

# Use and Implementation of DIGGS: Technical Workshop and Demonstration

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Raleigh, NC  
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## The Long Wait is Over.... DIGGS is Here

The long drought is over.....

For the Tarheels (not such a drought)



	Gonzaga Bulldogs (37-2)	65
	North Carolina Tar Heels (33-7)	71

[www.pinterest.com](http://www.pinterest.com)

For the DIGGS Community (a loooong drought)



Bar Harbor, Maine  
(2016)



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## Use an Implementation of DIGGS: Technical Workshop and Demonstration

### Session Organization

- **History of DIGGS and Examples of Other Systems**
- Technical Workshop – Tools that you can start to use now
- Future of DIGGS and Your Role

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## 1. History and Evolution of DIGGS? (www.diggsml.org)

The DIGGS project involves development of a GML (XML-based) geospatial standard schema for the transfer of geotechnical and geoenvironmental data within an organization or between multiple organizations. DIGGS can work with existing software, hardware, databases and data storage facilities to easily transfer and share your data.

```

    graph TD
      A[Field/Lab Data Acquisition Equipment] -- DIGGS --> B[Data Analysis Software]
      A -- DIGGS --> C[Geo-data Presentation Software]
      A -- DIGGS --> D[Central Database]
      B -- DIGGS --> D
      C -- DIGGS --> D
      D -- DIGGS --> E[GIS GoogleEarth]
      D -- DIGGS --> B
      D -- DIGGS --> C
  
```

Imagine a world where you do not have to cut and paste seven different times to get your "data" ingested

Very Important

- DIGGS is NOT a database.
- DIGGS is how you get data into and out of a database.

Once implemented by your organization, the DIGGS data transfer standard will help meet your needs for information and data asset management. It is anticipated that DIGGS will save state and federal agencies, and other public and private organizations millions of dollars. Savings will be realized through a combination of avoided drilling and laboratory testing costs, and efficiencies afforded by the availability of geotechnical data for multiple projects in a standard format.

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**Big Data...Big Standardized Data...  
Big Fat Hairy Deal!**

Red-headed Step Child



[www.quotesgram500.com](http://www.quotesgram500.com)

Overwhelmed



[www.goingconcern.com](http://www.goingconcern.com)

Bewildered



[www.pinterest.com](http://www.pinterest.com)

Just Plain Boring!

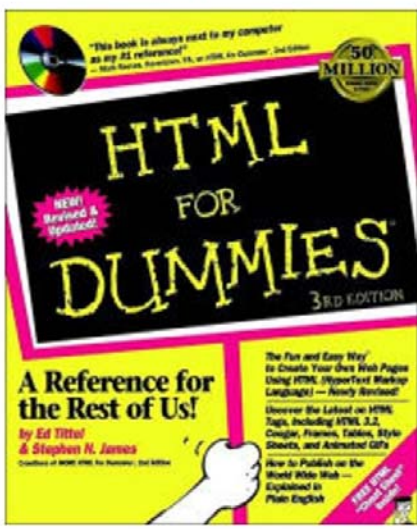


[www.thetelegraph.com](http://www.thetelegraph.com)

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**The Heart of DIGGS is XML**



[www.barnesandnoble.com](http://www.barnesandnoble.com)


**DIGGS is to Geotechnical Data  
what HTML is to the Internet**

Two Important questions:

- As long as your browser works and you can navigate through the internet, do you really care what HTML is all about?
- Do you need to understand what HTML is to use the internet?

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## Example XML/HTML Code

Tags → `<HTML>`

Tags → `<HEAD>`

Tags → `<TITLE>Your Title Here</TITLE>`

Tags → `</HEAD>`

Tags → `<BODY BGCOLOR="FFFFFF">`

Tags → `<CENTER><IMG SRC="clouds.jpg" ALIGN="BOTTOM"> </CENTER>`

Tags → `<HR>`

Tags → `<a href="http://somegreatsite.com">Link Name</a>`  
 is a link to another nifty site

Tags → `<H1>This is a Header</H1>`

Tags → `<H2>This is a Medium Header</H2>`

Tags → Send me mail at `<a href="mailto:support@yourcompany.com">`  
`support@yourcompany.com</a>`.

Tags → `<P>` This is a new paragraph!

Tags → `<P>` `<B>`This is a new paragraph!`</B>`

Tags → `<BR>` `<B>``<I>`This is a new sentence without a paragraph break, in bold italics.`</I>``</B>`

Tags → `<HR>`

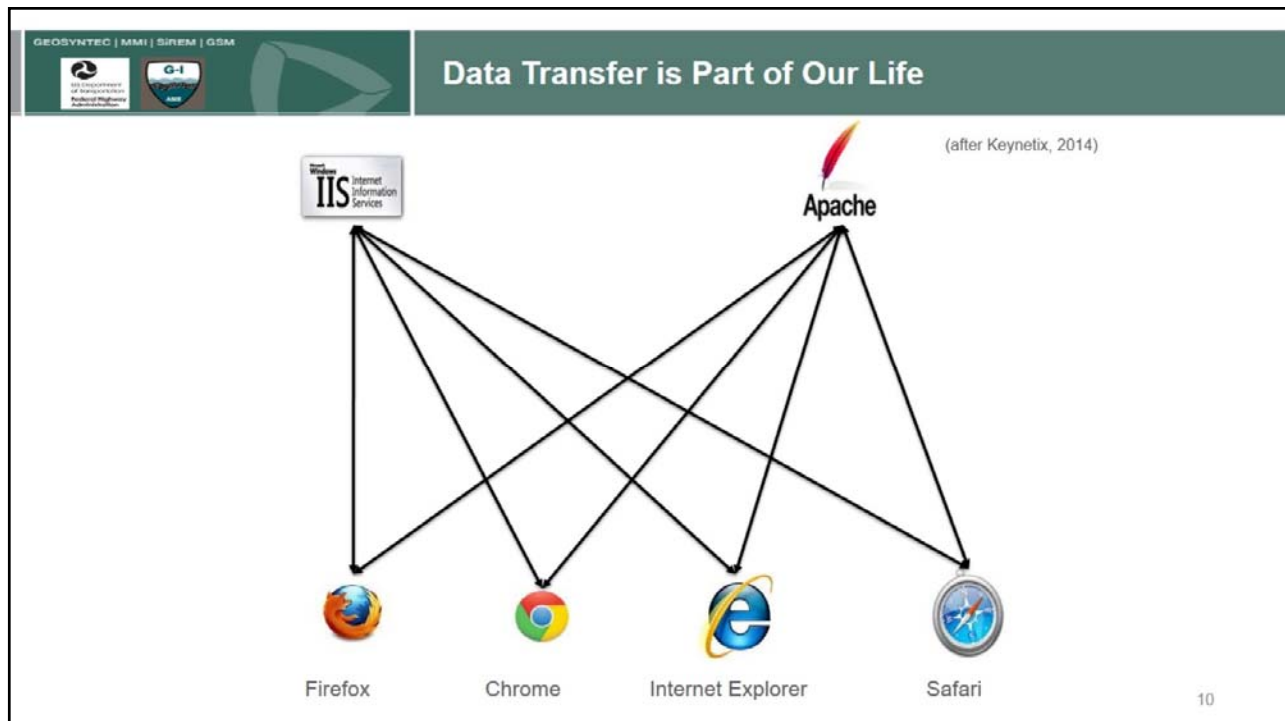
Tags → `</BODY>`

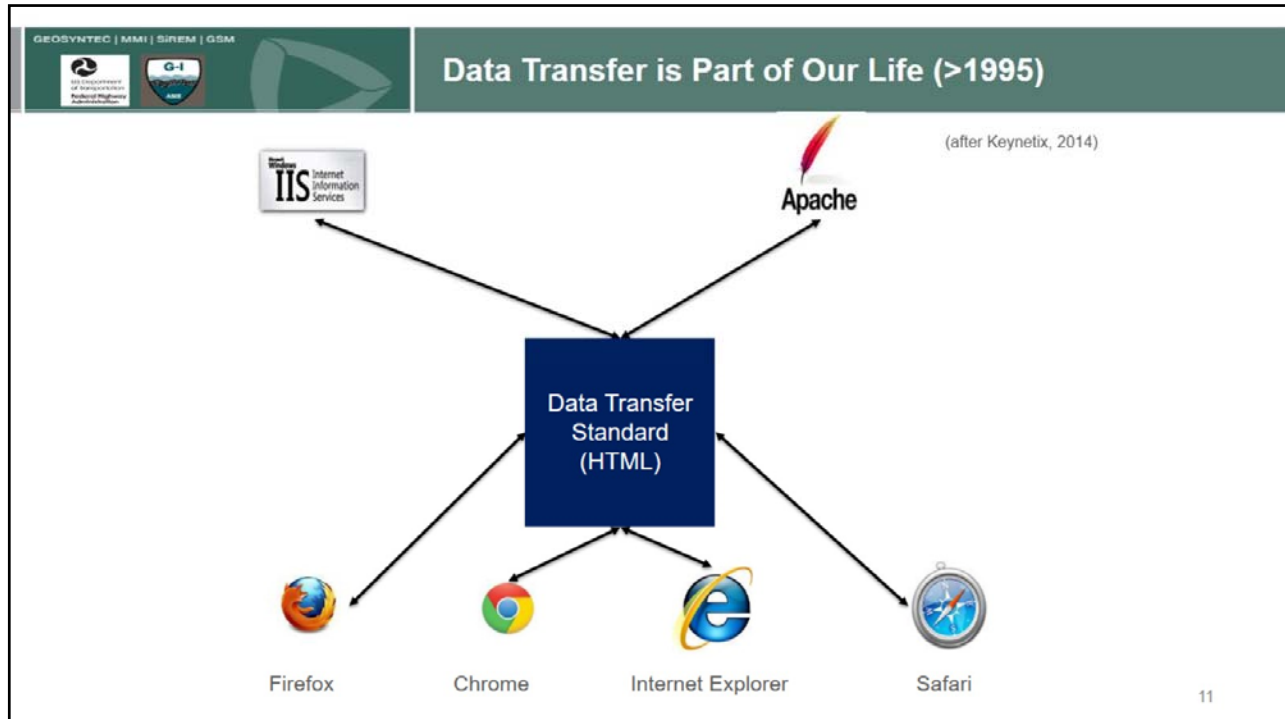
Tags → `</HTML>`

HTML

- Data entries are identified by "tags"
- Specific rules are developed for the code
- You never have to worry about these!

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**What is HTML?**

- **HTML** or **HyperText Markup Language** is the standard markup language used to create web pages
- The purpose of a web browser (i.e., Internet Explorer) is to read HTML documents and compose them into visible or audible web pages
- The browser does not display the HTML tags, but uses the tags to interpret the content of the page. HTML describes the structure of a website semantically along with cues for presentation, making it a markup language rather than a programming language


Example of HTML Code

```
<!DOCTYPE html>
<html>
  <head>
    <title>This is a title</title>
  </head>
  <body>
    <p>Hello world!</p>
  </body>
</html>
```

(after <http://en.wikipedia.org/wiki/HTML> )


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 **Data Transfer Using HTML**

- So here is the HTML Markup
 

```
<!DOCTYPE html>
<html>
<head>
<title>This is a title</title>
</head>
<body>
<p>Hello world!</p>
</body>
</html>
```





- So I ask again:
  - As long as your browser works and you can navigate through the internet, do you really care what HTML is all about?
  - Do you need to understand what HTML is to use the internet?

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 **Why is DIGGS Important to You and Your Agency?**





1. It is something we do not do as a profession
2. It represents good practice
3. It shows that we are progressive
4. It will make my job easier...eventually
5. It will at some point be required
6. ....

[www.diggsmi.org](http://www.diggsmi.org)

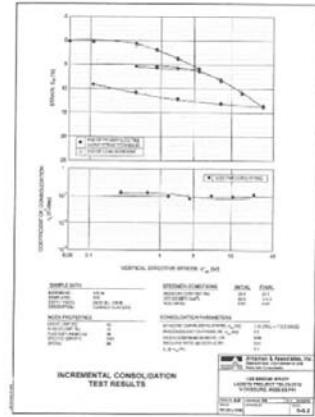
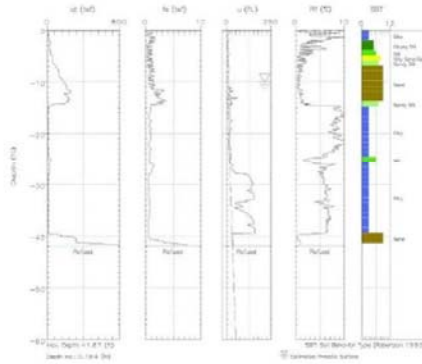
 

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**If It Is Only on Paper or .pdf File..... It Ain't Data**



### What are Data?



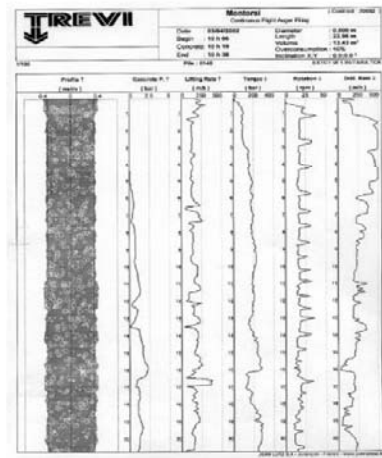
The "old school" and "status quo" will simply be unacceptable in the future

We can choose to lead or we can follow!

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**Contractors May be Ahead of Us!**

### What are Data?



Contractors currently are using "data" to help their operations AND for project QA



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## Ultimate Goal: Make it User Friendly in the User's Format

### Example Standard Boring Log Input

- Provide tool to get your boring log to look like this... automatically
- If it looks like this, it will generate a DIGGS file... automatically

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## Example Standard Boring Log :

### COSMOS

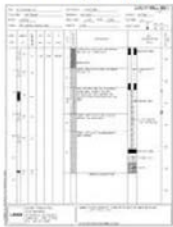
Data (and Boring Log) can be instantly transferred across the web

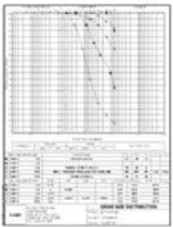
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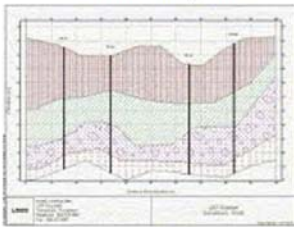
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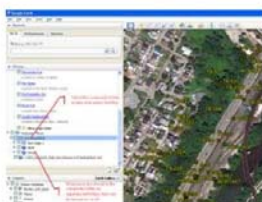
## Software Tools to Follow... This is Key to Success

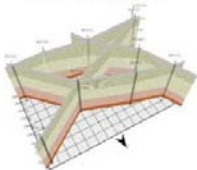
**Boring Logs**  


**Lab Test Report**  


**Fence Diagrams**  


**Completion Details**  



**GIS Interface**  


**3-D Graphics**  


[www.scientificsoftwaregroup.com/](http://www.scientificsoftwaregroup.com/)  
[www.bentley.com/](http://www.bentley.com/)

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## DIGGS, FHWA, ODOT, and G-I



**Innovative Collaboration**


- We recognized the problem
- We recognized the opportunity
- We found a solution in DIGGS

[www.Quotesgram.com](http://www.Quotesgram.com)


Peter Drucker (2012)

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## We Have Models the Help Guide Our Efforts





Association of Geotechnical & Geoenvironmental Specialists

<http://ags.org.uk/data-format>

In 1991, the AGS set up a method for transferring data between industry organizations. This is known to many simply as 'AGS Format' or 'AGS Data Format' and provides a standard way to transfer ground investigation, laboratory testing and monitoring data between the contributing parties of a project which involves geotechnical or geoenvironmental elements.

Put simply:

"The AGS Data Format allows for seamless sharing of data between different software used within the geotechnical/geoenvironmental industry".





<https://www.nzgd.org.nz/>


The New Zealand Geotechnical Database (NZGD) is an online database that provides a searchable repository for new and existing geotechnical information. It builds on the success of the Canterbury Geotechnical Database (CGD), which was developed for the Christchurch rebuild following the 2010/2011 Canterbury earthquake sequence. It also incorporates data previously held on the Auckland Geotechnical Database, which was initially set up by Watercare

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## We Have Even More Models to Guide our Efforts



Pipeline Open Data Standard

**Build an intelligent pipeline centerline.**


**What is the PODS Pipeline Data Model?**

The PODS Pipeline Data Model provides Pipeline Operators a highly-scalable database architecture to integrate critical records and analysis data with geospatial location for each component of your pipeline system in a vendor neutral platform.

**What's New?**

Announcing  
**Executive Director Kathy Mayo**

2014 PODS User Conference



**Geotechnical Virtual Data Center**

Standard Format and Business Model

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2. Use an Implementation of DIGGS:  
Technical Workshop and Demonstration

Session Organization

- History of DIGGS and Examples of Other Systems
- **Technical Workshop – Tools that you can start to use now**
- Future of DIGGS and Your Role

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What is DIGGS and Why XML?

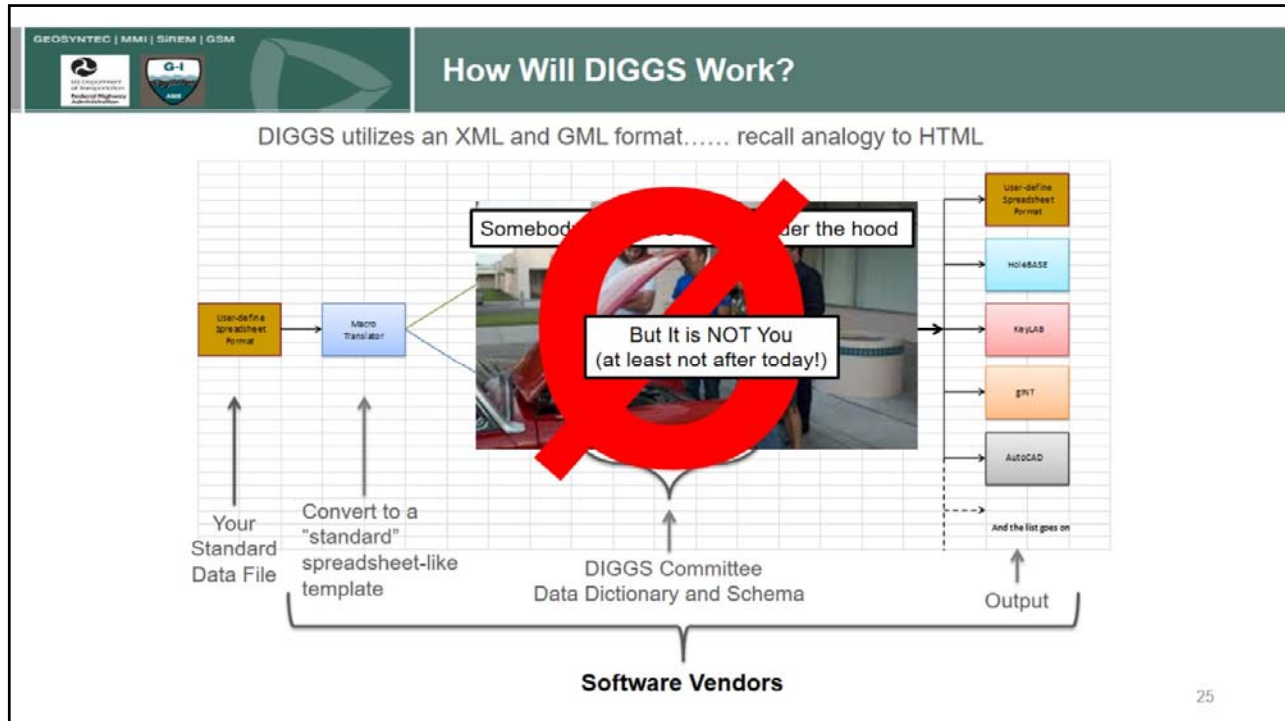
- DIGGS is a data transfer protocol.
- DIGGS is not a database, but rather a way to transfer data into and out of a database.
- XML is the industry standard for transferring data across the web.
- XML organizes data in a hierarchal format...think of each data entry representing a line in a spreadsheet. A database organizes data in a relational format...think of a table or a spreadsheet.

A Valid Question and Reasoned Answers

- Why not develop a standard spreadsheet tables or a standard database structure?
  - XML represents essentially machine-to-machine communication, whereas Excel or Access represent an application-to-application form of communication.
  - Once adopted, the transfer protocol will hopefully be “transparent” to the user.

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## Ultimate Goal: Make it User Friendly in the User's Format


### Example Standard Boring Log Input

- Provide tool to get your boring log to look like this...automatically
- If it looks like this, it will generate a DIGGS file... automatically

Top	Base	Description	Symbol	Angularity	HCI	Backfill	Top	Base	Description
0	1	Gravel, about 25 % fine to coarse, hard, sub	GW	subangular	none		0	1	Concrete
1	3	Silty Sand with Gravel (SM) — About 60 %	SM		none		1	3	Gravel
							3	7	Bentonite

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## Example Standard Boring Log : COSMOS

**Borehole Viewer - Mozilla Firefox**

File Edit View History Bookmarks Tools Help

 **Site Name:** Leffingwell Rd. Pedestrian Undercrossing **Hole Type:** test/exploratory boring  
**Data Provider:** CGS **Total Depth:** 51.5 m  
**Data Source:** CA Dept of Transportation **Driller:** CDT  
**Record Updated:** 3/14/2002 **Log Date:** 8/10/1989


**Record Updated:** -118.1044573 deg  
**Record Updated:** 33.90529083 deg

Depth(m)	Sample	SPT (N)	Lithology	Description	Gamma Ray		Dia		Depth (ft)
					0	50	1000	2	
0				Well graded SAND with GRAVEL(SW). Loose, yellowish brown, moist(FILL)					0
-5		10							-10
-10				SANDY lean CLAY(CL), medium stiff, dark bluish gray, moist.					-30
-15									-40
-20		17							-60
									-70

Data (and Boring Log) can be instantly transferred across the web


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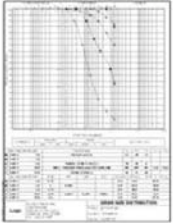


## Software Tools to Follow.... This is Key to Success

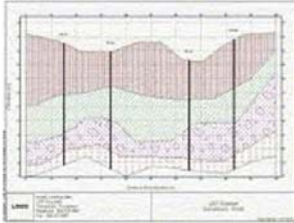
**Boring Logs**




**Lab Test Report**



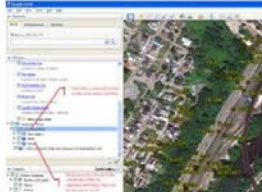
**Fence Diagrams**



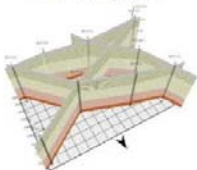
**Completion Details**



**GIS Interface**



**3-D Graphics**



[www.scientificsoftwaregroup.com/](http://www.scientificsoftwaregroup.com/)  
[www.bentley.com/](http://www.bentley.com/)


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What Can You Do with a Standard Format?


Honeywell (and White Robertson) use a 3-wire control standard

What does Nest know about thermostats??




<https://www.newegg.com>

Lesson #1: Once you develop a "standard" others will see opportunities and new products and capabilities will be developed.



<https://www.zoro.com>

Now Apple has joined the market



<http://www.apple.com>

Lesson #2: Consumer demand will drive the market.

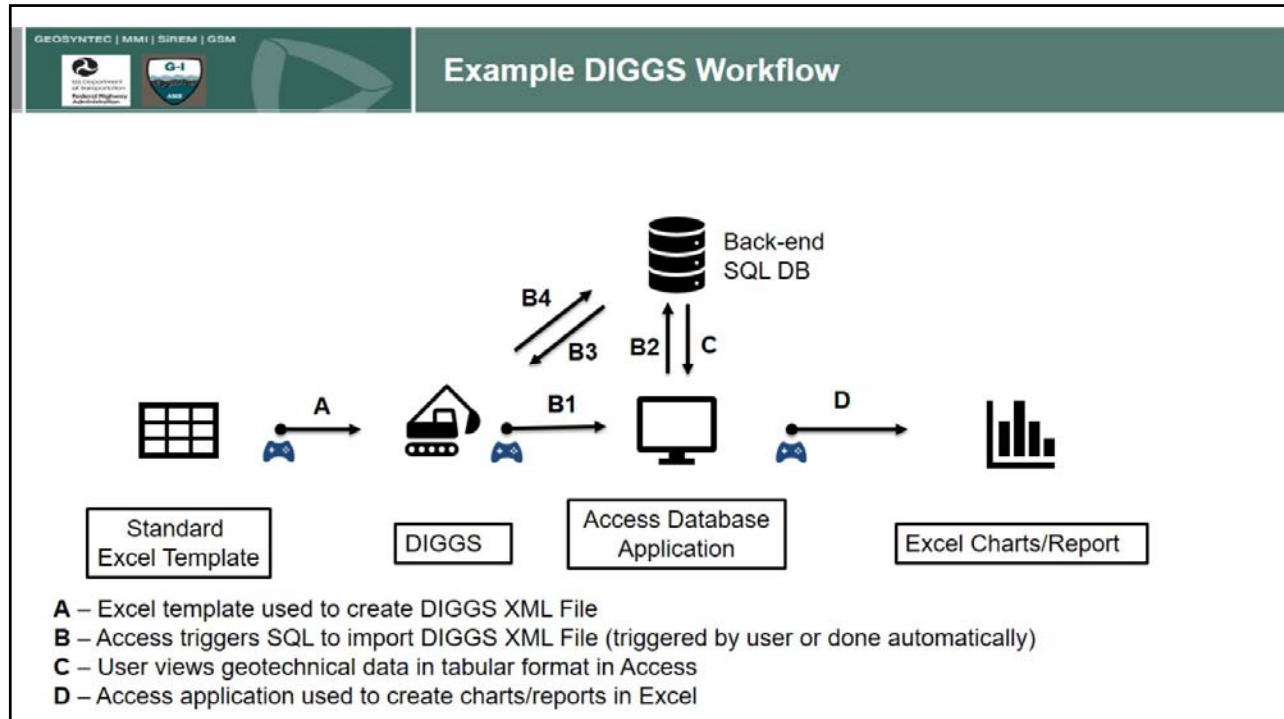
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Technical Workshop and Demonstration (w/ caveats)

- This is just one example of a cradle-to-grave DIGGS application
- We will walk through a step-by-step demonstration of what is being done and why it is a necessary component
- Ultimately, these steps can be (and will be) consolidated into a single step....and ultimately there will likely be an easier way to get to the end result
- Recognize that we are geotechnical engineers and database advocates who are venturing into the world of "software development," so the road may be a bit rocky until the "big boys" step up and help
- After this workshop/conference, we will post this application and provide instructions for its use on the G-I website
- We invite others to participate and add functionality to the application and to develop new applications
- Our ultimate goal is to spawn user/practitioner enthusiasm and user/practitioner demand. Software vendors will hopefully react to the demand.

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UNIVERSITY OF MISSOURI  
RUTHERFORD-HULLS

What are We Going to Do in the Workshop?

- Recognize that there is a standard data schema for generating a DIGGS file (thanks to the work of Dan Ponti at USGS)
- Start with an Excel file, a handwritten data sheet, the output from a laboratory LIMS, etc. to generate a “standard” spreadsheet or database file. For this demonstration, we elected to use a conventional gINT database structure as our “standard” (thanks again to Dan Ponti)
- Convert the standard gINT database tables into and XML file to generate what we reference as a valid DIGGS file (thanks to the work of Roger Chandler at Keynetix and Scott Deaton at Dataforensics)
- Transfer the DIGGS file to a conventional database. This is accomplished by mapping a DIGGS file to a series of SQL tables (because of enhanced XML parsing functionality in SQL) and then mapping the SQL tables to Access where they can be used by the user on a local machine (thanks to David Sardella at Geosyntec)
- Query the Access database to generate Excel files and tabulate/graph the results (thanks to Raphael Siebenmann at Geosyntec)

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Access the DIGGS Website ([www.diggsml.org](http://www.diggsml.org))

**DIGGS** DATA INTERCHANGE FOR GEOTECHNICAL AND GEOENVIRONMENTAL SPECIALISTS

Schema & Tools | **FAQ** | Blog | Publications | Presentations | Partners | Implementation Groups | Contact Us

Search

**Want to Get Involved?**  
DIGGS will revolutionize the way data is shared and transferred for geotechnical engineering. Become a [supporting member](#) to shape the future and get involved.

**Current DIGGS Schema Version**  
View the current DIGGS Schema, [Version 2.0.b](#).

**Latest Blog Posts**  
[DIGGS final report to ODOT](#)  
With the completion of the Ohio DOT's research project funding for DIGGS, support for the project now transitions

Now that you have the sample how do you share the generated data?

**Welcome to DIGGS**  
Welcome to the Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) website. We are looking for your involvement in the DIGGS community as we refine and implement DIGGS 2.0.

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View the DIGGS Schema (v2.0b)

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Home » [Schema & Tools](#) » DIGGS Schema version 2.0.b

**DIGGS Schema version 2.0.b**

The final version of DIGGS Schema version 2.0.b was released May, 2016.

Complete Schema: <http://diggsml.org/schemas/2.0.b/Complete.xsd>  
 Geotechnical Schema: <http://diggsml.org/schemas/2.0.b/Geotechnical.xsd>  
 Kernel Schema: <http://diggsml.org/schemas/2.0.b/Kernel.xsd>

DIGGS also relies on the following XML schemas

**Geography Markup Language (GML) Schemas** ([reference link](#))  
 GML 3.2 Subset Schema: [http://diggsml.org/schemas/2.0.b/gml3.2Profile\\_diggs.xsd](http://diggsml.org/schemas/2.0.b/gml3.2Profile_diggs.xsd)  
 Draft GML 3.3 Subset Schema: [http://diggsml.org/schemas/2.0.b/gml3.3Profile\\_diggs.xsd](http://diggsml.org/schemas/2.0.b/gml3.3Profile_diggs.xsd)

**Wellsite Information Transfer Standard Markup Language (WITSML) Schemas** ([reference link](#))  
 Data Types: [http://diggsml.org/schemas/2.0.b/witsml/1.3.1.1/typ\\_dataTypes.xsd](http://diggsml.org/schemas/2.0.b/witsml/1.3.1.1/typ_dataTypes.xsd)  
 Catalog: [http://diggsml.org/schemas/2.0.b/witsml/1.3.1.1/typ\\_catalog.xsd](http://diggsml.org/schemas/2.0.b/witsml/1.3.1.1/typ_catalog.xsd)  
 Measure Type: [http://diggsml.org/schemas/2.0.b/witsml/1.3.1.1/typ\\_measureTypes.xsd](http://diggsml.org/schemas/2.0.b/witsml/1.3.1.1/typ_measureTypes.xsd)

**Want to Get Involved?**  
DIGGS will revolutionize the way data is shared and transferred for geotechnical engineering. Become a [supporting member](#) to shape the future and get involved.

**Current DIGGS Schema Version**  
View the current DIGGS Schema, [Version 2.0.b](#).

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## DIGGS Schema written as XML File (several hundred lines of code follow)

```

<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema" version="2.0.b" elementFormDefault="qualified" targetNamespace="http://diggsml.org/schemas/2.0.b/geotechnical"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:witaml="http://www.witaml.org/schemas/1.3.1" xmlns:xal="http://www.w3.org/2001/XMLSchema-instance"
xmlns:diggs_geo="http://diggsml.org/schemas/2.0.b/geotechnical" xmlns:diggs="http://diggsml.org/schemas/2.0.b" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:vc="http://www.w3.org/2002/XMLSchema-varianting" vc:minVersion="1.0" vc:maxVersion="1.1">
  <!-- Import the gml and xlink namespaces (original local profiles) -->
  <import schemaLocation="gml3.2Profile_diggs.xsd" namespace="http://www.opengis.net/gml/3.2"/>
  <import schemaLocation="xlinks.xsd" namespace="http://www.w3.org/1999/xlink"/>
  <import schemaLocation="xml.xsd" namespace="http://www.w3.org/XML/1998/namespace"/>
  <!-- (canonical complete schemas for TeamEngine GML validation) <import namespace="http://www.opengis.net/gml/3.2" schemaLocation="http://schemas.opengis.net/gml/3.2.1/gml.xsd"/> <import
  namespace="http://www.w3.org/1999/xlink" schemaLocation="http://www.w3.org/XML/2003/06/xlink.xsd"/> <import namespace="http://www.w3.org/XML/1998/namespace"
  schemaLocation="http://www.w3.org/2001/xml.xsd"/> -->
  <!-- Include and import other DIGGS schemas -->
  <import schemaLocation="Kernel.xsd" namespace="http://diggsml.org/schemas/2.0.b"/>
  <!-- Import the witaml schemas -->
  <import schemaLocation="witaml/1.3.1.1/typ_dataTypes.xsd" namespace="http://www.witaml.org/schemas/1.3.1"/>
  <!-- Element type "diggs_geo:AtterbergLimitsTestType" substitutionGroup="diggs:AbstractLaboratoryTest" abstract="false" name="AtterbergLimitsTest">
  <element type="diggs_geo:AtterbergLimitsTestType" substitutionGroup="diggs:AbstractLaboratoryTest" abstract="false" name="AtterbergLimitsTest">
    <annotation>
      <documentation>The Atterberg limits are a basic measure of the nature of a fine-grained soil. Depending on the water content of the soil, it may appear in four states: solid, semi-solid, plastic
      and liquid. In each state the consistency and behavior of a soil is different and thus so are its engineering properties. Thus, the boundary between each state can be defined based on a
      change in the soil's behavior. The Atterberg limits can be used to distinguish between silt and clay, and it can distinguish between different types of silts and clays.</documentation>
    </annotation>
  </element>
  <complexType name="AtterbergLimitsTestType">
    <annotation>
      <documentation>Base type for AtterbergLimitsTest</documentation>
    </annotation>
  </complexType>
  <complexType name="diggs:AbstractLaboratoryTestType">
    <sequence>
      <element type="boolean" name="ovenDriedBeforeTest" minOccurs="0">
        <annotation>
          <documentation>True if sample is oven dried at 100 deg C or hotter prior to testing; otherwise false. True value for this property should produce a liquid_limit_oven_dried
          reportable result.</documentation>
        </annotation>
      </element>
      <element name="sieveProcedure" minOccurs="0">
        <annotation>
          <documentation>Value is wet if wet sieving on No. 40 screen (0.425 mm) is performed; dry if dry sieving on No. 40 screen (0.425 mm) is performed; none if no sieving is
          performed (sample is all finer-grained than 0.425 mm or coarser particles are picked out; unknown if not known. If value is None, the property handRemoved should be
          used.</documentation>
        </annotation>
      </element>
    </sequence>
  </complexType>
  <restriction base="string">

```

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## Populate the Standard gINT Database Template Project Table

File Home Insert Page Layout Formulas Data Review View Developer ACROBAT DIGGS Tell me what you want to do

HoleBASE Current AGS gINT About Help  
Workbook Data File GFI File Create DIGGS File About

W3948

	A	B	C	D	E	F	G	H	I	
1	Red are required fields	Contract Number	Division	Installation	Name	Name Line 2	Number	Job Number	Client	
2	Example ->	W3948	Huntington	Grout Holes	Bolivar Dam Seepage Barrier - Drilling and Grouting	Bolivar, Ohio	PB004	H2493	Bedrock Quarry, Ltd.	
3	Notes ->							What is the difference between Job Number and Number? Currently mapped to the Contract as a name with codeSpace = "Job Number"	Mapped as Client Name	
4		W3948	Huntington	Grout Holes	Bolivar Dam Seepage Barrier - Drilling and Grouting	Bolivar, Ohio	PB004	H2493	Bedrock Quarry, Ltd.	
5	Only 1 project allowed per workbook, per gINT schema.									

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### Populate the Standard gINT Database Template Point Table

PointID	HoleDepth	Depth UOM	gINT data entered by	Notes	North	East	Elevation	Overburden Thickness	Depth Drilled into Rock	Number Disturbed Samples	Total Core Boxes	Boring Type
Example -> P040U	68.8	ft	RIZZO/TerraFirm	Test remark	359974.7126	2264694.698	983.6	12	20	5	3	R
Notes ->	Default = ft		nothing of a projected CRS or latitude (decimal degrees)		easting of a projected CRS or longitude (decimal degrees)							
P040U	68.8	ft	RIZZO/TerraFirm	Test remark	359974.7126	2264694.698	983.6	12	20	5	3	R
YP1_B1	150	ft	RIZZO/TerraFirm		359970.7923	2264675.086	984.22	13.69999981				R
YP1_B2	120	ft	RIZZO/TerraFirm		359966.8719	2264655.474	984.97	15				R
YP2_B1	25		RIZZO/TerraFirm		359980.5932	2264724.116	980.85	9.5				R
YP2_B2	50		RIZZO/TerraFirm		359960.9913	2264626.056	985.63	15				R
HSR_N-B1	200		RIZZO/TerraFirm		359957.071	2264606.444	985.9	16				R
HSR_N-B2	250		RIZZO/TerraFirm		359953.1506	2264586.832	985.77	16				R
HSR-S-B1	400		RIZZO/TerraFirm		359949.2302	2264567.22	984.4	16.5	53.20000076			R

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### Populate the Standard gINT Database Template Lithology Table

PointID	Depth Bottom	Graphic	Description	Notes
Example -> P040U	0	12 SM	Tan, dry, silty SAND with gravels and clay	Small sample return
Notes ->	must be in same units as Depth LDM from Point		A value for EITHER Graphic; OR for Description is required	
P040U	0	12 SM	Tan, dry, silty SAND with gravels and clay	p_boliva_4_P040U
P040U	12	17.5 CLAYST	Dark gray, soft to moderately hard CLAYSTONE	p_boliva_4_P040U
P040U	17.5	20 SHALE	Shale: gray and soft	p_boliva_4_P040U
P040U	20	22 LIMEST	Limestone: dark gray, hard.	p_boliva_4_P040U
P040U	22	42 SHALE	Shale: light gray to gray, moderately hard to soft, oily drill water, interbedded shale.	p_boliva_4_P040U
P040U	42	48 CLAYST	Claystone: soft, gray	p_boliva_4_P040U
P040U	48	55 LIMEST	Limestone: gray, very hard, slow drilling.	p_boliva_4_P040U
P040U	55	59 CLAYST	Claystone: gray, fast drilling.	p_boliva_4_P040U
P040U	59	68 SANDSTONE	Sandstone: brown to rusty brown, hard Interbedded gray clay seams.	p_boliva_4_P040U
P040U	68	68.8 COAL	Coal: shiny black, hard.	p_boliva_4_P040U
YP1_B1	90	93 SW		p_boliva_4_YP1_B1
YP1_B1	150	152 SP	Poorly graded sand	This is a remark p_boliva_4_YP1_B1
YP1_B2	50	52 GP		p_boliva_4_YP1_B2
YP2_B1	20	23 SW		p_boliva_4_YP2_B1
YP2_B2	20	23 SW		This is a remark p_boliva_4_YP2_B2
HSR_N-B1	125	176 SW		p_boliva_4_HSR_N-B1

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## Populate the Standard gINT Database Template Sample Table

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HomeBASE Current Workbook Data File gINT About Help

HSR-S-B1

PointID	Depth	Length	Recovery Length	Run Number	Box or Sample No	Type	Container	Visual Classification	Lab Classification	Description
Example -> YP1_B1	90	3	3	47	1	SPT	Bag	SW-SM	SM	SAND with silt, very dark gray, SY3/1, no effervescence.
Notes ->	must be in same units as Depth UDM from Point worksheet			as relates to sampling method, not to material type			assume this description relates to lithology of sample			
YP1_B1	90	3	3	47		1 SPT	Bag	SW-SM	SM	SAND with silt, very dark gray, SY3/1, no effervescence.
YP1_B1	150	2	2		B1-150	Core	Box			
YP1_B2	50	2	2			SPT	Bag	ML	ML	Sandy SILT, very dark grayish brown, 2.SY3/2
YP2_B1	20	3	3				Bag	SM	SM	silty SAND, pale olive, SY6/3, well sorted, medium bedded
YP2_B2	20	3	3							
HSR_N-B1	125	1	1							
HSR_N-B2	125	2	2							
HSR-S-B1	120	1	1							
HSR-S-B1	210	3	3							
HSR-S-B1	340	2	2							
PO40U	23.25	1	1							

Instructions PROJECT POINT LITHOLOGY **SAMPLE** SIEVE SV READINGS

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## Populate the Standard gINT Database Template Sieve Table

File Home Insert Page Layout Formulas Data Review View Developer ACROBAT DIGGS Tell me what you want to do

HomeBASE Current Workbook Data File gINT About Help

Y1\_B1

PointID	Depth	Wt_Total_Spec	Wt_Passing_3plit_Sieve	Wt_Fines_Tested	Size_3plit_Sieve	Weighing_Method	Wt_Sieving_Tare_Coarse	Wt_Sieving_Tare_Fine	WC_Wt_1
Example -> PO40U	23.25	502.6000061	234.5189972	170	4.75	Electronic balance	28.29999924	18.39999962	120.3
Notes ->	must be in same units as Depth UDM from Point worksheet								
YP1_B1	90	129	90.30000305					0	
YP1_B1	150								
YP1_B2	50								
YP2_B1	20	472							
YP2_B2	20								
HSR_N-B1	125								
HSR_N-B2	125								
HSR-S-B1	120								
HSR-S-B1	210								
HSR-S-B1	340								
PO40U	23.25	502.6000061	234.5189972	170	4.75		28.29999924	18.39999962	

Instructions PROJECT POINT LITHOLOGY **SAMPLE** **SIEVE** READINGS

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## Populate the Standard gINT Database Sieve Readings Table

PointID	Depth	Reading Name	Soil_Tare	Percent_Finer	Reading UOM	Soil_Tare UOM
Example -> YP1_B1	90	25.4 1"	2	98	mm	g
YP1_B1	90	50.8 2"	0	100		
YP1_B1	90	25.4 1"	2	98		
YP1_B1	90	12.7 1/2"	3	95		
YP1_B1	90	4.75 #4	5	90		
YP1_B1	90	2 #10	9	81		
YP1_B1	90	0.85 #20	12	69		
YP1_B1	90	0.425 #40	20	49		
YP1_B1	90	0.15 #100	27	22		
YP1_B1	90	0.075 #200	12	10		
YP1_B1	150	76.1 3"	0	100		
YP1_B1	150	50.8 2"	0	95		
YP1_B1	150	25.4 1"	0	69		
YP1_B1	150	12.7 1/2"	0	66		
YP1_B1	150	4.75 #4	0	64		
YP1_B1	150	2 #10	0	60		
YP1_B1	150	0.85 #20	0	2		

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## Convert the gINT Database to a DIGGS File

**DIGGS Feedback Tool - About**

Version 1.7  
Created 12th March 2017

This tool is provided on a free to use licence for all organisations or individuals who want to create DIGGS files from Excel spreadsheets. The tool is provided free by Keynetix to enable you to give feedback to DIGGS and Keynetix.

To give feedback on the DIGGS schema please use the contact form on the DIGGS website [DIGGSML.org](http://DIGGSML.org)

To request new functionality for this tool, tell us about any problems you are having with it and to learn more about Keynetix's other state-of-the-art data management products, HoleBASE S1 and KeyLAB, please contact us at [support@keynetix.com](mailto:support@keynetix.com)

**Keynetix**

Contract Number	Job Number	Client
Example -> W3948	H2493	Bedrock Quarry, Ltd.
Notes -> W3948		
Only 1 project allowed per workbook, per gINT schema.		

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### Convert the gINT Database to a DIGGS File

Version 1.4  
16<sup>th</sup> September 2016

Number	Job Number
PBD04	H2493

What is the difference between Job Number and Number? Currently mapped to the Contract as a name with codeSpace = "Job Number"

PBD04 H2493

### Example DIGGS File from Feedback Tool

```
<Role>
  <rolePerformed>Reviewer</rolePerformed>
  <businessAssociatesRef xlink:href="#ba_rev_4"/>
</Role>
<remark>
  <content>Test remark</content>
</Remark>
<InvestigationTarget>Natural Ground</InvestigationTarget>
<projectRef xlink:href="#p_Boliva_4"/>
<locality>
  <Address gml:id="DGS981C-148F-2988-0085-10DCB">
    <gml:description>Seepage Barrier, West End</gml:description>
    <station>0+40</station>
    <offset>20</offset>
  </Address>
</locality>
<referencePoint>
  <PointLocation gml:id="p_Boliva_4_P0400-pl">
    <gml:pos srsDimension="3" srsName="urn:def:crs:DI00S:0.1:3734_6360">2264694.698 359974.7126 983.6</gml:pos>
  </PointLocation>
</referencePoint>
<referencePointAccuracy>
  <LocationAccuracy>
    <measurementMethod>GPS</measurementMethod>
  </LocationAccuracy>
</referencePointAccuracy>
<centerLine>
  <LinearExtent gml:id="p_Boliva_4_P0400-cl">
    <gml:posList srsDimension="3" srsName="urn:def:crs:DI00S:0.1:3734_6360">2264694.698 359974.7126 983.6 2264720.432 359901.453 924.0174522</gml:posList>
  </LinearExtent>
</centerLine>
<linearReferencing>
  <LinearSpatialReferenceSystem gml:id="p_Boliva_4_P0400-lsr">
    <gml:identifier codeSpace="urn:def:authority:DI00S:0.1:3734_6360">urn:x-diggs:def:fl:DI00S:0.1:3734_6360</gml:identifier>
    <gml:linearElement xlink:href="#p_Boliva_4_P0400-cl"/>
    <gml:lrms>
      <gml:LinearReferencingMethod gml:id="p_Boliva_4_P0400-lrm">
        <gml:chainage/>
      </gml:LinearReferencingMethod>
    </gml:lrms>
  </LinearSpatialReferenceSystem>
</linearReferencing>
```

## Transfer DIGGS File to SQL and then to ACCESS

Need to have SQL Express (free) on your computer and specific files in the appropriate directory. Instructions and example files will be posted on G-I website after Workshop.

Name	Date modified	Type	Size
Other	4/10/2017 12:45 PM	File folder	
SQL Server setup	4/10/2017 10:41 AM	File folder	
DIGGS DEMO.pptx	4/10/2017 11:41 AM	Microsoft PowerP...	69 KB
Diggs_ExternalXMLData.accdb	4/10/2017 5:43 PM	Microsoft Access ...	2,560 KB
Diggs_ExternalXMLData.laccdb	4/10/2017 5:56 PM	Microsoft Access ...	1 KB
Geosyntec.xml - Shortcut	4/10/2017 4:58 PM	Shortcut	4 KB
XML_GrainSizeCharts.xlsx	4/10/2017 5:43 PM	Microsoft Excel W...	19 KB

## Import DIGGS XML File to SQL Database and then Access

**DIGGS**  
DATA INTERCHANGE FOR GEOTECHNICAL AND GEOENVIRONMENTAL SPECIALISTS

### DIGGS Example XML Data Processor

Import DIGGS XML File Step 1: Imports XML file to SQL Database Tables

Open Grain Size Distribution Reports Step 2: Opens example Excel file containing the Grain Size Distribution Chart

Not surprising, the Access data tables look very similar to the gINT data tables, but they now have gotten populated using the transferred XML file. This represents new functionality from what has been previously posted and is where software vendors (or other coding gurus) will eventually improve.

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## Query Access to Generate and Excel Table and Plot

### DIGGS Example XML Data Processor

Import DIGGS XML File

Step 1: Imports XML file to SQL Database Tables

Open Grain Size Distribution Reports

Step2: Opens example Excel file containing the Grain Size Distribution Chart

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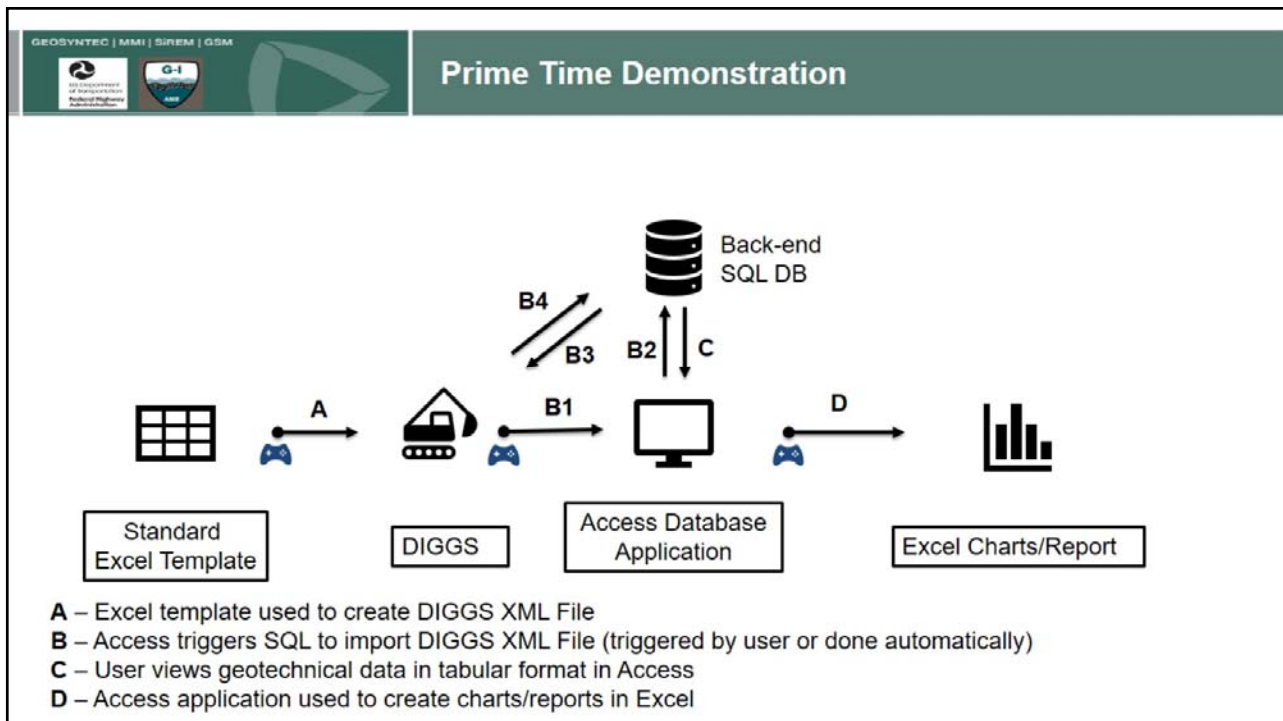
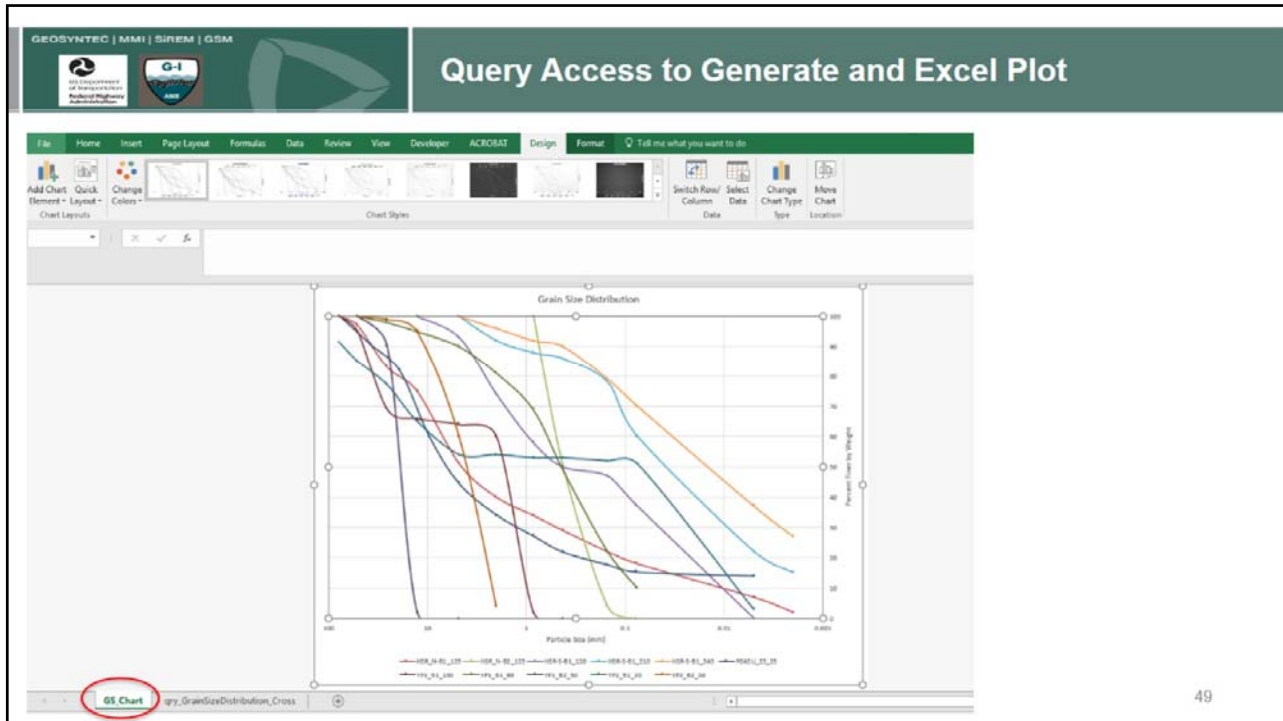
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## Query Access to Generate and Excel Table

Reading	Total Of Percent Finer	USB N-81 125	USB N-82 125	USB-S-B1 120	USB-S-B1 210	USB-S-B1 840	POB01-21-25	YPL1-B1-150	YPL1-B1-60	YPL1-B2-50	YPL2-B1-20	YPL2-B2-20
0.002	27	2			35	27						
0.005	37	7			0	22	37	13.9670496				3
0.075	70	18	0		37	60	70	15.29996967		10		51
0.15	79	22	4		47	78	79	17.68018913		22		52
0.425	90	29	30		50	86	90	21.93283081	0	49		53
0.85	100	34	100		58	88	92	27.2645092	2	69		53
2	96	40			74	92	96	34.18299103	60	81		54
4.75	100	51			93	100	100	44.46551895	64	90	0	54
9.5	59.97100067							59.97100067				60
12.7	100	75			100				66	95	2	65
19	81.84892278							81.84892278				65
25.4	99	83							69	98	90	77
38.1	90.93896912							90.93896912				99
50.8	100	97							95	100	100	85
76.1	100	100							100	100		91

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Prime Time Demonstration - Observations

- Because the DIGGS file is used for “data transfer” it is not needed after the data has been transferred into the user-defined database or data management system
- In its present form for this demonstration, we only present a particle size distribution example as a “proof of concept.” This compliments the recent work by Roger Chandler and Scott Deaton to demonstrate the “round trip” of data from gINT to HoleBASE and back to gINT using DIGGS.
- The purpose of these demonstrations is to not only demonstrate the proof of concept, but to also provide the user with working examples that will allow them to generate their own DIGGS files and database systems. Using the DIGGS schema, those not of the faint of heart can develop their own applications.... and hopefully post them on the G-I website.
- Hopefully, the users/participants can see the value and utility of the DIGGS system and will encourage software vendors (e.g., Bentley, Keynetix, RockWare, etc.) to add this functionality in the next generation of their software.

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3. Use an Implementation of DIGGS:  
 Technical Workshop and Demonstration

Session Organization

- History of DIGGS and Examples of Other Systems
- Technical Workshop – Tools that you can start to use now
- **Future of DIGGS and Your Role**

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## Status and Opportunities for Support and Participation

- Final Report from G-I Submitted to Ohio DOT
- Data Dictionary and Schema Developed for >40 Tests
  - Need community support to QA the test input models
- DIGGS Feedback Tool Developed to Automatically Develop DIGGS Files
  - Need community support to QA the test input models
- Solicit Commitment from Organizations
  - Private and public organizations
  - Seek R&D funding to advance DIGGS 2.0
  - Establish Web “blog” to communicate and inform
  - Identify the “next generation” DIGGS files
- Work with Software Vendors to Support DIGGS
  - Ongoing positive response, but we need your help and encouragement
- Develop Training Materials
  - Feedback Tool and Workshops like this are the tip of the iceberg

Log in for more information  
[www.diggsml.org](http://www.diggsml.org)


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## Ideas for Future


### Data Beyond Current DIGGS



**Literally, the sky will be the limit**

**Innovate and Create the Future**







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## Your Critical Role in Success of DIGGS Field of Dreams (1989)



**IF YOU BUILD IT,  
THEY WILL COME.**



We will Make DIGGS User Friendly and Provide Quantifiable Benefits



**IF YOU BUILD IT,  
WILL THEY COME ?**




Software Vendors Will Help if They are Confident of Owner Support

**You hold the key!  
Insist that software be developed to incorporate DIGGS**

<http://speakoutsarasota.com>

<http://franklymydearmojo.com>

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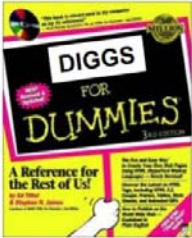
## Planning for the Future

FHWA

- Develop guidance and education for:
  - Management of Geotechnical Information
  - Communication of Geotechnical Information
- Advocate research on “Big Data” management
- Promote DIGGS as transfer protocol for communication of geotechnical data


Geo-Institute

- Solicit support and participation from public and private organizations
- Identify a sustainable business model to ensure growth
- Establish committees to help future development
- Solicit software vendor support






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## We Are Ready for You



[www.blog.sina.com.cn](http://www.blog.sina.com.cn)

**We believe that DIGGS will be successful if you support it**




[www.SayWhyDol.com](http://www.SayWhyDol.com)


**The recruiters are here today!  
If for some reason you have reservations about support, please contact us**

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## Conclusion



[www.cyber8technologies.com](http://www.cyber8technologies.com)



Download from Dreamstime.com

[www.dreamstime.com](http://www.dreamstime.com)

**DIGGS is Ready....but**

**The Transformation from Ho-Hum to Unbridled Excitement Depends on You. Thanks!**

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