Rubble House:
A situational learning experience

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

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
- Instrumentmentation system approached from consultant – client relationship. Client was the SPSU research team and students took role of consultants.

Engineering

- 3 racks required
- Gauge points starting at 12" above floor elevation
- Spaced 24" OC to top

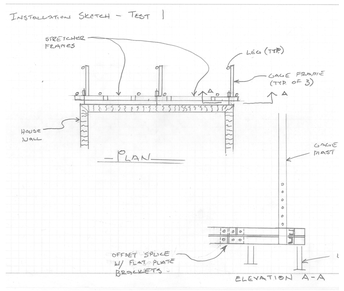
Proposed options:

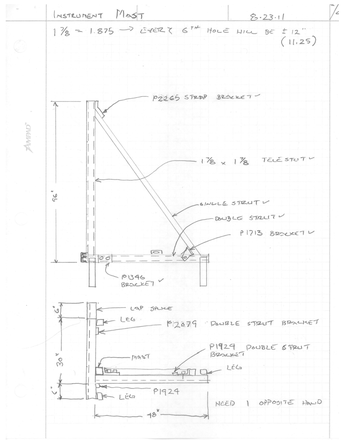
- Wood
- Unistrut
- Metal
- Hybrid

Pursued hybrid alternative to reduce instrument package costs

Major Components

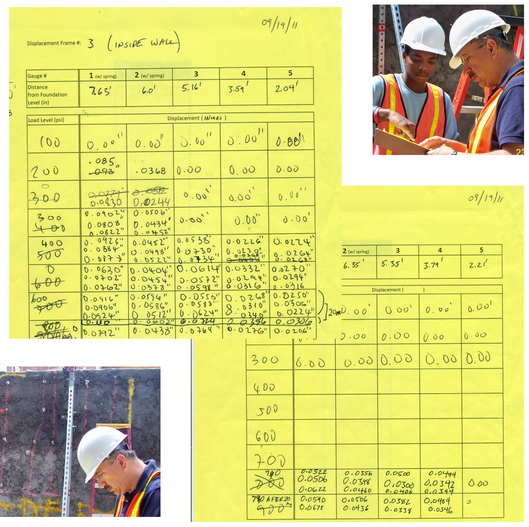
- Instrument mast
- Support frame
- Legs
- Displacement gages
- Deflection gages





Data Collection

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



Project challenges

- Limited budget
- Evolving performance criteria
- Destructive testing means only one chance to collect data

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

Project needs

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

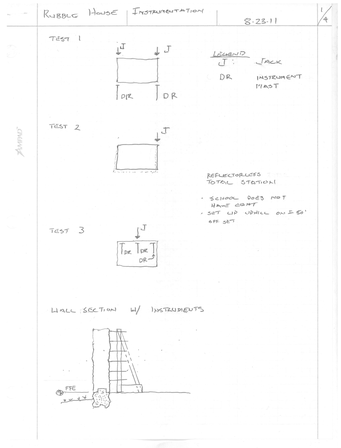
Concept

Key considerations:

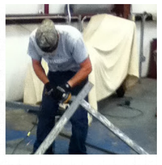
- Quick set-up
- Low cost
- Limited precision

Accepted concept

- Displacement gage rack system
- Test 2 use total station survey instrument
- Gage rack: instrument mast sub assembly with related support frames
- Displacement gage: tell tale gage
- Deflection gage added at request of research team



Fabrication

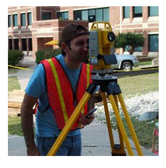


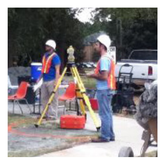
Installation

Triangulation

Additional resources used to triangulate displacement gage measurements

- Total station surveying
- 3-D laser scanning





Data Comparison

- Comparision of displacemnt gage and 3-D laser scan data
- Displacement gages had sufficeint accuracy and precesion for use by research team