Structures Laboratory
Assessment Summary Report

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OVERVIEW OF STRUCTURES LABORATORY

Purpose

The primary mission of the Structures Laboratory is to conduct experimental studies to determine the behavior of bridge components and full–size bridges. Data from these studies are used to improve the national bridge design specifications and to improve the safety, reliability, and cost-effectiveness of bridge construction in the United States. The development and evaluation of advanced high-performance materials and systems, e.g., high-performance steels, high-performance concrete, fiber-reinforced polymer composites, and adhesives, is a major focus of the current research program. The Laboratory also investigates structural failures that occur in service nationwide, determines the cause of failure, and develops practices and procedures to prevent similar failures.

Description

The Structures Laboratory is a world-class facility optimized for large-scale, indoor testing of bridge structures and components. The main Laboratory is uniquely designed to erect full-scale bridges indoors and to test them using the latest technology. Everything from small specimens to full-size bridges can be subjected to simulated truckloads to evaluate strength and performance. This Laboratory maintains the capability to evaluate

the strength and mechanical properties of structural materials and to instrument and perform field evaluation of in-service bridge structures. These characteristics and the following capabilities make this lab uniquely suited for large, multi-year efforts involving cooperative funding from States and industry.

- Fundamental research into the strength and safety of bridge structures and components.
- Fundamental research into the fatigue-resistance of structures under truck loading.
- Applied research to assess the suitability for service of various structural components and systems.
- Field evaluation of in-service structures.
- Forensic evaluation service of structural failures.

Key Strengths and Observations

General Observations:

- Highly competent Federal and contract staff.
- Excellent Laboratory facilities for gravity load testing of large-scale bridges.
- Excellent data acquisition systems.
- Ability to quickly respond to bridge-related emergency situations.
- Excellent flexibility to respond to unplanned task orders.
- Inconsistent, steady annual funding disrupts efficiency of Laboratory operation.
- Research reports backlog (26 reports).
- Numerous Structures Laboratory papers and reports could not be located in the
- Transportation Research Information Service (TRIS) database (21 of 121 found).

Key Recommendations and Status of Current Activities

1. **Panel Recommendation:** Identify and market unique capabilities of the laboratory.
   Action to be taken: The laboratory accomplishes this through fliers and dissemination activities; however, a more effective communications plan, including TFHRC website upgrades is being pursued. Lab Manager makes annual presentations to the AASHTO SCOB meetings.
   Status as of 9/28/05: A one-page update was prepared for AASHTO 2005. Laboratory staff has made numerous presentations to professional groups highlighting experimental research. Lab Manager made a presentation at AASHTO SCOB meeting June 2005. *June '2006, Target Completion Date.*
   Status as of 5/04/06: Outreach has been cut back significantly due to budget restrictions. *On-going, Target Completion Date.*
   Status as of 12/04/06: Multiple presentations are planned for 2007 to AASHTO, professional groups, etc. Dr. Beshah has taken over as the laboratory manager and is initiating action on the website upgrade. *April '2007, Target Completion Date.*
   Status as of 7/23/07: Text for the website is ready, and website upgrade has been initiated. *Completed*

2. **Panel Recommendation:** Explore web casting / streaming media capability at TFHRC.
   Action to be taken: Discuss with HRTS.
   Status as of 9/28/05: Considering streaming web casting and possible monthly web casts from TFHRC. *Dec '2005, Target Completion Date.*
   Status as of 5/04/06: Terry Halkyard, HRTS, has conducted training on web-conferencing and we will continue to explore options for digital recordings of lab activities for later internet delivery. TFHRC is exploring means to get increased band-width for streaming video applications. *Completed*

3. **Panel Recommendations**: Create opportunities for outreach.
   Action to be taken: Need to coordinate with the NHI about revitalizing the GRF program build on lab marketing activities to further promote opportunities for cooperative research and intern opportunities?
   Status as of 9/28/05: Under the MOU with George Mason University and George Washington University, lab classes were taught in 2005. Students recently completed a semester long course in experimental methods where the conducted laboratory sessions in hydraulics, materials testing, structural engineering, concrete and asphalt testing and soils testing, using TFHRC labs. *Dec '2006, Target Completion Date.*
   Status as of 5/04/06: There was no set-aside for GRF funding under SAFETEA-LU. *Dec '2006, Target Completion Date.*
   Status as of 12/04/06: Initial discussions have been held to advertise for a visiting researcher to help model the performance of the GRS Integrated Bridge of the Future research. There will also be opportunities via the Exploratory Advanced Research Program. *June '2007, Target Completion Date.*
   Status as of 7/23/07: At FHWA/UTC Workshop held on 03/07 at TFHRC, initial marketing effort was performed to identify opportunities and build research partnerships. Via the laboratory support contract, graduate students have been working on research projects. *Completed*

4. **Panel Recommendations**: Assure continuity of operations.
   Action to be taken: Need to encourage training of federal and contractor staff to have depth in all areas. Specific actions including allocating additional FTE as backup to key lab staff will depend on funding and immediate project needs.
   Status as of 9/28/05: *Continuous Effort* - Staffing actions are in place to provide continuity of Federal staff. Training continues for contractor staff. Backfilling federal concrete specialist position.
   Status as of 5/04/06: One contractor was hired for a federal position, and recruitment is underway to fill the lab manager position. Contractor is also filling several vacancies. Training continues for contractor staff. *Continuous Effort.*
   Status as of 12/04/06: 10/06 Dr. Beshah has been hired as the new federal Structures Laboratory Manager. Contractor staffing is adjusted as required to adapt to research priorities under SAFETEA/LU. *Completed.*

5. **Panel Recommendations:** Expand the academic diversity of the professional staff.

Action to be taken: This has always been a consideration when decisions are made regarding contractor and/or federal staff recruitment.
Status as of 9/28/05: No recent staff changes have been made. Several are anticipated by 2006. *FY '2007, Target Completion Date.*
Status as of 5/04/06: Academic diversity is being considered in selections. (Give examples here of backgrounds of selected)**.** *On-going - Target Completion Date.*
Status as of 12/04/06: The support services contractor advertises nationally to fill vacant positions. Two recent hires were from Minnesota and Missouri. Federal positions are advertised nationally. *Completed*

6. **Panel Recommendations:** Develop a plan for dissemination of research results.
Action to be taken: Streamline the FHWA technical report publication process. A fast track process is needed for large amounts of technical research information with low intended distribution. Increase publication brief technical project summaries. Coordinate with TRIS to make sure that all research papers and publications are forwarded to the TRIS database. This process will include a three page technical brief, which will accompany the NTIS report.
Status as of 9/28/05: - Discussions were initiated with HRTS. HRTS met with NTIS to develop standard formats for technical report briefs. Progress will be reported to the RD&T LC as it is made. *Spring '2005 Target Completion Date.*
Status as of 5/04/06: Pending completion of work between *HRTS and Dick Livingston. Summer 2006 - Target Completion Date.*
Status as of 12/04/06: 06/06 The NTIS publication process is in place and several reports are in preparation for publication. *Completed*

7. **Panel Recommendations:** Establish a specific focus for the laboratory.
Action to be taken: The laboratory has a specific goal to develop high performance materials and large structural bridge systems to support the FHWA strategic plan.
Status as of 9/28/05: Projects are being conceived to support FHWA's Bridge of the Future initiative. This includes the Sept 05 test on UHPC on a new UHPC bridge system. (Consider adding link for research project) *Fall '2005, Target Completion Date.*
Status as of 5/04/06: The focus has been defined by designated programs under SAFETEA-LU for HPS, HPC, and UHPC Research. *Target Date Completed*

8. **Panel Recommendations:** Work to correct thinly stretched resources.
Action to be taken: Need to develop project schedule flowchart to organize available resources. Ensure that resource needs and capabilities are clearly documented.
Status as of 9/28/05: - A Job announcement has been issued to backfill the concrete research position. Future staffing actions have been planned. *Dec '2005, Target Completion Date.*
Status as of 5/04/06: *A* Capital Improvement Plan for the lab has been developed and will be delivered in the near future. *Dec 2006 – Target Completion Date.*
Status as of 12/04/06: 10/06 Dr. Beshah has filled the laboratory manager position. Future staffing actions have been planned. *Completed*

9. **Panel Recommendations:** Develop a standard operating policy for project selection.
   Action to be taken: In-house projects are identified and selected to support the FHWA structures program Strategic Plan: cooperative projects are selected based on identified gaps by the bridge engineering community.
   Status as of 9/28/05: Develop paper stating how we keep the focus on research. Work is underway to define projects under SAFETEA-LU. *TBD, Target Completion Date.*
   Status as of 5/04/06: Coordinate lab research projects with Structures program agency roadmaps. *On-going - Target Completion Date.*
   Status as of 12/04/06: 10/06 Main projects under SAFETEA-LU have been selected in coordination with HIBT. Since there is no discretionary budget, State assistance is only being considered if funding is provided. *Completed*

10. **Panel Recommendations:** Establish a process for external monitoring and review of research projects.
    Action to be taken: The laboratory already has effective coordination with AASHTO technical groups. Need to discuss funding and resource availability to establish a more formal process on an office wide basis, which also complies with proposed OMB Peer Review imitative.
    Status as of 9/28/05: Comments and feedback given concerning the OMB peer review process. Preliminary discussion with TRB to advise research under SAFETEA-LU. Pending receipt of guideline from DOT/FHWA. *June '2006, Target Completion Date.*
    Status as of 5/04/06: An agreement is pending and expected in the near future. *June 2006, Target Completion Date.*
    Status as of 12/04/06: 10/06 Formal advisory groups are being established to help guide HPC and HPS research under SAFETEA/LU. 11/06 the first meeting of the HPC group was held; planning for HPS group underway. *Completed*

All Key Recommendations and Activities were completed November 1, 2007.