Three types of bridge parapets are shown: Type I, Type II, and Type III. For each type, options include standard masonry, single rustication lines, and double rustication lines.

**Wing Details:**
- **Type I:** Single rustication lines
- **Type II:** Single rustication lines
- **Type III:** Double rustication lines

**Parapet Details:**
- **Type I:** Single rustication lines
- **Type II:** Single rustication lines
- **Type III:** Double rustication lines

**Rustication Lines:**
- **Type I:** Standard
- **Type II:** Standard
- **Type III:** Standard

**Designer Notes:**
- The three types shown are preferred aesthetic concepts for Wisconsin projects. When used without pedestrian accommodations, they are to be used for masonry bridges and not subject to CSS funding.
- Only the choice of parapet, wing, and pier details for a given type should be used for that type.
- Lines parallel to the centerline of the guardrail are to be plain Type I.
- See standards 4.04 and 4.05 for additional details.
- See bridge manual section 4.2 for location of use and rendering.
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 CDS 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 (elevation) cast-in to be plain Type I. In lieu of the combination railing type (shown), chain link fencing may be used. See stand 4.04 for details.

See Bridge Manual Section 4.9 for location of use and renderings.
WING & PARAPET
AESTHETIC DETAILS

PARAPET OPTIONS

DESIGNER NOTES
WING PARALLEL TO CENTERLINE OF ABUTMENT
ELEPHANT EARS TO BE PLAIN TYPE B.

WING PARALLEL TO CENTERLINE OF ABUTMENT
ELEPHANT EARS TO BE PLAIN TYPE B.

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WING PARALLEL TO CENTERLINE OF ABUTMENT
ELEPHANT EARS TO BE PLAIN TYPE B.
MULTI-COLUMNED PIER
AESTHETIC DETAILS

SECTION THRU COLUMN

SEE DETAIL A

SECTION THRU COLUMN

SEE DETAIL A

DETAIL A

DETAL B

STANDARD 4.05

BILL OLIVA
1-15

APPROVED
NOTES

CHANGES SHALL NOT BE SCALED.

1. ALL GRS ABUTMENT STATIONS AND OFFSETS ARE GIVEN AT THE FRONT FACE OF THE VESSELMENT KEYBLOCK. SEE SECTIONS A-A AND B-B ON STANDARD 7.02 FOR LOCATION OF THE VESSELMENT KEYBLOCK.

2. FACTORED BEARING RESISTANCE OF 3X PSI AT BOTTOM OF REINFORCED SOIL FOUNDATION.

3. MAXIMUM ALLOWABLE WALL BAYETE IS 9 VERTICAL TO 1 HORIZONTAL OR 12 DEGREES.

4. PROVIDE CORNER BLOCKS AND/OR DETAILS COMPATIBLE WITH THE SELECTED MODULAR BLOCK SYSTEM. ROUNDED CORNERS ARE ALLOWABLE.

5. 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.

1. PROVIDE AN ADEQUATE WORKING WIDTH FOR GUARDRAIL DEFLECTION. REFERENCES SHOWN ON STANDARD 7.02 ARE REQUIRED.

2. MAXIMUM SKEW ANGLE IS 15°.

3. THE TOP OF THE CONTRAST-COLORED BLOCKS SHALL BE 2-3 BLOCK COURSES BELOW THE TOP OF RIPRAB ELEVATION.

4. NAME PLATE TO BE LOCATED ON THE OUTSIDE OF THE FIRST RIGHT GRS ABUTMENT AND TRAVELING INWARDS FOR OPEN RAILINGS.

5. THE MINIMUM REQUIRED TENSILE STRENGTH OF THE REINFORCEMENT COPPLED IS SHOWN IN THE SPECIAL PROVISIONS, REINFORCED GRS ABUTMENTS.

6. WHEN TRAVELING UPSTATION (FOR OPEN RAILINGS), THE USE OF GRS ABUTMENTS IS SUBJECT TO PRIOR APPROVAL BY THE BUREAU OF STRUCTURES.

7. FACTORED BEARING RESISTANCE OF XX PSI AT BOTTOM OF REINFORCED SOIL FOUNDATION.

8. PROVIDE CORNER BLOCKS AND/OR DETAILS COMPATIBLE WITH THE SELECTED MODULAR BLOCK SYSTEM. ROUNDED CORNERS ARE ALLOWABLE.

9. TEMPORARY FALSEWORK NOT TO BE SUPPORTED ON THE GRS ABUTMENT UNLESS APPROVED BY THE BUREAU OF STRUCTURES DEVELOPMENT SECTION.

THE FOLLOWING ARE REQUIRED:

- GRS ABUTMENT STATIONS AND ELEVATIONS
- TABLE OF GRS ABUTMENT STATIONS AND ELEVATIONS
- STANDARD 7.01
- APPROVED: BILL OLIVA
- DATE: 7-18
- BUREAU OF STRUCTURES

**TABLE OF GRS ABUTMENT STATIONS AND ELEVATIONS**

<table>
<thead>
<tr>
<th>GRS ABL STN.</th>
<th>ROADWAY ABL. STN.</th>
<th>ROADWAY CENTER</th>
<th>OFFSET</th>
<th>GRS ABL.</th>
<th>ROADWAY EL.</th>
<th>GRS ABL.</th>
<th>ROADWAY EL.</th>
<th>GRS ABL.</th>
<th>ROADWAY EL.</th>
<th>GRS ABL.</th>
<th>ROADWAY EL.</th>
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<th>ROADWAY EL.</th>
<th>GRS ABL.</th>
<th>ROADWAY EL.</th>
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**NOTES**

STATIONS AND OFFSETS GIVEN AT FRONT FACE OF VESSELMENT KEYBLOCK OR ELEVATION PLACED.

THESE STATIONS AND OFFSETS SHALL BE HELD REGARDLESS OF ACTUAL MODULAR BLOCK SIZE OR GRS ABUTMENT BATTER.
NOTES

PRECAST PIER CAP LENGTH MAXIMUM LENGTH OF EACH CAP SEGMENT IS BASED ON PROJECT.

LIMIT OF PRECAST PIER CAP TO BE PAID  PER SECTIONS AS SHOWN  PRECAST PIER CAPS.

SEE STANDARDS 7.08 7.09 7.10 MULTIPLE PIER SEGMENTS ARE RECO.

LEVEL

BEAM SEATS.

GIVE ELEVATION OF ROADWAY REF. LINE

PIER BEARING PADS

ELEVATOR PIER

END VIEW

PLAN

LOOKING UP STATION

LEFT  MIN.

4'-0"  MIN.

MIN.

2'-0"  MIN.

MIN.

3'-6"

MIN.

2'-0"

Note: All footings lengths THE SAME WITHIN A GIVEN PIER

STEEL SHIMS AT THE TOP AND BOTTOM OF THE COLUMN.

MANUFACTURER TO DETERMINE THE PRECAST PIER COLUMN LENGTHS ASSUMING 1/2" SLEEVE DIAMETER DIFFERS.

COUPLER SLEEVES. ADJUST STIRRUP DIMENSIONS AS NECESSARY IF THE ACTUAL COUPLE

STIRRUPS AT THE GROUTED COUPLERS ARE SIZED BASED ON A XX" OUTER DIAMETER.

CURVING SHIMS AS DEPENDS IF THE ACTUAL COUPLER SLEEVE DIAMETER DIFFERS.

NOTES

PIER SECTIONS P1 AND P2 ARE DETAIL ON STANDARD 7.04

FOR DETAILS.

SEE STANDARD 7.04

COUPLER (TYP.)

GROUTED BAR

FOR DETAILS.

SEE STANDARD 7.04

CONCRETE FOOTING.

CAST-IN-PLACE

PRECAST PIER CAP AND COLUMNS
GROUTED COUPLER NOTES

GROUTED SPLICE COUPLER CONNECTION SEQUENCE

1. PRECAST PIER COLUMN CORRECT ELEVATION ACHIEVED WITH BOLT ADJUSTMENT.
2. PIER COLUMN REINFORCEMENT BARS EXTENDED TO BE USED FOR ATTACHMENT TO COLUMN.
3. ERASE ALL GROUTED COUPLERS SHALL BE EPOXY COATED.
4. INCREASE DISPLACEMENT OR GAPS THAT DEVELOP IN THE GROUT JOINT USING HAND TOOLS.
5. MAINTAIN INTEGRITY OF GROUT BED DURING SETTING OPERATION. REPAIR GROUT.
6. PLACE AFTER ELEMENT ERECTION BUT PRIOR TO GROUTING OF COUPLERS.
7. IN THE SPECIFIED ERECTION ALLOW THE COUPLERS TO BE GROUTED AFTER THE PRECAST ELEMENTS HAVE BEEN ERECTED.
8. BRACE THE UPPER ELEMENT.
9. APPLICATION OF BEDDING GROUT.
10. IF THE COUPLER IS BELOW THE JOINT, COUPLER GROUT CAN BE INSTALLED PRIOR TO INSTALL GROUT IN COUPLERS FOLLOWING THE MANUFACTURER'S WRITTEN PROCEDURES.

GROUTED COUPLER PLAN AT TOP AND BOTTOM OF COLUMN

KEYED CONSTR. JOINT ELEVATION DETAIL

PRECAST PIER CAP AND COLUMN DETAILS

BILL OF BARS

TOTAL COATED: XX LBS

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

Note: This Bill of Bars is shown for information only. Payment for reinforcement in Precast Columns and Precast Pier Caps is included in the bid items 'Precast Columns' and Precast Pier Caps.

BUREAU OF STRUCTURES

PRECAST PIER CAP AND COLUMN DETAILS

STANDARD 7.04

APPROVED: Bill Oliva

DATE: 1-14
CONTRACTOR NOTES

The contractor shall follow the standard precast pier options when precast piers are used in lieu of cast-in-place piers. The pier configuration shall be interchangeable between c.i.p. and precast options. The pier configuration shall be determined by the structural design section. The contractor shall follow this standard when precast piers are used instead of cast-in-place piers. The use of optional precast pier details shall only be used when plans indicate allowance or with approval by the Board of Structural Design. The contractor shall follow the following additional standards when precast piers are used:

- Standard 7.04 - Precast Pier Cap and Column Details
- Standard 7.06 - Precast Bearing Block Details
- Standard 7.07 - Precast Pier Cap Details

The contractor may use precast segments at their discretion. Precast pier references are for designer informational purposes only and shall not be placed on the plans. Precast pier references are for designer informational purposes only and shall not be placed on the plans. The contractor may use precast elements in lieu of the cast-in-place pier, provided the contractor follows the following additional standards:

- Standard 7.05 - Precast Pier (Optional) Cap and Columns

The contractor shall follow the following additional standards when precast piers are used in lieu of cast-in-place piers:

- Standard 13.01 - Concrete Footing

The contractor shall follow the following additional standards when precast piers are used in lieu of cast-in-place piers:

- Standard 7.04 - Precast Pier Cap and Column Details
- Standard 7.06 - Precast Bearing Block Details
- Standard 7.07 - Precast Pier Cap Details

The contractor shall provide a concrete diaphragm between pier cap segments when multiple pier cap segments are used. Provide pier cap details to be identical with multiple cap segments when multiple cap segments are used. Make all footing lengths the same within a given pier.

ELEVATION
Looking up Station

PLAN

Pre-Cast Cap Length = Minimum Length of Concrete Cap on Precast Pier

Design: Bill Oliva

Date: 1-19
**PARTIAL TRANSVERSE SECTION AT DIAPHRAGM PIER**

**TOP OF DECK**

**CONTRACT PLANS**

**PRECAST OPTION**

**BEARING PAD**

**BEARING BLOCK**

**BEARING PADS, TYP.**

**CONCRETE PADS, TYP.**

**3" X 6" BEVELED KEYWAY BETWEEN BEARING BLOCKS. REFER TO STANDARDS 19.33, 19.34, 19.35.**

**PARTIAL TRANSVERSE SECTION**

**TOP OF CAP**

**BEARING BLOCK**

**BEARING PADS**

**CONCRETE PADS**

**PLAN**

**ELEVATION**

**BILL OF BARS**

<table>
<thead>
<tr>
<th>BAR MARK</th>
<th>NO.</th>
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<th>COAT</th>
<th>LOCATION</th>
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<tr>
<td>P550</td>
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<td>3'-5&quot;</td>
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<td>3'-5&quot;</td>
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<tr>
<td>P552</td>
<td></td>
<td>3'-6&quot;</td>
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<tr>
<td>P553</td>
<td></td>
<td>3'-9&quot;</td>
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**TOTAL COAT: XX LBS**

**NOTES:**

- This Bill of Bars is shown for information only. Precast Pier Shop Changes shall include all bars for transverse requirement. Payment for all items associated with the optional Precast Piers shall be included in the Cast-In-Place Concrete Billings.

- See Table "A" for additional Precast Pier Guidance.

**CONTRACTOR NOTES**

- The Contractor may use Cast-In-Place Bearing Blocks in lieu of Precast Bearing Block Details. The Contractor is responsible for the additional weight, which may cause Pier Cap segments to be in excess of 90 kips.

- See Standard 7.07 for Cast-In-Place Bearing Block Details and Additional Notes.

**PRECAST CONCRETE DETAIL NOTES**

- Precast Bearing Block Details shall only be used when plans indicate allowance for Precast Piers.

- The Contractor is responsible for the additional weight, which may cause Pier Cap segments to be in excess of 90 kips.

- See Standard 7.07 for Cast-In-Place Bearing Block Details and Additional Notes.
**CAST-IN-PLACE BEARING BLOCK DETAILS**

**Designer Note**

See 7.1.4.1.2 for additional precast pier guidance.

**Contractor Notes**

The contractor shall follow the standard when precast piers are used and when cast-in-place bearing blocks are used in lieu of precast bearing blocks. See standard 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. A cast-in-place bearing block height is used only if precast is not used, in which case the contractor must determine the cast-in-place bearing block height.

---

**PARTIAL TRANSVERSE SECTION**

**AT DIAPHRAGM PIER**

---

**PLAN**

---

**ELEVATION**

---

**TOP OF DECK**

---

**TOP OF CAP (CONTRACT PLANS)**

---

**TOP OF CAP (PRECAST OPTION)**

---

**SEE TABLE "A"**

---

**1'-10"**

---

**3'-9"**

---

**1'-10"**

---

**EXTERIOR GIRDER**

---

**INTERIOR GIRDER**

---

**TOP OF DECK**

---

**3" TYP.**

---

**p553**

---

**BAR SHOWN IN CONTRACT PLANS.**

---

**to girders. MATCH SIMILAR girders.**

---

**Spacing perpendicular bars placed parallel to**

---

**MIN.**

---

**pier cap**

---

**block**

---

**bearing**

---

**pier**

---

**FLANGE**

---

**girder bottom**

---

**PRESTRESSED BRG.**

---

**pier**

---

**DIAPHRAGM CONCRETE PLAN**

---

**2'-0"**

---

**AT DIAPHRAGM PIER PARTIAL TRANSVERSE SECTION**

---

**p552**

---

**2" MIN.**

---

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

---

**plan**

---

**S K E W**

---

**5 ' " M IN .**

---

**2'-0 " M A X .**

---

**CAST-IN-PLACE CONCRETE DETAIL notes**

---

**ELEVATION**

---

**CAST-IN-PLACE BEARING BLOCK HEIGHTS.**

---

**Cast-in-place Height = VARIES (5" MIN. TO 2'-0" MAX.).**

---

**Contractor TO DETERMINE THE**

---

**for precast piers.**

---

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

---

**A cast-in-place bearing block height is used only if precast is not used, in which case the contractor must determine the cast-in-place bearing block height.**
Typical section thru abutment at MSE Wall

**ABUTMENT BACKFILL DIAGRAM**

For wings parallel to roadway:
- **A** = MIN CHAIN OF ABUTMENT BODY (FT)
- **B** = STRUCTURAL APPROACH LENGTH (FT)
- **C** = LENS (FT)
- **D** = ASSUMED LENS (FT)
- **E** = LENS (FT)
- **F** = LENGTH OF ABUTMENT (FT)
- **G** = LENGTH OF ABUTMENT (FT)
- **H** = LENGTH OF ABUTMENT (FT)
- **I** = LENGTH OF ABUTMENT (FT)
- **J** = LENGTH OF ABUTMENT (FT)
- **K** = LENGTH OF ABUTMENT (FT)
- **L** = LENGTH OF ABUTMENT (FT)
- **M** = LENGTH OF ABUTMENT (FT)

**Abutment Backfill Diagram**

For wings parallel to abutment:
- **A** = MIN CHAIN OF ABUTMENT BODY (FT)
- **B** = STRUCTURAL APPROACH LENGTH (FT)
- **C** = LENS (FT)
- **D** = ASSUMED LENS (FT)
- **E** = LENS (FT)
- **F** = LENGTH OF ABUTMENT (FT)
- **G** = LENGTH OF ABUTMENT (FT)
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- **J** = LENGTH OF ABUTMENT (FT)
- **K** = LENGTH OF ABUTMENT (FT)
- **L** = LENGTH OF ABUTMENT (FT)
- **M** = LENGTH OF ABUTMENT (FT)

**NOTES**

The upper limits of excavation for structures bridges 0-10 are shown on the existing structures.

The backfill quantities are based on the pay limits shown on the drawings. The pay limits shown are the upper limits of excavation for abutments and retaining walls. Pay limits for fill bases beyond pay limits shown shall be incidental to excavation for structures.

Excavation below the abutment and abutment footing material is required. The abutments and abutment footing material shall be shown on the plans. For abutments directly behind abutments, see designer notes for more information.

**DESIGNER NOTES**

Type A backfill structure is required directly behind abutments. See designer notes for more information.

The backfill quantities are based on the pay limits shown on the drawings. The pay limits shown are the upper limits of excavation for abutments and retaining walls. Pay limits for fill bases beyond pay limits shown shall be incidental to excavation for structures.

Excavation below the abutment and abutment footing material is required. The abutments and abutment footing material shall be shown on the plans. For abutments directly behind abutments, see designer notes for more information.
STANDARD 9.02

1-19

STRUCTURE BACKFILL

Thru box culvert

Typical section

Thru Retaining Wall

Typical section

Thru MSE Retaining Wall

Typical section

retained backfill

1'-0"

box culvert

top of

1'-0"

reinforcement, typ.

MSE wall

mse backfill

3'-0"

designer notes

modify as needed

(choose applicable note, engineer.

determined by geotechnical

bedding backfill to be

Culvert undercut and

limits of breaker run should only be included on the plans if

For Culverts, the above note regarding potential substitution

manual sections 6.4.2 and 9.10 for additional information.

The design engineer should provide all necessary backfill pay

limits and notes in order to determine quantities. see bridge

The backfill quantities are based on the pay limits shown on

and behind apron wings for 3 feet. backfill placed beyond pay

limits or exceeding plan quantities shall be incidental to

Excavation for Structures.

undercut X'-X". Excavation for undercut to be included in

excavation for structures. Place "geotextile type c" and

under cut X'.

Type a

backfill structure

Type b

backfill structure

all precast box sections shall be placed on a bedding

platform, the contractor may elect to substitute #1 or #2

in lieu of breaker run for the box construction.

The contractor is responsible for base stability with any

other granular material as approved by the engineer.

Concrete coarse aggregate, select crushed material or

verify drainage, install rodent shield at ends of pipe

location, check detail on plans.

LIMITS AND NOTES 2

Notes

Notes

Notes

(Box Culverts)

The upper limits of excavation for structures culverts

shall be the existing groundline.

The designer notes are based on the pay limits shown on

the plans and may not reflect actual placed quantities.

"Backfill structure type a" required for the entire wall length.

The upper limits of "excavation for structures retaining walls

shall be incidental to Excavation for Structures.

The design engineer shall specify the "backfill structure type b" of 6" minimum depth.

of "backfill structure type b" required on the box culvert sides

as determined by the region geotechnical engineer or when constructed on fills)

allowed by the region geotechnical engineer. The contractor is responsible for base stability with any

other granular material as approved by the engineer.

Concrete coarse aggregate, select crushed material or

verify drainage, install rodent shield at ends of pipe

location, check detail on plans.

Notes (Retaining Walls)

The upper limits of excavation for structures retaining walls

shall be the existing groundline.

The designer notes are based on the pay limits shown on

the plans and may not reflect actual placed quantities.

"Backfill structure type a" required for the entire wall length.

The upper limits of "excavation for structures retaining walls

shall be incidental to Excavation for Structures.

The design engineer shall specify the "backfill structure type b" of 6" minimum depth.

of "backfill structure type B" required for the entire wall length.

as determined by the region geotechnical engineer or when constructed on fills)

allowed by the region geotechnical engineer. The contractor is responsible for base stability with any

other granular material as approved by the engineer.

Concrete coarse aggregate, select crushed material or

verify drainage, install rodent shield at ends of pipe

location, check detail on plans.

Designer Notes

The design engineer shall specify the "backfill structure type b" of 6" minimum depth.

of "backfill structure type b" required on the box culvert sides

as determined by the region geotechnical engineer or when constructed on fills)

allowed by the region geotechnical engineer. The contractor is responsible for base stability with any

other granular material as approved by the engineer.

Concrete coarse aggregate, select crushed material or

verify drainage, install rodent shield at ends of pipe

location, check detail on plans.

Legend

"Backfill pay limits" indicate pay limits.

shall be incidental to Excavation for Structures.

limits of excavation shall be determined by the contractor.

note and dimension not required. (undercut not required per

designer notes

modify as needed)

(choose applicable note, engineer.

determined by geotechnical

bedding backfill to be

Culvert undercut and

limits of breaker run should only be included on the plans if

For Culverts, the above note regarding potential substitution

manual sections 6.4.2 and 9.10 for additional information.

The design engineer should provide all necessary backfill pay

limits and notes in order to determine quantities. see bridge

The backfill quantities are based on the pay limits shown on

and behind apron wings for 3 feet. backfill placed beyond pay

limits or exceeding plan quantities shall be incidental to

Excavation for Structures.

undercut X'-X". Excavation for undercut to be included in

excavation for structures. Place "geotextile type c" and

under cut X'.

Type a

backfill structure

Type b

backfill structure

all precast box sections shall be placed on a bedding

platform, the contractor may elect to substitute #1 or #2

in lieu of breaker run for the box construction.

The contractor is responsible for base stability with any

other granular material as approved by the engineer.

Concrete coarse aggregate, select crushed material or

verify drainage, install rodent shield at ends of pipe

location, check detail on plans.
<table>
<thead>
<tr>
<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>Wings Parallel to Roadway</strong></td>
<td><strong>Wings Parallel to Abutment</strong></td>
<td><strong>Wings Parallel to Abutment</strong></td>
<td><strong>Wings Parallel to Abutment</strong></td>
</tr>
</tbody>
</table>

**Wing Fill Sections**

**At Wing Tips**

![Diagram of Wing Fill Sections](image_url)
**DESIGNER NOTES**

When piles are exposed, use the following details:

- **Cast-in-Place Piling**
  - For pipes placed in prebored holes cored into rock, do not require driving. If applicable, place the following note on the plans:
    - Cast-in-place pile shell material shall be in accordance with the standard specification.

- **End Plate Detail for CIP Piling in Artesian Conditions**
  - Only use for Artesian conditions.

- **End Plate Detail for CIP Piling**
  - For all pile sizes, terminate reinforcement 10’’ below groundline or streambed elevation.

- **Cast-in-Place Pipe**
  - Back up ring with a 3/8” wall thickness for 10” diameter.

- **HP Weld Detail**
  - Use when piles are exposed.

**PILE DETAILS**

- **HP Shapes**
  - Steel 'HP' shapes (10”, 12”, 14”)

- **Double Plate**
  - 6” x 8” x 8” - 12” Pile
  - 6” x 5” x 5” - 10” Pile
  - 6” x 10” x 10” - 14” Pile

- **Step-up Bars**
  - 1/2” for 12” and 14” Pile
  - 5/8” for 10” Pile

- **Back-up Ring**
  - 5/8” end plate to be the same diameter as the pile diameter.

- **Weld Detail**
  - See HP 55° at flange doubler plate.

- **Reinforcement Details**
  - Place #3 bars at 2’’ centers in all of drilled shafts.

- **Table**
  - Includes bar sizes and lengths.

**SECTION THRU CONCRETE**

**Cast-in-Place Piling**

- Used when piles are exposed.

- **Non-corrodible bar spacers**
  - Staggered bar steel reinforcement at 3’’ centers.

**BUREAU OF STRUCTURES**

Approved: Bill Oliva

Date: 1-18

STANDARD 11.01
**DESIGNER NOTES**

**WING PILE REQUIRED**
- 10'-0"
- 12'-0"
- 16'-0"
- 20'-0"

<table>
<thead>
<tr>
<th>WT BAR SIZE</th>
<th>5-#5's</th>
<th>2-#5's</th>
<th>4-#6's</th>
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</thead>
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<tr>
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<table>
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<tr>
<th>WT BAR SIZE</th>
<th>8'-6&quot;</th>
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</thead>
<tbody>
<tr>
<td>10'-0&quot;</td>
<td>6-#5's</td>
</tr>
<tr>
<td>11'-6&quot;</td>
<td>6-#7's</td>
</tr>
<tr>
<td>13'-0&quot;</td>
<td>7-#8's</td>
</tr>
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</table>

**WING HEIGHT**

<table>
<thead>
<tr>
<th>WT BAR SIZE</th>
<th>5-#5's</th>
<th>5-#6's</th>
<th>2-#7's</th>
<th>5-#8's</th>
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<tbody>
<tr>
<td>8'-6&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**BARS**

<table>
<thead>
<tr>
<th>WT BAR SIZE</th>
<th>2-#4 BARS</th>
<th>4-#6 &quot;L&quot; shp</th>
<th>5-#5 BARS</th>
<th>5-#7 BARS</th>
<th>5-#8 BARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-7&quot;</td>
<td></td>
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</tbody>
</table>

**LEVEL**

- B.F. of Abutment
- Level

**PLAN FOR TYPE A1 ABUTMENT**

(See Std. 12.01 for Abutment Body Details)

**SECTION A-A**

(See Std. 12.01 for Notes & Details)

**SECTION B-B**

(See Std. 12.01 for Notes & Details)

**LRFD DESIGN LOADS (WINGS)**

(See Note for Live Load & Weight of Soil)

**WING LENGTH - 10'-0" MINIMUM**

**WING TRAVELING UP STATION.**

**LOCATE NAME PLATE ON FIRST R.B. OR BENCH MARK CAP (WHEN SUPPLIED)**

**WING ELEVATION**

(See Standard 30.24 for Notes & Details)

**SECTION B-B**

(See Std. 12.01 for Notes & Details)

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

**Approved:**

Bill Oliva

Date: 1-17

Standard 12.07


**Designer Notes**

- 18" rubberized membrane waterproofing. Abutment until superstructure is in place.
- Do not place fill above 3'-0" from bottom of joint sealer. (1" deep and hold 1/4" below surface filler with non-staining gray non-bituminous sealer all exposed horiz. & vert. surfaces of 1" by beveled 2" x 6" key.

- #5 bars @ 1'-0" f.f.
- 9-#8 bars 3'-6" max.
- Maximum spa. 8'-0" (steel "H" or C-I-P conc.) piles to be designed.

- Minimum: 4" leg.
- 4'-0" horiz. spa.
- 3 - #4 tie bars at level

- Wingwall on f.f. of joint filler

- Edge of deck

- Lap length for horizontal bars shall be based on a "class C" top tension lap splice.

- Use 2'-3" for girder spans with a structural approach slab. (Std. 12.10)
- Use 1'-7" for slab spans with a structural approach slab. (Std. 12.10)
- Use 1'-11" for girder spans with no paving notch, but no structural approach slab.
- Use 1'-3" for slab spans with no paving notch, but no structural approach slab.

- Use 1'-6" for girder spans with no paving notch, but 36W", 45W", 54", 70", 72W" or 82W" girders are used, and skew > 25°.

- Seal all exposed m.e. & very surfaces of 1/2" thick non-penetrating jointing material. Joint filler, 1/4" deep and hold 1/4" below surface filler.

- Do not place fill above shot from bottom of joint sealer when superstructure is in place.

- If hrbm. masonry interposing, 1/2" thick non-penetrating jointing material shall be used. Joint filler, 1/4" deep and hold 1/4" below surface filler.

- Use 3/4" thick filler for slab structures.

- See Std. 12.01 & 27.05 poured, but before initial set has taken place.

- These bars may be placed after concrete is poured but before main slab set has taken place. See 13L, 13R, 17L.

- Use 1'-3" for slab spans and for girder spans when no paving notch exists.

- Use 1'-6" for girder spans with no paving notch but where, in girder span, a "top" or "H" bar is used and then 1'-3".

- Use 3/4" for slab spans with a "structural" approach seal.

- Use 1'-0" for slab spans with a "structural" approach seal.

- Use 1'-0" for girder spans with a "structural" approach seal.

- Use 1/2'-0" horizontal bars shall be based on a class 0'd top tension lap splice.
ALTERNATE CONSTRUCTION JOINT

ALTERNATE CONSTRUCTION JOINT AT ABUTMENT

NOTES
- Use a joint tool to construct a contraction joint approximately 0-8" thick.
- Bent zinc or plastic strips.
- Saw cutting joint is not allowed.
- Joint may be used in casting concrete around bored piles or pre-stressed elements.

* Bent zinc or plastic strips.

Drawing by: Bill Oliva
Approved: Date:

STANDARD 12.09
DESIGNER NOTES

INCLUDED ARE DETAILS OF SIMILAR STRUCTURAL APPROACH SLAB IN CONTRACT SHEETS.

LEGEND

- Structural Approach Slab
- Paving Notch
- Parapet on Structural Approach Slab
- Steel Reinforcement
- Concrete Adjacent Background
- No Filler, No Gap
- Joint
- Expansion Joint
- Filler
- Stainless Steel
- V-Groove
- END OF GIRDER
- STRUCTURAL APPROACH SLAB
- BRIDGE STRUCTURE
- ROADWAY PAVEMENT
- EDGE OF DECK
- CONTRACT SHEETS

INFORMATION

See Chapter 30 for parapets on structural approach slab details.

STANDARD 12.10 FOR DIFFERENT APPLICATION.
LEGEND

* PARTIAL PLAN REPRESENTATIVE OF SIMILAR LOCATION AS SHOWN ON STANDARDS 12.10 FOR DIFFERENT APPLICATION.

PARTIAL PLANS SHOWN HERE ARE FROM STANDARD 12.10.
DESIGNED

CONCRETE SLAB STRUCTURES

GIRDER STRUCTURES

END VIEW

ELEVATION

PLAN

ALTERNATE SECTION P1

GIVE ELEV. OF BEAM SEATS

LEVEL TOP OF SHAFT

NORMAL WATER

PLACE FOOTING CONCRETE ON FOOTING FORMS AND SHELL.

FOOTING CONCRETE TO BE FULLY DEVELOPED.

BARS TO BE DESIGNED HORIZONTAL STEEL AT 1' 0" IN BOTH DIRECTIONS.

1'-6" MIN.

3'-0" MIN.

2" X 6" DEELED KEYWAY BETWEEN GIRDERS. FOR PRECASTED GIREDR STRUCTURES, REFER TO STANDARD D17, P1. PLAN.

2" X 6" DEELED KEYWAY FOR CONCRETE SLAB SUPERSTRUCTURE. REFER TO STANDARD D17, P1.

4" BARS AT CENTER LINE.

ALTERNATE SECTIONS P1

GIVEN ELEVATION OF BEAM SEATS

LEVEL TOP OF FOOTING MAX.

3" MAX.

APPROX. 1/3 'L'

TO STANDARDS 18.01 & 18.02

13.02

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

1. FOR GIRDERS WITH " ELASTOMERIC BEARING PADS

2. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF CAP PARALLEL TO GRADE. SEE STANDARD 13.02.

ENGINEER'S DISCRETION.

ALTERNATE THE POSITION OF THE 90° AND 180° HOOKS AT EACH VERTICAL LAYER OF TIES. TIES ARE SPACED 1'-0" VERTICALLY.

ENGINEER'S DISCRETION.

A NON-STANDARD SHAPED CROSS-SECTION, SHAPED OR CURVED NOT REQUIRED, MAY BE USED ONLY WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE AREA OF WEDGE CLEAT OR THE COMPRESSION MEMBER.

COAT BAR STEEL DOWN TO TOP OF FOOTINGS IN ALL PIERS OF CAP AND TO ADJACENT BEARING SEAT STEPS.

SEE STANDARD 13.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING SEAT AREAS THAT ARE 4 INCHES OR MORE ABOVE THE LOWEST BEAM SEAT.

SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING SEAT AREAS WHICH IS PROVIDED SO THAT THE MAXIMUM HEIGHT OF POUR NEED NOT EXCEED 25'-0".

HAMMERHEAD PIER

CURVE BAR STEEL DOWN TO TOP OF FOOTINGS AT ALL PIERS. CURVE BAR STEEL IS TO BE PLACED APPROXIMATELY 2'-0" ABOVE NORMAL WATER ELEVATION.

SEE STANDARD 12.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING SEAT AREAS WHICH IS PROVIDED SO THAT THE MAXIMUM HEIGHT OF POUR NEED NOT EXCEED 25'-0".

HAMMERHEAD LENGTH = 'L' LOOKING UP STATION.

LEVEL TOP OF SHAFT

NORMAL WATER

KEYED CONSTRUCTION JOINTS SHALL BE FORMED BY BEVELED KEYED AT 2'-0" INSIDE DIAMETER OF SHAFT (MIN. 6" MAX. MIN. 3" MAX.

APPROX. 1/3 'L'

TO STANDARDS 18.01 & 18.02

13.02

THIS MAXIMUM VERT. BAR SPACING APPLIES ONLY WHEN THE VERTICAL BAR IS BETWEEN THE GIRDERS.

A NON-STANDARD SHAPED CROSS-SECTION, SHAPED OR CURVED NOT REQUIRED, MAY BE USED ONLY WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE AREA OF WEDGE CLEAT OR THE COMPRESSION MEMBER.

ENGINEER'S DISCRETION.

BARS TO BE DESIGNED HORIZONTAL STEEL AT 1' 0" IN BOTH DIRECTIONS.

1'-6" MIN.

3'-0" MIN.

2" X 6" DEELED KEYWAY FOR CONCRETE SLAB SUPERSTRUCTURE. REFER TO STANDARD D17, P1.

4" BARS AT CENTER LINE.

ALTERNATE THE POSITION OF THE 90° AND 180° HOOKS AT EACH VERTICAL LAYER OF TIES. TIES ARE SPACED 1'-0" VERTICALLY.

ENGINEER'S DISCRETION.

A NON-STANDARD SHAPED CROSS-SECTION, SHAPED OR CURVED NOT REQUIRED, MAY BE USED ONLY WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE AREA OF WEDGE CLEAT OR THE COMPRESSION MEMBER.

ENGINEER'S DISCRETION.

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BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE AREA OF WEDGE CLEAT OR THE COMPRESSION MEMBER.

ENGINEER'S DISCRETION.

A NON-STANDARD SHAPED CROSS-SECTION, SHAPED OR CURVED NOT REQUIRED, MAY BE USED ONLY WITH THE APPROVAL OF THE STRUCTURES DESIGN SECTION.

BEARING SEAT AREAS SHALL BE LEVEL EXCEPT FOR THE AREA OF WEDGE CLEAT OR THE COMPRESSION MEMBER.

ENGINEER'S DISCRETION.
PILE ENCASED PIER

**ELEVATION**

- Concrete slab superstructure
- Parallel to grade
- Top of pier to be level
- Minimum spa. 3'-0"
- Maximum spa. 8'-0"
- 4'-0" max.
- 2'-0" lap
- 1'-0" min.
- 4" leg
- Tie to nearest #4 bars, place adjacent to each pile location on one side only.

**PLAN**

- Steel piling shown, cast in place
- Concrete slab superstructure
- Looking up station 18.01 and 18.02

**SECTION A**

- Concrete slab superstructure
- Parallel to grade
- Top of pier to be level
- Minimum spa. 3'-0"
- Maximum spa. 8'-0"
- 4'-0" max.
- 2'-0" lap
- 1'-0" min.
- 4" leg
- Tie to nearest #4 bars, place adjacent to each pile location on one side only.

**END VIEW**

- Steel piling shown, cast in place
- Concrete slab superstructure
- Parallel to grade
- Top of pier to be level
- Minimum spa. 3'-0"
- Maximum spa. 8'-0"
- 4'-0" max.
- 2'-0" lap
- 1'-0" min.
- 4" leg
- Tie to nearest #4 bars, place adjacent to each pile location on one side only.

**DESIGNER NOTES**

- See Bridge Manual Section 13.03 for designer comments.
- Construction joints are not required regardless of length of pile encased pier.
- See Standard 13.03 for additional designer notes.

**PIER**

- Concrete slab superstructure
- Parallel to grade
- Top of pier to be level
- Minimum spa. 3'-0"
- Maximum spa. 8'-0"
- 4'-0" max.
- 2'-0" lap
- 1'-0" min.
- 4" leg
- Tie to nearest #4 bars, place adjacent to each pile location on one side only.

**CAP TYPE DETAIL**

- Use with encased piers
- On large piers

**APPROVED**

Bill Oliva

**DATE**

1-19

**STANDARD 13.03**
PILE BENT

MAX. SPA. (MEASURED AT BOTTOM OF CAP) 9 FT.

STANDARD 13.01 FOR CRITERIA WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

ENGINEER'S DISCRETION.

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

SEE STANDARD 13.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

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

#5 BARS @ 1'-0" (2'-0" LONG)

PLACE AS SHOWN

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

DESIGNER NOTES

ALL BAR SPACES TO BE BASED ON "CLASS C" TENSION LAP SPlice USING "STANDARD 12.09".

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

1. FOR GIRDERS WITH ELASTOMERIC BEARING PADS, SEE STANDARD 12.09.

2. FOR CONCRETE SUPERSTRUCTURES WHERE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 12.02.

SEE STANDARD 12.02 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

MAX. SPA. (MEASURED AT BOTTOM OF CAP) 9 FT.

STANDARD 13.01 FOR CRITERIA WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

ENGINEER'S DISCRETION.

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

SEE STANDARD 13.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

PILE BENT

MAX. SPA. (MEASURED AT BOTTOM OF CAP) 9 FT.

STANDARD 13.01 FOR CRITERIA WHEN THE BOTTOM OF THE GIRDERS SLOPE MORE THAN 1%.

ENGINEER'S DISCRETION.

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

SEE STANDARD 13.01 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.
Designer Notes

Provide 4" min. clear between anchor bolts and reinforcement.

For pier caps up to 2'-6" wide, provide at least one 4" min. clearance between reinforcing bars for concrete placement by tremie and for vibration. For caps greater than 2'-6" wide, provide at least two such gaps.

Show anchors locations on pier cap sheets.

Abutment reinforcement layout similar to pier cap reinforcement details.

Note

Provide transverse stirrup bars as needed to prevent shear, clear between anchor bolts and reinforcement.

Provide adequate clearance for post-installed anchors.

Provide reinforcement necessary to support main reinforcement.

Provide multiple layers of bar steel to avoid spacing that is too tight. Bunched bars may be used. Avoid lapping bunched bars.

Approved: Bill Oliva

Date: 1-17

PIER CAP REINFORCEMENT DETAILING

STANDARD 13.08
ULTIMATE DESIGN STRESSES

CONCRETE MASONRY — 4,000 F. P. A.
MONUMENT BAR STEEL
REINFORCEMENT, GRADE 60 — 60,000 F. P. A.

fy = 60,000 P.S.I.
f'c = 4,000 P.S.I.

NOTES

DETAILS OF CONSTRUCTION MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING MUST COMPLY WITH THE REQUIREMENTS OF THE STANDARD SPECIFICATION AND THE APPLICABLE SPECIAL PROVISIONS.

BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE CONCRETE AND THE REINFORCEMENT SHOWN SHALL BE USED OR CAST IN PLACE CONCRETE BARRIER CEMENT MASONRY.

DO NOT CUT OR DRILL INTO EXISTING COLUMN BAR STEEL.

ALL REINFORCEMENT SHALL BE EPOXY-COATED.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PROVIDE 3-INCH BAR CLEARANCE FROM BOTTOM OF FOOTING.

USE 2-INCH MINIMUM BAR CLEARANCE, EXCEPT AT FOOTINGS AND THE APPLICABLE SPECIAL PROVISIONS.

NO JOINTS SHALL BE ALLOWED IN CONSTRUCTION. NO JOINTS SHALL BE ALLOWED IN THE BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE CONCRETE.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PROVIDE 3-INCH BEVEL OR 1-INCH RADIUS ON BARRIER EDGES, TOP AND ENDS.

SEE STANDARD S-14 FOR DESIGNER NOTES.

SEE STANDARD S-14 FOR ADDITIONAL DETAILS.

51-INCH CONCRETE INTEGRAL BARRIER

NOTES

DETAIL A

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

REINFORCEMENT 2'-7' IN ADJACENT POUR.

ALONG A' OF COLUMN, USE LAP LONGITUDINAL REINFORCEMENT 2'-7' IN ADJACENT POUR.

BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE CONCRETE AND THE REINFORCEMENT SHOWN SHALL BE USED OR CAST IN PLACE CONCRETE BARRIER CEMENT MASONRY.

DO NOT CUT OR DRILL INTO EXISTING COLUMN BAR STEEL.

ALL REINFORCEMENT SHALL BE EPOXY-COATED.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PROVIDE 3-INCH BEVEL OR 1-INCH RADIUS ON BARRIER EDGES, TOP AND ENDS.

SEE STANDARD S-14 FOR DESIGNER NOTES.

SEE STANDARD S-14 FOR ADDITIONAL DETAILS.

51-INCH CONCRETE INTEGRAL BARRIER

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BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE CONCRETE AND THE REINFORCEMENT SHOWN SHALL BE USED OR CAST IN PLACE CONCRETE BARRIER CEMENT MASONRY.

DO NOT CUT OR DRILL INTO EXISTING COLUMN BAR STEEL.

ALL REINFORCEMENT SHALL BE EPOXY-COATED.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PROVIDE 3-INCH BEVEL OR 1-INCH RADIUS ON BARRIER EDGES, TOP AND ENDS.

SEE STANDARD S-14 FOR DESIGNER NOTES.

SEE STANDARD S-14 FOR ADDITIONAL DETAILS.

51-INCH CONCRETE INTEGRAL BARRIER

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BARRIER AND FOOTING SHALL CONSIST OF CAST IN PLACE CONCRETE AND THE REINFORCEMENT SHOWN SHALL BE USED OR CAST IN PLACE CONCRETE BARRIER CEMENT MASONRY.

DO NOT CUT OR DRILL INTO EXISTING COLUMN BAR STEEL.

ALL REINFORCEMENT SHALL BE EPOXY-COATED.

PLACE REINFORCEMENT SUCH THAT IT WILL NOT CONFLICT WITH THE ANCHOR ASSEMBLY FOR THRIE BEAM ATTACHMENT.

PROVIDE 3-INCH BEVEL OR 1-INCH RADIUS ON BARRIER EDGES, TOP AND ENDS.

SEE STANDARD S-14 FOR DESIGNER NOTES.

SEE STANDARD S-14 FOR ADDITIONAL DETAILS.
**INTEGRAL BARRIER DETAILS**

**DESIGNER NOTES**

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

- There is a concern for traffic to cross-over.
- Two-lane road is adjacent to barrier and future traffic control needs may cause the direction of traffic adjacent to barrier to be reversed.
- Hazards may exist in this region that require shielding. Contact the regional office for verification of any of these conditions.

**B. F. = BACK FACE**

**F. F. = FRONT FACE**

For vehicle protection, see FDM 11-35-1 to determine when beam or column reinforcement is needed for traffic control and the need to review any existing barriers should be noted.

**ADHESIVE ANCHOR LAYOUT**

**INTEGRAL BARRIER DETAILS**

**51-INCH VERTICAL CONCRETE BARRIER AND TRANSITION**

See Standard 13.11 for additional details.
WALL EXTERNAL & OVERALL STABILITY EVALUATION

Wall Height (feet)
Exposed Wall Height (feet)
Min. Embedment Length (feet)

SOIL PARAMETERS

Gravelly Backfill
Granular Backfill


LIST OF DRAWINGS

1. [Insert Wall System]
2. Subsurface Exploration

DESIGNER NOTES

- The lengths provided in the table are the minimum required reinforcement lengths based upon the factors described in the wall system specifications. The designer shall provide reinforcement details in accordance with the wall system specifications.
- The lengths provided in the table are the minimum required reinforcement lengths based upon external and overall stability at the designated locations.
- The designer shall provide details based on nominal panel dimensions and the actual panel dimensions. Details shall be able to accommodate various panel dimensions.
- Nominal MSE panel dimensions are 5-foot high and 5-foot wide. The wall embedment shall not be included in the pay limits.
- The contract quantity for the bid item (insert wall system) is based on a wall height measured from the top of wall to a constant depth of (insert value) below finished grade.

DESIGN DATA

- The contractor shall provide complete design plans, details, specifications, and shop drawings for the retaining walls in the special section. The contractor shall provide technical assistance to the designer during construction. The costs of furnishing these items shall be included in the bid pay quantities for the retaining walls. The costs of furnishing these items shall be included in the bid pay quantities for the retaining walls.
- Plan elevations and details shown on these drawings are intended to indicate general location, elevations, dimensions and materials. The contractor shall verify that the wall system selected will conform to the required elements and details.
- The retaining wall is to be designed using the elevations given on this sheet.
- Design for retaining wall to provide for finished grade sloped behind wall at screening.
- Design retaining wall for a live load surcharge of 100 psf.
- The maximum value of the angle of internal friction of the soil material in the reinforced zone shall be assumed to be 30° without certified test values.

EXAMPLE PLAN

EXAMPLE ELEVATION

GEOMETRY TABLE

<table>
<thead>
<tr>
<th>Station</th>
<th>roadway elevation</th>
<th>offset to earthen wall</th>
<th>top of wall backfill</th>
<th>finished grade lift</th>
</tr>
</thead>
</table>

SOIL PARAMETERS

- GRANULAR BACKFILL, REINFORCED ZONE, OR BACKFILL
- GRANULAR BACKFILL, NON-REINFORCED ZONE
- GRANULAR BACKFILL, NON-REINFORCED ZONE
- GRANULAR BACKFILL, NON-REINFORCED ZONE

TYP. CROSS SECT. OF RETAINING WALL

LIST OF DRAWINGS

1. [Insert Wall System]
2. Subsurface Exploration

BUREAU OF STRUCTURES

STANDARD 14.03

APPROVED: Bill Oliva

DATE: 1-19
CROSS SECTION THRU ABUTMENT at MSE wall

EYE BOLT DETAIL

CAST-IN-PLACE COPING

FACE OF CONCRETE

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

MSE WALL AT ABUTMENT

DESIGNER NOTES

Due to maintenance concerns, MSE walls shall not be used for the singular purpose of reducing span lengths. If the grade line cannot be raised, then MSE walls may be used to maintain the superstructure centerline. (In certain circumstances, they may also justify the use of MSE walls at abutments.)

Fall protection shall be provided. The option provided should be based on the preference of the bridge maintenance and design 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. Big item shall be "EYE BOLT ANCHORAGE" under development.

NOTES

- STRUCTURAL SUPERSTRUCTURE LATERAL LOADS TRANSFERRED TO THE ABUTMENT ARE GIVEN TO BE 5% PER FOOT OF ABUTMENT LENGTH. THE VALUES ARE TO BE USED FOR THE LINES, LAYS, OR THE ABUTMENT ANCHORAGE BY THE MSE MANUFACTURER (E.G., SYSTEM, DECK, ANCHOR, OTHER). THE FOLLOWING ASSUMED LOADS SHALL BE NOTED ON PLANS:

  - W.L. = ___ klf
  - W.L. = ___ klf
  - W.L. = ___ klf
  - W.L. = ___ klf

  FOR SEMI-EXPANSION OR FIXED TYPE ABUTMENTS

  THE DESIGN OF THE WALL IN FRONT OF THE ABUTMENT SHALL INCLUDE THE INDUSTRIAL EARTH LOADS, AND 240 PSF LIVE LOAD TRANSFERRED ACTING ON THE BACK OF THE ABUTMENT BEYOND THE BEAM SEATS.

- A SEAL ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES OF FILLER AND EXPOSED CONCRETE REMOVED NON-TAKING, DRY NON-TREATED, NON-GLAZED (HOLE WALL) SURFACE TO BE CONSIDERED Joints shall be treated with a minimum of the beam seat elevation prior to placing grout.

- Expansion joints to be backfilled with a minimum of the beam seat elevation prior to placing grout.

- The design of the wall in front of the abutment shall include the industrial earth loads, and 240 PSF live load transferred acting on the back of the abutment beyond the beam seats.

- A seal all exposed horizontal and vertical surfaces of filler and exposed concrete removed non-taking, dry non-treated, non-glazed (hole wall) surface to be considered joints shall be treated with a minimum of the beam seat elevation prior to placing grout.

- Expansion joints to be backfilled with a minimum of the beam seat elevation prior to placing grout.

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**MSE WALL AT ABUTMENT LAYOUT DETAILS**

**DESIGNER NOTES**

The "Preferred MSE Wall at Abutment Configuration" is the preferred option as it separates the MSE wall from the abutment, minimizing complicated details and inherent settlement issues. This advice is more relevant as skew increases.

**NOTES**

- Seal all exposed horizontal and vertical surfaces of filler with non-staining, gray, non-bituminous joint sealant. 1" deep and hold 1/" below surface of concrete.

**Details**

- Cast-in-place coping must be designed.
- Plan view of alternate MSE wall at abutment with closure wall.
- Front elevation of alternate MSE wall at abutment with closure wall.

**Approved:**

Bill Oliva

**Date:**

7-17
TYPICAL SECTION
MSE wall with concrete panel facing

MSE WALL PANEL AND BLOCK FACING

DESIGNER NOTE
SEE STANDARD FOR ADDITIONAL INFORMATION

BUREAU OF STRUCTURES

STANDARD 14.11

Approved: Bill Oliva
Date: 7-18
**MSE WALL WIRE FACING 1**

**Material Properties**
- Concrete Masonry Retaining Walls: $f_p = 3,500$ psi
- Prestressed Precast Concrete Panel: $f_p = 5,000$ psi
- Bar Steel Reinforcement, Grade 60: $f_y = 60,000$ psi
- Structural Carbon Steel, ASTM A36: $f_y = 36,000$ psi

**Notes**
- Clevis, Clevis Pin, Coupler, Multidirectional Connector, and Adhesive shall be non-corrosive and develop 75% of the ultimate tensile strength of the 1" diameter rod.
- Steel, Reinforcing Hardware, and Deadman anchor including all associated components are included in the bid item for the "Prestressed Precast Concrete Wall Panel".
- Forces applied to the design anchor must not be accounted for in the design of MSE reinforcement when satisfying force and moment equilibrium.

**Designer Notes**
- Show bar size and spacing only. Do not provide bill of bars.
- Concrete panels are to be field drilled.
- Clevis to be installed towards the top of the slotted hole.

**Legend**
- Conduit to design length to provide required horizontal capacity of anchor assembly. Length of conduit to be 75% minimum top of reinforcement size used.
- Clevis to be installed towards the top of the slotted hole.
- Optimal multidirectional connector may be used to facilitate alignment of the connection.
- Includes concrete for coping, footing, and deadman anchor.

**Design Notes**
- Maximum allowable wall panel height is 30'.
- The wall panel height is defined as the length from the top of the concrete footing to the top of the wall panel.
- Wall panel height is limited to 3' per wall panel, OBSTRUCTION. ALTERNATIVE SHALL BE LIMITED TO ONE PANEL CONNECTION PER PANEL.
- Anchors may be used to AVOID AN OBSTRUCTION.
- Alternative SHALL BE LIMITED TO ONE PANEL CONNECTION PER PANEL.
- Clevis, Clevis Pin, Coupler, Multidirectional Connector, and Adhesive shall be non-corrosive and develop 75% of the ultimate tensile strength of the 1" diameter rod.
- Turnbuckle to be corrosion resistant and develop 125% of the ultimate tensile strength of the 1" diameter rod.
- Steel, Reinforcing Hardware, and Deadman anchor including all associated components are included in the bid item for the "Prestressed Precast Concrete Wall Panel".

**Material Properties**
- Concrete Masonry Retaining Walls: $f_p = 3,500$ psi
- Prestressed Precast Concrete Panel: $f_p = 5,000$ psi
- Bar Steel Reinforcement, Grade 60: $f_y = 60,000$ psi
- Structural Carbon Steel, ASTM A36: $f_y = 36,000$ psi

**Bar Steel Reinforcement Grade 60**
- fy = 60,000 PSI
- f'c = 3,500 PSI

**Concrete Masonry Retaining Walls**
- fy = 36,000 PSI
- f'c = 5,000 PSI

**MSE WALL WIRE FACING 1**

**Approved: Bill Oliva**

**Date:**

**1-19**
TYPICAL WALL PANEL CONNECTION - PLAN VIEW

ALL ITEMS SHOWN ARE INCLUDED IN THE BID FOR PRESTRESSED PRECAST CONCRETE WALL PANEL.

BASE ANGLE DETAIL
- CENTERED ON PANEL JOINT OR AT LEAST 1'-0" END ON ELEVATION.
- 2" NEOPRENE FILLER TYP.
- SEE DETAIL THIS SHEET.
- BASE ANGLE DETAIL, TYP.
- ADHESIVE ANCHORS PER BASE ANGLE, TYP.

BASE ANGLE DETAIL
- 1/2" GALV. X 4" X L4
- SEAL BOTTOM 1'-0"
- FILLER (DO NOT USE)
- 1" X 1" NEOPRENE ELASTOMERIC BEARING PAD, TYP.
- 1/2" X 8" X 10" ELASTOMERIC BEARING PAD, TYP.

WALL PANEL JOINT DETAIL
- 2" MIN. GAP AT 6" CLE.
- CONCRETE WALL PANEL PRESTRESSED PRECAST
- BID ITEM "ALL ITEMS SHOWN ARE INCLUDED IN BID ITEM "PRESTRESSED PRECAST CONCRETE WALL PANEL".

WALL PANEL FOOTING DETAIL
- ADHESIVE ANCHORS SHALL CONFORM TO SECTION 502.2.12 OF THE STANDARD SPECIFICATIONS.

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

LEGEND
- USE IN-TOP RODS FOR FASTENING.
- USE IN-TOP PANELS AND SHEET METAL FOR FASTENING.
- USE IN-TOP PANELS AND SHEET METAL FOR FASTENING.
PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS

STANDARD 15.01

BILL OLIVA

STANDARD 15.01

PLACEMENT OF HEAVY RIPRAP AT RIVER CROSSINGS

STANDARD 15.01

BILL OLIVA
SECTION A-A
SYMMETRICAL ABOUT OUTER EDGE OF SUPERSTRUCTURE
VARIABLE - 5'-0" MIN.
EMBANKMENT BLEND WITH ADJACENT WINGWALL
BERM

PLAN

Typical Section Thru Select Crushed Material
Asphaltic material shall NOT be applied to the surface of Select Crushed Material.

Typical Section Thru Crushed Aggregate
Round stone will NOT be accepted.

NOTES

Apply asphaltic material uniformly over the surface of the paving.

FLAT WORK

DESIGNER NOTE
Preferred section shown, for alternate section see FDM 11-35-1.

APPROVED
Bill Oliva
DATE: 1-18
**PART TRANSVERSE SECTION AT ABUTMENT**

**TYPE A1 DIAPHRAGM WITH A RAISED SIDEWALK**

- 8" min. sidewalk
- Deck reinforcement not shown for clarity.

**SECTION A-A**

**SECTION B-B**

**SECTION THRU SIDEWALK**

**CROSS SECTION THRU UNANCHORED MEDIAN**

**ANCHORED MEDIAN CURB DETAIL**

**ANCHORED MEDIAN CURB DETAIL**

**CROSS SECTION THRU MEDIAN WITH A JOINT**

**DEFLECTION JOINT DETAIL**

**DESIGNER NOTES**

- For extreme sidewalk widening and/or superimposed loads, the deck may be level beneath the sidewalk in order to maintain constant deck thickness to reduce excessive sidewalk thickness.

**NOTES**

- When parapets are poured continuously from the end to end, max. shall be sized sufficient to extend 1'-0" past #4 bars at 1'-6" max., each direction.
- Parapet joints are used at the deflection joint detail.

**ELASTOMERIC COMPRESSION SEAL DETAIL**

**MEDIAN AND RAISED SIDEWALK DETAILS**

**STANDARD 17.01**

**BUREAU OF STRUCTURES**

**APPROVED**

**Bill Oliva**

**DATE:** 7-16
FLASHING DETAIL FOR NEW BRIDGES WITH OPEN RAILING

The edge of deck flashing is for open rail bridges and may be used for rehabilitation or new construction. Contact the region bridge maintenance engineer for the decision on whether or not to use the flashing on new bridges. Detail 1 or detail 2, or a combination of the two, may be used for rehabilitation.

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

REHABILITATION FLASHING DETAIL 1

Edge of deck flashing is for open rail bridges and may be used for rehabilitation or new construction. Contact the region bridge maintenance engineer for the decision on whether or not to use the flashing on new bridges. Detail 1 or detail 2, or a combination of the two, may be used for rehabilitation.

NOTES

The edge of deck flashing is for open rail bridges and may be used for rehabilitation or new construction. Contact the region bridge maintenance engineer for the decision on whether or not to use the flashing on new bridges. Detail 1 or detail 2, or a combination of the two, may be used for rehabilitation. The design engineer shall provide concrete surface repair details as needed. Conceptual details are shown on this standard.

REHABILITATION FLASHING DETAIL 2
DETERMINE DISTRIBUTION BARS

HALF LONGITUDINAL SECTION

PIER OR WALL TYPE PIER

Optional Longitudinal Construction Joint

PIER CAP OR WALL TYPE PIER

See specifications for column and cap details.

Designer Notes

Top Transverse Reinforcement Requirements

Continuous Flat Slab

Approved: Bill Oliva
Date: 7-17

Standard 18.02
28" GIRDER

\[ f = \sigma \cdot \frac{A}{f_e} \]

\[ f_e = \frac{f}{1 + \frac{e}{y}} \]

\[ S = \frac{y^2}{2} \]

\[ I = \frac{y^3}{3} \]

\[ f' = 270,000 \text{ P.S.I} \]

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

\[ \tau = 0.1459 \text{ IN.} / \text{IN.} \]

\[ 28" \text{ GIRDER DESIGN DATA} \]

\[ \text{DESIGNER NOTES} \]

\[ \text{LABEL THE SPAN IT IS USED IN.} \]

\[ \text{APPLIES TO THE DESIGNED STRUCTURE AND BOX AROUND EACH STRAND PATTERN THAT ON THE STRAND PATTERN SHEET, PLACE A} \]

\[ \text{WHICH IS TO BE AVOIDED.} \]

\[ * \text{ MAY REQUIRE DEBONDING AT ENDS, WHICH IS TO BE AVOIDED.} \]

\[ \text{STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY} \]

\[ \text{TO AVOID DRAPING OF 0.6" DIA. STRANDS} \]

\[ (0.5" \text{ DIA. STRANDS MAY ALSO BE USED}) \]

\[ 28" \text{ PRESTRESSED GIRDER DESIGN DATA} \]

\[ \text{STANDARD STRAND PATTERNS FOR UNDRAPPED STRANDS (0.6" DIA.)} \]

\[ \text{STANDARD STRAND PATTERNS FOR DRAINED STRANDS (0.5" DIA.)} \]

\[ \text{ARRANGEMENT AT 6 SPAN - FOR GIRDER WITH DRAINED 0.5" DIA. STRANDS} \]

\[ \text{BUREAU OF STRUCTURES} \]

\[ \text{APPROVED Bill Oliva DATE: 1-17} \]

\[ \text{STANDARD 19.02} \]
**36" GIRDERS**

- \( h = 369 \text{ ft} \)
- \( r^2 = 138.35 \text{ in}^2 \)
- \( y_1 = 20.27 \text{ in} \)
- \( y_2 = -15.83 \text{ in} \)
- \( I = 50,979 \text{ in}^4 \)
- \( S_1 = 2,027 \text{ in}^2 \)
- \( S_2 = -3,220 \text{ in}^2 \)
- \( \lambda_{T} = 384 \text{ ft/ft} \)

**PRE-TENSION**

\[ \gamma = \frac{f_{y}}{f_{y}} = \frac{270,000}{0.75 \times 270,000} = 202,500 \text{ P.S.I} \]

**STANDARD STRAND PATTERNS FOR UNDRAPPED STRANDS (0.6" DIA.)**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>( m_b ) (Inches)</th>
<th>( P_{init} ) (KIPS)</th>
<th>( S_1 ) (KIP-in)</th>
<th>( S_2 ) (KIP-in)</th>
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<td>4.87</td>
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</tbody>
</table>

**STANDARD STRAND PATTERNS FOR DRAPPED STRANDS (0.5" DIA.)**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>( m_b ) (Inches)</th>
<th>( P_{init} ) (KIPS)</th>
<th>( S_1 ) (KIP-in)</th>
<th>( S_2 ) (KIP-in)</th>
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</thead>
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<td>4.18</td>
<td>4.18</td>
</tr>
</tbody>
</table>

**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.
- Approved: Bill Oliva, Date: 1-17

36" PRESTRESSED GIRDERS DESIGN DATA

**36" PRESTRESSED GIRDERS DESIGN DATA**
36W" GIRDERS

PRE-TENSION

\[ f_b = 0.75 \times 270,000 \times 202,500 = 43.62 \text{ KIPS} \]

for low relaxation strands

\[ f_p = \frac{35.63}{688.80} \times 202,500 = 43.62 \text{ KIPS} \]

\( f_b \) per 0.6" Strand = 0.217 x 202,500 = 43.62 KIPS

\( f_p \) per 0.6" Strand = 0.217 x 202,500 = 43.62 KIPS

\( f_p \) per 0.6" Strand = 0.217 x 202,500 = 43.62 KIPS

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

APPROVED: Bill Oliva  DATE: 1-17

STANDARD 19.12
### 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.)*

### STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>d_0 (inches)</th>
<th>P(initial) / A_s f_s (KIPS)</th>
<th>f_s (psi) / A_s (psf/sq.in.)</th>
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<tr>
<td>30</td>
<td>-6.85</td>
<td>759</td>
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<tr>
<td>32</td>
<td>-6.65</td>
<td>767</td>
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<tr>
<td>34</td>
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</tr>
<tr>
<td>36</td>
<td>-6.25</td>
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<td>2,861</td>
</tr>
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<td>38</td>
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<td>2,911</td>
</tr>
<tr>
<td>40</td>
<td>-5.85</td>
<td>799</td>
<td>2,961</td>
</tr>
</tbody>
</table>

### STANDARD STRAND PATTERNS FOR DRAPED STRANDS

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>d_0 (inches)</th>
<th>P(initial) / A_s f_s (KIPS)</th>
<th>f_s (psi) / A_s (psf/sq.in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>-8.25</td>
<td>703</td>
<td>2,349</td>
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<tr>
<td>18</td>
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<tr>
<td>40</td>
<td>-5.85</td>
<td>799</td>
<td>2,961</td>
</tr>
</tbody>
</table>

### 45W" PRESTRESSED GIRDER DESIGN DATA

- **A** = 692 SQ. IN.
- **f_s** = 270,000 PSI
- **y_s** = 20,74 KIPS
- **y_f** = -6,529 KIPS
- **W1** = 721 LBS/FT.
- **n** = 258.70 IN.

### PRE-TENSION for low relaxation strands

\[ P_{init} = A f_s \]

\[ f_s = 0.75 \times 270,000 = 202,500 \text{ PSI} \]
54W" GIRDERS

PRE-TENSION

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

\[ f_t = 270,000 \text{ P.S.I.} \]

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

\[ \pi = 270,000 \text{ P.S.I.} \]

\[ \pi = 0.217 \times 270,000 = 58.74 \text{ KIPS} \]

\[ \gamma = 27.70 \text{ IN.} \]

\[ v = 202,500 \text{ P.S.I.} \]

\[ \gamma = 26.30 \text{ IN.} \]

\[ S_t = 11,592 \text{ IN.} \]

\[ v^* = \frac{26.30}{402.41} = 0.06536 \text{ in/in} \]

\[ f(\text{init.}) = A f_S \gamma \]

\[ f(\text{init.}) = A f_S v^* \]

\[ f(\text{init.}) = A f_S \gamma \]

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>(d_b) (inches)</th>
<th>PRE-TENSION P:(f_t) (KIPS)</th>
<th>(\gamma) (f_Sv^*) (K/sq.in.)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

DESIGNER NOTES

ON THE STRAND PATTERN SHEET, PLACE A BOX AROUND EACH STRAND PATTERN THAT APPLIES TO THE DESIGNED STRUCTURE AND LABEL THE SPAN IT IS USED IN.
**72W" PRESTRESSED GIRDERS DESIGN DATA**

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

2. **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.
   - APPROVED: Bill Oliva
   - DATE: 7-17

3. **STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS**

4. **STANDARD STRAND PATTERNS FOR DRAPED STRANDS**

5. **PRE-TENSION**
   - \( f_t = 0.75 \times 270,000 + 0.205 \times 202,500 \) for low relaxation strands
   - \( f_t / \text{per 0.6" strand} = 0.205 \times 202,500 = 41.42 \) KIPS

6. **Pi PER 0.6" STRAND = 0.205 X 202,500 = 41.42 KIPS**

7. **SHRINKAGE**
   - \( (\text{no. strands}) \times f_t \times 0.205 \times 202,500 \)

8. **TOTAL PULL-OUT LOADING**

9. **DESIGNER NOTES**
   - TO AVOID DRAPING OF 0.6" DIAMETER STRANDS
   - STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY
   - ARRANGEMENT AT SPAN - FOR GIRDERS WITH DRAPED 0.6" DIAMETER STRANDS
**82W" GIRDER DESIGN DATA**

- **A** = 980 sq. in.
- **s** = 202,500 psi
- **v** = 0.75 x 202,500 = 151,875 psi
- **y** = -39.68 in.
- **S** = -22,819 in.
- **I** = 31,273 in.

**DESIGNER NOTES**

- **There is currently a moratorium on the use of 82W" prestressed girders.**

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

**STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>x (inches)</th>
<th>P(calc) (kips)</th>
<th>f (init) (ksi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>-39.68</td>
<td>753</td>
<td>0.40</td>
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<tr>
<td>18</td>
<td>-34.25</td>
<td>1791</td>
<td>2.03</td>
</tr>
<tr>
<td>20</td>
<td>-30.25</td>
<td>819</td>
<td>2.09</td>
</tr>
</tbody>
</table>

**STANDARD STRAND PATTERNS FOR DRAPED STRANDS**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
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</tr>
<tr>
<td>20</td>
<td>-30.25</td>
<td>819</td>
<td>2.09</td>
</tr>
</tbody>
</table>

**COMPRESSION IS MINUS**

**82W" PRESTRESSED GIRDER DESIGN DATA**

- **Pre-Tension**
  - **f** = 0.75 x 270,000 - 202,500 psi
  - for low relaxation strands

- **Pre-Tension (init.)**
  - **P** = A f / S
  - **E** = 0.217 x 202,500 = 43.94 kips

**BUREAU OF STRUCTURES**

**APPROVED:** Bill Oliva

**DATE:** 7-17

**STANDARD 19.20**
### Dimensions for Prestressed Concrete Girders

#### At Pier
- Dimensions for prestressed concrete girders are shown on STD. 12.01.
- End of girder and 3" min. offset between flange and backwall to accommodate expansion.
- Dimension values are for prestressed concrete girders with steel bearings as shown on STD. 12.01.
- Use 2" cork filler at top of structural appurtenance slab (see STD. 12.01).

#### At Abutment
- Dimensions for prestressed concrete girders can be found in Chapter 40, Bridge Rehabilitation.
- New construction projects.

#### Designer Notes
- Standard detail drawings for the 45", 54", and 70" girder widths have been replaced with the 45W", 54W", and 70W" respectively and are no longer used in new construction projects.

### Bearing Pad Details
- Standard detail drawings for prestressed concrete girders are shown on STD. 12.01.
- Use 2" cork filler at top of structural appurtenance slab (see STD. 12.01).

### Designer Notes
- Standard detail drawings for prestressed concrete girders are shown on STD. 12.01.
- Use 2" cork filler at top of structural appurtenance slab (see STD. 12.01).

### Table: Bearing Pad Details

<table>
<thead>
<tr>
<th>Bearing Pad</th>
<th>Top Flange Width</th>
<th>Bottom Flange Width</th>
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<tbody>
<tr>
<td>20&quot;</td>
<td>30&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
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<tr>
<td>40&quot;</td>
<td>20&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>50&quot;</td>
<td>20&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

### Designer Notes
- Standard detail drawings for prestressed concrete girders are shown on STD. 12.01.
- Use 2" cork filler at top of structural appurtenance slab (see STD. 12.01).
ALL S.T.H., U.S.H., I.H.

USE PAVING NOTCH ON masonry bridges (cost incidental to const. joint is used)

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

AT 9" CTRS.

#5 BARS

(SEE STD. 19.31)

PREFORMED JOINT FILLER
LAMINATED ELASTOMERIC
8" X 34" X 1/2" NON-WATERPROOFING
RUBBERIZED MEMBRANE

PART TRANSVERSE SECTION AT DIAPHRAGM
TOP OF DECK

2" X 6". SEE DETAILS FORMED BY BEVELED KEYED CONST. JOINT

UNDER GIRDER FLANGE IN FRONT
1/2" Pref. joint filler placed symmetrically about 3'-0" of girders.

HORIZ. BARS. #5 BARS TO BE 6'-0" LONG
(1) 1" DIA. HOLE IN WEB FOR (2) #5 BARS

#5 BARS

3"

AND PLACED SYM. ABOUT 3'-0" OF GIRDERS.

HORIZ. U-BARS

PLACE INSIDE vert. #4 bars, provide two, 3" bevel seats at 1'-0" CTRS.

#4 BARS BETWEEN BEAM\
HORIZ. U-BARS

PLACE INSIDE WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

"CONCRETE MASONRY BRIDGES".

ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO NOTES

ON STD. 19.31.

FOR STRUCTURAL APPROACH SLAB slab (std. 12.10) is used. SHOW NO. 9 paving notch is 1'-0" WIDE BY 1'-4" TO ` SUBSTRUCTURE UNITS.

TO ` GIRDER.

DIAMETER IS TAKEN PARALLEL OF the diaphragm pour.

top of girder. If used, deck pour optional construction joint 1'-2" below

DIAPHRAGM AT 3/4" ELASTOMERIC BEARING
TOP FLANGE OF GIRDER 3 - #4 STIRRUPS UNDER EACH
1'-0" DIA. HIGH STRENGTH BOLTS.

HOLE (TYP.) IN ANGLE FOR 2" DIA. HIGH STRENGTH BOLTS.

2" x 2" x 1/2" PLATE WASHER
BETWEEN GIRDERS, EMBED 1'-0" AND 1'-7" RESPECTIVELY.
(3/4" Steel & Elastomeric BRGS.
7/8" Bars for 72W" & 82W" Girders at 1'-0" CENTERS X 3'-2" LONG)
#5 BARS AT 1'-0" CENTERS X 2'-0" LONG @ 1'-0" CTRS.

TOP FLANGE TO ALLOW FORM-OUT CORNER OF
ABUT. DIAPH.

JT. OPENING

SEES STD. 28.03 FOR MODULAR STRIP SEALS. SEE STD. 28.01 FOR STRIKE OFF &

CONCRETE DIAPH. TO EXTEND BETWEEN EXTERIOR GIRDER TO EXTEND BETWEEN
CONCRETE DIAPHRAGM TO "ELASTOMERIC BEARING PAD AND 1/2" PREFORMED
Joints.

#4 BARS BETWEEN BEAM HORIZONTAL BARS

PLACE BEARINGS IN FRONT OF GIRDERS.

3" X 3" X 1/8" PLATE WASHER
ANGLE 6" X 4" X 1/2" X 1'-7"

3" X 3" X 1/8" PLATE WASHER

DIAPHRAGM SUPPORT ANGLES SHALL VARY WITH THE REQUIREMENTS FOR ASTM A572 OR ASTM A449.

STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A325 STEEL DIAPHRAGM SUPPORT ANGLE TO CONCRETE WEB CONNECTION WASHERS SHALL BE GALVANIZED AFTER FABRICATION.

ALL DIAPHRAGM SUPPORT HARDWARE INCLUDING BOLTS, NUTS AND DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A709 GRADE 36.

"CONCRETE MASONRY BRIDGES".

ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO NOTES

ON STD. 19.31.

FOR STRUCTURAL APPROACH SLAB slab (std. 12.10) is used. SHOW NO. 9 paving notch is 1'-0" WIDE BY 1'-4" TO ` SUBSTRUCTURE UNITS.

TO ` GIRDER.

DIAMETER IS TAKEN PARALLEL OF the diaphragm pour.

top of girder. If used, deck pour optional construction joint 1'-2" below
**Notes**

**1.** All dimension material not otherwise specified in the concrete girders shall be the top and bottom plus or minus 0.125.

**2.** Each diaphragm between girders shall be a minimum of 8 in. wide at the ends of each girder.

**3.** All dimension material including bolts, nuts and washers shall be galvanized after fabrication.

**4.** Steel diaphragm to concrete and connection shall be diaphragm plus 0.060 high carbon steel and steel for deck connection shall meet the requirements for ASTM A449 or ASTM A490.

**Designer Notes**

For spans equal or less than 80', place one diaphragm at mid-length of girders for spans equal to or less than 80', place one diaphragm at 1/3 point.

**Intermediate Steel Diaphragms for 70°, 72W° & 82W° Prestressed Girders**

**Section at Interior Girders Thru Diaphragm for Skew Angles > 10°**

**Part Transverse Section at Diaphragm**

**Plan for Skew Angles < 10°**

**Plan for Skew Angles > 10°**

**Diaphragm Support**
CLEAR ROADWAY

CLEAN ROADWAY

LEGEND

CROWN AT JOINT

CROWN AWAY FROM JOINT

CROWN POINT

LEVEL

PLAN

TYP.

BEARING,

` CROSS SECTION THRU ROADWAY OUT TO OUT OF DECK

X.X%

X.X%

X.X%

X.X%

X.X%

X.X%

MEASURED AT BOTTOM OF PRESTRESSED BOX GIRDER.

OUT TO OUT OF BOX GIRDER SUPERSTRUCTURE

DECK OVERHANG DETAIL

DECK OVERHANG DETAIL

SEE STANDARD 19.56 FOR ADDITIONAL DETAILS

DEVICE, TYP.

LIFTING

DEAD LOAD DEFL.

DECK IS POURED. TOP OF GIRDER BEFORE 1/4 PT.

1/2 PT.

1/4 PT.

1/2 PT.

6" MIN.

DEADLOAD DEFLECTION (AT MIDSPAN)

FIELD MEASURED GIRDER CAMBER (AT MID SPAN)

6" MIN. DECK SLAB THICKNESS

END OF DECK AND MIDSPAN.

THESE VALUES ARE FOR INFORMATIONAL PURPOSES ONLY.

TO DETERMINE DECK THICKNESS AT GIRDER ENDS FOLLOW THE PROCESS:

1) MAX. DECK SLAB THICKNESS

2) FIELD MEASURED GIRDERS AT MID SPAN

NOTE: PLAN DECK THICKNESS BASED ON THEORETICAL INITIAL CAMBER VALUE. These values are not to be used in determining 't'. Use field measured girder camber at end of deck and parapet.

THEORETICAL INITIAL CAMBER VALUE AT THE TIME OF STRESS POCKET, TYP.

POST-TENSIONING, TYP.

#4 @ 1'-0" MAX.

STANDARD 19.53

BUREAU OF STRUCTURES

Prestressed Box Girder Details 2

Bill Oliva

Date:

PRELIMINARY DESIGN

STANDARD 19.53

ORDER DATA

MINIMUM CYLINDER STRENGTH OF CONCRETE @ TIME OF TRANSFER OF PRESTRESS FORCE.
POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM

SECTION A-A

POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM

SECTION B-B

SEAL WASHER

NO SKEW WITH SKEW

STRESS POCKET DETAIL

STANDARD 19.54
NOTES

- ALL TIE RODS, CONNECTORS, AND HARDWARE FOR STRUCTURAL STEEL ARE TO BE OF MATERIAL RECOMMENDED IN THE STANDARD SPECIFICATIONS.
- CONCRETE OR TIMBER PILING SUBJECT TO APPROVAL BY THE ENGINEER.
- ALTERNATE DETAILS MAY BE SUBMITTED USING LUMBER OR TIMBER PILING IN PLACE OF TIMBER BACKED ABUTMENT PLANKING, SUBJECT TO APPROVAL BY THE ENGINEER.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>MOMENT CAPACITY</th>
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</thead>
<tbody>
<tr>
<td>10 GAGE</td>
<td>23.0 (f = 18 K.S.I.)</td>
</tr>
<tr>
<td>7 GAGE</td>
<td>30.0 (f = 18 K.S.I.)</td>
</tr>
</tbody>
</table>

* USE TIE RODS ON WING PILING.
* USE TIE RODS WITH A BOLT AND WASHER.

** Table of Moment Capacities **

- Use tie rods on wing piling.
- Use tie rods with a bolt and washer.

** Table of Moment Capacities **

<table>
<thead>
<tr>
<th>MOMENT CAPACITY</th>
<th>23.0 (f = 18 K.S.I.)</th>
<th>30.0 (f = 18 K.S.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 GAGE</strong></td>
<td>23.0 (f = 18 K.S.I.)</td>
<td>30.0 (f = 18 K.S.I.)</td>
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<tr>
<td><strong>7 GAGE</strong></td>
<td>30.0 (f = 18 K.S.I.)</td>
<td>30.0 (f = 18 K.S.I.)</td>
</tr>
</tbody>
</table>
SECTION A-A

END DIAPHRAGM CONNECTIONS - WEB DEPTHS < 48"

- Skews 0° - 15°
- Skews > 15° ≤ 30°
- Skew > 30°

SECTION B-B

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

SECTION C-C

END DIAPHRAGM CONNECTIONS - WEB DEPTHS > 60"

NOTES
- All bolted connections shall be friction type using ASTM A325 or higher strength grade A490 Bolts with double washers.
- Lower cross frame members are sloped when difference in adjacent bottom flange elevations exceeds 4", held up from top of adjacent flange to bottom of diaphragm or lower cross frame when these members are sloped.
- Lower cross frame members that are level shall be placed 4" above the top of the nearest bottom flange of adjacent member.

DESIGNER NOTES
- See standard 24.02 for bearing stiffener cope & weld details.
- For web depths greater than 60", the number of bolts required between bearing stiffeners and lower connecting plates equals the number of bolts required in member "C" or the number required by the lower horizontal member, whichever is greater.
- 3/8"-weld, use 6" unless increased to accommodate large expansion devices.

Approved: Bill Oliva

STANDARD 24.04

TABLE "D"

<table>
<thead>
<tr>
<th>Member &quot;C&quot;</th>
<th>Web Depth</th>
<th>Member &quot;D&quot;</th>
<th>Conn. Plate</th>
<th>Size of Conn. Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Size</td>
<td>Min. Size</td>
<td>Max. Size</td>
<td>Min. Size</td>
<td>Size of Conn. Plate</td>
</tr>
<tr>
<td>Member &quot;C&quot;</td>
<td>Member &quot;D&quot;</td>
<td>Member &quot;C&quot;</td>
<td>Member &quot;D&quot;</td>
<td></td>
</tr>
<tr>
<td>17&quot;</td>
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<td>9&quot;</td>
<td>5&quot;</td>
<td>6&quot;</td>
<td>3&quot;</td>
<td>C10 x 24.7</td>
</tr>
</tbody>
</table>

Note: All Member "C" sides represent angles.
**NOTES**

Diaphragms shall be horizontal except where the difference in adjacent girder elevations is of such magnitude that necessitates sloping the diaphragms. When diaphragms are sloped, plate center of gravity shall be horizontal at mid-depth of girder.

All bolted connections shall be made with 5/8" high strength ASTM A325 bolts.

**DESIGNER NOTES**

See standard 24.02 for connection bar corner cope & weld details.

**INTERMEDIATE DIAPHRAGM SIZES**

<table>
<thead>
<tr>
<th>GIRDER DEPTH</th>
<th>INTERMEDIATE DIAPHRAGMS</th>
</tr>
</thead>
<tbody>
<tr>
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<td>21&quot; W. GIRDER</td>
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<tr>
<td>144&quot;</td>
<td>18&quot; W. GIRDER</td>
</tr>
</tbody>
</table>

**ROLLED GIRDER DIAPHRAGMS**

Approved: Bill Oliva

Date: 7-15
NOTES

1. FOR WELDING DETAILS SEE "CONNECTION STIFFENER DETAILS" ON STANDARD 24.02.
   MIN. PLATE SIZE SHOWN. DESIGN ACTUAL SIZE REQUIRED.

DESIGNER NOTES

1. THE STIFFENERS BETWEEN HINGE PLATES IS FOR EXPANSION ACTUAL OPENING IS BASED ON EXPANSION LENGTH AND TEMPERATURE.
   SLANTED HOLES IN ALL THE PLATES AND CONNECTING BARS WILL ACCOMMODATE A TOTAL TEMPERATURE MOVEMENT OF 8". THE DESIGNER MAY NEED TO INCREASE OR DECREASE THE LENGTH OF THE SLOT TO MEET SPECIFIC JOB REQUIREMENTS.

2. CROSS FRAME UNDER BRIDGE AND END STIFFENER IS ONLY REQ'D IF TOTAL WEB HEIGHT EXCEEDS 8'-10".
   SEE BRIDGE MANUAL, SECTION 24.1 FOR CRITERIA FOR LOCATING HINGE JOINTS.

EXPANSION HINGE
J OINT DETAILS

BILL OLIVA

STANDARD 24.08
**Designer Notes**

- **Haunch Heights**: Will normally be made 2" at edge of girders, at abutments, hinges, and field splices.
- **Haunch Depth Variations**: Need not be shown on the plans.
- If haunch variations exceed 0.5", the girders shall be cambered to reduce the variations in haunch thickness.

**Notes**

- Haunch height at centerline of girders.
- To determine "T", after all structural steel has been erected, elevations of the top flanges shall be taken at centerline of bearings and at 0.1 points.
- Top of deck elevation at final grade.
- Concave deflection: upward deflection is added, downward deflection is subtracted.
- Slab thickness:
  1. Value for setting haunch.

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

<table>
<thead>
<tr>
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</tr>
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These elevations are to top of steel diaphragms and cover plate. Theoretical in-place, are accounted for and they are not the material at erection. The elevation of the top steel at the field may vary. Slabs of concrete and thickness of footings in the erection and before permanently setting the superstructure.

**Blocking & Slab Haunch Details**

- **Blocking Diagram**: Shows the placement and details of blocking and slab haunch.
- **Section Thru Slab**: Illustrates the structural details at the section through the slab.
- **Treatment of Exterior Order at Sidewalk Overhang**: Explains the treatment and details at the sidewalk overhang.

---

**Bill Oliva**

Approved: 1-12

**Standard 24.09**
CURVED GIRDER LAYOUT

KINKED GIRDER LAYOUT

GENERAL NOTES
Sketches and notes apply to any number of spans. Number and size of girders and location of field splices to be determined by design.

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

For kinked girder layout, all substructure units and field splices shall be parallel to each other at each location.

Approved:
Scott Becker

Date:
7-10

STANDARD 24.10

BUREAU OF STRUCTURES
SLAB POURING SEQUENCE

Ideal Deck Pour Sequence

(Optional or Required Transverse Joint, Typ.)

Plan View - Showing Placement of Transverse Construction Joints

Notes:

For ease of placing concrete, small spans or exceed 1/3 span length per hour, but may not exceed 600 cu. yds. per hour, required only for continuous steel girder.

If optional joints are provided, two or more sequential pours may be combined and placed in one continuous operation. Two or more alternate deck pour points (L1, L2, etc.) may be placed on the same day.

The next deck pour can be made no less than 72 hours after the previous pour.

The contractor may submit an alternate pouring sequence subject to the approval of the Structures Design Section.

Designer Notes:

The designer shall determine if transverse joints are optional or required.

Optional transverse construction joints shall be detailed on the plans. The placing of pouring and construction joinss shall be coordinated with other plans. Generally, for steel girder structures, transverse joints shall be placed at 1/3 span. For other types of bridges, placement of transverse joints shall be noted on the plans.

Required transverse construction joints shall be detailed on the plans. The concrete between these joints should be the last pour placed.

When the width of slab is greater than 90 feet, a longitudinal construction joint shall be detailed at the edge of the concrete. The concrete between these joints should be the last pour placed.

For pours over 20° in the preferred direction of pour is small, an alternate pouring sequence is shown. For pours over 20° in the preferred direction of pour is small, the sequence may be started earlier on the pour.

Ideal Deck Pour Sequence

(Optional or Required Transverse Joint, Typ.)

Plan View - Showing Placement of Transverse Construction Joints

Notes:

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SECTION THRU EXPANSION END

SHOWING EXISTING STEEL GIRDER
WITHOUT EXISTING STEEL DIAPHRAGM

SEE STANDARDS FOR ADDITIONAL DETAILS

DESIGNER NOTE

1. MINIMUM PIPE DIAMETER INCREASED TO ACCOMMODATE LARGE EXPANSION DEVICES.

LEGEND

1. BARS PLACED PARALLEL TO GIRDER, SPACING PERPENDICULAR TO GIRDER.
2. DIMENSION IS TAKEN NORMAL TO E. ALIGNMENT

NOTES

1. FOR RESTORATION PROJECTS

DIAPHRAGM SUPPORT ANGLES SHALL BE ASTM A325 TYPE 1.

ALL BOLTS, NUTS AND WASHERS SHALL BE HOT-DIPPED GALVANIZED.

ALL SUPPORT ANGLES SHALL BE MOUNTED TO MIETREX CONVERTED TO USE WITH DIAPHRAGM SUPPORT ANGLES.

ALL REPLACEMENT PAVING BLOCK DIMENSIONS SHALL MATCH EXISTING PAVEMENT UNLESS DESIGNED OTHERWISE.

2. ALL DIAPHRAGM SUPPORT HARDWARE SHALL BE INCIDENTAL TO "STEEL GIRDER SLAB & SUPERSTRUCTURE DETAILS".

3. ALL SUPPORT ANGLES SHALL BE MOUNTED TO DIAPHRAGM SUPPORT ANGLES.

4. ALL REPLACEMENT PAVING BLOCK DIMENSIONS SHALL MATCH EXISTING PAVEMENT UNLESS DESIGNED OTHERWISE.

5. ALL BOLTS, NUTS AND WASHERS SHALL BE HOT-DIPPED GALVANIZED.

6. FOR RESTORATION PROJECTS, ALL DIAPHRAGM HARDWARE SHALL BE INCIDENTAL TO "STEEL GIRDER SLAB & SUPERSTRUCTURE DETAILS".

7. ALL DIAPHRAGM HARDWARE SHALL BE ACCORDANCE WITH ASTM A563 AND SHALL MEET THE REQUIREMENTS OF SUPPLEMENTARY REQUIREMENTS OF ASTM A563, LUBRICANT AND TEST FOR COATED NUTS.

8. ALL SUPPORT ANGLES SHALL BE MOUNTED TO ASTME A709 GRADE 36.
**BEARING NOTES**

All bearings are subjected to loads of gravity and earthquake. For loads of gravity, the foundation may require minimum thickness of masonry plate to be as specified by the bearing manufacturer. All bearings shall be made of rolled steel plates with the bearing surface and edges of the plates having a minimum thickness of 1/8".

All round head anchor bolts shall be made of ASTM A307 Grade A steel and shall comply with the requirements of the bearing manufacturer. All bearing bolts shall be made of carbon steel and shall comply with the requirements of the bearing manufacturer.

**ANCHOR BOLT NOTES**

For span lengths up to 36', use a type I masonry plate to span 0' - 39". For span lengths from 36' to 100', use a type II masonry plate to span 39" - 100". For span lengths greater than 100', use a type III masonry plate to span 100" - 150".

**DESIGNER NOTES**

Notice of bearing design in this drawing includes only load-bearing pad and masonry plate. Refer to the details below for the use of beveled rocker plate and masonry plate. For spans greater than 30' and also see bearing manufacturer's recommendations.

**BUREAU OF STRUCTURES**

Type 'A' - Steel Girders

**STANDARD 21.02**

**APPROVED**

Bill Oliva

Date: 1-19
BRC. DETAILS FOR STEEL
GDRS. AND PRECAST
UNITS ON A1 ABUTMENTS

FILLER THK. = BRG. HEIGHT OF BRG. PAD. (3" MIN.)
UNDER GIRDER FLANGE IN FRONT
PREFORMED JOINT FILLER

T = BRG. HEIGHT
FILLER x LENGTH OF ABUT.
4" X T" PREFORMED JOINT

NOTES
FOR SKEWED STRUCTURES CAST END OF PRECAST TEE ALONG SKew.

DESIGNER NOTES
SEE STANDARD 19.55 FOR PRESTRESSED BOX GIRDER BEARING DETAILS.
• USE PAVING NOTCH ON ALL U.S.H. BRIDGES. I.H. BRIDGES & ON C.T.H. BRIDGES WITH USE PAVING NOTCH ON ALL U.S.H. BRIDGES, S.T.H.

• USE RUBBERIZED MEMBRANE WATERPROOFING
• BARS PLACED PARALLEL TO GIRDERS, SPACING PERPENDICULAR TO G. SHEAR.

• SEE STD. 12.01

STANDARD 27.05
**ELEVATION - NEW CONSTRUCTION**

Permanent Hold Down Device

When required, hold-down devices shall be placed in the indicated locations. The anchor bolts, nuts, and washers shall be paid for as "Adhesive Anchors 1 1/2-Inch" and embed in concrete. The anchor bolts shall be threaded 3/4". Provide one standard wrought washer and one hex nut per bolt. Cotters and cotter pins shall be provided with each new bolt. The pin in the hold-down plate shall be set after aligning in the field. All material welded to the girders, which includes bearing stiffeners, plate, and pin, shall be included in the unit price bid for "Bearing Assemblies Expansion Joint".

**Temporary Hold Down Device**

All plate cuts shall be machined or machined flame cuts. All plate welds shall be indicated and all welds shall be made by a qualified welder. All material in the hold-down devices, which includes the hold-down plates, high-tensile strength bolts, nuts, and washers, shall be included in the unit price bid for "Bearing Assemblies Expansion Joint".

**NOTES (PERMANENT HOLD DOWN DEVICE)**

1. All structural steel plates shall be flat rolled steel plates with all surfaces smooth and free from warps and all edges smooth, straight, and vertical.
2. All plate cuts shall be machined or machined flame cuts. All plate welds shall be indicated and all welds shall be made by a qualified welder.
3. All material in hold-down devices, which includes hold-down plates, high-tensile strength bolts, nuts, and washers, shall be included in the unit price bid for "Bearing Assemblies Expansion Joint".
4. All material welded to the girders, which includes bearing stiffeners, plate, and pin, shall be included in the unit price bid for "Bearing Assemblies Expansion Joint".
5. The anchor bolts shall be paid for as "Adhesive Anchors 1 1/2-Inch" and embed in concrete. All material welded to the girders, which includes bearing stiffeners, plate, and pin, shall be included in the unit price bid for "Bearing Assemblies Expansion Joint".
6. The pin in the hold-down plate shall be set after aligning in the field. All material welded to the girders, which includes bearing stiffeners, plate, and pin, shall be included in the unit price bid for "Bearing Assemblies Expansion Joint".
7. All plate cuts shall be machined or machined flame cuts. All plate welds shall be indicated and all welds shall be made by a qualified welder.
For all new bridges, the steel top plate shall have a minimum thickness of 1⁄8". When the thickness is reduced, the following note shall be executed on the plans:

- STEEL BOTTOM PLATE THICKNESS MAY BE REDUCED TO A MINIMUM OF 1⁄8" TO MATCH THE OVERALL EXISTING BEARING HEIGHT.

When the thickness is less than 1⁄8", the following note shall be executed on the plans:

- STEEL TOP PLATE THICKNESS MAY BE REDUCED TO A MINIMUM OF 1⁄8" TO MATCH THE OVERALL EXISTING BEARING HEIGHT.

For all new bridges, the steel top plate shall have a minimum thickness of 1⁄8" for bearings used in bearing replacement projects. The steel top plate thickness may be reduced to a minimum of 1⁄8" to match the overall existing bearing height. When the thickness is reduced, the following note shall be executed on the plans:

- STEEL TOP PLATE THICKNESS MAY BE REDUCED TO A MINIMUM OF 1⁄8" TO MATCH THE OVERALL EXISTING BEARING HEIGHT.

DO NOT INCLUDE PRESTRESSED GIRDER SHINKAGE WHEN DESIGNING BEARINGS FOR SPACE REINFORCEMENT PROJECTS.

- FOR 28 & 36" GIRDER LENGTH, USE EIGHT STUDS FOR CLEARANCE TO PRESTRESSING STRANDS.
- FOR 45 & 54" GIRDER LENGTH, USE SIX STUDS FOR CLEARANCE TO PRESTRESSING STRANDS.
- FOR 72 & 82" GIRDER LENGTH, USE FOUR STUDS FOR CLEARANCE TO PRESTRESSING STRANDS.

NOTES

- BEARINGS SHALL NOT BE PLACED AT A TEMPERATURE GREATER THAN 85°F.
- ALL MATERIAL USED FOR BEARINGS SHALL BE PRESERVED AND STORED IN A DRY AND PROTECTED CONDITION.
- ALL STAINLESS STEEL PLATES SHALL BE FLAT LAMINATED ELASTOMERIC BEARING.
- ALL STRUCTURAL STEEL PLATES SHALL BE FLAT LAMINATED ELASTOMERIC BEARING.
- ALL MATERIAL USED FOR BEARINGS SHALL BE STEEL LAMINATED ELASTOMERIC BEARING.
### Bearing Notes

All bearings are symmetrical about X of center and Y of center.

- Anchor bolts, nuts and washers shall be galvanized in accordance with ASTM A153, Grade B.
- Anchor plate and bearing plate shall be furnished with teflon surface.
- Anchor bolts, nuts and washers shall conform to ASTM A449, Grade 50W.
- Expansion bearing assembly shall be galvanized.

**Designer Notes**

- Anchor bolts, nuts and washers shall be furnished with teflon surface.
- Anchor bolts, nuts and washers shall conform to ASTM A449, Grade 50W.
- Expansion bearing assembly shall be galvanized.

#### Expansion Bearing Assembly

*See designer notes for bearing replacements*

### Anchor Bolt Notes

- For span lengths up to 20'-0" use a type I masonry plate 9" x 20", 3/4" long anchor bolts.
- For span lengths greater than 20'-0" use a type II masonry plate 10" x 26", 1" long anchor bolts.

---

**Stainless Steel - TFE**

**Details Type 'A'-**

[Diagram of expansion bearing and related components]

**Approved:**

Bill Oliva  
1-19

**Standard 27.08**
ANCHOR BOLTS

(2) - 1" DIA. X 1'-10" LONG

3 "

OF BEARING

SIZE AS MASONRY PLATE "D".

" THICK BEARING PAD. SAME

TEFLON SURFACE

1"

ON PLATE "B".

5" 'LENGTH'

TEFLON SURFACE

24

GIRDER

END OF

STEEL PLATE "B"

8 STUDS - 36W", 45W", 54W", 72W" & 82W" GIRDER

6 STUDS - 28", 36", 45" 54" & 70" GIRDER

TO CLEAR PRESTRESSING STEEL.

SPACE " DIA. x 6" STEEL STUDS

b1

b1

b1

8" x 1" x 3'-6" - 36W", 45W", 54W", 72W" & 82W" GIRDER

8" x 1" x 3'-2" - 54" & 70" GIRDER

8" x 1" x 2'-10" - 45 GIRDER

8" x 1" x 2'-6" - 28" & 36" GIRDER

MASONRY PLATE "D"

5" x " x 2'-4" - 36W", 45W", 54W", 72W" & 82W" GIRDER

FINISH EQUIVALENT TO ANSI 8.  FINISH WITH SCRIVE

BEVELED STAINLESS STEEL ANCHOR PLATE WITH

" OF GIRDER

"THICKNESS GREATER THAN 2", THEN PROVIDE AN ANSI 250 FINISH TO TOP AND

THE BEARING CAPACITIES IN THE TABLE

IF EITHER REACTION EXCEEDS ITS CORRESPONDING BEARING CAPACITY, THE

INCLUDING A 33% DYNAMIC LOAD ALLOWANCE (IM).

BELOW. CONSIDER ONLY DEAD LOAD (DC + DW) AND HL-93 LIVE LOADS (LL),

CHECK TO SEE IF THE REACTIONS EXCEED THE BEARING CAPACITIES IN THE TABLE

"DEAD LOADS" ONLY. USE THE AASHTO LRFD SERVICE I LOAD COMBINATION AND

CALCULATE THE REACTIONS AT THE BEARINGS DUE TO "TOTAL LOADS" AND ALSO

ADDITIONAL GUIDANCE.

ANCHOR PLATE LENGTH TO BE DESIGNED. MINIMUM LENGTH IS 10".  SEE STD. 27.10 FOR

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

AND 4" TEFLON SURFACE.

HEIGHT OF BEARING SHOWN IN "EXPANSION BEARING ASSEMBLY" INCLUDES " BEARING PAD

FOR THE USE OF BEVELED ROCKER PLATE "C" ON GRADES GREATER THAN 3%.

SEE STANDARD 27.02 AND 19.31 FOR CLEARANCE REQUIREMENTS AND STANDARD 27.02

FOR EXPANSION BEARINGS, USE LAMINATED ELASTOMERIC BEARINGS WHENEVER POSSIBLE.

ELASTOMERIC BEARING PADS AND FULL-DEPTH CONCRETE DIAPHRAGMS.

IF ALL BEARINGS AT A GIVEN SUBSTRUCTURE UNIT ARE FIXED, UTILIZE " THICK

PLATE "B".

STANDARD 27.09  

BILL OLIVA  

DATE:

STANDARD 27.09
**Expansion Bearing Assembly**

*For Steel Girder*

- **Top Plate “A”**
- **Plate “C”**
- **Rocker Plate “D”**
- **Masonry (1/8”)**
- **Bearing Pad**
- **Steel Plate “B”**
- **Teflon Surface**

**Expansion Bearings at Pier**

- Prestressed Concrete Girders
- **Expansion Bearings at Abutment**
- Stainless Steel Anchor Plate
- **Shrinkage**

**BEARING OFFSET TABLE**

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<tr>
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**NOTES**

- **For Steel Expansion Bearings**
  - Use temperature setting table rather than centering bearings beneath bearing stiffeners for all temperatures.
- **For Prestressed Girders**
  - Preseated as shown on the substructure plan, providing adjustments for substructure location discrepancies, place each anchor centered between its given bearings.

**Designer Notes**

- The standard should only be used for steel bearings.
- **Top Plate “A”**
  - Preseated to account for thermal movement and construction tolerance. Use greater of value from procedure or from standard.
  - Use temperature setting table, rather than centering bearings.

**Steel Expansion Bearing Details**

- **TOP PLATE “A” LENGTH**
  - THERMAL MOVEMENT (USE GREATER OF VALUE FROM PROCEDURE BELOW)
  - CONTRACTURE TOLERANCE

- **TOP PLATE “A” LENGTH** DOUBLE THIS FOR PLATE “A” LENGTH

- Anchor plates in prestressed girders to be designed to account for centering bearing stiffeners and construction tolerance.

**Approved:**

- Bill Oliva
- Date: 1-17

**Standard 27.10**
**Typical Section Thru Joint At Steel Girder**

- EXTREMELY COLD OR WIND CONDITIONS MAY REQUIRE NEOPRENE STRIP SEAL INSTALLATION.
- PREPARE A TEMPERATURE TABLE SHOWING JOINT OPENINGS FROM 5°F TO 85°F IN 10°F INCREMENTS. ACCOUNT FOR PRESTRESSED GIRDER SHRINKAGE DUE TO TEMPERATURE CHANGE BEHIND JOINT.
- ONE FIELD SPLICE PERMITTED IN STEEL EXTRUSIONS, UNLESS MORE ARE REQUIRED.
- STRIP SEAL EXPANSION JOINT DETAILS:

**Strip Seal Expansion Joint Details**

- **NOTE:** The joint opening at 1°/ft. expansion length or 2°/ft. expansion length is designed for prestressed girder shrinkage due to temperature change. Joint opening and normal to girder is shown.
- **STUDS:** 1/2" x 6" long at 4" alternate centers. Weld to headers and plate washers for prestressed girder detail. Use washers or field-made washers. 1 1/2" of studs for steel girders. Weld field-made stud to top flange or attach by bolting through flange.
- **ARMS:** 1" dia. x 3" long at 6" alternate centers. Weld to headers and plate washers for prestressed girder detail. Use washers or field-made washers. 1 1/2" of studs for steel girders. Weld field-made stud to top flange or attach by bolting through flange.
- **PLATES:** 1" thick. Weld to studs and field-made washers or field-made washers for prestressed girder detail. Use washers or field-made washers. 1 1/2" of studs for steel girders. Weld field-made stud to top flange or attach by bolting through flange.

**Notes**

- The field spaces permitted in steel extrusions, unless more are required, for staged construction or galvanizing, contain details shall be submitted for approval, no specific permitted in strip seal expansion joint.
- After fabrication, hot dip galvanized steel extrusions shall be fieldinned. The joint opening at 1°/ft. expansion length or 2°/ft. expansion length is designed for prestressed girder shrinkage due to temperature change. Joint opening and normal to girder is shown.
- PREPARED A TEMPERATURE TABLE SHOWING JOINT OPENINGS FROM 5°F TO 85°F IN 10°F INCREMENTS. ACCOUNT FOR PRESTRESSED GIRDER SHRINKAGE DUE TO TEMPERATURE CHANGE BEHIND JOINT.
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- **STUDS:** 1/2" x 6" long at 4" alternate centers. Weld to headers and plate washers for prestressed girder detail. Use washers or field-made washers. 1 1/2" of studs for steel girders. Weld field-made stud to top flange or attach by bolting through flange.
- **ARMS:** 1" dia. x 3" long at 6" alternate centers. Weld to headers and plate washers for prestressed girder detail. Use washers or field-made washers. 1 1/2" of studs for steel girders. Weld field-made stud to top flange or attach by bolting through flange.
- **PLATES:** 1" thick. Weld to studs and field-made washers or field-made washers for prestressed girder detail. Use washers or field-made washers. 1 1/2" of studs for steel girders. Weld field-made stud to top flange or attach by bolting through flange.

**Notes**

- The field spaces permitted in steel extrusions, unless more are required, for staged construction or galvanizing, contain details shall be submitted for approval, no specific permitted in strip seal expansion joint.
- After fabrication, hot dip galvanized steel extrusions shall be fieldinned. The joint opening at 1°/ft. expansion length or 2°/ft. expansion length is designed for prestressed girder shrinkage due to temperature change. Joint opening and normal to girder is shown.
- PREPARED A TEMPERATURE TABLE SHOWING JOINT OPENINGS FROM 5°F TO 85°F IN 10°F INCREMENTS. ACCOUNT FOR PRESTRESSED GIRDER SHRINKAGE DUE TO TEMPERATURE CHANGE BEHIND JOINT.
- ONE FIELD SPLICE PERMITTED IN STEEL EXTRUSIONS, UNLESS MORE ARE REQUIRED.
- STRIP SEAL EXPANSION JOINT DETAILS:

**Strip Seal Expansion Joint Details**

- **NOTE:** The joint opening at 1°/ft. expansion length or 2°/ft. expansion length is designed for prestressed girder shrinkage due to temperature change. Joint opening and normal to girder is shown.
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WELD (TYP.)
MITER &

2" MIN. TO BEND LINE
SIDEWALK ( CURB FACE )
2" BEND LINE

* 6" MAX. SPA.
** 2" MAX. SPA.
( PERPENDICULAR TO FACE OF CURB
SEE DETAIL ON STANDARD 28.05

SIDEWALK ( CURB FACE )

SIDEWALK ( OUTSIDE EDGE )
EDGE OF DECK
ABUT. BACKWALL ( FRONT FACE )
WINGWALL ( BACK FACE )
CONSTR. JT.

STEEL POST

SIDEWALK COVER PLATE
WITH SLIP-RESISTANT SURFACE

PLACEMENT OF SLIP-RESISTANT SURFACE ON TOP WALKING SURFACE IN SHADED AREA ONLY
NOT ON CURB FACE, GALVANIZED PLATE
AFTER SLIP-RESISTANT SURFACE IS APPLIED.

PRODUCT MANUFACTURER CONTACT AT
ALCHP, STEEL ROSS TECHNOLOGY CORP. 1-800-345-8170
APPROVED SLIP-RESISTANT APPLIED SURFACES FOR STEEL PLATES

COVER PLATES FOR SIDEWALK W/ STEEL RAIL

PLAN OF SIDEWALK W/ STEEL POST

STANDARD 28.06

SCOT BECKER
APPROVED
PLAN

SECTION A1

SECTION A2

GRATE CASTING DETAIL
ATTACH GRATE TO FRAME FOR SHIPMENT

BRACKET DETAIL

NOTES

ALL MATERIAL FOR TYPE "GC" CASTING EXCLUDING FLANGE HOLD DOWN SCREWS SHALL BE GI Pipe
CONFORMING TO ASTM A53. CLASS 30. APPROXIMATE DIAMETER = 1 5/8".

ALL MATERIAL FOR BRACKETS SHALL CONFORM TO ASTM A36.

THE CONTRACTOR MAY PROVIDE AN ALTERNATE TYPE OF BRACKETS, THE PROPOSED ALTERNATE
DETAILS SHALL BE SUBMITTED AND SUBJECTED TO THE APPROVAL OF THE ENGINEER.

PLATED 4" ON DOWNSPOUTS SHALL BE REINFORCED.

REINFORCED GRATE PIPE EXHIBITS DOWNSPOUTS SHOWN. UNREINFORCED CAST IRON DOWNSPOUTS
SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 6-INCH".

AS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE BID ITEM "FLOOR DRAIN TYPE GC".

All material for grids and grates as shown on this sheet shall be included in the bid item "grate holding type GC".

LOCATION OF HOLES FOR BRACKET ANCHORAGE ON THE PRESTRESSED GIRDER SHEET, SHOW
IN THE BID ITEM "DOWNSPOUT 6-INCH".

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

DESIGNER NOTES

ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS AS SHOWN ON THE SHEET SHALL BE INCLUDED IN THE BID ITEM "DOWNSPOUT 6-INCH".

ALL MATERIAL FOR DOWNSPOUTS AND BRACKETS AS SHOWN ON THE SHEET SHALL BE INCLUDED IN THE BID ITEM "FLOOR DRAIN TYPE GC".

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IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT

DETAIL NOT TO BE USED OVER RAILROADS BECAUSE IT VIOLATES CLEARANCE REQUIREMENTS. CONTACT

ENGINEER AND WORKSHOPS SECTION FOR GUIDANCE.

2-1" DIA. HOLES
STANDARD PIPE CONFORMING TO ASTM A53.

FLANGED 6" DIA. DOWNSPOUTS SHALL BE REINFORCED

THE APPROVAL OF THE ENGINEER.

DETAILS SHALL BE SUBMITTED AND SUBJECT TO

TYPE OF BRACKET. THE PROPOSED ALTERNATE

THE CONTRACTOR MAY PROPOSE AN ALTERNATE

ASTM A36.

MATERIAL FOR BRACKETS SHALL CONFORM TO

EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC" CASTING, EXCLUDING TYPE "GC"

CONFORMING TO ASTM A48, CLASS 30.

GRAY IRON

REINFORCED TO BE CUT A MAX. OF

2" DIAM. STRANDS
TO AVOID DRAPED

LOCATE HOLES
11" DIAM.

2'-0" DIAM. HOLES

6" DIAM. BOLT

2" DIAM. ADJUSTING BOLT

REQ'D

PER DRAIN

AND 2 NUTS - 4 REQ'D

3" DIAM. BOLT THRU 2" DIAM. HOLE
2" DIAM. HOLE FOR 3" DIAM. BOLT

DESIGNER NOTES

APPROVED:

Bill Oliva

DATE:

STANDARD 29.01

BUREAU OF STRUCTURES

FLOOR DRAIN TYPE 'GC'
Location of holes for bracket anchorage on the prestressed girder sheet, shown.

**Design Notes**

All materials for floor drains as shown on this sheet shall be included in the bid.

- All material for downspouts, connectors, and graters as shown on this sheet shall be included in the bid.
- All material for floor drains as shown on this sheet shall be included in the bid.
- On the prestressed girder sheet shown, location of holes for bracket anchorage from topbottom and end of girder.

**Bracket Details**

- Use a bracket for 8" pipe. A metal plate is fabricated to the bracket. Use a bracket for 8" pipe. A metal plate is fabricated to the bracket.

**Grate Casting Details**

- Attach graters to frame for shipment.

**Section B-B**

- Top of girder: Use reinforcement to be cut a maximum of 1" transverse and longitudinal slab bar.

**Section A-A**

- Top of girder: Use reinforcement to be cut a maximum of 1" transverse and longitudinal slab bar.

- Use a bracket for 8" pipe. A metal plate is fabricated to the bracket.

**Notes**

- All materials for type WF.

- The contractor may propose an alternate type of grater. The proposed alternate details shall be submitted and subject to the approval of the Engineer.

- Contact designer notes.
LONG. PLACE SYM. #6 BARS 4'-0" ONLY.
CULVERT HEADERS BOLT ASSEMBLY) FOR EACH SIDE OF ANCHOR 4-#6 BARS (TWO ON 7" FOR 1'-6"
CULVERT HEADER 4" FOR 1'-3"
STANDARDS.
AS SHOWN ON SDD 14 B 20
A TRIE BEAM CONNECTION SHALL HAVE PROVISIONS FOR
AT END POSTS, RAIL MEMBER
WELD SEAL
SLAB EDGE OF END OF WINGWALL
2" FOR 1'-0" RAILING
10" 9" 11" 4"
1'-0"
1'-0"
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**At Abutments**

- **Roadway Opening:** 24" x 24" for expansion joint.
- **View Showing Outside Face of Parapet & Reinforcement:**
  - Joint Sealer: Gray non-bituminous fill with non-staining gray non-bituminous joint sealer.
  - Joint Spacing: 80'-0" long. Define constant joint with a lap.
  - Bars: Minimum of 1'-9" long. Minimum joint may be used. Run bar reinforcement through the joint.
  - Note: Ext. Vs. Groove to End of Parapet.
  - Note: Parapet - Similar to That Shown in Plan of Parapet.

**Elevation of Parapet**

- Highway opening 3'-0" for expansion joint.
- View showing outside face of parapet & reinforcement.

**At Deflection Joints**

- Elevation of parapet showing deflection joint in parapet or sidewalk using the following criteria:
  1. Girder structures and slab structures with a sidewalk over the pier.
  2. Girder structures and slab structures without sidewalks should have no deflection joints in the parapets.

**Details of Anchor Assembly**

- Note: Where girder structures and slab structures have a sidewalk over the pier, place a deflection joint approx. 4'-0" each side of pier, with none directly over the pier.

**Bill of Bars**

<table>
<thead>
<tr>
<th>Bar Type</th>
<th>Size</th>
<th>Length</th>
<th>Grade</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>R501</td>
<td>2&quot;</td>
<td>4'-0&quot;</td>
<td>#5</td>
<td>PARAPET</td>
</tr>
<tr>
<td>S501</td>
<td>3&quot;</td>
<td>4'-0&quot;</td>
<td>#5</td>
<td>PARAPET</td>
</tr>
<tr>
<td>R502/S502</td>
<td>2&quot;</td>
<td>4'-0&quot;</td>
<td>#5</td>
<td>PARAPET</td>
</tr>
</tbody>
</table>

**Legend**

- Virt. Const. Joint Strike Off as Shown and Gage Tolerance
- Optional construction joints in the parapets which are not shown, such as those shown as optional. Joints in parapets are used at the deflection joints. Joints in both should be coated with an approved liquid bond breaker and plate separators may be omitted.

**Designer Note**

- A 3" opening may be used (in lieu of a 2" opening) adjacent to the paving notch on type A Vicinit."
Combination Railing Type '3T' Details

**NOTES**

- Base plates shall be made of steel type by B-1, when small include all steel items shown.
- Post base plates shall be made of steel type by B-1, when small include all steel items shown.
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**LEGEND**

1. Base plate 1/2" x 2" x 1/8" wide x 1/8" x 1/2" cutout for bolts to 1/4". As shown, bolts may be placed to any one side of plate.
2. 1/2" x 1/2" x 1/2" anchor plate galvanized with 1/4" x 1/2" holes for two rods (2). 11.
3. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
4. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
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**COMBINATION RAILING TYPE '3T' DETAILS**

**LEGEND**

1. Base plate 1/2" x 2" x 1/8" wide x 1/8" x 1/2" cutout for bolts to 1/4". As shown, bolts may be placed to any one side of plate.
2. 1/2" x 1/2" x 1/2" anchor plate galvanized with 1/4" x 1/2" holes for two rods (2).
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16. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
17. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
18. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
19. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
20. Structure tubing 3/4" x 3/4" x 1/4" post plate, vertical, 2 to 11, and 1/4" x 1/2" holes in both edges for bolt nos. 2.
Inside Elevation

- Optional Construction Details in the Margins may be used.

- Joint Spacing: Minimum of 3'-0", Define Construction with a 1/2" V-Groove.

Designer Notes

- Combination railings types C1-C6 may also be used as a traffic barrier required between the roadway and sidewalk.
- Pedestrian rail mounted directly to a bridge sidewalk or retaining wall by increasing the railing height to a minimum of 3'-6" and a maximum of 4'-6" and using a minimum post size of 3"x3"x‰" when used on a bridge.
- A minimum 12'-0" Wing Length is recommended to accommodate the rail end transition and provide a post spacing on the Rand that will maintain the rail aesthetics.

- See Standard 30.17 for Additional Railing Details.

Combination Railing Types C1-C6

- Pedestrian rails may also be used as a traffic barrier, see "DETAIL A" for additional details.
- Joint Spacing: Minimum of 3'-0", Define Construction with a 1/2" V-Groove.

Approved:

STANDARD 30.17

Bill Oliva

DATE: 1/18
**Designer Notes**

The standard accommodates electrical service to light standards mounted on the structure. See 17.02 for conduit details and notes.

**Light Standard - Vertical - Parapet**

- Use a 18" x 12" x 6" junction box at each light standard (centered on light `)`.
- Use (1) - 2" dia. conduit to provide electrical service to lights mounted on top of the parapet.
- Location of conduit is measured from outside edge of `` girder to edge of deck.
- Use (2) - 2" dia. conduits if additional electrical service is required.

**Light Standard - Transverse - Deck - Bottom**

- Use (1) - 2" dia. conduit to provide electrical service to lights mounted on bottom of the deck.
- Location of conduit is measured from outer edge of deck steel to edge of `` girder.
- Use a 18" x 6" x 6" junction box when (1) - 2" conduit is used.

**Light Standard - Horizontal - Parapet**

- Use a 18" x 12" x 6" junction box at each light standard (centered on light `)`.
- Location of conduit is measured from outer edge of deck steel to edge of `` girder.
- Use (2) - 2" dia. conduits if additional electrical service is required.

**Legend**

- Light standard - Vertical - Parapet
- Light standard - Transverse - Deck - Bottom
- Light standard - Horizontal - Parapet
- **Construction Joint**: Strike off as shown.
- **Cut Out**: DO NOT DISPLACE.
- **Location of Conduit**: Measured from outside edge of junction box cover.
- **Nonmetallic Conduit to Metallic Conduit Adapter Fitting**: Use a 18" x 6" x 6" junction box where 2" dia. conduit is used.

**ILLUSTRATION**

- Inside elevation at junction box at semi-exp. joint
- Inside elevation at junction box at exp. joint
- Plan at light standard (deck steel not shown for clarity)

**Bill of Bars**

<table>
<thead>
<tr>
<th>Bar</th>
<th>Location</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>S504</td>
<td>Light std. - trans. - deck - bot.</td>
<td>18&quot;</td>
</tr>
<tr>
<td>S505</td>
<td>Light std. - horiz. - parapet</td>
<td>18&quot;</td>
</tr>
<tr>
<td>S506</td>
<td>Light std. - vert. - parapet</td>
<td>18&quot;</td>
</tr>
<tr>
<td>S507</td>
<td>Light std. - vert. - parapet</td>
<td>18&quot;</td>
</tr>
<tr>
<td>S508</td>
<td>Light std. - vert. - parapet</td>
<td>18&quot;</td>
</tr>
<tr>
<td>S509</td>
<td>Light std. - trans. - deck - top</td>
<td>18&quot;</td>
</tr>
<tr>
<td>S510</td>
<td>Light std. - vert. - parapet</td>
<td>18&quot;</td>
</tr>
</tbody>
</table>

**Approved**

- Bill Oliva
- Date: 7-18

**Bureau of Structures**

- Standard 30.21
This page contains detailed specifications for a timber railing attached to concrete slab details. The page includes diagrams and notes on the installation of steel transition plates, curbs, and railings. It also includes a bill of treated lumber with specific dimensions and notes on the installation process. The page is part of a standard for timber railings and is approved by the Bureau of Structures. The standard number is 30.25.
**INSIDE ELEVATION**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**PLANN**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**OUTSIDE ELEVATION**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**SECTION THRU PARAPET ON BRIDGE**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**BILL OF BARS**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**SINGLE SLOPE PARAPET 32SS STANDARD 30.30**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**FOR WING LOCATIONS**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**SECTION A**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**SECTION B**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**SECTION C**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**BARS FOR TRANSITION ON BRIDGE**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**FOR ALTERNATE PARAPETS**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**FOR GRIZZLY BEAM. SEE**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**FOR LOCATION**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**NOTE**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**SIGNATURE**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.

**CONSTRUCTION**

- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- Parapets - The parapet may be used.
- Optional construction joints - Place a 1/2" joint at the top of the parapet.
- Residential openings or cut outs for expansion joint, use 1/2 opening with filler for all elevations.
- /vertical.
For wing locations.

"General Plan" Sht.

For three beam. See assembly of anchor assembly 1'-8" 2'-6"

Bar Mark

Coat Bent abut.

Length location

Bill of bars

r501
r502
r503
r504
r505
r506
r507
r508
r509
s501
s503
s504
s502
s502
s503
s506
s507
s508
s509
s501
s502
s503
s504
s509

5'-10
5'-8
3'-0
5'-7
5'-5
5'-6
4'-9
4'-5
2'-9
4'-4
x
x
x
x
x
x
x
x
x
x
x
x
x
x

Parapet vert.

Parapet horiz.

Assembly of roadway parapet same not covered by finish surface.

Fraction " opening with filler for a1 abutments

Roadway opening or 2" min. for expansion joint. Use 2" opening with filler for abutments.

Inside elevation

SECTION A

SECTION B

SECTION C

Parapet vert.

Parapet vert.

Parapet vert.

Parapet vert.

Parapet vert.

Parapet vert.

Parapet vert.

Plan

Outside elevation

Section thru parapet on bridge

Bars for transition on bridge

Single slope parapet 36 SS

Approved: Bill Oliva

Date: 1-18

Bureau of Structures

Standard 30.31
**SINGLE SLOPE PARAPET 56SS**

**BUREAU OF STRUCTURES**

**BILL OF BARS**

**FOR ABUTMENT PARAPETS**

<table>
<thead>
<tr>
<th>Bar</th>
<th>Dia.</th>
<th>Qty.</th>
<th>Length</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>R501</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Parapet-Vert.</td>
</tr>
<tr>
<td>R502</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Parapet-Vert.</td>
</tr>
<tr>
<td>R503</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Parapet-Mid.</td>
</tr>
</tbody>
</table>

**DESIGNER NOTES**

The 56SS Parapet is only to be used if a "Type A1" Single Slope Concrete Roadway Barrier is placed at the end of the 56SS Parapet.

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

**OUTSIDE ELEVATION**

- DESIGNER MAY ELECT TO USE A R501 BAR IN LIEU OF A S5__ BAR ADJACENT TO THE PAVING NOTCH ON TYPE ABUTMENTS.
- TO THE PAVING NOTCH ON TYPE A1 ABUTMENTS.
- BILL OLIVA NAME PLATE. FOR LOCATION\

**PLAN**

- R503 AT END OF WING.
- R502 AT END OF WING.

**INSIDE ELEVATION**

- ROADWAY OPENING OR EXPANSION JOINT SPACING SHOWN FOR ABUTMENTS.
- USE ½" OPENING WITH FILLER FOR ABUTMENTS.

**SECTIONS A**

- SCALE 1" = 8'-0".

**SECTION THRU PARAPET ON BRIDGE**

- PARAPET BAR ON BRIDGE.

**STANDARD 30.33**
For wing locations.

"General plan" sht.

For three beam, see.

Of anchor assembly

Bar mark

C O A B E N T abut.

Length location

Bill of bars

r501
r502
r503
r504
r505
r506
r507
r508

4-5
5-0
2-9
4-4
4-9
4-10

x

x

x

x

x

x

x

Parapet-vert.

Parapet-vert.

Parapet-vert.

Parapet-vert.

Parapet-vert.

Parapet-vert.

Parapet-horiz.

Parapet-horiz.

Assembly

Assembly

Section a

Section b

Section c

5"

inside elevation

'V' Groove.

Define const. joint with 1/2" -

Min. joint spacing of 80'-0".

Lap longit. bars a min. of 1'-9".

Run bar reinf. thru the joint.

In the parapets may be used.

Optional construction joints

in the parapets may be used.

Lay longit. bars at spacing of 1/8-

Min. joint spacing of 80'.

Def. const. joint with 1/2-

1/4" groove.

Approach slab parapets

See structural approach slab standards 32.2 and 32.0

for approach slab information.

As abut., see standard 32.2 for abut. details.

See standard 30.20 for details of 32SS parapet on bridge.

Approved

Bill Oliva
For wing locations, see "General Plan" SHT.

Outside elevation

**BILL OF BARS**

*Note: All bars are in inches.*

<table>
<thead>
<tr>
<th>Bar</th>
<th>Qty</th>
<th>Length</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>R501</td>
<td>4</td>
<td>5'-5&quot;</td>
<td>Parapet-vert.</td>
</tr>
<tr>
<td>R502</td>
<td>4</td>
<td>5'-0&quot;</td>
<td>Parapet-vert.</td>
</tr>
<tr>
<td>R503</td>
<td>4</td>
<td>4'-5&quot;</td>
<td>Parapet-vert.</td>
</tr>
<tr>
<td>R504</td>
<td>4</td>
<td>3'-10&quot;</td>
<td>Parapet-vert.</td>
</tr>
<tr>
<td>R505</td>
<td>4</td>
<td>3'-5&quot;</td>
<td>Parapet-vert.</td>
</tr>
<tr>
<td>R506</td>
<td>4</td>
<td>2'-10&quot;</td>
<td>Parapet-vert.</td>
</tr>
<tr>
<td>R507</td>
<td>4</td>
<td>2'-5&quot;</td>
<td>Parapet-vert.</td>
</tr>
</tbody>
</table>

Additional notes:

- See Standard 30.31 for details of 36SS parapet on bridge.
- See Standard 30.35 for details of 36SS parapet on bridge.

See Structural Approach Slab Standards 12.10 and 12.11 for approach slab information.


**DESIGNER NOTES**

See Structural Approach Slab Standards 12.10 and 12.11 for approach slab information.

See Standard 12.12 for details of 36SS parapet on bridge.

Approved: Bill Oliva

Date: 1-18

Standard: 30.35
'V' GROOVE. DEFINE CONST. JOINT WITH A MIN. JOINT SPACING OF 80'-0". LAP LONGIT. BARS A MIN. OF 1'-9". RUN BAR REINF. THRU THE JOINT. IN THE PARAPETS MAY BE USED. OPTIONAL CONSTRUCTION JOINTS

A1 ABUT. SHOWN. SEE STANDARD 12.12 FOR A3 ABUT. DETAILS. FOR APPROACH SLAB INFORMATION. SEE STRUCTURAL APPROACH SLAB STANDARDS 12.10 AND 12.11 FOR DETAILS OF '56SS' PARAPET. THE '56SS' PARAPET IS ONLY TO BE USED IN A "TYPE S56" SINGLE SLOPE CONCRETE ROADWAY BARRIER ALONG THE END OF THE '56SS' PARAPET. SEE STANDARD 30.33 FOR DETAILS OF '56SS' PARAPET ON BRIDGE.

BILL OF BARS FOR STRUCTURAL APPROACH SLAB PARAPETS

BILL OF BARS

DESIGNER NOTES

STANDARD 30.37

SINGLE SLOPE PARAPET 56SS WITH STRUCTURAL APPROACH SLAB

1-18

Bill Oliva

APPROVED

STANDARD 30.37

BUREAU OF STRUCTURES

SLAB FOOTING

STRUCTURAL APPROACH SLAB

TRK

NOTES

1. CONTOUR - STRIKE OFF AS SHOWN.
2. EARS BARS TO BE PEG TO STRUCTURAL APPROACH SLAB STEEL BEFORE STRUCTURAL APPROACH SLAB IS PEGGED.
3. SLOPE FOR DRAINAGE

AREA = 52.5 SF
WEIGHT = 117 LBS/FT
**DESIGN DATA**

**DESIGNER NOTES**

**MATERIAL PROPERTIES**

- **Concrete Masonry:** $f'c = 3.5$ K.S.I.
- **Steel Reinforcement:** $fy = 60.0$ K.S.I.

**Earth Load:** Designed for Fill Height Range of **TO** FEET

- **Inlet:**
  - Height to be to the Nearest 0.5 Feet
  - Height to be to the Nearest 0.5 Feet

- **Outlet:**
  - Height to be to the Nearest 0.5 Feet
  - Height to be to the Nearest 0.5 Feet

**Eavestall Construction Joint (Section 36.20)**

**Hinge Construction Joint (Section 36.20)**

**REFERENCES**

- Standard 36.01
- Standard 36.02
- Standard 36.03
- Standard 36.04
- Standard 36.05

**NOTES**

- See Section 9 for Design Range of Fill Heights.
- Height to be to the Nearest 0.5 Feet
- Height to be to the Nearest 0.5 Feet
- Height to be to the Nearest 0.5 Feet

**BILL OLIVA**

**APPROVED DATE:** 1-19

**STANDARD 36.01**

---

**Legend**

- **D** indicates Wing Number

---

**Section C2**

- **Cut Off Wall**
- **Top of Slab**
- **Bottom Slab**
- **Eavestall Construction Joint**
- **Hinge Construction Joint**

---

**Plan Looking Up Station**

- **Build Apron & End of Box Level**

---

**Design Loading:** HL-93

**Inventoried Rating Factor:** RF = 1.05

**Operating Rating Factor:** RF = 1.35

**Wisconsin Standard Permit Vehicle (WIS.-SPV):** 255 (Kips)

**Live Load:**

- **Design Loading:** HL-93
- **Inventoried Rating Factor:** RF = 1.05
- **Operating Rating Factor:** RF = 1.35
- **Wisconsin Standard Permit Vehicle (WIS.-SPV):** 255 (Kips)
NOTE:
BARS STEEL REINFORCEMENT SHALL BE EMBEDDED 2" CLEAR UNLESS OTHERWISE SHOWN OR NOTED.

THE CONCRETE IN THE CUT OFF WALL MAY BE PLACED UNDERWATER IF THE EXCAVATION CANNOT BE DREDGED.

THE ALTERNATE CUT OFF WALL MAY BE USED IN LIEU OF THE CAST-IN-PLACE CONCRETE CUT OFF WALLS/REINFORCEMENT SHALL BE BASED ON CONCRETE CUT OFF WALLS.

LOCATE NAME PLATE ON NEAREST RIGHT WING AND UP STREAM FACE NAME PLATE UP STREAM.

FIRM CONTRACTOR MAY INSTALL A PRECAST CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE BOX CULVERTS WITH THE ACCEPTANCE OF THE SHOP DRAWINGS BY THE STRUCTURES DESIGN SECTION. THE PRECAST CONCRETE BOX CULVERT SHALL BE BASED ON THE QUANTITIES AND PRICES BID FOR THE ITEMS LISTED IN THE "TOTAL ESTIMATED QUANTITIES".

DESIGNER NOTES

SEE STANDARD 36.01 FOR ADDITIONAL NOTES.

ALL BAR STEEL FOR CAST-IN-PLACE CONCRETE BOX CULVERTS SHALL BE UNCOATED, EXCEPT WHEN THERE IS NO FILL OVER THE CULVERT, EVERY COATED BARS SHALL BE USED FOR THE TOP AND BOTTOM BARS IN THE TOP SLAB.

BAR STEEL FOR CAST-IN-PLACE CONCRETE APRONS SHALL BE UNCOATED AND ALL BAR STEEL FOR PRECAST CONCRETE APRONS SHALL BE EPOXY COATED.

FOR DESIGNATED CONCRETE BOX CULVERTS MACHINES FOR SURFACING AT GRADE MAY BE USED. NOTE THIS ON PLANS WHEN APPLICABLE.

CONCRETE CUT OFF WALLS. PAYMENT SHALL BE BASED ON CONCRETE CUT OFF WALLS.

THE ALTERNATE CUT OFF WALL MAY BE USED IN LIEU OF THE CAST-IN-PLACE BOX CULVERTS EXCAVATION CANNOT BE DREDGED.

THE CONCRETE IN THE CUT OFF WALL MAY BE PLACED UNDERWATER IF THE EXCAVATION CANNOT BE DREDGED.
A BOX CULVERT MANHOLE
FOR INLET TYPE B & 9

NOTES
FIELD CUT BAR STEEL REINFORCEMENT IN TOP SLAB TO CLEAR THE OPENING PROVIDED FOR MEDIAN INLET.
ADJUSTMENT OF THE COVER TO GRADE MAY BE ACCOMPLISHED BY THE USE OF WORMED AND SPLIT
BRICK. MAXIMUM ADJUSTMENT SHALL BE 8".

DESIGN NOTES
SIZE AND LENGTH OF "A" BARS TO BE DETERMINED BY THE DESIGNER.
STRENGTH SHOWN IS ADEQUATE TO DEPTHS UP TO 15'-6" FOR INLET TYPE 9 AND 44'-0" FOR
INLET TYPE 8, ASSUMING A COEFFICIENT OF 15'-6" FOR INLET TYPE 9 AND A UNIT
WEIGHT OF SOIL OF 0.120 KCF.
SECTIONS SHOWN ADEQUATE FOR DEPTHS UP TO 10'-10" ASSUMING MAX. LOAD OF 60#/SQ FT.

MAXIMUM ADJUSTMENT SHALL BE 8".
ACCOMPLISHED BY THE USE OF MORTAR AND BRICK.
ADJUSTMENT OF THE COVER TO GRADE MAY BE
TO CLEAR THE OPENING PROVIDED FOR MEDIAN INLET.
FIELD CUT BAR STEEL REINFORCEMENT IN TOP SLAB

VERIFIED STEEL ADEQUATE FOR DEPTHS UP TO 25'-0" ASSUMING WIND LOAD OF 50#/SQ FT.
VERTICAL STEEL ADEQUATE FOR DEPTHS UP TO
WEIGHT OF SOIL OF 0.120 KCF.
LATERAL EARTH PRESSURE OF 0.5 AND A UNIT
INLET TYPE 8, ASSUMING A COEFFICIENT OF
STEEL SHOWN IS ADEQUATE TO DEPTHS UP TO
BY THE DESIGNER.
SIZE AND LENGTH OF "A" BARS TO BE DETERMINED

STANDARD 36.04

BILL OLIVA
DATE: 7-16
Diameter (D) typ.

showing outside reinforc.

bar length D+1'-6" min. (typ.) on each side, both faces.

reinforcing cut by opening provide 50% of vertical bar mats (typ.) between inside and outside #4 diagonal bars, place both faces (typ.) 3'-0" min. top and bottom additional horiz. #4 bar, 6" cl. 

Opening
Horizontal Edge
Vertical Edge

half section

opening (typ.)

field cut 2" clear around culvert wall reinforcement, when d > 1'-6" S = 1'-6" min, D max

when D < 1'-6" S = 1'-6" 1'-0" min.

All bar steel reinforcement shall be cut 2" clear around opening details to be similar. Details shown are for cast-in-place culverts. Precast culvert details to be similar.

NOTES

PIPE OPENING IN CULVERT WALL

BUREAU OF STRUCTURES

Bill Oliva

APPROVED

STANDARD 36.07
PLASTIC BLOCKOUT

MINIMUM CONCRETE STRENGTH (     )  OF 3,500 PSI

1'-0" W-BEAM RAIL

GUARDRAIL POST ANCHORS TYPE 1
USE FOR THICKNESS "T" OF 8 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (     ) OF 4,000 PSI

USE FOR THICKNESS "T" OF 10 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (     ) OF 4,000 PSI

1" DIA. HOLE (TYP.)

GUARDRAIL POST ANCHORS TYPE 2

BE VERTICAL
THIS FACE TO W6X9 STEEL POST

THREADED 1" DIA. ROD

MEET SPACING AND CLEARANCE REQUIREMENTS.

ELEVATION
GUARDRAIL POST ANCHORS TYPE 1
USE FOR THICKNESS "T" OF 8 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (     ) OF 4,000 PSI

GUARDRAIL POST ANCHORS TYPE 2
USE FOR THICKNESS "T" OF 8 INCHES OR MORE AND MINIMUM CONCRETE STRENGTH (     ) OF 4,000 PSI

GUARDRAIL POST ANCHORAGE SYSTEM

6" X 4" X "' EACH BOTTOM PLATES-(4)

PLASTIC BLOCKOUT

MED STEEL POST

THE ELEVATION AND ANCHORAGE SYSTEM MET NHRP 350 EVALUATION CRITERIA FOR TEST LEVEL 3-4-5.

BASE PLATE

GUARDRAIL POST ANCHORAGE SYSTEM

SHEET METAL DETAIL

FOR UNCRACKED CONCRETE.

Adhesive anchors shall be provided in concrete as detailed. Adhesive bond strength shall meet or exceed 1305 psi for uncracked concrete.

GUARDRAIL POST ANCHORAGE SYSTEM

MATERIALS

ALL MATERIAL USED IN POSTS AND PLATES SHALL BE MADE FROM MATERIAL CONFORMING TO ASTM DESIGNATION A36 OR SM-50.

Steel shims may be used between plates and slab when required.

DESIGNER NOTES

STANDARD

Bill Oliva

Date: 7-16

Approved: Bill Oliva

STANDARD 36.08
**DESIGNER NOTES FOR PRECAST CONCRETE STRUCTURE**

No New shall be "three-sided precast concrete structure".

Precast bridges will be limited to spans not to exceed 42'-0".

Secure WISDOT and geotechnical (soils) engineer's approval before incorporating precast bridges in any project.

Check foundation pressure, scour and settlement to ensure that no foundation failure occurs.

Preferably provide footing on non-yielding foundation material; however, allowable differential settlement for footing on fill supporting the structure is 0.002 ft./ft. max. of the span, and design structure components to resist forces caused by the differential settlement. Reject anchored-hanger type systems where horizontal loads are imposed on the design.

When beam guard posts are to be embedded in fill above the precast anchorage, provide a depth of fill measured from top of anchorage to top of roadway, at least equal to the minimum embedment depth shown on Exhibit B.5.4 plus 1'-0". For shorter span culverts, where beam guard crosses the length of the structure, consideration shall be given to the details shown on Exhibit B.5.3. Provide all requirements on the standard can be met.

When a concrete barrier (single or multiple pieces) crosses the length of the structure, the fill depth must be adequate to accommodate the required footing depths, as shown on Exhibit B.5.2, and B.5.3. For concrete barrier details, provide a suitable drainage pipe along the culvert and wingwalls to release hydrostatic pressure, where significant seepage or below-grade water accumulation of water is anticipated behind the wall. Incorporate a method to prevent water from entering the drainage system, such as a filter system between drainage pipe and wingwall, direct grade from foundation to wingwall, etc. Along the exterior face of the wall or to the storm water conveyance.

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

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

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

**LRFD DESIGN LOADS**

<table>
<thead>
<tr>
<th>Vertical Earth Pressure</th>
<th>Unit Weight</th>
<th>120 PCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Earth Pressure</td>
<td>Unit Weight</td>
<td>125 PCF</td>
</tr>
</tbody>
</table>

**WALL BACKFILL REQUIREMENTS**

<table>
<thead>
<tr>
<th>APPROXIMATE/GUIDELINE</th>
<th>NUMBER OF ANCHORS PER WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH OF WALL</td>
<td>NO. ANCHORS</td>
</tr>
<tr>
<td>L = 14'-0&quot;</td>
<td>2</td>
</tr>
<tr>
<td>L = 20'-0&quot;</td>
<td>3</td>
</tr>
<tr>
<td>L = 24'-0&quot;</td>
<td>4</td>
</tr>
<tr>
<td>MULTIPLE-PEW ANCHOR</td>
<td>6</td>
</tr>
</tbody>
</table>

*Note: Adjacent segments shall be attached to each other to keep front faces in alignment. Place a fillet at these joints with a membrane along the joint at the back face.
IF PILES ARE REQUIRED

IF BASE SLAB IS REQUIRED

IF PEDESTAL IS REQUIRED

WITH GROUT.

OF PRECAST BRIDGE UNIT LEG

BOTTOM OF KEYWAY AND BOTTOM

NOMINAL 1” VOID BETWEEN

FILL ENTIRE KEYWAY INCLUDING

NOTE:

VARIES AS PER DESIGN

2'-0” MAX.

V A R IE S

3 " K E Y W A Y

3” CLR.

4 “ C L R .

(TYP.)

BRIDGE UNIT

(TYP.) PRECAST

HEADWALL

PRECAST

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**STAINLESS**

**TYPICAL SKEW LIMITS PLAN VIEW - NOT TO SCALE**

1'-6"

9"

(A S P E R D E S I G N)

PRECAST HEAD WALL

1'-9"

(8 " M I N .)

V A R I E S

1'-0" (8 " M I N .)

V A R I E S

LIFTING HOLES

LIFTING INSERTS

**TYPICAL LIFT POINT SEALING DETAIL**

CAST-IN-PLACE HEAD WALL DETAIL

PRECAST HEAD WALL DETAIL WITH COLLAR

**LEED COLLAR/HEAD WALL DESIGN NOTES:**

- Headwall details shown here have only been designed for the following 2 load cases:
  1) Earth Pressure Only
  2) Earth Pressure + Live Load Surcharge

- These details are not to be used where a vehicle load can be transmitted through a barrier to the headwall.

- 1'-0" Collar Thickness
- 1'-0" Headwall Thickness
- Soil behind headwall is at same elevation as top of headwall
- Headwall to be matched cast against culvert unit
- Membrane waterproofing
- Double nut and washer
- 1" dia. x 1'-4" coil rod
- 1" dia. x 7½" insert
- Rubberized membrane waterproofing
- 4½" dia. x 9" insert
- Stainless steel

**LIFTING HOLES**

**LIFTING INSERTS**

**Cast-In-Place Head Wall Detail**

**Precast Head Wall Detail with Collar**

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- 1" dia. x 7½" insert
- Rubberized membrane waterproofing
- 4½" dia. x 9" insert
- Stainless steel

**PRECAST THREE-SIDED BOX CULVERT HEAD WALL DETAILS**

**BUREAU OF STRUCTURES**

APPROVED: Scot Becker

DATE: 1-11

STANDARD 36.13

<table>
<thead>
<tr>
<th>UNIT SPAN</th>
<th>MAX. HEADWALL DIAM. TO HEADWALL</th>
<th>MAX. APPROXIMATE HEADWALL</th>
<th>HEADWALL</th>
<th>TO COLLECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>36'-0&quot;</td>
<td>8'-6&quot;</td>
<td>10'-0&quot;</td>
<td>36'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>20'-0&quot; + 20'-0&quot;</td>
<td>7'-0&quot;</td>
<td>10'-0&quot;</td>
<td>36'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>6'-0&quot;</td>
<td>10'-0&quot;</td>
<td>36'-0&quot;</td>
<td></td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
<td>10'-0&quot;</td>
<td>36'-0&quot;</td>
<td></td>
</tr>
</tbody>
</table>
**ELEVATION OF FENCE**

- Place cap at all ends of handrail, use 1/8" set screw.
- Use 2" H x 1/8" x 1/8" bar for splice when rail cap to fence is removed.
- Insert steel handrail sleeves (8" long) in handrail and secure with tension bar or bolt for first splice and with Post clamp for remaining splices.
- Place clamp on end of handrail (ends of handrail)
- Place cap at all ends of handrail, use 1/8" set screw.
- Use 2" H x 1/8" x 1/8" bar for splice when rail cap to fence is removed.
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**HANDRAIL SPLICE**

- Use 2" H x 1/8" x 1/8" bar for splice when rail cap to fence is removed.
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**HANDRAIL DETAILS**

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- Insert steel handrail sleeves (8" long) in handrail and secure with tension bar or bolt for first splice and with Post clamp for remaining splices.
- Place clamp on end of handrail (ends of handrail)
- Place cap at all ends of handrail, use 1/8" set screw.

**PLAN OF RAILING**

- Note: all bolt heads on side of fence adjacent to pedestrians.
- Alternate to double clamp plus line rail clamp in place of handrail. When rails are either secured to the post or rails are either secured to the base plate, as shown on standard view.
- Note: all bolt heads on side of fence adjacent to pedestrians.
- Alternate to double clamp plus line rail clamp in place of handrail. When rails are either secured to the post or rails are either secured to the base plate, as shown on standard view.

**FENCE MEMBER SIZE & WEIGHT**

<table>
<thead>
<tr>
<th>Member</th>
<th>Size (inch)</th>
<th>Weight (lb/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEEL END POST</td>
<td>2.375</td>
<td>2.27</td>
</tr>
<tr>
<td>END POST</td>
<td>2.375</td>
<td>2.27</td>
</tr>
<tr>
<td>LINE POST</td>
<td>2.375</td>
<td>3.65</td>
</tr>
<tr>
<td>MINERAL</td>
<td>2.375</td>
<td>3.65</td>
</tr>
<tr>
<td>CROSS BAR</td>
<td>2.375</td>
<td>2.27</td>
</tr>
<tr>
<td>POST SLEEVE</td>
<td>2.375</td>
<td>2.27</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>2.375</td>
<td>2.27</td>
</tr>
<tr>
<td>SLEEVE</td>
<td>2.375</td>
<td>2.27</td>
</tr>
</tbody>
</table>

**APPENDIX**

- Approved: Scot Becker
- Date: 7-10

**PEDESTRIAN OVERPASS DETAILS**

- Bureau of Structures
- Standard 37.02
- Approved: Scot Becker
- Date: 7-10
**CRASH WALL DETAILS**

**SECTION C-C**

**TRACK ON ONE SIDE OF COLUMNS**

**RAILROAD IN CUT**

**RAILROAD IN FILL**

**RAILWAY CROSS SECTIONS**

**TABLE C**

<table>
<thead>
<tr>
<th>TYPE OF ELEMENT</th>
<th>HEIGHT OF CRASH WALL CLEARANCE (FROM C-TRACK TO FALSEWORK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL PIER REQUIREMENT</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>PIER 1'-6&quot; TO 2'-0&quot;</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>PIER 2'-0&quot; TO 3'-6&quot;</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>CP PIER REQUIREMENT</td>
<td>12'-0&quot;</td>
</tr>
</tbody>
</table>

**NOTES**

- **HIGHWAY OVER RAILROAD DESIGN REQUIREMENTS**
- **BILL OLIVA**
- **DATE: 7-17**
- **STANDARD 38.01**
4-CHORD GALVANIZED STEEL SIGN BRIDGE

Design Data:
- Dead Load: 30 psi of supporting structure, canals, lights, and railings.
- Wind Load: 90 mph (3-second gust speed) to sign area & exposed members.
- Ice Load: 3 psf to 1 face of sign & around surface of members.
- Dead Load: 3 psf of sign, weight of supporting structure, canals, lights, and railings.

Notes:
- Chord shop splice shall be the welded splice shown above.
- Chord field splices shall be made with fabricated angle plates.
- Fabricator may make trusses any length keeping a section a multiple of 20'-0" & a multiple of 5'-0".
- Design data is used in lieu of bolted connections if a truss unit can be galvanized in one piece.
- Field connections shall be made with DTI washers.
- All structural steel members, plates, anchor rods, bolts, nuts, and washers shall be galvanized per section 641 of the WisDOT Standard Specifications.
- Welded connections can be used in lieu of bolted connections if a truss unit can be galvanized in one piece.
- Weld test as per AASHTO.
- Exact location of sign bridge shall be determined by the regional traffic engineer.
- Weld test as per AWS.
- Welded connections shall be galvanized per section 641 of the WisDOT Standard Specifications.
- Field connections shall be made with DTI washers.
- All structural steel members, plates, anchor rods, bolts, nuts, and washers shall be galvanized per section 641 of the WisDOT Standard Specifications.

Approved:
Bill Oliva

Date: 7-16
SHIM AS REQ'D.
TIGHT FIT
SIGN

RAIL MAY BE SPLICED IN THIS AREA ONLY.

D

M IN.

TYP.

SHIM AS REQ'D.
TIGHT FIT
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RAIL MAY BE SPLICED IN THIS AREA ONLY.

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TYP.

SHIM AS REQ'D.
TIGHT FIT
SIGN

RAIL MAY BE SPLICED IN THIS AREA ONLY.

D

M IN.

TYP.

SHIM AS REQ'D.
TIGHT FIT
SIGN

RAIL MAY BE SPLICED IN THIS AREA ONLY.

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TYP.

SHIM AS REQ'D.
TIGHT FIT
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RAIL MAY BE SPLICED IN THIS AREA ONLY.

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TIGHT FIT
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RAIL MAY BE SPLICED IN THIS AREA ONLY.

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RAIL MAY BE SPLICED IN THIS AREA ONLY.

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SHIM AS REQ'D.
TIGHT FIT
SIGN

RAIL MAY BE SPLICED IN THIS AREA ONLY.

D

M IN.

TYP.

SHIM AS REQ'D.
TIGHT FIT
SIGN

RAIL MAY BE SPLICED IN THIS AREA ONLY.
BILL OF BARS

<table>
<thead>
<tr>
<th>Location</th>
<th>Bar Mark</th>
<th>#</th>
<th>Bar Steel Est.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>A401</td>
<td>002</td>
<td>8</td>
<td>8 - 2&quot; 39.12</td>
<td></td>
</tr>
<tr>
<td>A402</td>
<td>015</td>
<td>8</td>
<td>8 - 2&quot; 39.12</td>
<td></td>
</tr>
<tr>
<td>A403</td>
<td>012</td>
<td>8</td>
<td>8 - 2&quot; 39.12</td>
<td></td>
</tr>
<tr>
<td>A404</td>
<td>012</td>
<td>8</td>
<td>8 - 2&quot; 39.12</td>
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<tr>
<td>A405</td>
<td>012</td>
<td>8</td>
<td>8 - 2&quot; 39.12</td>
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</tr>
<tr>
<td>A406</td>
<td>012</td>
<td>8</td>
<td>8 - 2&quot; 39.12</td>
<td></td>
</tr>
</tbody>
</table>

NOTES
- Spotwelds shall not be scaled.
- The first or first two digits of the bar mark signifies the bar size.
- Bar Steel Estimation shall be extended 3" clear unless otherwise detailed.
- Diameters are cut to cut.
- Center anchor rod assembly to miss bar steel reinforcement and mark sure it is plumb before anchor rod projection above footing at depth set on plan. Anchor rod assembly shall be securely tied in position string and after concrete placement, do not weld the anchor rod.

ULTIMATE DESIGN STRESSES

Concrete Masonry: 7,000 PSI
Bar Steel Reinforcement, Grade 60: 60,000 PSI
Anchor Bolts ASTM F1554: 55,000 PSI

FOUNDATION DATA

Allowable Soil Bearing Pressure = 2T/PSF

TOTAL ESTIMATED QUANTITIES (1 FTG.)

| Sign Supports Concrete Masonry | 8 CF |
| Sign Supports Steel Reinforcement | 500 LB |

CANTILEVER TRUSS FOOTING

BUREAU OF STRUCTURES

APPROVED: Bill Oliva
DATE: 1-18

STANDARD 39.12
BE STAINLESS STEEL.
NUT, BOLT AND WASHERS SHALL
LOCK WASHER
FLAT WASHER
NUT
"J" HOOK
HOOK TO POLE
FACTORY WELDED
HANDHOLE
WALL OPPOSITE HANDHOLE
SEE TABLE*
TYPICAL "J" HOOK LOCATION
HANDHOLE DETAILS
SECTION O-O
HANDHOLE NOTES
HANDHOLES SHALL BE LOCATED IN ONE COLUMN OF THE SIGN BRIDGE STRUCTURE OF ELECTRICALLY OPERATED DEVICES AND INSTALLATION OF THE STRUCTURE, COLUMNS WITH HANDHOLES SHALL BE LOCATED NEAR THE ELECTRICAL SERVICE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF THE ELECTRICAL DEVICE ENSURE THE HANDHOLE DETAILS ARE SHOWN IN THE ELECTRICAL PLAN DETAIL SHEETS.
HANDHOLE ELEMENTS TO BE GALVANIZED PER SECTION 641 OF THE WISDOT STANDARD SPECIFICATIONS.

<table>
<thead>
<tr>
<th>COLUMN SIZE</th>
<th>HANDHOLE PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWT X THK.</td>
<td>GWT X THK.</td>
</tr>
<tr>
<td>16&quot; X 0.375&quot;</td>
<td>5.562&quot; X 0.500&quot;</td>
</tr>
<tr>
<td>24&quot; X 0.562&quot;</td>
<td>6.625&quot; X 0.562&quot;</td>
</tr>
</tbody>
</table>

GROUNDING LUG DETAIL
WIRE AT EACH ANCHOR ROD.

ANCHOR RODS
WRAP PERIMETER OF ANCHOR ROD ASSEMBLY THREE TIMES AND SECURE TO ANCHOR RODS WITH GALVANIZED NUT AT EACH ANCHOR ROD.

ANCHOR PIPE
HEAD & WASHER, 4" LONG
FOR "J" HOOK LOCATION
HANDHOLE DETAILS
GROUNDING LUG INSIDE WELD ELECTRICAL EQUIPMENT
AL/CU - U.L. LISTED CONNECTOR (LUG)
THROUGH TYPE MECHANICAL NEMA APPROVED FEED BRACKET TO POLE FACTORY WELDED MOUNTED DIRECTLY OPPOSITE THE HANDHOLE AS SHOWN IN THE DRAWING.
WIRING. THE "J" HOOK SHALL BE ATTACHED ABOVE THE CENTERLINE OF THE UPPER HANDHOLE AND THE "J" HOOK SHALL BE FACTORY WELDED TO THE INSIDE OF ALL COLUMNS CONTAINING ELECTRICAL HANDHOLES SHALL BE NEAR THE ELECTRICAL SERVICE.  THE CONTRACTOR SHALL VERIFY THE LOCATION OF THE ELECTRICAL SERVICE ENTRANCE WITH THE REGION.
FOR ELECTRICALLY OPERATED DEVICES ARE INSTALLED ON/IN THE STRUCTURE.  COLUMNS HANDHOLES SHALL BE LOCATED IN ONE COLUMN OF THE SIGN BRIDGE STRUCTURE.

CONDUIT (AS REQ'D.) SHALL BE LOCATED, PLACED AND SIZED AS SHOWN ON THE TRAFFIC SECTION PRIOR TO FABRICATION OF THE SIGN BRIDGE COLUMNS AND MEMBERS. VERIFY THE LOCATION OF THE ELECTRICAL SERVICE ENTRANCE WITH THE REGION.

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

Details may be shown on plans if necessary for clarity.

Include applicable concrete masonry bid item to fill repairs.

---

**DECK REPAIR DETAIL - PLAN**

For designer information only

---

**DECK REPAIR DETAIL - SECTION**

For designer information only

---

**FULL-DEPTH DECK REPAIR DETAIL**

For designer information only

---

**CONCRETE REPAIR DETAILS**

Approved: Bill Oliva  Date: 1-18

---

**STANDARD 4601**
GALVANIC ANODE
STEEL
EXISTING REINFORCING WIRE, TYP.
ANODE TIE
TYPICAL INSTALLATION AT BAR STEEL INTERSECTION
TYPICAL INSTALLATION FOR BAR STEEL
EXISTING DECK OF THE REPAIR CONCRETE AT THE BOTTOM CONTACT WITH THE EXISTING REINFORCING STEEL IS IN INTERIOR OF REPAIR WHEN PLACE GALVANIC ANODES AT STEEL, typ.
EXISTING REINFORCING
EXISTING REINFORCING
GALVANIC ANODE - attach sawcut
PART PLAN TYPICAL REPAIR DETAIL
SPODE000 CONCRETE SURFACE REPAIR OF EMBEDDED GALVANIC ANODES EACH
SPX0000
NOTE: EXISTING REINFORCING STEEL TO BE COMPLETELY CLEAN OF CORRODED MATERIAL PRIOR TO INSTALLATION OF GALVANIC ANODES
GALVANIC ANODE - attach per typical detail
DESIGNER NOTES
CATHODIC PROTECTION
CATHODIC PROTECTION SHALL BE USED ONLY AT THE REQUEST OF THE REGIONAL BRIDGE MAINTENANCE ENGINEER.
INCLUSION APPLICABLE CONCRETE Masonry bid item to fill repairs.
NOTES
SEE SPECIAL PROVISION "EMBEDDED GALVANIC ANODES" FOR DETAILS ON MATERIAL, CONSTRUCTION, MEASUREMENT, AND PAYMENT INFORMATION.
ANGLES NEAREST TO EDGE OF REPAIR TO BE WITHIN 6" OF EDGE.
AFTER PLACEMENT GALVANIC ANODES SHOULD MAINTAIN A MINIMUM TOP COVER OF 1/2" AND A MINIMUM BOTTOM COVER OF 3/4".

STANDARD 40-02

BUREAU OF STRUCTURES

APPROVED: Bill Oliva
DATE: 1/18

CATHODIC PROTECTION
RUPTURED VOID REPAIR

SECTION THRU PARAPET ON WING

SECTION AT END OF SLAB

SECTION THRU RAILING
JOINT REPAIR-REMOVAL
STEEL GIRDER

SECTION THRU PROPOSED JOINT
STEEL GIRDER WITH END DIAPHRAGM

Concrete Overlay

Total Estimated Quantities

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Repair</td>
<td>27</td>
</tr>
<tr>
<td>Expansion Device</td>
<td>115</td>
</tr>
<tr>
<td>New Steel Reinforcement</td>
<td>10</td>
</tr>
</tbody>
</table>

Approved: Bill Oliva

Date: 1-17

Standard 40.04

BUREAU OF STRUCTURES

STRIP SEALS & DIAPHRAGM DETAILS FOR OVERLAYS

NOTE: All dimensions are approximate and may vary due to site conditions.

SEE STANDARD 19.33 FOR DIAPH. DETAILS.
SEE STANDARD 24.12 FOR STEEL REINFORCEMENT AND DIAPH. SIZE.
SEE STANDARD 28.01 FOR SUPPORTS USED WITH STRIP SEAL - STEEL EXTRUSIONS.

*This section is not required when original transverse deck reinforcement was used in the joint. Save and dispose of transverse reinforcing steel.

SEE STANDARD 40.04 FOR SUPPORTS USED WITH JOINT-REMOVABLE STRUCTURES.
**TOTAL ESTIMATED QUANTITIES**

<table>
<thead>
<tr>
<th>Item Description</th>
<th>CY</th>
<th>LB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Masonry Overlay Decks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bar Steel Reinforcement to Coated Structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Masonry Bridges</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DETAILS BELOW:**

**JOINT REPAIR**

- **Reduction:** Minimum 1" concrete overlay to remain in place.
- **Top of Existing Slab B. F. Abut. (Span 2)**
- **Match Existing Spacing (Spans 1 & 3)**
- **Haunch @ Piers.**
- **CROSS SECTION THRU ROADWAY LOOKING EAST**
- **HALF PLAN SHOWING TOP BAR STEEL REINF.**
- **HALF LONLT. SECTION**
- **HALF PLAN SHOWING BOTTOM BAR STEEL REINF.**

**REMOVAL LIMITS**

- **Concrete in the area to be removed for full depth deck repair. Leave concrete joint rough.**
- **Concrete below in the area to be removed for full depth deck repair.**

**CONSTRUCTION JOINT**

- **Defined by a 1" deep saw cut.**
- **Limits of removal to be defined by a 1" deep saw cut.**

**CONCRETE MASONRY OVERLAY DECKS**

**CONCRETE MASONRY BRIDGES**

**OTHERWISE INCLUDE IN BID ITEM**

**JOINT REPAIRS**

**LONGIT. CONST. JOINT REPAIRS**

**BILL OF MATERIALS**

- **PORTION OF SPAN 2**
- **REQUIRED ONLY FOR FULL DEPTH DECK REPAIR**

---

**APPROVED:** Bill Oliva 7-16

**STANDARD 4G05**
NOTES

1. Construction joints, pour concrete above these joints after superstructure concrete is in place. Strike off and leave rough.

2. Apply bituminous waterproofing seal all new & new joints at interface.

3. Seal all joints at new concrete contacts existing concrete.

4. Existing wings, remove a min. of 2'-0" below finishing edge.

5. Elevation, 1'-0", abutment, backwall and outline.

6. Remove concrete in this area down to keyway, expose seats, incorporate每一天, day steel into new work.

DESIGNER NOTES

See Chapter 12 for new bar steel placement, details, dimensions, & notes.

ABUTMENT WIDENING

BUREAU OF STRUCTURES

STANDARD 40.06

Bill Oliva

DATE: 7-16

APPROVED
INTERMEDIATE DIAPHRAGM CONNECTION TO EXISTING STEEL GIRDER

PLAN

SLAB WIDENING

BUREAU OF STRUCTURES

STANDARD 40.07

Bill Oliva

APPROVED: 7-16
EXPANSION BEARING REPLACEMENT - STEEL GIRDERS

STEEL BEARINGS

SEE STANDARD 27.08 FOR BEARING DETAILS

EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS

ELASTOMERIC BEARINGS

SEE STANDARD 27.07 FOR BEARING DETAILS

EXPANSION BEARING REPLACEMENT DETAILS

NOTES & DESIGNER NOTES

SEE EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS OR PRESTRESSED GIRDERS.

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS

PLATE 'E' DETAILS

STEEL BEARINGS

SEE STANDARD 40.08 FOR CONCRETE BLOCK ALTERNATE

EXPANSION BEARING REPLACEMENT - STEEL GIRDERS

ELASTOMERIC BEARINGS

EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS

ELASTOMERIC BEARINGS

EXPANSION BEARING REPLACEMENT

NOTES

1. MATERIALS USED FOR BEARINGS MUST BE COAT 1 1/2" AT THE END FACE (I.E., FOR BEARING PAD ELASTOMERIC LAMINATED)
2. STEEL PLATE THAT ATTACHED BEARER TOP PLATE TO ELASTIC BOLTS, BOLT PLATE TO ELASTOMERIC PAD

DESIGNER NOTES

THE STEEL TOP PLATE THICKNESS MAY BE INCREASED TO MAINTAIN THE OVERALL ELASTOMERIC BEARING THICKNESS. NO THICKNESS IS RECOMMENDED. THE FOLLOWING NOTE SHALL BE INCLUDED ON THE PLANS:

"NOTE: STEEL TOP PLATE THICKNESS MAY BE INCREASED TO MAINTAIN THE OVERALL ELASTOMERIC BEARING THICKNESS. NO THICKNESS IS RECOMMENDED."

NOTES

1. ALL BEARING PLATES USED FOR BEARINGS MUST BE COATED 1 1/2" AT THE END FACE (I.E., FOR BEARING PAD ELASTOMERIC LAMINATED)
2. STEEL PLATE THAT ATTACHED BEARER TOP PLATE TO ELASTIC BOLTS, BOLT PLATE TO ELASTOMERIC PAD

GENERAL NOTES

1. STEEL PLATE THAT ATTACHED BEARER TOP PLATE TO ELASTIC BOLTS, BOLT PLATE TO ELASTOMERIC PAD

EXCEPT FOR ELASTOMERIC BEARINGS, ALL BEARINGS MUST BE SQUARE 1 1/2" AT THE END FACE. ELASTOMERIC BEARINGS CANNOT BE SQUARE 1 1/2" AT THE END FACE.

EXPANSION BEARING REPLACEMENT DETAILS

NOTES & DESIGNER NOTES

SEE EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS OR PRESTRESSED GIRDERS.

EXPANSION BEARING REPLACEMENT DETAILS

NOTES & DESIGNER NOTES

SEE EXPANSION BEARING REPLACEMENT - PRESTRESSED GIRDERS OR PRESTRESSED GIRDERS.
TYPICAL HINGE DETAIL FOR WATERTIGHT EXPANSION DEVICE

NOTES

1. HANGER PLATES SHALL BE COATED WITH A HIGH-GRADE WATER-RESISTANT IMPREGNATED OIL TO PROTECT AGAINST CORROSION. HANGER PLATES SHALL BE FINSISHED ANSI 63.

2. HANGER PLATE DETAIL - SIZE TO BE DETERMINED BY DESIGN.

3. HANGER PLATE BUSHINGS SHALL BE THE SAME LENGTH AS THE HANGER PLATE AND HANGER PLATE STIFFENERS.

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

5. STEEL HANGERS SHALL COMPLY WITH THE REQUIREMENTS OF CAN/CSA-Z266, CAN/CSA-W150M, OR SIMILARLY DEVELOPED SPECIFICATIONS.

6. ALL MATERIAL AND WORK INVOLVED SHALL BE PAID FOR UNDER "HINGE REPLACEMENT".

7. REMOVE EXISTING HANGER PLATES, PINS, AND WIND TRANSFER PLATES AND REPLACE WITH NEW MATERIALS.

8. CONTRACTOR TO CONTACT ENGINEER IF CORROSION UNDERWATER CONDITIONS EXIST AT EXISTING PIN IS PRESENT.

9. PIN PLATES AND WIND TRANSFER PLATES SHALL BE SHAPED PROPERLY.

10. BUSHINGS SHALL BE THE SAME LENGTH AS THE HANGER PLATE AND HANGER PLATE STIFFENERS.

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

12. STEEL HANGERS SHALL COMPLY WITH THE REQUIREMENTS OF CAN/CSA-Z266, CAN/CSA-W150M, OR SIMILARLY DEVELOPED SPECIFICATIONS.

13. ALL MATERIAL AND WORK INVOLVED SHALL BE PAID FOR UNDER "HINGE REPLACEMENT".
CONCRETE BEARING BLOCK DETAILS

**CONCRETE BEARING BLOCK DETAILS**

May be used in lieu of Plate A as shown on STD. 40.08

**PRECAST CONCRETE BLOCK DETAIL**

- Depth = Width, Max. 1'-0".
- Anchor in CT, Adhesive anchors include adhesive anchors.
- Anchor bolts in conjunction.
- Grout 1/2" Pre-Cast Element - Eliminate stress concentration and reduce cracking.
- Precast block for any concrete block/area not being supported by a concrete block can be considered.
- The intent of the concrete block is to act as an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.

Bolts should be installed at least 4 locations (anchors include adhesive anchors, embed 1'-6" in concrete.

**SIDE ELEVATION**

- Embed 1'-6" in concrete. Adhesive anchors †-inch.
- Depth = Min. 5", Max. 1'-0"

**PLAN**

- Step bar 3/4 from top and fill to top with epoxy.
- 4" MIN. EDGE DISTANCE.
- Embed 1'-6" in concrete. Adhesive anchors †-inch.

**ELEVATION**

- Embed 1'-6" in concrete. Adhesive anchors †-inch.
- Anchors in CT, Adhesive anchors include adhesive anchors.
- Anchor bolts in conjunction.
- Grout 1/2" Pre-Cast Element - Eliminate stress concentration and reduce cracking.
- Precast block for any concrete block/area not being supported by a concrete block can be considered.
- The intent of the concrete block is to act as an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.
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- The block is to be considered an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.

**SIDE ELEVATION**

- Embed 1'-6" in concrete. Adhesive anchors †-inch.
- Depth = Min. 5", Max. 1'-0"

**PLAN**

- Step bar 3/4 from top and fill to top with epoxy.
- 4" MIN. EDGE DISTANCE.
- Embed 1'-6" in concrete. Adhesive anchors †-inch.

**ELEVATION**

- Embed 1'-6" in concrete. Adhesive anchors †-inch.
- Anchors in CT, Adhesive anchors include adhesive anchors.
- Anchor bolts in conjunction.
- Grout 1/2" Pre-Cast Element - Eliminate stress concentration and reduce cracking.
- Precast block for any concrete block/area not being supported by a concrete block can be considered.
- The intent of the concrete block is to act as an extension of the existing concrete slab.
- The block is to be considered an extension of the existing concrete slab.
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Bolts should be installed at least 4 locations (anchors include adhesive anchors, embed 1'-6" in concrete.

**SIDE ELEVATION**

- Embed 1'-6" in concrete. Adhesive anchors †-inch.
- Depth = Min. 5", Max. 1'-0"

**PLAN**

- Step bar 3/4 from top and fill to top with epoxy.
- 4" MIN. EDGE DISTANCE.
- Embed 1'-6" in concrete. Adhesive anchors †-inch.

**ELEVATION**

- Embed 1'-6" in concrete. Adhesive anchors †-inch.
- Anchors in CT, Adhesive anchors include adhesive anchors.
- Anchor bolts in conjunction.
- Grout 1/2" Pre-Cast Element - Eliminate stress concentration and reduce cracking.
NOTES

Steel spar (coupler) assembly shall be an approved type and shall develop in tension at least one of the yield strength of the spliced reinforcement bars. Dowel bar splicers shall be of minimum go and yield strength and have tensile strength equal to or greater than that of the spliced reinforcement bars. Dowel bar splicers shall meet the deformation requirements for standard ASTM deformed reinforcement bars.

For dowel bar splicers all reinforcement bars shall be lapped and tied to the spliced bars. Splicer (coupler) assembly in the slab shall be coated in accordance with the requirements for reinforcement bars.

Other systems of similar design may be submitted to the engineer for approval. Approval shall be based on certified test results from an approved testing laboratory that the proposed splice assembly satisfies the following requirement:

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

Where fy = yield strength of spliced reinforcement bar.

Concrete under bar coupled manufacturer recommendations. Pay based on bars as detailed.

Bar length computed to 1/16 in. dowel joint and shall be verified by tester to bar coupled manufacturer recommendations. Pay based on bars as detailed.

For dowel bar splicers, all reinforcement bars shall be lapped and tied to the ASTM deformed reinforcing bars. Dowel bar splicers shall meet the deformation requirements for standard reinforcement bars. Dowel bar splicers shall be of minimum 60 ksi yield strength, and have tensile strength in tension at least 125% of the yield strength of the spliced reinforcement bars.

Steel splice (coupler) assembly shall be an approved type and shall develop in tension at least one of the yield strength of the spliced reinforcement bars. Splicer (coupler) assembly in the slab shall be coated in accordance with the requirements for reinforcement bars.

Installation and setting methods:

1. Set splicer by means of a template bolt.
2. Set splicer by nailing to wood forms or cementing to steel forms.

Approved:

Date:

Bureau of Structures

Standard 40.11
**DESIGNER NOTES**

- The design engineer determines the value based on a minimum at edge of girder x-slope, and calculated residual girder camber, including the camber multiplier of 1.4. The value can vary and should be given for each 1/3 of the girder length. Values that maintain 2" minimum embedment and 2" clear from top of deck while accounting for this value can vary and should be given for each 1/3 of the girder length.

- Top of girder to be rough floated and broomed transversely, except the outside 2" of girder, which shall receive a smooth finish. An approved concrete sealer shall be applied to all smooth surfaces including the outside 2" of the top flange. Do not apply concrete sealer or epoxy to surfaces requiring application of concrete staining.

- The girder shall be provided with a suitable lifting device for handling and erecting the girder. Strands shall be flush with end of girder. For edge embedment, see standards shown in Table 40.7-1. Edge embedment shall be designed with not less than 75% of the total embedment shown in Table 40.7-1. All girder ends shall be cast full length as shown.

- Spacing shown for #4 stirrups is for grade as reinforcement. An alternate equivalent of welded wire fabric may be substituted for the stirrup reinforcement shown upon approval of the Structures Development Section.

- Prestressing strands shall be of 100,000 psi ultimate strength with a maximum embedment strength of 20,000 psi.

**SUPPORT WITH STEEL OR ELASTOMERIC BGS.**

- Steel or elastomeric bearing pad at bottom of girder.

**SIDE VIEW OF GIRDER**

- Location of draped strands.

**SECTION THRU GIRDER**

- Spacing and lap for steel stirrups.

**PLAN VIEW**

- Details A and B for stirrups and bars.

**NOTES**

- Prior approval from the Bureau of Structures for all patterns or longer spans will require a complete design of this reinforcement, which requires prior approval from the Bureau of Structures.

- Design Engineers are responsible for the design of the girder details shown.

- All girder details shall be designed to maintain 3" minimum embedment and 2" clearance from top of deck while accounting for the calculated residual girder camber, including the camber multiplier of 1.4.

- The design engineer determines this value based on 2" minimum haunch at edge of girder, x-slope, and calculated residual girder camber, including the camber multiplier of 1.4. The value can vary and should be given for each 1/3 of the girder length. Values that maintain 2" minimum embedment and 2" clear from top of deck while accounting for this value can vary and should be given for each 1/3 of the girder length.

- Top of girder to be rough floated and broomed transversely, except the outside 2" of girder, which shall receive a smooth finish. An approved concrete sealer shall be applied to all smooth surfaces including the outside 2" of the top flange. Do not apply concrete sealer or epoxy to surfaces requiring application of concrete staining.

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- Spacing shown for #4 stirrups is for grade as reinforcement. An alternate equivalent of welded wire fabric may be substituted for the stirrup reinforcement shown upon approval of the Structures Development Section.

- Prestressing strands shall be of 100,000 psi ultimate strength with a maximum embedment strength of 20,000 psi.
BEAMS, NESTED 12 GAUGE THRIE TWO, 12'-6" LONG BEAM GAURD ANCHOR ASSEMBLY FOR ABUTMENT WING END OF DECK OR THRIE BEAM TERMINAL END SYM. ABOUT NAME PLATE CHAMFER, TYP. 2'-0" 9 " 1'-8" 8" 2" 3 " 3 " 3 " ELEVATION OF PARAPET PART PLAN ON PARAPET (WHEN TRANSITION ENDS ON ABUT. WING) EXPANSION JOINT OPENING A A B B C C D D 11" 7 " 2'-6" 4'-0" 6'-6" 9 " ABUT. BACKWALL FRONT FACE OF CONSTRUCTION JOINT AT DEFLECTION AND AT WING TRANSITION OTHERWISE SHOWN.

NOTES

CONST. JOINT - STRIKE OFF AS SHOWN & FINISH WITH A WOODEN TROWEL.
MIN. JOINT SPACING OF 80'-0". DEFINE CONST. JOINT WITH A 1" 'V' GROOVE.
REINFORCEMENT THRU THE JOINT. LAP LONGIT. BARS A MIN. OF 2'-11".
OPTIONAL CONSTRUCTION JOINTS IN THE PARAPETS MAY BE USED. RUN BAR DEFLECTION JOINTS ARE REQUIRED ON SLAB SPAN STRUCTURES ONLY.
JOINTS IN PARAPETS ARE USED, PLATE SEPARATORS SHALL BE OMITTED.
PLATE REQUIRED WHEN DEFLECTION JOINTS ARE REQUIRED. IF CONSTRUCTION OTHERWISE SHOWN.

ALL SLOPED FACE PARAPET 'B' REINFORCEMENT ARE NO. 4 BARS UNLESS OTHERWISE SHOWN OR NOTED.

SEE SECTION B FOR DETAILS UNLESS OTHERWISE SHOWN OR NOTED.

OTHERWISE SHOWN OR NOTED SEE SECTION B FOR DETAILS UNLESS OTHERWISE SHOWN OR NOTED.

SECTION C

SLOPED FACE PARAPET 'B'

Approved: Bill Oliva
Date: 1/19

BUREAU OF STRUCTURES
STANDARD 40.15
ANCHOR BOLT NOTES:

For span lengths up to 80'-0", use a Type 3 masonry plate to

For span lengths from 80'-0" up to 120'-0", use a Type 4 masonry plate to

For span lengths greater than 120'-0", use a Type 5 masonry plate to

Width of masonry plate to be equal to or greater than 2".

Height of masonry plate to be equal to or greater than 2".

For new or replacement steel bearings, use Type 4 masonry plate and standard dimensions.

**NOTES**

- For bearing notes, clearance should be no more than 1/2".
- Anchor bolts, nuts, and washers shall be galvanized as required by the manufacturer.
- All anchor bolts and nuts shall be tightened to a minimum of 160 Kips for steel bearings, including new or replacement steel bearings.
- All anchor bolts and nuts shall conform to ASTM A325 specification.
- Plate to be shop painted and welded on site.
- All materials including steel bearings used in this design. Use Type 4 masonry plate and standard dimensions.

**Expansion Bearing Details**

**Type A Steel Orders**

**Approved:**

**Bill Oliva**

**Date:**

**Standard 4C16**
45° PRESTRESSED GIRDER DESIGN DATA

45° GIRDER

PRE-TENSION

\[ A = 560 \text{ SQ. IN.} \]
\[ \rho^2 = 223.91 \text{ IN.}^2 \]
\[ \rho = 223.91 \text{ IN.} \]
\[ f_{\text{ Init.}} = \frac{4}{3} \]
\[ S_{\text{ Init.}} = \frac{4}{3} \]
\[ (A/(2))^{2r} \]
\[ (1 + B)^{2s} \]
\[ 2u \]

STANDARD PATTERNS FOR DRAPED STRANDS

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

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**ARRANGEMENT AT 6 SPAN - FOR GIRDER WITH DRAPED 0.5" DIA. AND 0.6" DIA. STRANDS**

*0.5" DIA. STRANDS ONLY

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

**COMPRESSION IS POSITIVE**

**45° PRESTRESSED GIRDER DESIGN DATA**

**APPROVED: Bill Oliva**

**DATE:**

**STANDARD 4G.38**
ANCHOR PLATE

ELASTOMERIC & STEEL BRGS.

SIDE VIEW OF GIRDER

SIDE VIEW OF GIRDER

SUPPORT WITH STEEL OR ELASTOMERIC BRGS.

SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD

DESIGNER NOTES

NOTES

PRESTRESSED GIRDER MANUFACTURERS AND CONCURRANCE BY THE TRANSPORTATION LIMITATIONS AND REQUIRE APPROVAL BY THE DESIGNER NOTES

NOTE TO VERTICAL WIRE

GENERAL CONSTRUCTION:

PRESTRESS GIRDER MANUFACTURERS AND CONCURRANCE BY THE TRANSPORTATION LIMITATIONS AND REQUIRE APPROVAL BY THE DESIGNER NOTES

NOTE TO VERTICAL WIRE

GENERAL CONSTRUCTION:

PRESTRESSED GIRDER MANUFACTURERS AND CONCURRANCE BY THE TRANSPORTATION LIMITATIONS AND REQUIRE APPROVAL BY THE
PRE-TENSION

\( f = 0.25 \times 270,000 = 67,500 \text{ PSI} \)

\( f' = 0.75 \times 270,000 = 202,500 \text{ PSI} \)

\( \delta_{s} = -0.05248 \text{ IN./IN.} \)

STANDARD PATTERNS - 0.6" DIA. DRAPED STRANDS

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

PRE-TENSION

\( f = 0.25 \times 270,000 = 67,500 \text{ PSI} \)

\( f' = 0.75 \times 270,000 = 202,500 \text{ PSI} \)

\( \delta_{s} = -0.05248 \text{ IN./IN.} \)

STANDARD PATTERNS - 0.5" DIA. DRAPED STRANDS

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ARRANGEMENT AT 5 SPAN FOR GIRDERS WITH DRAPED 0.5" DIA. STRANDS
ROCKER BEARING TYPE
'B' - STEEL GIRDERS

Bureau of Structures

PRINTED PLATES SHALL BE FLAT ROLLED

NOTES

1. BEARINGS MAY BE CASE HARDENED AS AN ALTERNATE TO STAINLESS.
2. ALL STEEL PLATES ARE TO BE FLAT ROLLED AND ALL EDGES SMOOTH, STRAIGHT AND VERTICAL.
3. FOR UNPAINTED STRUCTURES THE UPPER 6" OF ALL ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED AS REQUIRED BY ASTM SPECIFICATION TYPE A709 GRADE 50W STEEL.
4. PINTLES SHALL CONFORM TO ASTM SPECIFICATION TYPE A449.

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ROCKER BEARING SHALL BE SET VERTICAL AT 45° F.

MATERIAL OF EQUIVALENT YIELD STRENGTH BUT ACTUAL MOVEMENT NOT TO EXCEED R/3.

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

ROCKER BEARING SHALL BE SET VERTICAL AT 45° F.

ILLUSTRATION DRAWING, U.S. PATENT 339, 125

ROCKER BEARING TYPE
'B' - STEEL GIRDERS

Bill Oliva

DATE:

STANDARD 40.21
**Notes**

- **Fixed Shoe:** Use 2" stiffeners for reactions > 1000 Kips.
- **Table of Dimensions:**
  - **For Reactions > 1000 Kips:** Use 2" stiffeners.
  - **For Reactions ≤ 1000 Kips:** Use 1½" stiffeners.

**Type B - Steel Girders Fixed Shoe**

<table>
<thead>
<tr>
<th>Reaction (Kips)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>G Values</th>
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<td>3&quot;</td>
<td>2½&quot; x 3½&quot;</td>
</tr>
</tbody>
</table>

**Dimensions:**

- **Sym. about 2"**
- **Fixed Shoe:** Use 2" stiffeners for reactions > 1000 Kips.
- **Table of Dimensions:**
  - **For Reactions > 1000 Kips:** Use 2" stiffeners.
  - **For Reactions ≤ 1000 Kips:** Use 1½" stiffeners.

**Bureau of Structures**

**Approved:** Bill Oliva  Date: 1-16

**Standard:** 40.22
For wing walls:

- Wing wall thickness 2 ft.
- Adhesive anchors: 3/8" dia. threaded rod, 3/8" washer, 1/2" nut, 1/2" washers

For cover plate:

- 1/8" x 2" x 36" long slotted holes
- For bridge heights:
  - Adhesive anchors: 3/8" dia. threaded rod
  - Plate washer, typ. 3" x 3" x 3/16"

For detail "A":

- Section thru channel
- 5/8" x 3/8" plate washer, typ.

For detail "B":

- Section thru channel
- 3/8" x 3/8" plate washer

NOTES:

- Wing strapping detail for the purpose of securing bridge replacement is not an alternative to the preferred method of securing bridge replacement.
- All provided steel material shall conform to ASTM A36.
- All structural steel (wings) 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.
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- 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.
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RAILING AND BEAM GUARD (WHEN REQ'D).

PLACEMENT OF ANCHOR ASSEMBLY FOR ADJUST LOCATIONS OF BARS TO ALLOW FOR WING LOCATIONS.

"GENERAL PLAN" SHT. FOR THREE BEAM. SEE placement of anchor assembly.

VARIES 1'-8" WING WALL 1'-3" WING WALL 1'-3" WING WALL

WING END OF SECTION A-A SECTION B-B SECTION C-C

SECTION THRU DECK ADJUST LOCATIONS OF BARS TO ALLOW PLACEMENT OF ANCHOR ASSEMBLY FOR RAILING AND BEAM GUARD (WHEN SUPPLIED).
NOTES
1. POST WILL BE "RAILING TUBULAR TYPE PF B-____", WHICH SHALL INCLUDE ALL STEEL ITEMS SHOWING ON DRAWING.
2. POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND CUTOFF POSTS SHALL BE SQUARE TO SHOWING PROFILE. FILL A V-HOLE IN THE POST BASE PLATE. NO. 3 AND NO. 4 SHALL CONFORM TO ASTM A500 GRADE B, STRUCTURAL TUBING NO. 2, NO. 5 AND NO. 6 SHALL CONFORM TO ASTM A709 GRADE 36. STRUCTURAL TUBING NO. 7 AND NO. 8 SHALL CONFORM TO ASTM A500 GRADE B.
3. ANCHORINGS SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF POST. SET POSTS NORMAL TO GRADE.
4. ALL JOINTS IN CONCRETE PARAPET ARE TO BE VERTICAL.
5. ALL STEEL ITEMS SHOWN, INCLUDING STEEL BASE PLATES, POSTS, AND ANCHORAGE NO. 3, ARE TO BE MACHINE OR MACHINE FLAME CUTS.
6. CUTS SHALL BE MACHINED OR FLAME CUT, WITH ALL EDGES SMOOTH, STRAIGHT AND VERTICAL. ALL PLATE CUTS SHALL BE FLAT WITH ALL SURFACES SMOOTH AND PREPARED FOR WELDING. WELD TO NO. 1 AND NO. 5, SHALL CONFORM TO ASTM A500 GRADE B. STRUCTURAL TUBING NO. 7 AND NO. 8 SHALL CONFORM TO ASTM A500 GRADE B.
7. ANCHORINGS SHALL BE ACCURATELY PLACED TO PROVIDE CORRECT ALIGNMENT OF POST. SET POSTS NORMAL TO GRADE.
8. PERIMETER OF PLATE NO. 2 WITH NON-STAINING GRAY NON-BITUMINOUS JOINT SEALER.
9. GOOD TOUCH-UP PAINTING TO BE DONE AT COMPLETION OF STEEL RAILING INSTALLATION TO THE SATISFACTION OF THE ENGINEER AT NO EXTRA COST.
10. THIS RAILING MEETS NCHRP REPORT 350 EVALUATION CRITERIA FOR TEST LEVEL 7-14."
inside elevation

- Roadway opening on E21 for expansion joint. Use ½ opening with filler for abutments.

plan

- Exterior construction joints in the parapets may be used for parapet height. Avoid placing A bench mark cap below the top of parapet, see STD. 12.01.

section a

section b

section c

bar series table

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</tr>
<tr>
<td>r508</td>
<td>5</td>
<td>3'-6&quot;</td>
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</table>

bar weights

- Use 4'-0" x 6'-6" for parapet vert.
- Use 2'-0" x 1'-0" for parapet vert.
- Use 6'-6" for parapet horiz.

bill of bars

for abutment parapets

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<th>length</th>
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<tr>
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<td>6</td>
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</table>

bars for transition on bridge

- Use 4'-0" x 6'-6" for parapet vert.
- Use 2'-0" x 1'-0" for parapet vert.

sloped face parapet 'hf'

- Steel before wing is poured.
- A bench mark cap may be used in lieu of a 9" rail or fence system that is attached a sloped face parapet 'HF'.

approved: bill oliva

standard 40.28
CROSS SECTION THRU ROADWAY
LOOKING NORTH

PLAN
TOP OF DECK SHOWN

TOTAL ESTIMATED QUANTITIES

<table>
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<tr>
<th>BID ITEM</th>
<th>UNIT</th>
<th>DESCRIPTION</th>
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<tr>
<td>502.3200</td>
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<td>509.2000</td>
<td>SY</td>
<td>FULL-DEPTH DECK REPAIR</td>
</tr>
<tr>
<td>509.2500</td>
<td>SY</td>
<td>CONCRETE MASONRY OVERLAY DECKS</td>
</tr>
</tbody>
</table>

NOTES

1. A MINIMUM OF 1-INCH OF CONCRETE SHALL BE REMOVED FROM THE ENTIRE BRIDGE DECK UNDER BID ITEM "CLEANING DECKS".

2. THE AVERAGE OVERLAY THICKNESS IS BASED ON THE MINIMUM OVERLAY THICKNESS PLUS 1/8-INCH TO ACCOUNT FOR VARIATIONS IN THE DECK SURFACE.

3. REMOVAL OF 1" OF EXISTING DECK UNDER BID ITEM "CLEANING DECKS" IS NOT INTENDED FOR PREVIOUSLY OVERLAYERED DECKS. EXISTING CONCRETE COVER MUST BE MAINTAINED AND CONSIDERED WHEN DETERMINING CONCRETE REMOVALS. REMOVE THE 1" OF EXISTING DECK OVERLAY.

4. SEALS OVERLAY CONSTRUCTION JOINTS ACCORDING TO SECTION 502.3.13.1 OF THE STANDARD SPECIFICATIONS.

5. SEAL DECK PREPARATION AREAS AS REQUIRED FOR BID ITEM "CLEANING DECKS".

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

CONCRETE MASONRY OVERLAY DECKS

NOTES

1. Deck preparation and full-depth deck repair areas shall be filled with "Concrete Masonry Overlay Decks".

2. Drawings shall not be scaled.

3. Dimensions shown are based on the original structure plans.

4. Protective surface treatment shall be applied to the entire top surface of the new concrete overlay.

5. Full-depth deck repairs shall be filled with "Concrete Masonry Overlay Decks".

6. Design notes may need to be added to the drawings.

7. See standard 40.04.

8. Labour and materials shall be included in the bid item "Concrete Masonry Overlay Decks".

9. Joint repair areas should not be included in deck repair areas or overlay quantities, see standard again.

10. Provide an average overlay thickness on the plans. The average overlay thickness is the minimum overlay thickness plus 1/8-inch to account for variations in the deck surface. Changes in cross-slope increase the average overlay thickness. Quantities are based on the average overlay thickness.

11. Provide a profile grade line on the plans.

12. Decks shall not include bid item "Adjusting Floor Drains" for deck preparation.

13. Section 502.3.13.1 of the Standard Specifications applies to all overlay methods and deck repairs without overlays.

14. CONCRETE MASONRY OVERLAY DECKS

CONCRETE MASONRY OVERLAY DECKS

NOTES

1. Protective surface treatment shall be applied to the entire top surface of the new concrete overlay.

2. Seal deck preparation construction joints according to Section 502.3.13.1 of the Standard Specifications.

3. Seal deck preparation areas as required for bid item "Cleaning Decks".

4. Provide (if available) deck condition assessment survey on plans. Include survey type and date completed.

5. Joint repair areas should not be included in deck repair areas or overlay quantities, see standard again.

6. Include the bid item "Adjusting Floor Drains" when drains are to be raised.

7. Restrictions on removal items shall be placed on the plans to prevent damage to reinforcing steel.

8. Allowable concrete removals. Include the bid item "Cleaning Decks to Reapply Concrete Masonry Overlay" when removing existing overlay.

9. ALL EXCAVATION REQUIRED TO COMPLETE THE OVERLAY OR JOINT REPAIRS AT THE ABUTMENTS ARE TO BE CONSIDERED INCIDENTAL TO THE BID ITEM "CONCRETE MASONRY OVERLAY DECKS".

10. Profile grade line shall be determined in the field based on a minimum overlay thickness of 2" placed above the deck surface. Minimum overlay thicknesses for various deck surfaces and expected overlay thickness are based on the minimum overlay thickness plus 1/8-inch to account for variations in the deck surface.

11. The average overlay thickness is based on the minimum overlay thickness plus 1/8-inch to account for variations in the deck surface.

12. Construction joint repair areas should not be included in deck repair areas or overlay quantities. See standard again.

13. Provide an average overlay thickness on the plans. The average overlay thickness is the minimum overlay thickness plus 1/8-inch to account for variations in the deck surface. Changes in cross-slope increase the average overlay thickness. Quantities are based on the average overlay thickness.

14. Provide a profile grade line on the plans.

15. Do not include bid item "Adjusting Floor Drains" for deck preparation.

16. Joint repair areas should not be included in deck repair areas or overlay quantities, see standard again.

17. Include the bid item "Concrete Masonry Overlay Decks" for deck preparation.

18. Survey completed Date: __/__/____
**Design Data**

**Life Load**

- **Dynamic Standby:**... kgf

**Operating Standby:**... kgf

**Maximum Standard Repair Vehicle Load:**... kgf

**Material Properties**

- **Concrete Masonry - Deck Patching** 4,000 psi

**Notes**

- **Drawings Not Be Scaled:**
  - Dimensions shown are based on the original structure plans.
  - Deck surface preparation is included in the bid item "Polymer Overlay".
  - Areas of "Preparation 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 Masonry Deck Repair".

**Total Estimated Quantities**

<table>
<thead>
<tr>
<th>Bid Item Number</th>
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<th>Unit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

**Design Notes**

- Deck surface preparation is included in the bid item "Polymer overlay".

**Preventative Overlay**

**Life Load**

- **Dynamic Standby:**... kgf

**Operating Standby:**... kgf

**Maximum Standard Repair Vehicle Load:**... kgf

**Structure:**

- Designed for a future wearing surface of 20 pounds per square foot.

**Notes**

- **Drawings Not Be Scaled:**
  - Deck surface preparation is included in the bid item "Polymer Overlay".

**Total Estimated Quantities**

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</table>

**Polymer Overlay**

**Design Notes**

- Polymer overlays shall not be placed on concrete approaches.

- When the bid item "Polymer Overlay" is used, rating should include the 5 psf overlay.

- Polymer overlays shall not be placed on concrete approaches.
### DESIGNER NOTES

**Concrete Overlays** are the current preferred method to overlay a bridge.

- Prepared areas require a minimum cure time of 7 days before placing overlay.
- Repairs to concrete deck patch areas may be used to shorten the required for placing overlay.

**Asphaltic Overlays** not requiring sheet membrane waterproofing are preferred.

- DO NOT PROVIDE A PROFILE GRADE LINE ON THE PLANS.
- Provide an average overlay thickness on the plans. This average overlay thickness value is based on the theoretical average overlay thickness plus or 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.
- Coordinate with region bridge maintenance and roadway engineers for the asphaltic design and quantities.

**Concrete Deck Patches** may be used to repair damage to the deck surface. Dimensions shown are based on the original structure plans. Dimensions shall not be scaled.

- 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".

**Notes**

**Drawings shall not be scaled**.

- **Design Data**
  - Live Load
  - Operating Ratios
  - Maximum Standard Design Vehicle Load

**Material Properties**

- Concrete Masonry: Deck Patching f'c = 4,000 P.S.I.

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</table>

**Polymer Modified Asphaltic Overlay**

- **Design Data**
  - Live Load
  - Operating Ratios
  - Maximum Standard Design Vehicle Load

**Material Properties**

- Concrete Masonry: Deck Patching f'c = 4,000 P.S.I.

**Notes**

- Drawings shall not be scaled.

**Design Data**

- Live Load
  - Operating Ratios
  - Maximum Standard Design Vehicle Load

**Material Properties**

- Concrete Masonry: Deck Patching f'c = 4,000 P.S.I.
CROSS SECTION THRU ROADWAY
LOOKING NORTH

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POSSIBLE ADDITIONAL BID ITEMS

NOTES

Use of polyester polymer concrete overlays are limited. See 40.5 in the Bridge Manual for additional guidance.

SPECIAL PROVISIONS, NOTES, AND DESIGNER NOTES ARE STILL UNDER DEVELOPMENT.

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WING ELEVATION
WING LENGTH TO 26'-6"