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<td>17</td>
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<td>18</td>
<td>Spread Footing Foundation Type C for Arm of 35' or Less</td>
</tr>
<tr>
<td>19</td>
<td>Spread Footing Foundation Type D for Arm of Greater Than 35' to 60'</td>
</tr>
</tbody>
</table>
NOTES:

2. See Standard Drawing E 805-SGGR-01 to -03 for grounding details.
3. Use continuous backing ring, 5/16" x 2" minimum. Tack weld only in root area of final weld.
End Cap

Inlet A

Inlet B

Inlet C

Inlet D

Inlet E

Base section with wall thickness 5/16" and field drilled hole for 5/8" bolt with curved washer and lock nut

End section extension with wall thickness 3/16" min. and with drilled hole for 5/8" bolt

OPTIONAL ARM SPLICE DETAIL

TYPICAL SEAM WELD

NOTES:

1. Number of cable inlets depends on arm L (See Arm Dimensions Table). The inlet diameter shall be 1 3/4" with rubber grommet (Typ.)

2. Optional splice can be used for arm length of greater than 40'. Field assembly shall achieve a snug tight joint, with minimum overlap not less than 1.5 times the inside dimension of the end section.

3. Arm rise R is measured in the undeflected position without vertical loads on the arm.

4. See Standard Drawings E 805-TSCS-07 and -08 for placement of signal and signs for each arm length.

5. If seam welds are used, the weld location for the arms shall be along the bottom, and on the side of pole as shown.
1) BOTTOM SPLICE PLATE (For Cantilever Arm Length of 35' or Less)

2) BOTTOM SPLICE PLATE (For Cantilever Arm Length Greater Than 35' to 60')

NOTES:


2. Bolt circle shall allow clearance for the plate washer. Cutting or trimming the washer will not be allowed.

INDIANA DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL CANTILEVER STRUCTURE
SIGNAL ARM POLE BASE PLATE, BOTTOM SPLICE PLATES, AND POLE TOP COVER DETAILS

SEPTEMBER 2013

STANDARD DRAWING NO. E 805-TSCS-04

INDECO-005

STATE OF INDIANA

DESIGN STANDARDS ENGINEER

03/26/13

ALFREDO B. HANZA

PROFESSIONAL ENGINEER

03/27/13

MARK A. MILLER

CHIEF ENGINEER
PLATES AND BOLTS FOR SIGNAL SINGLE ARM CANTILEVER

<table>
<thead>
<tr>
<th>ARM LENGTH</th>
<th>FLANGE PLATE A x B</th>
<th>BOLT PATTERN C x D</th>
<th>RING STIFFENER GUSSET PLATE W</th>
<th>FLANGE PLATE THICKNESS t</th>
<th>BOLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>15' to 35'</td>
<td>22&quot; x 22&quot;</td>
<td>17 1/2&quot; x 17 1/2&quot;</td>
<td>3/8&quot;</td>
<td>1 1/8&quot; - 7 UNC x 4 1/4&quot; Long</td>
<td></td>
</tr>
<tr>
<td>&gt;35' to 60'</td>
<td>33&quot; x 33&quot;</td>
<td>27 1/2&quot; x 27 1/2&quot;</td>
<td>1/2&quot;</td>
<td>1 1/2&quot; - 6 UNC x 6 1/4&quot; Long</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
2. The required signal arm rise shall be built into the gusset plate at the angle X. The angle X is described as arc tan R/L, where R is the arm rise and L is the arm length. Both R and L vary and are listed in the Arm Dimension Table on Standard Drawing E 805-TSCS-03.
3. Use continuous backing ring, 5/16" x 2" minimum. Tack weld only in root area of final weld.
Handhole A shall be used at the base of the pole. Handhole B shall be used at all other locations.

In lieu of fabricated handhole frame as shown, frame may be cut from 3" plate with rolling direction vertical.

See Standard Drawings E 805-TSCS-02 and -09 for handhole locations.

**NOTES:**

1. Handhole A shall be used at the base of the pole. Handhole B shall be used at all other locations.
2. In lieu of fabricated handhole frame as shown, frame may be cut from 3" plate with rolling direction vertical.
NOTE:

1. The structure arms and pole are designed for the above loading conditions. Foundation types A and C are designed for arms having length of 35 ft or less. See Standard Drawings E 805-TSCS-16 and -18 for foundation types A and C.
LOADING FOR ARM OF GREATER THAN 35' TO 60'


2. The structure arms and pole are designed for the above loading conditions. Foundation types B and D are designed for arms having length of greater than 35 ft to 60 ft. See Standard Drawings E 805-TSCS-17 and -19 for foundation types B and D.

NOTES:
VERTICAL CLEARANCE CRITERIA:
Maintain 40'-0" minimum clearance from top of pavement to the camera lens.

NOTES:
2. See Standard Drawing E 805-SGGR-01 to -03 for grounding details.
3. Base diameter of Pole Section 2 shall be equal to top diameter of Pole Section 1.
4. Use continuous backing ring, 5/16" x 2" minimum. Tack weld only in root area of final weld.

POLE DIMENSIONS

<table>
<thead>
<tr>
<th>CANTILEVER ARM LENGTH L</th>
<th>POLE SECTION 1</th>
<th>POLE SECTION 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BASE DIAMETER</td>
<td>WALL THICKNESS</td>
</tr>
<tr>
<td>15' to 35'</td>
<td>20'</td>
<td>5/16&quot;</td>
</tr>
<tr>
<td>&gt;35' to 60'</td>
<td>24&quot;</td>
<td>5/16&quot;</td>
</tr>
</tbody>
</table>

INDIANA DEPARTMENT OF TRANSPORTATION
TRAFFIC SIGNAL CANTILEVER STRUCTURE
COMBINATION POLE ELEVATION,
DIMENSIONS, AND BASE PLATE WELD DETAIL
SEPTEMBER 2014

STANDARD DRAWING NO. E 805-TSCS-09

/s/ Alfredo B. Hanza 12/02/13
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 12/05/13
CHIEF ENGINEER DATE
NOTES:
1. Number of cable inlets depends on L. See Arm Dimensions Table. The inlet diameter shall be 1 3/4" with rubber grommet (typ.).
2. Optional splice can be used for arm length of greater than 40 ft. Field assembly shall achieve a snug tight joint having overlap not less than 1.5 times the inside dimension of the end section.
3. Arm rise R is measured in the undeflected position without vertical loads on the arm.
5. If seam welds are used, the weld location for the arms shall be along the bottom, and on the side of the pole as shown.

ARM DIMENSIONS TABLE

<table>
<thead>
<tr>
<th>L</th>
<th>ARM DIAMETER AT POLE</th>
<th>ARM WALL THICKNESS</th>
<th>R</th>
<th>CABLE INLETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>15'</td>
<td>5 1/2&quot;</td>
<td>1/8&quot;</td>
<td>7 1/2&quot;</td>
<td>A</td>
</tr>
<tr>
<td>20'</td>
<td>5 1/2&quot;</td>
<td>1/8&quot;</td>
<td>1/10&quot;</td>
<td>A</td>
</tr>
<tr>
<td>25'</td>
<td>7&quot;</td>
<td>1/8&quot;</td>
<td>1'-0 1/2&quot;</td>
<td>A</td>
</tr>
<tr>
<td>30'</td>
<td>8&quot;</td>
<td>1/8&quot;</td>
<td>1'-3&quot;</td>
<td>A, B</td>
</tr>
<tr>
<td>35'</td>
<td>8&quot;</td>
<td>1/8&quot;</td>
<td>1'-5 1/2&quot;</td>
<td>A, B</td>
</tr>
<tr>
<td>40'</td>
<td>9&quot;</td>
<td>1/8&quot;</td>
<td>1'-8&quot;</td>
<td>A, B, C</td>
</tr>
<tr>
<td>45'</td>
<td>10&quot;</td>
<td>1/8&quot;</td>
<td>1'-10 1/2&quot;</td>
<td>A, B, C</td>
</tr>
<tr>
<td>50'</td>
<td>11&quot;</td>
<td>1/8&quot;</td>
<td>2'-1&quot;</td>
<td>A, B, C</td>
</tr>
<tr>
<td>55'</td>
<td>11&quot;</td>
<td>1/8&quot;</td>
<td>2'-3 1/2&quot;</td>
<td>A, B, C</td>
</tr>
<tr>
<td>60'</td>
<td>12&quot;</td>
<td>1/8&quot;</td>
<td>2'-6&quot;</td>
<td>A, B, C</td>
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</tbody>
</table>
**COMBINATION ARM CONNECTION DETAIL**

<table>
<thead>
<tr>
<th>ARM LENGTH</th>
<th>FLANGE PLATE A x B</th>
<th>BOLT PATTERN C x D</th>
<th>FLANGE PLATE THICKNESS</th>
<th>BOLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>15' to 35'</td>
<td>20' x 20'</td>
<td>17' x 17'</td>
<td>1'</td>
<td>7/8&quot; - 9 UNC x 3.5&quot; Long</td>
</tr>
<tr>
<td>&gt;35' to 60'</td>
<td>25' x 25'</td>
<td>22' x 22'</td>
<td>1'</td>
<td>7/8&quot; - 9 UNC x 3.5&quot; Long</td>
</tr>
</tbody>
</table>

**NOTES:**

2. The required combination arm rise shall be built into the gusset plate at the angle X. The angle X is described as $\arctan \left( \frac{R}{L} \right)$, where R is the combination arm rise and L is the arm length. Both R and L vary and are listed in the Arm Dimensions Table on Standard Drawing E 805-TSCS-03.
3. Use continuous backing ring, 5/16" x 2" minimum. Tack weld only in root area of final weld.
NOTES:
3. Diameter at the bottom of Pole Section 2 shall match the diameter at the top of Pole Section 1.
**NOTES:**

1. Orient bottom splice and bottom connection plates with combination arm as shown on the bottom splice plate detail on Standard Drawings E 805-TSCS-04 and -12.
2. All plate dimensions shall be based upon the outside diameter D at the top of pole section 1.
3. Diameter at bottom of pole section 2 shall match the diameter at the top of pole section 1.

---

**ELEVATION**

1. **Top connection plate**
   - 4 - 1 1/8" Ø bolts each with 1 hex nut
   - 2 - 5/16" thick plate washers with standard holes
   - 1" thick plate

2. **Bottom connection plate**
   - 5/16" thick plate

3. **Handhole B**
   - Pole section 1

**BOTTOM CONNECTION PLATE**

- 6 - 1 1/8" Ø X 2 3/4" long bolts all threads with lock washers

---

**INDIANA DEPARTMENT OF TRANSPORTATION**

**TRAFFIC SIGNAL CANTILEVER STRUCTURE**

**COMBINATION POLE SPLICE DETAILS FOR ARM OF GREATER THAN 35' TO 60'**

**SEPTEMBER 2013**

**STANDARD DRAWING NO.**

E 805-TSCS-13

---

/s/ Alfredo B. Hanza 02/05/13

DESIGN STANDARDS ENGINEER DATE

/s/ Alfredo B. Hanza 03/27/13

CHIEF ENGINEER DATE

No. 60020657

STATE OF INDIANA

PROFESSIONAL ENGINEER
NOTE:
1. The structure arms and pole are designed for the above loading conditions. Foundation types A and C are designed for arms having length of 35 ft or less. See Standard Drawings E 805-TSCS-16 and -18 for foundation types A and C.
NOTES:


2. The structure arms and pole are designed for the above loading conditions. Foundation types B and D are designed for arms having length of greater than 35 ft to 60 ft. See Standard Drawings E 805-TSCS-17 and -19 for foundation types B and D.

INDIANA DEPARTMENT OF TRANSPORTATION
TRAFFIC SIGNAL CANTILEVER STRUCTURE
COMBINATION ARM LOADING
FOR ARM OF GREATER THAN 35' TO 60'
SEPTEMBER 2013

STANDARD DRAWING NO. E 805-TSCS-15

/s/ Alfredo B. Hanca 02/05/13
DESIGN STANDARDS ENGINEER  DATE

/s/ Mark A. Miller 03/27/13
CHIEF ENGINEER  DATE
### Reinforcing Bars

<table>
<thead>
<tr>
<th>NUMBERS</th>
<th>LENGTH (ft.)</th>
<th>WEIGHT (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#7</td>
<td>12'-6&quot;</td>
<td>9</td>
</tr>
<tr>
<td>#4</td>
<td>9'-5&quot;</td>
<td>14</td>
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</tbody>
</table>

Total Reinforcing Bars: 88

Concrete, Class A: 318 CYS

### Notes:
1. Alternate 6" x 6" x 1/2" square washer with hex nut welded to lower end may be substituted for bent anchor bolt.
2. Bolt circle, b, shall allow clearance for the plate washer. Cutting or trimming the washer will not be allowed.
4. A tooled line or other type of permanent marking shall be provided on the top of the foundation to indicate the direction of the conduit.

---

**Standard Details:**

- **Anchor Bolt A Detail:**
  - Anchor bolt cover
  - Base plate A
  - Drilled shaft top
  - Metal skirt

- **Metal Skirt Detail:**
  - 5/16" stud bolt (Typ.)
  - 3/8" x 2" Slots
  - 5/16" Ø stud holes (Typ.)

- **Grounding Bushing:**
  - See Standard Drawing E 805-5GGR-01

---

**Bill of Materials**

<table>
<thead>
<tr>
<th>REINFORCING BARS</th>
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</thead>
<tbody>
<tr>
<td>SIZE OR MASK</td>
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<tr>
<td>#7</td>
</tr>
<tr>
<td>#4</td>
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</table>

Total #7: 230
Total #4: 88
Total Reinforcing Bars: 318

Concrete, Class A: 3.4 CYS

---

**Drawing Information:**

- **Standard Drawing No.:** E 805-TSCS-16
- **Elevacation:**
  - 2'-0"
  - 1'-6"
- **Section H-H:**
  - 1'-0"
  - 3'-0"

---

**Signature:**

- Alfredo B. Hanza, Design Standards Engineer
  - 02/05/13
- Mark A. Miller, Chief Engineer
  - 03/27/13
### EN 805-TSCS-17

**Bill of Materials**

<table>
<thead>
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<th>Drilled Shaft Type B</th>
<th>Reinforcing Bars</th>
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</thead>
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<td>Size or Mark</td>
<td>Number of Bars</td>
</tr>
<tr>
<td>#7</td>
<td>401</td>
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<tr>
<td>Total #7</td>
<td>17</td>
</tr>
<tr>
<td>Total Reinforcing Bars</td>
<td>617</td>
</tr>
</tbody>
</table>

**Concrete**

- Concrete, Class A
- 7.5 CYS

**Notes:**

1. Alternate 8" x 8" x 1/2" square plate tapped and welded to the anchor bolt may be substituted for bent anchor bolt.
2. Bolt circle, b, shall allow clearance for the plate washer. Cutting or trimming the washer will not be allowed.
4. A tooled line or other type of permanent marking shall be provided on the top of the foundation to indicate the direction of the conduits.

**Drawing Elements:**
- **Base plate B**
- **Metal skirt (See detail)**
- **1" Ø conduit for ground wire**
- **See Standard Drawing E 805-SGGR-01**
- **3/8" x 2" Slots**
- **5/16" Ø Stud Holes (Typ.)**
- **1 1/2" x 2 1/2" Min. Clearance**
- **To Weld At Pole**
- **2 1/4"Ø x 8'-0" Anchor bolts (typ.) on 2'-7" bolt circle evenly spaced**
- **2 1/4" anchor bolts**
- **1 6'-0" 401 X 12'-6"**
- **1'-9 7/8" 2'-6"**
- **1'-0" Max. Spacing**
- **2'-7" Bolt circle**
- **2 1/2"Ø Hole**
- **Metal skirt (See detail)**
- **2 1/4"Ø anchor bolts**
- **4'-0" 4" Max. Spacing**
- **4 1/2" Diameter**
- **6 1/2" Diameter**
- **4" Radius**
- **1" Diameter**
- **2" Diameter**
- **3/8" Diameter**
- **1 1/2" Diameter**
- **2 1/2" Diameter**
- **3" Diameter**
- **5/16" Diameter**

**Sections:**
- **Section I-I**
- **Plan**
- **Elevation**
- **Shard Section**
- **Skirt Detail**

**Design Standards Engineer:**

- Alfredo B. Hanza

**Chief Engineer:**

- Mark A. Miller
NOTES:

1. Alternate 6" x 6" x 1/2" square washer with hex nut welded to lower end may be substituted for the bend in the anchor bolt.

2. Minimum H required is 4 ft. soil cover over the entire footing area.

3. Bolt circle, B, shall allow clearance for the plate washer. Cutting or trimming the washer will not be allowed.


6. A tooled line or other type of permanent marking shall be provided on the top of the foundation to indicate the direction of the conduits.

**BILL OF MATERIALS**

<table>
<thead>
<tr>
<th>REINFORCING BARS</th>
<th>SIZE OR MASK</th>
<th>NUMBER OF BARS</th>
<th>LENGTH</th>
<th>WEIGHT (lbs.)</th>
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</thead>
<tbody>
<tr>
<td>701</td>
<td>6</td>
<td>11'-4&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>702</td>
<td>8</td>
<td>6'-0&quot;</td>
<td></td>
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<tr>
<td>Total #7</td>
<td>237</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>501</td>
<td>15</td>
<td>11'-8&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total #5</td>
<td>183</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total #4</td>
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<tr>
<td>Total #3</td>
<td>33</td>
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<tr>
<td>Total Reinforcing Bars</td>
<td>677</td>
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</tr>
</tbody>
</table>

**CONCRETE**

Concrete, Class A 8.2 CYS

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**ANCHOR BOLT C DETAIL**

See alternate ending ①

**PLAN**

1" Ø conduit for ground wire See Standard Drawing E 805-SGGR-01

**SECTION L-L**

1" Ø conduit 2" Ø conduits

**SECTION K-K**

1 3/4"Ø Anchor bolts 1 1/4" Min. clearance to weld at pole

**SECTION 3-3**

Base plate A

**ELEVATION**

301 x 11'-0" 302 x 3'-4" 501 x 11'-8" 701 x 11'-4"

**GROUNDING BUSHING**

2" Ø conduit

**INDIANA DEPARTMENT OF TRANSPORTATION**

**TRAFFIC SIGNAL CANTILEVER STRUCTURE**

**SPREAD FOOTING FOUNDATION TYPE C**

**FOR ARM OF 35' OR LESS**

**SEPTEMBER 2013**

---

**STANDARD DRAWING NO.**

E 805-TSCS-18

---

**CHIEF ENGINEER**

03/27/13 /s/ Mark A. Miller

---

**DESIGN STANDARDS ENGINEER**

02/05/13 /s/ Alfredo B. Hanza
### Bill of Materials

**Concrete**

<table>
<thead>
<tr>
<th>Size or Mark</th>
<th>Number of Bars</th>
<th>Length (ft.)</th>
<th>Weight (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>801</td>
<td>8</td>
<td>11'-5&quot;</td>
<td>504</td>
</tr>
<tr>
<td>802</td>
<td>16</td>
<td>6'-1&quot;</td>
<td>341</td>
</tr>
</tbody>
</table>

Total Reinforcing Bars: 1468

---

### Notes:

1. Alternate 8" x 8" x 1/2" square plate tapped and welded to anchor bolt may be substituted for the bent anchor bolt.

2. Minimum H required is 4 ft. soil cover over the entire footing area.

3. Bolt circle, B, shall allow clearance for the plate washer. Cutting or trimming the washer will not be allowed.


6. A tooled line or other type of permanent marking shall be provided on the top of the foundation to indicate the direction of the conduits.