STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>A (inches)</th>
<th>Pinit (KIPS)</th>
<th>E (KIPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.32</td>
<td>35.9</td>
<td>0.1531</td>
</tr>
<tr>
<td>10</td>
<td>0.47</td>
<td>43.94</td>
<td>0.217</td>
</tr>
<tr>
<td>12</td>
<td>0.62</td>
<td>52.7</td>
<td>0.3087</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>A (inches)</th>
<th>Pinit (KIPS)</th>
<th>E (KIPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.48</td>
<td>61.3</td>
<td>0.284</td>
</tr>
<tr>
<td>12</td>
<td>0.63</td>
<td>70.3</td>
<td>0.385</td>
</tr>
<tr>
<td>14</td>
<td>0.75</td>
<td>80.3</td>
<td>0.486</td>
</tr>
</tbody>
</table>

STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY

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

DESIGNER NOTES

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

PRE-TENSION

A = 8 x 10,000,000 #/ft.

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

y = -13.42 IN.

S = -2,138 IN.

y = -0.1459 IN./IN.
36" GIRDERS

PRE-TENSION

\[ f_{\text{per strand}} = 0.05 \times 270,000 \text{ PSI} \]

\[ f_{\text{init}} = 0.75 \times f_{\text{per strand}} \]

\[ f_{\text{init}} = 0.75 \times 0.05 \times 270,000 \text{ PSI} = 202,500 \text{ PSI} \]

\[ P_{\text{init}} = A f_{\text{init}} \]

\[ S_1 = \frac{r_y - y}{I} \]

\[ S_2 = \frac{r_y + y}{I} \]

\[ A = 369 \text{ SQ. IN.} \]

\[ r = 138.15 \text{ IN.} \]

\[ y = 20.17 \text{ IN.} \]

\[ y = -15.83 \text{ IN.} \]

\[ I = 50,979 \text{ IN.}^3 \]

\[ S = 2,527 \text{ IN.}^2 \]

\[ S = -3,220 \text{ IN.}^2 \]

\[ \text{WT.} = 384 \text{ #/FT.} \]

\[ y = -15.83 - 0.0146 \text{ IN./IN.} \]

\[ y = -12.83 - 0.1146 \text{ IN./IN.} \]

\[ y = -13.03 - 0.1146 \text{ IN./IN.} \]

\[ y = -13.16 - 0.1146 \text{ IN./IN.} \]

\[ y = -12.97 - 0.1146 \text{ IN./IN.} \]

\[ y = -12.83 - 0.1146 \text{ IN./IN.} \]

\[ y = -12.50 - 0.1146 \text{ IN./IN.} \]

\[ y = -12.23 - 0.1146 \text{ IN./IN.} \]

\[ y = -12.01 - 0.1146 \text{ IN./IN.} \]

\[ y = -11.66 - 0.1146 \text{ IN./IN.} \]

\[ y = -11.37 - 0.1146 \text{ IN./IN.} \]

\[ f_{\text{init}} = \frac{P_{\text{init}}}{A f_{\text{init}}} \]

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 (0.6" DIA.)

<table>
<thead>
<tr>
<th>No. of Strands</th>
<th>d (Inches)</th>
<th>P_{\text{init}} (KPS)</th>
<th>f_{\text{init}} (KIPS/\text{sq.in.})</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>-12.53</td>
<td>382</td>
<td>270.50</td>
</tr>
<tr>
<td>12</td>
<td>-10.23</td>
<td>429</td>
<td>2,054</td>
</tr>
<tr>
<td>18</td>
<td>-8.93</td>
<td>527</td>
<td>3,036</td>
</tr>
<tr>
<td>24</td>
<td>-7.54</td>
<td>615</td>
<td>3,915</td>
</tr>
<tr>
<td>30</td>
<td>-6.15</td>
<td>703</td>
<td>4,897</td>
</tr>
</tbody>
</table>

STANDARD STRAND PATTERNS FOR DRAPED STRANDS (0.5" DIA.)

<table>
<thead>
<tr>
<th>No. of Strands</th>
<th>d (Inches)</th>
<th>P_{\text{init}} (KPS)</th>
<th>f_{\text{init}} (KIPS/\text{sq.in.})</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>-12.53</td>
<td>243</td>
<td>1,100</td>
</tr>
<tr>
<td>12</td>
<td>-10.23</td>
<td>310</td>
<td>2,714</td>
</tr>
<tr>
<td>18</td>
<td>-8.93</td>
<td>372</td>
<td>3,268</td>
</tr>
<tr>
<td>24</td>
<td>-7.54</td>
<td>455</td>
<td>3,824</td>
</tr>
<tr>
<td>30</td>
<td>-6.15</td>
<td>545</td>
<td>4,380</td>
</tr>
<tr>
<td>36</td>
<td>-5.36</td>
<td>635</td>
<td>4,934</td>
</tr>
<tr>
<td>42</td>
<td>-4.56</td>
<td>724</td>
<td>5,480</td>
</tr>
</tbody>
</table>

36" Prestressed Girder Design Data
**GIRDER DETAILS**

- **SECTION A-A**

  **PLACE AS SHOWN**

  **#3 BARS**

  **IN PAIRS**

  **1 PAIR EACH END**

- **#6 BARS**

  **EACH END**

- **#6 BAR**

  **1 PAIR**

  **END OF GIRDER**

- **"OF BEARING & STEEL BRGS. ELASTOMERIC ANCHOR PLATE**

- **FILLER 2" OR ELASTOMERIC BRGS. SUPPORT WITH STEEL**

- **4 @ 3" = 1'-0"**

- **2 @ 6" = 1'-0"**

- **#4 STIRRUPS & #3 BARS EMBED INTO GIRDER 1'-3". PLACE @ STIRRUP SPACING. #4 BAR, EPOXY COATED.**

- **STIRRUP PAIRS. BETWEEN LIMITS OF #3 AT #4 STIRRUP SPACING**

- **3'-0" = 1'-9"**

- **#4 BAR MIN. 6 BARS FULL LENGTH, (4" LEG) #4 STIRRUPS (18" MAX. SPA.) TO BE DESIGNED**

- **#3 BAR, 2'-3" LONG. #4 @ 1'-0" BETWEEN. 2'-7" LONG #4 @ 5" FOR 15'-0" EACH END,**

- **MIN. DECK EMBEDMENT (ASTM A1064)**

- **MIN. CLEAR 1" MIN. CLEAR**

- **VERT. WIRE AREA SHALL BE > 40% OF AREA OF HORIZ. WIRE**

- **SHOWING WELDED WIRE FABRIC (WWF) STIRRUPS**

- **STRAINERS NOT SHOWN**

- **STRAINERS WITH AN ULTIMATE STRENGTH OF 270,000 PSI.**

- **MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.**

- **MINIMUM OF 6,000 PSI TO A MAX. OF 8,000 PSI. MAXIMUM RELEASE**

- **SPECIFY CONCRETE STRENGTH AS REQUIRED BY DESIGN FROM A VARIETY OF 270,000 PSI. USE 0.6" DIA. STRAND FOR ALL PATTERNS. THE MAX. NUMBER OF DRAPED 0.6" DIA. STRANDS IS 8.**

- **REINFORCEMENT IN STANDARD END SECTION OF THE GIRDER IS BASED ON THE STANDARD STRAND PATTERNS LISTED ON STANDARD 19.12 AND THE STANDARD LENGTHS SHOWN IN TABLE 19.3-1. USING DIFFERENT STRAND SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT.**

- **THE DESIGN ENGINEER DETERMINES THE VALUE BASED ON 2" MIN. HAUNCH AT BASE OF GIRDER, 3" DEEP PROFILES OVER GIRDER LENGTH AND CALCULATED RESIDUAL GIRDER CAMBER. PROVIDE STIRRUP SPACING THAT IS SYMMETRICAL ABOUT THE C/L OF GIRDER.**

- **ALL GIRDERS SHALL BE CAST FULL LENGTH AS SHOWN. SPACING SHOWN FOR #4 STIRRUPS IS FOR GRADE 60 REINFORCEMENT. AN EQUIMENT OF INTEREST IF THE FINAL ASSEMBLY PLANS.**

- **VALUES FOR ELASTOMERIC BEARING PLATE, SEE STD. 27.07 AND STEEL BRGS. SEE STD. 27.09. THIS REINFORCEMENT, WHICH REQUIRES PRIOR APPROVAL FROM THE BUREAU OF STRUCTURES. AN APPROVED CONCRETE SEALER SHALL BE APPLIED TO ALL EXCEPT THE OUTSIDE 8" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH. A SMOOTH SURFACE INCLUDING THE OUTSIDE 8" OF THE TOP FLANGE DO NOT APPLY CONCRETE SEALER TO ANY SURFACES RECEIVING APPLICATION OF CONCRETE STAINING.**

- **TOP OF GIRDER TO BE ROUGH FINISHED AND BRUSHED TRANSPARENTLY.**

- **DO NOT APPLY CONCRETE SEALER TO THE TOP OF THE GIRDER. ALL SMOOTH SURFACES INCLUDING THE OUTSIDE 8" OF THE TOP FLANGE.**

- **EXCEPT THE OUTSIDE 8" OF GIRDER, WHICH SHALL RECEIVE A SMOOTH FINISH.**

- **APPLICATION OF CONCRETE STAINING. DO NOT APPLY CONCRETE SEALER OR EPOXY TO SURFACES RECEIVING THE TOP OF THE GIRDER.**

- **DATE:**

  - 7/18

- **APPROVED:**

  - Bill Oliva
**36W" GIRDER**

- Area, A = 632 SQ. IN.
- Section Moment of Inertia, I = 99,980 IN.4
- Effective Stress Cones, \( f_s = -6,012 \text{ IN.}^2 \)
- Weight, WT. = 658 #/FT.

**PRE-TENSION**

- \( f_p = 270,000 \text{ P.S.I.} \)
- \( f_t = 0.75 \times 270,000 = 202,500 \text{ P.S.I.} \)

**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_A ) (Inches)</th>
<th>( P_i ) (Kips)</th>
<th>( S_i ) (KIPS/IN.2)</th>
<th>( f_i ) (KIPS/IN.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>-2.03</td>
<td>120</td>
<td>703</td>
<td>2,731</td>
</tr>
<tr>
<td>18</td>
<td>-2.74</td>
<td>191</td>
<td>2,746</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>-3.03</td>
<td>819</td>
<td>3,003</td>
<td></td>
</tr>
</tbody>
</table>

**STANDARD STRAND PATTERNS FOR DRAPE STRANDS**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>( d_A ) (Inches)</th>
<th>( P_i ) (Kips)</th>
<th>( S_i ) (KIPS/IN.2)</th>
<th>( f_i ) (KIPS/IN.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>-1.026</td>
<td>703</td>
<td>2,744</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>-1.545</td>
<td>191</td>
<td>3,006</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>-1.816</td>
<td>819</td>
<td>3,065</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>-1.172</td>
<td>167</td>
<td>3,337</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>-1.036</td>
<td>1035</td>
<td>4,261</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>-1.110</td>
<td>575</td>
<td>4,385</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>-1.204</td>
<td>1220</td>
<td>4,706</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>-1.243</td>
<td>139</td>
<td>5,030</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>-1.288</td>
<td>1408</td>
<td>5,393</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>-1.335</td>
<td>1558</td>
<td>5,783</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>-1.385</td>
<td>1882</td>
<td>6,103</td>
<td></td>
</tr>
</tbody>
</table>

**COMPRESION IS STATED**
45W” GIRDER

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

**PRE-TENSION**

for low relaxation strands

![Diagram of 45W” GIRDER]

**STANDARD ARRANGEMENTS TO RAISE CENTER OF GRAVITY**

**TO AVOID DRAPEING OF 0.6” DIA. STRANDS**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>e (inches)</th>
<th>PRE-TENSION, f_i (KIPS)</th>
<th>f_y (MPa) (K/sq.in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>-8.24</td>
<td>723</td>
<td>2,339</td>
</tr>
<tr>
<td>18</td>
<td>-8.35</td>
<td>737</td>
<td>2,456</td>
</tr>
<tr>
<td>20</td>
<td>-8.46</td>
<td>810</td>
<td>2,592</td>
</tr>
</tbody>
</table>

**STANDARD STRAND PATTERNS FOR UNDRAPED STRANDS**

<table>
<thead>
<tr>
<th>NO. STRANDS</th>
<th>e (inches)</th>
<th>PRE-TENSION, f_i (KIPS)</th>
<th>f_y (MPa) (K/sq.in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>-10.63</td>
<td>867</td>
<td>3,344</td>
</tr>
<tr>
<td>24</td>
<td>-10.54</td>
<td>815</td>
<td>3,011</td>
</tr>
<tr>
<td>26</td>
<td>-10.48</td>
<td>745</td>
<td>2,716</td>
</tr>
<tr>
<td>28</td>
<td>-10.40</td>
<td>623</td>
<td>2,285</td>
</tr>
<tr>
<td>30</td>
<td>-10.26</td>
<td>538</td>
<td>2,013</td>
</tr>
<tr>
<td>32</td>
<td>-10.29</td>
<td>458</td>
<td>1,799</td>
</tr>
<tr>
<td>34</td>
<td>-10.22</td>
<td>391</td>
<td>1,577</td>
</tr>
<tr>
<td>36</td>
<td>-10.26</td>
<td>321</td>
<td>1,355</td>
</tr>
<tr>
<td>38</td>
<td>-10.61</td>
<td>258</td>
<td>1,189</td>
</tr>
<tr>
<td>40</td>
<td>-10.64</td>
<td>195</td>
<td>1,030</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.
54" PRESTRESSED GIRDER DESIGN DATA

**T**

**W**

**S**

**B**

---

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

---

**DESIGNER NOTES**

- Label the span it is used in.
- Applies to the designed structure and label the span it is used in.

---

**54" GIRDER**

- **A** = 798 SQ. IN.
- **f** = 402,41 IN.
- **f** = 0.75 x 270,000 + 202,500 P.S.I. for low relaxation strands

---

**PRE-TENSION**

- **Pre-Tension for Low Relaxation Strands**

---

**T**

**B**

**S**

**W**

---

**BUREAU OF STRUCTURES**

**Approved**

**Date:**

**STANDARD 39.36**
### 72W" Prestressed Girders Design Data

- **Area** (ft²): 925,505
- **Moment of Inertia** (in⁴): 717,507
- **Initial Stress** (ksi): 37.13
- **Elastic Modulus** (ksi): 270,000
- **Strain** (ksi): 0.75
- **Pre-tension for low relaxation strands**

#### Standard Arrangements to Raise Center of Gravity

<table>
<thead>
<tr>
<th>No. Strands</th>
<th>d (inches)</th>
<th>P(init) (kips)</th>
<th>f (ksi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>-30.37</td>
<td>703</td>
<td>0.217</td>
</tr>
<tr>
<td>18</td>
<td>-29.39</td>
<td>711</td>
<td>0.234</td>
</tr>
<tr>
<td>20</td>
<td>-29.27</td>
<td>819</td>
<td>2.324</td>
</tr>
</tbody>
</table>

#### Standard Strand Patterns for Undraped Strands

<table>
<thead>
<tr>
<th>No. Strands</th>
<th>d (inches)</th>
<th>P(init) (kips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1.902</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>2.124</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>2.328</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>1.986</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>2.217</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>2.458</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>2.698</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>2.939</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>3.179</td>
<td></td>
</tr>
</tbody>
</table>

#### Standard Strand Patterns for Draped Strands

<table>
<thead>
<tr>
<th>No. Strands</th>
<th>d (inches)</th>
<th>P(init) (kips)</th>
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</thead>
<tbody>
<tr>
<td>16</td>
<td>5.893</td>
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<tr>
<td>18</td>
<td>5.947</td>
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</tr>
<tr>
<td>20</td>
<td>6.001</td>
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</tr>
<tr>
<td>22</td>
<td>7.036</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>7.091</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>7.146</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>7.201</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>7.257</td>
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</tr>
<tr>
<td>32</td>
<td>7.313</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>7.369</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>7.424</td>
<td></td>
</tr>
</tbody>
</table>

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

#### Pre-tension

\[
\sigma_f = 0.75 \times 270,000 = 202,500 \text{ksi}
\]

#### 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

---

**72W" GIRDER**

- Area: 925,505 ft²
- Moment of Inertia: 717,507 in⁴
- Initial Stress: 37.13 ksi
- Elastic Modulus: 270,000 ksi
- Strain: 0.75
- Pre-tension for low relaxation strands

### Standard Strand Patterns for Undraped Strands

<table>
<thead>
<tr>
<th>No. Strands</th>
<th>d (inches)</th>
<th>P(init) (kips)</th>
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<tbody>
<tr>
<td>16</td>
<td>-30.37</td>
<td>703</td>
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<tr>
<td>18</td>
<td>-29.39</td>
<td>711</td>
</tr>
<tr>
<td>20</td>
<td>-29.27</td>
<td>819</td>
</tr>
</tbody>
</table>

### Standard Strand Patterns for Draped Strands

<table>
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<tr>
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<tr>
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<td>18</td>
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</tr>
<tr>
<td>26</td>
<td>2.458</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>2.698</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>2.939</td>
<td></td>
</tr>
</tbody>
</table>

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

#### Pre-tension

\[
\sigma_f = 0.75 \times 270,000 = 202,500 \text{ksi}
\]

#### 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

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DESIGNER NOTES

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

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

Approved: Bill Oliva

Date: 7-17

BUREAU OF STRUCTURES

STANDARD 19.20
DECK 19.34
INTERIOR GIRDER 1'-6" 30°-40°
not required for 36w"
AT 9" CTRS.
#5 BARS
BRIDGES, AND C.T.H.
ALL S.T.H., U.S.H., I.H.
USE PAVING NOTCH ON
PREFORMED JOINT FILLER
BRG. PAD AND 4" X "
LAMINATED ELASTOMERIC
WATERPROOFING
RUBBERIZED MEMBRANE
END OF GIRDER
#6 BARS as shown
masonry bridges")
bid item "concrete
(cost incidental to
waterproofing if
rubberized membrane
placed after concrete
placed)
PART TRANSVERSE SECTION AT DIAPHRAGM
EXTERIOR GIRDER
INTERIOR GIRDER
1'-0"
PRESTRESSED GIRDER WITH
SEMI EXPANSION END
ON 36w" GIRDER & BRG.
" X 6". SEE DETAILS
FORMED BY BEVELED
PLATE WASHER
3" X 3" X " PLATE WASHER
TO EXT... NEW STRENGTH BOLTS.
NOTES
* LEAVE ROUGH.
STRIKE OFF &
CONST. JOINT
EXPANSION END
TOP VIEW OF DIAPHRAGM (EXPANSION END)
PRESTRESSED 36W" &
45W" GIRDER SLAB &
SUPERSTRUCTURE DETAILS
BUREAU OF
STRUCTURES
APPROVED
Bill Oliva
STANDARD 19.34
**PART TRANSVERSE SECTION AT DIAPHRAGM**

- **Diaphragm**
- **Girders**
- **Diaphragm Diaphragm**
- **Girder Stirrups**
- **Diaphragm Support**
- **Diaphragm for Skew Angles > 10°**
- **Diaphragm for Skew Angles < 10°**

**SECTION THRU DIAPHRAGM**

- **Center of Diaphragm**
- **Form 3/8" Holes in Plate Washer**
- **Form 3/8" Holes in Plate Washer**
- **Form 5/8" Holes in Plate Washer**

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

- **Diaphragm Support**
- **Diaphragm Support**
- **Diaphragm Support**
- **Diaphragm Support**

**NOTES**

- **All DIAPHRAGM MATERIALS NOT EMBEDDED IN THE CONCRETE GIRDERS SHALL BE TREATED AS THE EXTERIOR DIAPHRAGM.**
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**DESIGNER NOTES**

- **For DIAPHRAGM SUPPORTS, PLACE THE DIAPHRAGM AT LEAST 10 FT. AWAY FROM THE FACE OF THE GIRDER.**
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- **FOR DIAPHRAGM SUPPORTS, PLACE THE DIAPHRAGM AT LEAST 10 FT. AWAY FROM THE FACE OF THE GIRDER.**

**INTERIM STEEL DIAPHS. FOR 28", 36", 45", 45W" & 54W" PRESTRESSED GIRDERS**

- **(MEDIUM HIGH CARBON WIRE)**
- **Electroplated**
- **Electroplated**
- **Electroplated**

**TABLE**

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**SCHEDULE FOR STEEL DIAPHRAGMS**

- **All DIAPHRAGM MATERIALS NOT EMBEDDED IN THE CONCRETE GIRDERS SHALL BE TREATED AS THE EXTERIOR DIAPHRAGM.**
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**ACKNOWLEDGEMENTS**

- **BUREAU OF STRUCTURES**
- **Bill Oliva**
- **DATE: 7-19**

**STANDARD 19.36**
NOTES

ALL DIAPHRAGM MATERIAL NOT EMBEDDED IN THE CONCRETE GIRDER SHALL BE PAID FOR AT THE UNIT PRICE FOR "STEEL DIAPHRAGM" PLUS "FOR EACH"

EACH DIAPHRAGM BETWEEN GIRDERS SHALL CONSTITUTE ONE UNIT.

ALL DIAPHRAGM STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 36.

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

STEEL DIAPHRAGM TO CONCRETE WEB CONNECTION SHALL USE 1 1/4" HIGH STRENGTH BOLTS PLUS 'TURN UNLESS NOTED OTHERWISE. HIGH STRENGTH BOLTS FOR WEB CONNECTION SHALL MEET THE REQUIREMENTS FOR ASTM A490.

DESIGNER NOTES

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

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

SEC. 5.12

PLAN FOR SKEW ANGLES < 10°

PLAN FOR SKEW ANGLES > 10°

SECTION AT INTERIOR GIRDER THRU DIAPHRAGM FOR SKEW ANGLES > 10°

INTERM. STEEL DIAPHS. FOR 36W" PRESTRESSED GIRDER

BUREAU OF STRUCTURES

STANDARD 19.38

APPROVED

Bill Oliva

DATE: 7-19
**Legend**

- Bars not required when used on GRS abutments.
- Bars placed parallel to abutment when parallel to post-tensioning operation.
- Place one #4 bar UB. spacing until perpendicular to 1'-0" max. spacing until perpendicular to the 1'-0" max. spacing.
- Place along skew from end of prestressed box girder until all end block bottom stirrup bars, #4, are placed.

**Designer Notes**

- For bar bend details, see Standard 19.50 and Standard 19.51.
- For skewed structures cast end of prestressed box girder along skew.

**Part Girder Plan with Skew**

- 3" 4# bars not shown for clarity.

**Interior Girder Duct Plan**

- Duct elevation.

**Exterior Girder Duct Plan**

- Exterior edge of girder.

**Loop Insert Detail**

- Welded plate detail.

**Welded Plate Detail**

- Plate 4" x 4" x 1/2".

**Loop Insert Detail**

- 1/2" dia., 3" shaped thread bars.

**Part Girder Elevation Showing 0° Skew**

- Place #4 transverse bars as shown along skew.

**Stress Pocket**

- See Stress Pocket per Standard 19.52.
BEFORE POST-TENSIONING, JOINTS TO BE GROUTED FOR APPROVAL.

DESIGN SECTION TO THE STRUCTURES TO BE SUBMITTED ANCHOR DETAILS.

SEAL WASHER 9" 9"/DIAM. 5"

STRESS POCKET DETAIL

POST-TENSIONING DETAILS - ONE DUCT PER DIAPHRAGM

POST-TENSIONING DETAILS - TWO DUCTS PER DIAPHRAGM

SHEAR KEY DETAIL

STRESS POCKET DETAIL

PRESTRESSED BOX GIRDER DETAILS 3

BUREAU OF STRUCTURES

APPROVED: Bill Oliva
DATE: 11/18

STANDARD 19.54