Digital Integration of AASHTO Updates for Enhanced Engineering Decisions and Project Deliveries

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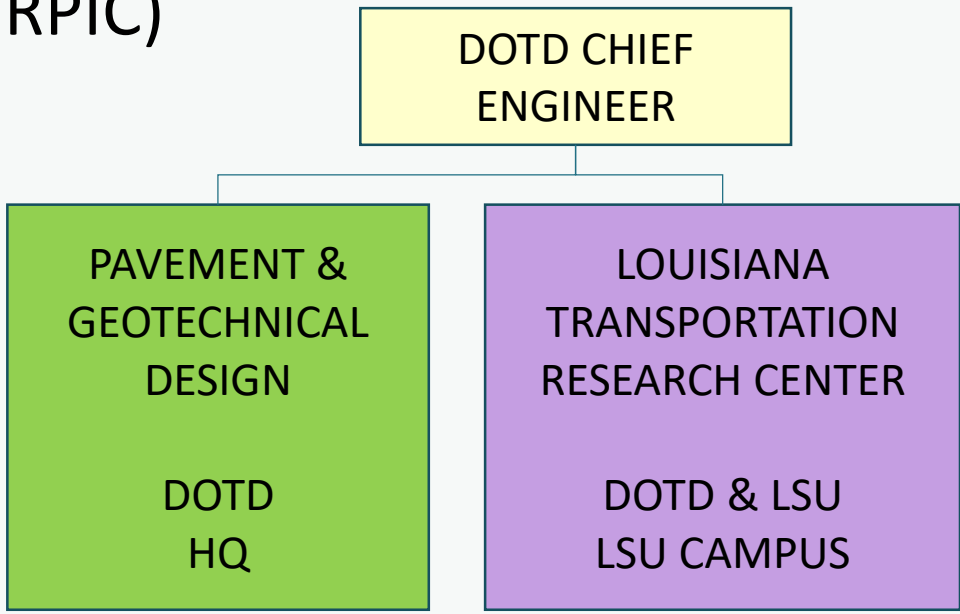
LTRC Project 24-2GT

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

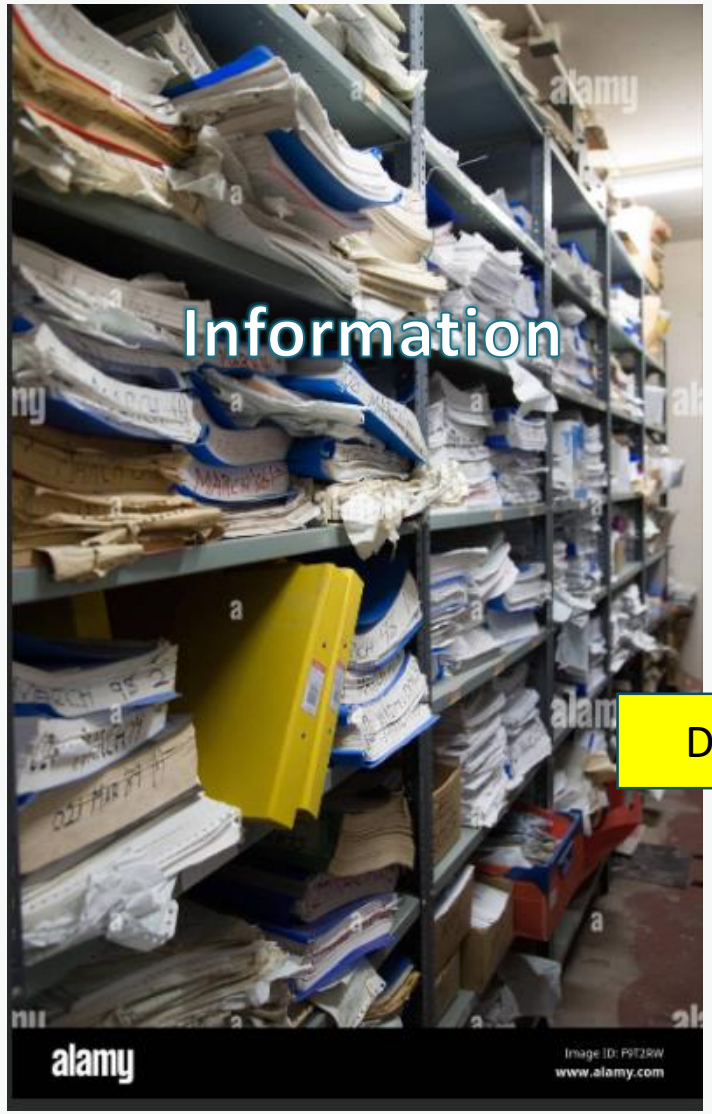
LOUISIANA TRANSPORTATION RESEARCH CENTER

LTRC Introduction

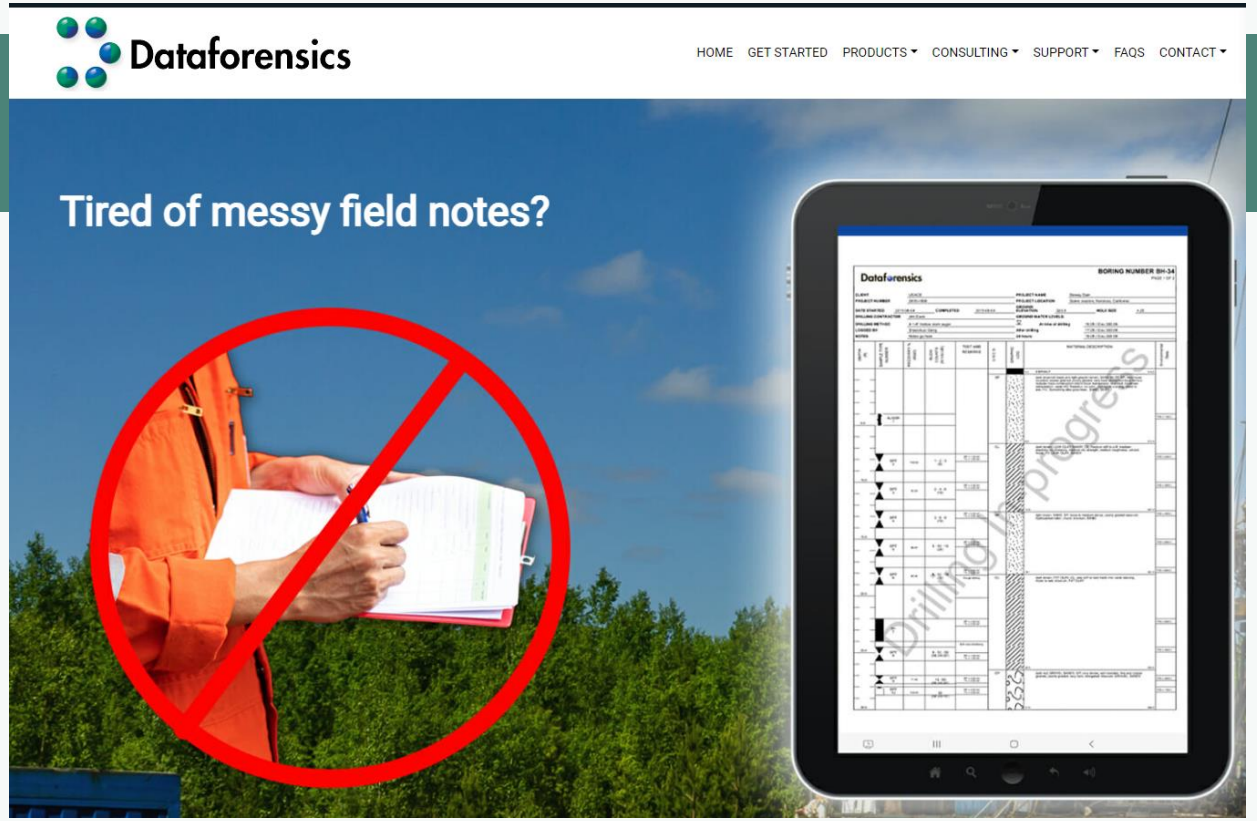
- LTRC Created by Louisiana Legislature in 1986.
- Sponsored Jointly by the Louisiana Department of Transportation and Development (DOTD) and Louisiana State University (LSU)
  - Conducts short- and long-term research
  - Provides technical assistance, training, continuing education, technology transfer to DOTD and the transportation community.
- Research Problem Identification Committees (RPIC)
  - Problem Solicitation
  - Committee Review & Rating
  - Importance & Implementation Potential
- Project Review Committee (PRC)
  - Industry, Academia, and Government



Data Management



Digitize



Geotechnical Database Efforts

- Phase 1, LTRC - PDFs (information) to ArcMAP
  - ArcGIS map with linked borings (custom code)
  - Content Manager with web interface
- Phase 2, Dataforensics – Digital Data
  - gINT – Bentley software customization
  - pLOG
  - Rapid CPT
  - Field Data Loggers
- Phase 3, Pile Load Test Database & District Shallow Soil Borings
  - HoleBASE, Keynetix
  - KeyLAB, Keynetix
- Phase 4, LTRC - OpenGround Cloud
  - LTRC Data Upload/Conversion
  - KeyLAB, Keynetix (internal drill crew)
  - Dataforensic (Bentley Rep)

LTRC Project # / Report #

03-1GT / 446

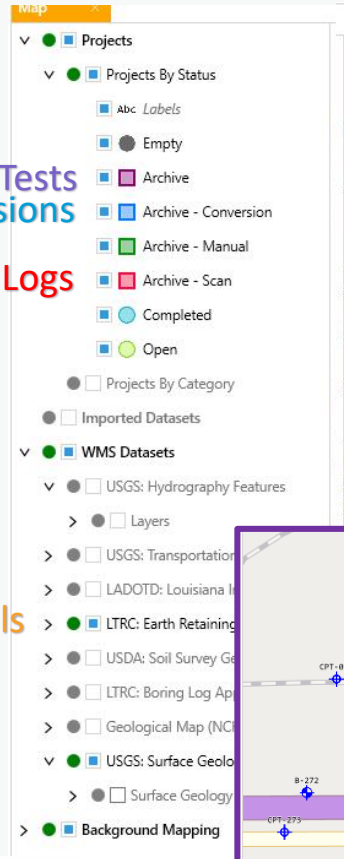
10-2GT / 498

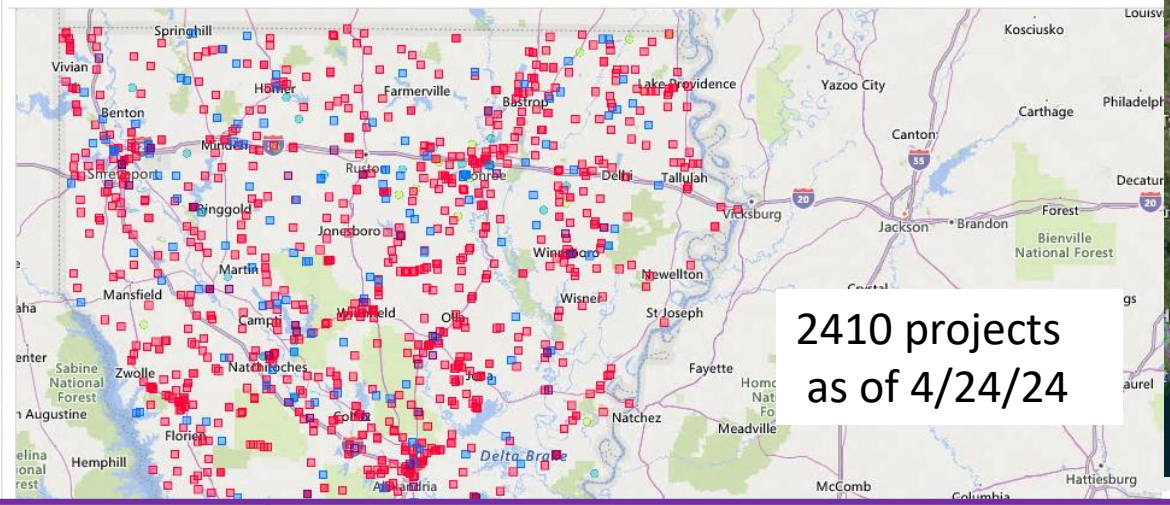
15-1GT / 634

24-2GT In-Progress

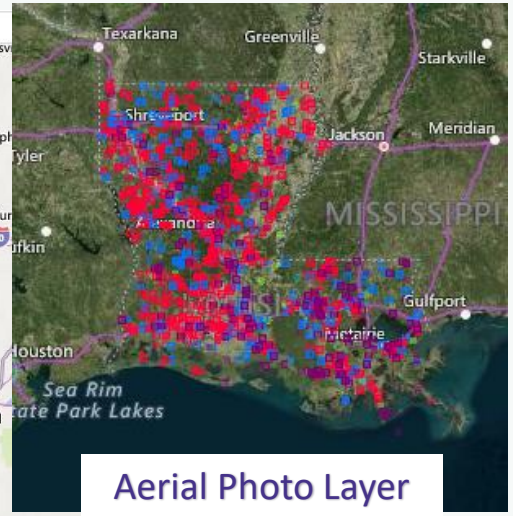
Geotechnical Database - Phase IV (21-2GT)

Pile Load Tests
gINT Conversions
.PDF Logs



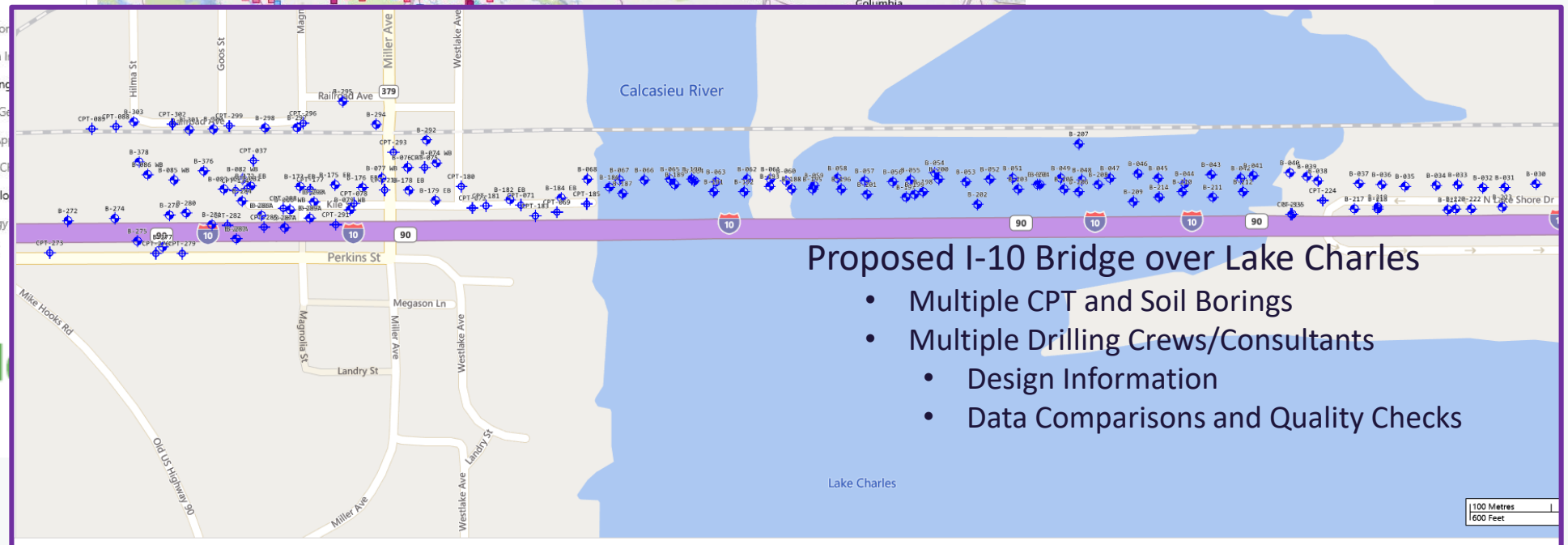


2410 projects
as of 4/24/24



Aerial Photo Layer

Retaining Walls

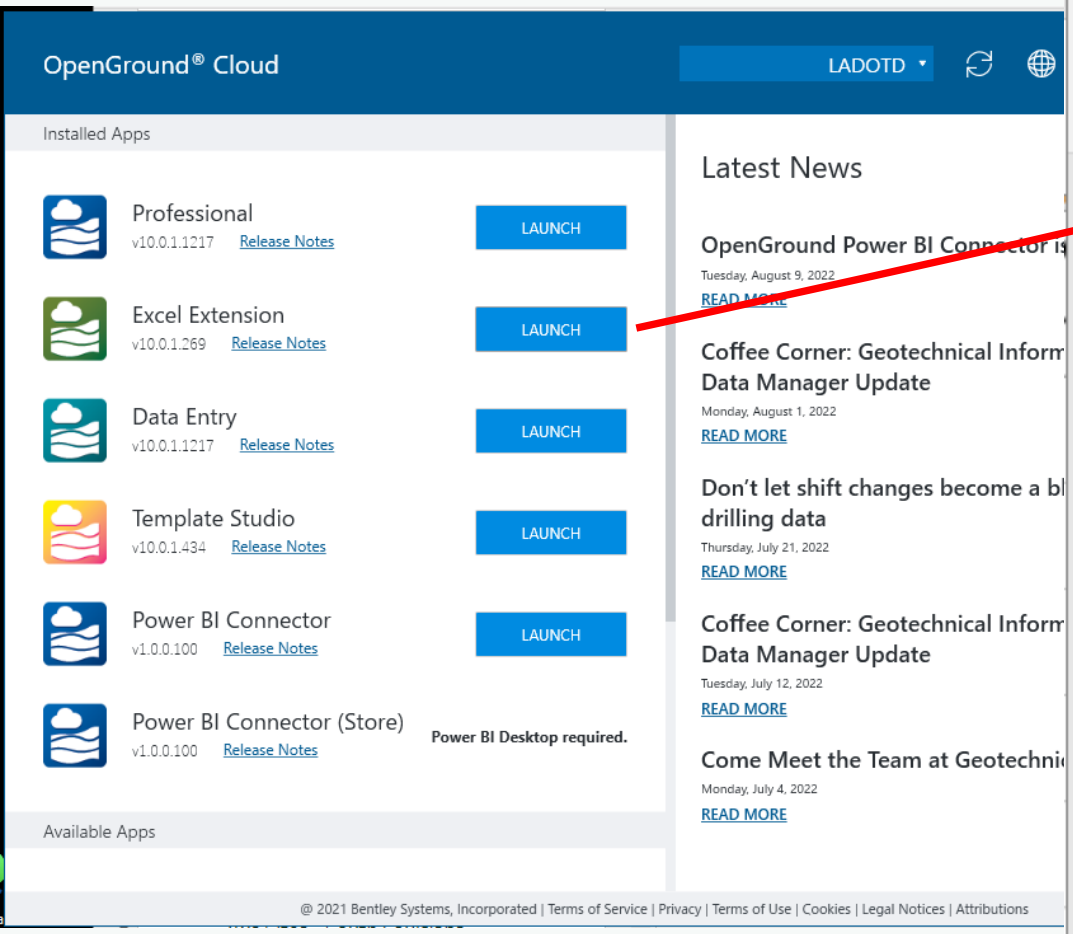


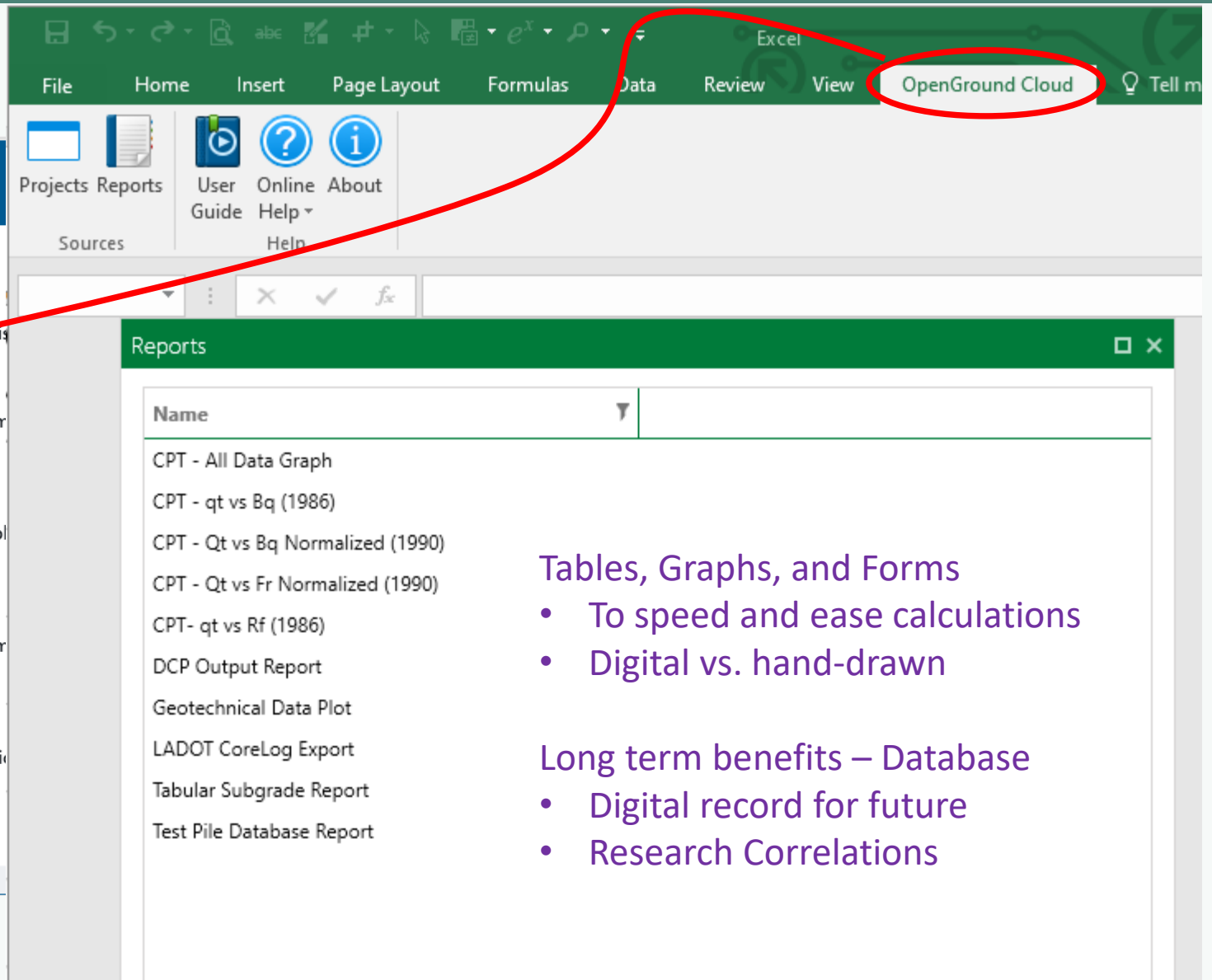
Proposed I-10 Bridge over Lake Charles

- Multiple CPT and Soil Borings
- Multiple Drilling Crews/Consultants
  - Design Information
  - Data Comparisons and Quality Checks

Bentley
OpenGround® CL
CONNECT Edition

Open Ground Cloud (OGC) Excel Extension





Tables, Graphs, and Forms

- To speed and ease calculations
- Digital vs. hand-drawn

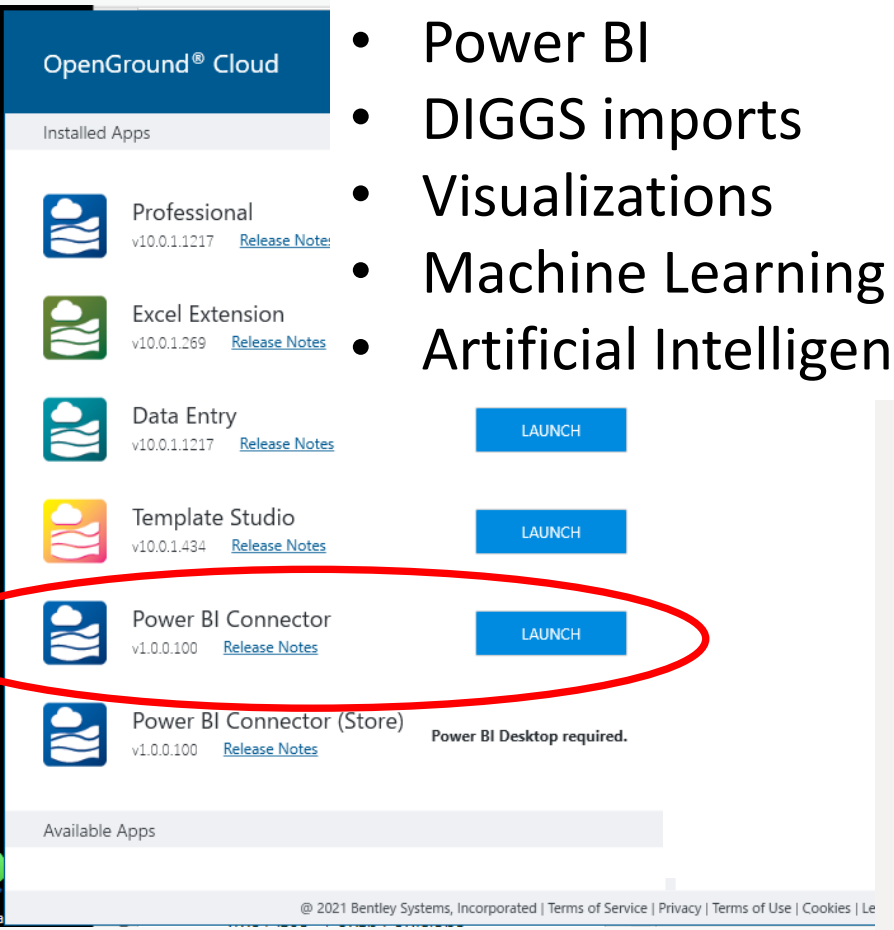
Long term benefits – Database

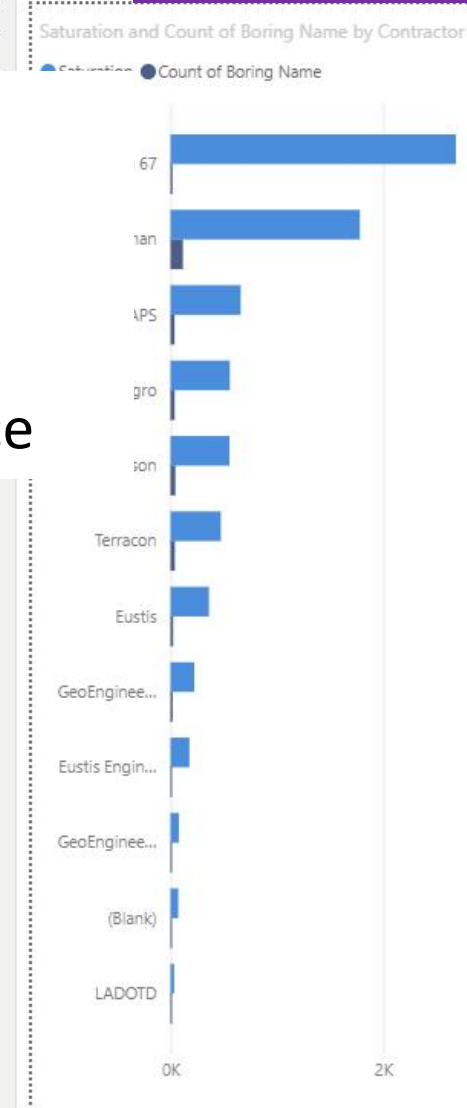
- Digital record for future
- Research Correlations

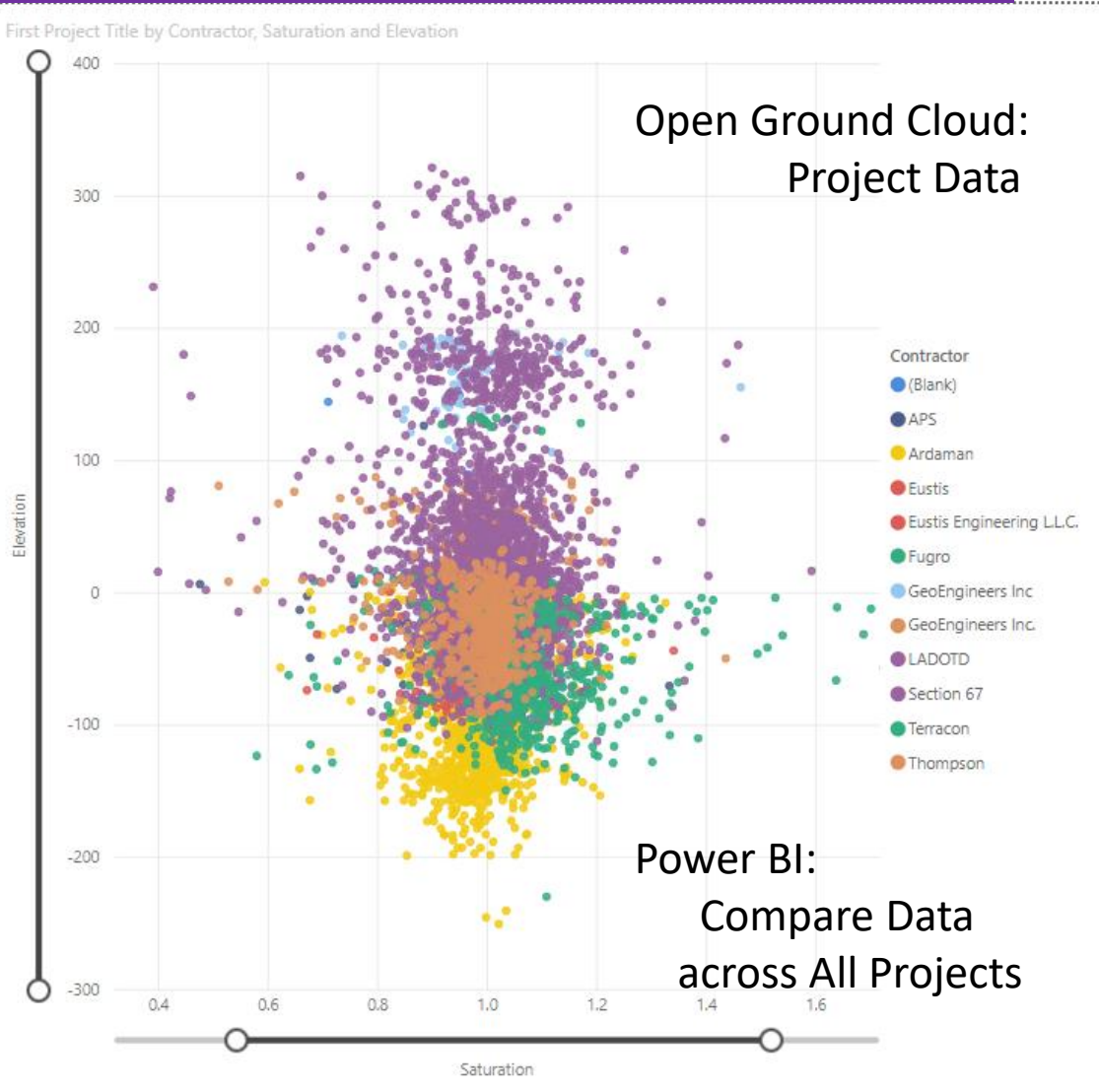
Other visualizations and analyses

Power BI visualizations using OpenGround Data

- Power BI
- DIGGS imports
- Visualizations
- Machine Learning
- Artificial Intelligence







Open Ground Cloud:
Project Data

Power BI:
Compare Data
across All Projects

LTRC Project: 24-2GT

"GEC-5"

WEB-based tool to Advance Geotechnical Data Interchange and Reliability-Based Site Characterization

LTRC: **DOTD**, Gavin Gautreau, Nick Ferguson, Technicians
LSU, Murad Abu-Farsakh, Research Associates, etc.

GeoSyntec: **Xin Peng, Staff**

Project Review Committee insight

DOTD: Section 67, Geotechnical & Section 22, Materials Laboratory
Dataforensics, Scott Deaton (Bentley-OGC Representative)

LTRC Project: 24-2GT Objectives

- **Web-Based Visualizations**
- **Data Management & DIGGS** Data Interchange for Geotechnical and Geoenvironmental Specialists
- **GEC-5** Geotechnical Engineering Circular (GEC) No. 5 (Updates)

LTRC Project: 24-2GT Objectives

- **Web-Based Visualization**

  Finalize/formalize a web-based platform used by DOTD for several large projects…to standardize this visualization process for all projects.

  - Interactively visualize and interpret data from soil borings, CPTs, geophysical/conventional data.
  - Create composite soil stratigraphy
  - Plot soil properties and derived parameters vs. elevation
  - Develop design profiles.

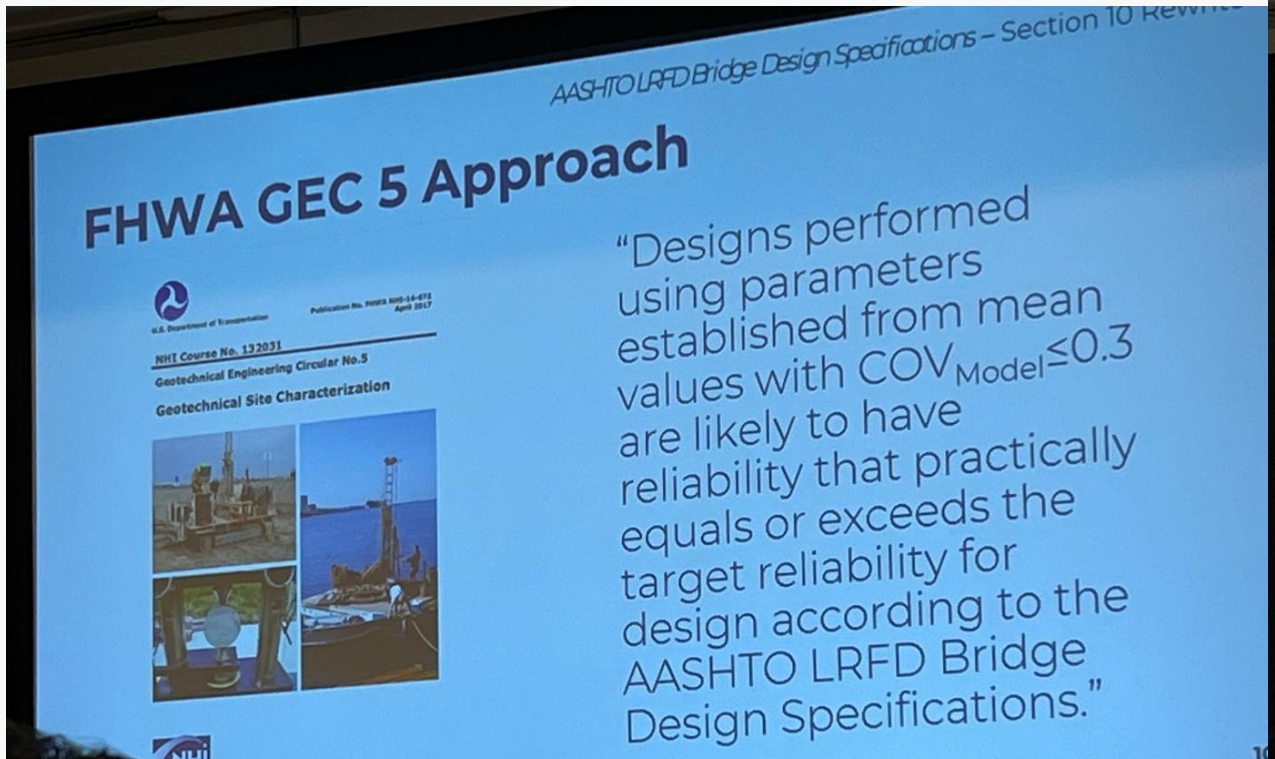
LTRC Project: 24-2GT Objectives

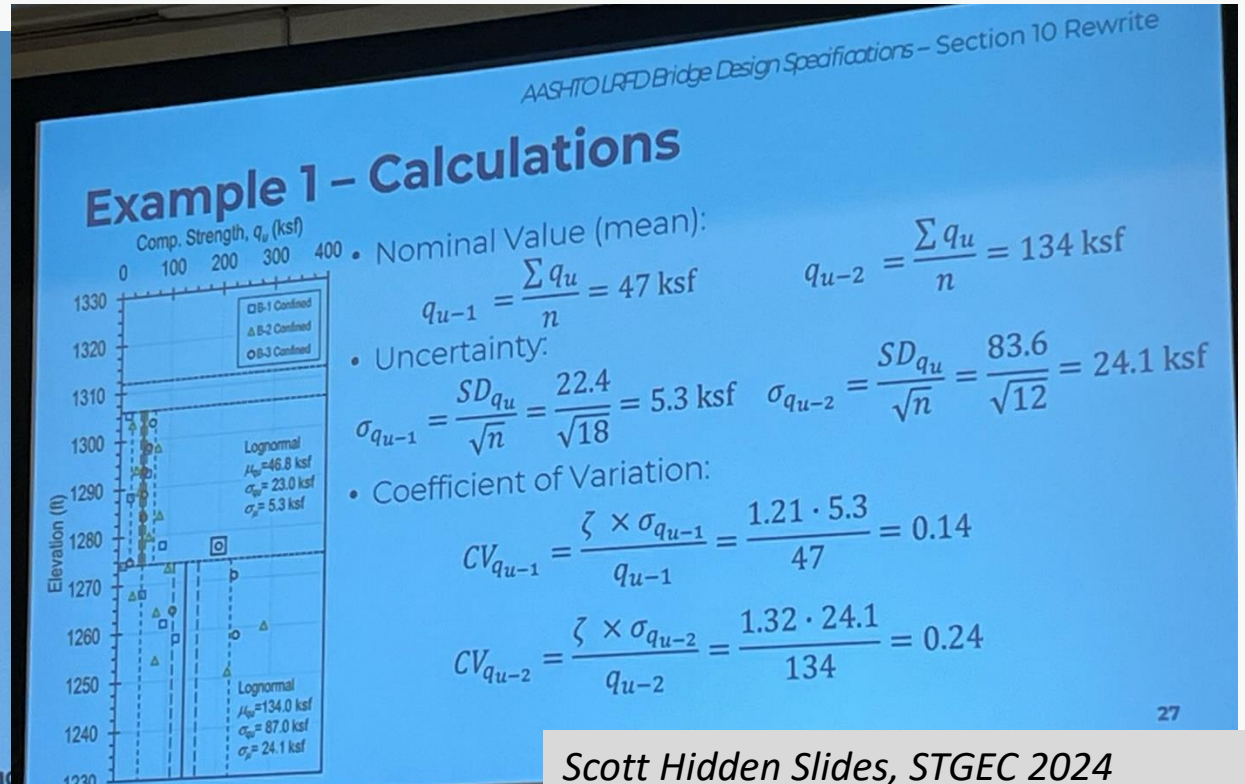
Data Management & DIGGS Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) - Implementation

- DOTD → Open Ground Cloud (OGC) & KeyLAB (Phase IV)
- DOTD Contract Consultants → …maybe OGC??? (other solutions)
  - gINT Sun-setting
  - Data transfer & exchange (new and historical data)
  - Proactive solution for DOTD and its consultants
- Implement a web-based platform with visualizations for standardized exchange to efficiently increase the quality of geotechnical data deliverables as a digital asset.

AASHTO LRFD Bridge Design Specifications

- **Section 10 Rewrite**
  - **2023 STGEC – Scott Hidden, NCDOT**
  - **2024 SWGEC- Jesse Rauser, LADOTD**





Scott Hidden Slides, STGEC 2024

Part Two
Xin Peng

Conclusions

- Advancing Geotechnical Data
  - Easy Access with GIS Interface
  - Current Functional Effectiveness and Efficiencies
  - Succession Planning
  - Long Term Database Building - Correlations
  - Leadership & Vision: Jesse Rauser