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Electronic Data Collection for Rockfall Hazard Evaluation

A Thesis
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Abstract

Rockfall field data collection traditionally has used conventional stationery tools, i.e. pencil and paper, for data collection. Traditional methodologies are being revisited with the advent of PDA's (Personal Digital Assistants) or pen-based computers. With the utilization of such technology, field data can be collected electronically. An electronic data collection system using PDA's was developed for this thesis. The advantages of the PDA approach over pencil and paper data collection include automatic error and data integrity checks during data input, and the elimination of manual data entry. The PDA's also allow automatic branching to solicit data input based on previous data entered, and support for code or scripting, which can be used to create unique files names based on the data entered. These advantages were implemented as part of an electronic data collection methodology within a rockfall hazard rating system for the TDOT (Tennessee Department of Transportation).

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1. INTRODUCTION

Background

Rockfall debris on Tennessee highways have been a recurring problem for the Tennessee Department of Transportation as well as a hazard for the motoring public, particularly in the steep topography of the Valley and Ridge Province and the Blue Ridge Province (Moore, 1986). To address the issue of rockfalls, the Tennessee Department of Transportation contracted the University of Tennessee and Virginia Tech to develop a Rockfall Management System (RMS) for U.S. Routes, States Routes, and Interstate Highways throughout Middle and East Tennessee that would facilitate efficient management of the rock slopes.

To develop the Rockfall Management System, a two-phase project was proposed. The first phase, which is discussed here, was comprised of a two-year pilot study that included the development and demonstration of the Rockfall Management System, and involved data collection in five selected counties. As a result of the collected data, major components of a Rockfall Management System were identified. The second phase was to implement the RMS in the remaining counties of middle and east Tennessee.

Major components of a Rockfall Management System include a rockfall hazard rating system, an electronic data collection system, and geographic information system. The electronic data collection or acquisition system component of the Rockfall Management System is discussed in detail. The electronic data collection system stores the information recorded from another

component of the Rockfall Management System, namely a Rockfall Hazard Rating System.

Rockfall hazard rating systems are used by a number of agencies to evaluate highway rock slopes in terms of the potential hazard to the motoring public. Within the United States, agencies typically use a variant of the rockfall hazard rating system developed by the Oregon Department of Transportation (ODOT) (Pierson & Vickle, 1993), then adopted by National Highway Institute (NHI) (Pierson & Vickle, 1993). While several rating systems are in use, they usually require the collection of various field data, ranging from traffic information to geologic structure and climate. This data collection has traditionally been done with paper forms, usually with the field data manually entered into a computer database or spreadsheet at a later time. Personal Digital Assistants (PDA) or pen-based computers offer opportunities to enter field data directly and efficiently in a digital format that can be downloaded directly to a database. With advances in technology electronic data collection is steadily becoming the medium by which data is collected.

Using commercially available software that allows for customization of electronic forms on the PDA, data collection can be tailored to a specific type of data. Customized rockfall hazard rating forms were developed to provide simple, consistent input through the use of drop-down list boxes, check boxes, yes-no selections, and the acquisition of GPS coordinates from a GPS receiver attached to the PDA.

2. Literature Review

Rockfall Hazard Rating System

Rockfall hazard rating systems have been used to assign a hazard rating to rock slopes and to assist in the prioritization of repair with maintenance activities. Based on collected information, a score is assigned to the rated information. The scores can then be used to assist in the prioritization of repair with maintenance activities. The rockfall hazard rating system developed by the Oregon Department of Transportation (ODOT), then adopted by National Highway Institute (NHI) (Pierson & Vickle, 1993), has been widely used. Several states and provinces including Colorado, Oregon, New York State, North Carolina, and Ontario have utilized this system or a variant of this system (Bateman, 2002). Some deviations from the NHI have been major while others only minor. The system developed by Ontario (Bateman, 2002) has four main factors, namely magnitude, instability, reach, and consequences. These major factors are used to assign a numerical value to the slope. New York State (Batemen, 2002) has three main factors: geologic factor, section factor, and human exposure factor, which are used to estimate the total relative risk factor. In general, the system differences result from the conditions that are present in the geographic location for which the system is being developed. Common to all systems is the evaluation of various traffic, geologic, and geographic specific information. Based on the information, a score is assigned to the rated information. The scores can then be used to assist in the prioritization of repair

with maintenance activities. A detailed comparison of rockfall hazard rating system developed different agencies that have can be found in Bateman (2002).

Electronic Data Collection

Personal digital assistants (PDA) or pen-based computers were first developed in the early nineteen-nineties (Sealy, 2002). Originally developed for business, PDA's have been utilized for data collection in various fields of science. Prior to the advent of PDA's as a method for data collection, studies examining personal computer notebooks as data collection devices were performed (Fayek et. al, 1998).

PDA's have been employed in various applications of civil engineering. Newell (1993) sites several applications for PDA's within civil engineering and transportation, including bridge inspection, highway sampling inspection, construction reports, highway vegetation inventory and landscape maintenance studies, materials testing, sight inventory, rail track maintenance, tunnel ventilation, bus/rail stop maintenance and bus inspection. In addition, Newell describes the need to reengineer a more competent and effective manner of handling a traditional issue, that of an inventory system. Within the study by Newell, several advantages of PDA's emerged, including improvement of data accuracy, increased efficiency, and the generation of cost savings. Furthermore, the ability to program logic allows the developer to control the user environment. For example, the users may be guided based on responses, error checking based on responses, automation of field calculations, elimination of managing

the filing and storage of field reports, and field sketches incorporated within the PDA (Newell, 1994).

In the construction industry, several studies have investigated the use of PDA's as data collection devices (McCullouch, 1993; McCullouch & Gunn, 1993). Results of the study conducted by McCullouch and Gunn indicated that benefits of using an electronic data collection system in paperwork intensive situations were the reduced processing time and improved data accuracy. While the study conducted by McCullouch and Gunn was in the early life of the PDA, other studies have described recent technology such as digital cameras, GPS (Global Positioning System) units, fax-modems, and celluar phones being incorporated within electronic data collection (Songer and Rojas, 1996). A more recent article by Navarrete (Navarrete, 1999) comments on the electronic data collection system developed by the Miami-Dade Transit Agency to reduce redundancy and time consumption with construction inspector's daily reports. To resolve the problem, the agency established several criteria for an electronic data collection system. The criteria included: minimization of duplicate data entry, utilization of present technologies, flexible software-programming endeavor, ease of data entry, manipulation of stored data, inexpensive system, and personnel accepted system. The Palm OS 3.0 was the operating system chosen and Pendragon Forms® the platform for the electronic data collection system (Navarrete, 1999).

Soil Conservation (NRSC)

The National Resources Soil Conservation Services (NRCS) formerly known as the Soil Conservation Services (CSC) used several brands of PDA's including the Newton Message Pad 2000, Message Pad 130, Message Pad 120, and Cassiopeia 2400 to collect data for its National Resources Inventory (NRI) (Brockmann et al., 2000). Data from the inventory consisted of historical land cover and use, soil type, conservation improvements, and soil erosion caused by water and wind. In addition to using PDA's, the NRCS utilized military grade GPS receivers, Rockwell Precision Lightweight GPS Receivers (PLGRS), to gather spatial information and digital cameras to provide an efficient means to document any damage (Brockmann et al., 2000).

Geotechnical Engnineering

Within Geotechnical Engineering, GeoSyntec Consultants in conjunction with the Georgia Department of Transportation (GDOT) has developed an application for geotechnical data acquisition (Bachus, 2002). Utilizing Pendragon Form 3.1®, forms were created to efficiently collect data during geotechnical subsurface investigation. This system was used to manage the data and to produce electronic boring logs by interfacing the PDA with another commercialized software package, gINT®. Similar to the work by GeoSyntec, Randy Kath utilized Pendragon Form 3.2® to develop electronic forms for assisting in digital mapping and soil boring logs (Kath, 2002).

3. Implementation of electronic data collection for Rockfall Hazard Rating

Prior to using a personal digital assistant (PDA) for data collection, applicable specific forms must be developed for the PDA. Various third party software packages are available to facilitate the development of forms.

Hardware Platform Selection

After identifying the available operating systems, namely Palm and Windows CE Operating System (OS), cost, availability, and functionality was evaluated. The Palm OS was selected for the hardware platform.

Software Platform Selection

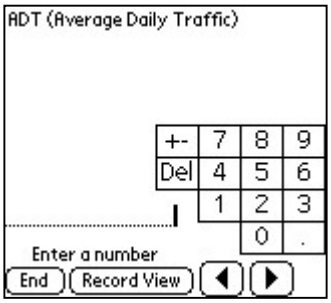
After identifying the cost and functional features of the prospective software package a platform was selected. Examples of functional features are the ability and ease of the creating customized forms, downloading and merging with existing data, and scripting (developer tools to controlling the user's environment). A number of software packages were evaluated with functional features as the evaluation criteria. Pendragon Forms 3.1®, later upgraded to 3.2, which runs on the Palm OS, was selected.

Pendragon Forms

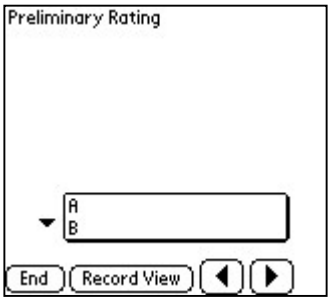
Pendragon Forms® allows for the creation of customized forms (Pendragon, 2000). To customize forms, the software has several types of fields, as shown in

Figure 1, which were created using the Palm Emulator, available at http://www.Palm.com. Figure 1a is an example numeric field for Average Daily Traffic (ADT), which only allows numeric data to be entered into the field and displays a numeric keypad to assist the user in entering data. Figure 1b is an example pop-up menu, where the user selects an input value from a data set, which in this case is the Preliminary Rating. Note, only choices of A or B are provided since data are not collected for C rated slopes. Figure 1c is a numeric field with a default value entered when the user views the screen. Several field types use default values, which aid in the ability to complete the form in a timely manner. Figure 1d is an option field, which is used to determine the Department of Transportation region of the state. Based on the region selected, the corresponding counties are then displayed. Figure 1e is a lookup field that is based on the input from a previous option field. Figure 1f is a lookup field response, which is displayed after the button is selected.

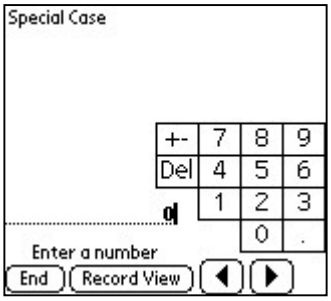
Advanced properties within Pendragon allow for the automation of certain types of fields. Each type of field has specific attributes and data types, which improves data integrity. Using a combination of fields, Pendragon Forms was used to create the Rockfall Hazard Rating System electronic data collection form. Pendragon is an application primarily developed for use with Microsoft Access. During installation, the installer is prompted for the version of Microsoft Access installed on the desktop computer. Microsoft Access is the only desktop computer system requirement for the desktop. However, the data can be exported to any database or table capable of reading an ASCII file. Within



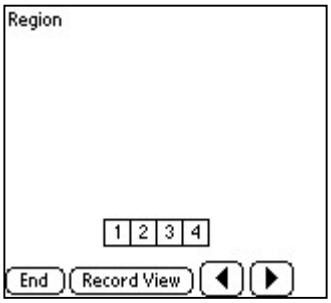
a. Numeric field



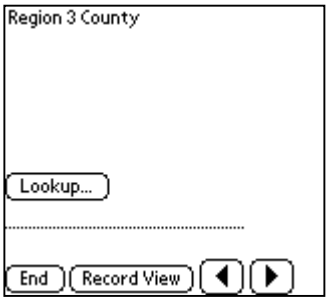
b. Pop-up menu



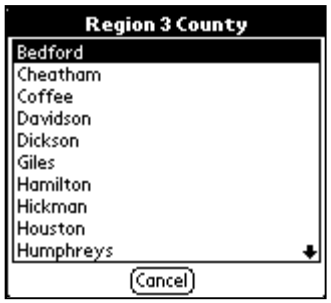
c. Numeric field with default value



d. Option field



e. Lookup field



f. Lookup field response

FIGURE 1. Example field types (a) numeric fields (b) pop-up menu (c) numeric field with default value (d) option field with choices 1-4 (e) lookup field (f) look up field response

Pendragon Forms, forms are created on the desktop computer and sent to the handheld device during a HotSync data transfer. Once a form is installed on the handheld, records can be created to store data. Pendragon allows for bi-directional synchronization of information; records on the PC are automatically sent to the handheld, and records entered on the handheld are automatically sent to the PC. If there is a conflict in which the same record is modified on the handheld and the PC, a synchronization rule can be setup either to have the handheld overwrite the PC or the PC overwrite the handheld (Pendragon, 2000).

Advantages of Electronic Data Collection

Electronic data collection provides several advantages over conventional data collection methods. Elimination of clipboards, paper maps, hand-written worksheets, and the collection of more data in less time are a few basic advantages over the conventional paper-based data collection methods. Other advantages include the elimination of data re-entry, branching, real-time error checking, an integrated GPS (Global Positioning System) interface, and enhanced data integrity.

Elimination of data re-entry

Collecting data using pen and paper leaves the task of transferring data into electronic format. Post-processing of data into electronic media often involves manual data entry, which is susceptible to error. This process is often time-

intensive and costly. Using the proposed electronic data collection system eliminates data re-entry since the data is initially entered electronically.

Branching (Scripting)

Development of electronic forms utilizes programming capabilities of Pendragon Forms® such as scripting. Appendix C provides details of the scripts used to develop the customized electronic form. Branching is a process by which the form designer writes codes or scripts to have the form display what a user sees based on the previous user response (Pendragon, 2002). Figure 2 demonstrates the use of branching. In this example, if the previous height is okay then the electronic form proceeds to the next field, which is a numeric input. On the other hand, if the previous height is not okay, then the device returns to the height determination screen to revisit the height information.

Real-time Error Checking (Scripting)

Implementation of real-time error checking is facilitated through the use of Pendragon Forms' *advanced field properties*, which have the ability to write scripts. Scripting allows the developer to control the events before and after a user views a particular field. In addition, scripting permits calculations within and on fields, allows for branching, and minimizes data entry by pre-filling fields (Pendragon). Figure 3 illustrates three common error types namely, *form message*, *missing response*, and *value not allowed*. *Form message* is the result of creating a custom message as shown in Figure 3a. Figure 3a illustrates the error displayed when the user enters a value that violates a specific relationship

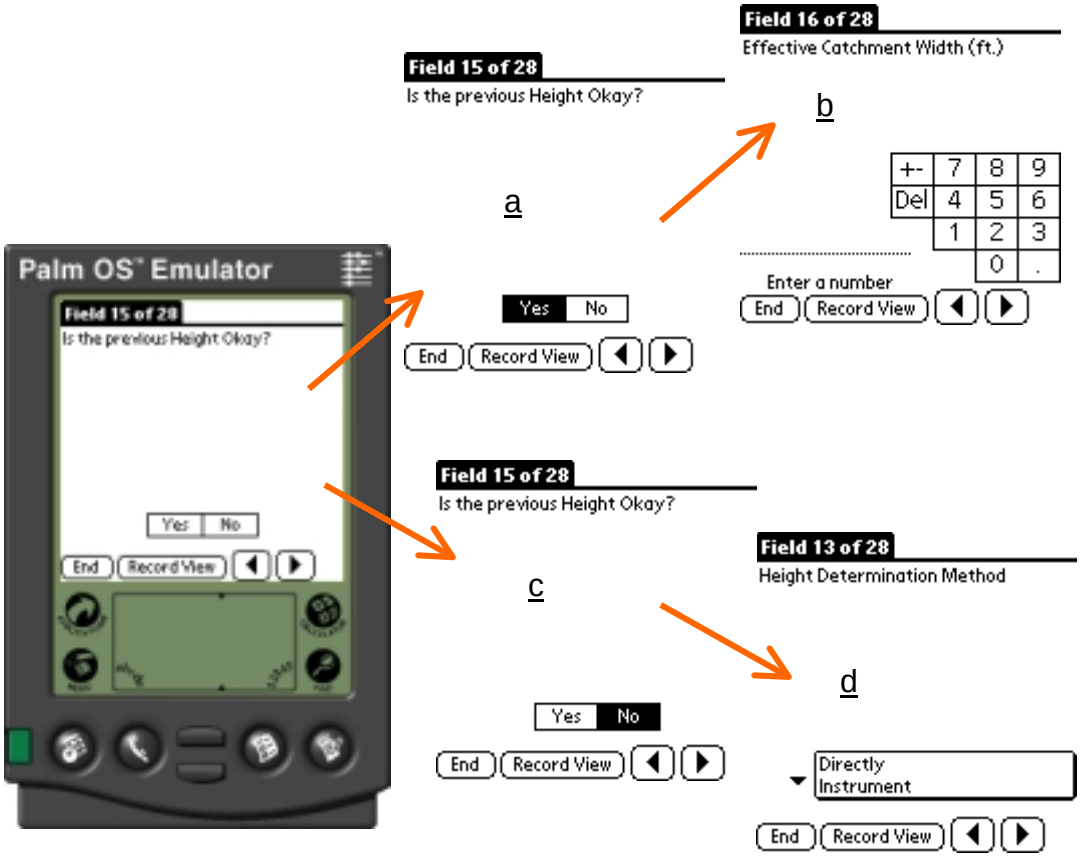
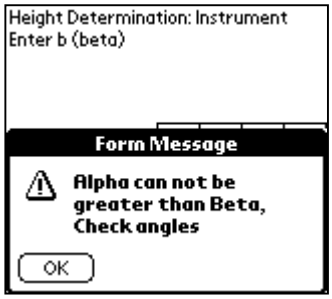
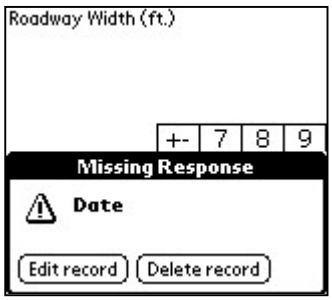


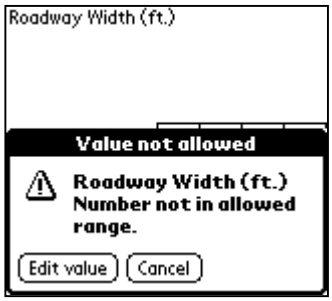
FIGURE 2 Branching (a) If the response to the question is “Yes” (b) Numeric field after “Yes” response (c) If the response to the question is “No” (d) Pop-up menu to select the method to reevaluate the height



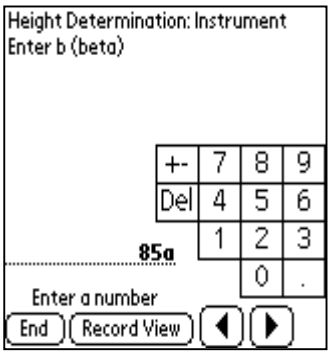
a. Scripting error message



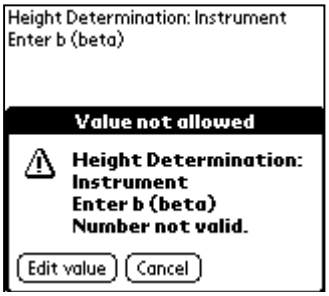
b. Missing data error message



c. Range error message



d. Numeric only field with alphanumeric data



e. Numeric only field with alphanumeric data error message

FIGURE 3 Sample error messages

(a) Scripting error message in response to incorrect alpha angle being greater than beta angle for height determination
(b) Missing data error message that occurs when form is ended without all the required fields containing data
(c) Range error message in response to a entered value not within specified maximum and minimum values
(d) Numeric only field with alphanumeric data
(e) Numeric only field with alphanumeric data error message

between known field parameters. In this example, the alpha value, previously entered, must be less than the beta value, but it is not, thus the error message is displayed. Figure 3b is an example of a *missing response* error. If a required field is not completed, an error message as seen in Figure 3b will be displayed allowing the user to edit the data. Another type of error is the *value not entered* error message as seen in Figure 3c. The *value not allowed* error message in this case results because the entered data does not fall within the pre-established range. Similarly, a *value not allowed* error message can be generated by entering an alphanumeric response in a numeric only field, as shown in Figure 3d. The resulting *value not allowed* error is displayed as shown in Figure 3e.

Integrated GPS Interface

Spatial data such as GPS (Global Positioning System) coordinates can be recorded in the proposed electronic data collection system through scripting. Pendragon Forms permits an attached device to transmit data via the serial port of the PDA (Pendragon, 2000). From an attached GPS unit, as shown in Figure 4, or an external GPS unit (attached to the serial port), coordinates (spatial data) can be gathered for the rock slope. While the GPS unit shown in Figure 4 has limited accuracy, it was found to be sufficient to locate the rated slopes. If more accuracy is desired, the coordinates obtained from higher accuracy equipment may be manually entered. Additional spatial information, log mile and slope length, collected and used in combination with the GPS coordinates to spatially locate the rated slopes. This allows the data to become part of a GIS or

FIGURE 4. Palm PDA with attached GPS receiver

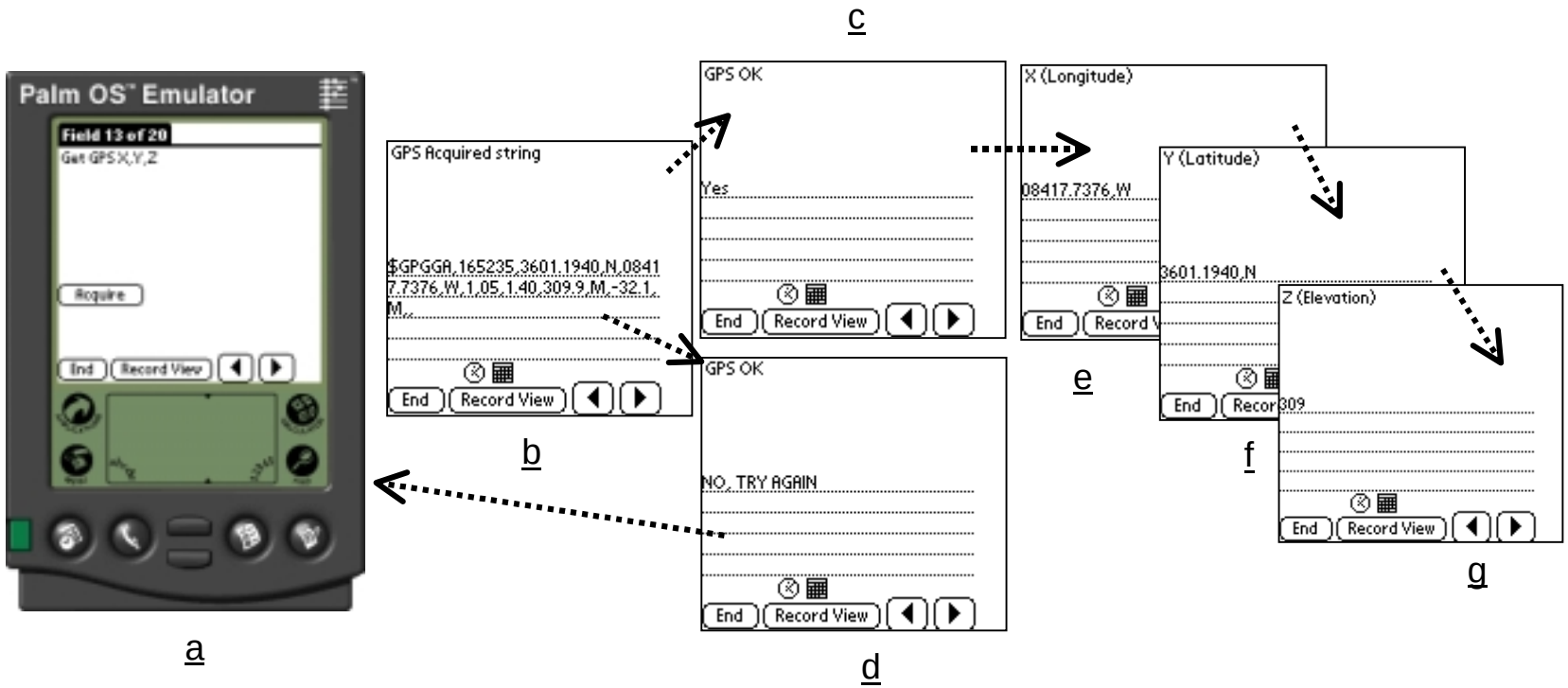


FIGURE 5. Integrated collection of GPS coordinates (a) field displaying GPS Acquire button (b) field displaying GPS acquired string (c) field inquiring if the acquired GPS string is the correct string with positive response (d) field displaying response of incorrect GPS string which returns to the acquire screen (e) automated longitude

Geographic Information System (Rose et al. 2002). Figure 5a illustrates a button field used to acquire the GPS coordinates. Coordinates for the longitude, latitude, and elevation are received by the PDA as one string as shown in Figure 5b. Figure 5c indicates that the correct string was received by the PDA. In the case, when the string is incorrect or incomplete, Figure 5d is displayed and the unit returns to the GPS acquire screen, Figure 5a. Once the correct string is recorded, longitude, latitude, and elevation are displayed as shown in Figure 5e-5f, respectively. Alternatively, the GPS data may be entered directly using a numeric field.

Data Integrity (Field Selection)

The system allows a developer with prior knowledge of data characteristics (numeric, alpha-numeric, categorical, etc.) to select field types corresponding to the specified data type. Selecting field types corresponding to the data type will only allow that specific data type to be entered. For example, ADT (Average Daily Traffic) stores the number of vehicles per day. As it is known that the ADT represents a numeric quantity, a numeric field can be specified. Figure 1a demonstrates the use of a numeric field. Using the numeric field type improves data integrity because only numeric data can be entered into the field. In addition, a keypad is provided for the user, which improves data integrity. If the user enters alphanumeric data in a numeric-only field, an error will be displayed. Other field types such as the popup menu illustrated in Figure 1b may be utilized to improve data integrity as well. Knowing that the preliminary rating choices are

either A or B, a pop-up menu with these values may be utilized to save time and avoid complications associated with character recognition during pen-based data entry. Utilizing specified field types promotes data integrity by prohibiting data that is not representative of the specified field type.

Data integrity is also improved by scripting. Scripting can be used to develop unique identifiers such as the file number in the proposed data collection system. The file number, consistent with TRIMS (Tennessee Road Information Management System), is composed of six parameters from the rated site, which are meshed into one string in the following order: county number, road number, special case, county sequence, beginning log mile, and reference to the centerline. Figure 6 illustrates the concatenation of the parameters. The accuracy of the file number is vital to the record being stored correctly and for utilization with other TDOT data. The PDA has the ability to assemble this string automatically from the data input.

Electronic Form for Preliminary Rating

The primary purpose of the preliminary rating form is to capture data necessary to evaluate whether a site received a rating of A, B, or C and record spatial data of the particular site. “A” rated slopes are subjected to detailed ratings, “B” rated slopes are recorded for monitoring purposes, and “C” slopes are not recorded because they represent a estimated low potential for rockfall on the road way and low historical rockfall activity. Based on the required fields for the preliminary form established in Vanderwater 2000 (Vanderwater, 2000), an

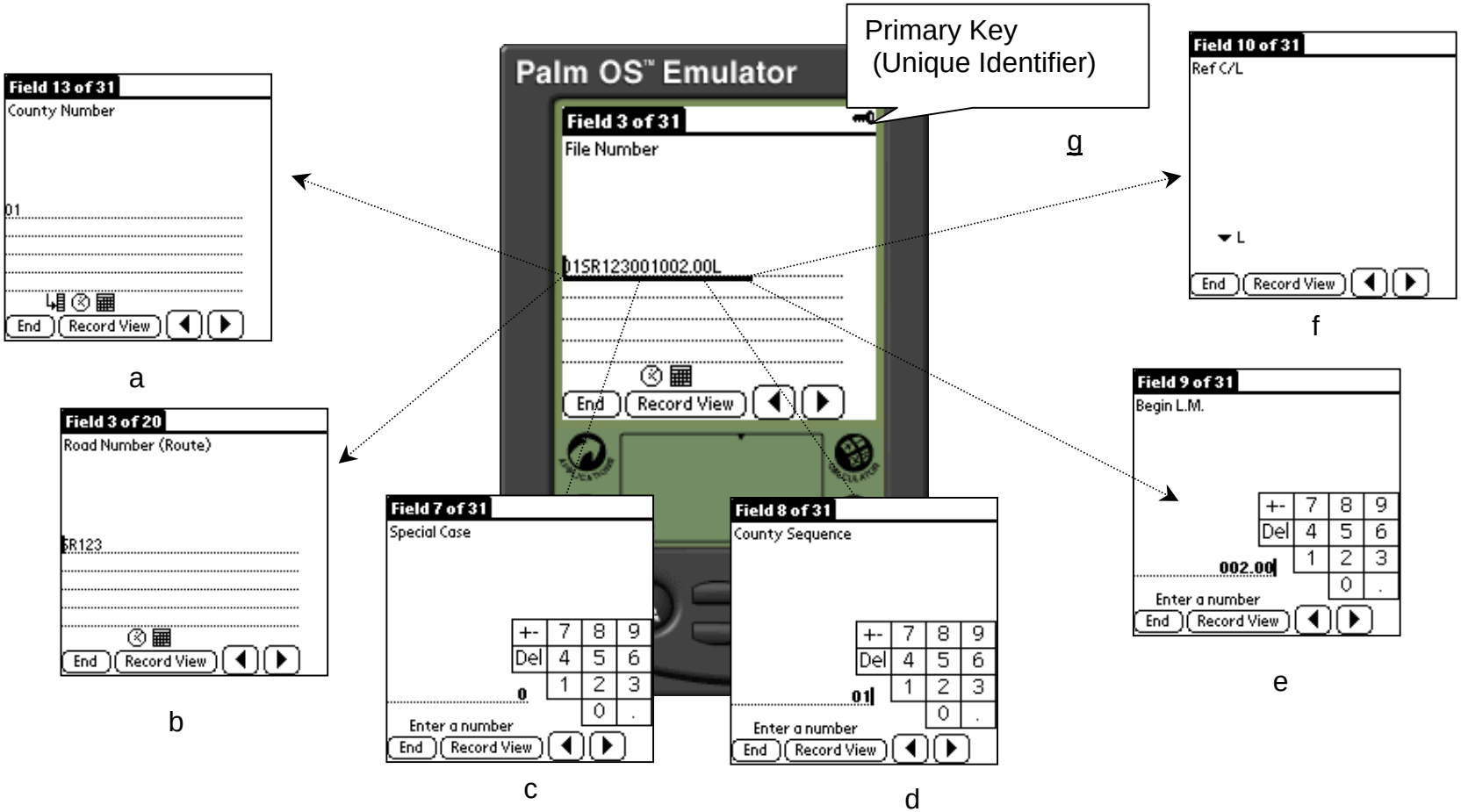


FIGURE 6. File number concatenation (a) county number field (b) route number field (c) special case field (d) county sequence field (e) beginning log mile field (f) reference to center line field (g) prime key identifier that is used to merge with other existing data. Note: The order in which the fields are collected is arbitrary.

electronic form for preliminary rating was developed. Appendix A - Preliminary Rating Users Manual demonstrates the step-by-step process to complete a preliminary rating and change values of a previous entry. Further explanation of each data field and its specific attributes are located in the Appendix C - Preliminary Rating Form Report.

Electronic Form for Detailed Rockfall Hazard Rating

The primary purpose of the detailed rating form is to capture data necessary to differentiate and assess the hazard of a particular site. The detailed rating then can be used to prioritize hazardous sites based on the scores received from the ratings. Appendix B- Detailed Rating Users Manual demonstrates the step-by-step process in which to complete a detailed rating and change values of a previous entry. Further explanation of each data field and its specific attributes can be found in Appendix D - Detailed Rating Form Report. Appendix E lists field types and the corresponding attributes that are incorporated into the electronic data collection system. Knowledge of each specific data field attribute allows for scripts to be written that only permit the specific data attributes. Appendix F – Editing an Existing Form illustrates how easy a field can be added to an existing form.

4. Future Applications

Just as computers continue to get smaller with faster processing capabilities and more storage space at lower cost, personal digital assistant's (PDA's) are rapidly evolving. Several peripherals presently available for PDA's include hard cases, digital cameras, GPS (Global Positioning System) units, digital voice recorders, memory stick, and wireless modems. Each peripheral attaches to the PDA unit through the expansion slot, which is rapidly becoming a standard feature in today's PDA market. In addition, a wide variety of software for PDA's is now available. Below is a summary of available features and how they may relate to future field data collection.

Hard Cases

As any electronic device is susceptible to physical damage, hard cases will protect the device from damage as a result of normal use, dropping, and environmental affects. Since damage to a PDA in the field may result in the loss of valuable data, hard cases are recommended.

Digital Cameras

Several companies offer attachable digital cameras for PDA's. While the addition of a digital camera attachment allows the PDA to double as a camera device, the attachable digital cameras do not compare to the quality of a separate digital camera. Often the attachable digital camera is specific for a particular type of PDA. Therefore different PDA brands use different digital camera attachments,

which can make upgrading uneconomical. For this reason, stand-alone cameras are typically more cost efficient.

GPS Units

Several companies offer attachable GPS units. As with digital camera attachments, the accuracy of the GPS unit is often not equal to that for a separate GPS unit. In addition, the attachable GPS unit is specific for a particular type of PDA. Therefore different PDA brands use different GPS unit attachments, which can makes upgrading uneconomical. While attachable GPS units were used during the early phases of data collection in this research project, a separate GPS unit has several advantages. The primary advantage is the ability to leave the GPS to acquire a signal while other data are collected, as it is known that stationery units have a better signal reception. Another advantage of an external unit is the ability to use the GPS unit for other tasks that do not require a PDA

Digital Voice Recorders

Digital voice recorders allow the PDA to be transformed into a digital tape recorder. Several companies offer digital voice recorders with adequate storage, recording time, and audio quality, but as with all other PDA accessories, the digital voice recorder is a function of the brand of PDA being used. A digital voice recorder may be useful to record notes about the slope or slope photographs. This feature was not investigated in this research.

Battery Charging and Memory Cards

Field data can be lost if batteries are not replaced or recharged according to the manufacturers directions. Taking a few simple precautions such as carrying a few extra batteries or a battery charger when using the device can reduce the issue of data loss. This very issue often leads to a topic of debate, which is whether replaceable batteries are preferred over rechargeable batteries. Both replaceable batteries and rechargeable batteries have advantages. One of the main arguments for replaceable batteries is the ability to easily and rapidly replace the batteries with new batteries that are commonly available at convenience stores. With rechargeable batteries, an electric power source is needed to recharge the batteries. On the other hand, one of the main arguments for rechargeable batteries is the one-time purchase of a battery, whereas replaceable batteries are a reoccurring expense.

Removable memory cards or sticks are available, which increase the storage capacity of the device and can be used to transfer data as well. Extra storage capacity could be used to backup existing data, store more data, or even add more features to aid in the rating procedure.

Wireless Networking and Web Capabilities

Several PDA manufactures offer wireless networking and web capabilities. The combined wireless network and web capabilities allow users to be connected with a local area network as well as perform operations over the internet. One feature of wireless networking is the ability to communicate with a host server. In

communicating with a host server, a user may send data to the server, as well as review existing data from the server. One possible application in the Rockfall Management System (RMS) is the use of TRIMS (Tennessee Roadway Information Management System), which could be located on a host server to allow the rater to retrieve TRIMS data while in the field.

Software

Numerous applications are being developed for PDA's to perform a variety of functions. As Pendragon Forms® allows the customization of forms, others for example assist in handwriting recognition. Graffiti was issued as the handwriting recognition software with the PDA, but JOT® was investigated due to its ability to input data as if writing naturally. Other vendors produce software similar to JOT®. A subject often of concern is the corruption of data by viruses. Several major computer virus vendors are producing anti-virus software for PDA's as well.

Impact of Peripherals on Project

In short, each peripheral utilizes the expansion slot of the PDA; therefore only one can be used at a time. Often it is advantageous to purchase the separate device rather than the peripheral device depending on the needed quality. During the project, an external digital camera was utilized extensively to record geologic features present on the slope. In addition to using a digital camera, an attachable GPS unit was employed. As a result it was concluded that an external

GPS unit would be more economical and versatile. In general, any of the peripheral device may be incorporated should the need arise.

5. Conclusions

An electronic data collection system was developed for rockfall hazard rating incorporating features such as real-time error checking, branching, popup menus, numeric keypads, and enhanced data integrity. Commercially available software permits the development of these custom forms, and examples were described for various data types related to rockfall hazard rating systems. The system's main advantage over conventional methods is the elimination of data re-entry and the ability to retrieve data to generate critical, but unique, informational strings such as the file number. Furthermore, electronic data collection is an efficient and effective means of collecting data. The capabilities of these systems are only limited by the ability of the mind to find new applications for the technology. It is anticipated that as the capabilities of these devices increase, their use as field data collection tools will increase as well.

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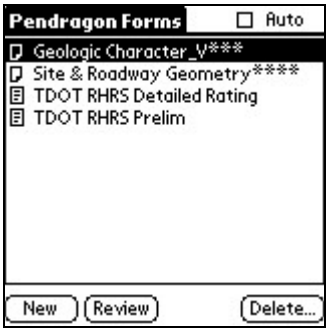
APPENDICES

APPENDIX A

User Guide for the Field PDA – Preliminary Rating

Guide to using Pendragon v 3.2 Prelim Rating Form for data entry.



- Select TDOT RHRS Prelim from the menu.
- Tap the New button to begin data entry.

Selecting the New button flashes the lookup date field and automatically advances the user to the next field. The Review button permits edits to be performed on previously entered data. The Delete button accesses a menu to delete a form or pervious data entry.

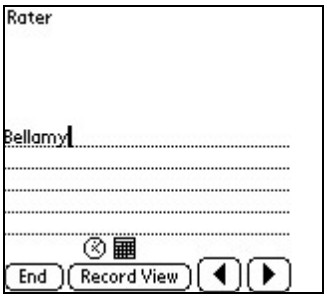
The calendar appears for selecting the date for the detailed rating fieldwork.

- Tap on the current date or tap the Today button.

Date selection flashes the completed date field and automatically advances the user to the next field.

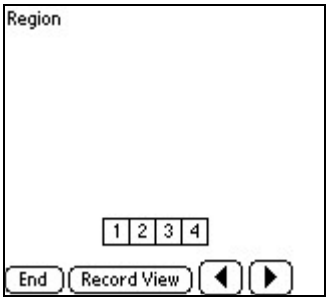
Rater

The rater field records the name of the person gathering the data for the road cut.



- Enter your rater name using the keyboard or alphanumeric pad.
- Select the (>) button to advance to the next field.

An example is shown. The End button ends the record and the Record View button is a two-column format that displays the field names in the left-hand column and responses in the right-hand column. The icon on the bottom left is used to automatically respond with the date and time and the icon on bottom right to respond with the date only. Neither the icons nor the Record View will be used in the rating process.



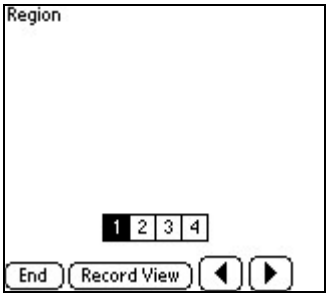
[2]**Region**

The region field stores the TDOT region number for the site.

- Select the region by tapping the appropriate number.

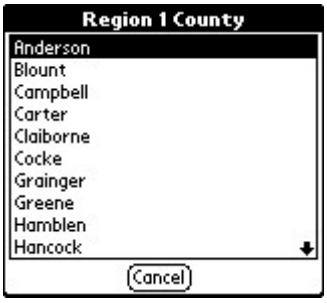
Selection of the region automatically advances the user to the next field.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Region 1 Selected

The screen shot shows region 1 has been selected. Selecting “1” indicates that the county is in Region one. Selection of 1 flashes the county lookup screen and automatically advances the user to the next field.

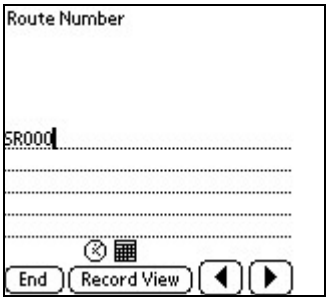


Region 1 Counties

A list of counties for the region is displayed. The county field records the county where the rating was performed.

- Select the appropriate county and use the scroll arrow if needed.

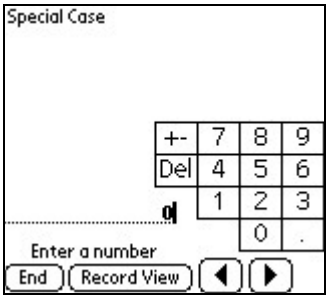
County selection flashes the completed county lookup field and automatically advances the user to the next field. The Cancel button is used when the incorrect county is selected. In this case, select the Cancel



[1,2]**Route Number**

This field records the state route number or in the case of the interstate, the interstate name is entered for the rating site. The route number determines the file number, and the format should be followed exactly to produce a correctly formatted file number. Note that the beginning of all entries is “SR” followed by the route number.

- Enter appropriate route number.



[1,2]**Special Case**

The special case field indicates if the site is an interstate, off ramp, spur, etc. Numbers may be entered using the touch pad on the screen or via the standard Palm interface at the base of the screen.

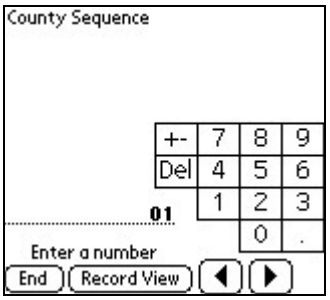
- Enter the special case.

None = 0 Spur = 1 Alternate = 2 Loop = 3 By-pass = 4
Business Route = 5 Northbound = 6 Southbound = 7
Eastbound = 8 Westbound = 9

- **Select the (>) button to proceed to the next field.**

Note: This field defaults to “0” which is the usual

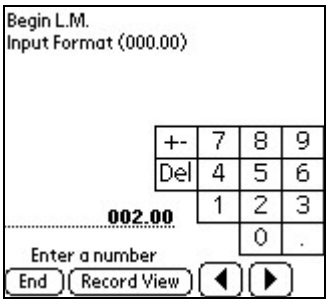
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



[1,2]**County Sequence**

The county sequence indicates how many times the route occurs in the county. Each time the route enters the county the sequence number is incremented by 1 starting at 01 for the first occurrence. The log mile starts over each time the sequence number changes.

- Enter the county sequence.
- Select the (>) button to proceed to the next field.

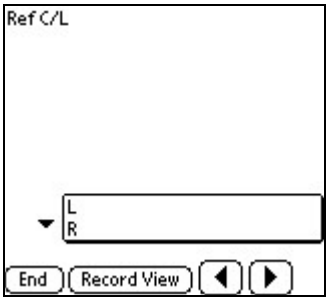


[1,2]**Beginning Log Mile**

The log mile for the beginning of the rating site is stated in hundredths of a mile and is called the "*Begin L.M.*" Input must consist of a six characters including the period; therefore preserve the digits to the left of the decimal point with zeros.

- Enter the beginning log mile.

Example input is shown.

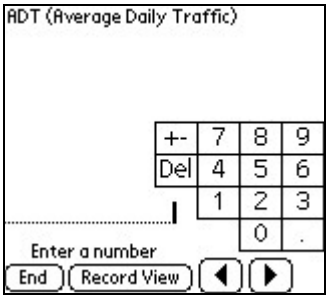


[1,2]**Reference to the Center Line (Ref C/L)**

The *Ref C/L* designates the side of the road where the slope is located, with respect to the centerline of the road, and in the direction of increasing log mile. A popup field displays L, or R, corresponding to the input formats for this field.

- Select a value for the reference to the centerline.

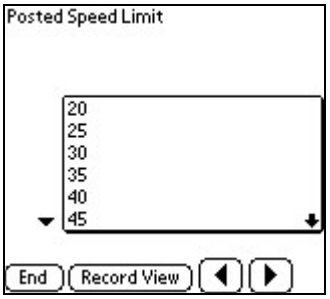
Selection of a value advances the user automatically to the next field.



[2]**Average Daily Traffic**

The ADT field corresponds to the daily traffic count, and is usually recorded prior to fieldwork for the site from TRIMS. The ADT is used to calculate the average vehicle risk.

- Enter the appropriate ADT as an integer.
- Select the (>) button to proceed to the next field.

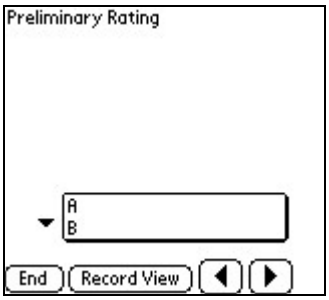


Posted Speed Limit

The posted speed limit, which maybe different from that found in TRIMS, is the speed limit at the site. The speed limit is used to calculate the average vehicle risk.

- Select the posted speed limit.
- Selection of a value advances the user automatically to the next field.

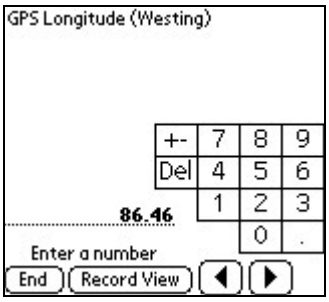
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Preliminary Rating
The preliminary rating records the rating given the site using NHI criteria for preliminary ratings. Only A and B slopes are recorded for the TDOT RMS.

- Select the appropriate preliminary rating, which also automatically advances the user to the next field.

Rockfall rating is complete, enter supplemental information.

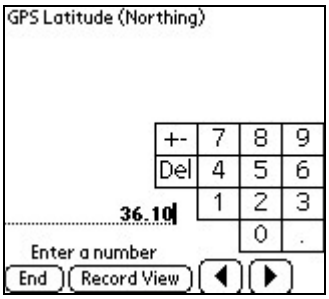


GPS Longitude
The *GPS Longitude* field stores the x coordinate of the spatial data.

- Enter the longitude as shown in the example.

Report Longitude to hundredths of a degree.

- Select the (>) button and proceed to next field.

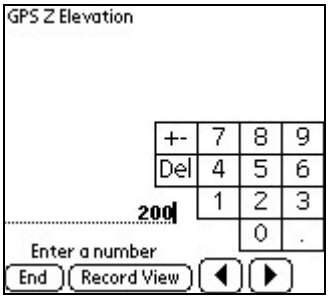


GPS Latitude
The *GPS Latitude* field stores the y coordinate of the spatial data.

- Enter the latitude as shown in the example.

Report Longitude to hundredths of a degree.

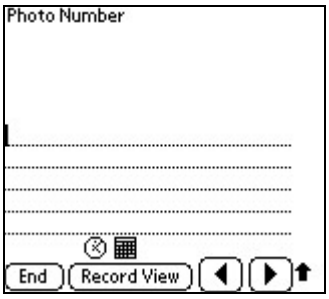
- Select the (>) button and proceed to next field.



GPS Z Elevation
The GPS Z Elevation field stores the z coordinate of the spatial data.

- Enter the elevation in feet.
- Select the (>) button and proceed to next field.

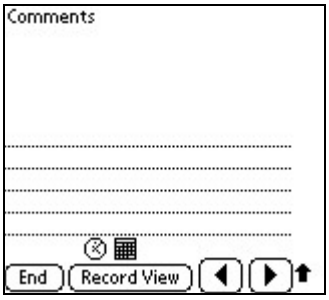
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Photograph Number

The photograph number stores the camera picture number for the rating site. The field allows the use of numbers and/or text because some camera's store picture number as alphanumeric. More than one number may be entered where more than one photograph is taken by separating the entries with commas.

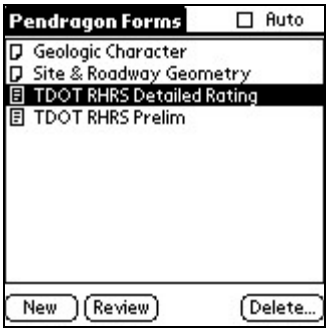
- Enter photograph number using the Palm alphanumeric pad.
- Select the (>) button and proceed to next field.



Comments

The comments field enables a user to record brief pertinent statements about critical aspects from the site. Completion of this field automatically completes data entry for this particular detailed rating and returns the user to the original forms listing (see next field).

- Select the (>) button and proceed to next field.

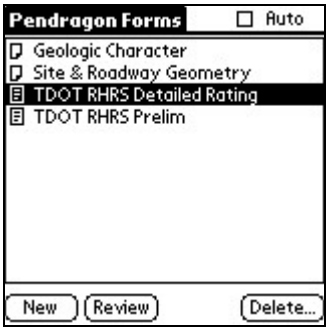


After Finishing the form returns to the beginning screen. The data will be downloaded during the next hot sync.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

Modifying and editing an existing record.

To modify an existing record, you will need to review the record on the handheld and select the record that you want to modify (Pendragon, 2001) The file number or any other distinctive parameter may be used to identify the specific record.

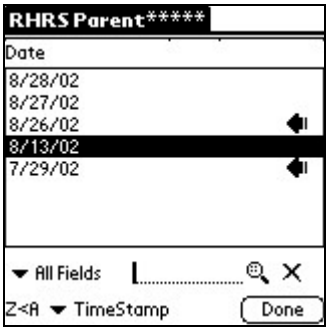


Form Screen

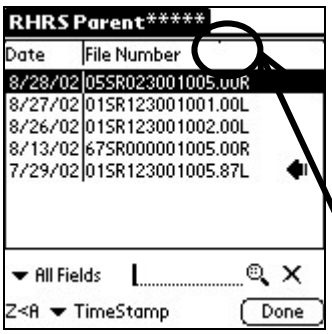
- Tap the name of a form to highlight it.

In this example, we are modifying a detailed rating.

- Tap the Review button.



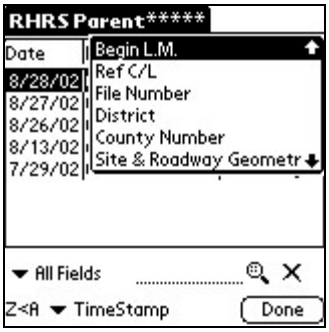
A list of records for that form that are in the particular PDA is displayed. Typically the first field, which is "Date" in this case, is shown on the screen. The arrow on the right indicates which records are awaiting download to the PC after a HotSync has occurred.



To determine which record to select, you can display up to two additional fields by tapping in the second and third columns heading positions and selecting the field name for the characteristic that you wish to display. In this example, the file number is displayed in the second column, and is chosen because these numbers have unique identities for each record.

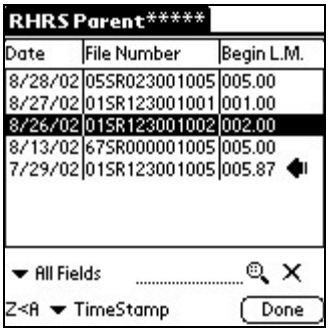
The tick mark indicates the division between two column headings.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



In this example, we want to check the Beginning Log Mile. To do so, we change the third column heading to "*Begin L.M.*" by tapping in the heading space.

- Tap into the heading space.



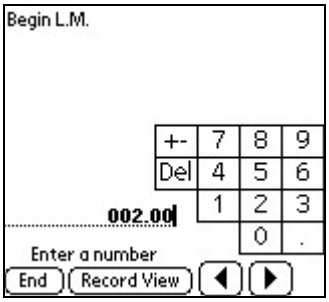
- Tap on a record to change the "*Begin L.M.*"

In this example, the County was Anderson County at mile marker 002.50 instead of the 000.200 as entered.

After tapping on the record you are automatically taken inside the form in record view. To the left are the headings of each field.

- To change the "*Begin L.M.*" field, tap the "*Begin L.M.*"

Note: the date the record was created is shown in the top left corner. The double left arrows take the user to the beginning of the fields (in this example to the date field), where as the double right arrows takes the user to

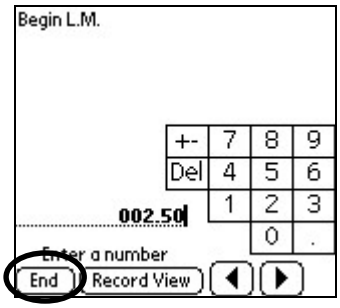


Now you are in field view, which is the view that the records were first created in.

- Tap the delete key to change the entry.

An alternatively approach is tapping on the field to the right and using the Palm alphanumeric pad to correct the entry.

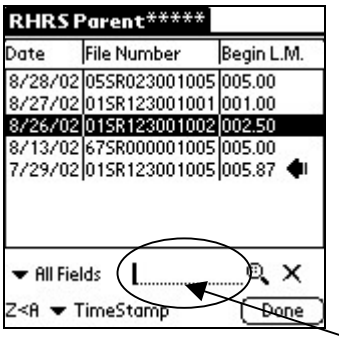
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Once the entry has been changed.

- Tap the End button located in the lower left corner as indicated in the example.

Tapping the > key will take you to the next field in the form.

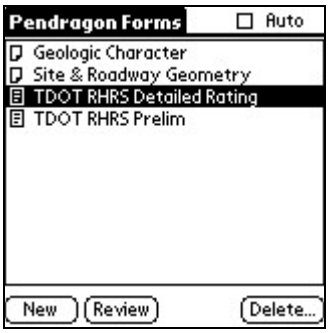


After tapping the End button, you are returned to the Review screen and the entry is changed.

- If all necessary changes are made, tap the Done button.

Changing the “All fields” changes the search criteria. The user can search on any of the field located on the form. Once the search criterion is entered (in the example, “All fields” is the search criteria), the user can filter for a specific value of the search criteria by typing the parameter in the blank line. Pressing the magnifying glass filters for the entered parameter. The X icon removes the filtered criteria.

The “TimeStamp” is the actual date the record was created, which may differ from the date of the rating.



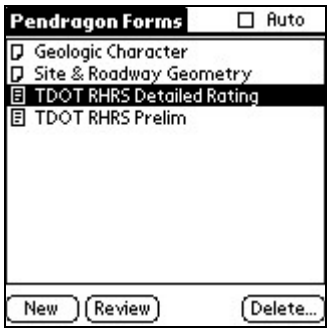
After selecting the Done button you are returned to the Forms Screen.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

APPENDIX B

User Guide for the Field PDA – Detailed Rating

Guide to using Pendragon v 3.2 Detailed Rating Form for data entry.



- Select TDOT RHRS Detailed Rating from the menu.
- Tap the New button to begin data entry.

Selecting the New button flashes the lookup date field and automatically advances the user to the next field. The Review button permits edits to be performed on previously entered data. The Delete button accesses a menu to delete a form or pervious data entry.

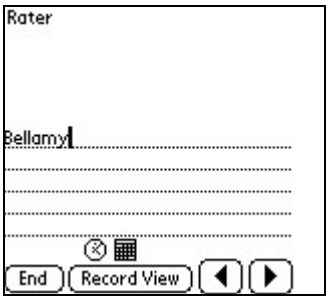
The calendar appears for selecting the date for the detailed rating fieldwork.

- Tap on the current date or tap the Today button.

Date selection flashes the completed date field and automatically advances the user to the next field.

Rater

The rater field records the name of the person gathering the data for the road cut.

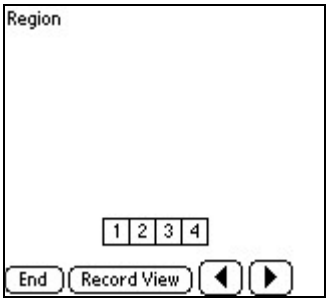


- Enter your rater name using the keyboard or alphanumeric pad.
- Select the (>) button to advance to the next field.

An example is shown. The End button ends the record and the Record View button is a two-column format that displays the field names in the left-hand column and responses in the right-hand column. The icon on the bottom left is used to automatically respond with the date and time and the icon on bottom right to respond with the date only. Neither the icons nor the Record

[2]**Region**

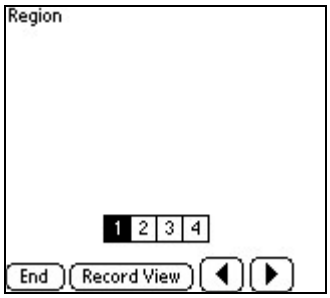
The region field stores the TDOT region number for the site.



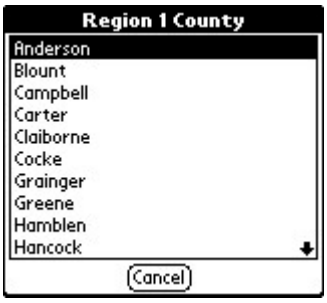
- Select the region by tapping the appropriate number.

Selection of the region automatically advances the user to the next field.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



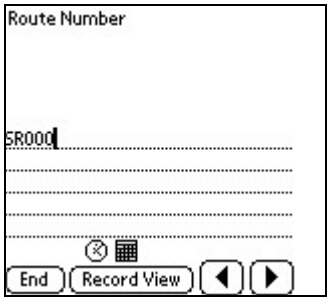
Region 1 Selected
The screen shot shows region 1 has been selected. Selecting “1” indicates that the county is in Region one. Selection of 1 flashes the county lookup screen and automatically advances the user to the next field.



Region 1 Counties
A list of counties for the region is displayed. The county field records the county where the rating was performed.

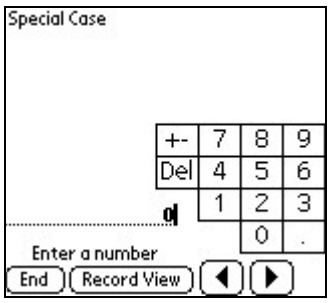
- Select the appropriate county and use the scroll arrow if needed.

County selection flashes the completed county lookup field and automatically advances the user to the next field. The Cancel button is used when the incorrect county is selected. In this case, select the Cancel button and return to lookup menu to re-select the correct



[1,2]**Route Number**
This field records the state route number or in the case of the interstate, the interstate name is entered for the rating site. The route number determines the file number, and the format should be followed exactly to produce a correctly formatted file number. Note that the beginning of all entries is “SR” followed by the route number.

- Enter appropriate route number.
- Select the (>) button to proceed to the next field.



[1,2]**Special Case**
The special case field indicates if the site is an interstate, off ramp, spur, etc. Numbers may be entered using the touch pad on the screen or via the standard Palm interface at the base of the screen.

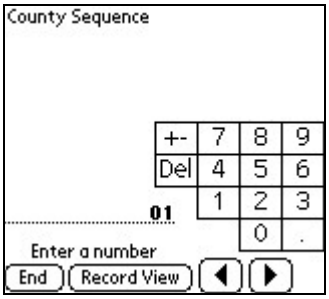
- Enter the special case.

None = 0 Spur = 1 Alternate = 2 Loop = 3 By-pass = 4
Business Route = 5 Northbound = 6 Southbound = 7
Eastbound = 8 Westbound = 9

- Select the (>) button to proceed to the next field.

Note: This field defaults to “0” which is the usual case.

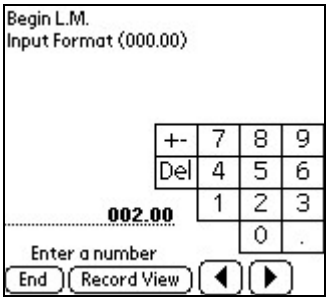
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



[1,2]**County Sequence**

The county sequence indicates how many times the route occurs in the county. Each time the route enters the county the sequence number is incremented by 1 starting at 01 for the first occurrence. The log mile starts over each time the sequence number changes.

- Enter the county sequence.
- Select the (>) button to proceed to the next field.

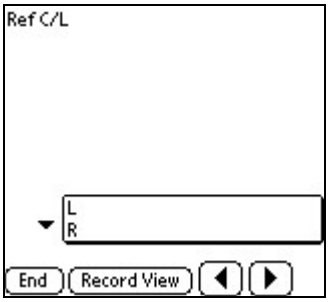


[1,2]**Beginning Log Mile**

The log mile for the beginning of the rating site is stated in hundredths of a mile and is called the "*Begin L.M.*" Input must consist of a six characters including the period; therefore preserve the digits to the left of the decimal point with zeros.

- Enter the beginning log mile.

Example input is shown.



[1,2]**Reference to the Center Line (Ref C/L)**

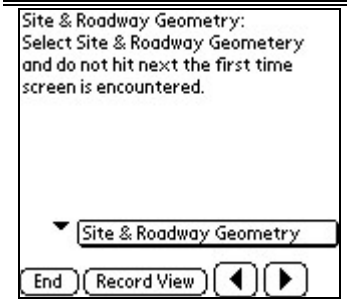
The *Ref C/L* designates the side of the road where the slope is located, with respect to the centerline of the road, and in the direction of increasing log mile. A popup field displays L, or R, corresponding to the input formats for this field.

- Select a value for the reference to the centerline.

Selection of a value advances the user automatically to the next field.

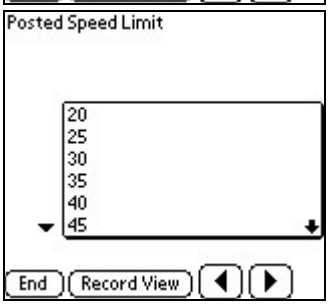
****Note: All required fields must be entered before**

Site and Roadway Geometry



The Site and Roadway Geometry field sends the user to another subform to record the site and roadway geometry information.

- Select "Site & Roadway Geometry" and the screen advances the user automatically to the next field.

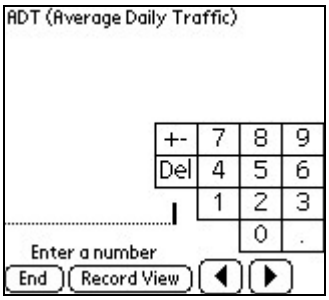


Posted Speed Limit

The posted speed limit, which maybe different from that found in TRIMS, is the speed limit at the site. The speed limit is used to calculate the average vehicle risk.

- Select the posted speed limit.
- Selection of a value advances the user automatically to the next field.

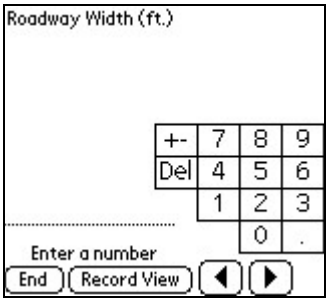
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



[2]**Average Daily Traffic**

The ADT field corresponds to the daily traffic count, and is usually recorded prior to fieldwork for the site from TRIMS. The ADT is used to calculate the average vehicle risk.

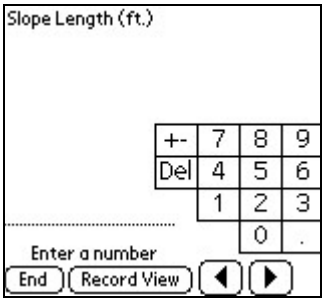
- Enter the appropriate ADT as an integer.
- Select the (>) button to proceed to the next field.



Roadway Width

The roadway width field corresponds to the measured width of the roadway from pavement edge to pavement edge. An estimate may be obtained from the TRIMS system and should be checked in the field.

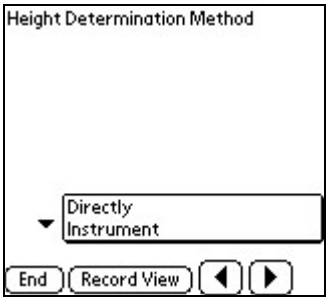
- Enter the appropriate roadway width with feet as the units.
- Select the (>) button to proceed to the next field.



Slope Length

The slope length field records the length of the portion of the slope that contains an A-class potential hazard to the motoring public.

- Enter the appropriate slope length to the nearest foot.
- Select the (>) button to proceed to the next field.



Height Determination Method

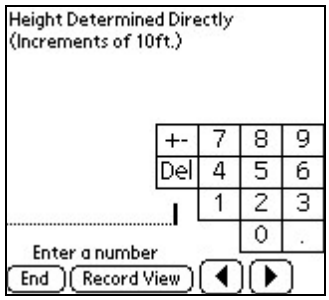
The height determination method field is used to record the choice of method, and control the sequence of fields for the selected measurement method. Choosing "*Directly*" allows the height to be estimated or input directly, while choosing "*Instrument*" allows the height to be calculated based on angles and distances to the instrument positions.

- Select a height determination method.

Selection of method automatically advances the user to the next field.

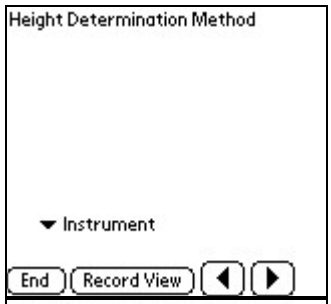
Height Determination Method: Choosing "Directly"

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

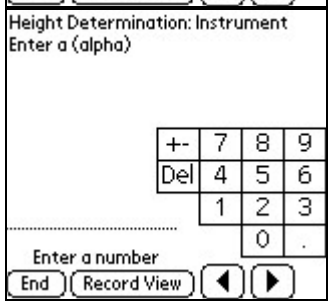


- Enter the height to the nearest 10 feet.
- Select the (>) button to proceed to the next field.

Height Determination Method: Choosing "Instrument"



Choosing "Instrument" indicates that the height will be calculated based on the NHI (1993) method.



- Enter the alpha angle as indicated in this figure.

The beta angle cannot be greater than the alpha angle.

- Select the (>) button to proceed to the next field.

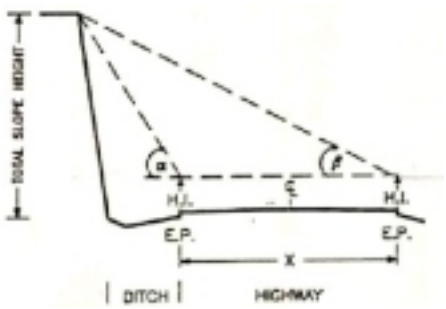
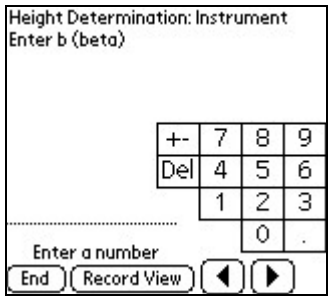
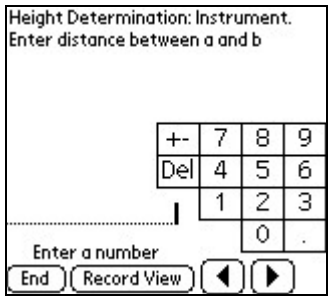


Figure 1 (NHI, 1993)

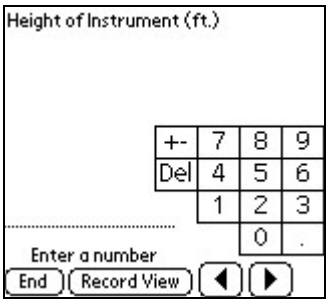


- Enter the beta angle.
- Select the (>) button to proceed to the next field.



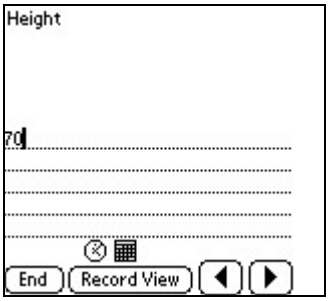
- Enter the distance between the points at which alpha and beta angles were measured (x distance on Figure 1.)
- Select the (>) button to proceed to the next field.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



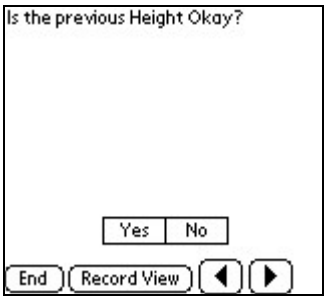
- Enter the instrument height at which alpha and beta were measured (HI in Figure 1.)
- Select the (>) button to proceed to the next field.

Continuing the rating.



The height is then displayed, whether entered "*Directly*" or calculated from "*Instrument*" input.

- Select the (>) button to proceed to the next field.

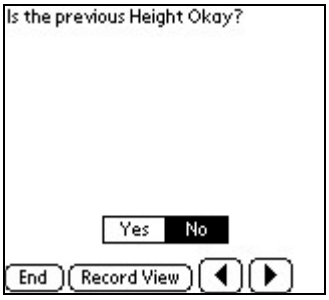


Verify that the height value displayed in the previous field is acceptable. In the case when the height is a result of "*Instrument,*" the user may want to recheck the input angles if the height does not appear to match the height estimate from visual inspection of the slope.

- Select Yes or No.

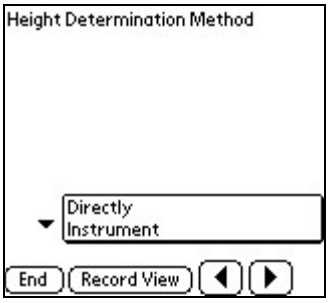
Selection of a value advances the user automatically to the next field.

Height Okay: "No"



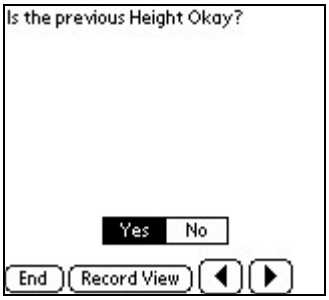
If the response to the *Height Okay* is "No," selection of a value returns the user automatically back to the Height Determination Method screen showing the previously selected entry.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

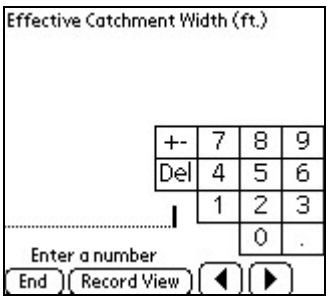


Repeat the process by either selecting "*Directly*" or "*Instrument*".

Height Okay: "Yes"



If the response to the height okay is "Yes" then the form automatically advances the user to the next screen.

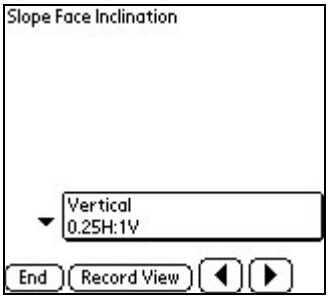


Effective Catchment Width

- Measure the catchment ditch width and record it as the effective catchment width.

The effective catchment width extents from the slope face to the edge of the pavement with units in feet.

- Select the (>) button to proceed to the next field.

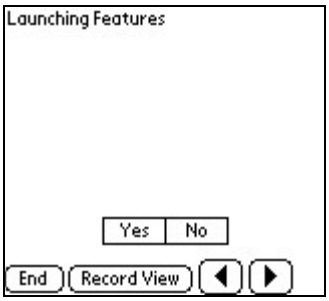


Slope Face Inclination

The facing field records whether the slope face is vertical or less than vertical. The facing is used to determine the necessary catchment width for the slope height and geometry based on TDOT's ditch criteria. This value is used to evaluate the degree of safety provided by the actual measured width.

- Selection of a value advances the user automatically to the next field.

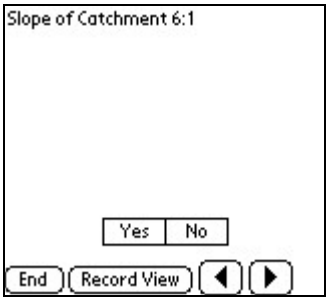
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Launching Features
The launching features field is used to record whether any benches, ramps or natural features are present that would tend to launch falling rocks into the road. If launching features are present indicate, “Yes”, otherwise indicate “No”.

- Select either “Yes” or “No.”

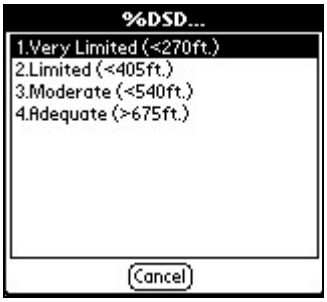
Selection of a value advances the user automatically to the next field.



Slope of Catchment 6:1
If the slope of the catchment is at least 6H:1V with slope down and away from the road), then indicate “Yes”, otherwise indicate “No.”

- Select either “Yes” or “No.”

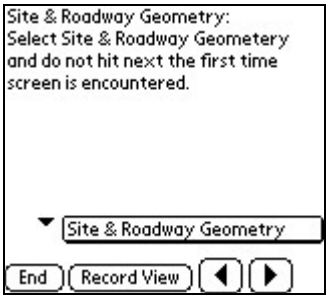
Selection of a value flashes the %DSD lookup field and advances the user automatically to the next field.



% DSD (Decision Sight Distance)
The popup field displays the list of distances corresponding to adequate, moderate, limited, and very limited sight distance. The minimum distances to meet the particular decision sight standard are in parentheses beside the standard. In this example for 45 mph, if the decision sight distance were estimated at 200ft., then the appropriate %DSD would be very limited because it’s less than 270ft. On the other hand, if the sight distance were 560ft. then the %DSD would be moderate.

- Select the appropriate %DSD.

Selection of the %DSD flashes the %DSD score and automatically advances the user to the next screen.
Note: Before proceeding to the next field all previous information must be entered.

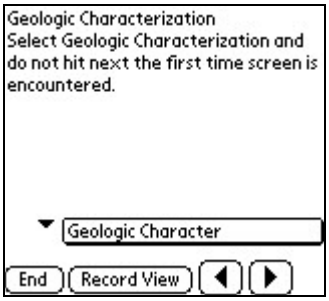


After the completion of the %DSD field, the form returns to the Site & Roadway Geometry field.

- Select the (>) button to proceed to the next field.

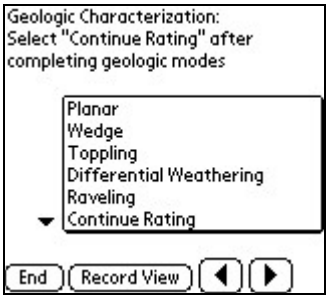
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

Geologic Characterization



- Select the Geologic Character to record the geologic data.

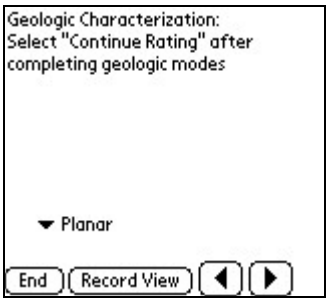
Selection of a value advances the user automatically to the next field.



- Select the category to begin recording the geologic data.

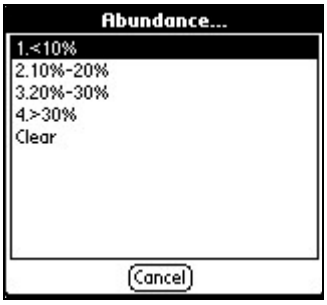
Ultimately, the form allows a user to select all the modes that apply to a rating site. Once a mode is selected the user is automatically advanced to the next field. Also, a "Continue Rating" option is available to end recording of geologic data, so as to continue on to rate water and rockfall history parameters. Note: The order that data are collected does not matter.

Planar Mode



- Select Planar from the drop down menu.

The planar abundance lookup field flashes and the user is automatically advanced to the next field.

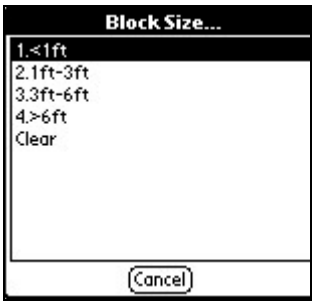


Abundance (Planar)

- Select the appropriate abundance range, using the field aids for guidance regarding the selection of an abundance category.

The "Clear" button should be used to deselect the rated failure mode. For example, in the case that the Planar mode was initially rated, but not applicable, selecting Clear will score the Abundance as 0. Selection of a value flashes the planar abundance score, the planar block size lookup field, and advances the user

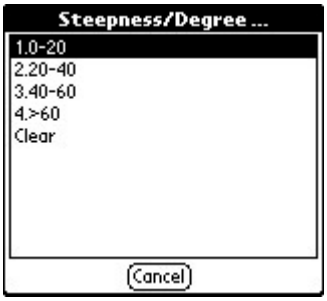
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Block Size (Planar)

- Select the appropriate block size range.

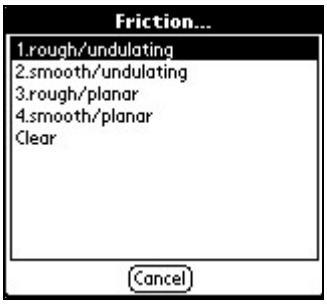
Selection of a value flashes the planar block size score, the steepness/degree lookup button, and advances the user automatically to the next field.



Steepness/Degree (Degrees) (Planar)

- Select the appropriate steepness/degree range for the wedge intersection lines.

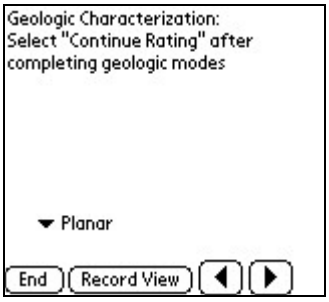
Selection of a value flashes the planar steepness/degree score, the planar friction lookup field, and advances the user automatically to the next field.



Friction (Planar)

- Select the appropriate friction category, using the field aids for guidance regarding the selection of a friction category.

Selection of a value flashes the planar fiction score and advances the user automatically to the next field.

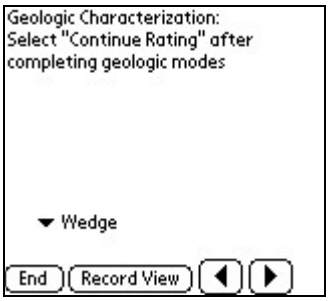


The user is returned to the geologic characterization menu, where either another active mode is selected or the “Continue Rating” is selected, in the case all modes have been rated.

- Select either another active mode or “Continue Rating.”

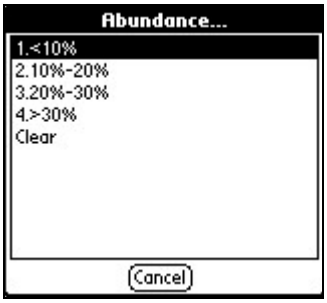
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

Wedge Mode



- Select Wedge from the drop down menu.

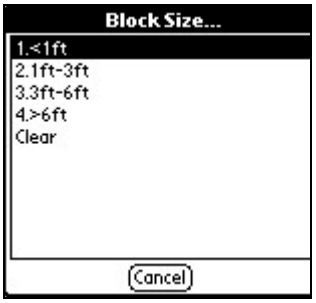
The wedge abundance lookup field flashes and the user is automatically advanced to the next field.



Abundance (Wedge)

- Select the appropriate abundance range, using the field aids for guidance regarding the selection of an abundance category.

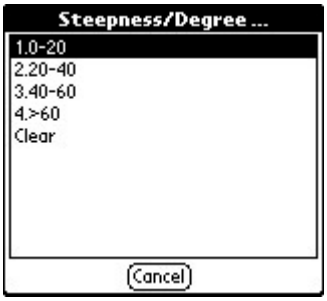
Selection of a value advances the user automatically to the next field. The "Clear" should be used to deselect the rated failure mode. For example, in the case that the Wedge mode was initially rated, but not applicable, selecting Clear will score the Abundance as 0. Selection of a value flashes the wedge abundance score, the wedge block size lookup field, and advances the user automatically to the next field.



Block Size (Wedge)

- Select the appropriate block size.

Selection of a value flashes the wedge block size score, the steepness/degree lookup button, and advances the user automatically to the next field.

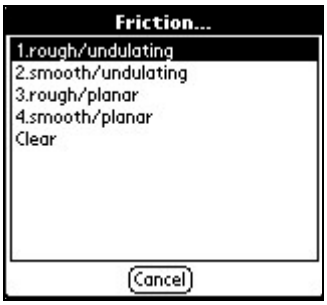


Steepness/Degree (Wedge)

- Select the appropriate steepness/degree range for the wedge intersection lines.

Selection of a value flashes the wedge steepness/degree score, the wedge friction lookup field, and advances the user automatically to the next field.

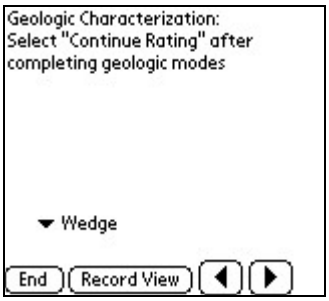
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Friction (Wedge)

- Select the appropriate friction category, using the field aids for guidance regarding the selection of a friction category.

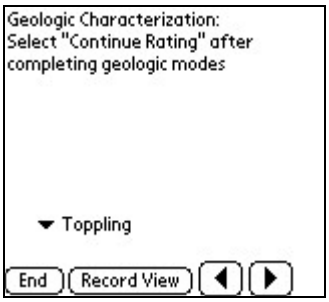
Selection of a value flashes the wedge fiction score and advances the user automatically to the next field.



The user is returned to the geologic characterization menu, where either another active mode is selected or the “Continue Rating” is selected, in the case all modes have been rated.

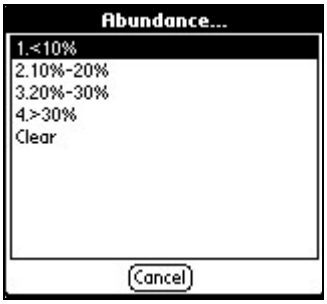
- Select either another active mode or “Continue Rating.”

Toppling Mode



- Select Toppling from the drop down menu.

The toppling abundance lookup field flashes and the user is automatically advanced to the next field.

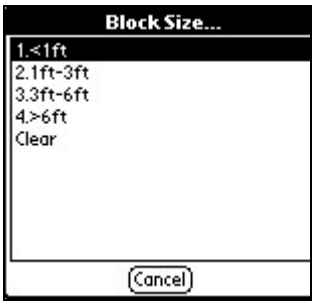


Abundance (Toppling)

- Select the appropriate abundance range, using the field aids for guidance regarding the selection of an abundance category.

Selection of a value advances the user automatically to the next field. The “Clear” should be used to deselect the rated failure mode. For example, in the case that the Toppling mode was initially rated, but not applicable, selecting Clear will score the Abundance as 0. Selection of a value flashes the toppling abundance score, the toppling block size lookup field, and advances the user automatically to the next field.

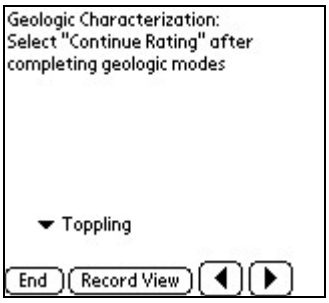
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Block Size (Toppling)

- Select the appropriate block size.

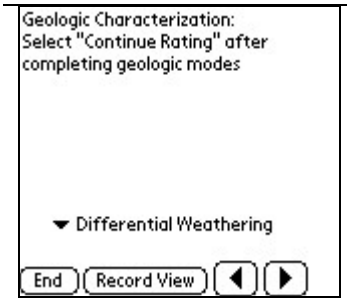
Selection of a value flashes the toppling block size score, the steepness/degree lookup button, and advances the user automatically to the next field.



The user is returned to the geologic characterization menu, where either another active mode is selected or the “Continue Rating” is selected, in the case all modes have been rated.

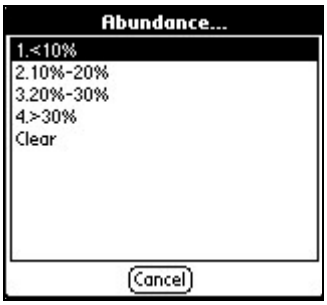
- Select either another active mode or “Continue Rating.”

Differential Weathering Mode



- Select Differential Weathering from the dropdown menu.

The differential weathering abundance lookup field flashes and the user is automatically advanced to the next field.

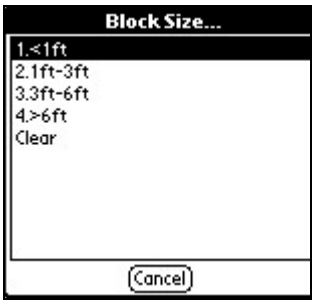


Abundance (Differential Weathering)

- Select the appropriate abundance range, using the field aids for guidance regarding the selection of an abundance category.

Selection of a value advances the user automatically to the next field. The “Clear” should be used to deselect the rated failure mode. For example, in the case that the Differential Weathering mode was initially rated, but not applicable, selecting Clear will score the Abundance as 0. Selection of a value flashes the differential weathering abundance score, the differential weathering block size lookup field, and advances the user automatically to the next field.

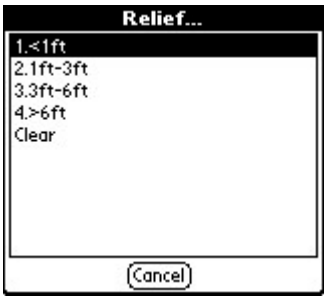
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Block Size (Differential Weathering)

- Select the appropriate block size.

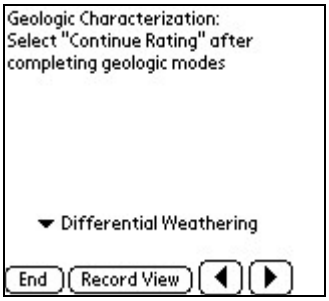
Selection of a value flashes the differential weathering block size score, the steepness/degree lookup button, and advances the user automatically to the next field.



Relief (Differential Weathering)

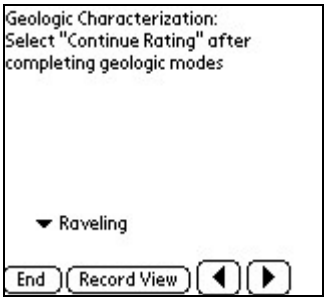
- Select the appropriate relief range where relief is the amount that overhangs are emergent from the slope face.

Selection of a value flashes the differential weathering relief score and advances the user automatically to the next field.



The user is returned to the geologic characterization menu, where either another active mode is selected or the “Continue Rating” is selected, in the case all modes have been rated.
Select either another active mode or “Continue Rating.”

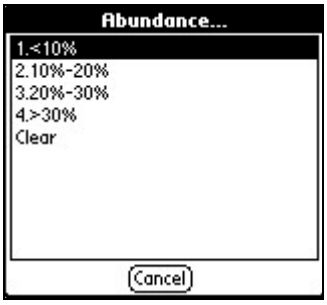
Raveling Mode



- Select Raveling from the dropdown menu.

The raveling abundance lookup field flashes and the user is automatically advanced to the next field.

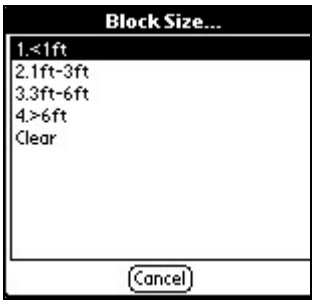
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Abundance (Raveling)

- Select the appropriate abundance range, using the field aids for guidance regarding the selection of an abundance category.

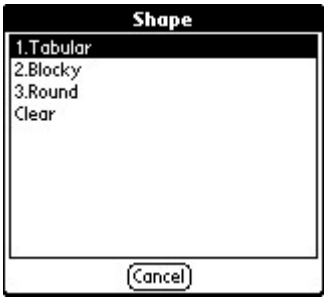
Selection of a value advances the user automatically to the next field. The “Clear” should be used to deselect the rated failure mode. For example, in the case that the Raveling mode was initially rated, but not applicable, selecting Clear will score the Abundance as 0. Selection of a value flashes the raveling abundance score, the raveling block size lookup field, and advances the user automatically to the next field.



Block Size (Raveling)

- Select the appropriate block size.

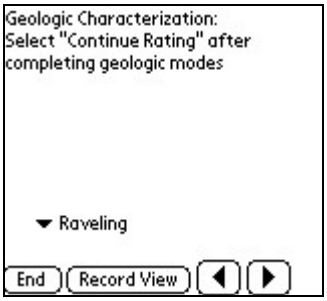
Selection of a value flashes the raveling block size score, the shape lookup button, and advances the user automatically to the next field.



Shape (Raveling)

- Select the appropriate shape of the representative block size.

Selection of a value flashes the raveling shape score, the and advances the user automatically to the next field.

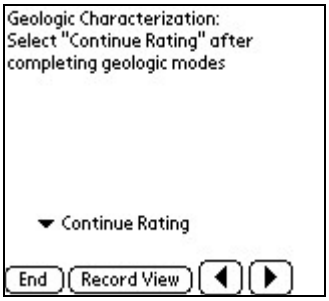


The user is returned to the geologic characterization menu, where either another active mode is selected or the “Continue Rating” is selected, in the case all modes have been rated.

- Select either another active mode or “Continue Rating.”

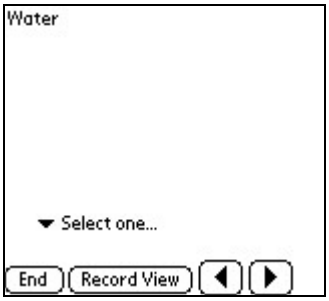
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

After Completion of Geologic Mode(s)



After rating the geologic failure modes that are present, select “Continue Rating” from the popup menu. Selection of a value advances the user automatically to the next field.

- Select Continue Rating.

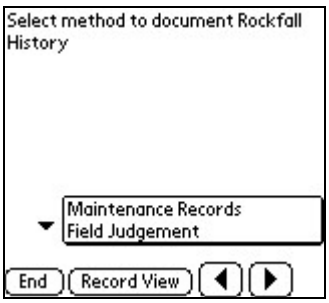


Water

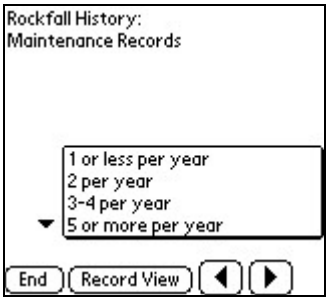
The water field is used to record the presence of water that is on the slope at the time of rating.

- Select the appropriate presence of water category. The choice automatically advances the user to the next field.

Note: The presence of water parameter is subject to change from day to day and season to season as a function of recent precipitation patterns. Use the field aid for presence of water to give guidance regarding the choice of an appropriate water category.



- Select the appropriate method to document the rockfall history and the user is automatically advanced to the next field.

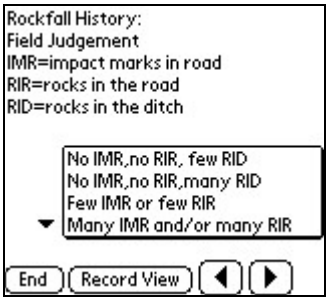


Rockfall History: Maintenance Records

- Select the appropriate category based on the maintenance record.

Note: Before proceeding to the next field all previous information must be entered.

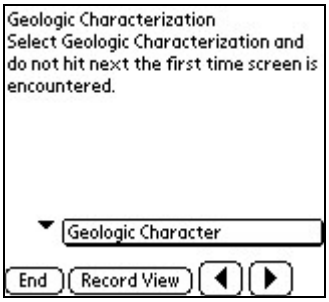
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Rockfall History: Field Judgment

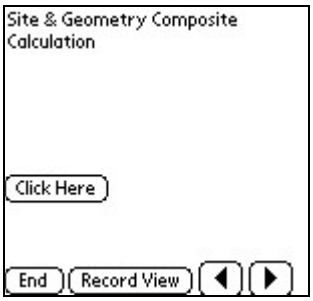
- Select the appropriate category for the Rockfall History based on the field judgment.

Note: Before proceeding to the next field all the previous information must be entered.



After the completion of the Rockfall History field the form returns to the Geologic Characterization field.

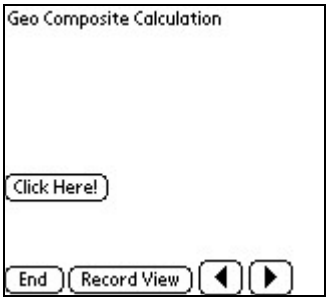
- Select the > key and proceed to the Site & Geometry Composite Calculation field.



Site & Geometry Composite Calculation

The *Site and Geometry Composite* calculation retrieves the calculated composite score for the recorded information of "Site & Roadway Geometry."

- Tap "Click Here" and the user is automatically advanced to the next field.

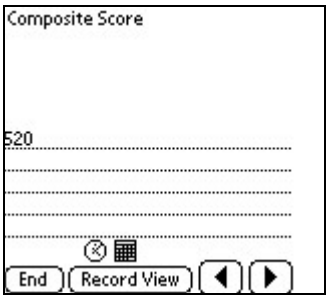


Geologic Composite Calculation

The Geo Composite calculation field retrieves the calculated composite score for the geologic characterization, rockfall history, and water.

- Tap "Click Here" and the user is automatically advanced to the next field.

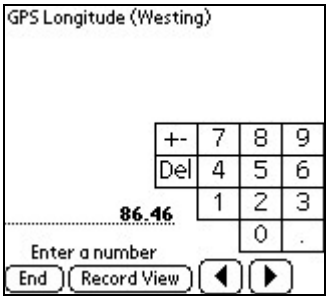
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Composite Score
The composite score reports the total score for all rated characteristics. This field is read-only and can only be changed by changing the rated parameters.
Note: if rated parameters are changed, to re-calculate the score, both the Site & Geometry Composite Calculation field and Geo Composite Calculate field must be revisited and "Click Here" selected.

- Select the (>) button to proceed to the next field.

Rockfall rating is complete, enter supplemental information.

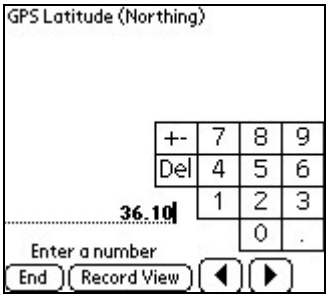


GPS Longitude
The *GPS Longitude* field stores the x coordinate of the spatial data.

- Enter the longitude as shown in the example.

Report Longitude to hundredths of a degree.

- Select the (>) button and proceed to next field.

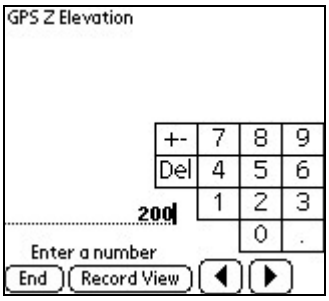


GPS Latitude
The *GPS Latitude* field stores the y coordinate of the spatial data.

- Enter the latitude as shown in the example.

Report Longitude to hundredths of a degree.

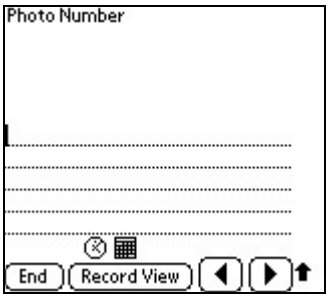
- Select the (>) button and proceed to next field.



GPS Z Elevation
The GPS Z Elevation field stores the z coordinate of the spatial data.

- Enter the elevation in feet.
- Select the (>) button and proceed to next field.

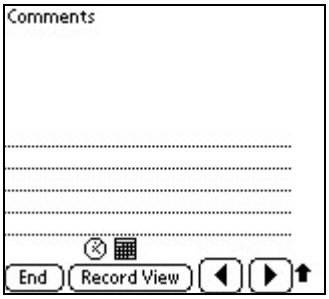
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Photograph Number

The photograph number stores the camera picture number for the rating site. The field allows the use of numbers and/or text because some camera's store picture number as alphanumeric. More than one number may be entered where more than one photograph is taken by separating the entries with commas.

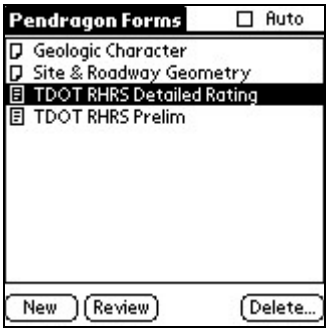
- Enter photograph number using the Palm alphanumeric pad.
- Select the (>) button and proceed to next field.



Comments

The comments field enables a user to record brief pertinent statements about critical aspects from the site. Completion of this field automatically completes data entry for this particular detailed rating and returns the user to the original forms listing (see next field).

- Select the (>) button and proceed to next field.

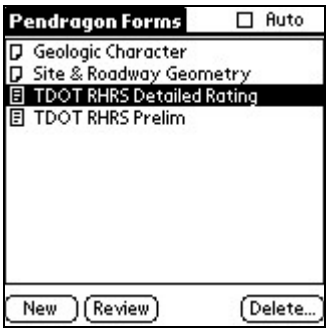


After Finishing the form returns to the beginning screen. The data will be downloaded during the next hot sync.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

Modifying and editing an existing record.

To modify an existing record, you will need to review the record on the handheld and select the record that you want to modify (Pendragon, 2001). The file number or any other distinctive parameter may be used to identify the specific record that you want to modify.

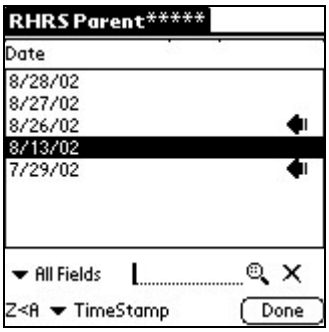


Form Screen

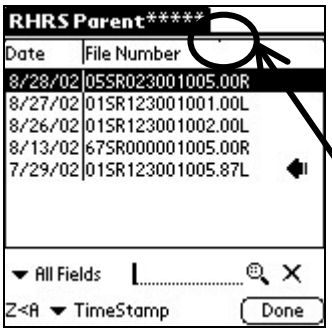
- Tap the name of a form to highlight it.

In this example, we are modifying a detailed rating.

- Tap the Review button.



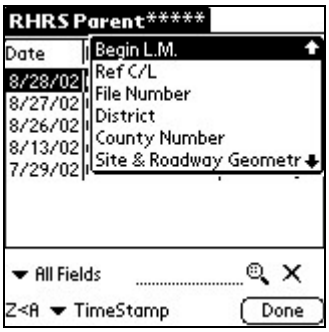
A list of records for that form that are in the particular PDA is displayed. Typically the first field, which is "Date" in this case, is shown on the screen. The arrow on the right indicates which records are awaiting download to the PC after a HotSync has occurred.



To aid in record selection, you can display up to two additional fields by tapping in the second and third columns heading positions, and then selecting the field name. In this example, the file number, which uniquely identifies each record, is displayed.

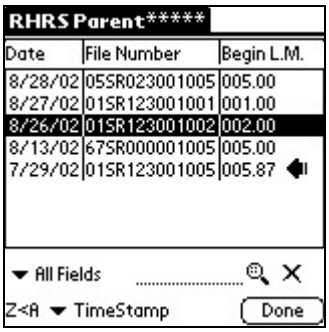
The tick mark indicates the division between two column headings.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



In this example, we want to check the Beginning Log Mile. To do so, we change the third column heading to "*Begin L.M.*" by tapping in the heading space.

- Tap into the heading space.



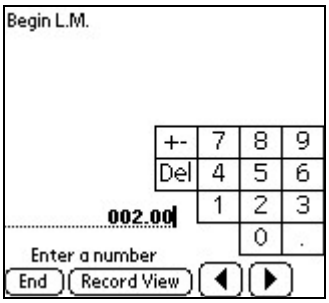
- Tap on a record to change the "*Begin L.M.*"

In this example, the County was Anderson County at mile marker 002.50 instead of the 000.200 as entered.

After tapping on the record you are automatically taken inside the form in record view. To the left are the headings of each field.

- To change the "*Begin L.M.*" field, tap the "*Begin L.M.*"

Note: the date the record was created is shown in the top left corner. The double left arrows take the user to the beginning of the fields (in this example to the date field), where as the double right arrows takes the user to the end of the fields (in this example to the Comments field). The single left arrow only advance the previous field and the single right arrow to the next field.

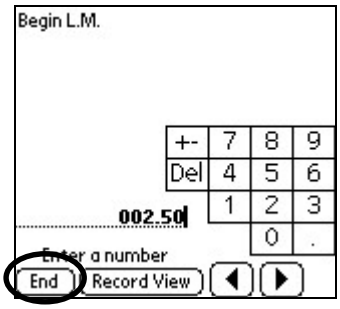


Now you are in field view, which is the view that the records were first created in.

- Tap the delete key to change the entry.

An alternatively approach is tapping on the field to the right and using the Palm alphanumeric pad to correct the entry.

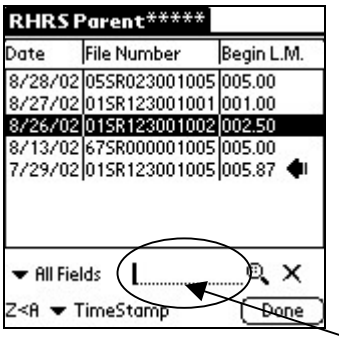
[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name



Once the entry has been changed.

- Tap the End button located in the lower left corner as indicated in the example.

Tapping the > key will take you to the next field in the form.

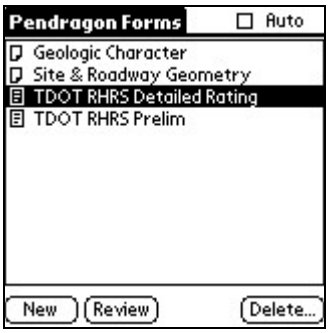


After tapping the End button, you are returned to the Review screen and the entry is changed.

- If all necessary changes are made, tap the Done button.

Changing the “All fields” changes the search criteria. The user can search on any of the field located on the form. Once the search criterion is entered (in the example, “All fields” is the search criteria), the user can filter for a specific value of the search criteria by typing the parameter in the blank line. Pressing the magnifying glass filters for the entered parameter. The X icon removes the filtered criteria.

The “TimeStamp” is the actual date the record was created, which may differ from the date of the rating.



After selecting the Done button you are returned to the Forms Screen.

[1]Information gather from Tennessee Roadway Information Management System (TRIMS)
[2]Field used in creation of file name

APPENDIX C

Preliminary Form Report

Form Name: **TDOT RHRS Prelim**

Field: **1**

Date

Field Type: **Date Only**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Date1**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **2**

Rater

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Rater**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Prelim**

Field: **3**

`Region[1234]`

Field Type: **Option 1 of 5**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Region1234**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Script:

```
exit:
if answer = "1" then hide from 4 to 7 show 4 goto 4 endif
if answer = "2" then hide from 4 to 7 show 5 goto 5 endif
if answer = "3" then hide from 4 to 7 show 6 goto 6 endif
if answer = "4" then hide from 4 to 7 show 7 goto 7 endif
```

Field: **4**

`Region 1 County`

Field Type: **Exclusive lookup list**

Parameters:

Region 1_Cnty	

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Region1County**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Prelim**

Field: **5**

Region 2 County

Field Type: **Exclusive lookup list**

Parameters: **Region 2_Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Region2County**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **6**

Region 3 County

Field Type: **Exclusive lookup list**

Parameters: **Region 3 _Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Region3County**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Prelim**

Field: **7**

```
Region 4 County
```

Field Type: **Exclusive lookup list**

Parameters: **Region 4_Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Region4County**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **8**

```
Route Number
Input Format (SR000)
```

Field Type: **Freeform text**

Parameters:

Default Value: **SR000**

Pattern:

Max Length:

Lookup List::

maxValue: **10**

minValue: **1**

Column Name: **RouteNumber**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Prelim**

Field: **9**

`Special Case`

Field Type: **Numeric**

Parameters:

Default Value: **0**

Pattern: **Integer**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SpecialCase**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **10**

`County Sequence`

Field Type: **Numeric**

Parameters:

Default Value: **01**

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CountySequence**

Script:

```
exit:
if answer > 10 then msgbox "The entered county sequence is very high,
check results" endif
```

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Prelim**

Field: **11**

```
Begin L.M.
Input Format (000.00)
```

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **BeginLM**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **12**

```
Ref C/L
```

Field Type: **Popup list**

Parameters:

L
R
L/R

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RefCL**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Prelim**

Field: **13**

ADT (Average Daily Traffic)

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **ADTAverageDailyTraffic**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **14**

Posted Speed Limit

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Integer**

Max Length:

Lookup List::

maxValue: **70**

minValue: **10**

Column Name: **PostedSpeedLimit**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Prelim**

Field: **15**

```
Preliminary Rating
Potential for RRR &/or
HRA
RRR=rocks to reach
roadway
```

Field Type: **Popup list**

Parameters:

A:mod-high RRR,and/or **B:low-mod RRR,and/or**	

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PreliminaryRating**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [x] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **16**

```
File Number
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **FileNumber**

Script:

calculate:
result = $18 & $8
result = result & $9
result = result & $10
result = result & $11

- [ ] Hidden
- [x] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [x] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **TDOT RHRS Prelim**

Field: **17**

District

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List:: **Cnty_District**

maxValue:

minValue:

Column Name: **District**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

Calculate:
if $[Region] = "1" then lookup $[R1C] within Cnty_District" endif
if $[Region] = "2" then lookup $[R2C] within Cnty_District" endif
if $[Region] = "3" then lookup $[R3C] within Cnty_District" endif
if $[Region] = "4" then lookup $[R4C] within Cnty_District" endif

Field: **18**

County Number

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List:: **Cnty_CntyNo**

maxValue:

minValue:

Column Name: **CountyNumber**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

Calculate:
if $[Region] = "1" then lookup $[R1C] within "Cnty_CntyNo" endif
if $[Region] = "2" then lookup $[R2C] within "Cnty_CntyNo" endif
if $[Region] = "3" then lookup $[R3C] within "Cnty_CntyNo" endif
if $[Region] = "4" then lookup $[R4C] within "Cnty_CntyNo" endif

Form Name: **TDOT RHRS Prelim**

Field: **19**

GPS Longitude (Westing)

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSLongitude**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **20**

Comb Long

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSLONG**

Script: **calculate:**
answer = $[GPSLongitude] & "N"

- [ ] Hidden
- [ ] Primary Key
- [x] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Prelim**

Field: **21**

GPS Latitude (Northing)

Field Type: **Numeric**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSLatitude**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **22**

Comb Lat

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CombLat**

Script: **calculate:**
answer = $[GPSLatitude] & "W"

- [ ] Hidden
- [x] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **TDOT RHRS Prelim**

Field: **23**

GPS Z Elevation

Field Type: **Numeric**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSZLatitude**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **24**

Photo Number

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PhotoNumber**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [x] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **TDOT RHRS Prelim**

Field: **25**

Comments

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Comments**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

APPENDIX D

Detailed Form Report

Form Name: **TDOT RHRS Detailed Rating**

Field: **1**

File Number

Field Type: **Freeform text**

Parameters:

Default Value:	
Pattern:	
Max Length:	
Lookup List::	
maxValue:	
minValue:	
Column Name:	**FileNumber**

- [x] Hidden
- [x] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
result = $[CntyNo] & $[RN]   result = result & $[SC]
result = result & $[CS]      result = result & $[BLM]
result = result & $[RCL]     result = result & RF
answer = result
```

Field: **2**

Date

Set date... Clear

Field Type: **Date Only**

Parameters:

Default Value:	
Pattern:	
Max Length:	
Lookup List::	
maxValue:	
minValue:	
Column Name:	**Date1**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Script:

Form Name: **TDOT RHRS Detailed Rating**

Field: **3**

Rater

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Rater**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **4**

Region[1234]

Field Type: **Option 1 of 5**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Region1234**

Script:

```
exit:
if answer = "1" then hide from [R1C] to [R4C] show [R1C] goto [R1C]
endif
 if answer = "2" then hide from [R1C] to [R4C] show  [R2C] goto  [R2C]
endif
```

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **5**

Region 1 County

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **Region 1_Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **R1C**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **6**

Region 2 County

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **Region 2_Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **R2C**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **7**

Region 3 County

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **Region 3 _Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **R3C**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **8**

Region 4 County

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **Region 4_Cnty**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **R4C**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **9**

```
Route Number
Input Format (State
Route = SR000 or
Interstate = I0000)
```

Field Type: **Freeform text**

Parameters:

Default Value: **SR000**

Pattern:

Max Length:

Lookup List::

maxValue: **10**

minValue: **1**

Column Name: **RN**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **10**

```
Special Case
```

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value: **0**

Pattern: **Integer**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SC**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **11**

```
County Sequence
```

Field Type: **Numeric**

Parameters:

Default Value: **01**

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CS**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Script:

```
exit:
if answer > 10 then msgbox "The entered county sequence is very high,
check results" endif
```

Field: **12**

```
Begin L.M.
Input Format (000.00)
```

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **BLM**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Script:

Form Name: **TDOT RHRS Detailed Rating**

Field: **13**

`Ref C/L`

Field Type: **Popup list**

Parameters:

L
R

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RCL**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **14**

`District`

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List:: **Cnty_District**

maxValue:

minValue:

Column Name: **District**

Script:

Calculate:
if $[R1234] = "1" then lookup $[R1C] within "Cnty_District" endif
if $[R1234] = "2" then lookup $[R2C] within "Cnty_District" endif
if $[R1234] = "3" then lookup $[R3C] within "Cnty_District" endif
if $[R1234] = "4" then lookup $[R4C] within "Cnty_District" endif

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **15**

County Number

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List:: **Cnty_CntyNo**

maxValue:

minValue:

Column Name: **CountyNumber**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
Calculate:
if $[R1234] = "1" then lookup $[R1C] within "Cnty_CntyNo" endif
if $[R1234] = "2" then lookup $[R2C] within "Cnty_CntyNo" endif
if $[R1234] = "3" then lookup $[R3C] within "Cnty_CntyNo" endif
if $[R1234] = "4" then lookup $[R4C] within "Cnty_CntyNo" endif
```

Field: **16**

Site & Roadway Geometry: Select Site & Roadway Geometery (Do not hit next arrow until ready to enter Geology

Field Type: **Single subform list**

Parameters:

Site & Roadway Geomet	

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SiteRoadwayGeometry**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

Form Name: **TDOT RHRS Detailed Rating**

Field: **17**

```
Geologic
Characterization
Select Geologic
Characterization (Do
not hit next arrow
```

Field Type: **Single subform list**

Parameters: **Geologic Character**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GeologicCharacterization**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **18**

```
Site & Geometry
Composite Calculation
```

Click here...

Field Type: **Button**

Parameters:

Default Value: **Click Here!**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CompositeCalculation**

Script: **click:**
subformsum "Site & Roadway Geometry" 42 $19 = integer result goto [SiteGeo]

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **19**

```
Site & Geo
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SiteGeo**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **20**

```
Geo Composite
Calculation
```

Click here...

Field Type: **Button**

Parameters:

Default Value: **Click Here!**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GeoCompositeCalculation**

Script:

```
click:
subformsum "Geologic Character" 28 $21 = integer result
goto [GeoComp]
```

- [ ] Hidden
- [x] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **TDOT RHRS Detailed Rating**

Field: **21**

Geo

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Geo**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **22**

Composite Score

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CompSC**

Script:

calculate:
result = $19 + $21
answer = integer result

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **23**

GPS Longitude (Westing)

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSLong**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **24**

Combined Long.

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CombinedLong**

Script:

```
calculate:
result = $[GPSLong] & " N"
answer = result
```

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **25**

GPS Latitude (Northing)

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSLat**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **26**

Comb. Lat.

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **CombLat**

Script:

```
calculate:
result = $[GPSLat] & " W"
answer = result
```

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **27**

GPS Z Elevation

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GPSZLatitude**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **28**

Photo Number

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PhotoNumber**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **TDOT RHRS Detailed Rating**

Field: **29**

Comments

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Comments**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **Site & Roadway Geometry**

Field: **1**

```
File Number
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **FileNumber**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [x] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **2**

```
Posted Speed Limit
```

Field Type: **Popup list**

Parameters:

20 **25** **30** **35** **40** **45** **50**	**70**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PSL**

Script:

```
exit:
if answer = 20 then  hide from [SL20] to [SL70] show [SL20] endif
if answer = 25 then  hide from [SL20] to [SL70] show [SL25] endif
if answer = 30 then  hide from [SL20] to [SL70] show [SL30] endif
if answer = 35 then  hide from [SL20] to [SL70] show [SL35] endif
```

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **3**

ADT (Average Daily Traffic)

Field Type: **Numeric**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **ADTAverageDailyTraffic**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **4**

Road Width (ft.)

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RdwyWdth**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **5**

```
Roadway Width Score
```

Field Type: **Freeform text**

Parameters:

Default Value: **100**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RoadwayWidthScore**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
result = 52 - $[RdwyWdth]
result = result / 8
result = 3 pow result
if result > 100 then result = 100 endif
```

Field: **6**

```
Slope Length (ft.)
```

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SlpLng**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

Form Name: **Site & Roadway Geometry**

Field: **7**

AVR Score

Field Type: **Freeform text**

Parameters:

Default Value: **100**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **AVRSC**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
result = $[ADT] * $[SlpLng]   result = result / 24
result = result / $[PSL]      result = result / 5280
result = result * 100         result = result / 25
result = 3 pow result
```

Field: **8**

Height Determination Method

Field Type: **Popup list**

Parameters:

Directly **Instrument**	

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **HDM**

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Script:

```
exit:
 if answer #Directly then hide from [HDD] to [IDH]  show [HDD] goto
[HDD] endif
if answer #Instrument then hide from [HDD] to [IDH] show  from [Alpha]
to [HI] goto [Alpha] endif
```

Form Name: **Site & Roadway Geometry**

Field: **9**

```
Height Determined
Directly
(Increments of 10ft.)
```

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **HDD**

Script: **exit:**
goto [Height]

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **10**

```
Height Determination:
Instrument
Enter a (alpha)
```

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Alpha**

Script: **exit: goto [Beta]**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **11**

```
Height Determination:
Instrument
Enter b (beta)
```

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Beta**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
exit:
if answer > $[Alpha] then msgbox "Alpha can not be greater than Beta,
Check angles."
goto [Alpha] endif goto [DisAB]
```

Field: **12**

```
Height Determination:
Instrument. Enter
distance between a and b
```

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **DisAB**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
exit: goto [HI]
```

Form Name: **Site & Roadway Geometry**

Field: **13**

```
Height of Instrument
(ft.)
```

+-	7	8	9
Del	4	5	6
	1	2	3

Field Type: **Numeric**

Parameters:

Default Value:

Pattern: **Float**

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **HI**

Script:

```
exit:
goto [Height]
```

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **14**

```
Height Determination:
Instrument. Diffence
between angle (a - b)
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **DiffAB**

Script:

```
calculate:
if $[Alpha] = null then
result = 1 else
result = $[Alpha] -$[Beta]
result = result * PI
```

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **15**

Height Determination: Instrument, Determined Height

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **IDH**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[SinA] = null then
result = 1 else
result = $[SinA] * $[SinB]
result = result * $[DisAB]
```

Field: **16**

Height

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Height**

- [ ] Hidden
- [ ] Primary Key
- [x] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[HDM] #Directly then result = $[HDD] endif
if $[HDM] #Instrument then result = $[IDH] endif
answer = result
```

Form Name: **Site & Roadway Geometry**

Field: **17**

```
Is the previous Height
Okay?
```

Field Type: **Yes or No**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **HghtOk**

Script:

```
exit:
if answer == N then
goto [HDM]
endif
```

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **18**

```
Height Score
```

Field Type: **Freeform text**

Parameters:

Default Value: **100**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **HeightScore**

Script:

```
calculate:
result = $[Height] / 25
result = 3 pow result
if result > 100 then result = 100 endif
answer =  result
```

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **19**

Sine of A

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SinA**

Script:

Calculate:
result = $[Alpha] * pi
result = result / 180
answer = sin result

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **20**

Sine of B

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SinB**

Script:

Calculate:
result = $[Beta] * pi
result = result / 180
answer = sin result

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **21**

Effective Catchment Width (ft.)

Field Type: **Numeric**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **ECWD**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **22**

Slope Face Inclination

Field Type: **Popup list**

Parameters: **Vertical**
0.25H:1V

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Facing**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **Site & Roadway Geometry**

Field: **23**

```
Vertical Slope Design
Catchement Width
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **VSDCW**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[Height] < 50 then result = 18
answer = result
goto  [LF]
endif
```

Field: **24**

```
0.25H:1V: Design
Catchment Width
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **HVDCW**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[Height] < 40 then result = 18
   answer = result
    goto  [LF] endif
if $[Height] < 50 then result = 24
```

Form Name: **Site & Roadway Geometry**

Field: **25**

```
%Difference
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Pdiff**

Script:

```
calculate:
if $[Facing] #Vertical then
result = $[ECW] / $[VSDCW]
result = result * 100
endif
```

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **26**

```
Launching Features
```

Field Type: **Yes or No**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **LF**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Form Name: **Site & Roadway Geometry**

Field: **27**

Slope of Catchment 6:1

Field Type: **Yes or No**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SlpCtmt**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [x] Required

Field: **28**

Bin Group

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **BG**

Script:

Calculate:
if $[Pdiff] < 50 then result = 4
answer = result
goto [SlpCtmt]
endif

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **29**

```
Ditch Effectiveness
Score
```

Field Type: **Freeform text**

Parameters:

Default Value: **100**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Score**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[LF] == Y then result = 1  else result = 0 endif
if $[SlpCtmt] == Y
then result = result + 1 endif
result = result + $[BG]
```

Field: **30**

```
% DSD: Speed Limit 20
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL20**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL20**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

Form Name: **Site & Roadway Geometry**

Field: **31**

```
% DSD: Speed Limit 25
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL25**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL25**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **32**

```
% DSD: Speed Limit 30
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL30**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL30**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **33**

```
% DSD: Speed Limit 35
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL35**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL35**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **34**

```
% DSD: Speed Limit 40
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL40**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL40**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **35**

```
% DSD: Speed Limit 45
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL45**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL45**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **36**

```
% DSD: Speed Limit 50
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL50**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL50**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **37**

```
% DSD: Speed Limit 55
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL55**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL55**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **38**

```
% DSD: Speed Limit 60
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL60**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL60**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **39**

```
% DSD: Speed Limit 65
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL65**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL65**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **40**

```
% DSD: Speed Limit 70
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **SL70**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SL70**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Site & Roadway Geometry**

Field: **41**

DSD Score

Field Type: **Freeform text**

Parameters:

Default Value: **100**

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **DSDSC**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[PSL] = 20 then result = $[SL20] endif
if $[PSL] = 25 then result = $[SL25] endif
if $[PSL] = 30 then result = $[SL30] endif
if $[PSL] = 35 then result = $[SL35] endif
```

Field: **42**

S & R G Composite

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **SRGComposite**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
result = $[RdwthSC] + $[AVRSC]
result = result + $[HghtSC]
result = result + $[DESC]
result = result + $[DSDSC]
```

Form Name: **Geologic Character**

Field: **1**

File Number

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **FileNumber**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [x] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **2**

Geologic Characterization: Select "Continue Rating" after completing geologic

Field Type: **Popup list**

Parameters:

Planar
Wedge
Toppling
Differential Weathering
Raveling
Continue Rating

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GeoChr**

Script:

```
exit:
if answer == "Planar" then show from [PLAB] to [PLF]
goto [PLAB] endif
if answer == "Wedge" then show from [WDAB] to [WDF]
goto  [WDAB] endif
```

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **3**

Abundance (Planar)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **PLAB**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PLAB**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **4**

Block Size (Planar)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **PLBS**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PLBS**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **Geologic Character**

Field: **5**

```
Steepness/Degree
(Degrees)
(Planar)
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **PLSD**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PLST**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **6**

```
Friction
(Planar)
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **PLF**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **PLFR**

Script: **exit:**
goto [GeoChr]

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **7**

Abundance (Wedge)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **WDAB**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **WDAB**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **8**

Block Size (Wedge)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **WDBS**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **WDBS**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **Geologic Character**

Field: **9**

```
Steepness/Degree
(Degrees)
(Wedge)
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **WDST**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **WDST**

Script:

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Field: **10**

```
Friction
(Wedge)
```

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **WDF**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **WDFR**

Script: **exit:**
goto [GeoChr]

- [ ] Hidden
- [ ] ReadOnly
- [ ] Key
- [ ] Autodefault
- [ ] Required
- [ ] Primary Key
- [ ] Don't Update PC
- [ ] Non-Printing

Form Name: **Geologic Character**

Field: **11**

Abundance (Toppling)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **TPAB**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **TPAB**

Script:

☐ Hidden ☐ Primary Key

☐ ReadOnly ☐ Don't Update PC

☐ Key ☐ Non-Printing

☐ Autodefault

☐ Required

Field: **12**

Block Size (Toppling)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **TPBS**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **TPBS**

Script: **exit:**
goto [GeoChr]

☐ Hidden ☐ Primary Key

☐ ReadOnly ☐ Don't Update PC

☐ Key ☐ Non-Printing

☐ Autodefault

☐ Required

Form Name: **Geologic Character**

Field: **13**

Abundance (Differential Weathering)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **DWAB**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **DWAB**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **14**

Block Size (Differential Weathering)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **DWBS**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **DWBS**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **15**

Relief (Differential Weathering)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **DWR**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **DWR**

Script: **exit:**
goto [GeoChr]

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **16**

Abundance (Raveling)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **RVAB**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RVAB**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **17**

Block Size (Raveling)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **RVBS**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RVBS**

Script:

☐ Hidden ☐ Primary Key

☐ ReadOnly ☐ Don't Update PC

☐ Key ☐ Non-Printing

☐ Autodefault

☐ Required

Field: **18**

Shape (Raveling)

Lookup...

Field Type: **Exclusive lookup list**

Parameters: **RVS**

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RVS**

Script: **exit:**
goto [GeoChr]

☐ Hidden ☐ Primary Key

☐ ReadOnly ☐ Don't Update PC

☐ Key ☐ Non-Printing

☐ Autodefault

☐ Required

Form Name: **Geologic Character**

Field: **19**

GeoScore

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GeoSc**

Script:

calculate:
result =$[PLAB] + $[PLBS]
result = result + $[PLST]
result = result + $[PLF]

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **20**

Water

Field Type: **Popup list**

Parameters:

None
Seeping
Flowing
Gushing

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **Water**

Script:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **21**

```
Water Score
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Column Name: **WaterSco**

Script:

```
calculate:
if $[Water] == None then assign 3 endif
if $[Water] == Seeping then assign 9 endif
if $[Water] == Flowing then assign 27 endif
if $[Water] == Gushing then assign 81 endif
```

Field: **22**

```
Select method to
document Rockfall
History
```

Field Type: **Popup list**

Parameters:

Maintenance Records **Field Judgement**	

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

- [ ] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Column Name: **RocHis**

Script:

```
exit:
if answer #Maintenance then show [RHMR] goto [RHMR] endif
if answer #Field then show [RHFJ] goto [RHFJ] endif
```

Form Name: **Geologic Character**

Field: **23**

Rockfall History: Maintenance Records

Field Type: **Popup list**

Parameters:

1 or less per year
2 per year
3-4 per year
5 or more per year

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RHMR**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **24**

Maintenance Record Score

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RHMRS**

Script:

calculate:
if $[RHMR] =="1 or less per year" then assign 3 endif
if $[RHMR] =="2 per year" then assign 9 endif
if $[RHMR] =="3-4 per year" then assign 27 endif
if $[RHMR] =="5 or more per year" then assign 81 endif

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **25**

```
Rockfall History:
Field Judgement
IMR=impact marks in road
RIR=rocks in the road
RID=rocks in the ditch
```

Field Type: **Popup list**

Parameters:

No IMR,no RIR, few RID **No IMR,no RIR,many RID** **Few IMR or few RIR** **Many IMR and/or many I**	

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RHFJ**

Script:

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Field: **26**

```
Field Judgement Score
```

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RHFJS**

Script:

calculate:
if $[RHFJ]=="No IMR,no RIR, few RID" then assign 3 endif

if $[RHFJ]=="No IMR,no RIR,many RID" then assign 9 endif

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Form Name: **Geologic Character**

Field: **27**

Rock History Score

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **RocHisSco**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
if $[RocHis] #Maintenance then assign $[RHMRS] endif
if $[RocHis] #Field  then assign $[RHFJS] endif
```

Field: **28**

Geo Composite

Field Type: **Freeform text**

Parameters:

Default Value:

Pattern:

Max Length:

Lookup List::

maxValue:

minValue:

Column Name: **GeoComposite**

- [x] Hidden
- [ ] Primary Key
- [ ] ReadOnly
- [ ] Don't Update PC
- [ ] Key
- [ ] Non-Printing
- [ ] Autodefault
- [ ] Required

Script:

```
calculate:
result = $[RocHisSco] + $[GeoSc]
result = result + $[WaterSco]
answer = result
```

Completed Scripts

Form Name: TDOT RHRS Prelim	
Field Name	Scripts
Region[1234]	exit: if answer = "1" then hide from 4 to 7 show 4 goto 4 endif if answer = "2" then hide from 4 to 7 show 5 goto 5 endif if answer = "3" then hide from 4 to 7 show 6 goto 6 endif if answer = "4" then hide from 4 to 7 show 7 goto 7 endif
County Sequence	exit: if answer > 10 then msgbox "The entered county sequence is is very high, check results" endif
File Number	calculate: result = $18 & $8 result = result & $9 result = result & $10 result = result & $11 result = result & $12 result = result & RF answer = result
District	Calculate: if $[Region] = "1" then lookup $[R1C] within Cnty_District" endif if $[Region] = "2" then lookup $[R2C] within Cnty_District" endif if $[Region] = "3" then lookup $[R3C] within Cnty_District" endif if $[Region] = "4" then lookup $[R4C] within Cnty_District" endif answer = result
County Number	Calculate: if $[Region] = "1" then lookup $[R1C] within "Cnty_CntyNo" endif if $[Region] = "2" then lookup $[R2C] within "Cnty_CntyNo" endif if $[Region] = "3" then lookup $[R3C] within "Cnty_CntyNo" endif if $[Region] = "4" then lookup $[R4C] within "Cnty_CntyNo" endif answer = result

Form Name: TDOT RHRS Detailed	
Field Name	Scripts
File Number	calculate: result = $[CntyNo] & $[RN] result = result & $[SC] result = result & $[CS] result = result & $[BLM] result = result & $[RCL] result = result & RF answer = result exit:
Region[1234]	if answer = "1" then hide from [R1C] to [R4C] show [R1C] goto [R1C] endif if answer = "2" then hide from [R1C] to [R4C] show [R2C] goto [R2C] endif if answer = "3" then hide from [R1C] to [R4C] show [R3C] goto [R3C] endif if answer = "4" then hide from [R1C] to [R4C] show [R4C] goto [R4C] endif
District	Calculate: if $[R1234] = "1" then lookup $[R1C] within "Cnty_District" endif if $[R1234] = "2" then lookup $[R2C] within "Cnty_District" endif if $[R1234] = "3" then lookup $[R3C] within "Cnty_District" endif if $[R1234] = "4" then lookup $[R4C] within "Cnty_District" endif answer = result
County Number	Calculate: if $[R1234] = "1" then lookup $[R1C] within "Cnty_CntyNo" endif if $[R1234] = "2" then lookup $[R2C] within "Cnty_CntyNo" endif if $[R1234] = "3" then lookup $[R3C] within "Cnty_CntyNo" endif if $[R1234] = "4" then lookup $[R4C] within "Cnty_CntyNo" endif answer = result

Form Name: Site & Roadway Geometry	
Field Name	Scripts
Posted Speed Limit	exit: if answer = 20 then hide from [SL20] to [SL70] show [SL20] endif if answer = 25 then hide from [SL20] to [SL70] show [SL25] endif if answer = 30 then hide from [SL20] to [SL70] show [SL30] endif if answer = 35 then hide from [SL20] to [SL70] show [SL35] endif if answer = 40 then hide from [SL20] to [SL70] show [SL40] endif if answer = 45 then hide from [SL20] to [SL70] show [SL45] endif if answer = 50 then hide from [SL20] to [SL70] show [SL50] endif if answer = 55 then hide from [SL20] to [SL70] show [SL55] endif if answer = 60 then hide from [SL20] to [SL70] show [SL60] endif if answer = 65 then hide from [SL20] to [SL70] show [SL65] endif if answer = 70 then hide from [SL20] to [SL70] show [SL70] endif
Roadway Width Score	calculate: result = 52 - $[RdwyWdth] result = result / 8 result = 3 pow result if result > 100 then result = 100 endif answer = result
AVR Score	calculate: result = $[ADT] * $[SlpLng] result = result / 24 result = result / $[PSL] result = result / 5280 result = result * 100 result = result / 25 result = 3 pow result if result > 100 then result = 100 endif answer = result
Height Determination Method	exit: if answer #Directly then hide from [HDD] to [IDH] show [HDD] goto [HDD] endif if answer #Instrument then hide from [HDD] to [IDH] show from [Alpha] to [HI] goto [Alpha] endif

Height Determination: Instrument. Diffence between angle (a - b)	calculate:
	if $[Alpha] = null then
	result = 1 else
	result = $[Alpha] -$[Beta]
	result = result * PI
	result = result / 180
	result = sin result
	endif
	answer = result

Height Determination: Instrument, Determined Height	calculate: if $[SinA] = null then result = 1 else result = $[SinA] * $[SinB] result = result * $[DisAB] result = result / $[DiffAB] result = result + $[HI] endif answer = round result = exit: goto [Height]

Form Name: Site & Roadway Geometry	
Field Name	Scripts
Height Score	calculate: result = $[Height] / 25 result = 3 pow result if result > 100 then result = 100 endif answer = result
Vertical Slope Design Catchement Width	calculate: if $[Height] < 50 then result = 18 answer = result goto [LF] endif if $[Height] < 60 then result = 24 answer = result goto [LF] endif if $[Height] < 70 then result = 28 answer = result goto [LF] endif if $[Height] < 80 then result = 32 answer = result goto [LF] endif if $[Height] < 125 then result = 36 answer = result goto [LF] endif if $[Height] < 175 then result = 40 answer = result goto [LF] endif if $[Height] > 175 then result = 52 answer = result goto [LF] endif

Form Name: Site & Roadway Geometry	
Field Name	Scripts
0.25H:1V: Design Catchment Width	calculate: if $[Height] < 40 then result = 18 answer = result goto [LF] endif if $[Height] < 50 then result = 24 answer = result goto [LF] endif if $[Height] < 60 then result = 30 answer = result goto [LF] end if if $[Height] < 70 then result = 34 answer = result goto [LF] endif if $[Height] < 80 then result = 38 answer = result goto [LF] endif if $[Height] < 125 then result = 42 answer = result goto [LF] endif

%Difference	calculate:
	if $[Facing] #Vertical then
	result = $[ECW] / $[VSDCW]
	result = result * 100
	endif
	if $[Facing] #0.25H:1V then
	result = $[ECW] / $[HVDCW]
	result = result * 100
	endif
	answer = result

Bin Group	Calculate: if $[Pdiff] < 50 then result = 4 answer = result goto [SlpCtmt] endif if $[Pdiff] < 70 then result = 3 answer = result goto [SlpCtmt] endif if $[Pdiff] < 90 then result = 2 answer = result goto [SlpCtmt] endif if $[Pdiff] > 90 then result = 1 answer = result goto [SlpCtmt] endif

Form Name: Site & Roadway Geometry	
Field Name	Scripts
Ditch Effectiveness Score	calculate: if $[LF] == Y then result = 1 else result = 0 endif if $[SlpCtmt] == Y then result = result + 1 endif result = result + $[BG] if result > 4 then result = 4 else result = result endif result = 3 pow result if result > 100 then result = 100 endif answer = result
DSD Score	calculate: if $[PSL] = 20 then result = $[SL20] endif if $[PSL] = 25 then result = $[SL25] endif if $[PSL] = 30 then result = $[SL30] endif if $[PSL] = 35 then result = $[SL35] endif if $[PSL] = 40 then result = $[SL40] endif if $[PSL] = 45 then result = $[SL45] endif if $[PSL] = 50 then result = $[SL50] endif if $[PSL] = 55 then result = $[SL55] endif if $[PSL] = 60 then result = $[SL60] endif if $[PSL] = 65 then result = $[SL65] endif if $[PSL] = 70 then result = $[SL70] endif answer = result
S & R G Composite	calculate: result = $[RdwthSC] + $[AVRSC] result = result + $[HghtSC] result = result + $[DESC] result = result + $[DSDSC] answer = result

Form Name: Geologic Character	
Field Name	Scripts
Geologic Characterization: Select Continue Rating after completing geologic modes	exit: if answer == "Planar" then show from [PLAB] to [PLF] goto [PLAB] endif if answer == "Wedge" then show from [WDAB] to [WDF] goto [WDAB] endif if answer == "Toppling" then show from [TPAB] to [TPBS] goto [TPAB] endif if answer == "Differential Weathering" then show from [DWAB] to [DWR] goto [DWAB] endif if answer == "Raveling" then show from [RVAB] to [RVS] goto [RVAB] endif if answer == "Continue Rating" then goto [Water] endif
GeoScore	calculate: result =$[PLAB] + $[PLBS] result = result + $[PLST] result = result + $[PLF] result = result + $[TPAB] result = result + $[TPBS] result = result + $[RVAB] result = result + $[RVBS] result = result + $[RVS] result = result + $[WDAB] result = result + $[WDBS] result = result + $[WDST] result = result + $[WDF] result = result + $[DWR] result = result + $[DWAB] result = result + $[DWBS] if result > 300 then result = 300 endif answer = result
Water Score	calculate: if $[Water] == None then assign 3 endif if $[Water] == Seeping then assign 9 endif if $[Water] == Flowing then assign 27 endif if $[Water] == Gushing then assign 81 endif
Maintenance Record Score	calculate: if $[RHMR] =="1 or less per year" then assign 3 endif if $[RHMR] =="2 per year" then assign 9 endif if $[RHMR] =="3-4 per year" then assign 27 endif if $[RHMR] =="5 or more per year" then assign 81 endif
Field Judgement Score	calculate: if $[RHFJ]=="No IMR,no RIR, few RID" then assign 3 endif if $[RHFJ]=="No IMR,no RIR,many RID" then assign 9 endif if $[RHFJ]=="Few IMR or few RIR" then assign 27 endif if $[RHFJ]=="Many IMR and/or many RIR" then assign 81 endif

APPENDIX E

Data Dictionary

Data Dictionary

Below are tables that summarize the file labels and file names used in the creation of the customized Pendragon forms.

Form: TDOT RHRS Detailed Rating	
File Label	**File Name**
BLM	Begin L.M.
CntyNo	County Number
CompSC	Composite Score
CS	County Sequence
DSTRT	District
GeoComp	Geo
GPSLat	GPS Latitude (Northing)
GPSLong	GPS Longitude (Westing)
R1C	Region 1 County
R2C	Region 2 County
R3C	Region 3 County
R4C	Region 4 County
Rater	Rater
RCL	Ref C/L
Region[1234]	Region[1234]
RN	Route Number
SC	Special Case
SiteGeo	Site & Geo

Form: Geologic Characterization	
Field Label	**Field Name**
DWAB	Abundance (Differential Weathering)
DWBS	Block Size (Differential Weathering)
DWR	Relief (Differential Weathering)
GeoChr	Geologic Characterization
GeoSc	GeoScore
PLAB	Abundance (Planar)
PLBS	Block Size (Planar)
PLF	Friction (Planar)
PLST	Steepness/Degree (Degrees) (Planar)
RHFJ	Rockfall History: Field Judgement
RHFJS	Rockfall History: Field Judgement Score
RHMR	Rockfall History: Maintenance Records
RHMRS	Rockfall History: Maintenance Record Score
RocHis	Select method to document Rockfall History
RocHisSco	Rock History Score
RVAB	Abundance (Raveling)
RVBS	Block Size (Raveling)
RVS	Shape (Raveling)
TPAB	Abundance (Toppling)
TPBS	Block Size (Toppling)
Water	Water
WaterSco	Water Score
WDAB	Abundance (Wedge)
WDBS	Block Size (Wedge)
WDF	Friction (Wedge)
WDST	Steepness/Degree (Degrees) (Wedge)

Form: Site & Roadway Geometry	
File Label	**File Name**
ADT	ADT (Average Daily Traffic)
Alpha	Height Determination: Instrument Enter a (alpha)
AVRSC	AVR Score
Beta	Height Determination: Instrument Enter b (beta)
BG	Bin Group
DESC	Ditch Effectiveness Score
DiffAB	Height Determination: Instrument. Difference between angles (a-b)
DisAB	Height Determination: Instrument. Enter distance between a and b
DSDSC	DSD Score
ECW	Effective Catchment Width (ft.)
Facing	Slope Face Inclination
HDD	Height Determined Directly
HDM	Height Determination Method
Height	Height
HghtOk	Is the previous Height Okay?
HghtSC	Height Score
HI	Height of Instrument (ft.)
HVDCW	0.25H:1V: Design Catchment Width
IDH	Height Determination: Instrument, Determined Height
LF	Launching Features
Pdiff	%Difference
PSL	Posted Speed Limit
RdwthSC	Roadway Width Score
RdwyWdth	Road Width (ft.)
SinA	Sine of A
SinB	Sine of B
SL20	% DSD: Speed Limit 20
SL25	% DSD: Speed Limit 25
SL30	% DSD: Speed Limit 30
SL35	% DSD: Speed Limit 35
SL40	% DSD: Speed Limit 40
SL45	% DSD: Speed Limit 45
SL50	% DSD: Speed Limit 50
SL55	% DSD: Speed Limit 55
SL60	% DSD: Speed Limit 60
SL65	% DSD: Speed Limit 65
SL70	% DSD: Speed Limit 70

Form: Site & Roadway Geometry	
File Label	**File Name**
SlpCtmt	Slope of Catchment 6:1
SlpLng	Slope Length (ft.)
SRGC	S & R G Composite
VSDCW	Vertical Slope Design Catchement Width

APPENDIX F

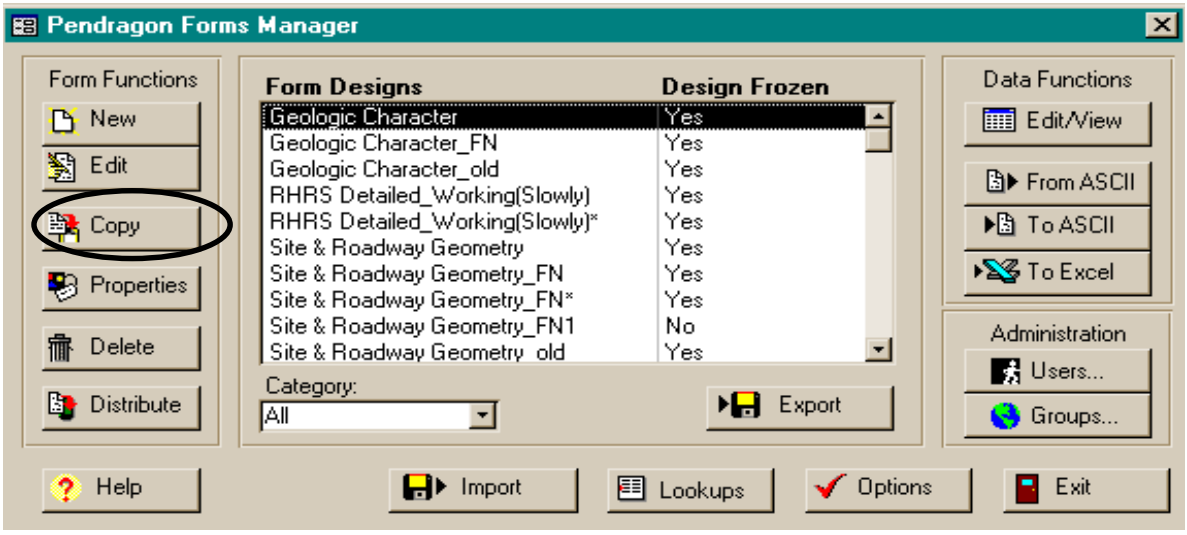
Pendragon Forms and Microsoft Access

Editing an Existing Form.

- Open Pendragon Forms and a screen similar to the one below will be displayed.
- Highlight the form to be edited.

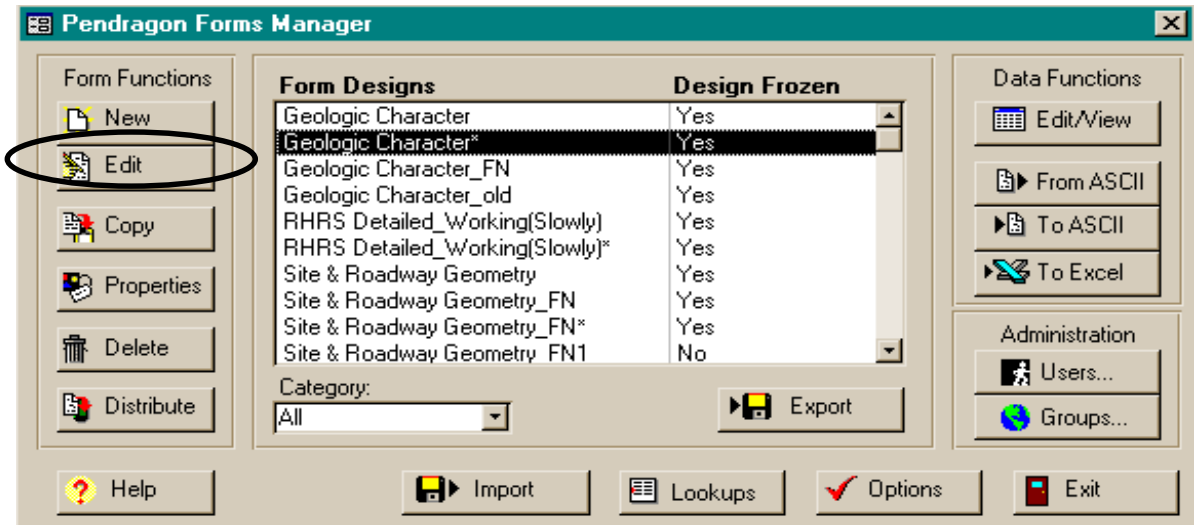
In this case we want to add an additional field to the Geologic Character Form, a frozen form, but in order to do so, we must first copy the form. A frozen form has a database table on the PC for storing records associated with the form, which cannot be changed. Only a few changes can be made to a frozen form, such as scripting, some advanced properties, form properties, file names, and selection of which lookup list to reference in a lookup list field.

Select the *Copy* button.



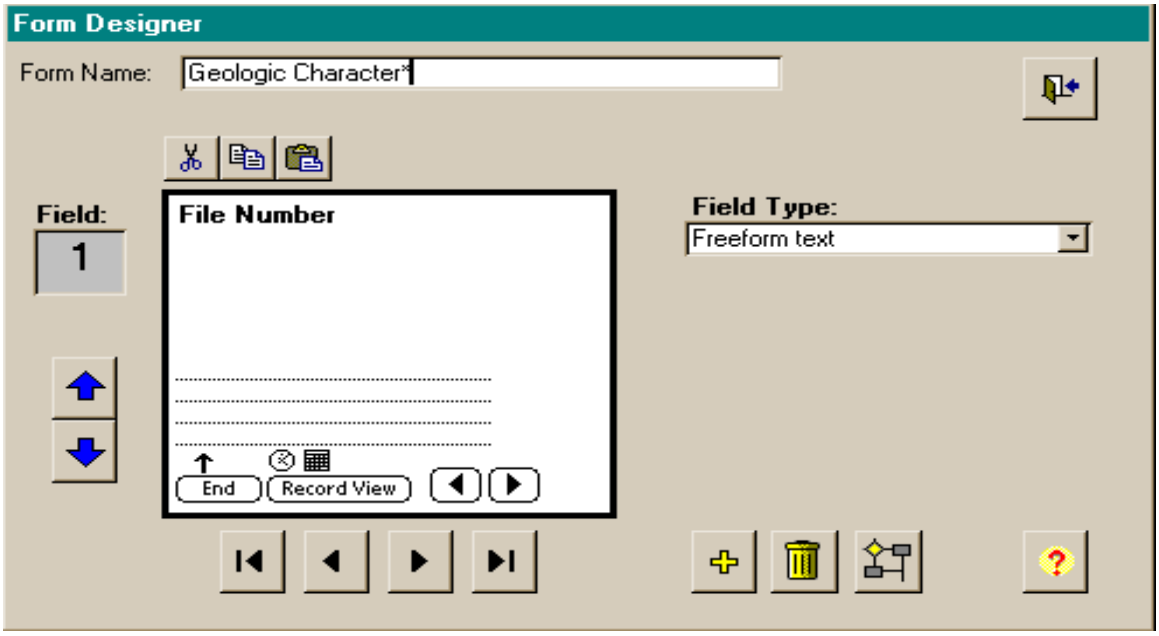
A copy of the Geologic Character is created with the name Geologic Character* that is not frozen. The asterisk indicates that it is the first revised version of the form. Each subsequent revision will have an addition asterisk.

- Select the edit button.



The Form Designer screen is displayed beginning at the first field.
The arrows located at the left changes the order in which the field is viewed by the user. The up arrow moves the field up and down arrow moves the field down. The arrows located at the bottom (|< , < , > , >|) scrolls through the fields to be edited. The buttons adjacent to the arrow button add a field (+), delete a field (trash can), and display the advanced properties. We want to add a field to be displayed last so we

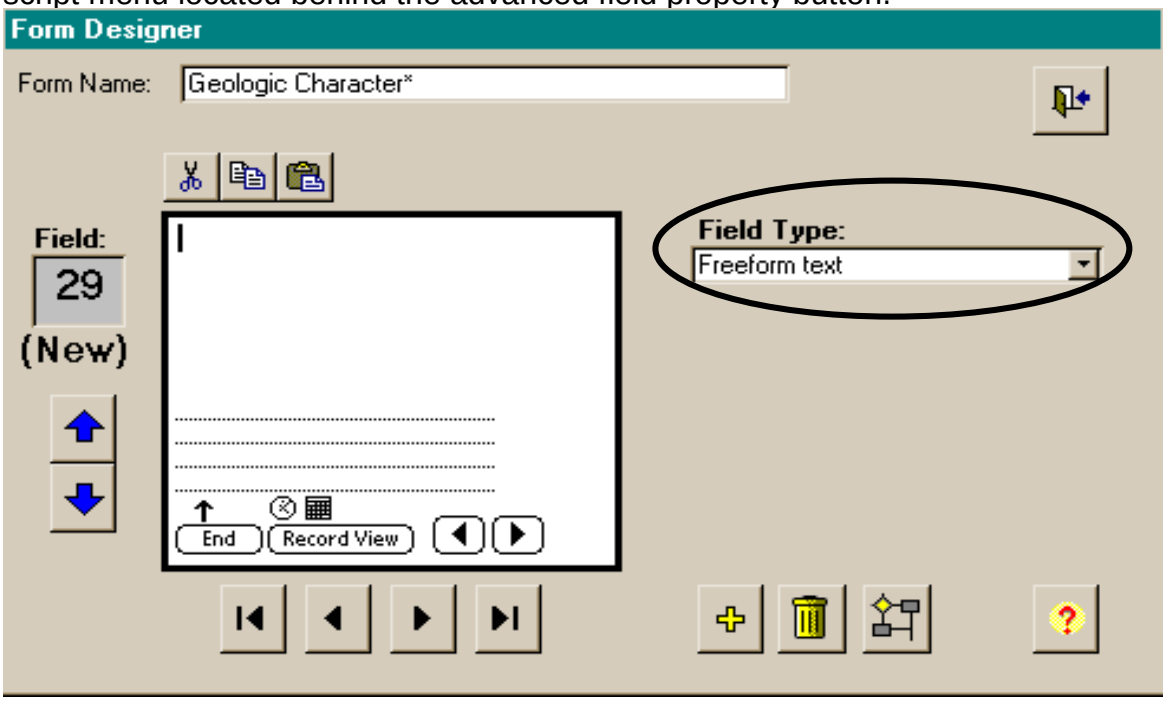
- Press the >| button to go to the last field.
- Then press the add button (+).



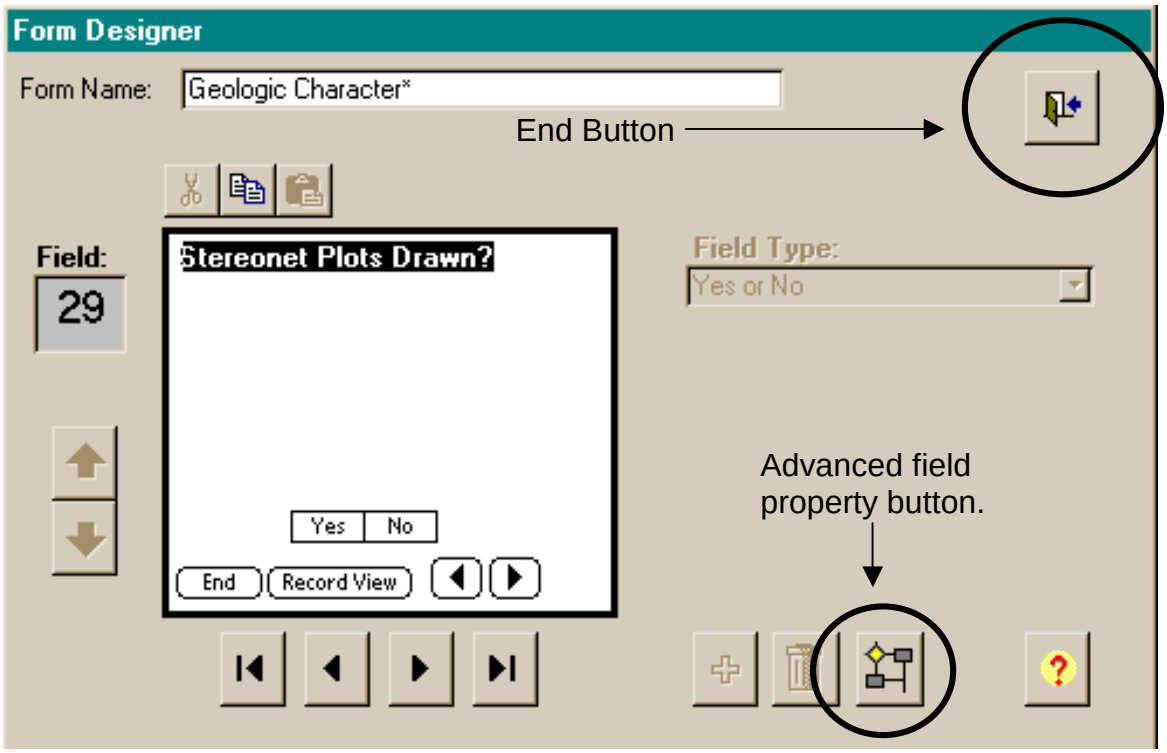
In this example we want to use the “Yes or No” field to ask the user if stereo net plots were drawn. Note that if subform(s) were previously linked to this specific form, the name of the form may need to be changed (an asterisk added) in order to link properly to the subform.

- Type the Field Name or text to be displayed when the user enters the field. In this example “Stereonet Plots Drawn?”
- Use the drop down menu to select the appropriate field type. In this example ‘Yes or No’.

If a script was to be used in this field, the developer would write the command in the script menu located behind the advanced field property button.

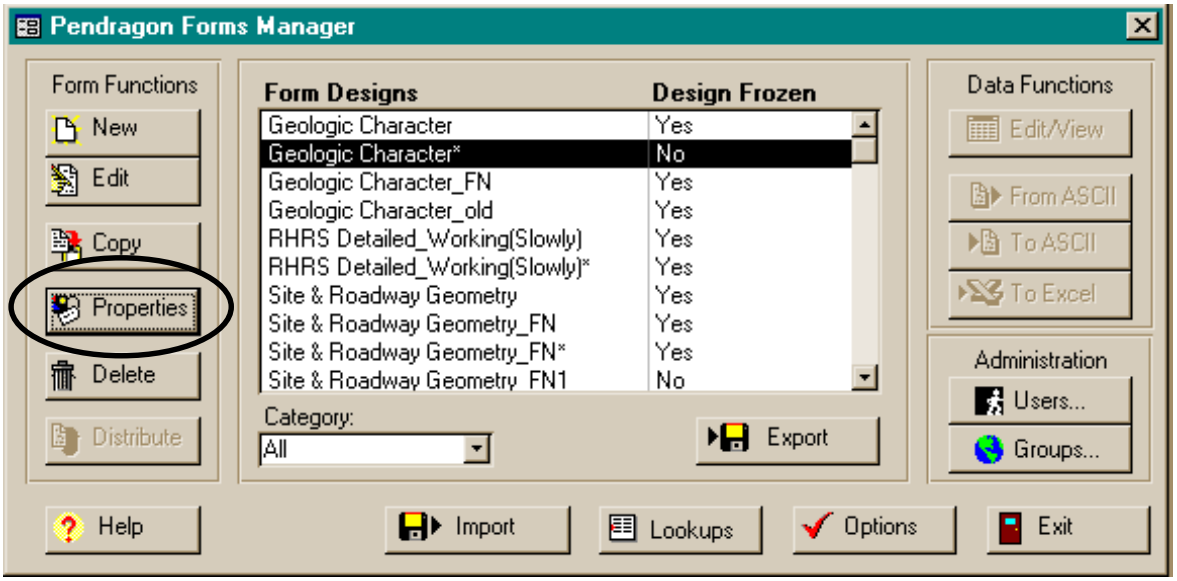


A completed field

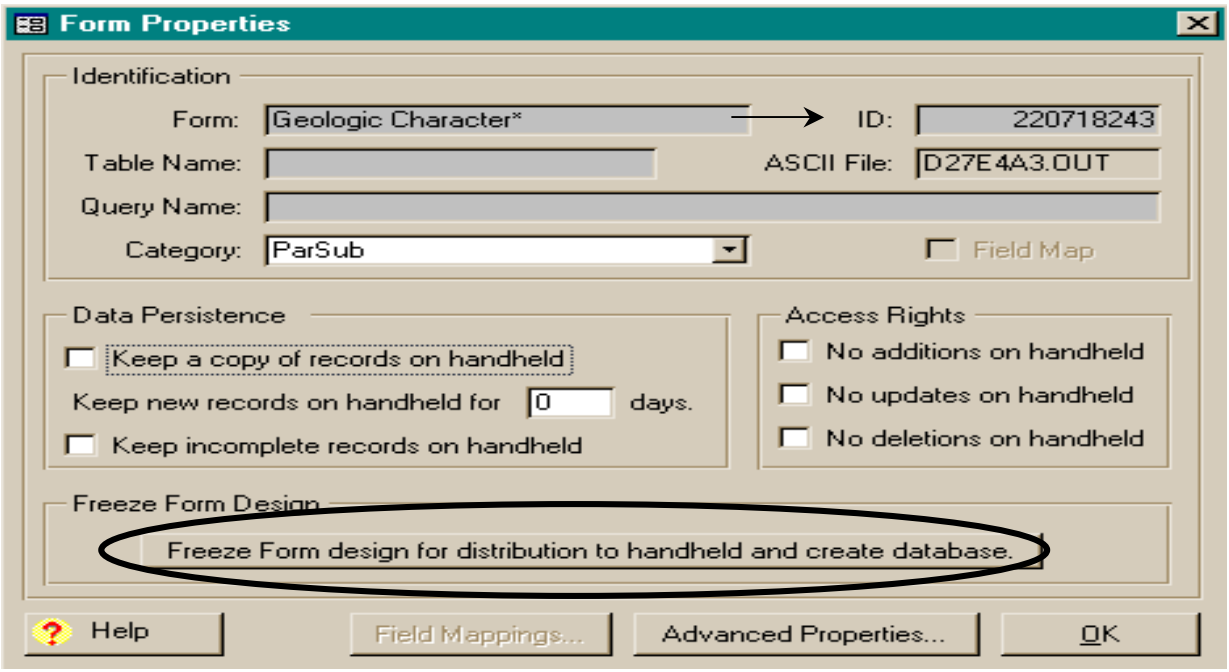


To Freeze the Modified Form

- Highlight the form with the added field to be frozen.
- Select the properties button.

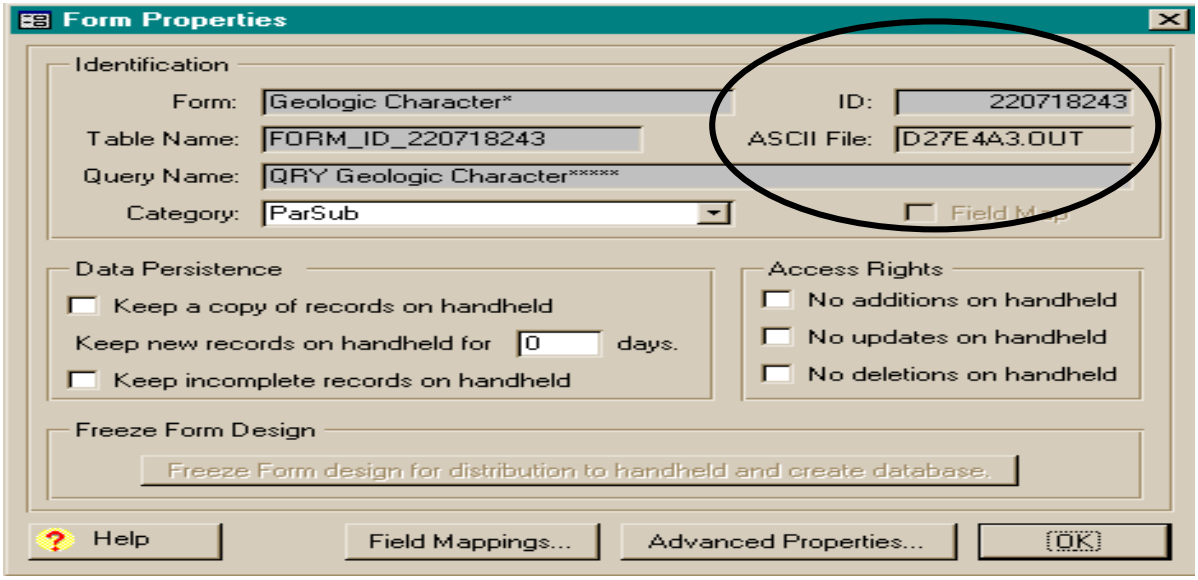


- Tap the Freeze Form design button.
- Select “yes” when the computer asks if you are sure you want to freeze the form.

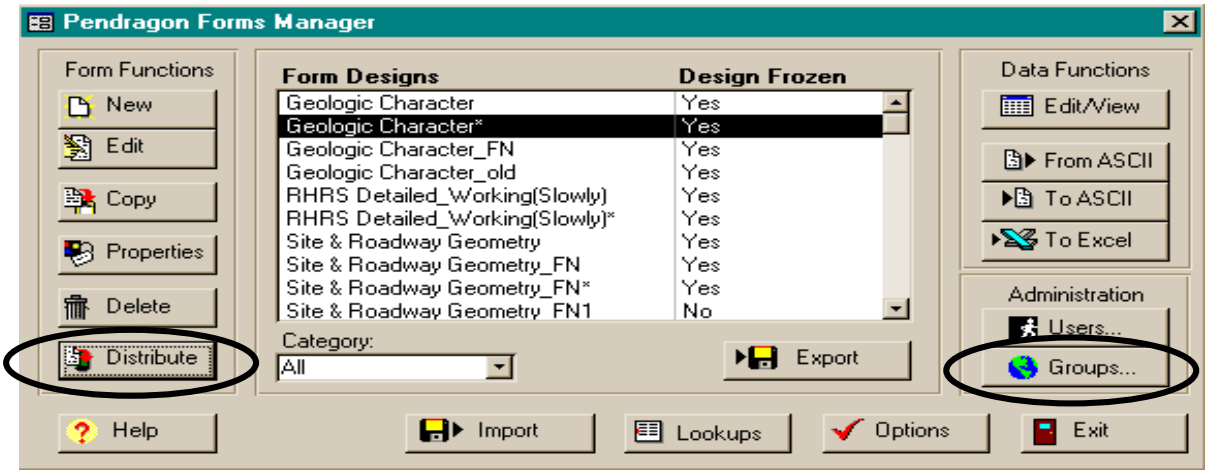


After the form is frozen, two unique strings are created that differentiate each form, namely the ID and ASCII File number. The ONLY way to tell if the current form is exactly the one that is needed is through the identification of these two numbers. These two numbers are found on the PDA by going to Help, then Form Info.

- To continue, tap the “OK” button to return to the Forms Manager.



- Tap the “Distribute” button, which sends the form to the PDA on the next HotSync and places the form in the Default Users group. To check that the form is in the user group
- Tap the Groups button.

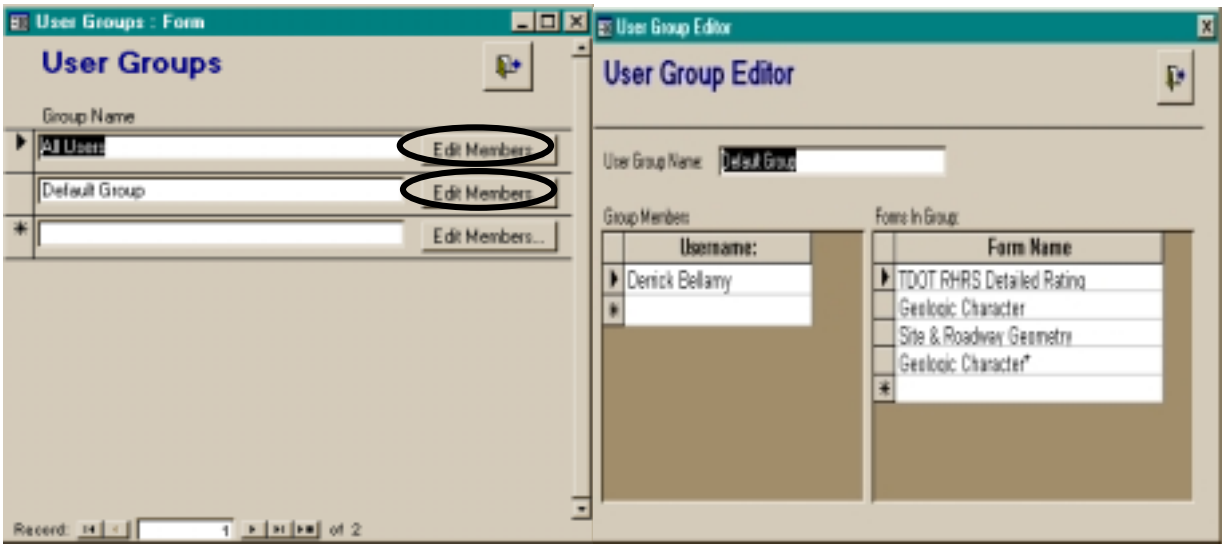


As can be seen by the form, the new form is loaded and ready for uploading to the PDA.

- Tap the Edit Members button adjacent to the Default Group.

The User Group Editor window appears. Check to insure that the edited form (with an asterisk) is in the Forms Group.

- Tap the close button and you are finished.



Installing Pendragon Form on PDA.

To install Pendragon Forms on the PDA consult the Pendragon Forms 3.2 user manual. Insure that the FORMS32.prc and Math.prc files are installed on the PDA.

VITA

Derrick Bellamy was born on July 25, 1978 in Conway, South Carolina. He graduated John Overton High School in 1996. From there he began attending the University of Tennessee in Knoxville, Tennessee and was awarded a Bachelors of Science in Civil Engineering in May 2001 graduating with honors. The project discussed in this document was the main focus of his research while pursing his Master's degree. Derrick Bellamy plans on entering in to the work force with future intentions of obtaining a Doctor of Philosophy.