Rubble House: A situational learning experience

William M. Lotz, Southern Polytechnic State University
and Chance Dennis, Southern Polytechnic State University

Project overview

- Research project to study an alternative building material being used to construct replacement homes in Haiti.
- Multidiscipline effort representing diverse segments of SPSU student body.
- Full-scale house used for tests.
- Student team responsible for the instrumentation design for field tests.
- Instrumentation system approached from consultant-client relationship. Client was the SPSU research team and students took role of consultants.

Project needs

- Measure movement in structure undergoing load tests.
- 3 static tests.
- 1 dynamic (test to failure).

Engineering

- 3 racks required.
- Gauges points starting at 12" above floor elevation.
- Spanned 24" OC to top.

Proposed options:
- Wood
- Unistrut
- Metal
- Hybrid

Pursued hybrid alternative to reduce instrument package costs.

Major Components
- Instrument mast
- Support frame
- Legs
- Displacement gages
- Deflection gages

Concept

Key considerations:
- Quick set-up
- Low cost
- Limited precision
- Accepted concept

Accepted concept:
- Displacement gages measured with digital micrometers.
- Data recorded on test record sheet.

Fabrication

Data Collection

- Displacement gages measured with digital micrometers.
- Data recorded on test record sheet.

Triangulation

Additional resources used to triangulate displacement gages measurements:
- Total station surveying
- 3-D laser scanning

Data Comparison

- Comparison of displacement gage and 3-D laser scan data.
- Displacement gages had sufficient accuracy and precision for use by research team.

Conclusions

- Student built gages provided sufficient accuracy for data to be used by research team.
- Situational learning is effective way to teach design process.
- Students enhanced communication skills by working within constraints and evolving performance requirements.

Future research

- Gage system for measuring large deflections.
- Quantitative study to see participation in situational learning scenarios predicts academic and professional success.

Completed rubble house in Haiti (courtesy of Conscience International).