PB98-131584

Mountain-Plains Consortium

Transportation Research, Public Service & Education

MPC REPORT NO. 98-88

Flagger Recertification
Interactive CD-ROM Development

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February 1998

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REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE February 1998	3. REPORT TYPE AND DATES COVERED project technical

4. TITLE AND SUBTITLE

Flagger Recertification Interactive CD-ROM Development

5. FUNDING NUMBERS

6. AUTHOR(S)

Gururaja Bandiakmakur, William J. Grenney, Thad E. Senti, Newell W. Crookston -- Utah State University

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Mountain-Plains Consortium
North Dakota State University
Fargo, ND

8. PERFORMING ORGANIZATION REPORT NUMBER

MPC 98-88

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Department of Transportation
University Transportation Centers Program
Washington, DC

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

The objective of this research is to develop a computer-based delivery system for one of Utah Department of Transportation's (UDOT) existing, traditional classroom training activities. The Flagging Recertification Training and Exam, which is part of the Maintenance Training Academy, was selected by the UDOT Technical Advisory Committee (TAC). The research was divided into two phases: (1) development of the computer-based training (CBT) delivery system software and (2) development and implementation of the content for training and testing.

14. SUBJECT TERMS

Flagging, UDOT, computer-based training

15. NUMBER OF PAGES

56

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)

Flagger Recertification Interactive CD-ROM Development

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February 1998

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TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

The objective of this research is to develop a computer-based delivery system for one of Utah Department of Transportation's (UDOT) existing, traditional classroom training activities. The Flagging Recertification Training and Exam, which is part of the Maintenance Training Academy, was selected by the UDOT Technical Advisory Committee (TAC). The research was divided into two phases: (1) development of the computer based training (CBT) delivery system software and (2) development and implementation of the content for training and testing.

The delivery system software was implemented on IBM PCs running MS Windows 3.1 or higher. Development tools included C++, Delphi, and Flexpert — an expert system authoring tool created by personnel in the Computer Based Intelligent Technology (CBIT) laboratory at the Utah State University. One of the most important theoretical elements of this research was to determine the effectiveness of using a "Knowledge base" approach for practical computer-based training applications. This is a departure from convention in which commercial authoring tools (i.e. "Toolbook," "Autherware," etc.) are used for CBT implementation.

The UDOT Technical Advisory Committee made available all the training materials currently being used for the traditional classroom setting. The materials included three training video tapes, class presentation notes, and examination questions. All materials had to be converted to digital format for the CBT. The video clips were digitized and edited in Video for Windows™ 1.0. The special effects and transitions were added to the video files using Adobe Premier™ software utility. The audio clips were digitized and edited in Wave Edit™ and images were developed in Photo Shop™. The research team conducted three beta cycles. Each cycle provided the TAC with a CBT prototype; collected comments and new materials, improved the prototype; and repeated the cycle.

The final product was delivered on CD ROM and included:

- Training materials delivered in nine categories

- Progress testing for each category during training

- A practice exam that does not affect the student's record

- A final exam that must be passed with a score of 80 percent or better

- A database that automatically is updated for each student.

The CBT recertification exam currently is being field tested by UDOT at eight sites around the state.

Overview of Instructional Theory

According to Robert M. Gagne[1], the primary assumption of instructional theory is that there are different kinds of learning outcomes (learning goals) and each of the learning outcomes required unique conditions for learning. An appropriate instructional strategy incorporates all the necessary conditions for presenting knowledge or demonstrating the skill, providing practice, and providing learner guidance for a given type of learning outcome.

According to Jones & Merrill[2], there are four types of knowledge objects: entities, activities, processes, and properties. Entities represent objects in the world and can include devices, persons, creatures, places, symbols, etc. Activities represent actions that the learner can take to act on objects in the world. Processes represent the changes that occur in the properties of objects in the world. Processes are triggered by activities or by other processes. Properties represent quantitative or qualitative attributes of entities. All knowledge objects have a set of information slots including name, portrayal, and description. The name contains the symbol or term that references the knowledge. The portrayal is one or more multimedia objects, such as text, audio, video, graphic, and animation, which will show or represent the knowledge object to the student. The description slot is an open compartment in which an author can place any desired information about the knowledge object. It is possible for the description slot to be subdivided into several sub slots.

2

Instructional design consists of five strategies[3]: procedure strategy, information strategy, parts of strategy, concepts or kinds of strategy, and principle strategy. The concepts of 'procedure strategy' are followed in the development of Flagger Recertification Tutorial & Exam (FRTE). In 'procedure strategy' a student can perform a series of actions, which lead to some desired consequence. A complete task is identified and the task is divided into distinct steps. If there are many steps, they are grouped into meaningful sub-sequences.

Overview of Computer-Based Training

Computer-based training is the presentation of training materials by means of the computer. CBT can take many forms, from simple presentation of information in a text-based format, much like the printed page in a textbook, to a full-blown multimedia presentation complete with text, images, video, audio, interaction and user feedback.

Effective instruction generally includes four phases. First, the instructor presents information to the student. Second, the instructor guides the student toward understanding it. Third, the student practices using the information to retain it and become fluent with it. Finally, the student takes the test or in some other way demonstrates his or her level of learning. Each of the five major types of computer-based training (CBT) programs provide one or more of the four phases of instruction. The five types are Tutorials, Drills, Simulations, Games, and Tests.

Tutorials

Tutorials generally are used to provide the first two phases: presenting information and guiding the student. The usual form for a tutorial is as follows: (1) Information is presented to the student. (2) The student is questioned about the information. (3) A response is requested. (4) The response is judged or evaluated. (5) Feedback is given to the student. The five steps can be repeated many times. Each time, the student receives a little more information and is guided toward an increased understanding of the

information. Tutorials are appropriate for presenting factual information, for learning rules and

principles, or for learning problem-solving strategies. If designed properly, they have the advantage over

classroom instruction in that each student receives personalized attention. Any lack of understanding or

misconception is dealt with through immediately feedback.

Drills

Computerized drills primarily are used for the third aspect of the instructional process,

practicing. They are particularly important when learning information in which fluency is required, such

as basic skills, foreign languages, spelling, usage, and vocabulary. Drills also can be used to practice the

application of rules. Whether the subject is body language, narcotics, or the law of search and seizure,

the student could be given a set of facts and asked to apply rules learned to the facts. Drills could be

developed as a supplement to regular instruction. The student could practice outside of class. Once the

student is fluent with the vocabulary and basic rules, class time could be used for the exceptions and

more difficult concepts. As in the case of tutorials, computerized drills can be tailored to the needs of the

individual student. The computer can be programmed to keep drilling on the items previously missed and

quit drilling on correct answers.

Simulations

In a simulation, the student actually performs the activities to be learned in a context similar to

the real world. Simulations can be used for any of the four phases of instruction. Computer-based

simulations are quite useful when learning to use complicated, difficult to obtain, or expensive machines

or pieces of equipment. There are many advantages to using simulations; often they increase the

motivation of the students. The students usually are better able to apply what they have learned to actual

simulations. Simulations are safe, convenient, and controllable.

Games

Like simulations, games may be used to provide an environment that facilitates learning and the acquisition of the skills. Games, however, may or may nor mimic reality or provide learning value. Simulations, on the other hand, usually are not as entertaining as games.

Tests

Computer-based tests are designed to do two things: (1) quiz the students on their knowledge of the material and (2) let them know which questions they missed and what the correct answers are. The student sees his or her score immediately. He or she also has the opportunity to query why the correct answer is correct, or why his or her answer is incorrect. Many times when a student takes a conventional test, all he or she gets out of it is a grade. When CBT techniques are used, the student gets much more in the way of feedback for missed questions, which provides additional instruction to fill in gaps in knowledge or to correct misconceptions. In fact, if the computer-based test is given before instruction, the feedback on missed questions can comprise the tutorial on material unfamiliar to the student.

DEVELOPMENT OF THE TOOL

The development of the Flagger Recertification Tutorial and Exam (FRTE) consisted of four

phases of development. (1) analysis phase, (2) design phase, (3) development phase, and (4) evaluation

phase. An incremental and iterative approach was followed throughout the development process.

Analysis Phase

In the analysis phase, numerous Utah Department Of Transportation (UDOT) flagging classes

were attended for following reasons: (1) to collect the course material and handouts distributed, (2) to

observe the instructor style of teaching and, (3) to gather the information on students learning process.

UDOT, Utah Power and Light (UP&L) and the Utah Transportation Technology Transfer Center (T-

square) provided flagging videos. The reviewed videos and video clips were extracted for the project.

Design Phase

During the design phase, numerous meetings were held with the Utah Department of

Transportation (UDOT) instructional designer's and other subject matter experts to determine the

sequence in which topics will be presented and the instructional design strategies that will be used.

Different paths were established to provide relevant examples and scenarios according to the tasks

individual students will be asked to accomplish. Prototypes were developed for each scenario for the

expert's comments and suggestions. After many of revisions and refinements, the tutorial was divided

into the following 41 topics and sub-topics.

- Introduction
  - About Flagger Recertification Tutorial and Exam
  - Mouse tutorial
- Legal Aspects

- Qualities
  - Alert and good judgment
  - Helpful attitude
  - Be patient
  - Be confident and commanding
  - Rules of conduct
- Attire
  - Street clothing
  - Safety attire
- Tools
  - Basic tools
  - Other equipment
- Station
  - Flagger's main position
  - Flagging station surroundings
- Using the stop/slow signs and hand signals
  - Hand signals
  - To stop the first vehicle, and to stop the second and the following vehicles
  - To release traffic
    - To release traffic into left lane (one way traffic)
    - To release traffic into right lane (one way traffic)
    - To release traffic into right lane (two way traffic)
  - To alert or slow traffic
  - Night time flagging
- Advance warning signs

- Advance warning sign dimensions

- Spacing between warning signs

- Responsibility of singing

■ Flagging situations

- Type of work

- Single Flagger operation

- Advance Flagger

- One-way or alternating traffic

- Night time flagging

- Urban flagging

■ Summary

■ Final Exam

Figures 1 through 10 show the flow of the tutorial through the topics and sub-topics.
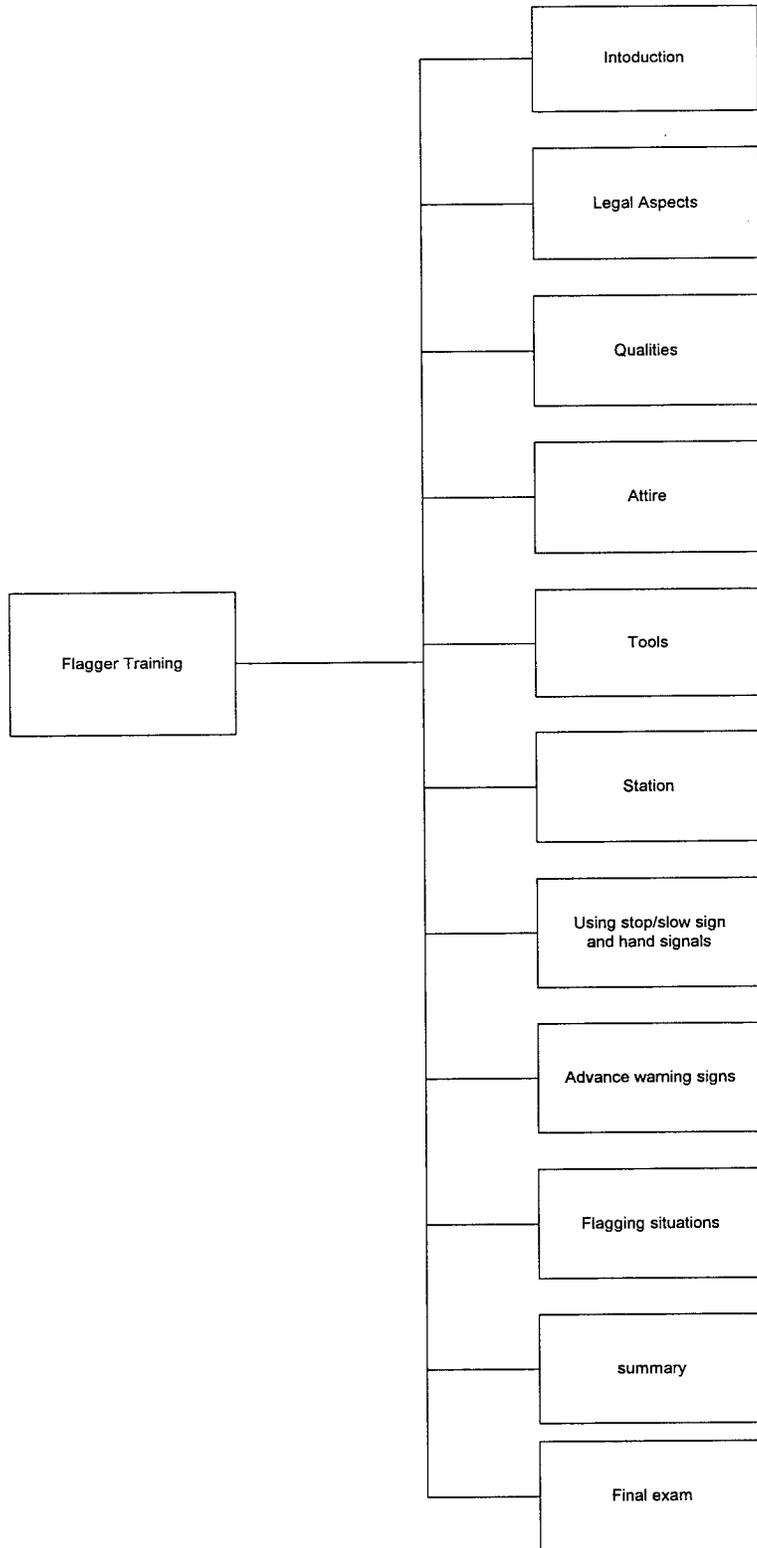
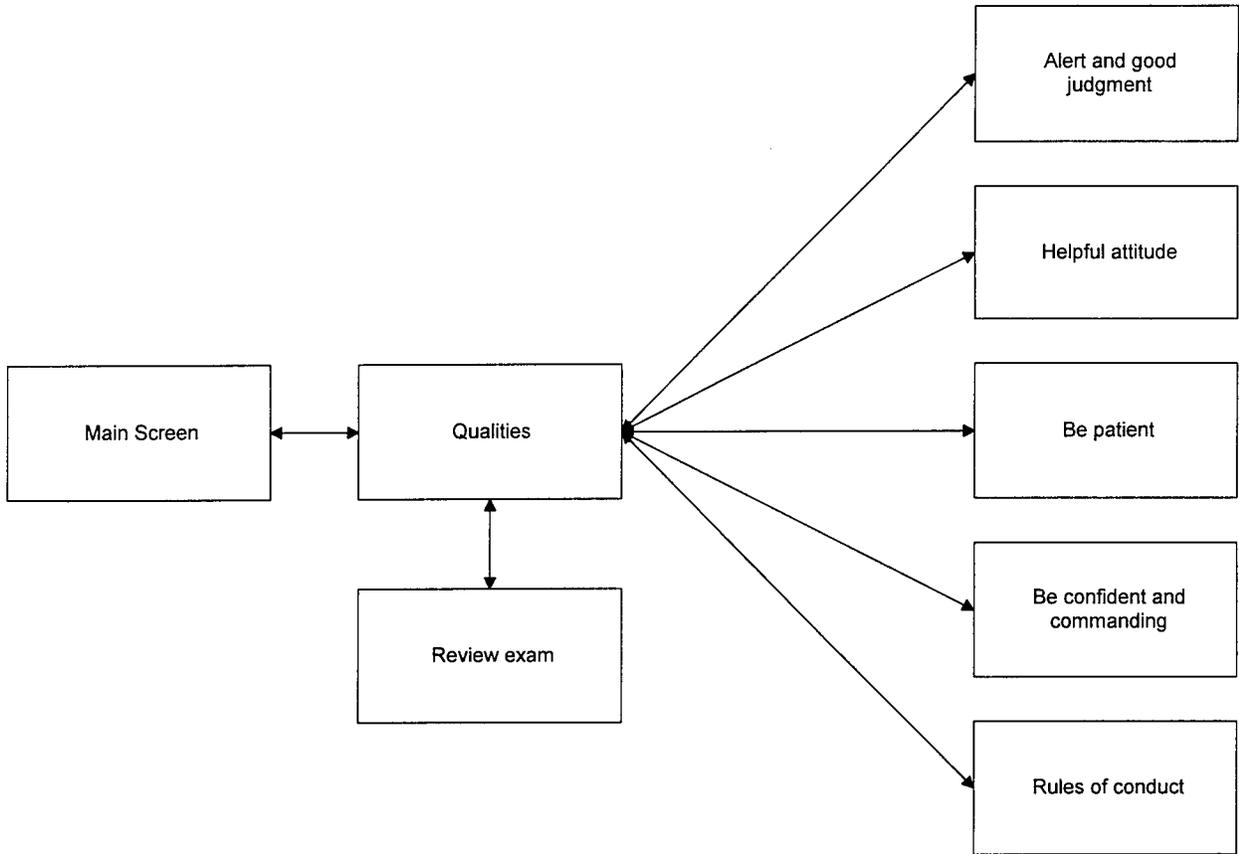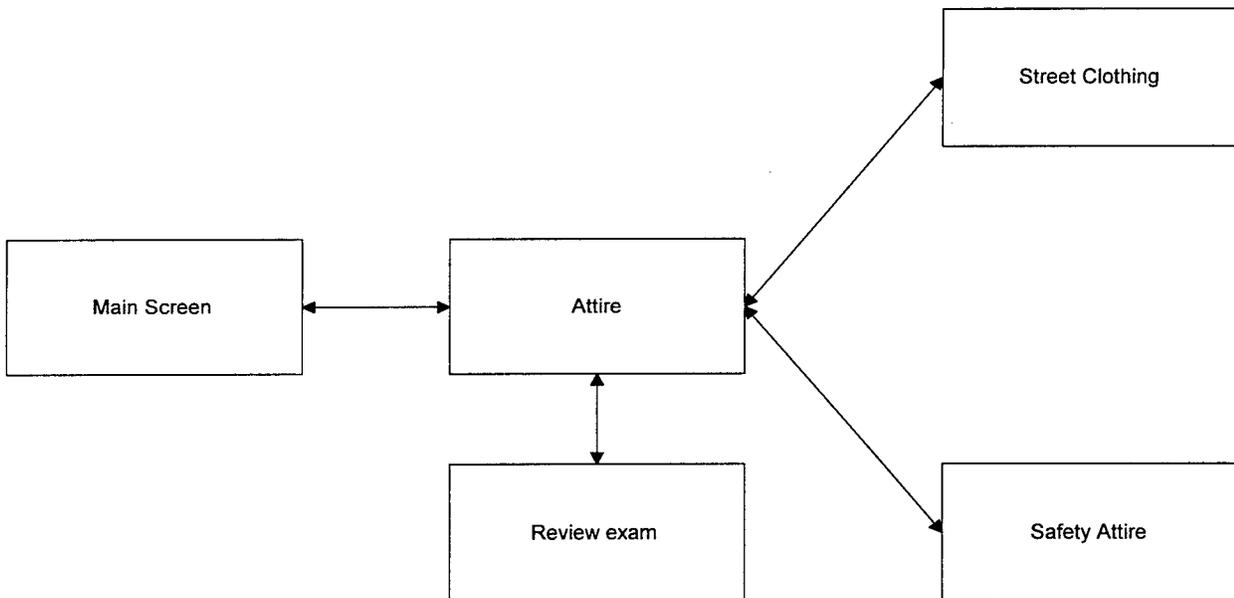Figure 1. Flagger Master Flowchart

Figure 2. Flagger Qualities
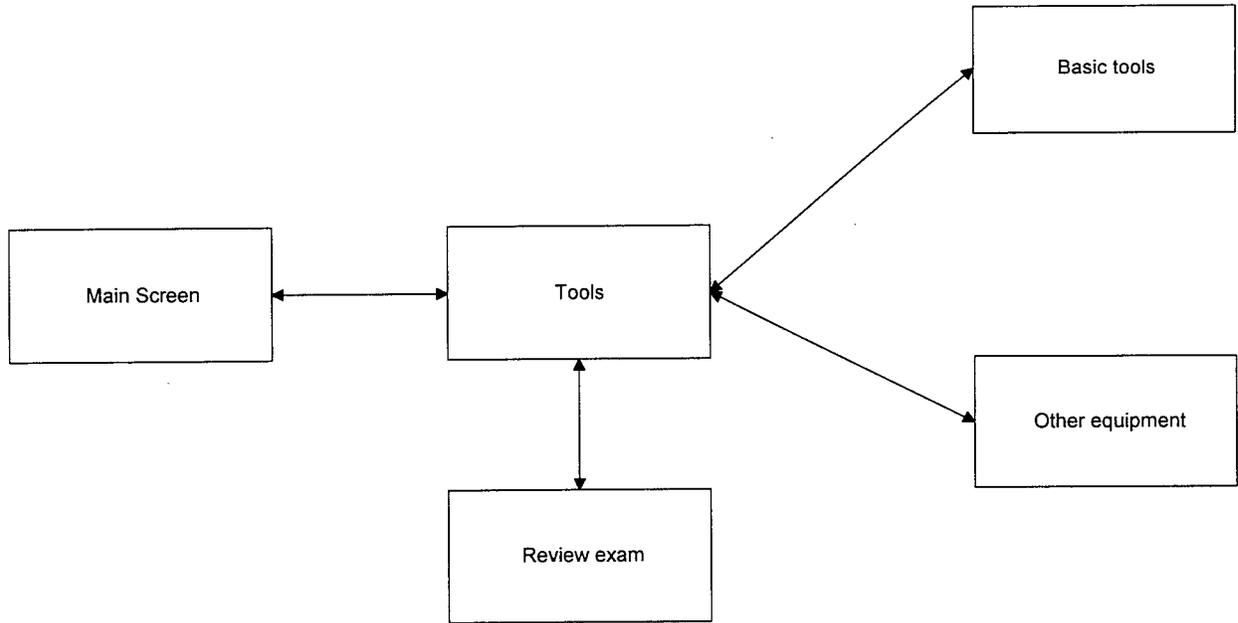

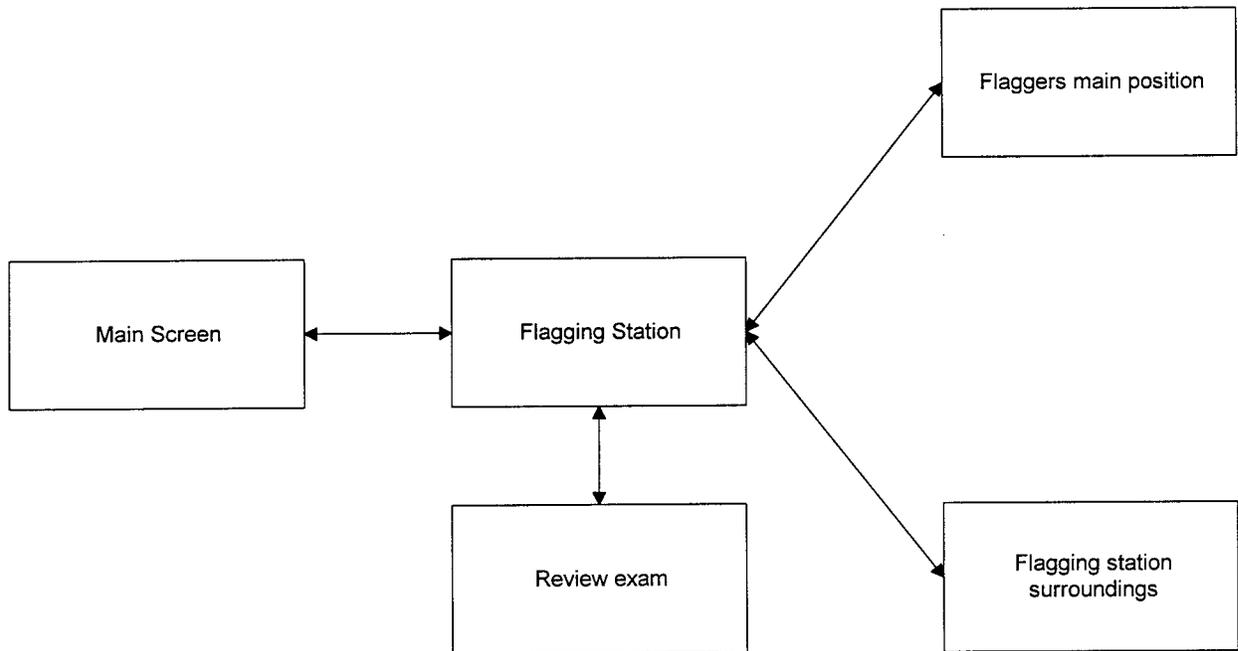Figure 3. Flagger Attire

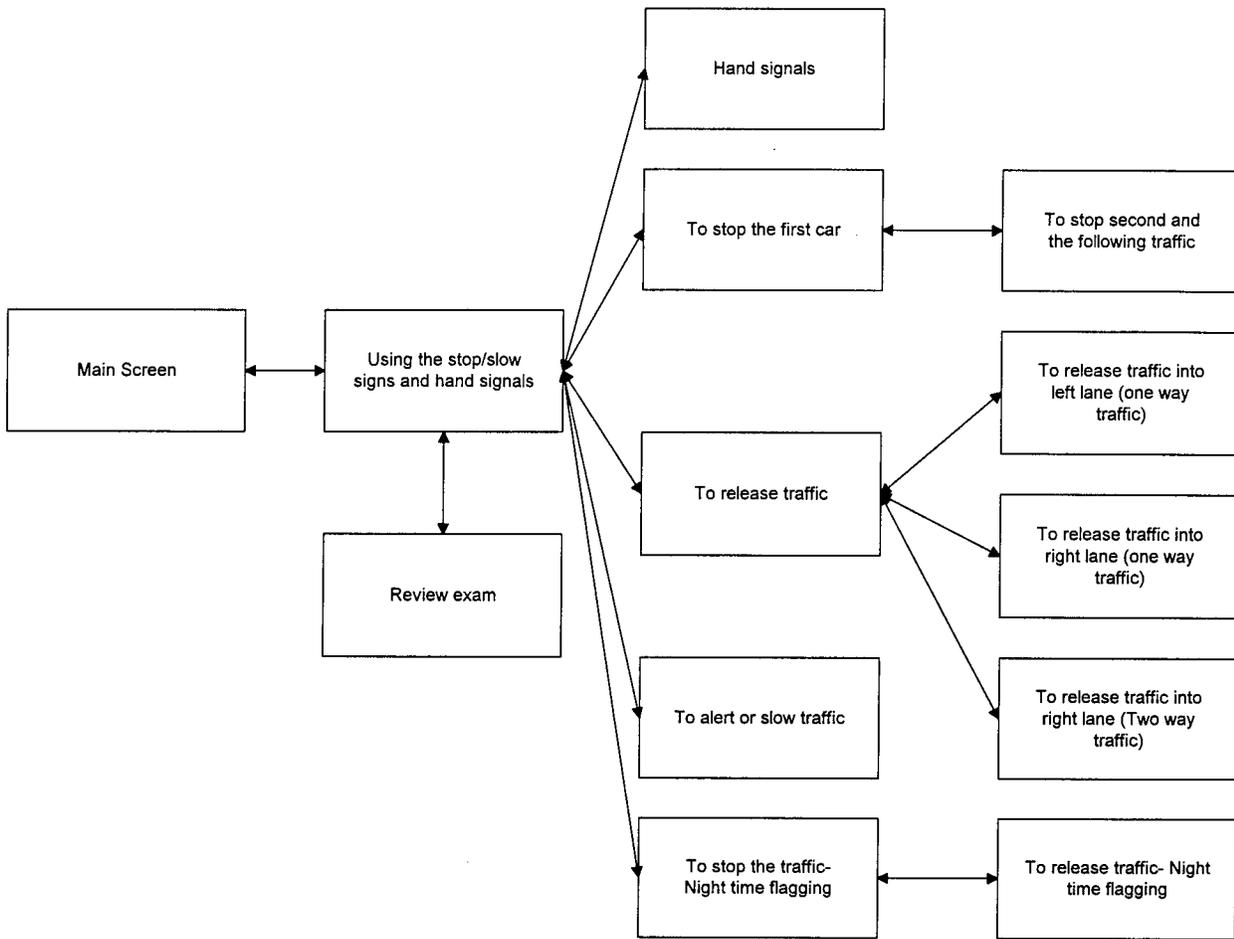Figure 4. Flagger Tools

Figure 5. Flagger Station

12

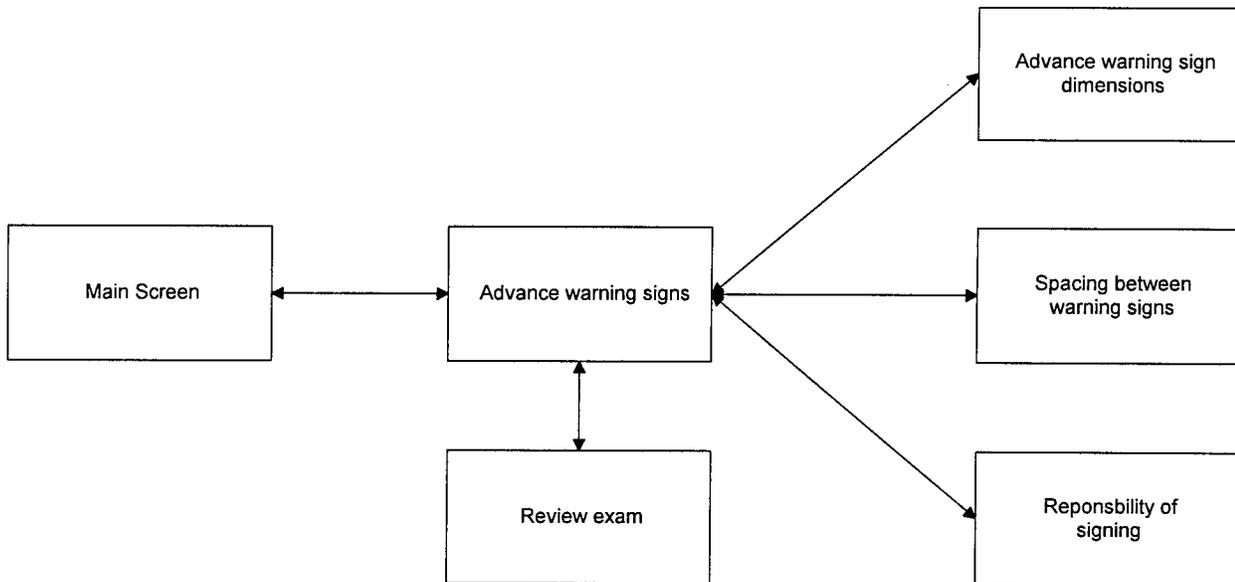Figure 6. Using Stop/Slow Signs and Hand Signals
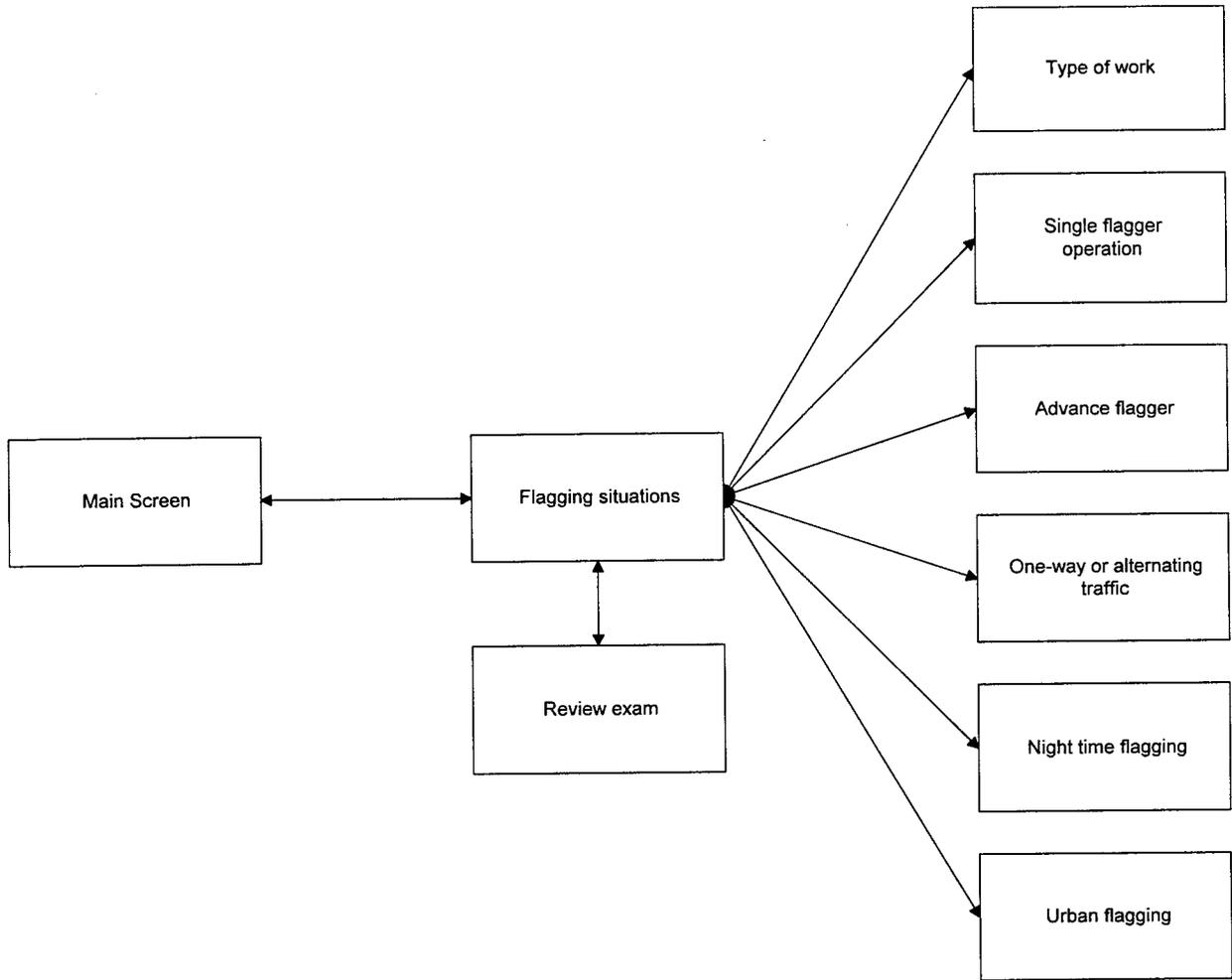

Figure 7. Advance Warning Signs
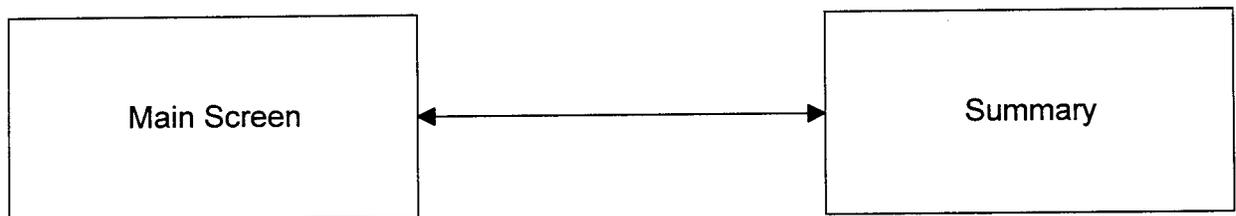
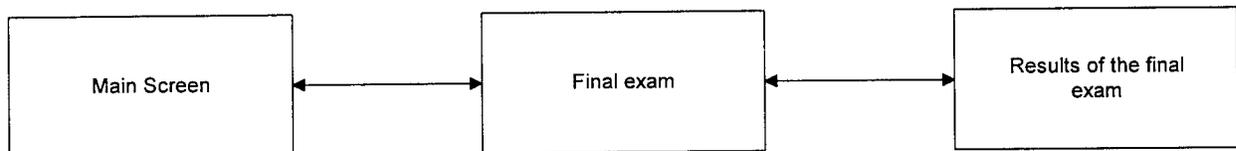Figure 8. Flagging Situations

Figure 9. Summary

Figure 10. Flagger Exam

14

Development Phase

The Flagger Recertification Tutorial and Exam is composed of three principle components.

- Logic controlling the sequence of topics for the tutorial and exam

- Multimedia objects used to present the visual information on each topic

- Question bank

Logic controlling the sequence of topics was developed in FLEXPERT authoring system created by personnel in the Computer Based Intelligent Technology Lab at Utah State University. This tool essentially constructs a "knowledge base" containing the logic for navigating through the session and accessing appropriate visual and sound resource. After proof of concert the Flexpert resources were converted to Delphi for more efficient delivery. The graphic images were developed in PhotoShop™, and the bitmap files — indicated by the extension: **.BMP** — are 256 color bitmaps. The audio files — indicated by the extension: **.WAV** — were recorded at 8 bit mono and 11 kHz, using Wave Edit™. The video files — indicated by the extension: **.AVI** — were digitized from Videocassette Recorder (VCR) using Video for Windows™ 1.0 with 30 frames per second and a quality parameter of 60 percent. The video files were compressed using the Intel Indeo™ R3.2 video (hardware compression, software expansion). A further compression of 25 percent was obtained by reducing the frame rate to 20 frames per second and quality parameter to 30 percent without much deterioration of the quality. The special effects and transitions were added to the video clips using Adobe Premiere software utility.

The question bank contains 75 questions distributed in the nine categories shown in Table 1. The final exam contains 25 questions selected at random from the 75 questions. About 33 percent of questions are asked from each category. Table 1 shows the number of questions in each category.

Category	Number of questions
Legal aspects	5
Qualities	12
Attire	6
Tools	6
Station	5
Using stop/slow sign and hand signals	14
Advanced warning signs	12
Situations	12
Miscellaneous	3

Table 1. Number of exam questions selected from each category

The questions types include:

- Applying numerical answers

- True/False or Yes/NO

- Multiple choice - single correct answers

- Multiple choice - multiple correct answers

- Multiple choice based on visual (video, audio, and bitmaps).

Evaluation Phase

The prototype was evaluated by the instructors and UDOT personnel during three testing cycles.

Improvements and refinements were made during each cycle. The final delivery included:

- The Compact Disk Read Only Memory (CD-ROM) containing the Beta version of the Flagger Recertification Tutorial and Exam (FRTE) software.

- The Users Manual

- The report describing the software structure and information for future modifications.

Five copies of the Flagger CBT were delivered to UDOT for field-testing.

APPLICATION OF THE TOOL

If the user is new to Windows, refer to Windows documentation and tutorials to learn the Windows fundamentals before working with the Flagger Recertification tutorial.

Starting Flagger Recertification

You can start the Flagger Recertification program by double clicking on Recertification Series group and then double clicking on the Flagger Recertification icon found inside the group.

Quitting Flagger Recertification

You can stop the Flagger Recertification application by clicking on the QUIT button. You will be asked if you are sure you want to quit.

On-line Help

You can access the on-line help included with Flagger by clicking the HELP button. This help will change depending on the context you are in when you pressed the help button.

Opening Screen

A mouse tutorial is provided for users who wish to brush up on their mouse skills before starting the interactive flagging tutorial. Users with more computer experience can jump directly to tutorial by clicking on the "YES" button shown in Figure 11.
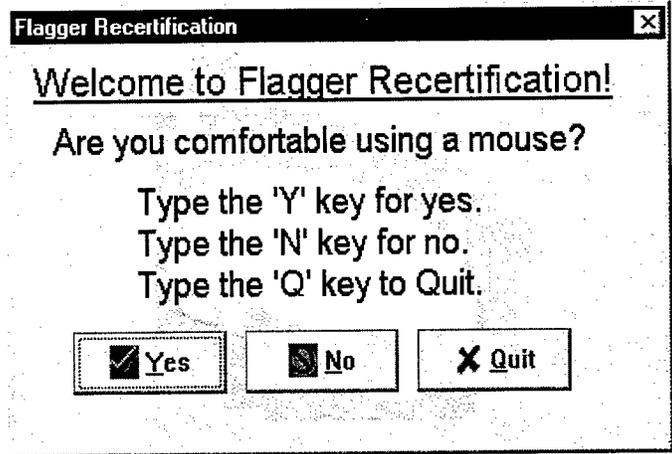
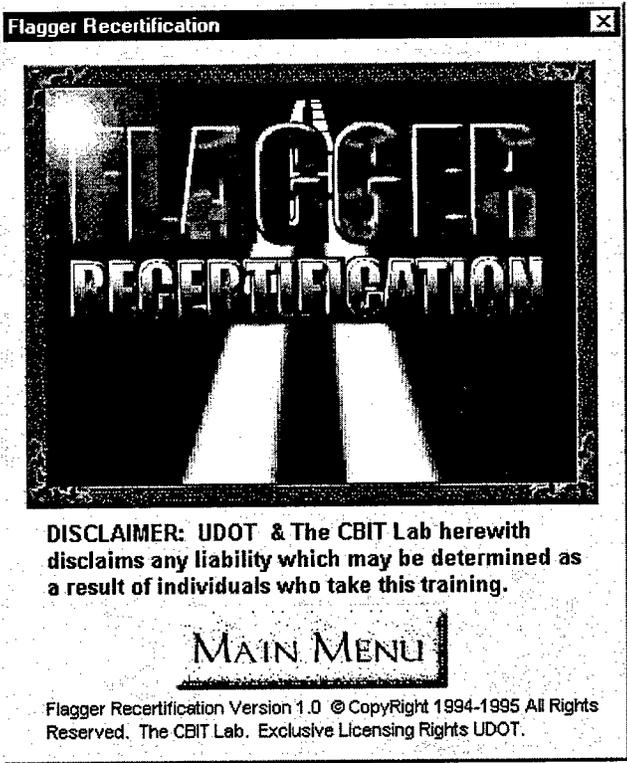Figure 11. Mouse Tutorial Options

Figure 12. Introduction Screen

High Level Menu

The window remains on the screen while the video is playing and automatically takes you to the Main Menu screen when it is finished. You can skip the video by pressing the Main Menu button at any time. Figure 13 shows the Main Menu Screen.

Figure 13. Main Menu

Tutorial Content

The Flagger Recertification tutorial is divided into nine topics as shown in Figure 13. Each topic is further divided into sub-topics. Figure 14 through Figure 21 show the sub-topics found under the main topics. The number of sub-topics in a main topic vary depending on the extent of the material in the main. In some cases, even the sub-topics are further broken up into discrete pieces of information, although it is rare that the topic tree goes that deep. You must complete all 10 of the main topics before

you can take the final exam. The program takes you through all topics sequentially and prohibits from continuing to the next main topic until all preceding topics have been completed. You will notice in Figure 13 that all of the buttons are disabled except the "INTRO" button. Subsequent buttons become enabled as preceding topics are completed. At any time , you may exit the program by clicking the "QUIT" button.

When a single main topic is completed, you have the option to take a small review exam to refresh your memory of the information covered in the sub-topics of that main topic. You also are allowed to select any of the items in the sub-topic for review, but only after the program has brought you through the information at least once.
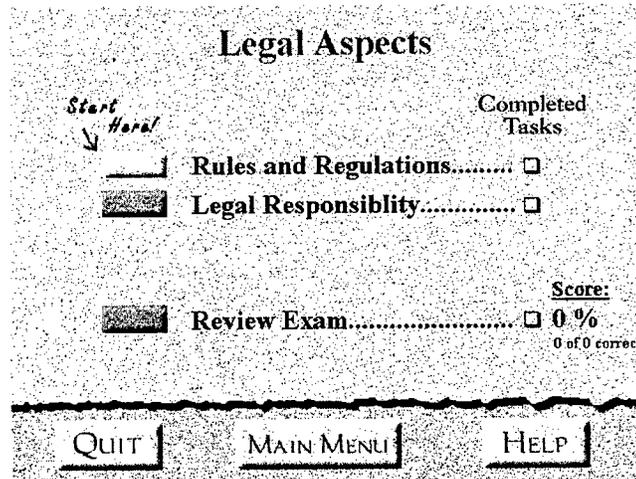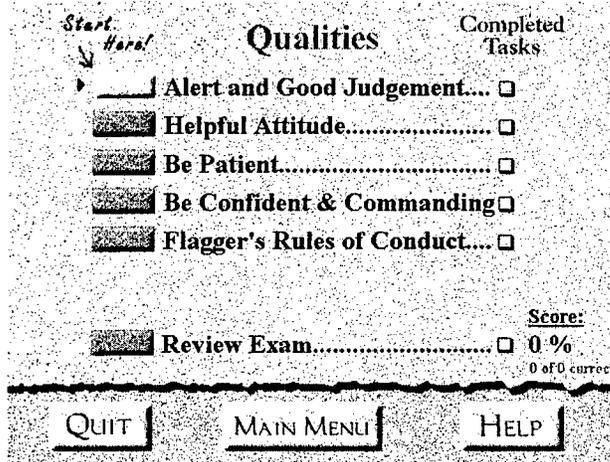

Figure 14. Legal Aspects Screen
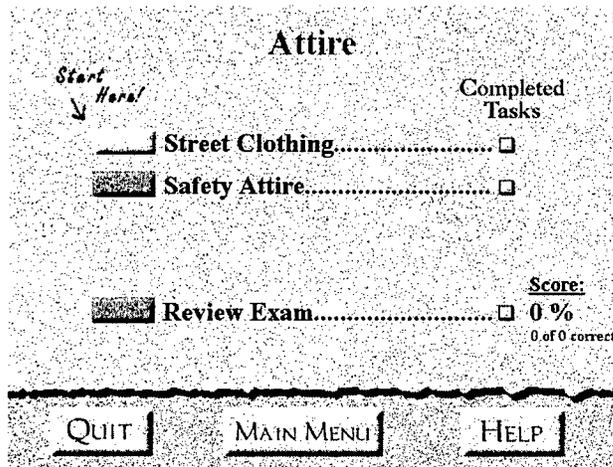
Figure 15. Flagger Qualities Screen

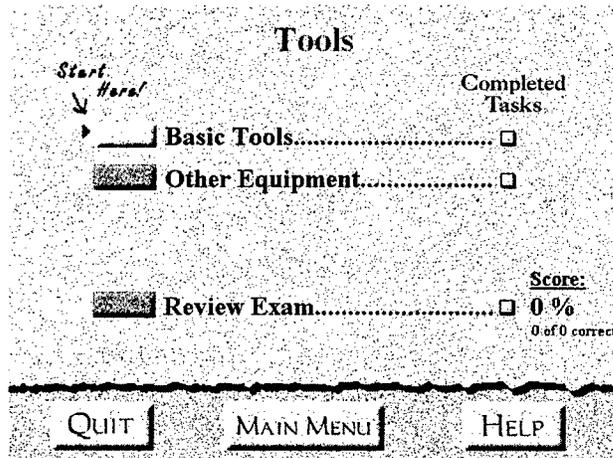Figure 16. Flagger Attire Screen

Figure 17. Flagger Tools Screen

21
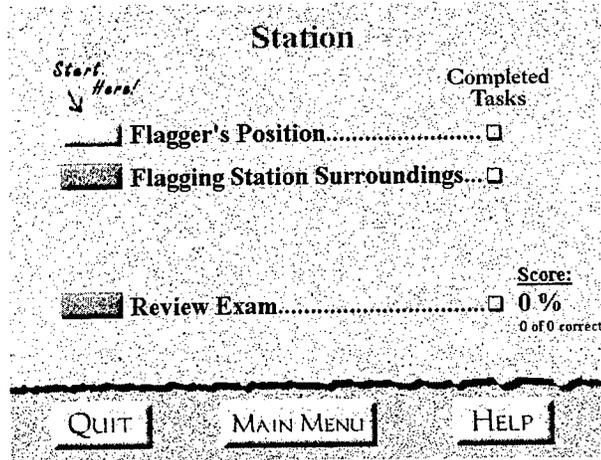
Figure 18. Flagger Station Screen
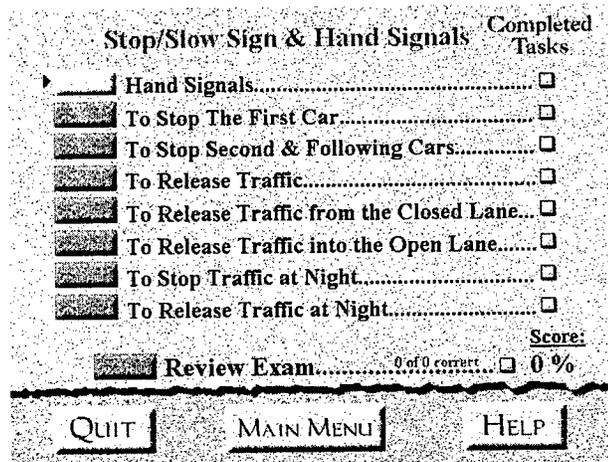
Figure 19. Using Stop/Slow Signs & Hand Signals
        Screen

Advance Warning Signs

Start Here!

Completed Tasks

Warning Sign Dimensions......☐

Responsiblity of Signing........☐

Score:

Review Exam............................☐ 0 %

0 of 0 correct

QUIT   MAIN MENU   HELP
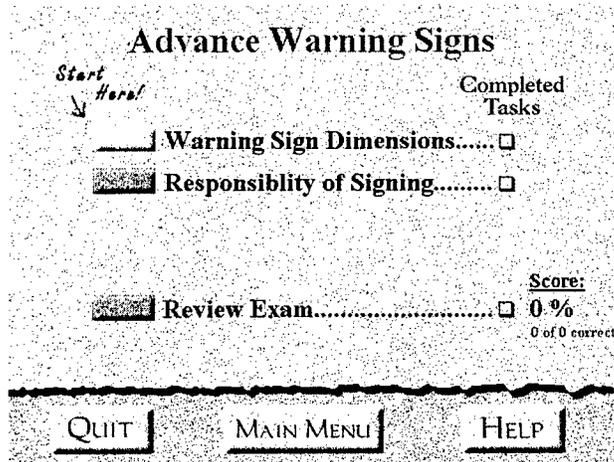
Figure 20. Advance Warning Signs Screen

Start Here!

Flagger Situations

Completed Tasks

Flagging Situations   (#1)..☐
Advance Flagger   (#2)..☐
One-way or Alternating Traffic (#3)..☐
Night Time Flagging   (#4)..☐
Urban Flagging   (#5)..☐

Score:

Review Exam............................☐ 0 %

0 of 0 correct

QUIT   MAIN MENU   HELP

Figure 21. Flagging Situations Scren

23

The Review Exam

The Review Exam is the last item to be explored on a content area screen. It is made available only after all subject areas have been explored. The review exam is for user's benefit and is considered a practice exam only. The scores are not permanently recorded 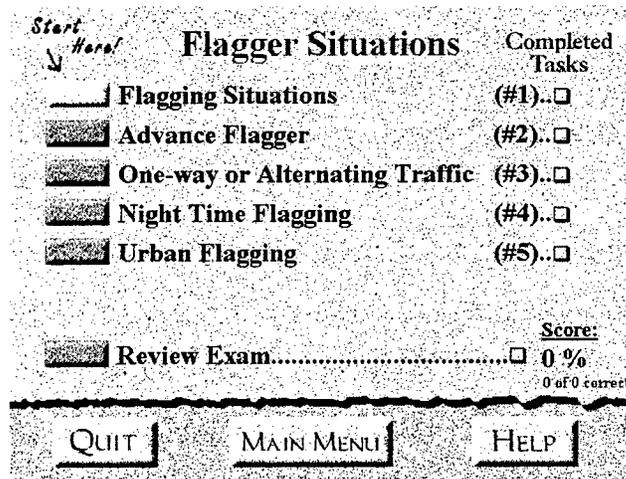anywhere. When you have completed the review exam you will be shown a score next to the completed tasks check box. If you scored high, continue to the next area by clicking the continue button, otherwise, it is suggested you have another look at the material. You can do so by clicking the subject buttons.

Navigating The Final Exam

The final exam differs from the review tests in that it will not offer feedback on the user's correctness between each question. It will randomly draw 25 questions from a pool of 75 questions, and tally the score at the completion of the exam. If the user quits during the middle of the exam it will be noted in the database entry that was created for the user prior to the start of the final exam. When the user finally completes the exam, he/she will be given notice of their pass/fail status, and this will be noted in the database.

User Information Screen

After the completion of Flagger Recertification tutorial, the user is presented with the screen shown in Figure 22. All the fields must be entered including Name, SS Number, Driver License Number and Expiration Date, and ORG No., which applies to UDOT only. This information is stored in a paradox 5.0 for Windows database file along with the results from the final exam.

Figure 22. Personal Information Window

To ensure you have typed in the information correctly, a confirmation dialog is presented as

shown in the Figure 23. Clicking "NO" will allow you to re-enter any incorrectly-entered information.

Figure 23. Personal Information Verification Screen

25

Exam Questions Types And Appearances

The exam question types will not differ from the typed encountered during the review exam. This is so that the user is comfortable with the process. Figures 24 and 25 illustrate the types of questions asked in the exam.

Figure 24. True/False

Figure 25. Multiple Choices

Final Score Results Screen

The final screen shown in Figure 26 shows the user his/her pass/fail status. In the background, the Flagger program will register this status in the database.
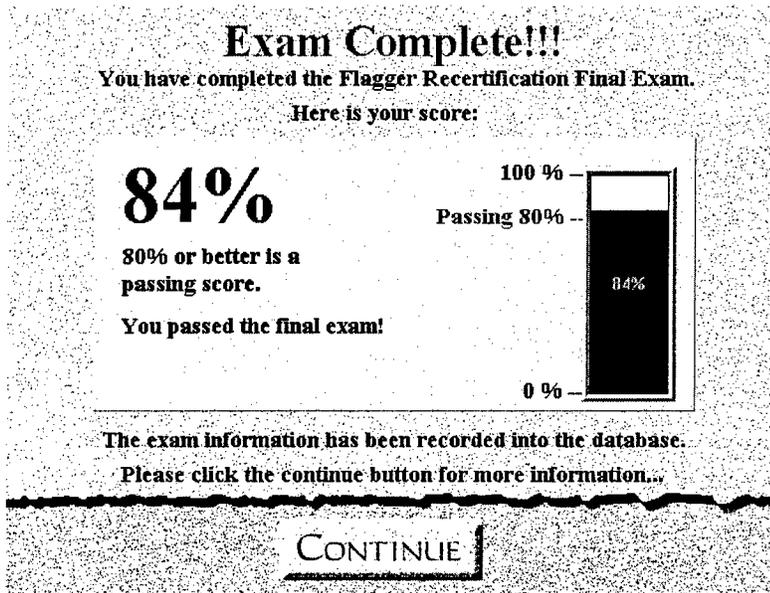
Figure 26. Final Exam Result Screen

Graphical User Interface Objects

Content Buttons

Content buttons appear next to content areas, such as "Legal Aspects," and are used to go to that part of the certification course. Simply place the mouse pointer over the button and click the left mouse button once. The button will depress and the screen will change to the "Legal Aspects" area.

Darkened content buttons are disabled. This means that you must visit the previous content area, before being allowed to continue. For example, you must visit and explore the "INTRO" area before you are allowed to explore the "Legal Aspects" area.

27

A flashing blue arrow like this one will appear next to the content area that the computer suggests you explore next. The blue arrow will progress automatically to the next content area as you complete each subject.

Completed Tasks

These small boxes appear below the "Completed Tasks" title and are next to each content area. The buttons are there to help you remember which content area you have visited. These boxes are checked out when you have completed exploration of a specific area and will look like this:

Button Bar Buttons

The button bar is the special strip found at the bottom of every screen. It may have different buttons on it depending on the subject matter you are exploring at the time. It is provided to help you explore the content areas in the Flagger Recertification course.

The QUIT button ends the Flagger Recertification session. You will be asked to confirm your choice to quit to make sure that you didn't accidentally press this button.

The HELP button takes you to the help screen and will be different depending on where you pressed the help button.

Subject Area Screen

Subject screens are where the tutorial information is presented. Read the text carefully and view the movie as many times as you like. This is the information you will be tested in the exam. There are four areas you must be familiar with to use this screen.

Text Area

Listen carefully for these topics!

- Stop/Slow Sign
  - 24 inches wide
  - 7 feet tall (on staff)
  - 8 sided
  - Lettering size 8 inches high!
  - Good condition

- Night time Flagging
  - Flash light with 6 to 8 inch red sleeve
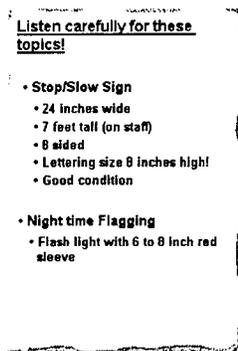
The text area highlights the important points in the video clip. You should read this outline to gain a better grasp on what the video clip is trying to communicate.

The continue button will always bring you to the next screen in a subject area.

Video Playback Area

The video playback area is where the movie is played. You can think of it as a television screen if you like. Depending on the speed of your computer, it may take a few seconds before the video begins to play.

Video Playback Control Buttons

Video playback control buttons are used by placing mouse pointer over them, and pressing the left mouse button once on them.

PLAY The play button will start a "paused" or "stopped" movie playing again.

PAUSE The pause button will stop a currently playing movie.

REW The rewind button will rewind, or place the movie back at the beginning.

SUMMARY

Benefits of Computer Based Training (CBT)

Take it any time

By using computer-based training, a transportation agency can make use of low productivity time. All employees have periods of downtime. They have to wait for material to arrive or they finish a job an hour before the end of the day. Using CBT, an agency can turn lost time to productive time.

Take it anywhere

CBT can be delivered on computers at any location, which alleviates travel to a training center. Employees can even take practice courses at home. There is no need to go out and purchase a classroom full of high cost, special purpose equipment — any 486 or better computer will do the job.

Reduction in learning time

CBT has been found to be as efficient as traditional training methods for many applications. Since the largest cost in providing training to employees is their time away from the job, the savings can be enormous. Compared to conventional training methods, CBT will reduce, by an average of 30 percent, the time needed to cover the same amount of materials to the same standard[6].

Education consistency

A CBT course always provides uniform and consistent content and delivery.

31

Refresher training

Refresher training may be one of the most important applications for CBT. In many cases, classroom training is needed for the initial course, but CBT can be used as a refresher. Time required to take refresher training can be significantly reduced since the program provides learners with control over their own learning path and depth.

Job-aid component

Because CBT can remain at the work-site, even certified employees can return to the course, select a small section from a course menu, and get the information they need to do a particular job. The courseware, in this way, does double duty as an on-line job aid.

Effective use of resources

Training staff can be allocated more efficiently as mentors, facilitators, or course developers.

Quality training

Training employees to do the job right reduces waste, increases productivity, and prevents adverse incidents. Compared to seminars and workshops, computer-based training has a 42 percent better educational retention rate; compared to a printed manual, CBT programs have delivered close to a 61 percent better educational retention rate[5].

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APPENDIX A

Hardware And Software Requirements

Hardware and Software Requirements

To use Flagger Recertification for Windows, your computer must meet the following requirements:

- An MS Windows 3.11 or better system computer with an Inter 486 microprocessor or greater, a hard drive, and a double-spin (2X) CD-ROM drive.

- 16 MB of RAM. Microsoft recommends 16 MB of RAM for best Windows results.

- A VGA graphics adapter and supporting monitor with 256 color capability. If you are running in 16 color mode it will not be sufficient for the high color photos and videos in the tutorial. A significant reduction in visual quality will occur with video boards configured for only 16 colors.

- Microsoft Windows version 3.11 or later.

- Microsoft or IBM PS/2 compatible mouse.

- Sound Blaster, Pro Audio Spectrum, or compatible sound board.

- Microsoft Video for Windows drivers and software, Version 1.1d or later. This package is automatically installed for you when you install the Flagger Recertification program and is mandatory to view the videos in the tutorial.

- Borland IDAPI database extensions. This package is automatically installed for you when the Flagger Recertification program is installed. It is mandatory to create Paradox 5.0 for Windows database files that are used to track the users input and exam results.

Installing Flagger Recertification

Due to the large capacity required by the videos in the Flagger Recertification tutorial — approximately 600 megabytes — it will be necessary to install the tutorial so that it runs from the CD-ROM, rather than hard-disk. This is accomplished by the installation utility.

The setup utility is found on the root directory of the Recertification CD-ROM, and is called "SETUP.EXE". It will install a small mandatory set of core files onto hard-disk necessary to access the tutorial and its resources, which are located on the CD-ROM disk.

Each computer intended as a tutorial station must go through the install process to ensure the core set of files needed to access the tutorial. The core set of files include these items:

- Flagger RUNTIME Engine and Components. The files are needed to actually run the tutorial and interpret the logic contained in the tutorial.

- Microsoft Video For Windows 1.1d. The files are needed for video clips to run on the host computer. They include audio codecs and video codecs for the Inter Indeo compression scheme used throughout the tutorial. The files are automatically installed by the install utility.

- Borland IDAPI Database Extensions. The files are needed for the Paradox 5.0 for Windows Database files to be created for the final exam results and user information. These files are automatically installed by the install utility.

The Video for Windows and IDAPI products are redistributable copies of the core files from the vendors of the packages. The Video for Windows installation is simple and will install automatically. The Borland IDAPI installation will request a location for the database engine files. We strongly recommend choosing the directories that Borland suggests, usually "C:\IDAPI," because other programs will look to that location for the IDAPI files (Paradox, dBASE, etc.).

To Run SETUP

- If Windows in not running, type "win" at the DOS prompt (only for Windows 3.1).

- Insert the Flagger Recertification CD-ROM into the CD-ROM drive.

- From the File menu on the Program Manager, choose RUN.

- In the Command Line box type d:\setup. Adjust the drive letter as necessary to comply with the location of your CD-ROM player and press ENTER or click OK.

- Wait for the setup program to load into memory. When the Flagger Recertification Installation window appears you will be given an "Installation Information" dialog that you must fill out. You must specify what the destination and source drives are for the installation.

- The first field is the directory where you want to install the Flagger program. If setup detects that the directory in the path already exists, you will be asked to enter a new directory name. If not, all contents in this directory similar to the Flagger Recertification program will be over-written. If you have an older version of the Flagger Recertification program, we suggest you delete the old program entirely and re-install the new system.

- It will take about 30-50 seconds to read the CD-ROM and to install the core components onto the hard-drive. The time will vary depending on your computer configuration.

- Once all the files have been installed, Setup will create a Flagger Recertification group and a "Flagger Recertification Tutorial and Exam" icon in the program manager.

APPENDIX B

Flagger Recertification Tutorial and Exam Question Bank

Legal Aspects

1. The manual on uniform traffic control devices (MUTCD) contains the guidelines set forth for flagger training.

   a) Yes

   b) No

2. In regulating and controlling traffic in a workzone, according to state law section 41-6-13, a flagger is no different from a

   a) Supervisor

   b) Traffic engineer

   c) Police officer

   d) None of the above

3. Aggressive actions toward drivers are recommended; at times you may feel justified.

   a) True

   b) False

4. It is important for a flagger to abide by the established regulations and provide the   driver with an environment that is consistent from work-zone to work-zone.

   a) Yes

   b) No

5. A flagger shares the legal responsibility of any of his or her incorrect or inconsistent actions.

   a) True

   b) False

Flagger Qualities

1. A flagger may leave his flagging station only

   a) When there is no approaching traffic

   b) When he is relieved by another certified flagger

   c) During adverse weather conditions

   d) None of the above

2. As a flagger you should know and understand the flagger rules of conduct.

   a) Yes

   b) No

3. Identify the qualities of a flagger

   a) Alert

   b) Watchful

   c) Strict

   d) Good judgment

4. How do you react to the situation shown in the video clip?

   a) Ignore

   b) Chase the motorist

   c) Record the license plate number

   d) None of the above

5. The flagger must exercise good judgment in stopping cars at the right time, permitting them to go at the right time.

   a) Yes

   b) No

6. The flagger does not have to be courteous because it will not affect any one.

   a) True

   b) False

7. All flaggers should be conscientious in doing their job because the lives of the motorists and workers depends on them doing the job properly.

   a) Yes

   b) No

8. A flagger may leave his station unattended for up to

   a) 1 minute

   b) 3 minutes

   c) 5 minutes

   d) None of the above

9. When it comes to protecting lives, the flagger is as important as any one.

   a) True

   b) False

10. Flaggers rules of conduct are to

    a) Be alert and ready to respond to any emergency.

    b) Keep clearly visible to approaching traffic at all time

    c) Record the license number of the vehicle, when driver disobey your instruction

    d) None of the above.

11. One purpose of the flagger is to keep traffic moving safely with as few delays as possible.

    a) True

    b) False

12. How do you react to the situation shown in the video?

a) Allow the driver to go

b) Be calm and courteous

c) React in your own way

d) None of the above

Flagger Attire

1. Identify the proper foot wear for a flagger.

a) Sandals

b) Boots

c) Slippers

d) None of the above

2. Full length pants are not required for the flagger.

a) True

b) False

3. A flagger attire must include a

a) Orange hat and orange vest

b) Yellow hat and orange vest

c) Yellow hat and yellow vest

d) Orange hat and yellow vest.

4. At night the flaggers vest and hard hat does not need to be reflectorized in well-lighted locations.

a) True

b) False

Flagger Tools

1. The dimensions of the stop/slow sign are ---------- and ---------- feet tall.

    a) True

    b) False

2. Identify the tools used to communicate with other flaggers.

    a) Baton

    b) Flash-light

    c) Walkie-talkie

    d) None of the above

3. A stop/slow sign of any size or color may be used as long as it has eight sides.

    a) True

    b) False

4. Identify the sign used to slow the traffic.

    a) True

    b) False

5. A walkie-talkie and baton also are needed when using a pilot car.

    a) Yes

    b) No

6. Flashing lights are advisable on advance warning signs during night time.

    a) True

    b) False

4 feet from the edge of the pavement.

a) True

b) False

3. For traffic approaching on a two lane highway, the flagger must be visible for at-least

a) 100 feet

b) 200 feet

c) 400 feet

d) 500 feet

4. Flaggers must park their car and any work equipment at least -------------- feet from the flagging station.

5. For traffic approaching on high speed volume roads the flagger must be visible for at least

a) 500 feet

b) 1000 feet

c) 1500 feet

d) 2000 feet

Using the stop/slow sign and hand signals

1. After stopping the first car in a series, the flagger moves out to the centerline to control the second and the following traffic.

    a) True

    b) False

2. Identify the correct procedure for releasing traffic.

    a) While standing on the left of the traffic you have stopped, show the "slow"   side of the sign to stopped vehicles, then motion them forward with the left hand.

    b) While standing on the right of the traffic you have stopped, show the "slow"   side of the sign to stopped vehicles.

    c) While standing on the right of the traffic you have stopped, show the "slow"   side of the sign to stopped vehicles, then motion them forward with the left hand.

    d) While standing on the right of the traffic you have stopped, show the "slow"   side of the sign to stopped vehicles. Wave the paddle back and forth.

3. There are ---------------- ways to release traffic.

4. Identify the video that shows the method to slightly slow the traffic.

    a) Video 1

    b) Video 2

    c) Video 3

    d) Video 4

5. A flagger shall always face traffic.

    a) Yes

    b) No

6.   How many standard hand signals are there for flagging?

a) One

b) Two

c) Three

d) Four

7.   How do you stop traffic during night?

a) Stand in a safe position on the shoulder facing traffic, wave the free hand back and forth.

b) Stand in a safe position on the shoulder facing traffic, wave the red wand flashlight back and forth.

c) Stand in a safe position on the shoulder facing traffic, wave the reflectorized paddle back and forth.

d) None of the above.

8.   Never turn your back to the traffic, it is not safe to do so.

a) True.

b) False

9.   You have to make clear and precise signals that can easily be seen and understood by the

a) Supervisor

b) Additional flagger

c) Motorist

d) Pedestrian.

10. When do you turn the sign paddle parallel to the shoulder of the road so that neither the "STOP" nor "SLOW" can be read by motorists approaching from either direction

a) To release traffic on the right lane of a two way traffic.

b) To release traffic into the right lane of one lane traffic.

c) To divert traffic on to the adjacent lane.

d) To release traffic onto the left lane of a one way traffic.

11. Identify the move forward signal in the Video:

a) Video 1

b) Video 2

c) Video 3

d) Video 4

12. Is the flagger in the video clip following the correct procedure?

a) Yes

b) No

13. You can wave a flashlight back and forth while releasing the traffic.

a) True

b) False

14. The red flag can be used as an alternative to the stop/slow sign.

a) Yes

b) No

Advance warning signs

1. Advance warning signs are diamond-shaped and usually ----------- inches on each side.

2. Stopping distances of approaching vehicles can vary with speed and road conditions.

   a) Yes

   b) No

3. The proper sequence for advance warning signs approaching the job site is

   a) Action sign, Situation sign, Attention sign

   b) Attention sign, Action sign, Situation sign

   c) Situation sign, Attention sign, Action sign

   d) Attention sign, Situation sign, Action sign.

4. Signing is the total responsibility of the flagger.

   a) Yes

   b) No

5. The spacing between the situation sign and the action sign on 45 and greater speed non-interstate highway is

   a) 100

   b) 500

   c) 1000

   d) 1500

6. The warning sign you see below is a

   a) Situation sign

   b) Attention sign

   c) Action sign

   d) None of the above

7. There are -------------- basic advance warning signs.

8.	The flagger symbol sign shall be used in advance of each flagger station.

a) Yes

b) No

9.	Who is responsible for turning away signs from the motorists view whenever the work shuts

down and no flagger is on duty?

a) Flagger

b) Supervisor

c) Traffic engineer

d) Contractor.

10.	Red is the primary color for construction warning signs.

a) True

b) False

11.	Spacing between advance warning signs on an interstate freeway is 1,000 feet.

a) Yes

b) No

12.	Each advance warning sign should have -------------- attention flags inserted in the top.

Flagging Situations

1. Each flagging situation is affected by the terrain, type of road, traffic, and work itself.

   a) True

   b) False

2. When two flaggers are hidden from each other or too far apart to communicate, there are --------- ----- basic ways of alternating traffic safely.

3. In urban areas, due to lower speed limits, the spacing between advance warning signs should be

   a) Reduced

   b) Increased

   c) Remains same

   d) None of the above

4. The advance flagger slows or stops each vehicle as it approaches and if necessary gives instruction to motorists driving through the work area.

   a) Yes

   b) No

5. At night the flagger is required to have a flashing light with a ------------to ---------- inch red sleeve on it.

6. At night the stop/slow sign

   a) should be reflectorized

   b) color should be changed to white

   c) must be bigger in size

   d) none of the above

7.	Night time flagging situation is the same as day time.

	a) True

	b) False

8.	Single flagger operation is only acceptable on

	a) Low-volume two lane roads, where there is good sight distance from both	directions and the work area is short.

	b) Medium-volume two lane roads, where there is good sight distance from both directions and the work area is short.

	c) High-volume two lane roads, where there is good sight distance from both	directions and the work area is short.

	d) None of the above.

9.	At night the flagging station should be illuminated with auxiliary lighting.

	a) True

	b) False

10.	Which method works best to communicate between flaggers, when the route is long and dangerous?

	a) Walkie-talkie

	b) Baton retrieval

	c) Pilot car

	d) None of the above

11.	Who is needed in an area of limited sight distance, such as curves, hills, etc.?

	a) Traffic engineer

	b) Contractor

	c) Police officer

	d) Additional flagger

12. Emergency vehicles such as ambulances, fire trucks, and police cars may move in front and stop at the flagger's station.

a) Yes

b) No

Miscellaneous

1. A flagger has to drink plenty of water or sports drink on a hot sunny day.

a) Yes

b) No

2. A flagger has to cover the hands, fingers and face in the summer to avoid sun burns.

a) True

b) False

3. When a motorist approaches in a dangerous way, a flagger has to jump out of the way and save himself or herself.

a) Yes

b) No