Geoenvironmental and Geotechnical Data Exchange: Setting the Standard *...for Landslide Data*

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Landslides: The *Future* of Managing and Sharing Data

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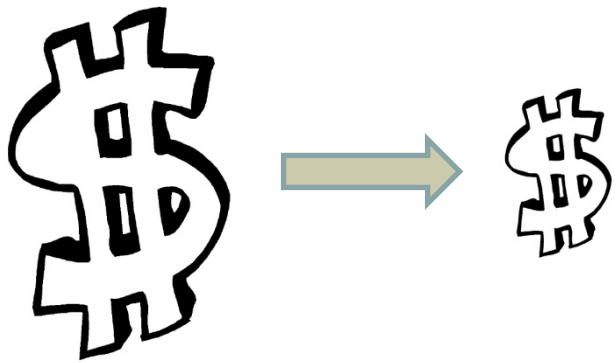
Topics

- Is there a need for a landslide data management system?
- Is there a need for a data exchange standard?
- Transportation Pooled Fund Project TPF-5(111)
- What is DIGGS today?
- Where is DIGGS going tomorrow?

Is there a need…?

State DOTs are faced with

- reduced funding
- reduced staffing



While, at the same time, handling

- increased infrastructure
- more complex and aging highway systems
- growing volumes of data, assets, geohazards

Is there a need…?

Geotechnical aspect of many highway projects is taken for granted.

DOTs have adopted management systems for

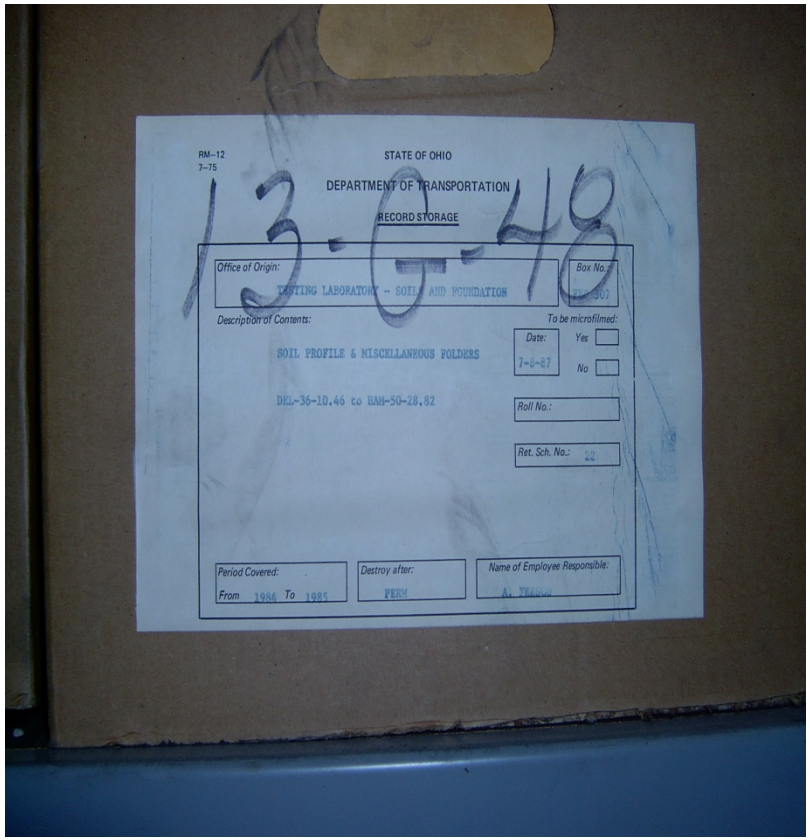
- Pavements
- Bridges
- Culverts
- Traffic signs
- Other assets

90% of construction cost on new alignment in mountainous terrain is geotechnical.

Is there a need…?

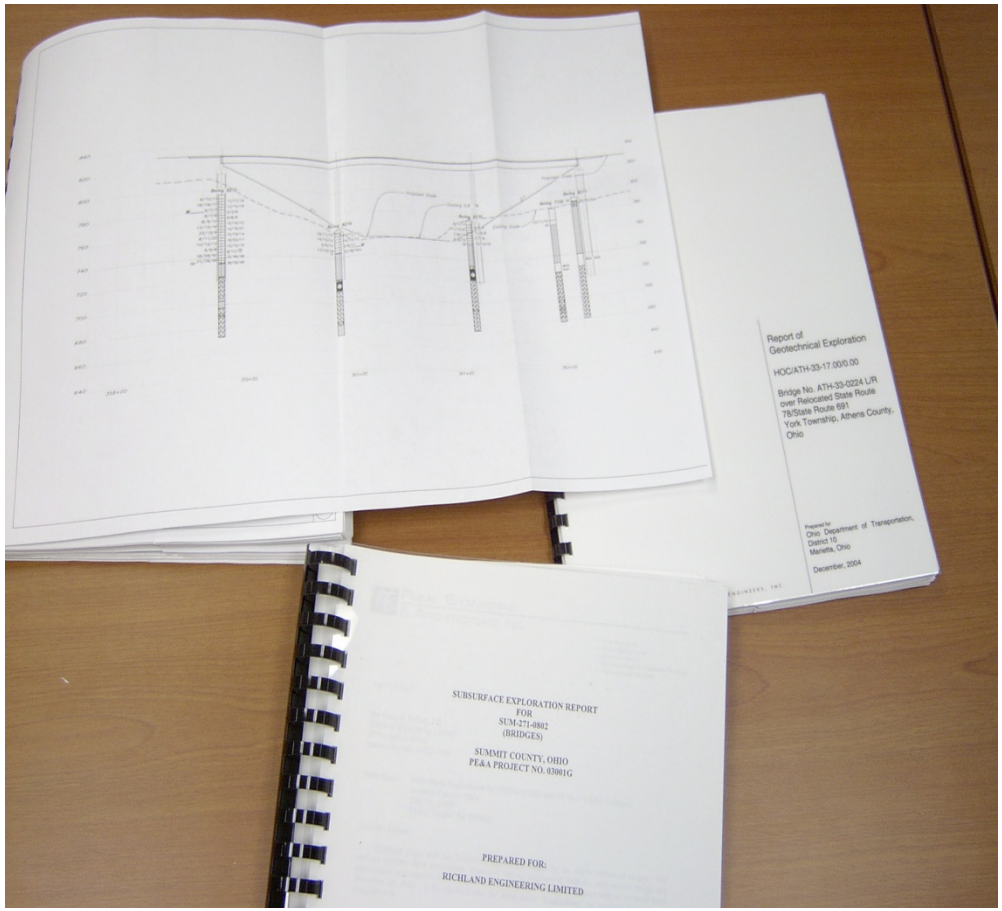
All too often, geotechnical data is still being managed like this:

Is there a need…?



20-30 person hours per week to retrieve information

Is there a need...?



90% of new projects....$52 Million per year

Is there a need…?

$52 Million per year

Is there a need…?

What is the economic value?

1. Minnesota DOT...savings of $20k per year in personnel time to look up borehole information

2. Missouri DOT...savings of $81k/year by implementing electronic field data entry; $20k/year in drilling by utilizing historic data

3. Florida DOT...savings of $250k to $500k in subsurface investigation on a single I-595 project by using existing data

Is there a need…?

What is the economic value?

4. Ohio DOT...savings of $12M to $24M by using previously collected subsurface exploration data

5. United Kingdom Highway Agency has saved 80% of slope repair cost through proactive maintenance made possible by GDMS

Is there a need…?

What is the practical/engineering value?

FHWA's Office of Federal Lands Highway:

- Planning
- Design
- Construction
- Rehabilitation

for highways/bridges on or accessing federal lands (30% of the country). Many of these roadways intersect or border state/county roads.

A key element in a successful system is the ability to easily and efficiently share geotechnical data.

Transportation Pooled Fund Project

June 2004—FHWA hosted "National Geotechnical Management Workshop: Archiving and Web Dissemination of Geotechnical Data"

- Consortium of Organizations for Strong-Motion Observation Systems (COSMOS)
- Pacific Earthquake Engineering Research (PEER) Center
- Federal agencies (e.g. USGS)
- State agencies (e.g. CALTRANS)
- Industry (e.g. Pacific Gas & Electric)
- Academia (e.g. University of Southern California)
- Software (e.g. EarthSoft, gINT Software)

Transportation Pooled Fund Project

June 2004—FHWA hosted "National Geotechnical Management Workshop: Archiving and Web Dissemination of Geotechnical Data"

1. Formed Geotechnical Management System Group
2. Formed Geotechnical Data Coalition Group
3. Proposed ideas for Special Interest Groups
4. Started formalizing Pooled Fund project

Transportation Pooled Fund Project

Geotechnical Management System (GMS) Group:

- California DOT
- Connecticut DOT
- Florida DOT
- Georgia DOT
- Indiana DOT
- Kentucky DOT
- Minnesota DOT
- Missouri DOT
- North Carolina DOT
- Ohio DOT
- Tennessee DOT
- FHWA
- USACE
- USEPA
- USGS
- UK Highway Agency

Transportation Pooled Fund Project

Geotechnical Management System (GMS) Group:

- Oversee Pooled Fund Project
- Develop scope and direction of work
- Provide direction to Geotechnical Data Coalition
- Review and approve products

Transportation Pooled Fund Project

Geotechnical Data Coalition Group:

- University of Florida
- Association of Geotechnical & Geoenvironmental Specialists (AGS)
- Construction Industry Research and Information Association (CIRIA)
- Consortium of Organizations for Strong Motion Observation Systems (COSMOS)
- FHWA
- Ohio DOT
- Special Interest Group Managers

Transportation Pooled Fund Project

Geotechnical Data Coalition Group:

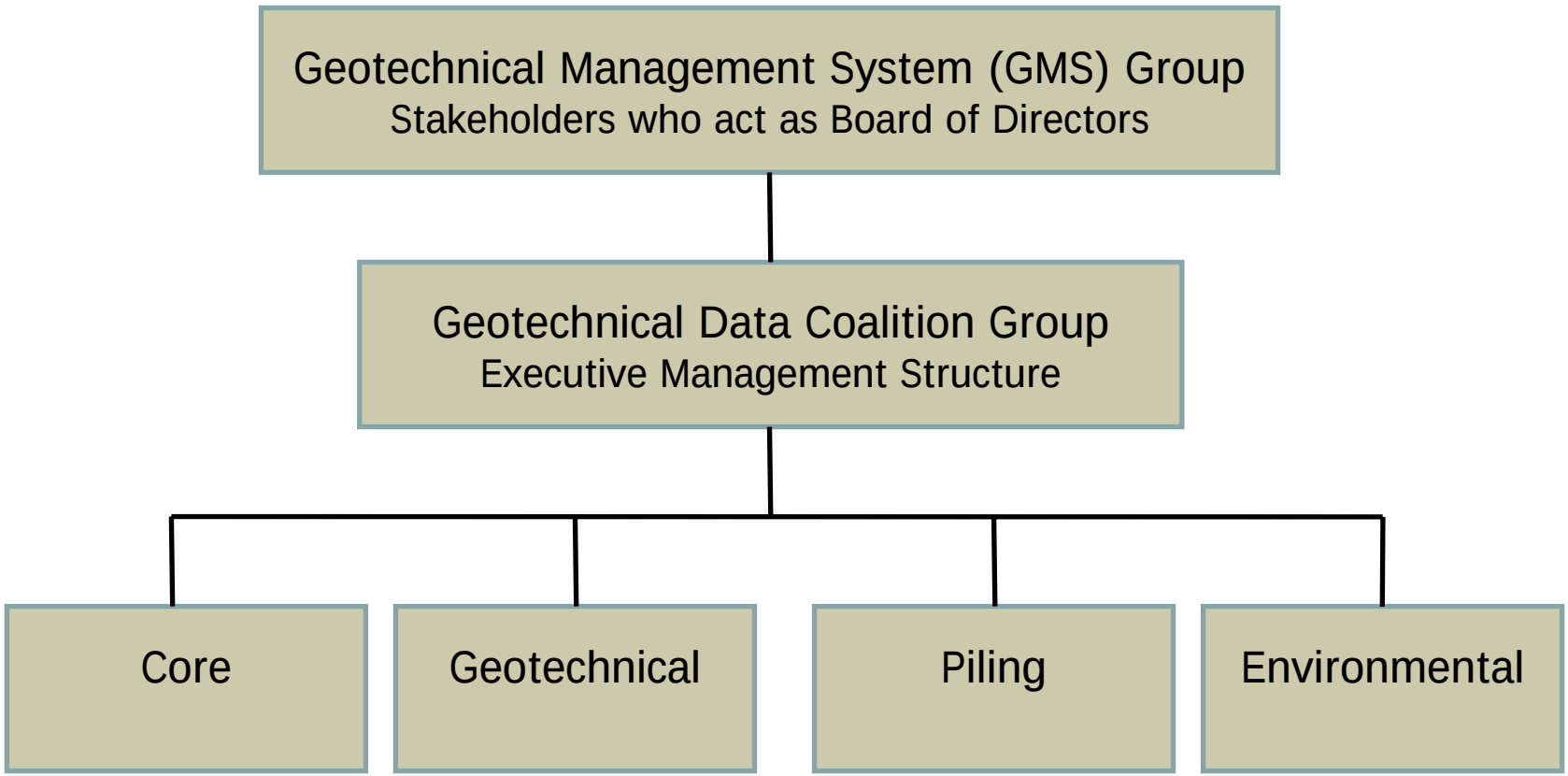
- Act as executive management team for new standards
- Consolidate existing standards into unified standards
- Direct, review, and accept work of special interest groups

Transportation Pooled Fund Project

Special Interest Groups:

- Groups formed for specific disciplines, feature areas
- Develop new data dictionaries, schemas
- Conduct meetings and workshops
- Compile and assess data
- Perform necessary work to develop standards

Transportation Pooled Fund Project



Transportation Pooled Fund Project

Geotechnical Management System (GMS) Objective:

Develop geotechnical and geoenvironmental data exchange standards.

Hence... TPF-5(111), Development of Standards for Geotechnical Management Systems

The name of these standards is

Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS)

What is DIGGS today?

1) Data dictionary
   - Combination of AGS, UF, & COSMOS tables and fields

2) GML-compliant (geospatial) XML schema:
   - Heirarchical (sample taken from a hole)
   - Extensible
   - Self-documenting
   - Self-validating

3) Codelists (valid values)
   - Shared
   - Updated easily, locally

What is DIGGS today?

DIGGS utilizes GML-compliant (geospatial) XML schema:

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        <type>B</type>
        <reference>1</reference>
        <specimen> ← tests are preformed on a specimen
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                <depthBase>1.00</depthBase>
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                <roles/>
                <description>-</description>
        </specimen>
</sample>
```

What is DIGGS today?

Keys to success:

- Tools that generate data in DIGGS format
- Tools that consume data in DIGGS format
- Tools that check for DIGGS correctness/ completeness
- Enterprise-level implementation (Automated Workflow)
- Added value: application of validation rules
- Added value: facilitation/simplification of data transfer
- Added value: enhancement of data use
- Added value: improvement of modeling and analysis

What is DIGGS today?

Several software tools being developed/updated to support DIGGS:

- Florida DOT database (available to any DOT)
- Geotechnical Virtual Data Center
- gINT
- EQuIS Data Processor
- AGS converter to DIGGS
- UK Highway Agency GDMS
- Ohio DOT GDMS

What is DIGGS today?

DIGGS 1.0 covers:

- Borehole data
- In-situ tests
- Laboratory tests
- Borehole geophysics
- Deep foundations

Where is DIGGS going?

Environmental SIG:

- Support AGS-E, EQuIS UK EDD, and SEDD
- Include structure for
  - Sample
    - Specimen
      - Test
        - Analysis
          - Result

There are at least 220 different environmental EDD formats; 50 or more labs have their own format.

Where is DIGGS going?

Future SIGs:

- 2D/Test Pits
- Surface geophysics
- Geohazards
- Geostructural assets

Transfer standard, not a database…

- Focus on information that is to be shared
- Extensible, but not universally comprehensive
- May not include all possible data related to a process
- Intent is to provide a consistent, usable format to transfer data between databases

Thank You!

Questions??