BSI NEWSLETTER

Bridge Software Institute

Spring, 2009 Issue #11

Welcome to the latest issue of the BSI Newsletter!

In this issue's Technical Corner we will discuss some of the new features available with the release of FB-Deep v2.01c.

The articles 'Technical Corner' and 'Discussions' are open for input from all readers. If you have a topic that you think should be discussed, let us know. Did you create a great model with features that you want to share? Everyone is welcome to submit articles for possible inclusion in subsequent issues. Please contact BSI at BSI@ce.ufl.edu with your ideas.

What's New at BSI

We are pleased to announce the release of FB-MultiPier v4.12c, FB-Deep v2.01c and Atlas v6.01. These programs are available for download from the BSI website.. The new versions contain fixes to the latest reported bugs and also includes a number of new features. Soil Parameter Tables have been added to FB-MultiPier via the Help Manual and our website, these are preliminary default values. Soil Parameter Tables

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Technical Corner

New Version FB-Deep 2.01c

FB-Deep, a program that estimates the static axial capacity of drilled shafts and driven piles, has undergone a major upgrade for its v2.01 release. This upgrade features two enhancements: CPT Analysis (Fig. 1) and FDOT Database Connectivity (Fig. 2). First let's look at CPT. CPT is an analysis type that uses Cone Penetration Test data to compute pile capacity.

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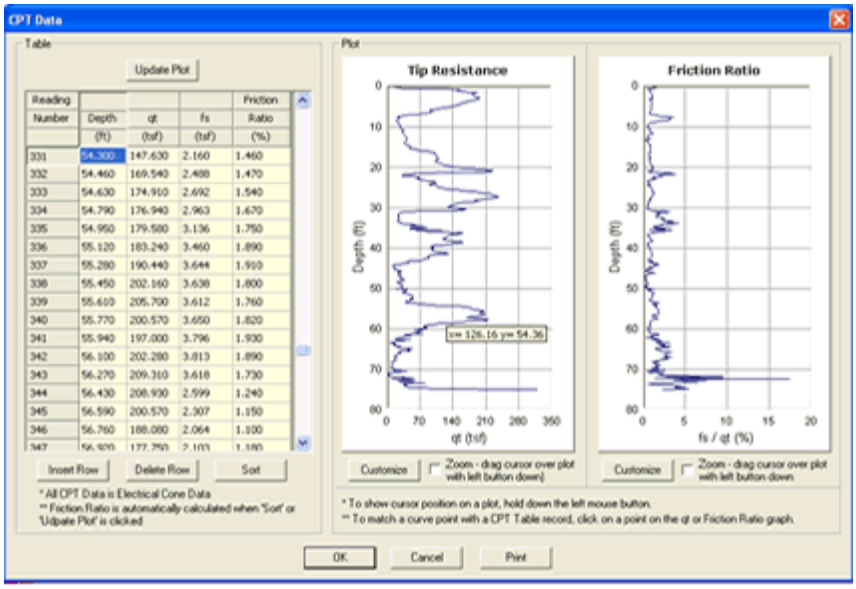

Fig. 1

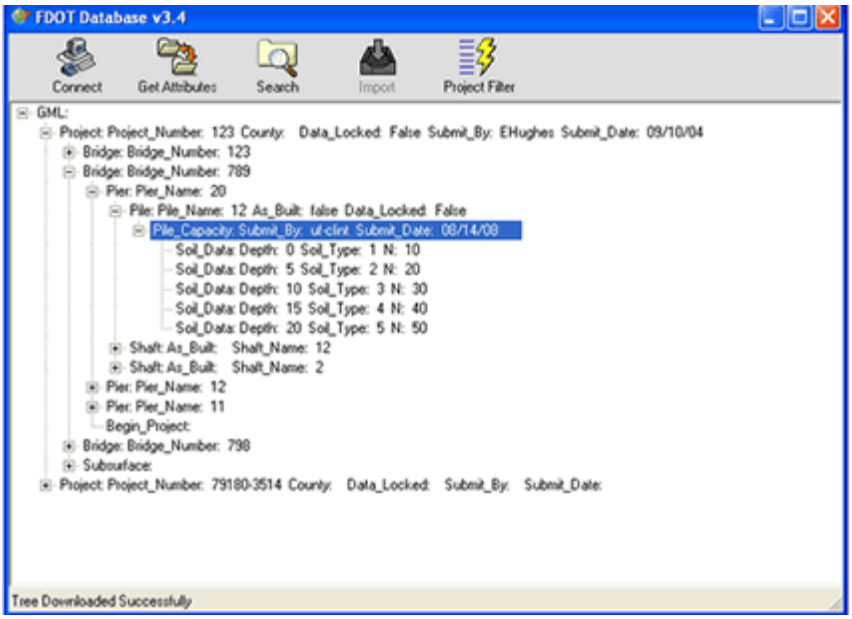

Fig. 2

More specifically, CPT is an in-situ test which pushes a cone into the ground at a constant rate. While being pushed, the cone takes measurements of tip resistance and sleeve friction at 2 cm intervals. The advantages of CPT are the ability to develop a continuous profile of the test site, cost savings, and to accurately measure the strengths of soft soils. Three CPT methods are available in FB-Deep: UF, LCPC, and Schmertmann. The UF method was developed at the University of Florida for the Florida Department of Transportation. It has the advantage of being able to provide better resistance factors and account for cemented soils. The LCPC method is widely used throughout Europe. The Schmertmann method is specified by the AASHTO LRFD Bridge Design Specification.

The Florida Department of Transportation (FDOT), in conjunction with the University of Florida, has developed a Geotechnical Database. This database contains geotechnical laboratory data, as well as construction as-built in-situ data. FB-Deep features connectivity to this database (Fig. 2), so that users can store and retrieve soil data for driven piles and drilled shafts. A login account is required to use the database. Contact the IT support department of your company to have your account created. FB-Deep cannot upload or download pile/shaft data (pile length, diameter, shape and etc). This enhancement will be added to the future version.

MultiPier v4.12c
FB-Deep v2.01c
Atlas v6.01

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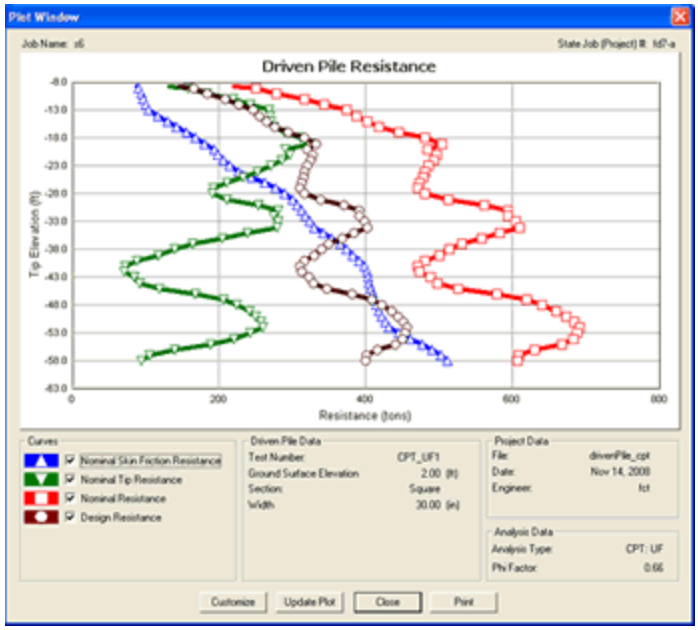

Fig. 3

In addition to CPT and Database features, the graphical output has also been greatly improved. The plot area can now be easily customized. For example, Capacity and Resistance Curves can be added or removed (Fig. 3).

New Version Atlas 6.01

The Florida Department of Transportation (FDOT) has provided funding to update Atlas v5.04 to be in compliance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals including interims through 2006, and to FDOT Design Standard Index 17725.

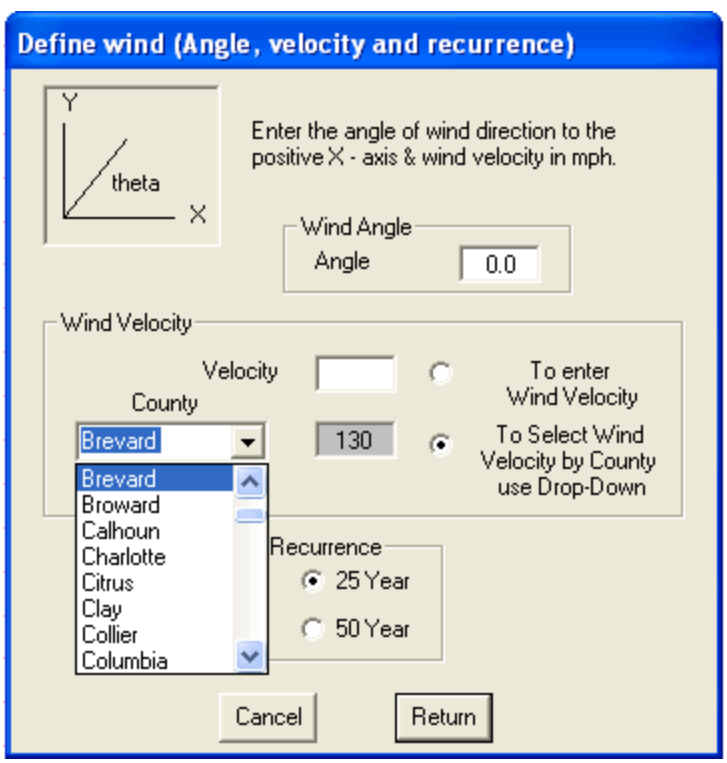

Fig. 4

The primary revisions are as follows:

1. The concrete pole selection is now based upon satisfying both service and strength checks as detailed in the current FDOT Index 17725. The previous index referenced a service approach only.

2. The calculation of the pole embedment length, while still using Brom's method, is modified through use of factored loads and a user-supplied resistance factor.

3. A new wind pressure equation is used which is based upon a basic wind velocity equal to the 3 sec-gust. The wind speed is user-defined or can be selected by reference to the Florida location (Fig. 4). The wind direction to be applied to the signal system is limited from 0 to 90 degrees.

4. A "results viewer" has been added which simplifies the navigation through printed output.

Discussions with...

Henry Bollmann P. E.
Research Engineer, Bridge Software Institute

BSI is currently testing the program generated "design tables" (Fig. 5). These consist of force envelopes which identify the controlling load cases and coexisting forces at all critical locations in the bridge substructure. These tables will be available as excel files and thus it will be convenient for the design engineer to export these design forces for further manipulation. FB-MultiPier currently provides the bi-axial strength interaction and demand/capacity ratio for all beam elements. While being a powerful design tool, especially for columns and piles, it is recognized that the program output must provide additional information to the bridge designer, especially when there are numerous load cases to contend with.

Maximum Forces For All Pile Sections

Pile Cross Section Data for Pier 1

PROP NO.	PILE NO.	ELEM NO	NODE NO.	LOAD CASE	i/j	Max/Min Force	FAX (kips)	F22 (kips)	F33 (kip-ft)	M22 (kip-ft)	M33 (kip-ft)	TORQUE (kip-ft)	D/C (Ratio)
1	1	1	1	1	J	Max Axial	15.19	8.86	0	0	101.74	0	0.37
1	1	1	1	2	J	Min Axial	-102.29	-0.03	0	0	-16	0	0.13
1	1	1	1	1	J	Max f22	15.19	8.86	0	0	101.74	0	0.37
1	1	1	1	2	J	Min f22	-102.29	-0.03	0	0	-16	0	0.13
1	1	1	1	3	J	Max f33	0	0	-16.53	-17.32	0	-47.59	0.06
1	1	1	1	3	J	Min f33	0	0	-16.53	-17.32	0	-47.59	0.06
1	1	1	1	3	J	Max m22	0	0	-16.53	-17.32	0	-47.59	0.06
1	1	10	91	3	I	Min m22	0	0	-16.53	-347.85	0	-47.59	1.21
2	1	11	91	1	J	Max Axial	15.19	8.86	0	0	-75.39	0	0.08
2	1	11	91	2	J	Min Axial	-102.29	-0.03	0	0	-15.43	0	0.05
2	1	11	91	1	J	Max f22	15.19	8.86	0	0	-75.39	0	0.08
2	1	11	91	2	J	Min f22	-102.29	-0.03	0	0	-15.43	0	0.05
2	1	11	91	3	J	Max f33	0	0	-16.53	-347.85	0	-47.59	0.32
2	1	11	91	3	J	Min f33	0	0	-16.53	-347.85	0	-47.59	0.32
2	1	11	91	3	J	Max m22	0	0	-16.53	-347.85	0	-47.59	0.32
2	1	20	101	3	I	Min m22	0	0	-16.53	-678.38	0	-47.59	0.62
2	1	11	91	3	J	Max m33	0	0	-16.53	-347.85	0	-47.59	0.32

Fig. 5

Working in conjunction with the University of Florida (UF) Civil and Coastal Engineering (CCE) department, BSI will soon be making a new FB-MultiPier feature available that will enable bridge designers to conduct dynamic barge impact analysis. This feature is made possible through Florida Department of Transportation (FDOT) funded research conducted by UF-CCE that involved full-scale barge to bridge collisions as well as extensive analytical research and calibration involving non-linear impact simulations.

Tips...

When troubleshooting convergence errors or checking for differences between input or output files, a quick and easy way to do this is to use a file comparison tool such as ExamDiff (Fig. 6) which is freeware available for download from prestoSoft. With ExamDiff you can compare input to input or output to output files and instantly see the differences.

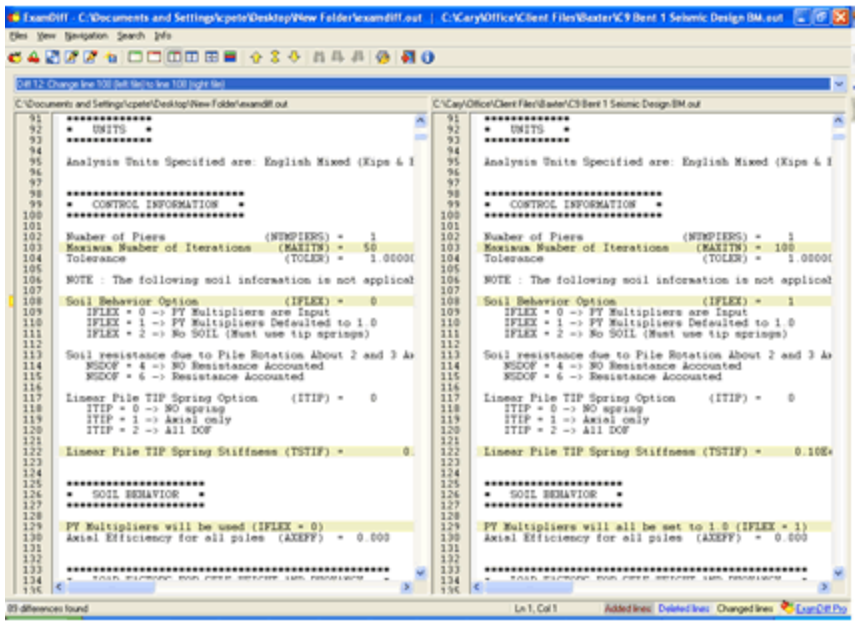

Fig. 6

BSI Program Status

FB-MultiPier V4.12c Download a FREE demo today!
Released: March 3, 2009 - Continuing Development - Technical Support Available

FB-MultiPier is the successor to FB-Pier. In addition to all the capabilities of FB-Pier the FB-MultiPier program allows for the modeling of a whole bridge that consists of multiple piers that are connected with bridge spans. In addition to the multiple load cases and the AASHTO coefficients that are available in FB-Pier, the new program is capable of performing dynamic analysis for the whole bridge. For more information about FB-MultiPier, click here.

FB-Deep V2.01c Download a FREE demo today!
Released: Febuary 13, 2009 - Continuing Development - Technical Support Available

The FB-Deep computer program is a Windows based program used to estimate the static axial capacity of drilled shafts and driven piles. The methodology is based upon Federal Highway Administration (FHWA) reports. FB-Deep guides the user through pile and shaft materials data, shape and dimensional inputs, soil properties, and boring log info. FB-Deep presents the data analysis in both clear graphical and text form. For more information about FB-Deep, click here.

Atlas V6.01
Released: Febuary 25, 2009 - Limited Web Support Available

Atlas is a finite element analysis program that is used for the design/analysis of cable supported traffic signal systems. The Atlas program models dual cable supported systems including single-point or two-point attachments and suspended box systems. For more information about Atlas, click here.

Contact BSI

If you need to contact BSI for any reason you can use any of the methods below:

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