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50th Anniversary Celebration
2017 Engineering Excellence Awards

National Recognition Award

Presented to

GCI INC

For the project

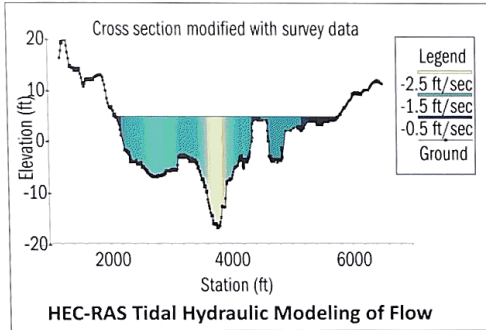
*Scour Evaluation for Bridges
with
Unknown Foundations*

April 2017

SCOUR EVALUATION FOR BRIDGES WITH UNKNOWN FOUNDATIONS

Project Location: Various Locations in Florida

Client: Florida Department of Transportation, District 5, 1650 N. Kepler Road, DeLand, FL



THE CHALLENGE:

The entrant firms were charged with properly identifying bridges needing scour countermeasures throughout most of Florida.

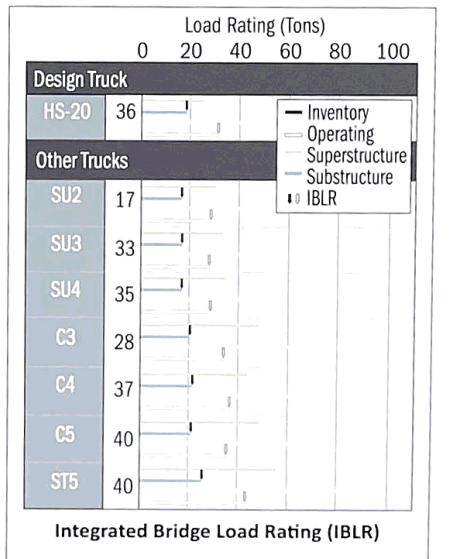
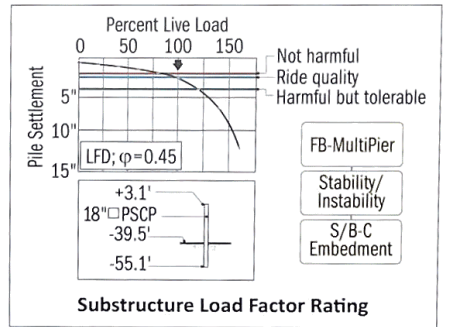
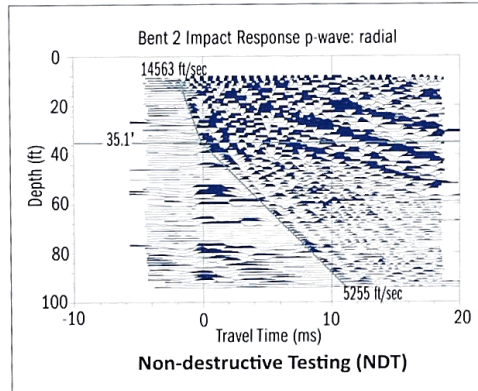
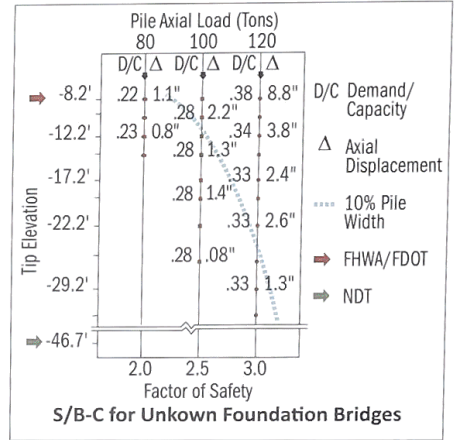
THE RESPONSE:

Ayres Associates and GCI INC, in partnership with Kimley-Horn and Associates, Inc., and STV Incorporated, performed hundreds of evaluations in various FDOT districts as part of the Unknown Foundation Bridge Scour Program, fielding multidisciplinary teams to complete necessary work, including risk assessment, field reviews, surveys, simple and complex riverine and tidal regime scour analysis, structural and geotechnical evaluations, non-destructive testing (NDT) of foundations using state-of-the-art methods, and preparing scour countermeasure plans of action.

FUTURE VALUE TO THE ENGINEERING PROFESSION:

The team pioneered many innovations that advance the state of practice, such as:

- **Static/Back-Calculation (S/B-C) method** for pile embedment estimation, which can be used to reduce costly NDT or assess/validate embedment estimates from more traditional methods.
- **Substructure/integrated bridge load rating.** Currently, bridge load ratings are typically assigned based on the superstructure's evaluation. Rarely is the substructure considered. Such load rating could cause catastrophic or functional failure if the substructure's load-carrying capacity is deficient. Our team developed the first known method to rationally assess the Substructure Load Rating as well as Integrated Bridge Load Rating for the superstructure-substructure system.
- **Sustainable considerations – foundation reuse.** Our team contributed to **reuse of bridge foundations** as an innovative approach to optimizing the engineering of the constructed project. In assessing existing unknown foundation bridges for reuse in rehabilitation, widening, or replacement, establishing foundation pile embedment and capacity using realistic geo-structural modeling is paramount.



AYRES ASSOCIATES
Tampa, FL

GCI INC
Longwood, FL

Kimley » Horn
West Palm Beach, FL

STV 100 Years
Jacksonville, FL

In Recognition of Leadership, Professionalism and Excellence
in Project Management

**Construction Owners Association of
America, Inc.
Project Leadership Award**

Presented to:

Orange County, Florida

For:

**Orange County Corrections
Booking and Release Center**

**Design Professional:
Strollo Architects**

**Owner's Representative:
PMA Consultants LLC**

**Construction Professional:
Centex Construction/GCI**

November, 2006



**CONSTRUCTION OWNERS
ASSOCIATION OF AMERICA, INC.**

ENGINEERING EXCELLENCE

Grand Award

Presented to
GCI INC

whose exemplary project

Scour Evaluation for Bridges with Unknown Foundations
in conjunction with

Florida Department of Transportation District V

has been judged to meet the highest standards of the Institute's

Engineering Excellence Awards Program

Recognizing Outstanding Achievements



florida institute of Consulting Engineers

AMERICAN COUNCIL OF ENGINEERING COMPANIES OF FLORIDA

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE OF FLORIDA



FICE President



Awards Chair
August 4, 2017

Date

ENGINEERING EXCELLENCE HONOR AWARD

This certificate is presented to

Geotech Consultants International, Inc.

for

SR 434 Widening

**Engineering Excellence
Awards Program**

*Recognizing Outstanding Design
By Consulting Engineers in Florida*



**FLORIDA
INSTITUTE OF
CONSULTING
ENGINEERS**

John P. H...

President

Charles C. Bayley

Awards Chairman

August 4, 2000

Date

"A Simple Innovation from the Past"

- An "Old and Simple" Approach Saves Significant Time and Money.

The project involved the widening of 2.2 miles of the existing SR 434 roadway from Tuskawilla Road to SR 417. The original project plan called for surcharging two areas containing loose/soft subsurface soils. With a combined effort by Hubbard Construction Company, Geotech Consultants International (GCI), Florida Department of Transportation (FDOT) and Kisinger Campo Associates (KCA), (FDOT's CEI representative), the conventional method of surcharge reinforced embankment which was originally designed for this job was replaced by a dewatering/preloading system designed by GCI. This method led to a 27 percent reduction in the project duration (originally estimated at 26.4 months).

The originally proposed surcharge placement/settlement rate required two months for completion of each Maintenance-Of-Traffic (MOT) phase. The surcharge embankment would then stay in-place for an estimated 4 months, resulting in a total surcharge time of 6 months per phase of surcharge. In order to maintain the existing flow of traffic and to ensure the proper settlement for each area of the proposed roadway, three MOT phases were originally designed for Surcharge Area I. This meant that a 6 month duration would have been required for each MOT phase resulting in a minimum of 18 months for Surcharge Area I. Surcharge Area II required only one MOT phase and was concurrent with Area I. Since the original contract time was 630 days, the surcharge alone would have required approximately 87% of the total contract time (550 calendar days).

GCI proposed a system of deep wells to lower the groundwater table at the proposed surcharge areas, thereby reducing number of MOT phases and producing a rapid and uniform consolidation of the loose/soft soils as well as accelerating the construction of the 250 foot, five-span bridge.

The actual duration of the dewatering system (including interruptions) from its installation to the completion of the pumping, drawdown and settlement was 353 days. Largely due to the effectiveness of the technology involved, the project was completed on January 8, 2000, 7 months ahead of the contract completion date, and a full 60 days ahead of the original contract completion date. This amounts to a 27 percent reduction in the duration of the total project time.



View of surcharge area I looking East

In addition to the time factors, the process also provided a cost savings of 21 percent of the originally proposed surcharge reinforced embankment to the FDOT, by reducing the number of MOT phases required, and by eliminating the need for geogrid reinforcement. Additional savings of \$50,000 were realized by the FDOT in the costs of sheet piling originally required for grade separation at the right-of-way line which was eliminated by the MOT changes.

PROJECT BENEFITS

• Innovative Application Of Existing Technology

Dewatering/Preloading is an "old and simple" process of improving weak soil by consolidation. The development of other ground improvement techniques made this procedure one that is rarely thought of as a means of ground improvement. The application proved to be very viable for this project resulting in significant cost savings and reduction in the construction time.

• Technical Value To Engineering Profession

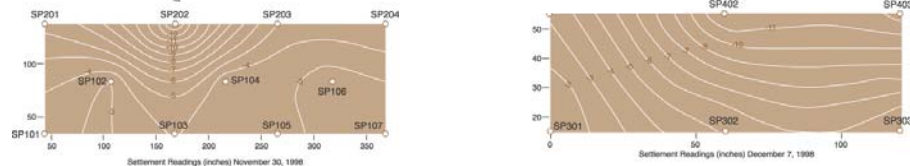
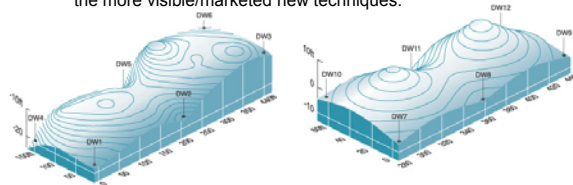
The application of such an "old and simple" technology serves as a reminder to engineers that the solution to a complex problem is not necessarily a complex one. It also reinforces a very important fact in the geotechnical field, "An approximate solution to the right problem is more desirable than a precise solution to the wrong problem" -U.S. Army et al. (1971).

• Social/Economic Considerations

The use of this "old and simple" technology proved to be a safe and cost-effective process. It reduced the MOT plan from three to two phases and saved almost 27 percent in the duration of the entire project (almost 7 months ahead of schedule) and almost 21 percent in the cost of surcharge reinforced embankment. It also improved the public safety conditions during the construction operation.

• Complexity

Ironically, the application/process is not complex. Rather, it is a very simple but forgotten one. Lowering of the groundwater table is done very often on construction jobs. To use it to compress soil strata is not difficult but rather lost as a feasible option among the more visible/marked new techniques.



• Meeting And Exceeding Owner's/Client Needs

The completion date for this project was estimated to be August 18, 2000. The roadway was opened January 8, 2000. The process accelerated the schedule of the 250-foot, five-span bridge originally scheduled to start construction on October 1999. The savings in construction time is on the order of 27%. The dewatering/preloading cost is far less than the originally proposed surcharge reinforced embankment.



View looking west at settled portion of existing roadway



View of completed roadway

"Team effort worked well and Jack Forester handled everything! Good for me! Wells worked well-everyone cooperated on the VECP effort."

**Amy Scales
FDOT Construction**

"The surcharge VECP-Hubbard, DOT, KCCS and GCI worked together on it and it became a significant time saver."

**Don Budnovich
FDOT Geotechnical**



View of surcharge area II looking East

Title: SR 434 Widening
Location: Seminole County, FL
Client: Hubbard Construction Company - Winter Park, FL
Entering Firm: Geotechnical Consultants International, Inc. - Longwood, FL

"An approximate solution to the right problem is more desirable than a precise solution to the wrong problem."
- U.S. Army et al. (1971)