# PENNDOT e-Notification

## Bureau of Design
## Bridge Quality Assurance Division

| **PAPIER**<br>No. 006<br>August 30, 2002 | **Clarification of Need to Assess Factored Minimum Pile Forces for Extreme Limit States in LRFD** |
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The following issues have been identified regarding factored minimum pile forces for extreme limit states in LRFD:

1)  On p. 5-59b of the PAPIER user's manual (Version 1.1), statements are made to suggest that the pile forces reported in the `'Minimum Pile Forces — Strength Limit States'` output table can be disregarded except for special circumstances, such as micropiles designed to resist tension.

**This notification is to inform users that the factored minimum pile forces reported for <u>all EXTREME limit states</u> must be specifically evaluated for acceptability, as reported in the `'Minimum Pile Forces — Strength Limit States'` output table for a LRFD analysis.**

Factored minimum pile forces for the extreme limit states need to be evaluated in LRFD because, unlike LFD, there are no corresponding service limit states (group load combinations) that include extreme event forces, such as earthquake.  In LFD, service Group-VII includes earthquake forces, and, therefore, the impact of seismic forces is appropriately evaluated even though the foundation design is based solely on service level forces.

ISSUE 2
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2)  The program may not report the correct performance ratio for factored minimum pile forces for extreme event limit states in the formal output.  The performance ratios reported by the program for Extreme limit states are based on the value entered for Parameter 13 ('Pile Tension Capacity') of the FTG command instead of the 'Pile Earthquake Tension Capacity' value (Parameter 14.)  Note, however, that the correct performance ratios are reported in the dump file under the `'Footing MAX/MIN Pile Forces'` table.

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3)  The program is not using the 'Pile Earthquake Tension Capacity' input value (Parameter 14 of the FTG command) for user-specified limit states defined as an "extreme" type ('EXT' input for Parameter 19 in conjunction with 'L' input value for Parameter 1 of the LFR command.)  Instead, the program is using the regular 'Pile Tension Capacity' value (Parameter 13 of the FTG command.)

4)  The user is cautioned about the handling of user-specified loads (loads entered via the UBF, UCP, UCL and UFR commands.)  If user-defined loads are added to strength limit states, they should also be appropriately added to the service limit state so that the serviceability aspects of these loads can be properly evaluated.

Please direct any questions concerning the above issues to:

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