

CONSULTING ENGINEERS
GENERAL MEMORANDUM 09-07

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING AND
HIGHWAY OPERATIONS
OFFICE OF ENGINEERING

New Bridge Design Standard Practices and Revised
Bridge Design Manual

May 1, 2009

To: CONSULTING ENGINEERS

The “Bridge Design Standard Practices” are hereby revised to include the new enclosed standard practices entitled “Pile Order Lengths and Test Piles” and “Maximum Design Pile Load”. Section 5 – Abutments, Piers and Walls of the Bridge Design Manual has been revised accordingly. Section 6 of the Geotechnical Engineering Manual and Section 7.02 of the Standard Specifications have also been revised to reflect these changes and other best practices. Section 5.15.1 and Section 5.15.2 and Design Aids 3.4.9a thru 3.4.14 of the Bridge Design Manual have been revised to incorporate previous “Bridge Design Standard Practices”.

All projects with an anticipated FDP date of September 1, 2009 or later shall incorporate these new design practices. A general special provision for Section 7.02-Piles has been prepared and needs to be included with any project that incorporates these new practices.

The Revised Bridge Design Manual and Geotechnical Engineering Manual can be viewed on the Department of Transportation’s Publications web page. The revised Section 7.02-Piles of the Standard Specifications, is available on the Soils and Foundations-Guide Specifications web page.

Very truly yours,

Manager of Consultant Design
Bureau of Engineering and
Highway Operations

Enclosure

BRIDGE DESIGN STANDARD PRACTICES

Pile Order Lengths and Test Piles

The current practice of generating pile order lists after driving test piles has significantly impacted the construction schedule of numerous projects. Delays associated with this practice can be severe when the pile type selected has limited availability and/or when the project's environmental permit includes seasonal work restrictions. In many cases, the test pile results do not lead to an order length which is significantly different than the original estimated pile lengths.

Proposed new practice:

Pile order lengths for end bearing piles on bedrock should be provided on the design plans when there is confidence in the subsurface profile. Test piles are still typically required to establish pile order lengths and pile capacity for friction piles. If pile driving records and pile load test data are available for a site (e.g. a bridge widening where the same pile type is proposed), specifying the pile order length on the design plans may be considered.

Readily available pile types should be used whenever possible; especially if the order length can not be established until after test piles are driven.

Maximum Design Pile Load

The current practice for displaying the controlling maximum axial design pile load was developed for a working stress design approach and is not consistent with the LRFD Bridge Design Specification. LRFD designs have different resistance factors applied to the geotechnical ultimate pile capacity based on the limit state being evaluated and the level of construction control being applied. Additional guidance is required to insure the proper value is being used to determine the required capacity of a pile.

Proposed new practice:

The controlling maximum axial pile load will be determined and displayed for each limit state. The geotechnical and structural designer will evaluate each limit state and determine an ultimate pile capacity for each substructure. The ultimate pile capacity is defined as the factored axial pile load divided by the resistance factor plus scour and downdrag resistances. The ultimate pile capacity is the value used for load testing and for sizing pile driving equipment. The contract drawings shall include a table that shows the ultimate pile capacity value for each substructure.