# Index 21800 Series Post-Tensioning

## Design Criteria

***AASHTO LRFD Bridge Design Specifications***, 6th Edition; ***Structures Design Guidelines (SDG)***; ***Specification*** Sections 452, 453 and 462

## Design Assumptions and Limitations

Indexes 21801, 21802 and 21803 depict various details and requirements for post-tensioning systems used on department projects. Use these standards with Specification Sections 452, 453 and 462 and the Approved Post Tensioning Systems List on the SDO website.

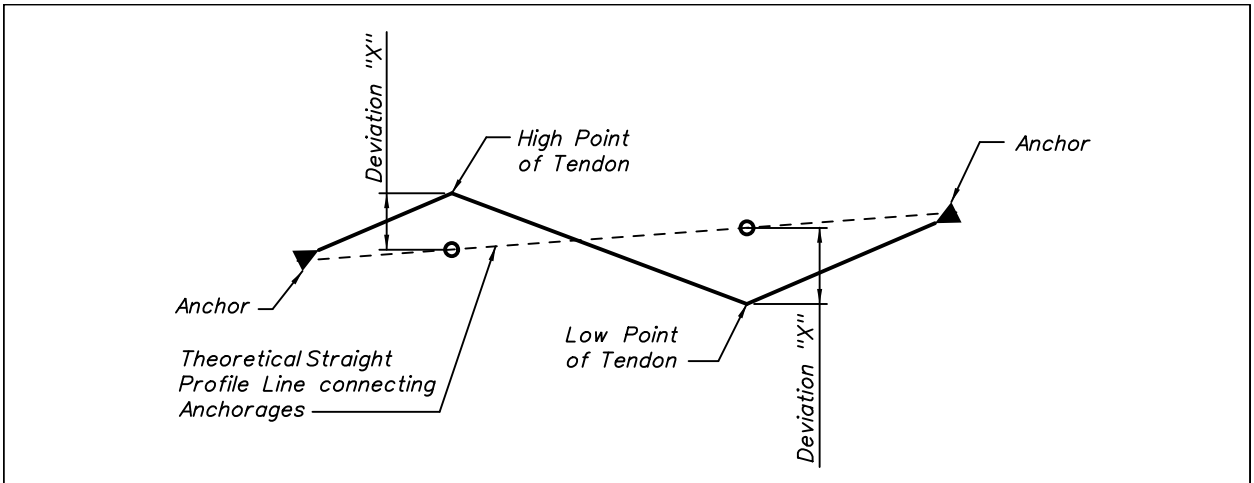
## Plan Content Requirements

In the Structures Plans:

Grouting and Anchor Protection: In addition to providing post tensioning quantity and stressing information on the plans, the designer shall provide general grouting information for each tendon type and anchor protection information for all tendons on the project, see Index 21801, 21802 and 21803. See below for example post-tensioning schedules for both PT Bars and tendons, respectively.In cases where the tendon types and anchor protection details shown in the Index are not sufficient for specific project requirements, the designer shall supplement the drawings as necessary. Deviations from Standard Drawings however, require the Department's approval.

Detail to the following FDOT Standard tendon anchorage sizes: 4k6, 7k6, 12k6, 15k6, 19k6, 27k6.

Top slab transverse tendons, top slab cantilever tendons and bottom slab continuity tendons with Deviation "X" less than or equal to 20" shall be treated as a Profile 12 tendon for grouting procedures (see sketch below).




TENDON PROFILE DEVIATION

For projects that utilize post tensioning bars, complete the following "Post-Tensioning Bar Data Table" and include it in the plans:

| POST-TENSIONING BAR DATA TABLE | | | | | | | | | | Table Date 01-01-12 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BAR DESIGNATION | NO. REQUIRED | BAR SIZE | BAR LENGTH (Ft-in) | BAR WEIGHT (lbs) | TOTAL WEIGHT (lbs) | STRESSING FORCE/BAR (kips) | *** STRESSING END | ELONGATION (in) | * TENDON PROFILE | ** ANCHOR PROTECTION TYPE | |
| | | | | | | | | | | AHEAD STA. | BACK STA. |
| | | | | | | | | | | | |

For non-longitudinal bars, ahead-station denotes left anchor, back-station denotes right anchor (looking ahead-station). For mostly vertical bars, ahead-station denotes top anchor, back-station denotes bottom anchor.
* See Post-Tensioning Vertical Profiles, Design Standards Index 21801.
** See Post-Tensioning Anchorage Protection, Design Standards Index 21802.
*** Stressing End Definitions:
- Ahead Station: Bar Live/Stressing End is ahead-station anchor.
- Back Station: Bar Live/Stressing End is back-station anchor.

For projects that utilize post tensioning tendons, complete the following "Post-Tensioning Tendon Data Table" and include it in the plans:

| POST-TENSIONING TENDON DATA TABLE | | | | | | | | | | | | | | Table Date 01-01-12 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TENDON DESIGNATION | NO. REQUIRED | TENDON SIZE | TENDON LENGTH (Ft-in) | TENDON WEIGHT (lbs) | TOTAL WEIGHT (lbs) | AHEAD-STATION STRESSING FORCE / TENDON (kips) | BACK-STATION STRESSING FORCE / TENDON (kips) | FORCE @ AHEAD-STATION END AFTER ANCHOR SET (kips) | FORCE @ BACK-STATION END AFTER ANCHOR SET (kips) | *** STRESSING END | THEORETICAL ELONGATION @ AHEAD-STATION END (in) | THEORETICAL ELONGATION @ BACK-STATION END (in) | * TENDON PROFILE | ** ANCHOR PROTECTION TYPE | |
| | | | | | | | | | | | | | | AHEAD STA. | BACK STA. |
| | | | | | | | | | | | | | | | |

In general, for non-longitudinal tendons, ahead-station denotes left anchor, back-station denotes right anchor (looking ahead-station). For mostly vertical tendons, ahead-station denotes top anchor, back-station denotes bottom anchor.
* See Post-Tensioning Vertical Profiles, Design Standards Index 21801.
** See Post-Tensioning Anchorage Protection, Design Standards Index 21802.
*** Stressing End Definitions:
- Ahead Station: Tendon Live/Stressing End is ahead-station anchor.
- Back Station: Tendon Live/Stressing End is back-station anchor.
- Alternate (ahead/back): Tendon Initial Live/Stresssing End is ahead-station anchor with associated elongation. Tendon Subsequent Live/Stressing End is back-station anchor with associated elongation.
- Alternate (back/ahead): Tendon Initial Live/Stresssing End is back-station anchor with associated elongation. Tendon Subsequent Live/Stressing End is ahead-station anchor with associated elongation.
- Double: Tendon Live/Stresssing End is simultaneously the ahead-station and back-station anchor with respective elongations.

Include the geometric effects of the profile grade and cross slope on tendon geometry when determining the appropriate vertical profile to specify in the data tables.

If necessary, the note(s) below the Data Tables may be modified by the EOR on a project by project basis to better clarify a unique tendon profile or arrangement.

When specifying the anchor protection type in the Post-Tensioning Bar Data Table or the Post-Tensioning Tendon Data Table, use the following descriptions in conjunction with the following figure and the details shown on Index 21802 for determining the appropriate callout:

**Type 1** - Anchor protection used for exposed surfaces for strand or bar tendons on Segmental Box Girder Superstructures, Integral or Straddle Pier Caps, Footings, etc.

**Type 2** - Anchor protection used for strand tendons anchoring in top flange blockouts or end of spliced Girder Segments.

**Type 3** - Top inspected anchor protection used for strand or bar tendons on Segmental Box Girder Superstructures constructed using the balanced cantilever method.

**Type 4** - Anchor protection used for strand tendons on the top surfaces of Piers.

**Type 5** - Anchor protection used for strand or bar tendons with interior blisters on Segmental Box Girder Superstructures.

**Type 6** - Anchor protection used for strand tendons on Flat Slab Superstructures.

**Type 7** - Anchor protection used for transverse strand tendons (generally 4 strands or less) on Segmental Box Girder Superstructures and other transversely post-tensioned superstructures.

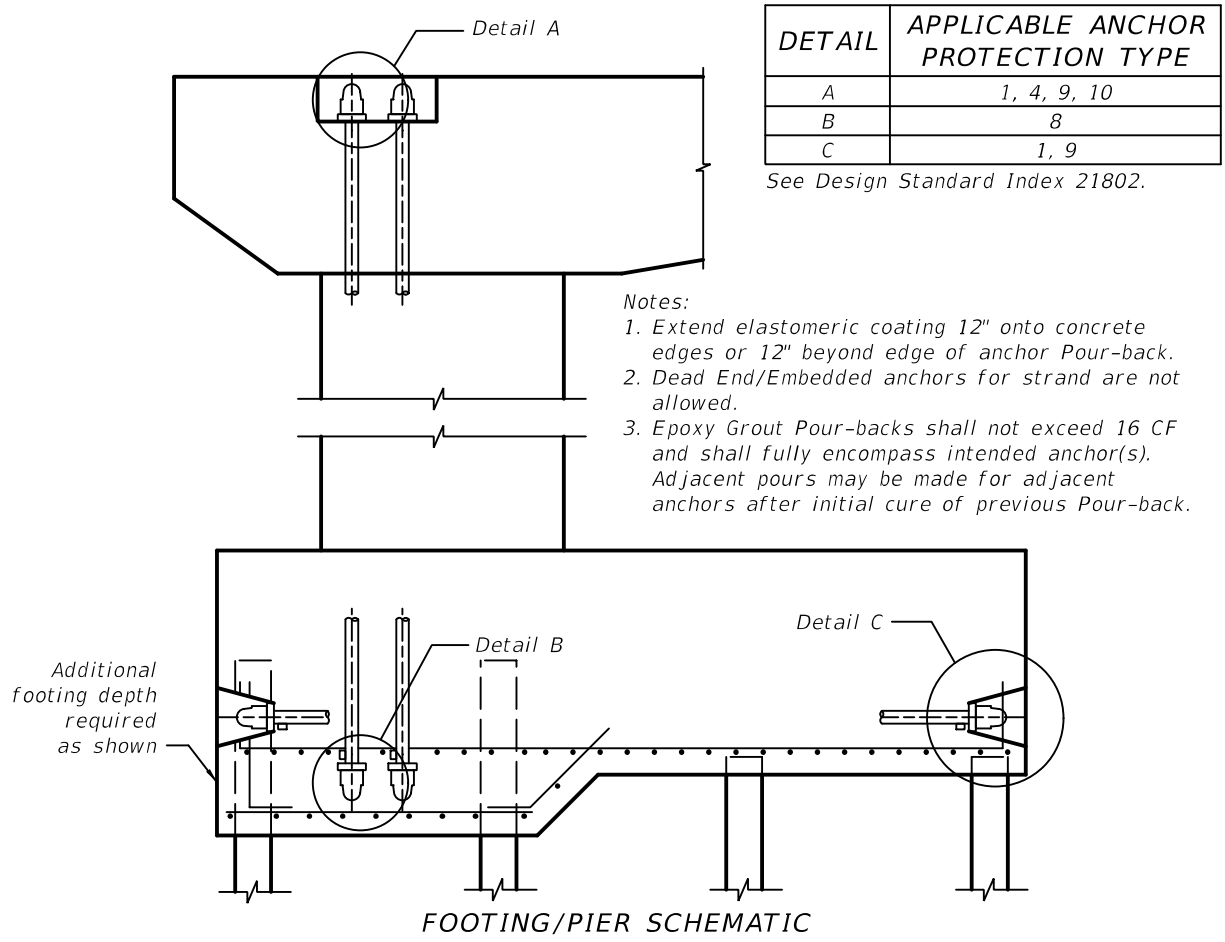
**Type 8** - Dead end anchor protection used for vertical bar tendons.

**Type 9** - Anchor protection used for bar tendons on Segmental Box Girder Pier Diaphragms, Footings, top surfaces of Piers, Integral or Straddle Pier Caps, etc.

**Type 10** - Anchor protection used for bar tendons on the top surfaces of Piers.

**Types 11 & 12** - Anchor protection used for bar tendons primarily on Integral or Straddle Pier Caps.

## Anchor Protection Types for Footing and Pier Post-Tensioning Applications




| DETAIL | APPLICABLE ANCHOR PROTECTION TYPE |
|---|---|
| A | 1, 4, 9, 10 |
| B | 8 |
| C | 1, 9 |

See Design Standard Index 21802.

Notes:
1. Extend elastomeric coating 12" onto concrete edges or 12" beyond edge of anchor Pour-back.
2. Dead End/Embedded anchors for strand are not allowed.
3. Epoxy Grout Pour-backs shall not exceed 16 CF and shall fully encompass intended anchor(s). Adjacent pours may be made for adjacent anchors after initial cure of previous Pour-back.

FOOTING/PIER SCHEMATIC

## Payment

| Item number | Item description | Unit Measure |
|---|---|---|
| 462-2-AA | Post Tensioning Tendons | LB |
| 462-3 | Additional Post Tensioning in Segmental Box Span<br>*Note: Use for rehabilitation projects only* | EA |

## Sample Tables:

**POST-TENSIONING BAR DATA TABLE** — Table Date 01-01-12

| BAR DESIGNATION | NO. REQUIRED | BAR SIZE | BAR LENGTH (Ft-in) | BAR WEIGHT (lbs) | TOTAL WEIGHT (lbs) | STRESSING FORCE/BAR (kips) | *** STRESSING END | ELONGATION (in) | * TENDON PROFILE | ** ANCHOR PROTECTION TYPE | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | AHEAD STA. | BACK STA. |
| PT-1 | 6 | 1¼ Ø | 21'-9" | 95.50 | 573.0 | 131 | AHEAD STA. | 0.940" | 12 | 10 | 10 |
| PT-2 | 8 | 1⅜ Ø | 16'-6" | 91.74 | 733.9 | 165 | BACK STA. | 0.713" | 12 | 10 | 10 |
| PT-3 | 24 | 1¾ Ø | 80'-0" | 737.60 | 17,702 | 280 | BACK STA. | 3.540" | 17 | 9 | 8 |

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** See Post-Tensioning Anchorage Protection, Design Standards Index 21802.
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**POST-TENSIONING TENDON DATA TABLE** — Table Date 01-01-12

| TENDON DESIGNATION | NO. REQUIRED | TENDON SIZE | TENDON LENGTH (Ft-in) | TENDON WEIGHT (lbs) | TOTAL WEIGHT (lbs) | AHEAD-STATION STRESSING FORCE / TENDON (kips) | BACK-STATION STRESSING FORCE / TENDON (kips) | FORCE @ AHEAD-STATION END AFTER ANCHOR SET (kips) | FORCE @ BACK-STATION END AFTER ANCHOR SET (kips) | *** STRESSING END | THEORETICAL ELONGATION @ AHEAD-STATION END (in) | THEORETICAL ELONGATION @ BACK-STATION END (in) | * TENDON PROFILE | ** ANCHOR PROTECTION TYPE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | AHEAD STA. | BACK STA. |
| 1 | 6 | 12-0.6 | 650'-0⅞" | 5757 | 34542 | 562.5 | 562.5 | 454.9 | 468.9 | Alt. (back/ahead) | 10.9 | 32.2 | 15 | 1 | 1 |
| 2 | 6 | 12-0.6 | 650'-1¾" | 5758 | 34548 | 562.5 | 562.5 | 456.3 | 456.3 | Alt. (back/ahead) | 10.8 | 31.6 | 15 | 1 | 1 |
| 3 | 6 | 12-0.6 | 650'-3⅝" | 5759 | 34554 | 562.5 | 562.5 | 458.4 | 459.8 | Alt. (back/ahead) | 10.6 | 31.0 | 15 | 1 | 1 |
| 4 | 6 | 12-0.6 | 650'-6¼" | 5761 | 34566 | 562.5 | 562.5 | 465.4 | 465.4 | Alt. (back/ahead) | 10.6 | 30.3 | 15 | 1 | 1 |

In general, for non-longitudinal tendons, ahead-station denotes left anchor, back-station denotes right anchor (looking ahead-station). For mostly vertical tendons, ahead-station denotes top anchor, back-station denotes bottom anchor.
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