BRIDGEWare® Update

Volume 12, Number 1

May 2008

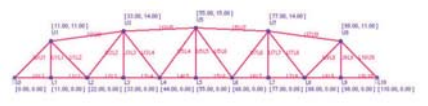
## Strategic Technical Direction Set

The Task Force established its overall technical direction for the coming years and presented it in the June 2007 Newsletter. Completing those objectives remains the focus of the task force. For Pontis, the focus is on the migration of the current client-server architecture to a thin-client or web-based application. Development is complete and testing is underway towards a delivery of version 5.1 in August 2008. Design of 5.2 is also underway and development is expected to begin this summer. (see page 4 for additional details)

Meanwhile, development work on Virtis and Opis continues to center on four fundamental items:

1. Strengthening Virtis' LRFR capability
2. Enhancing Opis as a design tool
3. Enhancing Opis LRFD substructure capabilities
4. Creating an AASHTO LRFD specification-checking module for superstructures

Updates on the progress towards these strategic technical goals can be found on pages 2 and 3 of the AASHTO BridgeWare® Update.

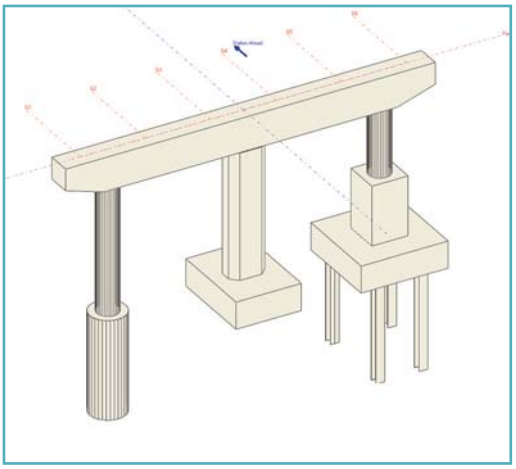


## Support for Gusset Plate Analysis

In response to the recent increased need to evaluate trusses, and specifically truss connections, the Virtis Task Force authorized the development of two new reports to supplement the existing truss analysis and reporting capabilities of Virtis. See the details on page 2.

# AASHTO BRIDGEWare® on the Move

This is an exciting time for the AASHTO BRIDGEWare® Task Force and user community as unprecedented improvements to the software are taking place. The software development phase of Pontis® 5.1 is completed and the testing phase is underway. Release of this new web-based version is planned for August. The detailed functional requirements for 5.2 have been completed by the Task Force. Development is moving forward according to the Strategic Technical Directions set by the Task Force and outlined in the June 2007 Newsletter. One of our strategic goals for Virtis® was met with the release of Version 5.6, which contains LRFR rating capability. For Opis®, new reinforced concrete superstructure and substructure analysis and specification-checking modules will be released very soon in version 6.0, addressing another strategic goal. Looking beyond the 6.0 release, Virtis will be adding another LRFR engine, initially for concrete and shortly thereafter for steel superstructures. Opis will be adding another LRFD analysis and specification-checking engine for prestressed concrete and steel superstructures. To address the goal of enhancing Opis to be a better design tool, design capabilities for prestressed concrete superstructures will be added for version 6.2 with more design features for steel and concrete structures to follow.



There have been several changes to the BRIDGEWare Task Force since the last newsletter. Brian McCaffrey, a member of the Task Force from the New York State Department of Transportation, resigned from NYSDOT and the Task Force to pursue other interests. In January, the Task Force welcomed Tim Armbrecht from the Illinois Department of Transportation. Tim heads the Bridge Ratings & Permits Unit within the Department's bridge office and has been very active in the Virtis/Opis User Group, recently serving as President. Scot Becker, Bureau of Structures Development Chief at the Wisconsin DOT, was selected to round out the Pontis side of the Task Force. Scot brings a wealth of knowledge in the area of bridge management as Pontis gets retooled. And finally, Tom Saad will be serving as the FHWA ex officio member of the Task Force bringing his LRFD and LRFR expertise at the perfect time for Virtis and Opis.

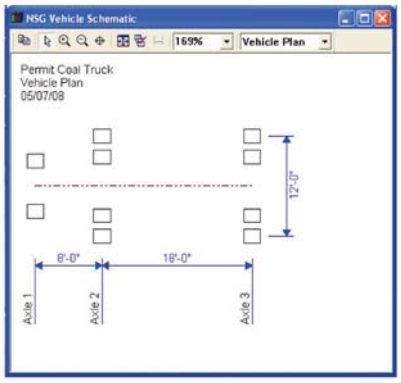
Addressing the needs of the users continues to be the highest priority for the Task Force, and we continue to work hard to address those needs. We appreciate the continued support of our users and value their participation in the Virtis, Opis and Pontis products. It is the hard work of the many volunteers who dedicate much time and effort to provide technical review of and testing assistance for our software that make it what it is today.

I'd also like to thank the Task Force members for their dedication and effort in leading us through the many challenges we face.

- ***George H. Conner***, AASHTO BRIDGEWare® Chair

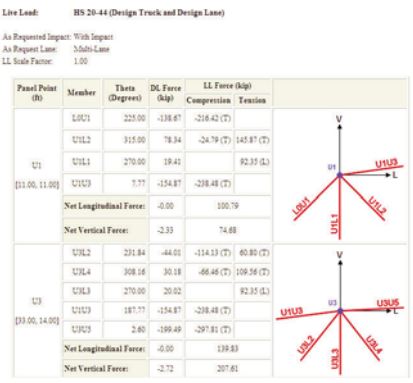
## 5.6 Release (November 2007)

- The ability to perform LRFR load rating.
- Enhancements to the Virtis Standard Engine.
- A new schematic for displaying vehicles that shows wheel and axle configurations.
- Several additional minor enhancements requested by the users, including copying of cross sections flange plate dimensions and an option to allow future wearing surface to be considered for design and ignored for rating.




The 5.6 release included several important enhancements in addition to numerous minor enhancements. The capability to rate structures in accordance with the AASHTO LRFR specification was the featured enhancement. The implementation uses the Wyoming BRASS Girder (LRFD)© module to provide LRFR rating capabilities.

Another important enhancement included in the 5.6 release was the schematic that showed axle and wheel configurations for vehicles. This is especially useful for verification of the description of nonstandard gage vehicles, which often consist of many more axles than standard AASHTO vehicles, with multiple sets of wheels per axle.



Live Load: HS 20-44 (Design Truck and Design Lane)

As Requested Impact: With Impact
As Request Lane: 3-Multi-Lane
LL Scale Factor: 1.00

| Panel Point (ft) | Member | Theta (Degrees) | DL Force (kip) | LL Force (kip) Compression | LL Force (kip) Tension |
|---|---|---|---|---|---|
| U1 [11.00, 11.00] | L0U1 | 225.00 | -138.67 | -216.42 (T) | |
| | U1L2 | 315.00 | 78.34 | -24.79 (T) | 145.87 (T) |
| | U1L1 | 270.00 | 19.41 | | 92.35 (L) |
| | U1U3 | 7.77 | -154.87 | -298.48 (T) | |
| | Net Longitudinal Force: | | -0.00 | 100.79 | |
| | Net Vertical Force: | | -2.33 | 74.68 | |
| U3 [33.00, 14.00] | U3L2 | 231.84 | -44.01 | -114.13 (T) | 60.80 (T) |
| | U3L4 | 308.16 | 30.18 | -66.46 (T) | 109.56 (T) |
| | U3L3 | 270.00 | 20.02 | | 92.35 (L) |
| | U1U3 | 187.77 | -154.87 | -298.48 (T) | |
| | U3U5 | 2.60 | -199.49 | -297.81 (T) | |
| | Net Longitudinal Force: | | -0.00 | 139.83 | |
| | Net Vertical Force: | | -2.72 | 207.61 | |

## Upcoming Release – Version 6.0 (June 2008)

- **Support for Oracle 10.2 and SQL Server 2005**
- **Support for Gusset Plate Analysis**

Two new reports for the truss analysis will be available in Virtis 6.0 to be released in the summer of 2008. The Task Force reviewed several suggested analysis procedures for truss connections and determined the best short-term approach was to provide easy access to the load data required for the analysis procedures. Two reports were designed to provide this information. The first report (see insert) presents the maximum member forces due to dead load and live load for each member at each panel point. The second report presents similar information, but instead of maximum forces, the concurrent member forces for each panel point's member under the critical condition are presented. Both reports are available as option in the Analysis Settings window and the reports can be accessed through the Analysis Output window.

## Future Releases

The following new features are scheduled for upcoming releases:

- **AASHTO LRFR Engine**

The addition of LRFR continues to be an important strategic goal and the Task Force is proceeding with the addition of LRFR to the new AASHTO LRFD engine. LRFR capability will be added to the AASHTO reinforced concrete LRFD engine in early 2009. The prestressed and steel superstructure engines described on page 3 will also contain LRFR support when they are released.

- **Support for "Fishbelly" steel girder profile**
- **Truss enhancements, including trusses with counters and truss type floorbeam members**

## Customer Support Center Software Upgrade

The Customer Support Center software will be upgraded to the latest version during the month of May. Customers and Beta Testers who access the Customer Support Center through a web browser will notice a few differences, but the web site will have a similar appearance and functionality. Developers with direct access will notice significant improvements and a different interface.

Some of the changes to the web interface include:

- More columns available by default for sorting incidents
- Existing description text is write protected, but new description text can be added.
- Workaround and resolution text now appears on separate tabs on the web page
- Printing now produces a PDF that can be saved or sent to a printer
- A few new search features are available
- The icon to e-mail an incident is no longer supported. Instead, users can now print the incident to a PDF and attach it to an e-mail.

## Upcoming Release – Version 6.0 (June 2008)

♦ **Support for Oracle 10.2 and SQL Server 2005**

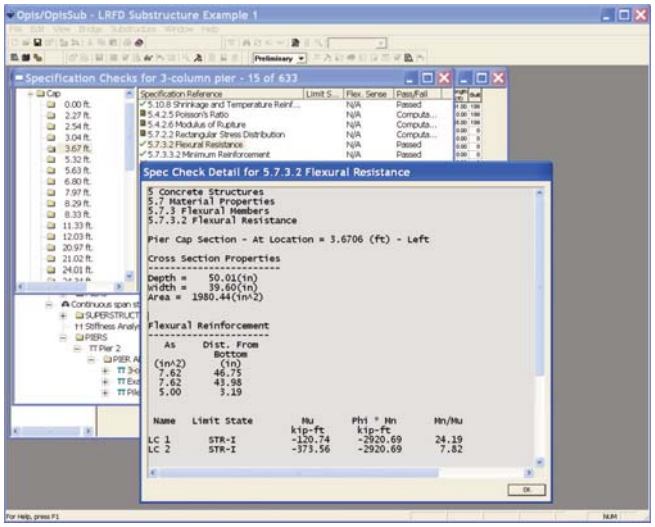
♦ **AASHTO LRFD Specification Checking Module**
New for this release is the AASHTO LRFD specification checking module. This new specification checking module includes the reinforced concrete articles from the 2007 – 4th Edition of the AASHTO LRFD Bridge Design Specifications. The next release of the specification checking module will include the prestressed articles followed by the steel articles.

The framework for this new module offers a great deal of flexibility, including the simultaneous support of multiple versions of a specification. Detailed calculation information is provided for each specification article and can be used by the design engineer to better understand how the article was implemented and what data was used in the evaluation of the article.

♦ **Opis Substructure LRFD Analysis and Specification Checking**
The upcoming June release of Opis includes the first "official" release of the substructure module. The two previous versions of Opis were "Demonstration" releases to provide users with a sampling of the features being developed and to solicit feedback about their needs for substructure analysis. The June release includes specification checking utilizing the new AASHTO LRFD Specification Checking module.

New for this release is the ability to describe the pier reinforcement for the four types of reinforced concrete piers (frame, solid shaft, wall and pile bent). After the structural analysis is complete, the pier can be evaluated by the new specification-checking module in accordance with the 4th Edition of the LRFD specification. Specification checking results are available similar to those provided by Opis for superstructure LRFD analyses. Reports are available that list the results of the specification evaluation and can be filtered to quickly show which articles failed for each component of the pier. Detailed calculations are available for reporting as well.

♦ **Opis Reinforced Concrete Superstructure LRFD Analysis and Specification Checking**
A new LRFD analysis engine for reinforced concrete superstructures is included in the upcoming release of Opis. This engine also utilizes the new AASHTO LRFD Specification Checking module. With this release, Opis will provide two LRFD analysis engines for reinforced concrete superstructures.




## Future Releases - More Enhancements to AASHTO Spec-Checker

The focus of the upcoming Opis development will continue to be on addressing the strategic technical goals. The following new features are scheduled for upcoming releases of Opis:

♦ **AASHTO LRFD Prestressed and Steel Superstructure Analysis and Specification-Checking Capabilities**
An AASHTO prestressed superstructure analysis engine is scheduled for release in the Spring of 2009. This work adds prestressed specification articles to the AASHTO LRFD specification checking module built. The 6.2 release will add the steel specification articles to the AASHTO LRFD specification checking module. With these two releases Opis will have two LRFD and two LRFR analysis engines available for all of the superstructure member types supported in Opis.

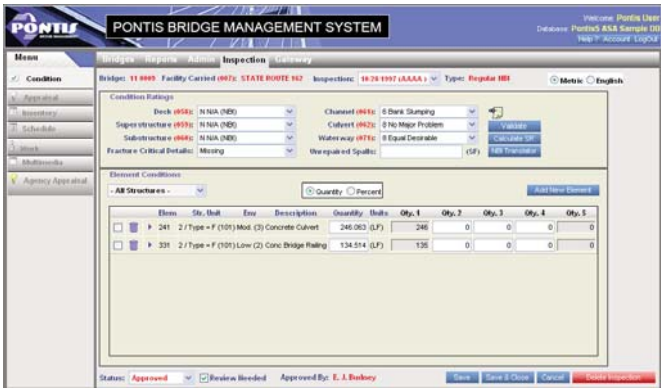
♦ **Several wizards – Superstructure, LRFD Distribution Factors, Diaphragm Layout and Shear Stirrup Layout**
Requests from the 2007 User Group Meeting showed a strong desire to provide tools to address some of the time consuming data entry requirements of Virtis and Opis. These requests will be addressed by the addition of several wizards that will significantly reduce the time required to describe a superstructure.

♦ **Improved reporting –** Improved reporting of the LRFD analysis of steel superstructures will be added to the 6.1 release.

## Pontis 5.1 Release in August

Pontis 5 is the web-based replacement for the highly successful Pontis 4 currently used by more than 40 states, local government agencies, and several international clients. It will gradually supplant Pontis 4 as releases of the new product are deployed over the next few years. The phased Pontis 5 implementation focuses on delivering real functionality in two main releases, termed 5.1 (inspection) and 5.2 (modeling, simulation, project development). Pontis 4 will be maintained and coexist with these versions until all the functionality that is to be provided in Pontis 5 is designed and implemented.

Development of Pontis 5.1 is nearly finished, and Beta testing is scheduled to begin in early June. The release is scheduled for the end of August.




## Upcoming BRIDGEWare User Group Meetings

### 2008 AASHTO Virtis/Opis User Group Conference

**Location:** Skirvin Hilton, Oklahoma City, OK
**Dates:** August 5-7, 2008
**Contact:** visit *www.vobug.org* for details

### 2008 Pontis User Group Meeting

**Location:** Sheraton Suites at San Diego Symphony Hall, San Diego, CA
**Dates:** September 23-24, 2008
**Contact:** Paul Cooley, CALTRANS

## Major Modeling Improvements Planned for 5.2

The Pontis development team is excited to be designing the next generation of bridge management decision support for Pontis 5.2, scheduled for release in 2009, the new system will complete the transition of Pontis to the latest in web-based functionality. But, even more significant, the new software will include a variety of major enhancements in realism and usability of Pontis models.

The new analysis will feature a graphical bridge-level analysis that helps engineers to visualize the future condition and performance of a structure, and evaluate alternative futures in terms of the scoping and timing of future work. The objective is to impart the same intuitive understanding of deterioration and economic performance of a bridge that engineers already develop for structural performance.

Building on the bridge-level analysis, the new project level model will use the analysis to help engineers create efficient projects to satisfy condition, economic, and mobility objectives on any structure or group of structures, such as a route or corridor. The model will assist with visualization of how decisions on one or more bridges affect the competition with other bridges for limited funding.

The new analysis will open the "black box" of the current program simulation, providing much more rapid and direct feedback on decisions. Using the multi-objective framework of NCHRP Report 590, the models will be able to give variable weight to life cycle cost, condition, vulnerability, mobility, and other performance measures for a better fit to agency asset management processes and goals.

With a greatly enhanced set of models and graphics, and much improved integration with routine project planning tasks, Pontis 5.2 should make bridge management decision support much more attractive and useful to the bridge and structures office at the state and local levels.

## Contractor for BRIDGEWare Development:

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| Mike Johnson | Pontis Task Force |
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| Wade Casey | Pontis Task Force, FHWA |