TYPICAL INSTALLATION AT BAR STEEL INTERSECTION

TYPICAL INSTALLATION FOR BAR STEEL

NOTES

Surfaces repaired with cathodic protection are based on the repair and are determined by the contract. The design quantity for the repair is "as determined by" and based on a maximum covering of concrete, whereas the actual quantity shall be based on the field conditions and as recommended by the cathode steel supplier.

Surface repairs shall be made with materials compatible with cathodic protection as recommended by the steel supplier.

Existing reinforcing steel to be completely covered with corrosion resistant concrete. Concrete to provide complete electrical connection of reinforcing steel. Protection is included in the repair of "corroded reinforcing steel".

Anodes nearest to edge of repair to be removed before edge.

After placement, galvanic anodes should maintain a minimum top cover of 2" and a minimum bottom cover of 0.5".

DESIGNER NOTES

Cathodic protection shall be used only at the request of the federal, state or municipal authority.

Include applicable corrosion hazards in bid to fill repairs.
RUPTURED VOID REPAIR

SECTION THRU PARAPET ON WING

SECTION AT END OF SLAB

DESIGNER NOTES

4. CHAINING PATIENT DECK PREPARATION AREAS NOT REQUIRED FOR CONCRETE OVERLAYS.

5. USE 'CONCRETE MASONRY DECK REPAIR' OR 'CONCRETE MASONRY DECK REPAIR FOR DECK REPAIR UNDER POLYMER' AS APPLICABLE FOR DECK REPAIR WITHOUT OVERLAYS.

OVERLAY DETAILS

BUREAU OF STRUCTURES

STANDARD 4G.03
**CONCRETE BEARING BLOCK DETAILS**

**GIRDERS REACTIONS AT BEARINGS (KIPS)**

<table>
<thead>
<tr>
<th></th>
<th>4th BRC</th>
<th>6th BRC</th>
<th>8th BRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTERIOR GIRDERS</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>EXTERIOR GIRDERS</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

**NOTES**

- The theoretical forces listed in the table are based on the National Bridge Expo 98 guidelines, with a 20% increase for seismic and construction forces. The table includes all reactions, including those from adjacent bearings, and is adjusted for the actual construction method.
- The LL reactions are based on NS-20 or NS-93 and include seismic forces.
- Exterior girders have LL and RA reactions; RA are calculated for the adjacent building.
- The exterior girders are designed to include the LL reactions for the adjacent building.

**DESIGNER NOTES**

- Add 10% to the exterior girders to account for variations in composite or other methods.
- Use the interior girders to determine the LL reactions, which include seismic and construction forces.
NOTES
For dowel bar couplers, all dowel bars shall be looped and tied to the reinforcement bars.

DESIGNER NOTES
On the plans provide location, spacing, size and quantity thereof. Do not give specific designation regarding the coupler as this is dictated by the bar coupler selected.

On the plans show details similar to "Section thru deck" and "Bar coupler alternatives".

At the plan bar of bars, indicate when bars require bar couplers by use of a symbol. Use the same symbol and a note stating that a bar coupler is required. Bar location are comprised to the E. of the construction joint and shall be incorporate in the bar coupler diagram. Placement, orientation, and length are to be included in the bar coupler bar sheath. The dowel often be determined.

SECTION THRU DECK

ONE-PIECE THREADED COUPLER SHOWN

DOWEL BAR COUPLER
STAGE 2 DOWEL COUPLER AND BAR COUPLER IN STAGE 1

ONE-PIECE THREADED COUPLER

BAR COUPLER ALTERNATIVES
PRE-TENSION

\[ \sigma = 270,000 \text{ psi} \]

\[ t = 0.75 \times 270,000 \times 202,500 \text{ psi} \times 1 \]

\[ \gamma = 29.77 \text{ psi} \]

\[ t_{\text{min}} = 24.70 \text{ psi} \]

\[ v = 260,750 \text{ lb} \cdot \text{in}^2 \]

\[ S_{\text{min}} = 0.93 \text{ lb} \cdot \text{in}^2 \]

\[ W_{\text{ft}} = 820 \text{ lb/ft} \]

**STANDARD PATTERNS FOR UNDRAPED STRANDS**

<table>
<thead>
<tr>
<th>N</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
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<tbody>
<tr>
<td>0.5&quot; DIA.</td>
<td>0.625</td>
<td>1.425</td>
<td>2.125</td>
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**STANDARD PATTERNS FOR DRAPE STRANDS**

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<tr>
<th>N</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
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<tbody>
<tr>
<td>0.5&quot; DIA.</td>
<td>0.625</td>
<td>1.425</td>
<td>2.125</td>
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</tr>
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</table>

**ARRANGEMENT AT 1/4 SPAN - FOR ORDERS WITH DRAPE 0.5" DIA. AND 0.6" DIA. STRANDS**

#50 STRANDS ONLY

**54" PERTENSION ORDER DESIGN DATA**

**APPROVED**

Bill Oliva

DATE: 1/18

**STANDARD 40.04**
**45° GIRDERS**

\[ 2 \times 560 \text{ SQ. FT.} \]

\[ r^2 = 225,001 \text{ sq. ft.} \]

\[ \gamma_0 = 29.9 \text{ kN/m}^2 \]

\[ \gamma_f = -20.27 \text{ kN/m} \]

\[ l = 126,390 \text{ in.} \]

\[ \gamma_c = 5.07 \text{ kN/m}^2 \]

\[ \gamma_p = -5.86 \text{ kN/m}^2 \]

\[ U_{t} = 583 \text{ kN/ft} \]

---

**PRE-TENSION**

\[ f_y = 270,000 \text{ psi} \]

\[ f_p = 0.75 \times 270,000 = 202,500 \text{ psi} \]

\[ f_y = 29.9 \times 202,500 = 6,095 \text{ kN/m} \]

\[ f_y = 20.27 \times 202,500 = 4,100 \text{ kN/m} \]

\[ f_y = 5.07 \times 202,500 = 1,057 \text{ kN/m} \]

\[ f_y = 6.86 \times 202,500 = 2,750 \text{ kN/m} \]

---

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

---

**STANDARD PATTERNS FOR UNDRAPE STRANDS**

<table>
<thead>
<tr>
<th>No. Strand</th>
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<th>100 ft.</th>
<th>120 ft/100 ft.</th>
<th>120 ft/100 ft.</th>
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</thead>
<tbody>
<tr>
<td>12</td>
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**STANDARD PATTERNS FOR DRAPE STRANDS**

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<td>2,350</td>
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<tr>
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<tr>
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</tr>
</tbody>
</table>

---

**ARRANGEMENT AT 90° SPAN - FOR GIRDERS WITH DRAPE OF 0.5" DIA. AND 0.6" DIA. STRANDS**

*0.5" DIA. STRANDS ONLY*
SUPPORT WITH STEEL OR ELASTOMERIC BARS.

SIDE VIEW OF ORDER

DESIGNER NOTES

**PLAN VIEW**

**SECTION A-A**

**DETAIL A**

NOTES

TOP OF ORDER TO BE ROUNDED & SMOOTHED. EXCEPT PIER SUPPORTS, CONCRETE SHALL BE PLACED & COMPACTED IN ONE COMPLETION. CONCRETE SHALL BE CALIBERED TO REQUIRE CONCRETE SPACING.

SUPPORT WITH 1/2" ELASTOMERIC BEARING PAD

70' PRESTRESSED ORDER DETAILS

BUREAU OF STRUCTURES

STANDARD 46.19

APPROVED: Bill Oliva

DATE: 9-17
### STANDARD PATTERNS - 0.5" DIA, DRAPED STRANDS

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
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<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<td>18930</td>
<td>1000</td>
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</tr>
</tbody>
</table>

#### 70° ORDER

- \( f_y = 71,000 \) psi
- \( f_p = 0.75 \times 71,000 = 53,250 \) psi
- \( f_p = 35,300 \) psi
- \( f_p = 28,400 \) psi
- 100% TENSION:
- \( f_p = 53,250 \) psi
- \( f_p = 35,300 \) psi
- \( f_p = 28,400 \) psi
- \( f_p = 33,000 \) psi

#### PRE-TENSION

- \( f_y = 65,700 \) psi
- \( f_p = 0.75 \times 65,700 = 49,275 \) psi
- 100% TENSION:
- \( f_y = 65,700 \) psi
- \( f_y = 49,275 \) psi
- \( f_y = 33,000 \) psi
- \( f_y = 22,000 \) psi

### ARRANGEMENT AT 0.5" SPAN FOR ORDERS WITH DRAPED 0.5" DIA, STRANDS

### ARRANGEMENT AT 0.6" SPAN FOR ORDERS WITH DRAPED 0.6" DIA, STRANDS
LEGEND

1. 9 x 2.5 with 3/6" SHCS on each side of post for stair rails. See drawing of stair rail for grade and spacing of anchors. Use plate for vertical, plate posts normal to stair rail.
2. PLATE P = 10 x 10 with 8.5" x 10.5" flat bar for anchoring bolts no. 2. See drawing for horizontal rails.
3. 3 x 3.5 x 10.5" anchors are also bars and washers. See drawing for stair rail.
4. SCREW NUT AND BOLT ARE IN CONCRETE. SEE DRAWING. USE 2-5/8" long at all other locations. 4-3/4" long for plate, 3-1/4" length for plate, 3-1/4" distance to center top of plate before threading.
5. 5/8" x 8" FLAT BAR WITH 3/8" SQUARE HOLES FOR ANCHOR BOLTS NO. 4.
6. 1-1/2 x 4 x 6" STRUCTURAL STAINLESS CONO FORMING TO ASTM DESIGNATION A841 OR 304 STAINLESS STAIR RAIL.
7. "FLAT BAR" LONG HOLE HOLD STAIR WITH NUT AND BOLT AS SHOWN IN DETAIL. MOUNTS AT STAIR HEAD. USE PLATE ATTACHMENTS ONLY. PLACE IMMEDIATELY UNDER STEP NO. 2.
8. PINNED IN PLATE NO. 4 & TUBES NO. 5 FOR 3/4" ALU. BAR 4 BOLT WRENCH TOOLS NUTS AND WASHERS.
9. GUIDING SLEEVE FABRICATED FROM 1 5/8" PLATE. PROVIDE "L" PLATE FOR NUT OR WRENCH TO USE DURING INSTALLATION OF 1 5/8" PLATE.
10. 5/32 x 2 1/2" long threaded rod elbow for field work. PROVIDE "L" PLATE FOR NUT OR WRENCH TO USE DURING INSTALLATION OF 1 5/8" PLATE.

NOTES

1. POST SHALL BE TUBULAR TYPE B-1, -2, -3. WHEN REQUIRED ALL TYPE A STUD STEEL, RAILING SHAPE FOR LENITY MAY INCLUDE 3 OR 4 POSTS.
2. POST BASE PLATES SHALL BE FLAT WITH ALL SURFACES SMOOTH AND FREE FROM KNOB AND ALL OTHER OBSTACLES AND VERTICAL, ALL PLATE ORS SHALL BE INCLUDED IN ELECTRICAL FITTINGS.
3. FOR FABRICATION TO BE PRACTICAL ALL MATERIALS EXCEPT ANCHORING DETAIL NO. 4 SHALL BE ASSEMBLED AND FURNISHED FOR INSTALLATION. STEEL PLATE POTS 4 STEEL TUBES SHALL BE ADEQUATELY CLEANED BY SUPP.

FOR FREIGHT TO BE SHIPPED ALL MATERIALS EXCEPT ANCHORING DETAIL NO. 4 & 5. SHALL BE SHIPPED FOR FIELD ASSEMBLY.

ALL STEEL SHADES POLES 4-STEEL TUBES SHALL BE ADEQUATELY CLEANED BY SUPP.

ALL MATERIALS MADE IN FABRICATION SHALL BE MADE FROM MATERIALS CONFORMING TO ASTM AND GRADE OR MEASURED ON SITE.

ALL POSTS SHIPS MAY BE MIXED WITH POSTS PIPE NO. 2 WHEN NON-STEEL TYPE SHED Booster Joint Select.

STEEL POST SHIPS MAY BE MIXED WITH POSTS PIPE NO. 2 WHEN NON-STEEL TYPE SHED Booster Joint Select.

THIS RAILING IS NO LONGER USED AND IS SHOWN FOR INFORMATIONAL PURPOSES ONLY:
CROSS SECTION THRU ROADWAY
LOOKING NORTH

TOTAL ESTIMATED QUANTITIES

<table>
<thead>
<tr>
<th>Description</th>
<th>RE ITEMS</th>
<th>UNT</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td>FAST DECKS TYPE 1</td>
<td>50/200</td>
<td>SV</td>
<td></td>
</tr>
<tr>
<td>FAST DECKS TYPE 2</td>
<td>50/200</td>
<td>SV</td>
<td></td>
</tr>
<tr>
<td>SANDING AND DECK PREPARATION</td>
<td>50/200</td>
<td>CF</td>
<td></td>
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<td>FAST DECK REPAIR</td>
<td>50/200</td>
<td>SV</td>
<td></td>
</tr>
<tr>
<td>CONCRETE MACHINERY DECK REPAIR</td>
<td>50/200</td>
<td>CV</td>
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<td>POLYMER OVERLAY</td>
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<td>POSSIBLE OR EVEN</td>
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</tr>
<tr>
<td>50/200</td>
<td>CV</td>
<td></td>
<td></td>
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</table>

NOTE: The item list is not complete. The item may need to be altered or removed to fit each individual case.

CROSS SECTION THRU ROADWAY
LOOKING NORTH

TOTAL ESTIMATED QUANTITIES

<table>
<thead>
<tr>
<th>Description</th>
<th>RE ITEMS</th>
<th>UNT</th>
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<tbody>
<tr>
<td>POLYMER OVERLAY</td>
<td>50/200</td>
<td>SV</td>
<td></td>
</tr>
</tbody>
</table>

NOTES
- Engraving shown are based on the original structure plans.
- Areas of preparation decks type may be defined by a saw cut.
- Preparation decks type 1, preparation decks type 2, and full-depth deck repair areas are based on the deck that is proposed to be rehabilitated and may require additional cutting and full-depth deck repair to be filled with concrete or other back fill.
- Design notes include in order to readily determine the needed repairs using a Portland cement-based concrete that has a minimum compressive strength of 2500 psi to ensure durability.

DESIGNER NOTES
- Deck depth varies to provide adequate bearing capacity for the polymer overlay.
- Polymer overlays and transitional areas are not recommended on concrete pavements.
- Provide overlay transitional area details and identify locations on the plans.

PREVENTATIVE OVERLAY

CROSS SECTION THRU ROADWAY
LOOKING NORTH

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

NOTES
- Polymer overlays and transitional areas are not recommended on concrete pavements.
- Provide overlay transitional area details and identify locations on the plans.

POLYMER OVERLAY

BUREAU OF STRUCTURES

STANDARD 40.32

APPROVED: Bill Oliva

DATE: T-20
CROSS SECTION THRU ROADWAY
LOOKING NORTH

SECTION THRU ABUTMENT
TRANSITIONAL AREA ON DECK
AT EXPANSION JOINT

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

NOTES:
- TRANSITIONAL AREA REQUIRED WHEN EXPANSION JOINTS ARE TO BE USED.
- POLYESTER POLYMER CONCRETE OVERLAY IS NOT REQUIRED AT TRANSITIONAL AREAS.

TOTAL ESTIMATED QUANTITIES

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<thead>
<tr>
<th>DESCRIPTION</th>
<th>NO. ITEMS</th>
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<td>RAPID SET DECK REPAIR</td>
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<tr>
<td>CLEARING DECKS</td>
<td>509.0000</td>
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DESIGNER NOTES
- USE OF POLYMER OVERLAYS ARE LIMITED TO THE BID SPECIFICATIONS.
- POLYMER OVERLAYS ARE NOT RECOMMENDED FOR TRANSITIONAL AREAS.
- POLYMER OVERLAYS ARE NOT RECOMMENDED ON CONCRETE PRODUCED.
- PLANS SHALL SPECIFY THE NUMBER OF TRANSITIONAL AREAS REQUIRED.
- FULL-DEPTH DECK REPAIR SHALL BE PROVIDED.
- POLYMER POLYMER CONCRETE OVERLAY IS NOT REQUIRED.

POLYESTER POLYMER CONCRETE OVERLAY

BUREAU OF STRUCTURES

STANDARD 40.34

APPROVED: Bill Oliva

DATE: 7-20
**36" GIRDER**

\[ a = 369 \text{ ft}, \]
\[ r_1^2 = 18.45 \text{ ft}^2, \]
\[ y_x = 20.37 \text{ in}, \]
\[ y_s = -15.83 \text{ in}, \]
\[ l = 50.78 \text{ in}^2, \]
\[ S_x = 2.33 \text{ ft}^2, \]
\[ S_y = -3.27 \text{ ft}^2, \]
\[ W_t = 384 \text{ kN/m}. \]

**PRE-TENSION**

\[ P_{\text{per 0.25" dia. strand}} = 0.030 \times 202,000 = 6,060 \text{ lbs} \]
\[ P_{\text{per 0.25" dia. strand}} = 0.027 \times 202,000 = 5,354 \text{ lbs} \]
\[ \frac{P}{A} = \frac{-15.83}{20.37}, \]
\[ f_t = \frac{\frac{1}{2}P}{A} \]

**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY**

**TO AVOID DRAPPING OF 0.5" DIA. STRANDS**

(0.5" dia. strands may also be used)

![Diagrams of standard arrangements to raise center of gravity](image)

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

![Diagrams of arrangements at 6" span](image)

**TABLE 40.43**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>d (Inches)</th>
<th>P/FA+P/A (lbs)</th>
<th>S_M (kips/lin ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>-0.03</td>
<td>243</td>
<td>1.94</td>
</tr>
<tr>
<td>10</td>
<td>-0.04</td>
<td>310</td>
<td>2.27</td>
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<td>12</td>
<td>-0.05</td>
<td>372</td>
<td>2.62</td>
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<tr>
<td>16</td>
<td>-0.07</td>
<td>434</td>
<td>3.29</td>
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<td>20</td>
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<td>496</td>
<td>3.91</td>
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<tr>
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<td>556</td>
<td>4.54</td>
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<tr>
<td>28</td>
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<td>615</td>
<td>5.13</td>
</tr>
<tr>
<td>32</td>
<td>-0.11</td>
<td>674</td>
<td>5.71</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.

**BUREAU OF STRUCTURES**

**APPROVED:** Bill Oliva

**DATE:** 8-21

**STANDARD 40.43**