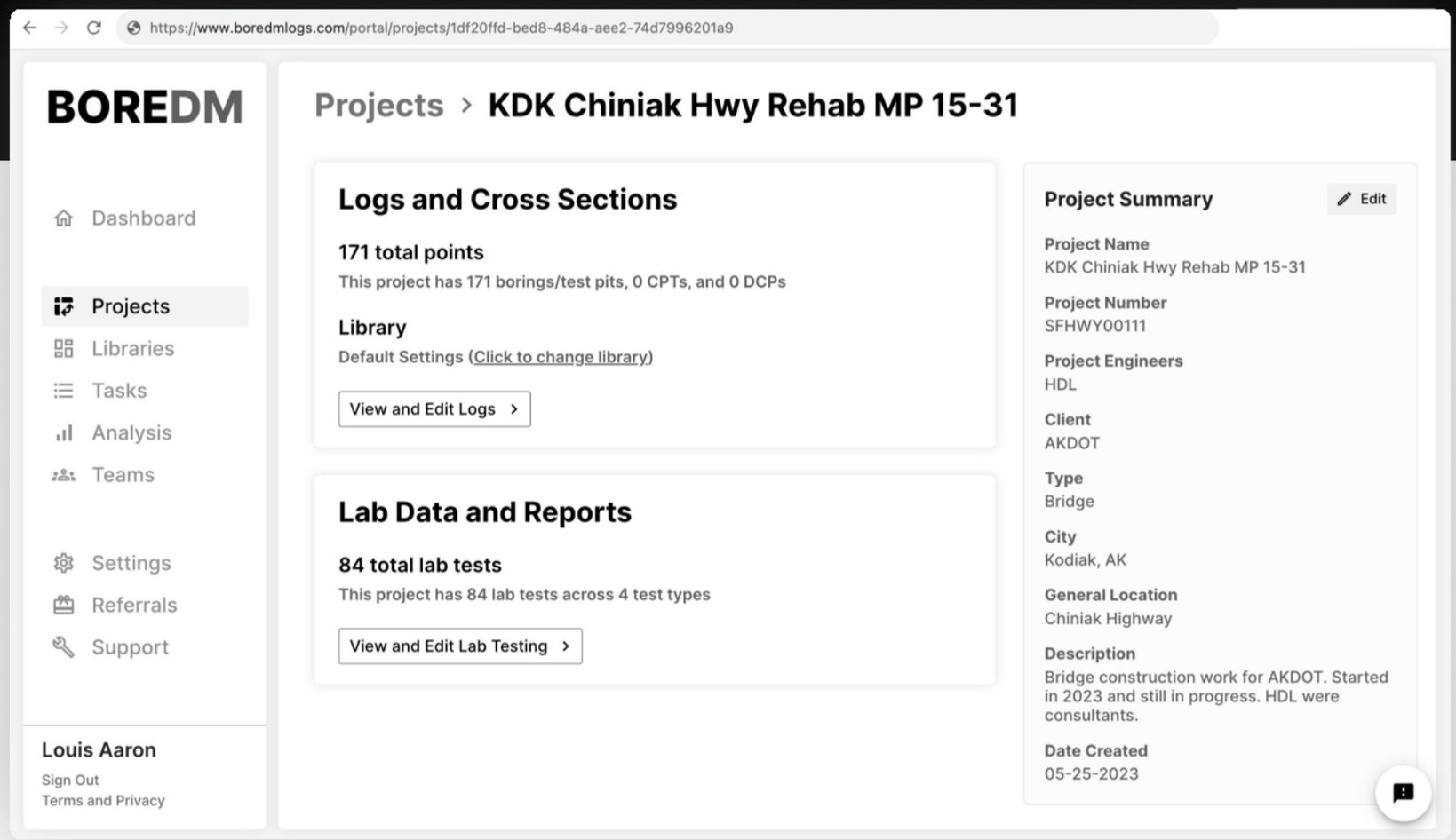
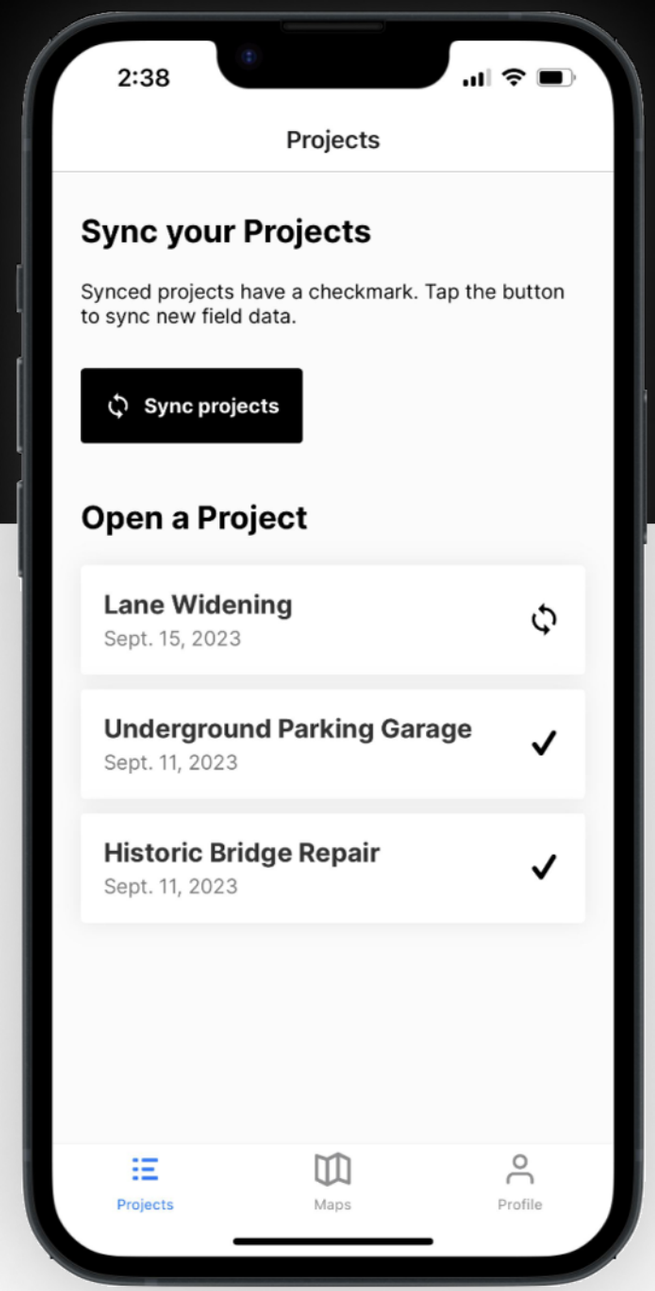
BOREDM

TRANSITIONING FROM BORING LOGS TO MODEL-BASED DELIVERABLES

Implications for Geotechnical Data Management





What is a model

Defining characteristics:

- Visual representations of data
- Intentionally omit some of the available data
- Not every single data point is useful (and some data point obfuscate reality)

Common models in geotechnical engineering:

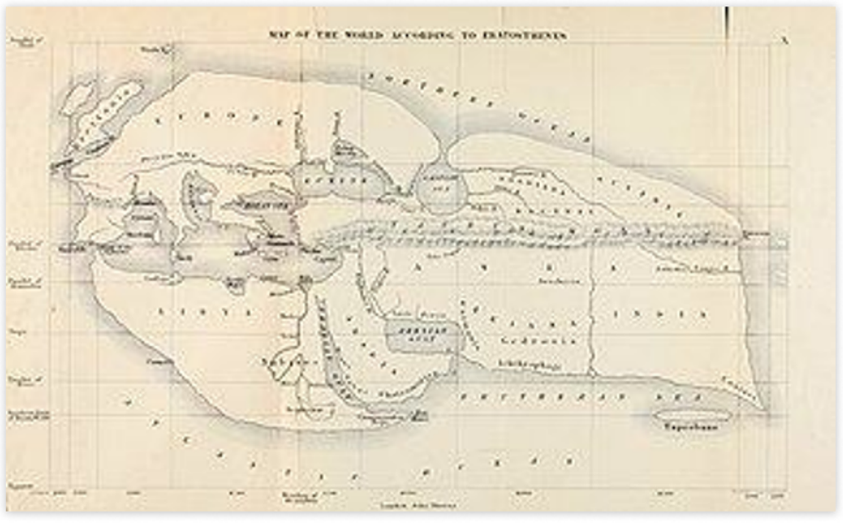
- PDF boring logs, PDF fence diagrams
- CAD boring logs, CAD fence diagrams
- CAD models in programs like MicroStation, Civil3D, and OpenRoads
- BIM (and BIM IFC) models
- Machine-learning models (“AI”)

Bottom line: intentionally omitting or removing some underlying data from a model is okay.

The PDF boring log is not dead (and we don’t need to kill it)

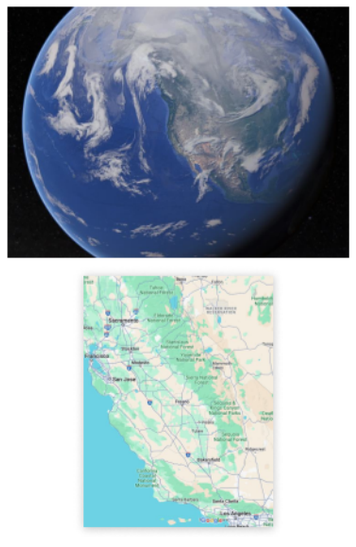
Misconception: PDF boring logs or PDF fence diagrams are going away entirely in favor of data deliverables like DIGGS files

- PDF logs and cross sections are useful (if relatively simple) models
- The real problem is that these models have long been generated and delivered *without being accompanied by the underlying data*. Once we generate one model (the PDF log), we can no longer reference that data to generate any other models at a later time



276 B.C. (Reconstruction)

1492



2024... still maps

What if there were no KMZs, shapefiles, or geo-data?

The much simpler problem of locating points in space has already been solved

- In the same way that geotechnical models preceded geotechnical databases, geospacial models also preceded geospacial databases
    - Geospatial models: maps and globes (when shared, require data re-entry)
    - Geospatial databases: ESRI/ArcGIS maps which contain lat/lon pairs

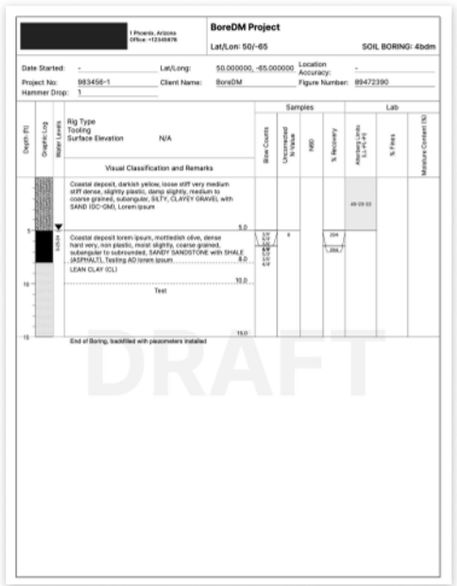
Geospatial data can be transferred via “data interchange standards” or APIs

- Data interchange standards for geospatial data:
    - Shapefiles
    - KMZs
    - GeoJSON
- APIs:
    - Google Maps API
    - ArcGIS API

The PDF boring log is not dead (and we don’t need to kill it)

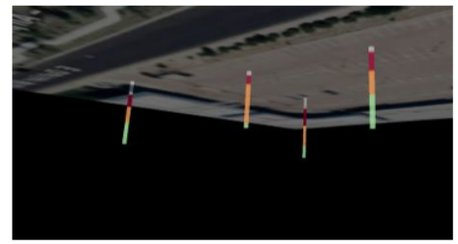
We are moving toward a world where the PDF is just one of many models

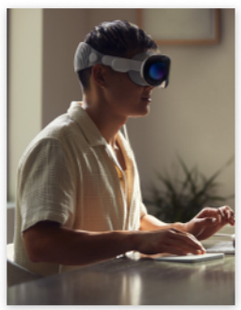
- These will include PDF logs, CAD logs and fence diagrams, and BIM (IFC) models. This means it will need to be very easy to
  - Quickly generate these models
  - Quickly share underlying datasets between software programs which can generate these models (DIGGS/AGS, which are a data *interchange* standards, not a database; and APIs)



1980s

2023





2024... still boring logs

What can we do (easily) with software today

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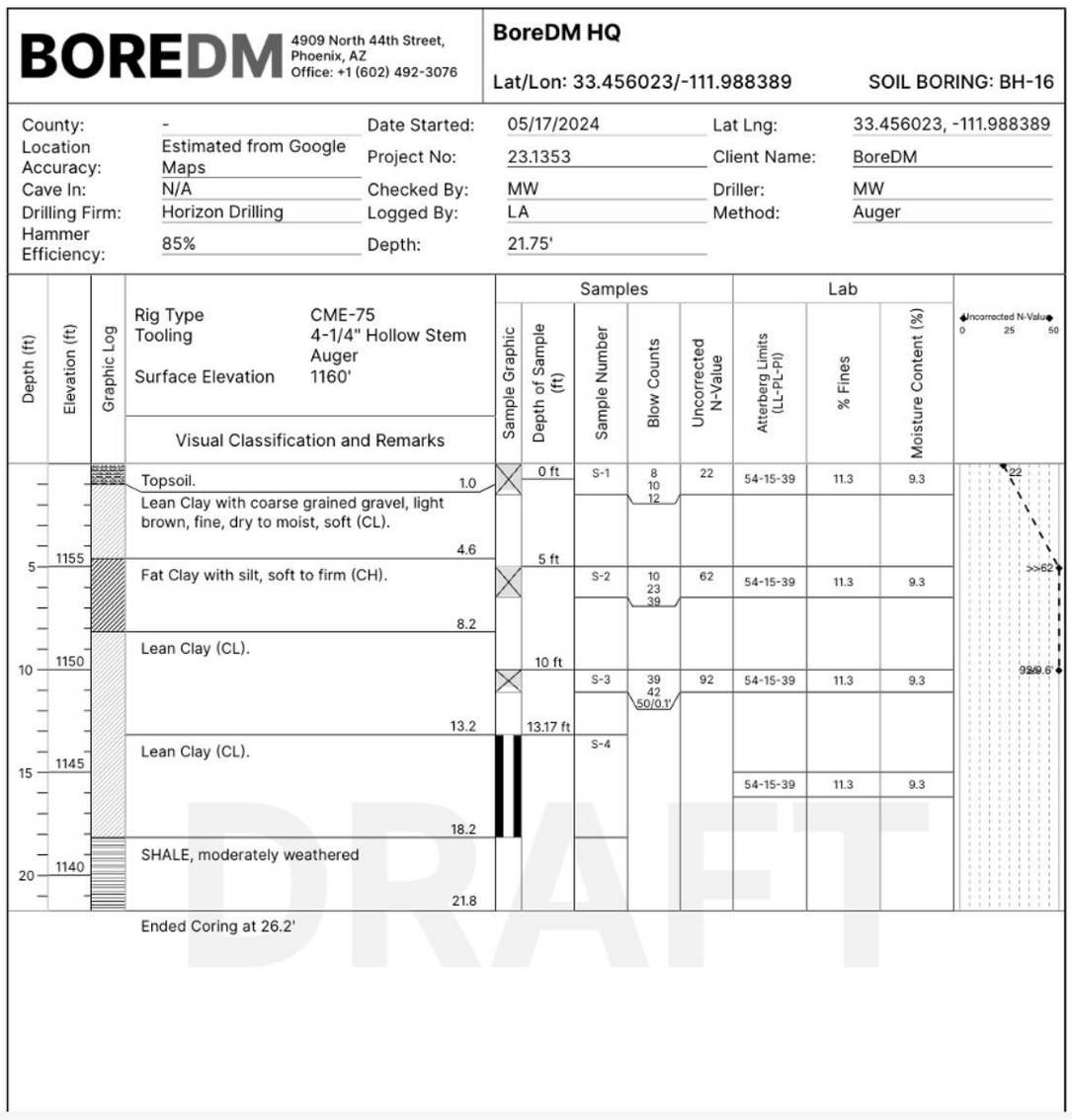
Status: Draft | Copy from another log | Preview Log PDF



BOREDM 4909 North 44th Street, Phoenix, AZ Office: +1 (602) 492-3076

BoreDM HQ

Lat/Lon: 33.456023/-111.988389 SOIL BORING: BH-16

County:	-	Date Started:	05/17/2024	Lat Lng:	33.456023, -111.988389
Location Accuracy:	Estimated from Google Maps	Project No:	23.1353	Client Name:	BoreDM
Cave In:	N/A	Checked By:	MW	Driller:	MW
Drilling Firm:	Horizon Drilling	Logged By:	LA	Method:	Auger
Hammer Efficiency:	85%	Depth:	21.75'		

Rig Type: CME-75
Tooling: 4-1/4" Hollow Stem Auger
Surface Elevation: 1160'

Depth (ft)	Elevation (ft)	Visual Classification and Remarks	Sample Graphic	Depth of Sample (ft)	Sample Number	Blow Counts	Uncorrected N-Value	Atterberg Limits (LL-PL-PI)	% Fines	Moisture Content (%)
0	1160	Topsoil. 1.0		0 ft	S-1	8 10 12	22	54-15-39	11.3	9.3
		Lean Clay with coarse grained gravel, light brown, fine, dry to moist, soft (CL). 4.6		5 ft						
5	1155	Fat Clay with silt, soft to firm (CH). 8.2			S-2	10 23 39	62	54-15-39	11.3	9.3
10	1150	Lean Clay (CL). 13.2		10 ft	S-3	39 42 50/0.1	92	54-15-39	11.3	9.3
				13.17 ft	S-4					
15	1145	Lean Clay (CL). 18.2						54-15-39	11.3	9.3
20	1140	SHALE, moderately weathered 21.8								

Ended Coring at 26.2'

Incorrected N-Value 0 25 50 — 22 >>62 >>9.6

DRAFT

Log Summary

Edit

Overview
Log Name: BH-16
Log Type: Soil Boring
Figure Number: -
Data Source: Created in BoreDM

Drilling Dates
Date Started: 05/17/24
Date Completed: -

Equipment
Rig Type: CME-75
Tooling: 4-1/4" Hollow Stem Auger
Method: Auger
Drilling Fluid: -
Hammer Type: -
Hammer Weight: -
Hammer Drop: -

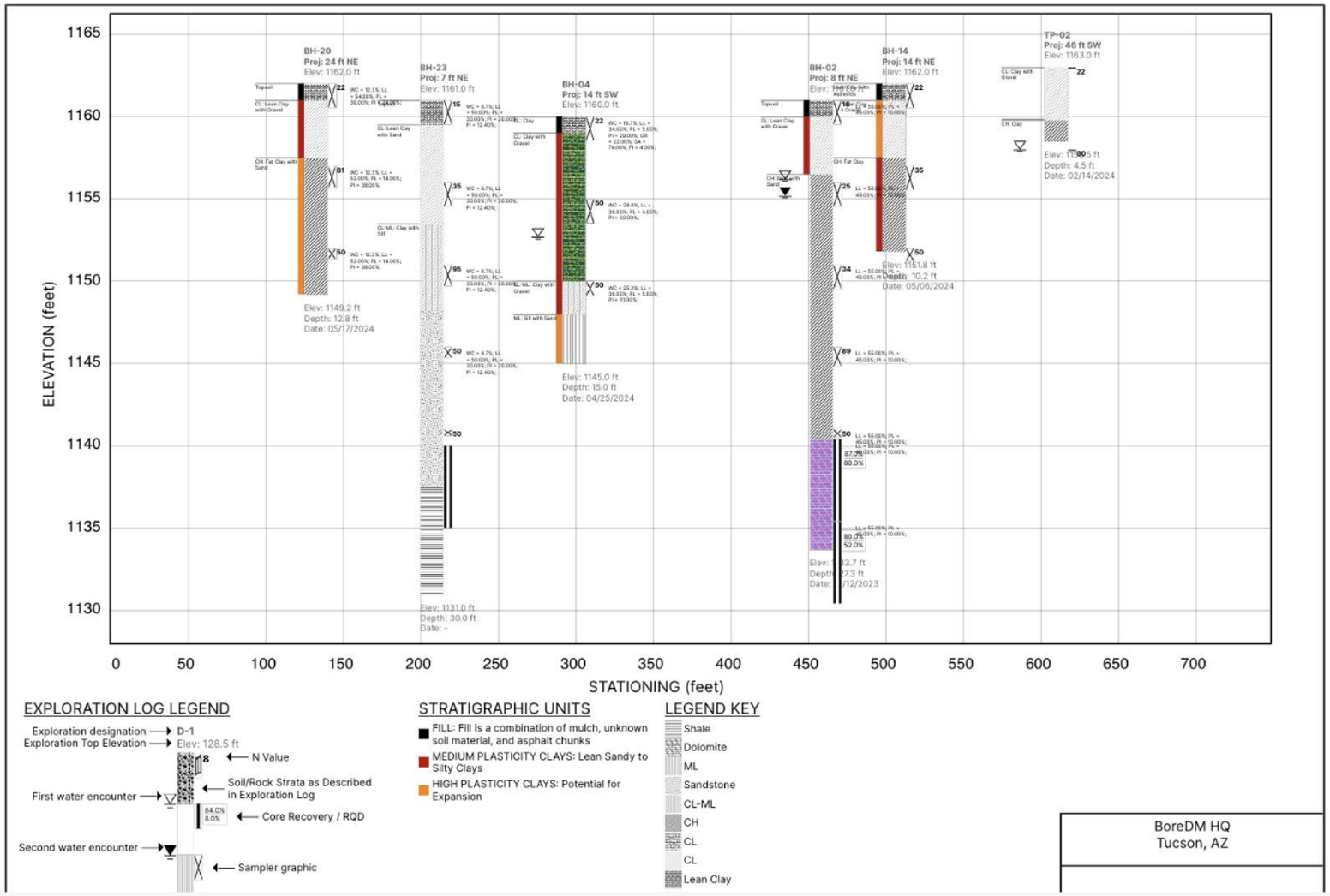
Team
Drilled by: MW
Logged by: LA
Checked by: MW
Drilling Firm: Horizon Drilling

Location and Elevation
Latitude: 33.456023

Projects › BoreDM HQ › Logs

Report Data | Field Data | Map | **Cross Sections** | Quality | Template | 3D BETA

Download PDF | Download DXF | Draw a line again



Generate a cross section

Stationing Unit
FEET

Soil Graphic Width
Standard

Font Family
Inter

Elevation Grid Frequency
Every 5 Feet

Stationing Grid Frequency
Every 50 Feet

Stratigraphic Units:
FILL: Fill is a combination of mulch, unknown soil material, and asphalt chunks
MEDIUM PLASTICITY CLAYS: Lean Sandy to Silty Clays
HIGH PLASTICITY CLAYS: Potential for Expansion

- [x] Sampler Icon
- [x] N Value
- [ ] Sample Number
- [x] % REC / % RQD

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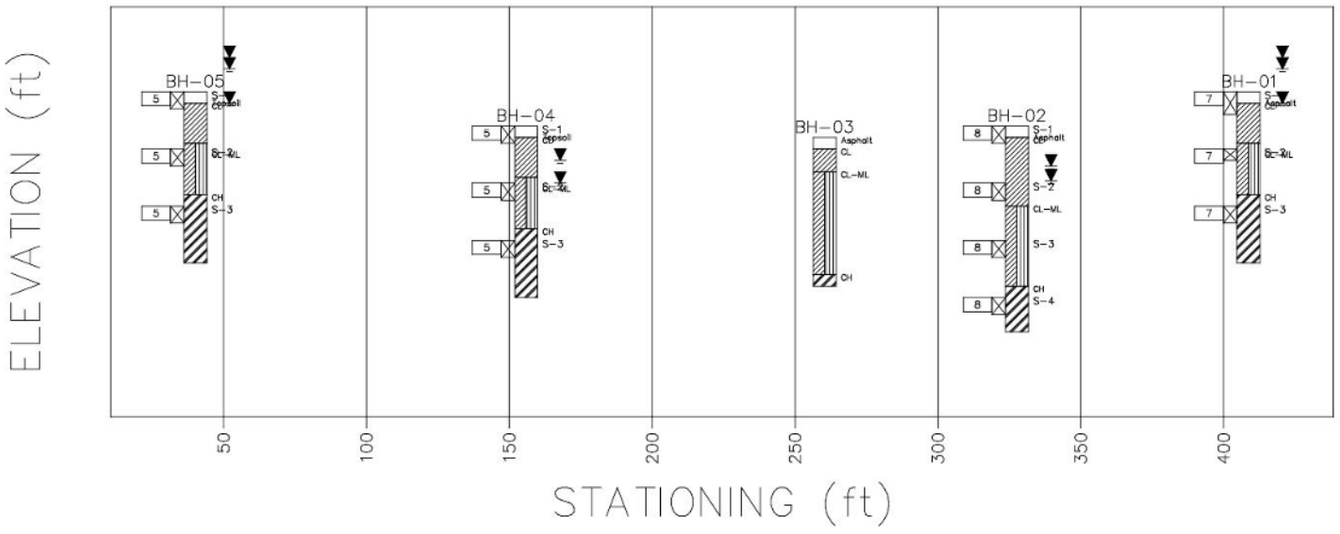
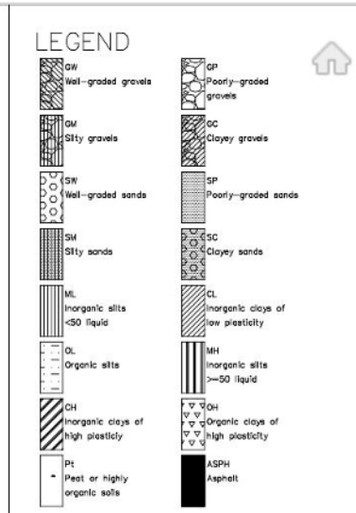
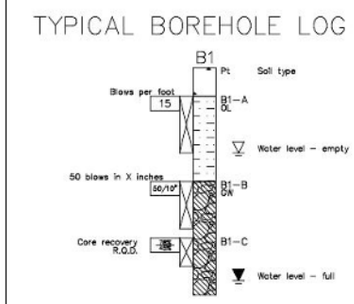
Views

- Model
  - 2D View
- Sheets
  - BoreDM_profile







Home Fit Pan Zoom Measure Markup

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Download Project Data

Download boring data as Excel, PDF or DXF files. Download maps as Excel (Boring ID, Lat, Long) or DXF files. Configure PDF boring data on the Templates tab, and configure PDF map data on the Site Maps tab.

Select download type

Civil 3D Geotechnical Module | Project Data - Leapfrog | Surfer Data - Excel | Project and Log Data - DIGGS | Projectand Log Data - AGS (Beta) | Download formats

Select borings

BH-01 | BH-02 | BH-03 | BH-04 | BH-05 | BH-06 | BH-07 | BH-08 | BH-09 | BH-10 | BH-11 | BH-12 | BH-13 | BH-14 | BH-15 | Borings

Exporting five files:

- 20240717_boredm_hq_geol.csv
- 20240717_boredm_hq_hole.csv
- 20240717_boredm_hq_sitemap.csv
- 20240717_boredm_hq_boringlogs.xlsx
- 20240717_boredm_hq_sitemap.ags

Download

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Pull data directly into other software via BoreDM's API

EXAMPLE WITH PROJECT SUMMARY DATA FOR GIS APPLICATIONS

Get a list of all projects and their locations

Run

```
fetch("https://www.boredmlogs.com/api/(redacted)
requestOptions)
```

Get a list of all logs, their locations, and their general layers

Run

```
fetch("https://www.boredmlogs.com/api/(redacted)
requestOptions)
```

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EXAMPLE WITH

Get a list of

Run

Get a list of

Run

ny_id>",

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Analysis

Run SQL or Python queries on your data

Query | Visualize

Query Builder | Save Query | ▷ Run

TABLES

SAVED QUERIES

- Get Depth and Elevat...
- Index Testing

```
1  SELECT
2
3
4
5
6
7
8  FROM
9      boredm.lab AS lab
10 JOIN
11     boredm.log AS log ON lab.log_id = log._id
12 JOIN
13
```

(redacted)

(redacted)

753 rows

Download

liquid_limit	plasticity_index	moisture_content	start_depth	latitude	longitude
45	22		0	50	-65
16	11		0	(redacted)	
20	17		5		

Analysis

Run SQL or Python queries on your data

Query **Visualize**

Structure

Traces

Subplots

Transforms

Style

Annotate

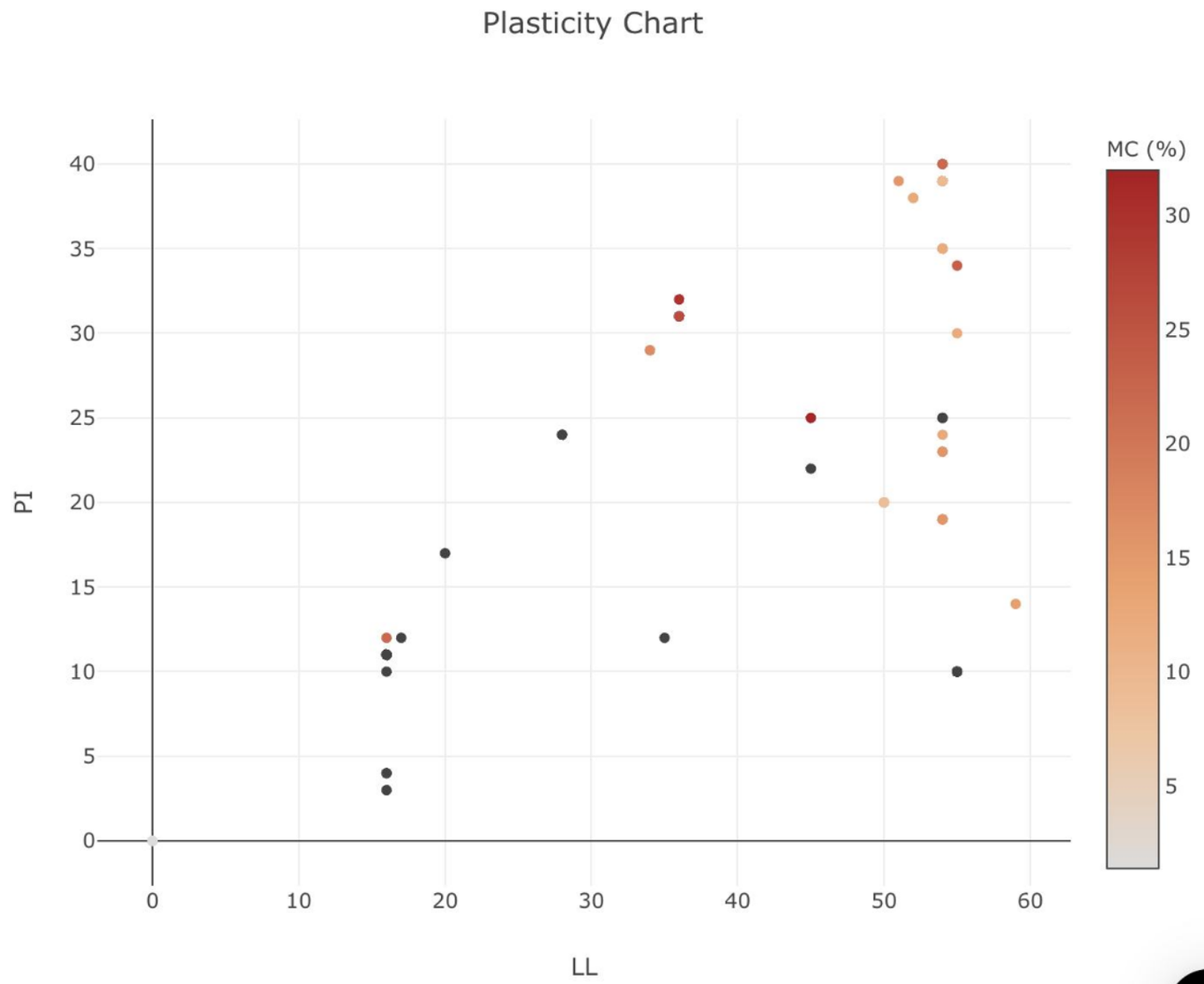
+ Trace

trace 0

Type: Scatter

X: liquid_limit

Y: plasticity_index



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