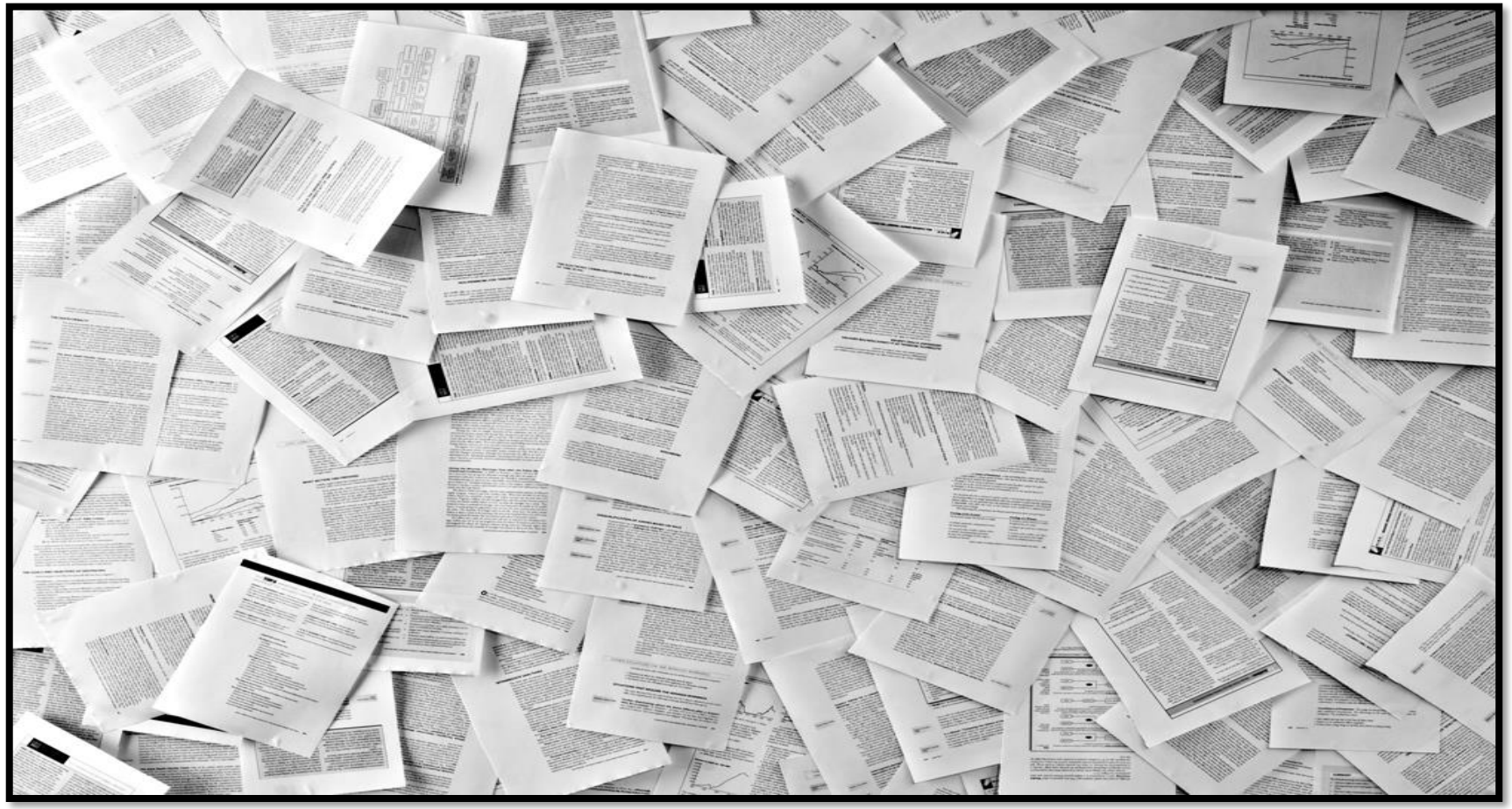
Plan Submittals and Communication with KYTC Geotech



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Meet the Panel

- Michael Carpenter KYTC Director Structures\Geotech Michael.Carpenter@ky.gov
- Sean House KYTC Geotech Geologist Supervisor-Registered Sean.House@ky.gov
- Tyler Sheffield KYTC Geotech Transportation Engineer Supervisor Tyler.Sheffield@ky.gov
- JC Wilhoite KYTC Geotech Transportation Engineer Supervisor James.Wilhoite@ky.gov
- Matt Sipes KYTC Design Transportation Engineering Branch Mgr. Matthew.Sipes@ky.gov
- Patrick Stone KYTC Geotech Systems Consultant IT Patrick.Stone@ky.gov

Intro

Approximately 40 minutes of presentation/round table discussion broke down into three sections

- Essential Data for Project Initiation
- Deliverables from Geotech to Designers
- 3D Geotechnical Modeling as a Deliverable

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What Does Geotech Need For Project Initiation ?

- Clear and Predictable Communications.
- Need for repeatability in project initiation submittals while retaining flexibility for special cases.
- Need to develop and understand roles on our teams since this impact's deliverables.
- Importance of quality checks being built into the process.
- The timing of design change decisions can greatly impact the quality and cost of Geotech data obtained in the field.

How will we address these Needs ?

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Essential Data for Project Initiation

- **Draft Memo**

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TRANSPORTATION CABINET
transportation.ky.gov

Andy Beshear
GOVERNOR

Jim Gray
SECRETARY

HIGHWAY DESIGN MEMORANDUM NO. X-24; STRUCTURAL DESIGN MEMORANDUM 0X-24

TO: Project Development Branch Managers
Active Consultants

FROM: Tim Layson, P.E., Director
Division of Highway Design

Mike Carpenter, P.E., Director
Division of Structural Design

DATE: Pending

SUBJECT: Submittal Items Required for Gathering and Assessing Geotechnical Roadway Data

Refer to memorandum No. 01-2019 CAD Standards for Highway Plans Version 4.x CADD for details on Cabinet requirements on design deliverables. The referenced memo specified "Electronic Engineering Data" (EED) and associated CADD Standards requirements. The purpose of this memorandum is to align these requirements with geotechnical roadway project initiation submittals. We understand that the timing for roadway geotechnical project work initiation will typically precede the completion of many of the EED deliverables. The clarity, completeness, and accuracy of project initiation documents directly impacts the quality of geotechnical information available for both design and construction. Inadequate or incorrect project initiation data can lead to significant increases in project development and delivery costs and lead to project delays.
To facilitate the fieldwork necessary for gathering and assessing geotechnical data to be delivered to the designer for development of the final plan set the following items must be provided:

- PDFs for the project Plans, Profile, and 50' Cross Sections (unless tighter spacing is required).
- If the EED documents have been completed, then send all data organized according to the CADD Standards specified folder structure to the Geotechnical Office. For inhouse projects, the designer can send the Geotech Project Manager a link to the EED folder and the Geotech staff will export the folder.
- If the project does not have the complete EED documents, provide the following:
  - Corridor
  - Geometry
  - Superelevation
  - Terrains
  - Control Elements
  - Utilities
  - Template Files
  - Sheet Boundary file (if separate)
  - Any other files that are needed to reproduce the designer's intent.

To aid in the creation of the Geotechnical files, provide these files referenced into a Project Master Reference file.

As always design team communication is critical and we understand that project development doesn't always take place in a uniform way. Some projects may have accelerated schedules or other factors that can result in the initiation of geotechnical project work before all the documents specified above may be available. These circumstances will continue to be addressed case by case by the project design team with an understanding of the risks associated with beginning or completing geotechnical project work based on limited information. This memorandum establishes a baseline of required information that can serve as a check list to designers for submittals and as a tool to assist the design team in risk assessment related to initiation of geotechnical project work based on limited information.

Thank you for your attention in this matter.

DRAFT

AN EQUAL OPPORTUNITY EMPLOYER M/F/D

Essential Data for Project Initiation

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Essential Data for Project Initiation

- **Draft Memo**

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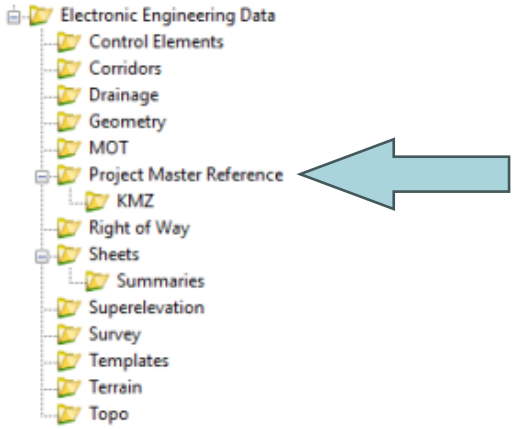
Electronic Engineering Data Folder Structure and File Names

Along with the PDF contract documents to be delivered for the Letting, Electronic Engineering Data (EED) shall also be submitted for all projects where 3D modeling is required. For a list of project types and associated modeling requirements, refer to the KYTC OpenRoads Designer FAQ.

Master Reference System

Within the Electronic Engineering Data folder are subfolders that will house the intelligent Bentley design files (DGN) and other supporting files. These files must maintain the intelligent civil data embedded within and remain referenced to one another throughout the submittal of the project. The Department will utilize a Master Reference file system as shown in the image below and on subsequent pages.



The Master Reference File concept is a way to organize the EED for a project into a logical file referencing system. Within the root folder there shall exist a Project Master Reference file that has of all the other Container files referenced. The Corridors, Geometry, Superelevation, Terrains and Control Elements folders shall contain individual DGN files for corridors, alignments, superelevation control lines, terrains and control elements. These individual DGN files shall be referenced into their respective Container files. For example, all of the individual Geometry DGN files are referenced into the 05_01234_56_Geom_Container.dgn file and stored in the Geometry folder. Container files should only contain reference files and no data itself. Should an instance occur where additional files are necessary, utilize the base concept for file naming and reference into the Master Reference file.

In addition to the aforementioned files, other supporting DGN files shall be placed in their corresponding folders, as illustrated on the following pages.

Essential Data for Project Initiation

- **Draft Memo**

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Round Table Topic #1

Essential Data for Project Initiation

- **Draft Memo**

Questions ?

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Round Table Topic #2

Deliverables from Geotech to Designers

- **Geotechnical Sheet Deliverables**

1. Geotechnical Symbols
2. Geotechnical Notes
3. Soil Profiles
4. Cut Stabilities
5. Embankment Stabilities

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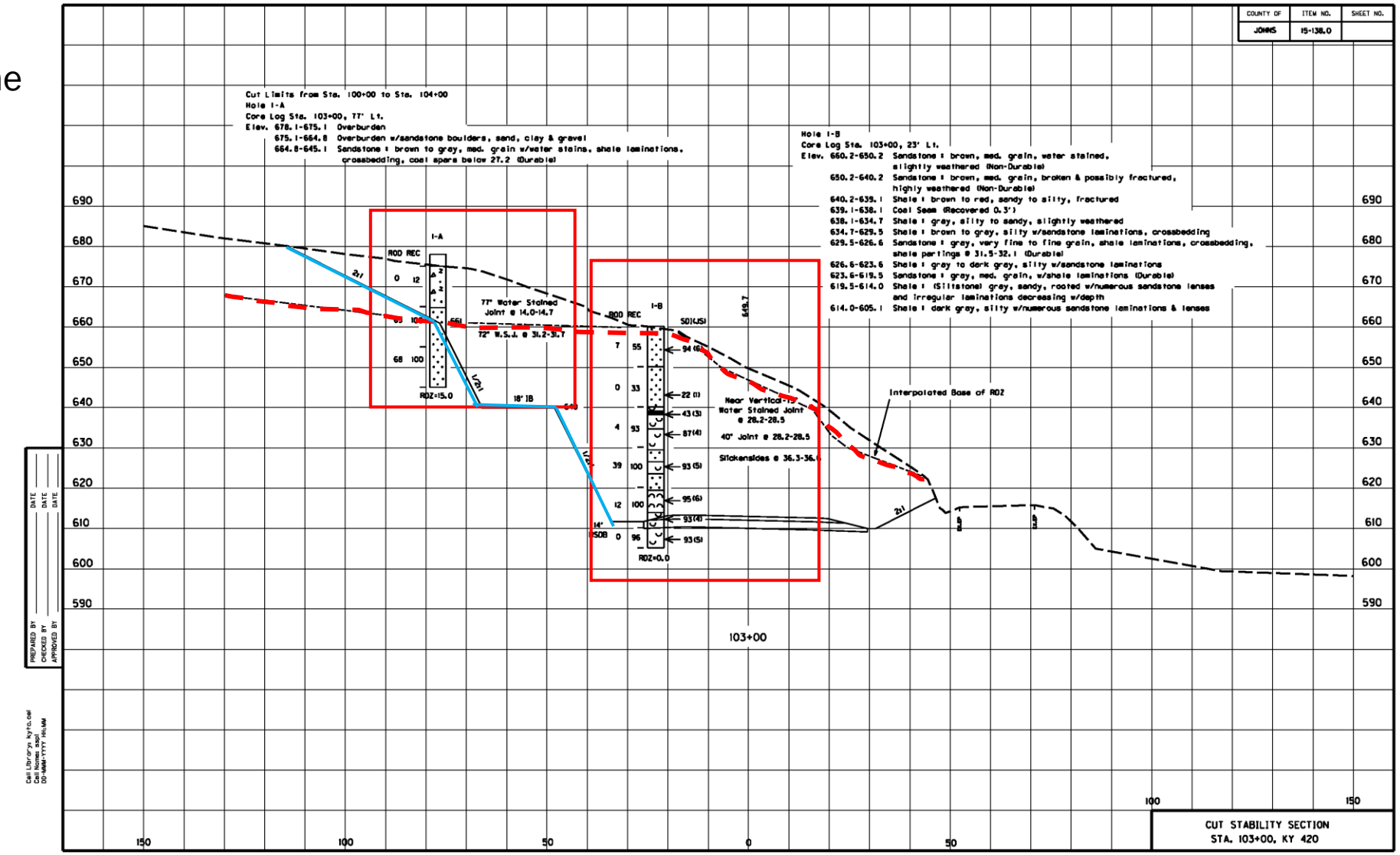
Rock Slope Design (RSD)

1. Geologic Data
2. Rock Disintegration Zone (RDZ)
3. Rock Cut Slope



Geotechnical Symbols Sheet

GEOTECHNICAL SYMBOLS

AASHTO CLASSIFICATION OF SOILS AND SOIL-AGGREGATE MIXTURES

GENERAL CLASSIFICATION	GRANULAR MATERIALS (35% OR LESS PASSING 0.075 MM)							SILT-CLAY MATERIALS (MORE THAN 35% PASSING 0,075 MM)			
GROUP CLASSIFICATION	A-1		A-3	A-2				A-4	A-5	A-6	A-7
	A-1-A	A-1-B		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6
SIEVE ANALYSIS, PERCENT PASSING											
2,00 MM (NO. 10)	50 MAX	...	...	...	...	...	...	...	...	...	...
0,425 MM (NO. 40)	30 MAX	50 MAX	51 MIN	...	...	...	...	...	...	...	...
0,075 MM (NO. 200)	15 MAX	25 MAX	10 MAX	35 MAX	35 MAX	35 MAX	35 MAX	36 MIN	36 MIN	36 MIN	36 MIN
CHARACTERISTICS OF FRACTION PASSING 0,425 MM (NO. 40)											
LIQUID LIMIT	...		...	40 MAX	41 MIN	40 MAX	41 MIN	40 MAX	41 MIN	40 MAX	41 MIN
PLASTICITY INDEX	6 MAX		N.P.	10 MAX	10 MAX	11 MIN	11 MIN	10 MAX	10 MAX	11 MIN	11 MIN

AI	ACTIVITY INDEX
LI	LIQUIDITY INDEX
S+C	SILT + CLAY (% FINER THAN NO.200 SIEVE)
○	ROCKLINE SOUNDINGS
◕	DISTURBED SAMPLE BORING
◎	UNDISTURBED SAMPLE BORING
⊙	UNDISTURBED SAMPLE BORING & ROCK CORE
●	ROCK CORE
⌖	SLOPE INCLINOMETER INSTALLATION TYPICAL APPLICATIONS
OW	OBSERVATION WELL
➡	APPROXIMATE FOOTING ELEVATION
▼ (DATE)	WATER ELEVATION

VS (psf)	FIELD VANE SHEAR STRENGTH
▮	THIN-WALLED TUBE SAMPLE
<	STANDARD PENETRATION TEST SAMPLE
N	PENETRATION RESISTANCE
Qu (psf)	UNCONFINED COMPRESSIVE STRENGTH
UU (psf)	UNCONSOLIDATED UNDRAINED TRIAXIAL STRENGTH
w%	MOISTURE CONTENT
KY RQD	ROCK QUALITY DESIGNATION (KENTUCKY METHOD)
STD RQD	ROCK QUALITY DESIGNATION (STANDARD METHOD)
SDI(JS)	SLAKE DURABILITY INDEX (JAR SLAKE TEST)
REC	CORE RECOVERY
φ	ANGLE OF INTERNAL FRICTION (TOTAL STRESS)
$\bar{\varphi}$	ANGLE OF INTERNAL FRICTION (EFFECTIVE STRESS)
c (psf)	COHESION (TOTAL STRESS)
$\bar{c}$ (psf)	COHESION (EFFECTIVE STRESS)
γ (pcf)	TOTAL UNIT WEIGHT
RDZ	ROCK DISINTEGRATION ZONE
OB	OVERBURDEN BENCH
IB	INTERMEDIATE BENCH
R	REFUSAL
NR	REFUSAL NOT ENCOUNTERED

UNIFIED SOIL CLASSIFICATIONS

MAJOR DIVISIONS		SYMBOL	NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GM	SILTY GRAVELS,GRAVEL-SAND-SILT MIXTURES.
		GC	CLAYEY GRAVELS,GRAVEL-SAND-CLAY MIXTURES.
	SAND AND SANDY SOILS	SW	WELL GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SM	SILTY SANDS,SAND-SILT MIXTURES.
		SC	CLAYEY SANDS,SAND-CLAY MIXTURES.
FINE GRAINED SOILS	SILTS AND CLAYS LL IS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS,ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS,SANDY CLAYS SILTY CLAYS, LEAN CLAYS.
		ML-CL	SILTY CLAY-SILTY CLAY WITH SAND AND OR GRAVEL, SANDY SILTY CLAY, SANDY SILTY CLAY WITH GRAVEL, GRAVELLY SILTY CLAY, GRAVELLY SILTY CLAY WITH SAND
	SILTS AND CLAYS LL IS GREATER THAN 50	MH	INORGANIC SILTS,MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS,ELASTIC SILTS.
		CH	INORGANIC CLAYS OF HIGH PLASTICITY,FAT CLAYS.

UNIFIED SOIL CLASSIFICATIONS - CONTINUED

MAJOR DIVISIONS		SYMBOL	NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GP-GC	POORLY GRADED GRAVEL WITH CLAY (OR SILTY CLAY), POORLY GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY & SAND)
		GP-GM	POORLY GRADED GRAVEL WITH SILT, POORLY GRADED GRAVEL WITH SILT AND SAND
		GW-GC	WELL GRADED GRAVEL WITH CLAY (OR SILTY CLAY), WELL GRADED GRAVEL WITH CLAY AND SAND (OR SILTY CLAY AND SAND)
		GW-GM	WELL GRADED GRAVEL WITH SILT, WELL GRADED GRAVEL WITH SILT AND SAND
		GC-GM	SILTY CLAYEY GRAVEL, SILTY CLAYEY GRAVEL WITH SAND
	SAND AND SANDY SOILS	SW-SC	WELL GRADED SAND WITH CLAY (OR SILTY CLAY), WELL GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY & GRAVEL)
		SP-SC	POORLY GRADED SAND WITH CLAY (OR SILTY CLAY), POORLY GRADED SAND WITH CLAY AND GRAVEL (OR SILTY CLAY AND GRAVEL)
		SP-SM	POORLY GRADED SAND WITH SILT, POORLY GRADED SAND WITH SILT AND GRAVEL
		SC-SM	SILTY CLAYEY SAND, SILTY CLAYEY SAND WITH GRAVEL
		SW-SM	WELL GRADED SAND WITH SILT, WELL GRADED SAND WITH SILT AND GRAVEL
UNCLASSIFIED MATERIAL		OH	ORGANIC (HIGH PLASTICITY)
		OL	ORGANIC (LOW PLASTICITY)

LIMESTONE	TALUS, MINE WASTE, FILL MATERIAL, BOULDERS, & ETC.
SANDSTONE	COAL
DURABLE SHALE (SDI ≥ 95)	DOLOMITE
NONDURABLE SHALE (SDI < 95)	LIMESTONE (ARGILLACEOUS)
GRANULAR EMBANKMENT	SLOPE PROTECTION
STRUCTURE GRANULAR BACKFILL	

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
TEAM KENTUCKY

REVISION	DATE

PREPARED BY
Division of Structural Design
Geotechnical Services Branch

DATE:
DESIGNED BY:
DETAILED BY:
CHECKED BY:

GEOTECHNICAL SYMBOLS SHEET

ROUTE: KY 32
ITEM NO. 09-80051.00
SHEET NO.
COUNTY OF: FLEMING/ROWAN
DRAWING NUMBER: R-005-2023

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Geotechnical Notes Sheet

GEOTECHNICAL NOTES

1.) IN ACCORDANCE WITH SECTION 206 OF THE CURRENT STANDARD SPECIFICATIONS, THE MOISTURE CONTENT OF EMBANKMENT MATERIAL SHALL NOT VARY FROM THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE CURRENT VERSION OF KM 64-511 BY MORE THAN +2 PERCENT OR LESS THAN -2 PERCENT. THIS MOISTURE CONTENT REQUIREMENT SHALL HAVE EQUAL WEIGHT WITH THE DENSITY REQUIREMENT WHEN DETERMINING THE ACCEPTABILITY OF EMBANKMENT CONSTRUCTION. REFER TO THE FAMILY OF CURVES FOR MOISTURE/DENSITY CORRELATION.

2.) ALL SOILS, WHETHER FROM ROADWAY OR BORROW, MAY REQUIRE MANIPULATION TO OBTAIN PROPER MOISTURE CONTENT PRIOR TO COMPACTION. DIRECT PAYMENT SHALL NOT BE PERMITTED FOR REHANDLING, HAULING, STOCKPILING, AND/OR MANIPULATING SOILS.

3.) EXCAVATION OF SURFACE DITCHES AND CHANNEL CHANGES ADJACENT TO EMBANKMENT AREAS SHALL BE PERFORMED PRIOR TO THE PLACEMENT OF THE ADJACENT EMBANKMENTS. THE MATERIAL EXCAVATED FOR THE CHANNEL CHANGES AND SURFACE DITCHES IS SUITABLE FOR EMBANKMENT CONSTRUCTION IF DRIED TO PROPER MOISTURE CONTENT IN ACCORDANCE WITH SECTION 206 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

4.) THE CONTRACTOR IS RESPONSIBLE FOR CONDUCTING ANY OPERATIONS NECESSARY TO EXCAVATE THE CUT AREAS TO THE REQUIRED TYPICAL SECTION. THESE OPERATIONS SHALL BE INCIDENTAL TO ROADWAY EXCAVATION OR EMBANKMENT-IN-PLACE AND NO ADDITIONAL COMPENSATION SHALL BE MADE FOR THIS WORK.

5.) SOME OF THE SOIL HORIZONS AND SLOPES ON THE PROJECT ARE SUBJECT TO EROSION. NECESSARY PROCEDURES IN ACCORDANCE WITH SECTIONS 212 AND 213 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SHALL BE FOLLOWED ON CONSTRUCTION.

6.) REMOVAL OF EXISTING STRUCTURES AND OTHER OBSTRUCTIONS SHALL BE COMPLETED IN ACCORDANCE WITH SECTION 203 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

7.) CLEARING AND GRUBBING OF ROADWAY AREAS SHALL BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 202 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION BEFORE EMBANKMENT PLACEMENT.

8.) BORROW MATERIAL, IF REQUIRED FOR SUBGRADE, SHALL MEET THE AVERAGE RESILIENT MODULUS OF 5,600 PSI.

9.) THE CONTRACTOR SHALL CONDUCT GRADING OPERATIONS IN SUCH A MANNER THAT SOIL (FREE OF ROCK LARGER THAN 4 INCHES AND SHALE) FROM ROADWAY EXCAVATION BE STOCKPILED SEPARATELY OR OTHERWISE MANIPULATED SO THAT AMPLE QUANTITIES ARE AVAILABLE FOR A CHEMICALLY STABILIZED ROADBED MEETING THE REQUIREMENTS OF SECTION 208 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. NO DIRECT PAYMENT WILL BE ALLOWED FOR SUCH NECESSARY MANIPULATING AS STOCKPILING, HAULING, AND/OR HANDLING THE MATERIAL.

10.) FOUNDATION EMBANKMENT BENCHES SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD DRAWING RGX-010 AT THE LOCATIONS LISTED BELOW AND/OR AS DIRECTED BY THE ENGINEER. CONTRARY TO STANDARD DRAWING RGX-010, THE TYPICAL RISE HEIGHT FOR BENCHING INTO SOIL/EARTH SLOPES SHALL BE 4 TO 5 FEET. BENCHES IN SOIL/EARTH SLOPES SHALL BE CONSTRUCTED ONE AT A TIME BEGINNING WITH THE LOWEST BENCH AND EACH BENCH SHALL BE BACKFILLED PRIOR TO EXCAVATION OF THE NEXT BENCH.

MAINLINE
STATION 8+25 TO 10+75, LEFT
STATION 33+75 TO 35+25, RIGHT
STATION 42+25 TO 43+25, RIGHT

11.) IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION OF EMBANKMENT BENCHES, CONSTRUCT A TRENCH UNDERDRAIN IN ACCORDANCE WITH STANDARD DRAWING RDP-006 DETAIL B, EXCEPT THE TRENCH SHALL HAVE A MINIMUM 2 FT. X 2 FT. CROSS-SECTION AND SHALL BE PLACED IN BOTH SOIL OR BEDROCK BENCHES. THE TRENCH BACKFILL SHALL CONSIST OF KENTUCKY COARSE AGGREGATE NO. 2 IN ACCORDANCE WITH SECTION 805 OF THE CURRENT STANDARD SPECIFICATIONS OR OTHER DURABLE, NON-ERODIBLE MATERIAL DEEMED SUITABLE BY THE ENGINEER. THE ROCK TRENCH SHALL BE GRADED TO ALLOW FOR POSITIVE DRAINAGE. THE ROCK TRENCH SHALL BE WRAPPED IN FABRIC GEOTEXTILE CLASS 2 (SUBSURFACE DRAINAGE) IN ACCORDANCE WITH SECTIONS 214 AND 843 OF THE CURRENT STANDARD SPECIFICATIONS. CONTRARY TO STANDARD DRAWING RDP-006, OUTLET UNDERDRAINS (PERPENDICULAR TO THE ROADWAY) SHALL FOLLOW DETAIL B WITH THE SAME BACKFILL AND FABRIC MATERIALS GIVEN ABOVE.

12.) PERFORATED PIPE FOR SUBGRADE DRAINAGE SHALL BE PLACED IN VERTICAL SAGS AND CUT TO FILL TRANSITIONS IN ACCORDANCE WITH KY STANDARD DRAWING RDP-005 AT THE FOLLOWING APPROXIMATE LOCATIONS AND/OR WHERE DESIGNATED BY THE ENGINEER.

MAINLINE
STATION 23+56
STATION 30+89
STATION 35+03
STATION 39+29

13.) IN AREAS WHERE PAVEMENT IS NOT TO BE OVERLAID, EXISTING BITUMINOUS CONCRETE LOCATED AT A DISTANCE LESS THAN THREE FEET BELOW THE PROPOSED SUBGRADE ELEVATION WITHIN THE LIMITS OF NEW ROADWAY EMBANKMENTS, SHALL BE REMOVED ENTIRELY. THIS SHALL BE PERFORMED IN COMPLIANCE WITH SECTION 206 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

14.) AS DIRECTED BY THE ENGINEER, EXISTING BITUMINOUS CONCRETE LOCATED AT A DISTANCE GREATER THAN THREE FEET BELOW THE PROPOSED SUBGRADE ELEVATION WITHIN THE LIMITS OF NEW ROADWAY EMBANKMENTS, SHALL BE SCARIFIED OR BROKEN UNTIL ALL CLEAVAGE PLANES ARE DESTROYED, OR THE PAVEMENT SHALL BE REMOVED ENTIRELY AS CONDITIONS DEMAND. THIS SHALL BE PERFORMED IN COMPLIANCE WITH SECTION 206 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

15.) IN ORDER TO PROVIDE A WORKING PLATFORM FOR EMBANKMENT CONSTRUCTION, NON-ERODIBLE GRANULAR EMBANKMENT IN ACCORDANCE WITH THE CURRENT EDITION OF SECTION 805 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SHALL BE PLACED OVER ALL SOFT AND/OR SATURATED AREAS THAT MAY BE DETECTED DURING CONSTRUCTION, AS DIRECTED BY THE ENGINEER. THE REQUIRED THICKNESS IS ESTIMATED TO BE 2 FOOT, BUT THE ACTUAL LOCATIONS AND THICKNESS SHALL BE DETERMINED BY THE ENGINEER DURING CONSTRUCTION AND MAY DEPEND ON SEASONAL FLUCTUATIONS IN THE WATER TABLE. THIS MATERIAL SHALL BE UNDERLAIN WITH GEOTEXTILE FABRIC CLASS 2 (SEPARATION) IN ACCORDANCE WITH SECTIONS 214 AND 843 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CURRENT EDITION.

16.) CONSTRUCT AN EIGHT (8)-INCH CEMENT STABILIZED SOIL SUBGRADE FOR THE ENTIRE PROJECT. APPLY CEMENT IN ACCORDANCE WITH SECTION 208 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. WHERE SOFT AND/OR WET SUBGRADE IS ENCOUNTERED DURING CONSTRUCTION, THE THICKNESS OF THE STABILIZED LAYER MAY BE INCREASED (UP TO 16 INCHES) TO ALSO SERVE AS A WORKING PLATFORM FOR SUBGRADE STABILIZATION. THESE ADJUSTMENTS SHALL BE AS DIRECTED BY THE ENGINEER AND MAY DEPEND ON SEASONAL FLUCTUATIONS IN THE WATER TABLE.

17.) IN AREAS WHERE CHEMICAL STABILIZATION IS NOT FEASIBLE (SUCH AS CROSS-OVERS, TIE-INS, NARROW PART-WIDTH CONSTRUCTION, ETC.), THE SUBGRADE SHALL BE CONSTRUCTED WITH FIFTEEN (15) INCHES OF KENTUCKY COARSE AGGREGATE NO. 2, NO. 3, OR NO. 23 SIZED STONE WITH GEOTEXTILE FABRIC CLASS 1 (STABILIZATION) PLACED ON TOP AND BOTTOM. THE AGGREGATE SHALL DAYLIGHT HORIZONTALLY TO THE EDGE OF EMBANKMENT IN FILLS AND TO THE DITCHLINE IN CUTS TO ENSURE POSITIVE DRAINAGE. THE ACTUAL LOCATIONS WILL BE DETERMINED BY THE ENGINEER DURING CONSTRUCTION.

18.) WHERE BEDROCK IS ENCOUNTERED AT THE TOP OF SUBGRADE IN THE CUTS, THE ROADBED SHALL BE UNDERCUT TWO (2) FEET BELOW THE PROPOSED GRADE AND THE LIMITS OF THE ROADBED EXCAVATION SHALL BE EXTENDED TO THE DITCHLINES. THE REFILL SHALL CONSIST OF SOIL FOR A CHEMICALLY STABILIZED ROADBED IN ACCORDANCE WITH SECTION 208 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

19.) ALL EMBANKMENT CONSTRUCTION CONSISTING OF NON-DURABLE SHALE WILL BE IN ACCORDANCE WITH SECTION 206 OF THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, "EMBANKMENTS PRINCIPALLY OF NON-DURABLE SHALE" OR "EMBANKMENT OF ROCK/SHALE/SOIL COMBINATION", AS DIRECTED BY THE ENGINEER.

COMMONWEALTH OF KENTUCKY DEPARTMENT OF HIGHWAYS	REVISION	DATE	PREPARED BY Division of Structural Design Geotechnical Services Branch	DATE: DESIGNED BY: DETAILED BY:	CHECKED BY	GEOTECHNICAL NOTES SHEET	ROUTE KY 32	ITEM NO. 09-80051.00 SHEET NO.	COUNTY OF FLEMING/ROWAN DRAWING NUMBER R-005-2023

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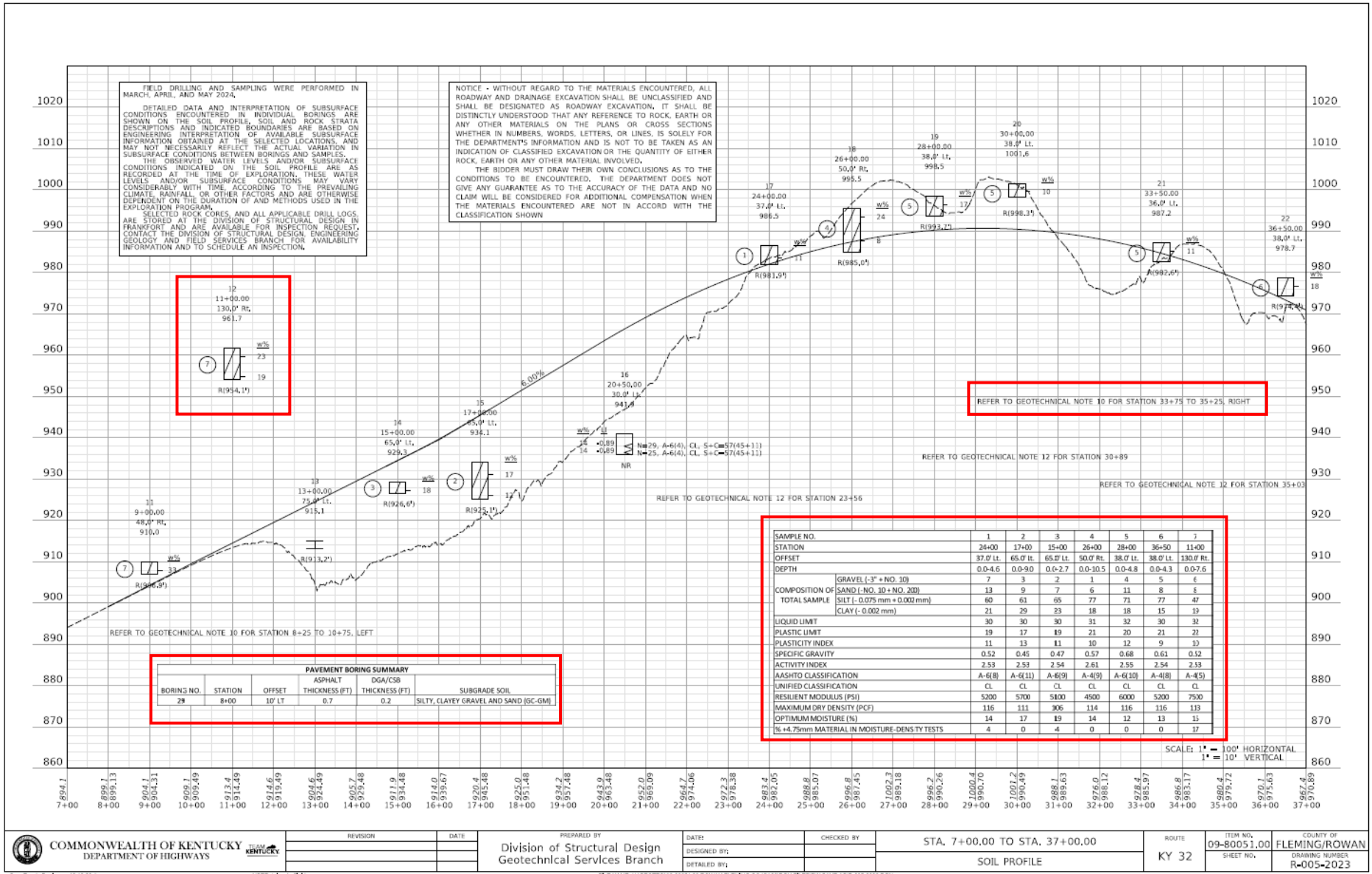
Profile Drilling (Soil Survey)

1. Soil Testing Data
2. Boring Profiles
3. Geotechnical Note Callouts
4. Pavement Boring Data



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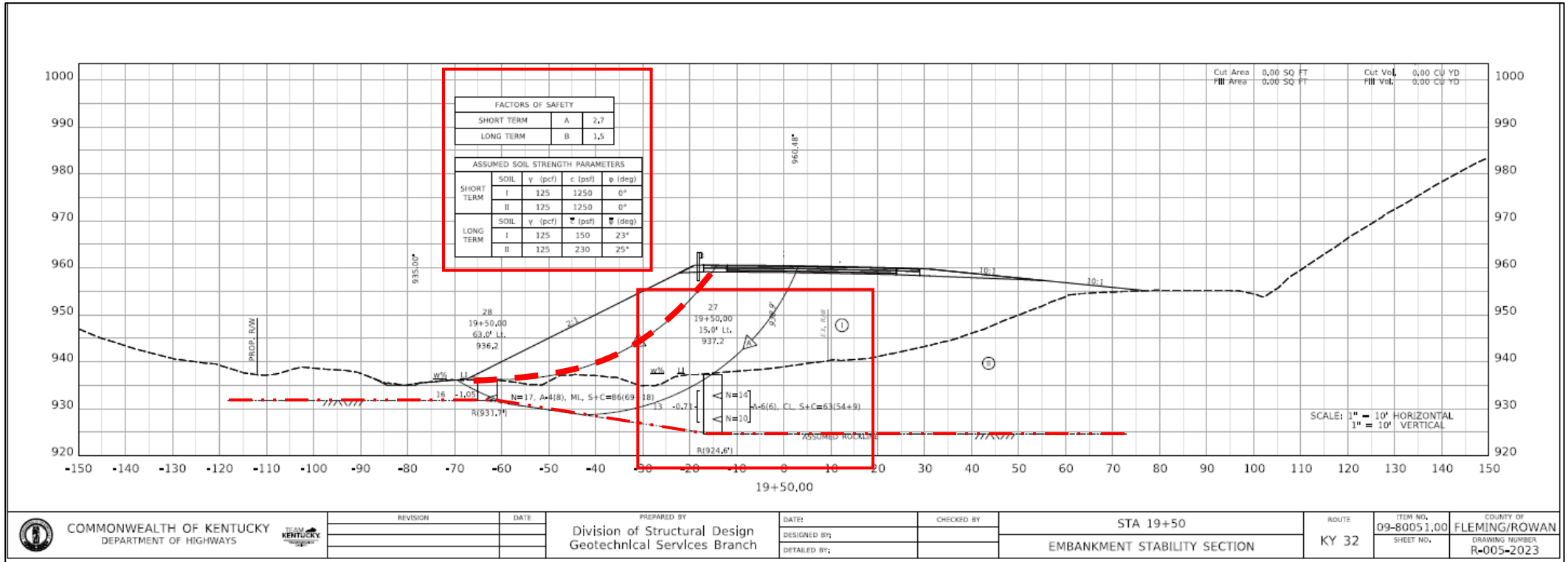
Embankment/Cut Stabilities

1. Assumed Rockline
2. Boring Profiles
3. Soil Parameters and Results



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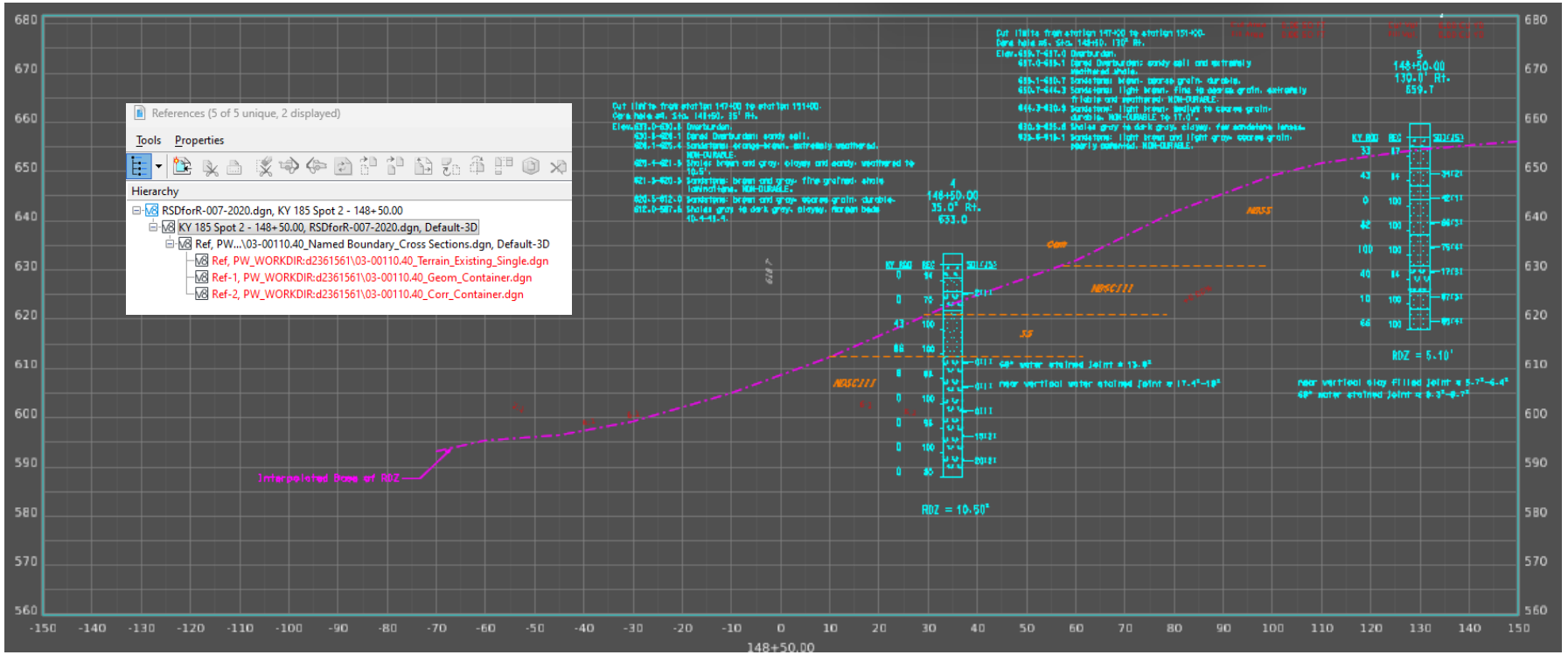
Round Table Topic #2

- **Deliverables from Geotech to Designers**
  - PDF report
  - DGN with Missing References. Currently In Version 10.12.02.04 of ORD?
  - Why Missing References?
    - You will need to relink the references



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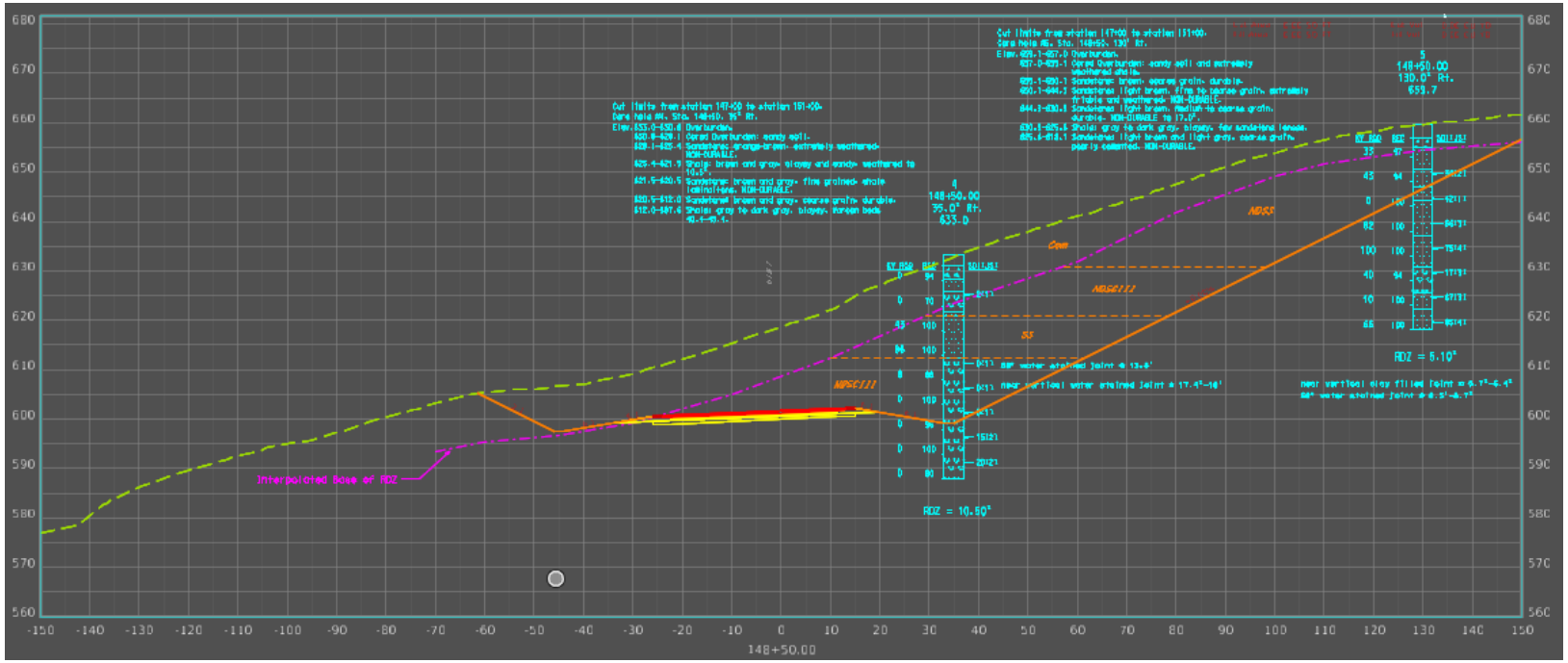
Round Table Topic #2

- **Deliverables from Geotech to Designers**

  Where is this info located?

  - Drawing Model for Cross Sections **Created by Geotech**
  - Design Model for Profiles **Created by Geotech**
  - 2d Graphics for now : RSDforR-XXX-YEAR.DGN, R-XXX-YEAR.DGN



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Round Table Topic #2

- **Deliverables from Geotech to Designers**

Questions ?

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Round Table Topic #3

3D Geotechnical Modeling as a Deliverable

Challenges:

- The presence of modeled features can create an illusion of certainty.
- The resolution of gathered field data is significantly lower than LiDAR, requiring the model to incorporate many assumptions.
- Modeling may inadvertently blur the distinction between geotechnical project managers and design engineers. (These roles are distinct and complex; future applications must maintain this separation.)
- We must develop a strategy for integrating geotechnical models into the overall design model.
- **Accurate 3D modeling could increase cost, time, and scope of Geotech and field work**

Promises:

- Easy visualization of geotechnical findings.
- Complex ideas and geometries can be conveyed rapidly.
- Models can be transformed to process design changes or new information.
- Simplified and automated analysis of quantities offers many advantages.
- Evolving technology will make model development increasingly easy and automated.

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Round Table Topic #3

3D Geotechnical Modeling as a Deliverable

Future 3D modeling Capabilities and Limitations.

3D Models/3D Elements

Possible Capabilities:

- 3d Surfaces RDZ/Rock
- 3d Bore Holes / Graphics
- Automatic Display of Cores in Profile and Cross Sections

Potential Limitations:

- Accuracy of Surfaces
- Data transfer limitations
- Liability during Construction
- Field Investigation costs to Improve Resolution of Data

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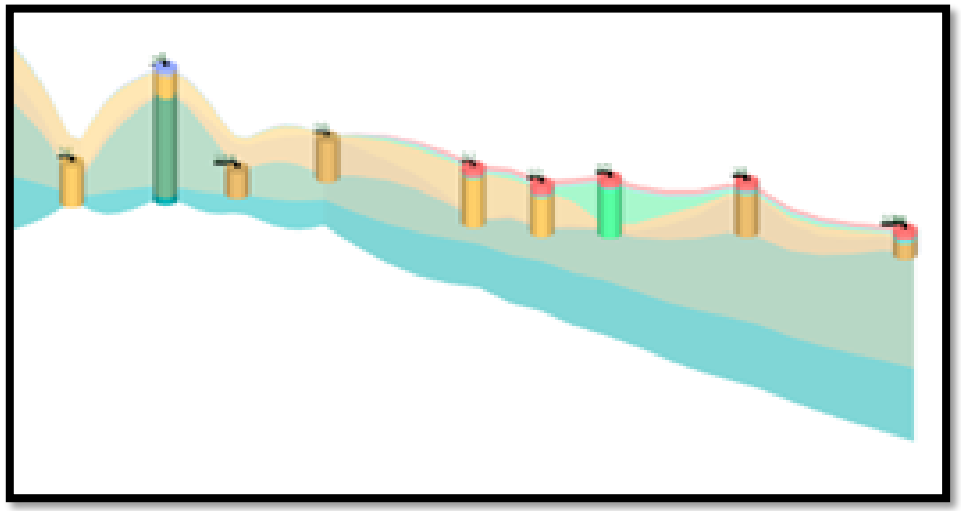
Round Table Topic #3

3D Geotechnical Modeling as a Deliverable

- Future 3D modeling capabilities and limitations.
- gINT Replacement options.



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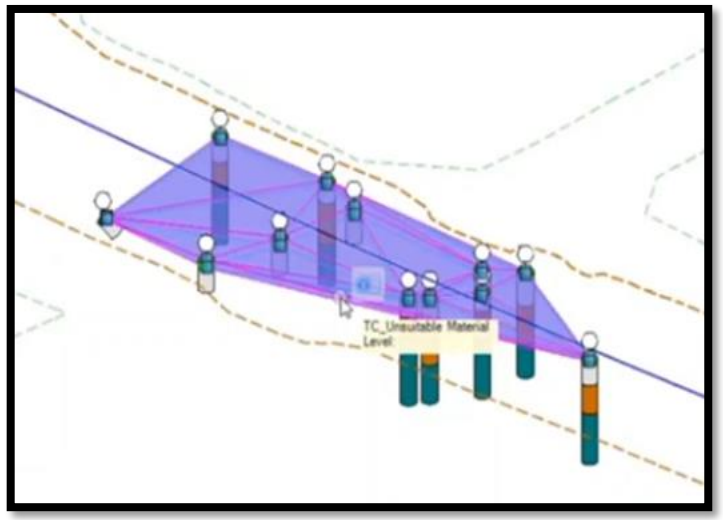

OpenGround

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Round Table Topic #3

3D Geotechnical Modeling as a Deliverable

Future 3D modeling capabilities and limitations.

Questions ?

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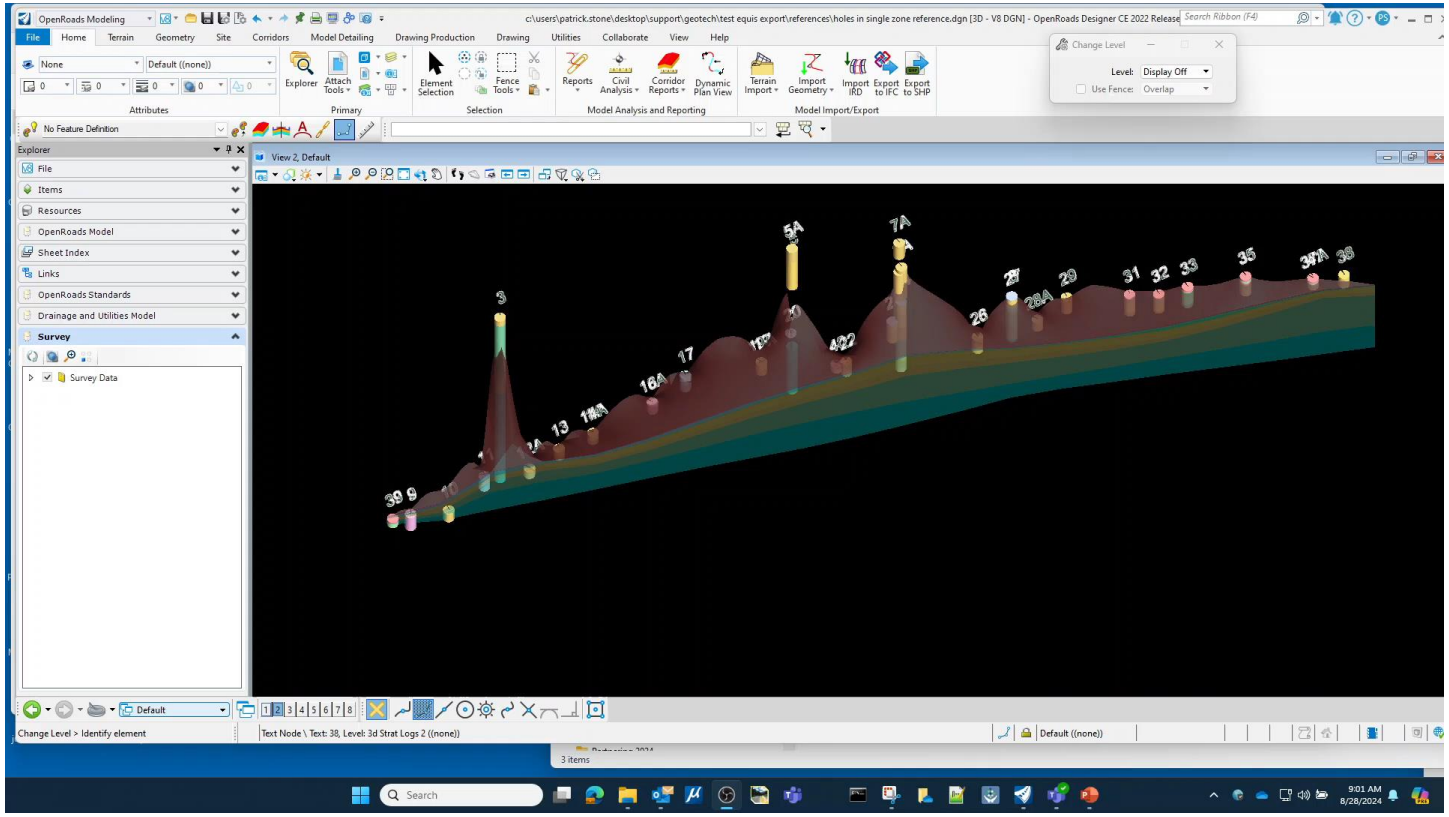
Plan Submittals and Communication with KYTC Geotech

9:00 am – 9:40 am-Code



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