



## Florida Department of Transportation

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### STRUCTURES DESIGN BULLETIN 14-06

DATE: April 30, 2014

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Construction Engineers, District Structures Design Engineers, District Maintenance Engineers

FROM: Robert V. Robertson, P. E., State Structures Design Engineer

COPIES: Brian Blanchard, Tom Byron, Duane Brautigam, David Sadler, Tim Lattner, Jeffrey Ger (FHWA)

SUBJECT: Revisions to Policy for Post-Tensioning Tendons

### REQUIREMENTS

The Florida Department of Transportation (FDOT) will be implementing the use of wax filler material in lieu of grout for corrosion protection on certain post-tensioning tendons in the near future.

The tendons for which wax filler material will be used include external tendons and the following internal tendons:

- Tendons with vertical deviation greater than 20" as currently defined by *Instructions for Design Standards* 21800
- Continuity tendons in segmental box girders
- Tendons in I-beams and U-Girders
- Strand tendons with vertical or predominantly vertical geometry
- Horizontal strand tendons in hammerhead, straddle and C-piers

All tendons with wax filler material will be assumed to be unbonded and must be designed and detailed to be fully replaceable. The wax filler material that will be used will be the same as, or very similar to, that which is already being used in Europe and elsewhere for the same purpose. Smooth wall polyethethylene (PE) duct will continue to be used for external tendons and will also be used for internal tendons with wax filler material.

For external tendons in segmental box girder bridges, the use of diabolos will be permitted at diaphragms and deviators. At pier segments and deviators where the tendon runs continuously through, the PE duct will also be permitted to run continuously through without the use of a section of steel pipe. The PE duct used for these tendons will be required to be compatible with the wax filler material and have sufficient wear-through and long term creep resistance so as to resist the radial forces imparted to it by the unbonded tendon.

In general, grout will continue to be used for all bar tendons and the following internal strand tendons with predominantly flat geometries:

- Tendons with vertical deviation less than or equal to 20"
- Transverse and longitudinal tendons in slabs

Grout material requirements are also being modified to improve the quality and performance of the finished product. Corrugated polypropylene duct will continue to be used for grouted internal tendons. These tendons will be assumed to be fully bonded.

An FDOT related research project entitled "Replaceable Unbonded Tendons for Post-Tensioned Bridges" is already underway. Results of this research project will be considered for inclusion in the design, detailing and construction criteria that are under development.

## **BACKGROUND**

Recurring issues and complications associated with the use of grout as a corrosion preventing filler material have illustrated the need for development of alternative techniques and materials for corrosion protection of tendons. One such promising technique is the use of a corrosion inhibiting wax filler material that is pumped into the duct after the tendon is stressed. Wax filler materials have been used successfully for this purpose for selected tendons in post-tensioned European bridges for over 10 years.

## **IMPLEMENTATION**

Design and detailing criteria, standard drawings and construction and material specifications are under development and will be distributed for review and comment to all of the post-tensioning vendors that interact with the FDOT. Draft versions of these items will be available no later than August 1, 2014 with the completed items released no later than October 1, 2014. The construction and material specifications will be included in the January 2016 eBook.

Construction projects to demonstrate the use of waxed post-tensioning systems will be identified over the coming months.

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