MAY 2015 MEETING

Wednesday, May 13, 2015 (1.0 PDH)

TECHNICAL PROGRAM

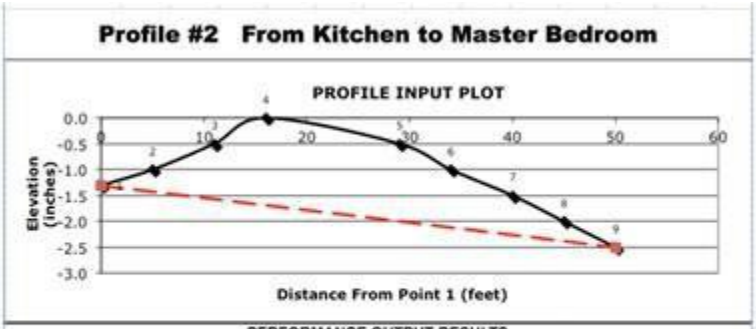
Guidelines for the Evaluation of Foundation Movement for Residential and Other Low-Rise Buildings – *An Update*

Speaker: Lowell Brumley, P.E., with BEC-Lin Engineering, LP, Houston TX, Tel. (281) 664-8440.

Mr. Brumley, Past FPA President and founding member, Structural Subcommittee Chair, and licensed professional engineer with MSCE and BSCE degrees from UT Arlington will present the FPA Structural Committee's paper no. FPA-SC-13-1, "Guidelines for the Evaluation of Foundation Movement for Residential and Other Low-Rise Buildings – *an Update*." Mr. Brumley worked as a design engineer in prestressed concrete for 5 years after graduating from college and for the last 33 years he has worked in the design and forensic evaluation of thousands of foundations, primarily in Texas.

The FPA's Structural Committee first published its FPA-SC-13 guideline in July 2007 under the leadership of Mr. Brumley, who chaired the subcommittee that developed the guideline over a 4-year period. Since 2007 that Rev. 0 peer-reviewed document has been used across Texas as well as in other states where foundation movement is common. In August 2012 the Structural Committee decided to update the guideline and formed a new ad hoc subcommittee under the leadership of co-chairs Lowell Brumley and Michael Skoller. Having recently passed the FPA peer review process, the new Rev. 1 guideline was just published, replacing the Rev. 0 version, and is freely available to the public here. The foundation performance analysis software developed and used by the subcommittee in developing the revised document is freely available to FPA members only here.

PRESENTATION SUMMARY



PERFORMANCE OUTPUT RESULTS

	ACTUAL	RESULT	PT. 1	PT. 2	PT. 3
Deflection 1 =	L / 348	****EXCEEDS L/360 LIMIT BY 4%****	1	4	7
Deflection 2 =	L / 348	***EXCEEDS L/360 LIMIT BY 3%***	2	4	6
Deflection 3 =	L / 349	**EXCEEDS L/360 LIMIT BY 3%**	1	4	8
Tilt =	0.20 %	20% OF 1% LIMIT			

The presentation on May 13, 2015 for the evaluation of residences and low rise buildings was given as an update to the original FPA-SC-13 paper. The presentation highlighted the changes made to the original "Guidelines".

How much foundation movement is too much?

The peer reviewed guideline Mr. Brumley presented was written to help answer that question with less subjectivity than has been experienced using other methods. The intent of the guideline is that it be used as a guide to determine if a foundation has performed within certain foundation performance limits; it does this through its inclusion of guidelines for data acquisition and presentation of the data, coupled with prescribed computations that are compared against limiting movement criteria.

Mr. Brumley's presentation addressed who should use the guideline, how field data should be retrieved and documented, how the field data should be correlated and analyzed, and how the analysis results should be reported depending on the client's intended use of the results. For those familiar with using the 2007 Rev. 0 version of the guideline, Mr. Brumley briefly reviewed the changes since that publication. He also demonstrated use of the software developed by the subcommittee to more efficiently perform the data analysis described in the guideline.

The presentation gave a brief description of the history to the paper's development; various documents, which were reviewed and referenced, that already contained existing guidelines and standards for slab-on-ground foundations; the methods used to investigate foundation movements and the major changes between the original version of this

paper and the new current version.

The paper discussed causes of foundation movement, construction tolerances and design limits versus performance limits. Several of the previous definitions for terms used in the first paper were clarified and reworded.

Levels of investigation and what are included in each level was discussed, along with procedures and data acquisition for foundation evaluation. Examples were given of how to present and evaluate elevation readings taken in the field on a foundation system.
Primary changes made from version 0 to version 1 include:

- Clarifications of how the effective length is to be used in the procedure.
- Implementing the requirement that a contour plan or cross section analysis be used to analyze deflection when the foundation's performance requires checking against the deflection limit.
- Removal of the k factor option that was previously offered to reduce the deflection limit in cases where the profile chosen was not on a principal axis of the foundation.
- Providing an example showing the user how to follow the evaluation procedure from start to finish, including field observations and measurements, documentation of the site, floor plans, phenomena, elevations, level distortion contours, slopes, etc., and analyzing deflection and tilt based on chosen profiles, comparing the results with the deflection and tilt limits.
- Updating the spreadsheet software available to the FPA members for analyzing deflection and tilt per the procedure. The update included allowing more input data points and ensuring the minimum effective length is not violated. Additional output is now provided on the spreadsheet.

Finally, the presentation outlined the FPA's current allowable guidelines for foundation movement, along with key points and reasons for choosing these current values.

To download a copy of the guideline being presented by Mr. Brumley, click here.

To download a copy of the slides presented by Mr. Brumley, click here

To download a copy of the spreadsheet software authored by the subcommittee (for members only), click here.

To read summaries of previous FPA presentations by Mr. Brumley, please click:

August 2007 - Guidelines for the Evaluation of Foundation Movement for Residential and Other Low-Rise Buildings

December 2002- Comments to the Use and Application of the PTI Method and Suggestions for Further Research

PAST PRESENTATIONS (click here)