KYTC gINT
Guidance Manual

KENTUCKY
TRANSPORTATION
CABINET

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Introduction

The gINT system is a product from Bentley for centralized data management and reporting for geotechnical subsurface projects. The software has been customized for the Geotechnical Branch of the Kentucky Transportation Cabinet (KYTC), with involvement from Kentucky Geological Survey (KGS), to allow the entry of drill hole, sample, and lab testing data collected in the course of geotechnical projects. The system has been set up to permit project managers, drillers, geologists, and lab personnel to enter data that they are responsible for. Once data entry for a project is complete and has been verified, a variety of hard copy or electronic reports can be printed that summarize the entered data. This document is a guide to proper input of information for the KYTC Geotechnical Branch's specific gINT system.

General Guidelines

Initial Startup. When you first start the software, it displays a Web page from www.gintsoftware.com. To begin using the software, you will either open an existing project database from the File menu or create a new empty database using the KYTC template (new blank gINT files are only generated by the KYTC Geotechnical office). Alternatively, you can get started by clicking the INPUT tab and selecting an existing project, or clicking the OUTPUT tab for generating reports of previously entered data.

Main Types of gINT Files. The two main gINT files that are need for proper input of information is the Project Database file (.gpj) and the current KYTC Library file (.glb). The Project Database file holds the project specific information in a relational database format. The Library file supplies a set of report forms, symbol sets, data entry lookup lists, user functions, and other objects specific for KYTC. A third file used for creation of blank Database files by KYTC is the Data Template file (.gdt).

Project Naming Convention. The convention for project naming is a letters for what type of project, dash, number of type of project for that year, dash, year of project record created. The most common project types are C (Construction), L (Landslide), M (Miscellaneous), P (Planning), S (Structure), R (Roadway). If an "A" is added to the project type it denotes an addendum. For example, if a project name is R-030-2016 then the gINT files is the thirtieth roadway project created for 2016.

User Permissions. Data entry groups and individual tables have been designed to provide edit access to staff according to their responsibilities. These user groups are Administrators, Drillers, Geologists, Soil Lab, and Rock Lab personnel. User identity is determined by your login name on the workstation. Each tab in the program consults a system database to determine whether the user has permission to edit. Only the system administrators can add or modify permissions for users. This is done by editing the library table **GR009 PERSONNEL** under the **DATA DESIGN** / **LIBRARY DATA** tab. To add a new user, enter the user's network login name and choose the Department from the pull down menu.

Data Input. In the INPUT application, entry forms are grouped under tabs according to who is responsible for the data, and individual forms are presented in the order in which data should be added. The best practice is to move from *left to right* with entering data into gINT since creation of information in one tab can be dependent on information entered in previous tabs. Columns on entry forms may be colored to indicate specific entry rules or conditions. Yellow columns are required fields – you can't save the record until that data is provided. Gray columns are calculated fields and do not allow data entry by users. Blue columns typically store values calculated from other fields, but allow for manual entry if the raw data do not exist. White columns are for manual data entry only. All fields that allow data entry are either free text entry or a pull down menu. When you click in a field, an arrow will appear on the right side of the column if a menu is available. If you need to enter a value that is not on the list, you can enter it manually then hit the <Enter> key.

Help Messages. There are two levels of help built into the data entry forms. General information about the Tab (or database table) can be found by clicking the Table Help button on the right side of the form's bounding box. Information specific to a particular field is displayed at the bottom of the screen when you click any item in that column. Both locations are shown in Figure 1.
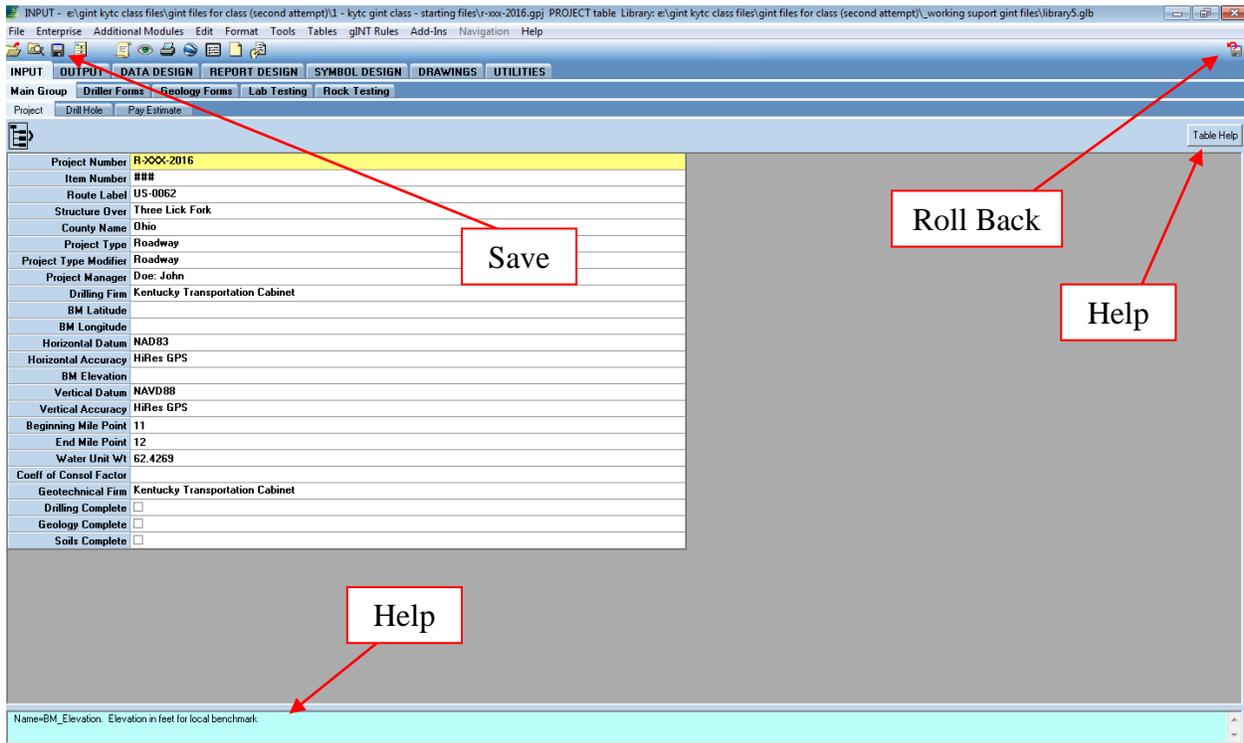

Figure 1. Help Message and Save Button Locations

Saving Your Work. The save button is the third icon from the left on the tool bar (looks like a floppy disk – if you remember those). When any data value has changed for the active tab, this icon will appear dark signifying that data is not saved. You can save your work at any time by clicking the save icon. Also, if you select another entry Tab, all changes will automatically be saved for you. Internal calculations are done as part of the save function (or in some cases, after save), so you may not see these values on the form until data is saved. There may be instances when saving generates a programming error or exception. If this happens, you may not be able to leave the Tab you are working in at the time. If this occurs, click the "Roll Back" tool located at the far right side of the toolbar which will return the data to the previous saved version. Both are shown in Figure 1.

gINT Project Setup

Creating a new project. (applicable to KYTC Geotechnical Branch only) The process of creating a new project involves extracting project data from the KYTC project management system, opening an empty project file in gINT using the KYTC template, then importing the data into gINT.

Step 1. Start the KYTC project management system
(http://kgs.uky.edu/kgsweb/KYTC/project_index.asp), and log in as GT Administrator with password Admin312.
- Select "Search/Edit Projects…"
- Enter criteria that will list the project(s) that you wish to set up in gINT
- On the search result page, click the "Export CSV File" link on the desired project line. Save all files to a common folder called ProjectImport (recommended, not required)
- Repeat similar downloads for all desired projects
- Note: the filenames will automatically be named "geotechproject_id".csv (e.g. R-001-2007.csv). Be careful not to save this file in a location where it may overwrite a similarly named file used for another purpose.

Step 2. Start gINT and create a new, empty gINT project, assigning the name of the Geotech project
- File > New Project > Clone Data Template
- Select "kytc#.gdt" as the template, then click OPEN (where # is the current library version)
- Enter the project id as the file name prefix, then click SAVE

Step 3. When the new project loads, the Input > Main Group > Project tab will be active (if not, make it so). You will see five fields with default data – all others should be blank.
- Select File > Import/Export > Import From Text File
- For Text File, click the load button (three dots) and navigate to the folder where you saved the project csv file
- Leave Correspondence blank
- Set Overwrite Options to "Named Fields"
- Click OK
- You should get a dialog window with a message "1 record imported" – click OK

Horizontal and Vertical Accuracy Fields

The default Horizontal Accuracy is assigned the value <1 (hi-resolution GPS) and is assumed to be NAD83 datum. This can be changed to a lower accuracy if another method was uniformly used for determining hole coordinates. These values will be assigned to similar fields in the Drill Hole tab for each hole. Following are the common methods and their assumed accuracy in feet:

Hi-resolution GPS	< 1
Tape	1-15
Hand-held GPS	15 – 30

Topo map   > 30

The default Vertical Accuracy is assigned the value <0.5 (hi-resolution GPS) and is assumed to be NAVD88 datum. If another method was used to determine hole elevations, select an accuracy value consistent with that method. Following are the common methods and their assumed accuracy in feet:

Hi-resolution GPS   < 0.5
Transit   0.5
Handlevel   1-4
Topo map   > 4

If a local benchmark was used for elevation, enter the benchmark coordinates in the BM Latitude and BM Longitude fields and set the Vertical Datum to "Assumed".

Importing Holes into a New Project. You can also import data from a coordinate data file into the Drill Hole tab so that the hole locations don't have to be manually entered.

Step 1. Verify you have the correspondence (translation) file (coordinate.gci).

Step 2. Import the hole locations from a coordinate file
- Open the coordinate file in notepad, and insert the text, **Point, on the line above the header line
- Make sure the header field names match the example below

ID,Latitude,Longitude,Hole, Elevation(ft),Station,Offset

- Save the text file
- Activate the Main Group > Drill Hole tab
- Select File > Import/Export > Import From Text File
- For Text File, click the load button (three dots) and navigate to the folder where you saved the coordinate file
- For Correspondence File select Coordinate.gci
- Set Overwrite Options to "Empty Fields"
- Click OK
- You should get a dialog window with a message "# records imported" – click OK

Station footages are converted to numeric format (without the +) in the gINT database. That's done to allow sorting of holes by station number—they will be reformatted with the + at report time. Check the offset footages after import to make sure they translated properly from text format to numeric (positive right, negative left).

Important! The initial Hole Depth value in the **Drill Hole** tab is incorrect because it is not included in the coordinate data file. Because it is required by gINT, a temporary value (999) must be assigned during import. Make sure that the actual hole depths are added prior to entering any driller or geologist hole data, otherwise the depth checks will generate error messages. Also, enter any additional header data for each hole before proceeding with the other tabs.

General Drilling Information

Drill Hole Table

The overall information for drilling is entered into the **Drill Hole** tab. This table contains information about the holes drilled. The specifies for each field in the **Drill Hole** tab is discussed below, going from right to left.

Hole Number As Staked. (required field) This values is the number given to the hole from the coordinate data submission form or value assigned to any additional holes drilled. This value needs to be unique for each project.

Hole Complete. Check this box when all subsurface data for the hole has been entered and verified. This will prevent any data modifications for that hole

Station Footage (ft). Station, in feet, for specific hole without "+". The "+" will be added at report time.

Offset (ft). Offset from alignment for specific hole in feet with offset to the right having a positive value and offset to left having a negative value.

Hole Moved. If the drilled hole location differs from that given in the coordinate data submission form (as imported), then check this box and enter the correct station/offset footage. If you have new coordinate values for this location you can enter them, otherwise, when you save you will be prompted to choose whether you want to delete the original coordinates (as a reminder to replace them) or keep them and reduce the accuracy of the hole location. If boring hole locations are moved more than 5 feet then it is standard practice that the location should be resurveyed. If for some reason resurveying is not completed, the accuracy of the hole should be reduced. For example, if the hole was moved ten feet, but not re-surveyed, you should change the horizontal accuracy to "Tape". Note: Leave this boxed check, even if the new coordinates are entered, to preserve that information.

Total Hole Depth (ft). (required field) The total depth of the hole drilled in feet. If hole information was imported then the default value of "999" should be replaced with the actual value.

Surface Elevations (ft). The surveyed elevation of the top of the drilled hole. If hole is moved then new elevation should be recorded with the appropriate level of accuracy recorded in the **Vertical Accuracy** field.

Latitude83. The latitude value for the specific hole from surveying.

Longitude83. The longitude value for the specific hole from surveying.

SZ_Northing. This value is the Kentucky Single Zone Northing value in feet. This value is calculated from the **Latitude83** and **Longitude83** upon save of the table.

SZ_Easting. This value is the Kentucky Single Zone Easting value in feet. This value is calculated from the **Latitude83** and **Longitude83** upon save of the table.

Hole Angle. The value should be -90 for vertical holes, and 0 for horizontal holes.

Drilling Dates (Start Date and End Date). If the hole was completed on the same day it started, then you only need to enter the **Start Date**. If the **End Date** is blank, the program will assign the value of the start date.

Hole Type. This field is used to document the type of boring hole. This field will trigger certain functions and calculation in other tabs. Select core hole when entering an open face log. In this application, bag samples must be associated with profile holes.

Observation Well. Check if observation well was installed in drill hole.

Hammer_Method. Select Hammer Method from dropdown menu or insert nonstandard value with <ENTER>

Rig Number. Select KYTC rig number from dropdown menu or insert value with <ENTER>.

Refusal. It is only necessary to check this box for profile, sample, and sounding holes if it applies – core holes are checked automatically by the program. Likewise, only enter **Refusal Depth** and **Lithology** for non-core holes.

Refusal Depth (ft). Depth, in feet, to refusal for profile, sample, and sounding holes. Refusal is defined in section GT-302-1 in the KYTC Geotechnical Manual.

Refusal Lithology. The type of material refusal was reached on.

Boulders. Check if boulders where encountered during drilling of hole.

Driller Name. Pick name of driller from drop down menu. If driller name is not present add driller name under **Data Design**/**Library Data** under **DRILLERS** (Shown in Figure 2).
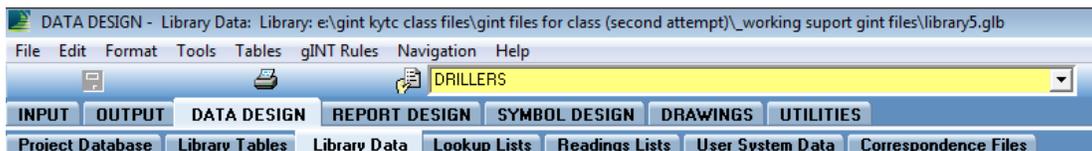
Figure 2. Drillers Name List Location

Driller Comments. This is a free form text field. *Important:* Any Information entered here about the hole will appear at the bottom of the driller's log report. This field should include any information specific on if the hole was moved and reason for moving and any hole that is not drilled or deleted and the reason as specified in GT-303-1 in the KYTC Geotechnical Manual. Additionally, this field should include Profile Remarks for profile borings to describe points of interest (such as locations and magnitudes of sinkholes, ponds, creeks, wet areas, springs, wells, talus deposits, existing landslides, limits of wooded areas, crop intervals, etc.) with the point of interest station, feature description, and offset direction from centerline.

> Note: Specific driller comments associated with depth information in a specific borehole should not be included in this field, instead should be included in table **Drillers Remarks** under the **Driller Forms** tab.

Slope Indicator. Check if inclinometer was installed.

Consecutive Samples. Check if continuous samples were obtained.

Original Hole Location Information (Original Latitude, Original Longitude, Orig Elevation). (cannot be entered) If **Hole Moved** is check original values are saved in these fields.

Hole Accuracy (Vertical Datum, Vertical Accuracy, Horizontal_Datum, Horizontal Accuracy). Values are populated when coordinate data submission form is import but should be changed if hole is moved and not resurveyed.

GintPointSort. Can be used to sort holes since field **Hole Number As Staked** is numeric and may not go in order.

Station Sort. Can be used to sort holes since stations may not be in order.

Pay Estimate Table

The pay estimate tab contains calculations that summarize drilling and sampling footages for preparation of cost estimates. No data entry is necessary unless information about dozer time, grouting, or reclamation is required. All tabs in the **Driller Forms** group must be completed before the **Pay Estimate** data is used. To transfer these data to Excel for further calculations, select File > Import/Export > Export to Excel.

Hole Number As	Rock Coring (ft)	Rock Sounding (ft)	Soil Boring (ft)	Bag Samples	SPT Intervals	Vane Tests	ST Intervals	Observation Well	Inclinometer Casing (ft)	Moisture Samples	Dozer Time (hr)	6in Auger Grout (ft)	4in Auger Grout (ft)	Rock Core Grout (ft)	Reclamation
1			12.0	1						3					
2			7.0							2					
3			7.0	1						2					
4			13.0	1						3					
5			10.0	1						2					
6															
7															
*															

Figure 3. Pay Estimate Table

Driller Forms

Important: When inputting information in the Driller's Form tab make sure that the information being input is for the correct hole. The hole that is currently set for inputting is indicated at the top middle of the screen in a yellow dropdown menu, as shown in Figure 4.
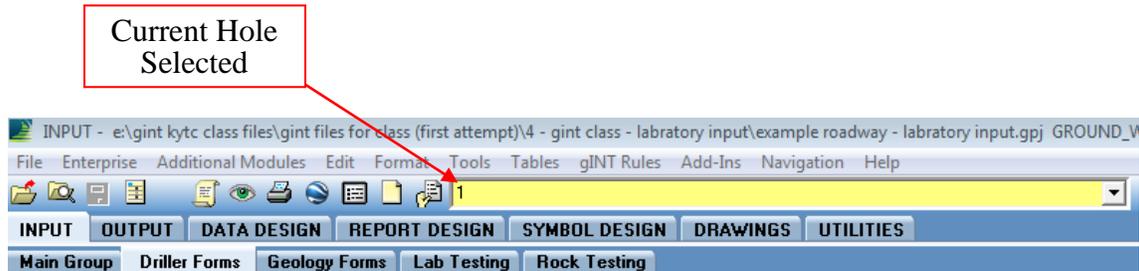
Figure 4. Hole Selection Dropdown

Ground Water Table

Enter one or more water level readings. For each date, enter the water depth in the hole (in feet) and whether it is an immediate or static reading. If more than one static reading is taken, the most recent is used on log reports. If the hole is dry, check the **Dry** field and leave the **Water Depth** blank. Holes with groundwater readings should have the **Observation Well** box checked in the **Drill Hole** table.

Figure 5. Ground Water Table Example

Core Runs Table

Enter the **Top Depth** of each core run and assign it a **Run Number**. Runs must be consecutive footage intervals (i.e., no missing intervals). If gaps in coring occur, enter the interval footages and add a comment explaining the circumstances (e.g., mine void or cave). **Bottom Depth** will be calculated automatically when the record is saved. Enter the length of

recovered core from the run so that recovery percent can be calculated. There is a field for both the driller's and geologist's interpretation of this value. The driller's will be imputing **Driller Recovered Length** (ft) and the **Standard RQD Length** (ft). The geologist will be entering in the **Geologist Recovered Length** (ft) and the **KY RQD Length** (ft).

Figure 6. Core Runs Table Example

Driller Soil Description Table

Enter the top depth of each soil unit. All intervals must have consecutive footage. **Bottom Depths** will be calculated in this order of precedence: 1) all lines except the last one are assigned the top depth of the next line, 2) if the hole involved coring, the bottom depth of the last line is set as the top depth of the first core run, 3) otherwise, the last depth is set as the bottom of the hole. Make sure to check this calculation and correct if necessary. Enter descriptive terms using the pull down menus for each field. Alternatively, enter a descriptive phrase in the **Driller Soil Comments** field.

Figure 7. Driller Soil Description Table Example

Driller Rock Description Table

For core holes, enter the **Top Depth** of each rock lithology layer. All intervals must be consecutive. **Bottom Depths** will be automatically calculated. Enter descriptive terms using the pull down menus for each field. Alternatively, enter a descriptive phrase in the **Comment** field.

INPUT | OUTPUT | DATA DESIGN | REPORT DESIGN | SYMBOL DESIGN | DRAWINGS | UTILITIES

Main Group | Driller Forms | Geology Forms | Lab Testing | Rock Testing

Ground Water | Core Runs | Driller Soil Description | Driller Rock Description | Soil Samples | Profile Holes | Jar Samples | F

[Driller Forms group]

	Top Depth (ft)	Bottom Depth (ft)	Color1	Color Conjunction	Color2	Rock Type Modifier	Rock Type	Comment	Graphic
	0	10.4	light gray				limestone	water stain	
	10.4	15.4	brown			fresh	shale with		
	15.4	20.4				fossiliferous	limestone	clay-filled	
	20.4	40.4	light gray			fresh	limestone		
	40.4	45.4	light gray	and	green	fresh	limestone		
	45.4	50.4	light gray			fresh	limestone		
	50.4	58.4	light gray			fresh	limestone		
*									

Figure 8. Driller Rock Description Table Example

Soil Samples Table

This table records sampled soil intervals in the hole. Because intervals are not consecutive, you must enter both the top and bottom depth of each interval. Enter the full depth penetrated for each sample interval even if all of the material was not recovered. Specify a unique sample number, the sampling method, and the thickness of recovered material. For SPT intervals, enter the number of blows for each six-inch increment. The **Blowcounts** field is calculated from values input and the format is specified in GT-302-5 in the KYTC Geotechnical Manual. (If entering blow counts for an old project, the final N Value can be entered manually in **N-Value** field).

INPUT | OUTPUT | DATA DESIGN | REPORT DESIGN | SYMBOL DESIGN | DRAWINGS | UTILITIES

Main Group | Driller Forms | Geology Forms | Lab Testing | Rock Testing

Ground Water | Core Runs | Driller Soil Description | Driller Rock Description | Soil Samples | Profile Holes | Jar Samples | Profile Remarks

[Driller Forms group]

	Top Depth (ft)	Bottom Depth (ft)	Sample Number	Sample Method	Recovered Thickness	Recovery Percent	SPT N1	SPT N2	SPT N3	Blowcounts	N-Value	Sample Comments
	3	4.4	ST-1	ST	1.4	100						
	5	5.6	SS-1	SPT			35	50		35-50/0.10'	50/0.10'	
*												

Figure 9. Soil Sample Table Example

Profile Holes Table

Soil profile holes are the most complex kind of hole to enter, because of the way jar and bag samples can be taken. To add a profile hole, enter the top depth of each soil horizon and its bag (soil) number. If a bag sample was taken from the interval, check the "sampled" box and enter the bag number. If an interval was not sampled, enter the bag number from a previous hole with the same soil type, but don't check the "sampled" box.

Figure 10. Profile Holes Table Example

Jar Samples Table

Enter the depth and jar number for each jar sample taken in a profile hole. Profile intervals must already have been entered so that the program can determine which soil (and bag) interval each jar was taken from. There must be at least one jar for each bag taken.

Figure 11. Jar Sample Table Example

Driller's Remarks

Enter in a remark that will display in the Remarks section on the right hand side of the Driller's Subsurface Log. These comments need to include a depth value that the comment is relevant and will display at that depth. Include any information that involves samples, cores, or areas that loss of water was noted.

Figure 12. Driller's Remarks Table Example

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Geology Forms

These table include all the data that geologist need to input to create geologist logs. It is best practice to work from left to right in the geology forms tables. <mark>Important</mark>: Two fields that needs to be entered by the geologist not in the geology forms is the **Geologist Recovered Length** and **KY RQD Length** located in the Drillers Forms, **Core Runs** table.

Geologist Lithology Table

Enter the top depth of each rock lithology. Choose the primary lithology from the pull down menu (required), ad enter the complete description in the field provided. The comments field is for parenthetical comments that will be appended to the description paragraph.

	Top Depth (ft)	Bottom Depth (ft)	Primary Lithology	Description	Comments	Graphic
	0	15.4	Limestone	Light Gray, Fine Crystalline, Laminated, Many Weathered Shale Partings to		
	15.4	19.7	VOID			
	19.7	35.2	Limestone (ND)	Dark Gray, Fine Grained and Crystalline, Highly Argillaceous, Many Shale		
	35.2	43.9	Shale	Gray, Calcareous, w/Fine Grained Limestone Zones		
	43.9	58.4	Limestone	Gray, Fine Crystalline, Laminated, Argillaceous Zones		
*						

Figure 13. Geologist Lithology Table Example

Core Hole Geology Table

This table records measurements and assessments made by the geologist for core holes. Select the correct hole number, then input the data that applies to the hole. This table will contain entries of **Depth to Bedrock** for sounding and sample holes. The depth to bedrock is copied from the **Drill Hole** table for sounding holes, therefore no entry is required. Additionally, samples that have core are pulled into the table during data entry of hole type, but **Depth to Bedrock** will need to be input for any sample hole that has core. **Base Weathered Rock** is the interpreted base of bearing rock and is only for structure projects. **RDZ Depth** is used for roadway projects and is defined in section GT-303-1 in the KYTC geotechnical manual as material deemed "rippable" with a D-9 dozer.

Upper Geologic Unit represents the GQ formation or member at the surface where the hole is drilled. The **Lower Geologic Unit** is optional, and records the lowest unit encountered in the hole, if different from the upper unit. Enter any depth measures that apply.

Figure 14. Core Hole Geology Table Example

Hole Remarks Table

This area is for comments that need to be added to geologist logs reports. Enter the **Top Depth** and optionally the **Bottom Depth** that the remarks applies to. Do not enter the depths as part of the remark, they will be added from the database at report time.

Figure 15. Hole Remarks Table Example

ABC Table

One or more values for allowable bearing capacity (tons per square feet) can be entered by depth in the hole. The values are assumed to be applicable from depth specified downward until another allowable bearing capacity value is giving.

Figure 16. ABC Table Example

Lab (Soils) Testing

These tables record information about soil samples taken and results of any laboratory tests. It is best practice to enter raw lab testing data, but final results can be entered as well. The soil specimen tab must be completed first, because values in these fields trigger the creation of necessary record in results tables. It is also best practice to procced from tabs left to right with data entry so that proper record can be generated in the more left tables.

Soil Specimen Table

This is the most important table to setup correctly for lab testing. Upon saving of the table records can be created in the **Sieve**, **Soil Classification**, **Proctor**, **CBR**, **QU**, **UU**, **CU**, and **KY Consolidation** tables based on the information input for the sample.

Top depth of soil samples, information about the sample and kinds of tests that are to be preformed are recorded in this table. Presuming an entry was added in **Driller Forms**/**Soil Samples** for the sample, a record should already exist for the depth with the **Sample Type** and **Sample Number**. There should also be jar samples added for jars entered in the **Drillers Forms** tab. Check the **No Specimen** box if there was insufficient material recovered.

Enter in **Penetrometer** for tests done on samples extracted from Shelby tubes and leave blank for other types of samples. The **Number Specimens** field refers to the number of samples that were created from a Shelby tube, not the number of tests conducted. Additionally, if a complete wax sample could not be created, select the pan option in the pull down menu.

For **Specimen # Test** fields input the type of test done for a single specimen. Include entry into one of the three **Specimen # Test** fields (going from left to right) for every sample that was tested from that specimen. For example, if three samples were made from a single Shelby tube and two Unconsolidated Undained Trixial (UU) test were conducted on two of the three samples it should be recorded as shown in Figure 16. When data is entered into the specimen test field appropriate sample information is created in the associated testing tables.

Figure 17. Soil Specimen Table UU Example

If Consolidated Drained Triaxial (CU) test are conducted an associated **Specimen Triaxial Set** needs to be entered. The **Specimen Triaxial Set** is a letter that groups together all of the samples that were tested for that CU test set. CU test sets should start at A and procced alphabetically. For example, if three samples where tested for a CU test labeled A with two

samples coming from the same Shelby tube then data entry should like what is presented in Figure 17.

Two Samples Tested That Are Part of CU Set A from the Same Shelby Tube

Depth	<= Penetrometer	Description	Proctor	Sieve	Number Specimens	Specimen 1 Test	Specimen1 Triaxial Set	Specimen 2 Test	Specimen 2 Triaxial Set	Specimen 3 Test	Specimen 3 Triaxial Set	Notes
3	5	Tan & gray	☐	No Gravel	pan							
5	5	Beige & black	☐	No Gravel	2	CU	A	CU	A			
10	2.75	Beige & gray	☐	With Gravel	1	CU	A					
15	2.75	Beige & yellowish orange	☐	No Gravel	pan							
15.7			☐	With Gravel								

Figure 18. Soil Specimen Table CU Example

Selected the type of sieve analysis conducted in the **Sieve** field dropdown menu. This selection is important since other lab tables are effected by the selection of type of sieve conducted.

Natural Moisture Table

Raw weights in grams can be entered so that moisture percent values will be calculated. Note: If one or more jar samples are taken for an interval in a profile hole, the program determines which bag number the jars apply to and adds a natural moisture record for the bag using the average moisture of jar samples. There should be at least one moisture sample per bag.

	Depth	Sample Type	Natural Moisture (%)	Number Tests	Can #	Wet Wt. +Tare (g)	Dry Wt. +Tare (g)	Tare Wt. (g)
	5	ST	24.66	1	4	60.1	54.7	32.8
	10	ST	24.15	1	1	81.8	74.7	45.3
	12	SPT	23.18	1	2	64.1	60.6	45.5
	15	SPT	23.18	1	2	64.1	60.6	45.5
	20	SPT	10.86	1	22	79.2	75.9	45.5
*								

Figure 19. Natural Moisture Table Example

Atterburg Table

Enter raw weights in the lower form for each Atterberg test performed. Can have as many Liquid and Plastic limits readings as desired. The program distinguishes between the two types by the blows/cone penetration fields. If these have values, then the reading is taken as a Liquid Limit reading, otherwise it is assumed to be a Plastic Limit reading. You can use the Casagrande

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rotating cup method of Liquid Limit determination by filling in values for the blows field. Use the cone penetrometer method by filling in those fields

Casagrande Method Liquid Limit Calculations:

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If only one reading exists, the ASTM D4318 one point method is used. If two readings, two one-point method calculations are averaged. If three or more, a best fit line through a graph of logarithm of blows vs. arithmetic water contents is used and the Liquid Limit is defined as the water content at 25 blows on this best fit line.

Cone Penetrometer Liquid Limit Calculation:

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You must have a minimum of three readings. A best fit line through a graph of arithmetic penetration vs. arithmetic water contents is used and the Liquid Limit is defined as the water content at 20mm on this best fit line.

Plastic Limit Calculation:

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Only one reading is required. The average of all the Plastic Limit readings is used as the final Plastic Limit value.

Figure 20. Upper Atterberg Table Example

Wet Soil + Can (g)	Dry Soil + Can (g)	Can Wt. (g)	Number of Blows	Moisture Content (%)	Cone Pen Initial (mm)	Cone Pen Final (mm)
29.9	26.72	20.97	26	55.30435		
22.83	21.34	15.59		25.91304		

Figure 21. Lower (Raw Values) Atterburg Table Example

Sieve Table

This table is used for raw sieve weight input. The information entered into the **Soil Specimen** table, **Sieve** field directly effects what is setup in this table when the **Soil Specimen** table is saved. The program supports splitting the test specimen. This is commonly done when the soil has a large gravel fraction. The specimen is split into coarse and fine fractions. The entire coarse fraction, and a portion of the fine fraction, are sieved.

With unsplit specimens the weight passing the split sieve and the fine weight tested are not used and the fields relating to "Coarse" are used and the "Fine" fields are ignored. If the specimen weight represented a wet condition, you must supply a "Coarse" water content. However, unsplit specimens are assumed to be sieved dry so the Coarse_Sieved_Wet field is ignored. Finally, supply the weight of the Coarse sieving tare. This can be 0.

With split specimens the **Wt Passing Split Sieve**, the **Wt Fines Tested**, and the **Split Sieve Size** in mm must be supplied. If the soil was weighed wet, the water contents for coarse and fine fractions must be supplied. If the coarse fraction was sieved wet, check the **Coarse Sieved Wet** box. The fine fraction is assumed to be sieved dry. Finally, supply the weight of the Coarse and Fine sieving tares. They can be 0.

Depth	Sample type	Wt Total Spec (g)	Wt Passing Split Sieve (g)	Wt Fines Tested (g)	Size Split Sieve (mm)	Weighing Method	Wt Sieving Tare Coarse (g)	Wt Sieving Tare Fine (g)	Water Content Coarse Wet Wt+Tare (g)	Water Content Coarse Dry Wt+Tare (g)	Water Content Coarse Wt Tare (g)	Water Content Coarse (%)
3	ST	1	1	50.09	2	I	0	0	1	1	0	0
5	ST	1	1	50.03	2	I	0	0	1	1	0	0
10	ST	520	427.29	50.04	2	I	0	0	1	1	0	0
15	ST	1	1	50	2	I	0	0	1	1	0	0
15.7	SPT	225.11	169.566	30.35	2	I	0	0	1	1	0	0

Figure 22. Sieve Table Example (Left Side of Table)

Water Content Fine Wet Wt+Tare (g)	Water Content Fine Dry Wt+Tare (g)	Water Content Fine Wt Tare (g)	Water Content Fine (%)	Coarse Sieved Wet
68.43	67.38	38.43	3.626943	✔
68.57	67.44	38.58	3.915454	✔
68.67	68.28	38.68	1.317568	✔
68.84	68.17	38.85	2.28513	✔
60.08	59.85	38.34	1.06927	✔

Figure 23. Sieve Table Example (Right Side of Table)

Table 1. Guideline for Entering Weights of Different Sieve Types

	Wt. Total Spec.	Wt Fines Tested	Size Split Sieve	WC Coarse Wet	WC Coarse Dry	WC Fine Wet	WC Fine Dry	Coarse Sieved Wet
With Gravel	actual	actual	2	1	1	actual	actual	
No Gravel	1	actual	2	1	1	actual	actual	
Wash Grad	actual	-	-	1	1	1	1	No

Figure 24. Lower (Raw Data) Sieve Table Example

SG (20c) Table

This table is only for entering raw specific gravity measurements on hydrometer samples. Results will be transferred to the **Soil Classification** table. If raw data are not available, enter the SG values in Soil Classification directly.

Figure 25. SG (20c) Table

Soil Classification Table

This tab contains the results of all soil classification parameters and is also used to enter percent finer values for sieve analyses when no raw data are available. In the later case, enter the percent finer values in the lower form and the specific gravity in the upper form, and the soil classifications will be automatically calculated. If these data are not available, the soil classification parameters can be entered in the upper form manually. The Verified box will be checked for samples that have the **Lock Sample** box marked in the Soil Specimen tab to indicate that data can't be modified.

Depth	Sieve_Type	Sample Type	- 3" (%)	- 2" (%)	- 1" (%)	- 3/4" (%)	- 3/8" (%)	- #4 (%)	- #10 (%)	- #40 (%)	- #200 (%)	Verified
3	No Gravel	ST	100.0	100.0	100.0	100.0	100.0	100.0	100.0	94.0	88.4	☐
5	No Gravel	ST	100.0	100.0	100.0	100.0	100.0	100.0	100.0	97.8	92.9	☐
10	With Gravel	ST	100.0	100.0	100.0	97.3	93.2	89.2	82.0	70.6	61.9	☐
15	No Gravel	ST	100.0	100.0	100.0	100.0	100.0	100.0	100.0	94.5	87.4	☐
15.7	With Gravel	SPT	100.0	100.0	75.1	75.1	75.1	75.1	75.1	58.4	44.6	☐

Plus #4 (%)	Gravel (%)	Coarse Sand (%)	Fine Sand (%)	Silt (>.002) (%)	Clay (<.002) (%)	Colloid (<.001) (%)	AASHTO Symbol	AASHTO Group Index	USCS Symbol	USCS Group Name
0.0	0.0	6.0	5.6	39.1	49.3	42.4	A-7-6	(29)	CH	FAT CLAY
0.0	0.0	2.2	4.9	41.6	51.4	40.5	A-7-6	(36)	CH	FAT CLAY
10.8	18.0	11.4	8.7	38.8	23.1	16.5	A-6	(14)	CL	LEAN CLAY
0.0	0.0	5.5	7.1	49.5	37.8	27.8	A-7-6	(23)	CL	LEAN CLAY
24.9	24.9	16.7	13.9	34.3	10.3	7.0	A-4	(4)	CL-ML	SILTY CLAY

Specific Gravity	Activity	D10 (mm)	D30 (mm)	D50 (mm)	D60 (mm)	D90 (mm)	D95 (mm)
2.816	0.608	0.000	0.000	0.002	0.005	0.122	0.545
2.813	0.623	0.000	0.000	0.000	0.004	0.058	0.158
2.778	0.650	0.000	0.004	0.025	0.063	5.450	12.931
2.776	0.581	0.000	0.000	0.005	0.010	0.142	0.490
2.746	0.682	0.000	0.016	0.148	0.491	37.838	43.496

Figure 26. Soil Classification Table Example

Proctor (Compaction) Table

When entering raw data, pick the test method from the **Method** Tab, normally T99A for a standard KY proctor or T99C_KYM for a KY proctor sample containing over 5 percent rock. Enter the Mold Diameter, Height and Weight (roughly 4 in diameter, 4.584 in height, and 4236

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grams for the weight). In the lower form enter your proctor analysis number for each point. The **Mold Volume**, **Maximum Dry Unit Wt** and **Optimum Moisture Content** are calculated. If not entering raw data just enter all numbers in the top form. The density units will be consistent with the **Water Unit Wt** field in the table **PROJECT**. For example, if Water_Unit_Wt = 62.4, the units will be in pounds per cubic foot, if 1, grams/cubic centimeter (or metric tons/cubic meter).

Figure 27. Standard T99A Entry Example, Upper Table

Figure 28. Standard T99A Example Raw Readings, Lower Table

Figure 29. Modified Kentucky Proctor Entry Example, Upper Table

Figure 30. Modified Kentucky Proctor Raw Readings, Lower Table

CBR (California Bearing Ratio) Table

Enter the raw weights for the CBR test.

Figure 31. CBR Table Example

QU (Quick Undrained Triaxial) Table

Enter the values specified in the **QU** table. Values needed **Moisture** (%), **Dry Density** (pcf), **Maximum Stress** (psf), **Strain At Failure** (%) and **Limiting Stress @ 10% Strain** (only if sample reached 10% strain). The **Wet Density** (pcf) will be calculated from the **Dry Density** and **Moisture**, or the **Wet Density** (pcf) can be entered and the **Dry Density** will be calculated. The **Report File Name** will be generated when the table is saved. When the file name is generated, save the lab report in a pdf file with the name assigned in the **Report File Name** field.

Figure 32. QU Table Example

UU (Unconsolidated Undrained Triaxial) Table

Enter the values specified for the **UU** table. Values needed are **Maximum Stress** (pcf), **Strain** (%) (which is strain at failure), **Moisture** (%), **Dry Density** (pcf), **Limiting Stress @ 10% Strain** (only if sample reached 10% strain), and **Cell Pressure** (psi). The **Report File Name** will be generated when the table is saved. When the file name is generated, save the lab report in a pdf file with the name assigned in the **Report File Name** field.

Figure 33. UU Table Example

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CU (Consolidated Undrained Triaxial) Table

Enter the values specified for the **CU** table. Values needed are **Triaxial Set**, **Phi** (deg) (friction angle in degrees), and **Cohesion** (psf). Both values of **Phi** and **Cohesion** are effective strength parameters. The **Report File Name** will be generated when the table is saved. When the file name is generated, save the lab report in a pdf file with the name assigned in the **Report File Name** field.

Figure 34. CU Table Example

KY Consolidation Table

Enter the values specified for the consolidation test. Values needed are the **Saturated Moisture** (%) (before the test at initial void ratio), **Moisture** (%) (natural moisture), **Dry Density** (pcf), **Pc** (tsf) (preconsolidation pressure), **Cc** (Compression Index), **Cr** (Recompression Index), and **E0** (Initial/In Situ Void Ratio). **Wet Density** (pcf) will be calculated from the **Dry Density** and **Moisture**. The **Report File Name** will be generated when the table is saved. When the file name is generated, save the lab report in a pdf file with the name assigned in the **Report File Name** field.

Figure 35. KY Consolidation Table Example

Rock Testing

This tab is for entering in lab testing conducted on rock samples.

Rock QU Table

Enter the values specified for the sample. Values needed are **Top Depth** (ft) of the sample, **Bottom Depth** (ft), **Sample Number**, and the **Strength Value** (psf). The **Report File Name** will be generated when the table is saved. When the file name is generated, save the lab report in a pdf file with the name assigned in the **Report File Name** field.

Figure 36. Rock QU Table Example

Slake Durability Table

Each sample tested must have a depth. Enter the values specified for the SDI Result to be calculated, **W1** (g) (weight before test) and **W2** (g) (weight after test). The **SDI Result** will be calculated upon saving the table.

Sample Depth (ft)	SDI #	W1 (g)	W2 (g)	SDI Result	Jar #	Jar Result
7	1	509	473	92.92731	1001-7	5
12	2	545	497	91.19266	1001-12	6
17	3	560	359	64.10714	1001-17	3
*						

Figure 37. Slake Durability Table Example