**PRESTRESSED CONCRETE PILE NOTES:**

**DESIGN SPECIFICATIONS:**

**SPIRAL TIES:**
Each wrap of spirals shall be tied to at least two corner strands. One turn required for spiral splices.

**CONCRETE CLASS:**
Concrete for all piles shall be Class V (Special) except designated High Moment Capacity Piles (Index 20631) shall be Class VI.
Concrete for the High Capacity Collar Splice shall be Class V (Special).

See “GENERAL NOTES” in Structures Plans for any specific locations where the use of Silica Fume is required.

**CONCRETE STRENGTH:**
The pile cylinder strength shall be 6,000 psi minimum at 28 days and 4,000 psi minimum at time of transfer of the Prestressing Force. The cylinder strength for designated High Moment Capacity Piles (Index 20631) shall be 8,500 psi minimum at 28 days and 6,500 psi minimum at time of transfer of the Prestressing Force.

**SPICE BONDING MATERIAL:**
The material to fill dowel holes and form the joint between pile sections shall be a Type B Epoxy Compound in accordance with Specification Section 926 and shall be contained on the Approved Products List (APL). Use Epoxy Bonding Compound or Epoxy Mortar as recommended by the Manufacturer. For Epoxy Mortar only use sand or other filler material supplied by the manufacturer and in the proportions recommended.

**PICK-UP POINTS:**
Piles shall be marked at the pick-up points to indicate proper points for attaching handling lines.

**REINFORCING STEEL:**
All reinforcing steel shall meet the requirements of Specification Section 450.

**PRESTRESSING STEEL:**
Prestressing steel shall be seven-wire strand, Grade 270, Low-Relaxation Strand (LRS).

**CORROSION PROTECTION OF EXPOSED STRANDS:**
For all pile ends exposed to the environment and not embedded under final conditions, protect strands in accordance with Specification Section 450.
NOTE:
1. For Sections D-D, E-E, & F-F see Index Nos. 20612, 20614, 20618, 20620, 20624 or 20630 for applicable concrete pile size and Pile Splice Reinforcement Details.
2. Prestressing strands, spiral ties and/or reinforcement are not shown for clarity.
3. In cases where pile splices are desired due to length limitations in shipping and/or handling, the "Drivable Preplanned Prestressed Precast Splice Detail" shall be used. Mechanical Pile Splices contained on the Approved Products List (APL) may also be used.
4. When preformed dowel holes are utilized, the 1" spiral tie pitch shall be continued to 4'-0" below the head of the pile. See Index Nos. 20618, 20620 & 20624. Preformed holes shall utilize either removable preforming material or stay-in-place core concrete. Stay-in-place core concrete shall be fabricated from galvanized sheet steel, meeting the requirements of ASTM A593. Coating Designation 560, 26 gauge. Ducts shall be 2" diameter with a minimum corrugation (rib) height of 0.12 in. Ducts shall be fabricated with either welded or interlocked seams. Galvanizing of welded seams shall not be required.
5. For tension piles where top of Prestressed Pile is less than 3 feet below Pile Cut-off Elevation, extend No. 10 Dowels into cap beyond Pile Cut-off Elevation to achieve development as approved by the Engineer.
Face of Concrete

Bottom surfaces of enclosure to be epoxy coated just prior to concrete casting per manufacturer's installation procedures.

Dataport Interface Cable (to radio module assembly)

NOTES:
1. For piles 18" and larger installed for bridge foundations, provide EDC Instrumentation in accordance with Specification Section 455.
2. Attach Tip Gauge extension cable to the underside of the strand shown in Section A-A. Secure cable to strand with nylon wire ties spaced a maximum of 6ft. along cable.
**ELEVATION**

**SECTION A-A**

**ALTERNATE STRAND PATTERNS**

- 4 - 0.6" Ø, Grade 270 LRS, at 44 kips
- 8 - ½" Ø (Special), Grade 270 LRS, at 25 kips
- 8 - ½" Ø, Grade 270 LRS, at 24 kips
- 8 - ½" Ø, Grade 270 LRS, at 23 kips
- 12 - ¾" Ø, Grade 270 LRS, at 16 kips

**SECTION D-D**

(See Nondrivable Unforeseen Reinforced Precast Pile Splice Detail)

- 4 - No. 10 Bars (Full Length)
- 12" Square Precast Pile
- 3" Cover (Typ.)
- 12" Spiral Ties

**SECTION E-E**

(See Drivable Unforeseen Prestressed Precast Pile Splice Detail)

- 12" Square Precast Pile
- 3" Cover (Typ.)
- 12" Spiral Ties
- 4 - No. 10 Dowels

**NOTES:**

1. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.

2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:
   - Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
   - The total strand pattern shall be concentric with the nominal concrete section of the pile.
**14" SQUARE PRESTRESSED CONCRETE PILE**

**NOTES:**
1. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:
   - Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
   - The total strand pattern shall be concentric with the nominal concrete section of the pile.

**ALTERNATE STRAND PATTERNS**
- 8 - 0.6" Ø, Grade 270 LRS, at 33 kips
- 8 - 0.6" Ø (Special), Grade 270 LRS, at 31 kips
- 8 - 0.6" Ø, Grade 270 LRS, at 31 kips
- 12 - 0.375" Ø, Grade 270 LRS, at 21 kips
- 16 - 0.325" Ø, Grade 270 LRS, at 16 kips

**SECTION A-A**
- See Alternate Strand Patterns
- W3.4 Spiral Ties

**SECTION D-D**
- (See Nondrivable Unforeseen Reinforced Precast Splice Detail)

**SECTION E-E**
- (See Drivable Unforeseen Prestressed Precast Splice Detail)

**PILE SPLICE REINFORCEMENT DETAILS**

**3" COVER (Typ.)**
- W3.4 Spiral Ties @ 6" pitch, full length

**14" SQUARE PRESTRESSED CONCRETE PILE**
**ELEVATION**

**ALTERNATE STRAND PATTERNS**

12 - 0.6" Ø, Grade 270 LRS, at 35 kips
12 - 0.75" Ø (Special), Grade 270 LRS, at 34 kips
16 - 0.75" Ø, Grade 270 LRS, at 26 kips
20 - 0.875" Ø, Grade 270 LRS, at 21 kips
24 - 1" Ø, Grade 270 LRS, at 17 kips

**NOTES:**

1. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:
   - Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
   - The local strand pattern shall be concentric with the nominal concrete section of the pile.

**SECTION A-A**

See Alternate Strand Patterns

**SECTION D-D**

(See Nondrivable Unforeseen Reinforced Precast Splice Detail)

**SECTION E-E**

(See Drivable Prestressed Precast Splice Detail)

**SECTION F-F**

(See Drivable Preplanned Splice Detail)

**PILE SPLICE REINFORCEMENT DETAILS**
**ALTERNATE STRAND PATTERNS**

- 12 - 0.6" Ø, Grade 270 LRS, at 42 kips
- 16 - 0.75" Ø (Special), Grade 270 LRS, at 31 kips
- 16 - 0.75" Ø, Grade 270 LRS, at 31 kips
- 24 - 0.833" Ø, Grade 270 LRS, at 21 kips

**NOTES:**

1. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.

2. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows:

   - Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
   - The total strand pattern shall be concentric with the nominal concrete section of the pile.
**ALTERNATE STRAND PATTERNS**

- 16 - 0.6" Ø, Grade 270 LRS, at 44 kips
- 20 - 1½" Ø (Special), Grade 270 LRS, at 34 kips
- 24 - 1½" Ø, Grade 270 LRS, at 31 kips

**NOTES:**
1. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.
2. Any of the given Alternate Strand Patterns may be utilized.
   The strands shall be located as follows:
   - Place one strand at each corner and place the remaining strands equally spaced between the corner strands.
   - The total strand pattern shall be concentric with the nominal concrete section of the pile.

**SECTION D-D**

**SECTION E-E**

**SECTION F-F**

See Nondrivable Unforeseen Reinforced Precast Pile Splice Detail
ALTERNATE STRAND PATTERNS

20 - 0.6" Ø, Grade 270 LRS, at 41 kips
24 - ½" Ø (Special), Grade 270 LRS, at 34 kips
28 - ¾" Ø, Grade 270 LRS, at 29 kips

NOTES:
1. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows: Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.
2. CONTRACTOR OPTION: The 30" pile may be cast SOLID by omitting the 18" Ø void. In this event, the Contractor shall submit calculations for approval and a proposed strand configuration that provide net prestressing after losses equal to 1000 psi. Alternate configurations for the diagonal ties, to maintain the position of the 4 - No. 8 Bars, may be approved by the Engineer.
3. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.

1. Any of the given Alternate Strand Patterns may be utilized. The strands shall be located as follows: Place one strand at each corner and place the remaining strands equally spaced between the corner strands. The total strand pattern shall be concentric with the nominal concrete section of the pile.
2. CONTRACTOR OPTION: The 30" pile may be cast SOLID by omitting the 18" Ø void. In this event, the Contractor shall submit calculations for approval and a proposed strand configuration that provide net prestressing after losses equal to 1000 psi. Alternate configurations for the diagonal ties, to maintain the position of the 4 - No. 8 Bars, may be approved by the Engineer.
3. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles and Index No. 20601 - Square Prestressed Concrete Pile Splices.
1. After the pile is driven and cut to grade, the top 8'-0" of the 18" Ø Void shall be filled with concrete. Prior to filling, the top 8'-0" of the 18" Ø Void with concrete, strip the cardboard form material from the void and sand/water blast all interface surfaces. Seal void and fill with potable water for 4-5 hours. Remove water to a surface-saturated-dry condition prior to making the concrete pour. In lieu of the cardboard form material and the surface preparation requirements described above, a stay-in-place corrugated thin wall galvanized pipe may be used. The concrete fill material shall be of the same type and strength as called for in the pile cap and paid for as substructure concrete.

2. Collar concrete shall reach a strength of 6,000 psi before pile driving is resumed.

3. Work this Index with Index No. 20600 - Notes and Details for Square Prestressed Concrete Piles.
### Table of Maximum Pile Pick-Up and Support Lengths

<table>
<thead>
<tr>
<th>Maximum Pile Length (Feet)</th>
<th>Required Storage and Transportation Detail</th>
<th>Pick-Up Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>119</td>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>170</td>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
</tbody>
</table>

**Design Specifications:**


**Concrete Class:**

Concrete for all piles shall be Class V (Special). Concrete for pile splices shall be Class IV. See "General Notes" in Structures Plans for any specific locations where the use of Silica Fume is required.

**Concrete Strength:**

The cylinder strength shall be 6,000 psi minimum at time of transfer of the Prestressing Force.

**Splice Bonding Material:**

The material to form the joint between pile sections shall be a Type B Epoxy Compound in accordance with Section 926 of the Specifications. The bonding agent used on internal pile surfaces shall be a Type A Epoxy Compound in accordance with Section 926 of the Specifications. Epoxy Compounds shall be listed in the Approved Products List (APL). Use Epoxy Bonding Compound or Epoxy Mortar as recommended by the Manufacturer. For Epoxy Mortar only use sand or other filler material supplied by the manufacturer and in the proportions recommended.

**Pile Pick-Up Points:**

Piles shall be marked at the pick-up points to indicate proper points for attaching handling lines.

**Reinforcing Steel:**

All reinforcing steel shall meet the requirements of Specification Section 450.

**Prestressing Steel:**

Prestressing tendons shall be made up of two seven-wire strands. Prestressing strands shall be 0.75" Ø (Special), Grade 70, low relaxation, at 33.8 kips.

**Pile Driving After Splicing:**

Pile splices shall reach a minimum strength of 3500 psi before driving is resumed.
1'-0" Ø Void, open top and bottom to allow through venting of sections

Roughen inside surface of 54" Ø Pile to ½" amplitude for Spliced Pile Section

Closed No. 4 Bars or W20 Wire Ties @ 1'-0" ± (Typ.)

Full Epoxy Compound Joint around cylinder pile wall only (See Detail "R")

24 - No. 11 Bars

24 - ½" Ø Formed Holes for Tendons @ Equal Spaces

1½" Ø Formed Hole (1 tendon per hole; 2 - ½" Ø (Spec.) strands per tendon shown as (*) GROUT per Specification 938)

Concrete Seal

Clean inside surface of 54" Ø Pile with a high pressure water blast (3000 psi Min.) and apply bonding agent for Driven Prestressed Pile

* For Spun Cast Cylinder Piles, the following requirements for concrete cover apply:
1. Slightly or Moderately Aggressive Environments: The concrete cover may be reduced to 2 inches.
2. Extremely Aggressive Environments: The concrete cover may be reduced to 2 inches as long as the concrete has a documented chloride ion penetration apparent diffusion coefficient with a mean value of 0.005 in² per year or less; otherwise, a 3-inch concrete cover is required.

Inside Pile Wall
Full epoxy compound joint

Temporary Blocking Form to retain epoxy compound

Gasket

Form to retain epoxy compound

Outside Pile Wall

Full Epoxy Compound Joint around cylinder pile wall only (See Detail "R")

2'-0" Min. Cover

3" Min. Cover

54" Ø Pile

4 - Longitudinal Spacers (No. 3 Bars or W11 wire) for Spiral Ties @ Equal Spaces

W11 Spiral Wire Ties

W20 Wire Spiral Ties

No. 4 Bars or W20 Wire Ties

24 - ½" Ø Formed Holes for Tendons @ Equal Spaces

SECTION A-A

SECTION B-B

DETAIL "A"
**Table of Maximum Pile Pick-Up and Support Lengths**

<table>
<thead>
<tr>
<th>Maximum Pile Length (Feet)</th>
<th>Required Storage and Transportation Detail</th>
<th>Pick-Up Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>2, 3, or 4 point</td>
<td>1 Point</td>
</tr>
<tr>
<td>174</td>
<td>2, 3, or 4 point</td>
<td>2 Point</td>
</tr>
</tbody>
</table>

**Design Specifications:**
- SPIRAL TIES:
  - One full wrap of spirals is required at both the head and tip of pile. One half turn required for spiral splices.
- CONCRETE CLASS:
  - Concrete for all piles shall be Class V (Special). Concrete for pile splices shall be Class IV. See "GENERAL NOTES" in Structures Plans for any specific locations where the use of Silica Fume is required.
- CONCRETE STRENGTH:
  - The cylinder strength shall be 4,000 psi minimum at time of transfer of the Prestressing Force.
- SPLICE BONDING MATERIAL:
  - The material to form the joint between pile sections shall be a Type B Epoxy Compound in accordance with Specification Section 926. The bonding agent used on internal pile surfaces shall be a Type A Epoxy Compound in accordance with Specification Section 926. Epoxy Compounds used shall be contained on the Approved Products List (APL). Use Epoxy Bonding Compound or Epoxy Mortar as recommended by the Manufacturer. For Epoxy Mortar only use sand or other filler material supplied by the manufacturer and in the proportions recommended.
- PICK-UP POINTS:
  - Piles shall be marked at the pick-up points to indicate proper points for attaching handling lines.
- REINFORCING STEEL:
  - All reinforcing steel shall meet the requirements of Specification Section 450.
- PRESTRESSING STEEL:
  - Prestressing steel shall be 0.6" Ø seven-wire strand, Grade 270 (low relaxation, at 440 kips).
- PILE DRIVING AFTER SPLICING:
  - Pile splices shall reach a minimum strength of 5500 psi before driving is resumed.
Concrete Seal

2'-0" M in. Cover

Driven Prestressed Pile

Closed No. 4 Bars or W20 Wire Ties @ 1'-0" ± (Typ.)

Roughen inside surface of 60" Ø Pile to 8" amplitude for Spliced Pile Section

Full Epoxy Compound Joint around cylinder pile wall only (See Detail "A")

Clean inside surface of 60" Ø Pile with a high pressure water blast (3000 psi Min.) and apply bonding agent for Driven Prestressed Pile

Concrete Seal

1'-0" Ø Void, open top and bottom to allow through venting of sections

Detail "A"

SECTION A-A

SECTION B-B

Form to retain epoxy compound

Temporary Blocking Form to retain epoxy compound

Full Epoxy Compound Joint

60" Ø

W11 Wire Spiral Ties

24 - No. 11 Bars @ Equal Spaces

2" Min. Cover (Typ.)

3" Min. Cover (Typ.)

36 - 0.6" Ø Strands @ Equal Spaces

60" Ø

W11 Wire Spiral Ties

24 - No. 11 Bars @ Equal Spaces

1'-0" Ø Void

1'-0" Min. Lap Splice

No. 4 Bars or W20 Wire Ties

3" Min. Cover (Typ.)

Spiral Ties

W11 Wire

1'-0" Min. Lap Splice

No. 4 Bars or W20 Wire Ties

W20 Wire Ties

Cast in Place Plug

36 - 0.6" Ø Strands @ Equal Spaces

60" Ø

36 - 0.6" Ø Strands @ Equal Spaces

60" Ø

36 - 0.6" Ø Strands @ Equal Spaces

60" Ø

45" Ø Void

3" Min. Cover (Typ.)

Spiral Ties

W11 Wire

Cast in Place Plug

DETAIL "A"

DRIVABLE UNFORESEEN FIELD SPLICE DETAIL
(Cast in Place Plug)