

BATON ROUGE | NEW ORLEANS | SHREVEPORT | LAKE CHARLES | NATIONWIDE

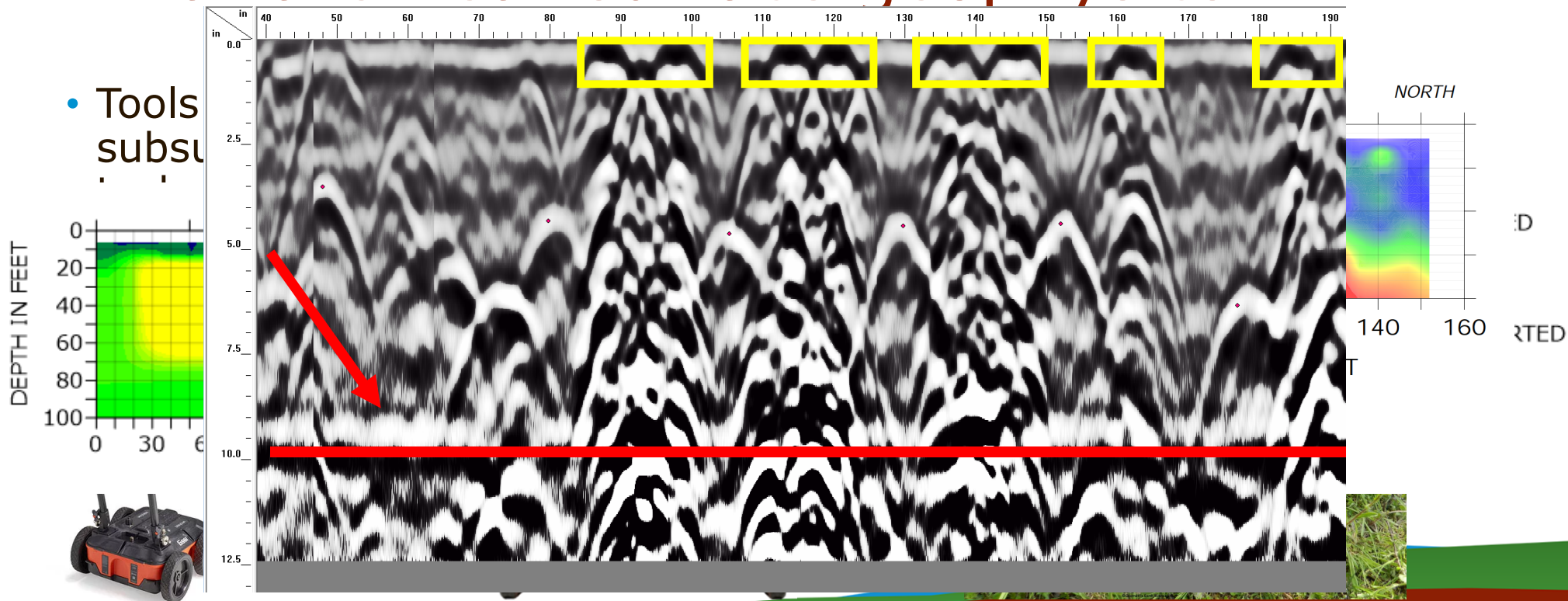


Utilizing Near Surface Geophysical Testing for the Purpose of Developing Site Characterization and Preliminary Parameters

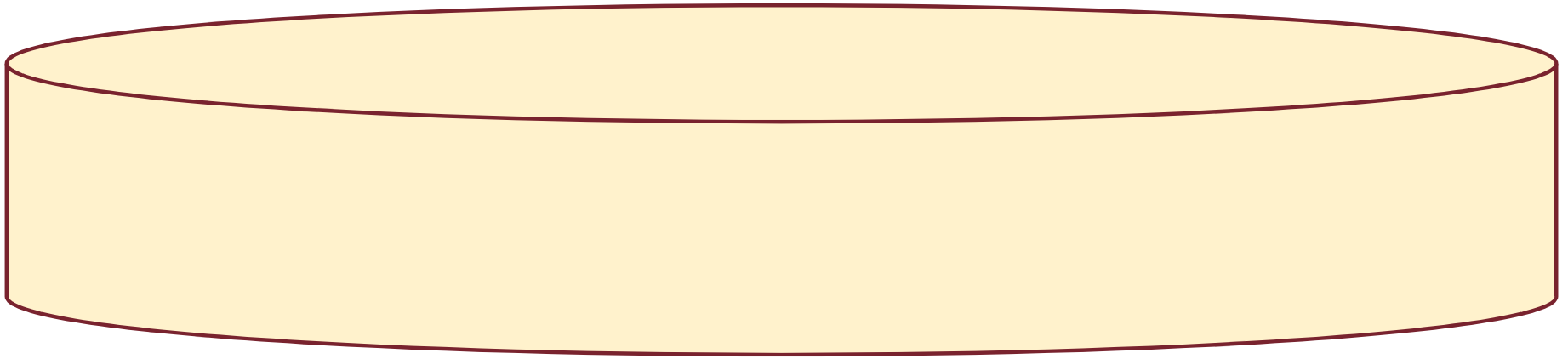
Nick Ratcliff, PG, RPG

Explore with us

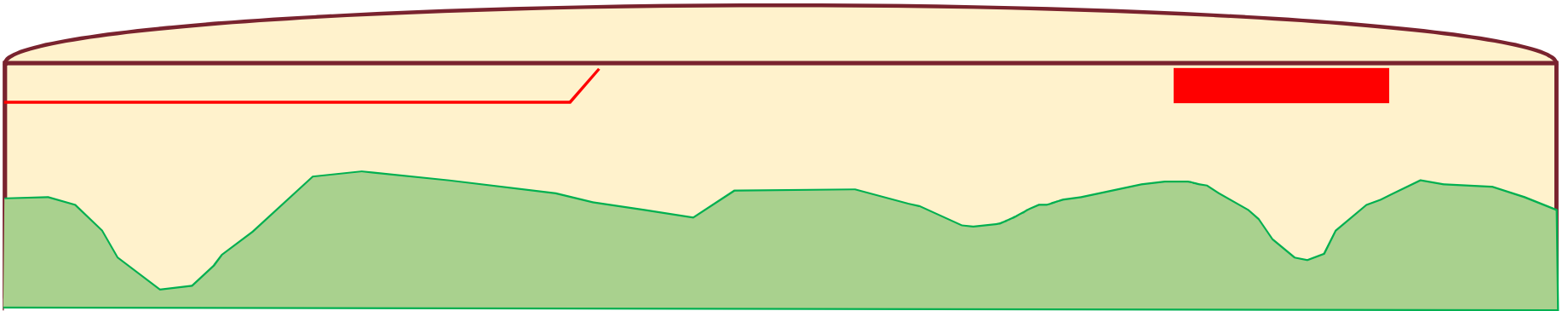
What are near surface geophysics?



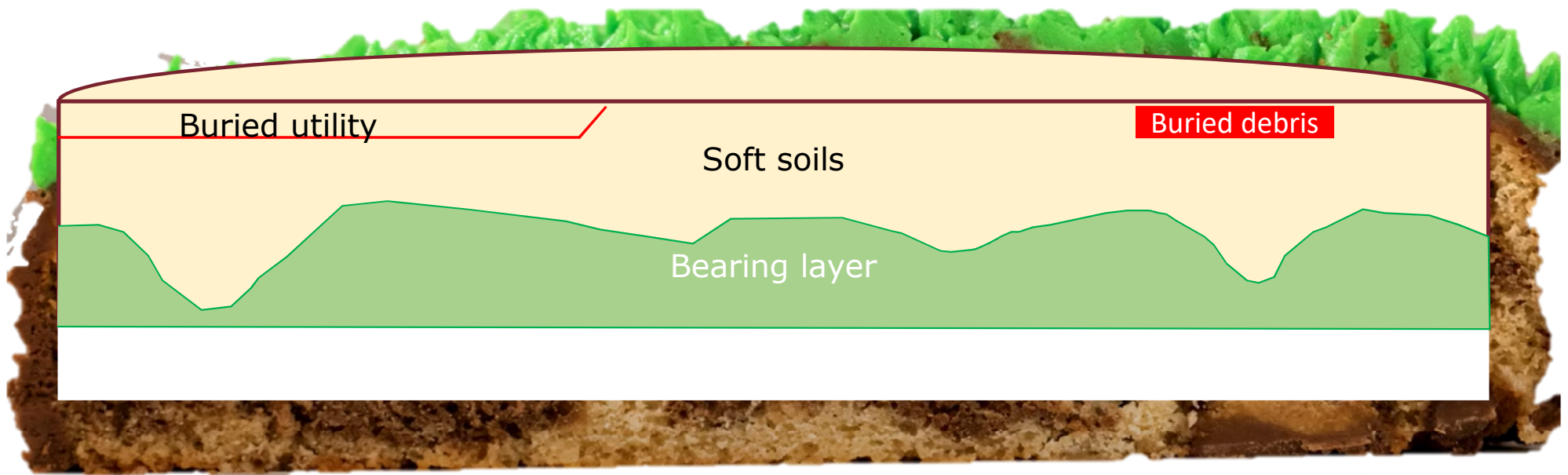
Smarter Exploration



Smarter Exploration



Smarter Exploration



What is a Smart Exploration Plan?

Predict

- **Looking from Above** – Pivvot, Stage1/VSP, Phase 1, Historical Records...

Screen

- **Adding Some Depth** – Remote Sensing/LiDAR/InSAR, Geophysical Screening and Profiling...

Target

- **Seeing is Believing** – Borings, CPT, Test Pits, Borehole Geophysics, MWD, In-Situ...

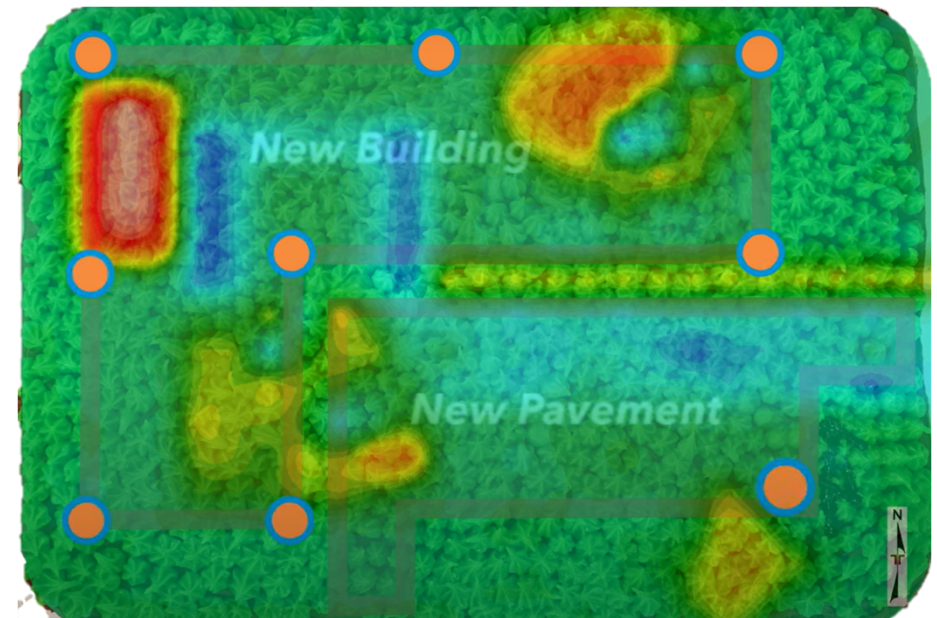
Test

- **Getting Close** – Lab Testing and Sampling, Solar Pile Load Testing (PLT), Deep Foundation Testing (DFT), Instrumentation...

PSTT – We can do site exploration more effectively

Smart Exploration Plan

- Predict areas of concern based on historic data
- Screen using a non-destructive tool
- Surgically investigate the site
- Test for soil parameters



How do we apply it?

- Define a parameter to investigate
- Scope the investigation
- Outline the findings and assess the condition being investigated
- Provide recommendations to avoid/mitigate the condition

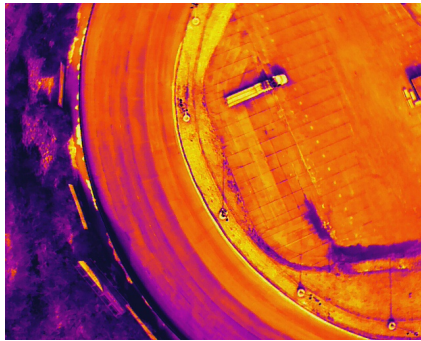


RED = BAD
YELLOW = MAYBE BAD
GREEN = PROBABLY NOT BAD
PURPLE = PROBABLY VERY BAD

Expecting the Unexpected

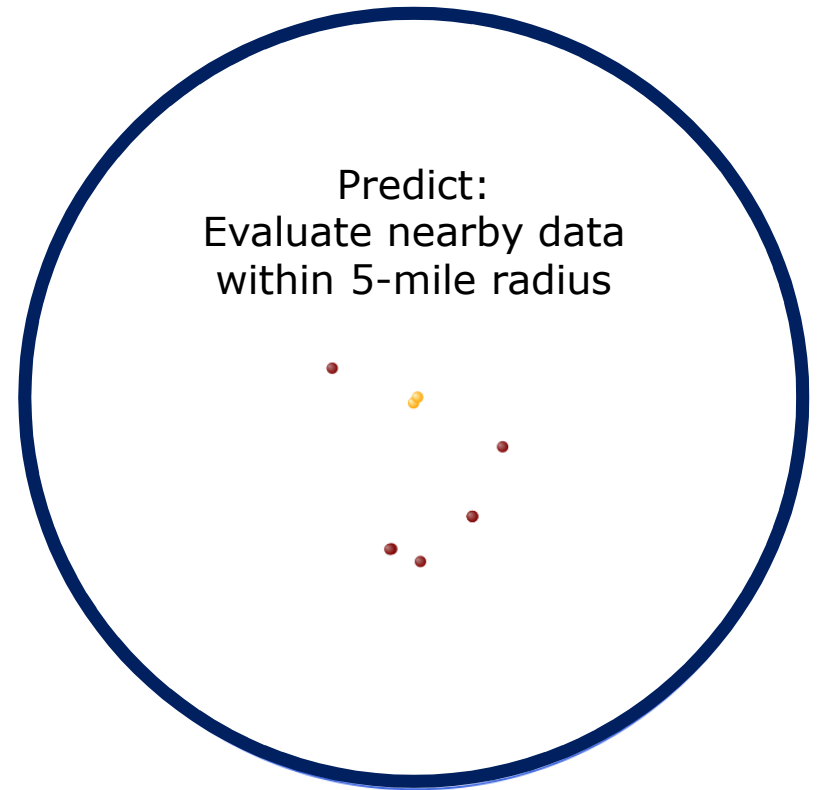
Site Restrictions May Prohibit Boring Studies:

- Overhead and underground obstructions
- Low overhead or interior access
- Prohibitive clearing or access tolerances



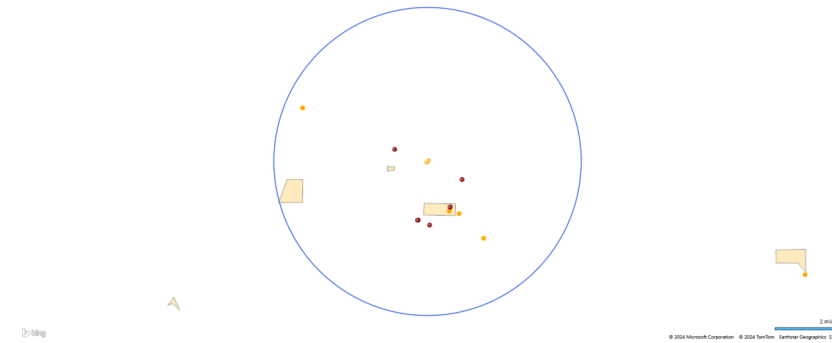
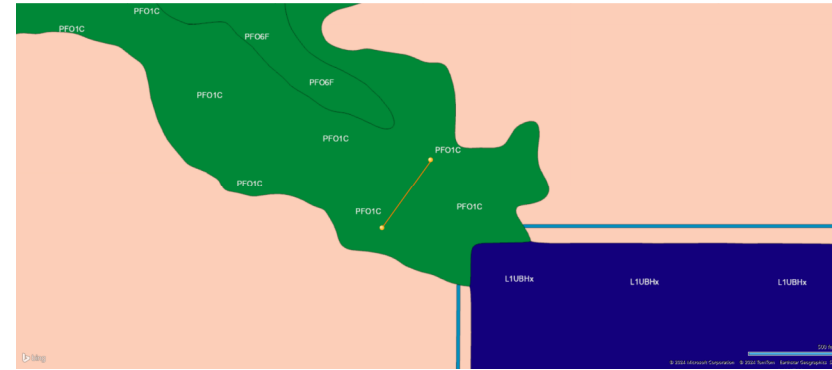
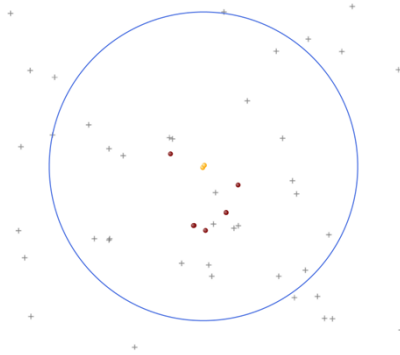
Case Study

- Area proposed for large scale infrastructure project
- Marginal site class expected (D or potentially E)
- Wanted to evaluate bearing stratum and liquefaction potential



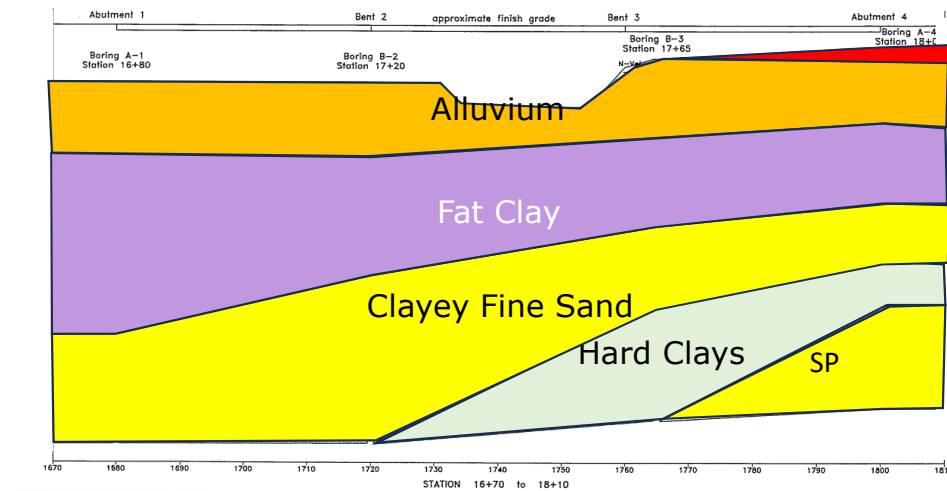
Predict

- Cemeteries
- National Wetlands Inventory
- Historic Places
- Liquefaction Potential



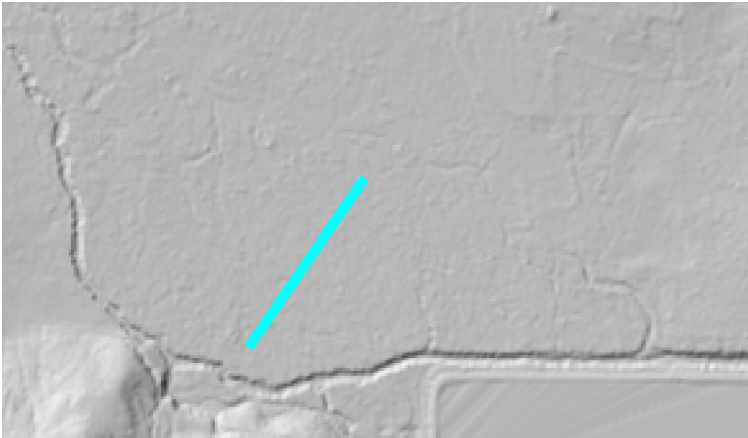
Predict

- Geotechnical borings from 2005 nearby
- Site is clear of known cemeteries
- Some hydric soils are possible
- Liquefaction risk is considered lower based on publicly available maps



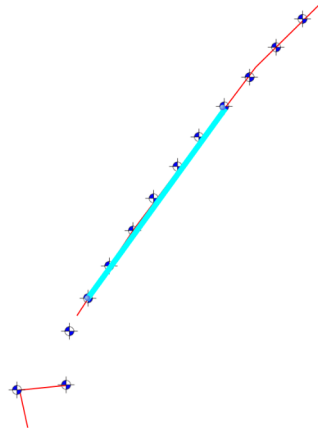
Screen

- Review of public lidar data – are there large areas of concern?
- Review street view for access, site concerns



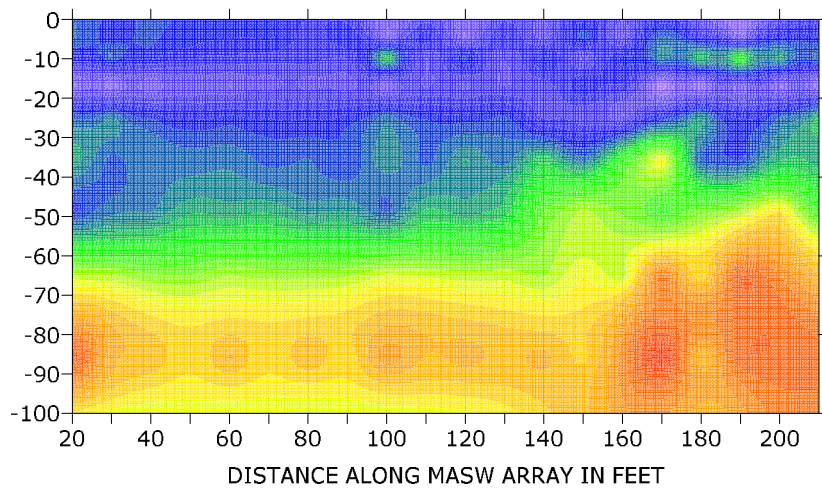
Screen

- Pair of MASW lines along proposed bridge alignment
- Borings ultimately planned along alignment

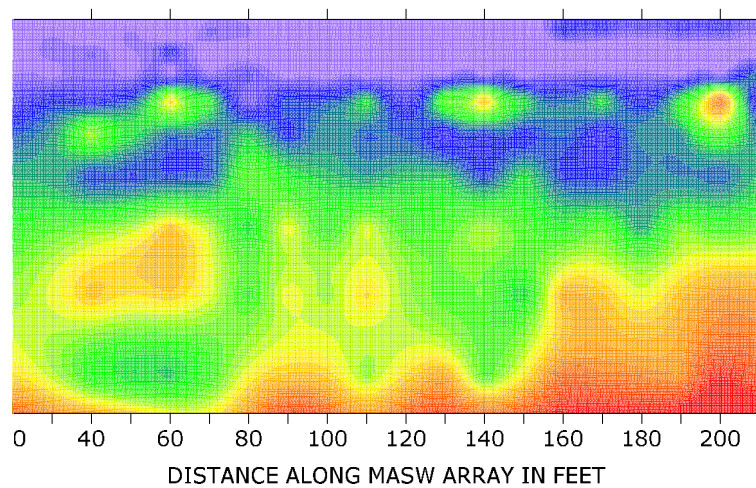


Screen

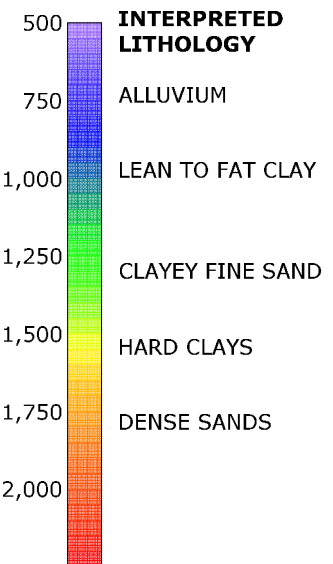
MASW LINE 1 - SOUTH END



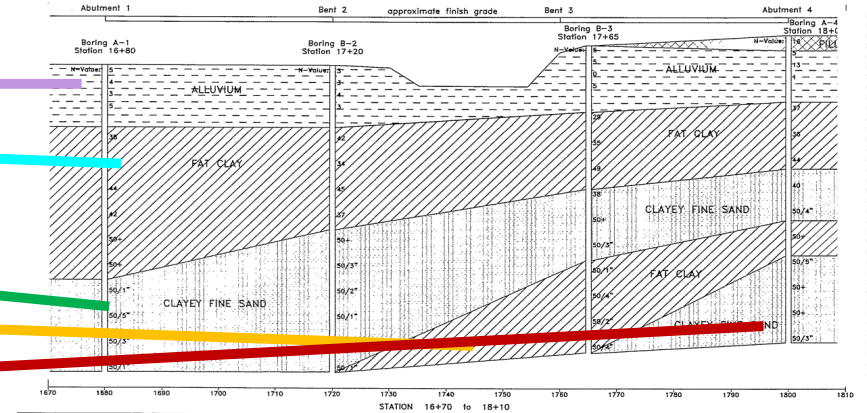
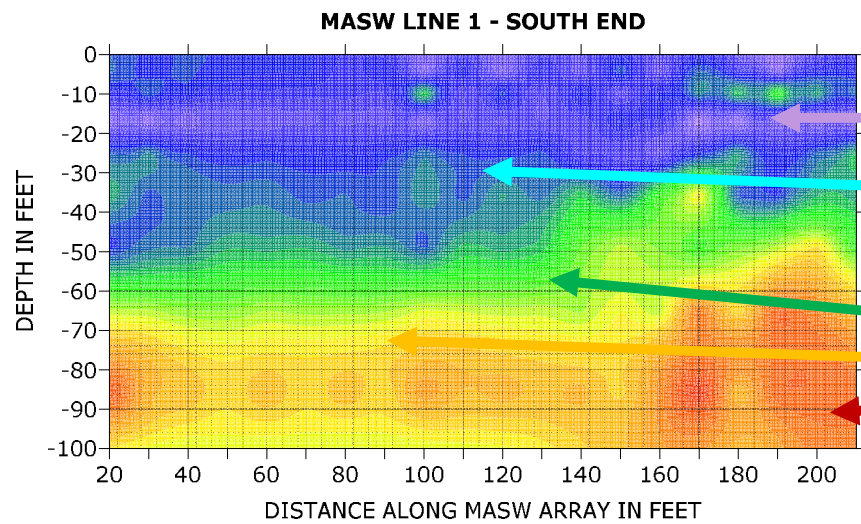
MASW LINE 2 - NORTH END



SHEAR WAVE VELOCITY IN FEET PER SECOND

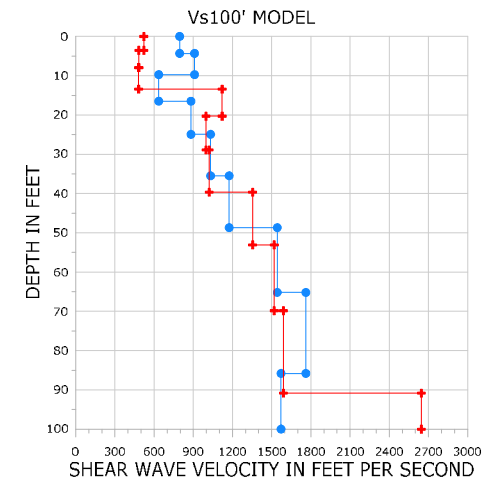
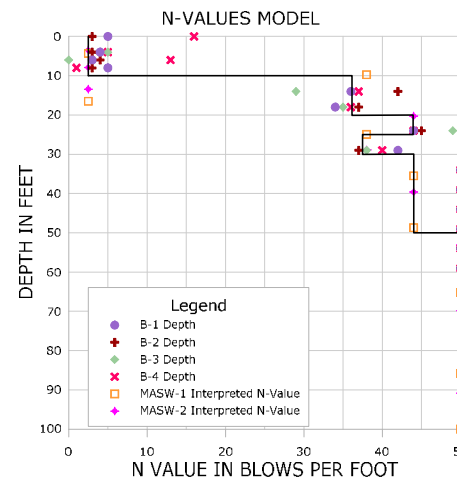
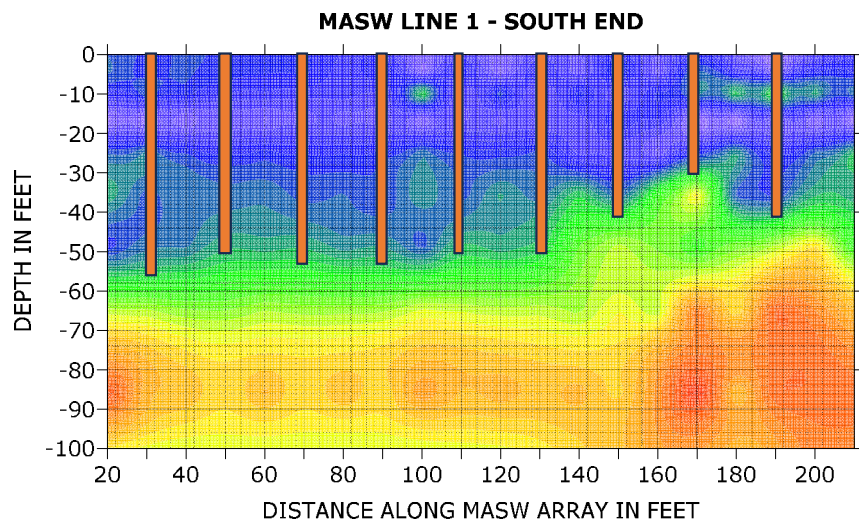


Preliminary Design



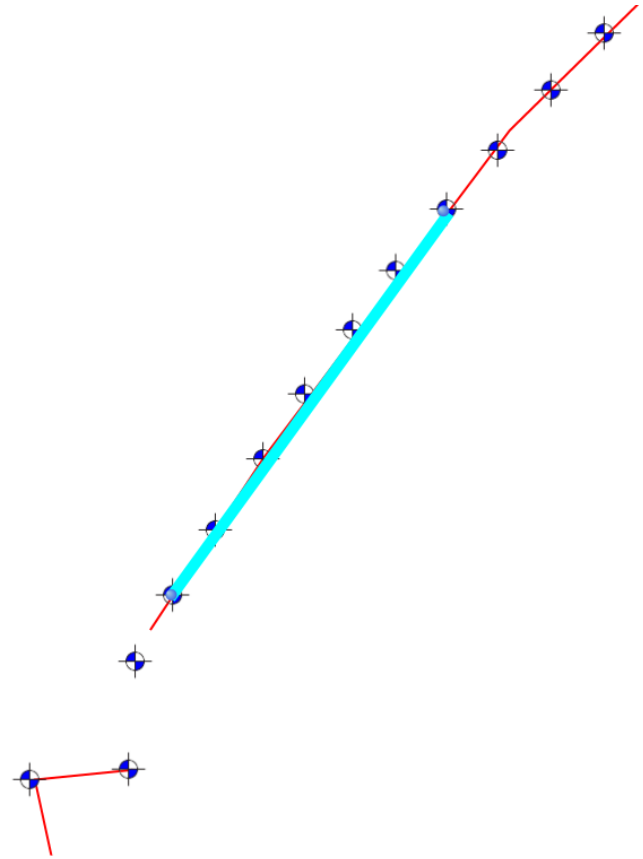
Preliminary Design

- Cross section view of the footings
- Rough estimate of design parameters
- Site class "D" – 1,100 fps



Target and Test

- Conduct additional borings to refine parameters
- Suggest additional MASW at other suspect bent locations



Financial Implications

- Next 12 Months Projects for Letting (LADOTD)
 - ~713 miles of pavement and forensic studies
 - ~104 miles of new roadway and bridge construction
- Estimated ~3,500 pavement cores, falling weight deflectometer, and Nuke Gauge Measurements, as well as ~1,000 geotechnical borings

Financial Implications

- Estimated \$4.8mil for exploration fees between methods
 - If 25% of locations are switched out for GPX, 15% reduction in cost
 - If 50% of locations are replaced with GPX, 30% reduction in cost
- Rarely do we fully replace traditional sampling with geophysical testing

QUESTIONS?

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for the Purpose of Developing Site
Characterization and Preliminary

Parameters

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