US-131 rehabilitation near Martin uses SMA
Now the largest in Michigan, the testing frame at Lawrence Technological University was recently expanded, with the work funded by a $60,000 grant from the Great Lakes Fabricators & Erectors Association. The device is currently testing concrete bridge design and rehabilitation technologies using composite materials.

**Expanded LTU testing frame enhances bridge research**

Important research already was underway as the official dedication was held Feb. 12 on the expanded testing frame at the structures laboratory at Lawrence Technological University. Thanks to $60,000 in support from the Great Lakes Fabricators & Erectors Association (GLFEA), the frame has become the largest in Michigan. As its commemorative plaque was being unveiled the device was testing a model of a new bridge design by Nabil Grace, an LTU professor of civil engineering.

The expanded frame now measures 60 ft. long by 15 ft. wide by 25 ft. high and was developed from a smaller structure also funded by the GLFEA that was erected in 1990. Labor to erect the steel frame expansion was provided by the Iron Workers Local 25 Apprentice Training Center.

The model currently undergoing testing on the frame is the fourth and last based on Grace's design. It simulates a proposed bridge being considered by the city of Southfield, which is currently seeking funding for the project. Estimated at $6 million, the project involves the construction of two three-span one lane test bridges at the entrance to an industrial park. One of the test bridges would make use of Grace's design. The other would make use of conventional materials and...
design methods.

Grace’s research is being sponsored by the National Science Foundation (NSF). Testing thusfar has generated favorable data suggesting he is on target for demonstrating the durability of his design, which relies on the use of composite materials as an alternative to steel. Composite materials are already in use in Canada, Europe, and Japan.

“The problem we have to counter is ductility — that is, how much energy can be observed before the bridge fails,” Grace said. “You do not want a sudden failure. You want to see a lot of cracks and sagging. This is so somebody can do something to mend the problems in order to avoid any catastrophic or sudden collapse.

“We have improved as we’ve gone along with each model. The ductility ratio for the first model was 59%. The second model was 63%.”

Composite materials, such as carbon fiber and glass fiber in place of steel, are becoming of growing interest in the engineering community. At the dedication ceremony, D. James Walker Jr., the GLFEA’s executive director, joked about the irony of his association’s efforts to fund testing facilities used in concrete bridge design, but emphasized how the expanded frame provides example of how partnering between the university, structural steel contractors and suppliers, and organized labor can result in advancements for all. The testing frame expansion was privately funded; no state tax dollars were used.

Recently Grace discussed his research on composite materials at a Jan. 13 meeting of the Transportation Research Board. Earlier this month he was selected by the NSF as one of ten delegates from the U.S. traveling to Japan to discuss and present American research activities in the use of composites in highway bridges.

The expanded LTU frame will also soon be used to test a new concrete girder repair process that uses composite materials. The work of an LTU graduate student, the research centers around comparing how best to reinforce cracked concrete girders. They will be wrapped in one of three different materials:

- Sika, consisting of three inch wide strips of carbon fiber manufactured in Switzerland and bonded to the girder with a substance called “butten.”
- Replark, consisting of carbon fiber sheets supplied by Mitsubishi Chemical of Japan, bonded to the girder.
- Glass fiber sheets produced by Owens Corning.

“If you have an aging bridge that is losing its load carrying capacity, this would be a way to beef the structure back to its original capacity,” Grace said. “This could add more strength without adding steel.

This would be applicable for mid-size spans, up to 66 ft., and is used in Europe.”

**NAWIC presents Clisho with Hallman Scholarship**

**Lansing** — The Lansing Chapter of the National Association of Women in Construction (NAWIC) has awarded its Winter 1997 Carolen E. Hallman Scholarship to Gayle Clisho of Escanaba.

NAWIC awards a $1000 scholarship twice a year to students enrolled full time in a course of study leading to a degree/certification in a construction-related field.

For more information contact Ronnie Neumann at 517/752-1922; Jenn Fossett at 517/753-8483; or Rosemarie Raymond at 517/694-0204.

**Hillsdale Academy to see mid-May groundbreaking**

**Hillsdale** — Plans are in the works to begin construction of the Hillsdale Academy for students from kindergarten through grade 12.

The architectural firm handling the $6 million project is Marshburn/Bunkley Associates, Kalamazoo.

The official ground breaking ceremony will take place May 16 but construction will begin as soon as the weather permits.