

On-line Geotechnical Database Considerations and Data Sharing STGEC October 22 – 25, 2012

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Outline

- Background/History
- Current capabilities in Virginia and Minnesota DOT Geotechnical Database Management System (GDBMS)
- Considerations in development of Virginia and Minnesota DOT GDBMS
- Lessons Learned
- Looking forward

Background/History – Subsurface Data

- Geotechnical information has traditionally been exchanged on paper or electronic paper (.pdf or CAD format)

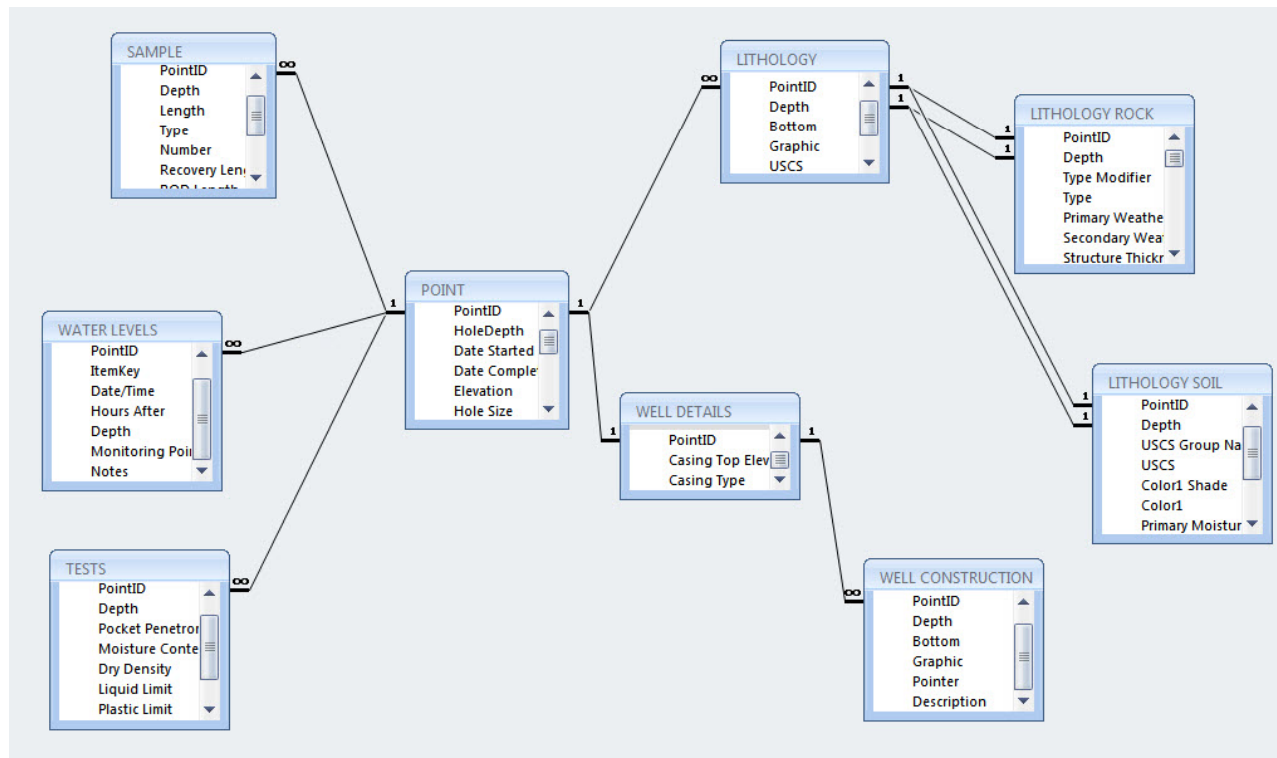


The collage features several key elements:

- gINT software form:** A data entry form with fields for CLIENT (ASC Corporation), PROJECT NUMBER (ASC-1234), DATE STARTED (11/2/02), COMPLETED (11/20/02), DRILLING CONTRACTOR (JAMA Drilling, Inc.), DRILLING METHOD (Hollow Stem Auger), LOGGED BY (A. Bose), CHECKED BY (Y. Ma), and NOTES (Weather: Warm, sunny, slight easterly wind).
- PDF icon:** A red Adobe PDF icon.
- Microsoft Word icon:** A green icon with a white 'W'.
- DWG icon:** A yellow and blue icon with 'DWG' text.
- Subsurface Diagram:** A screenshot of a software interface showing a cross-section of the ground with various soil layers and borehole locations (B-1 to B-5).

Geotechnical Databases

- Some organizations have started requiring data in a database format for individual projects.



Geotechnical Database Management Systems

- In the past few years a movement to maintain a geotechnical database management system has started
- Agencies are recognizing the value of the geotechnical data
 - ID trouble points
 - Reuse of existing data
 - Correction of errors in existing data
 - Instant access to legible data
 - Quick development of results for analysis and reports
 - Fast access, distribution and turn around time
 - Simple backup of data

Geotechnical Database Management Systems

The screenshot displays a web-based interface for managing geotechnical data. It features a map of Minnesota with various locations marked, a data table listing unique IDs and site information, and a summary report for a specific boring.

Map Interface: The map shows the state of Minnesota with a red dot indicating a location. The interface includes a search bar, a map navigation toolbar, and a legend. The map is titled "Foundation Borings" and is provided by Bentley Systems.

Data Table: The table lists unique IDs and site information. The columns are Unique ID, SP, and H. The data is as follows:

Unique ID	SP	H
07435		
07436		
07437		
07438		
07439		
59628	7106-66	
59629	7106-66	
59630	7106-66	
59631	7106-66	
59632	7106-66	
59633	7106-66	

Summary Report: The report provides detailed information for boring 59630. The data is as follows:

Unique ID	SP	Hole Type	Pjt Hole Num	Hwy Type	Hwy Num	County	STR Num	Elav	Depth	Comp Date
07435		BORING	T-1	No Road (Building, Pond, Study, Other)		Sherburne	90741	942	30	
07436		BORING	T-2	No Road (Building, Pond, Study, Other)		Sherburne	90741	943	21	
07437		BORING	T-3	No Road (Building, Pond, Study, Other)		Sherburne	90741	943	30	
07438		BORING	T-4	No Road (Building, Pond, Study, Other)		Sherburne	90741	942	30	
07439		BORING	T-5	No Road (Building, Pond, Study, Other)		Sherburne	90741	942	30	
59628	7106-66	BORING	F-1A	US Highway	169	Sherburne	71013	980.40	25.50	Sep 06, 2001
59629	7106-66	BORING	F-2A	US Highway	169	Sherburne	71013	987.30	55	Aug 21, 2001
59630	7106-66	BORING	F-3A	US Highway	169	Sherburne	71013	978.90	55.50	Aug 22, 2001
59631										
59632										
59633										

The summary report also includes a link to the boring's PDF report: <http://www.mrrapps.dot.state.mn.us/pdf/Borings/59630.pdf>.

Geotechnical Database Management Systems

http://gis.virginiadot.org/website/hr3x/odu_viewer.html

Virginia Department of Transportation
VDOT
 Materials Division

VDOT Geotechnical Database Management System (GDBMS) Framework
GDBMS::HR3X
 Project Site: Hampton Roads Third Crossing

Total No. of Boreholes: 586 >>> Home

Current Layer: VDOT (Std.) Dynamic Application

POINTID
664-613-

You are in Pan Mode

VDOT GDBMS :: Results from Selected Boring Site :: - Windows Internet Explorer provided by Bentley Systems

http://gis.virginiadot.org/Website/hr3x/php/odu_db_identify.php?POINTID=664-613-5&GINT=0664-061-103_PE101-8613.gpj

Geotechnical data from a selected boring site:
HR3X:: 664-613-5

Retrieved, parsed and translated to the VDOT Standardized data format: August 13th, 2012, 15:47:17 EST

Data Source Information		Additional Data Available	
Native Data Format:	Standardized	VDOT Standardized Data File:	0664-061-103_PE101-8613_664-613-5_vdot_std.gpj
Data Format Displayed:	VDOT Standardized	CSV File:	0664-061-103_PE101-8613_664-613-5_vdot_std.csv
File Type:	gINT Project file	Boring Log (PDF):	0664-061-103_PE101-8613_664-613-5_vdot_std_boring_log.pdf
File Name:	0664-061-103_PE101-8613.gpj	Boring Log (DXF):	0664-061-103_PE101-8613_664-613-5_vdot_std_boring_log.dxf
File size:	272 KBytes		
Unit:	Feet		

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Table: POINT											
POINTID	PROJECT_NUMBER	STRUCTURE_NUMBER	NORTH	EAST	HORIZONTAL_DATUM	ELEVATION	VERTICAL_DATUM	STATION	OFFSET	DATE_STARTED	DATE_COMPLETED
664-613-5		B613	3492748.305	12089720.546		15.9		181+96	110 ft Left of C/L		76.0

Table: PROJECT					
PROJECT_NAME	PROJECT_LOCATION	PROJECT_NUMBER	PPMS	BENCHMARK_LOCATION	UNITS
	Armstead Rd	0664-061-103_PE101			E

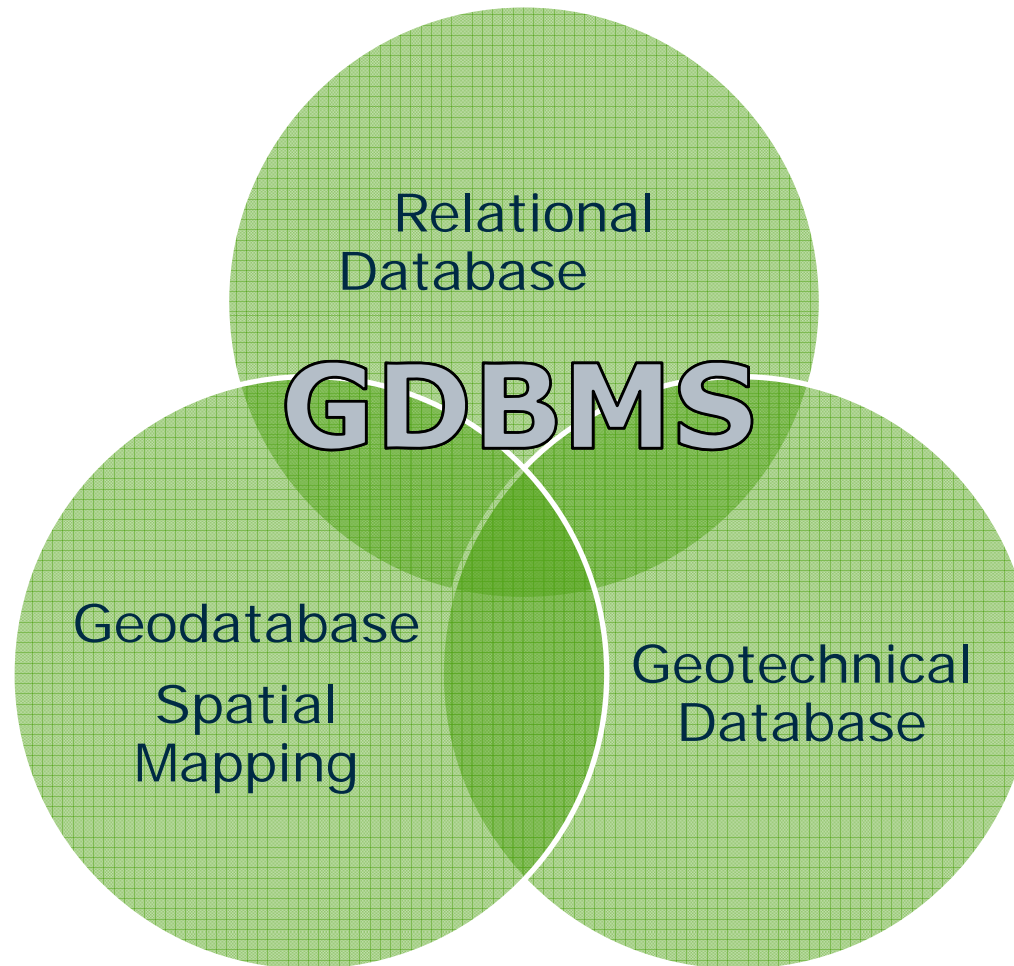
Table: SAMPLE										Query Returned:
RECORD	POINTID	DEPTH	PROJECT_NUMBER	STRUCTURE_NUMBER	SAMPLE_LENGTH	SAMPLE_TYPE	SPT_DATA_1	SPT_DATA_2		15 Records
1	664-613-5	4.5			1.5	SPT				
2	664-613-5	9.5			1.5	SPT				

Done

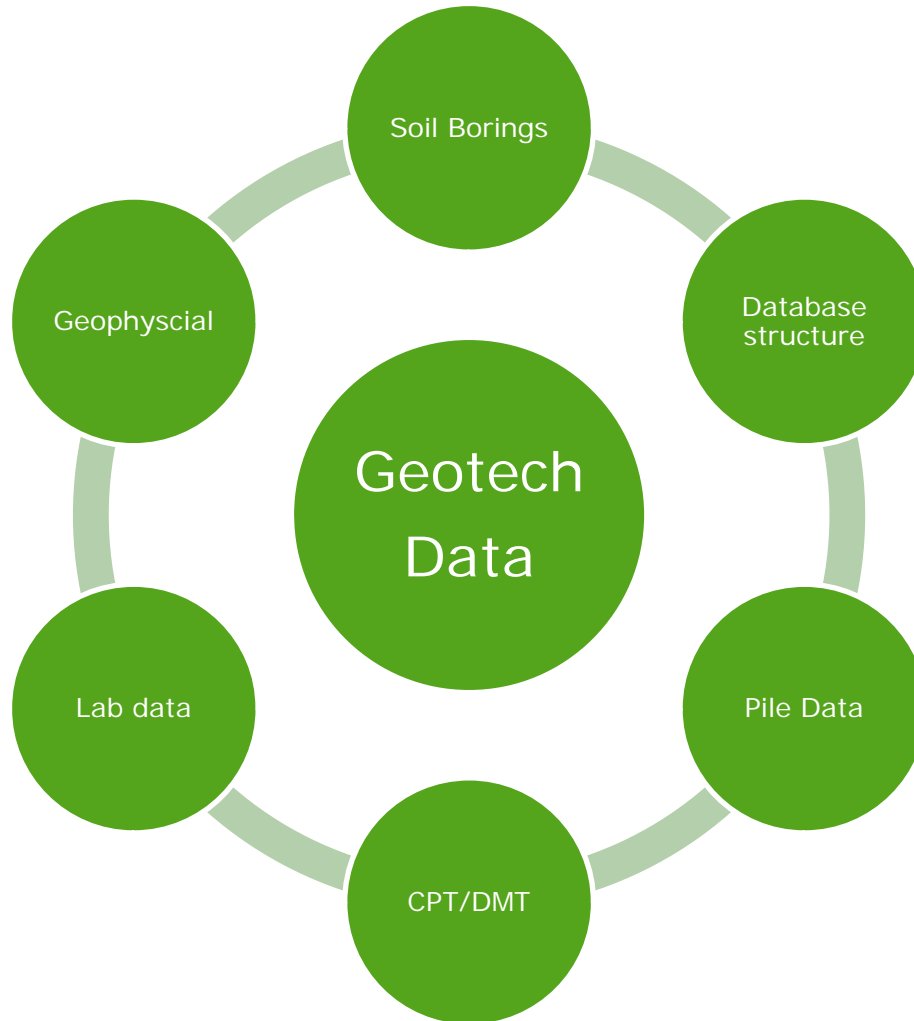
Internet | Protected Mode On 100%

Geotechnical Database Management Systems

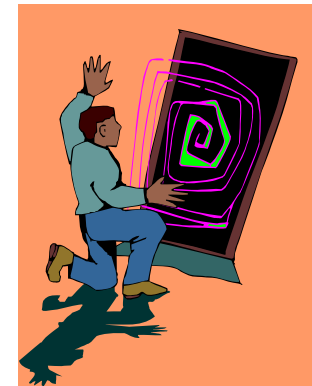
A GDBMS will be composed of several parts



Geotechnical Considerations



Future considerations?



Sharing Data

- VDOT shares geotechnical database files (gINT files, .csv format)
- MDOT has opted for a data exchange format (DIGGS)
- Informational exchange
 - Both organizations allow for PDF download of the borehole logs
 - VDOT has a DXF download option of logs

Data Reporting and Analysis



Geotechnical data from a selected boring site:
HR3X:: 664-607-3

Retrieved, parsed and translated to the VDOT Standardized data format: August 14th, 2012, 16:46:44 EST

Data Source Information

Native Data Format: **Standardized**
Data Format Displayed: **VDOT Standardized**
File Type: **gINT Project file**
File Name: **0664-061-103_PE101-B607.gpj**
File size: **268 KBytes**
Unit: **Feet**

Additional Data Available

VDOT Standardized Data File: **0664-061-103_PE101-B607_664-607-3_vdot_std.gpj**
CSV File: **0664-061-103_PE101-B607_664-607-3_vdot_std.csv**
Boring Log (PDF): **0664-061-103_PE101-B607_664-607-3_vdot_std_boring_log.pdf**
Boring Log (DXF): **0664-061-103_PE101-B607_664-607-3_vdot_std_boring_log.dxf**

Please click here to generate a "Printer-Friendly" page

Table: **POINT**

POINTID	PROJECT_NUMBER	STRUCTURE_NUMBER	NORTH	EAST	HORIZONTAL_DATUM	E
664-607-3		B607	3481655.093	12087083.065		2

Table: **PROJECT**

PROJECT_NAME	PROJECT_LOCATION	PROJECT_NUMBER	PPMS	BENCHMARK_LOCATION	UNITS	DEPTH_LOG_PAGE
Ramp D over RTE. 164	Suffolk	0664-061-103-101.615			E	40.0

Table: **SAMPLE**

RECORD	POINTID	DEPTH	PROJECT_NUMBER	STRUCTURE_NUMBER
1	664-607-3	4.5		
2	664-607-3	9.5		

Select (10 Max.) Boring Sites and Dynamically Generate a Fence Diagram

Select (10 Max.) Boring Sites and Dynamically Generate a Fence Diagram in DXF format

Generate Application's Data File

Application data files dynamically generated :

Input Data: Translated Data (Standard Format)

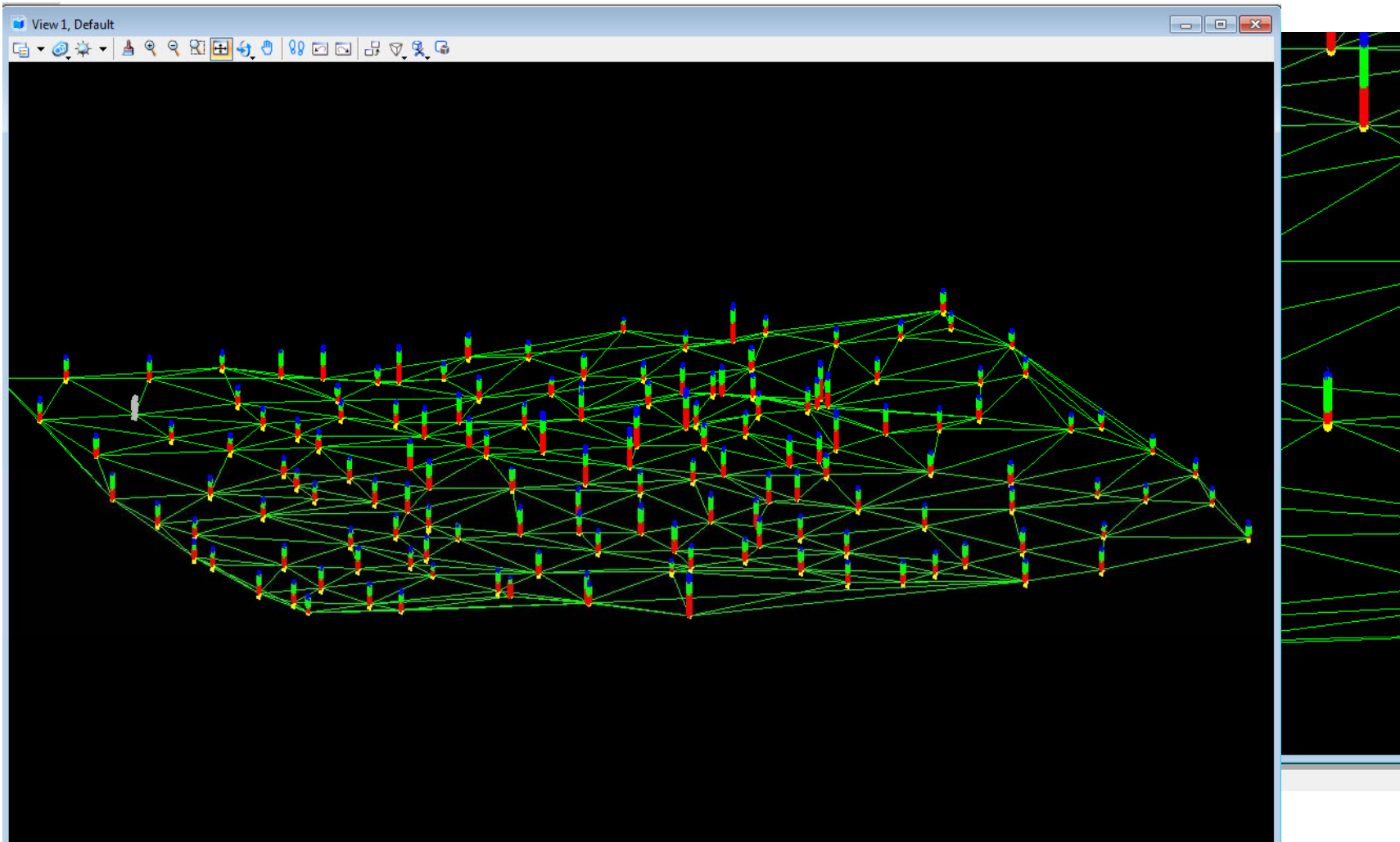
Boring Log (PDF)

Output Data File:

For DRIVEN: 0664-061-103_PE101-B607_664-607-1_driven.dvn
For Shaft: 0664-061-103_PE101-B607_664-607-1_shaft.sfd
For GALENA: 0664-061-103_PE101-B607_664-607-1_galena.gmf

For RSS: 0664-061-103_PE101-B607_664-607-1_rss.dat
For LPILE: 0664-061-103_PE101-B607_664-607-1_lpile.lpd

Data Analysis



Conclusions

- An geotechnical database is a part of an overall GDBMS
- Thorough consideration to a geotechnical database must be done by parties involved
- Consider analysis needs as well as data input for advanced use
- Streamlining of work processes produces the most financial benefit

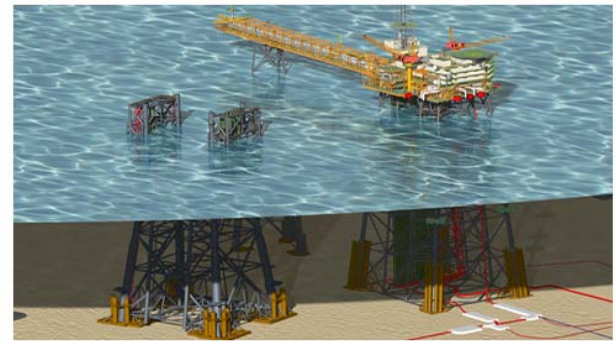
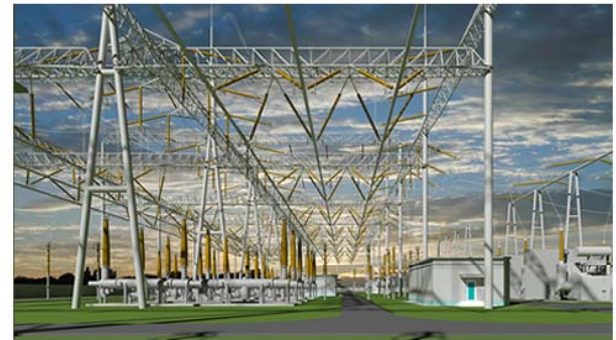


Thank you

- Ed Hoppe – Virginia DOT
- Kwame Adu-Gyamfi – Virginia DOT
- Derrick Dasenbrock – Minnesota DOT

Questions?





Thank You !

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