



# Illinois Department of Transportation

## Memorandum

---

To: ALL GEOTECHNICAL MANUAL USERS 10.2  
From: Ralph E. Anderson *Ralph E. Anderson*  
Subject: LRFD Geotechnical Pile Design and Construction Changes  
Date: February 3, 2010

---

IDOT recently completed research with the University of Illinois, aimed at reducing the cost of LRFD pile foundations. Various static methods used for pile design were evaluated and compared with several dynamic formulas which verify pile bearing resistance during construction. The study identified the most accurate method and formula for soils, piles, and driving equipment common to Illinois and developed procedures to increase agreement between estimated and driven lengths. As a result, the Department will now require the new Modified IDOT Static Method be used for geotechnical pile design and inclusion of the revised Guide Bridge Special Provision (GBSP) 68, which now specifies use of the WSDOT dynamic formula for pile acceptance.

The Modified IDOT static method is based on our past procedures but has key differences, including new side and tip surface area assumptions for H-piles, a pile type correction factor, and an improved resistance factor of 0.55. An all Geotechnical Manual Users (AGMU) Design Guide 10.2 is available on the IDOT website ([http://www.dot.il.gov/bridges/Design\\_Guides/AGMU\\_10.2-Geotechnical\\_Pile\\_Design\\_Guide.pdf](http://www.dot.il.gov/bridges/Design_Guides/AGMU_10.2-Geotechnical_Pile_Design_Guide.pdf)), replacing Design Guide 3.10.1, to document the new procedure. The new static method has also been programmed into a spreadsheet available at (<http://www.dot.il.gov/bridges/dcspreadsheets.html>) to help SGR authors provide the planner and structure designer with pile design tables for various pile types and bearing values.

The updated GBSP 68 located at (<http://www.dot.il.gov/bridges/GBSP68.pdf>), requires use of the WSDOT formula, developed by Tony Allen of the Washington State DOT, to verify nominal driven bearing in place of the currently specified FHWA Gates formula. In addition, the GBSP will expand the range of acceptable pile penetration rates, modify the hammer size recommendations and include a new factor to account for hammer type efficiency. To assist inspectors in determining when bearing has been obtained and Contractors with hammer selection, the "WSDOT Pile Bearing Verification" spreadsheet was developed and is available at (<http://www.dot.il.gov/bridges/dcspreadsheets.html>).

The GBSP 68 shall be used on all projects on and after the April 2010 letting. The Modified IDOT Static Method shall be used immediately on all SGRs not yet approved. If you have any questions, please contact William Kramer of our Foundations & Geotechnical Unit at (217) 782-7773 or [William.kramer@illinois.gov](mailto:William.kramer@illinois.gov) for further assistance.