Louisiana DOTD Geotechnical Database Efforts - Part II

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STGEC 2024

Questions to be addresse

1. **LADOTD already uses OpenGround. Why is there still a need to address geotechnical data management challenges?**

2. **What strategic steps can LADOTD take in the next decade to fully harness geotechnical data, transforming design and construction practices for more consistent reliability and greater efficiency?**

An Innovative Digital Solution for LADOT

Custom-Designed Web-Based Platform

Specifically built to meet LADOTD's evolving geotechnical needs.

Collaborative Development

Worked hand-in-hand with LADOTD's geotechnical team to tailor every aspect of the system.

Streamlined Data Workflows

Software-Agnostic Collaboration: Enables effective interaction between LADOTD and consultants, regardless of the software they use.

Automated Compliance and Efficient Design

Automatic Standards Adherence: Ensures designs comply with LRFD and national/state regulations effortlessly.

Optimized Design Process: Streamlines workflows through automation, boosting efficiency and consistency.

Current Data Delivery and Management Workflow at LADOTD

LADOTD Requests Data

1

- Static boring logs in PDF format
- Digital data in **gINT** format
- Both should be in LADOTD's standardized template formats.

Consultants Prepare Data

2

Consultants use their preferred geotechnical database software systems to prepare the requested data. They can be gINT, OpenGround, RSLog, BoreDM, TabLogs, or any other.

Data Submission

3

Consultants submit both PDF boring logs and **gINT** files aligned with LADOTD's **standardized** requirements.

LADOTD Manages Data

4

LADOTD manages the submitted data using OpenGround.

Transitioning to a Software-Agnostic Approach with DIGGS

LADOTD Requests Data

1

- Static boring logs in PDF format
- Digital data in **DIGGS** format
- Both should be in LADOTD's standardized template formats.

Consultants Prepare Data

2

Consultants use their preferred geotechnical database software systems to prepare the requested data. They can be gINT, OpenGround, RSLog, BoreDM, TabLogs, or any other.

Data Submission

3

Consultants submit both PDF boring logs and **DIGG** files aligned with LADOTD's **standardized** requirements.

LADOTD Manages Data

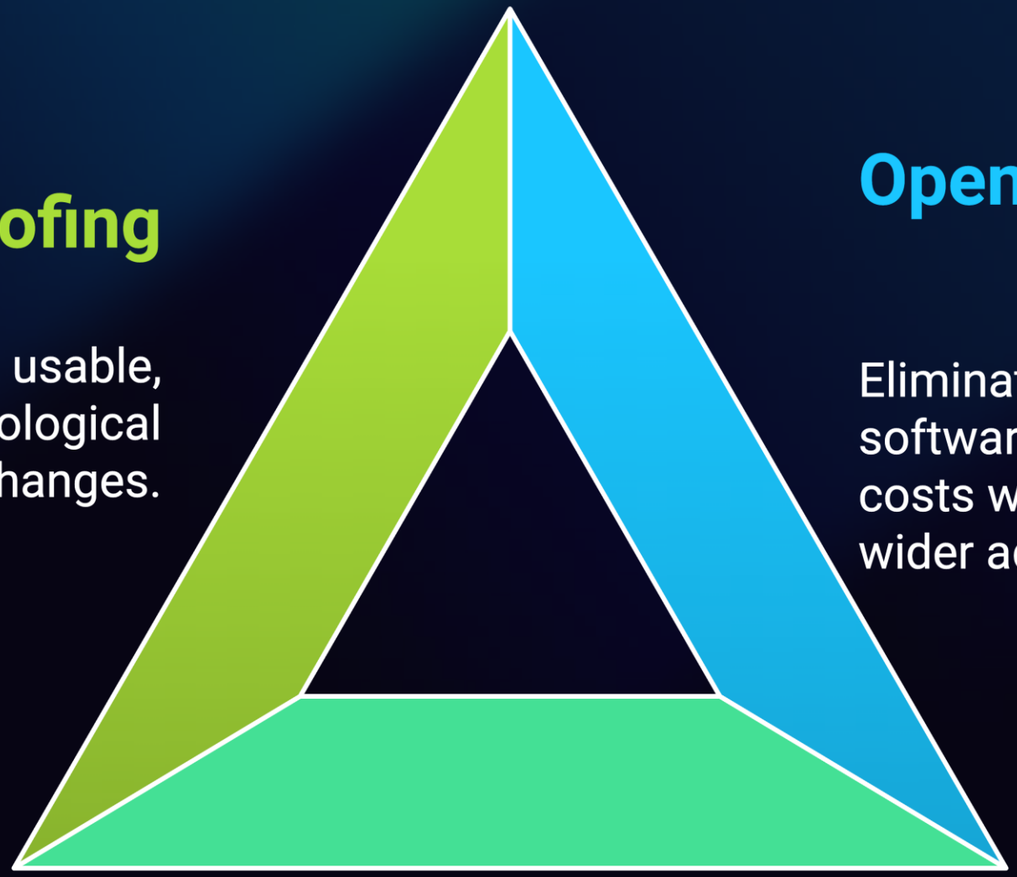
4

LADOTD manages the submitted data using OpenGround.

Why DIGGS?

Future-Proofing

Ensures data remains accessible, usable, and scalable despite technological advancements or software changes.



Open-Source Format

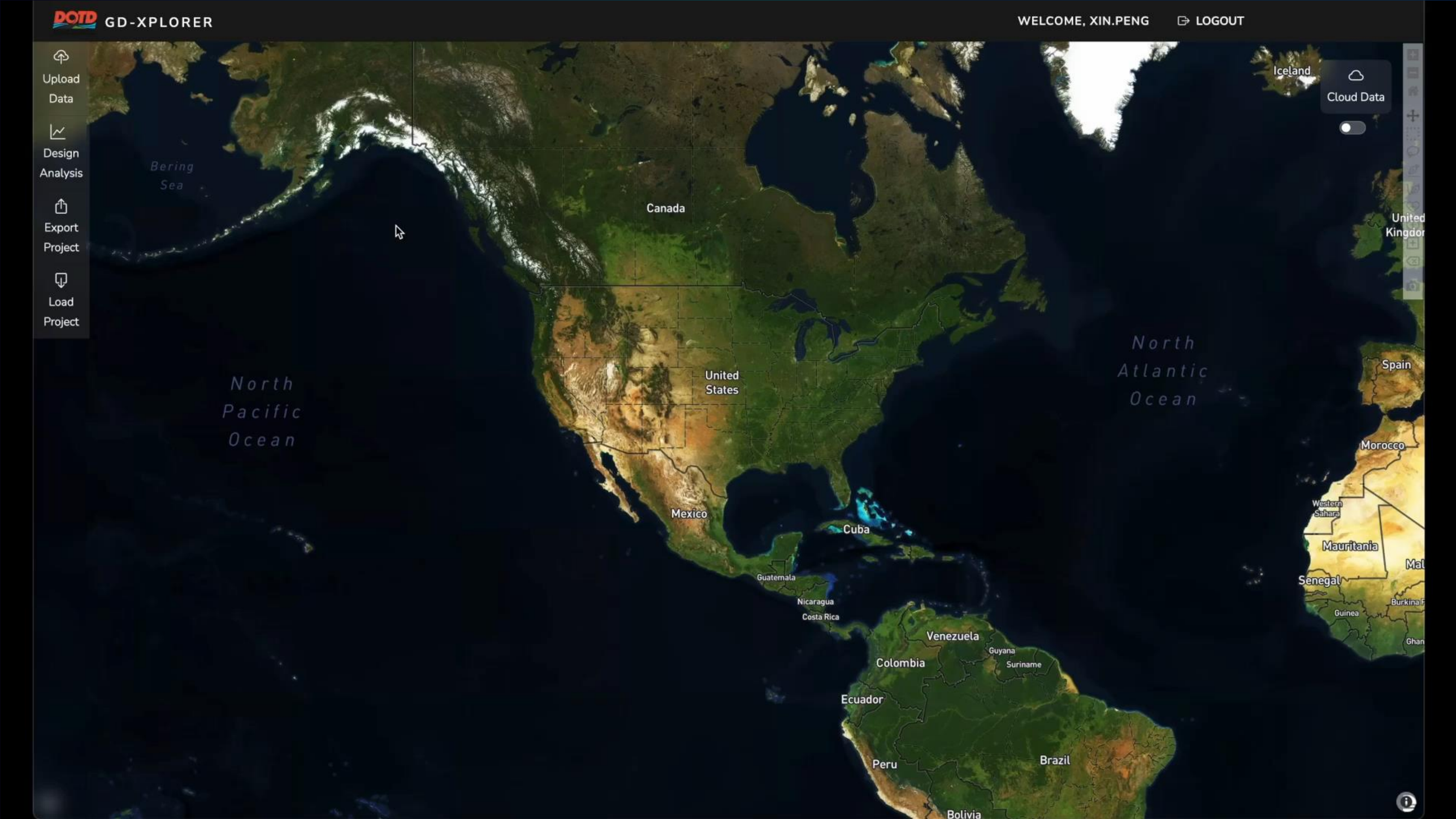
Eliminates dependency on specific software vendors and reduces licensing costs while promoting transparency and wider adoption within the industry.

Consultant Flexibility

Allows use of various tools, respecting existing workflows and enhancing collaboration.

Video Demo 1

The Power of Standardized Digital Format —An gINT Example


DOTD GD-XPLORER
WELCOME, XIN.PENG
LOGOUT
Upload Data
Design Analysis
Export Project
Load Project
Cloud Data
Bering Sea
Canada
Iceland
United Kingdom
North Pacific Ocean
North Atlantic Ocean
United States
Spain
Morocco
Western Sahara
Mauritania
Senegal
Guinea
Mexico
Cuba
Guatemala
Nicaragua
Costa Rica
Venezuela
Guyana
Suriname
Colombia
Ecuador
Peru
Brazil
Bolivia

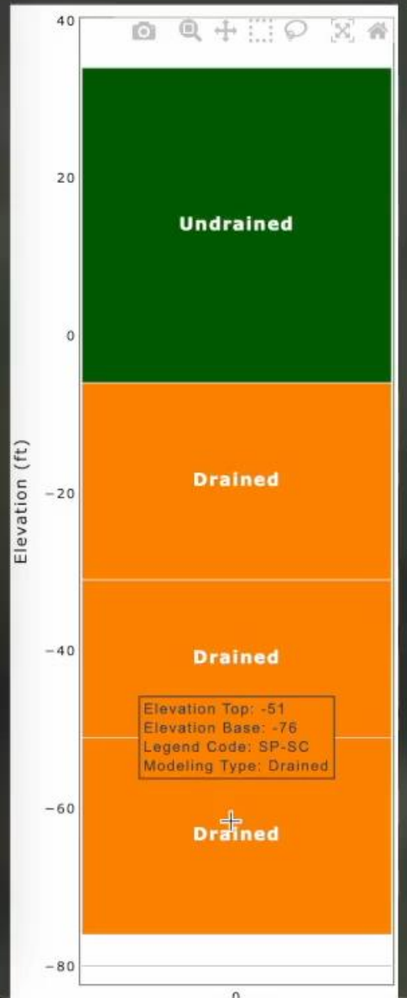
DESIGN ANALYSIS

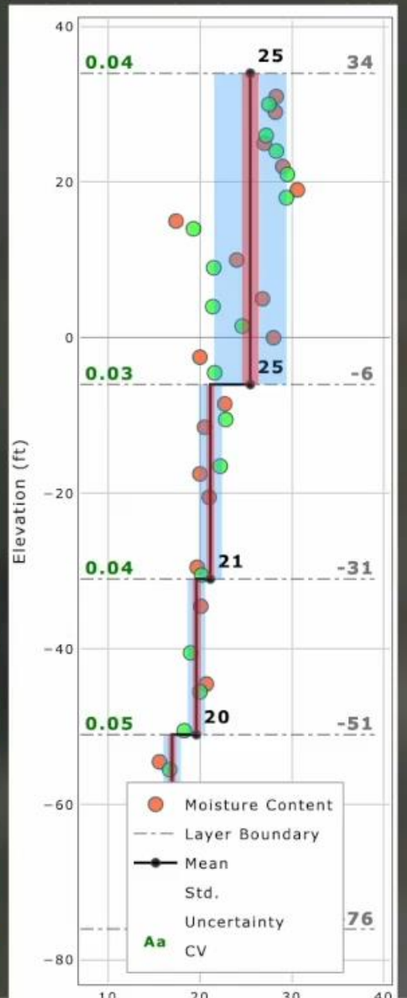
Data Profiles | Resistance Curve | Cross Section | Map Selected Data

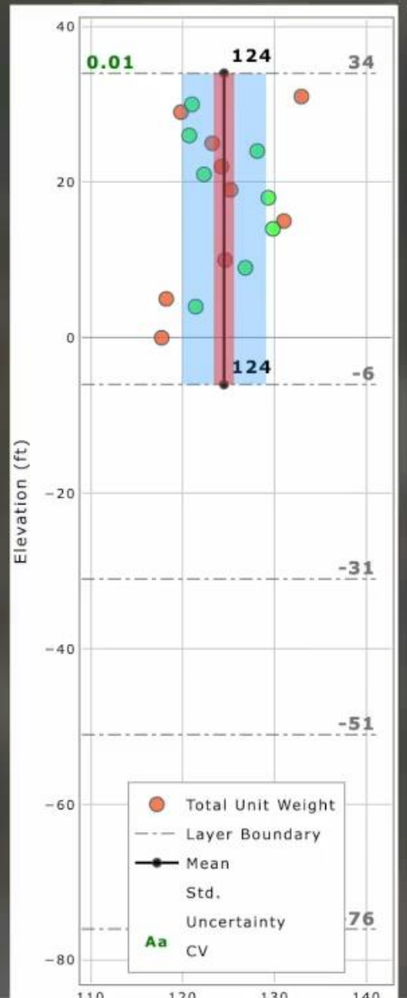
GENERATE FIGURE

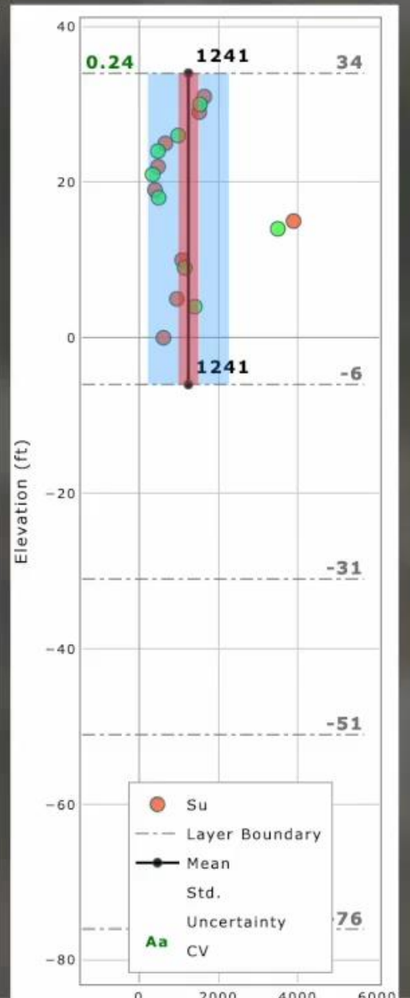
Stratigraphy Table

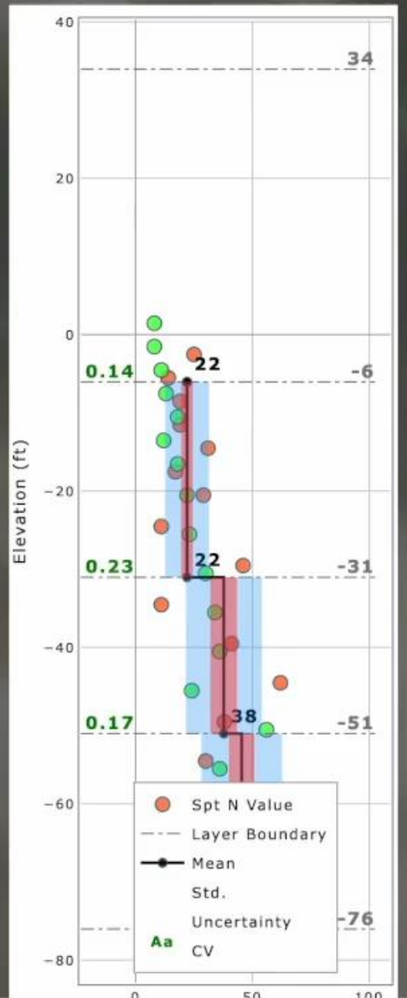
Stratigraphy | Moisture Content | Total Unit Weight | Undrained Shear Streng | Spt N Value | Fines Content

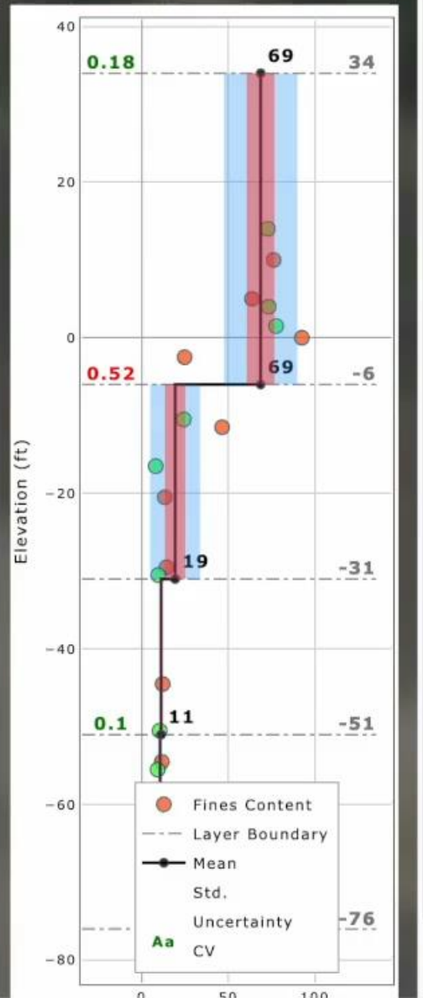






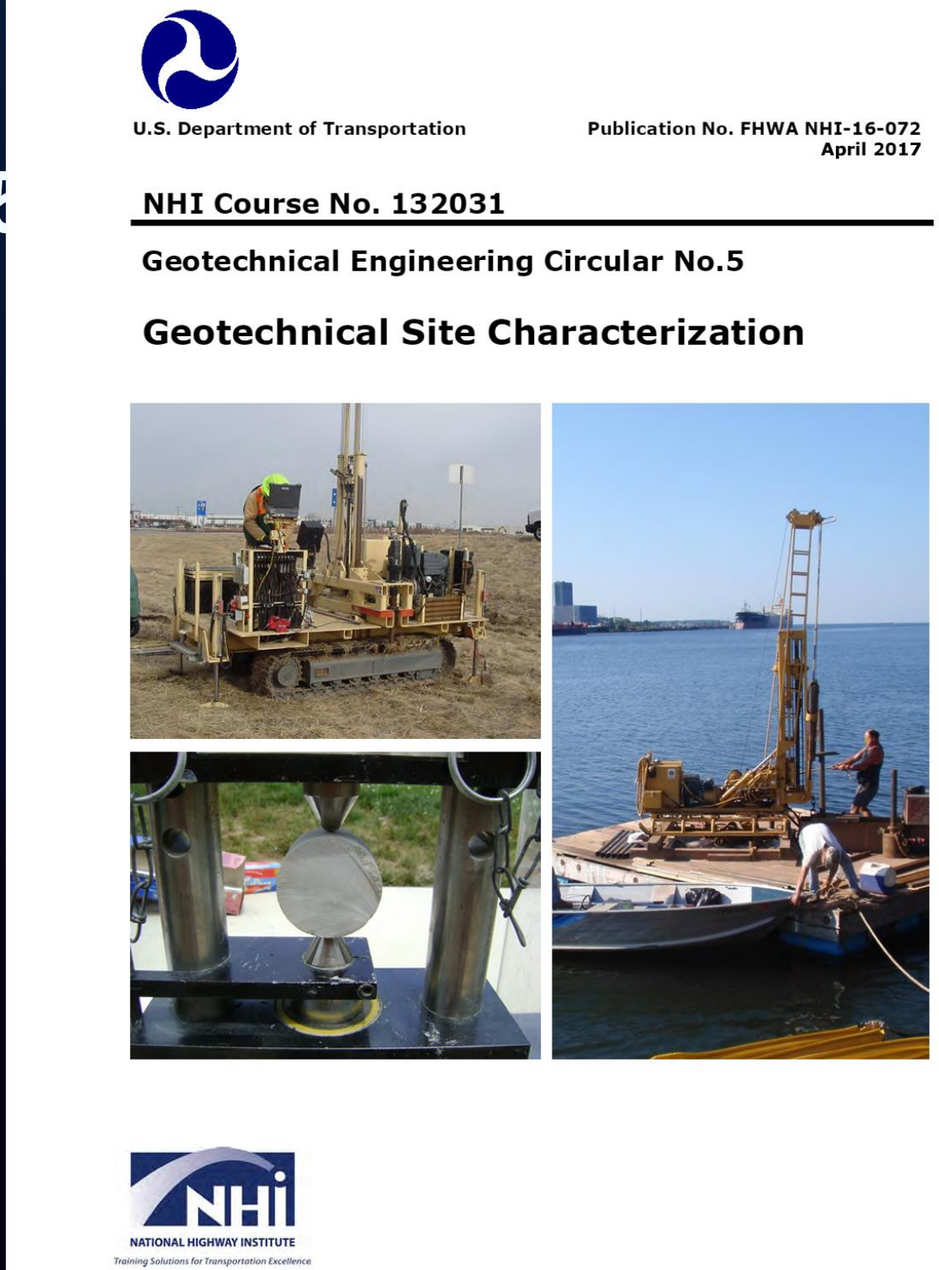






LRFD Integration with FHWA GEC-05

"Designs performed using parameters established from mean values with $COV_{Model} \leq 0.3$ are likely to have reliability that practically equals or exceeds the target reliability for design according to the AASHTO LRFD Bridge Design Specifications."



Video Demo 2

LRFD Integration – FHWA GEC-05

DOTD GD-XPLORER
WELCOME, XIN.PENG
LOGOUT
Upload Data
Design Analysis
Export Project
Load Project
Borehole
Cloud Data
SW Frontage Rd
SE Evangeline Thruway
Industrial Access
Hugh Wallis Rd S
S College Rd
Verot School Rd
Henderson Rd
Fouet Rd
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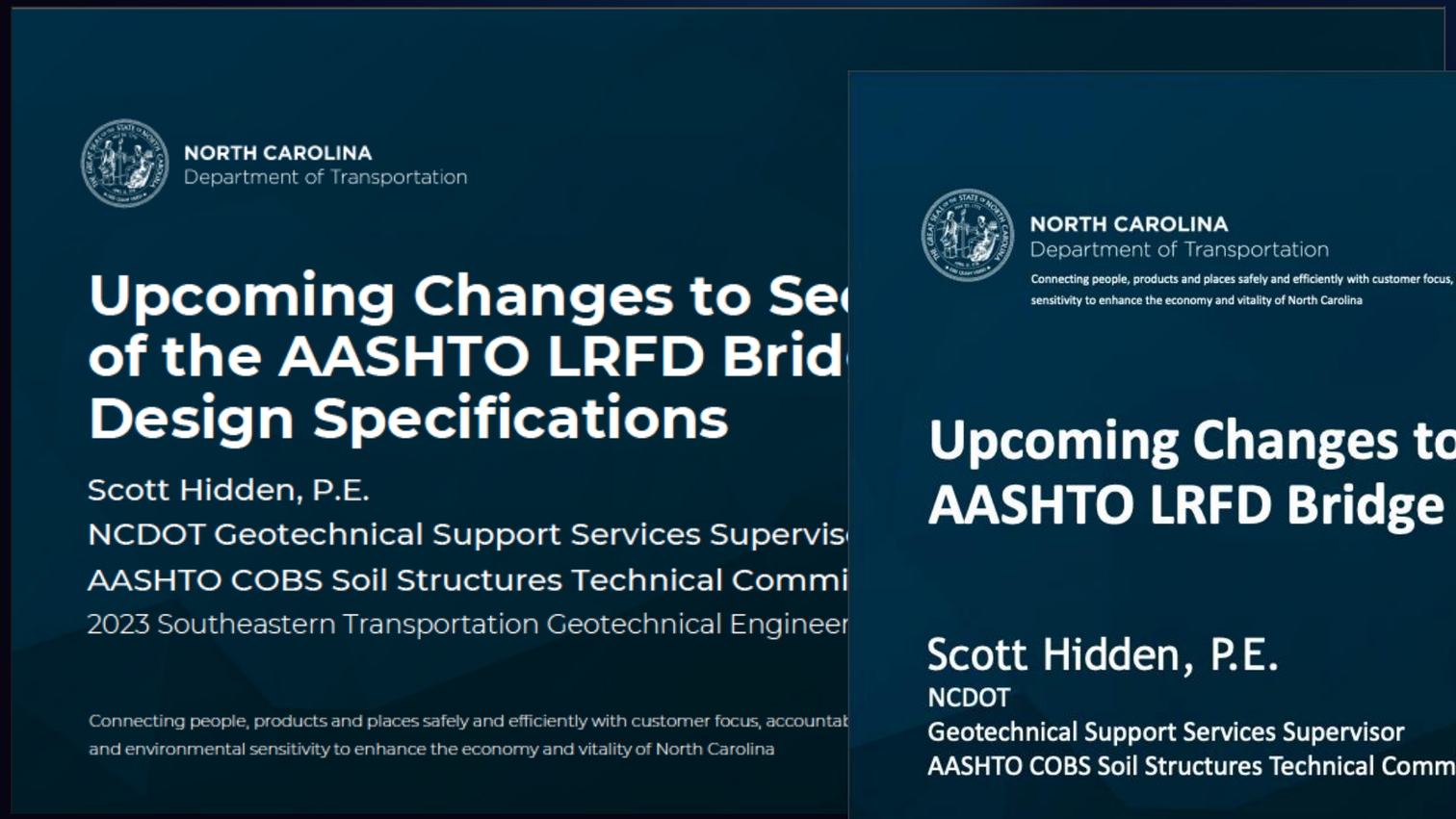
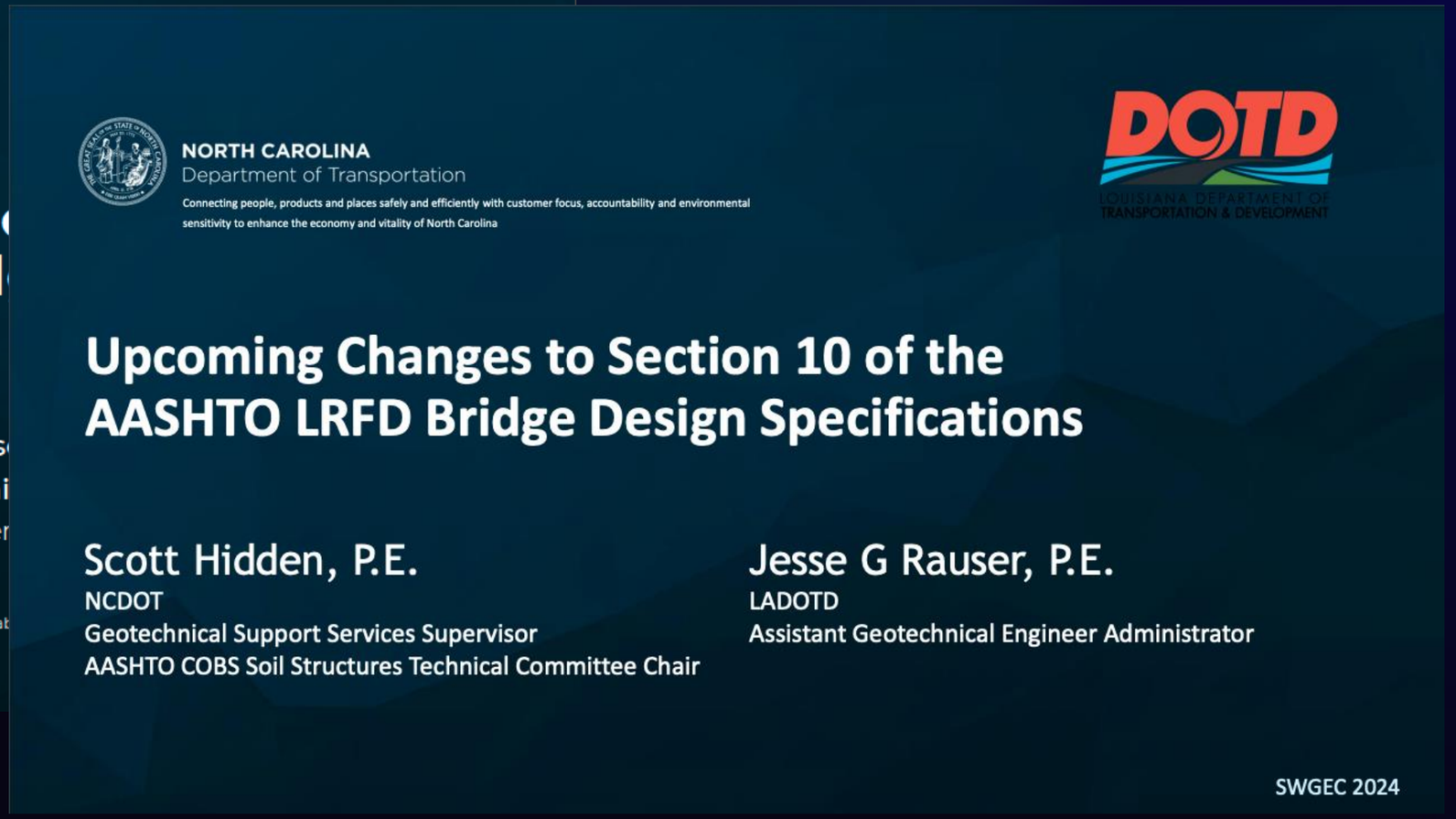
AASHTO LRFD Updates for Bridge De





Credit:

Scott Hidden, PE of NCDOT

Jesse Rauser, LADOTD

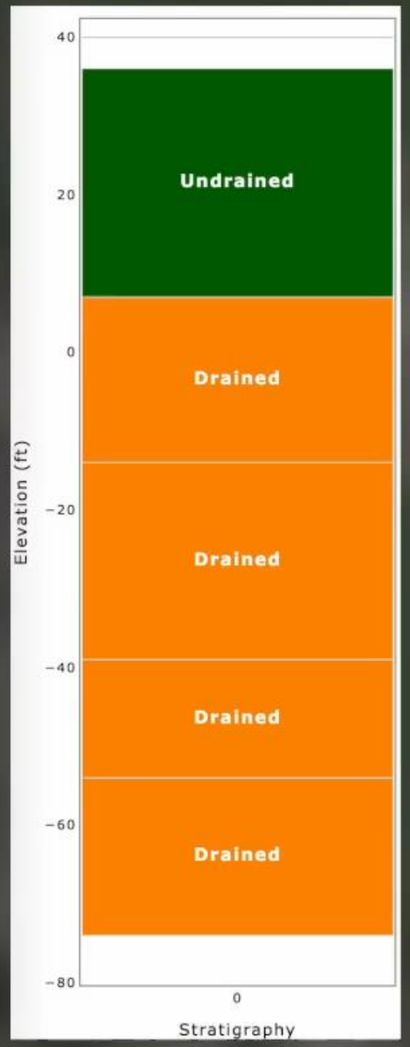
Video Demo 3

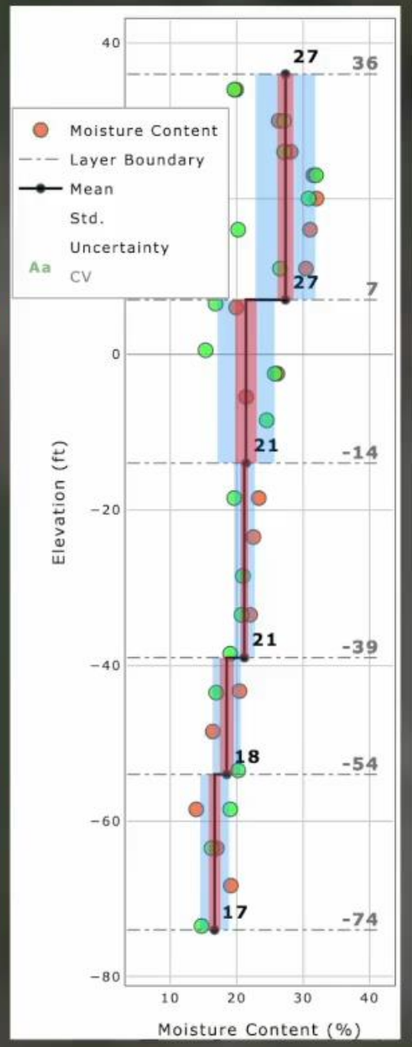
LRFD Integration — AASHTO LRFD Updates

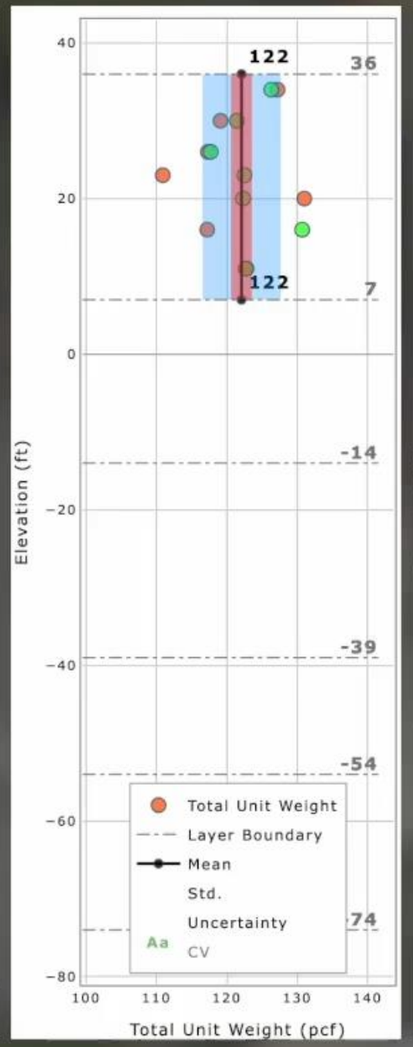
DESIGN ANALYSIS

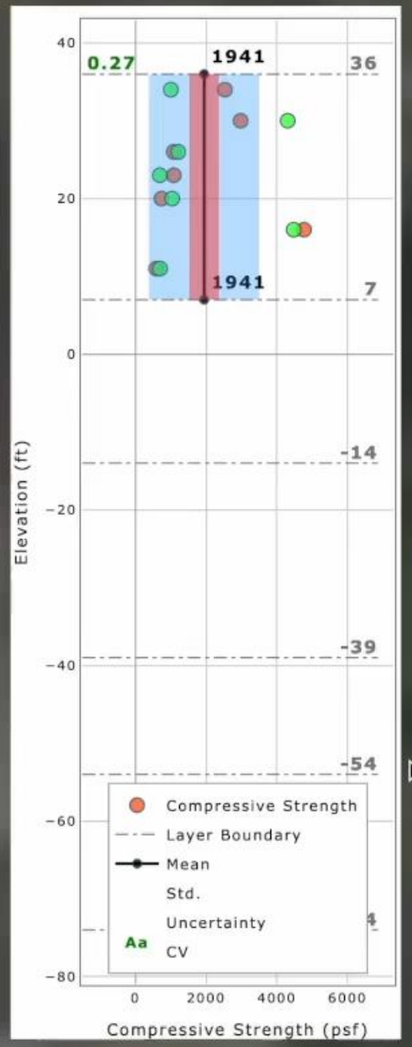
Split Layer | Delete Layer

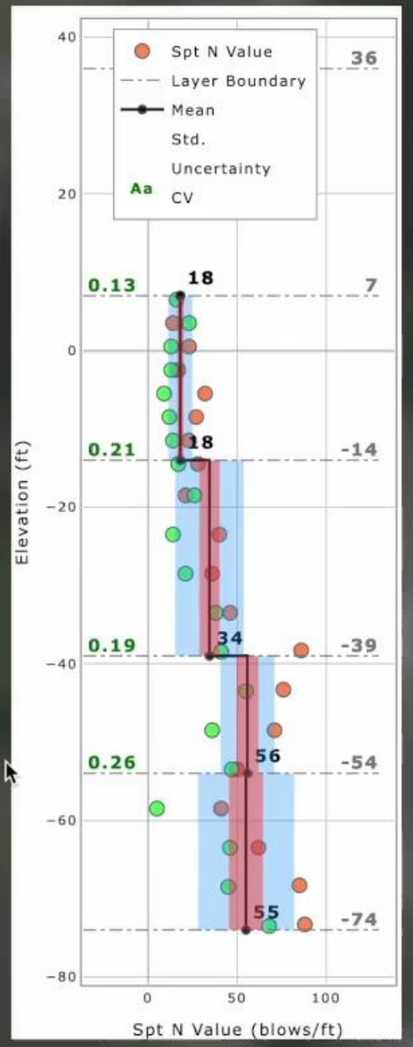
Stratigraphy | Moisture Content | Total Unit Weight | Compressive Strength | Spt N Value | Fines Content

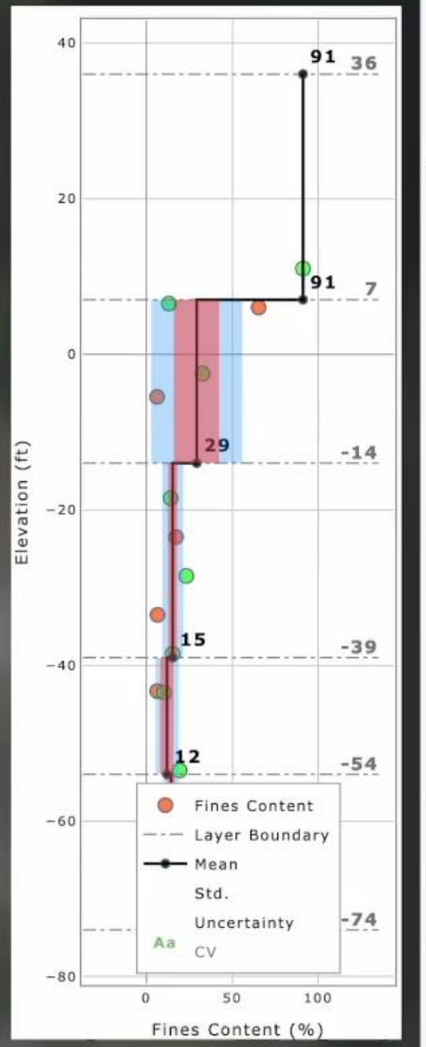












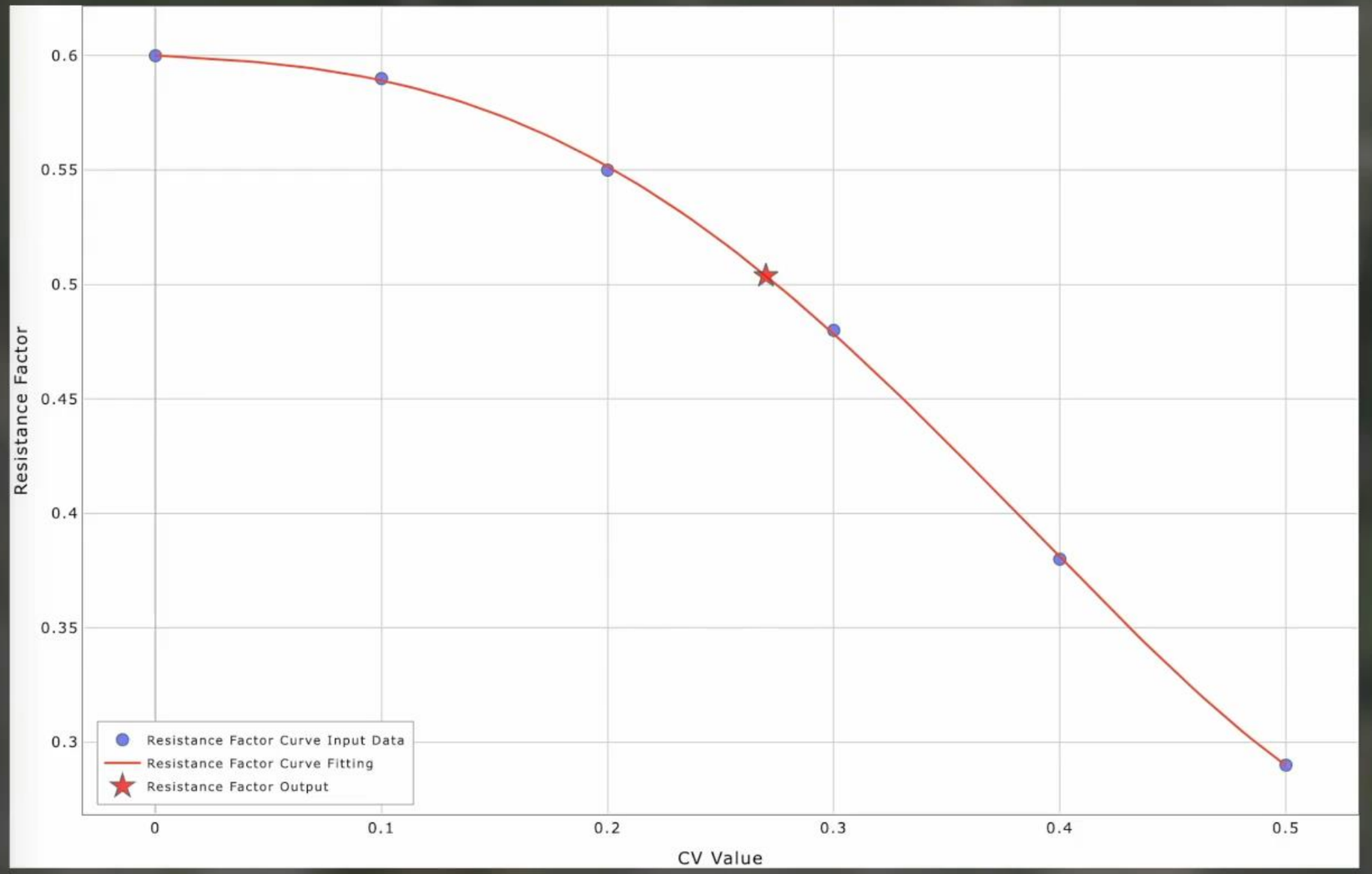
Video Demo 4

LRFD Integration —Collaboration Capabilities with Enhanced Efficiency and Transparen

DESIGN ANALYSIS

Data Profiles | Resistance Curve | Cross Section | Map Selected Data

Qu Curve For Unit Tip Resistance, 2025 Calibrated



Qu Curve for Unit Tip Resistance, 2025 Calibrated

SAVE

Resistance Curve Input

CV Value	Resistance Factor
0	0.6
0.1	0.59
0.2	0.55
0.3	0.48
0.4	0.38
0.5	0.29

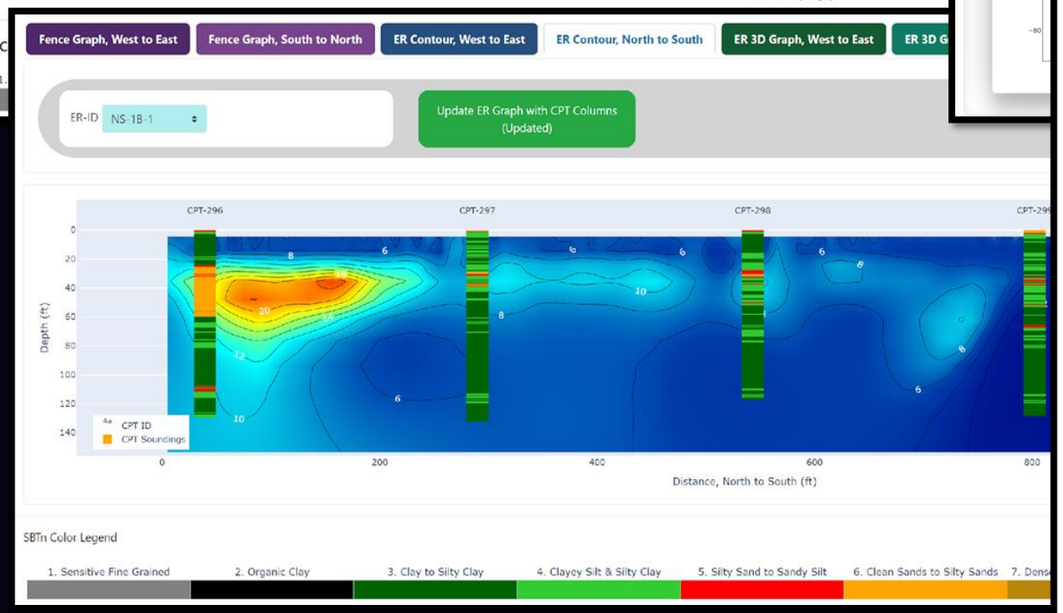
Polynomial Order: 4

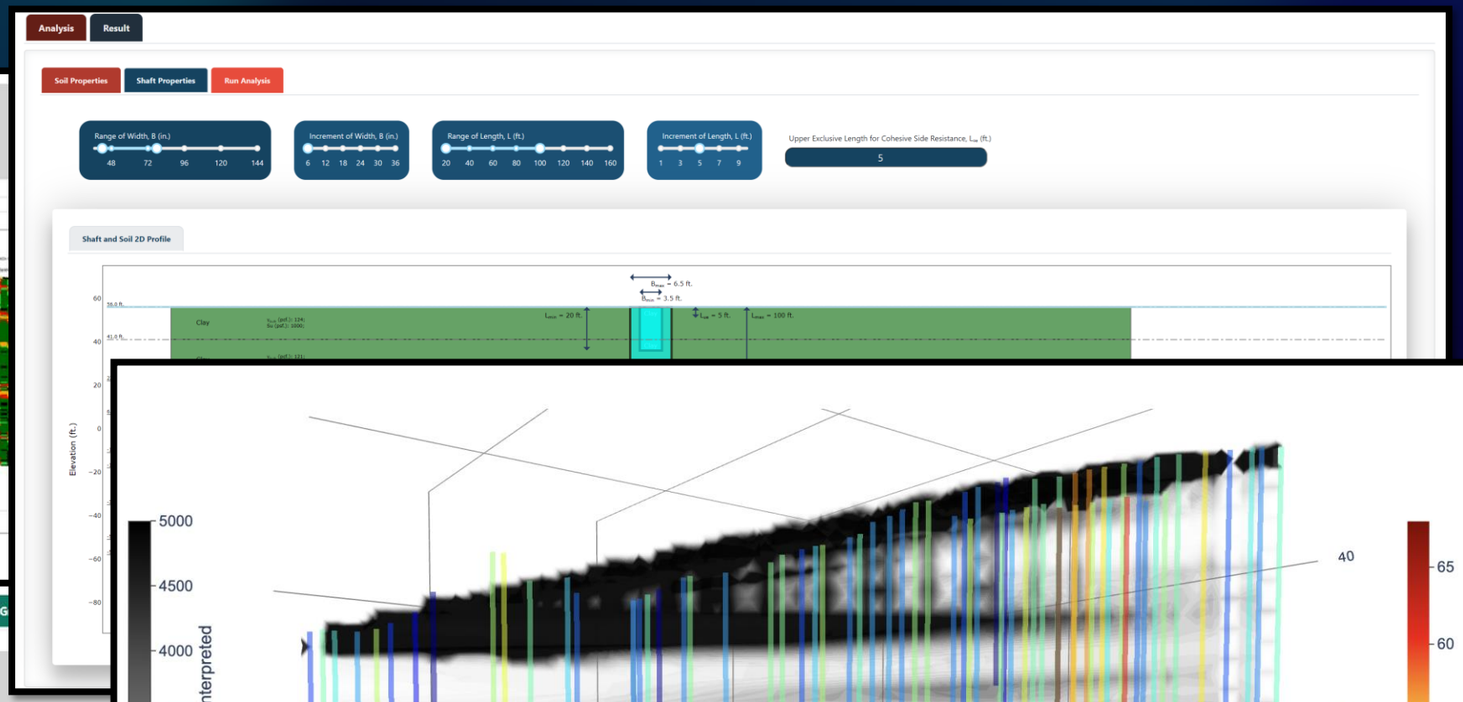
CV Value: 0.27

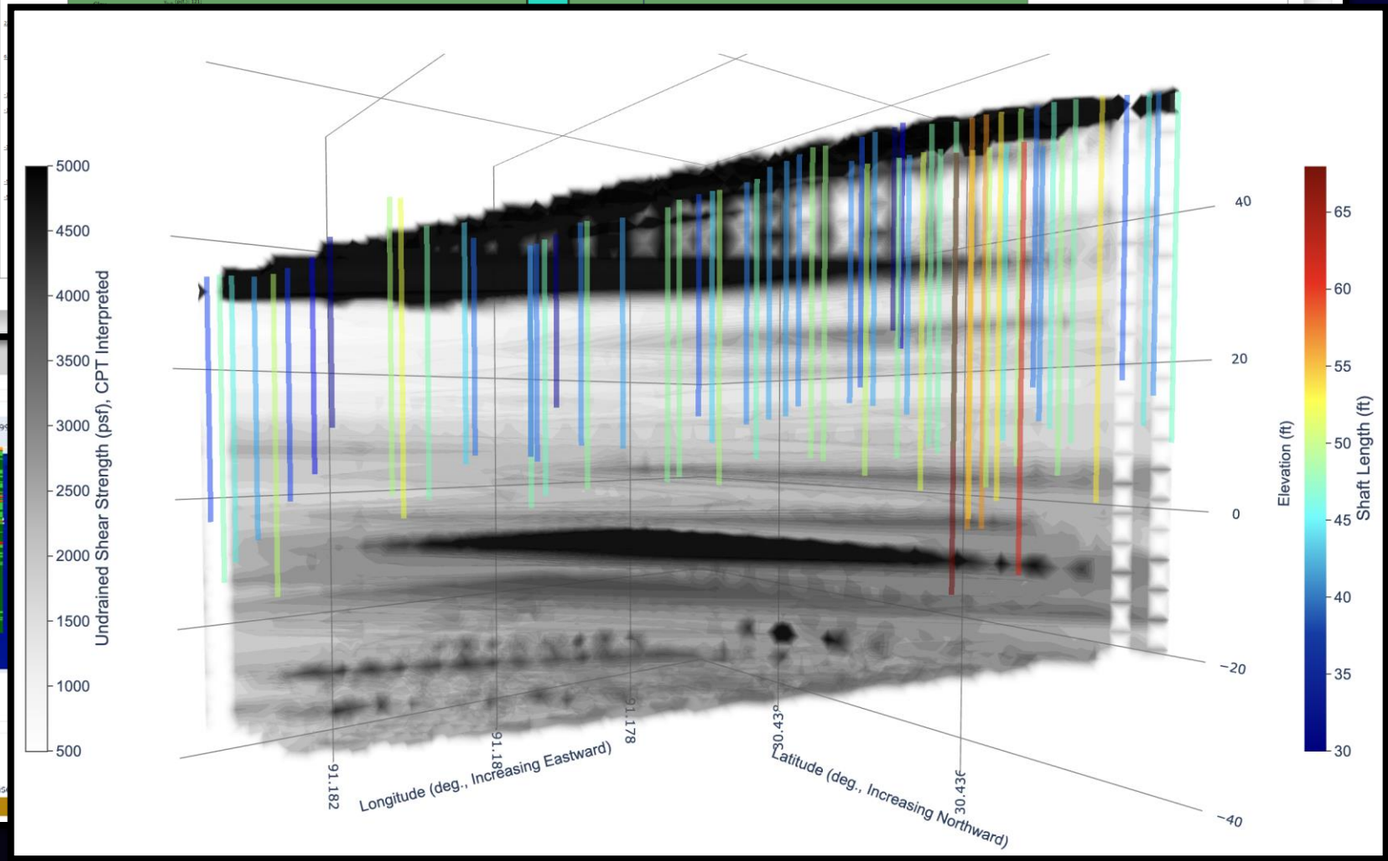
Resistance Factor: 0.5

This resistance curve is calibrated based Projects A, B, and C in 2025.

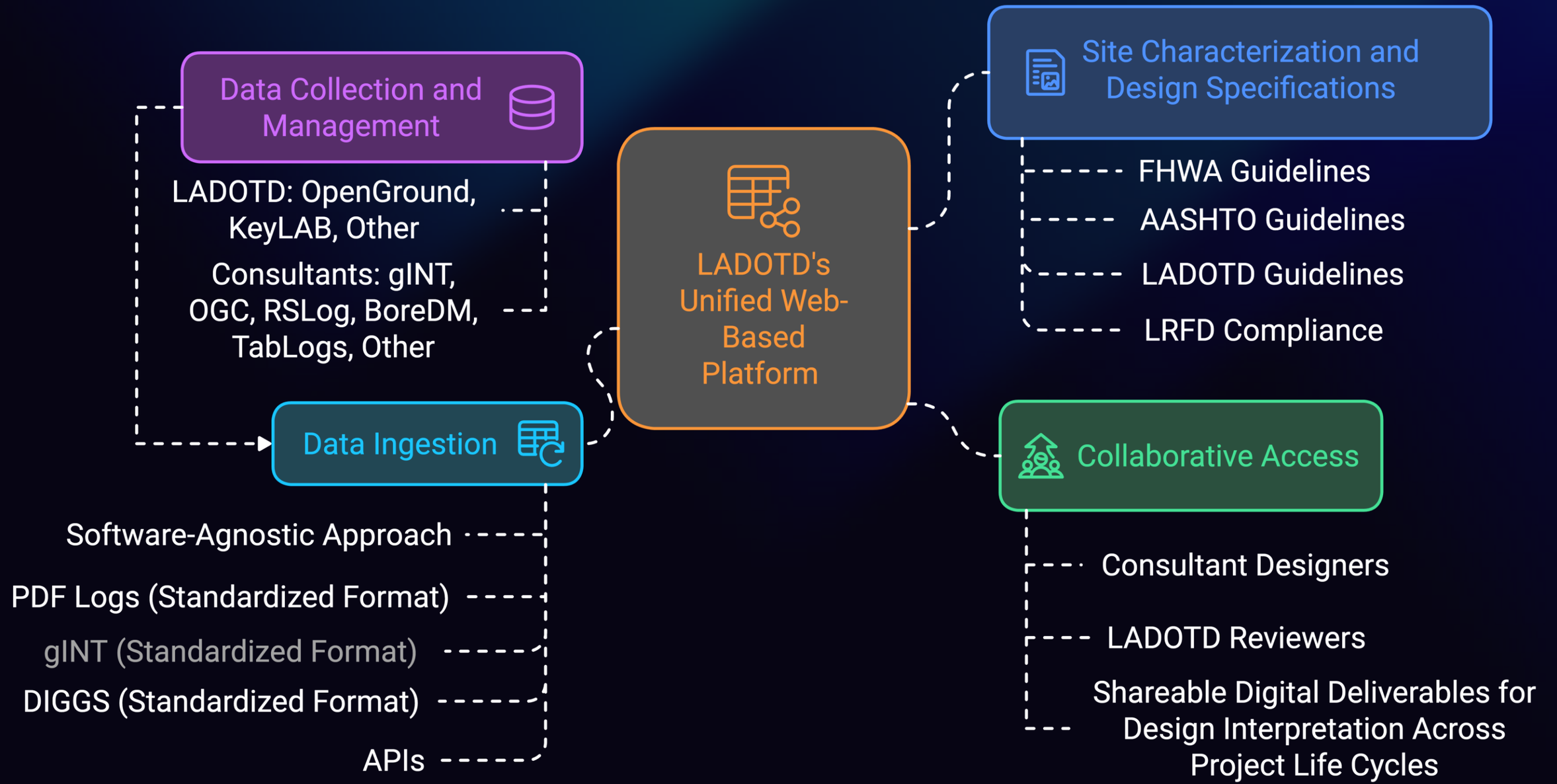
Other Prototypes





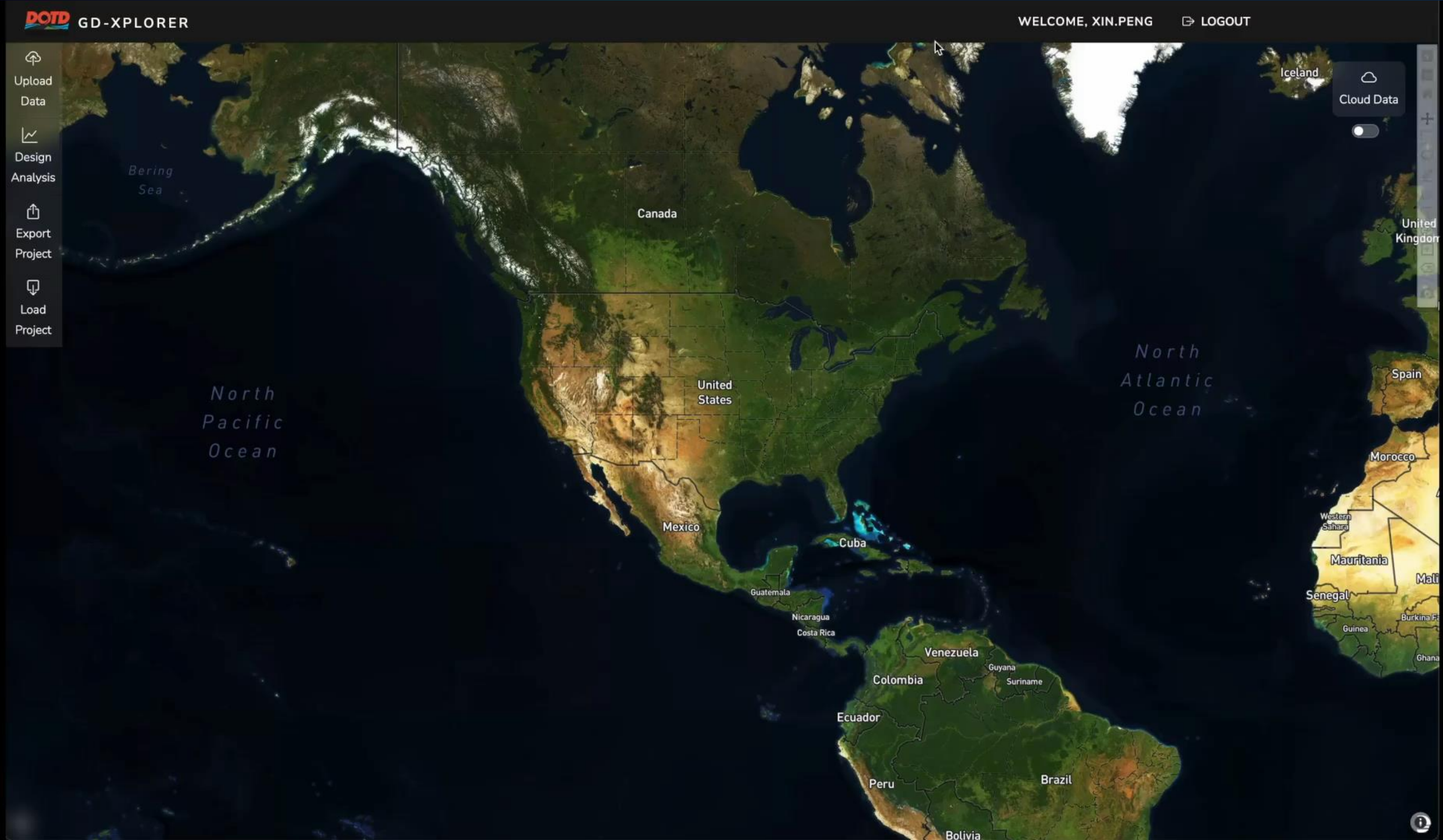


A Transformed Geotechnical Design Workflow



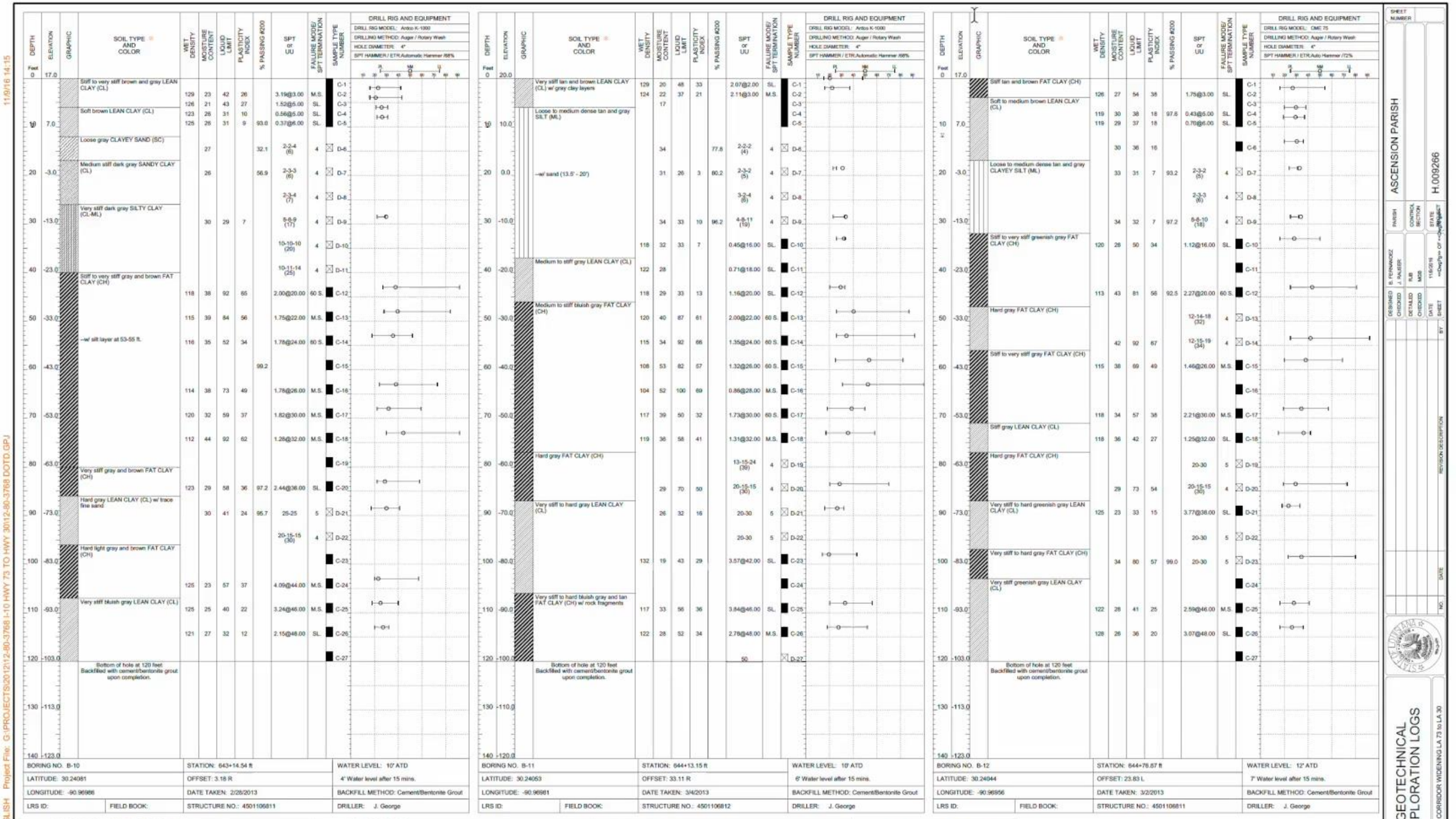
Video Demo 5

Cloud Module—Effectively Integrate Data from Multiple Sources


DOTD GD-XPLORER
WELCOME, XIN.PENG
LOGOUT
Upload Data
Design Analysis
Export Project
Load Project
Cloud Data
Iceland
Bering Sea
Canada
United States
North Pacific Ocean
North Atlantic Ocean
United Kingdom
Spain
Morocco
Western Sahara
Mauritania
Senegal
Guinea
Ghana
Mexico
Cuba
Guatemala
Nicaragua
Costa Rica
Venezuela
Guyana
Suriname
Colombia
Ecuador
Peru
Brazil
Bolivia

Video Demo 6

AI Module for PDF Boring Logs —Effectively Digitize and Load Data for Design Analysis



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Key Benefits to LADOTD

1 Elevated Design Efficiency

Boost productivity and collaboration with advanced data interpretation.

2 Industrial Standard Compliance

Align with national and state standards, integrating latest AASHTO requirements.

3 Ground-up Solution with Software-Agnostic Approach

Digests data across databases and formats, operating independently of any commercial software.

4 Adaptive Customization with Powered Capabilities

Provides flexibility with AI-powered capabilities for evolving engineering needs.

Acknowledgement

Leadership & Vision:
Jesse Rauser, PE, LADOTD

Project Management & Support:
Gavin Gautreau, PE, LTRC