard Details
- Approved: Bill Oliva
- Date: 7-20
36" GIRDER
\[ A = 369 \text{ sq. in.} \]
\[ r^2 = 189.25 \text{ in}^2 \]
\[ V_x = 20.17 \text{ in.} \]
\[ V_y = -5.83 \text{ in.} \]
\[ I = 50.979 \text{ in}^4 \]
\[ S_y = 2.527 \text{ in}^3 \]
\[ S_x = -3.220 \text{ in}^3 \]
\[ W_1 = 384 \text{ lb/ft} \]

PRE-TENSION
\[ f_y = 270,000 \text{ psi} \]
\[ f_y = 0.75 \times 270,000 = 202,500 \text{ psi} \]
for low relaxation strands
\[ P_i \text{ per 0.6" dia. strand} = 0.253 \times 202,500 = 51,162 \text{ kips} \]
\[ P_i \text{ per 0.5" dia. strand} = 0.1531 \times 202,500 = 31,000 \text{ kips} \]
\[ \frac{V_y}{s} = -0.0383 \times \frac{-0.0106}{\text{in.}^2} \]
\[ s_y = 138.15 \text{ in.} \]

\[ f_{(\text{init.})} = \frac{A}{(1 + e)} \]

KOMPRESSION IS POSITIV

<table>
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<tr>
<th>NO. STRANDS</th>
<th>( A_f ) (in.)</th>
<th>( P_i \times A_f s_y ) (kips)</th>
<th>( s_y ) (in.)</th>
<th>\( s_y ) (in.)</th>
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STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS (0.6" DIA.):

ARRANGEMENT AT 6" SPAN - FOR GIRDER WITH DRAPED 0.5" DIA. STRANDS

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

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