



Florida Department of Transportation

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JOSE ABREU
SECRETARY

December 22, 2004

MEMORANDUM
(FHWA Approved 12/22/04)

This Memo has Expired

TO: District Structures Design Engineers
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 District Directors of Production
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 District Directors of Operations
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 District Structures and Facilities Engineers
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 District Construction Engineers
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FROM: William Nickas, P.E., State Structures Design Engineer
 Ananth Prasad, P.E., Director, Office of Construction

COPIES: Freddie Simmons, Bob Greer, Sharon Holmes, Lap Hoang, Chester Henson, John Harris, Larry Sessions, Jack Evans, Marcus Ansley, David O'Hagan, Robert Robertson, Andre Pavlov, Dave Sadler, Steve Plotkin, Jeffrey Ger (FHWA)

SUBJECT: Temporary Design Bulletin CO4-08
 DCE Memorandum No. 26-04
 Grout Pads Beneath Miscellaneous Structure Baseplates

REQUIREMENTS:

1. The Plans Preparation Manual, Section 29.1, add the following paragraph at the end of the section:

Grout pads underneath the baseplates in double-nut moment joints of miscellaneous highway structures (i.e. mast arms, overhead sign structures, high mast lights, steel strain poles and monotube structures) shall be considered optional. Each FDOT District shall establish a policy as to when and/or where these pads shall be installed.

2. The Design Standards Index Nos. 17723, 17502, 17745 and 17746 as well as Structures Standard Index Nos. 2000 and 2010 shall be revised to incorporate the following:

- Where grout pads are detailed, the notation "Optional" will be added.
- Baseplates shall be secured with double nuts both above and below the baseplate. The locking nuts shall be half-height nuts. The standoff distance (the distance between the bottom of the full-height leveling nut and the top of the foundation) shall not exceed one anchor bolt diameter.
- For overhead signs and high mast light poles, notes shall be added or revised to specify that grout pads shall be constructed of non-shrink grout in accordance Standard Specifications Section 934 using procedures detailed in Section 649-6.
- For all affected standards, a note shall be added that when grout pads are omitted, the top of the supporting pedestals or drilled shaft foundations shall be no closer than 12" above finished grade.
- For all structures constructed without grout pads, a galvanized wire cloth screen shall be added to prevent debris and other matter from accumulating between the top of the foundation and the bottom of the baseplate. The screen shall be attached to the baseplate with self tapping screws.

3. Revise the Standard Specification for Road and Bridge Construction as follows:

649-6 shall be reformatted and modified to include a general section that will state, "649-6.1 General: Furnish and install grout when specified on the plans."

IMPLEMENTATION:

Structures Standard Indexes for these structures will be modified and released in July, 2005 and specifications modified for construction lettings in July, 2006.

COMMENTARY:

According to NCHRP Report 469, Fatigue-Resistant Design of Cantilevered Signal, Sign and Light Supports, 2002, "The use of grout under the baseplate in double-nut moment joints is not recommended because:

- a) It may crack, retain moisture, and then promote corrosion.
- b) It makes it impossible to inspect and retighten bottom nuts if necessary.
- c) In order to place the grout after the baseplate is in place, the standoff distance between the top of concrete and the bottom of the leveling nut may exceed the recommended distance equal to the anchor rod diameter. Research has shown that the local bending of individual anchor rods from shear forces and torsion becomes very significant as this standoff distance increases much more than this one diameter limit."

Conversely, it can be argued point by point that the use of properly constructed and maintained grout pads under the baseplate would:

- a) Inhibit moisture from getting to the anchor bolts.
- b) Prevent the bottom nuts from getting loose. These nuts may loosen as there is no second nut below them to assure they do not back off. A second nut is not used as that would increase the standoff distance.
- c) Not need to consider strict standoff distance criteria that is detailed in all drawings to insure the one diameter limit is maintained.

Therefore, it shall be left to the discretion of each District's Structures Design Engineer to consider on a case-by-case basis whether grout pads underneath miscellaneous structures are appropriate.

BACKGROUND & ADVISORIES:

Past failures of grout pads underneath miscellaneous highway structures revealed that they were improperly constructed. In many instances, these pads were not constructed using approved procedures. Instead, duct tape was wrapped around the anchor bolts so as to create a back form for the grout pad pour or dry-packing of concrete. This procedure actually promotes corrosion and totally defeats the purpose of the grout pad. Many Districts want to eliminate grout pads in rural areas but in order to prevent the space from being clogged with debris and harmful materials, the top of the supporting foundation should be set at a minimum of 12" above finished grade and a screen attached to the baseplate (see TAG Agenda Item July 04-2).

The State Structures Office has advised operational units of nationwide concerns about grout pads. Therefore, for existing overhead sign and high mast lighting structures, thorough inspections of the connections between the structures to its foundation should occur during the next inspection cycle. These inspections should include the following:

1. Notations of any exterior staining, voids, pockets or cracks on the grout pads.
2. Notations on the tightness of the nuts to the anchor bolts. Loose nuts should be re-tightened in accordance with Section 460-8.1.8 of the Standard Specifications.
3. Removal of the lower access hatches and a visual observation for any moisture trapped at the base of the structures.
4. Using handheld mirrors and flashlights note the grout pads' extent underneath the columns (is it full width and height, partial width and/or height, a grout ring, etc.).
5. If the grout pads are not full width and height, note the extent of any corrosion on the exposed anchor bolts.

For existing mast arms, steel strain poles and monotube structures, maintenance personnel responsible for these structures should also consider inspecting them to the extent cited above.

Structures determined to not have properly constructed grout pads should be reported to the State Construction Office who should pursue the contractor for remedial work as a Latent Defect. Report to the State Construction Office the name of the contractor who built the structure, when the project was completed and the location of the structure. All defective grout pads should be re-constructed from non-shrink grout in accordance with Section 934 using procedures detailed in Section 649-6. Once the contractor has removed the defective grout pad, a new grout pad may only be installed on projects whose anchor bolts exhibit no corrosion through their section.

Structures which have evidence of corrosion on their anchor bolts should be further inspected by a licensed professional engineer who should estimate the amount of section loss that has occurred. This engineer should then determine if the structure still meets the original design criteria. The contractor should submit the engineer's calculations to the State Structures Design Office for review and approval before proceeding with any repairs. If the structure is determined by the Department to meet the original design criteria, the contractor would be permitted to remove the corrosion from the anchor bolts and apply a zinc paint coating in accordance with Section 562 of the Standard Specifications. Leveling nuts should be checked and re-positioned if necessary to achieve the proper standoff distance. The grout pad may then be properly installed under the baseplate. If the structure is determined by the Department to not meet the original design criteria, a new foundation shall be constructed for the structure.

WNN/DOH/h

Attachments